

# Analog & Interface Products

Overview

Demo Boards

End Equipment

Chinese Tree

**LINEAR**

Amplifiers

Comparators

**INTERFACE**

CAN, CAN FD, LIN

HV Interface

USB and I/O Expanders

Ethernet

RF & Microwave, Wireless Interface

High Speed Data/Video

Real Time Clock/Calendar

**POWER MANAGEMENT**

DC/DC Converters

PWM Controllers

Battery Chargers

Power Discretes

Power Modules

Power MOSFET Drivers

Power over Ethernet

**THERMAL MANAGEMENT**

Temperature Sensors

Fan Control & Management

Motor Drivers

System Supervisors  
Voltage Detectors

Power Switches

Hot Swap / E-Fuses

DDR & SCSI Terminators

Display/LED Drivers

Digital Gate Drivers

**TIMING**

Clock & Timing Products

**MIXED SIGNAL**

A/D Converters

Current/DC Power Measurement ICs

Power Monitoring & Metering

DACs & Digital Potentiometers

Voltage References

**CO & FIRE DETECTION ICs**

Smoke Detector ICs

Piezoelectric Horn Drivers

**ULTRASOUND**

Ultrasound Products

概述

评估板

终端设备

English Tree

线性产品

放大器

比较器

接口产品

CAN, CAN FD, LIN

高电压接口IC

USB及I/O扩展器

以太网产品

无线产品

高速数据 / 视频

实时时钟/日历

电源管理

DC/DC转换器

PWM控制器

电池充电器

电源模块

功率MOSFET驱动器

功率MOSFET

温度管理

温度传感器

风扇控制及管理

电机驱动器

系统监控器及  
电压检测器

电源开关IC

热插拔控制器

DDR &  
SCSI终结器

显示/LED驱动器

时钟与定时

振荡器

时钟脉冲发生器

时钟和数据分配

混合信号

模数转换器

电流/DC功率检测IC

功率监控及电表IC

数模转换器及  
数字电位器

参考电压

一氧化碳及  
火灾探测IC

烟雾探测器IC

压电蜂鸣器驱动器

超声波

超声波产品

The latest version of Treelink is available at [www.microchip.com/treelink](http://www.microchip.com/treelink)

**Check for latest revision**

Online version of Treelink

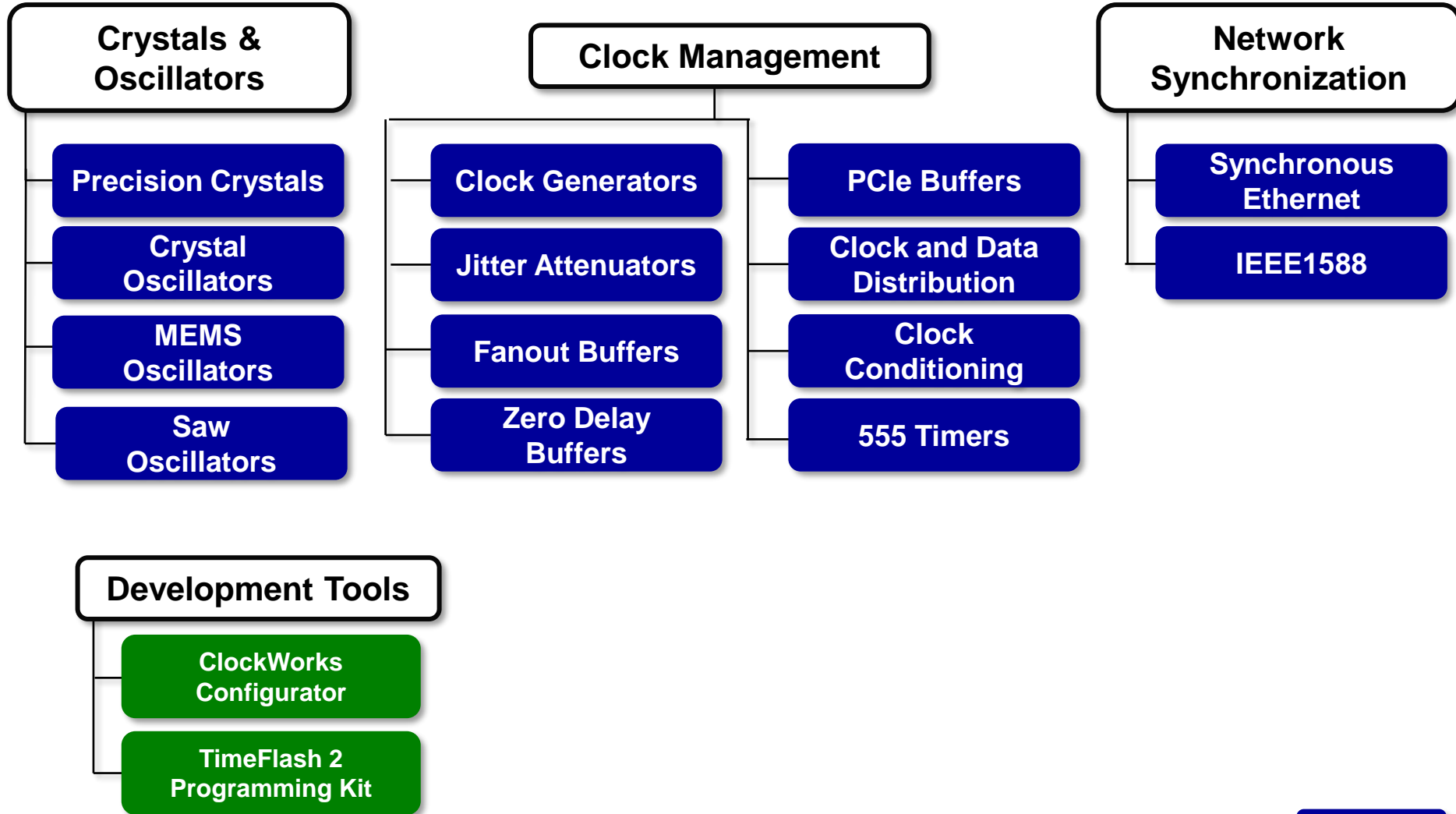
[www.microchip.com/treelinktool](http://www.microchip.com/treelinktool)

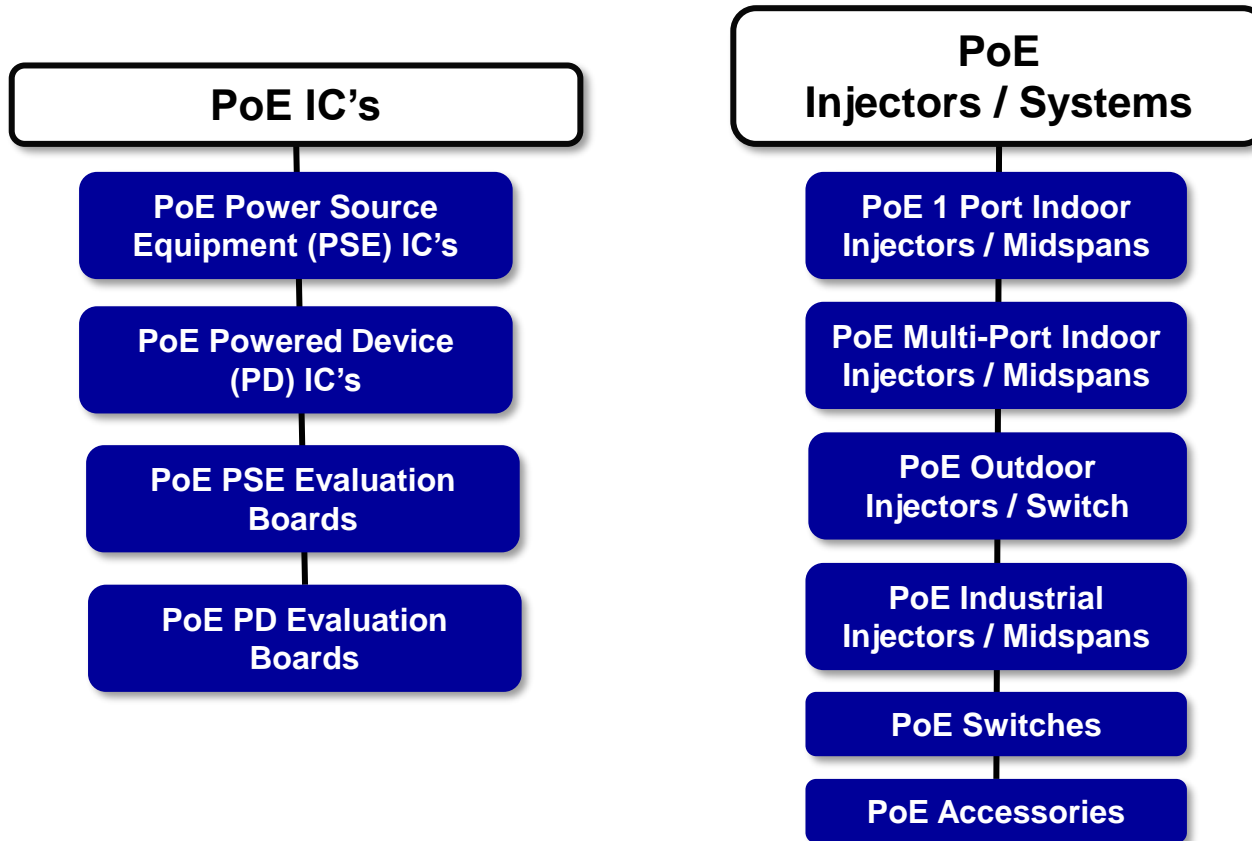
**Click for online version**

## Changes:

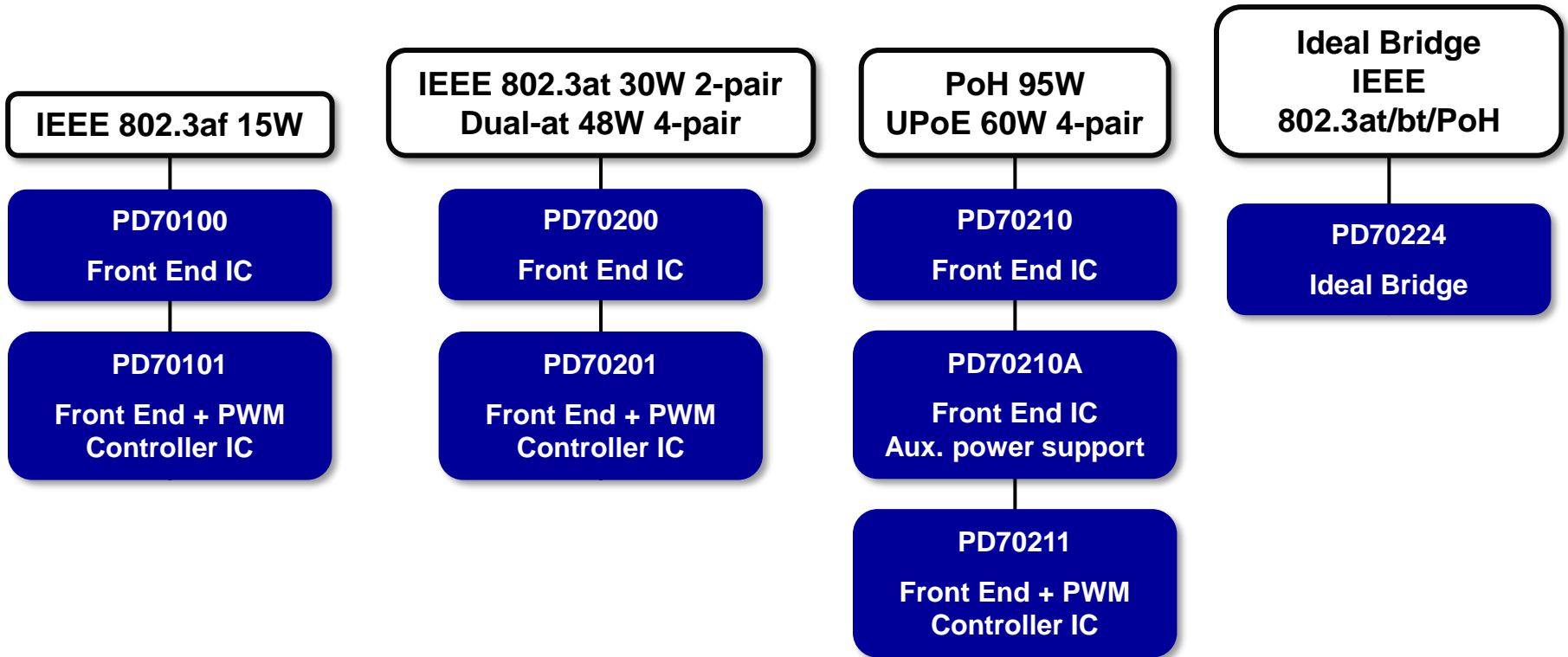
- Added MCU32 block diagrams
  - Die Cutting Machine
  - HMI for Diagnostic (A/C) Tools
  - Robotic Vacuum
  - Smart Home Lock
- Aero & Space updates
- WSG updates
  - Added LoRa SAMR34 Dev Kit & corrected typo
  - Replaced Wireless Solutions page for block diagrams
  - Replaced Wi-Fi & Bluetooth product slides
- Linear updates
  - Corrected Zero-drift links and typos
  - Added MCP6V66/7/9
  - Removed four dev tools
  - Replaced slides for MCP6401/2/4 and MCP6406/7/9
  - Changed automotive designations on many devices
- ADC updates
  - Replaced six pipelined ADC pages
  - Added automotive logos and packages
- Agile Switch – added six Digital Gate Driver products
- POE, PSE additions and corrections
- APID updates to five products

# Clock & Timing Products

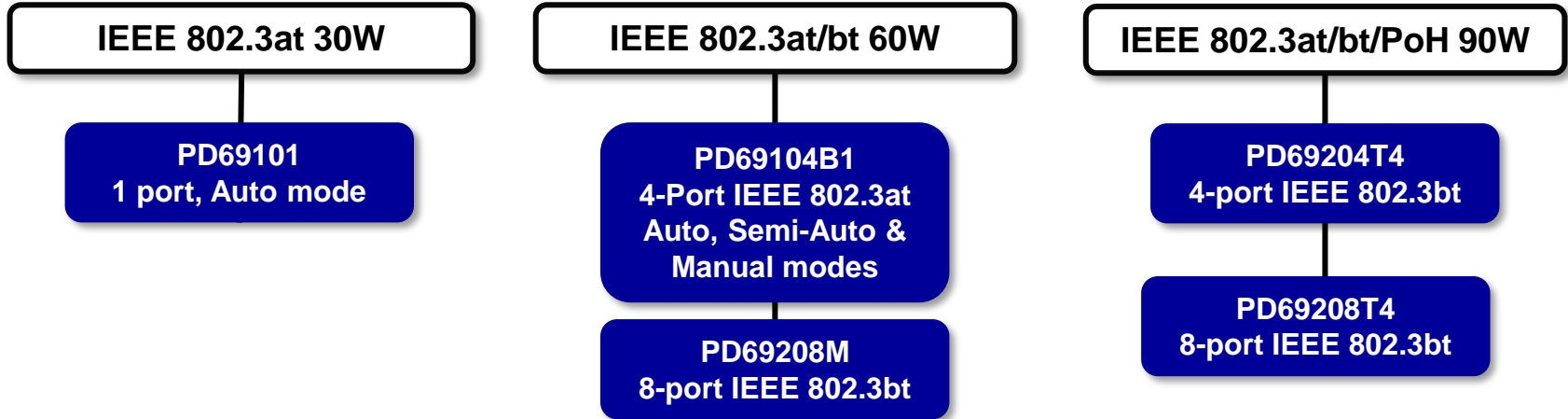




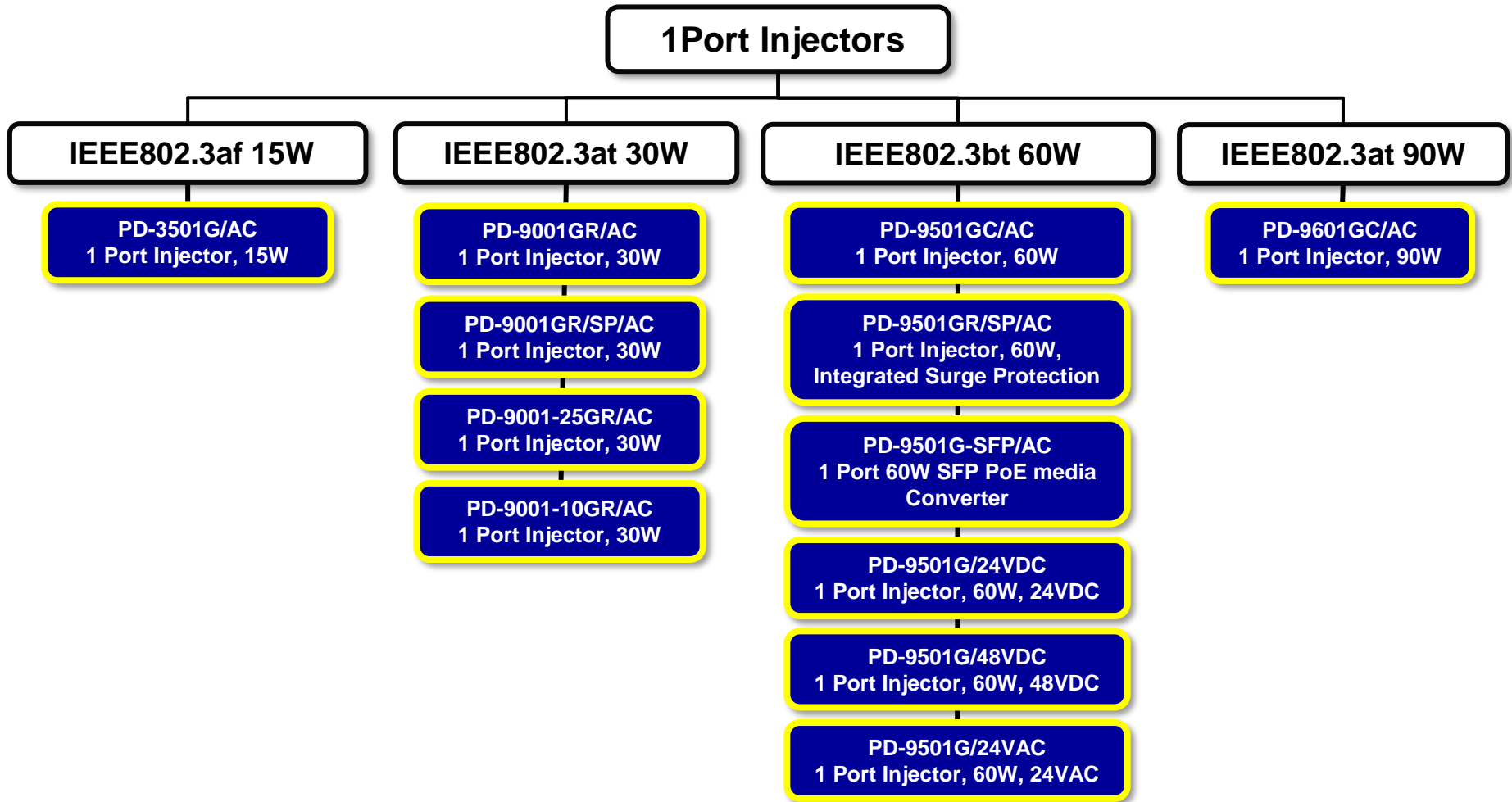
# PoE PD IC's



# PoE PSE IC's

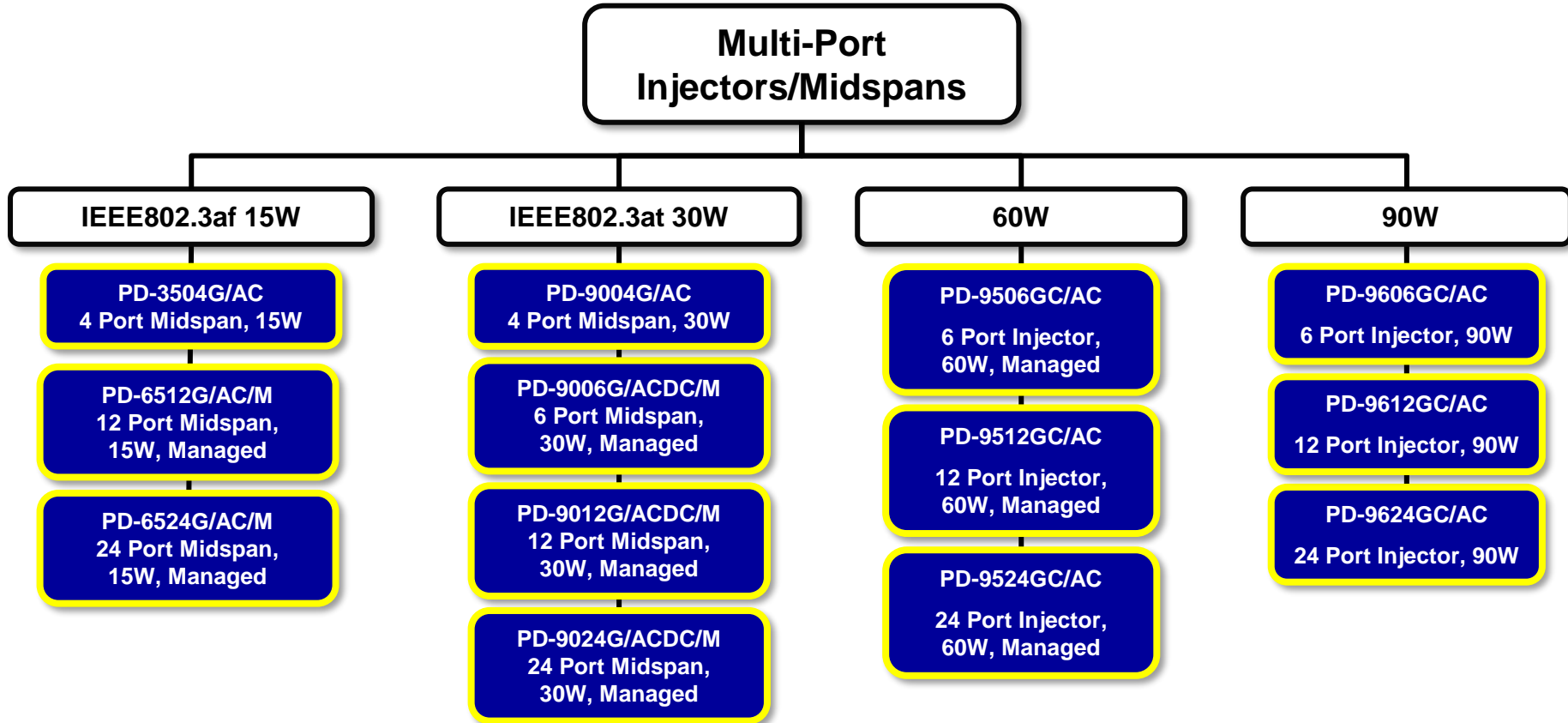


# PoE 1Port Indoor Injectors / Midspans

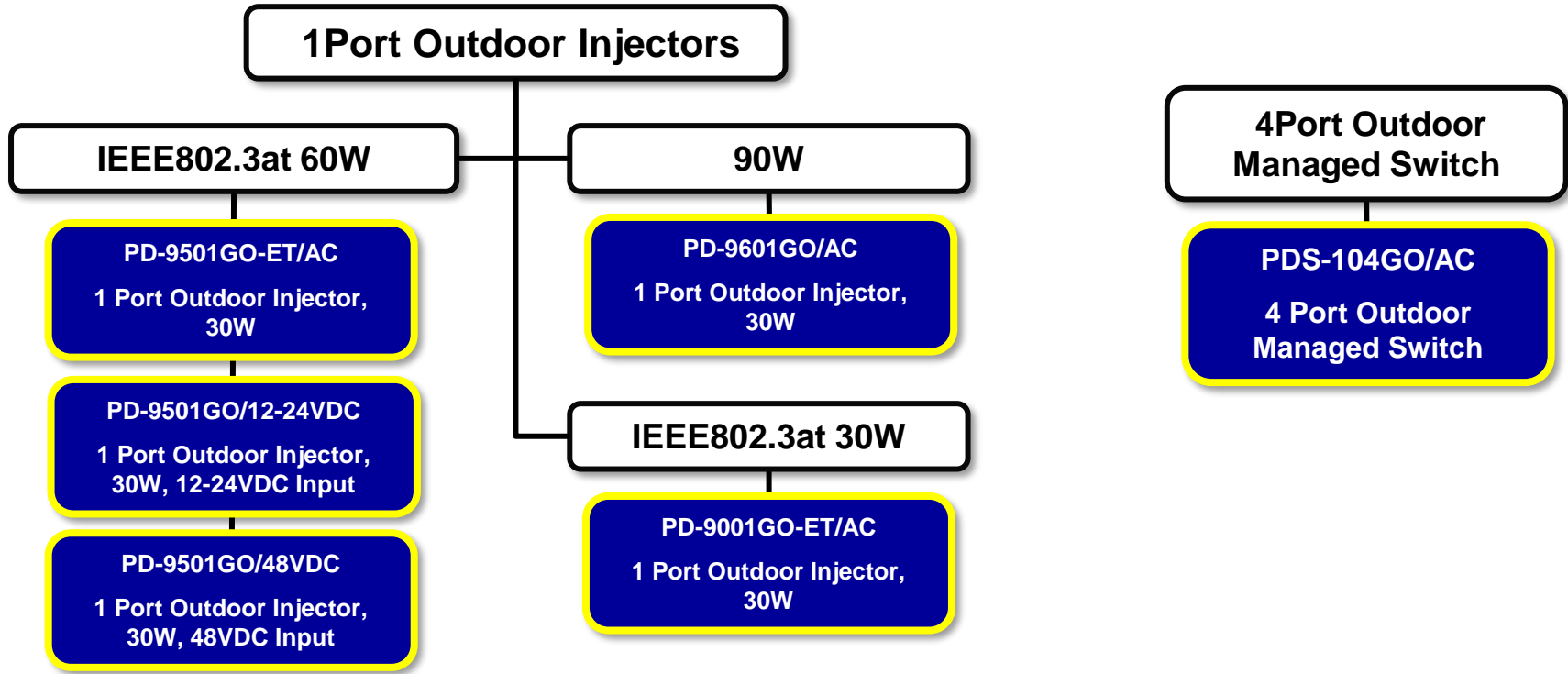




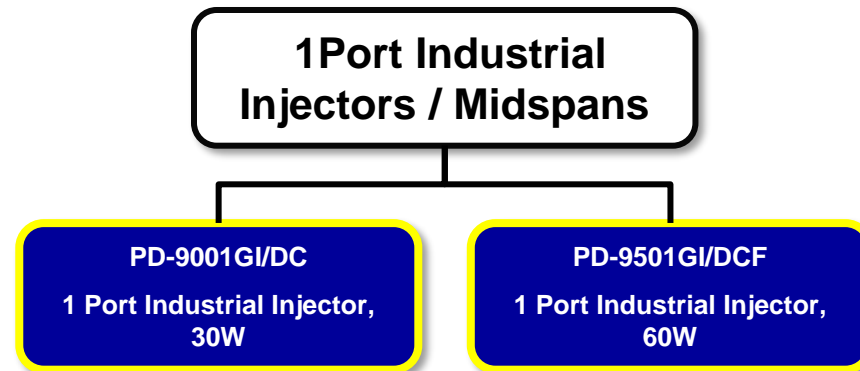
# PoE Multi-Port Indoor Injectors / Midspans



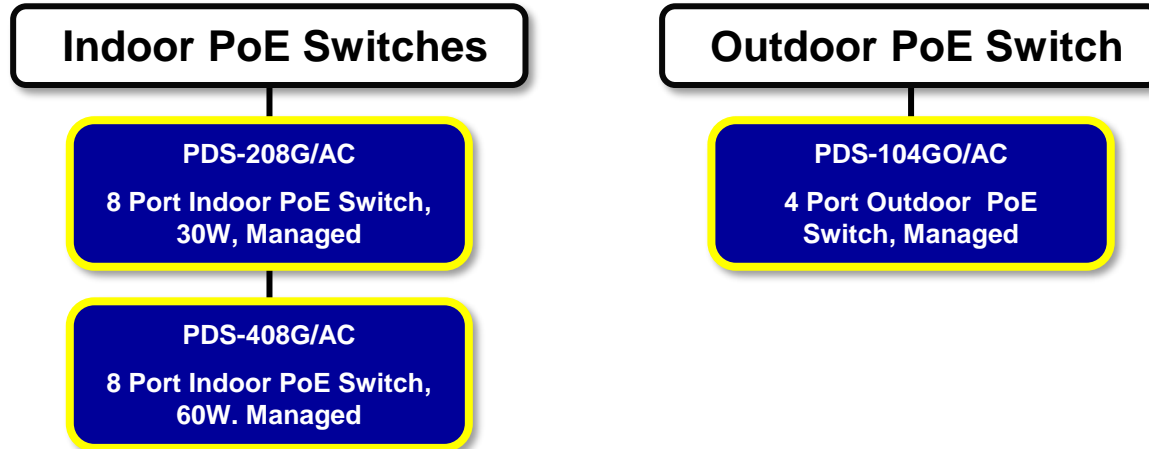
# PoE Outdoor Injectors / Switch



# PoE Industrial Injectors / Midspans



# PoE Switches



# PoE Accessories

## PoE Splitters

**PD-AS-601/5**  
PoE to 5VDC Splitter

**PD-AS-951/12-24**  
PoE to 12VDC / 24VDC  
Splitter

## PoE Extender

**PD-POE-EXTENDER**

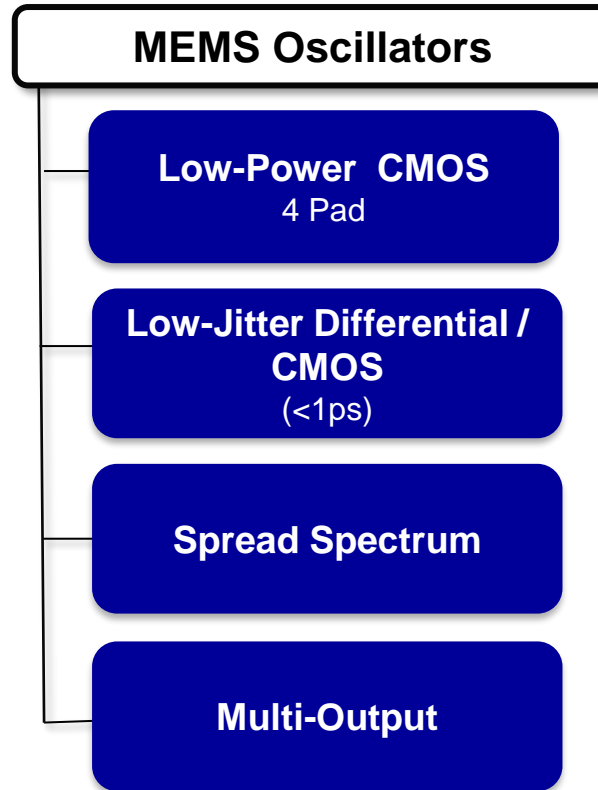
## Lighting Surge Protector

**PD-OUT/SP11**  
Outdoor PoE Lighting  
Protection

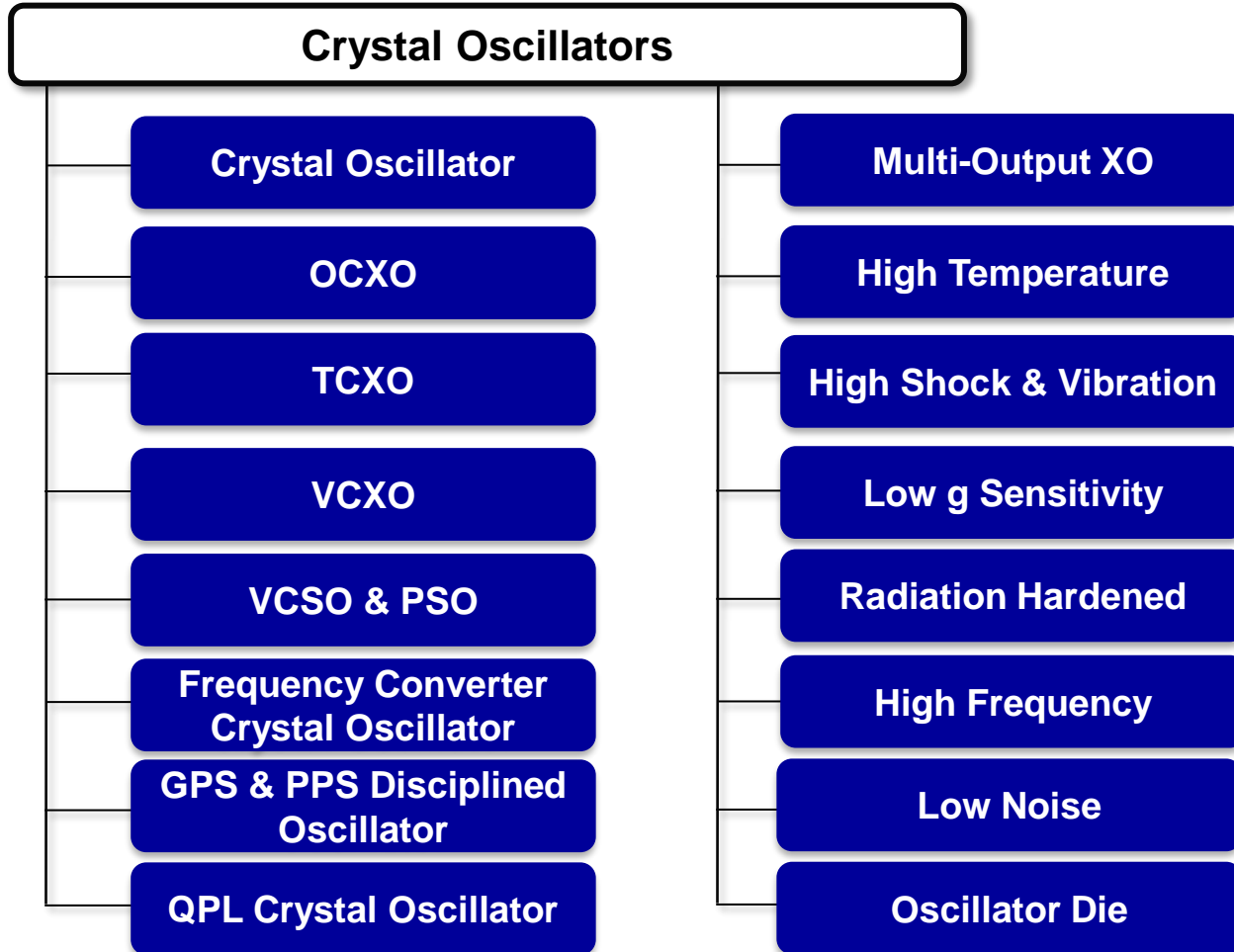
## PoE Tester

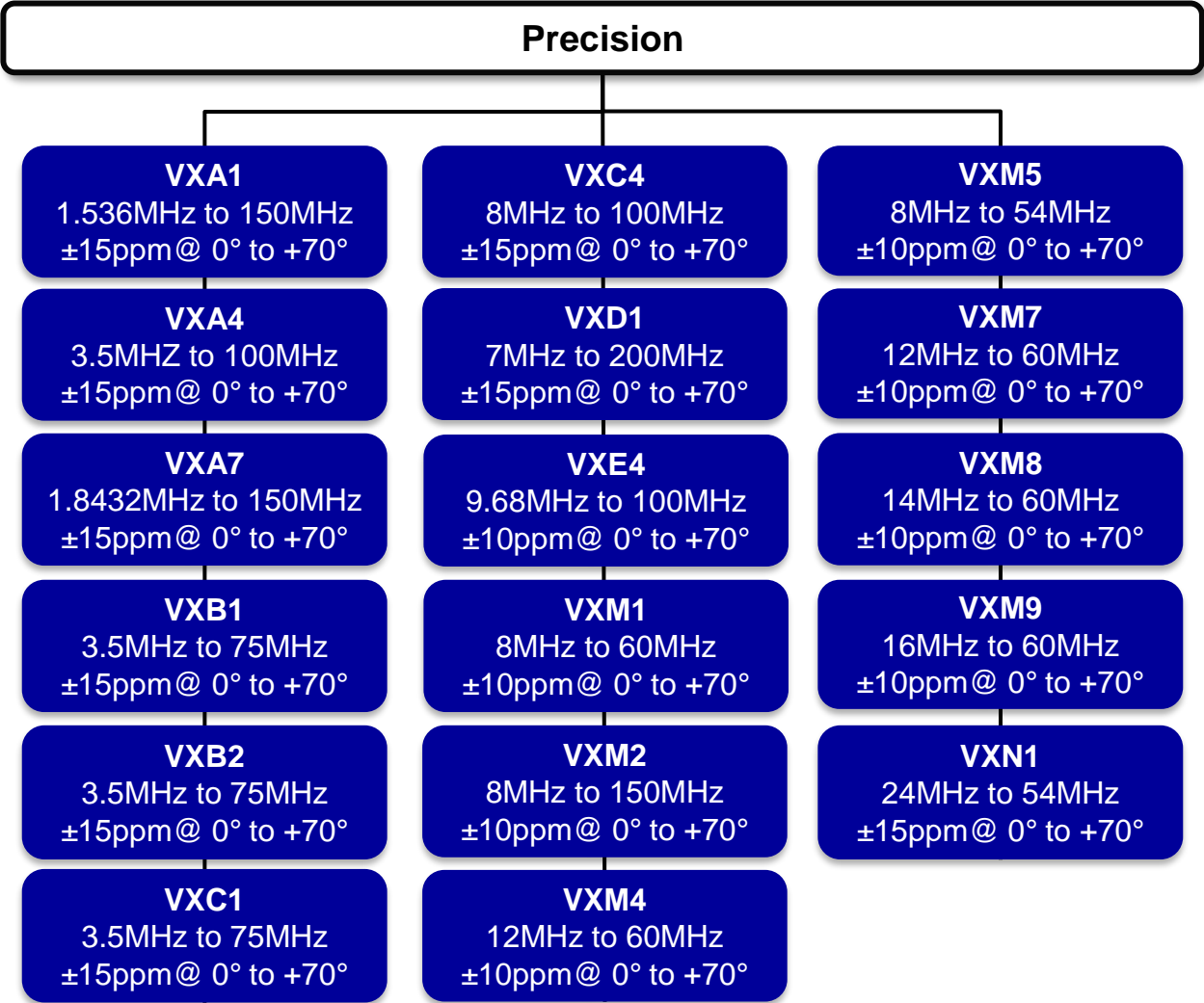
**PD-AFAT-TESTER**

# MEMS Oscillators



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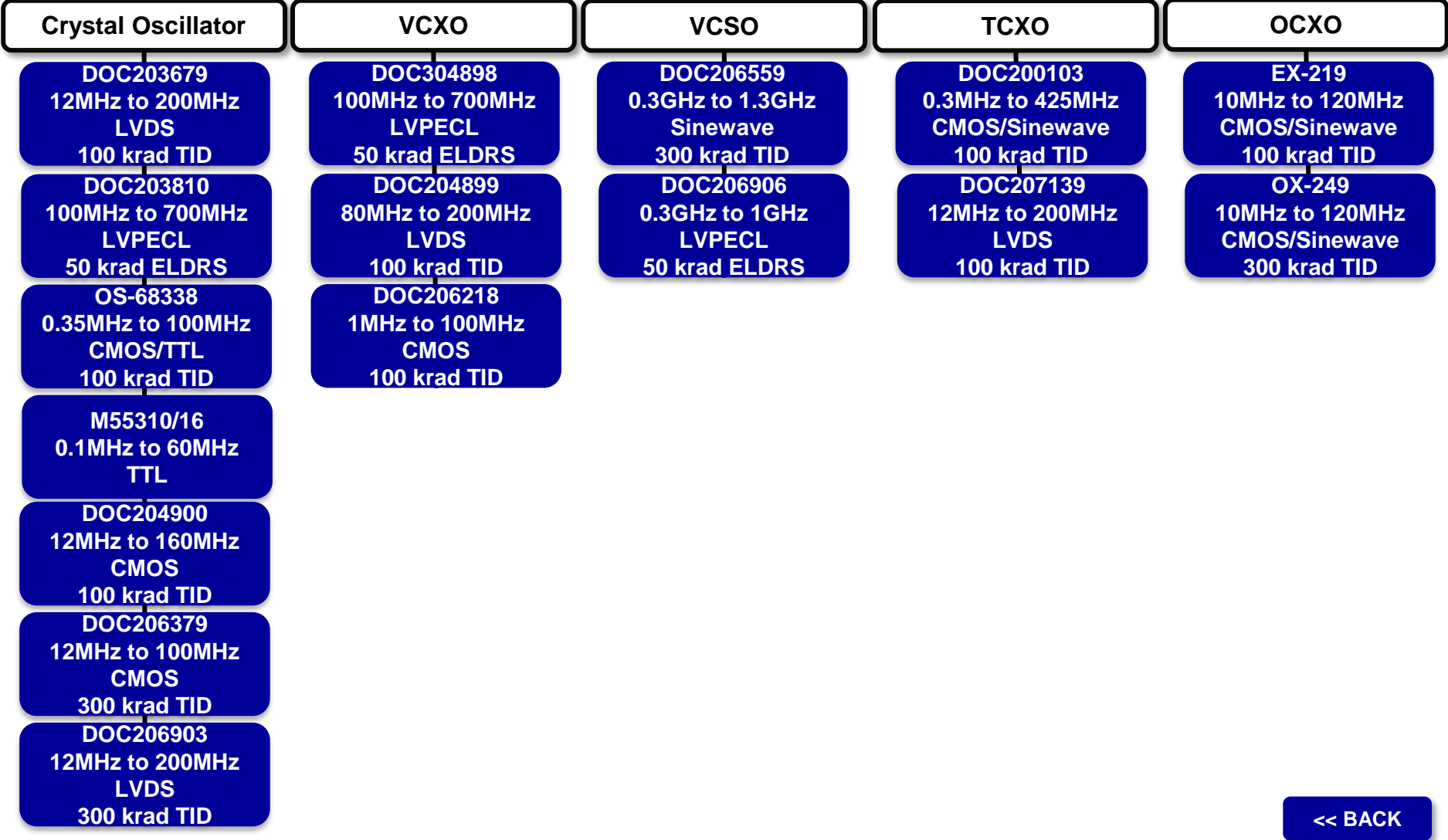






# Radiation Hardened

Product Tree



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**OCXO**

**OX-043**  
8MHz to 15MHz  
Sinewave  
0.02ppb/g

**OX-046**  
50MHz to 250MHz  
Sinewave  
0.05ppb/g

**OX-080**  
8MHz to 15MHz  
Sinewave  
0.02ppb/g

**OX-405**  
80MHz to 120MHz  
CMOS/Sinewave  
0.5ppb/g

**OX-407**  
10MHz to 50MHz  
CMOS/Sinewave  
0.07ppb/g

**TCXO**

**TX-321**  
5MHz to 50MHz  
CMOS  
0.2ppb/g

**TX-550**  
8MHz to 100MHz  
CMOS/Sinewave/LVPECL  
0.2ppb/g

**TX-707**  
8Mz to 52MHz  
CMOS/Sinewave  
0.1ppb/g

**TX-708**  
96MHz to 160MHz  
CMOS  
0.1ppb/g

**VCSO & SO**

**VS-506**  
0.8GHz to 3GHz  
Sinewave  
1.2ppb/g

**VS-508**  
0.8GHz to 2.9GHz  
LVPECL  
0.6ppb/g

**PS-508**  
0.6GHz to 3GHz  
LVPECL  
0.6ppb/g

**VCXO**

**VX-504**  
30MHz to 160MHz  
CMOS  
0.3ppb/g

**Crystal Oscillator**

**PX-504**  
30MHz to 180MHz  
CMOS  
0.3ppb/g



# High Shock & Vibration

Product Tree

Crystal Oscillator	MEMS Oscillator	OCXO	TCXO	VCXO	Saw Oscillator
M55310/09B 0.4MHz to 60MHz, TTL	DSC6000 2KHz to 100MHz CMOS	EX-421 10MHz to 100MHz CMOS, Sinewave	TX-550 8MHz to 100MHz CMOS/Sinewave/LVPECL	VX-500 1MHz to 800MHz CMOS/LVPECL	PS-508 0.6GHz to 3GHz Sinewave/LVPECL
M55310/16 0.1MHz to 60MHz, TTL	DSC1001/3/4 1MHz to 150MHz CMOS	OX-043 8MHz to 15MHz Sinewave	TX-707 8MHz to 52MHz CMOS/ Clipped Sine	VX-504 30MHz to 160MHz CMOS	
M55310/19B 1MHz to 60MHz, TTL	DSC1101/21 2.3MHz to 170MHz CMOS	OX-046 50MHz to 250MHz Sinewave	TX-708 96MHz to 160MHz CMOS		
M55310/21B 1MHz to 60MHz, TTL	DSC1102/22 2.3MHz to 460MHz LVPECL	OX-080 8MHz to 15MHz Sinewave			
M55310/26B .01MHz to 65MHz, CMOS	DSC1103/23 2.3MHz to 460MHz LVDS				
M55310/27B 1MHz to 85MHz, CMOS	DSC1104/24 2.3MHz to 460MHz HCSL				
M55310/28B 1MHz to 85MHz, TTL	DSC2XXX (2 Output ) 2.3MHz to 460MHz CMOS,LVPECL,LVDS,HCSL				
M55310/30B .045MHz to 65MHz CMOS	DSC2311 (2 Output) 2.3MHz to 460MHz CMOS				
PX-500 1MHz to 800MHz CMOS/TTL/LVDS/LVPECL	DSC400 (4 Output) 2.3MHz to 460MHz CMOS,LVPECL,LVDS,HCSL				
PX-504 30MHz to 180MHz CMOS					
PX-571 0.01MHz to 125MHz CMOS/TTL					
PX-700 1MHz to 800MHz CMOS/TTL/LVDS/LVPECL					

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# High Temp Oscillators

Product Tree

## Oscillator

HT-RTC-XO  
32.768KHz  
XTAL CMOS

PX-420  
0.5MHz-40MHz  
XTAL CMOS

PX-507  
1MHz-800MHz  
MEMS CMOS/TTL/LVPECL/LVDS

PX-610  
32.768KHz-40MHz  
XTAL CMOS

PX-702  
500KHz-50MHz  
XTAL CMOS

## VCXO

VX-400  
1MHz-32.768MHz  
CMOS

VX-708  
2MHz-40MHz  
CMOS

## OCXO

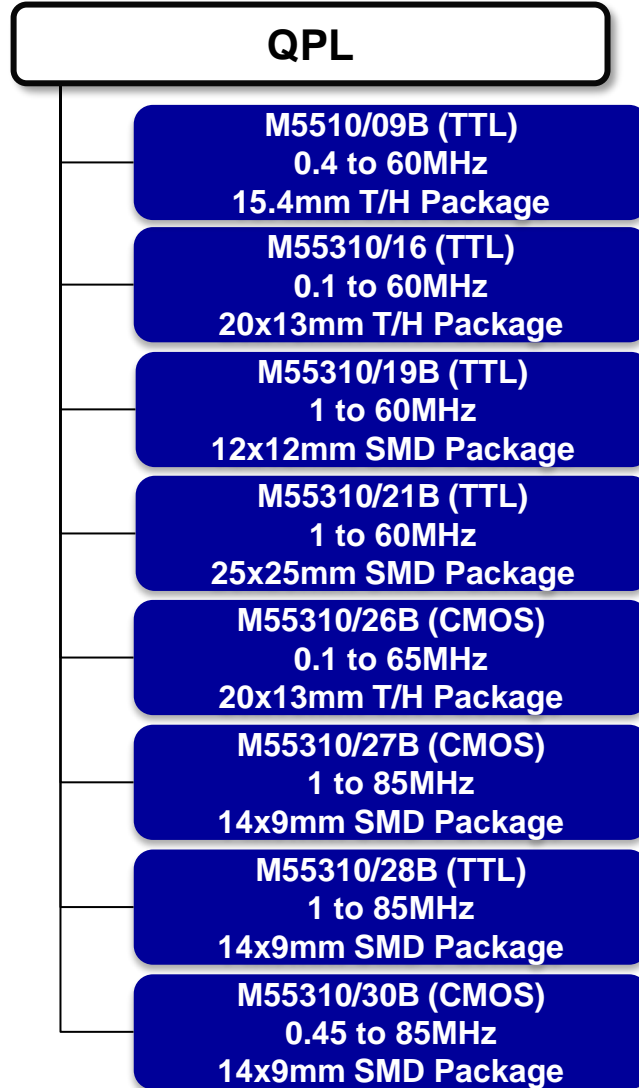
HX-171  
10MHz-20MHz  
CMOS

## RTC Module

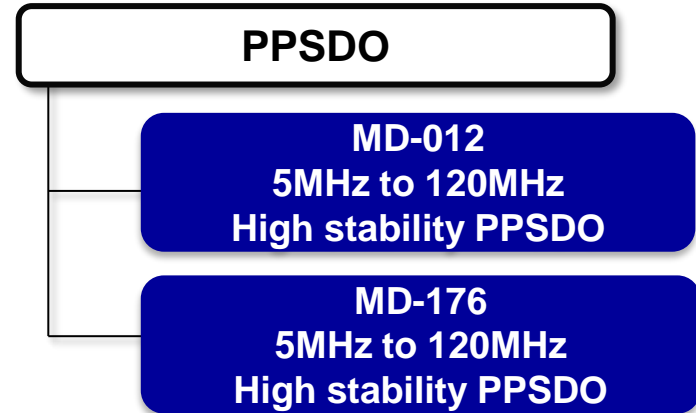
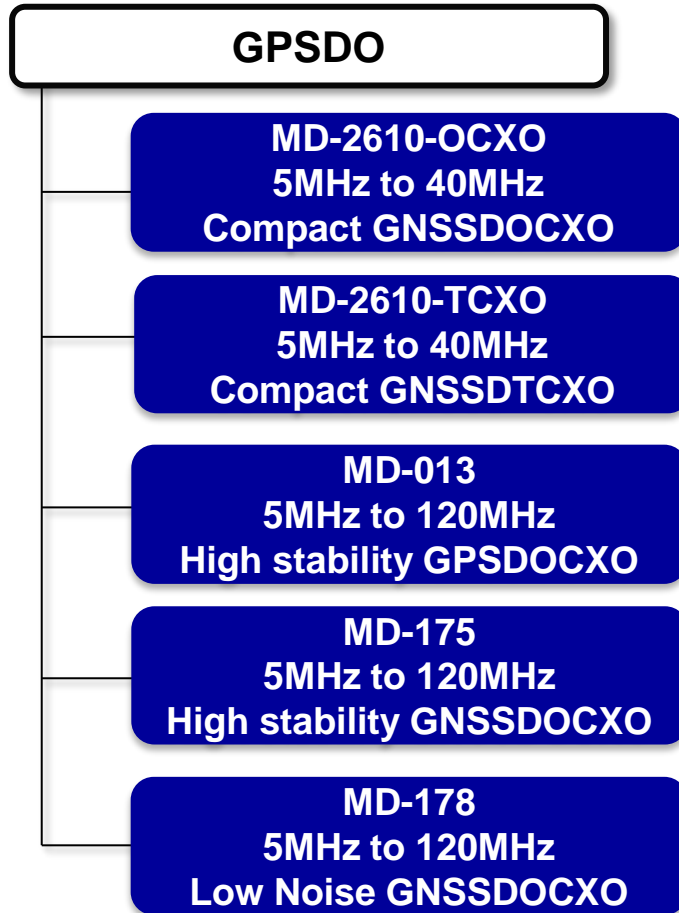
HM-4201-RTCM1  
0.000512MHz  
CMOS

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# QPL XO



# GPSDO & PPSDO



## Frequency Converter

**FX-400**  
1.5MHz to 800MHz  
CMOS/LVPECL/LVDS

**FX-402**  
1.5MHz to 800MHz  
LVPECL/LVDS

**FX-500**  
0.01MHz to 80MHz  
CMOS

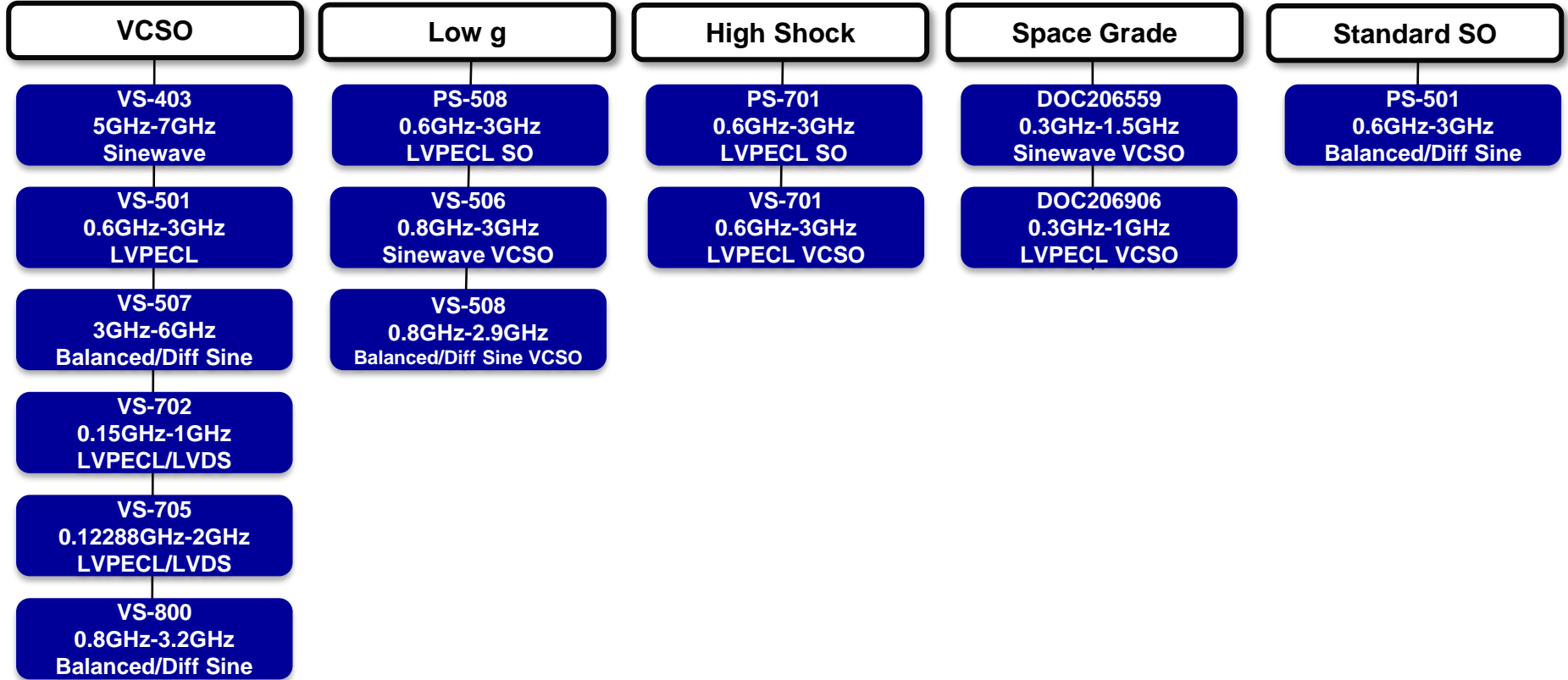
**FX-700**  
0.01MHz to 80MHz  
CMOS  
1 VCXO Input/1 VCXO Output

**FX-702**  
.062GHz to 1.2GHz  
LVPECL/LVDS  
1 Comp Output/1 Comp Input

## Clock Data Recovery

**CD-700**  
1MHz to 78MHz  
CMOS

# VCSO & PSO





# VCXO

Product Tree

**Standard**

**Low Noise**

**Space Grade**

**Low g**

**High Temp**

**Military Temp**

VV-701  
1.544-77.76MHz  
CMOS

VX-501  
0.01-1.2GHz  
CMOS/Sine/LVPECL/LVDS

DOC204898  
100MHz-700MHz  
LVPECL

VX-500  
1MHz-800MHz  
CMOS/LVPECL

VX-400  
1MHz-32.768MHz  
CMOS

VX-505  
20MHz-800MHz  
CMOS/LVPECL

VV-800  
1.544-77.76MHz  
CMOS

VX-706  
40MHz-300MHz  
CMOS/LVPECL

DOC204899  
80MHz-200MHz  
LVDS

VX-504  
30MHz-160MHz  
CMOS

VXS-708  
2MHz-40MHz  
CMOS

VX-705  
77.76MHz-170MHz  
CMOS/LVPECL

VX-805  
100MHz-204.8MHz  
LVPECL

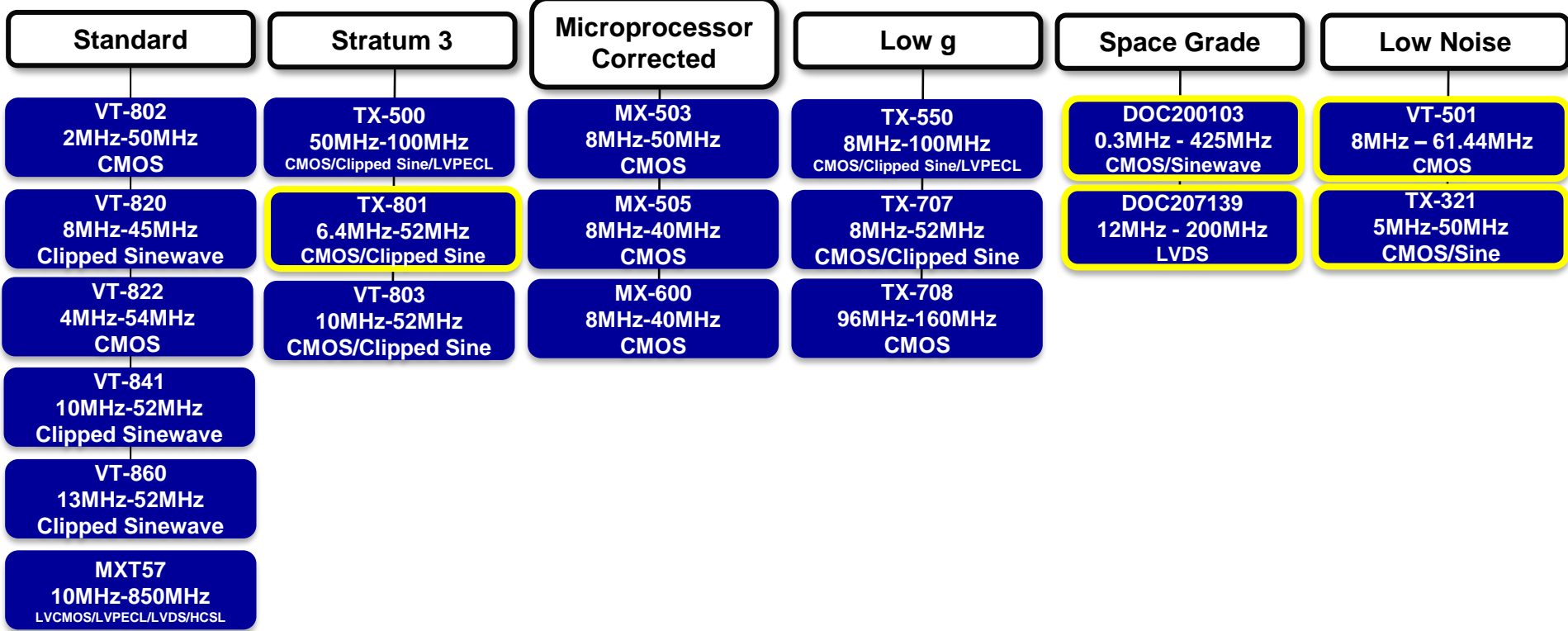
DOC06218  
1MHz-100MHz  
CMOS



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 = New product

# OCXO

Product Tree

**Low Noise**

**High Stability**

**Standard**

**Low g**

**Low Power**

**Coefficient**

**Space Grade**

**MX-041**  
5MHz-15MHz  
-140 dBc/Hz @ 10MHz

**OX-045**  
10MHz  
-163 dBc/Hz @ 10MHz

**OX-046**  
50-250MHz  
-175 dBc/Hz @ 100MHz

**OX-174**  
5MHz-20MHz  
-175 dBc/Hz @ 10MHz

**OX-175**  
50-130MHz  
176dBc/Hz @ 100MHz

**OX-204**  
10MHz-20MHz  
-175 dBc/Hz @ 10MHz

**OX-205**  
80-120MHz  
-178dBc/Hz @ 100MHz

**OX-209**  
20MHz-35MHz  
-175dBc/Hz @ 20MHz

**OX-304**  
10MHz-20MHz  
-173dBc/Hz @ 10MHz

**OX-305**  
80-120MHz  
-178dBc/Hz @ 100MHz

**OX-405**  
80-120MHz  
-160dBc/Hz @ 100MHz

**MX-041**  
5MHz-15MHz  
0.6ppb

**MX-060**  
5MHz-15MHz  
0.6ppb

**OX-171**  
5MHz-20MHz  
0.4ppb

**OX-208**  
5MHz-20MHz  
0.4ppb

**OX-221**  
10-30.72MHz  
3ppb

**OX-228**  
10MHz-20MHz  
1ppb

**OX-200**  
10-100MHz  
2ppb

**OX-220**  
10MHz-40MHz  
10ppb

**OX-400**  
10MHz-40MHz  
5ppb

**OX-401**  
10MHz-40MHz  
10ppb

**OX-502**  
10MHz-40MHz  
10ppb

**OX-601**  
10MHz-40MHz  
10ppb

**OX-047**  
8MHz-15MHz  
0.02ppb/g

**OX-046**  
50-250MHz  
0.05ppb/g

**OX-080**  
8MHz-15MHz  
0.02ppb/g

**OX-407**  
10MHz-50MHz  
0.07ppb/g

**OX-990**  
60-120MHz  
0.5ppb/g

**EX-400**  
10MHz-80MHz  
350mW

**EX-401**  
10-100MHz  
250mW

**EX-421**  
10-100MHz  
250mW

**EX-219**  
10-120MHz  
700mW

**MD-173**  
5MHz - 20MHz  
0.8ppb

**MD-223**  
10 - 30.72MHz  
3ppb

**MD-228**  
10MHz-20MHz  
3ppb

**OX-249**  
10-100MHz  
300 krad TID

**EX-219**  
10-120MHz  
100 krad TID



# Low Noise Oscillator

Product Tree

## OCXO

EX-401  
10-100MHz, CMOS/Sine

OX-304  
10-20MHz, Sine

EX-421  
10-100MHz, CMOS/Sine

OX-305  
80-120MHz, Sine

OX-174  
5-20MHz, CMOS/Sine

OX-405  
80-120MHz, CMOS/Sine

OX-175  
50-130MHz, Sine

OX-043  
8-15MHz, Sine

OX-204  
10-20MHz, Sine

OX-045  
10MHz, Sine

OX-205  
80-120MHz, Sine

OX-046  
50-250MHz, Sine

OX-209  
20-35MHz, Sine

## Oscillator

VC-709  
13.5-220MHz  
LVPECL/LVDS/HCSL

VC-711  
10-170MHz  
LVPECL/LVDS

MX55/57  
2.5-850MHz  
CMOS/LVPECL/LVDS/HCSL

DSC1101/21  
2.3-170MHz  
CMOS

DSC1102/22  
2.3-460MHz  
LVPECL

DSC1103/23  
2.3-460MHz  
LVDS

DSC1104/24  
2.3-460MHz  
HCSL

## Multi-Output

DSC2XXX  
2 Output  
CMOS, LVDS, LVPECL, HCSL

DSC400  
4 Output  
CMOS, LVDS, LVPECL, HCSL

## TCXO

TX-321  
5-50MHz, CMOS

MXT57  
10-850MHz  
CMOS, LVDS, LVPECL, HCSL

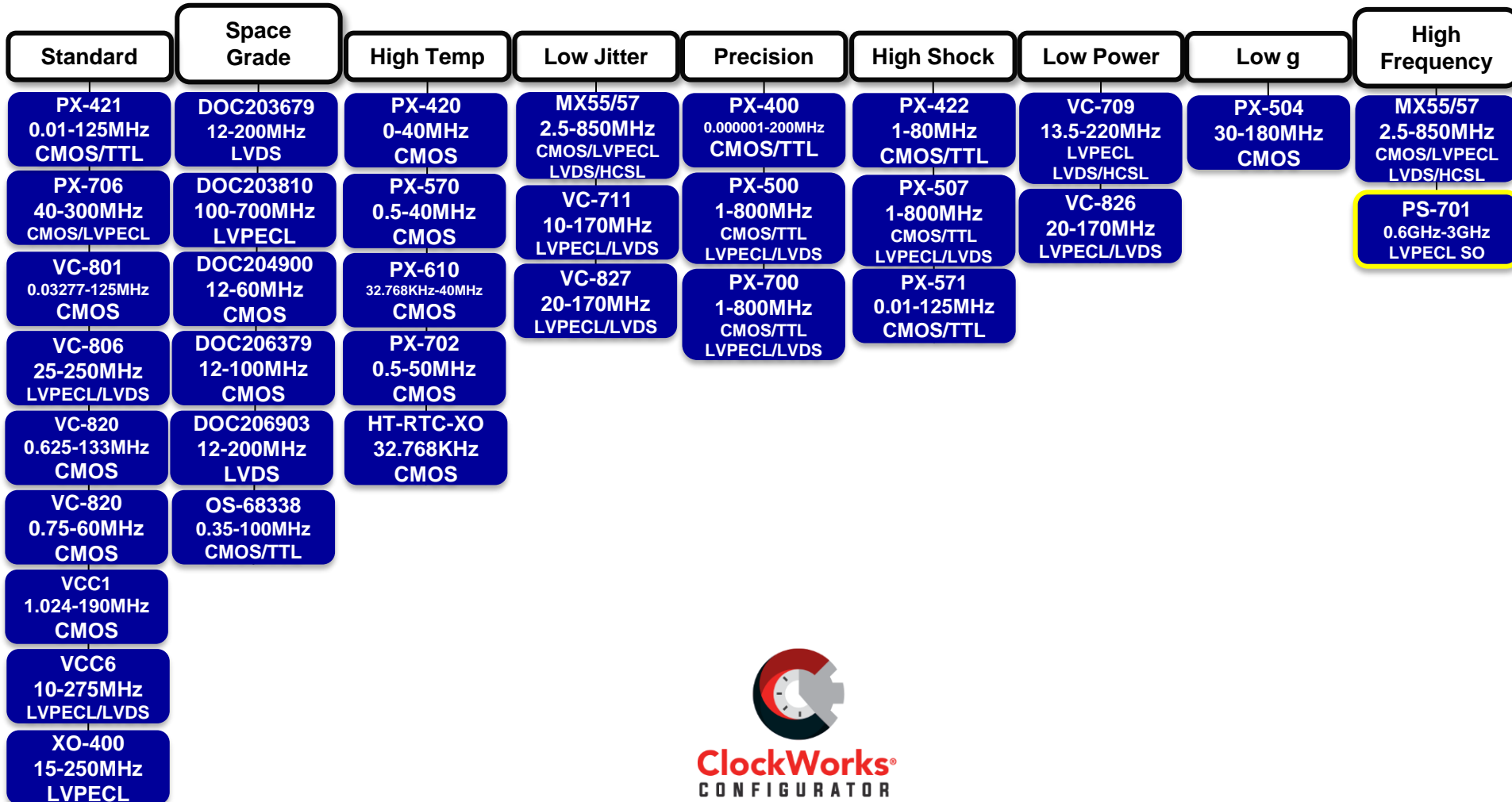
## VCSO

VS-800  
0.8-3.2GHz  
Sinewave

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# Crystal Oscillators

Product Tree



Customize & Create Oscillators and Clock Generators

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 = New product

# Low-Power MEMS Oscillators

## Low-Power MEMS Oscillators

**DSC6000B/6100B**  
CMOS  
2KHz to 100MHz

**DSC1001**  
15pF Drive Strength  
1 to 150MHz

**DSC1003**  
25pF Drive Strength  
1 to 150MHz

**DSC1004**  
40pF Drive Strength  
1 to 150MHz

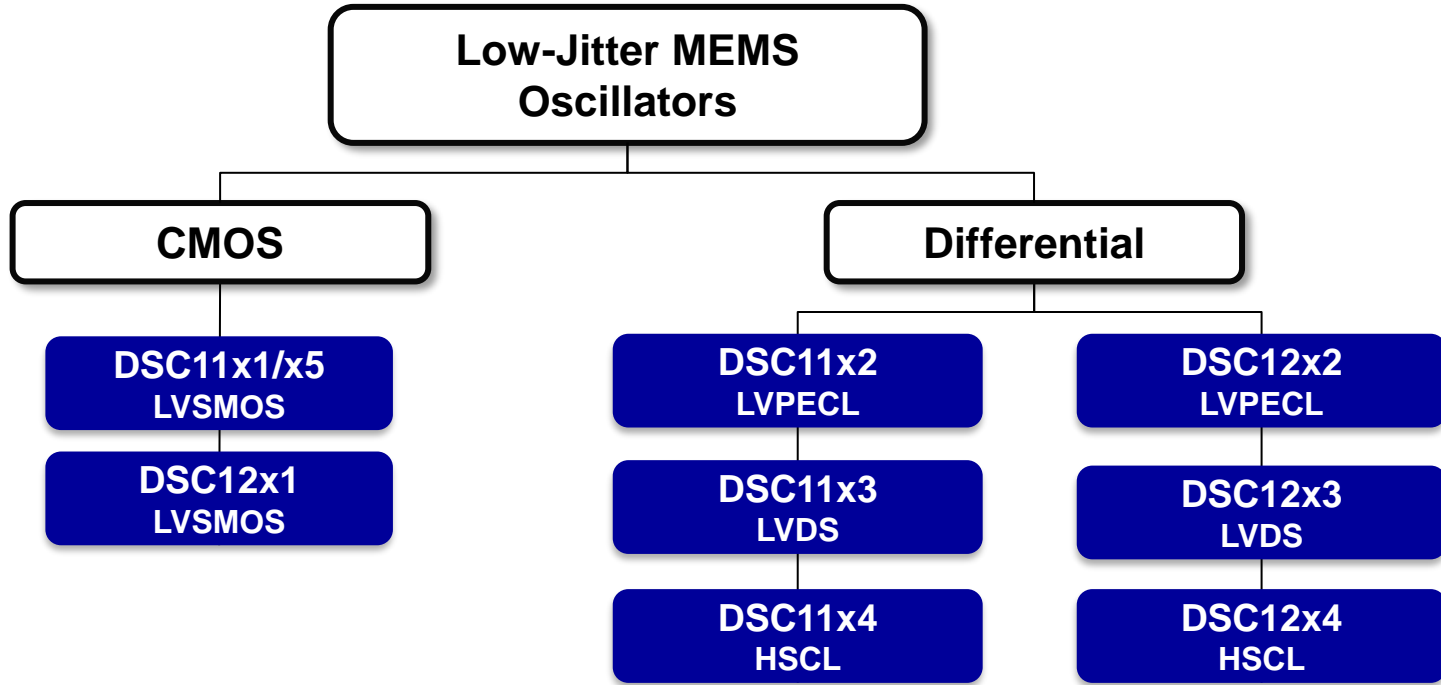


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# Low-Jitter MEMS Oscillators



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# Spread Spectrum

---

## Spread Spectrum MEMS

**DSC6300B**  
**1MHz to 100MHz**  
±0.25 to ±2.5% center spread  
-0.5% to -3% down spread



# Multi-Output XO

Multi-Output XO

**MX85**  
5 Outputs,  
0.2ps Phase Jitter



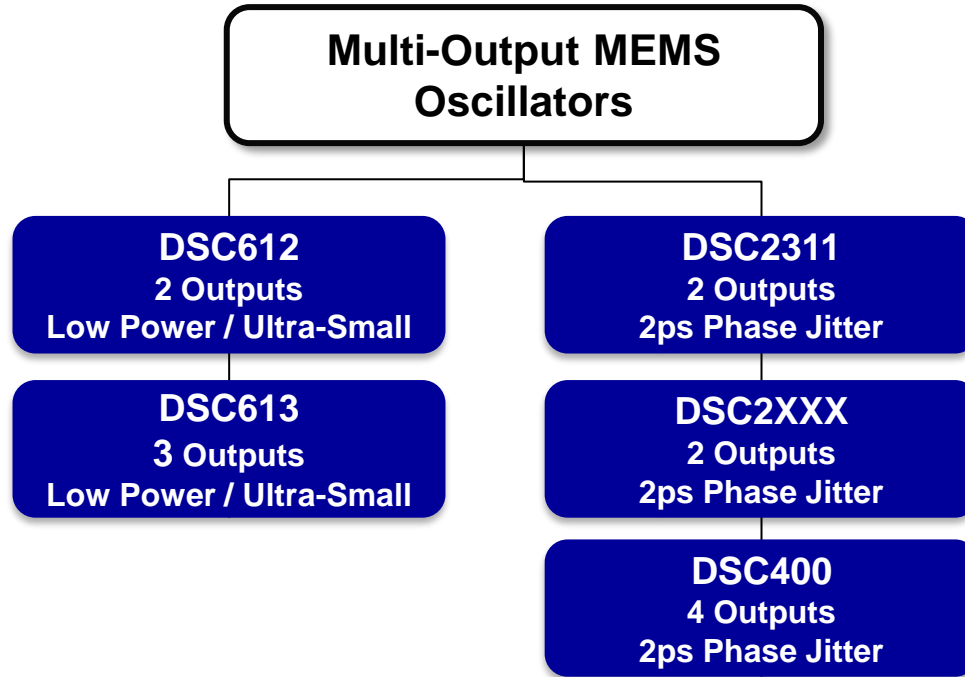
**ClockWorks**<sup>®</sup>  
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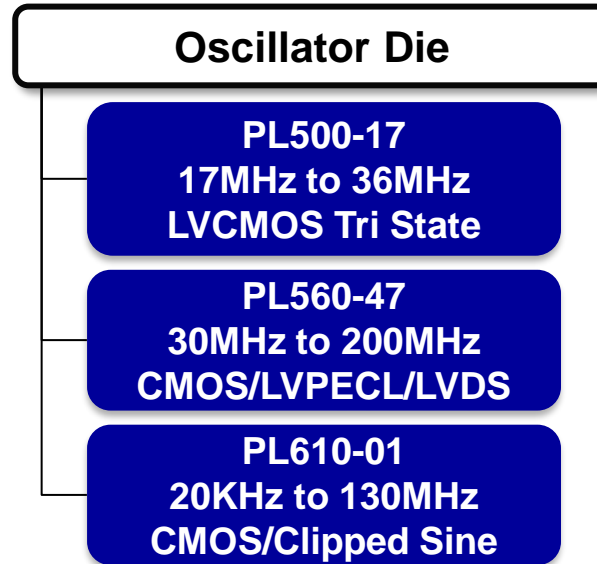
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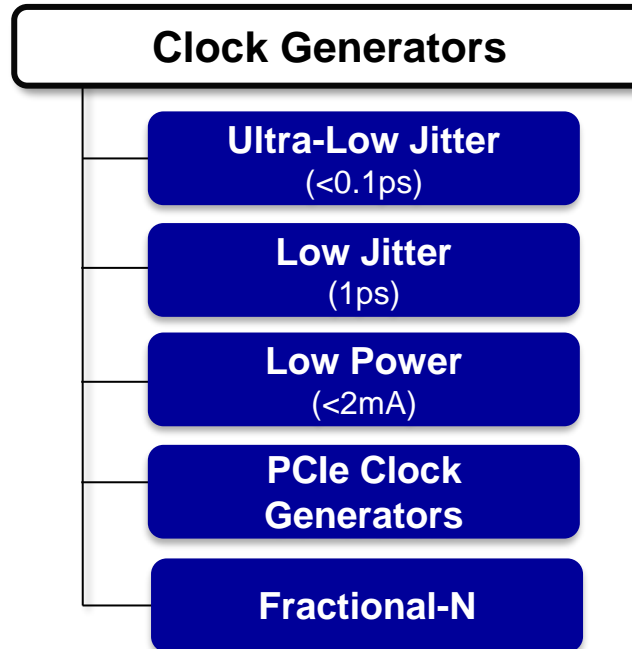
# High-Frequency

VSCO	Crystal OSC	VCXO	TCXO	OCXO	Saw Osc	FCXO
VS-403 5GHz-7GHz Sinewave	PX-400 .000001-200MHz CMOS/TTL	VX-500 1-800MHz CMOS/LVPECL	TX-401 250 to 700MHz Clipped Sinewave	EX-219 10 to 120MHz CMOS/Sine	PS-501 0.6 to 3GHz Sinewave/LVPECL	FX-400 1.5 to 800MHz CMOS/LVPECL/LVDS
VS-501 0.6GHz-3GHz Sine/LVPECL	PX-500 1-800MHz 2.5V/3.3V/5V	VX-501 0.01 to 1.2GHz 0.03ps rms	TX-550 8 to 100MHz CMOS/Sine/LVPECL	OX-046 50 to 250MHz Sine	PS-508 0.6 to 3GHz Sinewave/LVPECL	FX-402 125 to 850MHz LVPECL/LVDS
VS-504 0.6-2.5GHz Dual select	PX-501 0.01-1.2GHz 0.018fsec rms	VX-505 20 to 800MHz CMOS/LVPECL	TX-708 96 to 160MHz CMOS	OX-175 50 to 130MHz Sine	PS-701 0.6 to 3GHz Sinewave/LVPECL	FX-702 0.062 to 1.2GHz LVPECL/LVDS
VS-506 0.8GHz-3GHz Sinewave	PX-504 30-180MHz CMOS	VX-706 40 to 300MHz CMOS/LVPECL	DOC200103 0.3 to 425MHz Sine/CMOS	OX-205 80 to 120MHz Sine	PS-702 0.15 to 1GHz LVPECL/LVDS	
VS-507 3GHz-6GHz Sinewave	PX-700 1-800MHz 0.5ps rms	VX-805 100 to 204.8MHz LVPECL	DOC207139 12 to 200MHz LVDS	OX-249 10 to 120MHz CMOS/Sine		
VS-508 .8GHz-2.9GHz Sine/LVPECL	PX-824 10-800MHz 2.5V/3.3V	DOC204898 100 to 700MHz LVPECL	MXT57 11 to 850MHz 200fsec rms			
VS-701 0.6GHz-3GHz Sine/LVPECL	VCC6 10 to 275MHz LVPECL/LVDS	DOC204899 80 to 200MHz LVDS				
VS-702 0.15GHz-1GHz LVPECL/LVDS	MX-55/57 2.5 to 850MHz 130fsec rms					
VS-705 .12288-2GHz LVPECL/LVDS	DOC203810 100 to 700MHz LVPECL					
VS-800 0.8GHz-3GHz Sinewave	DOC204900 12 to 160MHz CMOS					

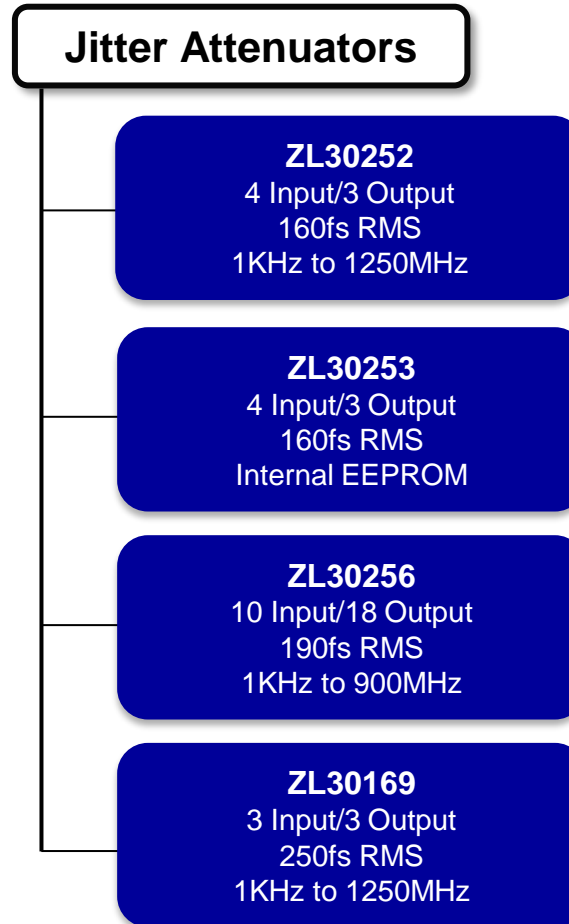


# Oscillator Die





# Jitter Attenuators



# Ultra-Low Jitter Clock Generators

## Ultra Low Jitter Clock Generators

### 3 Outputs

**ZL30250**  
0.16ps RMS  
<1Hz to 1035MHz  
CML/CMOS

**ZL30251**  
0.16ps RMS  
Internal EEPROM  
Differential/CMOS

**ZL30244**  
0.16ps RMS  
Dual Channel  
CML/CMOS

**ZL30245**  
0.16ps RMS  
Dual Channel  
CML/CMOS

### 5 Outputs

**MX85**  
200fs RMS  
Internal Crystal  
Differential/CMOS

**ZL30261**  
0.17ps RMS  
Internal EEPROM  
Differential/CMOS

### 6 Outputs

**ZL30260**  
0.17ps RMS  
External EEPROM  
Differential/CMOS

**ZL30264**  
0.17ps RMS  
External EEPROM  
Differential/CMOS

**ZL30265**  
0.17ps RMS  
Internal EEPROM  
Differential/CMOS

### 8 Outputs

**SM802**  
200fs Phase Jitter  
11MHz to 840MHz  
Differential/CMOS

**SM803**  
180fs Phase Jitter  
12MHz to 850MHz  
Differential/CMOS

### 10 Outputs

**ZL30262**  
0.17ps RMS  
External EEPROM  
Differential/CMOS

**ZL30263**  
0.17ps RMS  
Internal EEPROM  
Differential/CMOS

**ZL30266**  
0.17ps RMS  
External EEPROM  
Differential/CMOS

**ZL30267**  
0.17ps RMS  
Internal EEPROM  
Differential/CMOS

### 12 Outputs

**SM813**  
150fs Phase Jitter  
12MHz to 850MHz  
Differential/CMOS

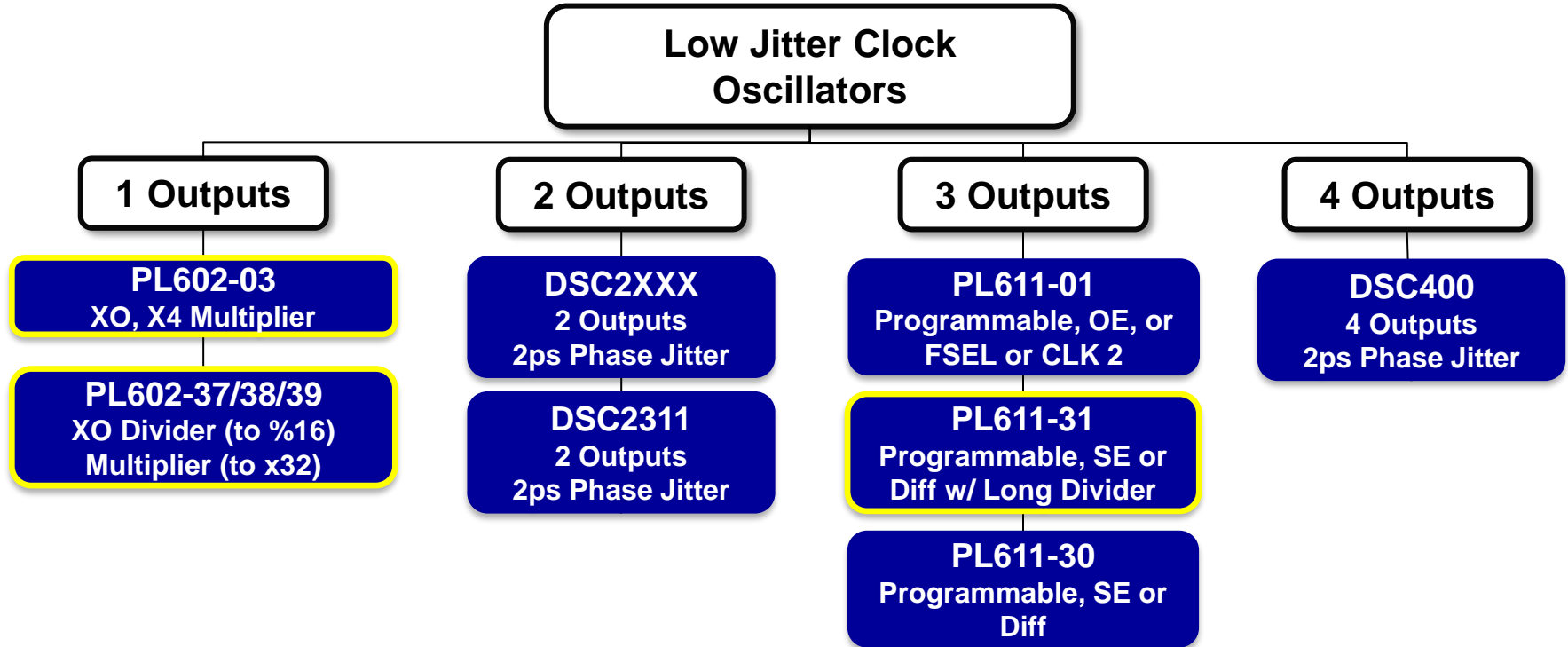


**ClockWorks**  
CONFIGURATOR

Customize & Create Oscillators and Clock Generators

<< BACK

# Low Jitter Clock Generators



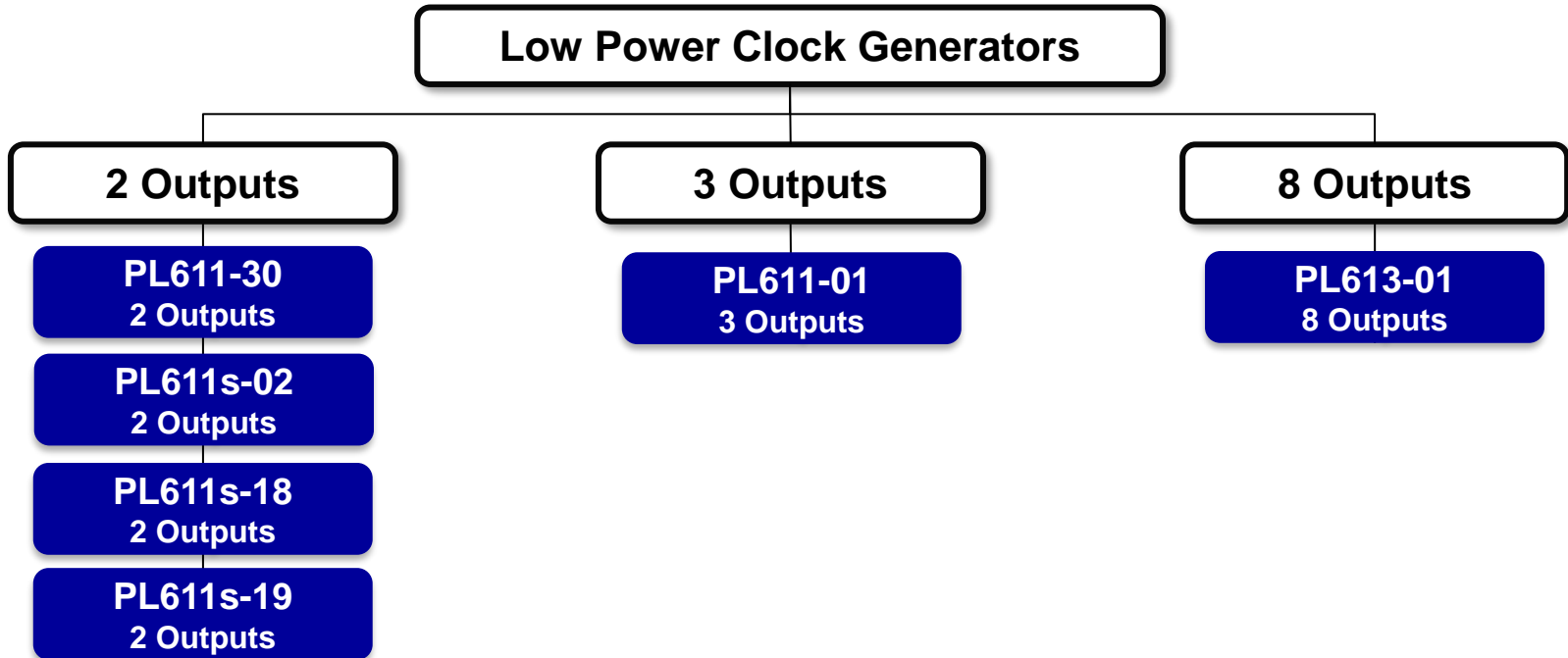
**ClockWorks**  
CONFIGURATOR

Customize & Create Oscillators and Clock Generators

<< BACK



# Low Power Clock Generators



**ClockWorks**<sup>®</sup>  
CONFIGURATOR

Customize & Create Oscillators and Clock Generators

<< BACK

# PCIe Clock Generators

## PCIe Clock Generators

### 1 Output

**PL602-XX**  
28ps pk-pk  
2.25v to 3.63v

### 2 Outputs

**DSC557-03**  
-40 to +125C  
2.25v to 3.6v

**PL602031/2/3/4**  
28ps pk-pk  
2.25v to 3.63v

### 3 Outputs

**DSC557-04**  
-40 to +105C  
2.25V to 3.6V

**ZL30281**  
<0.3ps @ 12KHz  
~20MHz  
1.8V/3.3V

### 4 Outputs

**DSC557-05**  
-40 to +105C  
2.25V to 3.6V

**PL602041**  
105fs (1.875 to  
20MHz)  
2.5V/3.3V

### EMI

**PL607041**  
320fs (1.5 to  
10MHz)  
2.5V/3.3V

### 6 Outputs

**ZL30282**  
<0.3ps @ 12KHz ~20MHz  
1.8V/3.3V

### 8 Outputs

**PL602081**  
250fs (12KHz-20MHz)  
2.5V/3.3V

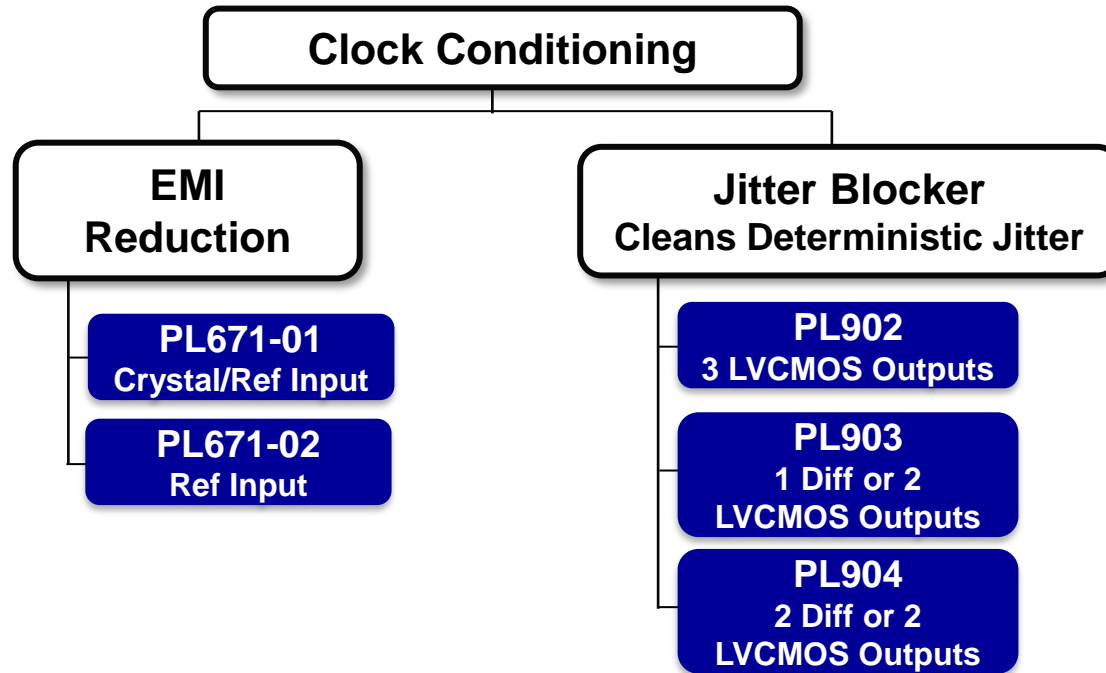
**PL602082**  
250fs (12KHz-20MHz)  
2.5V/3.3V

### EMI

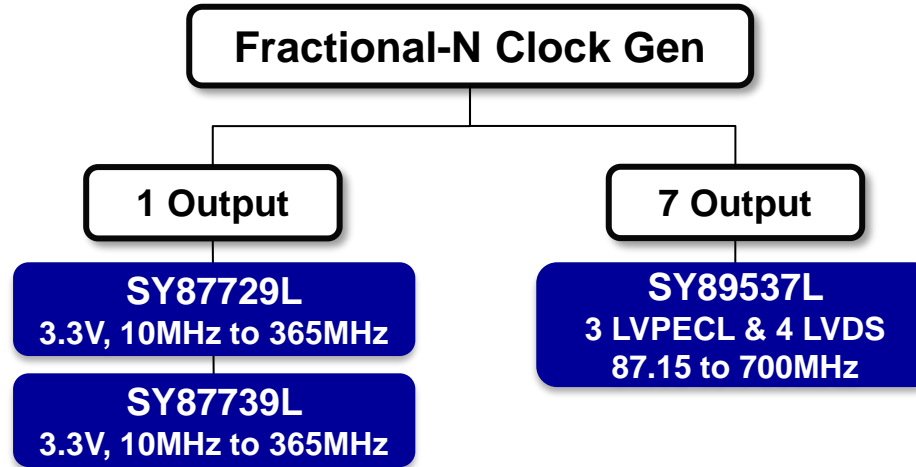
**PL607081**  
320fs (1.5MHz-10MHz)  
2.5V/3.3V

**PL607082**  
320fs (1.5MHz-10MHz)  
2.5V/3.3V

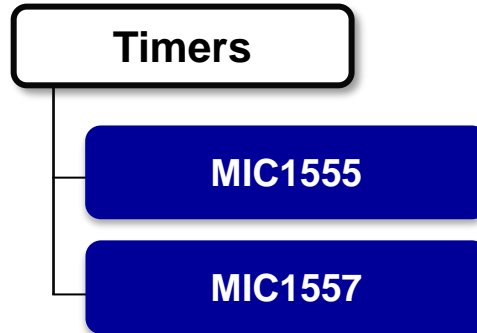
# Clock Conditioning



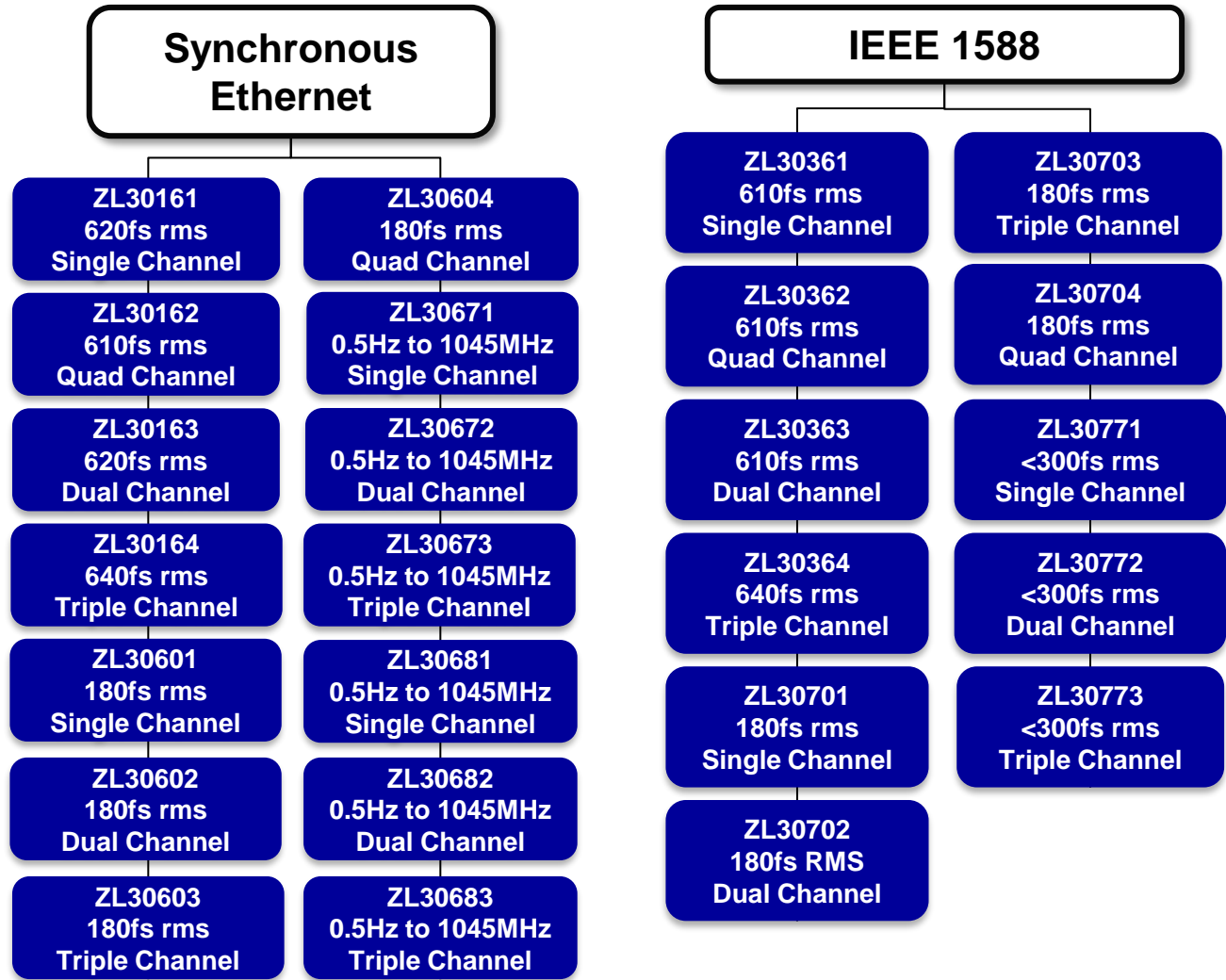
# Fractional-N Clock Generators



# 555 Timers



# Synchronous Ethernet & IEEE 1588/

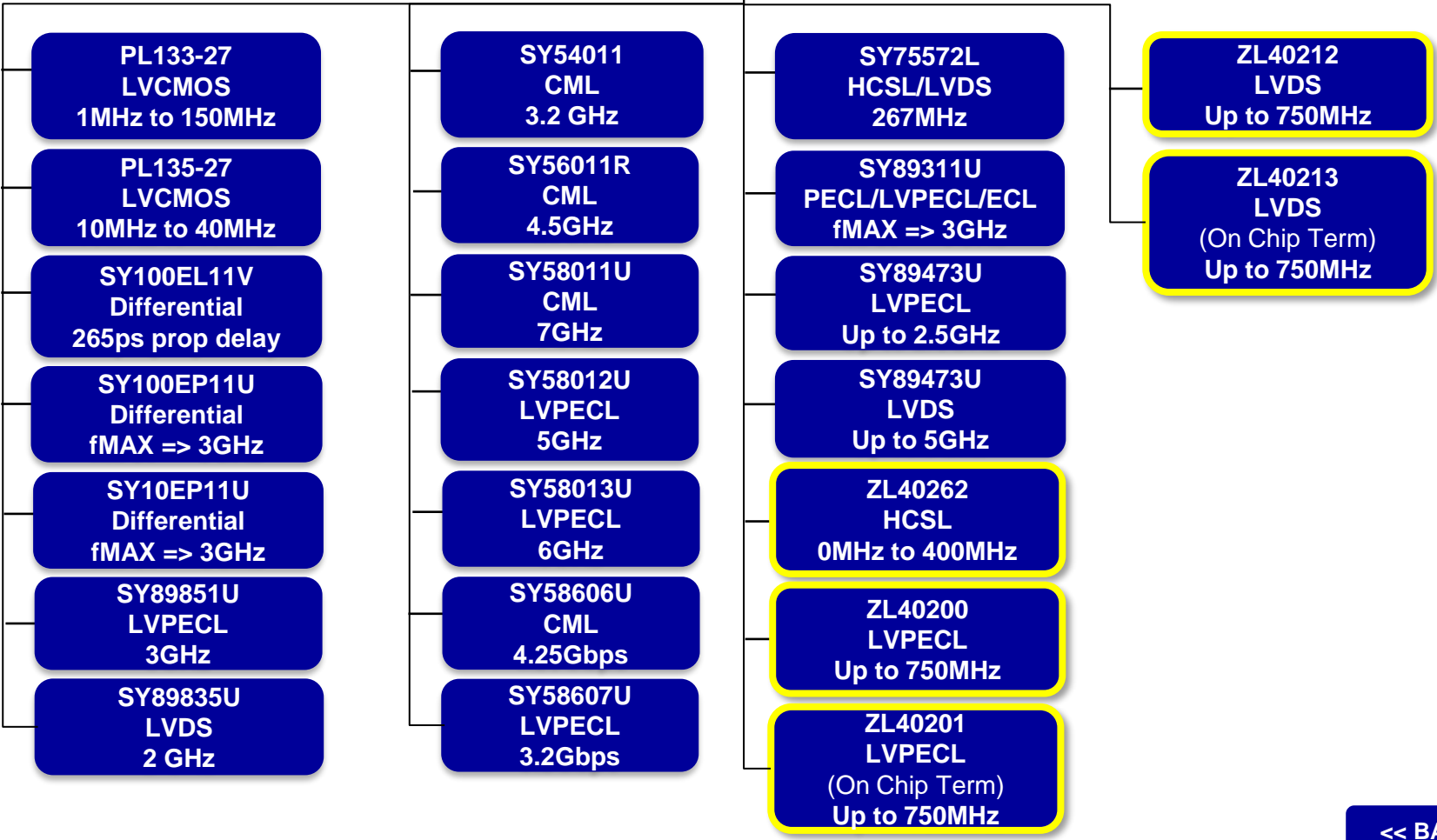


# Fanout Buffers



# 1:2 Fanout Buffers

**1:2 Fanout Buffers**





# 1:3 Fanout Buffers

## 1:3 Fanout Buffers

**PL133-37**

1.62V to 3.63V (LVCMOS)

1MHz to 150MHz

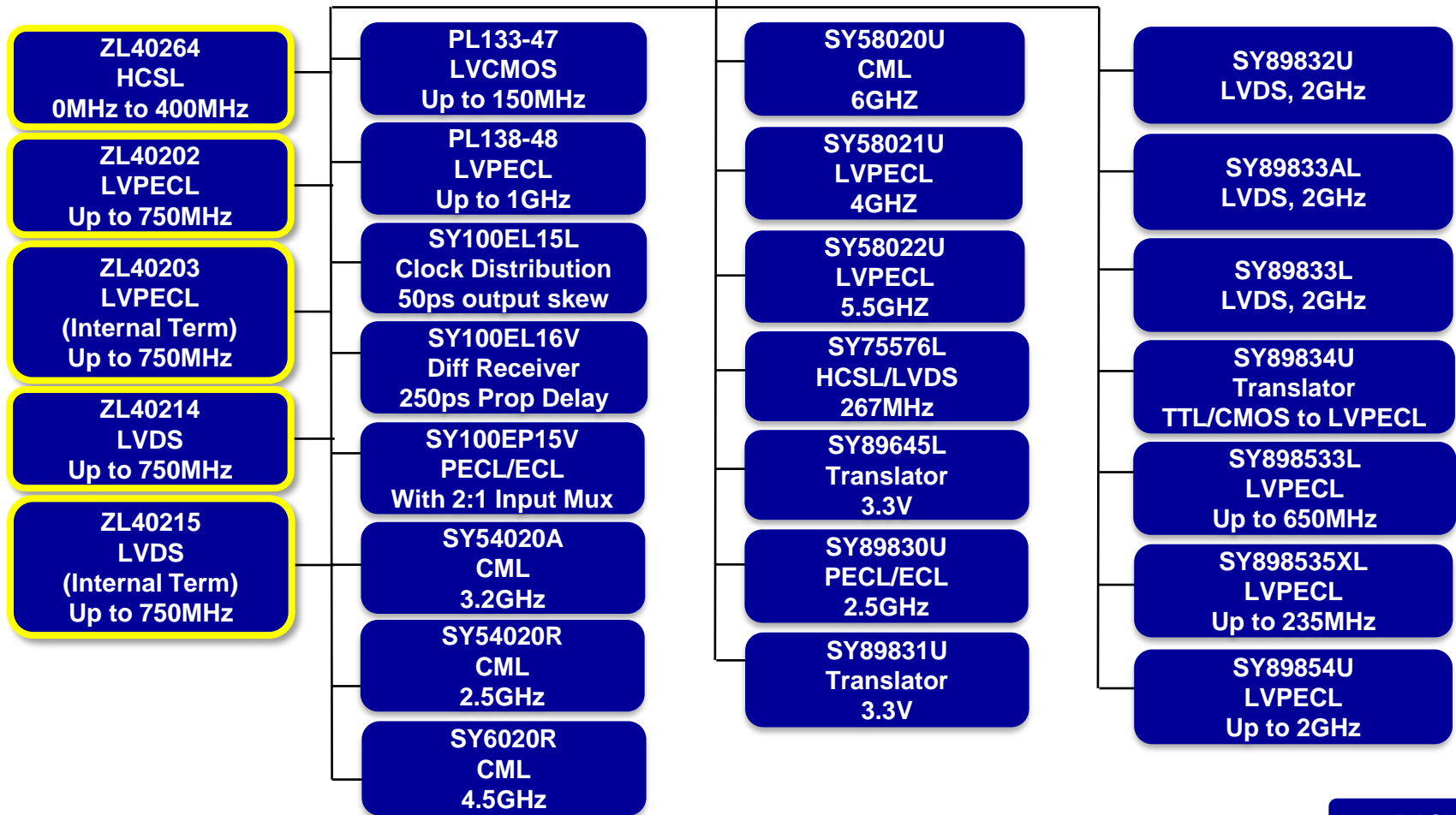
**PL135-37**

1.62 to 3.63V (LVCMOS)

10MHz to 40MHz

# 1:4 Fanout Buffers

## 1:4 Fanout Buffers



# 1:5 Fanout Buffers

## 1:5 Fanout Buffers

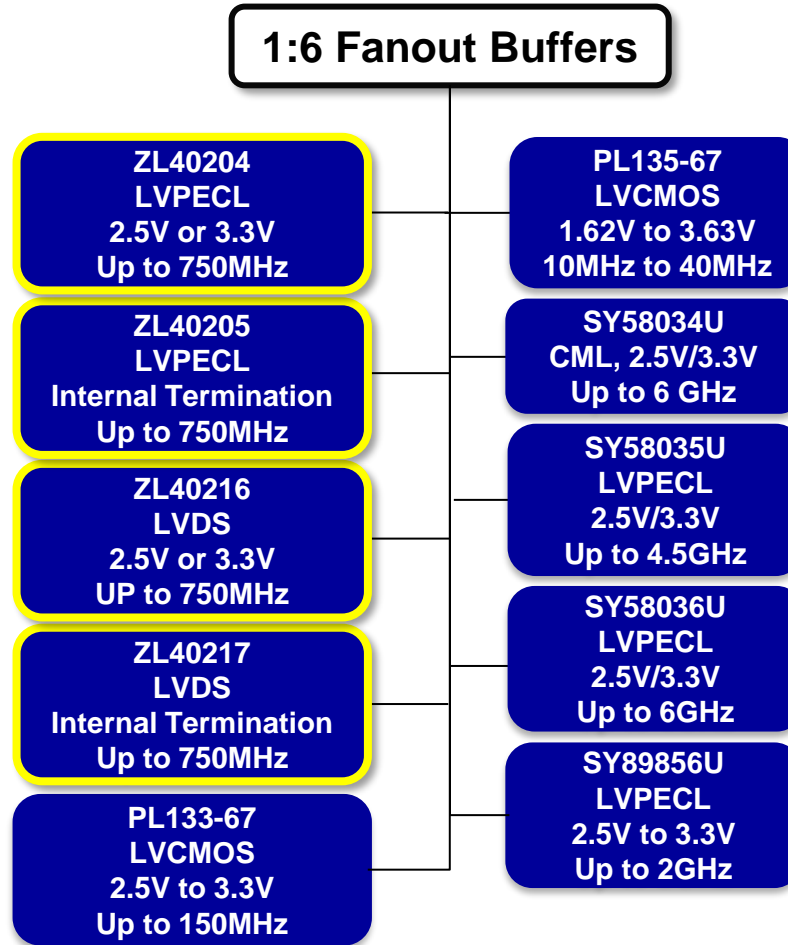
**SY100EL14**  
LVPECL, 3.3V/5V  
Up to 750MHz

**SY100EP14U**  
LVPECL  
2.5V/3.3V/5V  
Up to 2GHz

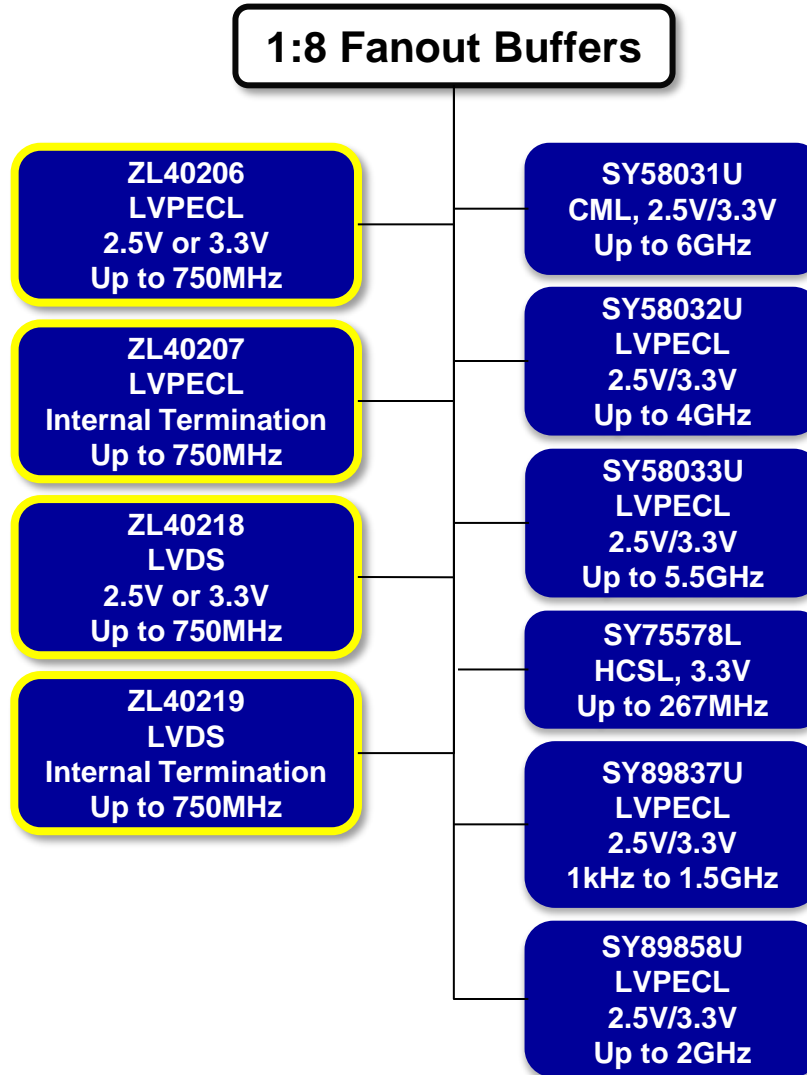
**SY89846U**  
LVPECL  
2.5V/3.3V  
Up to 1.5GHz

**SY89847U**  
LVDS, 2.5V  
Up to 1.5GHz

# 1:6 Fanout Buffers



# 1:8 Fanout Buffers



# 1:9 Fanout Buffers

**1:9 Fanout Buffers**

**PL133-97**  
LVCMOS, 2.5V/3.3V  
Up to 150MHz

**SY89809AL**  
Driver, 3.3V  
LVPECL/HSTL to HSTL

# 1:10 Fanout Buffers

## 1:10 Fanout Buffers

**SY100EP111U**  
PECL, 2.5V/3.3V  
Up to 3GHz

**SY89464U**  
LVPECL, 2.5V/3.3V  
1kHz to 1.5GHz

**SY89828L**  
LVDS, 3.3V  
Up to 1GHz

**SY89465U**  
LVDS, 2.5V  
1kHz to 1.5GHz

**SY89829U**  
LVPECL, 2.5V/3.3V  
Up to 1GHz

# 1:12 Fanout Buffers

## 1:12 Fanout Buffers

**SY89112U**  
LVPECL, 2.5V/3.3V  
Up to 3GHz

**SY89113U**  
LVDS, 2.5V  
Up to 1GHz



# 1:16 Fanout Buffers

1:16 Fanout Buffers

**SY898530U**  
**LVPECL**  
**2.5V/3.3V**  
**Up to 3GHz**

# 1:20 Fanout Buffers

## 1:20 Fanout Buffers

**SY89467U**  
LVPECL, 2.5V/3.3V  
Up to 1.5GHz

**SY89468U**  
LVDS, 2.5V  
Up to 1.5GHz

**ZL40292**  
3.3V (85 Ohm Term)  
HCSL (DB2000Q)  
0MHz to 250MHz

**ZL40293**  
3.3V (100 Ohm Term)  
HCSL (DB2000Q)  
0MHz to 250MHz

# 1:22 Fanout Buffers

## 1:22 Fanout Buffers

**SY89825U**  
LVPECL, 2.5V/3.3V  
Up to 1GHz

**SY89826L**  
LVDS, 3.3V  
Up to 1GHz

# 2:6 Fanout Buffers

## 2:6 Fanout Buffers

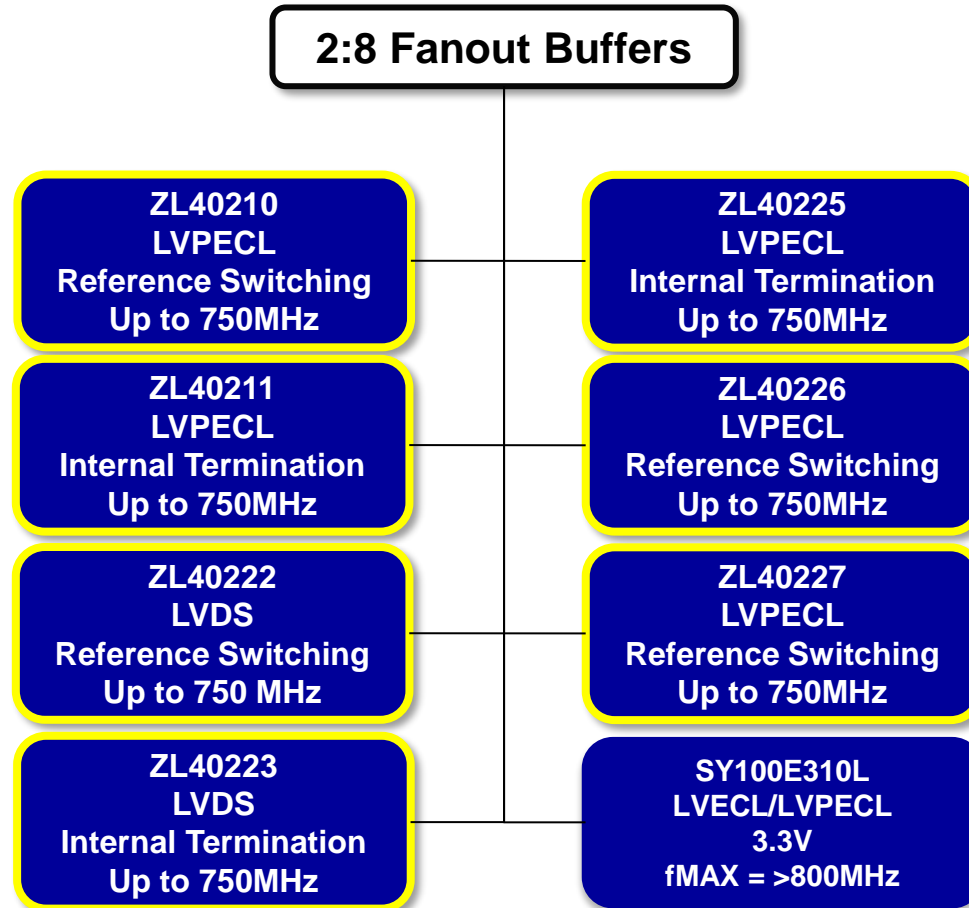
ZL40208  
LVPECL  
2.5V/3.3V  
Up to 750MHz

ZL40209  
LVPECL  
Internal Termination  
Up to 750MHz

ZL40220  
LVDS  
2.5V/3.3V  
Up to 750MHz

ZL40221  
LVDS  
Internal Termination  
Up to 750MHz

# 2:8 Fanout Buffers



# 2:10 Fanout Buffers

## 2:10 Fanout Buffers

ZL40260  
2.5V/3.3V  
LVPECL  
0MHz to 1.6GHz

# 3:4 Fanout Buffers

## 3:4 Fanout Buffers

ZL40234  
2.5V/3.3V  
LVCMOS  
0MHz to 1.6GHz

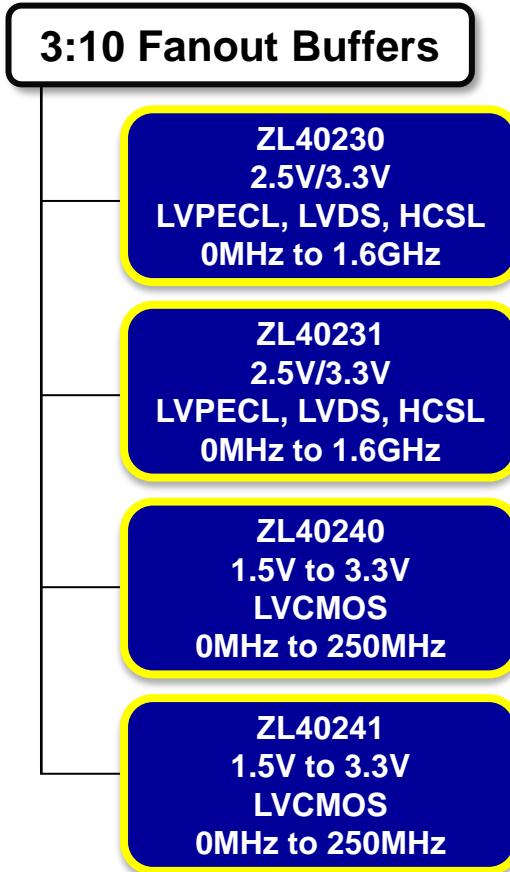
# 3:5 Fanout Buffers

## 3:5 Fanout Buffers

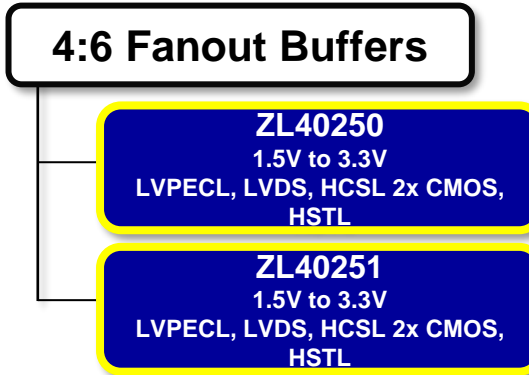
ZL40235  
2.5V/3.3V  
LVPECL, LVDS, HCSL  
0MHz to 1.6GHz



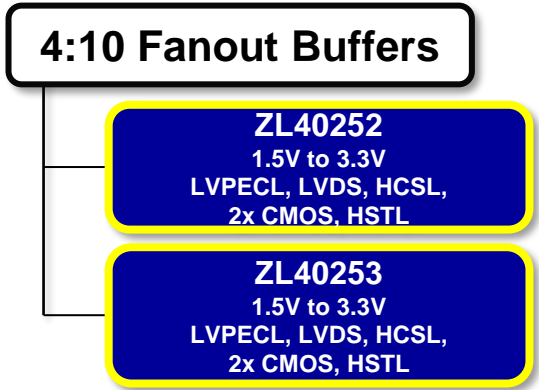
# 3:10 Fanout Buffers



# 4:6 Fanout Buffers



# 4:10 Fanout Buffers



## Zero-Delay Buffers

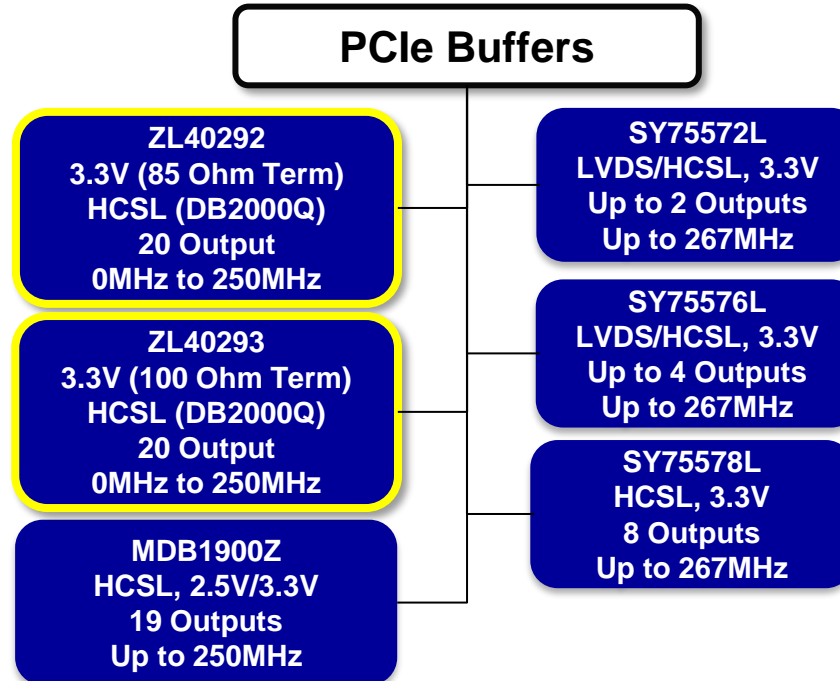
**PL102-10**  
LVCMOS, 2.5V/3.3V  
Up to 3 Outputs  
15MHz to 170MHz

**PL123-05/09**  
LVCMOS, 3.3V  
Up to 9 Outputs  
10MHz to 134MHz

**PL123E-05**  
LVCMOS, 2.5V/3.3V  
Up to 5 Outputs  
10MHz to 220MHz

**PL123E-09**  
LVCMOS, 2.5V/3.3V  
Up to 9 Outputs  
10MHz to 220MHz

**MDB1900Z**  
HCSL, 2.5V/3.3V  
Up to 19 Outputs  
Up to 250MHz



# Drivers & Receivers

## Drivers

**SY89850U**  
LVPECL, 2.5V/3.3V  
fMAX = 4GHz\

**SY10EP89**  
ECL, 3.3V/5V  
Toggle Freq = 3GHz

## Receivers

**SY100EL16V**  
ECL/PECL, 3.3V/5V  
250ps prop delay

**SY100EL17**  
ECL/LVPECL, 3.3V/5V  
Quad Receiver

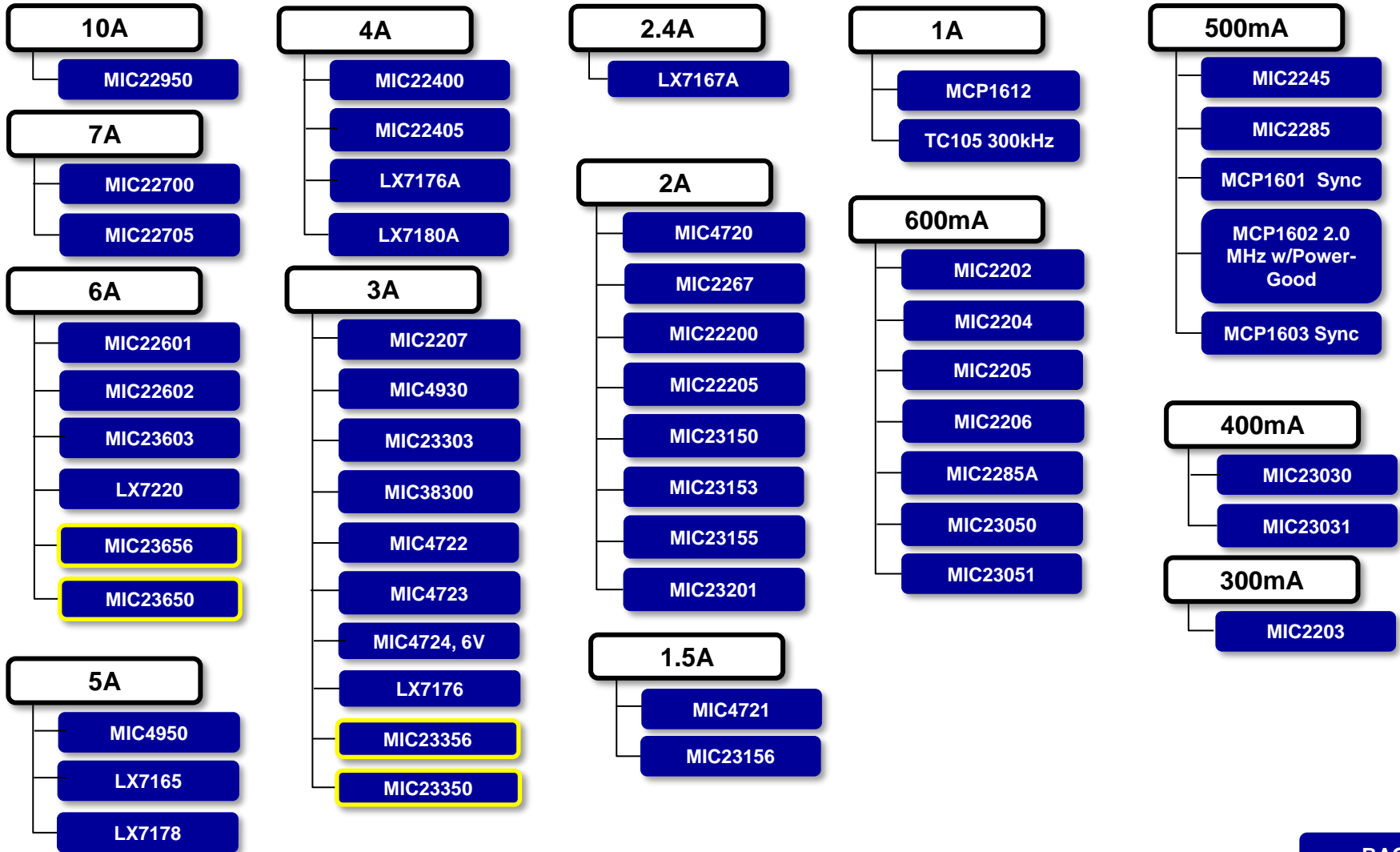
**SY58016L**  
CML, 3.3V  
Up to 10.7GHz

**SY89251V**  
ECL/LVPECL, 3.3V/5V  
250ps prop delay



# Step-Down (Buck) Internal SW 5.5V – 6V

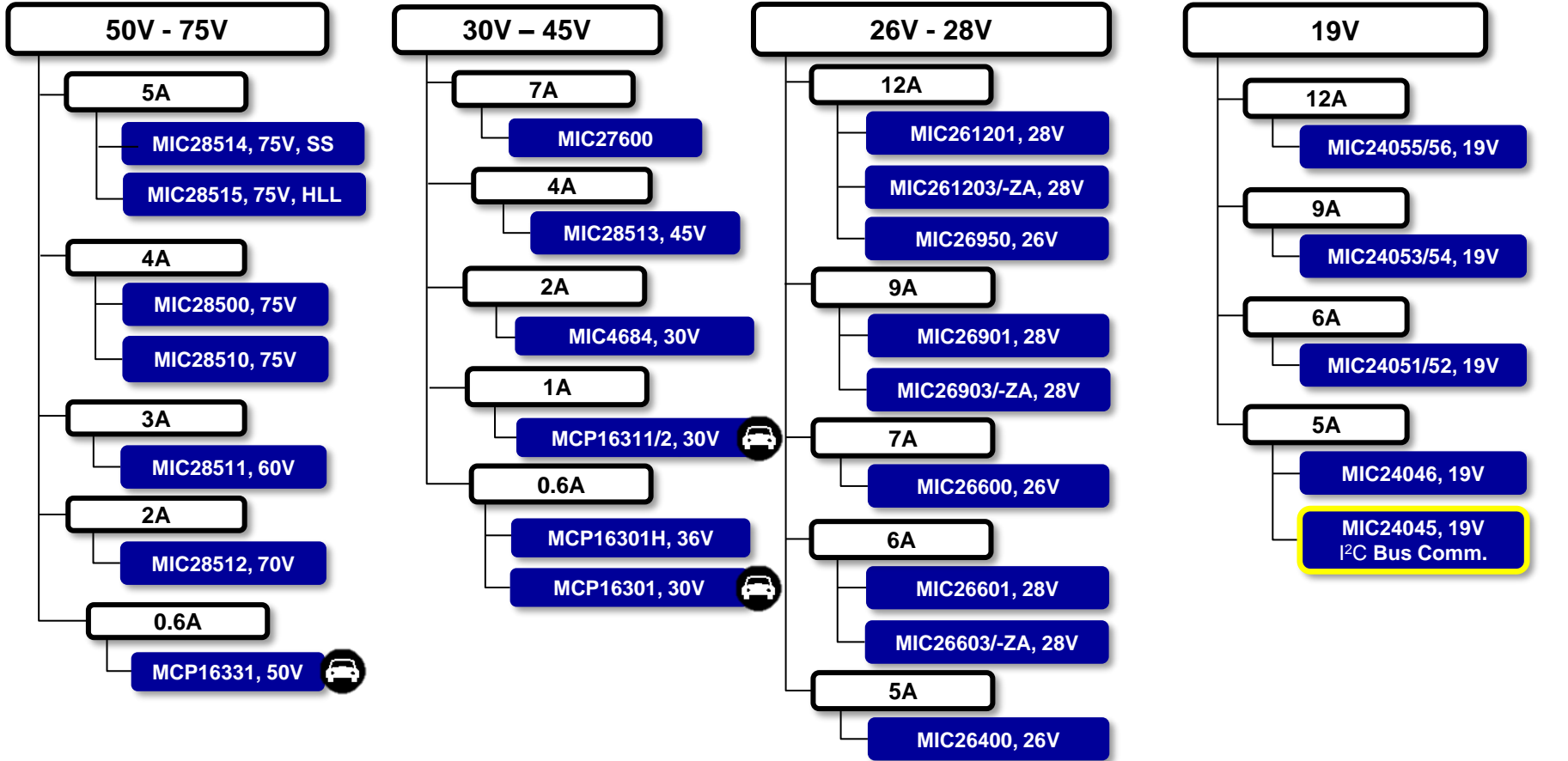
Product Tree



= New product

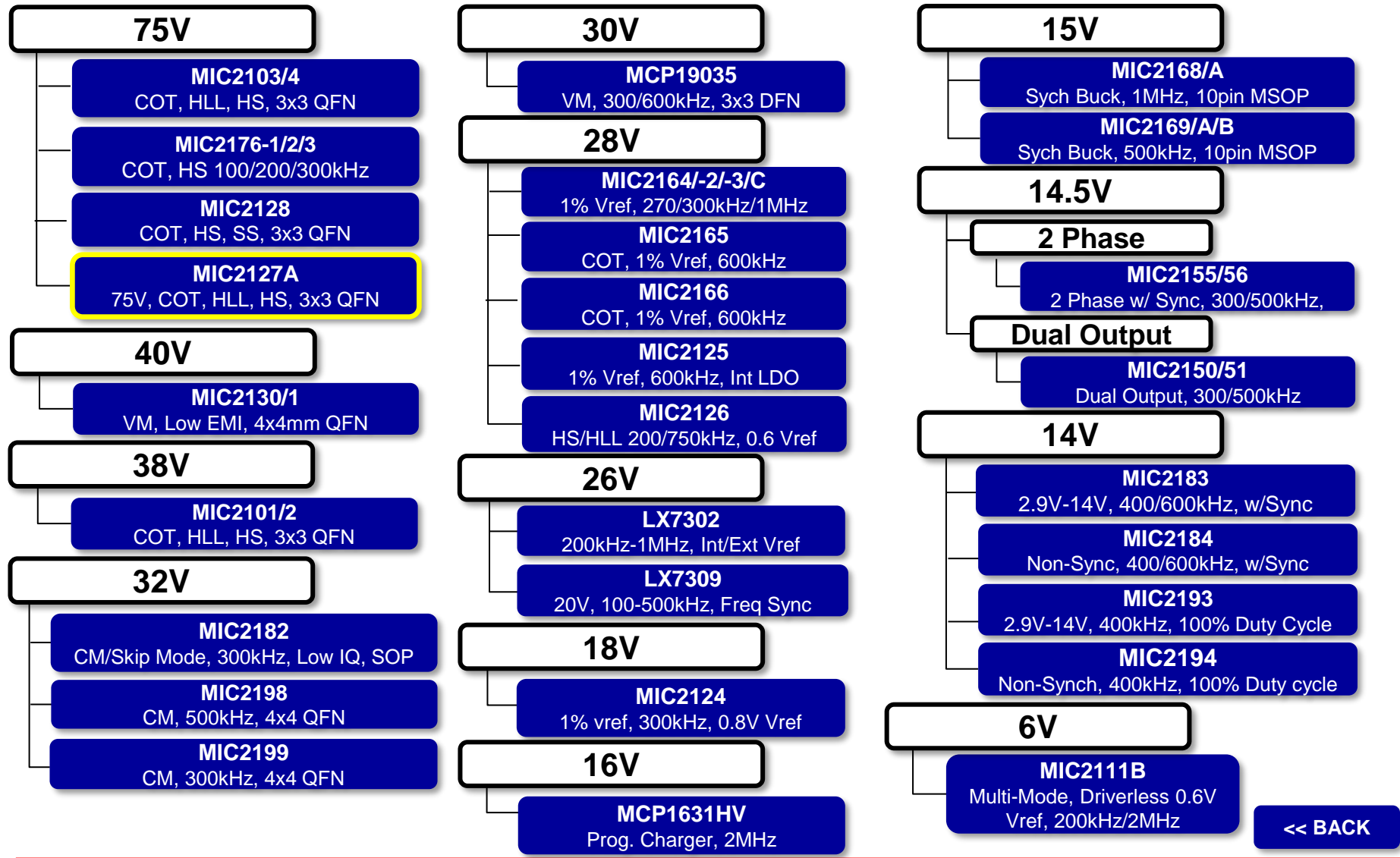
<< BACK

# Step-Down (Buck) Internal SW Up to 75V



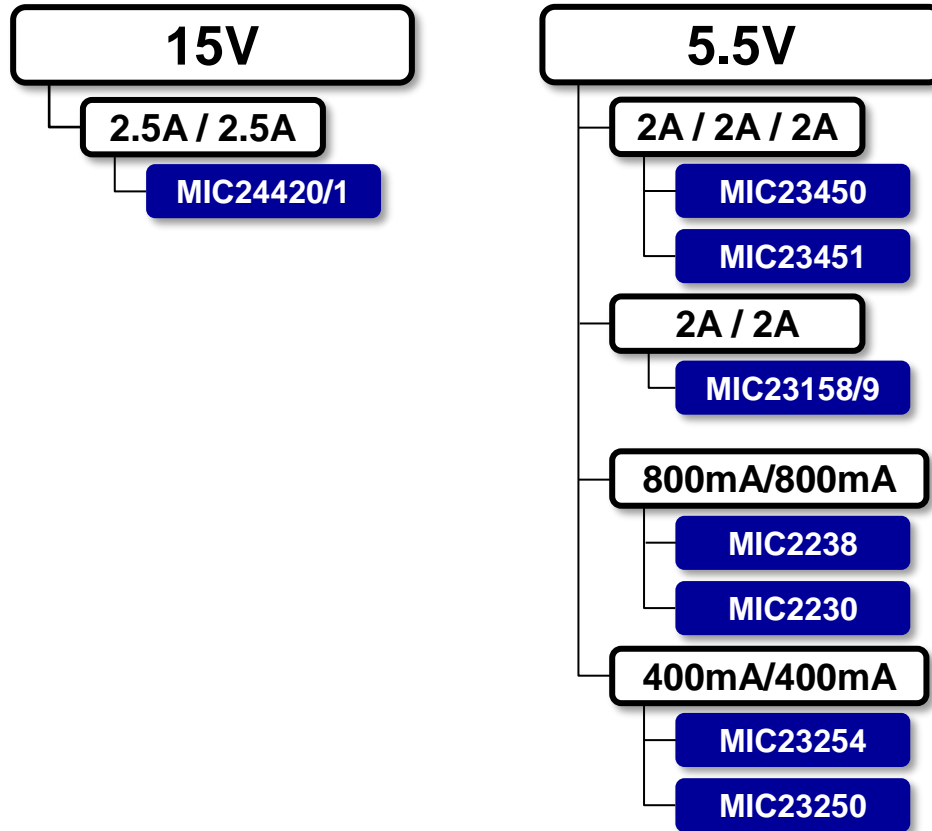


# Step-Down (Buck) External SW



 = New product

# Step-Down (Buck) Multi-Output



# Step-Up (Boost) Internal SW

**40V**  $V_{OUT} \leq 65V$

**MIC2171, 2.5A**

**MIC2172, 1.25A**  
f<sub>sw</sub> SYNC pin

**MIC3172, 1.25A**

**20V**  $V_{OUT} \leq 40V$

**MIC2601/2, 1.2A**  
1.2MHz/2MHz

**MIC2605/6, 0.5A**  
Int. Schottky  
1.2MHz/2MHz

**16V**  $V_{OUT} \leq 16V$

**MIC2145, 0.9A**  
Pgm I-Limit

**15V**  $V_{OUT} \leq 36V$

**MIC2570, 1A**  
f<sub>sw</sub> SYNC pin

**MIC2571, 1A**  
V<sub>IN(min)</sub>=0.9V  
f<sub>sw</sub> SYNC pin

**14V**  $V_{OUT} \leq 22V$

**MIC2141, 1A**  
DAC-controlled V<sub>OUT</sub>

**10V**  $V_{OUT} \leq 34V$

**MIC2253, 3.5A**  
V<sub>OUT</sub> ≤ 30V

**MIC2288, 1.2A**

**MIC2290, 0.75A**  
Int. Schottky

**MIC2295, 1.2A**  
1.2MHz

**MIC2296, 1.2A**  
600kHz

**6.5V**

**MIC2619, 0.35A**

**5.5V**  $V_{OUT} \leq 5.5V$

\* **MIC2875, 4.8A**  
BM, TLD  
Min f<sub>sw</sub> = 45kHz

\* **MIC2876, 4.8A**  
BM, TLD

\* **MIC2877, 6.5A**  
BM, TLD

\* **MCP1623/4, 0.425A**  
TLD, Startup @ 0.65V

\* **MCP16251/2, 0.65A**  
I<sub>Q</sub>=4μA  
TLD (16251), IB (16252)

\* **MCP1640/B/C/D, 0.8A**  
Startup @ 0.65V  
TLD (1640/B), IB (1640C/D)

\* **MCP1642B/D, 1.8A**  
Startup @ 0.65V  
TLD (1642B), IB (1642D)

**5.5V**  $V_{OUT} \leq 37V$


**MIC2250, 2A**  
Dithering, V<sub>OUT</sub> ≤ 32V

**MIC2251, 2A**  
Dithering, V<sub>OUT</sub> ≤ 37V

**MCP1661, 1.3A**  
V<sub>OUT</sub> ≤ 32V

**MCP1663, 1.8A**  
V<sub>OUT</sub> ≤ 32V

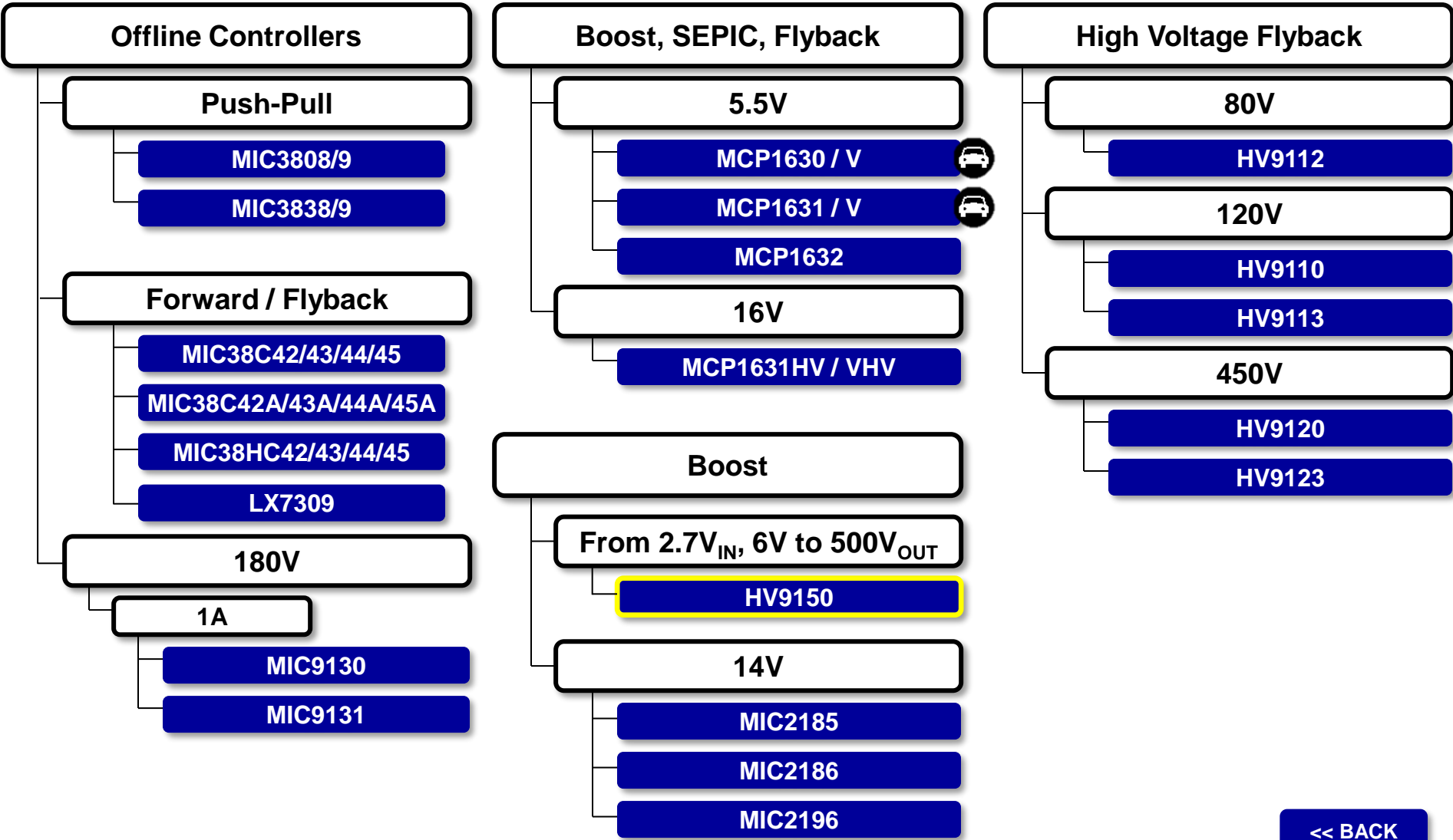
**MCP1665, 3.6A**  
V<sub>OUT</sub> ≤ 32V

\* = Synchronous  
 = Light Load Mode (HLL/PFM)  
 BM = Bypass Mode  
 IB = Input Bypass (shutdown)  
 TLD = True Load Disconnect (shutdown)



# Boost/SEPIC/Flyback/Forward & Push-Pull Controllers

Product Tree



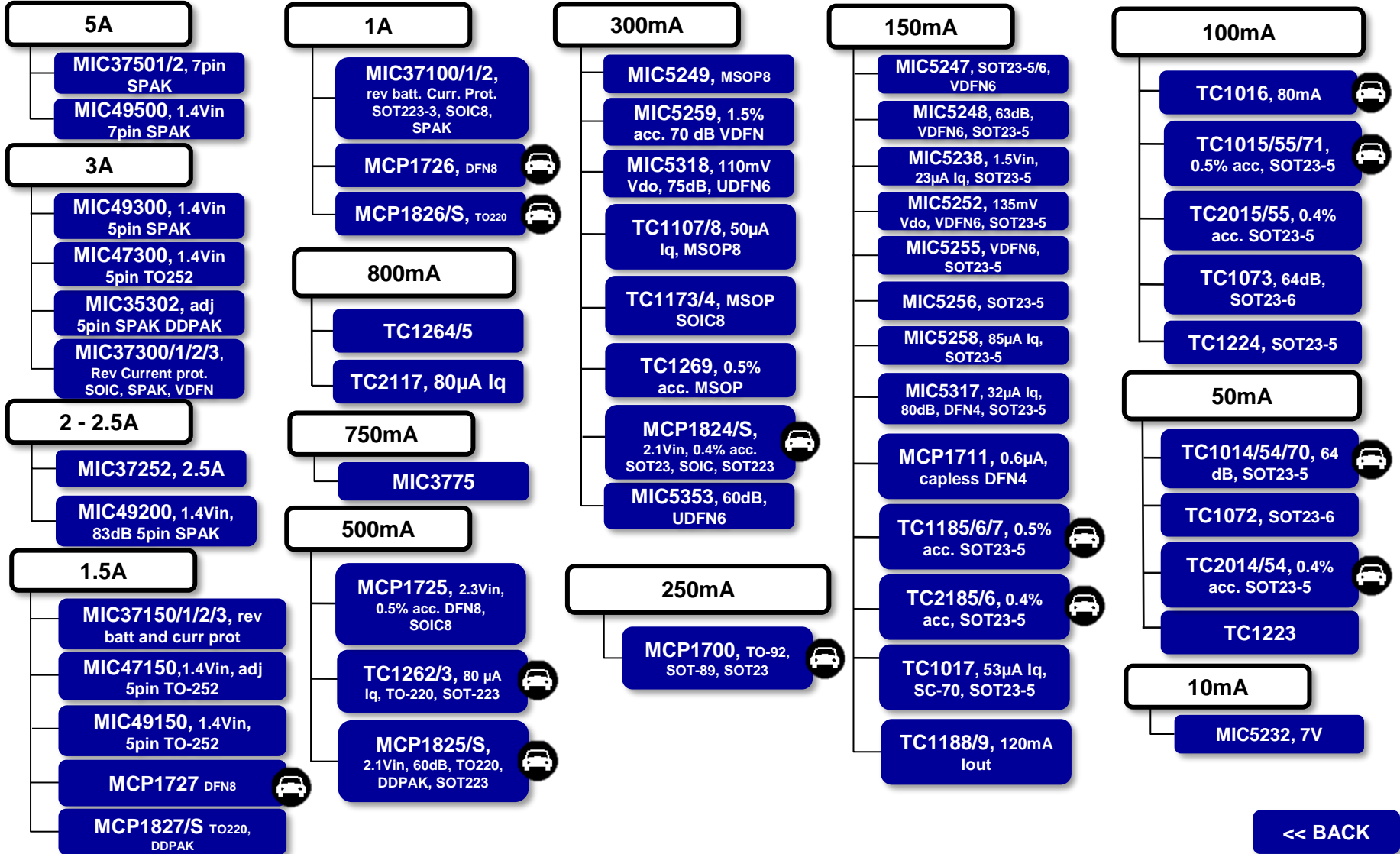
= New product

<< BACK



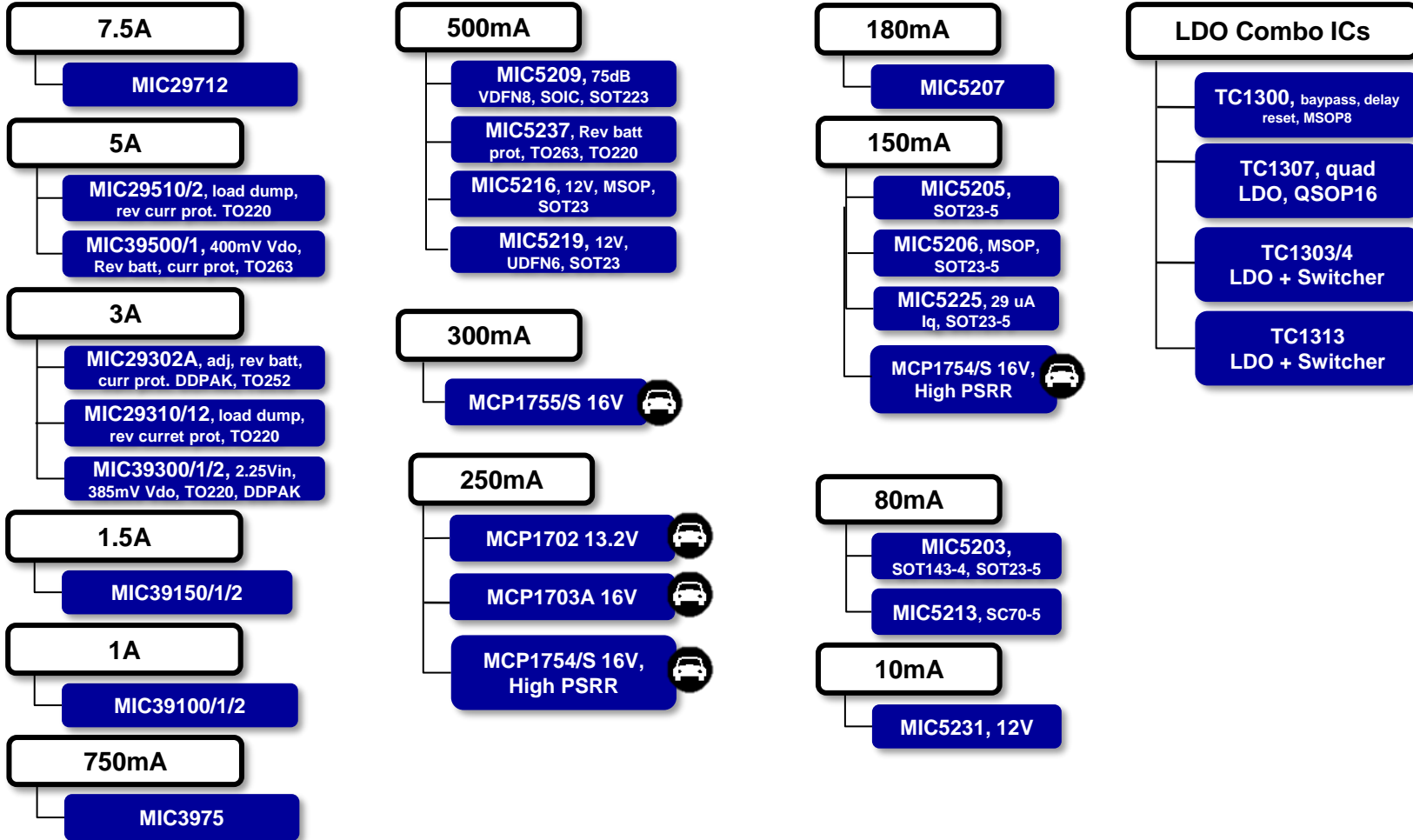
# Low Dropout Regulators 6V – 8V Input

Product Tree



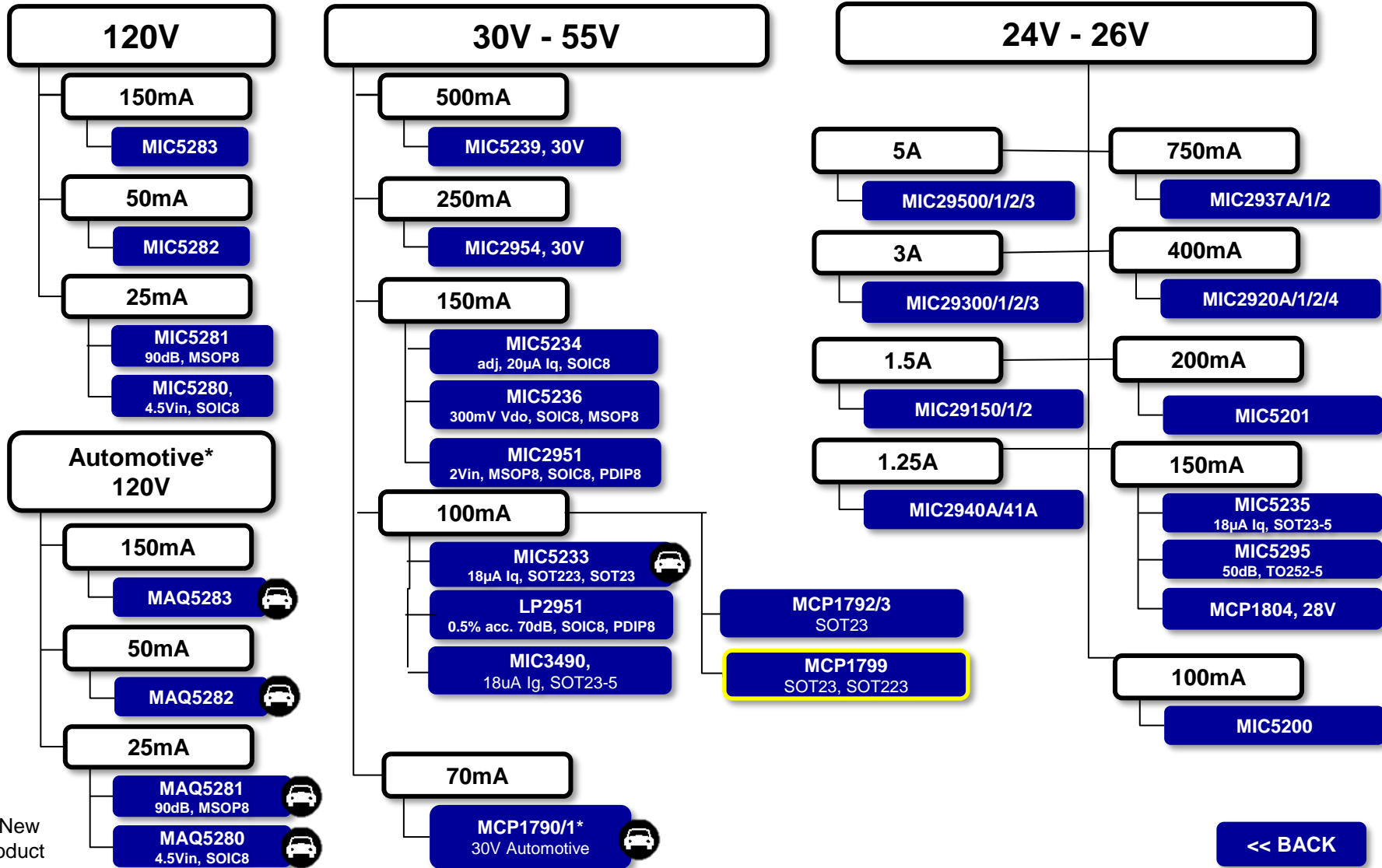
<< BACK


# Low Dropout Regulators 12V – 16V Input



# Low Dropout Regulators 24V - 120V

Product Tree



 = New product

[<< BACK](#)

\* Please refer to our Microchip Automotive Recommended Product Selector Guide for additional LDOs for AEC-Q100 status



# Low Dropout Regulators -16V – 5.5V

Product Tree

## 5.5V

## 3.6V – 3.8V

5A

MIC69502

4A

MIC68400

MIC68401

3A

MIC69301/2/3

2A

MIC68200

1.5A

MIC38150

MIC69153

1A

MIC69101/3

100mA

MIC5253

150mA

MIC5265  
UDFN6

MIC5301  
40mV Vdo, UDFN6

MIC5302, 50mV  
Vdo, UDFN4

MIC5304  
0.5% acc. UDFN6

MIC5305  
60mV Vdo, 85dB,  
VDFN6

MIC5306  
45mV, 16µA, SOT23-5

MIC5308  
90dB, UDFN6

MIC5365/66  
32 µA, 80 dB, UDFN4

MIC5376/7/8  
UDFN

MCP1810  
20nA Iq, DFN

MCP1811  
250nA Iq, DFN

200mA

MIC5367/8

300mA

MIC5323  
80dB, UDFN6/SOT23

MIC5363/4  
80dB, UDFN6

MIC5303  
100mV Vdo, UDFN4

MIC5307,  
20µA Iq, SOT23-5

MIC5309  
1.7Vin, 90dB,  
UDFN/SOT23

MIC5327  
0.5% acc. UDFN4

MIC5337  
UDFN4

MIC5501/2/3/4  
1x1DFN

MIC5512/4  
UDFN6

MAQ5300 Q100

MCP1812  
250nA Iq, DFN

400mA

MIC5325

500mA

MIC5319  
70dB, VDFN6,  
SOT23-5

MIC5524  
38µA Iq, UDFN4

MIC5528  
70dB, UDFN6

3A

MIC59300, DPAK

MIC61300, VDFN10

1.5A

MIC59150, SOIC8

MIC61150, VDFN10

1A

MIC47100, 3.6V

500mA

MIC47050   
44mV, 6µA, VDFN6

MIC47053  
44mV, 6µA, UDFN8

-16V

100mA

MIC5270

MIC5271

<< BACK



# Dual Output Linear Regulators

## 5.5V

2A

MIC68220

500mA

MIC5355

MIC5356

MIC5357

200mA

MIC5388/9

150mA / 300mA

MIC2210

MIC2211

MIC2212

MIC2213

MIC2214

MIC2219

TC1301/2



150mA

MIC5310

MIC5320

MIC5321

MIC5322

MIC5370/1

MIC5380/1

MIC5264

MIC5392/3

300mA

MIC5311

MIC5312

MIC5315

MIC5316

MIC5330

MIC5331

MIC5332

MIC5333

MIC5335

MIC5338/9

MIC5396/7/8/9

300mA / 500mA

MIC5350

## 16V

500mA

MIC5212

150mA

MIC5210

80mA

MIC5211

50mA

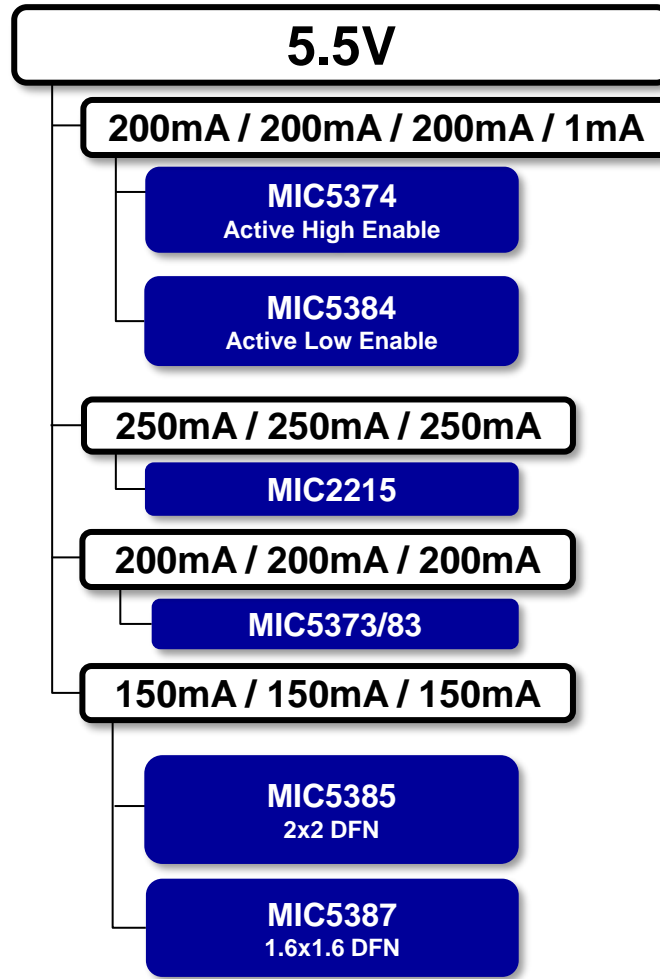
MIC5208

## 26V

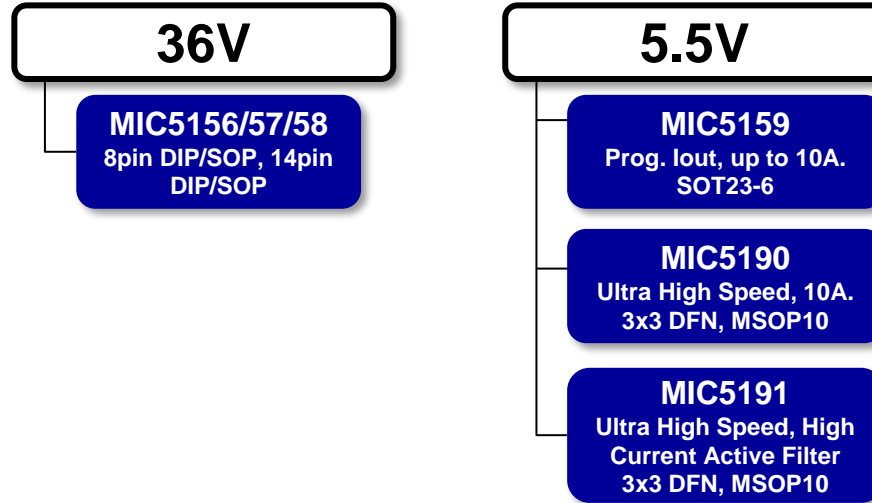
100mA

MIC5202

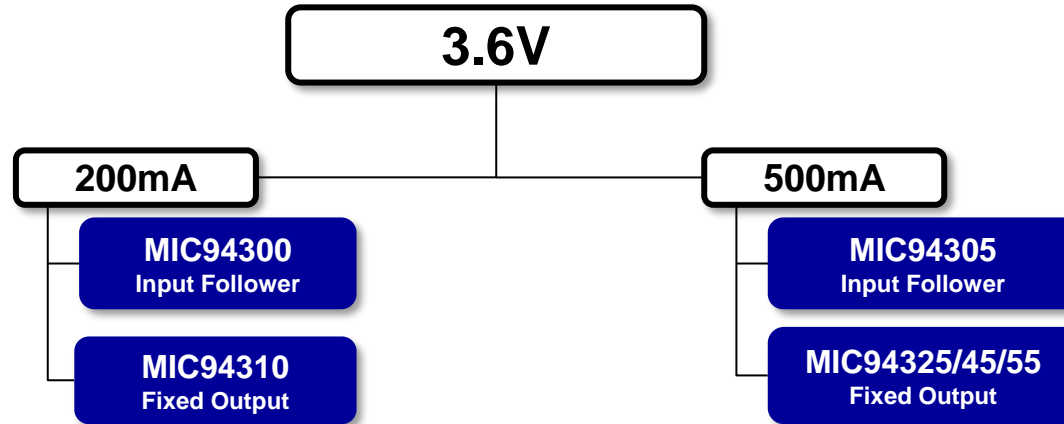
# Multi-Output LDOs



# Linear Regulator Controllers



# Linear Power Filters Ripple Blocker™





# Internal Inductor Switching Regulators

Product Tree

**Low Voltage**  
 $V_{IN} = 2.7V$  to  $5.5V$

6A

**MIC33M650**

Pin-selectable VOUT  
6x10x3mm

**MIC33M656**

Pin-selectable VOUT  
6x10x3mm

3A HeLDO™

**MIC38300**

Low Noise, 4X6mm

1.5A HeLDO™

**MIC38150**

Low Noise, 4X6mm

1.2A

**MIC33153**

Low Ripple, 3X3.5mm

600mA

**MIC33050**

Low Ripple, 3X3mm

**MIC3385**

8 MHz, Light load LDO  
mode, 3X3.5mm

400mA

**MIC33030**

8MHz  
Ultra Fast, 2.5X2mm

**Medium Voltage**  
 $V_{IN} = 4.5V$  to  $26V$

14A

**MIC45212**

200-600kHz  
Hyper speed, Light load,  
12x12x4mm

10A

**MIC45208**

200-600kHz  
Hyper speed, Light load,  
10x10x3mm

6A

**MIC45205**

200-600kHz  
Hyper speed, Light load,  
8x8x3mm

**MIC45116**

600kHz Fixed  
Hyper speed, Light load,  
8x8x3mm

5A

**MIC45404**

19V, Low Profile,  
Pin selectable VOUT  
10x6x2mm

**High Voltage**  
 $V_{IN} = 4.5V$  to  $50V$

3A

**MIC28303**

200-600kHz, 50V  
Hyper speed, Light load,  
12x12x3mm

**High Voltage**  
 $V_{IN} = 4.5V$  to  $70V$

3A

**MIC28304**

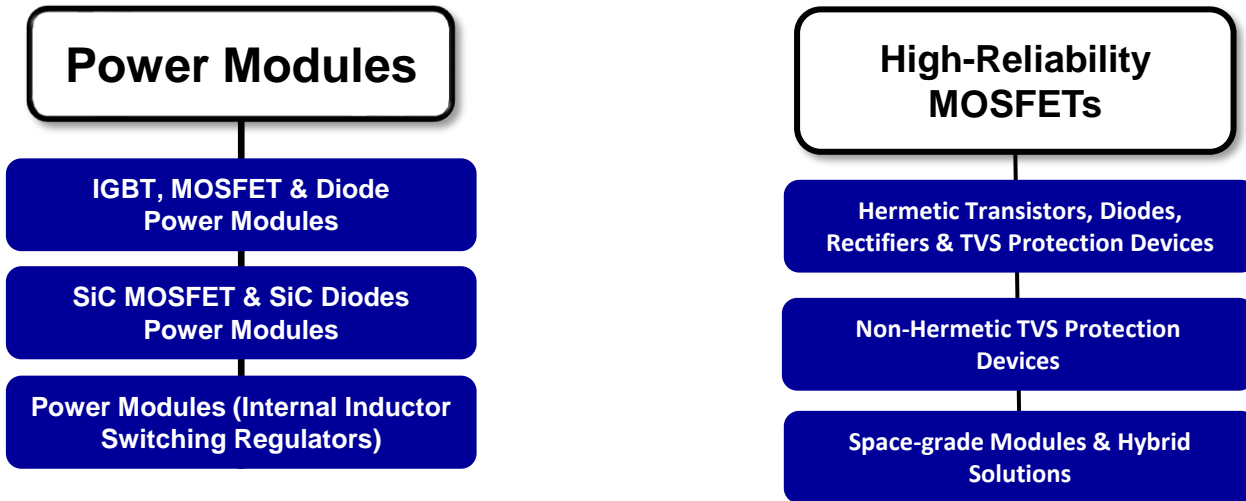
200-600kHz, 70V  
Hyper speed, Light load,  
12x12x3mm

<< BACK to Power Modules Demo & Eval Boards

<< BACK

<< Power Discretes

<< BACK to DC/DC Converters



<< Power Discretes

<< BACK

# PMICs

## 5.5V

**MIC7401**  
Configurable PMIC, five-channel 4MHz buck regulators, one 2MHz boost regulator, I<sup>2</sup>C Control, global enable

**MIC7400**  
Configurable PMIC, five-channel 4MHz buck regulators, one 2MHz boost regulator, I<sup>2</sup>C Control

**MIC2800**  
Digital PMIC, 2MHz DC/DC converter w/2 LDOs

**MCP16502**  
PMIC for SAMA5DX/SAM9X6 MPUs

**MIC2821**  
Digital PMIC, 2MHz DC/DC with 3 LDOs

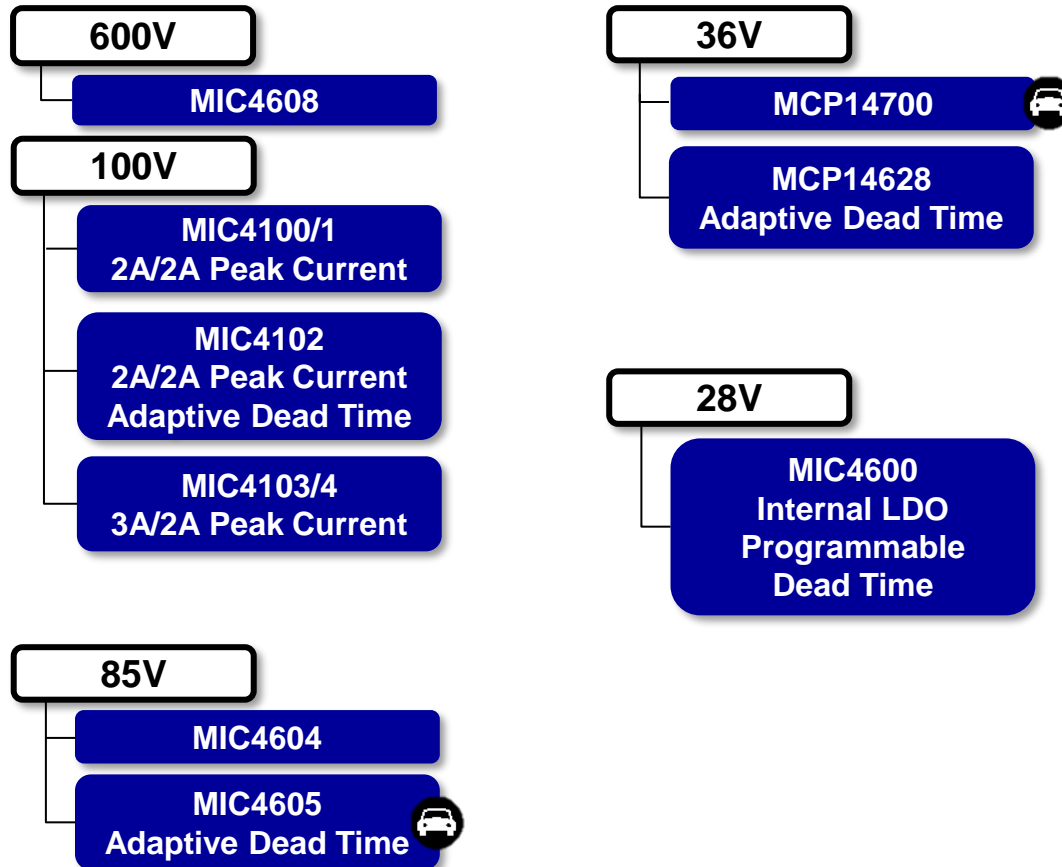
**MIC2811**  
Digital PMIC, 2MHz DC/DC with 3 LDOs

**MIC2810**  
Digital PMIC, 2MHz with 2 LDOs. LDO1 has a separate VIN pin

## 1.6V

**MIC23099**  
Single AA/AAA Cell Step-Up/Step-Down Regulators with Battery Monitoring

# Half-Bridge MOSFET Drivers







# Full-Bridge MOSFET Drivers

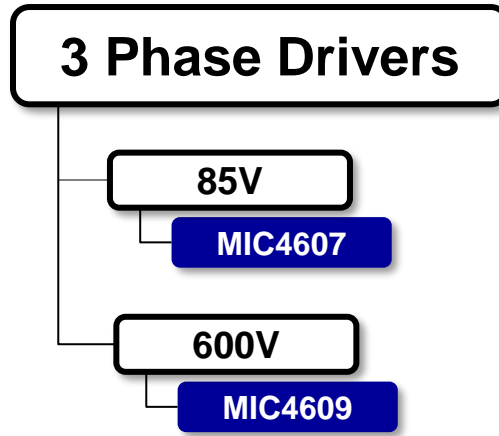
Product Tree

85V

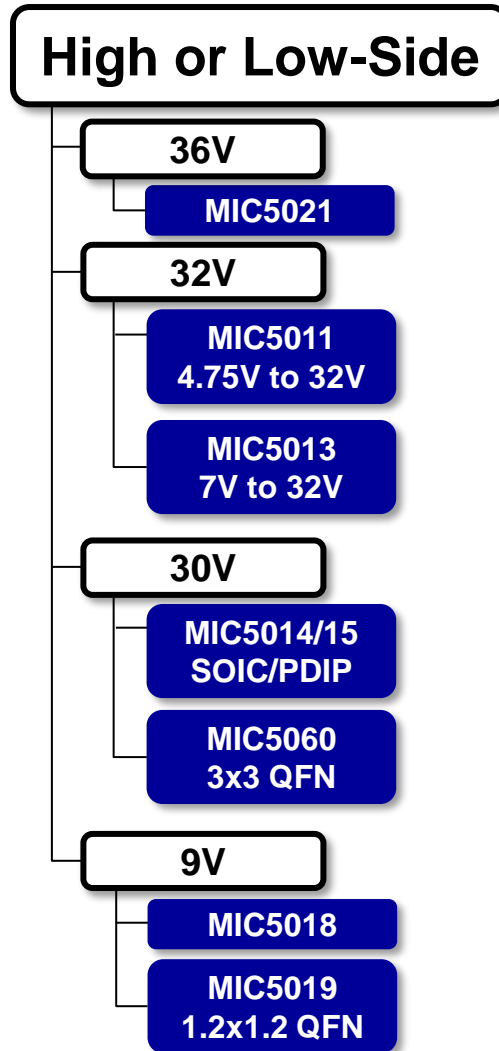
MIC4606

<< BACK

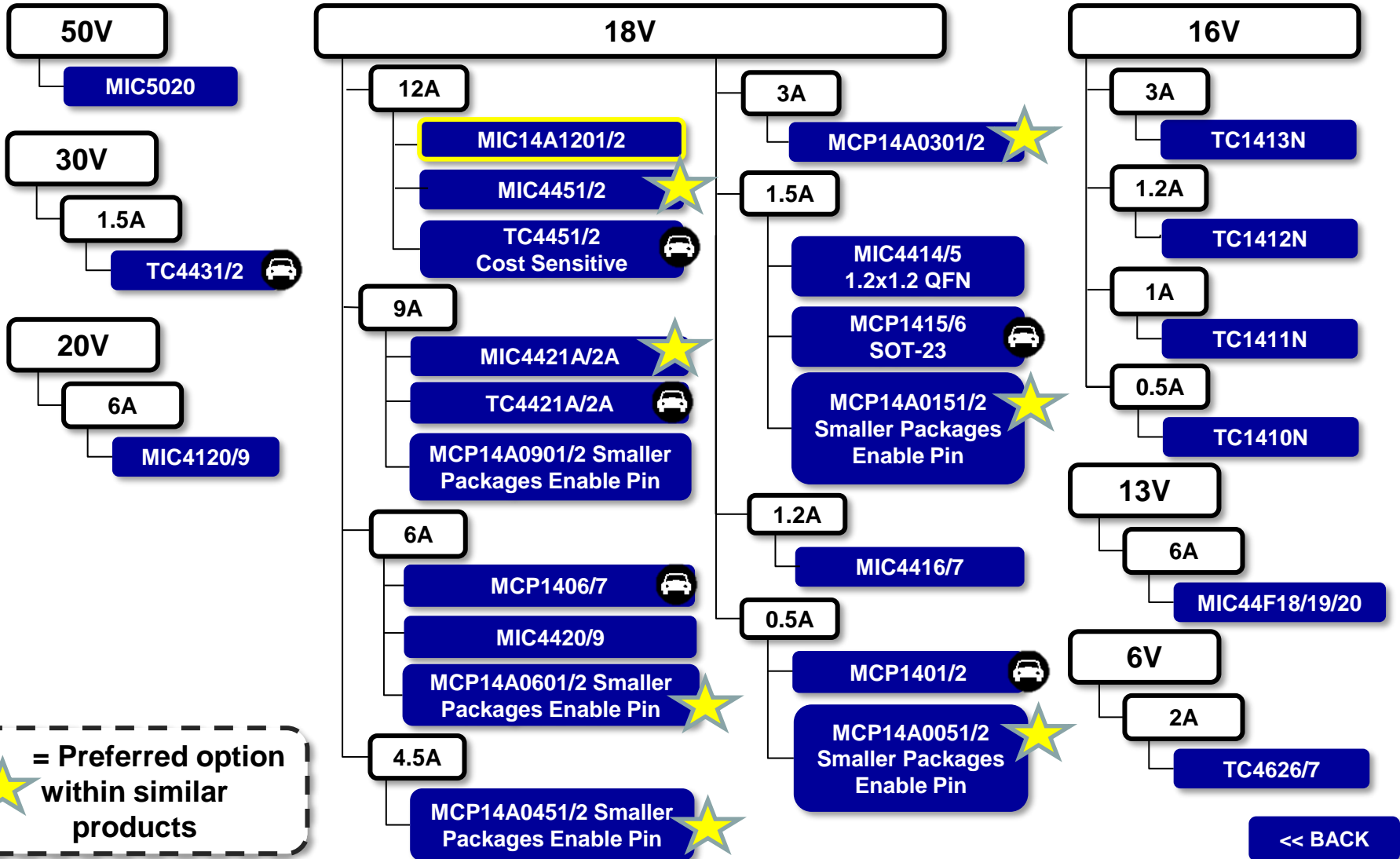
# Three-Phase MOSFET Drivers




# MOSFET Drivers High/Low Side

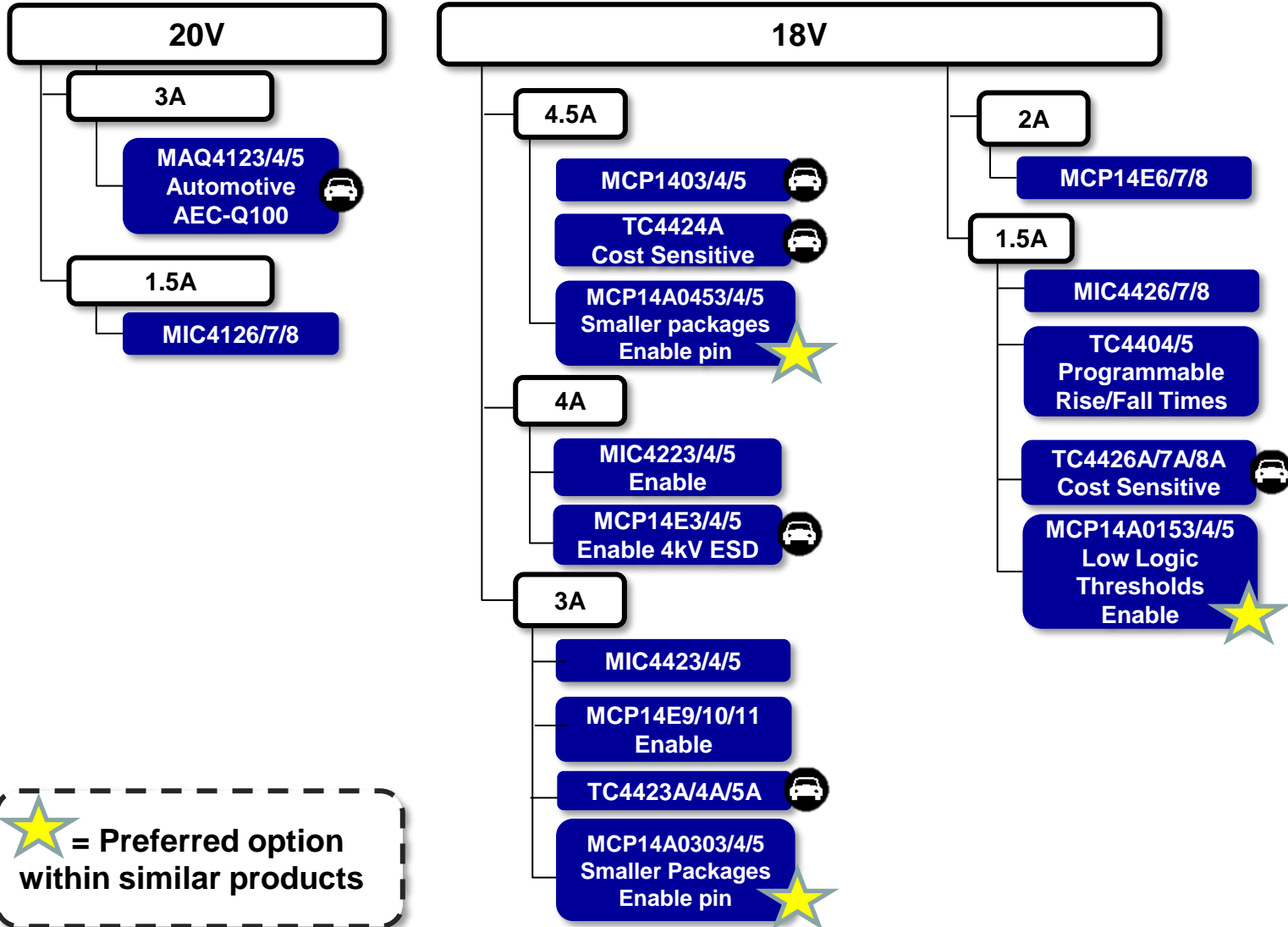



# Single Output MOSFET Drivers Low-Side



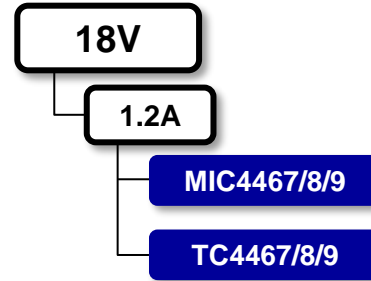
 = Preferred option within similar products

# Dual Output MOSFET Drivers Low-Side



 = Preferred option within similar products

# Quad Output MOSFET Drivers Low-Side



## Hot Swap Controllers

### Low Voltage (<16V)

#### 2 Outputs

**MIC2584**

#### 1 Output

**MIC2085/6**

**MIC2582/3/3R**

**MIC2310**

### High Voltage (>16V)

#### 1 Output

**MIC2587**

**MIC2588/94**

**MIC2595**

## E-Fuses

### LX8204

12V, 3.5A w/ Voltage Surge Protection

### LX8233

5V, 2.5A w/Bidirectional Protection, DevSleep/Disable Mode

### LX8237

Dual E-Fuses (5V/12V) + Dual Regulators w/Current Monitors & I<sup>2</sup>C

### LX8247

Dual E-Fuses (5V/12V) w/ Current Monitors & I<sup>2</sup>C

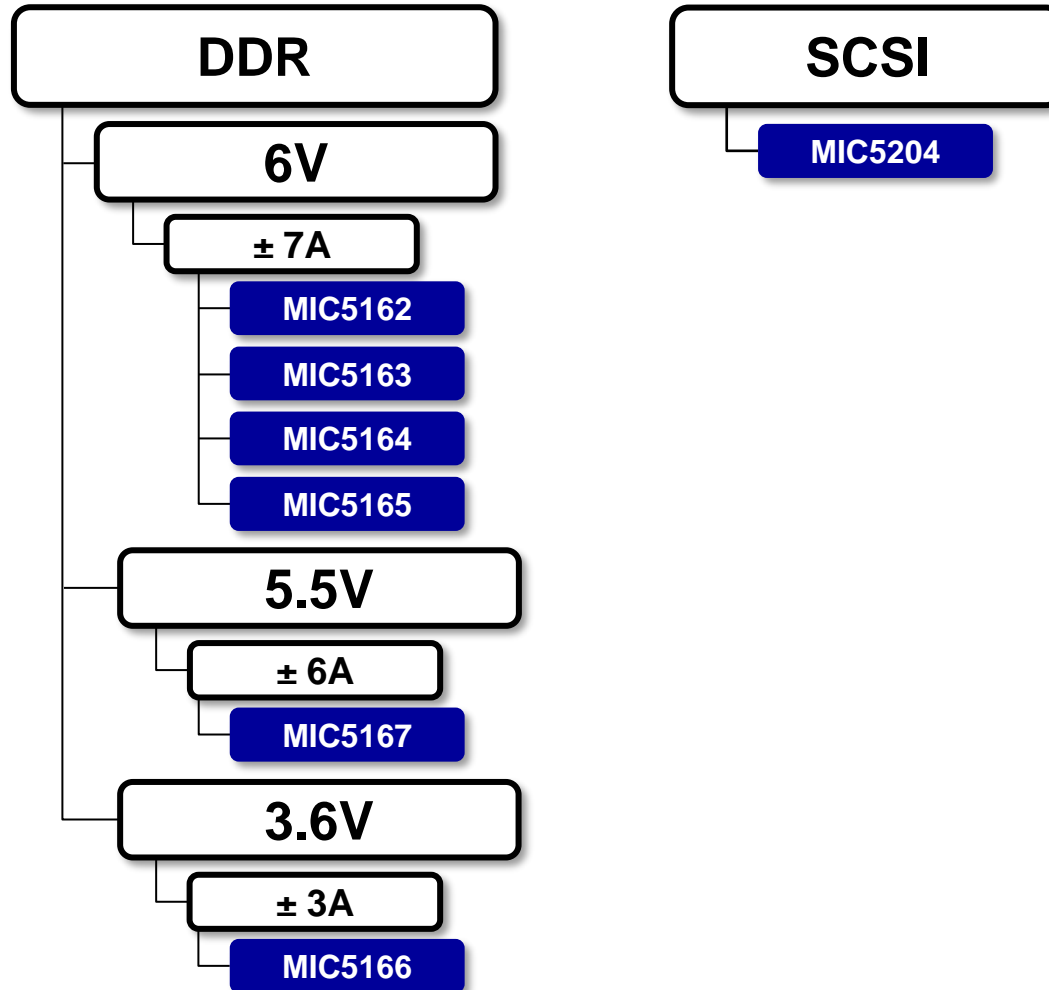
## Compact PCI/PCI-X/PCI Express

### 6 Outputs

**MIC2342**

**MIC2591B**

# DDR / SCSI Terminators





# LED Backlight Drivers

## Off Line

HV9911, 250V

HV9912, 100V

HV9961, 450V

HV9963 SEPIC

HV9967B, Int SW

HV9980, 3CH

## 40V

$I_{LIM} = 2.4A$

MIC3263  
6CH Boost

HV9985  
3-Ch SEPIC

## 20V

$I_{LIM} = 3.5A$

MIC3223

## 15V

$I_{LIM} = 750mA$

MIC2282

HV9803  
±2% accuracy

## 10V

$I_{LIM} = 4.75A$

MIC2298, 1MHz

MIC2299, 2MHz

$I_{LIM} = 1.7A$

MIC2297, 600kHz

$I_{LIM} = 1.2A$

MIC2291, 1.2MHz

$I_{LIM} = 750mA$

MIC2287, 1.2MHz

MIC2287C, 1.2MHz

MIC2289, Int Diode

MIC2289C, Int Diode

MIC2292/3, 1.6MHz

MIC2292C/3C, 2MHz

## 7V

$I_{LIM} = 750mA$

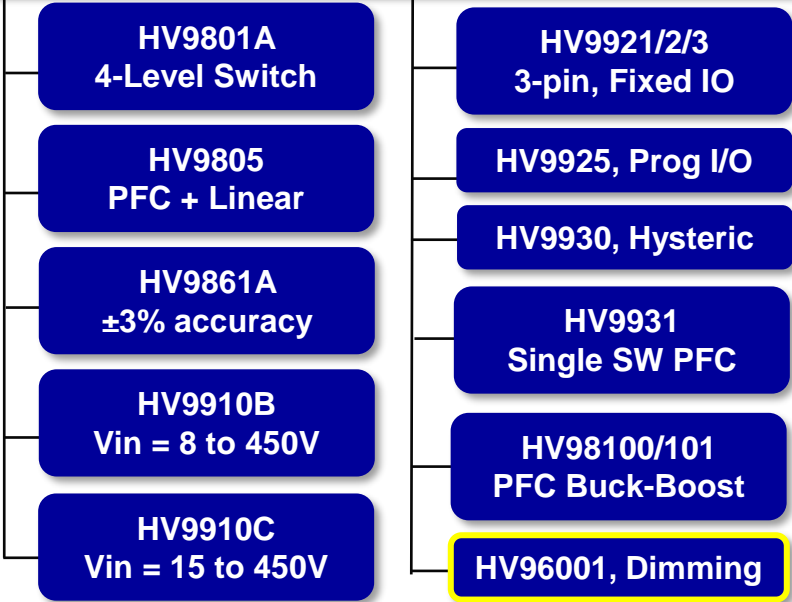
MIC3289, Diode

$I_{LIM} = 350mA$

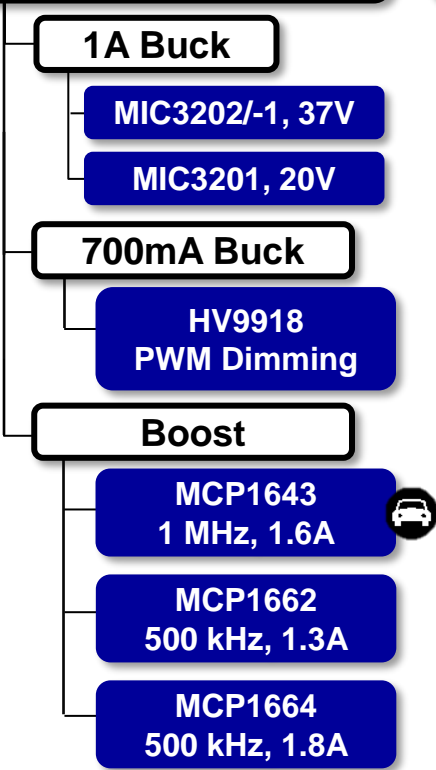
MIC3287,  $V_o=36$

# General Purpose & Automotive LED Drivers

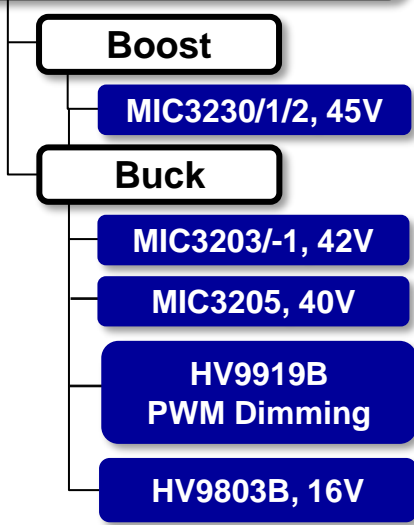
## Offline



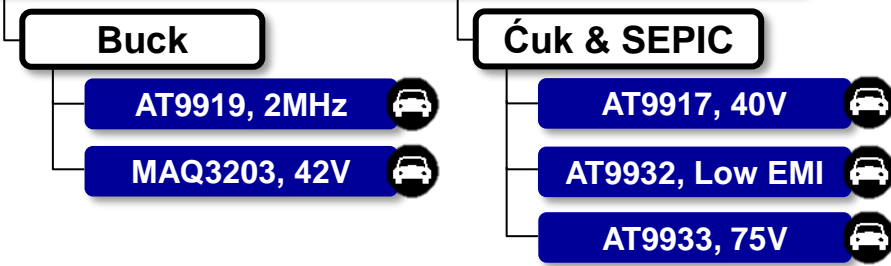
## Internal SW



## External SW



## Automotive



## 5.5V

6 LEDs @ 100mA

MIC4812

6 LEDs @ 50mA

MIC4811

6 LEDs @ 20mA

- MIC2843, PWM
- MIC2843A, DAM™
- MIC2844A, 1-wire
- MIC2846A, LDO

4 LEDs @ 20mA

MIC2842A, 1-wire

2 LEDs @ 30.2mA

- MIC2860-2D, 1-wire
- MIC2860-2P, PWM

1 LED @ 800mA

MIC4802

1 LED @ 600mA

MIC4801

## Sequential Linear

CL8800, 6-Stage,  
230V<sub>AC</sub>, QFN-33

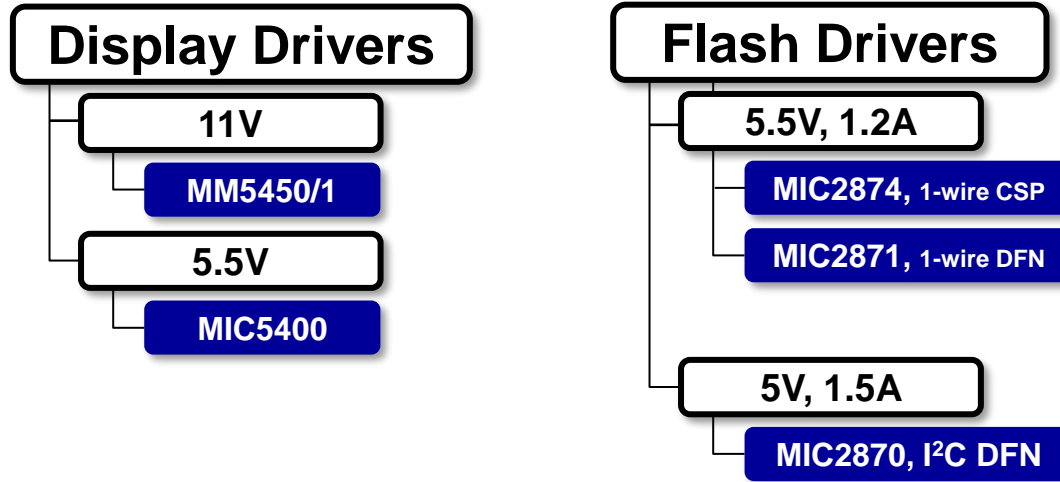
CL8801, 4-Stage,  
230V<sub>AC</sub>, QFN-33

CL88020, 4-Tap,  
120V<sub>AC</sub>, SOIC-8 EP

CL88030, 4-Tap,  
120V<sub>AC</sub>, 270V<sub>AC</sub>, QFN-10 Ld

CL88031, 6-Tap,  
120V<sub>AC</sub>, 270V<sub>AC</sub>, QFN-10 Ld

# Camera Flash Drivers & Display Drivers



# Single & Dual High-Side Power Switches

## Single 13.5V

1A

MIC94030

## Single 5.5V

7A

MIC95410

3A

MIC94161/2/3/4/5

MIC94040/1/2/3

MIC94044/5

2A

MIC94052/3

MIC94060/1/2/3

MIC94064/5

MIC94080/1/2/3/4/5

1.8A

MIC94050/1

1.2A

MIC94070/1/2/3

MIC94090/1/2/3/4/5

## Dual 5.5V

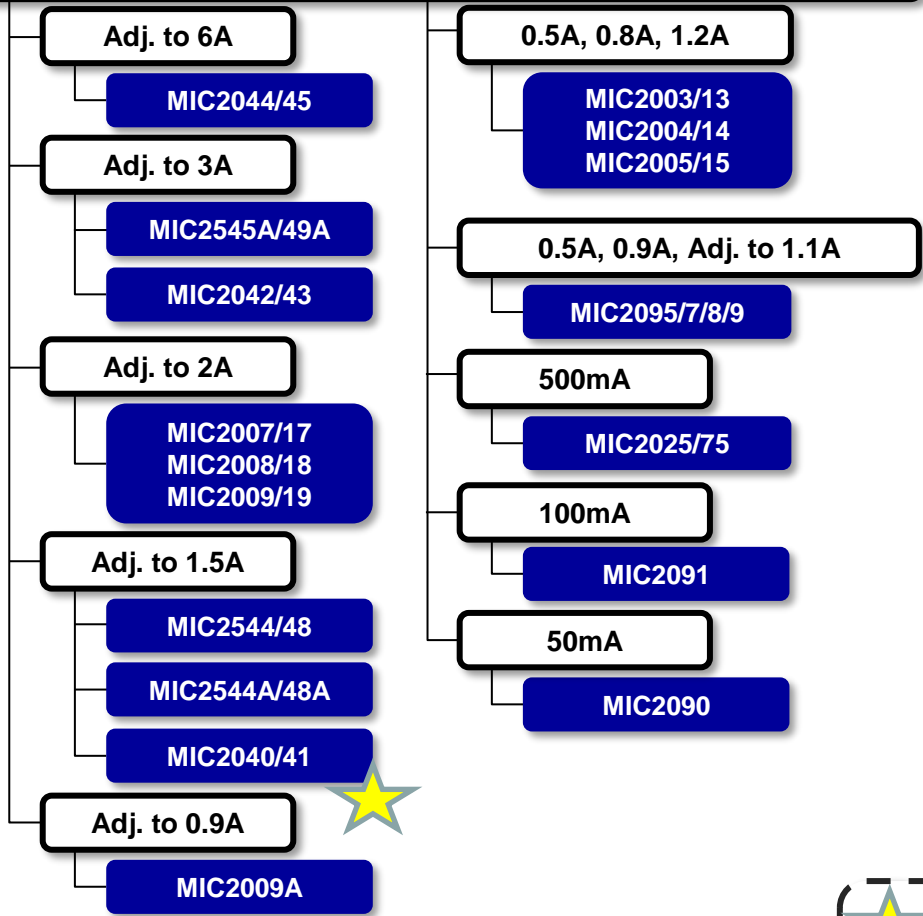
2A

MIC94066/7/8/9

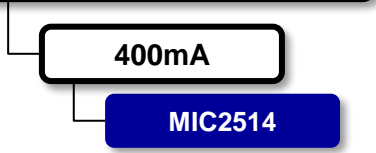
# USB Power Switches

Product Tree

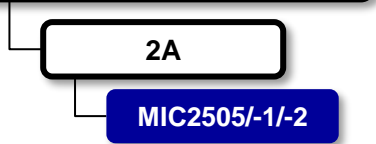
## Single 5.5V



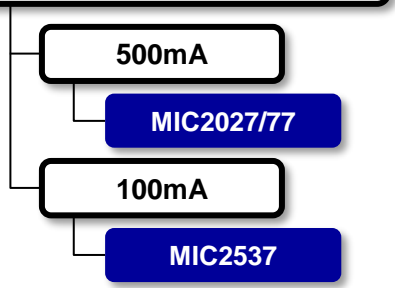
## Single 13.5V



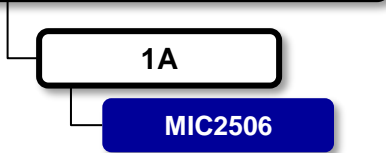
## Single 7.5V



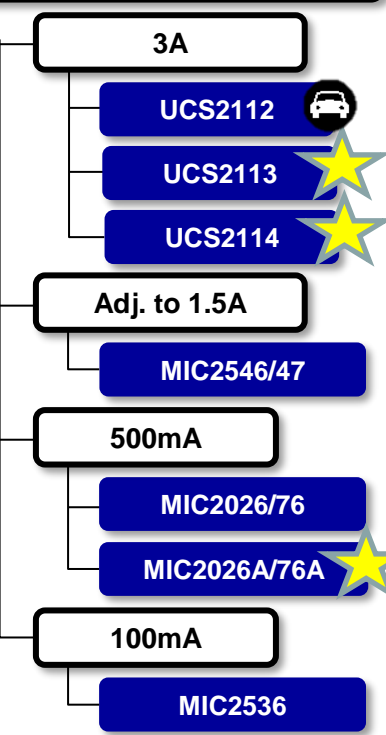
## Quad 5.5V



## Dual 7.5V



## Dual 5.5V



 = Preferred option within similar products

<< BACK

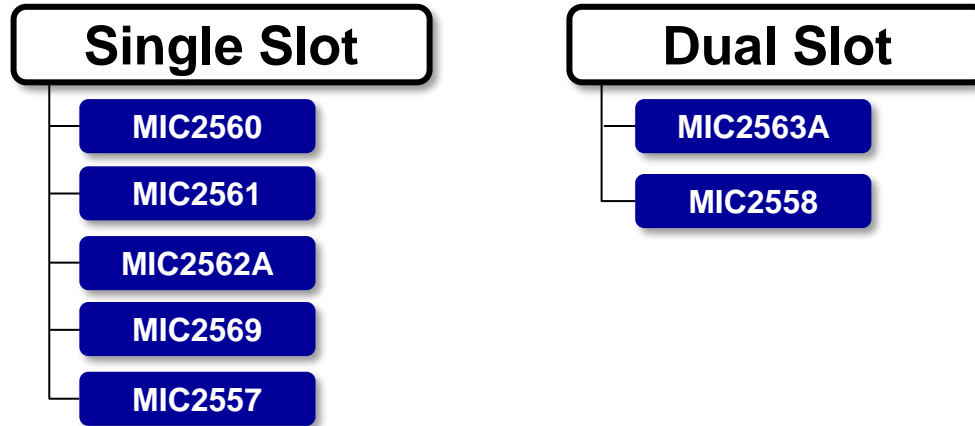
## USB Transceivers

MIC2550A

MIC2551A

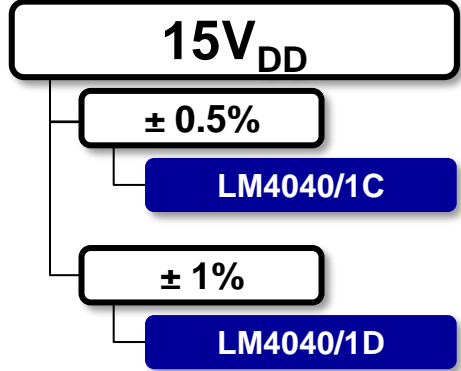
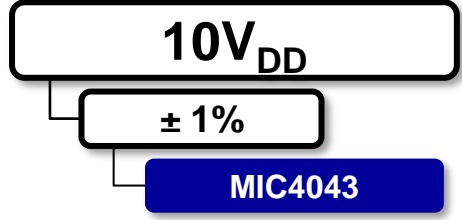
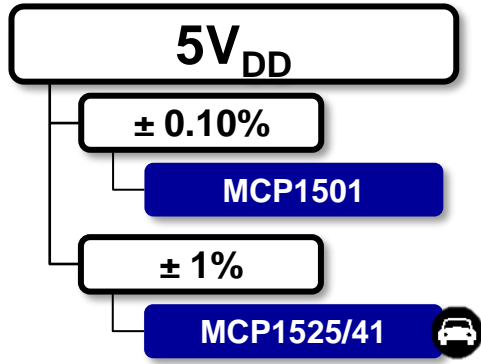
MIC2551A-2.5

MIC2555

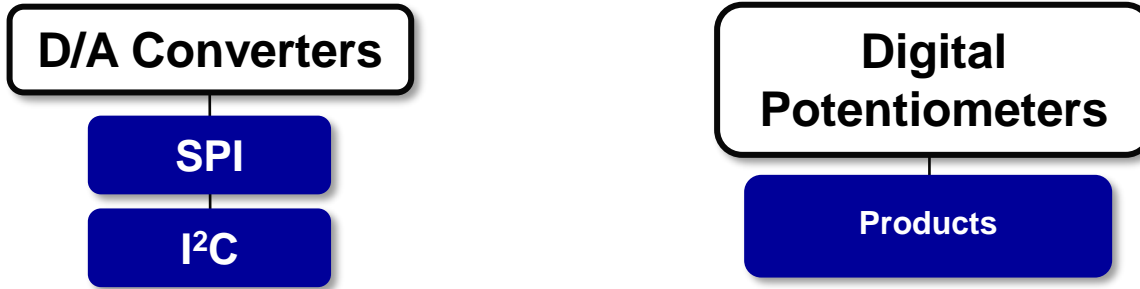




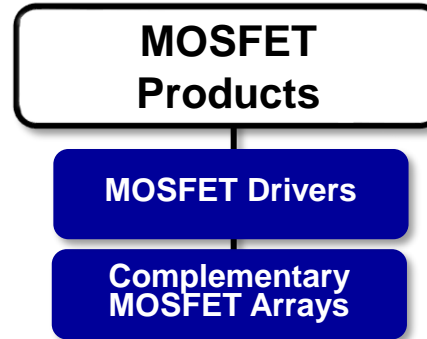
# Voltage References



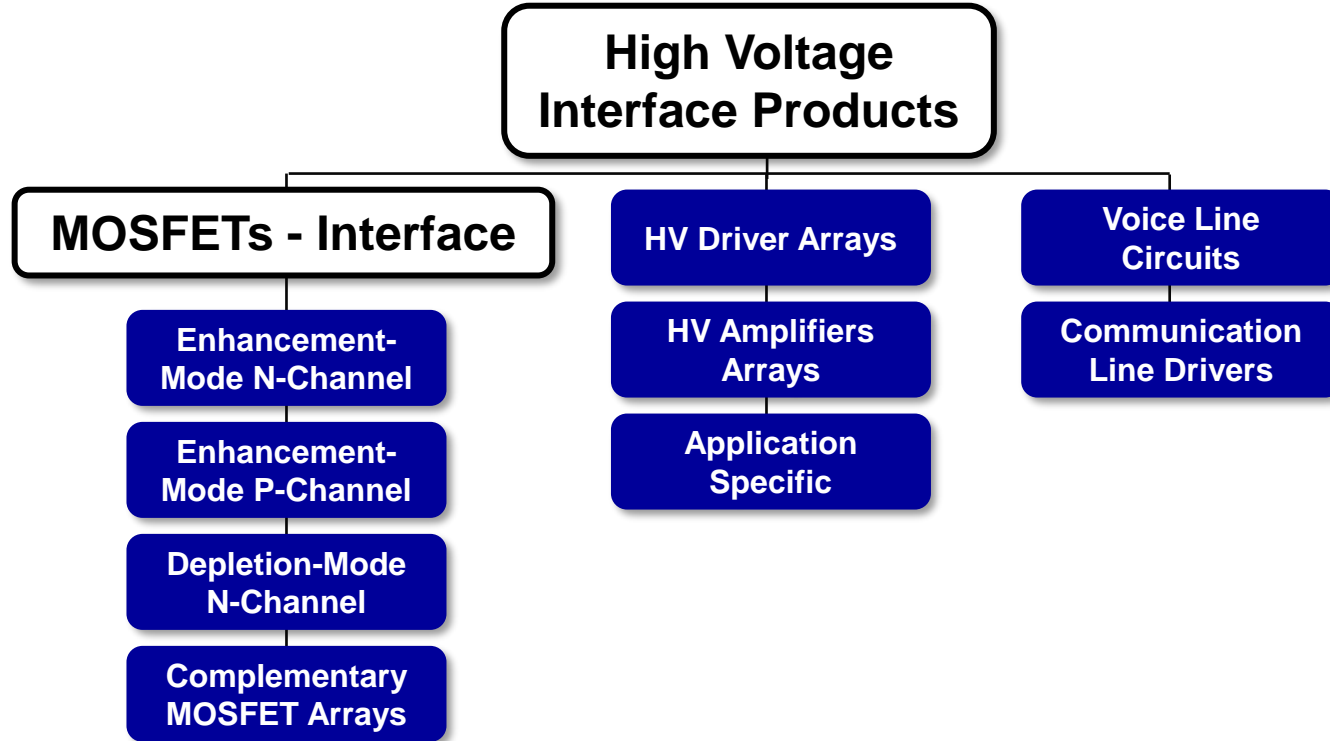
# DACs & Digital Potentiometers



# Ultrasound MOSFET Products

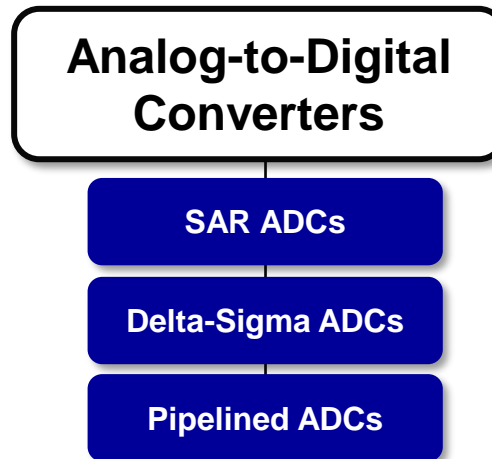


# High Voltage Interface



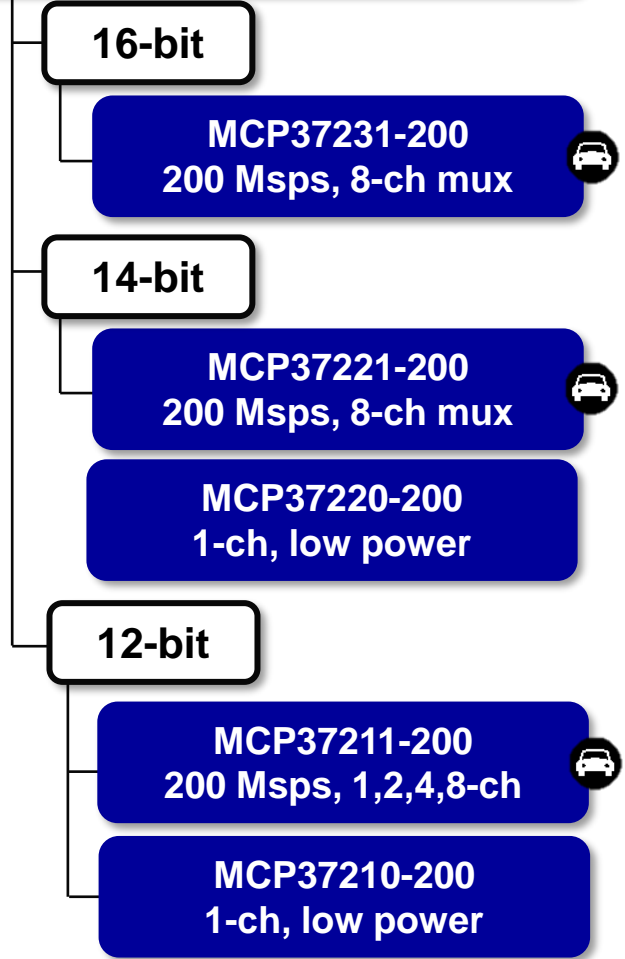


# Analog-to-Digital Converters

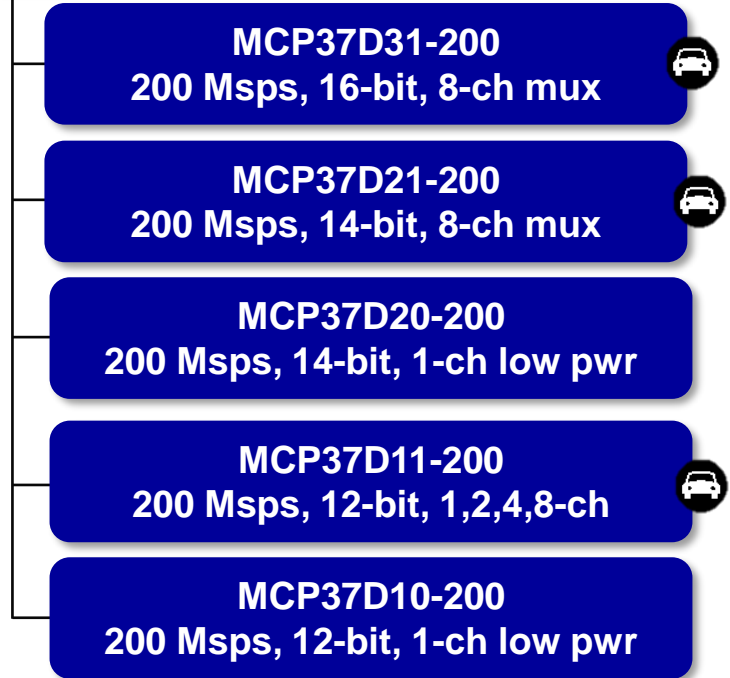


# Pipelined A/D Converters

## Standard Pipelined ADCs



## ADC with Integrated Digital Down-converter



# Complementary MOSFET Arrays

## Complementary

**TC1550**  
N-CH: 500V  $BV_{DSS}$ , 60 $\Omega$   $R_{DS(ON)}$   
P-CH: -500V  $BV_{DSS}$ , 125 $\Omega$   $R_{DS(ON)}$

**TC2320**  
N-CH: 200V  $BV_{DSS}$ , 7 $\Omega$   $R_{DS(ON)}$   
P-CH: -200V  $BV_{DSS}$ , 12 $\Omega$   $R_{DS(ON)}$

**TC6215**  
N-CH: 150V  $BV_{DSS}$ , 4 $\Omega$   $R_{DS(ON)}$   
P-CH: -150V  $BV_{DSS}$ , 7 $\Omega$   $R_{DS(ON)}$

**TC6320**  
N-CH: 200V  $BV_{DSS}$ , 7 $\Omega$   $R_{DS(ON)}$   
P-CH: -200V  $BV_{DSS}$ , 8 $\Omega$   $R_{DS(ON)}$

**TC7920**  
N-CH: 200V  $BV_{DSS}$ , 13 $\Omega$   $R_{DS(ON)}$   
P-CH: -200V  $BV_{DSS}$ , 15 $\Omega$   $R_{DS(ON)}$

**TC8020**  
N-CH: 200V  $BV_{DSS}$ , 8 $\Omega$   $R_{DS(ON)}$   
P-CH: -200V  $BV_{DSS}$ , 9.5 $\Omega$   $R_{DS(ON)}$

**TC8220**  
N-CH: 200V  $BV_{DSS}$ , 5.3 $\Omega$   $R_{DS(ON)}$   
P-CH: -200V  $BV_{DSS}$ , 6.5 $\Omega$   $R_{DS(ON)}$

## N-Channel

**TD9944**  
240V  $BV_{DSS}$ , 6 $\Omega$   $R_{DS(ON)}$

[<< BACK to Ultrasound](#)

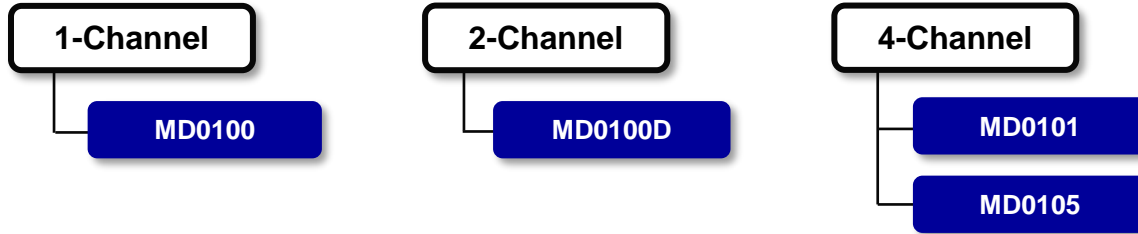
[<< BACK to High Voltage Interface](#)



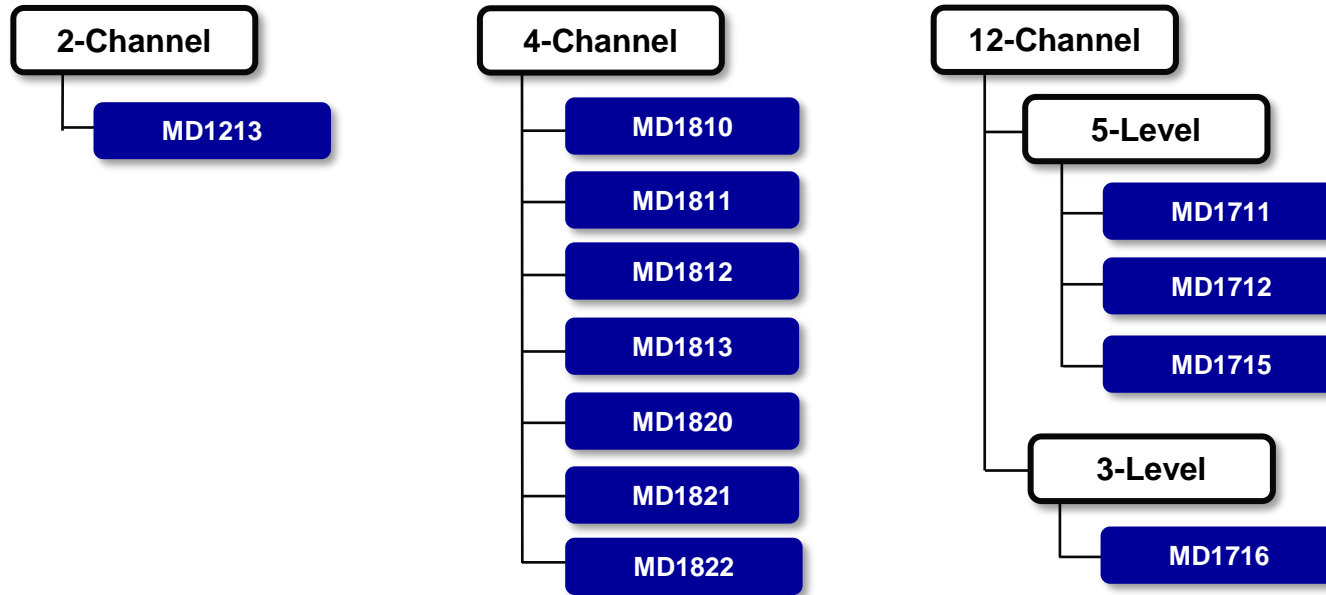


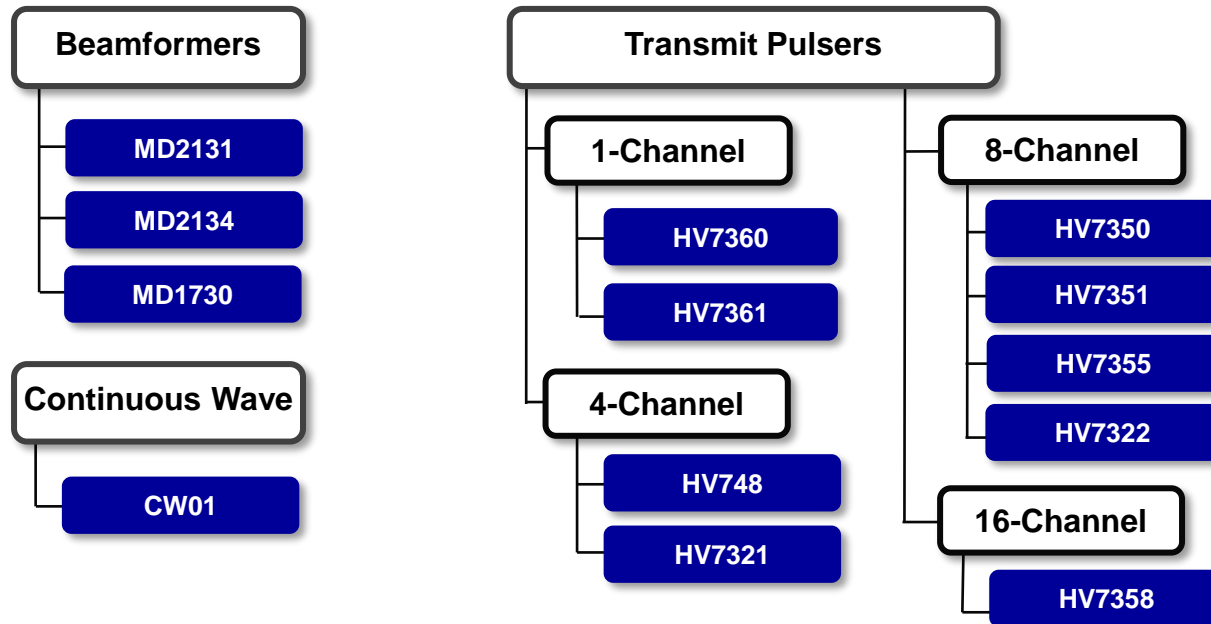
# Ultrasound Transmit/Receive Switch ICs

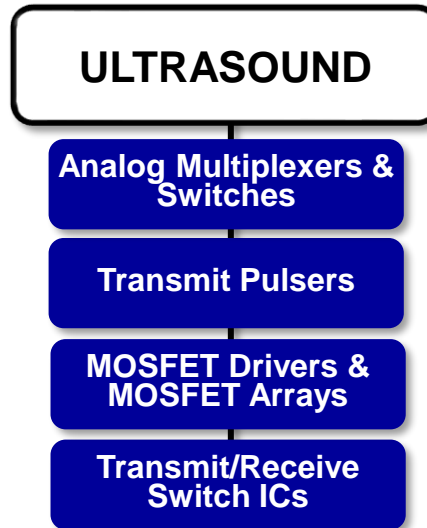
Product Tree



# Ultrasound MOSFET Drivers



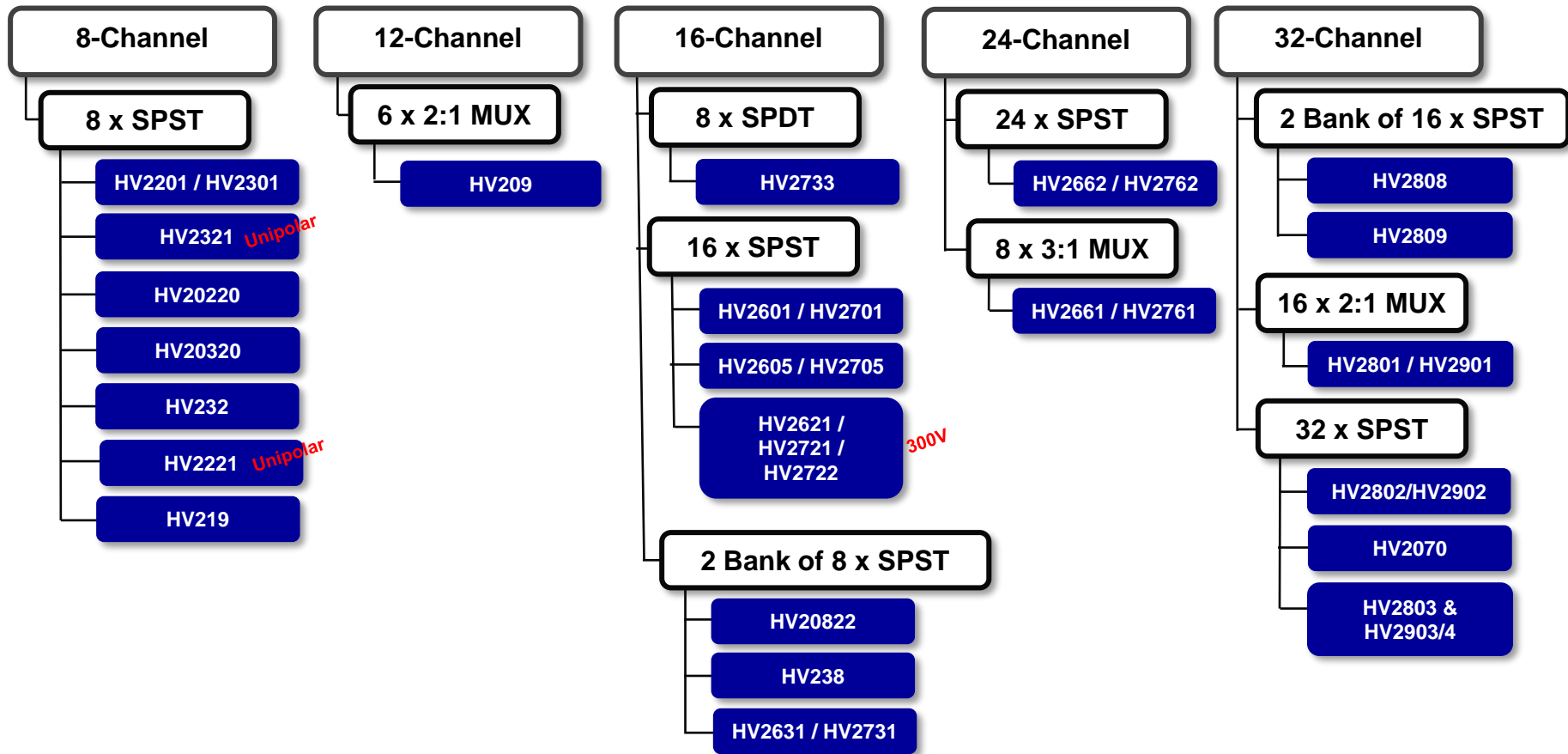


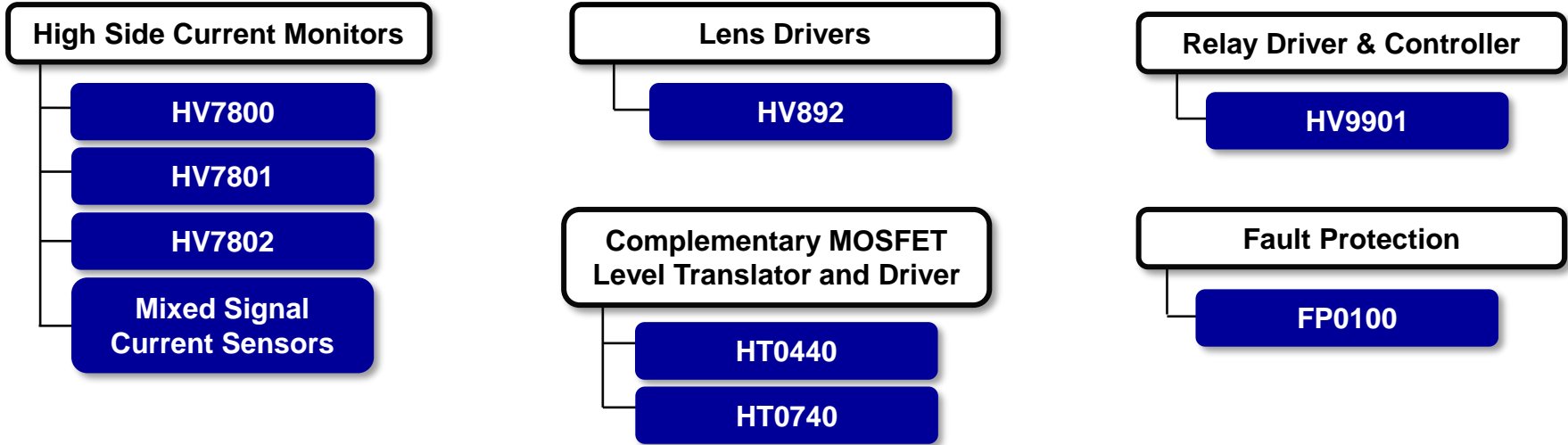


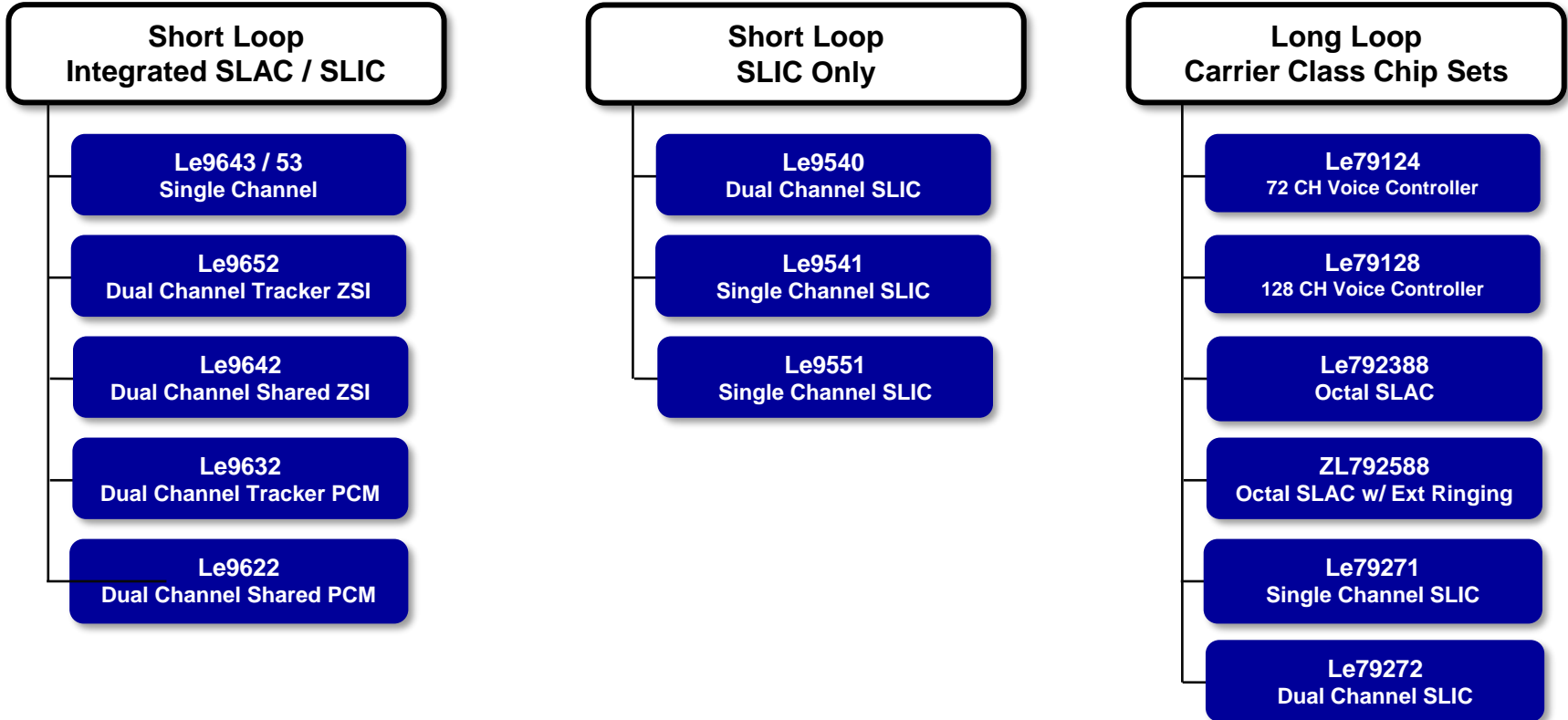


# Ultrasound Analog Multiplexers & Switches

Product Tree







## xDSL Line Drivers

- Le87251  
2 CH ADSL2+ Driver
- Le87270  
1 CH VDSL2 Class AB
- Le87271  
1 CH xDSL Class AB
- Le87557  
1 CH xDSL Class AB
- Le87290  
2 CH VDSL2 Class H

## G Fast Line Drivers

- Le87281  
1 CH G.Fast Driver
- Le87282  
2 CH G.Fast Driver
- Le87285  
1 CH G.Fast Driver
- Le87286  
1 CH G.Fast Driver

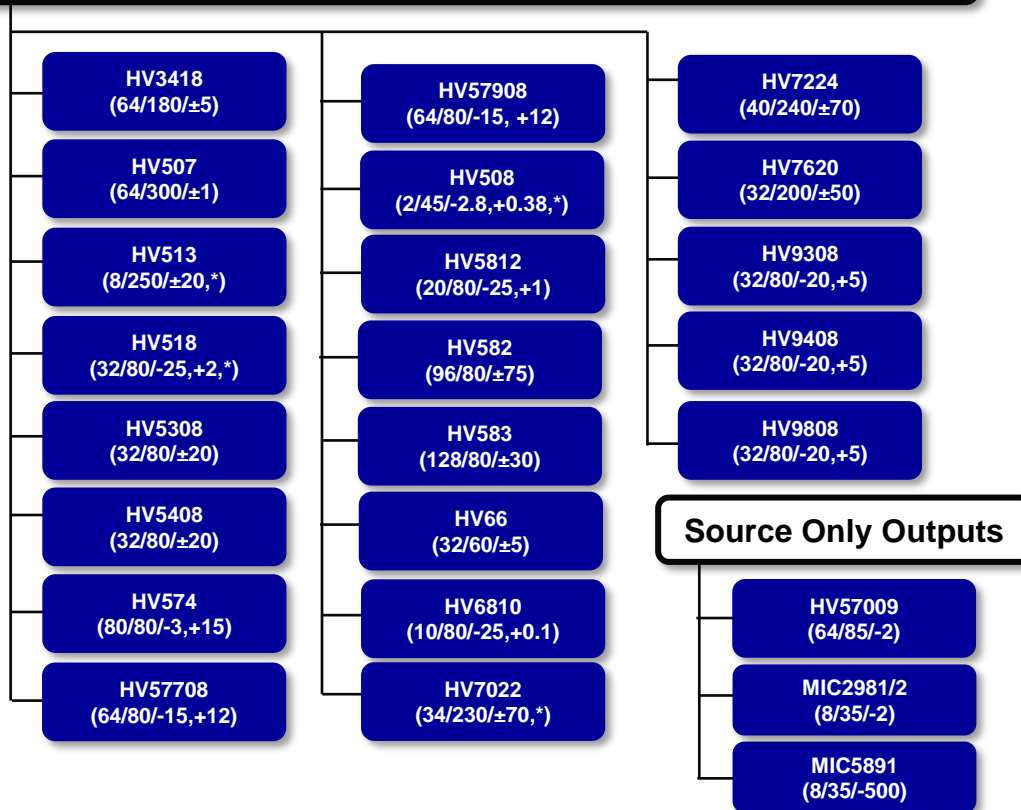
## Power Line Communication Line Drivers

- Le87401  
1 CH Class GH
- Le87402  
2 CH Class GH
- Le87501  
1 CH Class AB
- Le87511  
1 CH Class AB w/ Gain
- Le87611  
1 CH Class AB w/ 100mA Drive
- Le87612  
2 CH Class AB w/ 100mA Drive

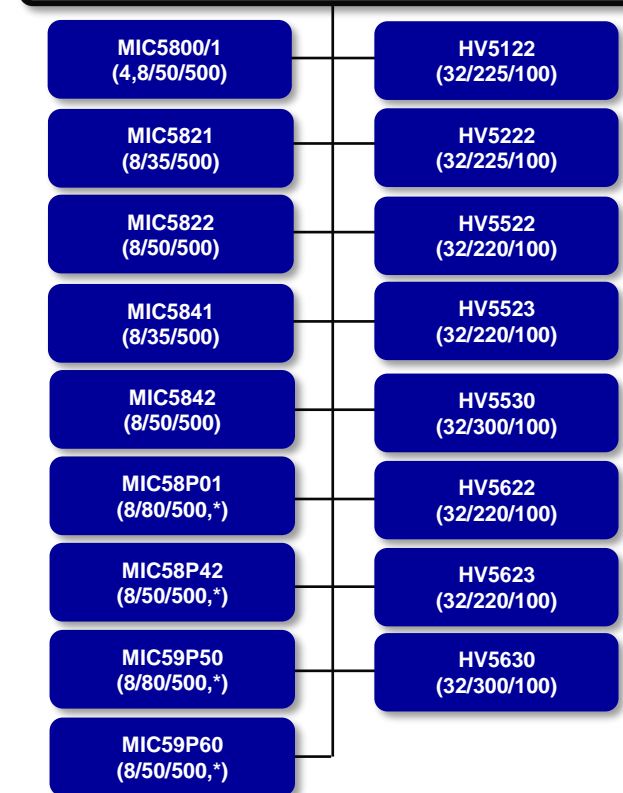


# HV Driver Arrays

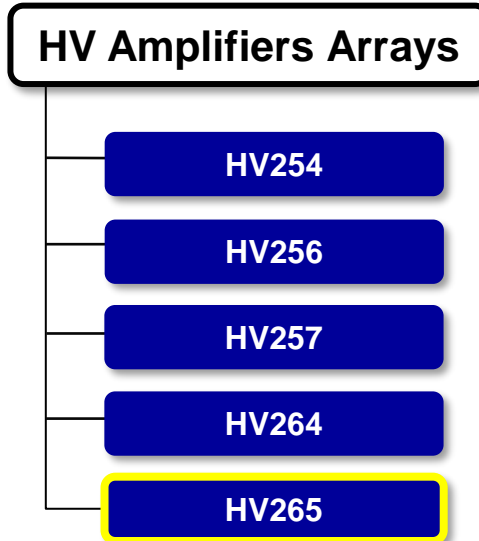
## Source-Sink Outputs



## Sink Only Outputs



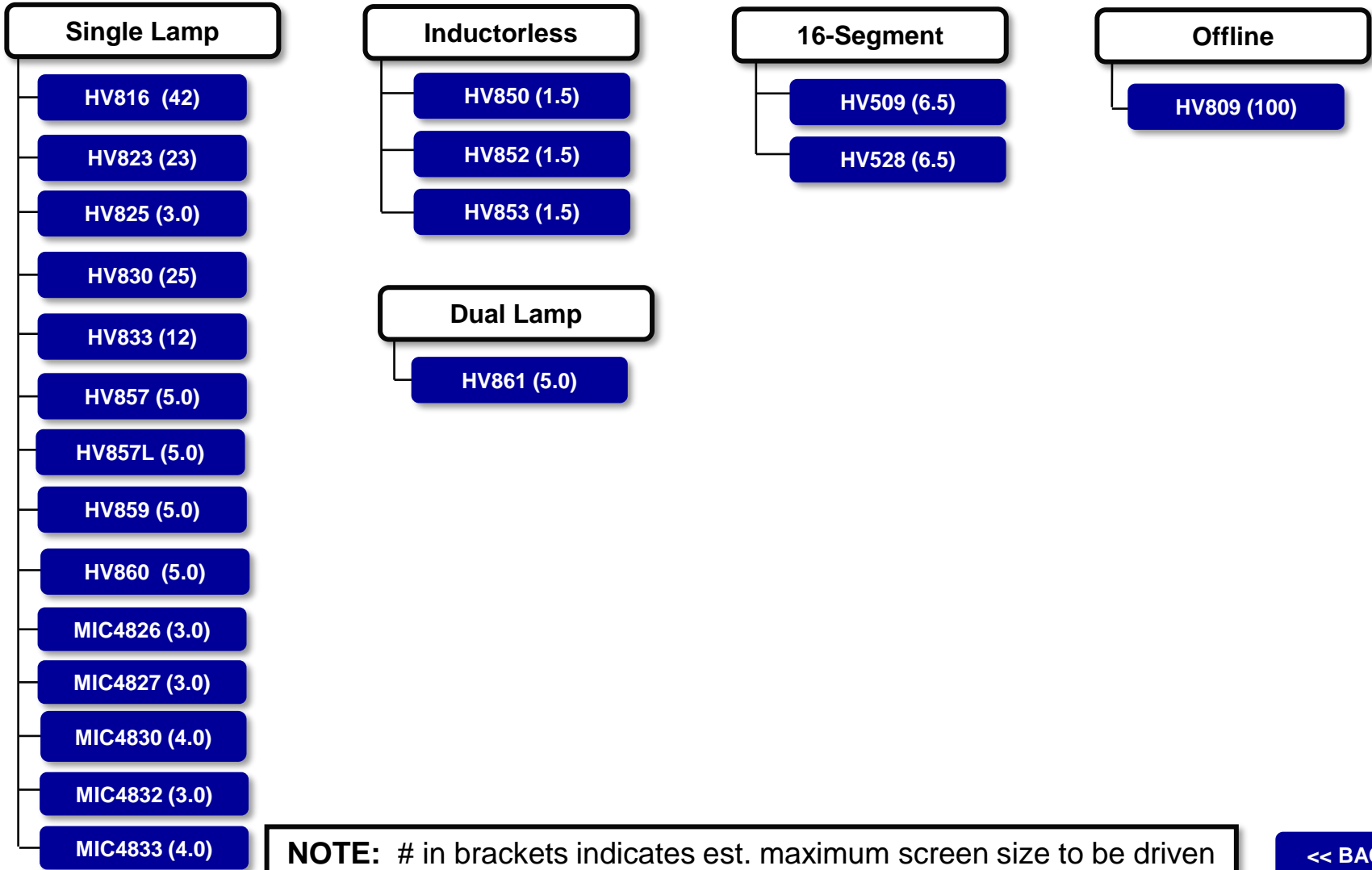
**NOTE:** ##/## below part number are Channel Count/Voltage Out (Operating)/Current per Channel (mA), and \* if there is are notes in mouse-over text. Each have their own considerations w.r.t. digital controls.





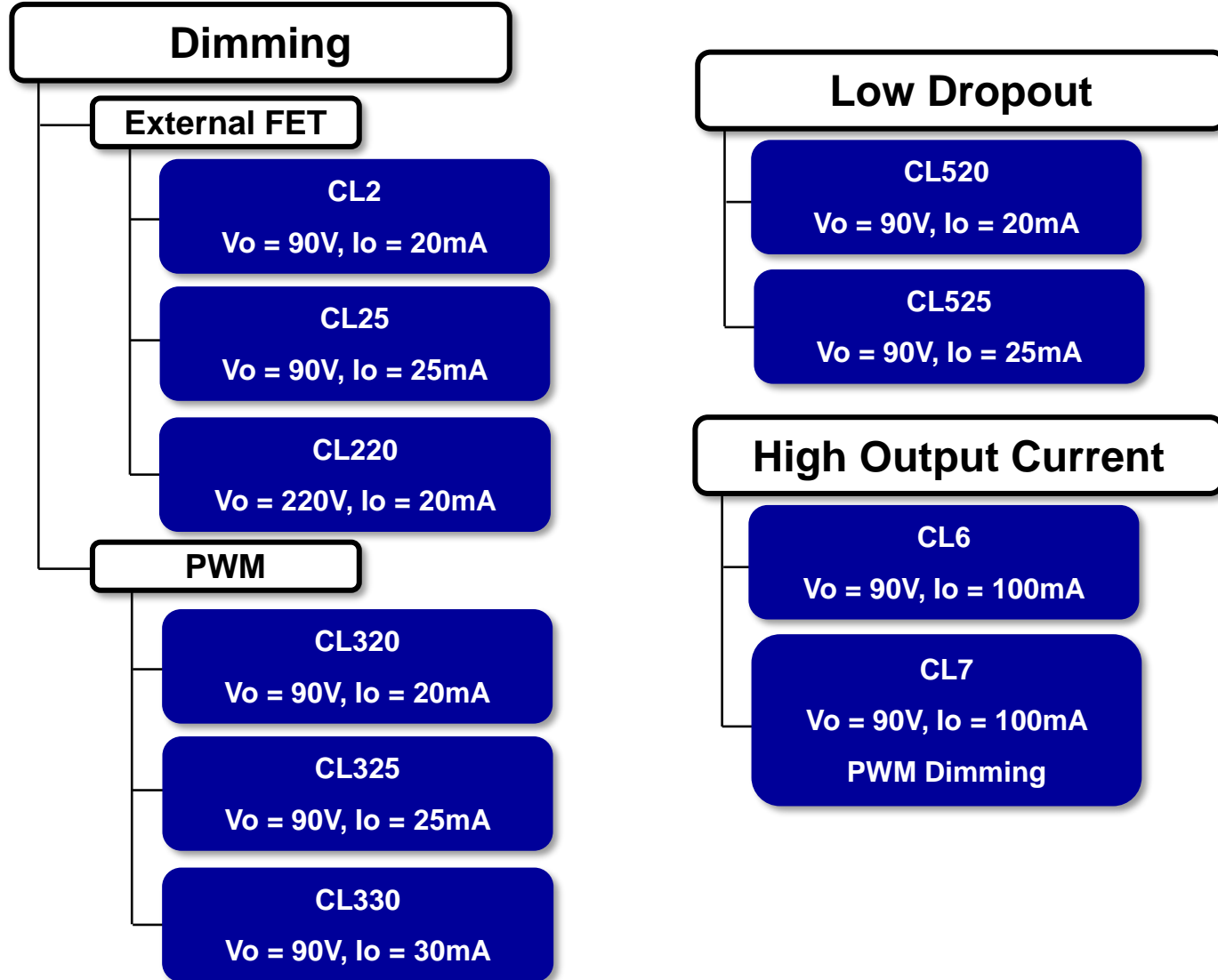
# Electroluminescent (EL) Backlight Drivers

Product Tree

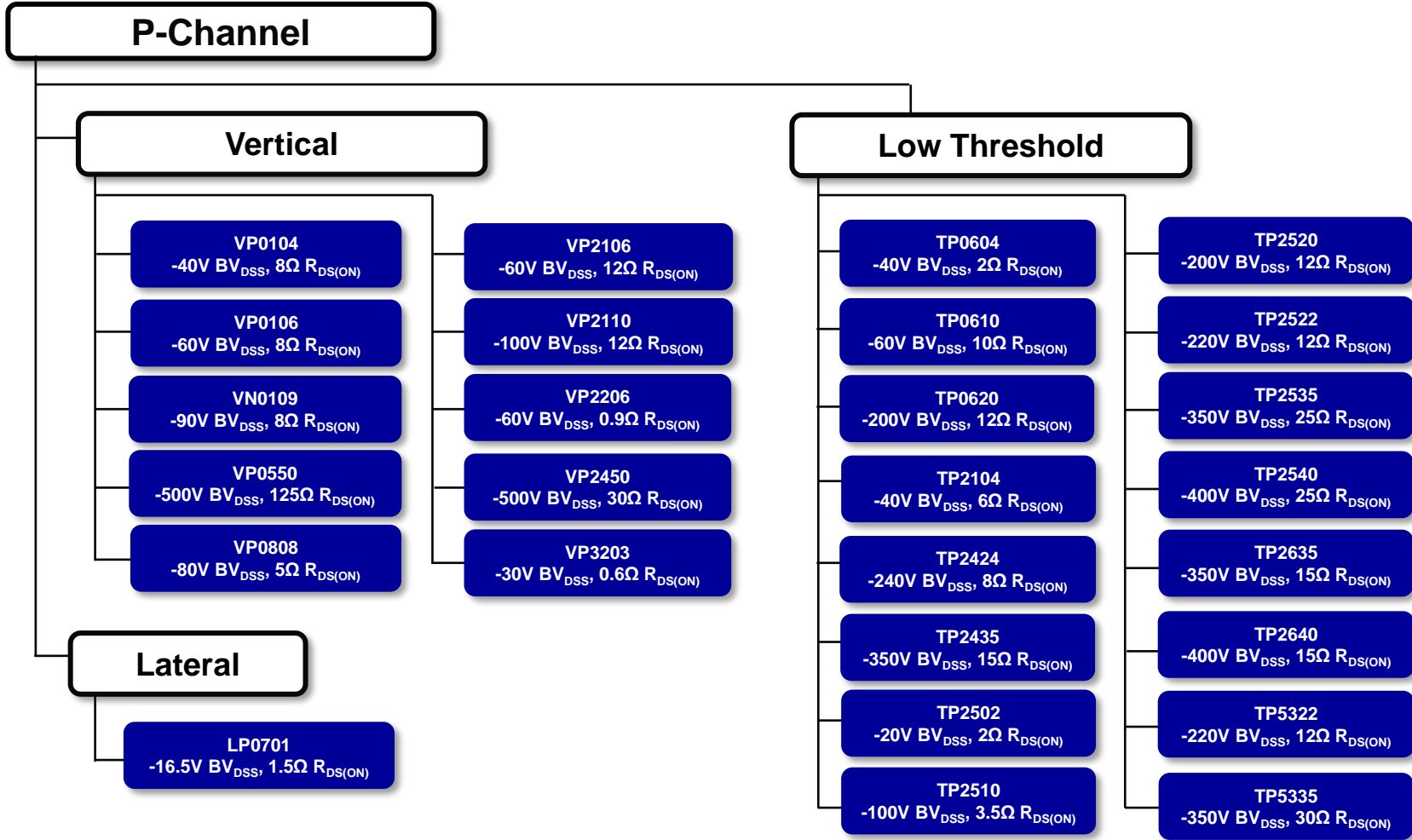


<< BACK

# Linear Current Regulators



# P-Channel Enhancement Mode MOSFETs



# N-Channel Enhancement Mode MOSFETs

**N-Channel**

**Vertical**

**Low Threshold**

- |   |   |   |
|---|---|---|
| <b>2N6660</b><br>60V $BV_{DSS}$ , 3 $\Omega$ $R_{DS(ON)}$   | <b>VN0606</b><br>60V $BV_{DSS}$ , 3 $\Omega$ $R_{DS(ON)}$     | <b>VN2410</b><br>240V $BV_{DSS}$ , 10 $\Omega$ $R_{DS(ON)}$ |
| <b>2N6661</b><br>90V $BV_{DSS}$ , 4 $\Omega$ $R_{DS(ON)}$   | <b>VN0808</b><br>80V $BV_{DSS}$ , 4 $\Omega$ $R_{DS(ON)}$     | <b>VN2450</b><br>500V $BV_{DSS}$ , 13 $\Omega$ $R_{DS(ON)}$ |
| <b>2N7000</b><br>60V $BV_{DSS}$ , 5 $\Omega$ $R_{DS(ON)}$   | <b>VN10K</b><br>60V $BV_{DSS}$ , 5 $\Omega$ $R_{DS(ON)}$      | <b>VN2460</b><br>600V $BV_{DSS}$ , 20 $\Omega$ $R_{DS(ON)}$ |
| <b>2N7002</b><br>60V $BV_{DSS}$ , 7.5 $\Omega$ $R_{DS(ON)}$ | <b>VN1206</b><br>120V $BV_{DSS}$ , 6 $\Omega$ $R_{DS(ON)}$    | <b>VN3205</b><br>50V $BV_{DSS}$ , 0.3 $\Omega$ $R_{DS(ON)}$ |
| <b>2N7008</b><br>60V $BV_{DSS}$ , 7.5 $\Omega$ $R_{DS(ON)}$ | <b>VN2106</b><br>60V $BV_{DSS}$ , 4 $\Omega$ $R_{DS(ON)}$     | <b>VN4012</b><br>400V $BV_{DSS}$ , 12 $\Omega$ $R_{DS(ON)}$ |
| <b>VN0104</b><br>40V $BV_{DSS}$ , 3 $\Omega$ $R_{DS(ON)}$   | <b>VN2110</b><br>100V $BV_{DSS}$ , 4 $\Omega$ $R_{DS(ON)}$    |   |
| <b>VN0106</b><br>60V $BV_{DSS}$ , 3 $\Omega$ $R_{DS(ON)}$   | <b>VN2210</b><br>100V $BV_{DSS}$ , 0.35 $\Omega$ $R_{DS(ON)}$ |   |
| <b>VN0109</b><br>90V $BV_{DSS}$ , 3 $\Omega$ $R_{DS(ON)}$   | <b>VN2222</b><br>60V $BV_{DSS}$ , 7.5 $\Omega$ $R_{DS(ON)}$   |   |
| <b>VN0300</b><br>30V $BV_{DSS}$ , 1.2 $\Omega$ $R_{DS(ON)}$ | <b>VN2224</b><br>240V $BV_{DSS}$ , 1.25 $\Omega$ $R_{DS(ON)}$ |   |
| <b>VN0550</b><br>500V $BV_{DSS}$ , 60 $\Omega$ $R_{DS(ON)}$ | <b>VN2406</b><br>240V $BV_{DSS}$ , 6 $\Omega$ $R_{DS(ON)}$    |   |

- |  |  |
|--|--|
| <b>TN0104</b><br>40V $BV_{DSS}$ , 1.8 $\Omega$ $R_{DS(ON)}$  | <b>TN2425</b><br>250V $BV_{DSS}$ , 3.5 $\Omega$ $R_{DS(ON)}$ |
| <b>TN0106</b><br>60V $BV_{DSS}$ , 3 $\Omega$ $R_{DS(ON)}$    | <b>TN2435</b><br>350V $BV_{DSS}$ , 6 $\Omega$ $R_{DS(ON)}$   |
| <b>TN0110</b><br>100V $BV_{DSS}$ , 3 $\Omega$ $R_{DS(ON)}$   | <b>TN2501</b><br>18V $BV_{DSS}$ , 2.5 $\Omega$ $R_{DS(ON)}$  |
| <b>TN0604</b><br>40V $BV_{DSS}$ , 0.75 $\Omega$ $R_{DS(ON)}$ | <b>TN2504</b><br>40V $BV_{DSS}$ , 1 $\Omega$ $R_{DS(ON)}$    |
| <b>TN0606</b><br>60V $BV_{DSS}$ , 1.5 $\Omega$ $R_{DS(ON)}$  | <b>TN2510</b><br>100V $BV_{DSS}$ , 1.5 $\Omega$ $R_{DS(ON)}$ |
| <b>TN0610</b><br>100V $BV_{DSS}$ , 1.5 $\Omega$ $R_{DS(ON)}$ | <b>TN2524</b><br>240V $BV_{DSS}$ , 6 $\Omega$ $R_{DS(ON)}$   |
| <b>TN0620</b><br>200V $BV_{DSS}$ , 6 $\Omega$ $R_{DS(ON)}$   | <b>TN2540</b><br>400V $BV_{DSS}$ , 12 $\Omega$ $R_{DS(ON)}$  |
| <b>TN0702</b><br>20V $BV_{DSS}$ , 1.3 $\Omega$ $R_{DS(ON)}$  | <b>TN2640</b><br>400V $BV_{DSS}$ , 5 $\Omega$ $R_{DS(ON)}$   |
| <b>TN2106</b><br>60V $BV_{DSS}$ , 2.5 $\Omega$ $R_{DS(ON)}$  | <b>TN5325</b><br>250V $BV_{DSS}$ , 7 $\Omega$ $R_{DS(ON)}$   |
| <b>TN2124</b><br>240V $BV_{DSS}$ , 15 $\Omega$ $R_{DS(ON)}$  | <b>TN5335</b><br>350V $BV_{DSS}$ , 15 $\Omega$ $R_{DS(ON)}$  |
| <b>TN2130</b><br>300V $BV_{DSS}$ , 25 $\Omega$ $R_{DS(ON)}$  |  |

# Depletion Mode MOSFETs

## N-Channel

### Vertical

**DN1509**  
90V  $BV_{DSX}$ , 6 $\Omega$   $R_{DS(ON)}$

**DN2450**  
500V  $BV_{DSX}$ , 10 $\Omega$   $R_{DS(ON)}$

**DN2470**  
700V  $BV_{DSX}$ , 42 $\Omega$   $R_{DS(ON)}$

**DN2530**  
300V  $BV_{DSX}$ , 12 $\Omega$   $R_{DS(ON)}$

**DN2535**  
350V  $BV_{DSX}$ , 25 $\Omega$   $R_{DS(ON)}$

**DN2540**  
400V  $BV_{DSX}$ , 25 $\Omega$   $R_{DS(ON)}$

**DN2625**  
250V  $BV_{DSX}$ , 3.5 $\Omega$   $R_{DS(ON)}$

**DN3135**  
350V  $BV_{DSX}$ , 35 $\Omega$   $R_{DS(ON)}$

**DN3145**  
450V  $BV_{DSX}$ , 60 $\Omega$   $R_{DS(ON)}$

**DN3525**  
250V  $BV_{DSX}$ , 10 $\Omega$   $R_{DS(ON)}$

**DN3535**  
350V  $BV_{DSX}$ , 10 $\Omega$   $R_{DS(ON)}$

**DN3545**  
450V  $BV_{DSX}$ , 20 $\Omega$   $R_{DS(ON)}$

**DN3765**  
650V  $BV_{DSX}$ , 8.0 $\Omega$   $R_{DS(ON)}$

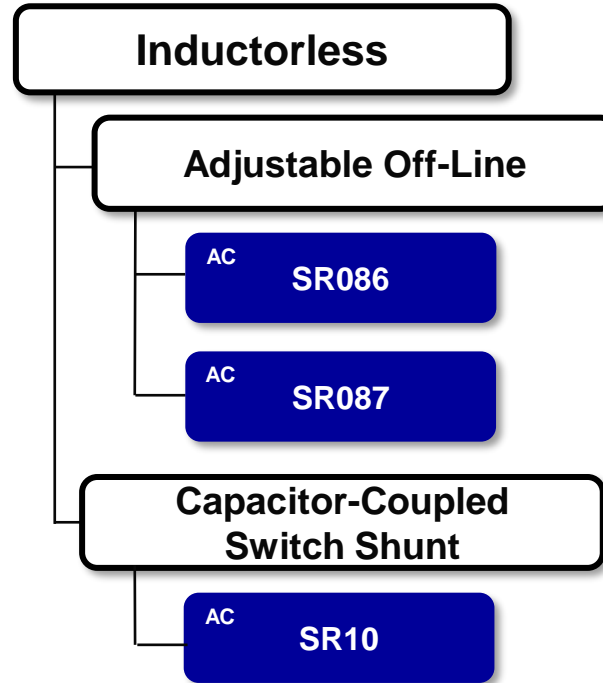
### Lateral

**LND01**  
9V  $BV_{DSX}$ , 1.4 $\Omega$   $R_{DS(ON)}$

**LND150**  
500V  $BV_{DSX}$ , 1000 $\Omega$   $R_{DS(ON)}$

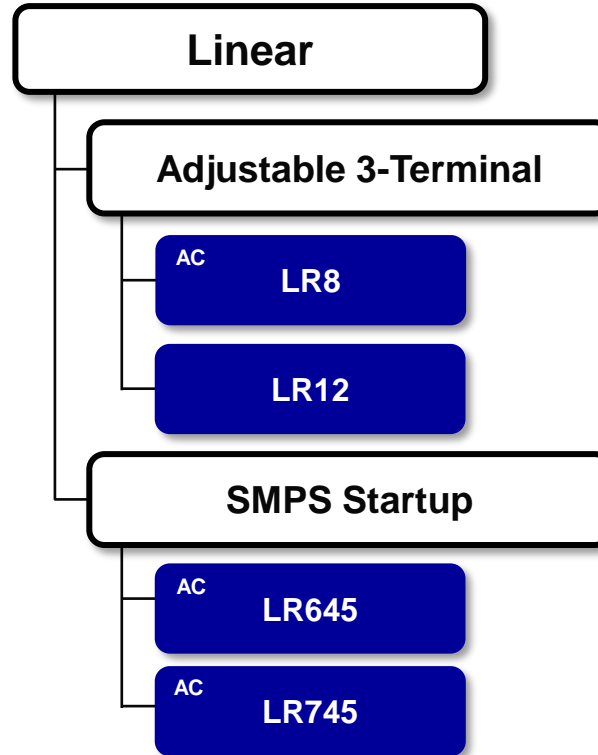
# Inductorless Off-Line Regulators

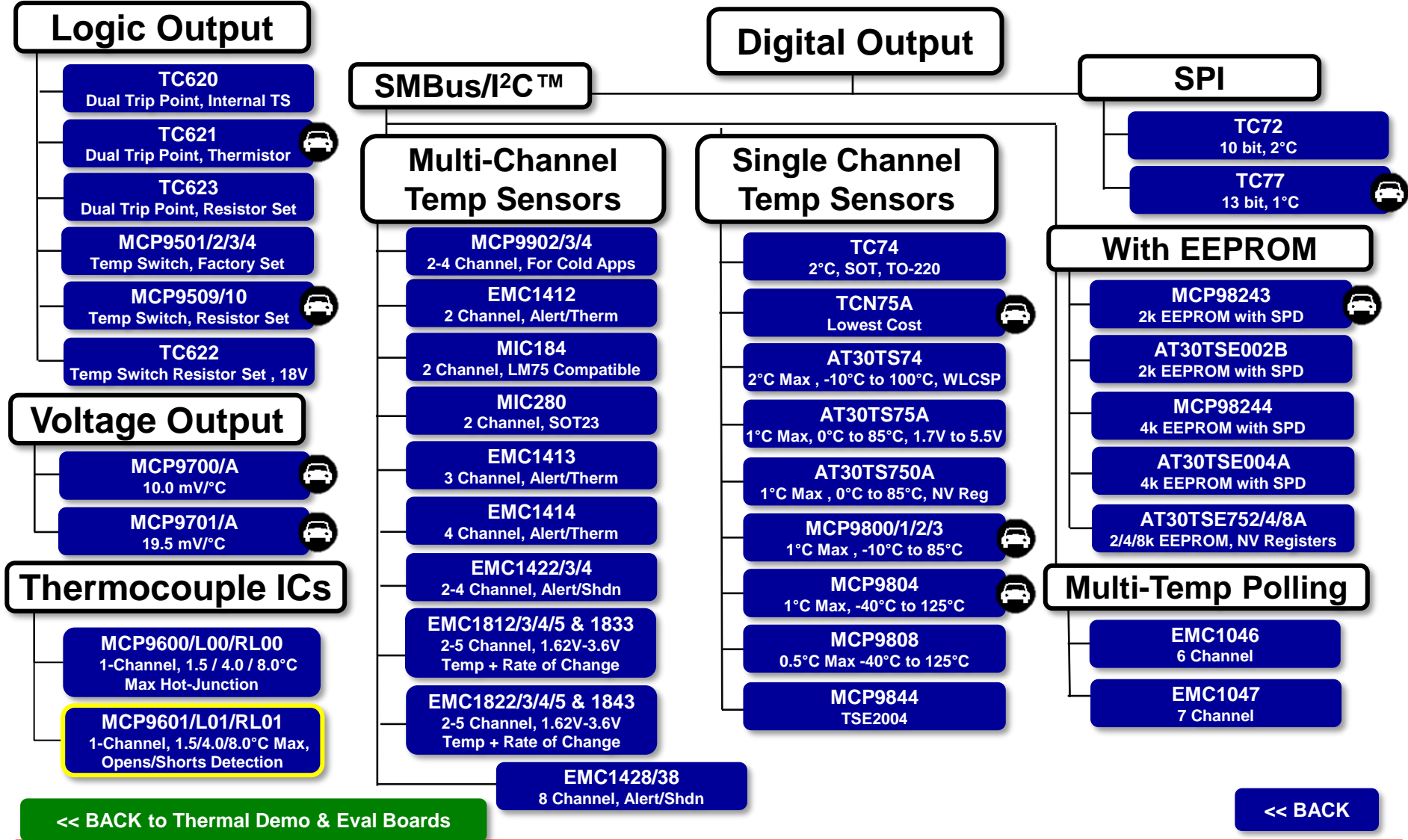
AC = Offline Capable





AC = Offline Capable

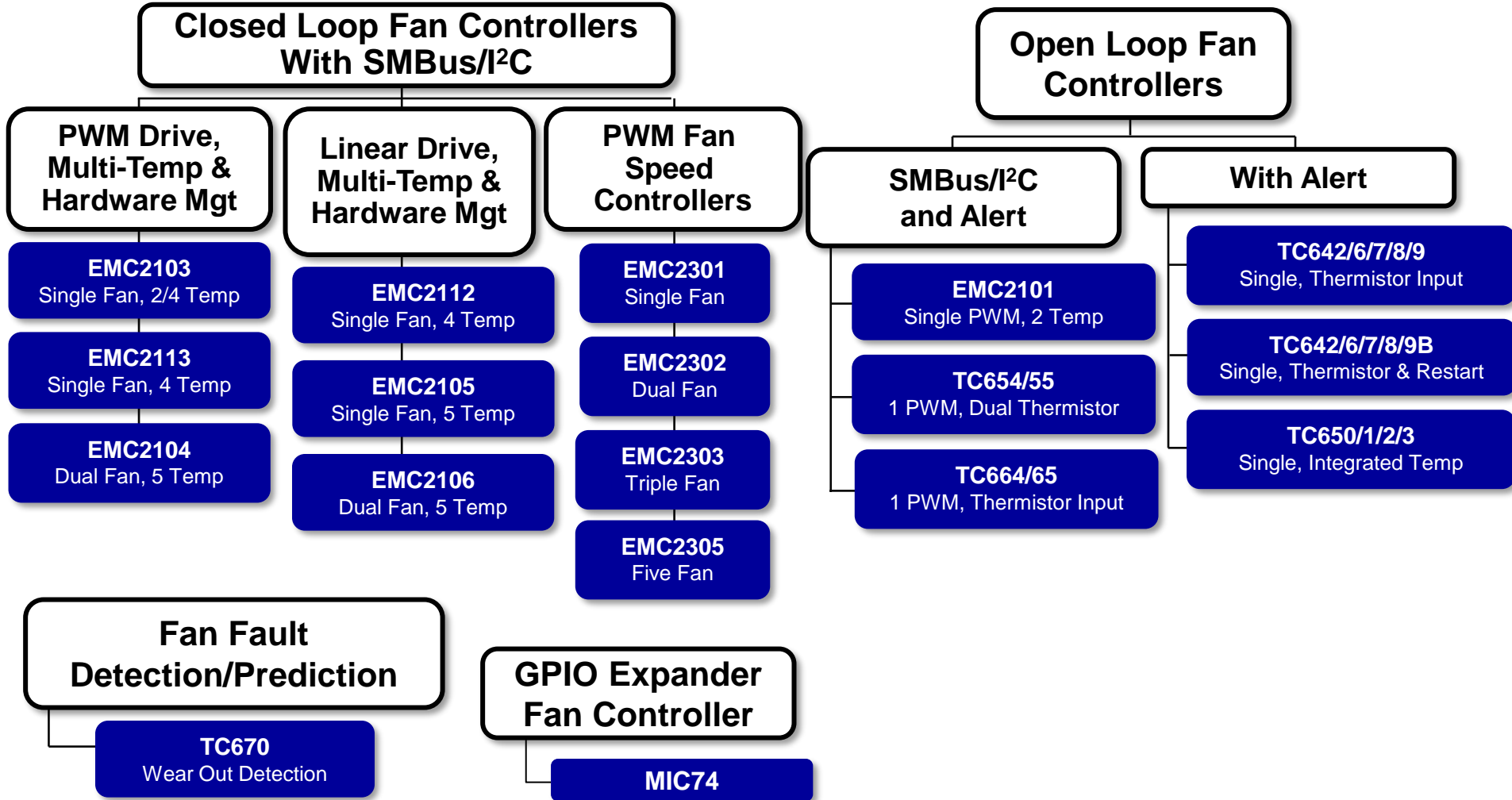






# Fan Control and Hardware Management

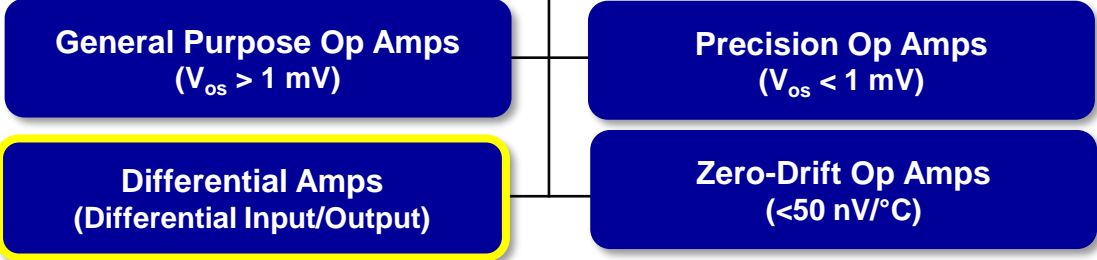
Product Tree



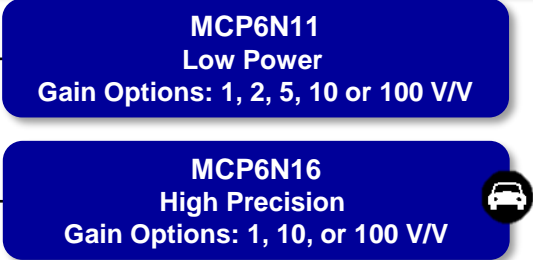
<< BACK to Fan Control Demo & Eval Boards

<< BACK

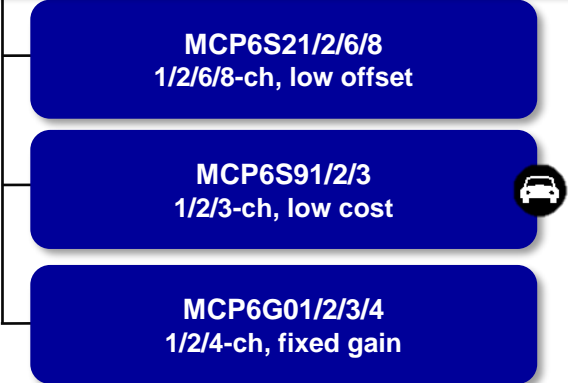
## Operational Amplifiers



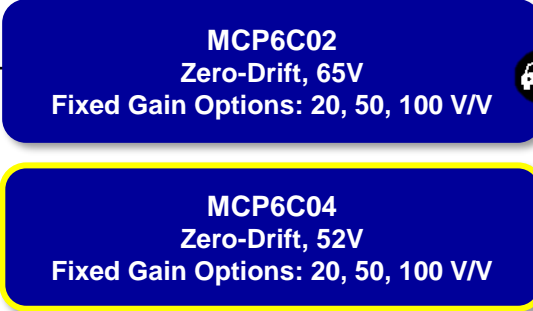
## Instrumentation Amplifiers



## PGA/SGA



## Current Sense Amplifiers



# General Purpose Op Amps

Product Tree

GBWP < 1 MHz

$V_{DD} \text{ max} < 7V$

MCP6441/2/4  
GBWP: 9 kHz,  
 $I_Q$ : 450 nA

MCP6041/2/3/4  
GBWP: 14 kHz

MCP6421/2/4  
GBWP: 90 kHz,  
Vos: 1mV, EMI Rejection

MCP6141/2/3/4  
GBWP: 100 kHz

MCP6231/2/4  
GBWP: 300 kHz

MIC861  
GBWP: 400 kHz

MIC863  
GBWP: 450 kHz

MCP6241/2/4  
GBWP: 550 kHz,

$7V < V_{DD} \text{ max} < 18V$

MIC7111  
GBWP: 25 kHz

MIC7300  
GBWP: 500kHz

LMC7101  
GBWP: 500kHz

MIC7122  
GBWP: 750kHz

GBWP = 1 to 10 MHz

$V_{DD} \text{ max} < 7V$

MCP6001/2/4  
GBWP: 1 MHz

MCP6401/2/4  
MCP6406/7/9  
GBWP: 1 MHz,  $I_Q$ : 45  $\mu$ A

MCP6471/2/4  
GBWP: 2 MHz, Vos: 1.5 mV

MCP6271/2/3/4/5  
GBWP: 2 MHz

MCP601/2/3/4  
GBWP: 2.8 MHz, R/R Out

MIC862  
GBWP: 3 MHz

MCP6286  
GBWP: 3.5 MHz, Low Noise

MCP6481/2/4  
GBWP: 4 MHz, Vos: 1.5 mV

MIC860  
GBWP: 4 MHz

MCP6281/2/3/4  
GBWP: 5 MHz

MCP6491/2/4  
GBWP: 7.5 MHz, Vos: 1.5 mV

MCP6291/2/3/4/5  
GBWP: 10 MHz

MCP6411  
GBWP: 1 MHz Vos: 1mV  
EMI Rejection

$7V < V_{DD} \text{ max} < 32V$

MCP6Hxx  
GBWP: 1/2/5/10 MHz

MIC6211  
GBWP: 2.5 MHz

GBWP > 10MHz

$V_{DD} \text{ max} < 7V$

MCP631/2/3/4/5/9  
GBWP: 24 MHz

MCP660/1/2/3/4/5/9  
GBWP: 60 MHz

$V_{DD} \text{ max} = 18V$

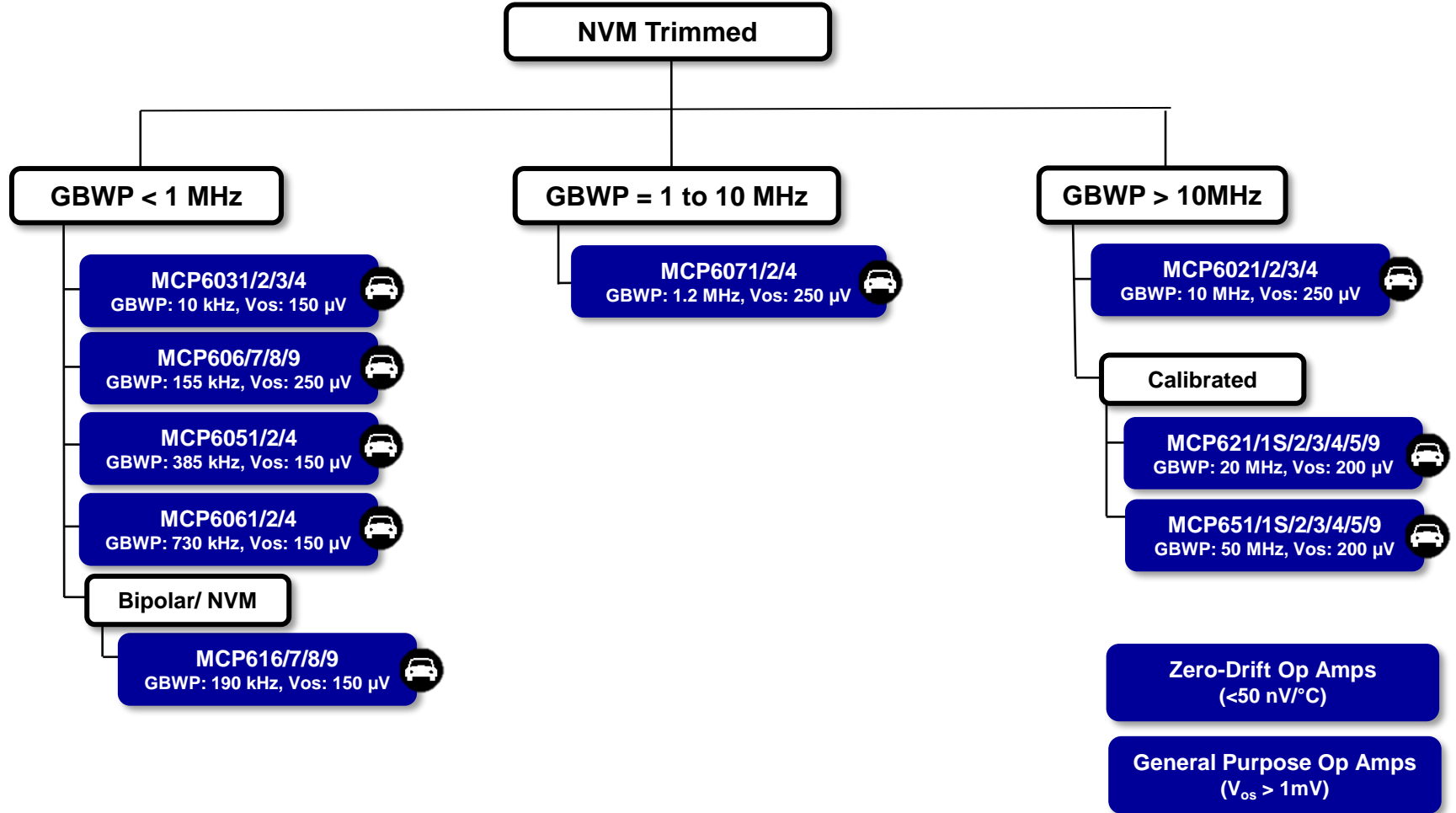
MIC920  
High Speed  
GBWP: 80 MHz

Low Cost Op Amps

MCP6LXX  
GBWP: 1/2/10 MHz


Precision Op Amps  
( $V_{os} < 1mV$ )

<< BACK



# Zero-Drift Amplifiers

**GBWP < 1 MHz**

**MCP6V11/2/4**  
GBWP: 80 kHz, Vos: 8  $\mu$ V 


**MCP6V16/7/9**  
GBWP: 80 kHz, Vos: 25  $\mu$ V

**MCP6V31/2/4**  
GBWP: 300 kHz, Vos: 8  $\mu$ V 


**MCP6V36/7/9**  
GBWP: 300 kHz, Vos: 25  $\mu$ V

**TC7652**  
GBWP: 400 kHz, Vos: 5  $\mu$ V

**GBWP = 1 to 10 MHz**

**MCP6V61/2/4**  
GBWP: 1 MHz, Vos: 8  $\mu$ V 

**MCP6V66/7/9**  
GBWP: 1 MHz, Vos: 25  $\mu$ V 

**MCP6V01/2/3**  
GBWP: 1.3 MHz, Vos: 2  $\mu$ V 

**MCP6V06/7/8**  
GBWP: 1.3 MHz, Vos: 3  $\mu$ V 

**MCP6V26/7/8**  
GBWP: 2 MHz, Vos: 2  $\mu$ V 

**MCP6V51**  
GBWP: 2 MHz, Vos: 15  $\mu$ V, 45 V

**MCP6V71/2/4**  
GBWP: 2 MHz, Vos: 8  $\mu$ V 

**MCP6V81/2/4**  
GBWP: 5 MHz, Vos: 9  $\mu$ V 

**TC7650**  
GBWP: 2 MHz, Vos: 5  $\mu$ V

**GBWP > 10MHz**

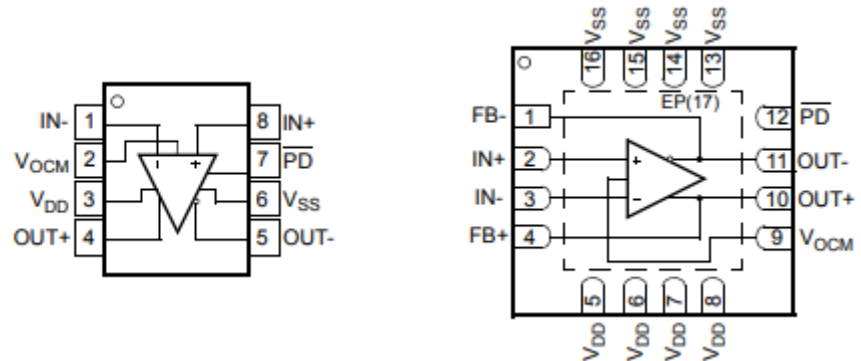
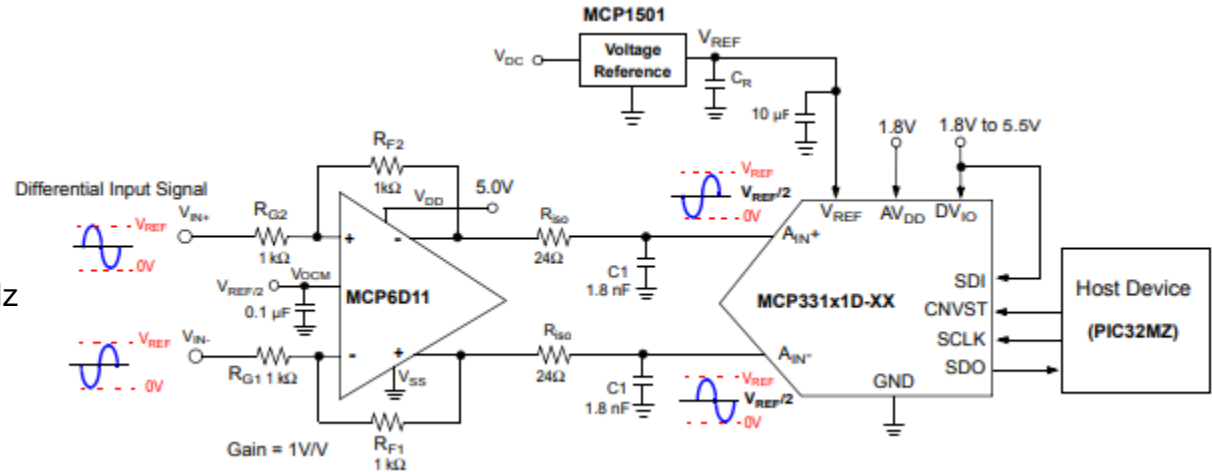
**MCP6V91/2/4**  
GBWP: 10 MHz, Vos: 9  $\mu$ V 

**Precision Op Amps**  
(V<sub>os</sub> < 1mV)

**General Purpose Op Amps**  
(V<sub>os</sub> > 1mV)

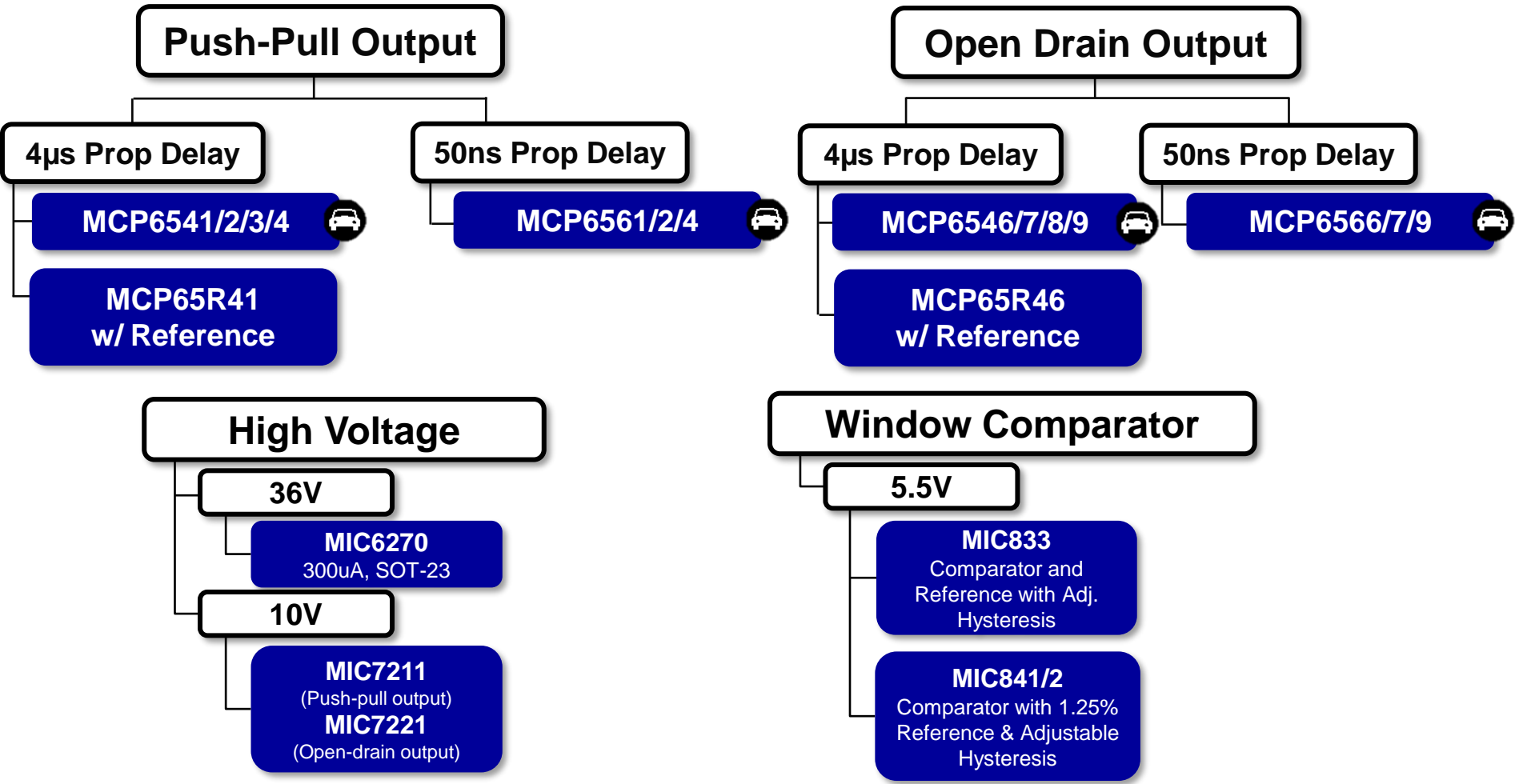
## Features:

- **Low Power**
  - $I_q$ : 1.4 mA
  - Operating Voltage: 2.5V to 5.5V
  - Power Down Pin
- **High Speed**
  - Gain-Bandwidth Product: 90 MHz
  - Slew Rate: 25V/ $\mu$ s
  - Settling: 300 ns to 16-bit
- **Low Noise/Distortion:**
  - 5 nV/ $\sqrt{\text{Hz}}$  at 10 kHz
  - Distortion (2Vp-p, 10 kHz)
    - HD2: -138 dBc
    - HD3: -137 dBc
- **High DC Precision:**
  - $V_{os}$ :  $\pm 150 \mu\text{V}$  (max.)
  - CMRR: 95 dB (min.)
  - PSRR: 100 dB (min.)
- **Easy to Use:**
  - Input Range Includes Negative Rail
  - Rail-to-Rail Output
  - Extended Temperature:  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- **Small Packages:**
  - 8-pin MSOP
  - 16-pin 3x3 QFN

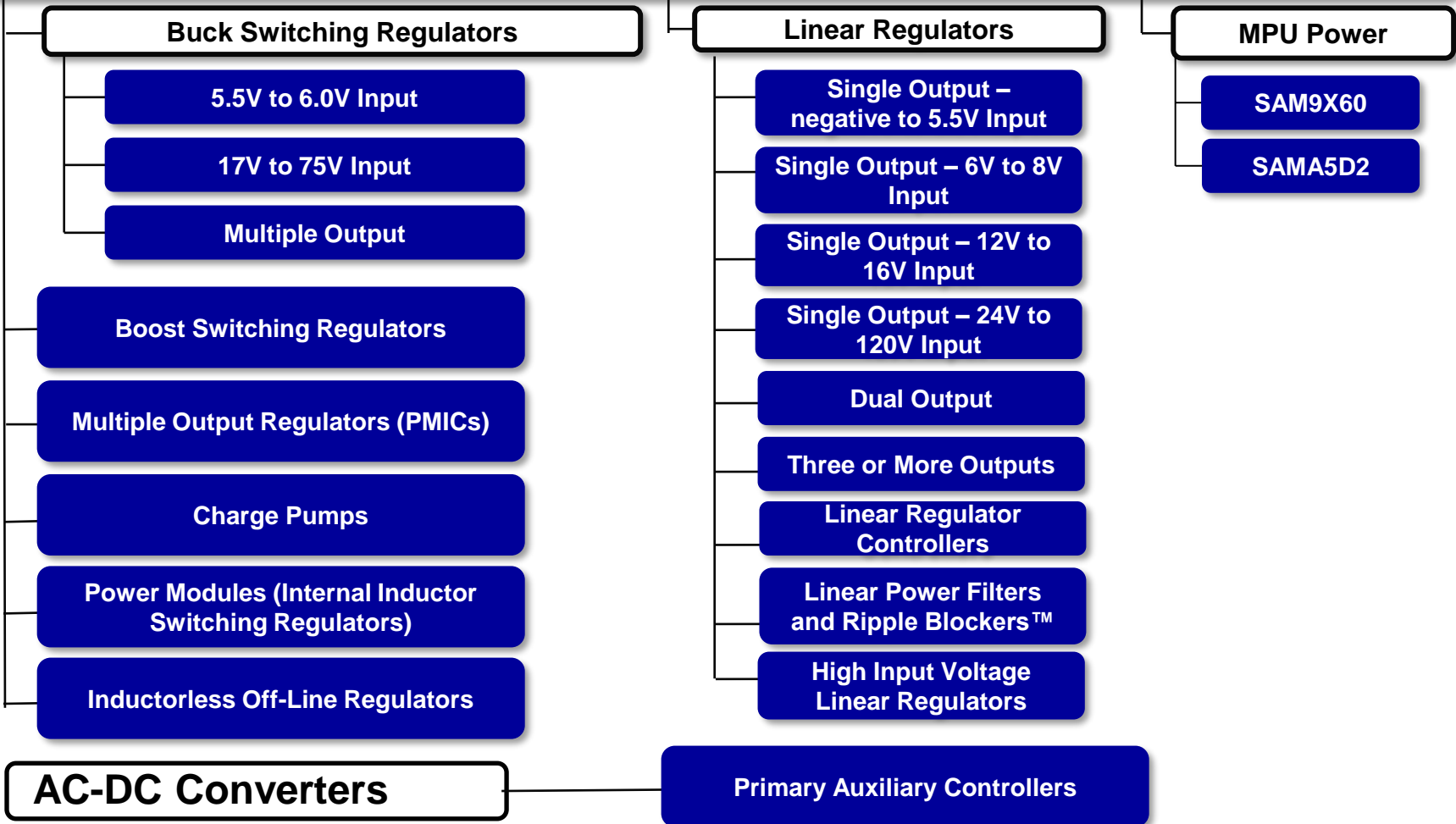




# Comparators



## DC-DC Converters

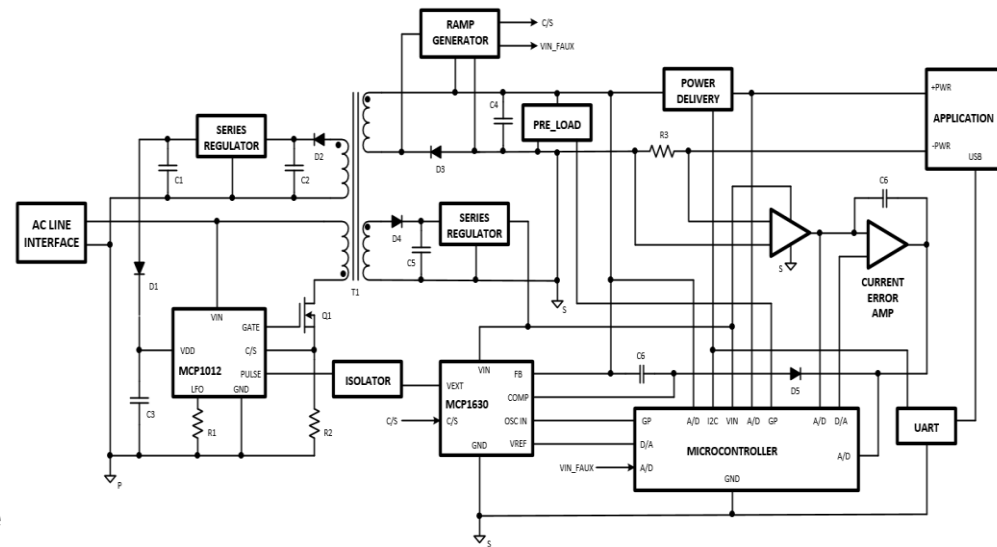


<< BACK to DC-DC Demo & Eval Boards

<< BACK

### Features:

- High Voltage Start-Up (Rated 500V/700V)
- Few External Components
- Internal Open-Loop, Peak Current Mode, Current Regulator for Start-Up
- Current Regulator Constant 21 $\mu$ s OFF Time
- Programmable Low Frequency Oscillator (LFO) Period
- Cycle by Cycle Current Limiting
- Protection Against Continuous Conduction Mode (CCM) of Operation
- Able to Accept External PWM Commands from a Secondary-Side Controller via Isolator (Optocoupler or Pulse Transformer)
- Under-Voltage Lockout (UVLO) and Over-Voltage Lockout (OVLO) Protections
- Sleep and Wake-up Commands
- Low Sleep Power: < 15 mW
- Robust Gate Driver, able to drive 2.2nF Load at 65kHz
- Over-Temperature Protection (Thermal Shutdown)
- Package: 7-Lead SOIC



# MPU Power

## SAM9

ARM926

Up to 600MHz

*Coming Soon*

SAM9x5/N/M

**SAM9X60**

## SAMA5

Cortex-A5

Up to 600MHz

*Coming Soon*

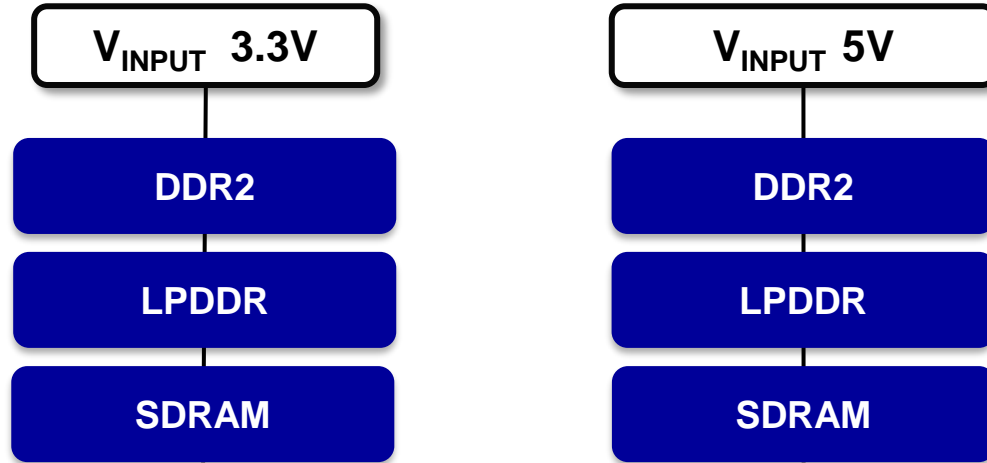
**SAMA5D2**

SAMA5D3

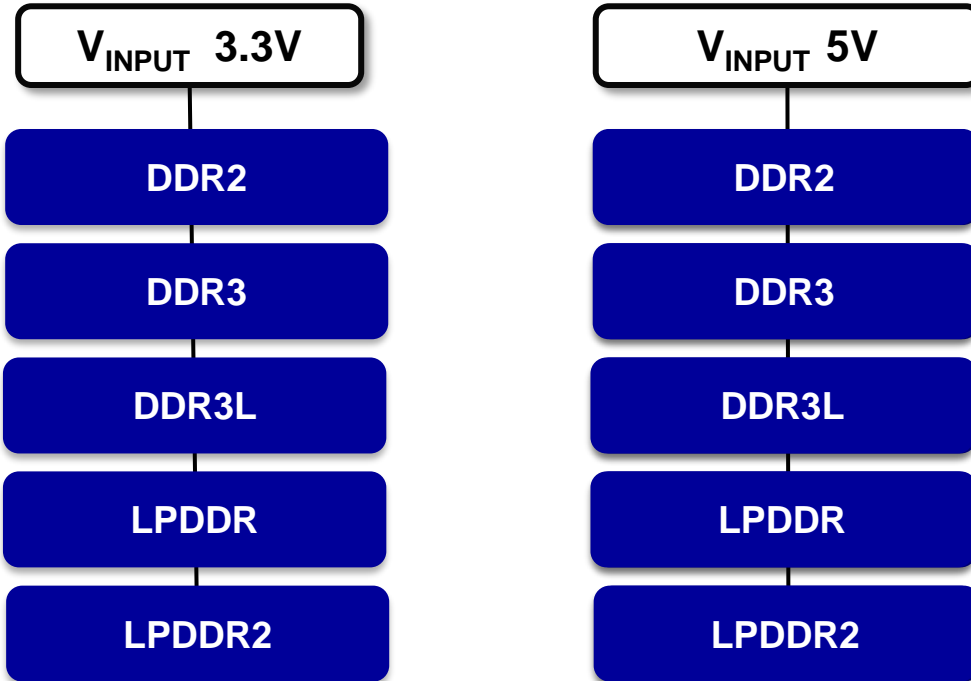
*Coming Soon*

SAMA5D4

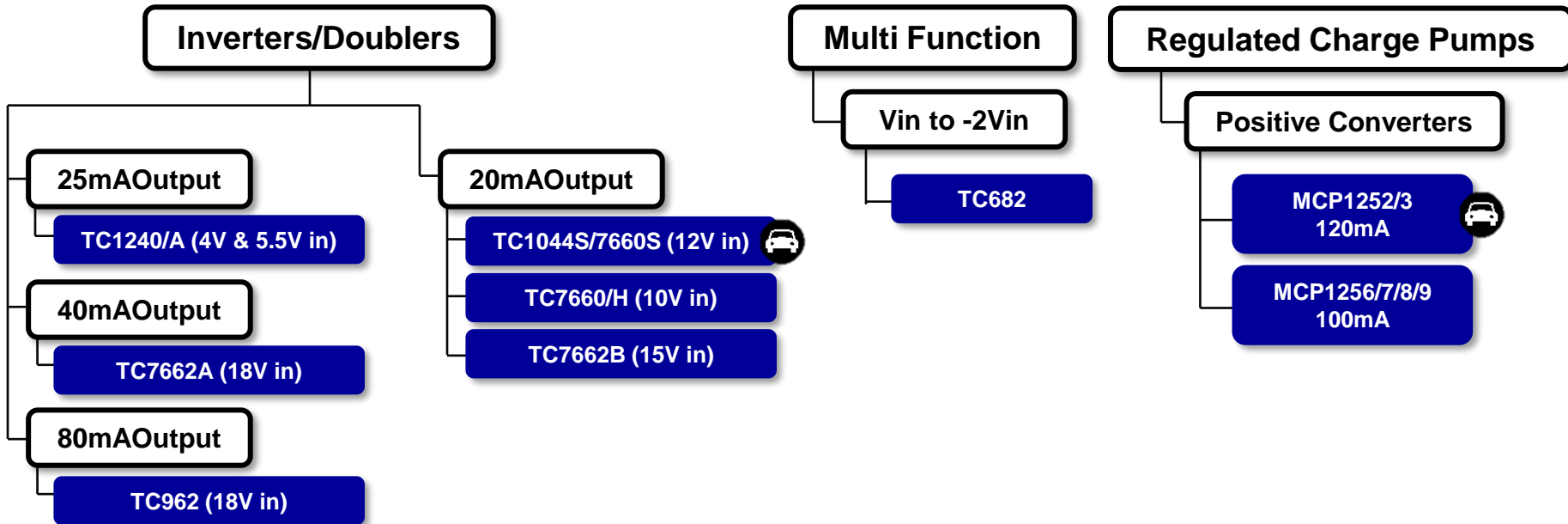
# SAM9X60 Power

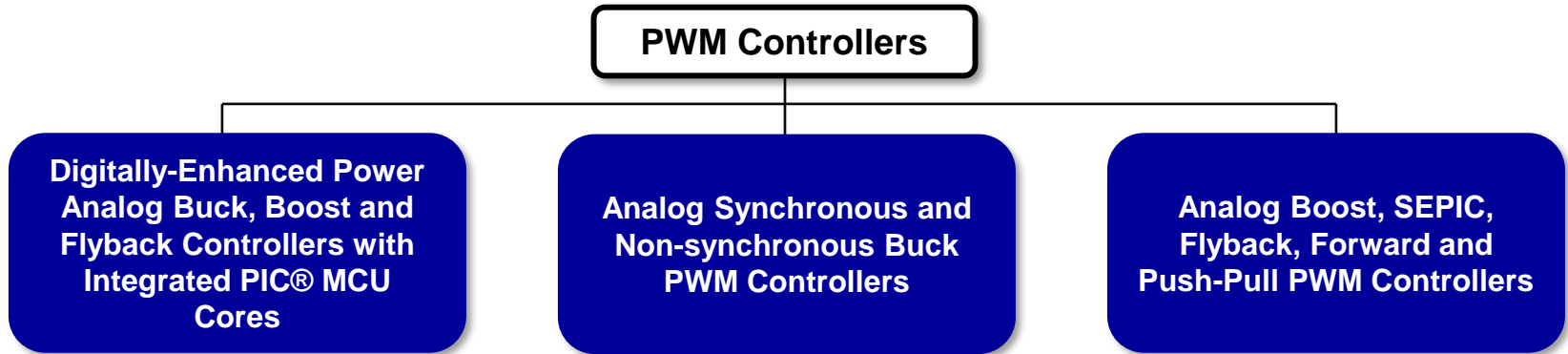


# SAMA5D2 Power



# Charge Pumps







# Digitally-Enhanced Power Analog Controllers

## Mixed High/Low Drive Capability

**MCP19110/1**  
32V Synchronous Controller for Step-Down Topologies  
4Kw Program Memory



**MCP19118/19** ★  
40V Synchronous Controller for Step-Down Topologies  
4Kw Program Memory



**MCP19122/3** ★  
40V Synchronous Controller for Step-Down Topologies  
4Kw Program Memory



## Low-Side Drive Capability

**MCP19114/5**  
42V Synchronous Controller for Step-Up Topologies  
4Kw Program Memory



**MCP19116/7** ★  
42V Synchronous Controller for Step-Up Topologies  
8Kw Program Memory & Improved Regulation Accuracy



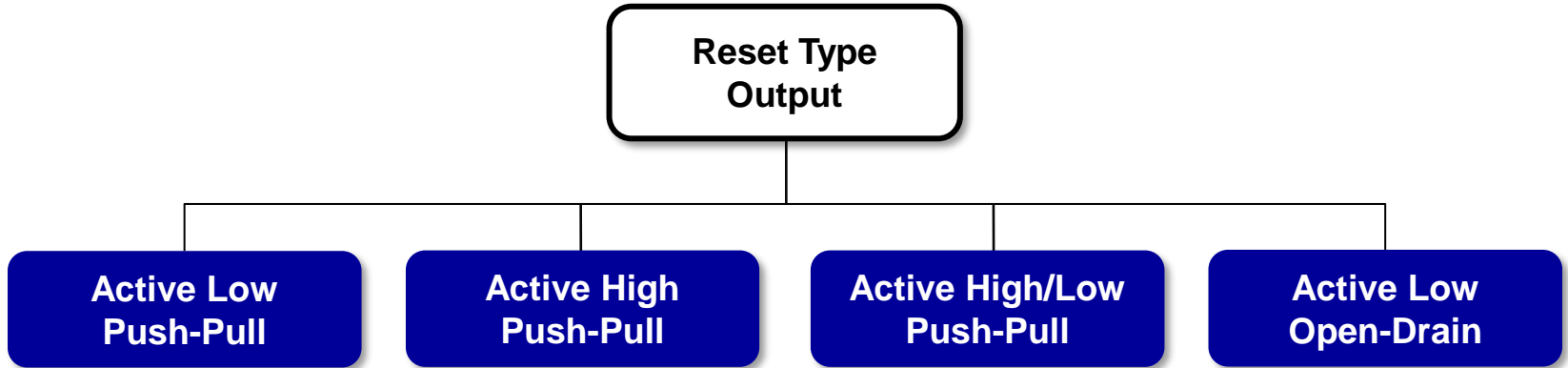
**MCP19124/5** ★  
42V Synchronous Controller for Step-Up Topologies  
4Kw Program Memory  
Voltage & Current Regulation



**MCP19214/5** ★  
42V Synchronous Controller for Step-Up Topologies  
8Kw Program Memory  
Voltage & Current Regulation




★ = Preferred option within similar products



# Active Low Push-Pull

## Low Pin Count

### MCP809

3 pin, 45µA, 350ms  
2.7V to 5V 


### TCM809

3 pin, 12µA, 140ms  
2.3V to 5V

### MIC809

3 pin, 5µA, 140ms  
2.7V to 5V


### MCP112

3 pin, 1µA, 0.1ms  
1.95V to 5V 

### TC54

3 pin, 1µA, 0.1ms,  
10V-Vin, 1.4V to 6V

### MCP102/3

3 pin, 1µA, 120ms  
1.95V to 5V 

### TC1272A

3 pin, 12µA, 140ms  
2.3V to 5V

### MCP100

3 pin, 45µA, 350ms  
2.7V to 5V

### MIC1810

3 pin, 5µA, 100ms  
5V

### MIC1815

3 pin, 5µA, 100ms  
3.3V

## Multiple Input

### MIC2774L

5 pin, MR, Dual Vin  
140ms, 1.8V to 5V

### MIC2776L

5 pin, MR, VDD & Vin  
140ms, 0.3Vref

### MIC2779L

5 pin, MR, Vref 1.24V  
Set 2 external threshold

MR = Manual Reset  
WDT = Watchdog Timer  
PF = Power Fail

 = Preferred option(s)  
within similar products

## Manual Reset and/or Watchdog

### MCP1316-22

5 pin, MR, WDT, Many timing/voltage options

### MIC705/6

8 pin, MR, WDT, PF  
200ms, 4.4V, 4.65V

### TC1270A

4/5 pin, MR  
280ms, 2.7V to 5V

### MIC8115

4 pin, MR  
1100ms, 3.3V

### MIC811

4 pin, MR  
140ms, 2.7V to 5V

### MIC8114

4 pin, MR, 790ms, 3.3V,  
AMD Elan SC400/410

# Active High Push-Pull

**Low Pin Count**

**MCP101**

3 pin, 45µA, 350ms  
2.7V to 5V

**MIC810**

3 pin, 5µA, 140ms  
2.7V to 5V

**MCP810**

3 pin, 45µA, 350ms  
2.7V to 5V

**TCM810** 

3 pin, 12µA, 130ms  
2.3V to 5V

**Multiple Input**

**MIC2774H**

5 pin, Dual Vin, MR  
140ms, 1.8V to 5V

**MIC2776H**

5 pin, MR, VDD & Vin  
140ms, 0.3Vref

**MIC2779H**

5 pin, MR, Vref 1.24V  
Set 2 external threshold

**Manual Reset and/or Watchdog**

**MCP1316-22**

5 pin, MR, WDT, Many timing/voltage options 


**MIC812** 

4 pin, MR  
140ms, 2.7V to 5V

**TC1271A**

4/5 pin, MR  
280ms, 2.7V to 5V

**MR = Manual Reset**  
**WDT = Watchdog Timer**  
**PF = Power Fail**

 = Preferred option within similar products

# Active High/Low Push-Pull

High Feature  
w/Peripherals

**MIC2777**  
5 pin, Dual Vin  
140ms, 1.8V to 5V

**MIC826**  
6 pin, MR, WDT, Dual  
Output, 140ms, 1.7V to 5V

**TC1232**  
8 pin, MR, WDT, Dual Output,  
250ms, 4.5V, 4.75V

**MIC1232** ★  
8 Pin, MR, WDT, Dual  
Output, 250ms, 5V

**MIC1832** ★  
8 pin, MR, WDT, Dual  
Output, 250ms, 3.3V

**MIC2775**  
5 pin, MR, Dual Output,  
140ms, 1.7V to 5V

**MCP1316-22** 🚗  
5 pin, MR, WDT, Many  
timing/voltage options

**MIC707/8**  
8 PIN, MR, WDT, PF, Dual  
Output, 200ms, 4.4V, 4.65V





**MIC2790/1/3**  
6/8 pin, VDD, MR, Dual Output,  
Cap Delay, 0.4V to 5.5V

MR = Manual Reset  
WDT = Watchdog Timer  
PF = Power Fail

★ = Preferred option  
within similar products

# Active Low Open-Drain




**Low Pin Count**

- MCP120/130**  
3 pin, 45µA, 350ms  
2.7V to 5V 
- MCP111**   
3 pin, 1µA, 0.1ms  
1.95V to 5V 
- MCP121/131**  
3 pin, 1µA, 120ms  
1.95V to 5V 
- MIC803**  
3 pin, 5µA, 140ms,  
1100ms, 2.7V to 5V
- TC54**  
3 pin, 1µA, 0.1ms, 10V-  
Vin, 1.4V to 6V

**Multiple Input**

- MIC2774N**  
5 pin, Dual Vin, MR  
140ms, 1.8V to 5V
- MIC2776N**  
5 pin, MR, VDD & Vin  
140ms, 0.3Vref

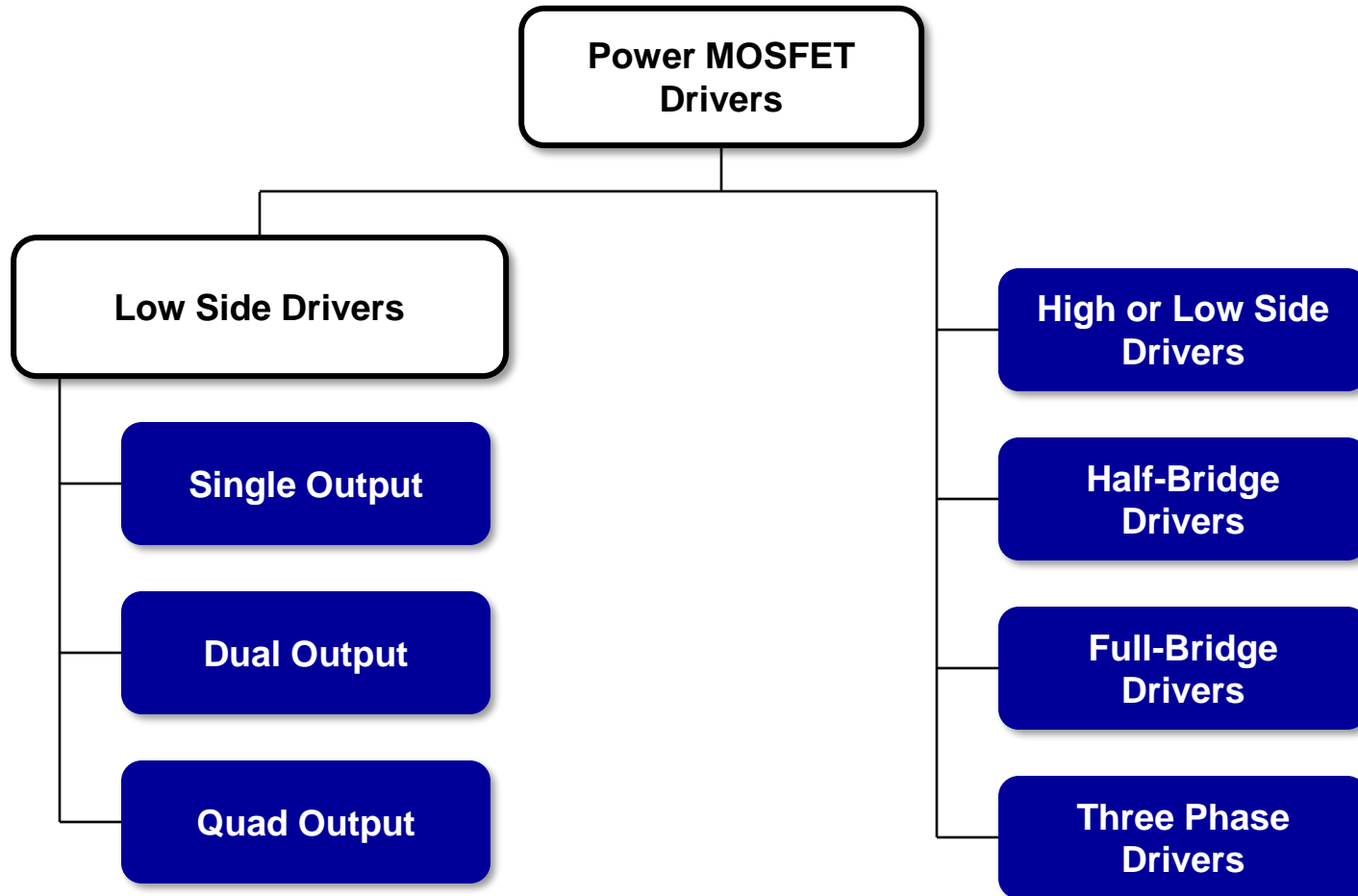
**High Feature w/Peripherals**

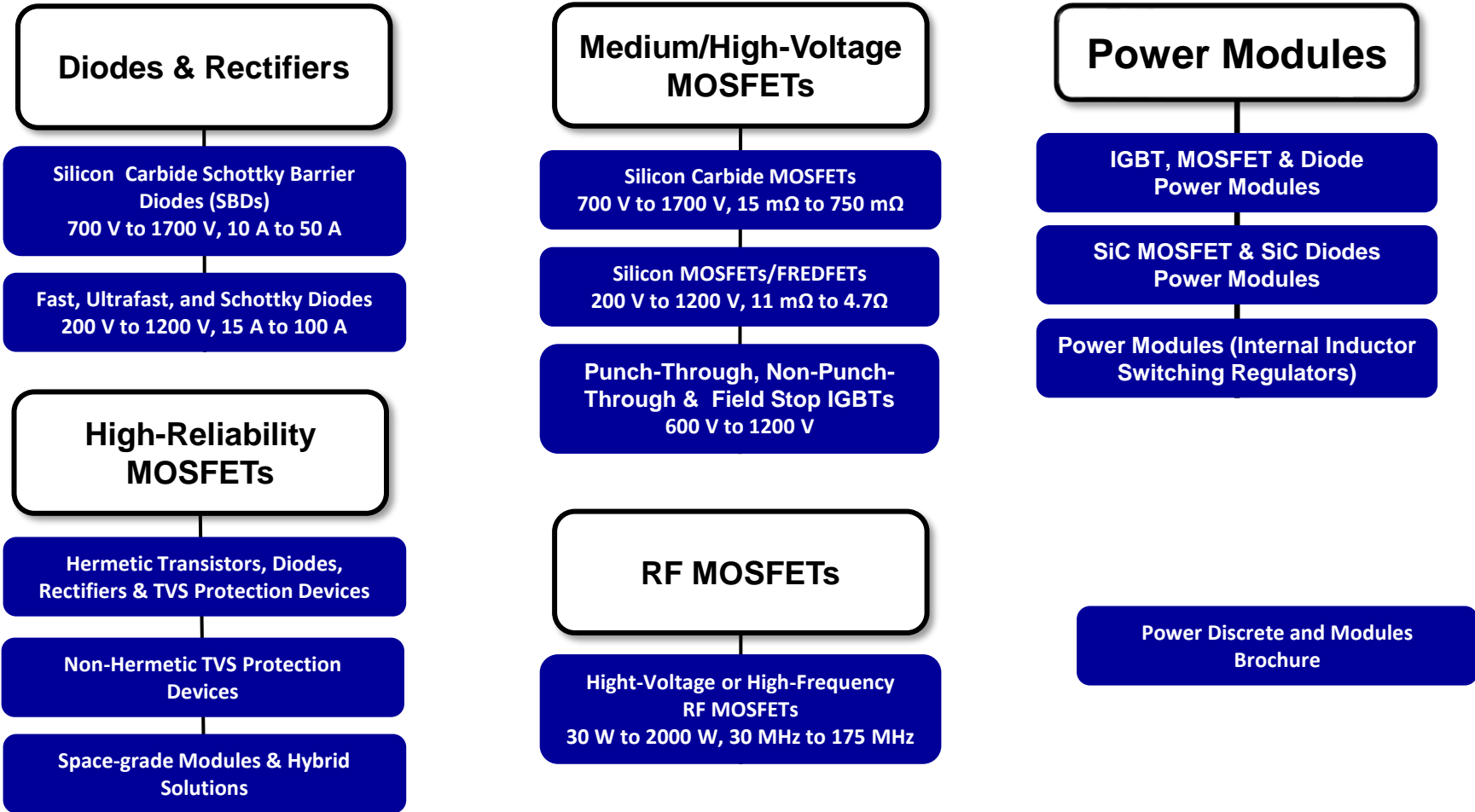
- MCP1316-22**  
5 pin, MR, WDT, Many  
timing/voltage options 
- MIC2772**  
8 pin, Dual MR and Vin  
3V, 3.15V, 4.5V, 4.75V
- MIC2782**   
6 bump CSP, Dual MR  
Push Button Resets
- TC1270AN**  
4/5 pin, MR   
280ms, 2.7V to 5V
- MIC2755**  
8 pin, Handheld focus  
Vin thresholds
- MIC2778**  
5 pin, Vref 1.24V  
Set 2 external threshold
- MIC6315**  
4 pin, MR, 20ms, 140ms,  
1100ms, 3V, 3.3V, 5V
- ATA5021**  
8 pin, WDT, Wake,  
Enable Output, Adj.  
WDT time, 5V

 = Preferred option within similar products

MR = Manual Reset  
WDT = Watchdog Timer  
PF = Power Fail

# Power MOSFET Drivers







# Diodes & Rectifiers

## SiC Schottky Barrier Diodes

MSCxxxSDA070  
700 V SiC SBD  
10/30/50 A  
TO-220, TO-247, D3PAK

MSCxxxSDA120  
1200 V SiC SBD  
10/30/50 A  
TO-220, TO-247, D3PAK

MSCxxxSDA170  
1700 V SiC SBD  
10/30/50 A  
TO-247

## Si Diodes

Ultrafast DQ Diodes  
600/1000/1200 V  
15 A to 75 A  
TO-220, TO-247, D3PAK, SOT-227

Fast Recovery D Diodes  
200/300/400/600/1000/1200 V  
(1x/2x) 15 A to 100 A  
TO-220, TO-247, D3PAK, SOT-227

Schottky Diodes  
200 V, (1x/2x) 30 A to 100 A  
TO-247, D3PAK,  
SOT-227, TO-264, T-MAX®

[<< Power Modules](#)

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# Hermetic/Non-Hermetic High-Reliability Solutions

## Hermetic Transistors/Diodes/Rectifiers/TVs

**ThinKey™**  
Schottkys, Rectifiers, TVS  
15V – 100V, 25A – 150A  
SMT Ceramic/Metal Package

Hermetic Glass, Small  
Signal Diodes,  
Schottkys & Rectifiers  
40V – 80V, 1A - 3A  
DO-41, DO-41UR, B-Pkg

Hermetic Metal Can Schottky, BJTs,  
Diodes & MOSFETs  
50V – 150V, NPN, PNP  
TO-18, TO-5/T-39, 3,4,6 Pin LCC  
SMD2, SMD1, SMD.5, SMD.22  
*DLA Slash Sheets*

Hermetic TVS Devices  
5.6V – 190V, 150W – 1500W  
Axial – DO-13, B/G SQ-MELF, SMD

Hermetic Glass Axial Small  
Signal Diodes  
50V – 150V  
Axial-DO-35, DO-35-UR  
Surface Mount – D-Pkg, MELF

Hermetic Axial Glass  
Diodes, Schottkys & Rectifiers  
50V – 1000V  
Axial – A, B Pkg

JANS 100 krad LDR-Qualified  
Bipolar Transistors  
2N2222A, 2N2907A,  
2N3700, 2N2369A

JANS Rad Hard MOSFETs  
60V – 200V, 300kRad (TID)  
Surface Mount & Through Hole Pkgs  
*DLA Slash Sheets*

## Non-Hermetic Devices

Non-Hermetic SMT TVS Devices  
Mini-PLAD, PLAD Powermite  
150W – 36kW  
5V – 400V  
DO-214AA/DO-215AA/

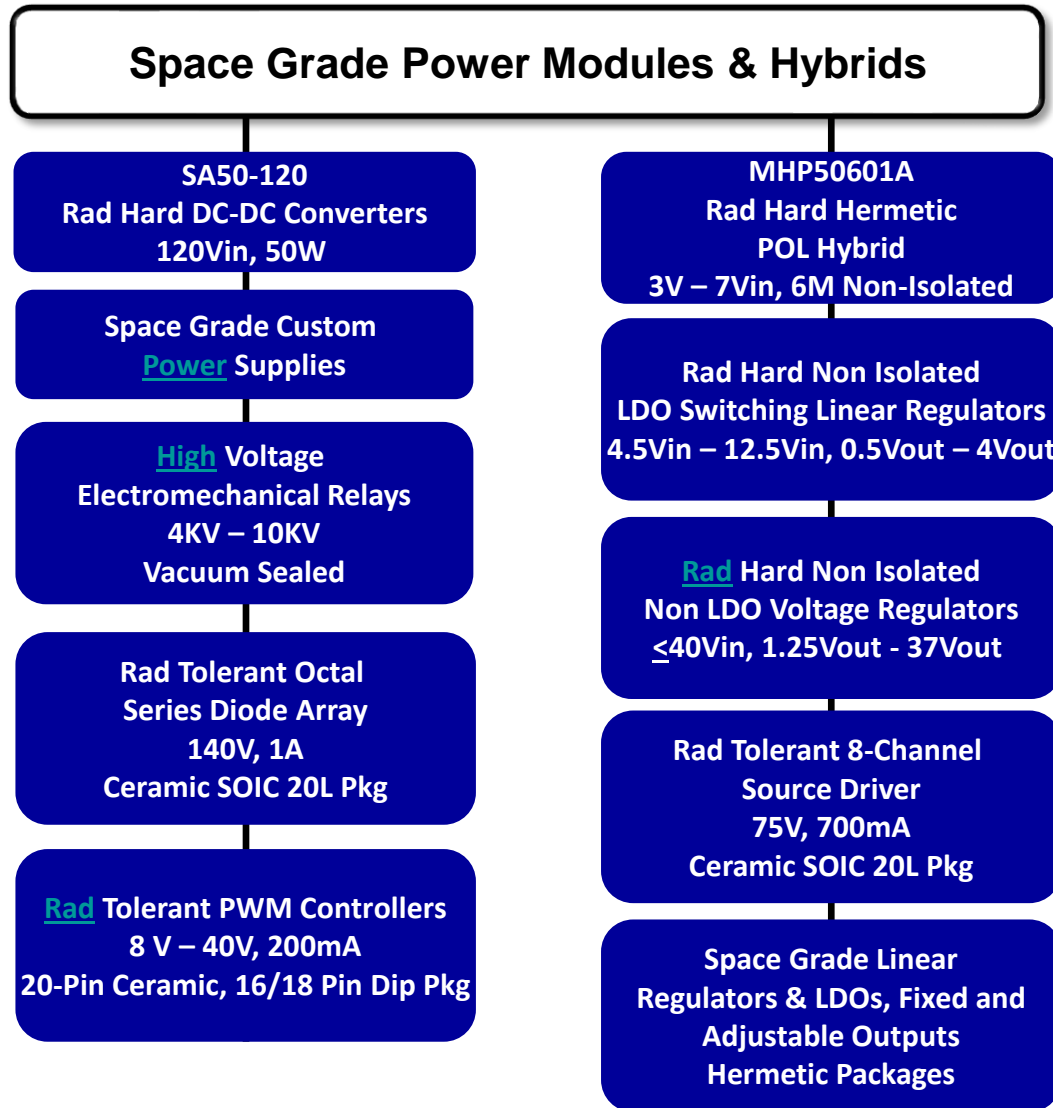
M-Level Screened Axial Lead  
TVS Devices  
600W – 100kW  
5V – 400V  
DO-201AE, T-18, DO-41, Case 5A

Hermetic TVS Devices  
5.6V – 190V, 150W – 1500W  
Axial – DO-13, B/G SQ-MELF, SMD

<< Space Grade Power Modules & hybrids

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# Space-Grade Module & Hybrid Solutions





# Medium/High-Voltage Power MOSFETs

## Si MOSFETs

Power MOSFETs/FREDFETs  
500/600/800/1000/1200 V  
36 mΩ to 2.4Ω  
TO-247, TO-264, D3PAK, SOT-227,  
T-MAX®

Low-Voltage MOSFETs/FREDFETs  
200/300 V, 40-175 A,  
11 mΩ to 85 mΩ  
TO-247, TO-264, D3PAK, SOT-227,  
TMAX®

Ultra-fast, Low Gate Charge  
MOSFETs, 500/800/1000/1200 V  
38 mΩ to 4.7Ω  
TO-247, TO-264, D3PAK, SOT-227,  
T-MAX®

Super Junction MOSFETs  
600/650/800/900 V  
35 mΩ to 450 mΩ  
TO-247, TO-264, D3PAK, SOT-227,  
T-MAX®

Linear MOSFETs  
500/600 V, 90/125 mΩ  
TO-264(L), SOT-227, T-MAX®

## SiC MOSFETs

SiC MOSFETs  
700 V, 15/35/60/90 mΩ,  
TO-247, D3PAK

SiC MOSFETs  
1200 V, 25/40/80/ mΩ,  
TO-247, D3PAK, SOT-227

SiC MOSFETs  
1700 V, 45/750 mΩ  
TO-247, D3PAK

## RF MOSFETs

High-Voltage ARFs  
90 W to 750 W, 25 MHz to 150 MHz  
TO-247, TO-264, T3/3A/3C, M174

High-Frequency VRFs  
30 W to 600 W, 30 MHz to 175 MHz  
T2, M174, M177, M208

Driver-RF DRF Hybrids  
400 W to 2000 W, 30 MHz  
T2B, T4/4A, T5

## PT, NPT, Field Stop IGBTs

Punch-Through IGBTs  
600/900/1200 V  
TO-247, TO-264, D3PAK,  
SOT-227, T-MAX®

Non-Punch-Through IGBTs  
Single & Combi, 650/1200 V  
TO-247, TO-264, D3PAK,  
SOT-227, T-MAX®

Field Stop IGBTs  
Single & Combi, 600/650/1200 V  
TO-247, TO-264(v), D3PAK,  
SOT-227, T-MAX®

[<< Power Modules](#)

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# SiC MOSFET & SiC Diode Power Modules

## SiC MOSFET Power Modules

**Three-Level  
T-Type & NPC**  
600 V / 1200 V  
20 A to 160 A

**Phase Leg**  
1200 V / 1700 V  
40 A to 200 A

**Very Low Inductance  
Package**  
1200 V / 1700 V  
207 A to 586 A

**Triple Phase Leg**  
1200 V  
55 A to 150 A

**Boot Chopper**  
1200 V  
50 A & 100 A

**Full Bridge**  
1200 V  
110 A

## SiC Diode Power Modules

**Dual Diode**  
700 V / 1200 V  
20 A to 100 A

**Full Bridge**  
700 V / 1200 V  
50 A to 200 A

**Phase Leg**  
700 V / 1200 V  
100 A to 600 A

**Dual Common Cathode**  
700 V / 1200 V  
100 A to 200 A

**3 Phase Bridge**  
700 V & 50 A

[<< IGBT, MOSFET & Diode](#)

[<< Power Modules](#)

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# IGBT, MOSFET, & Diode Power Modules

## IGBT Power Modules

Phase Leg  
600 V to 1700 V  
30 A to 600 A

Single Switch  
600 V to 1700 V  
400 A to 750 A

Chopper & Dual  
Chopper  
600 V to 1700 V  
35 A to 700 A

Three-level T-Type &  
NPC  
600 V to 1700 V  
20 A to 400 A

Three-Phase Leg  
600 V to 1200 V  
25 A to 120 A,

Intelligent Phase Leg  
600 V / 1200 V  
300 to 400 A

Dual Common  
Source  
600 V to 1700 V  
50 A to 150 A

Mix IGBT / MOSFET  
Renewable Energy  
600 V - 29 A to 50 A

Full Bridge  
600 V to 1700 V  
20 A to 300 A

IGBT Chopper  
+ SiC Diode  
1200 V  
25 A / 40 A

Asymmetrical Bridge  
600 V to 1700 V  
20 A to 300 A

## Si MOSFET Power Modules

Chopper & Dual  
Chopper  
100 V to 1200 V  
17 A to 370 A

Single Switch  
100 V to 1200 V  
86 A to 540 A

Full Bridge  
100 V to 1200 V  
6 A to 450 A

Interleaved PFC  
600 V  
38 A & 70 A

Asymmetrical  
Bridge  
100 V to 600 V  
64A to 207 A

Single & Dual  
Linear MOSFET  
600 V / 1000 V  
125 m $\Omega$  &  
600 m $\Omega$

Phase Leg  
100 V to 1200 V  
25 A to 300 A

Boost Buck  
600 V  
70A & 100 A

Triple Phase Leg  
75 V to 1000 V  
21 A to 100 A

PFC + Bypass Diode  
+ Phase Leg  
600 V  
27 A & 38 A

Dual Common  
Source  
100 V to 1200 V  
21 A & 370 A

## Si Diode Modules

Single Diode  
200 V to 1200 V  
400 A to 500 A

Three phase Bridge  
1600 V  
40 A & 90 A

Full Bridge  
200 V to 1700 V  
30 A to 200 A

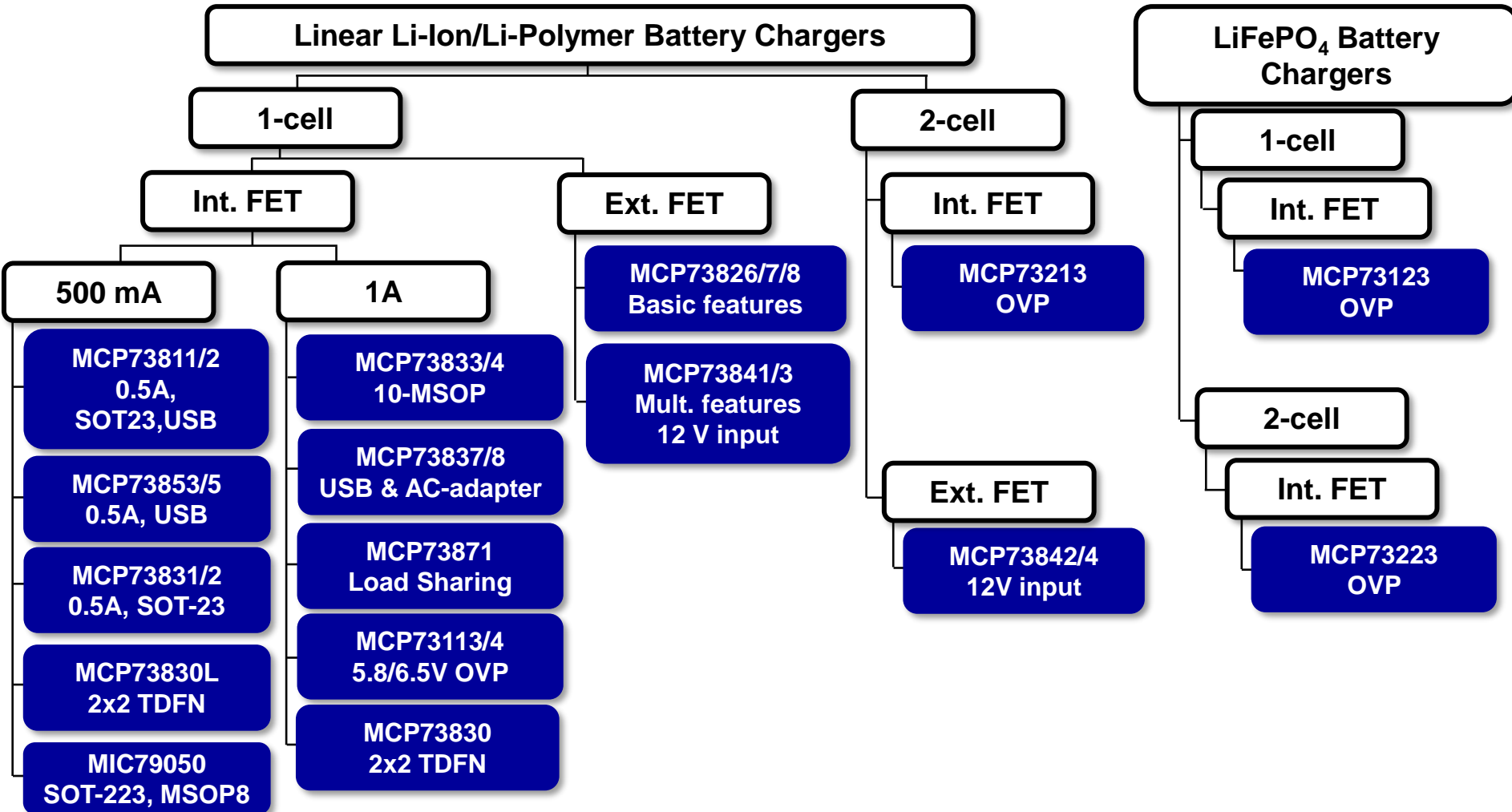
Series Diodes  
200 V to 1700 V  
400 A

<< SiC MOSFET & SiC Diode

<< Power Modules

<< Back

# Battery Chargers




10-bit

**MCP3021**  
22 ksps, I<sup>2</sup>C, SOT-23 


**MCP3001/2/4/8**  
200 ksps, SPI 

13-bit

**MCP3301/2/4**  
100 ksps, SPI,  
Differential 

16-bit

**MCP33131D-10/05**  
1Msps/500ksps, SPI,  
Differential 

**MCP33131-10/05**  
1Msps/500ksps, SPI,  
Single Ended 

12-bit

**MCP33111-10/05**  
1Msps/500ksps, SPI,  
Single Ended 

**MCP33111D-10/05**  
1Msps/500ksps, SPI,  
Differential 


**MCP33141-10/05**  
1Msps/500ksps, SPI,  
Single Ended 

**MCP33141D-10/05**  
1Msps/500ksps, SPI,  
Differential 


**MCP3201/2/4/8**  
100 ksps, SPI 

**MCP3221**  
22 ksps, I<sup>2</sup>C, SOT-23 

14-bit

**MCP33121-10/05**  
1Msps/500ksps, SPI,  
Single Ended 

**MCP33121D-10/05**  
1Msps/500ksps, SPI,  
Differential 

**MCP33151-10/05**  
1Msps/500ksps, SPI,  
Single Ended 

**MCP33151D-10/05**  
1Msps/500ksps, SPI,  
Differential 

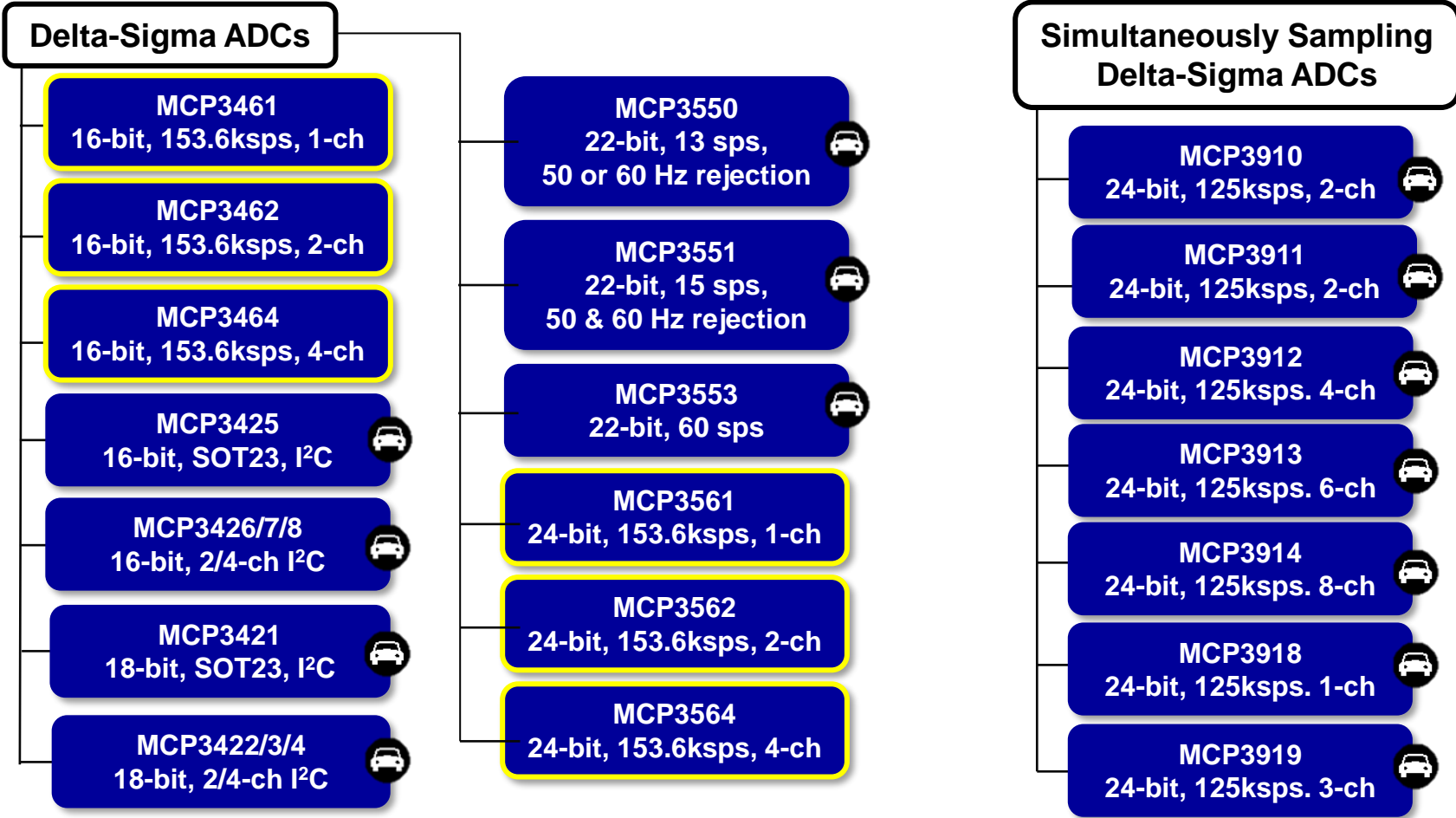
<< BACK to ADC Demo & Eval Boards

<< BACK

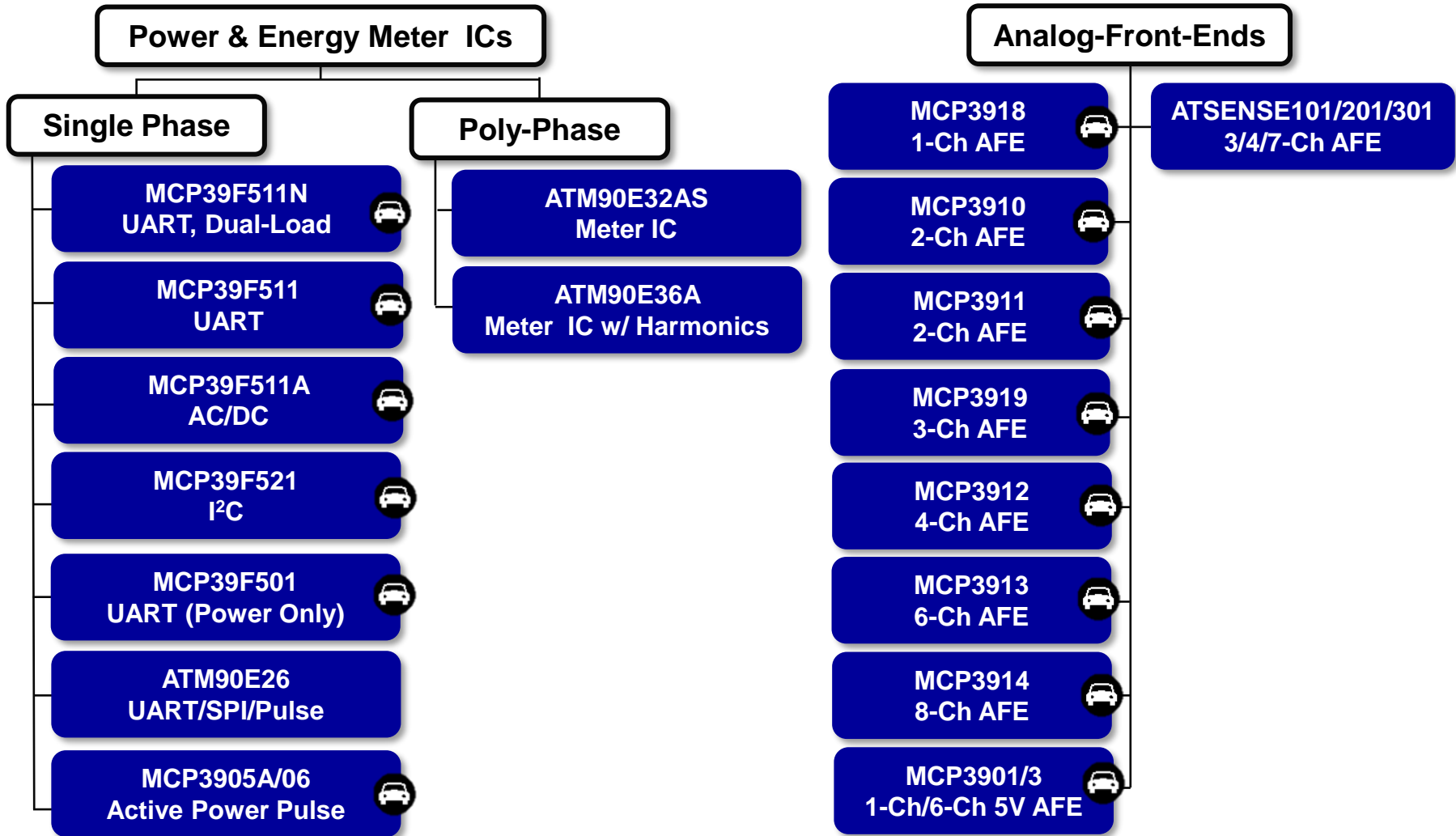
 = New product



# Delta-Sigma A/D Converters



# Power Monitoring & Metering ICs



# Current/DC Power Measurement ICs

## Current/DC Power w/ Temp Measurement

**EMC1701**  
1 temp, 3-24V, I<sup>2</sup>C

**EMC1702**  
2 temp, 3-24V, I<sup>2</sup>C

**EMC1704**  
4 temp, 3-24V, I<sup>2</sup>C

## Current/DC Power Measurement

**PAC1710**  
Single, 0-40V, I<sup>2</sup>C

**PAC1720**  
Dual, 0-40V, I<sup>2</sup>C

**PAC1921**  
Single, 0-32V w/Analog & Digital

**PAC1931**  
Single, 0-32V, I<sup>2</sup>C, w/accumulator

**PAC1932**  
Dual, 0-32V, I<sup>2</sup>C, w/accumulator

**PAC1933**  
Triple, 0-32V, I<sup>2</sup>C, w/accumulator

**PAC1934**  
Quad, 0-32V, I<sup>2</sup>C, w/accumulator

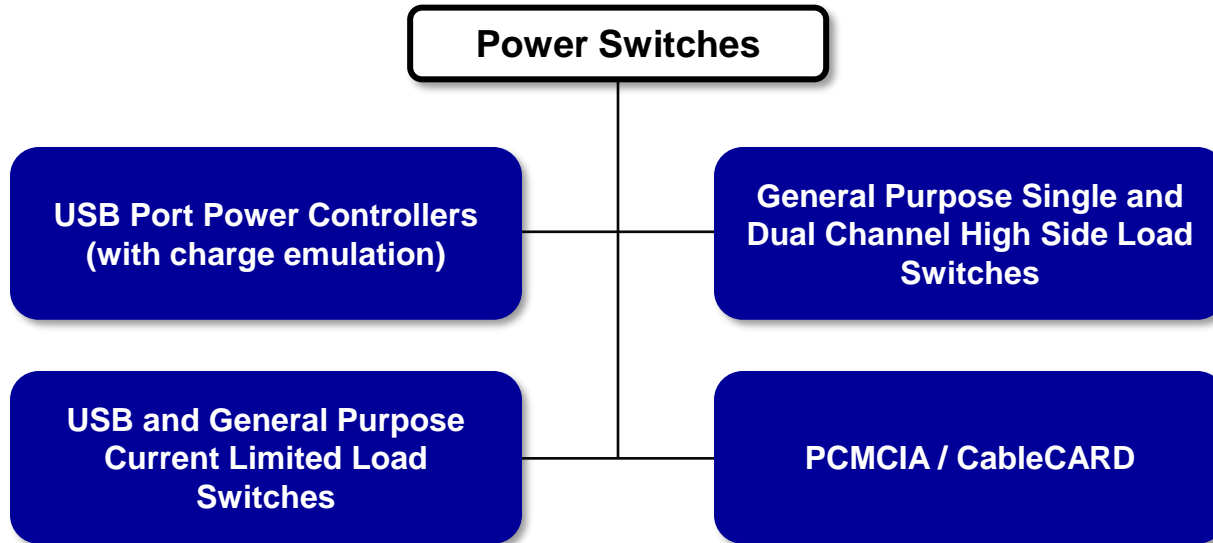
**High Voltage Analog  
Current Sensors**

<< BACK

<< BACK to Current/DC Power Demo & Eval Boards

<< BACK to Application Specific

# Power Switches



# USB Port Power Controllers

## Host Free Controller

### UCS1001

- 9-Built in charger emulation profiles
- 2.5A Integrated Vbus power switch
- USB 2.0 Data switch

## Programmable Controllers

### Standard Versions

#### UCS1002


- 9-Built in charge emulation profiles
- 1 Programmable profile
- 2.5A Vbus power switch
- USB 2.0 data switch
- Highest current algorithm with SLA

#### UCS1003


- 9-Built in charge emulation profiles
- 1 Programmable profile
- 2.7A Vbus power switch
- USB 2.0 Data switch
- Highest current algorithm available with SLA

### Automotive Versions

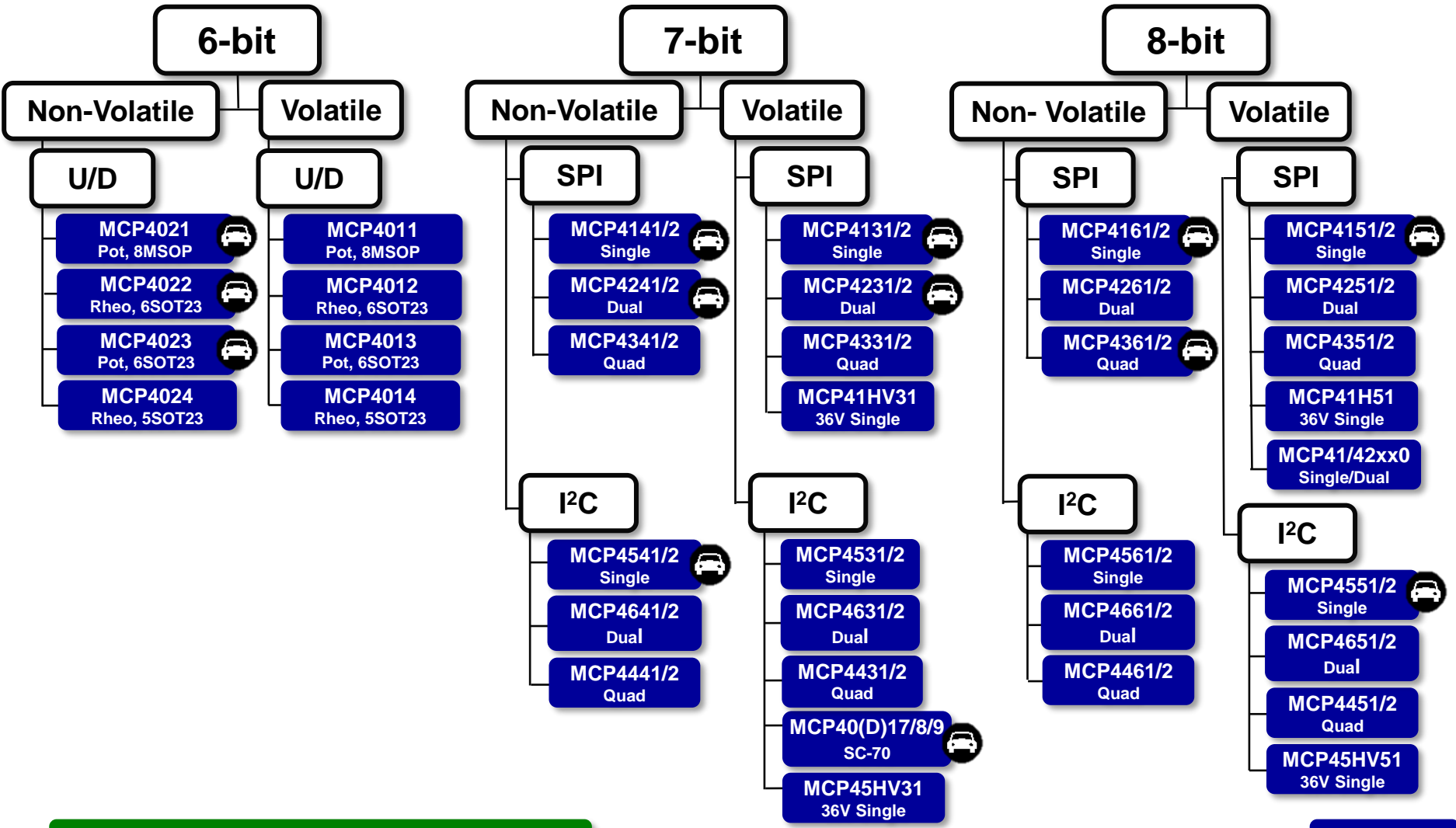
#### UCS81001/2

- 9-Built in charge emulation profiles
  - 1 Programmable profile
  - 2.5A Vbus power switch
  - USB 2.0 data switch
  - Highest current algorithm with SLA
- 

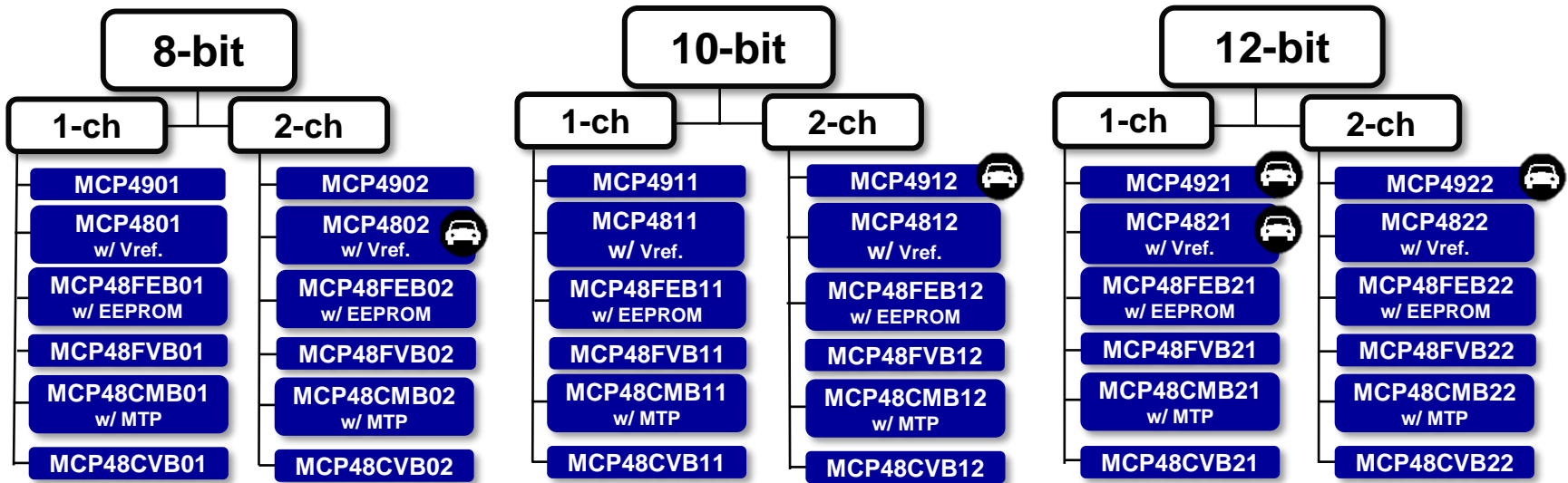
#### UCS81003

- 9-Built in charge emulation profiles
  - 1 Programmable profile
  - 2.7A Vbus power switch
  - USB 2.0 Data switch
  - Highest current algorithm available with SLA
- 

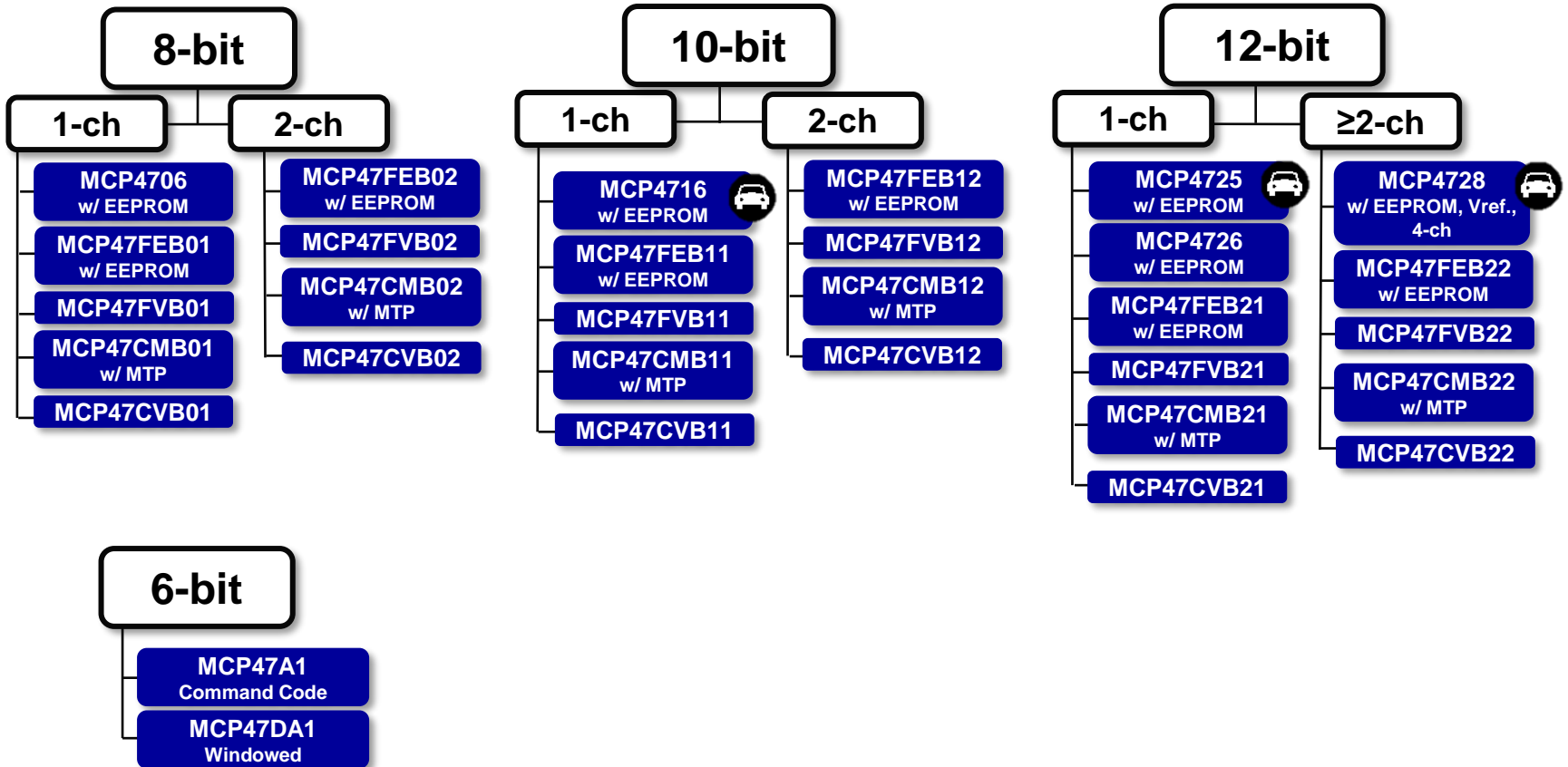
# Digital Potentiometers



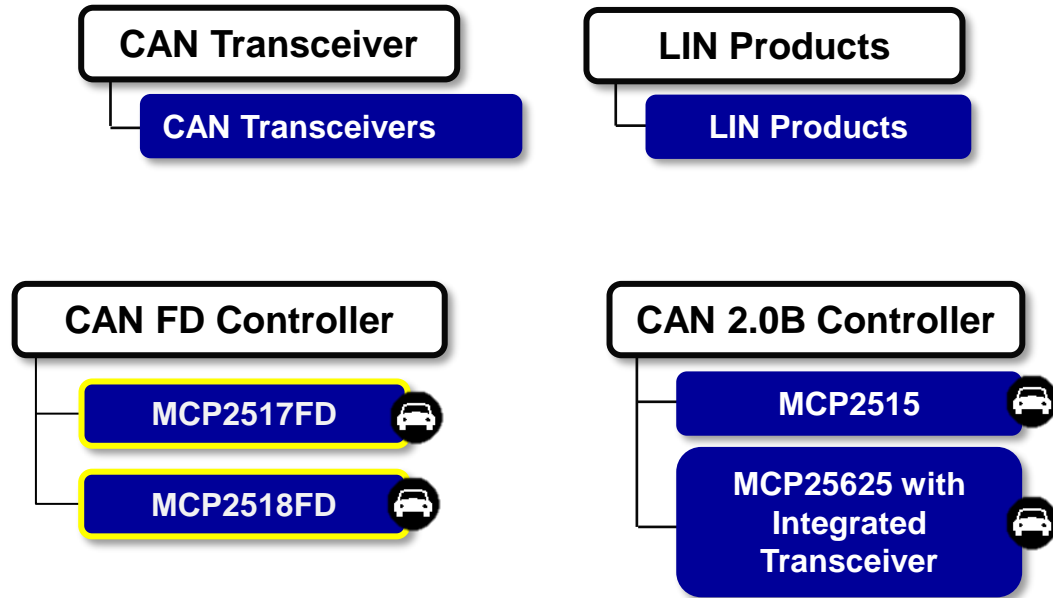
# D/A Converters (SPI)



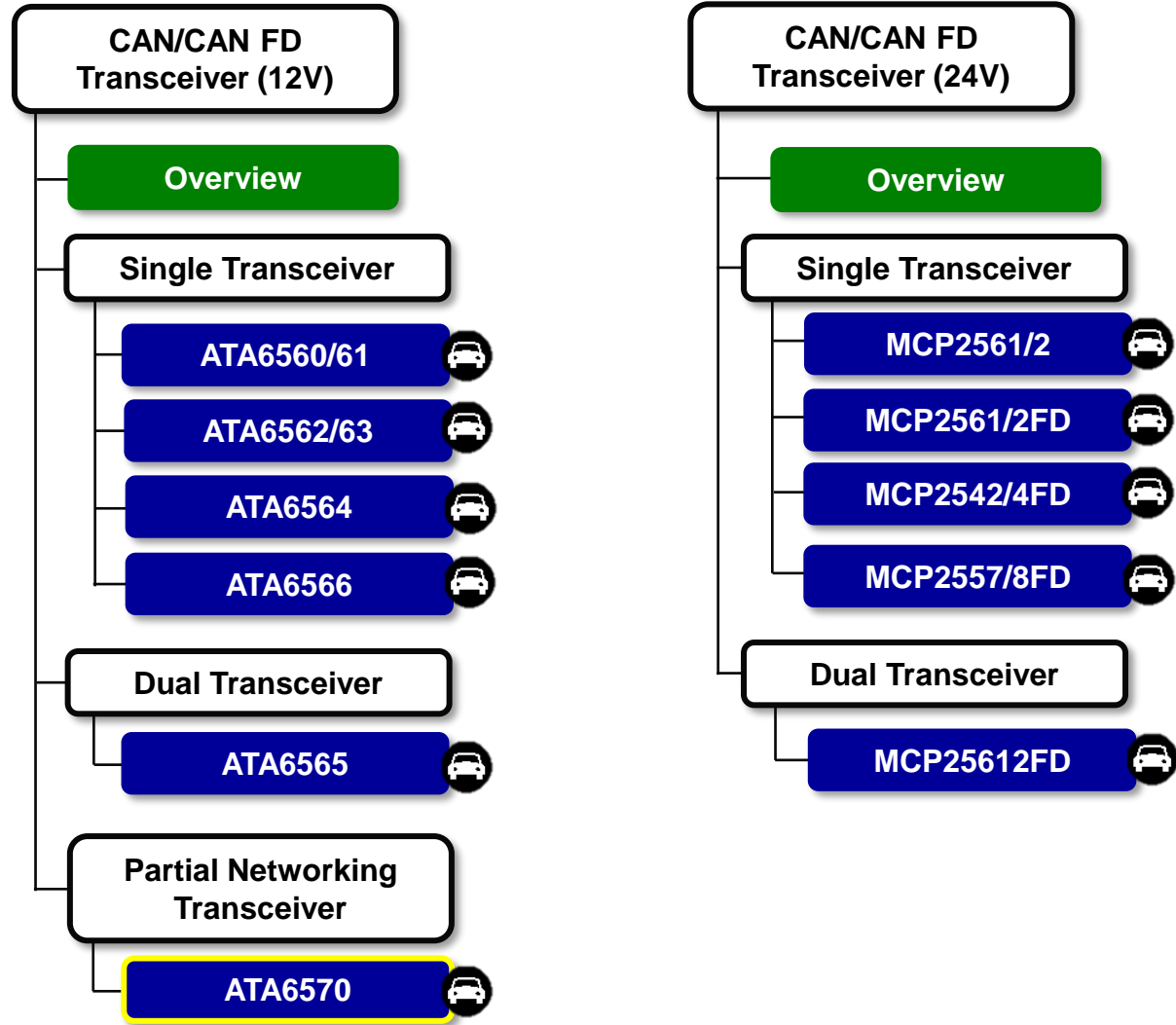
# D/A Converters (I<sup>2</sup>C)



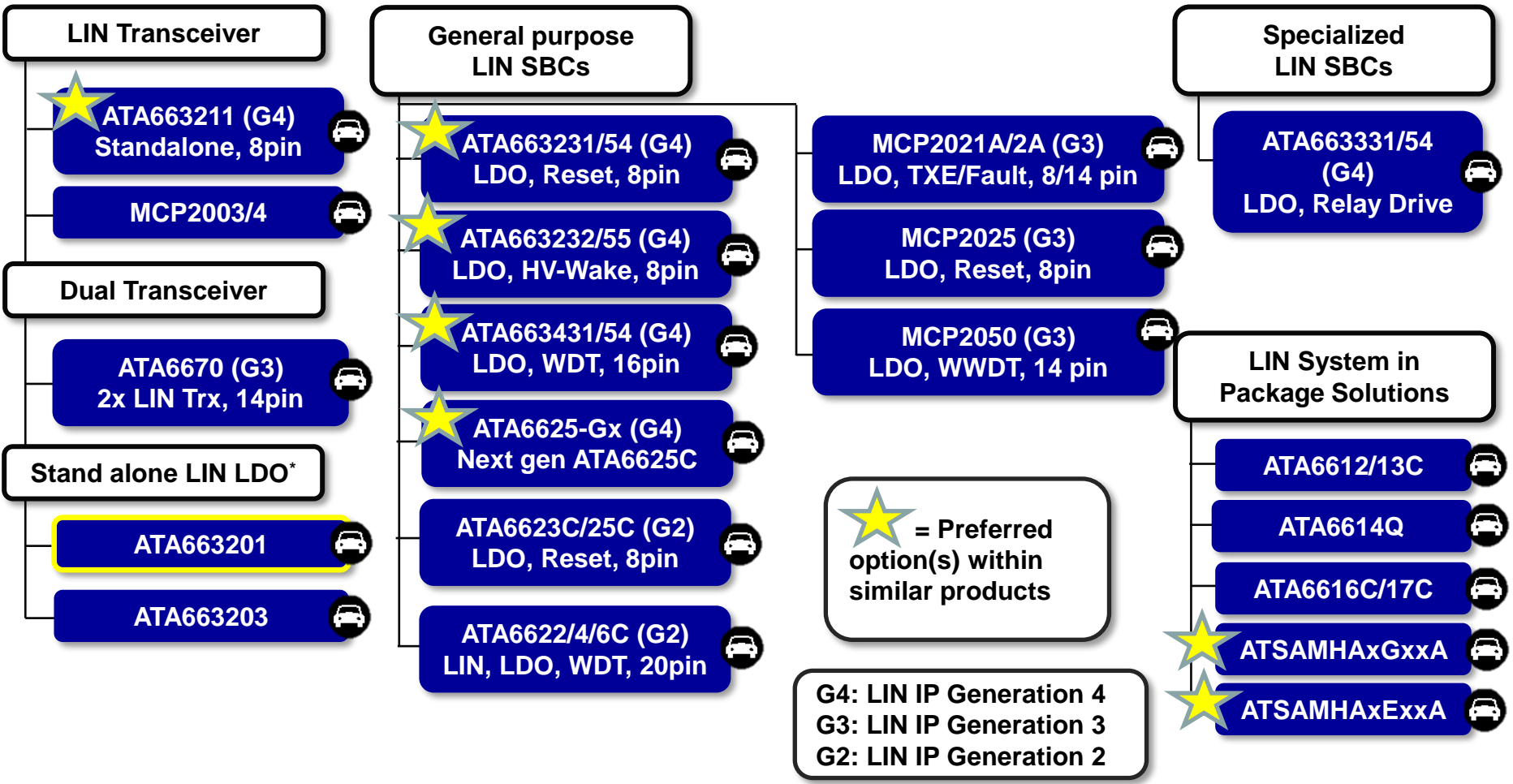




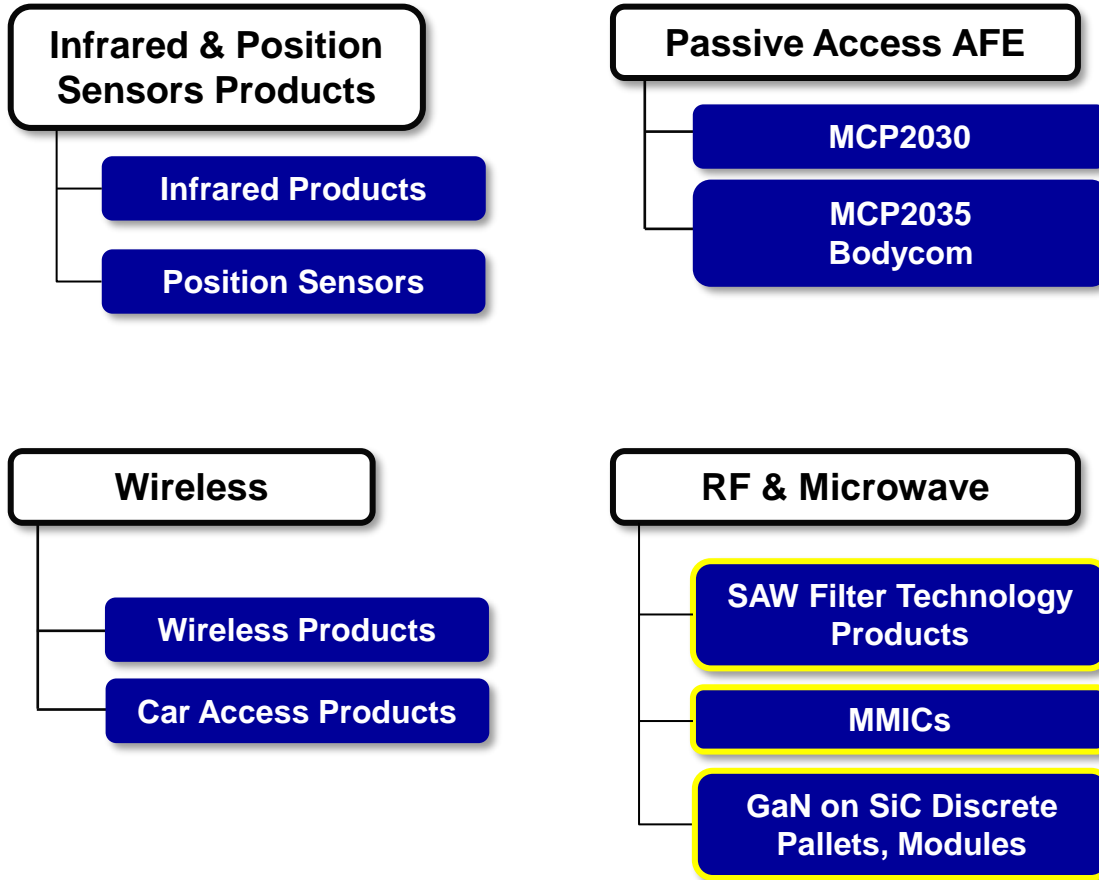
# CAN Transceiver



# LIN Products



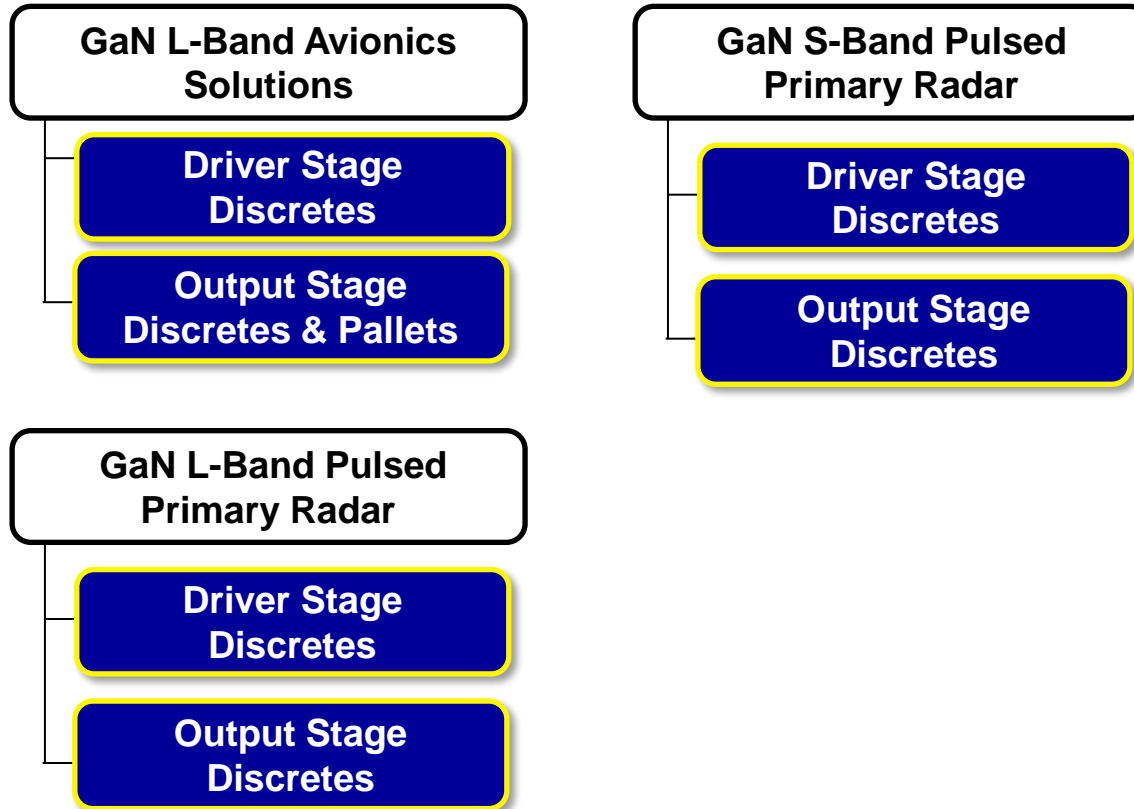
\* LIN LDO: LDO footprint compatible with LIN SBC ATA663254



<< BACK to Wireless Interface Demo & Eval Boards

<< BACK to RF Wireless Demo & Eval Boards

<< BACK





# GaN S-Band Radar Output Stage Discretetes

Frequency: 2.7 – 2.9GHz  
Pulsed Power: 100uS Pulse  
Width, 10% Duty Cycle

2729GN-150V  
150W Pout  
69% Drain Eff

2729GN-270V  
270W Pout  
68% Drain Eff

Frequency: 2.7-3.1GHz  
Pulsed Power: 200uS Pulse  
Width, 10% Duty Cycle

2731GN-120V  
120W Pout  
64% Drain Eff

2731GN-280LV  
280W Pout  
65% Drain Eff

Frequency: 3.1 – 3.5GHz  
Pulsed Power: 200uS Pulse  
Width, 10% Duty Cycle

3135GN-200V  
200W Pout  
58% Drain Eff

3135GN-400V  
400W Pout  
58% Drain Eff

Frequency: 3.1 – 3.5GHz  
Pulsed Power: 200uS Pulse  
Width, 20% Duty Cycle

3135GN-280LV  
280W Pout  
58% Drain Eff



# GaN S-Band Radar Driver Stage Discretes

---

Frequency: 2.7 – 3.1GHz  
Pulsed Power

**DC35GN-15-Q4 (SMT)**  
15W Pout  
60% Drain Eff

Frequency: 3.1 – 3.5GHz  
Pulsed Power

**DC35GN-15-Q4 (SMT)**  
12W Pout  
50% Drain Eff



# GaN L-Band Radar Output Stage Discretes & Pallets

Frequency: 1.2 – 1.4GHz  
Pulsed Power: 300uS Pulse  
Width, 10% Duty Cycle

**1214GN-600VHE**  
600W Pout  
63% Drain Eff

**1214GN-700V**  
700W Pout  
63% Drain Eff

Frequency: 1.2 – 1.4GHz  
Pulsed Power: 150uS Pulse  
Width, 10% Duty Cycle

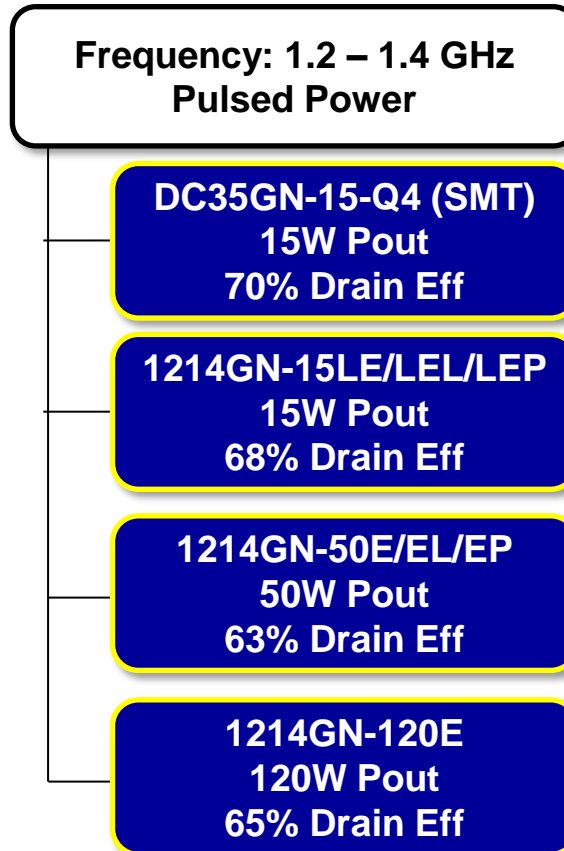
**1214GN-650V**  
650W Pout  
65% Drain Eff

Frequency: 1.2 – 1.4GHz  
Pulsed Power: 450uS Pulse  
Width, 30% Duty Cycle

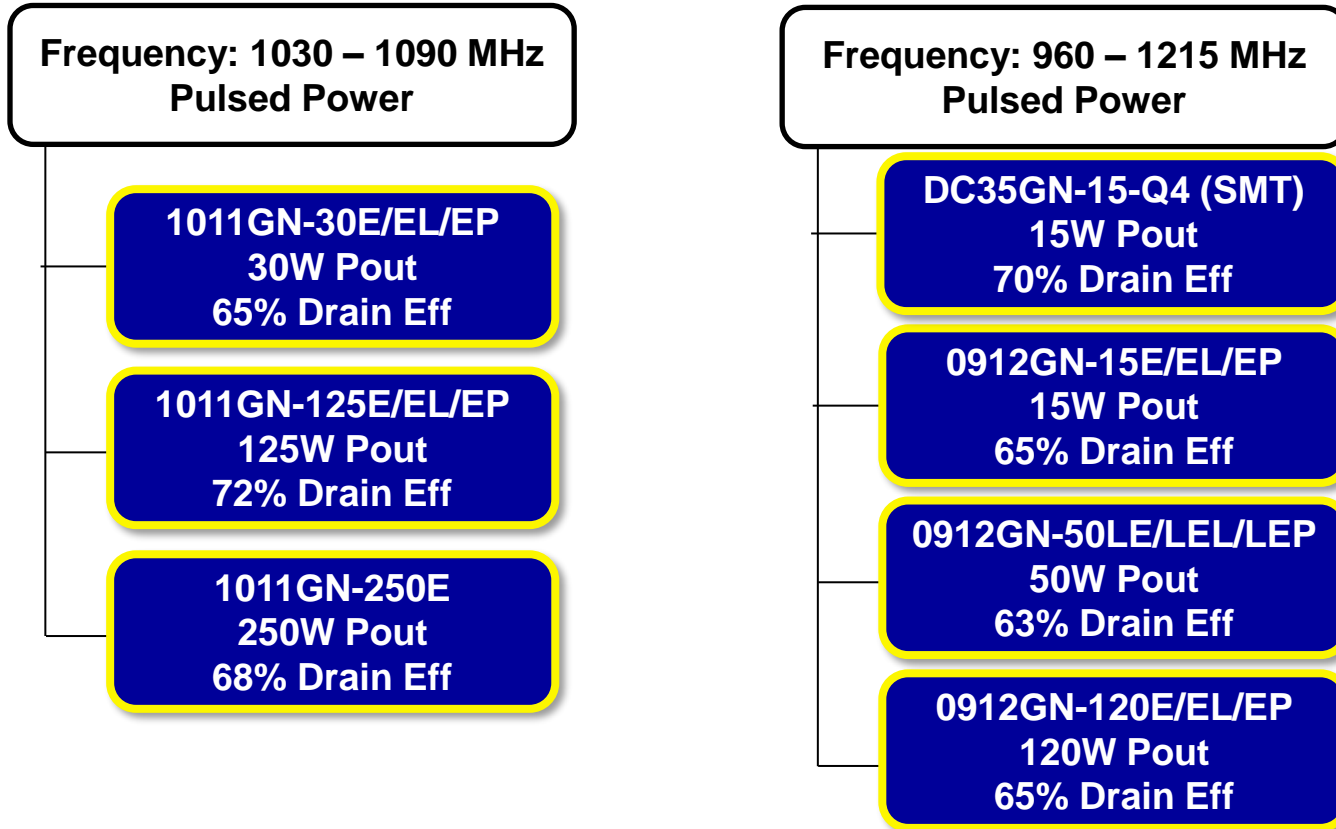
**1214GN-400LV**  
400W Pout  
65% Drain Eff



# GaN L-Band Radar Driver Stage Discretes

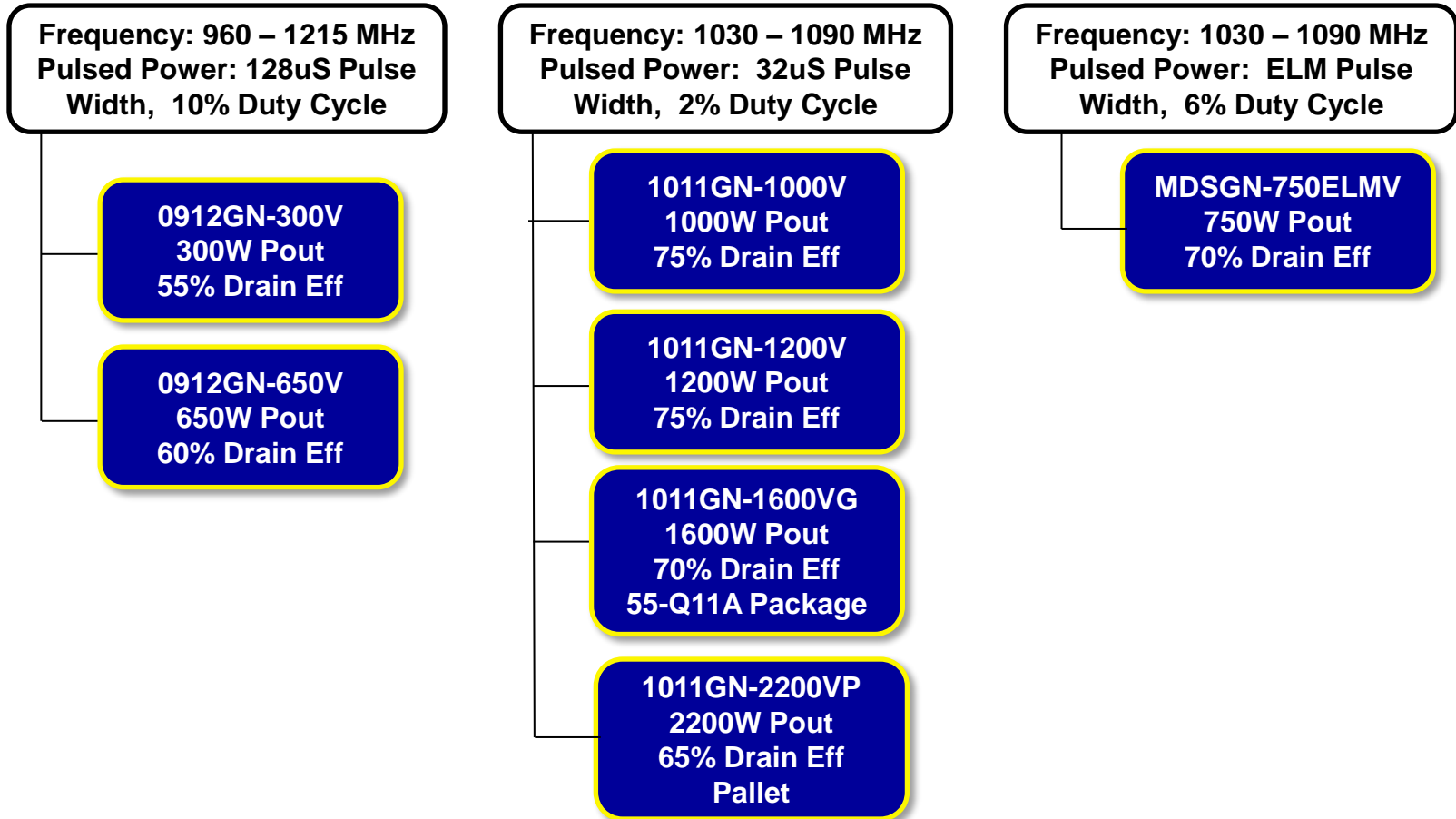


# GaN L-Band Avionics Driver Stage Discretes





# GaN L-Band Avionics Output Stage Discretes & Pallets




# Infrared & Position Sensors Products

## Position Sensors

**Grade 0**

40 °C to 150 °C

**LX3302A**

Analog, PWM, SNET, PSI5,  
SINE/COSINE Outputs 

**Grade 1**

-40 °C to 125 °C

**LX3301A**

Analog, PWM Outputs 

## Infrared Products

**IrDA® Protocol Handler + Bit  
Encoder/Decoder**

**MCP2140A**

Low speed, power, cost

**MCP2150/5**

Higher speed,  
Configurable ID

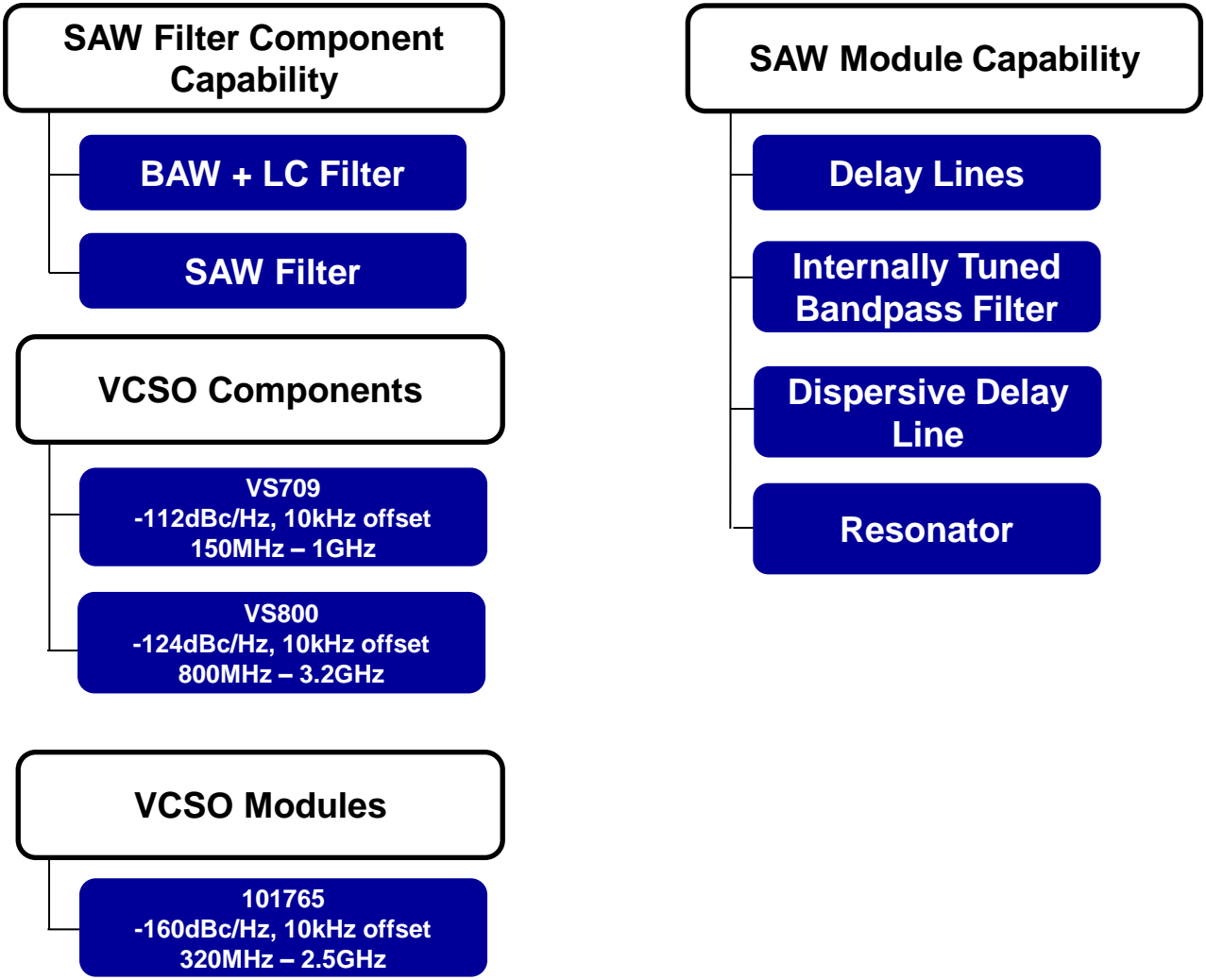
**Infrared Bit Encoder/Decoder**

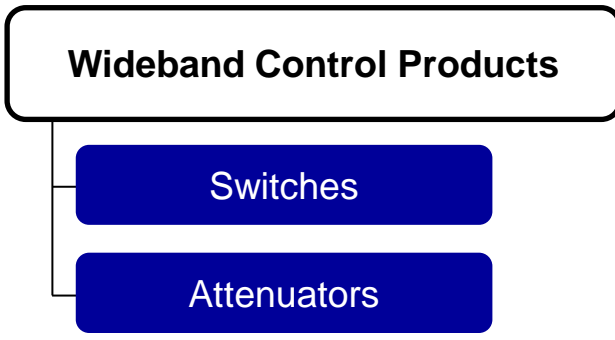
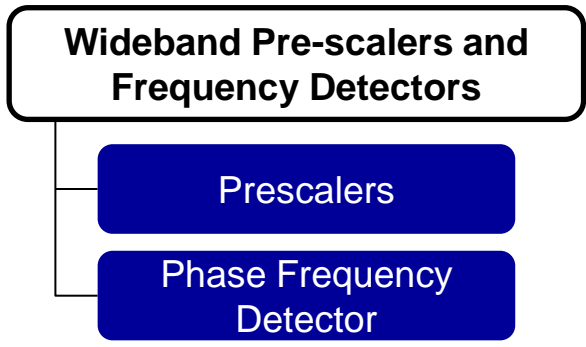
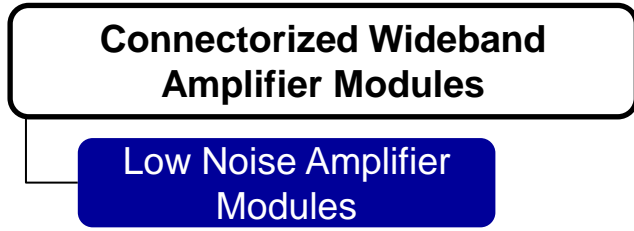
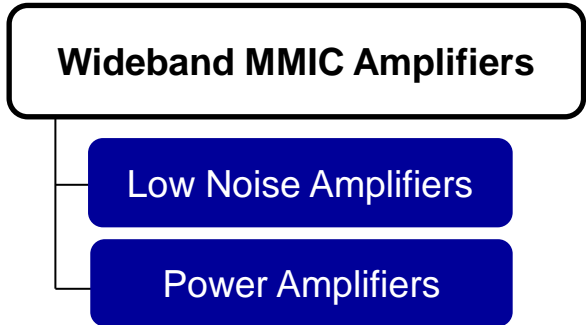
**MCP2120**

HW/SW baud select,  
OSC req.

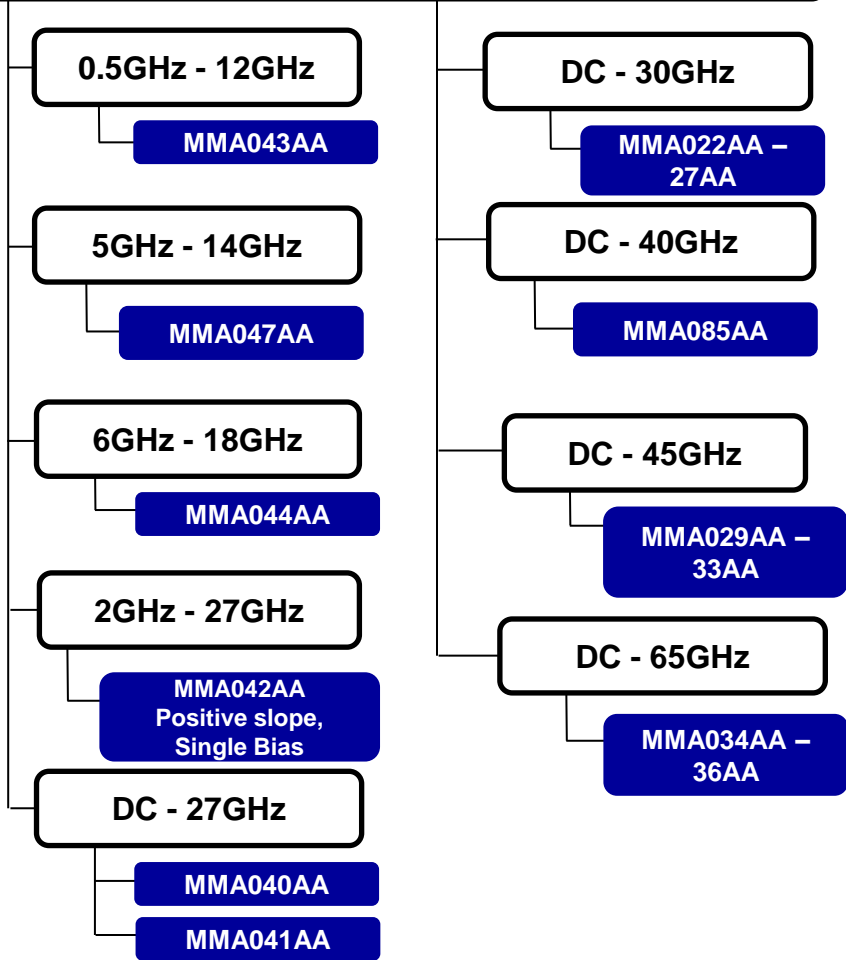
**MCP2122**

16x clock req., Low cost 

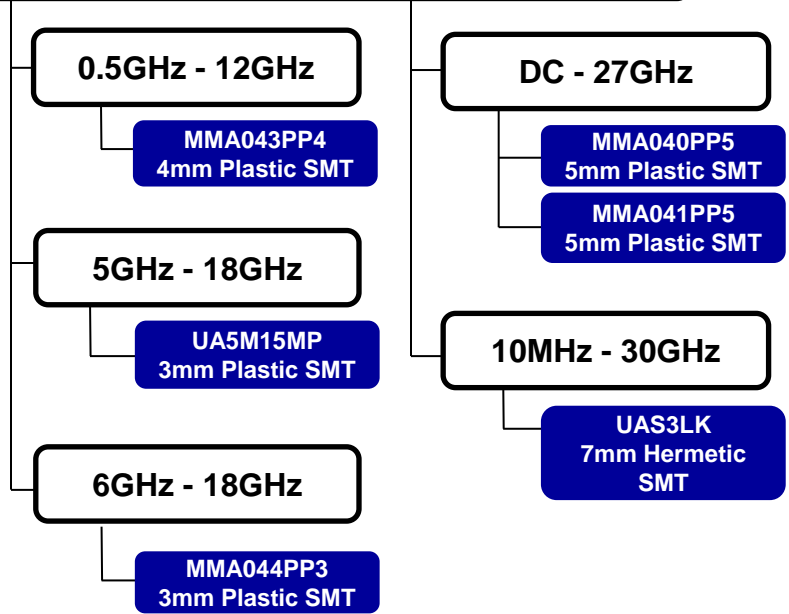


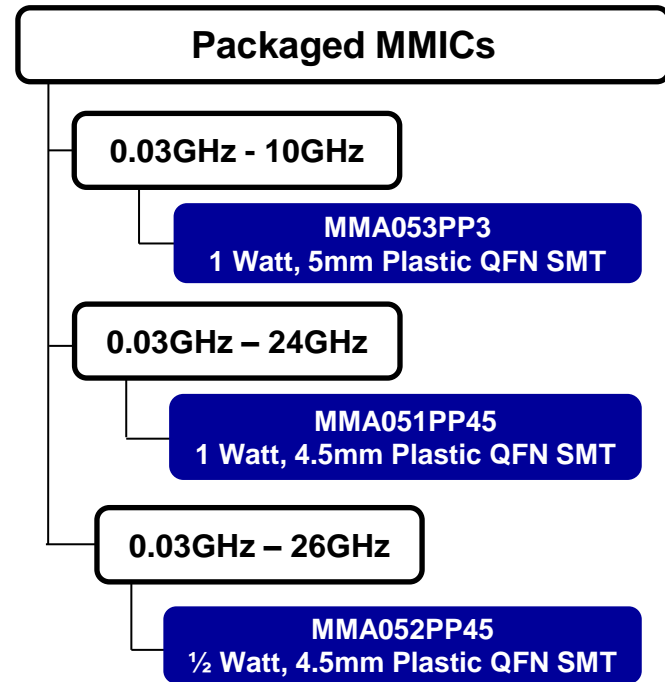
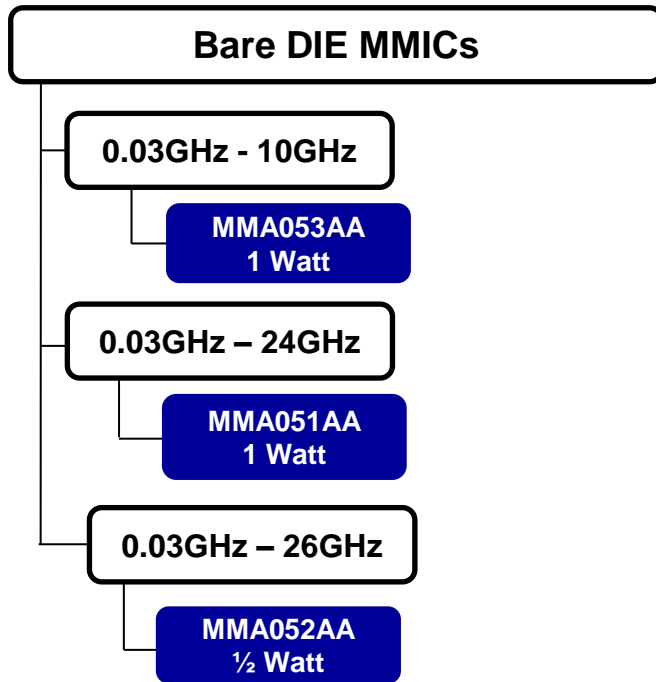


**Bare DIE MMICs**



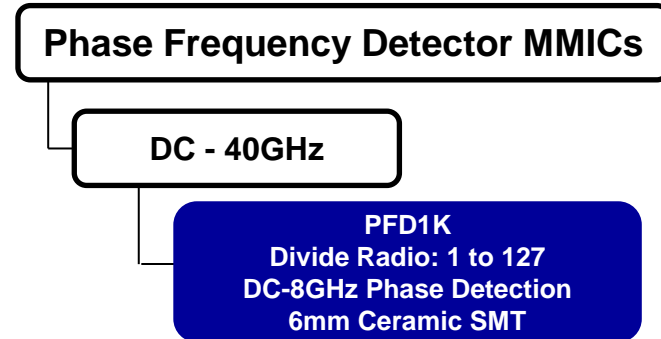
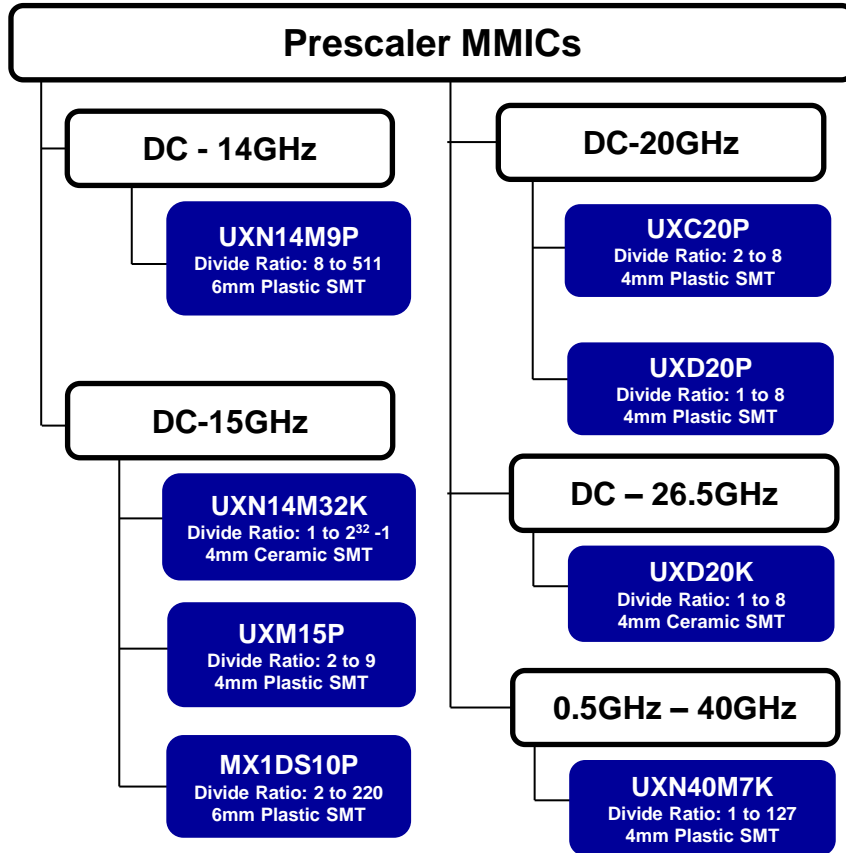
**Packaged MMICs**

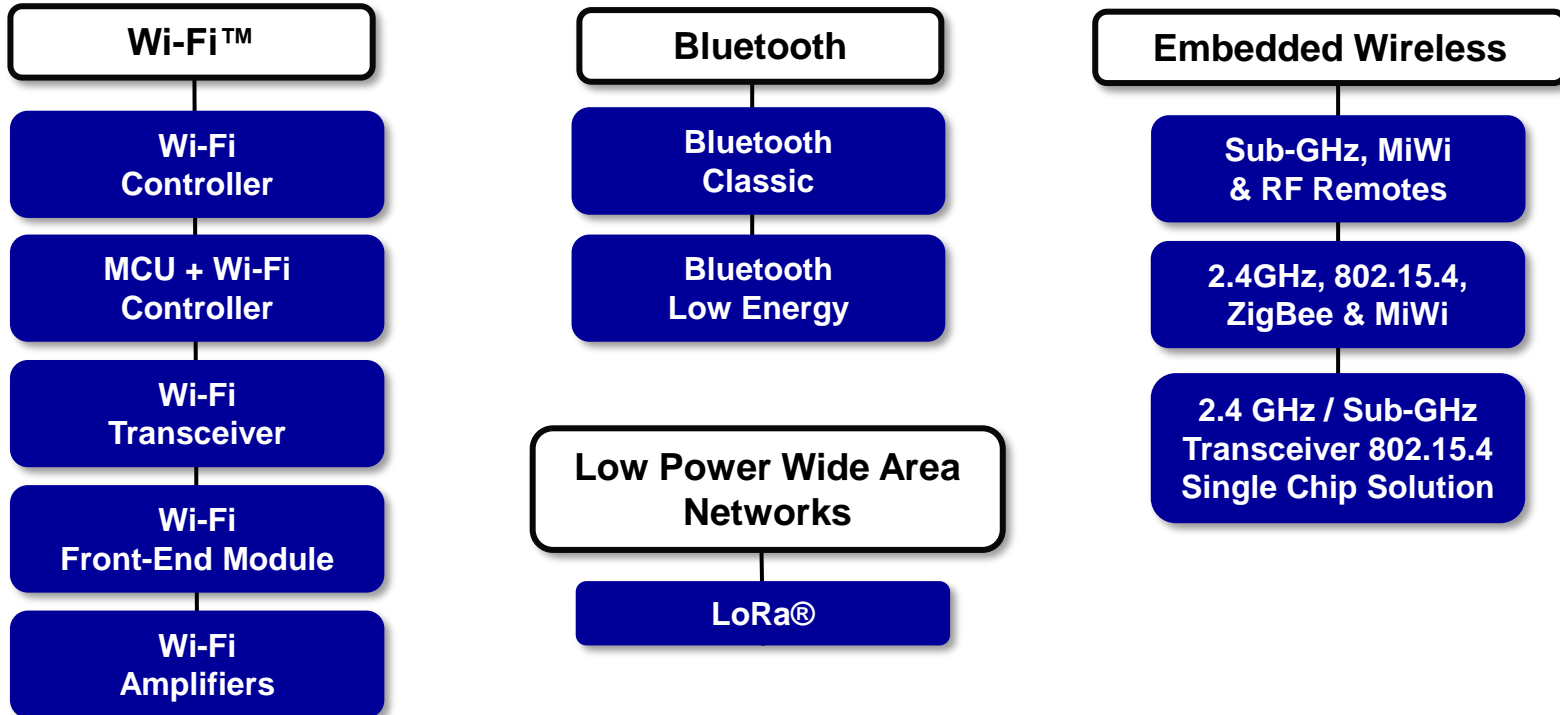


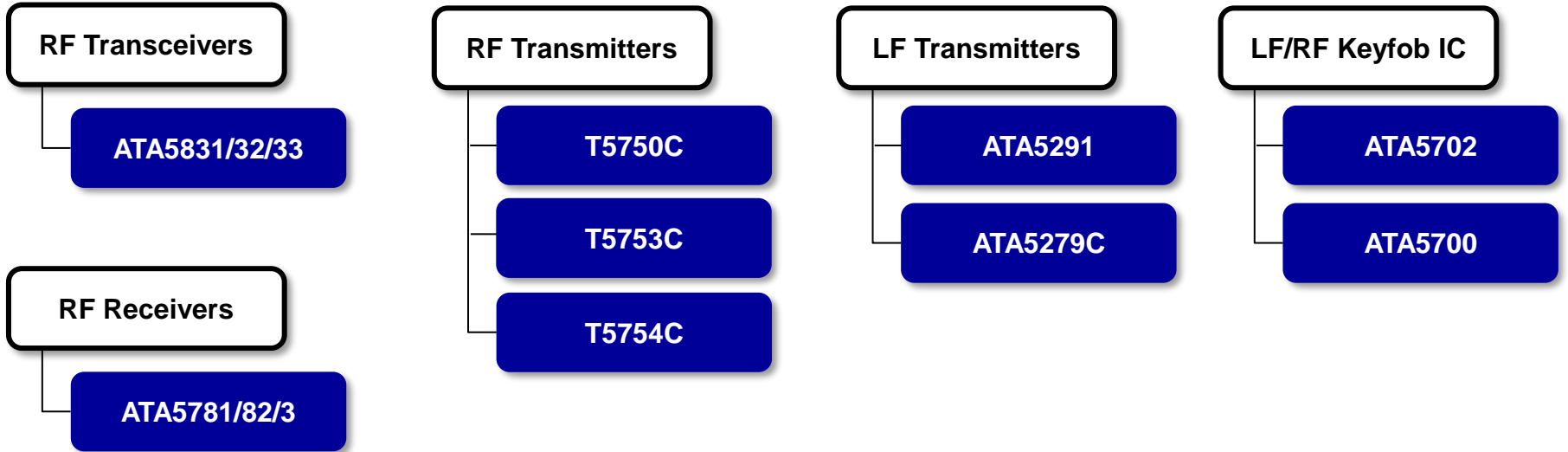


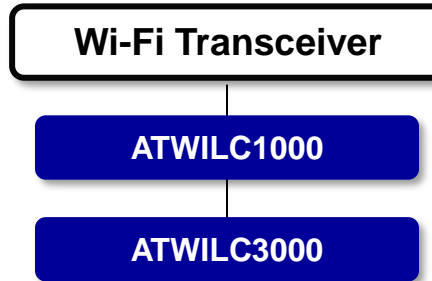


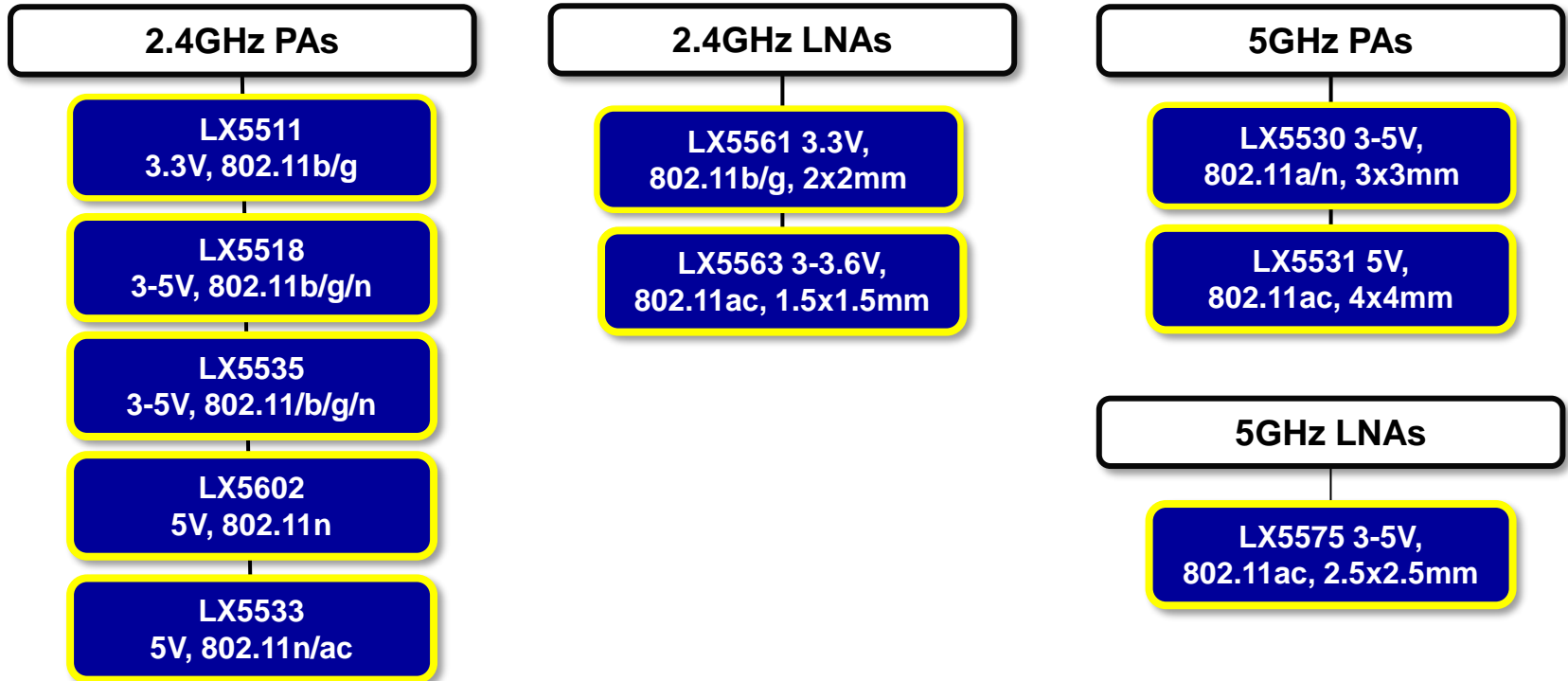
# Prescaler & Phase Frequency Detector MMICs











# Wi-Fi Front-End Module (802.11ac FEM)

**2.4GHz FEMs**

**LX5584A**  
3.3V, 3x3mm

**LX5584B**  
5V, 3x3mm

**LX5584H**  
5V, 2.5x2.5mm

**Dual Band FEM**

**LX5591**  
3.3V, 4x3mm

**5GHz FEMs**

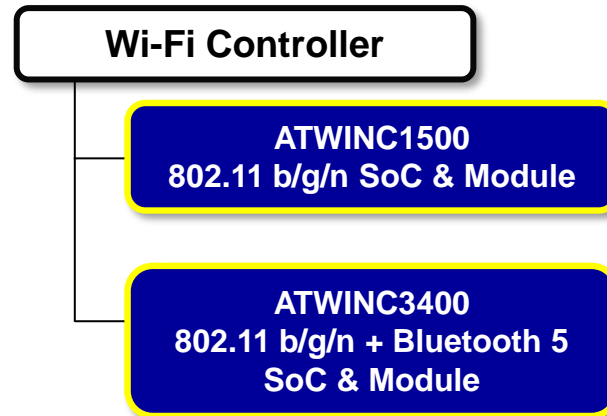
**LX5586A**  
3.3V, 2.5x2.5mm

**LX5586H**  
5V, 2.5x2.5mm

**LX5589A**  
3.3V, 2.5x2.5mm

**LX5589B**  
5V, 3x3mm

**LX5589H**  
5V, 2.5x2.5mm





# MCU + Wi-Fi Controller

Product Tree

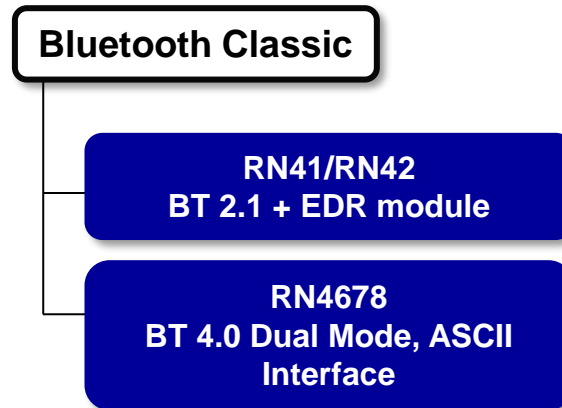
MCU + Wi-Fi Controller

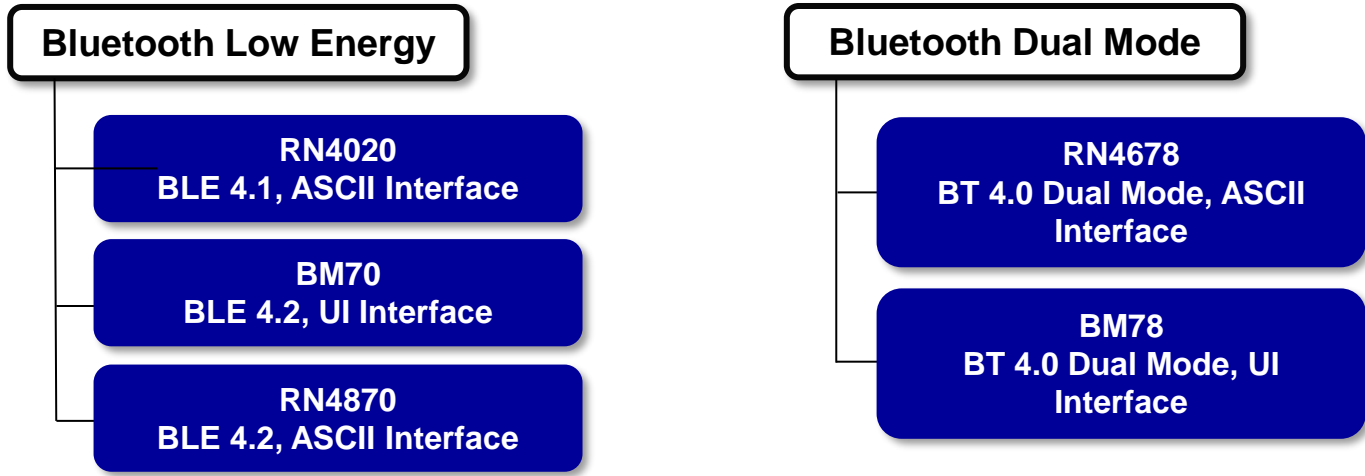
SAMW25

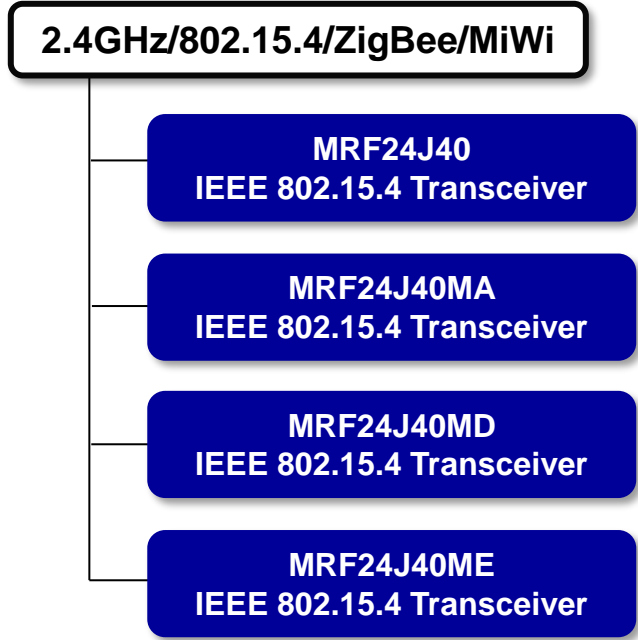
<< BACK to RF Wireless Demo & Eval Boards

<< BACK









2.4 GHz / Sub-GHz  
Transceiver 802.15.4  
Single Chip SiP

ATSAMR21

ATSAMR30

2.4 GHz / Sub-GHz  
Transceiver 802.15.4  
Single Chip Module

ATSAMR30M18

## Sub-GHz/MiWi

**MRF89XA**  
868/915/950 MHz Transceiver

**MRF89XAM8A**  
868/915/950 MHz Transceiver

**MRF89XAM9A**  
868/915/950 MHz Transceiver

## Sub-GHz RF Remotes

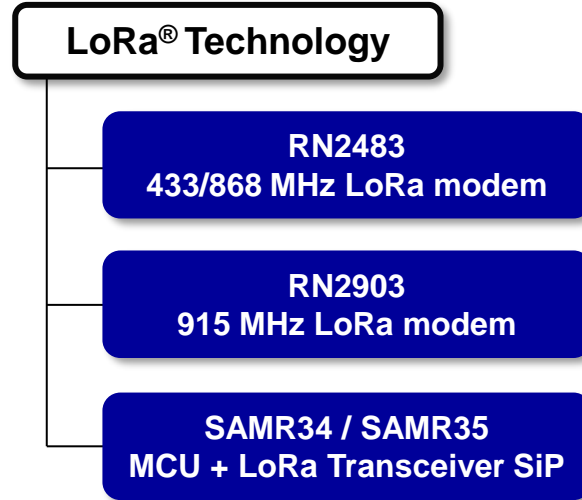
**MICRF114**  
285-445 MHz Transmitter

**MICRF113**  
300-450 MHz Transmitter

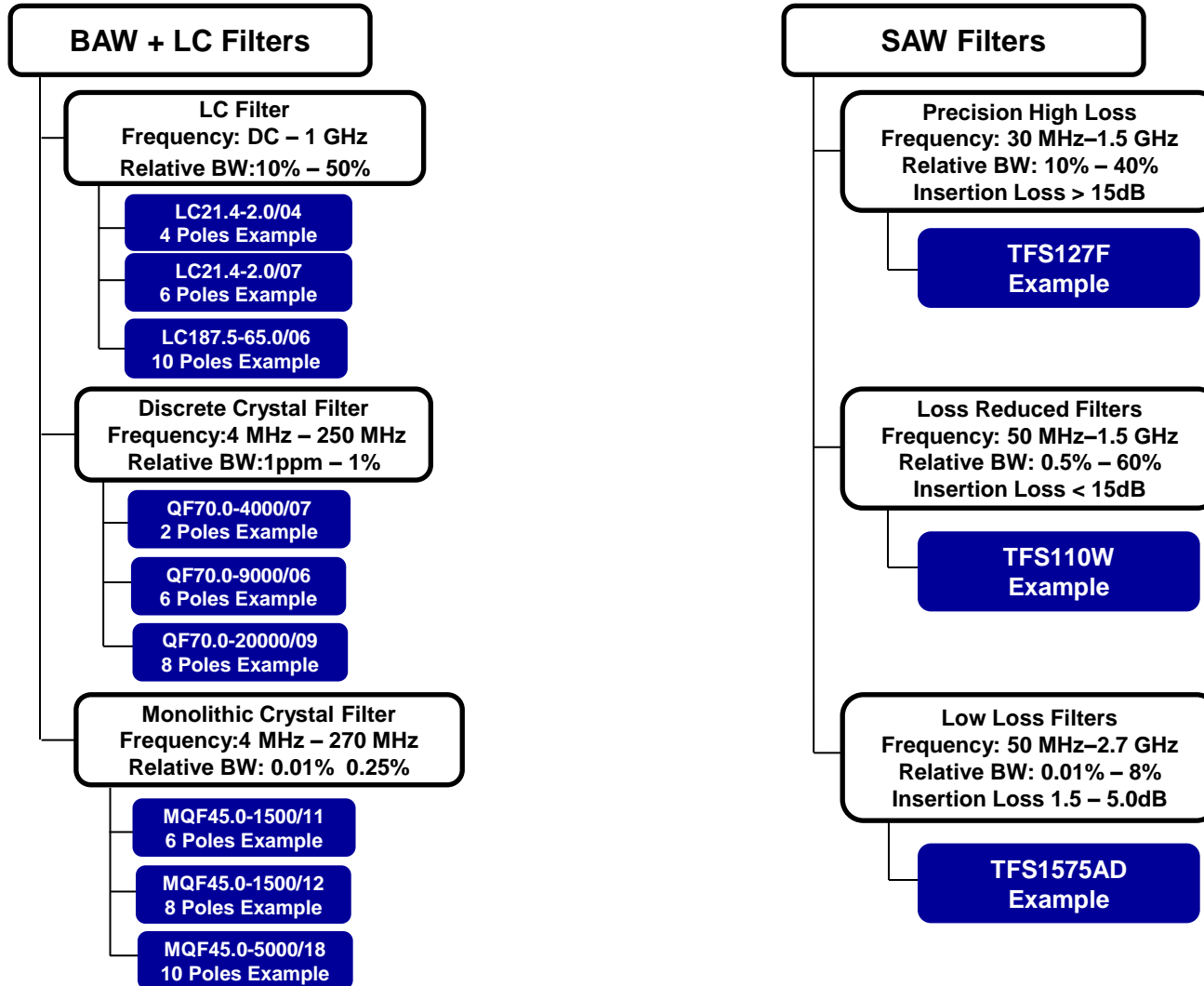
**MICRF112**  
300-450 MHz Transmitter

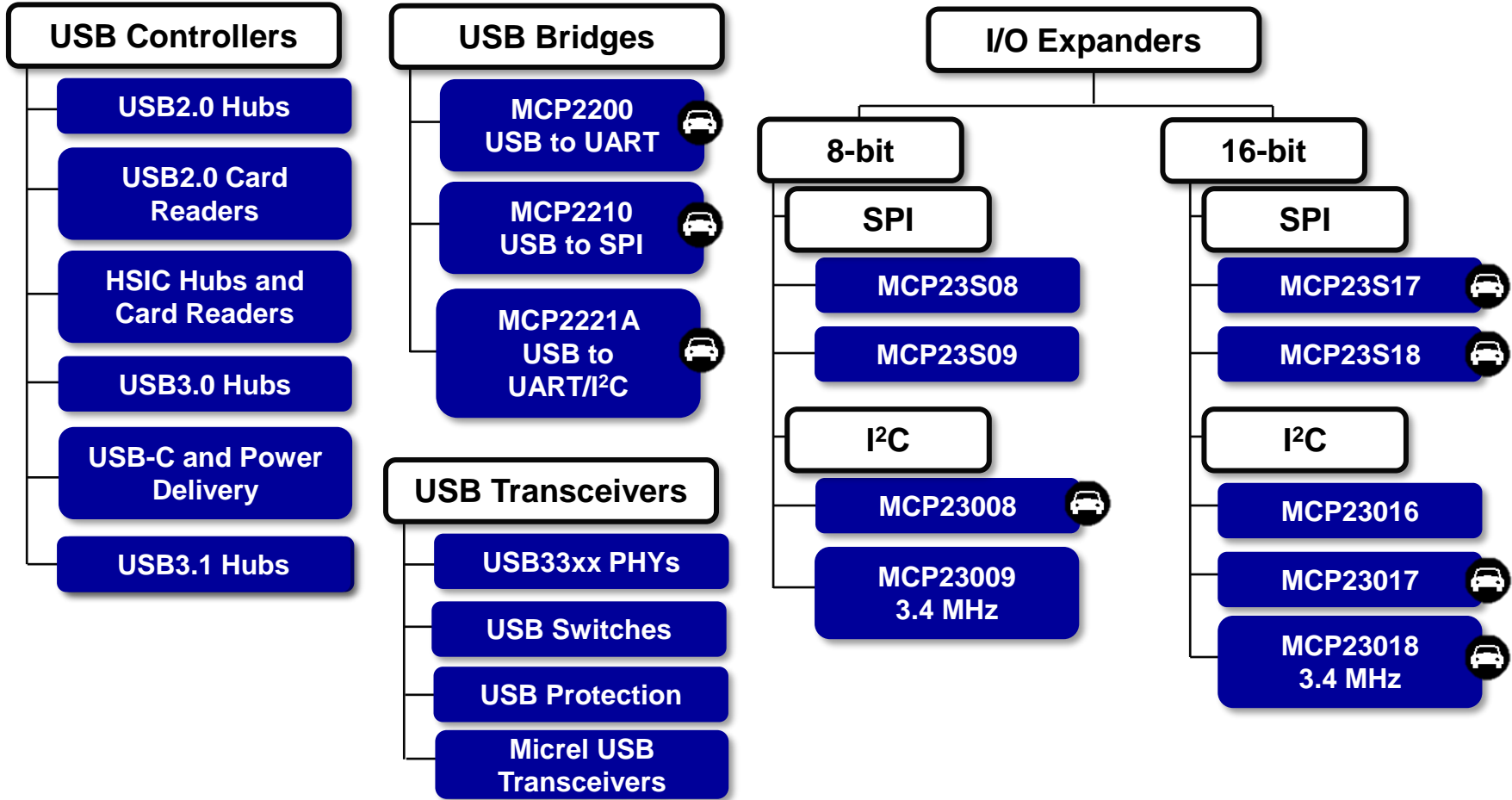
**MICRF219A**  
300-450 MHz Receiver

**MICRF220**  
300-450 MHz Receiver



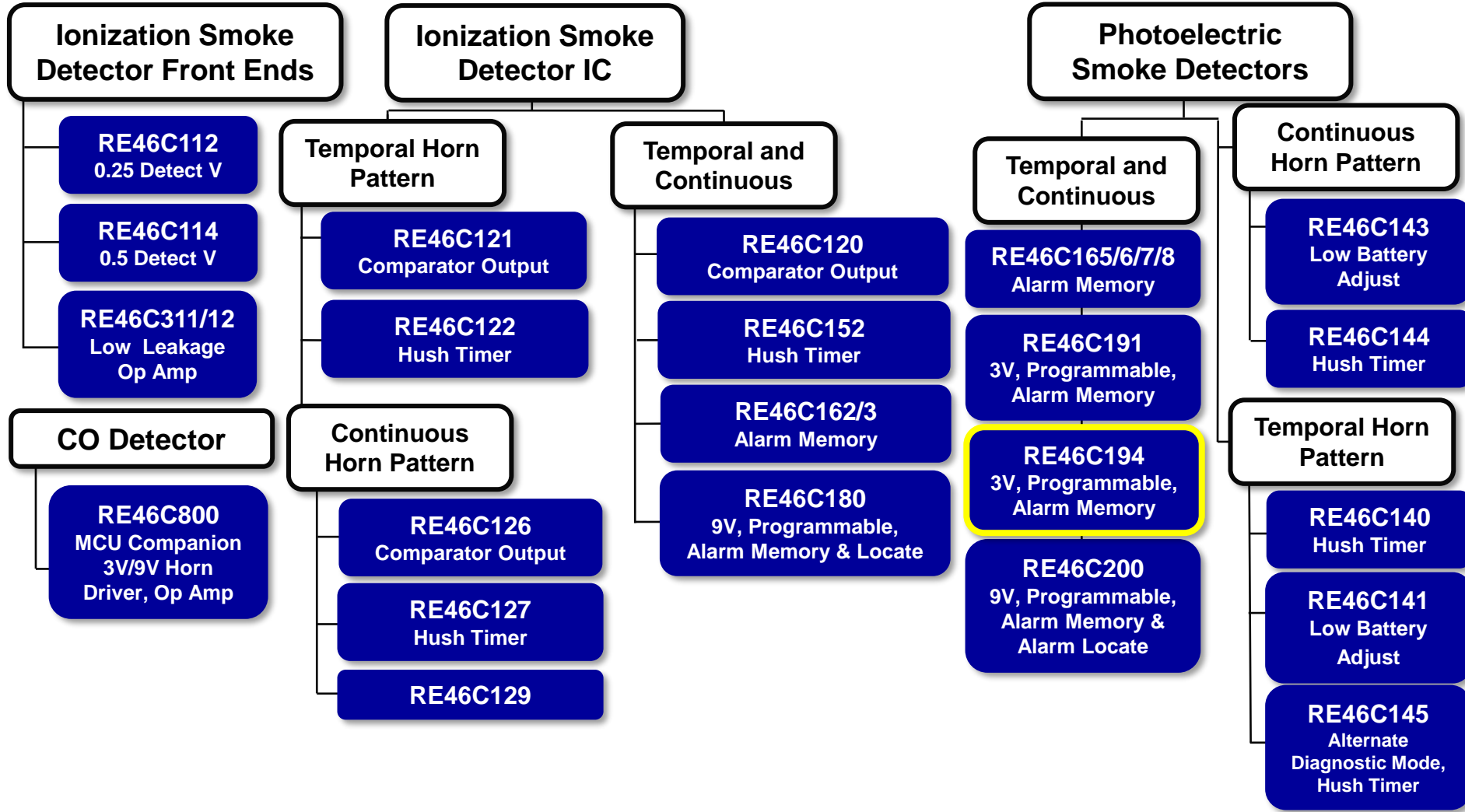
# SAW Filter Component Capability







# Smoke Detector ICs

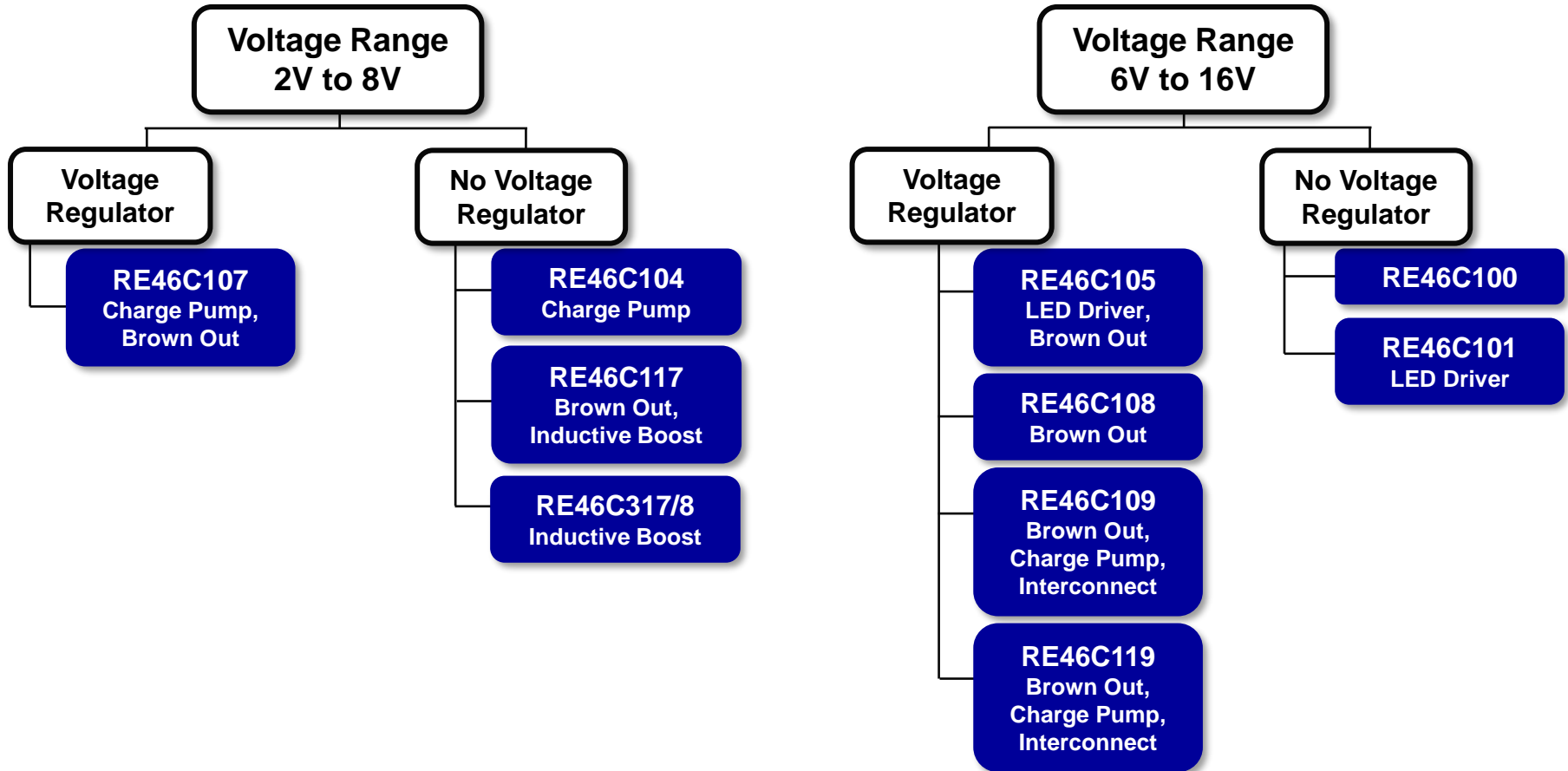


<< BACK to Smoke Detector Demo & Eval Boards

<< BACK

 = New product

# Piezoelectric Horn Drivers



## Ethernet Controller

ENC424J600/  
ENC624J600

ENC28J60

LAN9217/18

LAN89218 

LAN9220/21

LAN9250

LAN9252  
EtherCAT®

KSZ8851 

## ARCNET Controllers

COM20019/20/22

## USB to Ethernet Bridge

LAN7500

LAN951X

LAN9730

LAN7800/01/50 

LAN89530 

LAN89730 

## Ethernet PHYs

KSZ9031 GigE 

KSZ8081

LAN8710A

KSZ8091

LAN8740A/1A/2A

LAN88730 

KSZ8061  
Quiet-WIRE® 

KSZ8051 

## Ethernet Switches

LAN9303/M

LAN935X

KSZ8863/73  
3-Port 

KSZ8462/3  
IEEE1588

KSZ8864 4-Port 

KSZ8895 5-Port 

KSZ9893  
3-Port GigE

KSZ87xx  
5-Port GigE Uplink

KSZ856x  
7-Port 10/100 

KSZ989x  
6/7-Port GigE

KSZ9567  
7-Port GigE AVB/1588

KSZ9477  
7-Port GigE  
AVB/1588/DLR/HSR

KSZ9563  
3-Port Gigabit

KSZ8563  
3-Port 10/100

## Ethernet PHYs - Coax

EQCO875SC.3

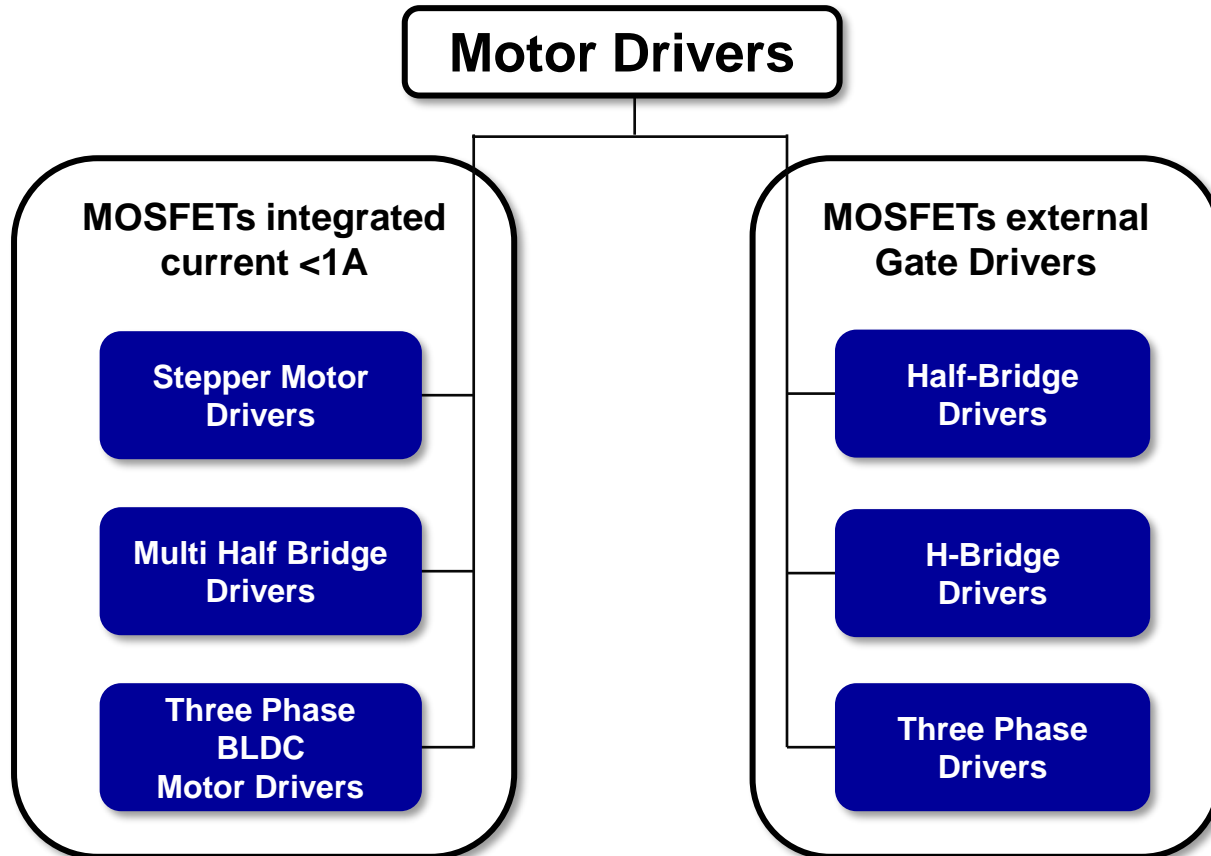
EQCO875SC.3-HS

EQCO850SC.3

EQCO850SC.3-HS

<< BACK to Ethernet Demo &  
Eval Boards

<< BACK



# MOSFET Integrated Motor Driver ICs

## Dual H-Bridge Stepper Motor Driver

**MTS62C19A 10V**  
– 40V, 750mA

**MTS2916A 10V**  
– 40V, 750mA

## Integrated Half-Bridge Motor Drivers

**ATA6826C**  
3 Half-bridges  
6.5V – 40V, 1A



**ATA6831/32C**  
3 Half-bridges  
6.5V – 40V, 1A  
T<sub>J</sub>=150/200°C



**ATA6836/38C**  
6 Half-bridges  
6.5V – 40V,  
650/950mA



## 3Φ Brushless Motor Driver

**MCP8063**  
2V – 14V, 1.5A



**MTD6501C/G**  
2V – 14V, 800mA

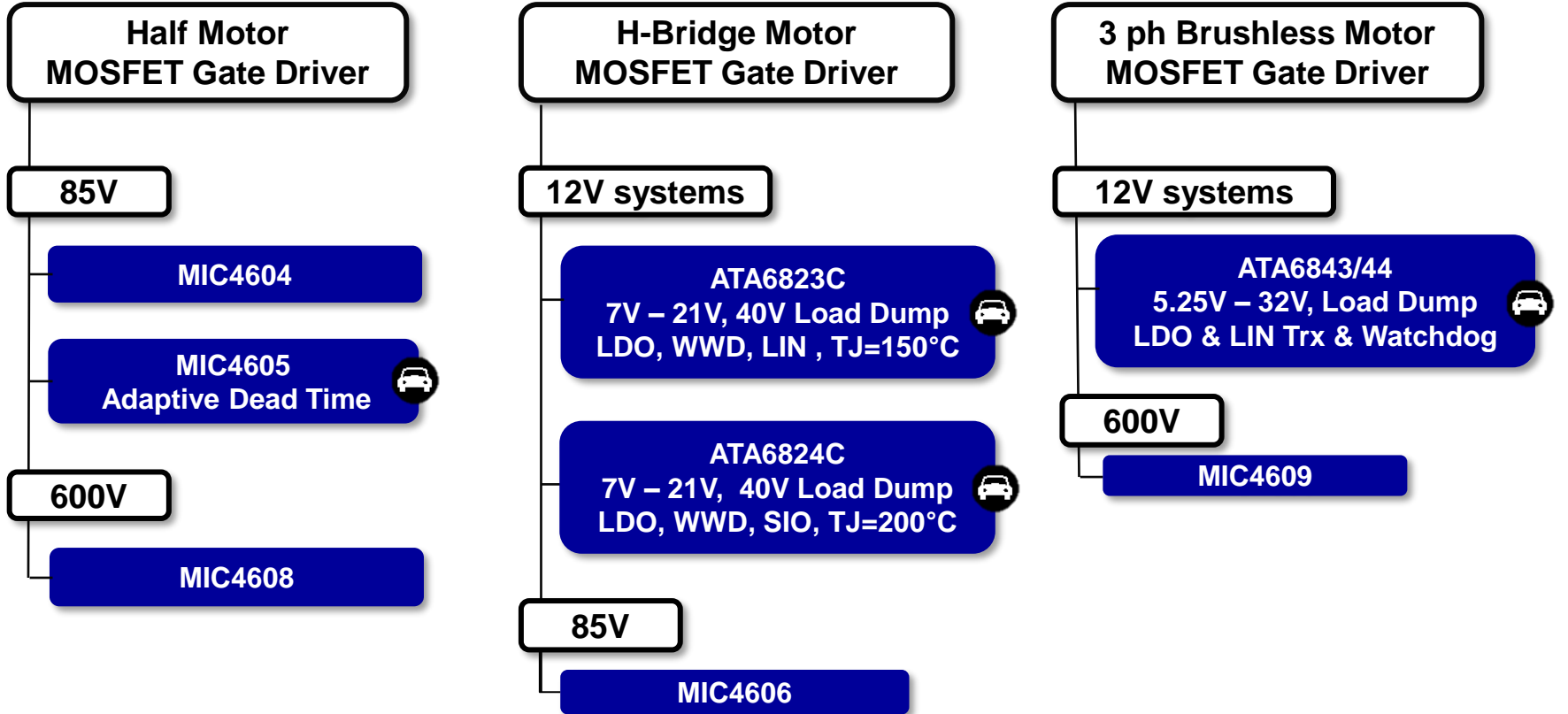
**MTD6501D**  
2V – 14V, 500mA

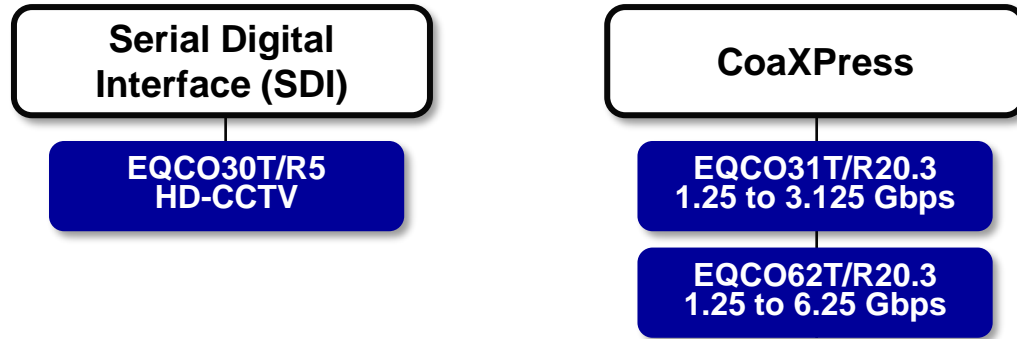
**MTD6502B**  
2V – 5.5V, 750mA

**MTD6505**  
2V – 5V, 750mA  
Adj. km

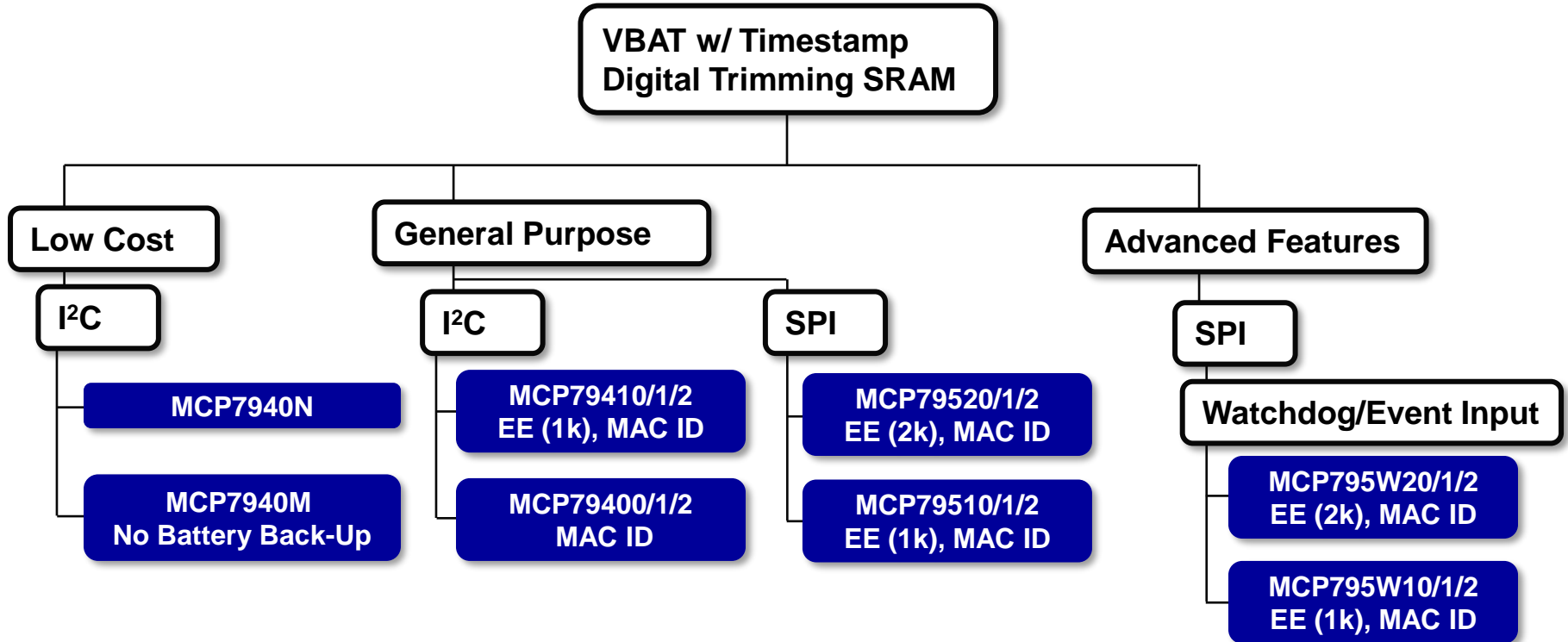
**MTD6508**  
2V – 5V, 750mA  
Adj. Start-Up

# Gate Drive Motor Driver ICs





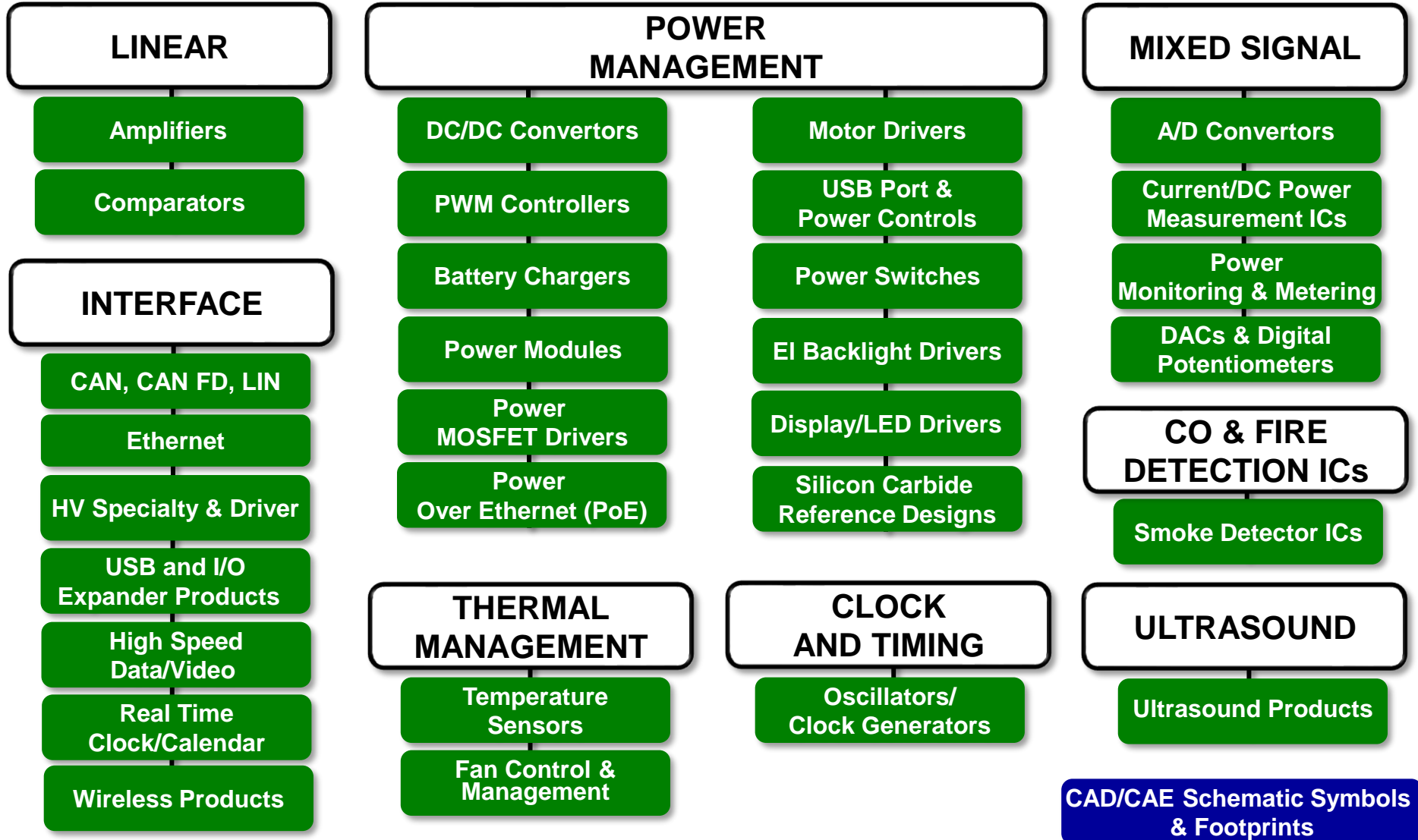
# Real Time Clock/Calendar





# Analog & Interface Demo Boards

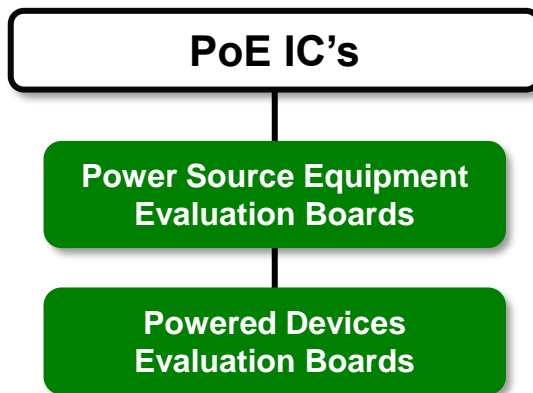
Product Tree





# Power Over Ethernet (PoE) Demo and Eval Boards

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<< Back to Power Over Ethernet

<< BACK



# PoE Powered Devices Eval Boards

<15W

**PD70100EVB15B**

PD70100 Based

**PD70101EVB6F**

PD70101 Based

**PD70101EVB3F**

PD70101 Based

**PD70101EVB15F-5**

PD70101 Based

**PD70101EVB15F-12**

PD70101 Based

<30W

**PD70201EVB25F-12**

PD70201 Based

**PD70201EVB25F-5**

PD70201 Based

**PD70201EVB25F-3**

PD70201 Based

**PD70201EVB25FW-3**

PD70201 Based

**PD70201EVB-U-25F-5**

PD70201 Based

>30W

**PD70201EVB47F**

PD70201 Based

**PD70211EVB50FW-5**

PD70211 Based

**PD70211EVB50FW-3**

PD70211 Based

**PD70211EVB51F-12**

PD70211 Based

**PD70224EVB**

PD70210/PF7022  
4 Based

**PD70224EVB-  
wAuxPwr**

PD70210A/PF7022  
4 Based

**PD70211EVB72F  
W-12**

PD70211 Based

[<< BACK to PoE PD Products](#)

[<< BACK](#)



# PoE PSE Evaluation Boards

## PoE PSE Evaluation Boards

### IEEE 802.3af/at

#### PD-IM-7401

1-Port PD69101 Based

#### PD-IM-7504B

4-Port PD69104B1 Based

### IEEE 802.3bt Type 3

#### PD-IM-7604-4MH

4-Port PD69208M Based

#### PD-IM-7608M

8-Port PD69208M Based

#### PD-IM-7608M-2

2-PD/8-PSE PD69208M Based

#### PD-IM-7618T4

8 2-Pair Ports PD69208T4 Based

### IEEE 802.3bt Type 4

#### PD-IM-7604-4T4H

4 x 2-pair + 4 x 4-pair Ports  
PD69208T4 / PD69204T4 Based

#### PD-IM-7618T4H

8 4-Pair Ports 2xPD69208T4  
Based

<< BACK to PoE Products

<< BACK

 = New

# Clock & Timing Tools

---

## Development Tools

ClockWorks  
Configurator

TimeFlash  
Programming Kit

<< BACK to Oscillators

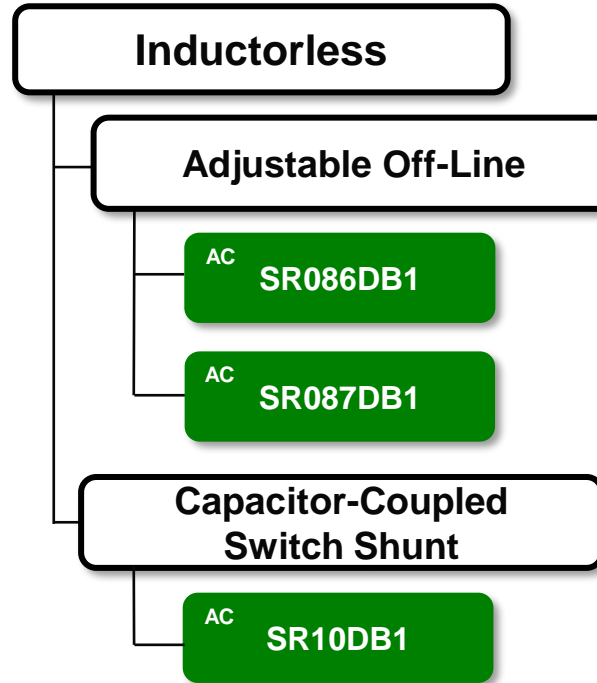
<< BACK to Clock Generators

<< BACK

---

# Voltage Regulator Demo and Eval Boards

AC = Offline Capable





# Ultrasound Demo Boards

---

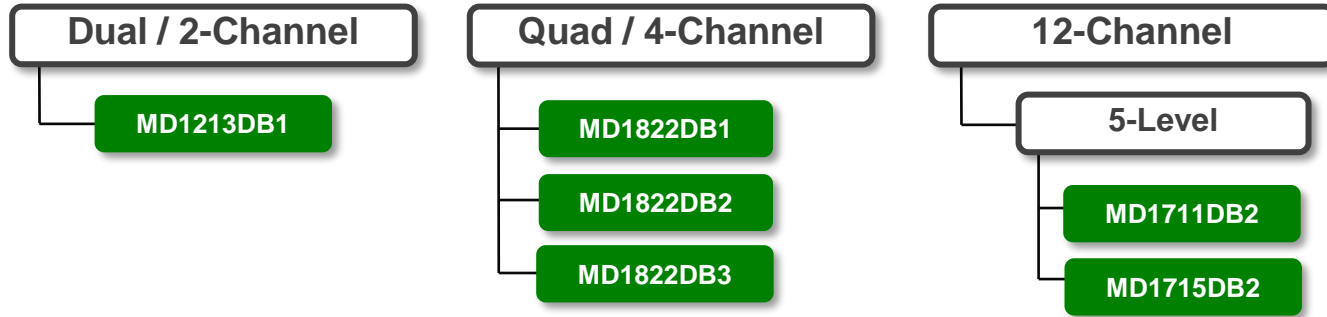
**Ultrasound MOSFET  
Drivers**

**Ultrasound Transmit IC**

**Ultrasound T/R Switch**



# Ultrasound MOSFET Driver Demo and Eval Boards







# EL Backlight Driver Demo and Eval Boards

## Single Lamp

HV816DB2

HV816DB3

HV830DB1

HV857LDB1

HV860DB1

## Dual Lamp

HV861DB1

## Offline

HV809DB2

## Inductorless

HV852DB1

HV853DB1



# Thermal Demo & Eval Boards

## Serial Output

TC77 PICtail™  
Demo Board

MCP9800 Temp  
Sensor Demo Bd

Thermocouple Ref.  
Design

EMC1412 Eval Board

MCP9902 Eval Board

EMC1833 Multi-  
Channel Eval Board

EMC2305 + EMC1438  
Eval Board

## Thermocouple ICs

MCP9600 Eval Board

## Voltage Output

MCP9700 PICtail™  
Demo Board

TC1047A PICtail™  
Demo Board

MCP9700 Thermistor  
Demo Board

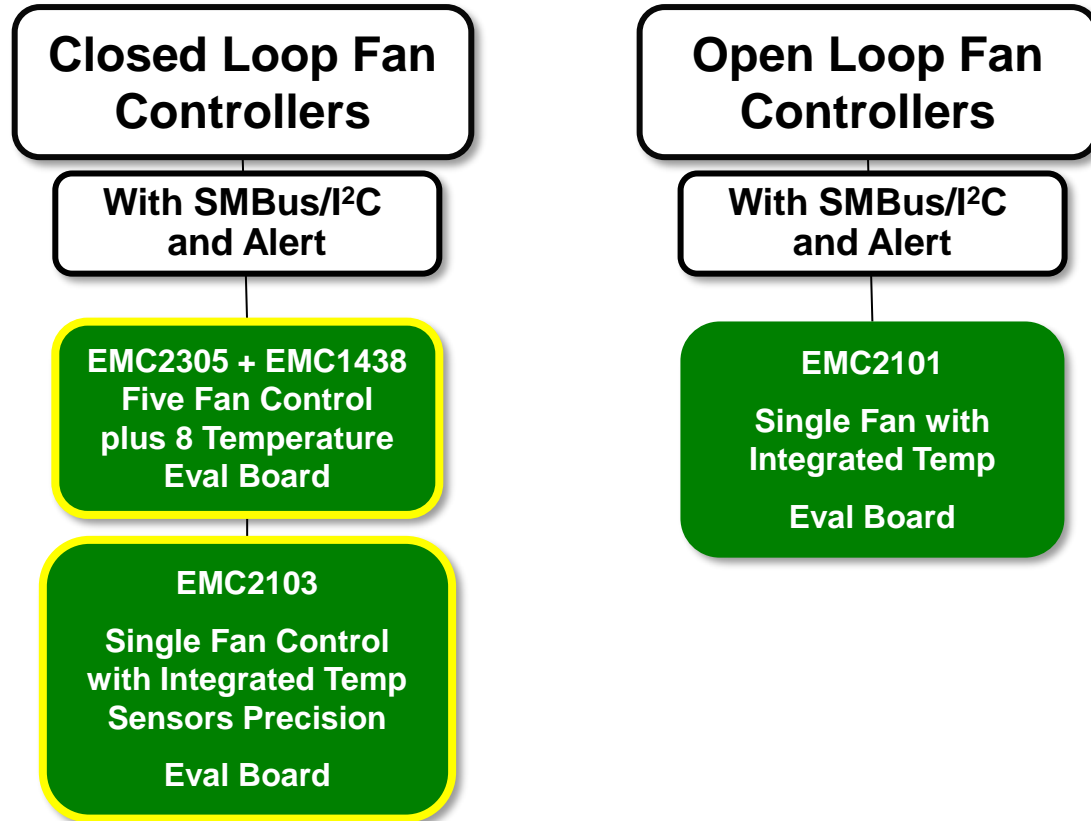
## General Purpose

PT100 RTD Eval Board

PICKit Serial SPI  
Demo Board

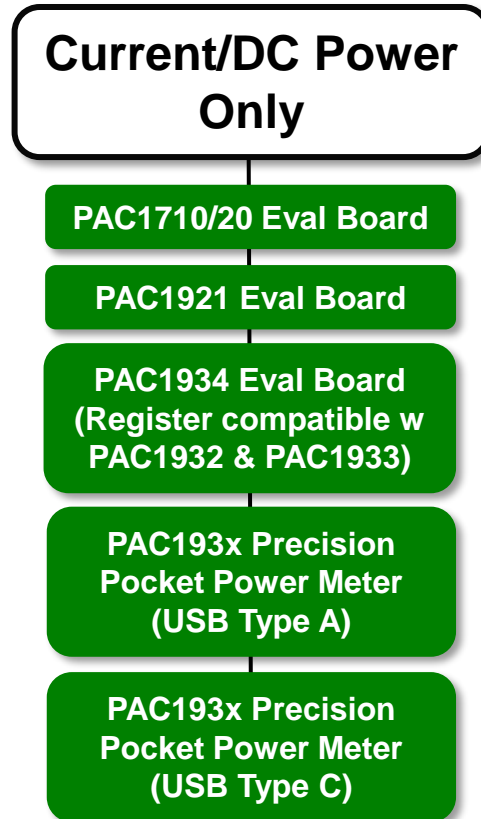
PICKit Serial I<sup>2</sup>C Demo  
Board

# Fan Control Demo & Eval Boards





# Current/DC Power Sensor Demo and Eval Boards



[<< BACK to Current/DC Power Products](#)

[<< BACK](#)



# USB Port Power Controller Demo & Eval Boards

---

**Host Free  
Controller**

**UCS1001 Evaluation  
Board**

**Programmable  
Controllers**

**UCS1002 Evaluation  
Board**

[<< BACK to USB Port Power Controller Products](#)

[<< BACK](#)

---

# Linear Demo and Eval Tools

## PGA

MCP6S22 PICtail™ Demo Board

MCP6S2X Eval Board

PICKit Serial SPI Demo Board

## Amplifiers

MCP6V01 Thermocouple Auto-Zeroed Reference Design

MCP6V01 Input Offset Demo Board

MCP651 Input Offset Evaluation Board

MCP6031 Photodiode PICtail Plus Demo Board

MCP661 Line Driver Demo Board

MCP6N11/MCP6V2x Wheatstone Bridge Ref Design

MCP6N16 Eval Board

MCP6421 EMIRR Eval Board

Humidity Sensor PICtail™ Demo Board

MCP6XXX Amplifier Evaluation Board 2

MCP6XXX Amplifier Evaluation Board 3

FilterLab®

# RF Wireless Demo & Eval Tools

## Wireless Evaluation Boards

Wi-Fi

Bluetooth

Sub-GHz/MiWi

802.15.4/ZigBee/MiWi

LoRa®

2.4 GHz / Sub-GHz  
802.15.4



# Wi-Fi Demo & Eval Boards

MCU + Wi-Fi

ATSAMW25-XPRO

Wi-Fi Controller

ATWINC1500-XSTK

Wi-Fi Transceiver

ATWILC1000-SD  
Evaluation Kit

MRF24WN0MA Wi-Fi  
PICtail/PICtail Plus  
(AC164153)

<< BACK to Wireless Products

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# LoRa™ Development Tools

## LoRa™ Technology

**RN2483 PICtail™/PICtail  
Plus Daughter Board**

**RN2483 LoRa™ Mote**

**RN2903 PICtail™/PICtail  
Plus Daughter Board**

**RN2903 LoRa® Mote**

**SAMR34 Xplained Pro  
Evaluation Kit**



# Embedded Wireless Demo and Eval Boards

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**2.4 GHz / Sub-GHz  
802.15.4 Transceivers**

**SAM R30 Xplained Pro  
Evaluation Kit**

[<< BACK to Wireless Products](#)

[<< BACK](#)

---



# Bluetooth Demo Boards

## Bluetooth - Data

BM-70-PICtail

BM-78-PICtail

RN-41-EK  
RN-42-EK

RN-4020-PICtail

RN4678-PICtail

RN-4870-SNSR

## Bluetooth - Audio

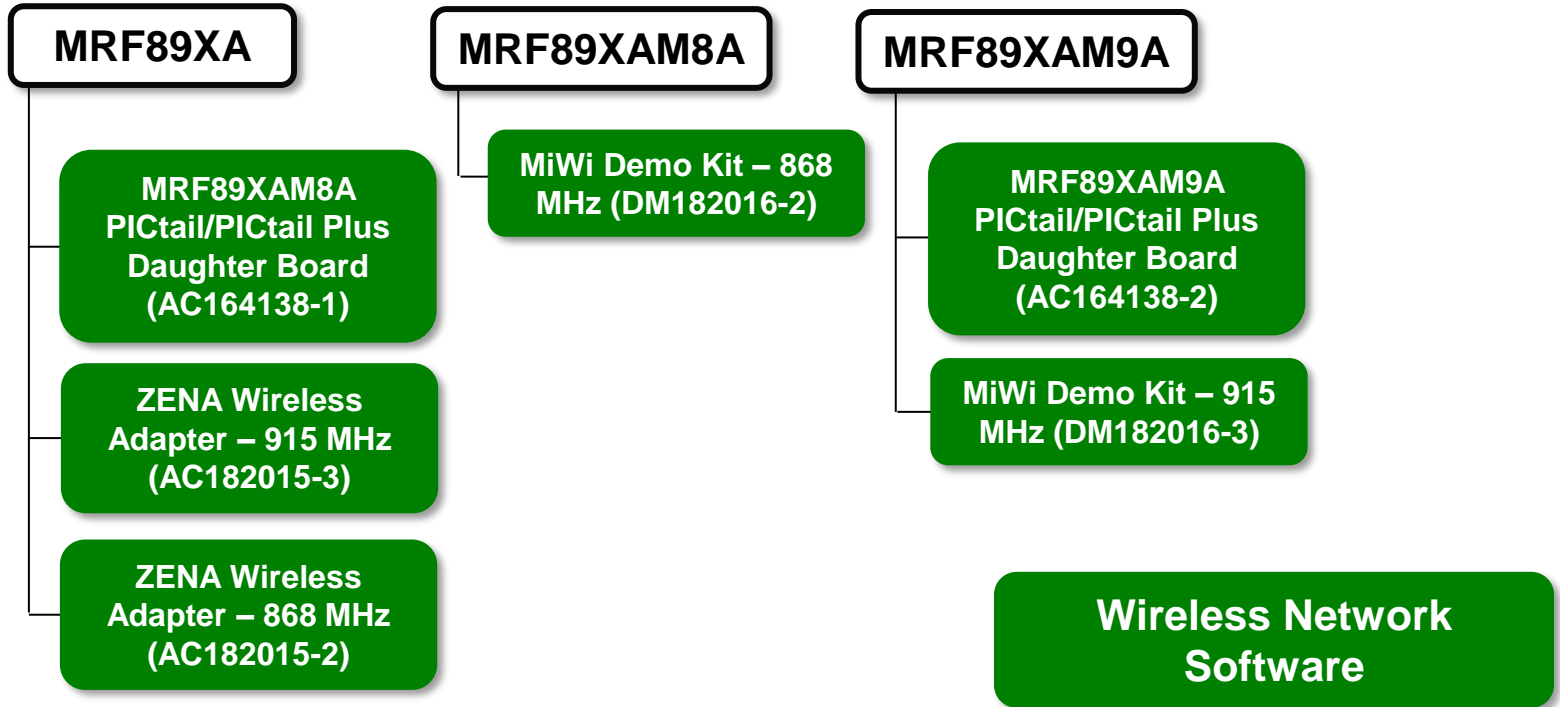
RN52 Bluetooth  
Audio  
Evaluation Kit  
(RN-52-EK)

## Bluetooth HCI + PIC32

PIC32 Bluetooth Audio  
Development Kit  
(DV320032)



# RF Wireless Transceivers Demo and Eval Boards





# RF Wireless Transceivers Demo and Eval Boards

## MRF24J40

Remote Control  
Demo Board with  
ZENA Wireless  
Adapter  
(DM240315-2)

ZENA Wireless  
Adapter – 2.4 GHz  
(AC182015-1)

## MRF24J40MA

MiWi Protocol to  
Wi-Fi Wireless Demo  
Kit (DM182018)

MiWi Demo Kit – 2.4  
GHz (DM182016-1)

MRF24J40MA PICtail  
/ PICtail Plus  
(AC164134-1)

## MRF24J40MD

MRF24J40MD PICtail  
/ PICtail Plus  
Daughter Board  
(AC164134-3)

## MRF24J40ME

MRF24J40ME PICtail  
/ PICtail Plus  
Daughter Board  
(AC164143-1)

Wireless Network  
Software

<< BACK to Wireless Products

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# DC-DC Converter Demo & Eval Boards

## DC-DC Converter Demo & Eval Boards

Boost Demo & Eval  
Boards

Buck Demo & Eval  
Boards

Buck-Boost/CUK  
Demo & Eval Boards

LDO Demo & Eval  
Boards

Charge Pump Demo  
& Eval Boards

Multiple Output  
Regulators Demo &  
Eval Boards

Inductorless Off-Line  
Regulators

<< BACK to DC-DC Converters

<< BACK

# LDO Demo & Eval Boards

## General Purpose

SOT223-5 Volt Reg.  
Eval Bd

SOT89-3 Volt Reg.  
Eval Bd

## Evaluation Boards

MCP1726 Eval Board

MIC38150 Eval Board

MIC38300 Eval Board

MIC47050 Eval Board

MIC47100 Eval Board

MIC49200 Eval Board

MIC5165 Eval Board

MIC5166 Eval Board

MIC5167 Eval Board

MIC5234 Eval Board

MIC59150 Eval Board

MIC59300 Eval Board

MIC68400 Eval Board

MIC69103 Eval Board

MIC69153 Eval Board

MIC69302 Eval Board

MIC69502 Eval Board

MAQ5280 Eval Board

MIC5280 Eval Board

MIC5380 Eval Board

MIC5301 Eval Board

MIC5308 Eval Board

MIC5365 Eval Board



# Charge Pumps Demo & Eval Boards

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Charge Pump

MCP1256/7/8/9 Eval Bd

MCP1252 Backlight Demo Bd

<< BACK to DC-DC Converters

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---





# Multiple Output Regulators Demo and Eval Boards

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## Evaluation Boards

MIC7400

MIC7401

MIC23099

MIC23450

MIC23451

<< BACK to DC-DC Converters

<< BACK



# Buck Switching Regulator Demo and Eval Boards

## Evaluation Boards

MCP1612

MCP1601

TC1303B

TC1303C

MCP1603

MCP1602

MCP16301 600mA  
Demo

MCP16301 5V Low  
Noise Eval Board

MCP16301 300 mA  
D2PAK Demo

MCP16311/2 Sync.  
Buck Eval Board

MCP16331 Buck  
Converter

MIC2172

MIC4684

MIC2207

MIC22205

MIC22405

MIC22705

MIC4720

MIC4723

MIC4724

MIC4930

MIC23050

MIC23031

MIC23030

MIC23153

MIC23158/9

MIC23250

MIC23303

MIC23603

MIC2125/6

MIC24051

MIC24052

MIC24053

MIC24054

MIC24055

MIC24056

MIC28511

MIC28512

<< BACK to DC-DC Converters

<< BACK



# Boost Switching Regulator Demo and Eval Boards

## Evaluation Boards

MCP16251 & MCP1640B  
Synchronous Boost  
Eval Board

MCP1662 LED Driver  
Eval Board

MCP1661 HV  
Boost/SEPIC Board

MCP1642B 2-Cell to  
USB Power Eval Board

MCP1643 1.6A LED  
Driver Eval Board

MCP1663 9V/12V/24V  
Eval Board

MCP1664 LED Driver  
Eval Board

MIC2601

MIC2605/6

MIC2619

MIC2875/6

MIC2250

MIC2295

## Reference Designs

MCP1640 Sync Boost  
Conv. Eval Board

MCP1640 Single Quad-  
A Battery Boost  
Reference Design

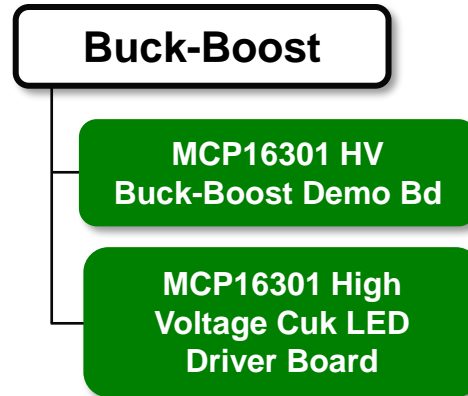
MCP1640 12V/50mA  
Two Cells Input  
Reference Design

MCP16251 Single Cell  
Boost w/ Ext. UVLO  
Reference Design



# Buck-Boost/CUK Switching Reg. Demo & Eval Boards

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# Battery Management Demo and Eval Boards

## Li-Ion Battery Charger

MCP73831 Eval Kit

MCP73855 Eval Board

MCP7382x Eval Board

MCP73113 Eval Board

MCP7383x Li-Ion System Power  
Path Management Ref. Design

MCP73871 Demo Board with  
Voltage Prop. Current Control

MCP73833 Eval Board

MCP73x23 LiFePO<sub>4</sub> Batt.  
Charger Eval Board

MCP73837/8 AC/USB Dual  
Input Battery Charger Eval Bd

MCP73213 OVP Dual Cell Li-  
Ion Batt. Charger Eval Brd

## PWM Controller Based

MCP1630 Li-Ion Battery  
Charger Reference Design

MCP1630 Li-Ion Battery  
Charger Multi-Bay Ref. Design

MCP1630 NiMH Battery  
Charger Demo Board

MCP1630V Bidirectional 4-cell  
Li-Ion Charger Ref Design

MCP1630 NiMH Battery  
Charger Reference Design

MCP1631HV Multi-Chemistry  
Battery Charger Ref. Design

MCP1631HV Digitally  
Controlled Prog. Current  
Source Ref. Design

[<< BACK to Battery Products](#)

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# Digital Pots and D/A Converter Demo Boards

## Digital Pots

MCP401x/2x Eval Board

MCP401x Eval Board

MCP42xx Eval Board

MCP43xx Eval Board

MCP46xx Eval Board

MCP42XX PICtail Plus  
Daughter Board

## General Purpose

Mixed Signal PICtail™  
Demo Bd

PICKit Serial SPI Demo Board

PICKit Serial I<sup>2</sup>C Demo Board

## D/A Converter

MCP4725 Eval Board

MCP4725 12-bit NV DAC  
PICtail™ Daughter Board

MCP47x6 PICtail™ Plus  
Daughter Board

MCP4728 Eval board

<< BACK to Digital Pot Products

<< BACK to DAC Products

<< BACK



# Power Monitoring & Energy Measurement

## Reference Designs

ATM90E32AS+  
SAM4L/SAML22 Poly-  
Phase Meter

ATM90E36A+  
SAM4L/SAML22  
Poly-Phase Meter

MCP3905A Energy  
Meter

MCP3911+PIC18F85K90  
Anti-Tamper Meter

MCP6L2 PIC18F66J93  
Low Cost Meter

MCP39F501 Power  
Meter Demo

MCP39F501 Power  
Monitor PICTail™

MCP39F511 Power  
Meter Demo

MCP39F521 Power  
Meter Demo

MCP39F511N Power  
Meter Demo

## Evaluation Boards

ATSAM4CMS /  
ATSAM4CMP DB

MCP3910 Eval board

MCP3911 Eval board

MCP3919 Eval board

MCP3912 Eval board

MCP3913 Eval board

MCP3914 Eval board

MCP3901 Eval board

MCP3903 Eval board

ATM90EXX Demo  
Boards

<< BACK to Power Monitoring/Metering ICs

<< BACK



# A/D Converter Demo Boards

## Pipelined ADC

MCP37X3X-200 16-bit  
ADC Evaluation Board

MCP37X1X-200 12-bit  
ADC Evaluation Board

MCP37XXX-200 14-bit  
ADC Evaluation Board

MCP37XXX Data  
Capture Card

## Delta-Sigma ADC

MCP3421 Battery Fuel  
Gauge Demo Board

MCP3421 Weight Scale  
Demo Board

MCP3421 SOT-23  
Eval Board

MCP342x Eval Boards

MCP3551 PICtail™  
Demo Board

MCP355X Tiny App.  
Sensor Demo Board

MCP355X Sensor App.  
Dev Board

Thermocouple Ref.  
Design

## SAR ADC

MCP3221 PICtail™  
Demo Board

Mixed Signal PICtail™  
Demo Bd

<< BACK to Pipelined A/D Converters

<< BACK to SAR A/D Converters

<< BACK to Delta-Sigma A/D Converters

<< BACK



# Interface Demo & Eval Boards

## I/O Expander

MCP23x17 Eval Board

MCP23x08 Eval Board

GPIO Expander Keypad  
Demo Board

PICKit Serial SPI Demo  
Board

PICKit Serial I<sup>2</sup>C™ Demo  
Board

## Passive Access AFE

MCP2030 Bidirectional  
Comm. Demo Kit

## USB Bridges

MCP2221 Breakout  
Module

MCP2200 USB to  
RS232 demo board

MCP2200  
Breakout Module

MCP2210  
Breakout Module

MCP2210 Eval Board

## USB Controllers

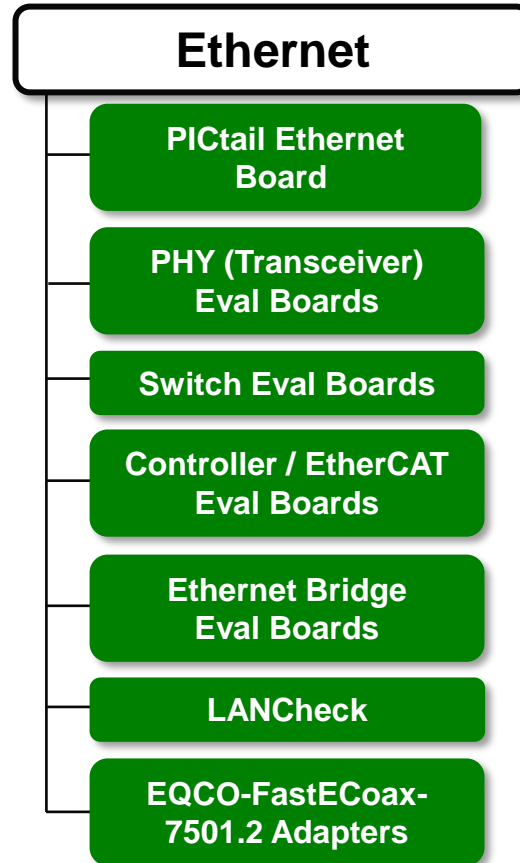
USB Eval Boards

<< BACK to Wireless Products

<< BACK to USB and I/O Expander Products

<< BACK

# Ethernet Demo & Eval Boards





# High Speed Data/Video Demo & Eval Boards

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## Eval Boards

EVB-DBSUB1584

EVB-DBSUB1586

## Modules

EQCO-SDI-30-7502

<< BACK to High Speed Data/Video

<< BACK



# CAN and LIN Demo & Eval Boards

## CAN

MCP2517FD Evaluation Board

MCP2515 PICtail™ Plus Demo Board

MCP2515 CAN Bus Monitor  
Demo Board

MCP25625 PICtail Daughter Board

ATA656x Demo Board

ATA6570 Demo Board

## LIN

CAN/LIN PICtail Plus  
Daughter Board

PICDEM CAN-LIN Demo Boards

LIN Serial Analyzer

Automotive Ambient Lighting Module

ATA663x Demo Board



# Power MOSFET Drivers Demo & Eval Boards

## Evaluation Boards

MIC5060

MIC4102

MIC4224

MIC4605

MIC4606

MIC4607

MIC4608

MIC4414/5

MIC5019

## Evaluation Boards

MSCSICSP3/REF2

MSCSICSP6/REF3

# Power Modules Demo & Eval Boards

## Evaluation Boards

MIC45516

MIC45205

MIC45208

MIC45212

MIC28304

MIC33030

MIC33050

MIC33153

MIC3385

MIC45404

# Power Switches Demo & Eval Boards

---

## Power Switches

MIC95410

MIC9516X

## USB Power Switches

UCS2112



# Switching Controller Demo and Eval Boards

## DC/DC Conversion

MCP1630 Automotive Boost  
Conv Demo Board

MCP1630 Coupled Induct.  
Boost Conv Demo Board

MCP1630 Boost Mode LED  
Driver Demo Board

MCP1632 300 kHz Boost  
Converter Demo Board

MCP19035 300 kHz Eval Bd

MCP19035 600 kHz Eval Bd

MCP19111 Eval Board

MCP19114 Flyback  
Standalone Eval Board

MCP19215 Dual SEPIC  
Boost Eval Board

MIC2101/2 Eval Board

MIC2169 Eval Board

MIC2196 LED Driver Eval Bd

MIC2104 Eval Board

MIC2103 Eval Board

MIC2130/1 Eval Board

MIC2176 5A Eval Board

## Battery Management

MCP1630 Li-Ion Battery  
Charger Reference Design

MCP1630 Li-Ion Battery  
Charger Multi-Bay Reference  
Design

MCP1630 NiMH Battery  
Charger Demo Board

MCP1630V Bidirectional 4-cell  
Li-Ion Charger Ref Design

MCP1631HV Digitally  
Controlled Prog. Current  
Source Ref. Design

<< BACK to PWM Controllers

<< BACK to Power Discrete

<< BACK



# Safety & Security

---

**Smoke Detector**

**RE46C190/1 Demo Board**

# Motor Drive

## Dual H-Bridge Driver

**MTS2916A Dual Full-Bridge Stepper Motor Drive Eval Brd**

## Half-Bridge Drivers

**ATA6826C  
3 Half-bridges Eval Board**

**ATA6831 / 32C w/ PWM  
3 Half-bridges Eval Board**

**ATA6831 / 32C BLDC  
Eval Board**

**ATA6836/38C  
6 Half-bridges Eval Board**

## 3 $\Phi$ BLDC Motor Controller

**MTD6505 3-Phase BLDC Sensorless Fan Controller DB**

**ATA6844-DK BLDC Motor Driver Evaluation Board**

**MCP8063 12V Sensorless Fan Controller Demo Kit**

## H-Bridge Motor Gate Driver

**ATA6823C H-Bridge LDO, WWD, LIN**

**ATA6824C H-Bridge TJ=200°C LDO, WWD, SIO**



# Real Time Clock/Calendar

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**MCP7941X RTCC PICtail Plus  
Daughter Board**

**MCP795XX RTCC PICtail Plus  
Daughter Board**

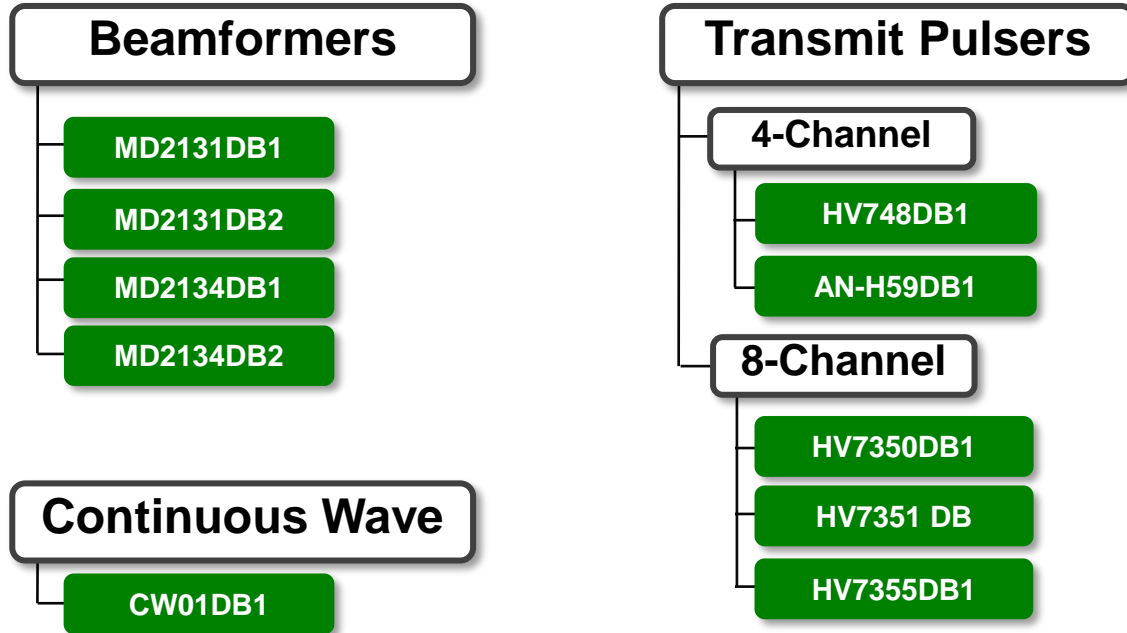
**<< BACK to Real Time Clock/Calendar**

**<< BACK**

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# Ultrasound Transmit IC Demo & Eval Boards





# Ultrasound Transmit/Receive Switch & Eval Boards

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1-Channel

MD0100DB1

4-Channel

MD0101DB1



# HV Specialty Demo & Eval Boards

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Lens Drivers

HV892DB1

MEMS Drivers/  
HV Array Amplifiers

HV264DB1

Fan Controller

HV7100DB1

<< BACK to Application Specific

<< BACK to Amplifiers / MEMs Drivers

<< BACK

---



# LED Driver Demo & Eval Boards

## General Purpose

HV9910BDB1

HV9910BDB2

HV9910BDB3

HV9910BDB7

HV9918DB1

HV9919BDB1

HV9921DB1

HV9922DB1

HV9922DB2

HV9861ADB1

HV9861ADB2

HV9923DB1

HV9925DB1

HV9930DB1

HV9930DB2

HV9931DB1

HV9931DB2

HV9931DB5

HV9805 230V Boost

HV9805 230V SEPIC

HV9805 120V Boost

HV980100/101 Eval Brd

MIC3202 Eval Brd

MIC3203 Eval Brd

MIC3223 Eval Brd

MIC3231 Eval Brd

MIC3263 Eval Brd

MIC4801 Eval Brd

MIC4802 Eval Brd

MIC4811 Eval Brd

MIC4812 Eval Brd

MIC3263 Eval Brd

MIC2298 Eval Brd

MIC2299 Eval Brd

MIC2297 Eval Brd

MIC2870 Eval Brd

## Sequential Linear

CL88020 120V<sub>AC</sub> 8.5W

## Backlighting

HV9911DB1

HV9911DB2

HV9911DB3

HV9911DB4

HV9912DB1

HV9961DB1

HV9980DB1

HV9967BDB1

## Automotive

AT9919DB1

AT9933DB1

MAQ3203 Eval Brd

<< BACK to LED Drivers

<< BACK



# General Purpose Demo & Eval Boards

---

**14-pin SOIC/TSSOP/PDIP  
Eval Board**

**5 and 6-pin SOT-23 Eval Board**

**PICKit Serial SPI Demo Board**

**Magnetic Field Evaluation Board**

**PSRR and Digital Noise  
Evaluation Board**

**8-pin SOIC/MSOP/TSSOP/PDIP  
Eval Board**

**3-pin SOT-23 Eval Board**

**PICKit Serial I<sup>2</sup>C Demo Board**

**Electrical Field Evaluation Board**

**MICUSB Serial Programmer**

[<< BACK to Supervisor Products](#)

[<< BACK to MOSFET Driver Products](#)

[<< BACK](#)

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# General Purpose Comparator Demo & Eval Boards

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**5 and 6-pin SOT-23 Eval Board**

**8-pin SOIC/MSOP/TSSOP/PDIP  
Eval Board**

**14-pin SOIC/TSSOP/PDIP  
Eval Board**

**Electrical Field Eval Board**

**Magnetic Field Eval Board**

**PSRR and Digital Noise  
Evaluation Board**

---

[<< BACK to Comparator Products](#)

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# Power Silicon Carbide Reference Designs

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**SiC Driver Boards**

**MSCSICSP3/REF2**

**MSCSICSP6/REF3**

**SiC  
Reference Designs**

**MSCSICPFC/REF5**

**<< BACK**

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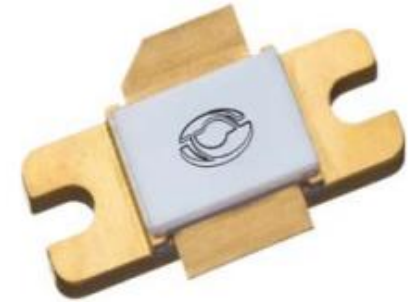
# **Appendix**

## **Product Pages**

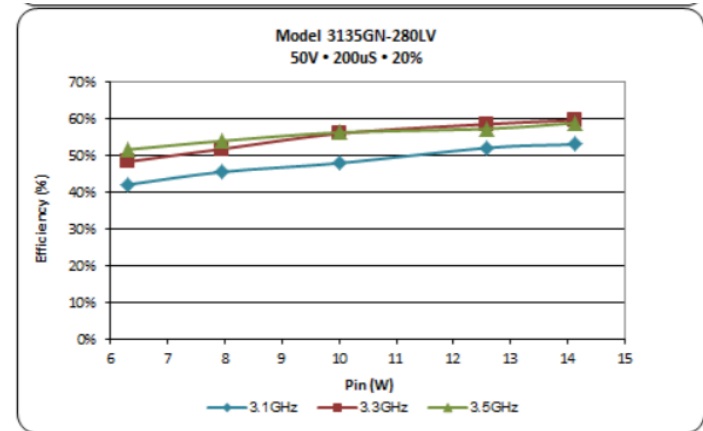
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## Features

- Pout: 280W
- Operating Voltage: 50V
- Frequency: 3.1-3.5 GHz
- 200us - 20% pulse formats
- Class AB • Common Source
- 58% Drain Efficiency



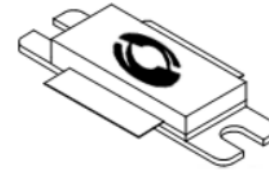
55-KP 0.638"x1.031"



Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
3.1-3.5	13.7	280 min	58	200	20	50	.39

## Features

- Pout: 400W
- Operating Voltage: 50V
- Frequency: 3.1-3.5 GHz
- 200us - 10% pulse formats
- Class AB • Common Source
- 65% Drain Efficiency



55-Q03 Case Style

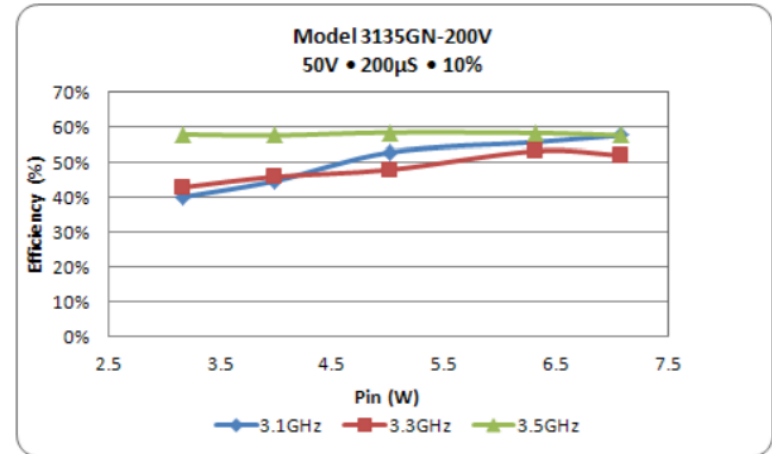
Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
3.1-3.5	12	200	65	200	10	50	.30

## Features

- Pout: 200W
- Operating Voltage: 50V
- Frequency: 3.1-3.5 GHz
- 200us - 10% pulse formats
- Class AB • Common Source
- 55% Drain Efficiency



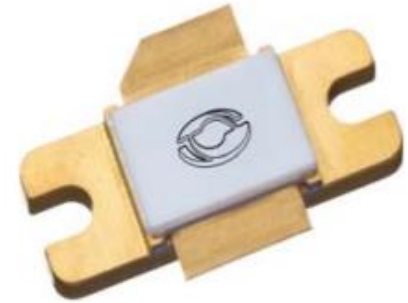
55-QP Case Style



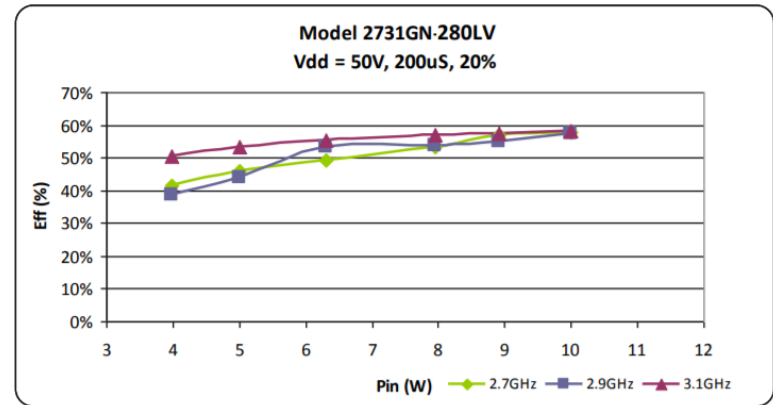
Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
3.1-3.5	15.3	200	55	200	10	50	.56

## Features

- Pout: 280W
- Operating Voltage: 50V
- Frequency: 2.7-3.1 GHz
- 200us - 20% pulse formats
- Class AB • Common Source
- 58% Drain Efficiency



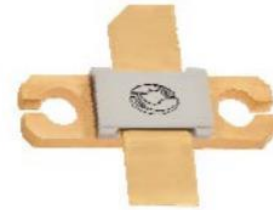
55-KR 0.638"x1.031"



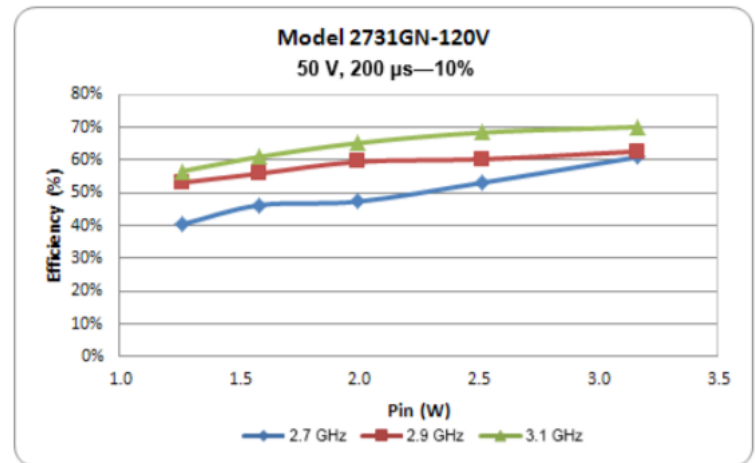
Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
2.7-3.1	15.0	280 min	58	200	20	50	0.37

## Features

- Pout: 120W
- Operating Voltage: 50V
- Frequency: 2.7-3.1 GHz
- 200us - 10% pulse formats
- Class AB • Common Source
- 64% Drain Efficiency



55-QP Case Outline

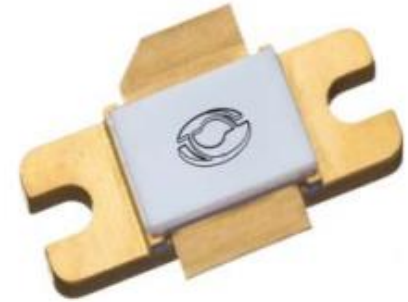


Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
2.7-3.1	16.5	120 min	64	200	10	50	1.13



## Features

- Pout: 270W
- Operating Voltage: 50V
- Frequency: 2.7-2.9 GHz
- 200us - 10% pulse formats
- Class AB • Common Source
- 68% Drain Efficiency

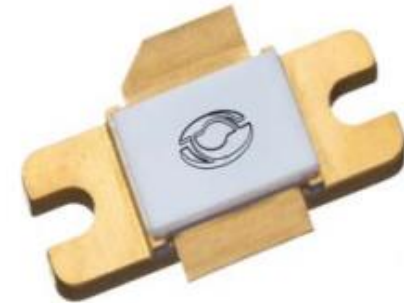


55-KR 0.638"x1.031"

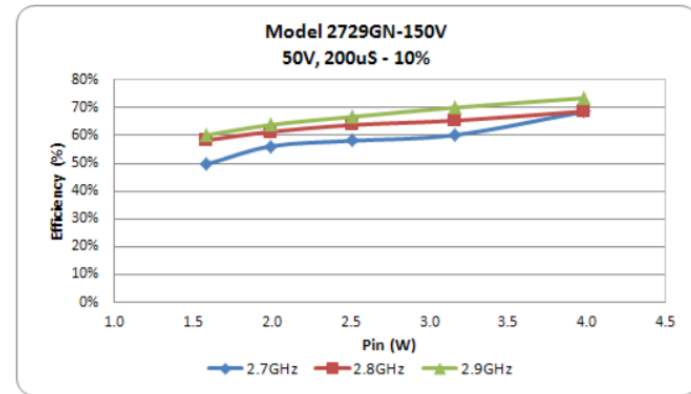
Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
2.7-2.9	15.6	270 min	68	200	10	50	0.5

## Features

- Pout: 150W
- Operating Voltage: 50V
- Frequency: 2.7-2.9 GHz
- 100us - 10% pulse formats
- Class AB • Common Source
- 69% Drain Efficiency



55-KR 0.638"x1.031"

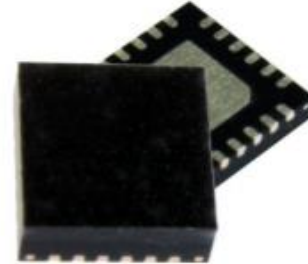


Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
2.7-2.9	16.2	150 min	69	100	10	50	0.35

## Features

- Pout: >15W
- Operating Voltage: 50V
- Frequency: DC-3.5GHz
- Pulsed or CW Applications
- Class AB • Common Source
- >70% Drain Efficiency

## Case Outline



QFN 4x4 mm

## Performance Summary by Frequency

Parameter	Units	0.960 GHz	1.2 GHz	1.4 GHz	2.7 GHz	2.9 GHz	3.1 GHz	3.5 GHz
Output Power Psat	W	20	21	19	20	20	20	16
Power Gain	dB	18.5	18.3	18	13	13	13	12
$\eta_D$ Drain Efficiency	%	65	72	66	60	63	60	60

TYPICAL BROAD BAND PULSED PERFORMANCE DATA<sup>1</sup> 3.1 – 3.5 GHz Band

Frequency	Pin (W)	Pout (W)	Id (A)	RL (dB)	$\eta_D$ (%)	Gain (dB)	Droop (dB)
3100 MHz	1.0	20.0	.670	-6	60	13	0.2
3300 MHz	1.0	18.0	.580	-7.6	62	12.6	0.12
3500 MHz	1.0	16.0	.540	-8.4	60	12	0.11

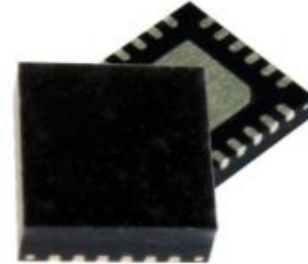
<sup>1</sup> Bias Condition: Vdd=+50V, Idq= 40 mA (Vgs= -2.0 ~ -4.5V typical), PW= 1 mS, DC = 10%

RF performance measured on the recommended evaluation board.

## Features

- Pout: >15W
- Operating Voltage: 50V
- Frequency: DC-3.5GHz
- Pulsed or CW Applications
- Class AB • Common Source
- >70% Drain Efficiency

## Case Outline



QFN 4x4 mm

## Performance Summary by Frequency

Parameter	Units	0.960 GHz	1.2 GHz	1.4 GHz	2.7 GHz	2.9 GHz	3.1 GHz	3.5 GHz
Output Power Psat	W	20	21	19	20	20	20	16
Power Gain	dB	18.5	18.3	18	13	13	13	12
$\eta_D$ Drain Efficiency	%	65	72	66	60	63	60	60

TYPICAL BROAD BAND PULSED PERFORMANCE DATA<sup>1</sup> 2.7 – 3.1 GHz Band

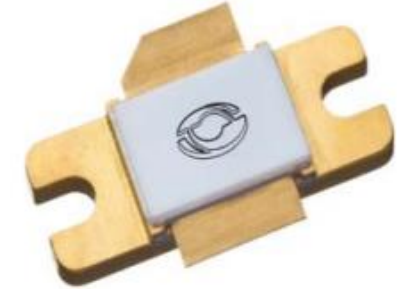
Frequency	Pin (W)	Pout (W)	Id (A)	RL (dB)	$\eta_D$ (%)	Gain (dB)	Droop (dB)
2700 MHz	1.0	20.4	.680	-6.0	60.0	13.1	0.12
2900 MHz	1.0	20.2	.640	-10.2	63	13.1	0.10
3100 MHz	1.0	17	.550	-9.5	62	12.3	0.09

<sup>1</sup> Bias Condition: Vdd=+50V, Idq= 40 mA (Vgs= -2.0 ~ -4.5V typical), PW= 1 mS, DC = 10%

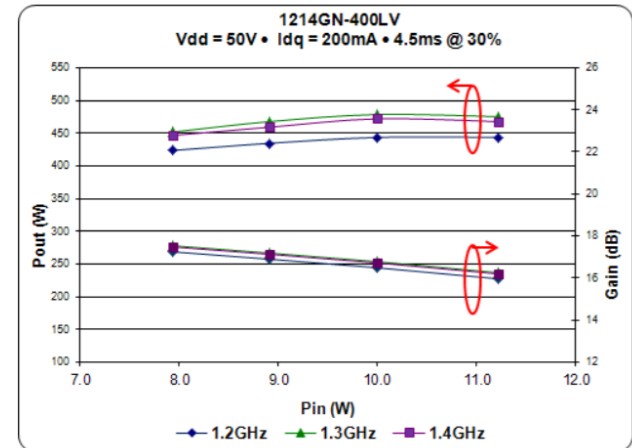
RF performance measured on the recommended evaluation board.

## Features

- Pout: 400W
- Operating Voltage: 50V
- Frequency: 1.2-1.4 GHz
- 4.5mS-35% pulse formats
- Class AB • Common Source
- >65% Drain Efficiency



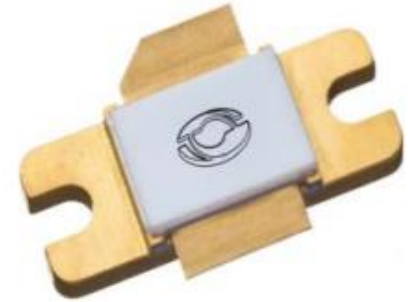
55-KR 0.638"x1.031"



Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (mS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1.2-1.4	16.8	400 min	68	4.5	35	50	0.3

## Features

- Pout: 650W
- Operating Voltage: 50V
- Frequency: 1.2-1.4 GHz
- 150us - 10% pulse formats
- Class AB • Common Source
- 69% Drain Efficiency



55-KR 0.638"x1.031"

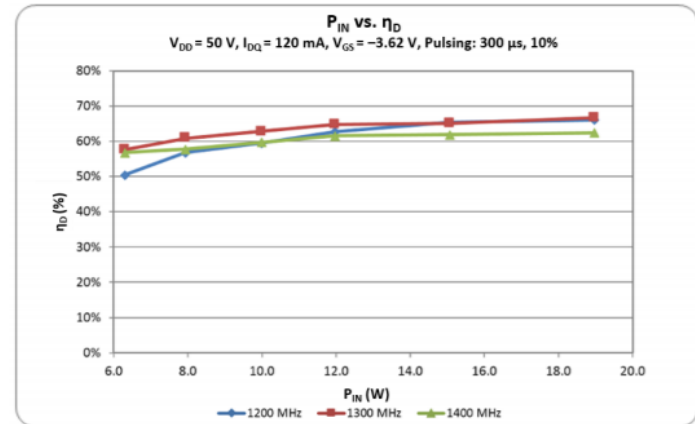
Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1.2-1.4	17	650 min	69	150	10	50	0.21

## Features

- Pout: 700W
- Operating Voltage: 50V
- Frequency: 1.2-1.4 GHz
- 300uS-10% pulse formats
- Class AB • Common Source
- >60% Drain Efficiency



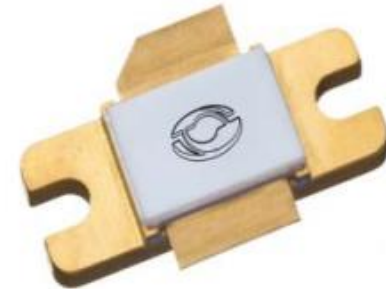
55Q03 0.385"x1.340"



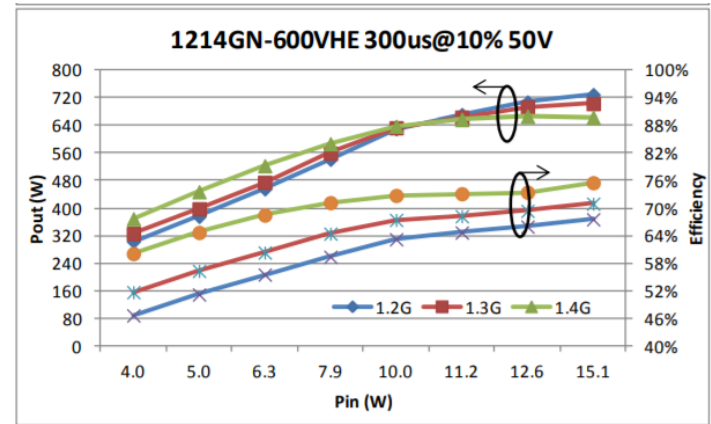
Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1.2-1.4	16.5	700 min	63	300	10	50	0.22

## Features

- Pout: 600W
- Operating Voltage: 50V
- Frequency: 1.2-1.4 GHz
- 300uS-10% pulse formats
- Class AB • Common Source
- >60% Drain Efficiency



55-KR 0.638"x1.031"



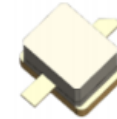
Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1.2-1.4	17.5	600 min	63	300	10	50	0.23



## Features

- Pout: 120W
- Operating Voltage: 50V
- Frequency: 1.2-1.4 GHz
- 300uS-10% pulse formats
- Class AB • Common Source
- >60% Drain Efficiency

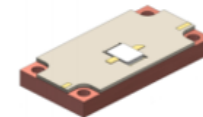
## Case Outline



1214GN-120EL, 55QQP Case  
(0.160"x0.230")



1214GN-120E, 55QQ Case  
(0.160"x0.550")



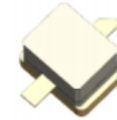
1214GN-120EP, Pallet  
(0.6"x1.2")

Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1.2-1.4	17	120 min	65	300	10	50	1.25

## Features

- Pout: 50W
- Operating Voltage: 50V
- Frequency: 1.2-1.4 GHz
- 300uS-10% pulse formats
- Class AB • Common Source
- 60% Drain Efficiency

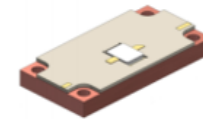
## Case Outline



1214GN-50EL, 55QQP Case  
(0.160"x0.230")



1214GN-50E, 55QQ Case  
(0.160"x0.550")



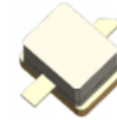
1214GN-50EP, Pallet  
(0.6"x1.2")

Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1.2-1.4	16	50 min	60	300	10	50	.37

## Features

- Pout: 15W
- Operating Voltage: 50V
- Frequency: 1.2-1.4 GHz
- 4.5mS-35% pulse formats
- Class AB • Common Source
- 68% Drain Efficiency

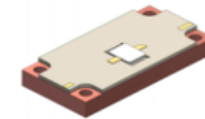
## Case Outline



1214GN-15LEL, 55QQP Case  
(0.160"x0.230")



1214GN-15LE, 55QQ Case  
(0.160"x0.550")



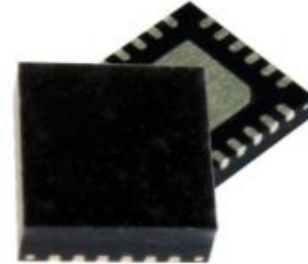
1214GN-15LEP, Pallet  
(0.6"x1.2")

Frequency (GHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (mS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1.2-1.4	18	15 min	68	4.5	35	50	0.34

## Features

- Pout: >15W
- Operating Voltage: 50V
- Frequency: DC-3.5GHz
- Pulsed or CW Applications
- Class AB • Common Source
- >70% Drain Efficiency

## Case Outline



QFN 4x4 mm

TYPICAL BROAD BAND PULSED PERFORMANCE DATA<sup>1</sup> 1.2 – 1.4 GHz Band

Frequency	Pin (W)	Pout (W)	Id (A)	RL (dB)	$\eta_D$ (%)	Gain (dB)	Droop (dB)
1200 MHz	0.32	21.4	.590	-10	72.5	18.3	0.1
1300 MHz	0.32	20.4	.580	-17	70.3	18.1	0.1
1400 MHz	0.32	19.3	.580	-12	66.5	17.9	0.12

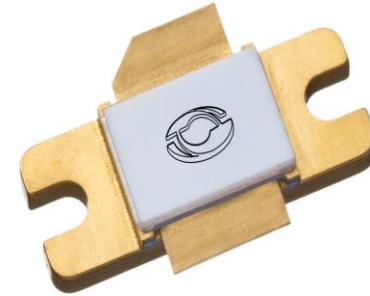
## Performance Summary by Frequency

Parameter	Units	0.960 GHz	1.2 GHz	1.4 GHz	2.7 GHz	2.9 GHz	3.1 GHz	3.5 GHz
Output Power Psat	W	20	21	19	20	20	20	16
Power Gain	dB	18.5	18.3	18	13	13	13	12
$\eta_D$ Drain Efficiency	%	65	72	66	60	63	60	60

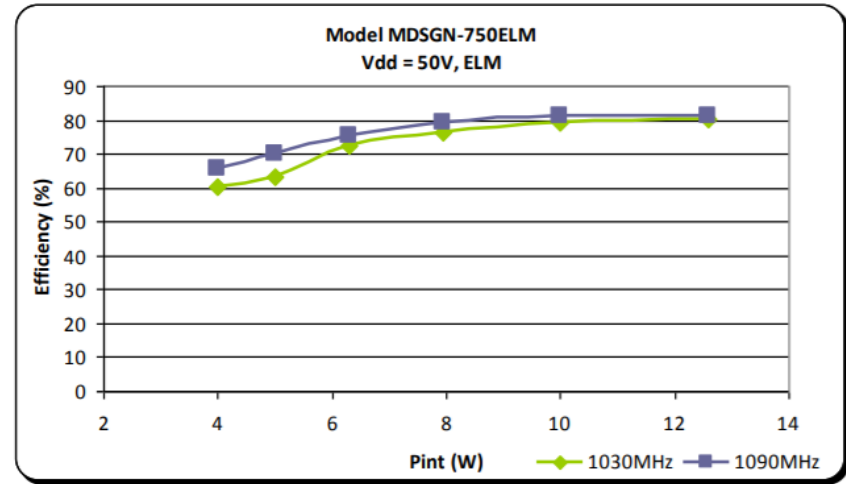
<sup>1</sup> Bias Condition: Vdd=+50V, Idq= 40 mA (Vgs= -2.0 ~ -4.5V typical), PW= 1 mS, DC = 10%  
RF performance measured on the recommended evaluation board.

## Features

- Pout: 750W
- Operating Voltage: 50V
- Frequency: 1030-1090MHz
- ELM pulse formats
- Class AB • Common Source
- 70% Drain Efficiency



55KR 0.385"x1.030"



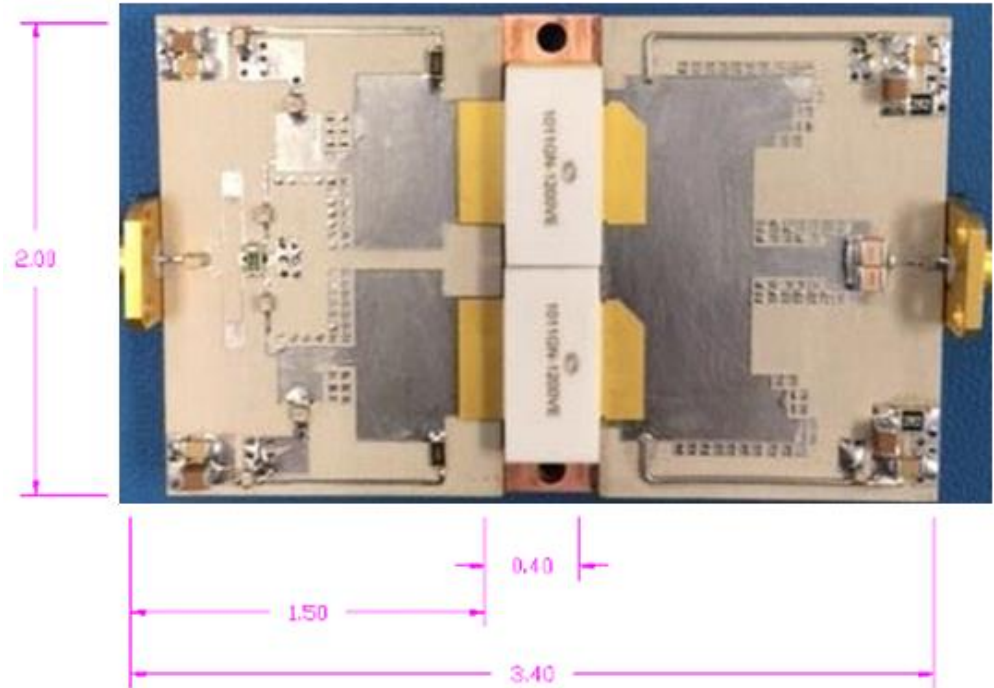
Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	19.1	750	70	Mode-S ELM	6.4	50	.23

# 1011GN-2200VP

1030-1090 MHz 2200W GaN Pallet Module

## Features

- 2200W Pulsed Power
- 32uS pulse width, 2% Duty Factor
- 50V operation
- Mode-S capable
- Efficiency >65%, Gain > 18dB
- Matched Pallet
- Uses 2 x 1011GN-1200VEL
- 3.4 x 2.0 in pallet



Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	18.5	1600	>65	32	2	50	0.05

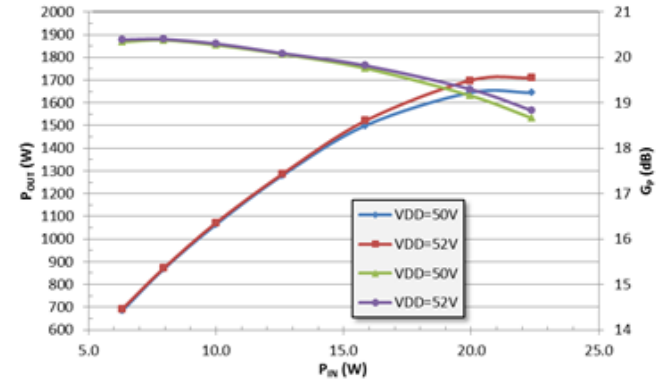
## Features

- 1600W, 52V, 1030/1090MHz
- 32 $\mu$ S-2% & ELM Pulsing Formats
- Class AB • Common Source • Single Ended
- >70% Drain Efficiency
- $G_p = 18.6$  dB typ
- <0.3 dB Typical Droop under 32us, 2% pulsing
- Single Ended

55-Q11A, 0.400"x1.610"



$P_{IN}$  vs.  $P_{OUT}$  &  $G_p$   
1030MHz,  $I_{DQ}=200$ mA  
32us Pulse Width, 2% Duty Cycle



Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration ( $\mu$ S)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	18.6	1600	>70	32	2	50	0.18

## Features

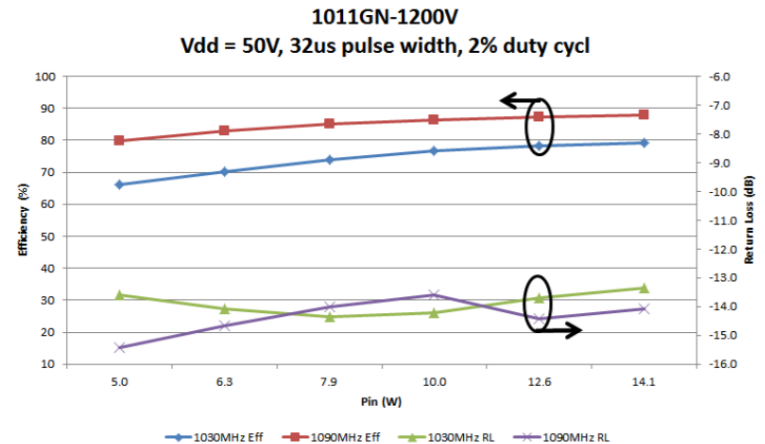
- Pout: 1200W
- Operating Voltage: 50V
- Frequency: 1030/1090MHz
- 32 $\mu$ S-2% & ELM Pulsing

## Formats

- Class AB • Common Source
- 75% Drain Efficiency



55Q03 0.385"x1.340"



Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration ( $\mu$ S)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	18.5	1200	75	32	2	50	0.25



# 1011GN-1000V

1030-1090 MHz 1000W GaN Discrete

[Online Datasheet](#)

## Features

- Pout: 1000W
- Operating Voltage: 50V
- Frequency: 1030/1090MHz
- 32 $\mu$ S-2% & ELM Pulsing Formats
- Class AB • Common Source
- 75% Drain Efficiency



55Q03 0.385"x1.340"

**TYPICAL PERFORMANCE DATA UNDER MODE-S ELM (32 $\mu$ S on 18 $\mu$ S off, N=48 pulses, DF=6.4%)**

Frequency	Pin (W)	Pout (W)	Id (A)	RL (dB)	$\eta_D$ @ pulse 1 (%)	Gain (dB)	Droop @ Pulse 48 (dB)
1030 MHz	9.3	1000	1.85	-14	69	19.5	0.80
1090 MHz	9.3	1000	1.75	-10	73	19.5	0.80

**TYPICAL PERFORMANCE DATA UNDER (32 $\mu$ S, DF=2%)**

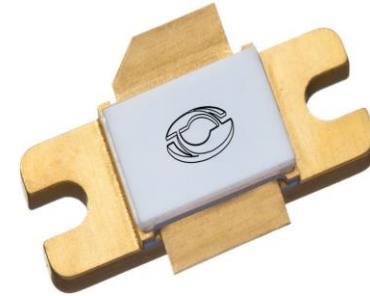
Frequency	Pin (W)	Pout (W)	Id (A)	RL (dB)	$\eta_D$ (%)	Gain (dB)	Droop (dB)
1030 MHz	8.9	1000	.61	-13	78	20.5	.15
1090 MHz	10	1000	.57	-10	84	20.0	.15

Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration ( $\mu$ S)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	19.5	1000	75	32	2	50	0.29

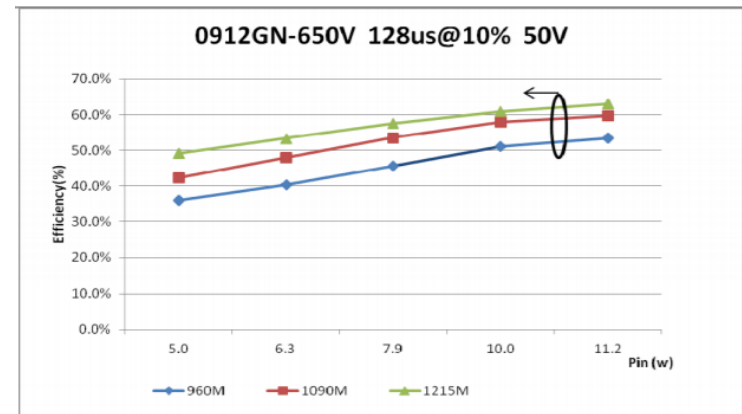
[<< BACK](#)

## Features

- Pout: 650W
- Operating Voltage: 50V
- Frequency: 960-1215MHz
- 128uS-10% pulse formats
- Class AB • Common Source
- 60% Drain Efficiency



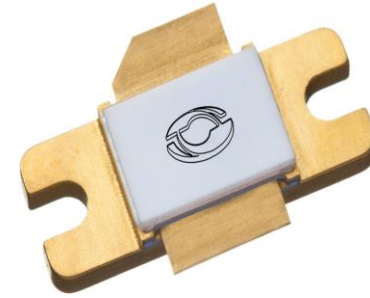
55KR 0.385"x1.030"



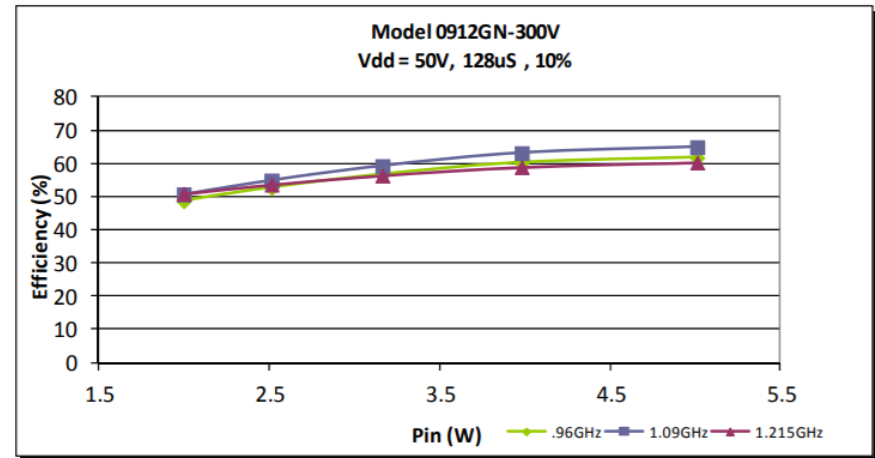
Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
960-1215	17	650	60	128	10	50	0.3

## Features

- Pout: 300W
- Operating Voltage: 50V
- Frequency: 960-1215MHz
- 128uS-10% pulse formats
- Class AB • Common Source
- 60% Drain Efficiency



55KR 0.385"x1.030"

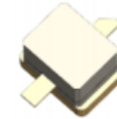


Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
960-1215	17	650	60	128	10	50	0.62

## Features

- Pout: 120W
- Operating Voltage: 50V
- Frequency: 960-1215 MHz
- 32uS-2% pulse formats
- Class AB • Common Source
- 65% Drain Efficiency

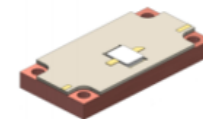
## Case Outline



0912GN-120EL, 55QQP Case  
(0.160"x0.230")



0912GN-120E, 55QQ Case  
(0.160"x0.550")



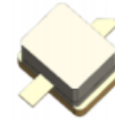
0912GN-120EP, Pallet  
(0.6"x1.2")

Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
960-1215	18.4	120 Min	65	32	2	50	0.38

## Features

- Pout: 50W
- Operating Voltage: 50V
- Frequency: 960-1215 MHz
- 32uS-2% and MIDS pulse formats
- Class AB • Common Source
- 63% Drain Efficiency

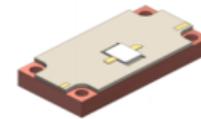
## Case Outline



0912GN-50LEL, 55QQP Case  
(0.160"x0.230")



0912GN-50LE, 55QQ Case  
(0.160"x0.550")



0912GN-50LEP, Pallet  
(0.6"x1.2")

Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
960-1215	16	50 Min	63	32	2	50	0.38

## Features

- Pout: 15W
- Operating Voltage: 50V
- Frequency: 960-1215 MHz
- 128uS-10% pulse formats
- Class AB • Common Source
- 65% Drain Efficiency

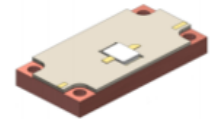
## Case Outline



0912GN-15E, 55QQ Case  
(0.160"x0.550")



0912GN-15EL, 55QQP Case  
(0.160"x0.230")



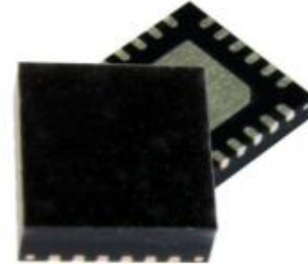
0912GN-15EP, Pallet  
(0.6"x1.2")

Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
960-1215	18	15 min	65	128	10	50	0.38

## Features

- Pout: >15W
- Operating Voltage: 50V
- Frequency: DC-3.5GHz
- Pulsed or CW Applications
- Class AB • Common Source
- >70% Drain Efficiency

## Case Outline



QFN 4x4 mm

TYPICAL BROAD BAND PULSED PERFORMANCE DATA<sup>1</sup> 0.96 – 1.215 GHz Band

Frequency	Pin (W)	Pout (W)	Id (A)	RL (dB)	$\eta_D$ (%)	Gain (dB)	Droop (dB)
960 MHz	0.32	22	.680	-12	67	18.6	0.25
1100 MHz	0.32	22	.630	-10.5	72	18.6	0.12
1215 MHz	0.32	21	.600	-14.7	71	18.3	0.10

## Performance Summary by Frequency

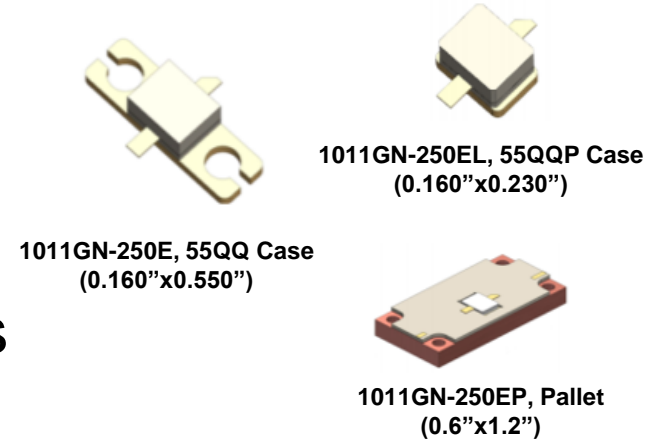
Parameter	Units	0.960 GHz	1.2 GHz	1.4 GHz	2.7 GHz	2.9 GHz	3.1 GHz	3.5 GHz
Output Power Psat	W	20	21	19	20	20	20	16
Power Gain	dB	18.5	18.3	18	13	13	13	12
$\eta_D$ Drain Efficiency	%	65	72	66	60	63	60	60

<sup>1</sup> Bias Condition: Vdd=+50V, Idq= 40 mA (Vgs= -2.0 ~ -4.5V typical), PW= 1 mS, DC = 10%  
RF performance measured on the recommended evaluation board.

## Features

- Pout: 250W
- Operating Voltage: 50V
- Frequency: 1030-1090MHz
- 32uS-2% & 128uS-10% pulse formats
- Class AB • Common Source
- >70% Drain Efficiency

## Case Outline



Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	20.5	250	75	32	2	50	0.68
1030-1090	20.3	250	71	128	10	50	0.68



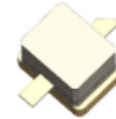
## Case Outline

## Features

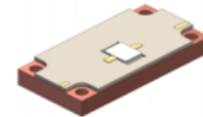
- Pout: 125W
- Operating Voltage: 50V
- Frequency: 1030-1090MHz
- 32uS-2% & 128uS-10% pulse formats
- Class AB • Common Source
- 72% Drain Efficiency



1011GN-125E, 55QQ Case  
(0.160"x0.550")



1011GN-125EL, 55QQP Case  
(0.160"x0.230")



1011GN-125EP, Pallet  
(0.6"x1.2")

Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	18.8	125	72	32	2	50	0.68
1030-1090	18.8	125	71	128	10	50	0.68

## Features

- Pout: 30W
- Operating Voltage: 50V
- Frequency: 1030-1090MHz
- 32uS-2% & 128uS-10% pulse formats
- Class AB • Common Source
- 65% Drain Efficiency

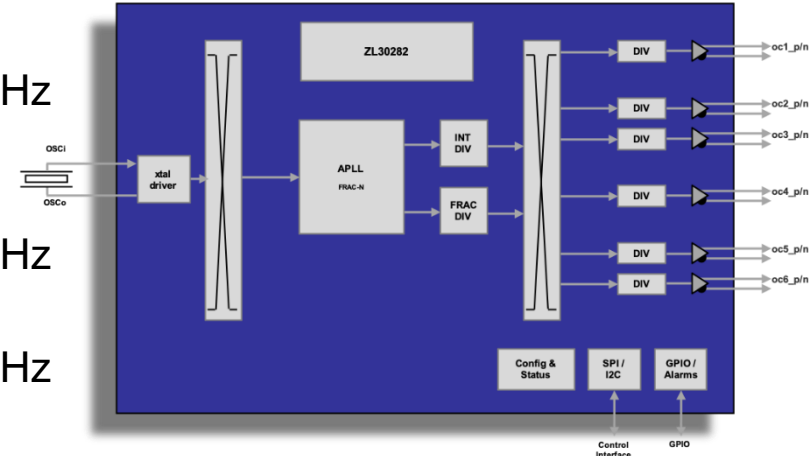
**CASE OUTLINE**  
55-QQP/QQ/Pallet  
Common Source



Frequency (MHz)	Gain (dB)	Power (W)	Eff (%)	Pulse Duration (uS)	Pulse Duty (%)	Vdd (V)	Rjc (C/W)
1030-1090	18.5	30	65	32	2	50	0.58
1030-1090	19	30	70	128	10	50	0.58

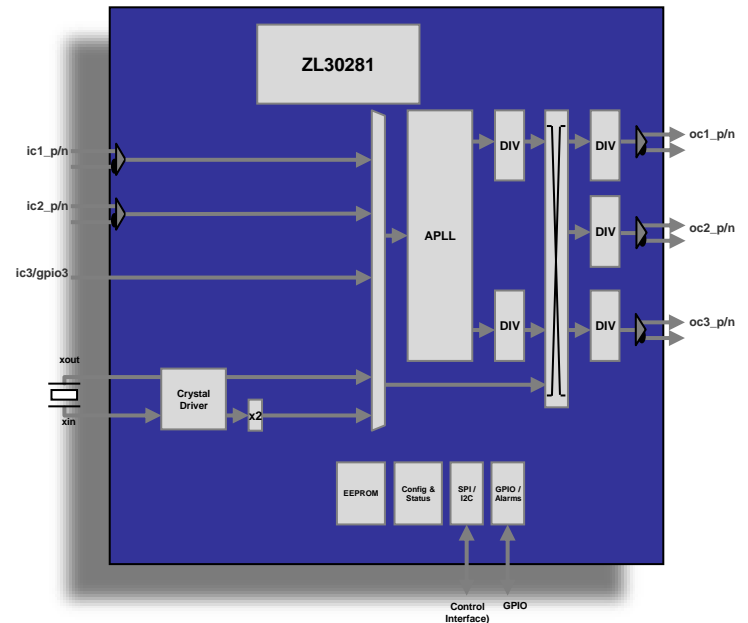
## Features

- 50 MHz crystal or CMOS as input
- Up to 6 output with 8 default configurations selected by hardware pins at reset (Configs 0-3 no SSC, Configs4-7 SSC for OC3-6):
  - Config0/4: OC1 100MHz HCSL, OC2\_P 25MHz LVCMOS, OC3/4/5 unused, OC6 100MHz HCSL
  - Config1/5: OC1 100MHz HCSL, OC2\_P 25MHz LVCMOS, OC3/4/5/6 100MHz HCSL
  - Config2/6: OC1 100MHz HCSL, OC2\_P 75MHz LVCMOS, OC3/4/5/6 100MHz HCSL
  - Config3/7: OC1/2 100MHz HCSL, OC3/4/5/6 100MHz HCSL
- Space-saving 8x8mm QFN56
- Output jitter typically <0.3ps RMS @12k~20MHz
- Clock ready indicator



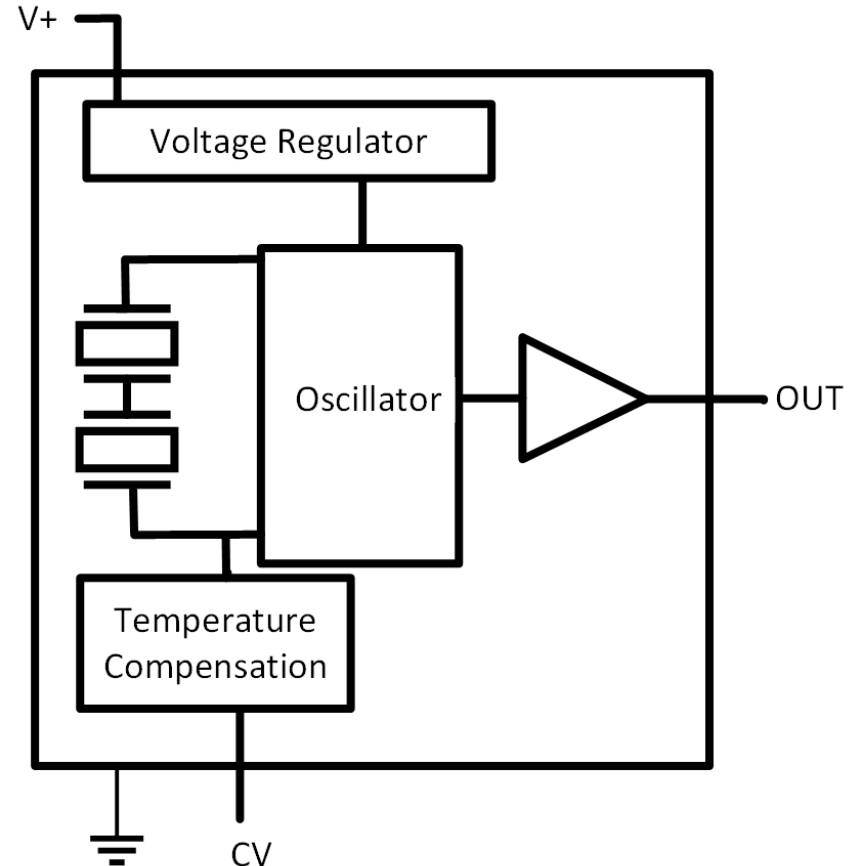
## Features

- 25MHz crystal or clock as input
- Up to 3 outputs with four default configurations selected by hardware pins at reset:
  - Config0: 100MHz on output OC1 (CML format)
  - Config1: 100MHz on OC1, OC2 (CML)
  - Config2: 100MHz on OC1 (CML), OC2 (HSTL)
  - Config3: 100MHz on OC1, OC2 (CML) and 25MHz LVCMOS on OC3
- Tiny 5x5mm QFN package
- Output jitter typically <0.3ps RMS @12k~20MHz
- Clock ready indicator



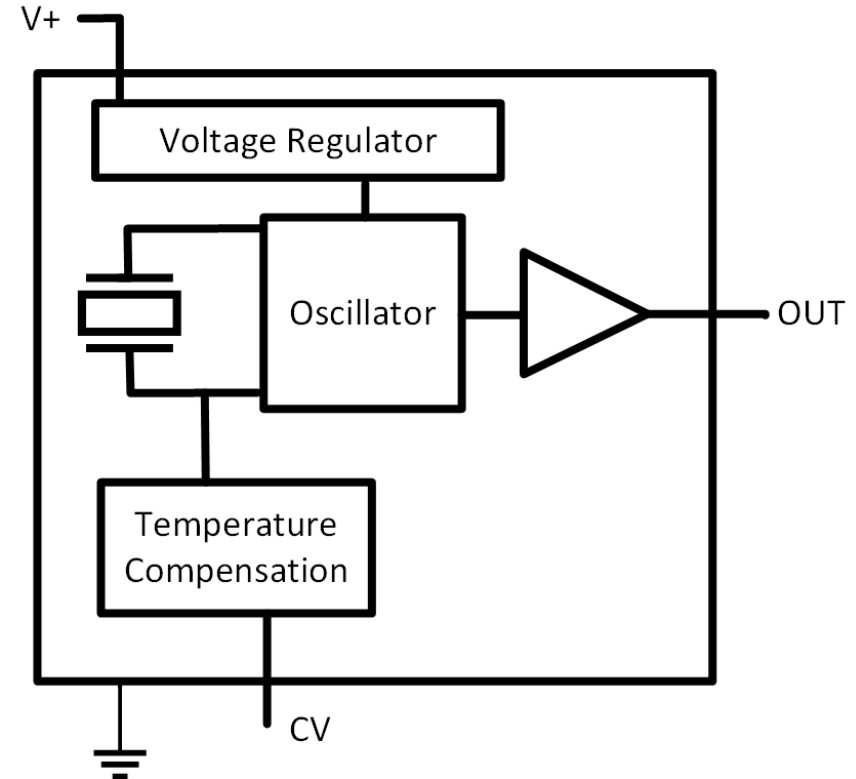
## Features:

- Lowest Noise TCXO in market
- Target Market: Test and Measurement
- Frequency Range: 5 to 50 MHz
- Output: CMOS
- Footprint: 23 x 18 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 82.5 mW
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -116 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -168 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm
- g-Sensitivity: 0.2 ppb/g



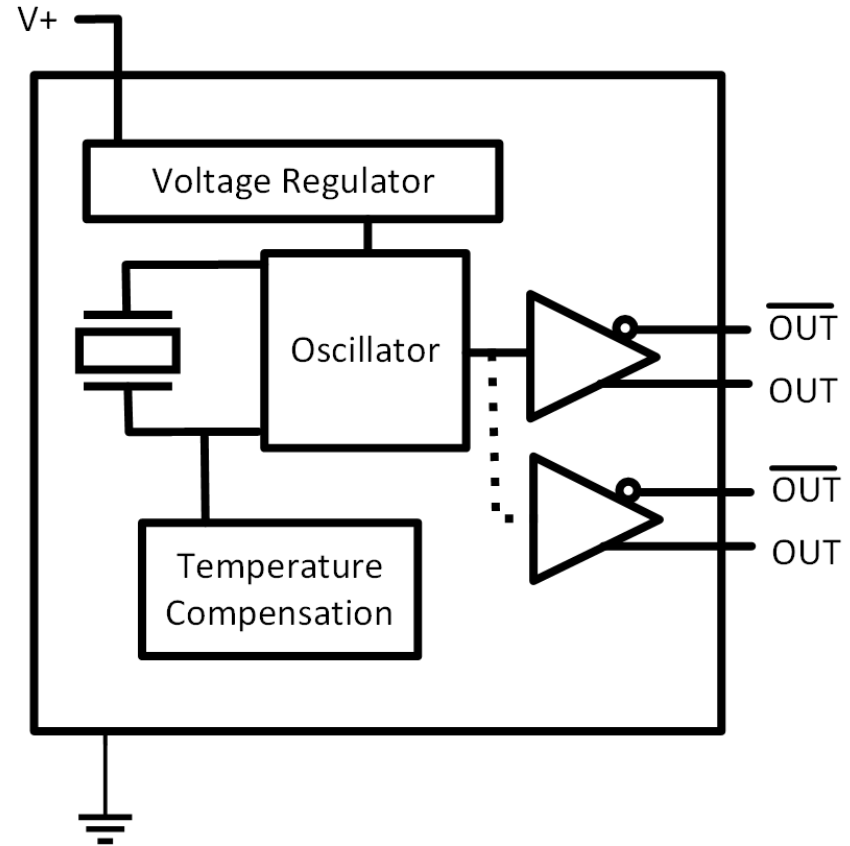
## Features:

- Low cost low noise TCXO
- Frequency Range: 8 to 61.44 MHz
- Output: CMOS
- Footprint: 12 x 10 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 49.5 mW
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -107 dBc/Hz @ MHz carrier
- Temperature stability 0 to 70°C: 1 ppm
- Temperature stability -20 to 70°C: 1ppm
- Temperature stability -40 to 85°C: 1 ppm



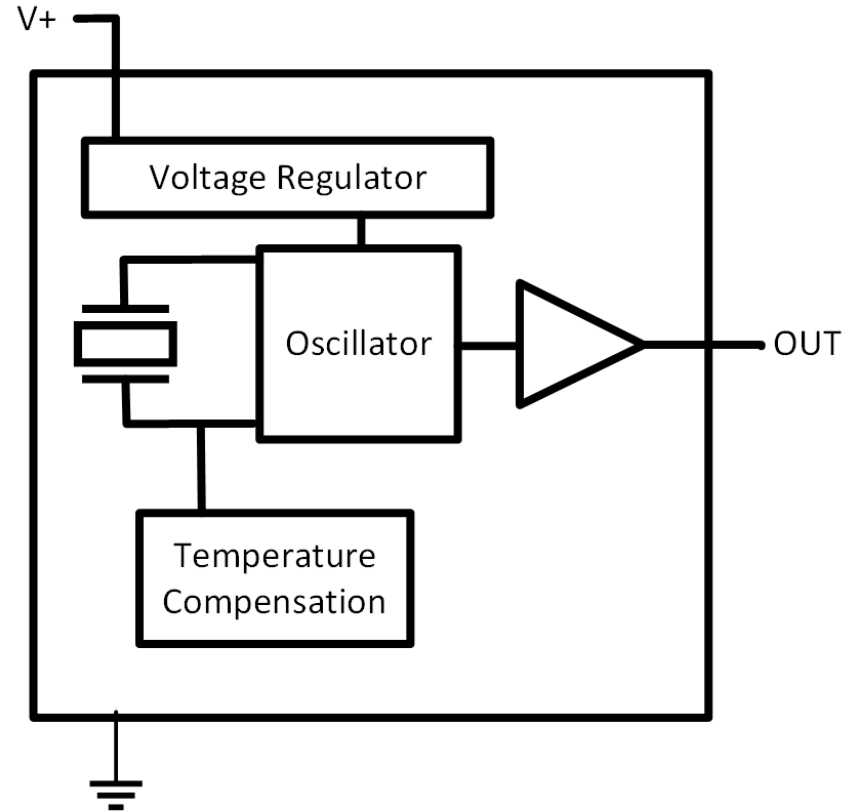
## Features:

- Dual complimentary output pairs
- Target Market: Space
- Frequency Range: 12 to 200 MHz
- Number of RF outputs: 1,2 pairs
- Output: LVDS
- Footprint: 35 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 10 mW
- Temperature Range: -55 to 105 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 10 ppm
- Aging per Year: 1 ppm
- 30 g Vibration



## Features:

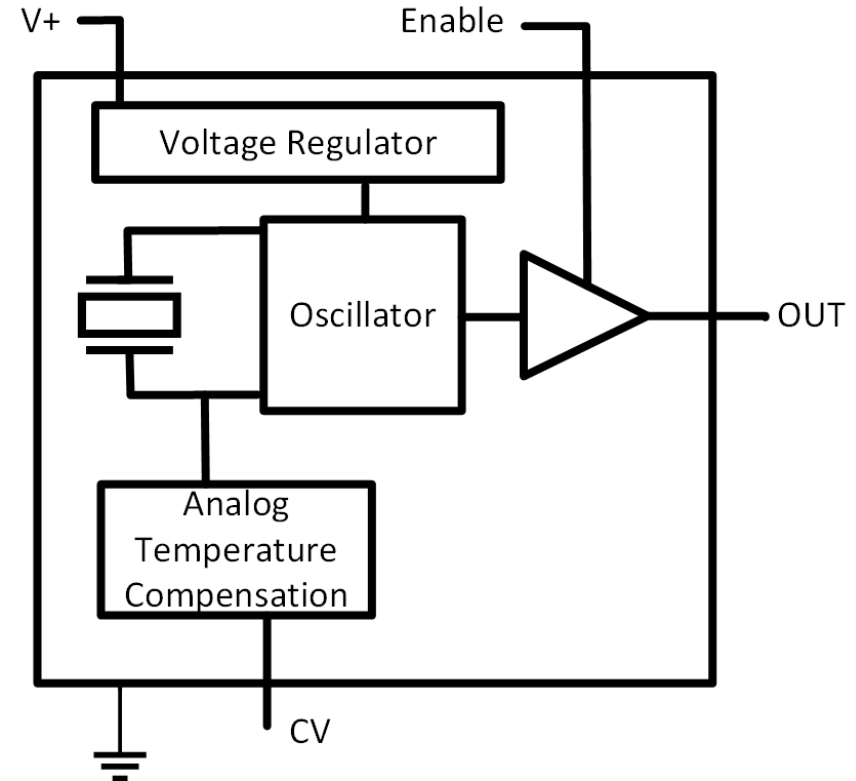
- Smallest space qualified TCXO in the world
- Target Market: Space
- Frequency Range: 0.3 to 425 MHz
- Output: CMOS, Sine
- Footprint: multiple options, see specification mm, through hole
- Supply Voltage: 3.3, 5, 12 V
- Power: 500 mW
- Temperature Range: -55 to 105 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 10 ppm
- Aging per Year: 1 ppm
- 30 g Vibration





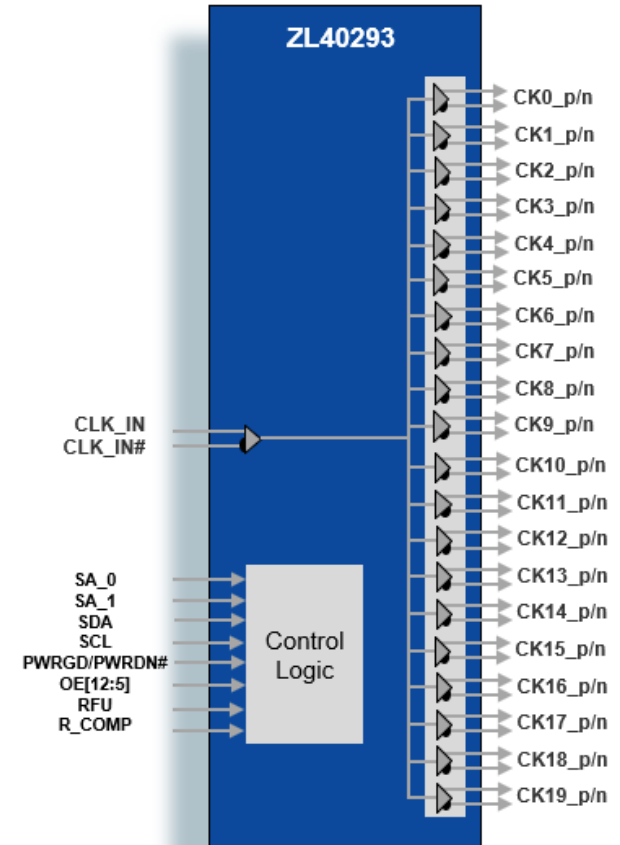
## Features:

- Frequency Range: 6.4 to 52 MHz
- Standard Frequencies: 10, 12.8, 20, 24.576, 25 MHz
- Output: CMOS, Clipped Sine
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 5.94 mW
- Temperature Range: -40 to 105 °C
- Temperature stability 0 to 70°C: 0.1 ppm
- Temperature stability -40 to 85°C: 0.28 ppm
- Temperature stability over Operating Temperature Range: 2 ppm



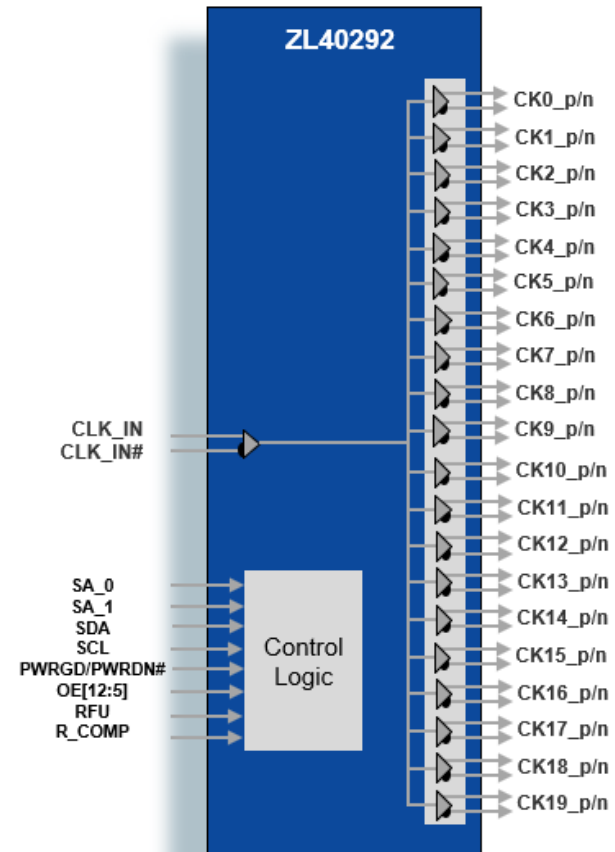
## Features

- Fully Compliant with PCIe 1, 2, 3, 4 and 5 Specifications
- 20 Low-Power Push-Pull HCSL PCIe Outputs
- Ultra-low additive jitter: 10fs maximum
- Supports clock frequencies from 0 to 250MHz
- Supports 3.3V power supplies
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 50ps
- SMBus Interface
- Eight OE pins
- Embedded series terminations adjusted for 100Ω differential transmission line
- Transparent for Spread-Spectrum Clock



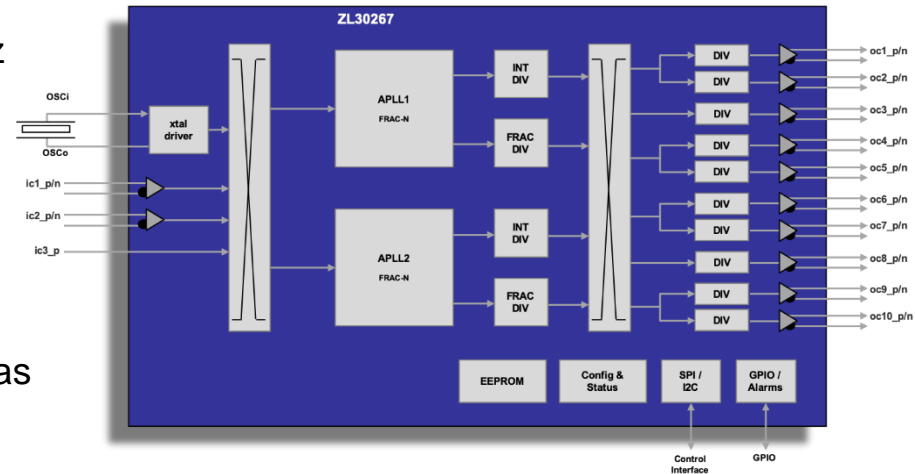
## Features

- Fully Compliant with Intel DB2000Q Specification
- 20 Low-Power Push-Pull HCSL PCIe Outputs
- Ultra-low additive jitter: 20fs maximum
- Supports clock frequencies from 0 to 250MHz
- Supports 3.3V power supplies
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 50ps
- SMBus Interface
- Eight OE pins
- Embedded series terminations adjusted or 85Ω differential transmission line
- Transparent for Spread-Spectrum Clock



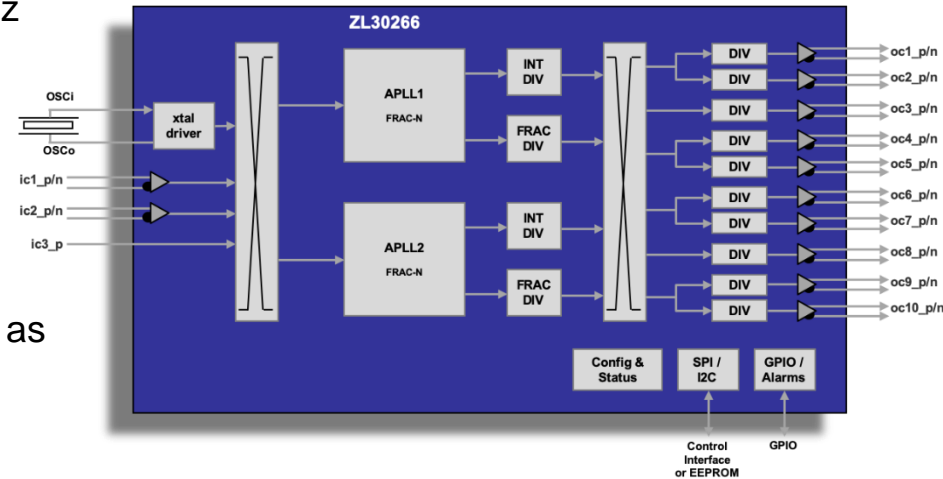
## Features

- Two Flexible Input Clocks
  - One crystal/CMOS input
  - Two differential/CMOS inputs
  - One single-ended/CMOS input
  - Any input frequency from 9.72MHz to 1.25GHz (300MHz max for CMOS)
  - Glitchless clock switching by pin or register
- 10 Any-Frequency, Any-Format Outputs
  - Any output frequency from 1Hz to 1045MHz
  - 2 fractional-N APLLs with 0ppm error
  - Output jitter from integer multiply and dividers as low as 0.17ps RMS (12kHz-20MHz)
  - Each output has an independent divider
  - Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL
  - In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)
  - Multiple output supply voltage banks with CMOS output voltages from 1.5V to 3.3V



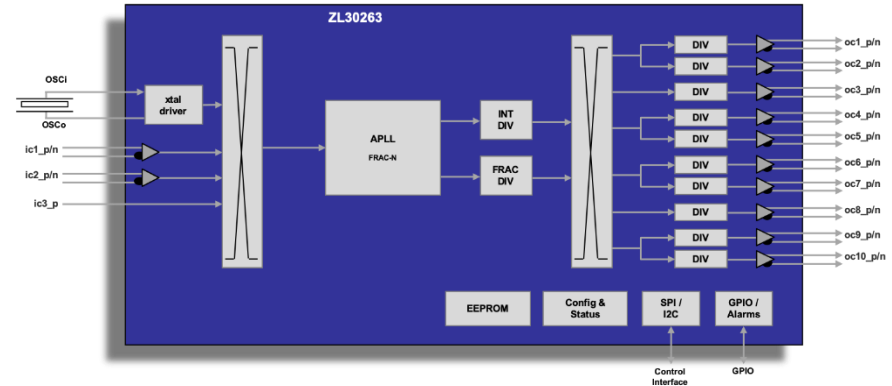
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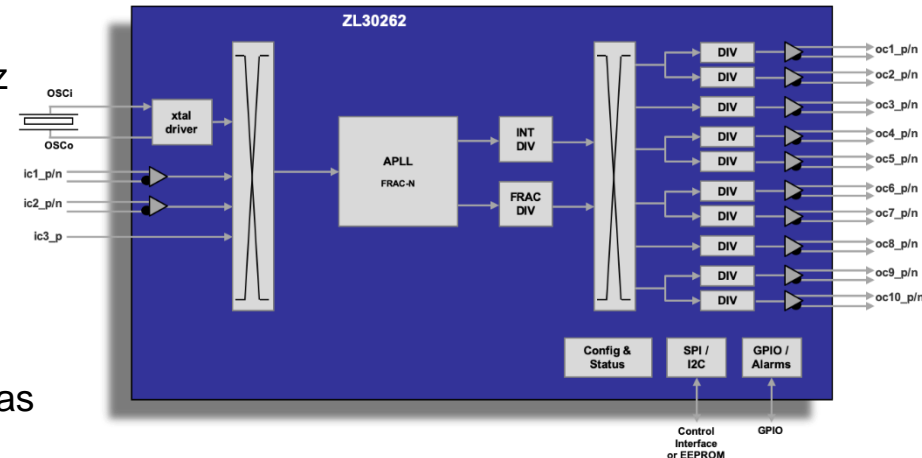
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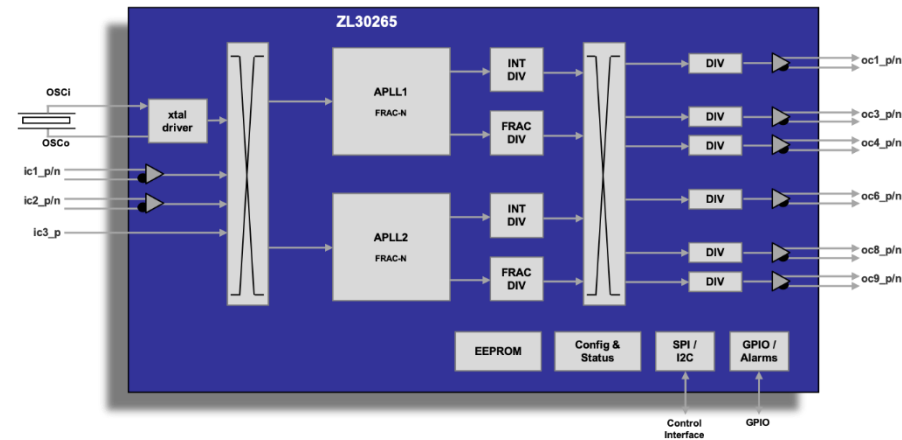
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- Two Flexible Input Clocks
  - One crystal/CMOS input
  - Two differential/CMOS inputs
  - One single-ended/CMOS input
  - Any input frequency from 9.72MHz to 1.25GHz (300MHz max for CMOS)
  - Glitchless clock switching by pin or register
- 10 Any-Frequency, Any-Format Outputs
  - Any output frequency from 1Hz to 1045MHz
  - 1 fractional-N APLL with 0ppm error
  - Output jitter from integer multiply and dividers as low as 0.17ps RMS (12kHz-20MHz)
  - Output jitter from fractional dividers is typically < 1ps RMS, many frequencies <0.5ps RMS
  - Each output has an independent divider
  - Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL



## Features

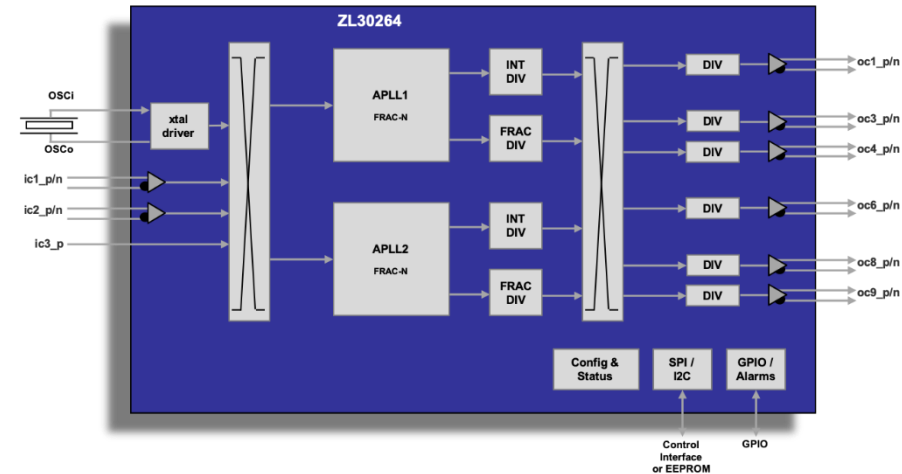
- Two Flexible Input Clocks
  - One crystal/CMOS input
  - Two differential/CMOS inputs
  - One single-ended/CMOS input
  - Any input frequency from 9.72MHz to 1.25GHz (300MHz max for CMOS)
  - Glitchless clock switching by pin or register
- 6 Any-Frequency, Any-Format Outputs
  - Any output frequency from 1Hz to 1045MHz
  - 2 fractional-N APLLs with 0ppm error
  - Output jitter from integer multiply and dividers as low as 0.17ps RMS (12kHz-20MHz)
  - Each output has an independent divider
  - Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL
  - In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)
  - Multiple output supply voltage banks with CMOS output voltages from 1.5V to 3.3V





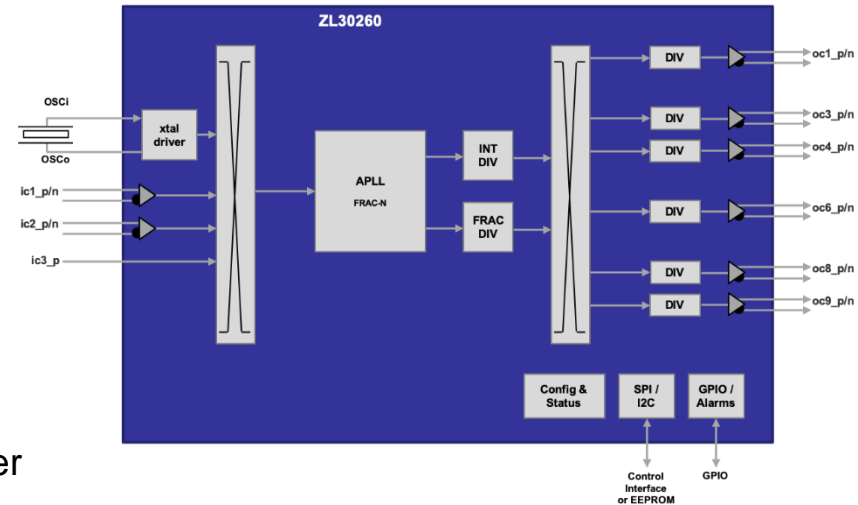
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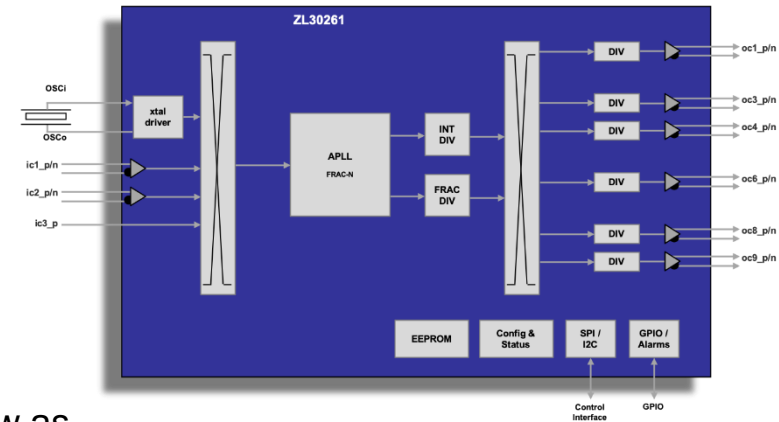
## Features

- Two Flexible Input Clocks
  - One crystal/CMOS input
  - Two differential/CMOS inputs
  - One single-ended/CMOS input
  - Any input frequency from 9.72MHz to 1.25GHz (300MHz max for CMOS)
  - Activity monitors, automatic or manual switching
  - Glitchless clock switching by pin or register
- 6 Any-Frequency, Any-Format Outputs
  - Any output frequency from 1Hz to 1045MHz
  - 1 fractional-N APLL with 0ppm error
  - Each APLL has a fractional divider and an integer divider to make a total of four independent frequency families
  - Output jitter from integer multiply and dividers as low as 0.17ps RMS (12kHz-20MHz)
  - Output jitter from fractional dividers is typically < 1ps RMS, many frequencies <0.5ps RMS
  - Each output has an independent divider



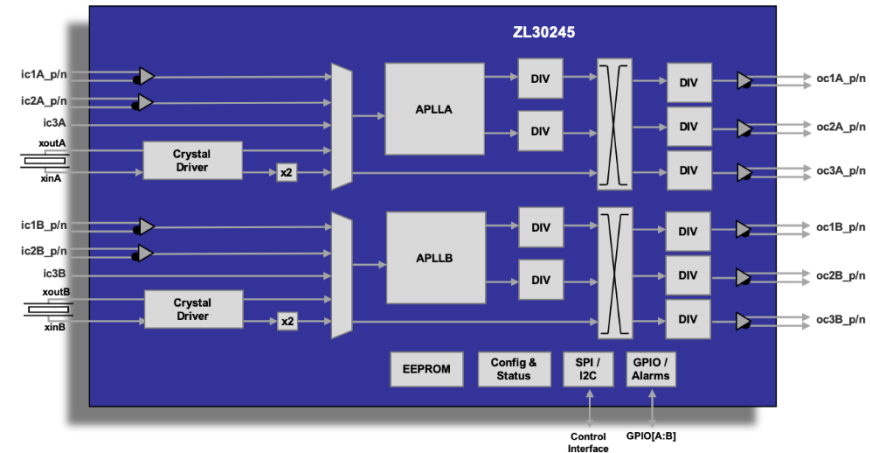
## Features

- Two Flexible Input Clocks
  - One crystal/CMOS input
  - Two differential/CMOS inputs
  - One single-ended/CMOS input
  - Any input frequency from 9.72MHz to 1.25GHz (300MHz max for CMOS)
  - Activity monitors, automatic or manual switching
  - Glitchless clock switching by pin or register
- 6 Any-Frequency, Any-Format Outputs
  - Any output frequency from 1Hz to 1045MHz
  - 1 fractional-N APLL with 0ppm error
  - Output jitter from integer multiply and dividers as low as 0.17ps RMS (12kHz-20MHz)
  - Output jitter from fractional dividers is typically < 1ps RMS, many frequencies <0.5ps RMS
  - Each output has an independent divider
  - Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL
  - Multiple output supply voltage banks with CMOS output voltages from 1.5V to 3.3V



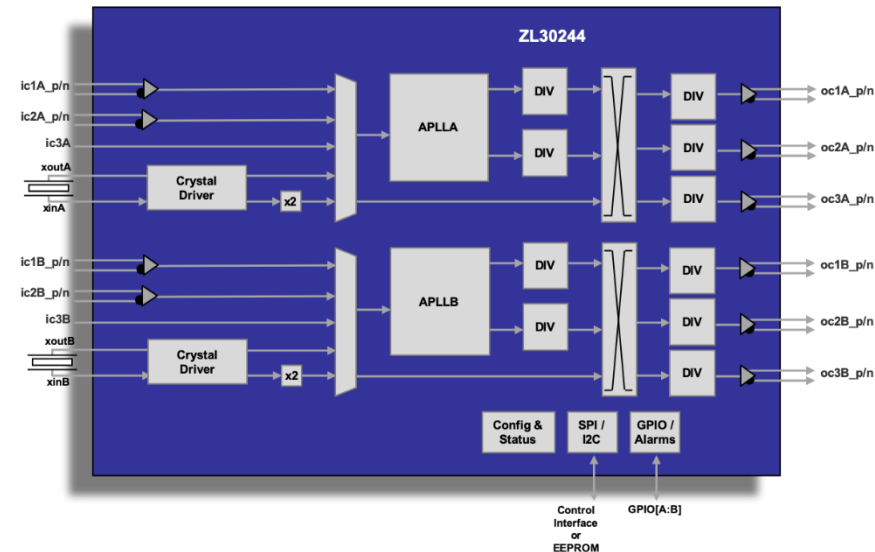
## Key Features

- Any input frequency from 9.72MHz to 1250MHz (9.72MHz to 300MHz for CMOS)
- Low-Jitter Fractional-N APLL and 3 Outputs
- Any output frequency from <1Hz to 1035MHz
- High-resolution fractional frequency conversion with 0ppm error
- Easy-to-configure, encapsulated design requires no external VCXO or loop filter components
- Each output has independent dividers
- Output jitter as low as 0.16ps RMS (12kHz to 20MHz integration band)
- Outputs are CML or 2xCMOS, can interface to LVDS, LVPECL, HSTL, SSTL and HCSL



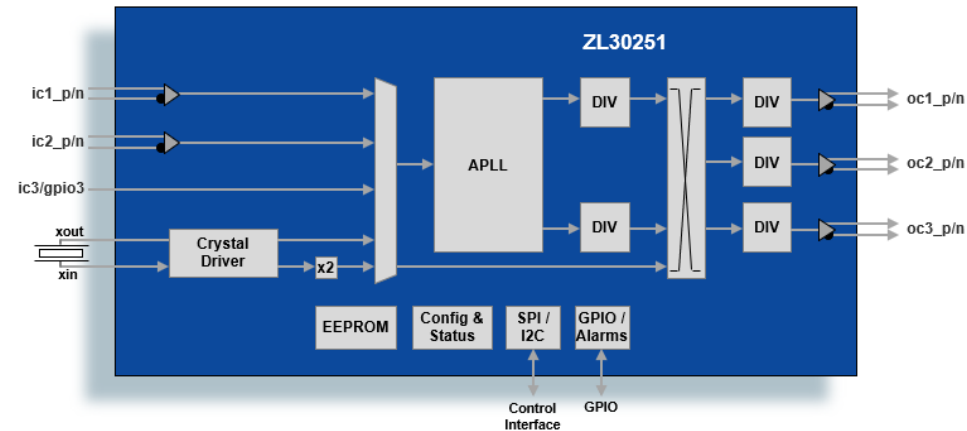
## Features

- Four Input Clocks
  - One crystal/CMOS Input
  - Two differential/CMOS inputs
  - One single-ended/CMOS input
  - Any input frequency from 9.72MHz to 1250MHz (9.72MHz to 300MHz for CMOS)
  - Clock selection by pin or register control
- Low-Jitter Fractional-N APLL and 3 Outputs
  - Any output frequency from <1Hz to 1035MHz
  - High-resolution fractional frequency conversion with 0ppm error
  - Each output has independent dividers
  - Output jitter as low as 0.16ps RMS (12kHz to 20MHz integration band)
  - Outputs are CML or 2xCMOS, can interface to LVDS, LVPECL, HSTL, SSTL and HCSL
  - In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)



## Features

- **Four Input Clocks**
  - One crystal/CMOS input
  - Two differential/CMOS inputs
  - One single-ended/CMOS input
  - Any input frequency from 9.72MHz to 1250MHz
  - (9.72MHz to 300MHz for CMOS)
  - Clock selection by pin or register control
- **Low-Jitter Fractional-N APLL and 3 Outputs**
  - Any output frequency from <1Hz to 1035MHz
  - High-resolution fractional frequency conversion with 0ppm error
  - Easy-to-configure, encapsulated design requires no external VCXO or loop filter components
  - Each output has independent dividers
  - Output jitter as low as 0.16ps RMS (12kHz-20MHz integration band)
  - Outputs are CML or 2xCMOS, can interface to LVDS, LVPECL, HSTL, SSTL and HCSL
  - In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)
  - Per-output supply pin with CMOS output voltages from 1.5V to 3.3V
  - Precise output alignment circuitry and per output phase adjustment
  - Per-output enable/disable and glitch-less start/stop (stop high or low)



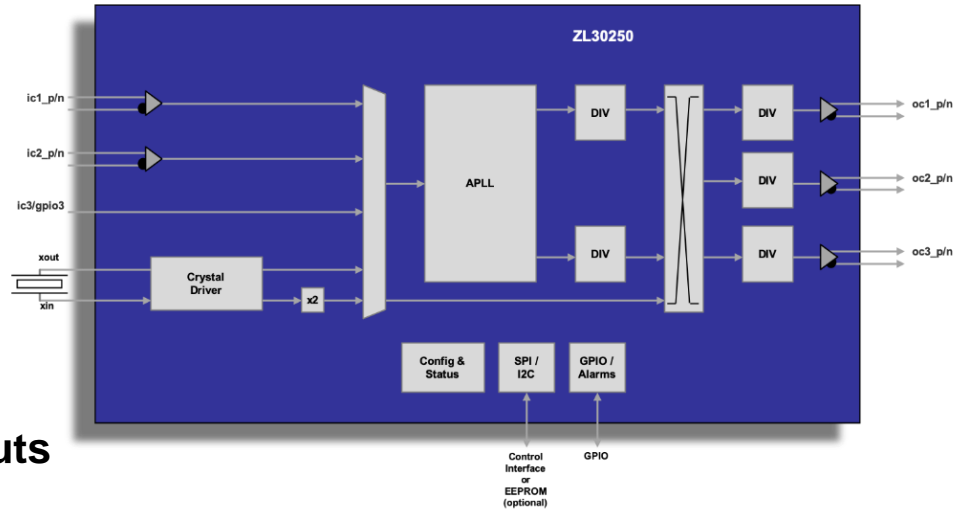
## Features

### Four Input Clocks

- One crystal/CMOS Input
- Two differential/CMOS inputs
- One single-ended/CMOS input
- Any input frequency from 9.72MHz to 1250MHz (9.72MHz to 300MHz for CMOS)
- Clock selection by pin or register control

### Low-Jitter Fractional-N APLL and 3 Outputs

- Any output frequency from <1Hz to 1035MHz
- High-resolution fractional frequency conversion with 0ppm error
- Output jitter as low as 0.16ps RMS (12kHz to 20MHz integration band)
- Outputs are CML or 2xCMOS, can interface to LVDS, LVPECL, HSTL, SSTL and HCSL
- In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)
- Per-output supply pin with CMOS output voltages from 1.5V to 3.3V



## Features

### Inputs/Outputs

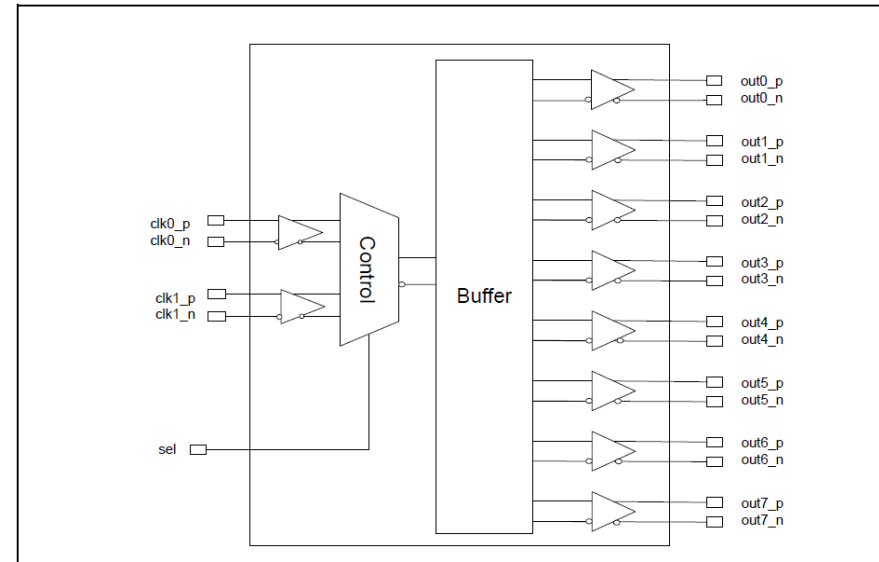
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Simple switching of references
- On-chip input termination and biasing for AC coupled inputs
- Eight precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 97 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 165 fs RMS





## Features

### Inputs/Outputs

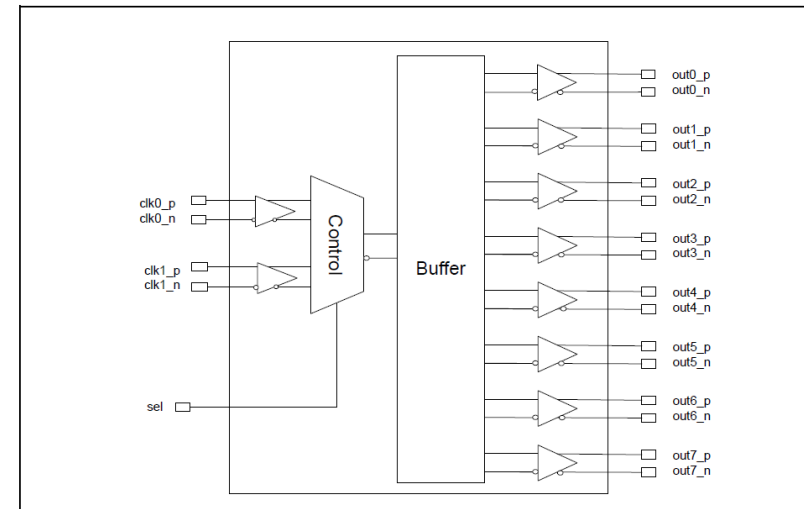
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Simple switching of references
- Eight precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 95 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 194 fs RMS



## Features

### Inputs/Outputs

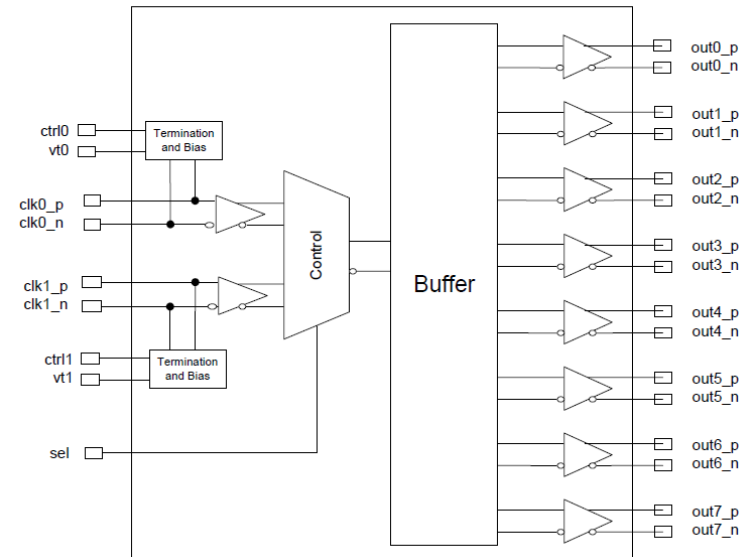
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Simple switching of references
- On-chip input termination and biasing for AC coupled inputs
- Eight precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 106 fs RMS



## Features

### Inputs/Outputs

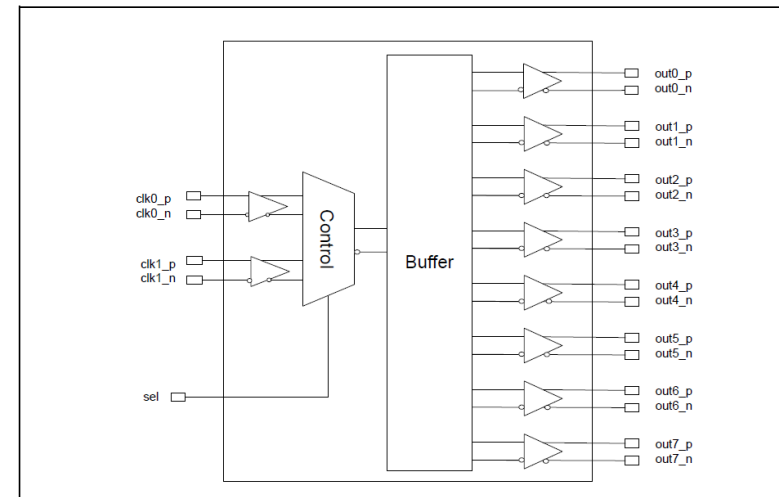
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- On-chip input termination and biasing for AC coupled inputs
- Eight precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 97 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 165 fs RMS



### Features

#### Inputs/Outputs

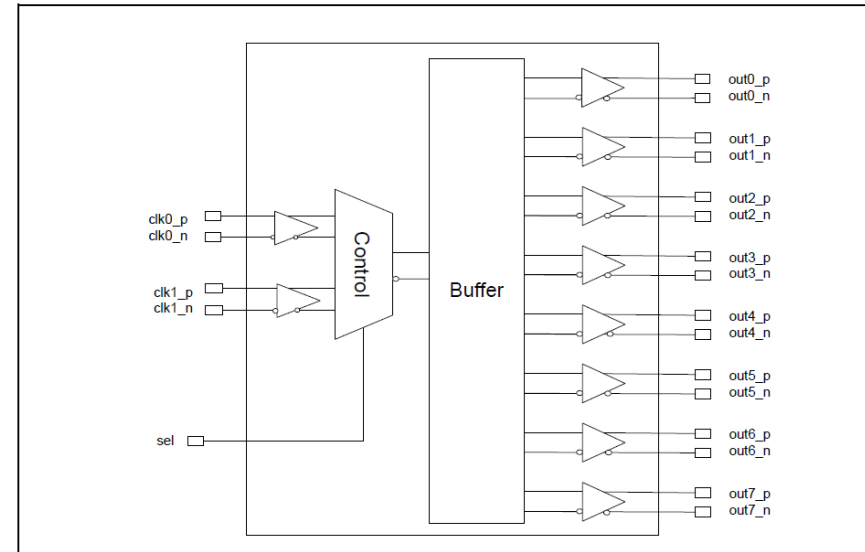
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- Eight precision LVDS outputs
- Operating frequency up to 750 MHz

#### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 95 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

#### Performance

- Ultra low additive jitter of 194 fs RMS



## Features

### Inputs/Outputs

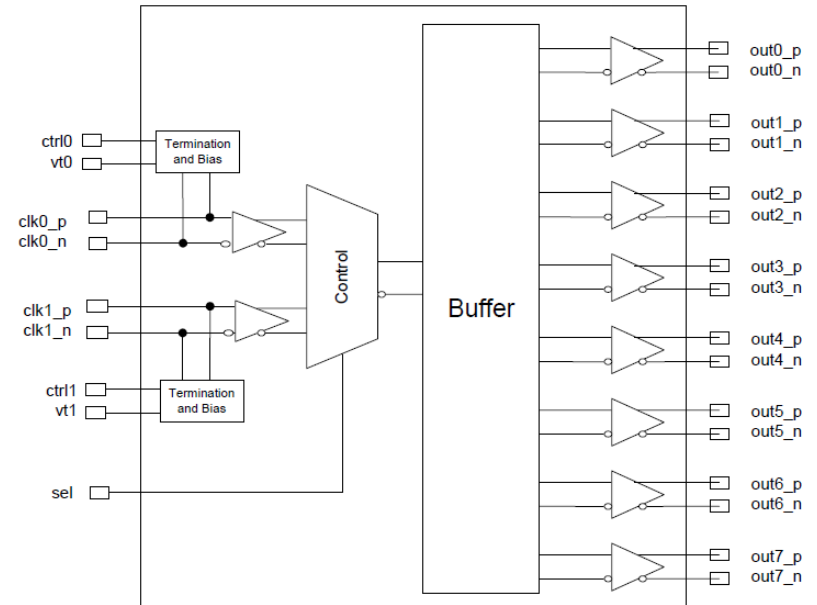
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- On-chip input termination and biasing for AC coupled inputs
- Eight precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 106 fs RMS



## Features

### Inputs/Outputs

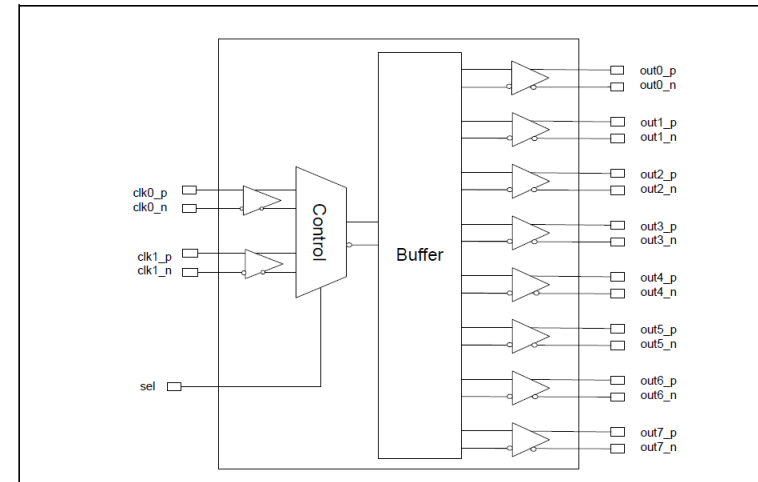
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- Eight precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

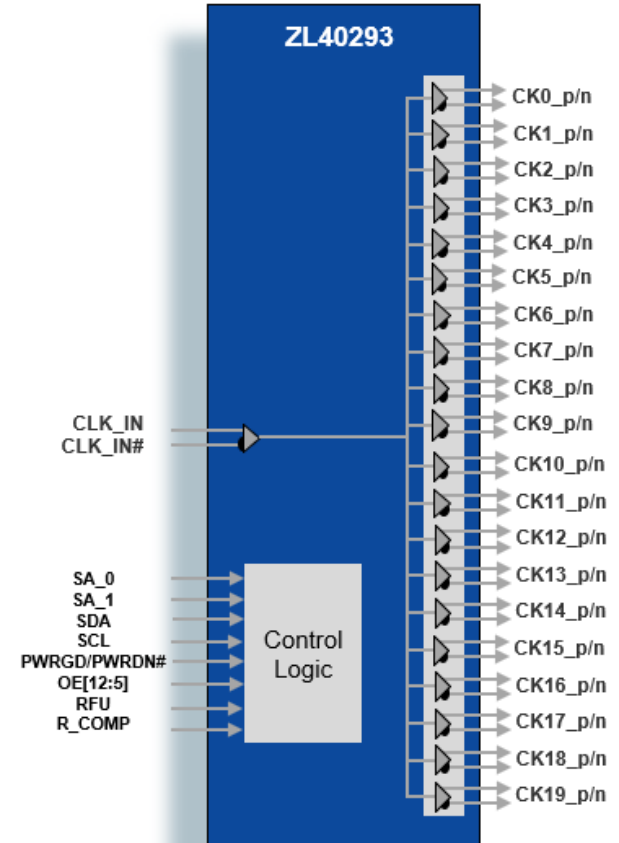
### Performance

- Ultra low additive jitter of 121 fs RMS



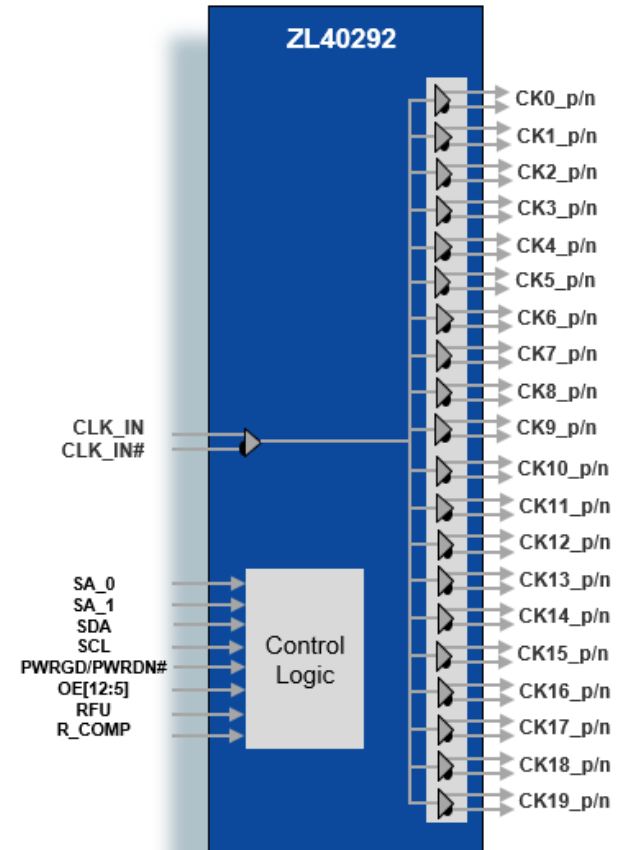
## Features

- Fully Compliant with PCIe 1, 2, 3, 4 and 5 Specifications
- 20 Low-Power Push-Pull HCSL PCIe Outputs
- Ultra-low additive jitter: 10fs maximum
- Supports clock frequencies from 0 to 250MHz
- Supports 3.3V power supplies
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 50ps
- SMBus Interface
- Eight OE pins
- Embedded series terminations adjusted for 100Ω differential transmission line
- Transparent for Spread-Spectrum Clock



## Features

- Fully Compliant with Intel DB2000Q Specification
- 20 Low-Power Push-Pull HCSL PCIe Outputs
- Ultra-low additive jitter: 20fs maximum
- Supports clock frequencies from 0 to 250MHz
- Supports 3.3V power supplies
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 50ps
- SMBus Interface
- Eight OE pins
- Embedded series terminations adjusted or 85Ω differential transmission line
- Transparent for Spread-Spectrum Clock





## Features

### Inputs/Outputs

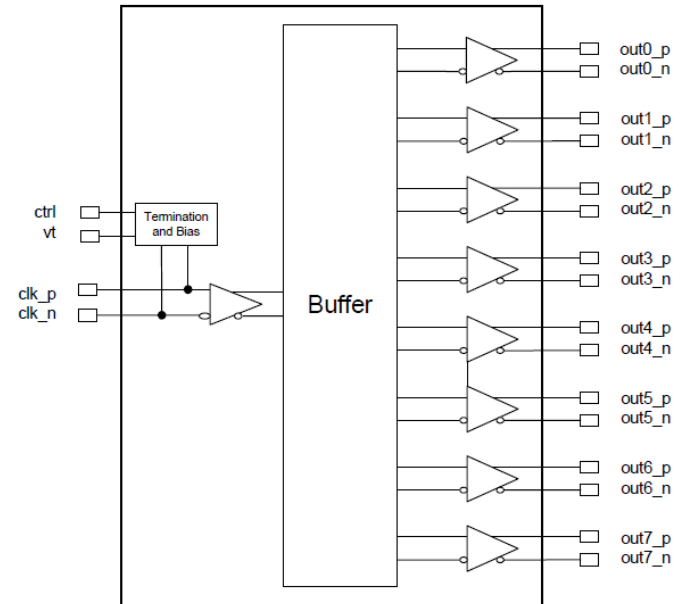
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Eight precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 62 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 135 fs RMS



## Features

### Inputs/Outputs

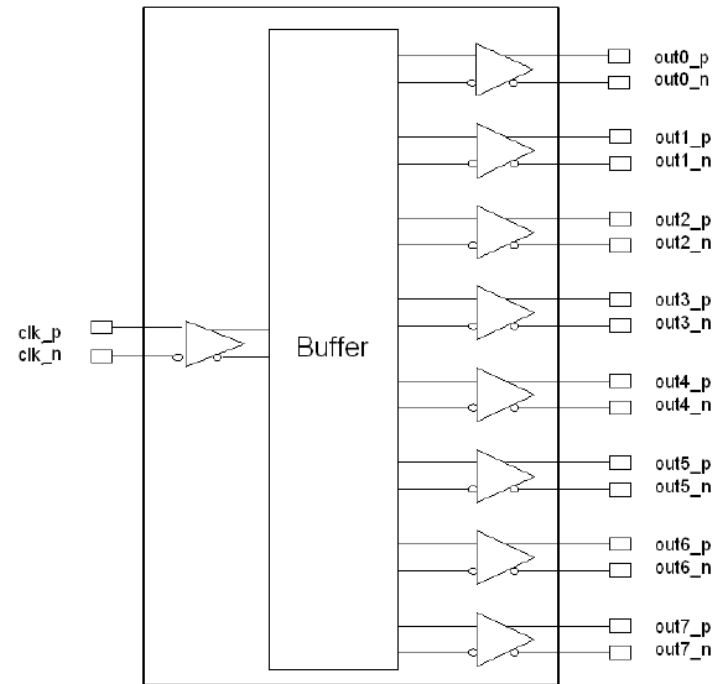
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Eight precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 106 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 104 fs RMS



## Features

### Inputs/Outputs

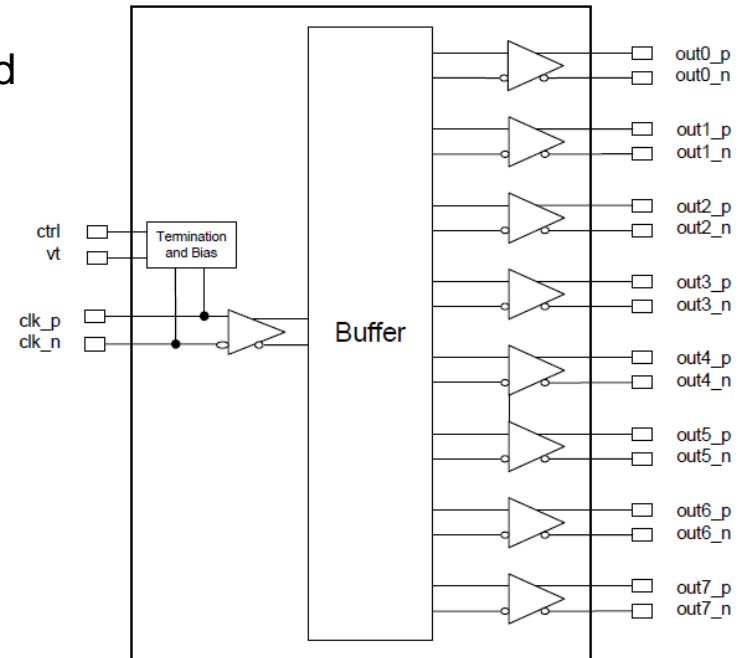
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Eight precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 36 fs RMS



## Features

### Inputs/Outputs

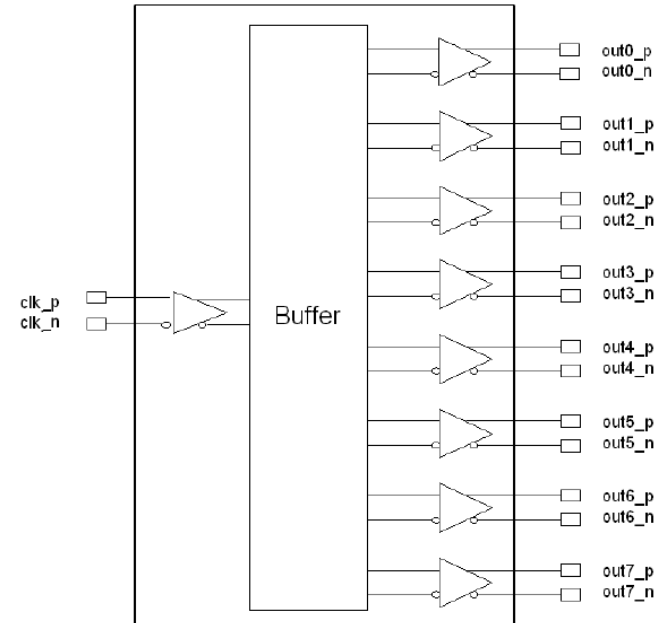
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Eight precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 122 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 38 fs RMS



### Features

#### Inputs/Outputs

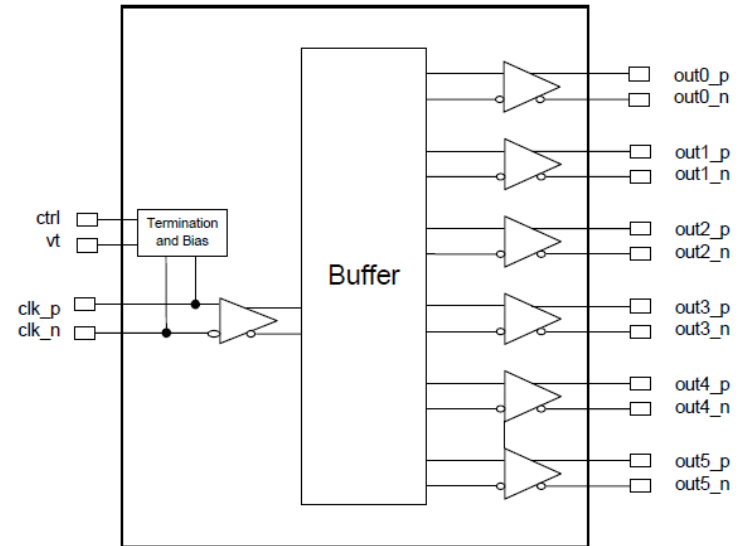
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Six precision LVDS outputs
- Operating frequency up to 750 MHz

#### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 62 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

#### Performance

- Ultra low additive jitter of 135 fs RMS



## Features

### Inputs/Outputs

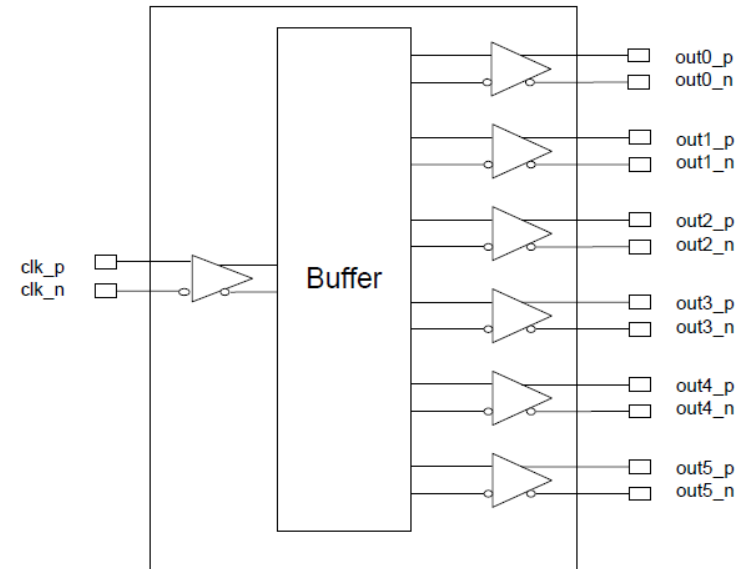
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Six precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 93 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 104 fs RMS



## Features

### Inputs/Outputs

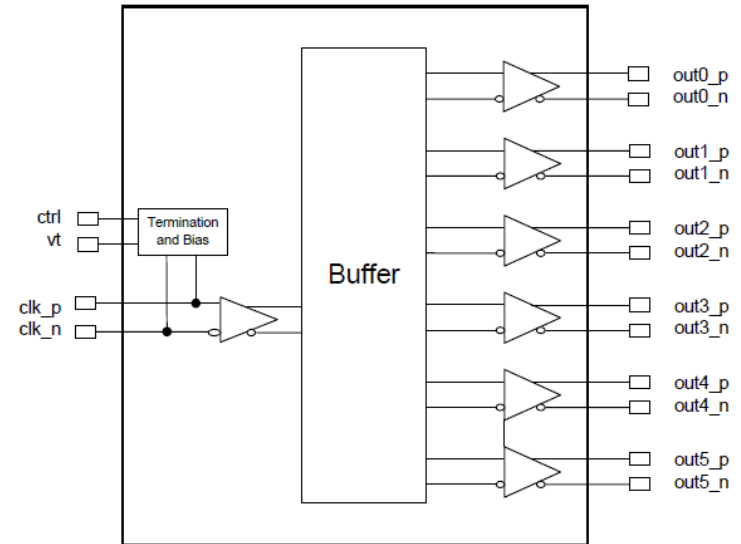
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Six precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 36 fs RMS



## Features

### Inputs/Outputs

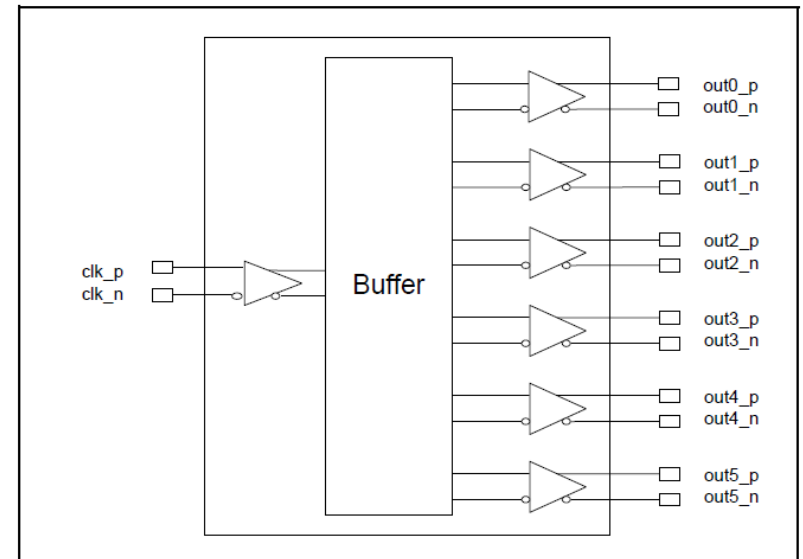
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Six precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 39 fs RMS





## Features

### Inputs/Outputs

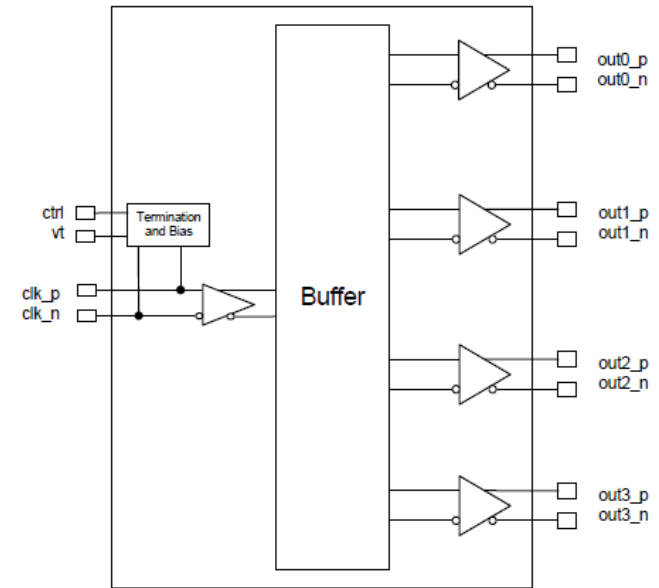
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Four precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 62 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 78 fs RMS



## Features

### Inputs/Outputs

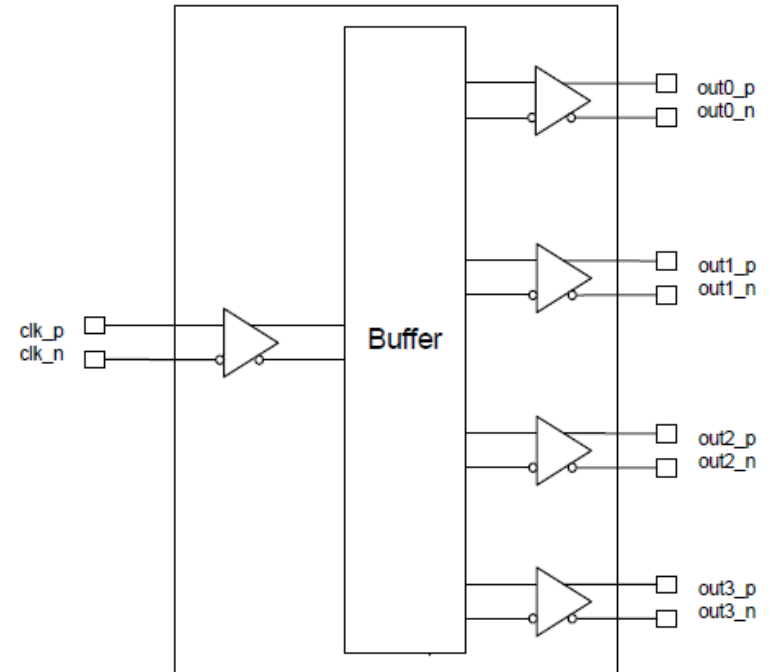
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Four precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 61 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 92 fs RMS



### Features

#### Inputs/Outputs

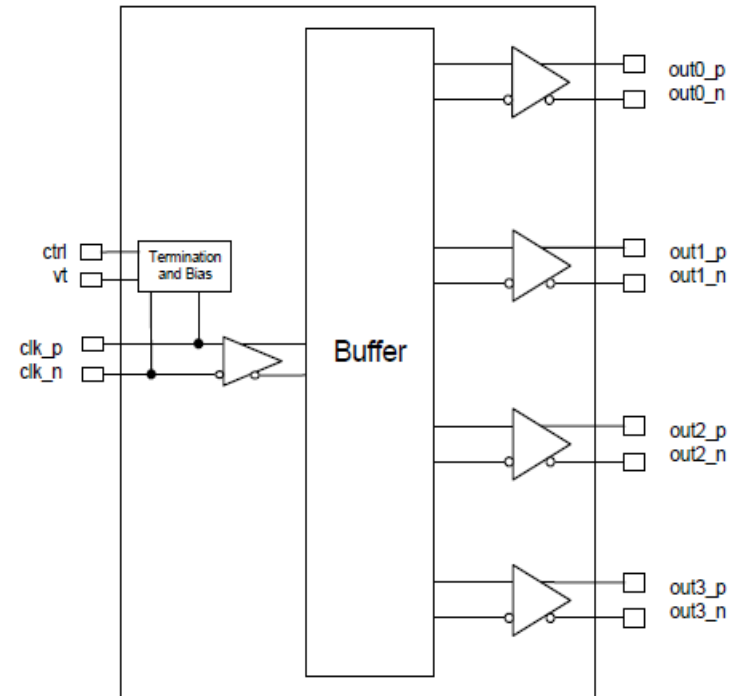
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Four precision LVPECL outputs
- Operating frequency up to 750 MHz

#### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 62 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

#### Performance

- Ultra low additive jitter of 40 fs RMS



## Features

### Inputs/Outputs

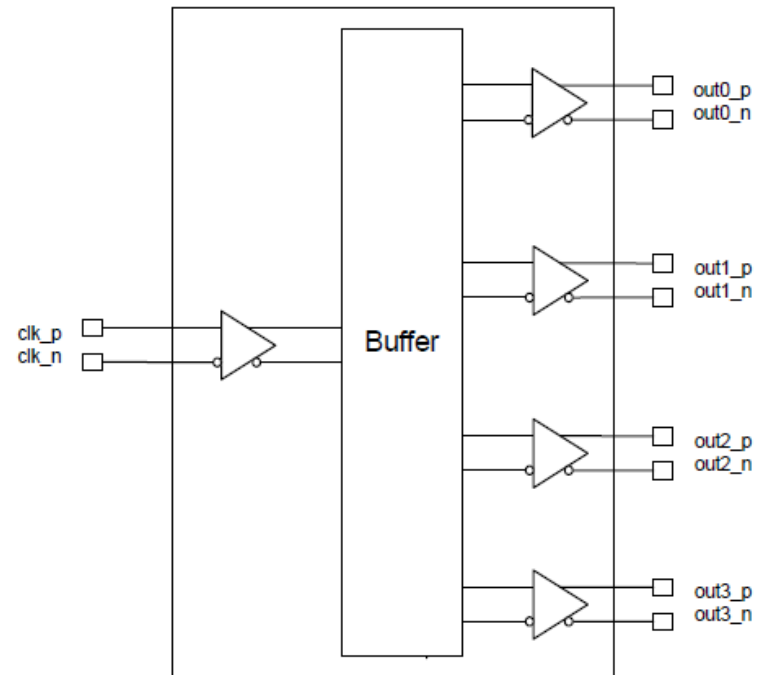
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Four precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 62 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

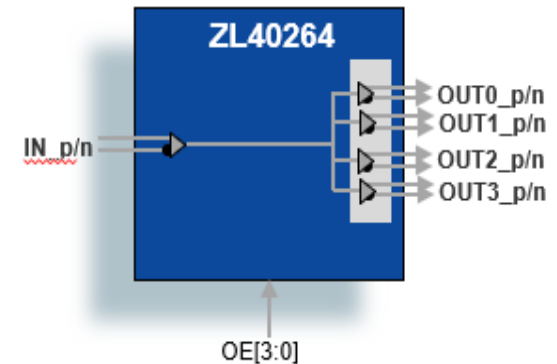
### Performance

- Ultra low additive jitter of 39 fs RMS



## Features

- One differential input which accepts any differential format.
- Four differential HCSL outputs
- Ultra-low additive jitter: 32fs (in 12kHz to 20MHz integration band at 400MHz clock frequency)
- Supports clock frequencies from 0 to 400MHz
- Supports 2.5V or 3.3V power supplies for HCSL outputs
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 50ps
- Individual Output Enable pin for each differential pair
- Transfers Spread-Spectrum without attenuation



## Features

### Inputs/Outputs

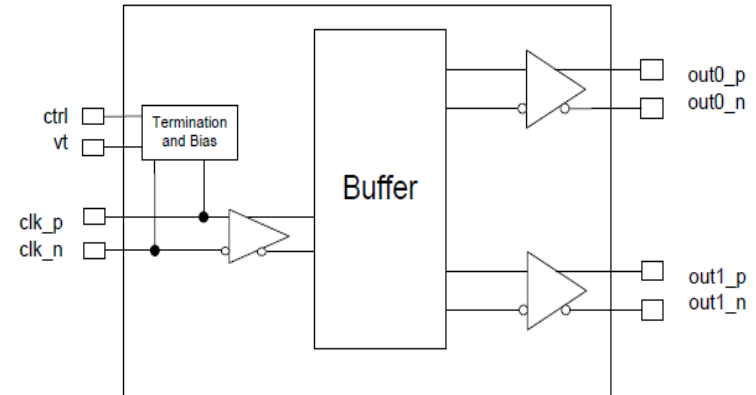
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Two precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 44 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 78 fs RMS



## Features

### Inputs/Outputs

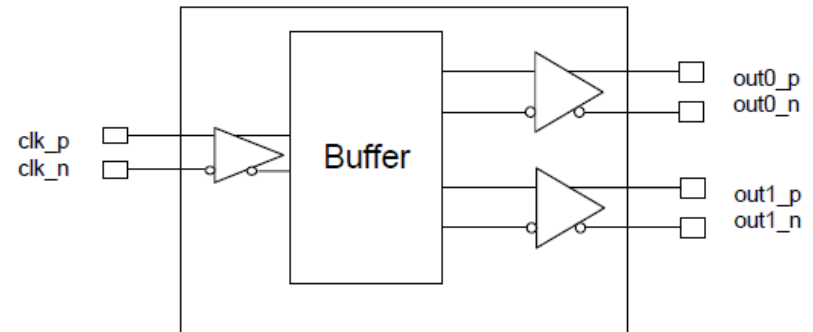
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Two precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 49 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 92 fs RMS



## Features

### Inputs/Outputs

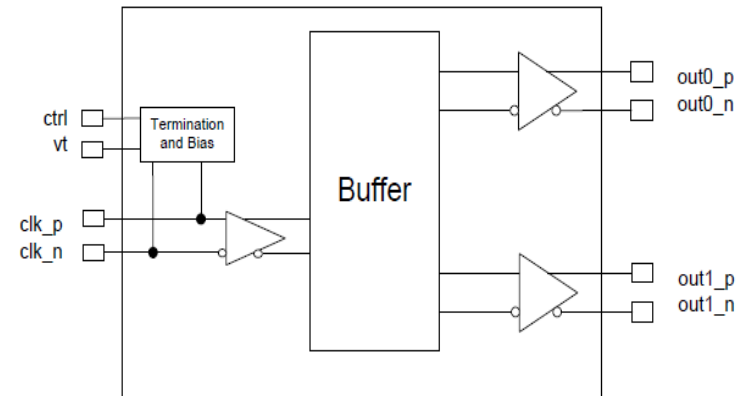
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- On-chip input termination and biasing for AC coupled inputs
- Two precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 49 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 40 fs RMS





## Features

### Inputs/Outputs

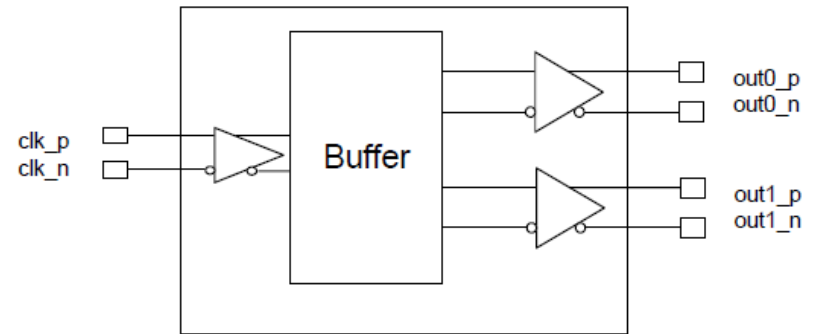
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
- Two precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 49 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

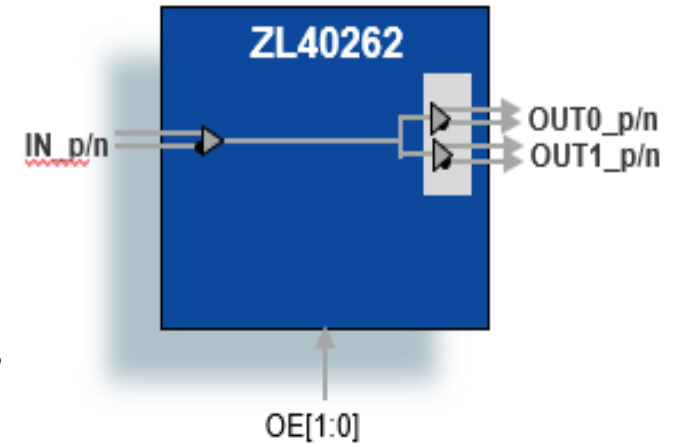
### Performance

- Ultra low additive jitter of 39 fs RMS



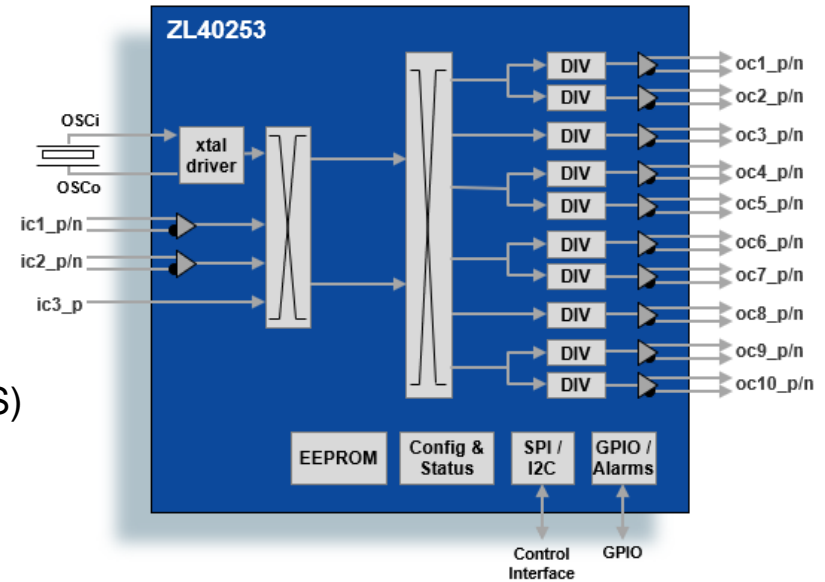
## Features

- One differential input which accepts any differential format.
- Two differential HCSL outputs
- Ultra-low additive jitter: 32fs (in 12kHz to 20MHz integration band at 400MHz clock frequency)
- Supports clock frequencies from 0 to 400MHz
- Supports 2.5V or 3.3V power supplies for HCSL outputs
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 50ps
- Individual Output Enable pin for each differential pair
- Transfers Spread-Spectrum without attenuation



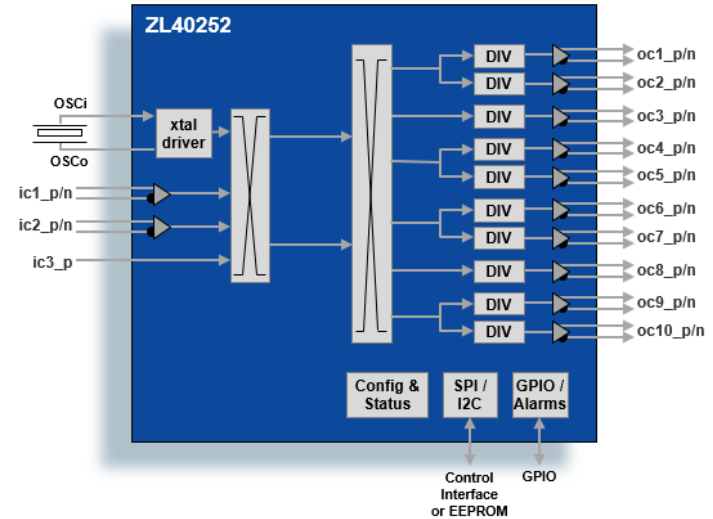
## Features

- Four flexible input clocks
- One crystal/CMOS input
- Two differential/CMOS inputs
- One single-ended/CMOS input
- Any input frequency up to 1GHz (300MHz for CMOS)
- Manual clock switching by pin or register
- 6 Universal Output Clocks with Dividers
- Each output has independent divider
- Low additive jitter <200fs RMS (12kHz-20MHz, for input frequencies  $\square$  100MHz)
- Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL
- In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)\*
- Multiple output supply voltage banks with CMOS output voltages from 1.5V to 3.3V
- Precise output alignment circuitry from GPIO pin or register bit\*
- Per-output skew adjustment\*
- Per-output enable/disable and glitch-less start/stop (stop high or low)
- Internal EEPROM



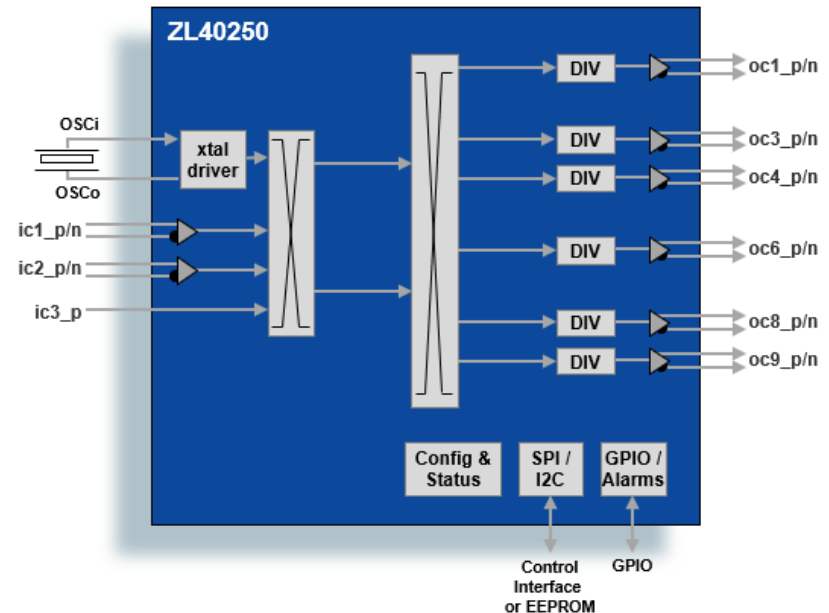
## Features

- Four flexible input clocks
- One crystal/CMOS input
- Two differential/CMOS inputs
- One single-ended/CMOS input
- Any input frequency up to 1GHz (300MHz for CMOS)
- Manual clock switching by pin or register
- 6 Universal Output Clocks with Dividers
- Each output has independent divider
- Low additive jitter <200fs RMS (12kHz-20MHz, for input frequencies  $\square$  100MHz)
- Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL
- In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)\*
- Multiple output supply voltage banks with CMOS output voltages from 1.5V to 3.3V
- Precise output alignment circuitry from GPIO pin or register bit\*
- Per-output skew adjustment\*
- Per-output enable/disable and glitch-less start/stop (stop high or low)



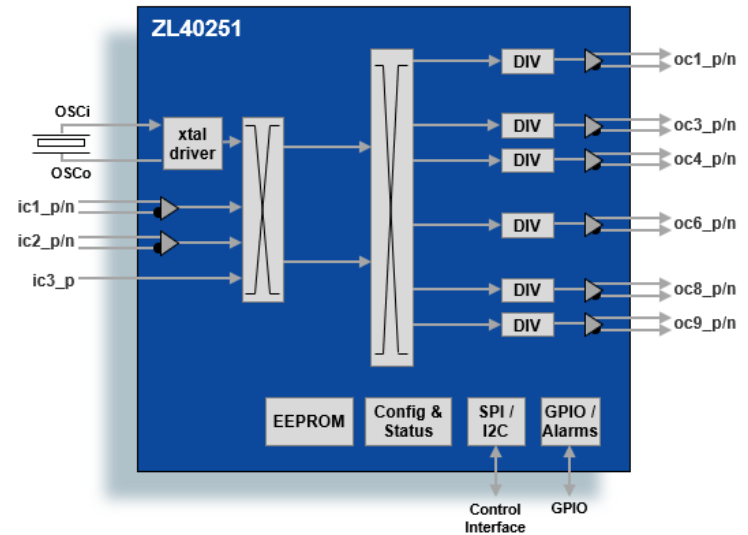
## Features

- Four flexible input clocks
- One crystal/CMOS input
- Two differential/CMOS inputs
- One single-ended/CMOS input
- Any input frequency up to 1GHz (300MHz for CMOS)
- Manual clock switching by pin or register
- 6 Universal Output Clocks with Dividers
- Each output has independent divider
- Low additive jitter <200fs RMS (12kHz-20MHz, for input frequencies  $\square$  100MHz)
- Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL
- In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)\*
- Multiple output supply voltage banks with CMOS output voltages from 1.5V to 3.3V
- Precise output alignment circuitry from GPIO pin or register bit\*
- Per-output skew adjustment\*
- Per-output enable/disable and glitch-less start/stop (stop high or low)



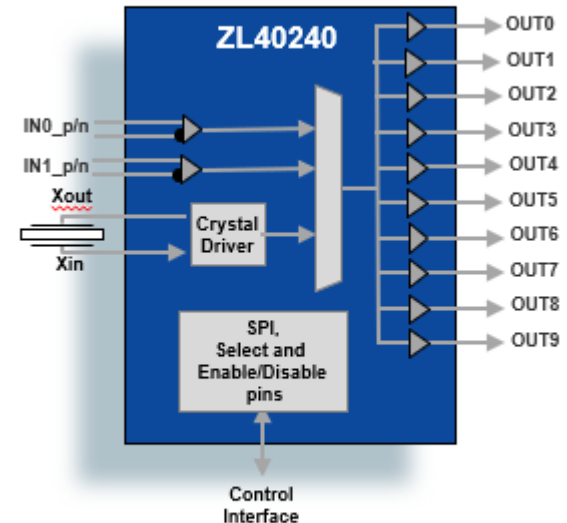
## Features

- Four flexible input clocks
- One crystal/CMOS input
- Two differential/CMOS inputs
- One single-ended/CMOS input
- Any input frequency up to 1GHz (300MHz for CMOS)
- Manual clock switching by pin or register
- 6 Universal Output Clocks with Dividers
- Each output has independent divider
- Low additive jitter <200fs RMS (12kHz-20MHz, for input frequencies  $\square$  100MHz)
- Each output configurable as LVDS, LVPECL, HCSL, 2xCMOS or HSTL
- In 2xCMOS mode, the P and N pins can be different frequencies (e.g. 125MHz and 25MHz)\*
- Multiple output supply voltage banks with CMOS output voltages from 1.5V to 3.3V
- Precise output alignment circuitry from GPIO pin or register bit\*
- Per-output skew adjustment\*
- Per-output enable/disable and glitch-less start/stop (stop high or low)
- Internal EEPROM



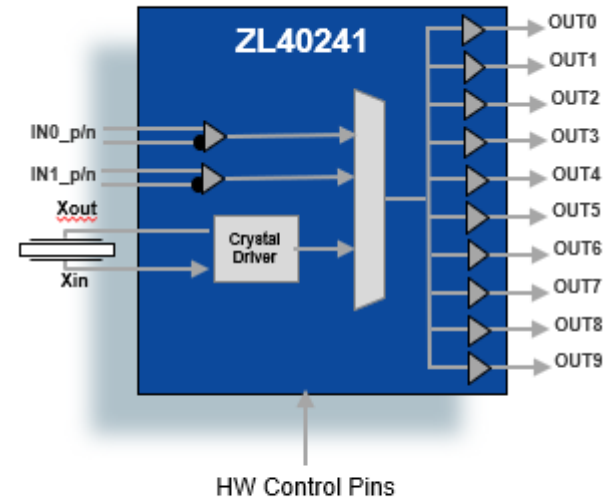
## Features

- 3 to 1 input Multiplexer: Two inputs accept any differential (LVPECL, HCSL, LVDS, SSTL, CML, LVCMOS) or a single ended signal and the third input accepts a crystal or a single ended signal
- Ten 1.5V/1.8V/2.5V/3.3V LVCMOS outputs
- Supports frequencies from 0 to 250MHz
- Ultra-low system level additive jitter: 17fs (12kHz to 20MHz)
- Ultra-low noise floor of -170dBc/Hz
- Supports crystals from 8MHz to 160MHz
- Supports 2.5V or 3.3V power supplies
- Output to output skew of 30ps (typical)
- Input to output delay of 2ns (typical)
- SPI or Hardware control



## Features

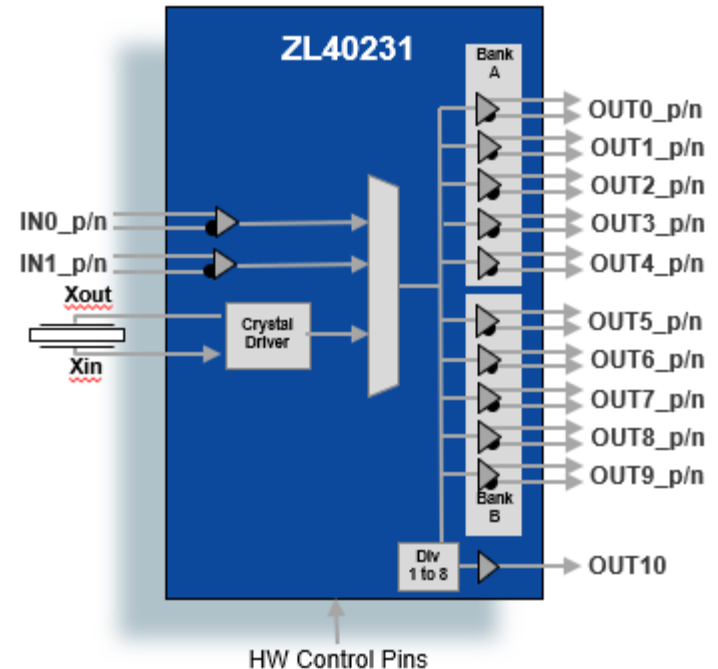
- 3 to 1 input Multiplexer: Two inputs accept any differential (LVPECL, HCSL, LVDS, SSTL, CML, LVCMOS) or a single ended signal and the third input accepts a crystal or a single ended signal
- Ten 1.5V/1.8V/2.5V/3.3V LVCMOS outputs
- Supports frequencies from 0 to 250MHz
- Ultra-low system level additive jitter: 17fs (12kHz to 20MHz)
- Ultra-low noise floor of -170dBc/Hz
- Supports crystals from 8MHz to 160MHz
- Supports 2.5V or 3.3V power supplies
- Output to output skew of 30ps (typical)
- Input to output delay of 2ns (typical)
- Hardware pin control





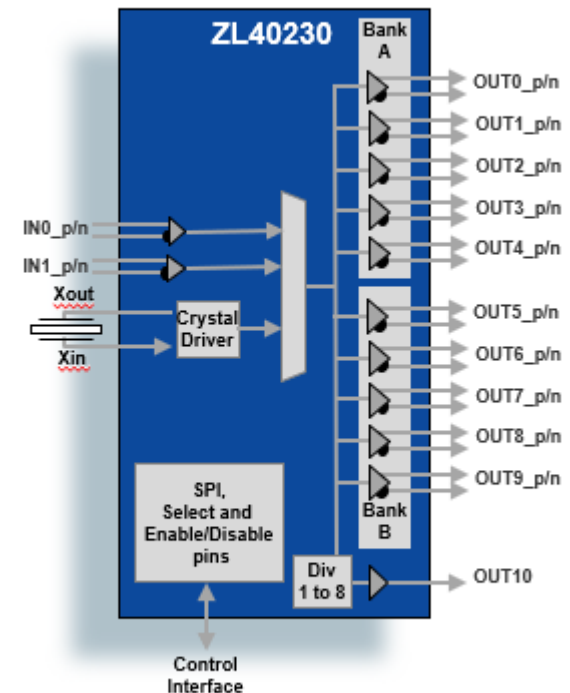
## Features

- 3 to 1 input Multiplexer: Two inputs accept any differential (LVPECL, HCSL, LVDS, SSTL, CML, LVCMOS) or a single ended signal and the third input accepts a crystal or a single ended signal
- Ten differential LVPECL/LVDS/HCSL outputs
- One LVCMOS output
- Ultra-low additive jitter: 24fs (integration band: 12kHz to 20MHz at 625MHz clock frequency)
- Supports clock frequencies from 0 to 1.6GHz
- Supports 2.5V or 3.3V power supplies on LVPECL/LVDS/HCSL outputs
- Supports 1.5V, 1.8V, 2.5V or 3.3V on LVCMOS output
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 40ps
- Device controlled control pins



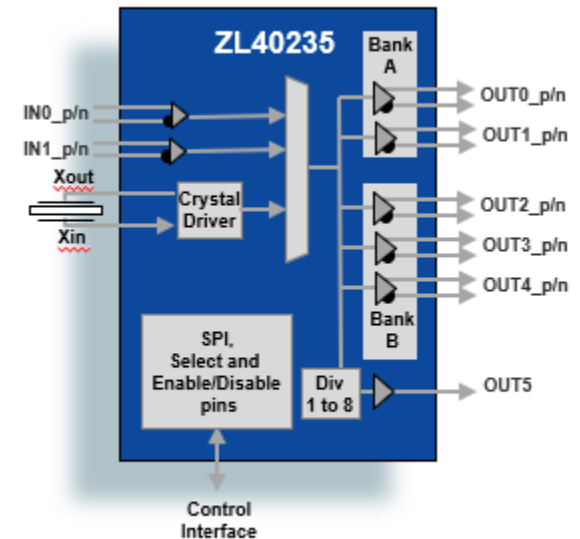
## Features

- 3 to 1 input Multiplexer: Two inputs accept any differential (LVPECL, HCSL, LVDS, SSTL, CML, LVCMOS) or a single ended signal and the third input accepts a crystal or a single ended signal
- Ten differential LVPECL/LVDS/HCSL outputs
- One LVCMOS output
- Ultra-low additive jitter: 24fs (integration band: 12k to 20MHz at 625MHz clock frequency)
- Supports clock frequencies from 0 to 1.6GHz
- Supports 2.5V or 3.3V power supplies on LVPECL/LVDS/HCSL outputs
- Supports 1.5V, 1.8V, 2.5V or 3.3V on LVCMOS output
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 40ps
- Device controlled via SPI or hardware control pins



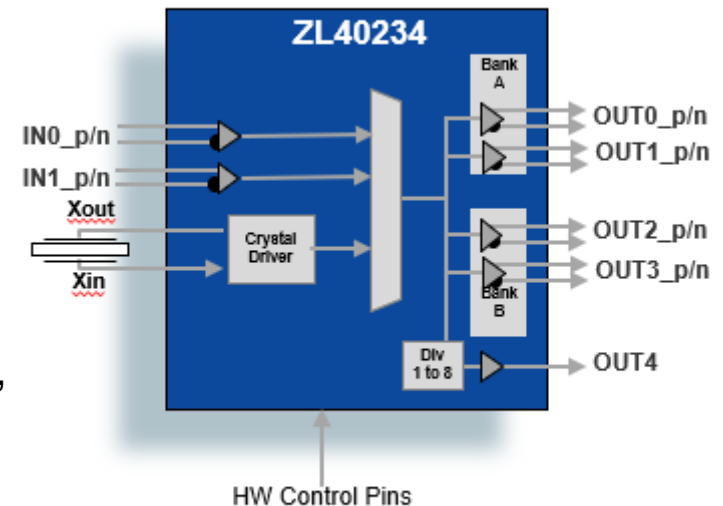
## Features

- 3 to 1 input Multiplexer: Two inputs accept any differential (LVPECL, HCSL, LVDS, SSTL, CML, LVCMOS) or a single ended signal and the third input accepts a crystal or a single ended signal
- Five differential LVPECL/LVDS/HCSL outputs and one LVCMOS output
- Ultra-low additive jitter: 24fs (integration band 12kHz to 20MHz at 625MHz clock frequency)
- Supports clock frequencies from 0 to 1.6GHz
- Supports 2.5V or 3.3V power supplies for LVPECL, LVDS or HCSL outputs
- Supports 1.5V, 1.8V, 2.5V or 3.3V power supplies for LVCMOS output
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- Maximum output to output skew of 40ps
- Device controlled via SPI or hardware pins



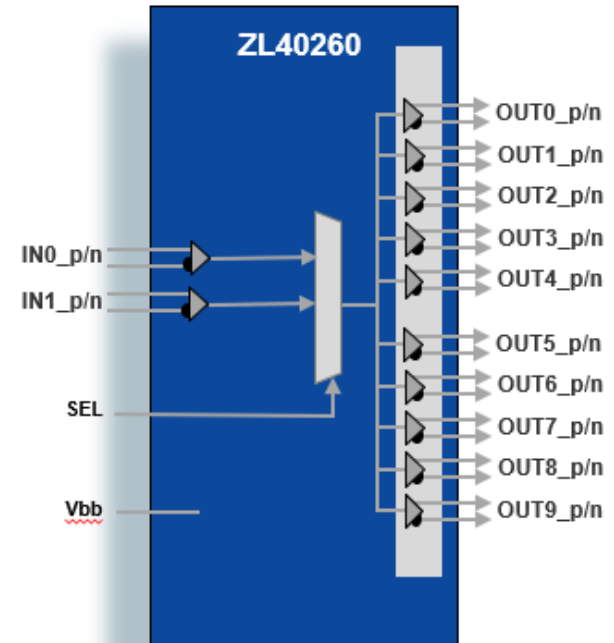
## Features

- 3 to 1 input Multiplexer: Two inputs accept any differential (LVPECL, HCSL, LVDS, SSTL, CML, LVCMOS) or a single ended signal and the third input accepts a crystal or a single ended signal
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- Supports 1.5V, 1.8V, 2.5V or 3.3V power supplies for LVCMOS output
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 40ps
- Device controlled via hardware pins



## Features

- Two inputs accept any differential (LVPECL, HCSL, LVDS, SSTL, CML) or single ended LVCMOS signal
- Ten 2.5V/3.3V LVPECL outputs
- Ultra-low additive jitter: 53fs for 125 MHz clock measured in 12KHz to 20MHz band
- Supports clock frequencies from 0 to 1.6GHz
- Supports 2.5V or 3.3V power supplies
- Embedded Low Drop Out (LDO) Voltage regulator provides superior Power Supply Noise Rejection
- Maximum output to output skew of 50ps
- Maximum input to output delay of 1.2ns
- Small input to output delay variation over voltage, temperature and process of 0.34ns
- Fast rise and fall times of 168ps
- Phase noise floor below -160dB/Hz for 125MHz clock



## Features

### Inputs/Outputs

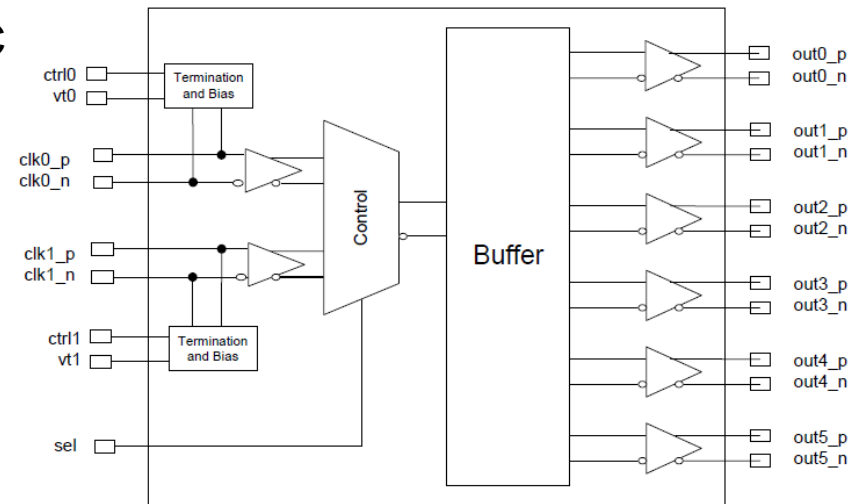
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- On-chip input termination and biasing for AC coupled inputs
- Six precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 97 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 165 fs RMS



## Features:

### Inputs/Outputs

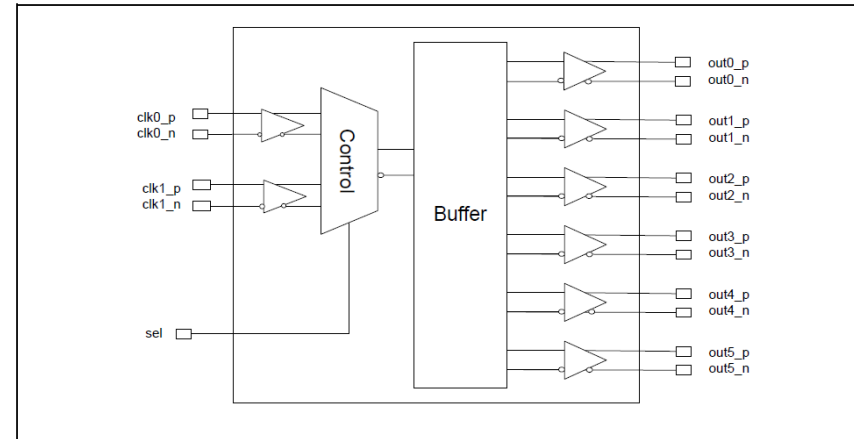
- Accepts differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- Six precision LVDS outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 95 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 194 fs RMS



## Features:

### Inputs/Outputs

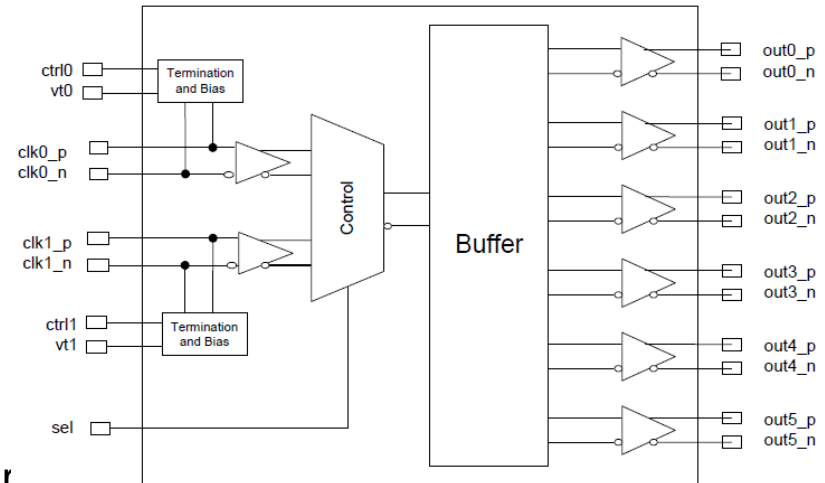
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- On-chip input termination and biasing for AC coupled inputs
- Eight precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

### Performance

- Ultra low additive jitter of 106 fs RMS





## Features:

### Inputs/Outputs

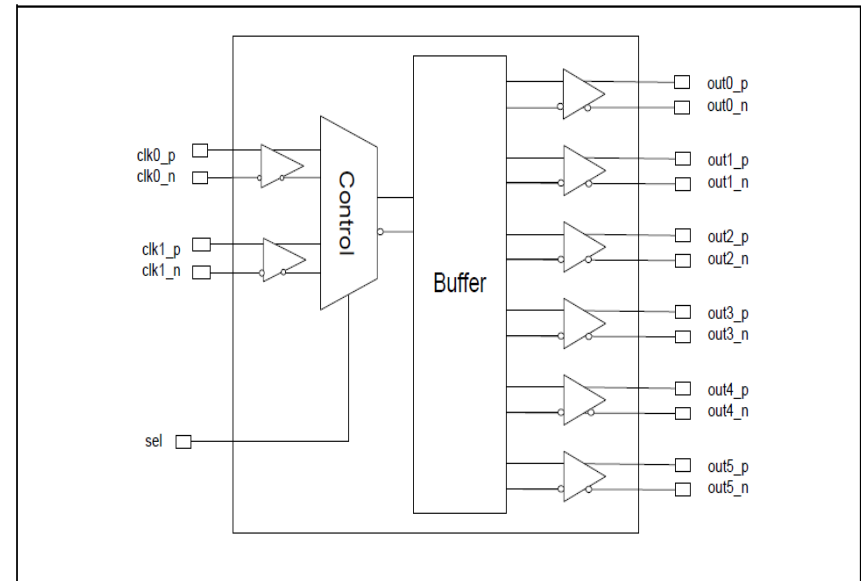
- Accepts two differential or single-ended input
  - LVPECL, LVDS, CML, HCSL, LVCMOS
  - Glitch-free switching of references
- Six precision LVPECL outputs
- Operating frequency up to 750 MHz

### Power

- Options for 2.5 V or 3.3 V power supply
- Core current consumption of 110 mA
- On-chip Low Drop Out (LDO) Regulator for superior power supply rejection

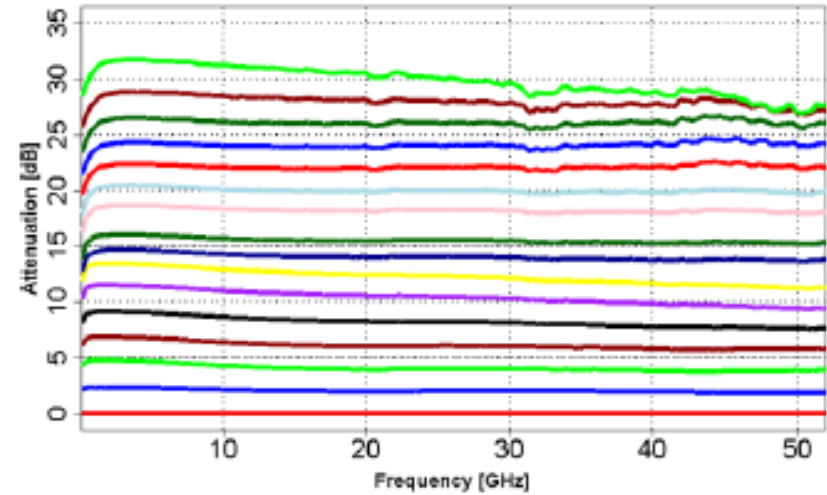
### Performance

- Ultra low additive jitter of 121 fs RMS



## Features

- Wideband operation: DC to 50 GHz
- Low Insertion Loss (<5dB)
- Good Input/Output Match
- Very flat attenuation
- Size: 1640 x 920 mm
- Technology: GaAs PHEMT
- Available in DIE form Only



MMS0004AA

## Voltage Variable Attenuators

Function	Frequency (GHz)	Insertion Loss (dB)	Dynamic Range (dB)	Return Loss (dB)	Input P1dB (dBm)	Package	Part Number
Analog VVA	DC-40	<3	17	>8	>8	Die	MMS005AA
Analog VVA	DC-50	<5	27	>12	>3	Die	MMS004AA

**Features:**

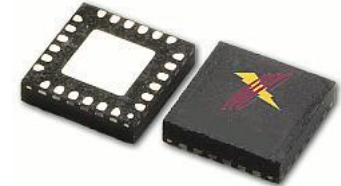
- Wideband to 26GHz
- Low Loss < 2dB
- High Isolation >40dB
- Technology: GaAs PHEMT

**Applications:**

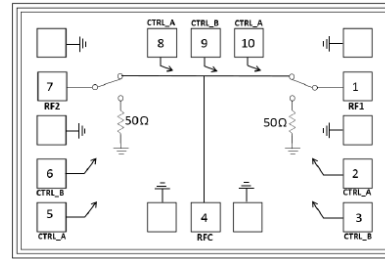
- Defense ; EW & Radar Equipment
- Test & Measurement Equipment
- TDD Microwave Radio
- Pulse Modulators
- Measurement Sensors



**MMS006PP3**

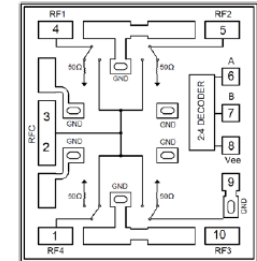


**MMS008PP3**



**MMS006AA**

**SPDT Absorptive Switch**  
**DC-20GHz, 1.5dB IL, 45dB**  
**ISO**



**MMS008AA**

**SP4T Absorptive Switch**  
**DC-10GHz, 1.2dB IL, 45dB**  
**ISO**

Configuration	Freq (GHz)	IL (dB)	Isol (dB)	Input P1dB (dBm)	Part Number
SPDT (Absorptive)	DC-20GHz	1.5	45	24	MMS006
SP4T (Absorptive)	DC-8GHz	1.4	47	28	MMS008

# Low Noise Amplifier Modules

Online Datasheets

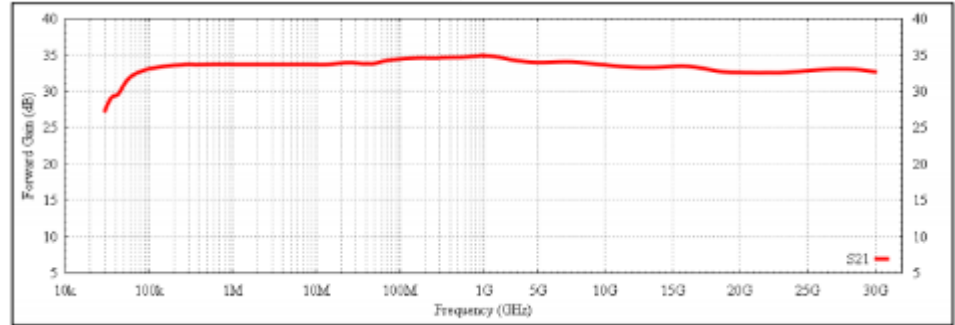
### Features

- Connectorized Wideband Performance to 65GHz
- 23 dBm saturated output power
- 30 dB gain with low gain flatness
- Small size package
- Hermetically Sealed

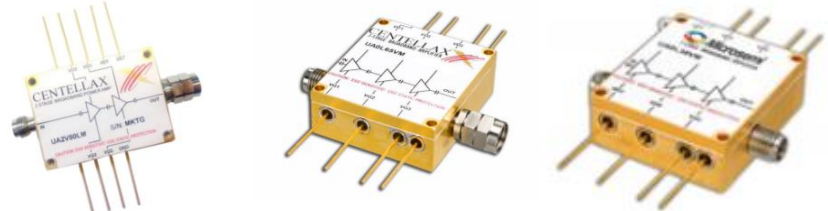
### Applications

- mm-wave systems
- EW applications
- High frequency test instrumentation
- Broadband gain amplifier

UA0L30VM: Gain vs. Frequency



UA2V50LM    UA0L65VM    UA0L30VM

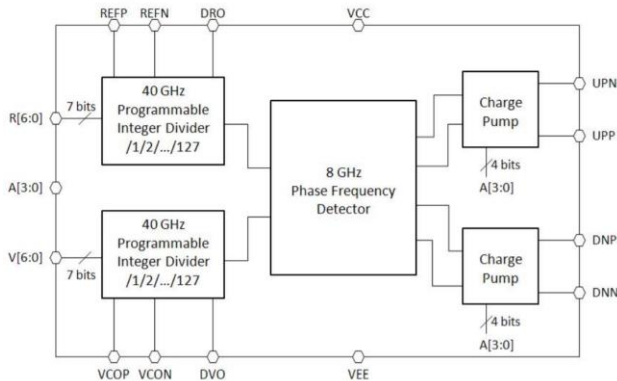


Frequency (GHz)	Psat (dBm)	Gain (dB)	Flatness (dB)	NF (dB)	Bias	Connector <sup>1</sup>	Part Number
0.0001-30	23	33	±2	4.5 @ 15 GHz	7V, 475mA	2.92 mm "K"	UA0L30VM
0.0001-65	22	23-35	-	5.2 @ 30 GHz	7V, 475mA	2.4 mm	UA0L65VM
0.01-50	22-30	25	±3	10.0 @ 30 GHz	7V, 1800mA	2.4 mm	UA0U50HM
2-50	22-30	23-30	±4	10.5 @ 30 GHz	7V, 1800mA	2.4 mm	UA2V50HM
2-50	22-30	18	±4.5	-	6V, 1600mA	2.4 mm	UA2V50LM

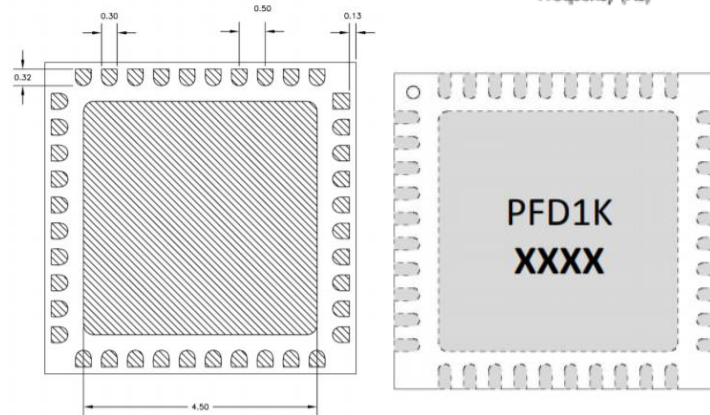
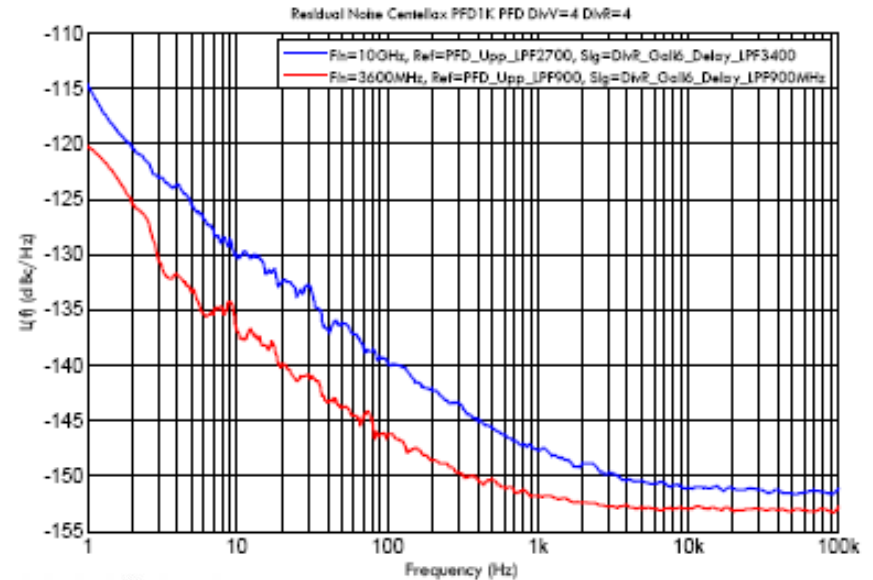
<< BACK

**Features:**

- **Up to 40GHz Prescaler Operation**
  - 1-127 variable modulus dividers
  - Differential Pre-scaler outputs accessible
- **8GHz Phase Comparison**
- **Low SSB Residual phase noise @ high frequency**
- **Single +3.3V supply**
- **Differential or Single ended Operation**
- **Digital and Analog Gain CTRL of Charge Pump**
- **PLL Loop invert pin**
- **6x6mm Ceramic QFN package**



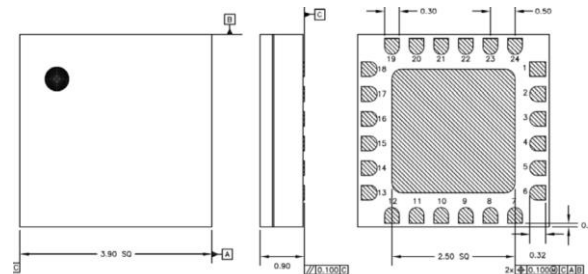
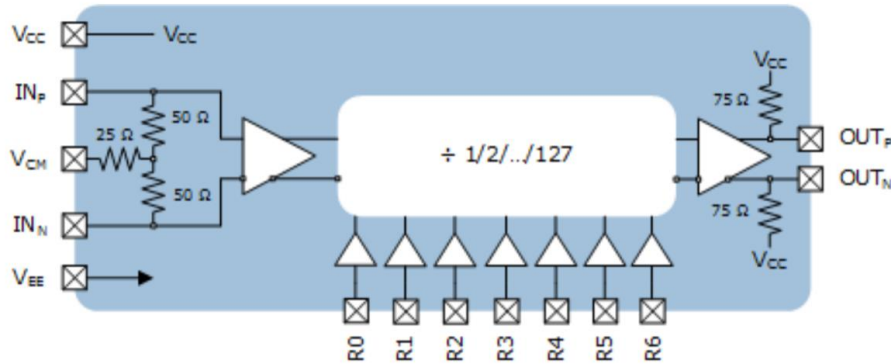
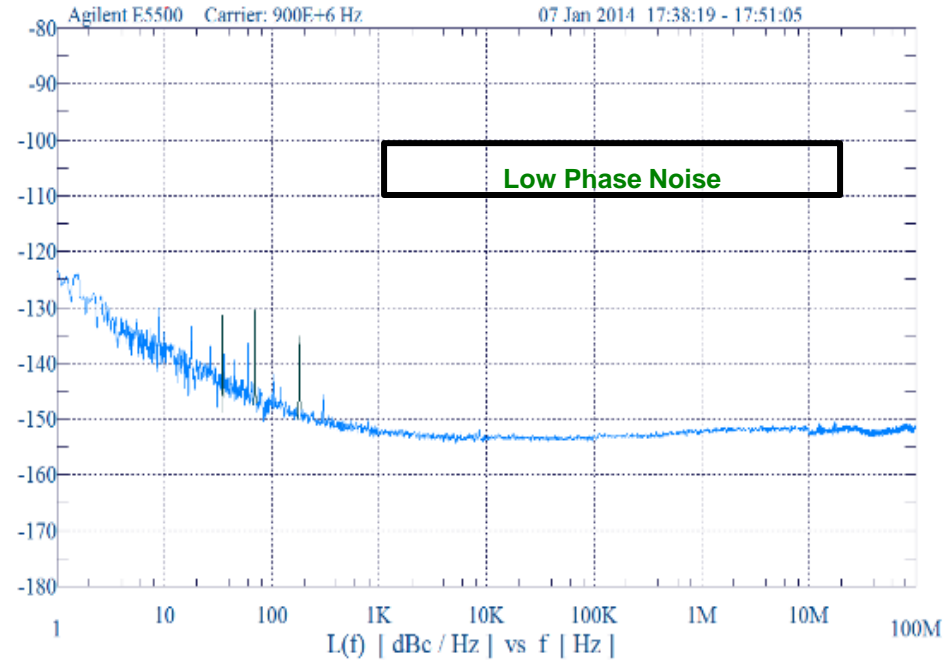
**SSB Phase Noise Performance**



### Features

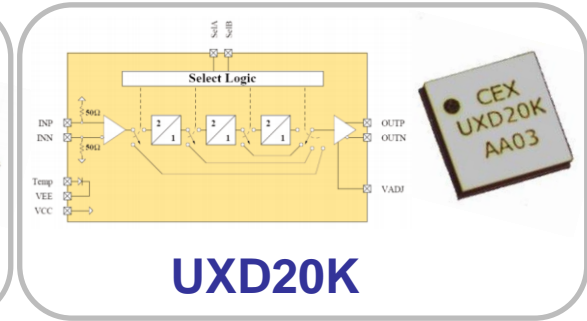
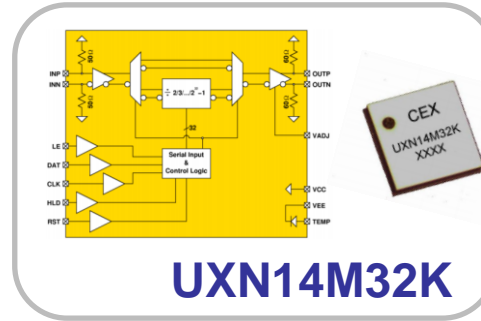
- 0.5 – 40GHz variable modulus prescaler
- Multiple divide ratios – 1 to 127 capability provides flexibility
- Large Output Swing: >600mWpp single ended
- Single ended or differential drive
- Low SSB Phase Noise: -153 dBc @ 10KHz
- 4x4mm Ceramic QFN

Regular FFT Segment Table



## Features

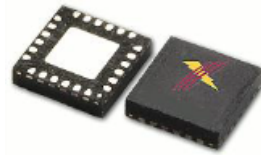
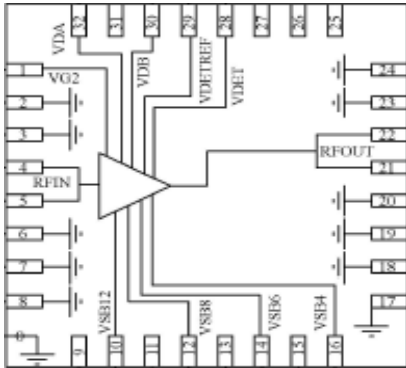
- Wide Operating Range: Up to 40GHz
- Divide Ratios: 1 to  $2^{32}-1$
- Single-ended or differential drive
- Low SSB phase noise
- QFN Style Packages
- Adjustable output amplitude



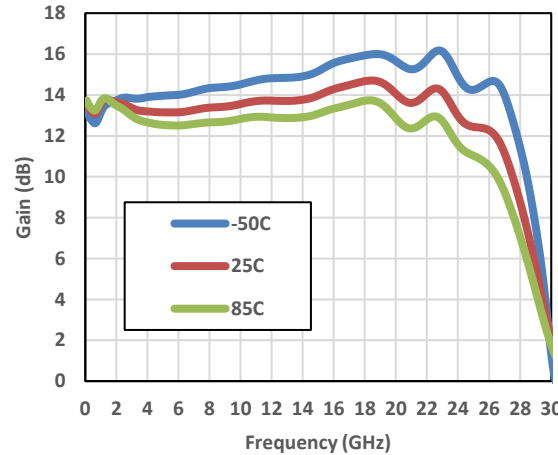
Part Number	Function	Frequency (GHz)	Pout (dBm)	10 kHz SSB Noise (dBc/Hz)	Pdiss (W)	Package
UXN14M9P	/8 to /511, programmable all integers	DC-14	4	-147	1.1	6 x 6 QFN
UXN14M32K	/1 to $(2^{32}-1)$ programmable	DC-15	4	-150	0.30-0.80	4 x 4 ceramic
UXM15P	/2/4/8 or /4/5/6/7/8/9 programmable	DC-15	5	-153	0.6	4 x 4 QFN
MX1DS10P	/2 to /220 programmable	DC-15	-4	-153	1.4	6 x 6 QFN
UXC20P	/2/4/8 programmable	DC-20	5	-153	0.5	4 x 4 QFN
UXD20P	/1/2/4/8 programmable	DC-20	5	-153	0.43	4 x 4 QFN
UXD20K	/1/2/4/8 programmable	DC-26.5	5	-153	0.43	4 x 4 ceramic
UXN40M7K	/1 to /127 programmable, all integers	0.5-40	2	-153	0.75	4 x 4 ceramic
PFD1K	8 GHz phase frequency detector with dual 40 GHz prescalers	DC-40	0.4 V <sub>P-P</sub>	-153	1.32	6 x 6 ceramic

## Features

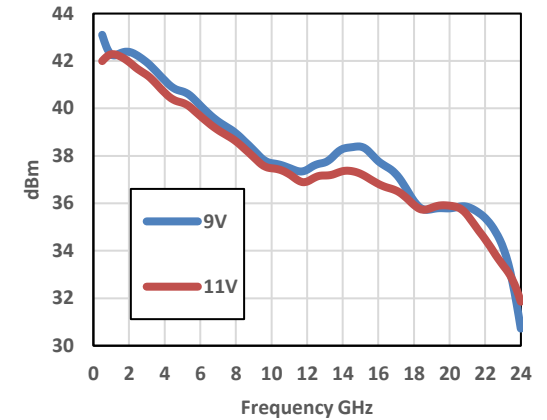
- Frequency range: DC to 24 GHz
- SMT Package (4.5mm QFN)
- Gain: 14 dB w/ 2dB positive gain slope
- High OIP3: >35dBm up to 22 GHz
- P1dB: >26dBm up to 20GHz
- Low Noise Figure: 4 dBm @ 18 GHz
- Supply: 10V @ 230mA



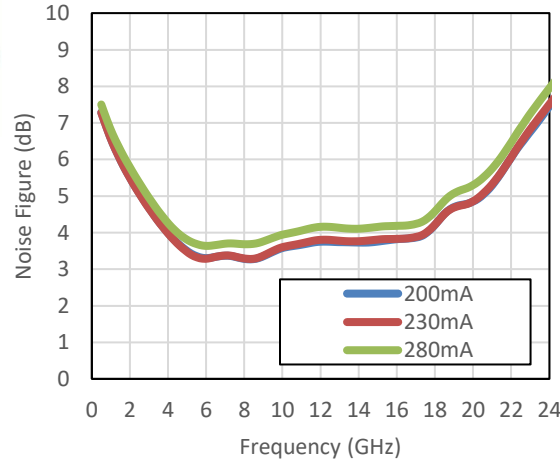
MMA052PP45 Small Signal Gain



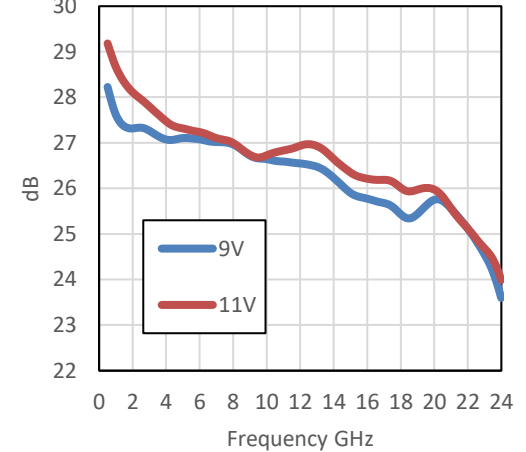
MMA052PP45 OIP3



MMA052PP45 Noise Figure



MMA052PP45 P1dB



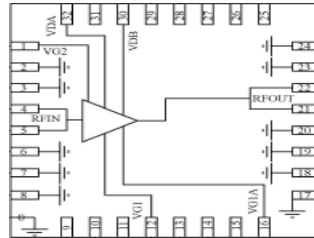
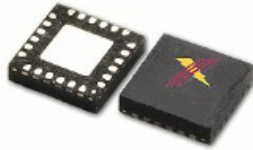


# MMA051PP45

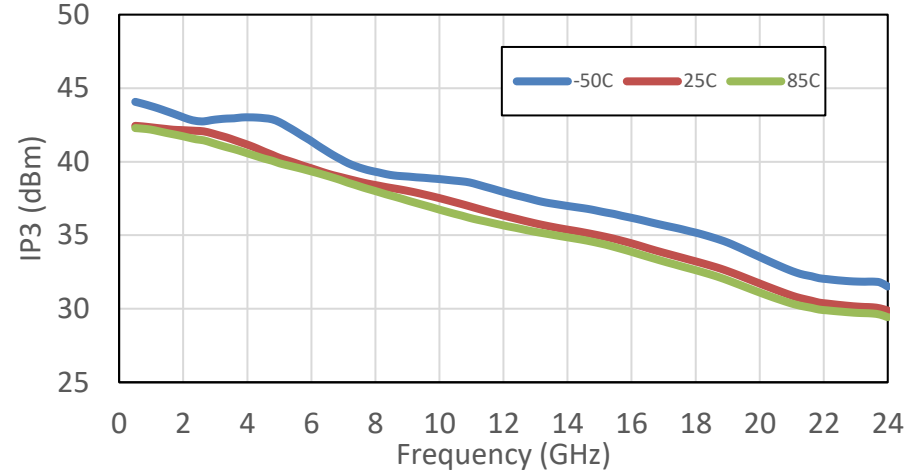
1Watt - Wideband High IP3 Amplifier MMIC in Plastic QFN SMT

## Features

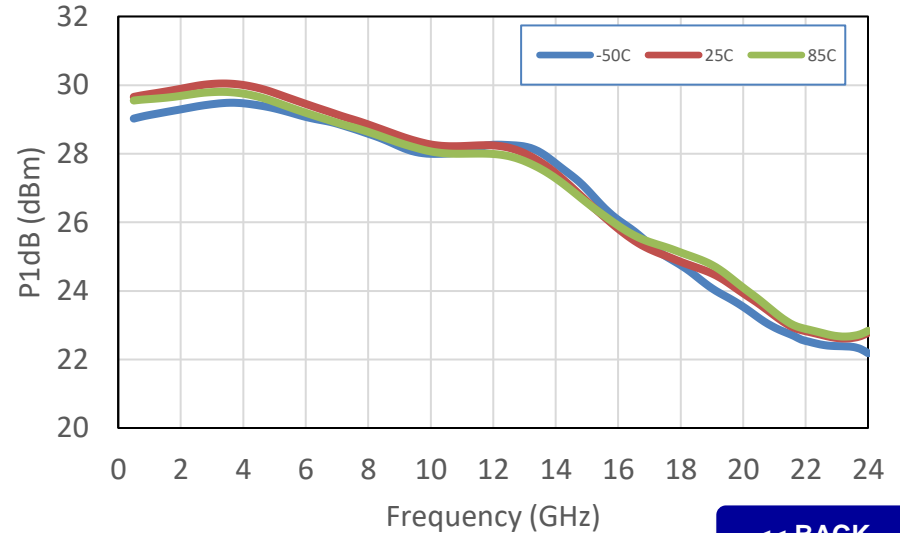
- Frequency range: DC to 22 GHz
- SMT Package (4.5mm QFN)
- Gain: 15 dB
- High OIP3: >35dBm up to 14GHz
- P1dB: >28dBm up to 14GHz
- Low Noise Figure: 4 dB @ 15 GHz
- Supply: 10V @ 350mA



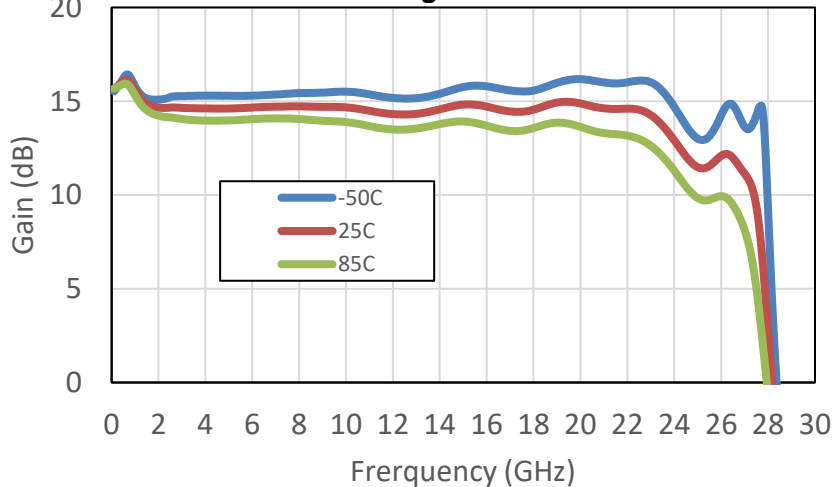
MMA051PP45 OIP3



MMA051PP45 P1dB

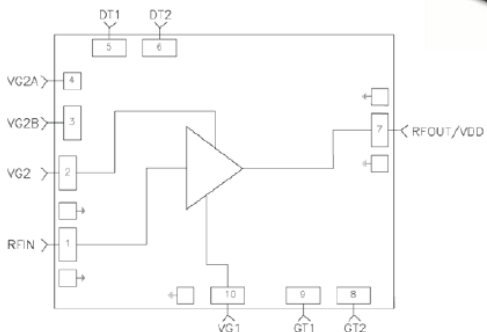
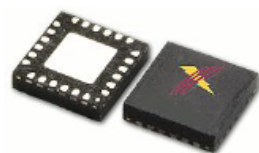


MMA051PP45 Small Signal Gain

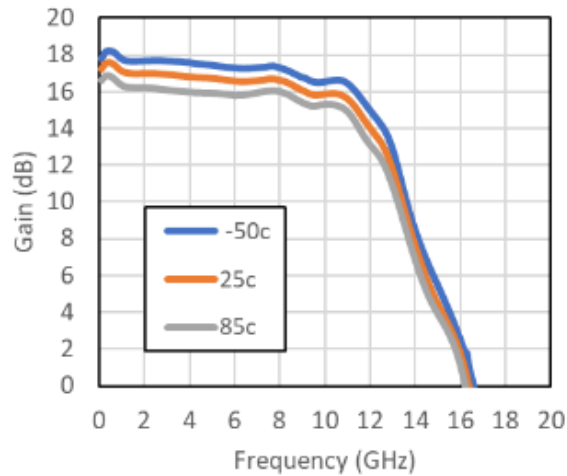


## Features

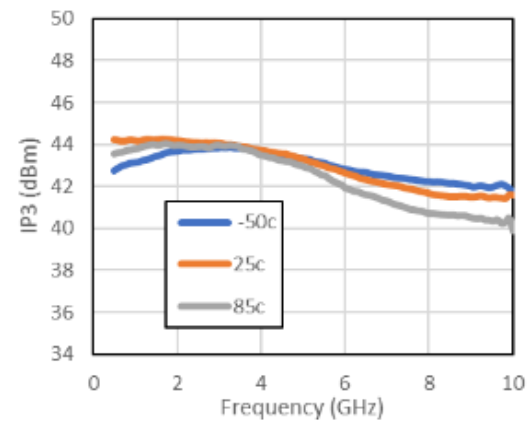
- Wideband: DC-10GHz
- 5mm, 32L Plastic QFN SMT Package
- Gain: 17dB
- High OIP3: 43dBm
- High  $P_{1dB}$ : 29dBm,  $P_{3dB}=31$ dBm
- OIP3: >33dBm up to 10GHz
- Bias: 10V, 420mA



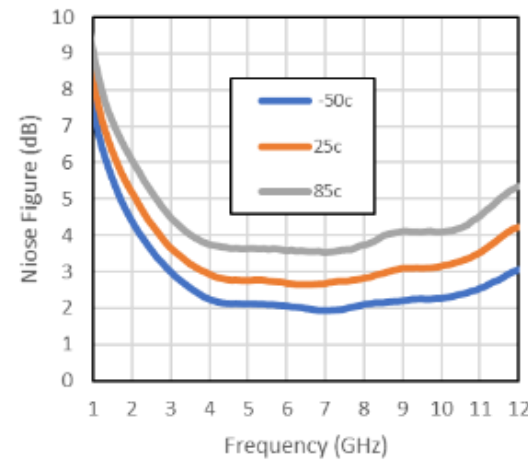
MMA053AA Small Signal Gain



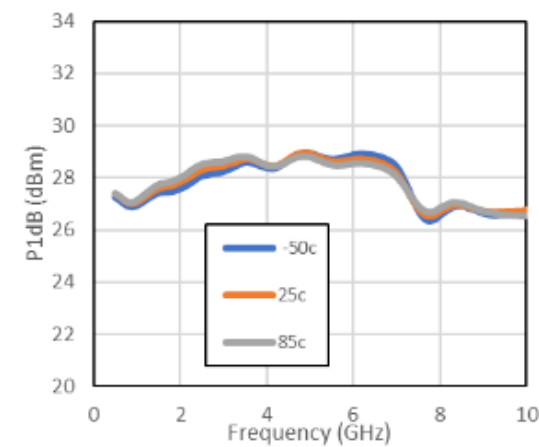
MMA053AA OIP3



MMA053AA Noise Figure

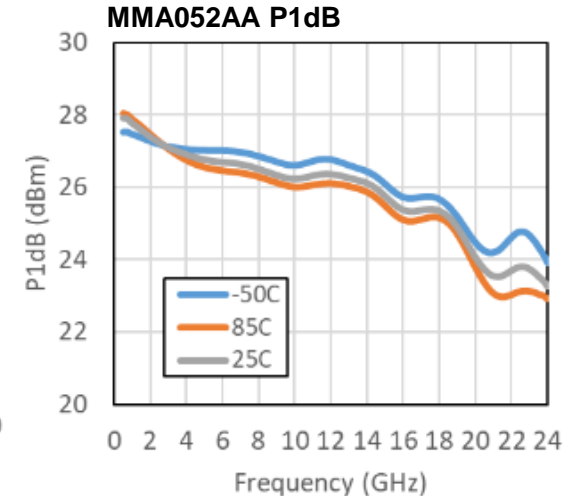
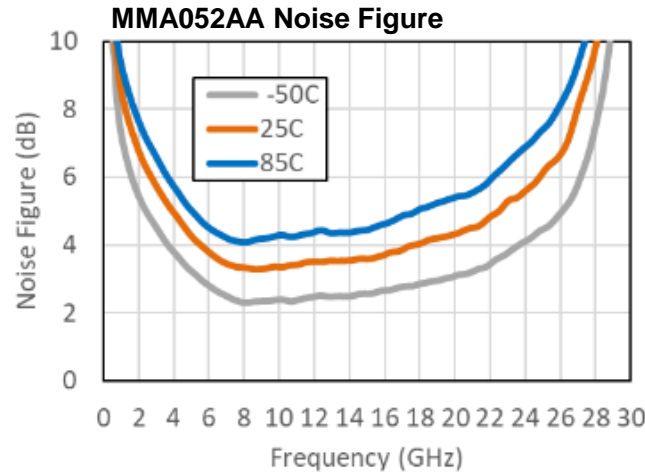
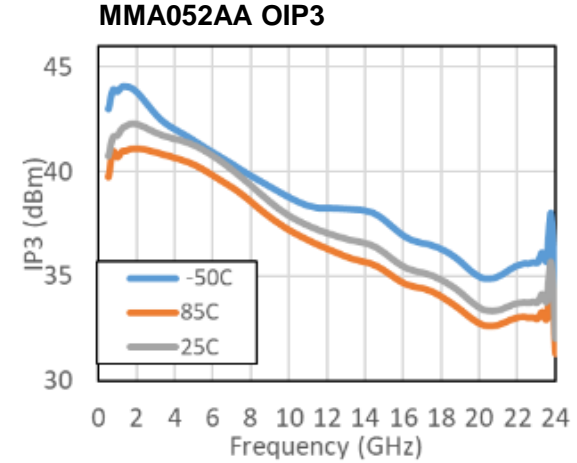
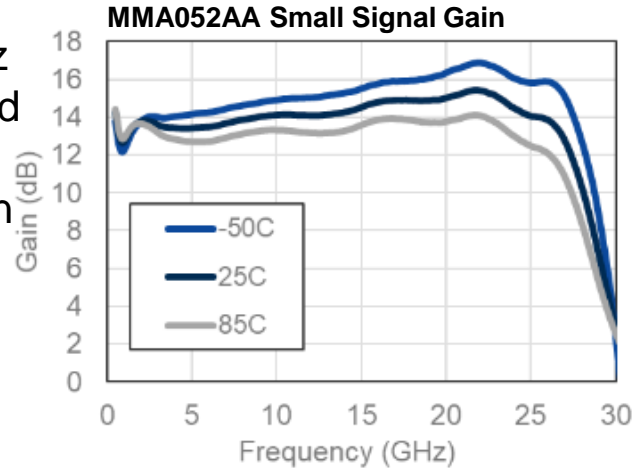
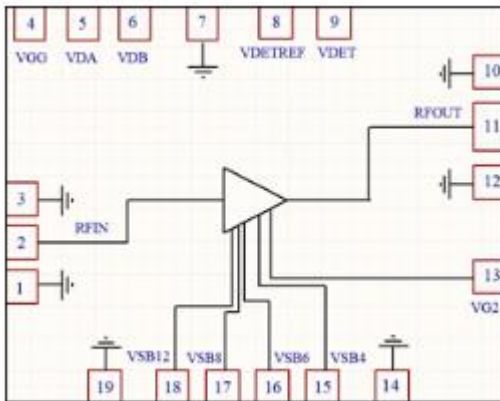


MMA053AA P1dB



### Features

- Frequency range: DC to 26 GHz
- SMT Package (4.5mm QFN) and Bare DIE
- Gain: 14 dB w/ 2dB positive gain slope
- High OIP3: 35dBm @18 GHz
- P1dB: 26dBm @ 16GHz
- Low Noise Figure: 4 dBm @ 15 GHz
- Supply: 9V @ 260mA



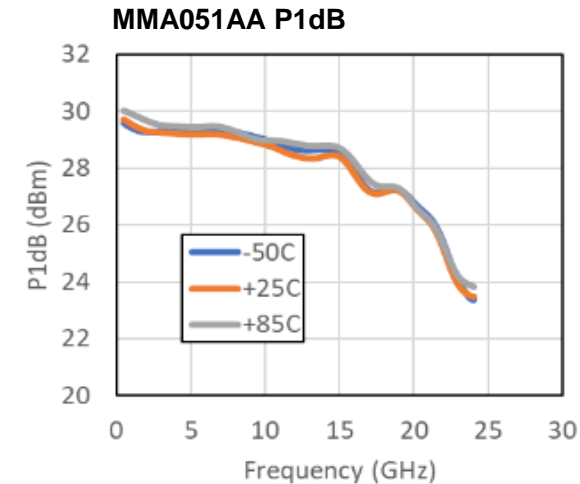
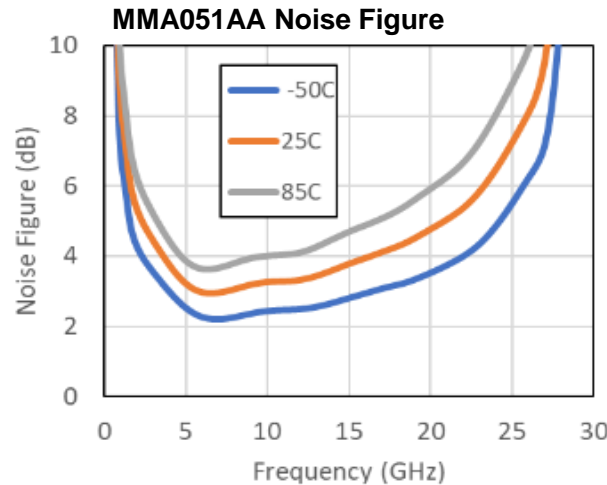
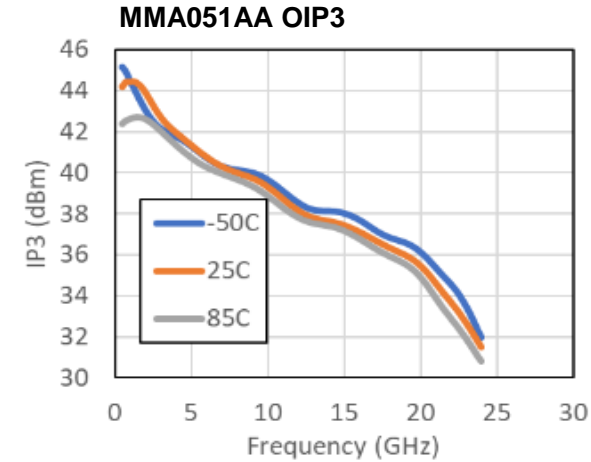
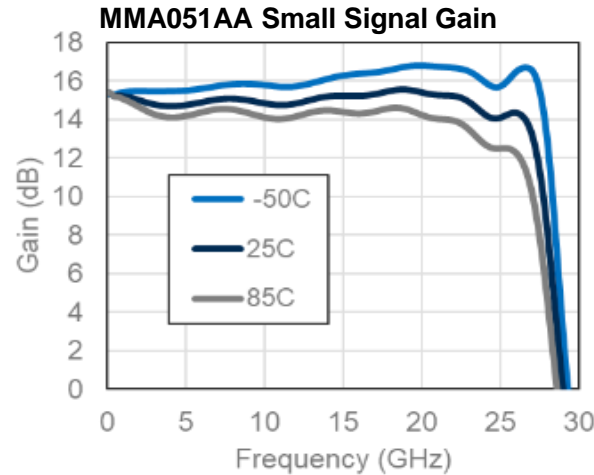
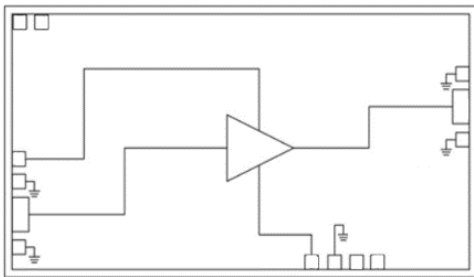


# MMA051AA

## 1Watt - Wideband High IP3 Amplifier MMIC Chip

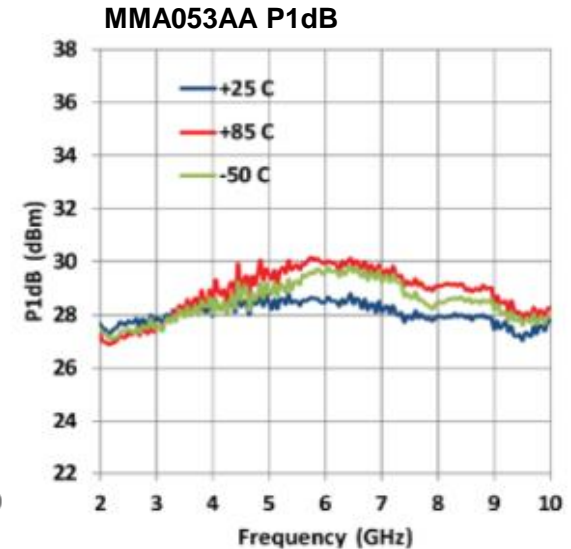
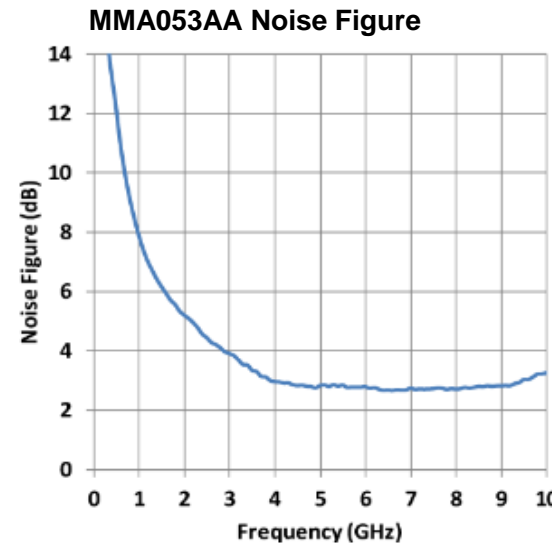
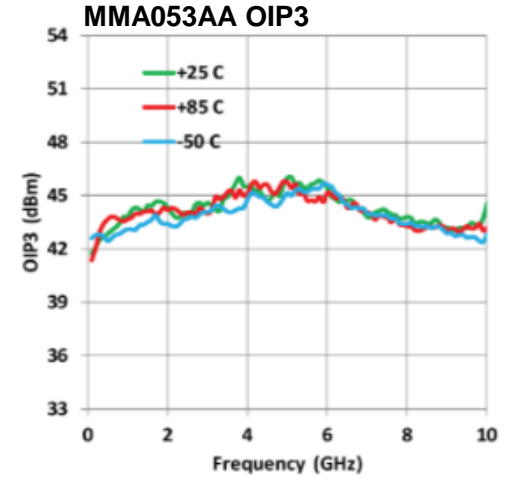
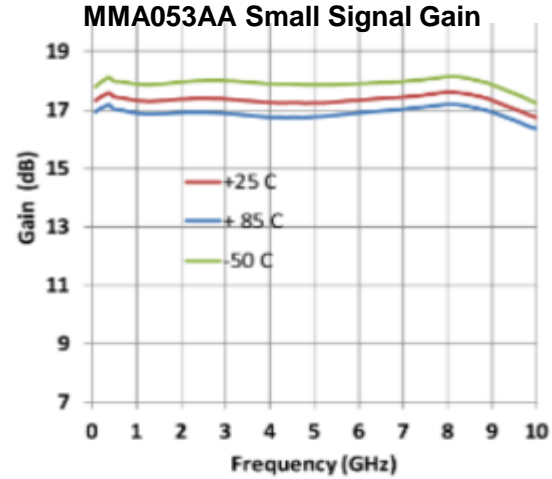
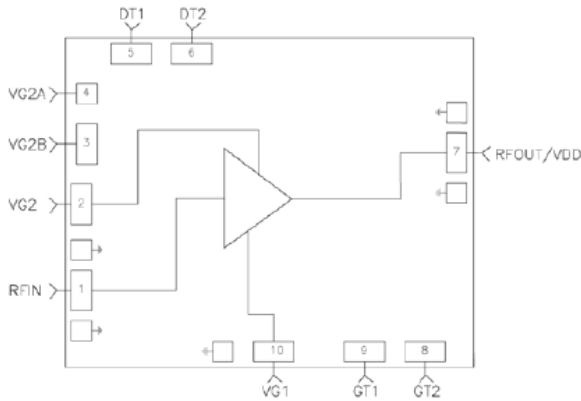
### Features

- Frequency range: DC to 24 GHz
- Bare DIE
- Gain: 15 dB
- High OIP3: 37dBm @15 GHz
- P1dB: 30dBm
- Low Noise Figure: 4 dBm @ 15 GHz
- Supply: 10V @ 420mA



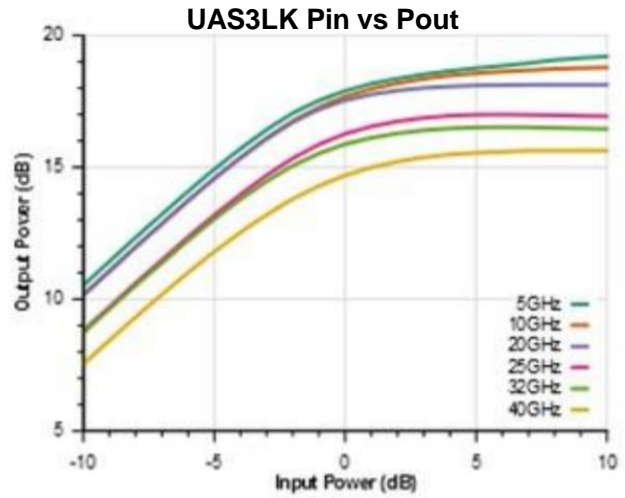
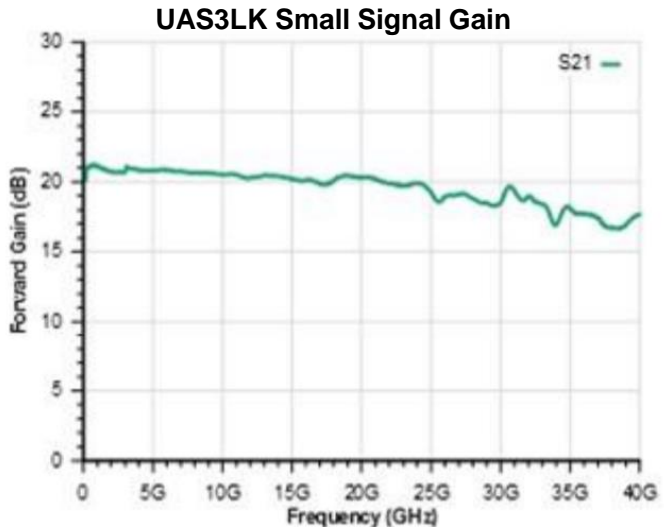
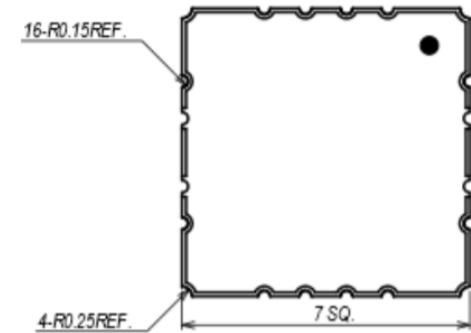
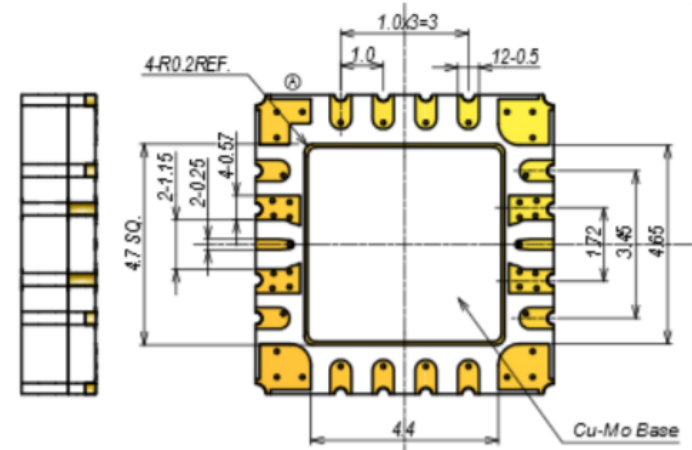
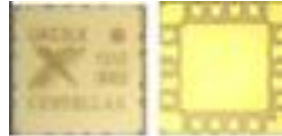
### Features

- Wideband: DC-10GHz
- Gain: 17dB
- High OIP3: 43dBm
- $P_{1dB}$ : 29dBm,  $P_{3dB}$ : 31dBm
- OIP3: >33dBm up to 10GHz
- Bias: 11V, 410mA



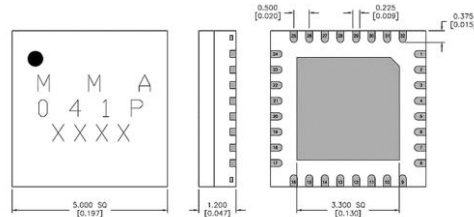
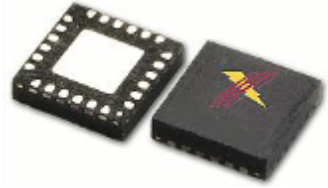
## Features

- Wideband: 1MHz-30GHz
- Hermetic Package: 7mm Ceramic SMT
- Adjustable Gain
- Low Phase Noise/Jitter
- Gain: 20dB Typ
- High Linearity P1dB14dBm
- Bias: 5V, 90ma
- Ideal for T&M, EW, Microwave Radio

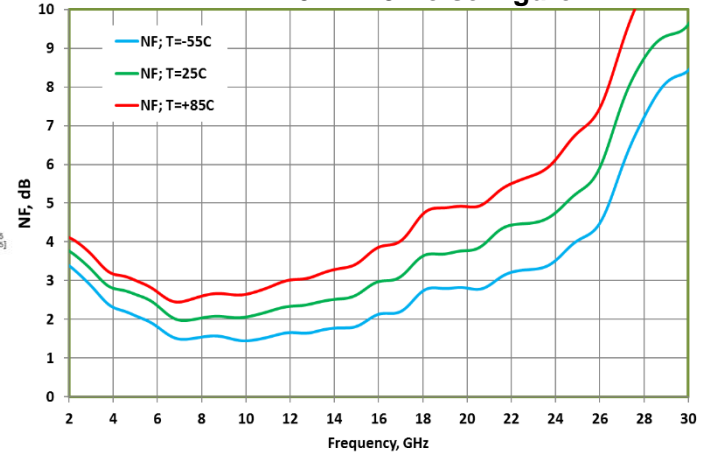


### Features

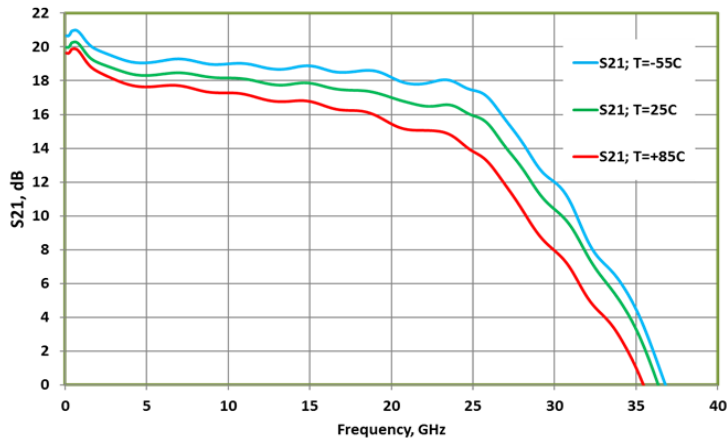
- Wideband: DC-26GHz
- SMT Package: 5mm QFN
- Gain: 18dB typ
- Low Noise Figure : 2.5dB
- High Linearity: P1dB=21dBm, OIP3=35dBm
- Bias: 7V, 150ma



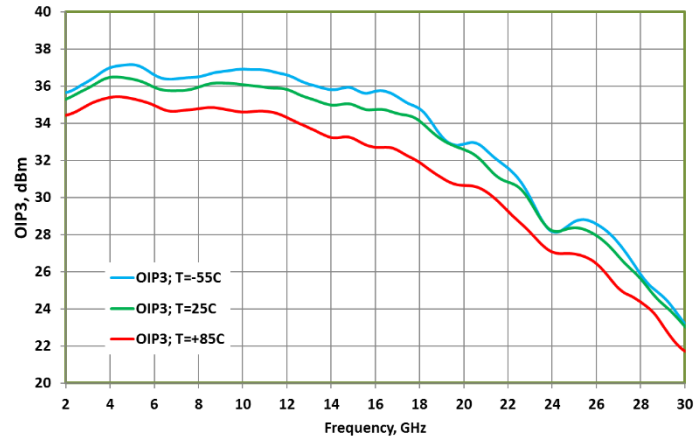
MMA041PP5 Noise Figure



MMA041PP5 Small Signal Gain

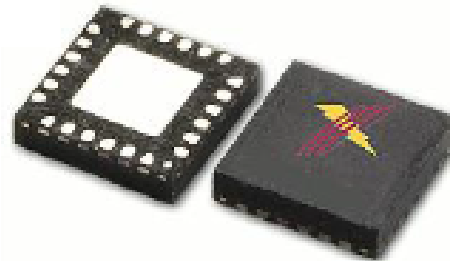
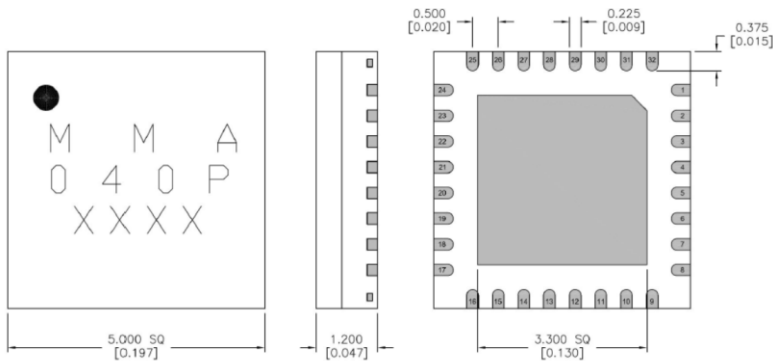
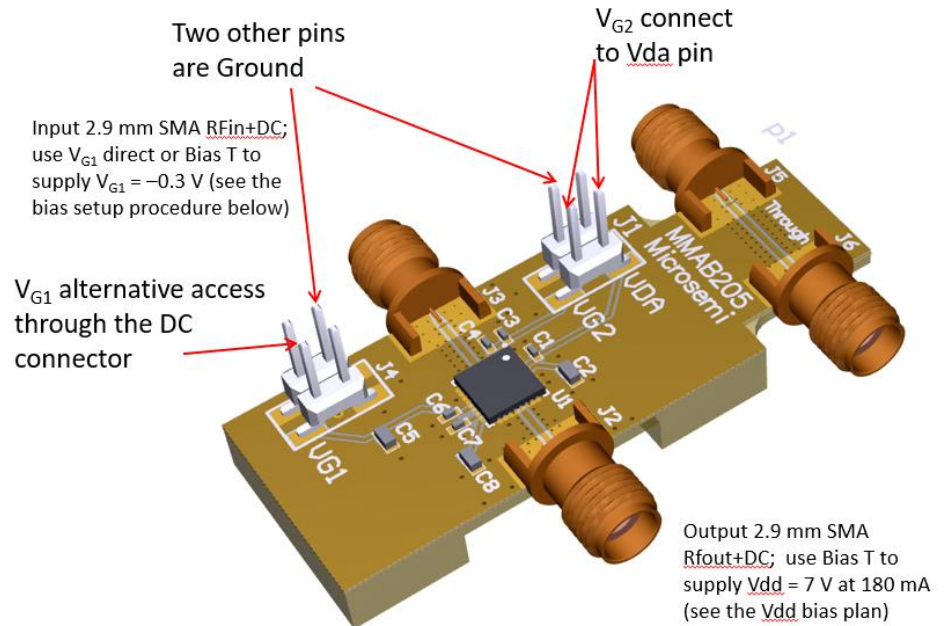


MMA041PP5 OIP3



### Features

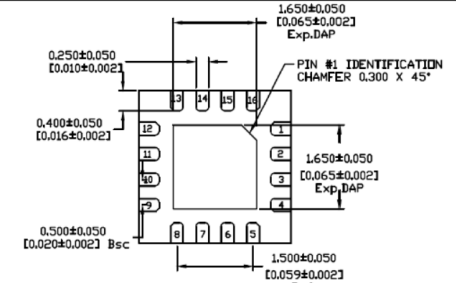
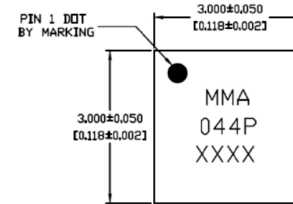
- Wideband: DC-27GHz
- SMT Package: 5mm QFN
- Gain: 15dB typ
- Low Noise Figure : 2dB typ.
- High Linearity: P1dB=16dBm, OIP3=28dBm
- Bias: 8V 60ma



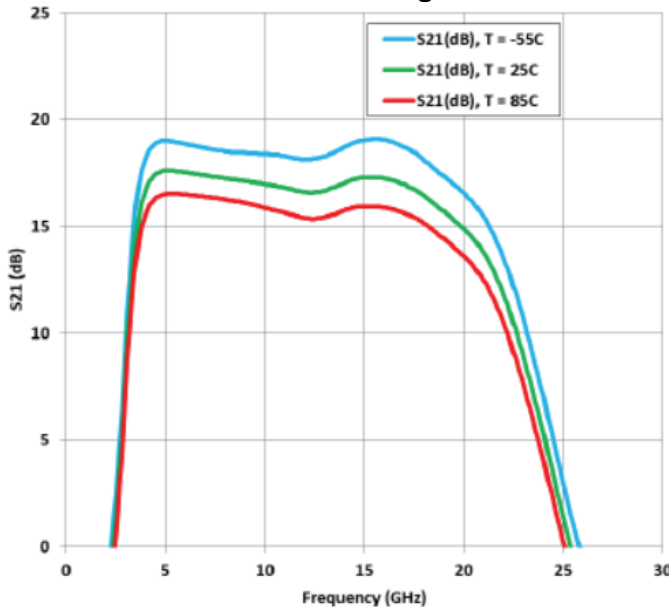


### Features

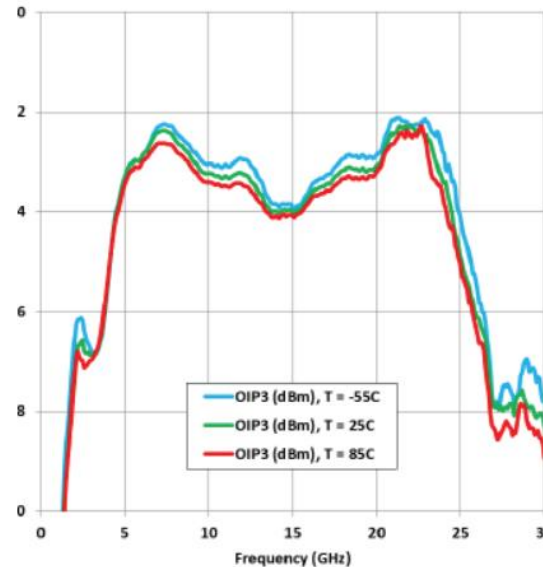
- Wideband: 6-18GHz
- SMT Package: 3mm QFN
- Gain: 17dB Typ
- Low Noise Figure : 2.0 dB Typical
- High Linearity P1dB 14dBm OIP3: 28dBm
- Bias: 4V, 100ma



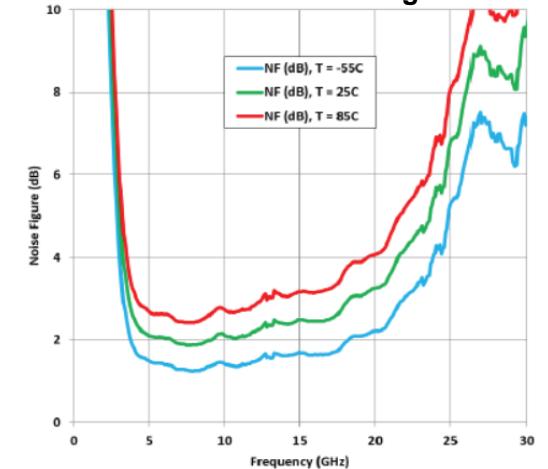
**MMA044PP3 Small Signal Gain**



**MMA044PP3 OIP3**

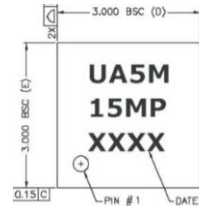
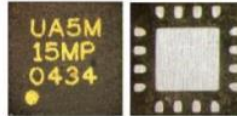


**MMA044PP3 Noise Figure**

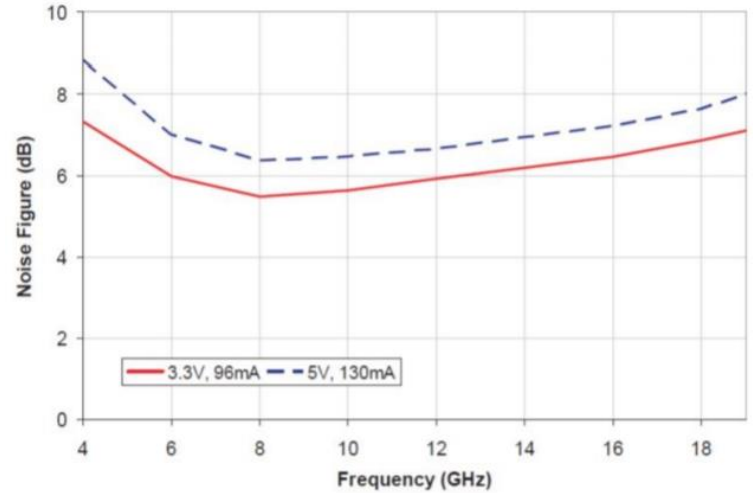


## Features

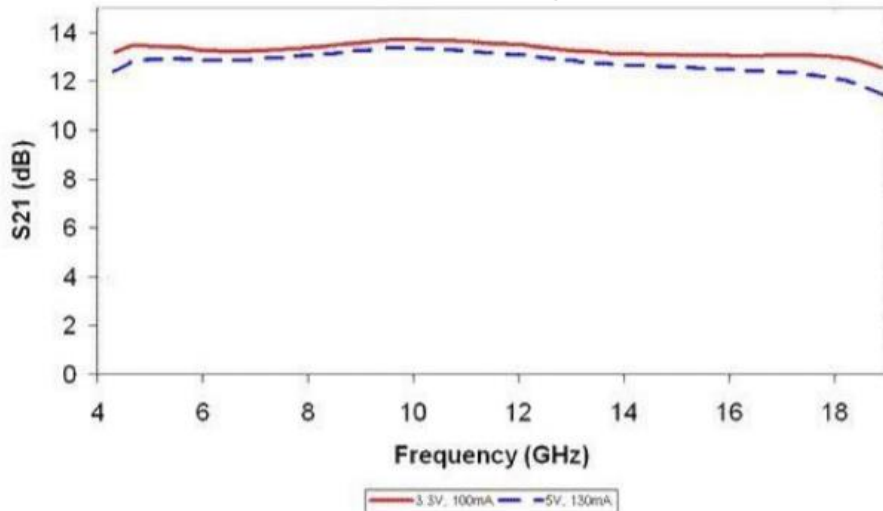
- Wideband: 5GHz – 18GHz
- Plastic package: 3mm QFN
- Single supply voltage or direct control of gate bias options
- Gain: 12dB
- Pout: 19.5dBm
- Bias: 3.3V, 130ma
- Low Phase Noise
- Ideal for LO Driver, Pt to Pt, Comms



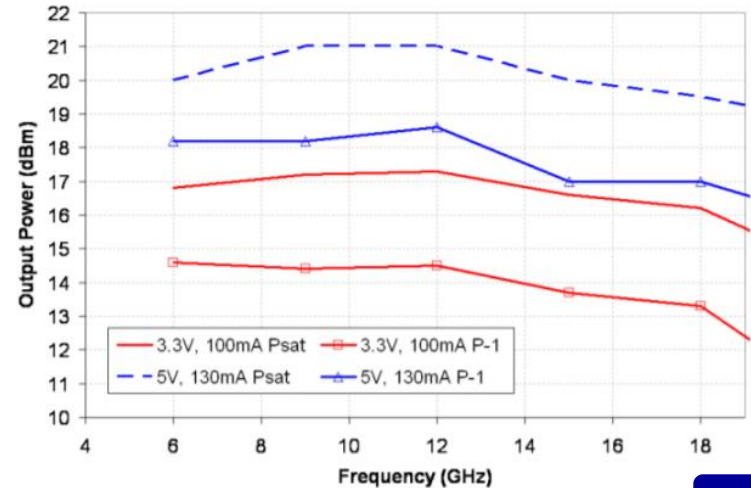
UA5M15MP Noise Figure



UA5M15MP Small Signal Gain

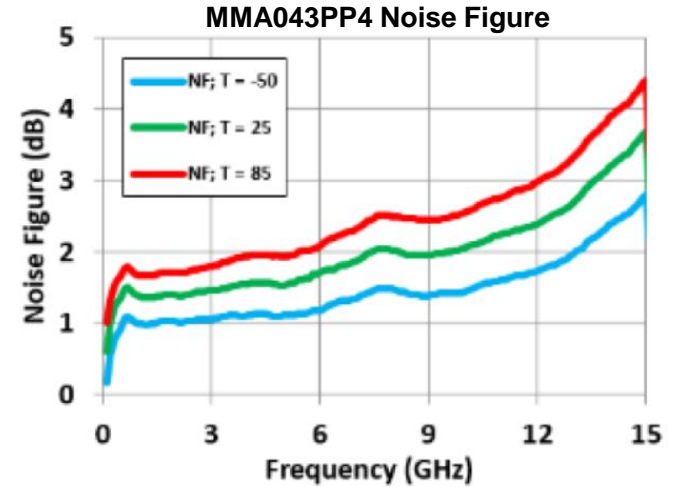
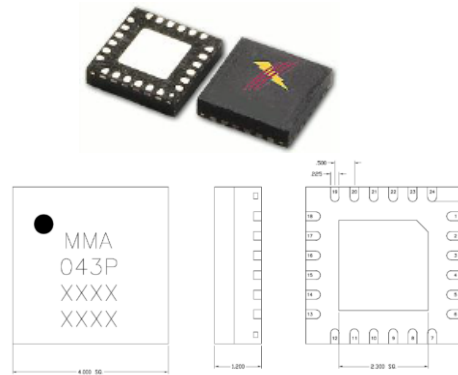


UA5M15MP Psat

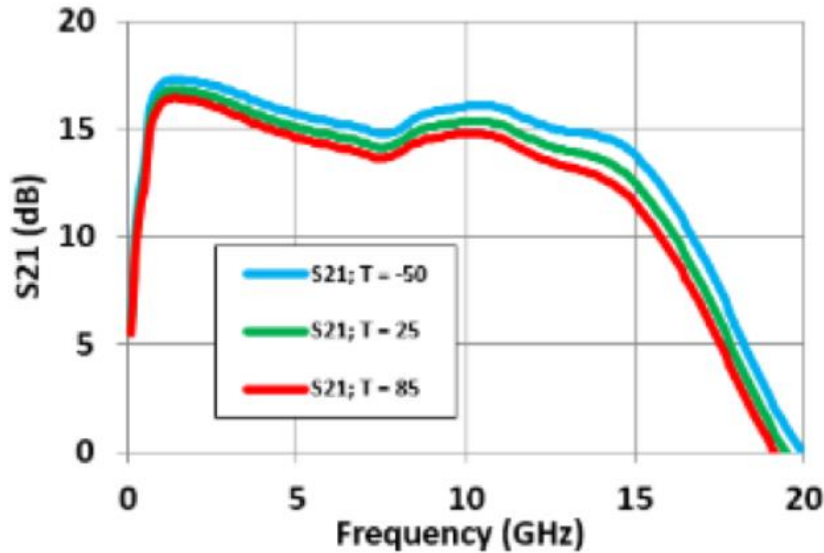


**Features:**

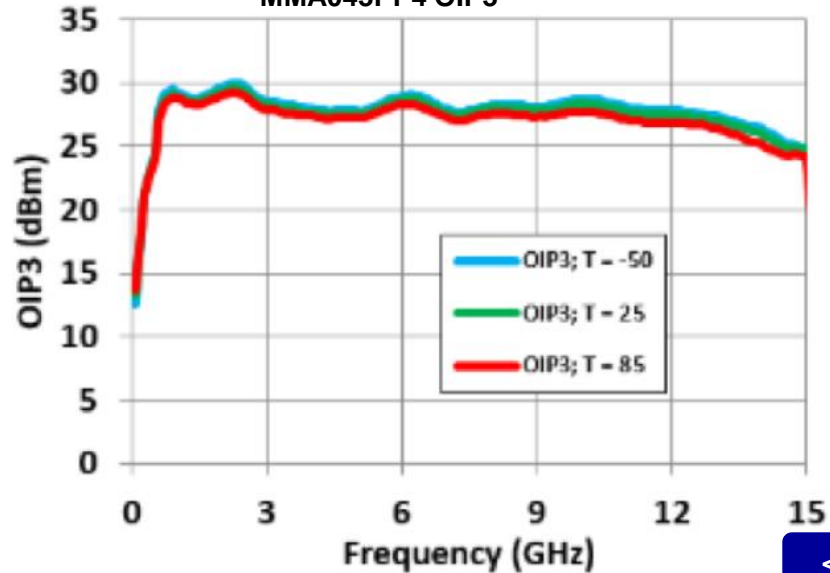
- Wideband: 0.5-12GHz
- SMT Package: 4mm QFN
- Gain: 16dB typ
- Low Noise Figure: 1.8dB typ
- High Linearity: P1dB=17dBm, OIP3=28dBm
- Bias: 5V, 55mA



**MMA043PP4 Small Signal Gain**



**MMA043PP4 OIP3**





# MMA034AA / 35AA / 36AA

## 0.04-65GHz Wideband MMIC Chip Amplifier family

Online Datasheet

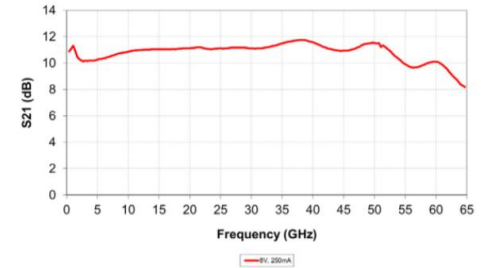
### Features

- Wideband 0.04-65GHz
- Integrated PLFX Technology
  - Allows use of less expensive coil
- Flat gain performance up to 50GHz: +/- 0.75dB
- >30dB dynamic gain control
- Integrated power detector
- 100% DC, RF and visually tested
- Size: 1640x920um
- Bare chip construction
- ECCN 3A001.b.2.d

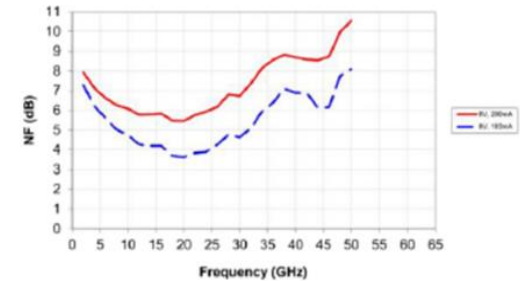
### Applications

- Defense ; EW & Radar Equipment
- Test & Measurement Equipment
- Wideband Microwave Signal Chains
- Microwave Signal Sources / Synthesizers
- Fiber Optic Modules

MMA034AA S21



Noise Frequency



Typical IC performance with package de-embedded

PN	Freq.	Gain	NF	p1dB	PSAT	PDC
MMA034AA	0.04-65	10	6	16.5	19.5	8V, 250ma
MMA035AA	0.04-65	10	6	15	18	7V, 150ma
MMA036AA	0.04-65	10	5	11	14.5	4.5V, 85ma

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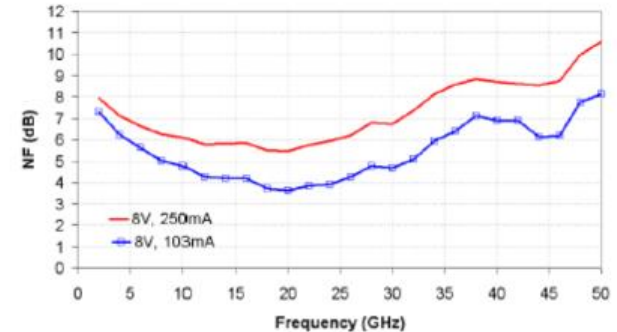
### Features

- MMA029AA – 33AA:
  - MMA029AA / 30AA / 31AA / 32AA / 33AA
- Wideband 0.04-45GHz
- Low PWR Consumption
- Includes on chip Power Detector: 30dB Dynamic Range
- Bare Chip construction
- ECCN 3A001.b.2.d

### Applications

- Defense ; EW & Radar Equipment
- Test & Measurement Equipment
- Wideband Microwave Signal Chains
- Microwave Signal Sources / Synthesizers
- Fiber Optic Modules

**MMA031AA**  
Noise Figure



*Typical IC performance with package de-embedded  
Bias: Vd=8V; Id=250 mA*

PN	Freq.	Gain	NF	p1dB	PSAT	PDC
MMA029AA	0.04-45	10	5	17	20	7V, 150ma
MMA030AA	0.04-45	11	4	13	14.5	4.5V, 85ma
MMA031AA	0.04-45	10	5	17	22	8V, 250ma
MMA032AA	0.04-45	10	6	17	21	8V, 250ma
MMA033AA	0.04-45	10	5.5	11.5	14.5	7V, 85ma



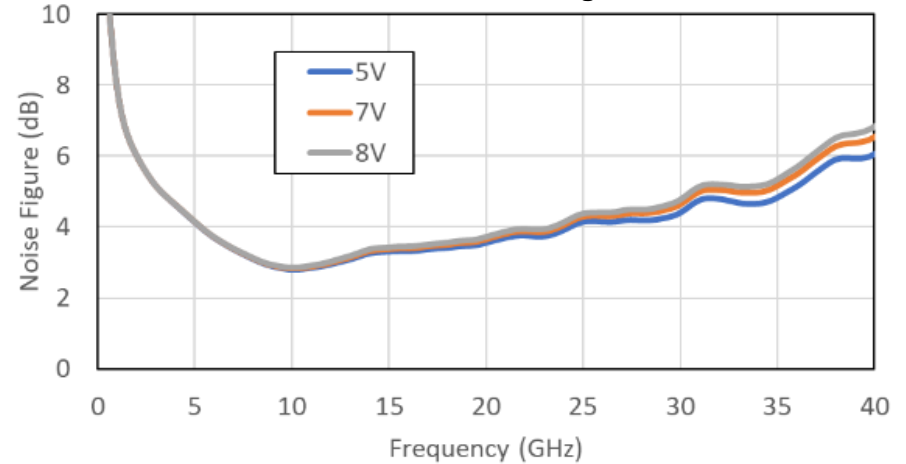
# MMA085AA

## DC-40GHz Wideband LNA MMIC Chip

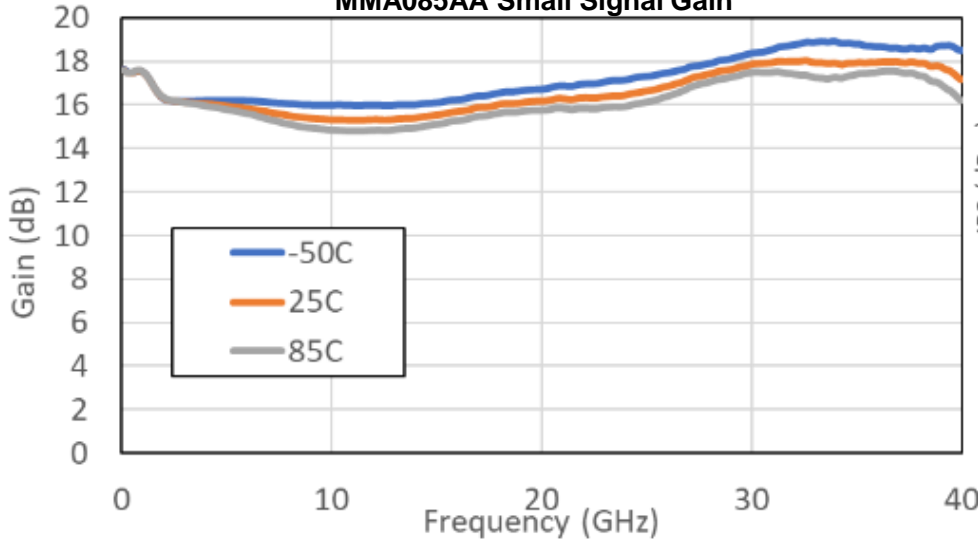
### Features

- Wideband: DC-40GHz
- Available in DIE
- Gain: 16dB w/ 2dB positive slope
- Low Noise Figure: <4dB
- OIP3: 30dBm
- P1dB: 20dBm
- Bias: 6V, 120mA

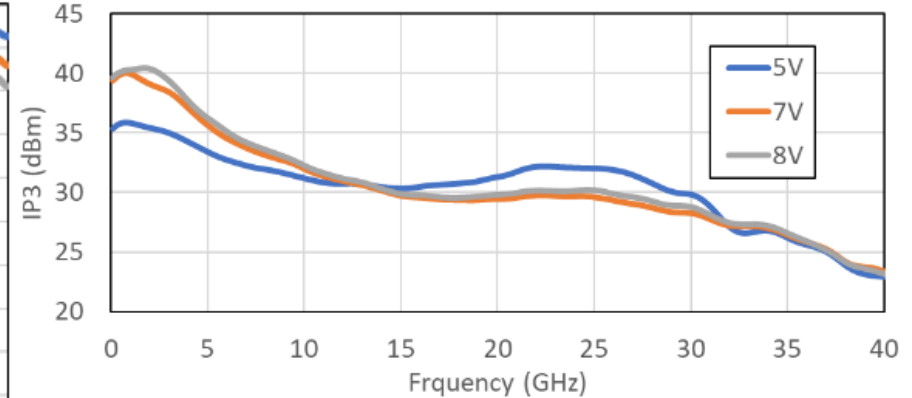
MMA085AA Noise Figure



MMA085AA Small Signal Gain



MMA085AA OIP3



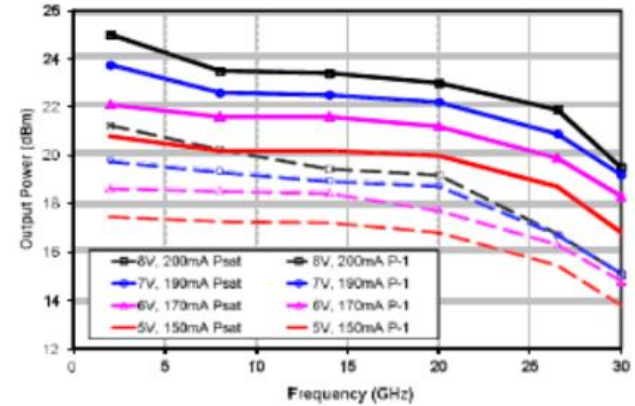
### Features

- MMA022AA – 27AA:
  - MMA022AA / 23AA / 24AA / 25AA / 26AA / 27AA
- Wideband 0.04-30GHz
- Low Noise
- Low PWR Consumption
- Includes on chip Power Detector: 30dB Dynamic Range
- Bare Chip construction

### Applications

- Defense ; EW & Radar Equipment
- Test & Measurement Equipment
- Wideband Microwave Signal Chains
- Microwave Signal Sources / Synthesizers
- Fiber Optic Modules

MMA026AA



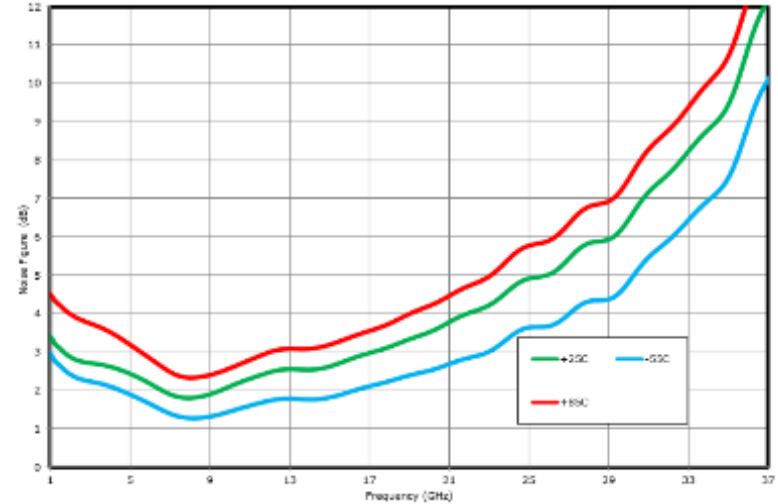
PN	Freq.	Gain	NF	p1dB	PSAT	PDC
MMA022AA	0.04-30	17	2.5	17	20	5V, 150ma
MMA023AA	0.04-30	17	3.5	19	24.5	8V, 250ma
MMA024AA	0.04-30	10	6	21	24	8V, 250ma
MMA025AA	0.04-30	18	2.5	17	20	5V, 150ma
MMA026AA	0.04-30	10	6	18	21	7, 150ma
MMA027AA	0.04-30	11	3.5	14	16.5	4.5, 85ma

### Features

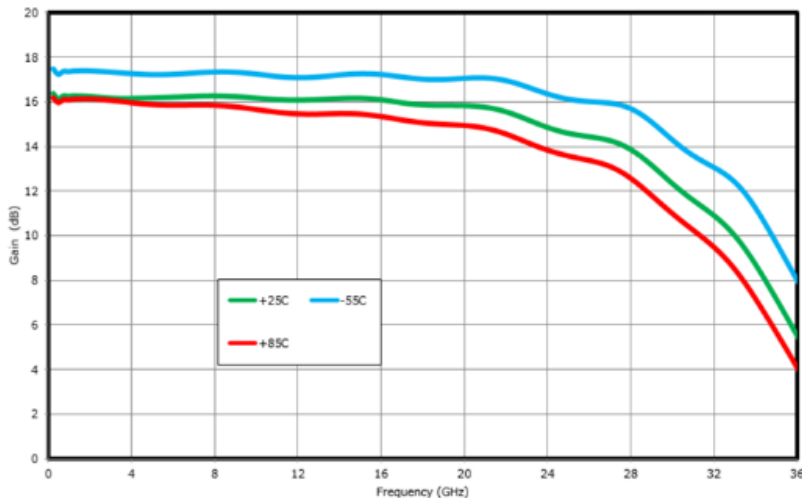
- Wideband: DC-27GHz
- SMT Package and Bare DIE
- Gain: 16dB typ
- Low Noise Figure : 2dB typ.
- High Linearity: P1dB=16dBm, OIP3=28dBm
- Bias: 8V 60ma



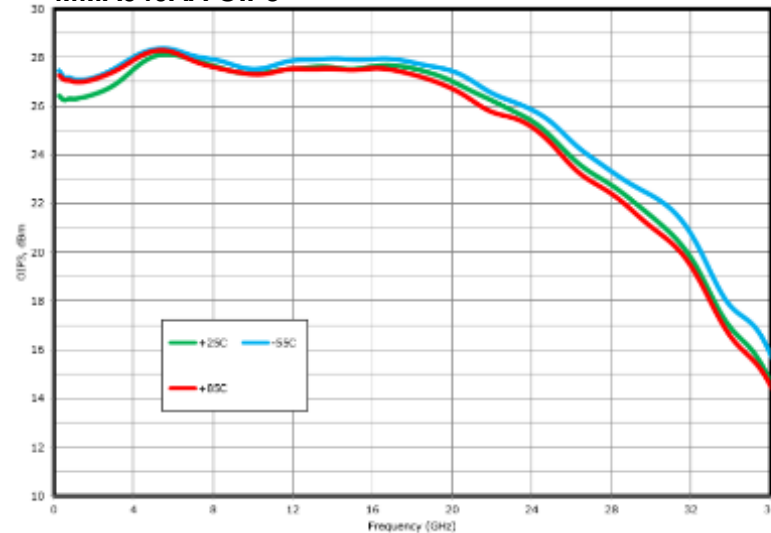
MMA040AA Noise Figure



MMA040AA Small Signal Gain



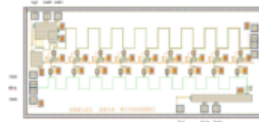
MMA040AA OIP3



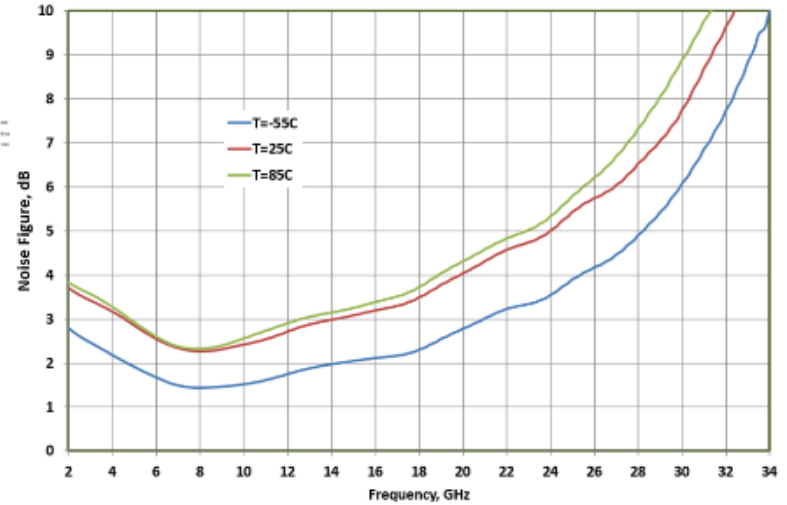


### Features

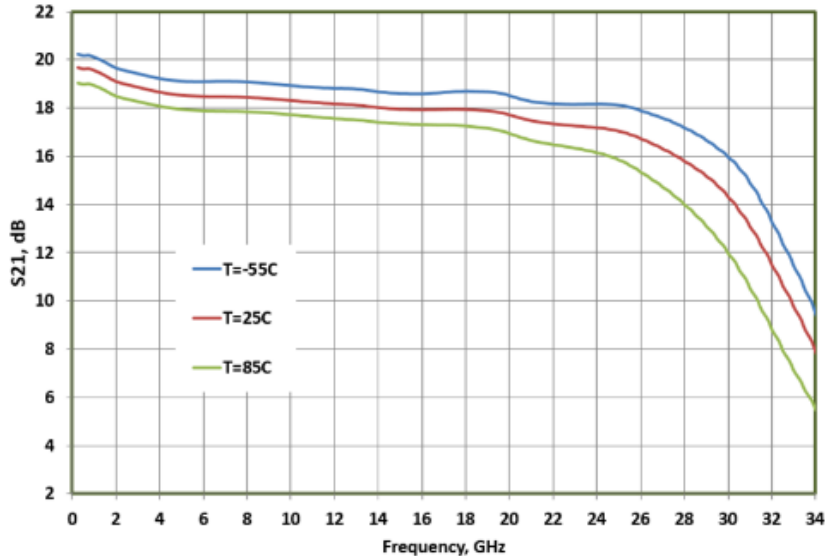
- Wideband: DC-26GHz
- SMT Package (5mm QFN) and Bare
- Gain: 18dB typ
- Low Noise Figure : 2.5dB
- High Linearity: P1dB=21dBm, OIP3=35dBm
- Bias: 7V, 150ma



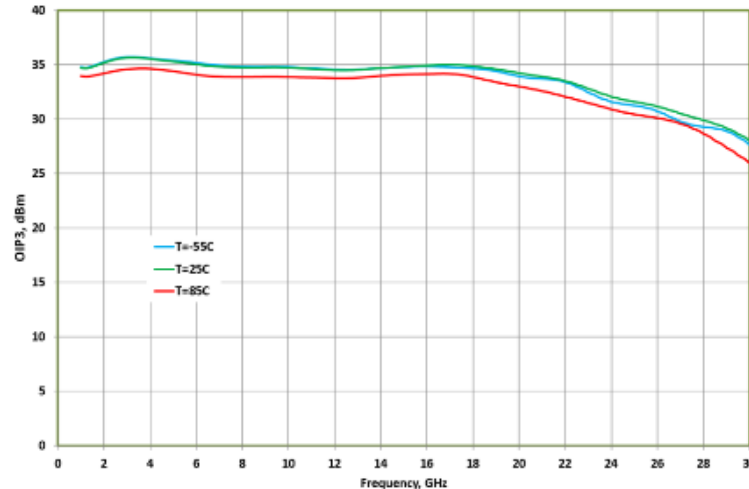
MMA041AA Noise Figure



MMA041AA Small Signal Gain



MMA041AA OIP3



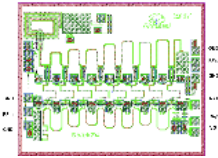


# MMA042AA

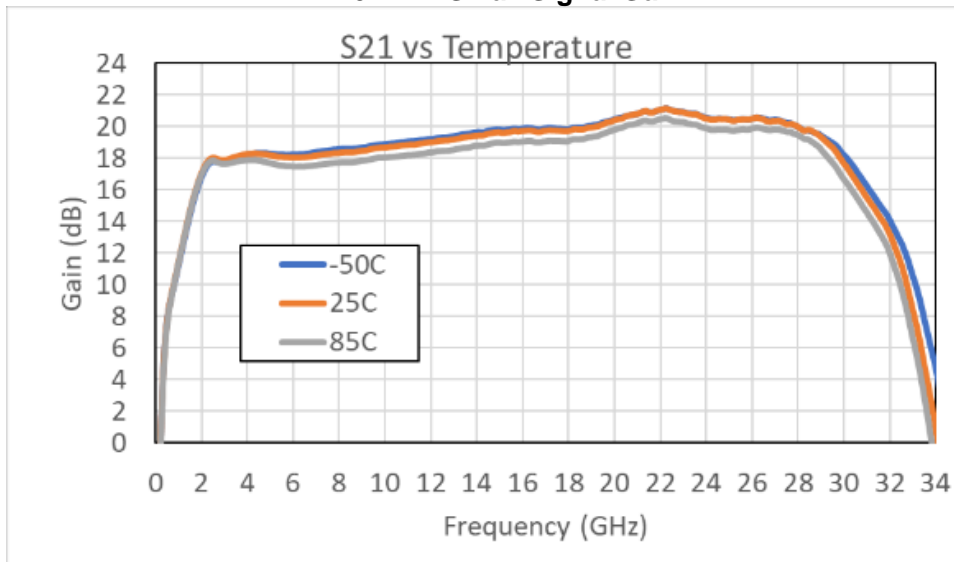
## 2GHz-25GHz Low Noise Amplifier MMIC Chip

### Features

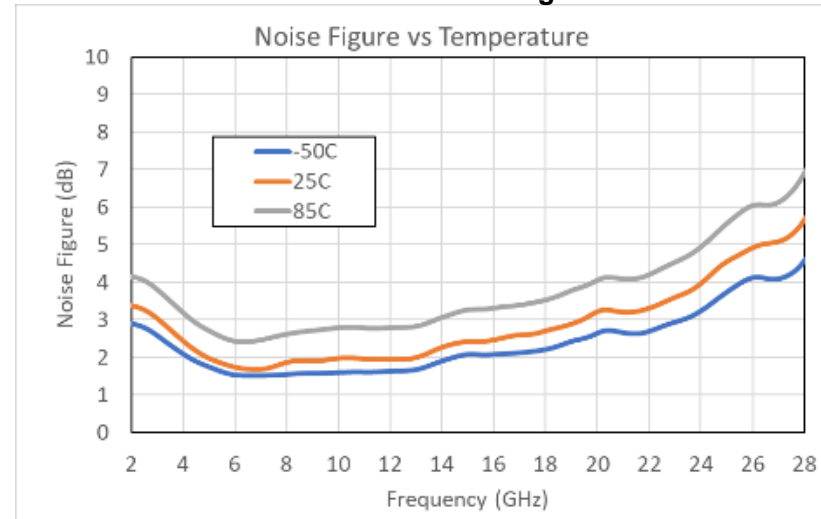
- Wideband: 2-25GHz w/ 2dB Positive Gain Slope
- SMT Package (5mm QFN) and Bare DIE
- Self Bias Design (Single Bias)
- High Gain: 19dB typical
- Low Noise: 2.5dB typical
- High Linearity: P1dB=19dBm, OIP3=30dBm
- Bias: 6V, 120ma



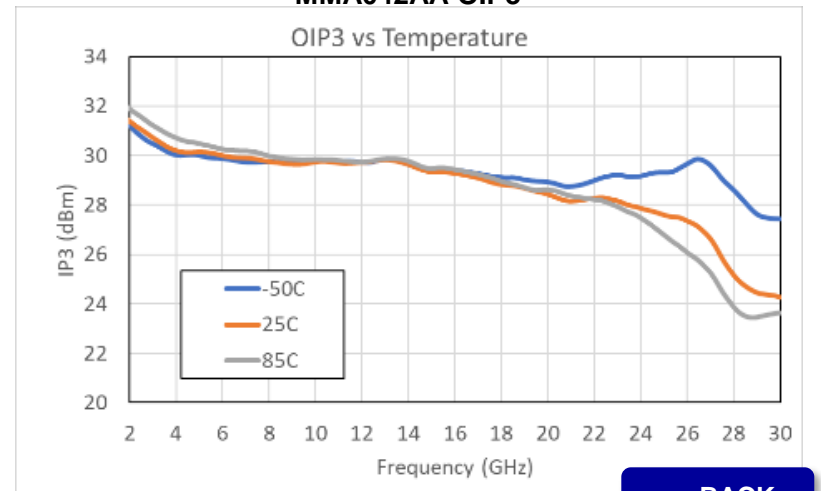
### MMA042AA Small Signal Gain



### MMA042AA Noise Figure



### MMA042AA OIP3





# MMA044AA

6-18GHz High Dynamic Range LNA MMIC Chip

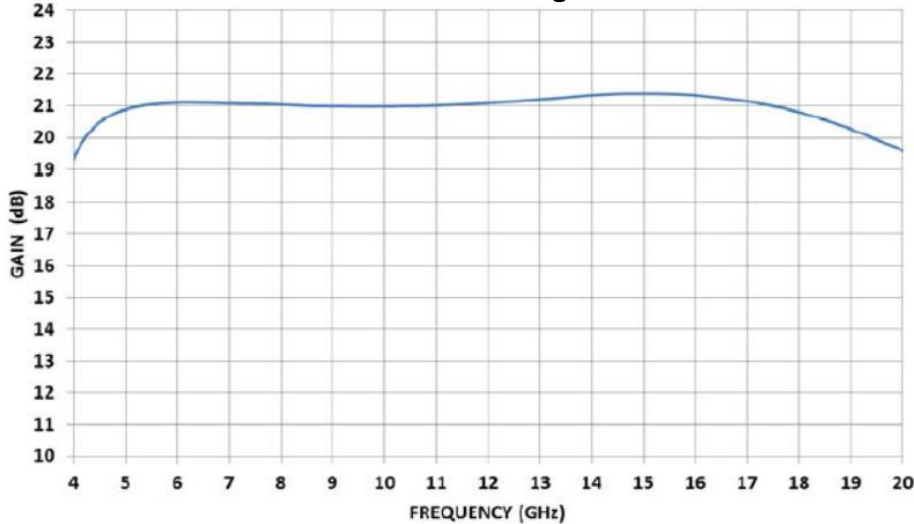
[Online Datasheet](#)

## Features

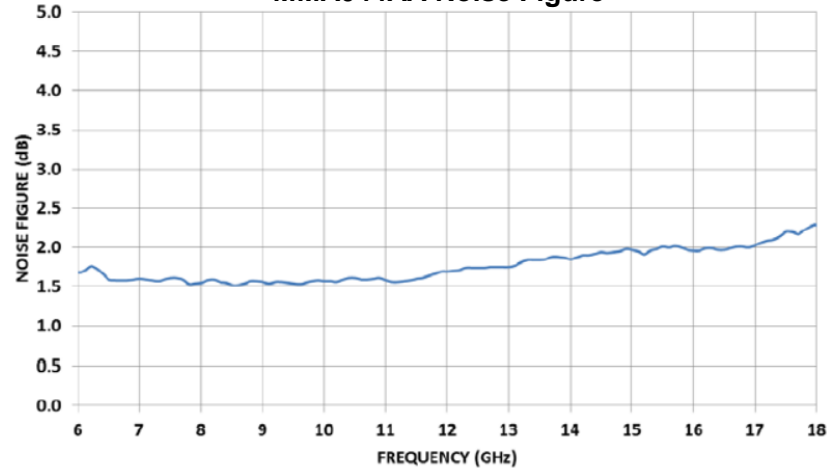
- Wideband: 6-18GHz
- SMT Package and Bare DIE
- Gain: 21dB Typ
- Low Noise Figure : 1.6 dB Typical
- High Linearity P1dB 17dBm OIP3: 28dBm
- Bias: 4V, 100ma

DIE w/ BCB

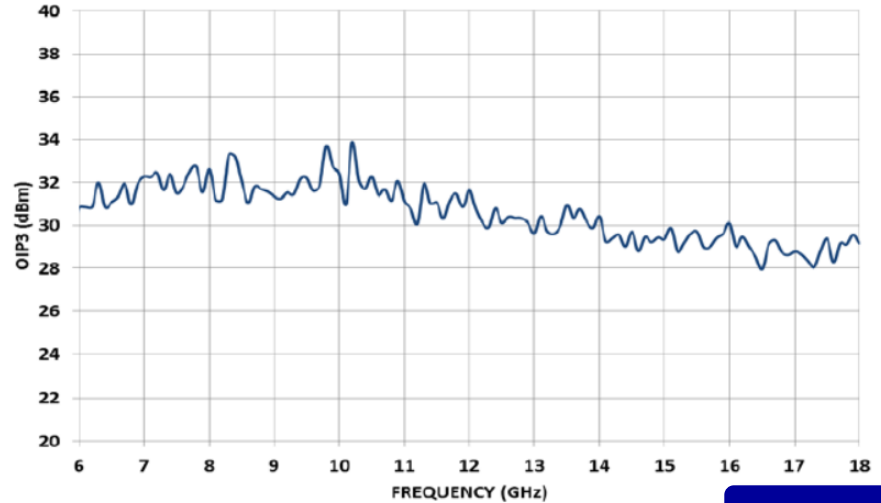
MMA044AA Small Signal Gain



MMA044AA Noise Figure



MMA044AA OIP3



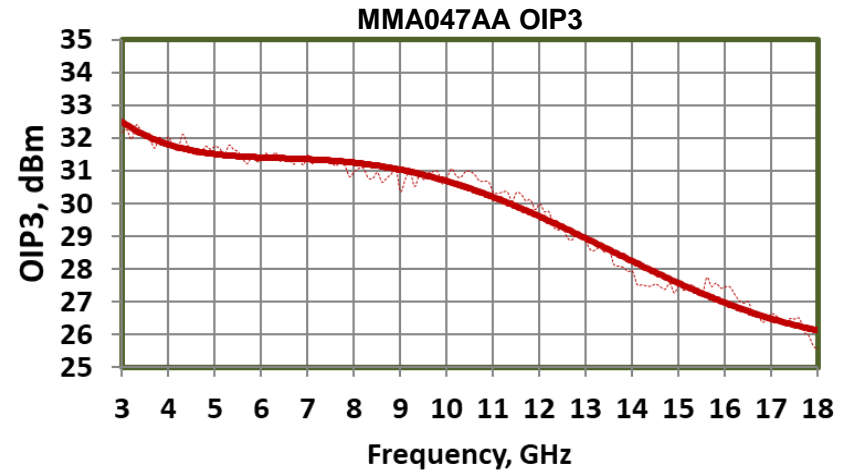
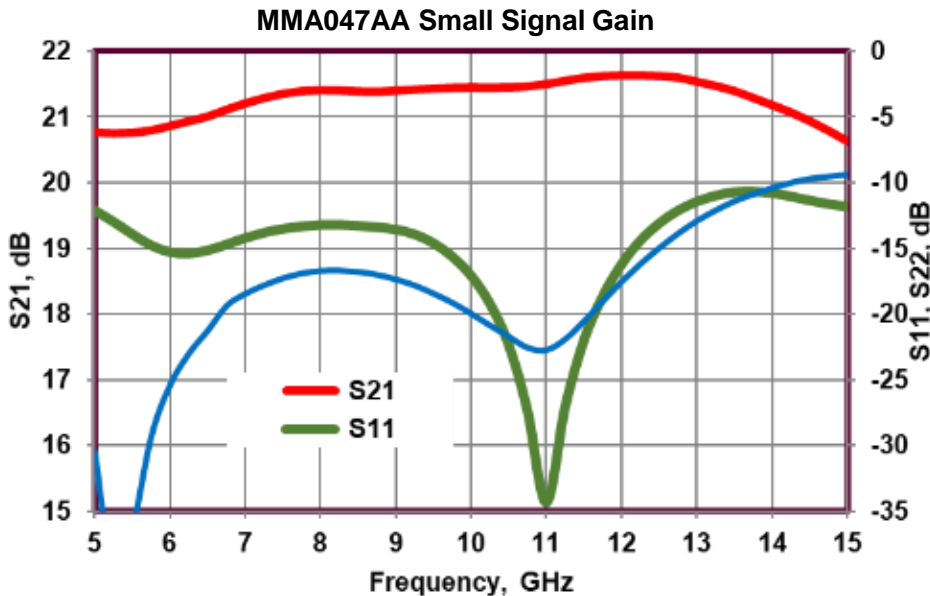
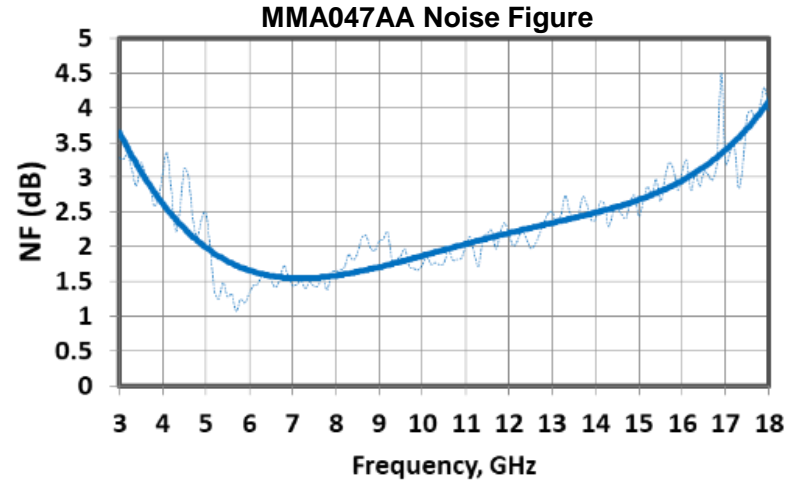
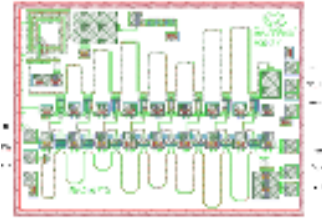
[<< BACK](#)

# MMA047AA

## 5-14GHz Wideband LNA MMIC Chip

### Features:

- Wideband: 5-14GHz
- SMT Package and Bare DIE
- Gain: 21dB
- Low Noise Figure: 2 dB
- High Linearity: P1dB=18dBm, OIP3=31dBm
- Bias: 5V, 110mA





# MMA043AA

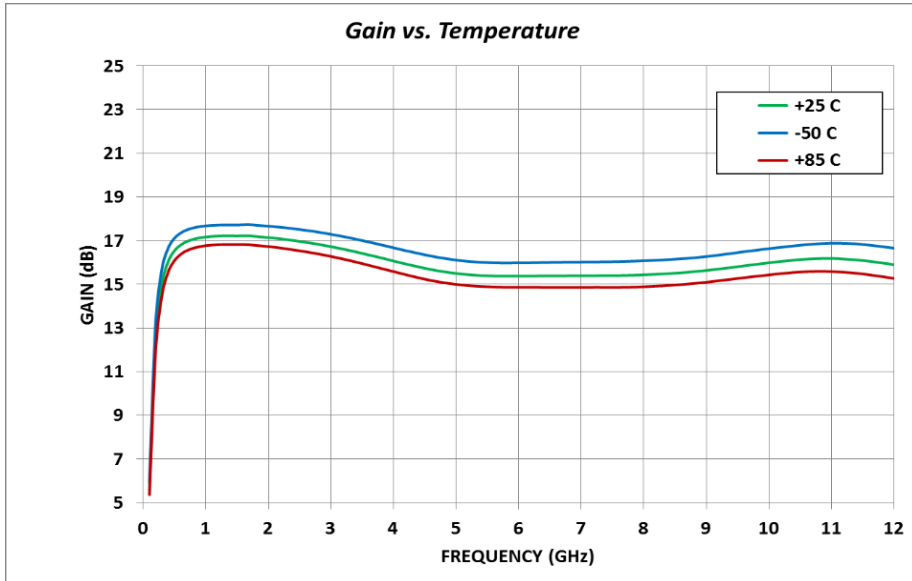
## 0.5-12GHz High Dynamic Range LNA MMIC Chip

Online  
Datasheet

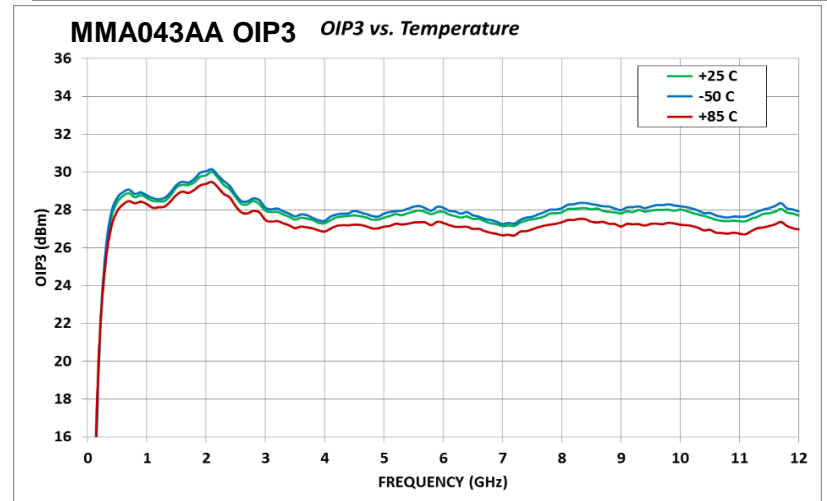
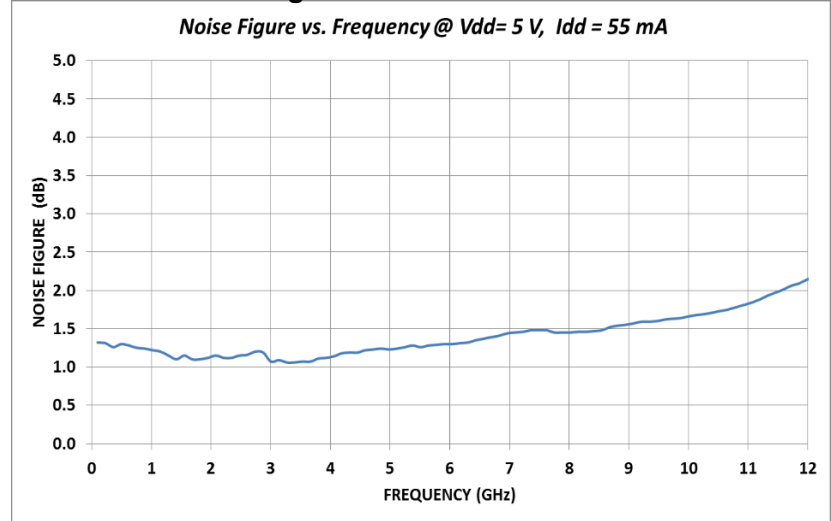
### Features

- Wideband: 0.5-12GHz
- SMT Package and Bare DIE
- Gain: 16dB typ
- Low Noise Figure: 1.5dB typ
- High Linearity: P1dB=17dBm, OIP3=28dBm
- Bias: 5V 55ma

### MMA043AA Small Signal Gain



### MMA043AA Noise Figure

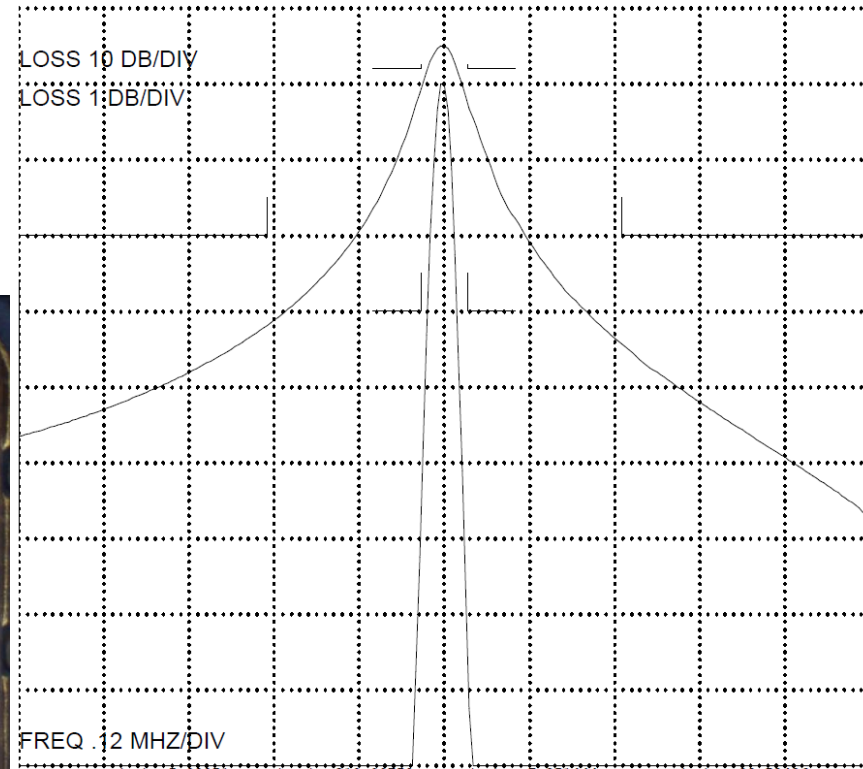
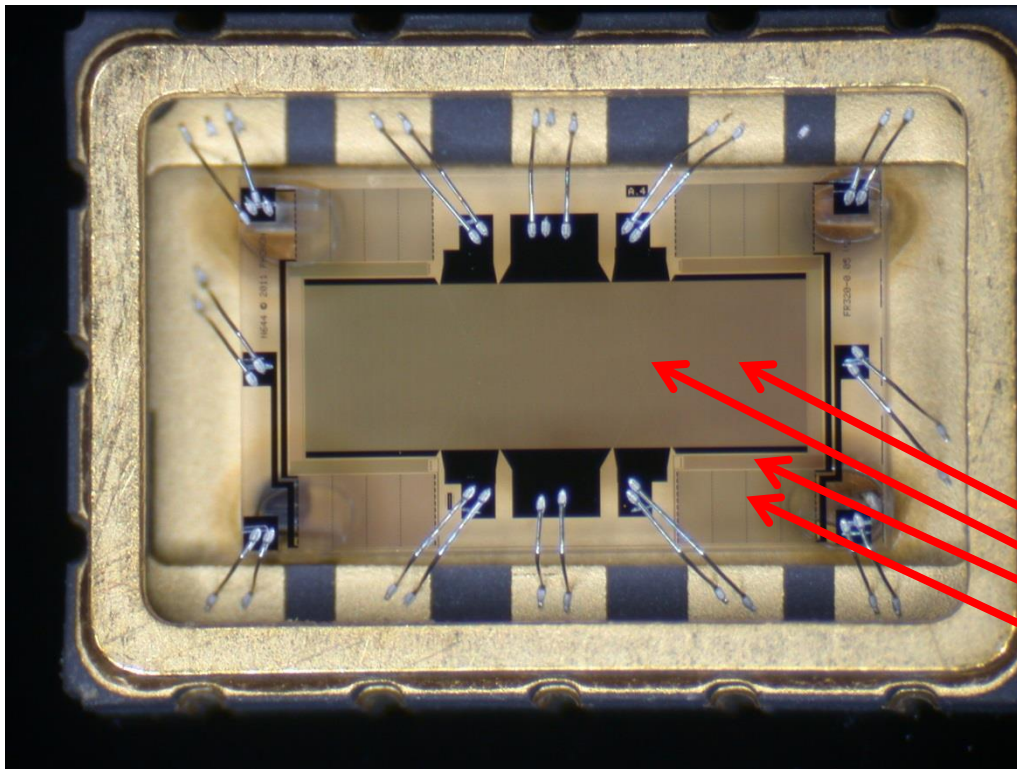


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# Resonator Filter

Example: Resonator Filter With Micro-oven

- 320 MHz Center
- 0.042 MHz Bandwidth at 3dB
- 6 dB Insertion Loss
- 5mm x 7mm LCC Package
- Heater and sensor resistors integrated on die surface for low power temp control



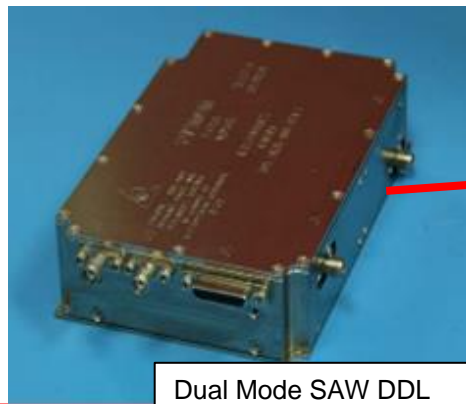
- SAW reflection gratings (3 places)
- SAW transducers (2 places)
- Micro-oven heater resistors (4 places)
- Micro-oven sensor resistors (4 places)

- Signal exhibits  $10\log(TB)$  processing gain from matched filtering while noise does not
- SAW can implement TB products  $>10,000$ . **This is 40dB Signal to Noise improvement!**
- This extends the RADAR's range which is limited by peak radiated power.
- Trend is towards AESA antennas w/ GaN amplifiers, which produce less power than the TWT antennas they are replacing. More dispersion (T) is needed to compensate.
- Chirp generation and compression can be done with SAW or digitally

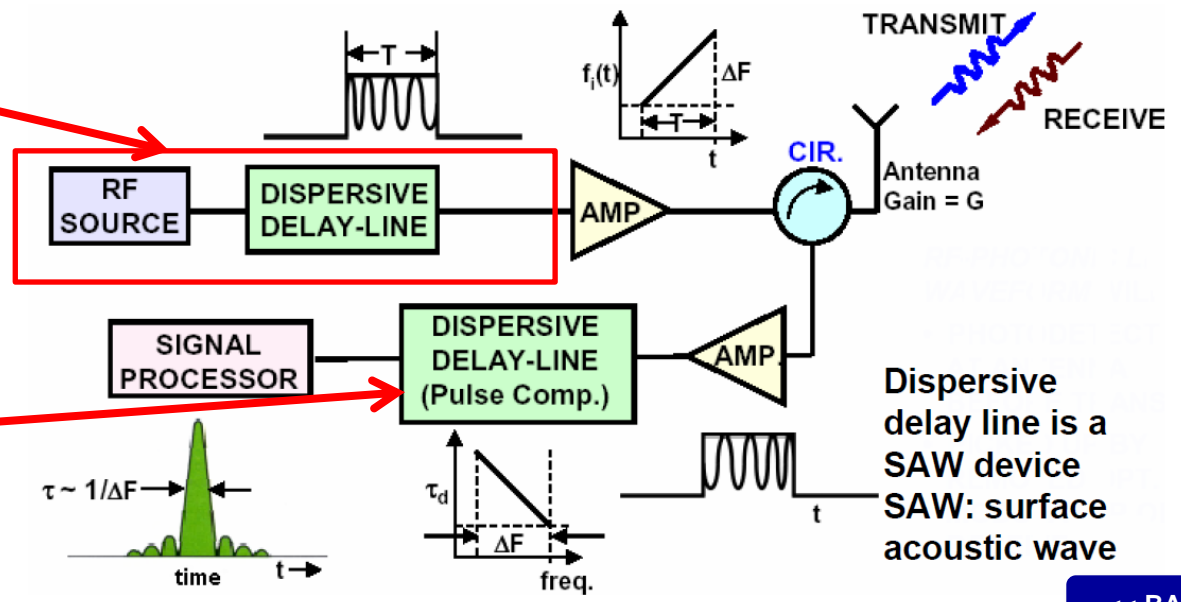
## Receiver signal processing chirp generation and compression



Digital Waveform Generator



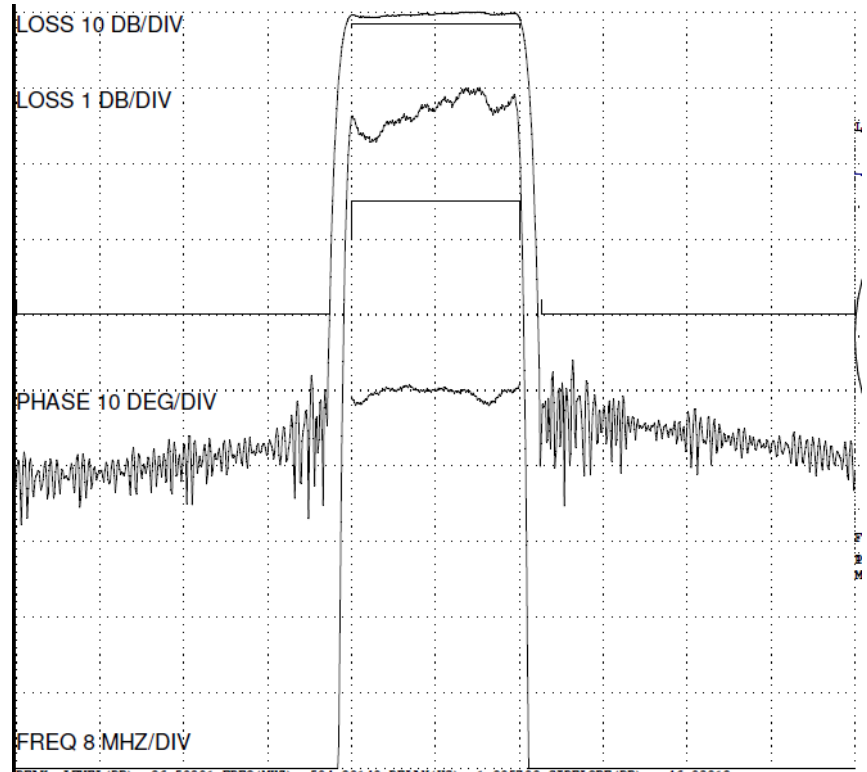
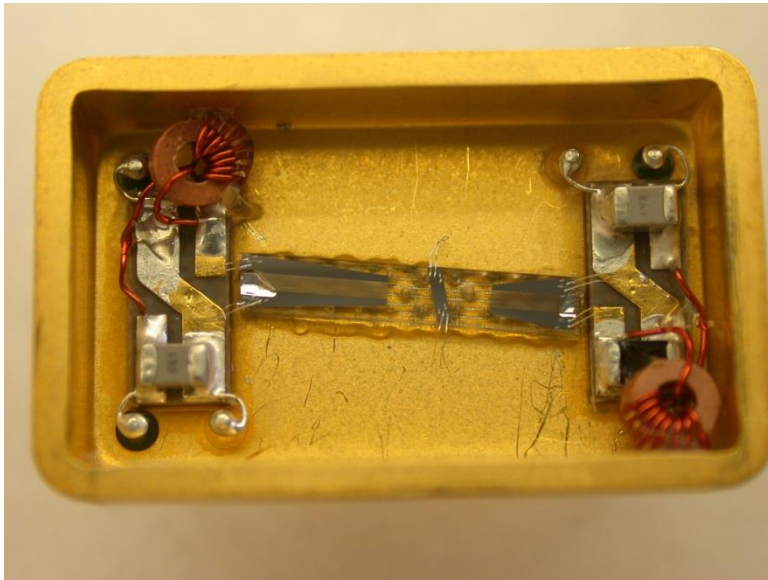
Dual Mode SAW DDL



Dispersive delay line is a SAW device  
SAW: surface acoustic wave

**Example:** *Internally Tuned Bandpass Filter*

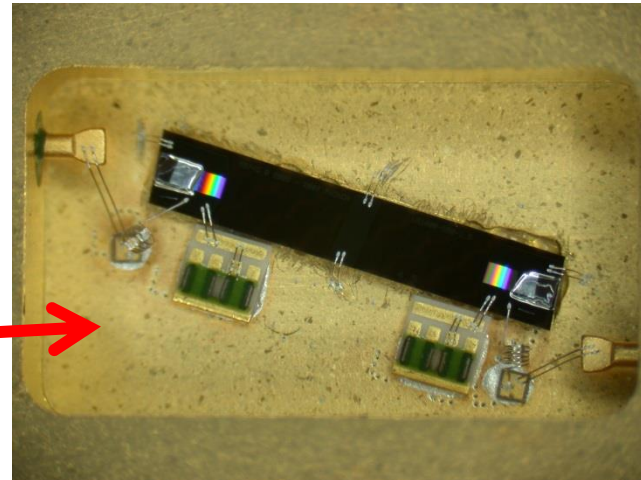
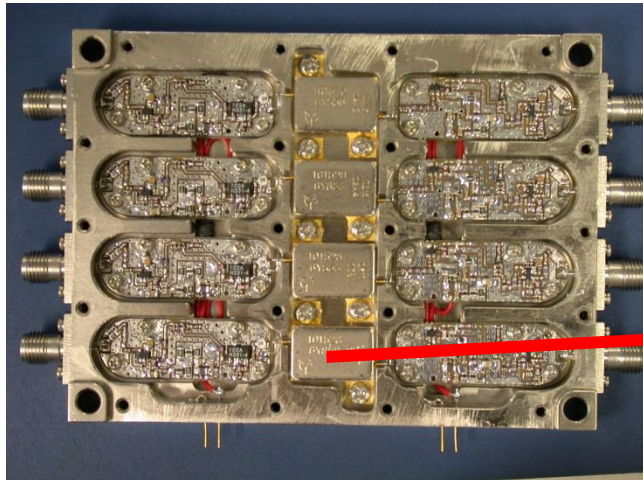
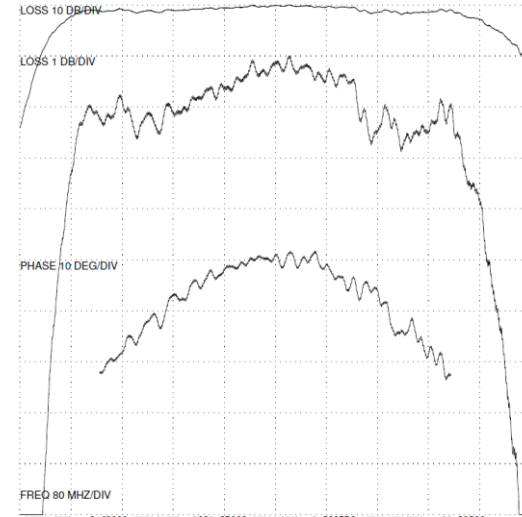
- 500 MHz Center
- 16.4 MHz Bandwidth at 1dB
- 19.9 MHz Bandwidth at 40dB
- Shape Factor 1.2:1
- 27 dB Insertion Loss
- 50 dB Rejection
- 1.8 us Delay
- 2.7deg-pp phase error from linear





## Example: 4 Channel, Amplified Delay Line

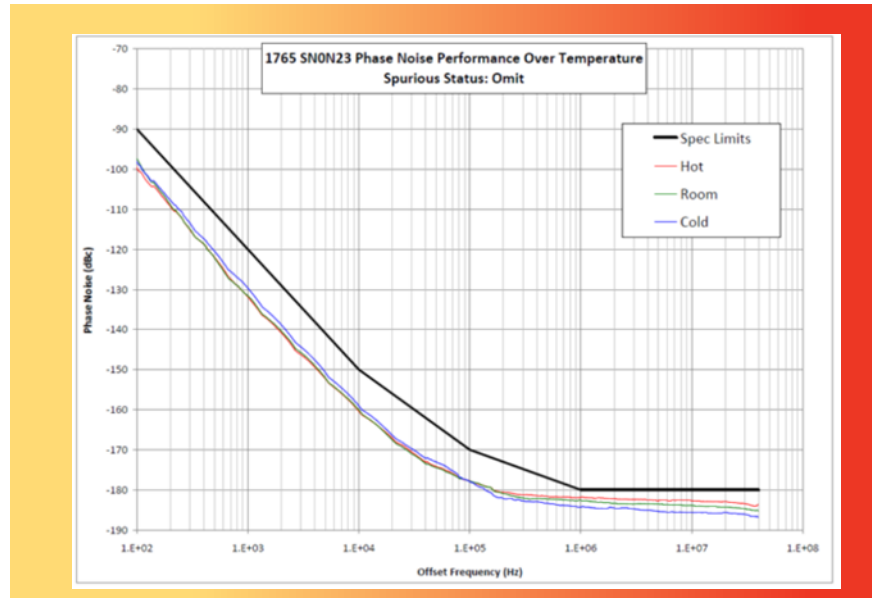
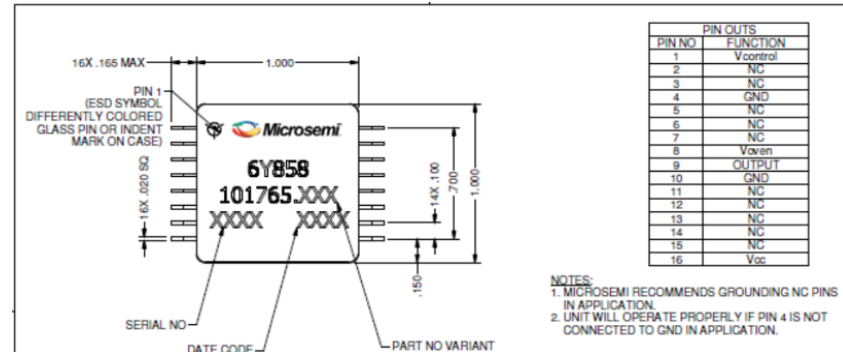
- 1000 MHz Center
- 600MHz Bandwidth at 2dB
- 9 dB Gain
- 1.5 us Delay
- Channel to Channel Gain Match <1.5 dB
- Channel to Channel Phase Match <6 deg



# 101765.101 (600MHz) VCSO Module

## Features:

- Frequency range: 320-2500MHz
- -160dBc/Hz @ 10kHz offset
- -180dBc/Hz noise floor
- High output power: +18 dBm
- <20ppm-pp Frequency shift over -40°C to +85°C Operation
- High reliability



### Features:

#### VS-800

- Size: 5.0 x 3.2 x 1.8 mm<sup>3</sup>
- Frequency Range: 0.8 GHz to 3.2 GHz
- Fundamental: 0.8 to 1.6 GHz
- X2: 1.6 to 3.2 GHz

#### Output Configuration:

- Single ended or Differential Sine Wave
- Typ Jitter (@ 1.568 GHz):
- 12kHz-20MHz: 6 fs-rms
- 10kHz-100MHz: 10 fs-rms

#### Typ Phase Noise (@ 1.568 GHz):

- 10K: -125 dBc/Hz
- 100K: -145 dBc/Hz
- Floor: -162 dBc/Hz



**Vectron**  
a Knowles company

**3GHz 5x3.2 VCISO**  
Ready for Production

**VS-800 Production Release**

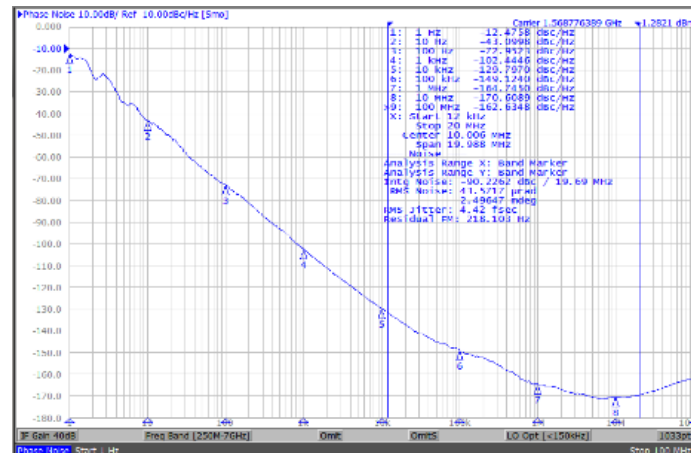
Vectron is excited to announce that the VS-800 is ready for full production. Since first announced late in 2016, Vectron has scaled up production and test capabilities, and stands ready to support volume orders. Evaluation boards are available to help reduce time to market by speeding the development process.

**Applications**

- Optical Networks 100G/400G/1.2T
- Test and Measurement
- High-Rel Military
- High Speed Data Converters
  - o ADCs and DACs

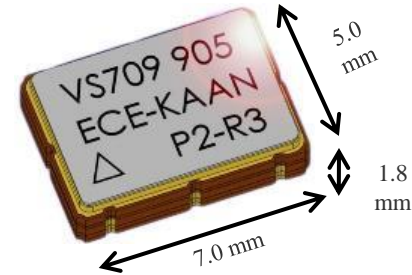
**Advantages**

- Smallest VCISO on the market
- Ultra-low jitter 6fs 12kHz to 20MHz
- High Speed Data Converters
- Frequencies up to 3.2GHz



### Features / Performance

- Frequency Range 150 MHz – 1.0 GHz
- Low Jitter performance (120 fs-rms 12 kHz to 20 MHz)
- Output options: LVPECL, LVDS
- 2.5V or 3.3V supply voltage
- Frequency Select with OD
- Two oscillator gain settings

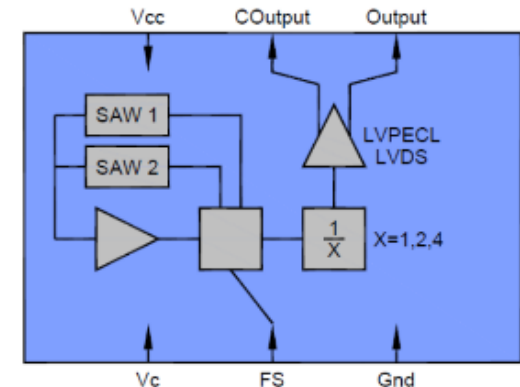


### Technical aspect

- 5th generation VCISO ASIC technology for improved performance
- Fundamental Design
- Improved Phase Noise and Jitter
- Frequency Select feature

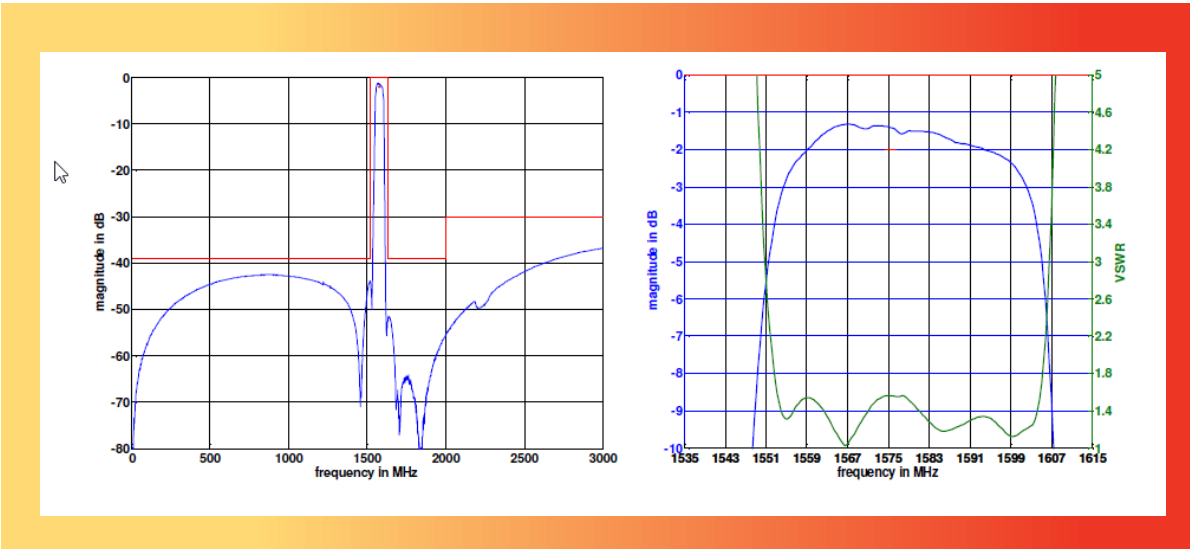
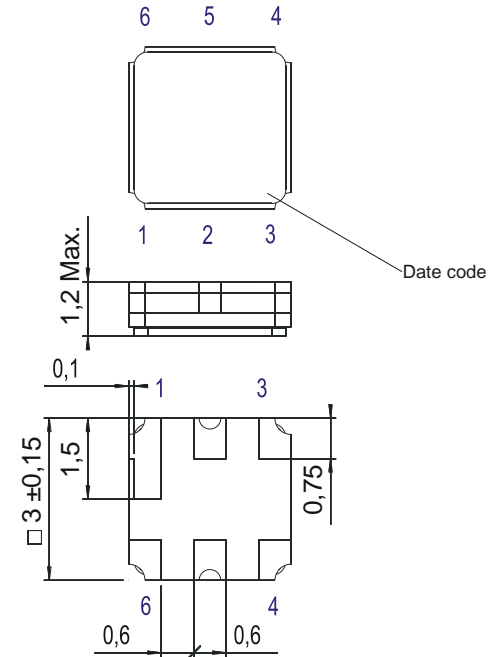
### Application

- Wireline – SONET/SDH, 10 GbE, Synchronous Ethernet, 100G/40G



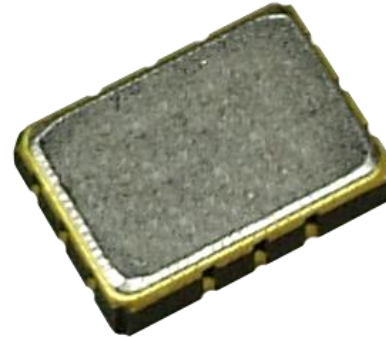
### Features:

- 1575.42MHz center frequency
- +/-1.023MHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, 2dB max
- Stopband attenuation >30dB
- RoHS compliant
- -40°C to +85°C
- Hermetic 3mm x 3mm package

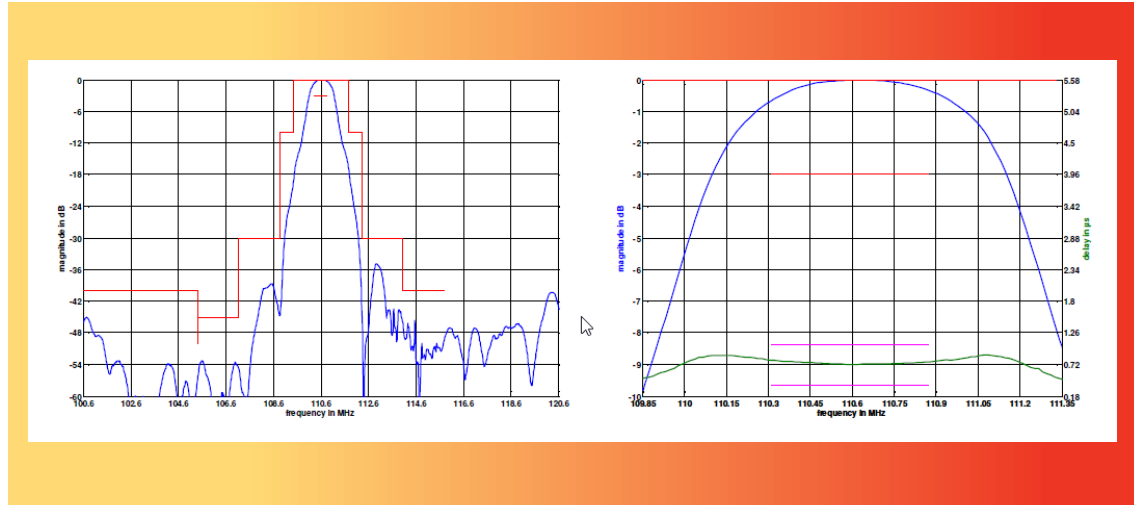
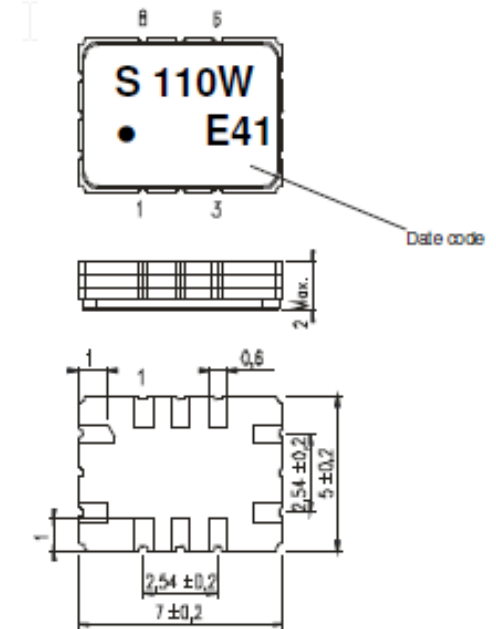


### Features:

- 110.592MHz center frequency
- +/-0.28MHz usable passband
- Insertion loss 4.5dB max
- Stopband attenuation >30dB
- RoHS compliant
- -20°C to +70°C
- Hermetic 7mm x 5mm package



(All dimensions in mm)

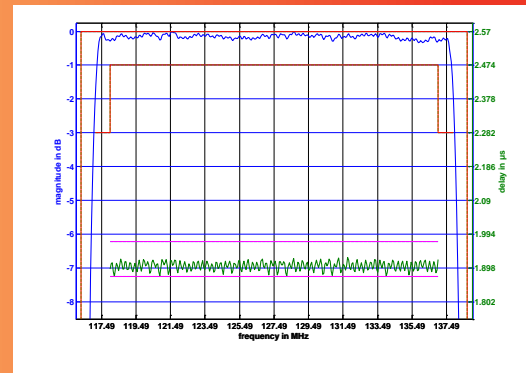
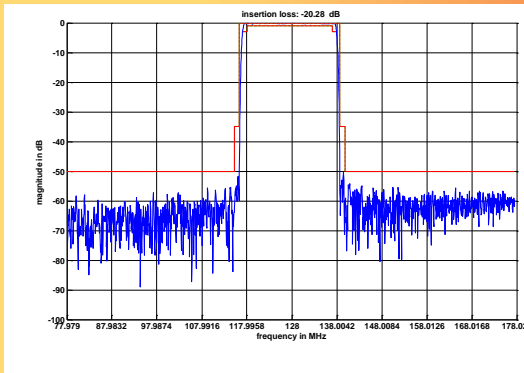
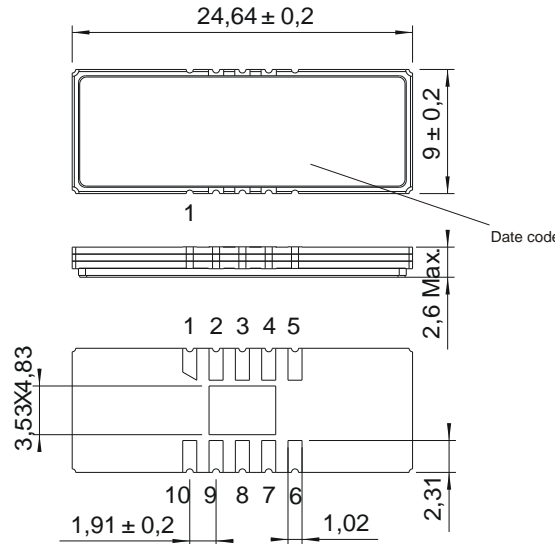


# TFS127F

## High Loss SAW Filter

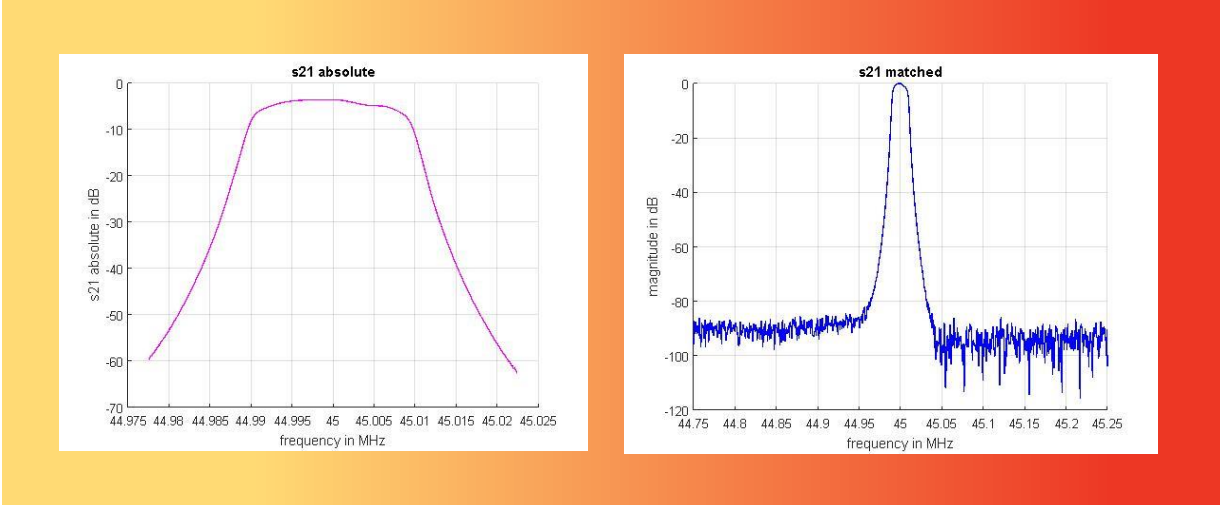
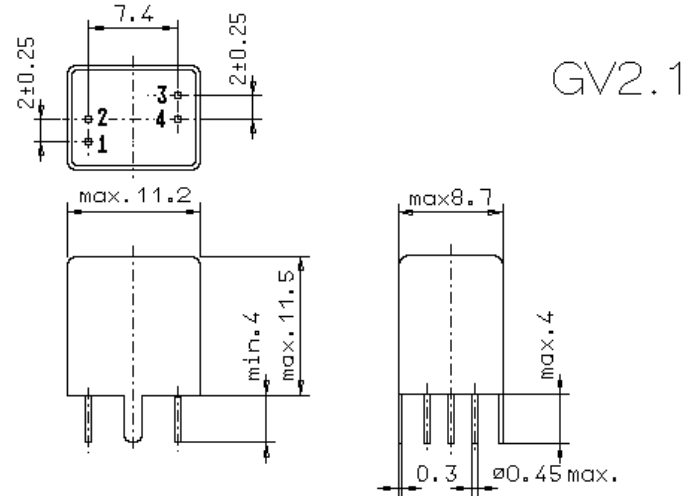
### Features:

- 127.5MHz center frequency
- +/-9.5MHz usable passband
- Single-ended 62 ohm input/output
- Insertion loss, 22dB max
- Stopband attenuation >35dB
- RoHS compliant
- -40°C to +85°C
- Hermetic 24mm x 9mm package



### Features:

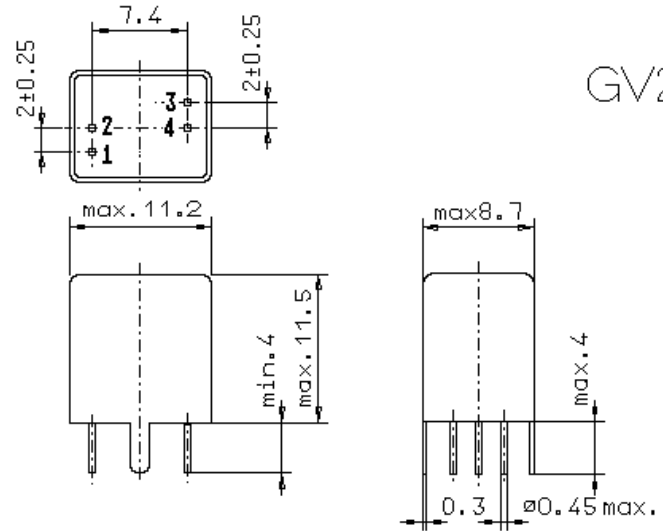
- 45MHz center frequency
- +/-7.5kHz usable passband
- Single-ended 650 ohm input/output
- Insertion loss, <5dB
- Stopband attenuation >80dB
- RoHS compliant
- Return loss >10dB at center
- -25°C to +70°C



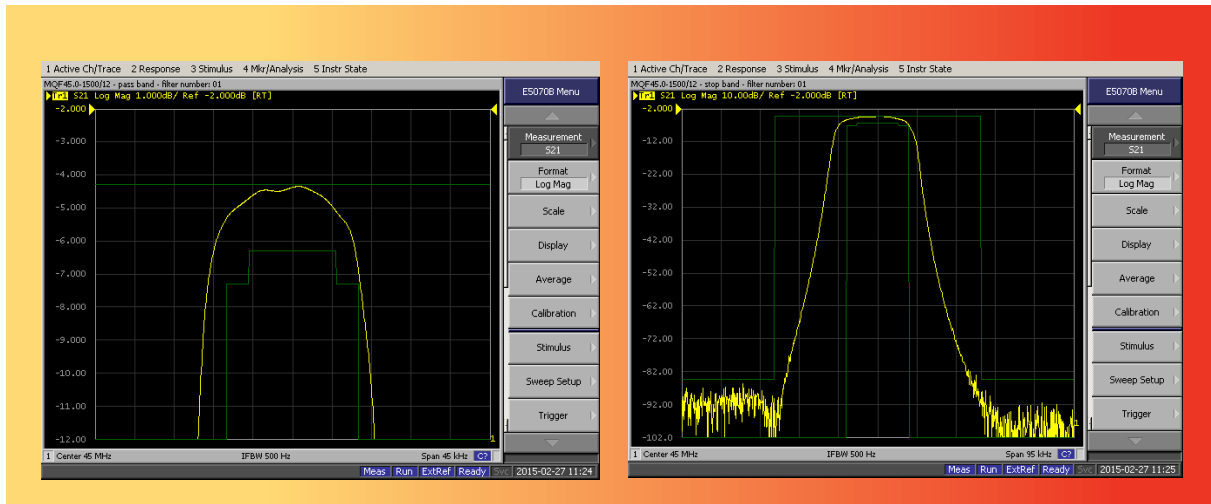


### Features:

- 45MHz center frequency
- +/-7.5kHz usable passband
- Single-ended 650 ohm input/output
- Insertion loss, <6dB
- Stopband attenuation >80dB
- RoHS compliant
- Return loss >10dB at center
- -20°C to +70°C

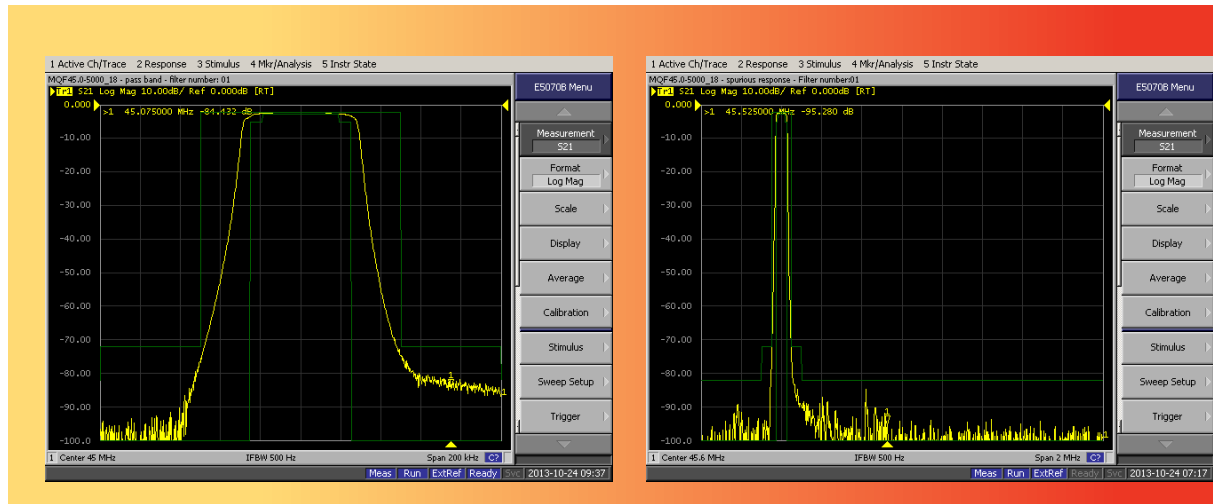
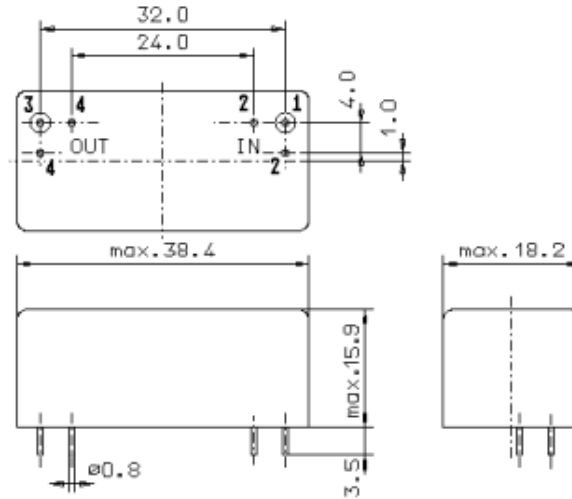


GV2.1



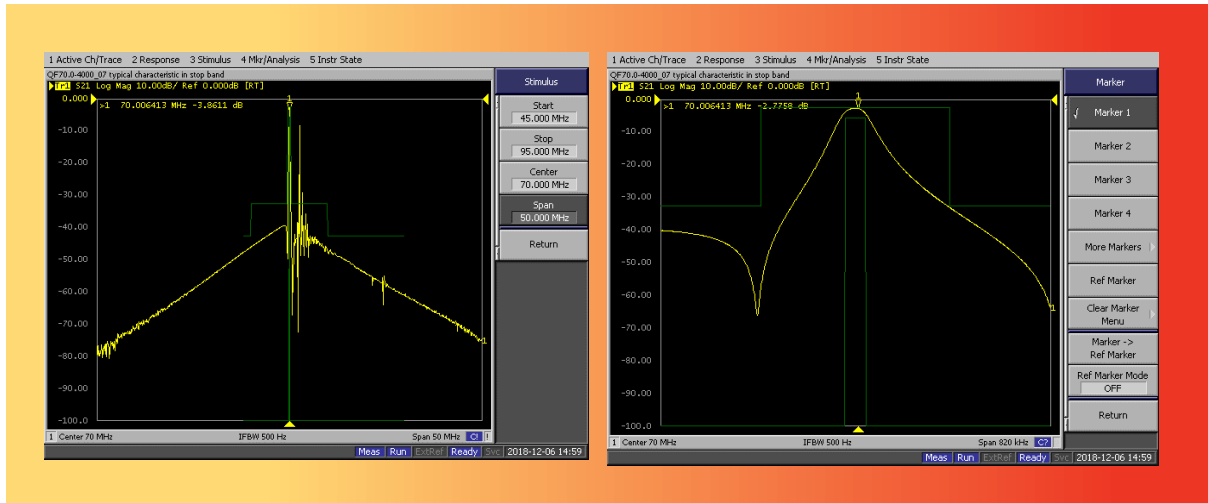
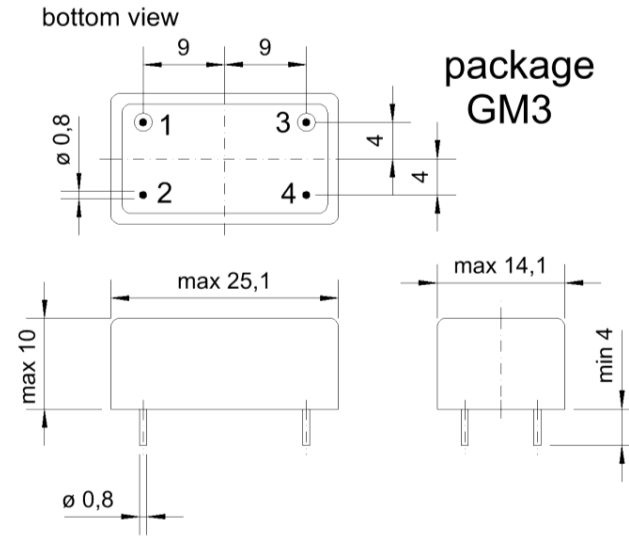
### Features:

- 45MHz center frequency
- +/-25kHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, <3dB
- Stopband attenuation >70dB
- RoHS compliant
- Return loss >11.73dB at ctr
- -20°C to +70°C



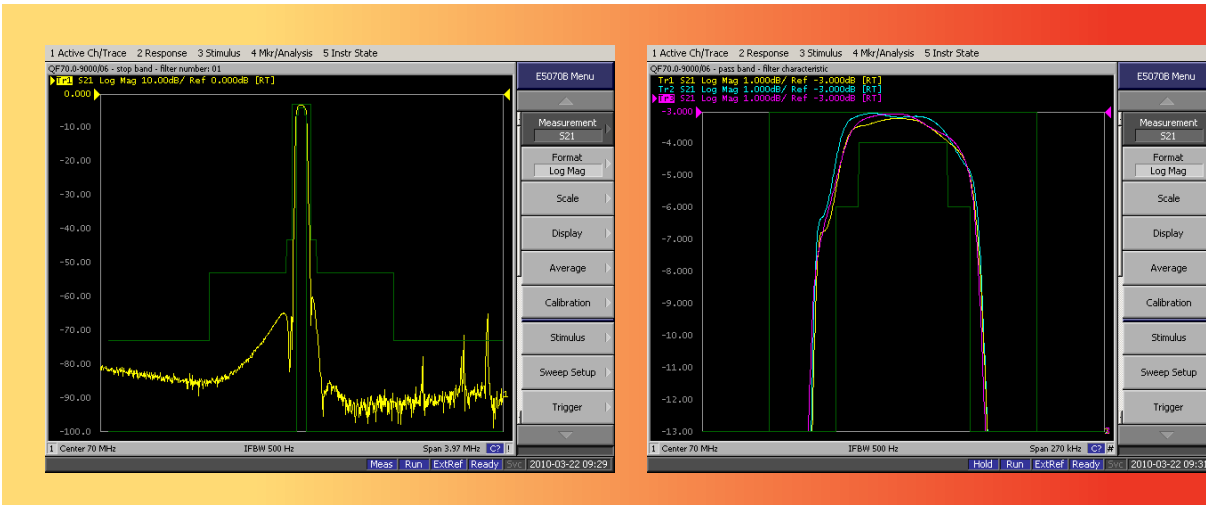
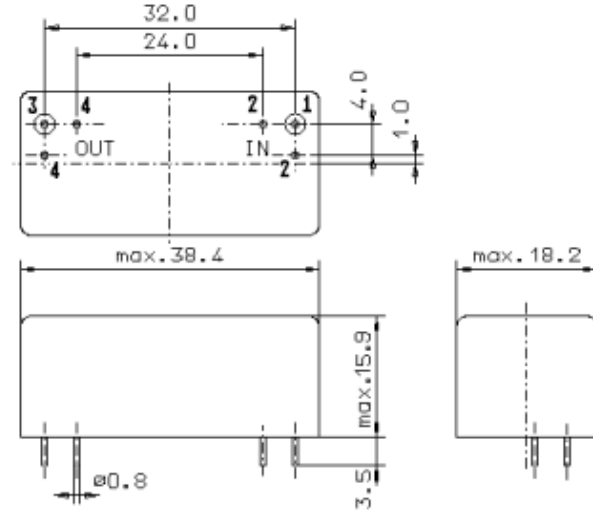
### Features:

- 70MHz center frequency
- +/-20kHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, 7dB max
- Stopband attenuation >30dB
- RoHS compliant
- -40°C to +85°C



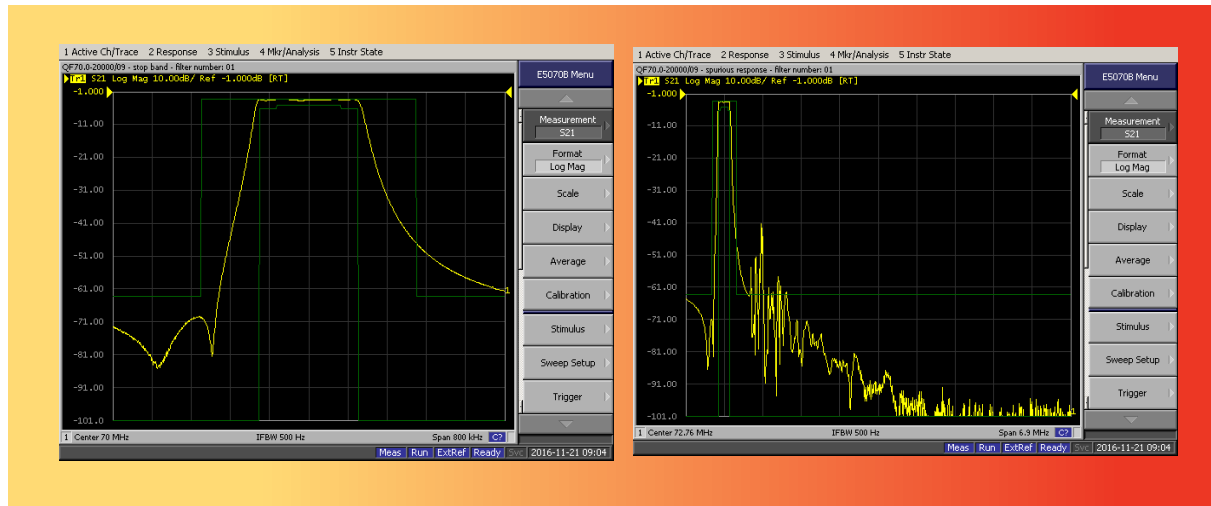
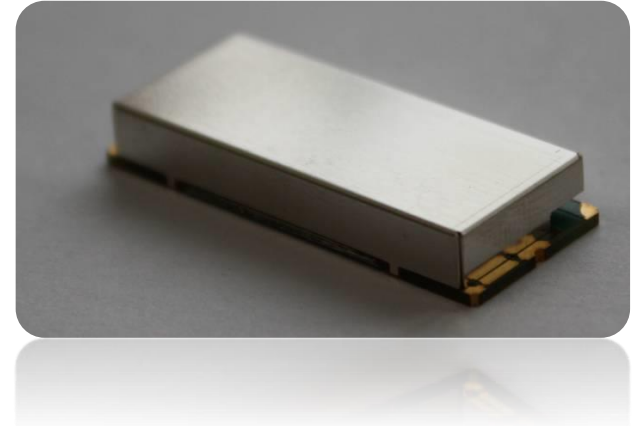
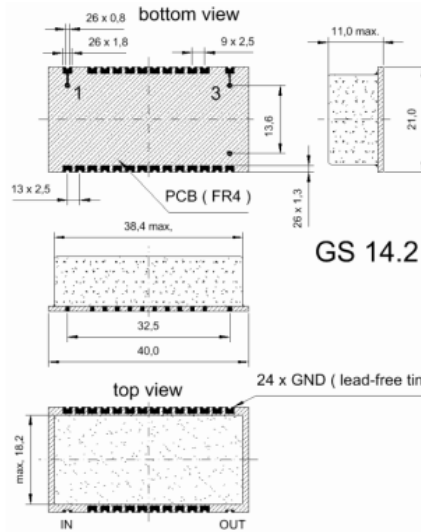
### Features:

- 70MHz center frequency
- +/-45kHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, 6dB max
- Stopband attenuation >40dB
- RoHS compliant
- -20°C to +70°C



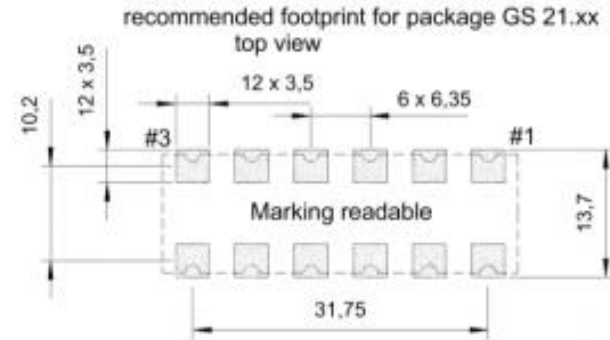
### Features:

- 70MHz center frequency
- +/-100kHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, 4.5dB max
- Stopband attenuation >60dB
- RoHS compliant
- -40°C to +85°C



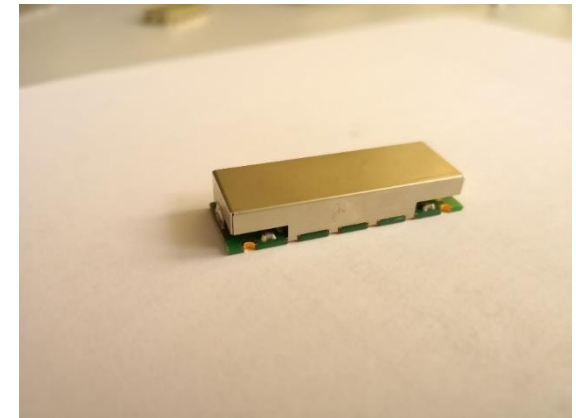
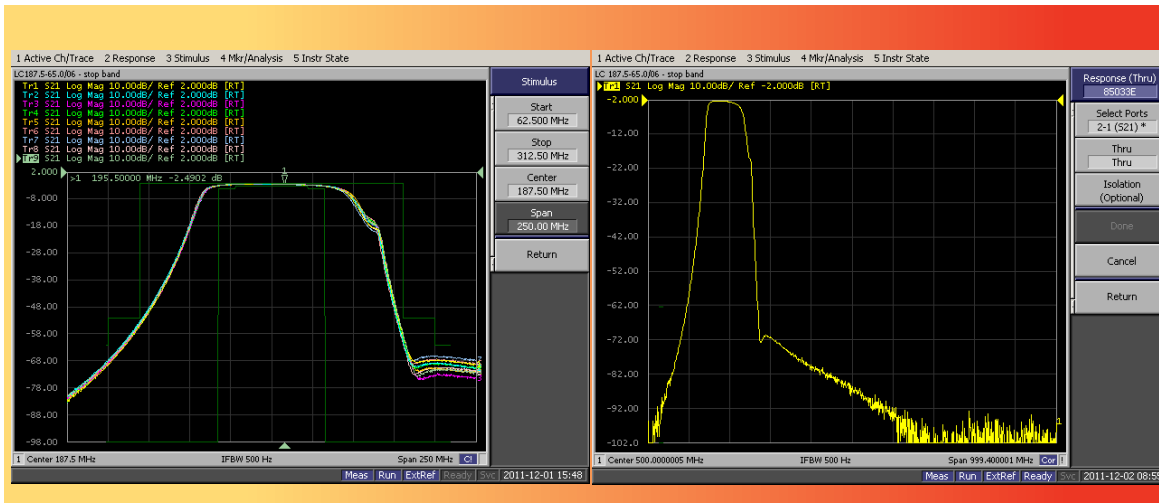
### Features:

- 187.5MHz center frequency
- +/-32.5MHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, 3dB max
- Stopband attenuation >50dB
- RoHS compliant
- -40°C to +85°C



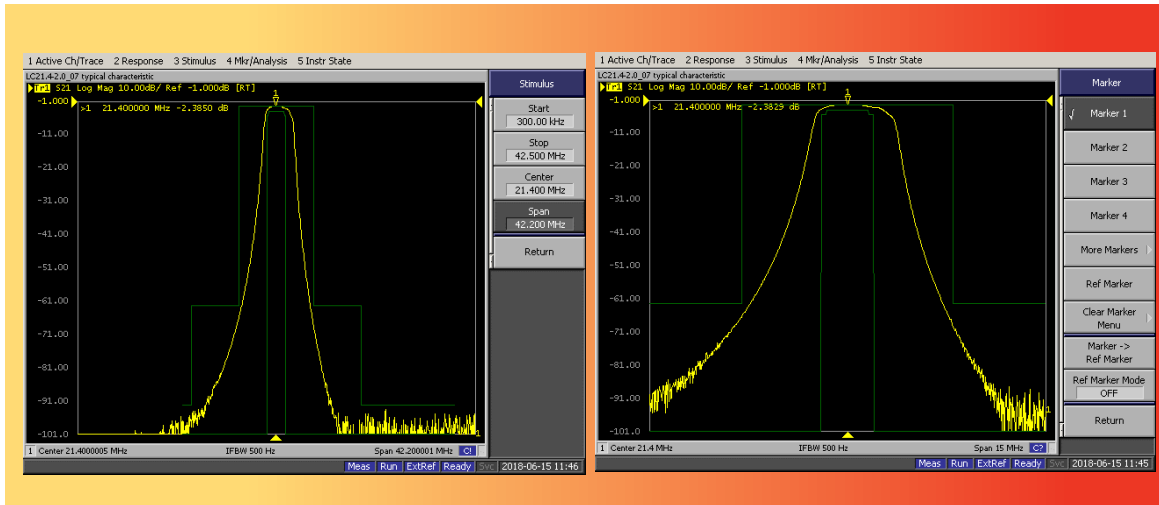
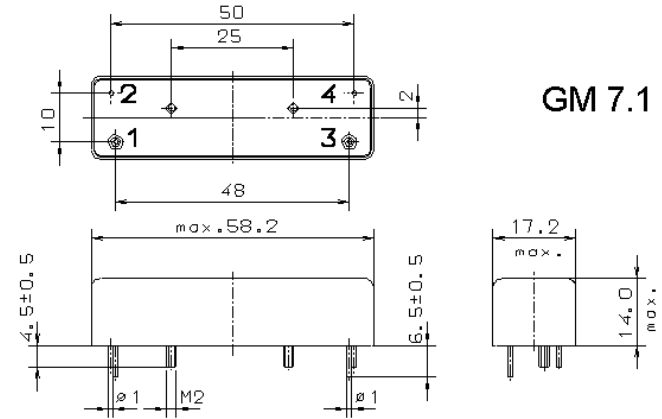
pin connection:

- #1 Input
- #3 Output
- all other pads GND



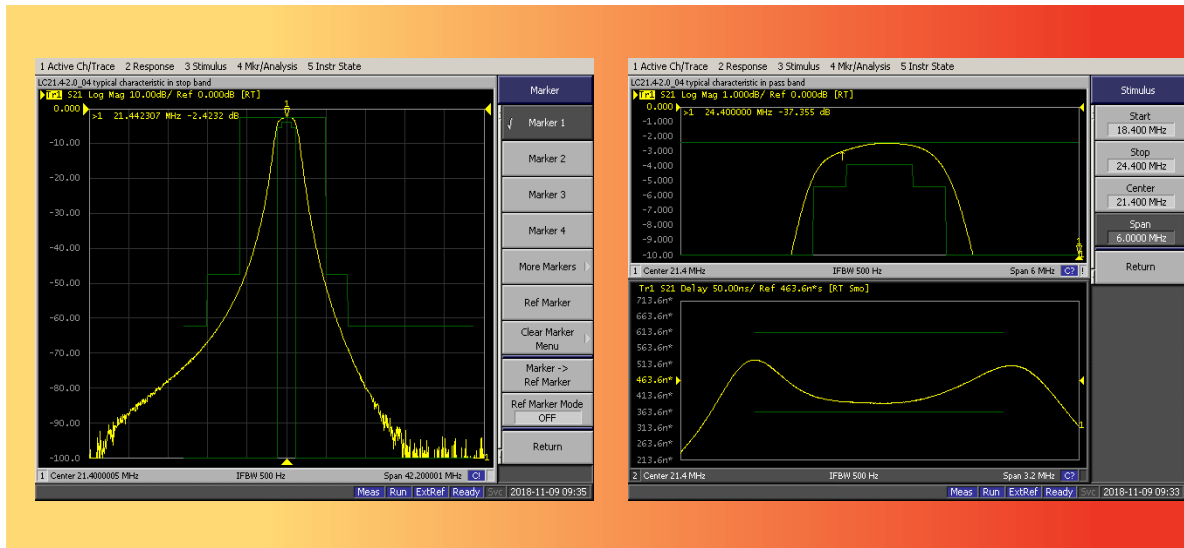
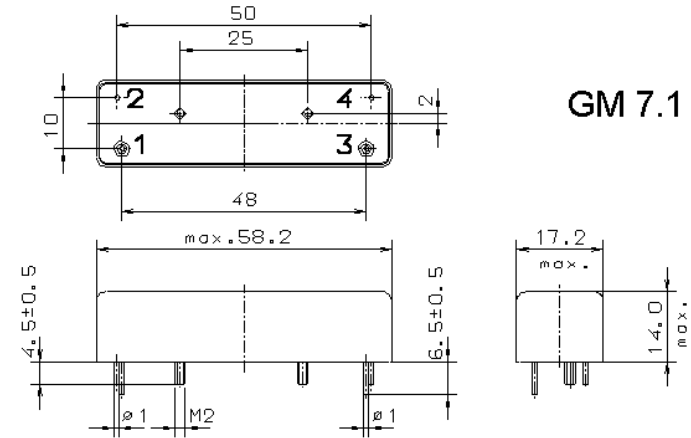
### Features:

- 21.4MHz center frequency
- +/-1.0MHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, 4dB max
- Stopband attenuation >60dB
- RoHS compliant
- -10°C to +70°C



### Features:

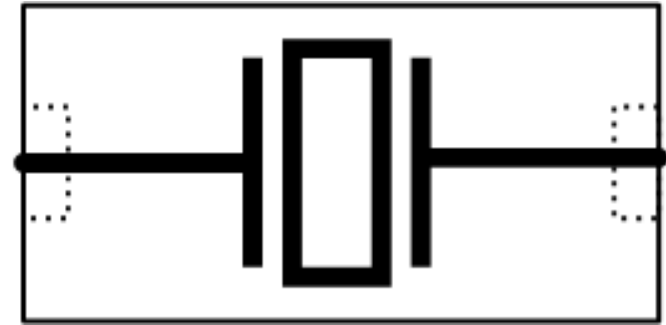
- 21.4MHz center frequency
- +/-1.0MHz usable passband
- Single-ended 50 ohm input/output
- Insertion loss, 4dB max
- Stopband attenuation >45dB
- RoHS compliant
- -20°C to +70°C





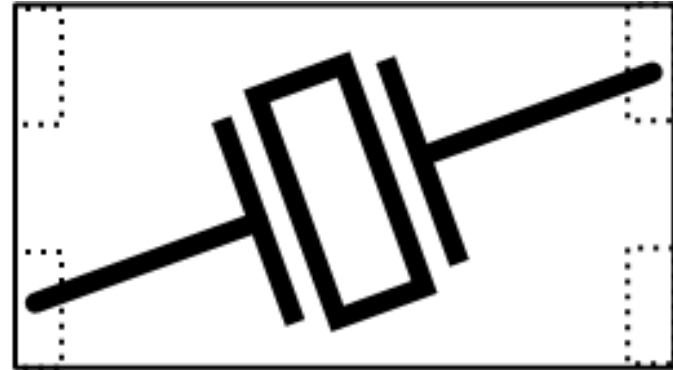
## Features:

- Frequency Range: 8 to 60 MHz
- Footprint: 5 x 3.2 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 50 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



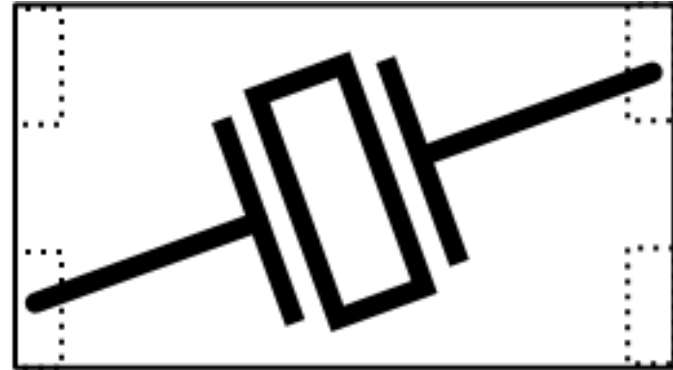
## Features:

- Frequency Range: 8 to 150 MHz
- Footprint: 5 x 3.2 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 50 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



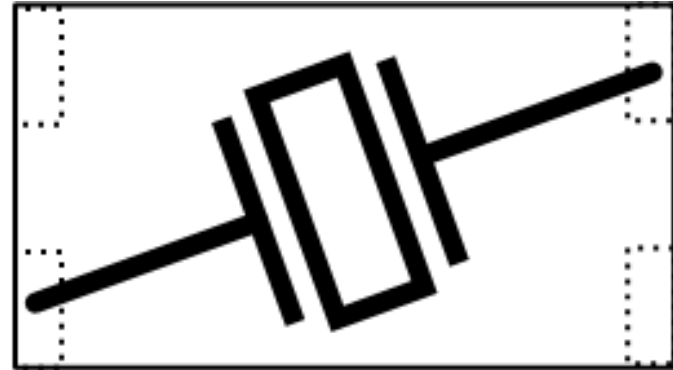
## Features:

- Frequency Range: 12 to 60 MHz
- Footprint: 4 x 2.5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 50 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



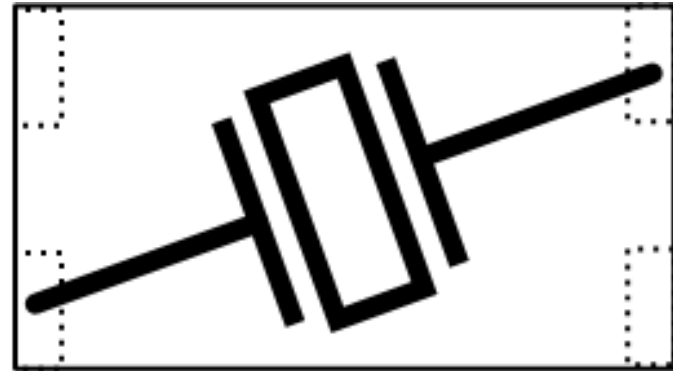
## Features:

- Frequency Range: 8 to 54 MHz
- Footprint: 5 x 3.2 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 40 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



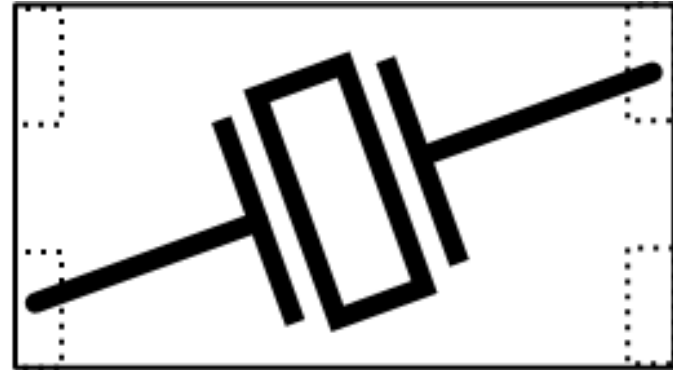
## Features:

- Frequency Range: 12 to 60 MHz
- Footprint: 3.2 x 2.5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 60 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



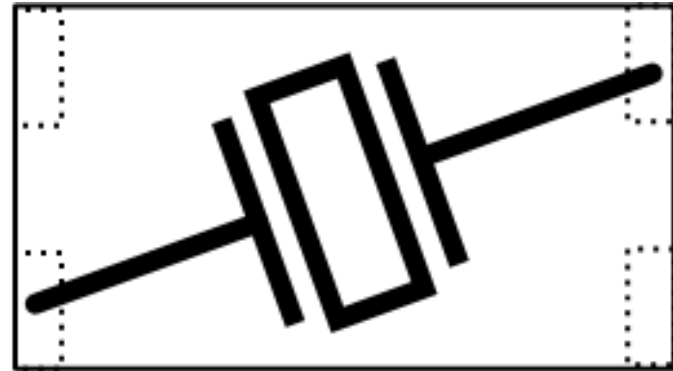
## Features:

- Frequency Range: 14 to 60 MHz
- Footprint: 2.5 x 2 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 60 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



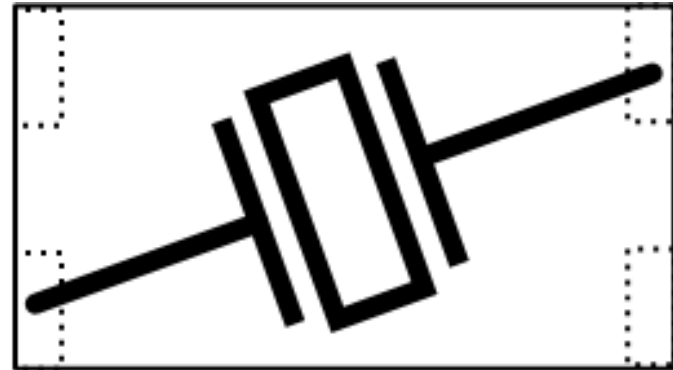
## Features:

- Frequency Range: 16 to 60 MHz
- Footprint: 2 x 1.6 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 100 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



## Features:

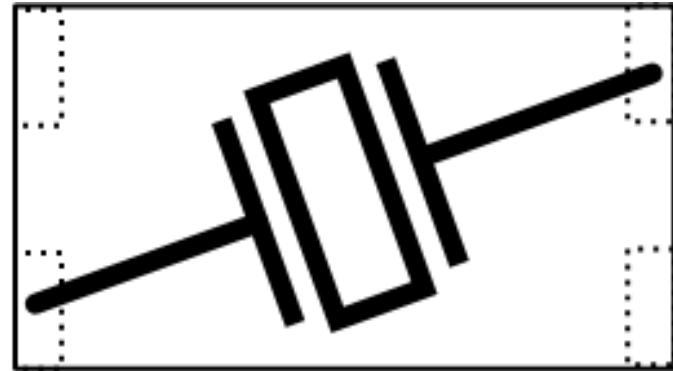
- Frequency Range: 24 to 54 MHz
- Footprint: 1.6 x 1.2 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 100 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm





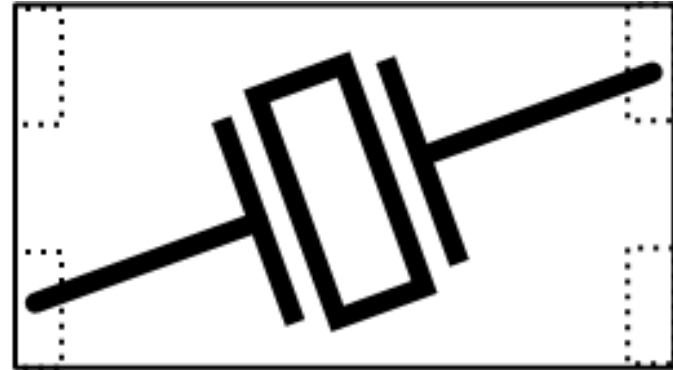
## Features:

- Frequency Range: 8 to 100 MHz
- Footprint: 7 x 5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 30 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm



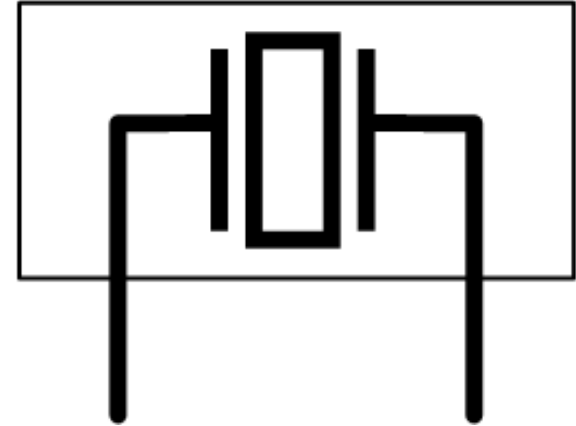
## Features:

- Frequency Range: 8 to 100 MHz
- Footprint: 7 x 5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 30 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm



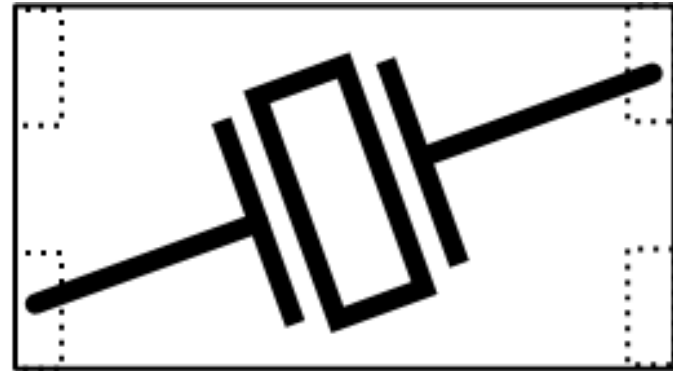
## Features:

- Frequency Range: 7 to 200 MHz
- Footprint: 7.9 x 3.2 mm, through hole
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 25 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm



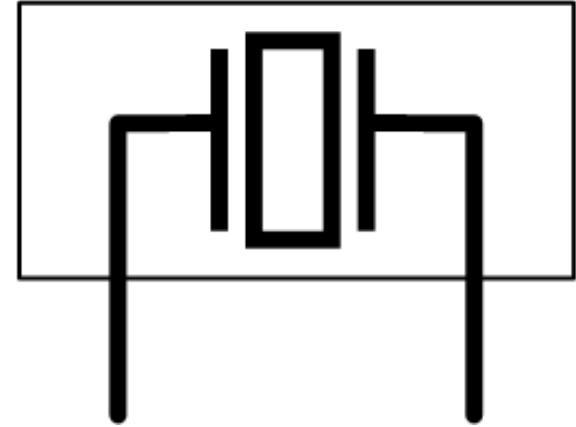
## Features:

- Frequency Range: 9.68 to 100 MHz
- Footprint: 6 x 3.5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 30 Ohms
- Temperature stability 0 to 70°C: 10 ppm
- Temperature stability -40 to 85°C: 50 ppm



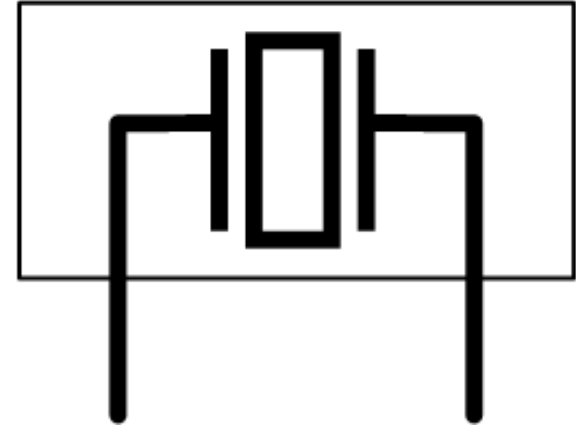
## Features:

- Frequency Range: 1.536 to 150 MHz
- Footprint: 11.5 x 5.0 mm, through hole
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 25 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm



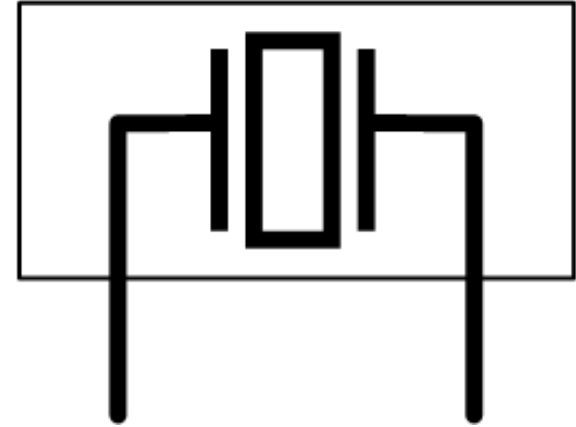
## Features:

- Frequency Range: 3.5 to 100 MHz
- Footprint: 10.9 x 4.5 mm, through hole
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 30 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm



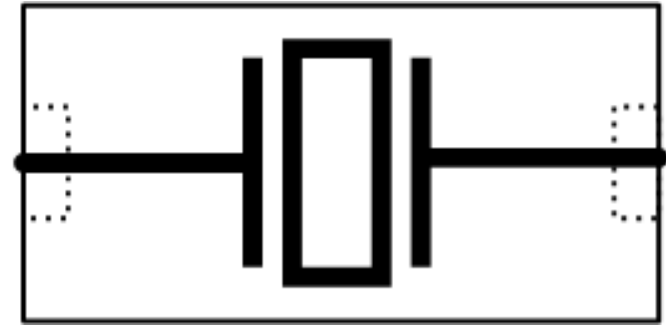
## Features:

- Frequency Range: 1.8432 to 150 MHz
- Footprint: 13.5 x 11.5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 25 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm



## Features:

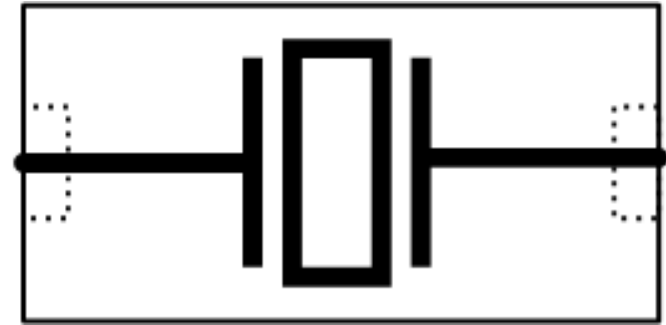
- Frequency Range: 3.5 to 75 MHz
- Footprint: 11.5 x 5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 25 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm





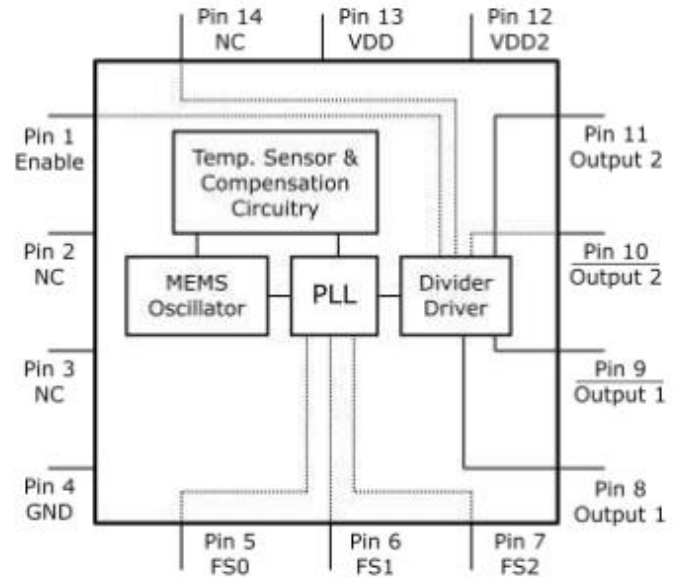
## Features:

- Frequency Range: 3.5 to 75 MHz
- Footprint: 11.5 x 5 mm, surface mount
- Temperature Range: -40 to 85 °C
- Cload max: 32 pF
- Co max: 5 pF
- Mode: fundamental, 3rd OT
- Maximum Drive Level: 100 uW
- ESR at 24 MHz: 25 Ohms
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 50 ppm



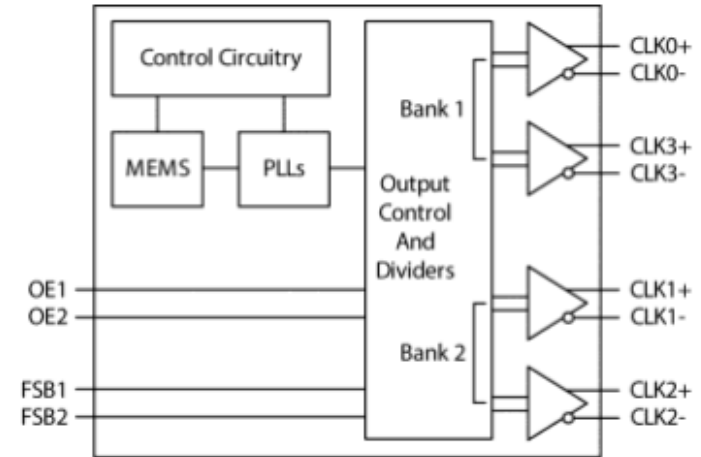
## Features:

- Low RMS Phase Jitter: 1.5 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:  $-20^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Two configurable independent outputs:
- LVCMOS, LVPECL, LVDS, HCSL
- Pin-Selectable Configurations:
- 3-bit Output Frequency Combinations
- Short Lead Times: 2 Weeks
- Wide Freq. Range: 2.3 to 460MHz
- Miniature Footprint of 3.2mm x 2.5mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Supply Range of 2.25V to 3.6V
- DSC20XX supports pin control
- DSC21xx supports I<sup>2</sup>C interface
- DSC22XX supports SPI interface



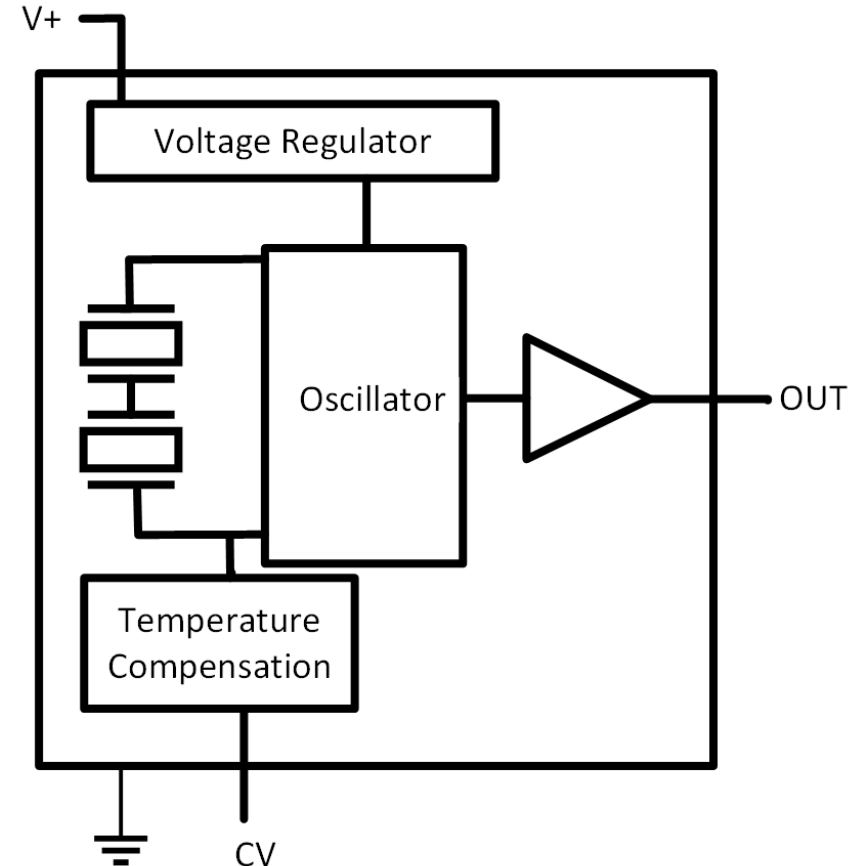
## Features:

- Low RMS Phase Jitter: <1ps (typ.)
- High Stability:  $\pm 25$ ppm,  $\pm 50$ ppm
- Wide Temperature Range:
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- High Supply Noise Rejection: -50dBc
- Wide frequency range: 2.3MHz to 460MHz
- 20-pin QFN footprint (5.0mm x 3.2mm)
- Excellent shock and vibration immunity:
  - Qualified to MIL-STD-883
- Four format-configurable outputs:
  - LVPECL, LVDS, HCSL, LVCMOS
- Available pin-selectable frequency table:
  - 1 pin per bank for two frequency sets
- High Reliability: 20x better MTF than quartz - based devices
- Wide supply range of 2.25V to 3.6V
- AEC-Q100 Automotive qualified



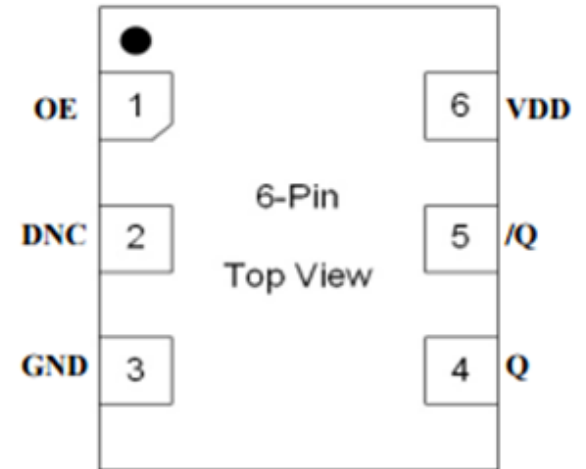
## Features:

- Lowest Noise TCXO in market
- Target Market: Test and Measurement
- Frequency Range: 5 to 50 MHz
- Output: CMOS
- Footprint: 23 x 18 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 82.5 mW
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -116 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -168 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm
- g-Sensitivity: 0.2 ppb/g



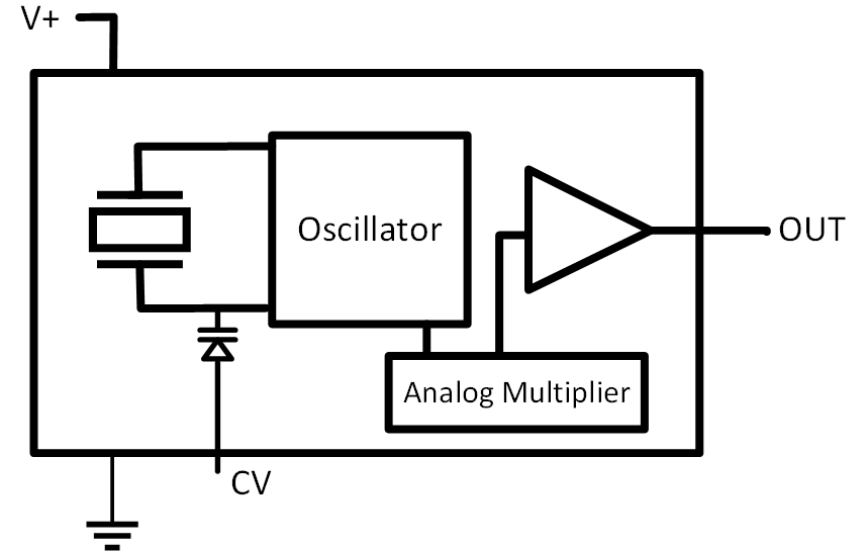
## Features:

- Supports 1 LVCMOS/LVPECL/LVDS/HSDL output
- Typical phase jitter: 0.2ps
- Guaranteed  $\pm 2.5$ ppm over  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- $\pm 5$ ppm total frequency stability
- Integrated crystal
- 10MHz to 850MHz
- Programmable output buffers
- O/E Pin selectable
- Industry standard 6-Pin 7mm x 5mm LGA package



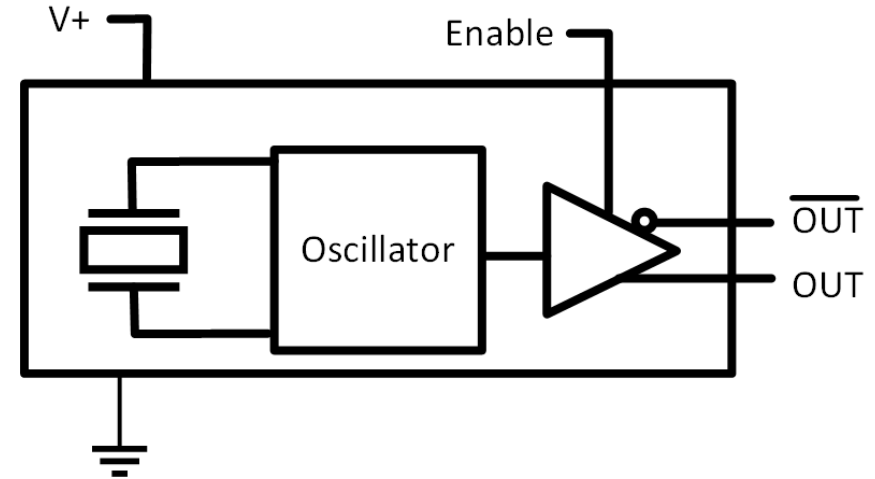
## Features:

- Smallest form factor, High Frequency VCISO in market
- Frequency Range: 0.8 to 3.2 GHz
- Output: Sine, Balanced or Differential Sinewave
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 250 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -95 dBc/Hz @2949.12 MHz carrier
- Phase Noise 1 MHz offset: -162 dBc/Hz @2949.12MHz carrier



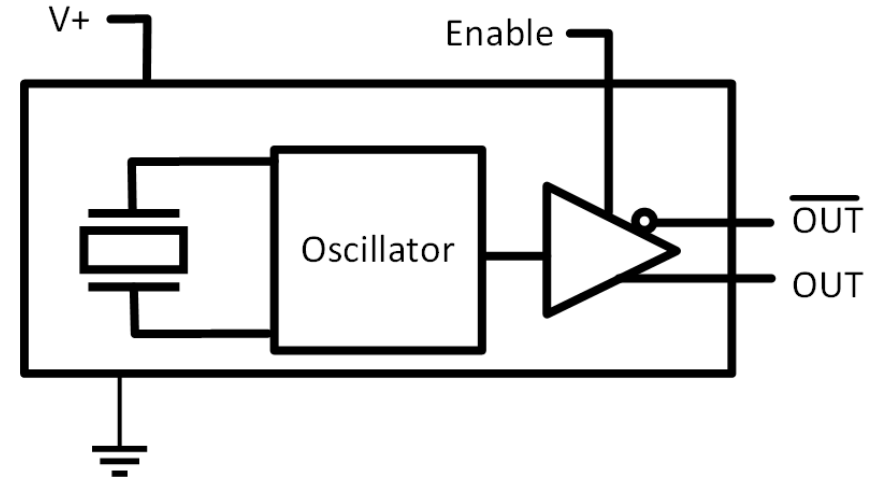
## Features:

- Frequency Range: 13.5 to 220 MHz
- Output: LVPECL, LVDS, HCSL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3, 3.3 V
- Power: 105 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 2 ppm
- 12k to 20 MHz jitter: 150 fs-rms @ 156.25 MHz



## Features:

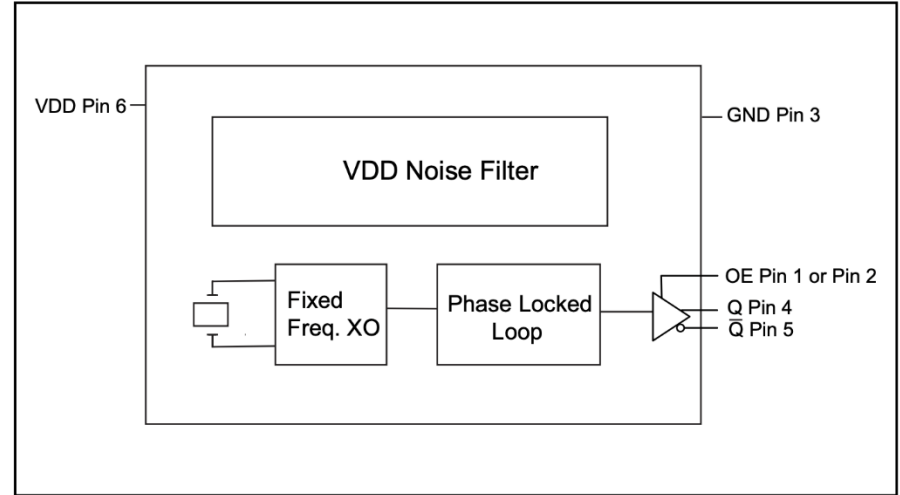
- Frequency Range: 10 to 170 MHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 152.5 mW
- Temperature Range: -40 to 105 °C
- Temperature stability over Operating Temperature Range: 100 ppm
- 12k to 20 MHz jitter: 100 fs-rms @ 156.25 MHz





## Features:

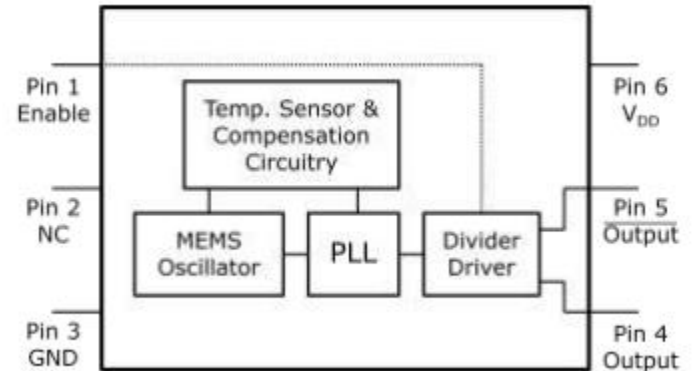
- Typical phase jitter: 200fs
- Supports 1 output
- Integrated crystal
- 2.5MHz to 850MHz
- Programmable output buffers
- O/E Pin selectable
- Industry standard package:
  - MX55 - 3.2mm x 5mm
  - MX57 - 5mm x 7mm



Part Number	Output Frequency (MHz)	Output Format	Frequency Stability (ppm)	Jitter (typ) (ps RMS)	Supply current (mA)	Supply voltage (V)	Temp. Range (°C)	Package size (mmxmm)	Custom Configuration
MX57	<840	LVC MOS	±50	0.2	70	2.25 to 3.63	-20 to 70 -40 to 85	7.0x5.0 6L	ClockWorks Web tool
MX55	<840	LVPECL						5.0x3.2 6L	
MX85	<840	LVDS HSCL		0.2	90			7.0x5.0 38-PIN LGA	

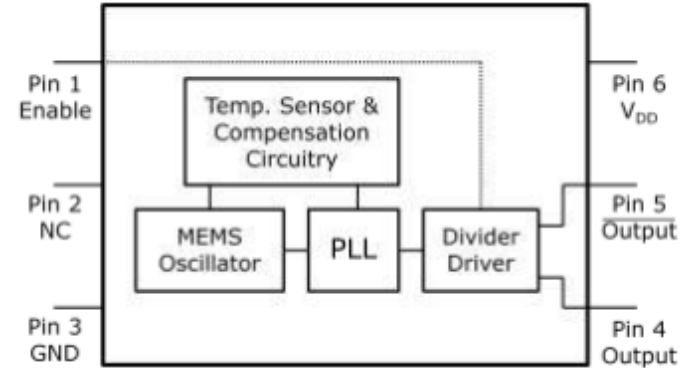
## Features:

- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive:  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 170MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function



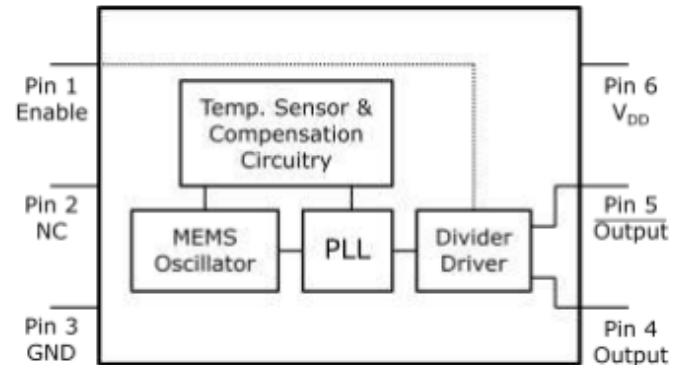
## Features:

- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function
- LVDS & HCSL Versions Available



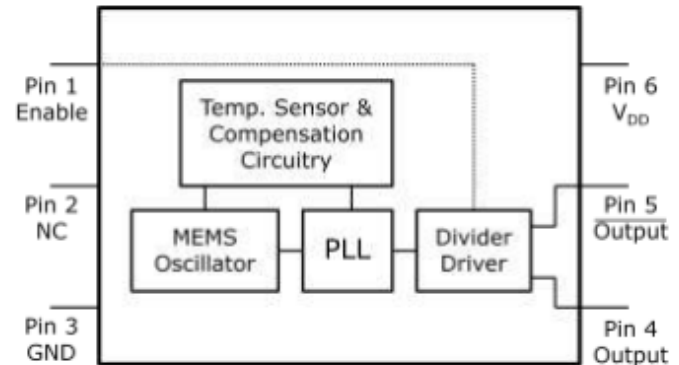
## Features:

- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function
- LVPECL & HCSL Versions Available



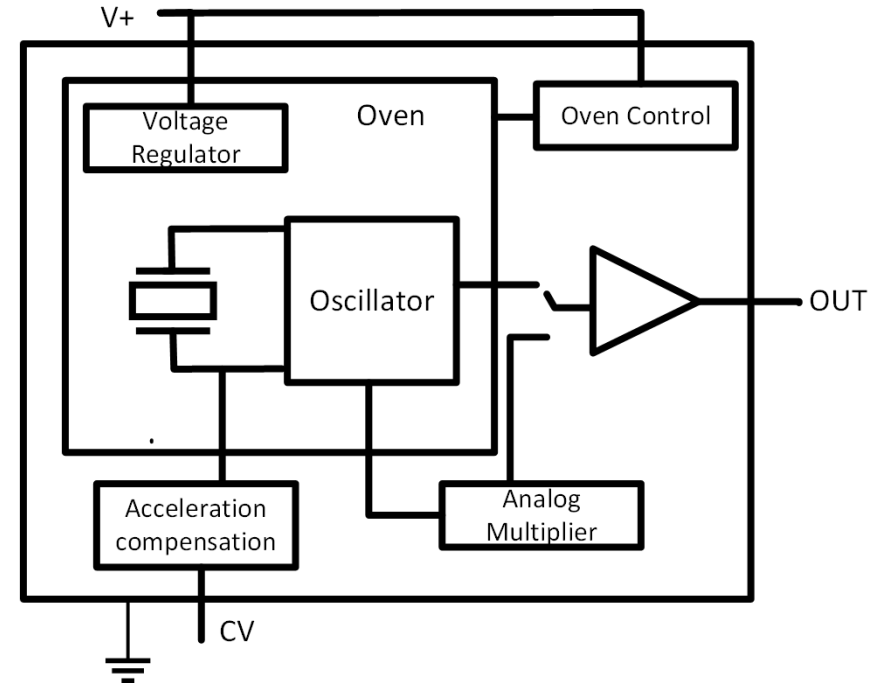
## Features:

- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
  - Qualified to MIL-STD-883
- High Reliability
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function
- LVDS & LVPECL Versions Available



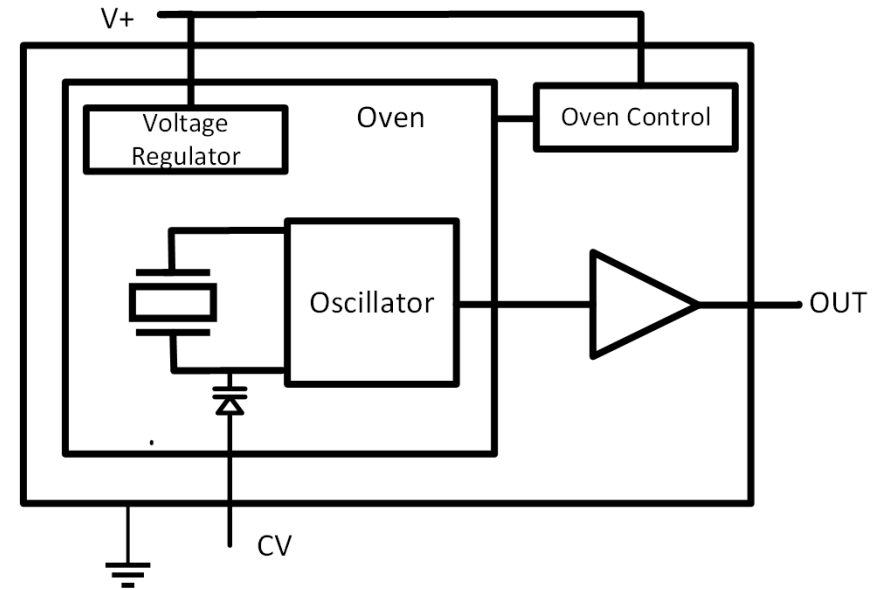
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -170 dBc/Hz @10 MHz carrier



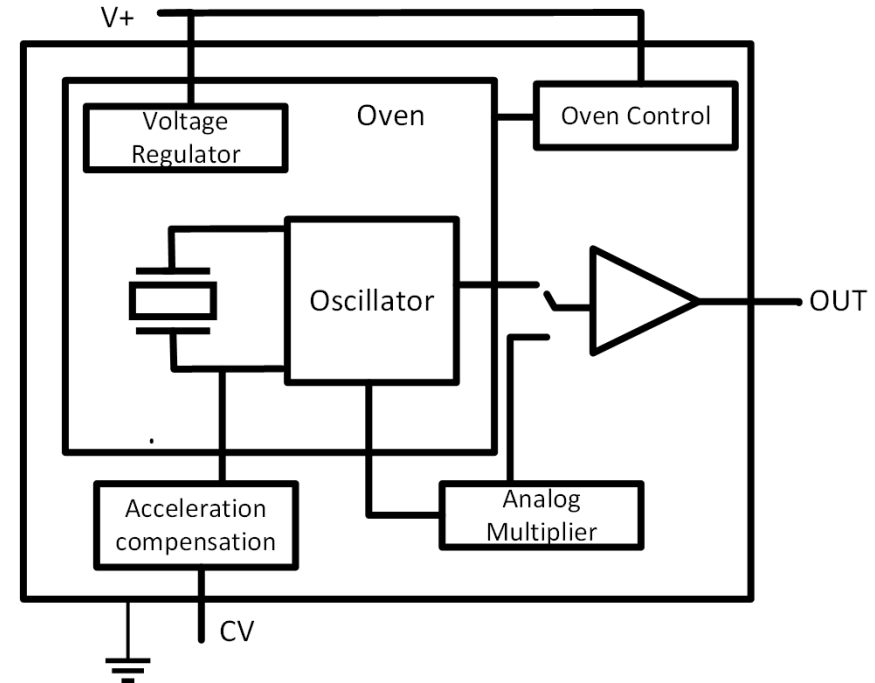
## Features:

- Low close in phase noise with excellent daily aging
- Target Market: Test and Measurement
- 10 MHz
- Standard Frequency: 10 MHz
- Output: Sine
- Footprint: 51 x 51 mm, through hole
- Supply Voltage: 12, 15 V
- Power: 2 W
- Temperature Range: -40 to 70 °C
- Phase Noise 10 Hz offset: -140 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -163 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 5 ppb



## Features:

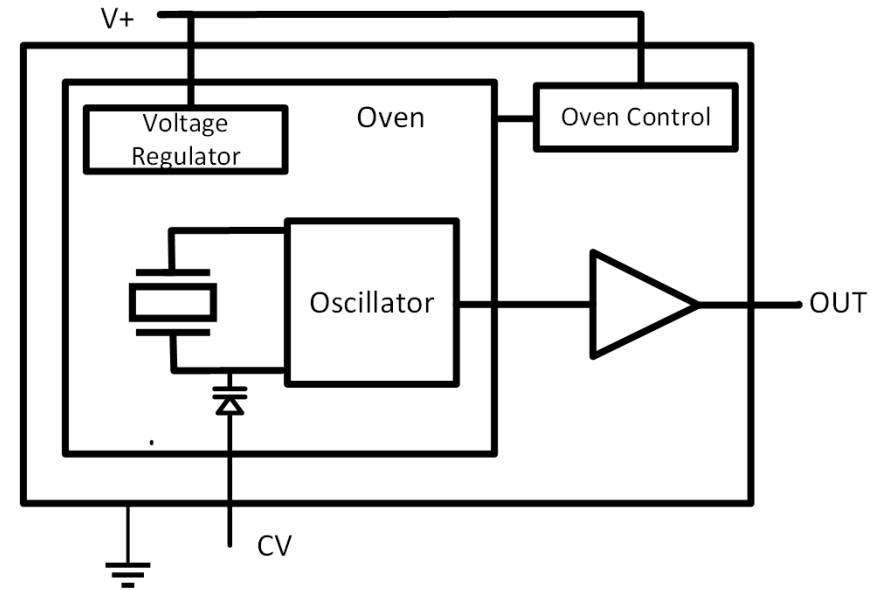
- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 50 to 250 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.05 ppb/g
- Phase Noise 10 Hz offset: -100 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @100 MHz carrier





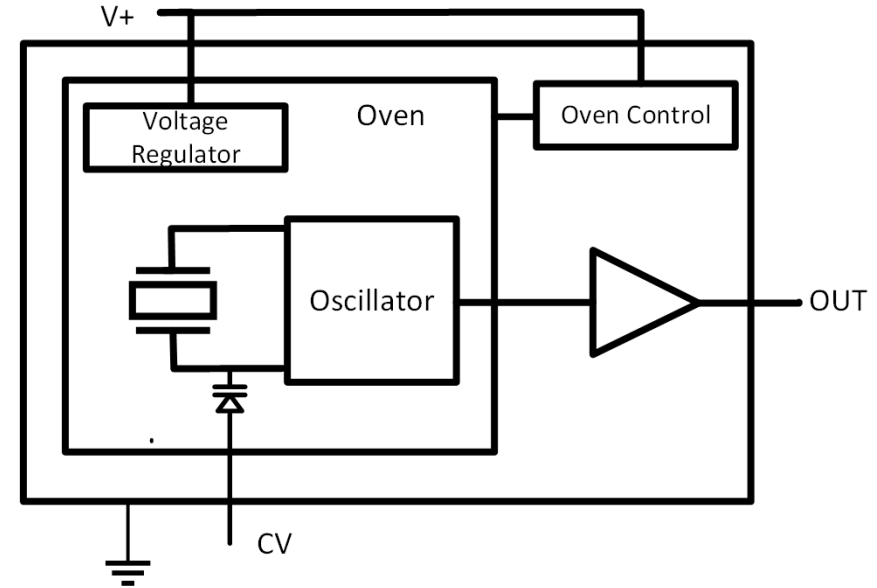
## Features:

- Low Phase Noise Oscillator
- Target Market: Test and Measurement
- Frequency Range: 80 to 120 MHz
- Output: Sine
- Footprint: 25 x 25 mm, through hole
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -45 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -178 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 200 ppb
- Aging per Year: 200 ppb



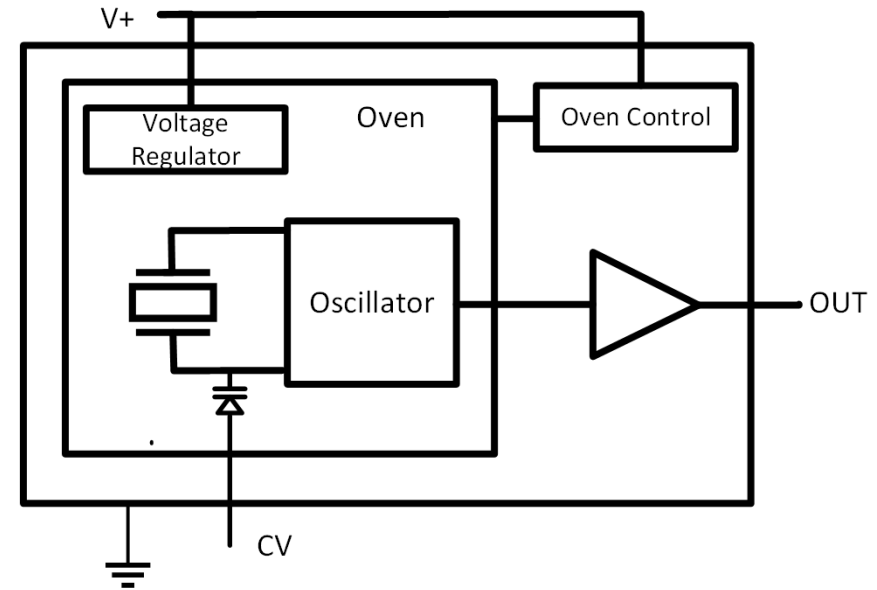
## Features:

- Frequency Range: 20 to 35 MHz
- Output: Sine
- Footprint: 25 x 25 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -115 dBc/Hz @20 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @20 MHz carrier
- Temperature stability over Operating Temperature Range: 50 ppb
- Aging per Year: 100 ppb



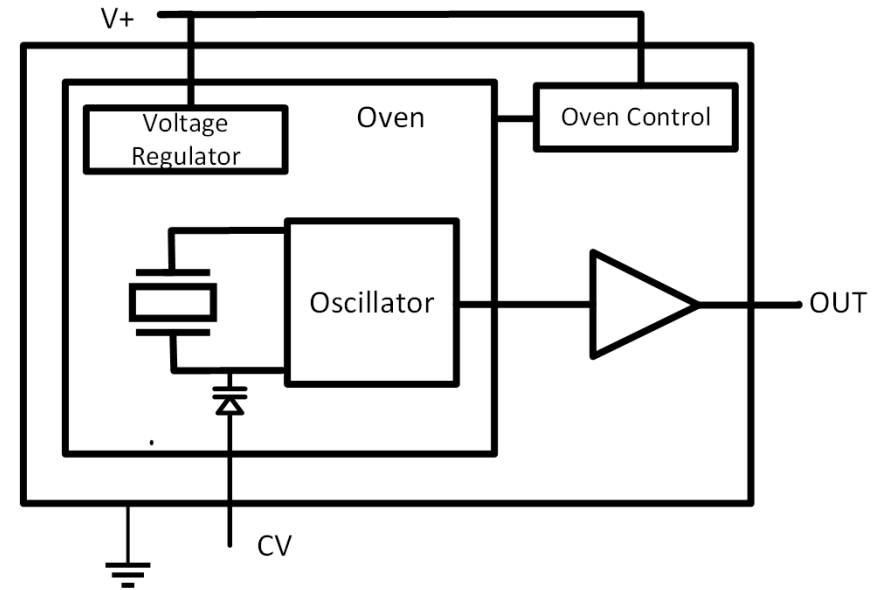
## Features:

- smallest form factor low noise oscillator
- Target Market: Test and Measurement
- Frequency Range: 10 to 20 MHz
- Output: Sine
- Footprint: 20 x 20 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -173 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 20 ppb
- Aging per Year: 30 ppb



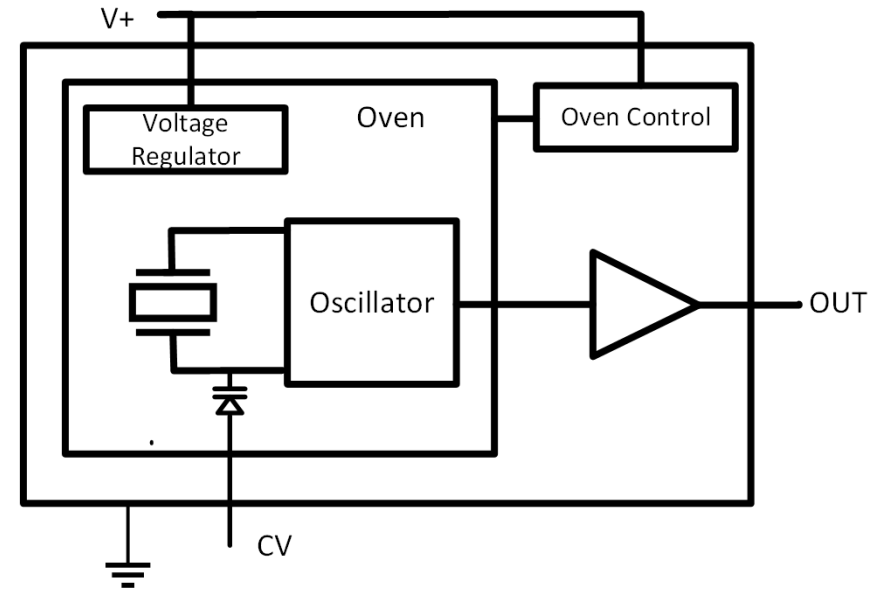
## Features:

- smallest form factor low noise oscillator
- Target Market: Test and Measurement
- Frequency Range: 80 to 120 MHz
- 100 MHz
- Standard Frequency: 100 MHz
- Output: Sine
- Footprint: 20 x 20 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -178 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 200 ppb
- Aging per Year: 200 ppb



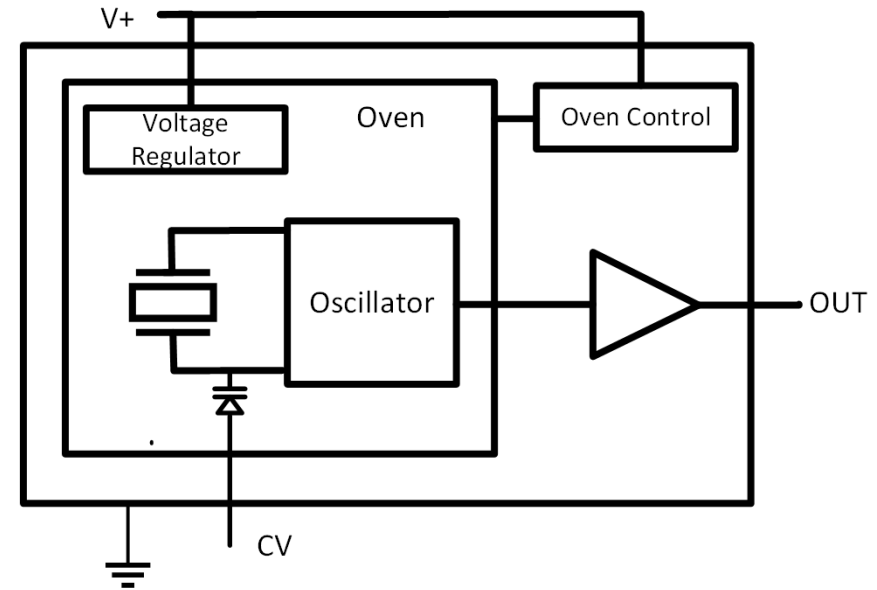
## Features:

- low noise, small factor OCXO
- Frequency Range: 80 to 120 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 1 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -95 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 50 ppb
- Aging per Year: 300 ppb



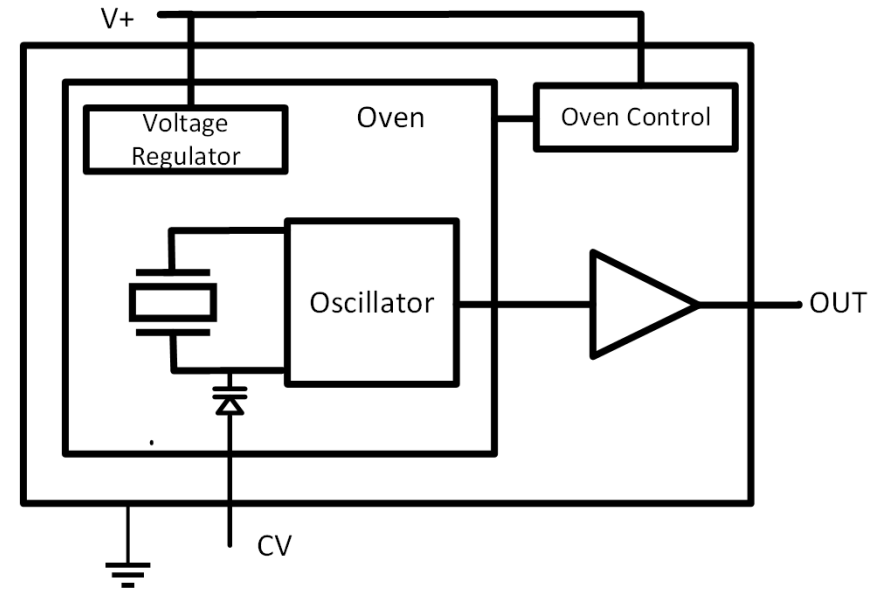
## Features:

- Frequency Range: 10 to 100 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 8 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.03 ppm
- Aging per Year: 0.1 ppm
- Phase Noise 10 Hz offset: -125 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



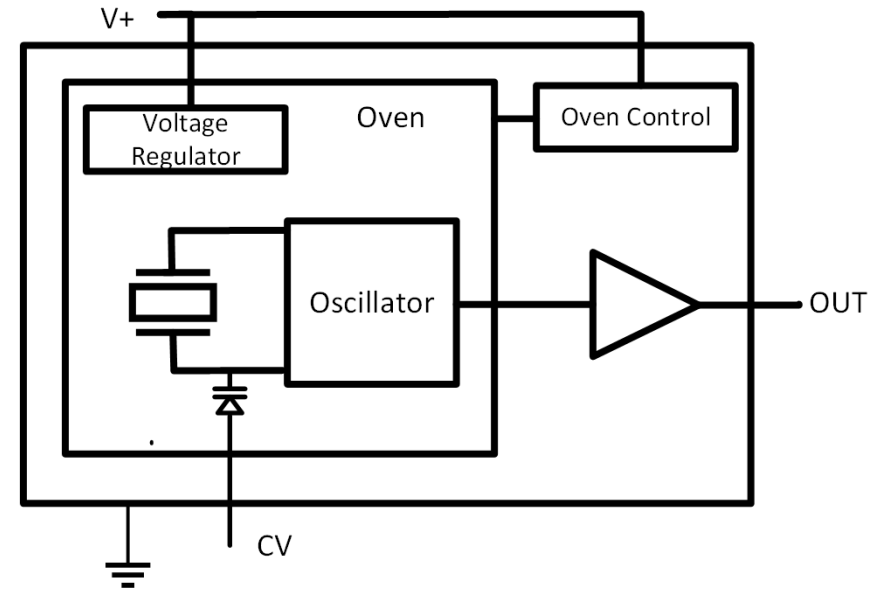
## Features:

- OCXO performance at ~ 1/5 the power
- Frequency Range: 10 to 100 MHz
- Output: CMOS, Sine
- Footprint: 13 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 12 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.03 ppm
- Aging per Year: 0.1 ppm
- Phase Noise 10 Hz offset: -125 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



## Features:

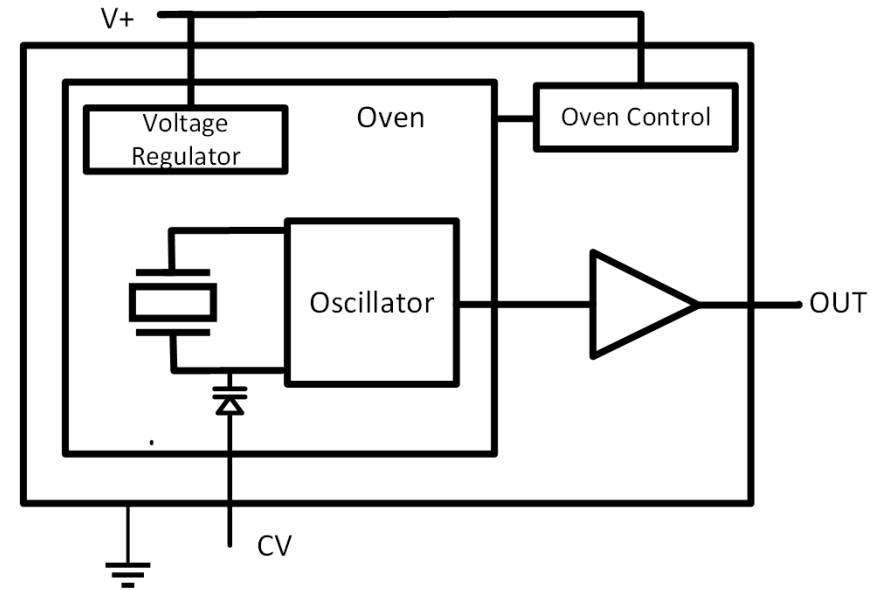
- High stability, Low phase noise oscillator
- Frequency Range: 5 to 20 MHz
- Output: CMOS, Sine
- Footprint: 38 x 28 mm, through hole, surface mount
- Supply Voltage: 5, 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 10 ppb
- Aging per Year: 100 ppb





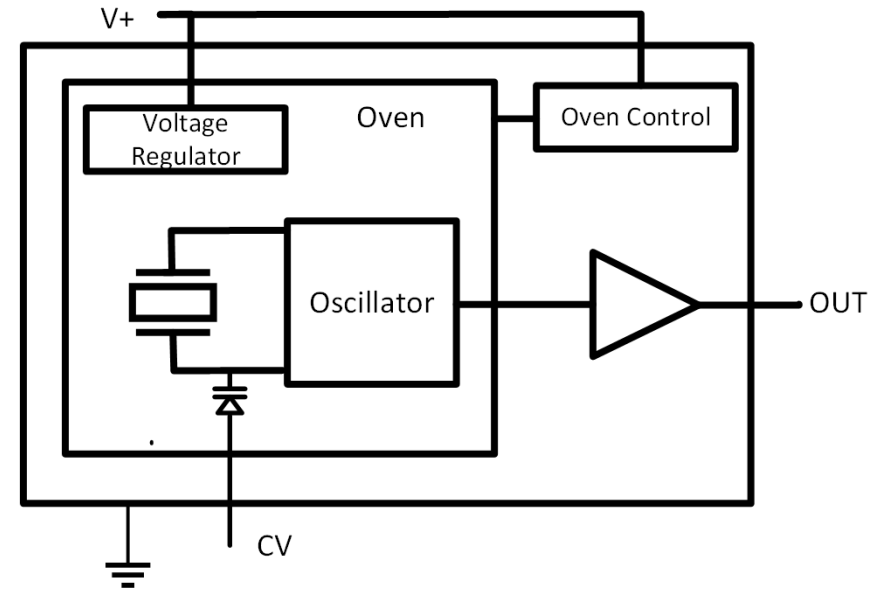
## Features:

- High stability, Low phase noise oscillator
- Frequency Range: 50 to 130 MHz
- Output: Sine
- Footprint: 38 x 28 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -176 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 100 ppb
- Aging per Year: 200 ppb



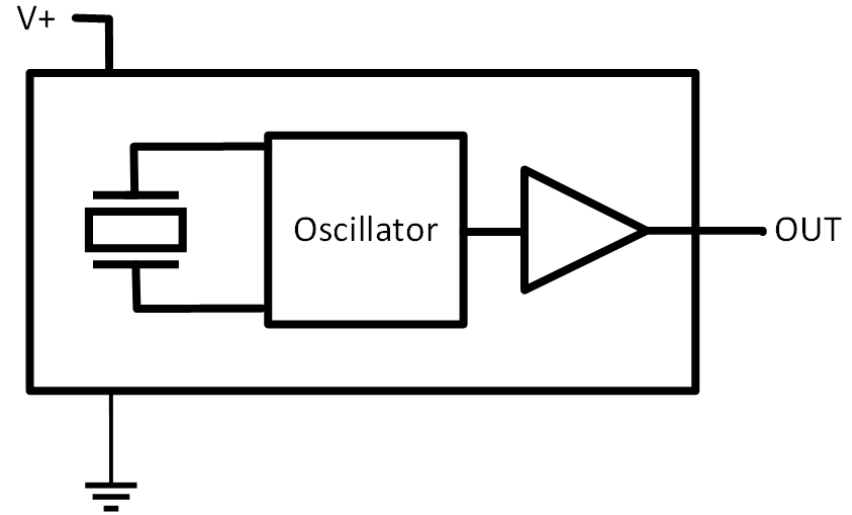
## Features:

- Low Phase Noise Oscillator
- Target Market: Test and Measurement
- Frequency Range: 10 to 20 MHz
- Output: Sine
- Footprint: 25 x 25 mm, through hole
- Supply Voltage: 5, 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -140 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 20 ppb
- Aging per Year: 30 ppb



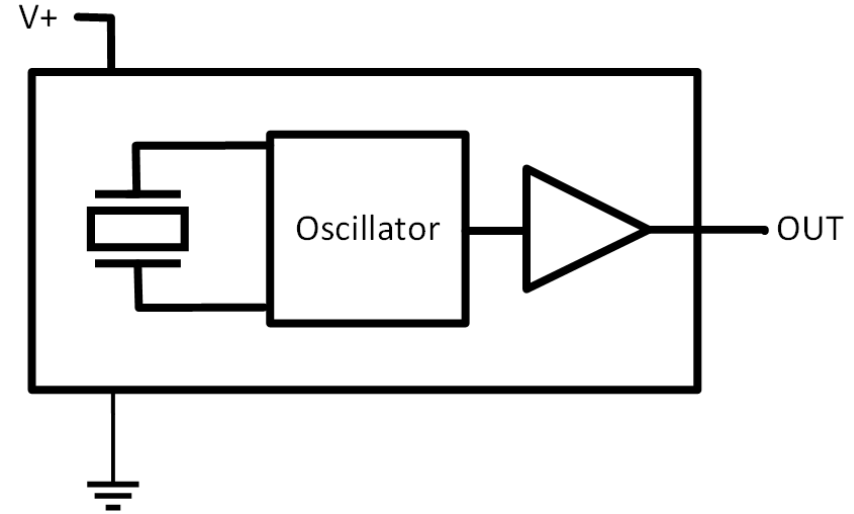
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.4 to 60 MHz
- Output: TTL
- Footprint: Ø15.4 mm, through hole
- Supply Voltage: 5 V
- Power: 165 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 0.6 ms Duration
- 20 g Vibration



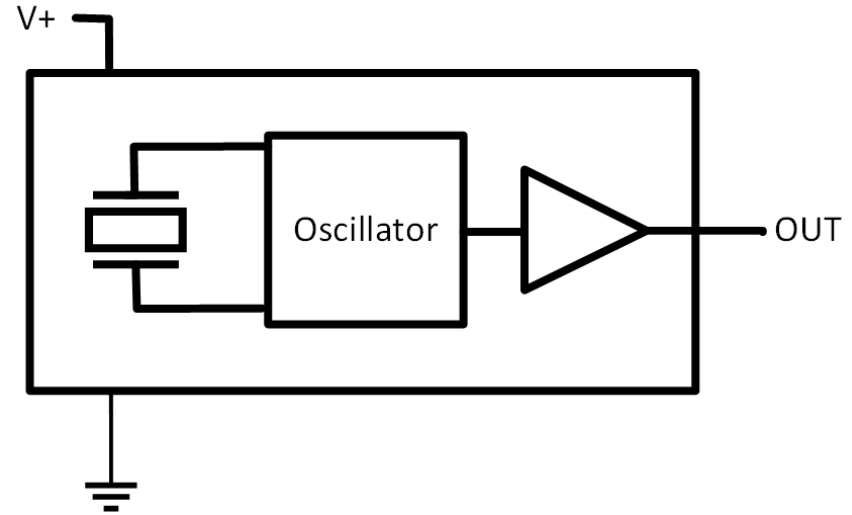
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.1 to 60 MHz
- Output: TTL
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 5 V
- Power: 1.5 W
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



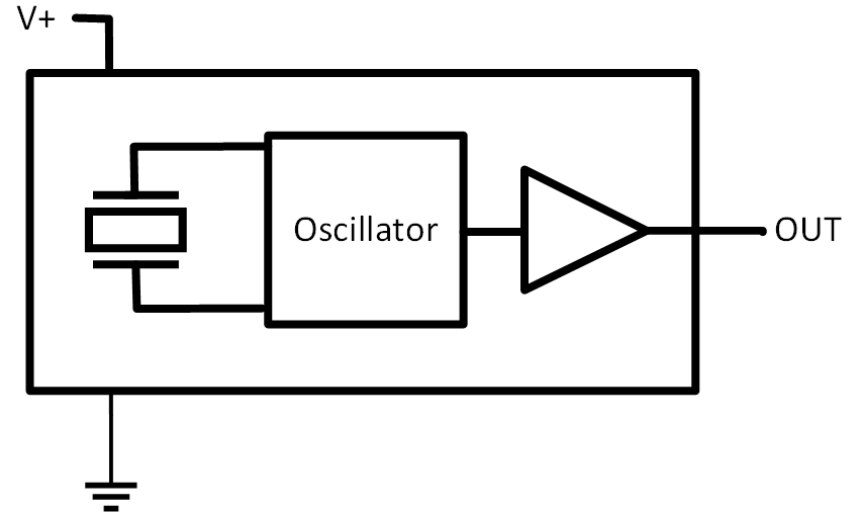
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 60 MHz
- Output: TTL
- Footprint: 12 x 12 mm, surface mount
- Supply Voltage: 5 V
- Power: 350 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



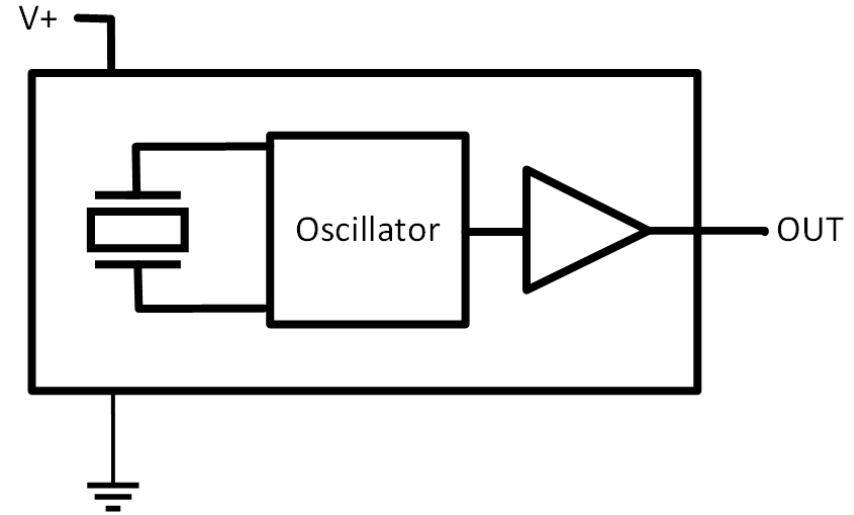
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 60 MHz
- Output: TTL
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 5 V
- Power: 150 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



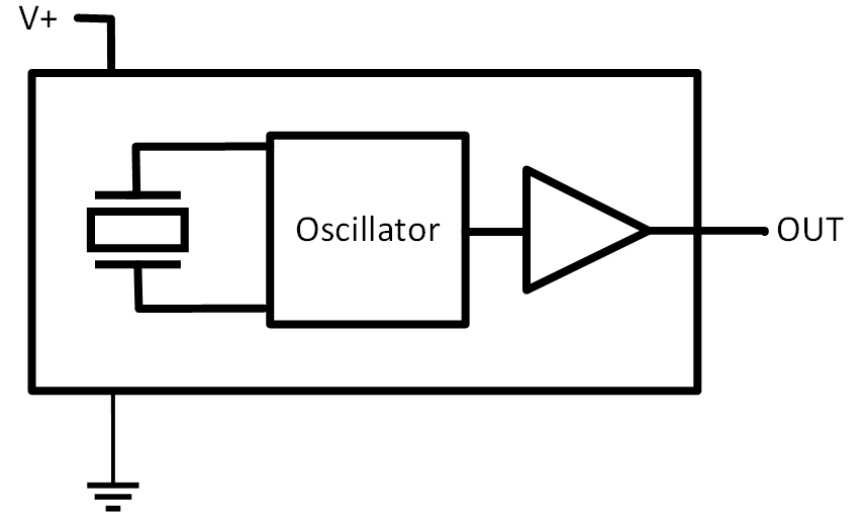
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.01 to 65 MHz
- Output: CMOS
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 5 V
- Power: 50 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



## Features:

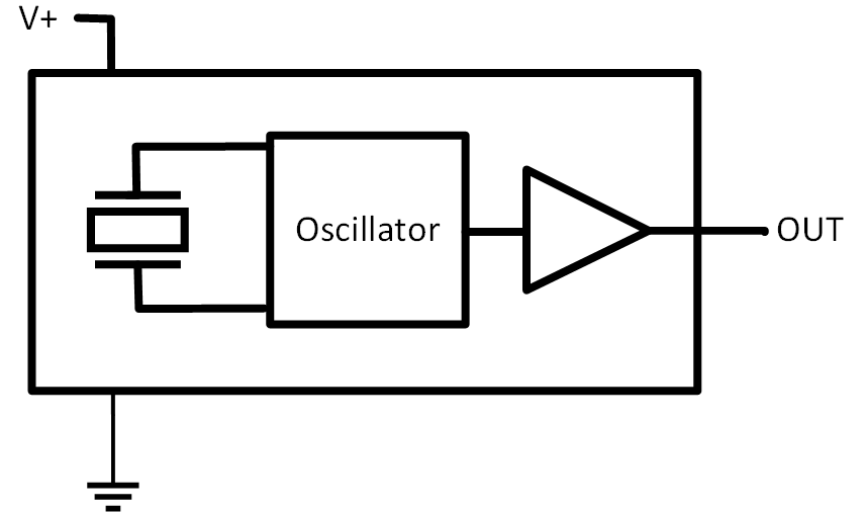
- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 85 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 5 V
- Power: 75 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration





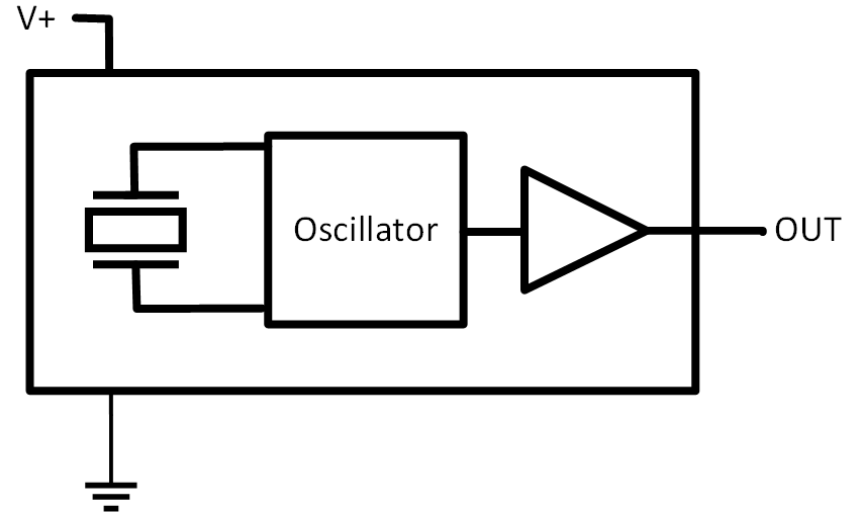
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 85 MHz
- Output: TTL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 75 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



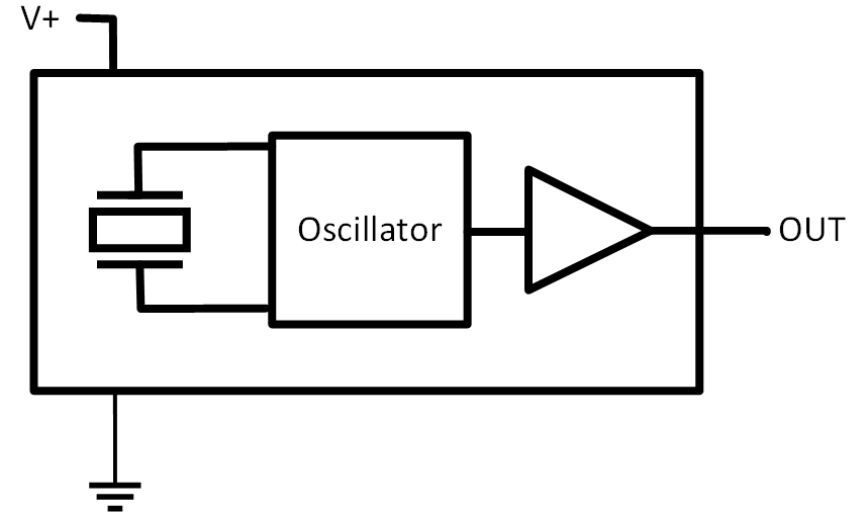
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.45 to 85 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 75 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



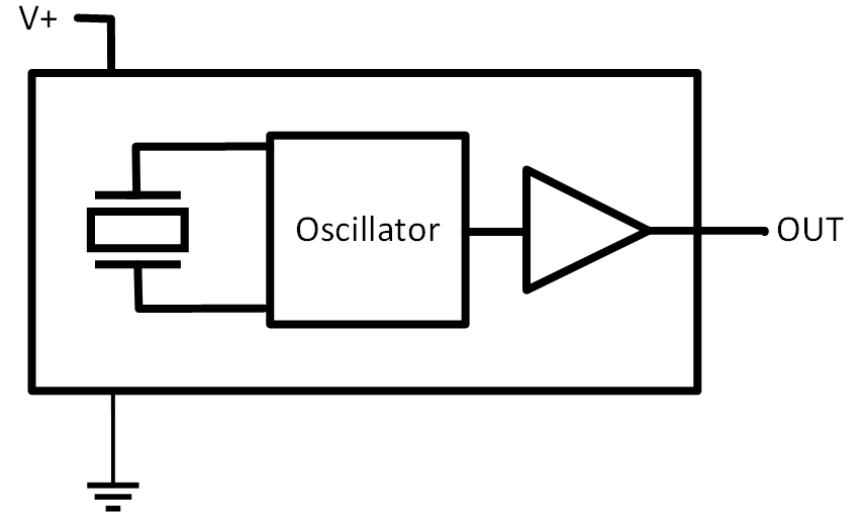
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -55 dBc/Hz @1000 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @1000 MHz carrier



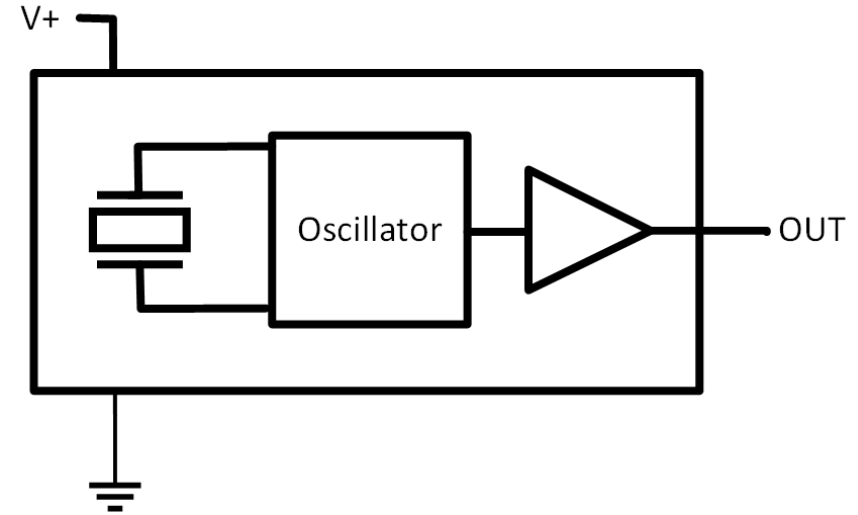
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.6 ppb/g
- Phase Noise 10 Hz offset: -55 dBc/Hz @1000 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @1000 MHz carrier



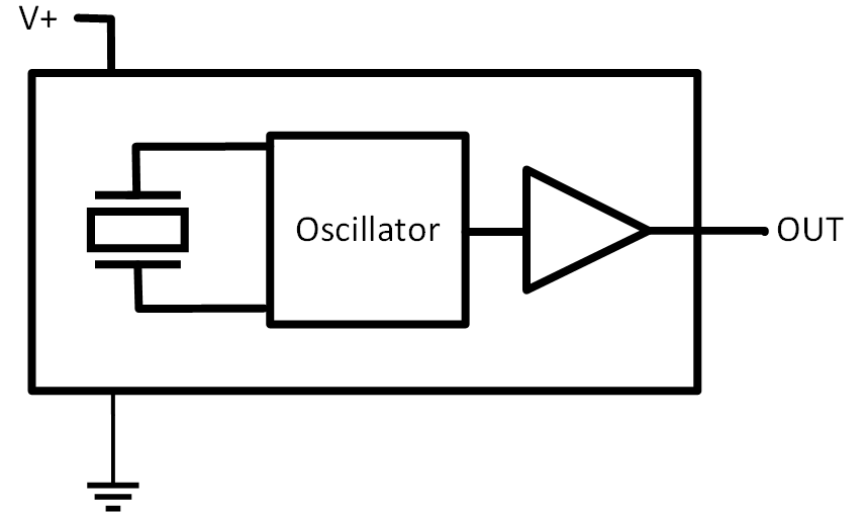
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 250 mW
- Temperature Range: 10 to 85 °C
- 20000 g Shock, 0.2 ms Duration
- Phase Noise 10 Hz offset: -52 dBc/Hz  
@1000 MHz carrier
- Phase Noise 100 kHz offset: -152 dBc/Hz  
@1000 MHz carrier



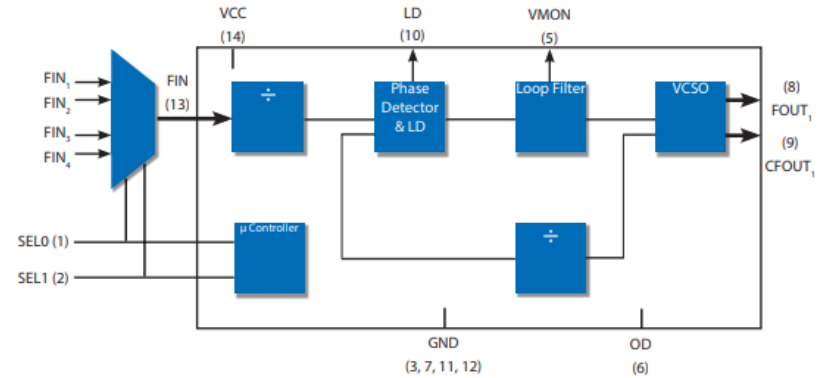
## Features:

- Frequency Range: 0.15 to 1 GHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 231 mW
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -46 dBc/Hz  
@622.08 MHz carrier
- Phase Noise 100 kHz offset: -134 dBc/Hz  
@622.08 MHz carrier



## Features:

- Frequency Range: 1.5 to 800 MHz
- Output: CMOS, LVPECL, LVDS
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 6 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 0.008 to 800 MHz
- Number of Inputs: 4
- Input Logic: CMOS, LVPECL, LVDS



## Features:

- Frequency Range: 125 to 850 MHz
- Number of RF outputs: 2
- Output: LVPECL, LVDS
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 1.5 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 0.008 to 400 MHz
- Number of Inputs: 4
- Input Logic: CMOS, LVPECL, LVDS

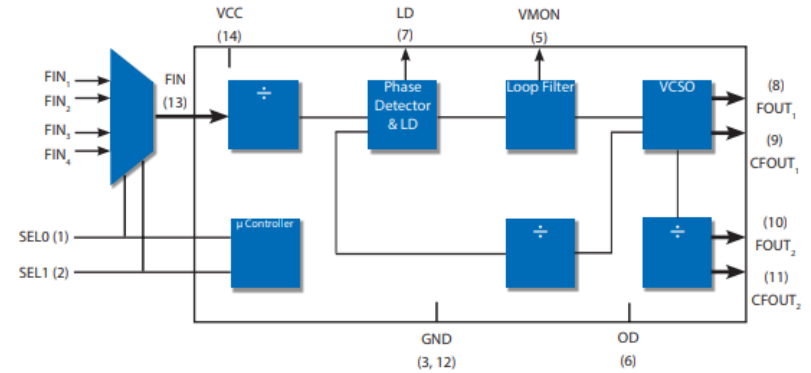
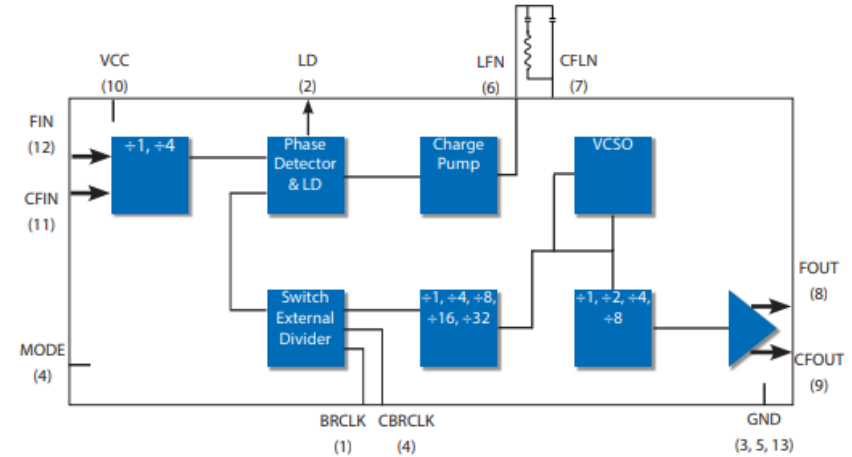


Figure 1 Functional block diagram



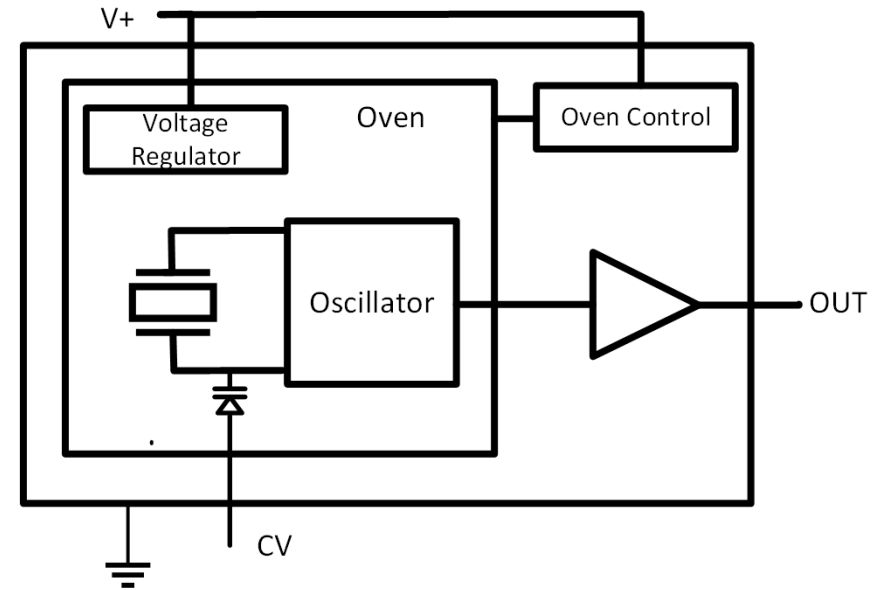
## Features:

- Frequency Range: 0.062 to 1.2 GHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 6 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 1 to 1000 MHz
- Number of Inputs: 1
- Input Logic: CMOS, LVPECL, LVDS



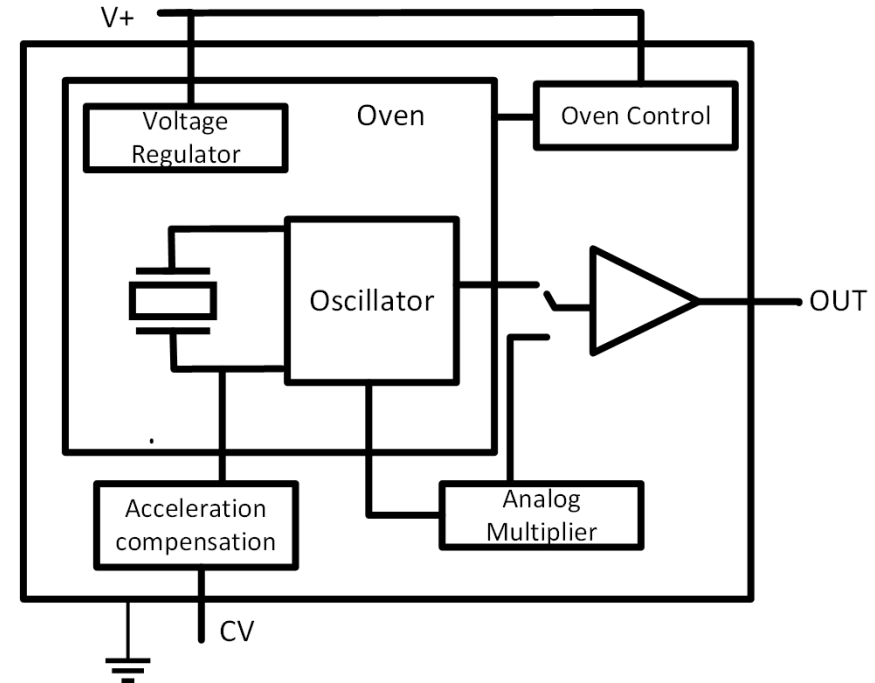
## Features:

- Only space qualified EMXO
- Target Market: Space
- Frequency Range: 10 to 120 MHz
- Output: CMOS, Sine
- Footprint: 26 x 24 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 10 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 0.1 ppm
- Aging per Year: 0.2 ppm
- 20 g Vibration



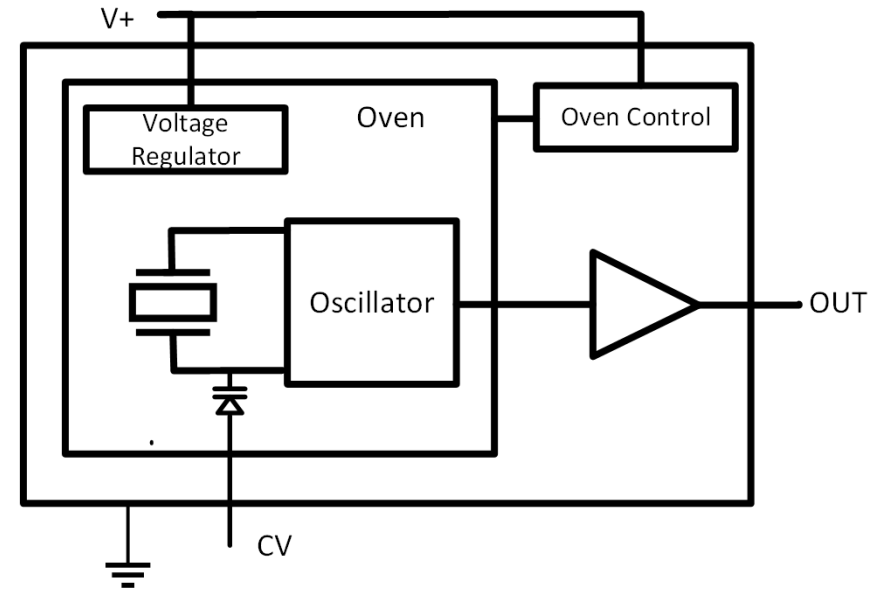
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 50 to 250 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.05 ppb/g
- Phase Noise 10 Hz offset: -100 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @100 MHz carrier



## Features:

- High stability, Low phase noise oscillator
- Frequency Range: 50 to 130 MHz
- Output: Sine
- Footprint: 38 x 28 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -176 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 100 ppb
- Aging per Year: 200 ppb

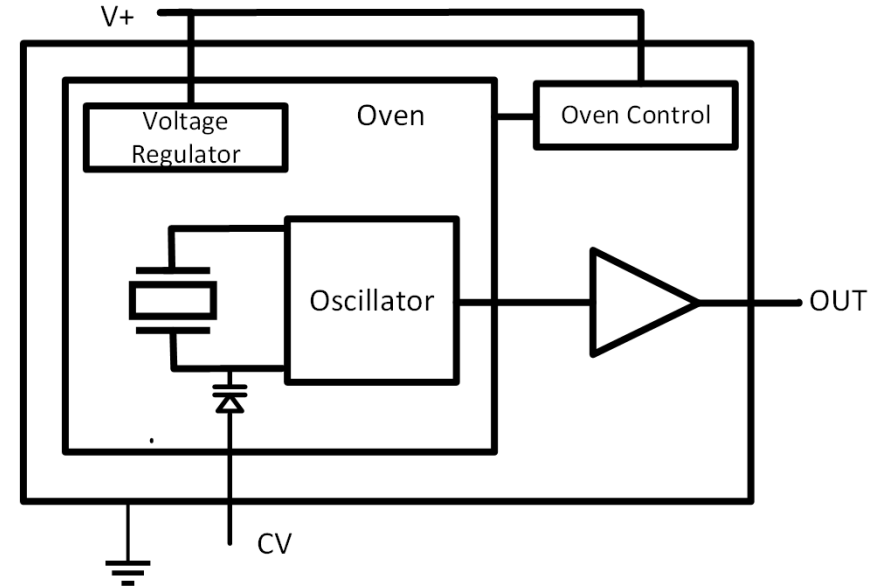


# OX-205

Low noise OCXO

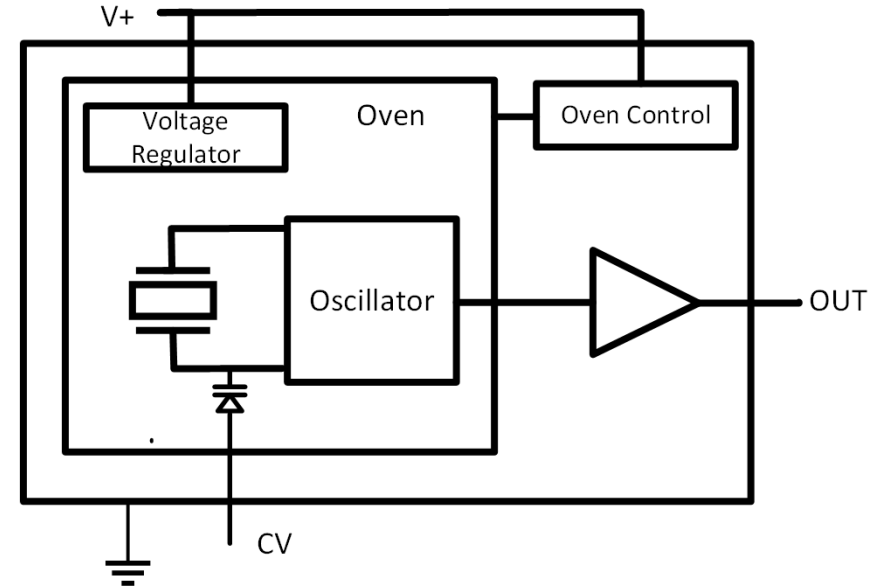
## Features:

- Low Phase Noise Oscillator
- Target Market: Test and Measurement
- Frequency Range: 80 to 120 MHz
- Output: Sine
- Footprint: 25 x 25 mm, through hole
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -45 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -178 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 200 ppb
- Aging per Year: 200 ppb



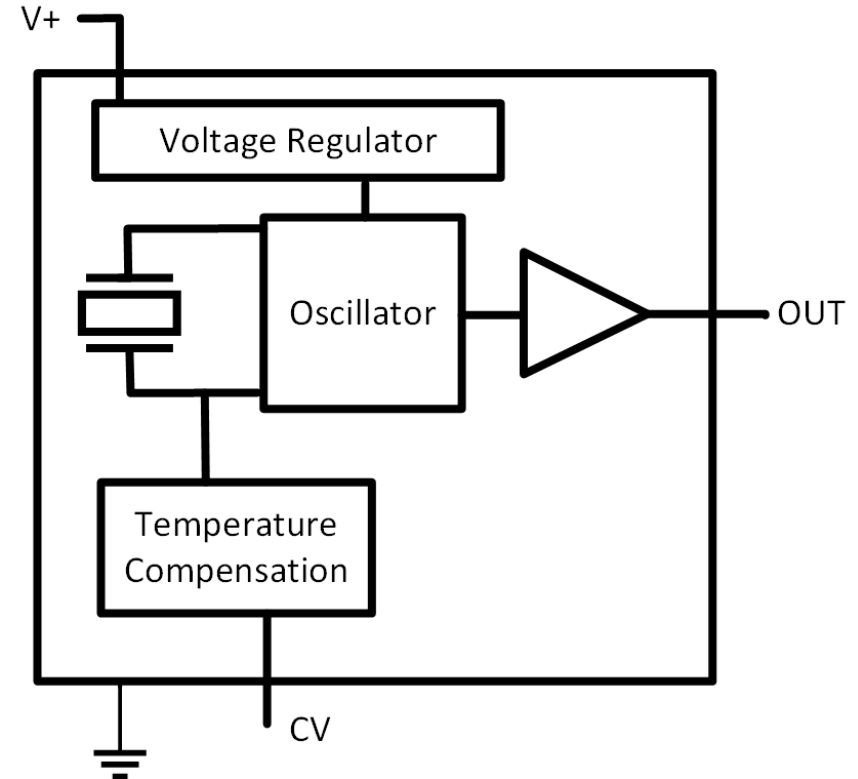
## Features:

- High Stability Space OCXO
- Frequency Range: 10 to 120 MHz
- Output: CMOS, Sine
- Footprint: 35 x 20 mm, through hole
- Supply Voltage: 5 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 300 krad TID
- Temperature stability over Operating Temperature Range: 100 ppb
- Aging per Day: 2 ppb
- Phase Noise 100 kHz offset: -163 dBc/Hz @50 MHz carrier



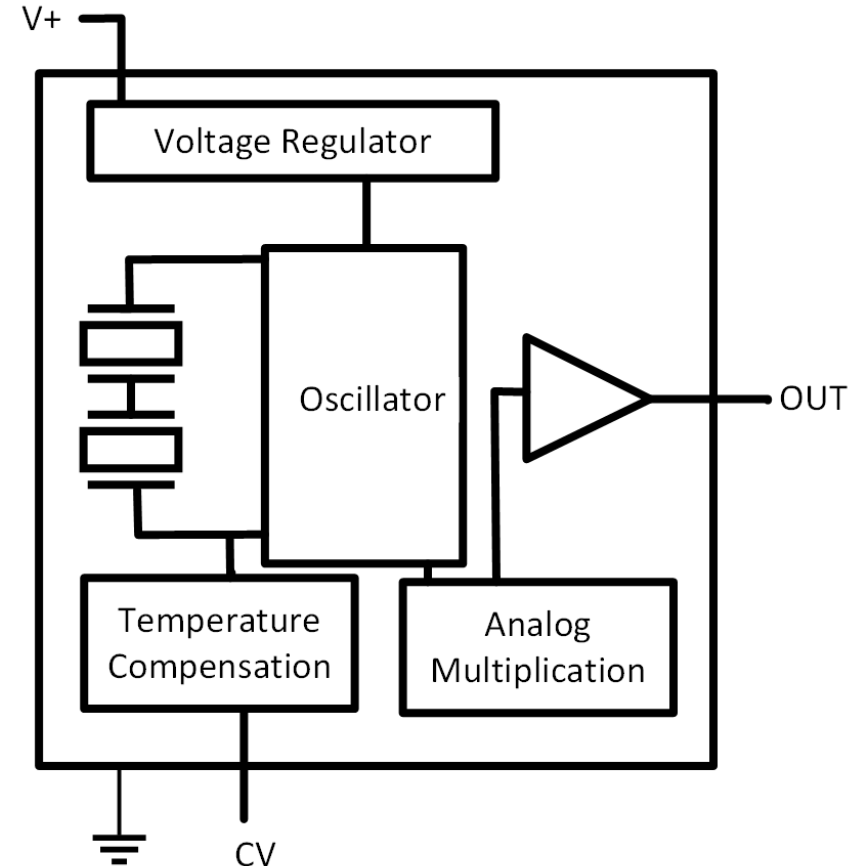
## Features:

- Frequency Range: 250 to 700 MHz
- Output: Clipped Sine
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 247.5 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 1 ppm
- Aging per Year: 0 ppm



## Features:

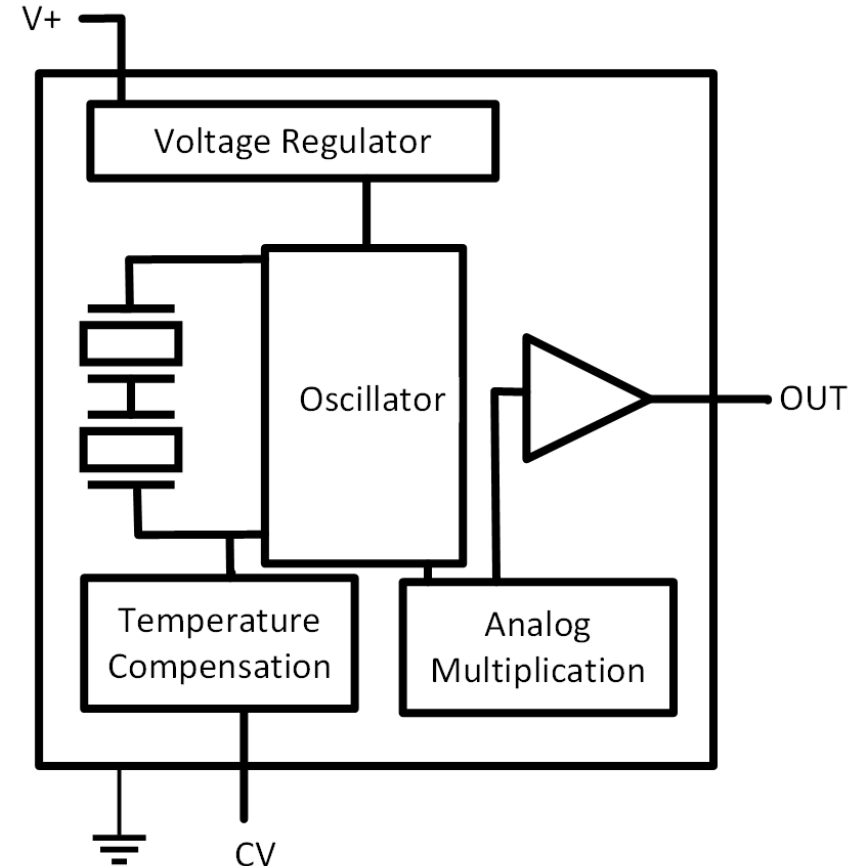
- Frequency Range: 8 to 100 MHz
- Standard Frequencies: 10, 12.8, 20 MHz
- Output: CMOS, Clipped Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 11 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 98 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.2 ppb/g
- Phase Noise 10 Hz offset: -110 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm





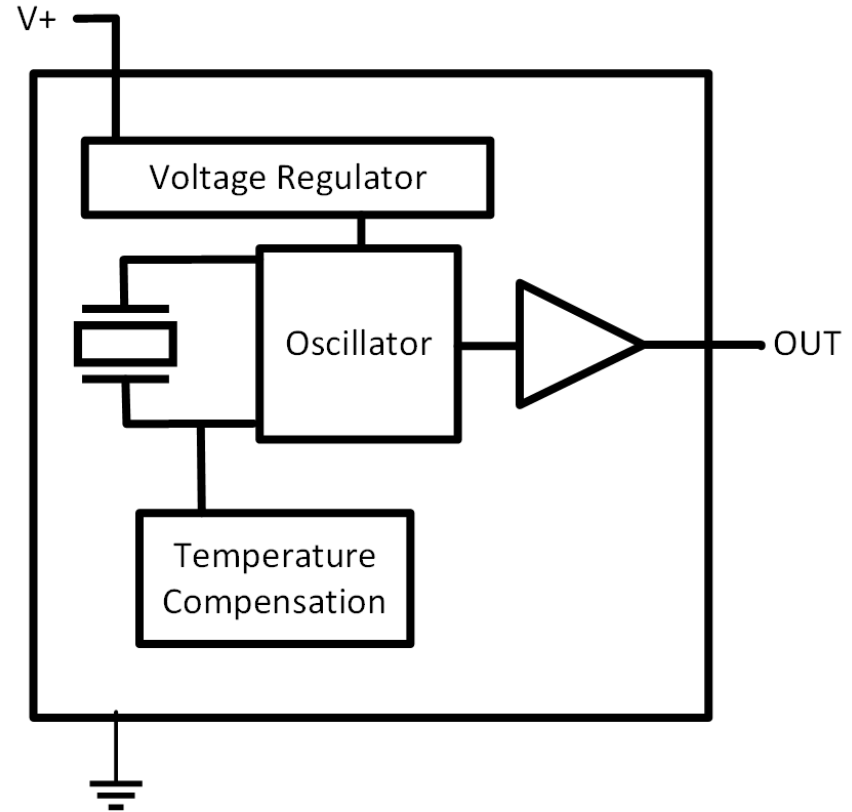
## Features: COMING SOON

- High frequency, low g
- Target Market: Military
- Frequency Range: 96 to 160 MHz
- Standard Frequencies: 98.208, 100, 115.2, 120, 144, 150, 155.52, 160 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 121 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.1 ppb/g
- Phase Noise 10 Hz offset: -75 dBc/Hz @150 MHz carrier
- Phase Noise 100 kHz offset: -145 dBc/Hz @150 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm



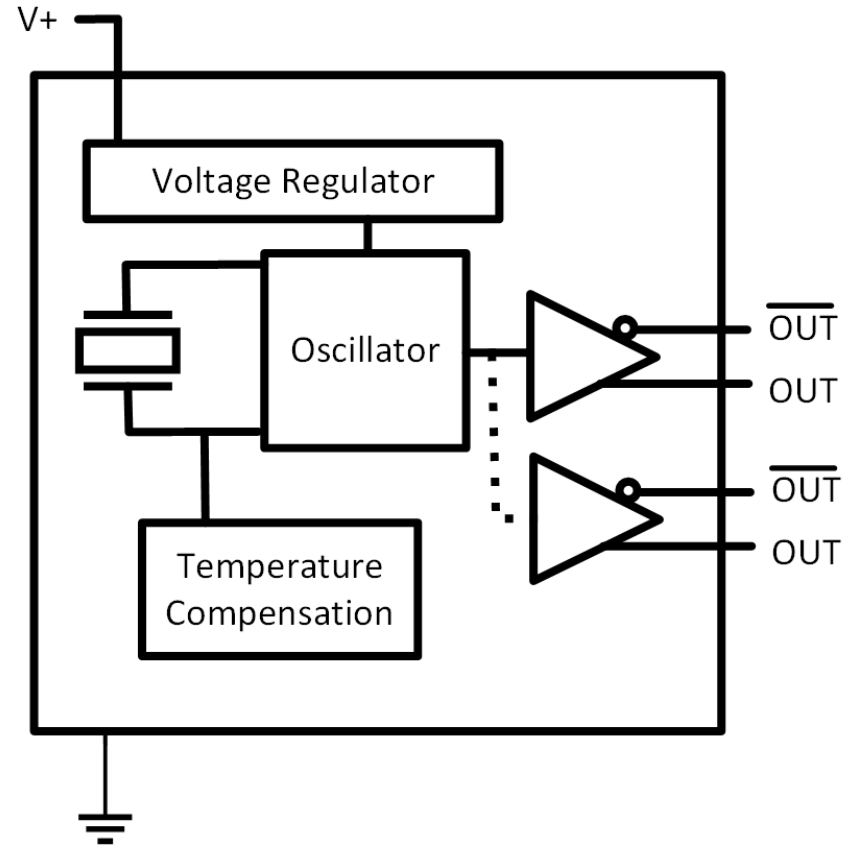
## Features:

- Smallest space qualified TCXO in the world
- Target Market: Space
- Frequency Range: 0.3 to 425 MHz
- Output: CMOS, Sine
- Footprint: multiple options, see specification mm, through hole
- Supply Voltage: 3.3, 5, 12 V
- Power: 500 mW
- Temperature Range: -55 to 105 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 10 ppm
- Aging per Year: 1 ppm
- 30 g Vibration



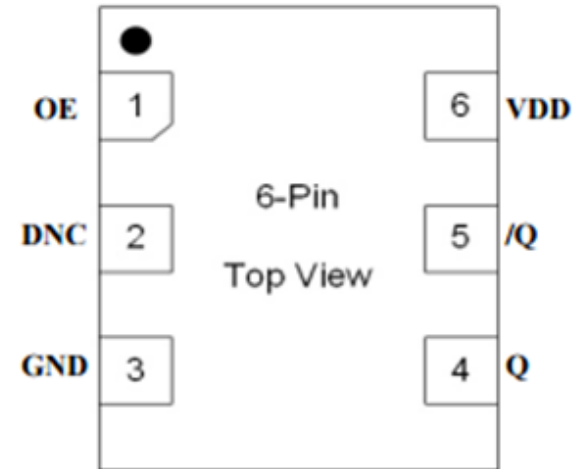
## Features:

- Dual complimentary output pairs
- Target Market: Space
- Frequency Range: 12 to 200 MHz
- Number of RF outputs: 1,2 pairs
- Output: LVDS
- Footprint: 35 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 10 mW
- Temperature Range: -55 to 105 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 10 ppm
- Aging per Year: 1 ppm
- 30 g Vibration



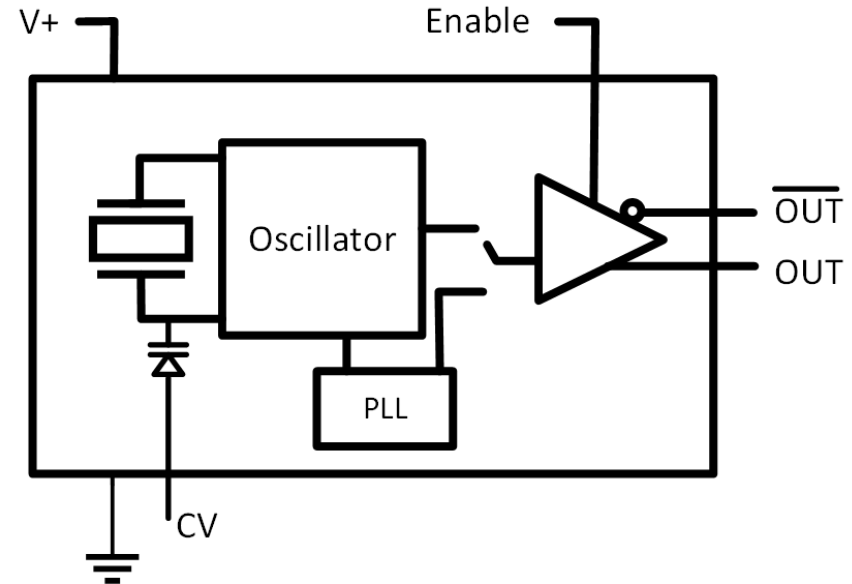
## Features:

- Supports 1 LVCMOS/LVPECL/LVDS/HSCCL output
- Typical phase jitter: 0.2ps
- Guaranteed  $\pm 2.5$ ppm over  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- $\pm 5$ ppm total frequency stability
- Integrated crystal
- Output up to 850MHz
- Programmable output buffers
- O/E Pin selectable
- Industry standard 6-Pin 7mm x 5mm LGA package



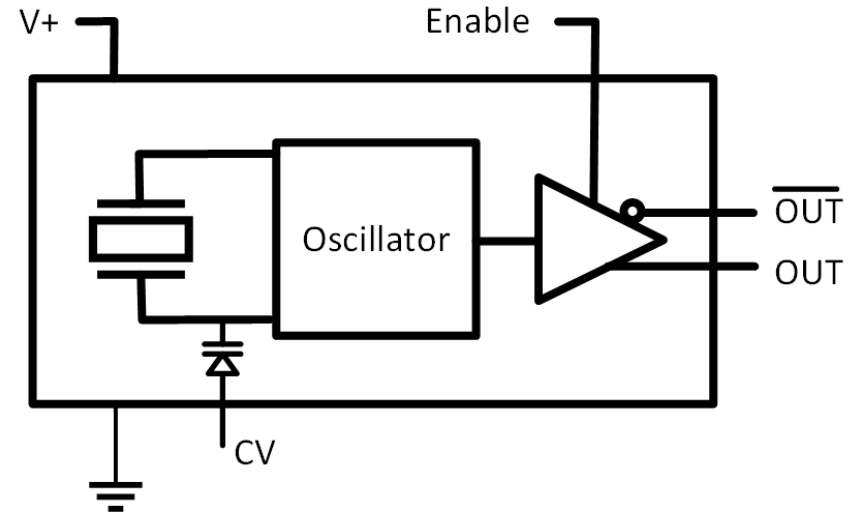
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 19.8 mW
- Temperature Range: -55 to 125 °C
- Pull Range: 50 ppm
- Phase Noise 10 Hz offset: -60 dBc/Hz @52 MHz carrier
- Phase Noise 100 kHz offset: -145 dBc/Hz @52 MHz carrier



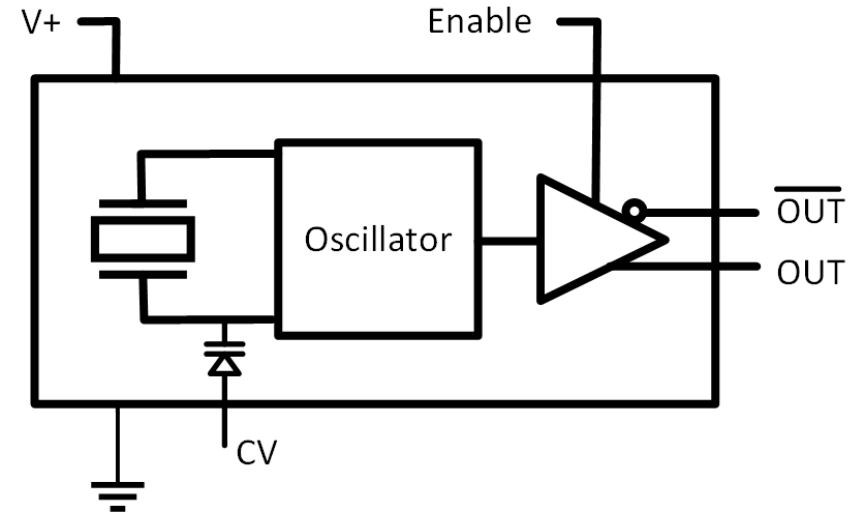
## Features:

- Frequency Range: 0.01 to 1.2 GHz
- Output: CMOS, Sine, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 132 mW
- Temperature Range: -40 to 85 °C
- Pull Range: 65 ppm
- Phase Noise 10 Hz offset: -76 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -166 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 30 ppm



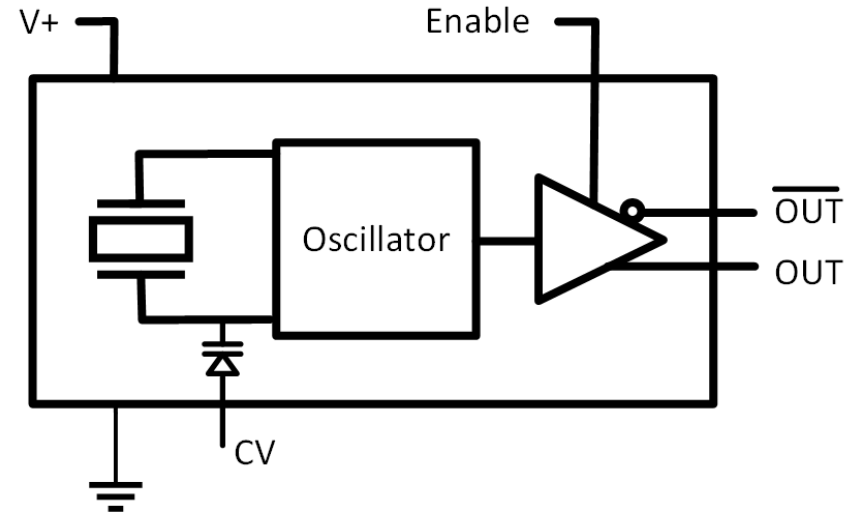
## Features:

- Frequency Range: 20 to 800 MHz
- Output: CMOS, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 132 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 45 ppm
- Pull Range: 60 ppm
- Phase Noise 10 Hz offset: -76 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -161 dBc/Hz @100 MHz carrier



## Features:

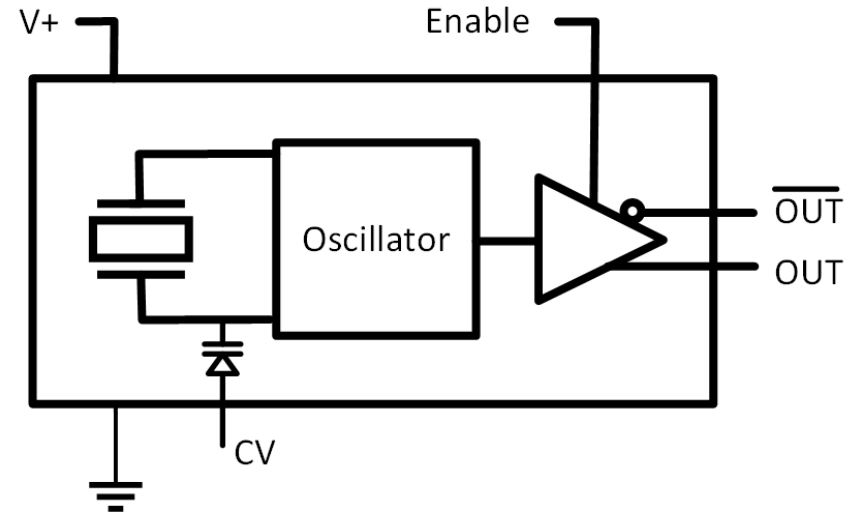
- Frequency Range: 40 to 300 MHz
- Output: CMOS, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 75 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 60 ppm
- Phase Noise 10 Hz offset: -72 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -166 dBc/Hz  
@122.88 MHz carrier





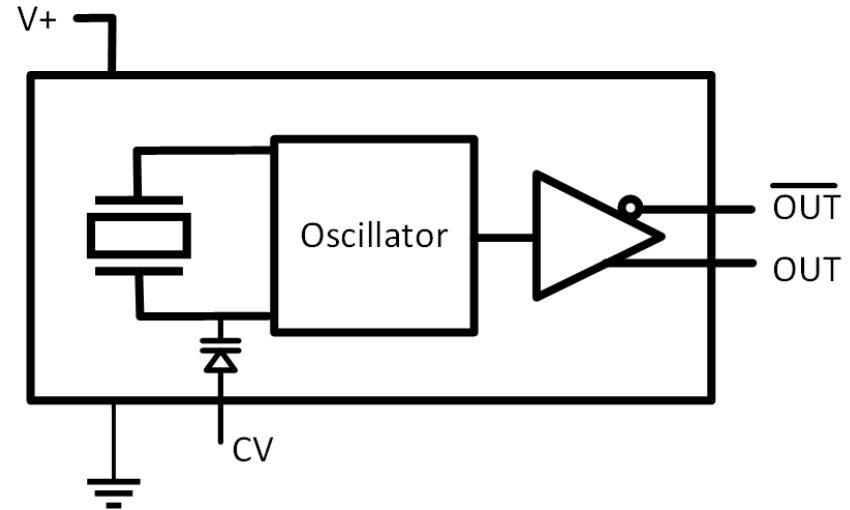
## Features:

- Frequency Range: 100 to 204.8 MHz
- Output: LVPECL
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 165 mW
- Temperature Range: -40 to 105 °C
- Absolute Pull Range: 50 ppm
- Phase Noise 10 Hz offset: -68 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -157 dBc/Hz  
@122.88 MHz carrier



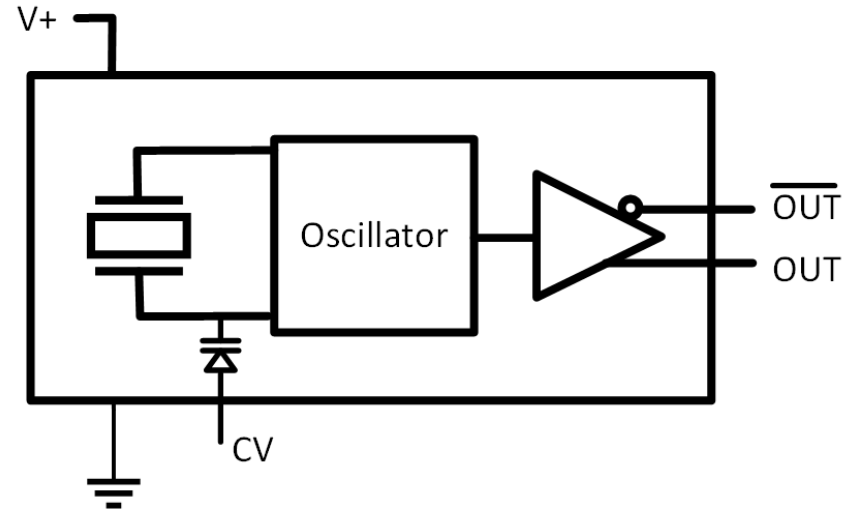
## Features:

- Popular for driving rad tolerant clock synchronizers and jitter cleaners
- Target Market: Space
- Frequency Range: 100 to 700 MHz
- Output: LVPECL
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 281 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 50 krad ELDRS
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



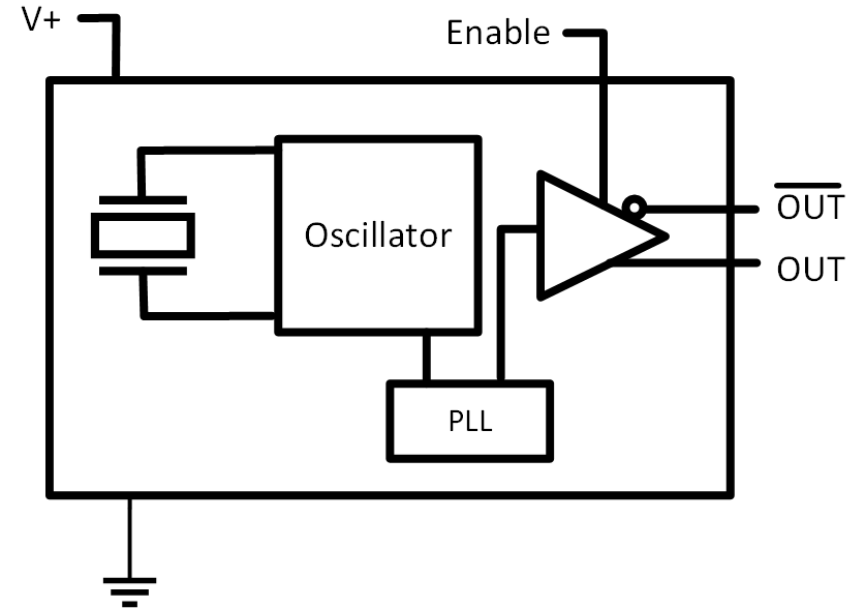
## Features:

- Target Market: Space
- Frequency Range: 80 to 200 MHz
- Output: LVDS
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 325 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



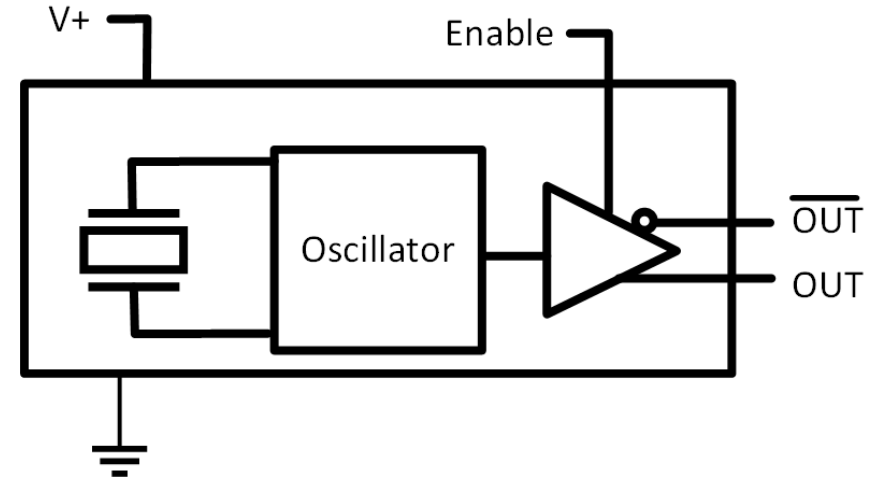
## Features:

- Frequency Range: 10 to 800 MHz
- Output: CMOS, LVPECL, LVDS
- Footprint: 3.2 x 2.5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 160 mW
- Temperature Range: -45 to 85 °C
- Temperature stability over Operating Temperature Range: 2 ppm
- 12k to 20 MHz jitter: 1000 fs-rms @ 125 MHz



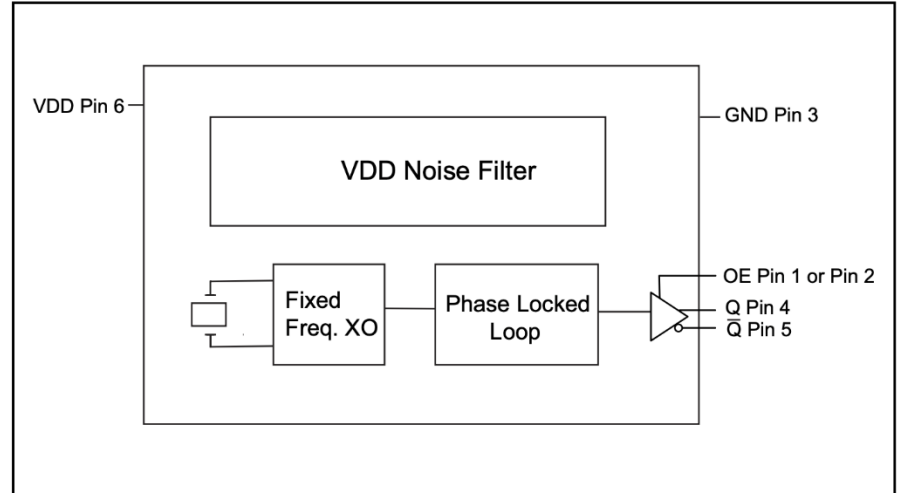
## Features:

- Frequency Range: 10 to 275 MHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 150 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 20 ppm
- Temperature stability -40 to 85°C: 20 ppm
- Temperature stability over Operating Temperature Range: 100 ppm
- 12k to 20 MHz jitter: 300 fs-rms @ 155.52 MHz



## Features:

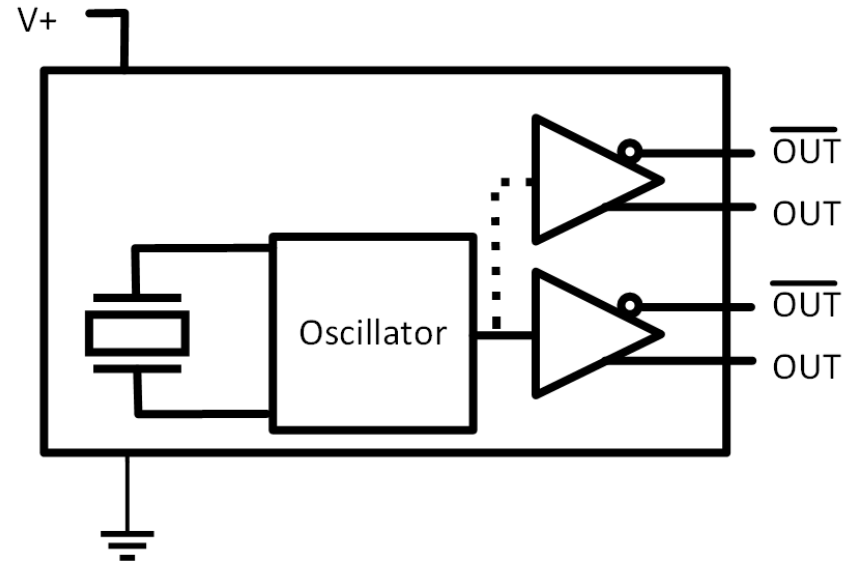
- Typical phase jitter: 200fs
- Supports 1 output
- Integrated crystal
- 2.5MHz to 850MHz
- Programmable output buffers
- O/E Pin selectable
- Industry standard package:
  - MX55 - 3.2mm x 5mm
  - MX57 - 5mm x 7mm



Part Number	Output Frequency (MHz)	Output Format	Frequency Stability (ppm)	Jitter (typ) (ps RMS)	Supply current (mA)	Supply voltage (V)	Temp. Range (°C)	Package size (mmxmm)	Custom Configuration
MX57	<840	LVC MOS	±50	0.2	70	2.25 to 3.63	-20 to 70 -40 to 85	7.0x5.0 6L	ClockWorks Web tool
MX55	<840	LVPECL						5.0x3.2 6L	
MX85	<840	LVDS HSCL		0.2	90			7.0x5.0 38-PIN LGA	

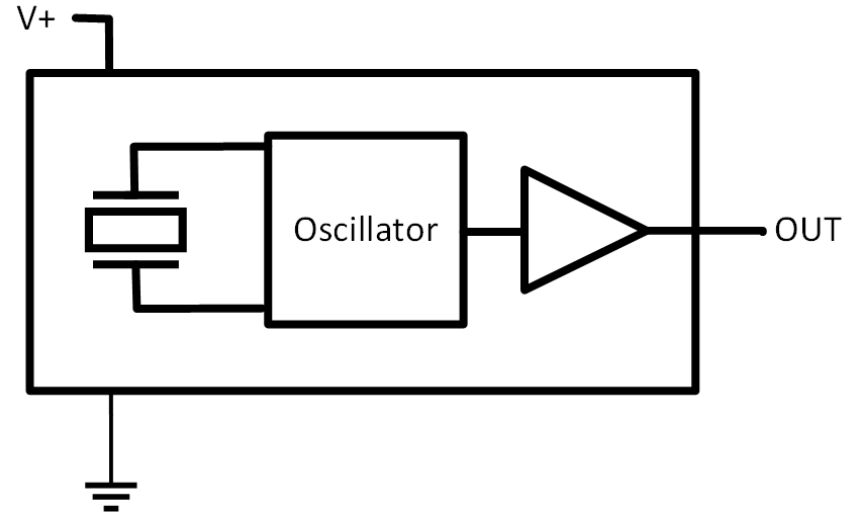
## Features:

- Dual complimentary output pairs
- Target Market: Space
- Frequency Range: 100 to 700 MHz
- Number of RF outputs: 1,2 pairs
- Output: LVPECL
- Footprint: multiple options, see specification mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 50 krad ELDRS
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



## Features:

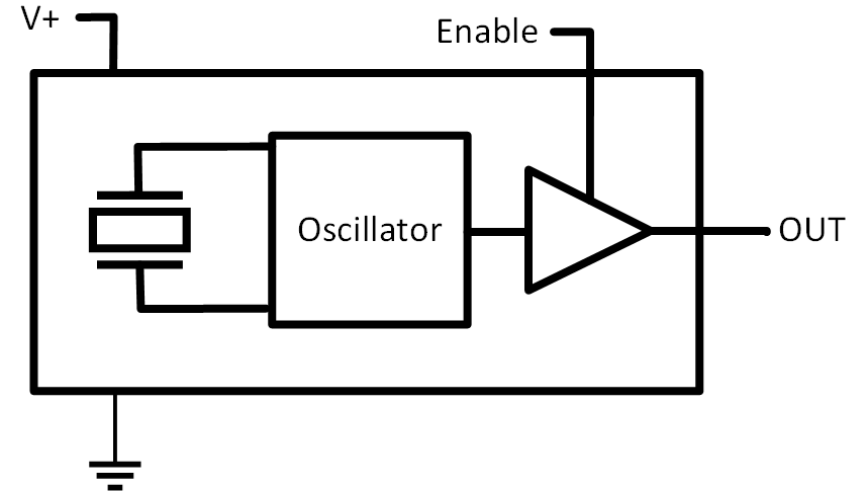
- SET/SEU free to  $>90$  MeV-cm<sup>2</sup>/mg
- Target Market: Space
- Frequency Range: 12 to 160 MHz
- Output: CMOS
- Footprint: multiple options, see specification mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 250 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration





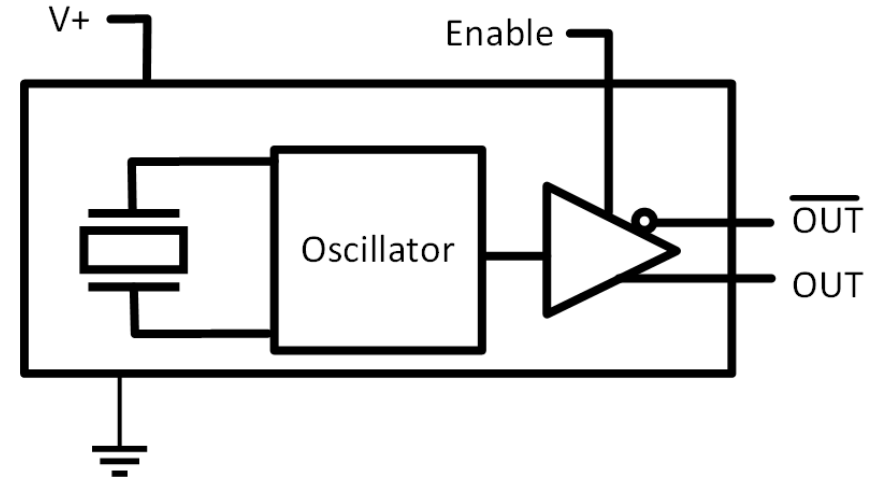
## Features:

- Frequency Range: 0.000001 to 200 MHz
- Output: CMOS, TTL
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 2.7 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 100 ppm



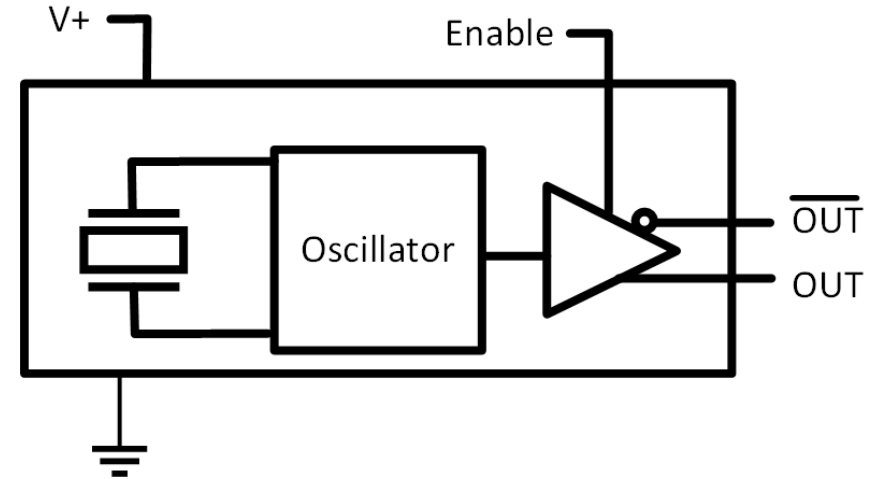
## Features:

- Target Market: Military
- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 15 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 3 ppm



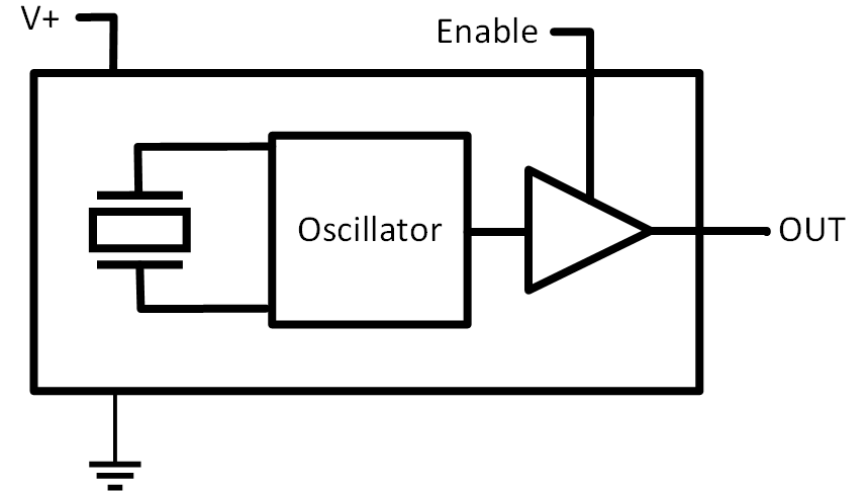
## Features:

- Frequency Range: 0.01 to 1.2 GHz
- Output: CMOS, Sine, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 99 mW
- Temperature Range: -20 to 70 °C
- Temperature stability over Operating Temperature Range: 10 ppm
- Aging per Year: 3 ppm
- Phase Noise 10 Hz offset: -85 dBc/Hz @416 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @416 MHz carrier



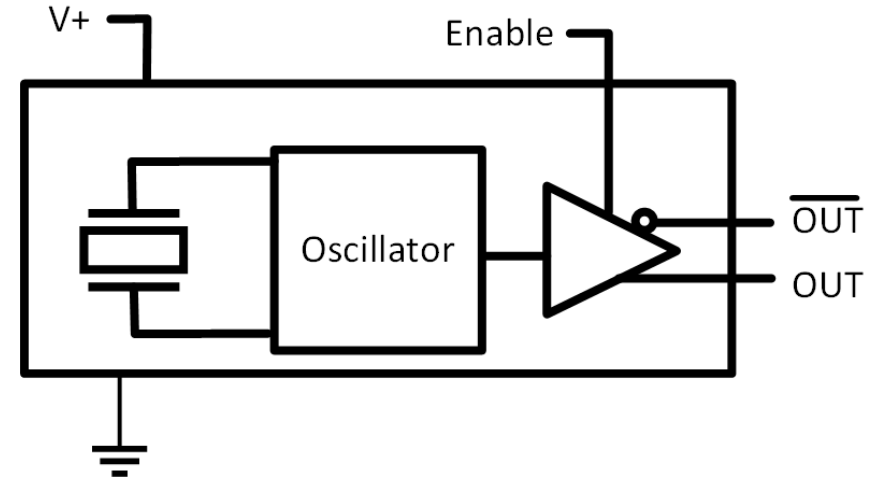
## Features:

- Frequency Range: 30 to 180 MHz
- Standard Frequencies: 50, 80, 100, 120, 122.88, 160 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.3 ppb/g
- Temperature stability over Operating Temperature Range: 25 ppm
- Aging per Year: 0 ppm



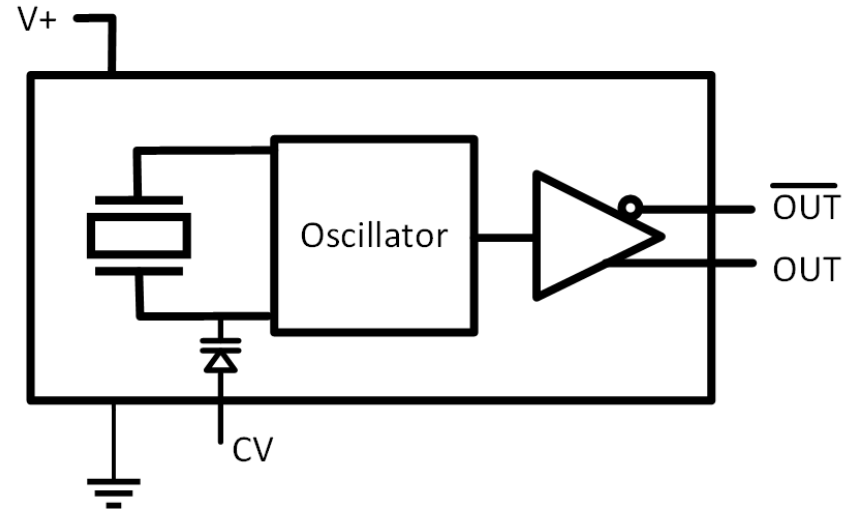
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 15 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 3 ppm



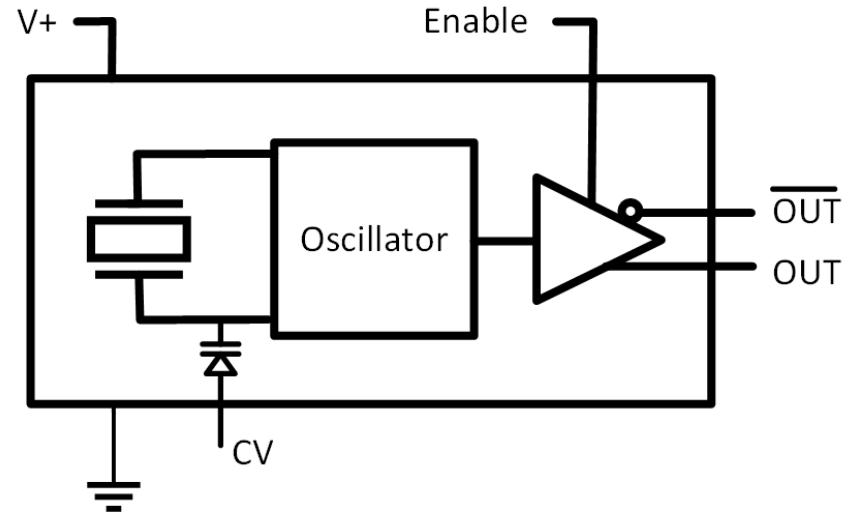
## Features:

- Frequency Range: 0.8 to 2.9 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 325 mW
- Temperature Range: 10 to 85 °C
- g-Sensitivity: 0.6 ppb/g
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -102 dBc/Hz @2000 MHz carrier
- Phase Noise 1 MHz offset: -150 dBc/Hz @2000MHz carrier



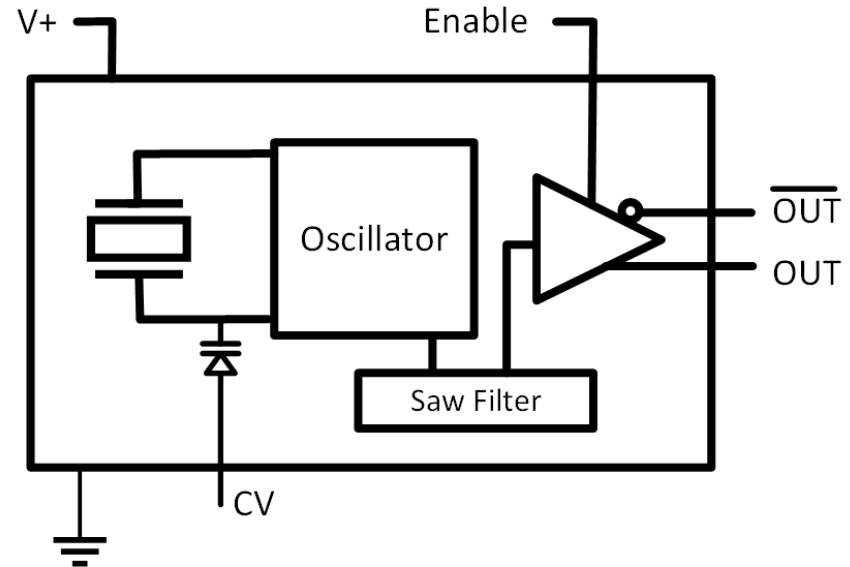
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 250 mW
- Temperature Range: 10 to 85 °C
- 20000 g Shock, 0.2 ms Duration
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -93 dBc/Hz @2000 MHz carrier
- Phase Noise 1 MHz offset: -158 dBc/Hz @2000MHz carrier



## Features:

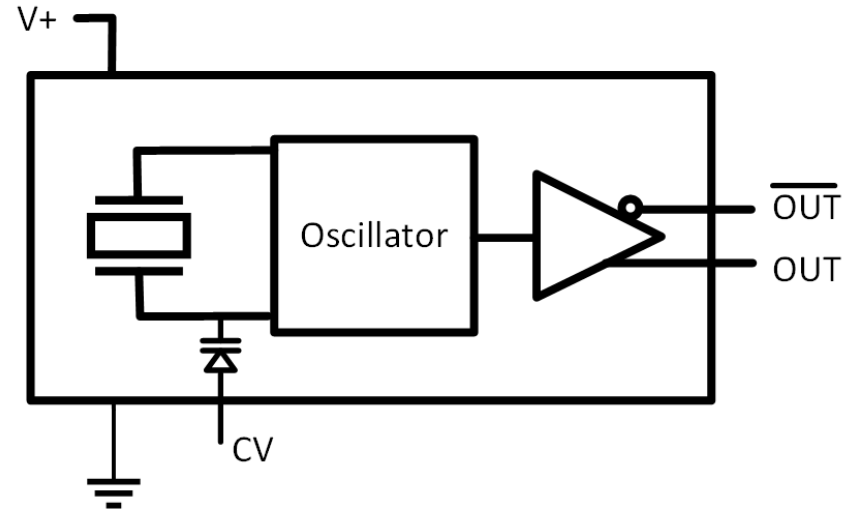
- Low noise, high stability VCISO
- Frequency Range: 0.15 to 1 GHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 20 ppm
- Absolute Pull Range: 50 ppm
- Phase Noise 1kHz offset: -108 dBc/Hz @622.08 MHz carrier
- Phase Noise 1 MHz offset: -137 dBc/Hz @622.08MHz carrier





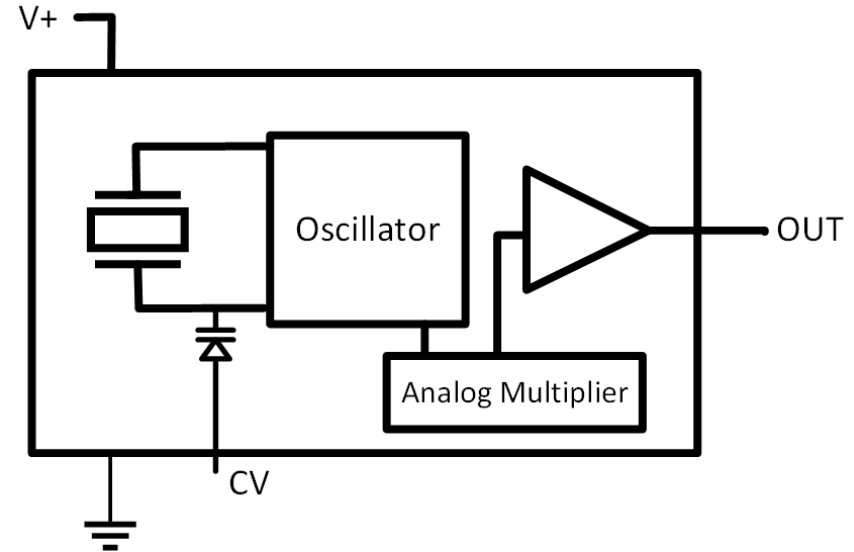
## Features:

- Frequency Range: 0.12288 to 1 GHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 240.9 mW
- Temperature Range: -40 to 85 °C



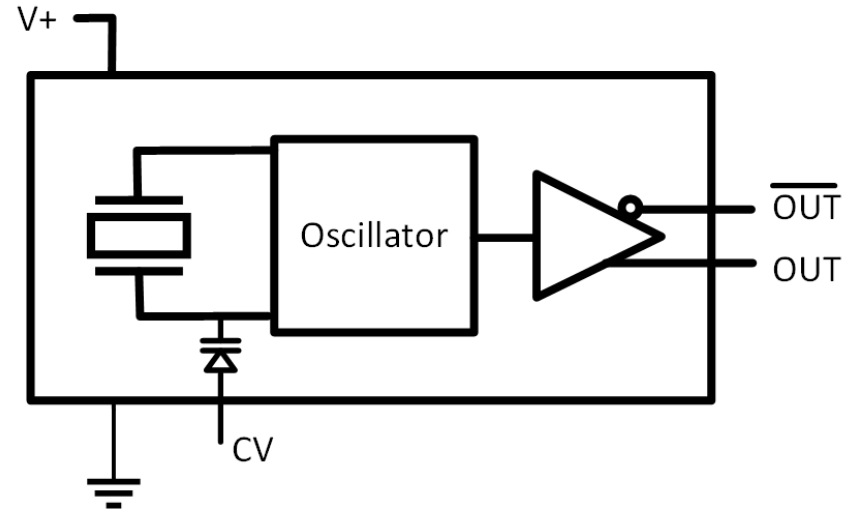
## Features:

- Smallest form factor, High Frequency VCSCO in market
- Frequency Range: 0.8 to 3.2 GHz
- Output: Sine, Balanced or Differential Sinewave
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 250 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -95 dBc/Hz @2949.12 MHz carrier
- Phase Noise 1 MHz offset: -162 dBc/Hz @2949.12MHz carrier



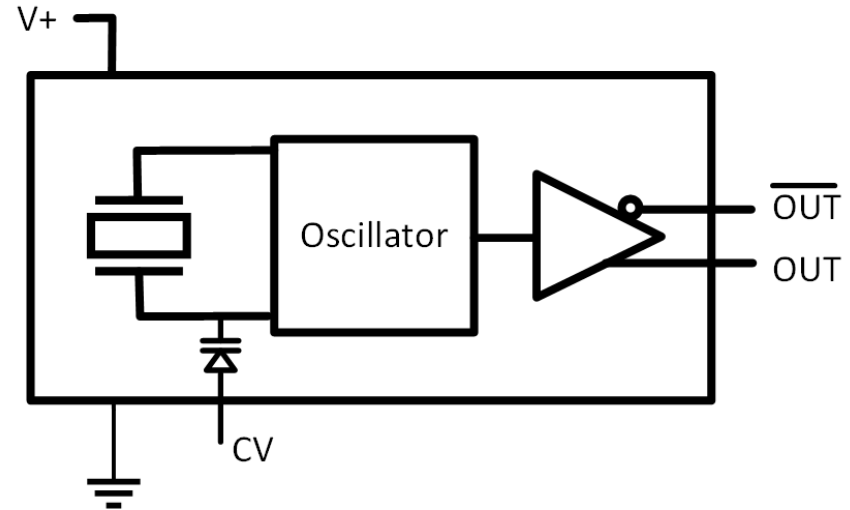
## Features:

- Frequency Range: 5 to 7 GHz
- Output: Sine
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 0 ppm
- Phase Noise 1kHz offset: -83 dBc/Hz @5898 MHz carrier
- Phase Noise 1 MHz offset: -140 dBc/Hz @5898MHz carrier



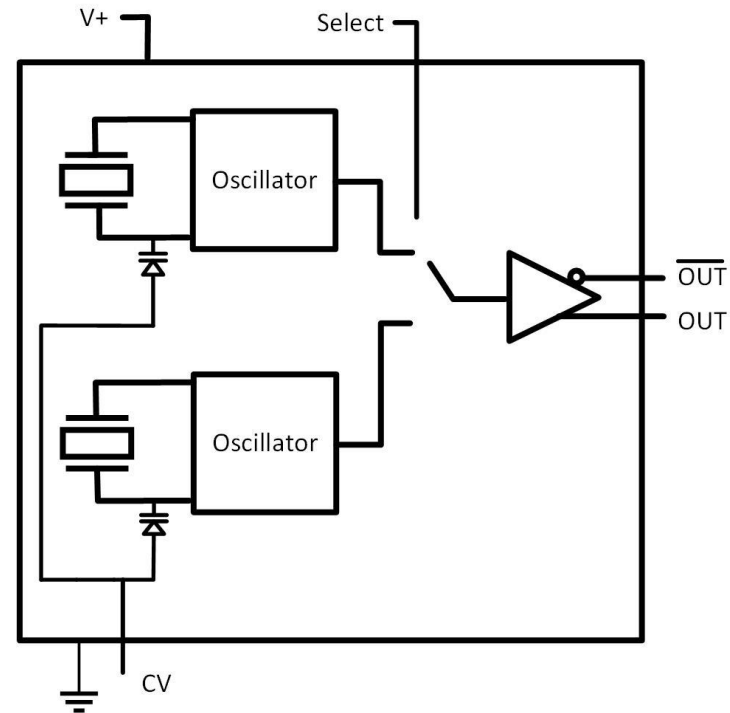
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 5 V
- Power: 500 mW
- Temperature Range: 10 to 85 °C
- Absolute Pull Range: 2 ppm
- Phase Noise 1kHz offset: -96 dBc/Hz @1700 MHz carrier
- Phase Noise 1 MHz offset: -156 dBc/Hz @1700MHz carrier



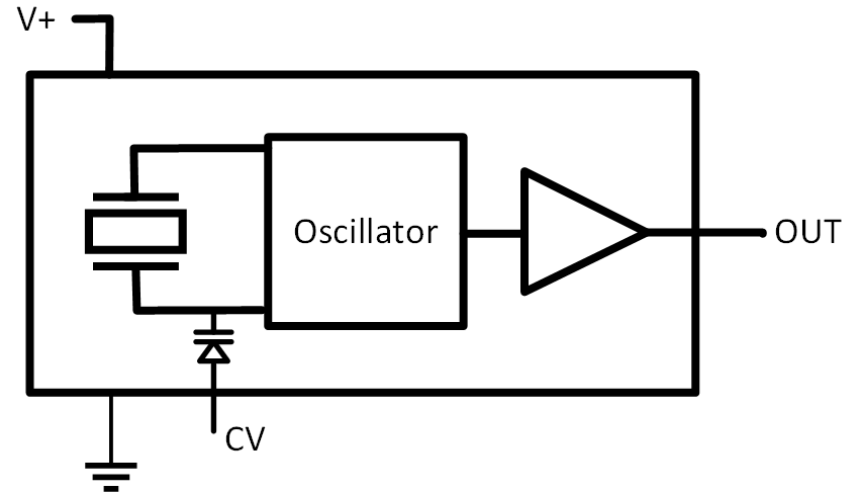
## Features:

- **Selectable frequency output**
- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: 10 to 85 °C
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -98 dBc/Hz @1980 MHz carrier
- Phase Noise 1 MHz offset: -159 dBc/Hz @1980MHz carrier



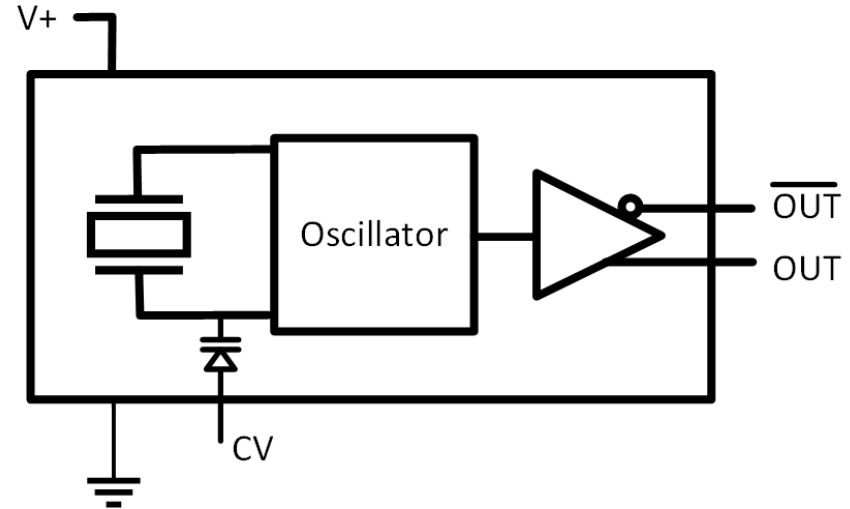
## Features:

- Frequency Range: 0.8 to 3 GHz
- Output: Sine
- Footprint: 14 x 9 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- 1.2ppb/g
- Temperature Range: 10 to 85 °C
- Absolute Pull Range: 20 ppm



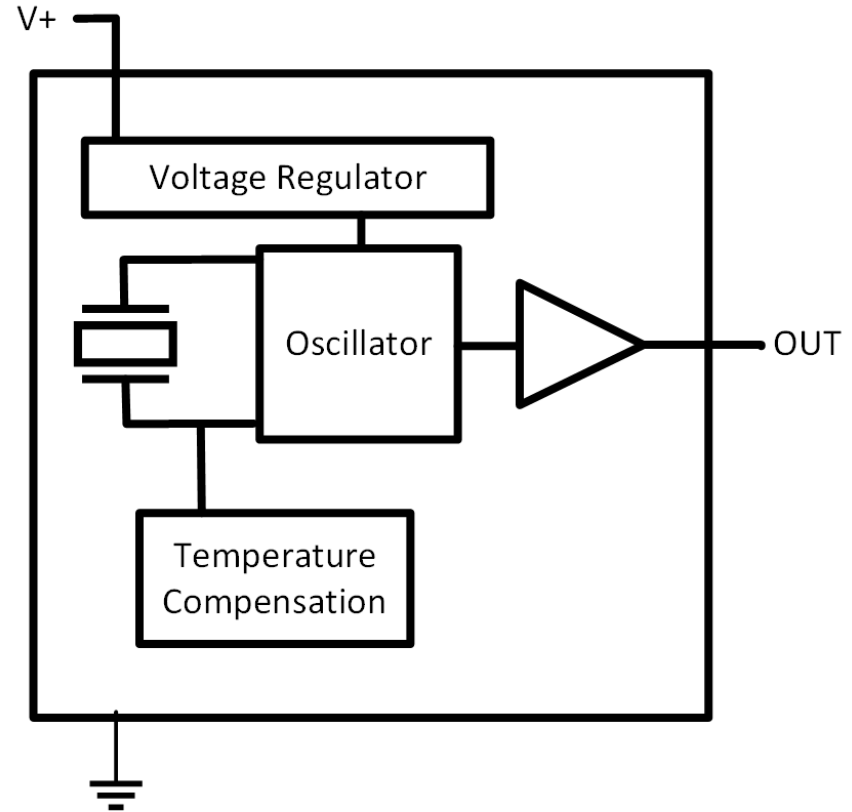
## Features:

- Frequency Range: 3 to 6 GHz
- Output: Sine, Balanced or Differential Sinewave
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 280.5 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 5 ppm
- Phase Noise 1kHz offset: -86 dBc/Hz @5898.24 MHz carrier
- Phase Noise 1 MHz offset: -146 dBc/Hz @5898.24MHz carrier



## Features:

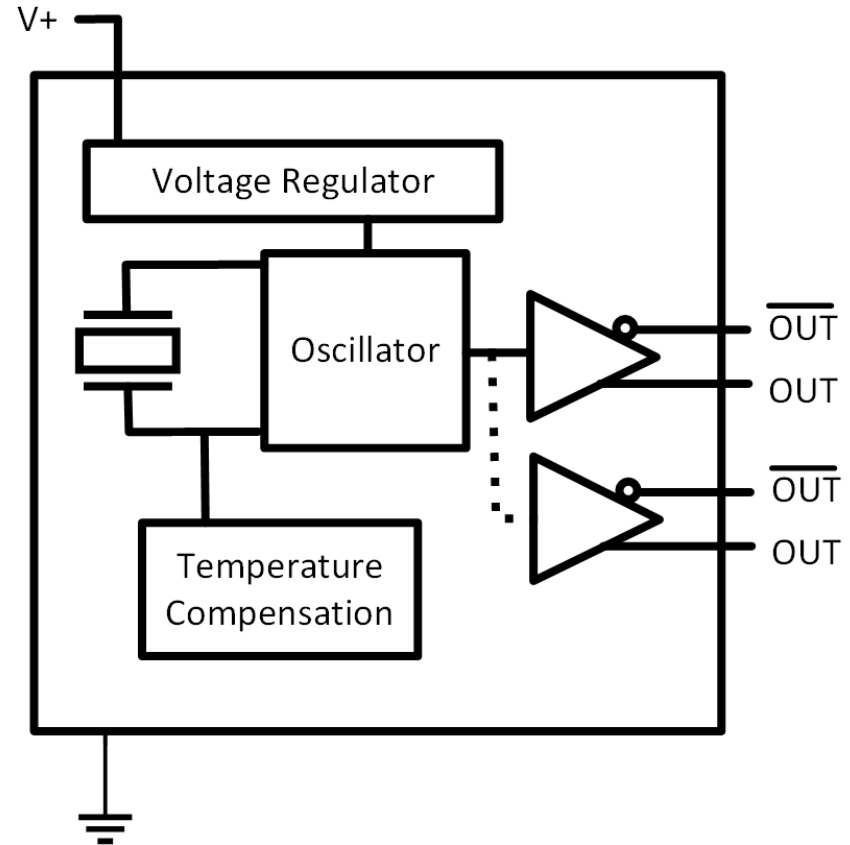
- Smallest space qualified TCXO in the world
- Target Market: Space
- Frequency Range: 0.3 to 425 MHz
- Output: CMOS, Sine
- Footprint: multiple options, see specification mm, through hole
- Supply Voltage: 3.3, 5, 12 V
- Power: 500 mW
- Temperature Range: -55 to 105 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 10 ppm
- Aging per Year: 1 ppm
- 30 g Vibration





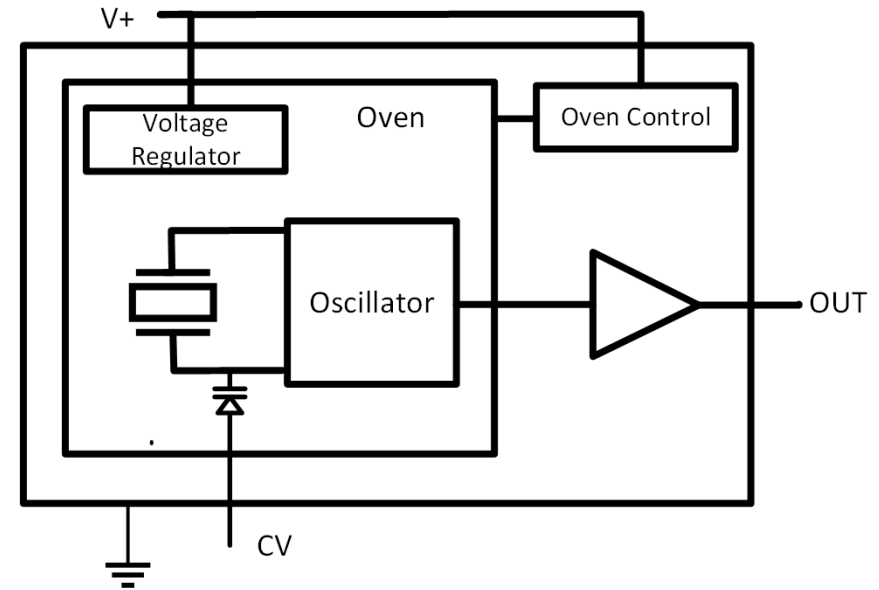
## Features:

- Dual complimentary output pairs
- Target Market: Space
- Frequency Range: 12 to 200 MHz
- Number of RF outputs: 1,2 pairs
- Output: LVDS
- Footprint: 35 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 10 mW
- Temperature Range: -55 to 105 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 10 ppm
- Aging per Year: 1 ppm
- 30 g Vibration



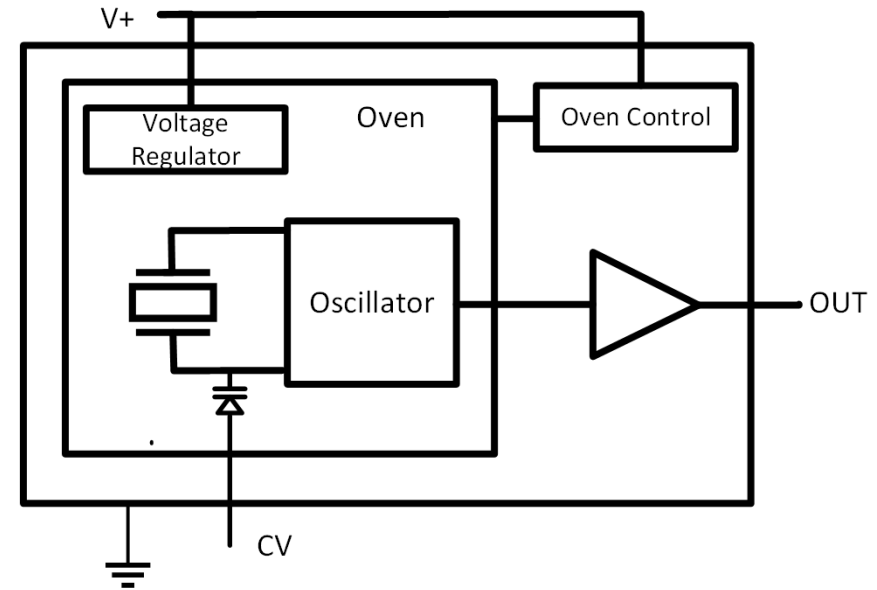
## Features:

- Only space qualified EMXO
- Target Market: Space
- Frequency Range: 10 to 120 MHz
- Output: CMOS, Sine
- Footprint: 26 x 24 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 10 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 0.1 ppm
- Aging per Year: 0.2 ppm
- 20 g Vibration



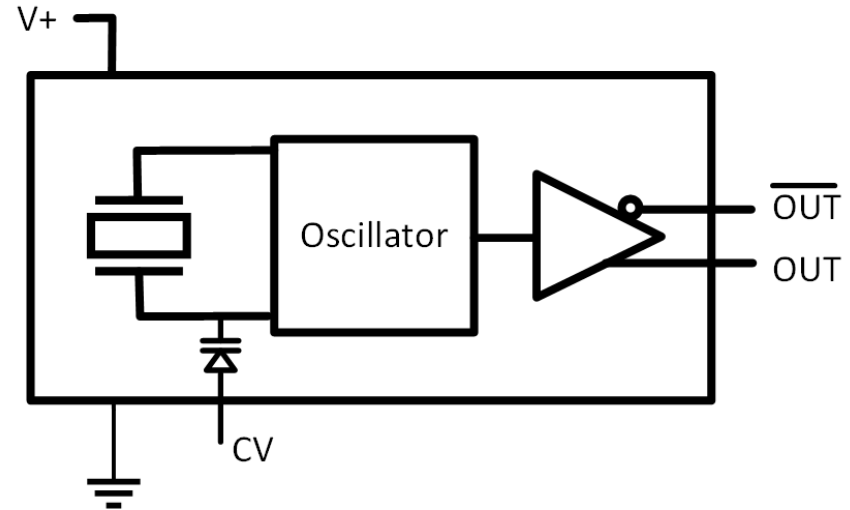
## Features:

- High Stability Space OCXO
- Frequency Range: 10 to 120 MHz
- Output: CMOS, Sine
- Footprint: 35 x 20 mm, through hole
- Supply Voltage: 5 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 300 krad TID
- Temperature stability over Operating Temperature Range: 100 ppb
- Aging per Day: 2 ppb
- Phase Noise 100 kHz offset: -163 dBc/Hz @50 MHz carrier



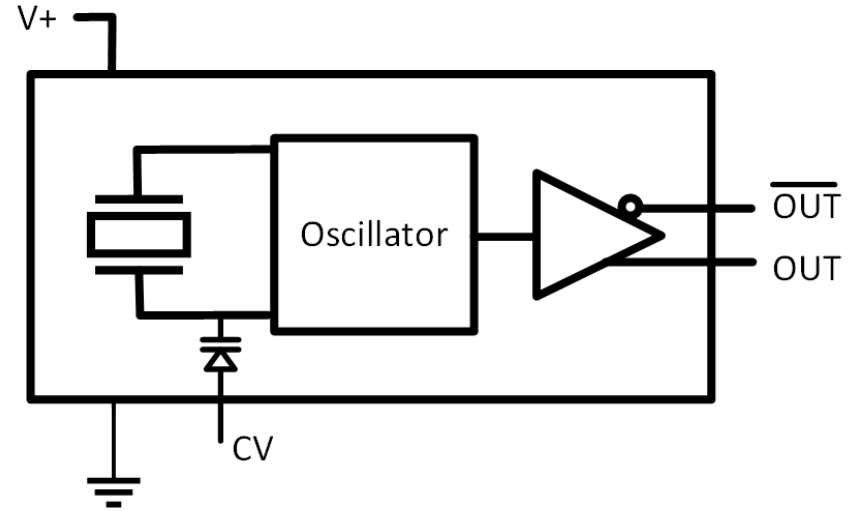
## Features:

- Popular for driving rad tolerant clock synchronizers and jitter cleaners
- Target Market: Space
- Frequency Range: 100 to 700 MHz
- Output: LVPECL
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 281 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 50 krad ELDRS
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



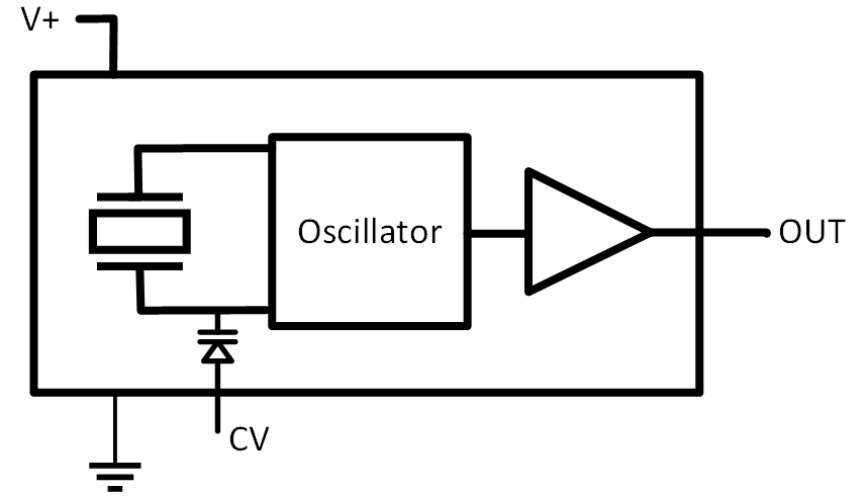
## Features:

- Target Market: Space
- Frequency Range: 80 to 200 MHz
- Output: LVDS
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 325 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



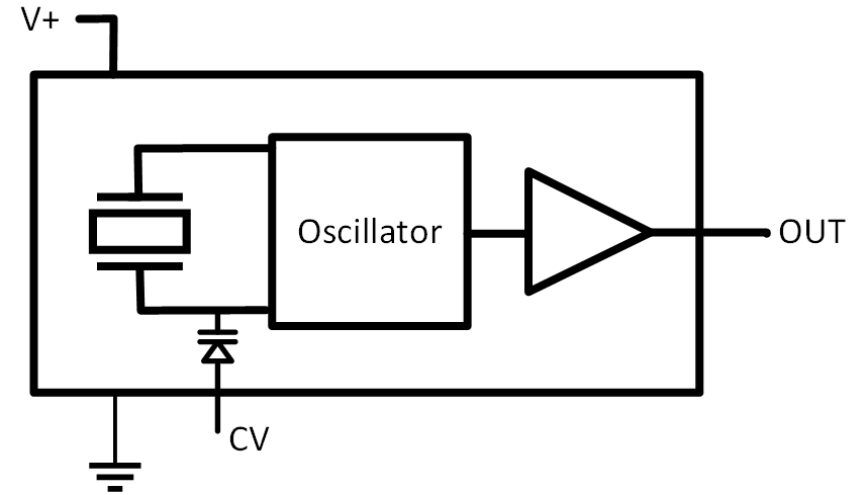
## Features:

- Target Market: Space
- Frequency Range: 1 to 100 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Absolute Pull Range: 50 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



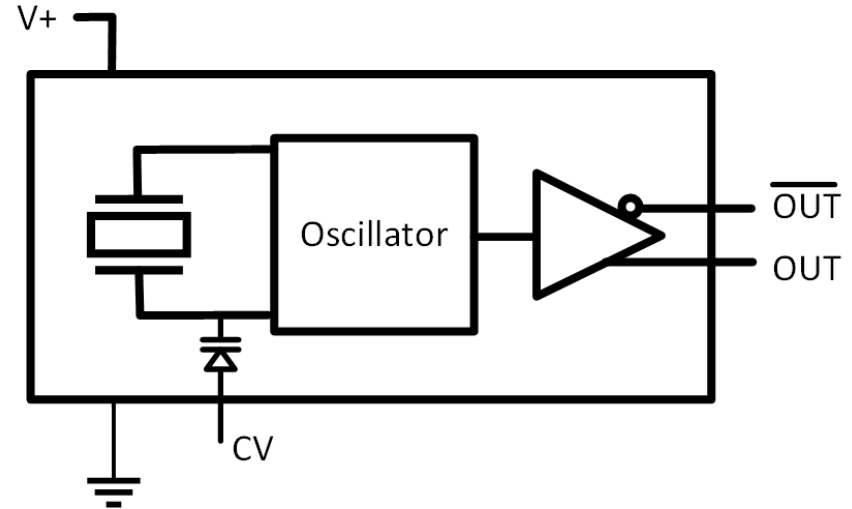
## Features:

- 300 krad for deep space missions
- Target Market: Space
- Frequency Range: 0.3 to 1.5 GHz
- Output: Sine
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3, 5, 12 V
- Power: 250 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 300 krad TID
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



## Features:

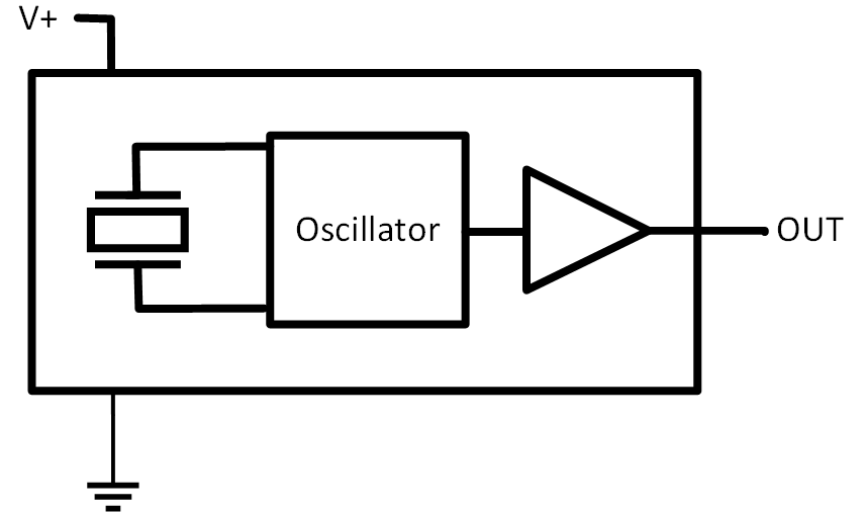
- Internal Microchip SAW resonator
- Target Market: Space
- Frequency Range: 0.3 to 1 GHz
- Output: LVPECL
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 33 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 50 krad ELDRS
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration





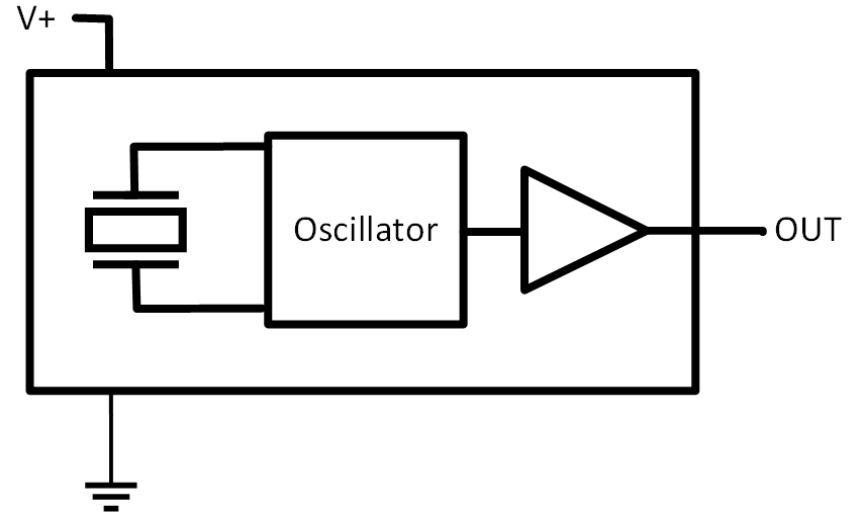
## Features:

- SET/SEU free to  $>90$  MeV-cm<sup>2</sup>/mg
- Target Market: Space
- Frequency Range: 12 to 160 MHz
- Output: CMOS
- Footprint: multiple options, see specification mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 250 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



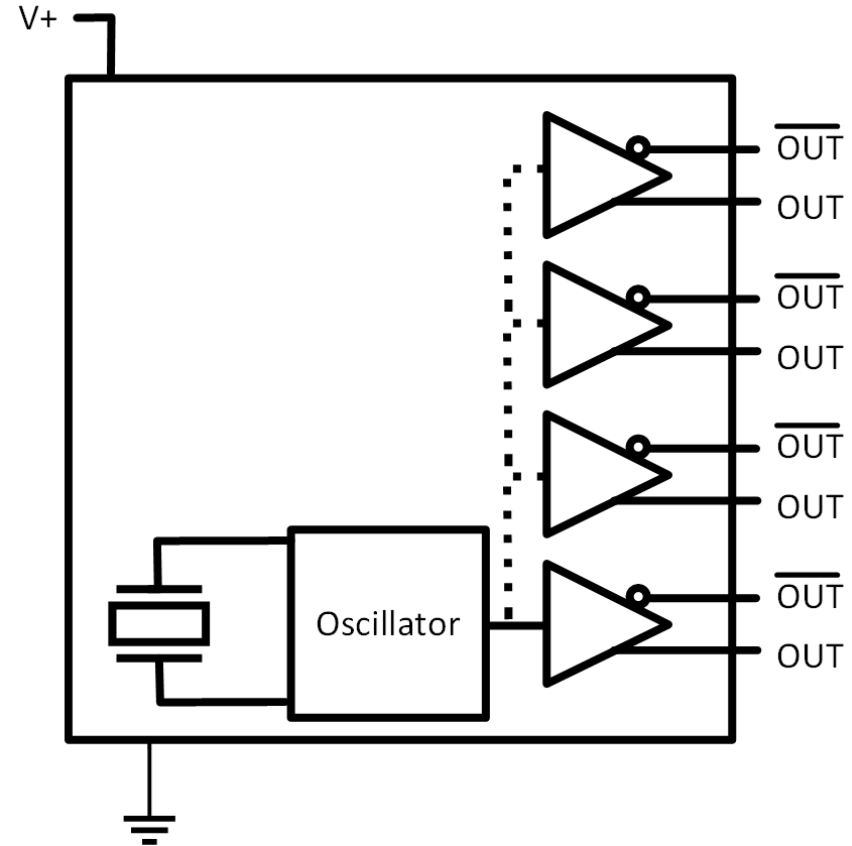
## Features:

- 300 krad for deep space missions
- Target Market: Space
- Frequency Range: 12 to 100 MHz
- Output: CMOS
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 241 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 300 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



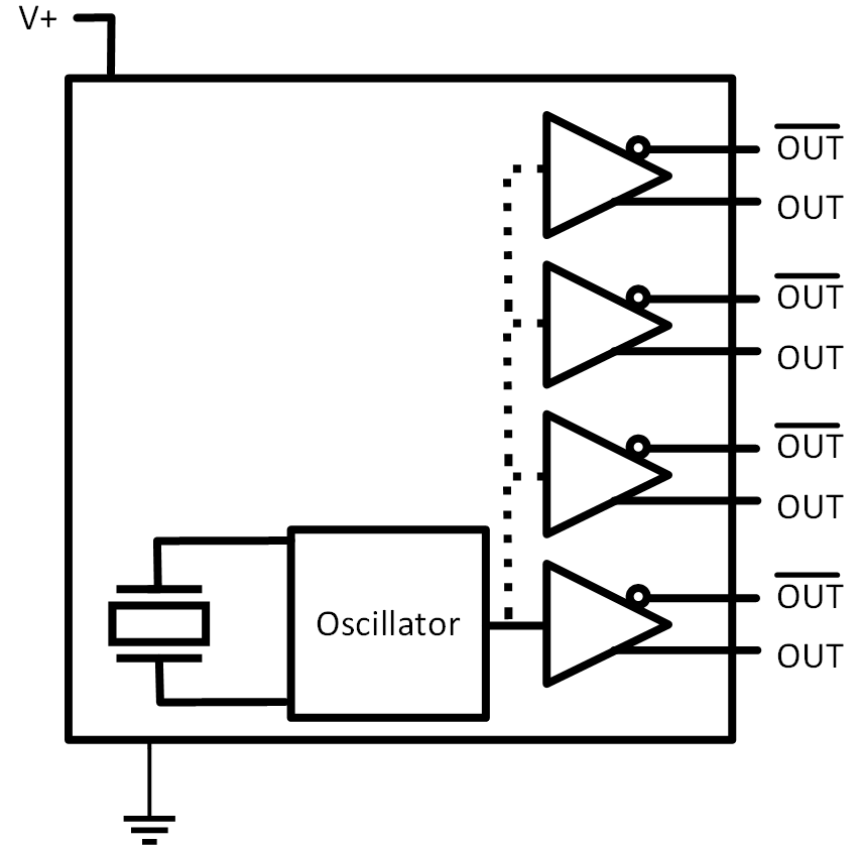
## Features:

- 300 krad for deep space missions
- Target Market: Space
- Frequency Range: 12 to 200 MHz
- Number of RF outputs: 1,2,4 pairs
- Output: LVDS
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 250 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 300 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



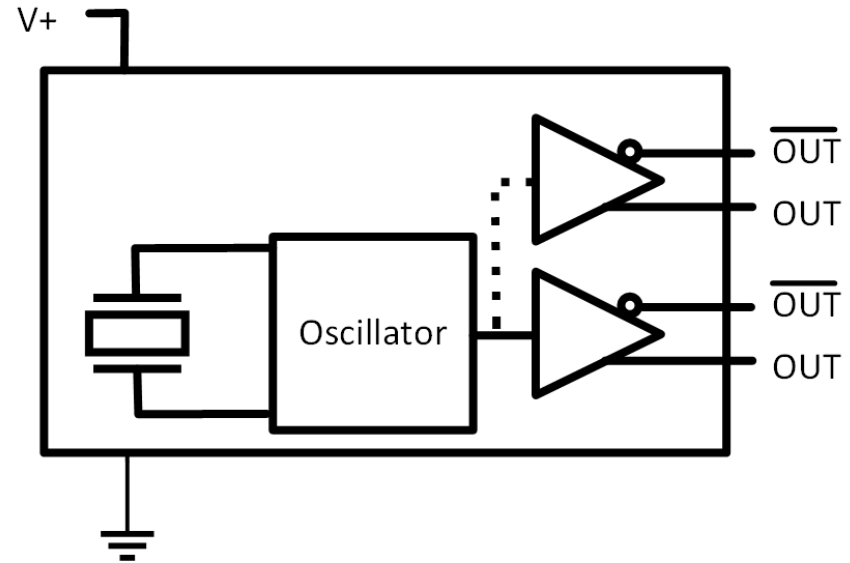
## Features:

- Ideal for driving RTG4 FPGA
- Target Market: Space
- Frequency Range: 12 to 200 MHz
- Number of RF outputs: 1,2,4 pairs
- Output: LVDS
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



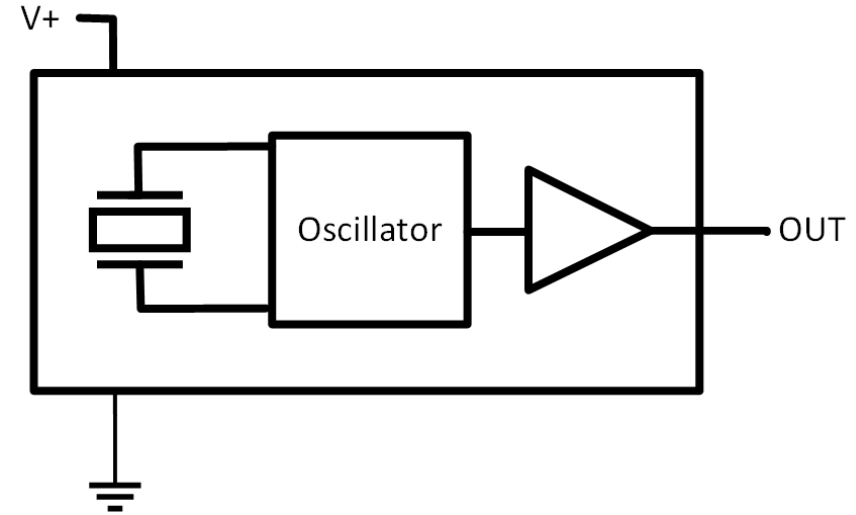
## Features:

- Dual complimentary output pairs
- Target Market: Space
- Frequency Range: 100 to 700 MHz
- Number of RF outputs: 1,2 pairs
- Output: LVPECL
- Footprint: multiple options, see specification mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 50 krad ELDRS
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



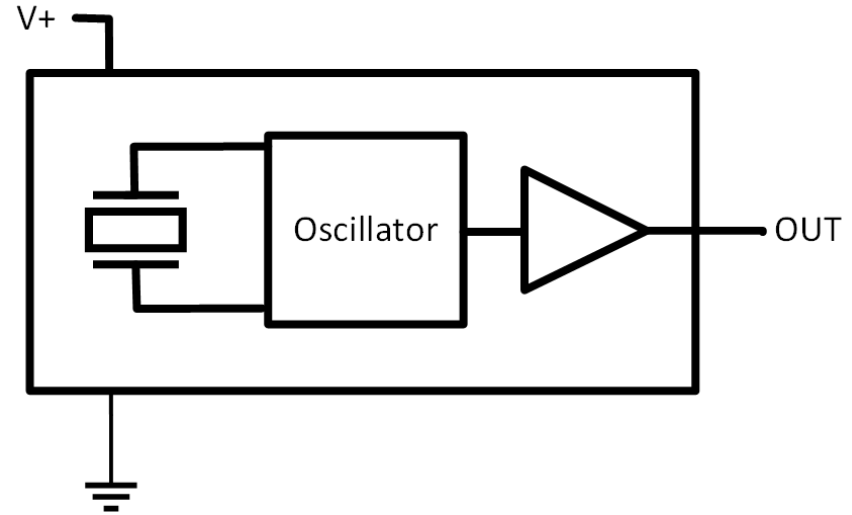
## Features:

- Ruggedized CMOS output Space XO with 100 krad tolerance
- Target Market: Space
- Frequency Range: 0.35 to 100 MHz
- Output: CMOS, TTL
- Footprint: multiple options, see specification mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 19.8 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



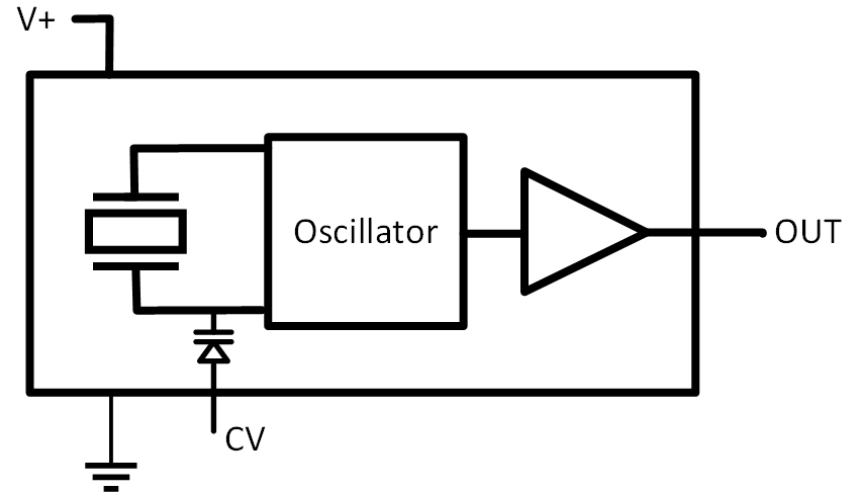
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.1 to 60 MHz
- Output: TTL
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 5 V
- Power: 1.5 W
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



## Features:

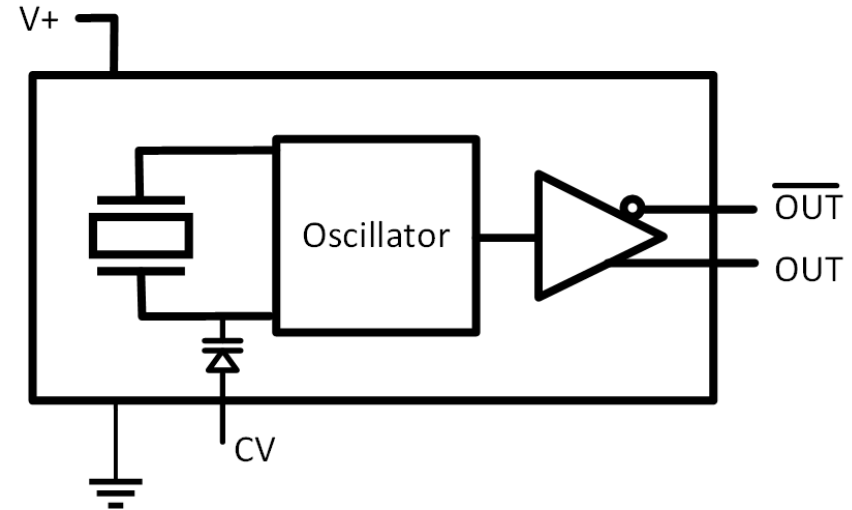
- Frequency Range: 0.8 to 3 GHz
- Output: Sine
- Footprint: 14 x 9 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- 1.2ppb/g
- Temperature Range: 10 to 85 °C
- Absolute Pull Range: 20 ppm





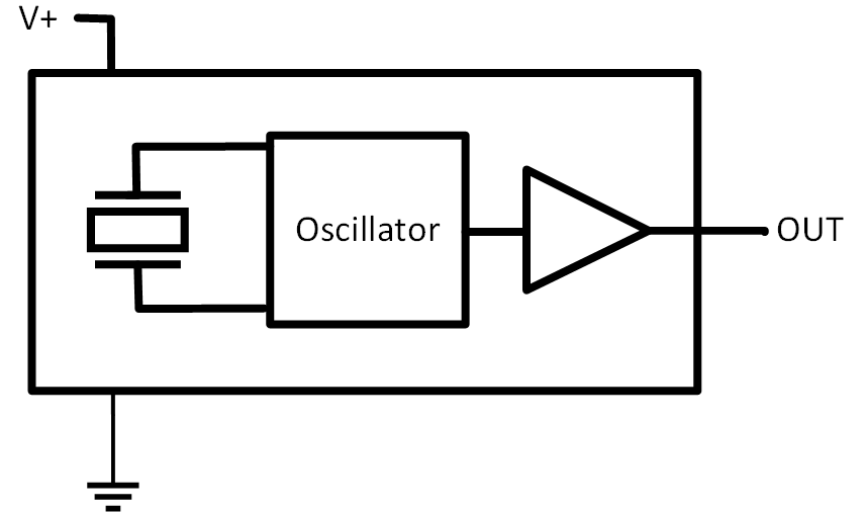
## Features:

- Frequency Range: 0.8 to 2.9 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 325 mW
- Temperature Range: 10 to 85 °C
- g-Sensitivity: 0.6 ppb/g
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -102 dBc/Hz @2000 MHz carrier
- Phase Noise 1 MHz offset: -150 dBc/Hz @2000MHz carrier



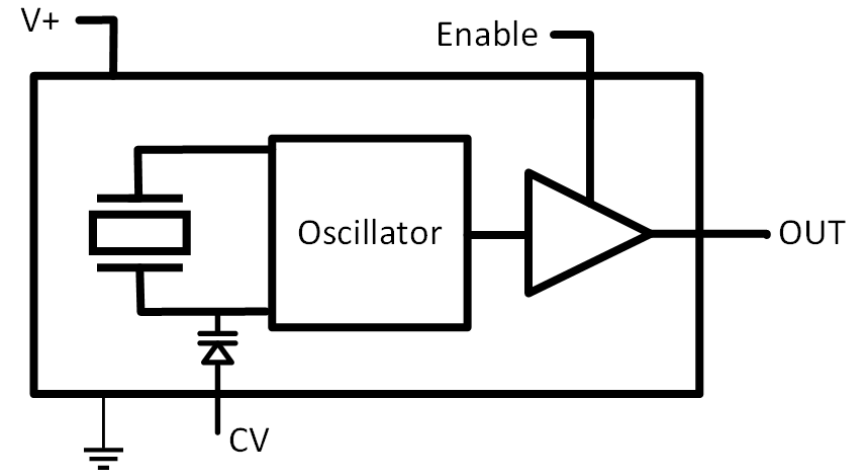
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.6 ppb/g
- Phase Noise 10 Hz offset: -55 dBc/Hz @1000 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @1000 MHz carrier



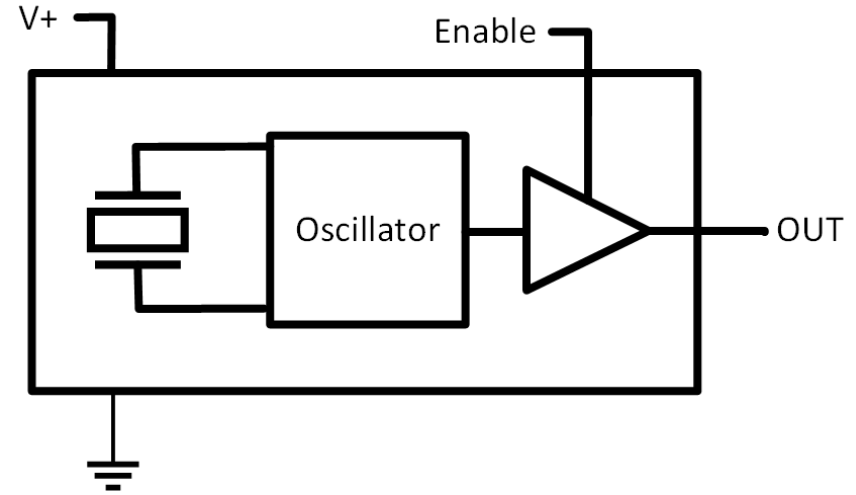
## Features:

- Frequency Range: 30 to 160 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 82.5 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.3 ppb/g
- Pull Range: 65 ppm
- Phase Noise 10 Hz offset: -72 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -161 dBc/Hz  
@122.88 MHz carrier



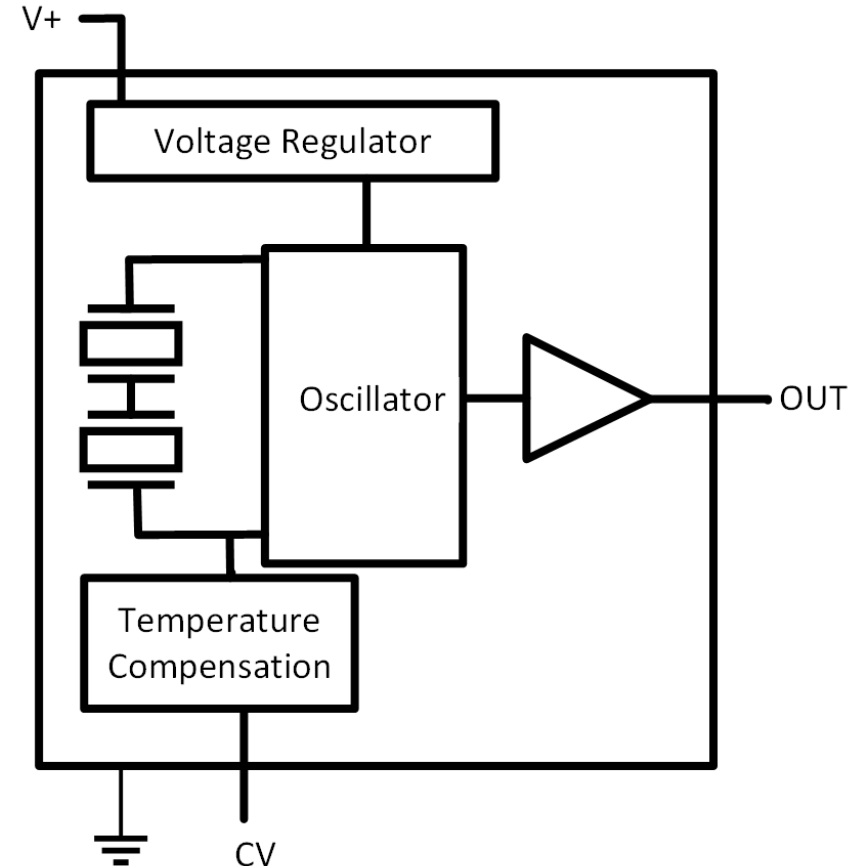
## Features:

- Frequency Range: 30 to 180 MHz
- Standard Frequencies: 50, 80, 100, 120, 122.88, 160 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.3 ppb/g
- Temperature stability over Operating Temperature Range: 25 ppm
- Aging per Year: 0 ppm



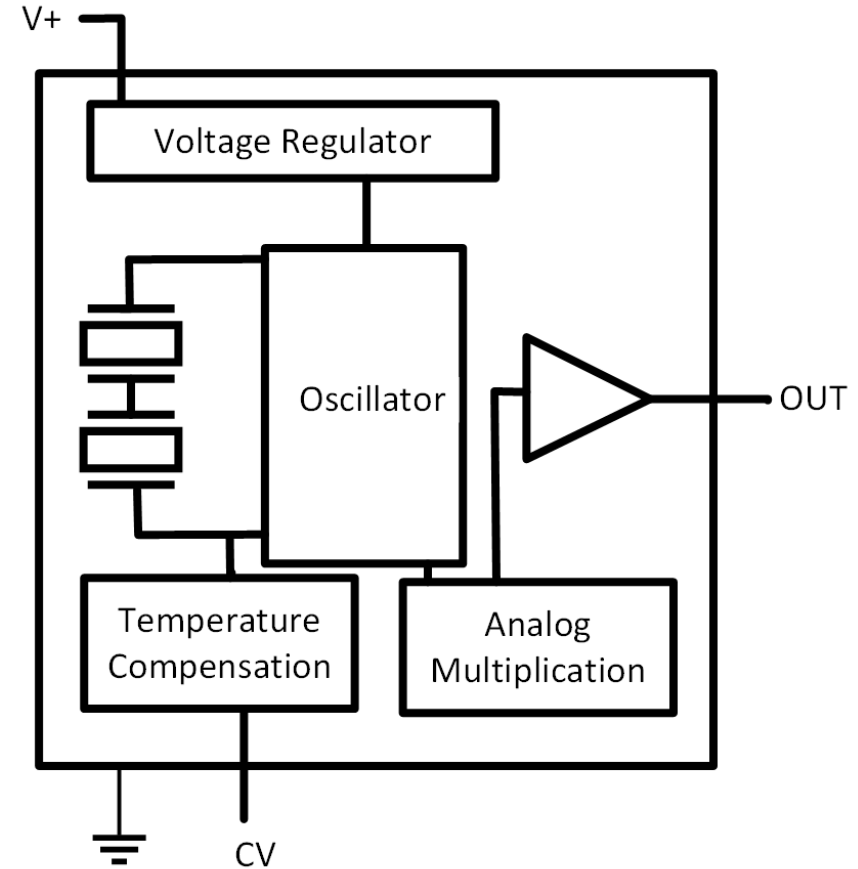
## Features:

- Lowest Noise TCXO in market
- Target Market: Test and Measurement
- Frequency Range: 5 to 50 MHz
- Output: CMOS
- Footprint: 23 x 18 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 82.5 mW
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -116 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -168 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm
- g-Sensitivity: 0.2 ppb/g



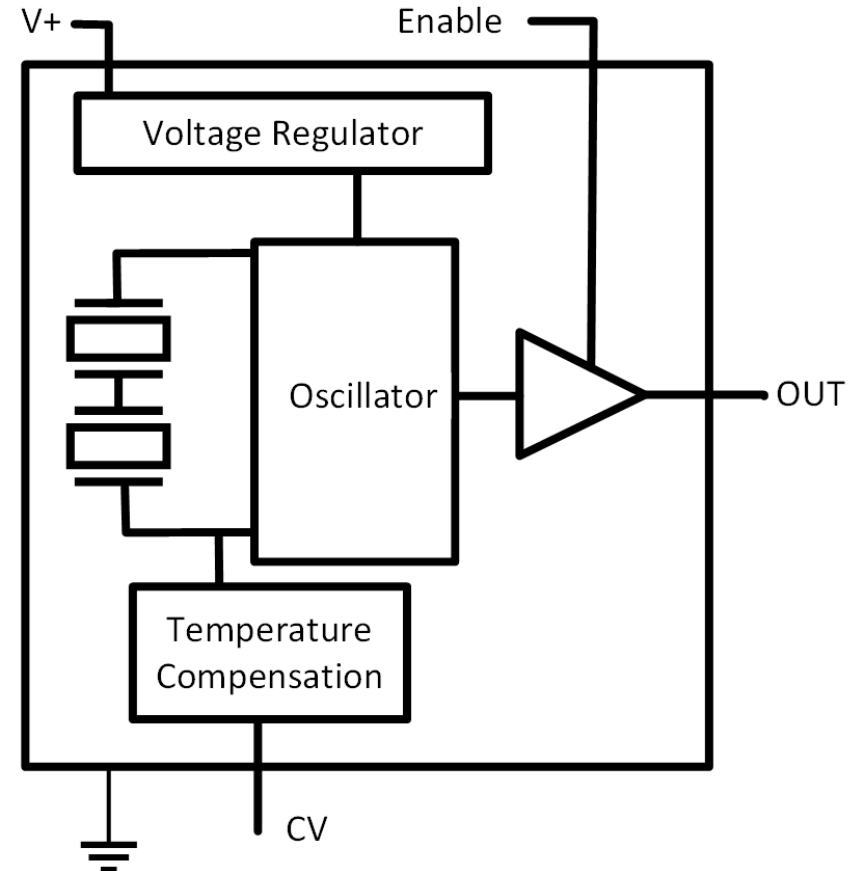
## Features:

- Frequency Range: 8 to 100 MHz
- Standard Frequencies: 10, 12.8, 20 MHz
- Output: CMOS, Clipped Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 11 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 98 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.2 ppb/g
- Phase Noise 10 Hz offset: -110 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm



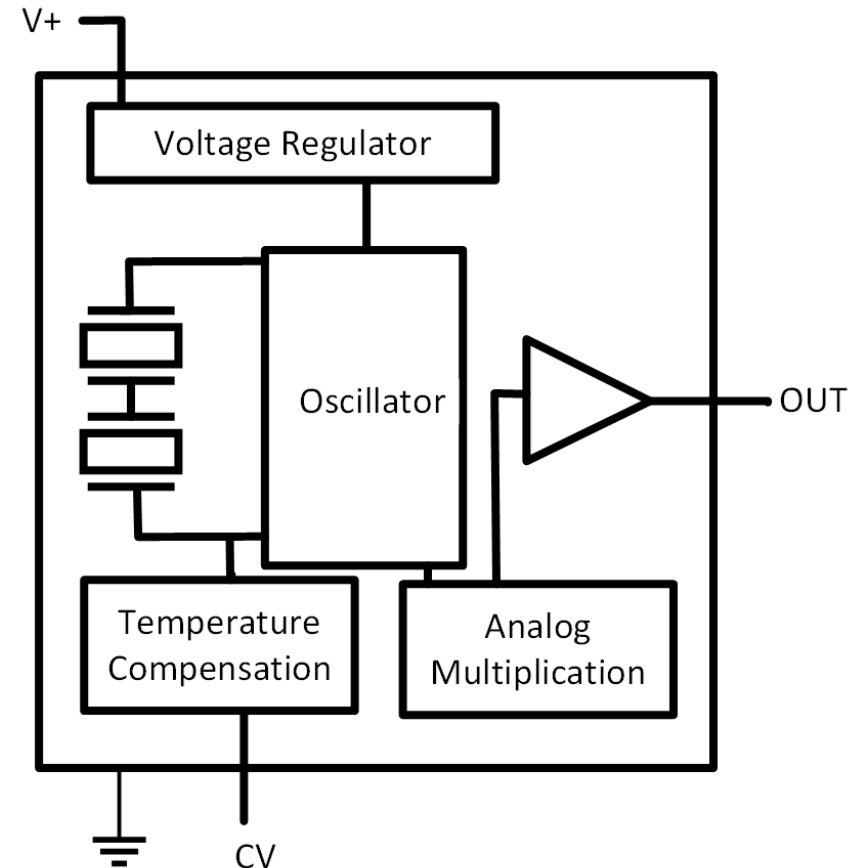
## Features:

- Dual crystal, hermetic, low g tcxo
- Target Market: Military
- Frequency Range: 8 to 52 MHz
- Standard Frequencies: 10, 16.368, 20, 25, 40, 50 MHz
- Output: CMOS, Clipped Sine
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.1 ppb/g
- Phase Noise 10 Hz offset: -100 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm



## Features: COMING SOON

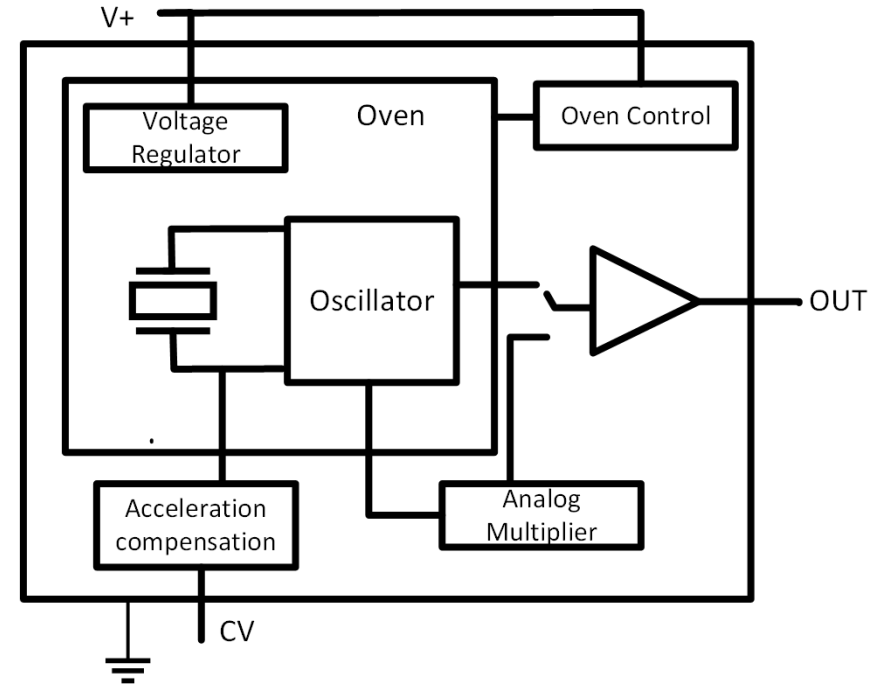
- High frequency, low g
- Target Market: Military
- Frequency Range: 96 to 160 MHz
- Standard Frequencies: 98.208, 100, 115.2, 120, 144, 150, 155.52, 160 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 121 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.1 ppb/g
- Phase Noise 10 Hz offset: -75 dBc/Hz @150 MHz carrier
- Phase Noise 100 kHz offset: -145 dBc/Hz @150 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm





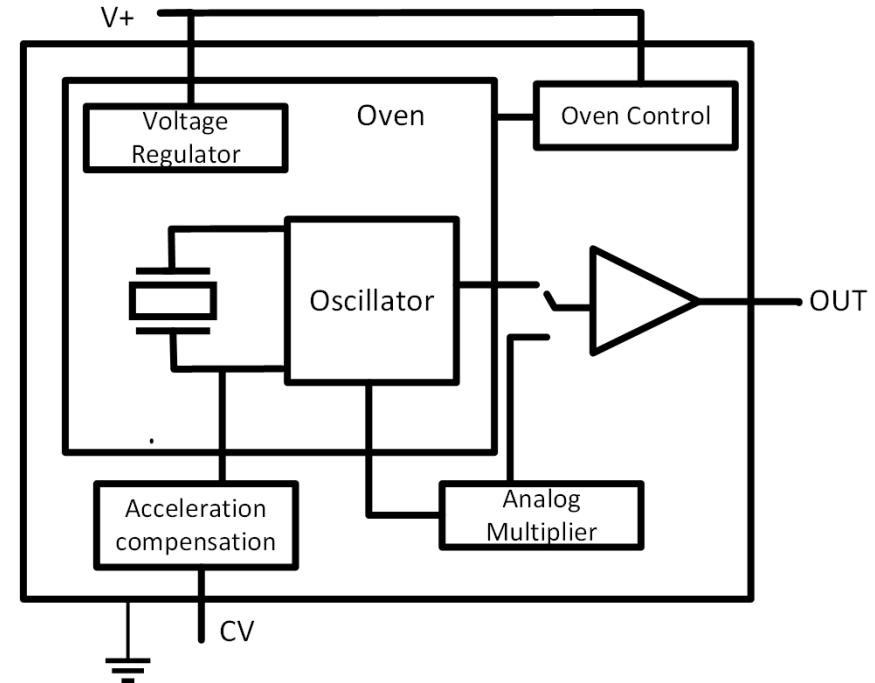
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -170 dBc/Hz @10 MHz carrier



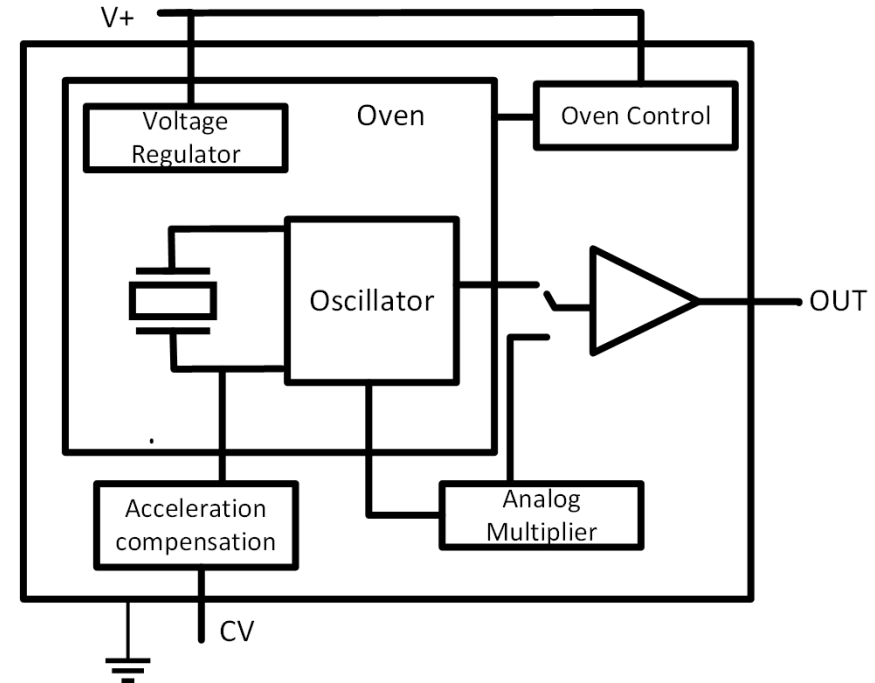
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 50 to 250 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.05 ppb/g
- Phase Noise 10 Hz offset: -100 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @100 MHz carrier



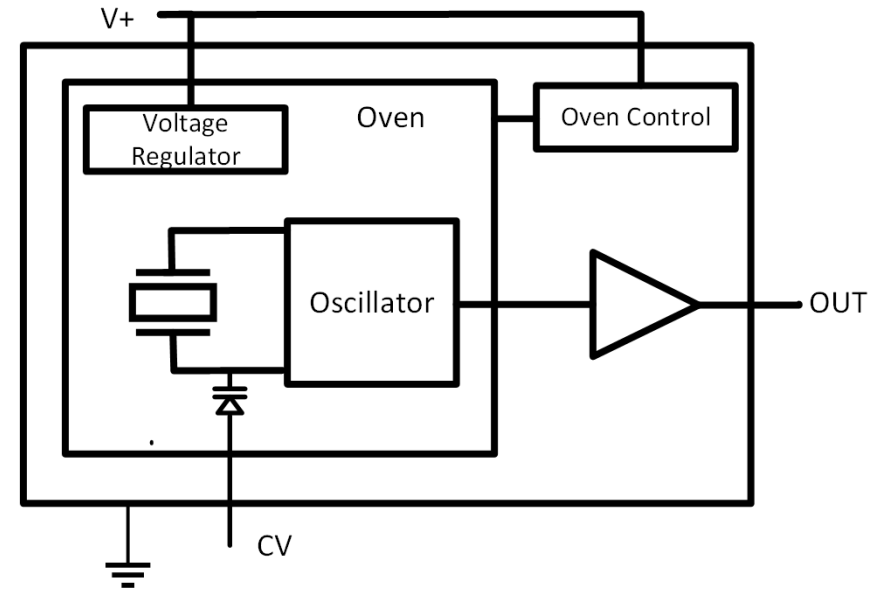
## Features:

- Smallest form factor Low g OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- Output: Sine
- Footprint: 38 x 38 mm, chassis
- Supply Voltage: 12 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -127 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



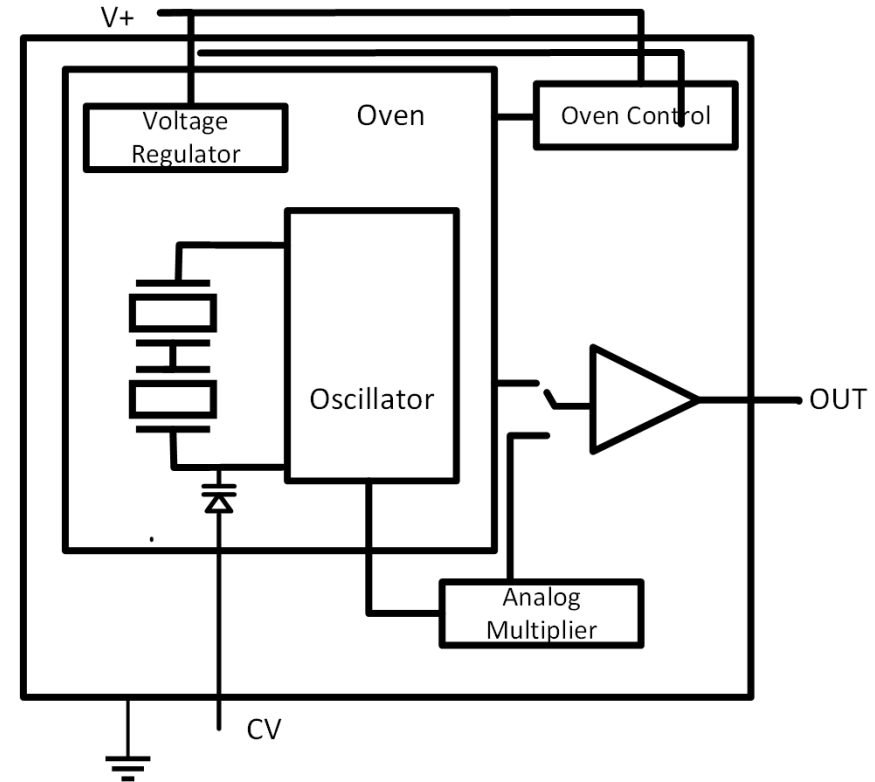
## Features:

- low noise, small factor OCXO
- Frequency Range: 80 to 120 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 1 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -95 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 50 ppb
- Aging per Year: 300 ppb



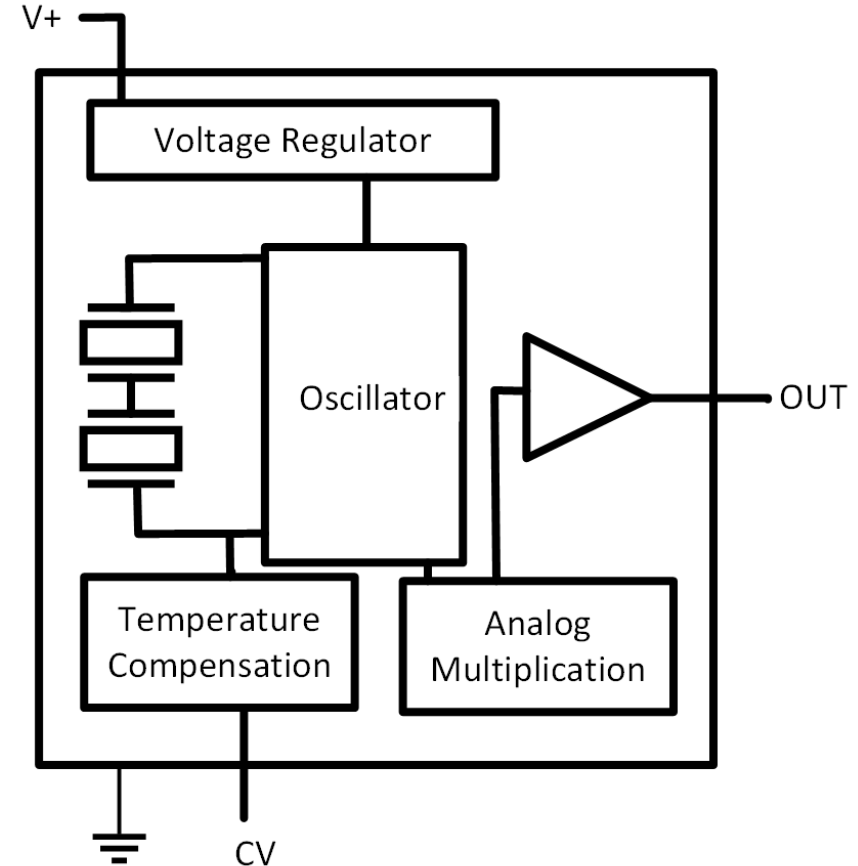
## Features:

- dual crystal, small form factor, low g OCXO
- Target Market: Military
- Frequency Range: 10 to 50 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 1 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.07 ppb/g
- Temperature stability over Operating Temperature Range: 100 ppb
- Phase Noise 10 Hz offset: -84 dBc/Hz @40 MHz carrier
- Phase Noise 100 kHz offset: -150 dBc/Hz @40 MHz carrier



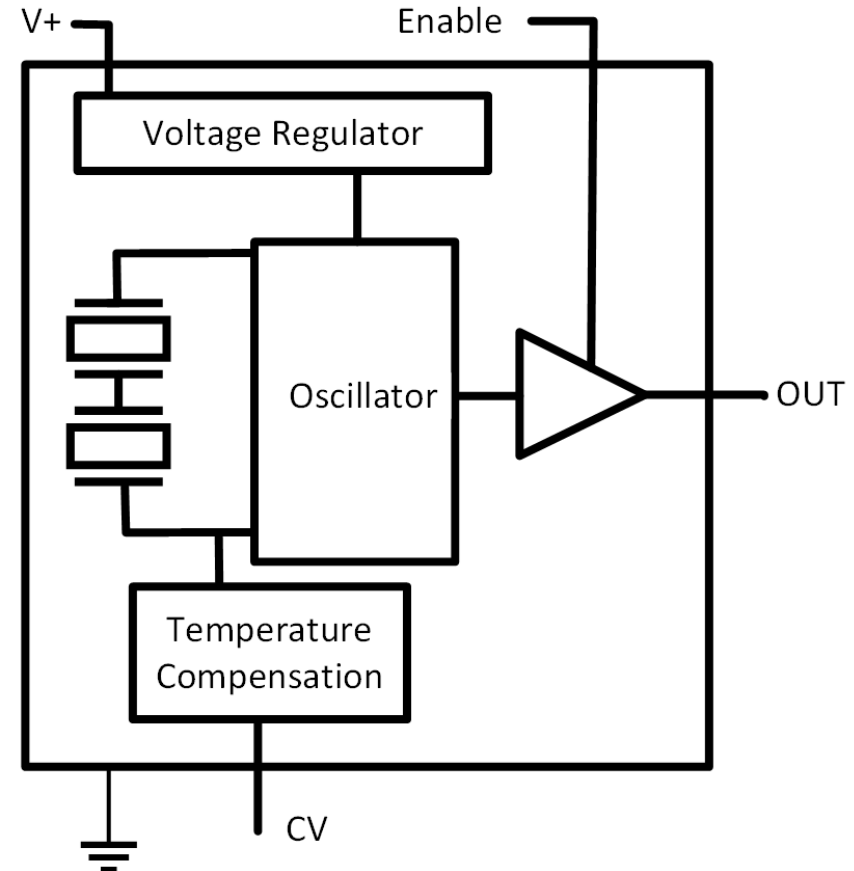
## Features:

- Frequency Range: 8 to 100 MHz
- Standard Frequencies: 10, 12.8, 20 MHz
- Output: CMOS, Clipped Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 11 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 98 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.2 ppb/g
- Phase Noise 10 Hz offset: -110 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm



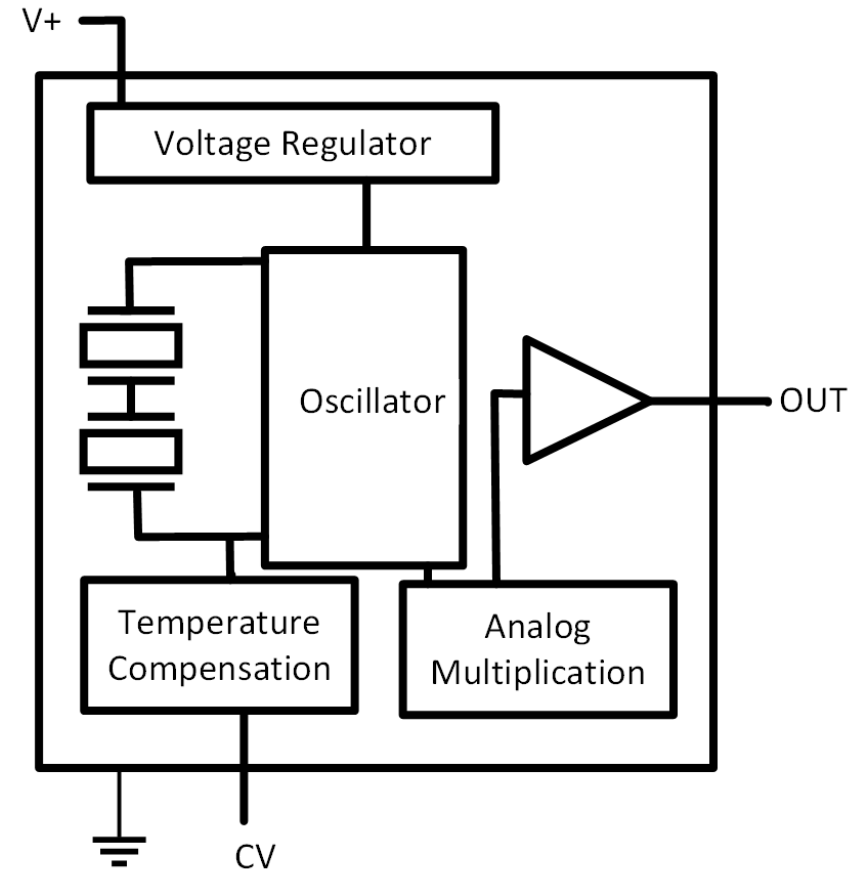
## Features:

- Dual crystal, hermetic, low g tcxo
- Target Market: Military
- Frequency Range: 8 to 52 MHz
- Standard Frequencies: 10, 16.368, 20, 25, 40, 50 MHz
- Output: CMOS, Clipped Sine
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.1 ppb/g
- Phase Noise 10 Hz offset: -100 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm



## Features: COMING SOON

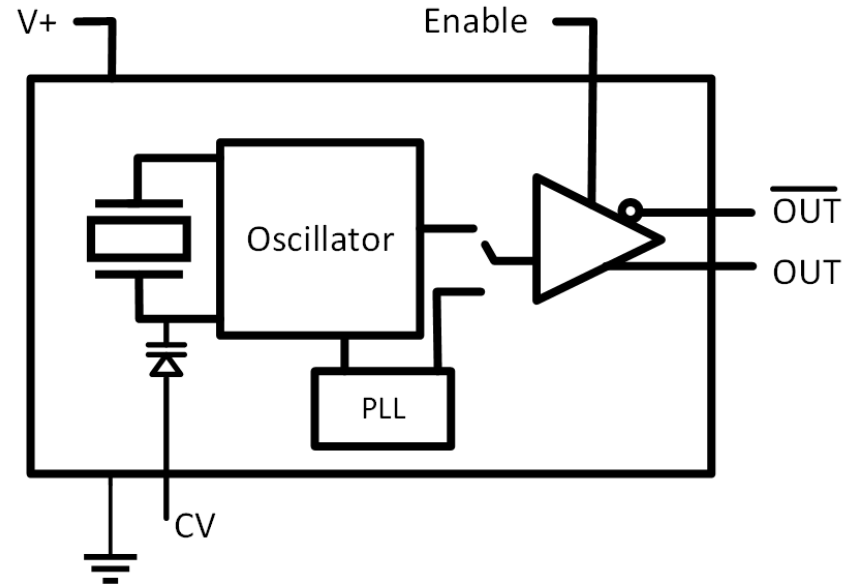
- High frequency, low g
- Target Market: Military
- Frequency Range: 96 to 160 MHz
- Standard Frequencies: 98.208, 100, 115.2, 120, 144, 150, 155.52, 160 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 121 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.1 ppb/g
- Phase Noise 10 Hz offset: -75 dBc/Hz @150 MHz carrier
- Phase Noise 100 kHz offset: -145 dBc/Hz @150 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm





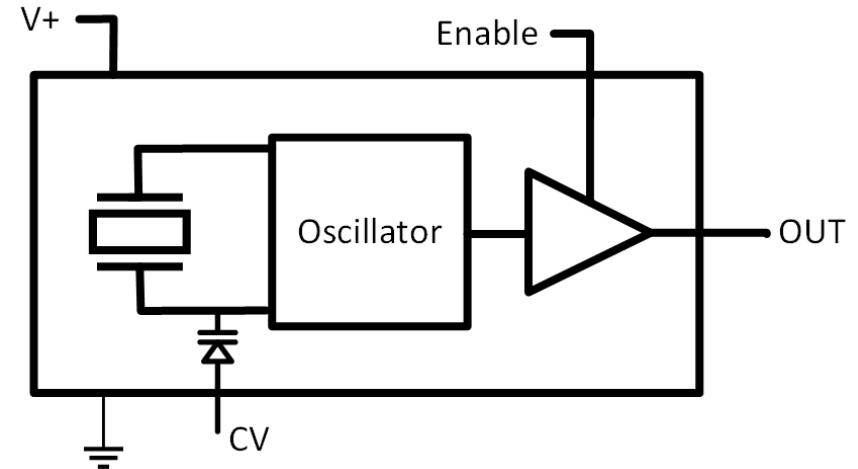
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 19.8 mW
- Temperature Range: -55 to 125 °C
- Pull Range: 50 ppm
- Phase Noise 10 Hz offset: -60 dBc/Hz @52 MHz carrier
- Phase Noise 100 kHz offset: -145 dBc/Hz @52 MHz carrier



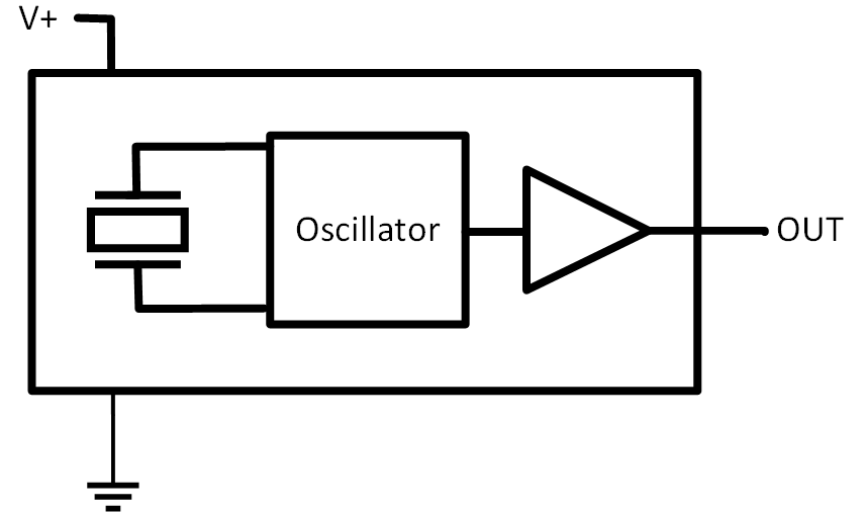
## Features:

- Frequency Range: 30 to 160 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 82.5 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.3 ppb/g
- Pull Range: 65 ppm
- Phase Noise 10 Hz offset: -72 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -161 dBc/Hz  
@122.88 MHz carrier



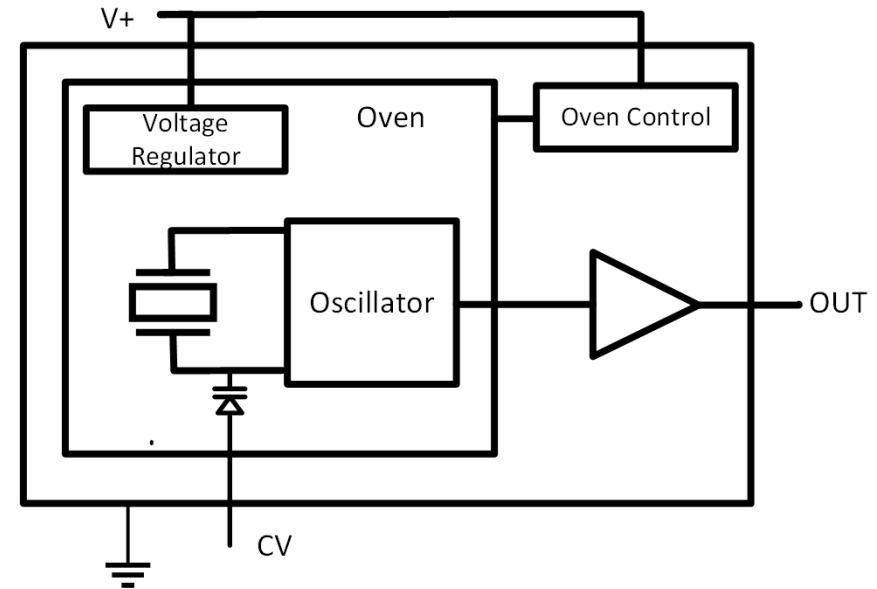
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.6 ppb/g
- Phase Noise 10 Hz offset: -55 dBc/Hz @1000 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @1000 MHz carrier



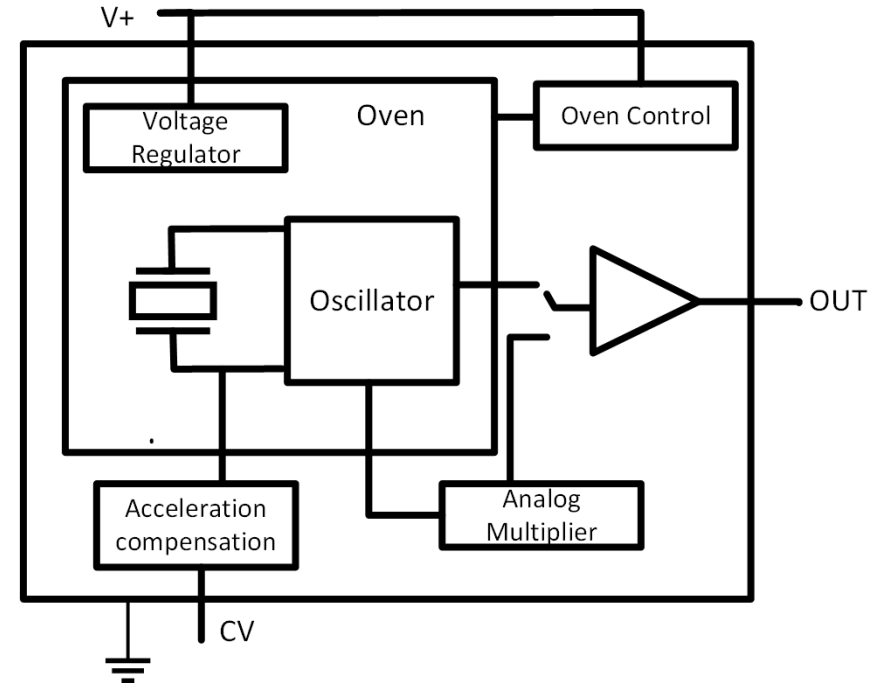
## Features:

- OCXO performance at ~ 1/5 the power
- Frequency Range: 10 to 100 MHz
- Output: CMOS, Sine
- Footprint: 13 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 12 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.03 ppm
- Aging per Year: 0.1 ppm
- Phase Noise 10 Hz offset: -125 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



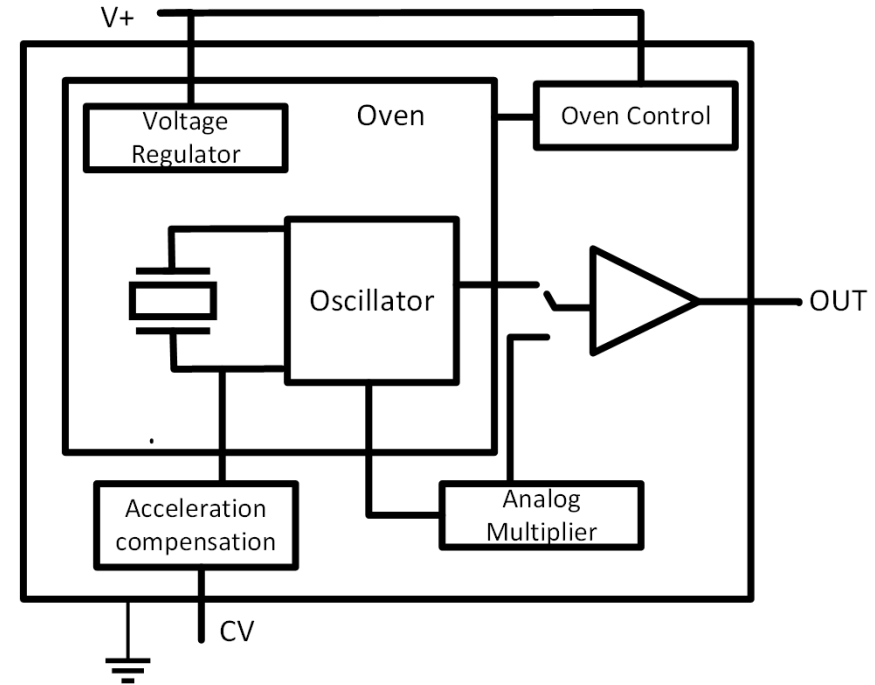
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -170 dBc/Hz @10 MHz carrier



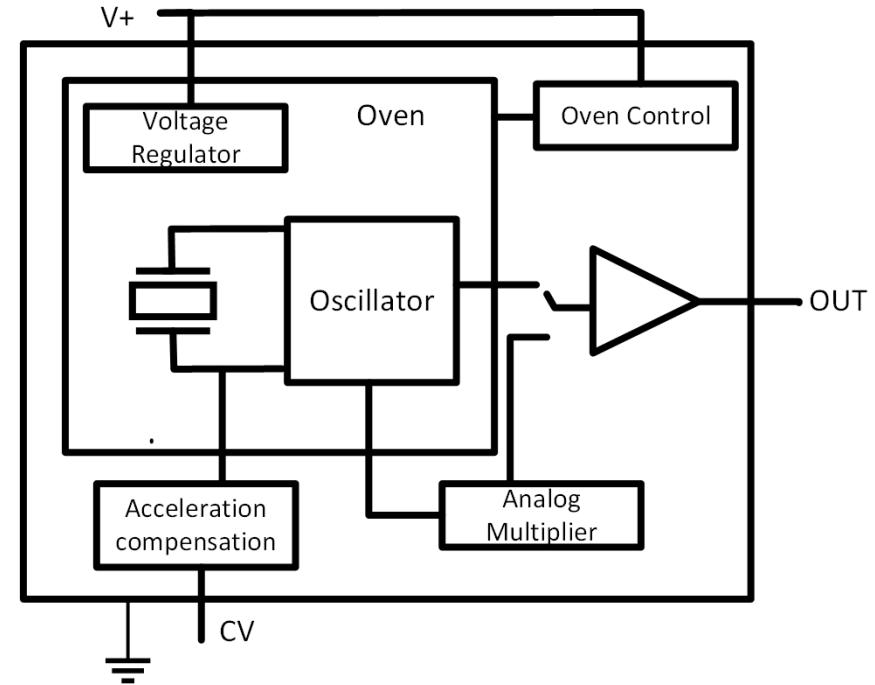
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 50 to 250 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.05 ppb/g
- Phase Noise 10 Hz offset: -100 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @100 MHz carrier



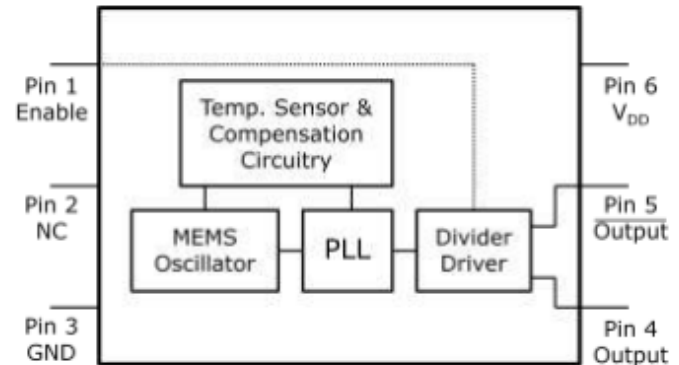
## Features:

- Smallest form factor Low g OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- Output: Sine
- Footprint: 38 x 38 mm, chassis
- Supply Voltage: 12 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -127 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



## Features:

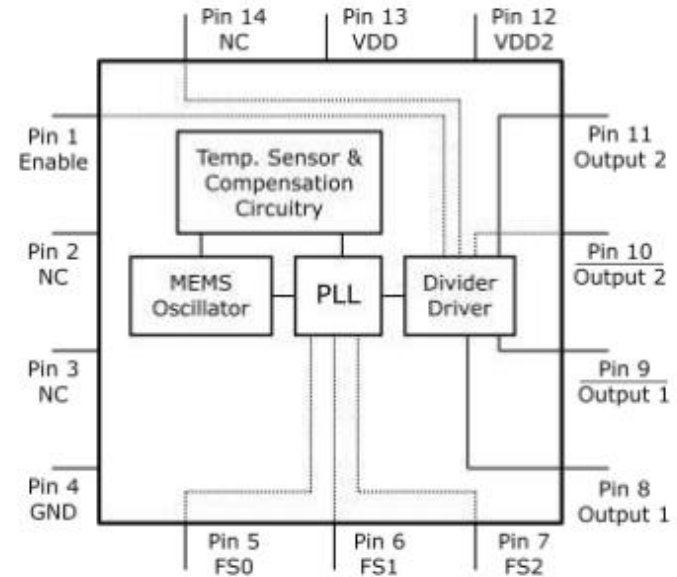
- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
  - Qualified to MIL-STD-883
- High Reliability
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function
- LVDS & LVPECL Versions Available





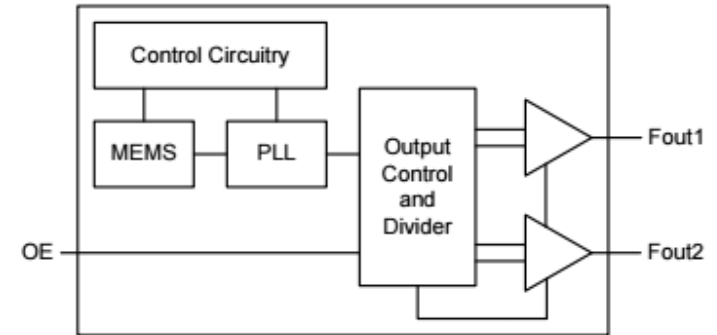
## Features:

- Low RMS Phase Jitter: 1.5 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:  $-20^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Two configurable independent outputs:
- LVCMOS, LVPECL, LVDS, HCSL
- Pin-Selectable Configurations:
- 3-bit Output Frequency Combinations
- Short Lead Times: 2 Weeks
- Wide Freq. Range: 2.3 to 460MHz
- Miniature Footprint of 3.2mm x 2.5mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Supply Range of 2.25V to 3.6V
- DSC20XX supports pin control
- DSC21xx supports I<sup>2</sup>C interface
- DSC22XX supports SPI interface



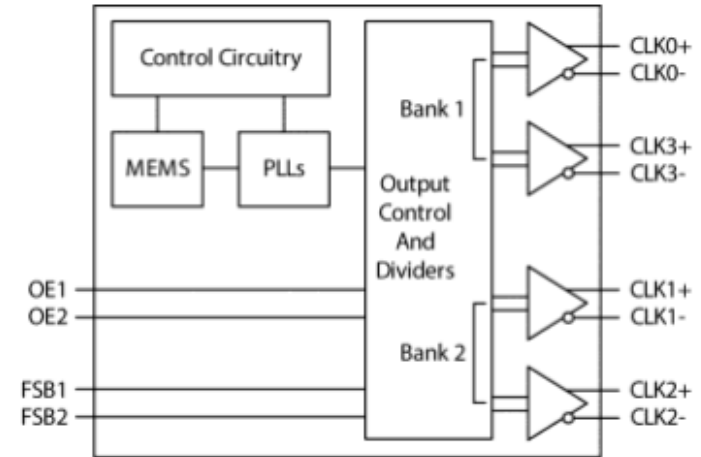
## Features:

- Two Simultaneous CMOS Outputs:
  - Output 1 Range: 2.3 to 170MHz
  - Output 2 Range: 2.3 to 170MHz
- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 25$  ppm;  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive:  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. Commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- High Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than crystal-based clock -  
– generator designs
- Supply Range of 2.25V to 3.6V



## Features:

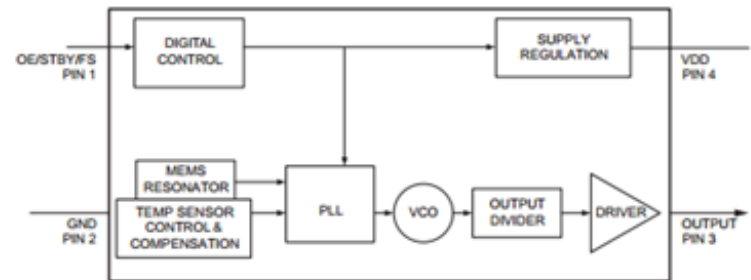
- Low RMS Phase Jitter: <math><1\text{ps}</math> (typ.)
- High Stability:  $\pm 25\text{ppm}$ ,  $\pm 50\text{ppm}$
- Wide Temperature Range:
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide frequency range: 2.3MHz to 460MHz
- 20-pin QFN footprint (5.0mm x 3.2mm)
- Excellent shock and vibration immunity:
  - Qualified to MIL-STD-883
- Four format-configurable outputs:
  - LVPECL, LVDS, HCSL, LVCMOS
- Available pin-selectable frequency table:
  - 1 pin per bank for two frequency sets
- High Reliability: 20x better MTF than quartz - based devices
- Wide supply range of 2.25V to 3.6V
- AEC-Q100 Automotive qualified



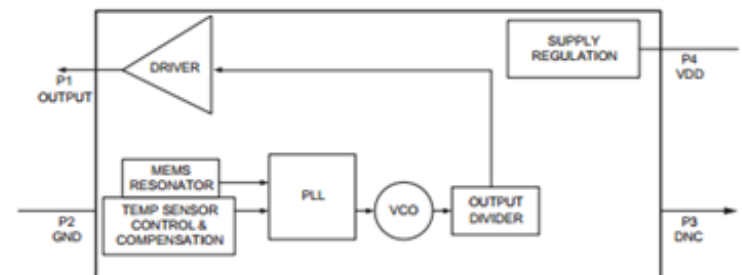
## Features:

- Wide Frequency Range:
- DSC60xx: 2kHz to 80MHz
- DSC61xx: 2KHz to 100MHz
- Ultra Low Power Consumption:
  - DSC60xx: 1.25mA/10.5uA (Active/Stdby)
  - DSC61xx: 3mA/10.5uA (Active/Stdby)
- Ultra Small Footprints:
  - 1.6mmx1.2mm, 2.0mmx1.6mm,
  - 2.5mmx2.0mm, 3.2mmx2.5mm
- Frequency Select input supports 2 frequencies
- High Stability:  $\pm 25$ ,  $\pm 50$  ppm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability
- 20x better MTF than quartz oscillators
- Supply Range of 1.71 to 3.63 V
- Temperature Range:
  - Industrial:  $-40^{\circ}$  to  $85^{\circ}$  C Ext.
  - Commercial:  $-20^{\circ}$  to  $70^{\circ}$  C

DSC6001/03/11/13/21/23/41/43/51/53/61/63

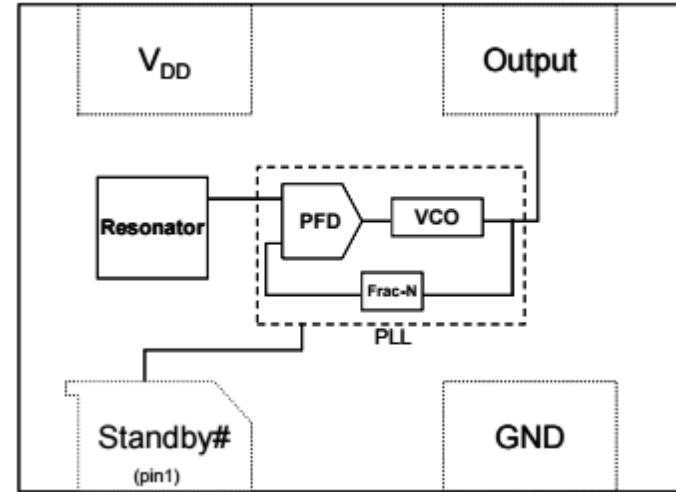


DSC6083 (kHz Output)



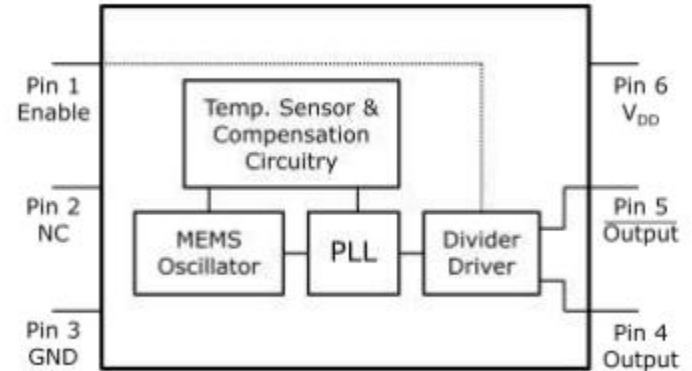
## Features:

- Frequency Range: 1 to 150MHz
- Drive Strength: 15pF, 25pF, 40pF
- Exceptional Stability over Temperature:
  - $\pm 10$  PPM,  $\pm 25$  PPM,  $\pm 50$  PPM
- Operating voltage of 1.7V to 3.6V
- Operating Temperature Range:
  - Extended Industrial  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended Commercial  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
  - Commercial  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- Low Operating and Standby Current:
  - 5mA Operating (40MHz)
  - 15 $\mu\text{A}$  Standby
- Ultra Miniature Footprint:
  - 2.5mm x 2.0mm x 0.85mm
  - 3.2mm x 2.5mm x 0.85mm
  - 5.0mm x 3.2mm x 0.85mm
  - 7.0mm x 5.0mm x 0.85mm
- MIL-STD 883 Shock and Vibration Resistant
- AEC-Q100 Qualified



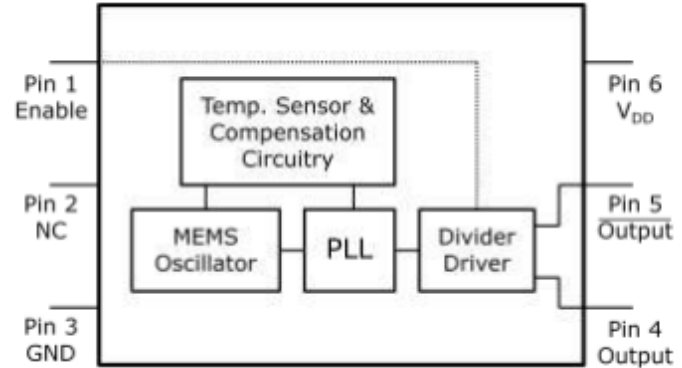
## Features:

- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive:  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 170MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function



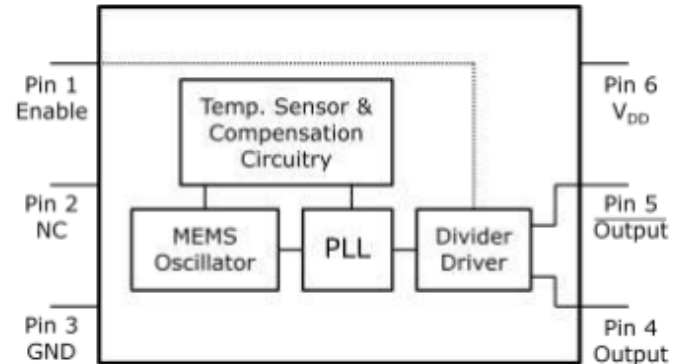
## Features:

- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function
- LVDS & HCSL Versions Available



## Features:

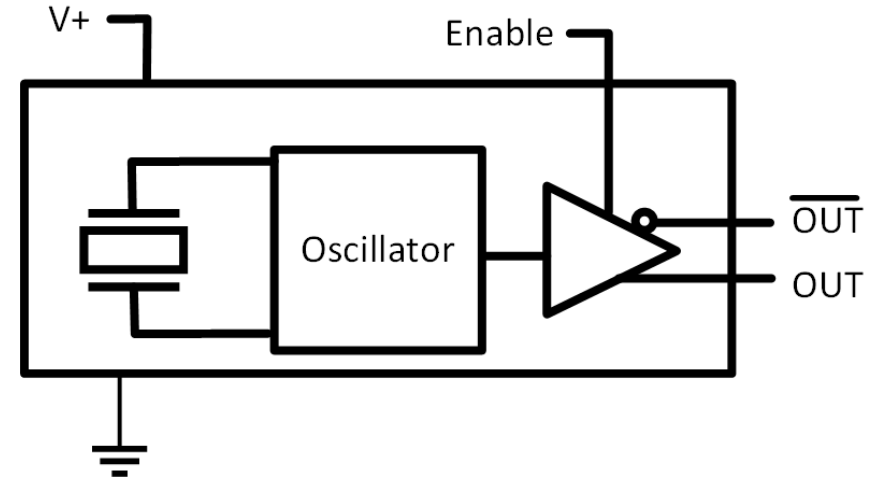
- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function
- LVPECL & HCSL Versions Available





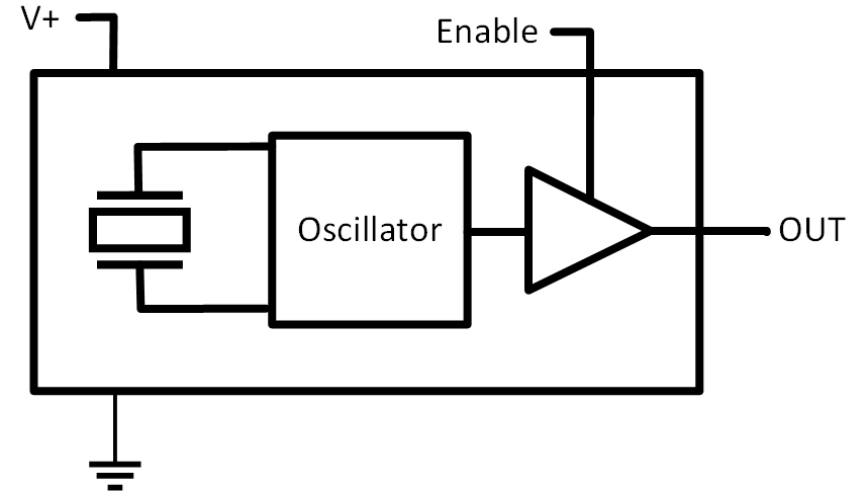
## Features:

- Target Market: Military
- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 15 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 3 ppm



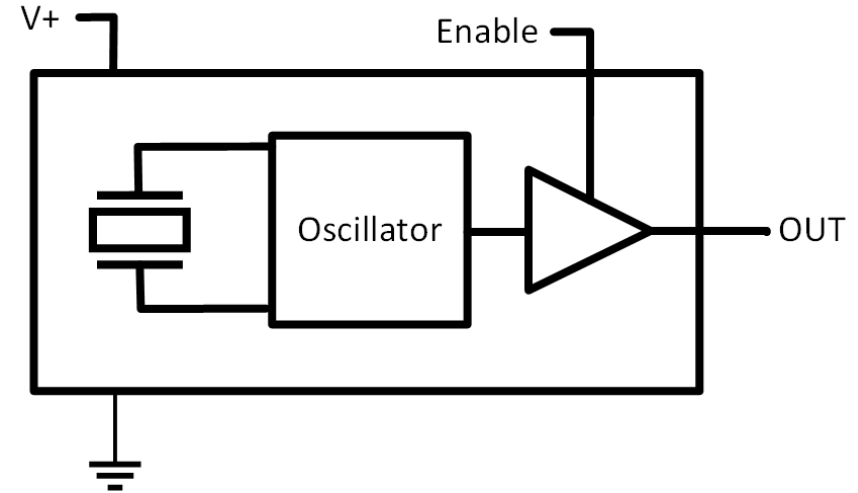
## Features:

- Frequency Range: 30 to 180 MHz
- Standard Frequencies: 50, 80, 100, 120, 122.88, 160 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.3 ppb/g
- Temperature stability over Operating Temperature Range: 25 ppm
- Aging per Year: 0 ppm



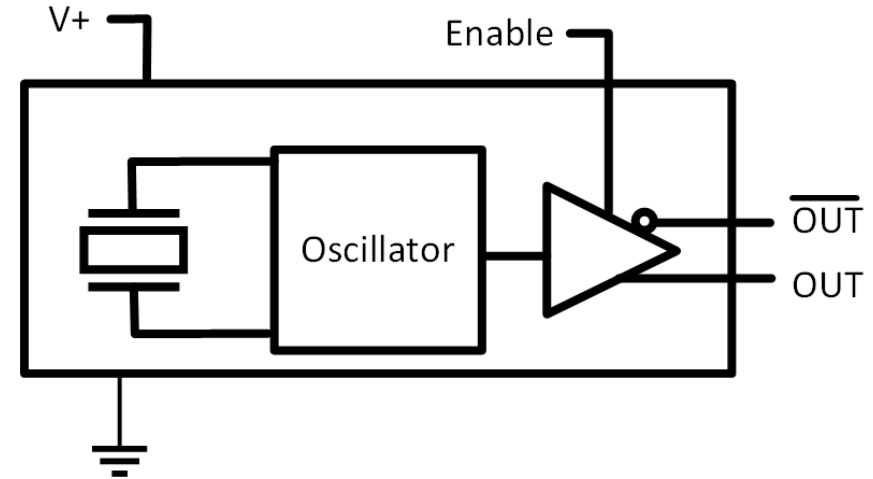
## Features:

- Target Market: Military
- Frequency Range: 0.01 to 125 MHz
- Output: CMOS, TTL
- Footprint: 9 x 9 mm, through hole
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 27 mW
- Temperature Range: -55 to 125 °C
- 100 g Shock, 6 ms Duration



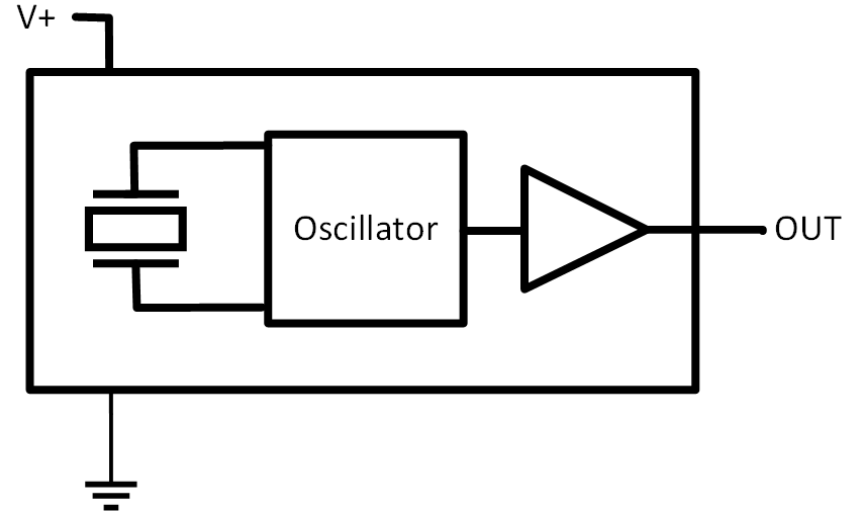
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 15 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 3 ppm



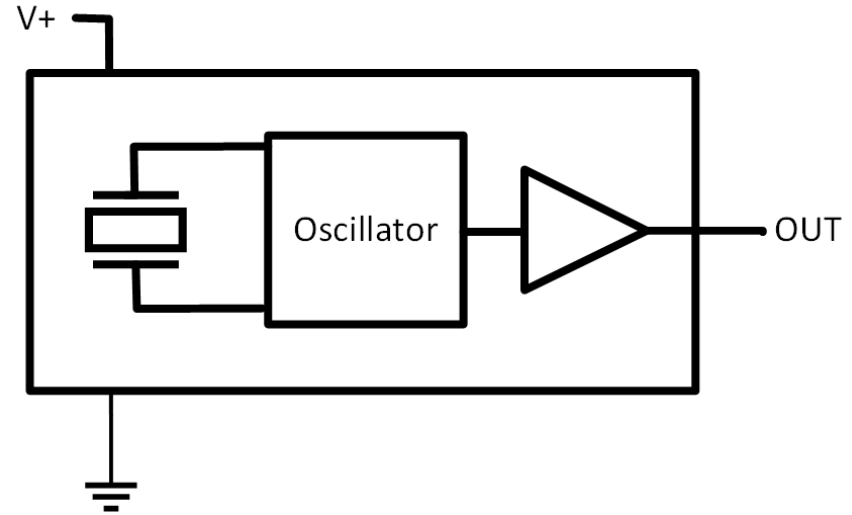
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 85 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 5 V
- Power: 75 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



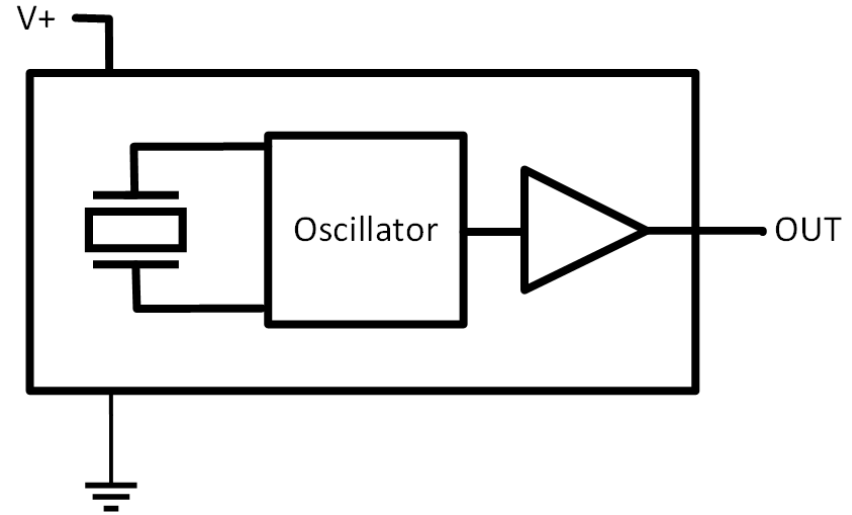
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 85 MHz
- Output: TTL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 75 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



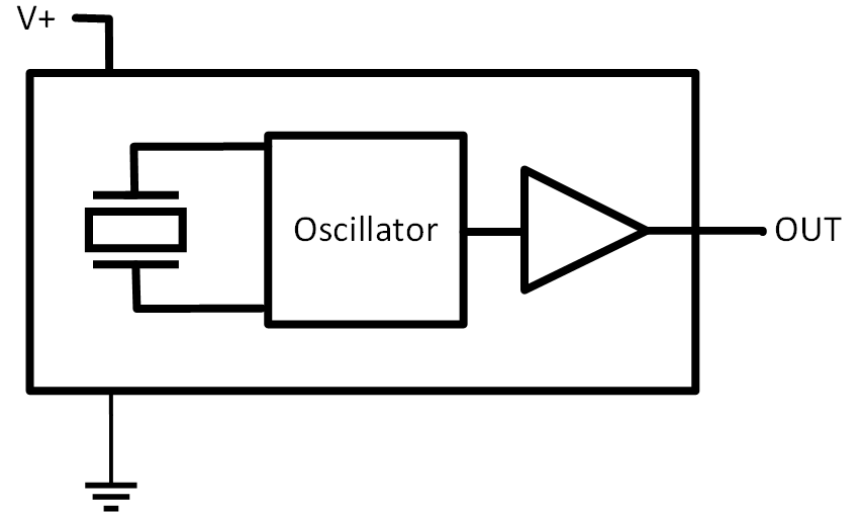
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.45 to 85 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 75 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



## Features:

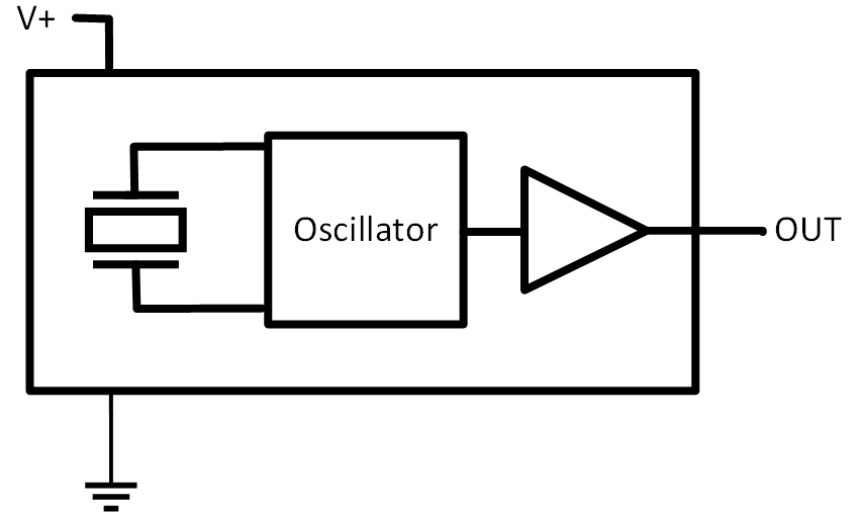
- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.4 to 60 MHz
- Output: TTL
- Footprint: Ø15.4 mm, through hole
- Supply Voltage: 5 V
- Power: 165 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 0.6 ms Duration
- 20 g Vibration





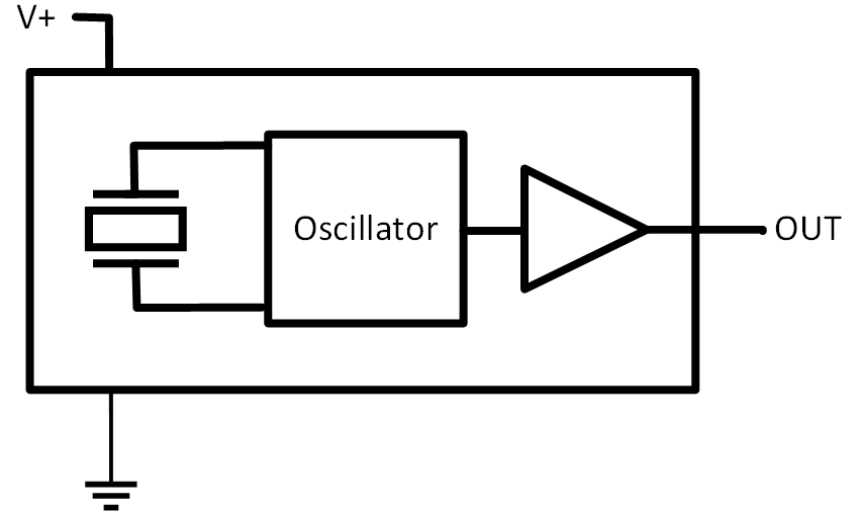
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.1 to 60 MHz
- Output: TTL
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 5 V
- Power: 1.5 W
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



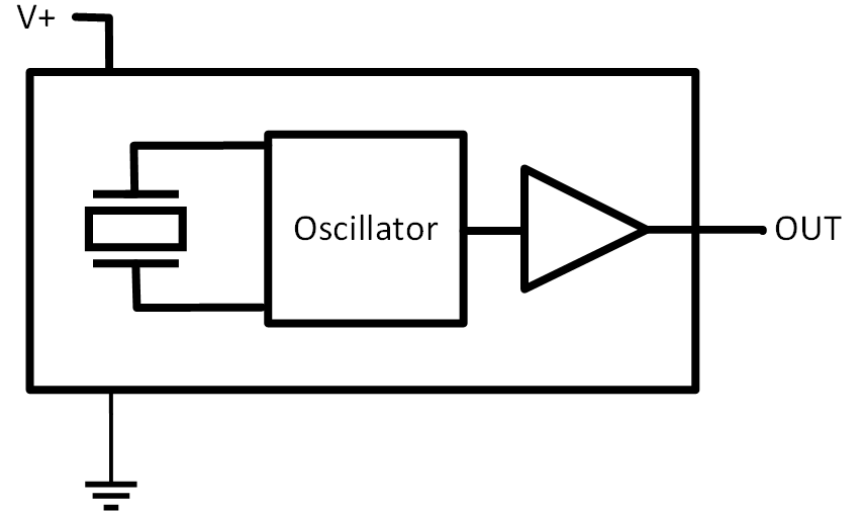
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 60 MHz
- Output: TTL
- Footprint: 12 x 12 mm, surface mount
- Supply Voltage: 5 V
- Power: 350 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



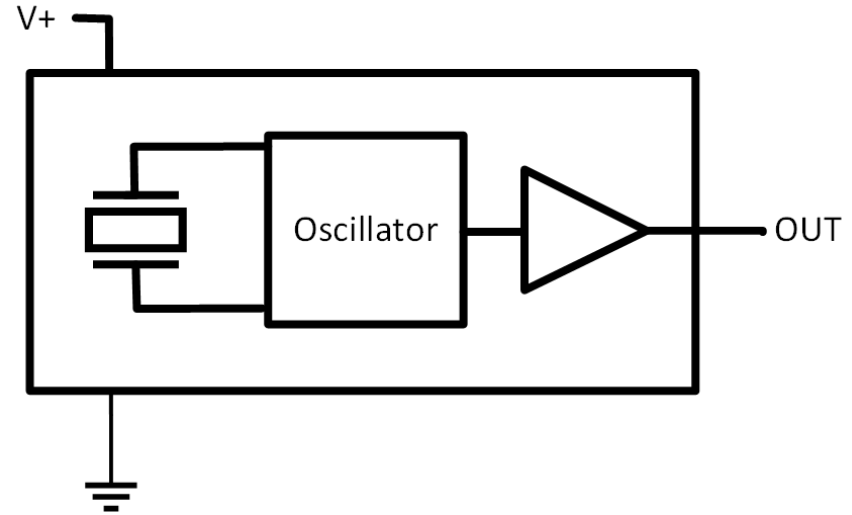
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 1 to 60 MHz
- Output: TTL
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 5 V
- Power: 150 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 10 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



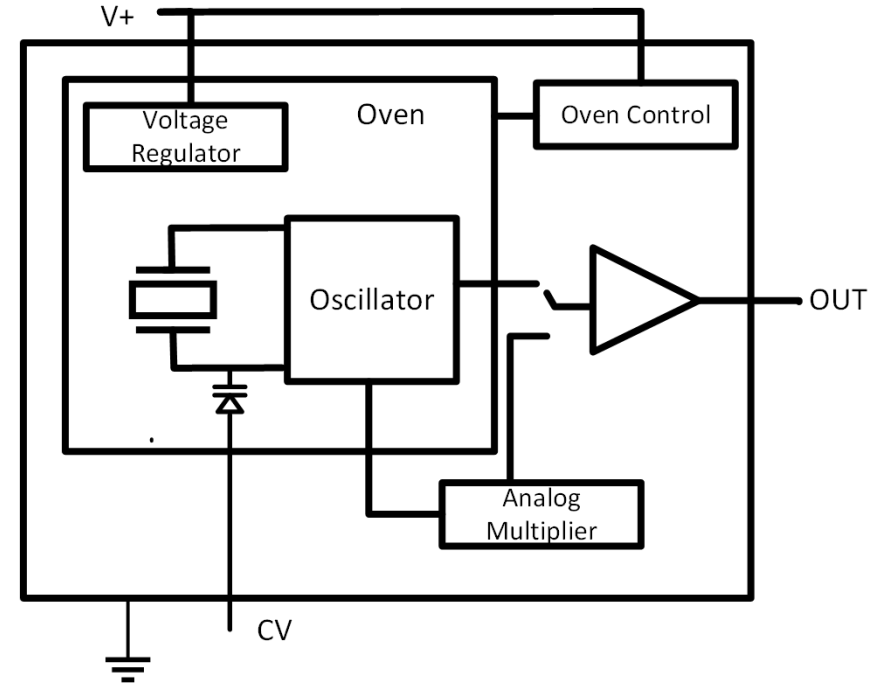
## Features:

- DSCC QPL Part
- Target Market: Military
- Frequency Range: 0.01 to 65 MHz
- Output: CMOS
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 5 V
- Power: 50 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 100 g Shock, 6 ms Duration
- 20 g Vibration



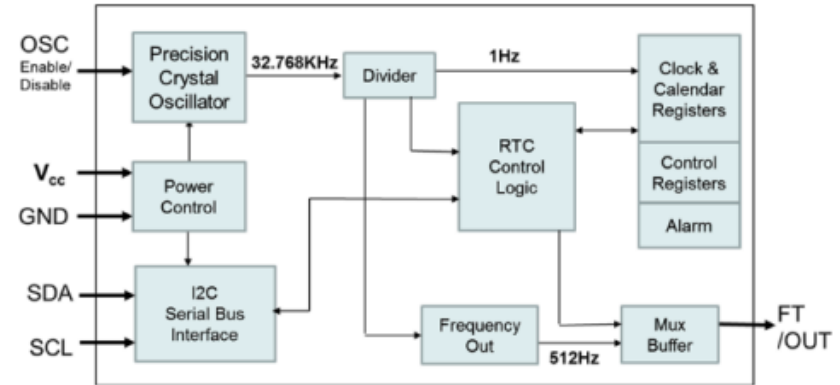
## Features:

- Target Market: Energy
- Frequency Range: 10 to 20 MHz
- Standard Frequencies: 10,20 MHz
- Output: CMOS
- Footprint: 28 x 38 mm, through hole
- Supply Voltage: 5 V
- Power: 75 mW
- Temperature Range: -40 to 150 °C
- Temperature stability over Operating Temperature Range: 5 ppb
- Aging per Day: 0.5 ppb



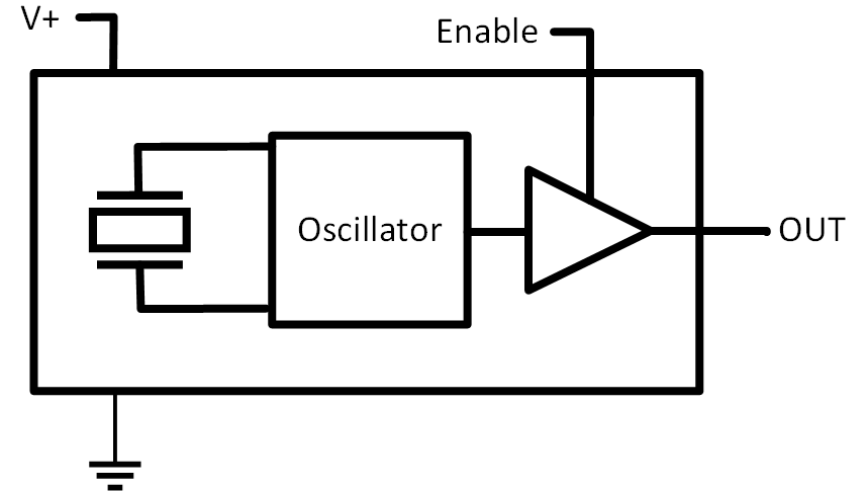
## Features:

- Real time clock module for time of day information on downhole applications
- Target Market: Energy
- 0.000512 MHz
- Standard Frequency: 0.000512 MHz
- Output: CMOS
- Footprint: 13 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3 V
- Power: 20 mW
- Temperature Range: -40 to 200 °C
- Serial communications Interface
- 1000 g Shock, 0.5 ms Duration



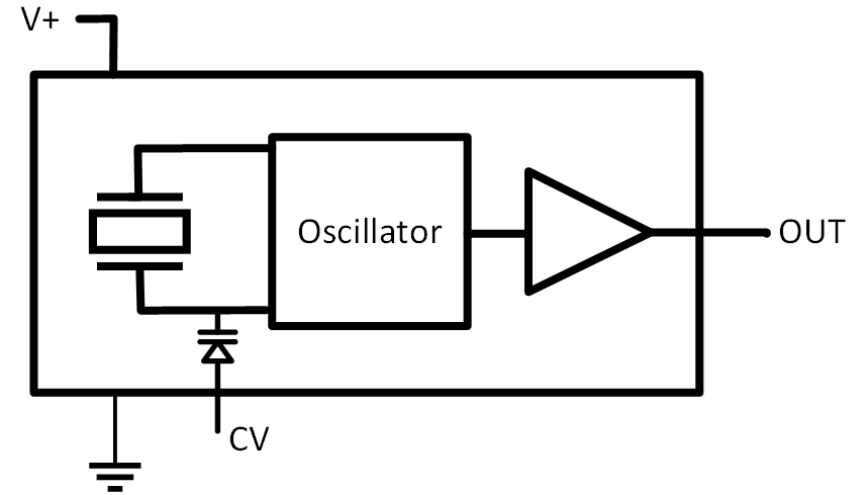
## Features:

- Target Market: Energy
- Frequency Range: 0.5 to 50 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3, 3.3, 5 V
- Power: 1.8 mW
- Temperature Range: -55 to 230 °C
- Temperature stability over Operating Temperature Range: 200 ppm
- 3000 g Shock, 0.3 ms Duration
- 30 g Vibration



## Features:

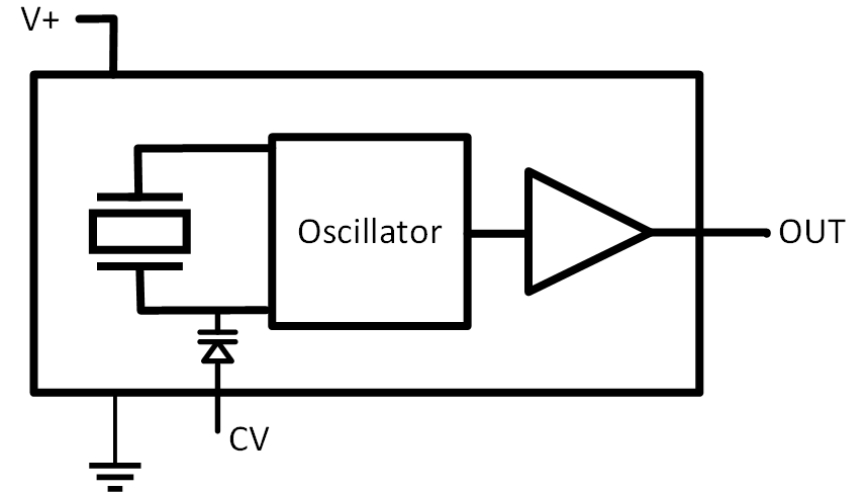
- Frequency Range: 1 to 32.768 MHz
- Output: CMOS
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 39.6 mW
- Temperature Range: -55 to 200 °C
- Temperature stability over Operating Temperature Range: 0 ppm
- Absolute Pull Range: 50 ppm





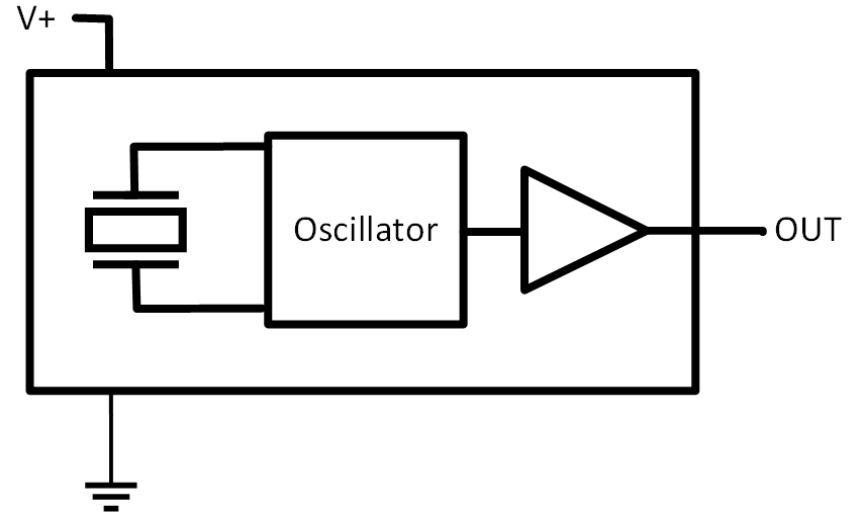
## Features:

- High temperature, small form factor VCO
- Frequency Range: 2 to 40 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 9.9 mW
- Temperature Range: -55 to 180 °C
- Absolute Pull Range: 25 ppm
- Phase Noise 10 Hz offset: -75 dBc/Hz @32 MHz carrier
- Phase Noise 100 kHz offset: -155 dBc/Hz @32 MHz carrier



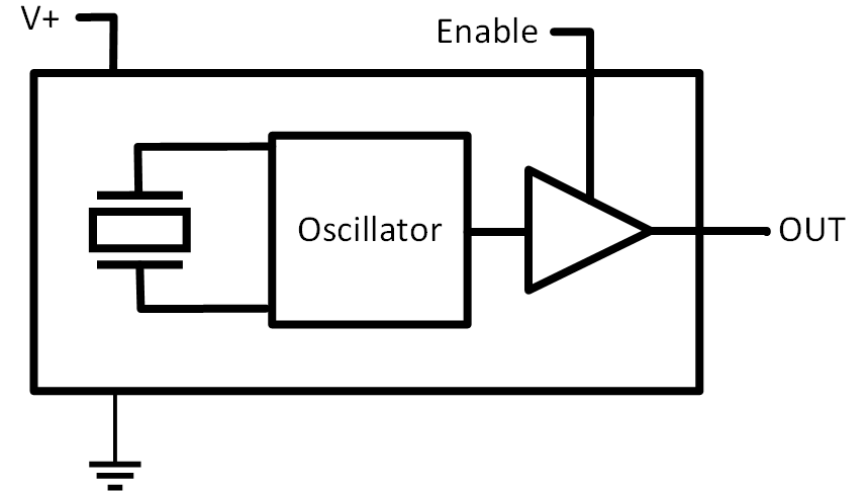
## Features:

- Stand alone high temp low power Xos at 32.768 kHz
- Target Market: Energy
- 0.032768 MHz
- Standard Frequency: 0.032768 MHz
- Output: CMOS
- Footprint: multiple options, see specification mm, through hole, surface mount
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 33 mW
- Temperature Range: -55 to 200 °C
- Temperature stability over Operating Temperature Range: 100 ppm



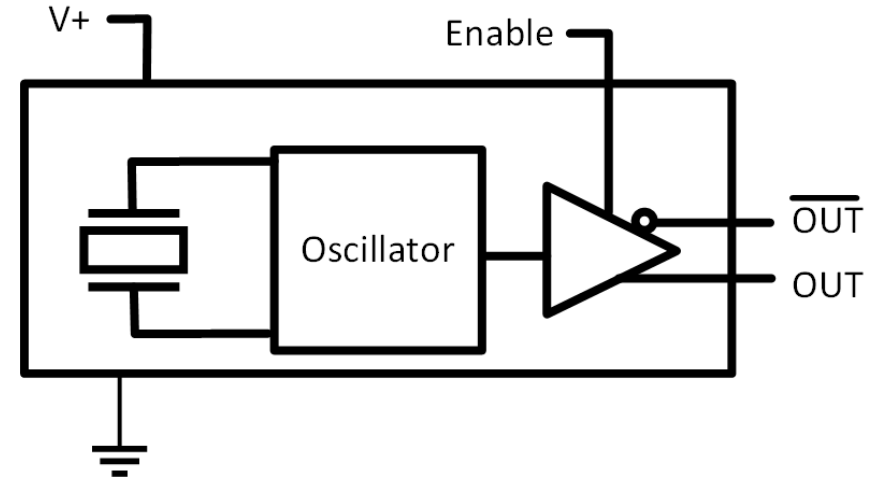
## Features:

- Target Market: Military
- Frequency Range: 0.5 to 40 MHz
- Output: CMOS
- Footprint: 13 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -55 to 230 °C
- Temperature stability over Operating Temperature Range: 200 ppm
- 1000 g Shock, 0.5 ms Duration



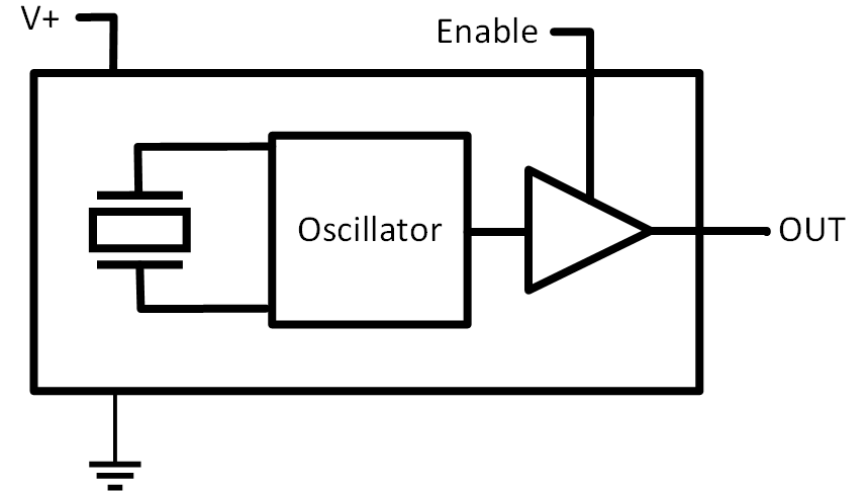
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 2.7 mW
- Temperature Range: -55 to 125 °C
- 100 g Shock, 6 ms Duration



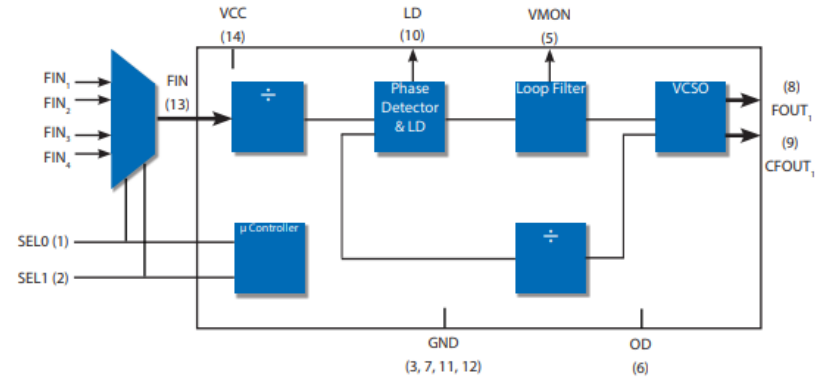
## Features:

- Target Market: Energy
- Frequency Range: 0.032768 to 40 MHz
- Output: CMOS
- Footprint: Ø9.65 mm, through hole
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -55 to 230 °C
- Temperature stability over Operating Temperature Range: 200 ppm
- 1000 g Shock, 0.5 ms Duration
- 20 g Vibration



## Features:

- Frequency Range: 1.5 to 800 MHz
- Output: CMOS, LVPECL, LVDS
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 6 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 0.008 to 800 MHz
- Number of Inputs: 4
- Input Logic: CMOS, LVPECL, LVDS



## Features:

- Frequency Range: 125 to 850 MHz
- Number of RF outputs: 2
- Output: LVPECL, LVDS
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 1.5 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 0.008 to 400 MHz
- Number of Inputs: 4
- Input Logic: CMOS, LVPECL, LVDS

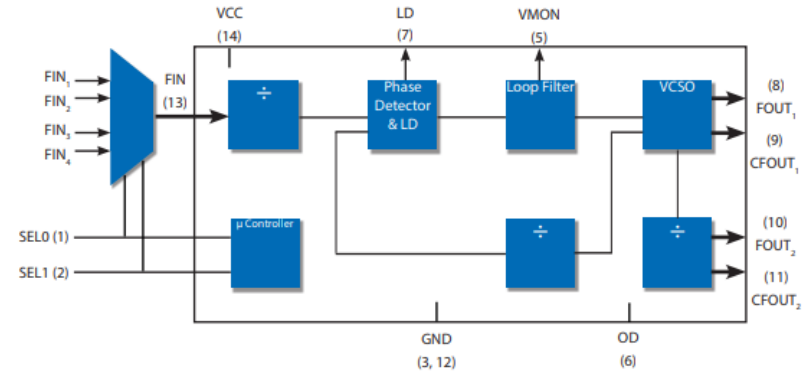
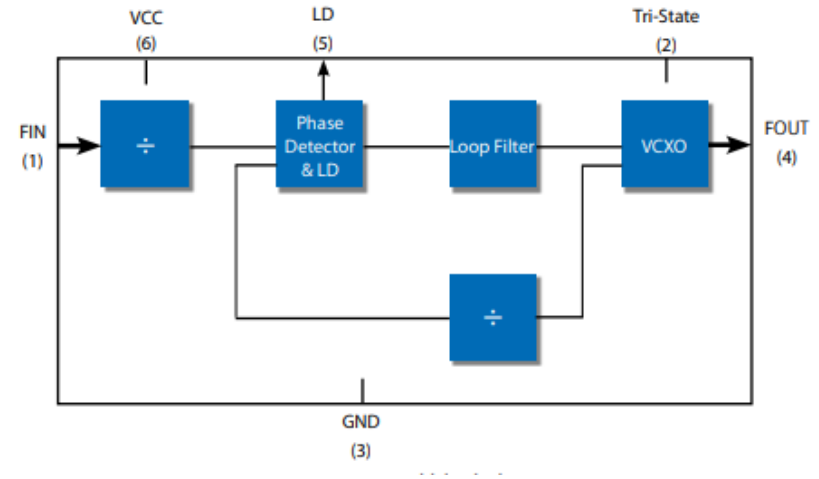


Figure 1. Functional block diagram

## Features:

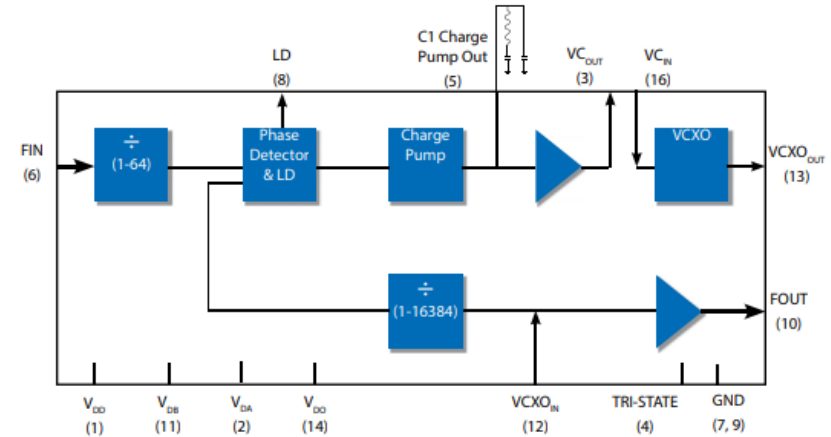
- Frequency Range: 0.01 to 80 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 10 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 0.008 to 78 MHz
- Number of Inputs: 1
- Input Logic: CMOS, TTL





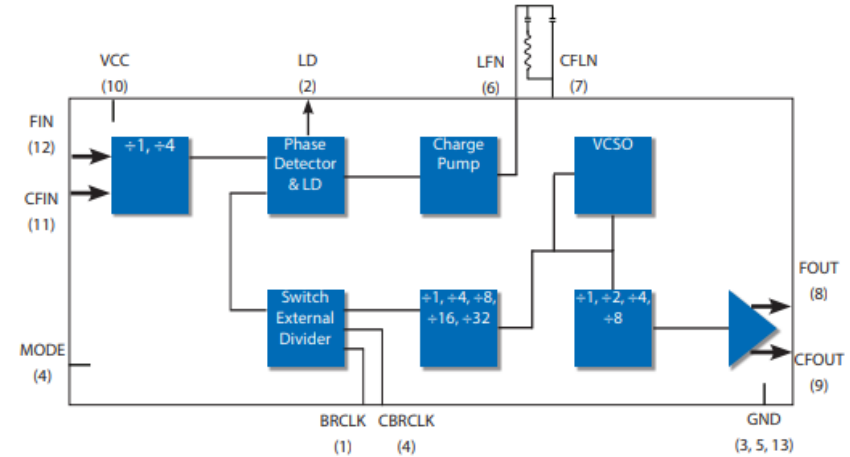
## Features:

- Frequency Range: 0.01 to 80 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 4 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 0.008 to 78 MHz
- Number of Inputs: 1
- Input Logic: CMOS, TTL



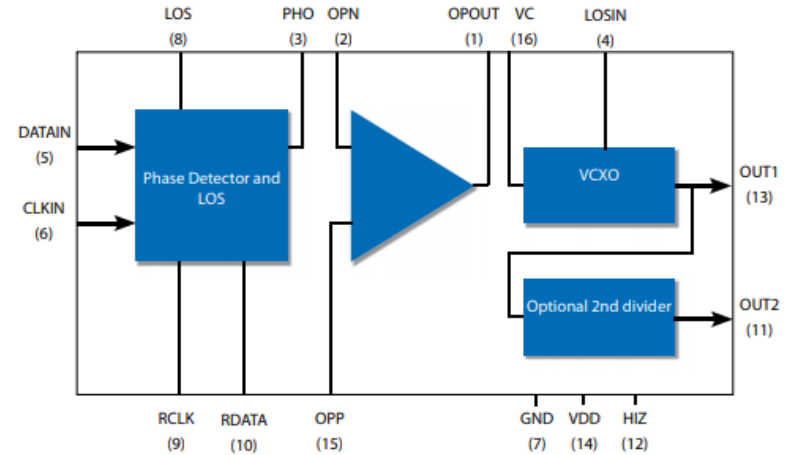
## Features:

- Frequency Range: 0.062 to 1.2 GHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 6 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 1 to 1000 MHz
- Number of Inputs: 1
- Input Logic: CMOS, LVPECL, LVDS



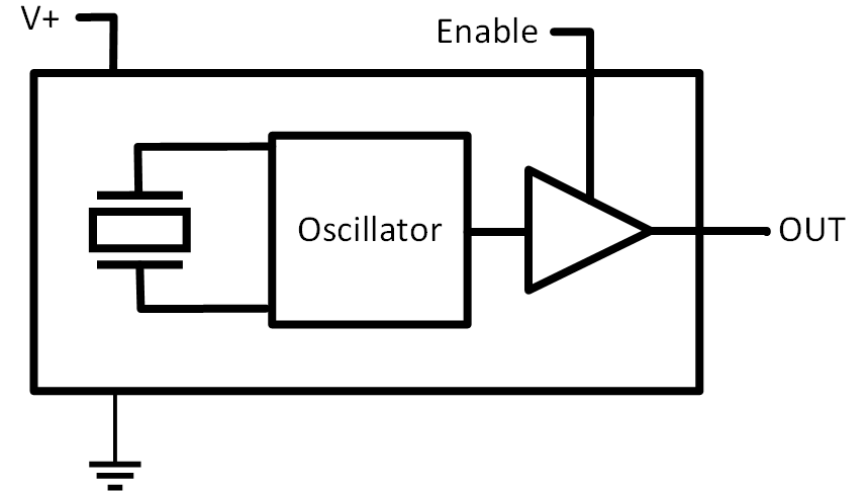
## Features:

- Recovers and cleans timing from data signal
- Frequency Range: 1 to 78 MHz
- Number of RF outputs: 2
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- Input Frequency: 0.008 to 78 MHz
- Input Logic: CMOS, TTL



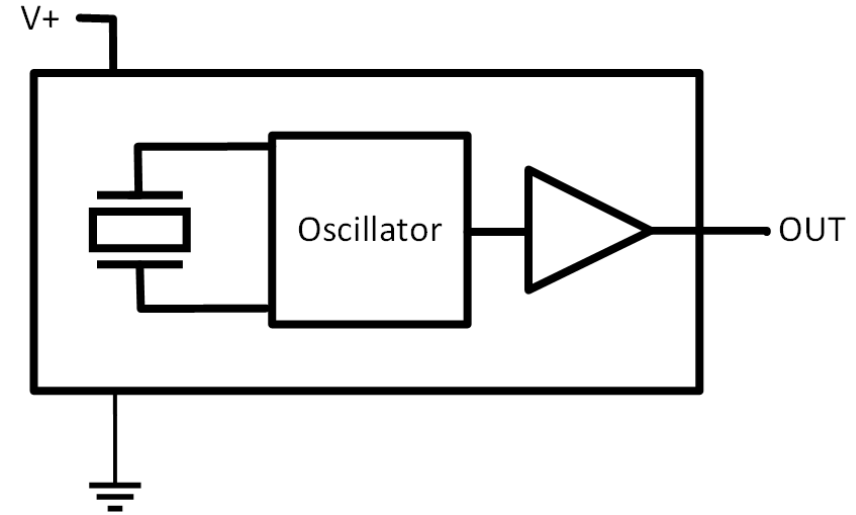
## Features:

- Frequency Range: 30 to 180 MHz
- Standard Frequencies: 50, 80, 100, 120, 122.88, 160 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.3 ppb/g
- Temperature stability over Operating Temperature Range: 25 ppm
- Aging per Year: 0 ppm



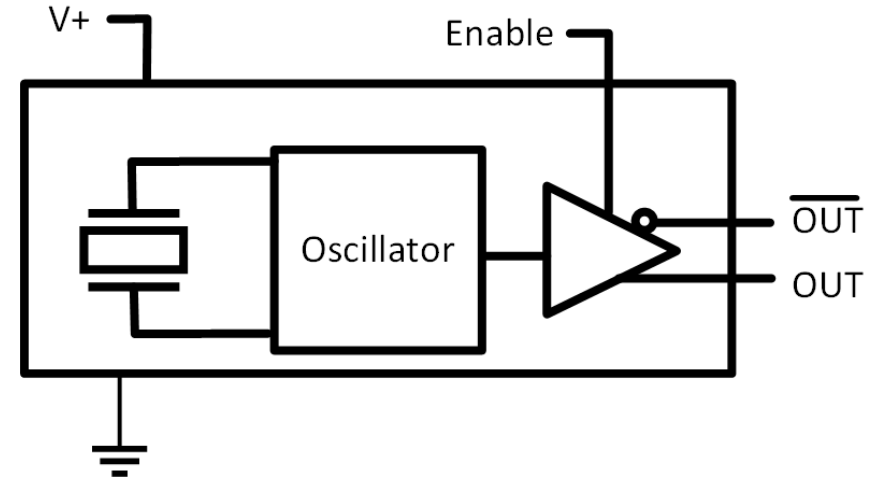
## Features:

- Target Market: Military
- Frequency Range: 1 to 80 MHz
- Output: CMOS, TTL
- Footprint: 12 x 12 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 350 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 25 ppm
- Temperature stability -40 to 85°C: 50 ppm
- Temperature stability over Operating Temperature Range: 100 ppm
- Aging per Year: 3 ppm



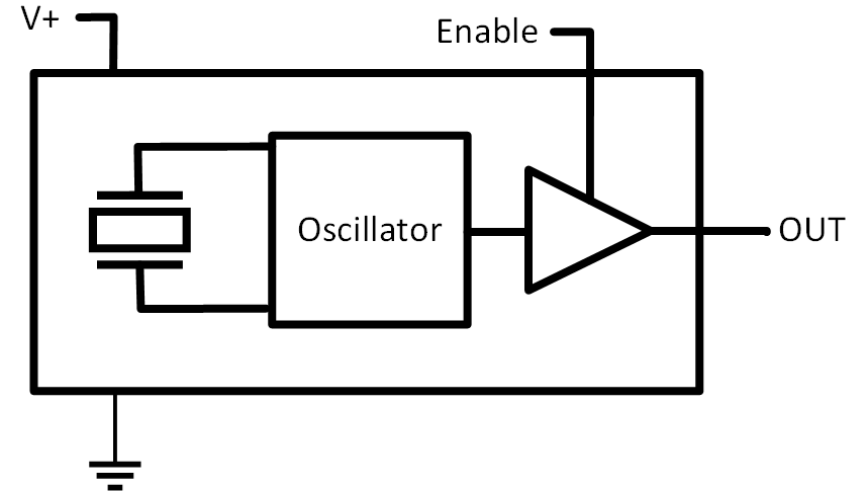
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 2.7 mW
- Temperature Range: -55 to 125 °C
- 100 g Shock, 6 ms Duration



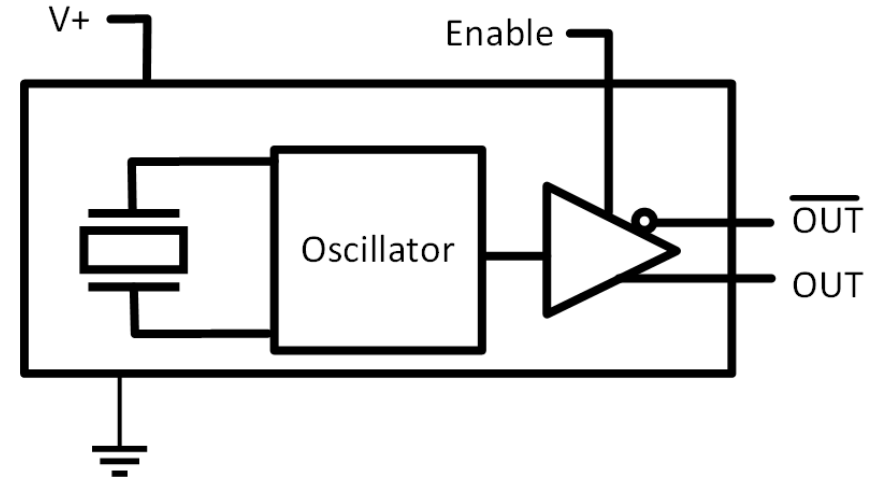
## Features:

- Target Market: Military
- Frequency Range: 0.01 to 125 MHz
- Output: CMOS, TTL
- Footprint: 9 x 9 mm, through hole
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 27 mW
- Temperature Range: -55 to 125 °C
- 100 g Shock, 6 ms Duration



## Features:

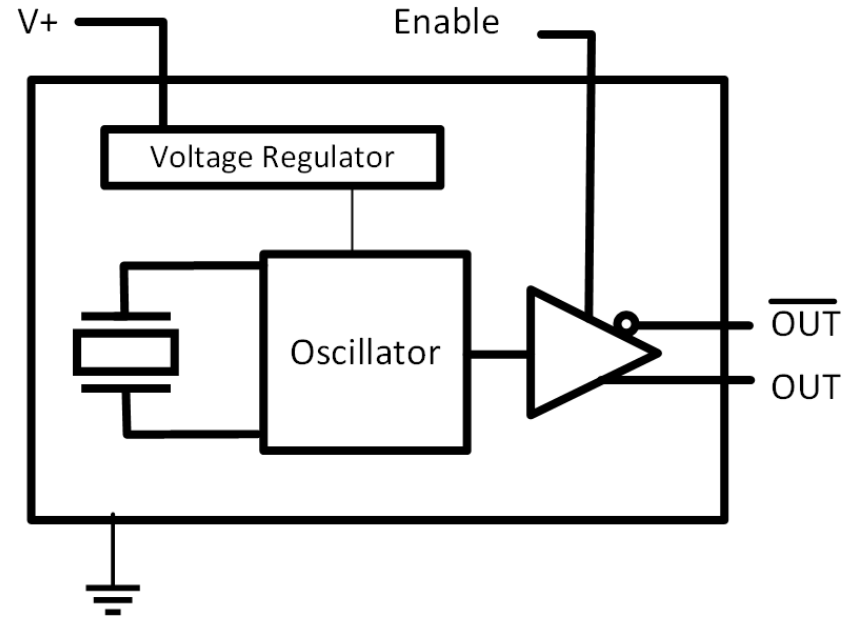
- Frequency Range: 13.5 to 220 MHz
- Output: LVPECL, LVDS, HCSL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3, 3.3 V
- Power: 105 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 2 ppm
- 12k to 20 MHz jitter: 150 fs-rms @ 156.25 MHz





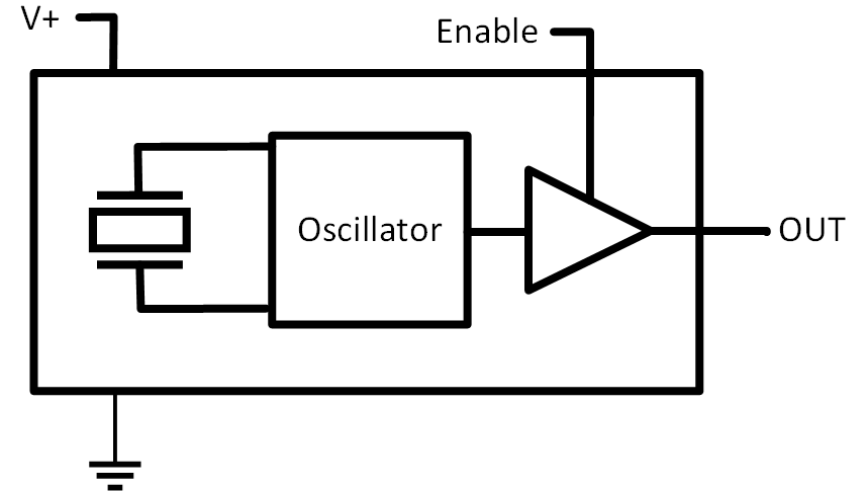
## Features:

- Frequency Range: 20 to 170 MHz
- Standard Frequencies: 25, 50, 125 MHz
- Output: LVPECL, LVDS
- Footprint: 3.2 x 2.5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 35 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 25 ppm
- 12k to 20 MHz jitter: 175 fs-rms @ 100 MHz



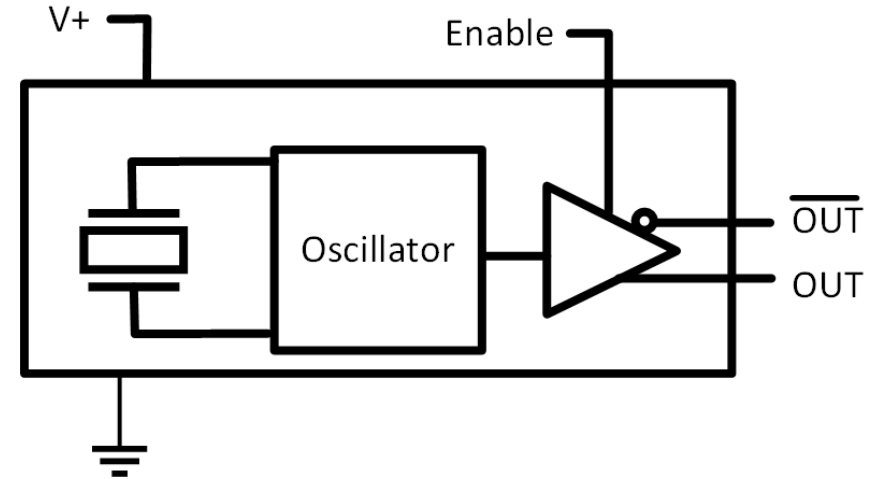
## Features:

- Frequency Range: 0.000001 to 200 MHz
- Output: CMOS, TTL
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 2.7 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 100 ppm



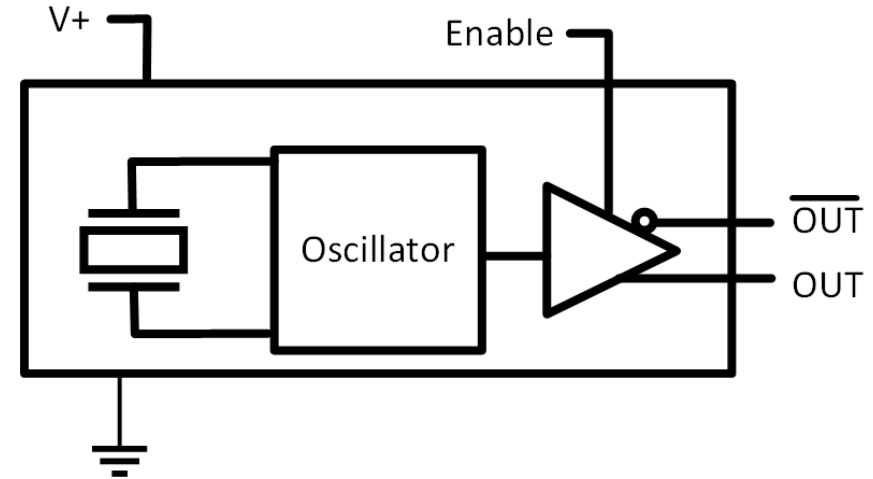
## Features:

- Target Market: Military
- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 15 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 3 ppm



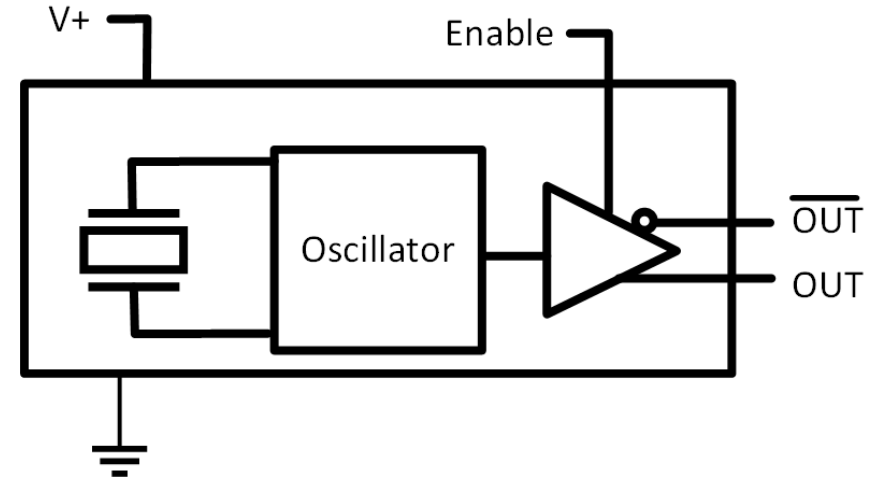
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, TTL, LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 15 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 3 ppm



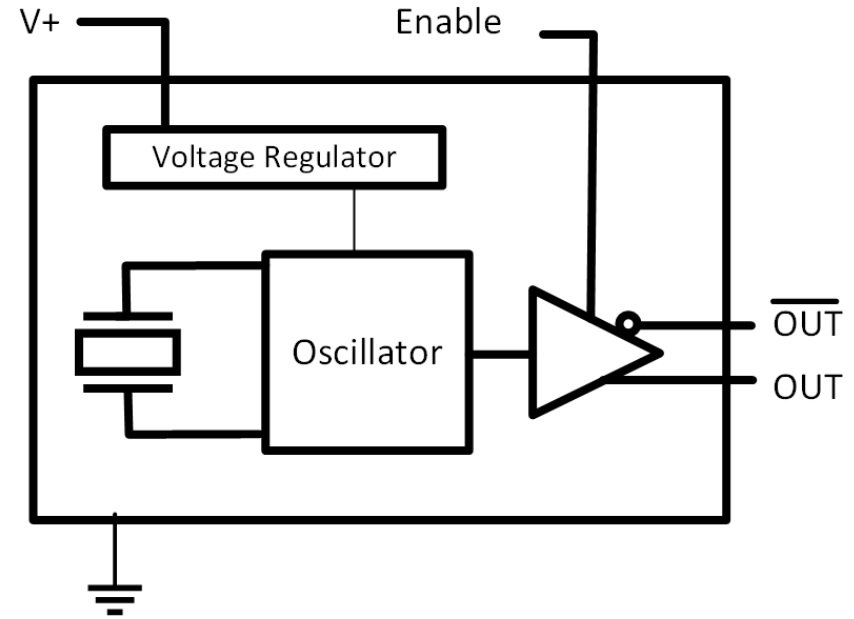
## Features:

- Frequency Range: 10 to 170 MHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 152.5 mW
- Temperature Range: -40 to 105 °C
- Temperature stability over Operating Temperature Range: 100 ppm
- 12k to 20 MHz jitter: 100 fs-rms @ 156.25 MHz



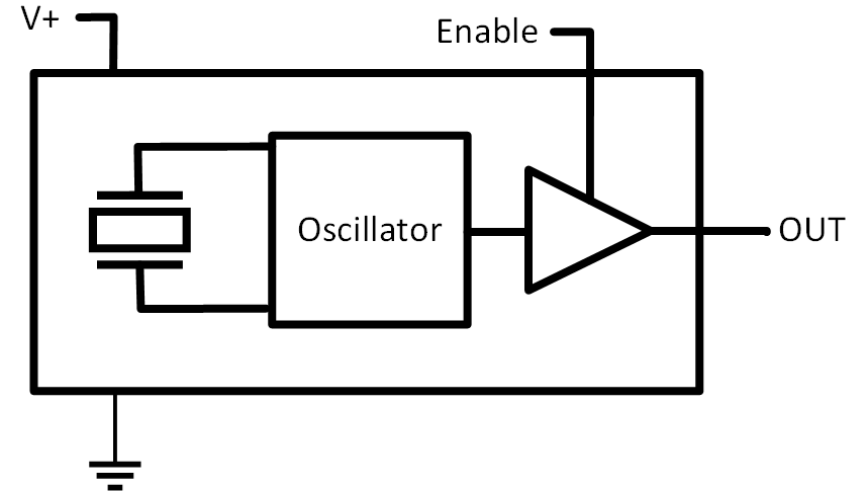
## Features:

- Frequency Range: 20 to 170 MHz
- Output: LVPECL, LVDS
- Footprint: 3.2 x 2.5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 152.5 mW
- Temperature Range: -40 to 105 °C
- Temperature stability over Operating Temperature Range: 100 ppm
- 12k to 20 MHz jitter: 130 fs-rms @ 156.25 MHz



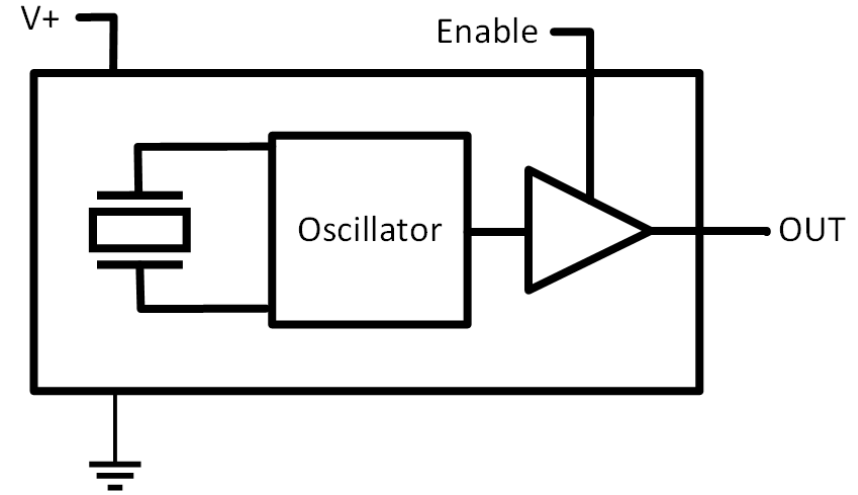
## Features:

- Target Market: Military
- Frequency Range: 0.5 to 40 MHz
- Output: CMOS
- Footprint: 13 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -55 to 230 °C
- Temperature stability over Operating Temperature Range: 200 ppm
- 1000 g Shock, 0.5 ms Duration



## Features:

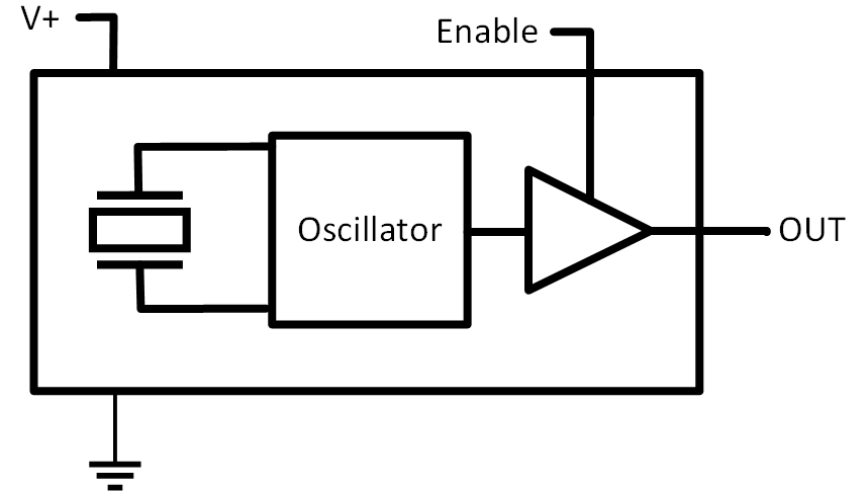
- Frequency Range: 0.5 to 40 MHz
- Output: CMOS
- Footprint: 8.5 x 8 mm, through hole, surface mount
- Supply Voltage: 1.8, 2.5, 3, 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -55 to 230 °C
- Temperature stability over Operating Temperature Range: 200 ppm
- 1000 g Shock, 0.5 ms Duration
- 20 g Vibration





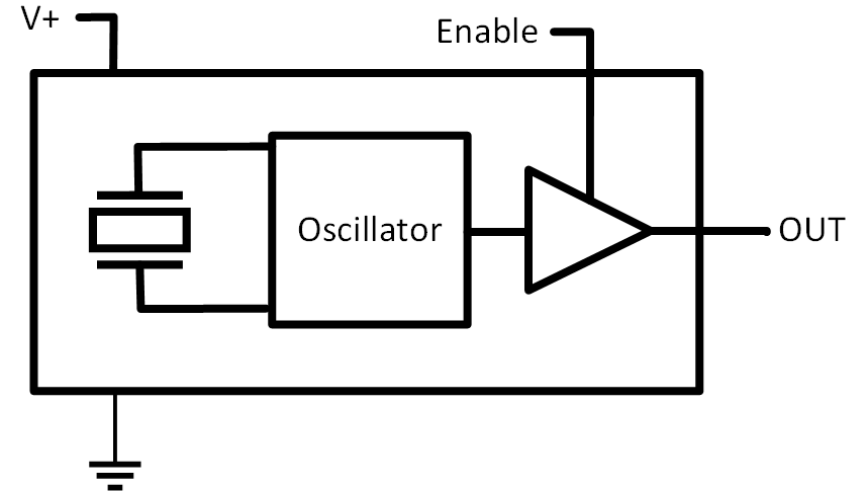
## Features:

- Target Market: Energy
- Frequency Range: 0.032768 to 40 MHz
- Output: CMOS
- Footprint: Ø9.65 mm, through hole
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -55 to 230 °C
- Temperature stability over Operating Temperature Range: 200 ppm
- 1000 g Shock, 0.5 ms Duration
- 20 g Vibration



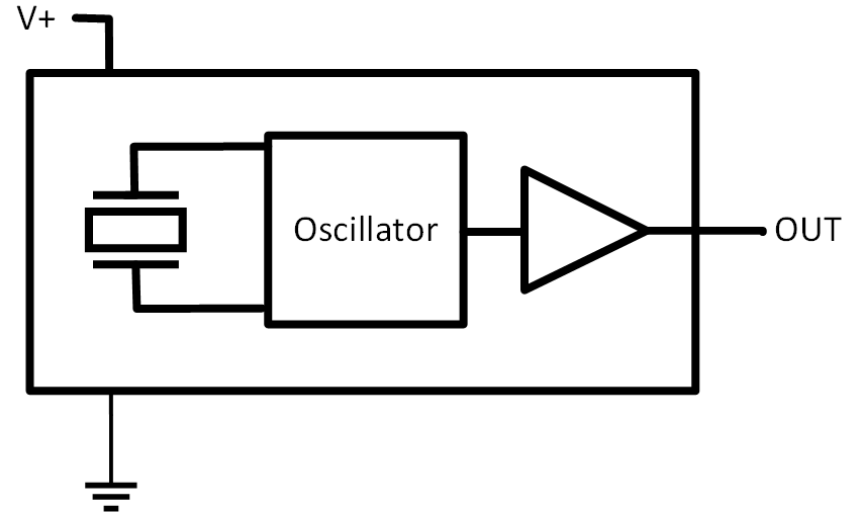
## Features:

- Target Market: Energy
- Frequency Range: 0.5 to 50 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3, 3.3, 5 V
- Power: 1.8 mW
- Temperature Range: -55 to 230 °C
- Temperature stability over Operating Temperature Range: 200 ppm
- 3000 g Shock, 0.3 ms Duration
- 30 g Vibration



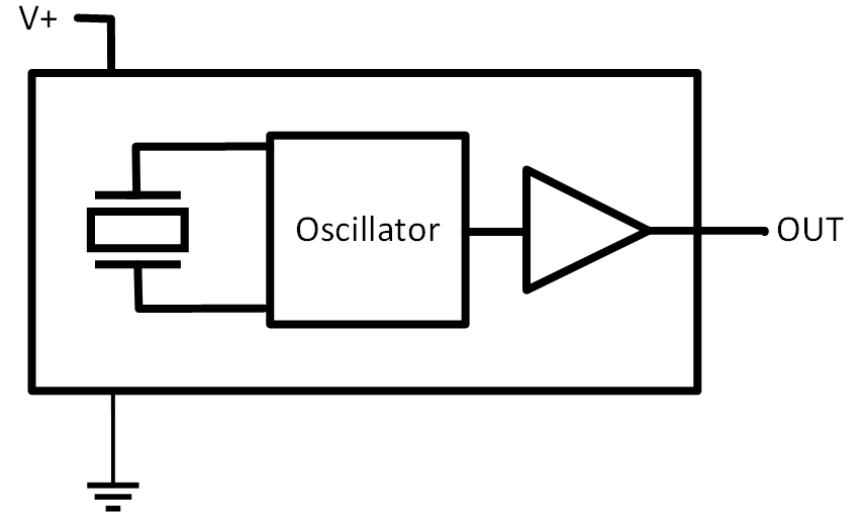
## Features:

- Stand alone high temp low power Xos at 32.768 kHz
- Target Market: Energy
- 0.032768 MHz
- Standard Frequency: 0.032768 MHz
- Output: CMOS
- Footprint: multiple options, see specification mm, through hole, surface mount
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 33 mW
- Temperature Range: -55 to 200 °C
- Temperature stability over Operating Temperature Range: 100 ppm



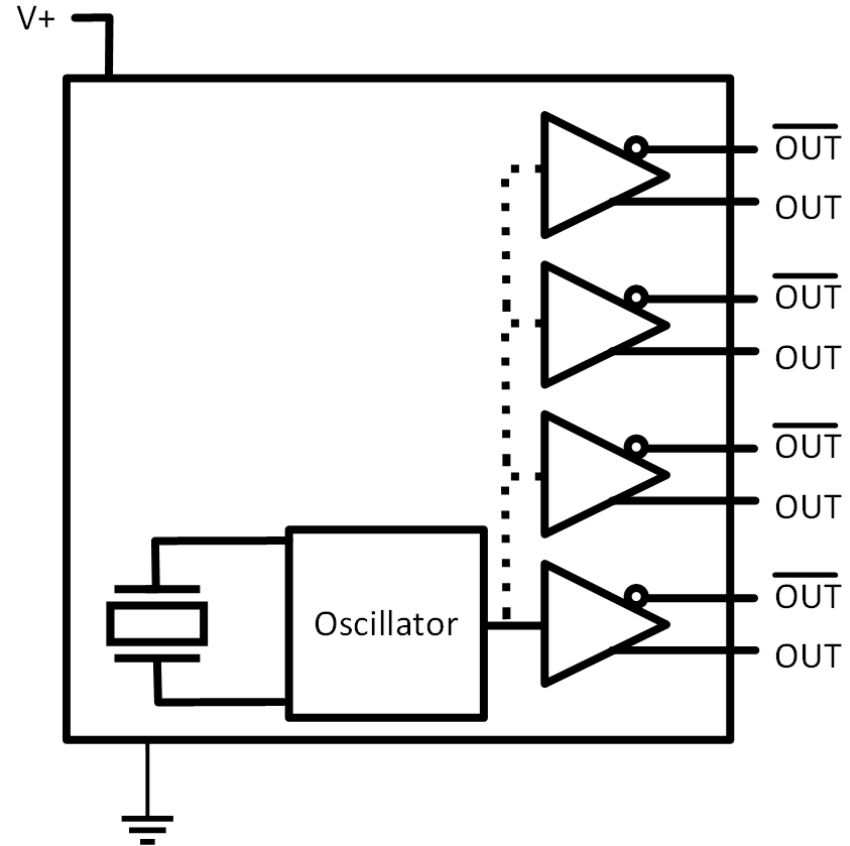
## Features:

- Ruggedized CMOS output Space XO with 100 krad tolerance
- Target Market: Space
- Frequency Range: 0.35 to 100 MHz
- Output: CMOS, TTL
- Footprint: multiple options, see specification mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 19.8 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



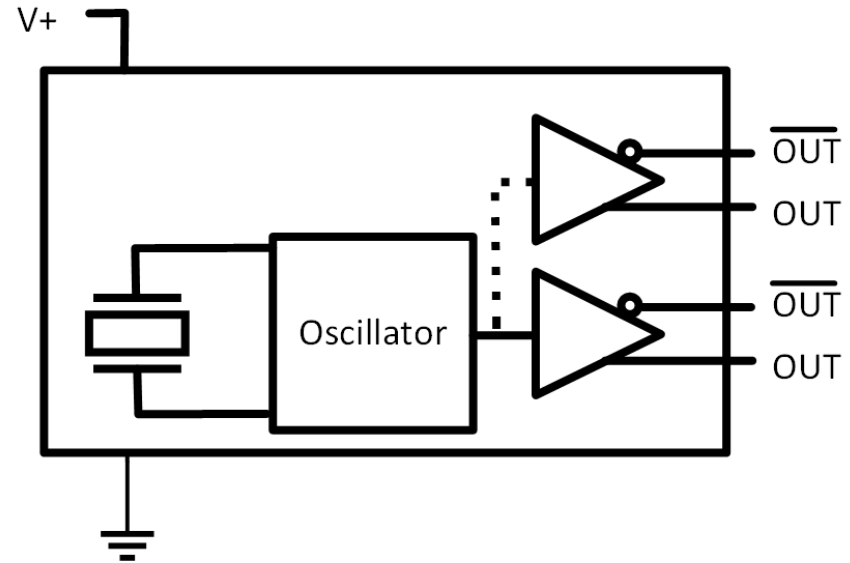
## Features:

- Ideal for driving RTG4 FPGA
- Target Market: Space
- Frequency Range: 12 to 200 MHz
- Number of RF outputs: 1,2,4 pairs
- Output: LVDS
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



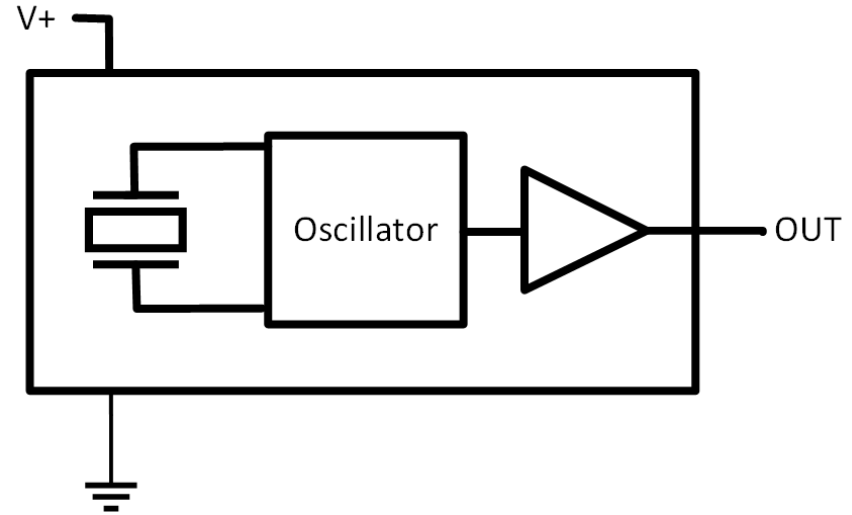
## Features:

- Dual complimentary output pairs
- Target Market: Space
- Frequency Range: 100 to 700 MHz
- Number of RF outputs: 1,2 pairs
- Output: LVPECL
- Footprint: multiple options, see specification mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 50 krad ELDRS
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



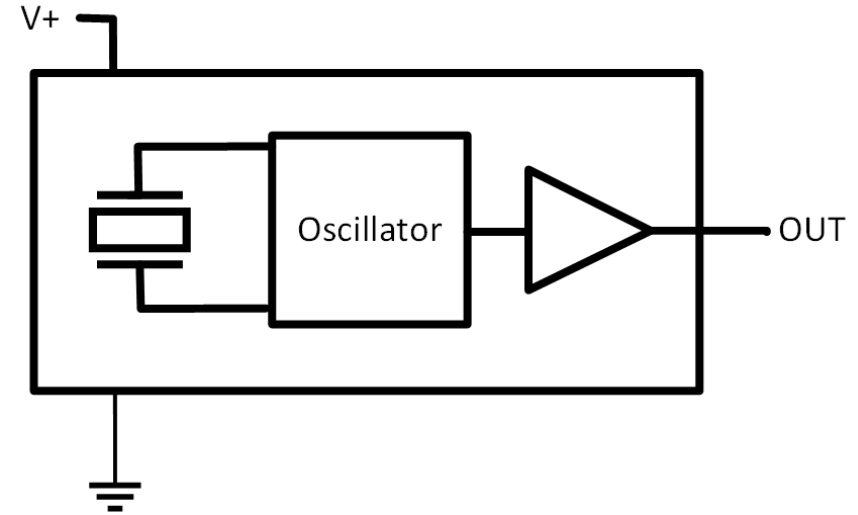
## Features:

- SET/SEU free to  $>90$  MeV-cm<sup>2</sup>/mg
- Target Market: Space
- Frequency Range: 12 to 160 MHz
- Output: CMOS
- Footprint: multiple options, see specification mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 250 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



## Features:

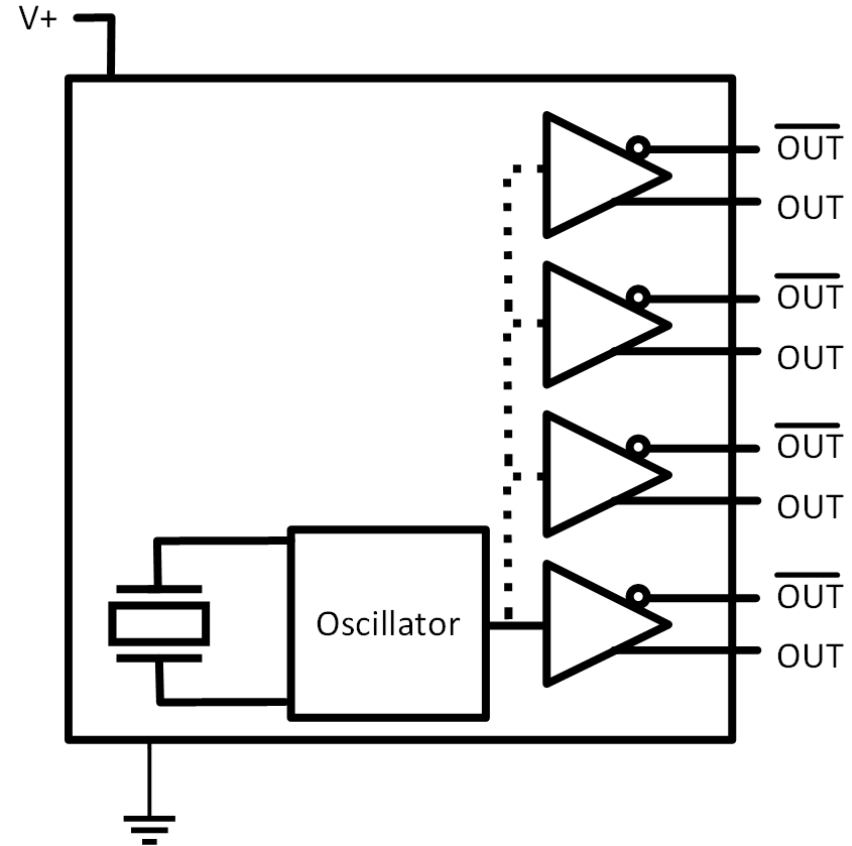
- 300 krad for deep space missions
- Target Market: Space
- Frequency Range: 12 to 100 MHz
- Output: CMOS
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 241 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 300 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration





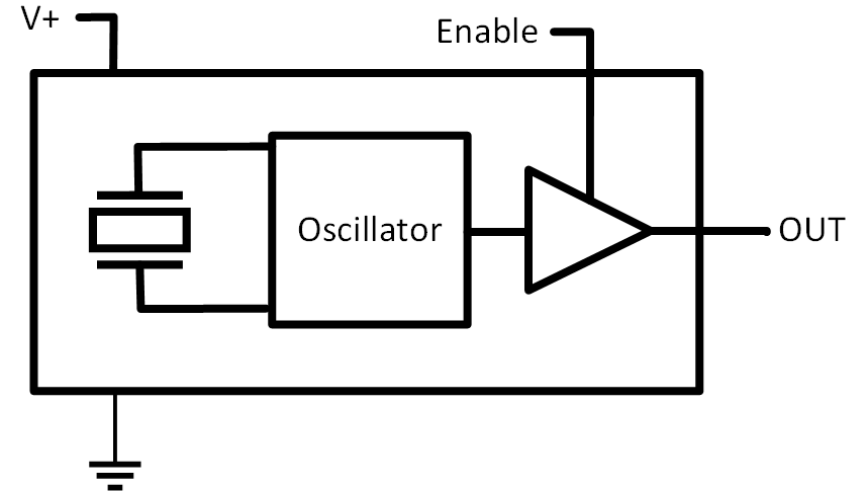
## Features:

- 300 krad for deep space missions
- Target Market: Space
- Frequency Range: 12 to 200 MHz
- Number of RF outputs: 1,2,4 pairs
- Output: LVDS
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 250 mW
- Temperature Range: -55 to 125 °C
- Radiation Tolerance: 300 krad TID
- Temperature stability over Operating Temperature Range: 50 ppm
- Aging per Year: 5 ppm
- 30 g Vibration



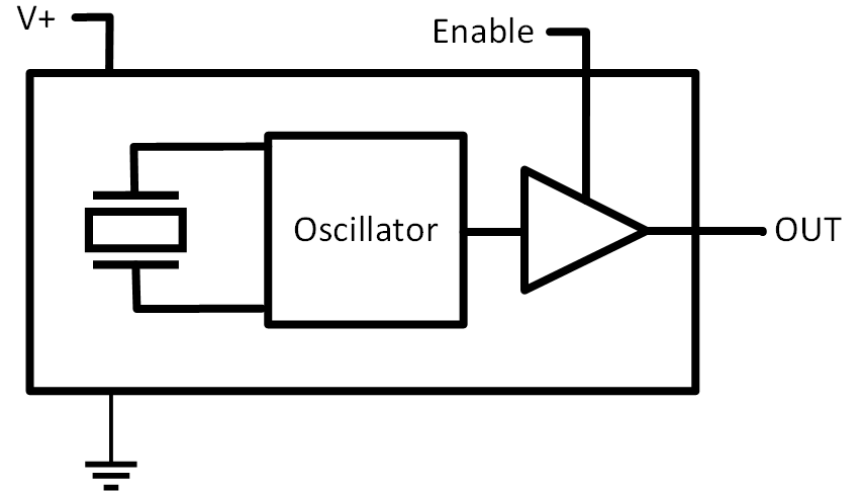
## Features:

- Frequency Range: 0.625 to 133 MHz
- Output: CMOS
- Footprint: 3.2 x 2.5 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3.3 V
- Power: 4.5 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- 12k to 20 MHz jitter: 61 fs-rms @ 125 MHz



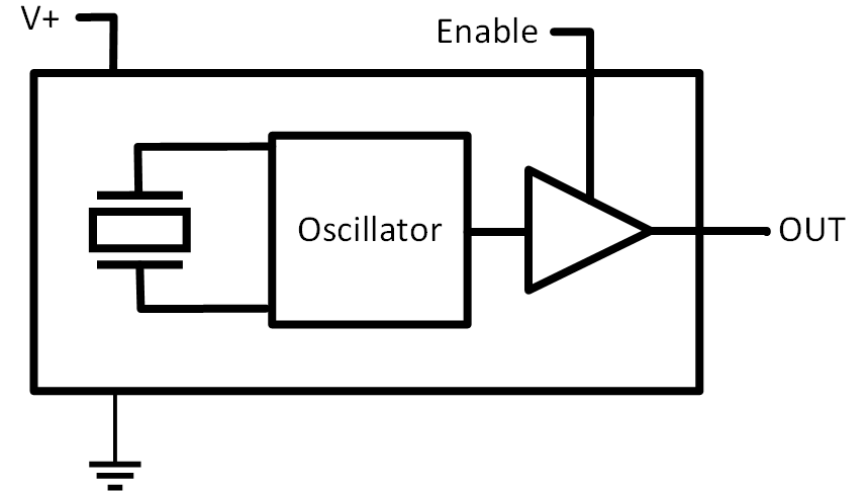
## Features:

- Frequency Range: 0.75 to 60 MHz
- Output: CMOS
- Footprint: 2.5 x 2 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3.3 V
- Power: 4.5 mW
- Temperature Range: -40 to 105 °C
- Temperature stability over Operating Temperature Range: 25 ppm
- 12k to 20 MHz jitter: 177 fs-rms @ 25 MHz



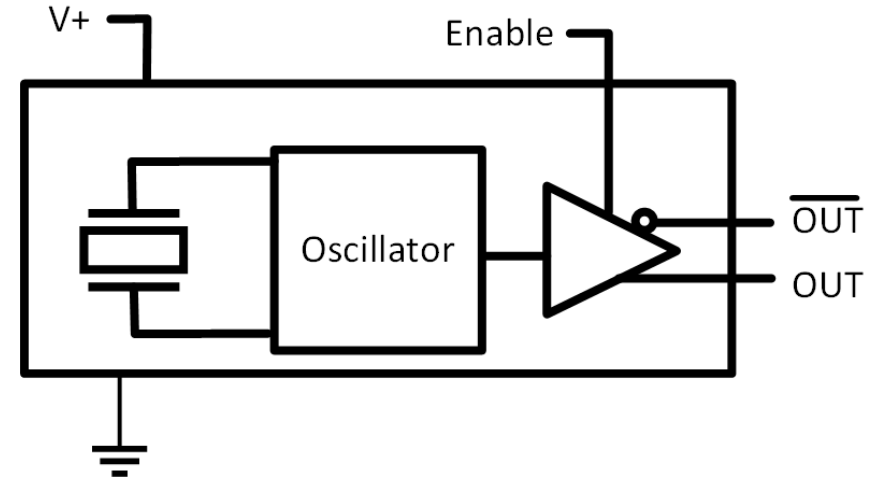
## Features:

- Frequency Range: 1.024 to 190 MHz
- Standard Frequencies: 20, 24.576, 25 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 9 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 25 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 50 ppm
- 12k to 20 MHz jitter: 500 fs-rms @ 125 MHz



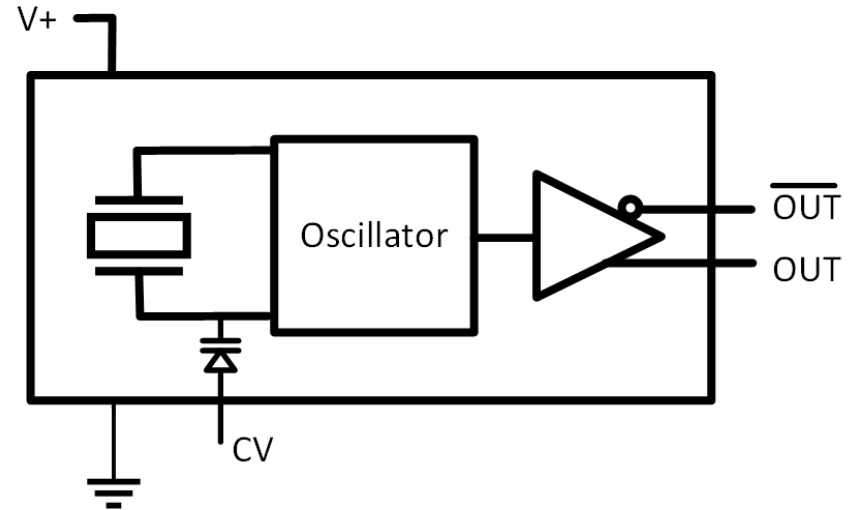
## Features:

- Frequency Range: 10 to 275 MHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 150 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 20 ppm
- Temperature stability -40 to 85°C: 20 ppm
- Temperature stability over Operating Temperature Range: 100 ppm
- 12k to 20 MHz jitter: 300 fs-rms @ 155.52 MHz



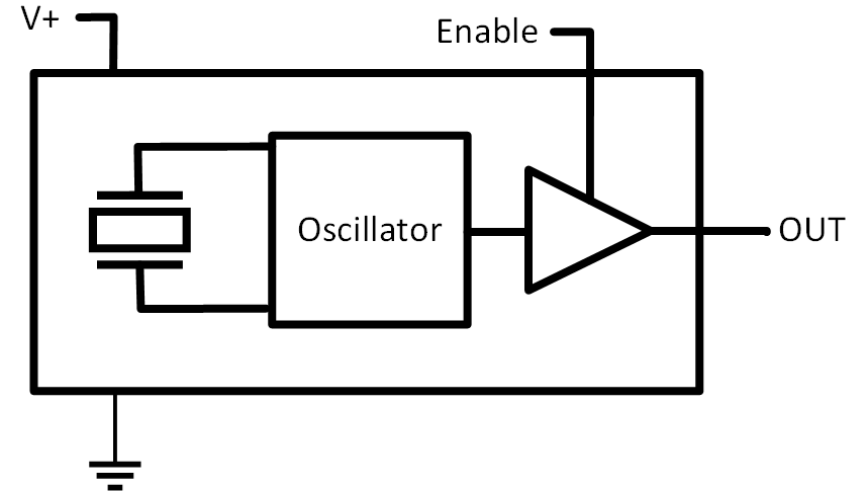
## Features:

- Frequency Range: 15 to 250 MHz
- Output: LVPECL
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 264 mW
- Temperature Range: -40 to 85 °C



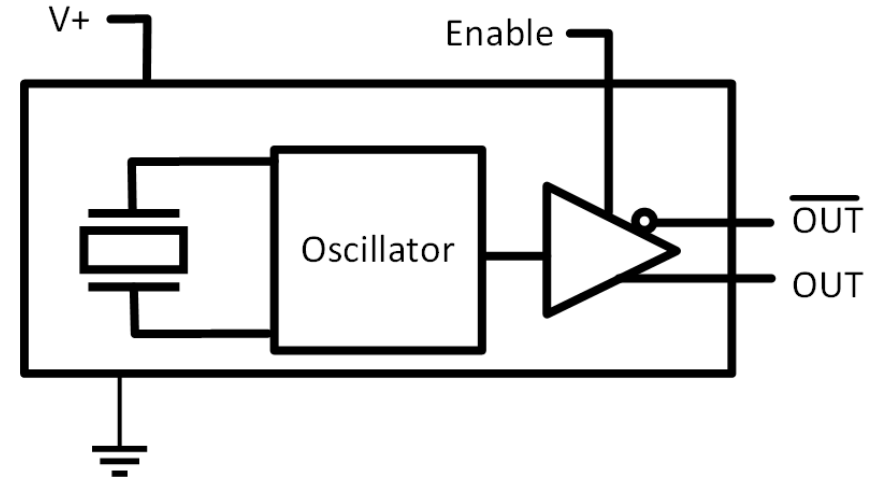
## Features:

- Target Market: Military
- Frequency Range: 0.01 to 125 MHz
- Output: CMOS, TTL
- Footprint: 13 x 13 mm, through hole, surface mount
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 1.8 mW
- Temperature Range: -55 to 125 °C
- Temperature stability 0 to 70°C: 15 ppm
- Temperature stability -40 to 85°C: 25 ppm
- Temperature stability over Operating Temperature Range: 100 ppm
- Aging per Year: 3 ppm



## Features:

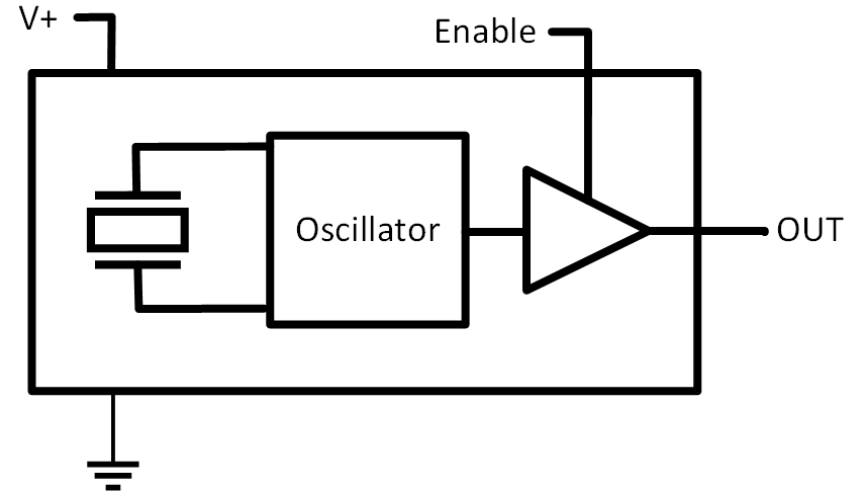
- Frequency Range: 40 to 300 MHz
- Output: CMOS, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 25 ppm
- Aging per Year: 0 ppm





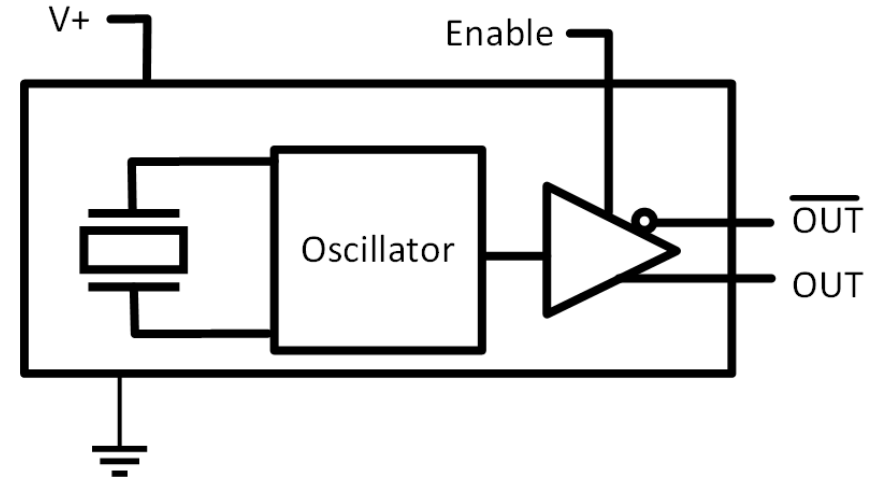
## Features:

- Frequency Range: 0.03277 to 125 MHz
- Output: CMOS
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3.3, 5 V
- Power: 9 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 50 ppm
- 12k to 20 MHz jitter: 500 fs-rms @ 125 MHz



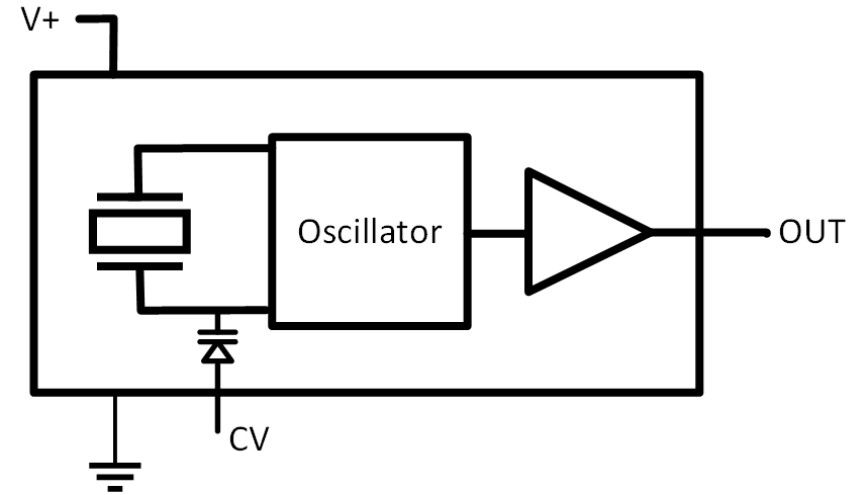
## Features:

- Frequency Range: 25 to 250 MHz
- Output: LVPECL, LVDS
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 150 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 25 ppm
- 12k to 20 MHz jitter: 300 fs-rms @ 155.52 MHz



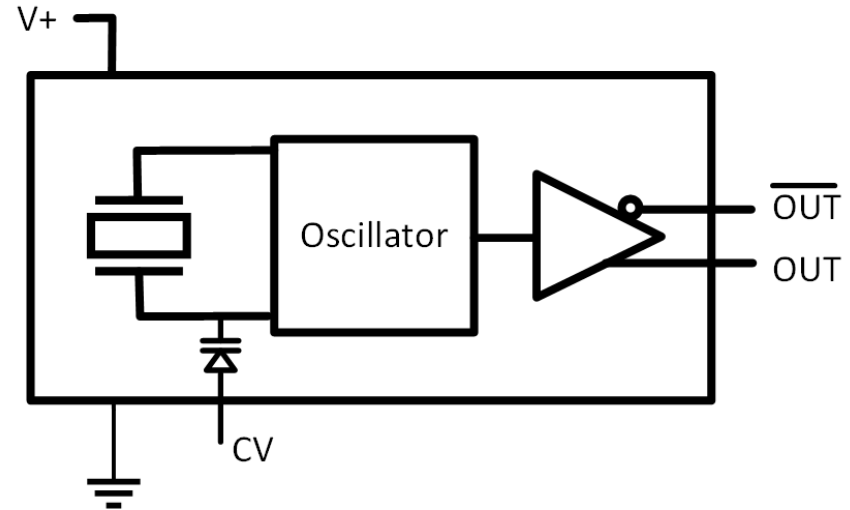
## Features:

- 300 krad for deep space missions
- Target Market: Space
- Frequency Range: 0.3 to 1.5 GHz
- Output: Sine
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3, 5, 12 V
- Power: 250 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 300 krad TID
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



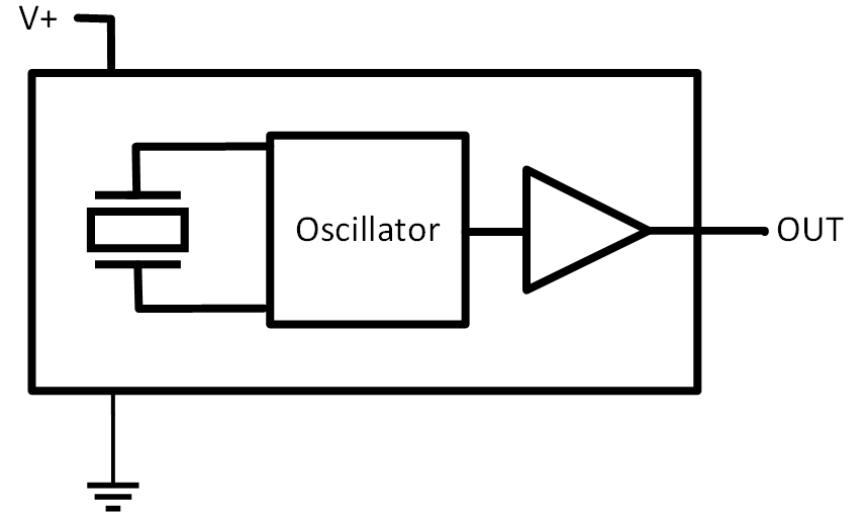
## Features:

- Internal Microchip SAW resonator
- Target Market: Space
- Frequency Range: 0.3 to 1 GHz
- Output: LVPECL
- Footprint: 16 x 16 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 33 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 50 krad ELDRS
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



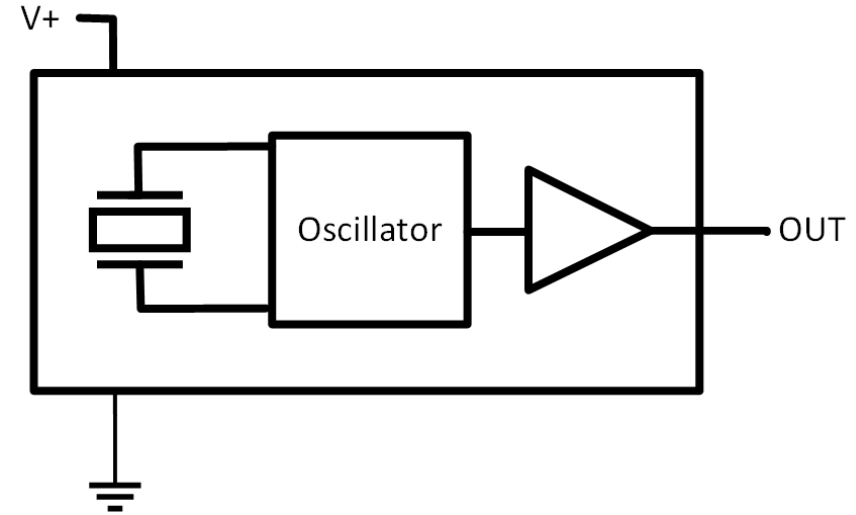
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -55 dBc/Hz @1000 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @1000 MHz carrier



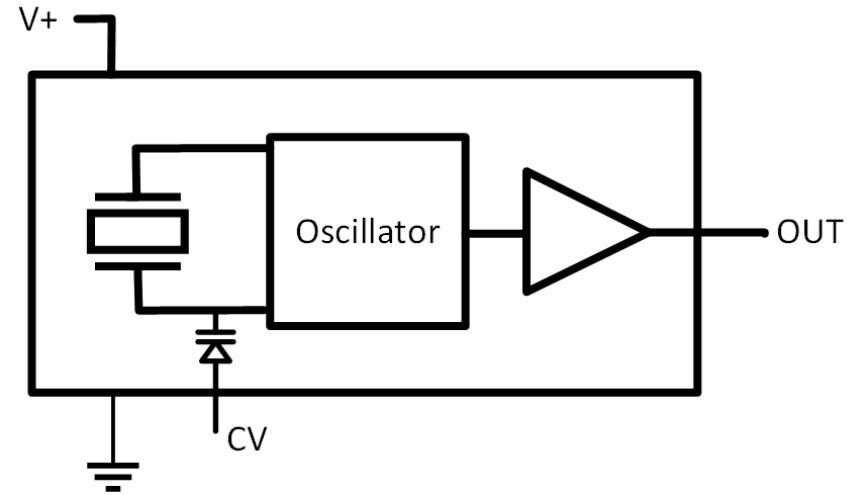
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.6 ppb/g
- Phase Noise 10 Hz offset: -55 dBc/Hz @1000 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @1000 MHz carrier



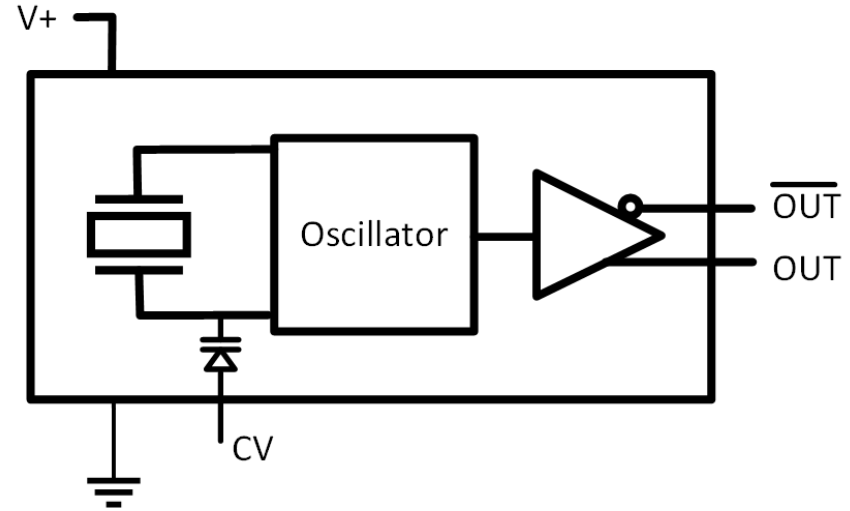
## Features:

- Frequency Range: 0.8 to 3 GHz
- Output: Sine
- Footprint: 14 x 9 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 330 mW
- 1.2ppb/g
- Temperature Range: 10 to 85 °C
- Absolute Pull Range: 20 ppm



## Features:

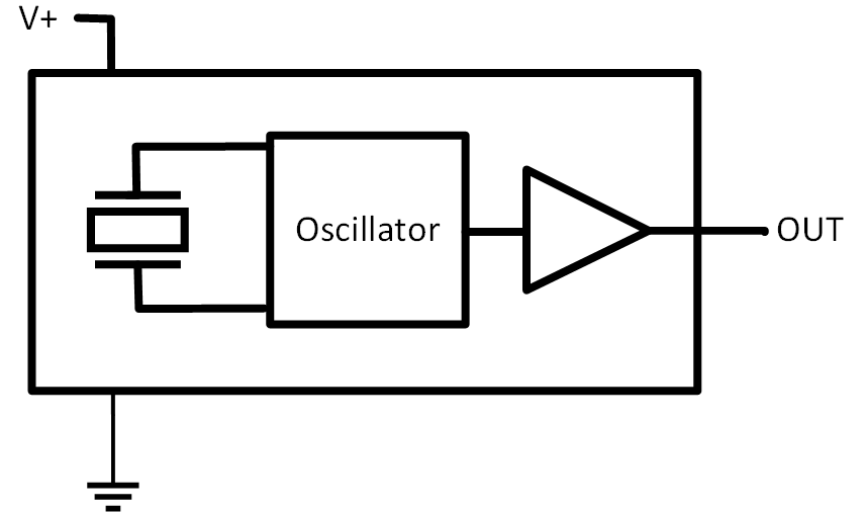
- Frequency Range: 0.8 to 2.9 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 325 mW
- Temperature Range: 10 to 85 °C
- g-Sensitivity: 0.6 ppb/g
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -102 dBc/Hz @2000 MHz carrier
- Phase Noise 1 MHz offset: -150 dBc/Hz @2000MHz carrier





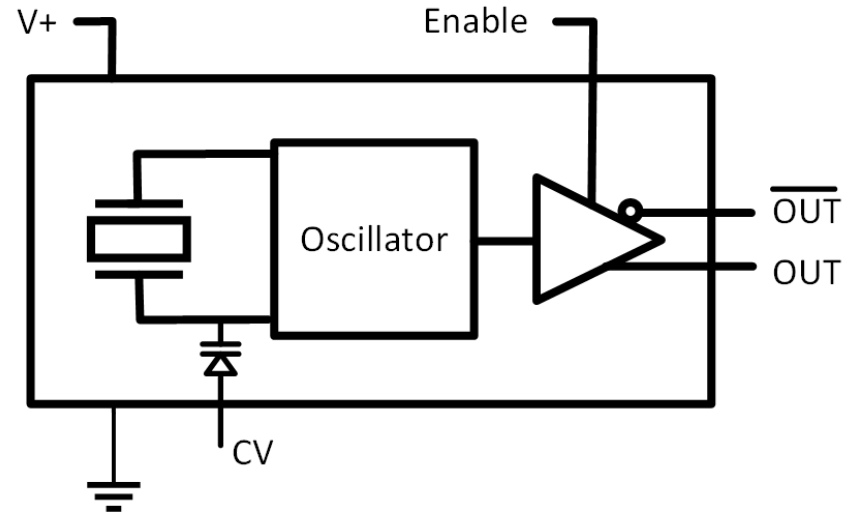
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 250 mW
- Temperature Range: 10 to 85 °C
- 20000 g Shock, 0.2 ms Duration
- Phase Noise 10 Hz offset: -52 dBc/Hz  
@1000 MHz carrier
- Phase Noise 100 kHz offset: -152 dBc/Hz  
@1000 MHz carrier



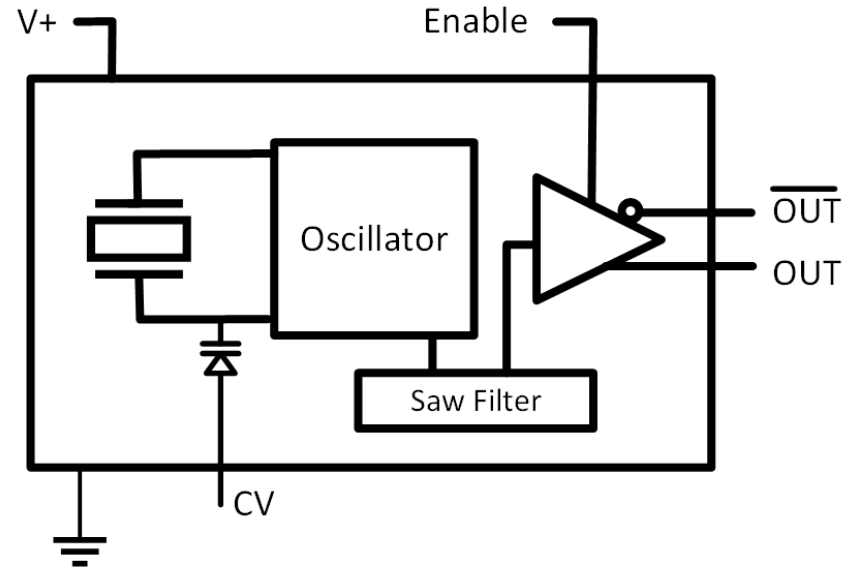
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 250 mW
- Temperature Range: 10 to 85 °C
- 20000 g Shock, 0.2 ms Duration
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -93 dBc/Hz @2000 MHz carrier
- Phase Noise 1 MHz offset: -158 dBc/Hz @2000MHz carrier



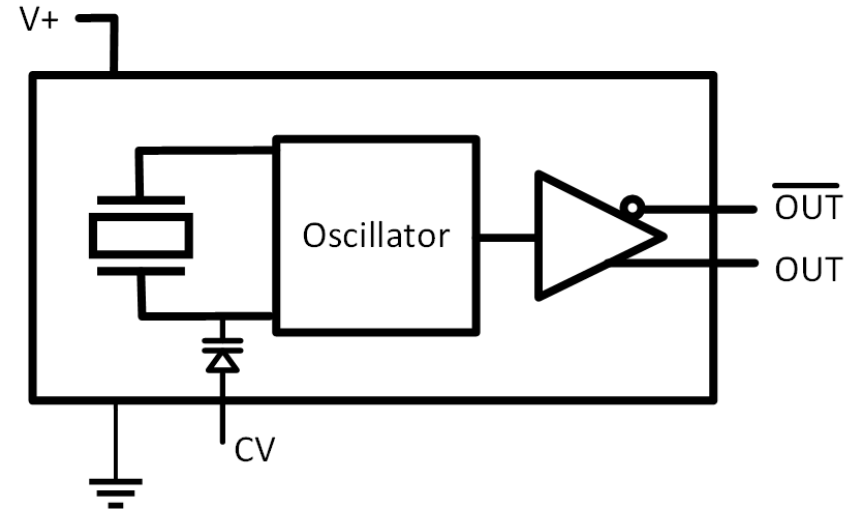
## Features:

- Low noise, high stability VCISO
- Frequency Range: 0.15 to 1 GHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 20 ppm
- Absolute Pull Range: 50 ppm
- Phase Noise 1kHz offset: -108 dBc/Hz @622.08 MHz carrier
- Phase Noise 1 MHz offset: -137 dBc/Hz @622.08MHz carrier



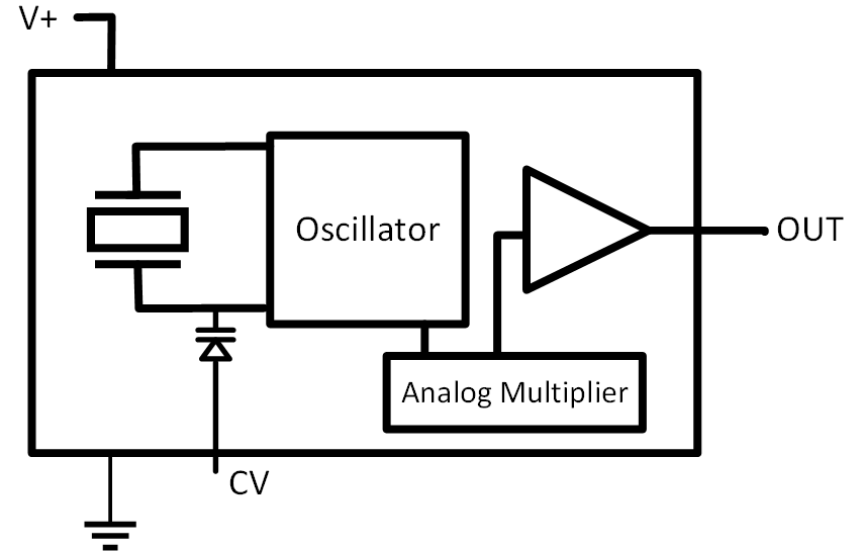
## Features:

- Frequency Range: 0.12288 to 1 GHz
- Output: LVPECL, LVDS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 240.9 mW
- Temperature Range: -40 to 85 °C



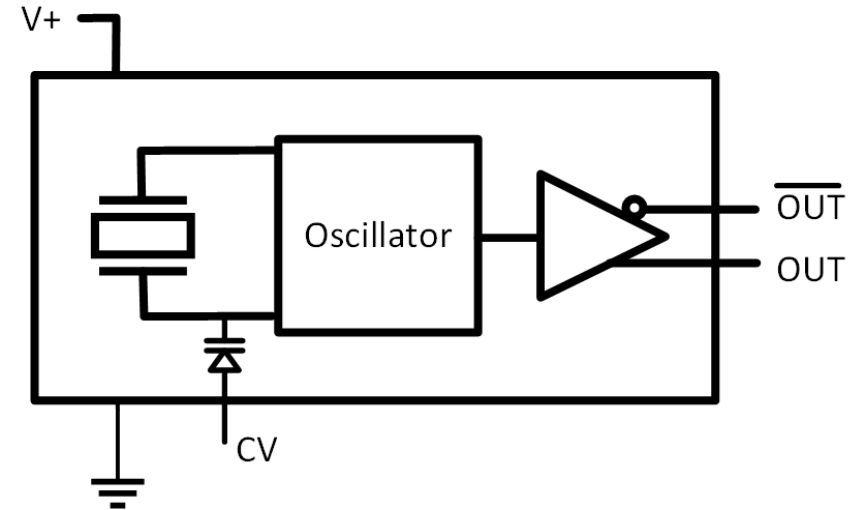
## Features:

- Smallest form factor, High Frequency VCSO in market
- Frequency Range: 0.8 to 3.2 GHz
- Output: Sine, Balanced or Differential Sinewave
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 250 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 20 ppm
- Phase Noise 1kHz offset: -95 dBc/Hz @2949.12 MHz carrier
- Phase Noise 1 MHz offset: -162 dBc/Hz @2949.12MHz carrier



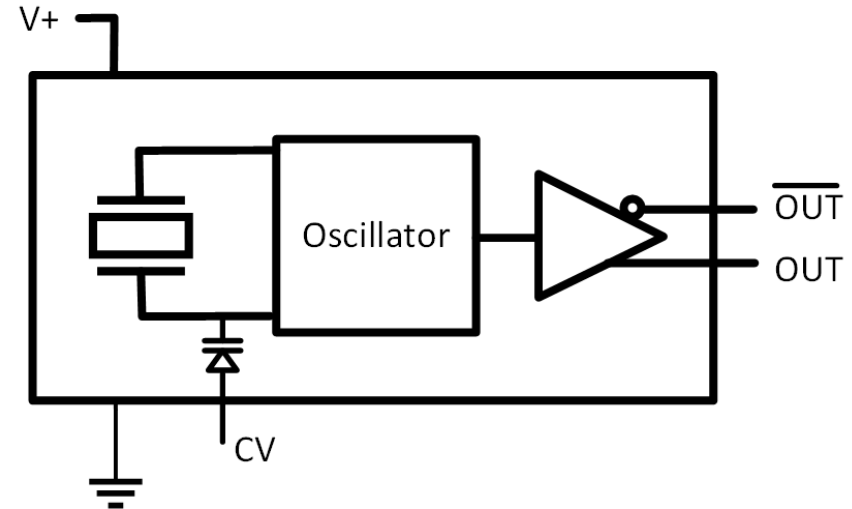
## Features:

- Frequency Range: 5 to 7 GHz
- Output: Sine
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 0 ppm
- Phase Noise 1kHz offset: -83 dBc/Hz @5898 MHz carrier
- Phase Noise 1 MHz offset: -140 dBc/Hz @5898MHz carrier



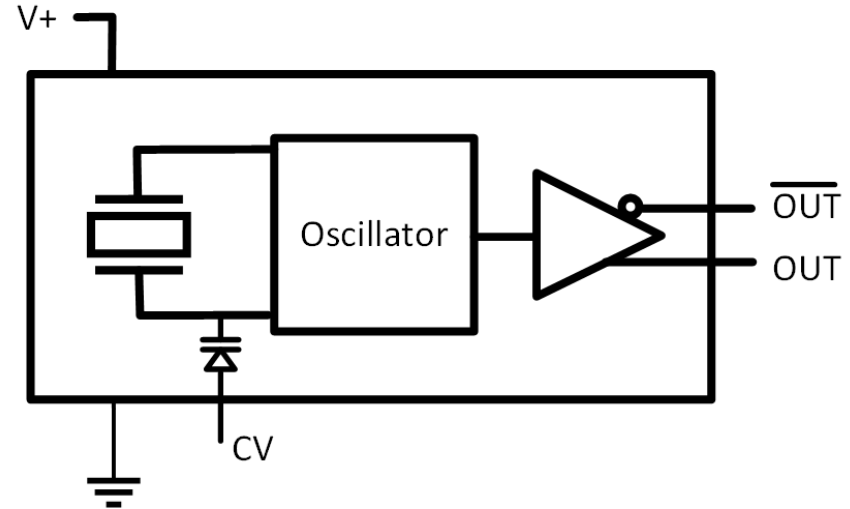
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 5 V
- Power: 500 mW
- Temperature Range: 10 to 85 °C
- Absolute Pull Range: 2 ppm
- Phase Noise 1kHz offset: -96 dBc/Hz @1700 MHz carrier
- Phase Noise 1 MHz offset: -156 dBc/Hz @1700MHz carrier



## Features:

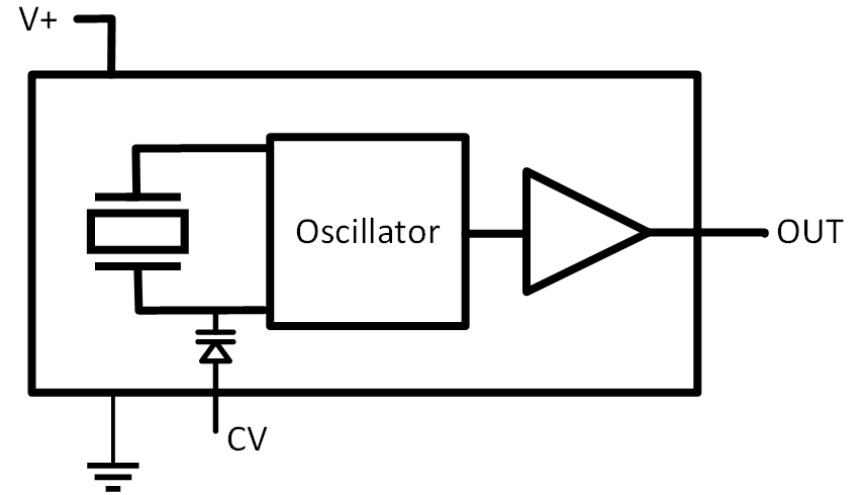
- Frequency Range: 3 to 6 GHz
- Output: Sine, Balanced or Differential Sinewave
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 280.5 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 5 ppm
- Phase Noise 1kHz offset: -86 dBc/Hz @5898.24 MHz carrier
- Phase Noise 1 MHz offset: -146 dBc/Hz @5898.24MHz carrier





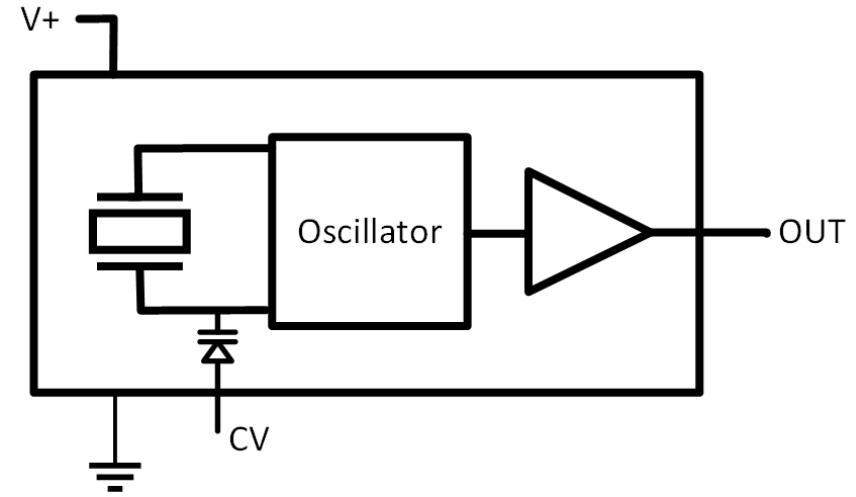
## Features:

- Frequency Range: 1 to 32.768 MHz
- Output: CMOS
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 39.6 mW
- Temperature Range: -55 to 200 °C
- Temperature stability over Operating Temperature Range: 0 ppm
- Absolute Pull Range: 50 ppm



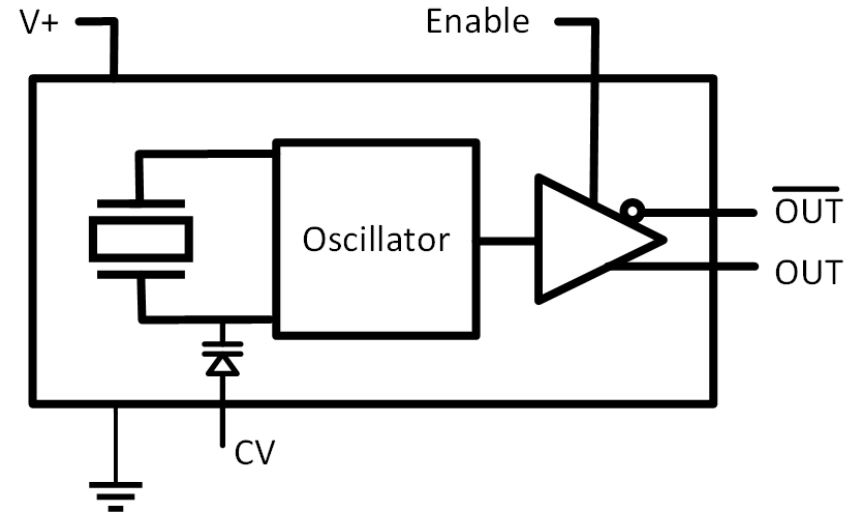
## Features:

- High temperature, small form factor VCO
- Frequency Range: 2 to 40 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 9.9 mW
- Temperature Range: -55 to 180 °C
- Absolute Pull Range: 25 ppm
- Phase Noise 10 Hz offset: -75 dBc/Hz @32 MHz carrier
- Phase Noise 100 kHz offset: -155 dBc/Hz @32 MHz carrier



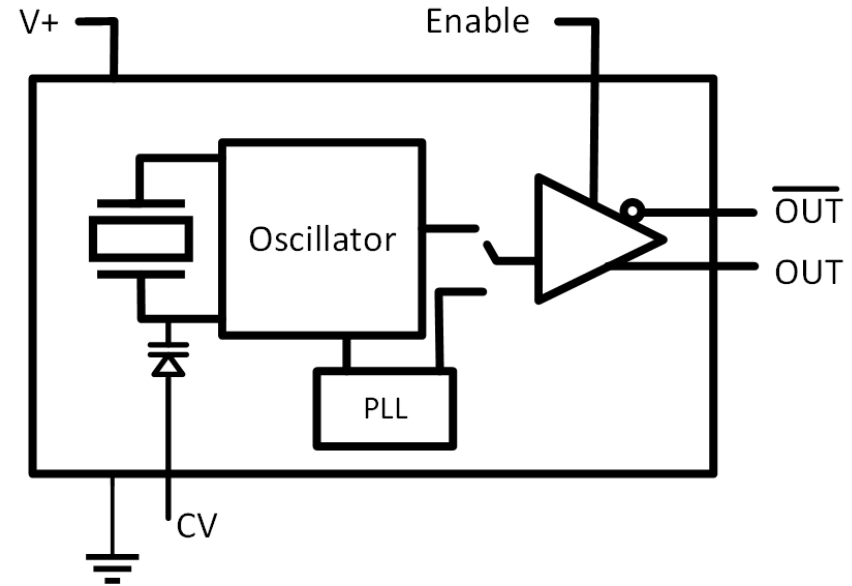
## Features:

- Frequency Range: 20 to 800 MHz
- Output: CMOS, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 132 mW
- Temperature Range: -55 to 125 °C
- Temperature stability over Operating Temperature Range: 45 ppm
- Pull Range: 60 ppm
- Phase Noise 10 Hz offset: -76 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -161 dBc/Hz @100 MHz carrier



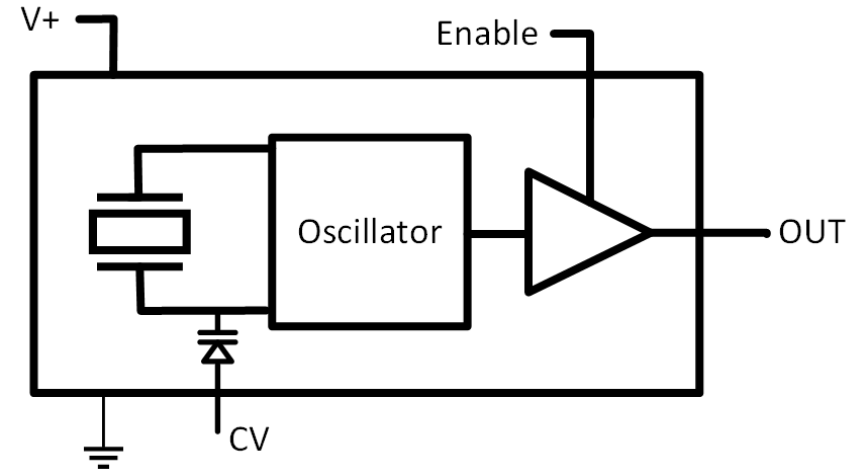
## Features:

- Frequency Range: 1 to 800 MHz
- Output: CMOS, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 19.8 mW
- Temperature Range: -55 to 125 °C
- Pull Range: 50 ppm
- Phase Noise 10 Hz offset: -60 dBc/Hz @52 MHz carrier
- Phase Noise 100 kHz offset: -145 dBc/Hz @52 MHz carrier



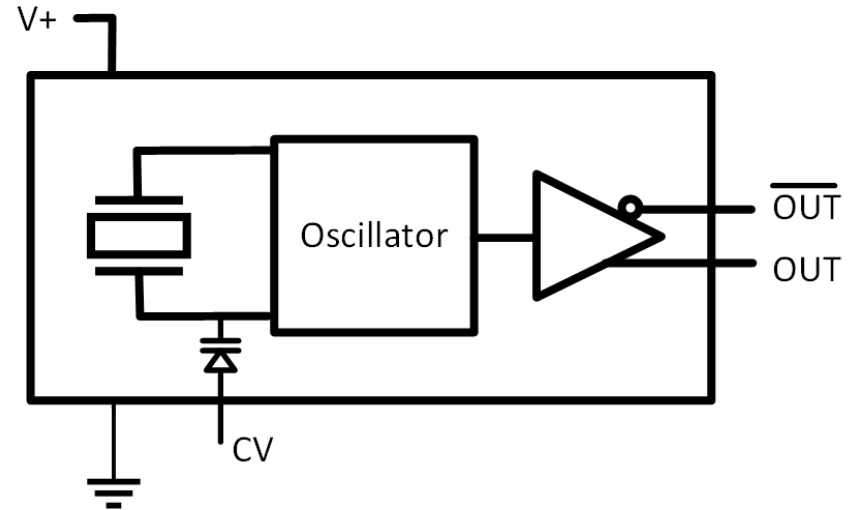
## Features:

- Frequency Range: 30 to 160 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 82.5 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.3 ppb/g
- Pull Range: 65 ppm
- Phase Noise 10 Hz offset: -72 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -161 dBc/Hz  
@122.88 MHz carrier



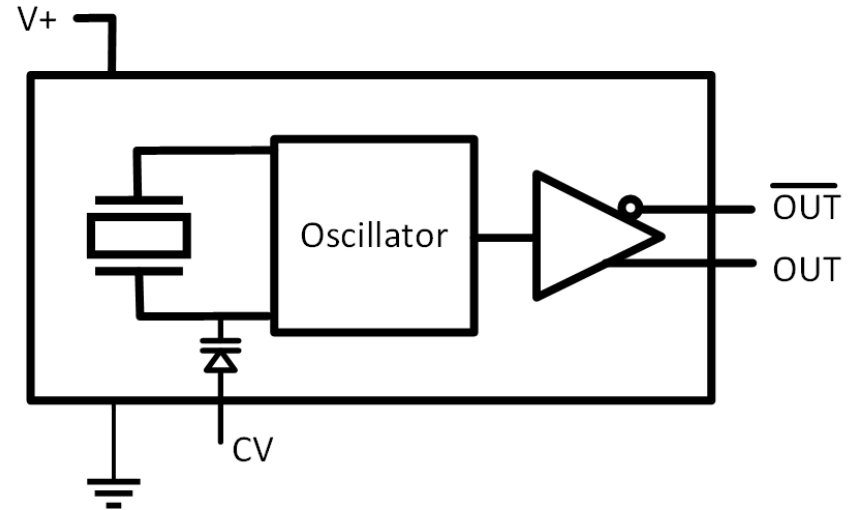
## Features:

- Popular for driving rad tolerant clock synchronizers and jitter cleaners
- Target Market: Space
- Frequency Range: 100 to 700 MHz
- Output: LVPECL
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 281 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 50 krad ELDRS
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



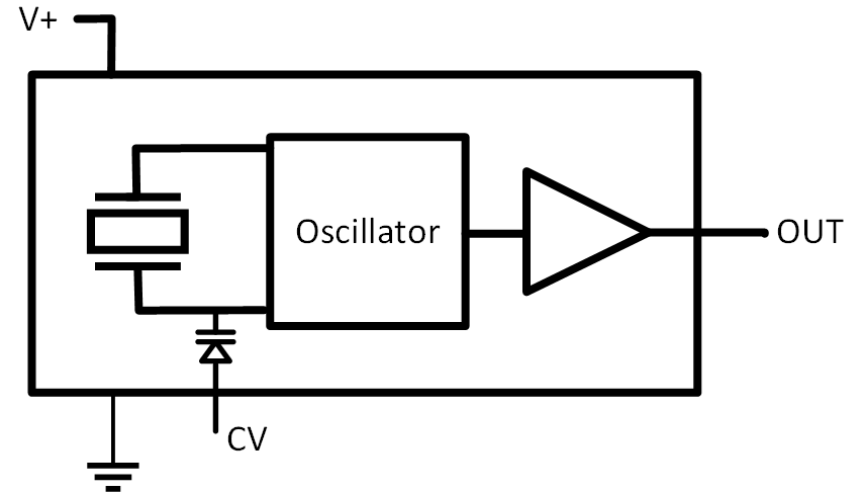
## Features:

- Target Market: Space
- Frequency Range: 80 to 200 MHz
- Output: LVDS
- Footprint: 25 x 25 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 325 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Absolute Pull Range: 20 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration



## Features:

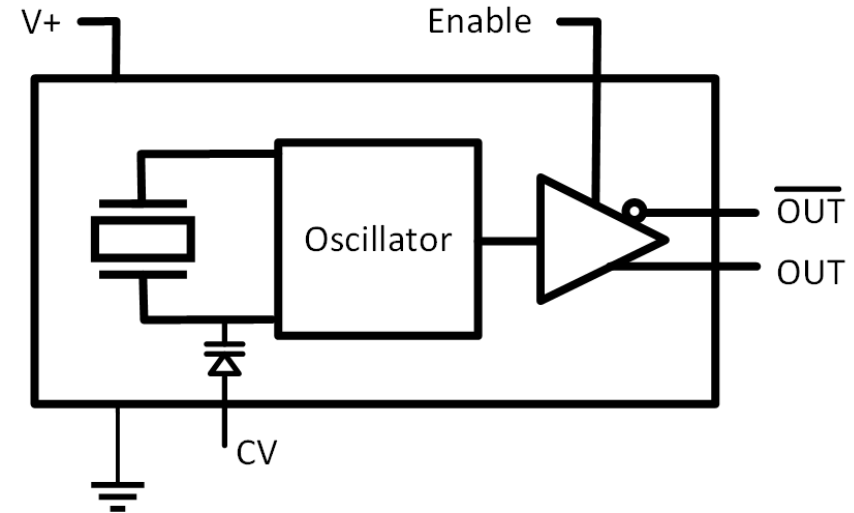
- Target Market: Space
- Frequency Range: 1 to 100 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 66 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Absolute Pull Range: 50 ppm
- 1500 g Shock, 0.5 ms Duration
- 30 g Vibration





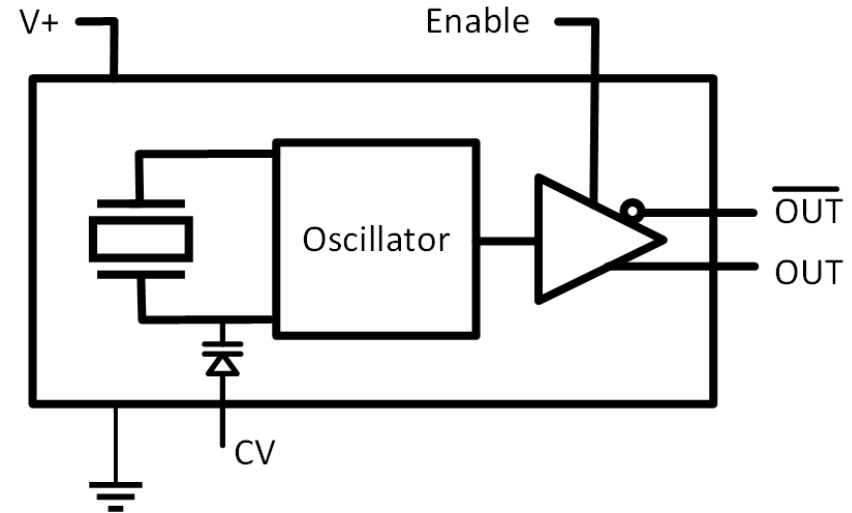
## Features:

- Frequency Range: 0.01 to 1.2 GHz
- Output: CMOS, Sine, LVPECL, LVDS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 132 mW
- Temperature Range: -40 to 85 °C
- Pull Range: 65 ppm
- Phase Noise 10 Hz offset: -76 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -166 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 30 ppm



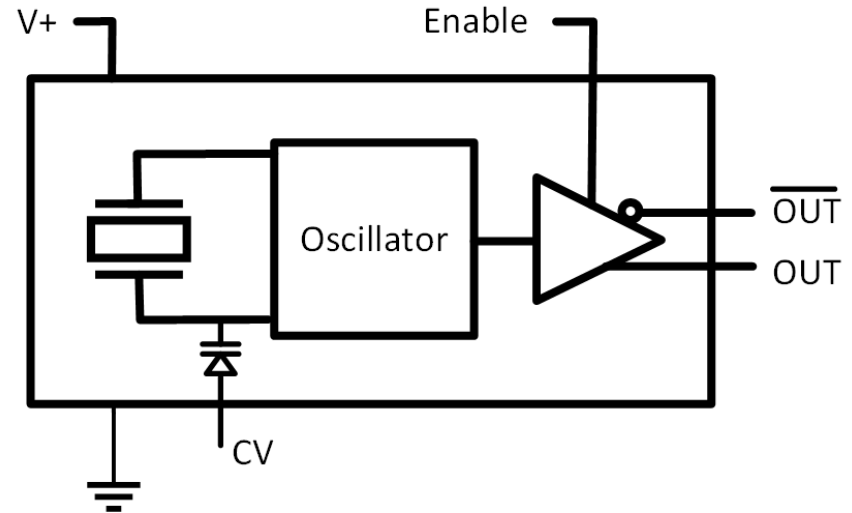
## Features:

- Frequency Range: 40 to 300 MHz
- Output: CMOS, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 75 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 60 ppm
- Phase Noise 10 Hz offset: -72 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -166 dBc/Hz  
@122.88 MHz carrier



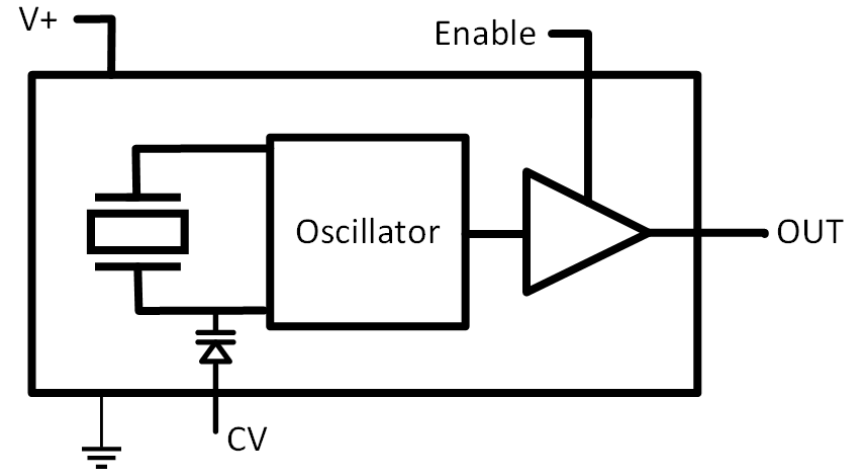
## Features:

- Frequency Range: 100 to 204.8 MHz
- Output: LVPECL
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 165 mW
- Temperature Range: -40 to 105 °C
- Absolute Pull Range: 50 ppm
- Phase Noise 10 Hz offset: -68 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -157 dBc/Hz  
@122.88 MHz carrier



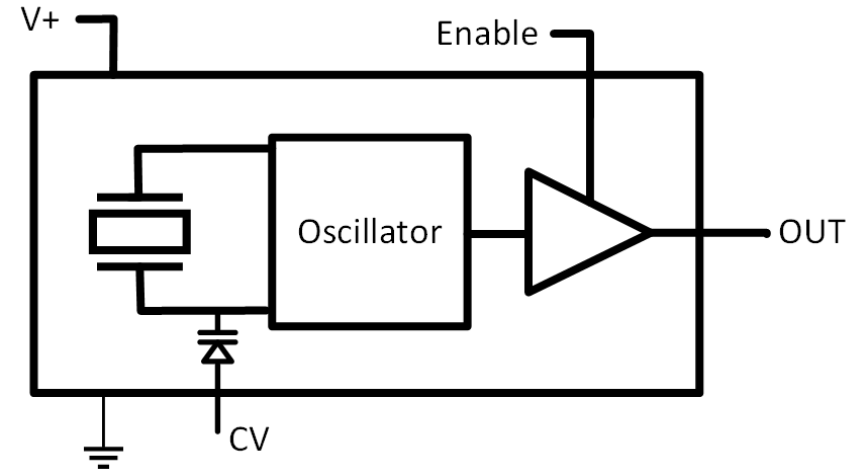
## Features:

- Frequency Range: 1.544 to 77.76 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 16.5 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 150 ppm
- Phase Noise 10 Hz offset: -64 dBc/Hz  
@61.44 MHz carrier
- Phase Noise 100 kHz offset: -164 dBc/Hz  
@61.44 MHz carrier



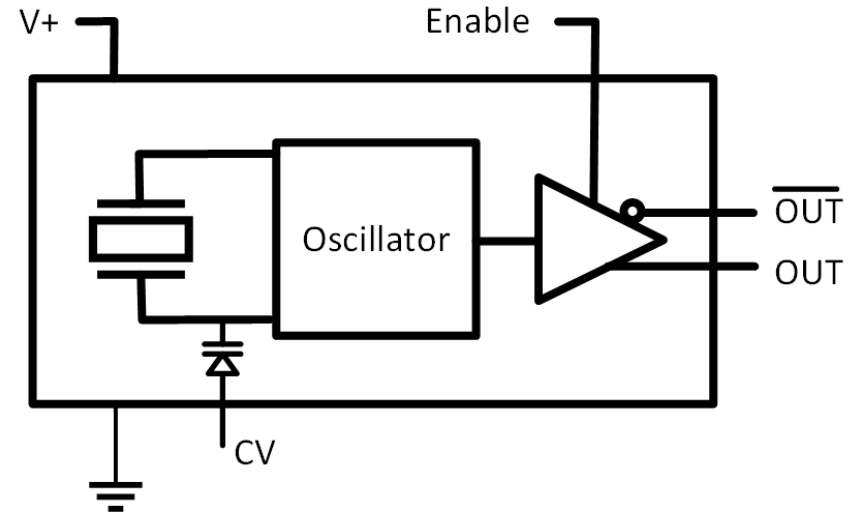
## Features:

- Frequency Range: 1.544 to 77.76 MHz
- Output: CMOS
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 49.5 mW
- Temperature Range: -40 to 85 °C
- Pull Range: 150 ppm
- Phase Noise 10 Hz offset: -63 dBc/Hz @61.44 MHz carrier
- Phase Noise 100 kHz offset: -157 dBc/Hz @61.44 MHz carrier



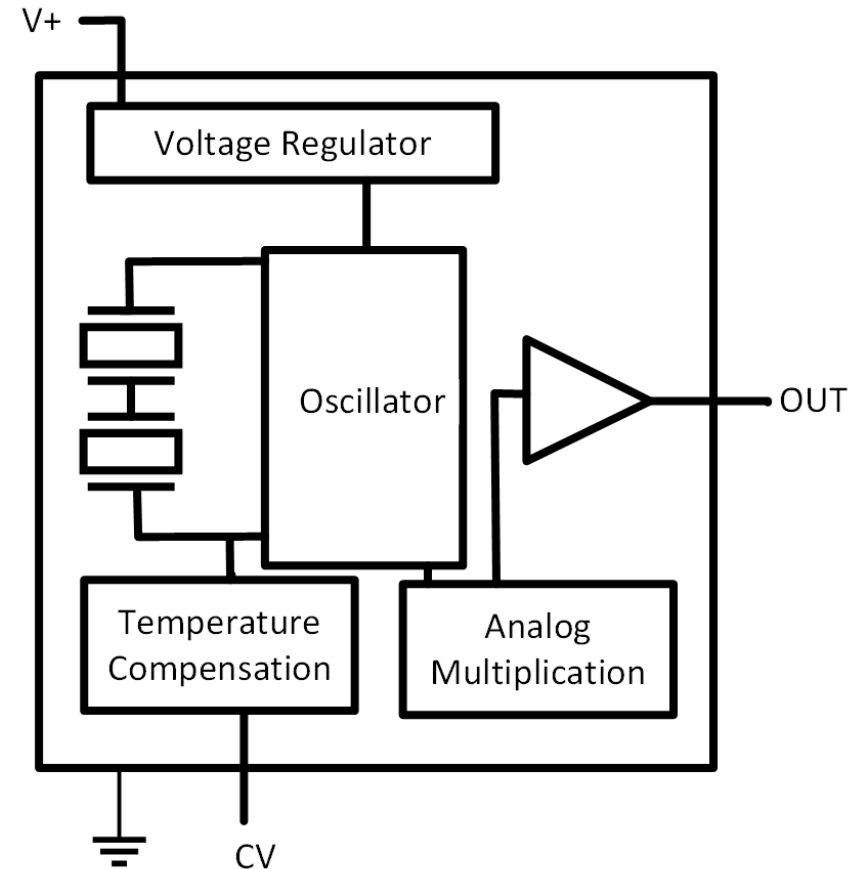
## Features:

- Frequency Range: 77.76 to 170 MHz
- Output: CMOS, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 33 mW
- Temperature Range: -40 to 85 °C
- Absolute Pull Range: 50 ppm
- Phase Noise 10 Hz offset: -66 dBc/Hz  
@122.88 MHz carrier
- Phase Noise 100 kHz offset: -151 dBc/Hz  
@122.88 MHz carrier



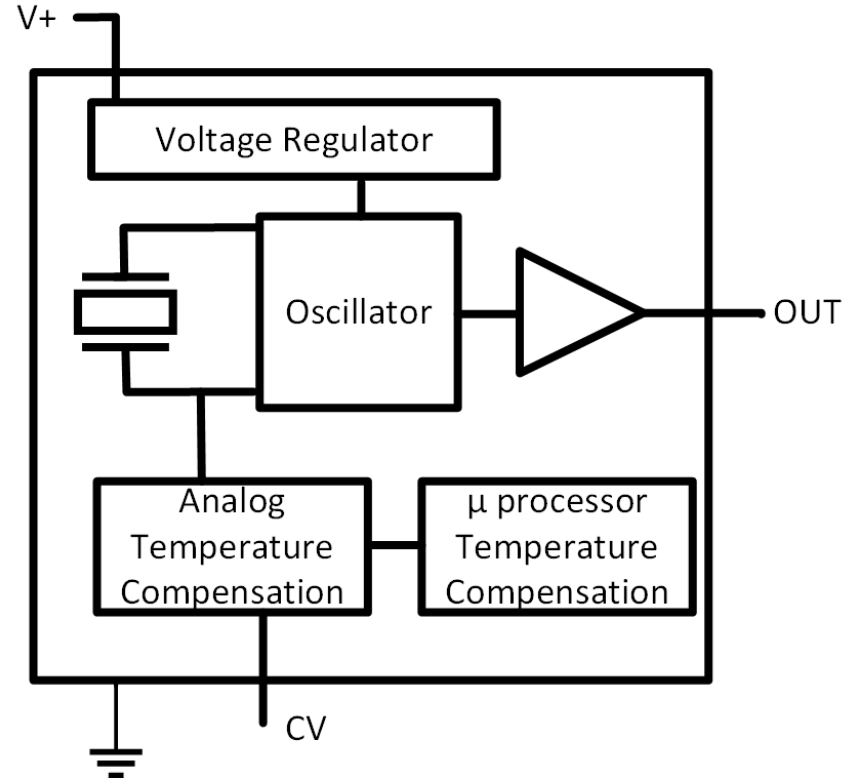
## Features: COMING SOON

- High frequency, low g
- Target Market: Military
- Frequency Range: 96 to 160 MHz
- Standard Frequencies: 98.208, 100, 115.2, 120, 144, 150, 155.52, 160 MHz
- Output: CMOS
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 121 mW
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.1 ppb/g
- Phase Noise 10 Hz offset: -75 dBc/Hz @150 MHz carrier
- Phase Noise 100 kHz offset: -145 dBc/Hz @150 MHz carrier
- Temperature stability over Operating Temperature Range: 1 ppm



## Features:

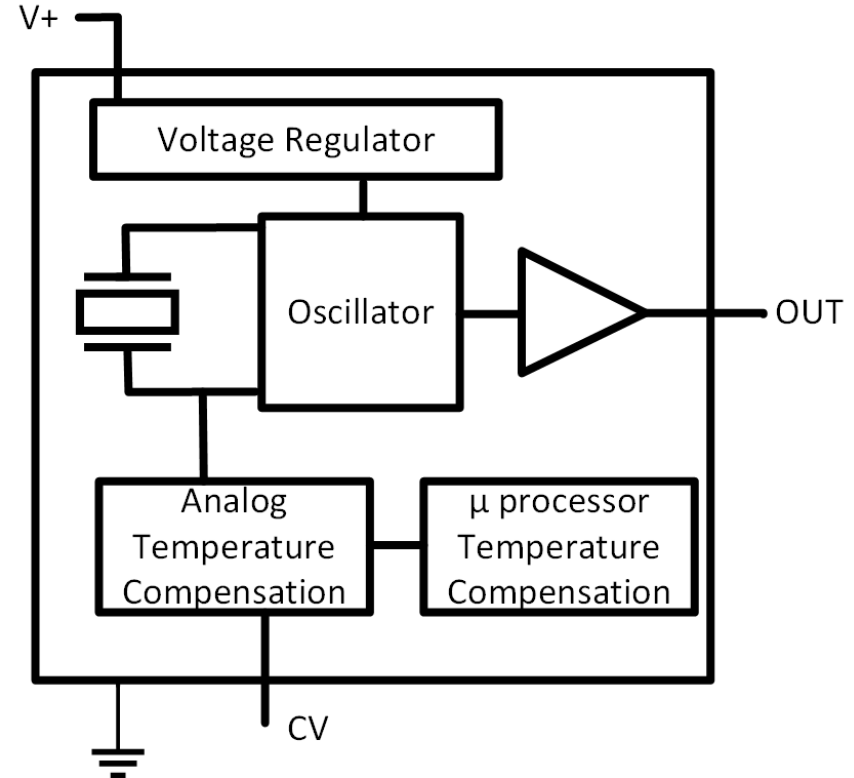
- OCXO temperature stability at just 40 mW
- Frequency Range: 8 to 50 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 40 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 20 ppb
- Temperature stability -20 to 70°C: 20 ppb
- Temperature stability -40 to 85°C: 30 ppb
- Aging per Day: 5 ppb





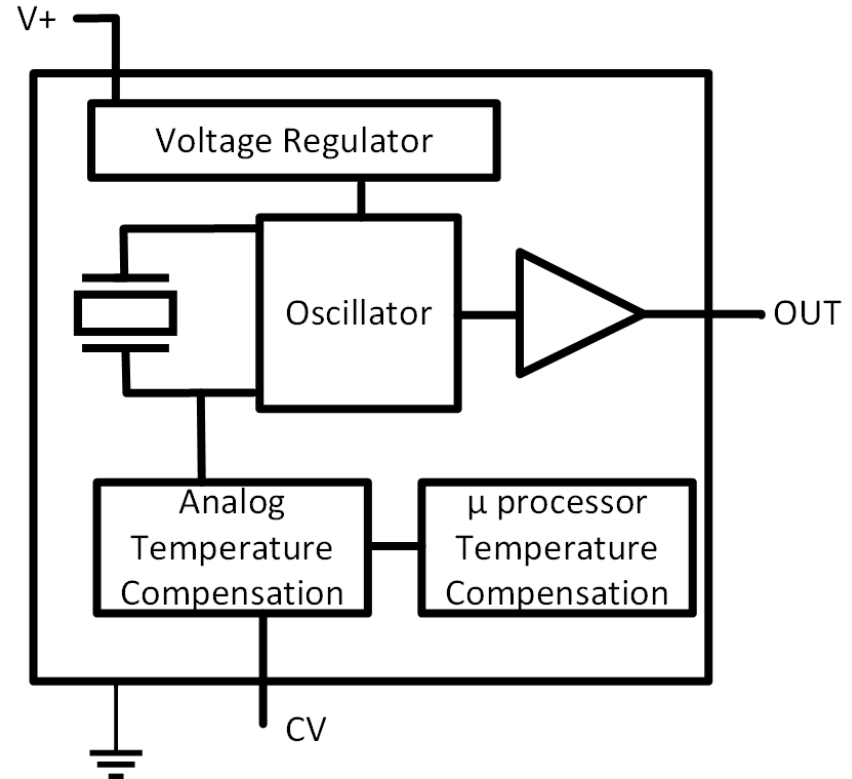
## Features:

- Microprocessor based temperature correction
- Frequency Range: 8 to 40 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, through hole
- Supply Voltage: 3.3 V
- Power: 40 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 30 ppb
- Temperature stability -20 to 70°C: 30 ppb
- Temperature stability -40 to 85°C: 50 ppb
- Aging per Day: 8 ppb



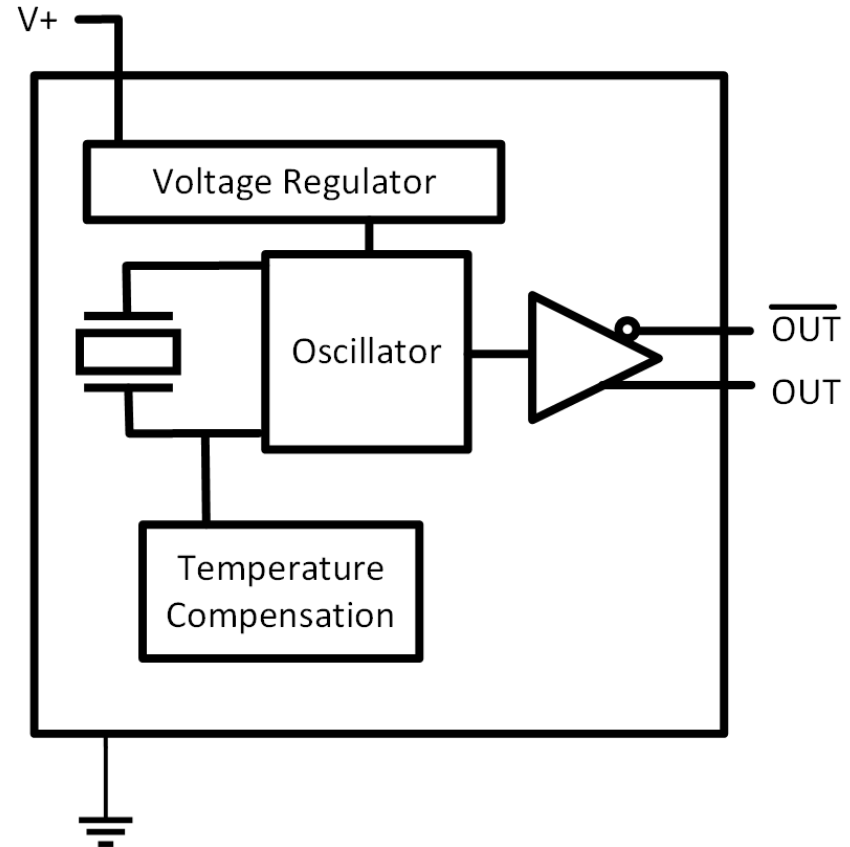
## Features:

- Microprocessor based temperature correction
- Frequency Range: 8 to 40 MHz
- Output: CMOS
- Footprint: 9 x 7 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 40 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 20 ppb
- Temperature stability -20 to 70°C: 20 ppb
- Temperature stability -40 to 85°C: 30 ppb
- Aging per Day: 5 ppb



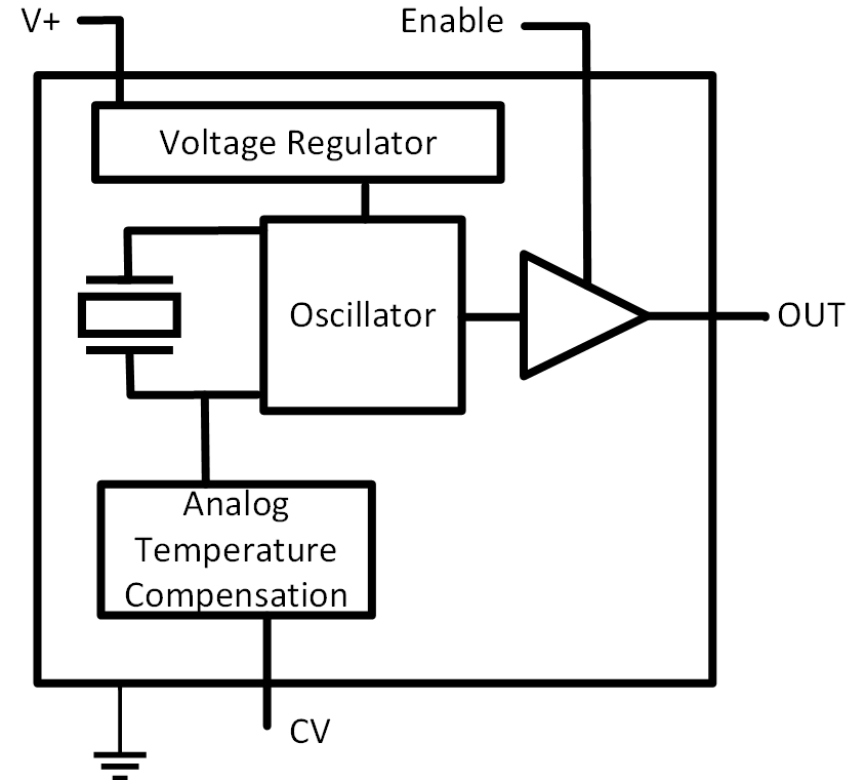
## Features:

- Frequency Range: 50 to 160 MHz
- Output: CMOS, Clipped Sine, Balanced or Differential Sinewave, LVPECL
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 82.5 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.28 ppm
- Aging per Year: 1 ppm



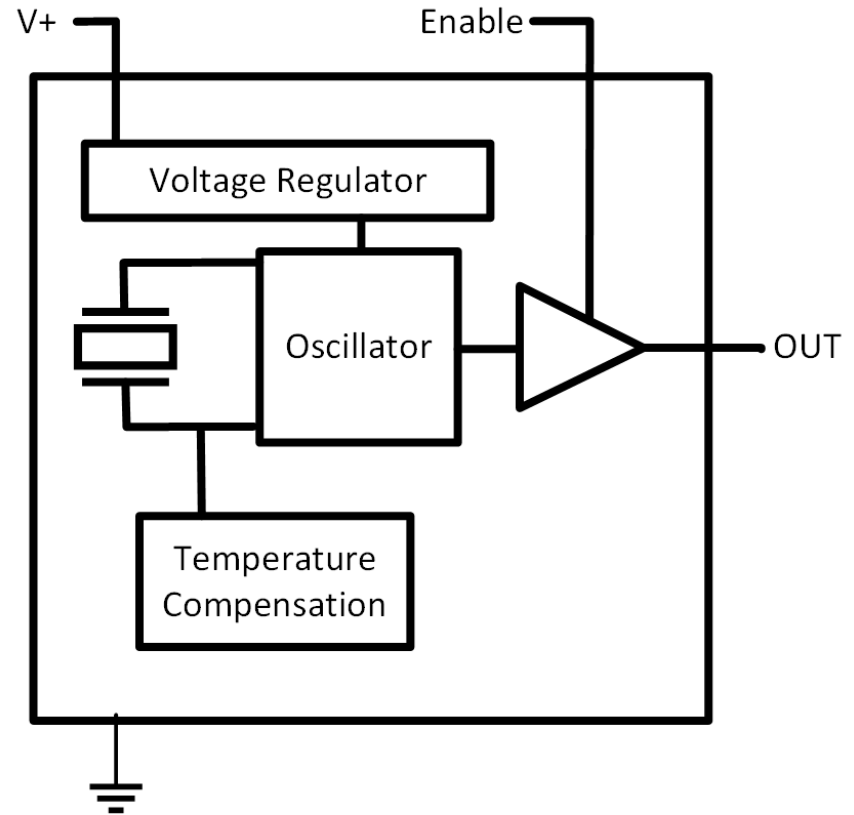
## Features:

- High Stability, small form factor TCXO
- Frequency Range: 10 to 52 MHz
- Standard Frequencies: 10, 12.8, 20 MHz
- Output: CMOS, Clipped Sine
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 2.5, 3.3, 5 V
- Power: 11.55 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 0.1 ppm
- Temperature stability -40 to 85°C: 0.28 ppm
- Aging per Day: 0.01 ppm



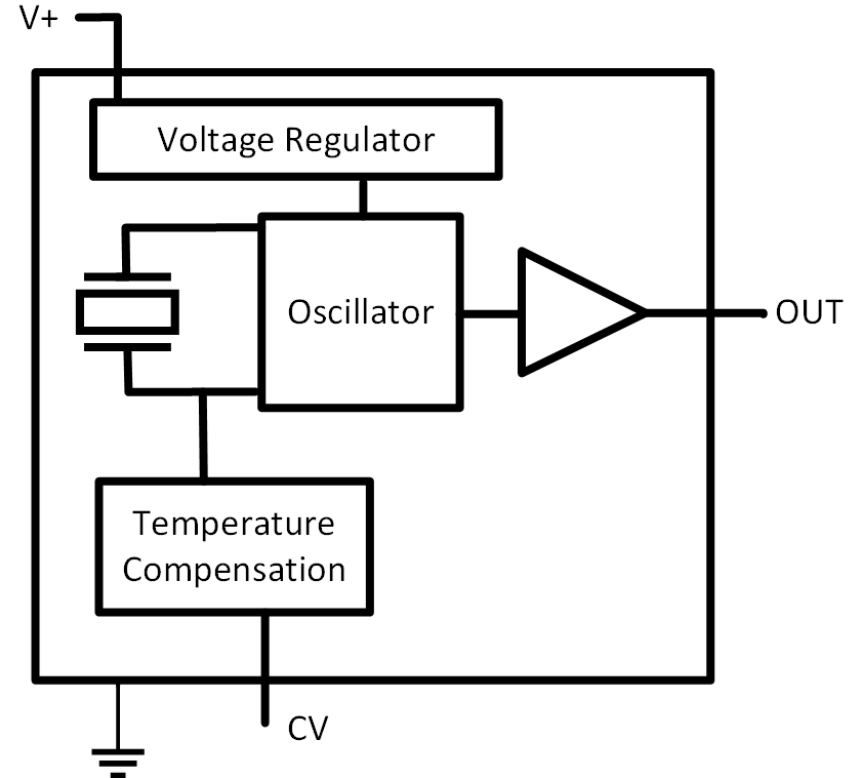
## Features:

- Frequency Range: 4 to 54 MHz
- Output: CMOS
- Footprint: 3.2 x 2.5 mm, surface mount
- Supply Voltage: 2.5, 3.3 V
- Power: 9.9 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 2 ppm
- Temperature stability -40 to 85°C: 2 ppm
- Aging per Day: 0.01 ppm



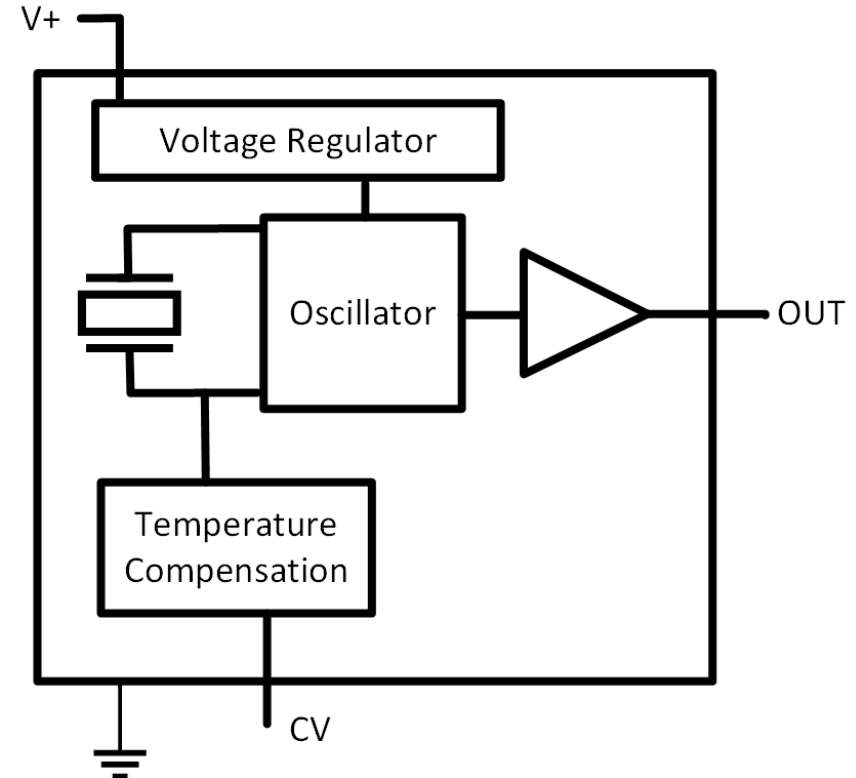
## Features:

- Similar to VT-841 but 4 pins
- Frequency Range: 10 to 52 MHz
- Output: Clipped Sine
- Footprint: 2.5 x 2 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3.3 V
- Power: 5.6 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 0.5 ppm
- Temperature stability -40 to 85°C: 1 ppm
- Aging per Day: 0.01 ppm



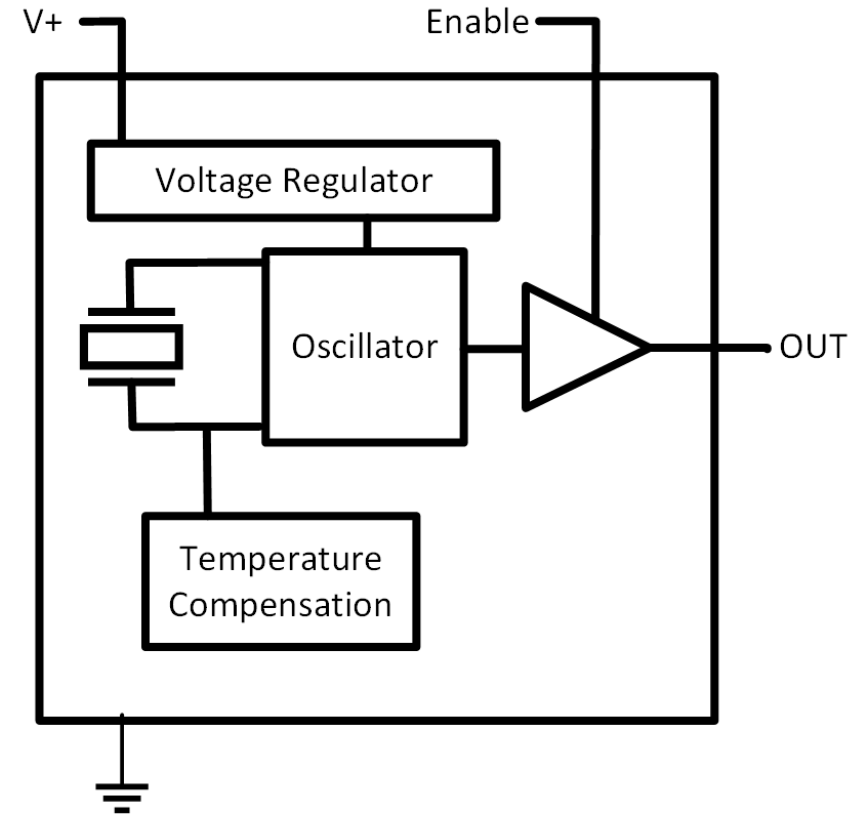
## Features:

- Smallest TCXO
- Frequency Range: 13 to 52 MHz
- Output: Clipped Sine
- Footprint: 2 x 1.6 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3, 3.3 V
- Power: 4.14 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 0.5 ppm
- Temperature stability -40 to 85°C: 0.5 ppm
- Aging per Day: 0.01 ppm



## Features:

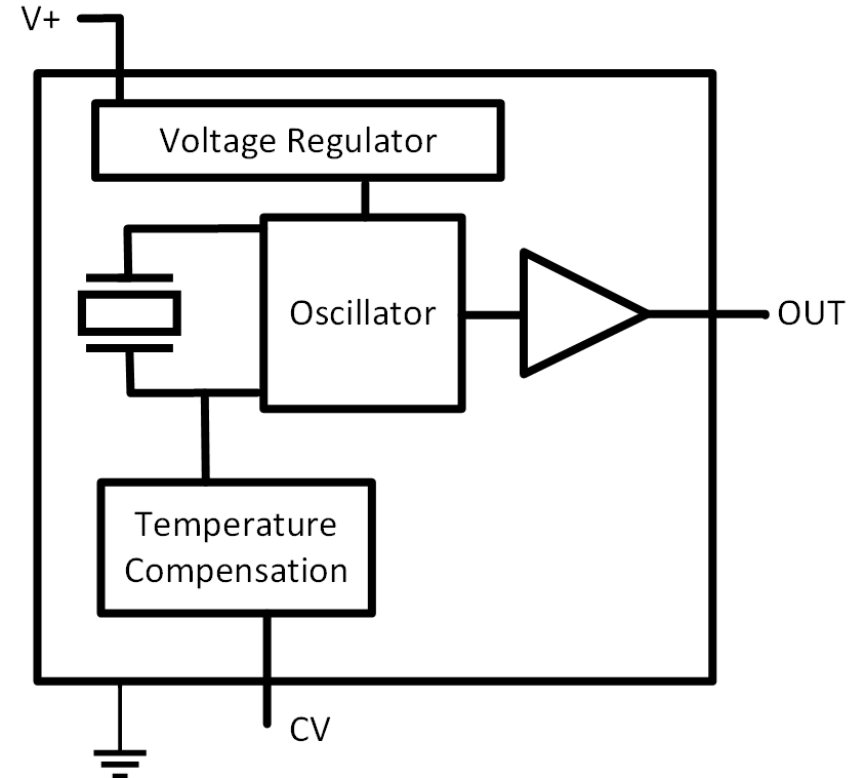
- Frequency Range: 2 to 50 MHz
- Output: CMOS
- Footprint: 5 x 3.2 mm, surface mount
- Supply Voltage: 2.5, 3, 3.3 V
- Power: 7.5 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 2 ppm
- Temperature stability -40 to 85°C: 2 ppm
- Aging per Day: 0.01 ppm





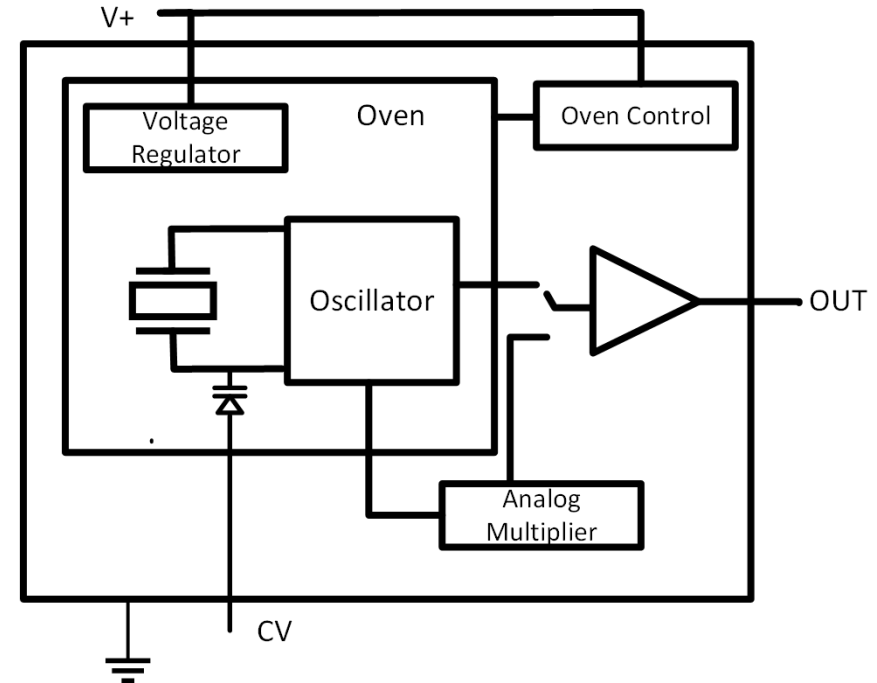
## Features:

- Frequency Range: 8 to 45 MHz
- Output: Clipped Sine
- Footprint: 3.2 x 2.5 mm, surface mount
- Supply Voltage: 1.8, 2.5, 3, 3.3 V
- Power: 1.5 mW
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 0.5 ppm
- Temperature stability -40 to 85°C: 0.5 ppm
- Aging per Day: 0.01 ppm



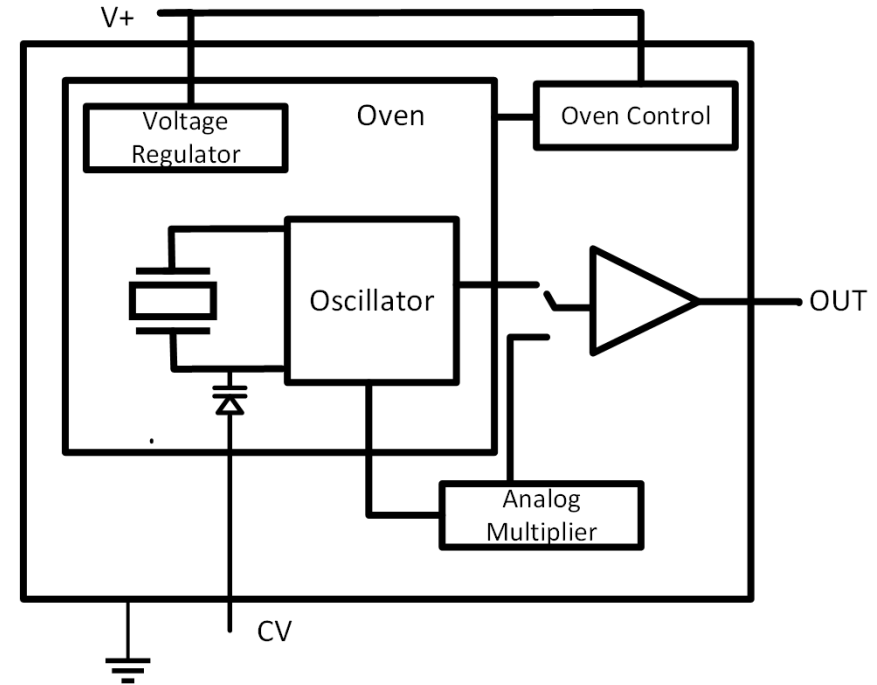
## Features:

- Standard 1x1 OCXO
- Frequency Range: 10 to 100 MHz
- Standard Frequencies: 10, 12.8, 20 MHz
- Output: CMOS, Sine
- Footprint: 25 x 25 mm, through hole
- Supply Voltage: 3.3, 5, 12 V
- Power: 1 W
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 2 ppb
- Temperature stability -20 to 70°C: 5 ppb
- Temperature stability -40 to 85°C: 10 ppb
- Aging per Day: 0.1 ppb
- Aging per Year: 20 ppb



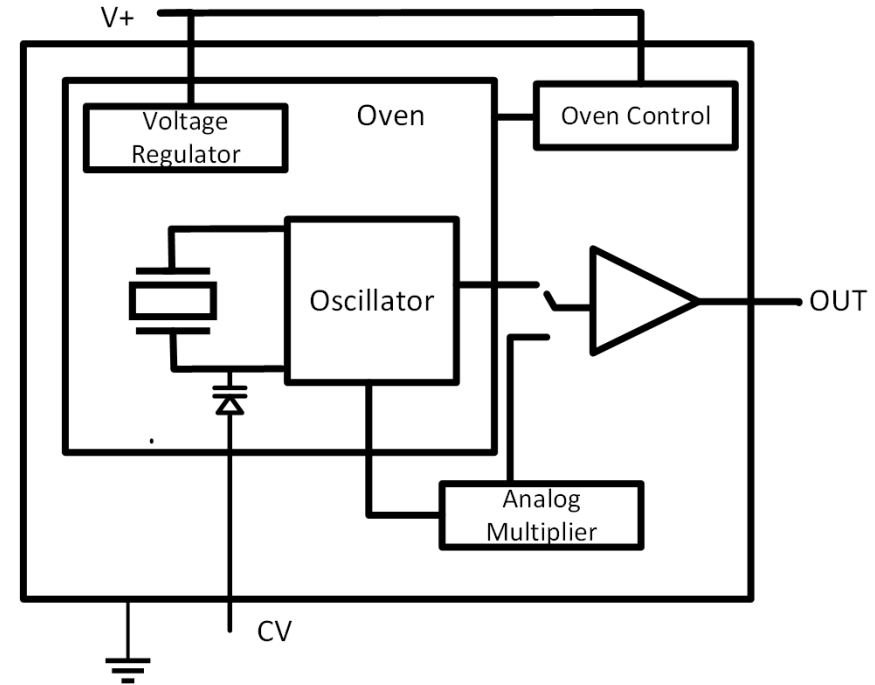
## Features:

- High Volume, Low Cost OCXO
- Frequency Range: 10 to 40 MHz
- Standard Frequencies: 10, 12.8, 20 MHz
- Output: CMOS, Sine
- Footprint: 25 x 22 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 10 ppb
- Temperature stability -20 to 70°C: 10 ppb
- Temperature stability -40 to 85°C: 10 ppb
- Aging per Day: 0.5 ppb
- Aging per Year: 60 ppb



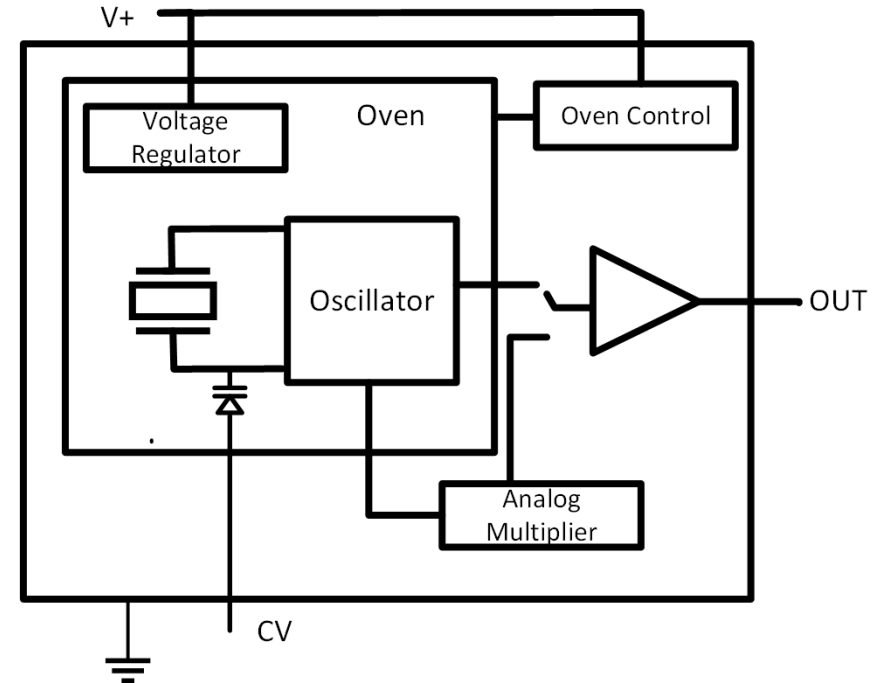
## Features:

- **High Volume, Low Cost OCXO**
- Frequency Range: 10 to 40 MHz
- Standard Frequencies: 10, 12.8, 20 MHz
- Output: CMOS
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 1 W
- Temperature Range: -40 to 95 °C
- Temperature stability over Operating Temperature Range: 10 ppb
- Temperature stability -40 to 85°C: 5 ppb
- Aging per Year: 100 ppb



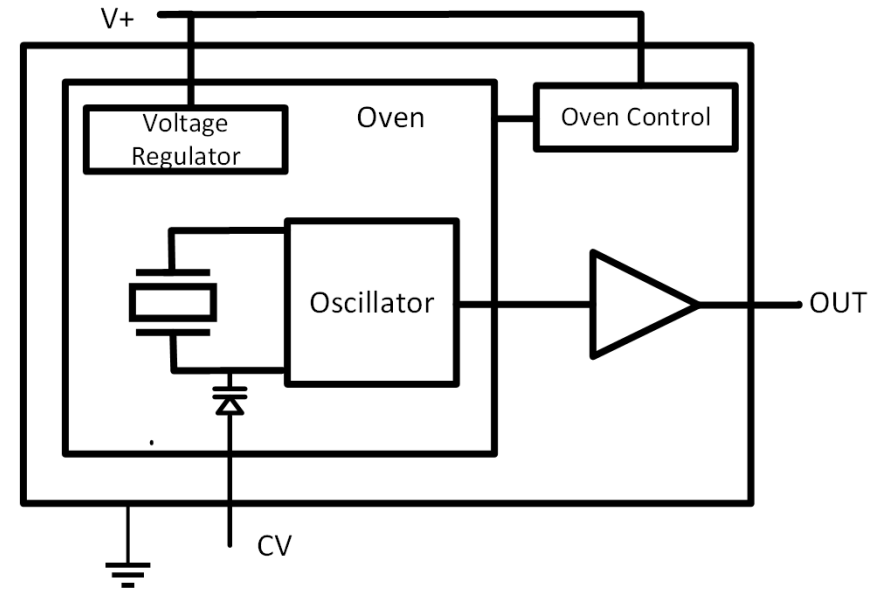
## Features:

- **High Volume, Low Cost OCXO**
- Frequency Range: 10 to 40 MHz
- Standard Frequencies: 10, 12.8, 20, 24.576, 25 MHz
- Output: CMOS
- Footprint: 20 x 13 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 1 W
- Temperature Range: -40 to 95 °C
- Temperature stability over Operating Temperature Range: 10 ppb
- Temperature stability -40 to 85°C: 5 ppb
- Aging per Year: 100 ppb



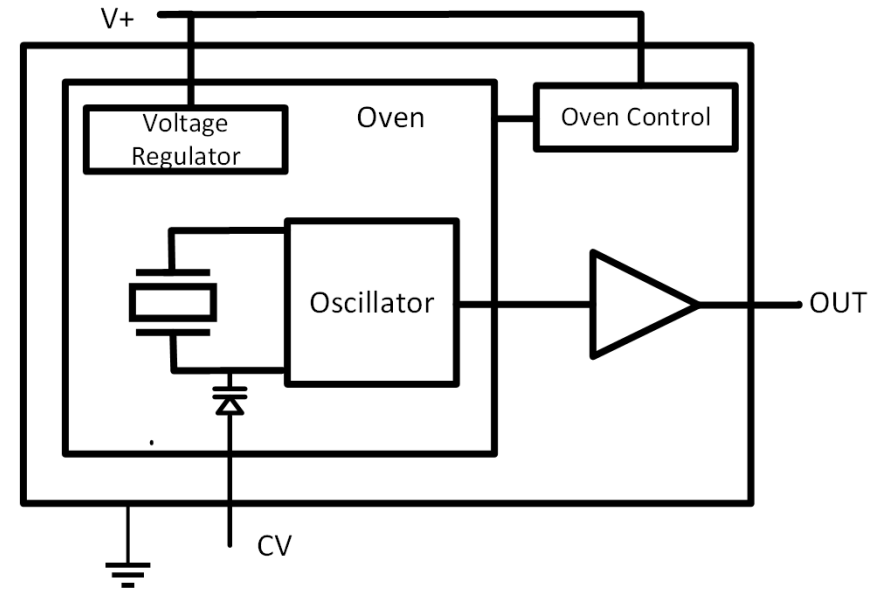
## Features:

- **ASIC based OCXO, excellent stability under airflow**
- Frequency Range: 10 to 40 MHz
- Standard Frequencies: 10, 12.8, 20, 24.576, 25, 30.72 MHz
- Output: CMOS
- Footprint: 14 x 9 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 500 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 10 ppb
- Temperature stability -40 to 85°C: 10 ppb
- Aging per Year: 500 ppb



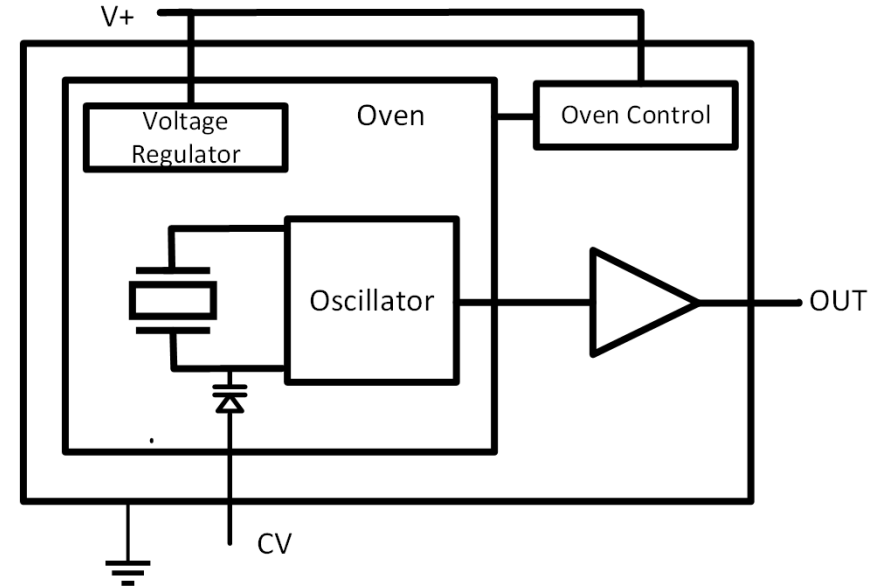
## Features:

- **ASIC based OCXO, excellent stability under airflow**
- Frequency Range: 10 to 40 MHz
- Standard Frequencies: 10, 12.8, 20, 24.576, 25, 30.72 MHz
- Output: CMOS
- Footprint: 9 x 7 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 500 mW
- Temperature Range: -40 to 95 °C
- Temperature stability over Operating Temperature Range: 10 ppb
- Temperature stability -40 to 85°C: 10 ppb
- Aging per Year: 500 ppb



## Features:

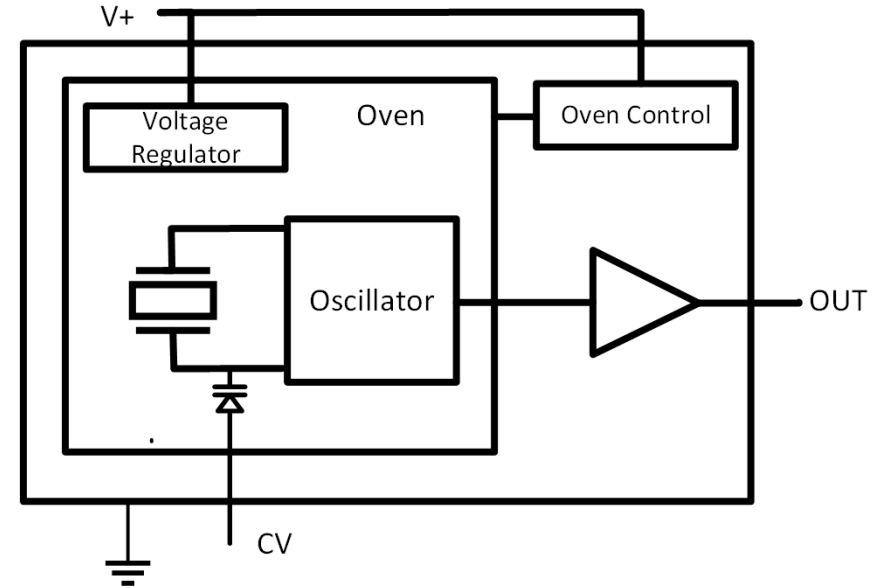
- Frequency Range: 10 to 80 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 350mW
- Temperature Range: -55 to 85 °C
- Temperature stability over Operating Temperature Range: 0.1 ppm
- Aging per Year: 0.2 ppm
- Phase Noise 10 Hz offset: -110 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -140 dBc/Hz @10 MHz carrier





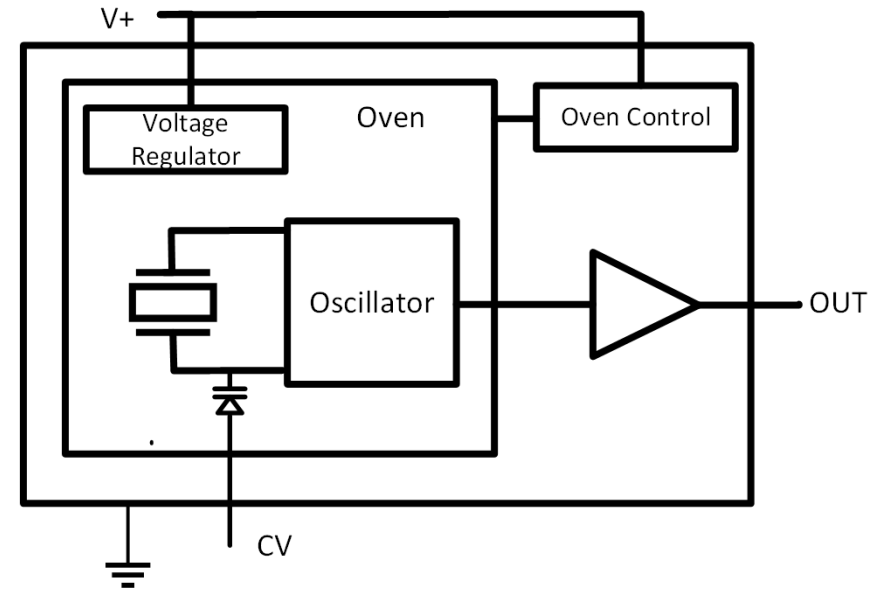
## Features:

- Frequency Range: 10 to 100 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 250mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.03 ppm
- Aging per Year: 0.1 ppm
- Phase Noise 10 Hz offset: -125 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



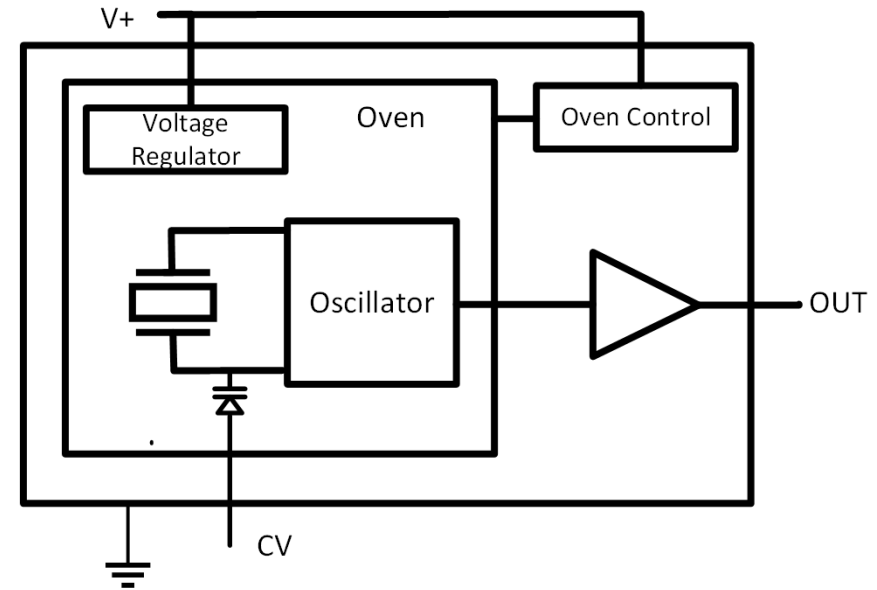
## Features:

- OCXO performance at ~ 1/5 the power
- Frequency Range: 10 to 100 MHz
- Output: CMOS, Sine
- Footprint: 13 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 250 mW
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.03 ppm
- Aging per Year: 0.1 ppm
- Phase Noise 10 Hz offset: -125 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



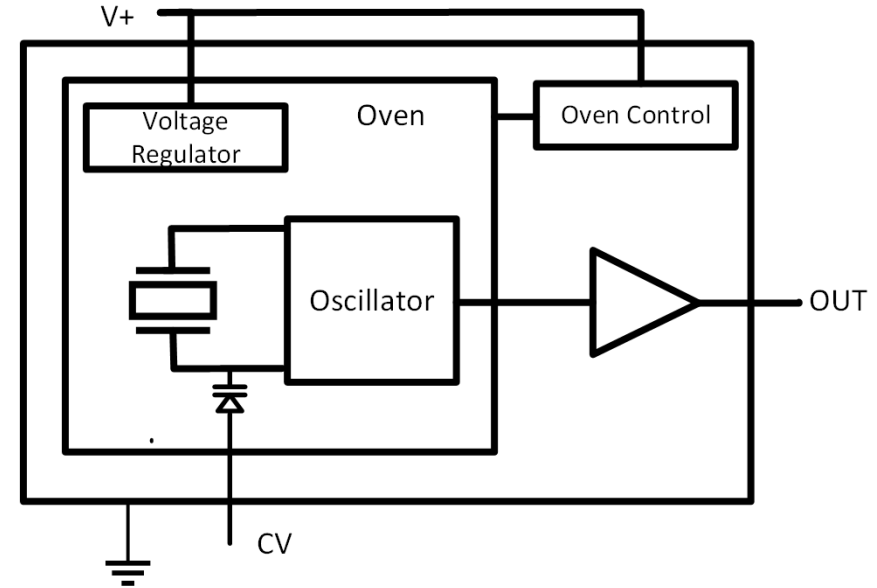
## Features:

- Only space qualified EMXO
- Target Market: Space
- Frequency Range: 10 to 120 MHz
- Output: CMOS, Sine
- Footprint: 26 x 24 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 700 mW
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 100 krad TID
- Temperature stability over Operating Temperature Range: 0.1 ppm
- Aging per Year: 0.2 ppm
- 20 g Vibration



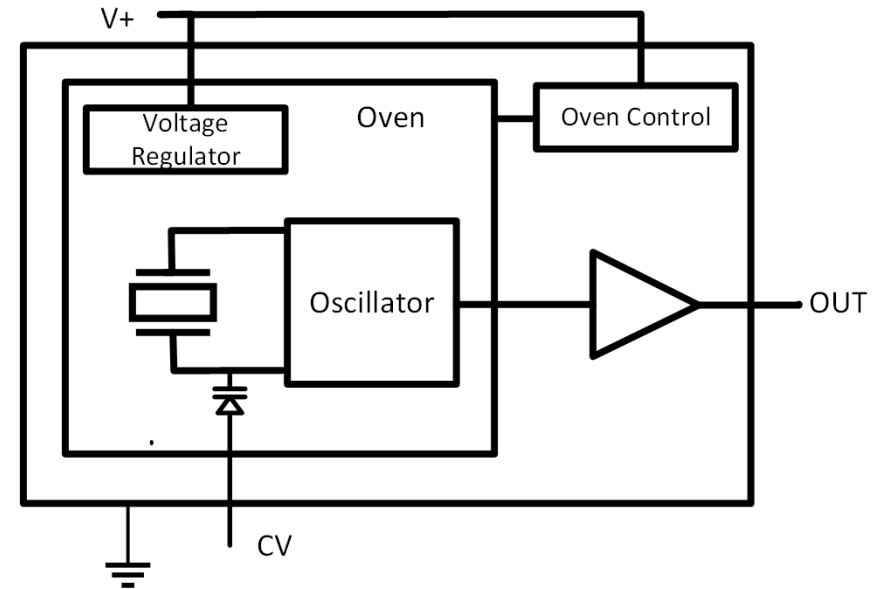
## Features:

- High Stability Space OCXO
- Frequency Range: 10 to 120 MHz
- Output: CMOS, Sine
- Footprint: 35 x 20 mm, through hole
- Supply Voltage: 5 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Radiation Tolerance: 300 krad TID
- Temperature stability over Operating Temperature Range: 100 ppb
- Aging per Day: 2 ppb
- Phase Noise 100 kHz offset: -163 dBc/Hz @50 MHz carrier



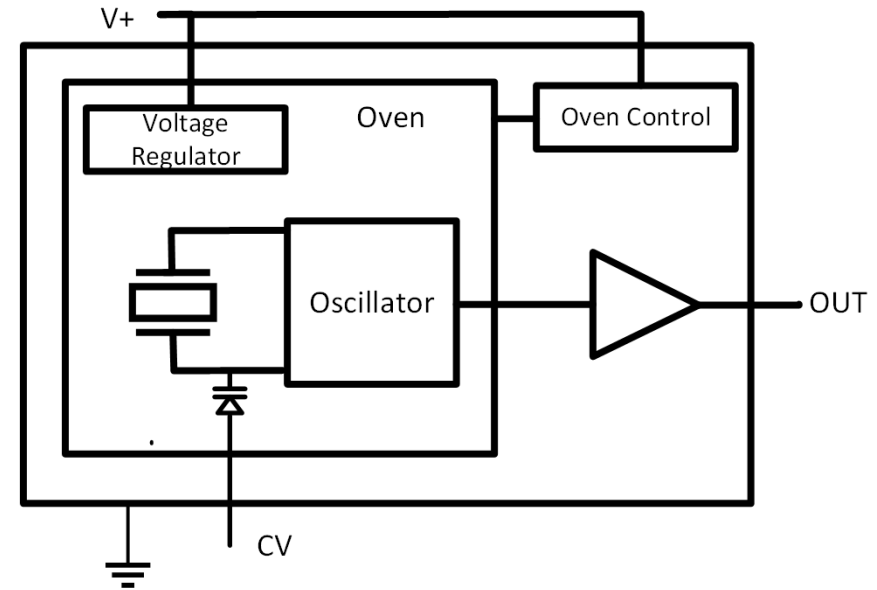
## Features:

- smallest form factor low noise oscillator
- Target Market: Test and Measurement
- Frequency Range: 10 to 20 MHz
- Output: Sine
- Footprint: 20 x 20 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -173 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 20 ppb
- Aging per Year: 30 ppb



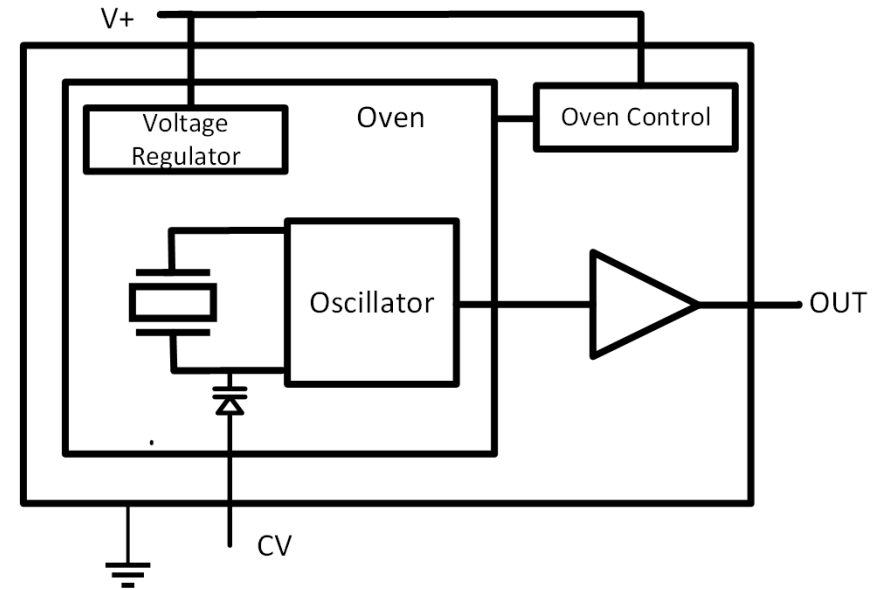
## Features:

- smallest form factor low noise oscillator
- Target Market: Test and Measurement
- Frequency Range: 80 to 120 MHz
- 100 MHz
- Standard Frequency: 100 MHz
- Output: Sine
- Footprint: 20 x 20 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -178 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 200 ppb
- Aging per Year: 200 ppb



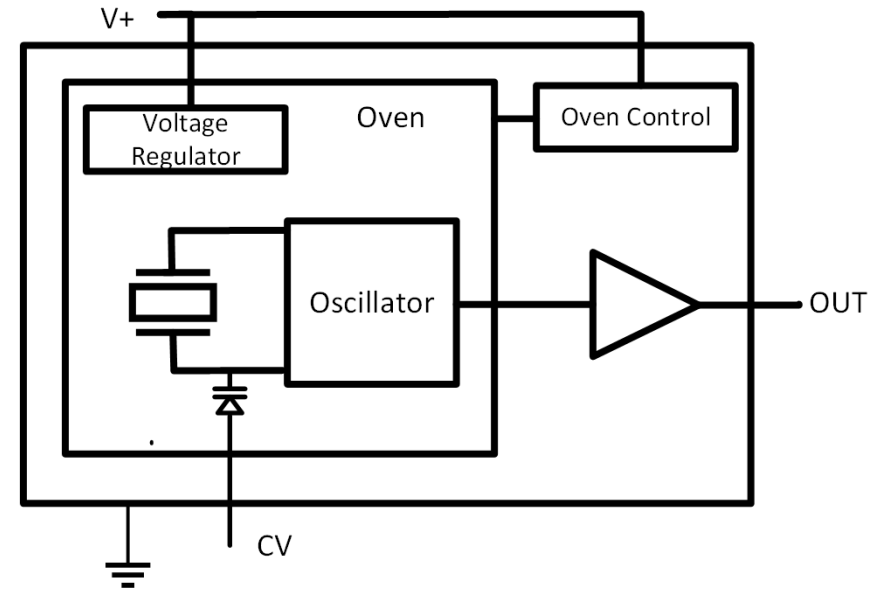
## Features:

- low noise, small factor OCXO
- Frequency Range: 80 to 120 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 1 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -95 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -160 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 50 ppb
- Aging per Year: 300 ppb



## Features:

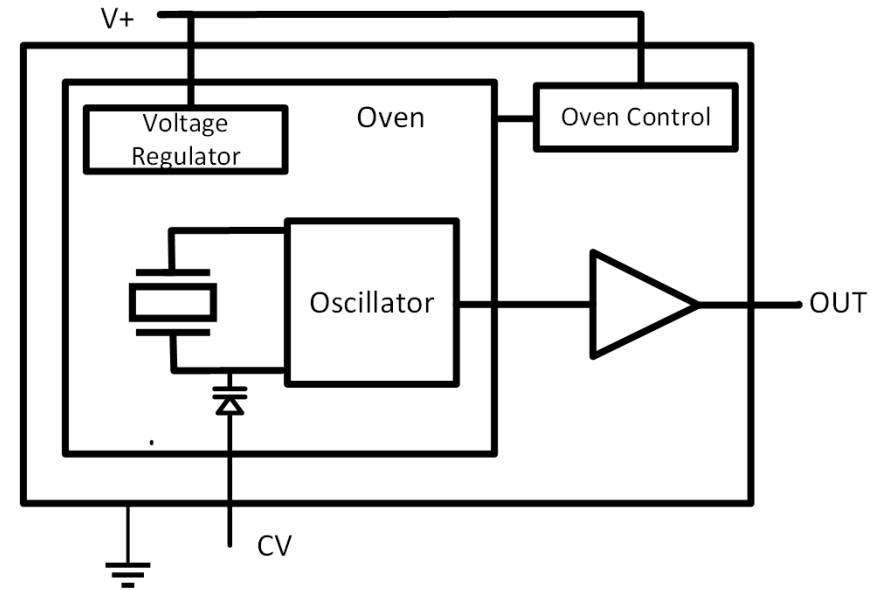
- High stability, Low phase noise oscillator
- Frequency Range: 5 to 20 MHz
- Output: CMOS, Sine
- Footprint: 38 x 28 mm, through hole, surface mount
- Supply Voltage: 5, 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 10 ppb
- Aging per Year: 100 ppb





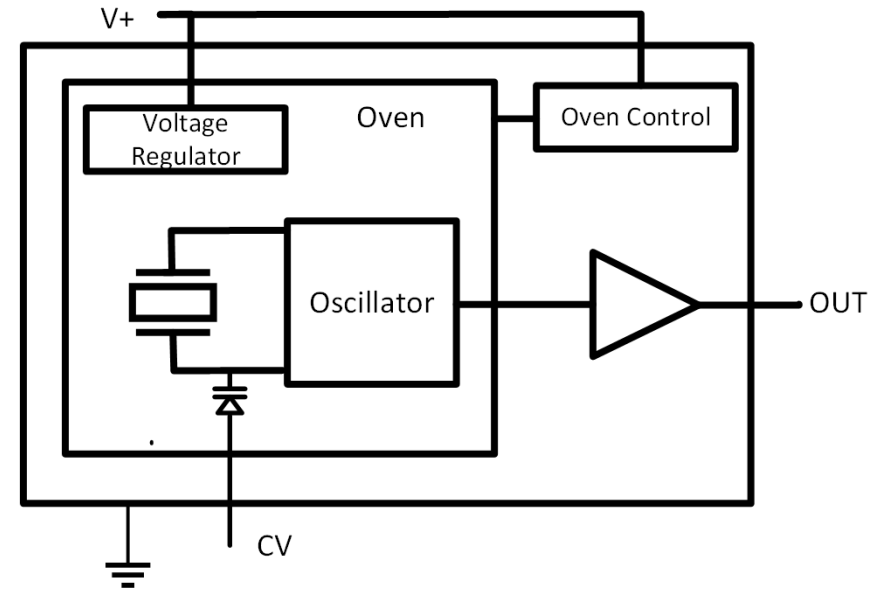
## Features:

- High stability, Low phase noise oscillator
- Frequency Range: 50 to 130 MHz
- Output: Sine
- Footprint: 38 x 28 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -176 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 100 ppb
- Aging per Year: 200 ppb



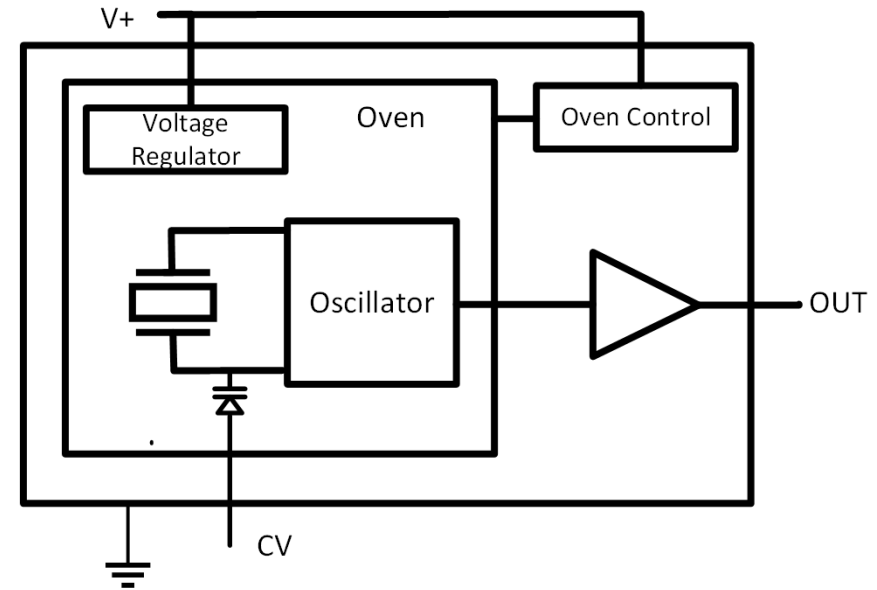
## Features:

- Low Phase Noise Oscillator
- Target Market: Test and Measurement
- Frequency Range: 10 to 20 MHz
- Output: Sine
- Footprint: 25 x 25 mm, through hole
- Supply Voltage: 5, 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -140 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @10 MHz carrier
- Temperature stability over Operating Temperature Range: 20 ppb
- Aging per Year: 30 ppb



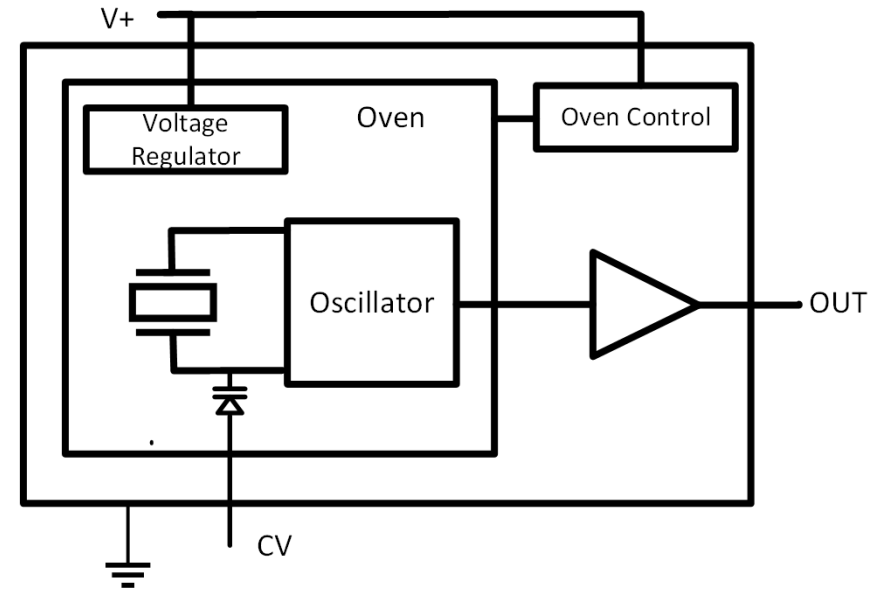
## Features:

- Low Phase Noise Oscillator
- Target Market: Test and Measurement
- Frequency Range: 80 to 120 MHz
- Output: Sine
- Footprint: 25 x 25 mm, through hole
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -45 to 85 °C
- Phase Noise 10 Hz offset: -105 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -178 dBc/Hz @100 MHz carrier
- Temperature stability over Operating Temperature Range: 200 ppb
- Aging per Year: 200 ppb



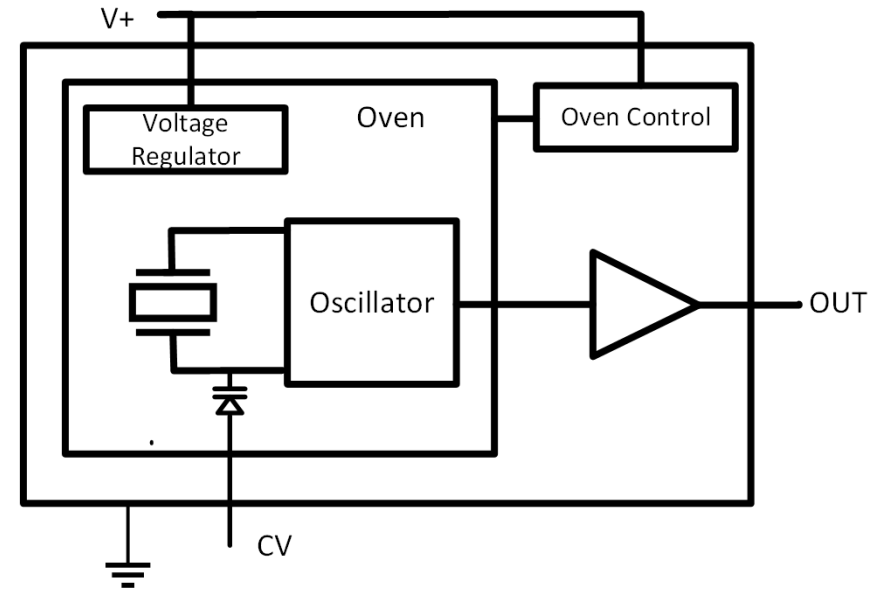
## Features:

- Frequency Range: 20 to 35 MHz
- Output: Sine
- Footprint: 25 x 25 mm, through hole, surface mount
- Supply Voltage: 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Phase Noise 10 Hz offset: -115 dBc/Hz @20 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @20 MHz carrier
- Temperature stability over Operating Temperature Range: 50 ppb
- Aging per Year: 100 ppb



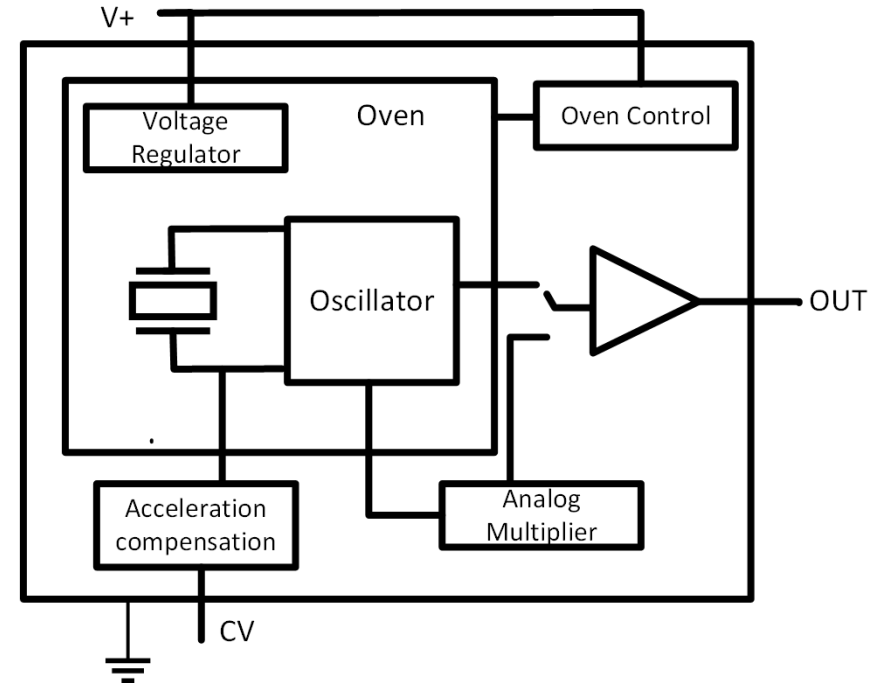
## Features:

- Low close in phase noise with excellent daily aging
- Target Market: Test and Measurement
- 10 MHz
- Standard Frequency: 10 MHz
- Output: Sine
- Footprint: 51 x 51 mm, through hole
- Supply Voltage: 12, 15 V
- Power: 2 W
- Temperature Range: -40 to 70 °C
- Phase Noise 10 Hz offset: -140 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -163 dBc/Hz @10 MHz carrier
- Temperature Stability over Operating Temperature Range: 5 ppb



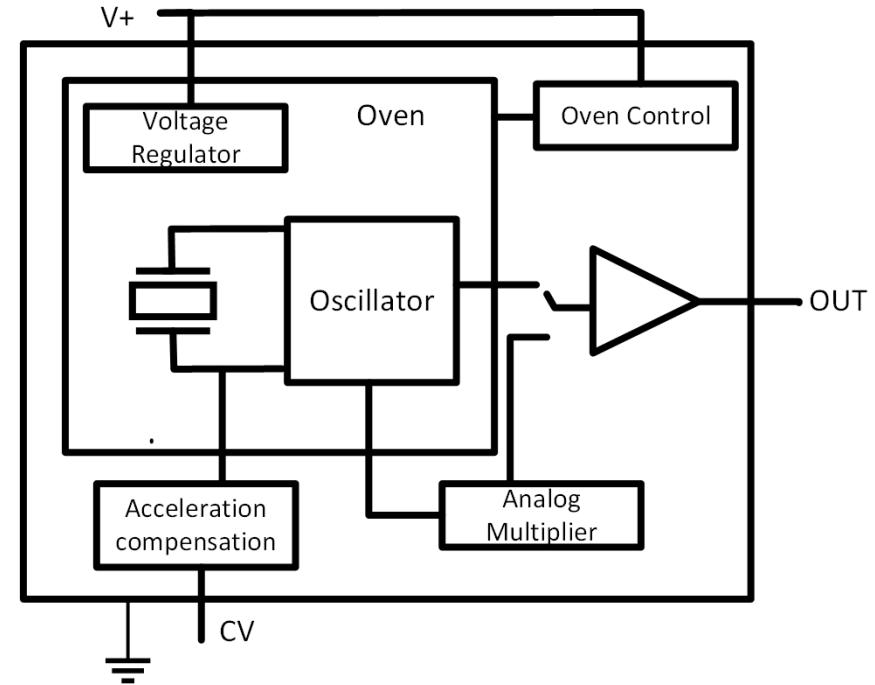
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -170 dBc/Hz @10 MHz carrier



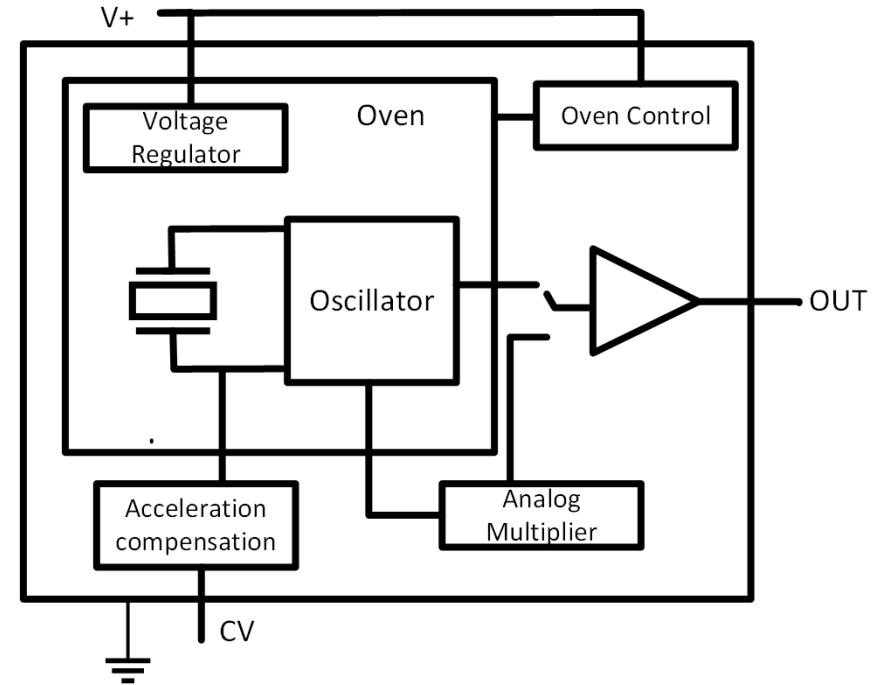
## Features:

- Low g, Low Phase Noise OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 50 to 250 MHz
- Output: Sine
- Footprint: 51 x 51 mm, chassis
- Supply Voltage: 12, 15 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.05 ppb/g
- Phase Noise 10 Hz offset: -100 dBc/Hz @100 MHz carrier
- Phase Noise 100 kHz offset: -175 dBc/Hz @100 MHz carrier



## Features:

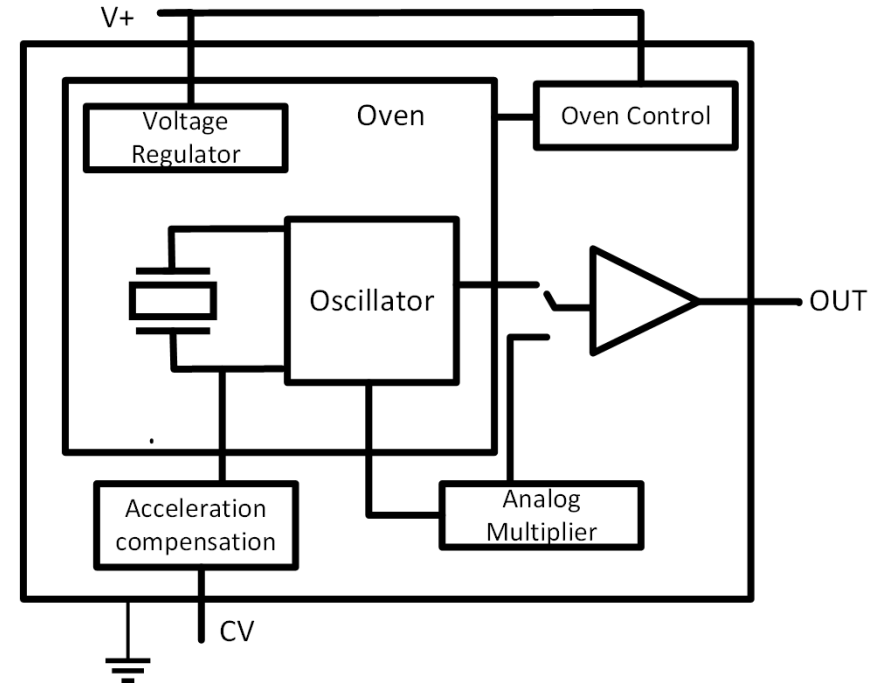
- **Low g, Low Phase Noise OCXO with active cancellation technology**
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Output: Sine
- Footprint: 52 x 71 mm, chassis
- Supply Voltage: 12 V
- Power: 5 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -135 dBc/Hz @ 10 MHz carrier
- Phase Noise 100 kHz offset: -170 dBc/Hz @ 10 MHz carrier





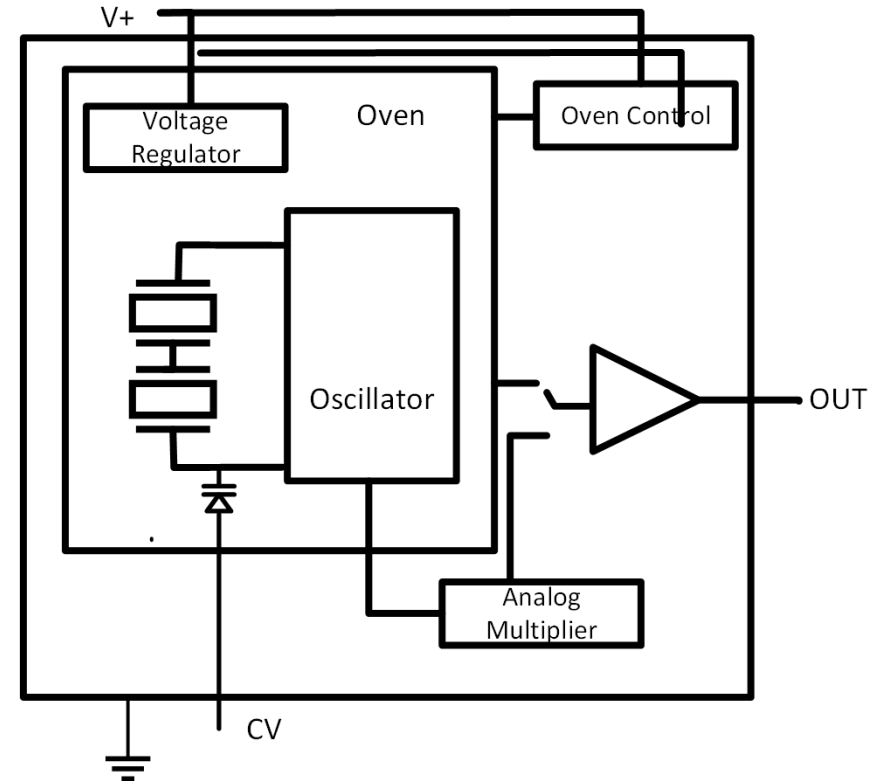
## Features:

- Smallest form factor Low g OCXO with active cancellation technology
- Target Market: Military
- Frequency Range: 8 to 15 MHz
- Output: Sine
- Footprint: 38 x 38 mm, chassis
- Supply Voltage: 12 V
- Power: 3 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.02 ppb/g
- Phase Noise 10 Hz offset: -127 dBc/Hz @10 MHz carrier
- Phase Noise 100 kHz offset: -165 dBc/Hz @10 MHz carrier



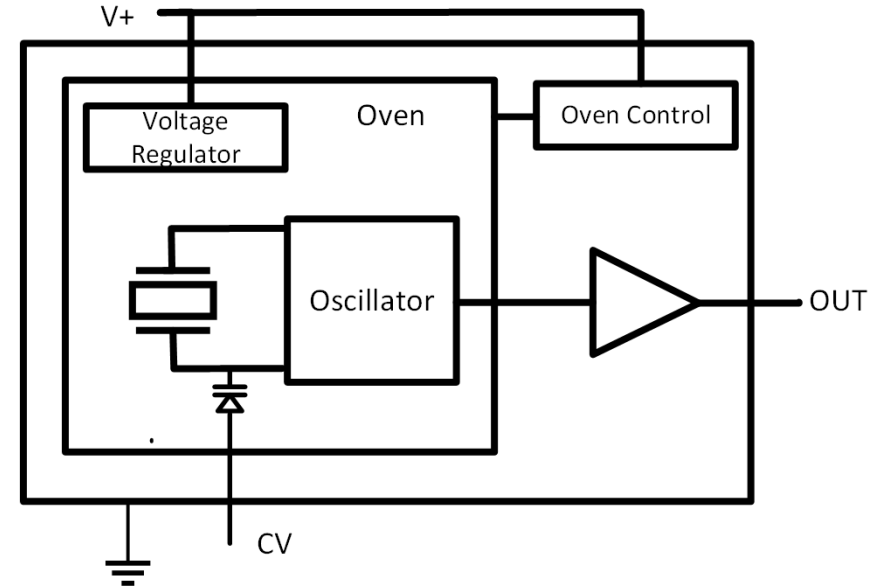
## Features:

- dual crystal, small form factor, low g OCXO
- Target Market: Military
- Frequency Range: 10 to 50 MHz
- Output: CMOS, Sine
- Footprint: 20 x 13 mm, through hole
- Supply Voltage: 3.3, 5 V
- Power: 1 W
- Temperature Range: -40 to 85 °C
- g-Sensitivity: 0.07 ppb/g
- Temperature stability over Operating Temperature Range: 100 ppb
- Phase Noise 10 Hz offset: -84 dBc/Hz @40 MHz carrier
- Phase Noise 100 kHz offset: -150 dBc/Hz @40 MHz carrier



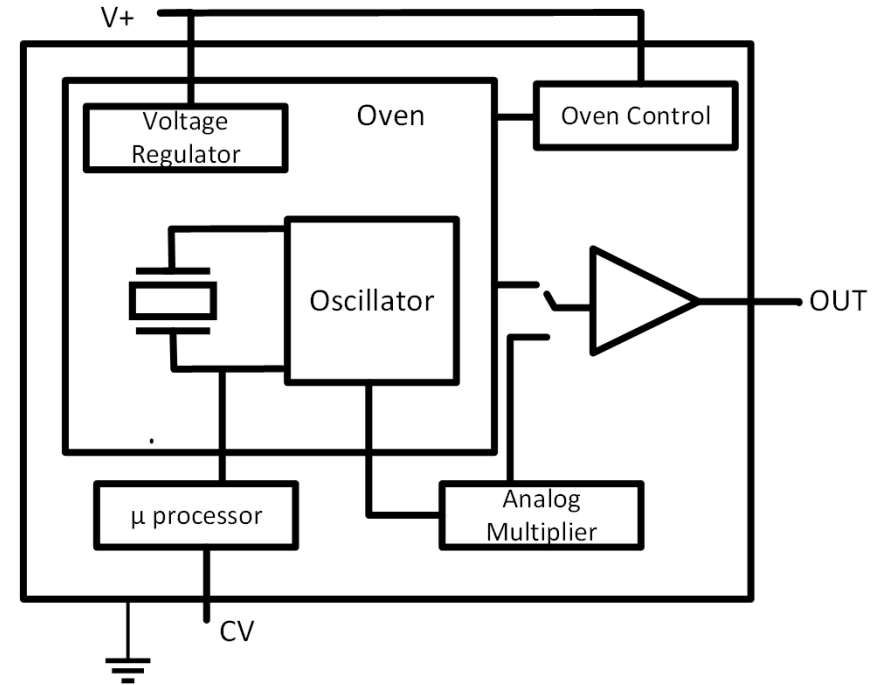
## Features:

- passive cancellation low g OCXO
- Target Market: Military
- Frequency Range: 60 to 120 MHz
- Output: Sine
- Footprint: 58 x 48 mm, chassis
- Supply Voltage: 15 V
- Power: 3 W
- 0.5 ppb/g
- Temperature Range: -40 to 85 °C



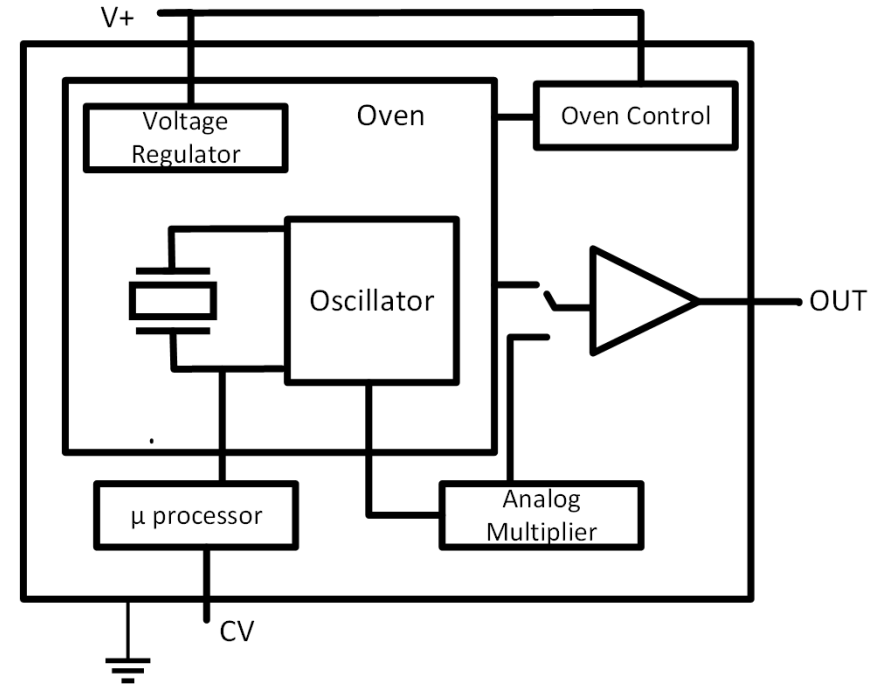
## Features:

- Microprocessor based temperature correction
- Frequency Range: 5 to 15 MHz
- Standard Frequencies: 5, 10 MHz
- Output: CMOS, Sine
- Footprint: 51 x 51 mm, through hole
- Supply Voltage: 5, 12 V
- Power: 2 W
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.6 ppb
- Aging per Day: 0.1 ppb



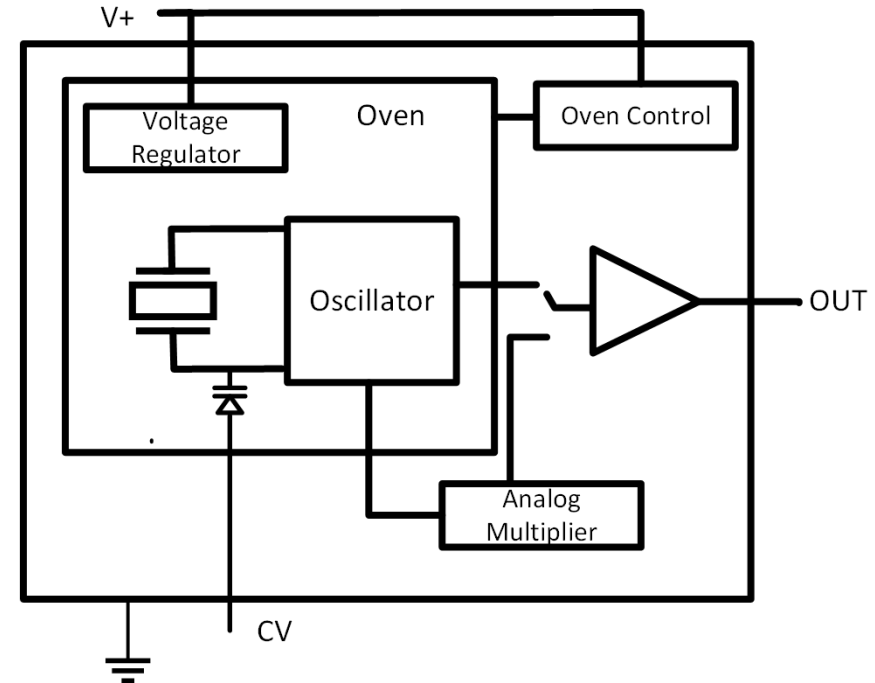
## Features:

- Microprocessor based temperature correction
- Frequency Range: 5 to 15 MHz
- Standard Frequencies: 5, 10 MHz
- Output: CMOS, Sine
- Footprint: 51 x 41 mm, through hole
- Supply Voltage: 5, 12 V
- Power: 2 W
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.6 ppb
- Aging per Day: 0.06 ppb



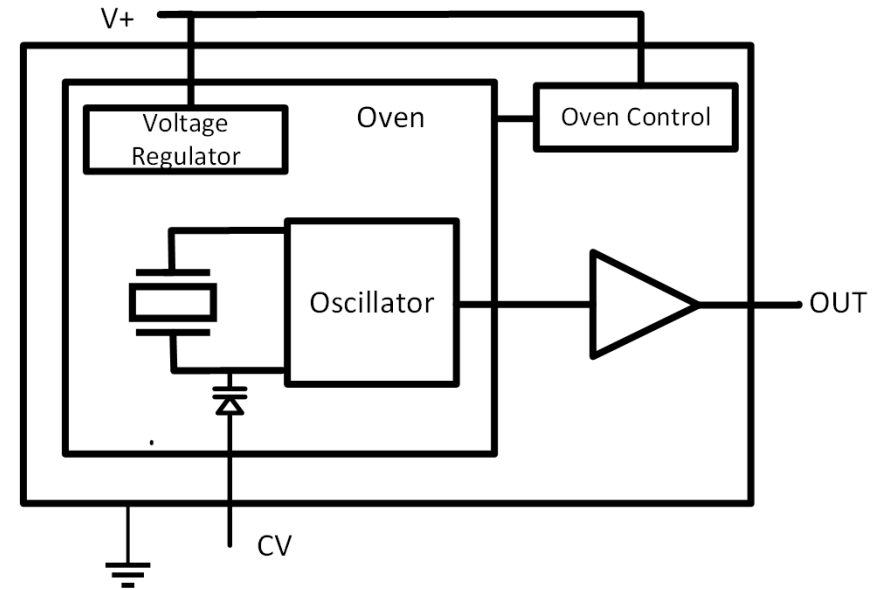
## Features:

- Highest Stability OCXO in portfolio
- Frequency Range: 5 to 20 MHz
- Standard Frequencies: 5, 10, 20 MHz
- Output: CMOS, Sine
- Footprint: 38 x 28 mm, through hole, surface mount
- Supply Voltage: 3.3, 5, 12 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 0.4 ppb
- Temperature stability -20 to 70°C: 0.6 ppb
- Temperature stability -40 to 85°C: 0.8 ppb
- Aging per Day: 0.06 ppb
- Aging per Year: 15 ppb
- ADEV @ 1 s tau: 5.00E-12 @10 MHz carrier



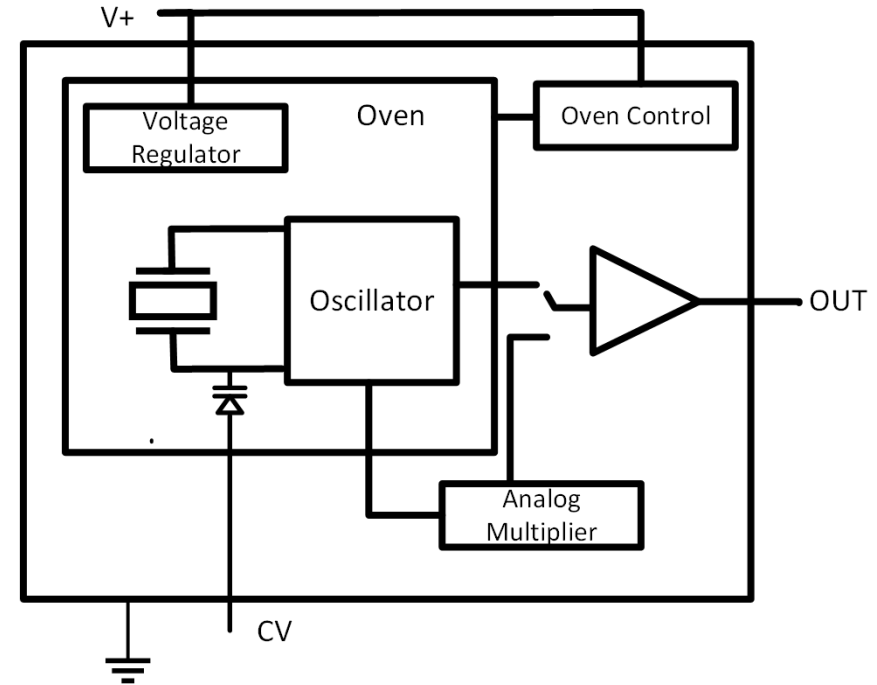
## Features:

- High Stability, 1x1 OCXO
- Frequency Range: 5 to 20 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Output: CMOS, Sine
- Footprint: 25 x 25 mm, through hole, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 2 W
- Temperature Range: -40 to 85 °C
- Temperature stability 0 to 70°C: 0.4 ppb
- Temperature stability -20 to 70°C: 0.6 ppb
- Temperature stability -40 to 85°C: 0.8 ppb
- Aging per Day: 0.15 ppb
- Aging per Year: 20 ppb
- ADEV @ 1 s tau: 5.00E-12 @10 MHz carrier



## Features:

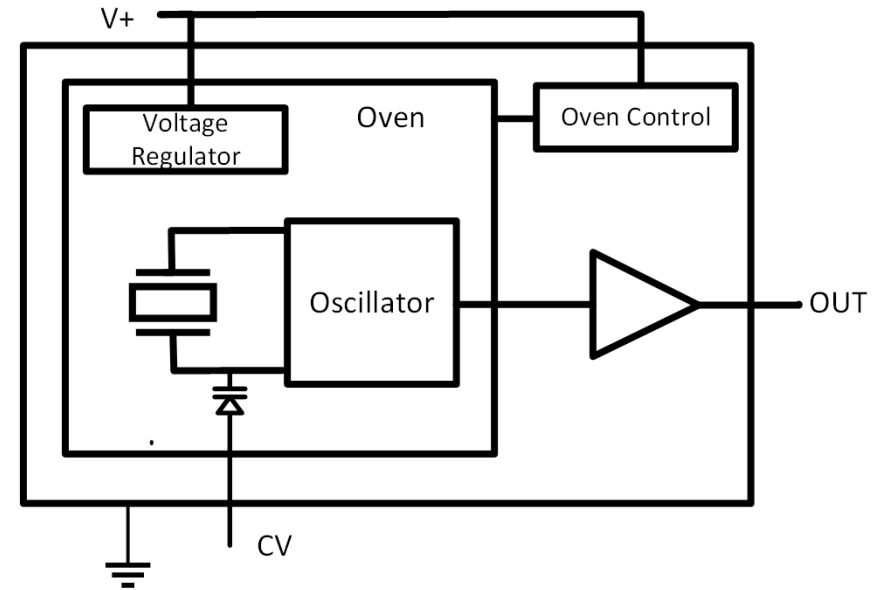
- **High stability 22x25 mm OXCO**
- Frequency Range: 10 to 30.72 MHz
- Standard Frequencies: 10, 20, 30.72 MHz
- Output: CMOS
- Footprint: 25 x 22 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 1.35 W
- Temperature Range: -40 to 85 °C
- Temperature stability -40 to 85°C: 3 ppb
- Aging per Day: 0.5 ppb
- Aging per Year: 60 ppb





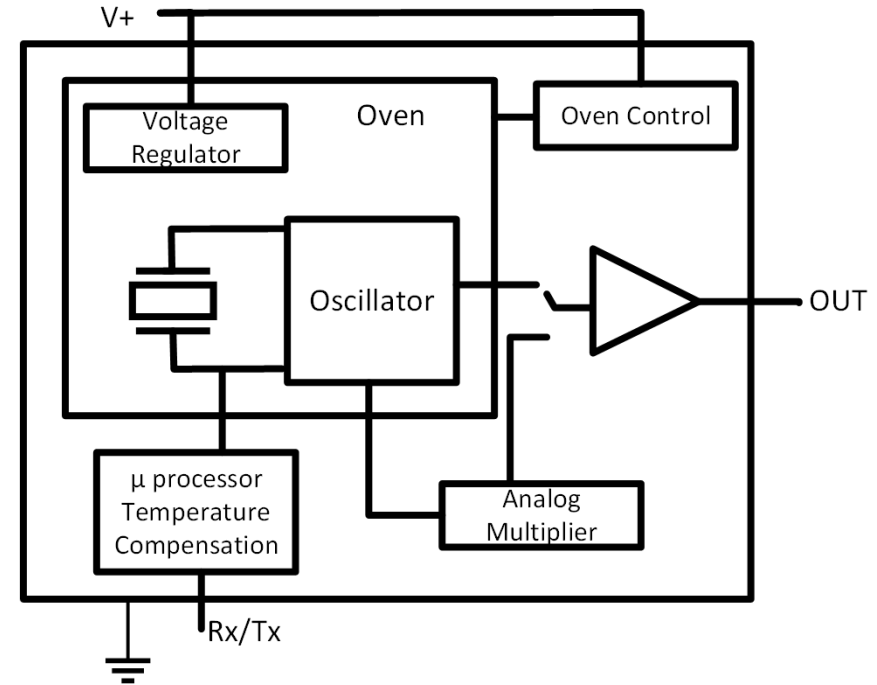
## Features:

- **High stability 22x25 mm OCXO**
- Frequency Range: 5 to 20 MHz
- Standard Frequencies: 5, 10, 20 MHz
- Output: CMOS
- Footprint: 25 x 22 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 1.35 W
- Temperature Range: -40 to 85 °C
- Temperature stability -40 to 85°C: 1 ppb
- Aging per Day: 0.1 ppb
- Aging per Year: 30 ppb



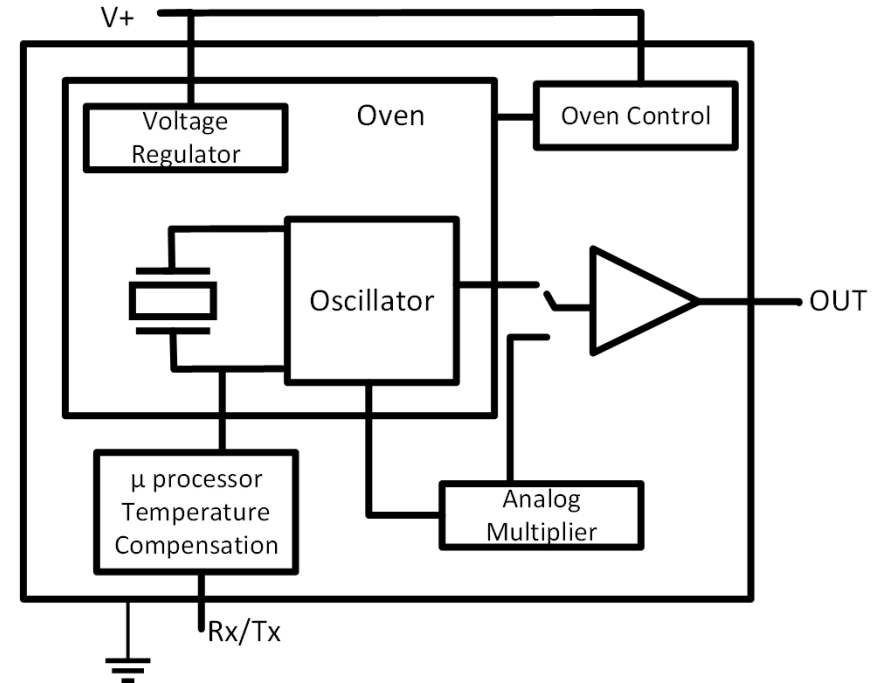
## Features:

- Serial interface provides frequency vs. temperature information
- Frequency Range: 10 to 20 MHz
- Standard Frequencies: 10, 20 MHz
- Output: CMOS
- Footprint: 25 x 22 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 3 ppb
- Aging per Day: 0.1 ppb
- Serial communications Interface



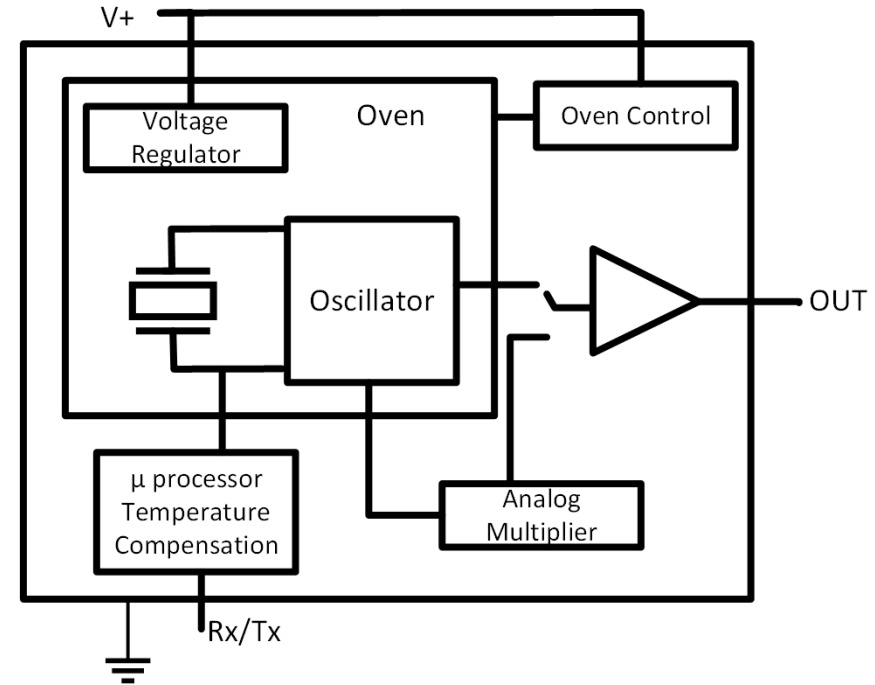
## Features:

- Serial interface provides frequency vs. temperature information
- Frequency Range: 10 to 30.72 MHz
- Output: CMOS
- Footprint: 25 x 22 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 3 ppb
- Aging per Day: 0.5 ppb
- Serial communications Interface



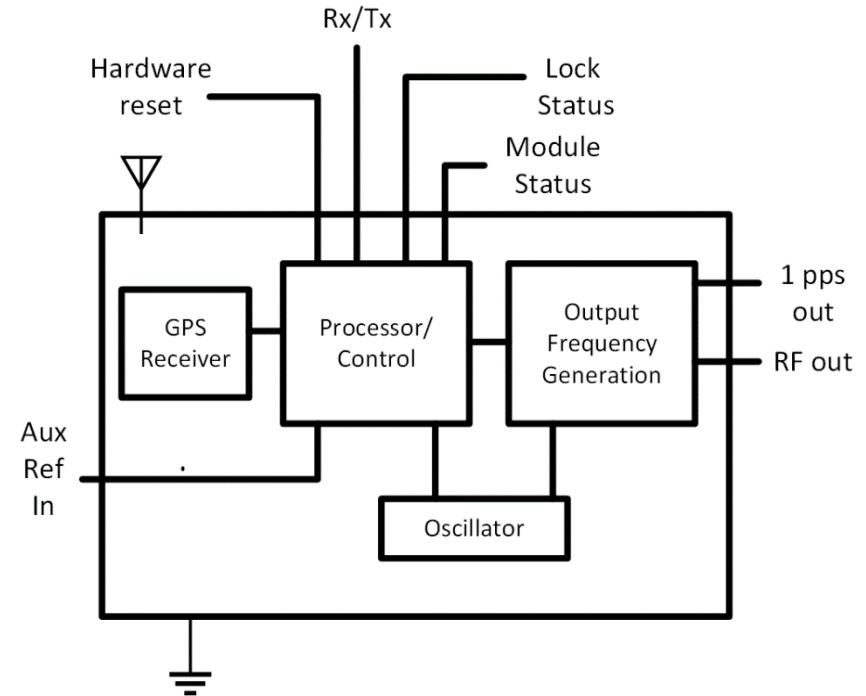
## Features:

- Serial interface provides frequency vs. temperature information
- Frequency Range: 5 to 20 MHz
- Standard Frequencies: 5, 10 MHz
- Output: CMOS, Sine
- Footprint: 38 x 28 mm, through hole, surface mount
- Supply Voltage: 5, 12 V
- Power: 1.8 W
- Temperature Range: -40 to 85 °C
- Temperature stability over Operating Temperature Range: 0.8 ppb
- Aging per Day: 0.06 ppb
- Serial communications Interface



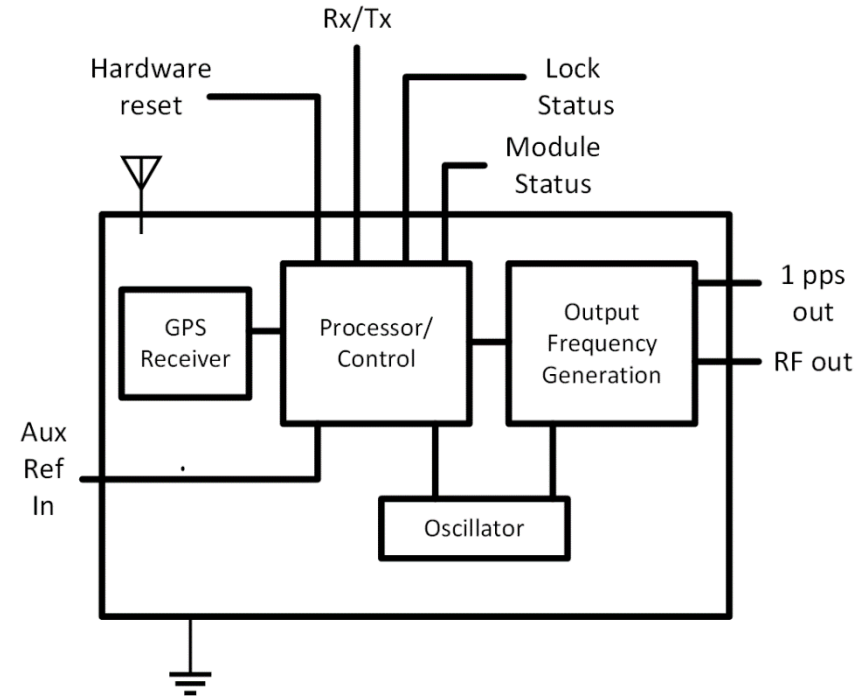
## Features:

- Smallest GPSDO on market
- Embedded OCXO
- Frequency Range: 5 to 40 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of PPS outputs: 1
- Output: CMOS
- Footprint: 25 x 20 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 330 mW
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- Embedded GPS Receiver
- GNSS Signal Types: GPS, GLONASS, QZSS, WAAS, MSAS, EGNOS, GAGAN
- 1.5 us holdover for 1.4 hours at constant temperature
- 400 us holdover for 24 hours at constant temperature



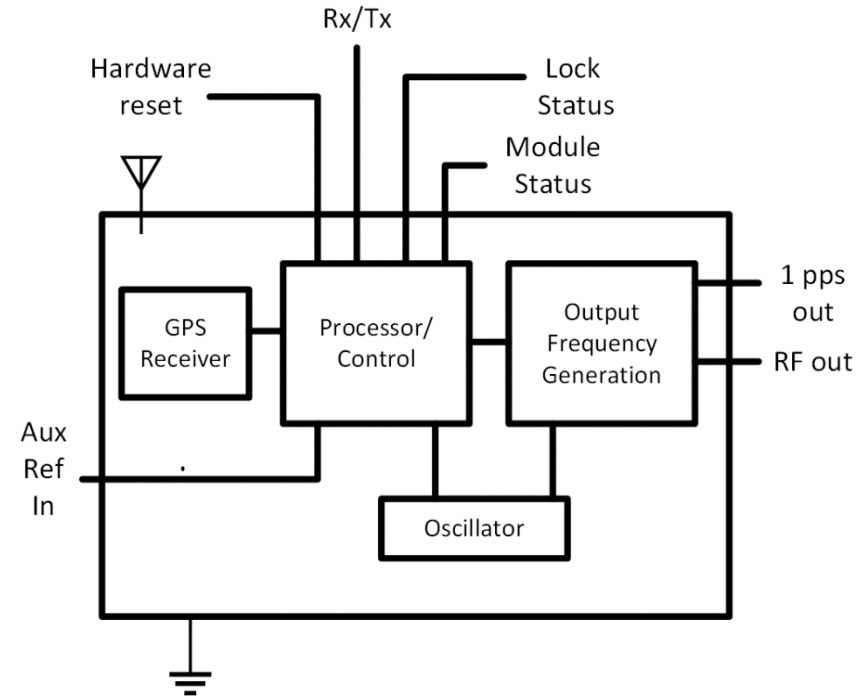
## Features:

- Smallest GPSDO on market
- Embedded TCXO
- Frequency Range: 5 to 40 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of PPS outputs: 1
- Output: CMOS
- Footprint: 25 x 20 mm, surface mount
- Supply Voltage: 3.3 V
- Power: 1.5 W
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- Embedded GPS Receiver
- GNSS Signal Types: GPS, GLONASS, QZSS, WAAS, MSAS, EGNOS, GAGAN
- 1.5 us holdover for 10 hours at constant temperature
- 8 us holdover for 24 hours at constant temperature



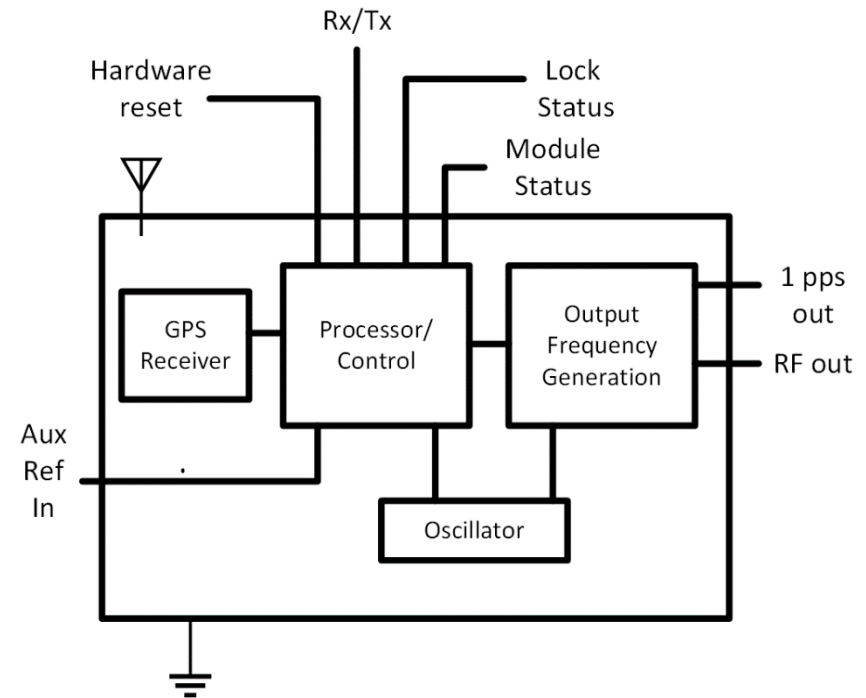
## Features:

- **Ultrastable PPSDO with embedded high stability OCXO**
- **Barometric Pressure Correction**
- **Aging Correction**
- Frequency Range: 5 to 120 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of RF outputs: 2
- Number of PPS outputs: 2
- Output: CMOS, Sine
- Footprint: 114 x 60 mm, chassis
- Supply Voltage: 12 V
- Power: 3.6 W
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- GNSS Signal Types: GPS, GLONASS, Galileo, QZSS, SBAS
- 1.5 us holdover for 24 hours at constant temperature
- 1.5 us holdover for 24 hours at constant temperature



## Features:

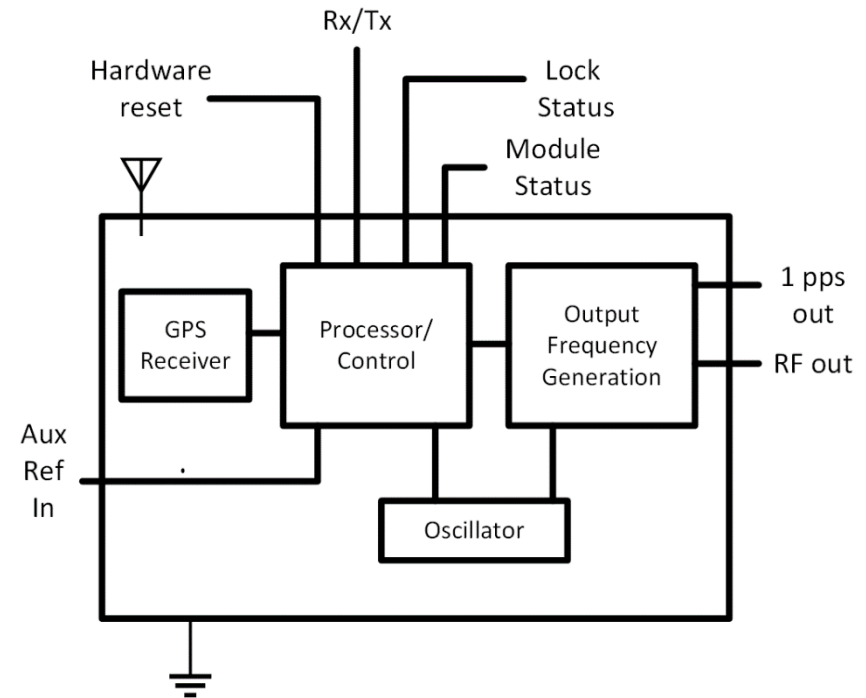
- **Ultrastable GNSSDO with embedded high stability OCXO**
- **Barometric Pressure Correction**
- **Aging Correction**
- Frequency Range: 5 to 120 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of PPS outputs: 1
- Output: CMOS, Sine
- Footprint: 50 x 40 mm, surface mount
- Supply Voltage: 5 V
- Power: 2 W
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- Embedded GPS Receiver
- GNSS Signal Types: GPS, GLONASS, Galileo, QZSS, SBAS
- 1.5 us holdover for 18 hours at constant temperature
- 2.5 us holdover for 24 hours at constant temperature





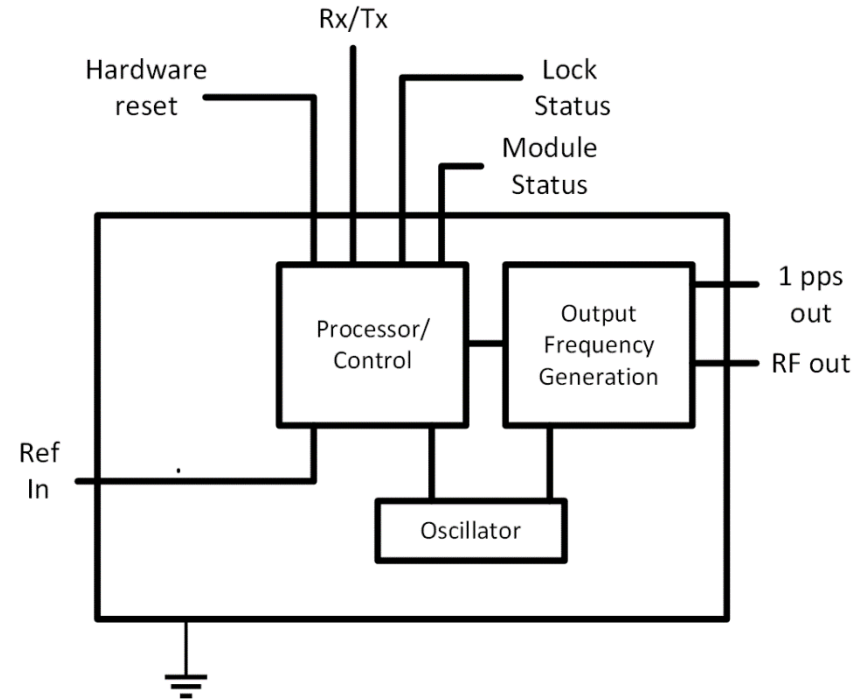
## Features:

- **GNSS time accuracy with Ultra low noise performance**
- Frequency Range: 5 to 120 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of PPS outputs: 1
- Output: Sine
- Footprint: 50 x 40 mm, surface mount
- Supply Voltage: 5 V
- Power: 2 W
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- Embedded GPS Receiver
- GNSS Signal Types: GPS, GLONASS, Galileo, QZSS, SBAS
- 1.5 us holdover for 9 hours at constant temperature
- Phase Noise 10 Hz offset: -135 dBc/Hz @ 10 MHz carrier
- Phase Noise 1 MHz offset: -170 dBc/Hz @ 10MHz carrier



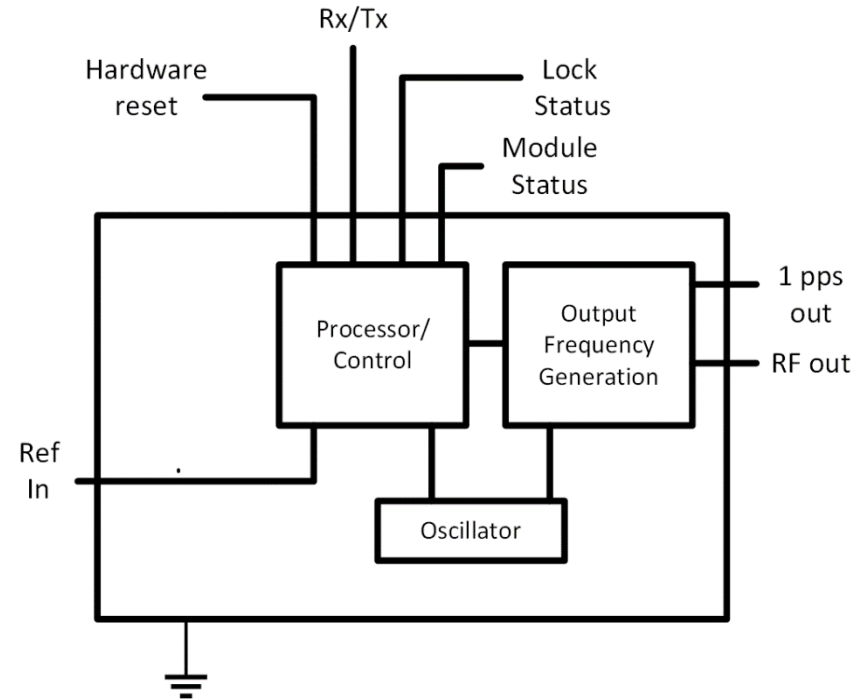
## Features:

- **Ultrastable GNSSDO with embedded high stability OCXO**
- **Barometric Pressure Correction**
- **Aging Correction**
- Frequency Range: 5 to 120 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of RF outputs: 2
- Number of PPS outputs: 2
- Output: CMOS, Sine
- Footprint: 114 x 60 mm, chassis
- Supply Voltage: 12 V
- Power: 3.6 W
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- 1.5 us holdover for 24 hours at constant temperature
- 1.5 us holdover for 24 hours at constant temperature



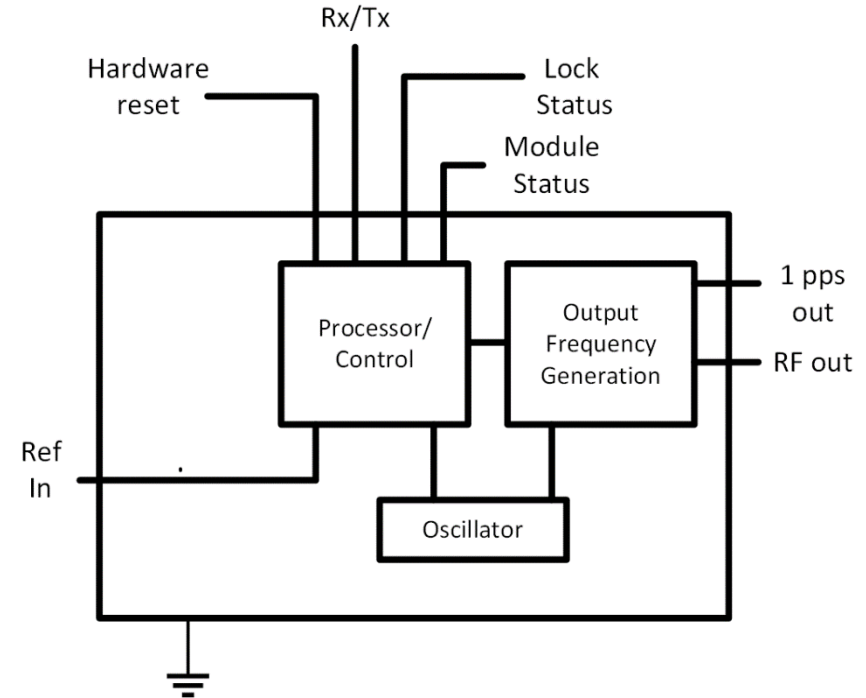
## Features:

- **Ultrastable PPSDO with embedded high stability OCXO**
- **Barometric Pressure Correction**
- **Aging Correction**
- Frequency Range: 5 to 120 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of PPS outputs: 1
- Output: CMOS, Sine
- Footprint: 50 x 40 mm, surface mount
- Supply Voltage: 5 V
- Power: 2 W
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- 1.5 us holdover for 18 hours at constant temperature
- 2.5 us holdover for 24 hours at constant temperature



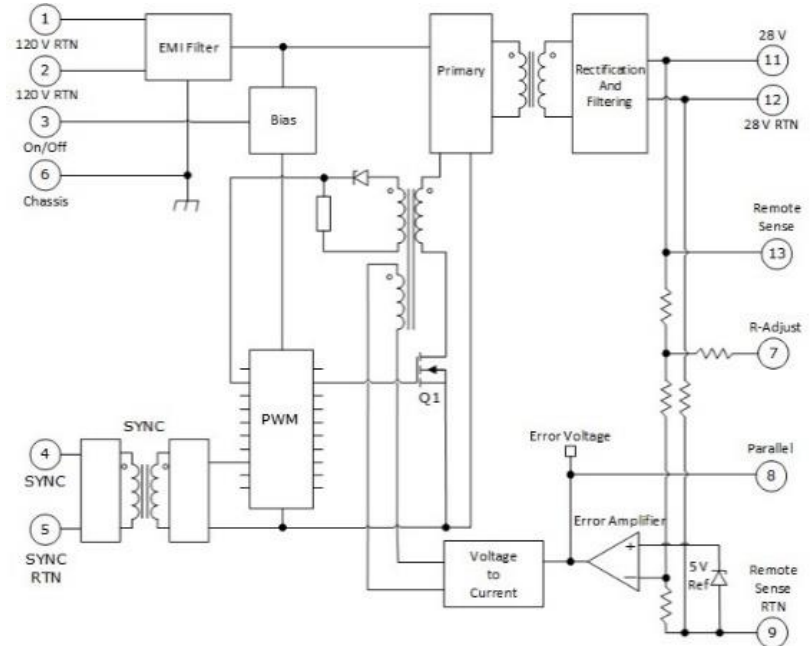
## Features:

- **PPS time accuracy with Ultra low noise performance**
- Frequency Range: 5 to 120 MHz
- 10 MHz
- Standard Frequency: 10 MHz
- Number of PPS outputs: 1
- Output: Sine
- Footprint: 50 x 40 mm, surface mount
- Supply Voltage: 5 V
- Power: 2 W
- Temperature Range: -40 to 85 °C
- Auxiliary PPS Input
- 1.5 us holdover for 9 hours at constant temperature
- Phase Noise 10 Hz offset: -135 dBc/Hz @10 MHz carrier
- Phase Noise 1 MHz offset: -170 dBc/Hz @10MHz carrier



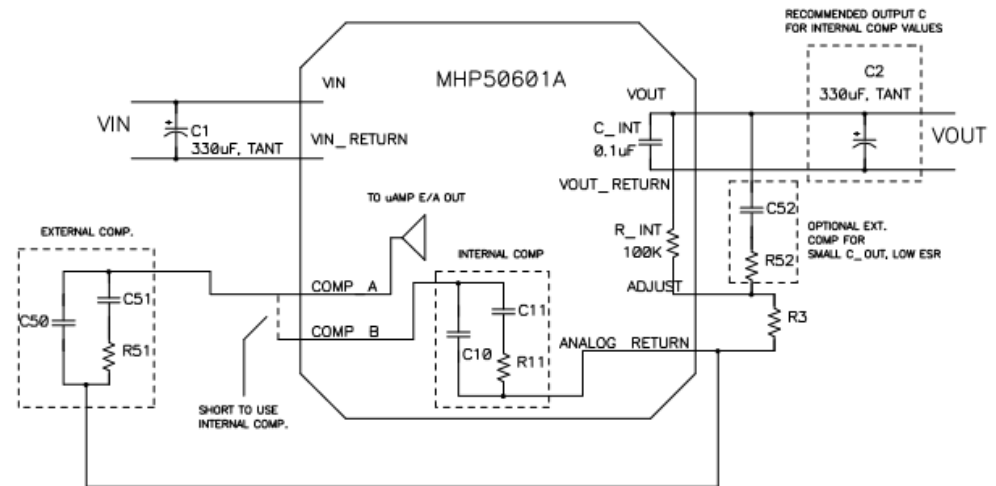
**Features:**

- 120 Vin (86Vdc-156Vdc), with internal EMI filter, 28Vin (In Development)
- Triple, dual, and single output versions (20+ catalog options)
- Isolated outputs
- 50 W total combined power output
- Inhibit, remote sense, and remote adjust
- Isolated sync input, 600 kHz
- Less than 1% accuracy over temp and radiation
- >86% efficient full load at 5 ±15 V output (T version)
- 3.055" L x 2.055" W x 0.50" H envelope
- Total dose rating of 100 krad(Si) at LDR
- SEE (all effects) >80 MeV-cm<sup>2</sup>/mg (H version)
- Thermal resistance= 0.041 °C in<sup>2</sup>/W (measured at 55 °C)
- NASA outgassing compliant: (TML)= 1% max,(CVCM)= 0.1% max



## Features:

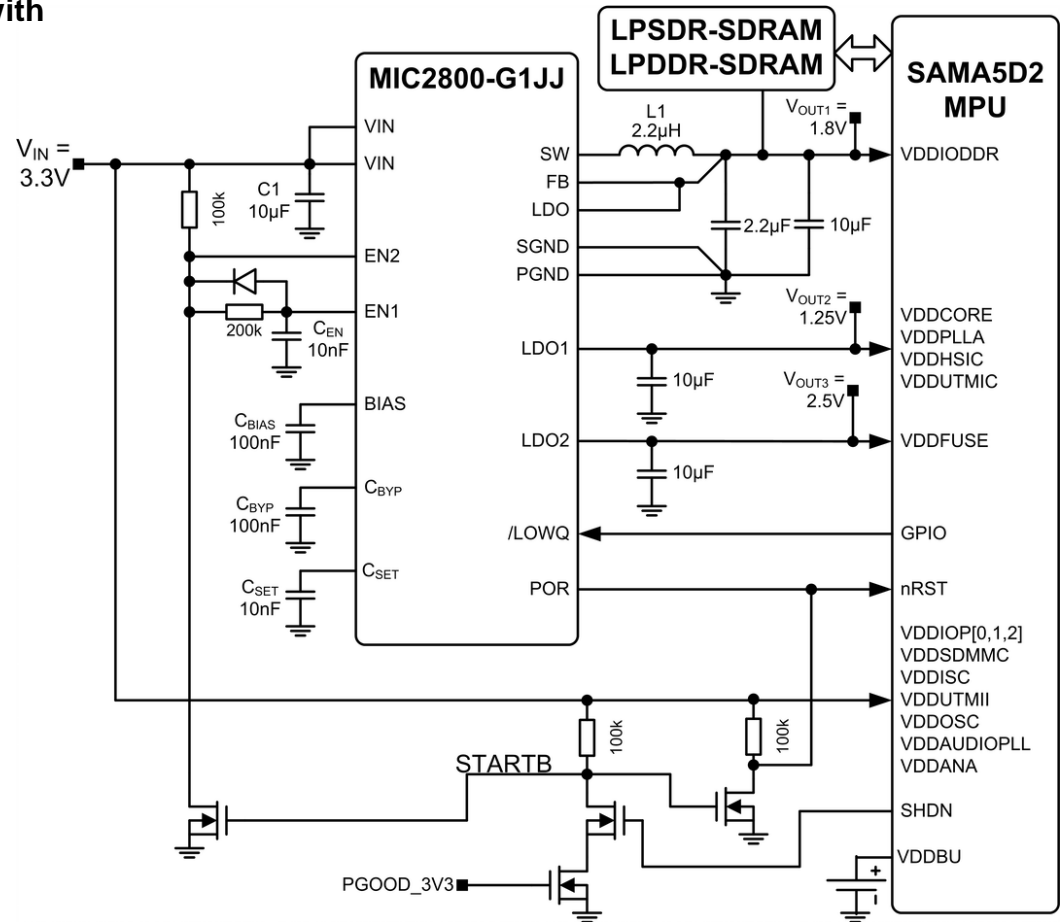
- $V_{in} = 3\text{ V to }7\text{ V}$  (7.5V in Absolute Max)
- Internal reference (0.8 V)
- Adjustable frequency 300 kHz to 500kHz
- Parallel operation  $180^\circ$  out of  $\Phi$  with sync pin
- Internal VREF 1.5% variation over temp and radiation
- Ultra-fast transient response to lower output impedance
- Integrated design ( $C_{in}$ ,  $C_{out}$ , and  $L_{switch}$ )
- Internal or optional external compensation and soft-start
- External enable or Under-voltage Lockout
- Output power good
- 96% peak efficiency



# SAMA5D2 LPDDR 1.8V, VIN 3.3V

## MIC2800 - 600mA Buck + Dual 300mA LDO with LowQ<sup>®</sup> Mode

- 2.7V to 5.5V input voltage range
- Integrated power-on reset with adjustable delay
- 30µA Total IQ when in LowQ<sup>®</sup> mode
- Thermal Shutdown Protection
- Current Limit Protection
- **Buck regulator**
  - Output current to 600mA in PWM mode
  - 75µVRMS output noise in LowQ<sup>®</sup> mode
  - 2 MHz PWM operation in normal mode
  - >90% efficiency
- **LDOs**
  - 300mA output current
  - Output voltage down to 0.8V
- 16p-QFN 3mm x 3mm

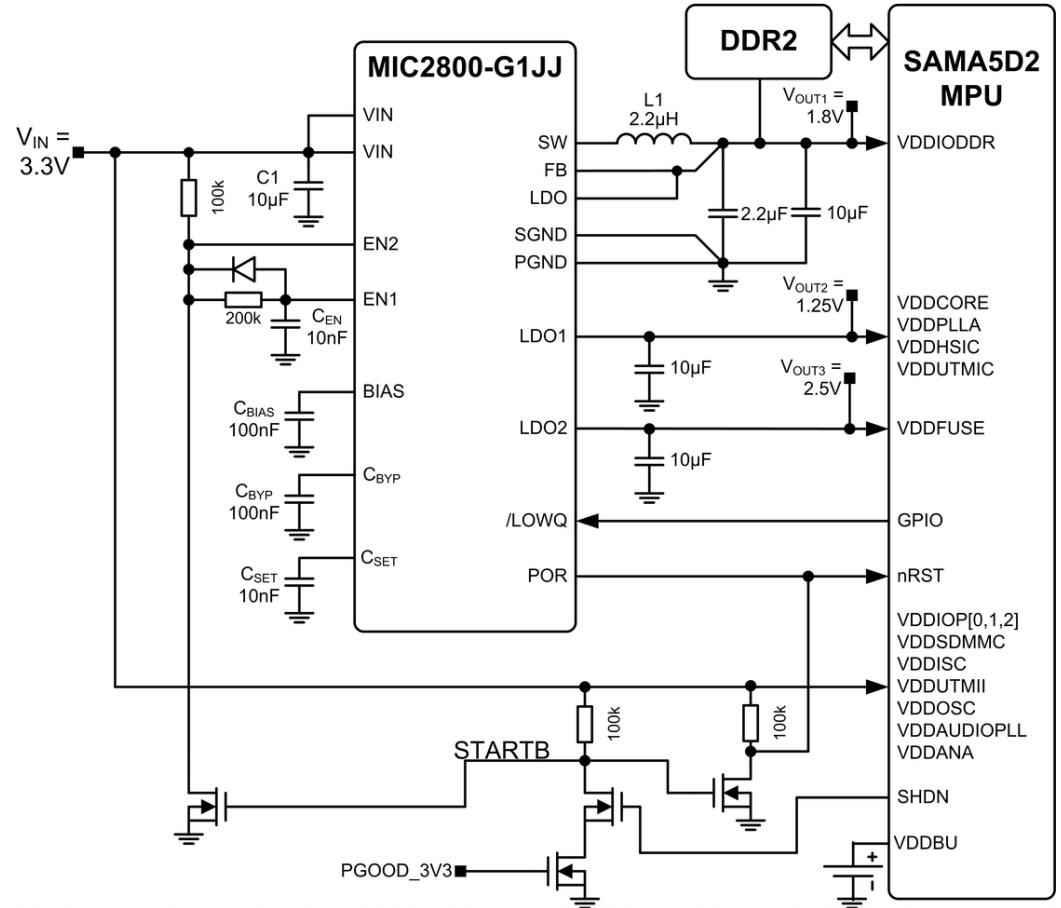


# SAMA5D2

## DDR2 1.8V, VIN 3.3V

### MIC2800 - 600mA Buck + Dual 300mA LDO with LowQ<sup>®</sup> Mode

- 2.7V to 5.5V input voltage range
- Integrated power-on reset with adjustable delay
- 30µA Total IQ when in LowQ<sup>®</sup> mode
- Thermal Shutdown Protection
- Current Limit Protection
- **Buck regulator**
  - Output current to 600mA in PWM mode
  - 75µVRMS output noise in LowQ<sup>®</sup> mode
  - 2 MHz PWM operation in normal mode
  - >90% efficiency
- **LDOs**
  - 300mA output current
  - Output voltage down to 0.8V
- 16p-QFN 3mm x 3mm





# SAMA5D2

## LPDDR2 1.8V, VIN 3.3V

### MIC2230 – Fast Transient, High Efficiency Dual 800mA Buck

- Input Voltage Range : 2.5V to 5.5V
- Adjustable Output Voltage : 0.8V to 5.5V
- High Efficiency: Upto 96% || Ultra-low 28 $\mu$ A I<sub>Q</sub>
- 2.5MHz PWM operation || Power good output
- 12L-TDFN 3mm x 3mm

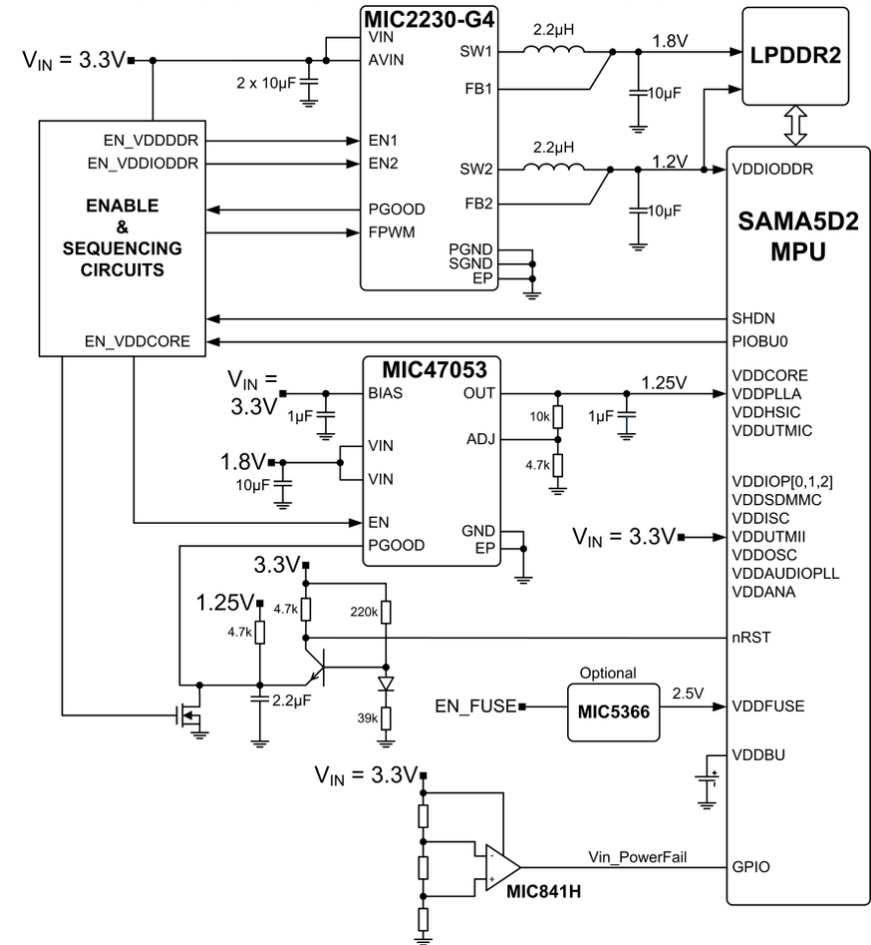
### MIC47053 - Micropower Ultra-Low Dropout Linear Regulator

- Voltage range: 1.0V to 3.6V (Input) || 2.3V to 5.5V (Bias)
- Low dropout voltage: 49mV at 500mA
- $\pm 2\%$  initial output voltage accuracy over temperature
- Adjustable output voltage range down to 0.4V
- 8p-TDFN 2mm x 2mm

### MIC841N – uPower Precision Comparator

- 1.5V to 5.5V operating range
- 1.5 $\mu$ A typical supply current || 10nA max input leakage
- $\pm 1.25\%$  voltage threshold accuracy || Adjustable hysteresis
- 6p-TDFN 1.6mm x 1.6mm

### MIC5366 - 150mA LDO w/ Auto Discharge (optional)



# SAMA5D2

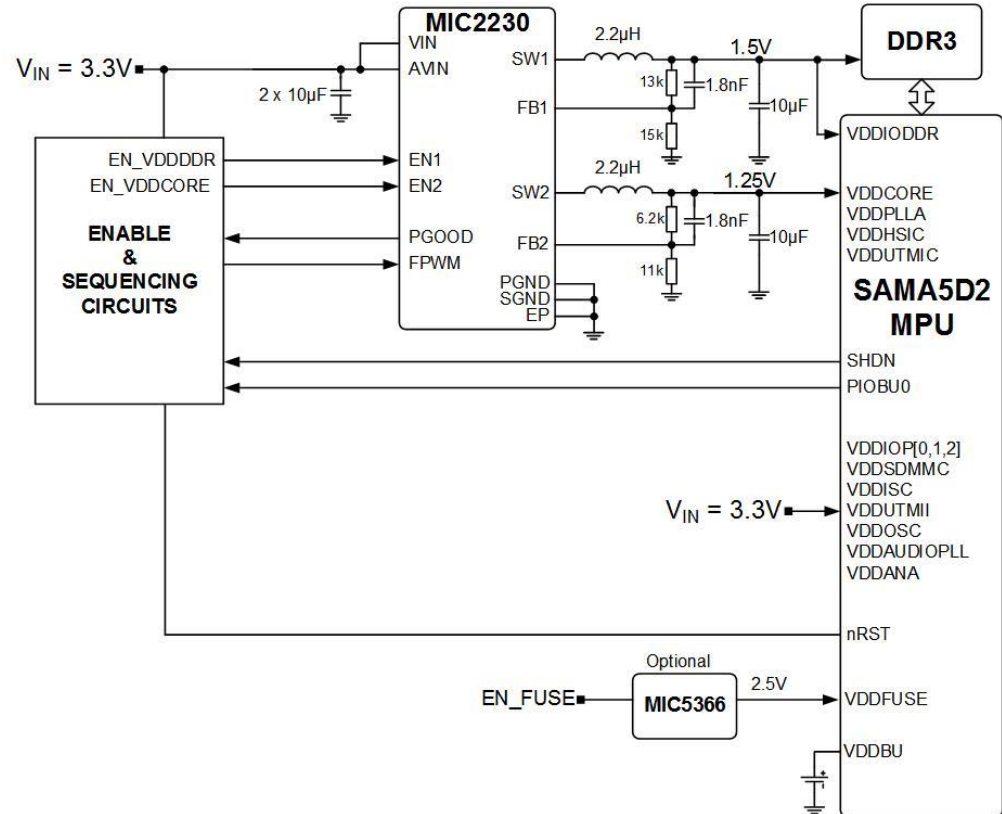
## DDR3 1.5V, VIN 3.3V

### MIC2230 – High Efficiency Dual 800mA Buck

- Input Voltage Range : 2.5V to 5.5V
- Adjustable Output Voltage : 0.8V to 5.5V
- High Efficiency: Upto 96% || Ultra-low 28 $\mu$ A  $I_Q$
- 2.5MHz PWM operation
- Power good output with internal 5 $\mu$ A current source allows sequencing with programmable delay time
- 12L-TDFN 3mm x 3mm

### MIC5366 - 150mA LDO w/ Auto Discharge (optional)

- Input voltage range: 2.5V to 5.5V
- Low dropout voltage: 180mV at 150mA
- Excellent Load/Line Transient Response
- Low quiescent current: 32 $\mu$ A
- High PSRR: 70dB
- Output discharge circuit
- High output accuracy:  $\pm 2\%$  initial accuracy
- Thermal shutdown || current limit protection
- 4p-TMLF 1mm x 1mm || SC-70-5 || 5p-TSOT23

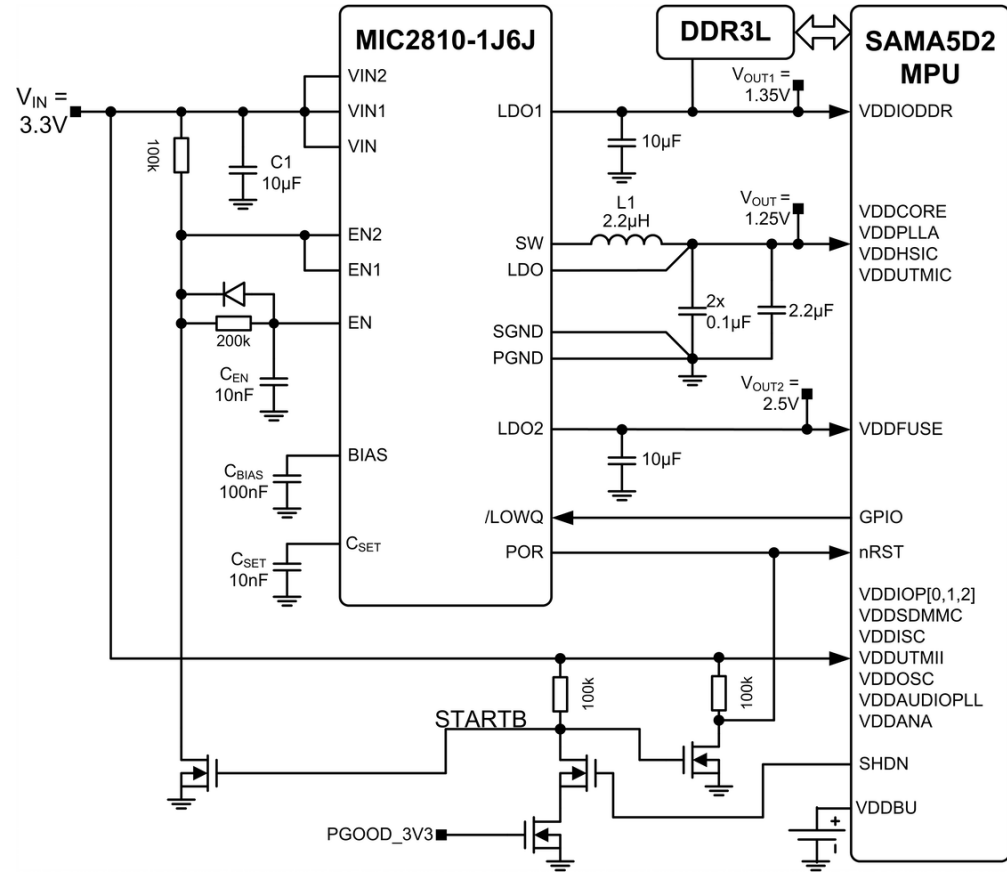


# SAMA5D2

## DDR3L 1.35V, VIN 3.3V

### MIC2810 - 600mA Buck + Dual 300mA LDO with LowQ<sup>®</sup> Mode

- 2.7V to 5.5V input voltage range
- Integrated power-on reset with adjustable delay
- 30 $\mu$ A Total IQ when in LowQ<sup>®</sup> mode
- Thermal Shutdown Protection
- Current Limit Protection
- **Buck regulator**
  - Output current to 600mA in PWM mode
  - 53 $\mu$ V<sub>RMS</sub> output noise in LowQ<sup>®</sup> mode
  - 2 MHz PWM operation in normal mode
  - >90% efficiency
- **LDOs**
  - 1.65V to 5.5V input voltage range (LDO1)
  - 2.7V to 5.5V input voltage range (LDO2)
  - 300mA output current
  - Output voltage down to 0.8V
- 16p-QFN 3mm x 3mm



# SAMA5D2 LPDDR2 1.8V, VIN 5V

## MCP16502 – High Performance PMIC for SAMA5DX/SAM9X6 MPUs

- Input Voltage Range : 2.7V to 5.5V
- 4x 1A DC-DC Buck regulators, 2x 300mA LDOs integrated
- < 300  $\mu$ A low-power mode typical quiescent current
- MPU-compatible default channel sequencing & nRSTO assertion delay
- Low-noise forced-PWM & light-load high-efficiency mode available
- I<sup>2</sup>C interface for programming and diagnostics
- Multimode operation and Dynamic Voltage Scaling
- Thermal-shutdown and current-limit protection
- User-programmable overcurrent response behavior
- 32-pin 5mm x 5mm VQFN package
- -40°C to +125°C junction temperature range

## MIC841N – $\mu$ Power Precision Comparator

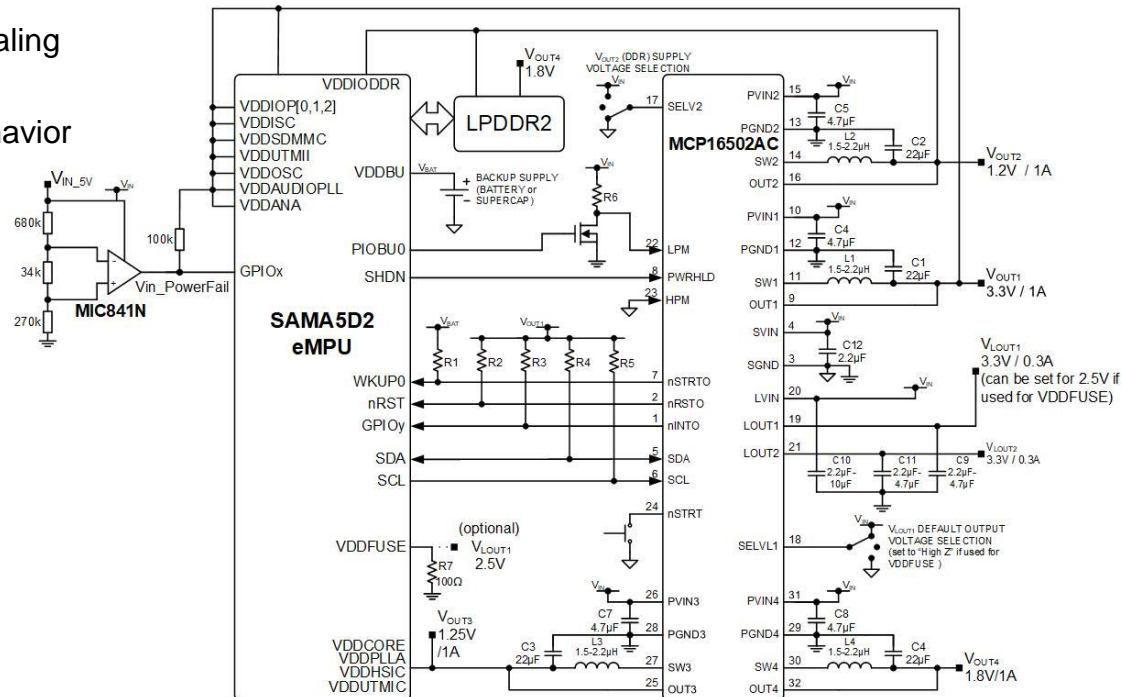
- 1.5V to 5.5V operating range
- 1.5 $\mu$ A typical supply current
- Externally adjustable hysteresis
- 6p-TDFN 1.6mm x 1.6mm

## Alternate Power Solution

MIC2230 + MIC841

MCP16502

MIC841



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# SAMA5D2

## LPDDR2 1.8V, VIN 5V

### MIC2230 – Fast Transient, High Efficiency Dual 800mA Buck

- Input Voltage Range : 2.5V to 5.5V
- Adjustable Output Voltage : 0.8V to 5.5V
- High Efficiency: Upto 96% || Ultra-low 28 $\mu$ A I<sub>Q</sub>
- 2.5MHz PWM operation
- Power good output with internal 5 $\mu$ A current source allows sequencing with programmable delay time
- 12L-TDFN 3mm x 3mm

### MIC841N – $\mu$ Power Precision Comparator

- 1.5V to 5.5V operating range
- 1.5 $\mu$ A typical supply current || 10nA max input leakage
- $\pm$ 1.25% voltage threshold accuracy
- Externally adjustable hysteresis
- 6p-TDFN 1.6mm x 1.6mm

### MIC5366 - 150mA LDO w/ Auto Discharge (optional)

### Recommended Power Solution

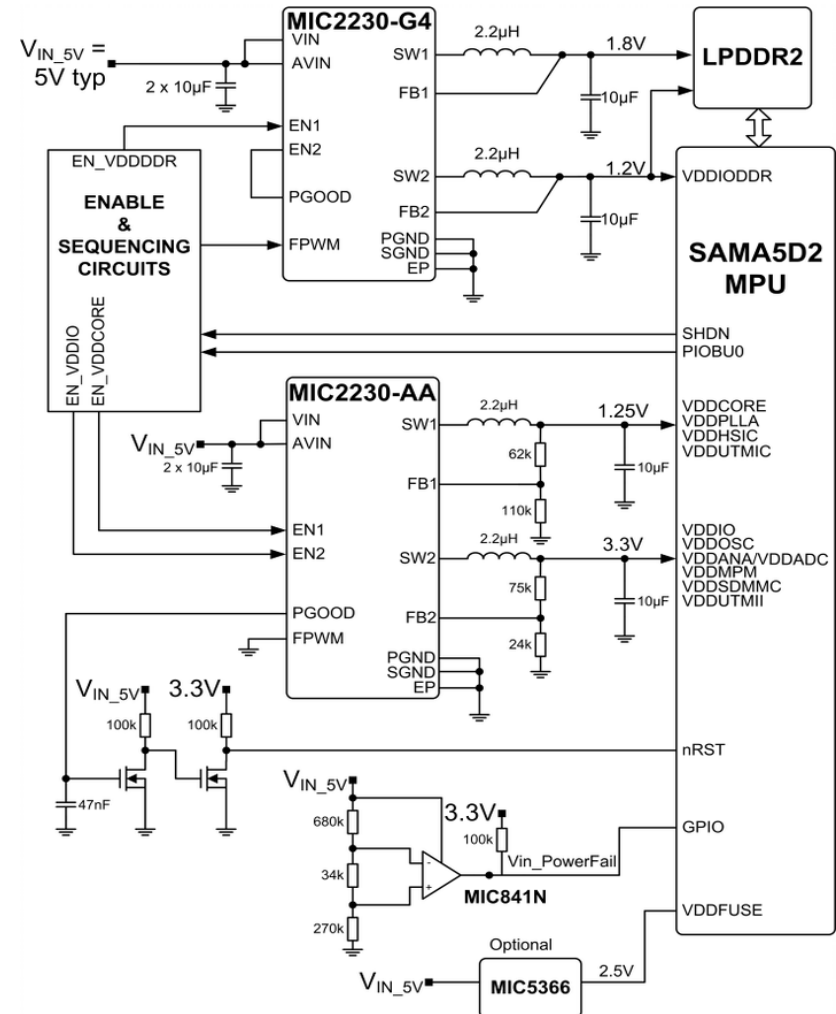
**MCP16502 + MIC841**

**MIC2230**

**MIC841**

**MIC5366 (optional)**

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# SAMA5D2

## DDR2 1.8V, VIN 5V

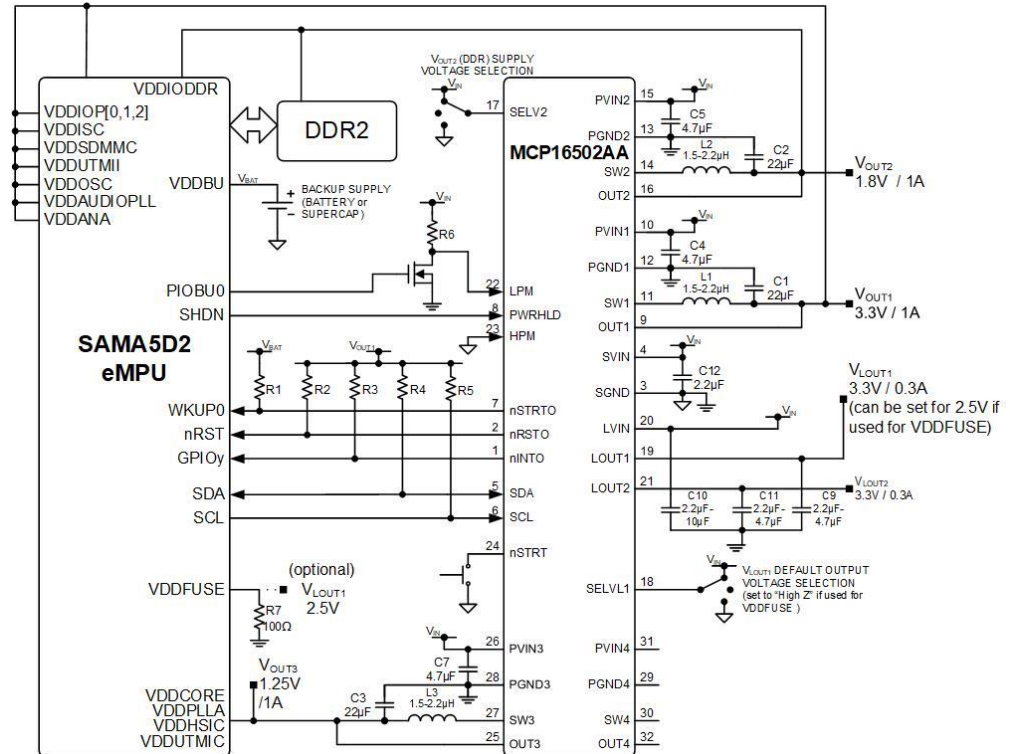
### MCP16502 – High Performance PMIC for SAMA5DX/SAM9X6 MPUs

- Input Voltage Range : 2.7V to 5.5V
- 4x 1A DC-DC Buck regulators, 2x 300mA LDOs integrated
- < 300  $\mu$ A low-power mode typical quiescent current
- MPU-compatible default channel sequencing & nRSTO assertion delay
- Low-noise forced-PWM & light-load high-efficiency mode available
- I<sup>2</sup>C interface for programming and diagnostics
- Multimode operation and Dynamic Voltage Scaling
- Thermal-shutdown and current-limit protection
- User-programmable overcurrent response behavior
- 32-pin 5mm  $\times$  5mm VQFN package
- -40°C to +125°C junction temperature range

### Alternate Power Solution

**MIC2800**

**MCP16502**



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# SAMA5D2 DDR2 1.8V, VIN 5V

## MIC2800 - 600mA Buck + Dual 300mA LDO with LowQ<sup>®</sup> Mode

- 2.7V to 5.5V input voltage range
- Integrated power-on reset with adjustable delay
- 30µA Total IQ when in LowQ<sup>®</sup> mode
- Thermal Shutdown Protection
- Current Limit Protection
- **Buck regulator**
  - Output current to 600mA in PWM mode
  - 75µVRMS output noise in LowQ<sup>®</sup> mode
  - 2 MHz PWM operation in normal mode
  - >90% efficiency
- **LDOs**
  - 300mA output current
  - Output voltage down to 0.8V
- 16p-QFN 3mm x 3mm

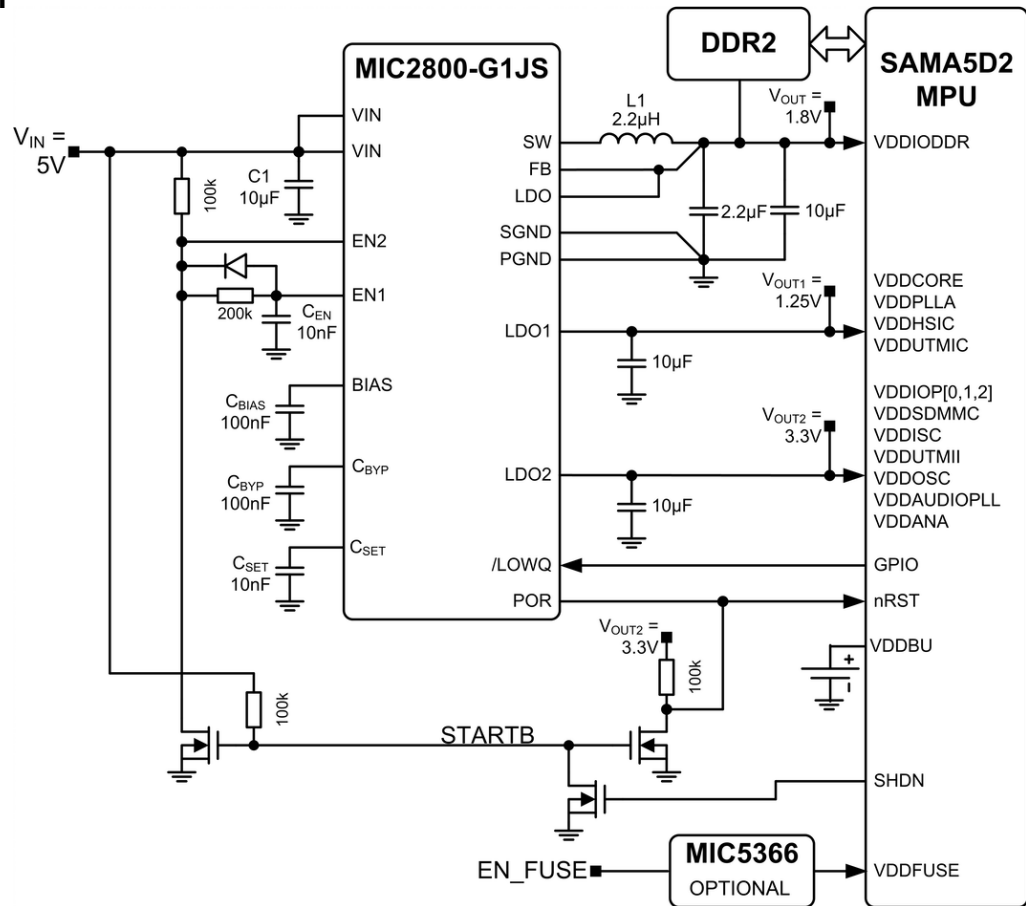
## MIC5366 - 150mA LDO w/ Auto Discharge (optional)

### Recommended Power Solution

MCP16502

MIC2800

MIC5366 (optional)



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# SAMA5D2

## DDR3 1.5V, VIN 5V

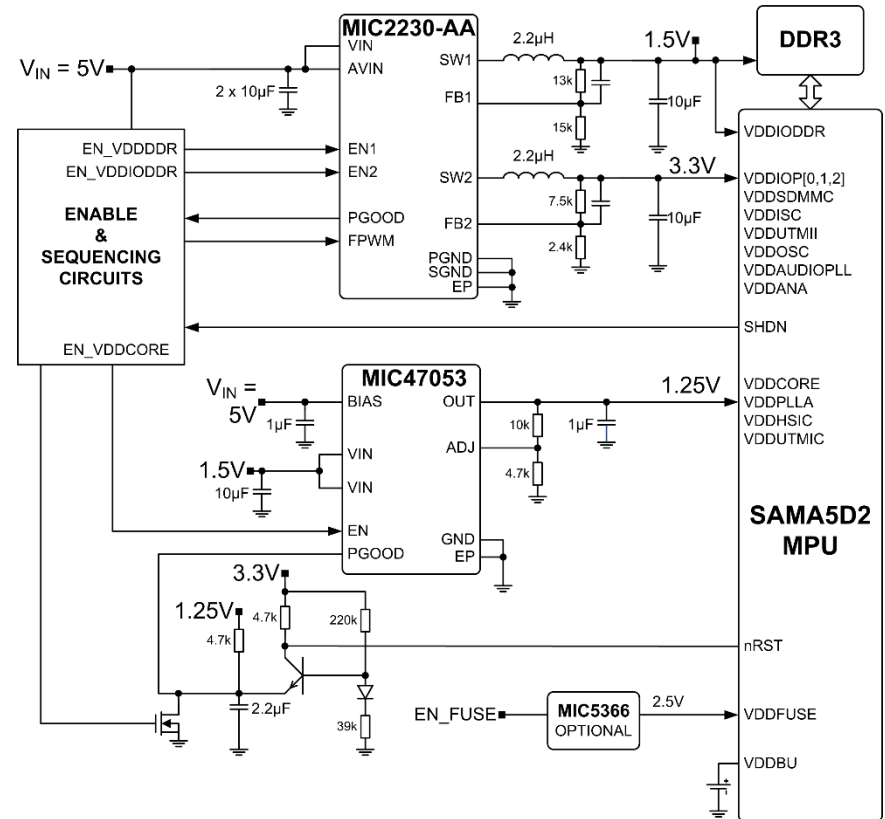
### MIC2230 – Fast Transient, High Efficiency Dual 800mA Buck

- Input Voltage Range : 2.5V to 5.5V
- Adjustable Output Voltage : 0.8V to 5.5V
- High Efficiency: Upto 96% || Ultra-low 28 $\mu$ A I<sub>Q</sub>
- 2.5MHz PWM operation
- Power good output with internal 5 $\mu$ A current source allows sequencing with programmable delay time
- 12L-TDFN 3mm x 3mm

### MIC47053 - Micropower Ultra-Low Dropout Linear Regulator

- Input voltage range: 1.0V to 3.6V
- Low dropout voltage: 49mV at 500mA
- $\pm 2\%$  initial output voltage accuracy over temperature
- Bias supply voltage range: 2.3V to 5.5V
- Adjustable output voltage range down to 0.4V
- 8p-TDFN 2mm x 2mm

### MIC5366 - 150mA LDO w/ Auto Discharge (optional)





# SAMA5D2

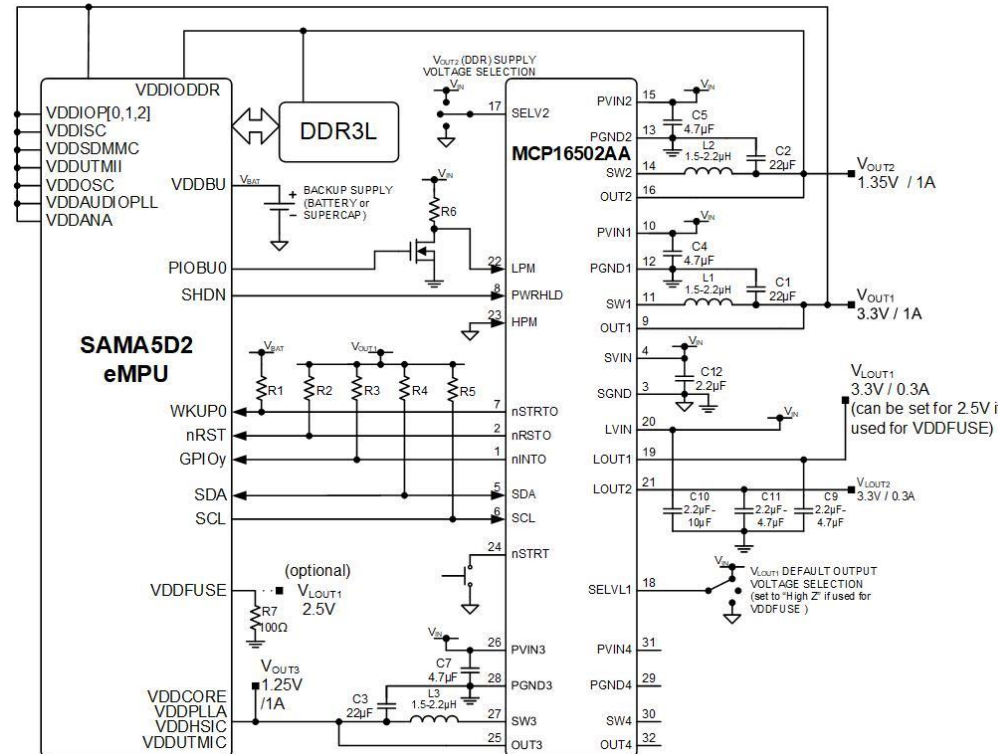
## DDR3L 1.35V, VIN 5V

### MCP16502 – High Performance PMIC for SAMA5DX/SAM9X6 MPUs

- Input Voltage Range : 2.7V to 5.5V
- 4x 1A DC-DC Buck regulators, 2x 300mA LDOs integrated
- < 300  $\mu$ A low-power mode typical quiescent current
- MPU-compatible default channel sequencing & nRSTO assertion delay
- Low-noise forced-PWM & light-load high-efficiency mode available
- I<sup>2</sup>C interface for programming and diagnostics
- Multimode operation and Dynamic Voltage Scaling
- Thermal-shutdown and current-limit protection
- User-programmable overcurrent response behavior
- 32-pin 5mm  $\times$  5mm VQFN package
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range

### Alternate Power Solution

**MIC2810**



**MCP16502**

**<< BACK**

# SAMA5D2

## DDR3L 1.35V, VIN 5V

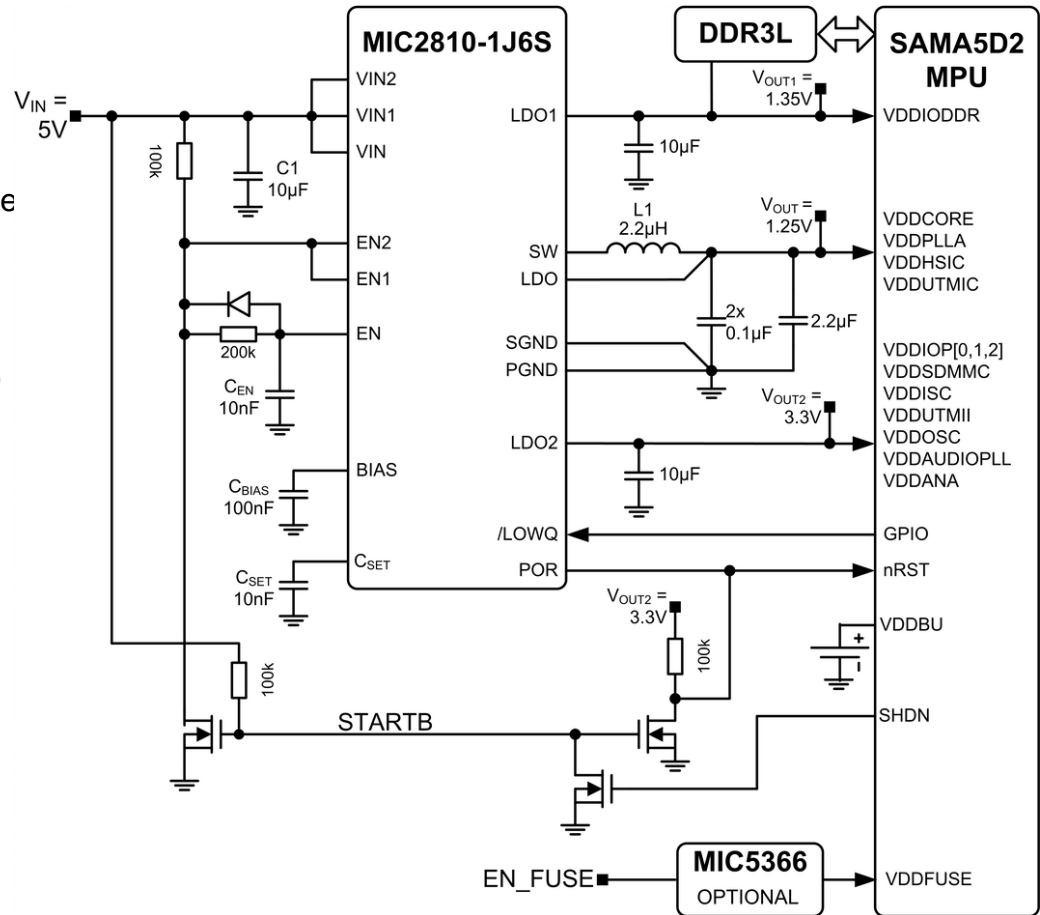
### MIC2810 – 600mA Buck + Dual 300mA LDOs

- Input Voltage Range : 2.5V to 5.5V
- Adjustable Output Voltage : 0.8V to 5.5V
- High Efficiency: Upto 96% || Ultra-low 28 $\mu$ A  $I_Q$
- 2.5MHz PWM operation
- Power good output with internal 5 $\mu$ A current source sequencing with programmable delay time
- 16p-QFN 3mm x 3mm

### MIC5366 - 150mA LDO w/ Auto Discharge (optional)

### Recommended Power Solution

**MCP16502**



**MIC2810**

**MIC5366 (optional)**

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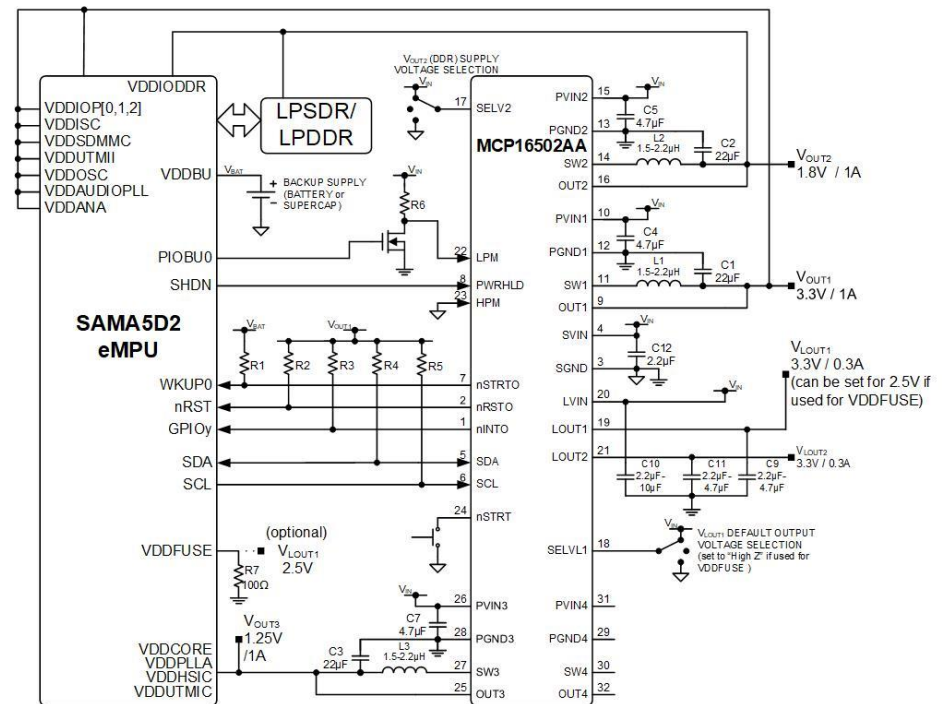
# SAMA5D2 LPDDR 1.8V, VIN 5V

## MCP16502 – High Performance PMIC for SAMA5DX/SAM9X6 MPUs

- Input Voltage Range : 2.7V to 5.5V
- 4x 1A DC-DC Buck regulators, 2x 300mA LDOs integrated
- < 300  $\mu$ A low-power mode typical quiescent current
- MPU-compatible default channel sequencing & nRSTO assertion delay
- Low-noise forced-PWM & light-load high-efficiency mode available
- I<sup>2</sup>C interface for programming and diagnostics
- Multimode operation and Dynamic Voltage Scaling
- Thermal-shutdown and current-limit protection
- User-programmable overcurrent response behavior
- 32-pin 5mm  $\times$  5mm VQFN package
- -40°C to +125°C junction temperature range

### Alternate Power Solution

**MIC2230 + MIC23050**



# SAMA5D2 LPDDR 1.8V, VIN 5V

## MIC2230 – Fast Transient, High Efficiency Dual 800mA Buck

- Input Voltage Range : 2.5V to 5.5V
- Adjustable Output Voltage : 0.8V to 5.5V
- High Efficiency: Upto 96% || Ultra-low 28 $\mu$ A I<sub>Q</sub>
- 2.5MHz PWM operation || Power good output
- 12L-TDFN 3mm x 3mm

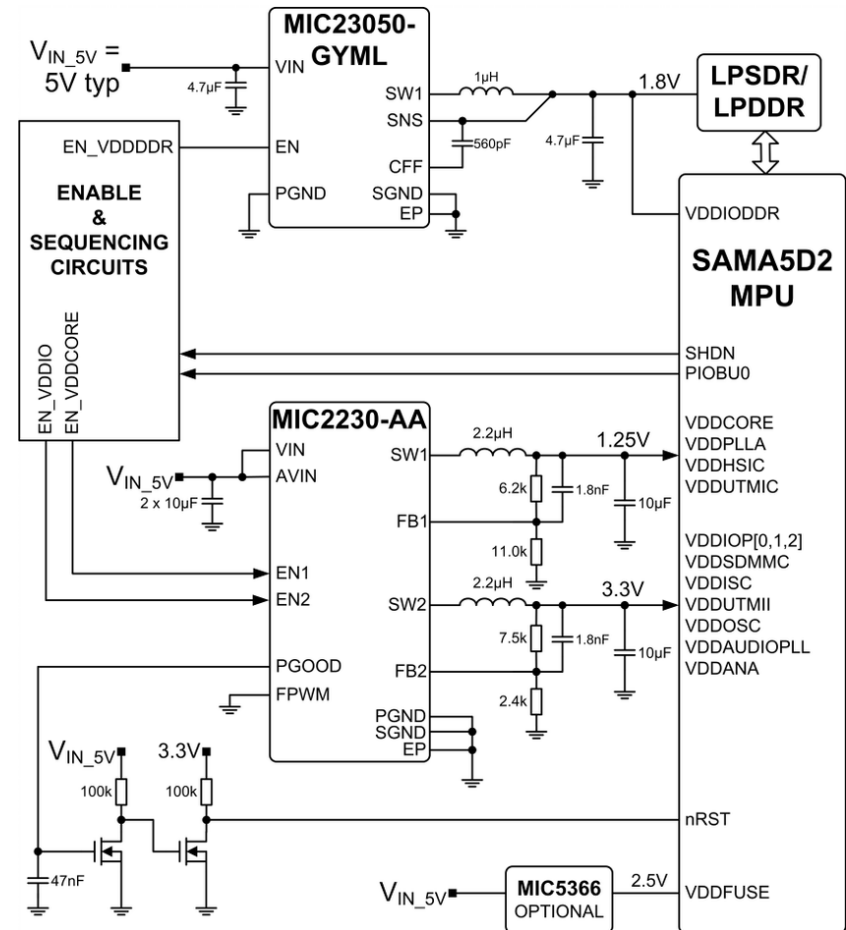
## MIC23050 - 4MHz 600mA Synchronous Buck Regulator

- Input voltage range: 2.7V to 5.5V
- Fixed output voltage from 0.72V to 3.3V
- Ultra fast transient response
- >93% Efficiency || 20 $\mu$ A typical quiescent current
- 8p-MLF 2mm x 2mm

## MIC5366 - 150mA LDO w/ Auto Discharge (optional)

### Recommended Power Solution

**MCP16502**



MIC2230

MIC23050

MIC5366 (optional)

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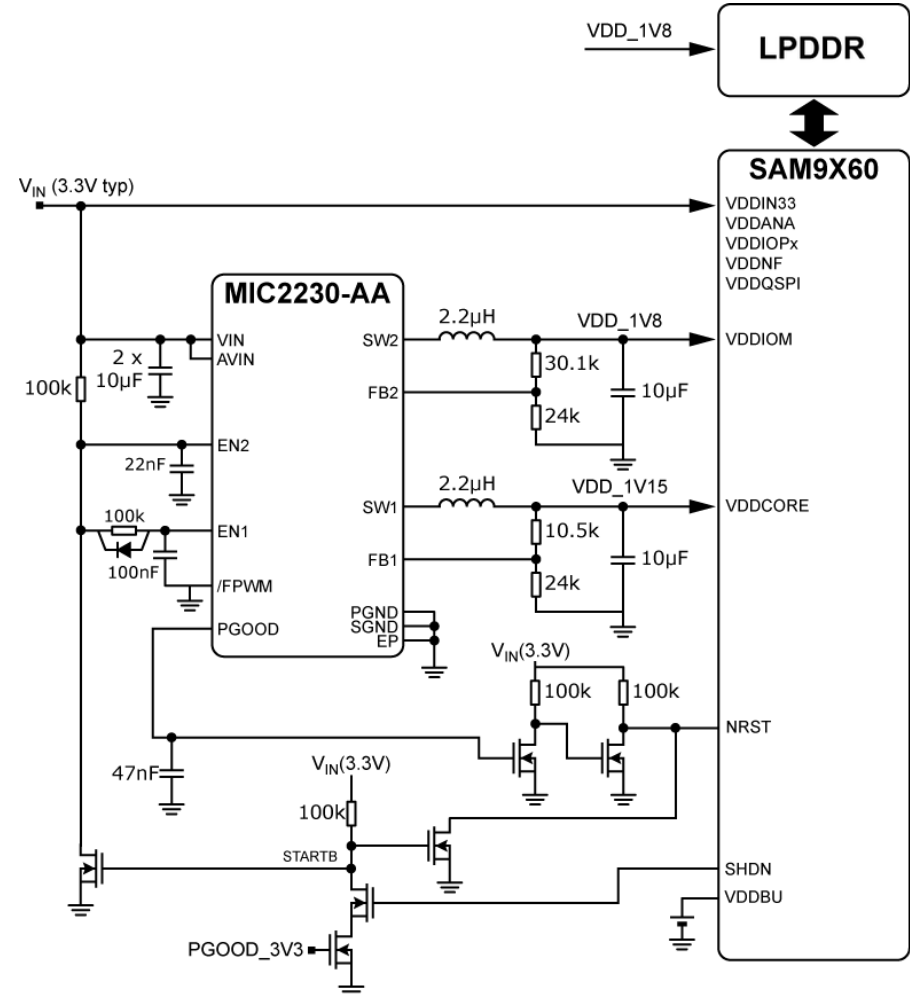


# SAM9X60

## LPDDR 1.8V, VIN 3.3V

### MIC2230 - High Efficiency Dual 800/800mA Buck

- Input Voltage Range 2.5V – 5.5V
- Output Voltage Range 0.8V – 5.5V
- Adjustable output voltage down to 0.8V
- 800mA current capability per channel
- High Efficiency: Over 96%
- Ultra-low quiescent current: Only 28µA
- Ultra-low shutdown current less than 1µA
- Fast transient performance
- 2.5MHz PWM operation
- No Schottky Diodes Required
- Built-in soft-start circuitry
- Current limit protection
- Automatic switching into light load mode operation
- /FPWM pin allows low noise all-PWM mode operation
- Power good output with internal 5µA current source allows sequencing with programmable delay time
- 12L-TDFN 3mm x 3mm

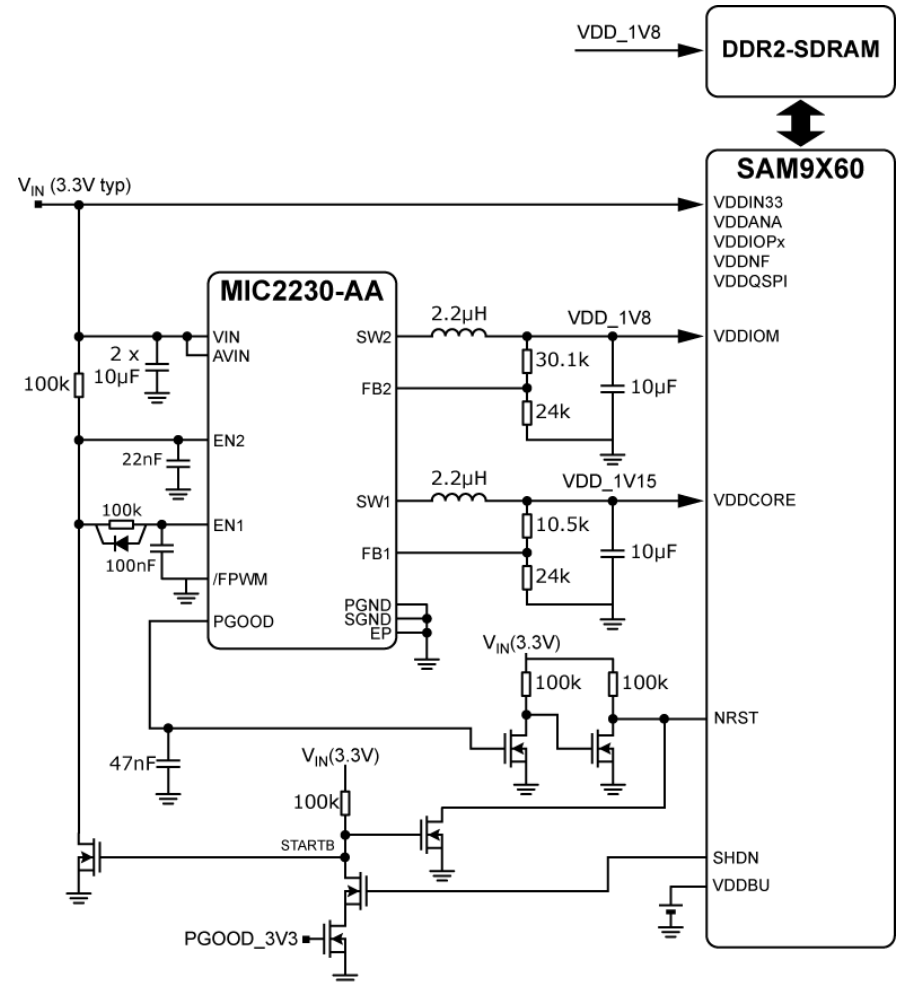


# SAM9X60

## DDR2 1.8V, VIN 3.3V

### MIC2230 - High Efficiency Dual 800/800mA Buck

- Input Voltage Range 2.5V – 5.5V
- Output Voltage Range 0.8V – 5.5V
- Adjustable output voltage down to 0.8V
- 800mA current capability per channel
- High Efficiency: Over 96%
- Ultra-low quiescent current: Only 28µA
- Ultra-low shutdown current less than 1µA
- Fast transient performance
- 2.5MHz PWM operation
- No Schottky Diodes Required
- Built-in soft-start circuitry
- Current limit protection
- Automatic switching into light load mode operation
- /FPWM pin allows low noise all-PWM mode operation
- Power good output with internal 5µA current source allows sequencing with programmable delay time
- 12L-TDFN 3mm x 3mm

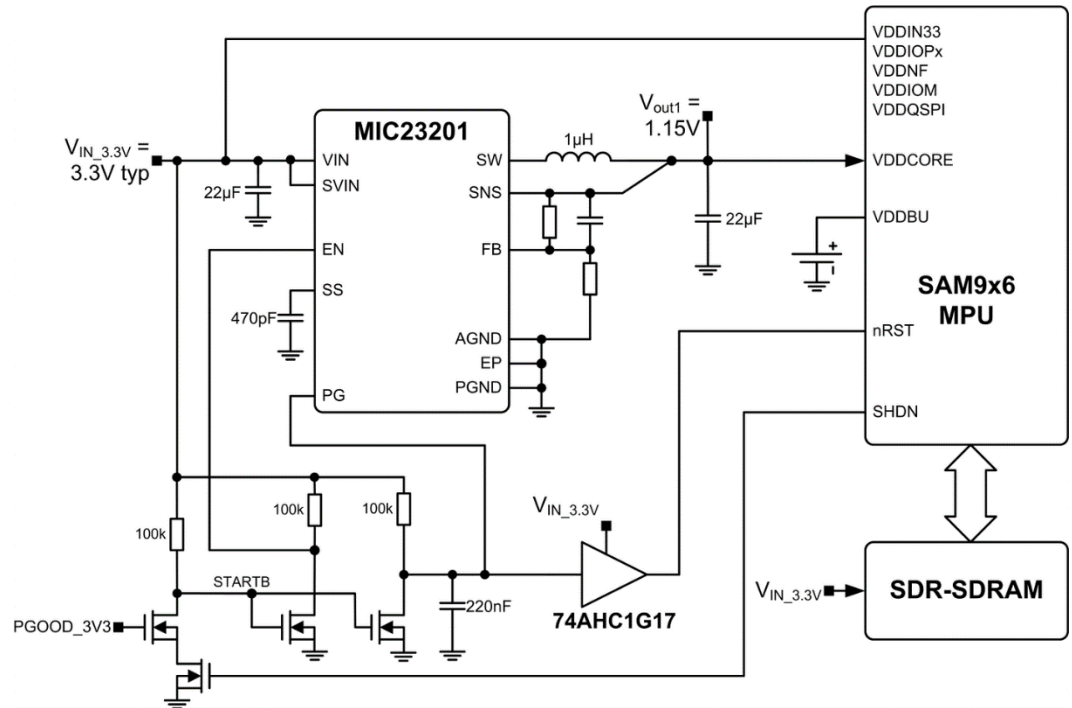


# SAM9X60

## SDRAM 3.3V, VIN 3.3V

### MIC23201 - 2A Hyper Speed Control™ Synchronous Buck Regulator

- 2.7V to 5.5V Input voltage range
- 2A output current
- Output Voltage as low as 0.9
- Up to 90% peak efficiency
- Low output voltage ripple: 16mV at full load
- 2MHz switching frequency
- 0.01µA shutdown current
- Programmable Soft-Start
- Power Good Indicator
- Safe for pre-biased output
- Ultra fast transient response
- Fully integrated MOSFET switches
- Thermal shutdown and current limit protection
- 10p-MLF 3mm x 3mm



### Alternate Power Solutions

Coming Soon

MIC23201

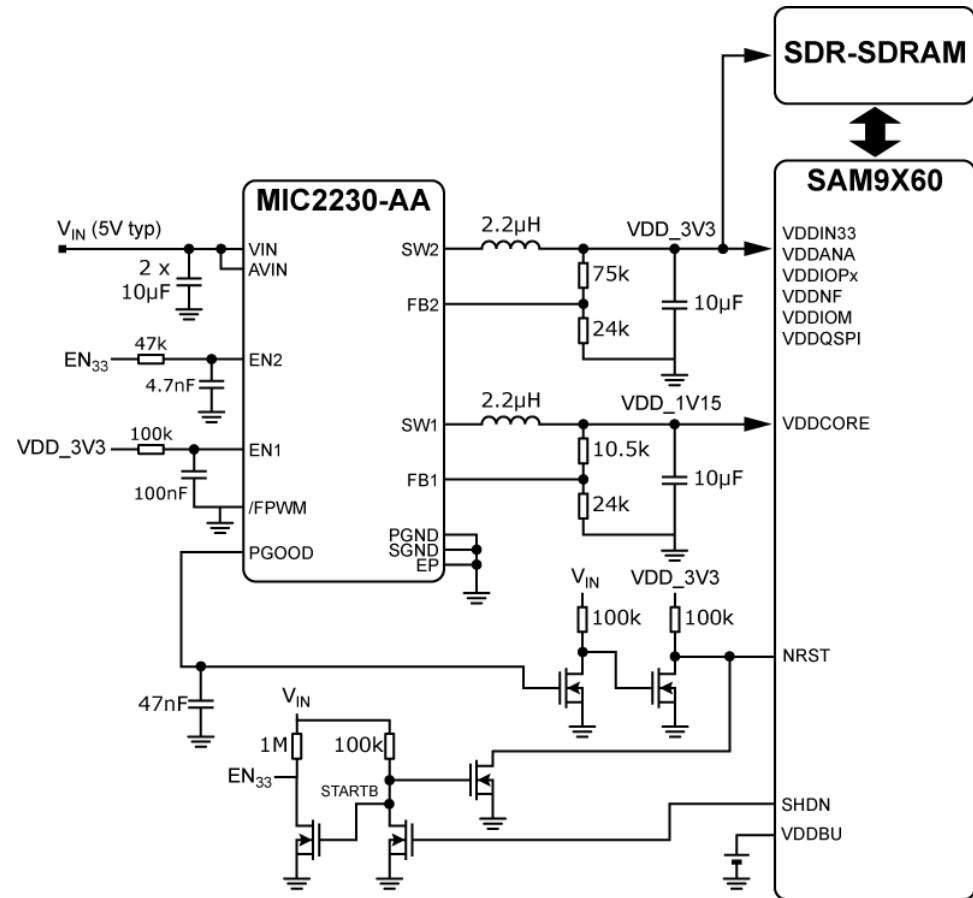
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# SAM9X60

## SDRAM 3.3V, VIN 5V

### MIC2230 - High Efficiency Dual 800/800mA Buck

- Input Voltage Range 2.5V – 5.5V
- Output Voltage Range 0.8V – 5.5V
- Adjustable output voltage down to 0.8V
- 800mA current capability per channel
- High Efficiency: Over 96%
- Ultra-low quiescent current: Only 28 $\mu$ A
- Ultra-low shutdown current less than 1 $\mu$ A
- Fast transient performance
- 2.5MHz PWM operation
- No Schottky Diodes Required
- Built-in soft-start circuitry
- Current limit protection
- Automatic switching into light load mode operation
- /FPWM pin allows low noise all-PWM mode operation
- Power good output with internal 5 $\mu$ A current source allows sequencing with programmable delay time
- 12L-TDFN 3mm x 3mm





# SAM9X60

## DDR2 1.8V, VIN 5V

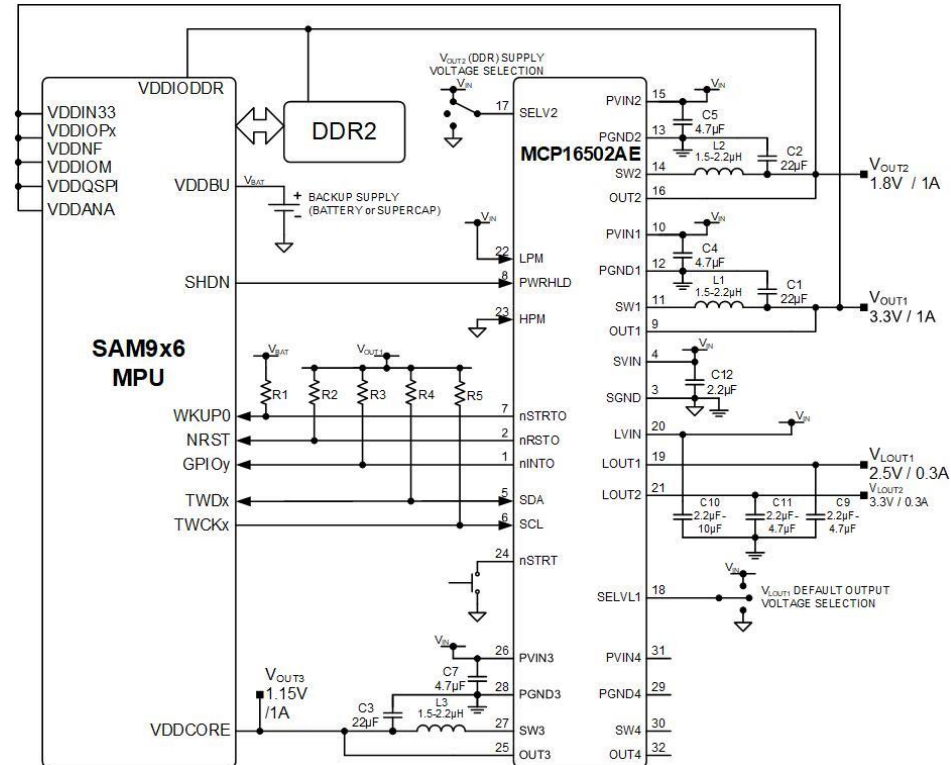
### MCP16502 – High Performance PMIC for SAMA5DX/SAM9X6 MPUs

- Input Voltage Range : 2.7V to 5.5V
- 4x 1A DC-DC Buck regulators, 2x 300mA LDOs integrated
- < 300  $\mu$ A low-power mode typical quiescent current
- MPU-compatible default channel sequencing & nRSTO assertion delay
- Low-noise forced-PWM & light-load high-efficiency mode available
- I<sup>2</sup>C interface for programming and diagnostics
- Multimode operation and Dynamic Voltage Scaling
- Thermal-shutdown and current-limit protection
- User-programmable overcurrent response behavior
- 32-pin 5mm  $\times$  5mm VQFN package
- -40°C to +125°C junction temperature range

### Alternate Power Solution

**MIC2800**

**MCP16502**



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# SAM9X60

## DDR2 1.8V, VIN 5V

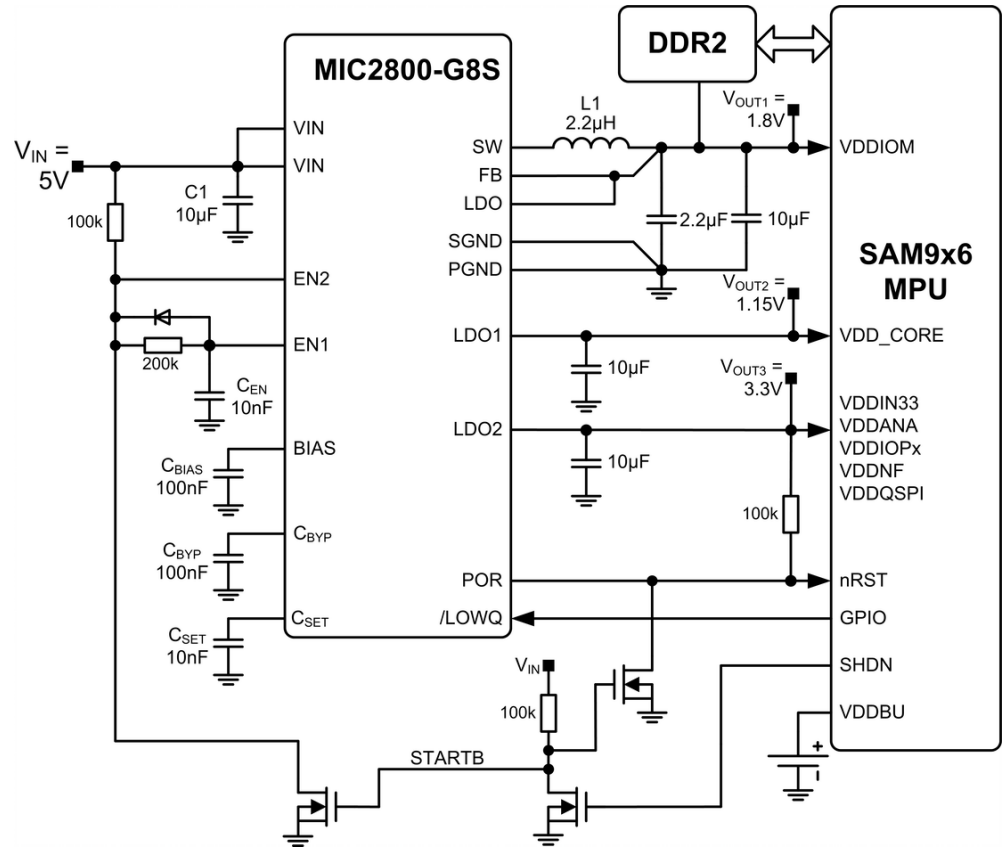
### MIC2800 - 600mA Buck + Dual 300mA LDO with LowQ<sup>®</sup> Mode

- 2.7V to 5.5V input voltage range
- Integrated power-on reset with adjustable delay
- 30µA Total IQ when in LowQ<sup>®</sup> mode
- Thermal Shutdown Protection
- Current Limit Protection
- **Buck regulator**
  - Output current to 600mA in PWM mode
  - 75µVRMS output noise in LowQ<sup>®</sup> mode
  - 2 MHz PWM operation in normal mode
  - >90% efficiency
- **LDOs**
  - 300mA output current
  - Output voltage down to 0.8V
- 16p-QFN 3mm x 3mm

### Recommended Power Solution

**MCP16502**

**MIC2800**



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# SAM9X60

## LPDDR 1.8V, VIN 5V

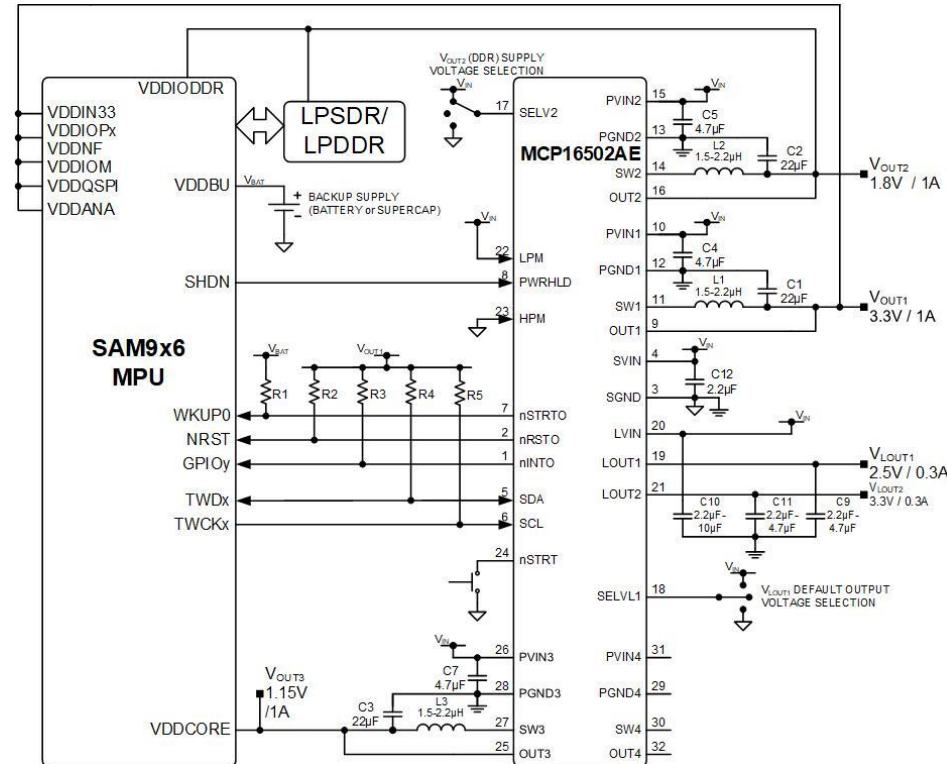
### MCP16502 – High Performance PMIC for SAMA5DX/SAM9X6 MPUs

- Input Voltage Range : 2.7V to 5.5V
- 4x 1A DC-DC Buck regulators, 2x 300mA LDOs integrated
- < 300  $\mu$ A low-power mode typical quiescent current
- MPU-compatible default channel sequencing & nRSTO assertion delay
- Low-noise forced-PWM & light-load high-efficiency mode available
- I<sup>2</sup>C interface for programming and diagnostics
- Multimode operation and Dynamic Voltage Scaling
- Thermal-shutdown and current-limit protection
- User-programmable overcurrent response behavior
- 32-pin 5mm  $\times$  5mm VQFN package
- -40°C to +125°C junction temperature range

### Alternate Power Solution

**MIC2800**

**MCP16502**



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# SAM9X60

## LPDDR 1.8V, VIN 5V

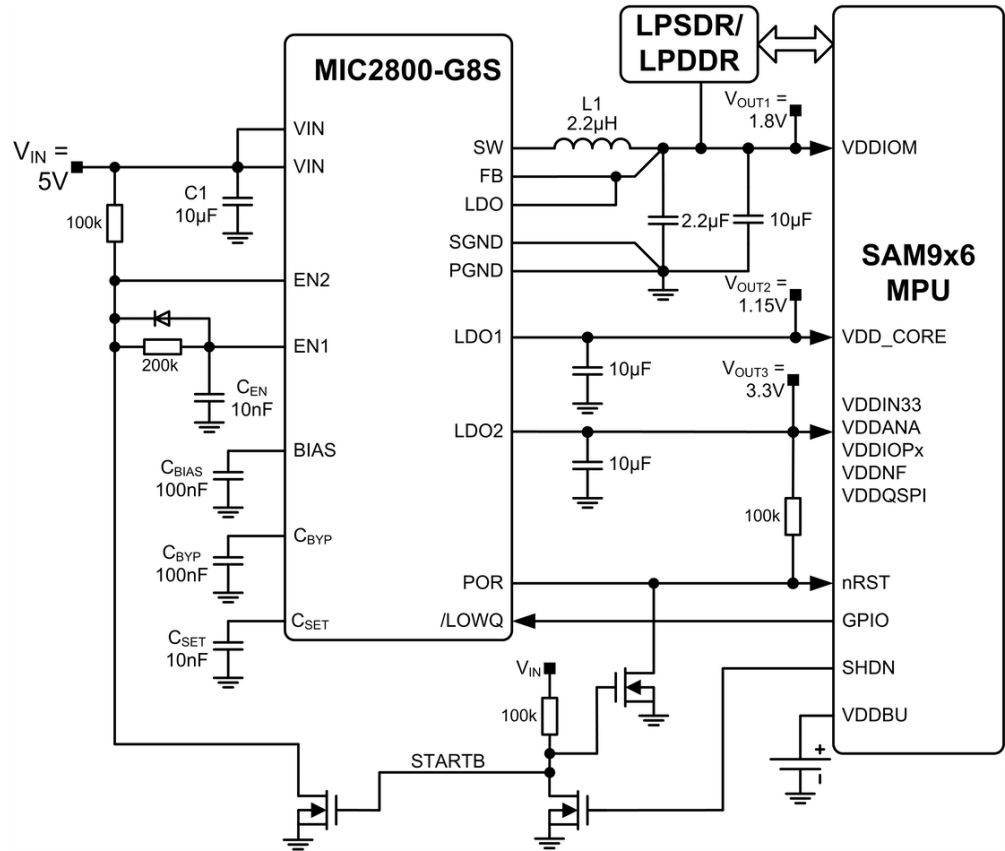
### MIC2800 - 600mA Buck + Dual 300mA LDO with LowQ<sup>®</sup> Mode

- 2.7V to 5.5V input voltage range
- Integrated power-on reset with adjustable delay
- 30 $\mu$ A Total IQ when in LowQ<sup>®</sup> mode
- Thermal Shutdown Protection
- Current Limit Protection
- **Buck regulator**
  - Output current to 600mA in PWM mode
  - 75 $\mu$ V<sub>RMS</sub> output noise in LowQ<sup>®</sup> mode
  - 2 MHz PWM operation in normal mode
  - >90% efficiency
- **LDOs**
  - 300mA output current
  - Output voltage down to 0.8V
- 16p-QFN 3mm x 3mm

### Recommended Power Solution

MCP16502

MIC2800



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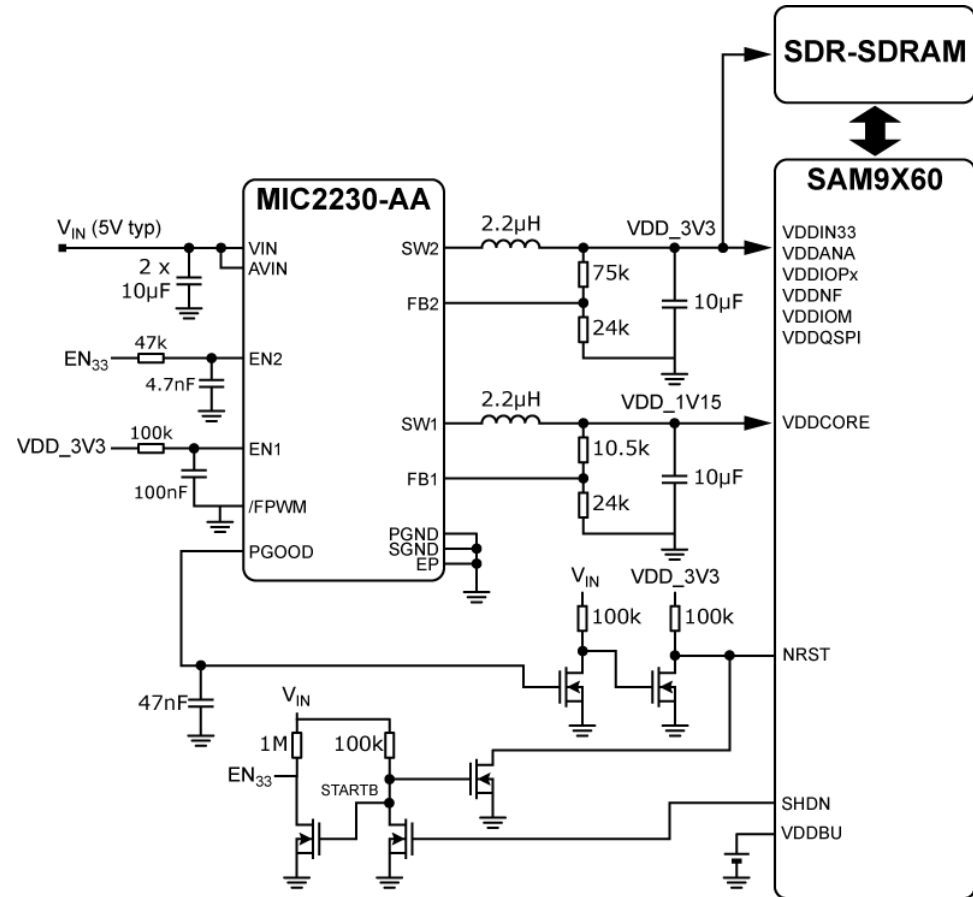


# SAM9X60

## SDRAM 3.3V, VIN 5V

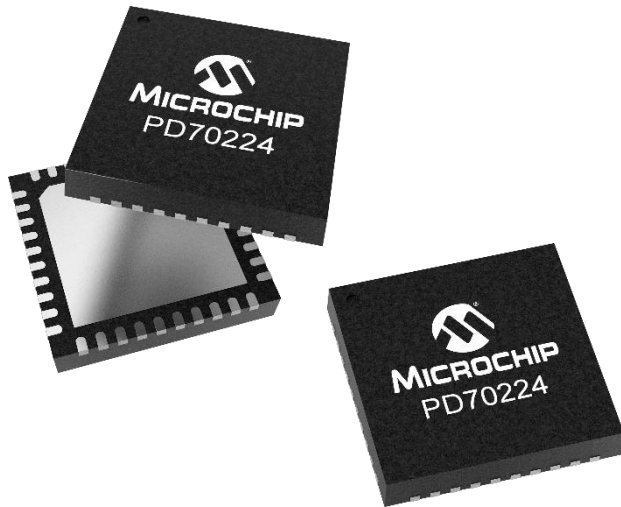
### MIC2230 - High Efficiency Dual 800/800mA Buck

- Input Voltage Range 2.5V – 5.5V
- Output Voltage Range 0.8V – 5.5V
- Adjustable output voltage down to 0.8V
- 800mA current capability per channel
- High Efficiency: Over 96%
- Ultra-low quiescent current: Only 28 $\mu$ A
- Ultra-low shutdown current less than 1 $\mu$ A
- Fast transient performance
- 2.5MHz PWM operation
- No Schottky Diodes Required
- Built-in soft-start circuitry
- Current limit protection
- Automatic switching into light load mode operation
- /FPWM pin allows low noise all-PWM mode operation
- Power good output with internal 5 $\mu$ A current source allows sequencing with programmable delay time
- 12L-TDFN 3mm x 3mm



## Features:

- Active circuit with low forward-drop to replace dissipative passive diode bridges
- Self-contained drive circuitry for MOSFETs
- Designed to support IEEE 802.3af/at/bt and PoH
- Integrated 0.16 $\Omega$  N-channel MOSFETs for 0.3 $\Omega$  total path resistance
- 'Power-present' indicator signals for identifying 4-pair bridge power
- Low leakage, < 10  $\mu$ A during detection
- Wide operating voltage range up to 57V
- -40°C to +85°C ambient
- 40 pins, 6 x 8mm QFN
- MSL3, RoHS compliant



## Description:

PD70224 is a dual pack of MOSFET-based full-bridge rectifiers. It contains low-R<sub>ds</sub> 0.16 $\Omega$  N-channel MOSFETs for much higher overall efficiency and higher output power, particularly when used in Powered Devices (PDs) for PoE applications. The entire drive circuitry for driving the MOSFETs is on-chip, including a charge pump for driving the high-side N-channel MOSFETs. The total forward drop (bridge offset) introduced by the IdealBridge™ rectifier is only 192 mV at 0.6A, compared to a standard bridge rectifier that typically presents 2000 mV of forward drop.

PD70224 IdealBridge™ can support over 1A current, making it the ideal choice not only for modern energy-saving 2-pair applications compliant with IEEE 802.3af and IEEE 802.3at (Type 1 and Type 2), but also 4-pair PDs such as IEEE 802.3bt and PoH.

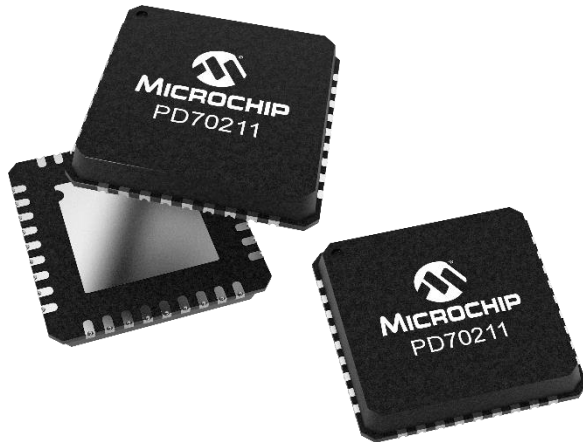
In addition, PD70224 is capable of helping to identify at the physical layer itself whether a 2-pair PSE or a 4-pair PSE is providing power over the cable. It does this by sensing the voltage on the line (un-rectified) side of the pairs.

**Features:**

- Supports IEEE 802.3af/at, HDBaseT both 2-pair / 4-pair configurations
- Wall-adaptor support (Rear Aux method)
- PD detection & programmable classification
- 2,3,4, and 6 event classification
- Integrated 0.3Ω isolating (series-pass) FET
- Inrush current limiting
- Less than 10μA offset current during detection
- Advanced PWM section
- 36 pin, 6 × 6 mm MLPQ
- MSL3, RoHS compliant

**Description:**

PD70211 is an advanced Powered Device (PD) Interface IC with integrated switching (PWM) regulator control for PDs in PoE applications. It supports IEEE802.3af, IEEE802at, HDBaseT and general 2/4-pair configurations. The PD70211 front-end includes an advanced classification block that supports 2, 3, 4, and 6 event classification. Using the SUPP\_Sx pins, it also identifies which of the four pairs of the cable actually receives power and generates appropriate flags. The IC features an internal bleeder for discharging the input capacitor of the DC/DC converter rapidly, so as to ensure fast re-detection and port power-up in case of sudden removal and re-insertion of the Ethernet cable into the RJ-45. The advanced PWM current mode section supports synchronous flyback and active clamp forward topologies, as well as buck, boost etc.



**Features:**

- Supports IEEE 802.3af/at, HDBaseT, both 2-pair or 4-pair configurations
- PD detection and programmable classification
- 2, 3, 4, and 6 event classification
- Integrated 0.3Ω isolating (series-pass) FET
- In-rush current limiting
- Wall adapter support
- Less than 5 μA offset current during detection
- 16-pin, 5 × 4mm MLPD
- MSL3, RoHS compliant

**Description:**

The PD70210A device is an advanced PD interface controller (front-end IC) for powered devices in PoE applications. It supports IEEE 802.3af, IEEE 802at, HDBaseT, and general 2- pair or 4-pair configurations. The PD70210 device includes an advanced classification block that supports 2, 3, 4, and 6 event classification. Using the SUPP\_Sx pins, they also identify which of the four pairs of the cable actually receive power and generates appropriate flags. The IC features an internal bleeder for rapidly discharging the input capacitor of the DC–DC converter, so as to ensure fast re-detection and port power-up in case of sudden removal and re-insertion of the Ethernet cable into RJ-45.





**Features:**

- Supports IEEE 802.3af/at, HDBaseT, with 2-pair or 4-pair configurations
- PD detection and programmable classification
- 2, 3, 4, and 6 event classification
- Integrated 0.3Ω isolating (series-pass) FET
- In-rush current limiting
- Less than 5 μA offset current during detection
- Lead-free DFN-16/QFN-38 package
- 16-pin, 5 × 4mm MLPD
- MSL3, RoHS compliant

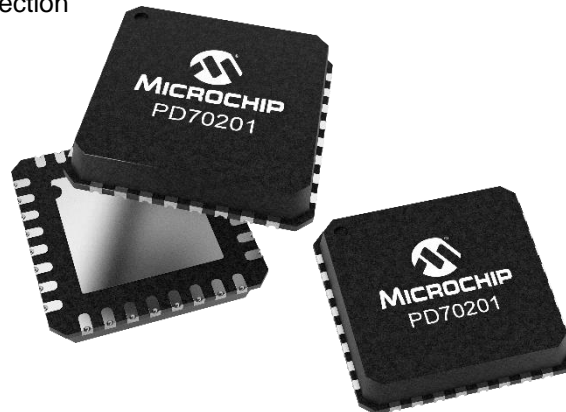
**Description:**

The PD70210 device is an advanced Powered Device (PD) interface controller (front-end IC) for powered devices in PoE applications. It supports IEEE 802.3af, IEEE 802at, HDBaseT, and general 2- pair or 4-pair configurations. The PD70210 device includes an advanced classification block that supports 2, 3, 4, and 6 event classification. Using the SUPP\_Sx pins, they also identify which of the four pairs of the cable actually receive power and generates appropriate flags. The IC features an internal bleeder for rapidly discharging the input capacitor of the DC–DC converter, so as to ensure fast re-detection and port power-up in case of sudden removal and re-insertion of the Ethernet cable into RJ-45.



## Features:

- IEEE 802.3af and IEEE 802.3at compliant
- Support for 4-pair applications of up to 48W With a Single IC
- Two-events classification:
  - Identification with a level signal
  - Indicating Type 1 or Type 2 PSE
- Less Than 10  $\mu$ A (typical) offset current during detection
- Signature resistor is disconnected upon detection
- Programmable classification setting with a single resistor
- Integrated 0.6 $\Omega$  isolating MOSFET switch with inrush current limit
- Power Off DC-DC Input Capacitor Discharge
- 100 kHz to 500 kHz adjustable DC-DC switching frequency
- DC-DC frequency can be synchronized to external clock
- Supports low power mode operation for higher efficiency
- Up to 50% duty cycle
- Soft-start circuit to control the output voltage rise time
- Two out-of-phase driver stages for efficient synchronous rectification or active clamp
- PoE port input UVLO with programmable threshold and hysteresis
- Internal differential amplifier simplifying non-isolated stepdown converter
- Overload and short circuit protection
- 32-pin, 5 x 5mm QFN
- MSL3, RoHS compliant



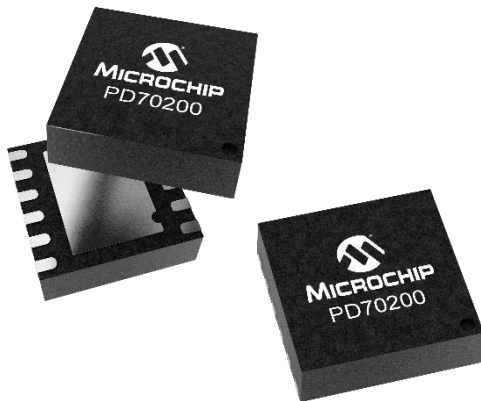
## Description:

The PD70201 is an integrated Powered Device (PD) Interface and PWM controllers for a DC-DC converter used in IEEE 802.3af and IEEE 802.3at applications. The PD70201 can be used for IEEE 802.3af, IEEE802.3at Type 1 and IEEE 802.3at Type 2 applications. A single PD70201 can be used in 4-pair applications which consumes up to 47.7W. The device has a number of features designed to improve efficiency and reliability:

- Detection and classification
- Capacitor
- Gate drivers
- Peak current mode control
- Maximum duty cycle
- Soft-start circuit
- Low voltage protection warning and monitoring

## Features:

- Designed to support IEEE 802.3af and IEEE 802.3at standards
- PD detection & programmable classification signature
- Two-events classification flag
- Signature resistor disconnection after detection
- Integrated 0.6Ω isolating switch and inrush current limiter
- 4-pairs support with a single PD70200 IC for up to 48W
- 4-pairs support with two PD70200 ICs for up to 96W
- Less than 10 μA offset current during detection
- Single DC voltage input (37V – 57V)
- Wide operating temperature range: –40°C to 85°C
- On-chip thermal protection
- 12-pin 3 × 4mm package
- MSL3, RoHS compliant



## Description:

The PD70200 device is a part of Microchip's series of Power over Ethernet (PoE) Powered Devices (PDs). The device transmits integrated power and analog data in a single 12-pin package. It is used in PDs, thus enabling next generation network devices to share power and data over the same cable. Microchip's new PD family offers a solution to any PD application compliant with IEEE 802.3af and IEEE 802.3at standards and 4-pairs extra power applications. The IC family's components can be used in both indoor and outdoor applications. The device family meets all PD-side-standards such as:

- Detection classification
- Integrated isolation switch with inrush current limiter, and over-current protection
- Two-events classification recognition and AT flag generation

In addition, the devices have a discharge mechanism for a DC / DC input capacitor, ensuring quick redetection capability in case the RJ-45 plug is disconnected and reconnected within a short time span.

The PD70200 IC design specifically supports IEEE 802.3at standard, including two events classification detection that enables the PD to distinguish whether the connected power source equipment (PSE) is IEEE 802.3at or IEEE 802.3af based. The PD70200 IC is designed to support 4 pair applications for PDs that require higher power.

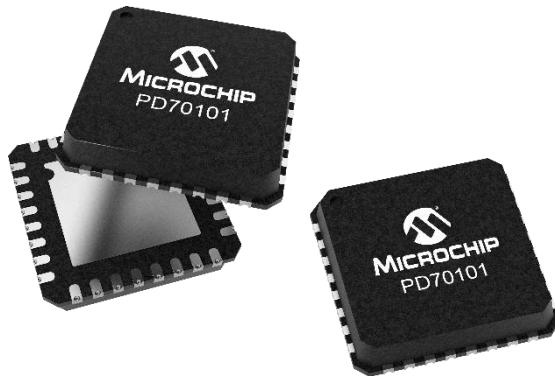
## Features:

- IEEE 802.3af and IEEE 802.3at TYPE 1 compliant
- Two-events classification
- Identification with a level signal
- Less than 10  $\mu$ A (typical) offset current during detection
- Signature resistor is disconnected upon detection
- Programmable classification setting with a single resistor
- Integrated 0.6 $\Omega$  isolating MOSFET switch with inrush current limit
- Power off DC-DC input capacitor discharge
- 100 kHz to 500 kHz adjustable DC-DC switching frequency
- DC-DC frequency can be synchronized to external clock
- Supports low power mode operation for higher efficiency
- Up to 50% duty cycle
- Soft-start circuit to control the output voltage rise time
- Two out-of-phase driver stages for efficient synchronous rectification or active clamp
- PoE Port Input UVLO with programmable threshold and hysteresis
- Internal differential amplifier simplifying non-isolated step-down converter
- Overload and short circuit protection
- 32-pin, 5 x 5mm QFN
- MSL3, RoHS compliant

## Description:

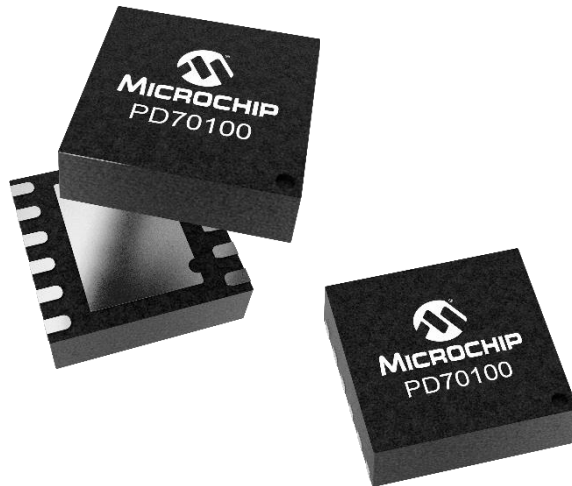
The PD70101 is an integrated Powered Device (PD) Interface and PWM controllers for a DC-DC converter used in IEEE 802.3af and IEEE 802.3at applications. The PD70101 can be used for IEEE 802.3af or IEEE 802.3at Type 1 applications. The device has a number of features designed to improve efficiency and reliability:

- Capacitor
- Gate drivers
- Peak current mode control
- Maximum duty cycle
- Soft-start circuit
- Low voltage protection warning and monitoring



## Features:

- Designed to support IEEE 802.3af and IEEE 802.3at type 1 applications
- PD detection & programmable classification signature
- Two-events classification flag
- Signature resistor disconnection after detection
- Integrated 0.6Ω isolating switch and inrush current limiter
- Less than 10 μA Offset Current during Detection
- Single DC Voltage Input (37V – 57V)
- Wide operating temperature range: –40°C to 85°C
- On-chip thermal protection
- 12-pin, 3 × 4mm DFN
- MSL3, RoHS compliant



## Description:

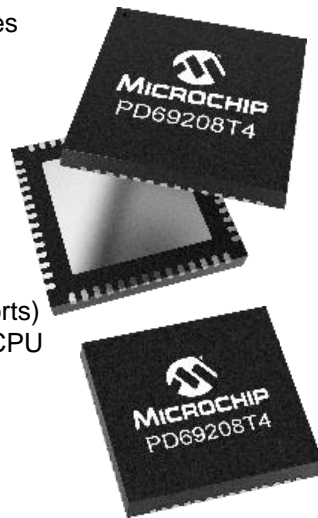
The PD70100 device is a part of Microchip's series of Power over Ethernet (PoE) Powered Devices (PDs). The device transmits integrated power and analog data in a single 12-pin package. It is used in PDs, thus enabling next generation network devices to share power and data over the same cable. Microchip's PD70100 is optimized for PD applications compliant with IEEE 802.3af and IEEE 802.3at type 1 standards. The IC family's components can be used in both indoor and outdoor applications. The device family meets all PD-side-standards such as:

- Detection
- Classification
- Integrated isolation switch with inrush current limiter, and over-current protection

In addition, the devices have a discharge mechanism for a DC / DC input capacitor, ensuring quick redetection capability in case the RJ-45 plug is disconnected and reconnected within a short time span.

## Features:

- 8 independent PoE channels
- Complies with IEEE 802.3af-2003, IEEE 802.3at-2009 and IEEE 802.3bt
- Supports three and six event classification based on PoH
- Drives 2-pair power ports or 4-pair ports (combining 2 PoE channels)
- Supports pre-standard PD detection
- Single DC voltage input (32V to 57V)
- Built in 3.3V and 5V regulators
- Input voltage out of range protection
- Wide ambient temperature range: -40°C to +85°C
- On-chip over-temperature thermal protection and monitoring
- Low power dissipation (0.1Ω sense resistor and 0.2Ω MOSFET R<sub>dson</sub> per channel)
- Includes reset command pin
- 4 x direct address configuration pins
- Continuous port monitoring and system data
- Configurable load current setting
- Configurable PSE Type AT / AF / BT / PoH modes
- Power soft start mechanism
- Voltage monitoring / protection
- Internal power on reset
- Emergency power management support 4 configurable power bank I/Os
- Advanced system power management algorithm supports up to 96 physical ports
- Interrupt out pin for system and port events
- Can be cascaded to up to 12 PoE devices (96 ports)
- Supports both UART and I2C interfaces to host CPU SW download
- LED stream support
- Detailed port status
- Programmable threshold temperature alarm limit
- PD69208T4: 56-pin, 8 x 8mm QFN
- PD692x0: 32 pin, 5 mm x 5 mm QFN package
- MSL3, RoHS compliant



## Description:

The PoE manager IC integrates power, analog, and state-of-the-art logic into a single 56-pin, plastic QFN package. The device is used in Ethernet switches and midspans to allow network devices to share power and data over the same cable. The PD69208T4 device is an 8-port, mixed-signal, and high-voltage PoE driver. Together with the PD692x0 external MCU, it performs as a PSE system. The PoE controller, PD692x0, is a cost-effective, pre-programmed MCU designed to implement enhanced mode PoE.

PD69208T4 / PD692x0 chip-set supports PoE Powered Device (PD) detection, power-up, and protection according to IEEE standards, as well as legacy/pre-standard PD detection. It provides PD real-time protection through the following mechanisms: overload, under-load, over-voltage, over-temperature, and short-circuit, and enables operation in a standalone mode. It also executes all real-time functions as specified in IEEE 802.3at, Power over HDBaseT (PoH) and IEEE 802.3bt standards.

PD69208T4 supports supply voltages between 32V and 57V without additional power supply sources. A system that powers over four pairs can be implemented by combining two ports of PD69208M, enabling an high power delivery to compatible PD devices. An on-going monitoring of system parameters for the host software is available via communication. Internal thermal protection is implemented in the chip. PD69208T4 is a low-power dissipation device that uses internal MOSFETs and internal 0.1Ω sense resistors.

PD692x0 features an ESPI bus interface up to 12 POE managers. PD692x0 has an embedded ARM Cortex™-M0+ core. It also uses I2C or UART interface to the host CP and is designed to support software field upgradable through the communication interface.

PD69208T4 is available in a 56 pin, 8 mm x 8 mm QFN package. PD692x0 is available in 32 pin, 5 mm x 5 mm QFN package

## Features:

- 8 independent PoE channels
- Complies with IEEE 802.3af-2003, IEEE 802.3at-2009 and IEEE 802.3bt
- Supports three and six event classification based on PoH
- Drives 2-pair power ports or 4-pair ports (combining 2 PoE channels)
- Supports pre-standard PD detection
- Single DC voltage input (32V to 57V)
- Built in 3.3V and 5V regulators
- Input voltage out of range protection
- Wide ambient temperature range: -40°C to +85°C
- On-chip over-temperature thermal protection and monitoring
- Low power dissipation (0.1Ω sense resistor and 0.2Ω MOSFET R<sub>dson</sub> per channel)
- Includes reset command pin
- 4 x direct address configuration pins
- Continuous port monitoring and system data
- Configurable load current setting
- Configurable PSE Type AT / AF / BT / PoH modes
- Power soft start mechanism
- Voltage monitoring / protection
- Internal power on reset
- Emergency power management support 4 configurable power bank I/Os
- Advanced system power management algorithm supports up to 96 physical ports
- Interrupt out pin for system and port events
- Can be cascaded to up to 12 PoE devices (96 ports)
- Supports both UART and I2C interfaces to host CPU with SW download
- LED stream support
- Detailed port status
- Programmable threshold temperature alarm limit
- 56-pin, 8 x 8mm QFN
- MSL3, RoHS compliant



## Features:

- 4 independent PoE channels
  - Complies with IEEE 802.3af-2003, IEEE 802.3at-2009 and IEEE 802.3bt
  - Supports three and six event classification based on PoH
  - Drives 2-pair power ports or 4-pair ports (combining 2 PoE channels)
  - Supports pre-standard PD detection
  - Single DC voltage input (32V to 57V)
  - Built in 3.3V and 5V regulators
  - Input voltage out of range protection
  - Wide ambient temperature range: -40°C to +85°C
  - On-chip over-temperature thermal protection and monitoring
  - Low power dissipation (0.1Ω sense resistor and 0.2Ω MOSFET R<sub>dson</sub> per channel)
  - Includes reset command pin
  - 4 x direct address configuration pins
  - Continuous port monitoring and system data
  - Configurable load current setting
  - Configurable PSE Type AT / AF / BT / PoH modes
  - Power soft start mechanism
  - Voltage monitoring / protection
  - Internal power on reset
  - Emergency power management support 4 configurable power bank I/Os
  - Interrupt out pin for system and port events
  - Can be cascaded to up to 12 PoE devices (96 ports)
  - Supports both UART and I2C interfaces to host CPU with SW download
  - LED stream support
  - Detailed port status
  - Programmable threshold temperature alarm limit
- PD69204T4: 56-pin, 8 x 8mm QFN  
PD692x0: 32 pin, 5 mm x 5 mm QFN package  
MSL3, RoHS compliant

## Description:

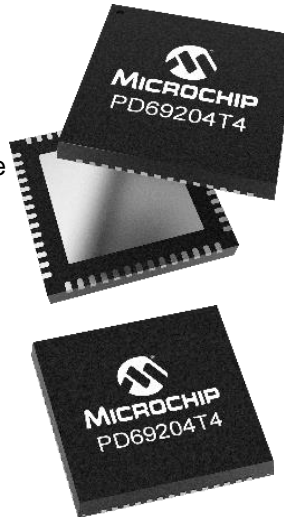
The PoE manager IC integrates power, analog, and state-of-the-art logic into a single 56-pin, plastic QFN package. The device is used in Ethernet switches and midspans to allow network devices to share power and data over the same cable. The PD69204T4 device is an 4-port, mixed-signal, and high-voltage PoE driver. Together with the PD692x0 external MCU, it performs as a PSE system. The PoE controller, PD692x0, is a cost-effective, pre-programmed MCU designed to implement enhanced mode PoE.

PD69204T4 / PD692x0 chip-set supports PoE Powered Device (PD) detection, power-up, and protection according to IEEE standards, as well as legacy/pre-standard PD detection. It provides PD real-time protection through the following mechanisms: overload, under-load, over-voltage, over-temperature, and short-circuit, and enables operation in a standalone mode. It also executes all real-time functions as specified in IEEE 802.3at, Power over HDBaseT (PoH) and IEEE 802.3bt standards.

PD69204T4 supports supply voltages between 32V and 57V without additional power supply sources. A system that powers over four pairs can be implemented by combining two ports of PD69208M, enabling a high power delivery to compatible PD devices. An on-going monitoring of system parameters for the host software is available via communication. Internal thermal protection is implemented in the chip. PD69204T4 is a low-power dissipation device that uses internal MOSFETs and internal 0.1Ω sense resistors.

PD692x0 features an ESPI bus interface up to 12 POE managers. PD692x0 has an embedded ARM Cortex™-M0+ core. It also uses I2C or UART interface to the host CPU, and is designed to support software field upgradable through the communication interface.

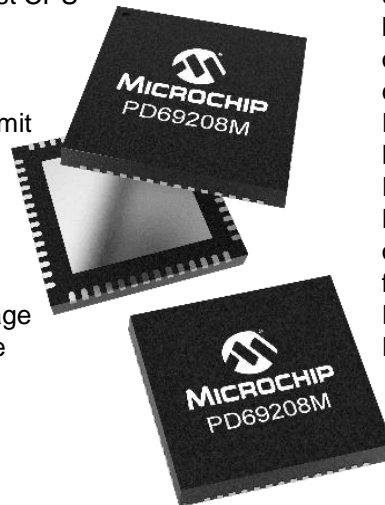
PD69204T4 is available in a 56 pin, 8 mm x 8 mm QFN package.  
PD692x0 is available in 32 pin, 5 mm x 5 mm QFN package





## Features:

- 8 independent PoE channels
- Complies with IEEE 802.3af-2003, IEEE 802.3at-2009 and IEEE 802.3bt
- Drives 2-pair power ports or 4-pair ports (combining 2 PoE channels)
- Supports pre-standard PD detection
- Single DC voltage input (32V to 57V) w/ built in 3.3V and 5V regulators
- Input voltage out of range protection
- Wide ambient temperature range: -40°C to +85°C
- On-chip over-temperature thermal protection and monitoring
- Low power dissipation (0.1Ω sense resistor and 0.2Ω MOSFET R<sub>ds(on)</sub> per channel)
- Power soft start mechanism
- Voltage monitoring / protection
- Internal power on reset
- Emergency power management support 4 configurable power bank I/Os
- Advanced system power management algorithm supports up to 96 physical ports
- Can be cascaded up to 12 PoE devices (96 physical ports)
- Supports both UART and I2C interfaces to host CPU
- LED stream support
- Software download via I2C or UART
- Detailed port status
- Programmable threshold temperature alarm limit
- Interrupt out pin for system and port events
- Forced port power ON function
- Port power limit setting
- Port matrix and priority
- Automatic PoE device type detection
- PD69208M: 56-pin, 8 mm x 8 mm QFN package
- PD692x0: 32 pin, 5 mm x 5 mm QFN package
- MSL3, RoHS compliant



## Description:

The PoE manager IC integrates power, analog, and state-of-the-art logic into a single 56-pin, plastic QFN package. The device is used in Ethernet switches and midspans to allow network devices to share power and data over the same cable. The PD69208M device is an 8-port, mixed-signal, and high-voltage PoE driver. Together with the PD692x0 external MCU, it performs as a PSE system. The PoE controller, PD692x0, is a cost-effective, pre-programmed MCU designed to implement enhanced mode PoE.

PD69208M / PD692x0 chip-set supports PoE Powered Device (PD) detection, power-up, and protection according to IEEE standards, as well as legacy / pre-standard PD detection. It provides PD real-time protection through the following mechanisms: overload, under-load, over-voltage, over-temperature, short-circuit, and enables operation in a standalone mode. It also executes all real-time functions as specified in IEEE 802.3at and IEEE 802.3bt standards.

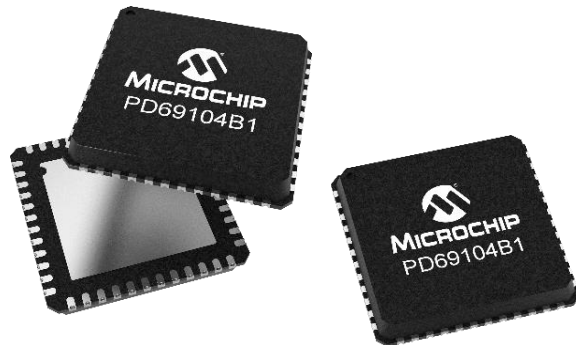
PD69208M supports supply voltages between 32V and 57V without additional power supply sources. A system that powers over four pairs can be implemented by combining two ports of PD69208M, enabling an high power delivery to compatible PD devices. An on-going monitoring of system parameters for the host software is available via communication. Internal thermal protection is implemented in the chip. PD69208M is a low-power dissipation device that uses internal MOSFETs and internal 100 mΩ sense resistors.

PD692x0 features an ESPI bus interface up to 12 POE managers. PD692x0 has an embedded ARM Cortex™-M0+ core. It also uses I2C or UART interface to the host CPU, and is designed to support software field upgradable through the communication interface.

PD69208M is available in a 56 pin, 8 mm x 8 mm QFN package. PD692x0 is available in 32 pin, 5 mm x 5 mm QFN package

## Features:

- Supports IEEE 802.3af and IEEE 802.3at, including two-event classifications
- MSCC extended auto and semi auto
- Supports pre-standard PD detection
- Supports Cisco device detection
- Single DC voltage input (44V to 57V)
- Wide temperature range:  $-10^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- Low-power dissipation (0.36 $\Omega$  sense resistor)
- Drives independent 4/2-pairs power port
- Includes two selectable communication modes (I<sup>2</sup>C and UART)
- Parameter setting using input pins or external serial EEPROM device
- Built-in dynamic power management and emergency power management mechanisms with 3 x power supply power-good pins
- Power soft start mechanism
- On-chip thermal protection
- On-chip continual thermal monitoring
- Voltage / current and temperature monitoring / protection
- Built-in 3.3V and 5V regulators
- Internal power on reset
- 48-pin, 8 x 8mm QFN
- MSL3, RoHS compliant



## Description:

A four-port, mixed-signal, high-voltage PoE Manager. It enables network devices to share power and data over a single cable. PD69104B1 PoE-Manager chip is employed by both Ethernet switches and midspans. The device integrates power, analog circuitry, and state-of-the-art control logic into a single 48-pin plastic quad flat no-leads (QFN) package.

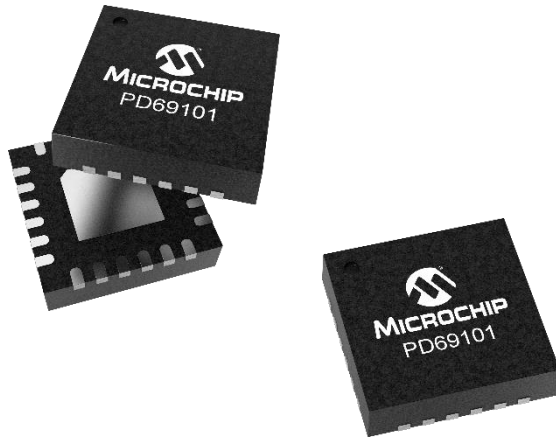
PD69104B1 supports the following modes of operation:

- **MSCC extended auto mode:** A stand-alone mode in which the PD69104B1 detects IEEE 802.3af-2003 compliant powered devices (PDs) and IEEE 802.3at-2009 high-power devices, ensuring safe power feeding and disconnection of ports based on a power management algorithm while employing a minimum of external components.
- **Semi auto mode:** Allows the host to control which devices are powered and which are not, as well as communicate with PD69104B1 and configuring it.

PD69104B1 executes all real time functions as specified in IEEE 802.3AF-2003 (AF) and IEEE 802.3AT high power (AT) standards. This includes load detection, AF and AT classifications. In addition, the PD69104B1 device features Multiple Classification Attempts (MCA) port status monitoring. PD69104B1 supports detection of legacy / pre-standard PD devices. It also provides PD real-time protection through the following mechanisms: overload, under-load, over-voltage, over-temperature, and short-circuit. PD69104B1/F supports supply voltages between 44V and 57V, with no need for additional power supply sources, and has built-in thermal protection. PD69104B1 is a low-power device that uses internal MOSFETs and external 0.36 $\Omega$  sense resistors. PD69104B1 is available in a 48 lead, 8 mm x 8 mm QFN package.

## Features:

- 1-port PoE PSE manager with internal  $0.34\Omega$  FET
- DC disconnect
- IEEE 802.3af and legacy detection
- IEEE 802.3at-compliant
- Direct LED driving
- SPI host interface
- 24-pin, 4 x 5mm QFN
- MSL3, RoHS compliant



## Description:

A single port, mixed-signal, high-voltage PoE driver. The device is utilized in Ethernet switches and enables network devices to share power and data over the same cable.

It enables detection of IEEE 802.3af-2003 compliant PDs (Powered Devices) and IEEE 802.3at high power devices ensuring safe power feeding and disconnection of ports with full digital control and a minimum of external components.

Integrating power, analog and state of the art logic, the PD69101 device fits into a single 24-pin, plastic QFN package. A “plug and play” device, the PD69101 executes all real time functions as specified in the IEEE 802.3af-2003 (“AF”) and IEEE 802.3at High Power (“AT”) standards, including load detection, “AF” and “AT” classification, and using Multiple Classification Attempts (MCA).

The PD69101 is designed to detect and disable disconnected ports, utilizing DC disconnection methods, as specified in the IEEE 802.3af-2003 and IEEE 802.3at-2009 standards. It can optionally detect legacy/pre-standard PD devices.

The PD69101 also provides PD protection such as over-load, under-load, over-voltage, over-temperature and short-circuiting. It supports supply voltages ranging from 44V to 57 VDC with no need for additional power supply sources.

The PD69101 is a low power device using an internal  $0.34\Omega$  MOSFET and an external  $0.5\Omega$  sense resistor. The chip includes built-in internal thermal protection. Two LEDs provide port state's indication and port type (AF/AT).

## Specifications:

- Number of ports: 1
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 46-57 VDC
- Output power: 45-55 VDC
- Dimensions: 110 mm x 50 mm x 30 mm (WxHxL)  
4.33 in x 2 in x 1.22 in
- Operating temperature: 32°to 104°F (0 to 40°C) (1G rate)  
32° to 122°F (0 to 50°C) (10/100M rate)
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/cUL Per EN 60950, GS Mark Per EN 60950

## Description:

With the PoE-extender, you can easily improve the range and placement of your wireless and surveillance networks and therefore the strength of your networks. PD-POE-Extender is a cost-effective way to extend the Ethernet network range beyond 100m, the PoE-extender will deliver both data and power to network devices up to 200m while complying with IEEE PoE and data standards.

The PoE-extender has both a PD and a PSE chip inside so both the power and the data may be reliably transmitted beyond 100m. The extender acts as a pass-through with data-repeating capabilities.

It can be cascaded to reach up to 500m from the closest datacenter or network closet so you can easily install WLAN APs, IP cameras and access controllers where you need them.



## Specifications:

- Number of ports: 1
- Data rates: 10/100/1000 Mbps
- DC input power: 95W
- Output power: 45-55 VDC
- Dimensions: 30 mm x 30 mm x 190 mm (WxHxL)  
1.18 in x 1.18 in x 7.48 in
- Operating temperature: 40° to 185°F (-40 to 85°C)
- Operating humidity: 95%
- Storage temperature: -40° to 185°F (-40 to 85°C)
- Surge handling capability: 10kv, 5kA to ground in 8/20  $\mu$ s, 800v, 100A PoE
- Regulatory compliance: REACH, RoHS compliant, WEEE compliant, IEC60529 level compliance IP66, NEMA 250, level 4x
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions), EN 55024 (immunity), VCCI
- Immunity to surges: IEC61643-21, GR1089, ITU-T K.45
- Safety approvals: UL 497 B

## Description:

The PD-OUT-SP11 is a high quality surge protection device designed to protect indoor Ethernet networks from lightning that may come from outdoor environment through the Ethernet cable.

The product is enclosed in a metal weatherproof enclosure, meeting IP66. It can be easily mounted on a wall or a pole.

The SP device can be installed before the cable enters the building to protect the indoor network or immediately adjacent to the wall- or pole-mounted outdoor device (i.e. WLAN AP, IP Camera, etc.).



## Specifications:

- Input: RJ-45 connector
- Detects: IEEE 802.3af, IEEE 802.3at, 4-pairs PSE
- Dimensions: 24 mm x 22 mm x 76 mm (WxHxL)  
0.94 in x 0.87 in x 2.99 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: CE
- Indicators: Midspan LED display (Green/Blue)

## Description:

The Power over Ethernet (PoE) tester when connected to an RJ-45 outlet, tests the cabling infrastructure for the presence of power, either IEEE802.3af or IEEE802.3at (2-pairs 30W or 4-pairs 60W). The PoE tester also identifies the existence and type of the power sourcing equipment in your network.

PD-AFAT-Tester has a compact design specifically tailored for system integrators and installers. It is plug and play / simple to use.



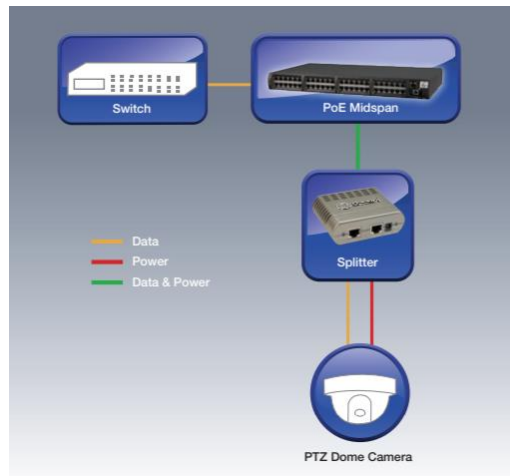
## Specifications:

- Number of ports: 1
- Data rate: 1000 Mbps
- PoE output: 54W
- Power conversion: from 48 V to 12 V or 24 VDC output (user selectable)

## Description:

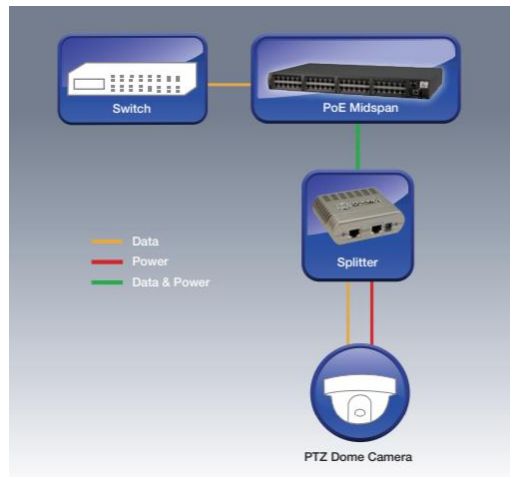
Many contemporary terminals such as 802.11n access points, thin clients, video phones, PTZ (Pan/Tilt/Zoom), and IP cameras were designed and deployed without the ability to accept power via their Ethernet input. Such devices can only accept power through their DC jack while their RJ45 input accepts only data. Also, such devices might require voltage levels lower than the PoE standard minimum voltage (44V in IEEE802.3af or 50V in 802.3at). Using PD-AS-951/12-24, these terminals can immediately become PoE ready without any modification required on their side.

The splitter is identified as a powered device (PD) in front of the powering Midspan and after being detected and powered by the Midspan, it physically splits the combined data and power stream into two separate cords (Ethernet data & DC power) which then go directly to the respective inputs on the terminal. The splitter also adjusts voltage to the level required by the terminal (5V, 12V or 24V).



## Specifications:

- Number of ports: 1
- Data rate: 1000 Mbps
- PoE output: 10W
- Power conversion: Power conversion from 48V to 5V output
- 2 DC Jacks: round 3.4x1.35 mm and 5.5x2.5 mm



## Description:

Many contemporary terminals such as 802.11n access points, thin clients, video phones, PTZ (Pan/Tilt/Zoom), and IP cameras were designed and deployed without the ability to accept power via their Ethernet input. Such devices can only accept power through their DC jack while their RJ45 input accepts only data. Also, such devices might require voltage levels lower than the PoE standard minimum voltage (44V in IEEE802.3af or 50V in 802.3at). Using PD-AS-601/5, these terminals can immediately become PoE ready without any modification required on their side.

The splitter is identified as a powered device (PD) in front of the powering Midspan and after being detected and powered by the Midspan, it physically splits the combined data and power stream into two separate cords (Ethernet data & DC power) which then go directly to the respective inputs on the terminal. The splitter also adjusts voltage to the level required by the terminal (5V, 12V or 24V).





## Specifications:

- Number of ports: 8
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 90-264 VAC
- Output power: 55 VDC
- Dimensions: 445 mm x 263 mm x 44 mm (WxHxL)
- Operating temperature: 32°F to 113°F (0°C to 45°C)
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant, WEEE compliant, CE
- EMI: FCC Class B CE EN 55022 Class B EN 55024 EN 61000-3-2 EN 61000-3-3
- Safety: UL/EN/IEC 60950-1

## Description:

The digital ceiling PoE switch offers an optimal and cost-effective solution for PoE lighting and other digital ceiling applications. It allows lighting fixtures and other Ethernet terminals to receive power and data over standard Ethernet cables in the most efficient way. The PDS-208G is a 240 W fanless switch, designed to be deployed in the ceiling or in communications rooms. Output PoE power can be configured per port, and the device supports full-power mode by providing 30 W for eight ports simultaneously and any individual port can go up to 72 W. The 240 W high-speed switch offers Layer 2 management capabilities. It has eight 10/100/1000 Mbps (Gigabit Ethernet) ports with PoE capabilities based on Microsemi 4-pair PoE technology that enables 50% power loss saving on the Ethernet cables. It also has two Gigabit ports that can be used for uplinks.



## Specifications:

- Number of ports: 8
- PoE output: 90W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Dimensions: 443 mm x 291 mm x 44.4 mm (WxHxL)
- Operating temperature: 32°F to 113°F (0°C to 45°C)
- Regulatory compliance: IEEE 802.3bt (PoE), RoHS compliant, WEEE compliant, CE
- EMI: FCC Class B, EN 55032 Class B, EN 55024, EN 61000-3-2, EN 61000-3-3
- Safety: UL/EN/IEC 60950-1 (ed.2), UL 2043, Plenum rating

## Description:

The PDS-408G digital ceiling PoE switch offers an optimal and cost-effective solution for PoE application like PoE lighting and other digital ceiling applications. It allows lighting fixtures and other Ethernet terminals to receive power, along with data, over standard Ethernet cables in the most efficient way. The PDS-408G is a 480W fan-less switch, designed to be deployed in the ceiling or in communications rooms. Provides automatic output PoE power based on PoE PD device class. It supports full power mode by providing 60W for all 8 ports simultaneously and any specific port can go up to 90W. The 480W high-speed switch can be managed over Web, SSH, Telnet, CLI. It has 8 ports of 10/100/1000 Mbps (Gigabit Ethernet) with PoE BT ports, 2 Gigabit ports and one 1000M/100M SFP port..



## Specifications:

- Number of ports: 1
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 20-60 VDC
- Output power: 50 VDC
- Dimensions: 31 mm x 111 mm x 78 mm (WxHxL)
- Operating temperature: -40°F to 167°F (-40°C to 75°C)
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant, WEEE compliant, REACH
- EMI: EN50522 Class A, EN55024
- Safety: UL 508
- Shock: IEC 60068-2-27 15g, 11 ms duration
- Freefall: IEC 60068-2-32
- Vibration: IEC 60068-2-6, 3, 5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min 1g, 9 H

## Description:

Single port, high-power solution for remote powering of current and emerging high power applications. Generating up to 30W, the 9001GI enables remote power for a new range of applications including 802.11n Access Points, pan-tilt zoom (PTZ) cameras and other IP terminals. It complies to IEEE 802.3at PoE standard and is backward compatible to IEEE802.3af. It can power both 10/100Base-T network devices and 1000Base-T devices. The 9001GI is designed for industrial applications and outdoor applications from temperature point of view.



## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 20-60 VDC
- Output power: 50 VDC
- Dimensions: 35 mm x 111 mm x 78 mm (WxHxL)
- Operating temperature: -40°F to 167°F (-40°C to 75°C)
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant, WEEE compliant, REACH
- EMI: FCC Part 15, Class A, EN50522 Class A (emissions), EN55024 (immunity)
- Safety: UL 508
- Shock: IEC 60068-2-27
- Freefall: IEC 60068-2-31
- Vibration: IEC 60068-2-6

## Description:

Single port, high-power solution for remote powering of current and emerging high power indoor applications. Generating 60W, the 9501GI enables remote power for a new range of applications including 802.11n Access Points, pan-tilt zoom (PTZ) cameras and other IP terminals. It complies to IEEE 802.3at PoE standard and is backward compatible to IEEE802.3af. It can power both existing 10/100/1000Base-T network devices and 1000BaseT devices such as wireless IEEE 802.11ac access points. The 9501GI is designed for industrial applications and outdoor applications from temperature point of view.



## Specifications:

- Number of ports: 5
- PoE output: 60W
- Data rates: SFP: 1000 mbps modules  
Copper: 10/100/1000 mbps
- Input power: 100-240 VAC
- Dimensions: 240 mm x 166 mm x 72 mm (WxHxL)  
8.42 in x 5.90 in x 2.75 in
- Operating temperature: -40°F to 122°F (-40°C to 50°C)
- Regulatory compliance: IEEE 802.3at (PoE, RoHS compliant, WEEE compliant, CE)
- EMI: FCC Part 15, Class B, EN 55022 Class B, EN 55024, EN61000-4-5 Class 5 (6 kV CM), VCCI
- Surge protection: GR-1089-CORE Issue 6, ITU-T K.20 6 kV on AC lines
- Safety: UL60950-1, UL-69950-22, GS Mark
- Other standards: Dust and water intrusion - IEC60529, Level IP66; NEMA 250

## Description:

An outdoor PoE switch that enables the connection of four powered devices to a network such as an outdoor WLAN, outdoor IP camera, or outdoor P2P radio. With VLAN and RADIUS support, the PDS-104GO brings improved security and performance. It provides better safety through centralized management of user profiles and authorized system access. By regulating network traffic in each VLAN, the switch offers increased network performance. There is no need to open the unit during installation. Deployment is simple and straightforward. In addition, it enables remote monitoring and control of the devices' status, including remote reset. The switch extends the reach between the switch and powered devices by an additional 100 meters, to a maximum of 200 meters—a major benefit in many applications. It offers lightning protection to the switch itself and to the indoor network.

[<< BACK to PoE Outdoor](#)[<< BACK to PoE Switches](#)

## Specifications:

- Number of ports: 1
- PoE output: 90W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC  $\pm$ 10%
- Output power: 54 VDC
- Dimensions: 214 mm x 150 mm x 70 mm (WxHxL)  
8.42 in x 5.90 in x 2.75 in
- Operating temperature: -40° to 149°F (-40 to 65°C)
- Regulatory compliance: IEEE 802.3at (PoE+ including 2-event, PoH Type 2), RoHS compliant, WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B, EN 55024, VCCI
- Surge protection: GR-1089-CORE Issue 6, ITU-T K.20 6 kV on AC lines
- Safety: UL60950-1, UL-69950-22
- Other standards: Dust and water intrusion - EN60529, Level1P66, NEMA 250, Level 4X ASTM, B-117 corrosion resistance

## Description:

Single-port Midspan offering a cost effective, PoH compliant solution for outdoor installations, guaranteeing 90 Watts of power and ensuring safe and reliable operation in outdoor environment of any standard PoH data terminal. It allows wireless LAN access points, security network cameras and other IP terminals to receive power, along with data, over standard Ethernet cables, leaving network infrastructure completely unaltered.

The PD-9601GO also offers surge protection for both the AC and the PoE ports ensuring the indoor equipment is protected from outdoor surges.



## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 36-60 VDC
- Output power: 50-57 VDC
- Dimensions: 214 mm x 150 mm x 70 mm (WxHxL)  
8.42 in x 5.90 in x 2.75 in
- Operating temperature: -40°F to 122°F (-40°C to 50°C) @ 60W  
-40°F to 131°F (-40°C to 55°C) @ 30W
- Regulatory compliance: IEEE 802.3at (PoE+ including 2-event, PoH Type 2), RoHS compliant, WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B, EN 55024, EN61000-4-5 Class 5 (6kV CM) VCCI
- Surge protection: GR-1089-CORE Issue 4, ITU-T K.20 6 kV on AC lines
- Safety: UL60950-1, UL60950-22, GS Mark
- Other standards: Dust and water intrusion - EN60529, Level1P66, NEMA 250, Level 4X ASTM, B-117 corrosion resistance

## Description:

Single-port Midspan offers a cost effective, IEEE 802.3at compliant solution for outdoor installations, guaranteeing 60 Watts of power and ensuring safe and reliable operation in outdoor environment of any standard PoE data terminal. It allows wireless LAN access points, security network cameras and other IP terminals to receive power, along with data, over standard Ethernet cables, leaving network infrastructure completely unaltered.

The PD-9501GO/48VDC also offers surge protection ensuring the indoor equipment is protected from outdoor surges.



## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 10-36 VDC
- Output power: 55 VDC
- Dimensions: 214 mm x 150 mm x 70 mm (WxHxL)  
8.42 in x 5.90 in x 2.75 in
- Operating temperature: -40°F to 122°F (-40°C to 50°C) @ 60W  
-40°F to 131°F (-40°C to 55°C) @ 30W
- Regulatory compliance: IEEE 802.3at (PoE+ including 2-event, PoH Type 2), RoHS compliant, WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B, EN 55024, EN61000-4-5 Class 5 (6kV CM) VCCI
- Surge protection: GR-1089-CORE Issue 4, ITU-T K.20 6 kV on AC lines
- Safety: UL60950-1, UL60950-22, GS Mark
- Other standards: Dust and water intrusion - EN60529, Level 1P66, NEMA 250, Level 4X ASTM, B-117 corrosion resistance

## Description:

Single port Midspan offering a cost effective, IEEE 802.3at compliant solution for outdoor installations, guaranteeing 60 Watts of power and ensuring safe and reliable operation in outdoor environment of any standard PoE data terminal. It allows wireless LAN access points, security network cameras and other IP terminals to receive power, along with data, over standard Ethernet cables, leaving network infrastructure completely unaltered. The PD-9501GO/12-24VDC also offers surge protection ensuring the indoor equipment is protected from outdoor surges.





## Features:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 54 VDC
- Dimensions:
  - 170 mm x 140 mm x 60 mm (WxHxL)
  - 6.69 in x 5.51 in x 2.36 in
- Operating temperature: -40°F to 149°F (-40°C to 65°C)
- Regulatory compliance:
  - IEEE 802.3at (PoE), RoHS & WEEE compliant, CE
- Electromagnetic Interference (EMI):
  - FCC Part 15, Class B, EN 55022 Class B (emissions), EN 55024, EN61000-4-5 Class 5 (6 kV CM/DM), VCCI
- Safety: UL/IEC/EN 60950-1, UL60950-22
- Other standards:
  - Dustproof and water resistance: EN60529, approvals level IP67; NEMA 250, level 4X ASTM B-117 corrosion resistance



## Specifications:

- Number of ports: 1
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 54 VDC
- Dimensions: 170 mm x 140 mm x 60 mm (WxHxL)  
6.69 in x 5.51 in x 2.36 in
- Operating temperature: -40°F to 149°F (-40°C to 65°C)
- Regulatory compliance: IEEE 802.3af (PoE), RoHS compliant, WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions), EN 55024, EN61000-4-5 Class 5 (6 kV CM/DM), VCCI
- Safety: UL/IEC/EN 60950-1, UL60950-22
- Other standards: Dustproof and water resistance: EN60529, approvals level IP67; NEMA 250, level 4X ASTM B-117 corrosion resistance

## Description:

Single-port Midspan offering a cost-effective, IEEE 802.3at compliant solution for outdoor installations, guaranteeing 30W of power and ensuring safe and reliable operation of any standard PoE data terminal in outdoor environments. It allows wireless LAN access points, security network cameras, and other IP terminals to receive power and data over standard Ethernet cables, leaving network infrastructure completely unaltered. The PD-9001GO-ET also offers surge protection for both the AC and the PoE ports, ensuring the indoor equipment is protected from outdoor surges.



## Specifications:

- Number of ports: 12
- PoE output: 90W
- Data rates: 10/100/1000 Mbps
- Input power: 100 to 240 VAC, 57VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in ± in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3bt, RoHS Compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions), EN 55024 (immunity), VCCI
- Safety: UL/IEC/EN 60950-1 (Ed. 2)

## Description:

The 12 multiport solution for remote powering of current as well as emerging high power applications. The PD-9600GC is designed specifically to power IEEE 802.11 access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 90W of power. The family solution support 802.3bt powered devices and is also backward compatible and safe to use with any IEEE 802.3af/at terminal. It can power both existing 10/100Base-T devices and Gigabit devices. With the midspan's plug and-play installation, they are easy and cost effective to implement leveraging existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 24
- PoE output: 90W
- Data rates: 10/100/1000 Mbps
- Input power: 100 to 240 VAC, 57VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in ± in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3bt, RoHS Compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions), EN 55024 (immunity), VCCI
- Safety: UL/IEC/EN 60950-1 (Ed. 2)

## Description:

The 24 multiport solution for remote powering of current as well as emerging high power applications. The PD-9600GC is designed specifically to power IEEE 802.11 access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 90W of power. The family solution support 802.3bt powered devices and is also backward compatible and safe to use with any IEEE 802.3af/at terminal. It can power both existing 10/100Base-T devices and Gigabit devices. With the midspan's plug and-play installation, they are easy and cost effective to implement leveraging existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 6
- PoE output: 90W
- Data rates: 10/100/1000 Mbps
- Input power: 100 to 240 VAC, 57VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in ± in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3bt, RoHS Compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/IEC/EN 60950-1 (Ed. 2)

## Description:

The 6 multiport solution for remote powering of current as well as emerging high power applications. The PD-9600GC is designed specifically to power IEEE 802.11 access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 90W of power. The family solution support 802.3bt powered devices and is also backward compatible and safe to use with any IEEE 802.3af/at terminal. It can power both existing 10/100Base-T devices and Gigabit devices. With the midspan's plug and-play installation, they are easy and cost effective to implement leveraging existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 24
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3bt, IEEE 802.3af/at , RoHS  
Compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety:UL/IEC/EN 60950-1 (Ed. 2)

## Description:

The 24-port solution for remote powering of current as well as emerging high power applications. The PD-9524GC is designed specifically to power IEEE 802.11 access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 60W of power. The family solution support IEEE 802.3bt powered devices and is also backward compatible and safe to use with any IEEE 802.3af/at terminal. It can power both existing 10/100Base-T devices and Gigabit devices. With the midspan's plug and-play installation, they are easy and cost effective to implement leveraging existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 12
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3bt, IEEE 802.3af/at , RoHS  
Compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety:UL/IEC/EN 60950-1 (Ed. 2)

## Description:

The 12-port solution for remote powering of current as well as emerging high power applications. The PD-9512GC is designed specifically to power IEEE 802.11 access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 60W of power. The family solution support IEEE 802.3bt powered devices and is also backward compatible and safe to use with any IEEE 802.3af/at terminal. It can power both existing 10/100Base-T devices and Gigabit devices. With the midspan's plug and-play installation, they are easy and cost effective to implement leveraging existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 6
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3bt, IEEE 802.3af/at , RoHS  
Compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety:UL/IEC/EN 60950-1 (Ed. 2)

## Description:

The 6-port solution for remote powering of current as well as emerging high power applications. The PD-9506GC is designed specifically to power IEEE 802.11 access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 60W of power. The family solution support IEEE 802.3bt powered devices and is also backward compatible and safe to use with any IEEE 802.3af/at terminal. It can power both existing 10/100Base-T devices and Gigabit devices. With the midspan's plug and-play installation, they are easy and cost effective to implement leveraging existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.





## Specifications:

- Number of ports: 24
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC, 46-57 VDC
- Output power: 55 VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3at (PoE+ including 2-event, PoH Type 2), RoHS compliant, VCCI, CE, C-Tick
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions), EN 55024 (immunity), VCCI
- Safety: UL/cUL Per EN 60950-1 GS Mark Per EN 60950-1

## Description:

Designed specifically to power IEEE 802.11n and IEEE 802.3at access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals. Includes 24 ports which are backward compatible and safe to use with any 802.3af terminal such as VoIP phones, IP cameras and wireless LAN access points. With plug-and-play installation, the Midspan is easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing the assurance of a future proof network. For secure remote management, it includes PowerView Pro management software.



## Specifications:

- Number of ports: 12
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC, 46-57 VDC
- Output power: 55 VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3at (PoE+ including 2-event, PoH Type 2), RoHS compliant, VCCI, CE, C-Tick
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions), EN 55024 (immunity), VCCI
- Safety: UL/cUL Per EN 60950-1 GS Mark Per EN 60950-1

## Description:

Designed specifically to power IEEE 802.11n and IEEE 802.3at access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals. Includes 12 ports which are backward compatible and safe to use with any 802.3af terminal such as VoIP phones, IP cameras and wireless LAN access points. With plug-and-play installation, the Midspan is easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing the assurance of a future proof network. For secure remote management, it includes PowerView Pro management software.



## Specifications:

- Number of ports: 6
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC, 46-57 VDC
- Output power: 55 VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3at (PoE+ including 2-event, PoH Type 2), RoHS compliant, VCCI, CE, C-TickW
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions), EN 55024 (immunity), VCCI
- Safety: UL/cUL Per EN 60950-1 GS Mark Per EN 60950-1

## Description:

Designed specifically to power IEEE 802.11n and IEEE 802.3at access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals. Includes 6 ports which are backward compatible and safe to use with any 802.3af terminal such as VoIP phones, IP cameras and wireless LAN access points. With plug-and-play installation, the Midspan is easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing the assurance of a future proof network. For secure remote management, it includes PowerView Pro management software.



## Specifications:

- Number of ports: 4
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 90-264 VAC
- Output power: 55 VDC
- Dimensions: 148 mm x 224 mm x 43 mm (WxHxL)  
5.82 in x 8.82 in x 1.69 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3af (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety:UL/cUL Per EN 60950, GS Mark Per EN 60950

## Description:

Offers a cost effective, IEEE 802.3at compliant solution to upgrade existing infrastructure with PoE, guaranteeing 30 Watts of power through each port and ensuring safe operation of any standard PoE data terminal. The PD-9004G is an ideal solution for powering and controlling up to 4 remote devices, including wireless LAN access points, security network cameras and IP phones without any changes to the installed network infrastructure.



## Specifications:

- Number of ports: 24
- PoE output: 15.4W
- Data rates: 10/100/1000 Mbps
- Input power: 90-240 VAC
- Output power: 52 VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32° to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3af (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/cUL Per IEC60950-1 GS Mark Per IEC60950-1

## Description:

Sets a new standard for highly secure, intelligent, remotely-managed and safe-to-use PoE. The 24 ports make a wide range of flexible Power over Ethernet installations possible. The Midspan provides up to 15.4W of power over Ethernet to IP telephones, wireless LAN access points, security network cameras and many other types of data terminals over standard Ethernet data cables, leaving network infrastructure completely unaltered. With the Midspan's plug-and-play installation, it is easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 12
- PoE output: 15.4W
- Data rates: 10/100/1000 Mbps
- Input power: 90-240 VAC
- Output power: 52 VDC
- Dimensions: 438 mm x 272 mm x 44 mm (WxHxL)  
17.3 in x 10.8 in x 1.75 in
- Operating temperature: 32° to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3af (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/cUL Per IEC60950-1 GS Mark Per IEC60950-1

## Description:

Sets a new standard for highly secure, intelligent, remotely-managed and safe-to-use PoE. The 12 ports make a wide range of flexible Power over Ethernet installations possible. The Midspan provides up to 15.4W of power over Ethernet to IP telephones, wireless LAN access points, security network cameras and many other types of data terminals over standard Ethernet data cables, leaving network infrastructure completely unaltered. With the Midspan's plug-and-play installation, it is easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 4
- PoE output: 15.4W
- Data rates: 10/100/1000 Mbps
- Input power: 100 to 240 VAC
- Output power: 55 VDC
- Dimensions: 148 mm x 224 mm x 43 mm (WxHxL)  
5.82 in x 8.82 in x 1.69 in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3af (PoE, PoH Type 1),  
RoHS compliant, WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/cUL Per EN 60950, GS Mark Per EN 60950

## Description:

Offers a cost effective, IEEE 802.3af compliant solution to upgrade existing infrastructures with PoE, providing a maximum of 15.4 watts of power through each port and ensuring safe operation of any standard PoE data terminal. The PD-3504G provides PoE to IP telephones, wireless LAN access points, security network cameras and IP terminals to receive power, along with data, over standard Ethernet cables, leaving network infrastructure completely unaltered.

With the Midspan's plug-and-play installation, they are easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Specifications:

- Number of ports: 1
- PoE output: 90W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 54 VDC
- Dimensions: 88.7 mm x 43.9 mm x 166.4 mm (WxHxL)  
3.49 in x 1.73 in x 6.55 in
- Operating temperature: 14°F to 104°F (-10°C to 40°C)
- Regulatory compliance: IEEE 802.3bt (Type 4), RoHS compliant, WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions), EN 55024 (immunity), VCCI
- Safety: UL/EN/IEC 60950-1 (ed.2)

## Description:

Single port solution that can provide up to 90W based on the IEEE 802.3bt standard, it is used for remote powering of current as well as emerging high power applications. The PD-9601GC is designed to power PoE compliant devices such as IEEE 802.11ax access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals requiring up to 90W of power. The PD-9601GC is IEEE 802.3bt type 4 and is also backward compatible and safe to use with any IEEE 802.3af/at terminal such as VoIP phones, IP cameras and wireless LAN access points, powering 10/100/1000Base-T devices. With the midspan's plug and-play installation, they are easy and cost effective to implement leveraging existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.





## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 24VAC  $\pm$  20%
- Output power: 54-57VDC
- Dimensions: 87 mm x 43 mm x 166 mm (WxHxL)  
3.46 in x 1.68 in x 5.63 in
- Operating temperature: -14°F to 104°F (-10°C to 40°C) @ 60W  
-14°F to 122°F (-10°C to 50°C) @ 30W
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity)
- Safety: GS Mark Per IEC60950

## Description:

Best-of-Breed single port solution for remote powering of current in a 24VAC environment as well as high power applications.

The Midspan is designed specifically to power IEEE 802.11n and IEEE 802.3at access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end-terminals with 60W of power, and is also backward compatible and safe to use with any 802.3af terminal such as VoIP phones, IP cameras and wireless LAN access points.

It can power both existing 10/100Base-T devices and emerging wireless Gigabit devices such as WI-MAX and wireless IEEE 802.11n access points.

With the Midspan's plug-and-play installation, they are easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing flexibility to assurance a future-proof scalable network.



## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 36-60 VDC
- Output power: 54-57 VDC
- Dimensions: 87 mm x 43 mm x 166 mm (WxHxL)  
3.46 in x 1.68 in x 5.63 in
- Operating temperature: -4°F to 104°F (-20°C to 40°C) @ 60W  
-4°F to 122°F (-20°C to 50°C) @ 30W
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity)
- Safety: GS Mark Per IEC60950

## Description:

Best-of-Breed single port solution for remote powering of devices in a 48VDC environment as well as high power applications.

The Midspan is designed specifically to power IEEE 802.11n and IEEE802.3at access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end-terminals with 60W of power, and is also backward compatible and safe to use with any 802.3af terminal such as VoIP phones, IP cameras and wireless LAN access points.

It can power both existing 10/100Base-T devices and emerging wireless Gigabit devices such as WI-MAX and wireless IEEE 802.11n access points.

With the Midspan's plug-and-play installation, they are easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing flexibility to assure a future-proof scalable network.



## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 20-36 VDC
- Output power: 54-57 VDC
- Dimensions: 87 mm x 43 mm x 166 mm (WxHxL)  
3.46 in x 1.68 in x 5.63 in
- Operating temperature: -4°F to 104°F (-20°C to 40°C) @ 60W  
-4°F to 122°F (-20°C to 50°C) @ 30W
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity)
- Safety: GS Mark Per IEC60950

## Description:

Best-of-Breed single port solution for remote powering of current in a 24VDC environment as well as high power applications.

The Midspan is designed specifically to power IEEE 802.11n and IEEE802.3at access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end-terminals with 60W of power, and is also backward compatible and safe to use with any 802.3af terminal such as VoIP phones, IP cameras and wireless LAN access points.

It can power both existing 10/100Base-T devices and emerging wireless Gigabit devices such as WI-MAX and wireless IEEE 802.11n access points.

With the Midspan's plug-and-play installation, they are easily and cost effectively implemented leveraging an existing Ethernet infrastructure while at the same time providing flexibility to assurance a future-proof scalable network.



## Specifications:

- Number of ports: 3
- PoE output: 60W
- Data rates: SFP: 1000 mbps modules  
Copper: 10/100/1000 mbps
- Input power: 100-240 VAC  $\pm 10\%$
- Output power: 54 VDC
- Dimensions: 80 mm x 36 mm x 160 mm (WxHxL)  $\pm$  mm
- Operating temperature: 14°F to 113°F ( $-10^{\circ}\text{C}$  to  $45^{\circ}\text{C}$ ) @ 60W  
14 °F to 131°F ( $-10^{\circ}\text{C}$  to  $55^{\circ}\text{C}$ ) @ 30W
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/EN/IEC 60950-1

## Description:

A media converter with PoE functionality. It has total of 3 ports that can be active simultaneously. Data input can be through SFP module or through the RJ45 port, while the output will be data and power up to 60 W. The media converter offers a unique solution to powering long range installations, where the data input comes over fiber. Standard SFP modules can be used (SM or MM modules). The 9501G-SFP complies with IEEE 802.3at and will provide PoE after detection. The PoE port will provide the power level needed by the end device, offering a safe solution for all types of applications starting with 802.3af loads and up to 802.3at 4-pairs loads.



## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 55 VDC
- Dimensions: 62 mm x 38 mm x 151mm (WxHxL)  
2.44 in x 1.5 in x 5.94 in
- Operating temperature: 14°F to 104°F (-10°C to 40°C) @ 60W  
14°F to 131°F (-10°C to 50°C) @ 30 W
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- Surge protection: EN 61000-4-5 (10/700 µsec, 4 KV)  
IEC- 61643-21  
GR-1089-CORE lightning protection  
demands ITU-T K.45 international standard
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/cUL Per EN 60950-1, GS Mark Per EN 60950-1

## Description:

Single port solution for remote powering of current as well as emerging high power applications.

The PD-9501GR/SP provides Surge Protection functionality optimal for the installation of outdoor PDs. The PD-9501GR/SP is designed specifically to power IEEE 802.11n and IEEE 802.3at access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 60W of power, and is also backward compatible and safe to use with any IEEE 802.3af terminal such as VoIP phones, IP cameras and wireless LAN access points. It can power both existing 10/100Base-T devices and emerging wireless 1000Base-T devices such as Wi-MAX and wireless IEEE 802.11n access points. The PD-9501GR/SP provides power on all 4-pairs while being backwards compatible to 802.3af and 802.3at powered devices.



## Specifications:

- Number of ports: 1
- PoE output: 60W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 55 VDC
- Dimensions: 62 mm x 38 mm x 151 mm (WxHxL)  
2.44 in x 1.5 in x 5.94 in
- Operating temperature: 32°F to 104°F (-0°C to 40°C)  
Regulatory compliance: IEEE 802.3bt (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/IEC/EN 60950-1 (ed. 2)

## Description:

Single port solution for remote powering of current as well as emerging high power applications. The PD-9501GC is designed specifically to power IEEE 802.11n and IEEE 802.3bt access points, pan-tilt-zoom (PTZ) and dome cameras, IP videophones, thin clients and other high power Ethernet end terminals with 60W of power, and is also backward compatible and safe to use with any IEEE 802.3af/at terminal such as VoIP phones, IP cameras and wireless LAN access points. It can power both existing 10/100Base-T devices and emerging wireless Gigabit devices such as wireless IEEE 802.11n access points. The PD-9501GC provides power on all 4-pairs while being backwards compatible to 802.3af and 802.3at powered devices.



## Specifications:

- Number of ports: 1
- PoE output: 30W
- Data rates: 10/100/1000 Mbps and 10 GbE
- Input power: 100-240 VAC
- Output power: 55 VDC
- Dimensions: 87.9 mm x 43 mm x 166 mm (WxHxL)  
3.46 in x 1.68 in x 6.53 in
- Operating temperature: 14°F to 113°F (-10°C to 45°C)
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/EN/IEC 60950-1

## Description:

Single port, high-power solution for remote powering of current and emerging high power indoor applications. Generating 30W, the PD-9001-10GR enables remote power for a new range of applications including 802.11ac Access Points, pan-tilt-zoom (PTZ) cameras and videophones. It complies to IEEE 802.3at PoE standard and is backward compatible to IEEE802.3af. It can power both existing 10/100/1000Base-T network devices and emerging wireless 10GbE devices such as wireless IEEE 802.11ac access points.



## Specifications:

- Number of ports: 1
- PoE output: 30W
- Data rates: 10/100/1000 Mbps and 2.5 GbE
- Input power: 100-240 VAC
- Output power: 55 VDC
- Dimensions: 87.9 mm x 43 mm x 166 mm (WxHxL)  
3.46 in x 1.68 in x 6.53 in
- Operating temperature: 14°F to 113°F (-10°C to 45°C)
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/EN/IEC 60950-1

## Description:

Single port, high-power solution for remote powering of current and emerging high power indoor applications. Generating 30W, the PD-9001-25GR enables remote power for a new range of applications including 802.11ac wave 2 Access Points, pan-tilt-zoom (PTZ) cameras and video-phones. It complies to IEEE 802.3at PoE standard and is backward compatible to IEEE802.3af. It can power both existing 10/100/1000Base-T network devices and emerging wireless 2.5GbE devices such as wireless IEEE 802.11ac access points.





## Specifications:

- Number of ports: 1
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 55 VDC
- Dimensions: 62 mm x 38 mm x 151 mm (WxHxL)  
2.44 in x 1.5 in x 5.94 in
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant, WEEE compliant, CE
- Surge protection: EN 61000-4-5 (10/700  $\mu$ sec, 4 KV)  
IEC-61643-21  
GR-1089-CORE lightning protection demands  
ITU-T K.45 international standard
- EMI: FCC Part 15, Class B, EN 55022 Class B (emissions), EN 55024 (immunity), VCCI
- Safety: UL/cUL Per IEC 60950-1, GS Mark Per IEC 60950-1

## Description:

Single port, high-power solution for remote powering of current and emerging high power applications. The PD-9501GR/SP provides surge protection functionality optimal for the installation of outdoor PDs. Generating up to 30W, the PD-9001GR/SP enables remote power for a new range of applications including 802.11n access points, pan-tilt-zoom (PTZ) cameras, and video-phones. It complies to IEEE 802.3at PoE standard and is backward compatible to IEEE 802.3af. It can power both existing 10/100 Base-T network devices and emerging wireless 1000 Base-T devices such as WiMAX and wireless IEEE 802.11n access points.



## Specifications:

- Number of ports: 1
- PoE output: 30W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 48 VDC
- Dimensions: 51.8 mm x 34.8 mm x 160.5 mm (WxHxL)  $\pm 0.5$ mm  
2.04 in x 1.37 in x 6.31 in  $\pm 0.02$  in
- Operating temperature: -4°F to 104°F (-20°C to 40°C) @ 30W  
-4°F to 131°F (-20°C to 55°C) @ 22.5W
- Regulatory compliance: IEEE 802.3at (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/EN/IEC 60950-1 (Ed.2)

## Description:

A single port, high-power solution for remote powering of current and emerging high power applications. Generating up to 30W, the PD-9001GR enables remote power for a new range of applications including 802.11n Access Points, pan-tilt-zoom (PTZ) cameras and video-phones. It complies to IEEE 802.3at PoE standard and is backward compatible to IEEE802.3af. It can power both existing 10/100Base-T network devices and emerging wireless 1000Base-T devices such as WiMAX and wireless IEEE 802.11n access points.



## Specifications:

- Number of ports: 1
- PoE output: 15.4W
- Data rates: 10/100/1000 Mbps
- Input power: 100-240 VAC
- Output power: 48 VDC
- Dimensions: 51.8 mm x 34.8 mm x 160.5 mm (WxHxL)  $\pm 0.5$ mm  
2.04 in x 1.37 in x 6.31 in  $\pm 0.02$  in
- Operating temperature: 32°F to 104°F (0°C to 40°C)
- Regulatory compliance: IEEE 802.3af (PoE), RoHS compliant,  
WEEE compliant, CE
- EMI: FCC Part 15, Class B, EN 55032 Class B (emissions),  
EN 55024 (immunity), VCCI
- Safety: UL/EN/IEC 60950-1 (Ed.2)

## Description:

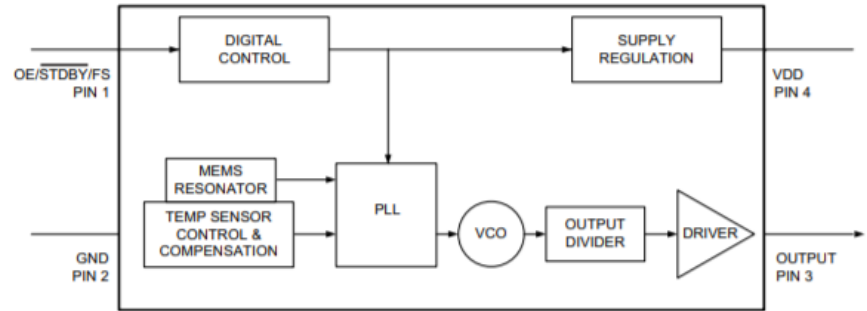
Single-port PoE Midspan offering a compact and cost effective, IEEE 802.3af compliant solution for powering IP phones, WLAN access points, network cameras and other IP terminal devices.

The PD-3501G provides reliable power over standard Ethernet cables, leaving existing network infrastructure completely unaltered. With plug-and-play installation, the PD-3501G can be easily and cost effectively implemented leveraging the existing Ethernet infrastructure while at the same time providing the assurance of a future proof network.



## Features:

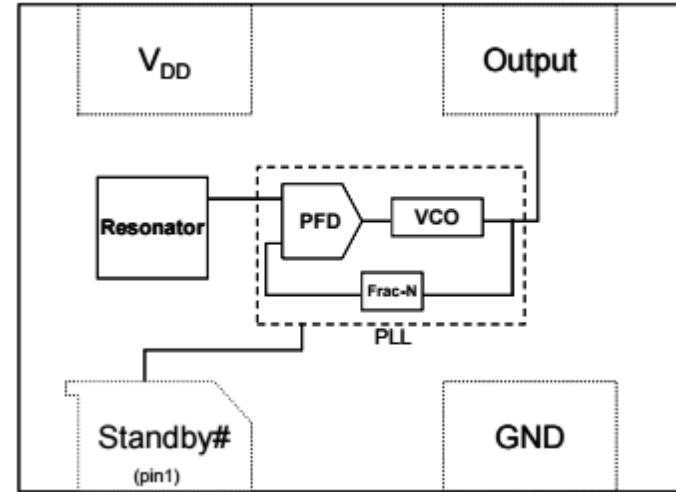
- Wide Frequency Range:
  - DSC60xxB: 2kHz to 80MHz
  - DSC61xxB: 2KHz to 100MHz
- Ultra Low Power Consumption:
  - DSC60xxB: 1.3mA/1uA (Active/Stdby)
  - DSC61xxB: 3mA/1uA (Active/Stdby)
- Ultra Small Footprints:
  - 1.6mmx1.2mm, 2.0mmx1.6mm,
  - 2.5mmx2.0mm, 3.2mmx2.5mm
- Frequency Select input supports 2 frequencies
- High Stability:  $\pm 20$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability
- 20x better MTF than quartz oscillators
- Supply Range of 1.71 to 3.63 V
- Temperature Range:
  - Automotive:  $-40^{\circ}$  to  $125^{\circ}\text{C}$
  - Extended Industrial:  $-40^{\circ}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}$  to  $85^{\circ}\text{C}$
  - Extended Commercial:  $-20^{\circ}$  to  $70^{\circ}\text{C}$



	Pin 1	Output Drive strength	Active Current
DSC6001	OE	10 pf	1.3mA
DSC6003	OE	5 pf	1.3mA
DSC6011	Standby	10 pf	1.3mA
DSC6013	Standby	5 pf	1.3mA
DSC6021	Frequency Select	10 pf	1.3mA
DSC6023	Frequency Select	5 pf	1.3mA
DSC6101	OE	10 pf	3mA
DSC6102	OE	15 pf	3mA
DSC6111	Standby	10 pf	3mA
DSC6112	Standby	15 pf	3mA
DSC6121	Frequency Select	10 pf	3mA
DSC6122	Frequency Select	15 pf	3mA

## Features:

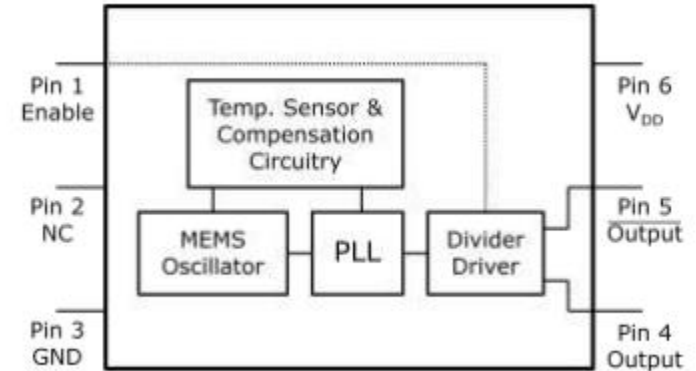
- Frequency Range: 1 to 150MHz
- Drive Strength: 15pF, 25pF, 40pF
- Exceptional Stability over Temperature:
  - $\pm 10$  PPM,  $\pm 25$  PPM,  $\pm 50$  PPM
- Operating voltage of 1.7V to 3.6V
- Operating Temperature Range:
  - Extended Industrial  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended Commercial  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
  - Commercial  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- Low Operating and Standby Current:
  - 5mA Operating (40MHz)
  - 15 $\mu\text{A}$  Standby
- Ultra Miniature Footprint:
  - 2.5mm x 2.0mm x 0.85mm
  - 3.2mm x 2.5mm x 0.85mm
  - 5.0mm x 3.2mm x 0.85mm
  - 7.0mm x 5.0mm x 0.85mm
- MIL-STD 883 Shock and Vibration Resistant
- AEC-Q100 Qualified



	Pin 1	Output Drive strength
DSC1001	Standby	15 pf
DSC1003	Standby	25 pf
DSC1004	Standby	40 pf

## Features:

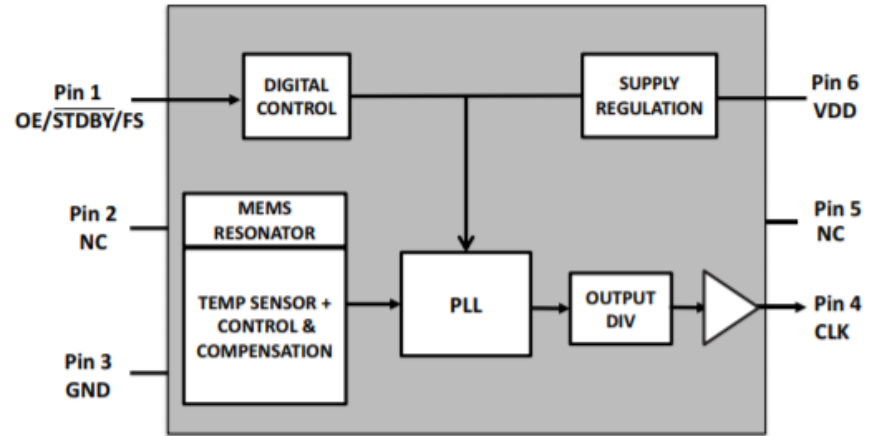
- Low RMS Phase Jitter: 1.7 ps (typ. 12k-20M)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive:  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 170MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm, 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function



	Pin 1	Output Drive Strength
DSC1101	Standby	High
DSC1121	OE	High
DSC1105	Standby	Low
DSC1125	OE	Low

## Features:

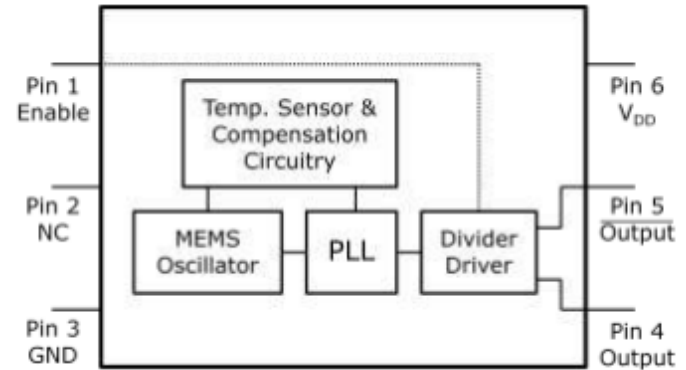
- Low RMS Phase Jitter: 0.65 ps (typ. 12k-20M)
- High Stability:  $\pm 20$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive:  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.5 to 170MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby/Output Enable/Frequency Select Function



	Pin 1
DSC1201	Standby
DSC1211	Frequency Select
DSC1221	OE

## Features:

- Low RMS Phase Jitter: 1.7 ps (typ. 12k-20M)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function

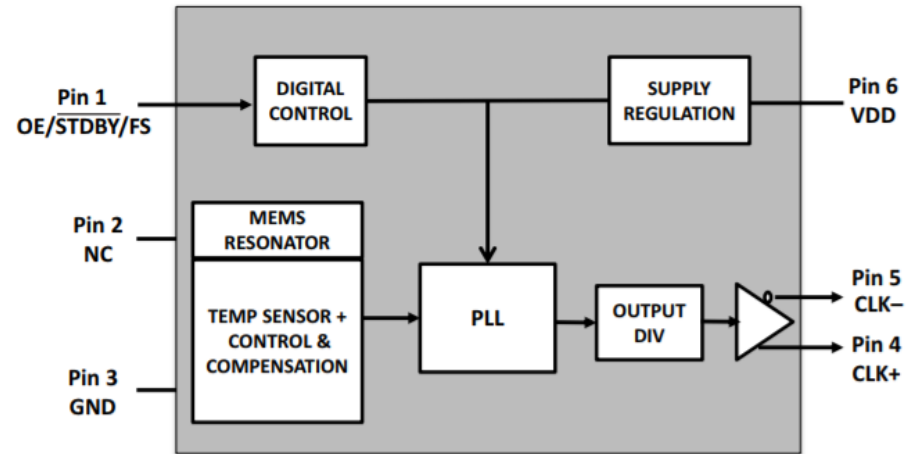


	Pin 1
DSC1102	Standby
DSC1122	OE



## Features:

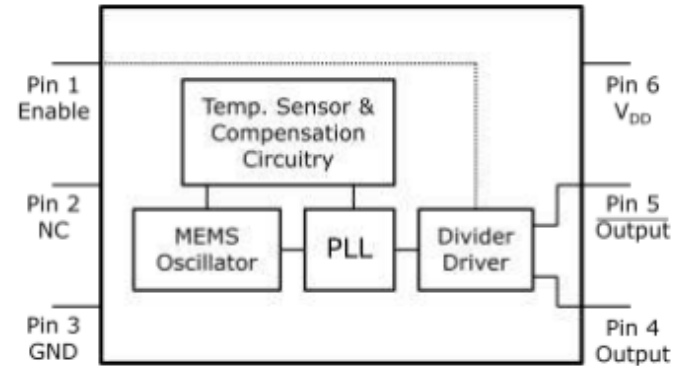
- Wide Freq. Range: 2.5 to 450MHz
- Low RMS Phase Jitter: 0.65 ps (typ. 12k-20M)
- High Stability:  $\pm 20$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Small Industry Standard Footprints:
  - $2.5\text{mm} \times 2.0\text{mm}$   $3.2\text{mm} \times 2.5\text{mm}$ ,
  - $5.0\text{mm} \times 3.2\text{mm}$ , &  $7.0\text{mm} \times 5.0\text{mm}$
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby/Output Enable/Frequency Select Function



	Pin 1
DSC1202	Standby
DSC1212	Frequency Select
DSC1222	OE

## Features:

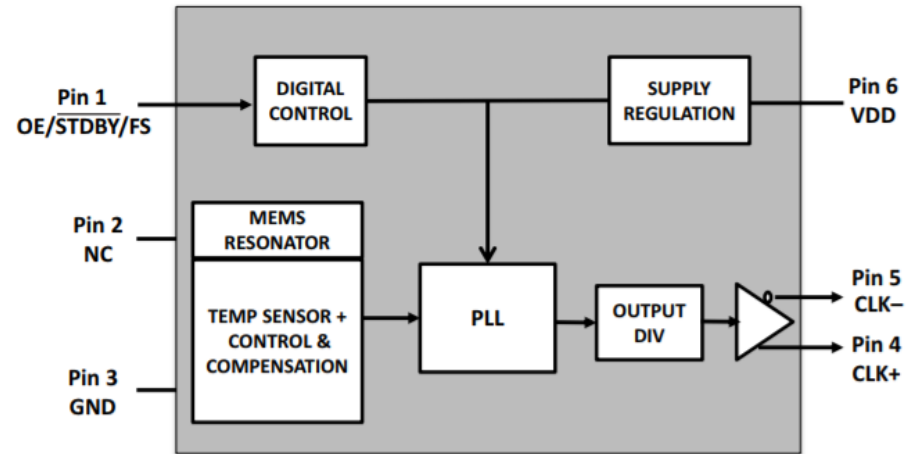
- Low RMS Phase Jitter: 1.7 ps (typ. 12k-20M)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Extended industrial:  $-20^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm 3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function



	Pin 1
DSC1103	Standby
DSC1123	OE

## Features:

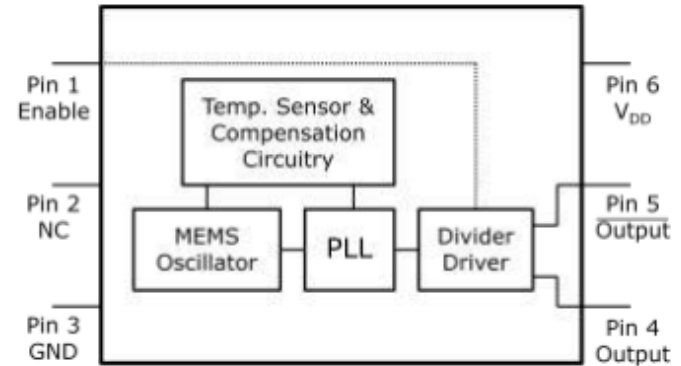
- Wide Freq. Range: 2.5 to 450MHz
- Low RMS Phase Jitter: 0.65 ps (typ. 12k-20M)
- High Stability:  $\pm 20$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive:  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby/Output Enable/Frequency Select Function



	Pin 1
DSC1203	Standby
DSC1213	Frequency Select
DSC1223	OE

## Features:

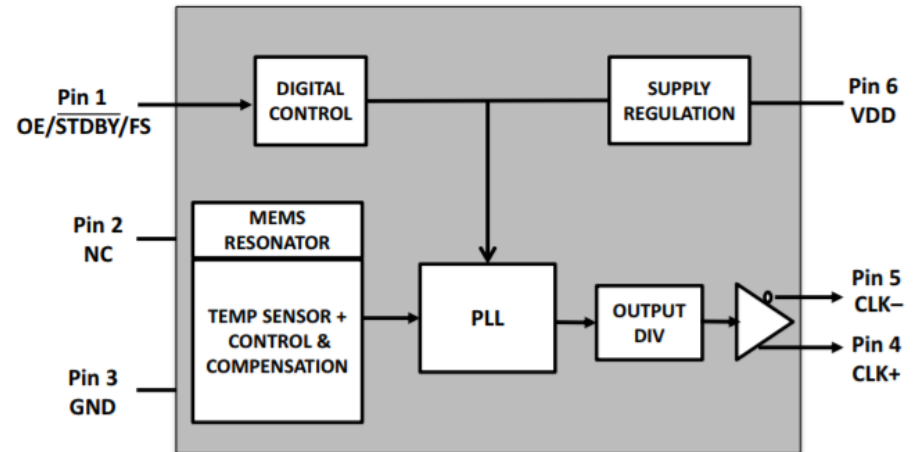
- Low RMS Phase Jitter: 1.7 ps (typ. 12k-20M)
- Meet PCIe Gen1/2/3/4 Clock Spec
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range
  - Extended industrial:  $-20^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Extended commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide Freq. Range: 2.3 to 460MHz
- Small Industry Standard Footprints
  - 2.5mm x 2.0mm3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
  - Qualified to MIL-STD-883
- High Reliability
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby & Output Enable Function



	Pin 1
DSC1104	Standby
DSC1124	OE

## Features:

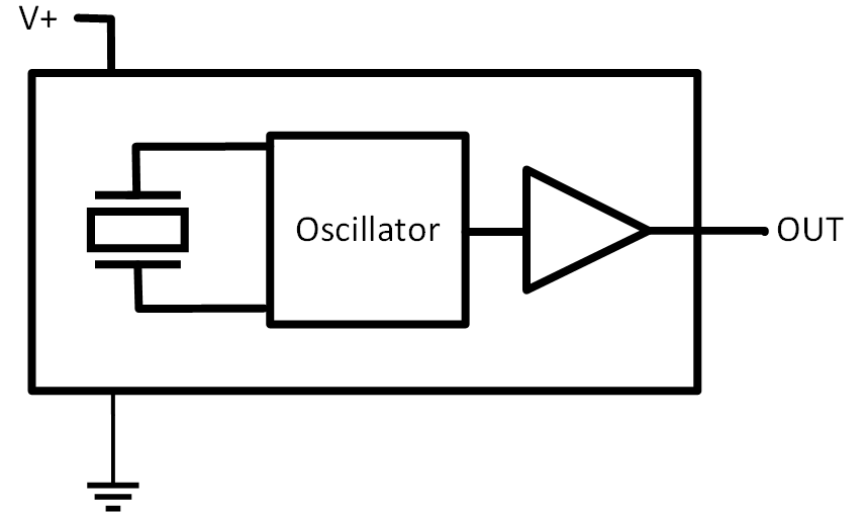
- Wide Freq. Range: 2.5 to 450MHz
- Low RMS Phase Jitter: 0.65 ps (typ. 12k-20M)
- Meets PCIe Gen1/2/3/4 Clock Specs
- High Stability:  $\pm 20$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Small Industry Standard Footprints:
  - 2.5mm x 2.0mm3.2mm x 2.5mm,
  - 5.0mm x 3.2mm, & 7.0mm x 5.0mm
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Low Current Consumption
- Supply Range of 2.25V to 3.6V
- Standby/Output Enable/Frequency Select Function



	Pin 1
DSC1204	Standby
DSC1214	Frequency Select
DSC1224	OE

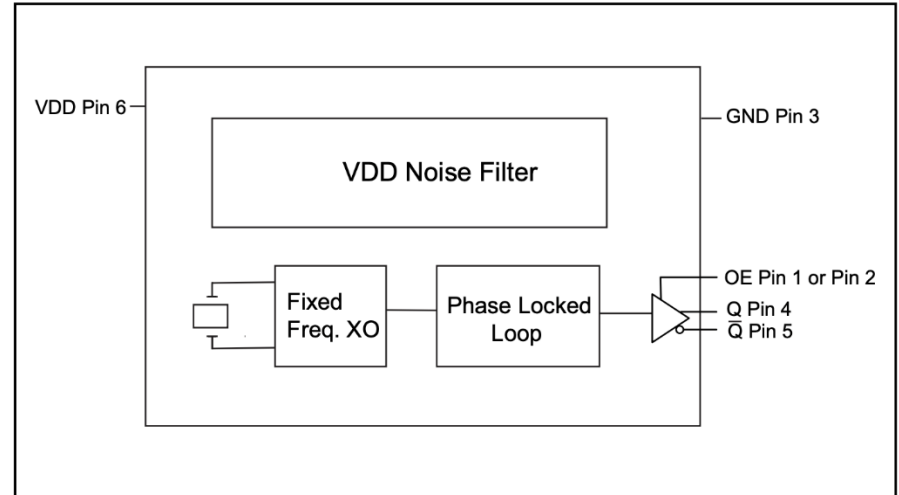
## Features:

- Frequency Range: 0.6 to 3 GHz
- Output: Sine, LVPECL
- Footprint: 7 x 5 mm, surface mount
- Supply Voltage: 3.3, 5 V
- Power: 250 mW
- Temperature Range: 10 to 85 °C
- 20000 g Shock, 0.2 ms Duration
- Phase Noise 10 Hz offset: -52 dBc/Hz  
@1000 MHz carrier
- Phase Noise 100 kHz offset: -152 dBc/Hz  
@1000 MHz carrier



## Features:

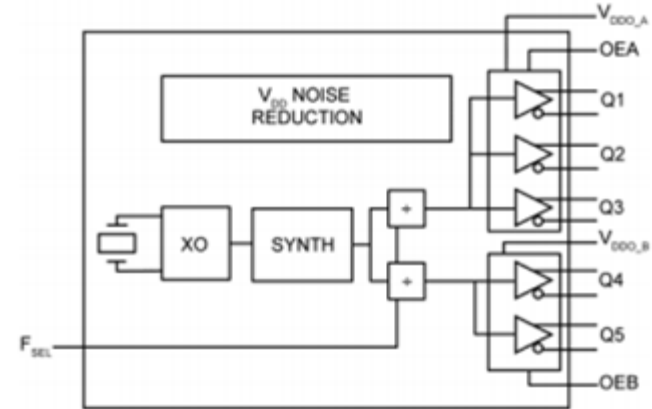
- Typical phase jitter: 200fs
- Supports 1 output
- Integrated crystal
- 2.5MHz to 850MHz
- Programmable output buffers
- O/E Pin selectable
- Industry standard package:
  - MX55 - 3.2mm x 5mm
  - MX57 - 5mm x 7mm



Part Number	Output Frequency (MHz)	Output Format	Frequency Stability (ppm)	Jitter (typ) (ps RMS)	Supply current (mA)	Supply voltage (V)	Temp. Range (°C)	Package size (mmxmm)	Custom Configuration
MX57	<840	LVC MOS	±50	0.2	70	2.25 to 3.63	-20 to 70 -40 to 85	7.0x5.0 6L	ClockWorks Web tool
MX55	<840	LVPECL						5.0x3.2 6L	
MX85	<840	LVDS HSCL		0.2	90			7.0x5.0 38-PIN LGA	

## Features:

- 230fs RMS Phase Jitter of Fanout
- Supports 5 outputs and 2 distinct frequencies up to –  
– 840MHz
- Complete clocking solution integrates the -  
- crystal, synthesizer, and fanout
- OTP configurable, customized samples within days
- FSEL enables in-circuit frequency selection
- 3.3V or 2.5V operation
- -40°C to +85°C ambient temperature range

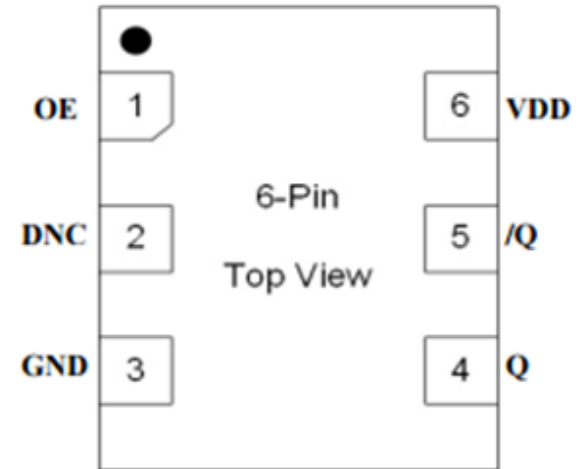


Part Number	Output Frequency (MHz)	Output Format	Frequency Stability (ppm)	Jitter (typ) (ps RMS)	Supply current (mA)	Supply voltage (V)	Temp. Range (°C)	Package size (mmxmm)	Custom Configuration
MX57	<840	LVC MOS	±50	0.2	70	2.25 to 3.63	-20 to 70 -40 to 85	7.0x5.0 6L	ClockWorks Web tool
MX55	<840	LVPECL						5.0x3.2 6L	
MX85	<840	LVDS HSCL		0.2	90			7.0x5.0 38-PIN LGA	



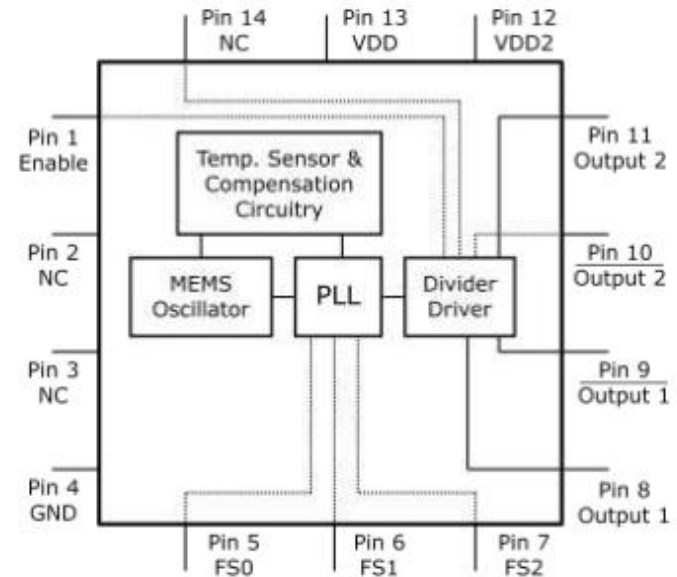
## Features:

- Supports 1 LVCMOS/LVPECL/LVDS/HACL output
- Typical phase jitter: 0.2ps
- Guaranteed  $\pm 2.5$ ppm over  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- $\pm 5$ ppm total frequency stability
- Integrated crystal
- Output up to 850MHz
- Programmable output buffers
- O/E Pin selectable
- Industry standard 6-Pin 7mm x 5mm LGA package



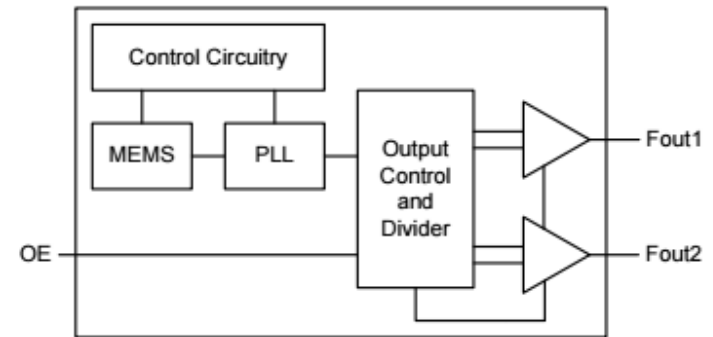
## Features:

- Wide Freq. Range: 2.3 to 460MHz
- Two configurable independent outputs:  
LVCMOS =1, LVPECL=2, LVDS=3, HCSL=4
- Low RMS Phase Jitter: 1.7 ps (typ. 12k-20M)
- High Stability:  $\pm 20$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:  $-20^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
- High Supply Noise Rejection: -50dBc
- Pin-Selectable Configurations:
- 3-bit Output Frequency Combinations
- Miniature Footprint of 3.2mm x 2.5mm, 14-pin
- Excellent Shock & Vibration Immunity
- Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than quartz oscillators
- Supply Range of 2.25V to 3.6V
- DSC20xx supports pin control
- DSC21xx supports I<sup>2</sup>C interface
- DSC22xx supports SPI interface



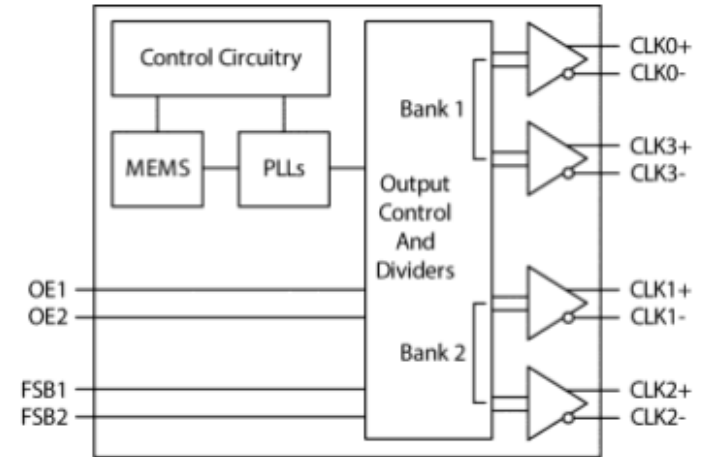
## Features:

- Two Simultaneous CMOS Outputs:
  - Output 1 Range: 2.3 to 170MHz
  - Output 2 Range: 2.3 to 170MHz
- Low RMS Phase Jitter: 1.7ps (typ. 12k-20M)
- High Stability:  $\pm 25$  ppm;  $\pm 50$  ppm
- Space Saving 6-pin 2.5 x 2.0mm Package
- Wide Temperature Range:
  - Automotive:  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. Commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection: -50dBc
- High Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than crystal-based clock -  
– generator designs
- Supply Range of 2.25V to 3.6V
- OE input to enable/disable output



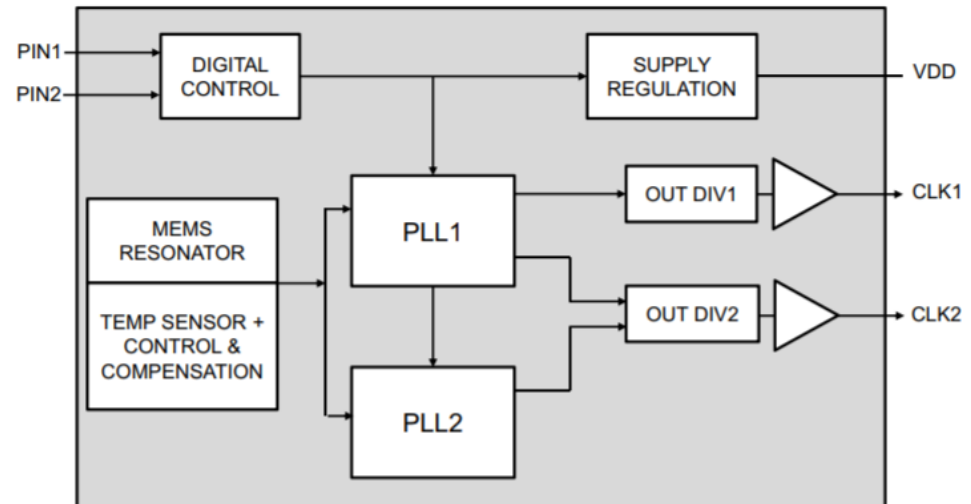
## Features:

- Wide frequency range: 2.3MHz to 460MHz
- Four format-configurable outputs:  
LVCMOS=1, LVPECL=2, LVDS=3, HCSL=4
- Low RMS Phase Jitter: 1.7ps (typ. 12k-20M)
- High Stability:  $\pm 25$ ppm,  $\pm 50$ ppm
- Wide Temperature Range:
  - Industrial:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- 20-pin QFN footprint (5.0mm x 3.2mm)
- Excellent shock and vibration immunity:
  - Qualified to MIL-STD-883
- Available pin-selectable frequency table:
  - 1 pin per bank for two frequency sets
- High Reliability: 20x better MTF than quartz -  
- based devices
- Wide supply range of 2.25V to 3.6V



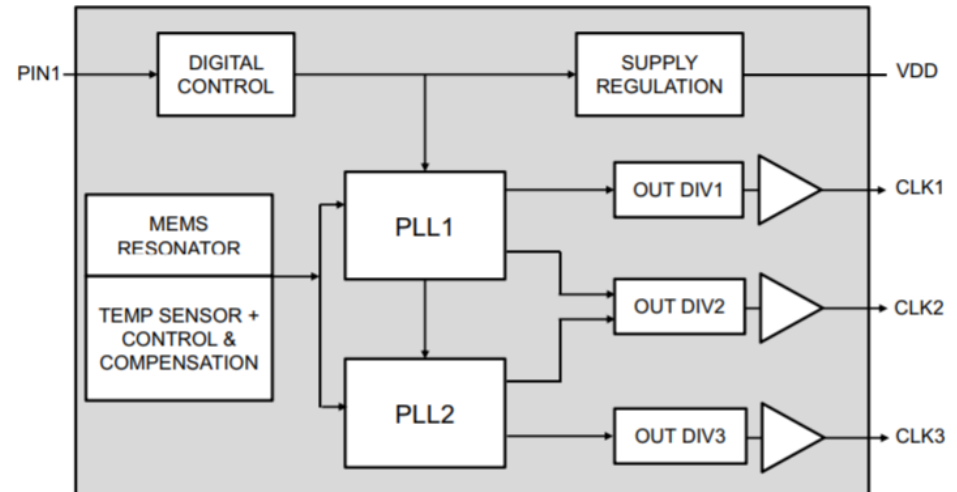
## Features:

- 2 any-rate outputs from 2k~100MHz
- Replace 2 crystals/oscillators
- Ultra-low power consumption:  
~3mA (active, 2 outputs), <1uA (standby)
- Ultra-small package:  
6-pin 1.6x 1.2mm / 2.0x1.6mm / 2.5x2.0mm 6L,
- High stability:  $\pm 20/25/50$ ppm
- Supply voltage: 1.71V -3.6V
- Supports Spread Spectrum clock output
- Supply Range of 1.71 to 3.63 V
- Temperature Range:
  - Automotive:  $-40^{\circ}$  to  $125^{\circ}$  C
  - Extended Industrial:  $-40^{\circ}$  to  $105^{\circ}$  C
  - Industrial:  $-40^{\circ}$  to  $85^{\circ}$  C
  - Extended Commercial:  $-20^{\circ}$  to  $70^{\circ}$  C



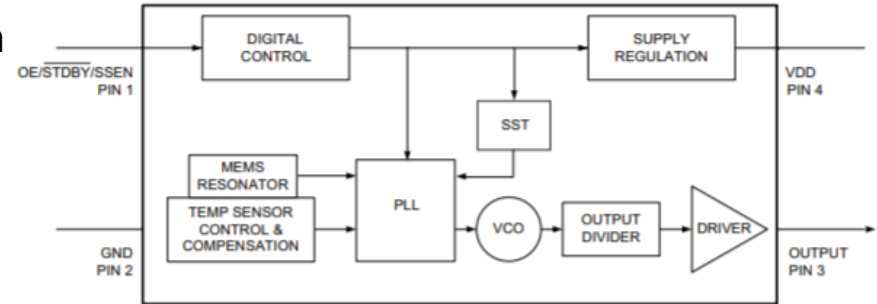
## Features:

- 3 outputs from 2k~100MHz
- Replace 3 crystals/oscillators
- Ultra-low power consumption:  
~5mA (active, 3 outputs), <1uA (standby)
- Ultra-small package:  
6-pin 1.6x 1.2mm / 2.0x1.6mm / 2.5x2.0mm,
- High stability:  $\pm 20/25/50$ ppm
- Supply voltage: 1.71V -3.6V
- Supports Spread Spectrum clock output
- Supply Range of 1.71 to 3.63 V
- Temperature Range:
  - Automotive:  $-40^{\circ}$  to  $125^{\circ}$  C
  - Extended Industrial:  $-40^{\circ}$  to  $105^{\circ}$  C
  - Industrial:  $-40^{\circ}$  to  $85^{\circ}$  C
  - Extended Commercial:  $-20^{\circ}$  to  $70^{\circ}$  C



## Features:

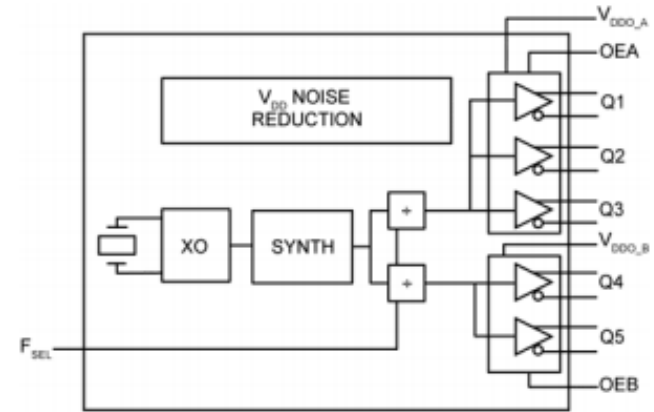
- Output frequency range: 1M~100MHz
- Standard Oscillator pin out with spread spectrum clock output for EMI reduction
- Supports  $\pm 0.25$  to  $\pm 2.5\%$  center spread and  $-0.5\%$  to  $-3\%$  down spread
- Ultra-low power consumption:
  - $\sim 3\text{mA}$  (active),  $\sim 1\mu\text{A}$  (standby)
- Ultra-small package size:
  - 1.6x 1.2mm, 2.0x1.6mm, 2.5x2.0mm, 3.2x2.5mm
- Pin 1 supports spread enable/disable input
- Supply voltage: 1.8/2.5/3.3V
- Supply Range of 1.71 to 3.63 V
- Temperature Range:
  - Automotive:  $-40^\circ$  to  $125^\circ$  C
  - Extended Industrial:  $-40^\circ$  to  $105^\circ$  C
  - Industrial:  $-40^\circ$  to  $85^\circ$  C
  - Extended Commercial:  $-20^\circ$  to  $70^\circ$  C



	Pin 1	Output Drive strength
DSC6301	OE	10 pf
DSC6302	OE	15 pf
DSC6311	Standby	10 pf
DSC6312	Standby	15 pf
DSC6331	Spread Enable	10 pf
DSC6332	Spread Enable	15 pf

## Features:

- 230fs RMS Phase Jitter of Fanout
- Supports 5 outputs and 2 distinct frequencies:
  - Up to 840MHz
- Independently configurable output buffers:
  - LVDS, LVPECL, HCSL, CMOS
- Complete clocking solution integrates the crystal, -  
- synthesizer, and fanout
- OTP configurable, customized samples within days
- FSEL enables in-circuit frequency selection
- 3.3V or 2.5V operation
- -40°C to +85°C ambient temperature range

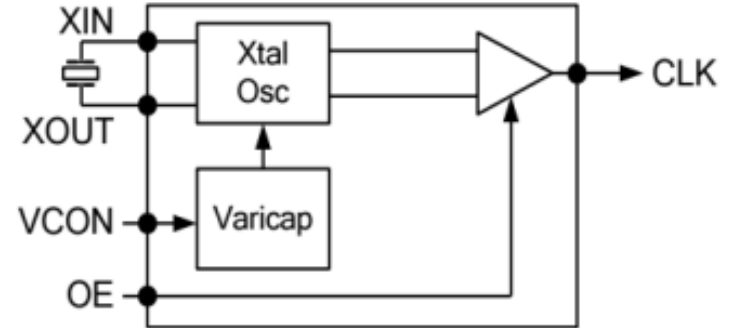


Part Number	Output Frequency (MHz)	Output Format	Frequency Stability (ppm)	Jitter (typ) (ps RMS)	Supply current (mA)	Supply voltage (V)	Temp. Range (°C)	Package size (mmxmm)	Custom Configuration
MX57	<840	LVC MOS	±50	0.2	70	2.25 to 3.63	-20 to 70 -40 to 85	7.0x5.0 6L	ClockWorks Web tool
MX55	<840	LVPECL						5.0x3.2 6L	
MX85	<840	LVDS HSCL		0.2	90			7.0x5.0 38-PIN LGA	



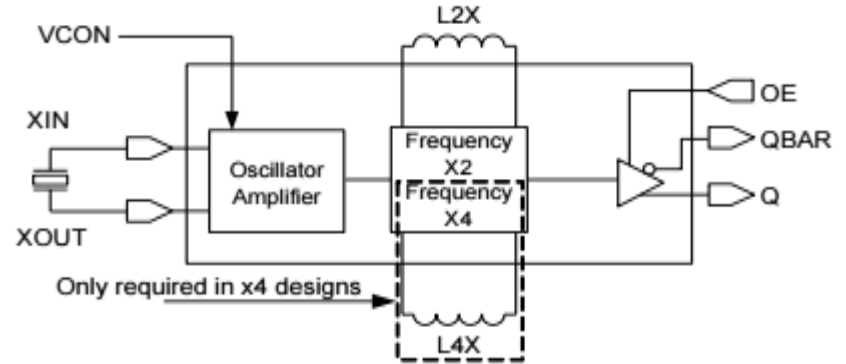
## Features:

- $V_{CXO}$  output for the 17MHz to 36MHz range
- Low phase noise (-130dBc @ 10kHz offset at -35.328MHz)
- LVCMOS output with OE tri-state control
- 17 to 36MHz fundamental crystal input
- Integrated high linearity variable capacitors
- 8mA drive capability at TTL output
- $\pm 150$  ppm pull range, max 5% (typ.) linearity
- Low jitter (RMS): 2.5ps period jitter
- 2.5V to 3.3V operation
- Available in: 8-Pin SOP, 6-pin SOT23, and Die



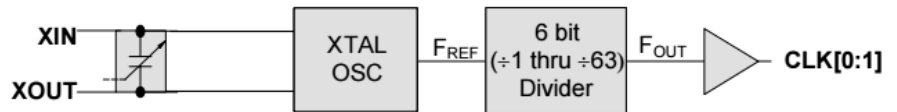
## Features:

- Non-PLL frequency multiplication
- Input frequency from 30-200MHz
- Output frequency from 60-800MHz
- Ultra-low jitter:
  - RMS phase jitter <0.25ps (12kHz-20MHz)
  - RMS random period jitter <25ps
- Low phase noise:
  - -142 dBc/Hz @100kHz offset from 155.52MHz
  - -150 dBc/Hz @10MHz offset from 155.52MHz
- High linearity pull range (typ. 5%)
- Low phase noise and jitter:
  - Equivalent to fundamental crystal at the output frequency
- $\pm 120$  PPM pullability  $V_{CXO}$  Low input frequency eliminates the –  
– need for expensive crystals
- Differential output levels (PECL, LVDS), or single-ended CMOS
- Single 3.3V,  $\pm 10\%$  power supply
- Temperature Range:
  - Commercial 0°C to +70°C
  - Industrial -40°C to +85°C
- Available in 16-pin TSSOP, 3x3 QFN packages, and die



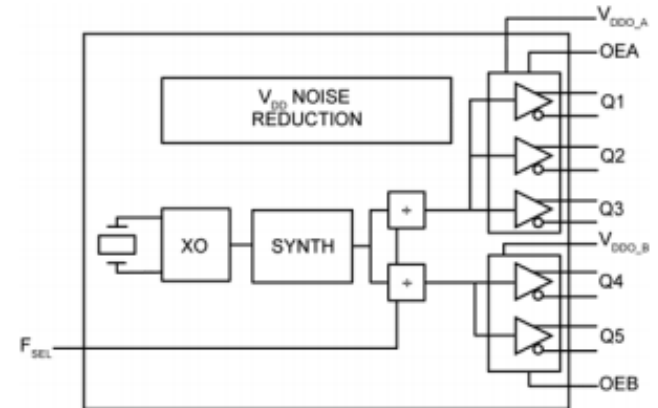
## Features:

- Wide frequency coverage, programmable, -
  - advanced oscillator design
- Programmable “Odd/Even” Divider up to 63
- Direct oscillation operation w/ optional –
  - programmable features:
    - Output Drive Strength (4, 8, or 16mA)
    - 6-bit Odd/Even Output Divider
- Input Frequency:
  - Fundamental Crystal: 5MHz to 130MHz
  - Reference Clock: 1MHz to 130MHz
- Supports CMOS or Sine Wave input clock
- Output Frequency: 20kHz to 130MHz
- Very low Jitter and Phase Noise
- Low current consumption
- Single 1.8V - 3.3V  $\pm 10\%$  power supply
- Industrial temperature range: -40°C to +85°C
- Available in 6-pin DFN, SOT-23 packages and die



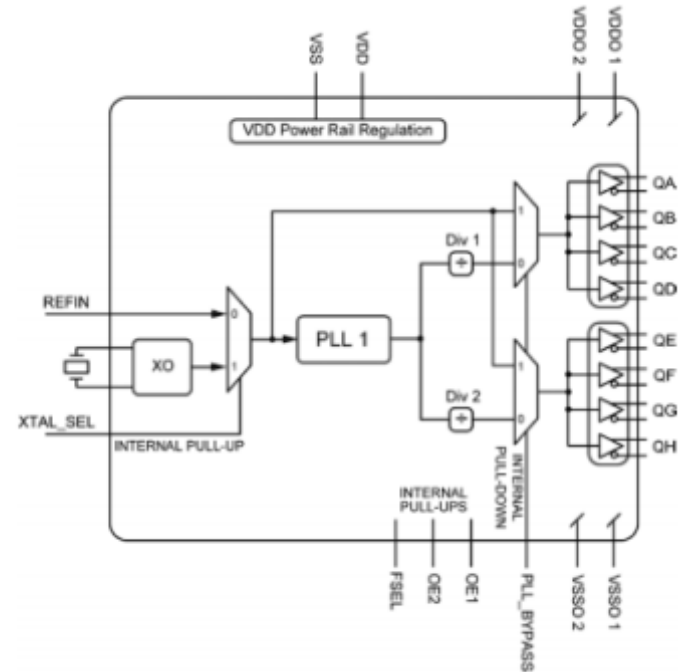
## Features:

- 230fs RMS Phase Jitter of Fanout
- Supports 5 outputs and 2 distinct frequencies up to -  
- 840MHz
- Independently configurable output buffers:
  - LVDS, LVPECL, HCSL, CMOS
- Complete clocking solution integrates the -  
- crystal, synthesizer, and fanout
- OTP configurable, customized samples within days
- FSEL enables in-circuit frequency selection
- 3.3V or 2.5V operation
- -40°C to +85°C ambient temperature range



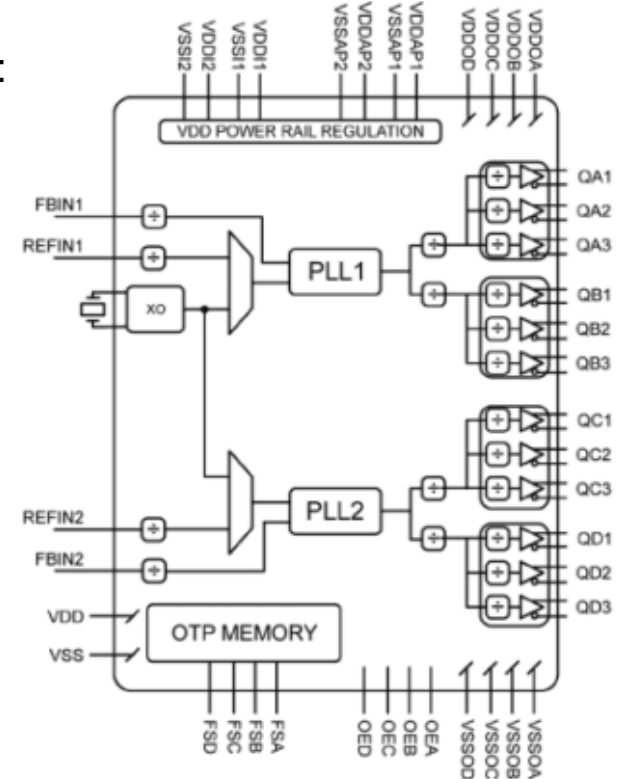
## Features:

- 115fs at 156.25MHz (1.875MHz to 20MHz)
- 245fs at 156.25MHz (12kHz to 20MHz)
- On chip power supply regulation:
  - Excellent board level power supply noise – immunity
- Generates up to 8 combinations of differential - or 16 single-ended clock outputs.
- LVPECL, LVDS, HCSL, LVCMOS (SE or Diff)
- Selectable input:
  - Crystal: 11MHz to 30MHz
  - Reference input: 11MHz to 80MHz
- No external crystal oscillator capacitors required
- 2.5V or 3.3V operating power supply
- Industrial temperature range: -40°C to +85°C
- Available QFN packages:
  - 44-pin 7mm x 7mm
  - 32-pin 5mm x 5mm
  - 24-pin 4mm x 4mm
  - 16-pin 3mm x 3.5mm



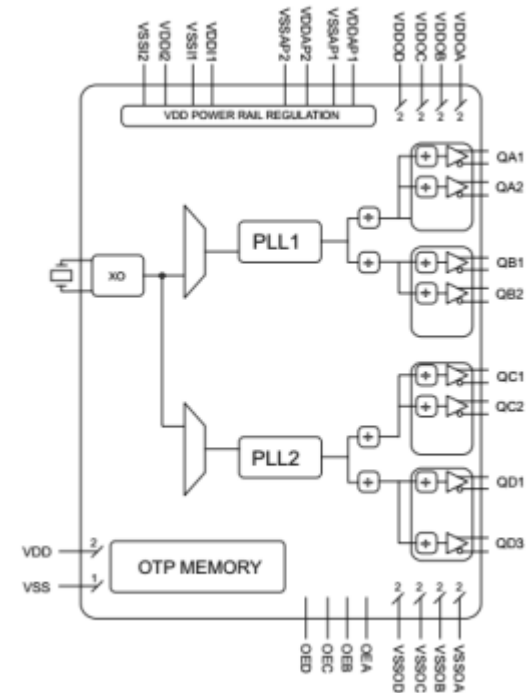
## Features:

- Generates up to 12 differential or single-ended frequencies:
  - 75fs phase jitter @ 156.25MHz (1.875MHz to 20MHz)
  - 180fs phase jitter @ 156.25MHz (12KHz to 20MHz)
- Two PLL synthesizers to generate multiple frequencies
- Independently programmable output logic and frequency
- Output logic: LVPECL, LVDS, HCSL, LVCMOS
- Selectable input:
  - Crystal: 12MHz to 50MHz
  - Reference Input: 12MHz to 850MHz
- No external crystal oscillator capacitors required
- 3.3V or 2.5V operating power supply
- Separate output power supplies:
  - Each bank can be at different levels
- Feedback input pins for use as zero delay buffer
- On chip power supply regulation for excellent power –  
- supply noise immunity
- Temperature Range:
  - Commercial 0°C to +70°C
  - Industrial -40°C to +85°C
- Available in 84-pin 7mm x 7mm QFN package



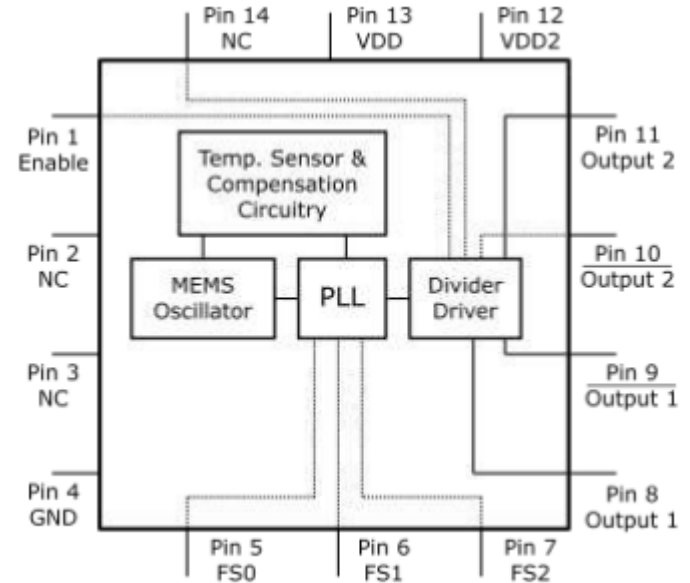
## Features:

- Generates up to 18 differential or single-ended frequencies:
  - <65fs phase jitter @ 156.25MHz (1.875MHz to 20MHz)
  - <115fs phase jitter @ 156.25MHz (12KHz to 20MHz)
- Two PLL synthesizers to generate multiple frequencies
- Independently programmable output logic and frequency
- Output logic: LVPECL, LVDS, HCSL, LVCMOS
- Selectable input:
  - Crystal: 31.25MHz to 156.25MHz
- No external crystal oscillator capacitors required
- 3.3V or 2.5V operating power supply
- Separate output power supplies:
  - Each bank can be at different levels (4 banks of 2 – - outputs each)
- On chip power supply regulation for excellent power supply - – noise immunity
- Supports Commercial or Industrial temperature ranges
- Temperature Range:
  - Commercial 0°C to +70°C
  - Industrial -40°C to +85°C
- Available in 48-pin 7mm x 7mm QFN package



## Features:

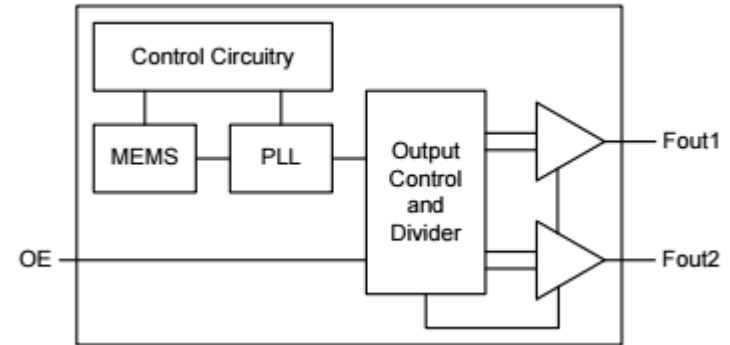
- Low RMS Phase Jitter: 1.5 ps (typ.)
- High Stability:  $\pm 10$ ,  $\pm 25$ ,  $\pm 50$  ppm
- Wide Temperature Range:  $-20^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Two configurable independent outputs:
  - LVCMOS, LVPECL, LVDS, HCSL
- Pin-Selectable Configurations:
  - 3-bit Output Frequency Combinations
- Wide Freq. Range: 2.3 to 460MHz
- Miniature Footprint of 3.2mm x 2.5mm
- Excellent Shock & Vibration Immunity
  - Qualified to MIL-STD-883
- High Reliability
  - 20x better MTF than quartz oscillators
- Supply Range of 2.25V to 3.6V





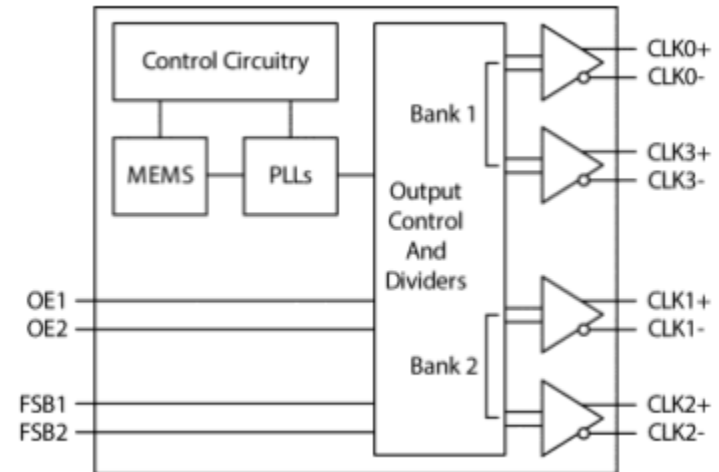
## Features:

- Two Simultaneous CMOS Outputs:
  - Output 1 Range: 2.3 to 170MHz
  - Output 2 Range: 2.3 to 170MHz
- Low RMS Phase Jitter: <1 ps (typ.)
- High Stability:  $\pm 25$  ppm;  $\pm 50$  ppm
- Wide Temperature Range:
  - Automotive:  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$
  - Ext. Industrial:  $-40^{\circ}\text{C}$  to  $105^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
  - Ext. Commercial:  $-20^{\circ}\text{C}$  to  $70^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- High Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- High Reliability:
  - 20x better MTF than crystal-based clock  
– generator designs
- Supply Range of 2.25V to 3.6V



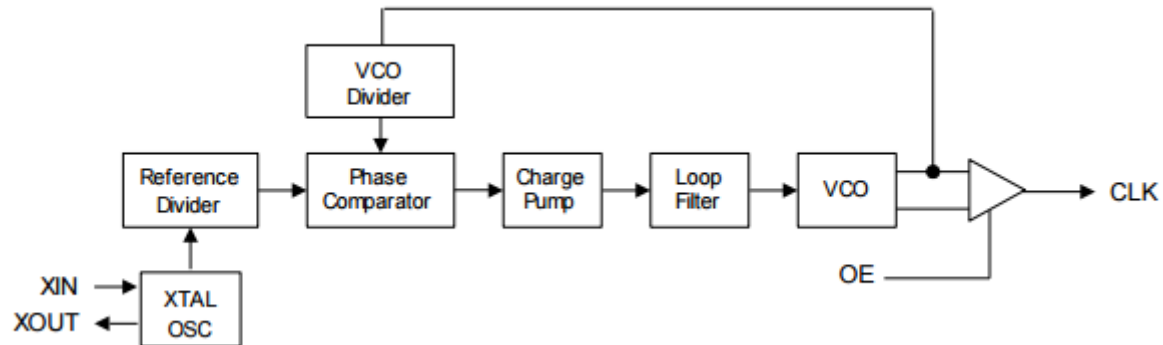
## Features:

- Low RMS Phase Jitter: <math><1\text{ps}</math> (typ.)
- High Stability:  $\pm 25\text{ppm}$ ,  $\pm 50\text{ppm}$
- Wide Temperature Range:
  - Ext. commercial:  $-20^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
  - Industrial:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- High Supply Noise Rejection:  $-50\text{dBc}$
- Wide frequency range: 2.3MHz to 460MHz
- 20-pin QFN footprint (5.0mm x 3.2mm)
- Excellent shock and vibration immunity:
  - Qualified to MIL-STD-883
- Four format-configurable outputs:
  - LVPECL, LVDS, HCSL, LVCMOS
- Available pin-selectable frequency table:
  - 1 pin per bank for two frequency sets
- High Reliability: 20x better MTF than quartz – based devices
- Wide supply range of 2.25V to 3.6V
- AEC-Q100 Automotive qualified



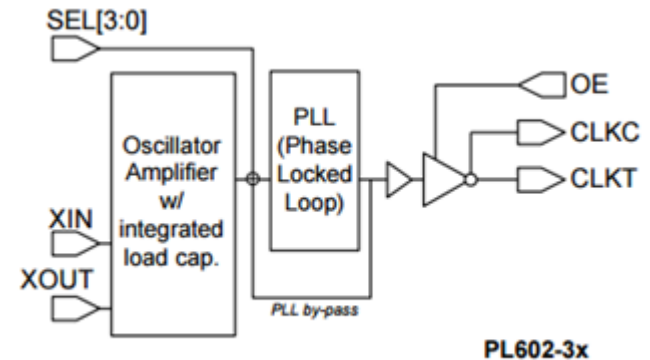
## Features:

- Low phase noise XO output for the 48MHz to 100MHz range (-130 dBc at 10kHz offset).
- 12 to 25MHz crystal input
- Integrated crystal load capacitor:
- No external load capacitor required.
- Selectable High Drive (30mA) or Standard Drive (10mA) output.
- 3.3V operation
- Available in 8-Pin TSSOP or SOIC



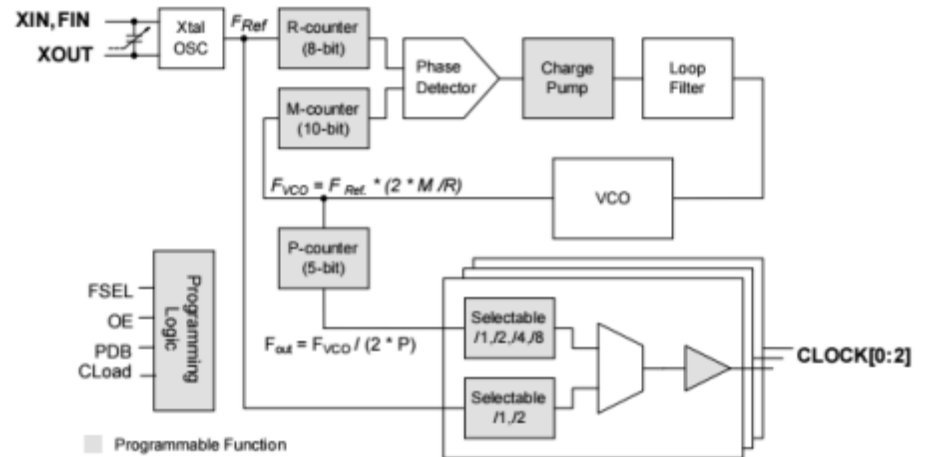
## Features:

- Selectable 750kHz to 800MHz range
- Low phase noise output:
  - -127dBc/Hz for 155.52MHz @ 10kHz offset
  - -115dBc/Hz for 622.08MHz @ 10kHz offset
- LVCMOS (PL602-37), LVPECL (PL602-35 and -  
- PL602-38) or LVDS (PL602-39) output
- 12MHz to 25MHz crystal input
- No external load capacitor or varicap required
- Output Enable selector
- Selectable /16 to x32 frequency divider/multiplier
- 3.3V operation
- Available in 16-Pin TSSOP, 16-pin 3mm x 3mm –  
- packages



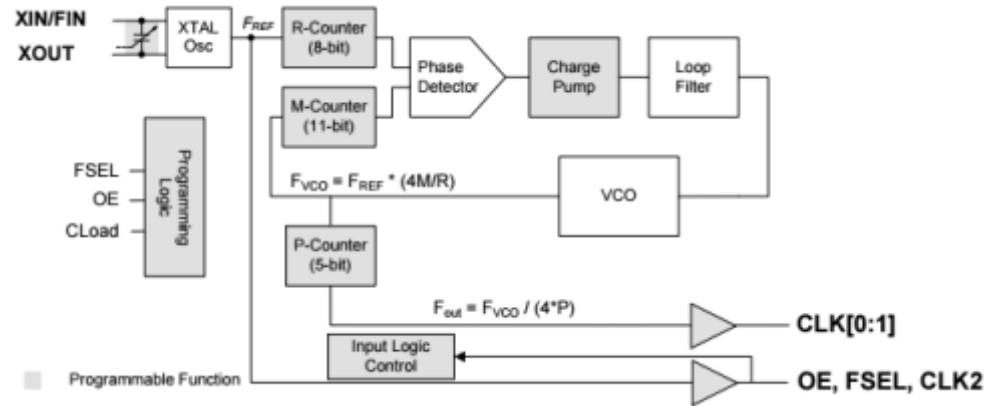
## Features:

- Advanced programmable PLL design
- Very low Jitter and Phase Noise:
  - 30-70ps Pk-Pk typical
- Up to 3 programmable outputs
- Output frequency up to 200MHz CMOS
- Accepts Crystal or reference clock inputs:
  - Fundamental crystal: 10MHz-30MHz
  - 3RD overtone crystal: Up to 75MHz
  - Reference input: Up to 200MHz
- Accepts <1.0V reference signal input – voltage
- One programmable I/O pin can be configured as:
  - Programmable clock
  - Frequency Selection input
  - Output Enable (OE)
  - Power Down (PDB) input
- Supply operating range 2.25V to 3.63V
- Industrial temperature range: -40°C to +85°C
- Available in 8-pin MSOP/SOP, and 6-pin SOT packages



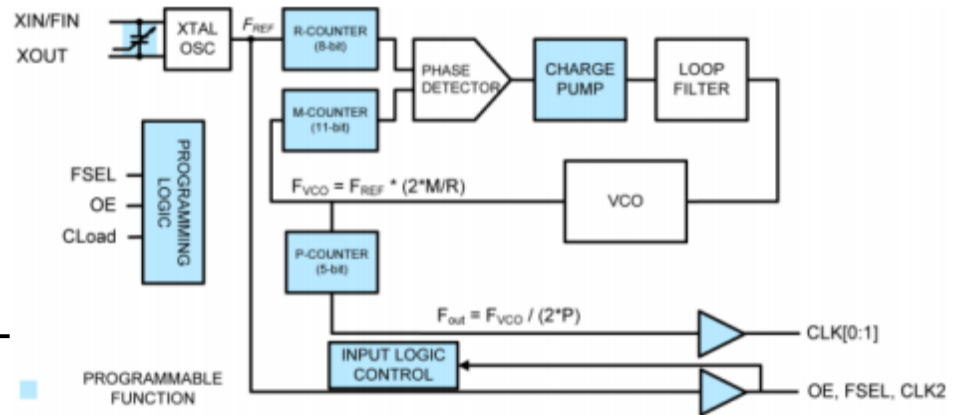
## Features:

- Advanced programmable PLL design
- Very low Jitter and Phase Noise:
  - <40ps Pk-Pk typ.
- Supports complementary LVCMOS –  
- outputs to drive LVPECL & LVDS inputs
- Output Frequencies:
  - ≤400MHz at 3.3V
  - ≤350MHz at 2.5V
- Input Frequencies:
  - Fundamental crystal: 10MHz-30MHz
  - 3RD overtone crystal: Up to 75MHz
  - Reference Input: Up to 200MHz
- Accepts <1.0V reference signal input voltage
- One programmable I/O pin can be configured as:
  - Output Enable (OE) input
  - Frequency Selection (FSEL) input
  - Reference Clock (CLK2) output
- Single 2.5V or 3.3V ±10% power supply
- Industrial temperature range: -40°C to +85°C
- Available in 8-pin MSOP/SOP and 6-pin SOT-23 packages



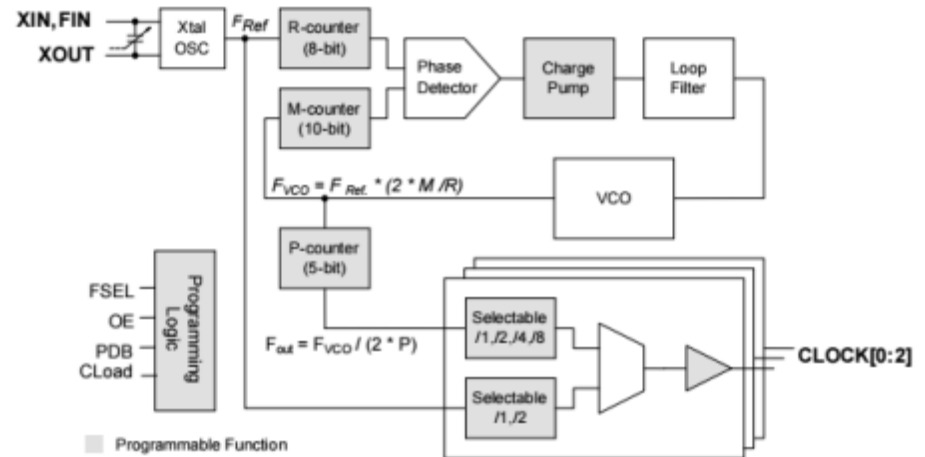
## Features:

- Advanced programmable PLL design
- Very low Jitter and Phase Noise:
  - <40ps Pk-Pk typ.
- Up to 3 outputs
- Output Frequencies up to 200MHz CMOS:
  - Provides complementary LVCMOS -
  - outputs to drive LVSMOS, LVPECL, -
  - LVDS, HCSL or CML inputs
- Input Frequencies:
  - Fundamental crystal: 10MHz – 30MHz
  - Reference clock: 1MHz – 200MHz
- Accepts <1.0V reference signal input voltage
- One programmable I/O pin can be configured as:
  - Output Enable (OE) input
  - Frequency Selection (FSEL) input
  - Reference Clock (CLK2) output
- Single 2.5V or 3.3V  $\pm 10\%$  power supply
- Industrial temperature range: -40°C to +85°C
- Available in 8-pin MSOP/SOP and 6-pin SOT-23 packages



## Features:

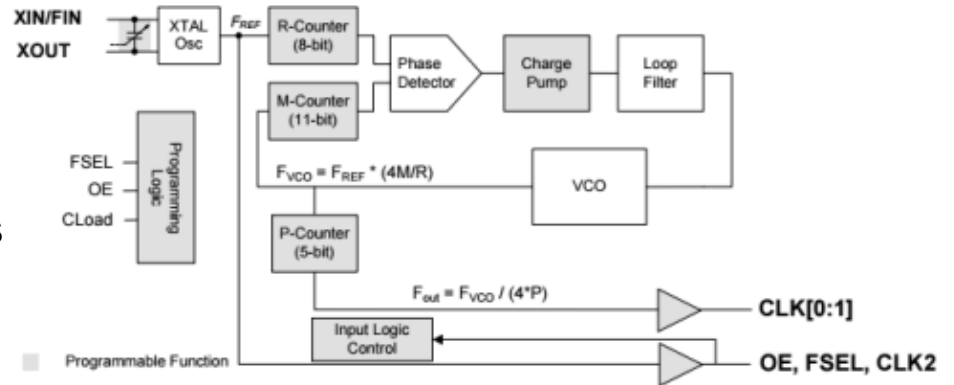
- Advanced programmable PLL design
- Very low Jitter and Phase Noise
  - 30-70ps Pk-Pk typical
- Up to 3 programmable outputs
- Output frequency up to 200MHz CMOS
- Accepts Crystal or reference clock inputs:
  - Fundamental crystal: 10MHz-30MHz
  - 3RD overtone crystal: Up to 75MHz
  - Reference input: Up to 200MHz
- Accepts <1.0V reference signal input – voltage
- One programmable I/O pin can be configured as:
  - Programmable clock
  - Frequency Selection input
  - Output Enable (OE)
  - Power Down (PDB) input
- Supply operating range 2.25V to 3.63V
- Industrial temperature range: -40°C to +85°C
- Available in 8-pin MSOP/SOP, and 6-pin SOT packages





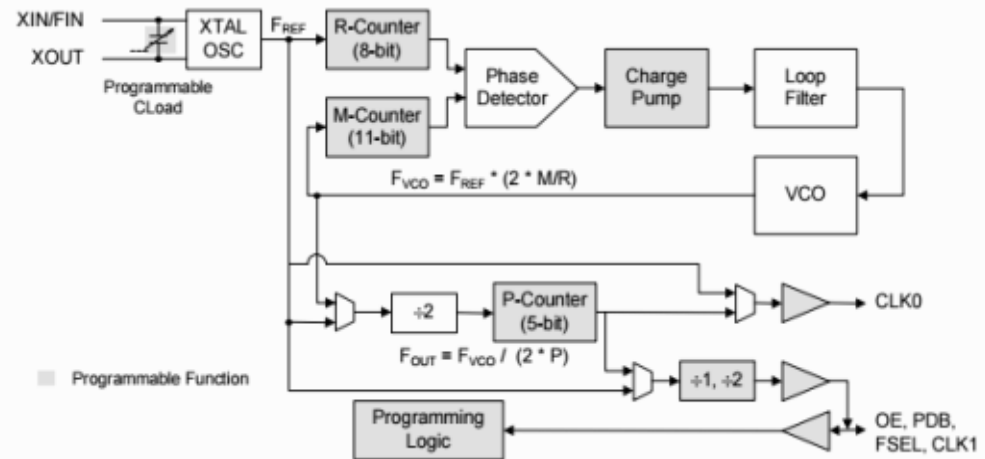
## Features:

- Advanced programmable PLL design
- Very low Jitter and Phase Noise:
  - <40ps Pk-Pk typ.
- Supports complementary LVCMOS –  
- outputs to drive LVPECL and LVDS inputs
- Output Frequencies:
  - ≤400MHz at 3.3V
  - ≤350MHz at 2.5V
- Input Frequencies:
  - Fundamental crystal: 10MHz-30MHz
  - 3RD overtone crystal: Up to 75MHz
  - Reference Input: Up to 200MHz
- Accepts <1.0V reference signal input voltage
- One programmable I/O pin can be configured as:
  - Output Enable (OE) input
  - Frequency Selection (FSEL) input
  - Reference Clock (CLK2) output
- Single 2.5V or 3.3V ±10% power supply
- Industrial temperature range: -40°C to +85°C
- Available in 8-pin MSOP/SOP, and 6-pin SOT-23 packages



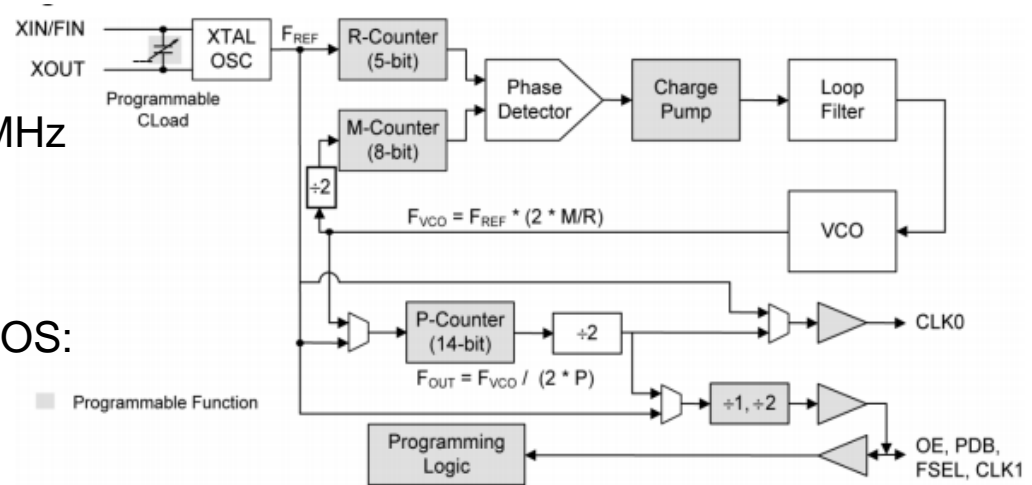
## Features:

- Advanced One Time Programmable PLL design
- Programmable PLL or Direct Oscillation operation
- Very low Jitter and Phase Noise:
  - 30-70ps Pk-Pk typ.
- Output Frequencies:
  - $\leq 110\text{MHz}$  at 1.8V
  - $\leq 166\text{MHz}$  at 2.5V
  - $\leq 200\text{MHz}$  at 3.3V
- Input Frequencies:
  - Fundamental crystal: 10MHz-30MHz
- Input Frequency: Fundamental crystal:
  - 10MHz-50MHz
- 8-bit Switch Capacitor for  $\pm 50\text{ppm}$  crystal CL tuning
- Low current consumption,  $< 10\mu\text{A}$  when PDB is activated
- One programmable I/O pin can be configured as:
  - Output Enable (OE) input
  - Power Down (PDB) input
- Single 1.8V, 2.5V or 3.3V  $\pm 10\%$  power supply
- Industrial temperature range:  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$
- Wire bond (-02) or Flip-Chip (-03) pad layout



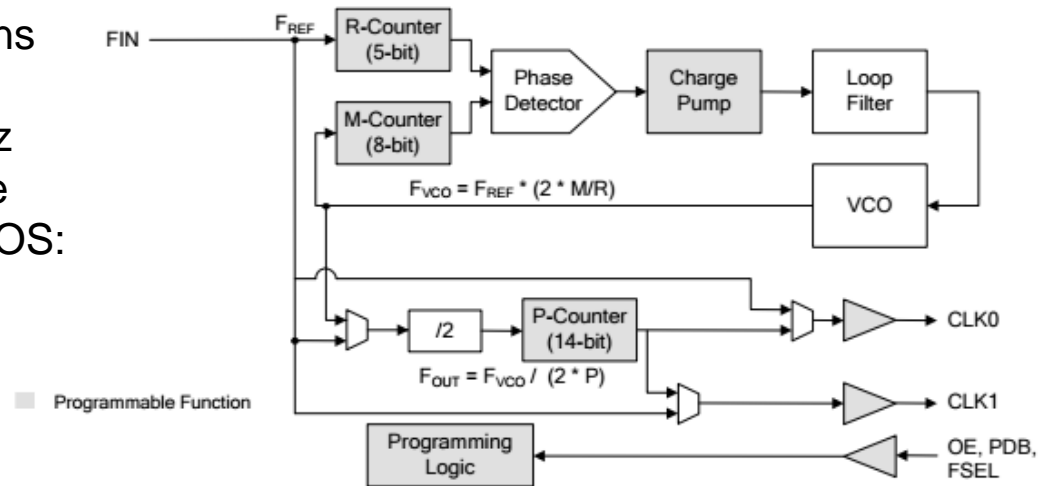
## Features:

- Designed for very low power applications
- Accepts crystal or reference clock inputs
- Input frequency:
  - Fundamental crystal: 10MHz to 50MHz
  - Reference input: 1MHz to 125MHz
- Accepts >0.1V reference signal input - voltage
- Output frequency 0.5kHz to 125MHz CMOS:
  - 65MHz @ 1.8V operation
  - 90MHz @ 2.5V operation
  - 125MHz @ 3.3V operation
- One programmable I/O pin can be configured as:
  - OE, PDB, FSEL, or CLK1
- Low current consumption:
  - <1.0mA with 27MHz & 32kHz outputs
  - <5µA when PDB is activated
- Single 1.8V - 3.3V ±10% power supply
- Industrial temperature range: -40°C to +85°C
- Available in 6-pin DFN, and SOT-23 packages



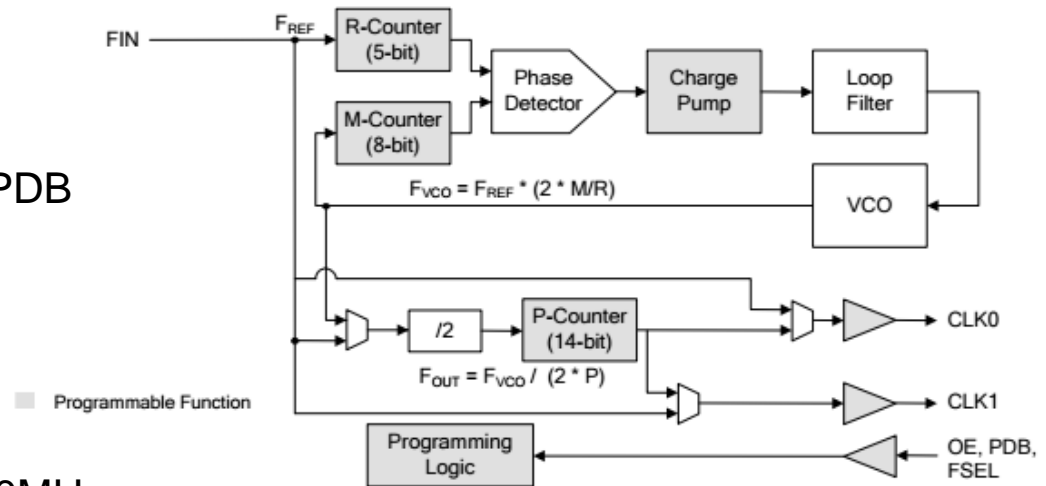
## Features:

- Designed for very low power applications
- Input Frequency, AC Coupled:
  - Reference input: 1MHz to 125MHz
  - Accepts >0.1V input signal voltage
- Output frequency up to 125MHz LVCMOS:
  - ≤65MHz @ 1.8V operation
  - ≤90MHz @ 2.5V operation
  - ≤125MHz @ 3.3V operation
- One programmable input pin can be configured as:
  - Power Down (PDB) input
  - Output Enable (OE)
  - Frequency Selection Switching input
- Disabled outputs Active Low
- Low current consumption:
  - <1.0mA with 27MHz & 32kHz outputs
  - <5µA when PDB is activated
- Single 1.8V - 3.3V ±10% power supply
- Industrial temperature range: -40°C to +85°C
- Available in 6-pin DFN, and SOT-23 packages



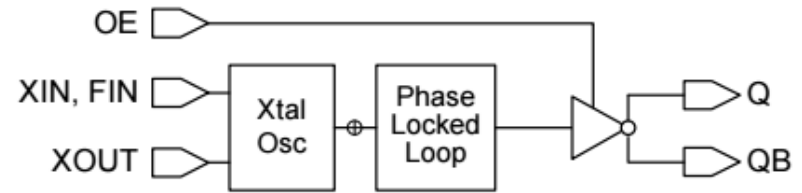
## Features:

- Designed for PCB space savings
- 3 low-power Programmable PLLs & -
  - Up to 8 clock outputs
- Low-Power Consumption: 10µA typ in PDB
- Output Frequency:
  - ≤110MHz @ 1.8V operation
  - ≤166MHz @ 2.5V operation
  - ≤200MHz @ 3.3V operation
- Input Frequency:
  - Fundamental Crystal: 10MHz to 40MHz
  - Reference Input: 10MHz to 200MHz
- Programmable I/O pins can be configured as:
  - Output Enable (OE), Configuration Switching – (CSEL), Frequency Switching (FSELX), Power – Down (PDB) inputs, or Clock Outputs
- Disabled outputs programmable as HiZ or Active Low
- Single 1.8V, 2.5V or 3.3V ±10% power supply
- Temperature range:
  - Commercial: 0°C to +70°C, Industrial: -40°C to +85°C
- Available in 3mm x 3mm QFN or TSSOP packages



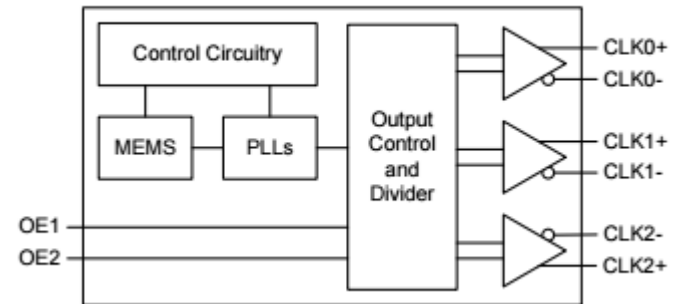
## Features:

- Input Frequency:
- Fundamental Crystal or Reference Input: 25MHz
- Output Frequency:
  - PL602-21: 100MHz differential outputs
  - PL602-22: 125MHz differential outputs
  - PL602-23: 200MHz differential outputs
  - PL602-26: 25MHz differential outputs
  - PL602-27: 250MHz differential outputs
  - PL602-15: 156.25MHz differential outputs
- Very low Jitter: 28ps Pk-Pk typ
- Very low Phase Noise:
  - -130 dBc at 10kHz offset at 100MHz
- No external loop filter is required
- Power supply range: 2.25V to 3.63V
- Industrial temperature range: -40°C to 85°C
- 6-pin SOT and 8-pin SOP packages



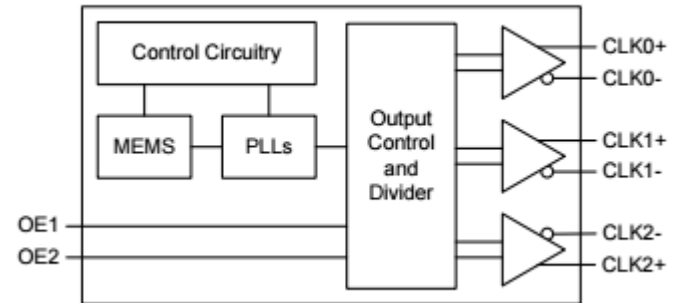
### Features:

- Meets PCIe Gen1, Gen2 & Gen3 specs.
- Available Output Formats:
  - HCSL, LVPECL, or LVDS
  - HCSL/LVPECL, HCSL/LVDS, -  
- LVPECL/LVDS
- Wide Temperature Range:
  - Ext. Industrial: -40°C to 105°C
  - Industrial: -40°C to 85°C
  - Ext. Commercial: -20°C to 70°C
- Excellent Shock & Vibration Immunity
  - Qualified to MIL-STD-883
- Low Power Consumption
  - 30% lower than competing devices
- Supply Range of 2.25V to 3.6V
- TSSOP and 14-Pin QFN packages



## Features:

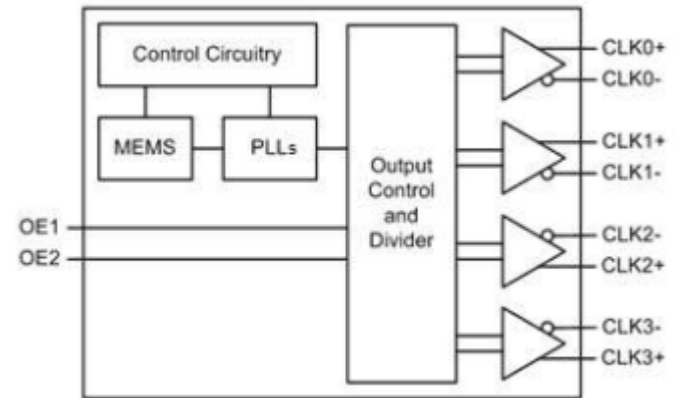
- Meets PCIe Gen1, Gen2 & Gen3 specs.
- Available Output Formats:
  - HCSL, LVPECL, or LVDS
  - Mixed Outputs: LVPECL/HCSL/LVDS
- Wide Temperature Range:
  - Ext. Industrial: -40°C to 105°C
  - Industrial: -40°C to 85°C
  - Ext. Commercial: -20°C to 70°C
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- Low Power Consumption:
  - 30% lower than competing devices
- Supply Range of 2.25V to 3.6V
- Available in 20-Pin QFN package





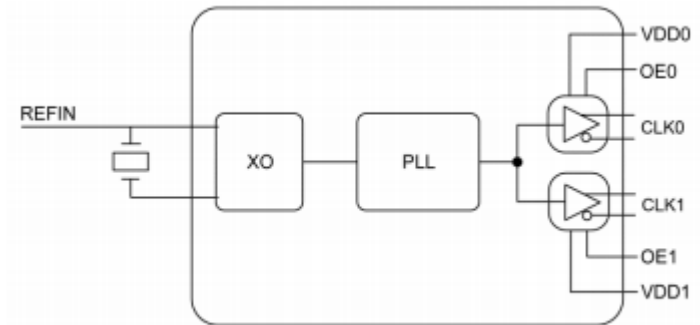
## Features:

- Meets PCIe Gen1, Gen2 & Gen3 specs.
- Available Output Formats:
  - HCSL, LVPECL, or LVDS
  - Mixed Outputs: LVPECL/HCSL/LVDS
- Wide Temperature Range:
  - Ext. Industrial: -40°C to 105°C
  - Industrial: -40°C to 85°C
  - Ext. Commercial: -20°C to 70°C
- Excellent Shock & Vibration Immunity:
  - Qualified to MIL-STD-883
- Low Power Consumption:
  - 30% lower than competing devices
- Supply Range of 2.25V to 3.6V
- Available in 20-Pin QFN package



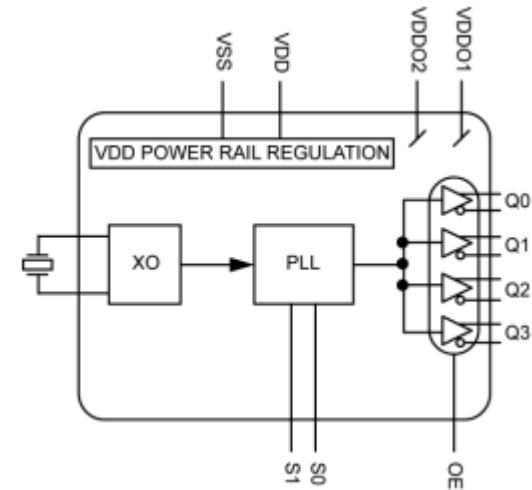
## Features:

- Input frequency:
  - Fundamental crystal or reference input –  
- 25MHz
- Output frequency:
  - PL602031: 2 x 25MHz differential outputs
  - PL602032: 2 x 100MHz differential outputs
  - PL602033: 2 x 125MHz differential outputs
  - PL602034: 2 x 200MHz differential outputs
- Very low jitter: 28ps peak-to-peak typical
- Very low phase noise: -130dBc at 10kHz offset –  
- at 100MHz
- Compliant with PCI-Express Gen1 and Gen2
- Industrial temperature range: -40°C to +85°C
- Power supply range: 2.25V to 3.63V
- Available in 16-pin QFN package



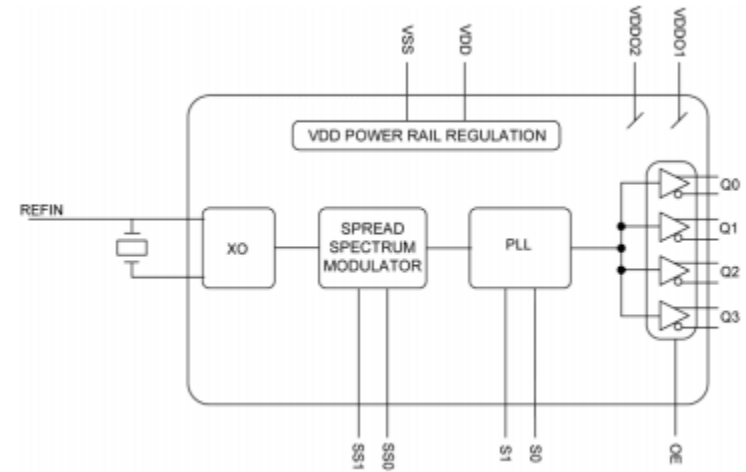
## Features:

- Input crystal frequency of 25MHz
- Generates four HCSL clock outputs:
  - 25MHz, 100MHz, 125MHz, and 200MHz
- 2.5V or 3.3V operating range
- Typical phase jitter @ 100MHz (1.875MHz to – 20MHz): 105fs
- Compliant with PCI Express Gen1, Gen2, - and Gen 3
- Industrial temperature range: -40°C to +85°C
- Available in 24-pin 4mm x 4mm QFN package



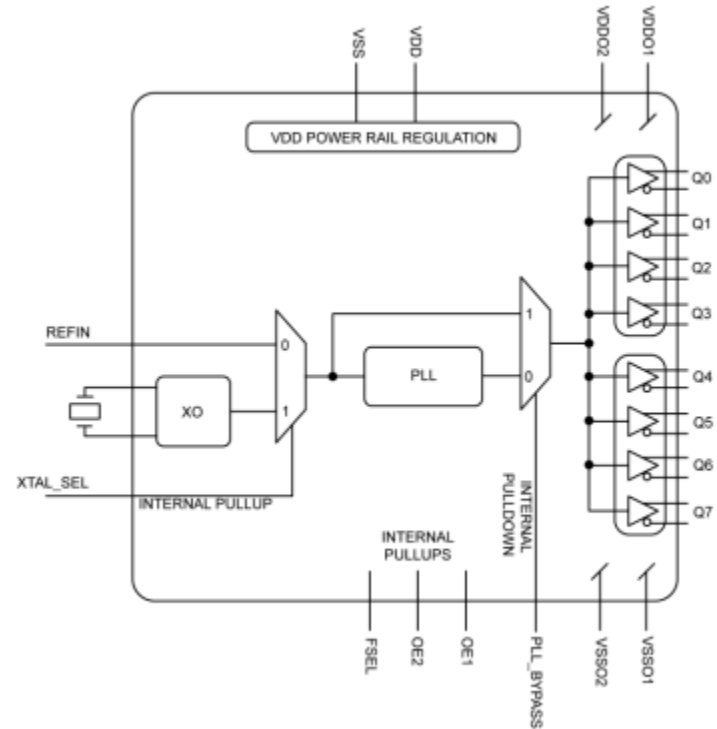
## Features:

- 25MHz fundamental crystal or reference input
- Generates four HCSL clock outputs:
  - 25MHz, 100MHz, 125MHz, and 200MHz
- Spread spectrum for EMI reduction
- 2.5V or 3.3V operating range
- Typical phase jitter @ 100MHz (1.5MHz to – 10MHz): 320fs
- Industrial temperature range: -40°C to +85°C
- Available in 24-pin 4mm x 4mm QFN package



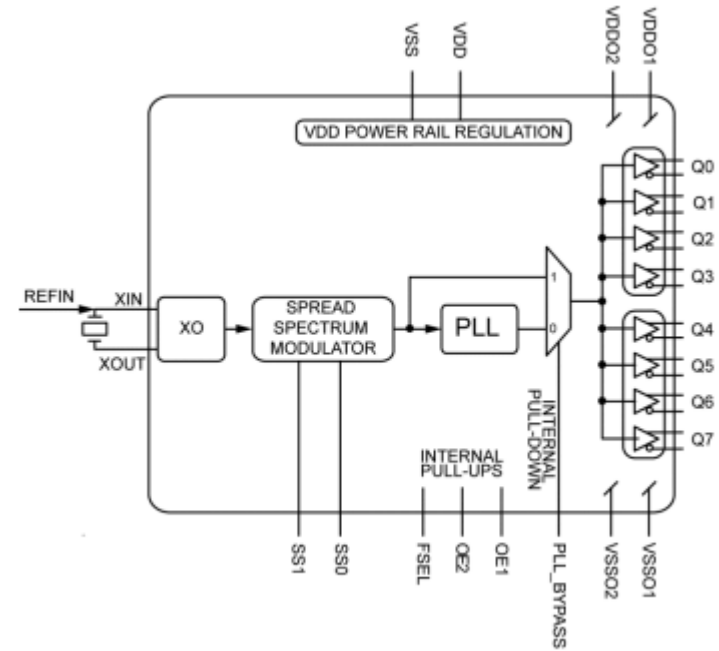
## Features:

- Generates eight HCSL clock outputs
- PL602081 output frequencies: 25MHz, -  
- 100MHz, or 200MHz
- PL602082 output frequencies: 25MHz, -  
- 125MHz, or 250MHz
- 2.5V or 3.3V operating range
- Typical phase jitter: 250fs for 12kHz to 20MHz
- Industrial temperature range: -40°C to +85°C
- Available in 44-pin 7mm x 7mm QFN package



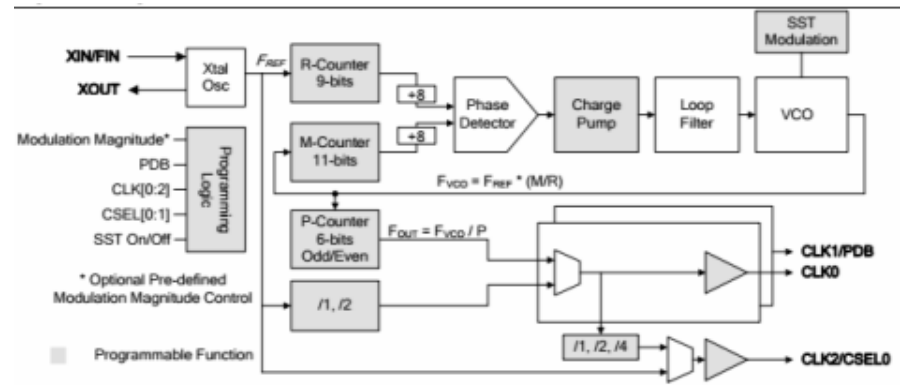
## Features:

- Generates eight HCSL clock outputs
- PL607081 output frequencies: 25MHz, -  
- 100MHz, or 200MHz
- PL607082 output frequencies: 25MHz, -  
- 125MHz, or 250MHz
- Spread spectrum for EMI reduction
- 2.5V or 3.3V operating range
- Typical phase jitter @ 100MHz: 320fs for –  
- 1.5MHz to 10MHz
- Industrial temperature range: -40°C to +85°C
- Available in 44-pin 7mm x 7mm QFN package



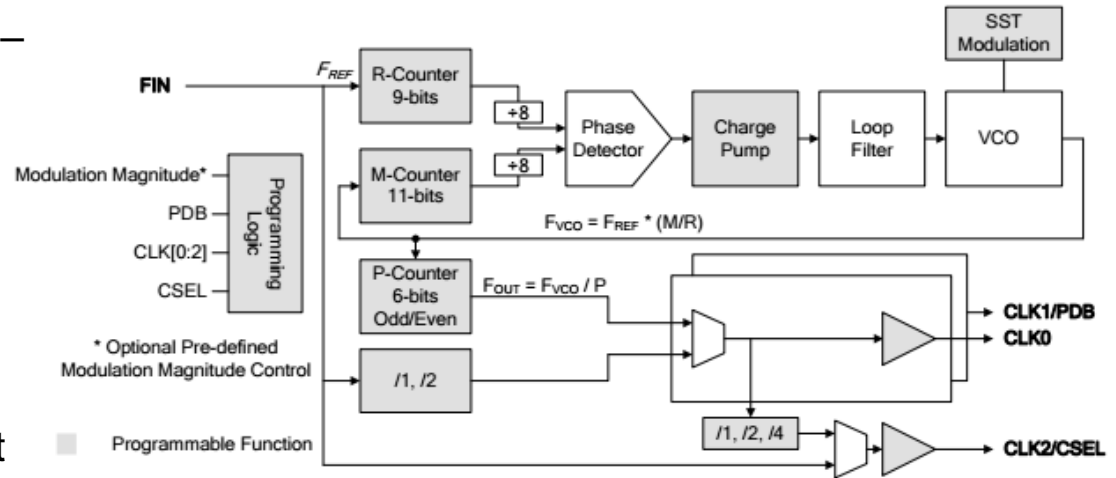
## Features:

- Advanced programmable PLL with Spread - Spectrum
- Crystal or Reference Clock input:
  - Fundamental crystal: 10MHz to 40MHz
  - Reference input: 1MHz to 200MHz
- Accepts  $\geq 0.1V$  reference signal input voltage
- Up to 3 programmable outputs
- Low Cycle to Cycle jitter
- Single 2.5V or 3.3V  $\pm 10\%$  power supply
- Programmable Spread Spectrum Modulation Magnitude:
- Center Spread:  $\pm 0.125\%$  to  $\pm 2.0\%$  in  $\pm 0.125\%$  steps:
  - Down Spread: -0.25% to -4.0% in 0.25% steps
  - Spread Spectrum On/Off selection
- Programmable output drive (4mA, 8mA, 16mA)
- Industrial temperature range:
  - -40°C to +85°C
- Output frequency range:
  - Up to 166MHz @ 2.5V
  - Up to 200MHz @ 3.3V
- 8-pin SOP, MSOP and 6-pin SOT packaging



## Features:

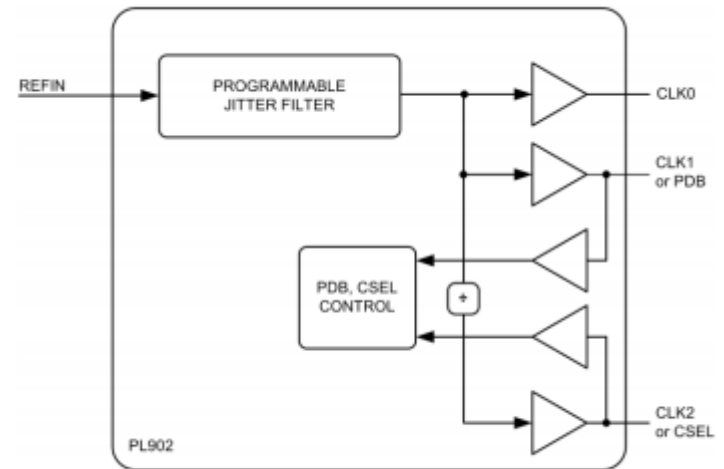
- Advanced programmable PLL with –
  - Spread Spectrum
- Reference Clock input:
  - 1MHz to 200MHz
- Output Frequency:
  - ≤200MHz
- Two programmable I/O pins:
  - PDB for Power Down function
  - CSEL for Configuration Select
  - CLK1/CLK2 additional clock –
    - outputs
- Programmable output drive
- Low Cycle to Cycle jitter
- Single 2.5V or 3.3V ±10% power supply
- 6-pin SOT23 and Thin SOT (TSOT) packaging





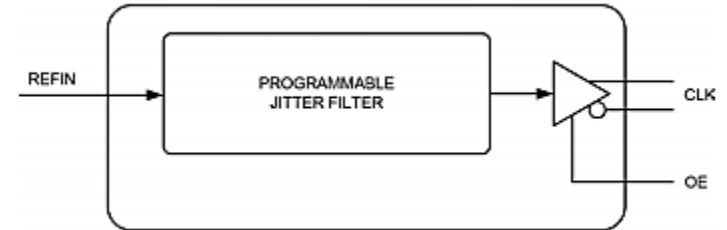
## Features:

- Lowest power, smallest programmable jitter attenuator
- Input/output frequency up to 200MHz
- I/O pins can be configured as:
  - Output enable (OE)
  - Frequency switching (CSEL)
  - Power down (PDB) input
  - CLK1(2) output
- <10µA current consumption with PDB active
- Industrial temperature range:
  - -40°C to +85°C
- Available in 6-pin SOT-23 package
- Related devices:
  - PL903xxx: Single-ended input, differential -  
- output, and phase noise cleaning
  - PL904xxx: Differential input, two differential -  
- outputs, and phase noise cleaning



## Features:

- Lowest-power, smallest programmable jitter attenuator
- Input frequency up to 200MHz
- Output frequency up to 840MHz
- Jitter attenuation 20dB at 3MHz spur frequency
- Additive phase jitter or phase jitter floor:
  - 55fs for 1.875MHz to 20MHz
  - 251fs for 12kHz to 20MHz
- Single ended CMOS input
- One differential or two single ended outputs
- Output logic types supported:
  - LVPECL, LVDS, HCSL and LVCMOS (single –  
- ended or differential).
- Industrial temperature range from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in 24-pin QFN package
- Related devices:
  - PL902xxx: LVCMOS, period jitter cleaning
  - PL904xxx: Differential input, two differential –  
- outputs, and phase noise cleaning



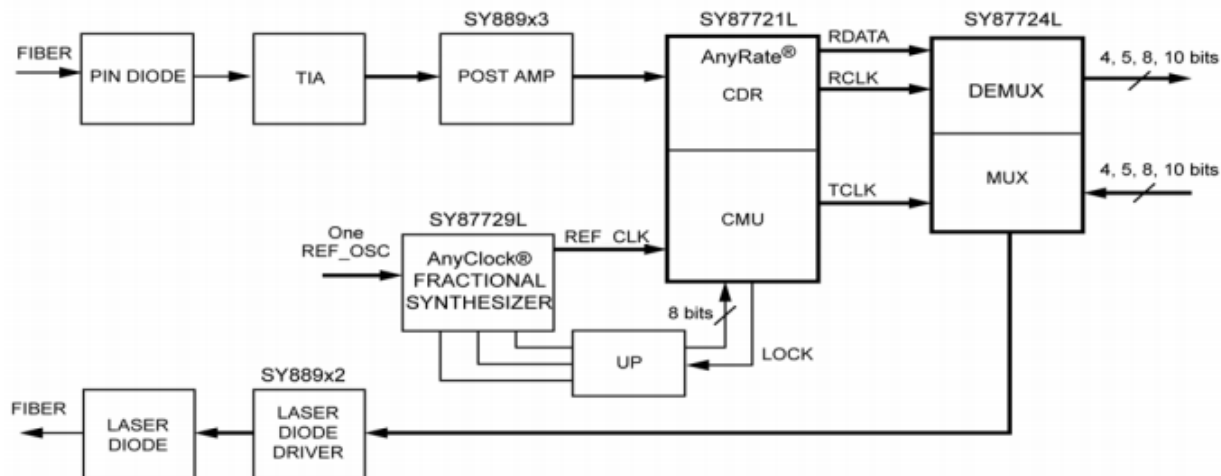
## Features:

- Input frequency up to 200MHz
- Output frequency up to 850MHz
- Programmable input type, differential or single –  
- ended
- Up to two outputs supporting:
  - LVPECL, LVDS, HCSL, or LVCMOS logic –  
- types
- Output enable control for each output
- Jitter attenuation of 20db at 3MHz spur frequency
- Cleans up spurs to below 0.5psRMS phase jitter
- Industrial temperature range: -40°C to +85°C
- Available in 32-pin QFN package
- Related devices:
  - PL902xxx: LVCMOS, period jitter cleaning
  - PL903xxx: Single-ended input, one –  
- differential output, phase noise cleaning



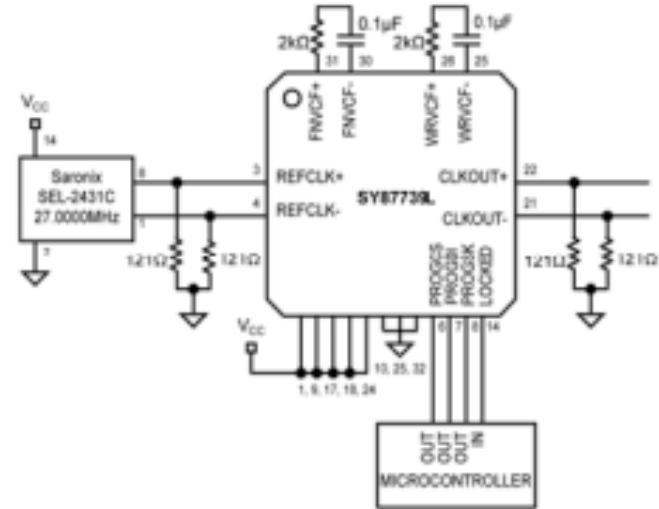
## Features:

- Fractional synthesizer from 10MHz to 365MHz -  
- from a single 27MHz reference oscillator
- Generates exactly the correct frequency for -  
- common transport protocols with or without FEC
- Directly enables SY87721L to lock onto any data –  
- rate within its range
- Exceeds BellCore and ITU jitter generation specifications
- Programmable via MicroWire™ interface
- Available in 32-Pin EPAD-TQFP package



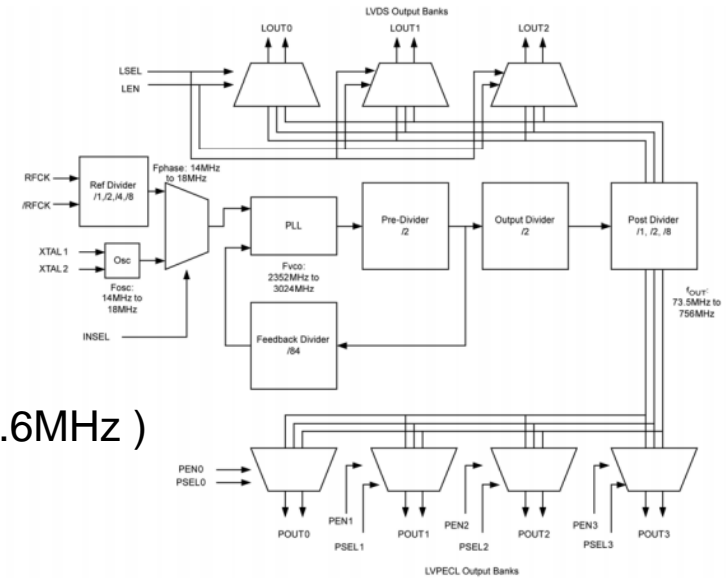
## Features:

- Protocol transparent fractional-N synthesizer
- 10MHz to 729MHz from a single 27MHz –  
- reference oscillator
- Generates exactly the correct frequency for –  
- common transport protocols with or without FEC
- Directly enables SY87721L CDR to lock onto any –  
- data rate within its range
- Exceeds BellCore and ITU jitter generation –  
- specifications
- Programmable via MicroWire™ interface
- Available in 32-Pin ePad-TQFP package



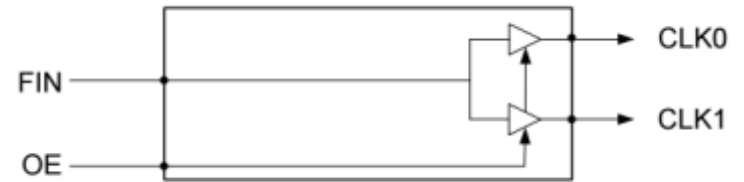
## Features:

- Integrated programmable synthesizer with multiple -
  - output dividers, fanout buffers, and clock drivers
- Direct interface to crystal: 14MHz to 18MHz Input MUX:
  - Ideal for reference backup clock source or -
  - system test frequency source
  - Input MUX isolates XTAL and minimizes crosstalk
- Guaranteed AC performance:
  - 87.15MHz to 700MHz output range (w/ RFCK at 16.6MHz)
  - <100psPP total jitter
  - <7psRMS cycle-to-cycle jitter
  - <8psPP deterministic jitter
  - <0.7psRMS crosstalk induced jitter
  - <50ps bank-to-bank skew
- LVPECL and LVDS outputs, TTL/CMOS compatible control logic
- Five independently programmable output frequency banks:
  - Four differential LVPECL output banks
  - One differential LVDS output bank with 3 output pairs
- 3.3V  $\pm 10\%$  power supply (2.5V output capable)
- Industrial temperature range: -40°C to +85°C
- Available in 44-pin (7mm x 7mm) MLF® package



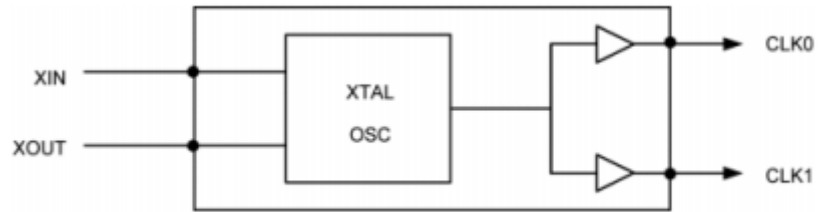
## Features:

- 2 LVCMOS Outputs
- Input/Output Frequency: 1MHz to 150MHz
- Supports LVCMOS or Sine Wave Input Clock
- Extremely low additive Jitter
- 8mA Output Drive Strength
- Low Current Consumption
- Single 1.8V, 2.5V or 3.3V  $\pm 10\%$  operation
- Operating Temperature Range:
  - Commercial: 0°C to 70°C
  - Industrial: -40°C to 85°C
- Available in DFN-6L Packages



## Features:

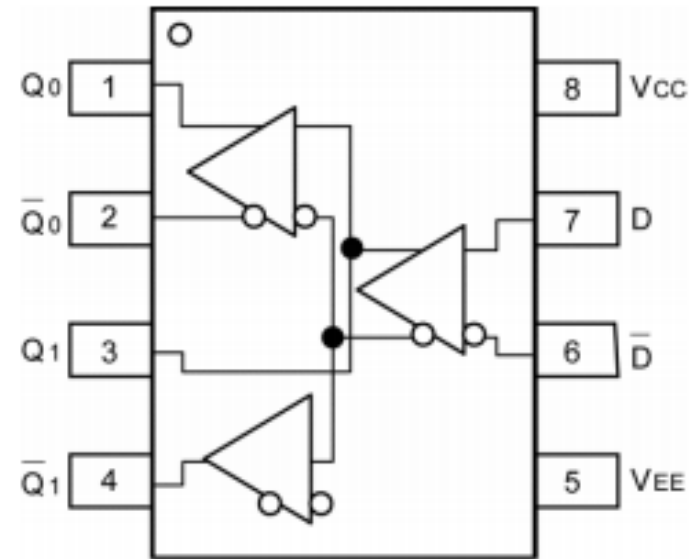
- Advanced oscillator design for wide –  
- frequency coverage
- Two LVCMOS Outputs
- 8mA Output Drive Strength
- Input/Output Frequency: 10MHz to –  
- 40MHz fundamental crystal
- Very low jitter and phase noise
- Low current consumption
- Single 1.62V to 3.63V power supply
- Available in 2.0mm x 13.0mm DFN-6 package





## Features:

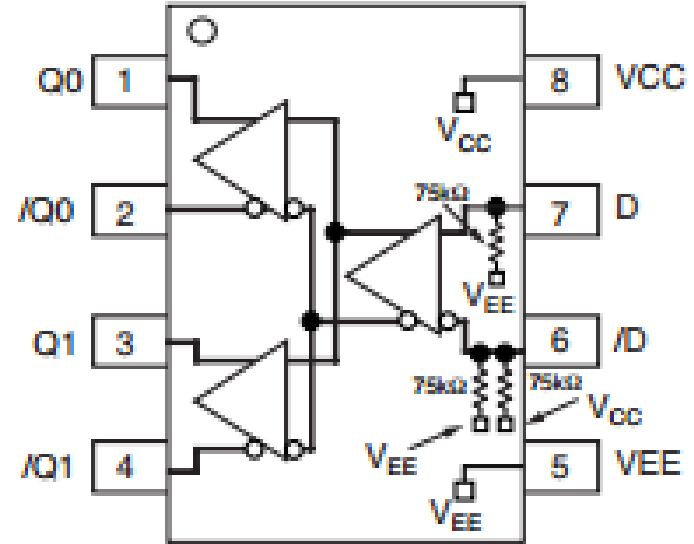
- 3.3V and 5V power supply options
- 265ps propagation delay
- 5ps skew between outputs
- High bandwidth output transitions
- Internal 75k $\Omega$  input pull-down resistors
- Replaces SY10/100EL11
- Improved output waveform characteristics
- Available in 8-pin SOIC package



8-Pin SOIC (Z8-1)

## Features:

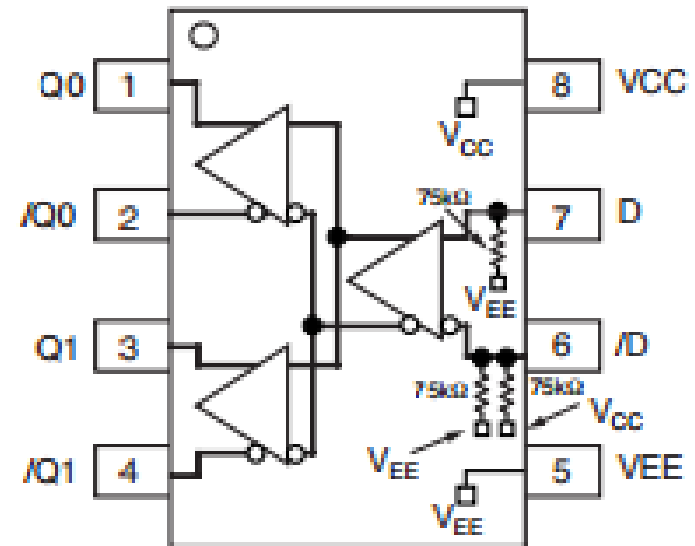
- 2.5V, 3.3V, and 5V power supply options
- Guaranteed AC parameters over temperature:
  - $f_{MAX} = >3GHz$
  - $<20ps$  output-to-output skew
  - $<200ps$  tr/ff
  - $<300ps$  propagation delay
- Industrial temperature range:  $-40^{\circ}C$  to  $+85^{\circ}C$
- Available in 8-Pin MSOP and SOIC packages



**8-pin MSOP and SOIC Packages**

## Features:

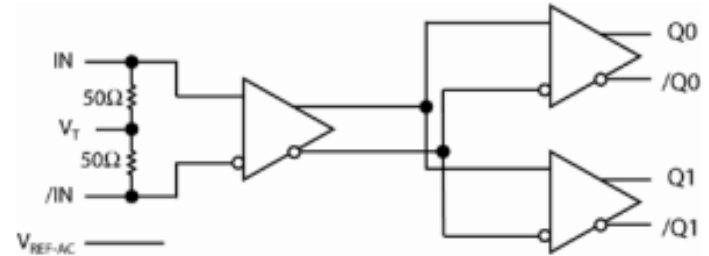
- 2.5V, 3.3V, and 5V power supply options
- Guaranteed AC parameters over temperature:
  - $f_{MAX} = >3\text{GHz}$
  - $<20\text{ps}$  output-to-output skew
  - $<200\text{ps}$  tr/ff
  - $<300\text{ps}$  propagation delay
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in 8-Pin MSOP and SOIC packages



**8-pin MSOP and SOIC Packages**

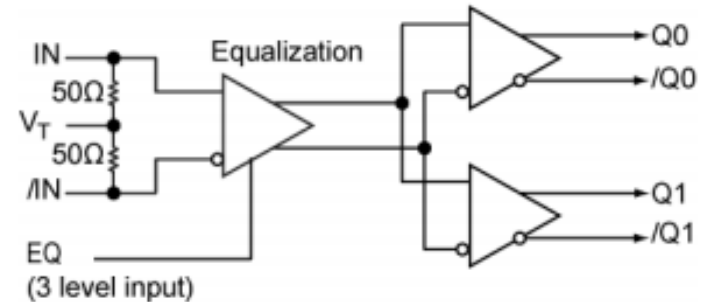
## Features:

- 1.2V/1.8V/2.5V CML 1:2 Fanout Buffer
- Guaranteed AC performance over temperature –  
- and voltage:
  - DC-to >3.2Gbps throughput
  - <300ps propagation delay (IN-to-Q)
  - <15ps within-device skew
  - <95ps rise/fall times
- Ultra-low jitter design:
  - <50fsRMS typical additive phase jitter
- High-speed CML outputs
- 2.5V  $\pm 5\%$  VCC, 1.2/1.8V/2.5V  $\pm 5\%$  -  
- VCCO power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) MLF package



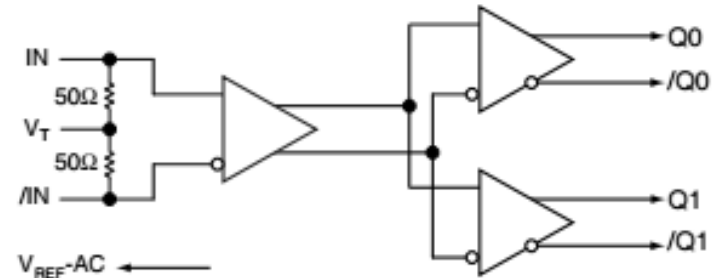
## Features:

- 1.2V/1.8V/2.5V CML 1:2 Fanout Buffer
- Equalizes 9, 18, 27 inches of FR4
- Guaranteed AC performance over temperature –  
- and voltage:
  - DC-to >6.4Gbps Data throughput
  - DC-to >4.5GHz Clock throughput
  - <280ps propagation delay (IN-to-Q)
  - <15ps within-device skew
- <80ps rise/fall times
- Ultra-low jitter design:
  - <1psRMS random jitter
- High-speed CML outputs
- 2.5V  $\pm 5\%$  VCC, 1.2/1.8V/2.5V  $\pm 5\%$  VCCO power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



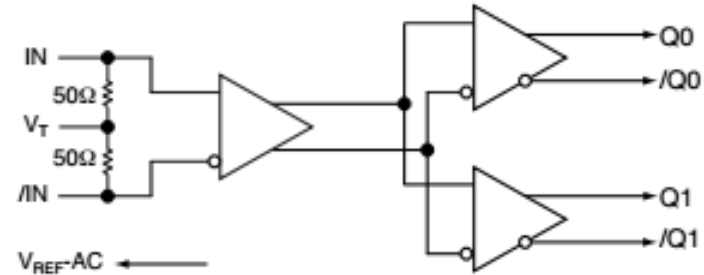
## Features:

- Precision 1:2, 400mV CML fanout buffer
- Guaranteed AC performance over –
  - temperature/voltage:
    - >7GHz fMAX clock
    - <60ps tr/td times
    - <250ps tpd
    - <15ps max. skew
- Low jitter performance:
  - <10psPP total jitter (clock)
- <1psRMS random jitter (data):
  - <10psPP deterministic jitter (data)
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts DC coupled and –
  - AC-coupled differential inputs: LVPECL, LVDS, and CML
- 50Ω source terminated CML outputs
- Power supply 2.5V ±5% and 3.3V ±10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) MLF® package



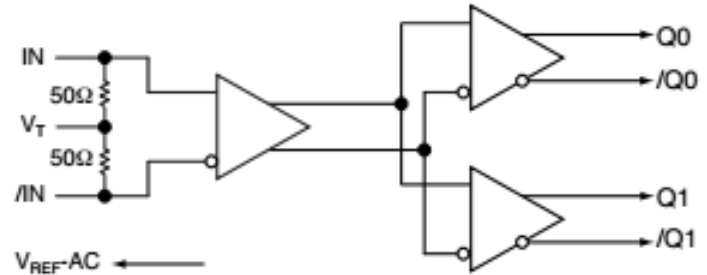
## Features:

- Precision 1:2, 800mV LVPECL fanout buffer
- Guaranteed AC performance over –
  - temperature/ voltage:
- >5GHz fMAX (clock)
- <110ps tr/tf times
- <260ps tpd
- <15ps max skew
- Low jitter performance
- 60fs RMS phase jitter
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts DC and –
  - AC-coupled differential inputs: LVPECL, LVDS, and CML
- Outputs are 100k LVPECL compatible, 800mV swing
- Power supply 2.5V  $\pm$ 5% and 3.3V  $\pm$ 10%
- Industrial temperature range:
  - -40°C to +85°C e
- Available in 16-pin (3mm x 3mm) QFN package



## Features:

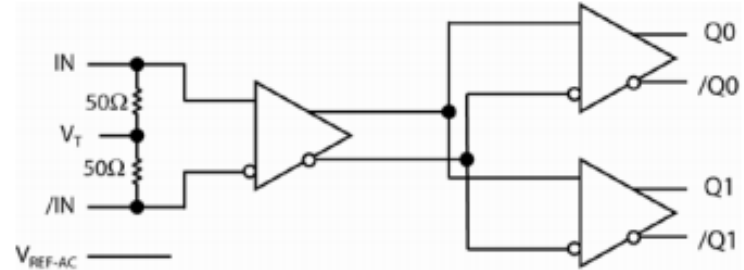
- Precision 1:2, 400mV LVPECL fanout buffer
- Low phase jitter
- <55fsRMS (typical)
- Guaranteed AC performance over temperature –  
- and voltage:
  - >6GHz fMAX clock
  - <80ps tr/tf times
  - <250ps tpd
- <15ps maximum skew
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts DC –  
- coupled and AC-coupled differential inputs: -  
- LVPECL, LVDS, and CML
- 400mV LVPECL compatible outputs
- Power supply 2.5V  $\pm$ 5% and 3.eV  $\pm$ 10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin 3mm x 3mm QFN package





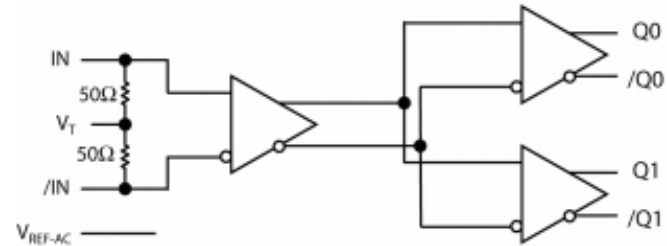
## Features:

- Precision 1:2, 400mV CML fanout buffer
- Guaranteed AC performance over –
  - temperature and voltage:
    - DC-to >4.25Gbps throughput
    - <320ps propagation delay (IN-to-Q)
    - <15ps within-device skew
    - <85ps rise/fall times
- Fail Safe Input
- Prevents outputs from oscillating when input is invalid
- Ultra-low jitter design
- 100fsRMS typical additive jitter
- High-speed CML outputs
- 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10% power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



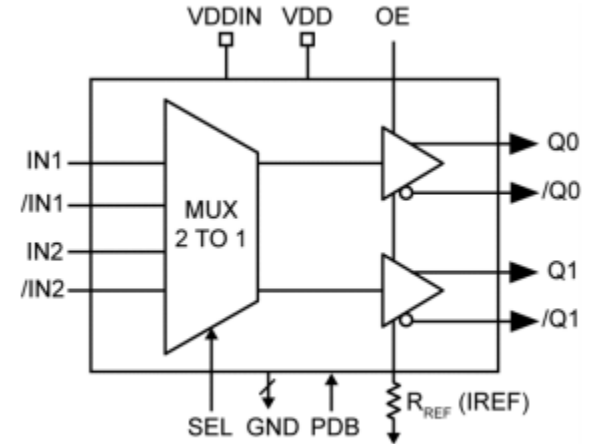
## Features:

- Precision 1:2, 800mV LVPECL fanout buffer
- Guaranteed AC performance over temperature –  
- and voltage:
  - DC-to >3.2Gbps throughput
  - <350ps propagation delay (IN-to-Q)
  - <20ps within-device skew
  - <110ps rise/fall times
- Fail Safe Input prevents outputs from oscillating when input is invalid
- Ultra-low jitter design
- 85fsRMS phase jitter
- High-speed LVPECL outputs
- 2.5V  $\pm 5\%$  or 3.3V  $\pm 10\%$  power supply operation
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in 16-pin (3mm x 3mm) QFN package



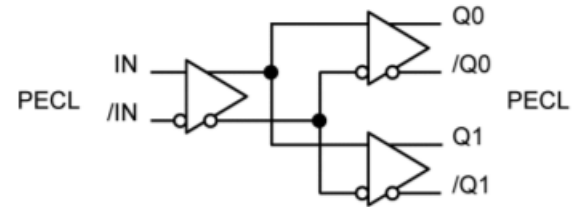
## Features:

- Two differential pairs of LVDS or HCSL outputs
- Two pairs of differential inputs accept LVDS or HCSL –  
- logic levels
- 267MHz maximum frequency
- Ultra-low phase jitter:
  - 137fsRMS, 200MHz (12kHz–20MHz)
  - 153fsRMS, 156.25MHz (12kHz–20MHz)
  - 212fsRMS, 100MHz (12kHz–20MHz)
- <2ps total jitter (peak-to-peak), 200MHz (BER = 10-12)
- 50ps output-to-output skew
- 3.3V  $\pm$ 5% power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



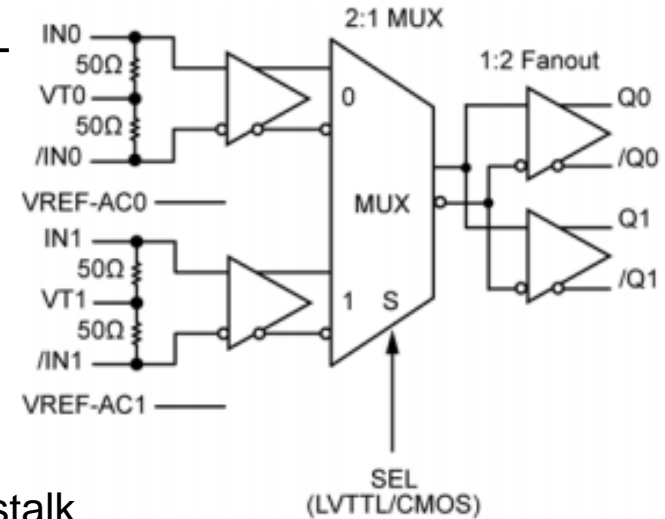
## Features:

- 2.5V, 3.3V, and 5V power supply
- >Guaranteed AC parameters over temperature:
- $f_{MAX} > 3.0\text{GHz}$
- $< 20\text{ps}$  output-to-output skew
- $< 200\text{ps}$  tr/ff
- $< 300\text{ps}$  propagation delay
- 51fsRMS phase jitter (typical)
- 100K compatible I/O
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in ultra-small 8-pin MLF<sup>®</sup> -  
- (2mm x 2mm) package



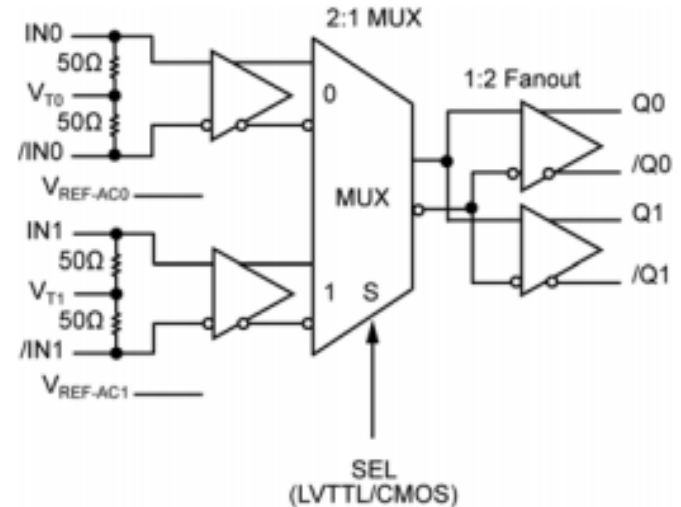
## Features:

- Selects between two input channels and provides two -  
- copies of the selected output
- Guaranteed AC performance over temperature and -  
- supply voltage:
  - DC to 2.5Gbps data throughput
  - DC to 2.5GHz fMAX (clock)
  - <500ps In-to-Out tpd
  - <190ps tr/ff
  - <20ps Output-to-output skew
- Unique patented input isolation design minimizes crosstalk
- Ultra-low Jitter Design:
  - <1psRMS random jitter
  - <1psRMS cycle-to-cycle jitter
  - <10psPP total jitter (clock)
  - <0.7psRMS crosstalk induced jitter
- Unique patent-pending input termination and VT pin –  
- accepts DC and AC-coupled inputs (CML, PECL, LVDS)
- 800mV (100K) LVPECL output swing
- 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10% supply voltage
- Industrial temperature range: -40°C to +85°C



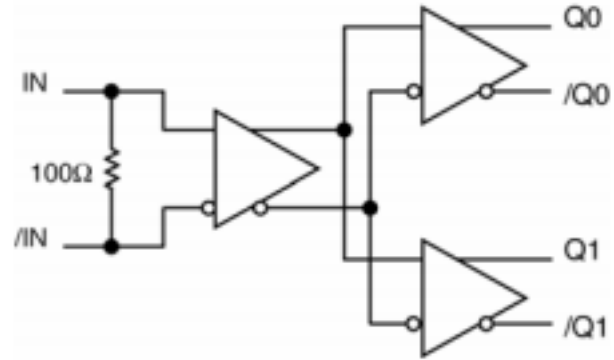
## Features:

- Selects from two inputs and provides two output copies
- AC performance:
  - DC to 2.5Gbps data throughput
  - DC to 2.5GHz fMAX (clock)
  - <470ps In-to-Out tpd
  - <150ps tr/ff
  - <20ps output-to-output skew
- Unique input isolation design minimizes crosstalk
- Ultra-low jitter design:
  - <1psRMS random jitter
  - <10psPP deterministic jitter
  - <1psRMS cycle-to-cycle jitter
  - <10psPP total jitter (clock)
  - <0.7psRMS crosstalk induced jitter
- Unique input termination and VT pin accepts DC and AC -  
– coupled inputs (CML, PECL, LVDS)
- 325mV LVDS output swing
- 2.5V  $\pm$ 5% supply voltage
- Industrial temperature range:-40°C to +85°C
- Available in 24-pin (4mm x 4mm) QFN package



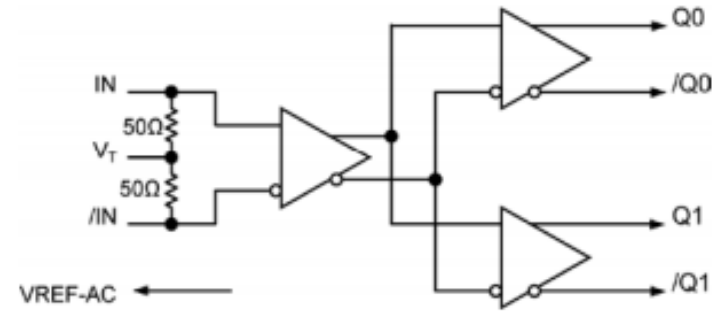
## Features:

- Guaranteed AC performance over temperature –  
- and voltage:
- DC-to >3.2Gbps throughput:
  - 210ps typical propagation delay (IN-to-Q)
  - <20ps within-device skew
  - <150ps rise/fall times
- Fail Safe Input
- Prevents outputs from oscillating
- Ultra-low jitter design:
  - <1psRMS cycle-to-cycle jitter
  - <10psPP total jitter
  - <1psRMS random jitter
  - <10psPP deterministic jitter
- High-speed LVDS outputs
- 2.5V  $\pm$ 5% power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 8-pin (2mm x 2mm) MFL® package



## Features:

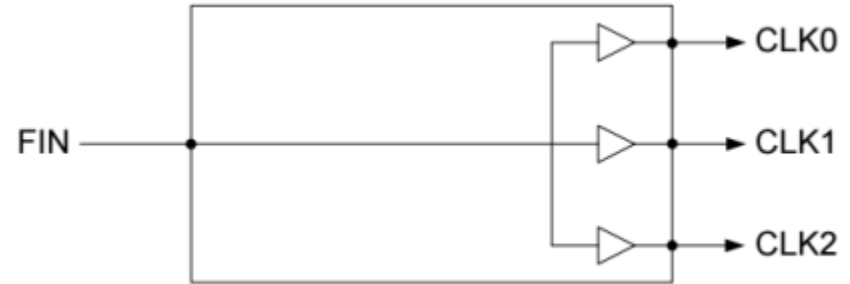
- Precision 1:2, 800mV LVPECL fanout buffer
- Low power consumption: 80mW typ. (2.5V)
- Guaranteed AC performance over temperature –  
- and voltage:
  - DC to >3GHz clock throughput
  - <340ps propagation delay
  - <180ps rise/fall time
  - <20ps output-to-output skew
- Ultra-low jitter design:
  - <1psRMS random jitter
  - <10psPP deterministic jitter
  - <10ps PP total jitter (clock)
- Unique, patented input termination and VT pin accepts DC -  
- and AC-coupled inputs (CML, LVPECL, LVDS)
- 100K LVPECL-compatible outputs
- Power supply 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10%
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in 16-pin (3mm x 3mm) MLF® package





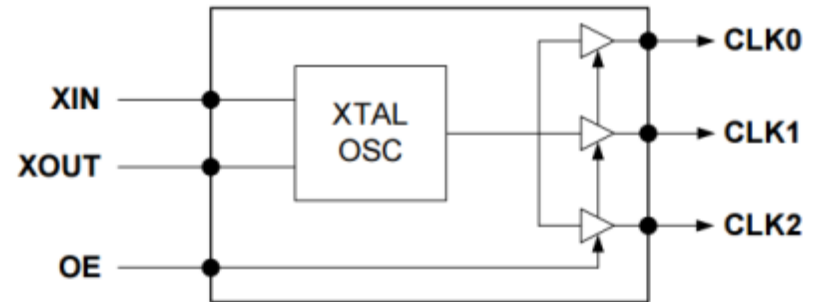
## Features:

- 3 LVCMOS Outputs
- 12mA Output Drive Strength
- Input/Output Frequency: Reference Clock: -  
- 1MHz to 150MHz
- Supports LVCMOS or Sine Wave Input -  
- Clock
- Very Low Jitter and Phase Noise
- Low Current Consumption
- Single 1.8V, 2.5V or 3.3V  $\pm 10\%$  operation
- Operating Temperature Range:
  - Commercial: 0°C to 70°C
  - Industrial: -40°C to 85°C
- Available in SOT23-6L packages



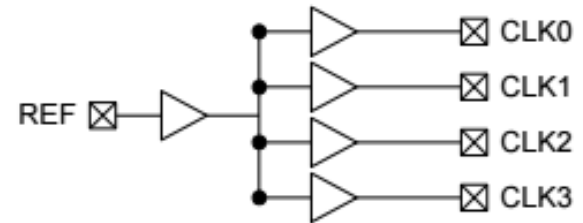
## Features:

- Advanced Oscillator Design for Wide –  
- Frequency Coverage
- 3 LVCMOS Outputs
- 12mA Output Drive Strength
- Input/Output Frequency:
  - Fundamental Crystal: 10MHz to 40MHz
- Very Low Jitter and Phase Noise
- Low Current Consumption
- Single 1.62V to 3.63V Power Supply
- Available in SOP-8L package



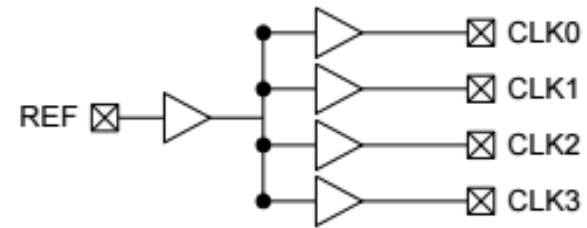
## Features:

- 1:4 LVCMOS output fanout buffer for DC to 150MHz
- Low Additive Phase Jitter of 60fs RMS
- 8mA Output Drive Strength
- Low power consumption for portable applications
- Low input-output delay
- Output-Output skew less than 250ps
- 2.5V to 3.3V  $\pm 10\%$  operation
- Industrial temperature range:
  - -40°C to 85°C
- Available in 8-Pin SOP package



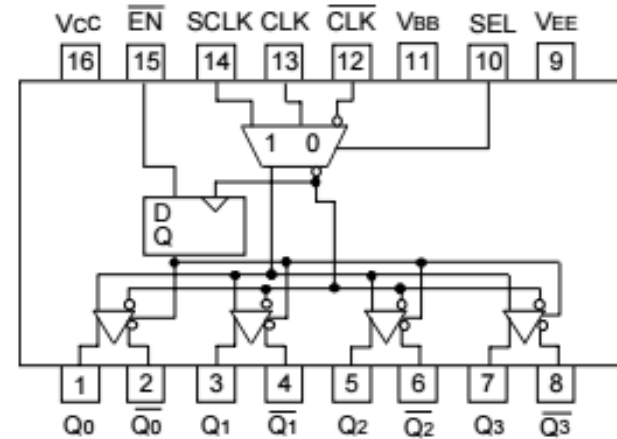
## Features:

- Four differential 2.5V/3.3V LVPECL output -  
- pairs
- Output Frequency:  $\leq 1\text{GHz}$
- Two selectable differential input pairs
- Translates any standard single-ended or –  
- differential input format to LVPECL output
- Accepts standard input formats and more:
  - LVPECL, LVCMOS, LVDS, HCSL, SSTL,  
LVHSTL, CML
- Output Skew: 25ps (typ.)
- Part-to-part skew: 140ps (typ.)
- Propagation delay: 1.5ns (typ.)
- Additive Jitter: <100fs (typ.)
- Operating Supply Voltage: 2.375V ~ 3.63V
- Industrial temperature range:
  - -40°C to 85°C
- Package: 20-pin TSSOP



## Features:

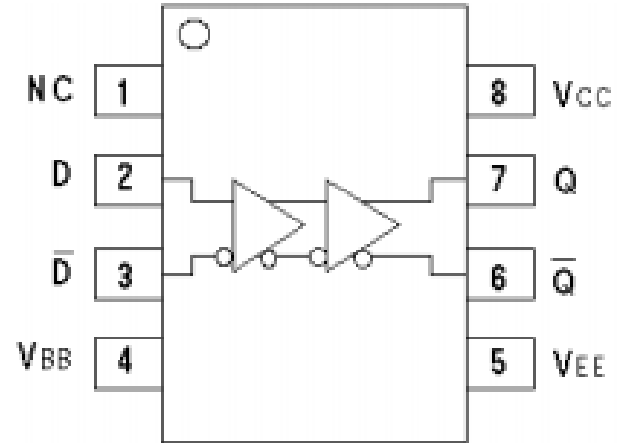
- 3.3V power supply
- 50ps output-to-output skew
- Low power
- Synchronous enable/disable
- Multiplexed clock input
- 75K $\Omega$  internal input pull-down resistors
- Available in 16-pin SOIC package



**SOIC  
TOP VIEW**

## Features:

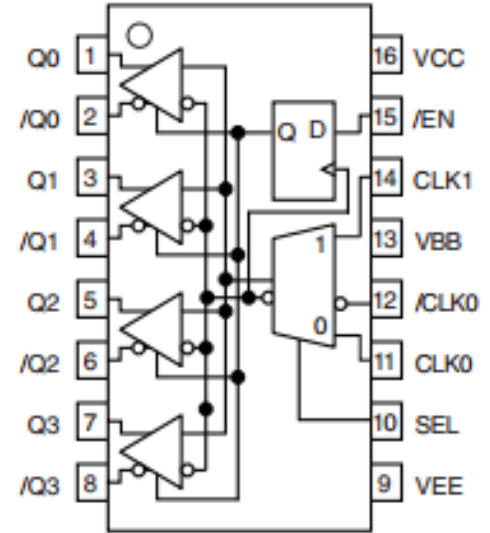
- 3.3V and 5V power supply options
- 250ps propagation delay
- High bandwidth output transitions
- Internal 75K $\Omega$  input pull-down resistors
- Replaces SY10/100EL16
- Improved output waveform characteristics
- Available in 8-pin MSOP and SOIC package



8-Pin MSOP (K8-1)  
8-Pin SOIC (Z8-1)

## Features:

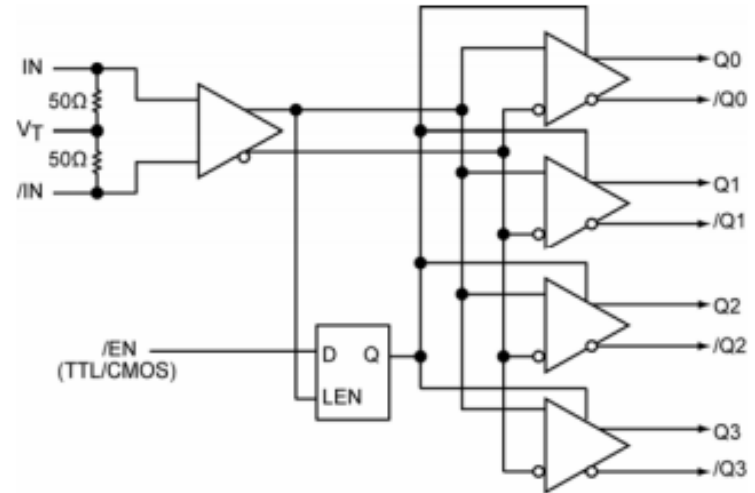
- High-speed 1:4 PECL/ECL fanout buffer
- 2:1 multiplexer input
- Guaranteed AC parameters over temp/voltage:
  - >2.5GHz fMAX (toggle)
  - <225ps rise/fall times
  - <25ps within device skew
  - <425ps propagation delay (CLK-to-Q)
- Low jitter design:
  - <1psRMS cycle-to-cycle jitter
  - <20psPP total jitter
- Flexible power supply: 3.3V/5V
- Industrial temperature range:
  - -40°C to +85°C
- VBB reference for AC-coupled or single-ended applications
- Output enable/disable function
- 100K PECL/ECL compatible logic
- Input accepts PECL/LVPECL/ECL/HSTL logic levels
- Available in a 16-pin TSSOP package



**Available in 16-Pin TSSOP  
(K4-16-1)**

## Features:

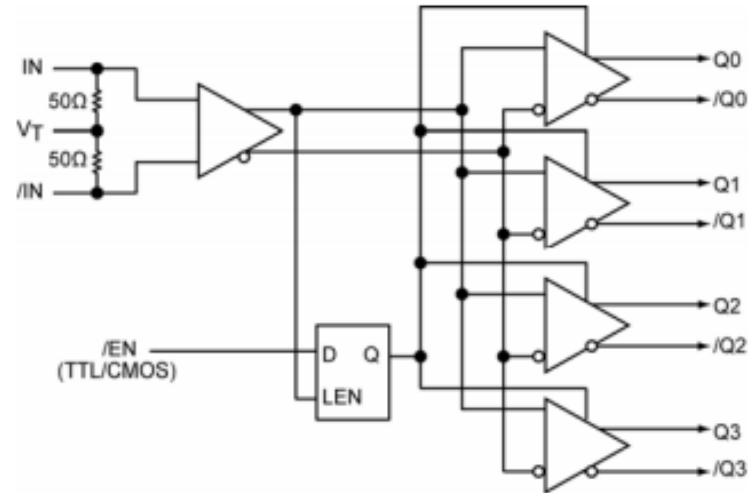
- 1.2V/1.8V/2.5V CML 1:4 Fanout Buffer
- Active-low Enable (/EN) input to disable the –  
– outputs
- Guaranteed AC performance over temperature –  
– and voltage:
  - DC-to- >3.2Gbps throughput
  - DC-to >3.2GHz Clock throughput
  - <320ps propagation delay (IN-to-Q)
  - <20ps within-device skew
  - <100ps rise/fall times
- Ultra-low jitter design:
  - <1psRMS cycle-to-cycle jitter
- High-speed CML outputs
- 2.5V  $\pm 5\%$   $V_{CC}$ , 1.2V/1.8V/2.5V  $\pm 5\%$   $V_{CCO}$  –  
– power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) MLF® package





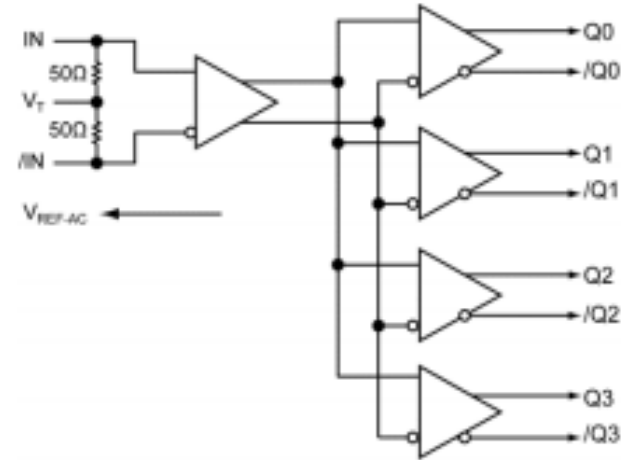
## Features:

- 1.2V/1.8V/2.5V CML 1:4 Fanout Buffer w/ FSI
- Active-low Enable (/EN) input to disable the –  
- outputs
- Guaranteed AC performance over temperature –  
- and voltage:
  - DC-to- >3.2Gbps throughput
  - DC-to >2.5GHz Clock throughput
  - <400ps propagation delay (IN-to-Q)
  - <20ps within-device skew
  - <100ps rise/fall times
- Ultra-low jitter design:
  - <1psRMS cycle-to-cycle jitter
- High-speed CML outputs
- 2.5V  $\pm 5\%$  VCC, 1.2V/1.8V/2.5V  $\pm 5\%$  VCCO –  
- power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



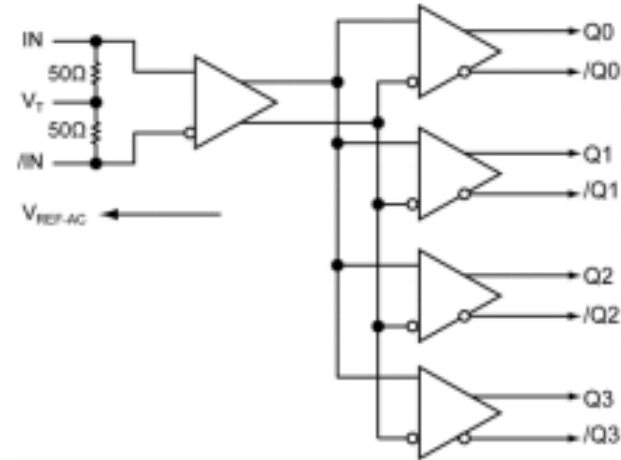
## Features:

- 1.2V/1.8V/2.5V CML 1:4 Fanout Buffer
- Equalizes 9, 18, 27 inches of FR4
- Guaranteed AC performance over temperature –  
- and voltage:
  - DC-to >6.4Gbps Data throughput
  - DC-to >4.5GHz Clock throughput
  - <280 ps propagation delay (IN-to-Q)
  - <15ps within-device skew
  - <90ps rise/fall times
- Ultra-low jitter design:
  - <1psRMS random jitter
- High-speed CML outputs
- 2.5V  $\pm 5\%$   $V_{CC}$ , 1.2/1.8V/2.5V  $\pm 5\%$   $V_{CCO}$  -  
- power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



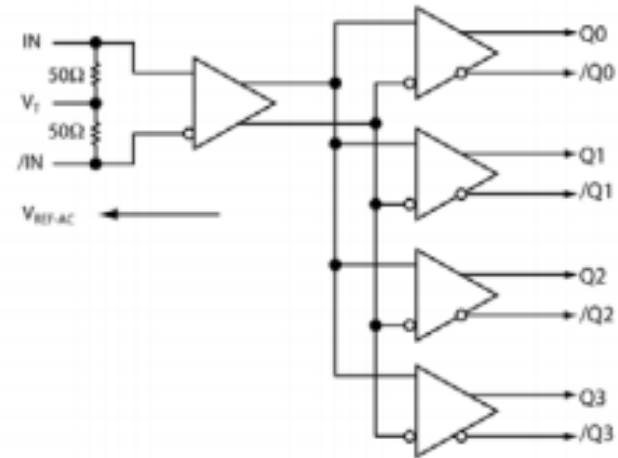
## Features:

- Precision 1:4, 400mV CML fanout buffer
- Guaranteed AC performance over –
  - temperature/voltage:
    - >6GHz fMAX clock
    - <60ps tr/td times
    - <250ps tpd
    - <15ps max. skew
- Low jitter performance:
  - <10pspp total jitter (clock)
  - <1psrms random jitter (data)
  - <10pspp deterministic jitter (data)
- Accepts an input signal as low as 100mV
- Unique input termination and VTpin accepts DC coupled and AC-
  - coupled differential inputs: LVPECL, LVDS, and CML
- 50Ω source terminated CML outputs
- Power supply 2.5V ±5% and 3.3V ±10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) MLF® package



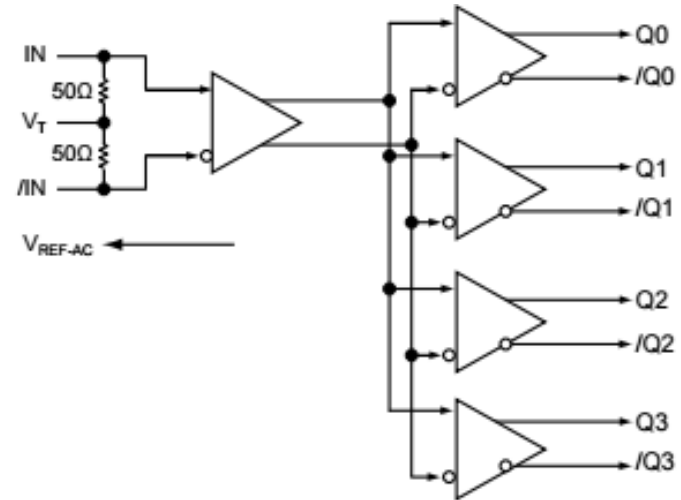
## Features:

- Precision 1:4 LVPECL fanout buffer
- Low jitter performance:
  - 70fsRMS phase jitter (typical)
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts -
  - DC-coupled and AC-coupled differential –
  - inputs:
    - LVPECL, LVDS, and CML
- 100k LVPECL-compatible 800mV swing output
- Power supply 2.5V  $\pm$ 5% and 3.3V  $\pm$ 10%
- Industrial temperature range:
  - -40°C to +85°C range
- Available in 16-pin (3mm x 3mm) QFN package



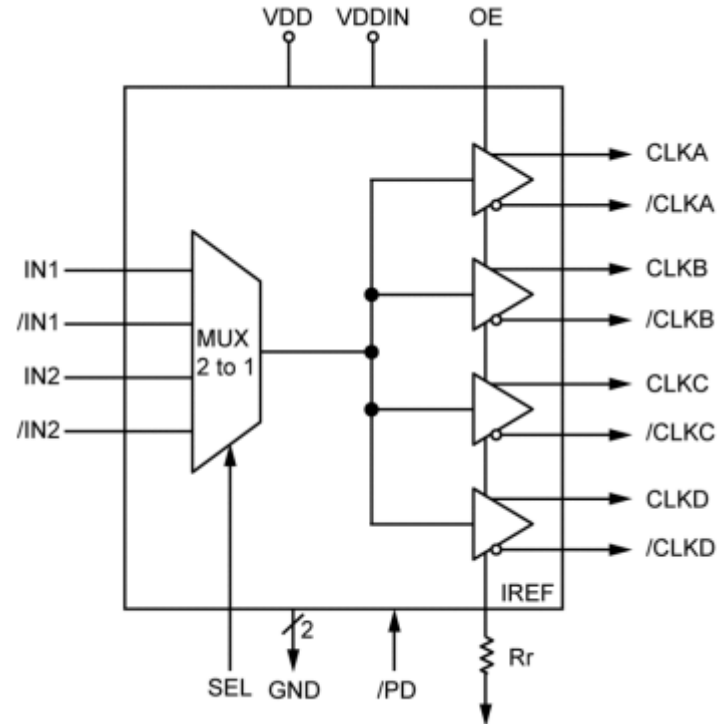
## Features:

- Precision 1:4, 400mV LVPECL fanout buffer
- Guaranteed AC performance over temperature –  
- and voltage:
  - > 5.5GHz fMAX clock
  - <80ps tr/tf times
  - <250ps ( $V_{IN} \geq 300\text{mV}$ ) tpd
  - <15ps max. skew
- Low jitter performance:
  - 60fs RMS phase jitter
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts DC and -  
- AC-coupled differential inputs: LVPECL, LVDS and CML
- 400mV LVPECL compatible outputs
- Power supply 2.5V  $\pm 5\%$  and 3.3V  $\pm 10\%$
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



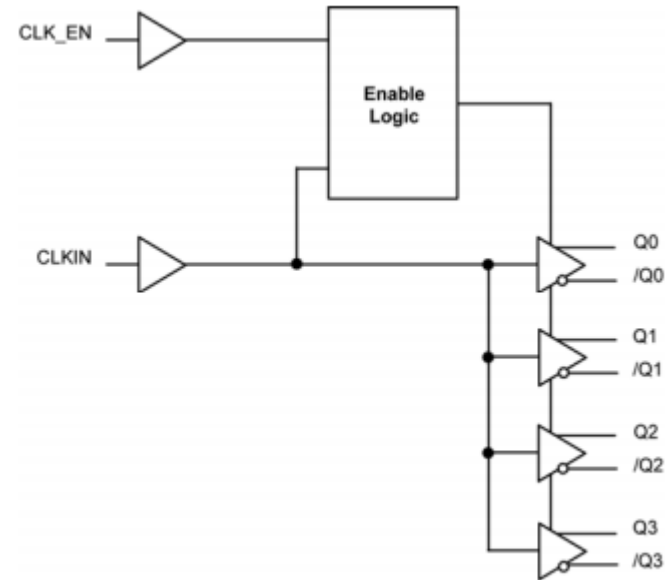
## Features:

- Four differential pairs of LVDS or HCSL outputs
- Two pairs of differential inputs accept LVDS or –  
– HCSL logic levels
- 267MHz max HCSL frequency
- 100MHz max LVDS frequency
- Ultra low phase jitter:
  - 137fsrms, 200MHz (12kHz–20MHz)
  - 153fsrms, 156.25MHz (12kHz–20MHz)
  - 212fsrms, 100MHz (12kHz–20MHz)
- <2ps Total\_Jitterpk-pk, 200MHz (BER =  $10^{-12}$ )
- 50ps output-to-output skew
- 3.3V  $\pm 5\%$  power supply operation
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in 20-pin TSSOP package



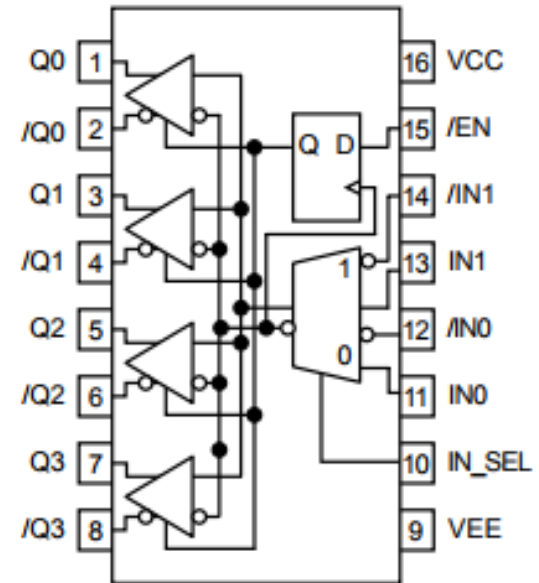
## Features:

- Four identical LVDS outputs
- CLKIN accepts LVCMOS or LVTTL input levels
- Maximum output frequency: 650MHz
- Translates LVCMOS/LVTTL input signals to –  
- LVDS levels
- <40ps output-to-output skew
- <3ns propagation delay
- <400ps rise/fall times
- 3.3V  $\pm$ 5% operating supply
- Industrial temperature range:
  - -40°C to +85°C
- Available in 20-pin TSSOP



## Features:

- Guaranteed AC parameters over temp/voltage:
  - >2.5GHz f<sub>MAX</sub>
  - <25ps within-device skew
  - <225ps tr/TF time
  - <450ps prop delay
- Low jitter design:
  - <1psRMS cycle-to-cycle jitter
  - <15psPP total jitter
- 2:1 Differential MUX input
- Flexible supply voltage: 2.5V/3.3V/5V
- Wide operating temperature range:
  - -40°C to +85°C
- 100K ECL compatible outputs
- Inputs accept PECL/LVPECL/ECL/HSTL logic levels
- Available in a 16-pin TSSOP package

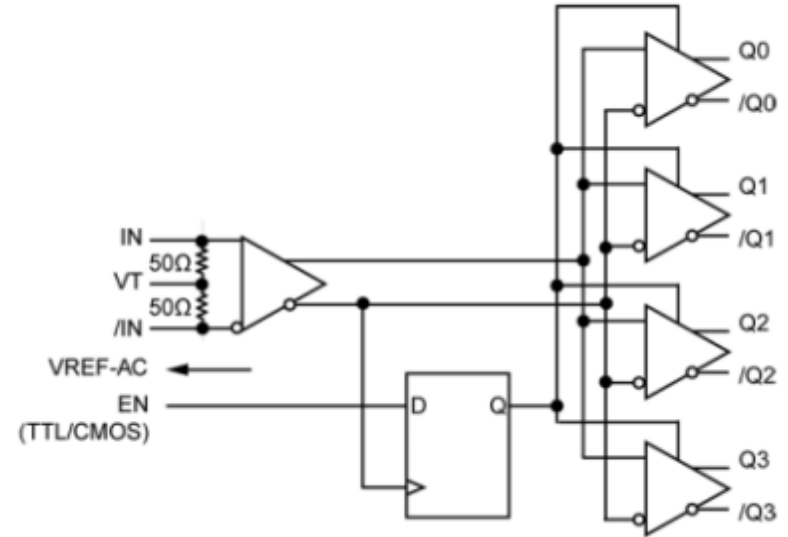


16-Pin TSSOP (T32-1)



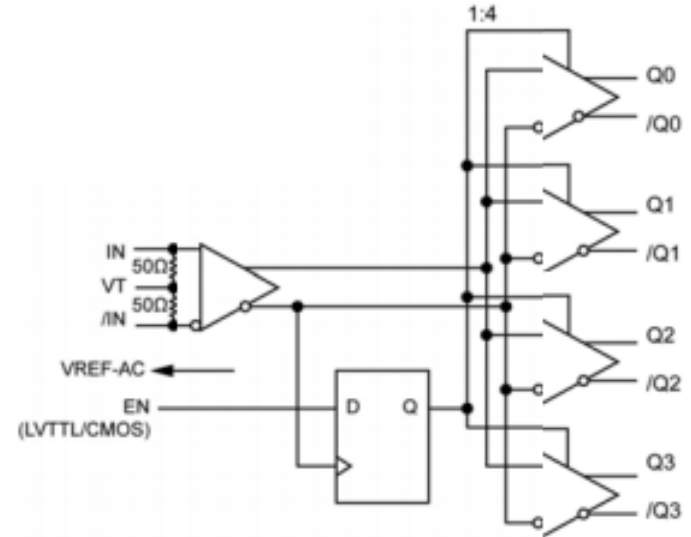
## Features:

- Guaranteed AC performance over temperature –  
- and voltage:
  - DC-to-2.5GHz throughput (typical)
  - 350ps propagation delay (IN-to-Q) (typical)
  - 5ps within-device skew (typical)
  - 150ps rise/fall time (typical)
- Ultra-low jitter design:
  - 62fsRMS phase jitter (typical)
- Unique patent-pending input termination and –  
- VT pin accepts DC- and AC-coupled –  
- differential inputs
- 800mV, 100K LVPECL typical output swing
- Power supply 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) MLF® package



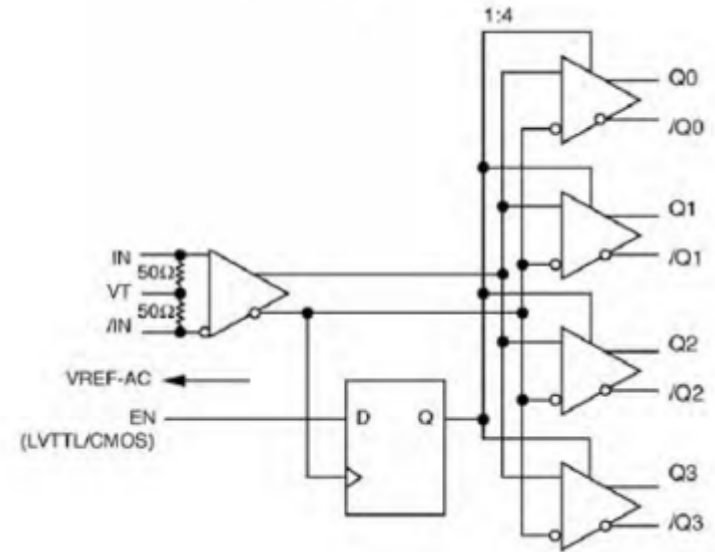
### Features:

- Guaranteed AC performance over temperature –  
- and voltage:
  - DC-to >2.0GHz throughput
  - <570ps propagation delay (IN-to-Q)
  - <20ps within-device skew
  - <200ps rise/fall time
- Ultra-low jitter design:
  - 81fsRMS phase jitter
- Unique, patent-pending input termination and –  
- VT pin accepts DC- and AC-coupled inputs
- High-speed LVDS outputs
- 2.5V voltage supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



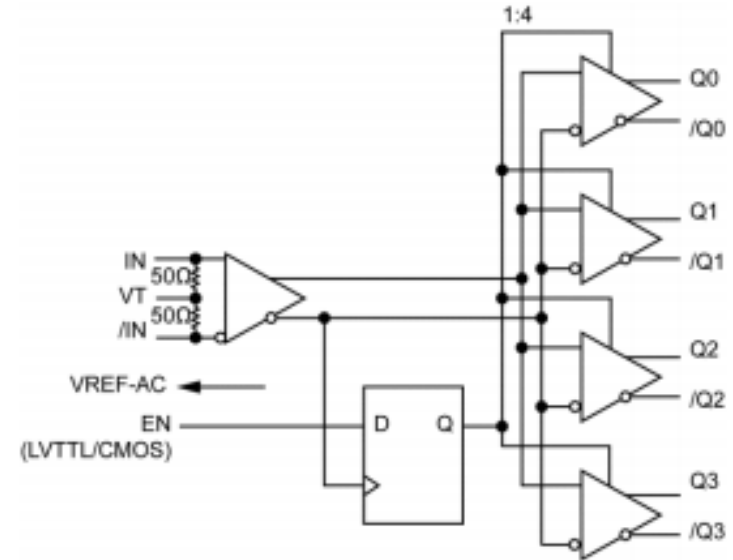
## Features:

- Guaranteed AC performance over temperature -  
– and voltage:
  - DC-to >2.0GHz throughput
  - <470ps propagation delay (IN-to-Q)
  - <20ps within-device skew
  - <190ps rise/fall time
- Improved ultra-low jitter design:
  - 195fsRMS phase jitter (typ.)
- Unique input termination and VT pin accepts –  
- DC- and AC-coupled inputs
- High-speed LVDS outputs
- 3.3V power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



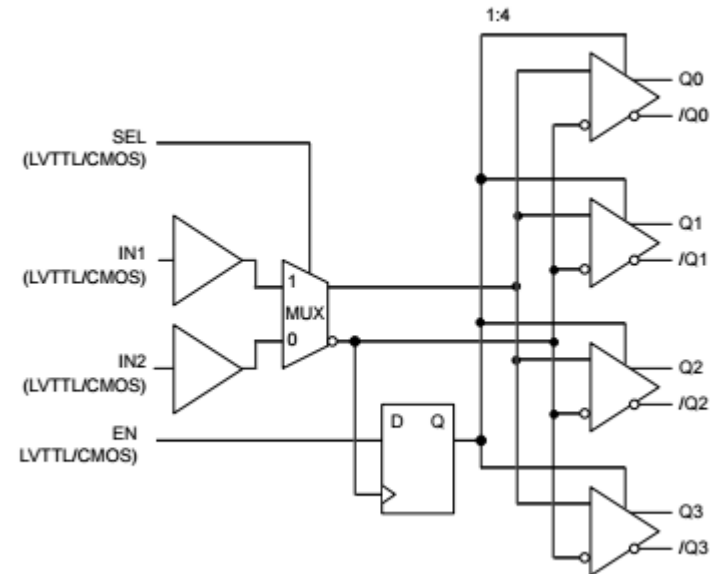
### Features:

- Guaranteed AC performance over temperature – and voltage:
- DC-to >2GHz throughput:
  - <600ps propagation delay (IN-to-Q)
  - <20ps within-device skew
  - <190ps rise/fall times
- Ultra-low jitter design:
- 98fsRMS phase jitter
- Unique input termination and VTpin accepts -
  - DC and AC-coupled inputs
- High-speed LVDS outputs
- 3.3V power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 16-pin (3mm x 3mm) QFN package



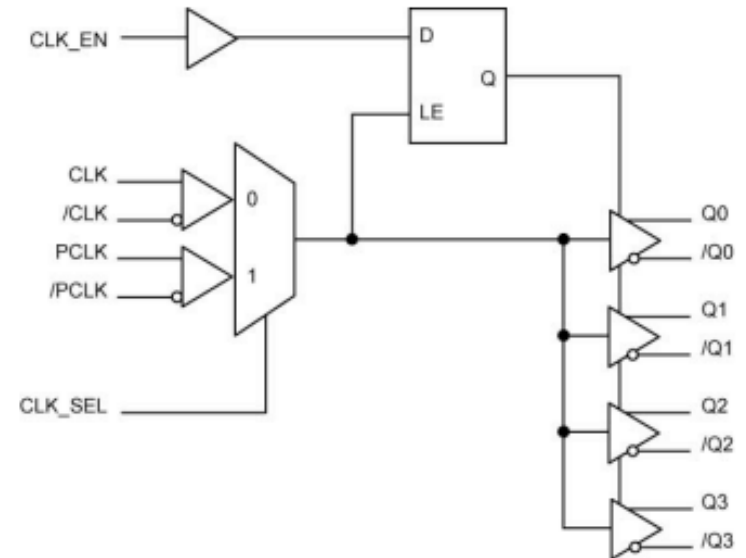
## Features:

- Selects between two LVTTTL/CMOS inputs and –
  - provides
- 4 LVPECL output copies
- Guaranteed AC performance over temperature –
  - and voltage:
    - DC-to >1.0GHz throughput
    - <500ps propagation delay (IN-to-Q)
    - <20ps within-device skew
    - <225ps rise/fall time
- Ultra-low jitter design:
  - <1psRMS cycle-to-cycle jitter
  - <1psRMS random jitter
  - <10psPP deterministic jitter
  - <10psPP total jitter (clock)
- Low voltage 2.5V and 3.3V supply operation
- 100K LVPECL outputs
- Industrial temperature range:
  - -40°C to +85°C
- Includes a 2:1 MUX select input
- Available in 16-pin (3mm x 3mm) MLF® package



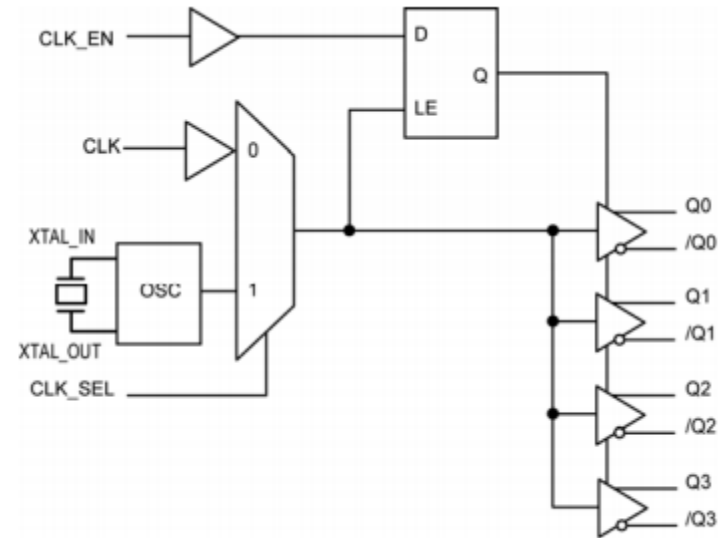
## Features:

- Provides four differential 3.3V LVPECL copies
- Selects between differential CLK, /CLK or –  
- LVPECL clock inputs
- CLK, /CLK pair accepts LVDS, LVPECL, –  
- LVHSTL, SSTL, HCSL input levels
- PCLK, /PCLK pair accepts LVPECL, CML, –  
- SSTL input levels
- Guaranteed AC performance over temperature –  
- and supply voltage:
  - 650MHz Maximum output frequency
  - <1.4ns Propagation delay (In-to-Q)
  - <30ps Output skew
  - <150ps Part-to-part skew
- Additive phase jitter, RMS: 0.06ps (typical)
- 3.3V  $\pm 5\%$  supply voltage
- Commercial temperature range:
  - 0°C to +70°C
- Available in a 20-pin TSSOP package



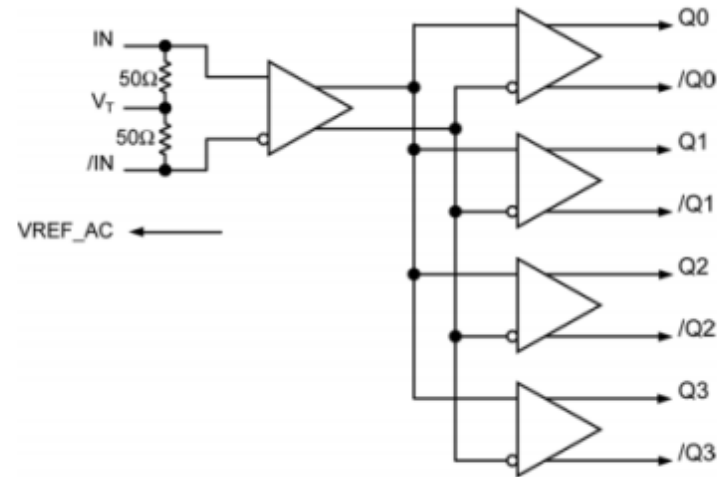
## Features:

- Provides four differential 3.3V LVPECL copies
- Selects between single-ended CLK or crystal –  
- inputs
- CLK accepts LVCMOS or LVTTTL input levels
- Guaranteed AC performance over temperature –  
- and supply voltage:
  - 235MHz Maximum output frequency
  - <1.65ns Propagation delay (In-to-Q)
  - <30ps Output skew
  - <200ps Part-to-part skew
- Additive phase jitter, RMS: 0.09ps (typical)
- 3.3V  $\pm$ 5% supply voltage
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Available in a 20-pin TSSOP package



## Features:

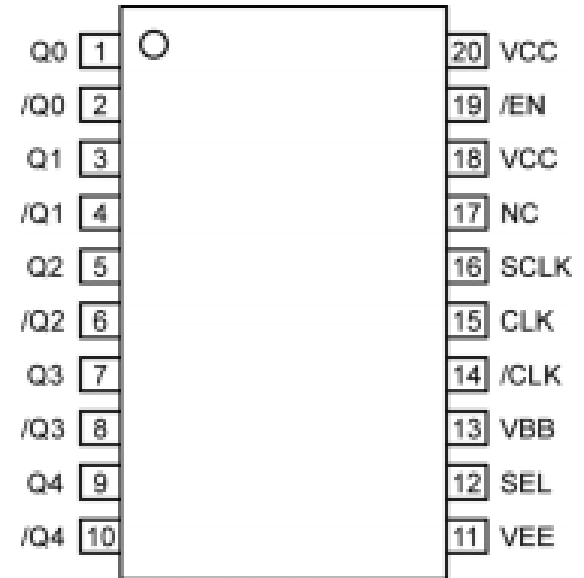
- Precision 1:4, LVPECL fanout buffer
- Low power: 137mW (2.5V typ)
- Guaranteed AC performance over temperature –  
- and supply voltage:
  - DC- to >2GHz Clock fMAX
  - <340ps tpd
  - <180ps tr/td time
  - <20ps max. skew
- Ultra-low jitter design:
  - <1psrms random jitter
  - <10pspp deterministic jitter
  - <10pspp total jitter (clock)
- Unique patent pending input termination and VT pin accepts
- DC-coupled and AC-coupled inputs (CML, PECL, LVDS)
- Typical 800mV (100k) LVPECL output swing
- Power supply 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in ultra-small (3mm x 3mm) 16-pin QFN package





## Features:

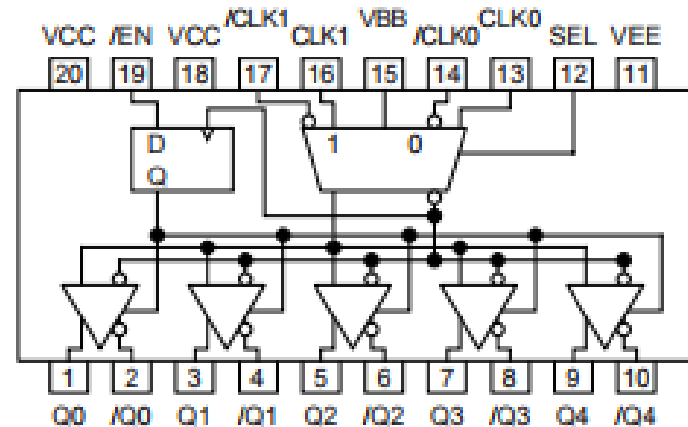
- 3.3V and 5V power supply options
- 70fsRMS typical additive phase jitter
- Typical 30ps output-to-output skew
- Max. 50ps output-to-output skew
- Synchronous enable/disable
- Multiplexed clock input
- 75K $\Omega$  internal input pull-down resistors
- Available in 20-pin SOIC package



20-Pin Narrow SOIC  
(Top View)

## Features:

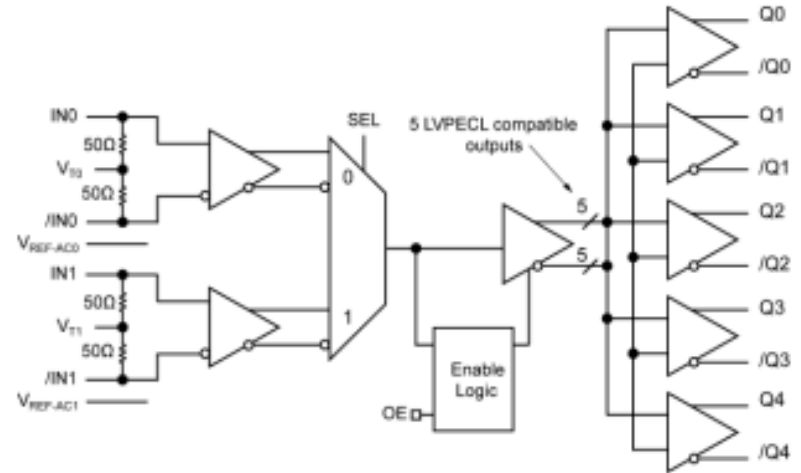
- Guaranteed AC parameters over –
  - temp/voltage:
    - >2GHz fMAX
    - <25ps within-device skew
    - <275ps tr/tf time
    - <525ps prop delay
- 2:1 Differential MUX input
- Flexible supply voltage: 2.5V/3.3V/5V
- Wide operating temperature range:
  - -40°C to +85°C
- VBB reference for single-ended or AC –
  - coupled PECL inputs
- 100K ECL compatible outputs
- Inputs accept PECL/LVPECL/ECL/HSTL logic
- 75k internal input pull-down resistors
- Available in a 20-Pin TSSOP package



**20-Pin TSSOP**

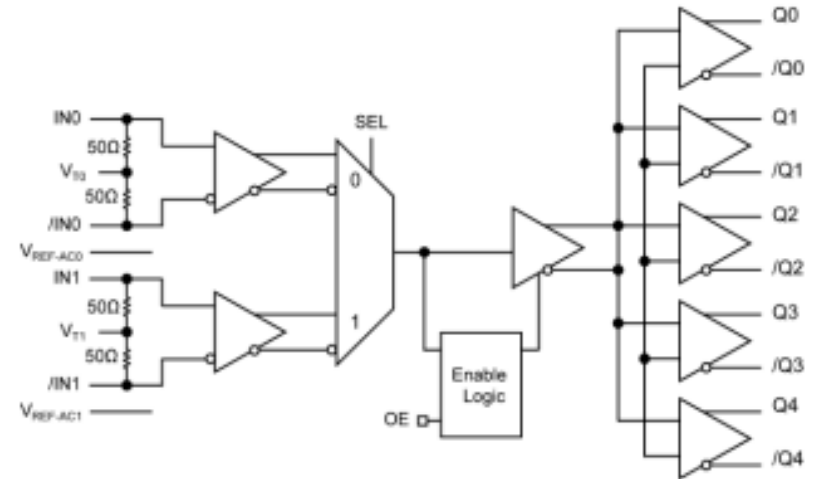
## Features:

- Select from two inputs and provides 5 copies
- Fail-Safe Input:
  - Prevents outputs from oscillating when –
    - input is invalid
- AC performance:
  - DC-to >1.5GHz throughput
  - <900ps Propagation Delay (IN-to-Q)
  - <250ps Rise/Fall times
- Ultra-low jitter design:
  - 150fsRMS phase jitter (typ.)
  - <0.7psRMS MUX crosstalk induced jitter
- Unique, patented MUX input isolation design –
  - minimizes adjacent channel crosstalk
- Patented internal termination & VT pin accepts –
  - DC- and AC-coupled inputs (CML, PECL, LVDS)
- Wide input voltage range.  $V_{CC}$  to GND
- 2.5V  $\pm 5\%$  or 3.3  $\pm 10\%$  supply voltage
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin (5mm x 5mm) QFN package



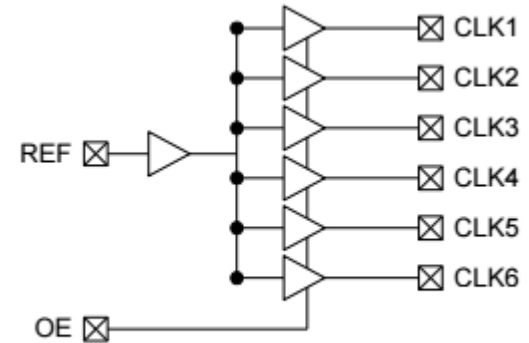
## Features:

- Selects between two sources and provides 5 precision LVDS copies
- Fail-Safe Input:
  - Prevents outputs from oscillating when –
    - input is invalid
- AC performance:
  - DC-to >1.5GHz throughput
  - <1000ps Propagation Delay (IN-to-Q)
  - <210ps Rise/Fall times
- Ultra-low jitter design:
  - 150fsRMS phase jitter (typ.)
  - <0.7psRMS MUX crosstalk induced jitter
- Unique, patented MUX input isolation design –
  - minimizes adjacent channel crosstalk
- Unique, patented internal termination and VT pin accepts DC and AC-coupled inputs (CML, PECL, LVDS)
- Wide input voltage range  $V_{CC}$  to GND
- 2.5V  $\pm 5\%$  supply voltage
- Industrial temperature range: -40°C to +85°C
- Available in 32-pin (5mm x 5mm) QFN package



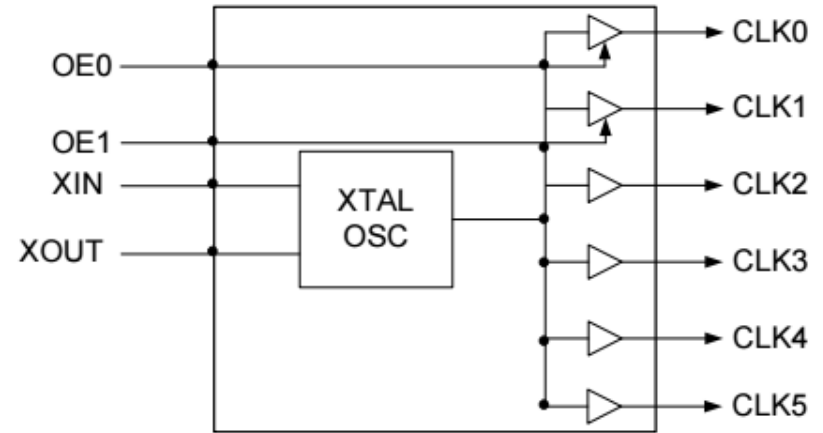
## Features:

- 1:6 LVCMOS output fanout buffer for DC to 150MHz
- 8mA Output Drive Strength
- Low power consumption for portable applications
- Low input-output delay
- Output-Output skew less than 250ps
- Low Additive Phase Jitter of 60fs RMS
- 2.5V to 3.3V  $\pm 10\%$  operation
- Industrial temperature range:
  - -40°C to 85°C
- Available in 16-Pin SOP package



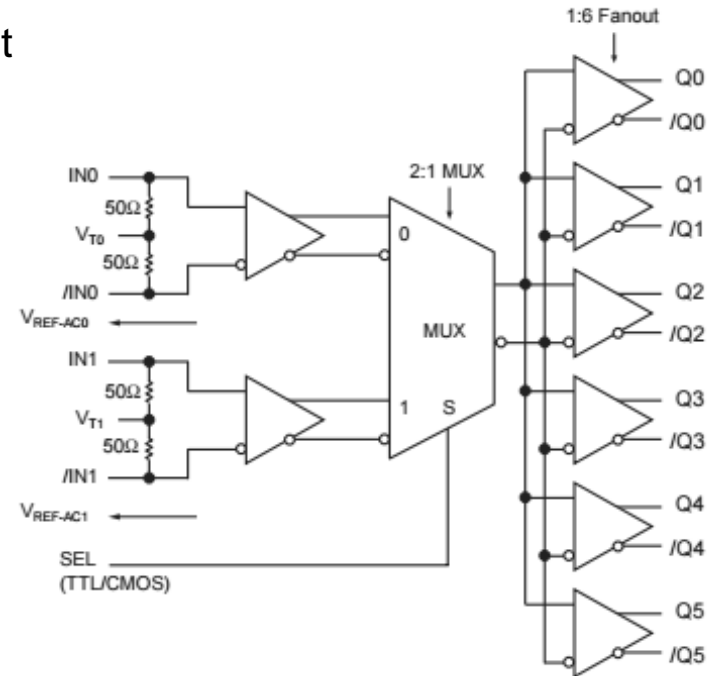
## Features:

- Advanced Oscillator Design for Wide –  
- Frequency Coverage
- 6 LVCMOS Outputs with 2 Output Enable Pins
- 8mA Output Drive Strength
- Input/Output Frequency:  
• Fundamental Crystal: 10MHz to 40MHz
- Very Low Jitter and Phase Noise
- Low Current Consumption
- Single 1.62V to 3.63V Power Supply
- Available in QFN-16L and TSSOP-16L packages



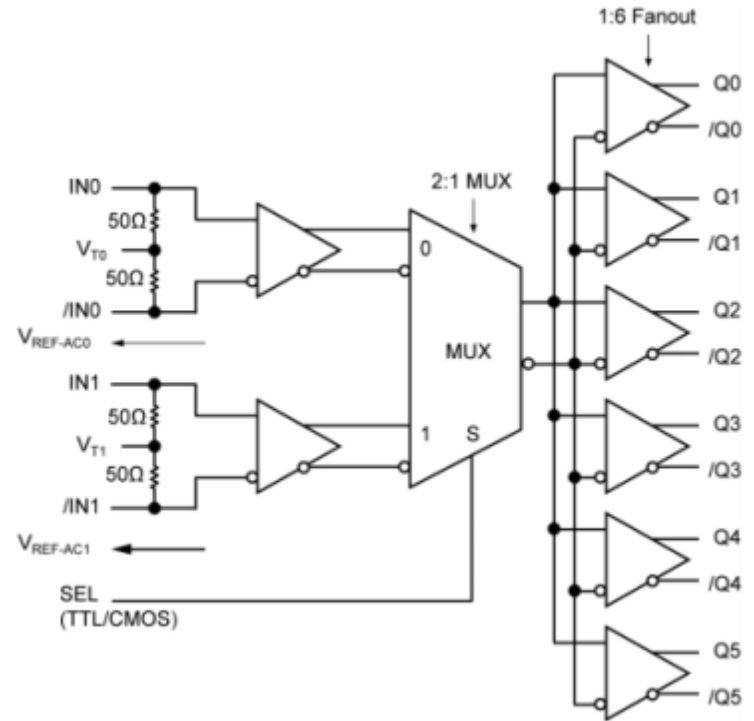
## Features:

- Provides six ultra-low skew copies of the selected input
- 2:1 MUX input included for clock switchover – applications
- Guaranteed AC performance over temperature and – voltage:
- Clock frequency range: DC to >6GHz
  - <290ps IN-to-OUT tpd
  - <60ps tr/tf times
  - <20ps skew (output-to-output)
- Unique input isolation design minimizes crosstalk
- Ultra low-jitter design:
  - 60fs RMS phase jitter
  - <0.7psRMS crosstalk-induced jitter
- Low supply voltage operation: 2.5V and 3.3V
- Unique input termination and VT pin accepts DC-coupled - and AC-coupled inputs (CML, PECL, LVDS)
- Internal 50Ω output source termination
- 400mV CML output swing
- Industrial temperature range: -40°C to +85°C
- Available in 32-pin (5mm x 5mm) QFN package



## Features:

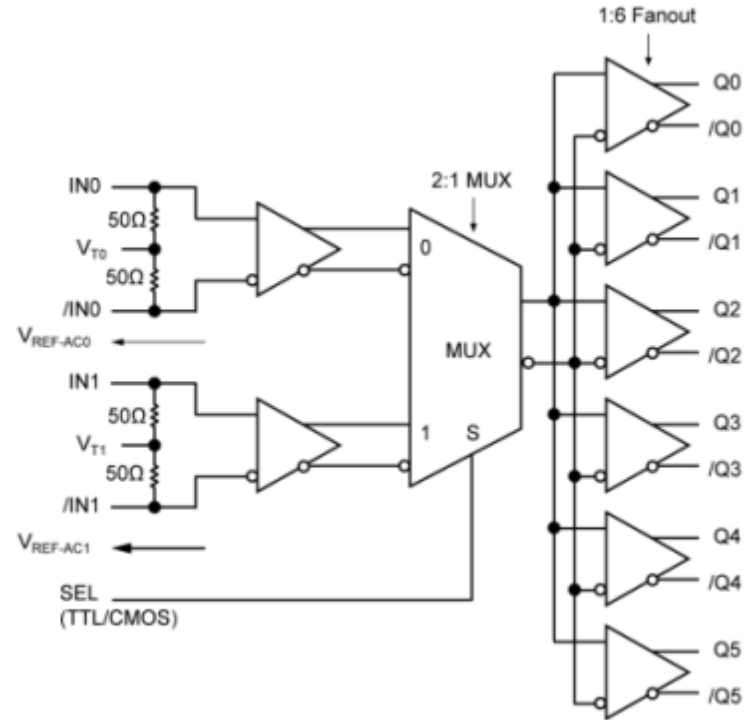
- Provides six ultra-low skew copies of the selected – input
- 2:1 MUX input included for clock switchover – applications
- Guaranteed AC performance over temperature and – voltage:
  - Clock frequency range: DC to >4.5GHz
  - <320ps IN-to-OUT tpd
  - <110ps tr/TF times
  - <20ps skew (output-to-output)
- Ultra-low jitter design:
  - 50fsRMS phase jitter (typ)
- Low supply voltage operation: 2.5V and 3.3V
- Unique input termination and VTpin accepts DC – - coupled and AC-coupled inputs (CML, PECL, LVDS)
- Unique input isolation design minimizes crosstalk
- 100K LVPECL compatible output swing
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin (5mm x 5mm) MLF® package





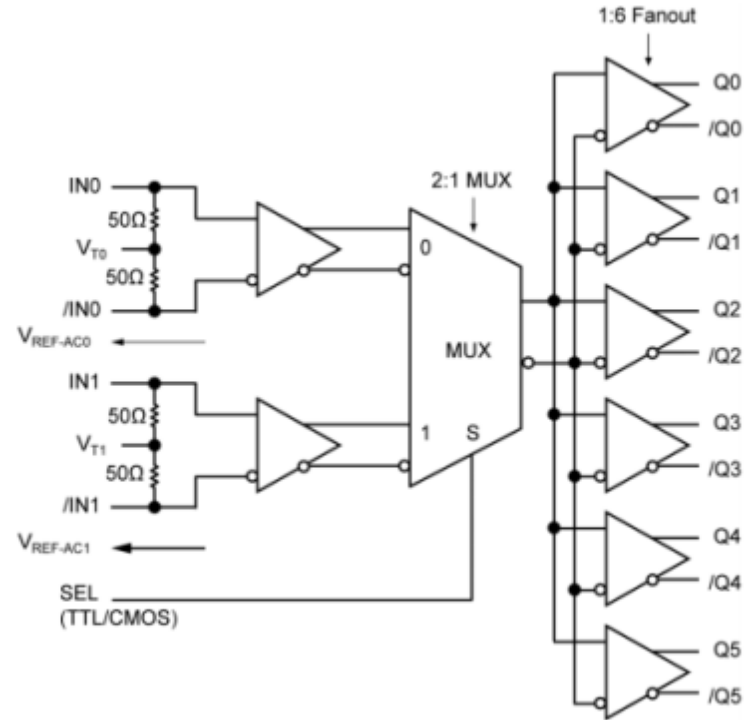
## Features:

- Provides six ultra-low skew copies of the selected –  
- input
- 2:1 MUX input included for clock switchover –  
- applications
- Guaranteed AC performance over temperature and –  
- voltage:
  - Clock frequency range: DC to >6GHz
  - <300ps IN-to-OUT tpd
  - <80ps tr/tf times
  - <20ps skew (output-to-output)
- Ultra-low jitter design:
  - 50fsRMS phase jitter (typ)
- Low supply voltage operation: 2.5V and 3.3V
- Unique input termination and VTpin accepts DC –  
- coupled and AC-coupled inputs (CML, PECL, LVDS),
- Unique input isolation design minimizes crosstalk
- 400mV LVPECL (100K compatible) output swing
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin (5mm x 5mm) MLF® package



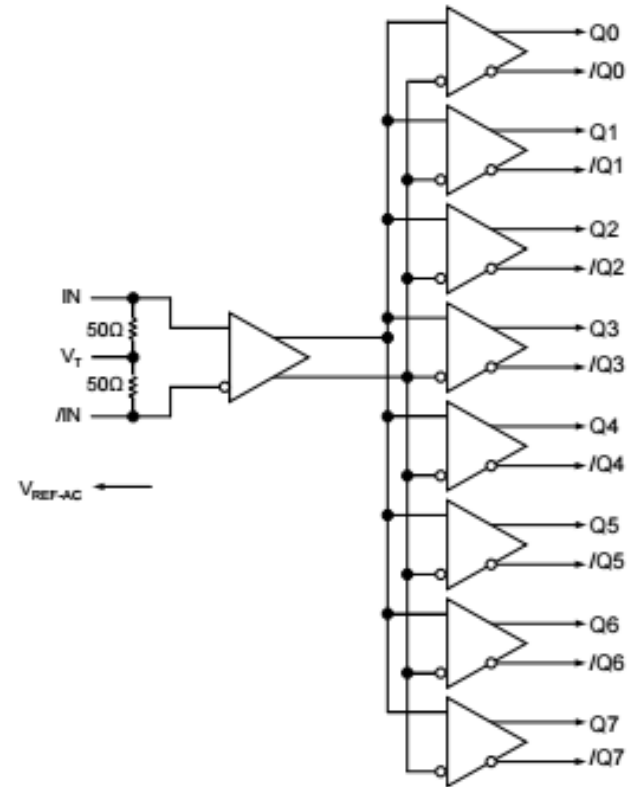
## Features:

- 6 ultra-low skew copies of the selected input
- 2:1 MUX input included for clock switchover – applications
- Low power: 225mW typical (2.5V)
- 2.5V to 3.3V supply voltage
- Unique input isolation design minimizes crosstalk
- Guaranteed AC performance over temperature and – voltage:
  - Clock frequency range: DC to >2.0GHz
  - <400ps IN-to-OUT tpd
  - <200ps tr/ft times
  - <30ps skew (output-to-output)
- Ultra-low jitter design:
  - 40fsRMS phase jitter
  - <0.7psRMS crosstalk-induced jitter
- Unique input termination and VT pin accepts DC – and AC-coupled inputs (CML, PECL, LVDS)
- 100k LVPECL compatible output swing
- Industrial temperature range: -40°C to +85°C range
- Available in 32-pin (5mm x 5mm) QFN package



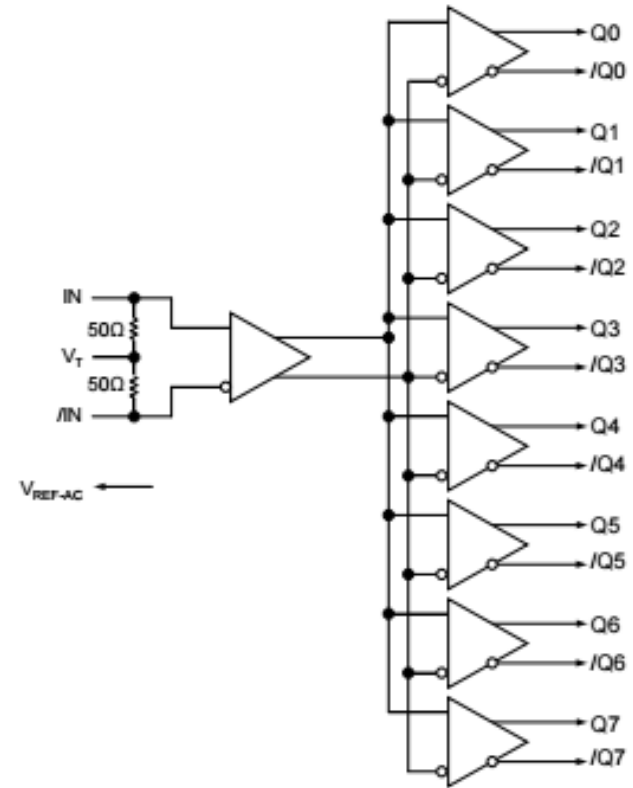
## Features:

- Precision 1:8, 400mV CML fanout buffer
- Guaranteed AC performance over temperature –  
- and voltage:
  - Clock frequency range: DC to >6GHz
  - <60ps tr/ff time
  - <270ps tpd
  - <20ps output-to-output skew
- Low-jitter performance:
  - 75fsRMS phase jitter (typ)
- 50Ω source-terminated CML outputs
- 400mV CML output swing into 50Ω load
- Fully differential I/O
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts –
  - DC-coupled and AC-coupled differential inputs: -
  - (LVPECL, LVDS, and CML)
- Power supply 2.5V ±5% or 3.3V ±10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin (5mm x 5mm) MLF® package



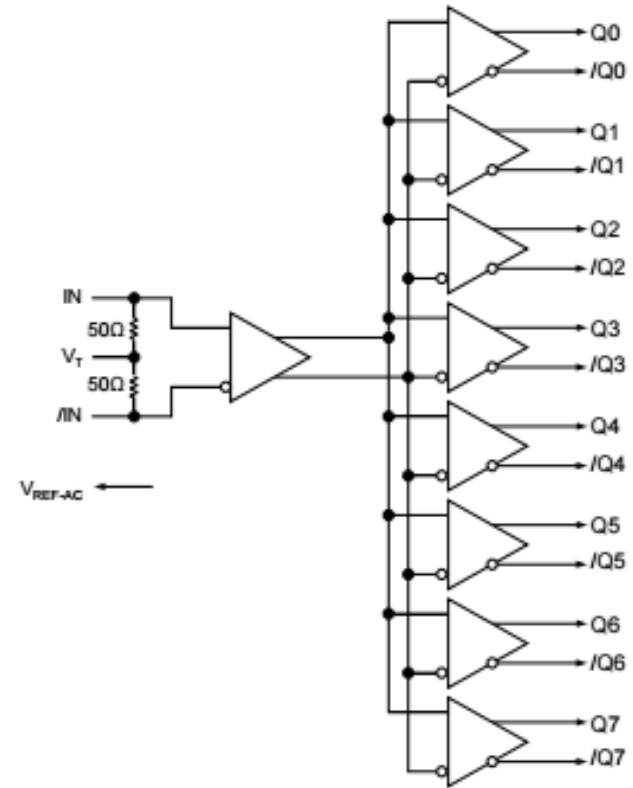
## Features:

- Precision 1:8, LVPECL fanout buffer
- Guaranteed AC performance over temperature –  
- and voltage:
  - Clock frequency range: DC to 4GHz
  - <110ps tr/TF time
  - <330ps tpd
  - <20ps skew
- Low-jitter performance:
  - 76fsRMS phase jitter (typ)
- 100k LVPECL compatible outputs
- Fully differential inputs/outputs
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts DC -  
- coupled and AC-coupled differential inputs: -  
- LVPECL, LVDS, and CML
- Power supply 2.5V ±5% or 3.3V ±10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin (5mm x 5mm) MFL® package



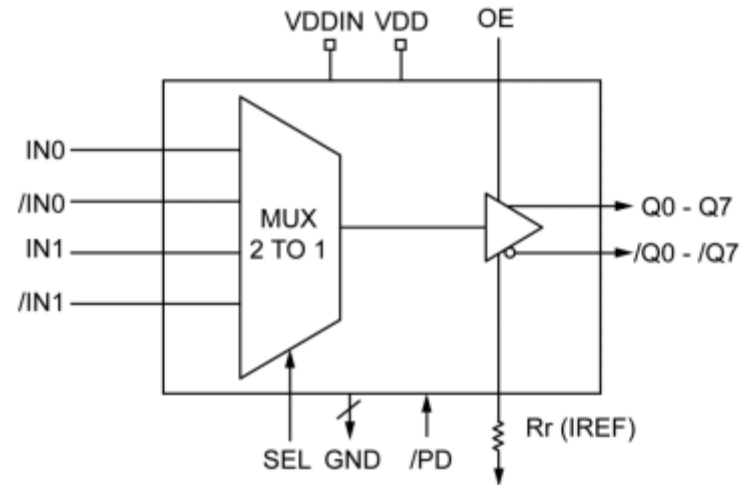
## Features:

- Precision 1:8, 400mV LVPECL fanout buffer
- Guaranteed AC performance over temperature –  
- and voltage:
- Clock frequency range: DC to 5.5GHz:
  - <80ps tr/td times
  - <280ps tpd
  - <20ps skew
- Low-jitter performance:
  - 76fsRMS phase jitter (typ)
  - "top" >100k LVPECL compatible outputs
- Fully differential inputs/outputs
- Accepts an input signal as low as 100mV
- Unique input termination and VT pin accepts –
  - DC-coupled and AC-coupled differential inputs: -
  - LVPECL, LVDS, and CML
- Power supply 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin (5mm x 5mm) MFL® package



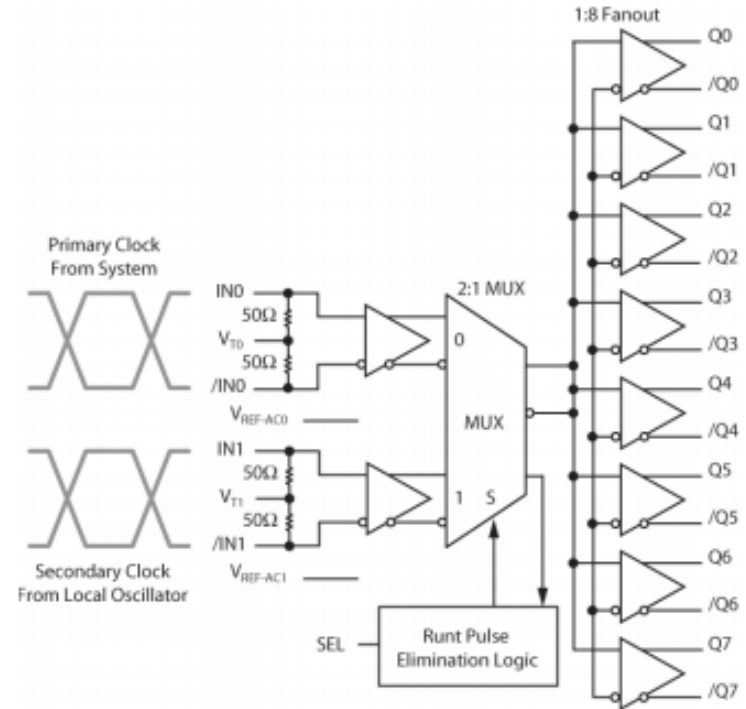
## Features:

- Eight differential pairs of HCSL outputs
- Two pairs of differential inputs accept LVDS –  
- or HCSL logic levels
- 267MHz max frequency
- Ultra low phase jitter:
  - 130fsRMS phase jitter (typ)
- <100ps output-to-output skew
- 3.3V power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin QFN package



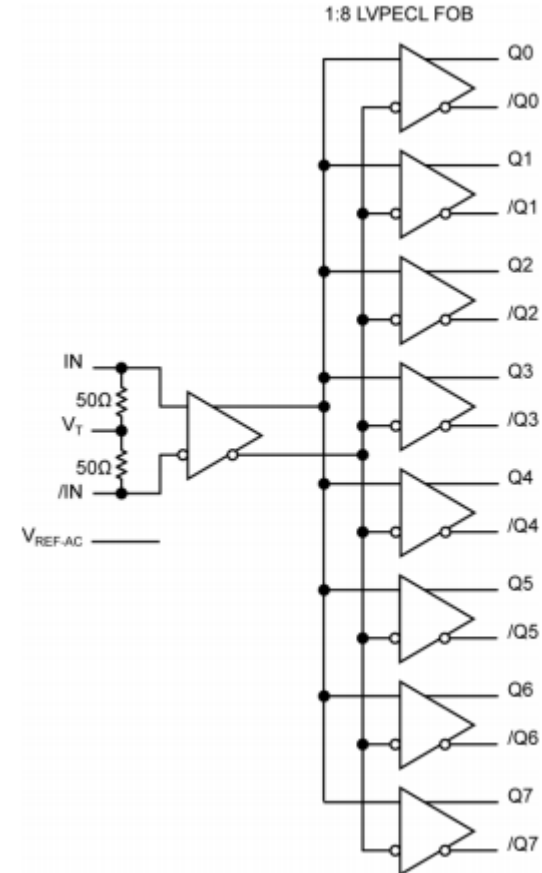
## Features:

- Selects between two clocks, and provides 8 – precision, low skew LVPECL output copies
- Guaranteed AC performance over temperature – and supply voltage:
- Wide operating frequency: 1kHz to >1.5GHz
  - <975ps in-to-out tpd
  - <180ps tr/ff
  - <40ps output-to-output skew
- Unique input isolation design minimizes crosstalk
- Ultra-low jitter design:
  - 150fs RMS phase jitter
  - <0.7psRMS MUX crosstalk-induced jitter
- Unique input termination and VTpin accepts DC – or AC-coupled inputs (CML, PECL, LVDS)
- 800mV LVPECL output swing
- Power supply +2.5V ±5% or +3.3V ±10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 32-pin (5mm x 5mm) QFN package



## Features:

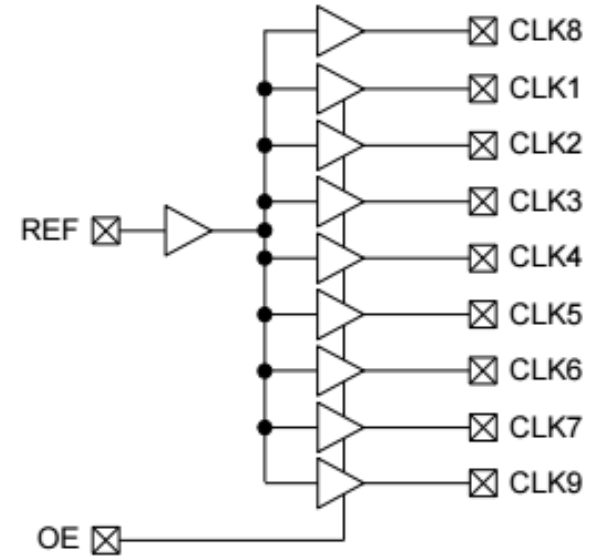
- Precision 1:8, LVPECL fanout buffer
- Low power: 238mW (2.5V)
- Guaranteed AC performance over temperature -  
- and supply voltage:
  - Wide operating frequency: DC to 2.0GHz
  - <380ps In-to-Out tpd
  - <200ps tr/ff
  - <30ps skew
- Ultra-low jitter design:
  - 710fsRMS phase jitter (typ.)
- 100k LVPECL compatible outputs
- Fully differential inputs/outputs
- Accepts an input signal as low as 100mV –  
- (200mVpp)
- Unique input termination and VT pin accepts -  
- DC-coupled and AC-coupled differential inputs -  
- (LVPECL, LVDS, and CML)
- Power supply 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10%
- Industrial temperature range:-40°C to +85°C
- Available in 32-pin (5mm x 5mm) QFN package





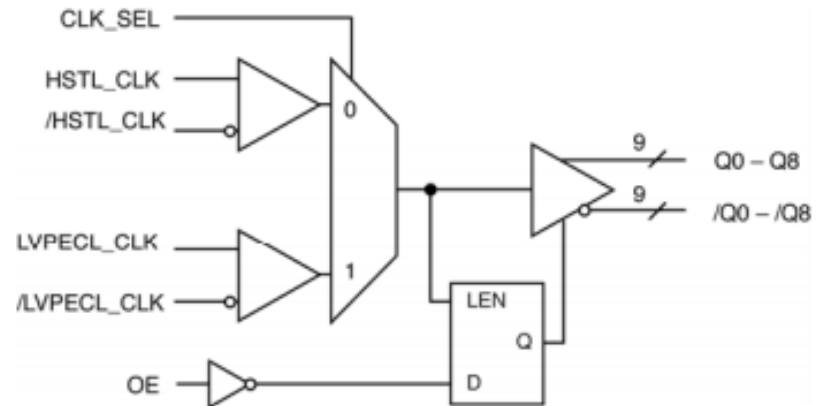
## Features:

- 1:9 LVCMOS output fanout buffer for DC to 150MHz
- 8mA Output Drive Strength
- Low power consumption for portable applications
- Low input-output delay
- Output-Output skew: <250ps
- Low Additive Phase Jitter: 60fs RMS
- 2.5V to 3.3V  $\pm 10\%$  operation
- Industrial temperature range:
  - -40°C to 85°C
- Available in 16-Pin QFN package



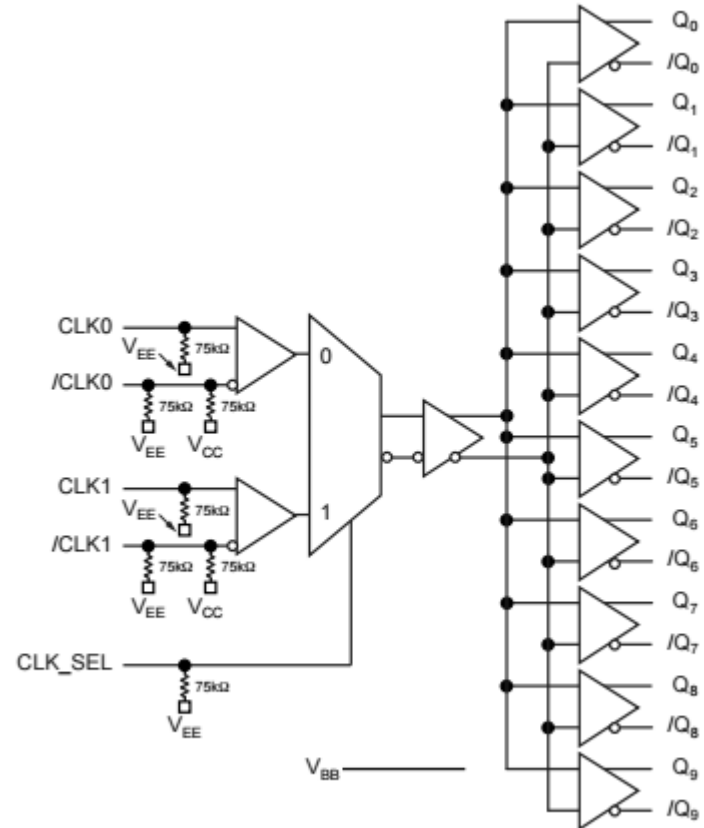
### Features:

- 3.3V core supply, 1.8V output supply for –
  - reduced power
- LVPECL and HSTL inputs
- Nine differential HSTL (low-voltage swing) –
  - output pairs
- HSTL outputs drive 50Ω-to-ground with no –
  - offset voltage
- 750MHz maximum clock frequency
- Low part-to-part skew (100ps typical)
- Low pin-to-pin skew (15ps typical)
- Available in 32-pin TQFP



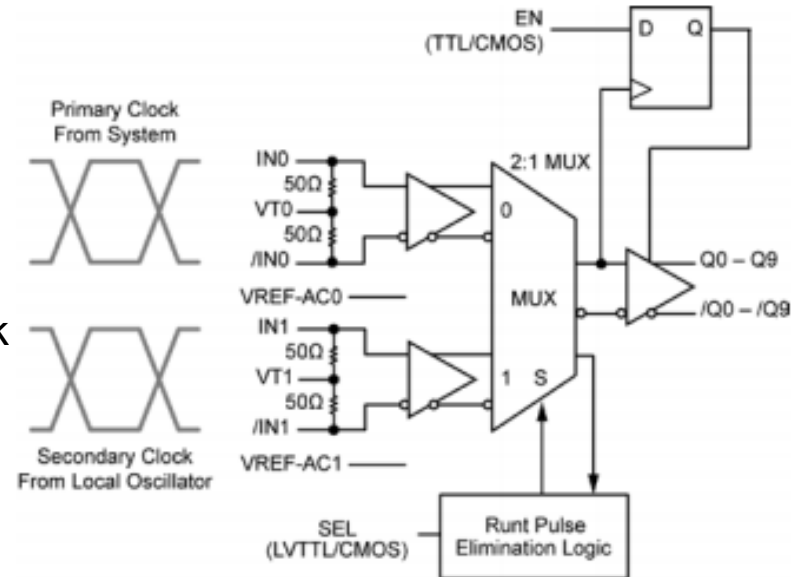
## Features:

- 2.5V and 3.3V power supply options
- Guaranteed AC parameters over temperature:
  - $f_{MAX} = 3\text{GHz}$
  - $<25\text{ps}$  output-to-output skew
  - $<250\text{ps}$  tr/ff
  - $<400\text{ps}$  propagation delay
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Differential design
- VBB output for single-ended input applications
- Fully compatible with industry standard 100K –  
- I/O levels
- Available in 32-pin TQFP package



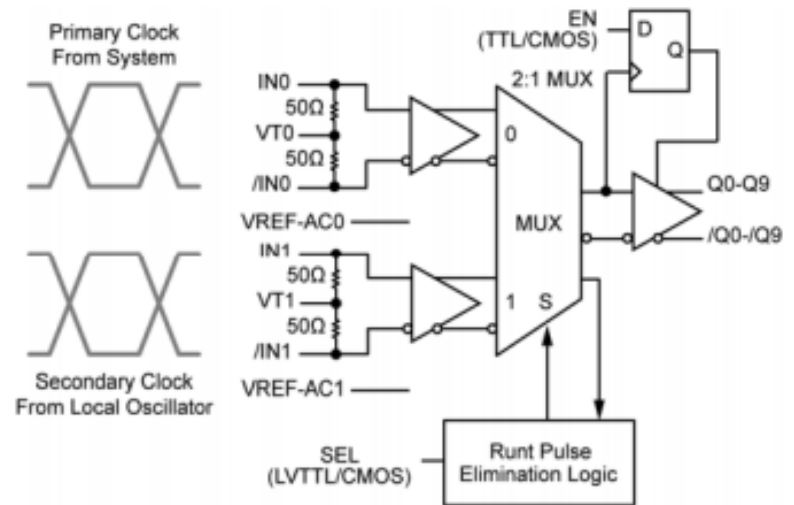
## Features:

- Selects between two sources, and provides 10 – LVPECL copies
- AC performance:
  - Wide operating frequency: 1kHz to >1.5GHz
  - <1100ps In-to-Out tpd
  - <220ps tr/ff
- Unique MUX isolation minimizes adjacent crosstalk
- Fail-Safe Input prevents oscillations
- Ultra-low jitter design:
  - <1psRMS random jitter
  - <1psRMS cycle-to-cycle jitter
  - <10psPP total jitter (clock)
  - <0.7psRMS MUX crosstalk induced jitter
- Unique patented internal termination and VT pin accepts DC – and AC-coupled inputs (CML, PECL, - LVDS)
- 800mV LVPECL output
- 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10% supply voltage
- Industrial temperature range:
  - -40°C to +85°C
- 44-pin (7mm x 7mm) QFN package



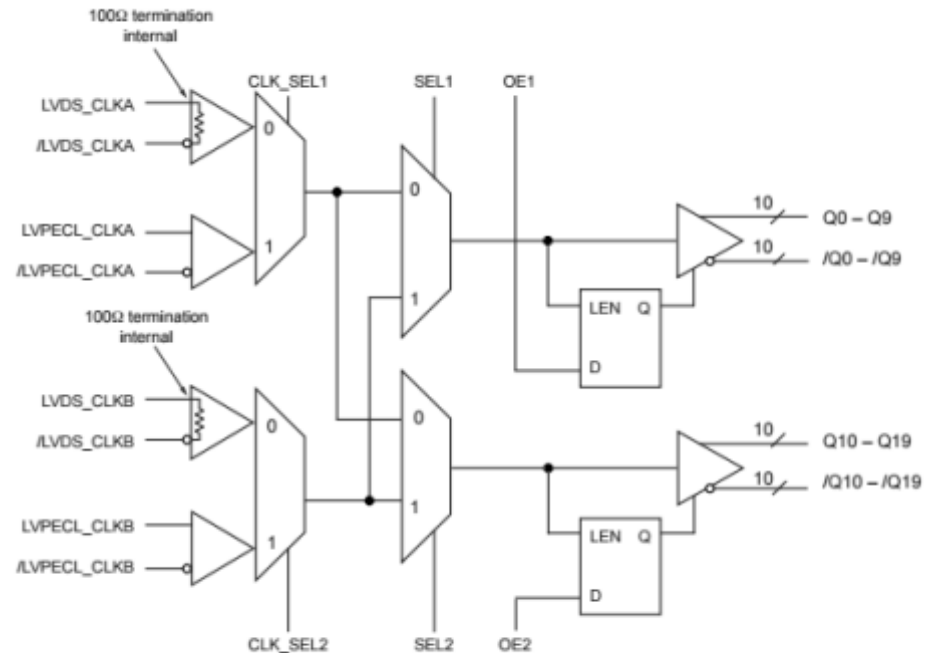
## Features:

- Selects between two sources, and provides 10 –  
- LVDS copies
- AC performance:
  - Wide operating frequency: 1kHz to >1.5GHz
  - <1200ps In-to-Out tpd
  - <220ps tr/ff
- Unique input isolation minimizes adjacent -  
- channel crosstalk
- Fail-Safe Input prevents oscillations
- Ultra-low jitter design:
  - 183fsRMS phase jitter (typical)
  - <0.7psRMS MUX crosstalk-induced jitter
- Unique input termination and VT pin accepts DC and AC-coupled –  
- inputs (CML, PECL, LVDS)
- 325mV LVDS output swing
- 2.5V ±5% supply voltage
- Industrial temperature range: –40°C to +85°C Output enable
- Available in 44-pin (7mm x 7mm) QFN package



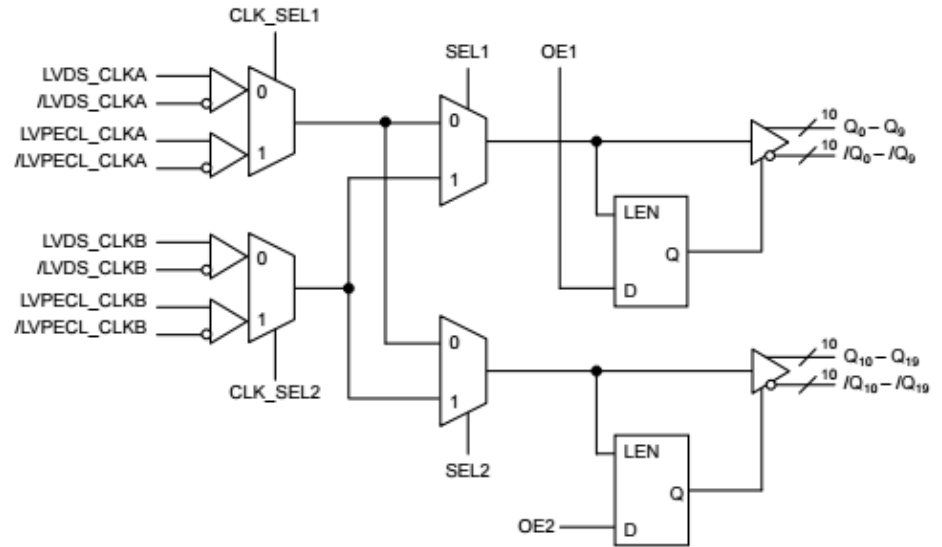
## Features:

- High-performance dual 1:10, 1GHz LVDS – fanout buffer/translator
- Two banks of 10 differential LVDS outputs
- AC parameters:
  - >1GHz fMAX
  - <50ps within device skew
  - <400ps tr/ff time
- Each bank includes a 2:1 input mux
- 2:1 mux input accepts LVDS and LVPECL
- Low jitter performance
  - <1psRMS cycle-to-cycle jitter
  - <1psPP total jitter
- 3.3V supply voltage
- Output enable function
- LVDS input includes internal 100Ω termination
- Available in a 64-Pin EPAD-TQFP



## Features:

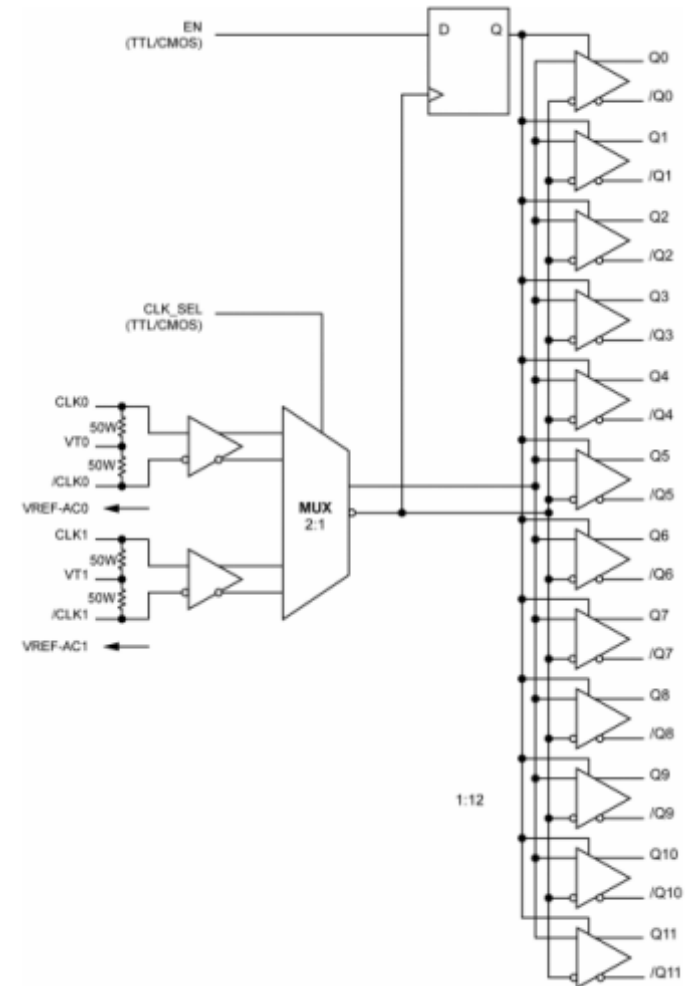
- Dual 1:10 fanout buffer/translator
- Accepts LVPECL or LVDS inputs
- Multiplexed inputs ideal for redundant –
  - clock switchover
- AC parameters:
  - >2GHz fMAX (toggle)
  - <50ps ch-ch skew
- LVDS input includes 100Ω internal –
  - termination
- Low supply voltage: 2.5V, 3.3V
- Industrial temperature range:
  - -40°C to +85°C
- Output enable (OE) pin
- Available in 64 EPAD-TQFP



Logic Symbol

## Features:

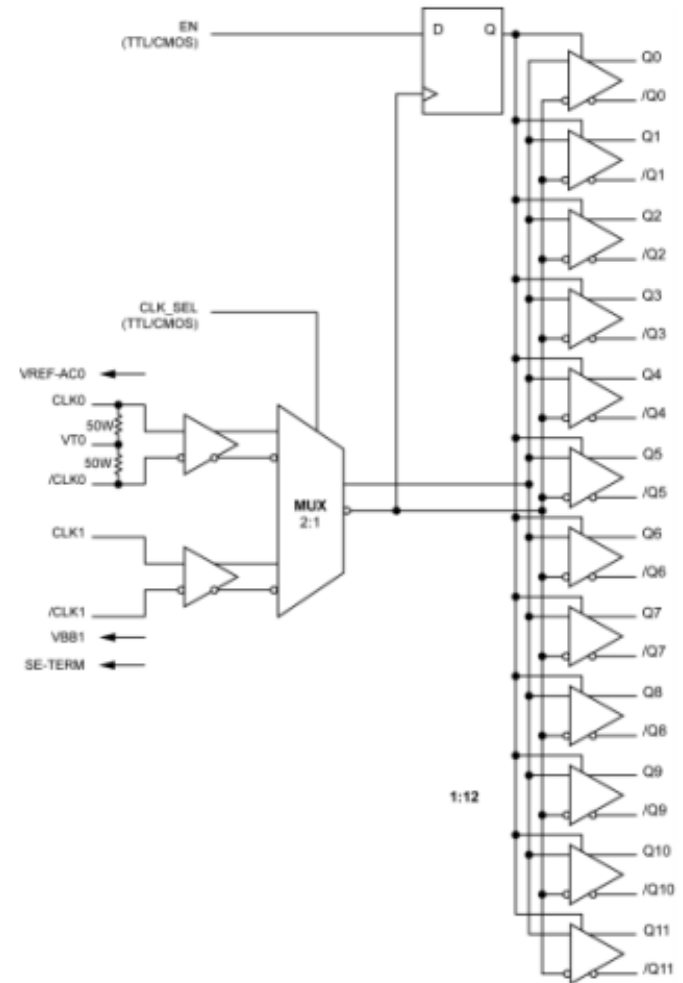
- Selects between 1 of 2 inputs, and provides 12 – precision, low skew LVPECL output copies
- AC performance:
  - DC to >2GHz throughput:
  - <550ps propagation delay CLK-to-Q
  - <220ps rise/fall time
  - <25ps output-to-output skew
- Ultra-low jitter design:
  - 50fsRMS phase jitter (typ.)
  - <0.7psRMS crosstalk induced jitter
- Unique input termination and VT pin accepts DC – coupled and AC-coupled differential inputs
- Unique 2:1 input MUX provides superior isolation to – minimize channel-to-channel crosstalk
- 800mV, 100K LVPECL output swing
- Power supply 2.5V +5% or 3.3V +10%
- Industrial temperature range:
  - -40°C to +85°C
- Available in 44-pin (7mm x 7mm) QFN package





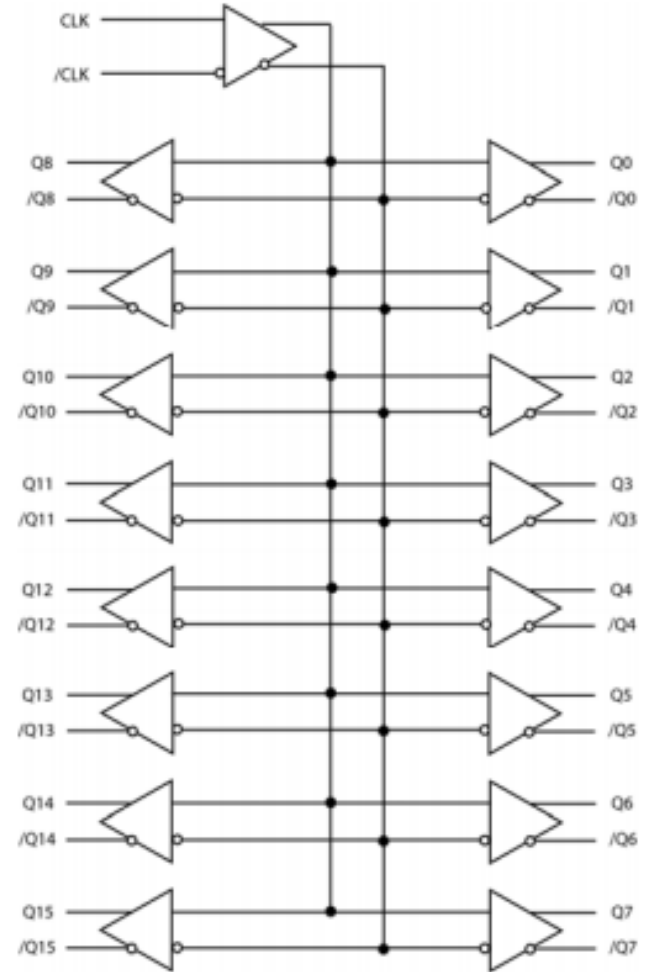
## Features:

- Selects between 2 inputs & provides 12 LVDS copies
- AC performance:
  - DC to >1GHz throughput
  - <975ps propagation delay CLK0-to-Q
  - <250ps rise/fall time
  - <25ps output-to-output skew
- Ultra-low jitter design:
  - 130fsRMS phase jitter (typ.)
  - 0.7psRMS crosstalk-induced jitter
- Unique 2:1 input MUX provides minimizes crosstalk
- CLK0 input features a unique input termination
  - VT pin that accepts AC- and DC-coupled inputs -
  - CLK1 accepts virtually any logic standard:
    - Single-ended: TTL/CMOS, LVPECL
    - Differential: LVPECL, LVDS, CML, HSTL
- 325mV LVDS-compatible output swing
- Power supply: 2.5V  $\pm$ 5%
- Industrial temperature range:
  - -40°C to +85°C
- 44-pin (7mm x 7mm) QFN package



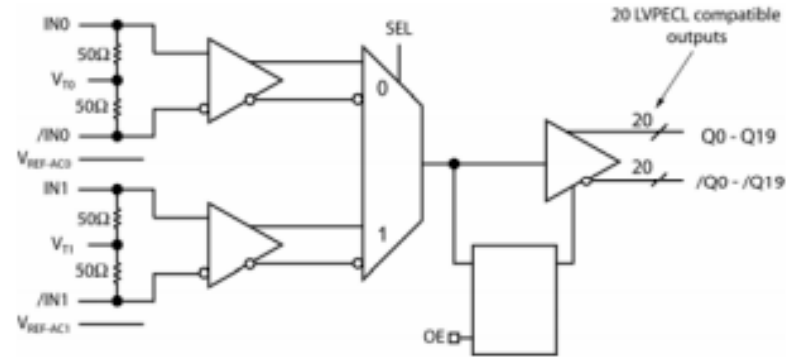
## Features:

- 16 Differential 2.5V LVPECL outputs
- Differential CLK inputs. Accepts LVDS, LVPECL, - LVHSTL, SSTL, HCSL logic levels
- Translates any single-ended input signal to 2.5V - LVPECL levels with a resistor bias on /CLK input
- 500MHz maximum output frequency
- <50ps output skew
- <250ps part-to-part skew
- <2ns propagation delay
- 3.3V Core, 2.5V output operating supply
- Commercial temperature range:
  - 0°C to +70°C
- Available in 48-pin TQFP package
- Pin-to-pin compatible with ICS8530



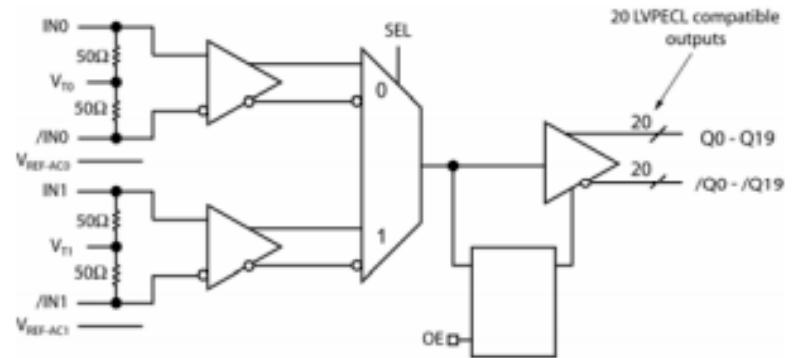
## Features:

- Selects between two inputs & provides 20 –
  - LVPECL copies
- Fail-Safe Input:
  - Prevents outputs from oscillating with –
    - invalid input
- AC performance:
  - DC-to >1.5 GHz throughput
  - <1200ps Propagation Delay (In-to-Q)
  - 270ps Rise/Fall times
- Ultra-low jitter design:
  - <1psRMS random jitter
  - <1psRMS cycle-to-cycle jitter
  - <10psPP total jitter (clock)
  - <0.7psRMS MUX crosstalk induced jitter
- Unique MUX input design minimizes crosstalk
- Unique internal termination and VT pin accepts DC and AC –
  - coupled inputs (CML, PECL, LVDS)
- 2.5V  $\pm$ 5% or 3.3V  $\pm$ 10% supply voltage
- Industrial temperature range -40°C to +85°C
- 64-pin TQFP package



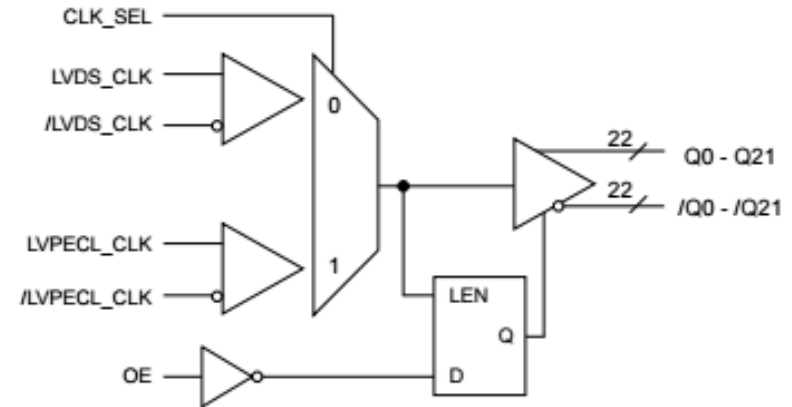
## Features:

- Selects between 2 inputs & provides 20 –  
- LVDS copies
- Fail-Safe Input:
  - Prevents outputs oscillation with –  
- invalid inputs
- AC performance:
  - DC to >1.5GHz throughput
  - <1200ps Propagation Delay (In-to-Q)
  - <270ps Rise/Fall times
- Ultra-low jitter design:
  - <1psRMS random jitter
  - <1psRMS cycle-to-cycle jitter
  - <10psPP total jitter (clock)
  - <0.7psRMS MUX crosstalk induced jitter
- Unique MUX input isolation design minimizes adjacent channel crosstalk -
- Unique internal termination and VT pin accepts DC and AC-coupled –  
- inputs (CML, PECL, LVDS)
- 2.5V  $\pm$ 5% supply voltage
- Industrial temperature range: -40°C to +85°C
- Available in 64-pin EPAD-TQFP package



## Features:

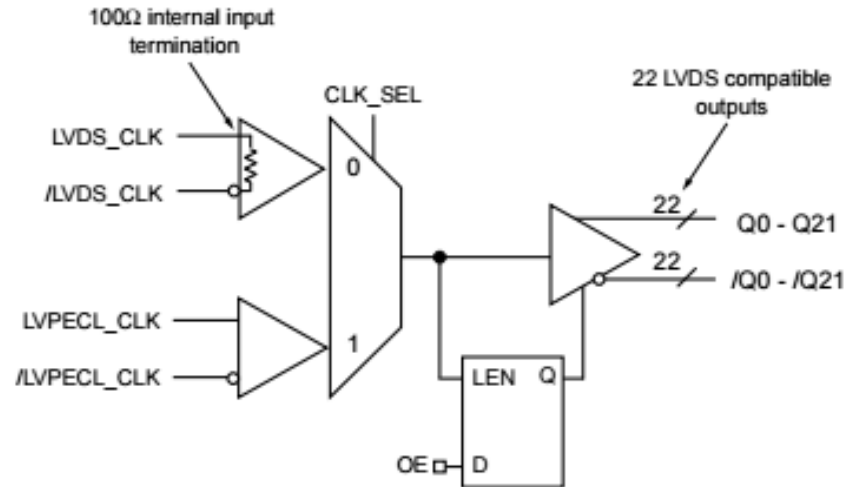
- LVPECL or LVDS input to 22 LVPECL outputs
- 100K ECL compatible outputs
- LVDS input includes 100Ω termination
- Guaranteed AC parameters over voltage:
  - >2GHz fMAX (toggle)
- <35ps max. ch-ch skew
- Low voltage operation: 2.5V, 3.3V
- Industrial temperature range:
  - -40°C to +85°C
- Output enable pin
- Available in a 64-Pin EPAD-TQFP



Logic Symbol

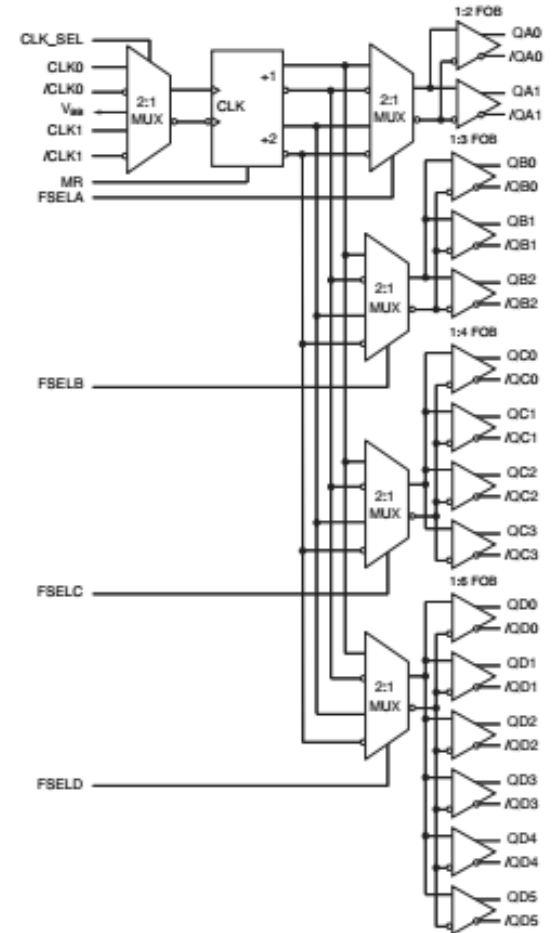
## Features:

- High-performance, 1GHz LVDS fanout buffer/ - translator
- 22 differential LVDS output pairs
- AC parameters:
  - >1GHz fMAX
  - <50ps within device skew
  - <400ps tr/ff time
- Low jitter performance:
  - <1psrms cycle-to-cycle jitter
  - <1ps (pk-pk) total jitter
- 2:1 mux input accepts LVDS and LVPECL
- 3.3V supply voltage
- LVDS input includes internal 100Ω termination
- Output enable function
- Available in a 64-Pin EPAD-TQFP



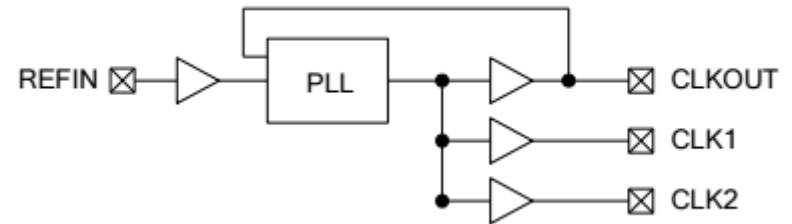
## Features:

- AC performance:
  - >800MHz fMAX (typical)
  - <50ps within-device skew
- 15 differential LVPECL outputs
- Low voltage operation:
  - LVPECL: +3.3V ±10%
  - LVECL: -3.3V ±10%
- Internal 75kΩ pull-down resistors
- Industrial temperature range:
  - -40°C to +85°C -
- Pin-for-pin, plug-in replacement for  
- MC100LVE310
- Available in 28-pin PLCC package



## Features:

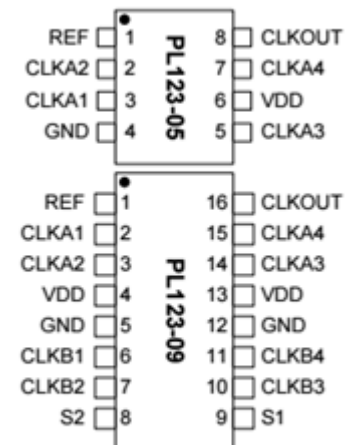
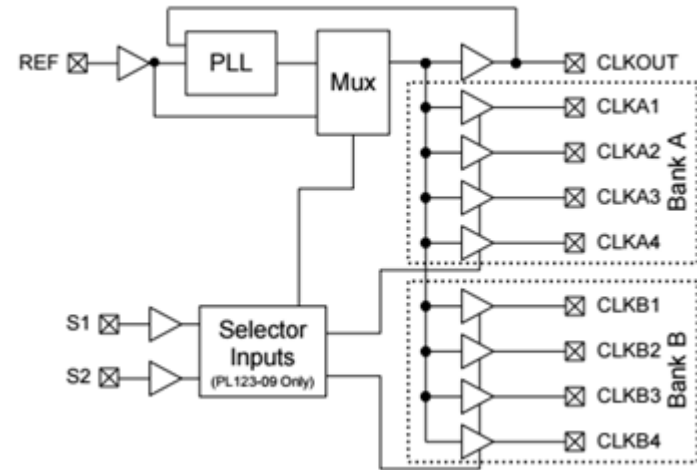
- Frequency Range:
  - 15 to 170MHz @ 3.3V
  - 15 to 145MHz @ 2.5V
- Internal Phase Locked Loop Allows Spread –
  - Spectrum Modulation on Reference Clock to –
  - Pass to Outputs
- Zero Input to Output Delay
- Less Than 700ps Device to Device Skew
- Less Than 200ps Skew Between Outputs
- Less Than 100ps Cycle to Cycle Jitter
- 2.5V or 3.3V Power Supply
- Available in 8-Pin SOP or 6-pin SOT-23 packages





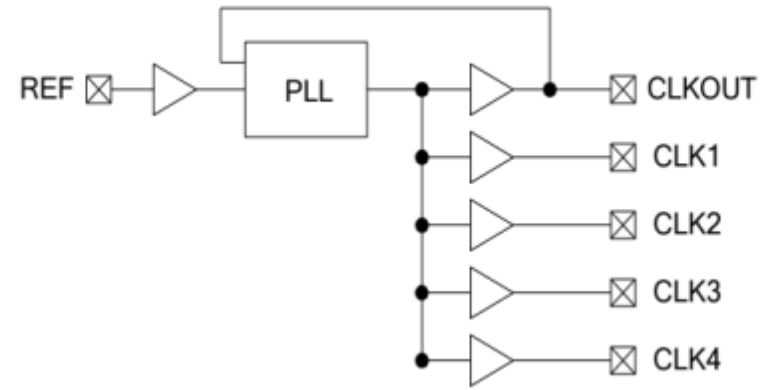
## Features:

- Frequency Range” 10MHz to 134MHz
- Output Options:
  - 5 outputs: PL123-05
  - 9 outputs: PL123-09
- Zero input - output delay
- Optional Drive Strength:
- Standard (8mA) PL123-05/-09
- High (12mA) PL123-05H/-09H
- 3.3V  $\pm$ 10% operation
- Temperature ranges:
  - Commercial temperature range:
    - 0°C to +70°C
  - Industrial temperature range:
    - -40°C to +85°C
- PL123-05 available in 8-Pin SOP packages
- PL123-09 available in 16-Pin SOP and TSSOP –  
- packages



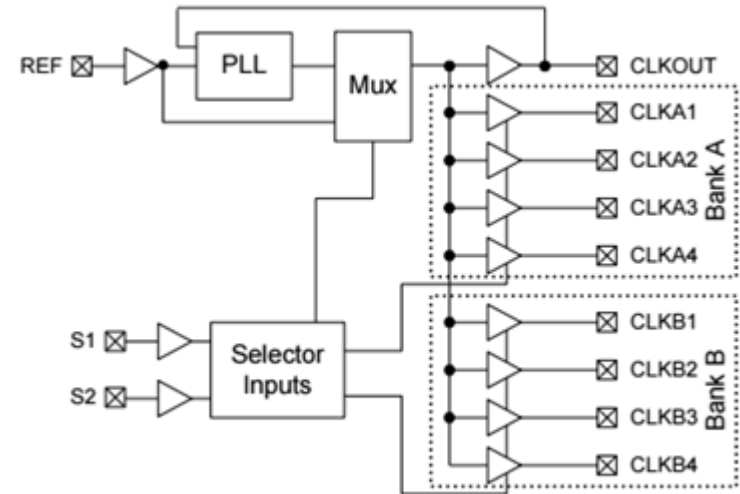
## Features:

- Frequency Range 10MHz to 220MHz
- Zero input - output delay
- Low output-to-output skew
- Optional Drive Strength:
  - Standard (8mA) PL123E-05
  - High (12mA) PL123E-05H
- 2.5V or 3.3V  $\pm 10\%$  operation
- Available in 8-pin SOP packaging



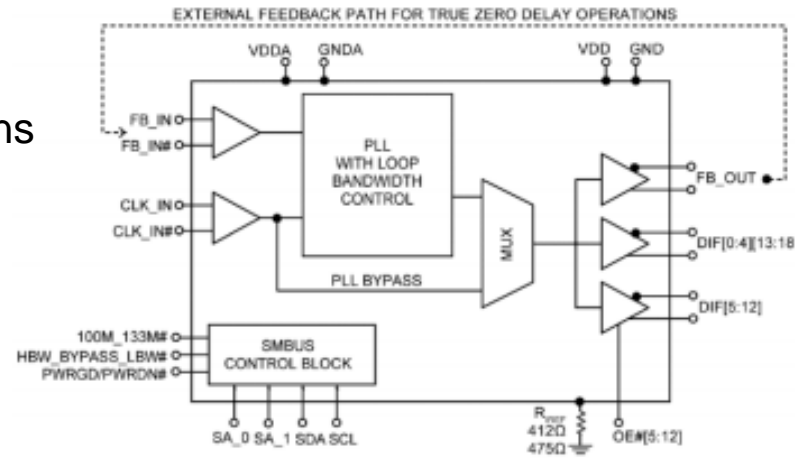
## Features:

- Frequency Range 10MHz to 220MHz
- Zero input - output delay
- Low output-to-output skew
- Optional Drive Strength:
  - Standard (8mA) PL123E-09
  - High (12mA) PL123E-09H
- 2.5V or 3.3V  $\pm 10\%$  operation
- Available in 16-Pin SOP and TSSOP packages



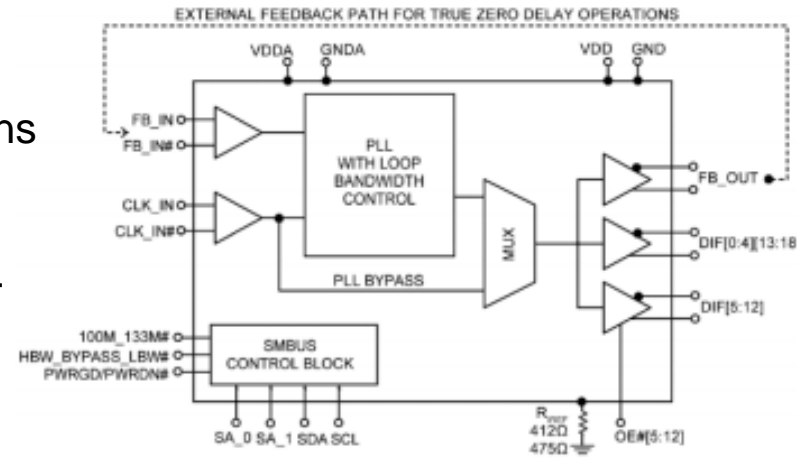
## Features:

- Supports zero delay (0ps) buffer mode for –
  - 100MHz and 133MHz clock frequencies.
- External feedback path for true zero delay operations
- Zero delay (PLL) mode can filter jitter
- Selectable PLL bandwidth for PLL mode
- Supports fanout buffer mode for clock frequencies -
  - between 0MHz and 250MHz
- Differential input reference with HCSL logic –
  - (0V ~ 0.7V)
- Nineteen differential HCSL-compatible clock output pairs
- Eight dedicated OE# pins to control their assigned output:
  - Glitch free assertion/de-assertion.
- Spread spectrum modulation tolerant for EMI reduction
- SMBus interface for controlling output properties
  - Enable/disable and delay tuning
- Disabled outputs in power-down mode for maximum power savings
- Nine selectable SMBus addresses
- 3.3V or 2.5V operation
- Commercial temperature range: 0°C to +70°C
- 72-pin 10mm x 10mm QFN package



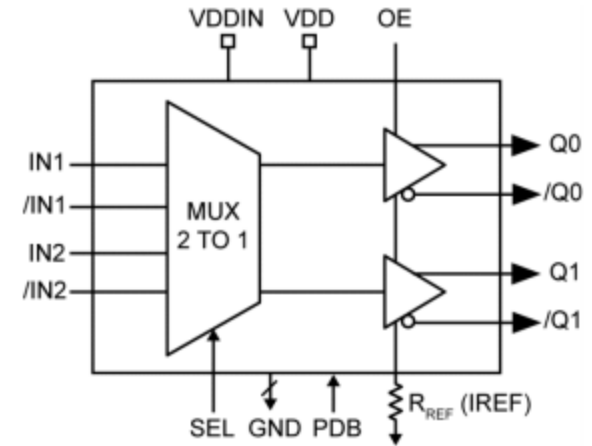
## Features:

- Supports zero delay (0ps) buffer mode for –
  - 100MHz and 133MHz clock frequencies.
- External feedback path for true zero delay operations
- Zero delay (PLL) mode can filter jitter
- Selectable PLL bandwidth for PLL mode
- Supports fanout buffer mode for clock frequencies -
  - between 0MHz and 250MHz
- Differential input reference with HCSL logic –
  - (0V ~ 0.7V)
- Nineteen differential HCSL-compatible clock output pairs
- Eight dedicated OE# pins to control their assigned output:
  - Glitch free assertion/de-assertion.
- Spread spectrum modulation tolerant for EMI reduction
- SMBus interface for controlling output properties
  - Enable/disable and delay tuning
- Disabled outputs in power-down mode for maximum power savings
- Nine selectable SMBus addresses
- 3.3V or 2.5V operation
- Commercial temperature range: 0°C to +70°C
- 72-pin 10mm x 10mm QFN package



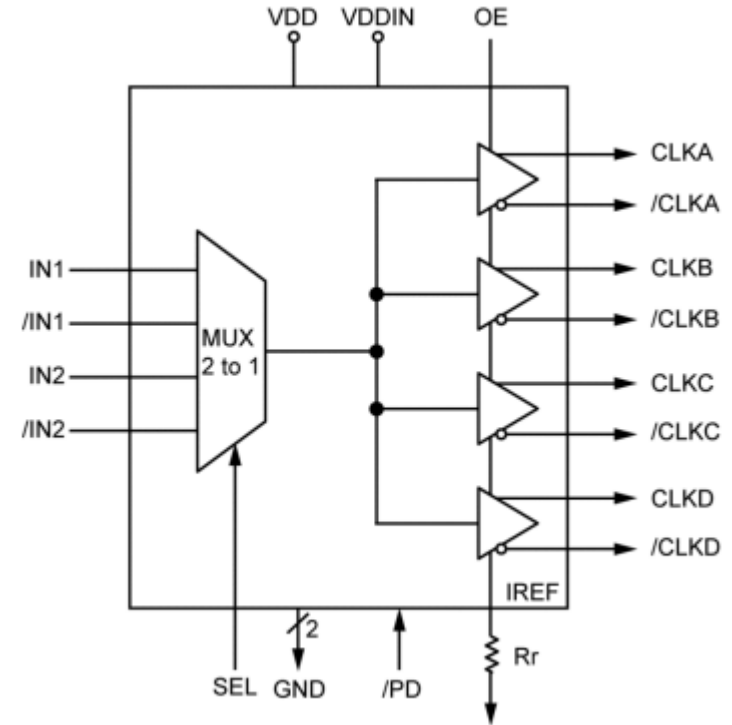
## Features:

- Two differential pairs of LVDS or HCSL outputs
- Two pairs of differential inputs accept LVDS or –  
– HCSL logic levels
- 267MHz maximum frequency
- Ultra-low phase jitter:
  - 137fsRMS, 200MHz (12kHz–20MHz)
  - 153fsRMS, 156.25MHz (12kHz–20MHz)
  - 212fsRMS, 100MHz (12kHz–20MHz)
  - <2ps total jitter (peak-to-peak), 200MHz  
– (BER = 10<sup>-12</sup>)
- 50ps output-to-output skew
- 3.3V ±5% power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- 16-pin (3mm × 3mm) QFN package



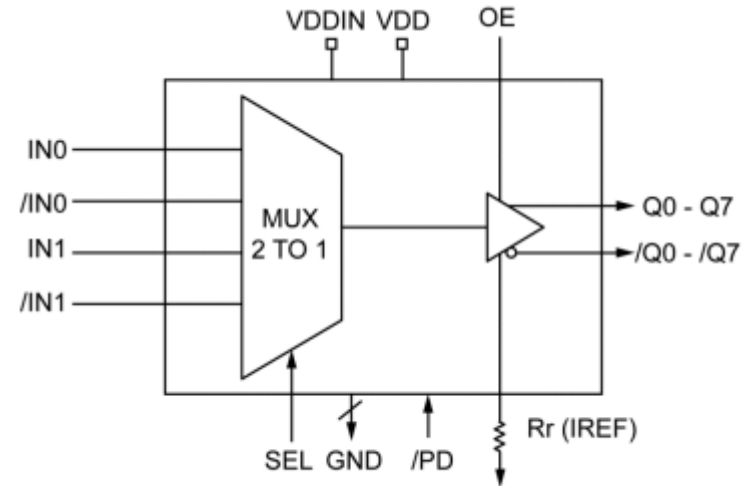
## Features:

- Four differential pairs of LVDS or HCSL outputs
- Two pairs of differential inputs accept LVDS or -  
- HCSL logic levels
- 267MHz max HCSL frequency
- 100MHz max LVDS frequency
- Ultra-low phase jitter:
  - 137fsrms, 200MHz (12kHz–20MHz)
  - 153fsrms, 156.25MHz (12kHz–20MHz)
  - 212fsrms, 100MHz (12kHz–20MHz)
- <2ps Total\_Jitterpk-pk, 200MHz(BER =  $10^{-12}$ )
- 50ps output-to-output skew
- 3.3V  $\pm 5\%$  power supply operation
- Industrial temperature range:
  - -40°C to +85°C
- 20-pin TSSOP package



## Features:

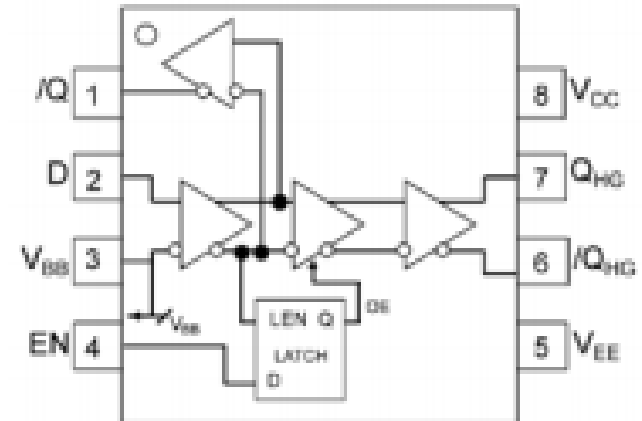
- Eight differential pairs of HCSL outputs
- Two pairs of differential inputs accept LVDS or -  
- HCSL logic levels
- 267MHz max frequency
- Ultra low phase jitter:
  - 130fsRMS phase jitter (typ)
- <100ps output-to-output skew
- 3.3V power supply operation
- Industrial operating temperature:
  - -40°C to +85°C
- Available in 32-pin QFN package





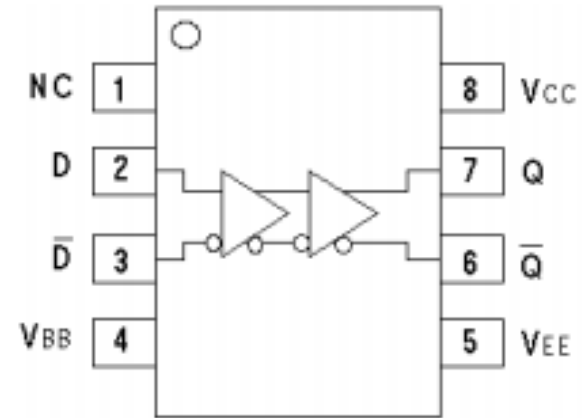
## Features:

- 3.3V and 5V power supply options
- 250ps propagation delay
- Ideal for pulse amplifier and limiting amplifier –  
- applications
- Data synchronous enable/disable (EN) on QHG -  
- and QHG provides for complete glitchless gating -  
- of the outputs
- Ideal for gating timing signals
- Complete solution for high quality, high frequency -  
- crystal oscillator applications
- Available in an ultra-small 8-pin (2mm x 2mm) DFN package



## Features:

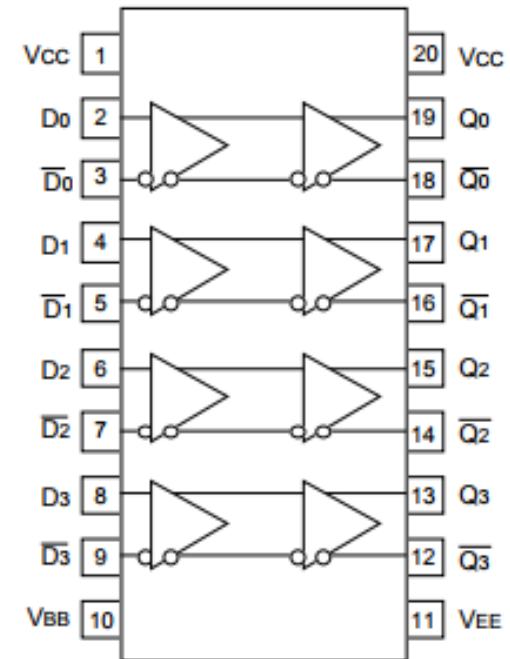
- 3.3V and 5V power supply options
- 250ps propagation delay
- High bandwidth output transitions
- Internal 75K $\Omega$  input pull-down resistors
- Replaces SY10/100EL16
- Improved output waveform characteristics
- Available in 8-pin MSOP and SOIC package



8-Pin MSOP (K8-1)  
8-Pin SOIC (Z8-1)

## Features:

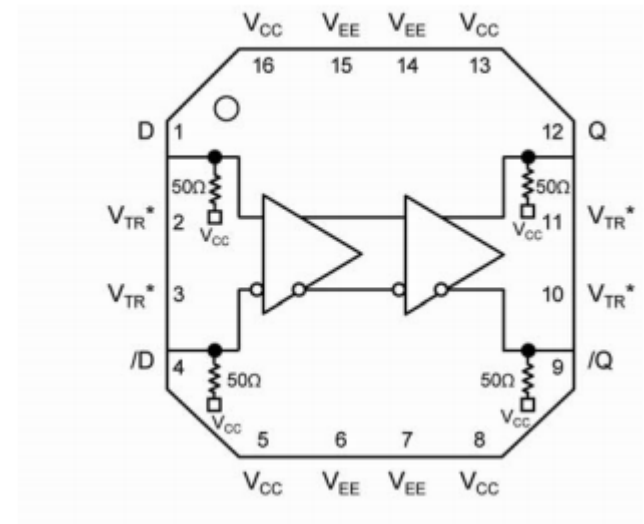
- 3.3V and 5V power supply options
- High bandwidth output transitions
- Internal 75K $\Omega$  input pull down resistors
- Available in 20-pin SOIC package



20-Pin Wide SOIC (Z20-1)

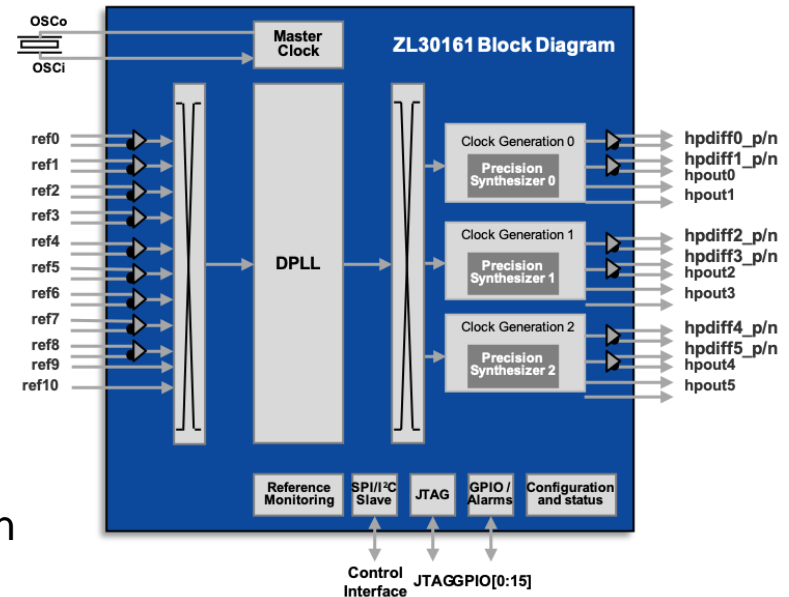
## Features:

- Accepts up to 10.7Gbps data
- <45ps edge rate
- Gain  $\geq 4V/V$
- CML/PECL differential inputs
- CML outputs
- Internal 50 $\Omega$  input termination
- Internal 50 $\Omega$  output load resistors
- Available in 16-pin (3mm x 3mm) MLF<sup>®</sup> package or die



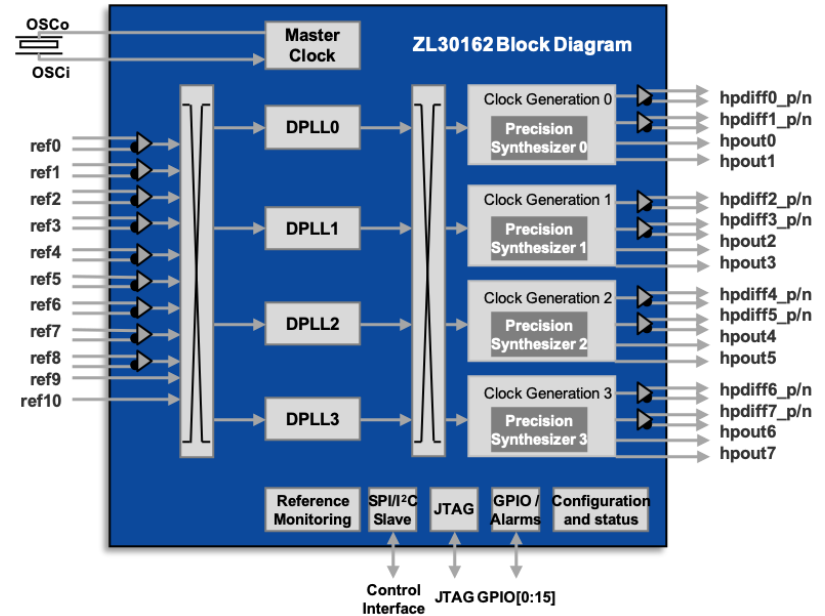
## Features

- Fully compliant SEC (G.813) and EEC (G.8262) flexible rate conversion Digital Phase Locked Loop (DPLL)
- Programmable digital PLL/Numerically Controlled Oscillator (NCO) synchronizes to any clock rate from 1Hz to 750MHz
- Three programmable synthesizers generate any clock rate from 1Hz to 750MHz with maximum jitter below 0.62 ps rms
- Flexible two-stage architecture translates between arbitrary data rates, line coding rates and FEC rates
- Digital PLL filter jitter from 0.1mHz up to 1kHz



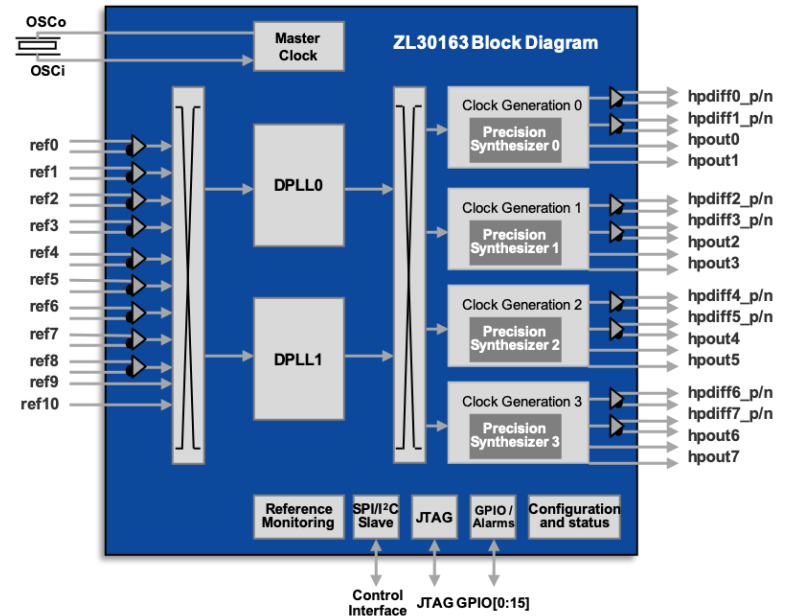
## Key Features

- Fully compliant SEC (G.813) and EEC (G.8262) flexible rate conversion Digital Phase Locked Loop (DPLL)
- Four independent, programmable DPLLs/Numerically Controlled Oscillators (NCOs) synchronize to any clock rate from 1 Hz to 750 MHz
- Four programmable synthesizers generate any clock rate from 1 Hz to 750 MHz with maximum jitter below 0.61 ps rms
- Flexible two-stage architecture translates between arbitrary data rates, line coding rates and FEC rates
- Digital PLLs filter jitter 0.1 mHz up to 1 kHz



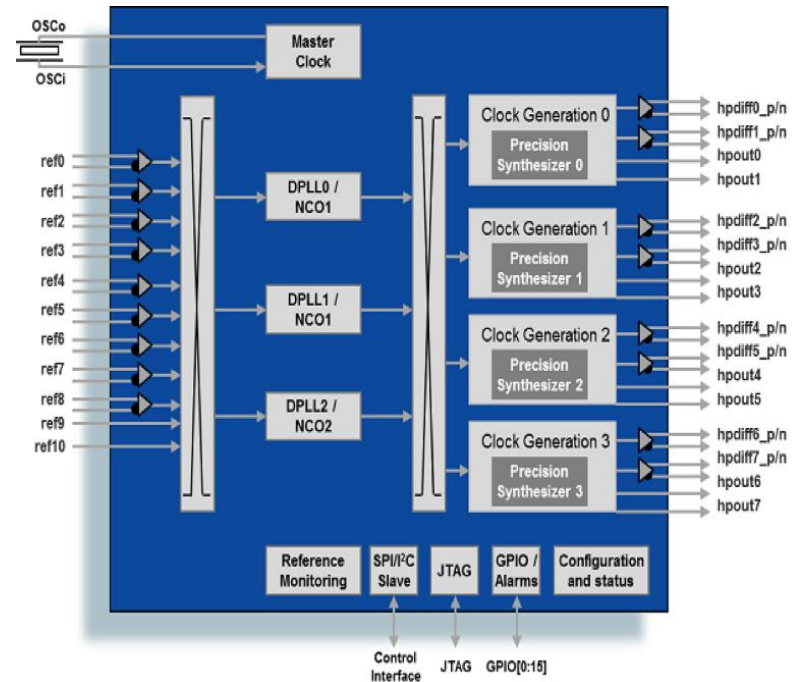
## Features

- Fully compliant SEC (G.813) and EEC (G.8262) flexible rate conversion Digital Phase Locked Loop (DPLL)
- Two independent, programmable DPLLs/Numerically Controlled Oscillators (NCOs) synchronize to any clock rate from 1Hz to 750MHz
- Four programmable synthesizers generate any clock rate from 1Hz to 750MHz with maximum jitter below 0.62 ps rms
- Flexible two-stage architecture translates between arbitrary data rates, line coding rates and FEC rates
- Digital PLLs filter jitter from 0.1mHz up to 1kHz



## Features

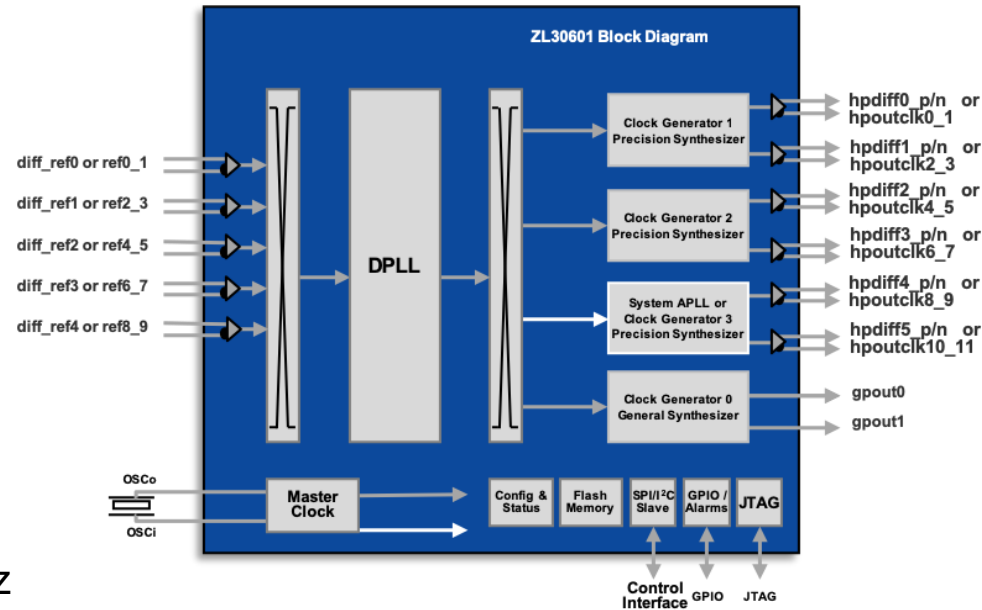
- Fully compliant SEC (G.813) and EEC (G.8262) flexible rate conversion Digital Phase Locked Loop (DPLL)
- Three independent, programmable DPLLs/Numerically Controlled Oscillators (NCOs) synchronize to any clock rate from 1 Hz to 750 MHz
- Four programmable synthesizers generate any clock rate from 1 Hz to 750 MHz with maximum jitter below 0.64 ps rms
- Flexible two-stage architecture translates between arbitrary data rates, line coding rates and FEC rates
- Digital PLLs filter jitter 0.1 mHz up to 1 kHz





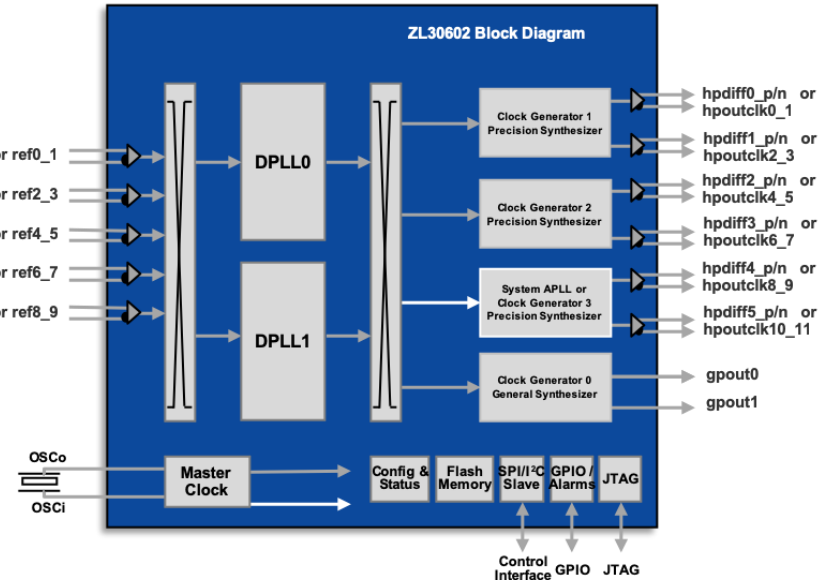
## Features

- Fully compliant to EEC (G.8262), SEC (G.813), GR-253 SMC and GR-1244 Stratum 3/3E
- Excellent jitter performance of 180 fs RMS in the 12 kHz to 20 MHz band meets jitter requirements for 10G/40G and 100G PHYs
- Three programmable ultra-low jitter synthesizers generate any frequency from 0.5 Hz to 900 MHz
- One programmable general-purpose synthesizer generates any clock from 0.5 Hz to 180 MHz
- 6 differential (CML) or 12 single ended (CMOS) ultra-low jitter outputs plus two general purpose CMOS outputs
- Accepts up to 10 LVPECL/LVDS/HCSL/LVCMOS inputs



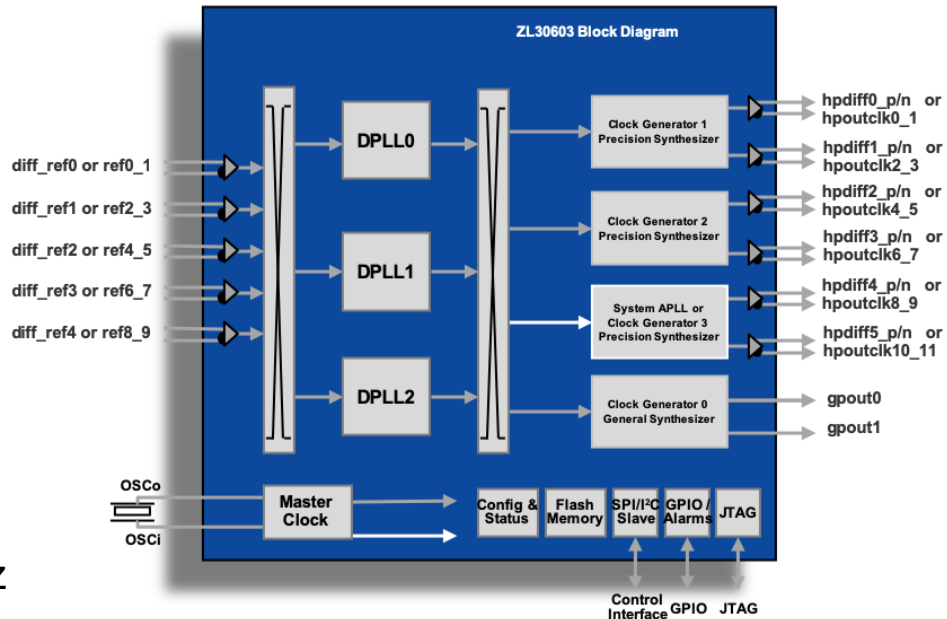
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- Excellent jitter performance of 180 fs RMS in the 12 kHz to 20 MHz band meets jitter requirements for 10G/40G and 100G PHYs
- Three programmable ultra-low jitter synthesizers generate any frequency from 0.5 Hz to 900 MHz
- One programmable general-purpose synthesizer generates any clock from 0.5 Hz to 180 MHz
- 6 differential (CML) or 12 single ended (CMOS) ultra-low jitter outputs plus two general purpose CMOS outputs
- Accepts up to 10 LVPECL/LVDS/HCSL/LVCMOS inputs



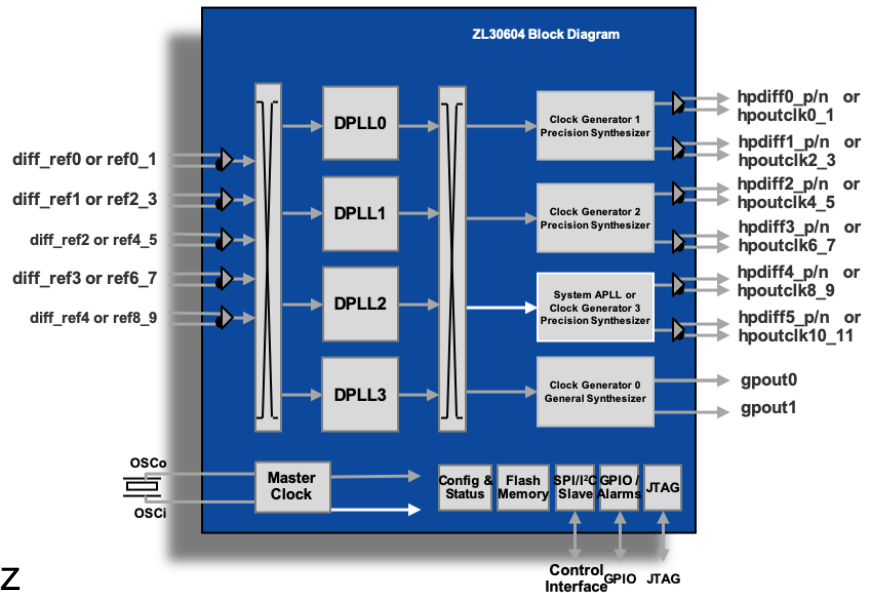
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- Excellent jitter performance of 180 fs RMS in the 12 kHz to 20 MHz band meets jitter requirements for 10G/40G and 100G PHYs
- Three programmable ultra-low jitter synthesizers generate any frequency from 0.5 Hz to 900 MHz
- One programmable general-purpose synthesizer generates any clock from 0.5 Hz to 180 MHz
- 6 differential (CML) or 12 single ended (CMOS) ultra-low jitter outputs plus two general purpose CMOS outputs
- Accepts up to 10 LVPECL/LVDS/HCSL/LVCMOS inputs



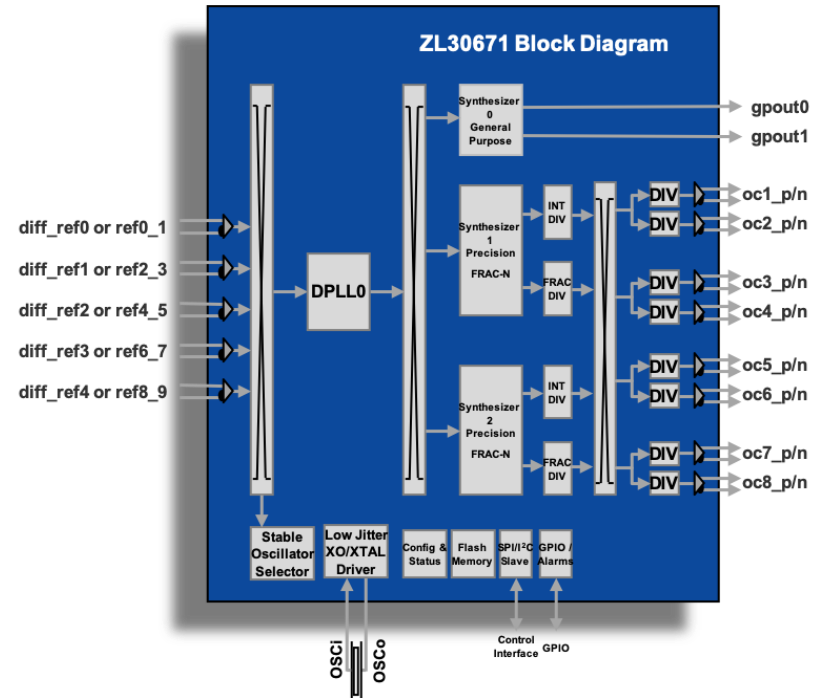
## Features

- Fully compliant to EEC (G.8262), SEC (G.813), GR-253 SMC and GR-1244 Stratum 3/3E
- Excellent jitter performance of 180 fs RMS in the 12 kHz to 20 MHz band meets jitter requirements for 10G/40G and 100G PHYs
- Three programmable ultra-low jitter synthesizers generate any frequency from 0.5 Hz to 900 MHz
- One programmable general-purpose synthesizer generates any clock from 0.5 Hz to 180 MHz
- 6 differential (CML) or 12 single ended (CMOS) ultra-low jitter outputs plus two general purpose CMOS outputs
- Accepts up to 10 LVPECL/LVDS/HCSL/LVCMOS inputs



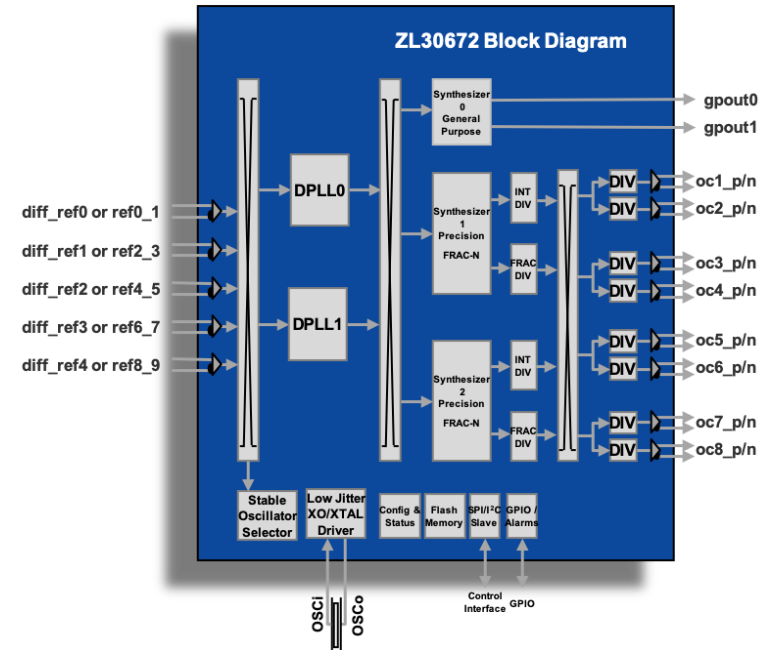
## Features

- Precise phase/frequency measurement and tuning lower system latency to meet 4G LTE, 5G & Wireless Infrastructure
- Ultra-fast lock to GPS/GNSS and 1PPS for faster power-up time for 4G LTE, 5G & Wireless Infrastructure
- Precise chip-to-chip time interfaces use less backplane traces for 1PPS distribution for chassis systems
- Split oscillator option lowers cost, lowers jitter, and provides redundancy
- Fully compliant to EEC (G.8262), SEC (G.813), GR-253 SMC and GR-1244 Stratum 3/3E
- Two programmable ultra-low jitter synthesizers generate any frequency from 0.5 Hz to 1045 MHz



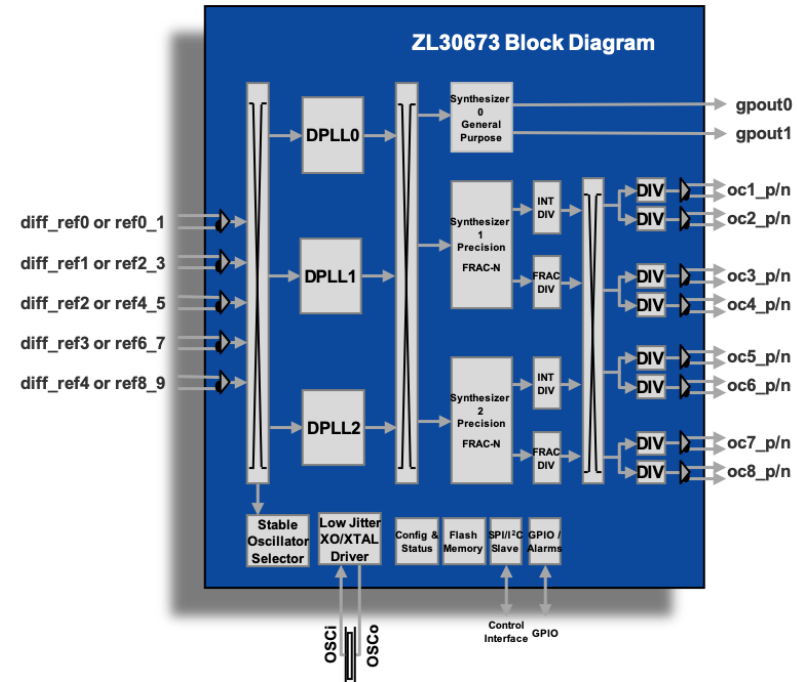
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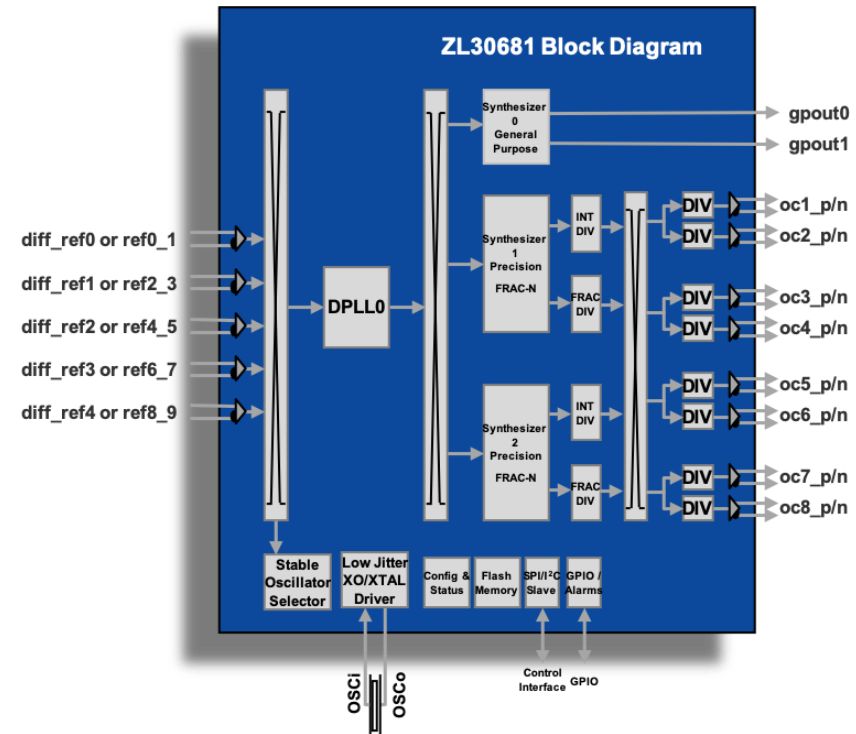
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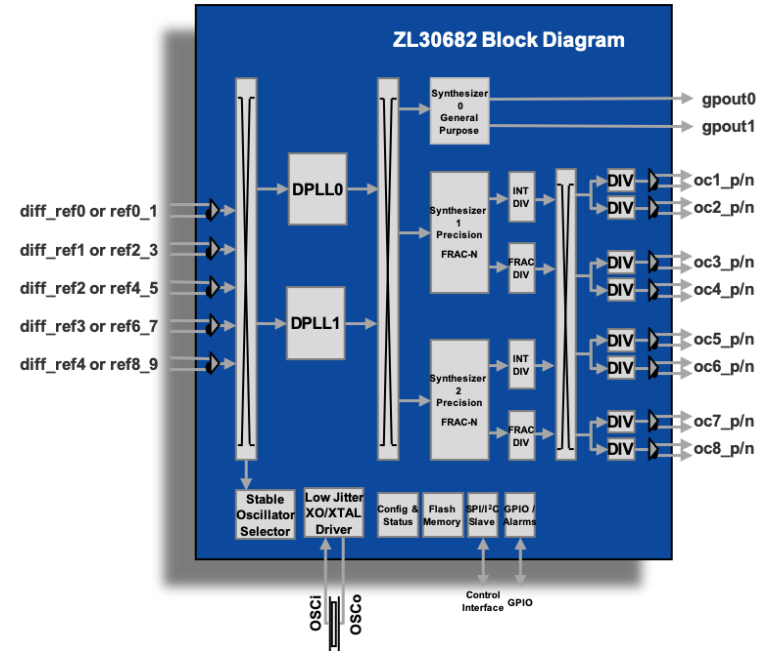
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- Split oscillator option lowers cost, lowers jitter, and provides redundancy
- Two programmable ultra-low jitter synthesizers generate any frequency from 0.5 Hz to 1045 MHz
- One programmable general-purpose synthesizer generates any clock from 0.5 Hz to 180 MHz
- 8 differential or 16 single ended ultra-low jitter outputs plus two general purpose CMOS outputs





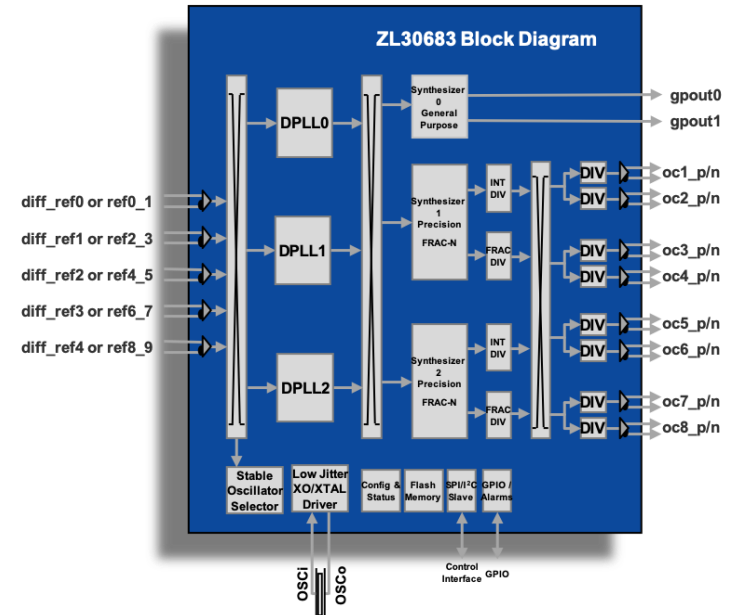
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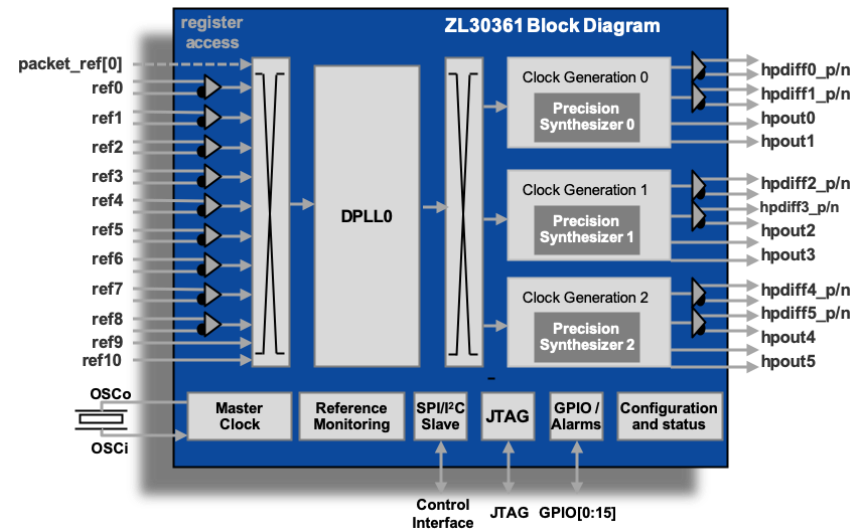
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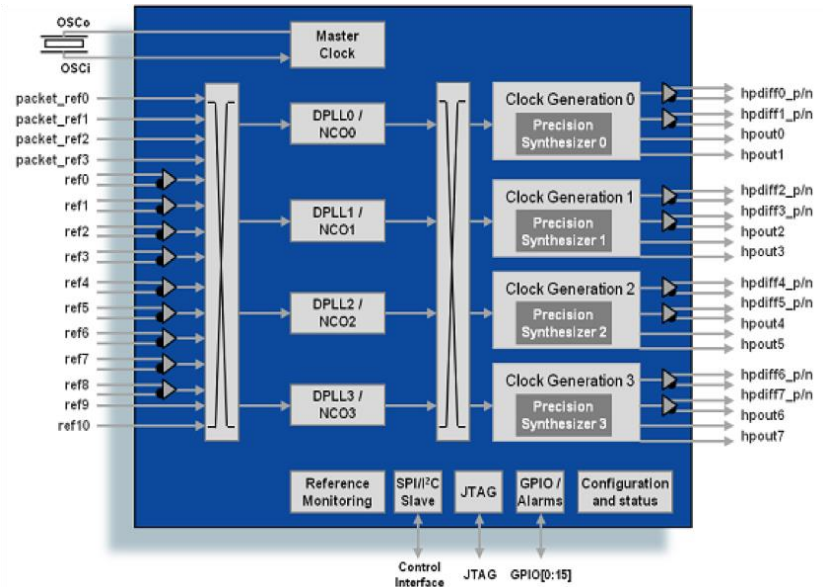
## Features

- Single High quality DPLL channel
- Frequency and Phase Sync over Packet Networks
  - Frequency accuracy performance for WCDMA-FDD, GSM, LTE-FDD and femtocell applications
  - Frequency performance for ITU-T G.823 and G.824 synchronization interface, as well as G.8261 PNT PEC and CES interfaces
  - Phase Synchronization performance for WCDMA-TDD, Mobile WiMAX, TD-SCDMA and CDMA2000 applications
  - Client holdover and reference switching between multiple Servers



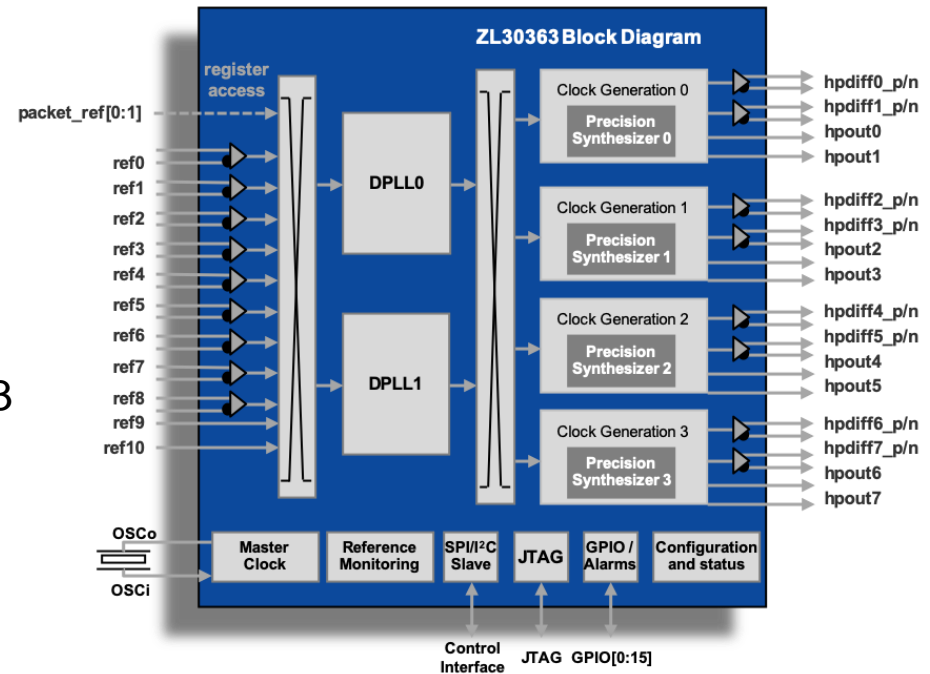
## Features

- Four independent DPLLs with programmable bandwidth from 0.1 mHz up to 1 kHz
- Frequency and Phase Sync over Packet Networks
  - Frequency accuracy performance for WCDMA-FDD, GSM, LTE-FDD and femtocell applications
  - Frequency performance for ITU-T G.823 and G.824 synchronization interface, as well as G.8261 PNT PEC and CES interfaces
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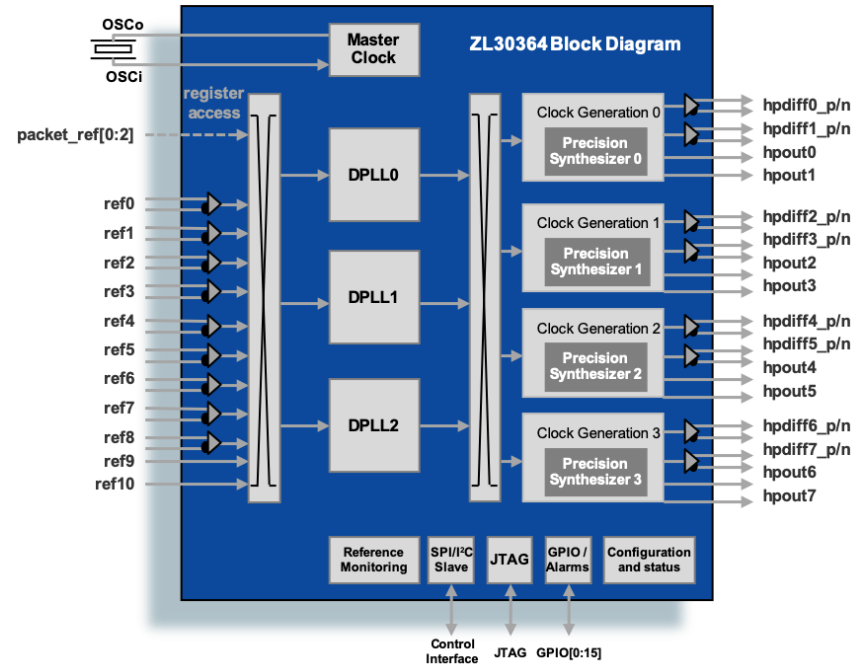
## Features

- Two independent clock channels
- Frequency and Phase Sync over Packet Networks
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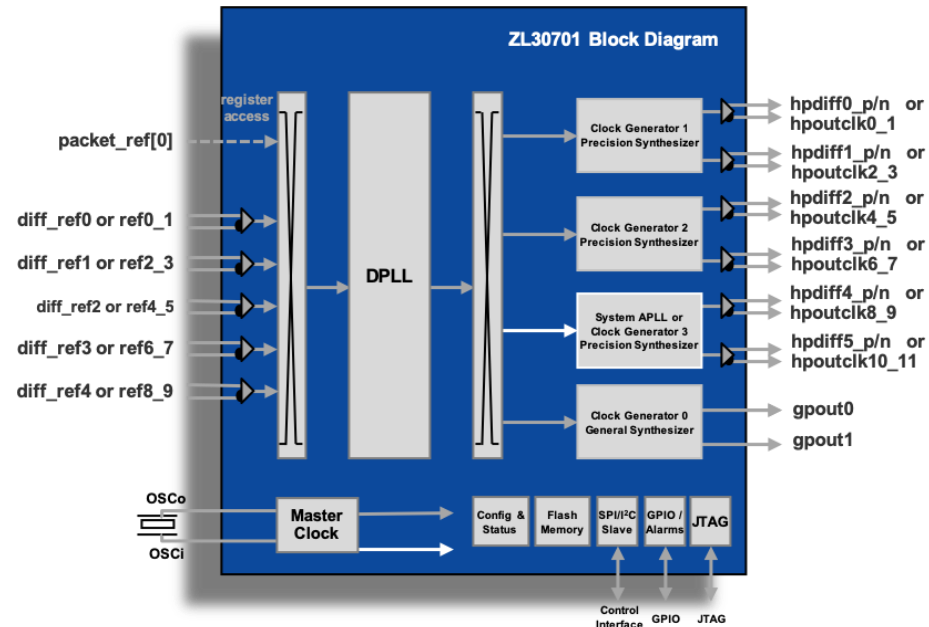
## Features

- Three independent DPLLs with programmable bandwidth from 0.1 mHz up to 1 kHz
- Frequency and Phase Sync over Packet Networks
  - Frequency accuracy performance for WCDMA-FDD, GSM, LTE-FDD and femtocell applications
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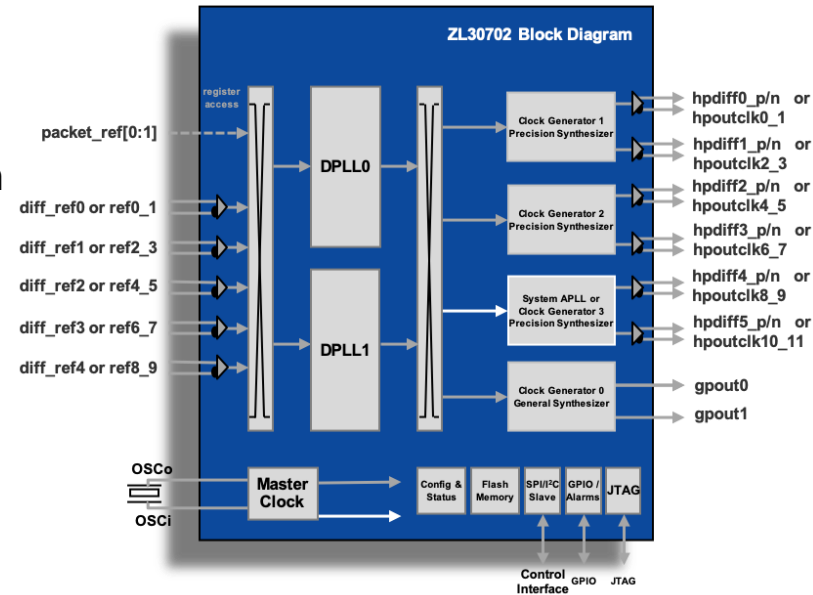
## Features

- Fully compliant to EEC (G.8262), SEC (G.813), GR-253 SMC and GR-1244 Stratum 3/3E
- Frequency accuracy performance for GSM, WCDMAFDD, LTE-FDD base stations and small cell applications, with target performance less than  $\pm 15$  ppb
- Frequency performance for ITU-T G.823 and G.824 synchronization interface, as well as G.8261 PNT EEC, PNT PEC and CES interface specifications
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## Features

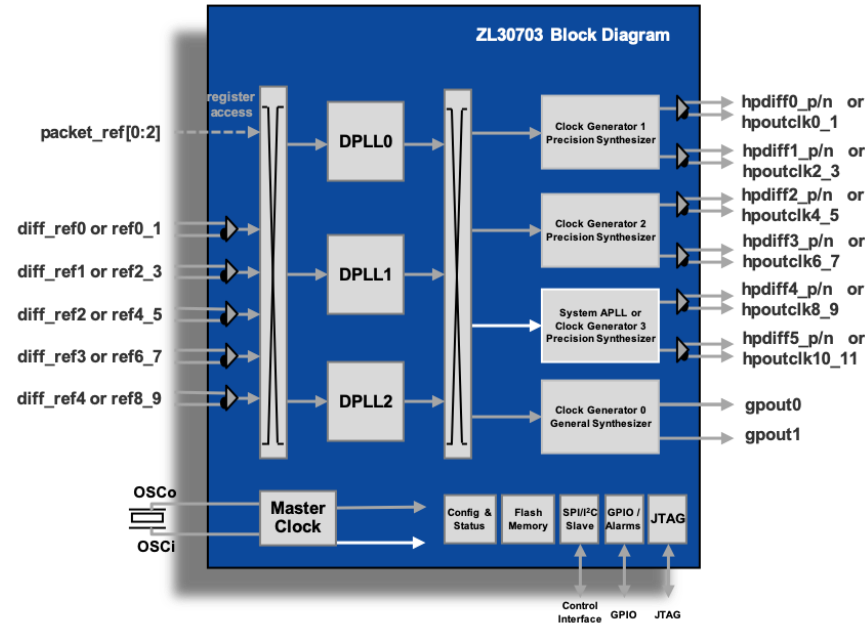
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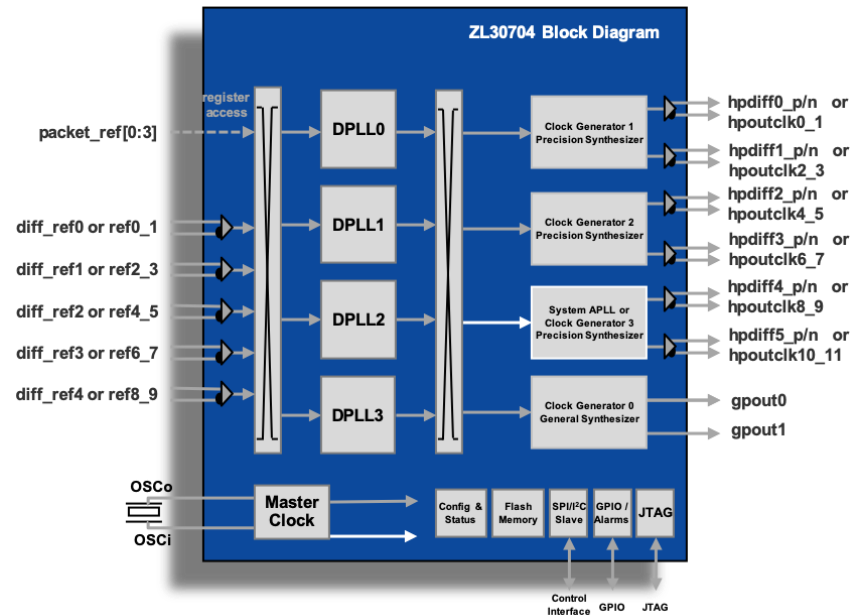
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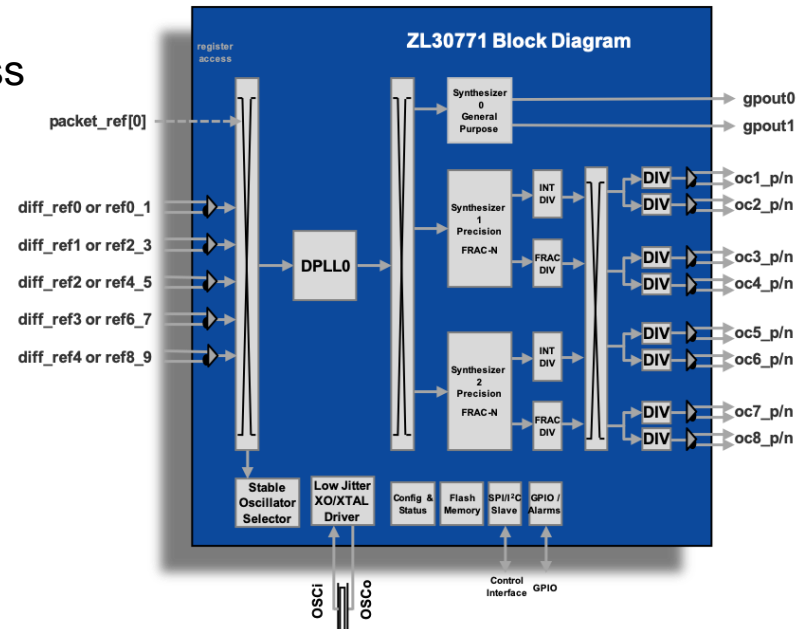
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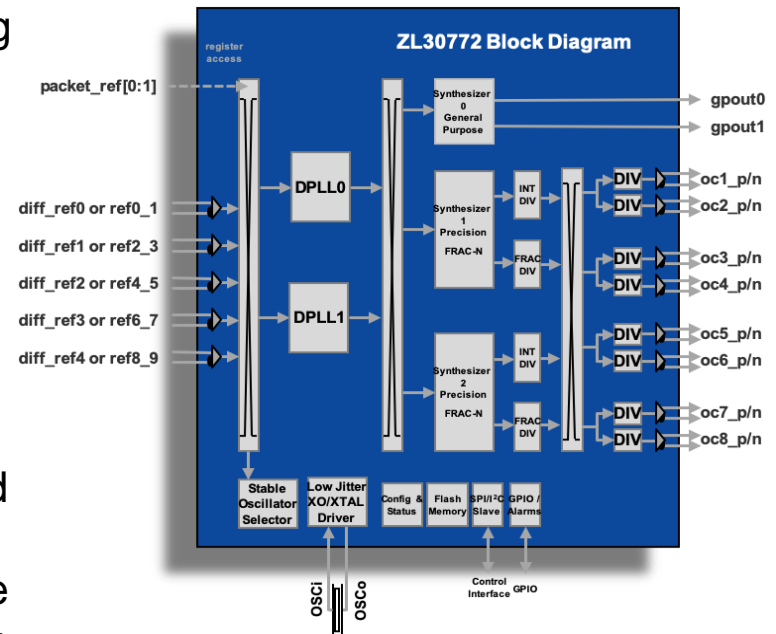
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- Sophisticated packet clock recovery algorithms are field proven and most widely deployed by Carriers
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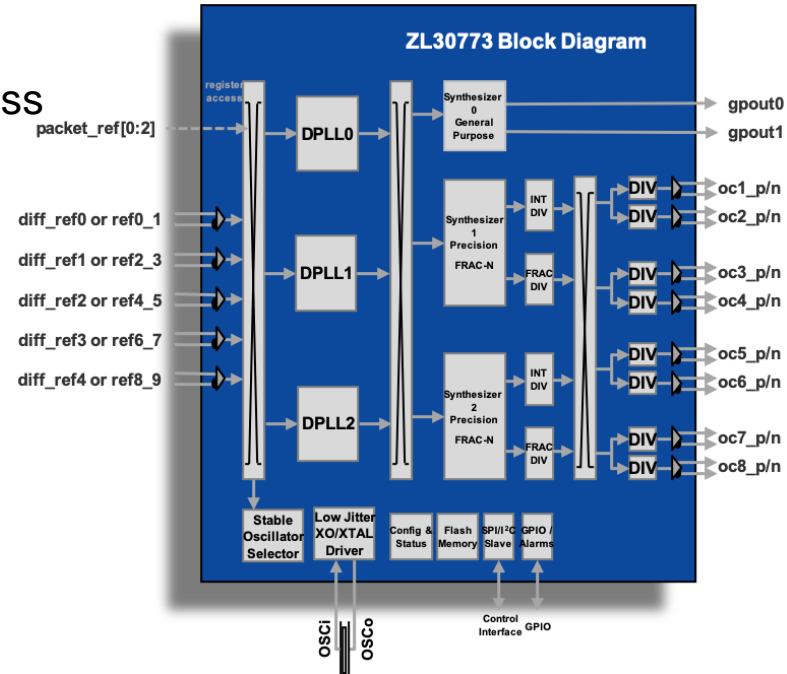
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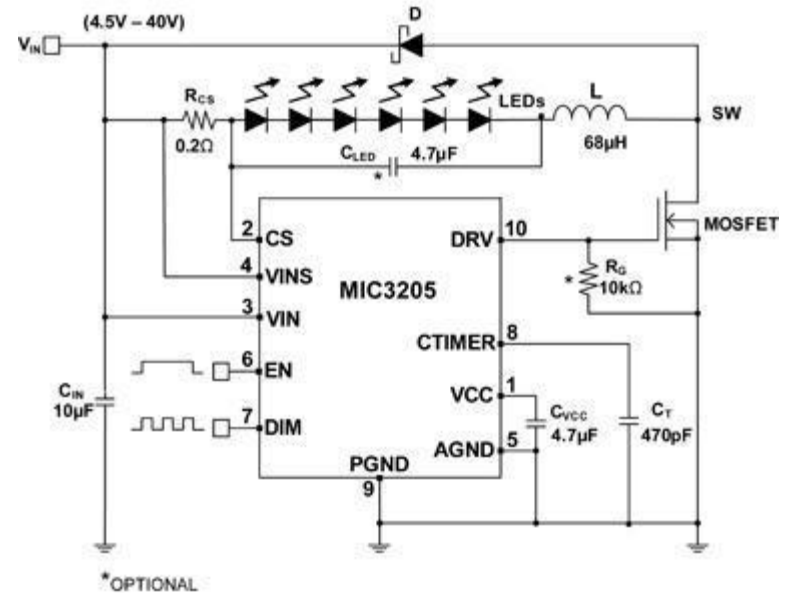
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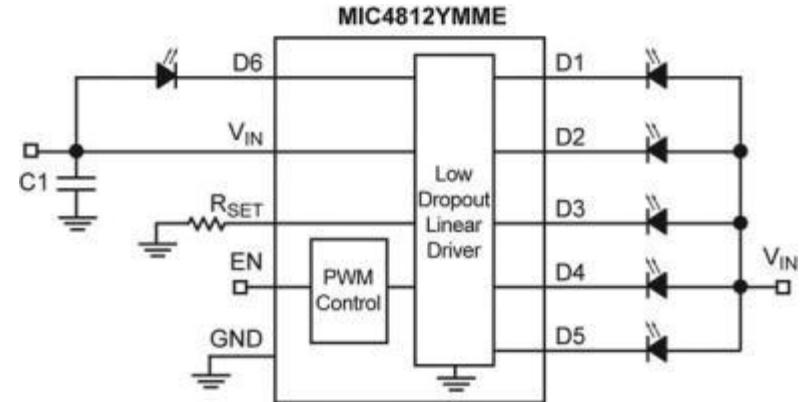
## Features:

- 4.5V to 40V input voltage range
- Fixed operating frequency over input voltage range
- High efficiency (>90%)
- $\pm 5\%$  LED current accuracy
- High-side current sense
- Dedicated dimming control input
- Hysteretic control (no compensation required)
- Up to 1.5MHz switching frequency
- Adjustable constant LED current
- Over-temperature protection
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range



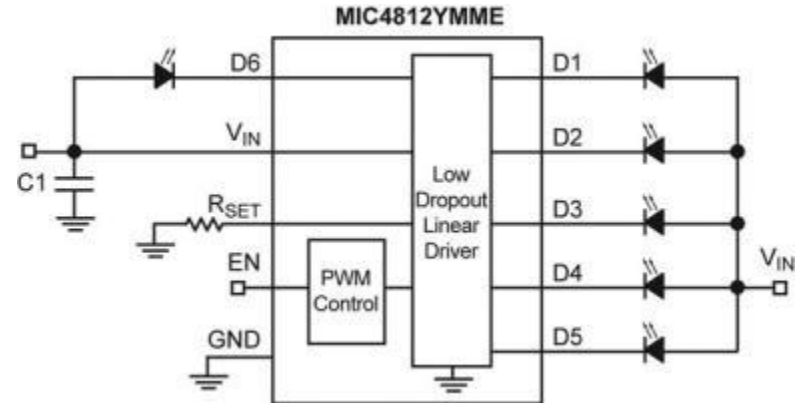
## Features:

- High efficiency (no voltage boost losses)
- Ultra Fast PWM™ control (200Hz to 500kHz)
- Input voltage range: 3.0V to 5.5V
- LED current range up to 100mA per channel
- Programmable LED current with external resistor
- Dropout of 190mV at 100mA
- Matching better than  $\pm 1\%$  (typical)
- Current accuracy better than  $\pm 1\%$  (typical)
- Maintains proper regulation regardless of how –  
- many channels are utilized
- 10-pin MSOP with ePad package



## Features:

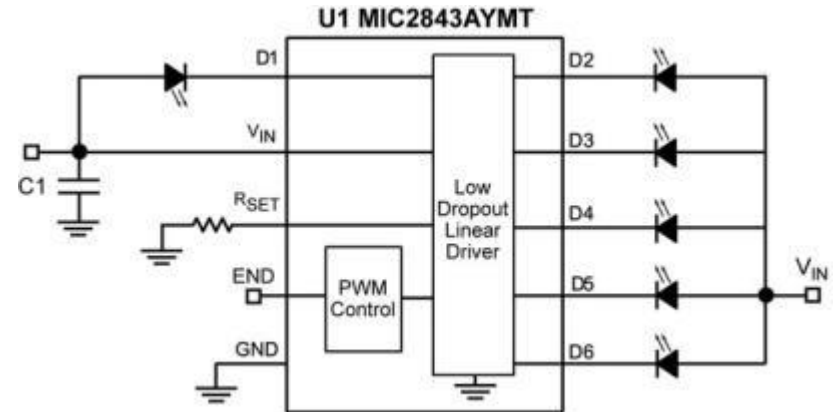
- High efficiency (no voltage boost losses)
- Ultra Fast PWM™ control (200Hz to 500kHz)
- Input voltage range: 3.0V to 5.5V
- LED current range up to 50mA per channel
- Programmable LED current with external resistor
- Dropout of 100mV at 50mA
- Matching better than  $\pm 1\%$  (typical)
- Current accuracy better than  $\pm 1\%$  (typical)
- Maintains proper regulation regardless of how –  
- many channels are utilized
- 10-pin MSOP package





## Features:

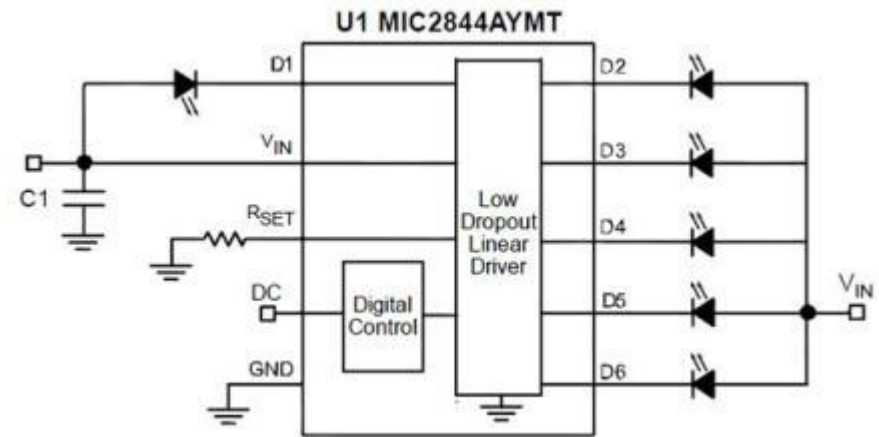
- High efficiency (no voltage boost losses)
- Dynamic Average Matching™ (DAM™) \*
- Ultra Fast PWM™ control (200Hz to 500kHz)
- Input voltage range: 3.0V to 5.5V
- Dropout of 40mV at 20mA
- Matching better than  $\pm 3\%$  (typical) - MIC2843
- Matching better than  $\pm 1.5\%$  (typical) - MIC2843A
- Current accuracy better than  $\pm 1.5\%$  (typical)
- Maintains proper regulation regardless of how -  
- many channels are utilized
- Available in a 10-pin 2mm x 2mm Thin MLF® package



\* The MIC2843A features DAM™ which is specifically designed to provide optimum matching across all WLEDs.

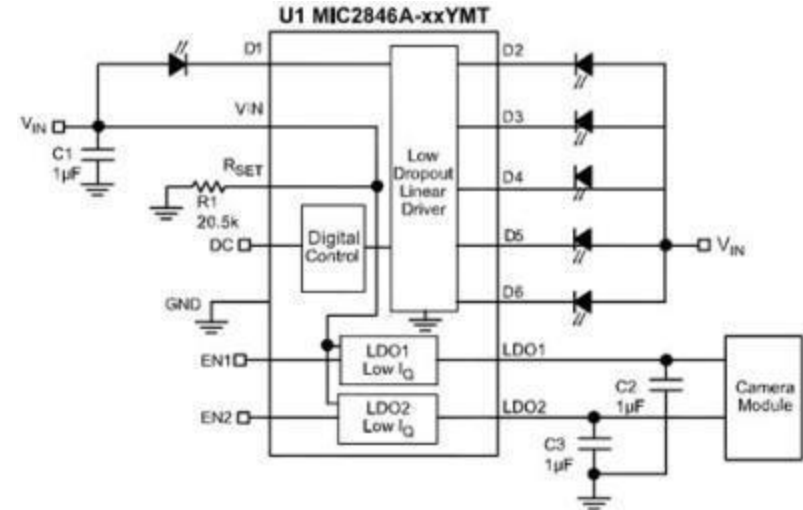
### Features:

- High efficiency (no voltage boost losses)
- Dynamic Average Matching™ (DAM™)
- Single wire digital control
- Input voltage range: 3.0V to 5.5V
- Dropout of 40mV at 20mA
- Matching better than  $\pm 1.5\%$  (typical)
- Current accuracy better than  $\pm 1.5\%$  (typical)
- Maintains proper regulation regardless of how
  - many channels are utilized
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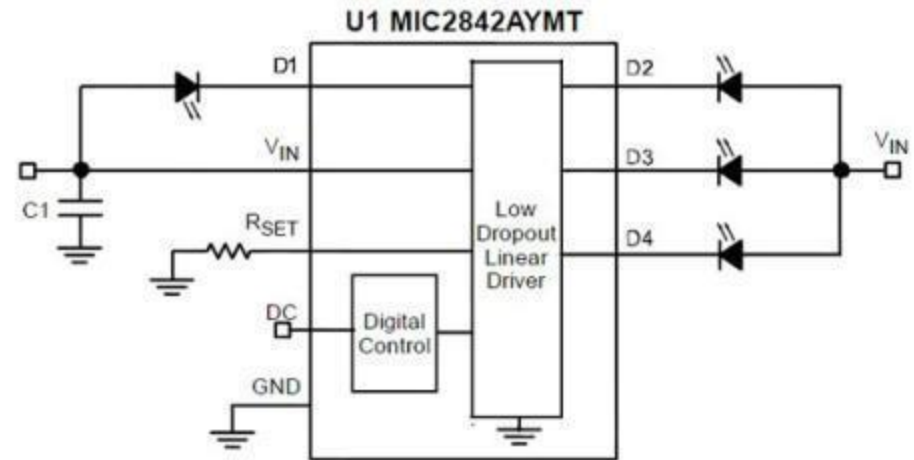
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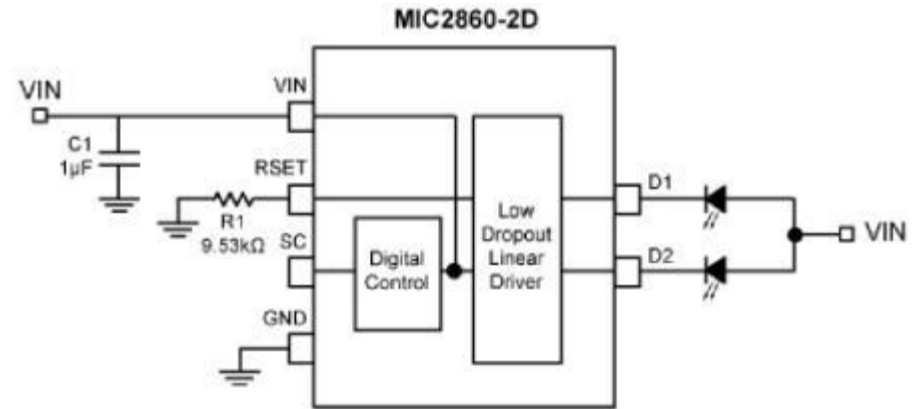
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- Dropout of 40mV at 20mA
- Matching better than  $\pm 1.5\%$  (typical)
- Current accuracy better than  $\pm 1.5\%$  (typical)
- Maintains proper regulation regardless of –
  - how many channels are utilized
- Available in a 10-pin 2mm x 2mm Thin –
  - MFL® package



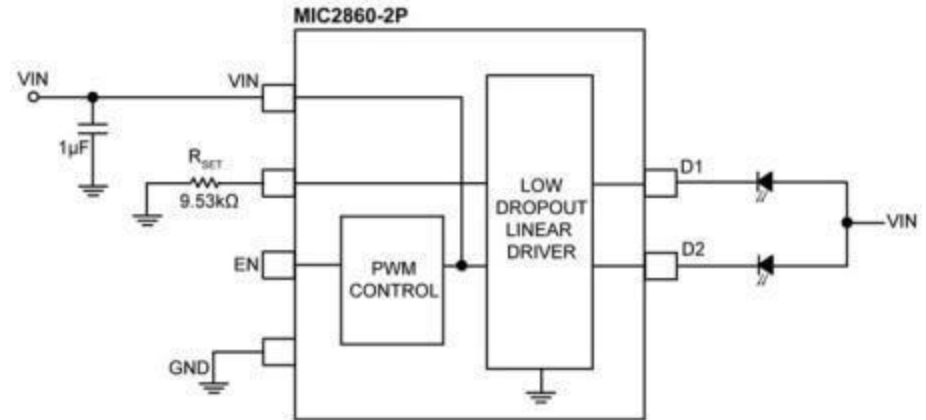
## Features:

- High efficiency (no switching losses)
- No charge pumps
- Two WLED driver channels
- Single wire digital control
- Input voltage range: 3.0V to 5.5V
- WLED driver dropout of 52mV at 30.2mA
- Matching better than  $\pm 0.5\%$  (typical)
- Current accuracy better than  $\pm 1.0\%$  (typical)
- Available in Thin SOT-23 and SC-70 6-pin –  
- packages



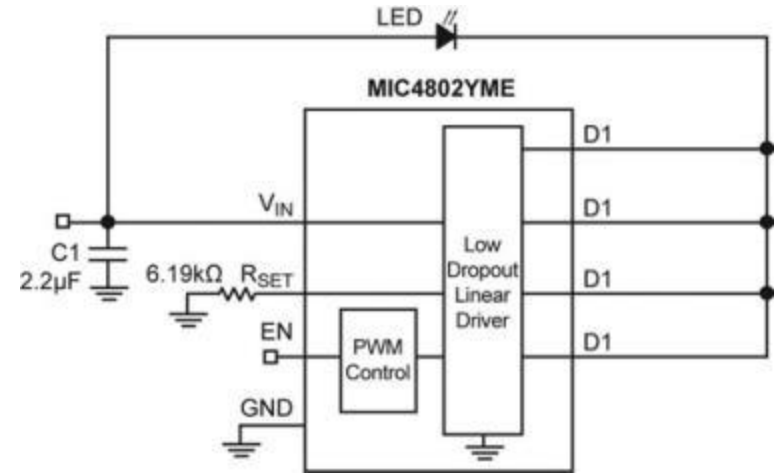
## Features:

- High efficiency (no switching losses)
- PWM frequency as low as 250Hz
- Input voltage range: 3.0V to 5.5V
- Linear driver dropout of 52mV at 30.2mA
- Matching better than  $\pm 0.5\%$  (typical)
- Current accuracy better than 1.0% (typical)
- Available in Thin SOT-23 and SC-70 –  
- packages



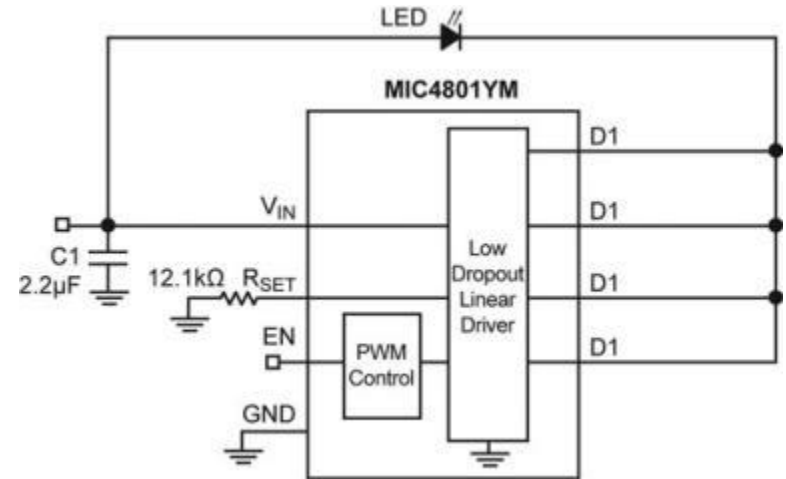
## Features:

- High efficiency (no voltage boost losses)
- Ultra Fast PWM™ control (200Hz to 500kHz)
- Input voltage range: 3.0V to 5.5V
- Dropout of 280mV at 800mA
- Programmable LED current with external resistor
- Current accuracy of  $\pm 1\%$  typical



## Features:

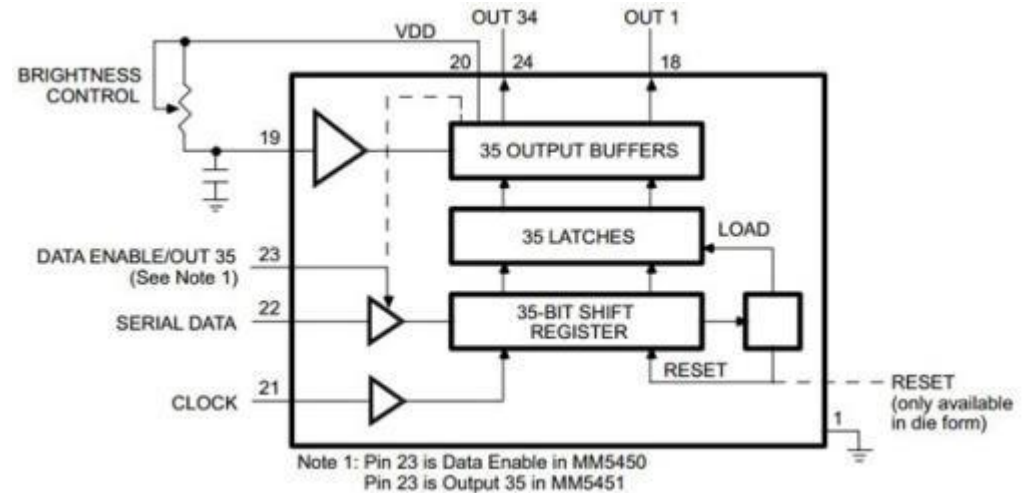
- High efficiency (no voltage boost losses)
- Ultra Fast PWM™ control (200Hz to 500kHz)
- Input voltage range: 3.0V to 5.5V
- Dropout of 130mV at 400mA
- Programmable LED current with external resistor
- Current accuracy of  $\pm 1\%$  typical





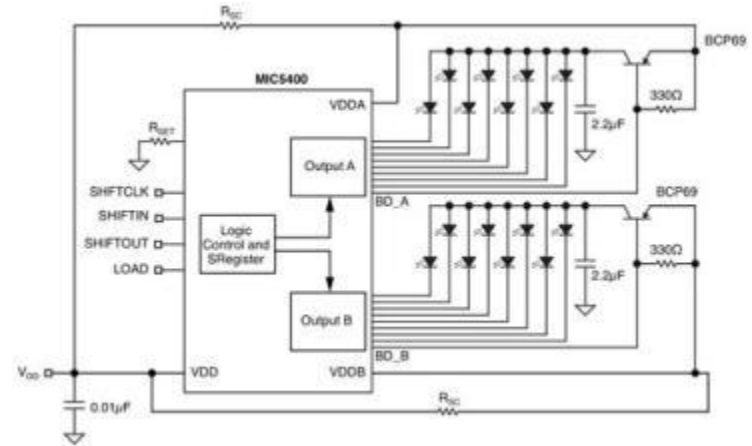
## Features:

- Continuous brightness control
- Serial data input
- No load signal requirement
- Enable (on MM5450)
- Wide power supply operation
- TTL compatibility
- 34 or 35 outputs, 15mA capability
- Alphanumeric capability



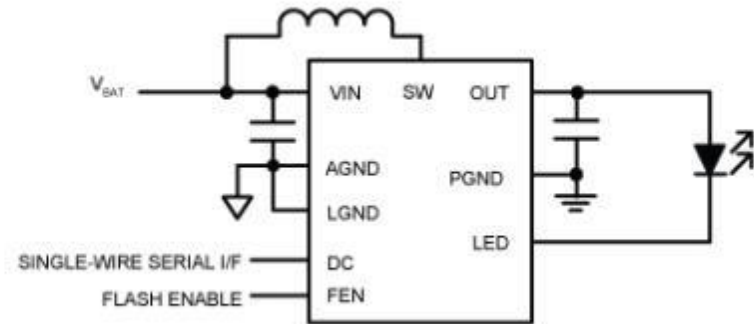
## Features:

- Two banks of 8 outputs
- Output characteristics:
- Current sink: 30mA:
  - Programmable brightness control:
    - Coarse: 4-Bit resolution DAC
    - Fine: 10-Bit resolution PWM
  - Resistor sets maximum LED current to -
    - compensate variation in LEDs
  - Current limit on each output
- Full protection:
  - Over temperature shutdown
  - Watchdog disables output under fault condition
  - Power-on Reset [all LEDs off]
  - Soft-start on power up and watchdog recovery
  - Output open fault detection with status register read back
- Output transitions are staggered to minimize supply transients



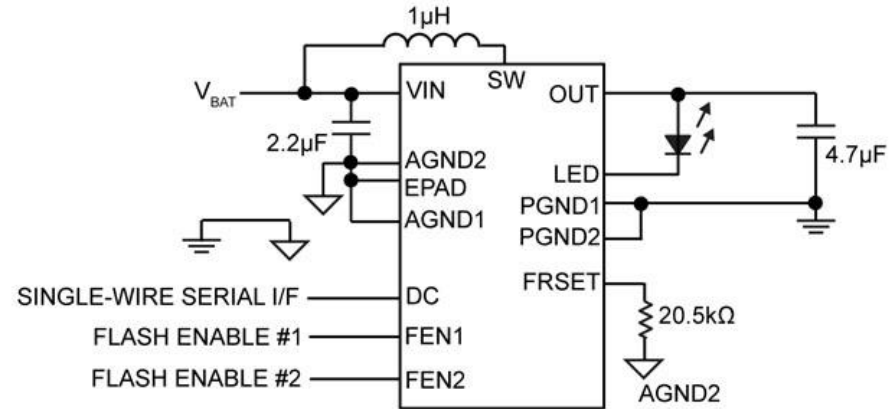
## Features:

- Up to 1.2A flash LED driving current
- Highly efficient synchronous boost driver
- Input voltage range: 2.7V to 5.5V
- True load disconnect
- Configurable safety time-out protection
- Output overvoltage protection (OVP)
- Control through single-wire serial interface or -  
- external control pin
- LED short detection and protection
- 1 $\mu$ A shutdown current
- Available in 9-bump 1.30mm x 1.30mm WLCSP package



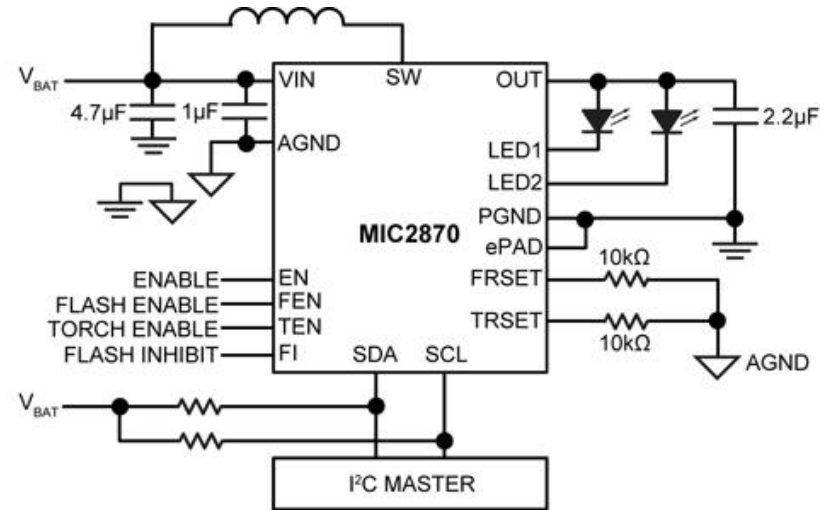
### Features:

- Up to 1.2A flash LED driving current
- $\pm 5\%$  LED current accuracy
- Input voltage range: 2.7V to 5.5V
- True load disconnect
- Configurable safety time-out protection
- Output overvoltage protection (OVP)
- Control through single-wire serial interface or -  
- external control pins
- LED short detection and protection
- Highly efficient, synchronous boost driver (up to 94%)
- 1 $\mu$ A shutdown current
- Available in 14-pin 3mm  $\times$  2mm LDFN package



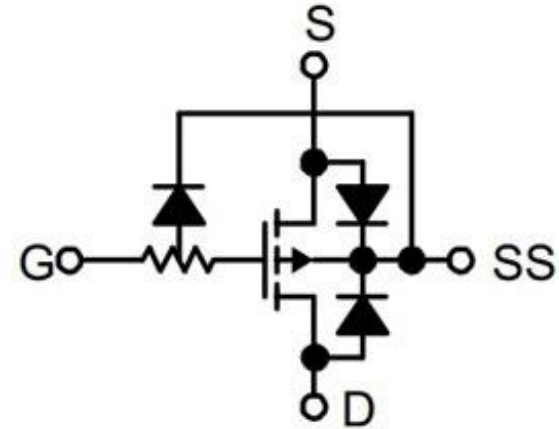
## Features:

- Up to 1.5A flash LED driving current with a 2.7V - to 5.0V input voltage range
- High-efficiency 2MHz VF adaptive boost driver
- Configurable 1 or 2 channel(s) WLED driver
- LED driving current soft-start
- Control through I<sup>2</sup>C interface or external pins
- True load disconnect
- Flash time-out protection
- 1 $\mu$ A shutdown current
- Available in 16-pin 2mm  $\times$  2mm TQFN package
- Flash inhibit function for GSM pulse –  
- synchronization



## Features:

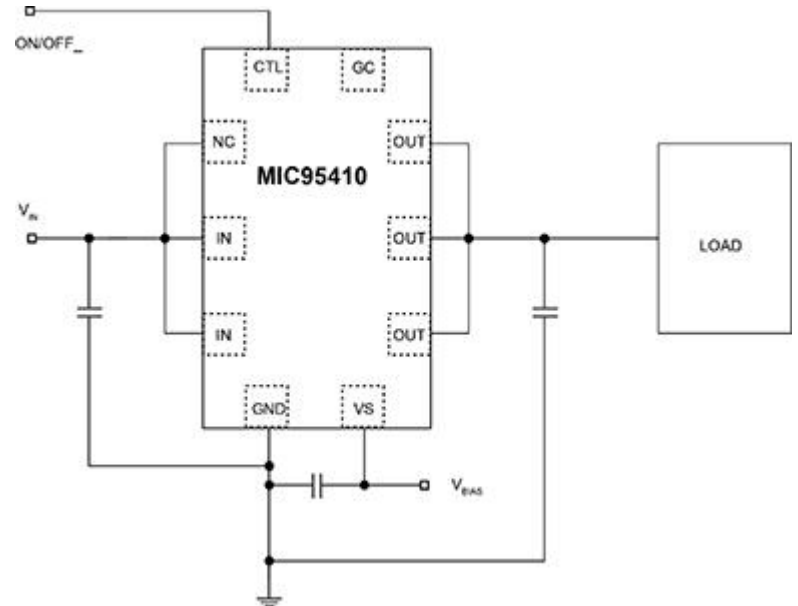
- 13.5V minimum drain-to-source breakdown
- 0.75Ω typical on-resistance at 4.5V gate-to-source - voltage
- 0.45Ω typical on-resistance at 10V gate-to-source - voltage
- Operates with 2.7V gate-to-source voltage
- Separate substrate connection for added control
- Industry's smallest surface mount package



**MIC94030**

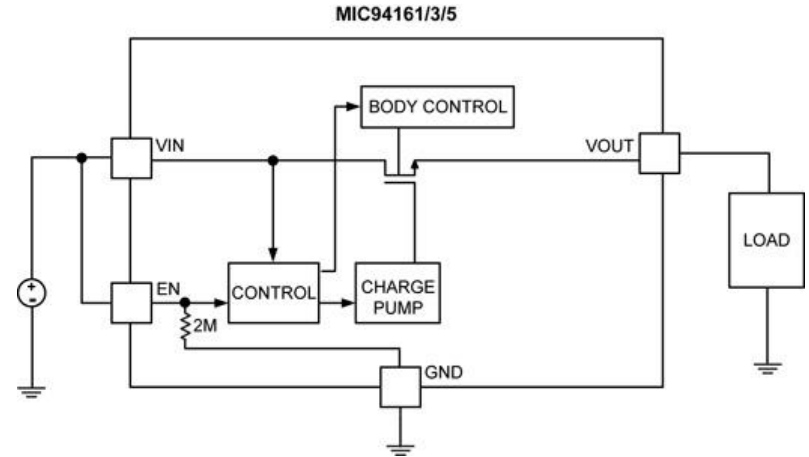
## Features:

- Ultra-low  $R_{DS(ON)}$ : 6.6mΩ typical
- True 7A current capability
- Power rail switching from sub-1V to 5.5V
- Bias voltage from 2.7V to 9V
- $\leq 1\mu\text{A}$  OFF-state bias supply current
- $\leq 1\mu\text{A}$  OFF-state power switch leakage current
- Adjustable slew rate for inrush current limiting by -  
- external capacitor
- Load discharge
- TTL-compatible control input
- 10-pin 1.2mm × 2.0mm QFN package, 0.5mm pin -  
- pitch
- -40°C to +125°C junction temperature range



## Features:

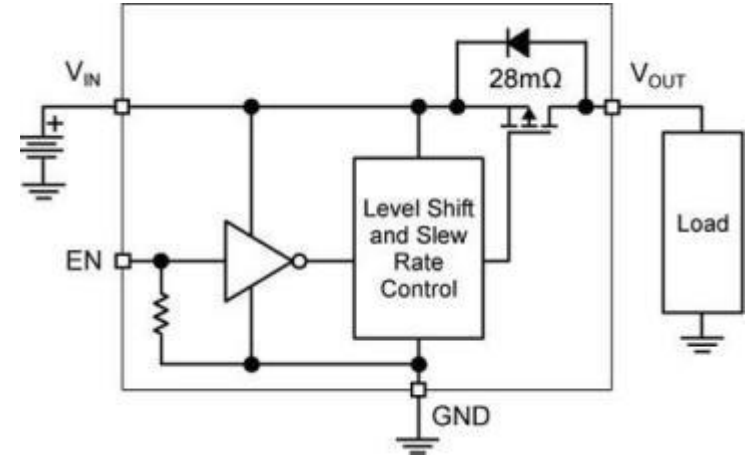
- 1.5mm x 1mm 6-ball WLCSP package
- 14.5mΩ  $R_{\text{DS(on)}}$
- 1.7V to 5.5V input voltage range
- 3A continuous operating current
- Ultra-low quiescent current
- Reverse current flow blocking (no “body diode”)
- Internal level shift for CMOS/TTL control logic
- Micropower shutdown current
- Soft-start: MIC94161/4/5 (2.7ms)
- Load discharge circuit: MIC94162/4
- Ultra-fast turn-off time
- Junction operating temperature: -40°C to +125°C





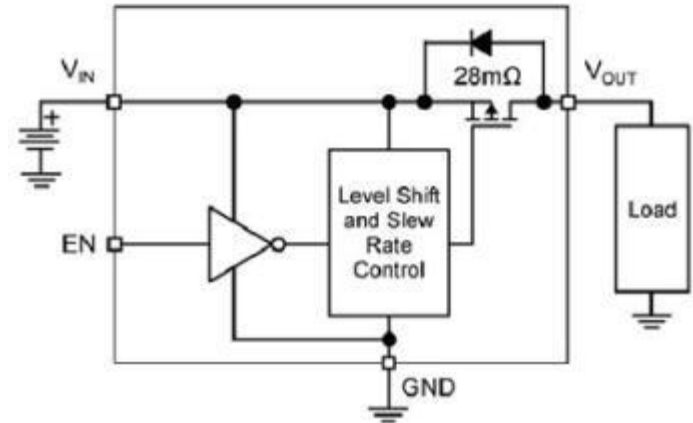
## Features:

- 28mΩ RDS(on)
- 3A continuous operating current
- 1.2mm x 1.2mm space saving 4-pin MLF® package
- 1.7V to 5.5V input voltage range
- Internal level shift for CMOS/TTL control logic
- Ultra low quiescent current
- Micro-power shutdown current
- Soft-Start: MIC94042, MIC94043
- Load discharge circuit: MIC94041, MIC94043
- Ultra fast turn off time
- Junction operating temperature: -40°C to +125°C



## Features:

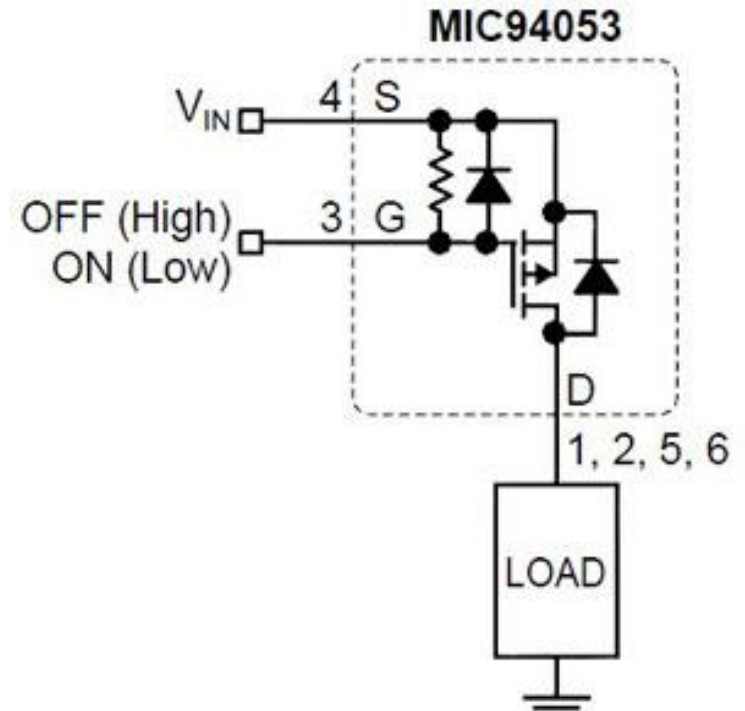
- 28mΩ RDS(on)
- 3A continuous operating current
- 1.2mm x 1.2mm space saving 4-pin MLF® package
- 1.7V to 5.5V input voltage range
- Internal level shift for CMOS/TTL control logic
- Ultra low quiescent current
- Micro-power shutdown current
- Soft-Start: 1ms
- Load discharge circuit: MIC94045
- Ultra fast turn off time
- Junction operating temperature: -40°C to +125°C



MIC94044 (1ms soft-start)

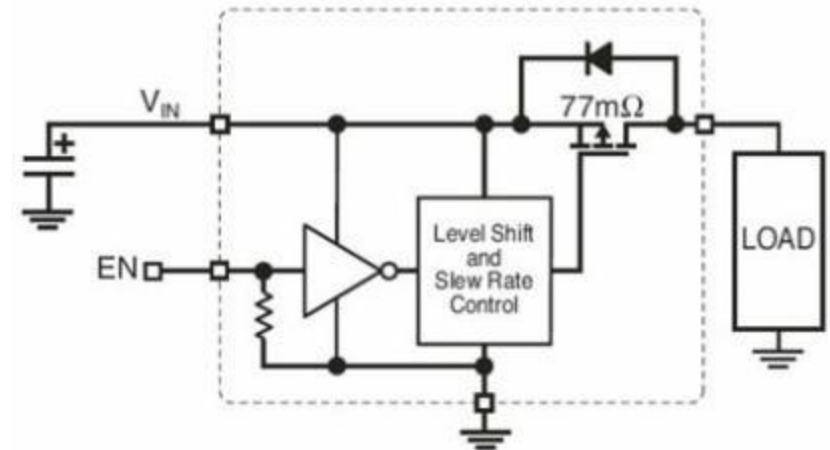
## Features:

- 1.8V to 5.5V input voltage range
- Low on-resistance P-channel MOSFET
- $70\text{m}\Omega$  at  $V_{GS} = 4.5\text{V}$  (typ)
- 2A continuous current
- $V_{GS}$  pull-up resistor (MIC94053)
- Teeny™ SC-70-6 package
- Junction temperature range:  $-40^\circ\text{C}$  to  $+150^\circ\text{C}$



### Features:

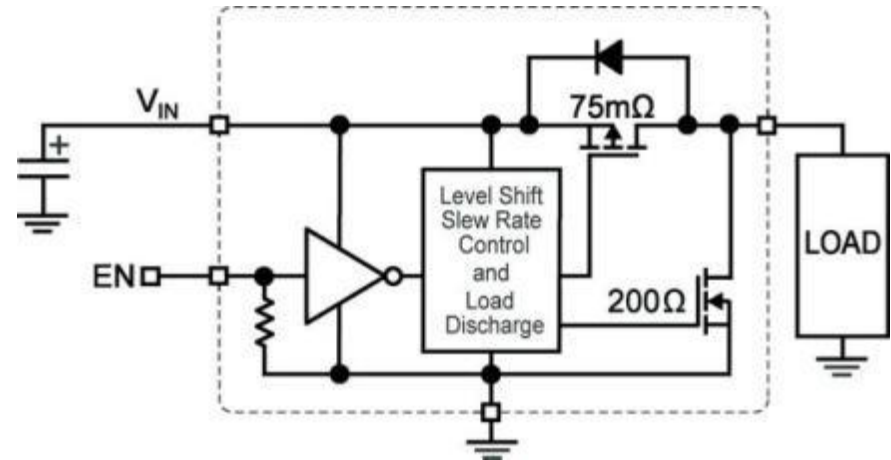
- High efficiency (no voltage boost losses)
- Dynamic Average Matching™ (DAM™)
- Ultra Fast PWM™ control (200Hz to 500kHz)
- Input voltage range: 3.0V to 5.5V
- Dropout of 40mV at 20mA
- Matching better than  $\pm 1.5\%$  (typical)
- Current accuracy better than  $\pm 1.5\%$  (typical)
- Maintains proper regulation regardless of how -  
- many channels are utilized
- Available in a 10-pin 2mm x 2mm Thin MLF® -  
- package



**MIC94060, 62**  
**Load Switch Application**

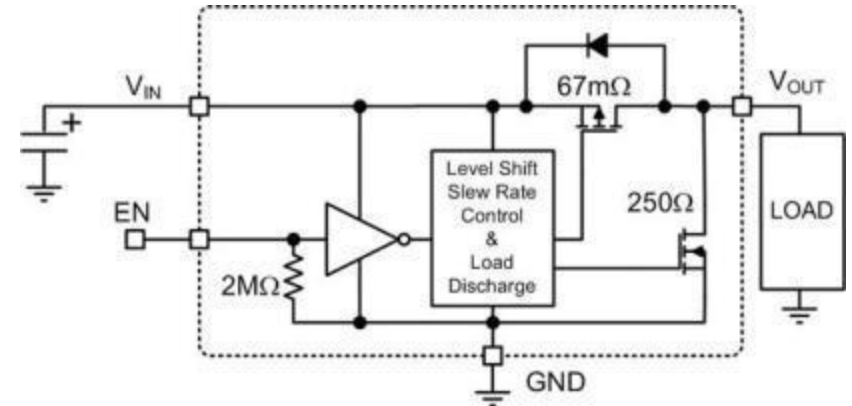
## Features:

- 1.7V to 5.5V input voltage range
- 2A continuous operating current
- 77m $\Omega$  (typ) R<sub>DS(on)</sub>
- Low 2 $\mu$ A quiescent current
- Soft-Start: 115 $\mu$ s
- Micro-power shutdown <1 $\mu$ A
- Load discharge circuit: MIC94065
- Built-in level shift for control logic; can be –  
- operated by 1.5V logic
- Space saving 1.2mm x 1.6mm Thin MLF® package



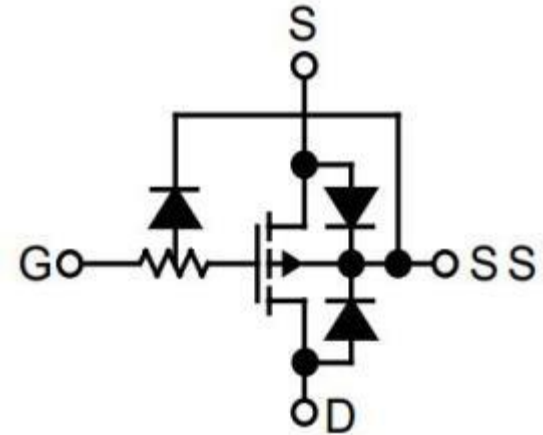
## Features:

- High efficiency (no voltage boost losses)
- Dynamic Average Matching™ (DAM™)
- Ultra Fast PWM™ control (200Hz to 500kHz)
- Input voltage range: 3.0V to 5.5V
- Dropout of 40mV at 20mA
- Matching better than ±1.5% (typical)
- Current accuracy better than ±1.5% (typical)
- Maintains proper regulation regardless of how –  
- many channels are utilized
- Available in a 10-pin 2mm x 2mm Thin MLF® package



## Features:

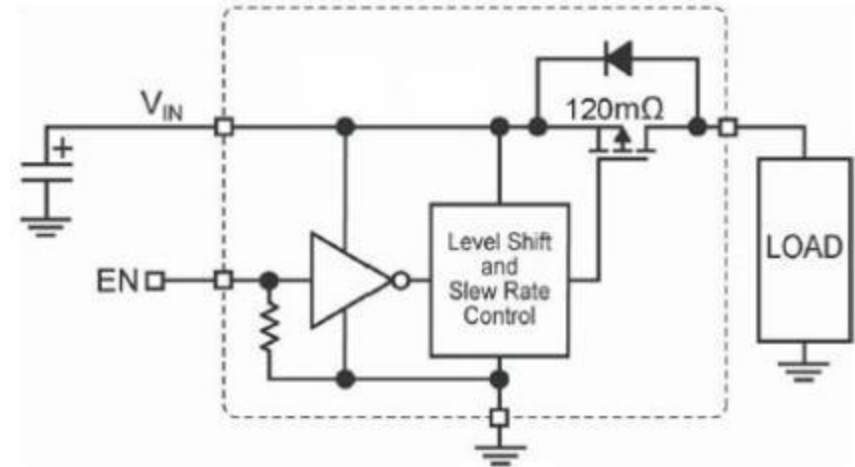
- 0.125Ω typical on-resistance at 4.5V gate-to-source – voltage
- Operates with 1.8V gate-to-source voltage
- Separate substrate connection allows reverse-blocking



**MIC94050**

## Features:

- 1.7V to 5.5V input voltage range
- 1.2A continuous operating current
- 3A pulse current
- 120mΩ R<sub>DSON</sub> (typical)
- Low 2μA quiescent current
- Soft-Start: MIC94072/73
- Micro-power shutdown <1μA
- Load discharge circuit: MIC94071, MIC94073
- Built-in level shift for control logic
  - Can be operated by 1.5V logic
- 1.2mm x 1.6mm Thin MLF® package

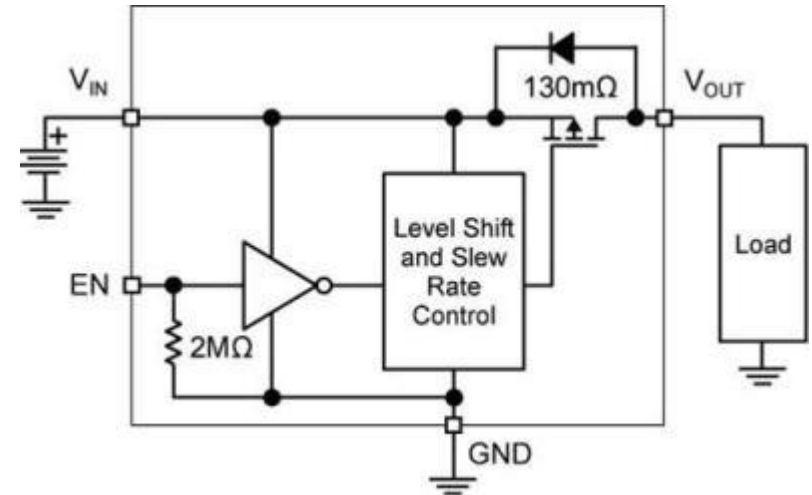


**MIC94070, 72**  
Load Switch Application



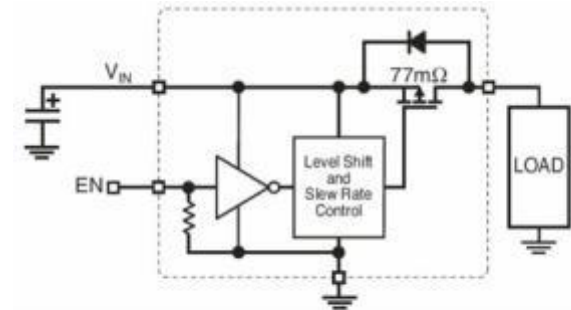
### Features:

- 1.7V to 5.5V input voltage range
- 1.2A continuous operating current
- 130mΩ R<sub>DS(ON)</sub>
- Internal level shift for CMOS/TTL control logic
- Ultra low quiescent current
- Micro-power shutdown current
- Rapid turn-on: MIC94090/1
- Soft-Start: MIC94092/3 (790μs), MIC94094/5 –  
- (120μs)
- Load discharge circuit: MIC94091/3/5
- 1.2mm x 1.2mm Thin MLF® and SC-70-6 packages

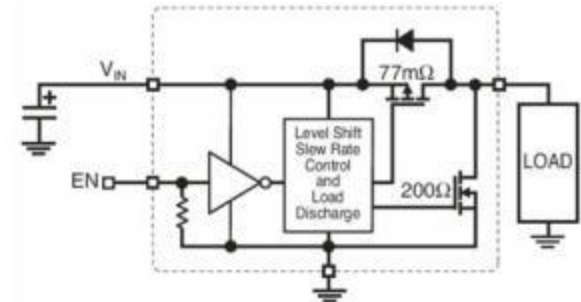


## Features:

- 1.7V to 5.5V input voltage range
- 2A continuous operating current
- 85mΩ (typ) R<sub>ON</sub>
- Built-in level shift for control logic; can be operated by - 1.5V logic
- Low 2μA quiescent current
- Soft-Start: MIC94068-69
- Micro-power shutdown <1μA
- Load discharge circuit: MIC94067, MIC94069
- Space saving 2mm x 2mm MFL<sup>®</sup> package



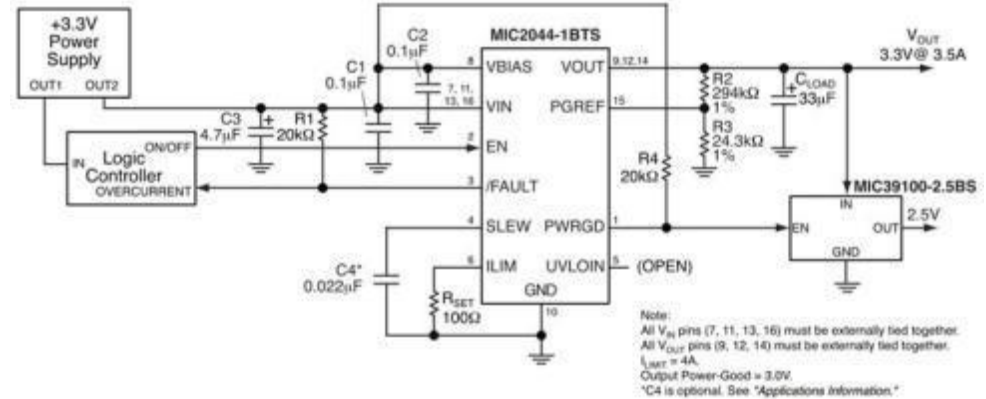
½ MIC94066, 68  
Load Switch Application



½ MIC94067, 69  
Load Switch with Capacitive Load Discharge

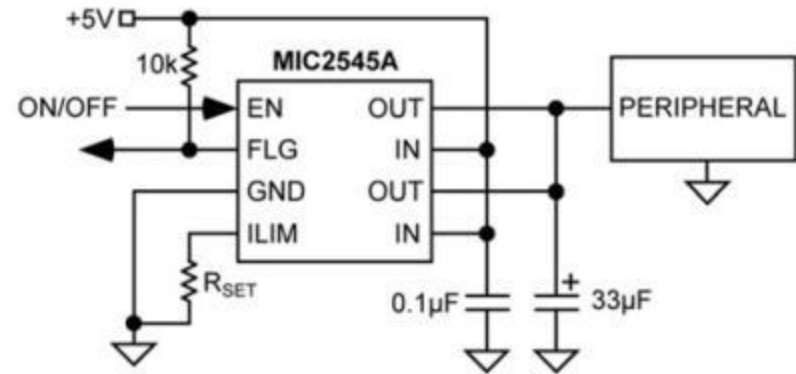
## Features:

- 30mΩ maximum on-resistance
- 0.8V to 5.5V operating range
- Adjustable current limit
- Up to 6A continuous output current
- Short circuit protection
- Very fast reaction to short circuits
- Thermal shutdown
- Adjustable slew-rate control
- Circuit breaker mode (MIC2045)
- Fault status flag
- Power-Good detection
- Undervoltage lockout
- No reverse current flow through the –  
- switching MOSFET when OFF or disabled
- Low quiescent current



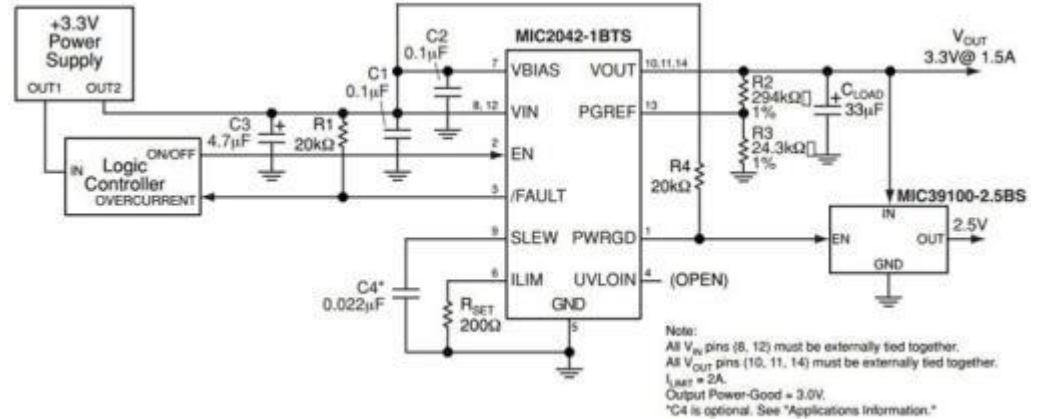
## Features:

- 2.7V to 5.5V input
- Adjustable current-limit up to 3A
- Reverse current flow blocking
- 90 $\mu$ A typical on-state supply current
- 1 $\mu$ A typical off-state supply current
- 50m $\Omega$  maximum on-resistance
- Open-drain fault flag
- Thermal shutdown
- Thermal-shutdown output latch (MIC2549A)
- 2ms (slow) soft-start turn-on, fast turnoff
- Available with active-high or active-low enable



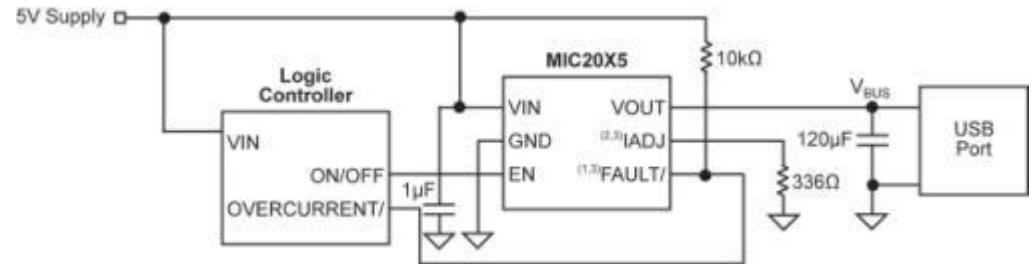
## Features:

- 60mΩ max. on-resistance
- 0.8V to 5.5V operating range
- Adjustable current limit
- Power-Good detection
- Up to 3A continuous output current
- Short-circuit protection with thermal –  
– shutdown
- Adjustable slew-rate control
- Circuit breaker mode (MIC2043)
- Fault status flag
- Undervoltage lockout
- Output MOSFET reverse current flow block when disabled
- Very fast reaction to short-circuits
- Low quiescent current



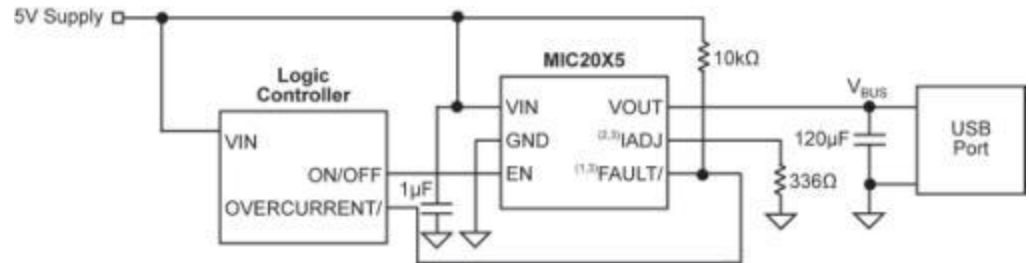
## Features:

- 70m $\Omega$  typical on-resistance @ 5V
- Enable active high or active low
- 2.5V-5.5V operating range
- Undervoltage lock-out (UVLO)
- Variable UVLO allows adjustable –  
- UVLO thresholds\*
- Automatic load discharge for capacitive loads\*
- Soft-start prevents large current inrush
- Adjustable slew rate allows custom slew rates\*
- Automatic-on output after fault
- Thermal protection
- Adjustable current limit 0.2A to 2.0A\* (MIC20X7-MIC20X9)
- Adjustable current limit 0.1A to 0.9A\* (MIC20X9A)



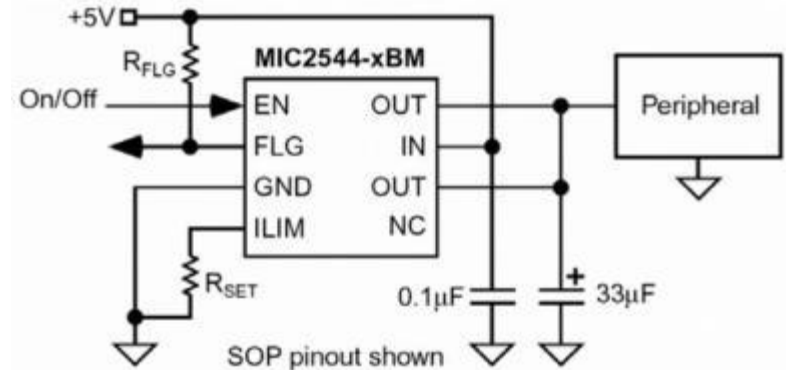
## Features:

- Enable active high or active low
- 2.5V-5.5V operating range
- Undervoltage lock-out (UVLO)
- 70m $\Omega$  typical on-resistance @ 5V
- Variable UVLO allows adjustable –
  - UVLO thresholds\*
- Automatic load discharge for -
  - capacitive loads\*
- Soft-start prevents large current inrush
- Adjustable slew rate allows custom slew rates\*
- Automatic-on output after fault
- Thermal protection
- Adjustable current limit 0.1A to 0.9A\* (MIC20X9A)



## Features:

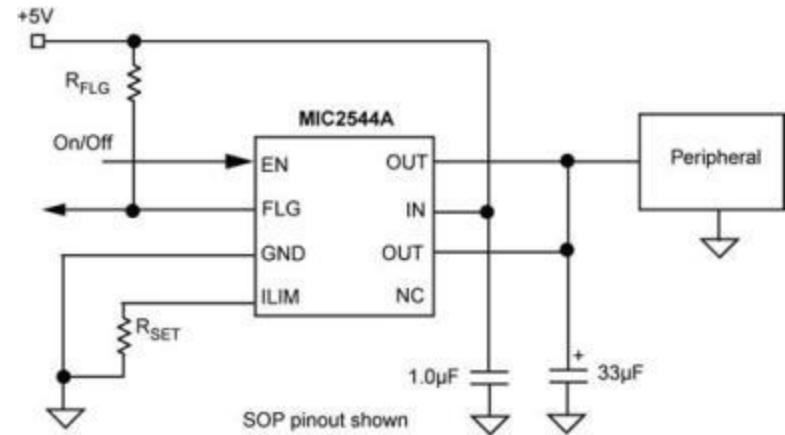
- 2.7V to 5.5V input
- Adjustable current-limit up to 1.5A
- 75 $\mu$ A typical on-state supply current
- 1 $\mu$ A typical off-state supply current
- 120m $\Omega$  maximum on-resistance
- Open-drain fault flag
- Thermal shutdown
- Thermal shutdown output latch (MIC2548)
- 2ms (slow) turn-on and fast turnoff
- Available with active-high or active-low enable
- Reverse current flow blocking (no "body diode")





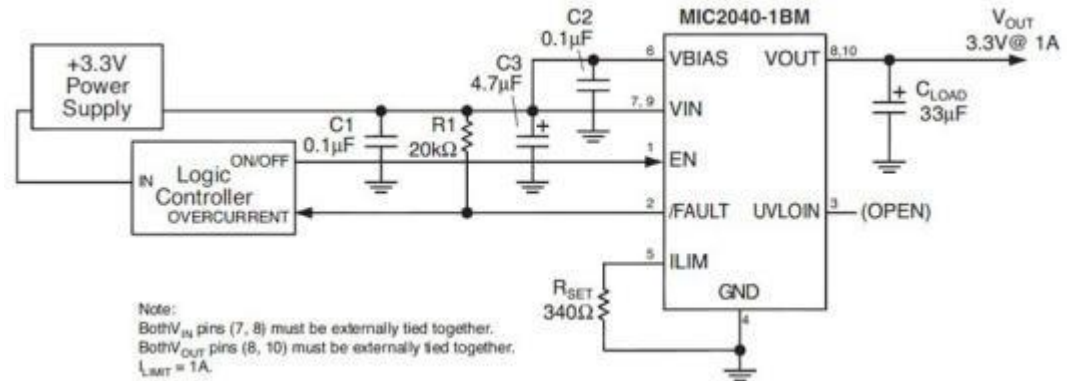
## Features:

- 2.7V to 5.5V input
- Adjustable current-limit up to 1.5A
- 90 $\mu$ A typical on-state supply current
- 1 $\mu$ A typical off-state supply current
- 120m $\Omega$  maximum on-resistance
- Open-drain fault flag
- Thermal shutdown
- Thermal shutdown output latch (MIC2548A)
- 2ms (slow) turn-on and fast turn-off
- Available with active-high or active-low enable
- Reverse current flow blocking (no "body diode")



## Features:

- 75mΩ max. on-resistance
- 0.8V to 5.5V operating range
- Adjustable current limit
- Up to 1.5A continuous output –  
- current
- Circuit breaker mode (MIC2041)
- Fault status flag
- Undervoltage lockout
- Output MOSFET reverse current flow  
- block when disabled
- Very fast reaction to short-circuits
- Low quiescent current
- Short circuit protection with thermal shutdown

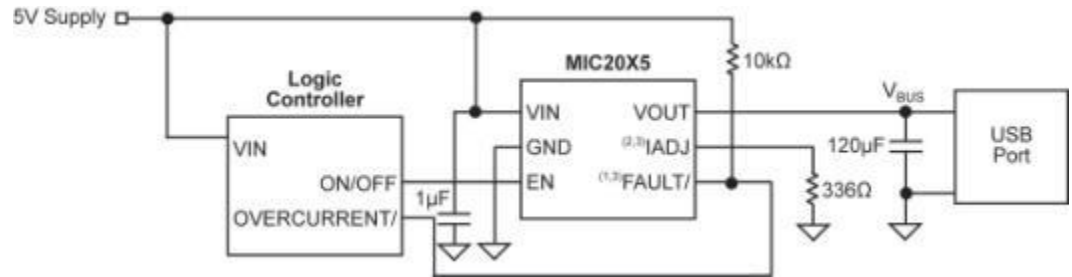


# MIC2003/4/5 MIC2013/4/5

Fixed Current Limiting Power Distribution Switches

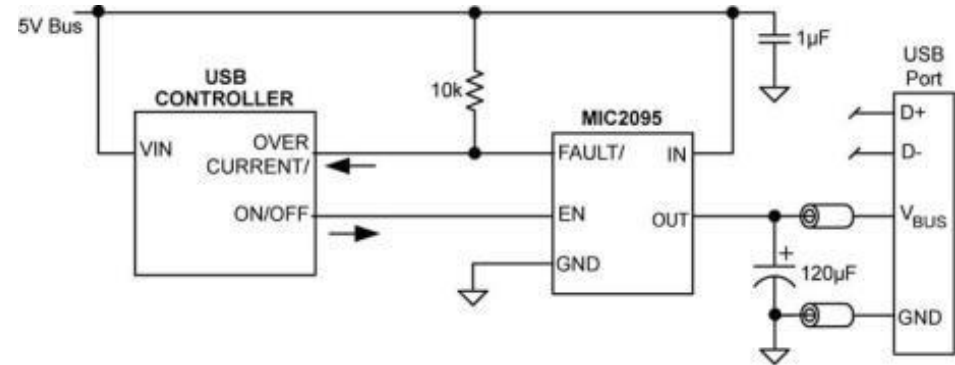
## Features:

- 70mΩ typical on-resistance @ 5V
- Enable active high or active low
- 2.5V-5.5V operating range
- Undervoltage lock-out (UVLO)
- Pre-set current limit values of 0.5A, -  
- 0.8A, and 1.2A\*
- Variable UVLO allows adjustable –  
- UVLO thresholds\*
- Automatic load discharge for capacitive loads\*
- Soft-start prevents large current inrush
- Adjustable slew rate allows custom slew rates\*
- Automatic-on output after fault
- Thermal protection



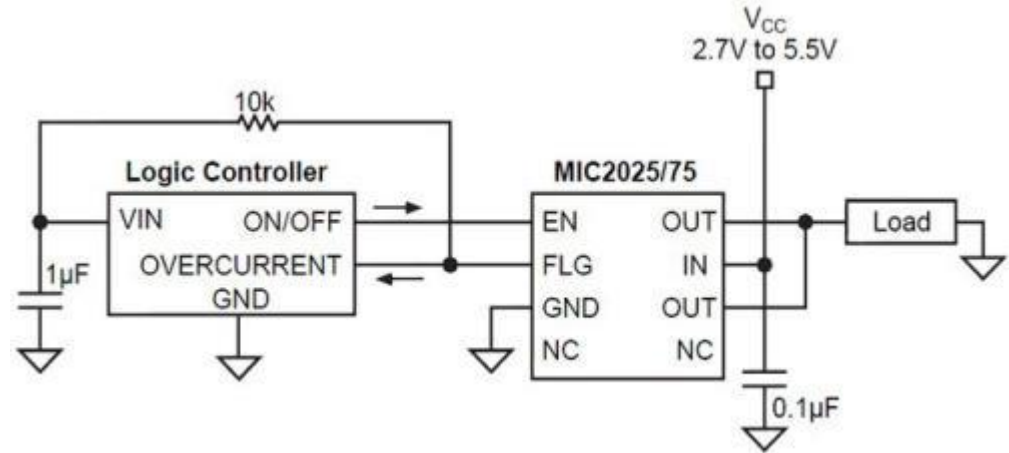
## Features:

- Under voltage lock-out (UVLO)
- Automatic-on output after fault
- Thermal protection
- Soft start prevents large current inrush
- Enable active high or active low
- 170m $\Omega$  typical on-resistance @ 5V
- 2.5V - 5.5V operating range
- MIC2095: 0.5A fixed current limit
- MIC2098: 0.9A fixed current limit
- MIC2097: Kickstart for high peak –  
- current loads
- MIC2097/99: Resistor programmable –  
- current limit - 0.1A to 1.1A



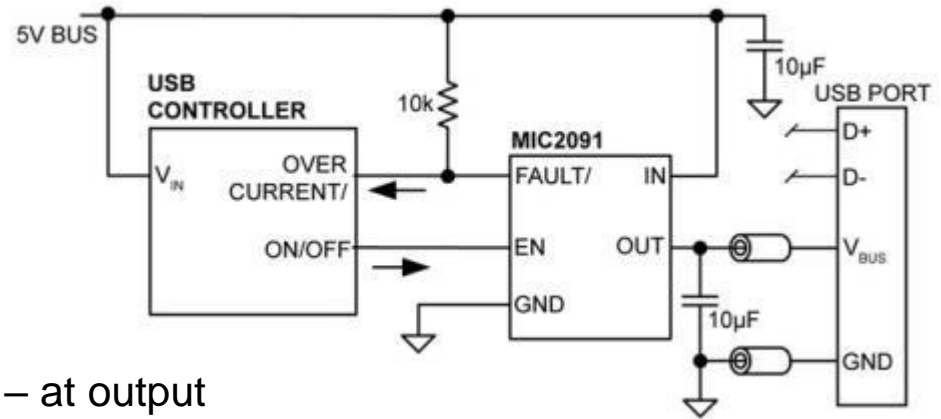
## Features:

- 140mΩ maximum on-resistance
- 2.7V to 5.5V operating range
- Undervoltage lockout
- Logic-compatible input
- Soft-start circuit
- Low quiescent current
- Reverse current flow blocking (no –  
- "body diode")
- Circuit breaker mode (MIC2075) –  
- reduces power consumption
- 500mA minimum continuous output current
- Short-circuit protection with thermal shutdown
- Fault status flag with 3ms filter eliminates false assertions
- Pin-compatible with MIC2525



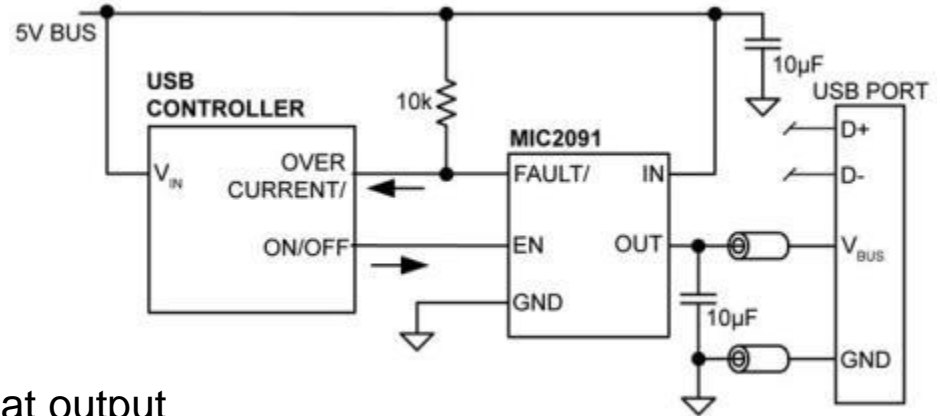
## Features:

- 1.8V to 5.5V supply voltage
- 790 mΩ typical RDSON at 3.3V
- 100mA minimum continuous current
- Reverse current blocking (OGI)
- Thermal shutdown
- Under-voltage lockout (UVLO)
- Low quiescent current
- 20ns super fast reaction time to hard short – at output
- 10ms fault flag delay (tD\_FAULT/) eliminates false assertions
- Auto-retry overcurrent and short-circuit protection (-1 version)
- Latch-off on current limit (-2 version)
- Fault status flag indicates: over-current, over-temperature, or UVLO



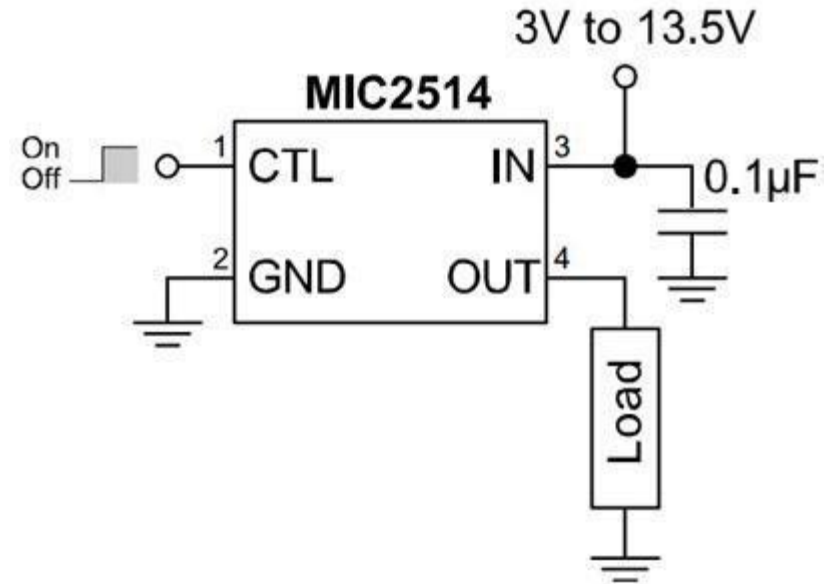
## Features:

- 1.8V to 5.5V supply voltage
- 790 m $\Omega$  typical RDSON at 3.3V
- 50mA minimum continuous current
- Reverse current blocking (OGI)
- Under-voltage lockout (UVLO)
- Low quiescent current
- Thermal shutdown
- 20ns super fast reaction time to hard short at output
- 10ms fault flag delay (tD\_FAULT/) eliminates false assertions
- Auto-retry overcurrent and short-circuit protection (-1 version)
- Latch-off on current limit (-2 version)
- Fault status flag indicates: over-current, over-temperature, or UVLO



## Features:

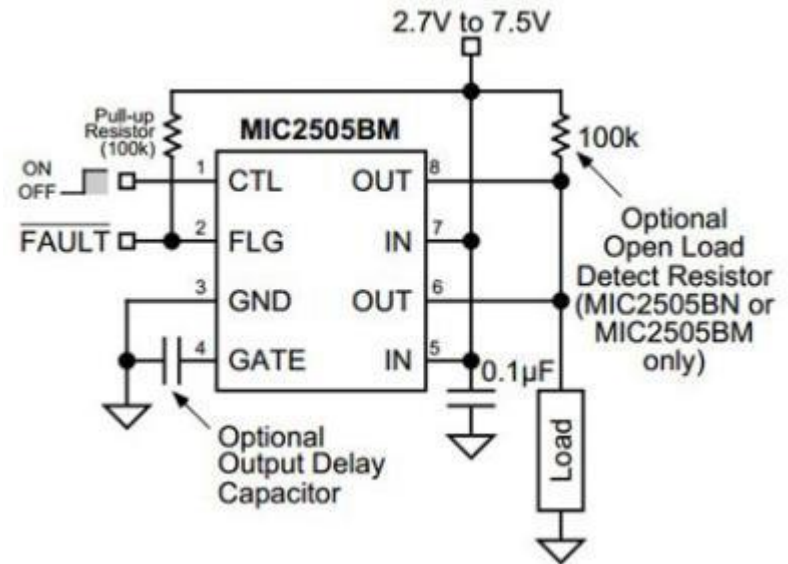
- MOSFET on-resistance
  - 1.5Ω typical at 5V
  - 0.95Ω typical at 12V
- 3V to 13.5V input
- 25μA typical on-state supply current at 5V
- <1μA typical off-state supply current at 5V
- Current limit
- Thermal shutdown
- Slow turn-on





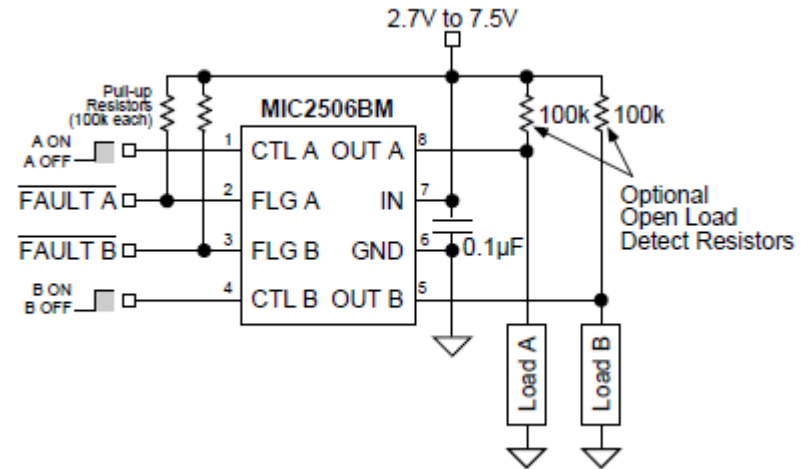
## Features:

- Low MOSFET on resistance to 2.7V
  - 30mΩ typical at 5V (MIC2505-series)
  - 35mΩ typical at 3.3V (MIC2505-series)
- 2.7V to 7.5V input
- 110μA typical on-state supply current
- 1μA typical off-state supply current
- Output can be forced higher than input (off-state)
- Current limit
- Thermal shutdown
- 2.5V undervoltage lockout (UVLO)
- Open-load detection (MIC2505 only)
- Open-drain fault flag
- 5ms (slow) turn-on and fast turnoff
- Logic-level control/enable input



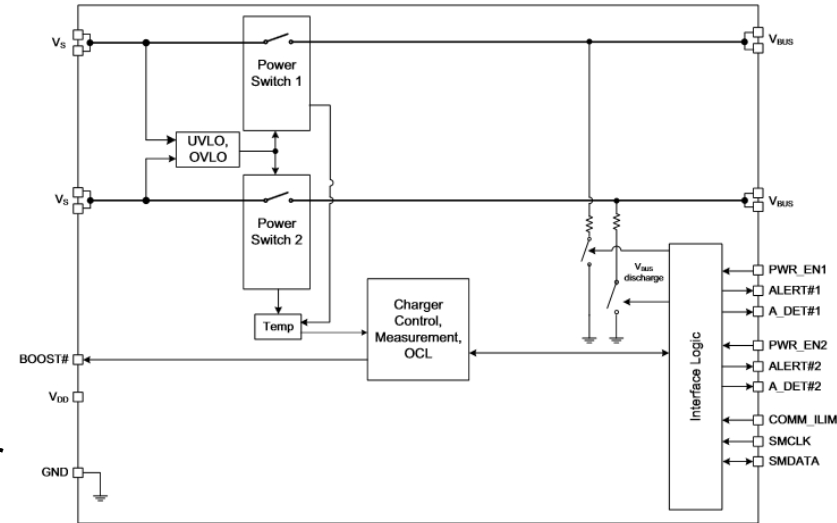
## Features:

- Low MOSFET on resistance to 2.7V
  - 75m $\Omega$  typical at 5V (each MIC2506 output)
  - 80m $\Omega$  typical at 3.3V (each MIC2506 output)
- 2.7V to 7.5V input
- 110 $\mu$ A typical on-state supply current
- 1 $\mu$ A typical off-state supply current
- Output can be forced higher than input (off-state)
- Current limit
- Thermal shutdown
- 2.5V undervoltage lockout (UVLO)
- Open-load detection (MIC2506 only)
- Open-drain fault flag
- 5ms (slow) turn-on and fast turnoff
- Logic-level control/enable input



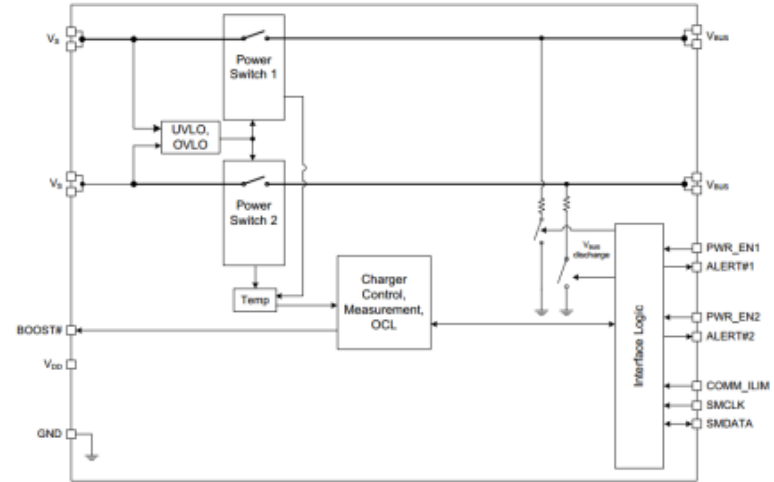
## Features:

- Dual-Port Power Switches:
- 3.0A continuous current per VBUS port
- Independent port power switch enable pins
- Dual fault ALERT# active drain output pins
- Constant Current or Trip mode current limiting
- Undervoltage, overvoltage lockout, back-drive, -  
- back-voltage protection
- Auto-recovery fault handling with low test current
- BOOST# logic output to increase DC-DC converter  
– output under large load conditions
- A\_DET# open-drain outputs for device detection
- SMBus 2.0/I<sup>2</sup>C™ Mode Features:
  - Eight programmable current limits
  - Block read and block write
- 4x4 mm 20-pin QFN
- Self-contained current monitoring
- Fully programmable per-port charge rationing and behaviors
- Per-port BC1.2 VBUS Discharge Function
- Operating Temperature Range: -40°C to +105°C
- Recommended for Automotive Design



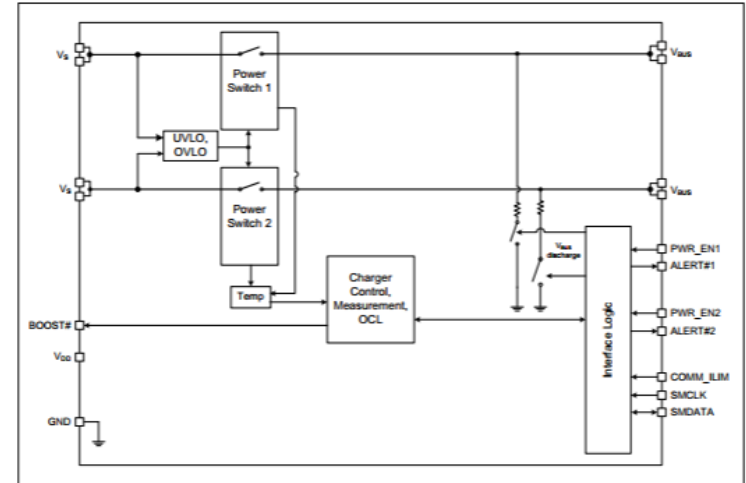
## Features:

- Dual-Port Power Switches:
  - 2.9V to 5.5V source voltage range
  - 3.0A continuous current per VBUS port
  - Independent port power switch enable pins
  - Dual fault ALERT# active drain output pins
  - Constant Current or Trip mode current limiting – behaviors
  - Undervoltage and overvoltage lockout
  - Back-drive, back-voltage protection
  - Auto-recovery fault handling with low test current
  - BOOST# logic output to increase DC-DC – converter output under large load conditions
- SMBus 2.0/I2C™ Mode Features:
  - Eight programmable current limits
  - Block read and block write Block read and block write
- Self-Contained Current Monitoring )
- Fully Programmable Per-Port Charge Rationing
- Configurable Per-Port BC1.2 VBUS Discharge Function
- Operating Temperature Range: -40°C to +105°C
- 4x4 mm 20-pin QFN



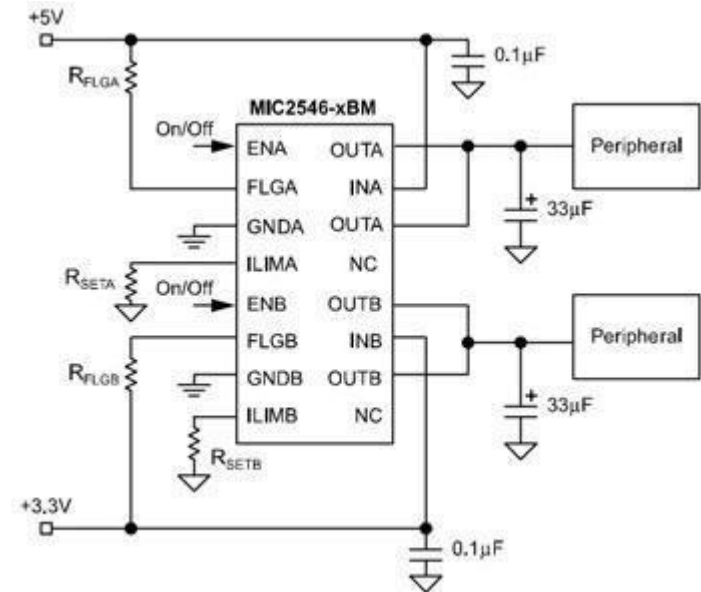
## Features:

- Dual-Port Power Switches:
  - 2.9V to 5.5V source voltage range
  - 18mΩ On resistance per switch
  - 3.0A continuous current per VBUS port
  - Independent port power switch enable pins
  - Dual fault ALERT# active drain output pins
  - Constant Current or Trip mode current limiting
  - Undervoltage and overvoltage lockout
  - Back-drive, back-voltage protection
  - Auto-recovery fault handling with low test current
  - BOOST# logic output to increase DC-DC converter output under large load conditions
- SMBus 2.0/I2C™ Mode Features:
  - Eight programmable current limits
  - Block read and block write Block read and block write
- Self-Contained Current Monitoring
- Fully Programmable Per-Port Charge Rationing
- Configurable Per-Port BC1.2 VBUS Discharge Function
- Operating Temperature Range: -40°C to +105°C
- 3x3 mm 20-pin QFN



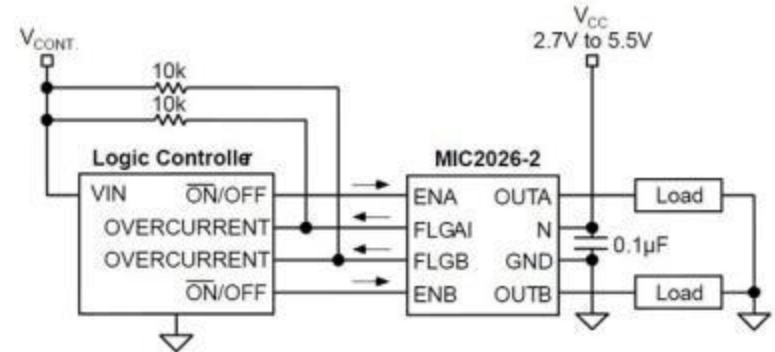
## Features:

- 2.7V to 5.5V input
- Adjustable current-limit up to 1.5A
- Reverse current flow blocking (no "body diode")
- 100 $\mu$ A typical on-state supply current per channel
- 2 $\mu$ A typical off-state supply current
- 120m $\Omega$  maximum on-resistance
- Open-drain fault flag
- Thermal shutdown
- Thermal shutdown output latch (MIC2547)
- 2ms (slow) turn-on and fast turn-off
- Available with active-high or active-low enable



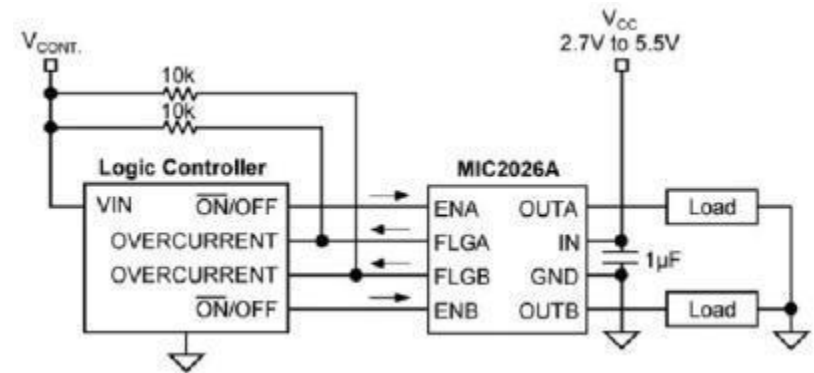
## Features:

- 140m $\Omega$  maximum on-resistance per channel
- 2.7V to 5.5V operating range
- 500mA minimum continuous current per channel
- Shortcircuit protection with thermal shutdown
- Thermally isolated channels
- Fault status flag with 3ms filter eliminates false –  
- assertions
- Undervoltage lockout
- Reverse current flow blocking (no "body diode")
- Circuit breaker mode (MIC2076)
- Logic-compatible inputs
- Soft-start circuit
- Low quiescent current
- Pin compatible with MIC2526



## Features:

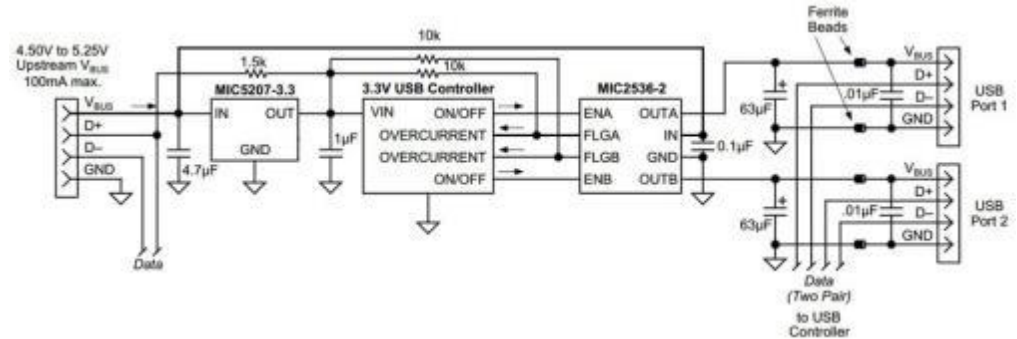
- 100mΩ typical RDS(ON) at 5.0V
- 140mΩ maximum RDS(ON) at 5.0V
- 2.7 V to 5.5 V operating range
- 500mA minimum continuous current per channel
- Short circuit protection with thermal shutdown
- Thermally isolated channels
- Soft-start circuit
- Fault status flag with 3ms filter eliminates false –  
- assertions
- UVLO (Undervoltage lockout)
- Reverse current flow blocking (no "body diode")
- Circuit breaker mode (MIC2076A)
- Pin compatible with the MIC2026/2076
- Logic-compatible inputs
- Low quiescent current





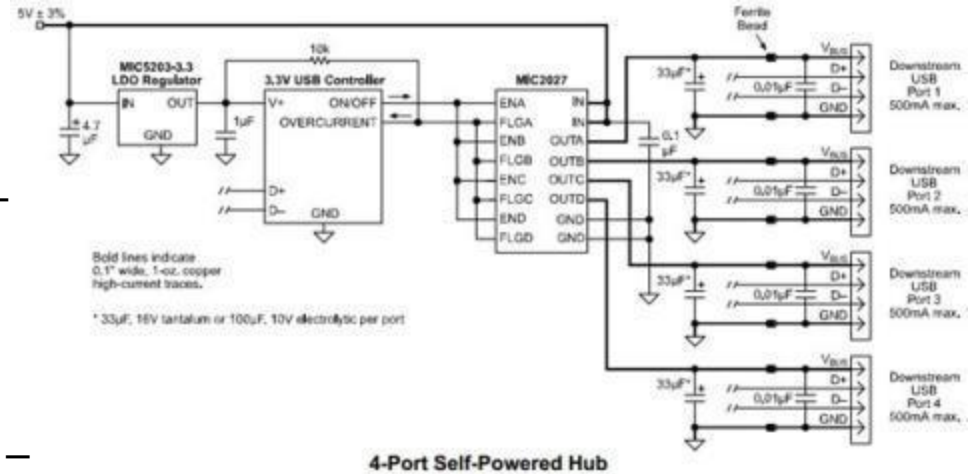
## Features:

- Compliant to USB specifications
- 2.7V to 5.5V operating range
- Soft-start circuit
- 100 $\mu$ A maximum on-state supply –  
- current
- <1 $\mu$ A typical off-state supply current
- Fast-acting short circuit protection with –  
- thermal shutdown
- Integrated filter eliminates false overcurrent flag assertions
- 150mA minimum continuous load current per channel
- 400m $\Omega$  typical on-resistance
- Individual open-drain fault flag pins with transient filter
- Active-high (-1) and active-low (-2) versions
- Reverse-current blocking in off mode (no "body diode")



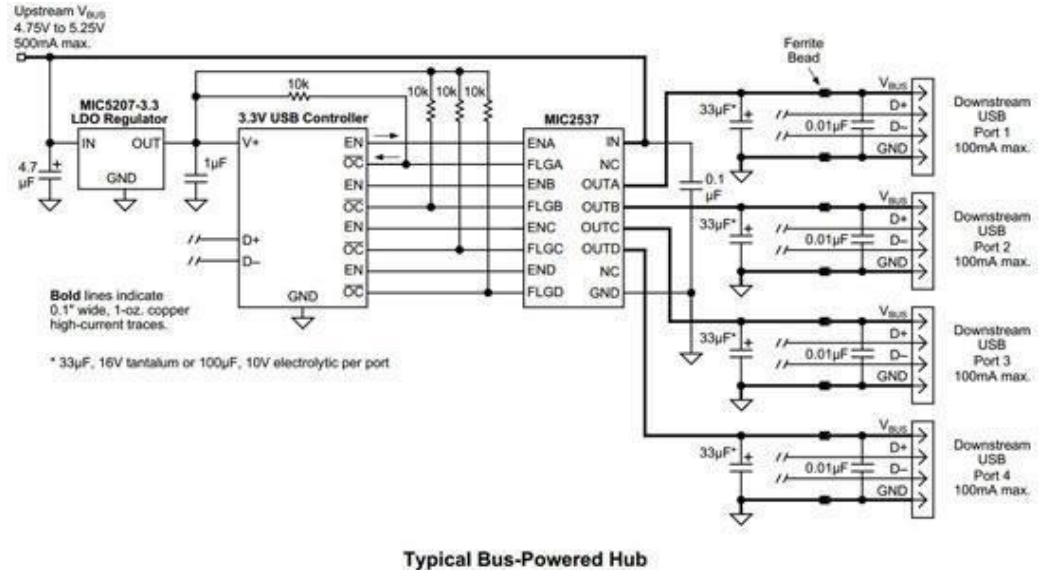
## Features:

- 150mΩ maximum on-resistance per –  
- channel
- 2.7V to 5.5V operating range
- 500mA minimum continuous current per –  
- channel
- Short-circuit protection with thermal –  
- shutdown
- Thermally isolated channels
- Fault status flag with 3ms filter eliminates –  
- false assertions
- Undervoltage lockout
- Reverse current flow blocking (no "body diode")
- Circuit breaker mode (MIC2077) reduces –  
- power consumption
- Logic-compatible inputs
- Soft-start circuit
- Low quiescent current
- Pin compatible with MIC2524 and MIC2527



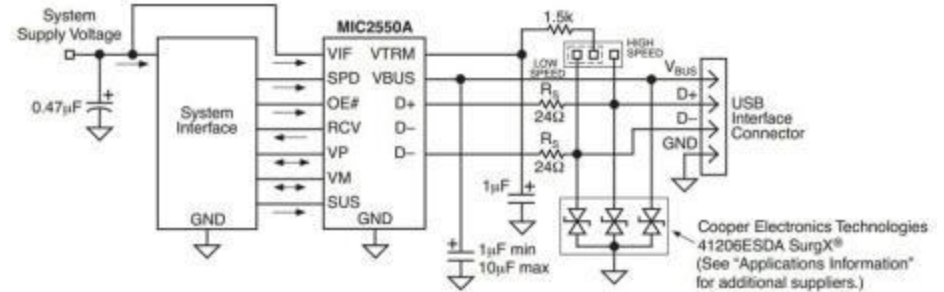
### Features:

- Compliant to USB specifications
- 3V to 5.5V input
- 100mA min continuous load per port
- 425mΩ typical on-resistance
- < 400mA current limit
- Individual open-drain fault flag leads
- 3V/5V-compatible enable inputs
- Active-high (-1) and active-low (-2) – - versions
- 100μA max. on-state supply current
- <1μA typical off-state supply current
- 16-lead SOP package
- Operating Temperature Range: -40°C to +85°C



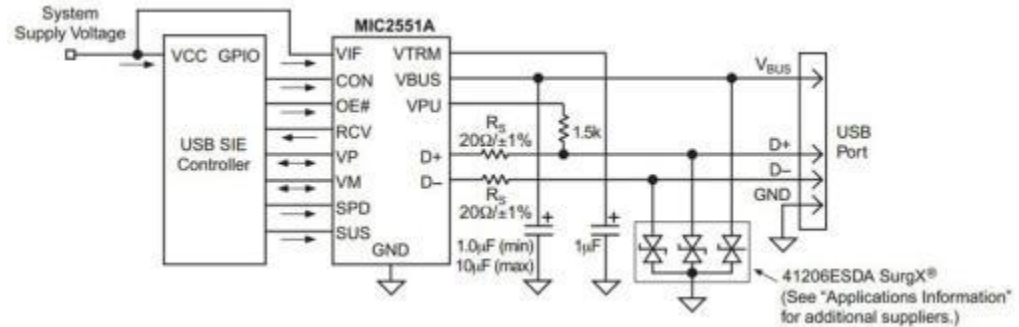
## Features:

- Compliant to USB Specification Rev. 2.0
  - Low-speed (1.5Mbps)
  - Full-speed (12Mbps) operation
- Compliant to IEC-61000-4.2 (Level 2)
- Operation down to 2.5V
- Dual supply voltage operation
- Integrated speed-select termination supply
- Meets USB suspend current requirements
- 14-pin TSSOP and 16-pin QFN packages



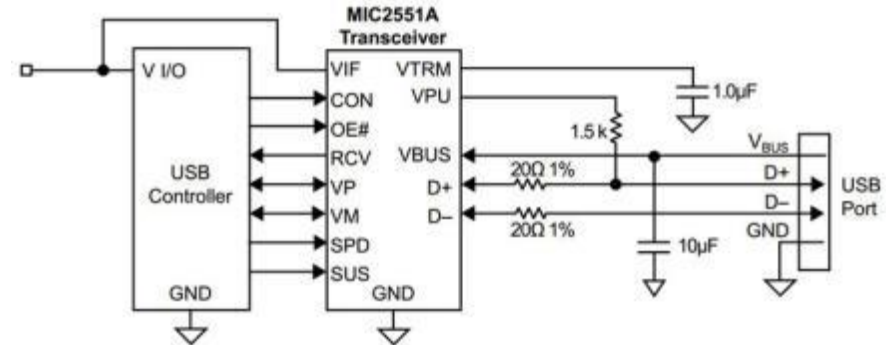
## Features:

- Compliant to USB Specification –
  - Revision 2.0 for full speed (12Mbps) –
  - and low speed (1.5Mbps) operation
- Compliant to IEC-61000-4.2 (Level 3)
- Separate I/O supply with operation –
  - down to 1.6V
- Integrated speed select termination –
  - supply
- Very-low power consumption to meet USB suspend
  - current requirements
- Small TSSOP and QFN packages
- No power supply sequencing requirements
- Software controlled re-enumeration



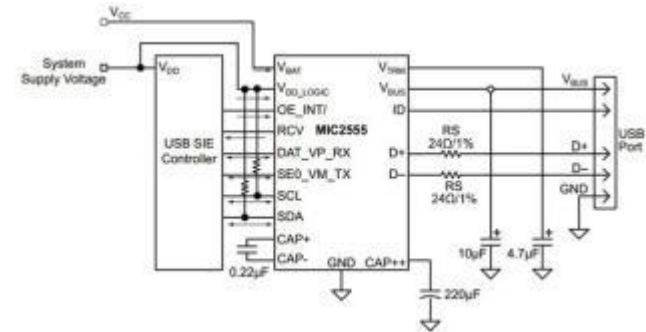
## Features:

- $\pm 15\text{kV}$  ESD protection on VBUS, D+ and D-
- Smaller 2.5mm x 2.5mm QFN package
- USB 1.1 and 2.0 compliant transceiver (full –  
- speed -12Mbps and low speed - 1.5Mbps) –  
- operation
- Separate I/O supply with operation down to –  
- 1.6V
- Integrated speed select termination supply
- Very-low power consumption to meet USB –  
- suspend current requirements
- No power supply sequencing requirements
- Software controlled enumeration



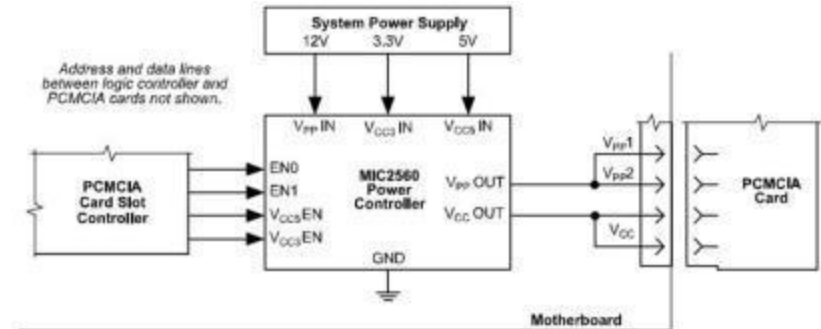
## Features:

- Complies with USB-IF USB standard 2.0 and OTG –  
- supplement Revision 1.0a.
- Provides signaling and control logic for SRP and HNP, -  
- enabling USB Dual-role device operation.
- Designed for Full-speed and Low-speed USB –  
- communications.
- I<sup>2</sup>C controller interface.
- Offers 3 modes of operation: USB; UART; Audio
- Operates with VLOGIC of 1.6V - 4.5V, assuring compatibility with  
- low voltage ASICs.
- Tri-level ID detection for recognition of USB and non-USB devices.
- Supports USB/Car Kit audio interface.
- Allows Single-ended and Differential Logic I/O.
- Integrated charge pump for VBUS supply.
- On-chip pull-up, pull-down resistors minimize external component –  
- count.
- Suspend and Power-down modes for power conservation.
- Operates over the full Industrial Temperature range: -40°C to –  
- +85°C



## Features:

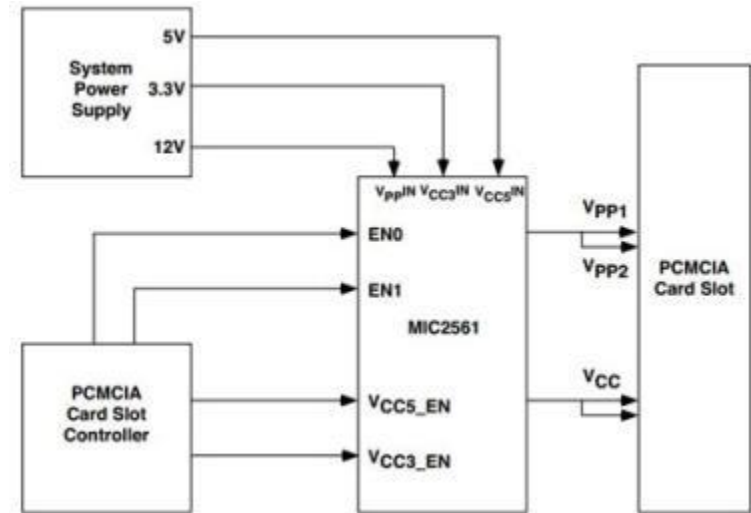
- Complete PCMCIA VCC and VPP switch matrix
- No external components required
- Logic compatible with industry standard –
  - PCMCIA controllers
- No voltage overshoot or switching transients
- Break-before-make switching
- Output current limit and overtemperature –
  - shutdown
- Digital flag for error condition indication
- Ultra-low power consumption
- Digital selection of VCC and VPP voltages
- Over 1A VCC output current
- 200mA VPP (12V) output current
- Options for direct compatibility with industry –
  - standard PCMCIA controllers
- 16-Pin SOIC package





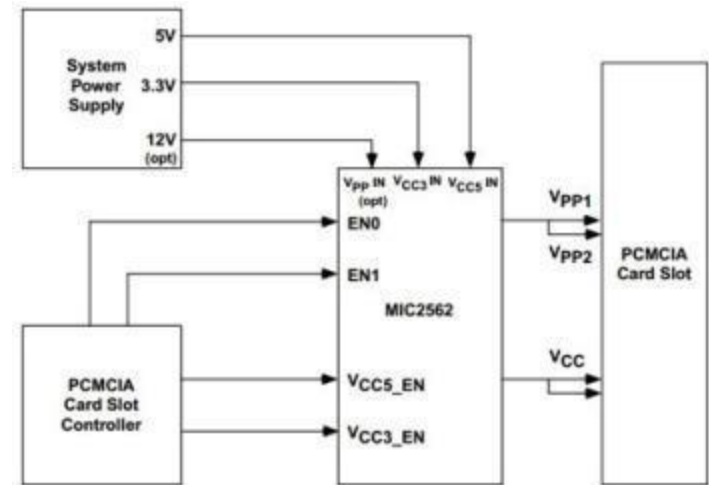
## Features:

- Complete PCMCIA VCC and VPP Switch Matrix in – a Single IC
- No External Components Required
- Controlled Switching Times
- Logic Options for Compatible with Industry –
  - Standard PCMCIA Controllers
- No Voltage Overshoot or Switching Transients
- Break-Before-Make Switching
- Output Current Limit and Over-Temperature –
  - Shutdown
- Digital Flag for Error Condition Indication
- Ultra Low Power Consumption
- Digital Selection of VCC and VPP Voltages
- Over 750mA of VCC Output Current
- 200mA of VPP Output Current
- 14-Pin SOIC Package



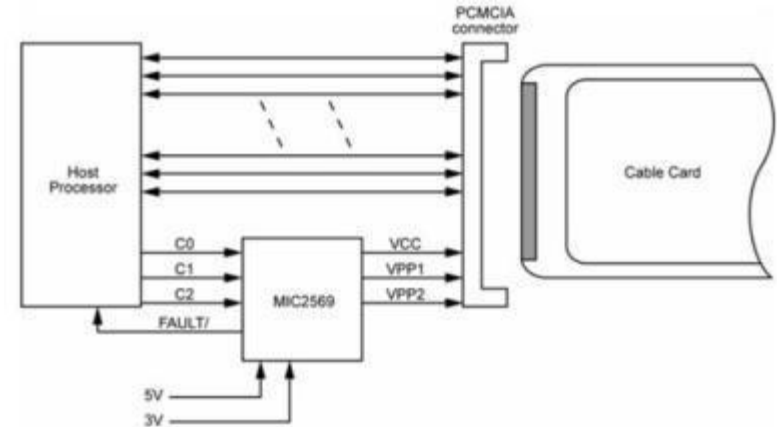
## Features:

- High-efficiency, low-resistance switches require no –  
- 12V bias supply
- No external components required
- Output current limit and overtemperature shutdown
- Open-drain flag for error condition indication
- Ultra-low power consumption
- Complete PC Card/CardBus VCC and VPP switch –  
- matrix in a single package
- Logic compatible with industry standard PC Card –  
- logic controllers
- No voltage shoot-through or switching transients
- Break-before-make switching
- Digital selection of VCC and VPP voltages
- Over 1A VCC output current
- Over 200mA VPP output current
- Pb-free SOIC packages



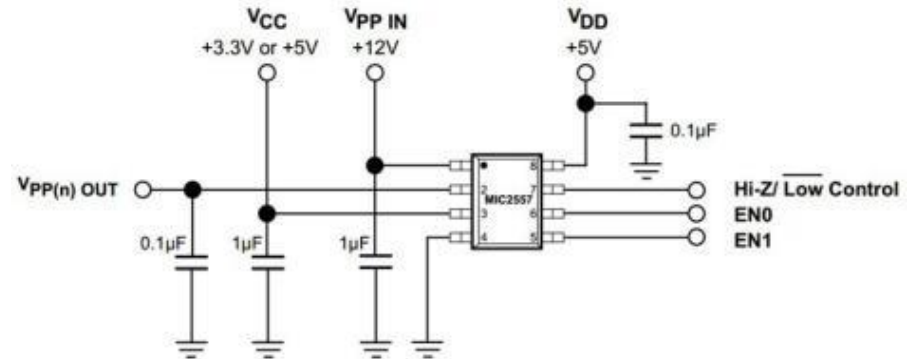
## Features:

- 110 mΩ maximum  $V_{CC}$  on resistance
- 400 mΩ maximum  $V_{PP}$  on resistance
- 3.0V to 3.6V for the 3.3V<sub>IN</sub> operating range
- 3.0V to 5.5V for the 5V<sub>IN</sub> operating range
- 1.3A minimum  $V_{CC}$  current limit
- 150mA minimum  $V_{PP}$  current limit –  
- (150mA each)
- Compact 16-pin QSOP packaging
- Operating temperatures from -40°C to –  
- +85°C Low quiescent current
- Soft start turn-on
- Break-before-make voltage switching
- Short-circuit protection with thermal shutdown
- Input under voltage lock-out (UVLO)
- ESD protection
- No external components required



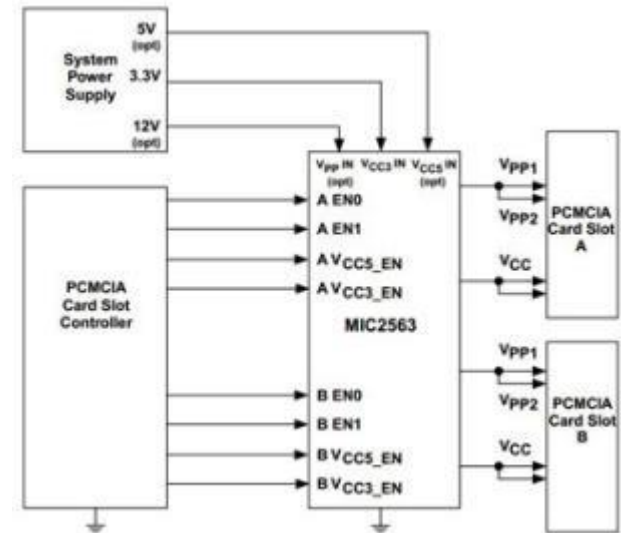
## Features:

- Complete PCMCIA VPP Switch Matrix in –
  - a Single IC
- No External Components Required
- Digital Selection of 0V, VCC, VPP, or High –
  - Impedance Output
- No VPP OUT Overshoot or Switching –
  - Transients
- Break-Before-Make Switching
- Low Power Consumption
- 120mA VPP (12V) Output Current
- Optional Active Source Clamp for Zero Volt Condition
- 3.3V or 5V Supply Operation
- 8-Pin SOIC Package



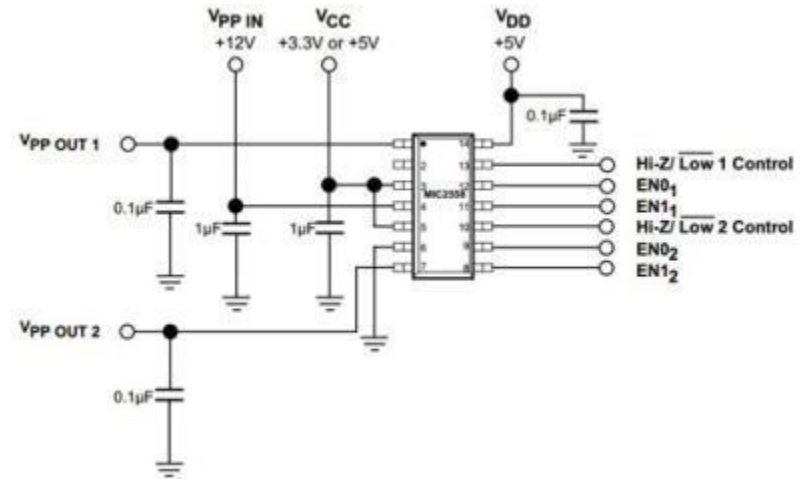
## Features:

- Single package controls two PC Card slots
- High-efficiency, low-resistance switches require no 12V – bias supply
- No external components required
- Output current limit and overtemperature shutdown
- Ultra-low power consumption
- Complete dual-slot PC Card/CardBus VCC and VPP – switch matrix in a single package
- Logic compatible with industry standard PC Card logic – controllers
- No voltage shoot-through or switching transients
- Break-before-make switching
- Digital selection of VCC and VPP voltages
- Over 1A VCC output current for each section
- Over 250mA VPP output current for each section
- Lead-free 28-pin SSOP package



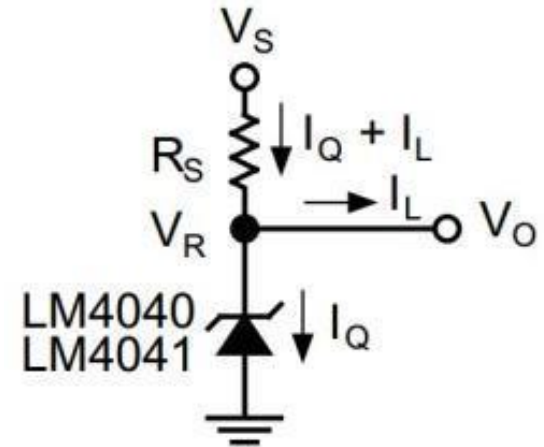
## Features:

- Complete PCMCIA VPP Switch Matrix in a –  
- Single IC
- Dual Matrix allows independent VPP1 and VPP2
- Digital Selection of 0V, VCC, VPP, or High –  
- Impedance Output
- No VPPOUT Overshoot or Switching Transients
- Break-Before-Make Switching
- Ultra Low Power Consumption
- 120mA VPP (12V) Output Current
- Optional Active Source Clamp for Zero Volt –  
- Condition
- 3.3V or 5V Supply Operation
- 14-Pin SOIC Package



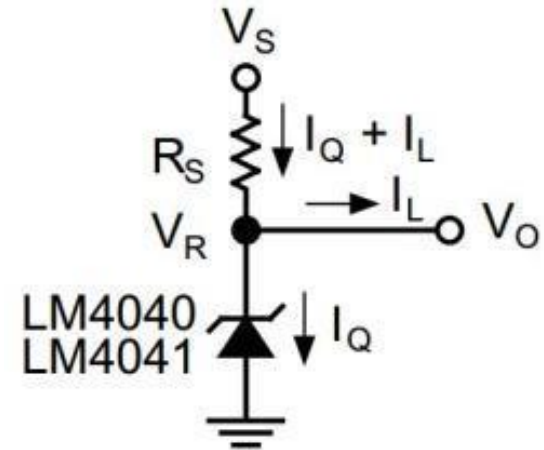
## Features:

- Initial Accuracy: 0.5%
- Small SOT-23 package
- No output capacitor required
- Tolerates capacitive loads
- Fixed reverse breakdown voltages of 2.5V, 4.096V –  
- and 5.0V (LM4040)
- 1.225V or Adjustable reverse breakdown versions –  
- (LM4041)



## Features:

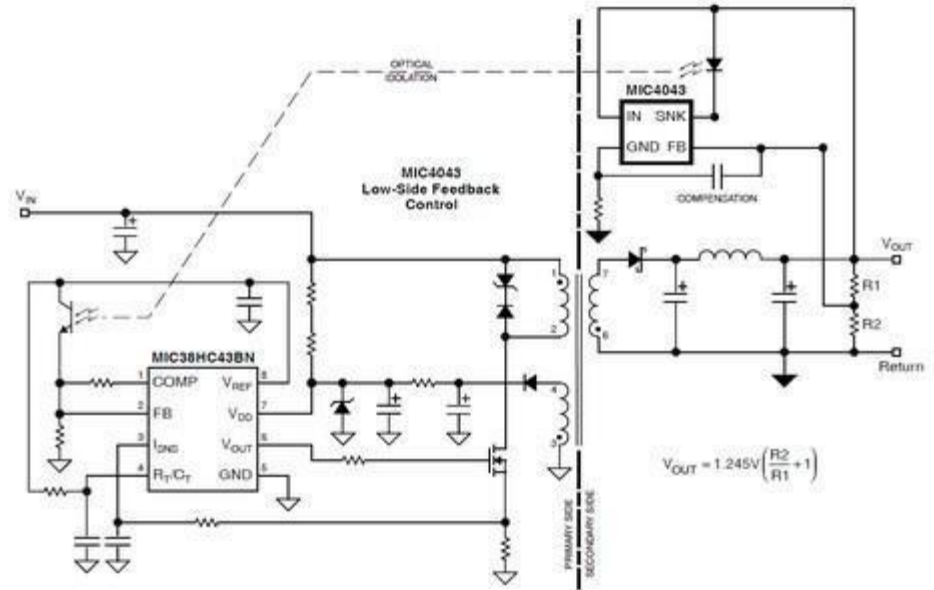
- Initial Accuracy: 1%
- Small SOT-23 package
- No output capacitor required
- Tolerates capacitive loads
- Fixed reverse breakdown voltages of 2.5V, 4.096V – and 5.0V (LM4040)
- 1.225V or Adjustable reverse breakdown versions – (LM4041)





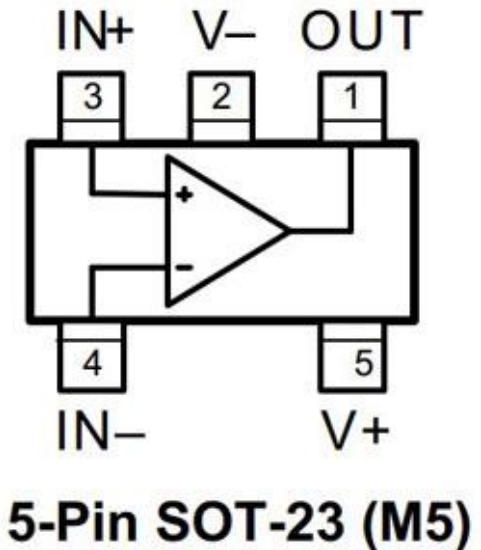
## Features:

- Ideal for 1.8V switching converters
- Low-voltage operation: 400mV –
  - maximum saturation over operating –
  - temperature range
- Easy to use: voltage in, current out
- 2% voltage tolerance over operating –
  - temperature range



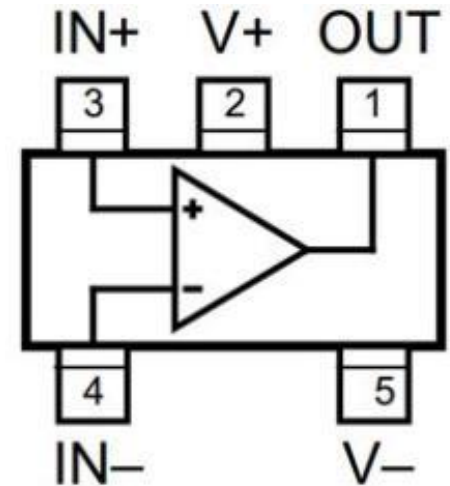
## Features:

- 2V to 36V supply
- 300 $\mu$ A supply current independent of supply
- 25nA input bias current
- $\pm$ 5nA input offset current
- $\pm$ 3mV input offset voltage
- Input common-mode voltage range includes ground
- 250mV at 4mA output saturation voltage
- Differential input voltage range equal to the power –  
- supply voltage
- Output compatible with TTL, DTL, ECL, MOS, and –  
- CMOS logic



## Features:

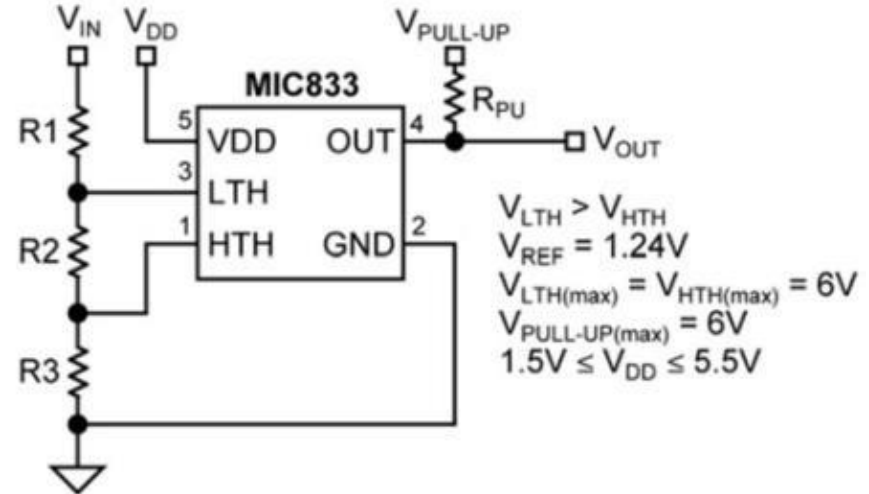
- Small footprint SOT-23-5 package
- Guaranteed performance at 2.2V, 2.7V, -5V, and 10V
- 7 $\mu$ A typical supply current at 5V
- <5 $\mu$ s response time at 5V
- Push-pull output (MIC7211)
- Open-drain output (MIC7221)
- Input voltage range may exceed supply - voltage by 0.3V
- >100mA typical sink or source



**SOT-23-5 (M5)**

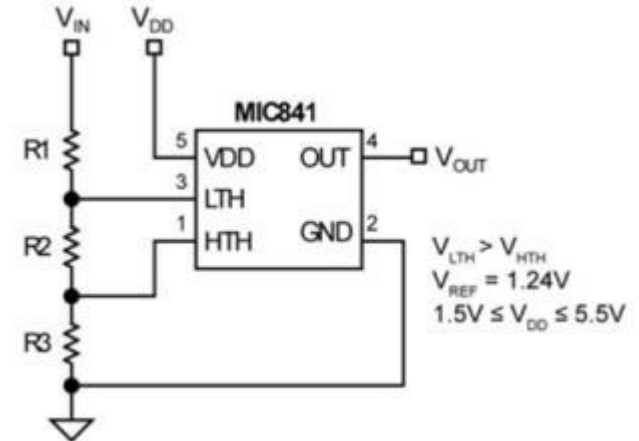
## Features:

- Optimized for PDAs, cellular telephones, -  
- pagers, and other battery-powered devices
- Inputs and output can pull up to 6V -  
- regardless of supply voltage
- Independently adjustable high- and low -  
- voltage thresholds
- High  $\pm 1.5\%$  voltage threshold accuracy
- Extremely low  $1\mu\text{A}$  typical supply current
- Immune to brief input transients
- 5-lead SOT-23 package



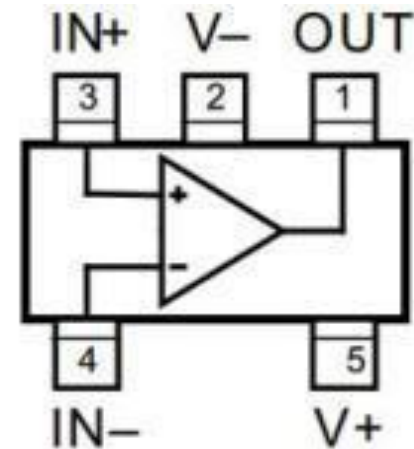
## Features:

- 1.5V to 5.5V operating range
- 1.5 $\mu$ A typical supply current
- $\pm$ 1.25% voltage threshold accuracy
- 10nA maximum input leakage current over temperature
- Externally adjustable hysteresis (MIC841)
- Internal 20mV hysteresis (MIC842)
- Output options:
  - Push-pull, active high
  - Push-pull, active low
  - Open drain, active low
- Immune to brief input transients
- Teeny™ 5-pin SC-70 package
- 6-pin 1.6mm x 1.6mm TDFN (MIC841)
- 4-pin 1.2mm x 1.6mm TDFN (MIC842)



## Features:

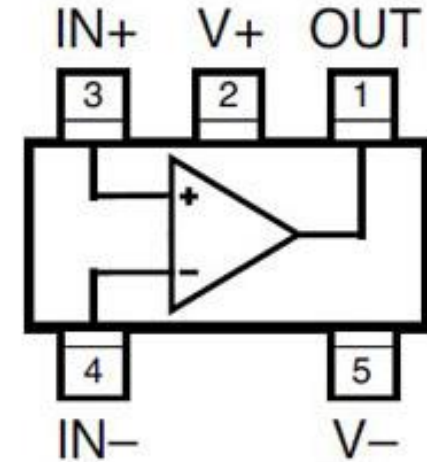
- 4V to 32V operation
- Small footprint package
- Unity gain stable
- 2.5 MHz unity gain bandwidth
- 6V/ $\mu$ s typical slew rate
- Short circuit protected



**SOT-23-5 (M5)**

## Features:

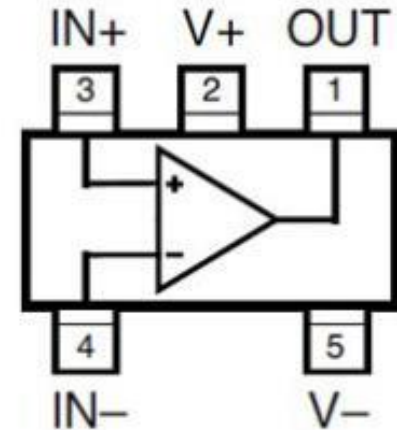
- Small footprint SOT-23-5 package
- Guaranteed 2.7V, 3V, 5V, and 12V performance
- 500kHz gain-bandwidth
- 0.01% total harmonic distortion at 10kHz (5V, 2k $\Omega$ )
- 0.5mA typical supply current at 5V



**SOT-23-5 (M5)**

## Features:

- Output swing to within 1mV of rails with 1.8V supply and -100k $\Omega$  load
- Small footprint SOT-23-5 package
- Guaranteed performance at 1.8V, 2.7V, 5V, and 10V
- 15 $\mu$ A typical supply current at 1.8V
- 25kHz gain-bandwidth at 5V
- Suitable for driving capacitive loads

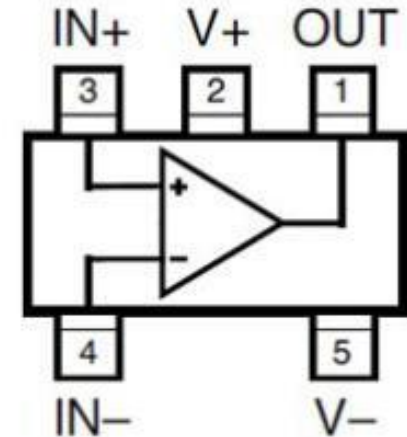


**SOT-23-5 (M5)**



## Features:

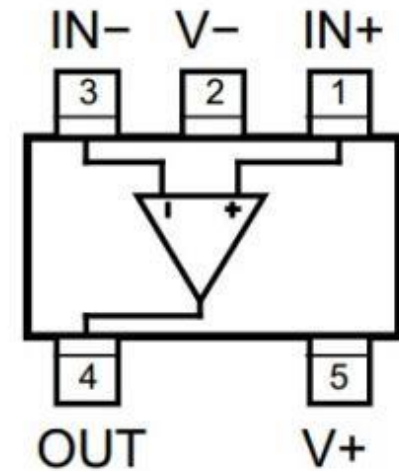
- Output swing to within 1mV of rails with 1.8V supply and –  
– 100k $\Omega$  load
- Small footprint SOT-23-5 package
- Guaranteed performance at 1.8V, 2.7V, 5V, and 10V
- 15 $\mu$ A typical supply current at 1.8V
- 25kHz gain-bandwidth at 5V
- Suitable for driving capacitive loads



**SOT-23-5 (M5)**

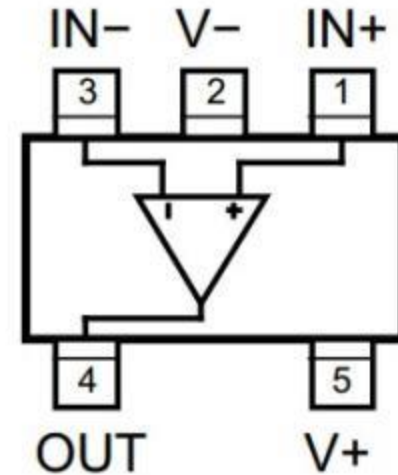
## Features:

- Teeny™ SC70 packaging
- 4MHz gain-bandwidth product
- 30 $\mu$ A supply current
- Rail-to-rail output
- Ground sensing at input common mode to GND
- Common mode to GND
- Drive large capacitive loads



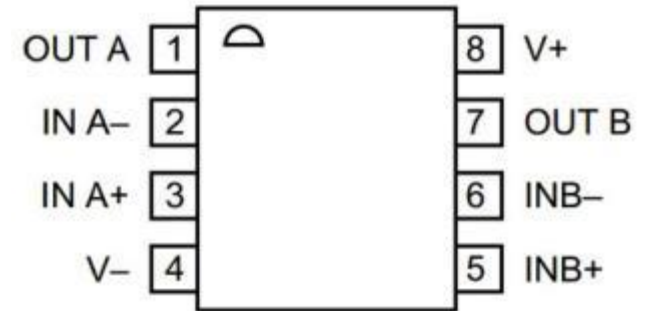
## Features:

- Teeny™ SC70 packaging
- 400kHz gain-bandwidth product
- 650kHz, -3dB bandwidth
- 4.6 $\mu$ A supply current
- Rail-to-Rail output
- Ground sensing at input (common mode to GND)
- Drives large capacitive loads (1000pF)
- Unity gain stable



## Features:

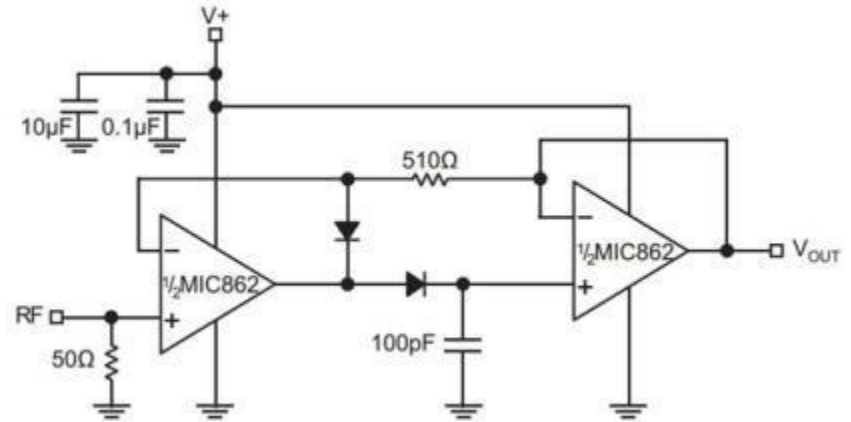
- Small footprint MSOP-8 package
- 350 $\mu$ A supply current per op amp at 2.2V supply
- Guaranteed 2.2V, 5V, and 15V performance
- 750kHz gain-bandwidth product at 2.2V supply
- 0.01% total harmonic distortion at 1kHz (15V, 2k $\Omega$ )
- Drives 200pF at 5V and greater supply voltages



MSOP-8 (MM)

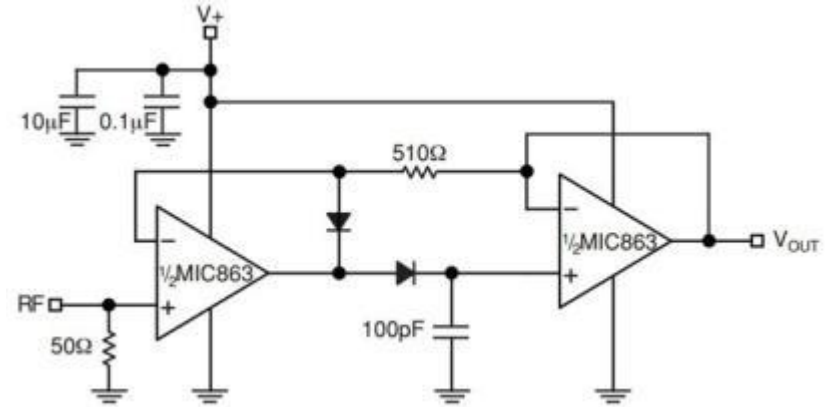
## Features:

- SOT23-8 packaging
- 3MHz gain-bandwidth product
- 5MHz, -3dB bandwidth
- 31 $\mu$ A supply current
- Rail-to-rail output
- Ground sensing at input (common mode – to GND)
- Drive large capacitive loads
- Unity gain stable



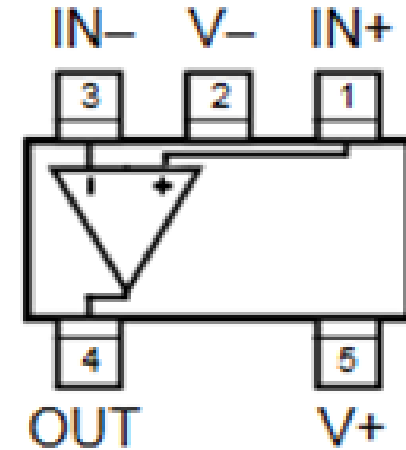
## Features:

- SOT23-8 packaging
- 450kHz gain-bandwidth product
- 800kHz, -3dB bandwidth
- 4.2 $\mu$ A supply current/channel
- Rail-to-rail output
- Ground sensing at input (common mode to GND)
- Drives large capacitive loads (0.02 $\mu$ F)
- Unity gain stable



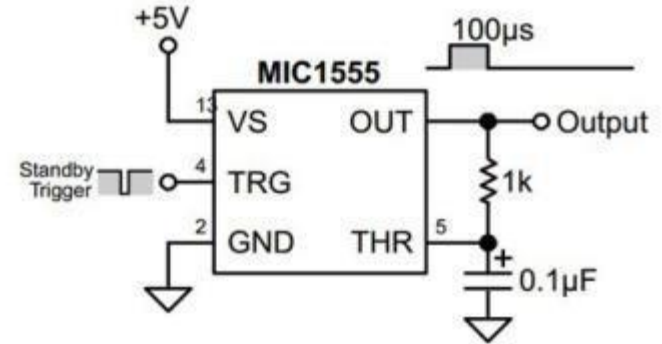
## Features:

- Gain Bandwidth Product: 80 MHz (typical)
- Supply Current: 550  $\mu$ A (typical)
- Input Offset Voltage (max):  $\pm 5$  mV
- Supply Voltage:  $\pm 2.5$ V to  $\pm 9$ V
- Phase Margin: 32° (typ.)
- Short Circuit Current: 63 mA (typical)
- Noise: 11 nV/ $\sqrt{\text{Hz}}$  (typical, at 10 kHz)
- Slew Rate: 3000 V/ $\mu$ s (typical)
- Industrial Temperature Range: -40°C to +85°C
- Packages: SC-70



## Features:

- +2.7V to +18V operation
- Low current
- <math>1\mu\text{A}</math> typical shutdown mode (MIC1557)
- 200 $\mu\text{A}$  typical (TRG and THR low) at 3V supply
- Timing from microseconds to hours
- "Zero" leakage trigger and threshold inputs
- 50% square wave with one Resistor, one Capacitor
- Threshold input precedence over trigger input
- <math>15\Omega</math> output on resistance
- No output cross-conduction current spikes
- <math>0.005\%/^{\circ}\text{C}</math> temperature stability
- <math>0.055\%/V</math> supply stability
- SOT-23-5 package

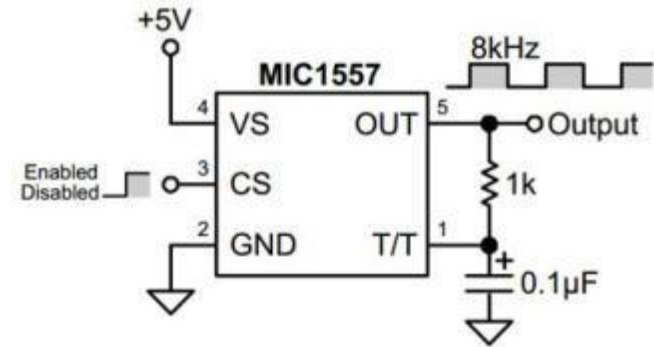


Monostable (One-Shot)



## Features:

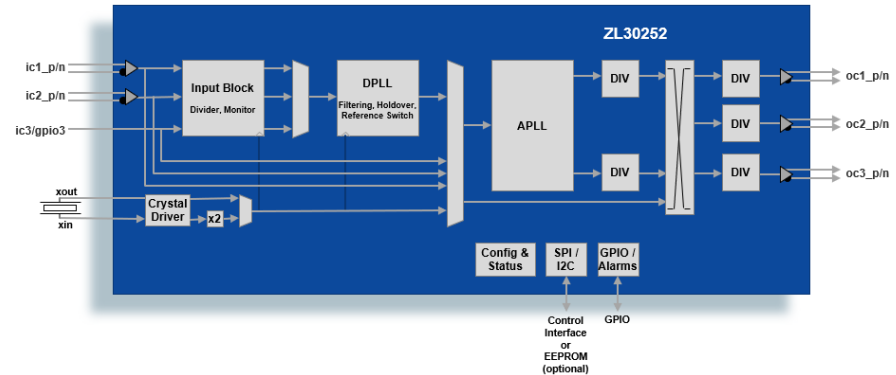
- +2.7V to +18V operation
- Low current
- <math>1\mu\text{A}</math> typical shutdown mode (MIC1557)
- 200 $\mu\text{A}$  typical (TRG and THR low) at 3V supply
- Timing from microseconds to hours
- "Zero" leakage trigger and threshold inputs
- 50% square wave with one Resistor, one Capacitor
- Threshold input precedence over trigger input
- <math>15\Omega</math> output on resistance
- No output cross-conduction current spikes
- <math>0.005\%/^{\circ}\text{C}</math> temperature stability
- <math>0.055\%/V</math> supply stability
- SOT-23-5 package



**Astable (Oscillator)**

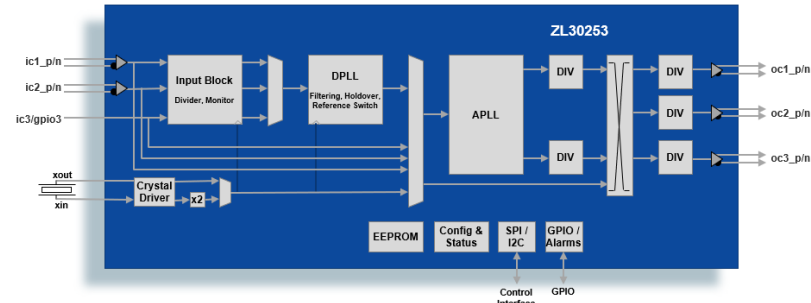
## Features

- Three inputs: two differential/CMOS, one CMOS
- Any input frequency from 1kHz to 1250MHz
- (1kHz to 300MHz for CMOS)
- Inputs continually monitored for activity and frequency accuracy
- Automatic or manual reference switching
- Low-Bandwidth DPLL
- Digitally controlled phase adjustment
- Automatic self-configuration at power-up from external EEPROM; up to four configs pin-selectable
- Numerically controlled oscillator mode
- Spread-spectrum modulation mode
- Zero-delay mode with external feedback
- SPI or I2C processor Interface
- Easy-to-use evaluation software



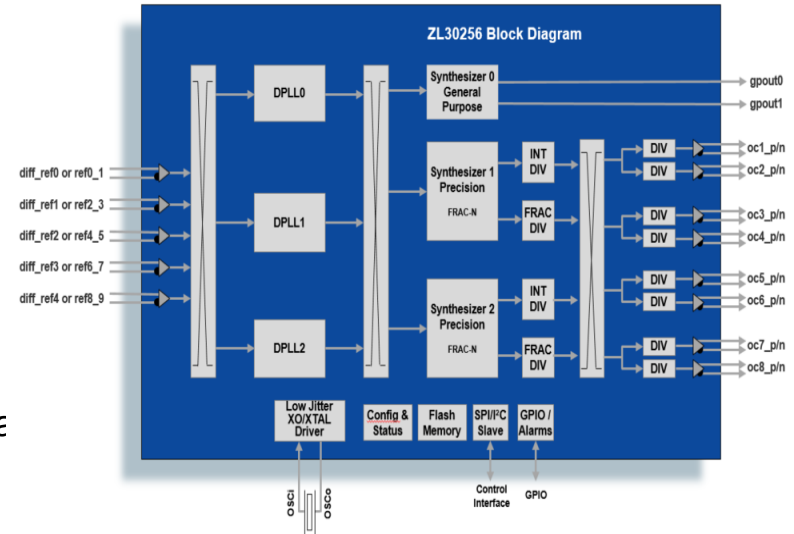
## Features

- Three inputs: two differential/CMOS, one CMOS
- Any input frequency from 1kHz to 1250MHz
- (1kHz to 300MHz for CMOS)
- Inputs continually monitored for activity and frequency accuracy
- Automatic or manual reference switching
- Low-Bandwidth DPLL
- Digitally controlled phase adjustment
- Automatic self-configuration at power-up from internal EEPROM; up to four configs pin-selectable
- Numerically controlled oscillator mode
- Spread-spectrum modulation mode
- Zero-delay mode with external feedback
- SPI or I2C processor Interface
- Easy-to-use evaluation software



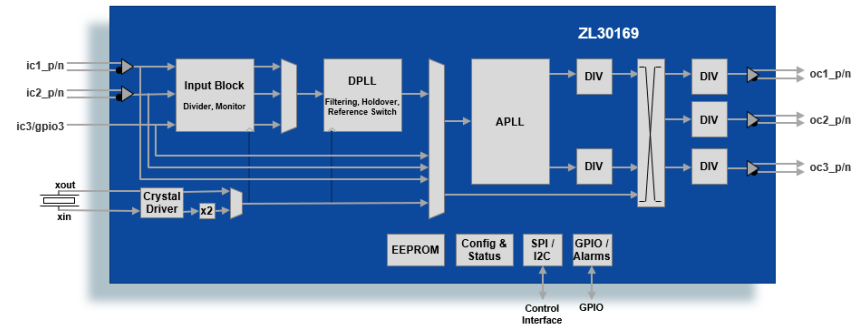
## Features

- One, Two or Three DPLL Channels
- Programmable bandwidth, 14Hz to 470Hz
- Free-run or holdover on loss of all inputs
- Hitless reference switching
- High-resolution holdover averaging
- Per-DPLL phase adjustment, 1ps resolution
- Programmable tracking range, phase-slope, limiting, frequency-change limiting and other advanced features
- Output Clock Frequency Generation
- Automatic self-configuration at power-up from internal Flash memory
- Input-to-output alignment <200ps (ext feedback)
- Internal compensation (1ppt) for local oscillator frequency error in DPLLs and input monitors
- Numerically controlled oscillator behavior in each DPLL and each fractional output divider
- Easy-to-configure design requires no external VCXO or loop filter components
- 7 GPIO pins with many possible behaviors
- SPI or I2C processor Interface
- 1.8V and 3.3V core VDD voltages
- Power: 1.3W for 2 inputs, 1 synth, 6 LVDS out
- Easy-to-use evaluation/programming software



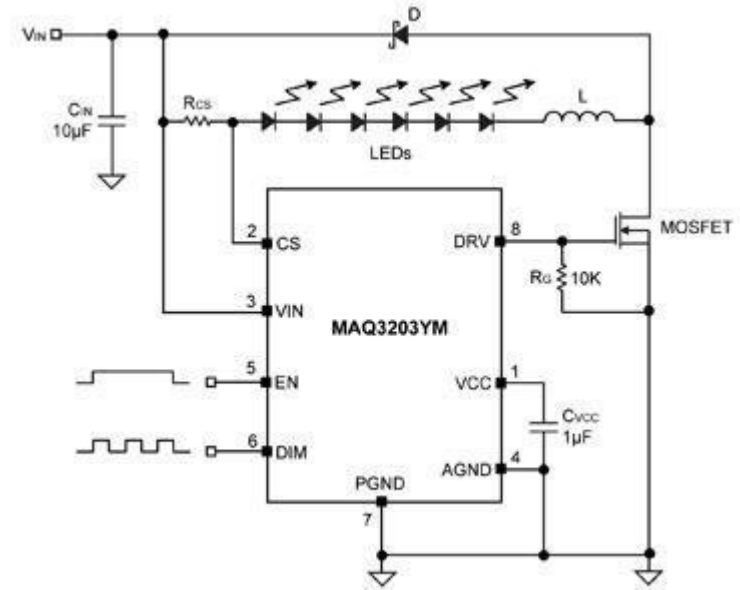
## Input clocks

- Three inputs, two differential/CMOS, one CMOS
- Any input frequency from 1kHz to 1250MHz
- (1kHz to 300MHz for CMOS)
- Inputs continually monitored for activity and frequency accuracy
- Automatic or manual reference switching
- Low-bandwidth DPLL
- Low-jitter fractional-N APLL and 3 outputs
- Automatic self-configuration at power-up from internal EEPROM; up to four configurations
- pin-selectable
- Numerically controlled oscillator mode
- Zero-delay mode with external feedback
- SPI or I2C processor Interface
- Easy-to-use evaluation software



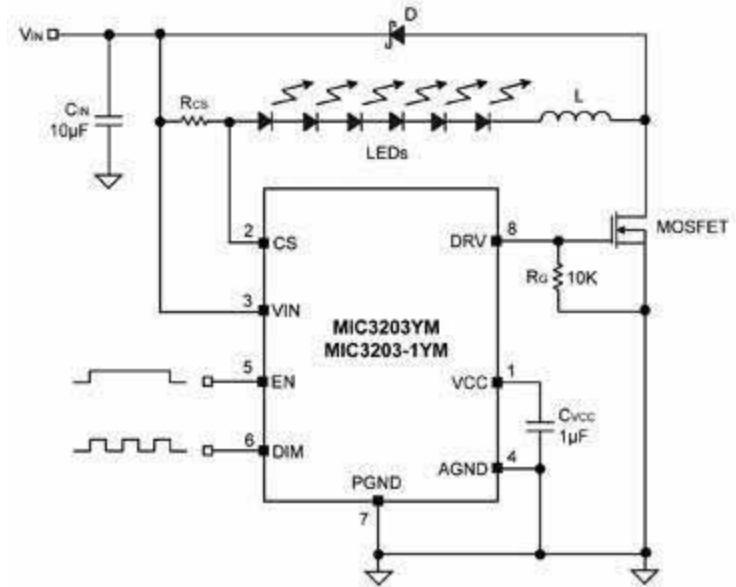
### Features:

- AEC-Q100 qualified
- 4.5V to 42V input voltage range
- High efficiency (>90%)
- $\pm 5\%$  LED current accuracy
- Dither enabled for low EMI
- High-side current sense
- Dedicated dimming control input
- Hysteretic control (no compensation)
- Up to 1.5MHz switching frequency
- Adjustable constant LED current
- Over-temperature protection
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range
- Recommended for Automotive Design



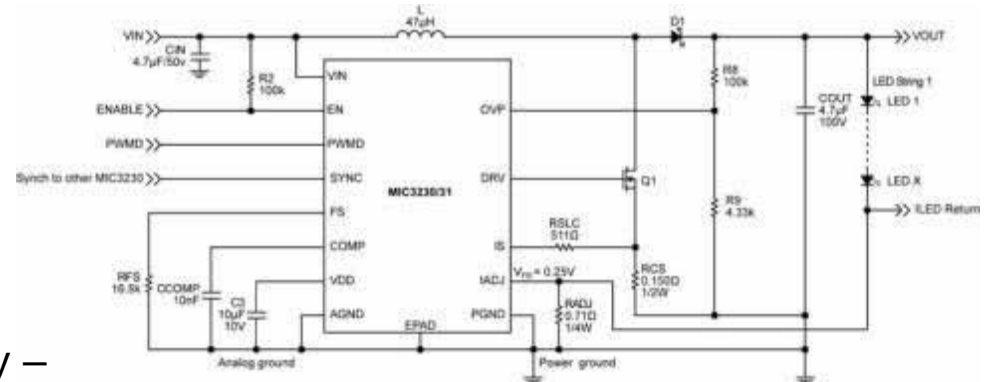
## Features:

- 4.5V to 42V input voltage range
- High efficiency (>90%)
- $\pm 5\%$  LED current accuracy
- MIC3203: Dither enabled for low EMI
- MIC3203-1: Dither disabled
- High-side current sense
- Dedicated dimming control input
- Hysteretic control (no compensation required)
- Up to 1.5MHz switching frequency
- Adjustable constant LED current
- Over-temperature protection
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range



## Features:

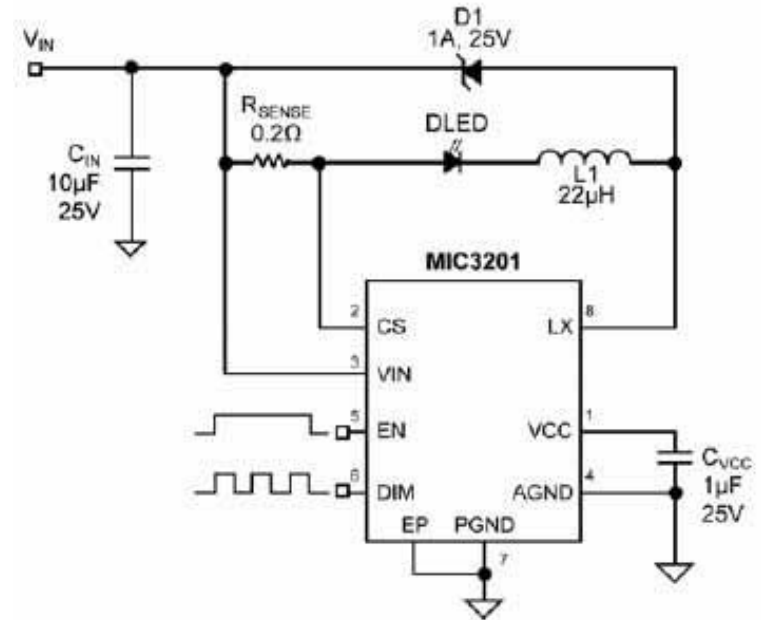
- 6V to 45V input supply range
- Capable of driving up to 70W
- Ultra-low EMI via dithering (MIC3231)
- Programmable LED drive current
- Feedback voltage =  $250\text{mV} \pm 3\%$
- Programmable switching frequency –
  - (MIC3230/1) or 400kHz fixed frequency –
  - operation (MIC3232)
- PWM dimming and separate enable shutdown
- Frequency synchronization with other MIC3230s
- Protection features:
  - Over voltage protection (OVP)
  - Over-temperature protection
  - Under voltage lockout (UVLO)
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range





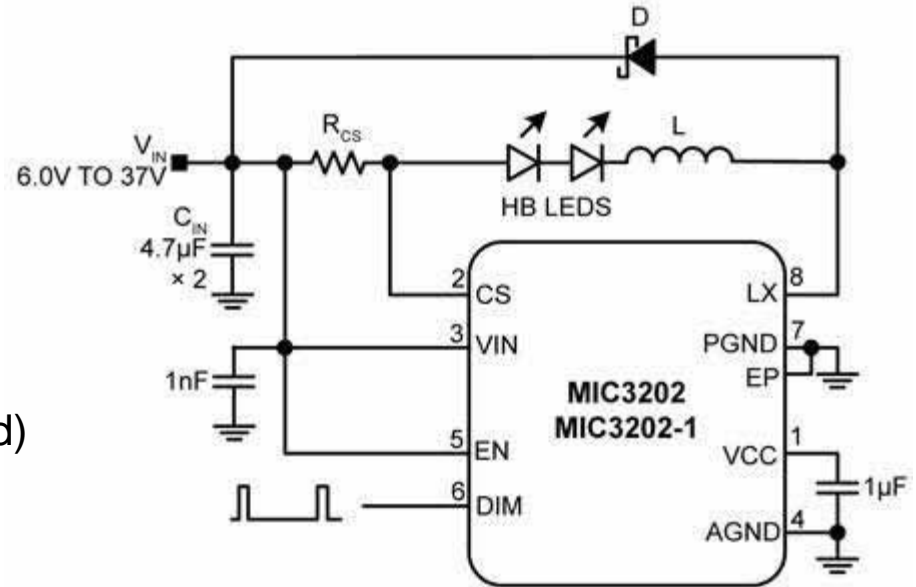
## Features:

- 6.0V to 20V input voltage range
- High efficiency (>90%)
- $\pm 5\%$  LED current accuracy
- High-side current sense
- Dedicated dimming control input
- Hysteretic control (no compensation!)
- 1A internal power switch
- Up to 1MHz switching frequency
- Adjustable constant LED current
- 5V on board regulator
- Over-temperature protection
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  Junction temperature range
- Available in an 8-Pin ePad SOIC package



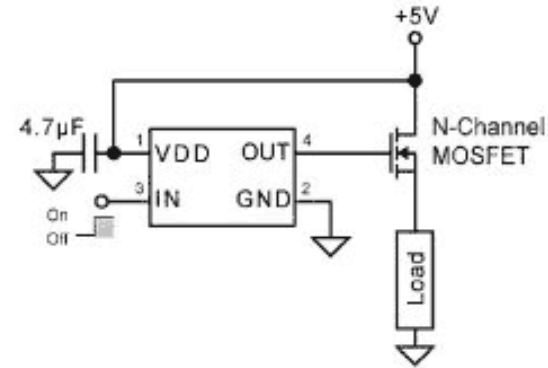
## Features:

- 6V to 37V input voltage range
- High efficiency (>90%)
- $\pm 5\%$  LED current accuracy
- MIC3202: Dither enabled for low EMI
- MIC3202-1: Dither disabled
- High-side current sense (up to 1A)
- Dedicated dimming control input
- Hysteretic control (no compensation required)
- Up to 1MHz switching frequency
- Adjustable constant LED current
- Over-temperature protection
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range

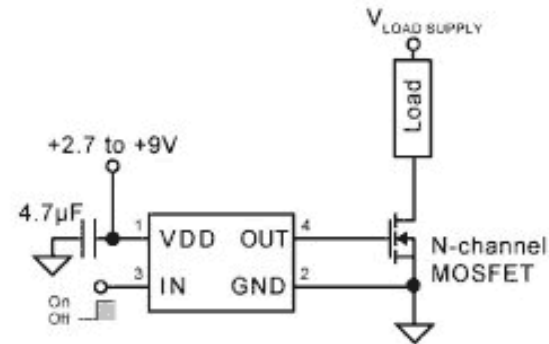


## Features:

- 4-pin 1.2mm x 1.2mm Thin QFN Package
- +2.7V to +9V supply voltage range
- 16V gate drive at  $V_{DD} = 9V$
- 8V gate drive at  $V_{DD} = 2.7V$
- Operates in low and high side configurations
- 150 $\mu$ A (typical) supply current at  $V_{DD} = 5V$
- <1 $\mu$ A shutdown supply current
- -40°C to +125°C Junction Temperature Range



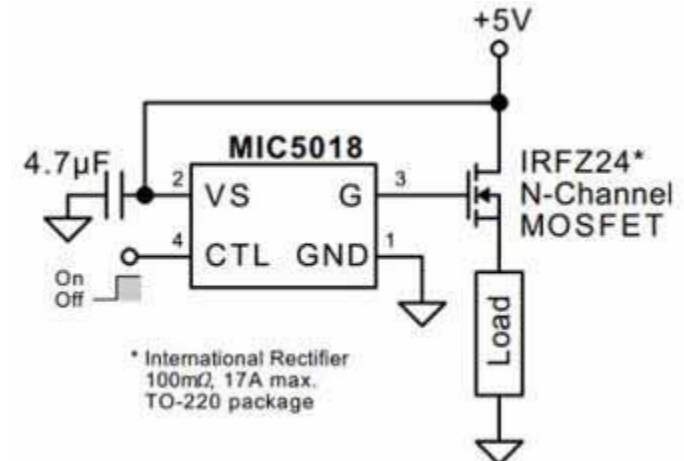
Low-Voltage High-Side Power Switch



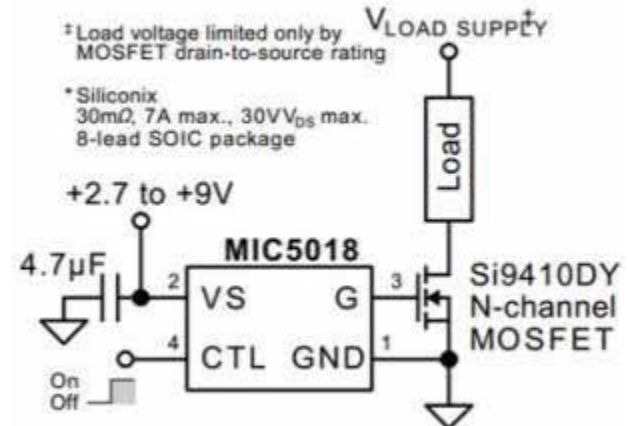
Low-Side Power Switch

## Features:

- +2.7V to +9V operation
- 150µA typical supply current at 5V supply
- ≤1µA typical standby (off) current
- Charge pump for high-side low-voltage applications
- Internal Zener diode gate-to-ground MOSFET – protection
- Operates in low- and high-side configurations
- TTL compatible input
- ESD protected



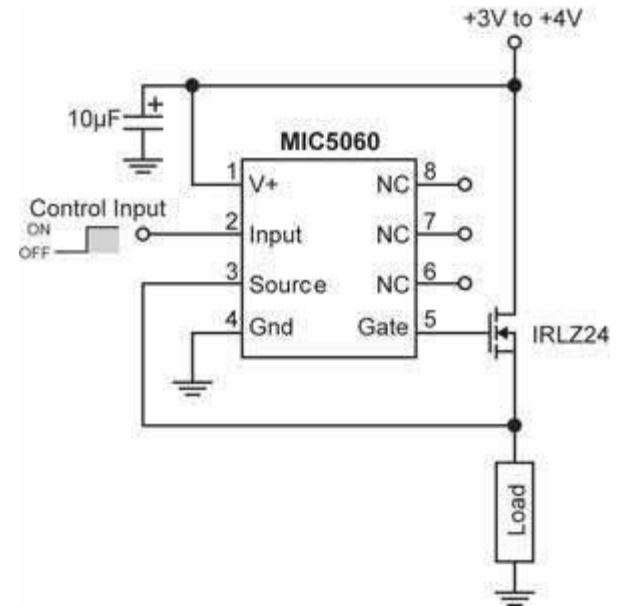
**Low-Voltage High-Side Power Switch**



**Low-Side Power Switch**

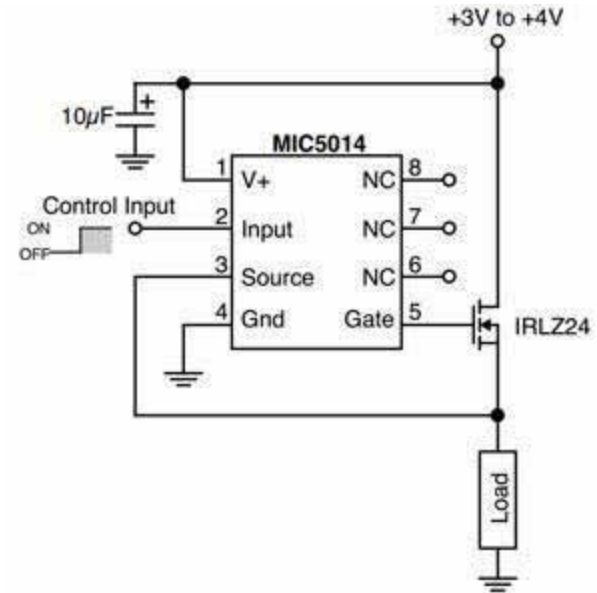
## Features:

- 2.75V to 30V operation
- 100 $\mu$ A maximum supply current (5V supply)
- 15 $\mu$ A typical off-state current
- Internal charge pump
- TTL-compatible input
- Withstands 60V transient (load dump)
- Reverse battery protected to -20V
- Inductive spike protected to -20V
- Overvoltage shutdown at 35V
- Internal 15V gate protection
- Minimum external parts
- Operates in high-side or low-side configurations
- 1 $\mu$ A control input pull-off
- Available in 8-pin 3mm x 3mm MLF<sup>®</sup> package



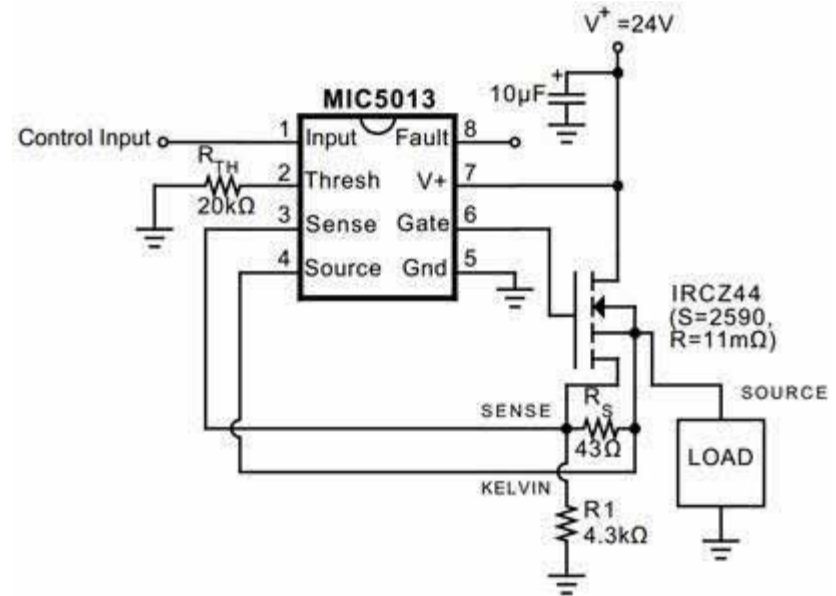
## Features:

- +2.75V to +30V operation
- 100 $\mu$ A maximum supply current (5V supply)
- 15 $\mu$ A typical off-state current
- Internal charge pump
- TTL compatible input
- Withstands 60V transient (load dump)
- Reverse battery protected to  $-20$ V
- Inductive spike protected to  $-20$ V
- Overvoltage shutdown at 35V
- Internal 15V gate protection
- Minimum external parts
- Operates in high-side or low-side configurations
- 1 $\mu$ A control input pull-off
- MIC5015: Inverting
- MIC5014: Non-inverting versions



## Features:

- +7.0V to +32V operation
- Less than 1 $\mu$ A current in the "off" state
- Internal charge pump to drive the gate of an N – channel power FET above supply
- Available in small outline SOIC packages
- Internal Zener clamp for gate protection
- 60 $\mu$ s typical turn-on time to 50% gate overdrive
- Programmable over-current sensing
- Dynamic current threshold for high in-rush loads
- Fault output pin indicates current faults
- Implements high- or low-side switches



## Features:

- +4.75V to +32V operation
- Less than 1 $\mu$ A current in the "off" state
- Internal charge pump to drive the gate of an N-channel – power FET above supply
- Available in small outline SOIC packages
- Internal Zener clamp for gate protection
- Minimum external parts count
- Can be used to boost drive to low-side power FETs –  
- operating on logic supplies
- 25 $\mu$ s typical turn-on time with optional external –  
- capacitors
- Implements high- or low-side drivers

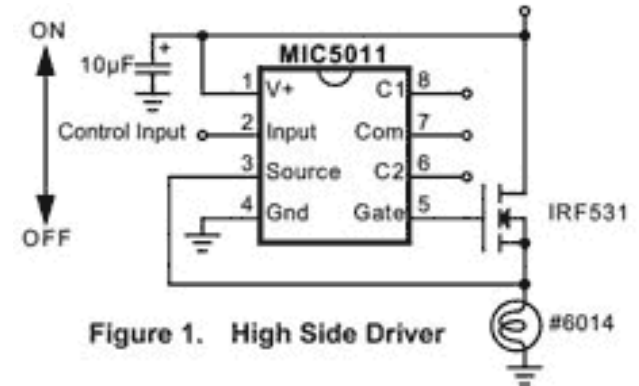


Figure 1. High Side Driver

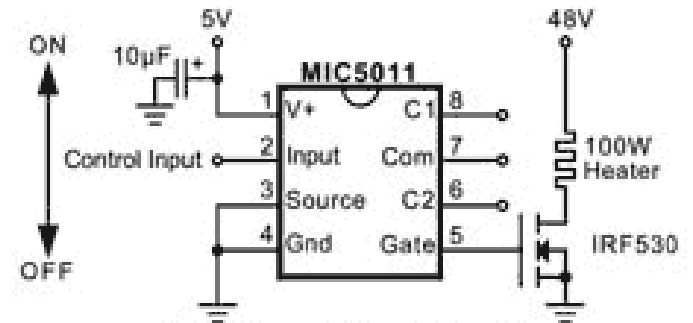
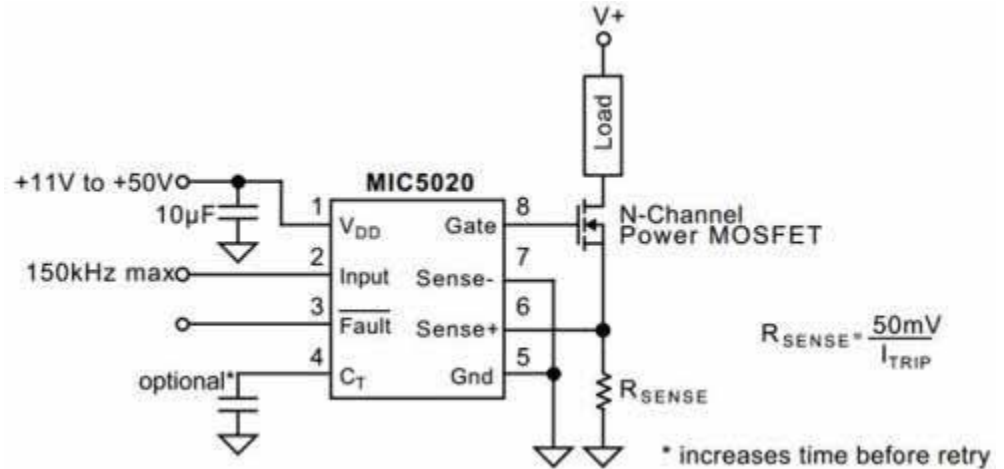


Figure 2. Low Side Driver



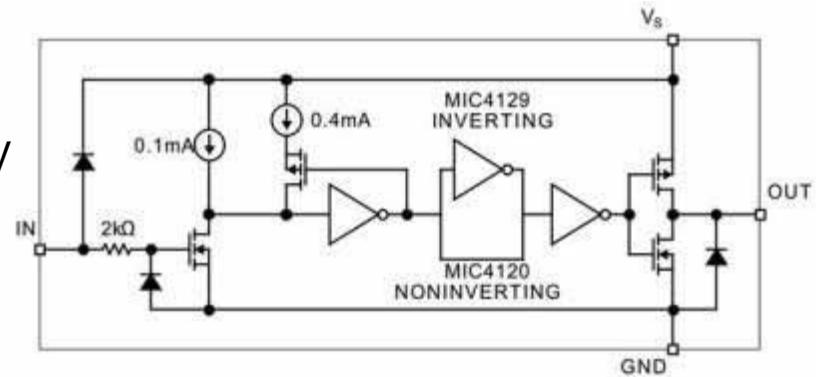
## Features:

- 11V to 50V operation
- 175ns rise/fall time driving 2000pF
- TTL compatible input with internal pull –  
- down resistor
- Overcurrent limit
- Fault output indication
- Gate to source protection
- Compatible with current sensing –  
- MOSFETs



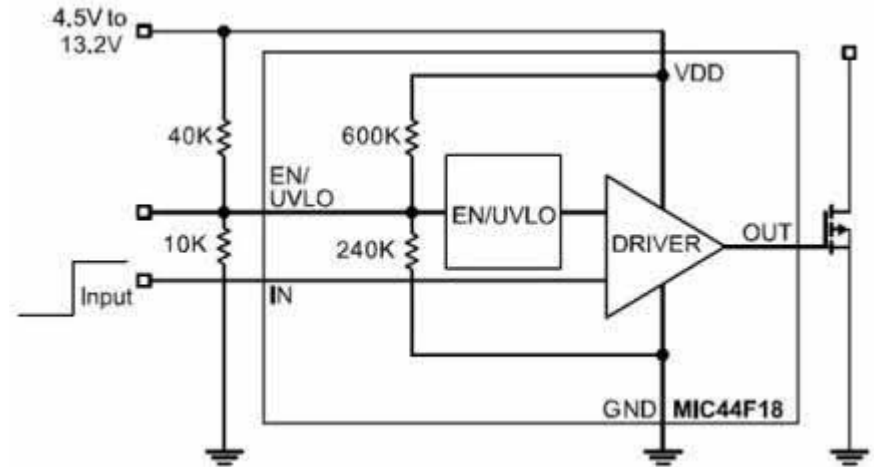
## Features:

- Latch-up protected: will withstand  $>200\text{mA}$  –  
- reverse output current
- Logic input withstands negative swing of up to 5V
- Matched rise and fall times of 25ns
- High peak output current at 6A
- Wide operating range from 4.5V to 20V
- High capacitive load drive of 10,000pF
- Logic high input for any voltage from 2.4V to  $V_S$
- Low equivalent input capacitance (typ) at 6pF
- Low supply current is  $450\mu\text{A}$  with logic 1 input
- Low output impedance is  $2.5\Omega$
- Output voltage swing within 25mV of ground or  $V_S$
- Exposed backside pad packaging reduces heat
  - ePad SOIC-8L ( $\theta_{JA} = 58^\circ\text{C/W}$ )
  - 3mm x 3mm MLF®-8L ( $\theta_{JA} = 60^\circ\text{C/W}$ )



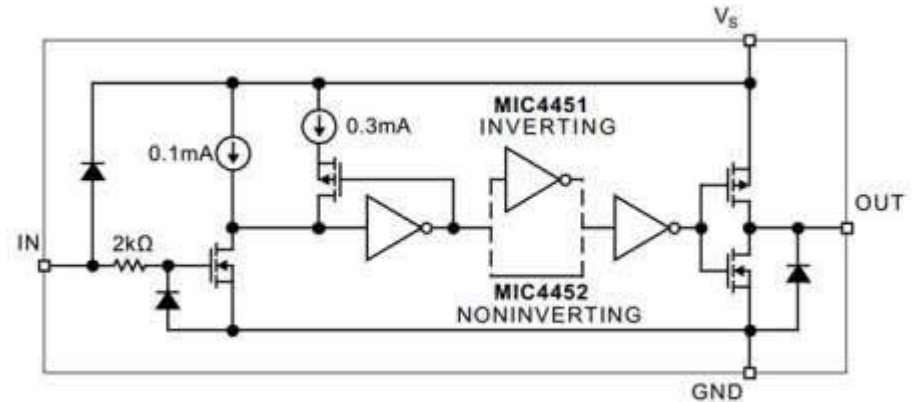
## Features:

- 4.5V to 13.2V input operating range
- 6A peak output current
- High accuracy  $\pm 5\%$  enable input threshold
- High speed switching capability:
  - 10ns rise time in 1000pF load
  - $< 15\text{ns}$  propagation delay time
- Flexible UVLO function:
  - 4.2V internally set UVLO
  - Programmable with external resistors
- Latch-up protection to  $> 500\text{mA}$  reverse –  
- current on the output pin
- Enable function
- Thermally enhanced ePad MSOP-8 package option
- Miniature 2mm x 2mm MFL<sup>®</sup>-8 package option
- Pb-free packaging



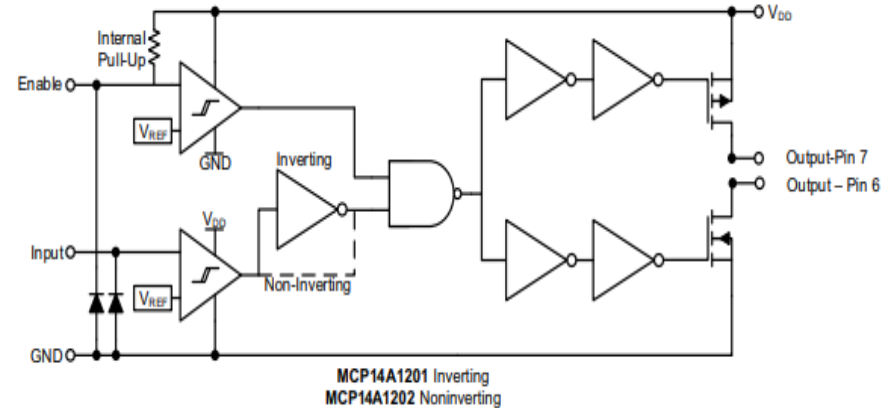
## Features:

- BiCMOS/DMOS construction
- Latch-up proof: fully isolated process is –  
- inherently immune to any latch-up.
- Input will withstand negative swing of –  
- up to 5V
- Matched rise and fall times 25ns
- High peak output current 12A peak
- Wide operating range 4.5V to 18V
- High capacitive load drive 62,000pF
- Low delay time 30ns typ.
- Logic high input for any voltage from 2.4V to  $V_S$
- Low equivalent input capacitance (typ.) 7pF
- Low supply current 450 $\mu$ A with logic 1 input
- Low output impedance 1.0 $\Omega$
- Output voltage swing to within 25mV of ground or  $V_S$



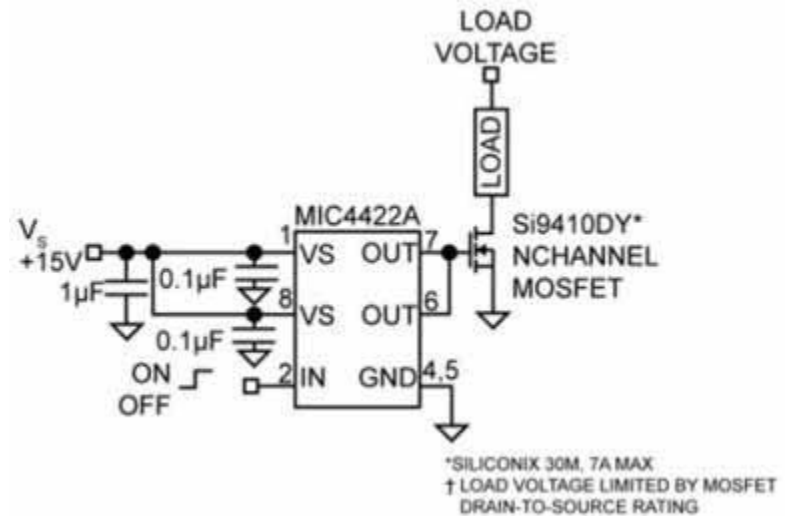
## Features List:

- High Peak Output Current: 12.0A (typical)
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- Low Shoot-Through/Cross-Conduction Current in Output Stage
- High Capacitive Load Drive Capability:
  - 15,000 pF in 25 ns (typical)
- Short Delay Times: 28 ns (tD1), 28 ns (tD2) (typical)
- Low Supply Current: 360  $\mu$ A (typical)
- Low-Voltage Threshold Input and Enable with Hysteresis
- Latch-Up Protected: Withstands 500 mA Reverse Current
- Space-Saving Packages:
  - 8-Lead MSOP
  - 8-Lead SOIC
  - 8-Lead 2 x 3 TDFN



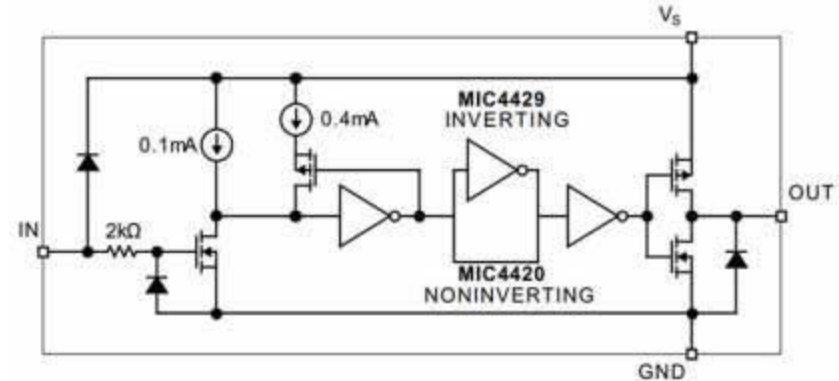
## Features:

- High peak-output current: 9A peak (typ.)
- Wide operating range: 4.5V to 18V (typ.)
- Minimum pulse width: 50ns
- Input will withstand negative swing of up to 5V
- High capacitive load drive: 47,000pF
- Low delay time: 15ns (typ.)
- Logic high input for any voltage from 2.4V to VS
- Low equivalent input capacitance (typ.): 7pF
- Low supply current: 500 $\mu$ A (typ.)
- Latch-up proof: fully isolated process is inherently –  
- immune to any latch-up.
- Output voltage swing to within 25mV of ground or VS



## Features:

- CMOS construction
- Latch-up protected: will withstand  $>500\text{mA}$  –  
- reverse output current
- Logic input withstands negative swing of up to 5V
- Matched rise and fall times of 25ns
- High peak output current at 6A
- Wide operating range from 4.5V to 18V
- High capacitive load drive of 10,000pF
- Low delay time of 55ns typical
- Low delay time 55ns typ.
- Logic high input for any voltage from 2.4V to  $V_S$
- Low equivalent input capacitance (typ.) 6pF
- Low supply current 450 $\mu\text{A}$  with logic 1 input
- Low output impedance 2.5 $\Omega$
- Output voltage swing within 25mV of ground or  $V_S$





**MICROCHIP**

# MCP14A0901/2

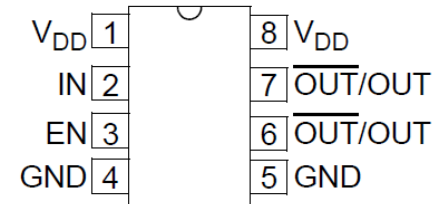
Online  
Datasheet

## 9A MOSFET Driver with Low Threshold Input and Enable

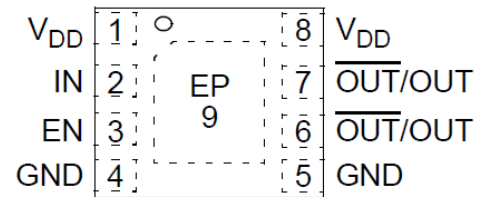
### Features:

- High Peak Output Current: 9.0A (typical)
- Wide Input Supply Voltage Operating Range: -4.5V to 18V
- Low Shoot-Through/Cross-Conduction Current in Output Stage
- High Capacitive Load Drive Capability: - 10,000 pF in 24 ns (typical)
- Short Delay Times: 27 ns (tD1), 27 ns (tD2) (typical)
- Low Supply Current: 360  $\mu$ A (typical)
- Low-Voltage Threshold Input and Enable with Hysteresis
- Latch-Up Protected: Withstands 500 mA Reverse Current
- Space-Saving Packages:
  - 8-Lead MSOP
  - 8-Lead SOIC
  - 8-Lead 2 x 3 TDFN

**MCP14A0901/MCP14A0902**  
MSOP/SOIC



**MCP14A0901/MCP14A0902**  
2 x 3 TDFN\*



\* Includes Exposed Thermal Pad (EP)

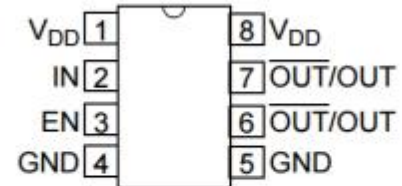


## Features:

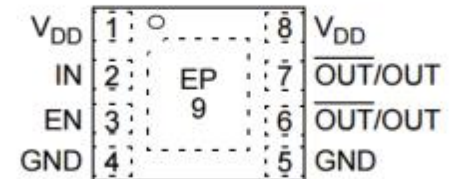
- Peak Output Current: 6 A (typical)
- Wide Supply Voltage Range: 4.5 V to 18 V
- Low Shoot-Through/Cross-Conduction Current –  
- in Output Stage
- High Capacitive Load Drive Capability:
  - 2500 pF in 10 ns (typ.)
  - Short Delay: 22 ns (tD1), 22 ns (tD2) (typ.)
- Low Supply Current: 375  $\mu$ A (typ.)
- Low Voltage Threshold Input and Enable
  - Hysteresis: 1.2 to 1.6 V
- Latch-Up Protected:
  - Withstands 500 mA Reverse Current
- Small Packages:
  - 8- Lead MSOP
  - 8- Lead SOIC
  - 8- Lead 2x3 TDFN

## Package Types

**MCP14A0601/MCP14A0602**  
MSOP/SOIC



**MCP14A0601/MCP14A0602**  
2 x 3 TDFN\*

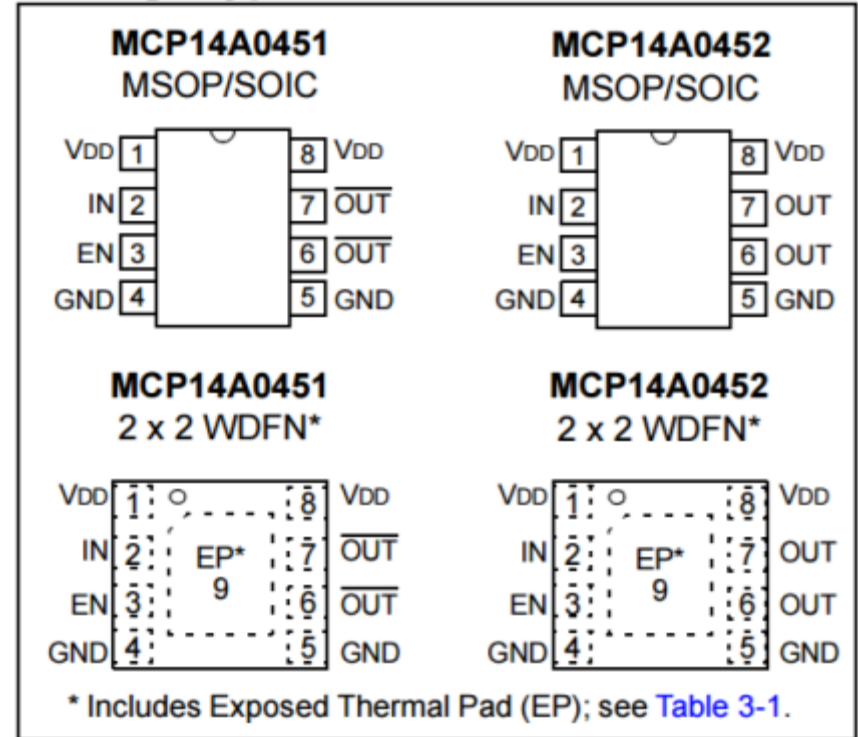


\* Includes Exposed Thermal Pad (EP); see [Table 3-1](#).

## Features:

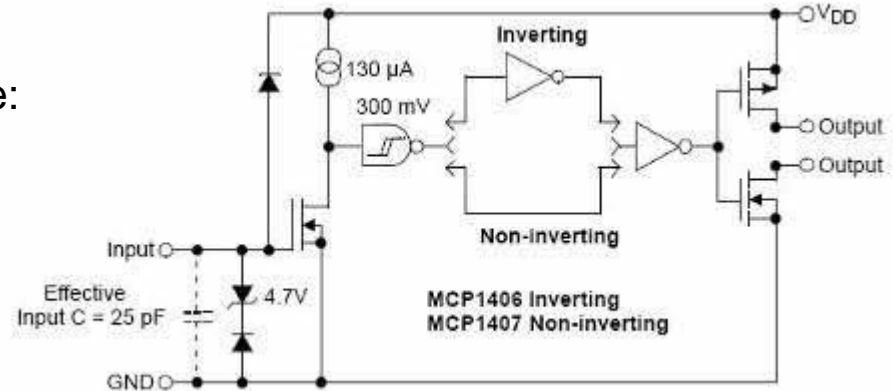
- Peak Output Current: 4.5 A (typical)
- Wide Supply Voltage Range: 4.5 V to 18 V
- Low Shoot-Through/Cross-Conduction –  
- Current in Output Stage
- High Capacitive Load Drive Capability:
  - 2200 pF in 9.5 ns (typ.)
  - Short Delay: 16 ns (tD1), 19.5 ns (tD2) –  
- (typ.)
- Low Supply Current: 355  $\mu$ A (typ.)
- Low Voltage Threshold Input and Enable
  - Hysteresis: 1.2 to 1.6 V
- Latch-Up Protected:
  - Withstands 500 mA Reverse Current
- Small Packages:
  - 8- Lead MSOP
  - 8- Lead SOIC
  - 8- Lead 2x2 WDFN

## Package Types



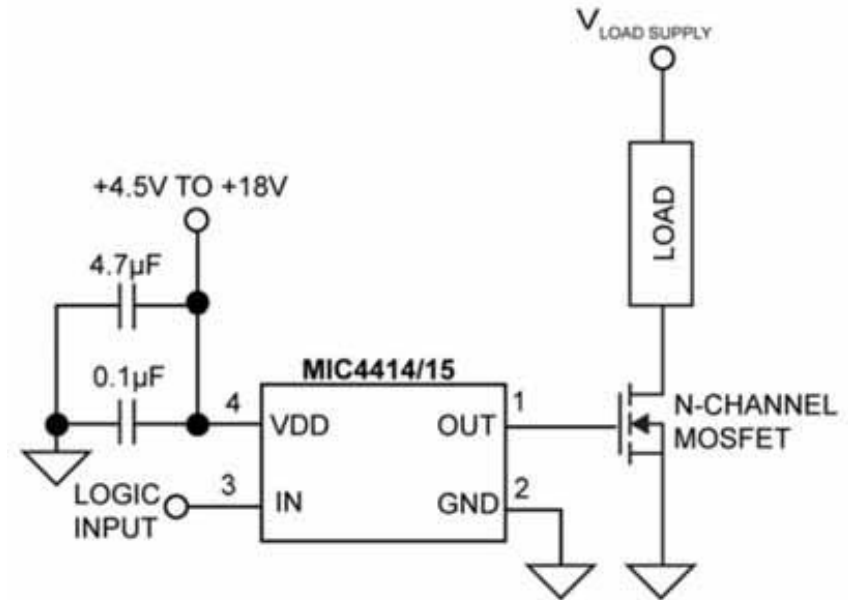
## Features:

- High Peak Output Current: 6.0A (typ.)
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- High Capacitive Load Drive Capability:
  - 2500pF in 20ns
  - 6800pF in 40ns
- Short Delay Times: 40ns (typ.)
- Matched Rise/Fall Times
- Low Supply Current:
  - With Logic '1' Input: 130 $\mu$ A (typ.)
  - With Logic '0' Input: 35 $\mu$ A (typ.)
- Latch-Up Protected: Will Withstand 1.5A
- Reverse Current
- Logic Input Will Withstand Negative
- Swing up to 5V
- Pin compatible with the TC4420/TC4429
- Space-saving 8-Pin SOIC, PDIP and 8-Pin
- 6x5 DFN Packages
- Recommended for Automotive Design



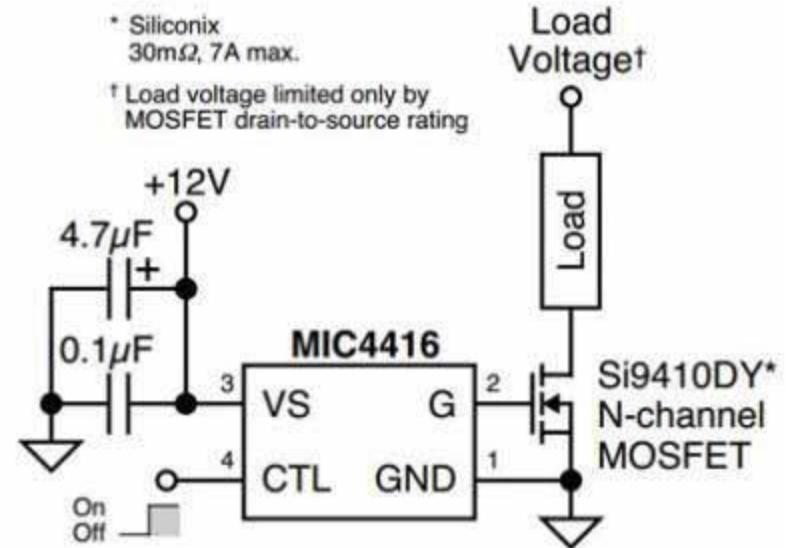
## Features:

- Ultra-small 4-pin 1.2mm x 1.2mm thin QFN –  
- package
- +4.5V to +18V operating supply voltage range
- 1.5A peak current
  - 3.5Ω output resistance at 18V
  - 9Ω output resistance at 5V
- Low steady-state supply current
  - 77μA control input low
  - 445μA control input high
- 12ns rise and fall times into 1000pF load
- MIC4414 (non-inverting)
- MIC4415 (inverting)
- -40°C to +125°C junction temperature
- MIC4414 (non-inverting)
- MIC4415 (inverting)



## Features:

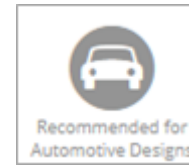
- +4.5V to +18V operation
- Low steady-state supply current
  - 50 $\mu$ A typical, control input low
  - 370 $\mu$ A typical, control input high
- 1.2A nominal peak output
  - 3.5 $\Omega$  typical output resistance at 18V supply
  - 7.8 $\Omega$  typical output resistance at 5V supply
- Operates in low-side switch circuits
- TTL-compatible input withstands -20V
- ESD protection
- 25mV maximum output offset from supply or ground
- Inverting and noninverting versions





# MAQ4123/4/5

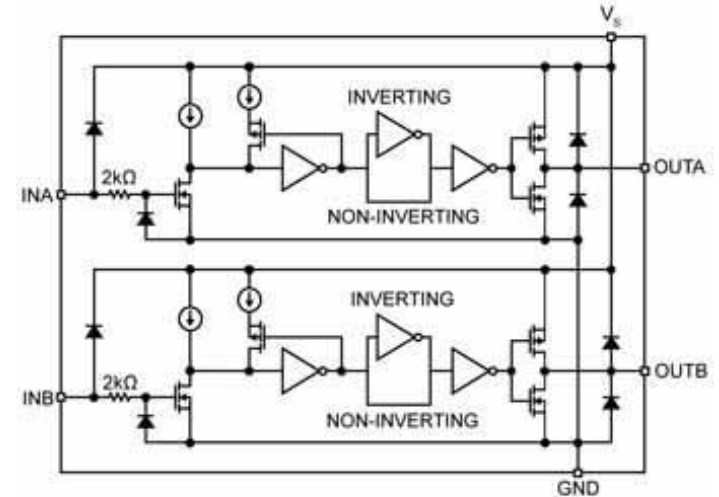
Automotive AEC-Q100 Qualified Dual 3A Peak  
Low-Side MOSFET Driver



Online  
Datasheet

## Features:

- Automotive AEC-Q100 qualified
- High  $\pm 3A$  peak output current
- Wide 4.5V to 20V supply voltage range
- Low  $2.3\Omega$  output resistance
- Logic input withstands swing to -5V
- Output voltage swings within 25mV of ground or  $V_S$
- Low supply current
  - 2.0mA with logic 1 input (maximum over – temperature)
  - 300 $\mu A$  with logic 0 input (maximum over – temperature)
- '426/7/8-, '1426/7/8-, '4426/7/8 industry standard pin out
- Fast 10ns rise/fall times with 1800pF capacitive load
- TTL/CMOS logic inputs independent of supply voltage
- Inverting, non-inverting, and differential configurations
- -40°C to +125°C temperature range
- Recommended for Automotive Design

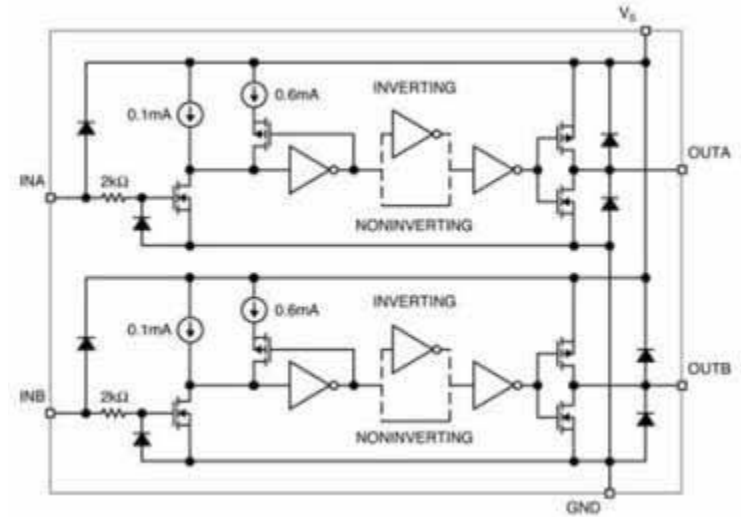


INTEGRATED COMPONENT  
COUNT:  
• 4 RESISTORS  
• 4 CAPACITORS  
• 52 TRANSISTORS

<< BACK

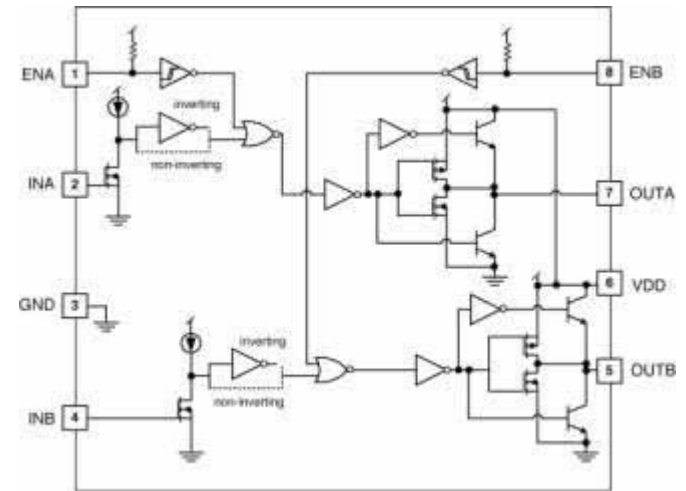
## Features:

- Dual 1.5A-peak drivers
- 4.5V to 20V operating range
- Exposed backside pad packaging reduces heat
  - ePad SOIC-8L ( $\theta_{JA} = 58^{\circ}\text{C/W}$ )
  - ePad MSOP-8L ( $\theta_{JA} = 60^{\circ}\text{C/W}$ )
  - 3mm x 3mm MLF®-10L ( $\theta_{JA} = 60^{\circ}\text{C/W}$ )
- Bipolar/CMOS/DMOS construction
- 25mV maximum output offset from supply or ground
- Latch-up protection to >500mA reverse current
- Switches 1000pF in 25ns
- Logic-input threshold independent of supply voltage
- Logic-input protection to -5V
- 6pF typical equivalent input capacitance
- -40°C to +125°C operating junction temperature range



## Features:

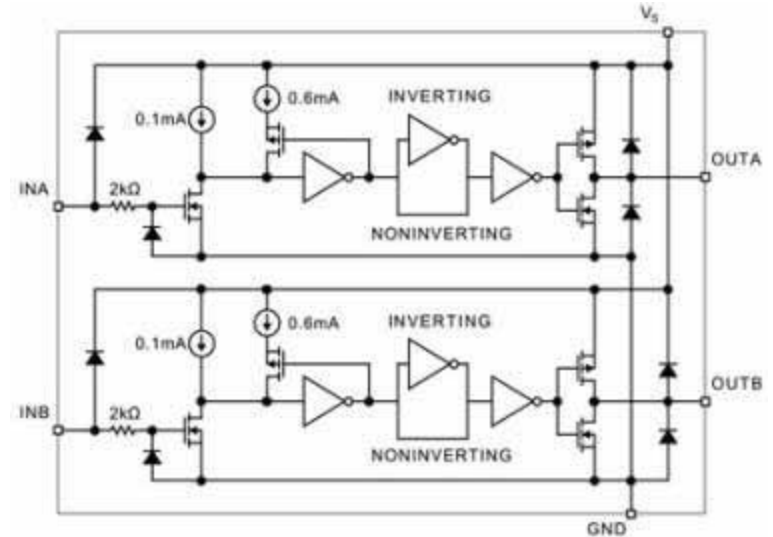
- 4.5V to 18V supply voltage operating range
- High peak source/sink current
  - $\pm 3A$  at  $V_{DD} = 8V$
  - $\pm 4A$  at  $V_{DD} = 12V$
- 15ns/15ns rise and fall times with 2000pF load
- 25ns/35ns (rising/falling) input propagation delay
- 20ns/45ns (rising/falling) enable propagation delay
- Active-high driver enable inputs with 100k $\Omega$  pull-ups
- Output latch-up protection to >500mA reverse current
- Industry standard pin out with two package options
  - ePad MSOP-8 (  $\theta_{JA} = 60^{\circ}C/W$  )
  - 8-pin SOIC (  $\theta_{JA} = 120^{\circ}C/W$  )
- Available in dual-inverting (MIC4223), dual non-inverting –  
– (MIC4224) and complementary (MIC4225)
- -40°C to +125°C operating junction temperature range





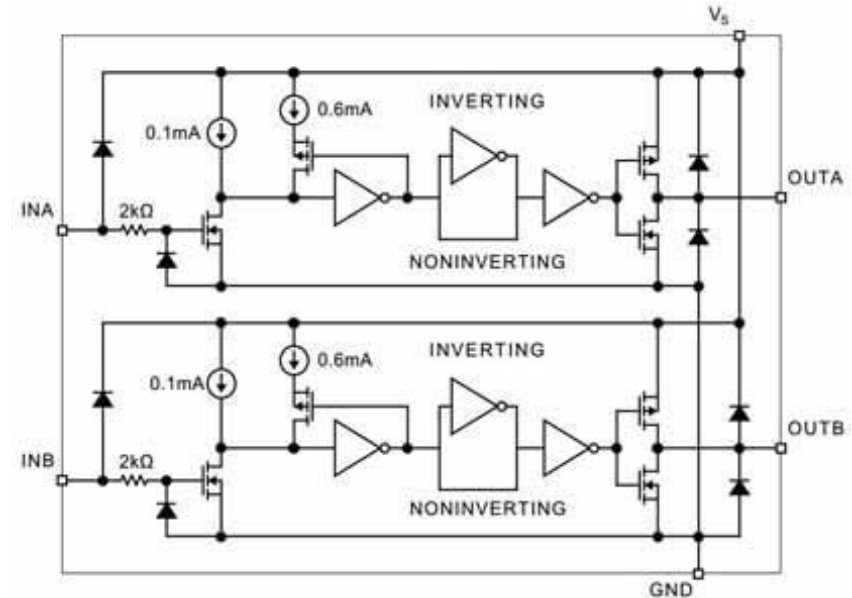
## Features:

- Reliable, low-power bipolar/CMOS/DMOS –  
- construction
- Latch-up protected to >500mA reverse current
- Logic input withstands swing to -5V
- High 3A peak output current
- Wide 4.5V to 18V operating range
- Drives 1800pF capacitance in 25ns
- Short <40ns typical delay time
- Low equivalent 6pF input capacitance
- 3.5mA with logic 1 input
- 350 $\mu$ A with logic 0 input
- Low 3.5 $\Omega$  typical output impedance
- Output voltage swings within 25mV of ground or VS.
- '426/7/8-, '1426/7/8-, '4426/7/8-compatible pinout
- Inverting, noninverting, and differential configurations



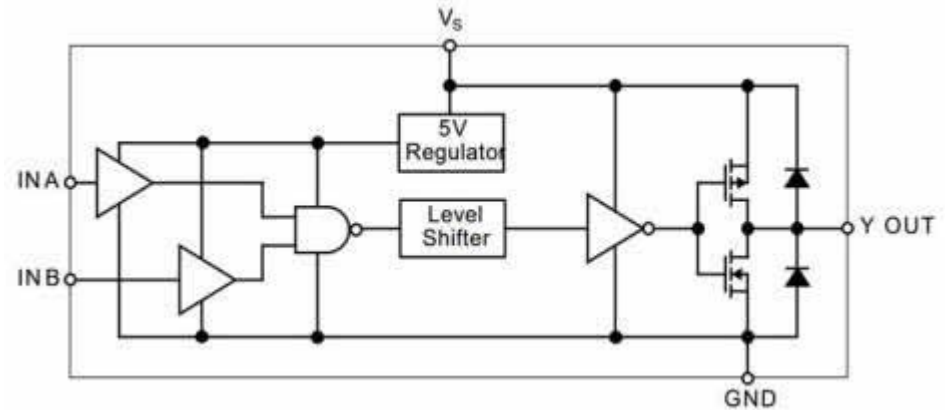
## Features:

- Latch-up protection to >500mA reverse current
- 1.5A peak output current
- 4.5V to 18V operating range
- Low quiescent supply current
  - 4mA at logic 1 input
  - 400 $\mu$ A at logic 0 input
- Switches 1000pF in 25ns
- 7 $\Omega$  output impedance
- <40ns typical delay
- 6pF typical equivalent input capacitance
- 25mV max. output offset from supply or ground
- Replaces MIC426/427/428 and MIC1426/1427/1428
- Dual inverting, dual noninverting, and inverting/ - noninverting configurations
- ESD protection



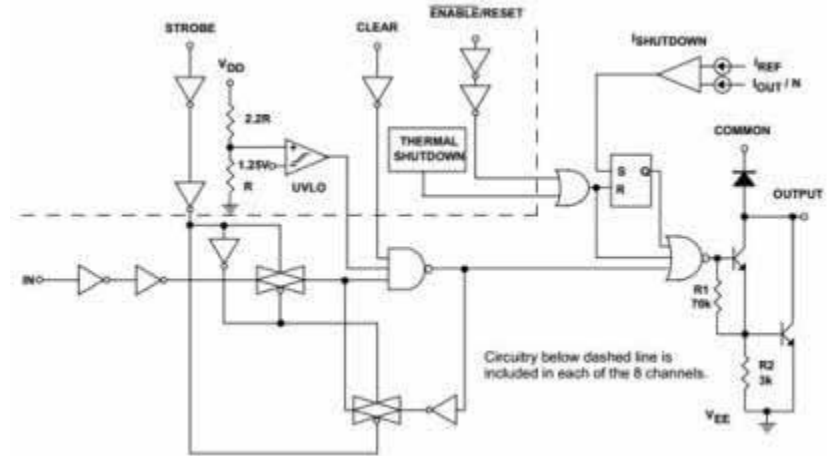
## Features:

- Built using reliable, low power CMOS –  
- processes
- Latchproof: withstands 500mA inductive –  
- kickback
- Three input logic choices
- Symmetrical rise and fall times 25ns
- Short, equal delay times 75ns
- High peak output current 1.2A
- Wide operating range 4.5 to 18V
- Low equivalent input capacitance (typ) 6pF
- Inputs = Logic 1 for any input from 2.4V to  $V_S$
- ESD protected



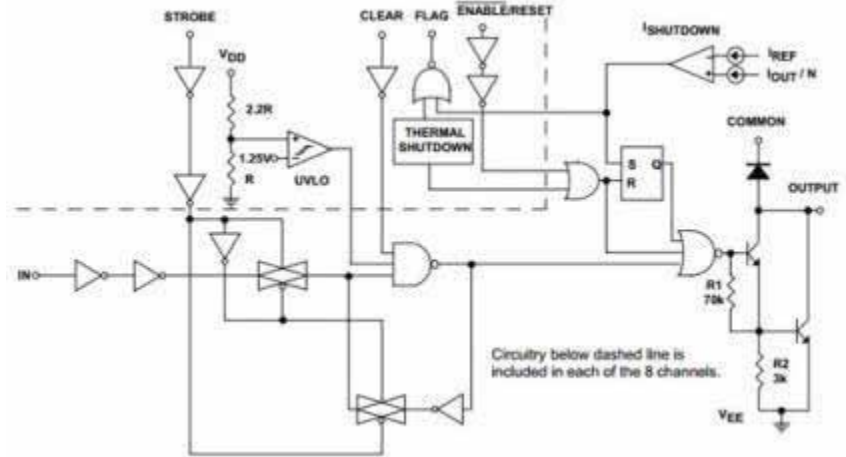
## Features:

- 4.4MHz Minimum Data Input Rate
- High-Voltage, High-Current Outputs
- Per-Output Overcurrent Shutdown (500mA – - typical)
- Under Voltage Lockout
- Thermal Shutdown
- Output Transient Protection Diodes
- CMOS, PMOS, NMOS, and TTL Compatible – - Inputs
- Internal Pull-Down Resistors
- Low-Power CMOS Latches



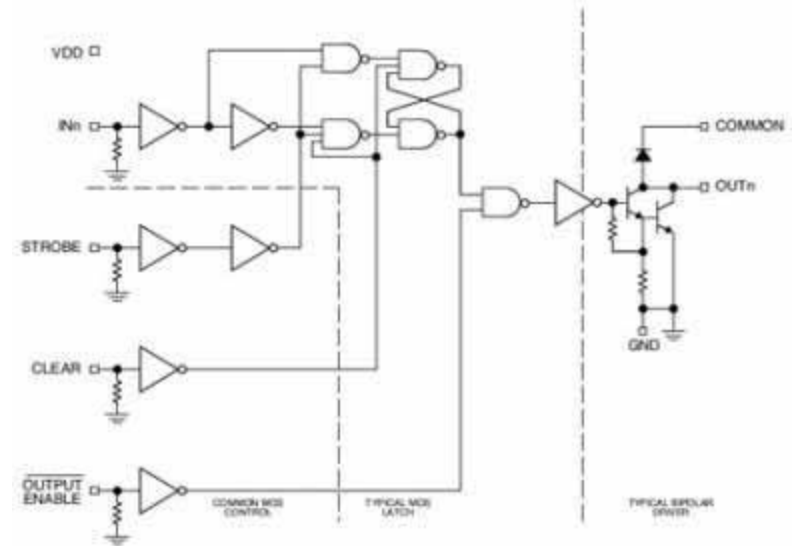
## Features:

- 4.4 MHz Minimum Data Input Rate
- High-Voltage, High-Current Outputs
- Undervoltage Lockout
- Thermal Shutdown
- Output Fault Flag
- Output Transient Protection Diodes
- CMOS-, PMOS-, NMOS-, and TTL-compatible – Inputs
- Internal Pull-Down Resistors
- Per-Output Over-Current Shutdown (500mA – - Typical)
- Low-Power CMOS Latches
- Single or Split Supply Operation



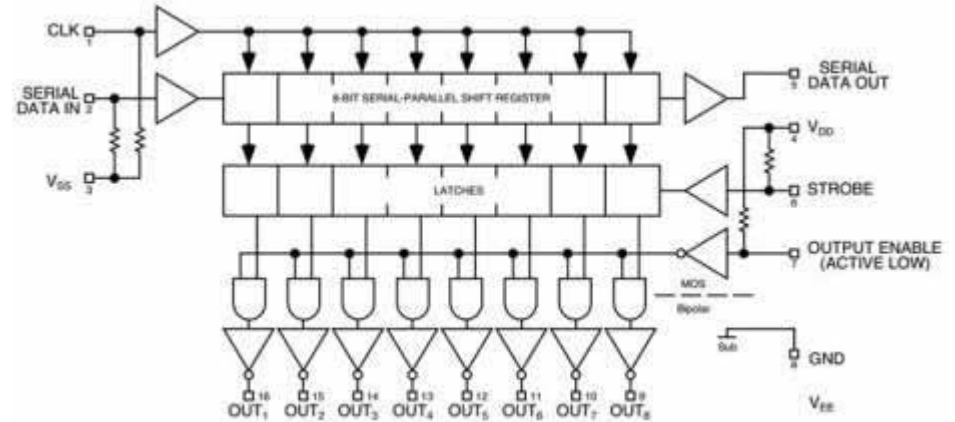
## Features:

- CMOS, PMOS, NMOS, and TTL Compatible –  
- Inputs
- 4.4MHz Minimum Data Input Rate
- High-Voltage, Current Sink Outputs
- Output Transient Protection
- Internal Pull-Down Resistors
- Low-Power CMOS Latches



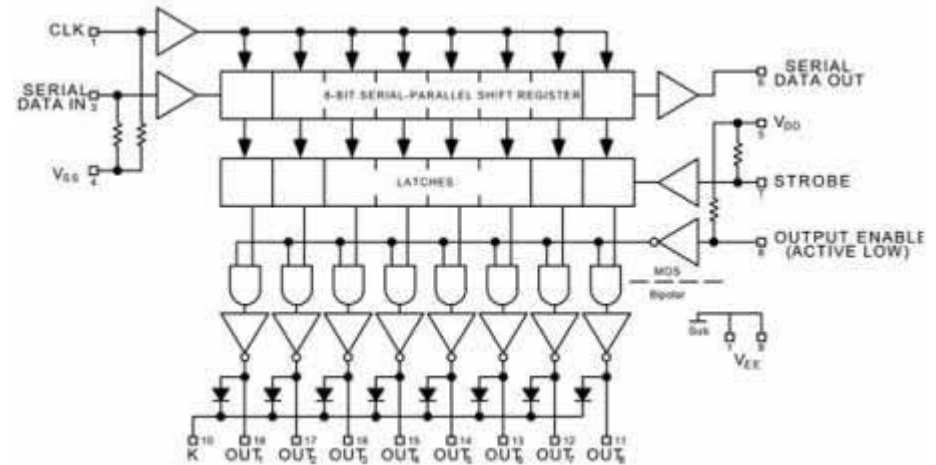
## Features:

- 3.3 MHz Minimum Data-Input Rate
- CMOS, PMOS, NMOS, TTL Compatible
- Internal Pull-Down or Pull-Up Resistors
- Low-Power CMOS Logic and Latches
- High-Voltage Current-Sink Outputs
- Single or Split Supply Operation



## Features:

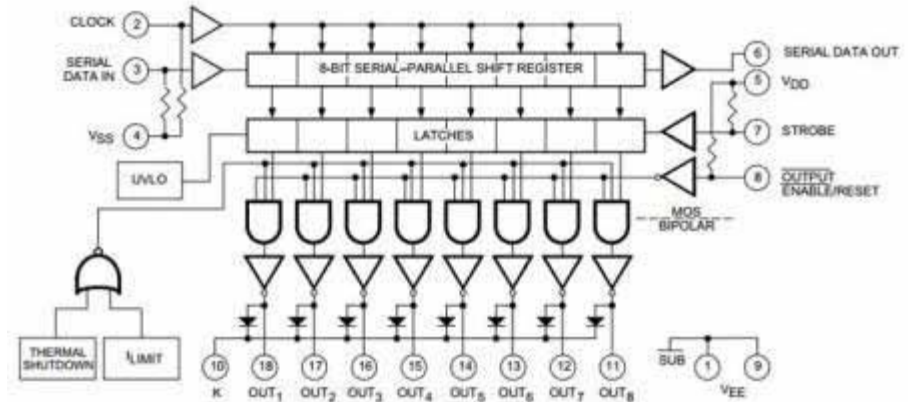
- 3.3 MHz Minimum Data-Input Rate
- CMOS, PMOS, NMOS, TTL Compatible
- Internal Pull-Up/Pull-Down Resistors
- Low-Power CMOS Logic and Latches
- High-Voltage Current-Sink Outputs
- Output Transient-Protection Diodes
- Single or Split Supply Operation





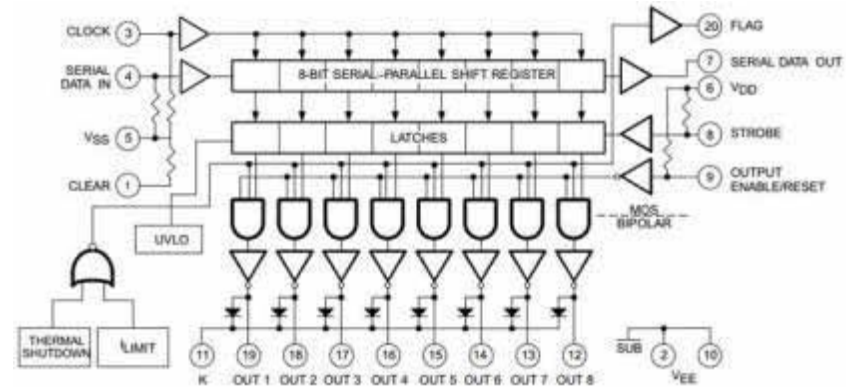
## Features:

- 3.3 MHz Minimum Data-Input Rate
- CMOS, PMOS, NMOS, and TTL Compatible
- Internal Pull-Up/Pull-Down Resistors
- Low Power CMOS Logic and Latches
- High Voltage (80V) Current-Sink Outputs
- Output Transient-Protection Diodes
- Single or Split Supply Operation
- Thermal Shutdown
- Under-Voltage Lockout
- Per-Output Over-Current Shutdown (500mA typical)



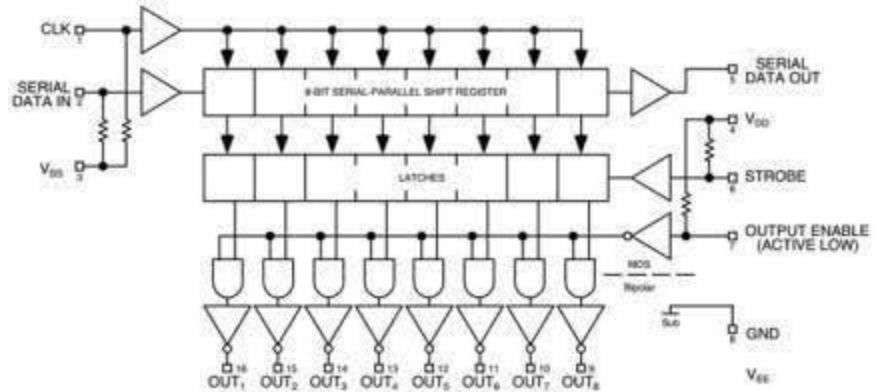
## Features:

- 3.3 MHz Minimum Data-Input Rate
- Output Current Shutdown (500mA Typical)
- Under Voltage Lockout
- Thermal Shutdown
- Output Fault Flag
- CMOS, PMOS, NMOS, and TTL Compatible
- Internal Pull-Up/Pull-Down Resistors
- Low Power CMOS Logic and Latches
- High Voltage Current Sink Outputs
- Output Transient-Protection Diodes
- Single or Split Supply Operation



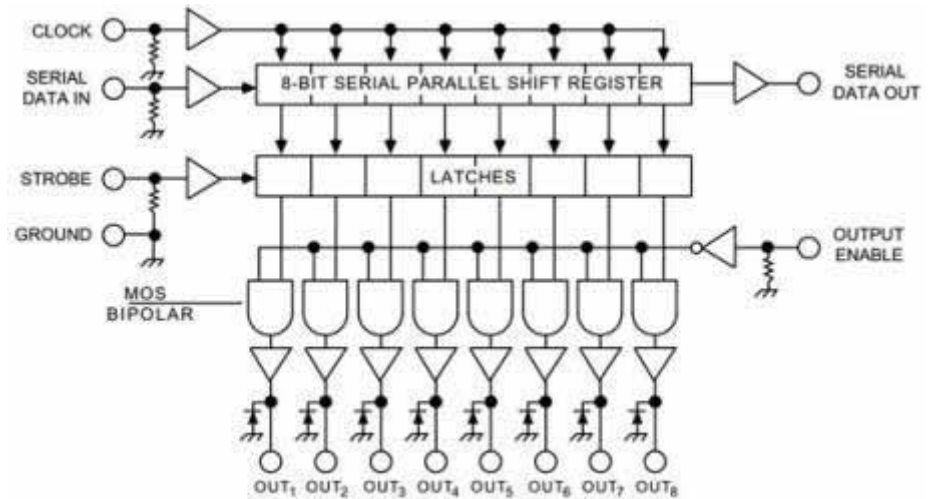
## Features:

- 3.3 MHz Minimum Data-Input Rate
- CMOS, PMOS, NMOS, TTL Compatible
- Internal Pull-Down or Pull-Up Resistors
- Low-Power CMOS Logic and Latches
- High-Voltage Current-Sink Outputs
- Single or Split Supply Operation



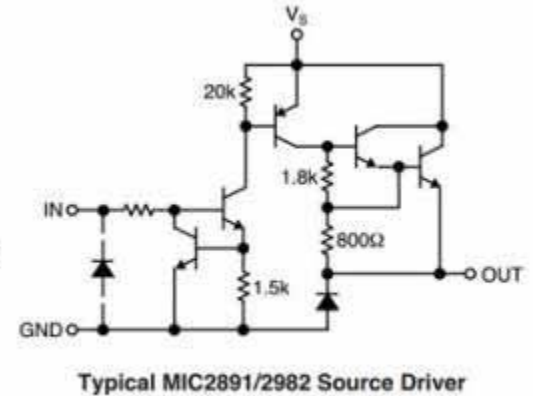
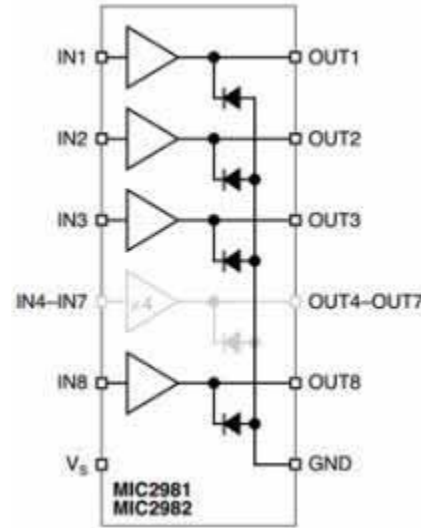
## Features:

- High-voltage, high-current outputs
- Output transient protection diodes
- CMOS-, PMOS-, NMOS-, and TTL - compatible inputs
- 5MHz typical data input rate
- Low-power CMOS latches



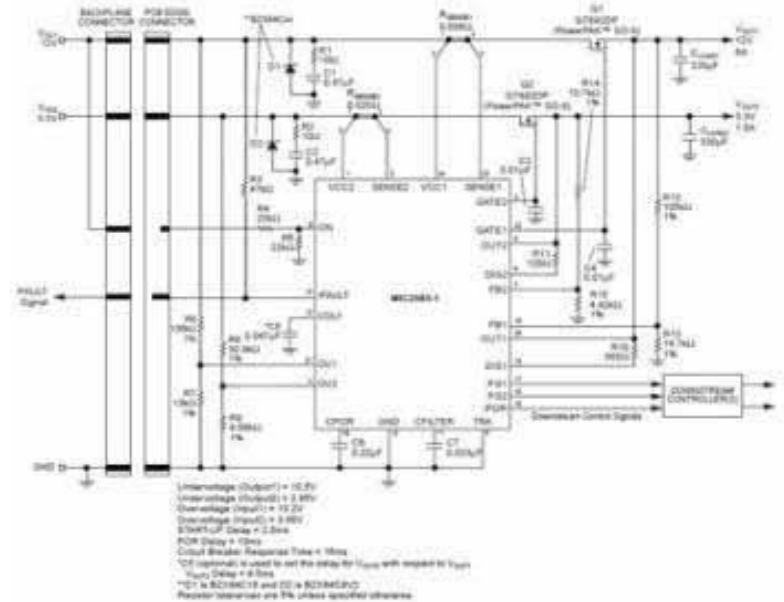
## Features:

- Output voltage to 50V
- Output current to 500mA
- Transient-protected outputs
- Integral clamp diodes
- TTL-, CMOS-, or PMOS-compatible –  
- inputs



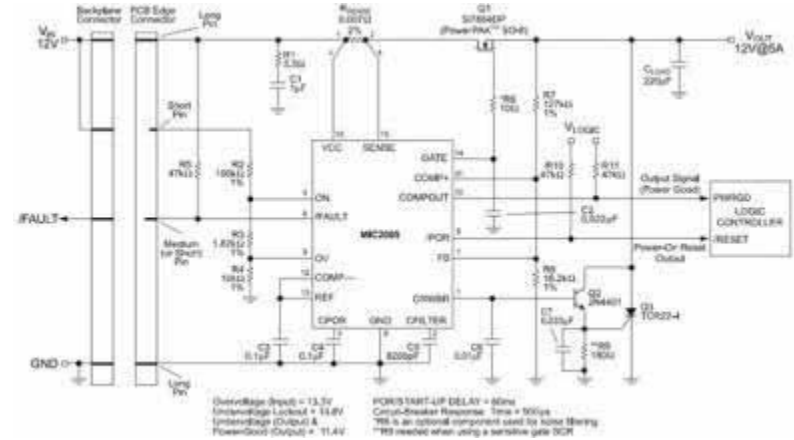
## Features:

- 1.0V to 13.2V supply voltage operation
- Surge voltage protection up to 20V
- Programmable inrush current limiting
- Electronic circuit breaker
- Undervoltage lockout protection
- Fast response to short circuit conditions ( $<1\mu\text{s}$ )
- Dual-level overcurrent fault sensing eliminates –  
– false tripping
- Current regulation limits inrush current regardless –  
– of load capacitance



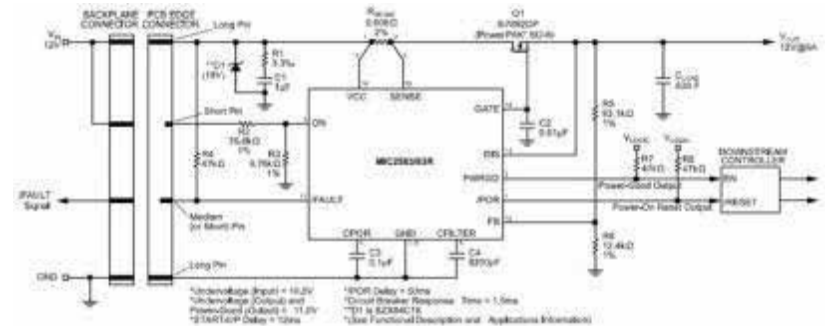
## Features:

- MIC2085: Pin for pin functional equivalent to the –  
– LTC1642
- 2.3V to 16.5V supply voltage operation
- Surge voltage protection to 33V
- Operating temperature range -40°C to +85°C –  
– Programmable inrush current limiting
- Analog foldback current limiting
- Electronic circuit breaker
- Dual-level overcurrent fault sensing
- Fast response to short circuit conditions (<1µs)
- Programmable output undervoltage detection
- Undervoltage lockout protection
- Power-on reset (MIC2085/86) and power-good (MIC2086) status outputs
- Driver for SCR crowbar on overvoltage Single Channel Hot Swap Controllers



## Features:

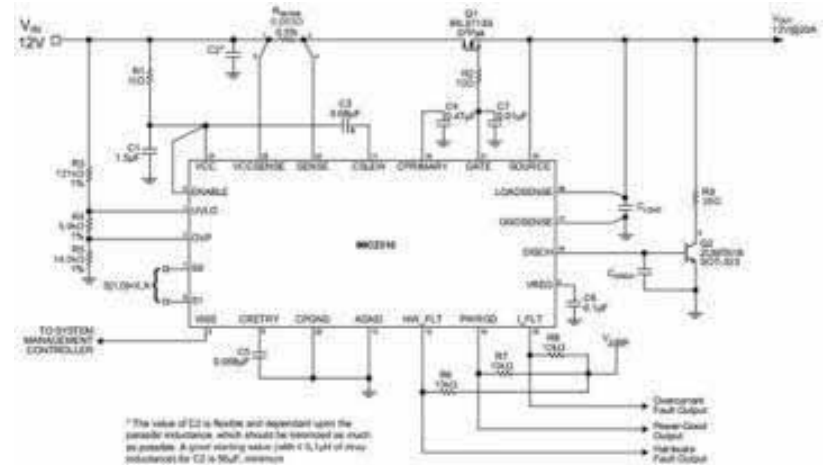
- MIC2582: Pin-for-pin functional equivalent –  
- to the LTC1422
- 2.3V to 13.2V supply voltage operation
- Surge voltage protection up to 20V
- Programmable inrush current limiting
- Electronic circuit breaker
- Fast response to short-circuit conditions ( $<1\mu\text{s}$ )
- Programmable output undervoltage detection
- Undervoltage Lockout (UVLO) protection
- Auto-restart function (MIC2583R)
- Power-on-Reset status output
- Power good (PG) status output (MIC2583 and MIC2583R)
- /FAULT status output (MIC2583 and MIC2583R)
- Current regulation limits inrush current regardless of load capacitance





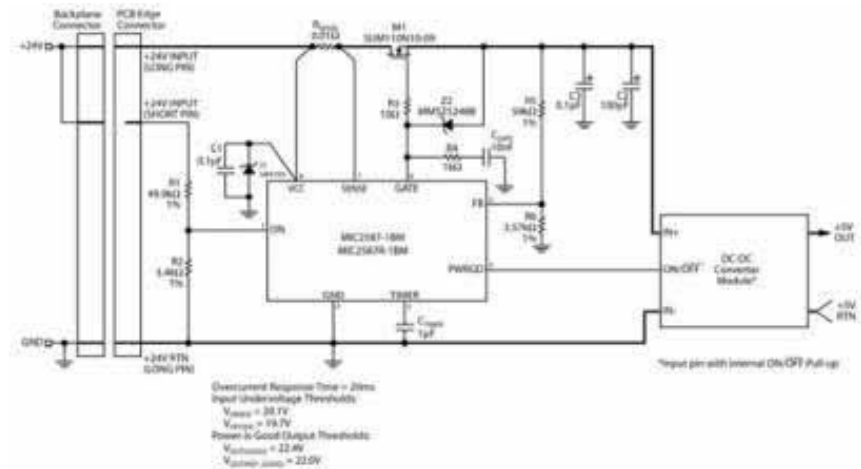
## Features:

- Provides safe PCB insertion and removal from –
  - live +12V backplanes
- Patent-pending, adaptive circuit breaker –
  - threshold control
- Maintains constant power product at output
- Power-limit product (VA) is externally –
  - programmable for various power applications
- Dual-level, dual-speed overcurrent -
  - detection/protection
- Programmable primary detector response time
- Fast (<1 $\mu$ s) secondary detector response time to short circuit conditions
- User-programmable threshold settings via (2) digital inputs
- Programmable inrush current slew-rate control
- Electronic circuit breaker functions after fault
- Latch off
- Automatic retry
- Fault reporting:
  - Open-drain 'Power-is-Good' output
  - Open-drain 'I\_FLT' output signaling for all current faults
  - Shorted RSENSE and Damaged MOSFET detection (D-G and D-S shorts)



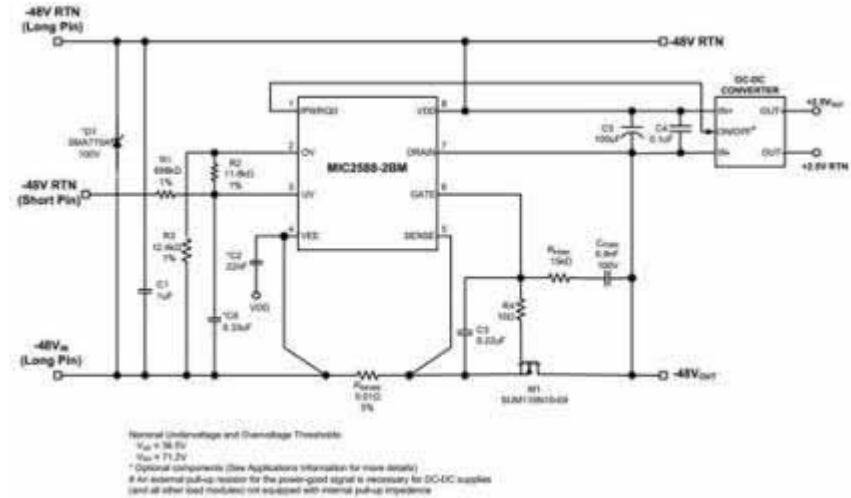
## Features:

- MIC2587: Pin-for-pin functional equivalent to –  
– the LT1641
- Fast responding circuit breaker ( $< 2\mu\text{s}$ ) to short –  
– circuit loads
- Operates from +10V to +80V with 100V ABS –  
– MAX operation
- Fault Reporting: Open-drain "Power-is-Good" –  
– output for enabling DC/DC converter(s)
- Active-HIGH: MIC2587-1/MIC2587R-1
- Active-LOW: MIC2587-2/MIC2587R-2
- Industrial temperature specifications at –  
– VCC = +24V and VCC = +48V
- Active current regulation minimizes inrush current
- Electronic circuit breaker for overcurrent fault protection
- Output latch off (MIC2587) or
- Output auto-retry (MIC2587R)



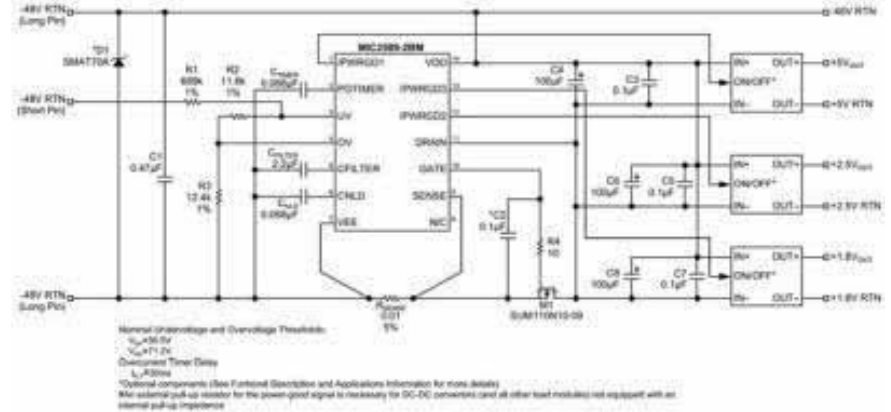
## Features:

- MIC2588: Pin-for-pin functional equivalent to the – LT1640/LT1640A/LT4250
- Provides safe insertion and removal from live – - 48V (nominal) backplanes
- Operates from -19V to -80V
- Electronic circuit breaker function
- Built-in 400 $\mu$ s "nuisance-trip" delay (tFLT)
- Regulated maximum output current into faults
- Programmable inrush current limiting
- Fast response to short circuit conditions (< 1 $\mu$ s)
- Programmable undervoltage and overvoltage – - lockouts (MIC2588-xBM)
- Programmable UVLO hysteresis (MIC2594-xBM)
- Fault reporting: Active-HIGH (-1BM) and Active – - LOW (-2BM) Power-Good output signal



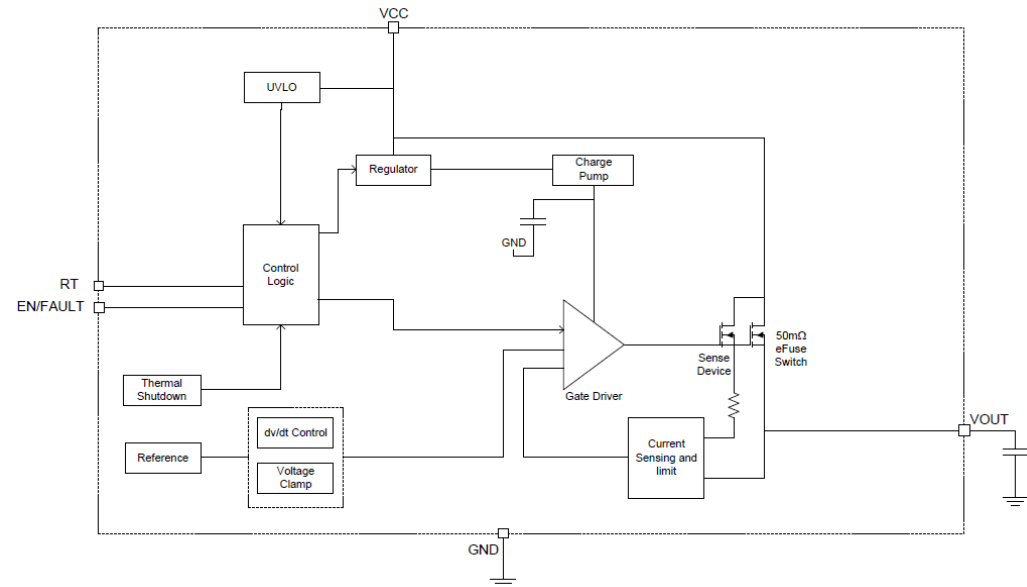
### Features:

- Operates from -19V to -80V
- Electronic circuit breaker function:
  - Output latch OFF (MIC2595)
  - Output auto-retry (MIC2595R)
- Active current regulation to control inrush –  
- currents
- Programmable UVLO hysteresis
- Provides safe insertion and removal from –  
- live 48V (nominal) backplanes
- User-programmable overcurrent detector –  
- response time
- Fast responding circuit breaker ( $<1\mu\text{s}$ ) to –  
- short circuit conditions
- Staggered 'Power-Good' output signals –  
- provide load sequencing:
  - Active-HIGH (-1)
  - Active-LOW (-2)



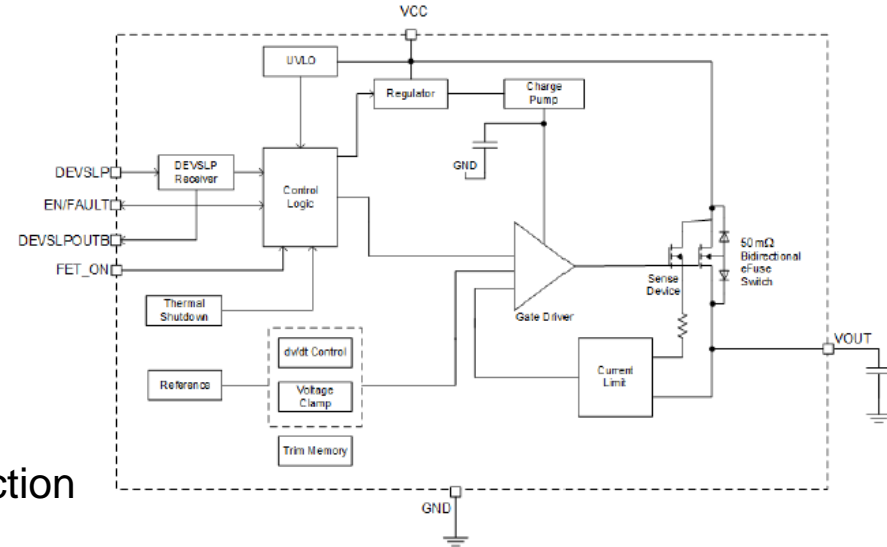
### Features:

- Protected from Hot-Swap Condition
- 50mΩ(typ.)  $R_{\text{DS(ON)}}$  Internal eFuse FET
- Up to 24V Transient Input Range
- < 15V Output Voltage Clamp incl. Dynamic Transient
- Continuous Operation During VCC Surge
- 3.5A Current Limit at Overloading
- Over-Temperature Protection
- 13mS and 1.4ms Softstart Rise Time
- Current Limit During Vout Softstart
- UVLO Detection
- 3mm x 3mm DFN



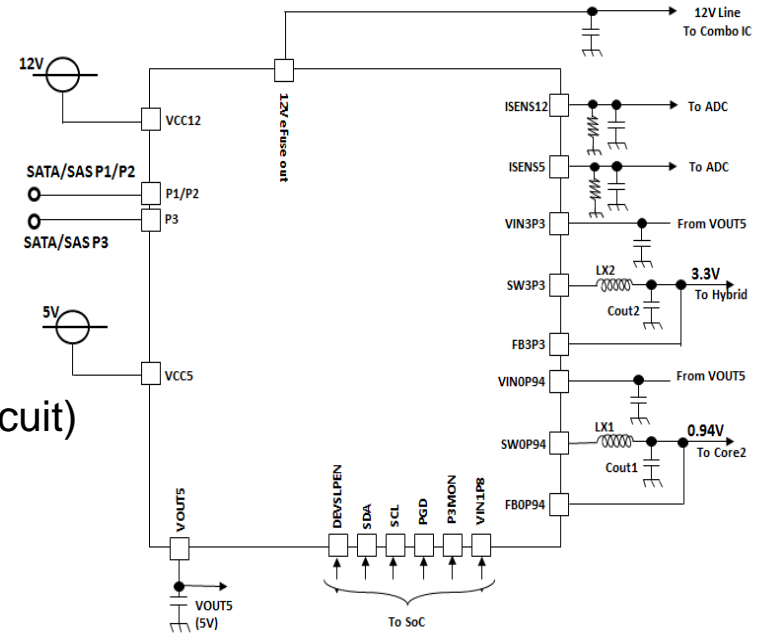
## Features:

- 50mΩ (typ)  $R_{DS(ON)}$  Internal eFuse FET
- Bi-directional current blocking switch
- Up to 15 V transient input range
- 6 V output voltage clamp
- SATA DevSleep support
- SAS-DISABLE support
- Continuous operation during VCC surge
- Current limit at overload and short-circuit protection
- Over-temperature protection
- Selectable soft-start, 13ms or 1.4ms rise time
- UVLO detection
- 2 mm x 3 mm VQFN



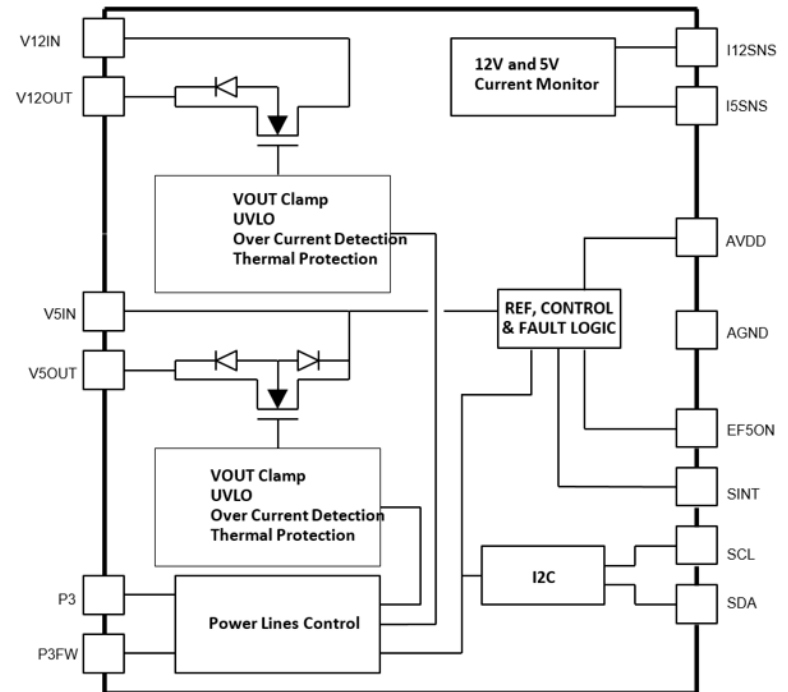
## Features List:

- Dual E-Fuse Devices for SATA / SAS Connections
- 25v and 15v surge protection on 12v and 5v inputs
- 5v E-Fuse has Bidirectional switch
- Built in 3.5A Switcher at 2MHz
- Built in 0.3A Switcher at 6MHz
- Hot Swap Compliant
- Current Limiting (hot swap inrush, overload, short-circuit)
- Inrush Current Limiting by slew rate control
- I2C Bus for monitoring
- E-Fuse Current monitoring output.
- Continuous operation during surge
- 50mOhm  $R_{\text{DS(on)}}$
- Over Current control
- Output Voltage slew rate Control.
- UVLO Detection
- 3.5mm x 4.5mm DFN



## Features List:

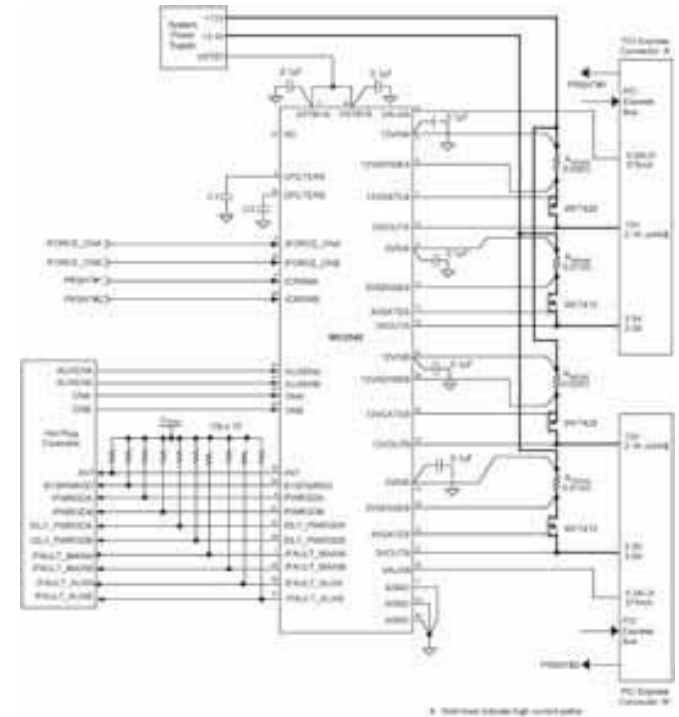
- 4A 12v E-Fuse
- 4A 5v E-Fuse with Bi-Switch
- Current Monitor Output
- P3 Enable Option via I<sup>2</sup>C
- Inrush Current Limiting
- Ultra Fast Clamping
- Over Current / Short Current Limit
- Thermal Protection
- Fault Pin for Over-Current and Thermal
- Output Voltage Soft-start Control





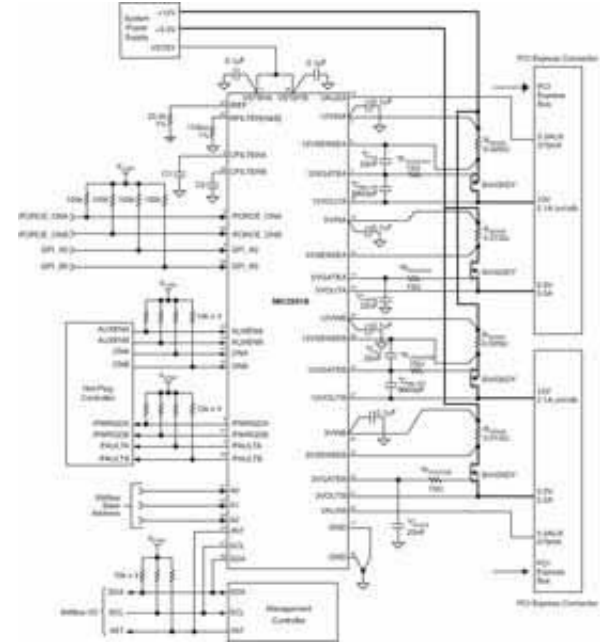
## Features:

- Supports two independent PCI Express slots
- MAIN & AUX outputs are inter-dependent during AUX –  
- overcurrent conditions
- 12V, 3.3V, and 3.3VAUX supplies supported per PCI –  
- Express Specification v1.0a, v.2.0
- Integrated Power MOSFETS for 3.3VAUX rails
- Electronic circuit breakers for each supply per slot
- Programmable gate voltage slew-rate control
- Active current regulation controls inrush current
- User-programmable Primary Overcurrent Detector
- /PWRGD and Delayed /PWRGD (164 ms) Signal –  
- Outputs per slot
- Separate /FAULT output signals for MAIN and AUX –  
- rails for each slot
- Internally de-bounced Plug-in Card Retention Switch –  
- Inputs per slot.



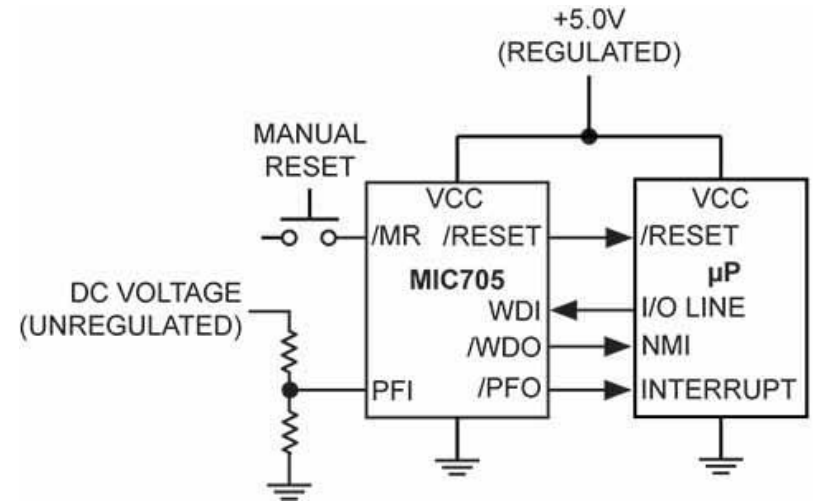
## Features:

- Voltage-tolerant I/O for compatibility with SMBus 2.0 – - systems
- 12V, 3.3V, and 3.3VAUX supplies supported per PCI – - Express Specification v1.0a
  - Integrated power MOSFETs for 3.3VAUX rails
  - Standby operation for Wake-on-LAN applications with low backfeed on Main +12V and +3.3V rails.
- On-chip circuitry for data collection of each rail output – - voltage and output current for both slots
  - Integral analog multiplexer and 8-bit  $\Delta\Sigma$ ADC
  - Compliant to the Intelligent Platform Management Interface (IPMI) Specification v1.0
  - Conversion results available via an SMBus interface
- Programmable inrush current limiting
- Active current regulation controls inrush current
- Electronic circuit breaker for each supply to each slot
- Thermal isolation between circuitry for Slot A and Slot B



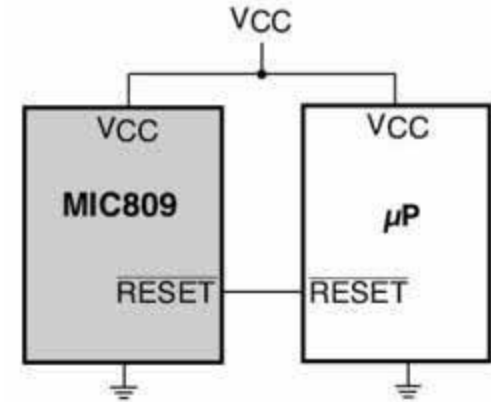
## Features:

- De-bounced manual reset input is TTL/CMOS – Compatible
- Reset pulse width: 200ms
- Watchdog timer, 1.6s (MIC705/706)
- 4.65V or 4.40V Precision Voltage Monitor
- Early power fail warning or low battery detect



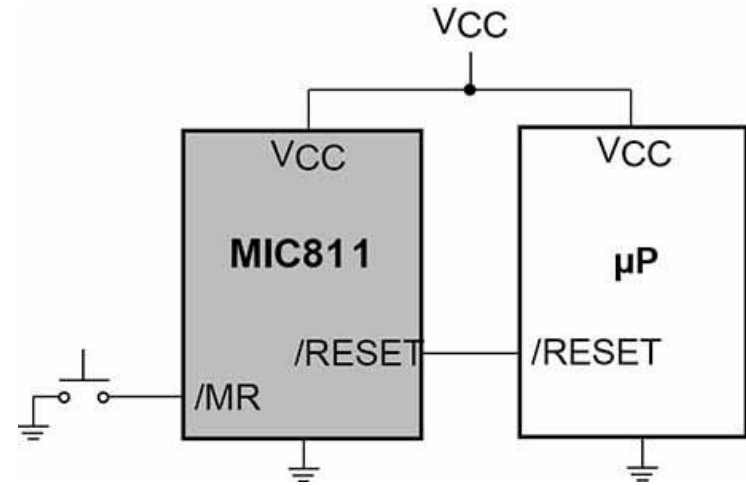
## Features:

- Precision voltage monitor for 3V, 3.3V or 5V power supplies
- /RESET remains valid with VCC as low as 1.4V for SOT-23 –  
- packaged part
- /RESET remains valid with VCC as low as 1V for SC70 –  
- packaged part
- Typically less than 15 $\mu$ A supply current for SOT-23 packaged  
– part
- 5 $\mu$  typical supply current for SC70 packaged part
- 140ms minimum reset pulse widths available
- Available in 3-pin SOT-23 and SC-70 package



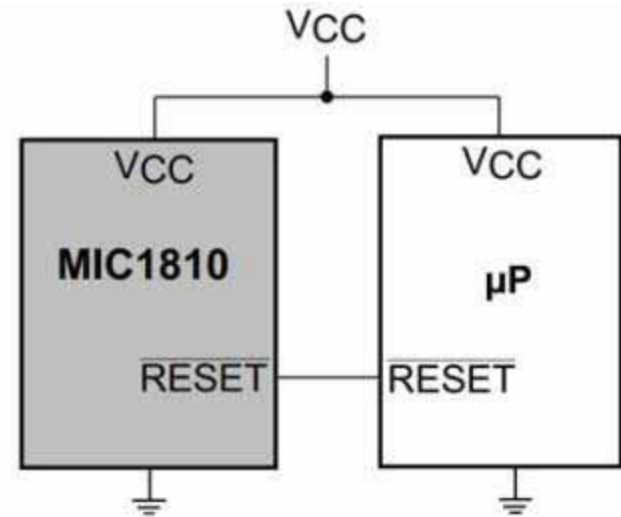
## Features:

- Precision voltage monitor for 3V, 3.3V or 5V –  
- power supplies
- /RESET remains valid with VCC as low as 1V
- 5 $\mu$ A typical supply current
- 140ms minimum reset pulse width available
- Manual reset input
- Available in 4-pin SOT-143 package



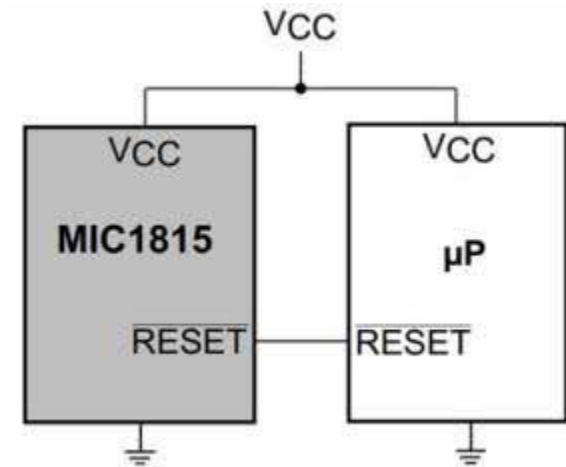
## Features:

- Precision voltage monitor for 5%, 10%, or 15% drop  
– in 5V power supplies
- /RESET remains valid with VCC as low as 1V
- 5 $\mu$ A supply current (typical)
- 100ms minimum reset pulse width
- No external components required
- Available in 3-pin SOT-23 package



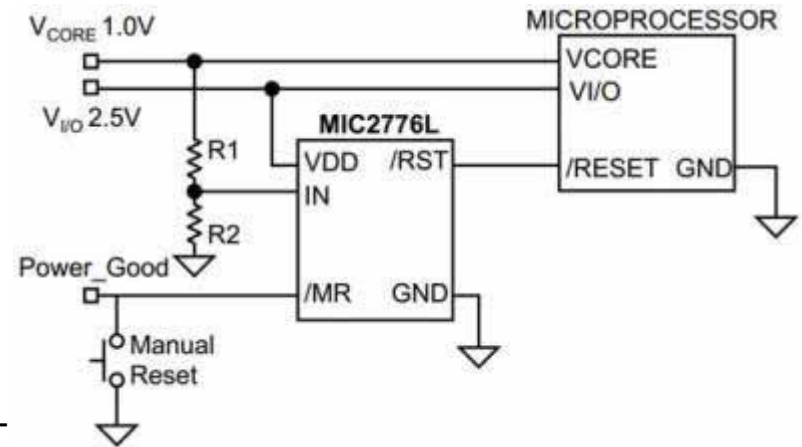
## Features:

- Precision voltage monitor for 10% or 20% drop in –  
- 3.3V power supplies
- /RESET remains valid with VCC as low as 1V
- 5 $\mu$ A supply current
- 100ms minimum reset pulse width
- No external components required
- Available in 3-pin SOT-23 package



## Features:

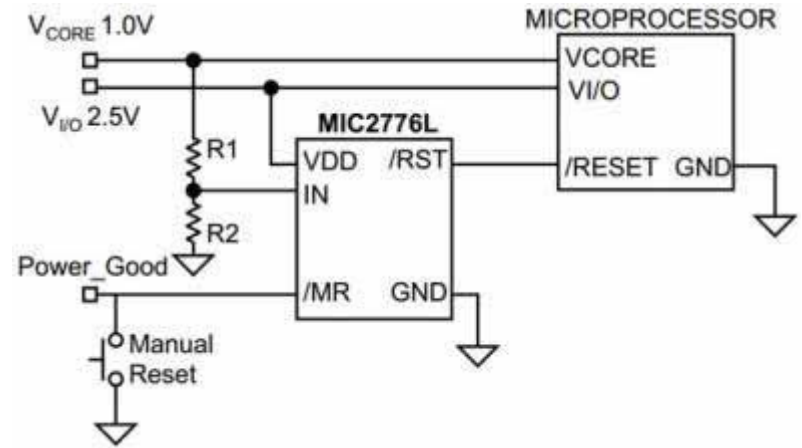
- $\pm 1.5\%$  threshold accuracy
- Separate  $V_{DD}$  input
- Generates power-on reset pulse (140ms min.)
- Manual reset input
- Inputs can be pulled above  $V_{DD}$  (7V abs. max.)
- Ultra-low supply current, 3.0 $\mu$ A typical
- Rejects brief input transients
- User-adjustable input can monitor supplies as low –  
- as 0.3V
- Choice of active-high, active-low or open-drain –  
- activelow reset output
- IttyBitty® SOT-23-5 package
- Open-drain output can be pulled above  $V_{DD}$  (7V –  
- abs. max.)





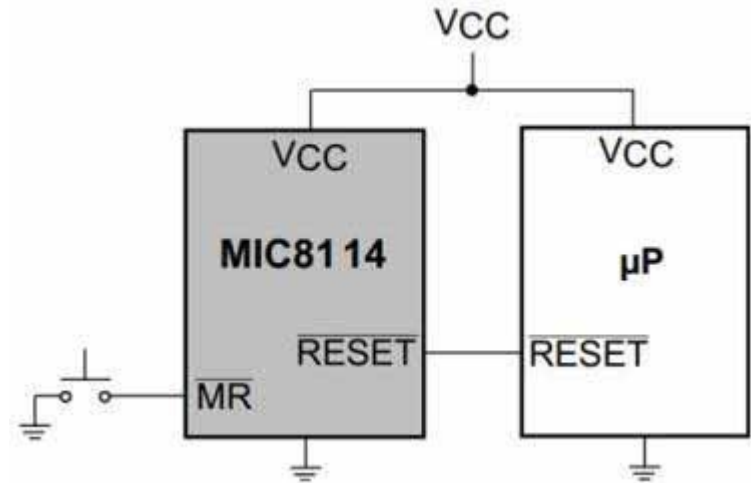
## Features:

- Optimized for PDAs, cellular telephones, pagers, -  
- and other battery-powered devices
- Independently adjustable high- and low-voltage –  
- thresholds
- Internal logic prevents battery-voltage-fluctuation –  
- chatter
- For applications requiring open-drain output, see –  
- MIC2778
- High  $\pm 2\%$  voltage threshold accuracy
- Built in 140ms (minimum) delay deglitches output
- Extremely low 1 $\mu$ A typical supply current
- Immune to brief power supply transients
- 5-lead SOT-23 package



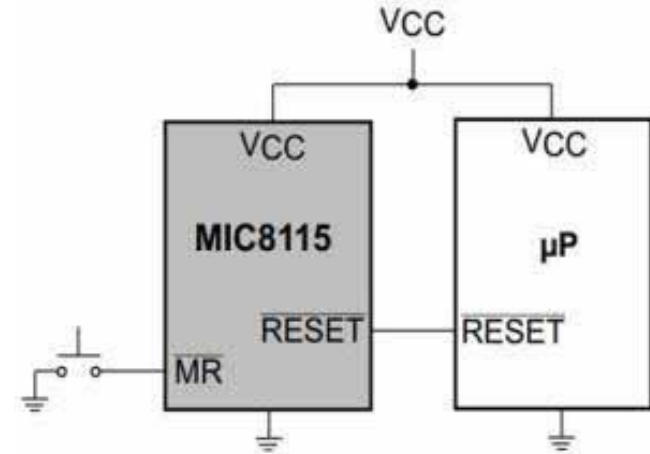
## Features:

- Precision voltage monitor for 3.3V power supplies
- Specifically tailored to the AMD Elan SC400/410
- /RESET remains valid with VCC as low as 1V
- 5 $\mu$ A typical supply current
- 790ms minimum reset pulse width
- Manual reset input
- Available in 4-Pin SOT-143 Package



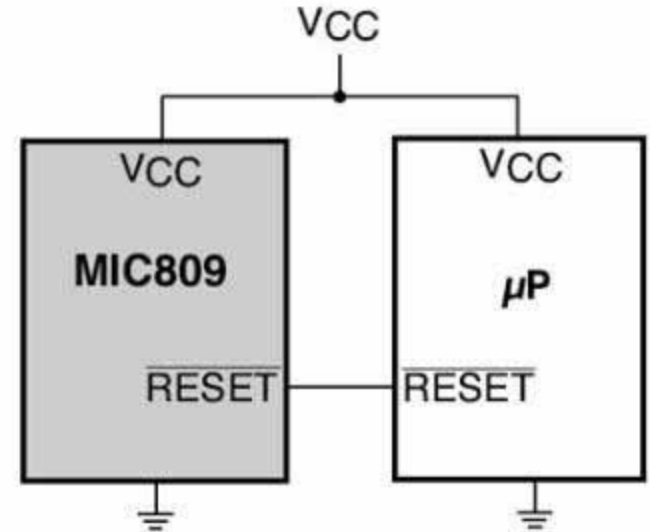
## Features:

- Precision voltage monitor for 3.3V power supplies
- Specifically tailored to the AMD Elan SC500 Series
- /RESET remains valid with VCC as low as 1V
- 5 $\mu$ A typical supply current
- 1100ms minimum reset pulse width
- Manual reset input
- Available in 4-Pin SOT-143 Package



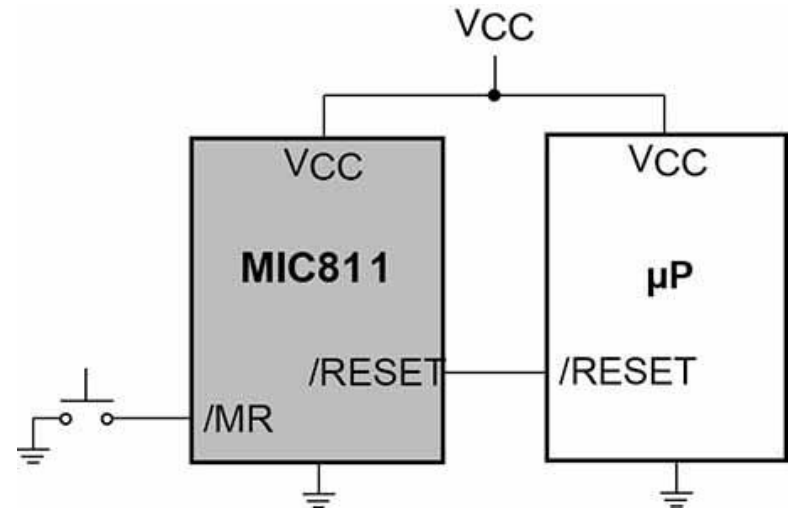
## Features:

- Precision voltage monitor for 3V, 3.3V or 5V power –  
- supplies
- /RESET remains valid with VCC as low as 1.4V for –  
- SOT-23 packaged part
- /RESET remains valid with VCC as low as 1V for –  
- SC70 packaged part
- Typically less than 15 $\mu$ A supply current for SOT-23 –  
- packaged part
- 5 $\mu$  typical supply current for SC70 packaged part
- 140ms minimum reset pulse widths available
- Available in 3-pin SOT-23 and SC-70 package



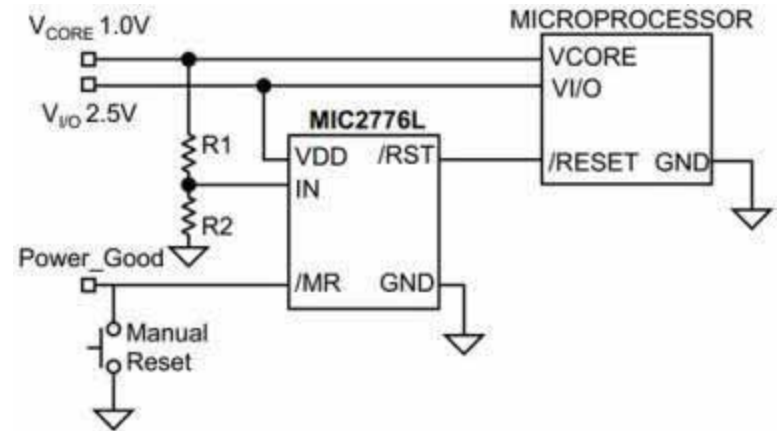
## Features:

- Precision voltage monitor for 3V, 3.3V or 5V –  
- power supplies
- /RESET remains valid with VCC as low as 1V
- 5 $\mu$ A typical supply current
- 140ms minimum reset pulse width available
- Manual reset input
- Available in 4-pin SOT-143 package



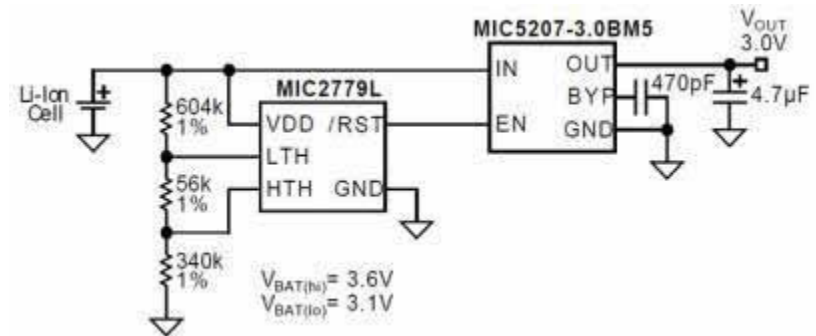
## Features:

- $\pm 1.5\%$  threshold accuracy
- Separate  $V_{DD}$  input
- Generates power-on reset pulse (140ms min.)
- Manual reset input
- Inputs can be pulled above  $V_{DD}$  (7V abs. max.)
- Open-drain output can be pulled above  $V_{DD}$  (7V – - abs. max.)
- Ultra-low supply current, 3.0 $\mu$ A typical
- Rejects brief input transients
- Choice of active-high, active-low or open-drain – - active low reset output
- IttyBitty® SOT-23-5 package
- User-adjustable input can monitor supplies as low as 0.3V



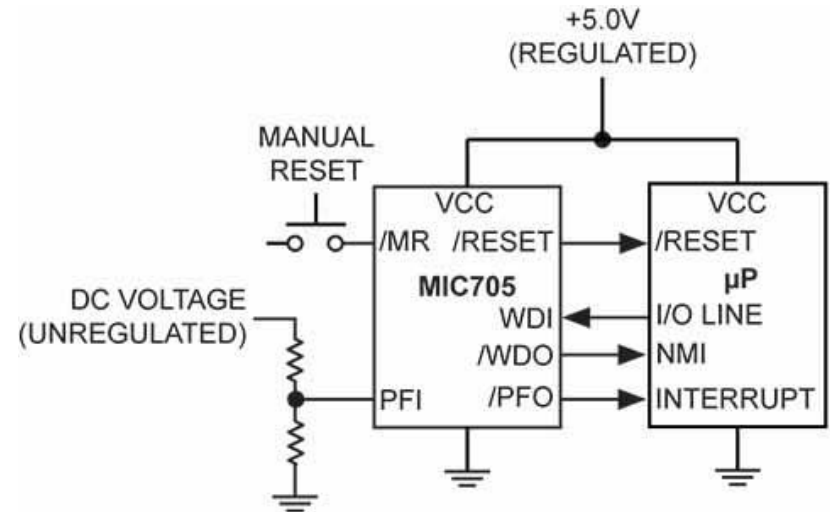
### Features:

- Optimized for PDAs, cellular telephones, pagers, - and other battery-powered devices
- Independently adjustable high- and low-voltage – - thresholds
- For applications requiring open-drain output, see – MIC2778
- Internal logic prevents battery-voltage-fluctuation – chatter
- High  $\pm 2\%$  voltage threshold accuracy; 1% - - available
- Built in 140ms (minimum) delay deglitches output
- Extremely low 1 $\mu$ A typical supply current
- Immune to brief power supply transients
- 5-lead SOT-23 package



## Features:

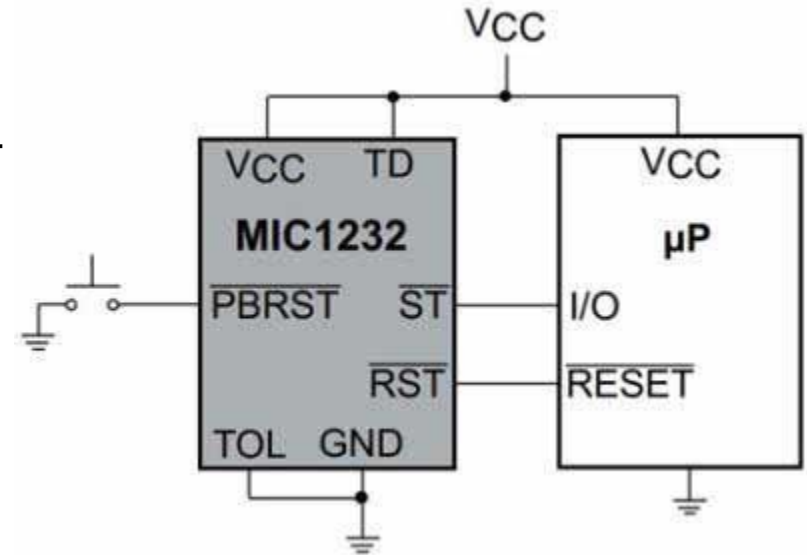
- De-bounced manual reset input is TTL/CMOS –  
- Compatible
- Reset pulse width: 200ms
- Watchdog timer, 1.6s (MIC705/706)
- 4.65V or 4.40V Precision Voltage Monitor
- Early power fail warning or low battery detect





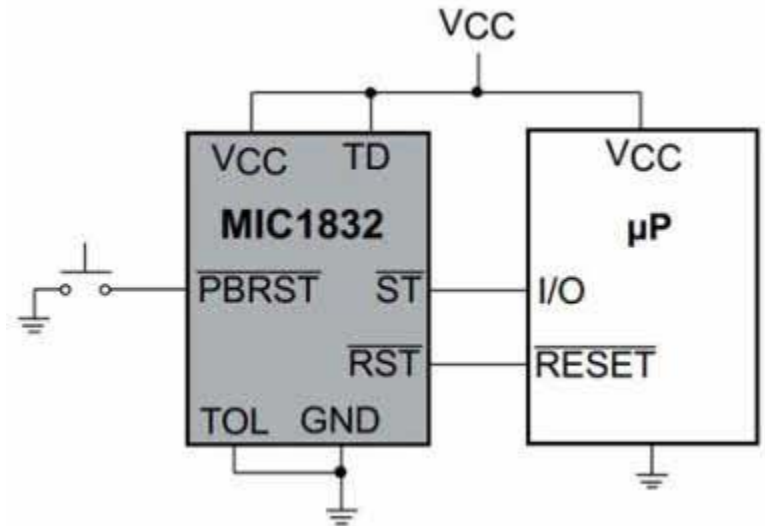
## Features:

- Power OK/Reset time delay, 250ms min.
- Watchdog timer, 150ms, 600ms, or 1.2s typical
- Precision supply voltage monitor, select between -  
– 5% or 10% of supply voltage
- Available in 8-pin surface mount (SO)
- De-bounced External reset input
- Low supply current, <math><18\mu\text{A}</math> typical



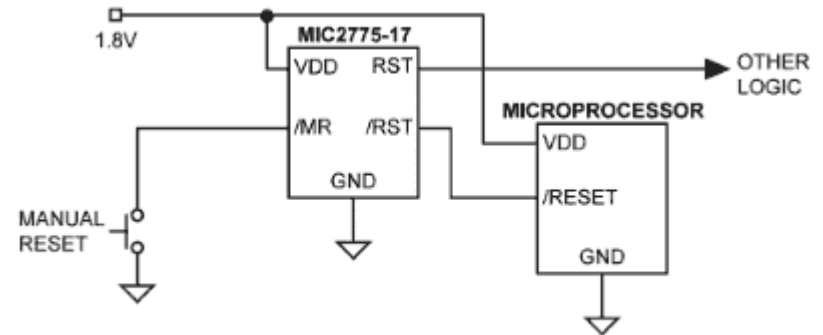
## Features:

- Power OK/Reset time delay, 250ms min.
- Watchdog timer, 150ms, 600ms, or 1.2s typical
- Precision supply voltage monitor, select –  
- between 5% or 10% of supply voltage
- Available in 8-pin surface mount (SO)
- De-bounced External reset input
- Low supply current, <math><18\mu\text{A}</math> typical



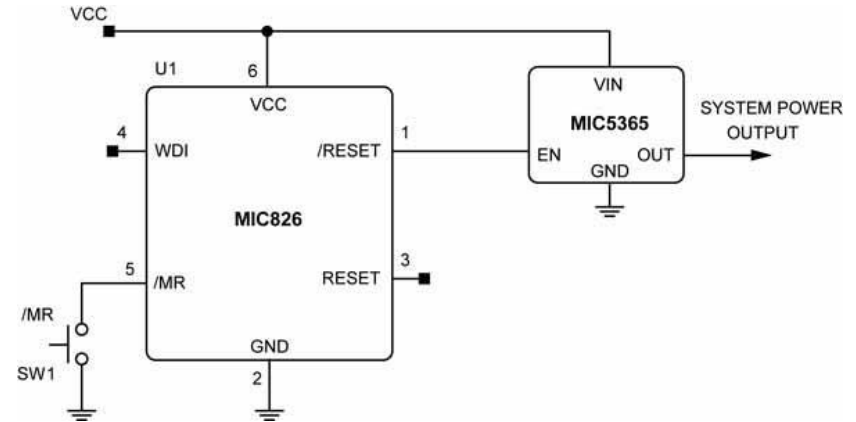
## Features:

- Monitors power supply for under-voltage –  
- conditions
- Choice of factory-programmed thresholds
- Generates 140ms (minimum) power-on –  
- RESET pulse
- Manual reset capability
- Both active-high and active-low RESET –  
- outputs
- /RST output valid down to 1.2V
- Ultra-low supply current, 3.5 $\mu$ A typical
- Rejects brief input transients
- No external components
- Pin compatible upgrade for MAX825
- IttyBitty® 5-pin SOT-23 package



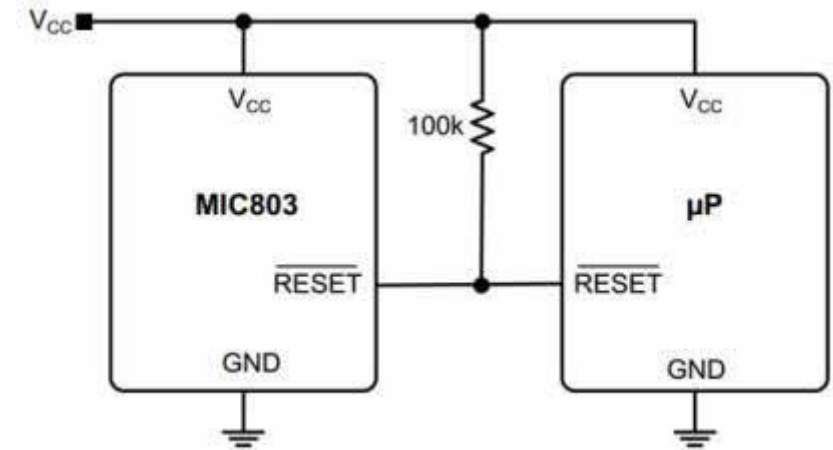
### Features:

- Precision 1.8V to 5V power supply monitor
- $\pm 0.5\%$  threshold accuracy at  $T_A = +25^\circ\text{C}$
- $\pm 1.5\%$  threshold accuracy from  $T_A = -40^\circ\text{C}$  to  $+125^\circ\text{C}$
- $3.8\mu\text{A}$  supply current (MIC826S/R/T/W/Y/Z)
- $4.8\mu\text{A}$  supply current (MIC826L/M)
- 140ms (min.) reset timeout period
- 1.6s (typ.) watchdog timeout period
- Active-high and active-low push-pull outputs
- Guaranteed reset output valid to  $V_{CC} = 1\text{V}$
- $-40^\circ\text{C}$  to  $+125^\circ\text{C}$  junction temperature range
- 6-pin 1.6x1.6x0.5mm Thin DFN package
- 50% smaller version of MAX823/MAX824/MAX825/ -  
- ADM823/ADM824/ADM825
- 8x lower watchdog input current than competition



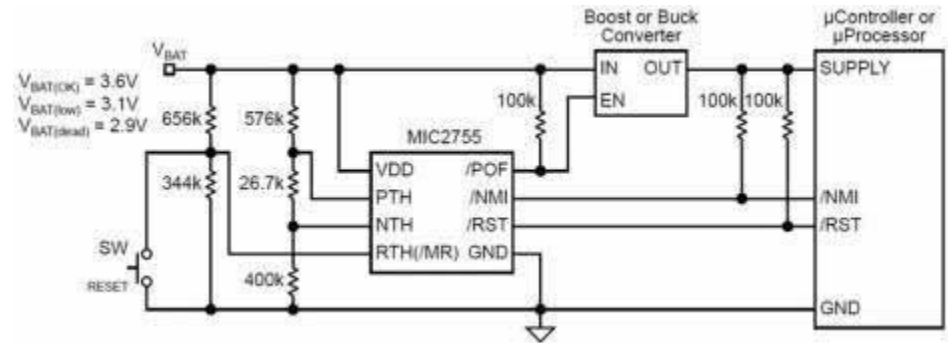
## Features:

- 4.5 $\mu$ A supply current (typical) at 3.6V
- Open-Drain /RESET output
- /RESET remains valid with VCC as low as 1V
- 20ms, 140ms, or 1120ms (min) reset timeout –  
- Options
- 2.63V to 4.63V Preset Voltage Threshold –  
- Options
- 2.5% Voltage Threshold Accuracy over –  
- temperature
- 3-pin SC70-3 and 3-pin SOT-23 package
- -40°C to +125°C Junction Temperature Range



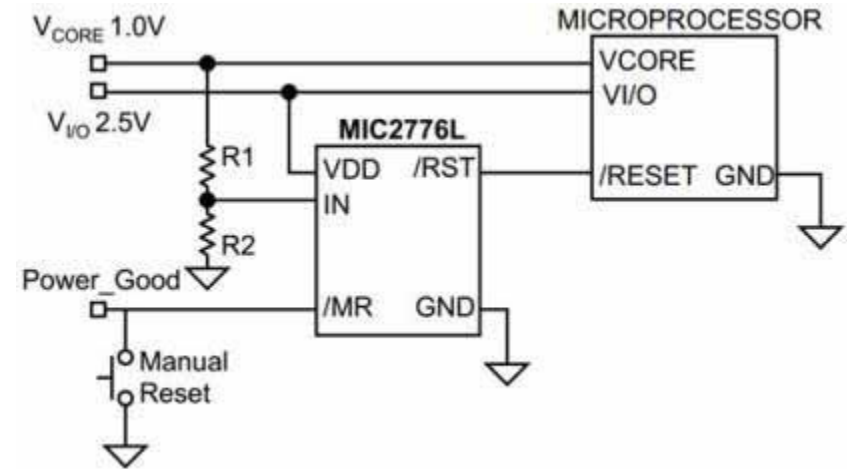
## Features:

- Optimized for PDAs, pagers and other –  
– hand-held devices.
- Detects multiple battery states: Battery –  
– OK, Low battery, Dead battery.
- Adjustable voltage thresholds
- High accuracy  $\pm 2\%$  voltage thresholds
- Reset generation at power-on (700ms –  
– min.)
- De-bounced manual reset function
- Internal logic prevents chatter if battery voltage fluctuates
- Extremely low  $2\mu\text{A}$  typical supply current
- 8-pin MSOP package



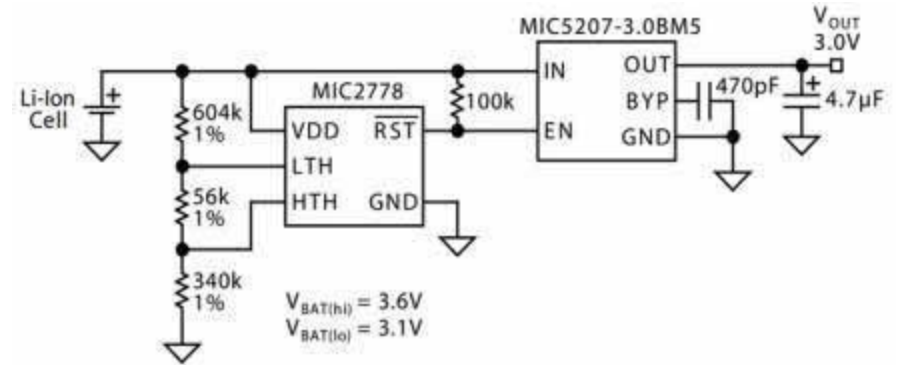
## Features:

- User-adjustable input can monitor supplies as –
  - low as 0.3V
- $\pm 1.5\%$  threshold accuracy
- Separate  $V_{DD}$  input
- Generates power-on reset pulse (140ms min.)
- Choice of active-high, active-low or open-drain
  - activelow reset output
- Inputs can be pulled above  $V_{DD}$  (7V abs. max.)
- Open-drain output can be pulled above  $V_{DD}$  –
  - (7V abs. max.)
- Ultra-low supply current, 3.0 $\mu$ A typical
- Rejects brief input transients
- SOT-23-5 package



## Features:

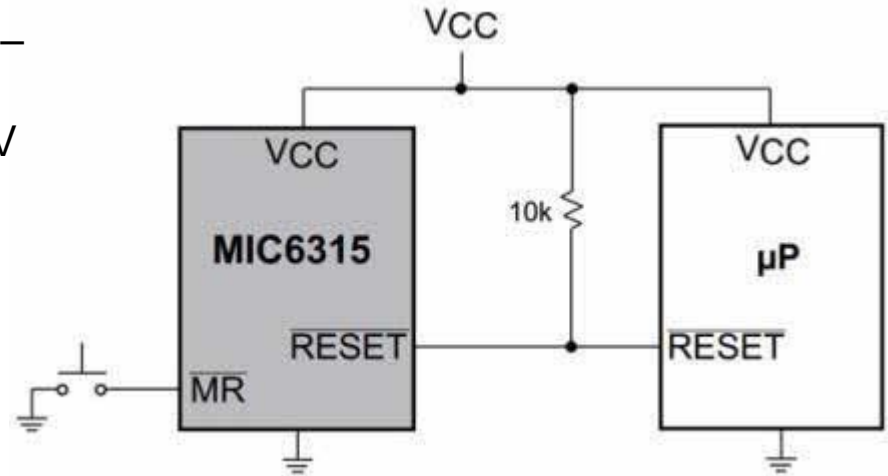
- Optimized for PDAs, cellular telephones, -  
- pagers, and other battery-powered devices
- Independently adjustable high- and low –  
- voltage thresholds
- Internal logic prevents battery-voltage –  
- fluctuation chatter
- High  $\pm 2\%$  voltage threshold accuracy; 1% -  
- available
- Built in 140ms (minimum) delay deglitches output
- For applications not requiring built-in delay, see MIC841
- Immune to brief power supply transients
- 5-lead SOT-23 package





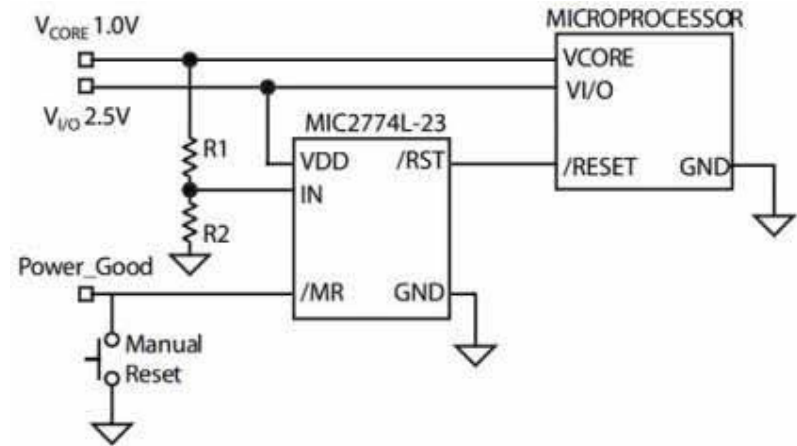
## Features:

- Precision voltage monitor for 3V, 3.3V or 5V –  
- power supplies
- /RESET remains valid with VCC as low as 1V
- 5 $\mu$ A supply current
- 20ms, 140ms, or 1100ms minimum reset –  
- pulse widths available
- Manual reset input
- 4-pin SOT-143 package



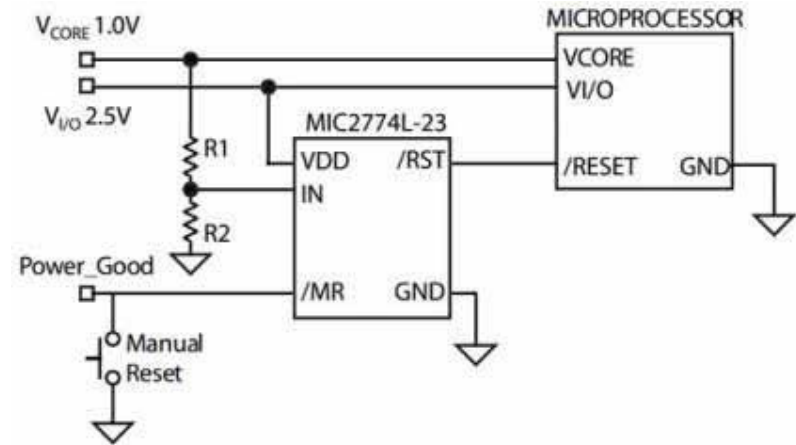
### Features:

- Monitors two independent power supplies –  
- for under-voltage conditions
- One fixed and one user adjustable input
- Choice of factory-programmed thresholds
- Adjustable input can monitor supplies as –  
- low as 0.3V
- Generates 140ms (minimum) power-on –  
- reset pulse
- Inputs may be pulled above  $V_{DD}$  (7V abs. max.)
- $/RST$  output valid down to 1.2V
- Ultra-low supply current, 3.5 $\mu$ A typical
- Rejects brief input transients
- 5-lead SOT-23 package
- Pin compatible upgrade for MAX6306/09/12



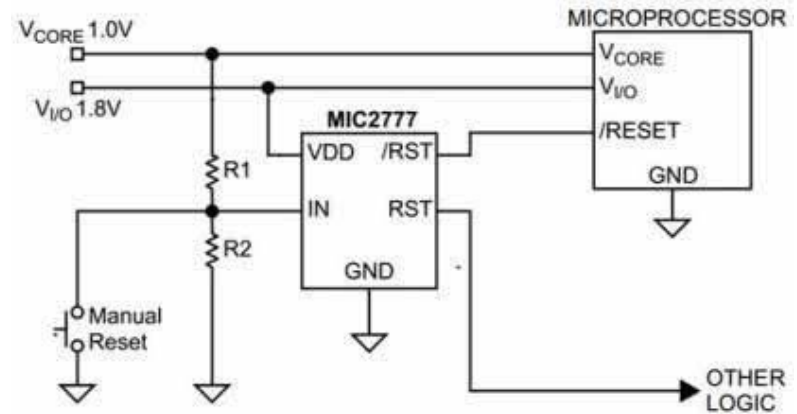
### Features:

- Monitors two independent power supplies for –  
– under-voltage conditions
- One fixed and one user adjustable input
- Choice of factory-programmed thresholds
- Adjustable input can monitor as low as 0.3V
- Generates 140ms (min) power-on reset pulse
- Choice of active-high, active-low, or open-drain –  
– active low reset outputs
- Inputs may be pulled above  $V_{DD}$  (7V abs. max.)
- /RST output valid down to 1.2V
- Ultra-low supply current, 3.5 $\mu$ A typical
- Rejects brief input transients
- 5-lead SOT-23 package
- Pin compatible upgrade for MAX6306/09/12



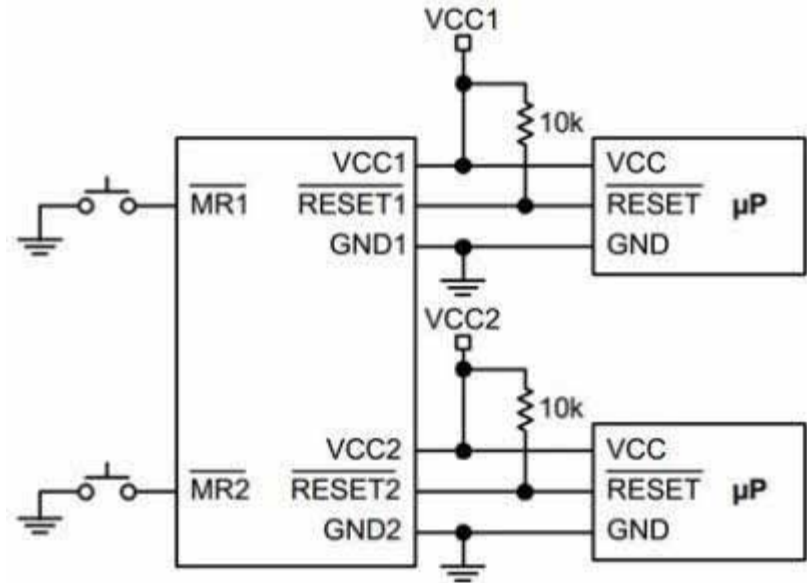
## Features:

- Monitors two independent power supplies for –
  - under-voltage conditions
- One fixed and one user adjustable input
- 1.5% threshold accuracy
- Choice of factory-programmed thresholds
- User-adjustable input can monitor supplies –
  - as low as 0.3V
- Generates 140ms (min) power-on RESET pulse
- Manual reset capability
- Input may be pulled above  $V_{DD}$  (abs. max.)
- /RST output valid down to 1.2V
- Ultra-low supply current, 3.5 $\mu$ A typical
- Rejects brief input transients
- 5-pin SOT-23 package



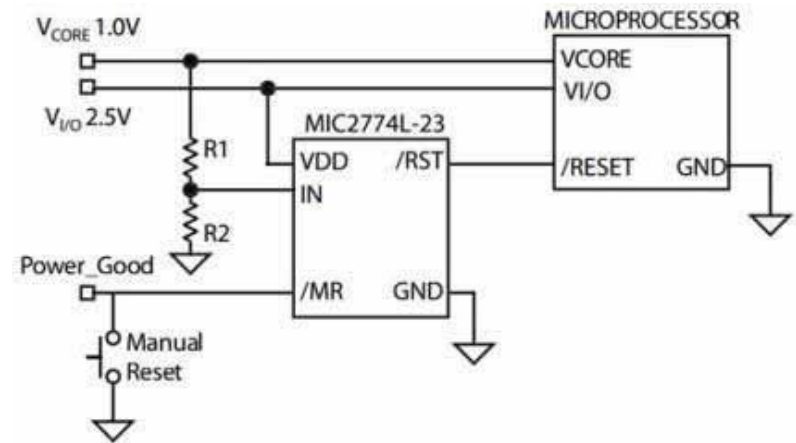
## Features:

- Two independent voltage supervisors
- Directly replaces discrete supervisors
- Generates power-on reset pulses
- De-bounced manual reset Inputs
- Choice of voltage thresholds
- 20, 140, or 1100ms reset timeouts
- Reset output may be pulled above VCC
- Rejects brief input transients
- Ultra-small 2mm x 2mm MLF® package



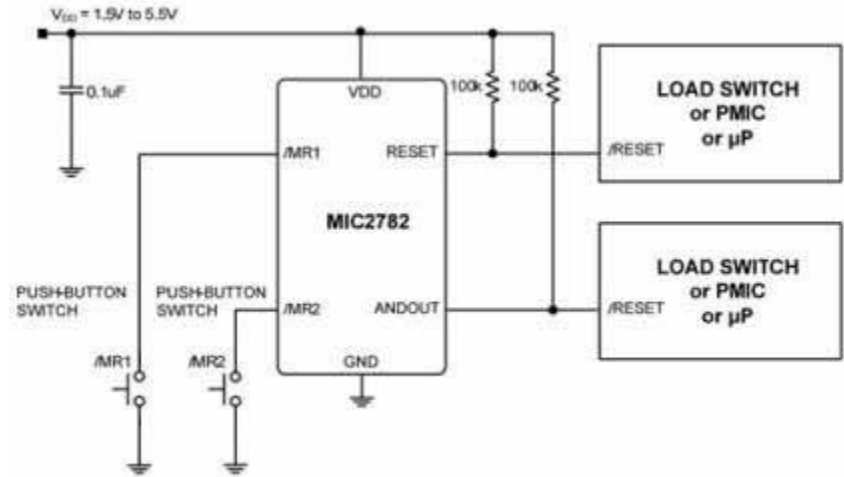
## Features:

- Monitors two independent power supplies for –  
– under-voltage conditions
- One fixed and one user adjustable input
- Choice of factory-programmed thresholds
- Adjustable input can monitor as low as 0.3V
- Generates 140ms (min) power-on reset pulse
- Manual reset input
- Inputs may be pulled above  $V_{DD}$  (7V abs. max.)
- /RST output valid down to 1.2V
- Ultra-low supply current, 3.5 $\mu$ A typical
- Rejects brief input transients
- 5-lead SOT-23 package
- Pin compatible upgrade for MAX6306/09/12



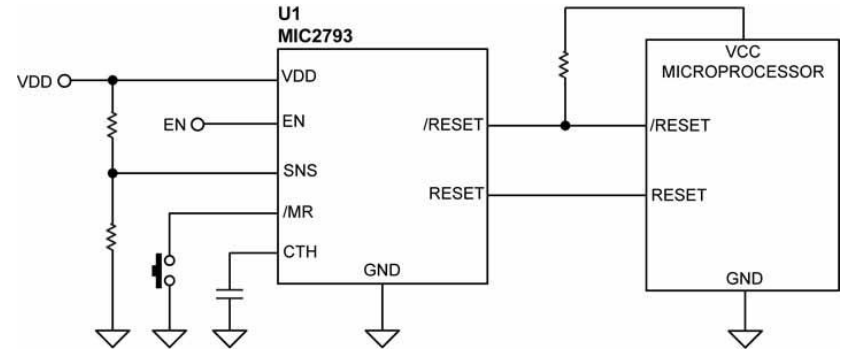
## Features:

- 1.5V to 5.5V Operating Supply Voltage Range
- 2.2 $\mu$ A Supply Current with /MR1, /MR2 not asserted
- Factory programmed setup periods of 6s, 8s, - 10s, or 12s
- Factory programmed reset timeout periods of - 0.5s, 1s, or 2s
- Integrated 65k $\Omega$  /MR1 and /MR2 Pull-Up - Resistors
- RESET asserts after /MR1 and /MR2 are - asserted low for a setup period
- ANDOUT asserts after /MR1 and /MR2 are - asserted low for a de-bounce time (1.5ms)



## Features:

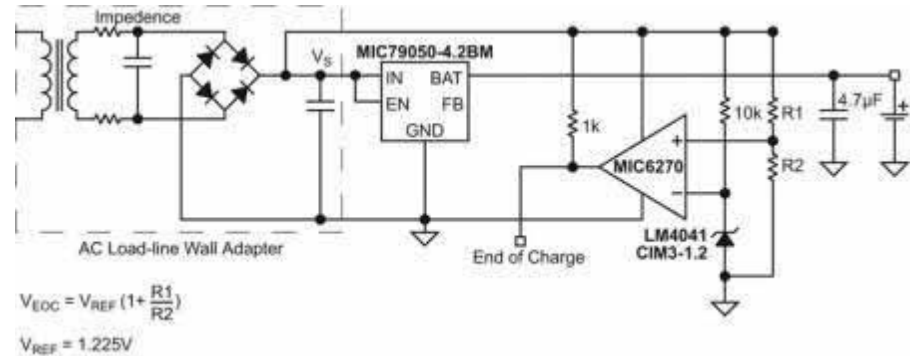
- 1.5V to 5.5V operating supply voltage range
- Ultra-fast propagation delay (1 $\mu$ s typically)
- 0.4V reference voltage (SNS pin)
  - $\pm 1.0\%$  threshold accuracy from  $-40^{\circ}\text{C}$  to  $- +125^{\circ}\text{C}$
  - Monitored voltage range from 0.4V to 5.5V
- Active-high enable input pin (MIC2793 only)
- The MIC2790/1/3 features multiple options:
  - Open-drain active-low (/RESET)
  - Push-pull active-low (/RESET)
  - Push-pull active-high (RESET)
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range
- 6-pin TSOT-23 (MIC2790)
- 6-pin 2 $\times$ 2mm Thin DFN (MIC2790)
- 6-pin 1.6 $\times$ 1.6mm Thin DFN (MIC2791)
- 8-pin 2 $\times$  2mm Thin DFN (MIC2793)





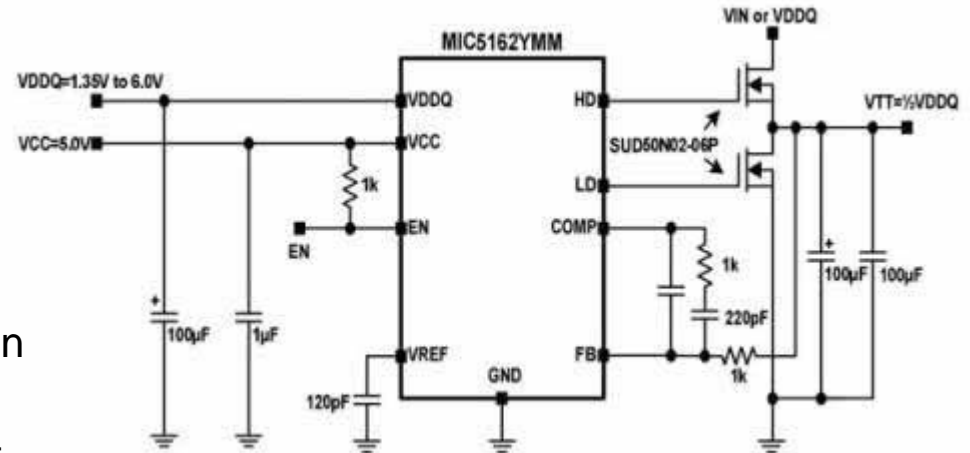
## Features:

- High accuracy:
  - $\pm 0.75\%$  over  $-5^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$
- Zero off-mode current
- $10\mu\text{A}$  reverse leakage
- Ultra-low  $380\text{mV}$  dropout at  $500\text{mA}$
- Wide input voltage range
- Logic controlled enable input –  
- (8-pin devices only)
- Thermal shutdown and current limit –  
- protection
- Power MSOP-8, Power SOIC-8, and –  
- SOT-223
- Pulse charging capability



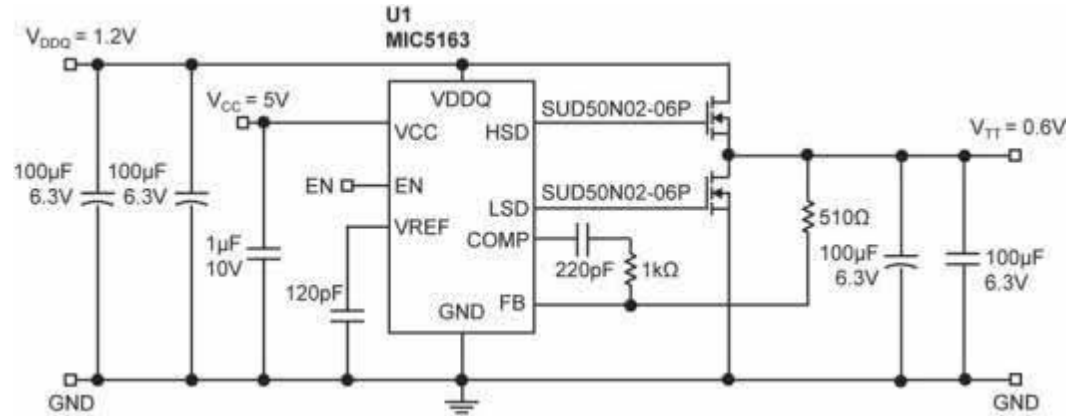
## Features:

- Input voltage range: 1.35V to 6V
- Up to 7A VTT Current
- Tracking programmable output
- Wide bandwidth
- Logic controlled enable input
- Requires minimal external components
- DDR, DDR2, DDR3, memory termination
- $-40^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$
- JEDEC Compliant Bus termination for –
  - SCSI, GTL, SSTL, HSTL, LV-TTL, -
  - Rambus, LV-PECL, LV-ECL, etc
- Tiny MSOP-10 package



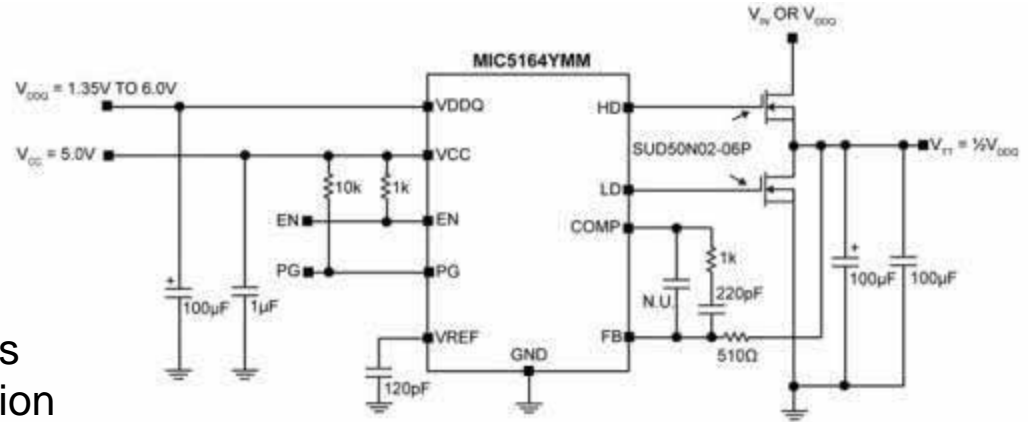
## Features:

- 0.75V to 6V input supply voltage
- Memory termination for: DDR3, -  
- GDDR3/4/5
- Tracking programmable output
- Logic controlled enable input
- Wide bandwidth
- Minimal external components –  
- required
- Tiny MSOP-10 package
- $-40^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$



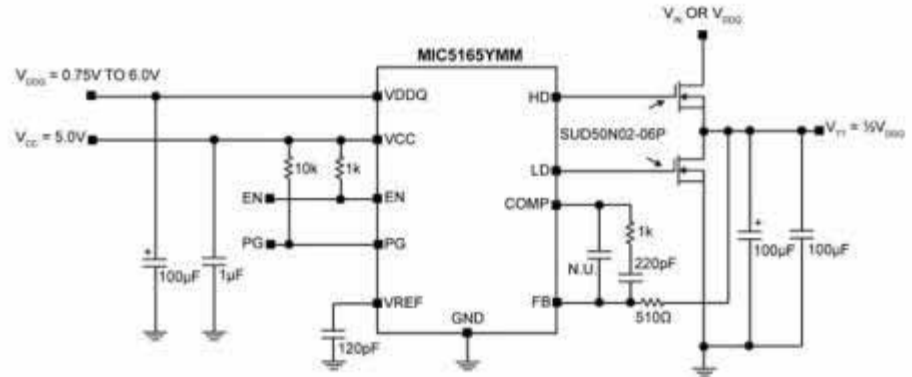
## Features:

- Input voltage range: 1.35V to 6V
- Up to 7A VTT Current
- Tracking programmable output
- Power Good (PG) signal
- Wide bandwidth
- Logic controlled enable input
- Requires minimal external components
- DDR, DDR2, DDR3, memory termination
- $-40^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$
- JEDEC-compliant bus termination for –
  - SCSI, GTL, SSTL, HSTL, LV-TTL, -
  - Rambus, LV-PECL, LV-ECL, etc
- Tiny MSOP-10 package



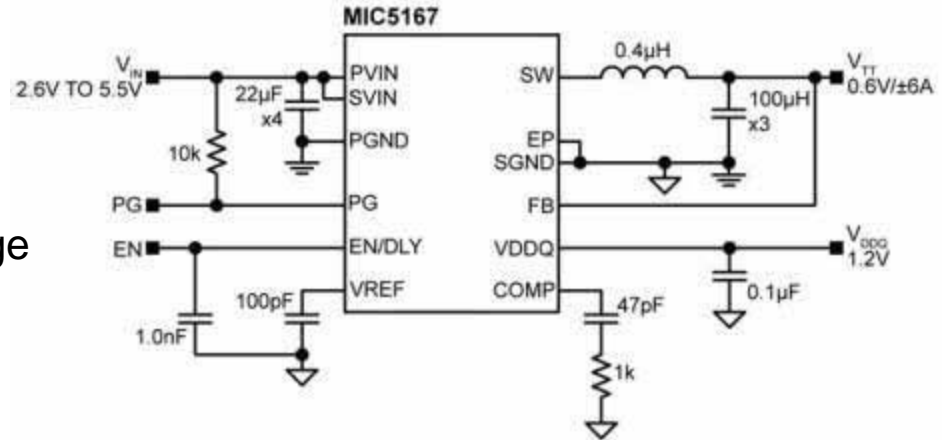
## Features:

- Input voltage range: 0.75V to 6V
- Up to 7A VTT Current
- Tracking programmable output
- Power Good signal
- Wide bandwidth
- Logic-controlled enable input
- Requires minimal external components
- DDR3, GDDR3/4/5 memory termination
- $-40^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$
- Tiny MSOP-10 package



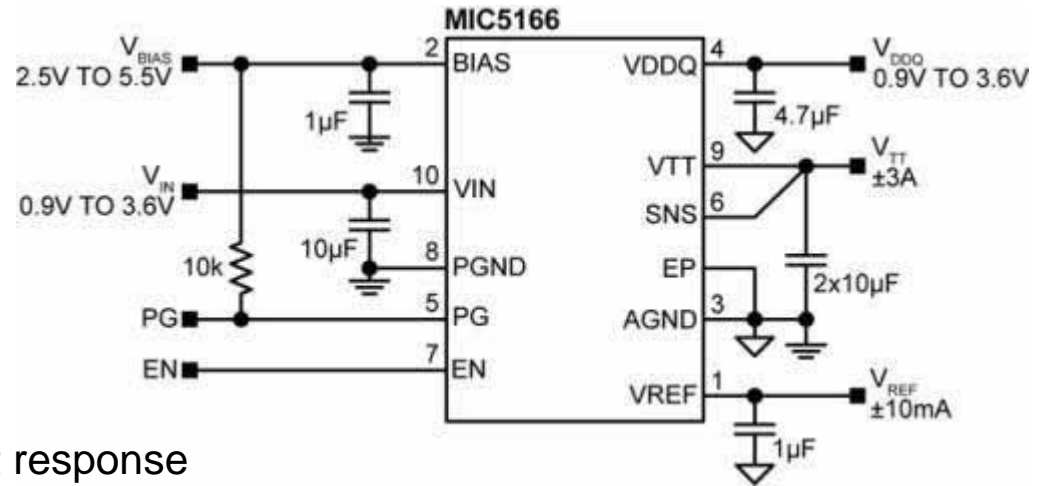
## Features:

- Input voltage range: 2.6V to 5.5V
- VTT voltage adjustable down to 0.35V
- Output load current up to  $\pm 6A$
- Power Good fault flag
- Efficiency > 94% across a broad load range
- Ultra fast transient response
- Easy RC compensation
- 100% maximum duty cycle
- Fully integrated MOSFET switches
- Micropower shutdown
- Thermal shutdown and current-limit protection
- 24-pin 4mm x 4mm MLF<sup>®</sup>
- -40°C to +125°C junction temperature range



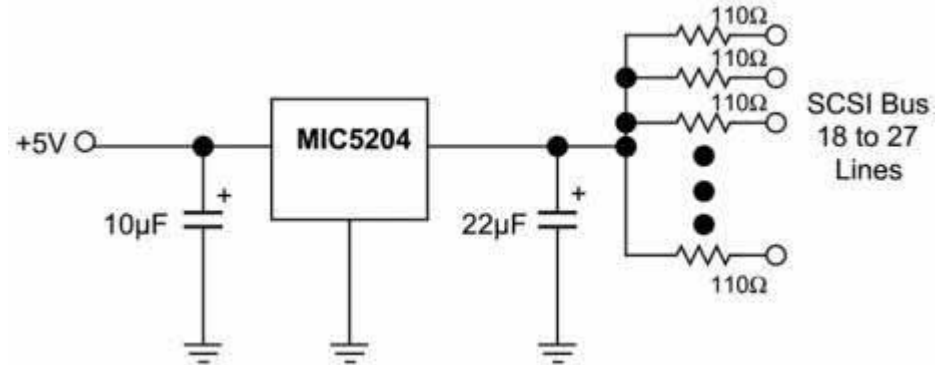
## Features:

- Operating voltage range:
- VDDQ Supply: 0.9V to 3.6V
- Bias Supply: 2.5V to 5.5V
- High output voltage accuracy:
- 0.015% line regulation
- 1.5% load regulation
- Logic level enable input
- Power Good (PG)
- High bandwidth – very fast transient response
- Stable with two 10 $\mu$ F ceramic output capacitors
- Two 10 $\mu$ F output capacitors used in most –  
- applications
- Thermally enhanced 3mm  $\times$  3mm MFL<sup>®</sup>
- Junction temperature range -40 $^{\circ}$ C to +125 $^{\circ}$ C



## Features:

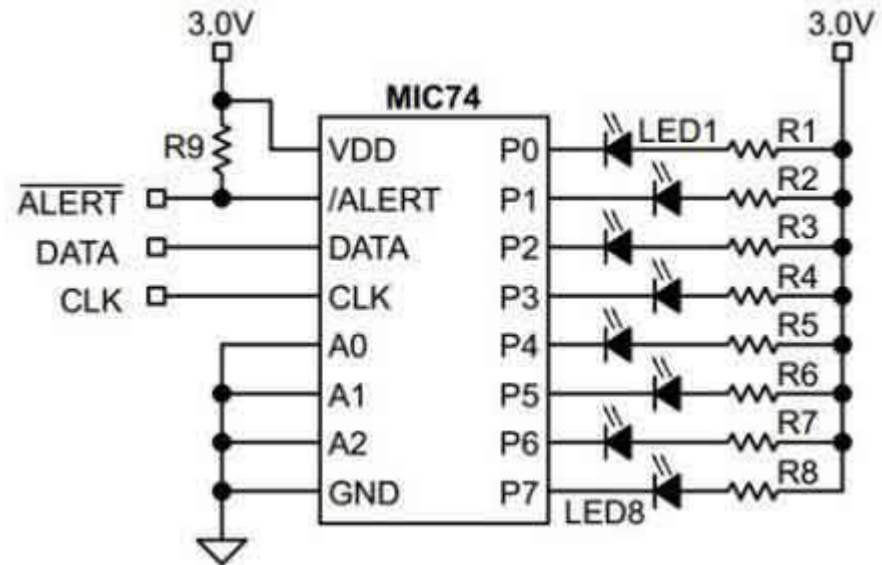
- $\pm 1\%$  output voltage accuracy
- Guaranteed 500mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Zero off-mode current
- Logic-controlled electronic shutdown
- Available in SO-8 and SOT-223 packages





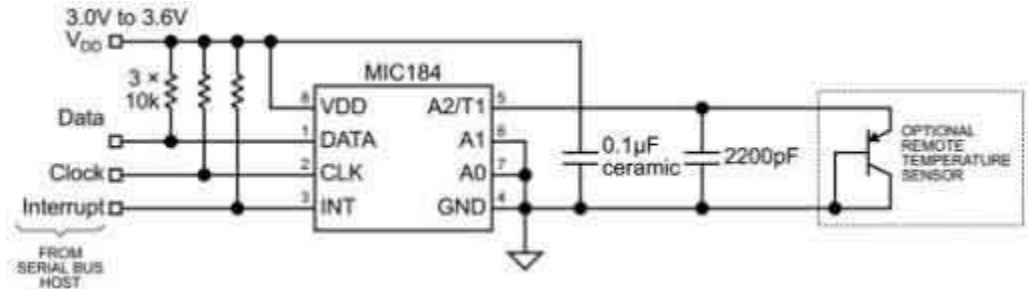
## Features:

- Provides eight bits of general purpose I/O
- Built in fan speed control logic (optional)
- 2-wire SMBus™/I<sup>2</sup>C™ compatible serial –  
- interface plus interrupt output
- 2.7V to 3.6V operating voltage range
- 5V-tolerant I/O
- Low quiescent current: 2µA (typical)
- Bit-programmable I/O options:
  - Input or output
  - Push-pull or open-drain output
  - Interrupt on input changes
- Outputs can directly drive LEDs (10mA IOL)
- Up to 8 devices per bus



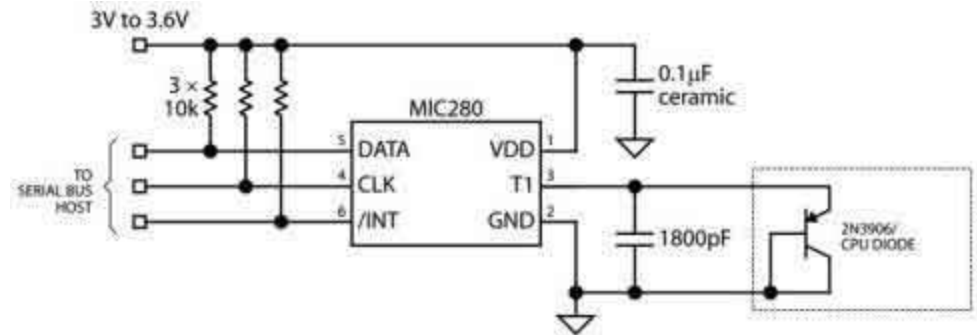
## Features:

- Measures local and remote –  
- temperatures
- Pin and software backward –  
- compatible to LM75
- 9-bit sigma-delta ADC
- 2-wire I<sup>2</sup>C/SMBus compatible –  
- interface
- Programmable thermostatic settings –  
- for either internal or external zone
- Open-drain comparator/interrupt output pin
- Interrupt mask and status bits
- Low-power shutdown mode
- Fail-safe response to diode faults
- 2.7V to 5.5V power supply range
- 8-Lead SOP and MSOP packages



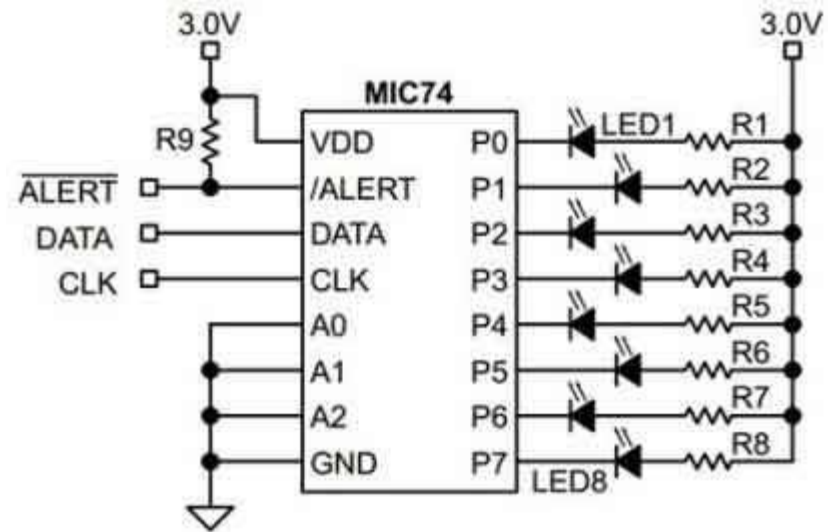
## Features:

- Measures local and remote –
  - temperature
- Highly accurate remote sensing  $\pm 1^{\circ}\text{C}$  –
  - max.,  $60^{\circ}\text{C}$  to  $100^{\circ}\text{C}$
- Superior noise immunity for reduced –
  - temperature guardbands
- 9-bit to 12-bit temperature resolution for –
  - remote zone
- Fault queues to further reduce nuisance –
  - tripping
- Programmable high, low, and over –
  - temperature thresholds for each zone
- SMBus 2.0 compatible serial interface –
  - including device timeout to prevent –
  - bus lockup
- 3.0V to 3.6V power supply range
- SOT23-6 package



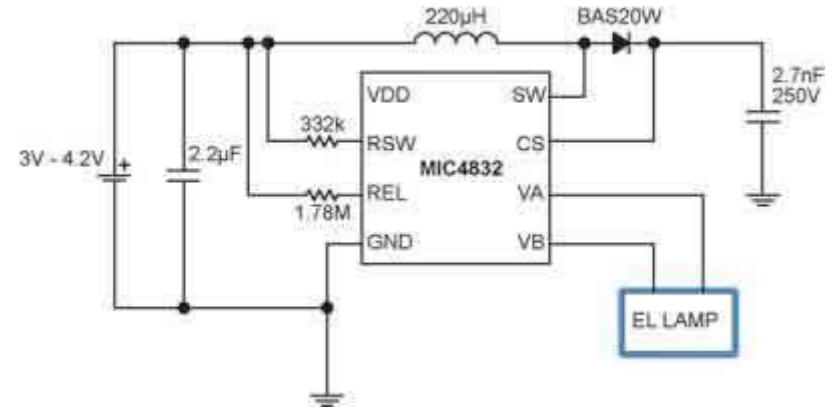
## Features:

- Provides eight bits of general purpose I/O
- Built in fan speed control logic (optional)
- 2-wire SMBus™/I<sup>2</sup>C™ compatible serial –  
- interface plus interrupt output
- 2.7V to 3.6V operating voltage range
- 5V-tolerant I/O
- Low quiescent current: 2μA (typical)
- Bit-programmable I/O options:
- Input or output
- Push-pull or open-drain output
- Interrupt on input changes
- Outputs can directly drive LEDs (10mA IOL)
- Up to 8 devices per bus



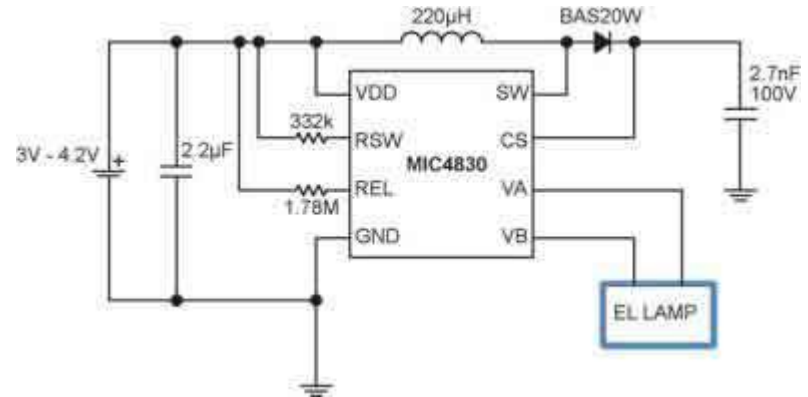
## Features:

- 1.8V to 5.5V DC input voltage
- 220VPP output voltage capable
- Low audible noise EL drive waveform
- Supports EL panel sizes up to 3in<sup>2</sup> (19cm<sup>2</sup>)
- Low 25 $\mu$ A operating supply current
- Small inductor size with low profile (220 $\mu$ H)
- Tiny 8-pin 3mm x 3mm MFL<sup>®</sup> package
- Adjustable boost converter frequency
- Adjustable EL lamp frequency
- 10nA shutdown current



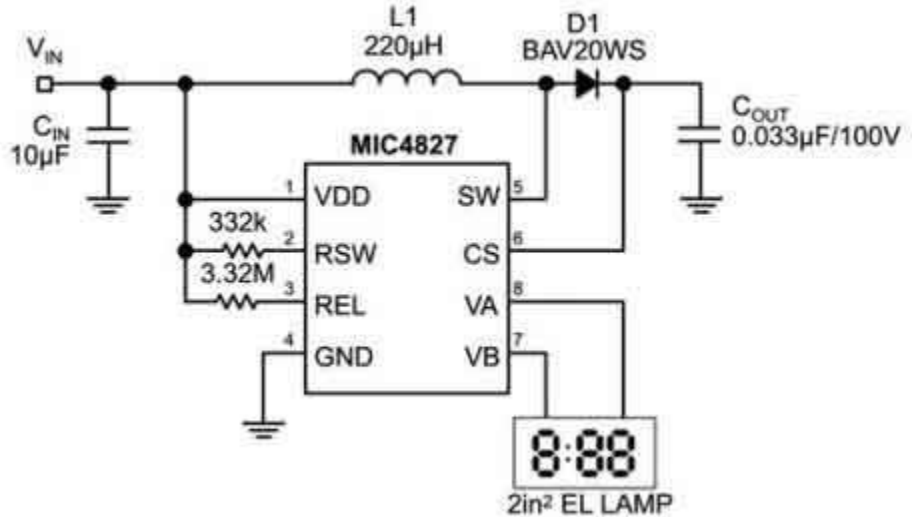
## Features:

- 1.8V to 5.5V input voltage
- 180VPP output voltage
- Low audible noise EL drive waveform
- Supports EL panel sizes up to 4in<sup>2</sup> (25cm<sup>2</sup>)
- Low 45 $\mu$ A operating supply current
- Small inductor size with low profile (220 $\mu$ H)
- Tiny 8-pin 3mm x 3mm MLF<sup>®</sup> package
- Adjustable boost converter frequency
- Adjustable EL lamp frequency
- Low 10nA shutdown current



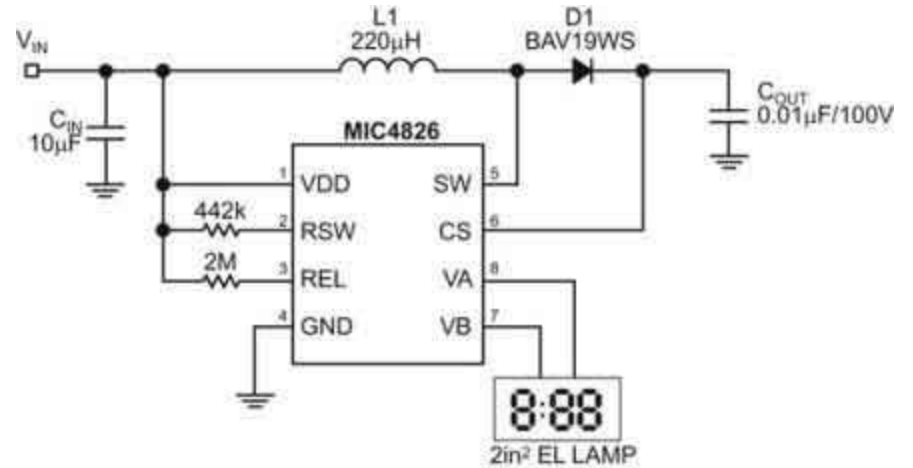
## Features:

- 1.8V to 5.5V DC input voltage
- 180VPP regulated AC output waveform
- Independently adjustable EL lamp frequency
- Independently adjustable boost converter – frequency
- 0.1 $\mu$ A shutdown current



## Features:

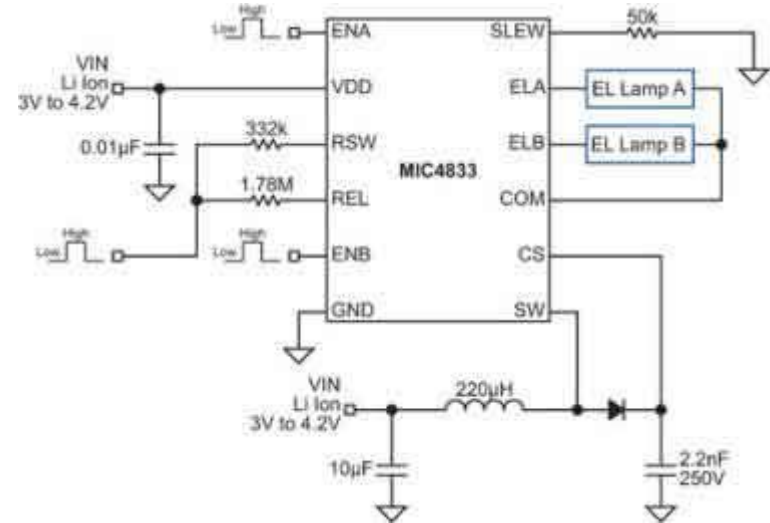
- 1.8V to 5.5V DC input voltage
- 160VPP regulated AC output waveform
- Independently adjustable EL lamp frequency
- Independently adjustable boost converter – frequency
- 0.1 $\mu$ A shutdown current





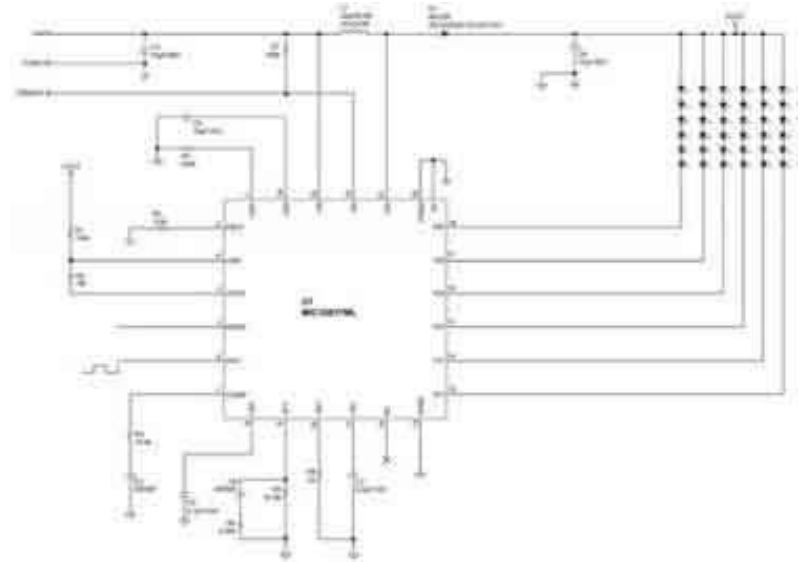
## Features:

- Drives two EL panels
  - Up to 4in<sup>2</sup> each at full brightness
- Independent input control for each of the two –  
– panels and allows PWM dimming.
- 220VPP regulated AC output waveform
- 2.3V to 5.8V DC input voltage
- Wave-shaping circuit to reduce audible noise
- Adjustable slew rate for audible noise reduction
- Single inductor to power both panels
- 0.1μA typical shutdown current
- 12-pin 3mm x 3mm MFL<sup>®</sup> package
- -40°C to +125°C junction temperature range
- Independently adjustable boost converter –  
– and EL panel frequency



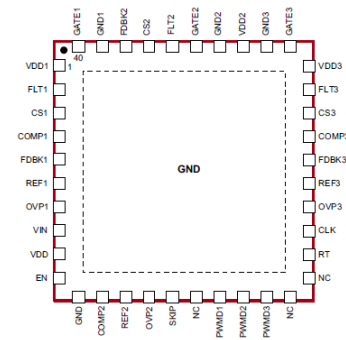
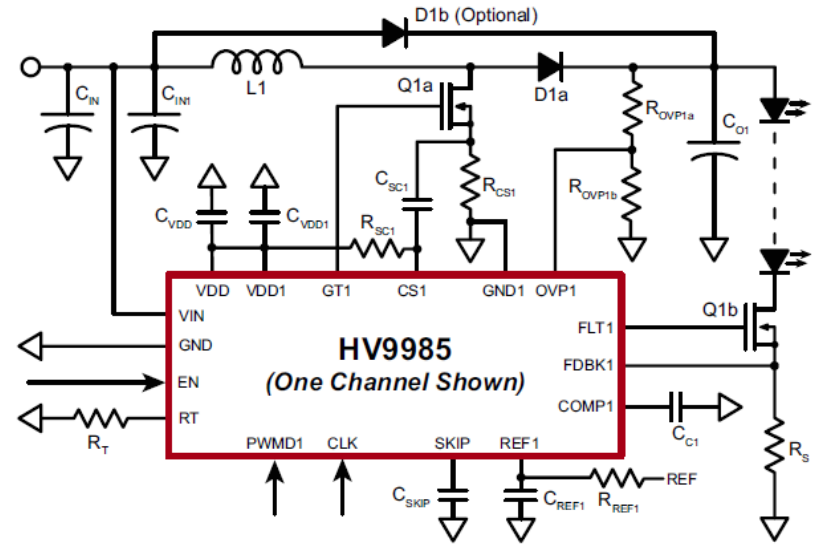
## Features:

- 6V to 40V wide input voltage range
- Drives six channels of up to 10 white LEDs
- Programmable WLED current from 15mA to –  
- 30mA
- Highly reliable operation with open and short –  
- LEDs
- Accurate 16 dimming log levels sets the dimming –  
- ratio from 1% to 100%
- Flicker-Free Dimming filters the jitter from the –  
- dimming control input signal and eliminates –  
- dimming flicker
- Accurate LED channel current matching  $\pm 3\%$
- Accurate initial LED current setting  $\pm 2\%$
- High efficiency up to 90%
- Low ( $<40\mu\text{A}$ ) shutdown current over temperature
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range
- Available in 24-pin 4mm x 4mm MFL<sup>®</sup> package



## Features:

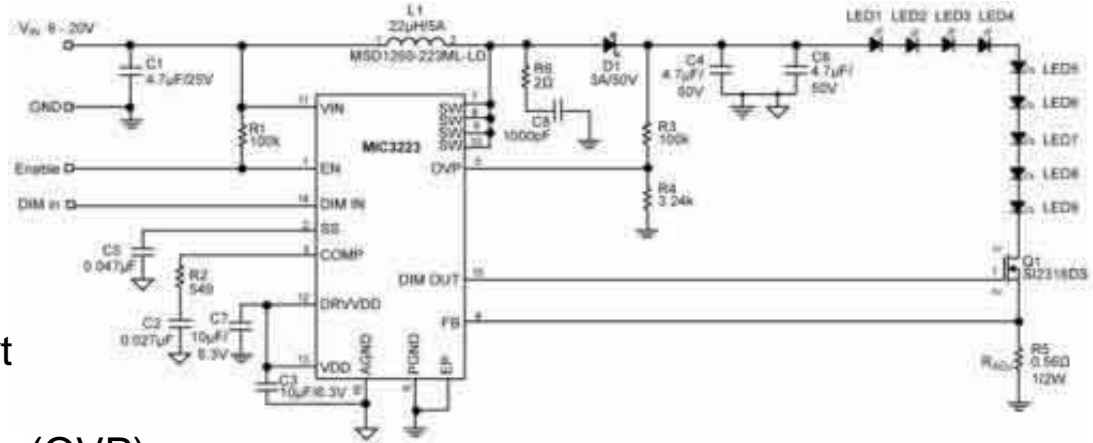
- Switch mode controller for single-switch –  
- converters
- Optimized for driving Logic Level FETs
- Typical +/-2% absolute and string-to-string -  
- current accuracy
- High PWM dimming ratio up to 5000:1
- 10-40V input range
- Constant frequency operation up to 1Mhz
- On –chip clock or external clock option
- Programmable slope compensation
- Linear and PWM dimming
- SCP & OVP
- Hiccup mode protection
- 40-Lead QFN (6x6) package



40-Lead QFN  
(top view)

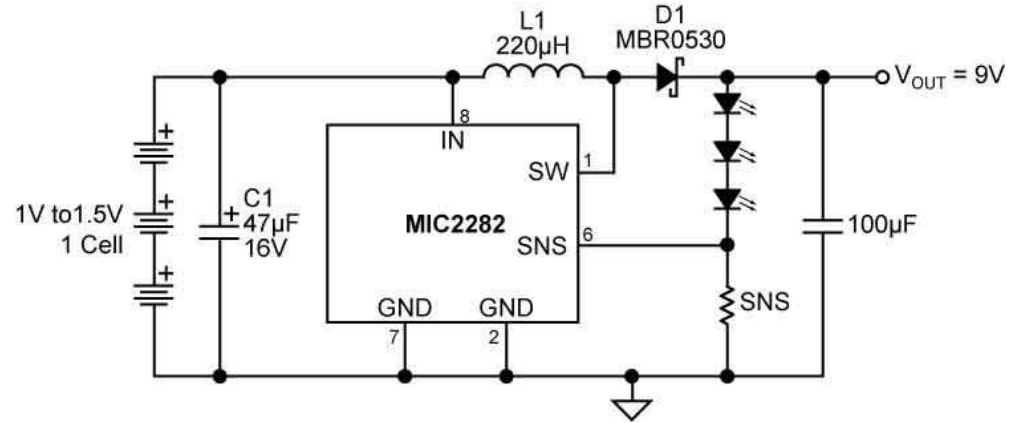
## Features:

- 4.5V to 20V supply voltage
- 1MHz switching frequency
- 100mΩ/3.5A internal power –  
- FET switch
- LEDs can be dimmed with a –  
- PWM signal
- Externally programmable soft-start
- Protection features that include:
  - Output over voltage protection (OVP)
  - Under voltage lockout (UVLO)
  - Over temperature protection
- Junction temperature range: -40°C to +125°C
- Available in an exposed pad 16-pin –  
- TSSOP package
- 200mV feedback voltage
- Step-up output voltage (boost) up to 37V



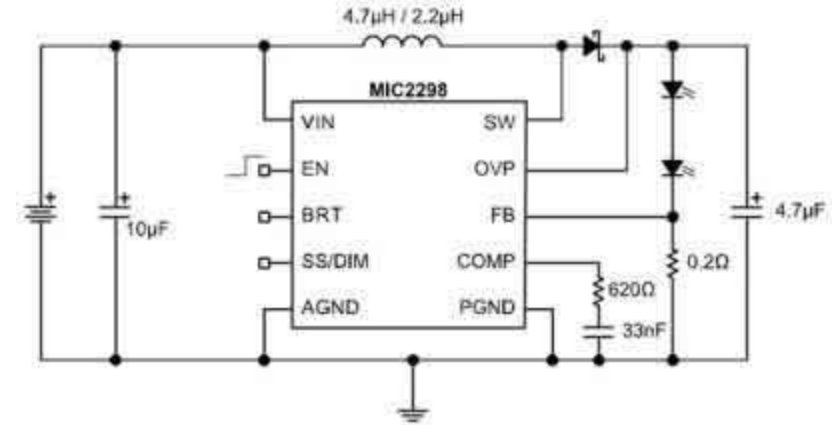
## Features:

- Operates from a single-cell supply –  
- ( $V_{IN} = 0.9V$  to  $15V$ )
- Ultra Low EMI
- $120\mu A$  typical quiescent current
- Adjustable output voltages
- $220mV$  sense voltage
- $20kHz$  switching frequency
- Over temperature protection
- 8-pin MSOP package
- Low component count solution



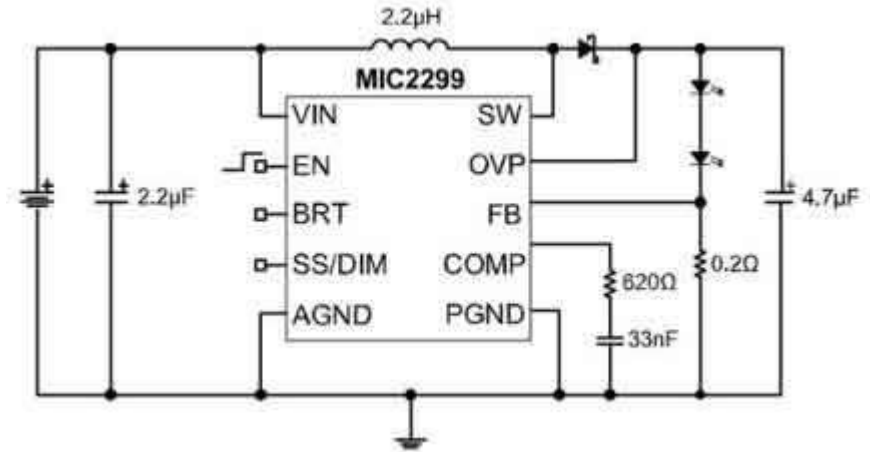
### Features:

- 3.5A minimum switch current delivers at least -  
- 7W of output power over temperature
- 200mV  $\pm 10\%$  feedback voltage
- 2.5V to 10V input voltage
- Output voltage up to 30V (max)
- 12-pin 3mm x 3mm leadless MFL<sup>®</sup> package
- Output over voltage protection (OVP)
- <1% line regulation
- 1 $\mu$ A shutdown current
- Over-temperature protection
- Externally programmable soft-start
- Under voltage lockout (UVLO)
- -40°C to +125°C junction temperature range



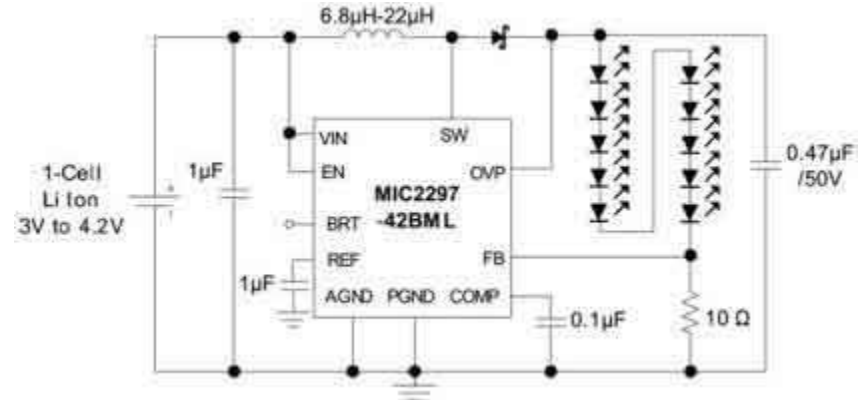
### Features:

- Programmable current control
- 200mV  $\pm$ 10% feedback voltage
- 2.5V to 10V input voltage
- Output over voltage protection (OVP)
- Output voltage up to 30V (max)
- Fixed 2.0MHz Operation
- Guaranteed 3.5A switch current over –  
– temperature
- Solution size of just 0.25in<sup>2</sup> (1.6cm<sup>2</sup>)
- Output power range of 7W to 12W
- <1% line regulation
- 1 $\mu$ A shutdown current
- Under-voltage lockout (UVLO)
- 12-pin 3mm x 3mm leadless MFL<sup>®</sup> package
- -40°C to +125°C junction temperature range



## Features:

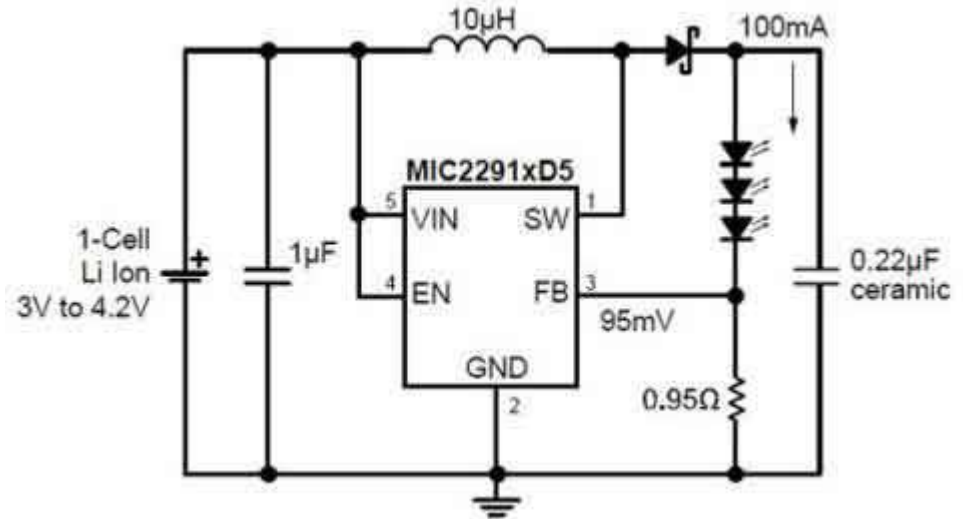
- 2.5V to 10V input voltage range
- Output voltage up to 40V
- 1.2A switch current
- 600kHz PWM operation
- Trimmed 200mV feedback voltage
- Output over voltage protection (fixed or –  
- adjustable)
- PWM brightness control
- DAC brightness control
- <1% line regulation
- 1 $\mu$ A shutdown current
- Over temperature protection
- UVLO
- 10-pin 2.5mm x 2.5mm MLF® package
- -40°C to +125°C junction temperature range





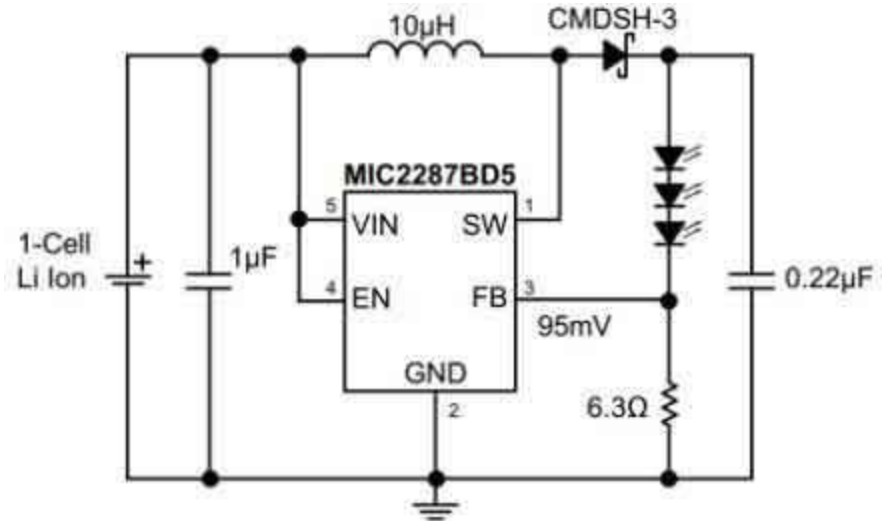
### Features:

- 2.5V to 10V input voltage
- Output voltage up to 34V
- 1.2A switch current
- 1.2MHz PWM operation
- 95mV feedback voltage
- Over voltage protection (OVP)
- Options for 15V and 34V
- Stable with ceramic capacitors
- <1% line and load regulation
- 1 $\mu$ A shutdown current
- UVLO
- Low-profile Thin SOT23-5 package option
- 2mm x 2mm MLF<sup>®</sup> package option
- -40°C to +125°C junction temperature range



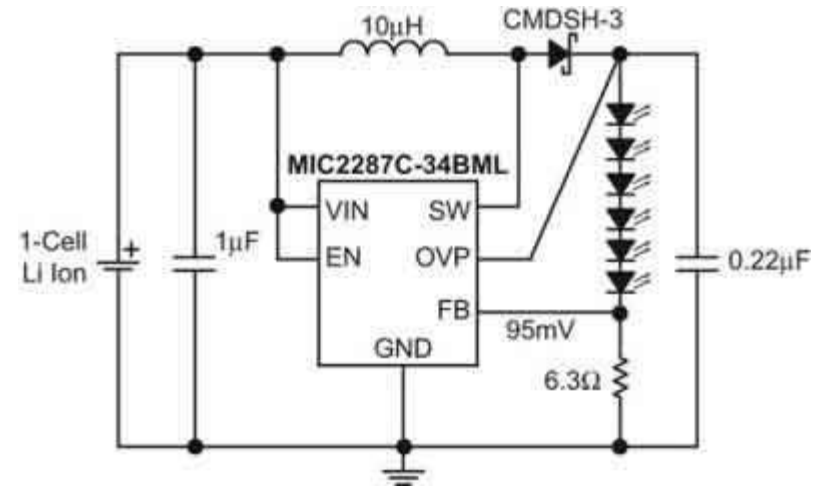
## Features:

- 2.5V to 10V input voltage
- Output voltage up to 34V
- Over 500mA switch current
- 1.2 MHz PWM operation
- 95mV feedback voltage
- Output over voltage protection (OVP)
- Options for 15V, 24V, and 34V OVP
- <1% line and load regulation
- <1 $\mu$ A shutdown current
- Over-temperature protection
- UVLO
- Low profile Thin SOT-23-5 package option
- 8-lead 2mm x 2mm MLF® package option
- -40°C to +125°C junction temperature range



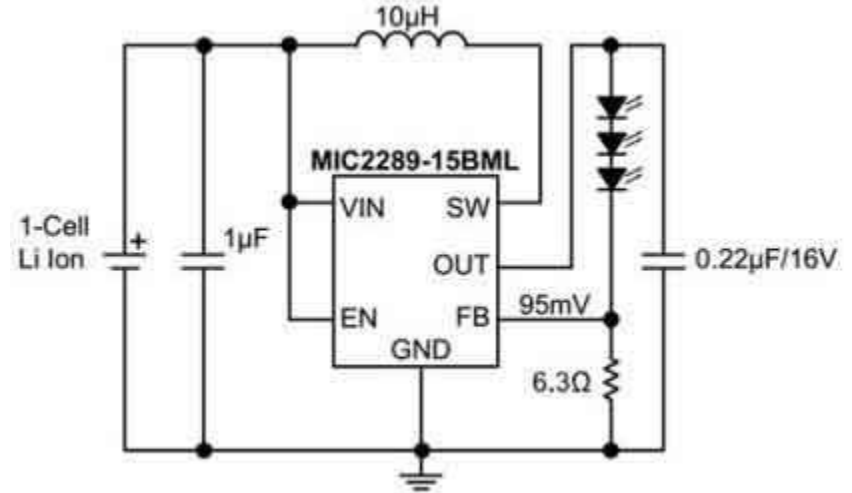
### Features:

- 2.5V to 10V input voltage
- Output voltage up to 34V
- Over 500mA switch current
- 1.2 MHz PWM operation
- 95mV feedback voltage
- Output over voltage protection (OVP)
- Options for 15V, 24V, and 34V OVP
- Over-temperature protection
- UVLO
- Low profile Thin SOT-23-5 package option
- 8-lead 2mm x 2mm MLF® package option
- -40°C to +125°C junction temperature range
- For higher performance specifications see the MIC2287



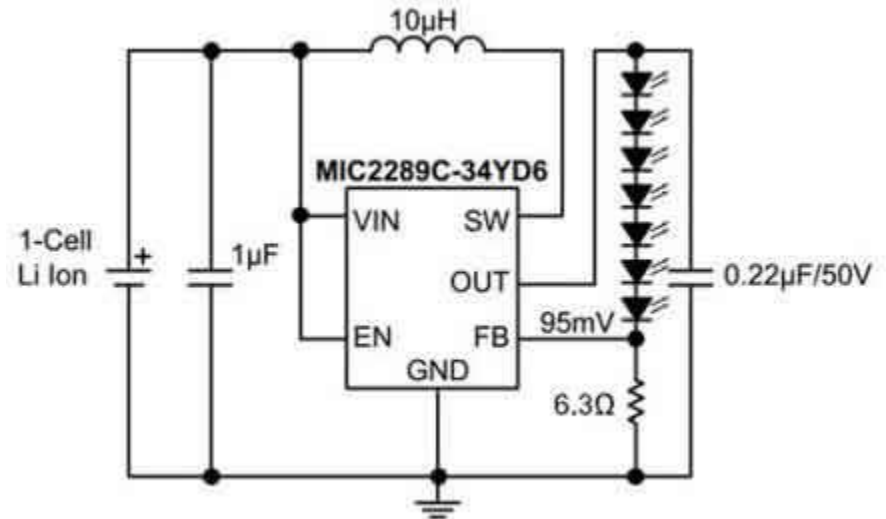
## Features:

- 2.5V to 10V input voltage
- Output voltage up to 34V
- Internal Schottky diode
- 15V, 24V, 34V output OVP options
- 1.2MHz PWM operation
- Over 500mA switch current
- 95mV feedback voltage
- <1% line and load regulation
- <1 $\mu$ A shutdown current
- Over-temperature protection
- UVLO
- 8-pin 2mm x 2mm MFL<sup>®</sup> package
- -40°C to +125°C junction temperature range



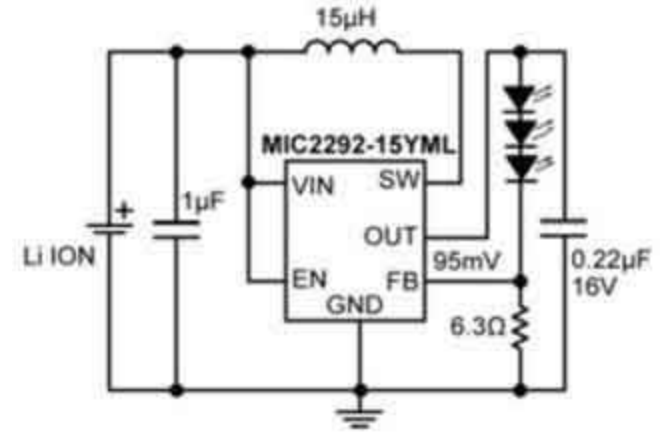
## Features:

- 2.5V to 10V input voltage
- Output voltage up to 34V with OVP
- Internal Schottky diode
- Over 500mA switch current
- 1.2MHz PWM operation
- 95mV feedback voltage
- <1% line and load regulation
- <1 $\mu$ A shutdown current
- Over-temperature protection
- UVLO
- Thin SOT-23 6-pin package
- -40°C to +125°C junction temperature range
- For higher performance specifications see the MIC2289



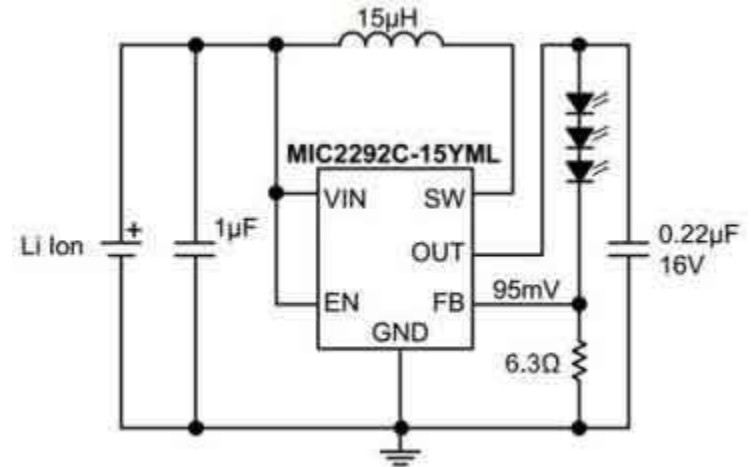
## Features:

- 2.5V to 10V input voltage
- Output voltage up to 34V
- Internal Schottky diode
- 1.6MHz PWM operation (MIC2292)
- 2.0MHz PWM operation (MIC2293)
- 15V and 34V output overvoltage protection options
- 500mA switch current rating
- 95mV feedback voltage
- <1% line and load regulation
- <1 $\mu$ A shutdown current
- Over-temperature protection
- OVP, UVLO
- 8-pin 2mm x 2mm MFLF<sup>®</sup> package
- -40°C to +125°C junction temperature range



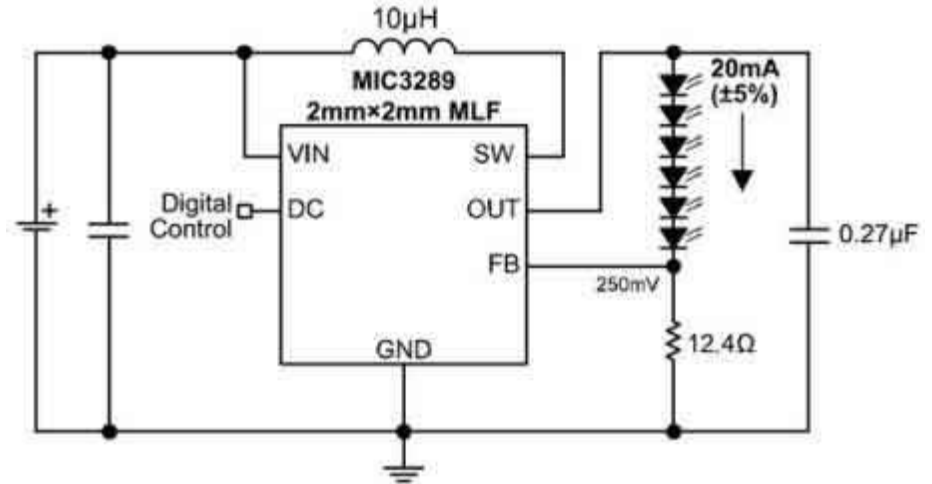
## Features:

- 2.5V to 10V input voltage
- Output voltage up to 34V
- Internal Schottky diode
- 1.6MHz PWM operation (MIC2292C)
- 2.0MHz PWM operation (MIC2293C)
- 15V and 34V output overvoltage protection –  
- options
- 500mA switch current rating
- 95mV feedback voltage
- <1% line and load regulation
- <1 $\mu$ A shutdown current
- Over-temperature protection
- OVP, UVLO
- 8-pin 2mm x 2mm MFL<sup>®</sup> package
- -40 $^{\circ}$ C to +125 $^{\circ}$ C junction temperature range



### Features:

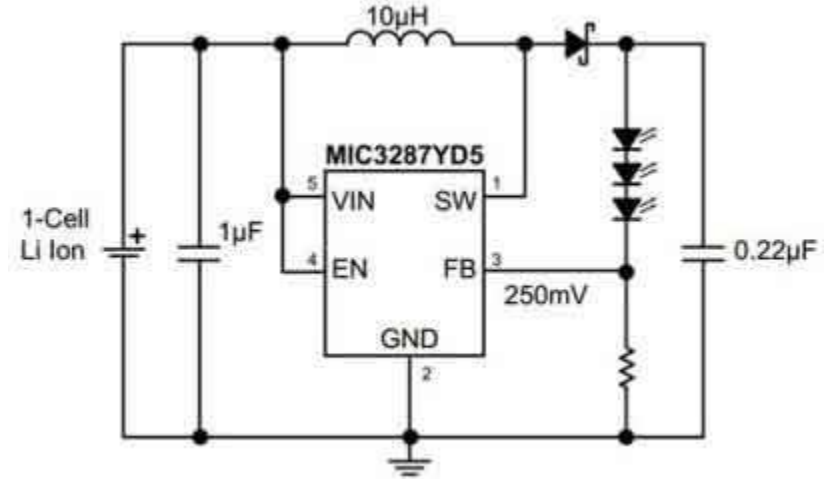
- Single wire combines 16 level logarithmic –  
- brightness and shutdown control
- 16V/24V OVP options supports up to 4 -  
- and 6 WLEDs
- Start-up in any one of 16 brightness levels
- Internal Schottky diode
- 2.5V to 6.5V input voltage
- 1.2MHz PWM operation
- Over 500mA switch current
- 250mV reference voltage
- $\pm 5\%$  LED current accuracy
- $< 1\mu\text{A}$  shutdown current
- UVLO
- Thin SOT23-6L package option
- 2mm x 2mm leadless MLF<sup>®</sup>-8L package option
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range





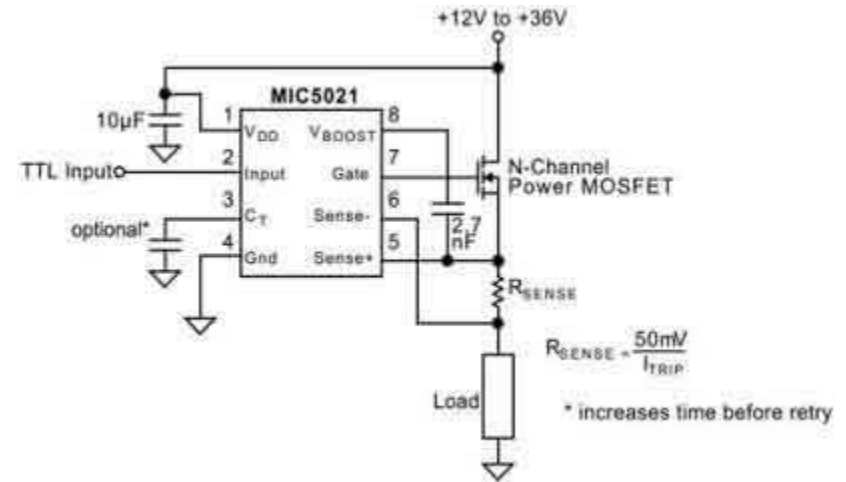
### Features:

- 2.8V to 6.5V input voltage
- 350mA switch current
- Optional 24V output over voltage protection – (OVP)
- 1.2MHz PWM operation
- 250mV feedback voltage
- <1% line and load regulation
- <1 $\mu$ A shutdown current
- Over-temperature protection
- Under voltage lockout (UVLO)
- Low profile Thin SOT-23 package option
- 8-pin 2mm x 2mm MFL<sup>®</sup> package option
- -40°C to +125°C junction temperature range



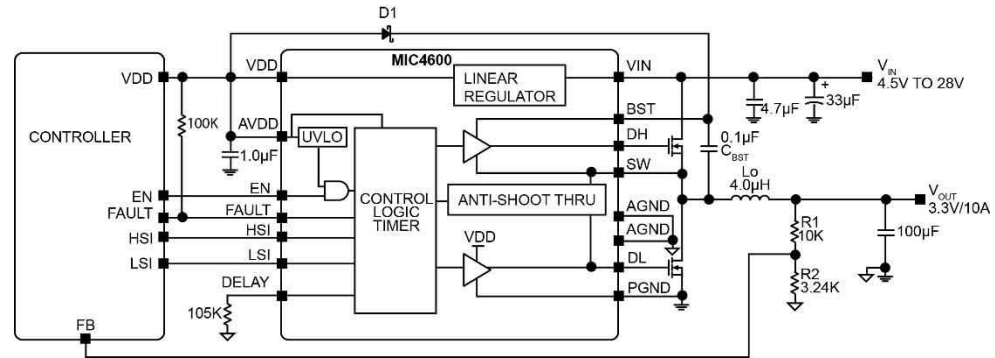
## Features:

- 12V to 36V operation
- 550ns rise/fall time driving 2000pF
- TTL compatible input with internal pull-down – resistor
- Overcurrent limit
- Gate to source protection
- Internal charge pump
- 100kHz operation guaranteed over full – temperature and operating voltage range
- Compatible with current sensing MOSFETs
- Current source drive reduces EMI



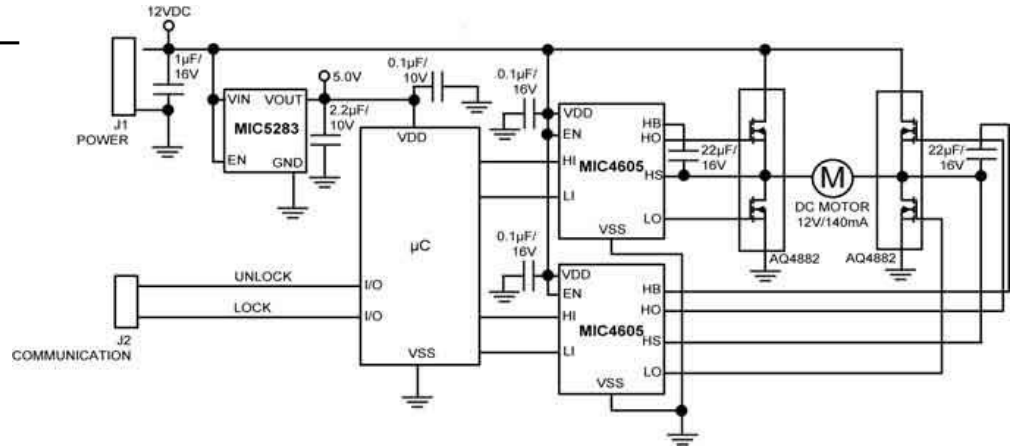
## Features:

- Adjustable dead time circuitry
- Anti-shoot-through protection
- Internal LDO for single supply operation
- Input voltage range: 4.5V to 28V
- Fast propagation delay: 20ns
- Up to 1.5 MHz operation
- Low voltage logic level inputs for  $\mu\text{C}$  or –  
- FPGA driven power solutions
- Independent inputs for low and high side –  
- drivers
- $2\Omega$  gate drive capable of driving 3000pF –  
- load with 15ns rise and fall times
- Low 450 $\mu\text{A}$  typical quiescent current
- 3mm x 3mm QFN package
- $-40^\circ\text{C}$  to  $+125^\circ\text{C}$  junction temperature range



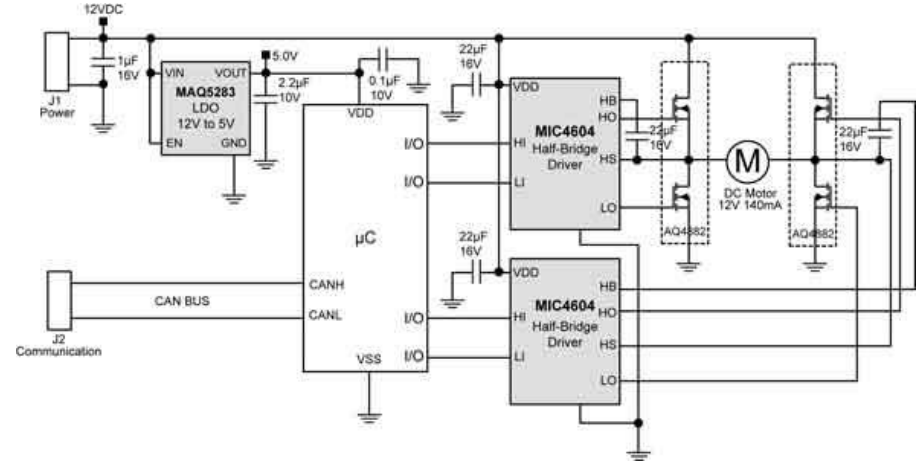
### Features:

- 5.5V to 16V gate drive supply voltage – range
- Advanced adaptive-dead-time
- Intelligent shoot-through protection
- MIC4605-1: Dual TTL inputs
- MIC4605-2: Single PWM input
- Enable input for on/off control
- On-chip bootstrap diode
- Fast 35ns propagation times
- Drives 1000pF load with 20ns rise – and fall times
- Low power consumption: 135µA quiescent current
- Separate high- and low-side under-voltage protection
- -40°C to +125°C junction temperature range



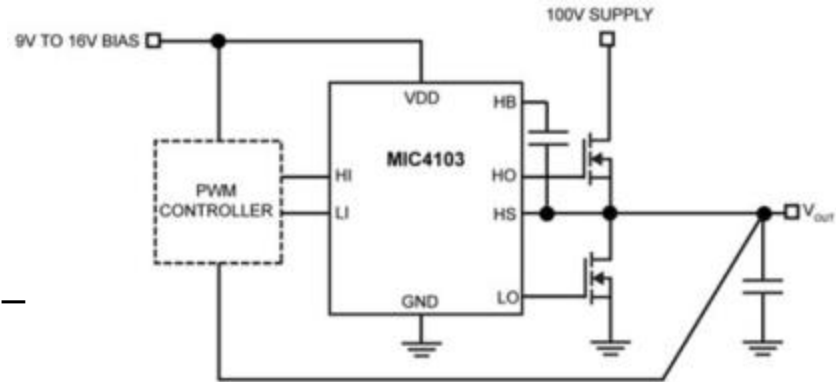
## Features:

- 5.5V to 16V gate drive supply voltage range
- Drives high-side and low-side N-Channel –  
- MOSFETs with independent inputs
- TTL input thresholds
- On chip bootstrap diode
- Fast 39ns propagation times
- Drives 1000pF load with 20ns rise and –  
- fall times
- Low power consumption
- Supplies under-voltage protection
- -40°C to +125°C junction temperature range



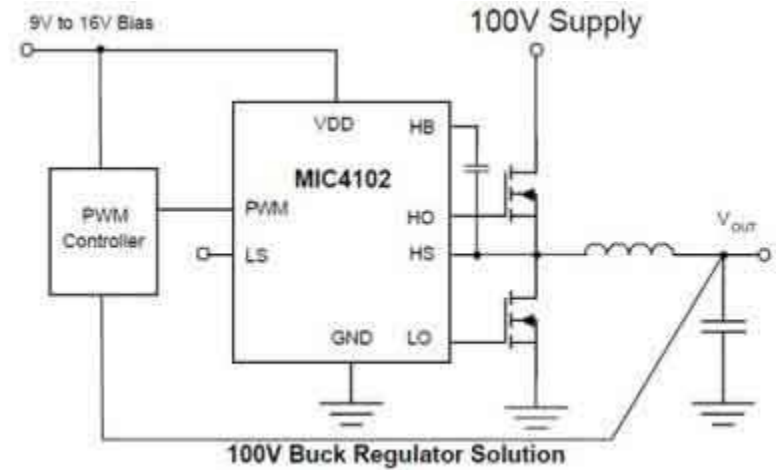
### Features:

- Asymmetrical, low impedance outputs drive –
  - 1000pF load with 10ns rise times and 6ns –
  - fall times
- Bootstrap supply max voltage to 118V DC
- Supply voltage up to 16V
- Drives high- and low-side N-Channel MOSFETs –
  - with independent inputs
- CMOS input thresholds (MIC4103)
- TTL input thresholds (MIC4104)
- On-chip bootstrap diode
- Fast 24ns propagation times
- Low power consumption
- Supply under-voltage protection
- Typical 2.5Ω pull up and 1.25Ω pull down output –
  - driver resistance
- -40°C to +125°C junction temperature range



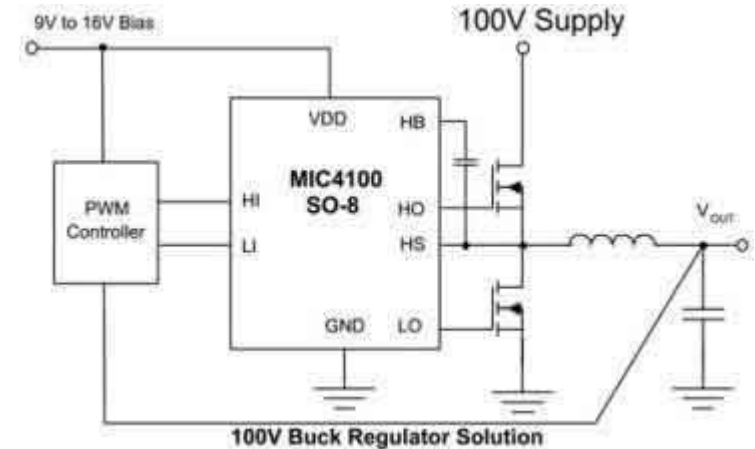
## Features:

- Drives high- and low-side N-Channel MOSFETs –  
- with single input
- Adaptive anti-shoot-through protection
- Low side drive disable pin
- Bootstrap supply voltage to 118V DC
- Supply voltage up to 16V
- TTL input thresholds
- On-chip bootstrap diode
- Fast 30ns propagation times
- Drives 1000pF load with 10ns rise and fall times
- Low power consumption
- Supply under-voltage protection
- 2.5Ω pull up, 1.5Ω pull down output resistance
- Space saving SOIC-8L package
- -40°C to +125°C junction temperature range



## Features:

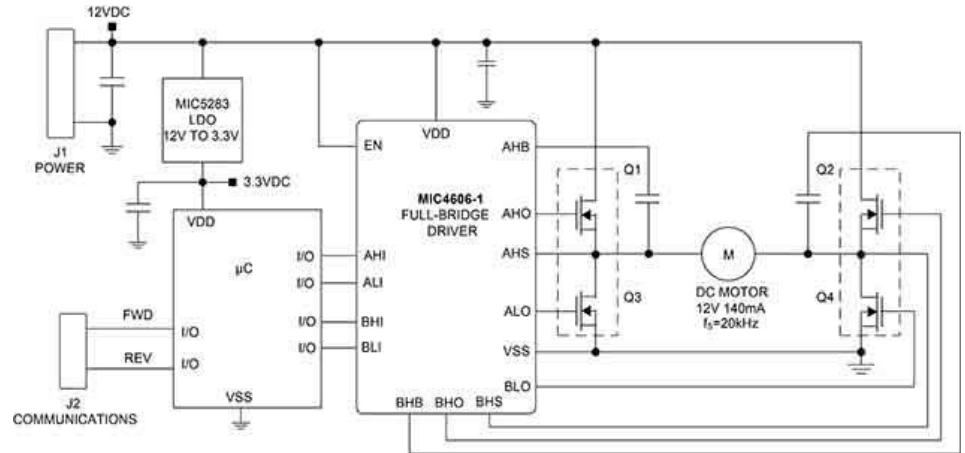
- Bootstrap supply max voltage to 118V DC
- Supply voltage up to 16V
- Drives high- and low-side N-Channel MOSFETs –  
- with independent inputs
- CMOS input thresholds (MIC4100)
- TTL input thresholds (MIC4101)
- On-chip bootstrap diode
- Fast 30ns propagation times
- Drives 1000pF load with 10ns rise and fall times
- Low power consumption
- Supply under-voltage protection
- 3Ω pull up, 3Ω pull down output resistance
- Space saving SOIC-8L package
- -40°C to +125°C junction temperature range





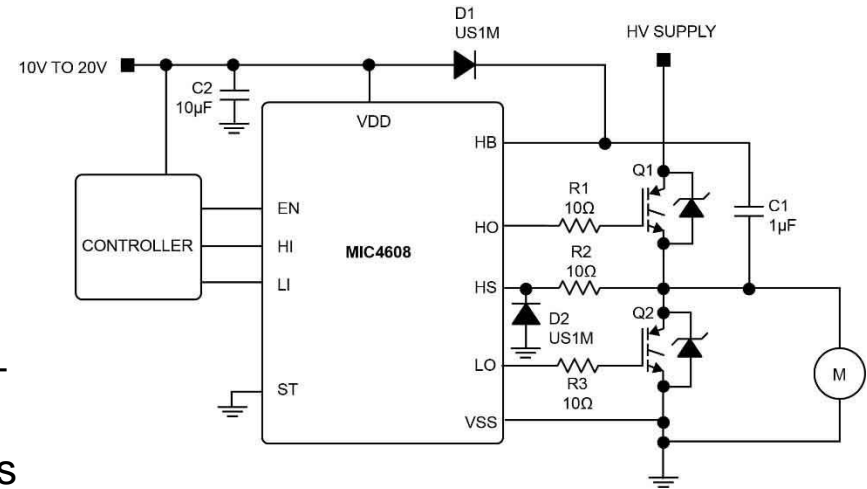
## Features:

- 5.5V to 16V gate drive supply voltage – range
- Advanced adaptive-dead-time
- Intelligent shoot-through protection
- MIC4606-1: 4 Independent TTL inputs
- MIC4606-2: 2 PWM inputs
- Enable input for on/off control
- On-chip bootstrap diodes
- Fast 35ns propagation times
- Drives 1000pF load with 20ns rise and – fall times
- Low power consumption: 235 $\mu$ A quiescent current
- Separate high- and low-side under-voltage protection
- -40°C to +125°C junction temperature range



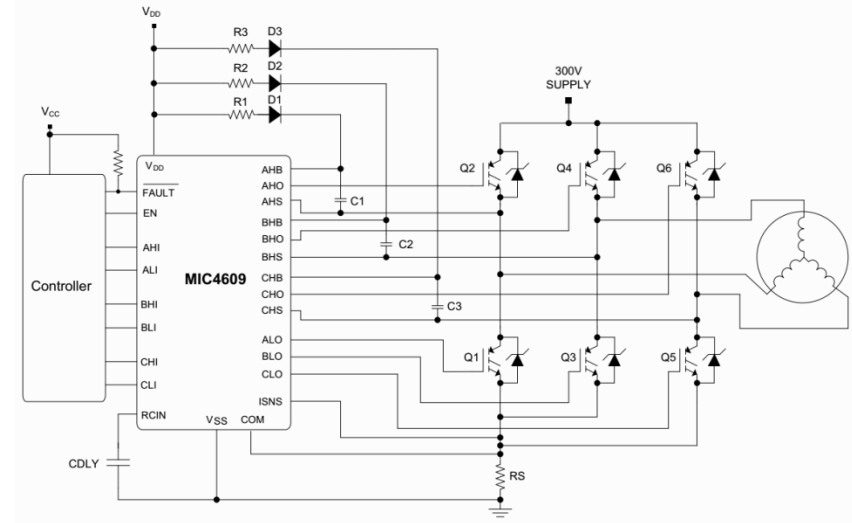
## Features:

- Adjustable dead time circuitry
- Anti-shoot-through protection
- Internal LDO for single supply operation
- Input voltage range: 4.5V to 28V
- Fast propagation delay: 450ns
- Up to 25 kHz operation
- Low voltage logic level inputs for  $\mu\text{C}$  or FPGA –  
- driven power solutions
- Independent inputs for low and high side drivers
- 2 $\Omega$  gate drive capable of driving 3000pF load –  
- with 15ns rise and fall times
- Low 450 $\mu\text{A}$  typical quiescent current
- -40°C to +125°C junction temperature range
- 14-SOIC



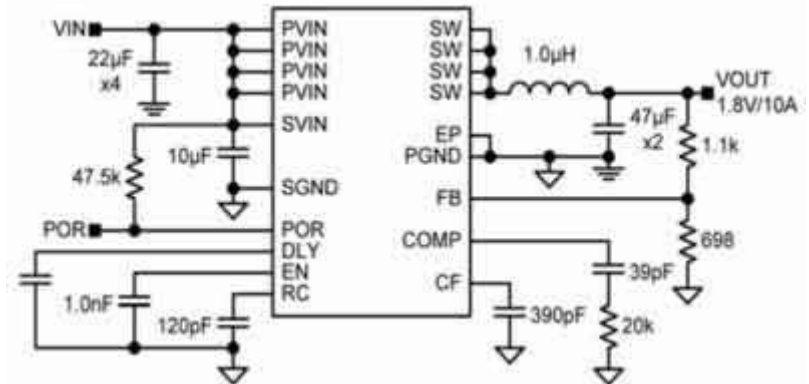
## Features:

- Gate drive supply voltage up to 20V
- Overcurrent protection with programmable –  
- restart delay
- 1A gate drivers
- Single (PWM) and dual (independent) inputs –  
- per phase
- Fault signal asserts on overcurrent and  $V_{DD}$  –  
- UVLO
- TTL input thresholds
- 300ns typical input filtering time
- Shoot thru protection
- Low power consumption
- Supply under-voltage protection
- -40°C to +125°C junction temperature range



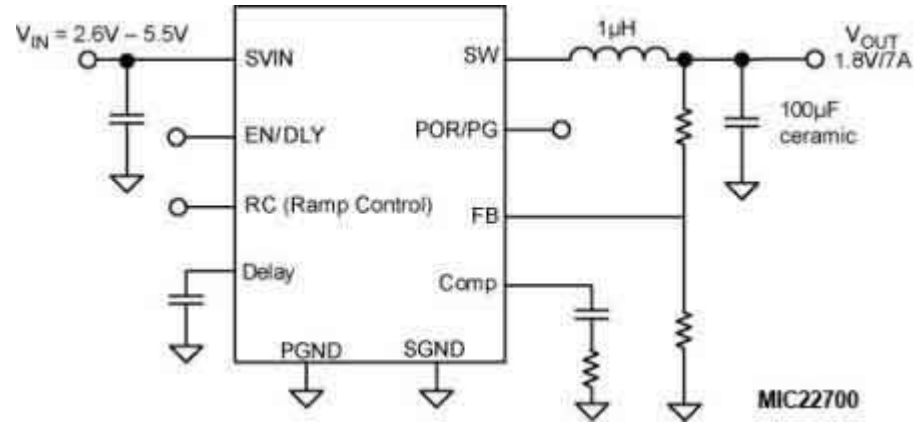
## Features:

- 2.6V to 5.5V supply voltage
- Fully integrated MOSFET switches
- Adjustable output voltage option down to 0.7V
- Output load current up to 10A
- Full sequencing and tracking capability
- Power On Reset
- Efficiency >95% across a broad load range
- Operating frequency programmable: 400kHz to –  
– 2MHz
- Ultra-fast transient response
- 100% maximum duty cycle
- Micropower shutdown
- Thermal shutdown and current-limit protection
- Available in a 32-pin 5mm x 5mm MFL® package
- -40°C to +125°C junction temperature range



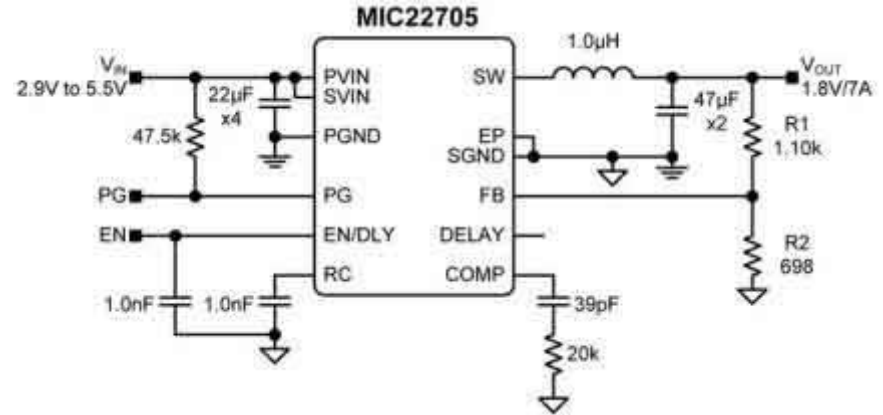
## Features:

- Input voltage range: 2.6V to 5.5V
- Output voltage adjustable down to 0.7V
- Output current up to 7A
- Full sequencing and tracking capability
- Power on Reset/Power Good
- Efficiency >95% across a broad load range
- Easy RC compensation
- 100% maximum duty cycle
- Fully integrated MOSFET switches
- Micropower shutdown
- Thermal shutdown and current limit protection
- 24-pin 4mm x 4mm MLF®
- -40°C to +125°C junction temperature range



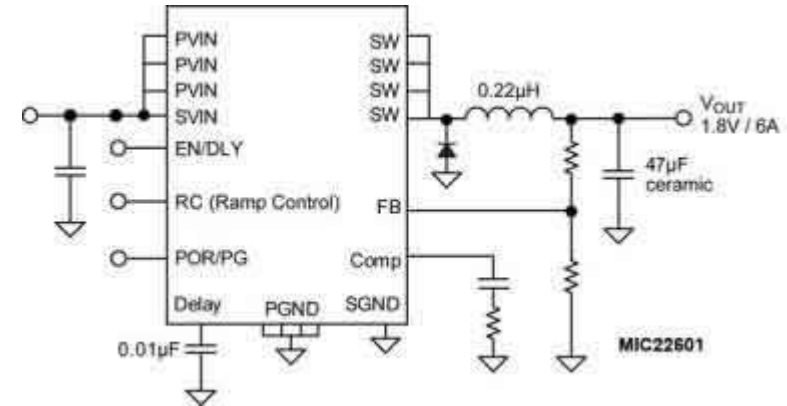
## Features:

- Input voltage range: 2.9V to 5.5V
- Output load current up to 7A
- Output voltage adjustable down to 0.7V
- Safe start-up into a pre-biased load
- Full sequencing and tracking capability
- Power Good output
- Efficiency >95% across a broad load range
- Ultra-fast transient response
- Easy RC compensation
- 100% maximum duty cycle
- Fully-integrated MOSFET switches
- Thermal-shutdown and current-limit protection
- 24-pin 4mm x 4mm MLF®
- -40°C to +125°C junction temperature range



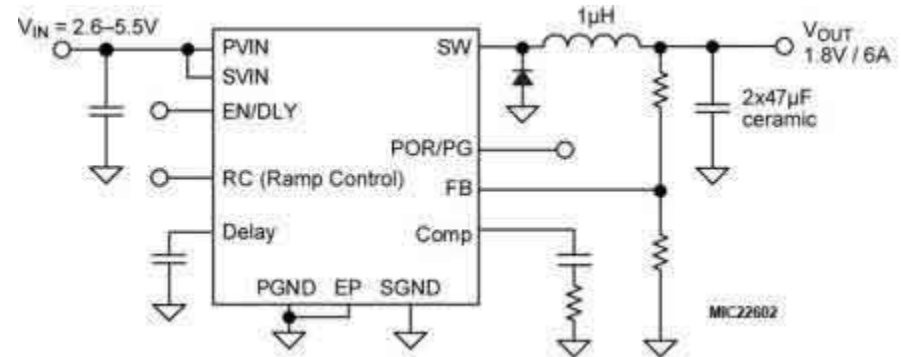
## Features:

- Input voltage range: 2.6V to 5.5V
- 4MHz PWM frequency
- Output current to 6A
- Small Passive components: 0.22 $\mu$ H and 22 $\mu$ F
- Full sequence and tracking ability
- Power On Reset/Power Good
- Adjustable output voltage option down to 0.7V
- Ultra fast transient response:
  - Easy RC compensation
- 100% maximum duty cycle
- Fully integrated MOSFET switches
- Thermal shutdown and current limit protection
- 24-pin 4mmx4mm M<sup>L</sup>F<sup>®</sup> package
- -40°C to +125°C junction temperature range



## Features:

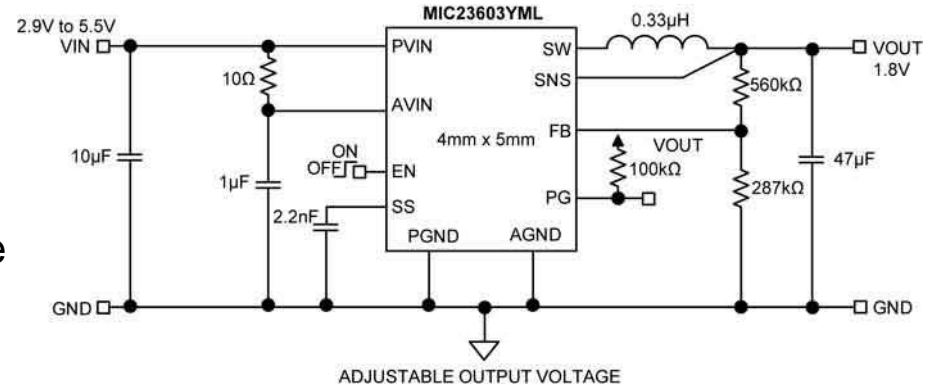
- Input voltage range: 2.6V to 5.5V
- Output voltage adjustable down to 0.7V
- Output load current up to 6A
- Full sequencing and tracking capability
- Power on Reset/Power Good output
- Efficiency >95% across a broad load range
- Ultra fast transient response-Easy RC compensation
- 100% maximum duty cycle
- Fully integrated MOSFET switches
- Hiccup mode current limiting
- Micropower shutdown
- Thermal shutdown and current limit protection
- 24-pin 4mm x 4mm MLF®
- -40°C to +125°C junction temperature range





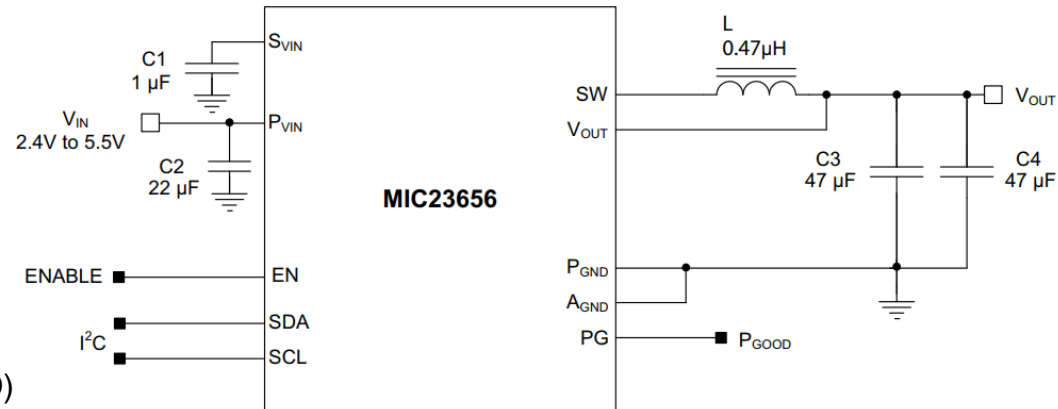
## Features:

- Input voltage: 2.7V to 5.5V
- 6A output current
- Up to 93% efficiency and 81% at 1mA
- 24 $\mu$ A typical quiescent current
- 4MHz PWM operation in continuous mode
- Ultra-fast transient response
- Power Good
- Programmable soft-start
- Low voltage output ripple:
  - 14mVpp ripple in HyperLight Load® mode
  - 5mV output voltage ripple in full PWM mode
- Fully integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Thermal shutdown and current limit protection
- Output voltage as low as 0.65V
- 20-pin 4mm x 5mm DFN



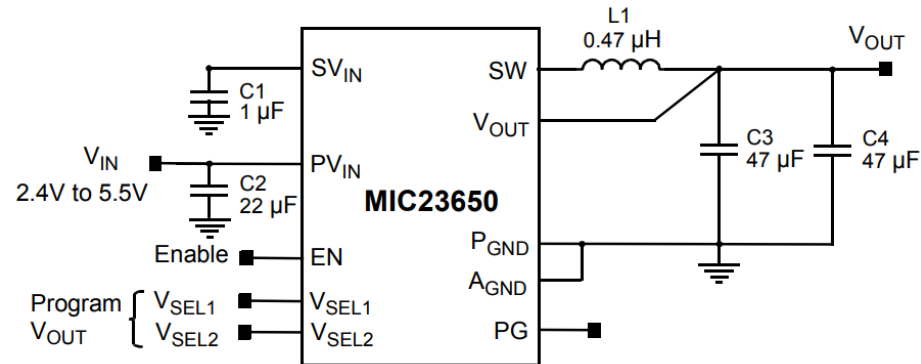
## Features List:

- Input Voltage Range: 2.4V to 5.5V
- 6A (pulsed) Output Current
- Multiple Faults Indication through I<sup>2</sup>C
- I<sup>2</sup>C Programmable:
  - Output Voltage:
    - 0.6V - 1.28V, 5 mV Resolution
    - 0.6V - 3.84V, 10/20 mV Resolution
  - Slew Rate: 0.2 ms/V - 3.2 ms/V
  - ON time (Switching Frequency)
  - High Side Current Limit: 3.5A - 10A
  - Enable Delay: 0.2 ms - 3 ms
  - Output Discharge when Disabled (EN = GND)
- High Efficiency (up to 95%)
- Ultra-Fast Transient Response
- ±1.5% Output Voltage Accuracy Over Line/Load/Temp
- Safe Start-Up with Pre-Biased Output
- Typical 1.5 µA Shutdown Supply Current
- Low Dropout (100% Duty Cycle) Operation
- Latch-Off Thermal Shutdown Protection
- Latch-Off Current Limit Protection
- Power-Good (PG) Open-Drain Output
- 2.5mm x 2.5mm FTQFN Package



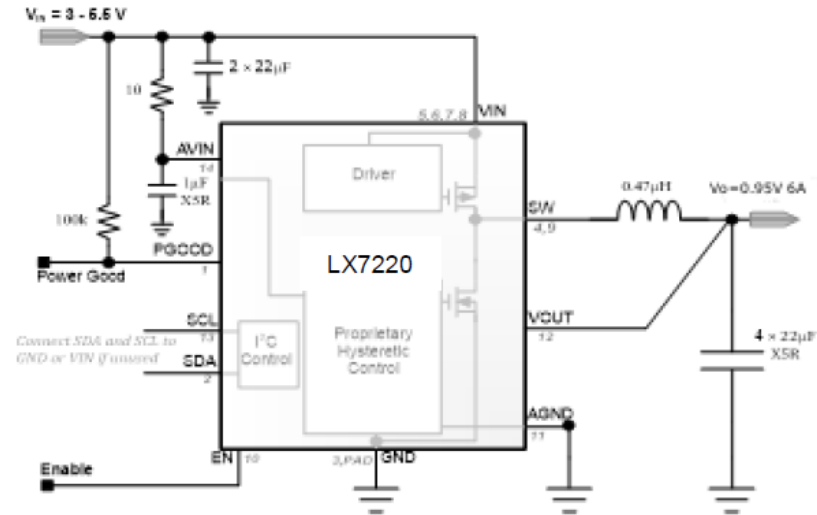
## Features List:

- Input Voltage Range: 2.4V to 5.5V
- 6A (pulsed) Output Current
- Pin Strapping Output Voltage Selection:
  - Three-State pins (nine voltage options)
  - 0.6V, 0.8V, 0.9V, 1.0V, 1.2V, 1.5V, 1.8V, 2.5V or 3.3V
- Reduced Component Count
  - (No Feedback Resistors)
- High Efficiency (up to 95%)
- Output Discharge when Disabled
- Constant-ON-Time Control with High Switching Frequency:
  - 1.2 MHz typical at 1.0V output voltage
- 0.8 ms/V Soft Start Speed
- Ultra-Fast Transient Response
- ±1.5% Output Voltage Accuracy Over Line/Load/Temp
- Safe Start-Up with Pre-Biased Output
- Typical 1.5  $\mu$ A Shutdown Supply Current
- Low Dropout (100% Duty Cycle) Operation
- Latch-Off Thermal Shutdown Protection
- Latch-Off Current Limit Protection
- Power-Good (PG) Open-Drain Output



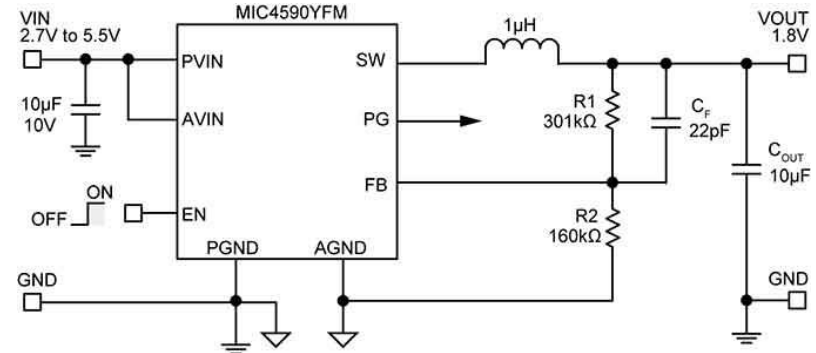
## Features:

- Constant Frequency Hysteretic Control
- Extremely Fast Line/Load Transient Response
- I<sup>2</sup>C for Output Adjustment (3.4Mbps)
- 1.2 MHz Switching Frequency
- Extremely Low-R<sub>DS(on)</sub> MOSFETS
- Input Supply Voltage Range: 2.7V to 5.5V
- Load Currents up to 6A
- Default Power Save Mode for Light-Load Efficiency
- UVLO, OVP, OCP
- -40°C to +85°C Ambient Temperature
- 2mm x 3mm VQFN



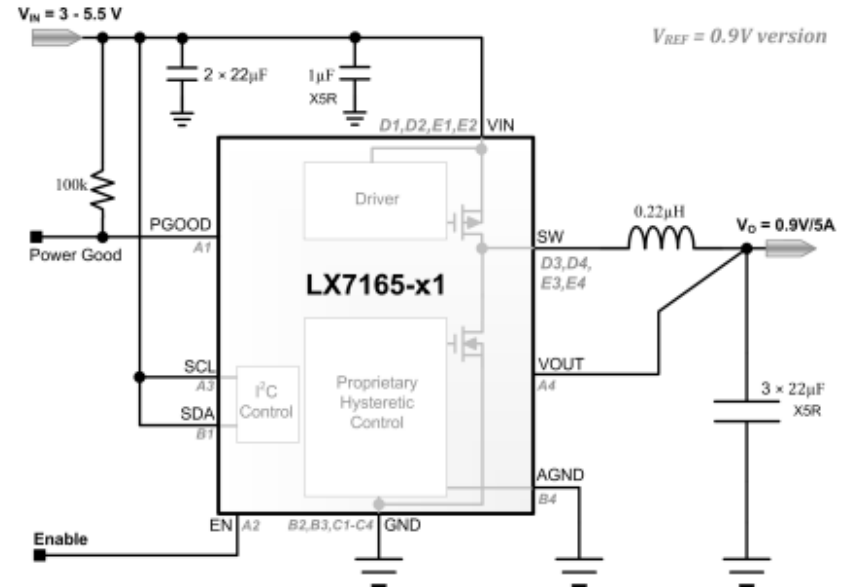
## Features:

- Input voltage: 2.7V to 5.5V
- 5A output current
- Up to 95% efficiency
- Up to 3.3MHz operation
- Safe start-up into a pre-biased output
- Power Good output
- Ultra-fast transient response
- Low output voltage ripple
- Low RDS(ON) integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Thermal shutdown and current limit protection
- Output voltage as low as 0.7V
- 8-pin SOIC and 3mm  $\times$  4mm DFN-10L
- -40°C to +125°C junction temperature range



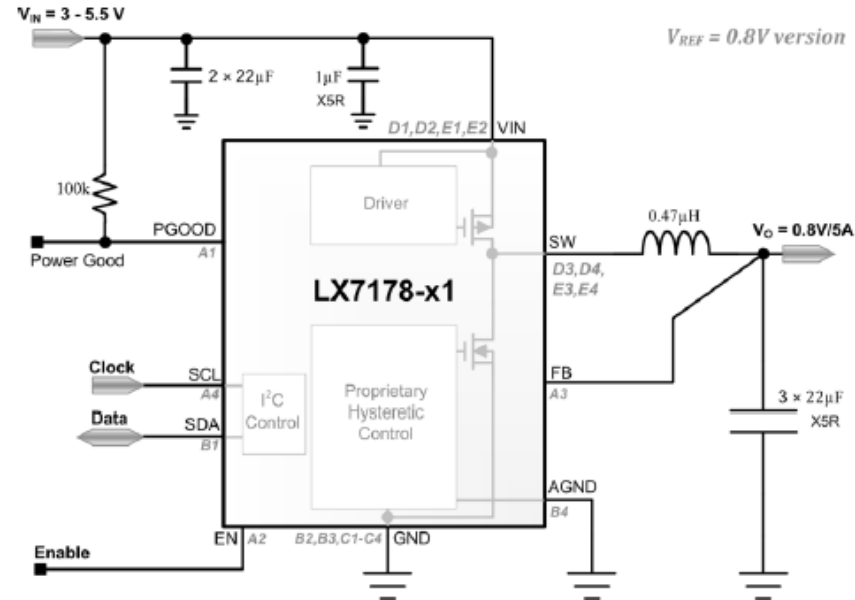
## Features:

- Constant Frequency Hysteretic Control
- Extremely Fast Line/Load Transient Response
- I<sup>2</sup>C for Output Adjustment (3.4Mbps)
- 1.875 MHz Switching Frequency
- Extremely Low-R<sub>DSON</sub> MOSFETS
- Input Supply Voltage Range: 3.0V to 5.5V
- Load Currents up to 5A
- I<sup>2</sup>C Selectable Power Save Mode for Light-Load Efficiency
- UVLO, OVP, OCP
- 4 fixed output voltage options:
  - 0.8, 0.9V, 0.95V, and 0.97V (no voltage divider is necessary)
- Output adjustable up to 3.3V w/voltage divider
- 1.6mm x 2mm WLCSP-20 (0.4mm pitch)



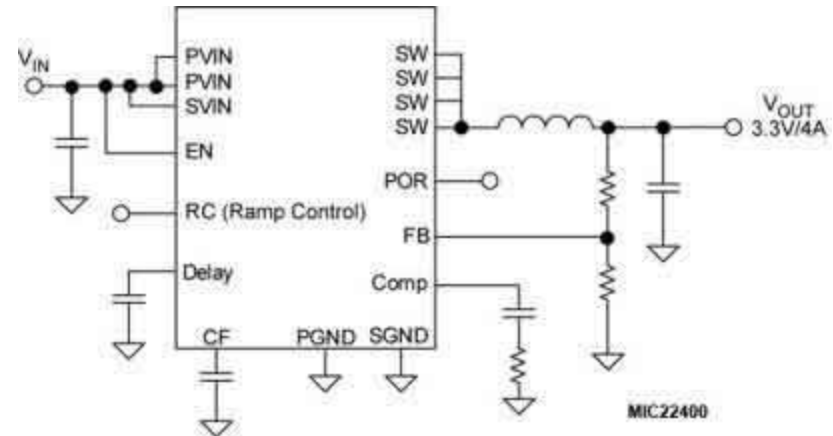
## Features:

- Constant Frequency Hysteretic Control
- Extremely Fast Line/Load Transient Response
- I<sup>2</sup>C for Output Adjustment (3.4Mbps)
- 1.875 MHz Switching Frequency
- Extremely Low-R<sub>DS(on)</sub> MOSFETS
- Input Supply Voltage Range: 3.0V to 5.5V
- Load Currents up to 5A
- I<sup>2</sup>C Selectable Power Save Mode for Light-Load Efficiency
- UVLO, OVP, OCP
- Fixed 0.8V output (no voltage divider is necessary)
- Output adjustable up to 3.3V w/voltage divider
- 1.6mm x 2mm WLCSP-20 (0.4mm pitch)



### Features:

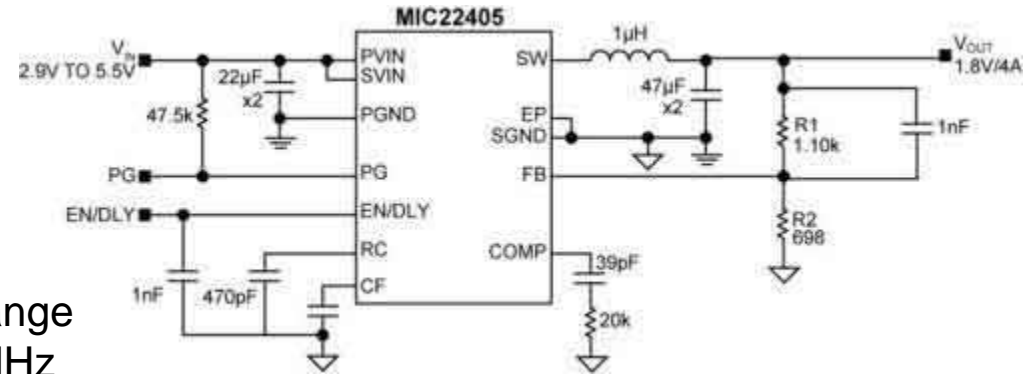
- Input voltage range: 2.6V to 5.5V
- Output voltage adjustable down to 0.7V
- Output current up to 4A
- Full sequencing and tracking ability
- Power-On-Reset (POR)
- Efficiency > 90% across a broad load range
- Programmable frequency 300kHz to 4MHz
- Easy Ramp Control™ (RC) compensation
- 100% maximum duty cycle
- Fully-integrated MOSFET switches
- Thermal-shutdown and current limit protection
- 20-pin 3mm x 4mm MLF®
- 20-pin ePad TSSOP
- -40°C to +125°C junction temperature range





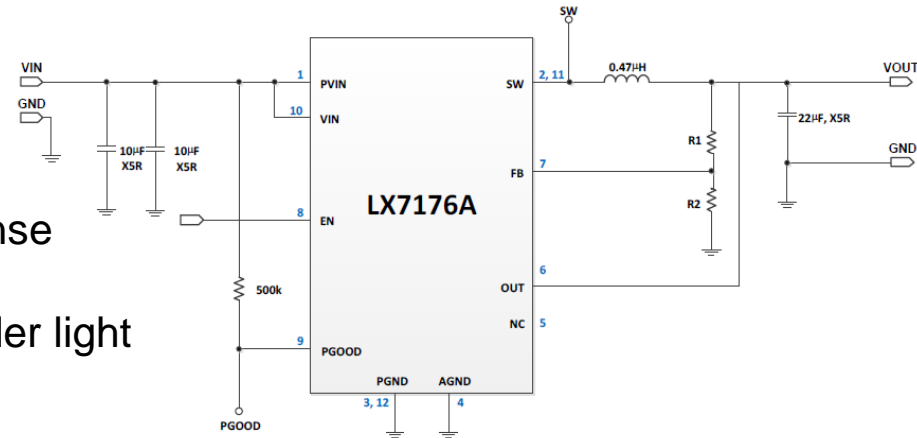
## Features:

- Input voltage range: 2.9V to 5.5V
- Ultra-fast transient response
- Output load current up to 4A
- Safe start-up into a pre-biased output
- Full sequencing and tracking capability
- Efficiency > 95% across a broad load range
- Programmable frequency 300kHz to 4MHz
- Easy RC compensation
- 100% maximum duty cycle
- Fully-integrated MOSFET switches
- Thermal shutdown and current-limit protection
- 20-pin 3mm x 4mm MLF®
- -40°C to +125°C junction temperature range
- Output voltage adjustable down to 0.7V



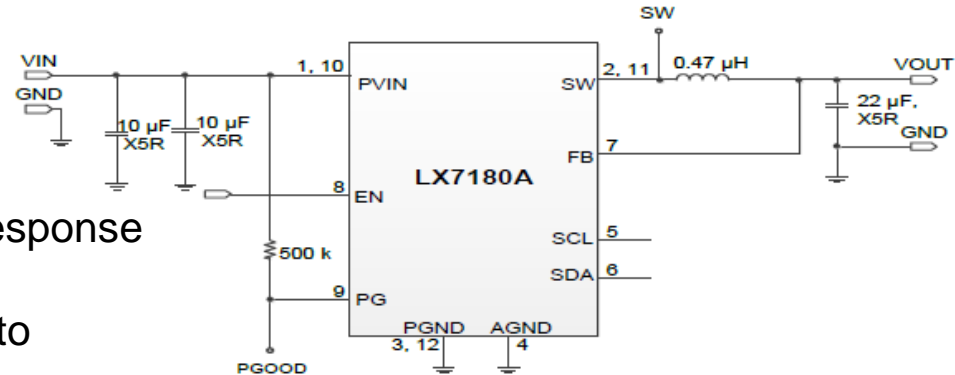
## Features:

- Load current up to 4A
- Input Supply Voltage Range: 3V - 5.5V
- Hysteretic control offers best transient response
- CCM switching at a constant 1.65MHz
- Automatically switches to DCM switching under light loads to improve efficiency
- 100% Duty Ratio Operation
- Input under voltage and over voltage protection
- Enable and Power Good Function
- Internal soft-start
- Cycle-by-Cycle Over Current Protection
- Hiccup Mode protects against short circuit faults
- 2mm x 2mm QFN



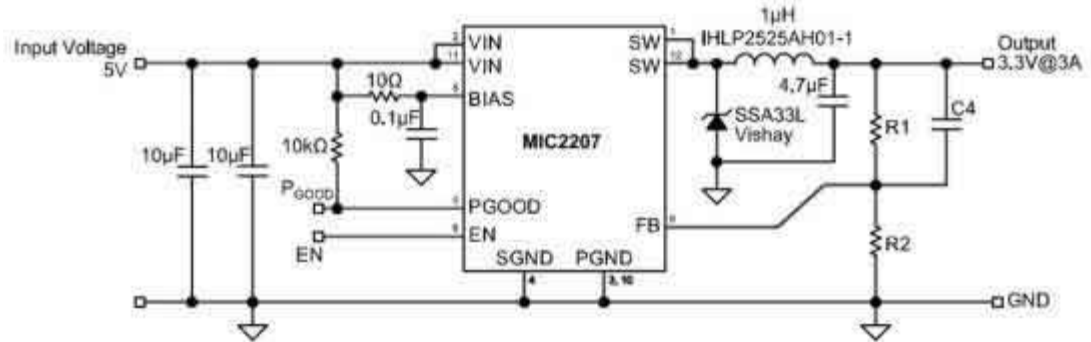
## Features:

- Load Current up to 4A
- Input Supply Voltage Range: 3.0V - 5.5V
- Hysteretic Control Offers Best Transient Response
- PWM Switching at a Constant 1.65 MHz
- Power Save Mode (PSM) can be Selected to Improve Light Load Efficiency.
- 100% Duty Ratio Operation
- Input Under Voltage and Over Voltage Protection
- Enable and Power Good Function
- Internal Soft-start
- Cycle-by-Cycle Over Current Protection
- Hiccup Mode Protects Against Short Circuit Faults
- I<sup>2</sup>C Serial Interface at 3.4 Mbps
- Seven Bit Adjustable Reference Voltage via I<sup>2</sup>C Bus



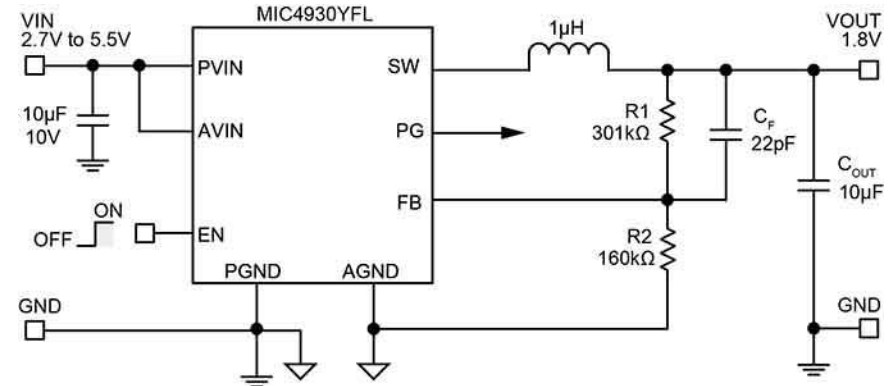
## Features:

- 2.7V to 5.5V supply voltage
- 2MHz PWM mode
- Output current to 3A
- >94% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option –  
- down to 1V
- Ultra-fast transient response
- Ultra-small external components stable with a –  
- 1 $\mu$ H inductor and a 4.7 $\mu$ F output capacitor
- Fully integrated 3A MOSFET switch
- Micropower shutdown
- Thermal shutdown and current limit protection
- 12-pin 3mm x 3mm MLF® package
- -40°C to +125°C junction temperature range



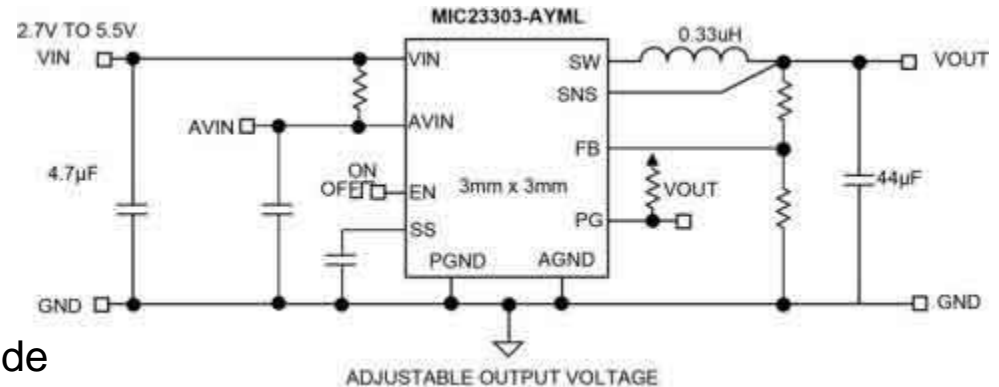
## Features:

- Input voltage: 2.7V to 5.5V
- 3A output current
- Up to 95% efficiency
- Up to 3.3MHz operation
- Safe start-up into a pre-biased output
- Power Good output
- Ultra-fast transient response
- Low output voltage ripple
- Low RDS(ON) integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Thermal shutdown and current limit protection
- Output voltage as low as 0.7V
- 3mm  $\times$  4mm DFN-10L
- -40°C to +125°C junction temperature range



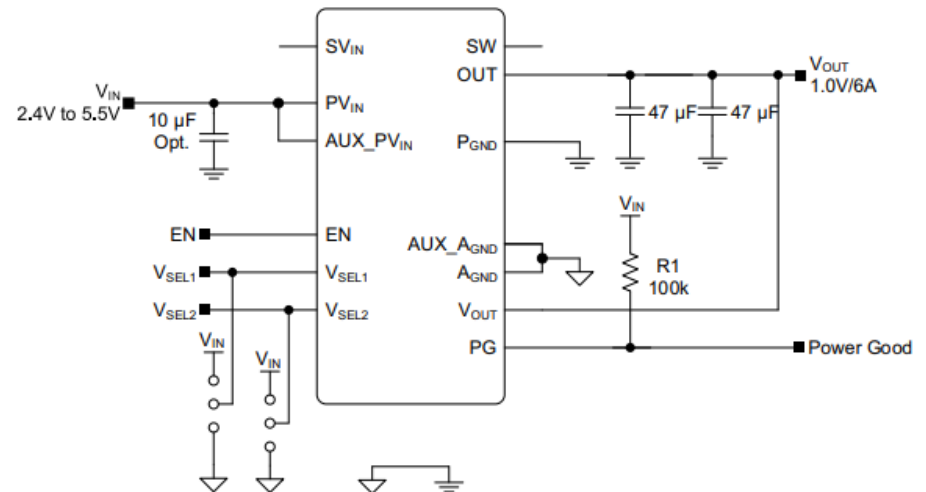
## Features:

- Input voltage: 2.7V to 5.5V
- Output voltage: down to 0.65V
- Up to 3A output current
- Up to 93% peak efficiency
- 80% typical efficiency at 1mA
- 24 $\mu$ A typical quiescent current
- 4MHz PWM operation in continuous mode
- 35mVpp ripple in HyperLight Load® mode
- 5mV output voltage ripple in full PWM mode
- Fully integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Thermal-shutdown and current-limit protection
- 12-pin 3mm x 3mm DFN
- -40°C to +125°C junction temperature range



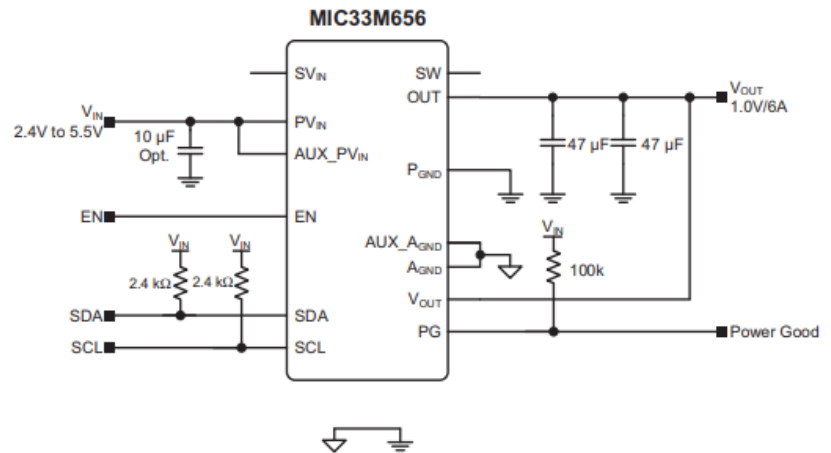
## Features

- 2.4V to 5.5V Input Voltage Range
- 6A Output Current
- Pin Strapping Voltage Selection:
  - Tri-state pins (nine voltage options)
  - 0.6V, 0.8V, 0.9V, 1.0V, 1.2V, 1.5V, 1.8V, 2.5V or 3.3V output voltage
- Reduced Component Count (No Feedback Resistors)
- High Efficiency (up to 95%)
- Output Discharge when Disabled
- Constant-On-Time (COT) Control with High Switching Frequency:
  - 1.2 MHz typical at 1.0V output voltage
- $\pm 1.5\%$  Output Voltage Accuracy Over Line/Load/Temperature Range
- 0.8 ms/V Soft Start Speed
- Supports Safe Start-up with Pre-Biased Output
- Typical 1.5  $\mu$ A Shutdown Supply Current
- Low Dropout Operation (100% Duty Cycle)
- Ultra-Fast Transient Response
- Latch-Off Thermal Shutdown Protection
- Latch-Off Current Limit Protection
- Power Good (PG) Open-Drain Output
- Meets CISPR32 Class B Emissions
- Package: 53-Lead, 6 mm x 10 mm B1QFN



## Features

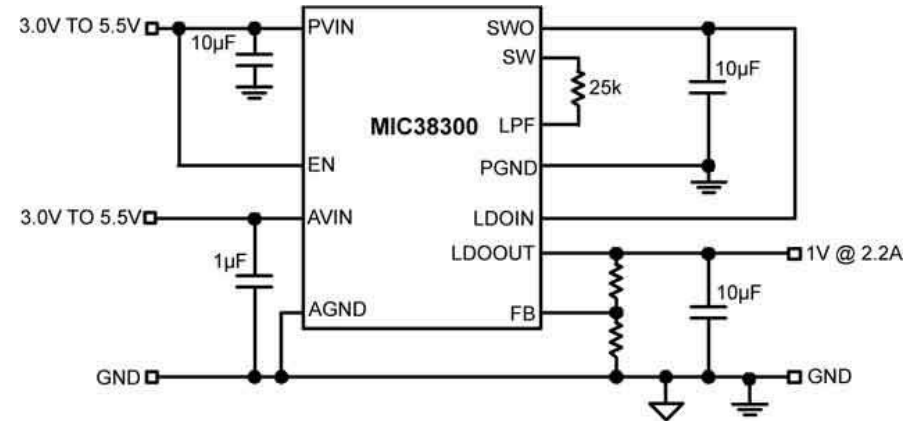
- Input Voltage Range: 2.4V to 5.5V
- 6A Output Current
- Multiple Faults Indication through I<sup>2</sup>C
- I<sup>2</sup>C Programmable:
  - Output voltage: 0.6V-1.28V, 5 mV resolution; 0.6V-3.84V, 10/20 mV resolution
  - Slew rate: 0.2 ms/V-3.2 ms/V
  - On time (switching frequency)
  - High-side current limit: 3.5A-10A
  - Enable delay: 0.2 ms-3 ms
  - Output discharge when disabled (EN = GND)
- High Efficiency (up to 95%)
- Ultra-Fast Transient Response
- ±1.5% Output Voltage Accuracy Over Line/Load/Temperature Range
- Safe Start-up with Pre-Biased Output
- Typical 1.5  $\mu$ A Shutdown Supply Current
- Low Dropout (100% Duty Cycle) Operation
- I<sup>2</sup>C Speed, Up to 3.4 MHz
- Latch-Off Thermal Shutdown Protection
- Latch-Off Current Limit Protection
- Meets CISPR32 Class B Emissions
- Power Good (PG) Open-Drain Output
- Package: 53-Lead, 6 mm x 10 mm B1QFN





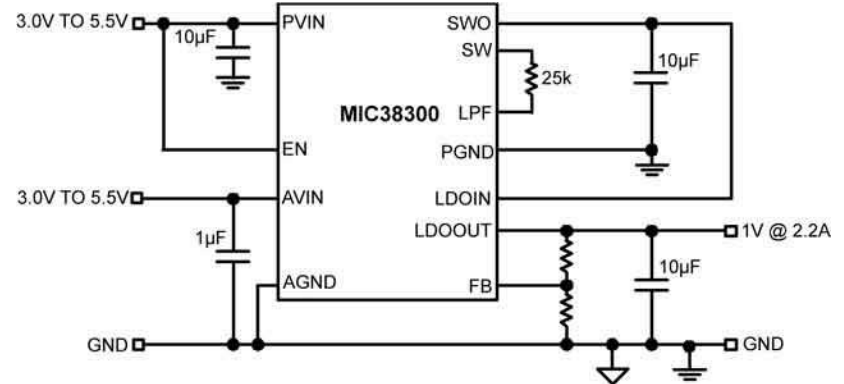
## Features:

- 3A peak output current
- 2.2A continuous operating current
- Input voltage range: 3.0V to 5.5V
- Adjustable output voltage down to 1.0V
- Output noise less than 5mV
- Ultra fast transient performance
- Unique switcher plus LDO architecture
- Fully integrated MOSFET switches
- Micro-power shutdown
- Easy upgrade from LDO as power dissipation –  
- becomes an issue
- Thermal shutdown and current limit protection
- 4mm x 6mm x 0.9mm MFL® package



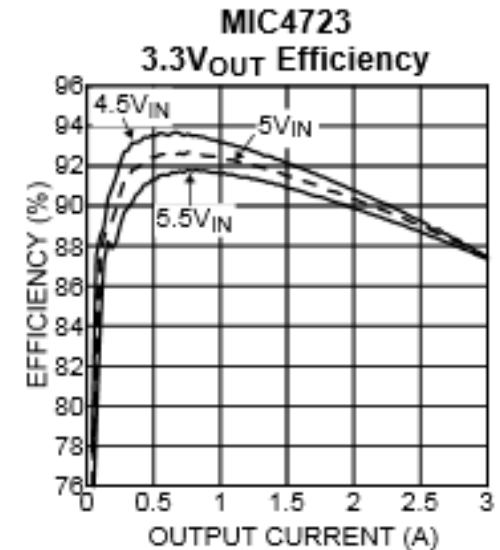
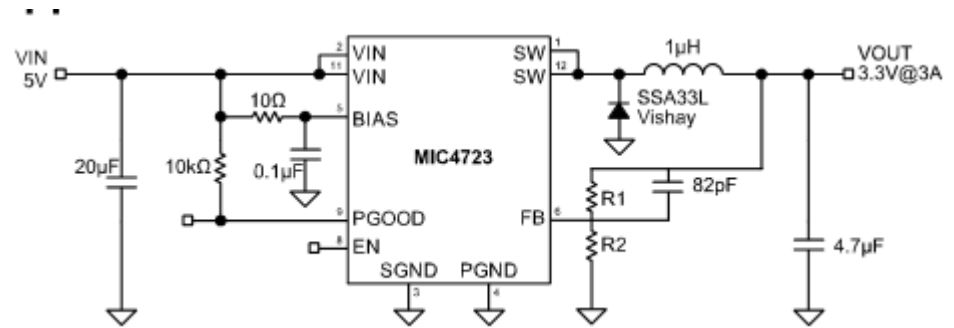
## Features:

- 2.7V to 5.5V supply voltage
- 2.7MHz PWM mode
- Output current to 3A
- >92% efficiency
- Adjustable output voltage option down to 1V
- 100% maximum duty cycle
- Ultra-fast transient response
- Ultra-small external components Stable with a –  
- 0.47 $\mu$ H inductor and a 4.7 $\mu$ F output capacitor
- Fully integrated 3A MOSFET switch
- Micropower shutdown
- Thermal shutdown and current limit protection
- Pb-free 12-pin 3mm x 3mm MFL® package
- -40°C to +125°C junction temperature range



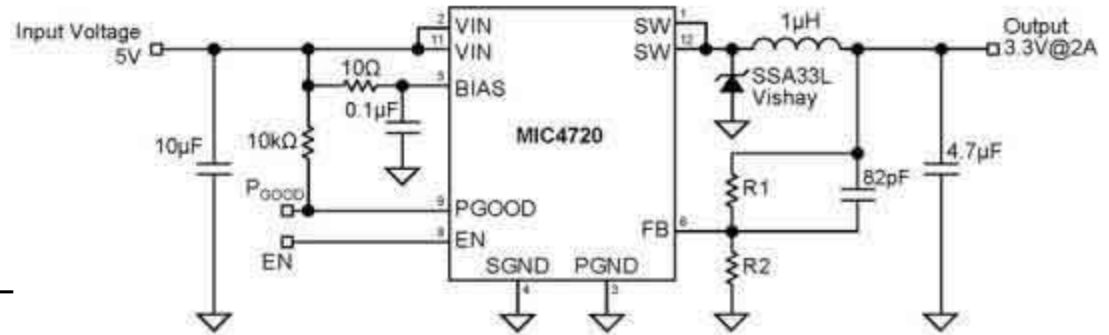
## Features:

- 2.7V to 5.5V supply voltage
- 2.0MHz PWM mode
- Output current to 2A
- Up to 94% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option down –  
- to 1V
- Ultra-fast transient response
- Ultra-small external components Stable –  
- with a 1 $\mu$ H inductor and a 4.7 $\mu$ F output capacitor
- Fully integrated 2A MOSFET switch
- Thermal shutdown and current limit protection
- Pb-free 12-pin 3mm x 3mm MFL<sup>®</sup> package
- -40°C to +125°C junction temperature range
- Pb-free 10-pin ePad MSOP package



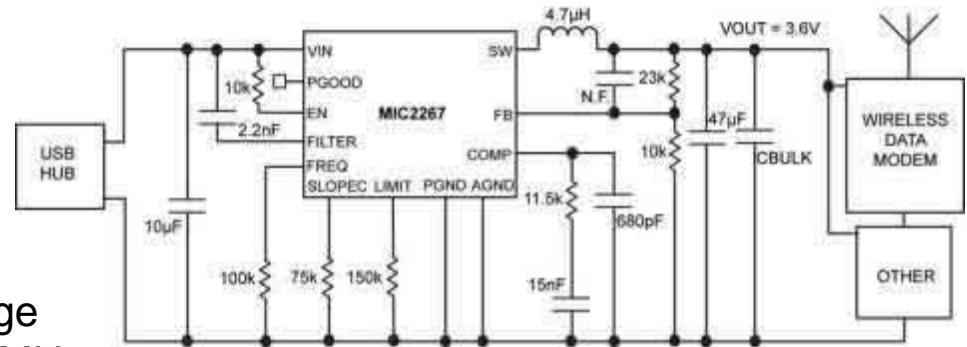
## Features:

- 2.7V to 5.5V supply voltage
- 2.0MHz PWM mode
- Output current to 2A
- Up to 94% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option –  
- down to 1V
- Ultra-fast transient response
- Ultra-small external components –  
- Stable with a 1 $\mu$ H inductor and –  
- a 4.7 $\mu$ F output capacitor
- Fully integrated 2A MOSFET switch
- Thermal shutdown and current limit protection
- Pb-free 12-pin 3mm x 3mm MLF® package
- -40°C to +125°C junction temperature range
- Pb-free 10-pin ePad MSOP package



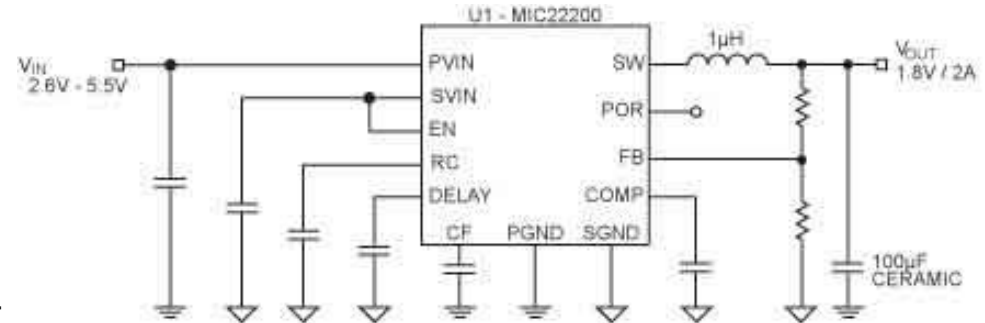
### Features:

- Input voltage range: 3.0V to 5.5V
- Micropower shutdown
- Fast transient response
- Output voltage adjustable down to 1.0V
- Up to 96% efficiency at 500mA output
- Efficiency <90% across a broad load range
- Adjustable frequency from 400kHz to 1.5MHz
- Adjustable input current limiting 100mA –  
- to over 1A
- 100% maximum duty cycle
- Fully integrated MOSFET switches
- Thermal shutdown and output current limit protection
- 12-pin 3mm x 3mm MFL<sup>®</sup>
- Junction temperature range: -40°C to +125°C



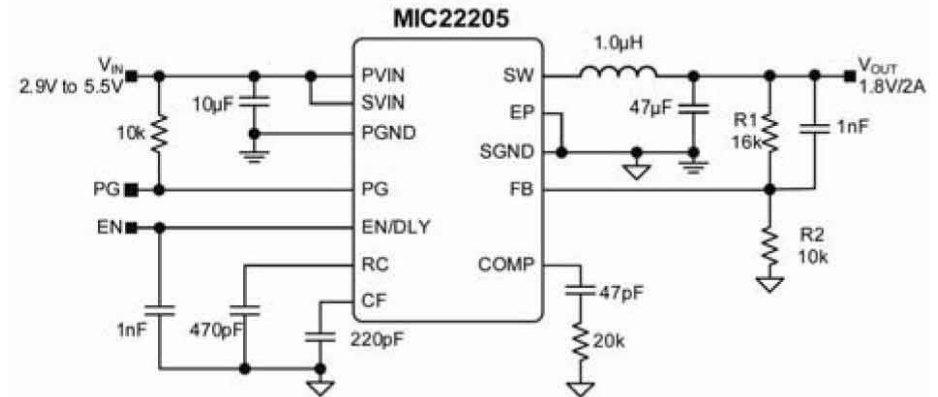
### Features:

- Input voltage range: 2.6V to 5.5V
- Output current to 2A
- Full sequencing and tracking capability
- Easy RC compensation
- Power On Reset (POR) output
- Adjustable output voltage option down –  
- to 0.7V
- Efficiency >90% across a broad load range
- Operating frequency: Programmable –  
- from 800 kHz up to 4MHz
- Ultra fast transient response
- 100% maximum duty cycle
- Fully integrated MOSFET switches
- Thermal shutdown and current limit protection
- Available in Pb-free 3mm x 3mm 12-pin –  
- MFL® package
- -40°C to +125°C junction temperature range



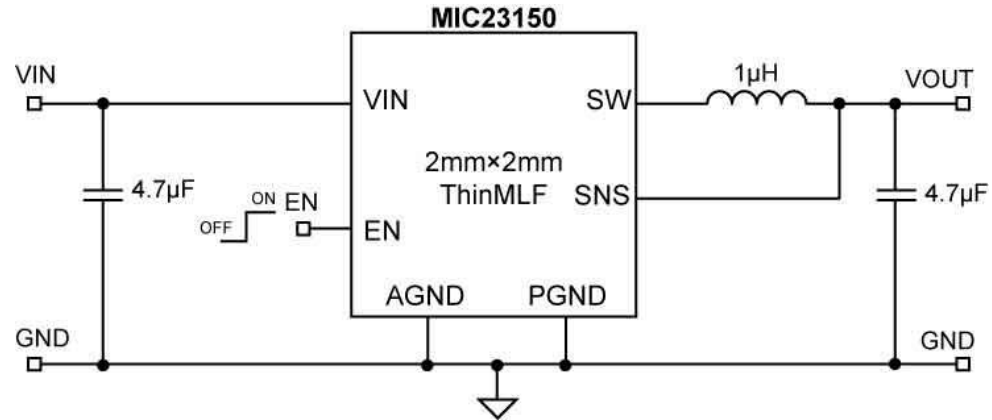
## Features:

- Input voltage range: 2.9V to 5.5V
- Output voltage adjustable down to 0.7V
- Output load current up to 2A
- Safe start-up into a pre-biased output
- Full sequencing and tracking capability
- Power Good (PG) output
- Efficiency >95% across a broad load range
- Programmable frequency 300kHz to 4MHz
- Easy RC compensation
- 100% maximum duty cycle
- Fully-integrated MOSFET switches
- Thermal-shutdown and current-limit protection
- 12-pin 3mm x 3mm MLF®
- -40°C to +125°C junction temperature range



## Features:

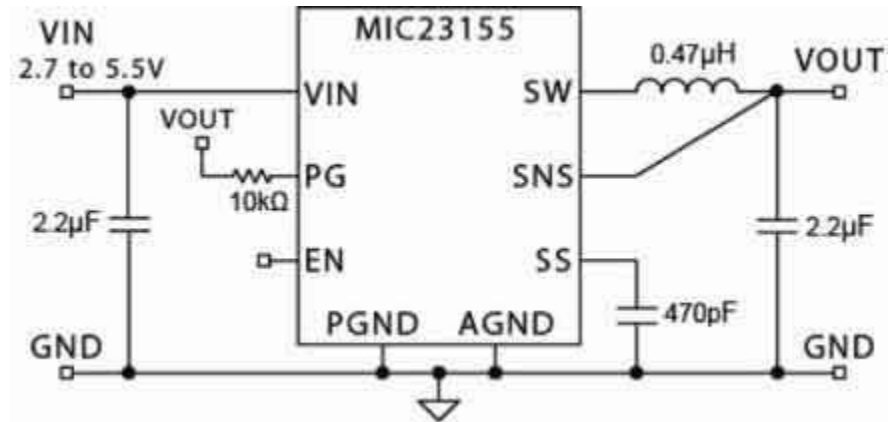
- Input voltage: 2.7V to 5.5V
- 2.0A output current
- Up to 93% peak efficiency
- 87% typical efficiency at 1mA
- 23 $\mu$ A typical quiescent current
- 4MHz PWM operation in continuous –  
- mode
- Low ripple output voltage
- 14mVpp ripple in HyperLight Load® -  
- mode
- 5mV output voltage ripple in full PWM mode
- Fully integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Output Voltage as low as 0.95V
- 8-pin 2mm x 2mm Thin MLF®
- -40°C to +125°C junction temperature range





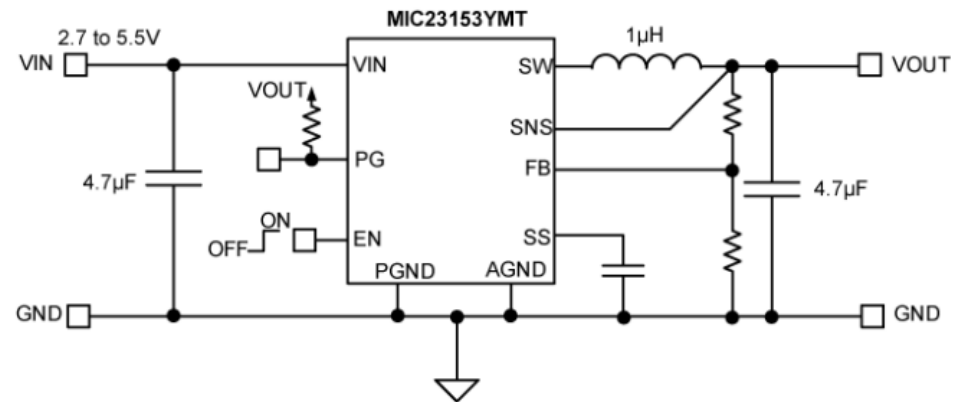
## Features:

- Input voltage: 2.7V to 5.5V
- Up to 2A output current
- Up to 94% peak efficiency
- 85% typical efficiency at 1mA
- Programmable soft-start
- 22 $\mu$ A typical quiescent current
- Output voltage: fixed or adjustable –  
- (down to 0.7V)
- 3MHz PWM operation in continuous –  
- conduction mode
- Active output discharge when disabled
- Fully integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Thermal shutdown and current limit protection
- 10-pin 2.5mm x 2.5mm Thin MLF®
- -40°C to +125°C junction temperature range



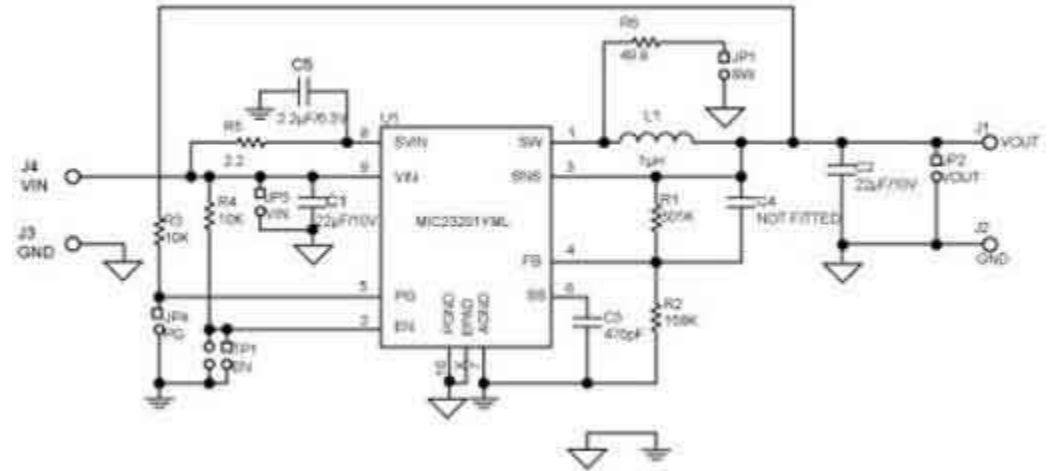
## Features:

- Input voltage: 2.7V to 5.5V
- Output voltage fixed or adjustable (0.62V to 3.6V)
- Up to 2A output current
- Up to 93% peak efficiency
- 85% typical efficiency at 1mA
- Power good output
- Programmable soft-start
- 22 $\mu$ A typical quiescent current
- 4MHz PWM operation in continuous mode
- Low ripple output voltage
  - 35mVpp ripple in HyperLight Load® mode
  - 5mV output voltage ripple in full PWM mode
- Fully integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Thermal shutdown and current limit protection
- 10-pin 2.5mm x 2.5mm Thin MLF®
- -40°C to +125°C junction temperature range



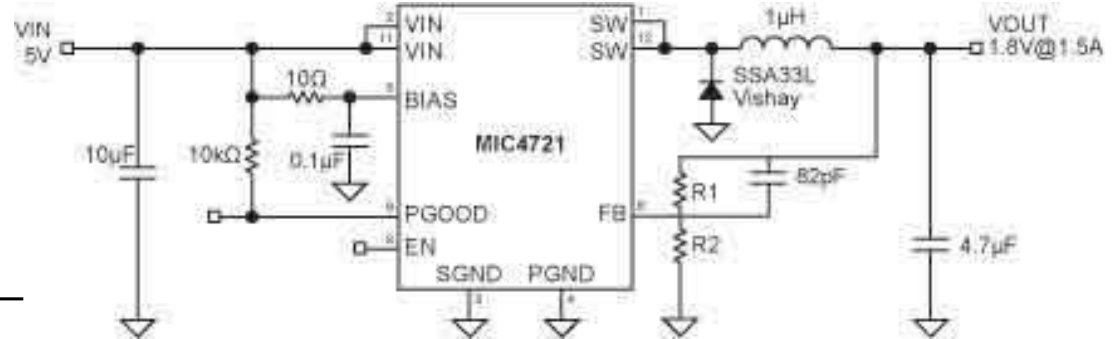
## Features:

- Input voltage: 2.7V to 5.5V
- 2A output current
- Up to 90% peak efficiency
- Programmable Soft-Start
- Power Good Indicator
- 2MHz switching frequency
- Safe for pre-biased output
- Ultra fast transient response
- Low voltage output ripple, 16mV –  
- at full load
- Fully integrated MOSFET switches
- 0.01µA shutdown current
- Output Voltage as low as 0.95V
- 10-pin 3mm x 3mm MFL®
- -40°C to +125°C junction temperature range



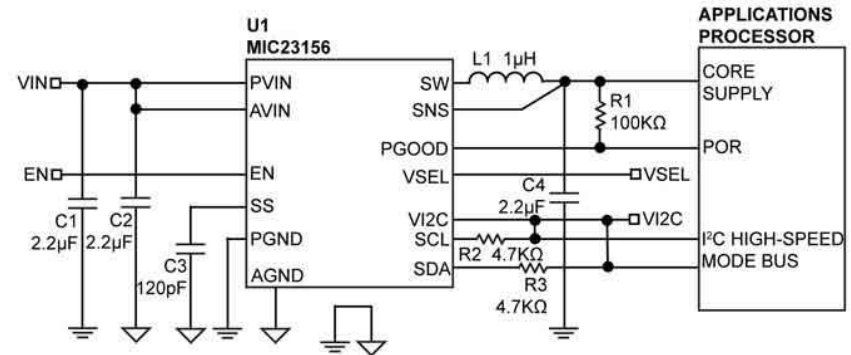
## Features:

- 2.7V to 5.5V supply voltage
- 2MHz PWM mode
- Output current to 1.5A
- Up to 94% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option –  
- down to 1V
- Ultra-fast transient response
- Stable with a 1 $\mu$ H inductor and a 4.7 $\mu$ F output capacitor
- Fully integrated 1.5A MOSFET switch
- Micropower shutdown
- Power Good pin
- Thermal shutdown and current limit protection
- 10-pin MSOP package
- -40°C to +125°C junction temperature range



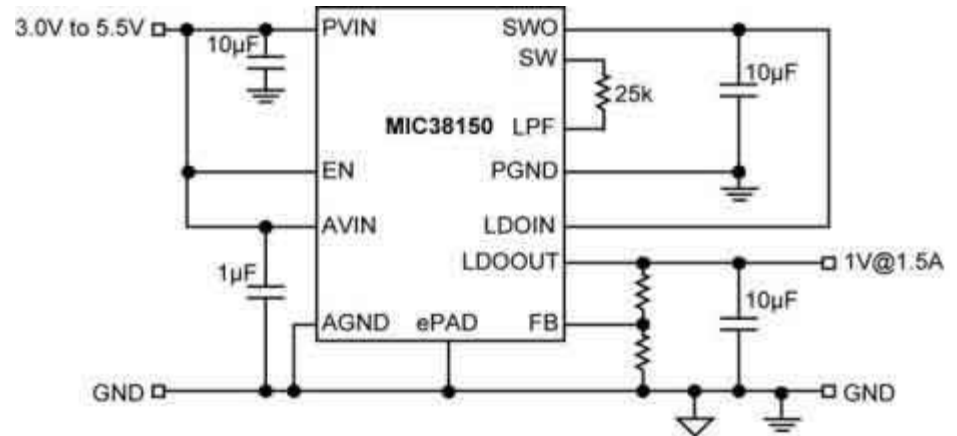
## Features:

- Input voltage: 2.7V to 5.5V
- Up to 1.5A output current
- Safe startup in to pre-biased output
- Up to 93% peak efficiency
- Fast pin-selectable output voltage
- 1MHz I<sup>2</sup>C-controlled adjustable output: -  
-  $V_{OUT} = 0.7$  to  $2.4V$  in  $10mV$  steps
- High output voltage accuracy ( $\pm 1.5\%$  over temperature)
- Programmable soft-start using external capacitor
- Ultra-low quiescent current of  $30\mu A$  when not switching
- Thermal-shutdown and current-limit protection
- Stable with  $1\mu H$  output inductor and  $2.2\mu F$  ceramic capacitor
- Junction temperature range of  $-40^{\circ}C$  to  $+125^{\circ}C$



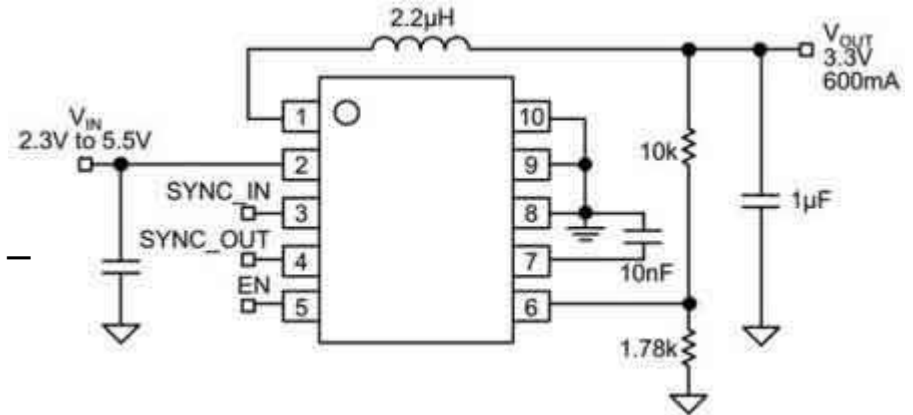
## Features:

- Output current up to 1.5A
- Input voltage range: 3.0V to 5.5V
- Adjustable output voltage down to 1.0V
- Output noise less than 5mV
- Ultra fast transient performance
- Unique switcher plus LDO architecture
- Fully integrated MOSFET switches
- Micro-power shutdown
- Easy upgrade from LDO as power –  
- dissipation becomes an issue
- Thermal shutdown and current limit protection
- 4mm x 6mm x 0.9mm MLF® package



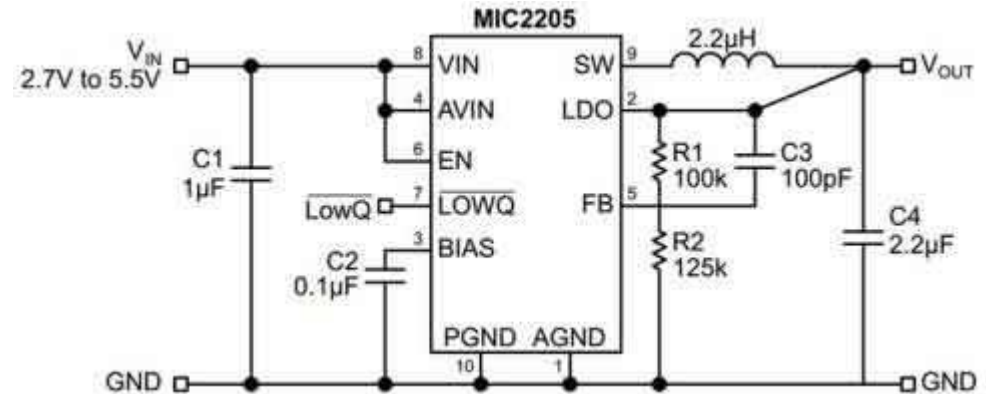
## Features:

- Input voltage range: 2.3V to 5.5V
- Output down to 0.5V @ 600mA
- 2MHz PWM operation
- Stable with 1 $\mu$ F ceramic output capacitor.
- Ultra-fast transient response (up to 500kHz – - GBW)
- All ceramic capacitors
- >95% efficiency
- Fully integrated MOSFET switches
- Easily synchronized to external clock
- SYNCLOCK feature to daisy chain multiple 2202s
- Requires only 4 external components
- 1% line and load regulation
- 10-pin MSOP and 3mm x 3mm MLF®-10L package options
- -40°C to +125°C junction temperature range



## Features:

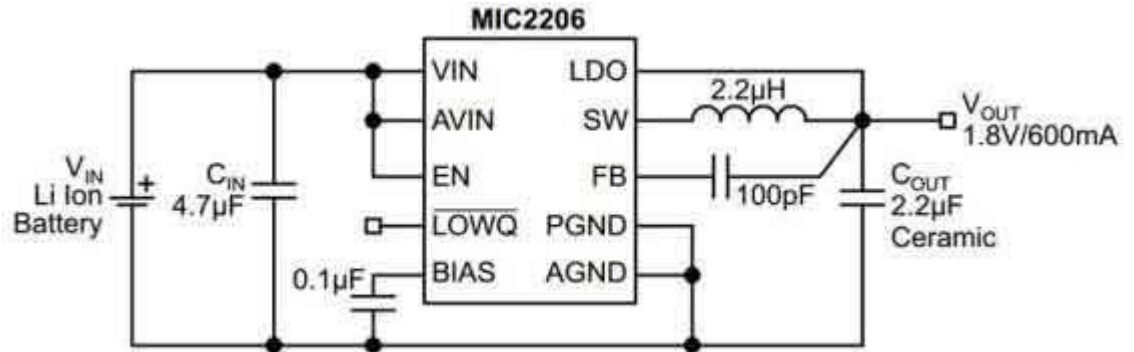
- 2.7V to 5.5V supply voltage
- Light load LowQ® LDO mode
- 18 $\mu$ A quiescent current
- Low noise, 75mVrms
- 2MHz PWM mode
- Output current to 600mA
- >95% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option down to 1V
- Fixed output voltage option available
- Ultra-fast transient response
- Stable with 1 $\mu$ F ceramic output capacitor
- Fully integrated MOSFET switches
- 3mm x 3mm MLF®-10L package
- -40°C to +125°C junction temperature range





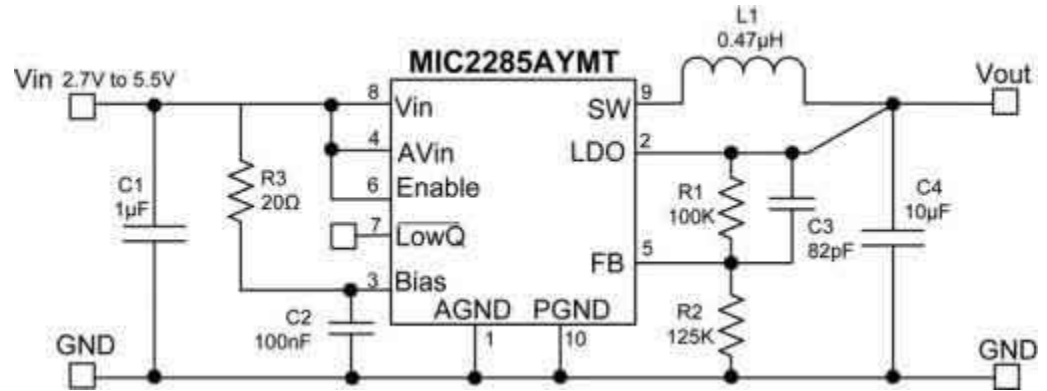
## Features:

- 2.7V to 5.5V supply voltage
- Light load LowQ® LDO mode:
  - 18 $\mu$ A quiescent current
  - Low noise, 75 $\mu$ Vrms
- 2MHz PWM mode
- Output current to 600mA:
  - >95% efficiency
  - 100% maximum duty cycle
- Output Voltage Scaling (1V output in LowQ® Mode)
- Stable with 1mF ceramic output capacitor
- Fully integrated MOSFET switches
- Thermal shutdown and current limit protection
- 3mm x 3mm MLF®-10L package
- -40°C to +125°C junction temperature range



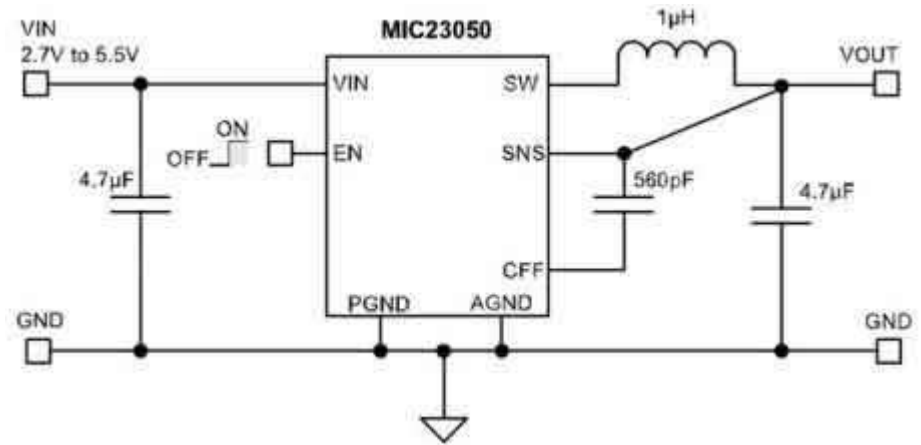
## Features:

- Light load LowQ® LDO mode:
  - 20  $\mu$ A quiescent current
  - Low noise, 75  $\mu$ Vrms
- 8MHz PWM mode:
  - Output current to 600mA
  - >90% efficiency
  - 100% maximum duty cycle
- Adjustable output voltage option –  
- down to 1V:
  - Fixed output voltage options available
- Requires only a 0.47 $\mu$ H inductor
- Enables sub 0.55mm profile solution
- Fully integrated MOSFET switches
- Thermal shutdown and current limit protection
- 10-pin 2mm x 2mm x 0.55mm MLF® package
- -40°C to +125°C junction temperature range



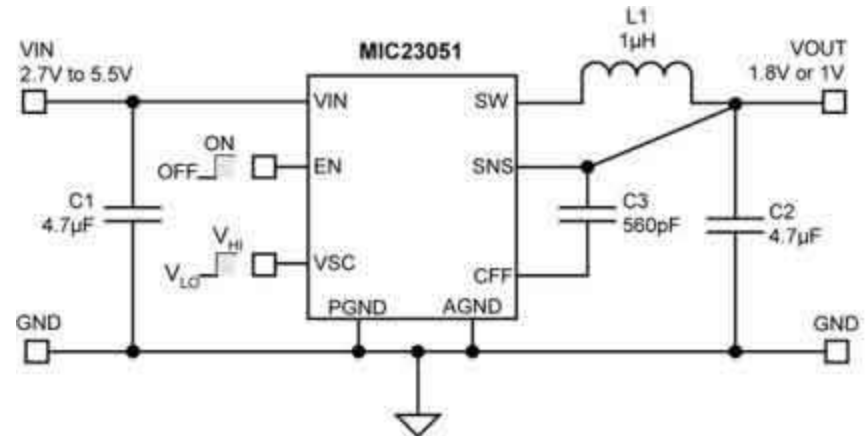
## Features:

- Input voltage range: 2.7V to 5.5V
- 600mA output current
- Fixed output voltage from 0.72V to 3.3V
- Ultra fast transient response
- 20 $\mu$ A typical quiescent current
- 4MHz in PWM in constant current mode
- 0.47 $\mu$ H to 2.2 $\mu$ H inductor
- Low voltage output ripple:
  - 25mVpp in HyperLight Load® mode
  - 3mV output voltage ripple in full PWM mode
- >93% efficiency
- ~89% at 1mA
- Available in 8-pin 2mm x 2mm MFL®
- -40°C to +125°C junction temperature range



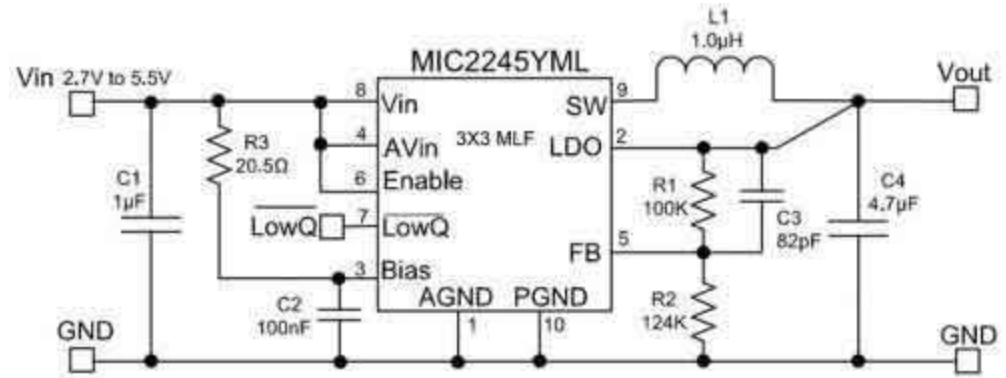
## Features:

- Input voltage range: 2.7V to 5.5V
- 600mA output current
- Fixed output voltage from 0.72V to 3.3V
- Output voltage scaling option
- 20 $\mu$ A typical quiescent current
- 4MHz in CCM PWM operation in –
  - normal mode
- 0.47 $\mu$ H to 2.2 $\mu$ H inductor
- Low voltage output ripple
- 25mVpp in HyperLight Load® mode
- 3mV output voltage ripple in full –
  - PWM mode
- >93% efficiency
- ~85% at 1mA
- Available in 8-pin 2mm x 2mm MLF®
- -40°C to +125°C junction temperature range



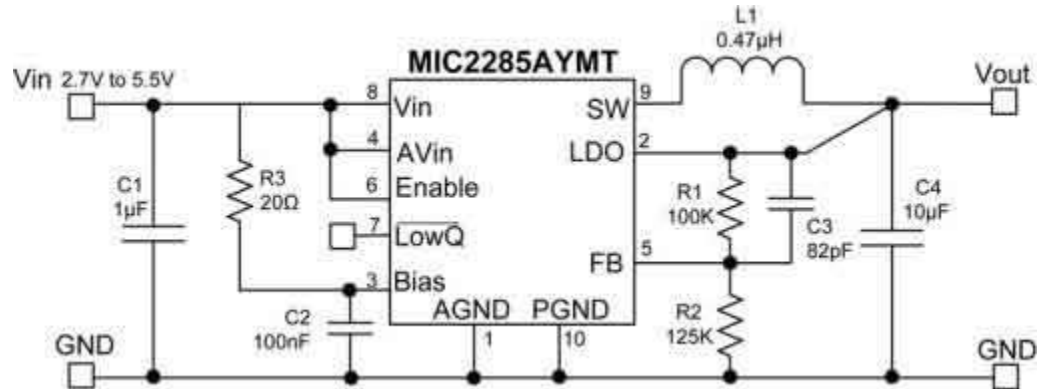
## Features:

- 2.7V to 5.5V supply/input voltage
- Light load LowQ® LDO mode
- 20 $\mu$ A quiescent current
- Low noise, 75 $\mu$ Vrms
- 4MHz PWM mode
- Output current to 500mA
- >92% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option down to 1V
- Fixed output voltage options available
- Uses a tiny 1 $\mu$ H inductor
- Fully integrated MOSFET switches
- Thermal shutdown and current limit protection
- 10-pin 3mm x 3mm MFL® package
- -40°C to +125°C junction temperature range



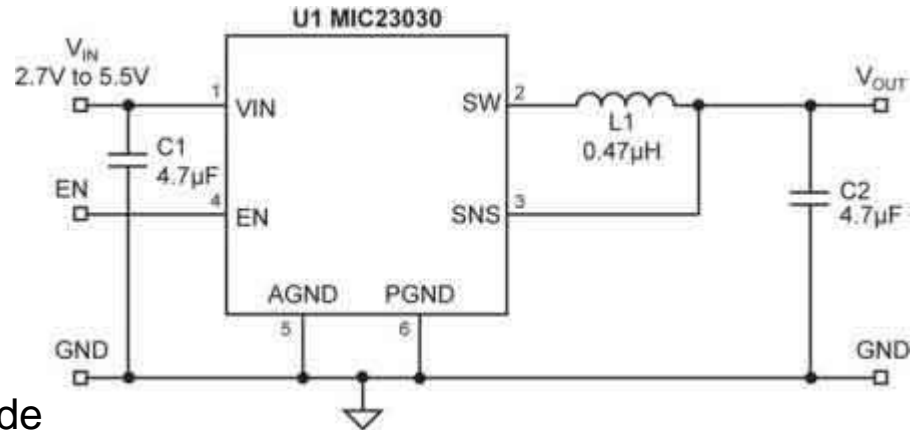
## Features:

- 2.7 to 5.5V supply/input voltage
- Light load LowQ® LDO mode:
  - 20 $\mu$ A quiescent current
  - Low noise, 75 $\mu$ Vrms
- 8MHz PWM mode:
  - Output current to 500mA
  - >90% efficiency
  - 100% maximum duty cycle
- Adjustable output voltage option down –  
- to 1V:
  - Fixed output voltage options available
- Ultra-fast transient response
- Uses a tiny 0.47 $\mu$ H inductor
- Enables sub 1mm profile solution
- Fully integrated MOSFET switches
- 10-pin 3mm x 3mm MLF® package
- -40°C to +125°C junction temperature range



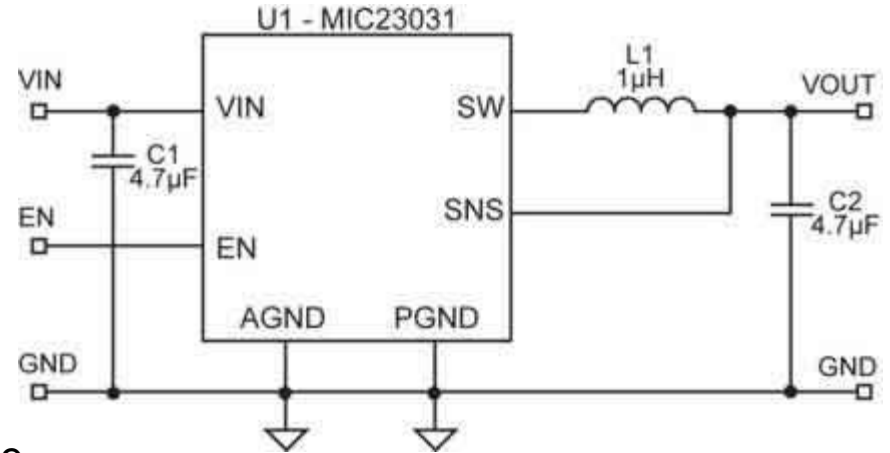
## Features:

- Input voltage: 2.7V to 5.5V
- 400mA output current
- Up to 91% efficiency and 83% at 1mA
- 21  $\mu$ A typical quiescent current
- 8MHz PWM operation in continuous mode
- Ultra fast transient response
- Low voltage output ripple:
  - 14mVpp ripple in HyperLight Load® mode
  - 5mV output voltage ripple in full PWM mode
- Fully integrated MOSFET switches
- 0.01  $\mu$ A shutdown current
- Fixed and adjustable output voltage options –  
- available
- 6-pin 1.6mm x 1.6mm Thin MLF®
- -40°C to +125°C junction temperature range



## Features:

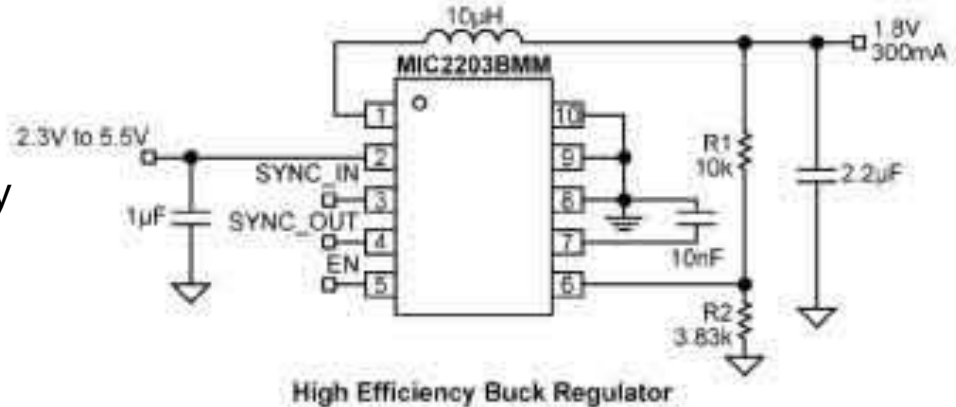
- Input voltage range: 2.7V to 5.5V
- 400mA output current
- Up to 93% efficiency and 88% at 1mA
- 21 $\mu$ A typical quiescent current
- 4MHz PWM operation in continuous mode
- Ultra fast transient response
- Low voltage output ripple:
  - 20mVpp ripple in HyperLight Load® mode
  - 3mV output voltage ripple in full PWM mode
- 0.01 $\mu$ A shutdown current
- Fixed and adjustable output voltage options –  
- available
- 6-pin 1.6mm x 1.6mm Thin MFL®
- -40°C to +125°C junction temperature range





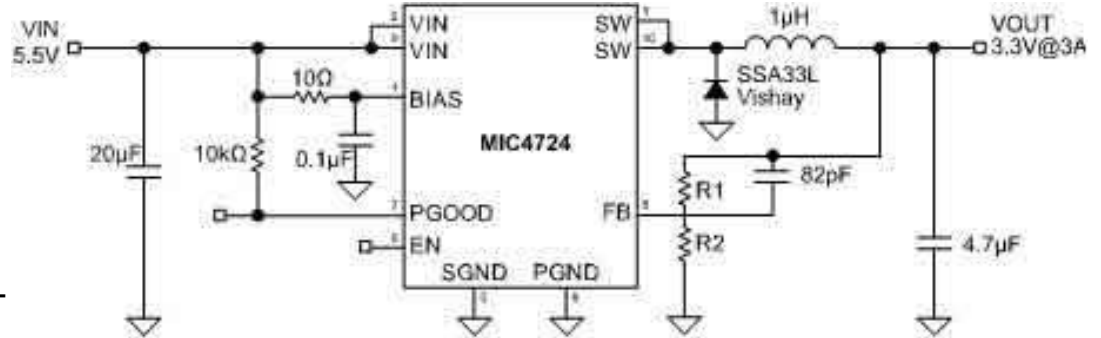
## Features:

- Input voltage range: 2.3V to 5.5V
- Output voltage adjustable down to 0.5V
- 300mA output current
- Constant 1MHz PWM switching frequency
- > 95% efficiency
- < 1mA switching supply current
- < 350 $\mu$ A static quiescent current
- < 1 $\mu$ A shutdown current
- All-ceramic capacitors
- Easily synchronized to external clock
- SYNCLOCK feature to daisy chain multiple devices
- Thermal shutdown and current limit protection
- 10-pin MSOP, and 3mm x 3mm MLF®-10L package options
- -40°C to +125°C junction temperature range



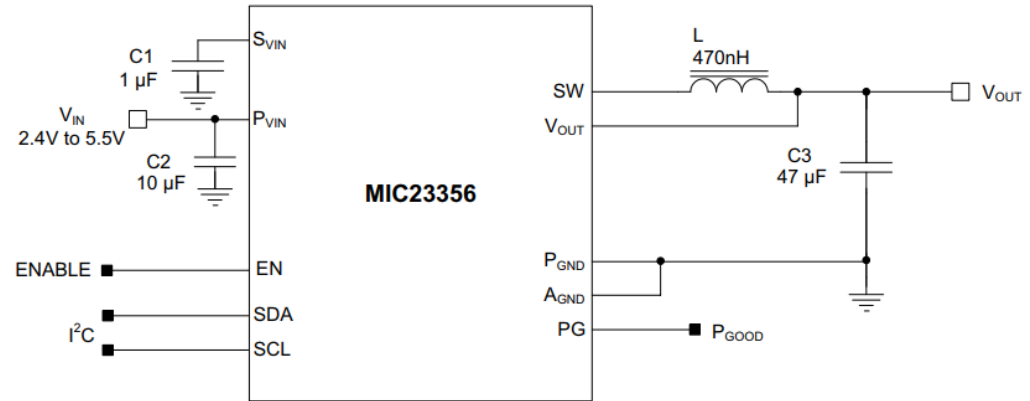
## Features:

- 3.0 to 6.0V supply voltage
- 2.0MHz PWM mode
- Output current to 3A
- Up to 94% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option –  
- down to 1V
- Ultra-fast transient response
- Ultra-small external components stable with –  
- a 1 $\mu$ H inductor and a 4.7 $\mu$ F output capacitor
- Fully integrated 3A MOSFET switch
- Micropower shutdown
- Thermal shutdown and current limit protection
- 10-pin ePad MSOP package
- -40°C to +125°C junction temperature range



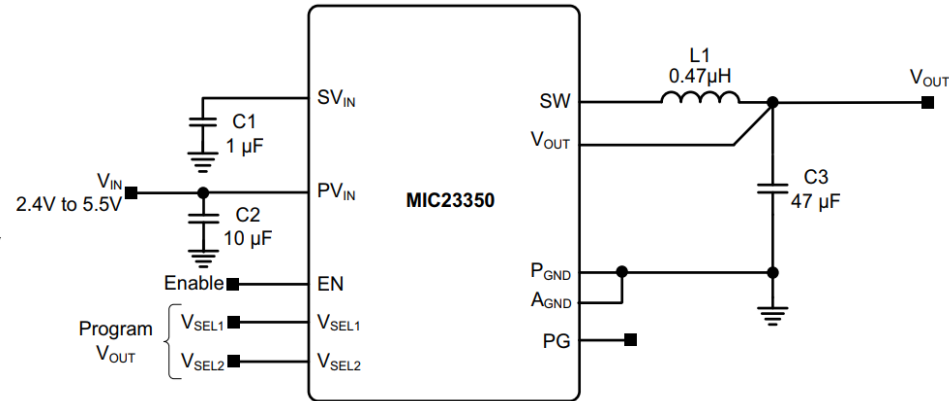
## Features List:

- Input Voltage Range: 2.4V to 5.5V
- 3A Continuous Output Current
- Multiple Faults Indication through I<sup>2</sup>C
- I<sup>2</sup>C Programmable:
  - Output Voltage:
    - 0.6V - 1.28V, 5 mV Resolution
    - 0.6V - 3.84V, 10/20 mV Resolution
  - Slew Rate: 0.2 ms/V - 3.2 ms/V
  - ON time (Switching Frequency)
  - High Side Current Limit: 3.5A - 5A
  - Enable Delay: 0.2 ms - 3 ms
  - Output Discharge when Disabled (EN = GND)
- High Efficiency (up to 95%)
- Ultra-Fast Transient Response
- ±1.5% Output Voltage Accuracy Over Line/Load/Temp
- Safe Start-Up with Pre-Biased Output
- Typical 1.5 μA Shutdown Supply Current
- Low Dropout (100% Duty Cycle) Operation
- Latch-Off Thermal Shutdown Protection
- Latch-Off Current Limit Protection
- Power-Good (PG) Open-Drain Output
- 2.5mm x 2.5mm FTQFN Package



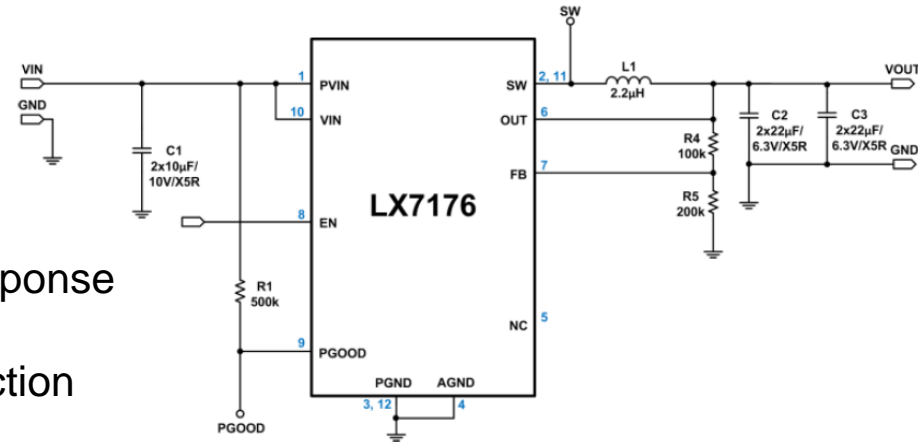
## Features List:

- Input Voltage Range: 2.4V to 5.5V
- 3A Continuous Output Current
- Pin Strapping Output Voltage Selection:
  - Three-State pins (nine voltage options)
  - 0.6V, 0.8V, 0.9V, 1.0V, 1.2V, 1.5V, 1.8V, 2.5V or 3.3V
- Reduced Component Count
  - (No Feedback Resistors)
- High Efficiency (up to 95%)
- Output Discharge when Disabled
- Constant-ON-Time Control with High Switching Frequency:
  - 1.2 MHz typical at 1.0V output voltage
- 0.8 ms/V Soft Start Speed
- Ultra-Fast Transient Response
- ±1.5% Output Voltage Accuracy Over Line/Load/Temp
- Safe Start-Up with Pre-Biased Output
- Typical 1.5  $\mu$ A Shutdown Supply Current
- Low Dropout (100% Duty Cycle) Operation
- Latch-Off Thermal Shutdown Protection
- Latch-Off Current Limit Protection
- Power-Good (PG) Open-Drain Output



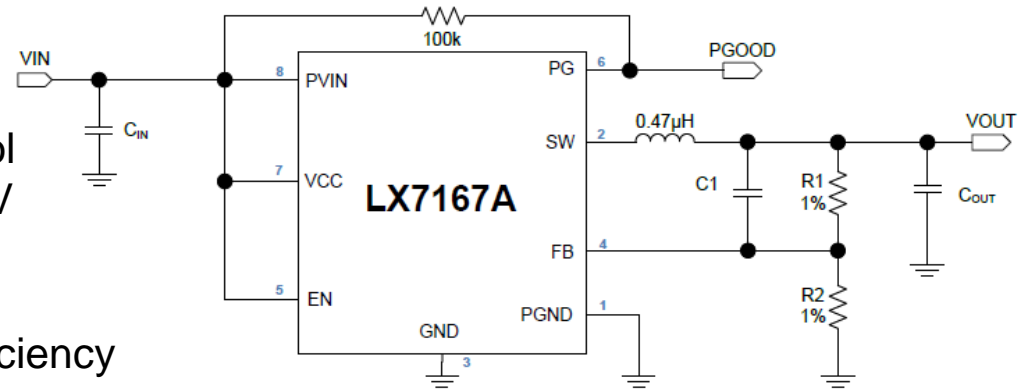
## Features:

- Load Current up to 3A
- Input Supply Voltage Range: 3.0V - 5.5V
- Integrated PMOS and NMOS
- Hysteretic Control Offers Best Transient Response
- PWM Switching at a Constant 1.65MHz
- Input Under-voltage and Over-voltage Protection
- Enable and Power Good Function
- Internal Soft-start
- Cycle-by-Cycle Over Current Protection
- Hiccup Mode Protects Against Short Circuit Faults
- 2mm x 2mm QFN



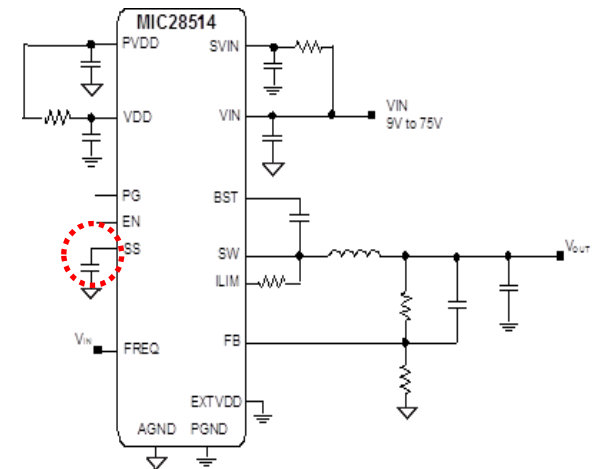
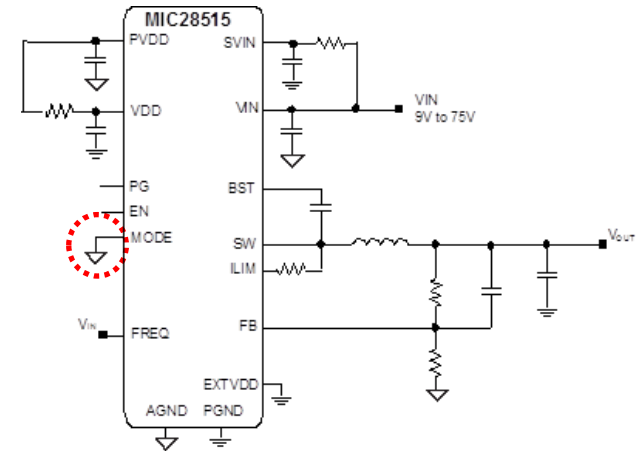
### Features:

- Load Current up to 2.4A
- Constant Frequency Hysteretic Control
- Input Supply Voltage Range: 3V - 5.5V
- Integrated PMOS and NMOS
- 3MHz Switching Frequency
- SKIP Pulse to Improve Light Load Efficiency
- Input UVLO and OV Protection
- Enable Pin
- Power Good
- Internal Soft-start
- Cycle-by-Cycle Over Current Protection
- Hiccup Mode Operation Under FB UVLO
- 2mm x 2mm DFN



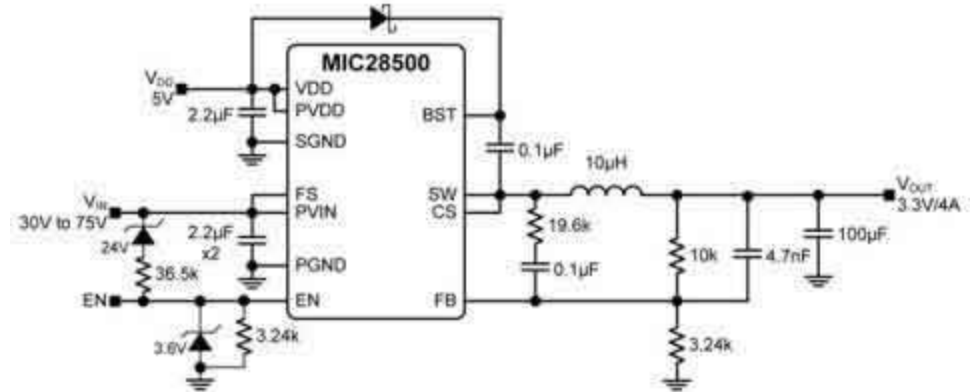
## Features:

- Input voltage range: 4.5V to 75V
- Adjustable output from 0.6V to 32V (Limited by duty cycle)
- High Current capability of 5A
- Adaptive Constant On Time Control
- 0.6V Internal reference
- 270 KHZ to 800KHZ switching Frequency
- High Voltage Internal LDO for single supply operation
- Operation with both internal and external VDD
- Supports start up to pre-bias output
- Internal compensator for tight output regulation
- Enable function for low stand-by current
- External programmable soft start to reduce inrush
- (MIC28514 Only)
- External MODE pin to select DCM/CCM operation
- (MIC28515 Only)
- Programmable current limit and hiccup short circuit protection
- Thermal shut down with hysteresis
- CCM only operation for reduced noise at low output current
- Compact size – 6 X 6 mm VQFN
- -40°C to +125°C junction temperature range



## Features:

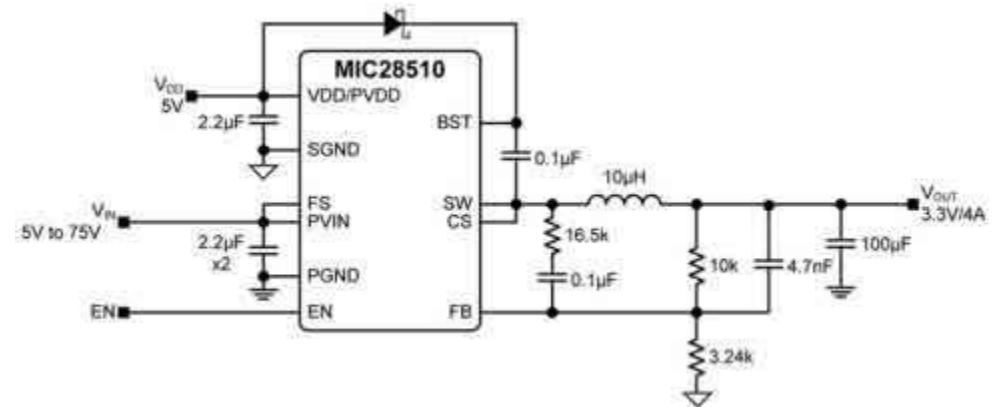
- Hyper Speed Control™ architecture –
  - enables
- High delta V operation ( $V_{IN} = 75V$  and –
  - $V_{OUT} = 0.8V$ )
- Small output capacitance
- 30V to 75V voltage input
- Adjustable output down to 0.8V
- $\leq 1\%$  FB accuracy
- Any Capacitor™ stable
- Zero-ESR to high-ESR output capacitors
- 4A output current capability, up to 90% -
  - efficiency
- 100kHz to 500kHz switching frequency
- Fold-back current-limit and "hiccup" mode –
  - short-circuit protection
- Supports safe startup into a pre-biased load
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm x 6mm MLF® package





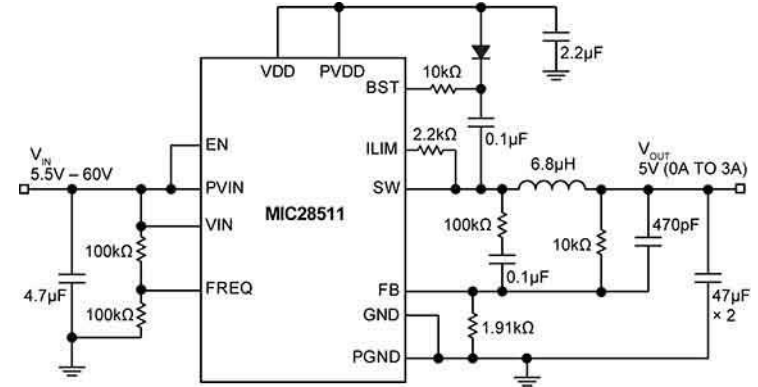
## Features:

- Hyper Speed Control™ architecture –
  - enables
- Any Capacitor™ stable
- Small output capacitance
- 4.5V to 75V voltage input
- $\leq 1\%$  FB accuracy
- 4A output current capability, up to 95% -
  - efficiency
- Adjustable output voltage form 0.8V to 24V
- High delta V operation ( $V_{IN} = 75V$  and  $V_{OUT} = 0.8V$ )
- Zero-ESR to high-ESR output capacitors
- 100kHz to 500kHz switching frequency
- Fold-back current-limit and “hiccup” mode –
  - short-circuit protection
- Supports safe startup into a pre-biased load
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm x 6mm MLF® package



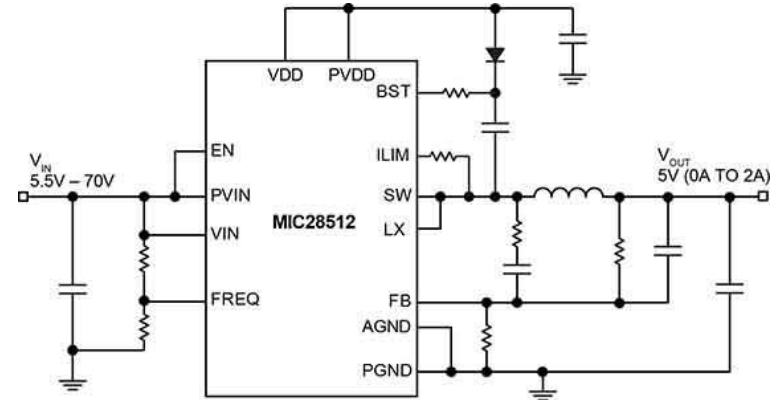
## Features:

- 4.6V to 60V operating input voltage supply
- Up to 3A output current
- Integrated high-side and low-side N-channel – MOSFETs
- HyperLight Load (MIC28511-1) architecture
- Hyper Speed Control (MIC28511-2) architecture
- Enable input and power good (PGOOD) output
- Programmable current limit
- Fold-back “hiccup” mode short-circuit protection
- Built-in 5V regulator for single-supply operation
- Adjustable 200kHz to 680kHz switching frequency
- Fixed 5ms soft-start
- Internal compensation and thermal shutdown.
- Thermally-enhanced 24-pin 3mm × 4mm FCQFN package
- Junction temperature range of -40°C to +125°C



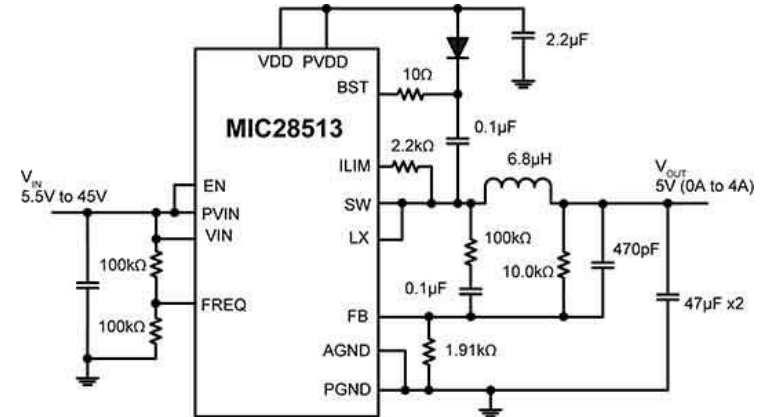
## Features:

- 4.6V to 70V operating input voltage supply
- Up to 2A output current
- Integrated high-side and low-side N-channel –  
- MOSFETs
- MIC28512-1: HyperLight Load architecture
- MIC28512-2: Hyper Speed Control architecture
- Enable input, Power Good output
- Built-in 5V regulator for single supply operation
- Adjustable 200kHz to 680kHz switching frequency
- Fixed 5ms soft-start
- Programmable current limit and fold-back “hiccup” –  
- mode short circuit protection
- Internal compensation and thermal shutdown.
- Thermally enhanced 24-pin 3mm × 4mm FCQFN
- Junction temperature range of -40°C to +125°C



## Features:

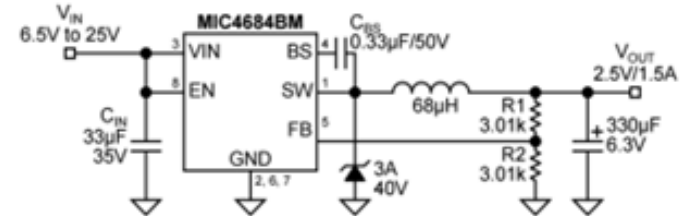
- 4.6V to 45V operating input voltage supply
- Up to 4A output current
- Integrated high-side and low-side N-channel – MOSFETs
- MIC28513-1: HyperLight Load architecture
- MIC28513-2: Hyper Speed Control architecture
- Enable input, Power Good output
- Built-in 5V regulator for single supply operation
- Adjustable 200kHz to 680kHz switching – frequency
- Fixed 5ms soft-start
- Programmable current limit and fold-back – “hiccup” mode short circuit protection
- Internal compensation and thermal shutdown.
- Thermally enhanced 24-pin 3mm × 4mm FCQFN
- Junction temperature range of -40°C to +125°C



## Features:

- SO-8 package with 2A continuous output current
- Over 85% efficiency
- Fixed 200kHz PWM operation
- Wide input voltage range: 4V to 30V
- Output voltage adjustable to 1.235V
- All surface mount solution
- Internally compensated with fast transient response
- Over-current protection
- Frequency fold-back short-circuit protection
- Thermal shutdown

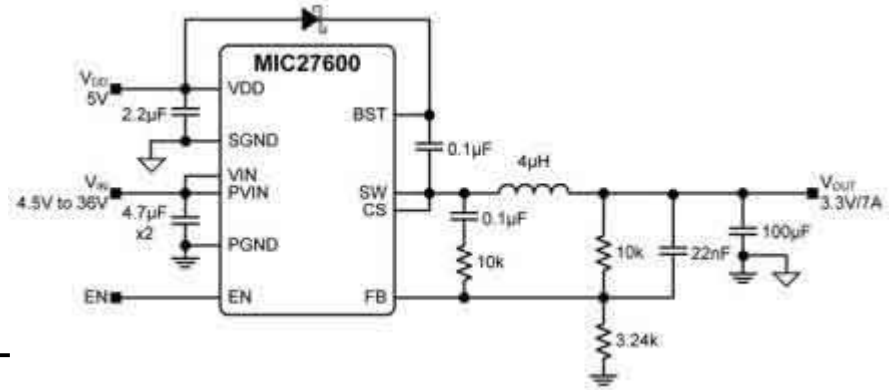
## Typical Application



Adjustable Buck Converter

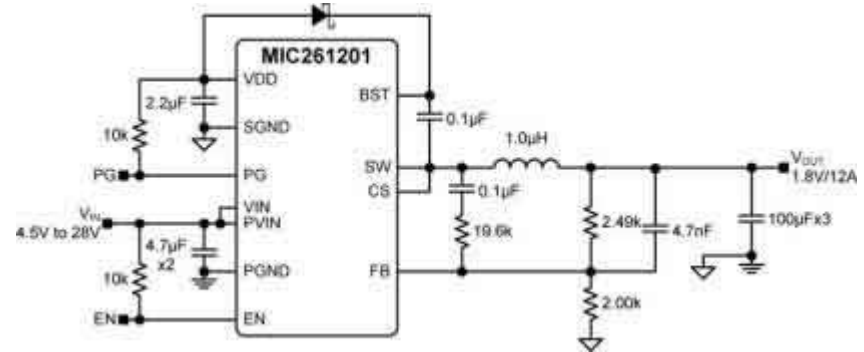
## Features:

- Hyper Speed Control™ architecture enables:
  - High delta V operation ( $V_{IN} = 36V$  and  $-V_{OUT} = 0.8V$ )
  - Small output capacitance
- 4.5V to 36V voltage input
- $\pm 1\%$  FB accuracy
- Adjustable output from 0.8V to 5.5V ( $V_{HSD} \leq -28V$ )
- Adjustable output from 0.8V to 3.6V ( $V_{HSD} \leq 36V$ )
- Any Capacitor™ Stable - Zero-ESR to high-ESR
- 7A output current capability, up to 95% efficiency
- 300kHz switching frequency
- Internal compensation, 6ms Internal soft-start
- Fold-back current-limit and "hiccup" mode – short-circuit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm - 6mm MFL® package



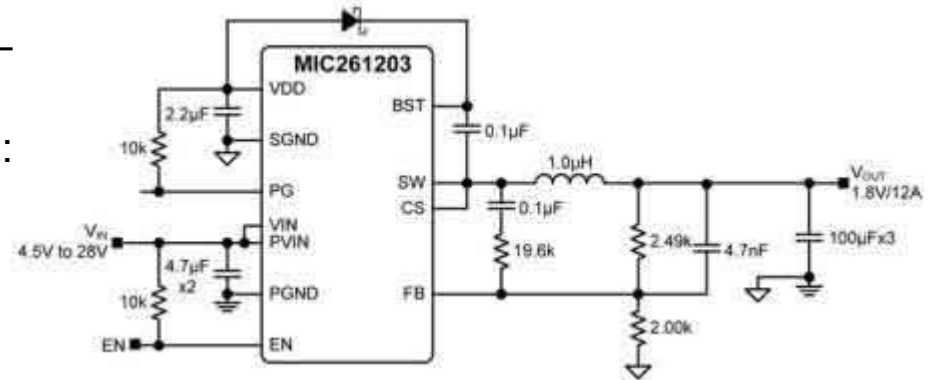
## Features:

- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{IN} = 28V$  and  $-V_{OUT} = 0.8V$ )
- Small output capacitance
- 4.5V to 28V voltage input
- 12A output current capability, up to 95% - efficiency
- Adjustable output from 0.8V to 5.5V
- $\pm 1\%$  feedback accuracy
- Any Capacitor® stable - zero-to-high ESR
- 600kHz switching frequency
- No external compensation
- Power Good (PG) output
- Fold-back current-limit and "hiccup" mode – short-circuit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm x 6mm MFL® package



## Features:

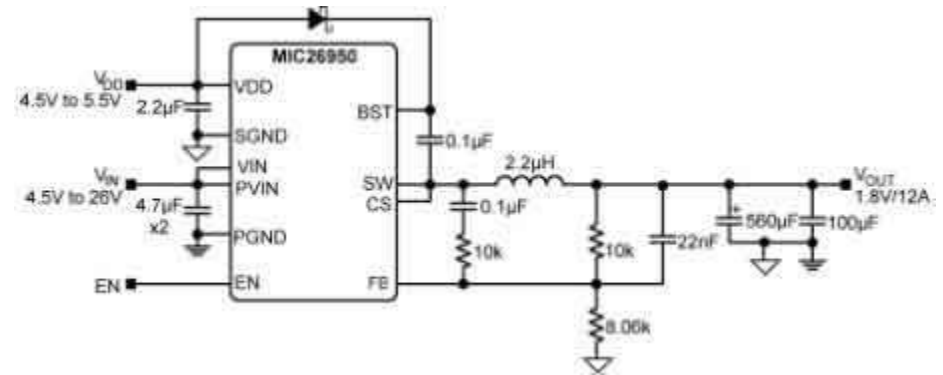
- HyperLight Load® efficiency - up to 80% at –  
- 10mA
- Hyper Speed Control™ architecture enables:
  - High delta V operation ( $V_{IN} = 28V$  and  
-  $V_{OUT} = 0.8V$ )
  - Small output capacitance
  - Input voltage range: 4.5V to 28V
  - Output current up to 12A
  - Up to 95% efficiency
  - Adjustable output voltage from 0.8V to 5.5V
- $\pm 1\%$  FB accuracy
- Any Capacitor™ stable - zero-to-high ESR
- 600kHz switching frequency
- Power Good (PG) output
- Fold-back current-limit and "hiccup" mode –  
- short-circuit protection
- 5mm x 6mm MLF® package
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range





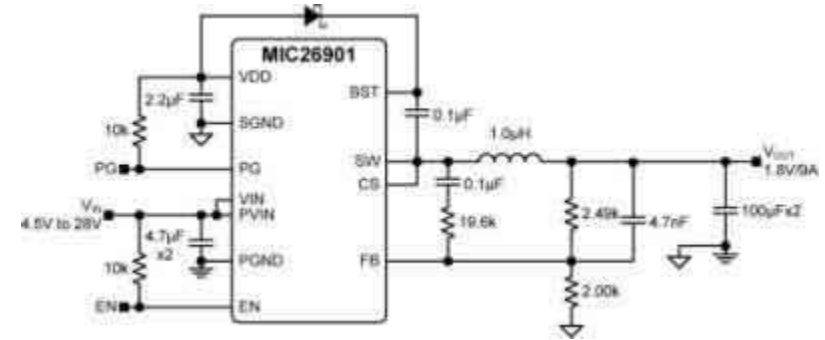
## Features:

- 4.5V to 26V input voltage
- Any Capacitor™ Stable
- Zero ESR to high-ESR output capacitance
- 12A output current capability
- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{IN} = 26V$  and –  
–  $V_{OUT} = 0.8V$ )
- Small output capacitance
- 300kHz switching frequency
- Adjustable output from 0.8V to 5.5V ( $\pm 1\%$  accuracy)
- Up to 95% efficiency
- 6ms Internal soft-start
- Fold-back current-limit and "hiccup" mode –  
– short-circuit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm x 6mm MFL® package



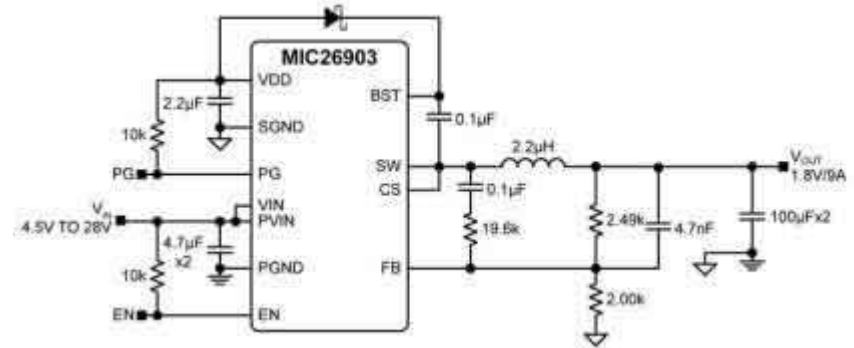
## Features:

- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{IN} = 28V$  and –  
–  $V_{OUT} = 0.8V$ )
- Small output capacitance
- 4.5V to 28V voltage input
- 9A output current capability, up to 95% efficiency
- Adjustable output from 0.8V to 5.5V
- $\pm 1\%$  feedback accuracy
- Any Capacitor™ stable -zero-to-high ESR
- 600kHz switching frequency
- No external compensation
- Fold-back current-limit and "hiccup mode" –  
– short-circuit protection
- Supports safe startup into a pre-biased load
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm x 6mm MLF® package



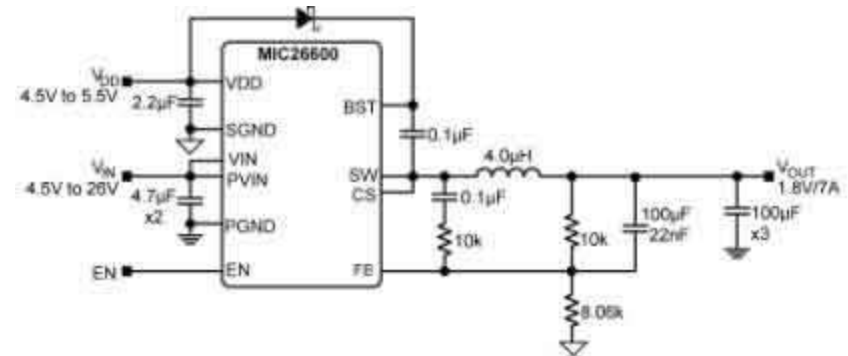
## Features:

- HyperLight Load® efficiency - up to 80% at –  
- 10mA
- Hyper Speed Control™ architecture enables:
  - High delta V operation ( $V_{IN} = 28V$  and –  
-  $V_{OUT} = 0.8V$ )
  - Small output capacitance
  - Input voltage range: 4.5V to 28V
  - Output current up to 9A
  - Up to 95% efficiency
  - Adjustable output voltage from 0.8V to 5.5V
- $\pm 1\%$  FB accuracy
- Any Capacitor™ stable - zero-to-high ESR
- 600kHz switching frequency
- Power Good (PG) output
- Fold-back current-limit and "hiccup" mode –  
- short-circuit protection
- 5mm x 6mm MLF® package
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range



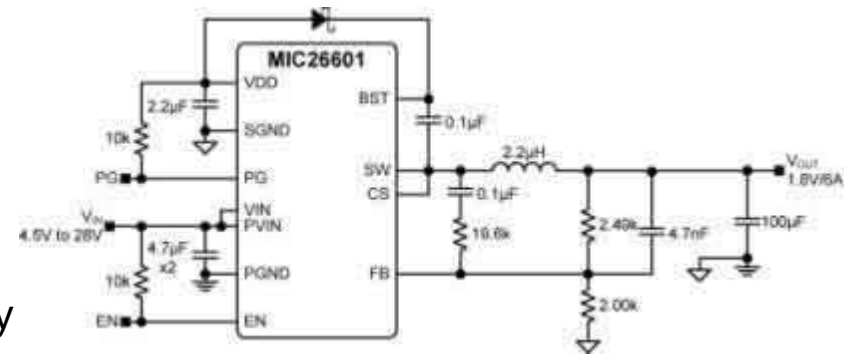
## Features:

- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{IN} = 26V$  and –  
–  $V_{OUT} = 0.8V$ )
- Small output capacitance
- 4.5V to 26V input voltage
- Adjustable output from 0.8V to 5.5V ( $\pm 1\%$  –  
– accuracy)
- Any Capacitor™ Stable
- Zero ESR to high ESR output capacitance
- 7A output current capability
- 300kHz switching frequency
- Up to 95% efficiency
- 6ms Internal soft-start
- Fold-back current limit and "hiccup" mode –  
– short-circuit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm x 6mm MLF® package



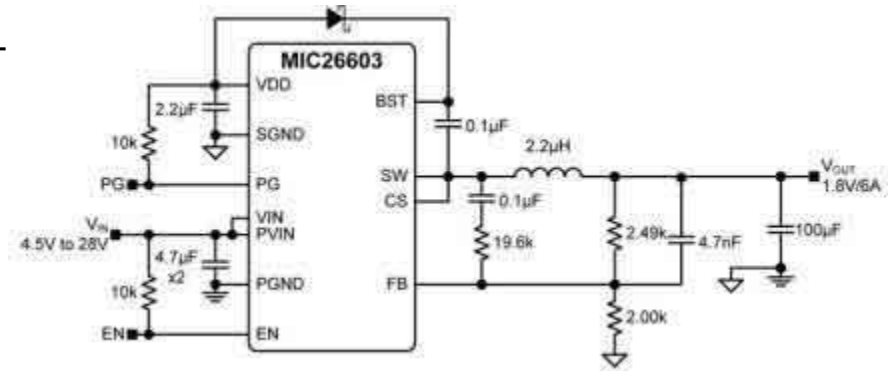
## Features:

- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{IN} = 28V$  and –  
–  $V_{OUT} = 0.8V$ )
- Small output capacitance
- 4.5V to 28V voltage input
- 6A output current capability, up to 95% efficiency
- Adjustable output from 0.8V to 5.5V
- $\pm 1\%$  feedback accuracy
- Any Capacitor™ stable - zero-to-high ESR
- 600kHz switching frequency
- No external compensation
- Power Good (PG) output
- Fold-back current-limit and "hiccup mode" –  
– short-circuit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm x 6mm MLF® package



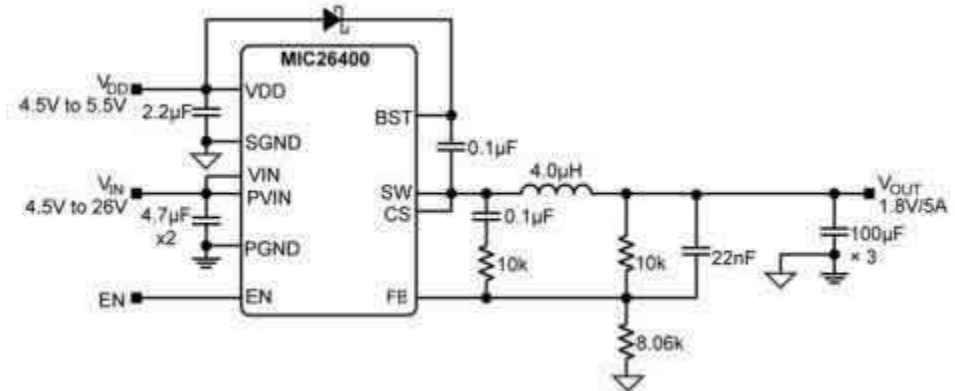
## Features:

- HyperLight Load® efficiency - up to 80% at –  
– 10mA
- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{IN} = 28V$  and –  
–  $V_{OUT} = 0.8V$ )
- Small output capacitance
- Input voltage range: 4.5V to 28V
- Output current up to 6A
- Up to 95% efficiency
- Adjustable output voltage from 0.8V to 5.5V
- $\pm 1\%$  FB accuracy
- Any Capacitor™ stable - zero-to-high ESR
- 600kHz switching frequency
- Fold-back current-limit and "hiccup" mode short  
– circuit protection
- Safe start-up into pre-biased loads
- 5mm x 6mm MLF® package
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range



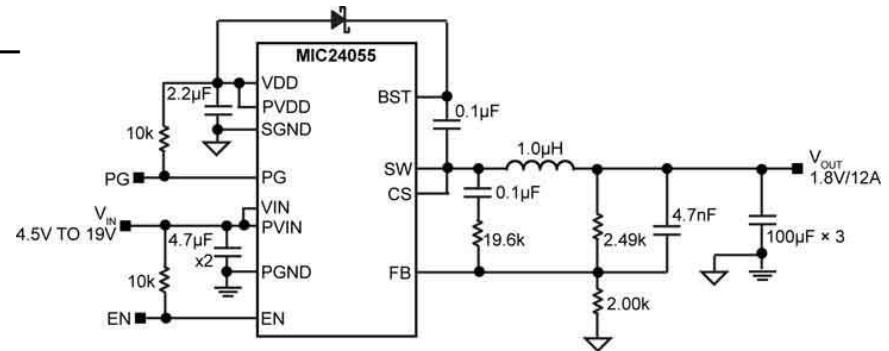
## Features:

- 4.5V to 26V input voltage
- Any Capacitor™ Stable:
  - Zero ESR to high-ESR output –  
- capacitance
- 5A output current capability
- Hyper Speed Control™ architecture –  
- enables:
  - High delta V operation ( $V_{IN} = 26V$  –  
- and  $V_{OUT} = 0.8V$ )
  - Small output capacitance
- Adjustable output from 0.8V to 5.5V ( $\pm 1\%$  accuracy)
- 300kHz switching frequency
- Up to 95% efficiency
- 6ms Internal soft-start
- Fold-back current limit and "hiccup" mode short –  
- circuit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- 28-pin 5mm X 6mm MFL® package



## Features:

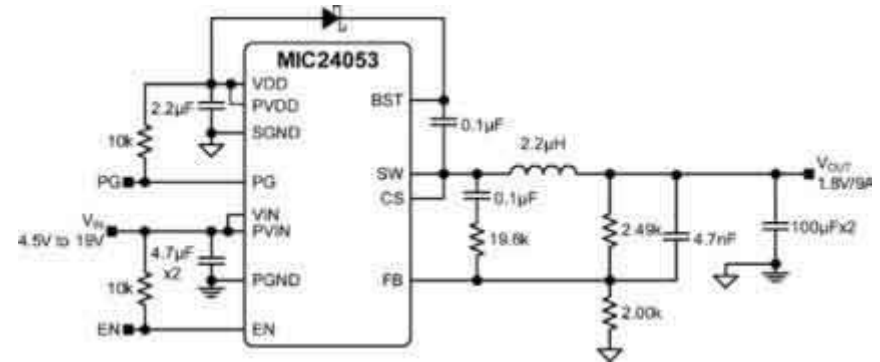
- HyperLight Load® efficiency – up to 80% at –  
– 10mA:
  - Hyper Speed Control™ architecture –  
– enables
  - High delta V operation ( $V_{IN} = 19V$  and –  
–  $V_{OUT} = 0.8V$ )
- Small output capacitance
- Input voltage range: 4.5V to 19V
- Output current up to 12A
- Up to 95% efficiency
- Adjustable output voltage from 0.8V to 5.5V
- ±1% feedback accuracy
- Any Capacitor™ stable - zero-to-high ESR
- 600kHz switching frequency
- Foldback current-limit and "hiccup" mode short –  
– circuit protection
- -40°C to +125°C junction temperature range
- Available in 28-pin 5mm × 6mm QFN package





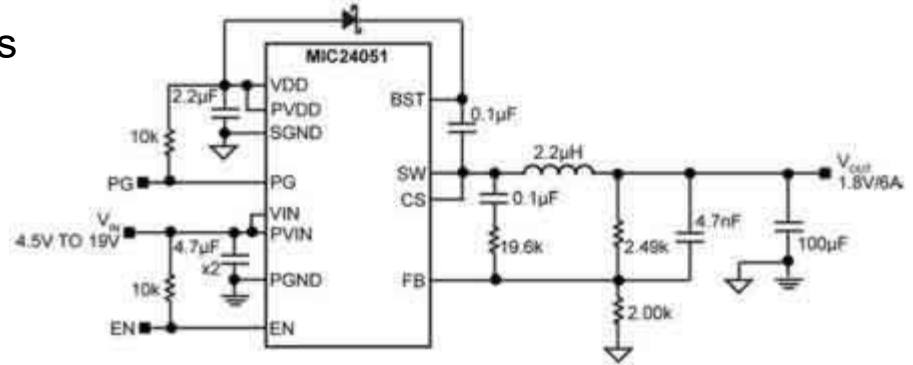
## Features:

- HyperLight Load® efficiency - up to 80% at –  
– 10mA:
  - Hyper Speed Control™ architecture enables
  - High delta V operation ( $V_{IN} = 19V$  and –  
–  $V_{OUT} = 0.8V$ )
- Small output capacitance
- Input voltage range: 4.5V to 19V
- Output current up to 9A, up to 95% efficiency
- Adjustable output voltage from 0.8V to 5.5V
- $\pm 1\%$  feedback accuracy
- Any Capacitor™ stable - zero-to-high ESR
- 600kHz switching frequency
- No external compensation
- Fold-back current-limit and "hiccup" mode –  
– short-circuit protection
- Supports safe start-up into pre-biased loads
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- Available in 28-pin 5mm × 6mm QFN package



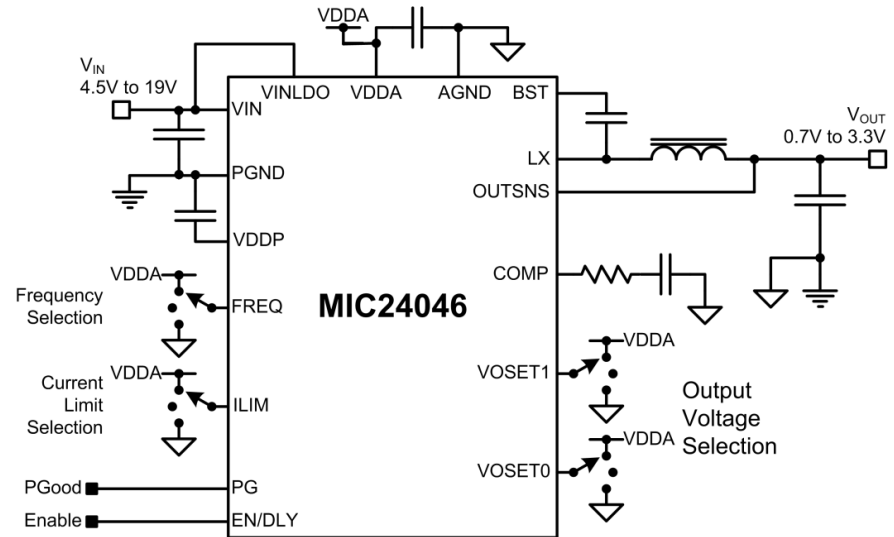
### Features:

- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{IN} = 19V$  and  $-V_{OUT} = 0.8V$ )
- Small output capacitance
- 4.5V to 19V input voltage
- No external compensation
- Any Capacitor™ stable - Zero-to-high ESR
- 6A output current capability, up to 95% - efficiency
- 600kHz switching frequency
- Adjustable output from 0.8V to 5.5V ( $\pm 1\%$  - accuracy)
- Power Good (PG) output
- Fold-back current limit and "hiccup" mode – short-circuit protection
- Supports safe start-up into a pre-biased load
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- Available in 28-pin 5mm X 6mm QFN package



## Features:

- Input voltage range: 4.5V to 19V
- 5A output current
- >90% efficiency over wide load range
- 9 pin-selectable output voltage value: -  
- 0.7V, 0.8V, 0.9V, 1.0V, 1.2V, 1.5V, 1.8V,  
- 2.5V, 3.3V
- Pin-selectable current limit: -  
- for 3A to 5A applications, 3 values
- Pin-selectable switching frequency:  
400kHz, 565kHz, 790kHz
- Capacitor-adjustable turn-on delay
- Power Good Status Output
- 20-pin 3mm x 3mm QFN package (0.5mm –  
- pin pitch)



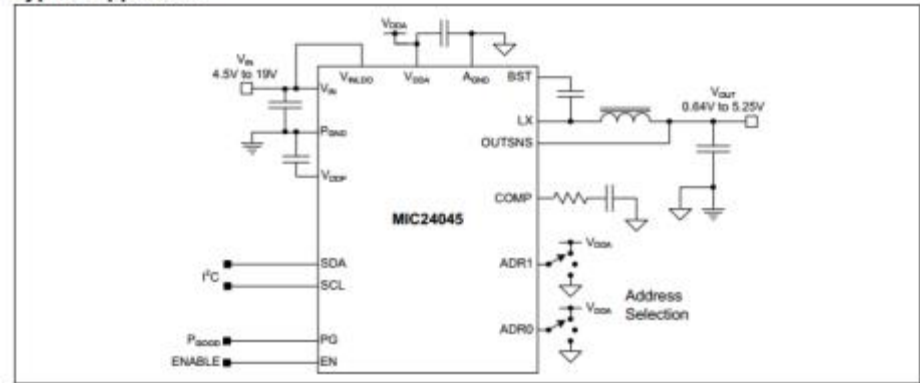
## Applications:

Network Switch and  
Routers  
Base Station, Telecom  
Servers  
Storage  
FPGA and DSP Power  
Micro Servers

## Features:

- 4.5V to 19V Input Voltage Range
- 5A (maximum) Output Current
- I<sup>2</sup>C Programmable Output Voltage:
  - 0.64V to 5.25V in 5 mV, 10 mV, 30 – mV and
- 50 mV steps
- High Efficiency (>95%)
- I<sup>2</sup>C Programmability of:
  - Soft-Start: 0.16, 0.38, 0.76 and – 1.5V/ms ramp rates
  - Switching Frequency: 310 kHz, 400 – kHz, 500 kHz, 570 kHz, 660 kHz, - 780 kHz, 1 MHz, 1.2 MHz
  - Current Limits for 2A, 3A, 4A and 5A loads
  - Output Voltage Margining: -5%, +5%
  - Start-up delays: 0 ms to 10 ms
- ±1% Output Voltage Accuracy Over Temperature
- Supports Safe Start-Up with Pre-Biased Output
- Extensive Diagnostics through I<sup>2</sup>C Interface

Typical Application

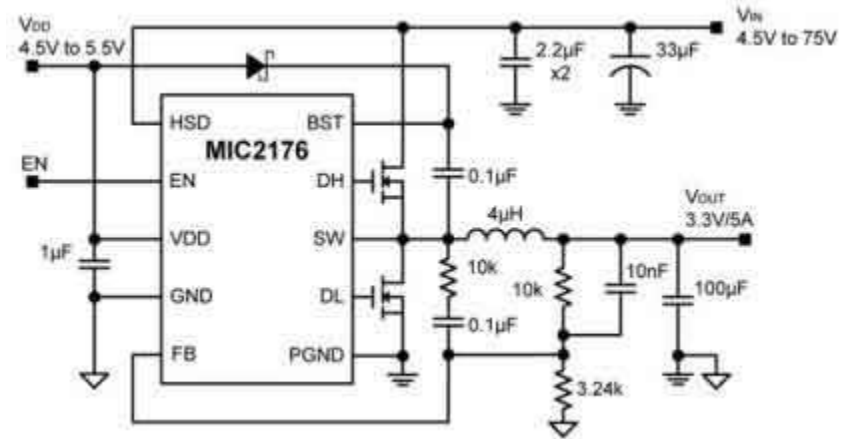


## Applications:

Network Switch and Routers  
Base Station, Telecom  
Servers  
Storage  
FPGA and DSP Power  
Micro Servers

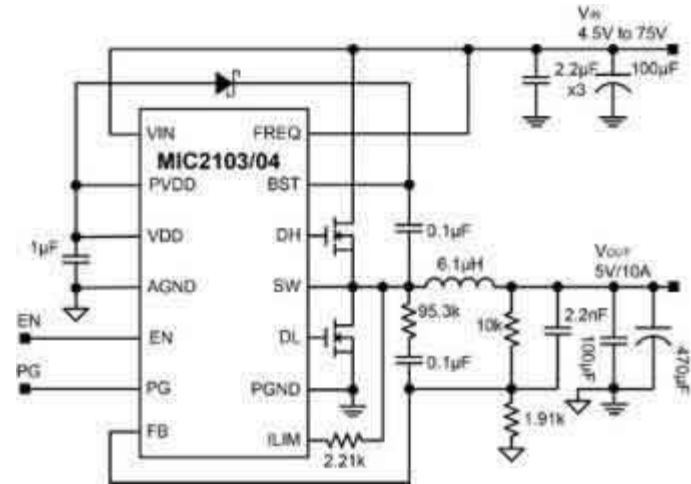
## Features:

- Hyper Speed Control™ architecture enables
- High delta V operation –  
- ( $V_{IN} = 75V$  and  $V_{OUT} = 1.2V$ )
- Small output capacitance
- 4.5V to 75V input voltage
- Output down to 0.8V with  $\pm 1\%$  accuracy
- Any Capacitor™ stable
- Zero-ESR to high-ESR output capacitance
- 100kHz/200kHz/300kHz switching frequency
- Internal compensation
- 6ms Internal soft-start
- Fold-back current limit and "hiccup" mode short -  
– circuit protection
- Thermal shutdown
- Supports safe start-up into a pre-biased output
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- Available in 10-pin MSOP package



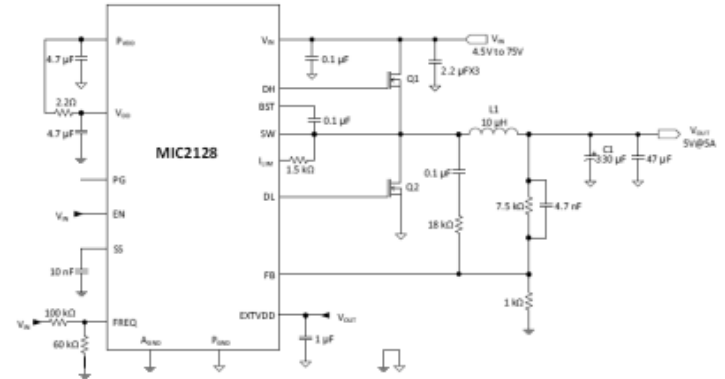
## Features:

- Hyper Speed Control™ architecture enables:
  - High delta V operation ( $V_{IN}=75V$  and  $-V_{OUT}=1.2V$ )
  - Any Capacitor™ stable
- 4.5V to 75V input voltage
- 0.8V Reference Voltage with  $\pm 1\%$  accuracy
- 200kHz - 600kHz, programmable switching freq.
- Hyper Light Load Control (MIC2103 only)
- Hyper Speed Control (MIC2104 only)
- Enable input, Power-Good output
- Built-in 5V regulator for single-supply operation
- Programmable current limit and fold-back –  
- “hiccup” mode short-circuit protection
- 5ms internal soft-start, internal compensation, -  
- and thermal shutdown
- Supports safe start-up into a pre-biased output
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- Available in 16-pin 3mm x 3mm MLF® package



## Features:

- 4.5V to 75V input voltage
- Hyper Speed Control architecture
- High Delta V operation
- Any Capacitor™ stable
- Adjustable output voltage from 0.6 V to 24V:
  - Also limited by duty cycle
- Up to 800kHz, programmable switching –  
- frequency
- Built-in 5V regulator for single-supply operation
- Programmable current limit and “hiccup” mode –  
- short-circuit protection
- Programmable External soft start
- Internal compensation, and thermal shutdown
- Option for External and Internal  $V_{DD}$
- Supports safe start-up into a pre-biased output
- -40°C to +125°C junction temperature range
- Available in 16-pin 3mm x 3mm QFN Package

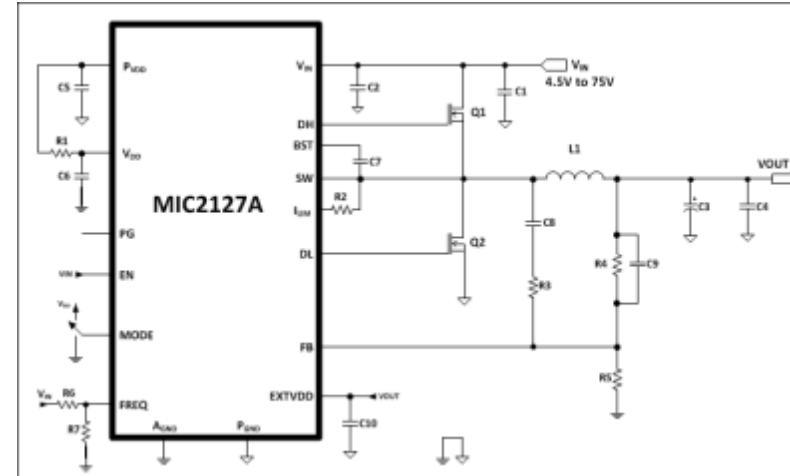


## Applications

- ✓ Telecom & Datacomm
- ✓ Servers and storage
- ✓ Automotive Infotainment (Non AECQ-100)
- ✓ Industrial Control
- ✓ HVAC equipment

## Features:

- 4.5V to 75V input voltage
- Hyper Speed Control architecture
- High Delta V operation
- Any Capacitor™ stable
- Adjustable output voltage from 0.6 V to 30V
- 270kHz - 800kHz, programmable switching –  
- frequency
- Built-in 5V regulator for single-supply operation
- Bootstrap LDO for improved system efficiency –  
- at light loads
- Programmable current limit and “hiccup” mode –  
- short-circuit protection
- Soft start, internal compensation, & thermal –  
- shutdown
- Selectable light load operating mode (MODE)
- Enable input and Power Good output
- Supports safe start-up into a pre-biased output
- -40°C to +125°C junction temperature range
- Available in 16-pin 3mm x 3mm QFN Package



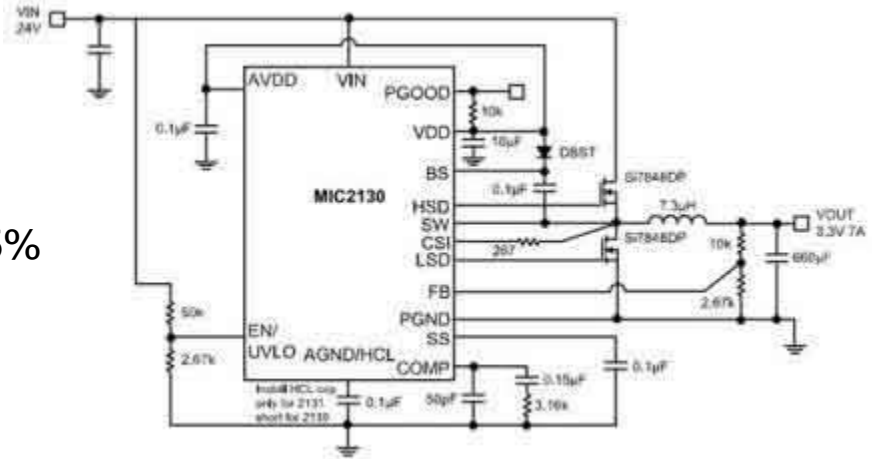
## Highlights:

- ✓ Internal boost strap
- ✓ 0.6V Reference
- ✓ Selectable Light Load Operating mode
- ✓ Programmable Current limit & Frequency



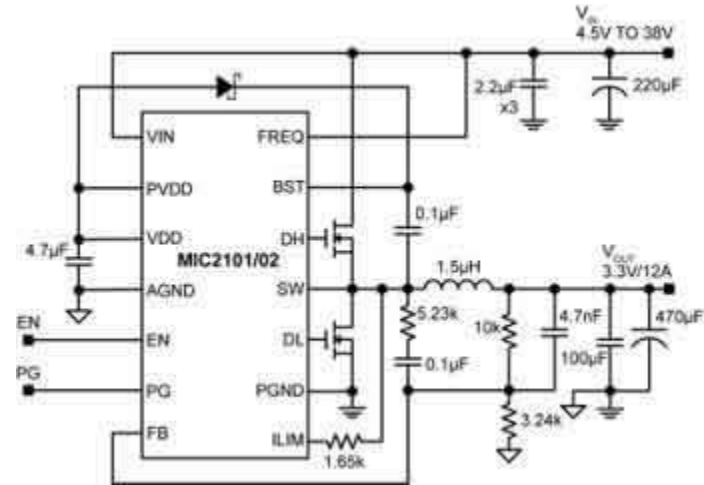
## Features:

- 8V to 40V input voltage range
- Adjustable output voltages down to 0.7V
- Low EMI option (MIC2131)
- Fixed 150kHz and 400kHz frequency options
- Adaptive gate drive allows efficiencies over 95%
- Programmable current limit with no sense – resistor
- Senses low-side MOSFET current
- Excellent line and load regulation due to fast hysteretic control loop during transients
- Internal drivers allow 15A output current
- Power Good output allow simple sequencing
- 100% increase in current limit (MIC2131)
- 16-pin e-TSSOP and 16-pin 4mm x 4mm MLF®
- Junction temperature range of -40°C to +125°C



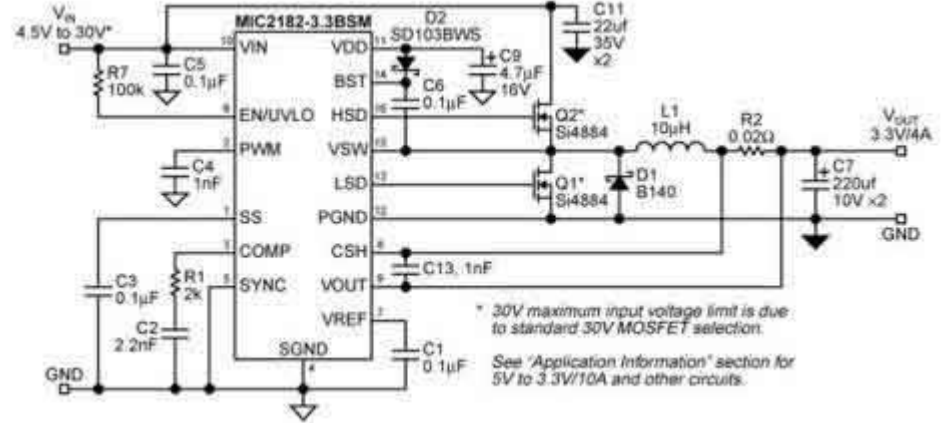
## Features:

- Hyper Speed Control™ architecture enables:
  - High delta V operation ( $V_{IN}=38V$  and -  $V_{OUT}=1.2V$ )
  - Any Capacitor™ stable
- 4.5V to 38V input voltage
- 0.8V Reference Voltage with  $\pm 1\%$  accuracy
- Hyper Light Load Control (MIC2101 only)
- Hyper Speed Control (MIC2102 only)
- Enable input, Power-Good output
- 200kHz to 600kHz, programmable switching –  
- frequency
- Built-in 5V regulator for single-supply operation
- Programmable current limit and fold-back “hiccup” –  
- mode short-circuit protection
- 5ms internal soft-start, internal compensation, and –  
- thermal shutdown
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- Available in 16-pin 3mm x 3mm MFL® package



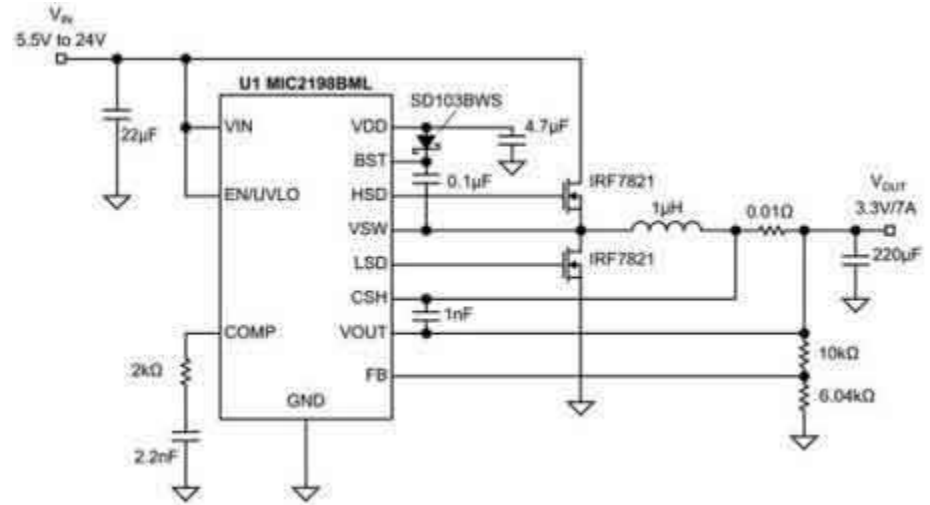
## Features:

- 4.5V to 32V Input voltage range
- 1.25V to 6V Output voltage range
- 95% efficiency
- 300kHz oscillator frequency
- 5 $\omega$  impedance MOSFET Drivers
- Drives N-Channel MOSFETs
- 600 $\mu$ A typical quiescent current (skip-mode)
- Logic controlled micropower shutdown ( $I_Q$  – - <0.1 $\mu$ A)
- Cycle-by-cycle current limiting
- Precision 1.245V reference output
- 0.6% total regulation
- 16-pin SOP and SSOP packages
- Sustained short-circuit protection at any input voltage
- 20A output current capability



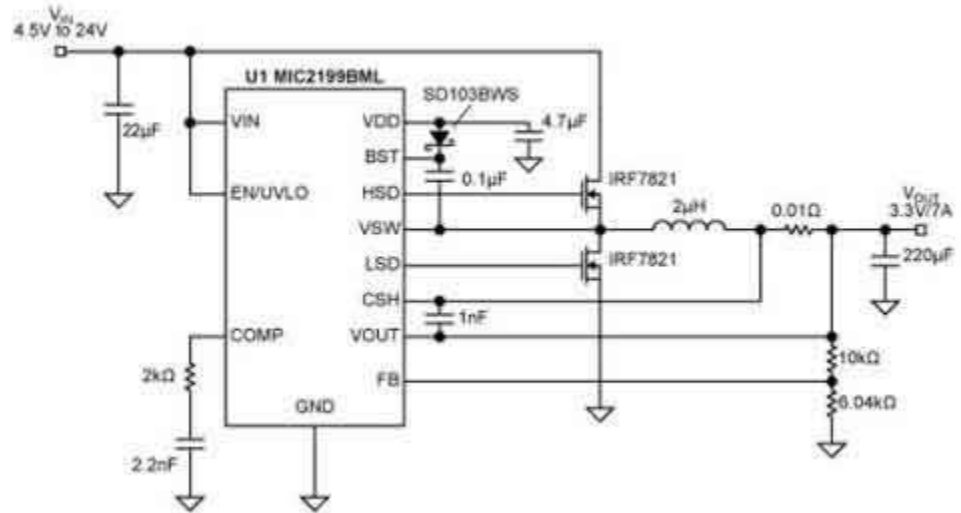
### Features:

- 4.5V to 32V input range
- 4mm x 4mm MFL® package
- 500kHz PWM operation
- >90% efficiency
- Output voltage adjustable down to 0.8V
- 20A output current capability
- Drives all N-Channel MOSFETs
- Logic controlled micropower shutdown
- Cycle-by-cycle current limiting
- Adjustable under-voltage lockout
- Frequency fold-back overcurrent protection



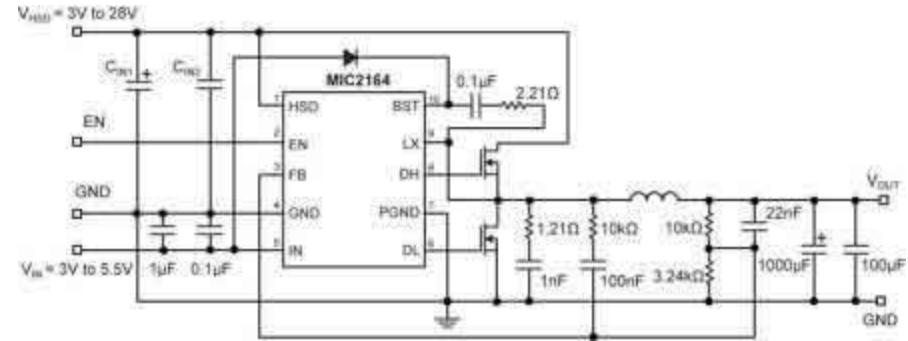
## Features:

- 4.5V to 32V input range
- 4mm x 4mm MFL<sup>®</sup> package
- 300kHz PWM operation
- 95% efficiency
- Output voltage adjustable down to 0.8V
- 20A output current capability
- Drives all N-Channel MOSFETs
- Logic controlled micropower shutdown
- Cycle-by-cycle current limiting
- Adjustable under-voltage lockout
- Frequency fold-back overcurrent protection



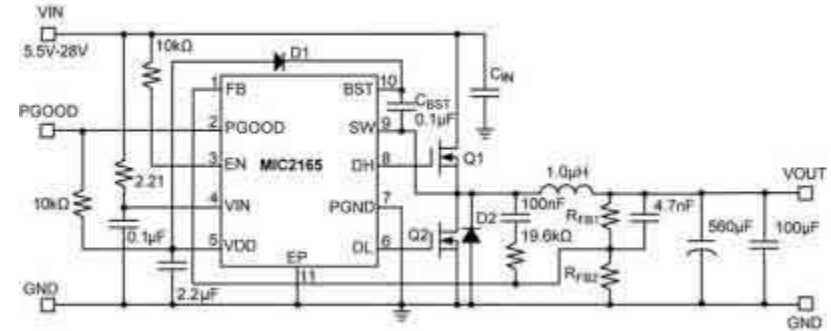
## Features:

- 3V to 28V input voltage
- Zero ESR to high ESR
- 25A output current capability
- 300kHz/600kHz/1MHz switching frequency
- Adaptive on-time mode control
- Hyper Speed Control™ architecture enables
- High delta V operation ( $V_{HSD}=28V$  and  $V_{OUT}=0.8V$ )
- Smaller output capacitors than competitors
- Adjustable output from 0.8V to 5.5V with  $\pm 1\%$  -  
- (MIC2164/-2/-3) or  $\pm 3\%$  (MIC2164C) feedback accuracy
- Up to 95% efficiency
- Fold-back current limit and "hiccup" mode short-circuit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- Available in 10-pin MSOP package



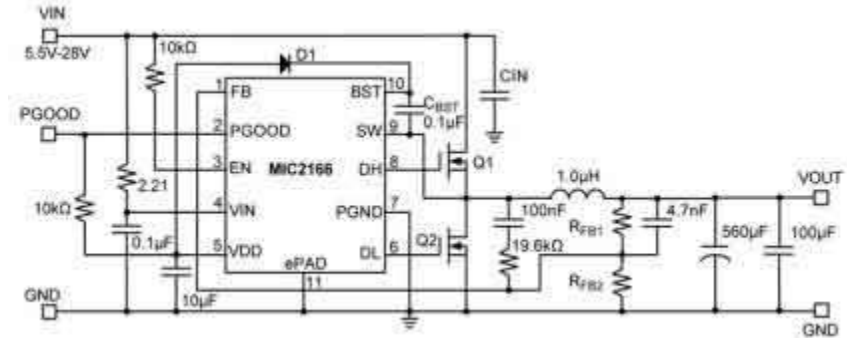
## Features:

- Hyper Speed Control™ architecture enables:
  - High  $V_{IN}$ /Low  $V_{OUT}$  operation ( $V_{IN}=28V$  –  
- and  $V_{OUT}=0.8V$ )
  - Smallest output capacitance
- HyperLight Load® Efficiency
- Built-in 5V regulator for single-supply operation
- Any Capacitor™ stable: Zero ESR to high ESR
- Power-Good output
- Input voltage range: 4.5V to 28V
- 5  $\mu A$  typical shutdown current
- 25A output current drive capability
- Adjustable output from 0.8V to 5.5V with  $\pm 1\%$  –  
- FB Accuracy
- 600kHz switching frequency
- Internal 5ms digital soft start
- Thermal shutdown and "hiccup" current limit –  
- protection
- No external current-sense resistor required
- Safe start-up into pre-biased loads
- 10-pin MSOP ePad package



## Features:

- Hyper Speed Control™ architecture enables:
  - High delta V operation ( $V_{IN}=28V$  and  $-V_{OUT}=0.8V$ )
  - Smallest output capacitance
- Built-in 5V regulator for single-supply operation
- Any Capacitor™ stable: Zero ESR to high ESR
- Power Good (PGOOD) output
- Input voltage range: 4.5V to 28V
- 5µA typical shutdown current
- 25A output current drive capability
- Adjustable output from +0.8V to 5.5V with  $\pm 1\%$  - accuracy
- 600kHz switching frequency
- Internal 5ms digital soft-start
- Thermal shutdown and "hiccup" current limit – protection
- No external current-sense resistor required
- Safe start-up into pre-biased loads
- 10-pin MSOP ePad package

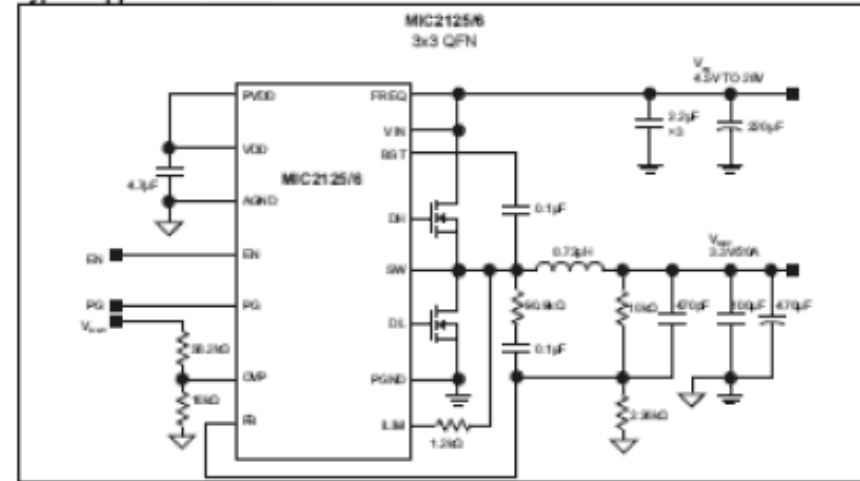




## Features:

- Hyper Speed Control Architecture Enables:
  - High delta V operation ( $V_{IN} = 28V$  and  $-V_{OUT} = 0.6V$ )
  - Any Capacitor™ stable
- 4.5V to 28V Input Voltage
- Adjustable Output Voltage from 0.6V to 24V
- 200 kHz to 750 kHz Programmable Switching – Frequency
- HyperLight Load® (MIC2125)
- Enable Input and Power Good Output
- Built-in 5V Regulator for Single-Supply Operation
- Programmable current limit and “hiccup” mode – short-circuit protection
- 7 ms internal soft-start, internal compensation, – and thermal shutdown
- Supports Safe Start-Up into a Pre-biased Output
- $-40^{\circ}C$  to  $+125^{\circ}C$  Junction Temperature Range
- Available in 16-pin, 3 mm × 3 mm QFN Package

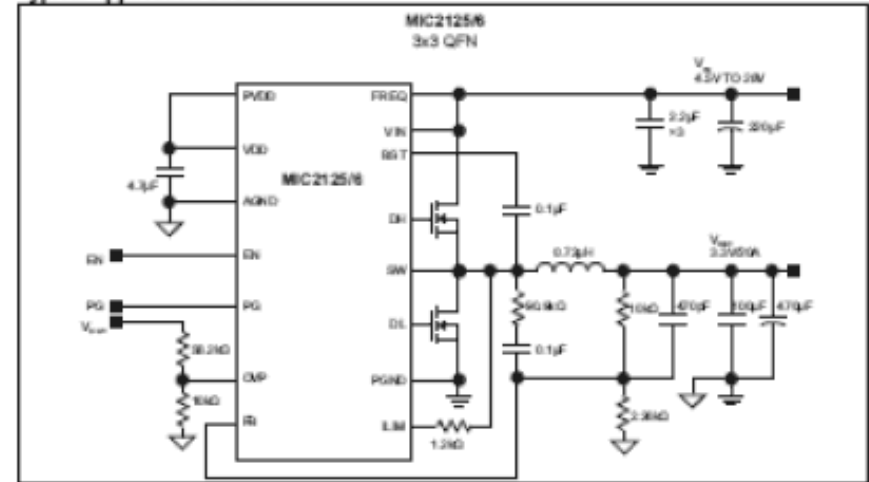
Typical Application Circuit



## Features:

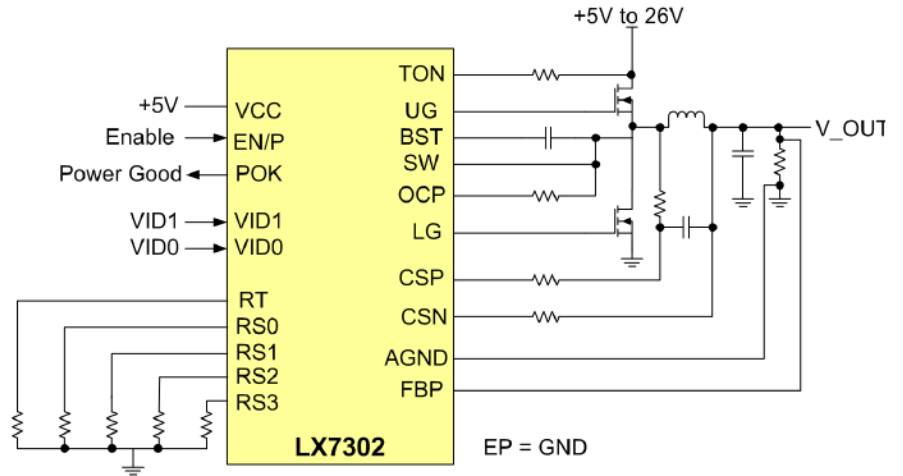
- Hyper Speed Control Architecture Enables:
  - High delta V operation ( $V_{IN} = 28V$  and -  $V_{OUT} = 0.6V$ )
  - Any Capacitor™ stable
- 4.5V to 28V Input Voltage
- Adjustable Output Voltage from 0.6V to 24V
- 200 kHz to 750 kHz Programmable Switching –  
- Frequency
- Hyper Speed Control® (MIC2126)
- Enable Input and Power Good Output
- Built-in 5V Regulator for Single-Supply Operation
- Programmable current limit and “hiccup” mode -  
- short-circuit protection
- 7 ms internal soft-start, internal compensation, -  
- and thermal shutdown
- Supports Safe Start-Up into a Pre-biased Output
- $-40^{\circ}C$  to  $+125^{\circ}C$  Junction Temperature Range
- Available in 16-pin, 3 mm × 3 mm QFN Package

Typical Application Circuit



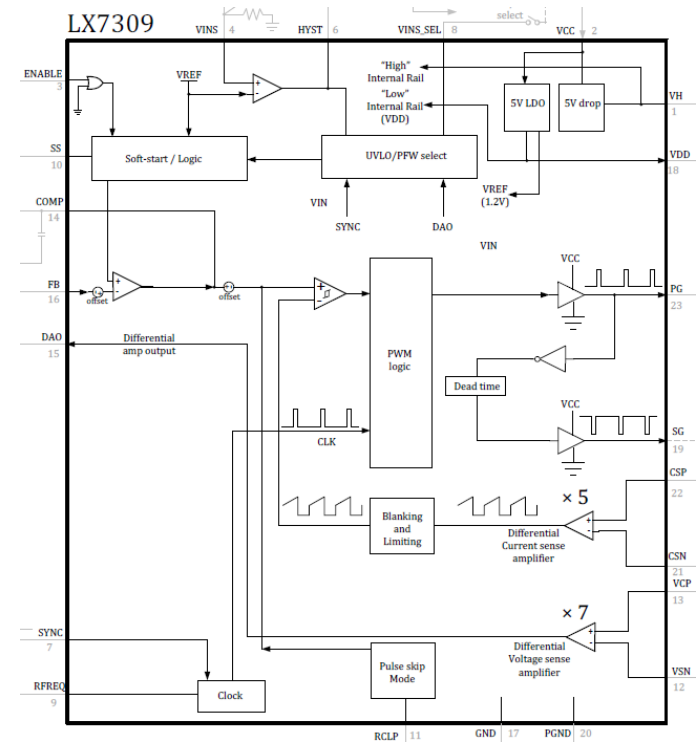
## Features:

- Integrated High & Low Side Drivers
- Input Voltage Range 5V to 26V
- 200kHz to 1MHz Switching Frequency
- Differential Feedback
- Inductor Current Sensing
- Droop Control
- Enable/Disable
- VID Control or Ext Reference
- Power Saving Mode
- OCP, OVP, UVP, OTP, UVLO
- 3mm x 3mm VQFN



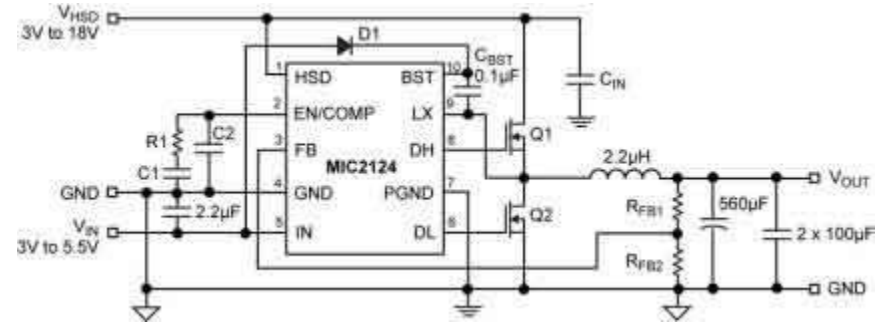
## Features:

- Current-mode control for fast line and load correction responses
- 50% duty cycle limit for simple Forward converters and for avoiding subharmonic instability in Flyback, Boost and Buck-Boost
- 200mV peak current sense signal with differential Kelvin sensing for noise immunity and higher efficiency
- Two out-of-phase driver stages for synchronous rectification or active clamp
- 24-pin, 4x4 mm QFN



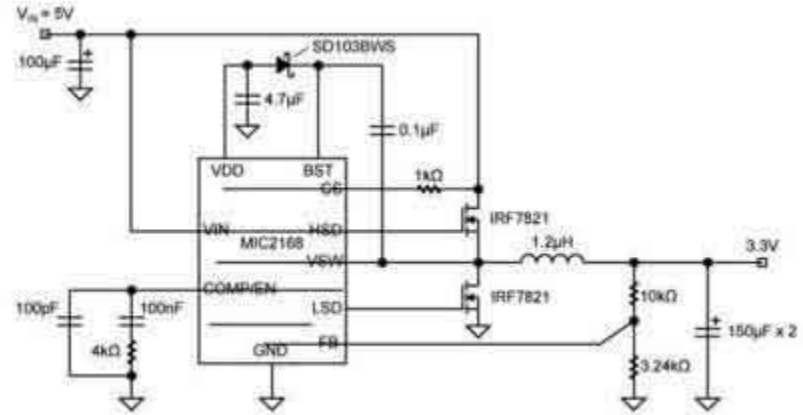
## Features:

- +3V to +18V input voltage
- 25A output current capability
- Any Capacitor™ stable:
  - Zero ESR to high ESR
- Output down to 0.8V with  $\pm 1\%$  FB accuracy
- Up to 94% efficiency
- 300kHz switching frequency
- All N-Channel MOSFET design
- Shutdown feature with EN/COMP
- No current-sense resistor needed
- Internal 4ms digital soft-start
- Cycle-by-Cycle fold-back current-limit protection
- 10-pin MSOP package
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range



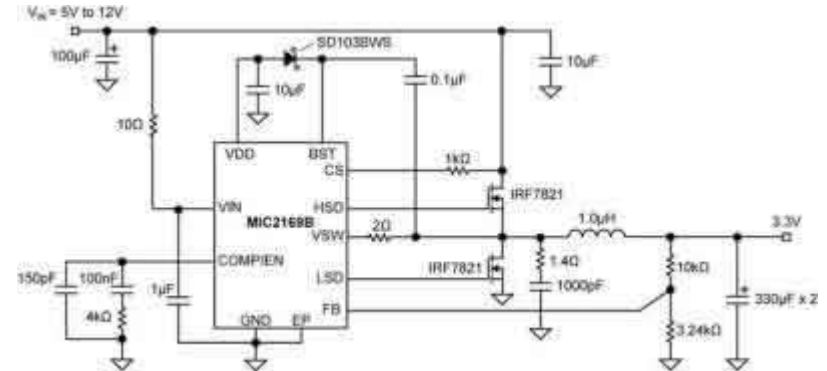
## Features:

- 3V to 14.5V input voltage range
- Adjustable output voltage down to 0.8V
- Up to 95% efficiency
- 1MHz PWM operation
- No external current sense resistor
- Adaptive gate drive increases efficiency
- Adjustable current-limit senses high-side –  
- N-Channel MOSFET current
- Ultra-fast response with hysteretic transient –  
- recovery mode
- Overvoltage protection protects the load in –  
- fault conditions
- Dual mode current limit speeds up recovery time
- "Hiccup" mode short-circuit protection Internal soft-start
- Dual function COMP and EN pin allows low-power shutdown
- Small size MSOP 10-lead package



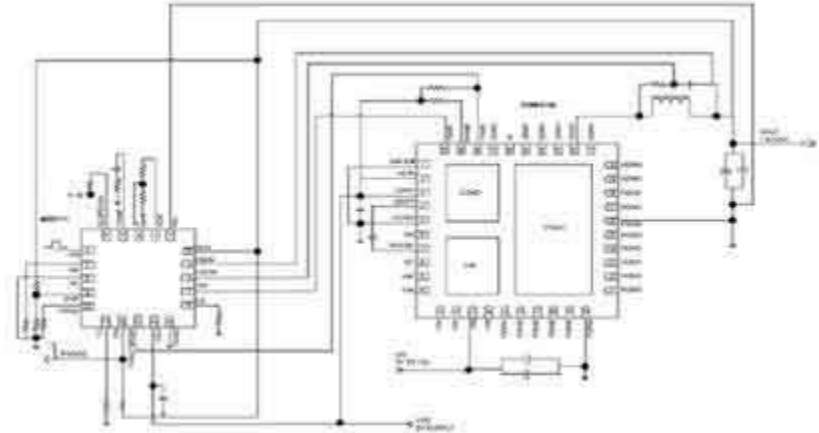
## Features:

- 3V to 14.5V input voltage range
- Adjustable output voltage down to 0.8V
- 500kHz PWM operation
- Up to 95% efficiency
- Output pre-biased protection
- Built-in 2.2 $\omega$  drivers to drive two N-Channel –  
- MOSFETs
- Adaptive gate drive increases efficiency
- Simple, externally-compensated voltage-mode –  
- PWM control
- Short minimum ON time of 30ns allowing very low duty cycle
- Fast transient response
- Adjustable current limit senses high-side N-Channel MOSFET current
- Hiccup mode short-circuit protection
- Dual function COMP and EN pin allows low-power shutdown
- Available in a small size 10-pin MSOP and 10-pin MSOP ePad package



## Features:

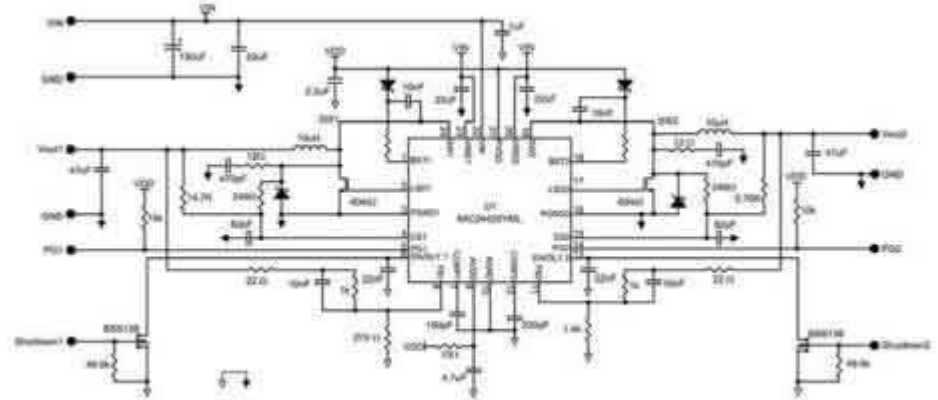
- Single 3.3V or 5V supply
- Supports load currents more than 50A
- Programmable valley-current/voltage-mode –
  - PWM architecture
- 3.3V logic PWM outputs compatible with power –
  - stage modules and DrMOS modules
- Programmable switching frequency: 200kHz to –
  - 2MHz
- Differential remote sensing for output voltage –
  - and inductor current
- 0.6V reference voltage with total  $\pm 1\%$  accuracy for output
- Adjustable soft-start/soft-stop and pre-biased safe startup
- Programmable OCP, OVP, OTP, and dedicated FAULT –
  - pin for system safe startup/stop
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range
- Available in 20-pin 3mm  $\times$  3mm TQFN package





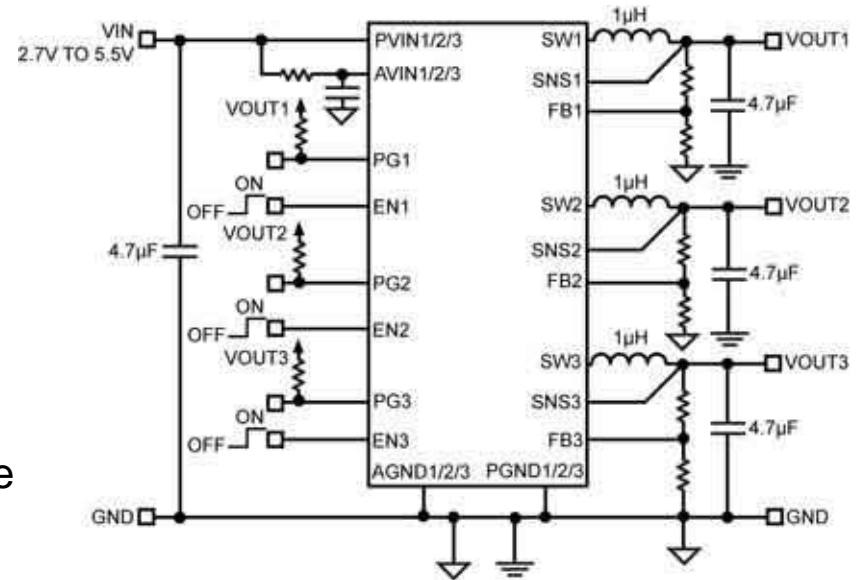
## Features:

- 4.5V to 15V input voltage range
- Adjustable output voltages down to 0.7V
- 2.5A per channel
- 180° out of phase operation
- Pre-biased output startup capability
- Low-side driver for synchronous operation
- 2% output voltage accuracy (over – temperature)
- 500kHz (MIC24421) and 1MHz – (MIC24420) switching frequency
- Programmable max current limit
- Ramp Control™ provides soft-start
- Low-side current sensing allows very low duty-cycle
- Works with ceramic output capacitors
- 24-pin 4mm x 4mm MLF® package
- Junction temperature range of -40°C to +125°C



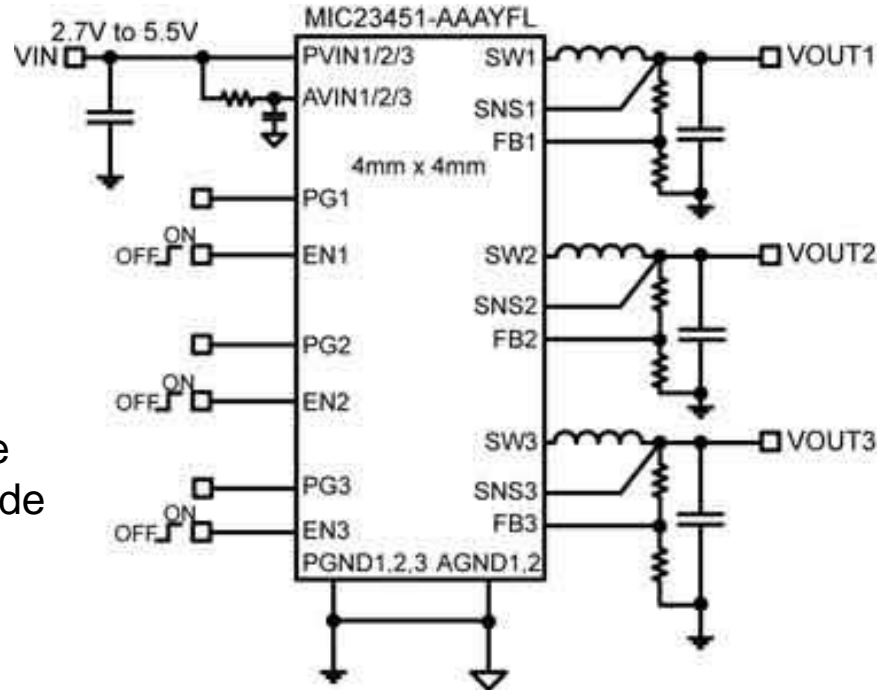
## Features:

- Input voltage: 2.7V to 5.5V
- Three independent 2A outputs
- Up to 93% peak efficiency
- 81% typical efficiency at 1mA
- 23 $\mu$ A typical quiescent current (per channel)
- 3MHz PWM operation in continuous mode
- Low voltage output ripple:
  - 30mVpp ripple in HyperLight Load® mode
  - 5mV output voltage ripple in full PWM mode
- Fully integrated MOSFET switches
- 0.01 $\mu$ A shutdown current (per channel)
- Thermal-shutdown and current-limit protection
- Output voltage as low as 1V
- 32-pin 5mm x 5mm QFN
- -40°C to +125°C junction temperature range



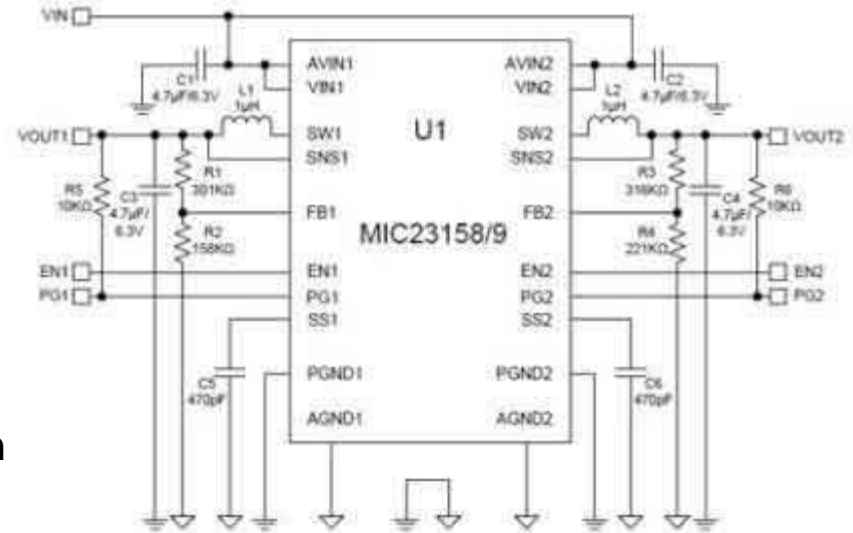
## Features:

- Input voltage: 2.7V to 5.5V
- Three independent 2A outputs
- Up to 93% peak efficiency
- 81% typical efficiency at 1mA
- 24µA typical quiescent current (per channel)
- 3MHz PWM operation in continuous mode
- Ultra-fast transient response
- Low voltage output ripple:
  - 30mVpp ripple in HyperLight Load® mode
  - 5mV output voltage ripple in full PWM mode
- Fully integrated MOSFET switches
- Thermal shutdown and current limit protection
- Output voltage as low as 1.0V
- 26-pin 4mm x 4mm QFN package
- Junction temperature range of -40°C to +125°C



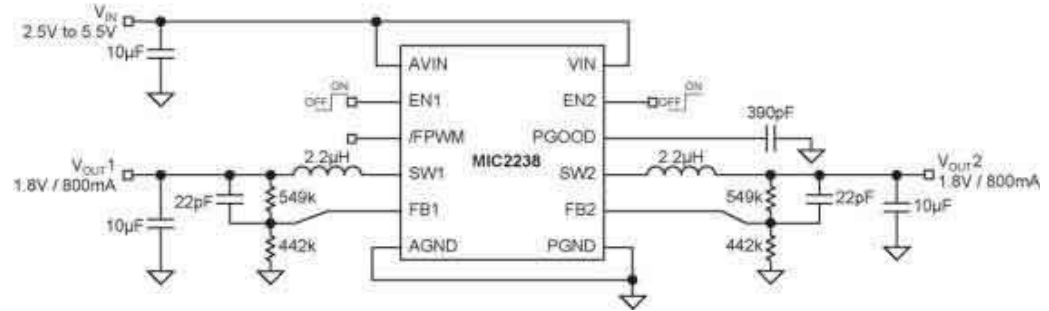
## Features:

- Input voltage: 2.7V to 5.5V
- Output voltage: Adjustable (down to 1.0V)
- Two independent 2A outputs
- Up to 94% peak efficiency
- 83% typical efficiency at 1mA
- Two independent Power Good Indicators
- Independent programmable Soft Start
- 45µA typical quiescent current
- 3MHz PWM operation in continuous conduction – mode
- Fully integrated MOSFET switches
- 0.01µA shutdown current
- Thermal shutdown and current limit protection
- 20-pin 3mm x 4mm MFL® package
- Junction temperature range of -40°C to +125°C



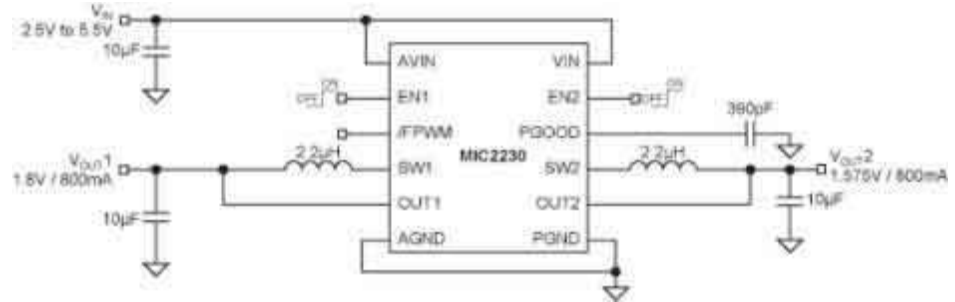
## Features:

- Input voltage range: 2.5V to 5.5V
- 28 $\mu$ A quiescent current
- Fixed output voltage versions
- Adjustable version down to 0.8V
- Low noise 2.5MHz PWM –  
- operation
- Dual output voltages running –  
- out of phase
- 800mA output current capability for each channel
- Stable with 2.2 $\mu$ H inductor, 2.2 $\mu$ F ceramic cap
- Automatic switching into light load mode of operation
- /FPWM pin allows low noise all-PWM mode operation
- Power good output with internal 5 $\mu$ A current source –  
- allows sequencing with programmable delay time
- Current limit protection
- Pb-Free 3mm x 3mm MFL<sup>®</sup>-12L package



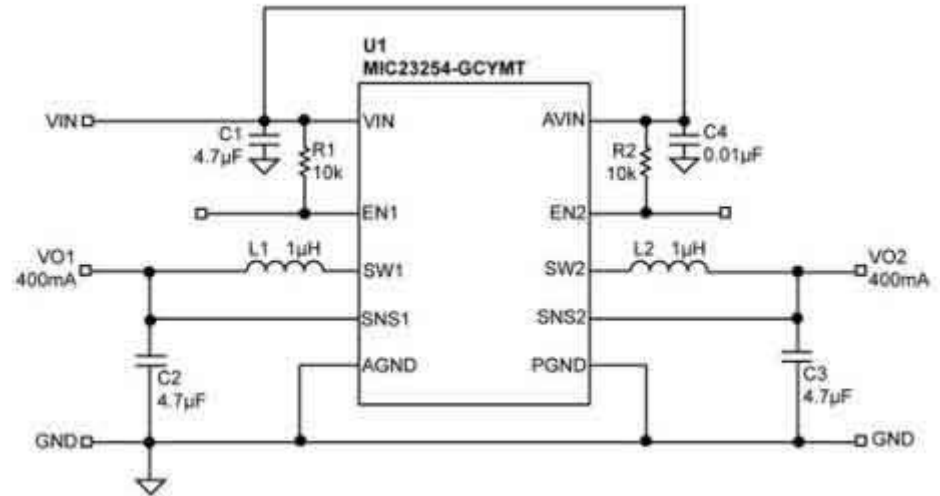
### Features:

- High Efficiency: Over 96%
- Ultra-low quiescent current: Only 28 $\mu$ A
- Ultra-low shutdown current less than 1 $\mu$ A
- Fast transient performance
- 2.5MHz PWM operation
- High output current capability per channel: -
  - 800mA
- No Schottky Diodes Required
- Stable with 2.2 $\mu$ H inductor, 2.2 $\mu$ F ceramic cap
- Adjustable output voltage down to 0.8V
- Built-in soft-start circuitry
- /FPWM pin allows low noise all-PWM mode operation
- Power good output with internal 5 $\mu$ A current source –
  - allows sequencing with programmable delay time
- Small Thermally Enhanced 3mm  $\times$  3mm MLF<sup>®</sup> package



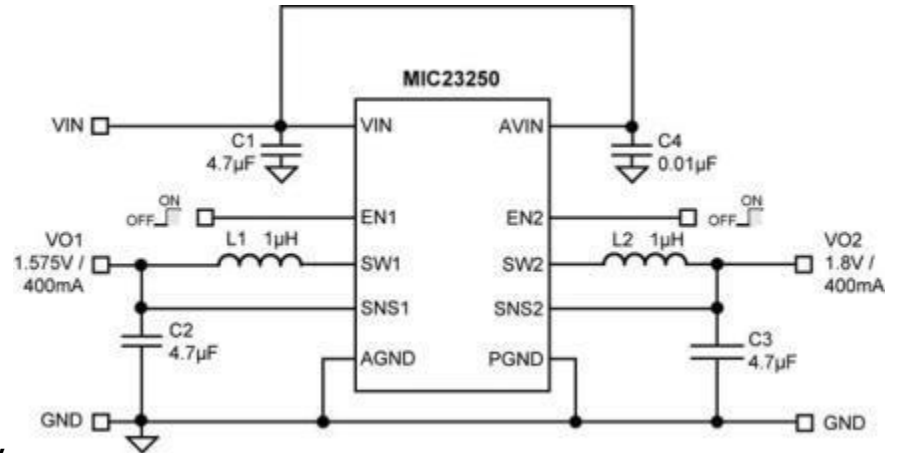
## Features:

- Low input voltage range: 2.5V to 5.5V
- Dual output current 400mA/400mA
- 33 $\mu$ A dual quiescent current
- 1 $\mu$ H inductor with a 4.7 $\mu$ F capacitor
- 4MHz in PWM operation
- Ultra-fast transient response
- Low voltage output ripple
- Up to 94% peak efficiency and 85% - efficiency at 1mA
- 20mVpp in HyperLight Load® mode
- 3mV output voltage ripple in full PWM mode
- 0.01 $\mu$ A shutdown current
- Fixed output: 10-pin 2mm x 2mm Thin MLF®
- -40°C to +125°C junction temperature range



## Features:

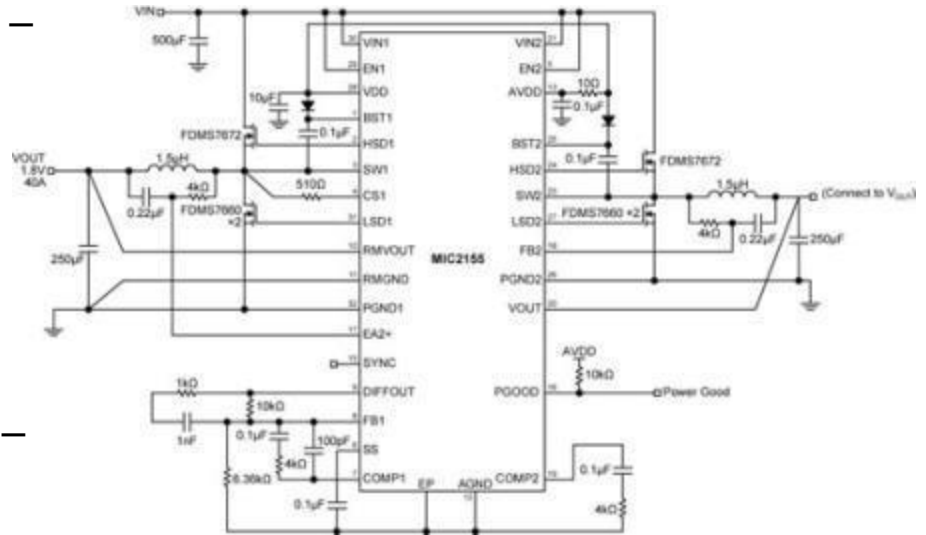
- Input voltage range: 2.7V to 5.5V
- Dual output current 400mA/400mA
- 33 $\mu$ A dual quiescent current
- 1 $\mu$ H inductor with a 4.7 $\mu$ F capacitor
- 4MHz in PWM operation
- Ultra fast transient response
- Low voltage output ripple
- 20mVpp in HyperLight Load® mode
- Up to 94% peak efficiency and 85% efficiency –  
- at 1mA
- 3mV output voltage ripple in full PWM mode
- 0.01 $\mu$ A shutdown current
- Fixed output: 10-pin 2mm x 2mm Thin MLF®
- Adjustable output: 12-pin 2.5mm x 2.5mm Thin MLF®
- -40°C to +125°C junction temperature range





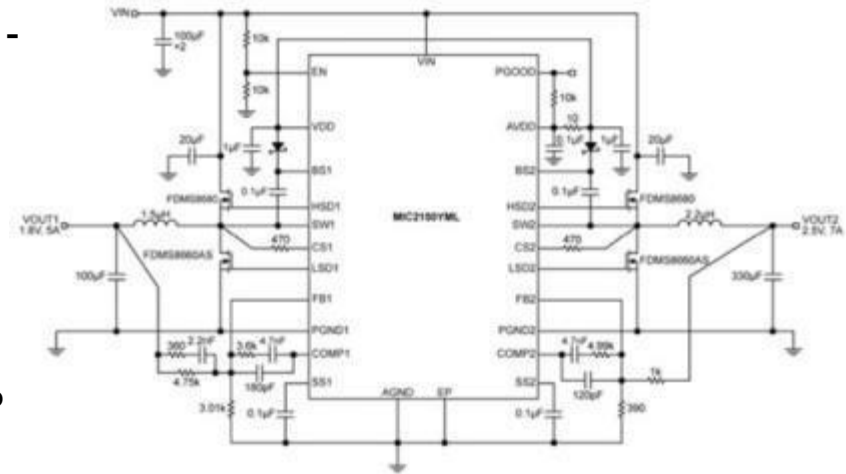
## Features:

- Synchronous Buck Control ICs with outputs –
  - switching 180° out-of-phase
- Remote sensing with internal differential –
  - amplifier
- 4.5V to 14.5V input voltage range
- Adjustable output voltages down to 0.7V
- Starts up into a pre-biased output
- 500kHz PWM operation (MIC2155)
- Adaptive gate drive allows efficiencies over –
  - 95%
- Senses low-side MOSFET current
- Internal drivers allow 25A per phase
- Dual enables with micro-power shutdown –
  - and UVLO
- Single output high current capability with –
  - master-slave current sharing
- Small footprint 32-pin 5mm x 5mm MFL®
- Junction temperature range of -40°C to +125°C



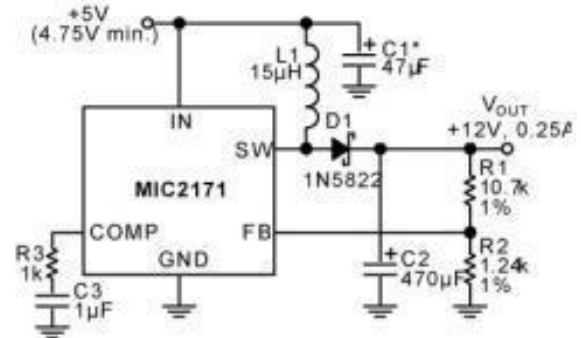
## Features:

- Dual Synchronous Buck Control IC with outputs -
  - switching 180° out-of-phase
- 4.5V to 14.5V input voltage range
- Adjustable output voltages down to 0.7V
- 1% output voltage accuracy
- MIC2150: 500kHz PWM operation
- MIC2151: 300kHz PWM operation
- Adaptive gate drive allows efficiencies over 95%
- Adjustable current limit with no sense resistor –
  - Senses low-side MOSFET current
- Internal drivers allow 20A per phase
- Power Good output allow simple sequencing
- Output over-voltage protection
- Tiny 4mm x 4mm 24-Pin MLF® package
- Junction temperature range of -40°C to +125°C

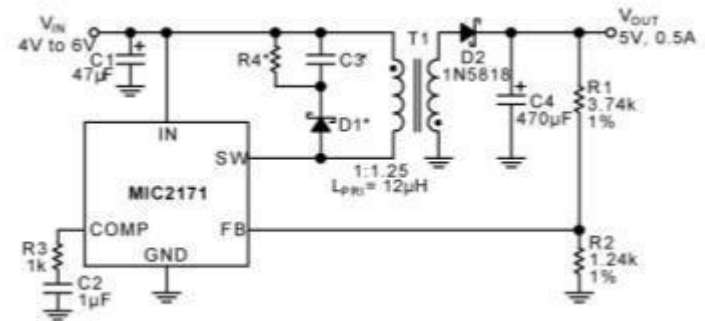


## Features:

- 2.5A, 65V internal switch rating
- 3V to 40V input voltage range
- Current-mode operation, 2.5A peak
- Internal cycle-by-cycle current limit
- Twice the frequency of the LM2577
- Low external parts count
- Operates in most switching topologies
- 7mA quiescent current (operating)
- Fits LT1171/LM2577 TO-220 and TO-263 –  
- sockets



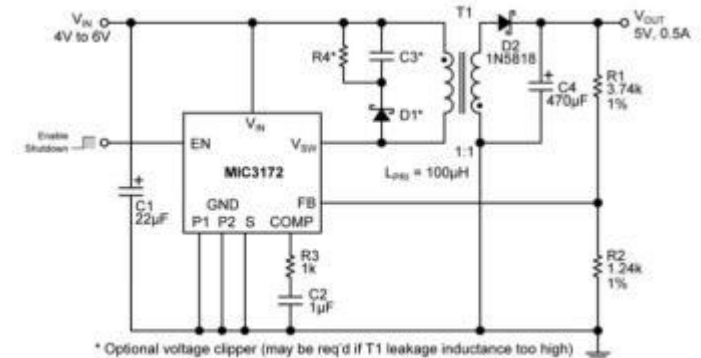
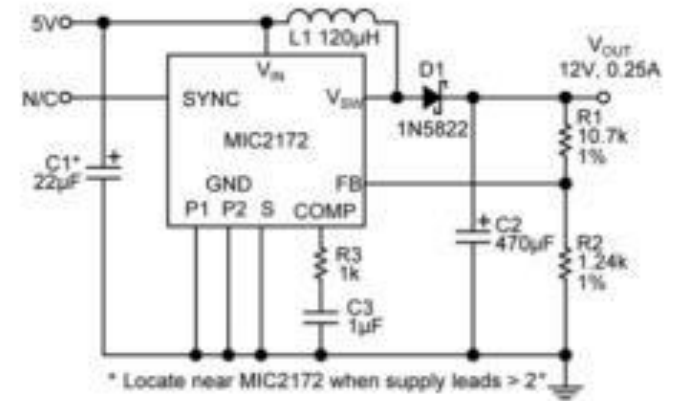
\* Locate near MIC2171 when supply leads > 2"



\* Optional voltage clipper (may be req'd if T1 leakage inductance too high)

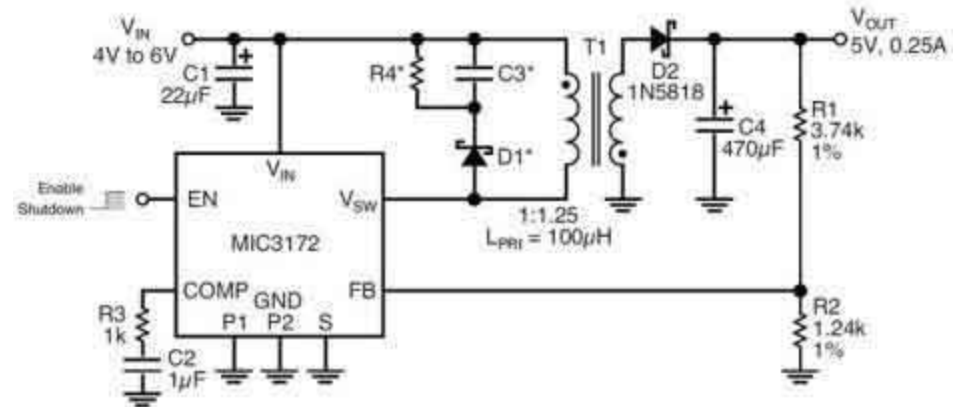
## Features:

- 1.25A, 65V internal switch rating
- 3V to 40V input voltage range
- Current-mode operation
- Thermal shutdown
- Low external parts count
- Internal cycle-by-cycle current limit
- Operates in most switching topologies
- 7mA quiescent current (operating)
- <math><1\mu\text{A}</math> quiescent current, shutdown mode –  
- (MIC3172)
- TTL shutdown compatibility (MIC3172)
- External frequency synchronization (MIC2172)
- External frequency trim (MIC2172)
- Fits most LT1172 sockets (see applications info)



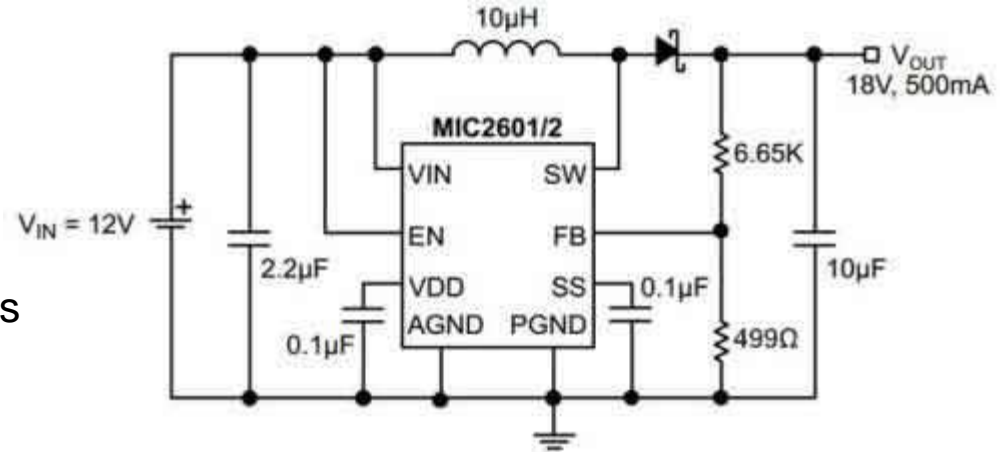
## Features:

- 1.25A, 65V internal switch rating
- 3V to 40V input voltage range
- Current-mode operation
- Internal cycle-by-cycle current limit
- Thermal shutdown
- Low external parts count
- Operates in most switching topologies
- 7mA quiescent current (operating)
- <math><1\mu\text{A}</math> quiescent current, shutdown mode –  
- (MIC3172)
- TTL shutdown compatibility (MIC3172)
- External frequency synchronization (MIC2172)
- External frequency trim (MIC2172)
- Fits most LT1172 sockets (see applications info)



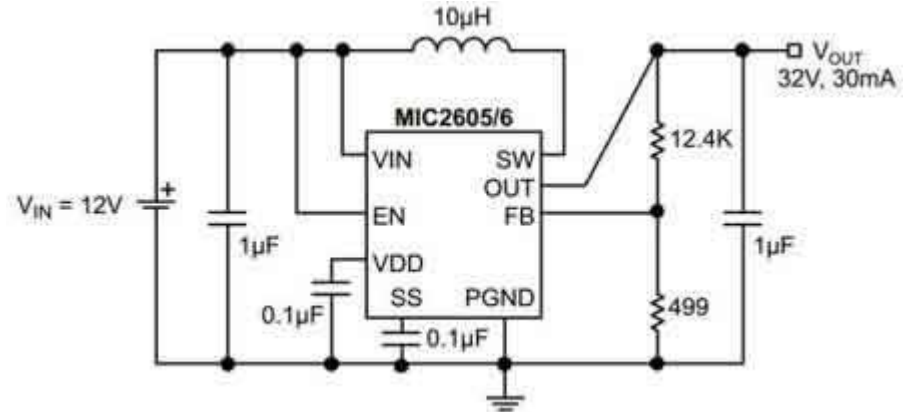
### Features:

- Wide input voltage range: 4.5V to 20V
- Output voltage adjustable to 40V
- 1.2A switch current
- MIC2601 operates at 1.2MHz
- MIC2602 operates at 2MHz
- Stable with small size ceramic capacitors
- High efficiency
- Programmable soft start
- <math><10\ \mu\text{A}</math> shutdown current
- UVLO
- Output over-voltage protection
- Over temperature shutdown
- 8-pin 2mm x 2mm M<sup>L</sup>F<sup>®</sup> package
- -40°C to +125°C junction temperature range



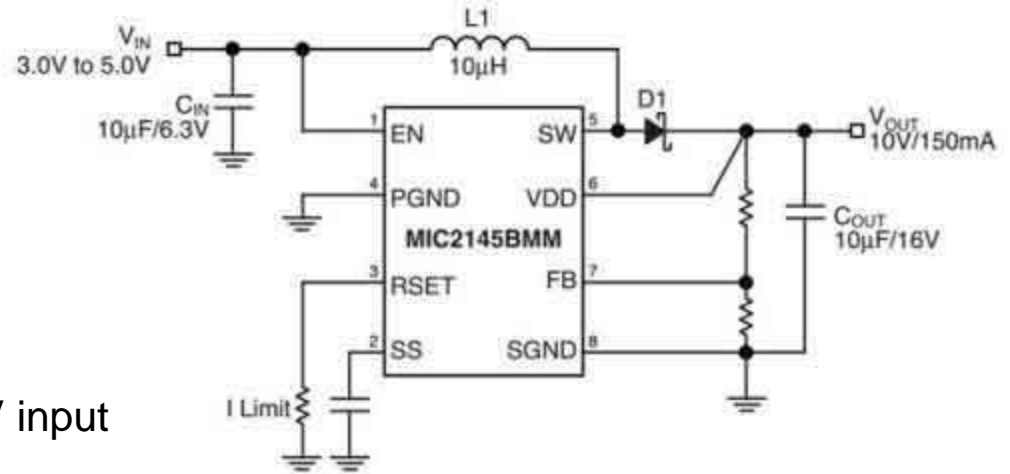
### Features:

- Wide input voltage range: 4.5V to 20V
- Output voltage adjustable to 40V
- 0.5A switch current and Schottky diode
- MIC2605 operates at 1.2MHz
- MIC2606 operates at 2MHz
- Programmable soft start
- Stable with small size ceramic capacitors
- High efficiency
- Low input and output ripple
- <math><10\mu\text{A}</math> shutdown current
- UVLO
- Output over-voltage and over-temperature protection
- 8-pin 2mm x 2mm MFL<sup>®</sup> package
- -40°C to +125°C junction temperature range



## Features:

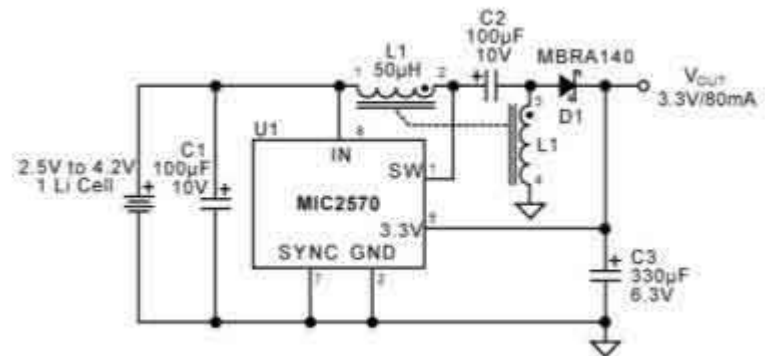
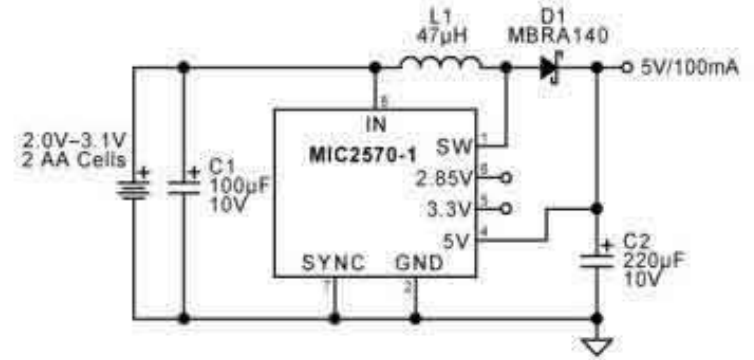
- 2.4V to 16V input voltage
- Output adjustable to 16V
- Programmable peak current limit
- Soft start
- Up to 450kHz switching frequency
- 0.5 $\mu$ A shutdown current
- 200 $\mu$ A quiescent current
- Capable of 5V/500mA output with 3.3V input
- Achieves over 85% efficiency
- Implements low power boost, SEPIC, and – flyback topologies
- MSOP-8 and 3mm x 3mm MLF<sup>®</sup>-10L





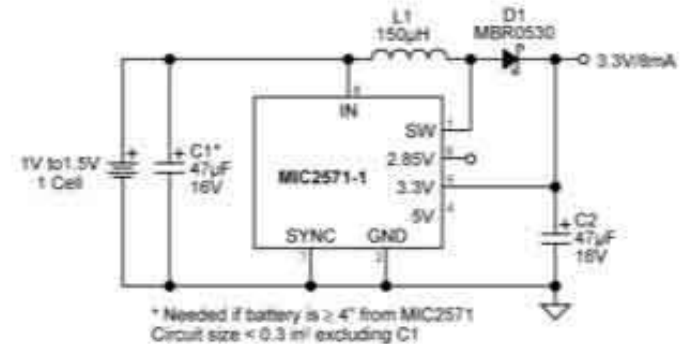
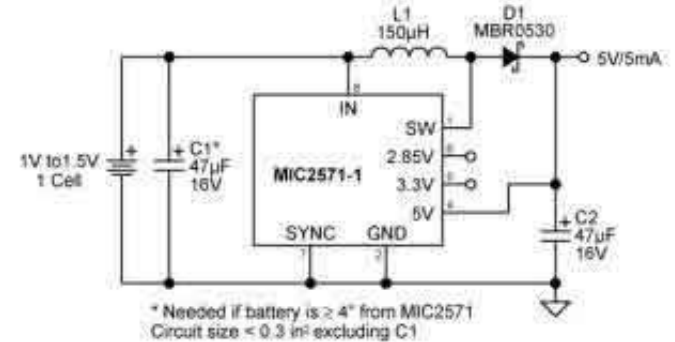
## Features:

- Operates from a two-cell supply:
  - 1.3V to 15V operation
- 130 $\mu$ A typical quiescent current
- Complete regulator fits 0.6 in<sup>2</sup> area
- 2.85V/3.3V/5V selectable output voltage –  
- (MIC2570-1)
- Adjustable output up to 36V (MIC2570-2)
- 1A current limited pass element
- Frequency synchronization input
- 8-lead SOIC package



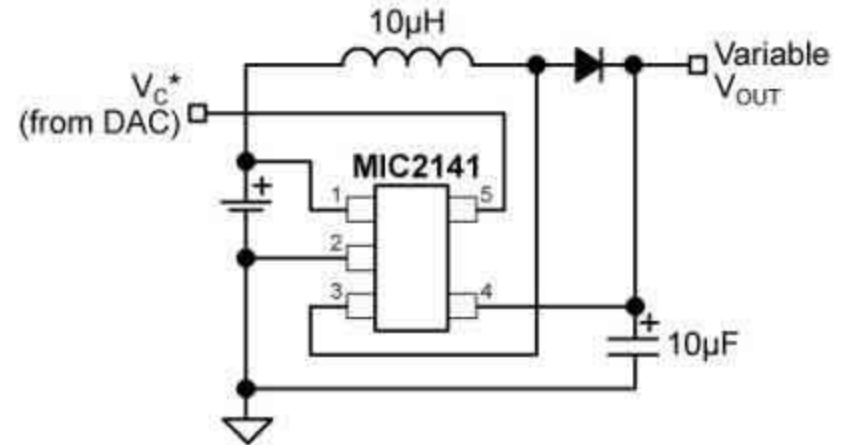
## Features:

- Operates from a single-cell supply:
  - 0.9V to 15V operation
- 120 $\mu$ A typical quiescent current
- Complete regulator fits 0.3 in<sup>2</sup> area
- 2.85V/3.3V/5V selectable output voltage –  
- (MIC2571-1)
- Adjustable output up to 36V (MIC2571-2)
- 1A current limited pass element
- Frequency synchronization input
- 8-lead MSOP package



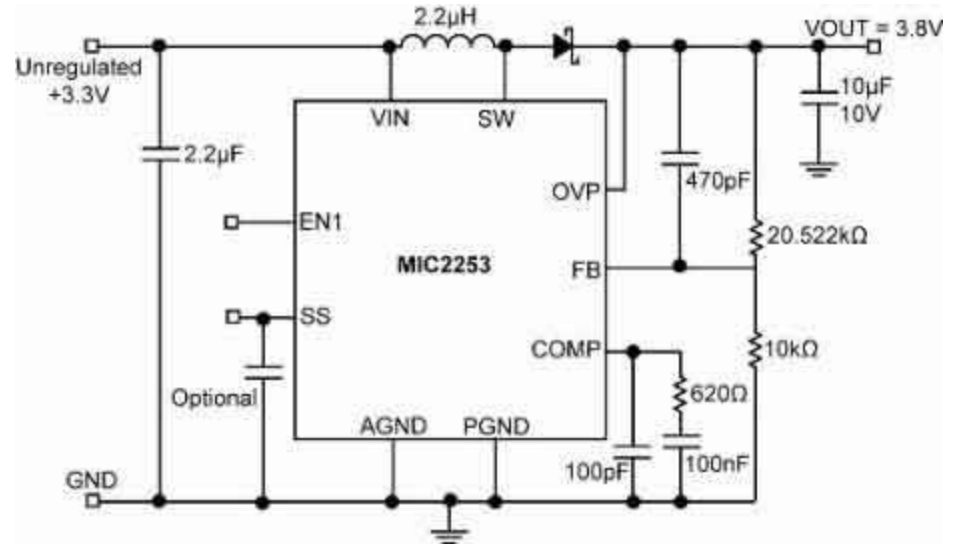
## Features:

- Implements low-power boost, SEPIC, - or fly-back
- 2.2V to 14V input voltage
- 330kHz switching frequency
- $<2\mu\text{A}$  shutdown current
- $70\mu\text{A}$  quiescent current
- 1.24V bandgap reference
- Typical output current 1mA to 10mA
- SOT-23-5 package



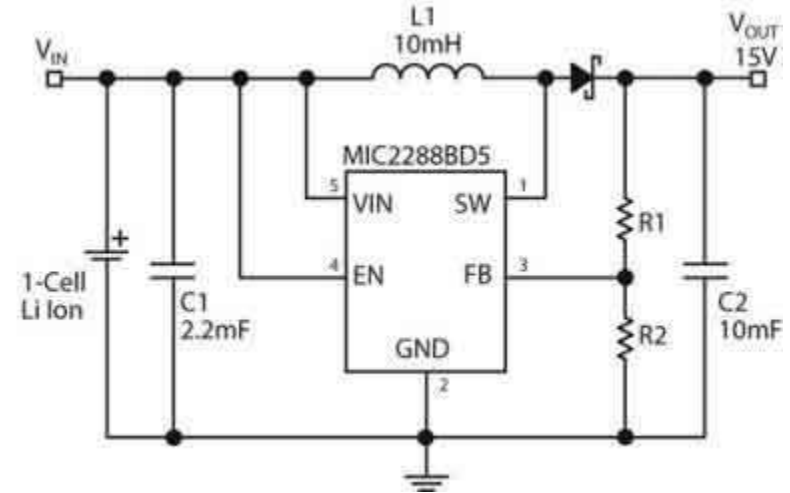
### Features:

- 3.5A minimum switch current
- 1.245V  $\pm$ 3% feedback voltage
- 2.5V to 10V input voltage
- Output over-voltage protection (OVP)
- Externally programmable soft-start
- Output voltage up to 30V (max)
- Fixed 1MHz operation
- <1% line regulation
- 0.1 $\mu$ A shutdown current
- Over temperature protection
- Under-voltage lockout (UVLO)
- 12-pin 3mm x 3mm leadless MFL<sup>®</sup> package
- -40 $^{\circ}$ C to +125 $^{\circ}$ C junction temperature range



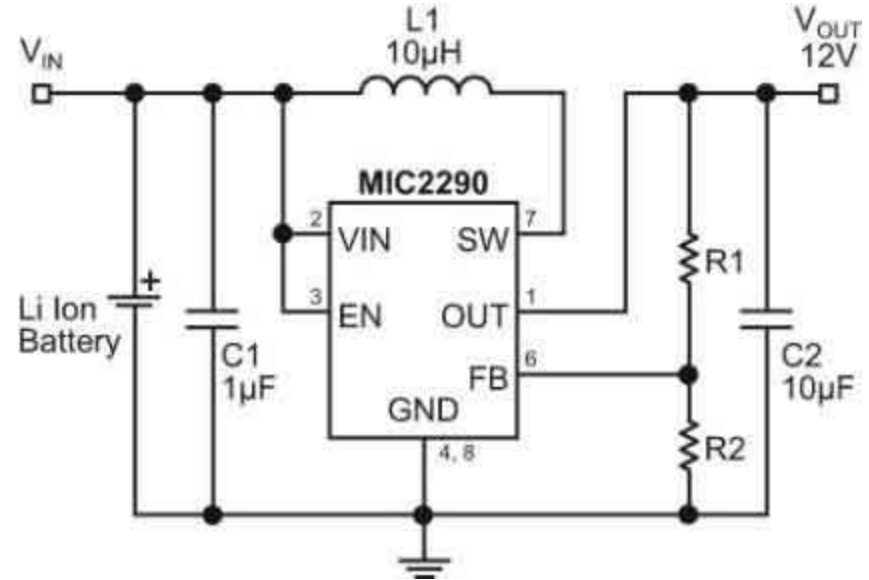
## Features:

- 2.5V to 10V input voltage range
- Output voltage adjustable to 34V
- Over 1A switch current
- 1.2MHz PWM operation
- Stable with ceramic capacitors
- <1% line and load regulation
- Low input and output ripple
- <1 $\mu$ A shutdown current
- Output overvoltage protection (MIC2288BML)
- Over temperature shutdown
- Thin SOT-23-5 package option
- 2mm x 2mm leadless MLF<sup>®</sup>-8L package option
- -40°C to +125°C junction temperature range



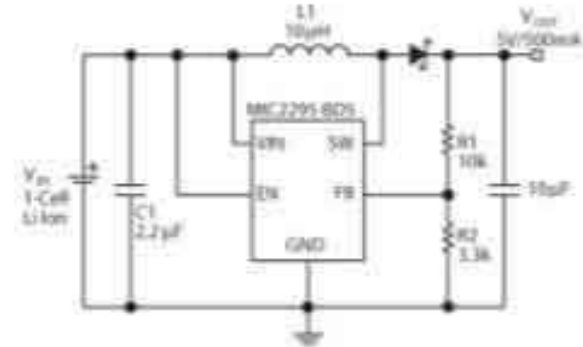
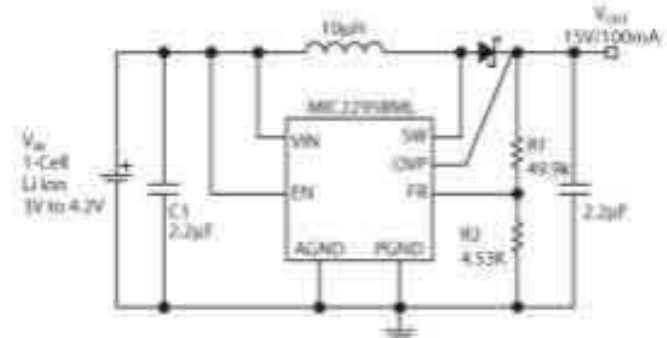
## Features:

- Internal Schottky diode
- 2.5V to 10V input voltage
- Output voltage adjustable to 34V
- Over 500mA switch current
- 1.2MHz PWM operation
- Stable with ceramic capacitors
- <1% line and load regulation
- Low input and output ripple
- <1 $\mu$ A shutdown current
- UVLO
- Output overvoltage protection
- Over temperature protection
- 2mm x 2mm 8-pin MFL<sup>®</sup> package
- -40 $^{\circ}$ C to +125 $^{\circ}$ C junction temperature range



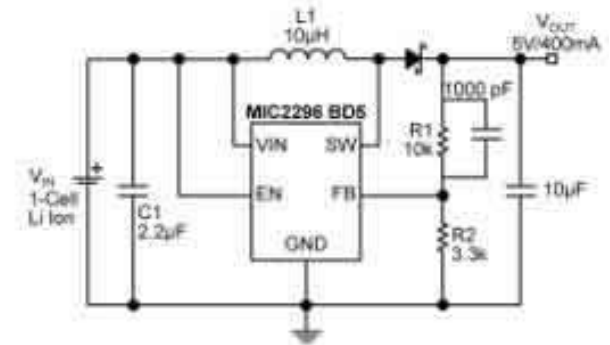
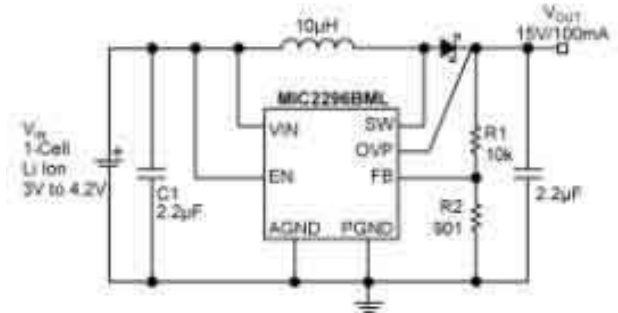
## Features:

- 2.5V to 10V input voltage range
- Output voltage adjustable to 34V
- 1.2A switch current
- 1.2MHz PWM operation
- Stable with small size ceramic capacitors
- High efficiency
- Low input and output ripple
- $<1\mu\text{A}$  shutdown current
- UVLO
- Output over-voltage protection (MIC2295BML)
- Over temperature shutdown
- Thin SOT23-5 package option
- 2mm x 2mm leadless 8-lead MLF® package option
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range



## Features:

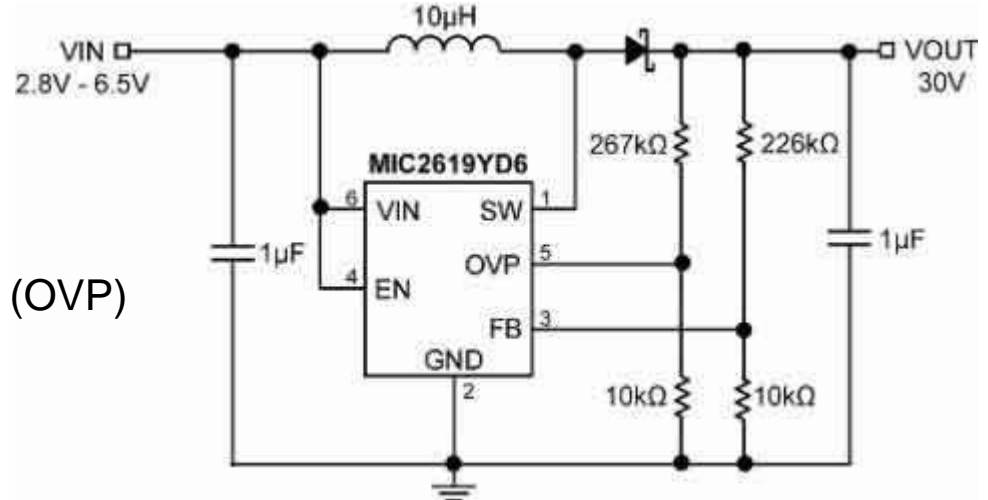
- 2.5V to 10V input voltage range
- Output voltage adjustable to 34V
- 1.2A switch current
- 600kHz PWM operation
- Stable with small size ceramic capacitors
- High efficiency
- Low input and output ripple
- <math><1 \mu\text{A}</math> shutdown current
- UVLO
- Output over-voltage protection (MIC2296BML)
- Over temperature shutdown
- 2mm x 2mm leadless 8-lead MLF® package option
- -40°C to +125°C junction temperature range





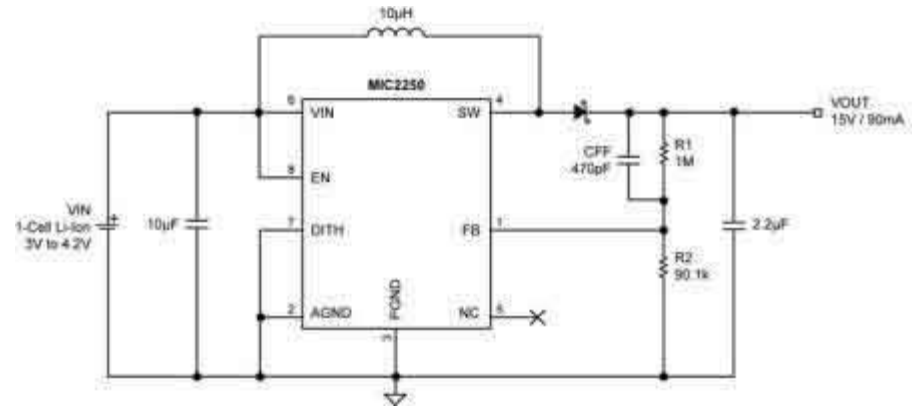
### Features:

- 2.8V to 6.5V input voltage
- 350mA switch current
- Output voltage up to 35V
- 1.2MHz PWM operation
- 1.265V feedback voltage
- Programmable over-voltage protection (OVP)
- <1% line regulation
- <1 $\mu$ A shutdown current
- Over-temperature protection
- Under-voltage lock out (UVLO)
- Low profile Thin SOT-23-6 package
- -40°C to +125°C junction temperature range



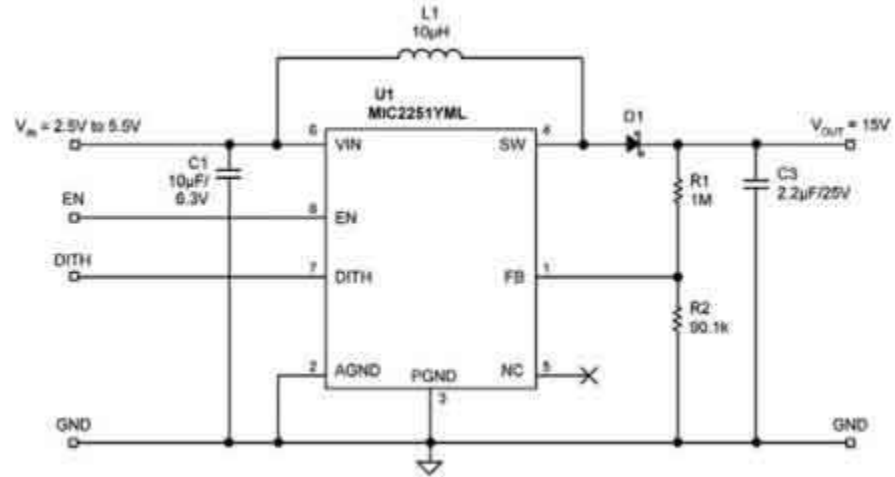
## Features:

- Over 80% efficient for a 300:1 load range
- 2.5V to 5.5V input voltage range
- Output voltage adjustable to 32V
- 52 $\mu$ A (typ) quiescent current
- EMI reduction circuitry
- Stable with small ceramic capacitors
- <1 $\mu$ A shutdown current
- Constant peak current control reduces –
  - output ripple
- UVLO and thermal shutdown
- 8-pin 2mm x 2mm leadless MLF® package (MIC2250)
- 5-pin Thin SOT-23 package (MIC2250-1 and -2)
- -40°C to +125°C junction temperature range



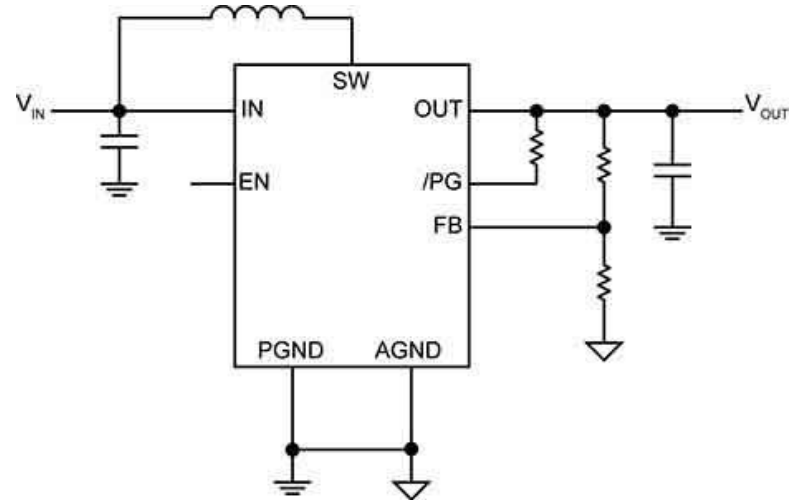
## Features:

- Over 80% efficient for a 300:1 load range
- 2.5V to 5.5V input voltage range
- Output voltage adjustable to 37V
- 52 $\mu$ A (typ) quiescent current
- EMI reduction circuitry
- Stable with small ceramic capacitors
- <1 $\mu$ A shutdown current
- UVLO and thermal shutdown
- Constant peak current control reduces –
  - output ripple
- 8-pin 2mm x 2mm leadless MLF® package (MIC2251)
- 5-pin Thin SOT-23 package (MIC2251-1 and -2)
- -40°C to +125°C junction temperature range



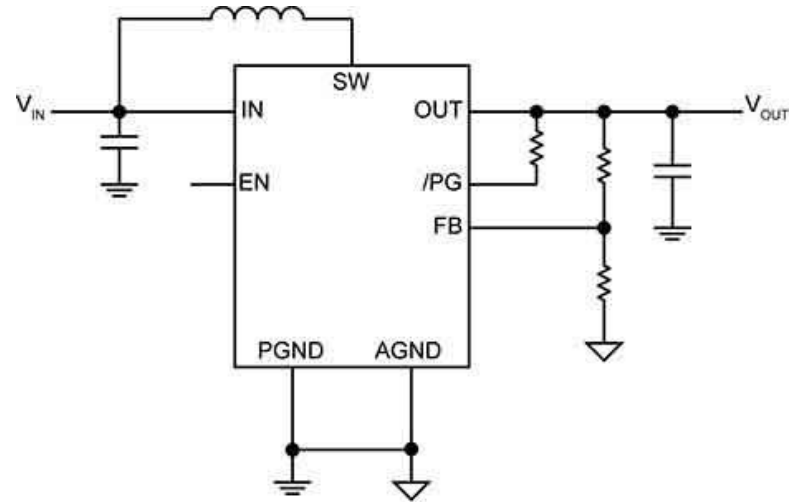
## Features:

- Input voltage range: 2.5V to 5.5V
- Fully integrated, high-efficiency, 2MHz –  
– synchronous boost regulator
- Bi-directional true load disconnect
- Integrated anti-ringing switch
- Minimum switching frequency of 45kHz
- Up to 95% efficiency
- $<1\mu\text{A}$  shutdown current
- Bypass mode for  $V_{IN} \geq V_{OUT}$  Overcurrent protection and thermal shutdown
- Fixed and adjustable output versions
- 8-pin 2mm × 2mm TDFN package



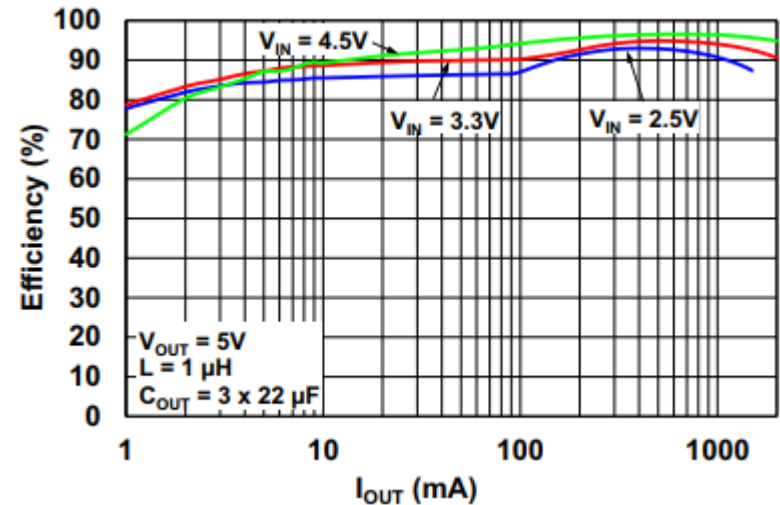
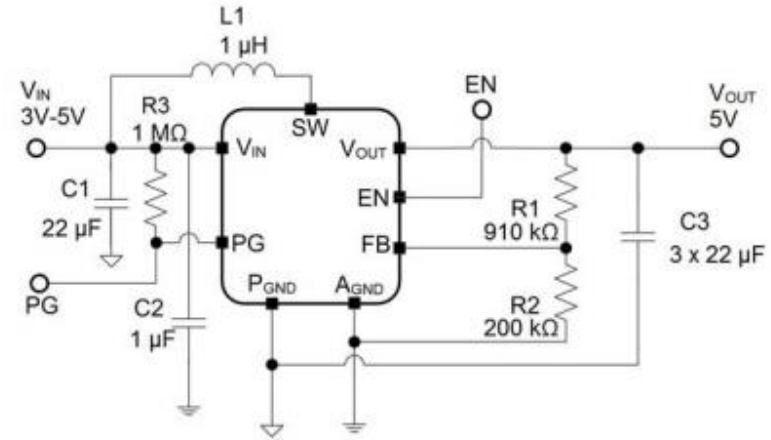
## Features:

- Input voltage range: 2.5V to 5.5V
- Fully integrated, high-efficiency, 2MHz – synchronous boost regulator
- Bi-directional true load disconnect
- Integrated anti-ringing switch
- Up to 95% efficiency
- $<1\mu\text{A}$  shutdown current
- Bypass mode for  $V_{IN} \geq V_{OUT}$  Overcurrent protection and thermal shutdown
- Fixed and adjustable output versions
- 8-pin 2mm × 2mm TDFN package



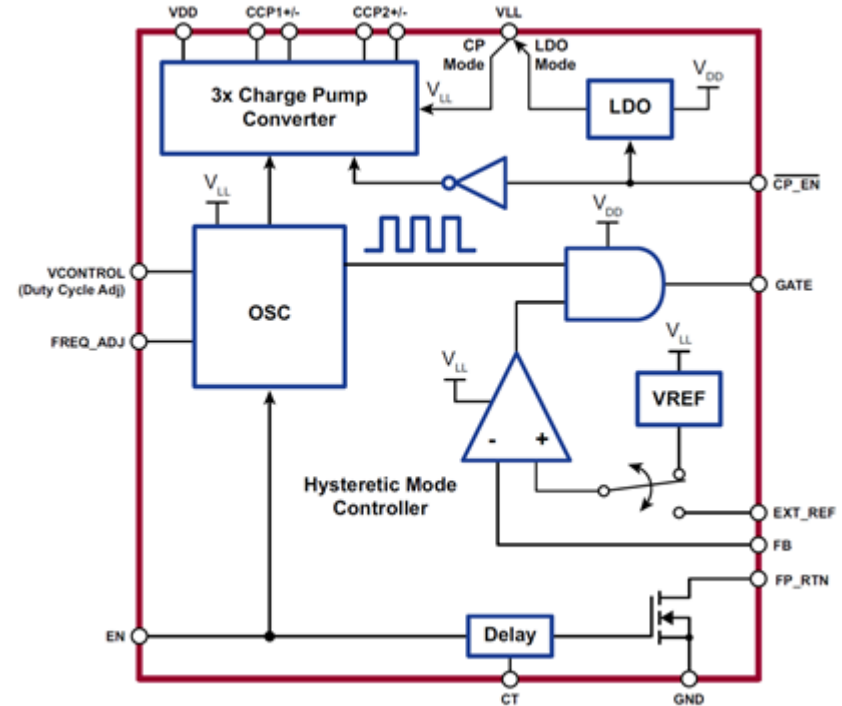
## Features:

- Up to 95% Efficiency
- Fully Integrated, High Efficiency, 2MHz Switching Frequency
- Bidirectional True Load Disconnect, Overvoltage Protection (OVP) and Undervoltage Lockout (UVLO)
- Controlled Pre-Charge Current Limit at Start-Up
- Ultra-Fast Transient Response
- Input Voltage Range from 2.5V to 5.5V
- Maximum Output Current:
  - 1.5A,  $V_{IN} = 2.5V$  and  $V_{OUT} = 5V$
  - 2A,  $V_{IN} = 3V$  and  $V_{OUT} = 5V$
- Output Voltage Range:
- Adjustable
- Fixed Versions: 4.75V, 5V, 5.25V, 5.5V
- Integrated Anti-Ringing Switch for EMI Reduction
- Typically Less than 2 $\mu$ A Shutdown Current
- Internal Compensation
- Bypass Mode for  $V_{IN} \geq V_{OUT}$
- Power Good (PG) Output
- Overcurrent Protection and Thermal Shutdown
- Available Package: 8-pin FTQFN 2mm x 2mm



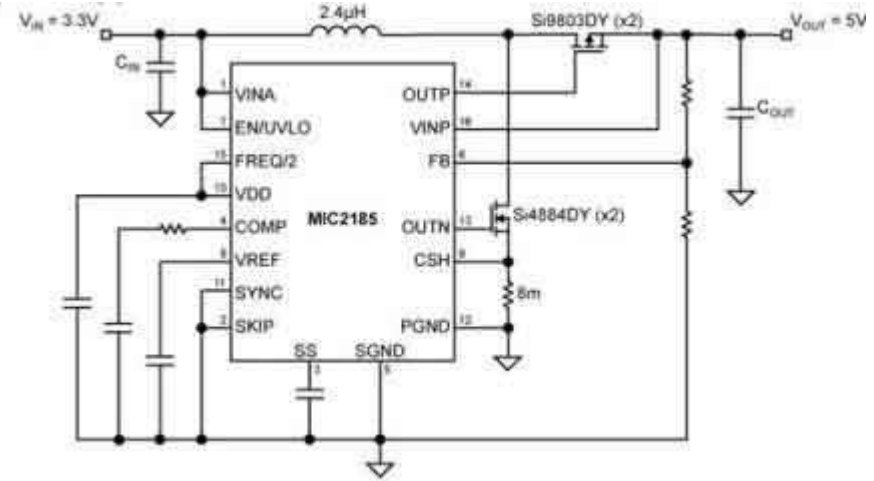
## Features:

- Wide output range: 6V to 500V
- Low 2.7V input
- 5W max output power w/external MOSFET
- Built-in charge pump for gate drive voltage
- Fsw programmable: 40kHz to 400kHz
- 4 Duty Cycle Selections: 50% to 87.5%
- FB return ground switch for power savings – applications
- Built-in delay timer for internal protection



## Features:

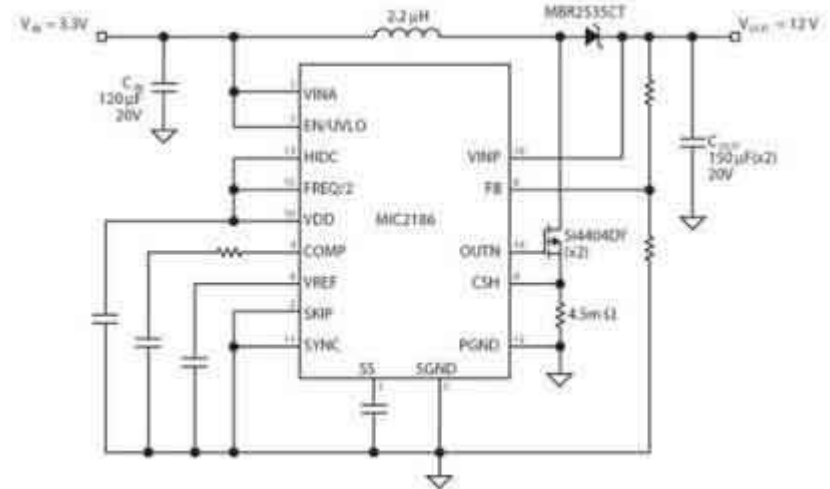
- Input voltage range: 2.9V to 14V
- 95% efficiency
- Oscillator frequency of 200kHz/400kHz
- Frequency sync to 600kHz
- 0.5 $\mu$ A shutdown current
- Two 5 $\Omega$  output drivers
- Front edge blanking
- PWM current mode control
- Cycle-by-cycle current limiting
- Frequency fold-back protection
- Adjustable under-voltage lockout
- Precision 1.245V reference output
- 16-pin SOIC narrow body package





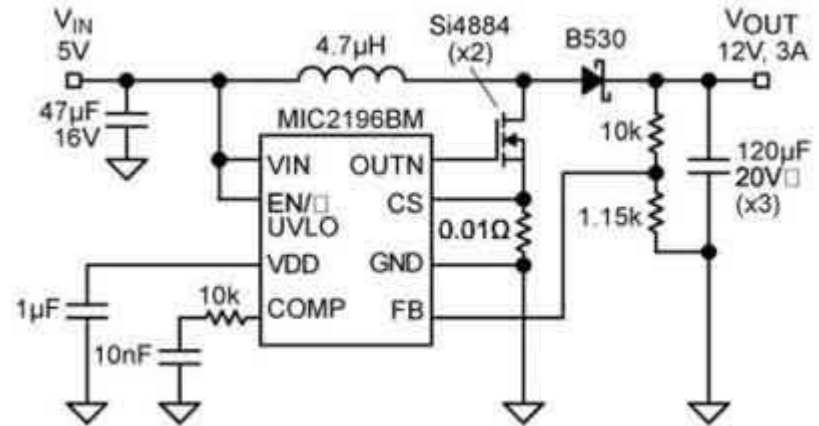
## Features:

- Input voltage range: 2.9V to 14V
- 1.6Ω output driver
- Oscillator frequency of 100kHz/200kHz/400kHz
- Frequency sync to 600kHz
- Front edge blanking
- PWM Current Mode Control
- Selectable light load SKIP mode
- 600μA quiescent current (SKIP-Mode)
- 0.5μA shutdown current
- Cycle-by-cycle current limiting
- Frequency fold-back protection
- Precision 1.245V reference output
- 16-pin SOIC and QSOP package options
- Selectable 50% maximum duty cycle for fly-back applications



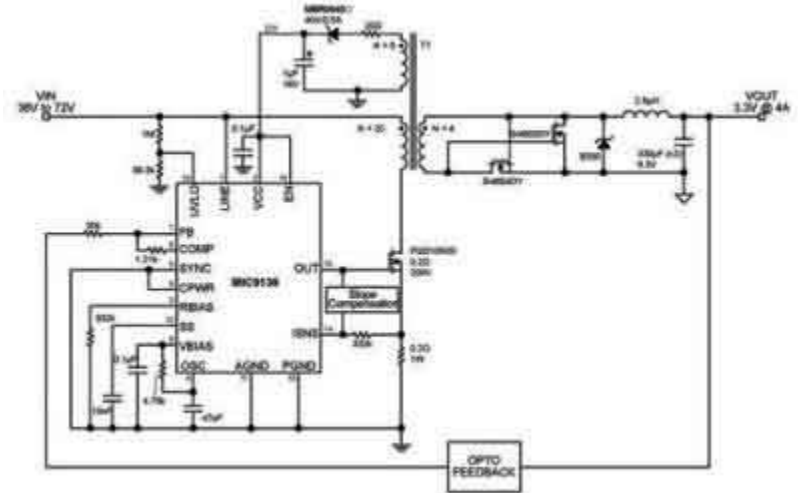
## Features:

- 2.9V to 14V input voltage range
- >90% efficiency
- 2Ω output driver
- 400kHz oscillator frequency
- PWM current mode control
- 0.5μA micro-power shutdown
- Programmable UVLO
- Front edge blanking
- Cycle-by-cycle current limiting
- Frequency foldback short-circuit protection
- 8-pin SOIC package



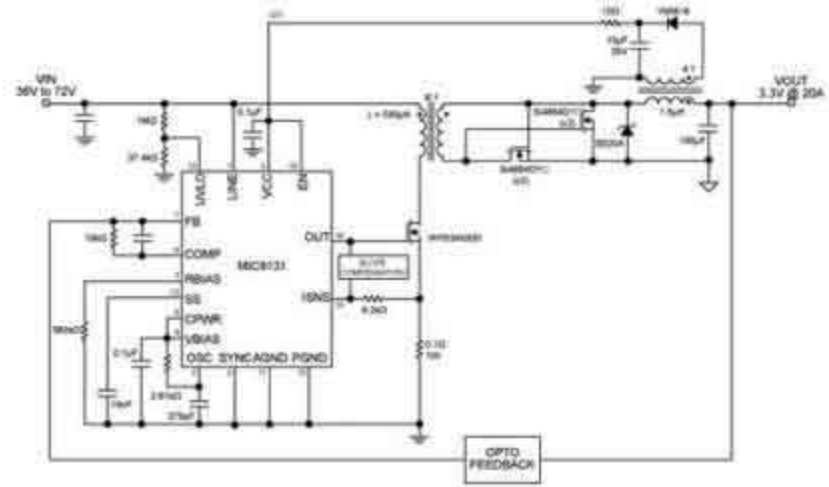
## Features:

- Input voltages up to 180V
- Internal oscillator capable of >2.5MHz operation
- Synchronization capability to 4MHz
- Current sense delay of 34ns
- Minimum pulse width <25ns
- 90% efficiency
- 1.3mA quiescent current
- 1 $\mu$ A shutdown current
- Resistor programmable current sense threshold
- Selectable sort-start retry
- 4 $\Omega$  sink, 12 $\Omega$  source output driver
- Programmable under-voltage lockout
- Constant-frequency PWM current-mode control
- 16-pin SOIC and 16-pin QSOP



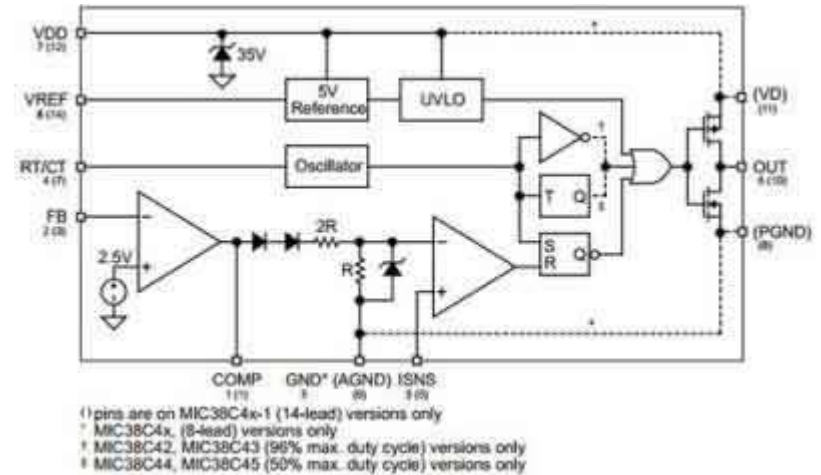
## Features:

- Input voltages up to 180V
- Internal oscillator capable of  $>2.5\text{MHz}$  operation
- Accurate 75% maximum duty cycle
- Synchronization capability to 6MHz
- Current sense delay of 34ns
- Minimum pulse width of  $<25\text{ns}$
- 90% efficiency
- 1.3mA quiescent current
- $1\mu\text{A}$  shutdown current
- Resistor programmable current sense threshold
- $4\Omega$  sink,  $12\Omega$  source output driver
- Programmable under-voltage lockout
- Constant-frequency PWM current-mode control
- 16-pin SOIC and 16-pin QSOP



## Features:

- Fast 40ns output rise and 30ns output fall times
- Ultra-low start-up current (50µA typical)
- Low operating current (4mA typical)
- CMOS outputs with rail-to-rail swing
- ≥500kHz current-mode operation
- Trimmed 5V bandgap reference
- Trimmed oscillator discharge current
- -40°C to +85°C temperature range meets –  
– UC284x specifications
- High-performance, low-power BiCMOS Process
- UVLO with hysteresis
- Pin-for-pin compatible with UC3842/3843/3844/3845(A)
- Low cross-conduction currents

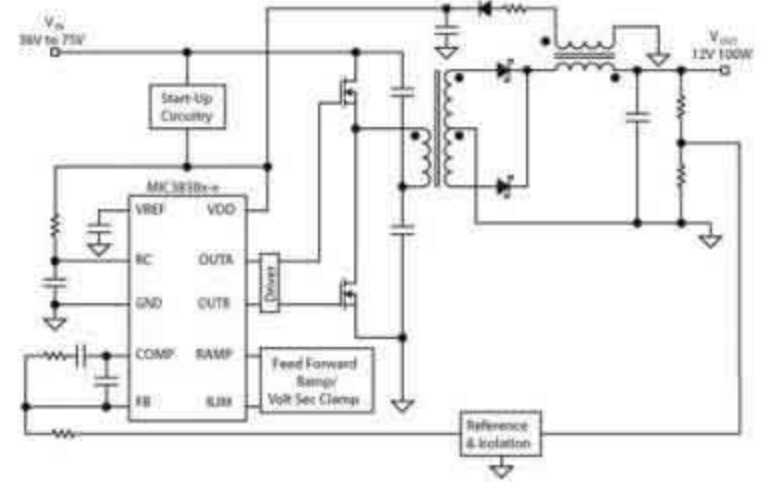


# MIC38C42A/43A/ 44A/45A

BiCMOS Current-Mode PWM Controllers

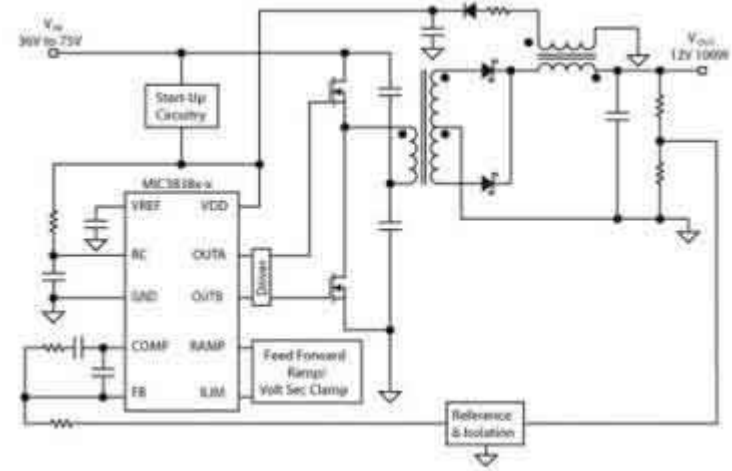
## Features:

- Fast 40ns output rise and 30ns output fall times
- -40°C to +85°C temperature range meets UC284x –  
- specifications
- High-performance, low-power BiCMOS Process
- Ultra-low start-up current (100µA typical)
- Low operating current (4mA typical)
- CMOS outputs with rail-to-rail swing
- CMOS outputs with rail-to-rail swing
- Current-mode operation up to 500kHz
- Trimmed 5V bandgap reference
- Pin-for-pin compatible with UC3842/3843/3844/3845(A)
- Trimmed oscillator discharge current
- UVLO with hysteresis
- Low cross-conduction currents



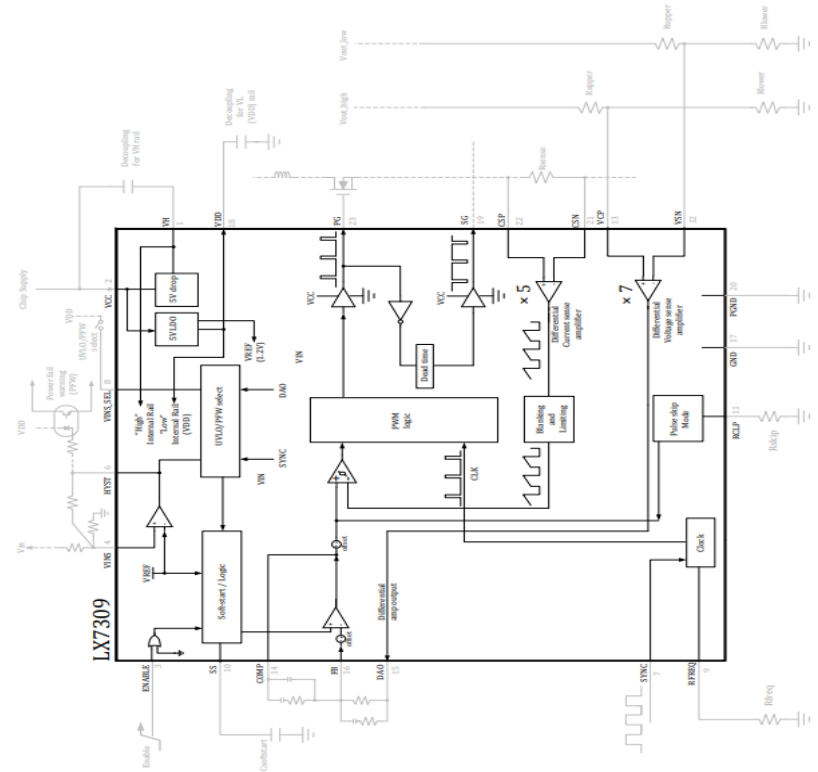
## Features:

- Fast 20ns output rise and 15ns output fall times
- High-performance, low-power BiCMOS Process
- Ultra-low start-up current (50 $\mu$ A typical)
- Low operating current (4mA typical)
- High output drive (1A peak current, HC version)
- CMOS outputs with rail-to-rail swing
- Current-mode operation up to 500kHz
- Trimmed 5V bandgap reference
- -40°C to +85°C temperature range exceeds –  
– UC284x specifications
- Pin-for-pin compatible with UC3842/3843/3844/3845(A)
- Trimmed oscillator discharge current
- UVLO with hysteresis
- Low cross-conduction currents



## Features:

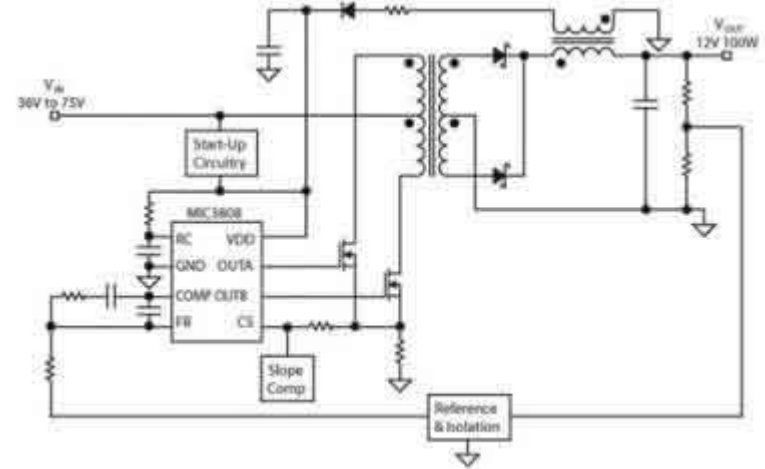
- Current-mode control for fast line and load correction responses
- 50% duty cycle limit for simple Forward converters and for avoiding subharmonic instability in Flyback, Boost and Buck-Boost
- 200mV peak current sense signal with differential Kelvin sensing for noise immunity and higher efficiency
- Two out-of-phase driver stages for synchronous rectification or active clamp
- ROHS-compliant, 24-pin, 4x4 mm QFN





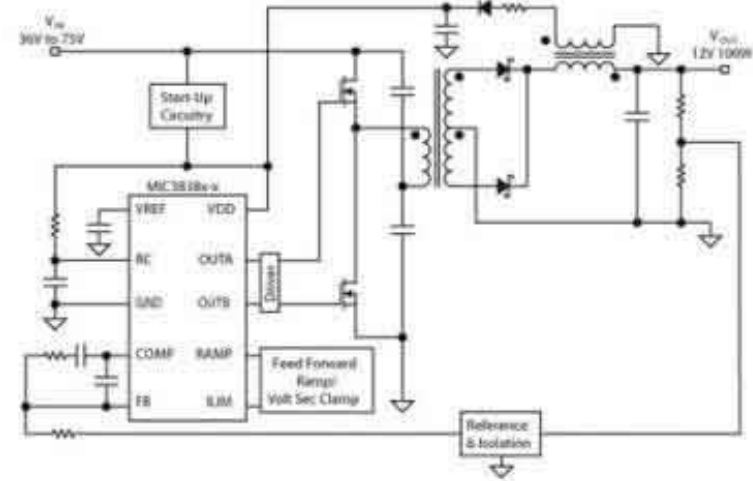
## Features:

- Dual output drive stages in push-pull –  
- configuration
- Leading edge current-sense blanking
- 130 $\mu$ A typical start-up current
- 1mA typical run current
- Operation to 1MHz
- Internal soft start
- On-chip error amplifier with 4MHz gain –  
- bandwidth product
- On-chip  $V_{DD}$  clamping
- Output drive stages capable of 500mA –  
- peak source current, 1A peak sink current



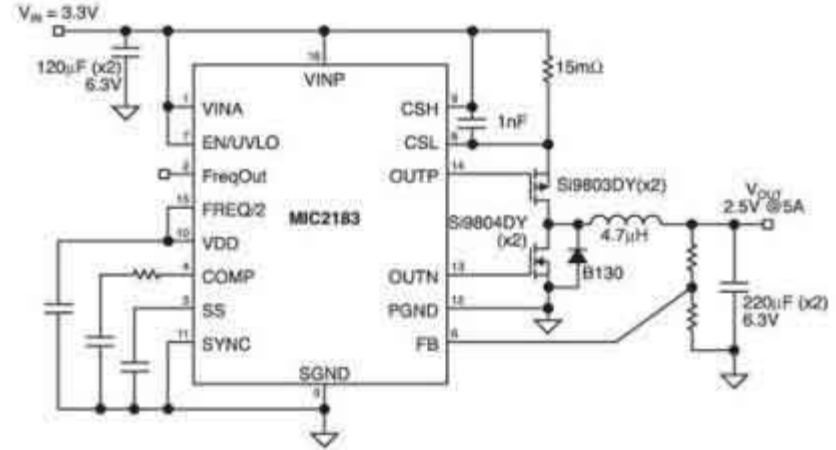
## Features:

- Dual output drive stages in push-pull - configuration
- Configurable for current-mode or – - voltage-mode control
- Easily implements volt-second clamp
- Leading edge current-sense blanking
- 3V reference output available
- 130 $\mu$ A typical start-up current
- 1mA typical run current
- Operation to 1MHz
- On-chip error amplifier with 4MHz – - gain bandwidth product
- Internal soft start
- On-chip  $V_{DD}$  clamping
- Output drive stages capable of 500mA peak – - source current, 1A peak sink current



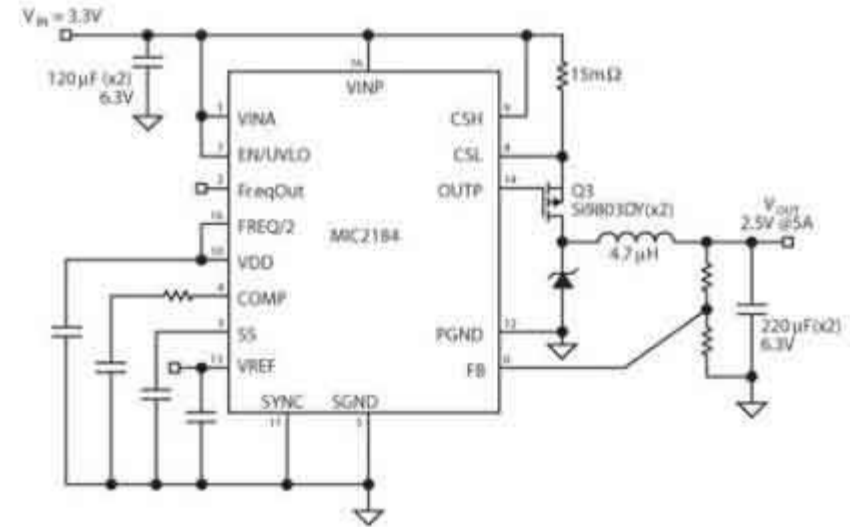
## Features:

- Input voltage range: 2.9V to 14V
- >90% efficiency
- Oscillator frequency of 400kHz
- Frequency divide-by-two pin
- Frequency sync to 600kHz
- Front edge blanking
- 5 $\omega$  output drivers (typical)
- FreqOut oscillator output allows simple charge – pump implementation in low voltage systems
- PWM current mode control
- 1 $\mu$ A shutdown current
- Cycle-by-cycle current limiting
- Frequency fold-back short circuit protection
- 16-pin narrow-body SOP and QSOP package options



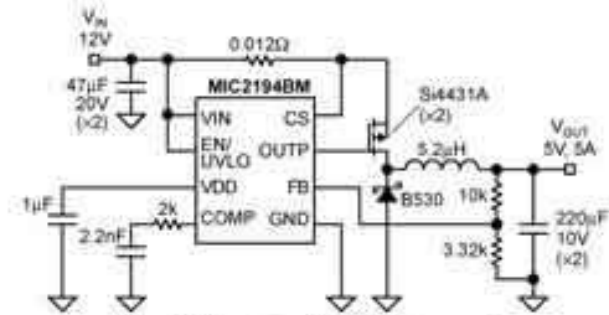
## Features:

- Input voltage range: 2.9V to 14V
- >90% efficiency
- Oscillator frequency of 400kHz
- Frequency divide-by-two pin
- Frequency sync to 600kHz
- FreqOut oscillator output allows simple charge – pump implementation in low voltage systems
- 1.245V reference output
- Front edge blanking
- 5w output driver
- PWM current mode control
- 1 $\mu$ A shutdown current
- Frequency fold-back short circuit protection
- 16-pin narrow-body SOIC and QSOP package options

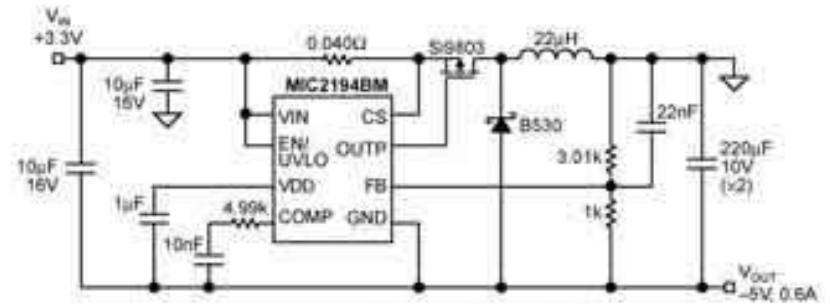


## Features:

- 2.9V to 14V input voltage range
- 400kHz oscillator frequency
- PWM current mode control
- 100% maximum duty cycle
- Front edge blanking
- Four output drivers
- Cycle-by-cycle current limiting
- Frequency fold-back short circuit protection
- 8-lead SOIC package



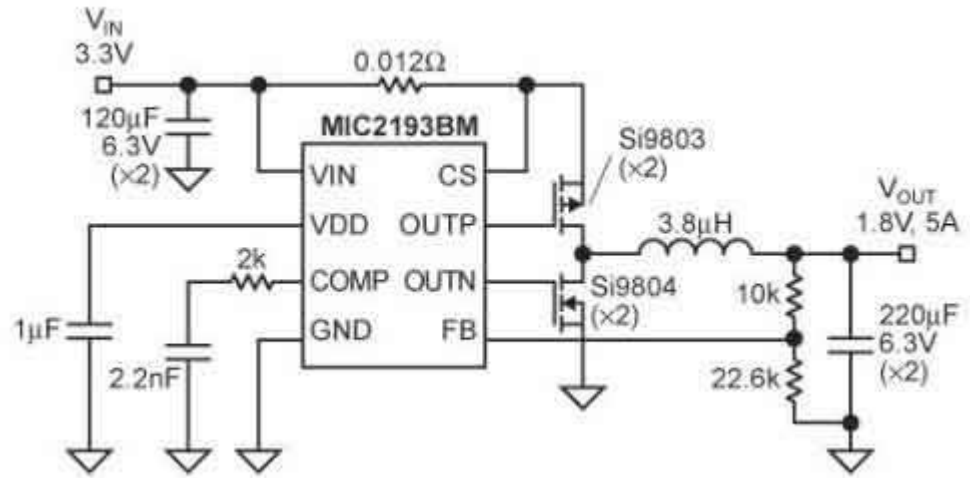
Adjustable Output Buck Converter



Positive-to-Negative Buck-Boost Converter

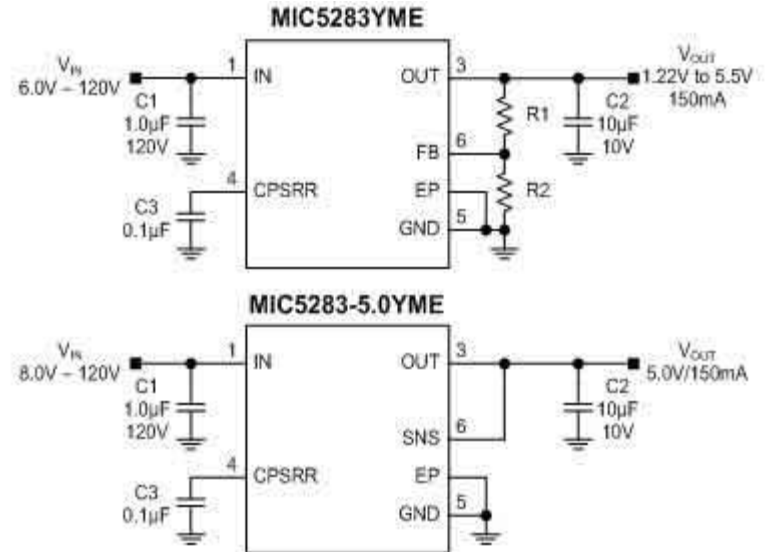
## Features:

- 2.9V to 14V input voltage range
- 400kHz oscillator frequency
- PWM current mode control
- 2 $\omega$  output drivers
- 100% maximum duty cycle
- 0.5 $\mu$ A micro-power shutdown
- Programmable UVLO
- Front edge blanking
- Cycle-by-cycle current limiting
- Frequency fold-back short –  
- circuit protection
- 8-lead SOIC package



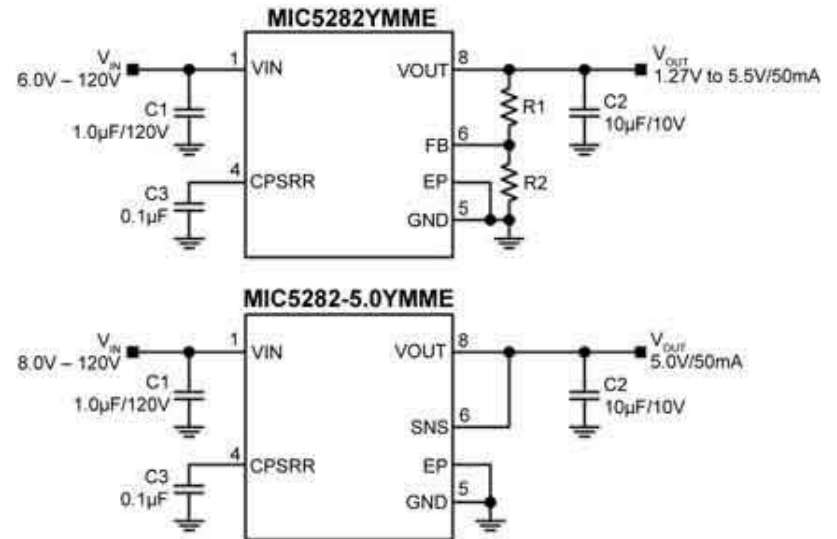
## Features:

- Wide input voltage range: 6V to 120V DC
- Ultra-low quiescent current: 8 $\mu$ A
- 150mA guaranteed output current
- Adjustable output from 1.22V to 5.5V
- Stable with ceramic output capacitors
- Ultra-high PSRR (75dB at 10kHz)
- Ultra-high line rejection (load dump)
- High output accuracy:
  - $\pm 3\%$  initial accuracy
- Thermal shutdown and current limit protection
- Thermally efficient 8-pin ePad SOIC packages
- Very low profile 3mm x 3mm MLF<sup>®</sup> package



## Features:

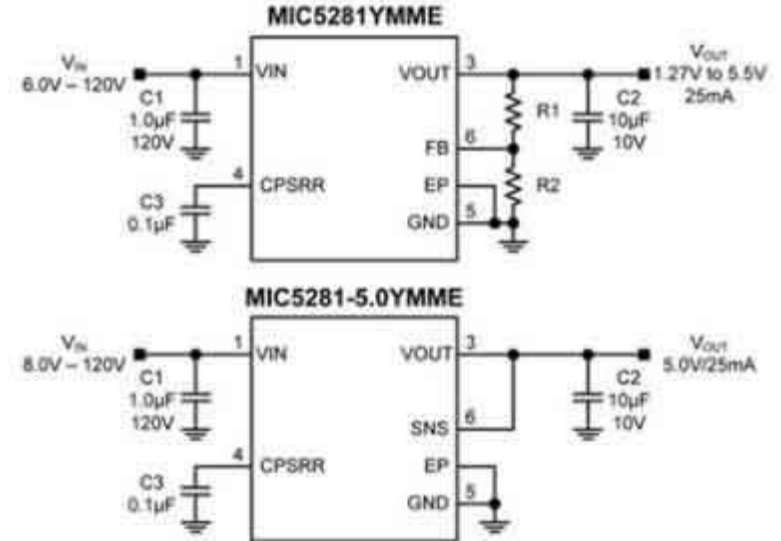
- Wide input voltage range: 6V to 120V DC
- Ultra-low quiescent current: 6 $\mu$ A
- 50mA guaranteed output current
- Adjustable output from 1.27V to 5.5V
- Withstands up to +120V DC at the input
- Stable with ceramic output capacitors
- Ultra-high PSRR (80dB at 10kHz)
- Ultra-high line rejection (load dump)
- High output accuracy:
  - $\pm 3\%$  initial accuracy
- Thermal shutdown and current limit protection
- Thermally efficient, 8-pin MSOP and 8-pin ePad –  
- MSOP packages





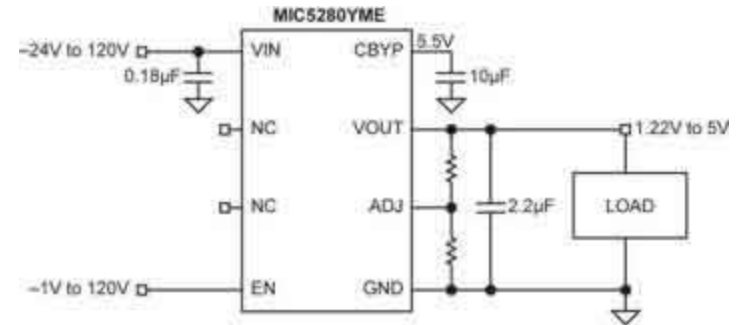
## Features:

- Wide input voltage range: 6V to 120V DC
- Ultra-low quiescent current: 6 $\mu$ A
- 25mA guaranteed output current
- Adjustable output from 1.27V to 5.5V
- Withstands up to +120V DC at the input
- Stable with ceramic output capacitors
- Ultra-high PSRR <90dB
- Ultra-high line rejection (load dump)
- High output accuracy:
  - $\pm 3\%$  initial accuracy
- Thermal shutdown and current limit protection
- Thermally efficient 8-pin MSOP and 8-pin ePad –  
- MSOP packages



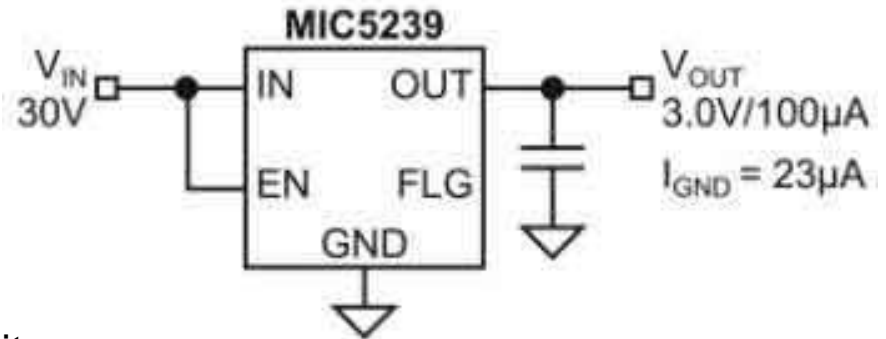
## Features:

- Wide input voltage range: 4.5V to 120V DC
- Very low quiescent current: 31 $\mu$ A typical
- 25mA guaranteed output current
- Adjustable output from 1.215V to 5V
- DC voltage protection down to -24V
- Ability to withstand up to +120V DC at the input
- Stable with ceramic output capacitors
- Ultra-high PSRR >80dB for RF applications
- High output accuracy
  - $\pm 2\%$  initial accuracy
  - $\pm 3\%$  over temperature (-40°C to +125°C)
- Thermal shutdown and current limit protection
- Thermally efficient 8-pin ePad SOIC package



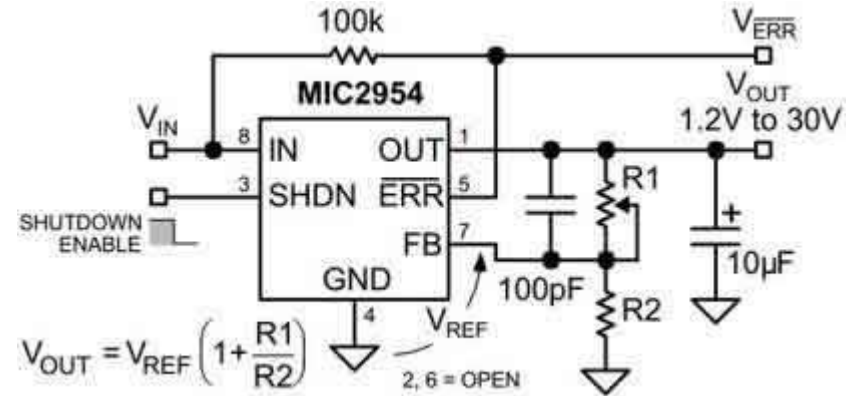
## Features:

- Ultra-low quiescent current –  
- ( $I_Q = 23\mu\text{A}$  @  $I_O = 100\mu\text{A}$ )
- Continuous 500mA output current
- Wide input range: 2.3V to 30V
- Low dropout voltage: 350mV at 500mA
- $\pm 1.0\%$  initial output accuracy
- Stable with ceramic or tantalum output capacitor
- Logic-compatible enable input
- Low output voltage error flag indicator
- Overcurrent protection
- Thermal shutdown
- Reverse leakage protection
- Reverse battery protection
- High power SOIC-8, MSOP-8 and SOT-223 packages



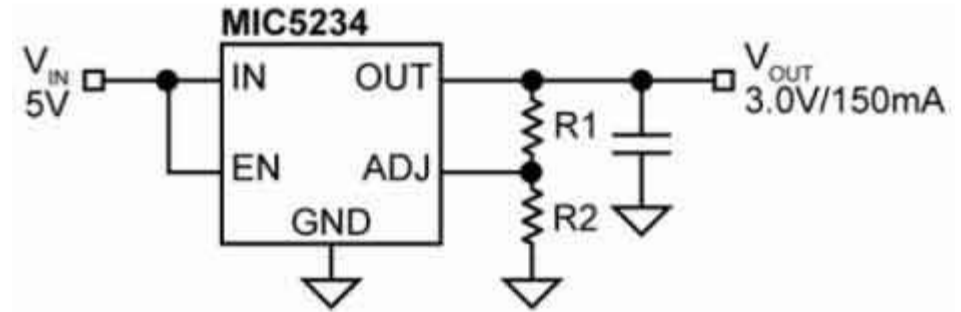
## Features:

- High-accuracy: 5V, guaranteed 250mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Input can withstand -20V reverse battery –  
- and +60V positive transients
- Error flag warns of low output voltage
- Logic-controlled electronic shutdown
- Output programmable from 1.24V to 29V –  
- (MIC2954-07/08)
- Available in TO-220, TO-92, and surface –  
- mount SOT-223 and SOP-8 packages



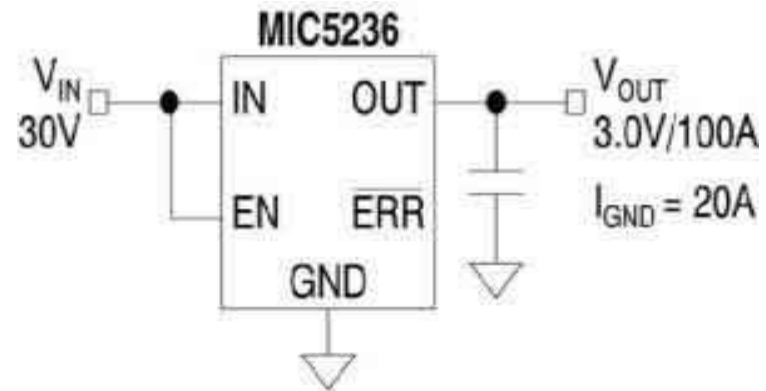
## Features:

- Ultra-low quiescent current (IQ equals –  
– 20 $\mu$ A at IO equals 100 $\mu$ A)
- Wide input voltage range: 2.3V to 30V
- Low dropout:
  - 230mV at 50mA
  - 320mV at 150mA
- Adjustable output voltage
- Typical  $\pm 1.0\%$  initial output accuracy
- Logic-compatible enable input
- Overcurrent protection
- Thermal shutdown protection
- Reverse leakage and reverse battery protection
- Thermally enhanced 8-pin ePad SOIC package



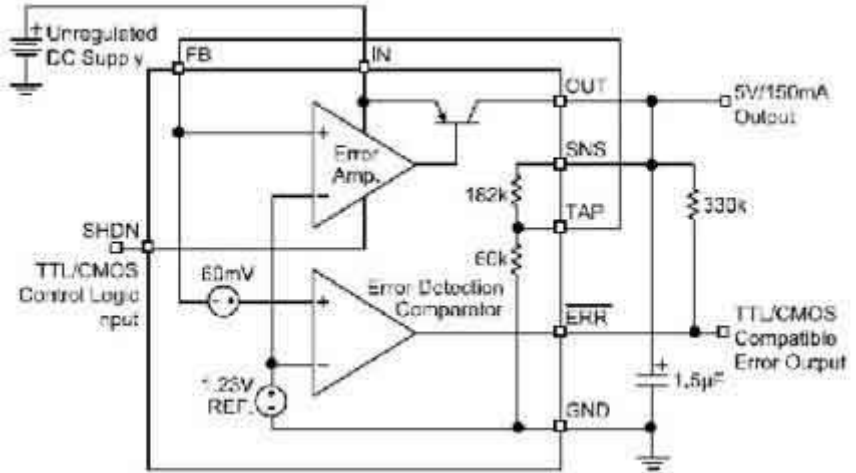
## Features:

- Ultra-low quiescent current –
  - (IQ equals 20 $\mu$ A at IO equals 100 $\mu$ A)
- Wide input range: 2.3V to 30V
- Low dropout:
  - 230mV at 50mA;
  - 300mV at 150mA
- Fixed 2.5V, 3.0V, 3.3V, 5.0V and –
  - adjustable outputs
- $\pm 1.0\%$  initial output accuracy
- Stable with ceramic or tantalum –
  - output capacitor
- Load dump protection: -20V –
  - to +60V input transient survivability
- Logic-compatible enable input
- Low output flag indicator
- Reverse leakage protection
- Reverse battery protection
- High power SOP-8 and MSOP-8



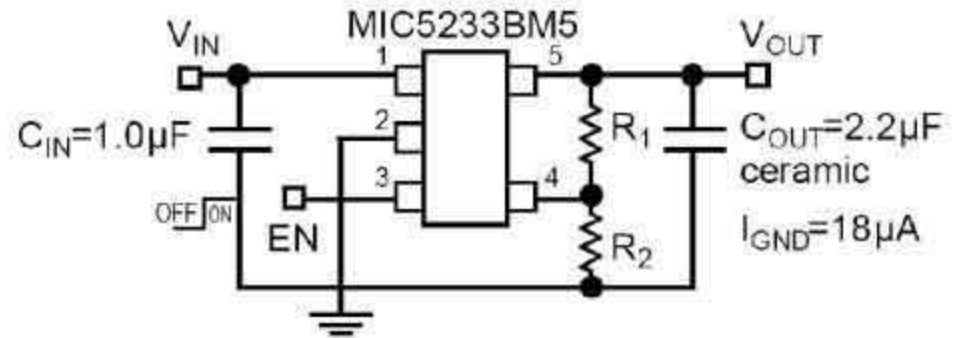
## Features:

- High accuracy: 3.3V, 4.85V, or 5V with –  
- guaranteed 150mA output
- Extremely low quiescent current
- Low-dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Use as regulator or reference
- Needs only 1.5 $\mu$ F for stability
- Current and thermal limiting
- Unregulated DC input can withstand –20V –  
- reverse battery and +60V positive transients
- Error flag warns of output dropout
- Logic-controlled electronic shutdown
- Output programmable from 1.24V to 29V



## Features:

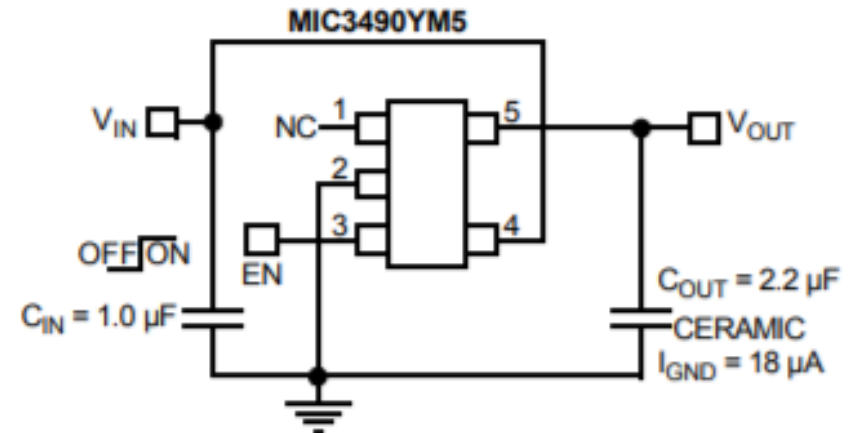
- Wide input voltage range: 2.3V to 36V
- Ultra-low ground current: 18 $\mu$ A
- Low dropout voltage of 270mV at 100mA
- High output accuracy of  $\pm 2.0\%$  over –  
- temperature
- $\mu$ Cap: stable with ceramic or tantalum –  
- capacitors
- Excellent line and load regulation –  
- specifications
- Zero off-mode current
- Reverse battery protection
- Reverse leakage protection
- Thermal shutdown and current limit protection
- IttyBitty® SOT-23-5 package
- Recommended for Automotive Design





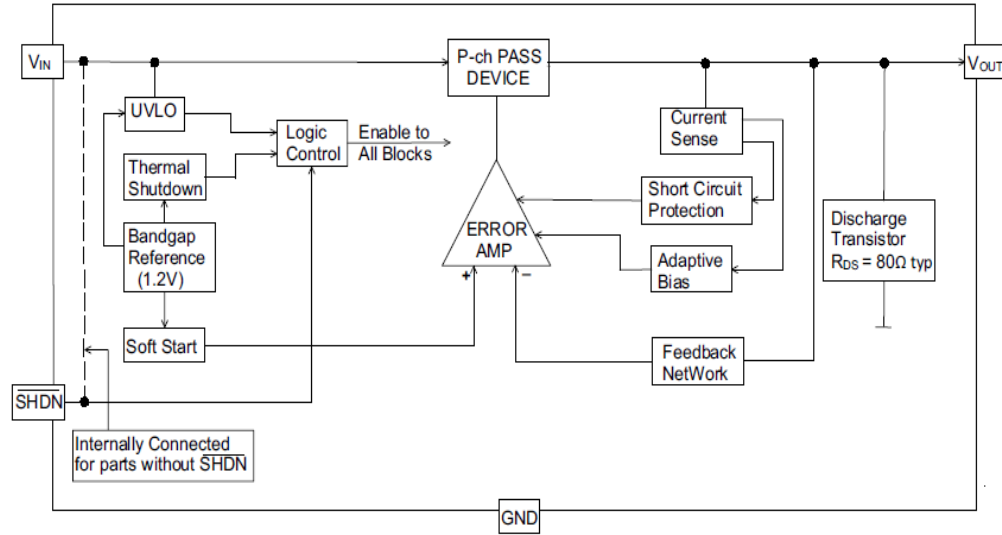
## Features:

- Wide input voltage range: 2.3V to 36V
- Ultra-low ground current: 18 $\mu$ A
- Low dropout voltage of 270mV at 100mA
- High output accuracy of  $\pm 2.0\%$  over –
  - temperature
- $\mu$ Cap: stable with ceramic or tantalum –
  - capacitors
- Excellent line and load regulation –
  - specifications
- Near Zero off-mode current: Typical 0.1 $\mu$ A
- Reverse battery protection
- Reverse leakage protection
- Thermal shutdown and current limit protection
- SOT-23-5 package
- The MIC3490 is Pin-to-Pin Compatible with LM3490

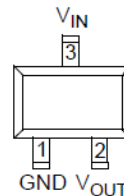


### Features

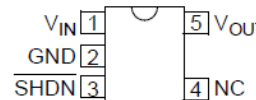
- Wide Input Voltage Range: 4.5V – 55V
  - Up to 70V transient
  - Under Voltage Lock Out: 2.7V typ
- AEC-Q100 and PPAP Capable with Grade 0
- Extended Operating Temperature Range
  - -40 to 150C
- Low Quiescent Supply Current: 25 uA typ
- Low Shutdown Supply Current: 2 uA typ
- Standard Output Voltages: 3.3V and 5.0V
  - Tolerance: 2% typ
- Stable with Ceramic Output Capacitor: 2.2  $\mu$ F
- Output Current Capability: 100mA typ
  - Short Circuit Current Foldback Protection
  - Thermal Shutdown Protection: 175C
- High PSRR
  - 80dB @ 100Hz typ
  - 55dB @ 100kHz typ
- Available in the following packages:
  - 3-Lead SOT-23A (MCP1792)
  - 3-Lead SOT-223 (MCP1792)
  - 5-Lead SOT-23 (MCP1793)
  - 5-Lead SOT-223 (MCP1793)



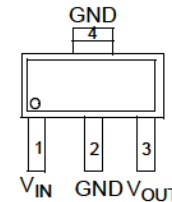
3-Pin SOT-23A



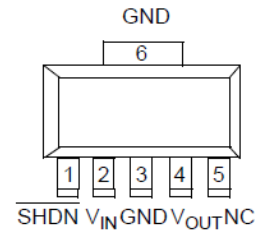
5-Pin SOT-23



3-Pin SOT-223



5-Pin SOT-223



TOP VIEW

## Features:

- AEC-Q100 with Grade 0 and PPAP Capable
- Wide Input Voltage Range: 4.5V to 45V
  - Under Voltage Lock Out: 2.8V typical
- Extended Working Temperature Range: -40°C to +150°C
- Standard Output Regulated Voltages (VR): 3.3V and 5.0V
  - Tolerance  $\pm 2\%$
- Low Quiescent Supply Current: 25  $\mu\text{A}$  typical
- Output Current Capability: 80 mA typical
- Stable with 1  $\mu\text{F}$  Ceramic Output Capacitor
- Short Circuit Protection
- Thermal Shutdown Protection:
  - +180°C typical
  - Hysteresis: 22°C typical
- High PSRR: - 70 dB @ 1 kHz typical
- Available in the Following Packages:
  - 3-Lead SOT-23
  - 3-Lead SOT-223

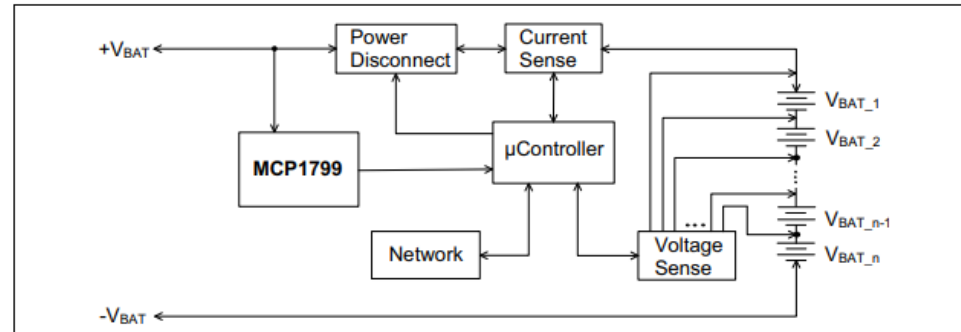
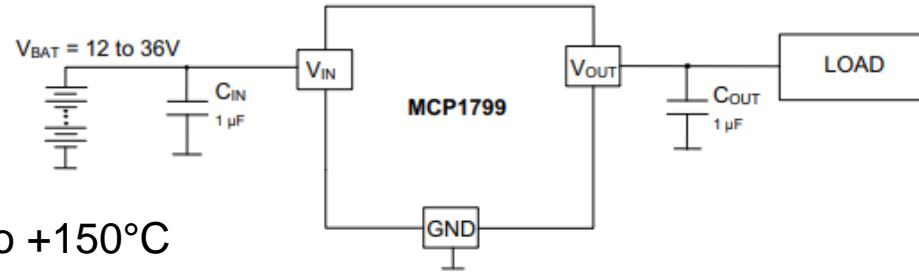
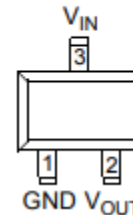
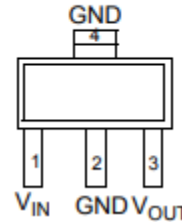


FIGURE 6-1: Smart Battery Pack Application Example.

3-Pin SOT-23

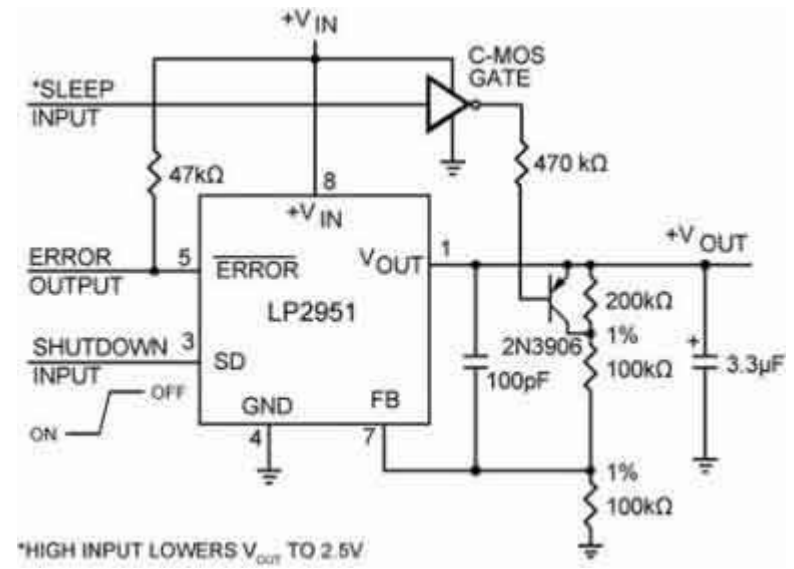


3-Pin SOT-223



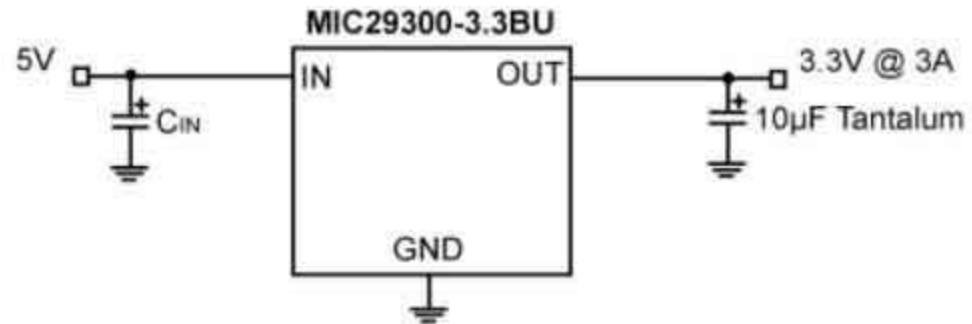
## Features:

- High accuracy 5V, guaranteed 100 mA output
- Extremely low quiescent current
- Low-dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Use as regulator or reference
- Needs only 1 $\mu$ F for stability
- Current and thermal limiting
- LP2951 Versions Only:
  - Error flag warns of output dropout
  - Logic-controlled electronic shutdown
  - Output programmable from 1.24V to 29V



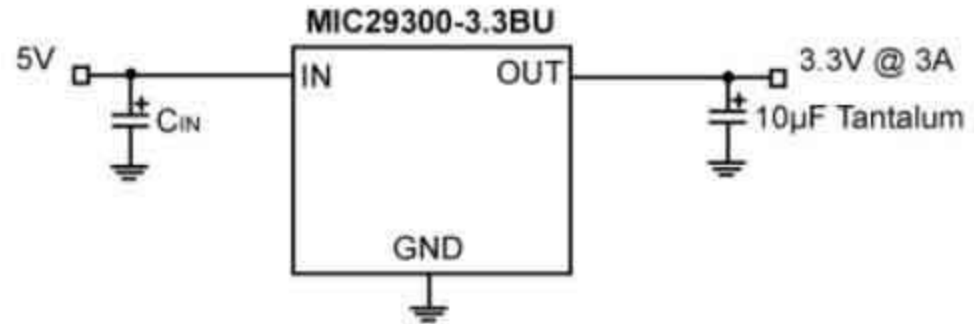
## Features:

- High current capability:
  - MIC29150/29151/29152/29153: 1.5A
  - MIC29300/29301/29302/29303: 3A
  - MIC29500/29501/29502/29503: 5A
  - MIC29750/29751/29752: 7.5A
- Low dropout voltage
- Low ground current
- Accurate 1% guaranteed tolerance
- Reverse-battery and load dump protection
- Zero-current shutdown mode (5-pin versions)
- Error flag signals output out-of-regulation (5-pin versions)
- Also characterized for smaller loads with industry –
  - leading performance specifications
- Fixed voltage and adjustable versions



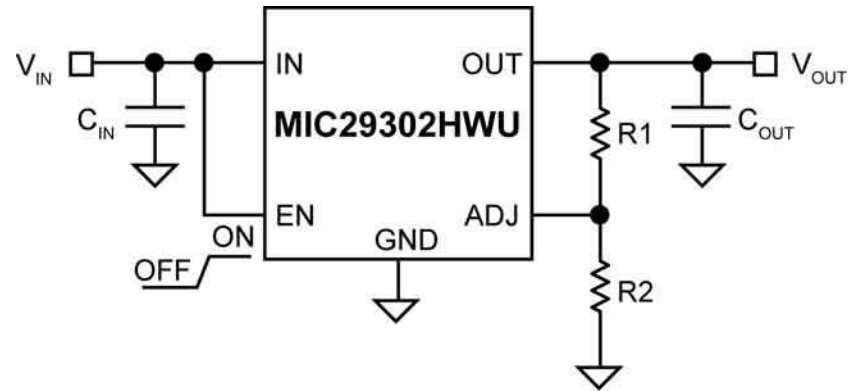
## Features:

- High current capability:
  - MIC29150/29151/29152/29153: 1.5A
  - MIC29300/29301/29302/29303: 3A
  - MIC29500/29501/29502/29503: 5A
  - MIC29750/29751/29752: 7.5A
- Low dropout voltage
- Low ground current
- Accurate 1% guaranteed tolerance
- Extremely fast transient response
- Reverse-battery and load dump protection
- Zero-current shutdown mode (5-pin versions)
- Error flag signals output out-of-regulation (5-pin versions)
- Also characterized for smaller loads with industry-leading –  
- performance specifications
- Fixed voltage and adjustable versions



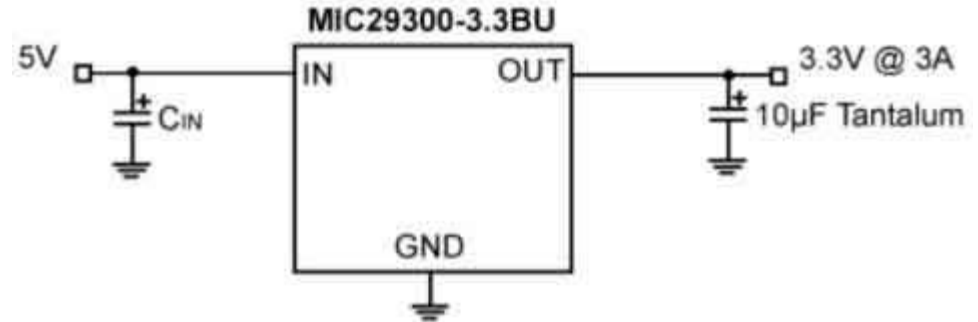
## Features:

- 3A current capability
- Low dropout voltage
- Low ground current
- Accurate 1% guaranteed tolerance
- Extremely fast transient response
- Reverse-battery and “Load Dump” protection
- Zero-current shutdown mode
- Error flag signals output out-of-regulation
- Also characterized for smaller loads with industry –  
- leading performance specifications



## Features:

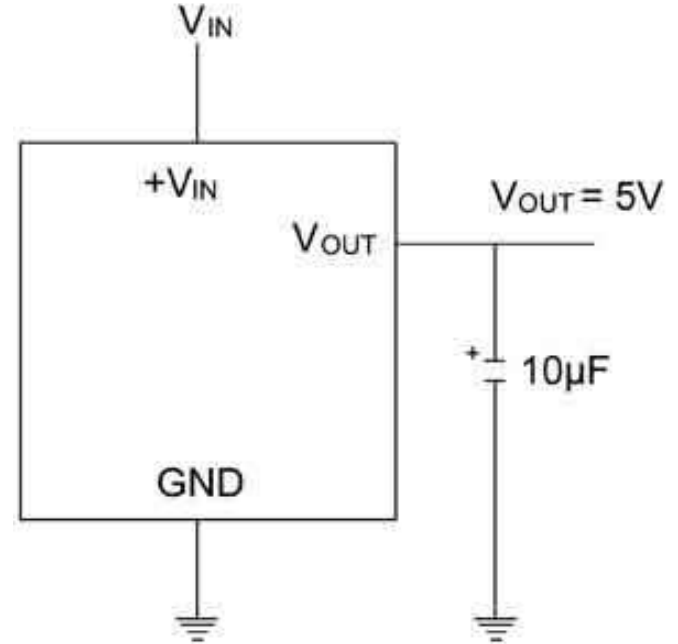
- High current capability:
  - MIC29150/29151/29152/29153: 1.5A
  - MIC29300/29301/29302/29303: 3A
  - MIC29500/29501/29502/29503: 5A
  - MIC29750/29751/29752: 7.5A
- Low dropout voltage
- Low ground current
- Accurate 1% guaranteed tolerance
- Extremely fast transient response
- Reverse-battery and load dump protection
- Zero-current shutdown mode (5-pin versions)
- Error flag signals output out-of-regulation (5-pin versions)
- Also characterized for smaller loads with industry –
  - leading performance specifications
- Fixed voltage and adjustable versions





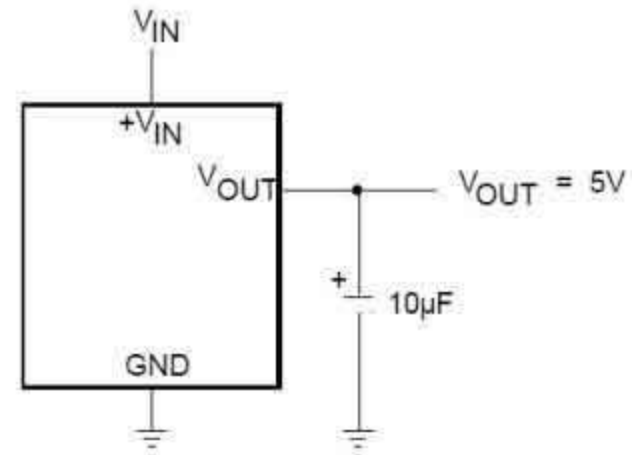
## Features:

- High output voltage accuracy
- Guaranteed 1.25A output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- High output voltage accuracy
- Guaranteed 1.25A output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting



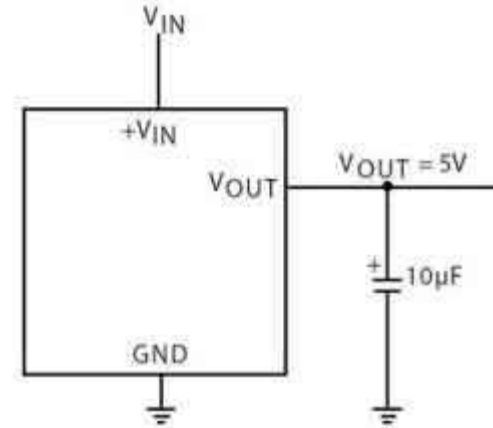
## Features:

- High output voltage accuracy
- Guaranteed 750mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Input can withstand -20V reverse battery and +60V –  
- positive transients
- Error flag warns of output dropout
- Logic-controlled electronic shutdown
- Output programmable from 1.24V to 26V (MIC29372)
- Available in TO-220, TO-263, TO-220-5, and –  
- TO-263-5 packages



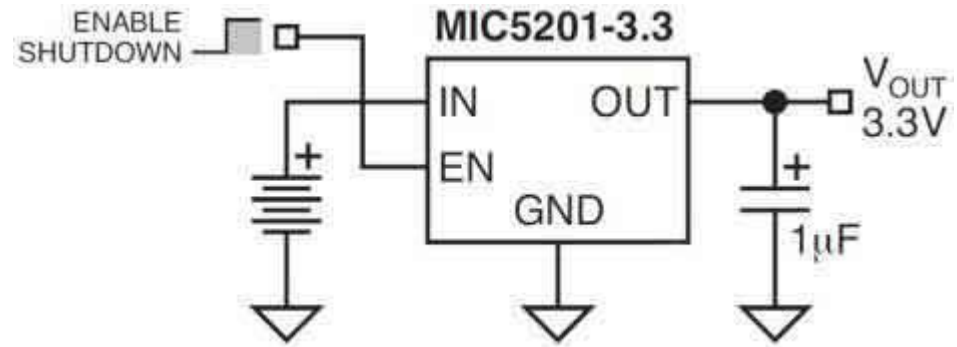
## Features:

- High output voltage accuracy
- Guaranteed 400mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Input withstands -20V reverse battery and +60V –  
- positive transients
- Error flag warns of output dropout
- Logic-controlled electronic shutdown
- Output programmable from 1.24V to 26V –  
- (MIC29202/MIC29204)
- Available in TO-220, TO-220-5, and surface-mount –  
- TO-263-5, SOT-223, and SO-8 packages.



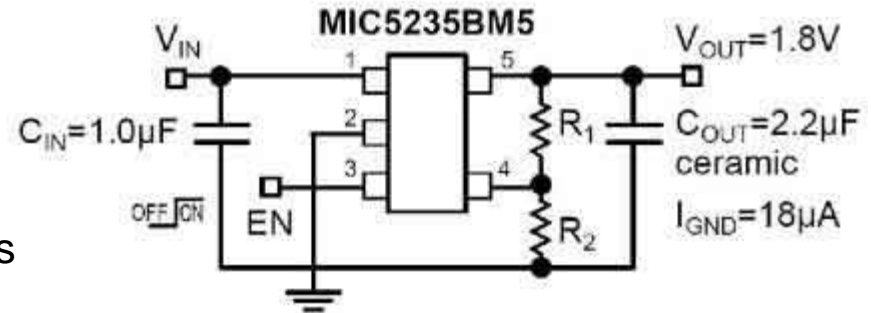
## Features:

- High output voltage accuracy
- Variety of output voltages
- Guaranteed 200mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Reversed battery protection
- Load-dump protection (fixed voltage versions)
- Zero off-mode current state
- Logic-controlled electronic enable
- Available in SO-8 and SOT-223 packages



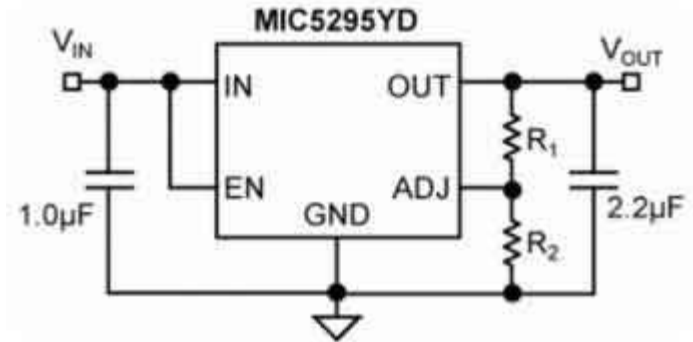
## Features:

- Wide input voltage range: 2.3V to 24V
- Ultra-low ground current: 18 $\mu$ A
- Low dropout voltage: 310mV at 150mA
- High output accuracy:  $\pm 2.0\%$  over temperature
- $\mu$ Cap: stable with ceramic or tantalum capacitors
- Excellent line and load regulation specifications
- Zero off-mode current
- Reverse battery protection
- Reverse leakage protection
- Thermal shutdown and current limit protection
- IttyBitty® SOT-23-5 package



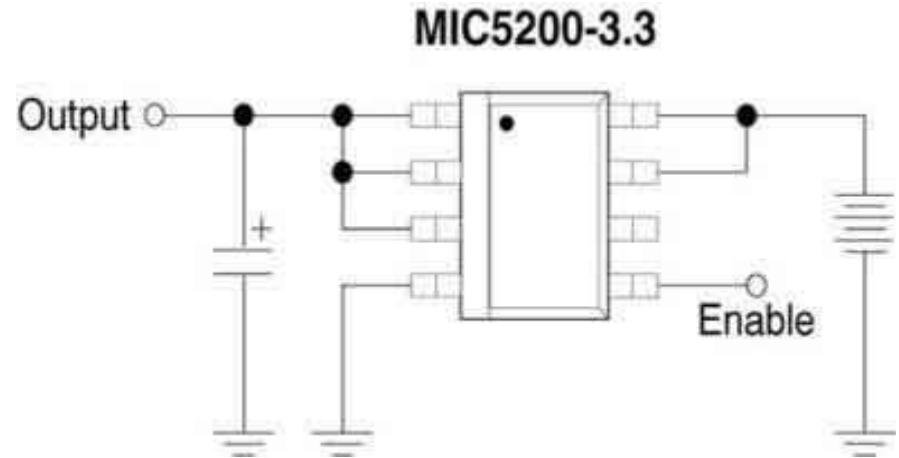
## Features:

- Wide input voltage range: 2.3V to 24V
- Ultra-low ground current: 18 $\mu$ A
- Low dropout voltage: 300mV at 150mA
- High initial output accuracy:  $\pm 1.0\%$
- Stable with ceramic or tantalum capacitors
- Excellent line and load regulation specifications
- Reverse battery protection
- Reverse leakage protection
- Thermal shutdown and current limit protection
- Power TO-252-5 (D-Pak) package
- Adjustable output from 1.24V to 20V



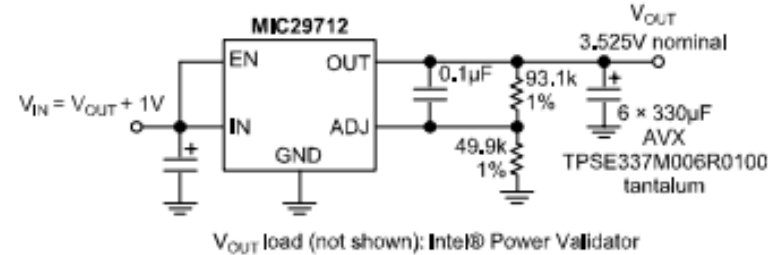
## Features:

- High output voltage accuracy
- Variety of output voltages
- Guaranteed 100mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Zero off-mode current
- Logic-controlled electronic shutdown
- Available in 8-pin SOIC, MM8® 8-pin –  
- MSOP and SOT-223 packages



## Features:

- Fast transient response
- 7.5A current capability
- 700mV dropout voltage at full load
- Low ground current
- Accurate 2% guaranteed tolerance
- Zero-current shutdown mode
- No minimum load current
- Fixed voltage and adjustable versions

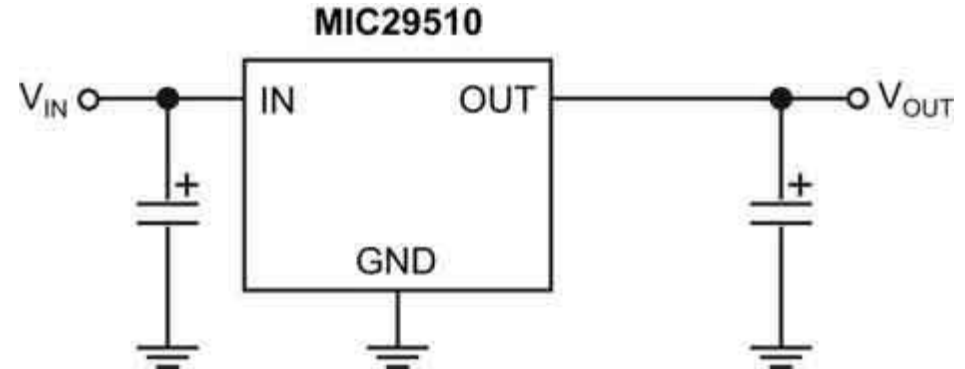


**MIC29710 Load Transient Response Test Circuit**



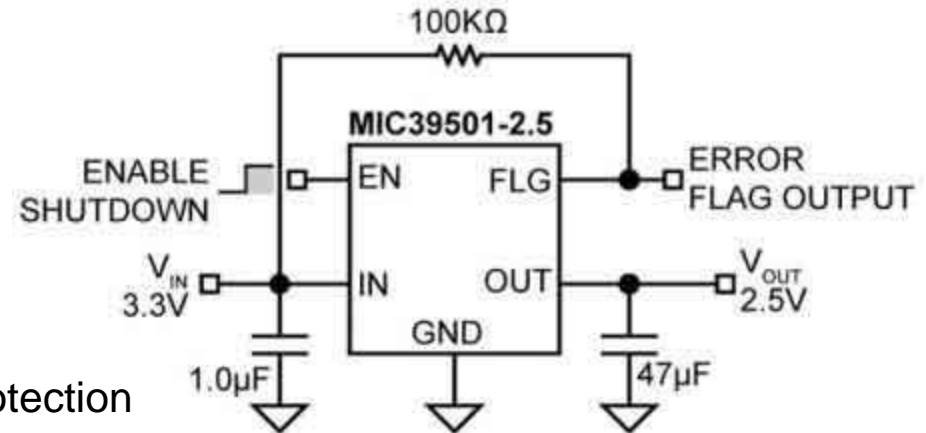
## Features:

- Fast transient response
- 5A current capability
- 700mV dropout voltage at full load
- Low ground current
- Accurate 1% guaranteed tolerance
- Zero current shutdown mode (MIC29512)
- Fixed voltage and adjustable versions



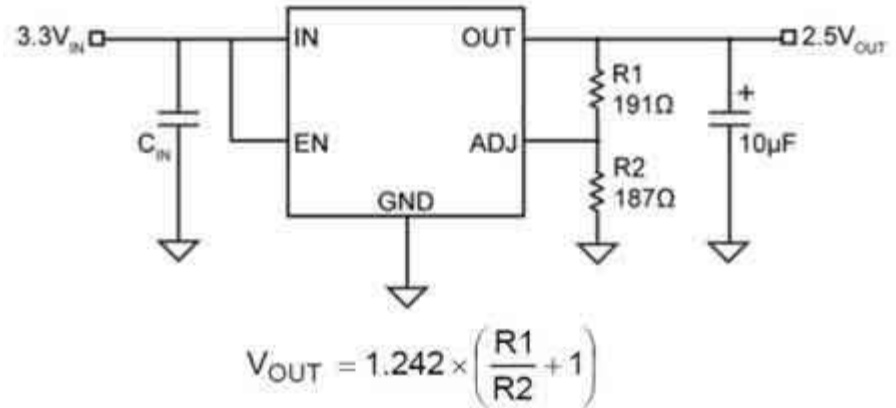
## Features:

- 5A minimum guaranteed output current
- 400mV dropout voltage:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V conversion
- 1% initial accuracy
- Low ground current
- Current limiting and thermal shutdown
- Reverse battery and reverse lead insertion protection
- Reverse leakage protection
- Fast transient response
- TO-263 and TO-220 packages
- TTL/CMOS-compatible enable pin (MIC39501 only)
- Error flag output (MIC39501 only)
- Ceramic capacitor stable (See application information)



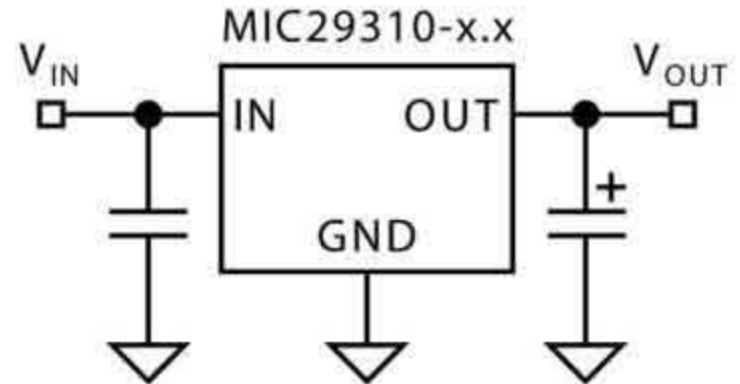
## Features:

- High current capability:
  - 3A over full temperature range
- Low dropout voltage of 450mV at full load
- Low ground current
- Accurate 1% guaranteed tolerance
- Extremely fast transient response
- Zero-current shutdown mode
- Error flag signals output out-of-regulation
- Adjustable output voltage
- Available in TO-263-L and TO-252-5L packages



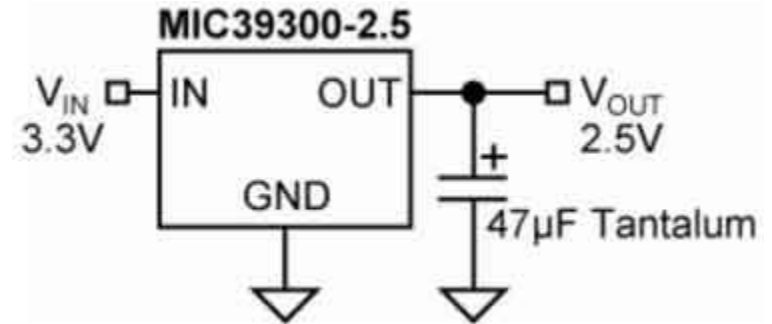
## Features:

- Low cost versions of MIC29300 family
- Fast transient response
- 3A current over full temperature range
- 600mV dropout voltage at full load
- Low ground current
- Accurate 1% guaranteed tolerance
- Zero current shutdown mode (MIC29312)
- Fixed voltage and adjustable versions



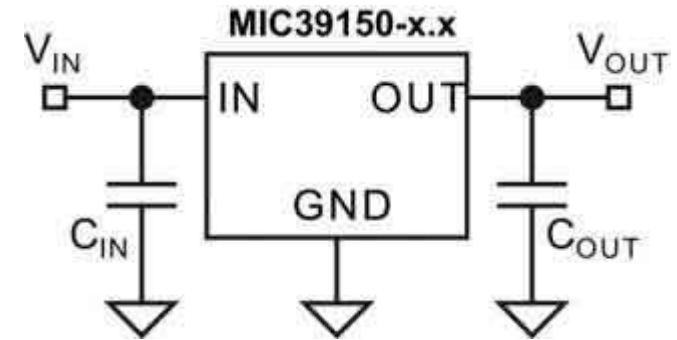
## Features:

- 3.0A minimum guaranteed output current:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V conversion
- 1% initial accuracy
- Low ground current
- 550mV maximum dropout voltage over –  
- temperature
- Current limiting and thermal shutdown
- Reverse battery protection
- Reverse leakage protection
- Fast transient response
- TO-263 (D2Pak) and TO-220 packaging
- TTL/CMOS compatible enable pin (MIC39301/2 only)
- Error flag output (MIC39301 only)
- Adjustable output (MIC39302 only)



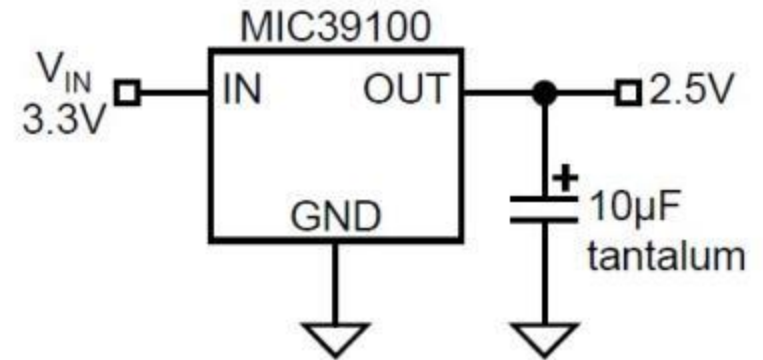
## Features:

- 1.5A minimum guaranteed output current
- 500mV maximum dropout voltage over temperature:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5 to 1.8V or 1.65V conversion
- 1% initial accuracy
- Low ground current
- Current limiting and thermal shutdown
- Reverse battery and reverse lead insertion protection
- Reverse leakage protection
- TTL/CMOS-compatible enable pin (MIC39151/2 only)
- Error flag output (MIC39151 only)
- Adjustable output (MIC39152 only)
- Power D-Pak package (TO-252) Adjustable only
- Power D<sup>2</sup>Pak Package (TO-263)



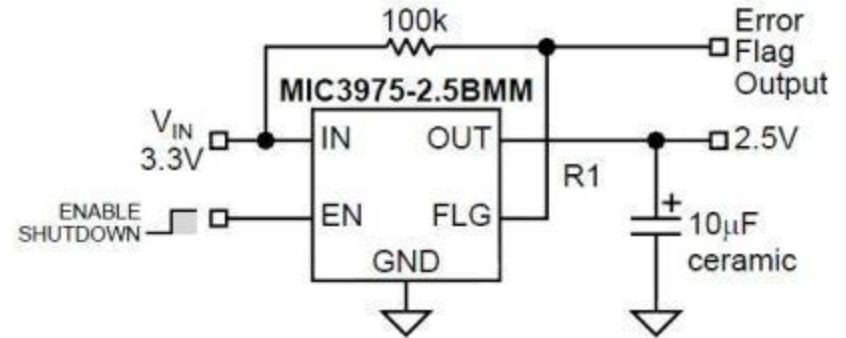
## Features:

- Fixed and adjustable output voltages to 1.24V
- 410mV typical dropout at 1A:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V conversion
- 1A minimum guaranteed output current
- 1% initial accuracy
- Low ground current
- Current limiting and thermal shutdown
- Reversed-battery protection
- Reversed-leakage protection
- Fast transient response
- Low-profile SOT-223 package
- Power SO-8 package



## Features:

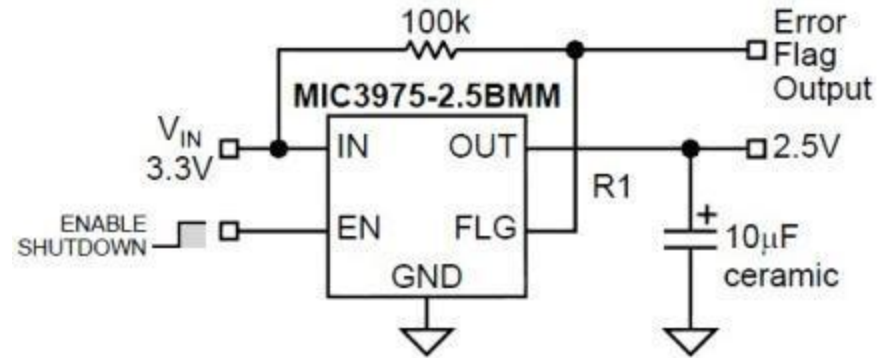
- Fixed and adjustable output voltages to 1.24V
- 280mV typical dropout at 750mA:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V or 1.65V conversion
- Stable with ceramic capacitor
- 750mA minimum guaranteed output current
- 1% initial accuracy
- Low ground current
- Current limiting and thermal shutdown
- Reverse battery protection
- Reverse leakage protection
- Fast transient response
- Low-profile MSOP-8





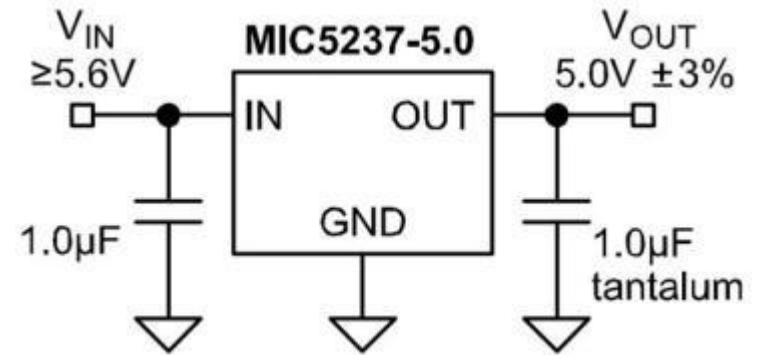
## Features:

- Fixed and adjustable output voltages to 1.24V
- 280mV typical dropout at 750mA:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V or 1.65V –  
- conversion
- Stable with ceramic capacitor
- 750mA minimum guaranteed output current
- 1% initial accuracy
- Low ground current
- Current limiting and thermal shutdown
- Reverse battery protection
- Reverse leakage protection
- Fast transient response
- Low-profile MSOP-8



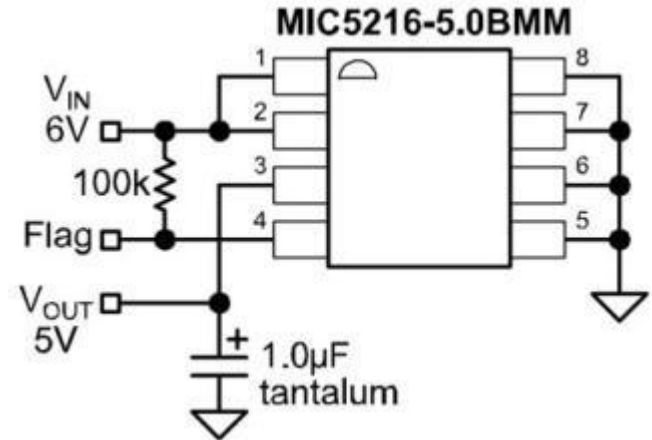
## Features:

- Low 300mV typical dropout voltage at full load
- Extremely tight load and line regulation
- Current and thermal limiting
- Reversed battery protection
- TO-220 and TO-263 packages
- Low temperature coefficient
- Guaranteed 500mA output over the full operating –  
- temperature range
- No-load stability
- Low noise output



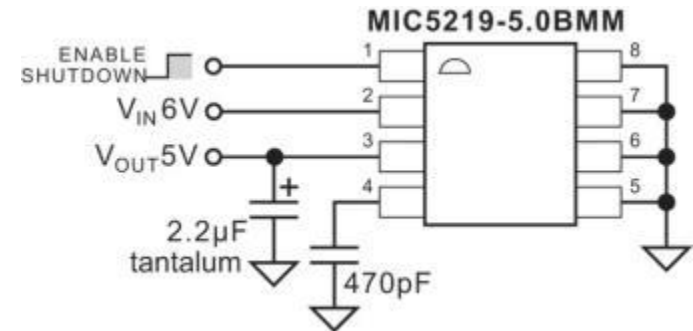
## Features:

- Error flag indicates under-voltage fault
- Low 500mV maximum dropout voltage at full load
- Extremely tight load and line regulation
- Tiny SOT-23-5 and MM8® power MSOP-8 package
- Low noise output
- Low temperature coefficient
- Current and thermal limiting
- Reversed battery protection
- Guaranteed 500mA peak output over the full –  
- operating temperature range
- CMOS/TTL-compatible enable/shutdown control
- Near-zero shutdown current



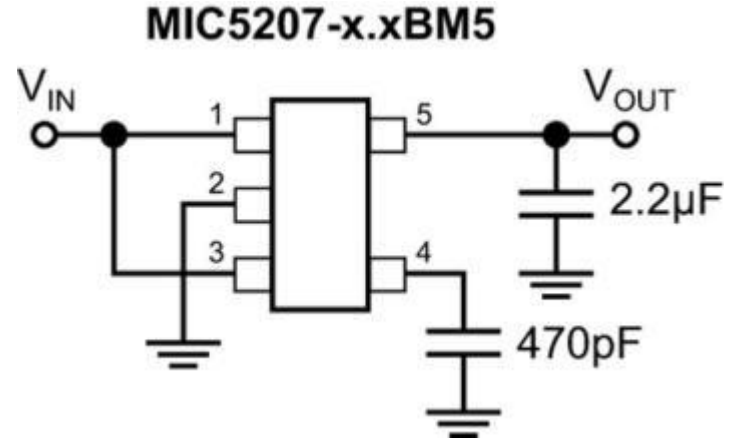
## Features:

- Low 500mV maximum dropout voltage at full load
- Extremely tight load and line regulation
- Ultra-low noise output
- Low temperature coefficient
- Current and thermal limiting
- Tiny SOT-23-5 and MM8® power MSOP-8 package
- 500mA output current capability:
  - SOT-23-5 package - 500mA peak
  - 2mm x 2mm MLF® and Thin MLF® packages –  
- 500mA continuous
  - MSOP-8 package - 500mA continuous
- Reversed battery protection
- CMOS/TTL-compatible enable/shutdown control
- Near-zero shutdown current



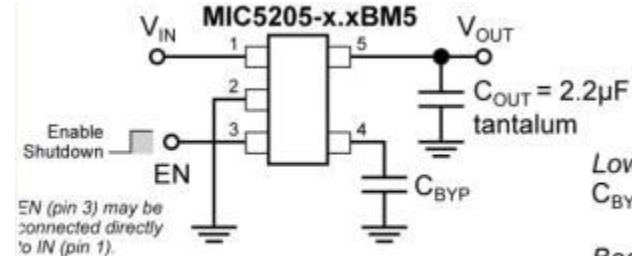
## Features:

- Ultra-low noise output
- High output voltage accuracy
- Guaranteed 180mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Reverse battery protection
- Zero off-mode current state
- Logic-controlled electronic enable



## Features:

- Ultra-low noise output
- High output voltage accuracy
- Guaranteed 150mA output
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Reverse battery protection
- Zero off-mode current
- Logic-controlled electronic enable

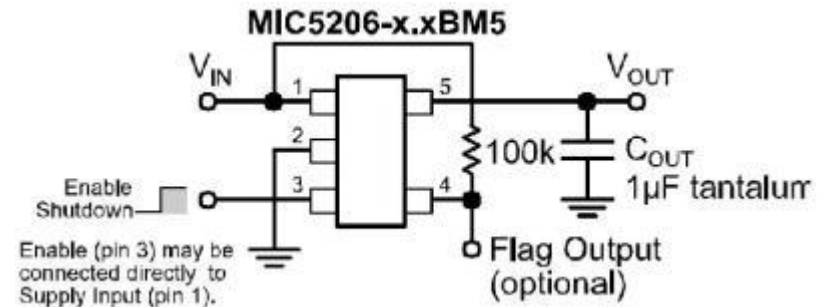


*Low-Noise Operation:*  
 $C_{BYN} = 470\text{pF}$ ,  $C_{OUT} \geq 2.2\mu\text{F}$

*Basic Operation:*  
 $C_{BYN} = \text{not used}$ ,  $C_{OUT} \geq 1\mu\text{F}$

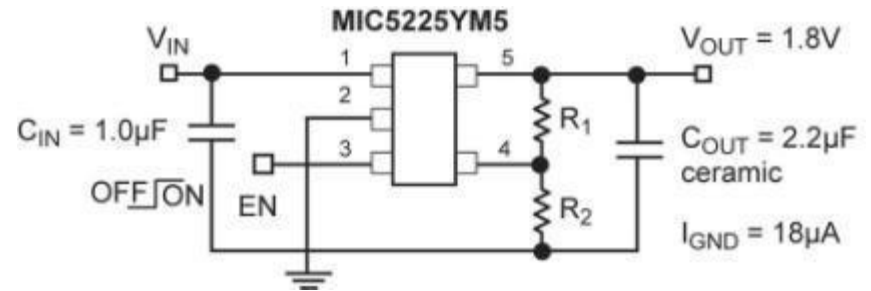
## Features:

- Error flag indicates under-voltage fault
- High output voltage accuracy
- Guaranteed 150mA output
- Ultra-low noise output (8-pin versions)
- Low quiescent current
- Low dropout voltage
- Extremely tight load and line regulation
- Very low temperature coefficient
- Current and thermal limiting
- Reversed battery protection
- Zero off-mode current
- Logic-controlled electronic enable



## Features:

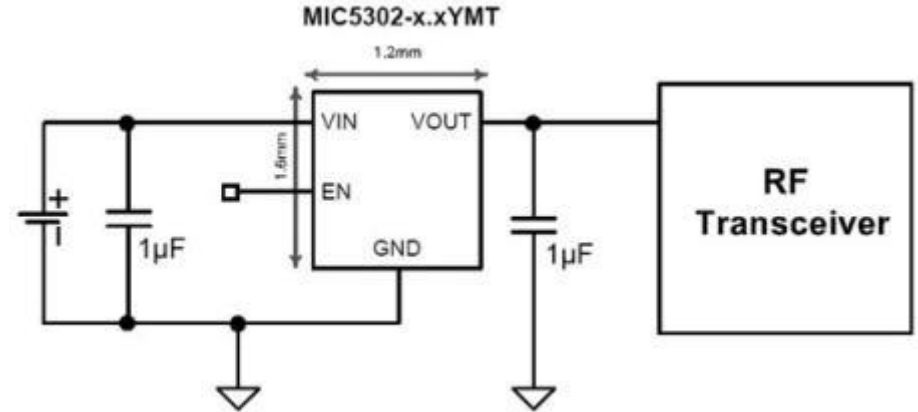
- Wide input voltage range: 2.3V to 16V
- High output accuracy of  $\pm 2.0\%$  over –  
– temperature
- Guaranteed 150mA output
- Very low ground current: 29 $\mu$ A
- Low dropout voltage of 310mV at 150mA
- $\mu$ Cap: stable with ceramic or tantalum capacitors
- Excellent line and load regulation specifications
- Reverse battery protection
- Reverse leakage protection
- Zero off-mode current
- Thermal shutdown and current limit protection
- IttyBitty® SOT-23-5 package





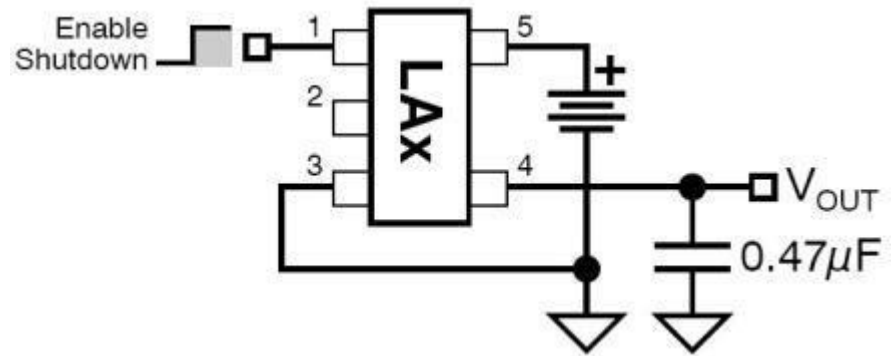
## Features:

- Tiny 4-lead and 5-lead surface-mount –  
- packages
- Wide selection of output voltages
- Guaranteed 80mA output
- Low quiescent current
- Low dropout voltage
- Tight load and line regulation
- Low temperature coefficient
- Current and thermal limiting
- Reversed input polarity protection
- Zero off-mode current
- Logic-controlled shutdown
- Stability with low-ESR ceramic capacitors



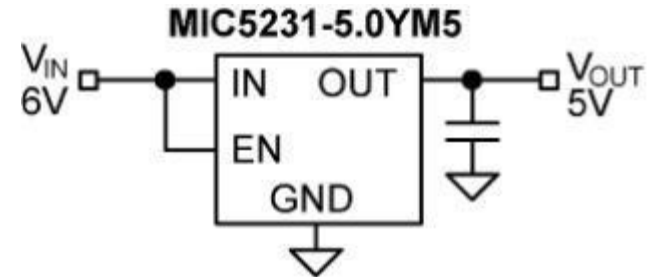
## Features:

- Teeny™ SC-70 package
- Wide selection of output voltages
- Guaranteed 80mA output
- Low quiescent current
- Low dropout voltage
- Tight load and line regulation
- Low temperature coefficient
- Current and thermal limiting
- Reversed input polarity protection
- Zero off-mode current
- Logic-controlled shutdown
- Stability with low-ESR ceramic capacitors



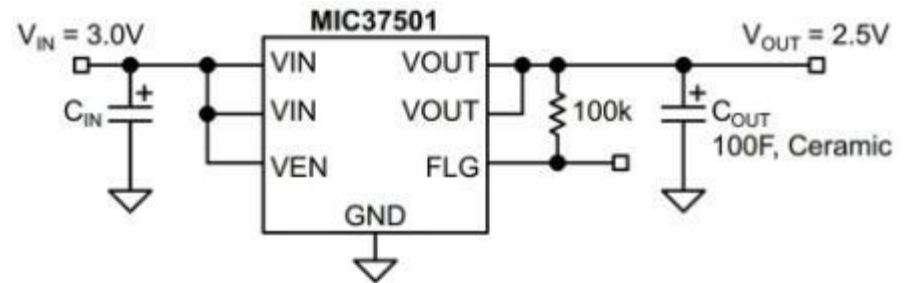
## Features:

- Extremely low quiescent current: only 0.65 $\mu$ A
- No output capacitor requirement
- Stable with ceramic or tantalum capacitors
- IttyBitty® SOT-23-5 surface-mount package
- 10mA output drive
- Low 150mV at 10mA dropout voltage
- Tight load and line regulation
- Low temperature coefficient
- Logic-level enable input



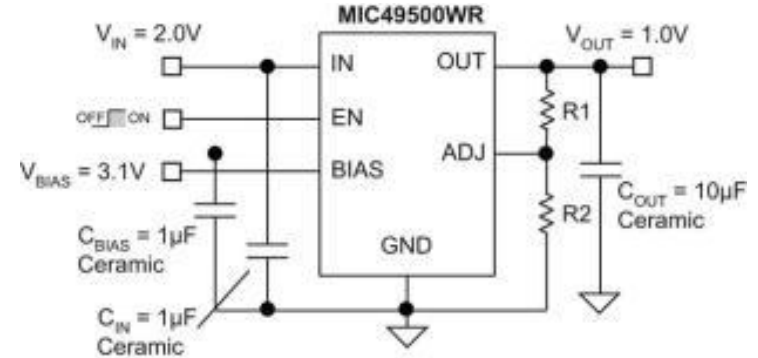
## Features:

- 5A minimum guaranteed output current
- 500mV maximum dropout voltage:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V, 1.65V, or 1.5V –  
- conversion
- Stable with ceramic or tantalum capacitor:
  - $V_{IN}$ : 2.3V to 6.0V
- $\pm 1.0\%$  initial output tolerance
- Fixed and adjustable output voltages:
  - MIC37501 -7 terminal fixed voltage
  - MIC37502 -5 (TO-263) and 7 (SPAK) terminal –  
- adjustable voltage
- Excellent line and load regulation specifications
- Logic controlled shutdown
- Thermal shutdown and current-limit protection
- Reverse leakage protection
- Low-profile S-Pak and TO-263 packages



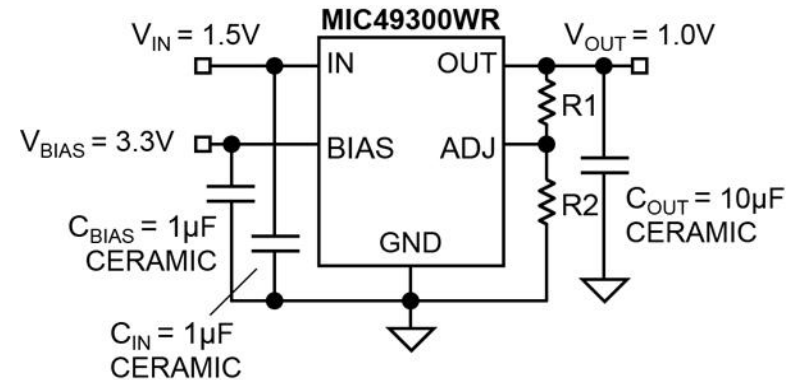
## Features:

- Input voltage range: 2.7V to 6.0V:
  - $V_{IN}$ : 1.4V to 6V
  - $V_{BIAS}$ : 3V to 6V
- Stable with 10 $\mu$ F ceramic output capacitor
- $\pm 1.0\%$  initial output tolerance
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) is 500mV over –  
– temperature
- Adjustable output voltage down to 0.7V
- Ultra-fast transient response (Up to 10MHz bandwidth)
- Excellent line and load regulation specifications
- Logic controlled shutdown option
- Thermal shutdown and current limit protection
- Thin 7-pin S-Pak package
- TO-263 7-pin package
- -40°C to +125°C operating junction temperature range



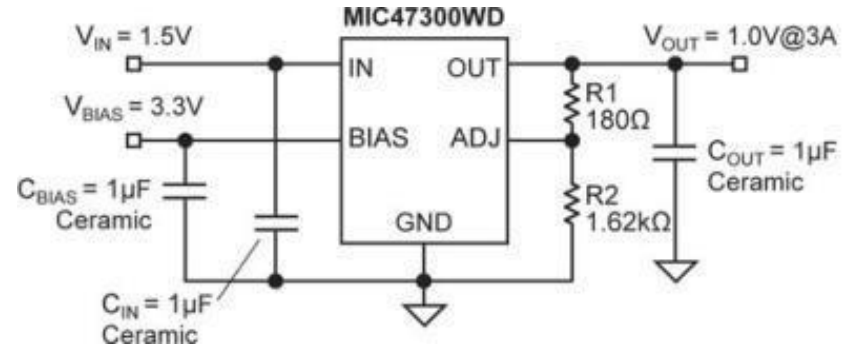
## Features:

- Input voltage range:
  - $V_{IN}$ : 1.4V to 6.5V
  - $V_{BIAS}$ : 3.0V to 6.5V
- Stable with 1 $\mu$ F ceramic capacitor
- $\pm 1\%$  initial tolerance
- Maximum dropout voltage ( $V_{IN} - V_{OUT}$ ) of 500mV –  
- over temperature
- Adjustable output voltage down to 0.9V
- Ultra-fast transient response (Up to 10MHz bandwidth)
- Excellent line and load regulation specifications
- Logic controlled shutdown option
- Thermal shutdown and current limit protection
- Power S-Pak package
- Junction temperature range: -40°C to +125°C



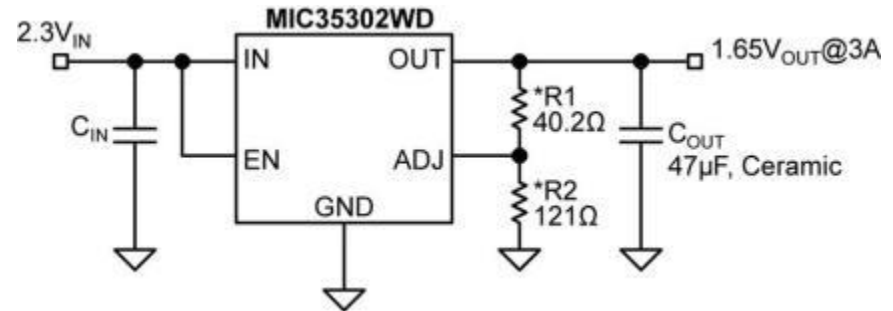
## Features:

- Input voltage range:
  - $V_{IN}$  : 1.4V to 6.5V
  - $V_{BIAS}$  : 3.0V to 6.5V
- Stable with 1 $\mu$ F ceramic capacitor
- $\pm 1\%$  initial tolerance
- Maximum dropout voltage ( $V_{IN} - V_{OUT}$ ) of –  
– 400mV over temperature
- Adjustable output voltage down to 0.9V
- Ultra fast transient response (Up to 10MHz bandwidth)
- Excellent line and load regulation specifications
- Power D-Pak package (TO-252)
- Thermal shutdown and current limit protection
- Junction temperature range: -40°C to +125°C



## Features:

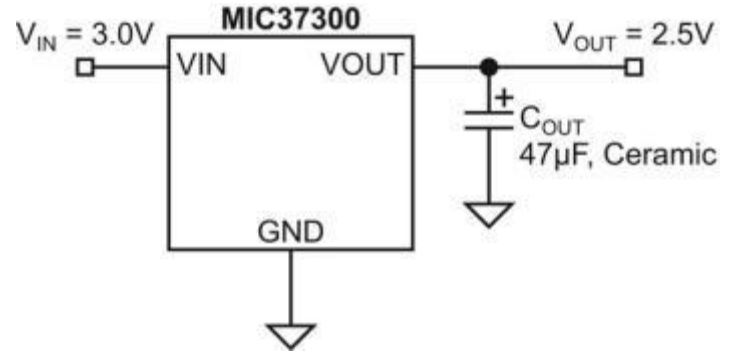
- Ideal for 3.0V to 2.5V conversion
- Stable with ceramic or tantalum capacitor
- Wide input voltage range:
  - $V_{IN}$ : 2.25V to 6.0V
- Excellent line and load regulation specifications
- 3.0A minimum guaranteed output current
- Ideal for 2.5V to 1.8V, 1.65V, or 1.5V conversion
- 600mV maximum dropout voltage over temperature
- Logic-controlled shutdown
- Thermal shutdown and current limit protection
- Reverse leakage protection
- -40°C to +125°C junction temperature
- Power D-Pak package (TO-252)





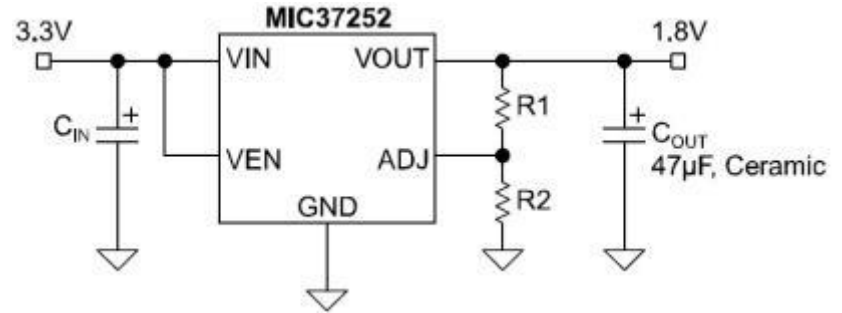
## Features:

- 3.0A minimum guaranteed output current
- 500mV maximum dropout voltage over-temperature
- Ideal for 3.0V to 2.5V conversion
- Ideal for 2.5V to 1.8V, 1.65V, or 1.5V conversion
- Stable with ceramic or tantalum capacitor
- Wide input voltage range:
  - $V_{IN}$ : 2.25V to 6.0V
  - $\pm 1.0\%$  initial output tolerance
- Fixed and adjustable output voltages:
  - MIC37300 3-pin fixed voltages
  - MIC37301 5-pin S-Pak or 8-pin ePad SOIC fixed –  
- voltages with flag
  - MIC37302 5-pin adjustable voltage
  - MIC37303 8-pin ePad SOIC adjustable voltage with flag
- Thermal shutdown and current limit protection
- Reverse leakage protection



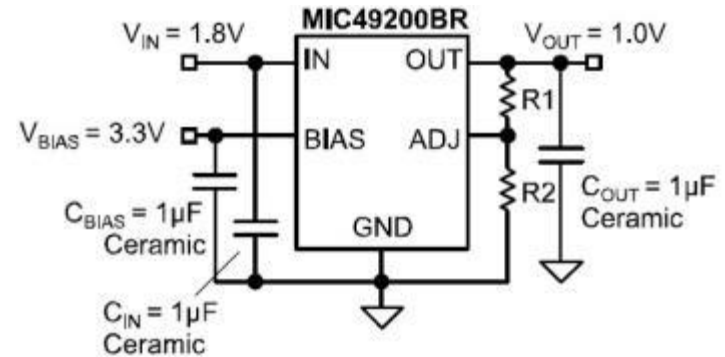
## Features:

- 2.5A minimum guaranteed output current
- Ideal for 3.3V to 1.8V conversion
- Stable with ceramic or tantalum capacitor
- $\pm 2.0\%$  initial output tolerance
- Dropout voltage is 550mV at 2.5A
- Excellent line and load regulation specifications
- Logic controlled shutdown
- Thermal shutdown and current limit protection
- Reverse leakage protection
- S-Pak and TO-263 packages



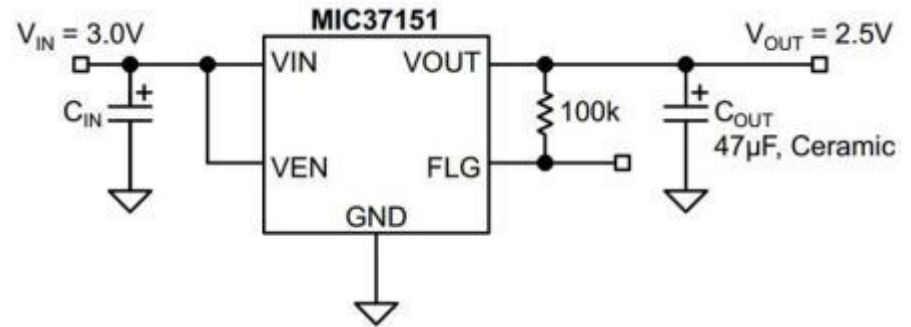
## Features:

- Input voltage range: 2.7V to 6.0V:
  - $V_{IN}$ : 1.4V to 6.5V
  - $V_{BIAS}$ : 3.0V to 6.5V
- Stable with 1 $\mu$ F ceramic output capacitor
- $\pm 1.0\%$  initial output tolerance
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) is 500mV over –  
– temperature
- Adjustable output voltage down to 0.9V
- Ultra-fast transient response (up to 10MHz bandwidth)
- Excellent line and load regulation specifications
- Logic-controlled shutdown option
- Thermal shutdown and current limit protection
- Thin 5-pin S-Pak package
- -40°C to +125°C operating junction temperature range



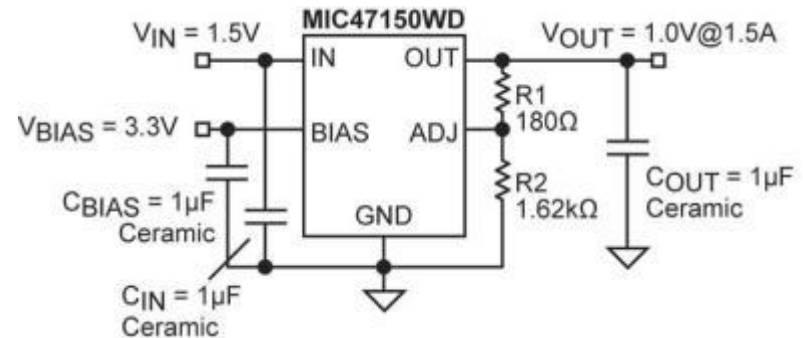
## Features:

- 1.5A minimum guaranteed output current
- 500mV maximum dropout voltage over –  
– temperature:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V, 1.65V, or 1.5V  
– conversion
- Stable with ceramic or tantalum capacitor
- Wide input voltage range:
  - $V_{IN}$ : 2.25V to 6.0V
- $\pm 1.0\%$  initial output tolerance
- Fixed and adjustable output voltages
  - MIC37150 - 3-pin fixed voltages
  - MIC37151 - 5-pin S-Pak or 8-pin ePad SOIC
- Fixed voltages with flag:
  - MIC37152 - 5-pin adjustable voltage
  - MIC37153 - 8-pin adjustable voltage with flag
- Thermal shutdown and current limit protection
- Low profile 3 or 5-pin S-Pak packages or 8-pin ePad SOIC



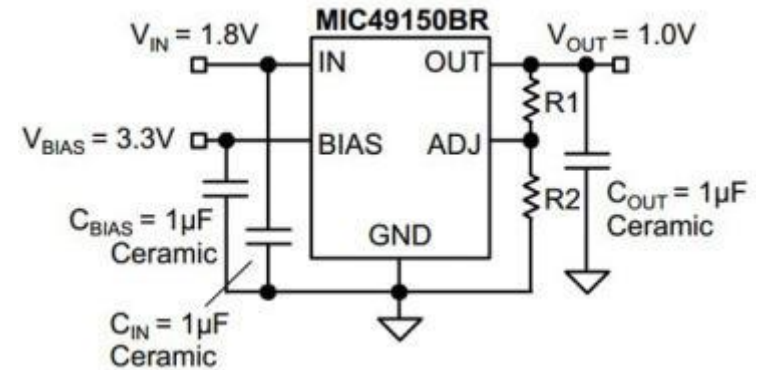
## Features:

- Input voltage range:
  - $V_{IN}$  : 1.4V to 6.5V
  - $V_{BIAS}$  : 3.0V to 6.5V
- Stable with 1 $\mu$ F ceramic capacitor
- $\pm 1\%$  initial tolerance
- Maximum dropout voltage ( $V_{IN} - V_{OUT}$ ) of –  
– 500mV over temperature
- Adjustable output voltage down to 0.9V
- Ultra fast transient response (up to 10MHz –  
– bandwidth)
- Excellent line and load regulation specifications
- Power D-Pak package (TO-252)
- Thermal shutdown and current limit protection
- Junction temperature range: -40°C to +125°C



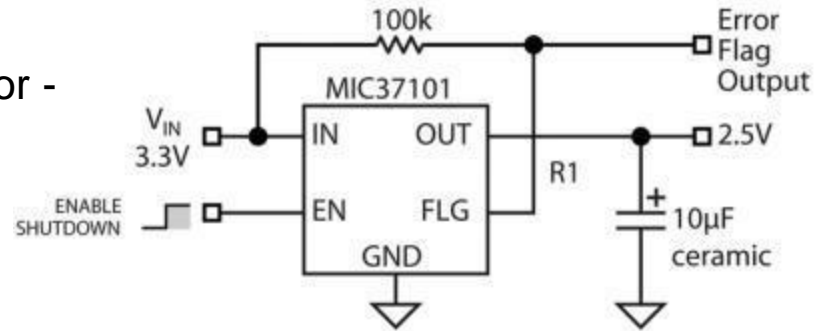
## Features:

- Input voltage range:
  - $V_{IN}$  : 1.4V to 6.5V
  - $V_{BIAS}$  : 3.0V to 6.5V
- Stable with 1 $\mu$ F ceramic capacitor
- $\pm 1\%$  initial tolerance
- Maximum dropout voltage ( $V_{IN} - V_{OUT}$ ) of –  
– 500mV over temperature
- Adjustable output voltage down to 0.9V
- Ultra fast transient response (up to 10MHz bandwidth)
- Excellent line and load regulation specifications
- Logic-controlled shutdown option
- Thermal shutdown and current limit protection
- Power MSOP-8 and S-Pak packages
- Junction temperature range: -40°C to +125°C



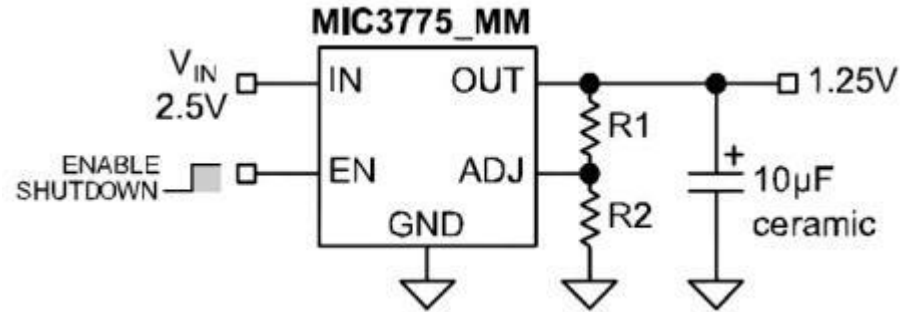
## Features:

- Fixed and adjustable output voltages to 1.24V
- $\mu$ Cap Regulator, 10 $\mu$ F ceramic output capacitor -  
- stable
- 280mV typical dropout at 1A:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V, 1.65V, or 1.5V  
- conversion
- 1A minimum guaranteed output current
- 1% initial accuracy
- Low ground current
- Current limiting and thermal shutdown
- Reverse leakage protection
- Fast transient response
- Low-profile SOT-223 package
- Power SO-8 package
- S-PAK package (MIC37102 only)



## Features:

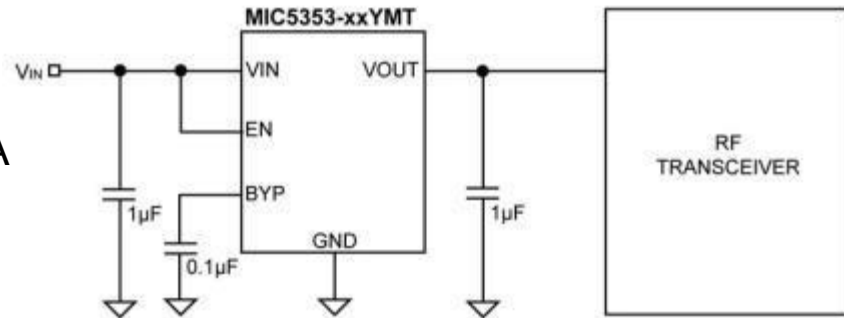
- Fixed and adjustable output voltages –  
- to 1.24V
- 280mV typical dropout at 750mA:
  - Ideal for 3.0V to 2.5V conversion
  - Ideal for 2.5V to 1.8V or 1.65V –  
- conversion
- Stable with ceramic capacitor
- 750mA minimum guaranteed output current
- 1% initial accuracy
- Low ground current
- Current limiting and thermal shutdown
- Reverse leakage protection
- Fast transient response
- Low-profile power MSOP-8 package





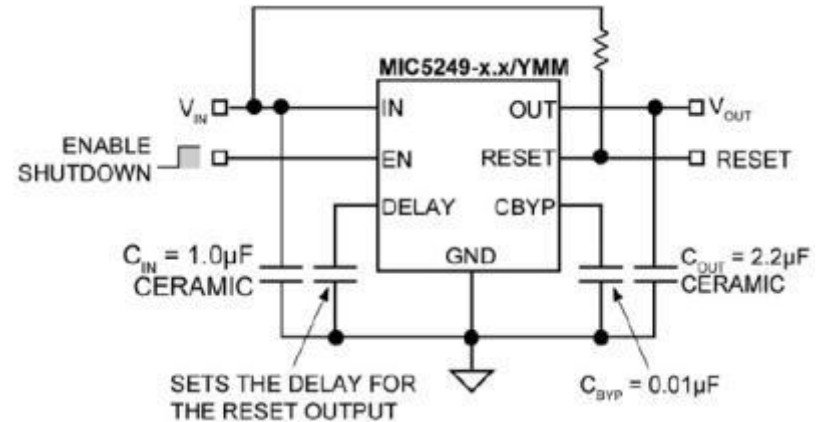
## Features:

- 500mA guaranteed output current
- Input voltage range: 2.6V to 6V
- Ultra-low dropout voltage: 160mV at 500mA
- $\pm 2\%$  initial accuracy
- Ultra-low output noise:  $30\mu\text{V}_{\text{rms}}$
- Low quiescent current:  $90\mu\text{A}$
- Stable with ceramic output capacitors
- $35\mu\text{s}$  turn-on time
- Thermal shutdown and current limit protection
- Tiny 6-pin 1.6mm x 1.6mm Thin MLF® lead-less package



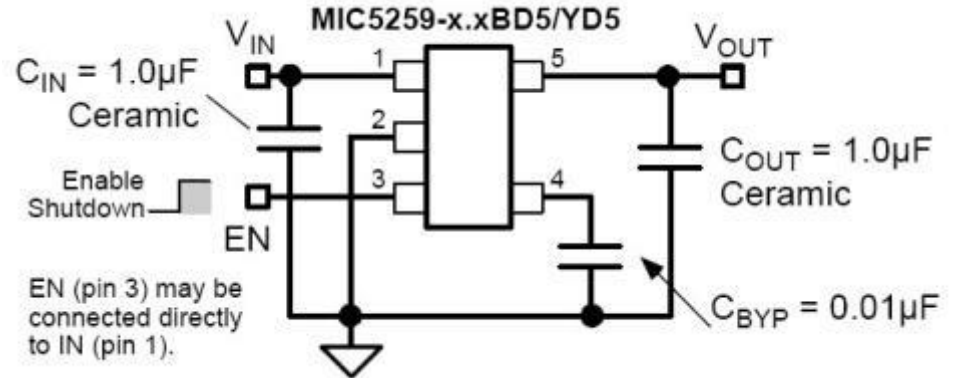
## Features:

- 300mA output current
- High PSRR: 65dB at 120Hz
- Stable with ceramic output capacitor
- Power-on reset output with adjustable –  
- delay time
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 3.0\%$  over temperature
- Low dropout voltage: 400mV at 300mA
- Low quiescent current: 85mA
- Zero off-mode current state
- Thermal shutdown protection
- Current limit protection
- Tiny MSOP-8 package



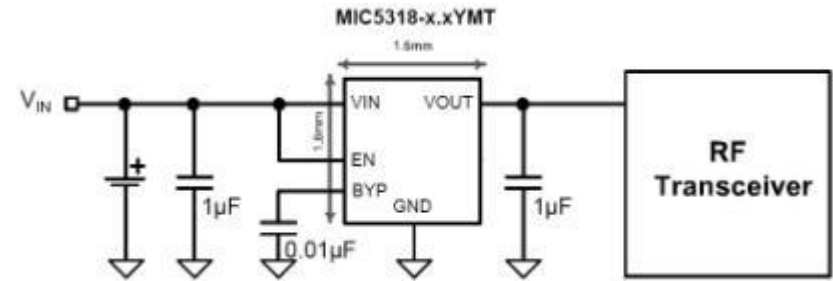
## Features:

- Input voltage range: 2.7V to 6.0V
- PSRR: 70dB at 1kHz
- Low output noise: 30 $\mu$ Vrms
- Stability with ceramic output capacitors
- Low dropout: 300mV at 300mA
- High output accuracy:
  - 1.5% initial accuracy
  - 3.0% over temperature
- Low quiescent current: 105 $\mu$ A
- Tight load and line regulation
- TTL logic-controlled enable input
- Zero off-mode current state
- Thermal shutdown and current limit protection



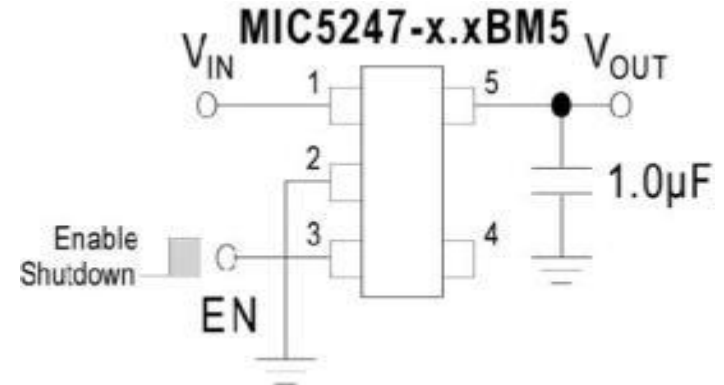
## Features:

- Ultra-low dropout voltage: 110mV at 300mA
- Input voltage range: 2.3V to 6.0V
- 300mA guaranteed output current
- Stable with ceramic output capacitors
- Ultra-low output noise: 30 $\mu$ Vrms
- Low quiescent current: 85 $\mu$ A total
- High PSRR: >70dB at 1kHz
- Less than 35 $\mu$ s turn-on time
- High output accuracy:
  - $\pm 2\%$  initial accuracy
  - $\pm 3\%$  over temperature
- Thermal shutdown and current limit protection
- Tiny 6-pin 1.6mm x 1.6mm Thin MLF<sup>®</sup> package
- Thin SOT23-5 package



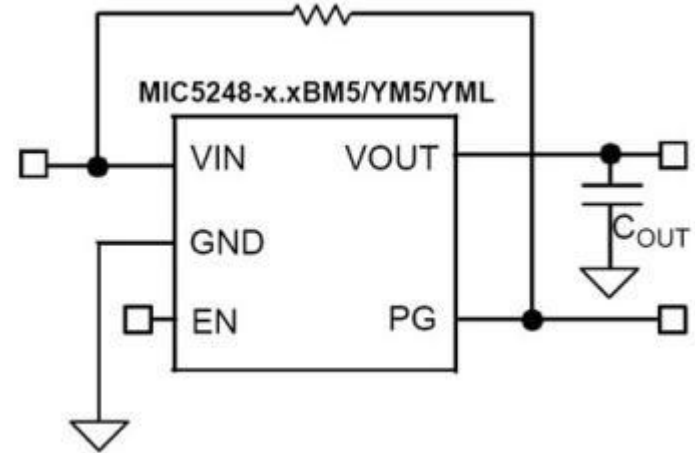
## Features:

- Ultra-low noise
- Low voltage outputs
- Load-independent, ultra-low ground current: 85mA
- 150mA output current
- Current limiting
- Thermal shutdown
- Tight load and line regulation
- Zero off-mode current
- Stability with low-ESR capacitors
- Fast transient response
- Logic-controlled enable input



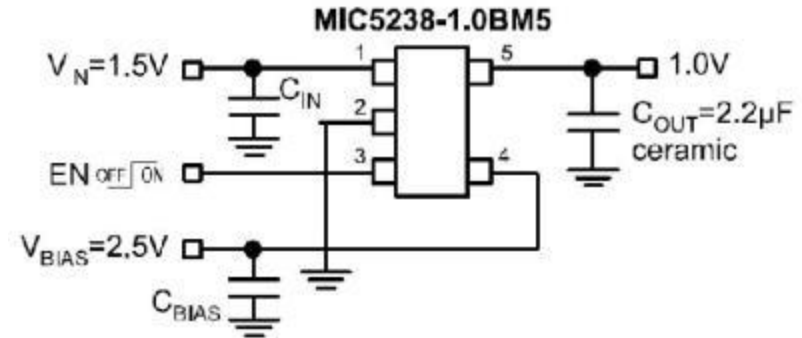
## Features:

- Power Good indicator
- Load-independent, ultra-low ground current: 100 $\mu$ A
- 150mA output current
- Current limiting
- Thermal shutdown
- Tight load and line regulation
- Zero off-mode current
- Stability with low-ESR capacitors
- Fast transient response
- TTL logic-controlled enable input



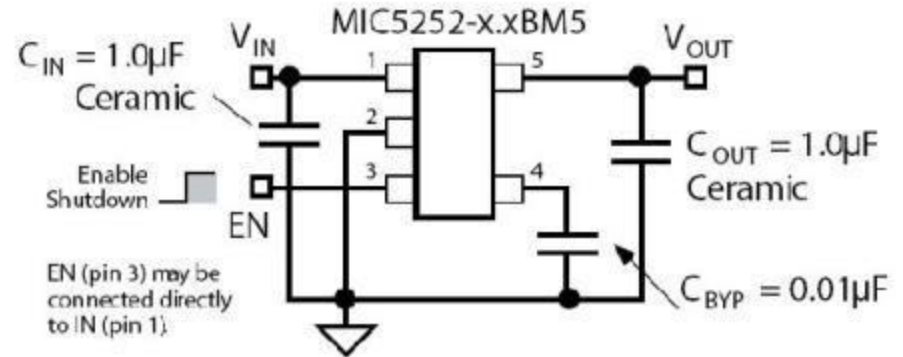
## Features:

- Ultra-low input voltage range: 1.5V to 6V
- Low dropout voltage: 310mV at 150mA
- High output accuracy:  $\pm 2.0\%$  over temperature
- $\mu$ Cap: stable with ceramic or tantalum capacitors
- Excellent line and load regulation specifications
- Zero off-mode current
- Ultra-low output voltage: 1.1V minimum output – voltage
- Reverse leakage protection
- Thermal shutdown and current limit protection
- IttyBitty® SOT-23-5 package



## Features:

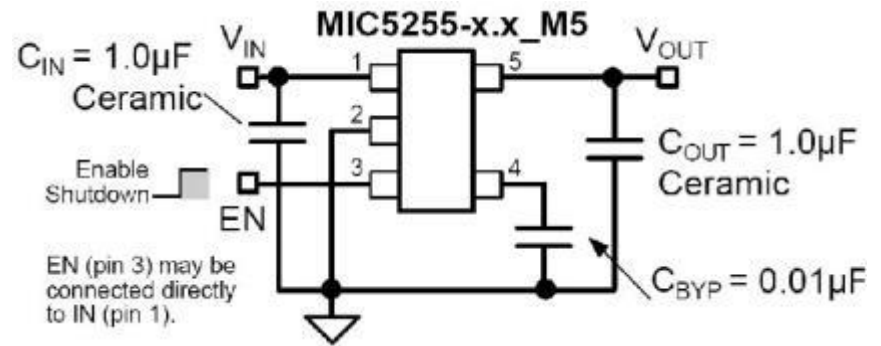
- Input voltage range: 2.7V to 6.0V
- PSRR equals 50dB at  $V_O + 0.3V$
- Ultra-low output noise:  $30\mu V_{rms}$
- Stability with ceramic output capacitors
- Ultra-low dropout: 135mV at 150mA
- High output accuracy:
  - 1.0% initial accuracy
  - 2.0% over temperature
- Low quiescent current: 90 $\mu A$
- Tight load and line regulation
- TTL logic-controlled enable input
- Zero off-mode current
- Thermal shutdown and current limit protection





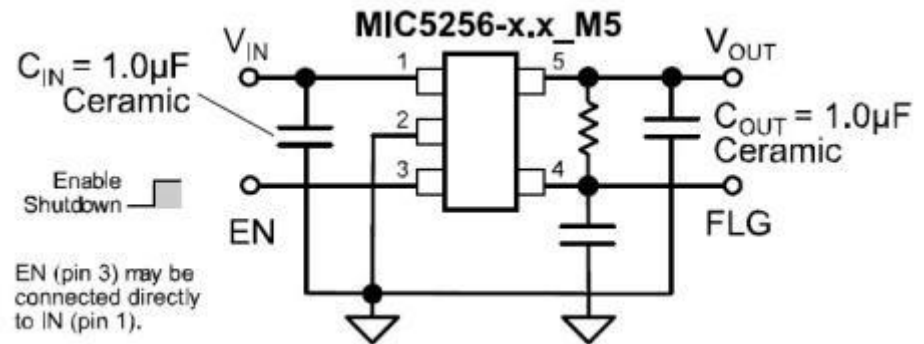
## Features:

- Input voltage range: 2.7V to 6.0V
- Thin SOT package: 1mm height SOT-23-5
- Ultra-low output noise: 30 $\mu$ V(rms)
- Stability with ceramic output capacitors
- Ultra-low dropout: 135mV at 150mA
- High output accuracy:
  - 1.0% initial accuracy
  - 2.0% over temperature
- Low quiescent current: 90 $\mu$ A
- Tight load and line regulation
- TTL logic-controlled enable input
- Zero off-mode current
- Thermal shutdown and current limit protection



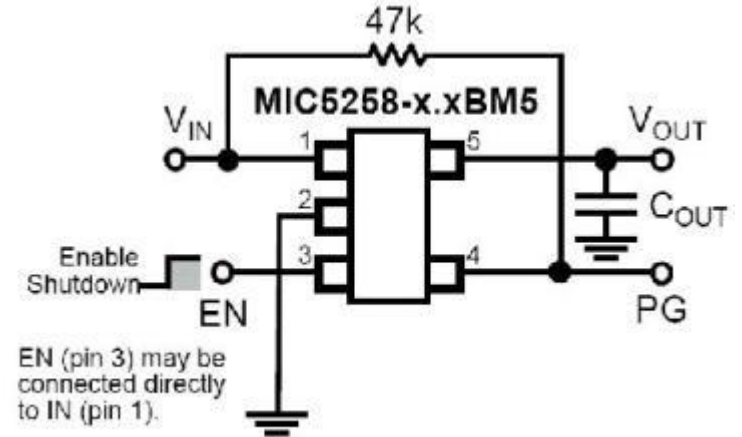
## Features:

- Input voltage range: 2.7V to 6.0V
- Thin SOT package: 1mm height
- Error flag indicates fault condition
- Stable with ceramic output capacitor
- Ultra-low dropout: 135mV at 150mA
- High output accuracy:
  - 1.0% initial accuracy
  - 2.0% over temperature
- Low quiescent current: 90 $\mu$ A
- Tight load and line regulation
- Thermal shutdown and current limit protection
- Zero off-mode current
- TTL logic-controlled enable input



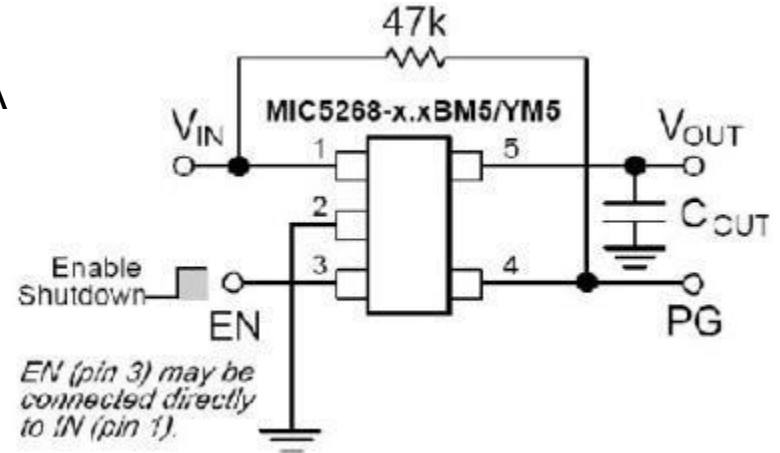
## Features:

- Power Good indicator
- Load-independent, ultra-low ground current: 100mA
- 150mA output current
- Current limiting
- Thermal shutdown
- Tight load and line regulation
- Zero off-mode current
- Stability with low-ESR capacitors
- Fast transient response
- TTL logic-controlled enable input



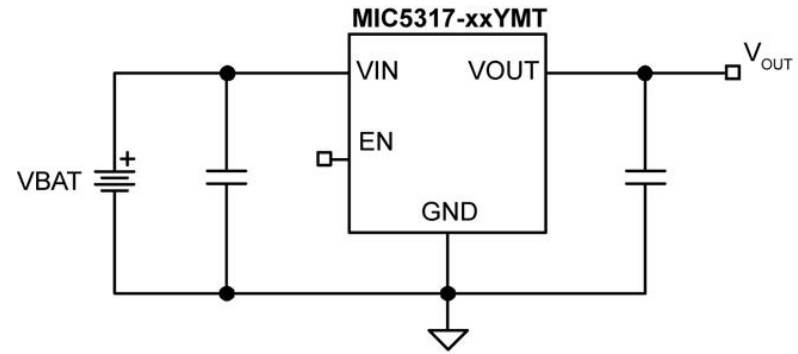
## Features:

- Power Good indicator
- Load-independent, ultra-low ground current: 100mA
- 150mA output current
- Current limiting
- Thermal shutdown
- Tight load and line regulation
- Zero off-mode current
- Stability with low-ESR capacitors
- Fast transient response
- TTL logic-controlled enable input



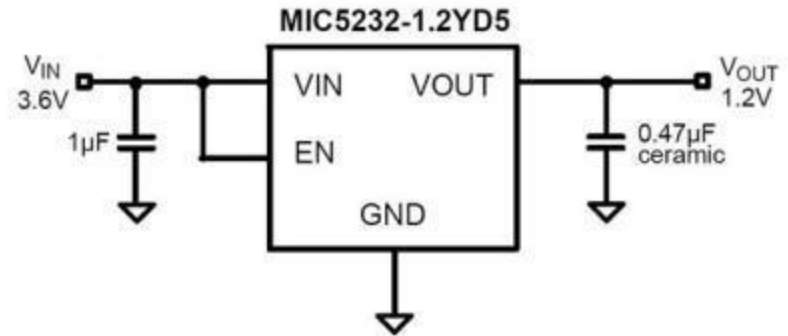
## Features:

- Tiny 1mm × 1mm Thin DFN, SOT23-5 and –  
– TSOT23-5 packages
- Wide 2.5V to 6V operating range
- 150mA guaranteed output current
- Stable with 1 $\mu$ F ceramic output capacitors
- Low dropout voltage: 155mV @ 150mA
- Excellent load/line transient response
- Low quiescent current: 29 $\mu$ A
- High PSRR: 70dB
- Thermal-shutdown and current-limit protection



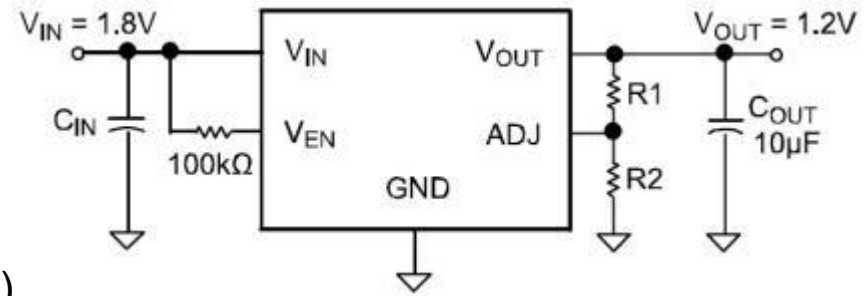
## Features:

- Input voltage range: 2.7V to 7.0V
- Ultra-low  $I_q$ : Only 1.8 $\mu$ A operating current
- Stable with 0.47 $\mu$ F ceramic output capacitor
- Low dropout voltage of 100mV at 10mA
- Reverse Battery Protection
- High output accuracy:
  - +2.0% initial accuracy
  - +3.0% over temperature
- Logic-Level Enable Input
- Miniature 6-pin 2mm x 2mm MLF<sup>®</sup> package
- Lead-Free Thin SOT-23-5 Package
- Tight Load and Line Regulation



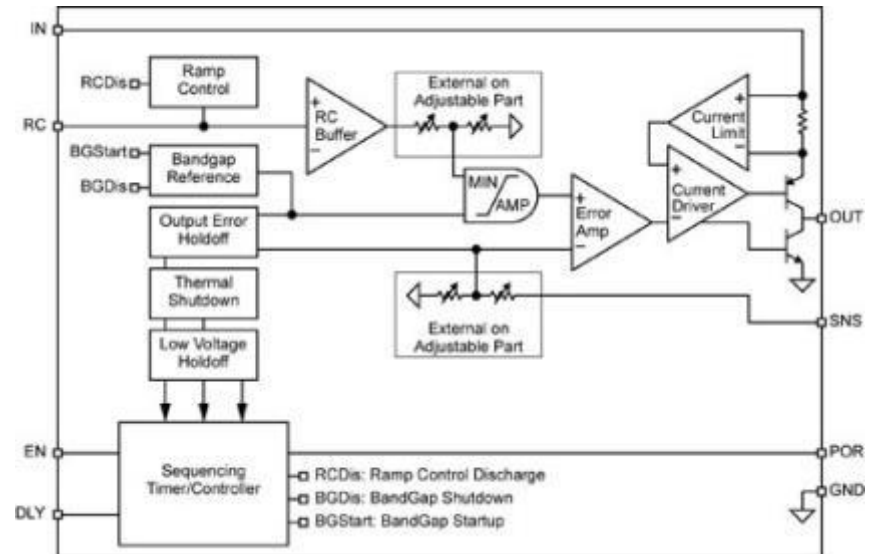
## Features:

- Input voltage range:  $V_{IN}$ : 1.65V to 5.5V
- $\pm 1.0\%$  initial output tolerance
- Adjustable output voltage down to 0.5V
- Max. dropout ( $V_{IN} - V_{OUT}$ ) of 500mV over –  
– temperature
- Stable with 10 $\mu$ F ceramic output capacitor (5A)
- Excellent line and load regulation specifications
- Logic controlled shutdown
- Thermal shutdown and current limit protection
- 7-Pin S-Pak package
- -40 $^{\circ}$ C to +125 $^{\circ}$ C temperature junction



## Features:

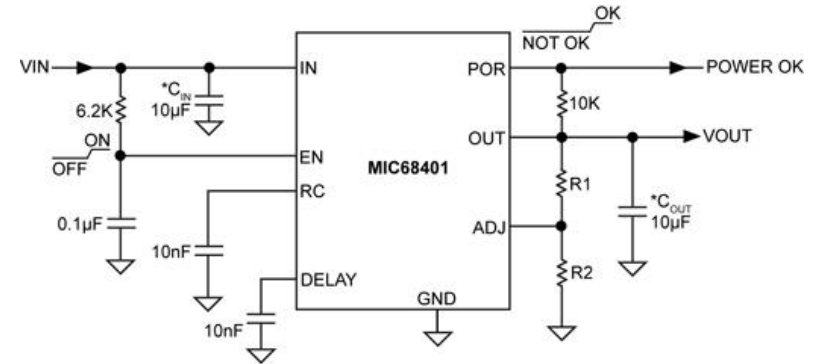
- Stable with 10 $\mu$ F ceramic capacitor
- Input voltage range: 1.65V to 5.5V
- $\pm 2.0\%$  output tolerance over temperature
- 4A maximum output current - peak start up
- 3A continuous operating current
- Timing controlled sequencing on/off
- Tiny 4mm x 4mm MFL® package
- Fixed and adjustable output voltages
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) of 500mV –  
- over temperature at 3A output current
- Thermal shutdown and current limit protection
- Programmable Ramp Control™ for:
  - In-rush current limiting
  - Slew rate control of the output voltage
- Single Master can control multiple Slave –  
- regulators with tracking output voltages





## Features:

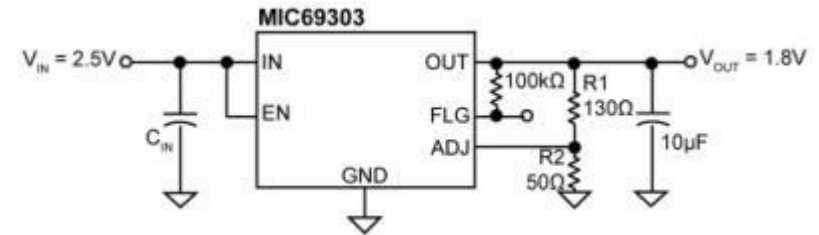
- Stable with 10 $\mu$ F ceramic capacitor
- Input voltage range: 1.65V to 5.5V
- Low 0.5V reference voltage
- $\pm 2.0\%$  output tolerance over temperature
- 4A output current
- Timing-controlled sequencing on/off
- Programmable Ramp Control™ for:
  - In-rush current limiting
  - Slew rate control of the output voltage
- Power-on-reset (POR) supervisor
  - Programmable delay time
- Single master can control multiple slave regulators –
  - with tracking output voltages
- Small 4mm  $\times$  4mm QFN package
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) of 500mV over –
  - temperature at 3A output current
- Fixed and adjustable output voltages



\*MINIMUM CAPACITANCE. FOR GUIDANCE ON THE VALUE OF  $C_{IN}$  AND  $C_{OUT}$ , PLEASE REFER TO THE APPLICATIONS INFORMATION SECTION

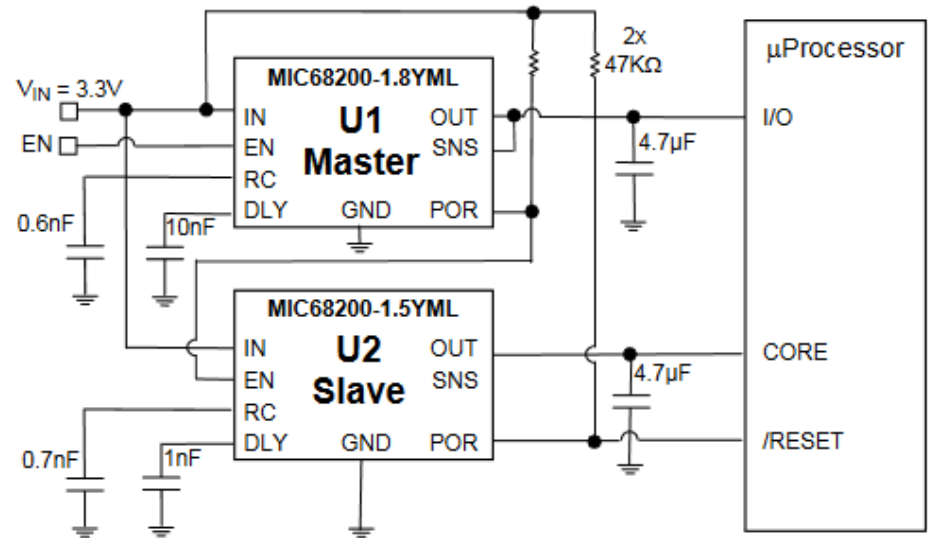
## Features:

- Input voltage range:  $V_{IN}$ : 1.65V to 5.5V
- Adjustable output voltage down to 0.5V
- Stable with 10 $\mu$ F ceramic output capacitor
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) of 500mV over –  
– temperature
- Excellent line and load regulation
- Logic controlled shutdown
- Thermal shutdown and current limit protection
- Error flag output
- 5-Pin TO-263
- 5-Pin S-Pak package
- ePad SOIC-8 package
- 12-Pin 4mm x 4mm MFLF<sup>®</sup> package (MIC69303 only)
- -40°C to +125°C junction temperature range



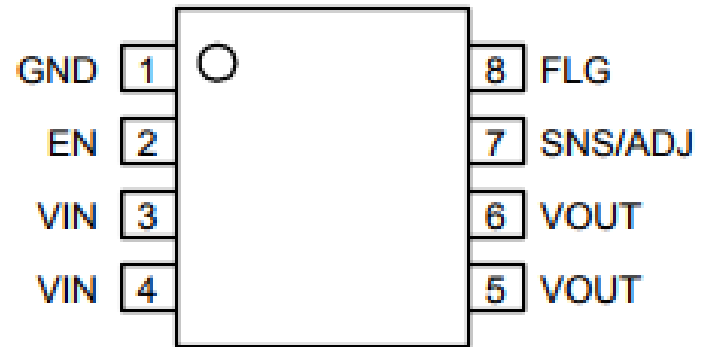
## Features:

- Stable with 4.7µF ceramic capacitor
- Input voltage range: 1.65V to 5.5V
- ±1.0% initial output tolerance
- 2A maximum output current
- 1A continuous operating current
- Tiny 3mm x 3mm MLF® package
- Programmable Ramp Control™ for:
  - In-rush current limiting
  - Slew rate control of the output voltage
- Power-on reset (POR) supervisor
  - Programmable delay time
- Single master can control multiple slave –
  - regulators with tracking output voltages
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) of 500mV –
  - over temperature at 1A output current
- Fixed and adjustable output voltages
- Thermal shutdown and current limit protection



## Features:

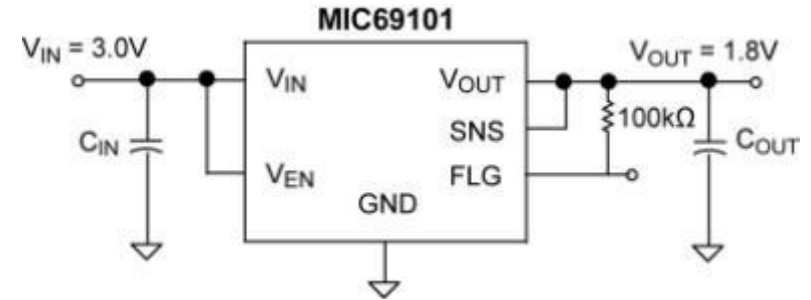
- Adjustable output voltage down to 0.5V
- Stable with 10 $\mu$ F ceramic output capacitor
- 10-Pin 3mm x 3mm MFL<sup>®</sup> package
- Thermal shutdown and current limit protection
- Single input voltage range:  $V_{IN}$ : 1.65V to 5.5V
- -40°C to +125°C junction temperature
- Excellent line and load regulation specifications
- Logic controlled shutdown
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) of 500mV –  
- over temperature



**8-Pin EPAD SOIC (ME)**

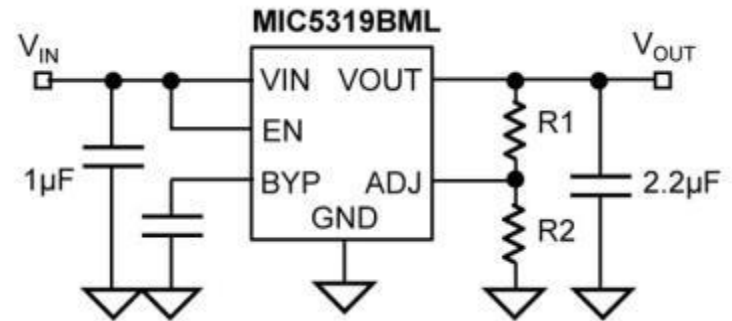
## Features:

- Adjustable output voltage down to 0.5V
- Stable with 4.7 $\mu$ F ceramic output capacitor
- Excellent line and load regulation specifications
- Logic-controlled shutdown
- Single input voltage range:  $V_{IN}$ : 1.65V to 5.5V
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) of 500mV over –  
– temperature
- Thermal shutdown and current limit protection
- 10-Pin 3mm x 3mm MFL<sup>®</sup> package
- -40°C to +125°C junction temperature



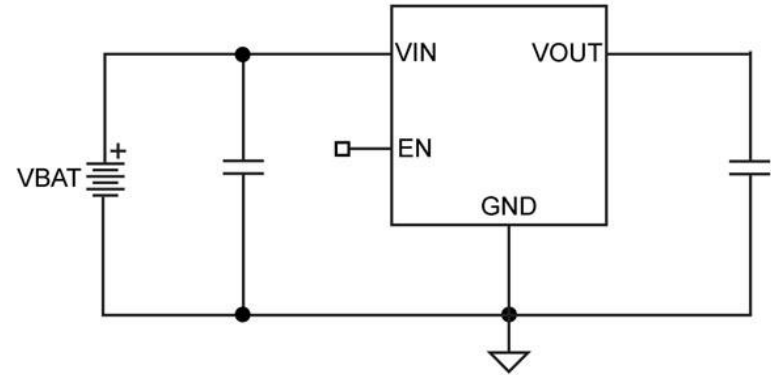
## Features:

- Ultra-low dropout voltage 200mV @ 500mA
- Input voltage range: 2.5 to 5.5V
- Stable with ceramic output capacitor
- Low output noise 30 $\mu$ Vrms
- Low quiescent current of 90 $\mu$ A total
- High PSRR, up to 70dB @1kHz
- Fast turn-on-time 40 $\mu$ s typical
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Tiny 2mm x 2mm MFL<sup>®</sup> package, 500mA continuous
- Thin SOT-23-5 package, 500mA peak



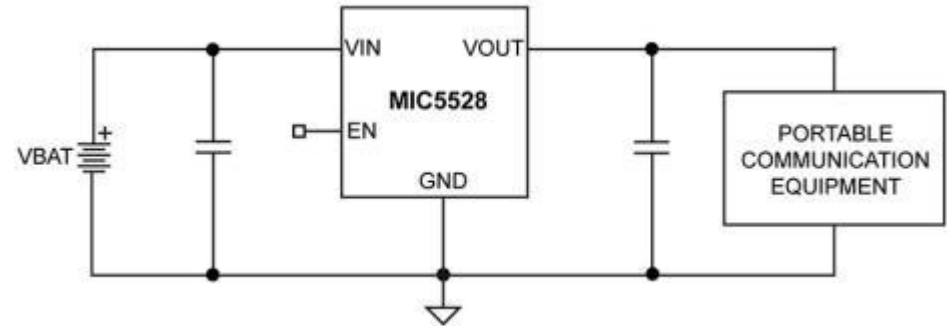
## Features:

- Input voltage range: 2.5V to 5.5V
- Fixed output voltages down to 1.0V
- 500mA guaranteed output current
- High output initial accuracy ( $\pm 1\%$ )
- High PSRR: 80dB
- Low quiescent current: 38 $\mu$ A
- Stable with 2.2 $\mu$ F ceramic output capacitors
- Low dropout voltage: 260mV @ 500mA
- Auto-discharge and internal enable pulldown
- Thermal-shutdown and current-limit protection
- 4-pin 1mm x 1mm Thin DFN package



## Features:

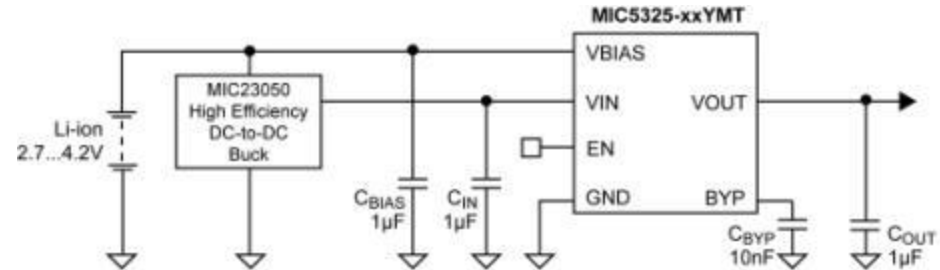
- Input voltage range:
  - 2.5V to 5.5V
- Fixed output voltages –
  - down to 1.0V
- $\pm 2\%$  Room temperature accuracy
- Low quiescent current: 38 $\mu$ A
- Stable with 2.2 $\mu$ F ceramic output –
  - capacitors
- Low dropout voltage: 260mV @ 500mA
- Auto-discharge and internal enable pulldown
- Thermal-shutdown and current-limit protection
- 6-pin 1.2mm x 1.2mm extra thin DFN package
- 6-pin 1.2mm x 1.2mm thin DFN package





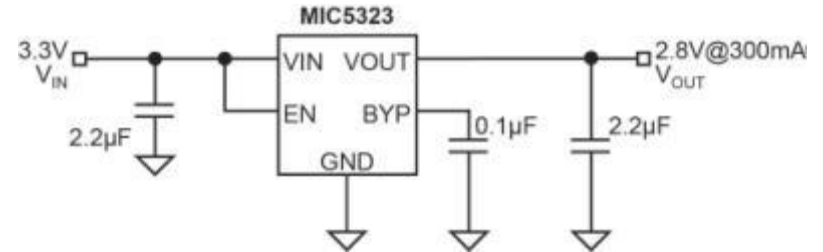
## Features:

- Wide input voltage range:
  - 1.7V to 5.5V
- Very fast transient response
- Bias supply voltage range:
  - 2.5V to 5.5V
- Ultra-low ground current:
  - 35  $\mu$ A typical
- 400mA maximum output –  
- current per LDO
- Thermal shutdown and current limit protection
- Tiny 6-pin 2mm x 2mm Thin MLF® package
- Ultra-low dropout voltage ULDO™: 110mV at 400mA
- Stable with 1 $\mu$ F ceramic output capacitor
- $\pm$ 2% voltage accuracy over temperature
- Adjustable output voltage range: 0.8V to 2.0V



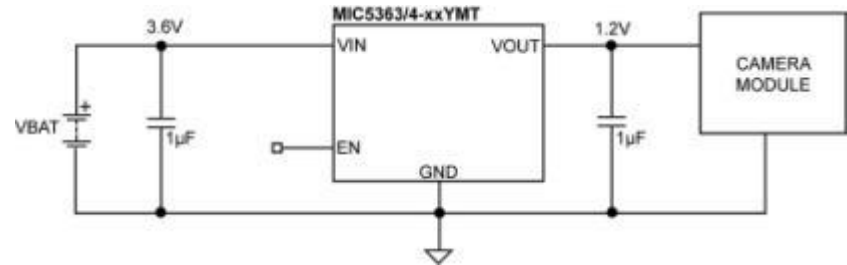
## Features:

- Input voltage range: 2.65 to 5.5V
- Stable with ceramic output capacitor
- Ultra-low dropout voltage of 120mV at 300mA
- 300mA guaranteed output current
- Low output noise: 20 $\mu$ Vrms
- High PSRR: up to 80dB at 1kHz
- Less than 30 $\mu$ s turn-on time with  $C_{BYP} = 0.1\mu$ F
- High output accuracy:  $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection
- 6-pin 2mm  $\times$  2mm Thin MLF<sup>®</sup> package
- Thin SOT-23-5 package



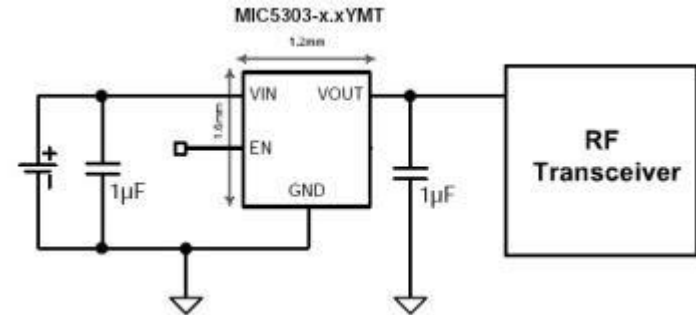
## Features:

- 2.5V to 5.5V input voltage range
- 300mA output
- High output accuracy:  $\pm 2\%$
- Low quiescent current: typically 38 $\mu$ A
- Stable with 1 $\mu$ F ceramic capacitors
- High PSRR: 70dB at 1kHz
- Low dropout voltage: 225mV at 300mA
- Thermal shutdown protection
- Current limit protection
- Active output discharge circuit: MIC5364
- 6-pin 1.2mm x 1.2mm Thin MLF<sup>®</sup> package



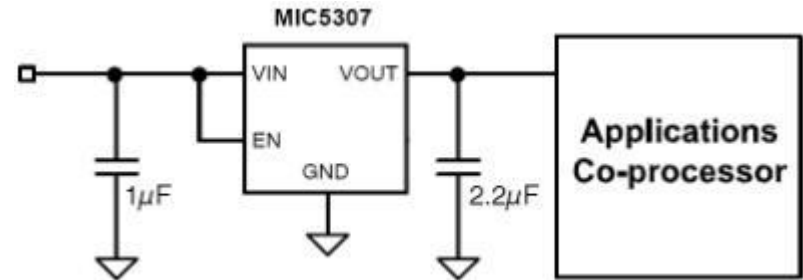
## Features:

- Ultra-small 1.2mm x 1.6mm Thin MLF® package
- Low dropout voltage: 100mV at 300mA
- Output noise: 120 $\mu$ Vrms
- Input voltage range: 2.3V to 5.5V
- 300mA guaranteed output current
- Stable with ceramic output capacitors
- Low quiescent current: 85 $\mu$ A total
- 35 $\mu$ s turn-on time
- High output accuracy:
  - $\pm$ 2% initial accuracy
  - $\pm$ 3% over temperature
- Thermal shutdown and current limit protection



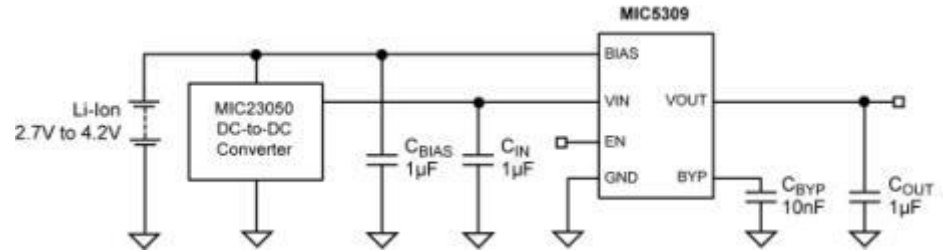
## Features:

- Input voltage range: 2.4V to 5.5V
- Ultra-low IQ: only 20 $\mu$ A operating current
- Stable with ceramic output capacitor
- Low dropout voltage of 120mV at 300mA
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection



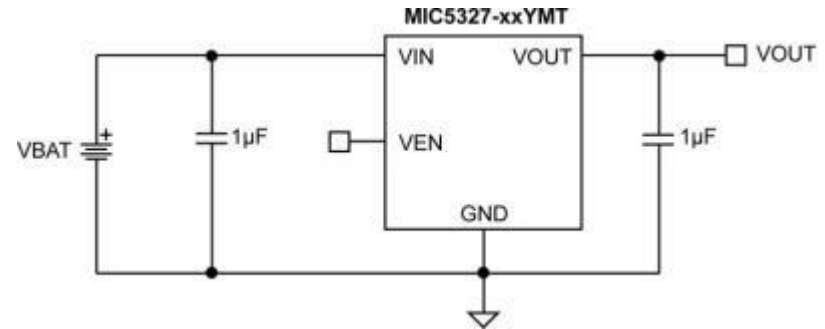
## Features:

- Input voltage range: 1.7V to 5.5V
- Guaranteed 300mA over temperature
- High PSRR: up to 90dB at 1kHz
- Ultra-low dropout voltage: 100mV for –  
- typical 300mA load
- Output Voltage range: 0.8V to 2.0V
- Very low ground current: 23 $\mu$ A under full load
- Bias supply voltage range: 2.5V to 5.5V
- Stable with 1 $\mu$ F ceramic output capacitor
- 300mA maximum output current at 1.7V input voltage
- Very fast transient response ideal for digital loads
- Thermal shutdown and current limit protection
- Tiny 6-pin 1.6mm x 1.6mm Thin MLF<sup>®</sup> package
- 6-pin TSOT-23 package



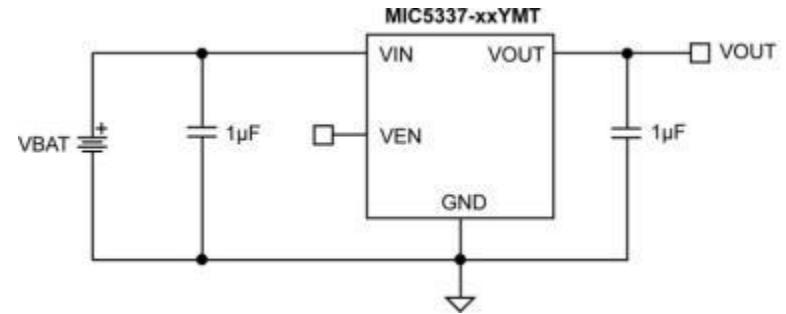
## Features:

- 300mA output current
- Input voltage range: 2.3V to 5.5V
- Low 24 $\mu$ A operating current
- Low dropout voltage of 180mV at 300mA
- Fixed output voltages
- Stable with 1 $\mu$ F ceramic capacitors
- Thermal shutdown and current limit protection
- Tiny 4-pin 1.2mm x 1.6mm Thin MLF® package



## Features:

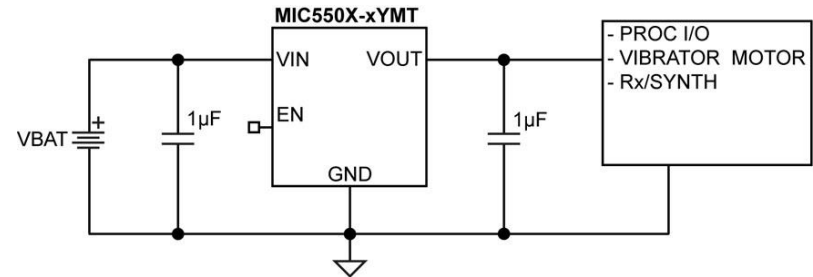
- 300mA output current
- Low  $I_Q$ : only 24 $\mu$ A operating current
- Low dropout voltage: 180mV at 300mA
- Active discharge when enable pin is low
- Input voltage range: 2.3V to 5.5V
- Fixed output voltages
- Stable with 1 $\mu$ F ceramic capacitors
- Thermal shutdown and current limit protection
- Tiny 4-pin 1.2mm x 1.6mm Thin MLF<sup>®</sup> package





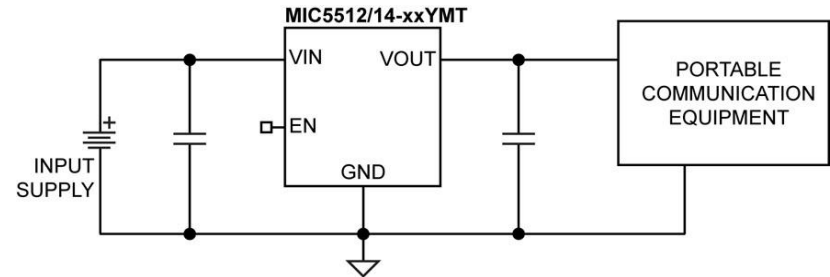
## Features:

- Input voltage range: 2.5V to 5.5V
- Fixed output voltages from 1.0V to 3.3V
- 300mA guaranteed output current
- High output accuracy ( $\pm 2\%$ )
- Low quiescent current: 38 $\mu$ A
- Stable with 1 $\mu$ F ceramic output capacitors
- Low dropout voltage: 160mV @ 300mA
- Output discharge circuit: MIC5502, MIC5504
- Internal enable pull-down: MIC5503, MIC5504
- Thermal-shutdown and current-limit protection
- 4-lead 1.0mm x 1.0mm Thin DFN package
- MIC5504 5-pin SOT23 package



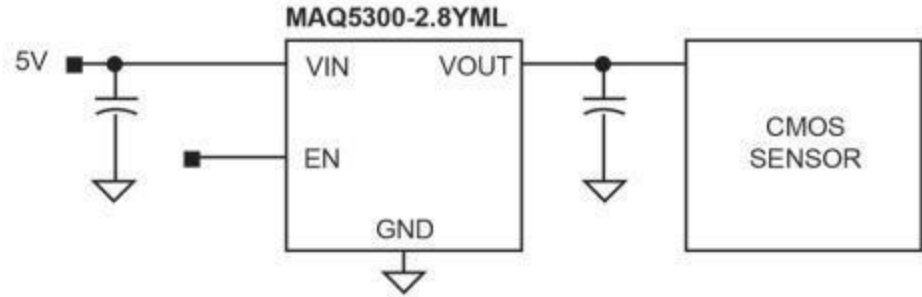
## Features:

- Input voltage range: 2.5V to 5.5V
- Fixed output voltages from 1.0V to 3.3V
- 300mA guaranteed output current
- $\pm 1\%$  initial output accuracy
- Stable with  $1\mu\text{F}$  ceramic output capacitors
- Low dropout voltage: 160mV @ 300mA
- Output discharge circuit
- Internal enable pull-down resistor (MIC5514)
- Available in ultra-small 6-pin 1.6mm  $\times$  1.6mm Thin DFN package



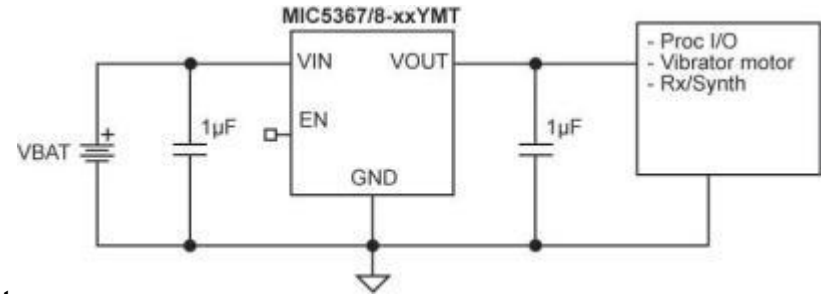
## Features:

- Small 2mm  $\times$  2mm DFN package
- Low dropout voltage: 100mV at 300mA
- Output noise 120 $\mu$ VRMS
- Input voltage range: 2.3V to 5.5V
- 300mA guaranteed output current
- Stable with ceramic output capacitors
- Low quiescent current: 85 $\mu$ A total
- 30 $\mu$ s turn-on time
- High output accuracy:
  - $\pm$ 2% initial accuracy
  - $\pm$ 3% over temperature
- Thermal shutdown and current-limit protection
- Recommended for Automotive Design



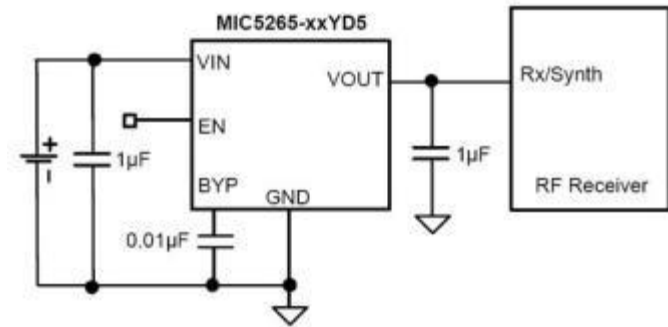
## Features:

- Input voltage range: 2.5V to 5.5V
- Stable with 1 $\mu$ F ceramic output capacitors
- Low dropout voltage: 180mV at 150mA
- Excellent load/line transient response
- Low quiescent current: 29 $\mu$ A
- 200mA peak (150mA continuous) output current
- High PSRR: 65dB
- Output discharge circuit -- MIC5368
- High output accuracy:  $\pm 2\%$  initial accuracy
- Tiny 1.6mm x 1.6mm Thin MLF® package
- Thermal shutdown and current limit protection



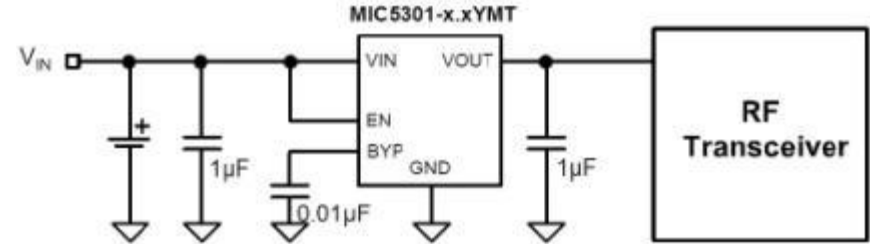
## Features:

- 2.7V to 5.5V supply voltage
- Low 90 $\mu$ A quiescent current per LDO
- Thin SOT-23-5 package
- Low Noise: 57 $\mu$ Vrms
- High PSRR: 70dB at 1kHz
- Low dropout voltage: 210mV at 150mA
- Stable with ceramic output capacitors
- Independent enable pins
- Fast transient response
- Active shutdown on both outputs



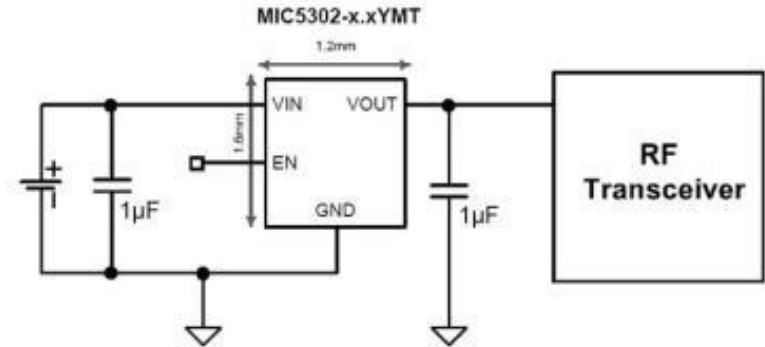
## Features:

- Ultra-low dropout voltage:
  - 40mV at 150mA
- Input voltage range:
  - 2.3V to 5.5V
- 150mA guaranteed output current
- Stable with ceramic output capacitors
- Ultra-low output noise: 30 $\mu$ Vrms
- Low quiescent current: 85 $\mu$ A total
- High PSRR: up to 75dB at 1kHz
- 35 $\mu$ s turn-on time
- High output accuracy:
  - $\pm 2\%$  initial accuracy
  - $\pm 3\%$  over temperature
- Thermal shutdown and current limit protection
- Tiny 6-pin 1.6mm x 1.6mm MLF<sup>®</sup> lead-less package



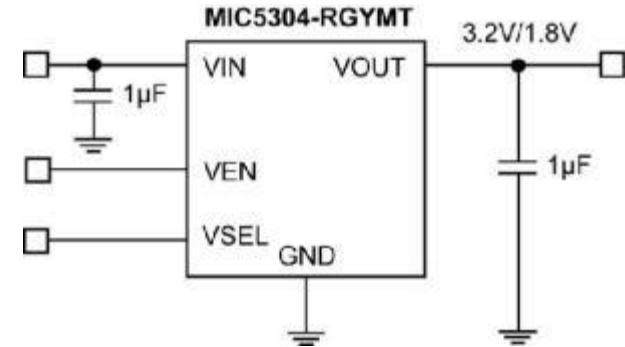
## Features:

- Ultra-small 1.2mm x 1.6mm –
  - Thin MLF® package
- Low dropout voltage:
  - 50mV at 150mA
- Output noise: 120 $\mu$ Vrms
- Input voltage range:
  - 2.3V to 5.5V
- 150mA guaranteed output current
- Stable with ceramic output capacitors
- Low quiescent current: 85 $\mu$ A total
- 35 $\mu$ s turn-on time
- High output accuracy:
  - $\pm$ 2% initial accuracy
  - $\pm$ 3% over temperature
- Thermal shutdown and current limit protection



## Features:

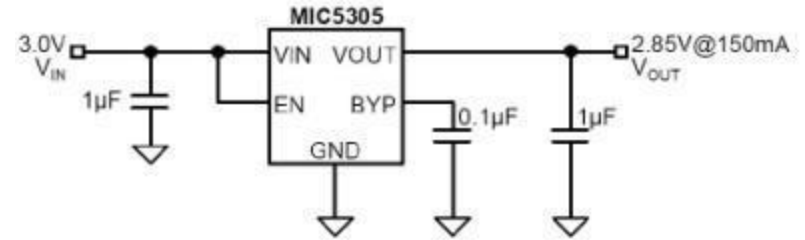
- 150mA output current
- Logic-controlled selectable output voltage
- Input voltage range: 2.3V to 5.5V
- Low 24 $\mu$ A operating current
- Fast transition time between –
  - selected output voltages
- Stable with 1 $\mu$ F ceramic capacitors
- Low dropout voltage: 85mV at 150mA
- Thermal shutdown and current limit protection
- Tiny 6-pin 1.6mm x 1.6mm Thin MLF<sup>®</sup> package





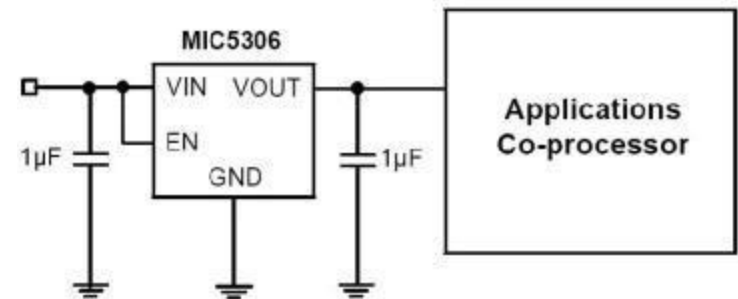
## Features:

- Ultra-low dropout voltage: 60mV at 150mA
- Input voltage range: 2.25V to 5.5V
- Stable with ceramic output capacitor
- 150mA guaranteed output current
- Low output noise: 20 $\mu$ Vrms
- Low quiescent current: 90 $\mu$ A total
- High PSRR: up to 85dB at 1kHz
- Less than 30 $\mu$ s turn-on time w/CBYP = 0.01 $\mu$ F
- High output accuracy
- Thermal shutdown protection
- Current limit protection
- Tiny 6-pin 2mm x 2mm MLF<sup>®</sup> package
- Ultra-Thin 6-pin 2mm x 2mm Thin MLF<sup>®</sup> package



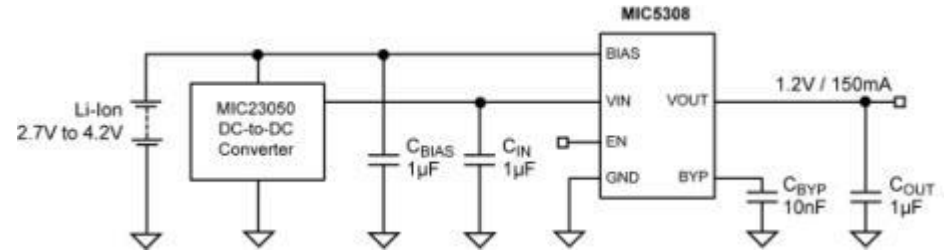
## Features:

- Input voltage range: 2.25V to 5.5V
- Ultra-low IQ: only 16 $\mu$ A operating current
- Stable with ceramic output capacitor
- Low dropout voltage: 45mV at 100mA
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection



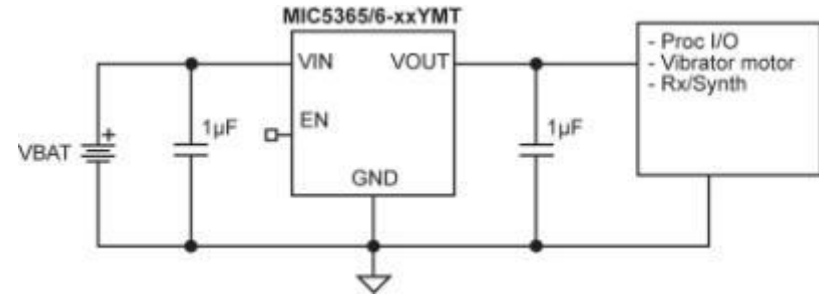
## Features:

- Input voltage range: 1.6V to 5.5V
- High PSRR: up to 90dB at 1kHz
- Guaranteed 150mA over temperature
- Ultra-low dropout voltage: 45mV at 150mA
- Output voltage range: 0.8V to 2.0V
- Very low ground current: 23 $\mu$ A under full load
- Bias supply voltage range: 2.5V to 5.5V
- Stable with 1 $\mu$ F ceramic output capacitor
- Input voltage range: 1.6V to 5.5V
- Guaranteed 150mA over temperature
- Ultra-low dropout voltage: 45mV at 150mA
- High PSRR: up to 90dB at 1kHz
- Output voltage range: 0.8V to 2.0V



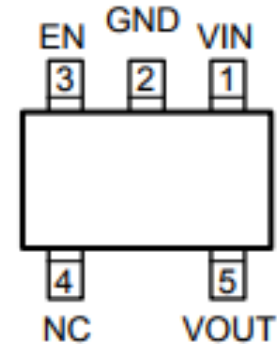
## Features:

- Input voltage range: 2.5V to 5.5V
- 150mA guaranteed output current
- Stable with ceramic output capacitors
- Low dropout voltage: 180mV at 150mA
- Tiny 1mm x 1mm Thin MLF®, SC-70-5, and –  
– Thin SOT23-5 packages
- Excellent Load/Line Transient Response
- Low quiescent current: 32 $\mu$ A
- High PSRR: 70dB
- Output discharge circuit (MIC5366)
- High output accuracy:
  - $\pm 2\%$  initial accuracy
- Thermal shutdown and current limit protection

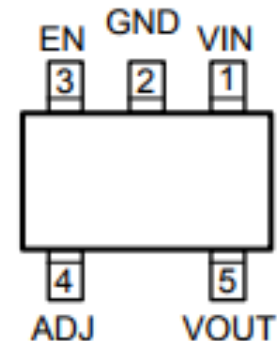


## Features:

- Low cost 5-pin SC-70 package
- Low dropout voltage: 120mV at 150mA
- Input voltage range: 2.5V to 5.5V
- 150mA guaranteed output current
- 8-pin 1.2mm x 1.2mm Thin MFL® package
- Stable with 0402 ceramic capacitors as low as 1µF
- Low quiescent current: 29µA
- Adjustable output -- MIC5377/8
- Output discharge circuit -- MIC5376/8
- High output accuracy:
  - ±2% initial accuracy
- Thermal shutdown and current limit protection



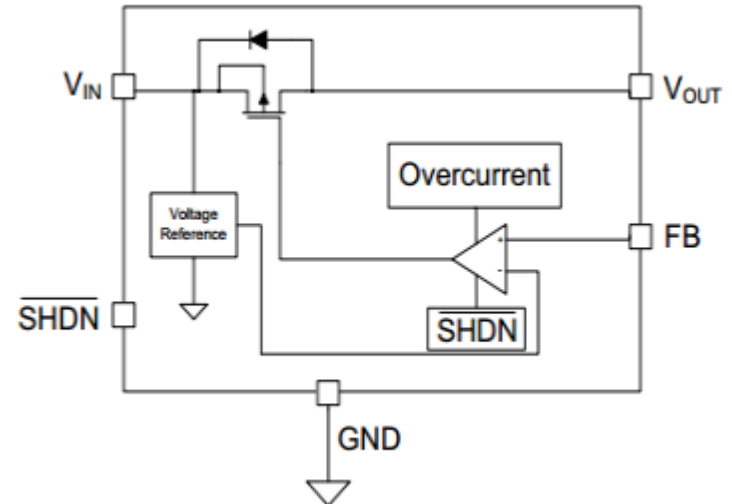
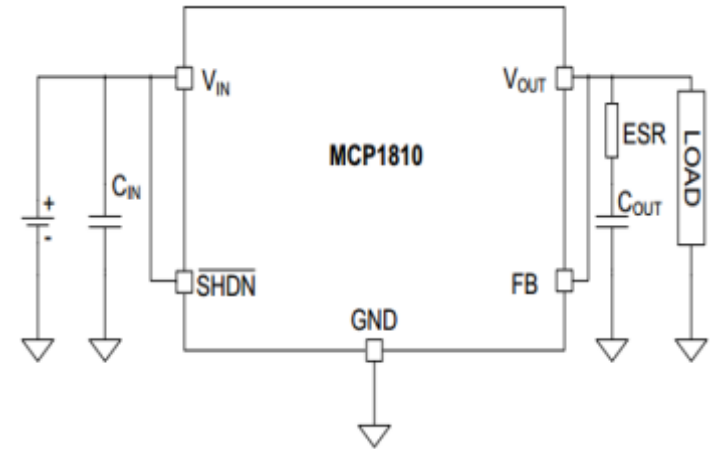
**5-Pin SC-70 (C5)  
MIC5375/6 Fixed Output**



**5-Pin SC-70 (C5)  
MIC5377/8 Adjustable Output**

## Features:

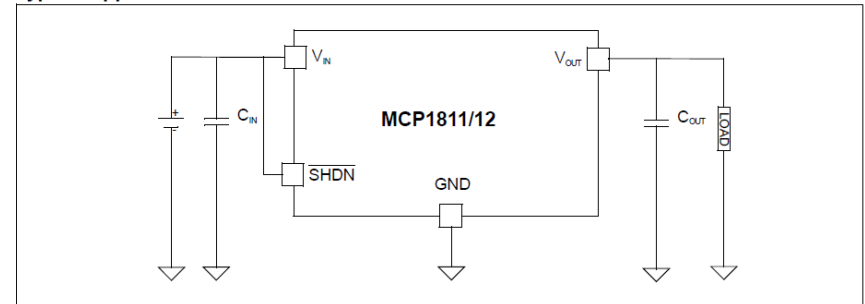
- Ultra-Low Quiescent Current: 20 nA (typical)
- Ultra-Low Shutdown Supply Current: 1 nA (typ)
- 150 mA Output Current Capability for  $V_R \leq 3.5V$  –  
- 100 mA Output Current Capability for  $V_R > 3.5V$
- Input Operating Voltage Range: 2.5V to 5.5V
- Standard Output Voltages (VR): 1.2V, 1.8V, 2.5V, -  
- 3.0V, 3.3V, 4.2V
- Low Dropout Voltage: 380 mV max at 150 mA
- Stable with 1.0  $\mu F$  Ceramic Output Capacitor
- Overcurrent Protection
- Space Saving, 8-Lead 2 x 2 mm VDFN



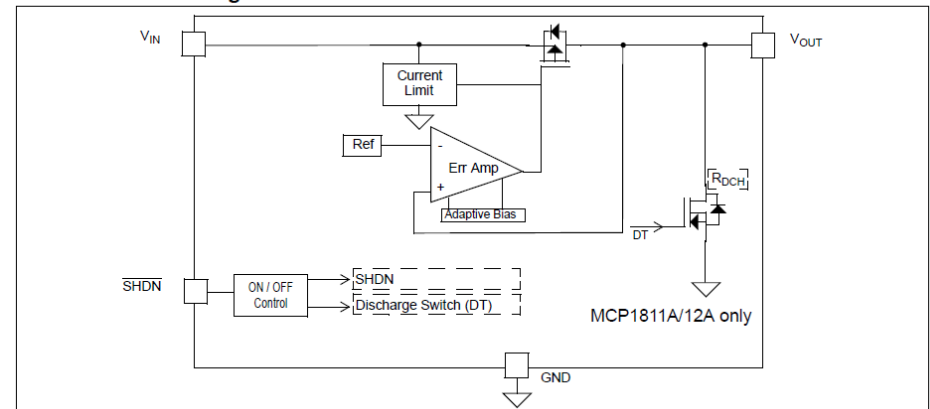
## Features:

- Ultra-Low Quiescent Current: 250 nA (typical)
- Ultra-Low Shutdown Supply Current
  - 10 nA typical for MCP1811A/12A
  - 5 nA typical for MCP1811B/12B
- Output Current Capability:
  - 150 mA for MCP1811A/B
  - 300 mA for MCP1812A/B
- Input Voltage range: 1.8V to 5.5V
- Standard Output Voltages (VR): 1V, 1.2V, 1.8V, 2.0V, 2.5V, 2.8V, 3.0V, 3.3V and 4.0V.
- Constant Low Dropout Voltage: 550 mV
- Stable with Ceramic Output Capacitor: 1.0  $\mu$ F (MCP1811) and 2.2  $\mu$ F (MCP1812)
- Overcurrent Protection
- Output Discharge (Shutdown mode, SHDN=GND)
- MCP1811A/12A
  - Available in the following packages:
    - 3-Lead SOT-23
    - 3-Lead SC70
    - 5-Lead SOT-23
    - 5-Lead SC70
    - 4-Lead 1 x 1 mm UDFN

Typical Application



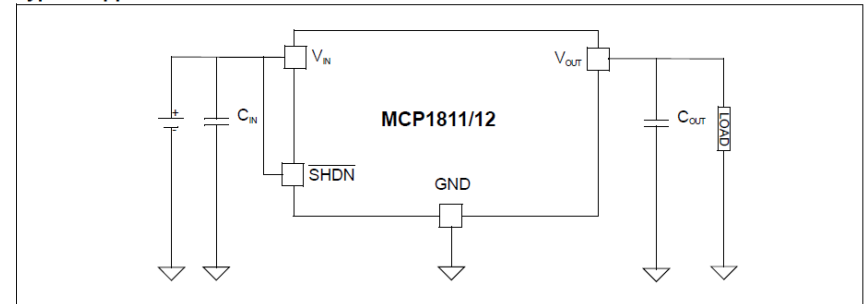
Functional Block Diagram



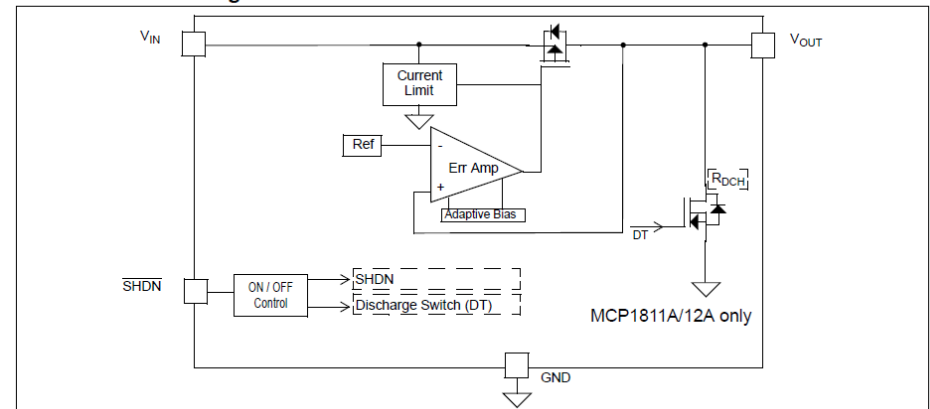
## Features:

- Ultra-Low Quiescent Current: 250 nA (typical)
- Ultra-Low Shutdown Supply Current:
  - 10 nA typical for MCP1811A/12A
  - 5 nA typical for MCP1811B/12B
- Output Current Capability:
  - 150 mA for MCP1811A/B
  - 300 mA for MCP1812A/B
- Input Voltage range: 1.8V to 5.5V
- Standard Output Voltages (VR): 1V, 1.2V, 1.8V, 2.0V, 2.5V, 2.8V, 3.0V, 3.3V and 4.0V.
- Constant Low Dropout Voltage: 550 mV
- Stable with Ceramic Output Capacitor:
  - 1.0  $\mu$ F (MCP1811) and 2.2  $\mu$ F (MCP1812)
- Overcurrent Protection
- Output Discharge (Shutdown mode, SHDN=GND)  
MCP1811A/12A
- Available in the following packages:
  - 3-Lead SOT-23
  - 3-Lead SC70
  - 5-Lead SOT-23
  - 5-Lead SC70
  - 4-Lead 1 x 1 mm UDFN

Typical Application



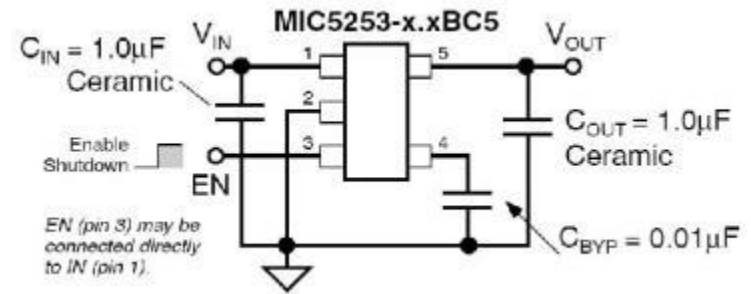
Functional Block Diagram





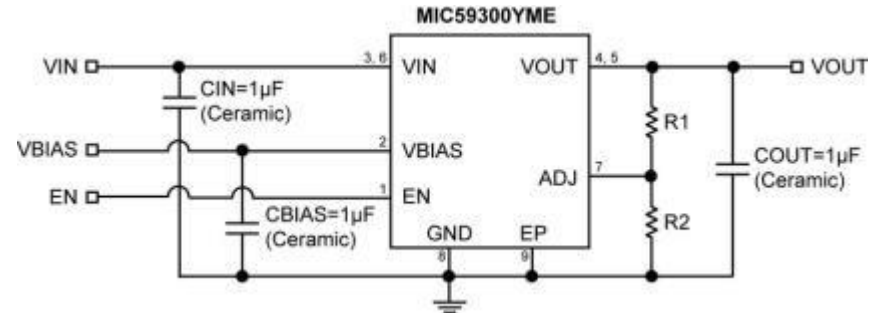
## Features:

- Input voltage range: 2.7V to 5.5V
- Teeny™ SC-70-5 package
- Ultra-low output noise: 30 $\mu$ Vrms
- Stability with ceramic output capacitors
- 100mA continuous output current, 150mA –  
- peak current
- Ultra-low dropout: 165mV at 100mA
- High output accuracy:
  - 1.5% initial accuracy
  - 3.0% over temperature
- Low ground current 95 $\mu$ A
- TTL logic-controlled enable input
- Zero off-mode current
- Thermal shutdown and current limit protection



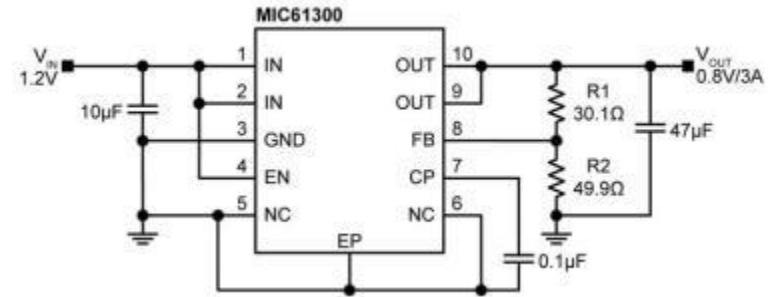
## Features:

- Input voltage range:
  - $V_{IN} = 1.0V$  to  $3.8V$
  - $V_{BIAS} = 3.0V$  to  $5.5V$
- Stable with  $1\mu F$  ceramic capacitor
- $\pm 1\%$  initial tolerance
- Maximum dropout voltage of  $500mV$  over –  
– temperature
- Adjustable output voltage down to  $0.5V$
- Ultra-fast transient response
- Logic controlled shutdown option
- Thermal shutdown and current limit protection
- $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature range
- TO-263 and 8-pin ePad SOIC
- Pin compatible upgrade to MIC49300



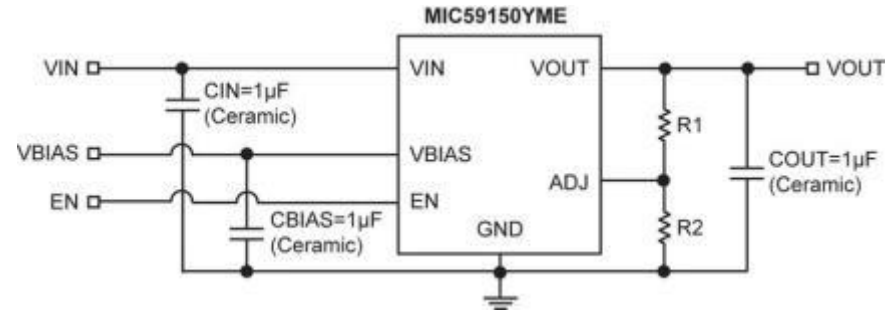
## Features:

- Single  $V_{IN}$  rail: 1.1V to 3.6V
- Soft-start control via external capacitor
- Typical dropout of 150mV at room temperature
- Output voltage adjustable down to 0.5V
- Soft-start control via external capacitor
- Excellent line and load regulation
- Logic controlled shutdown
- Thermal shutdown and current limit protection
- 10-pin 3mm x 3mm MFL® package
- 10-pin ePad MSOP package
- Junction temperature range from -40°C to +125°C
- Maximum dropout of 350mV at full load over temperature
- Soft-start control via external capacitor



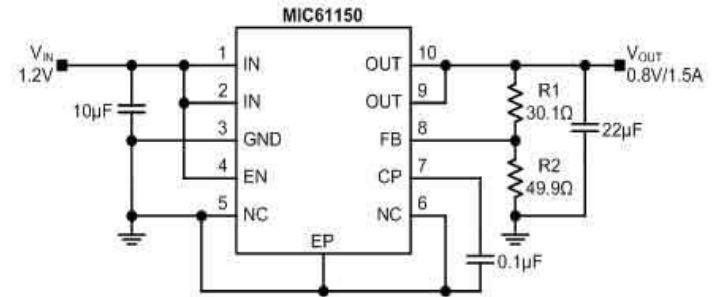
## Features:

- Input voltage range:
  - $V_{IN} = 1.0V$  to  $3.8V$
  - $V_{BIAS} = 3.0V$  to  $5.5V$
- Stable with  $1\mu F$  ceramic capacitor
- Maximum dropout voltage of  $250mV$  over –  
– temperature
- Adjustable output voltage down to  $0.5V$
- Ultra fast transient response
- Excellent line and load regulation specifications
- Logic controlled shutdown option
- Thermal shutdown and current limit protection
- Junction temperature range:  $-40^{\circ}C$  to  $+125^{\circ}C$
- 8-pin EPAD SOIC



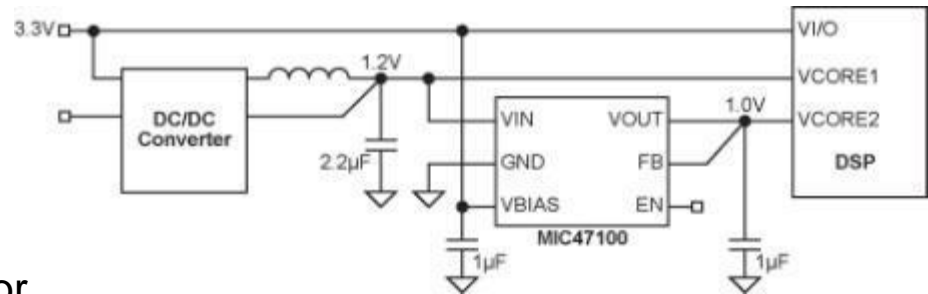
## Features:

- Single  $V_{IN}$  rail: 1.1V to 3.6V
- Typical dropout of 75mV at room temperature
- $C_{OUT}$  as low as 22 $\mu$ F (ceramic capacitor)
- Output voltage adjustable down to 0.5V
- Soft-start control via external capacitor
- Excellent line and load regulation
- Logic controlled shutdown
- Thermal shutdown and current limit protection
- 10-pin 3mm x 3mm MFL<sup>®</sup> package
- 10-pin ePad MSOP package
- Output voltage accuracy:  $\pm 2.5\%$  over temperature
- Maximum dropout of 200mV at full load over temperature
- Junction temperature range from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$



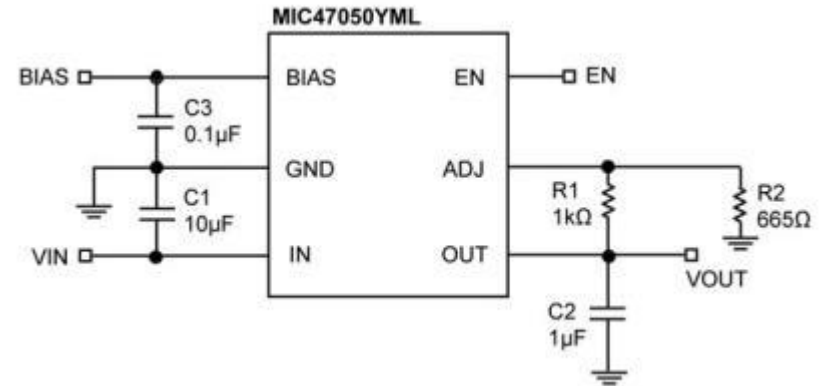
## Features:

- Operating voltage range:
  - Input Supply: 1.0V to 3.6V
  - Bias Supply: 2.3V to 5.5V
- 0.8V to 2.0V output voltage range
- PSRR >50dB at 100kHz
- Stable with a 1 $\mu$ F ceramic output capacitor
- Low dropout voltage of 80mV at 1A
- High output voltage accuracy:
  - $\pm 1.5\%$  initial accuracy
  - $\pm 2\%$  over temperature
- UVLO on both supply voltages for easy turn-on
- ePad MSOP-8 -- small form factor power package
- Thermally enhanced 2mm x 2mm MLF<sup>®</sup> -- smallest solution



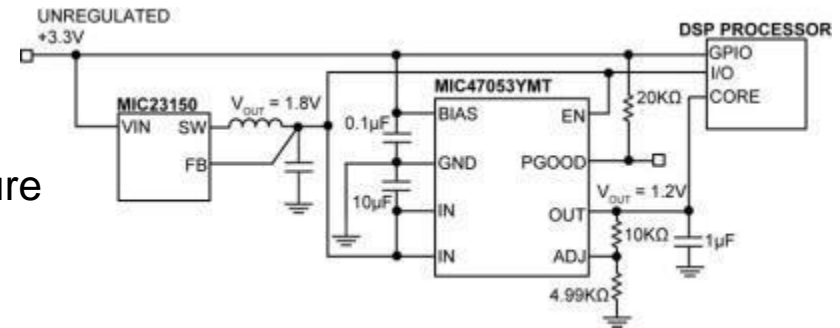
## Features:

- Input voltage range: 1.0V to 3.6V
- Stable with 1 $\mu$ F ceramic output capacitor
- $\pm 1.5\%$  initial output voltage accuracy
- Bias supply voltage range: 2.3V to 5.5V
- Adjustable output voltage range: 0.4V to 2.0V
- Logic-level enable input
- 400mA maximum output current per LDO
- Very fast transient response
- UVLO on both supply packages
- Thermally enhanced 2mm x 2mm MLF<sup>®</sup> and –  
– Thin MLF<sup>®</sup> packages
- Junction temperature range of -40 $^{\circ}$ C to +125 $^{\circ}$ C
- Low dropout voltage ULDO<sup>™</sup>: 44mV at 500mA
- Recommended for Automotive Design



## Features:

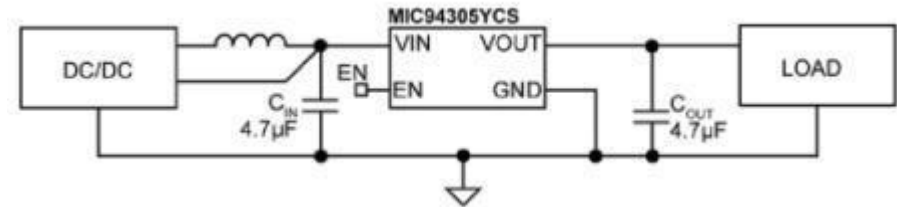
- Input voltage range: 1.0V to 3.6V
- Stable with 1 $\mu$ F ceramic output capacitor
- Low dropout voltage: 49mV at 500mA
- $\pm 2\%$  initial output voltage accuracy over temperature
- Bias supply voltage range: 2.3V to 5.5V
- Adjustable output voltage range down to 0.4V
- Logic-level enable input
- UVLO on both supply voltages
- High bandwidth - very fast transient response
- Low shutdown current: 0.1 $\mu$ A typical
- Thermally enhanced 2mm x 2mm Thin DFN package
- Junction temperature range of -40°C to +125°C





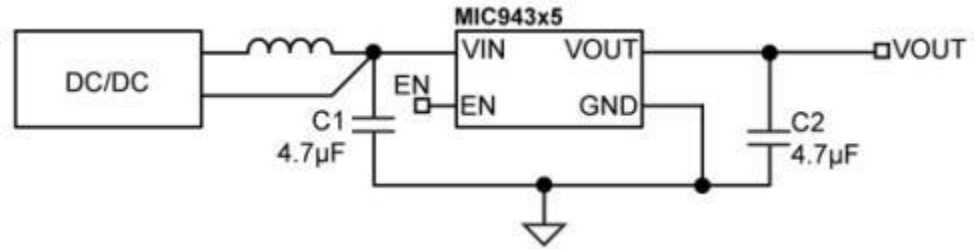
## Features:

- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide –  
- frequency - band: >60dB from 40kHz –  
- to 5MHz
- Rated to 500mA output current
- Current-limit and thermal-limit protected
- 1.6mm x 1.6mm, 6-pin Thin DFN
- Logic-controlled enable pin
- -40°C to +125°C junction temperature range



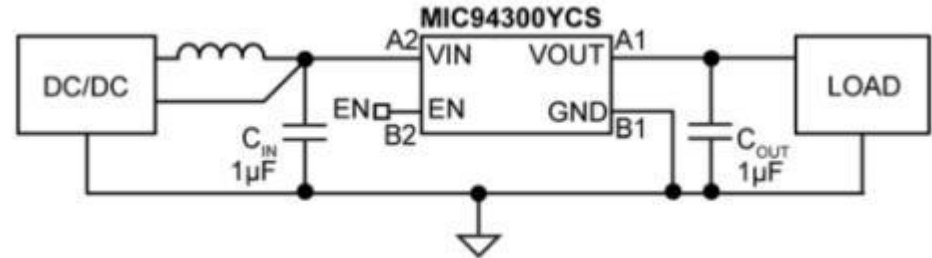
## Features:

- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide –
  - frequency band: >50dB from –
  - 10Hz to 5MHz at 500mA load
- Rated to 500mA output current
- Fixed and adjustable output voltages
- Optional output auto-discharge when disabled
- Current-limit and thermal-limit protected
- 1.6mm x 1.6mm, 6-pin Thin DFN
- -40°C to +125°C junction temperature range



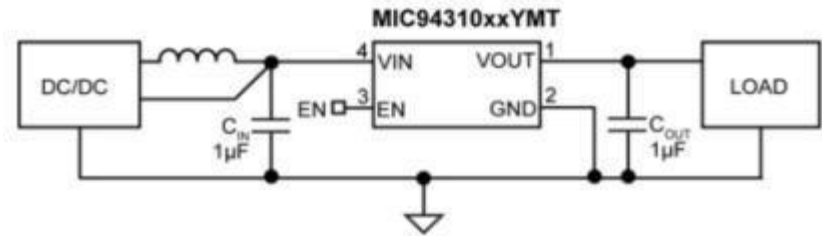
## Features:

- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide –
  - frequency band: >60dB from 40kHz –
  - to 5MHz
- Rated to 200mA output current
- Current-limit and thermal-limit protected
- 1.2mm x 1.6mm, 4-pin Thin MFL®
- Logic-controlled enable pin
- -40°C to +125°C junction temperature range



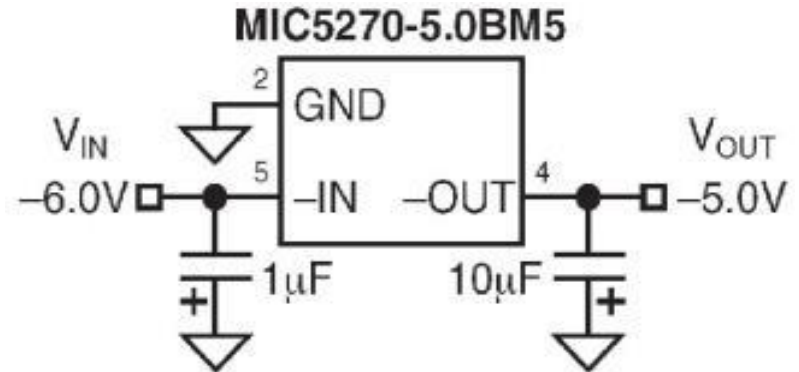
## Features:

- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide –
  - frequency band: >50dB from –
  - 10Hz to 10MHz at 200mA load
- Rated to 200mA output current
- -40°C to +125°C junction temperature range
- Fixed output voltages
- Current-limit and thermal-limit protected
- 1.2mm x 1.6mm, 4-pin Thin DFN
- 5-pin SOT-23
- Logic-controlled enable pin



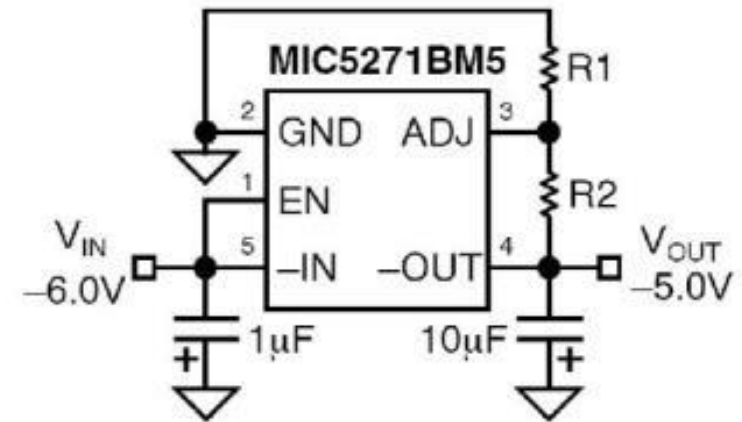
## Features:

- Stable with ceramic or tantalum capacitor
- Low dropout voltage:
  - 500mV at 100mA
- Tight initial accuracy:  $\pm 2\%$
- Tight load and line regulation
- Low ground current:
  - 35 $\mu$ A at load equals 100 $\mu$ A
- Thermal shutdown
- Current limiting
- IttyBitty® SOT-23-5 packaging



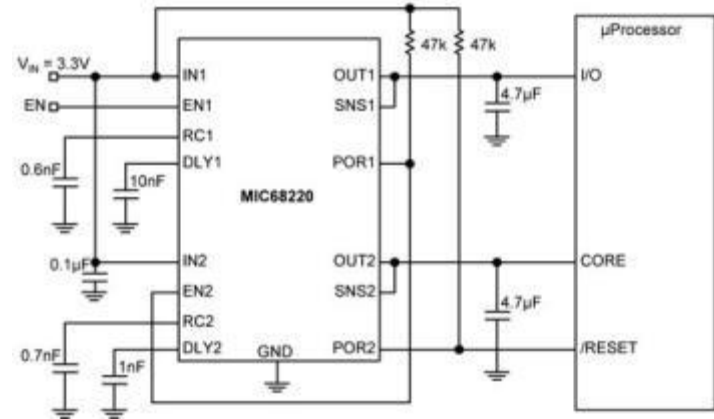
## Features:

- Stable with ceramic or tantalum capacitor
- Positive and negative enable thresholds
- Low dropout voltage: 500mV at 100mA
- Low ground current: 35 $\mu$ A at load equals 100 $\mu$ A
- Tight initial accuracy:  $\pm 2\%$
- Tight load and line regulation
- Thermal shutdown
- Current limiting
- SOT-23-5 packaging
- Zero off-mode current



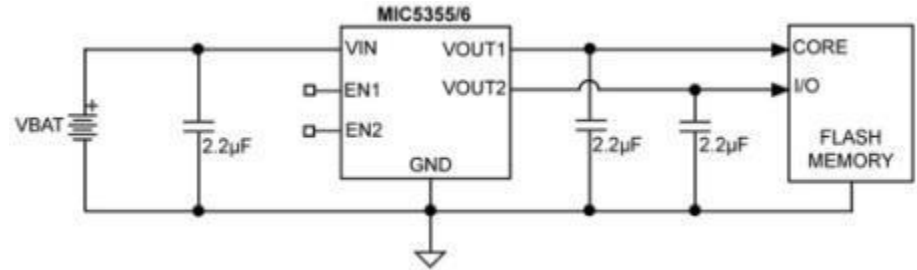
## Features:

- Stable with 4.7 $\mu$ F ceramic output capacitor
- Input voltage range: 1.65V to 5.5V
- $\pm 1.0\%$  initial output tolerance
- 2A maximum output current - peak start up
- 1A Continuous operating current
- Programmable Ramp Control™ with:
  - For in-rush current limiting
  - Slew rate control of the output voltage
- Power-on Reset (POR) supervisor
  - Programmable delay time
- Single Master can control multiple Slave –
  - regulators with tracking output voltages
- Tiny 4mm x 5mm MLF® package
- Maximum dropout ( $V_{IN} - V_{OUT}$ ) of 500mV –
  - over temperature at 1A output current
- Fixed and adjustable output voltages
- Thermal shutdown and current limit protection



## Features:

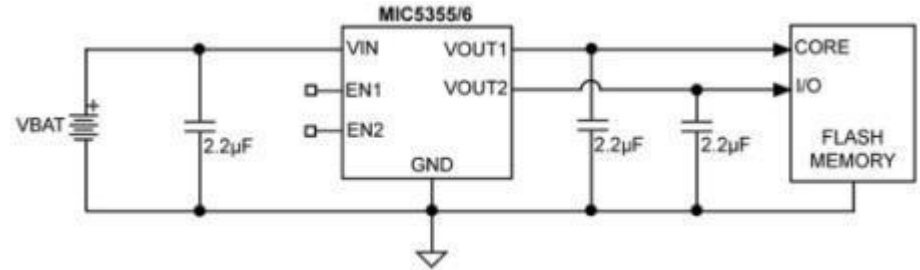
- 2.5V to 5.5V input voltage range
- 2% initial output accuracy
- Wide output voltage range: 1.0V to 3.3V
- Low quiescent current: 38 $\mu$ A per output
- Low shutdown current : <1 $\mu$ A typical
- $\mu$ Cap stable with 2.2 $\mu$ F ceramic capacitor
- Low dropout voltage: 350mV at 500mA
- Excellent load/line transient response
- Independent logic controlled enable pins
- Output discharge circuit (MIC5356)
- Current and thermal limit protection
- Power 8-pin ePad MSOP package





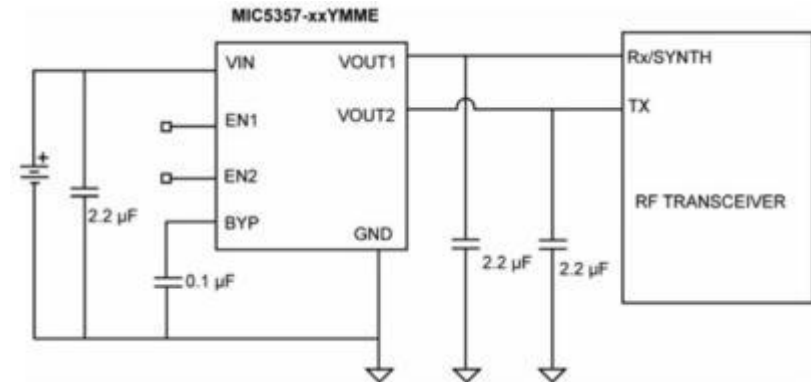
## Features:

- 2.5V to 5.5V input voltage range
- 2% initial output accuracy
- Wide output voltage range: 1.0V to 3.3V
- Low quiescent current: 38 $\mu$ A per output
- Very low quiescent current in shutdown: -  
- <1 $\mu$ A typical
- $\mu$ Cap stable with 2.2 $\mu$ F ceramic capacitor
- Low dropout voltage: 350mV at 500mA
- Excellent load/line transient response
- Independent logic controlled enable pins
- Output discharge circuit (MIC5356)
- Current and thermal limit protection
- Power 8-pin ePad MSOP package



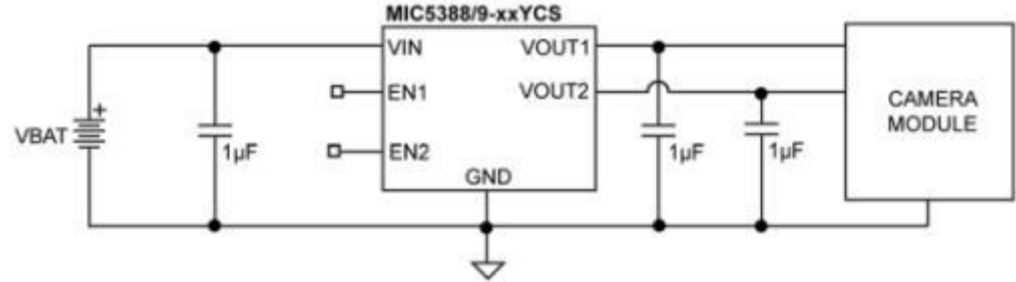
## Features:

- 2.6V to 5.5V input voltage range
- Ultra-low output noise: 51 $\mu$ Vrms
- $\pm$ 2% initial output accuracy
- Small 8-pin ePad MSOP package
- Excellent Load/Line transient response
- Ultra-low dropout voltage: 130mV @ 500mA
- Fast start up time: 38 $\mu$ s
- $\mu$ Cap stable with 2.2 $\mu$ F ceramic capacitors
- Thermal shutdown protection
- Low quiescent current: 160 $\mu$ A with both outputs –  
- at maximum load



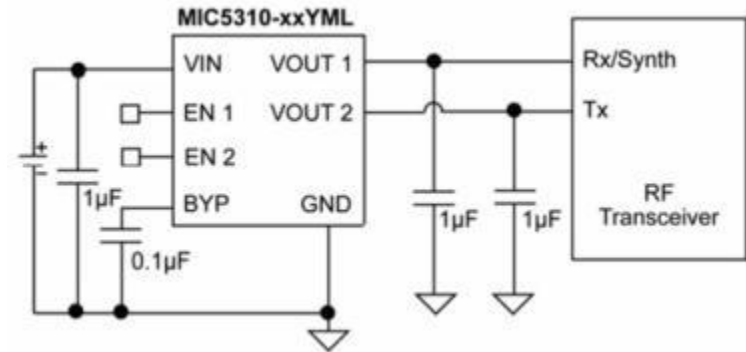
## Features:

- 2.5V to 5.5V input voltage range
- Independent enable pins
- High output accuracy:  $\pm 2\%$
- Low quiescent current:
  - 32 $\mu$ A per LDO
- Stable with 1 $\mu$ F ceramic –
  - output capacitors
- Two 200mA peak output current LDOs
- Low dropout voltage: 175mV at 150mA
- Output discharge circuit (MIC5389)
- Thermal shutdown protection
- Current limit protection
- 6-bump 1.5mm x 1.0mm WLCSP package



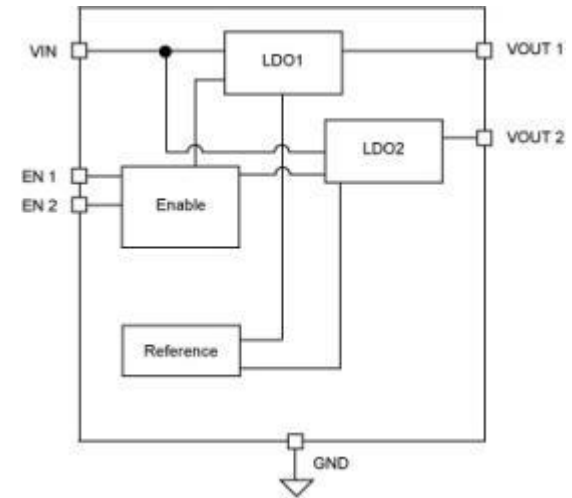
## Features:

- Ultra-low dropout voltage ULDO 35mV @ 150mA
- High PSRR: >70dB @ 1KHz
- Ultra-low output noise: 30 $\mu$ Vrms
- $\pm$ 2% initial output accuracy
- 2.3V to 5.5V input voltage range
- Tiny 8-pin 2mm x 2mm MLF<sup>®</sup> leadless package
- Excellent load/line transient response
- Fast start-up time: 30 $\mu$ s
- $\mu$ Cap stable with 1 $\mu$ F ceramic capacitor
- Thermal shutdown protection
- Low quiescent current: 75 $\mu$ A per output
- Current limit protection



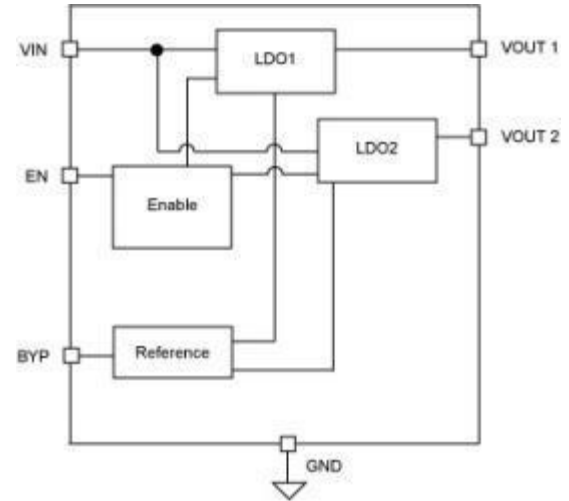
## Features:

- 2.3V to 5.5V input voltage range
- Ultra-low dropout voltage ULDO: 35mV @ 150mA
- Independent enable pins
- Tiny 6-pin 1.6mm x 1.6mm Thin MLF® leadless package
- Low cost TSOT-23-6 package
- PSRR: >65dB on each LDO
- 150mA output current per LDO
- $\mu$ Cap stable with 1 $\mu$ F ceramic capacitor
- Low quiescent current: 85 $\mu$ A per output
- Fast turn-on time: 30 $\mu$ s
- Thermal shutdown protection
- Current limit protection



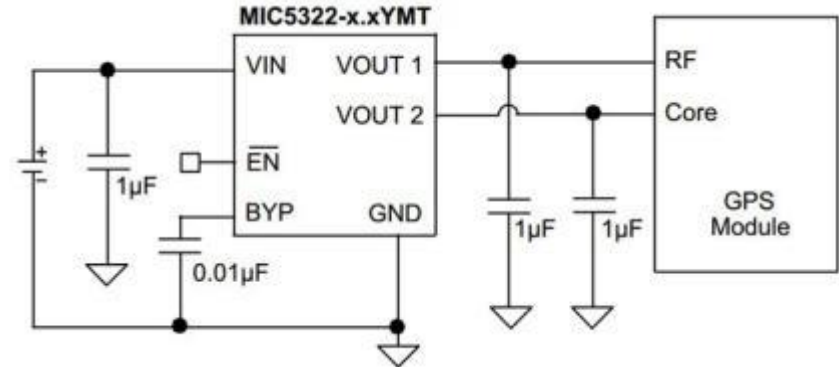
## Features:

- 2.3V to 5.5V input voltage range
- Ultra-low dropout voltage ULDO: 35mV @ 150mA
- Tiny 6-pin 1.6mm x 1.6mm MLF® leadless package
- Low cost TSOT-23-6 package
- Bypass pin for improved noise performance
- High PSRR: >75dB on each LDO
- Ultra low noise output: > 30 $\mu$ Vrms
- Dual 150mA outputs
- $\mu$ Cap stable with 1 $\mu$ F ceramic capacitor
- Low quiescent current: 150 $\mu$ A per output
- Fast turn-on time: 45 $\mu$ s
- Thermal shutdown protection
- Current limit protection



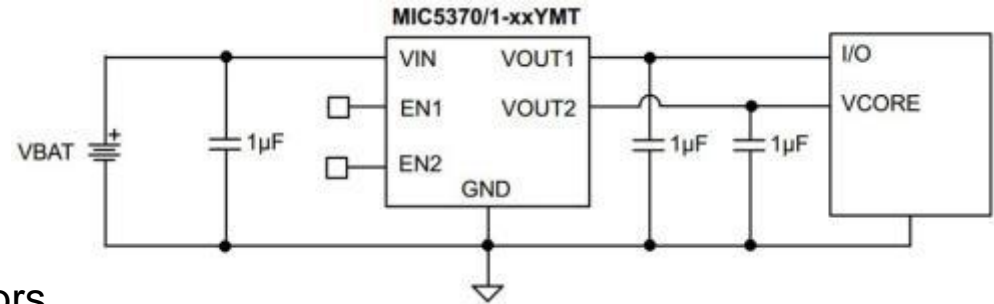
## Features:

- 2.3V to 5.5V input voltage range
- Dual 150mA outputs
- $\mu$ Cap stable with 1 $\mu$ F ceramic capacitor
- Low quiescent current: 150 $\mu$ A
- Fast turn-on time: 45 $\mu$ s
- Ultra-low dropout voltage ULDO: 35mV –  
- @ 150mA
- Tiny 6-pin 1.6mm x 1.6mm Thin MLF® -  
- leadless package
- Bypass pin for improved noise performance
- High PSRR: >75dB on each LDO
- Ultra-low noise output: > 30 $\mu$ Vrms
- Thermal shutdown protection
- Current limit protection



## Features:

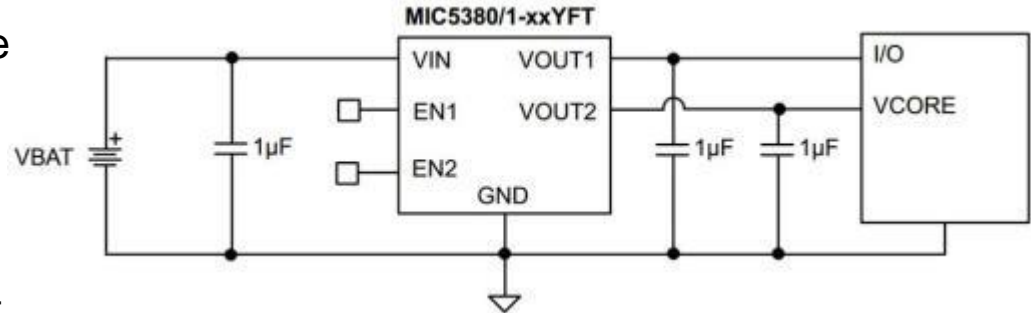
- 2.5V to 5.5V input voltage range
- Two 150mA output current LDOs
- High output accuracy:
  - $\pm 2\%$  initial accuracy
- Low quiescent current 32 $\mu$ A per LDO
- Stable with 1 $\mu$ F ceramic output capacitors
- Independent enable pins
- Low dropout voltage: 155mV at 150mA
- Thermal shutdown protection
- Current limit protection
- Output discharge circuit (MIC5371)
- 6-pin 1.6mm x 1.6mm Thin MLF® package





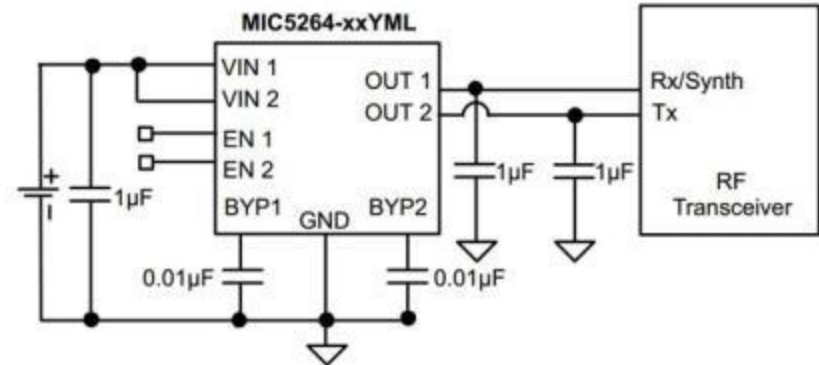
## Features:

- 6-pin 1mm x 1mm Thin MLF® package
- 2.5V to 5.5V input voltage range
- 150mA output current per LDO
- High output accuracy  $\pm 1\%$  typical
- Low quiescent current 32 $\mu$ A per LDO
- Stable with 0402 1 $\mu$ F ceramic output –  
- capacitors
- Low dropout voltage: 155mV at 150mA
- Output discharge circuit (MIC5381)
- Independent enable pins
- Thermal shutdown protection
- Current limit protection



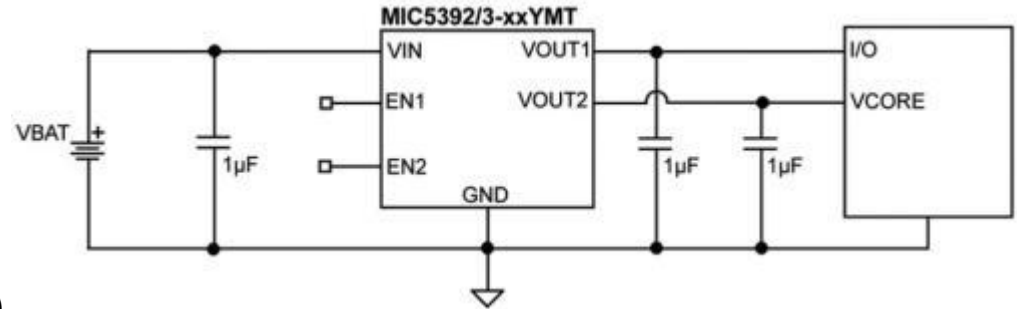
## Features:

- 2.7V to 5.5V supply voltage
- Low 90 $\mu$ A quiescent current per LDO
- Tiny 2.5mm x 2.5mm MLF<sup>®</sup> package
- Low noise: 57 $\mu$ Vrms
- High PSRR: 70dB at 1kHz
- Low dropout voltage: 210mV at 150mA
- Stable with ceramic output capacitors
- Independent enable pins
- Fast transient response
- Active shutdown on both outputs



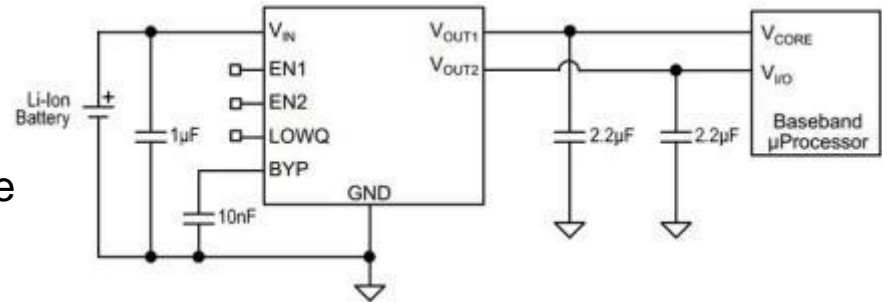
## Features:

- 2.5V to 5.5V input voltage range
- Two 150mA output current LDOs
- Independent enable pins
- High output accuracy:  $\pm 2\%$  initial –  
- accuracy
- Low quiescent current (32 $\mu$ A per LDO)
- Stable with 1 $\mu$ F ceramic output capacitors
- Low dropout voltage (155mV at 150mA)
- Thermal-shutdown protection
- Current-limit protection
- Internal 25 $\Omega$  output discharge circuit (MIC5393)
- Tiny 6-pin 1.2mm x 1.2mm Thin DFN package



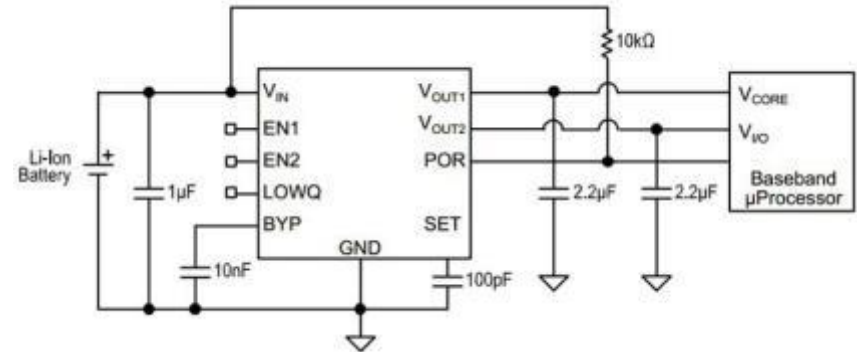
## Features:

- Input voltage range: 2.25V to 5.5V
- LowQ® Mode:
  - 7 $\mu$ A total quiescent current
  - 10mA output current capable LowQ® mode
  - Logic level control with external pin
- Stable with ceramic output capacitor
- 2 LDO outputs: 300mA each
- Tiny 10-pin 3mm x 3mm MLF® package
- Low dropout voltage of 60mV @ 150mA
- Ultra-low quiescent current of 28 $\mu$ A total in full current mode
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection



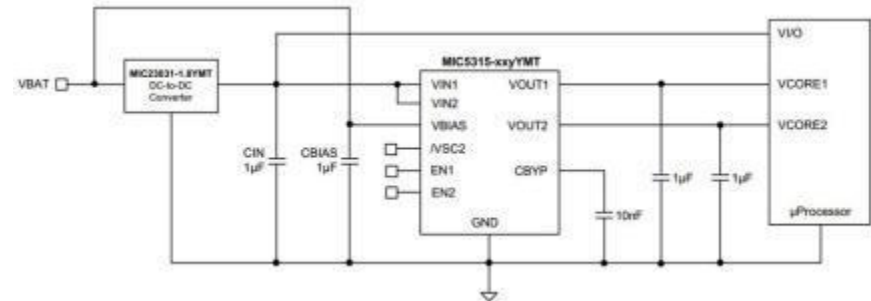
## Features:

- Input voltage range: 2.25V to 5.5V
- LowQ® Mode:
  - 7 $\mu$ A total quiescent current
  - 10mA output current capable LowQ® mode
  - Logic level control with external pin
- Stable with ceramic output capacitor
- 2 LDO outputs: 300mA each
- Integrated power-on reset (POR) with –  
- adjustable delay time
- Tiny 3mm x 3mm MLF®-10 package
- Low dropout voltage of 60mV @ 150mA
- Ultra-low quiescent current of 28 $\mu$ A total in full current mode
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection



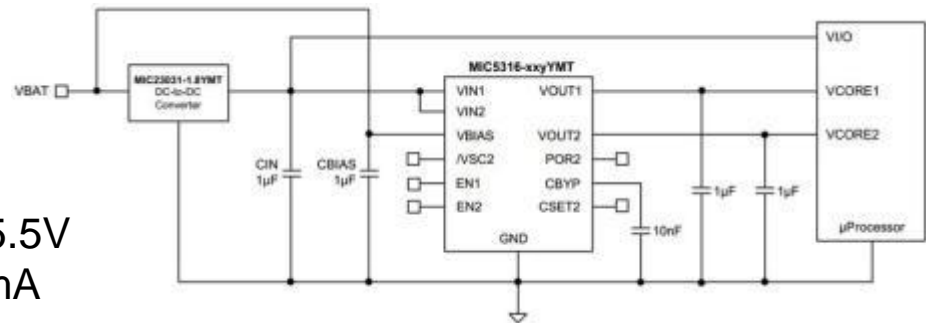
### Features:

- 300mA output current for each LDO
- Voltage select function
- Dual low voltage regulator inputs: 1.7V to 5.5V
- Low output voltage range: 0.8V to 2.0V
- Ultra-low dropout voltage of 85mV @ 300mA
- Stable with 1  $\mu$ F ceramic output capacitors
- Very fast transient response
- Thermal shutdown and current limit protection
- Tiny 10-pin 2mm x 2mm Thin MLF® package



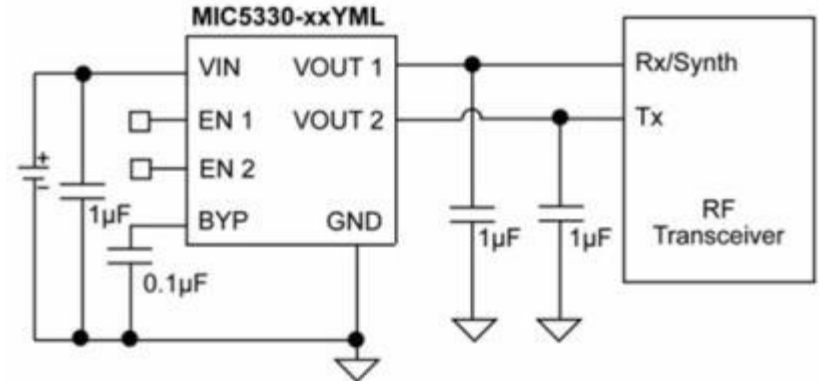
## Features:

- 300mA output current for each LDO
- Voltage select function
- Low output voltage range: 0.8V to 2.0V
- Very fast transient response
- Dual low voltage regulator inputs: 1.7V to 5.5V
- Ultra-low dropout voltage of 85mV @ 300mA
- Power on Reset output with adjustable delay
- Stable with 1 $\mu$ F ceramic output capacitors
- Thermal shutdown and current limit protection
- Tiny 12-pin 2.5mm x 2.5mm Thin MLF® package



## Features:

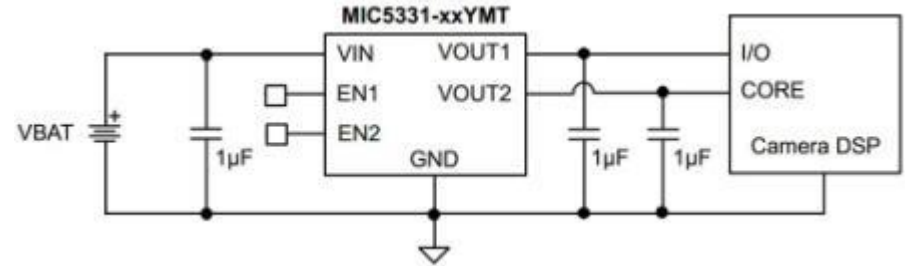
- 2.3V to 5.5V input voltage range
- High PSRR: >70dB @ 1KHz
- Ultra-low output noise: 30 $\mu$ Vrms
- $\pm$ 2% initial output accuracy
- Fast start-up time: 30 $\mu$ s
- Tiny 8-pin 2mm x 2mm MLF® -  
- leadless package
- Excellent Load/Line transient response
- Ultra-low dropout voltage ULDO 75mV @ 300mA
- 300mA output current per LDO
- Thermal shutdown protection
- Low quiescent current: 75 $\mu$ A per output
- Current limit protection





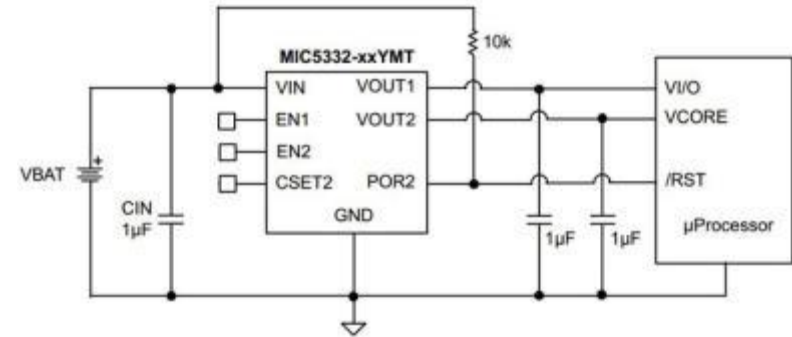
## Features:

- 2.3V to 5.5V input voltage range
- 300mA output current per LDO
- Very low quiescent current: 25 –  
-  $\mu\text{A}$  per LDO
- High PSRR: >65dB on each LDO
- Stable with 1  $\mu\text{F}$  ceramic output –  
- capacitors
- Tiny 8-pin 2mm x 2mm Thin MLF® package
- Ultra-low dropout voltage: 120mV @ 300mA
- Low output voltage noise: 50  $\mu\text{V}_{\text{rms}}$
- Thermal shutdown protection
- Current limit protection



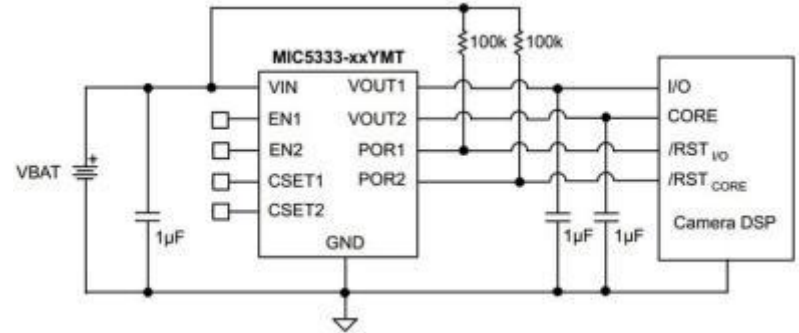
## Features:

- POR output with programmable delay on LDO2
- 300mA output current per LDO
- Very low quiescent current: 25  $\mu$ A per LDO
- High PSRR: >65dB on each LDO
- 2.3V to 5.5V input voltage range
- Stable with 1 $\mu$ F ceramic output capacitors
- Tiny 8-pin 2mm x 2mm Thin MLF<sup>®</sup> package
- Ultra-low dropout voltage: 120mV @ 300mA
- Low output voltage noise: 50  $\mu$ V<sub>rms</sub>
- Thermal shutdown protection
- Current limit protection



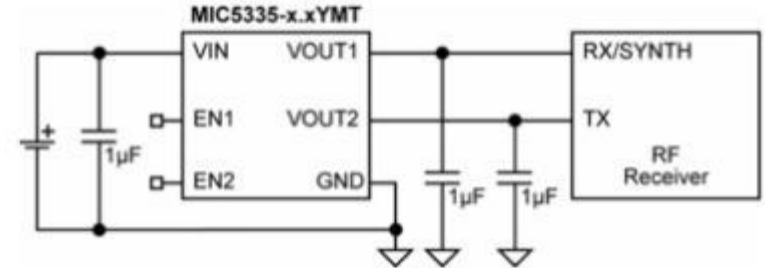
## Features:

- 2.3V to 5.5V input voltage range
- 300mA output current per LDO
- Very low quiescent current:
  - 25 $\mu$ A per LDO
- Stable with 1 $\mu$ F ceramic output –  
- capacitors
- POR output with programmable –  
- delay for each LDO
- High PSRR: >65dB on each LDO
- Tiny 10-pin 2.5mm x 2.5mm Thin MLF® package
- Ultra-low dropout voltage: 120mV @ 300mA
- Low output voltage noise: 50  $\mu$ V<sub>rms</sub>
- Thermal shutdown protection
- Current limit protection



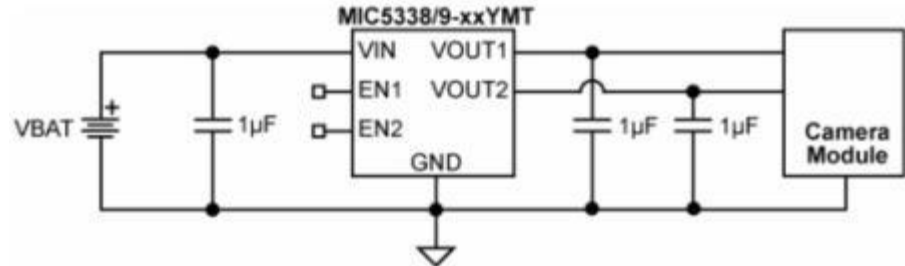
## Features:

- 2.3V to 5.5V input voltage range
- Ultra-low dropout voltage:
  - 75mV at 300mA
- Independent enable pins
- Ultra Thin 1.6mm x 1.6mm –
  - 6-pin MFL® package
- High PSRR: >65dB
- 300mA output current per LDO
- $\mu$ Cap Stable with 1 $\mu$ F ceramic capacitor
- Low quiescent current: 90 $\mu$ A/LDO
- Fast turn-on time: 30 $\mu$ s
- Low output voltage noise: 24 $\mu$ V<sub>rms</sub>
- Thermal shutdown protection
- Current limit protection



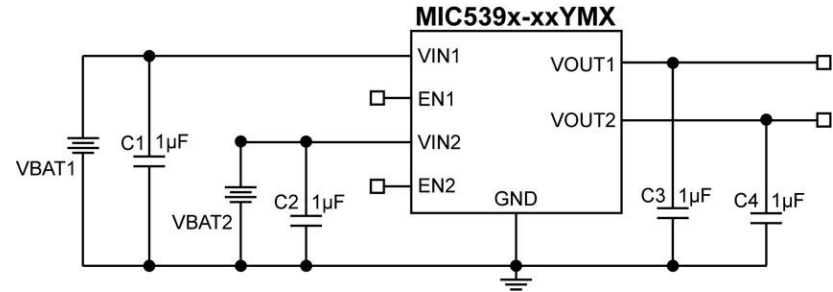
## Features:

- 2.5V to 5.5V input voltage range
- Two 300mA outputs
- High output accuracy: 2%
- Low quiescent current: 70 $\mu$ A total
- Stable with ceramic output capacitors
- Independent enable pins
- Low dropout voltage: 220mV at 300mA
- Low output noise
- Thermal shutdown protection
- Current limit protection
- Output discharge circuit (MIC5339)
- 6-pin 1.6mm x 1.6mm Thin MLF<sup>®</sup> package



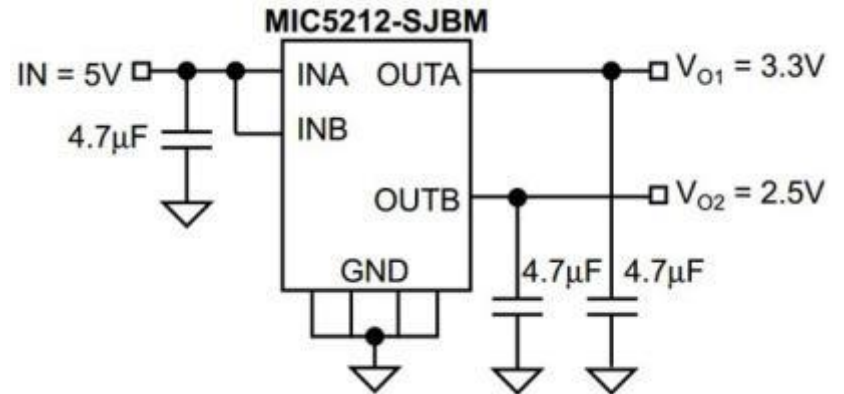
## Features:

- 2.5V to 5.5V input voltage range
- Independent power inputs
- Output voltage range from 1V to 3.3V
- Two 300mA outputs
- High output accuracy ( $\pm 2\%$ )
- Low quiescent current: 37 $\mu$ A typical/LDO
- Stable with 1 $\mu$ F ceramic output capacitors
- Low dropout voltage (160mV at 300mA)
- Internal enable pull-down (MIC5398, MIC5399)
- Output discharge circuit (MIC5397, MIC5399)
- Thermal-shutdown protection
- Current-limit protection
- 8-pin 1.2mm x 1.6mm Extra Thin DFN package



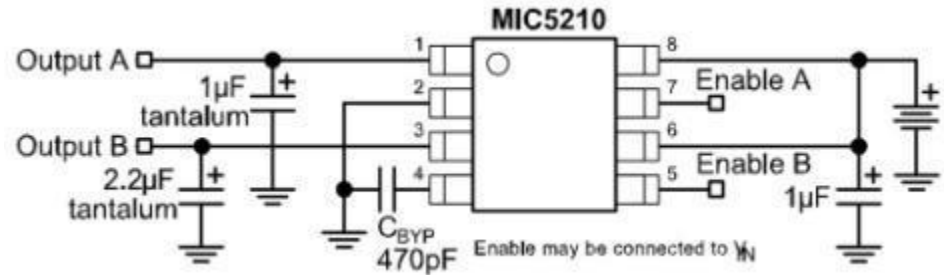
## Features:

- Fused lead frame SOIC-8
- Up to 500mA per regulator output
- Low quiescent current
- Low dropout voltage
- Tight load and line regulation
- Low temperature coefficient
- Current and thermal limiting
- Reversed input polarity protection



## Features:

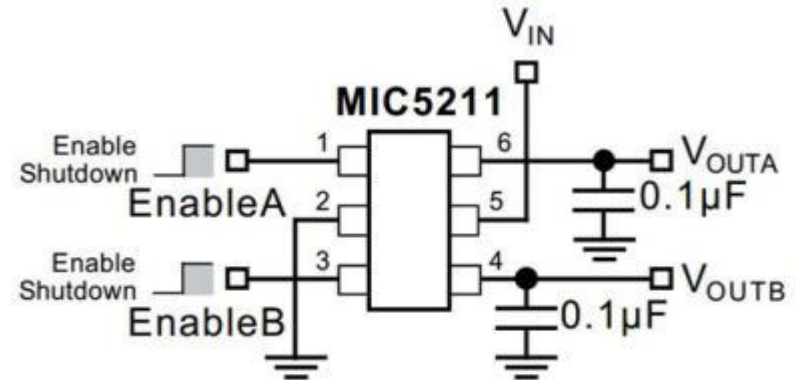
- Micrel Mini 8®; MSOP package
- Up to 150mA per regulator output
- Low quiescent current
- Low dropout voltage
- Wide selection of output voltages
- Tight load and line regulation
- Low temperature coefficient
- Current and thermal limiting
- Reversed input polarity protection
- Zero off-mode current
- Logic-controlled electronic enable





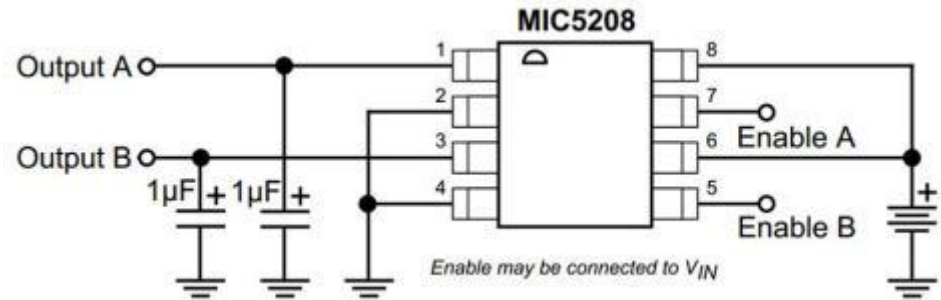
## Features:

- Stable with low-value ceramic or tantalum capacitors
- Independent logic controls
- Low quiescent current
- Low dropout voltage
- Mixed voltages available
- Tight load and line regulation
- Low temperature coefficient
- Current and thermal limiting
- Reversed input polarity protection
- Zero off-mode current
- Dual regulator in tiny SOT-23 package
- 2.5V to 16V input range



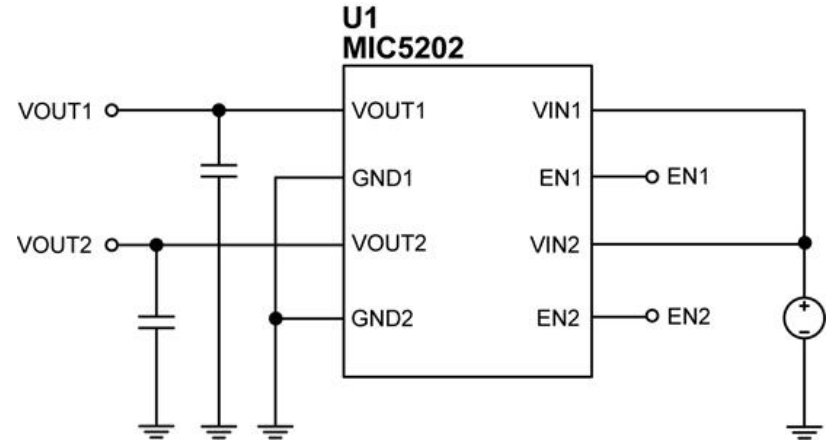
## Features:

- Micrel Mini 8® MSOP package
- Guaranteed 50mA output
- Low quiescent current
- Low dropout voltage
- Wide selection of output voltages
- Tight load and line regulation
- Low temperature coefficient
- Current and thermal limiting
- Reversed input polarity protection
- Zero off-mode current
- Logic-controlled electronic enable



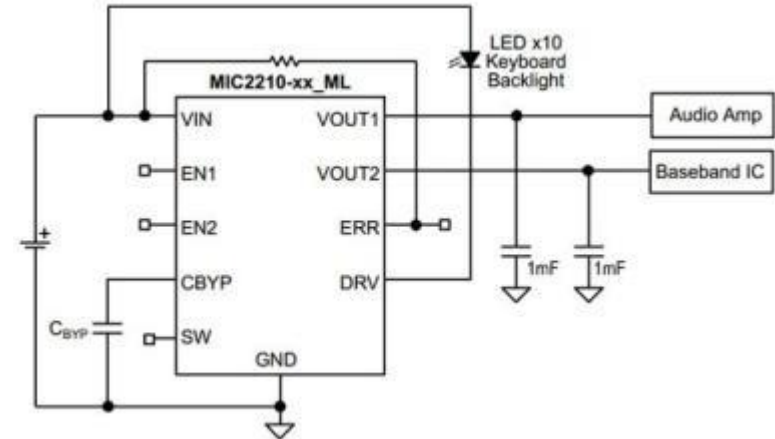
## Features:

- High output voltage accuracy
- Variety of output voltages
- Up to 100mA of continuous output current
- Low ground current
- Low dropout voltage
- Excellent line and load regulations
- Extremely low temperature coefficient
- Current and thermal limit protections
- Reverse-battery protection
- Zero off-mode current
- Logic-controlled electronic shutdown
- 8-pin SOIC package



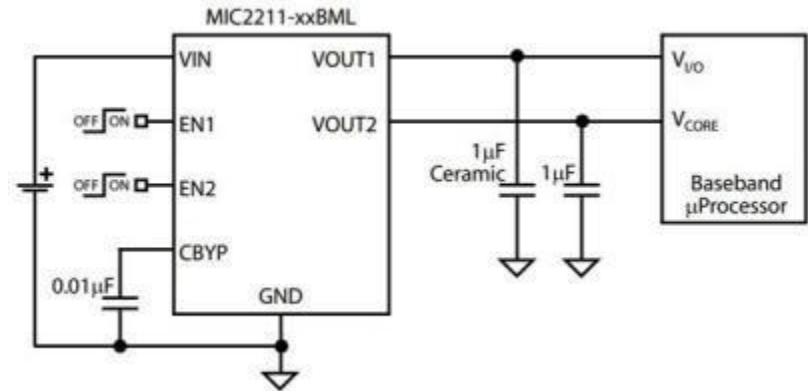
## Features:

- Input voltage range: 2.25V to 5.5V
- Stable with ceramic output capacitor
- 2 LDO outputs
- Output 1: 150mA output current
- Output 2: 300mA output current
- 1 Open-drain driver
- Low dropout voltage of 80mV @ 100mA
- Ultra-low quiescent current of 48 $\mu$ A
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection
- Tiny 10-pin 3mm x 3mm MLF<sup>®</sup> package



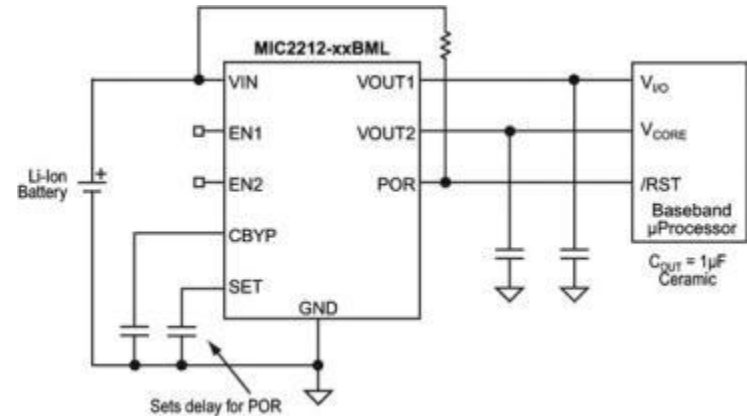
## Features:

- Input voltage range: 2.25V to 5.5V
- Stable with ceramic output capacitor
- 2 LDO outputs:
  - Output 1: 150mA output current
  - Output 2: 300mA output current
- Low dropout voltage of 80mV @ 100mA
- Ultra-low quiescent current of 48 $\mu$ A total -  
- (24 $\mu$ A/LDO)
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection
- Tiny 10-pin 3mm x 3mm MLF<sup>®</sup> package



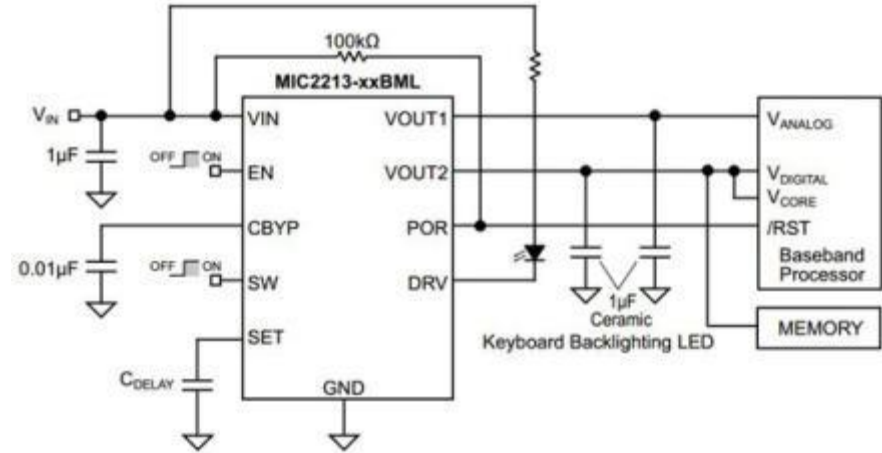
## Features:

- Input voltage range: 2.25V to 5.5V
- Stable with ceramic output capacitor
- 2 LDO outputs:
  - Output 1: 150mA output current
  - Output 2: 300mA output current
- Power-on reset function with adjustable –  
– delay time
- Low dropout voltage of 80mV @ 100mA
- Ultra-low quiescent current of 48 $\mu$ A
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection
- Tiny 10-pin 3mm x 3mm MLF<sup>®</sup> package



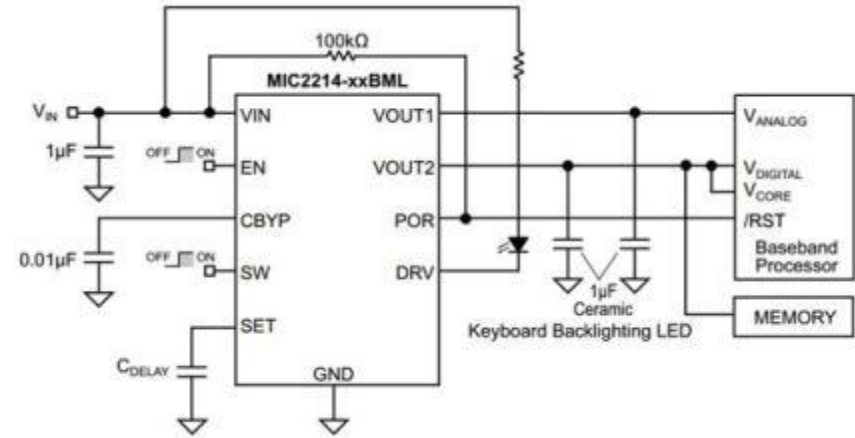
## Features:

- 2 LDO outputs:
  - Output 1: 150mA output current
  - Output 2: 300mA output current
- 1 Open-drain driver
- Sequencing between outputs 1 and 2
- Input voltage range: 2.25V to 5.5V
- Stable with ceramic output capacitor
- Power-on reset function with adjustable –  
- delay time
- Low dropout voltage of 80mV @ 100mA
- Ultra-low quiescent current of 48 $\mu$ A
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Tiny 3mm x 3mm MLF<sup>®</sup>-10 package



## Features:

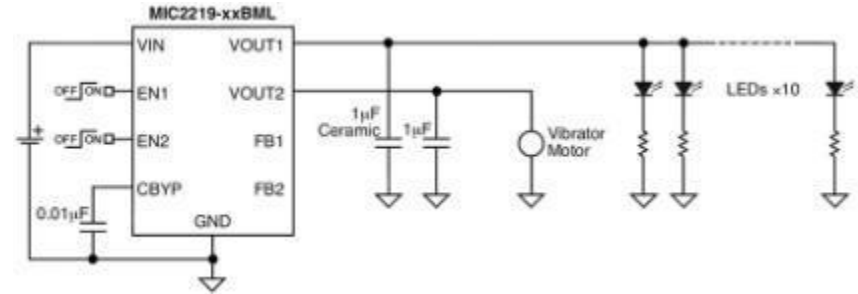
- Input voltage range: 2.25V to 5.5V
- Stable with ceramic output capacitor
- 2 LDO outputs:
  - Output 1: 150mA output current
  - Output 2: 300mA output current
- 1 Open-drain driver
- Power-on reset function with adjustable –  
- delay time
- Low dropout voltage of 80mV @ 100mA
- Ultra-low quiescent current of 48 $\mu$ A
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection
- Tiny 3mm x 3mm MLF<sup>®</sup>-10 package





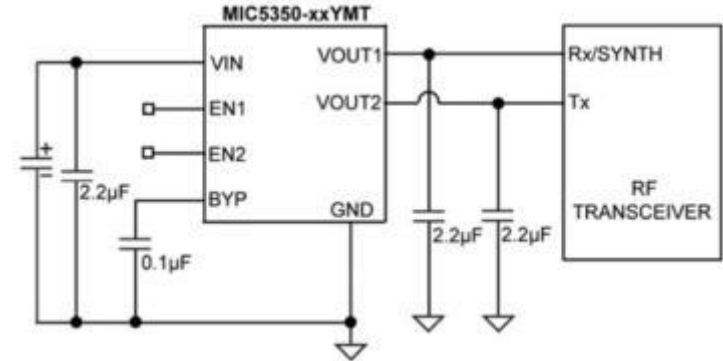
## Features:

- Input voltage range: 2.25V to 5.5V
- Stable with ceramic output capacitor
- 2 LDO outputs:
  - Output 1: 150mA output current
  - Output 2: 300mA output current
- Feedback pins externally accessible
- Low dropout voltage of 80mV @ 100mA
- Ultra-low quiescent current of 48 $\mu$ A –  
- total (24 $\mu$ A/LDO)
- High output accuracy:
  - $\pm 1.0\%$  initial accuracy
  - $\pm 2.0\%$  over temperature
- Thermal shutdown protection
- Current limit protection
- Tiny 10-pin 3mm x 3mm MFL<sup>®</sup> package



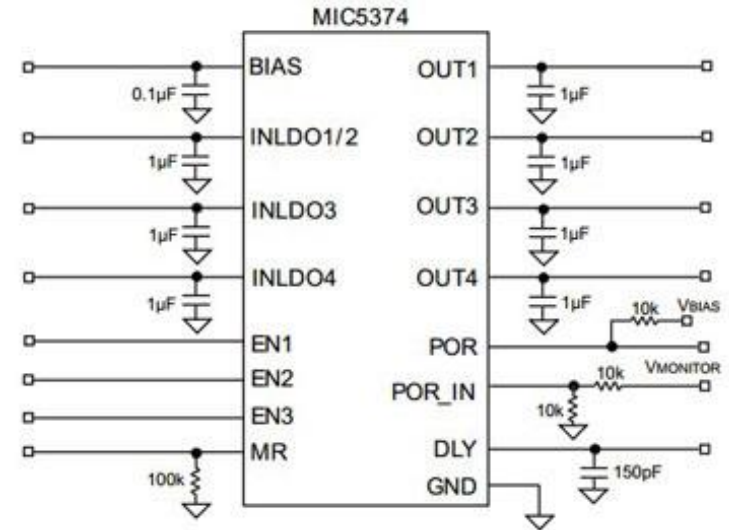
## Features:

- 2.6V to 5.5V input voltage range
- Ultra-low output noise: 30 $\mu$ Vrms
- $\pm$ 2% initial output accuracy
- Excellent Load/Line transient response
- Fast start-up time: 30 $\mu$ s
- Ultra-low dropout voltage: 75mV @ 300mA –  
- and 125mV @ 500mA
- $\mu$ Cap stable with 2.2 $\mu$ F ceramic capacitors
- Thermal shutdown protection
- Low quiescent current: 130 $\mu$ A with both outputs –  
- at maximum load
- Current limit protection
- 8-pin 2mm x 2mm Thin MLF® package



## Features:

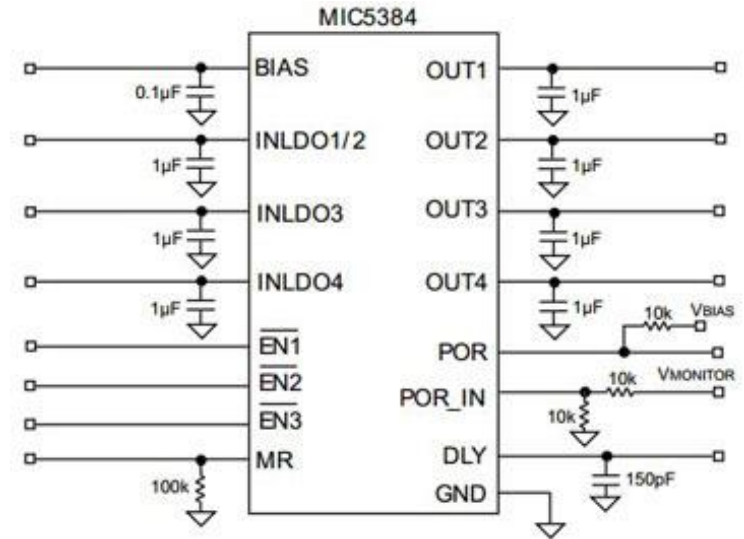
- 1.7V to 5.5V input supply voltage range
- Output current: 200mA LDO1/2/3, 1mA LDO4
- LDO4: Ultra low 8  $\mu$ A I BIAS for RTC support
- High output accuracy ( $\pm 2\%$ )
- Independent enable pins
- Thermal shutdown and current limit protection
- POR with user-defined voltage monitoring
- POR voltage input
- Adjustable delay time
- Manual reset pin
- Low dropout voltage: 170mV at 150mA
- High PSRR: 55dB at 1kHz on each LDO
- Stable with tiny ceramic output capacitors
- 2.5mm x 2.5mm Thin QFN 16-pin package



**Typical MIC5374-xxxxYMT Circuit**

## Features:

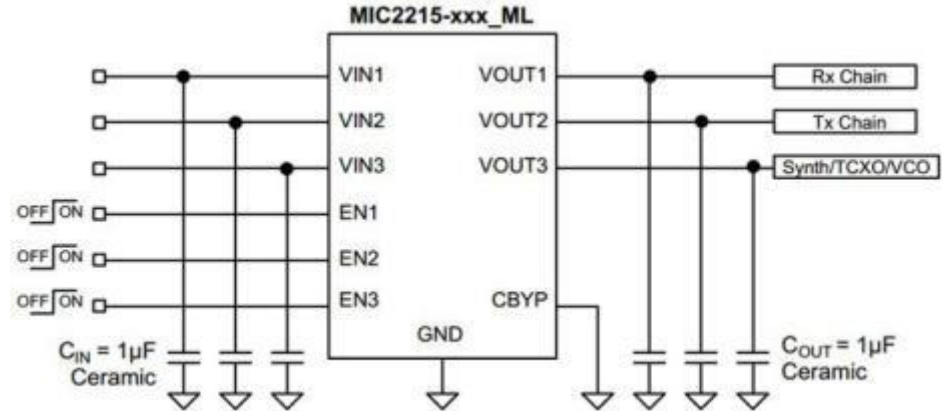
- 1.7V to 5.5V input supply voltage range
- Output current: 200mA LDO1/2/3, 1mA LDO4
- LDO4: Ultra low 8  $\mu$ A I BIAS for RTC support
- High output accuracy ( $\pm 2\%$ )
- Independent enable pins
- 2.5mm x 2.5mm Thin QFN 16-pin package
- Thermal shutdown and current limit protection
- POR with user-defined voltage monitoring
- POR voltage input
- Adjustable delay time
- Manual reset pin
- Low dropout voltage: 170mV at 150mA
- High PSRR: 55dB at 1kHz on each LDO
- Stable with tiny ceramic output capacitors



**Typical MIC5384-xxxxYMT Circuit**

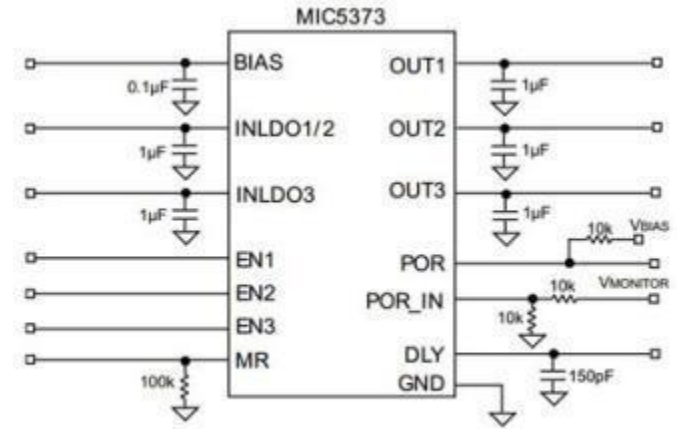
## Features:

- Input voltage range: +2.25V to +5.5V
- 70dB PSRR
- Stable with ceramic output capacitor
- High output accuracy:
- $\pm 1.0\%$  initial accuracy
- $\pm 2.0\%$  over temperature
- Low dropout voltage of 100mV –  
- @ 150mA
- Low quiescent current: 110 $\mu$ A per –  
- regulator
- Fast turn-on time: 30 $\mu$ s
- Zero off-mode current
- Thermal shutdown protection
- Current-limit protection
- 16-pin (4mm x 4mm) MLF<sup>®</sup> package



## Features:

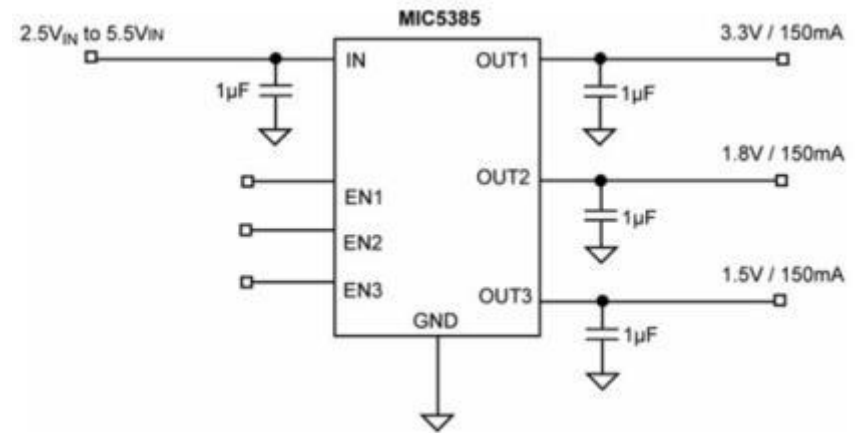
- 1.7V to 5.5V input supply voltage range
- Output current: 200mA LDO1/2/3
- High output accuracy (  $\pm 2\%$  )
- Independent enable pins
- POR with user-defined voltage monitoring:
  - POR voltage input
  - Adjustable delay time
  - Manual reset pin
- Low dropout voltage: 170mV at 150mA
- High PSRR: 55dB at 1kHz on each LDO
- Stable with tiny ceramic output capacitors
- Thermal shutdown and current limit protection
- 2.5mm x 2.5mm Thin MLF® 16-pin package



Typical MIC5373-xxxYMT Circuit

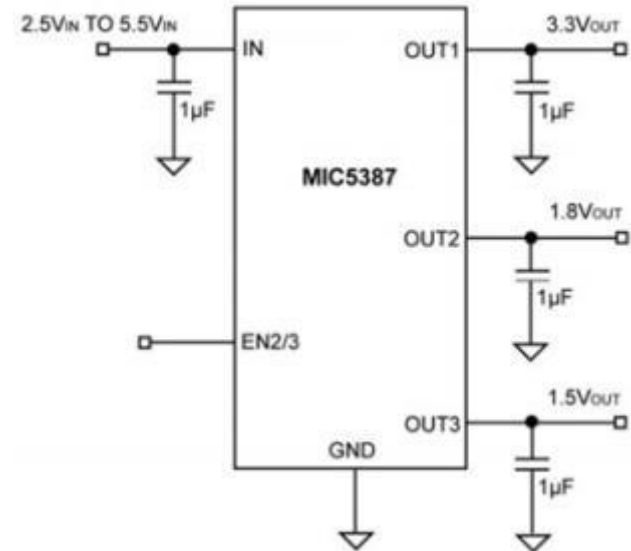
## Features:

- Input voltage range: 2.5V to 5.5V
- 150mA guaranteed output current for –  
– each output
- Stable with ceramic output capacitors
- Low dropout voltage: 180mV @ 150mA
- Excellent Load/Line Transient Response
- Low quiescent current: 32 $\mu$ A per LDO
- High PSRR: 70dB
- High output accuracy:
  - $\pm 2\%$  initial accuracy
- Thermal shutdown and current limit protection
- 2mm x 2mm Thin MLF



## Features:

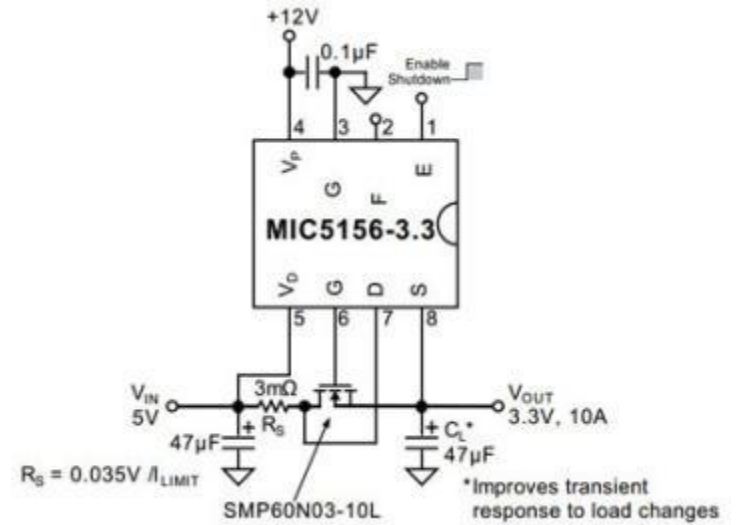
- Input voltage range: 2.5V to 5.5V
- 150mA guaranteed output current for each output
- Stable with ceramic output capacitors
- Low dropout voltage: 180mV @ 150mA
- Excellent Load/Line Transient Response
- Low quiescent current: 32 $\mu$ A per LDO
- High PSRR: 70dB
- High output accuracy:
  - $\pm 2\%$  initial accuracy
- Thermal-shutdown and current-limit protection
- Tiny 6-pin 1.6mm x 1.6mm Thin MLF





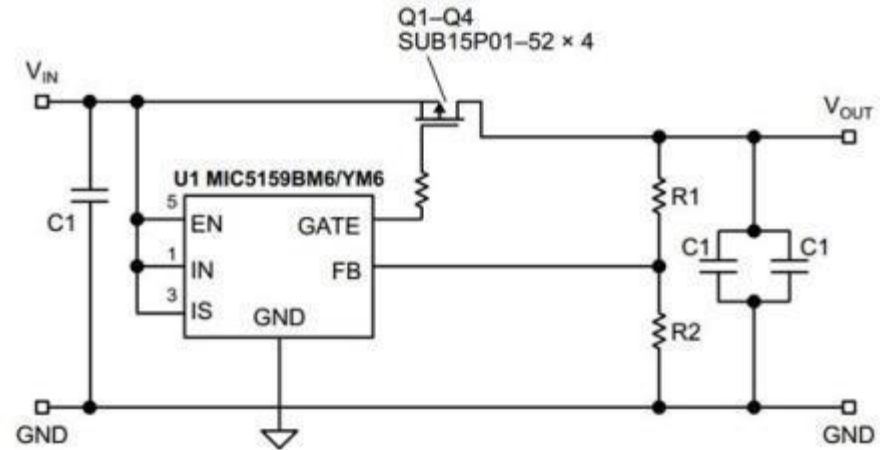
## Features:

- 4.5mA typical operating current
- <1µA typical standby current
- Low external parts count
- Optional current limit (35mV typical threshold)
- 1% initial output voltage tolerance in most –  
- configurations
- 2% output voltage tolerance over temperature
- Fixed output voltages of 3.3V, 5.0V (MIC5156)
- Fixed output voltages of 3.3V, 5.0V, 12V (MIC5157)
- Programmable (1.3V to 36V) with 2 resistors –  
- (MIC5156/8)
- Internal charge pump voltage tripler (MIC5157/8)
- Enable pin to activate or shutdown the regulator
- Internal gate-to-source protective clamp
- All versions available in DIP and SOIC



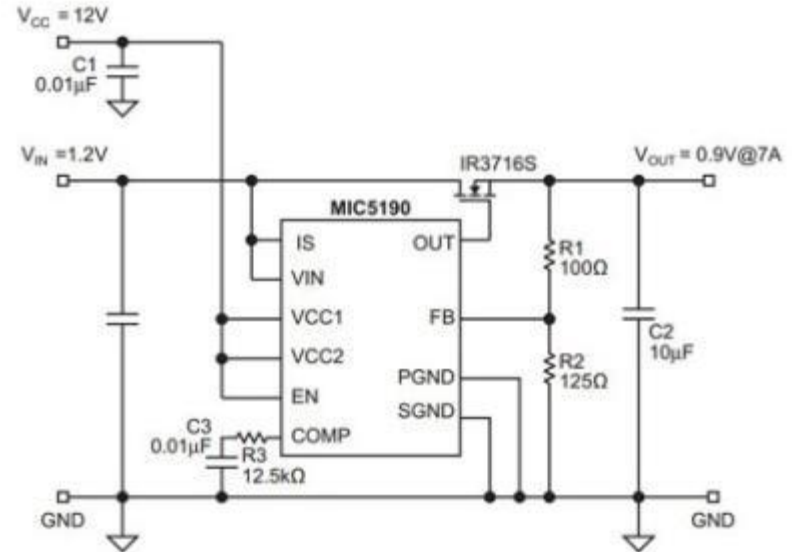
## Features:

- Fast transient response
- Input voltage range:  $V_{IN}$ : 1.65V to 5.5V
- $\pm 1.0\%$  initial output tolerance
- Stable with ceramic output capacitor
- Capable up to 10A
- Logic-controlled shutdown
- Programmable current limit
- Excellent line and load regulation –  
- specifications
- Fixed 1.8V or adjustable output –  
- voltage down to 1.25V
- Current limit protection
- Extended temperature range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- SOT-23-6 Package



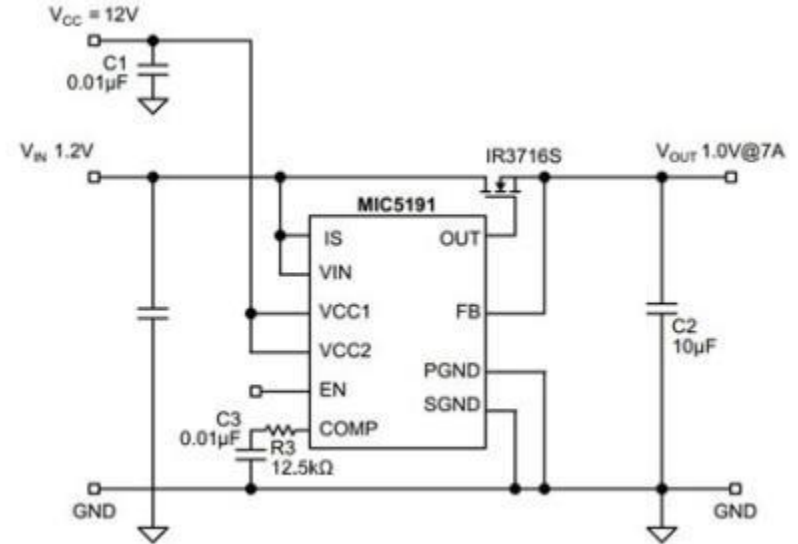
## Features:

- Input voltage range:
  - $V_{IN} = 0.9V$  to  $5.5V$
- $\pm 1.0\%$  initial output tolerance
- Dropout down to  $25mV$  @  $10A$
- Filters out switching frequency –
  - noise on input
- Very high large signal bandwidth  $>500kHz$
- PSRR  $>40dB$  at  $500kHz$
- Adjustable output voltage down to  $0.5V$
- Stable with any output capacitor
- Excellent line and load regulation –
  - specifications
- Logic controlled shutdown
- Current limit protection
- $3mm \times 3mm$  10-lead MLF® and –
  - MSOP-10 packages
- Available  $-40^{\circ}C$  to  $+125^{\circ}C$  junction –
  - temperature



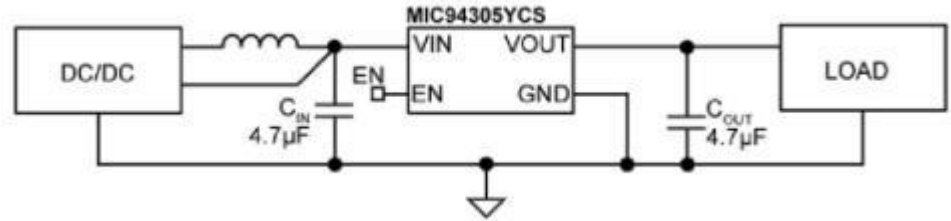
## Features:

- Input voltage range:
  - $V_{IN} = 1.0V$  to  $5.5V$
- $\pm 1.0\%$  initial output tolerance
- Dropout down to  $25mV$  @  $10A$
- Filters out switching frequency noise on input
- Very high large signal bandwidth  $>500kHz$
- PSRR  $>40dB$  at  $500kHz$
- Adjustable output voltage down to  $1.0V$
- Stable with any output capacitor
- Excellent line and load regulation specifications
- Logic controlled shutdown
- Current limit protection
- 10-lead MLF® and MSOP-10 packages
- Available  $-40^{\circ}C$  to  $+125^{\circ}C$  junction temperature



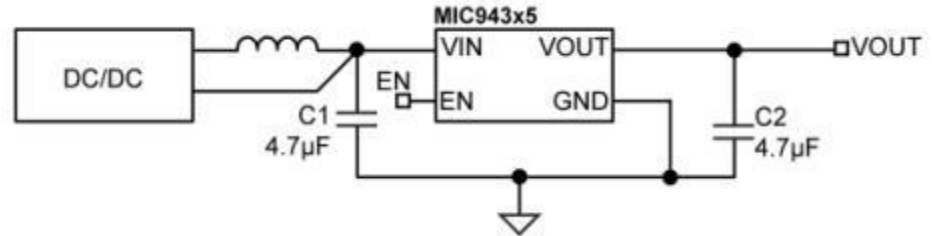
## Features:

- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide –
  - frequency band: >60dB from –
  - 40kHz to 5MHz
- Rated to 500mA output current
- Current-limit and thermal-limit protected
- 1.6mm x 1.6mm, 6-pin Thin DFN
- Logic-controlled enable pin
- -40°C to +125°C junction temperature range



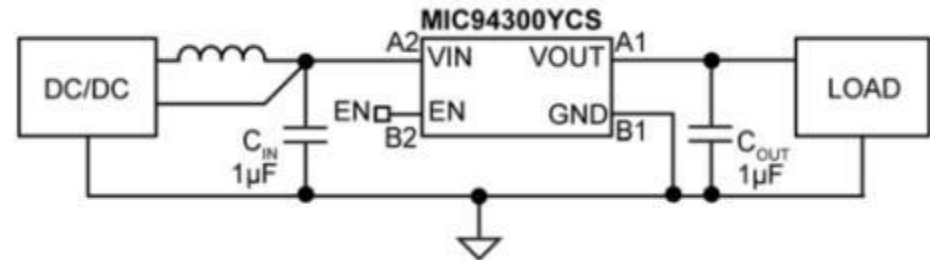
## Features:

- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide –
  - frequency band: >50dB from 10Hz –
  - to 5MHz at 500mA load
- Rated to 500mA output current
- Fixed and adjustable output voltages
- Optional output auto-discharge when disabled
- Current-limit and thermal-limit protected
- 1.6mm x 1.6mm, 6-pin Thin DFN
- -40°C to +125°C junction temperature range



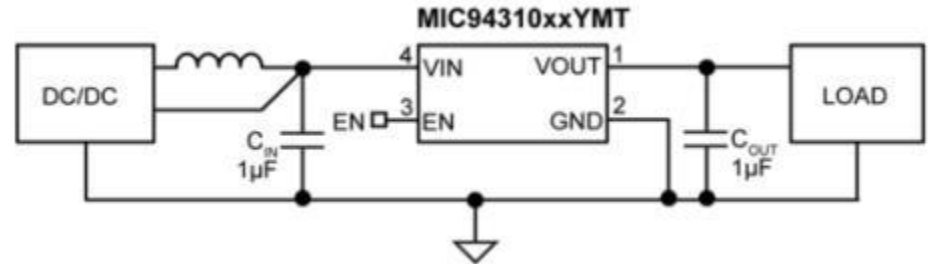
## Features:

- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide –
  - frequency band: >60dB from –
  - 40kHz to 5MHz
- Rated to 200mA output current
- Current-limit and thermal-limit protected
- 1.2mm x 1.6mm, 4-pin Thin MLF®
- Logic-controlled enable pin
- -40°C to +125°C junction temperature range



## Features:

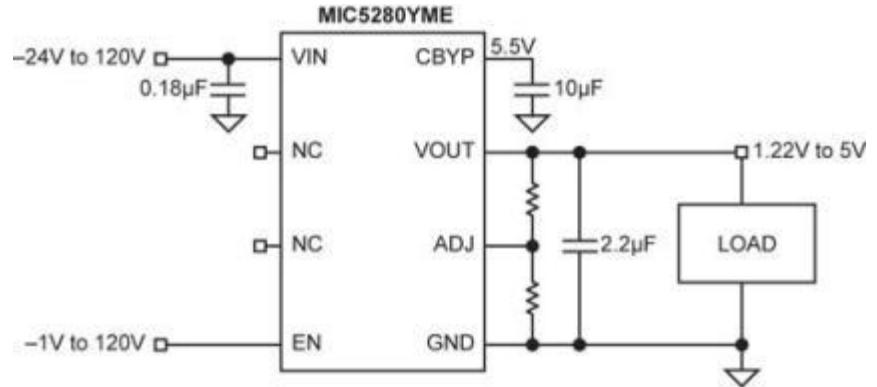
- 1.8V to 3.6V input voltage range
- Active noise rejection over a wide -  
- frequency band: Rated >50dB, 10Hz  
- 10MHz
- -40°C to +125°C junction temperature range
- Fixed output voltages
- Current-limit and thermal-limit protected
- 1.2mm x 1.6mm, 4-pin Thin DFN
- 5-pin SOT-23
- Logic-controlled enable pin





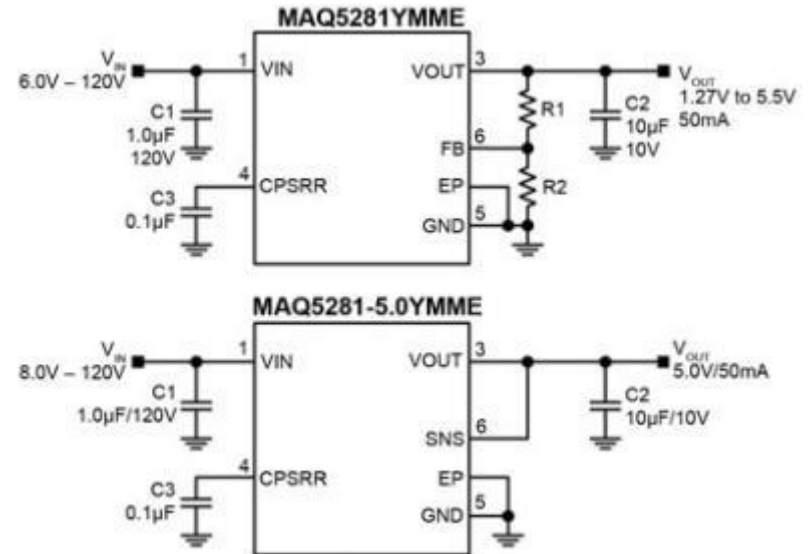
## Features:

- Wide input voltage range:
  - 4.5V to 120V DC
- Very low quiescent current:
  - 31 $\mu$ A typical
- 25mA guaranteed output current
- Adjustable output from 1.215V to 5V
- DC voltage protection down to -24V
- Ability to withstand up to +120V DC –  
- at the input
- Stable with ceramic output capacitors
- Ultra high PSRR >80dB for RF applications
- High output accuracy:
  - $\pm 2\%$  initial accuracy
  - $\pm 3\%$  over temperature ( -40°C to +125°C)
- Thermal shutdown and current limit protection
- Thermally efficient 8-pin ePad SOIC package
- AEC-Q100 qualified
- Recommended for Automotive Design



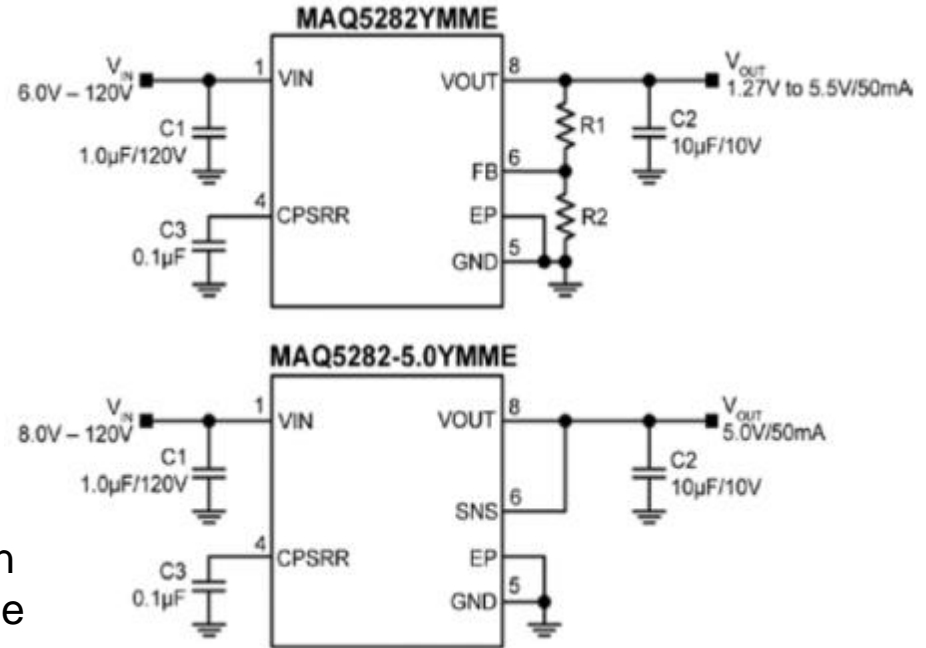
## Features:

- Wide input voltage range: 6V to 120V DC
- Ultra-low quiescent current: 6 $\mu$ A
- 25mA guaranteed output current
- Adjustable output from 1.27V to 5.5V
- Withstands up to +120V DC at the input
- Stable with ceramic output capacitors
- Ultra-high PSRR <90dB
- Ultra-high line rejection (load dump)
- High output accuracy:
  - $\pm 3\%$  initial accuracy
- Thermal shutdown and current limit protection
- Thermally efficient 8-pin ePad MSOP package
- Recommended for Automotive Design



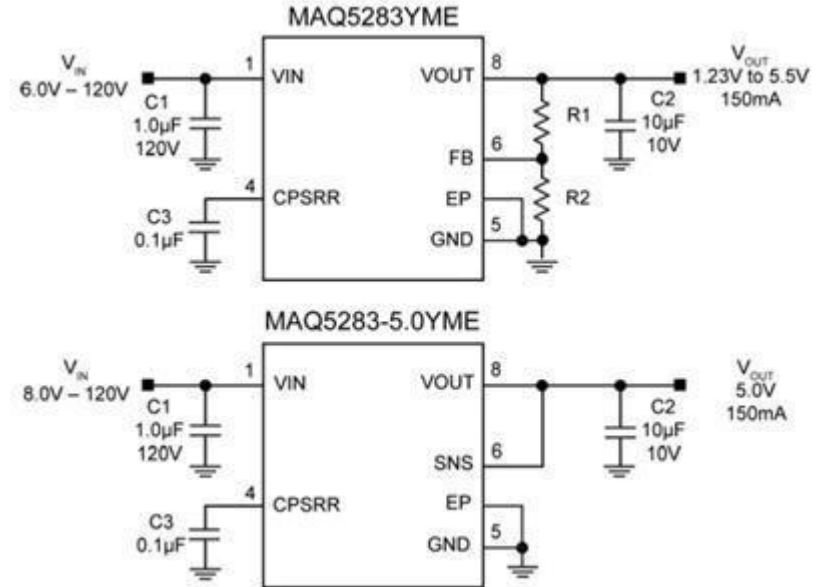
## Features:

- AEC-Q100 qualified
- Wide input voltage range: 6V to 120V DC
- Ultra-low quiescent current: 6 $\mu$ A
- 50mA guaranteed output current
- Adjustable output from 1.27V to 5.5V
- Withstands up to +120V DC at the input
- Stable with ceramic output capacitors
- Ultra-high PSRR (80dB at 10kHz)
- Ultra-high line rejection (load dump)
- High output accuracy:  $\pm 3\%$  initial accuracy
- Thermal shutdown and current limit protection
- Thermally efficient 8-pin ePad MSOP package
- Recommended for Automotive Design



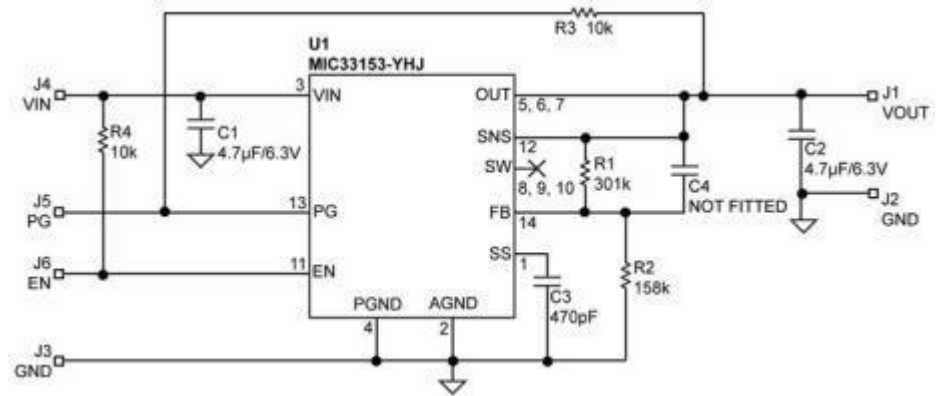
## Features:

- AEC-Q100 qualified
- Wide input voltage range: 6V to 120V DC
- Ultra-low quiescent current: 8 $\mu$ A
- 150mA guaranteed output current
- Adjustable output from 1.23V to 5.5V
- Stable with ceramic capacitors
- Ultra-high PSRR (75dB at 10kHz)
- Ultra-high line rejection (load dump)
- High output accuracy:  $\pm 3\%$  initial accuracy
- Thermal shutdown and current limit protection
- Thermally efficient, 8-pin ePad SOIC package
- Recommended for Automotive Design



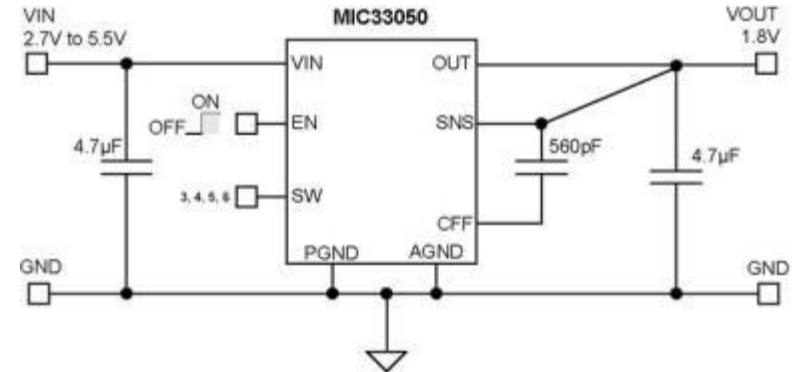
## Features:

- Internal inductor simplifies design
- Input voltage: 2.7V to 5.5V
- Output voltage: fixed or adjustable from 0.62V to 3.6V
- Up to 1.2A output current
- Up to 93% peak efficiency
- 85% typical efficiency at 1mA
- Power Good (PG) output
- Programmable soft start
- 22 $\mu$ A typical quiescent current
- 4MHz PWM operation in continuous mode
- Ultra-fast transient response
- Low ripple output voltage:
  - 35mVpp ripple in HyperLight Load® mode
  - 7mV output voltage ripple in full PWM mode
- 0.01 $\mu$ A shutdown current
- Thermal shutdown



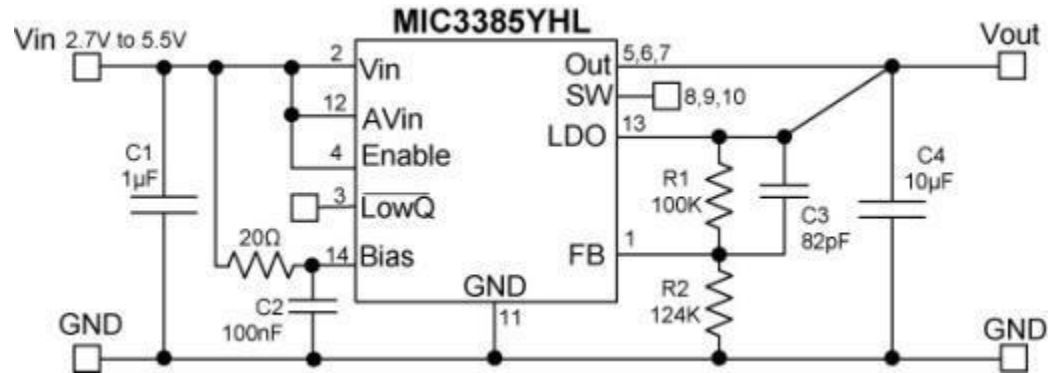
## Features:

- Input voltage range: 2.7V to 5.5V
- Fixed output voltage options from –  
– 0.72V to 3.3V
- Output current guaranteed up to 600mA
- Ultra fast transient response
- 20 $\mu$ A typical quiescent current
- 4MHz in PWM in constant current mode
- HyperLight Load® mode
- No external inductor required
- Low voltage output ripple:
  - 25mVpp in HyperLight Load® mode
  - 3mV output voltage ripple in full PWM mode
- >93% efficiency, >83% at 1mA
- Fully integrated MOSFET switches
- Micropower shutdown
- Thermal shutdown and current limit protection
- 3mm x 3mm MLF®-12L



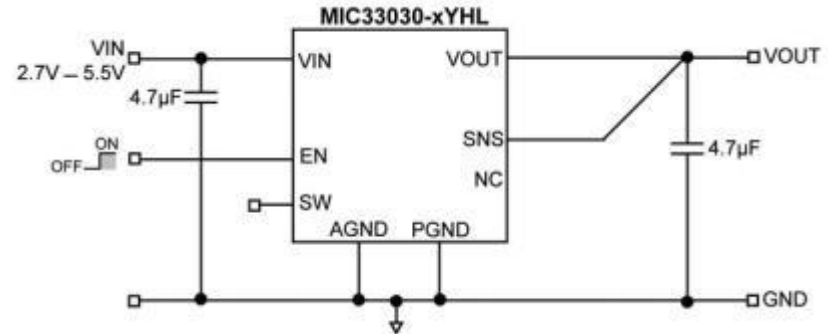
## Features:

- 2.7 to 5.5V supply voltage
- Light load LowQ® LDO mode
- 18 $\mu$ A quiescent current
- Low noise, 75 $\mu$ Vrms
- 8MHz PWM mode
- Output current to 600mA
- >90% efficiency
- 100% maximum duty cycle
- Adjustable output voltage option –  
- down to 1V
- Ultra-fast transient response
- No external inductor required
- Enables sub 1mm profile solution
- Fully integrated MOSFET switches
- Micropower shutdown
- Thermal shutdown and current limit protection
- 14-pin 3mm x 3.5mm MLF® package



## Features:

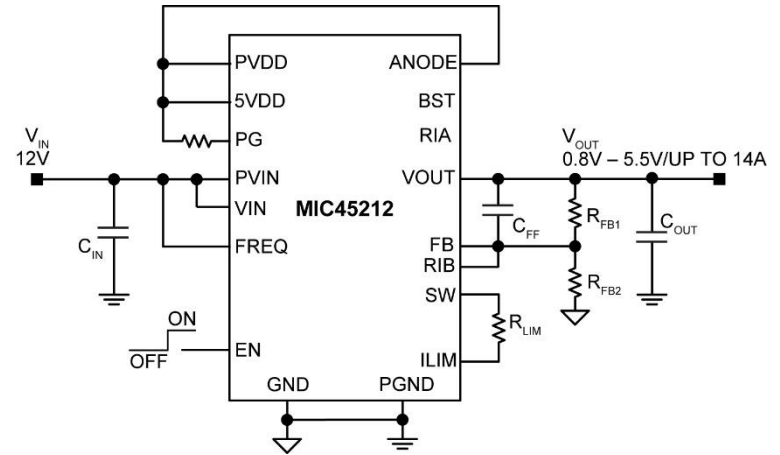
- Internal inductor simplifies design –
  - to two external capacitors
- Input voltage: 2.7V to 5.5V
- Output voltage accuracy of  $\pm 2.5\%$  -
  - over temperature
- 400mA output current
- Efficiency up to 75% at 1mA
- 21 $\mu$ A typical quiescent current
- Up to 8MHz PWM operation in continuous mode
- Ultra fast transient response
- Low-voltage output ripple:
  - 30mVpp ripple in HyperLight Load® mode
  - 7mV output voltage ripple in full PWM mode
- Fully-integrated MOSFET switches
- 0.01 $\mu$ A shutdown current
- Thermal shutdown and current-limit protection
- Output voltage options: Fixed and adjustable 0.7V to 3.6V
- 2.5mm x 2.0mm 10-Lead HMLF®





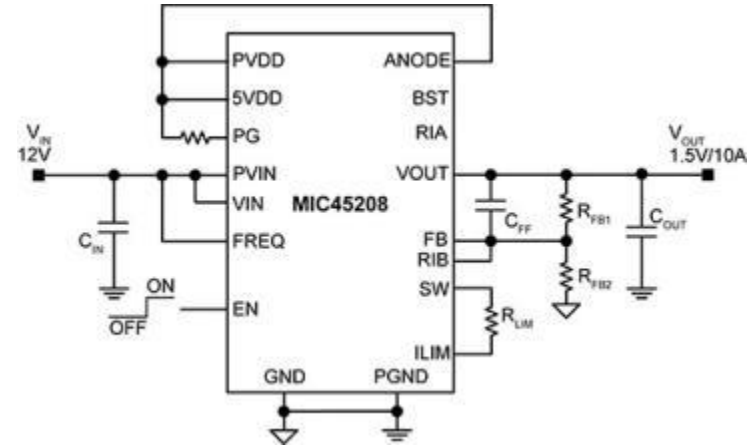
## Features:

- No compensation required
- Up to 14A output current
- >93% peak efficiency
- Output voltage:
  - 0.8V to 85% of  $V_{IN}$  with  $\pm 1\%$  accuracy
- Adjustable switching frequency:
  - 200kHz to 600kHz
- Enable input and open-drain power good output
- Hyper Speed Control™ (45212-2) architecture –
  - enables fast transient response
- HyperLight Load® (45212-1) improves light –
  - load efficiency
- Supports safe startup into pre-biased output
- CISPR22, Class B complaint
- $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  junction temperature range
- Thermal shutdown protection
- Short-circuit protection with hiccup mode
- Adjustable current limit
- Package: 64-pin 12mm x 12mm x 4mm QFN



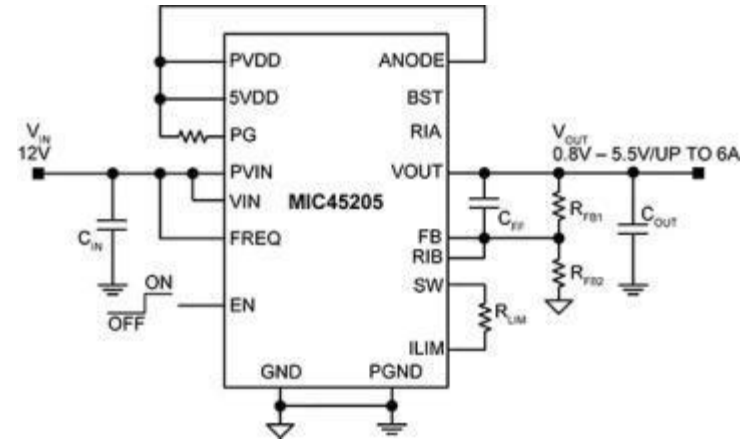
## Features:

- No compensation required
- Up to 10A output current
- >93% peak efficiency
- Output voltage:
  - 0.8V to 85% of VIN with  $\pm 1\%$  accuracy
- Adjustable switching frequency:
  - 200kHz to 600kHz
- Enable input and open-drain power good output
- Hyper Speed Control™ (45208-2) architecture –
  - enables fast transient response
- HyperLight Load® (45208-1) improves light load –
  - efficiency
- Supports safe startup into pre-biased output
- CISPR22, Class B complaint
- -40°C to +125°C junction temperature range
- Thermal shutdown protection
- Short-circuit protection with hiccup mode
- Adjustable current limit
- Package: 52-pin 10mm x 10mm x 4mm QFN



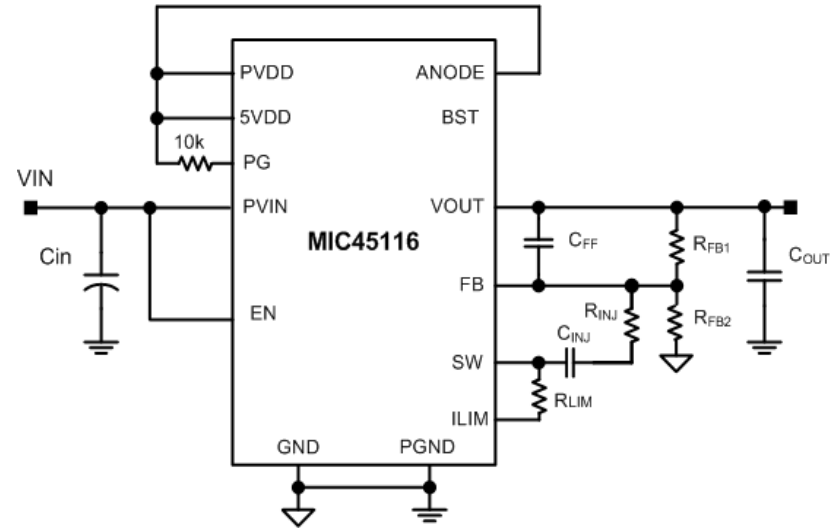
## Features:

- No compensation required
- Up to 6A output current
- >93% peak efficiency
- Output voltage:
  - 0.8V to 5.5V with  $\pm 1\%$  accuracy
- Adjustable switching frequency:
  - 200kHz to 600kHz
- Enable input and open-drain power –
  - good output
- Hyper Speed Control™ (45205-2) –
  - architecture enables fast transient response
- HyperLight Load® (45205-1) improves light load efficiency
- Supports safe startup into pre-biased output
- CISPR22, Class B complaint
- -40°C to +125°C junction temperature range
- Thermal shutdown protection
- Short-circuit protection with hiccup mode
- Adjustable current limit
- Package: 52-pin 8mm x 8mm x 3mm QFN



## Features:

- Highly integrated solution including controller, - inductor, FETs, and passives
- Hyper Speed Control® architecture for fast – load transient response
- HyperLight Load® operation for high efficiency at light loads
- Adjustable output voltage:
  - 0.8V to 85% of input with  $\pm 1\%$  accuracy
- Wide input operating range: 4.75V to 20V
- 1% accurate internal reference
- 600 kHz Fixed switching frequency
- Adjustable current limit and ripple injection
- Hiccup mode short circuit protection
- Thermal protection
- Safe startup into pre-biased output
- 8 mm x 8 mm X 3 mm, 52 pin QFN package
- -40°C to +125°C temperature range

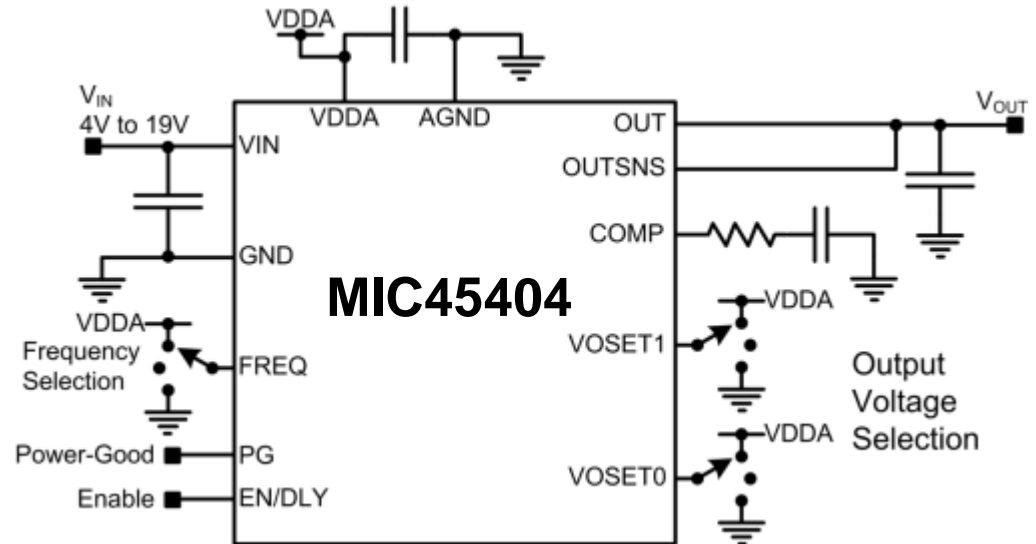


## Applications

- General purpose High density POL application
- Datacom/Networking/Computing
- Storage
- Base Stations
- Industrial
- FPGA Power

## Features:

- Input voltage range: 4V to 19V
- 5A output current
- > 90% efficiency over wide load – range
- 9 pin-selectable output voltage – values (GND/float/ $V_{DDA}$ ): 0.7V, - 0.8V, 0.9V, 1.0V, 1.2V, 1.5V, - 1.8V, 2.5V, 3.3V
- Pin-selectable switching frequency – (400kHz, 565kHz, 790kHz)
- Capacitor-adjustable turn-on delay – at EN/DLY
- Supports safe pre-biased start-up
- Thermal shutdown
- Hiccup mode short-circuit protection
- -40°C to +125°C operating – temperature range
- 54-pin 10mm x 6mm QFN package
- Ultra-Low profile: 2mm package height

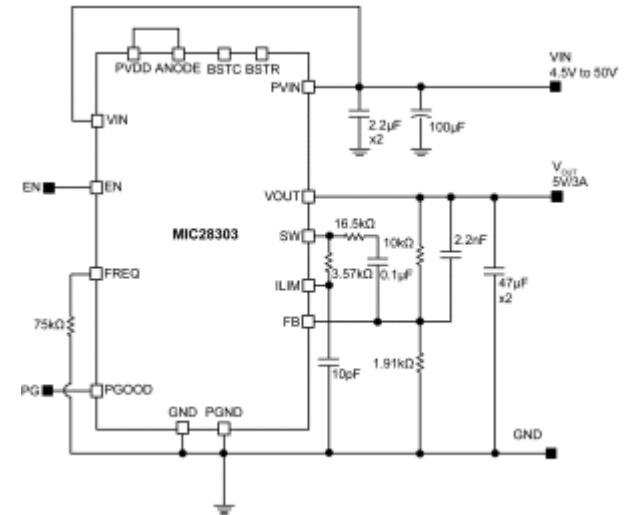


## Applications

- Network Switches and Routers
- Base stations, Telecom
- Servers & Storage
- SSD
- Industrial
- FPGA and DSP Power

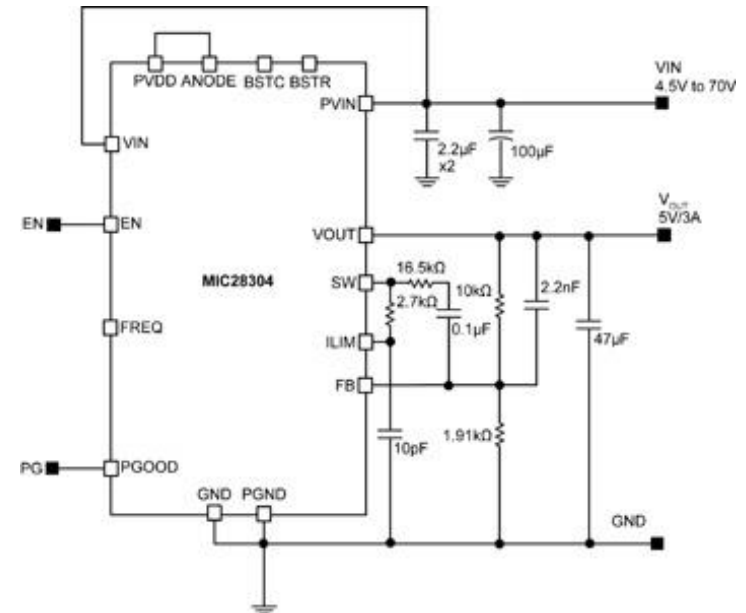
## Features:

- Easy to use:
  - Stable with low-ESR ceramic output capacitor
  - No compensation and no inductor to choose
- 4.5V to 50V input voltage
- Single-supply operation
- Power Good (PG) output
- Low radiated emission (EMI) per EN55022, Class B
- Adjustable current limit
- Adjustable output voltage from 0.9V to 24V (also –  
- limited by duty cycle)
- 200kHz to 600kHz, programmable switching frequency
- Supports safe start-up into a pre-biased output
- -40°C to +125°C junction temperature range
- Package: 64-pin, 12mm x 12mm x 3mm QFN



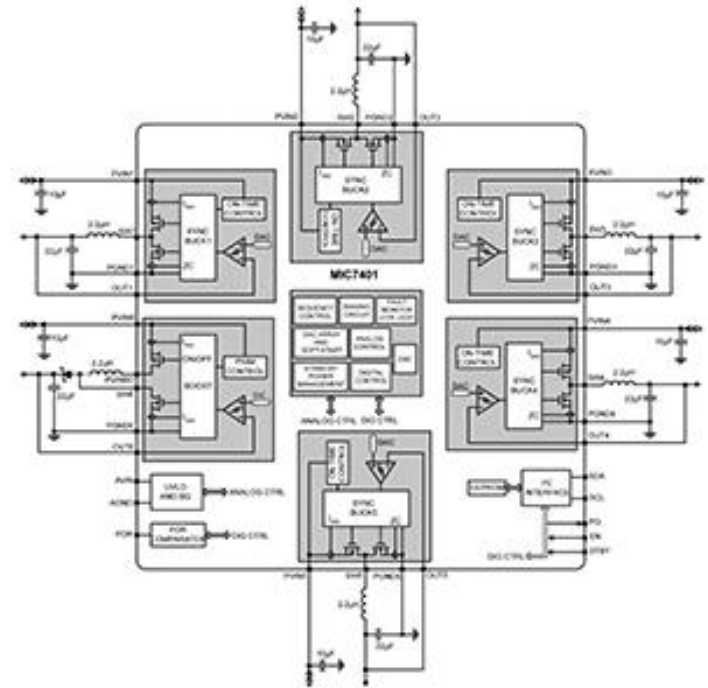
## Features:

- Easy to use:
  - Stable with low-ESR ceramic output capacitor
  - No compensation and no inductor to choose
- 4.5V to 70V input voltage
- HyperLight Load® Control (MIC28304-1)
- Hyper Speed Control™ (MIC28304-2)
- Single-supply operation
- Power Good (PG) output
- Hiccup mode current limit
- Low radiated emission (EMI) per EN55022, class B
- 5ms internal soft-start, internal compensation, and –  
– thermal shutdown
- Adjustable current limit
- 0.8V Reference voltage with  $\pm 1\%$  accuracy
- Adjustable output voltage from 0.8V to 24V (also limited by duty cycle)
- 200kHz to 600kHz, programmable switching frequency
- Supports safe start-up into a pre-biased output
- Package: 64-pin, 12mm x 12mm x 3.5mm QFN



## Features:

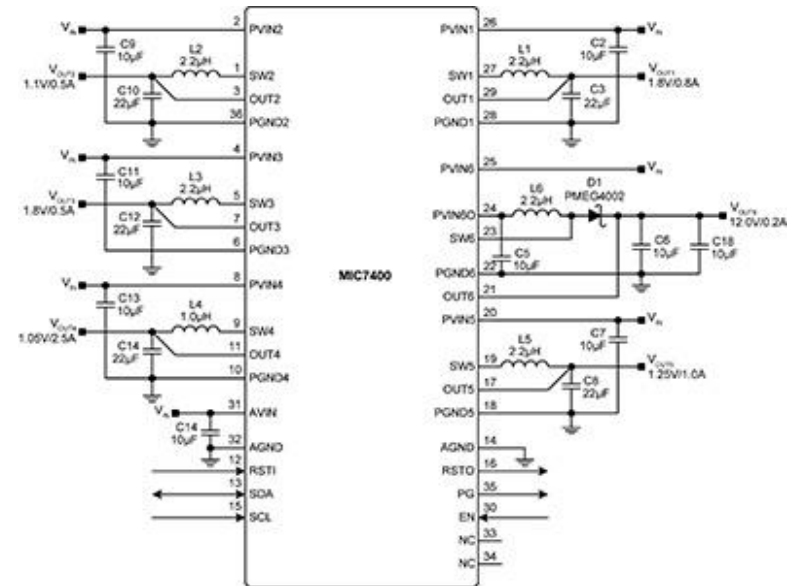
- Input voltage: 2.4V to 5.5V
- Five independent synchronous bucks up to 3A
- One independent non-synchronous boost 200mA
- 200µA quiescent current (all regulators on)
- 5µA typical shutdown current
- 93% peak buck efficiency, 85% typical efficiency –  
- at 1mA
- Dual power mode: stand-by and normal mode
- I<sup>2</sup>C interface up to 3.4MHz
- I<sup>2</sup>C on-the-fly EEPROM programmability, featuring:
  - Buck and boost output voltage scaling
  - Power-on-Reset (PoR) threshold and delay
  - Power-up sequencing/sequencing delay
  - Buck and boost current limit / pull-down when disabled
  - Individual ON, OFF, and stand-by modes
  - Soft-start and global power-good masking
- 23µA buck, 70µA boost typ quiescent currents
- 1.5% output accuracy over temperature/line/load
- Thermal-shutdown and current-limit protection
- 36-pin 4.5mm x 4.5mm x 0.85mm FQFN package





## Features:

- Input voltage: 2.4V to 5.5V
- Five independent synchronous bucks up to 3A
- One independent non-synchronous boost 200mA
- 200µA quiescent current (all regulators on)
- Dual power mode: stand-by and normal mode
- I<sup>2</sup>C interface up to 3.4MHz
- 93% peak buck efficiency, 85% typ. efficiency –  
- at 1mA
- I<sup>2</sup>C on-the-fly EEPROM programmability, featuring:
  - Buck and boost output voltage scaling
  - Power-on-reset threshold and delay
  - Power-up sequencing/sequencing delay
  - Buck and boost current limit
  - Buck and boost pull-down when disabled
  - Individual ON, OFF, and standby modes
  - Soft-start and global power-good masking
- 1.5% output accuracy over temperature/line/load



## Features:

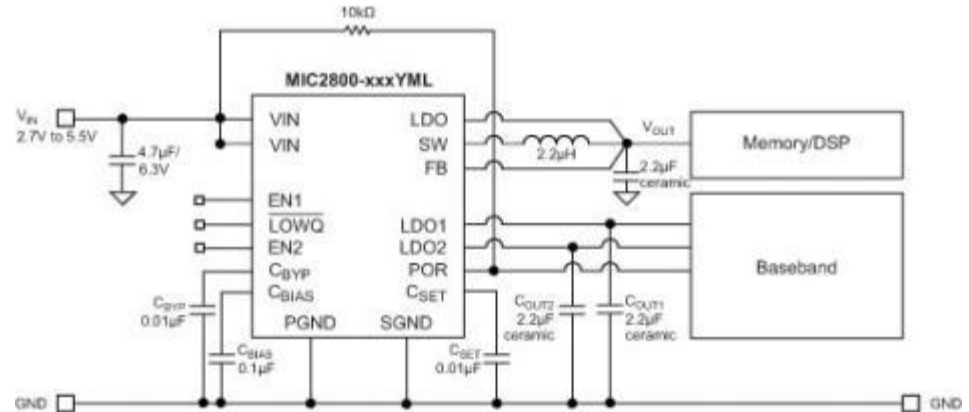
- 2.7V to 5.5V input voltage range
- 2MHz DC/DC converter and two stand – alone LDOs
- Integrated power-on reset (OR function – for all outputs)
- 30 $\mu$ A Total IQ when in LowQ<sup>®</sup> mode

## DC/DC Converter:

- DC to DC Converter
- Output current to 600mA in PWM mode
- LowQ<sup>®</sup> Mode: no noise light load mode
- 75 $\mu$ VRMS output noise in LowQ<sup>®</sup> mode
- 2 MHz PWM operation in normal mode

## LDOs:

- LDOs
- Ideal for 1.8V to 1.5V conversion
- 300mA output current from 1.8V input
- Output voltage down to 0.8V
- LDO2: 300mA output current capable

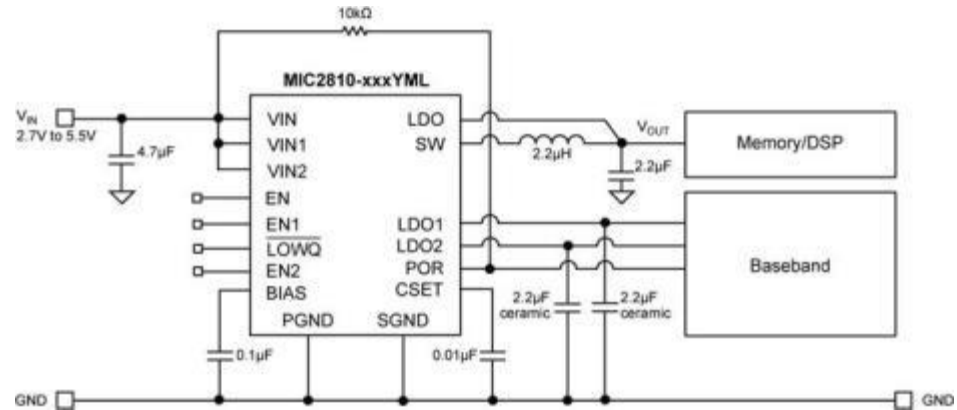


## Features:

- LowQ® mode:
  - 30 $\mu$ A Total IQ when in LowQ® mode
- Tiny 16-pin 3mm x 3mm MLF® package
- DC/DC Converter
- 2.7V to 5.5V input voltage range
- Output current to 600mA in PWM mode
- LowQ® Mode: no noise light load mode:
  - 53 $\mu$ Vrms Output noise in LowQ® - mode

## LDOs:

- LDO1:
  - 1.65V to 5.5V input voltage range
  - 300mA Output current
- LDO2:
  - 2.7V to 5.5V input voltage range
  - 300mA Output current



## Features:

- 2MHz DC/DC converter and 3 LDOs
- $\pm 2\%$  Output Voltage Accuracy on all outputs

## DC/DC Converter:

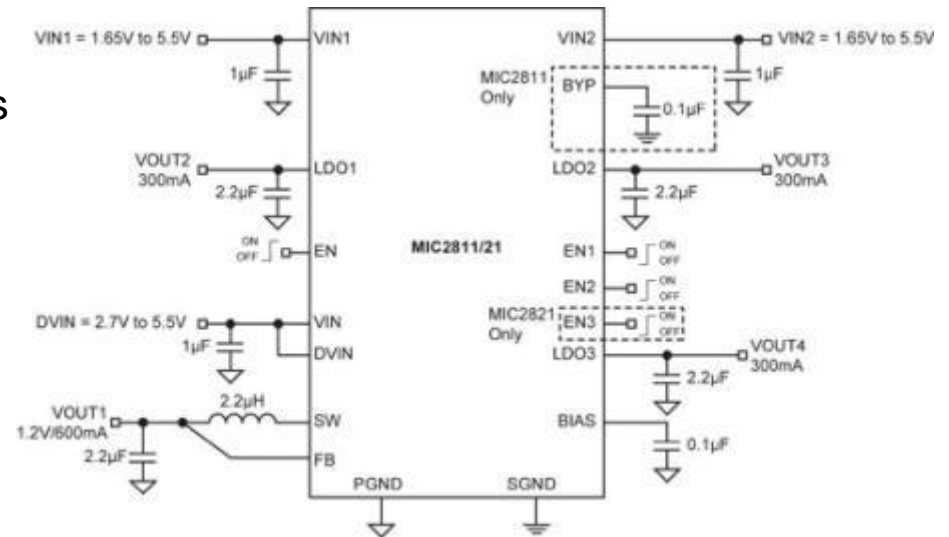
- 2.7V to 5.5V input voltage range
- Output current to 600mA
- Up to 86% efficiency (1.2V output)

## LDO 1 and 2:

- 1.65V to 5.5V input voltage range
- Fixed Output voltage as low as 0.8V
- 70dB PSRR at 1kHz

## LDO 3:

- 2.7V to 5.5V input voltage range
- 300mA output current
- Fixed Output voltage as low as 1.0V



## Features:

- 2MHz DC/DC converter and 3 LDOs
- $\pm 2\%$  Output Voltage Accuracy on all outputs

## DC/DC Converter:

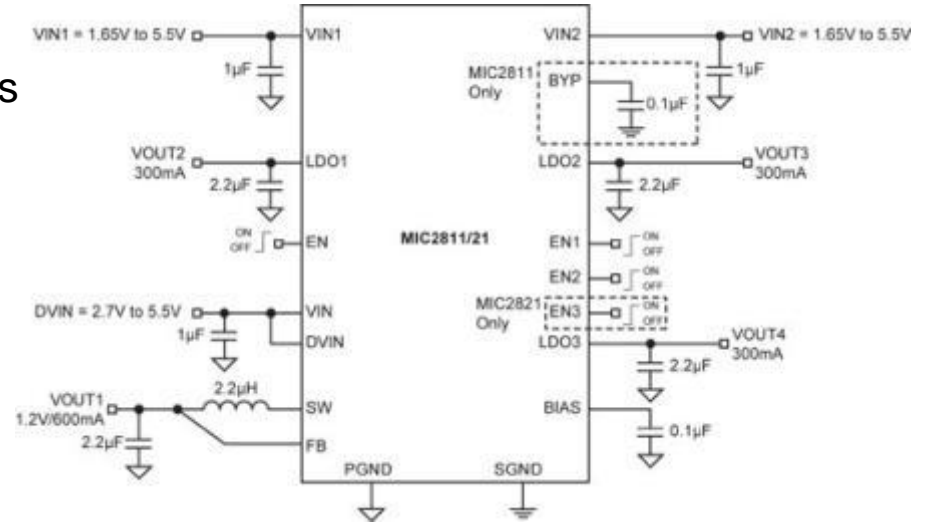
- 2.7V to 5.5V input voltage range
- 2MHz PWM operation
- Up to 86% efficiency (1.2V output)

## LDO 1 and 2:

- 1.65V to 5.5V input voltage range
- Fixed Output voltage as low as 0.8V
- 70dB PSRR at 1kHz

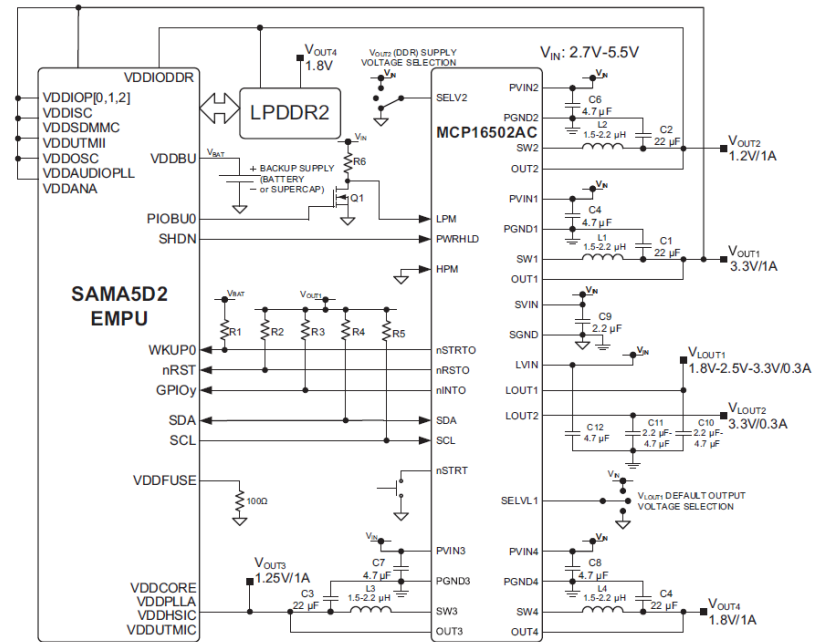
## LDO 3:

- 2.7V to 5.5V input voltage range
- 300mA output current
- Fixed Output voltage as low as 1.0V



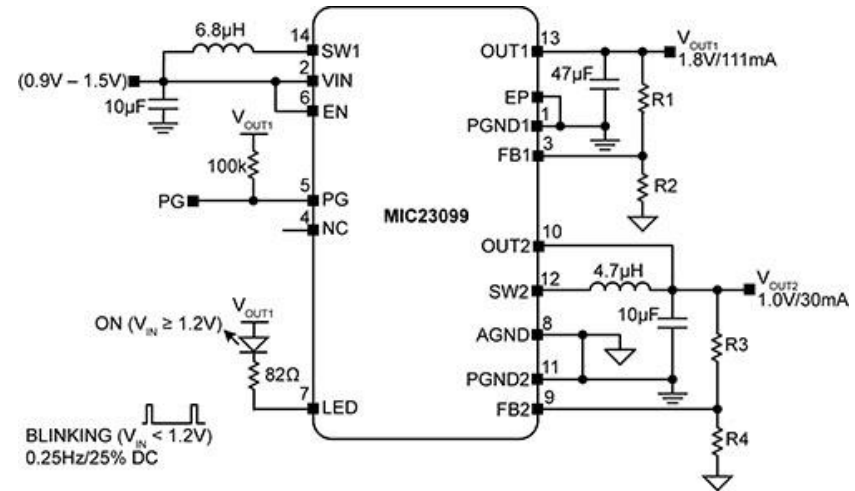
## Features

- Input voltage: 2.7V to 5.5V
- 4x 1A DC-DC Buck regulators, 2x 300mA LDOs integrated
- 100% Maximum Duty Cycle capability
- 2 MHz PWM operation in continuous mode
- +/-1% voltage accuracy for Buck2-4
- Pin-Selectable / Pin-pin compatible variants for memory configurability
- MPU-compatible default channel sequencing and nRSTO assertion delay
- I2C interface for programming and diagnostics
- Multimode operation and Dynamic Voltage Scaling
- Low-noise forced-PWM and low Iq light-load high-efficiency mode available
- Robust interfacing to MPU through optimized ESD protection: no leakage from VDDBU possible
- < 300  $\mu$ A low-power mode typical quiescent current (operational, 4 Bucks + 1 LDO ON)
- 10 $\mu$ A maximum shutdown current (Vin=4.5V)
- Thermal-shutdown and current-limit protection
- User-programmable overcurrent response behavior
- 32-pin 5mm x 5mm VQFN package
- -40°C to +125°C junction temperature range



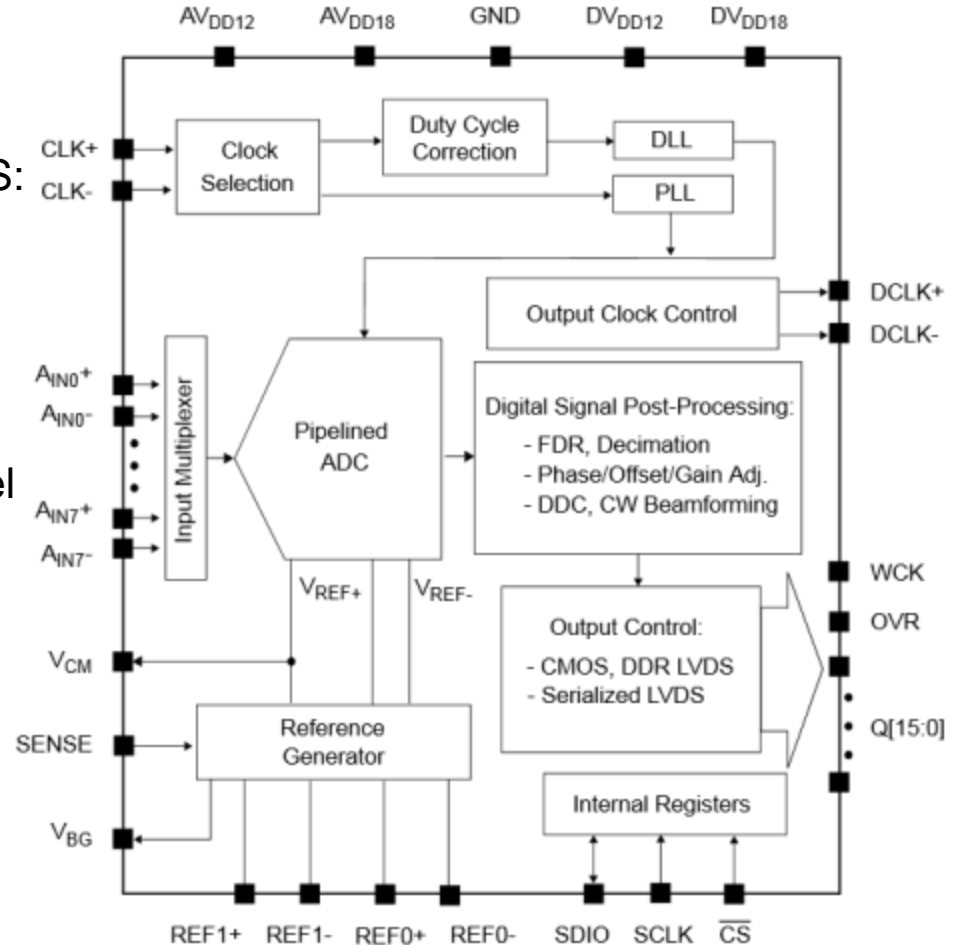
## Features:

- $V_{IN}$  range from 0.85V to 1.6V
- $V_{OUT1}$  (step-up) adjustable from 1.8V to 3.3V
- $V_{OUT2}$  (step-down) adjustable from 1.0V to  $V_{OUT2}$
- $V_{OUT1}/400mW$  and  $V_{OUT2}/30mA$  from a single cell
- Minimizes switching noise in the audio band
- Anti-ringing control circuit to minimize EMI
- Turn-on inrush current limiting and soft-start
- Automatic output discharge
- Step-up regulator with output disconnect in – shutdown
- Low-battery indicator
- Power Good (PG) output
- Low output ripple < 10mV
- 14-pin 2.5mm × 2.5mm × 0.55mm thin QFN – (TQFN) package
- -40°C to +125°C junction temperature range



## Features:

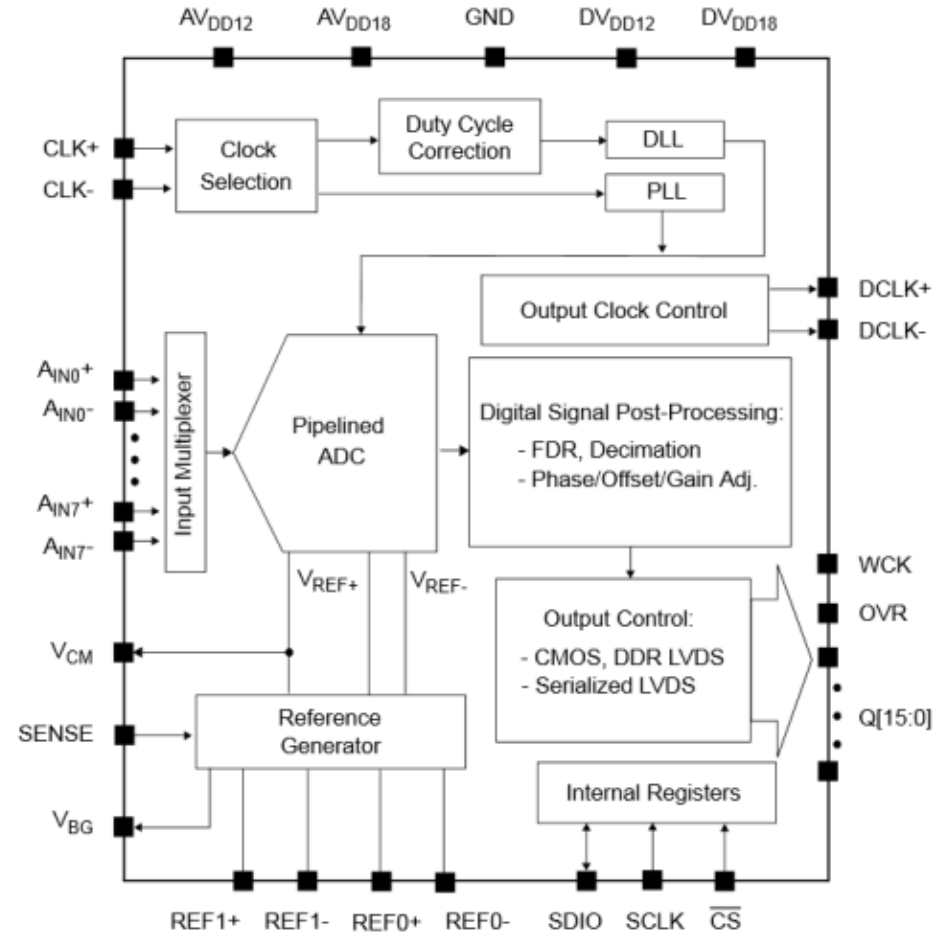
- 16-bit resolution
- 200 Msps sampling rate
- Low power 490 mW at full sample rate, LVDS:
  - 144 mW Standby, 28 mW Shutdown
- >74.7 dBFS SNR at 200 Msps
- >90 dBFS SFDR at 200 Msps
- Internal Digital Down-converter (DDC)
- Decimation filters for improved SNR
- Phase, offset and gain adjust of each channel
- 8-channel mux
- Fractional delay recovery for time-delay –
  - corrections in multi-channel operations
- Input channel bandwidth of 500 MHz
- Output data in serial DDR LVDS or CMOS
- Configuration via SPI
- Packaging:
  - TFBGA-121 (8 mm x 8 mm)
    - AEC-Q100 qualified
    - Temperature Grade 1: -40°C to +125°C
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
    - Temperature range: -40°C to +85°C





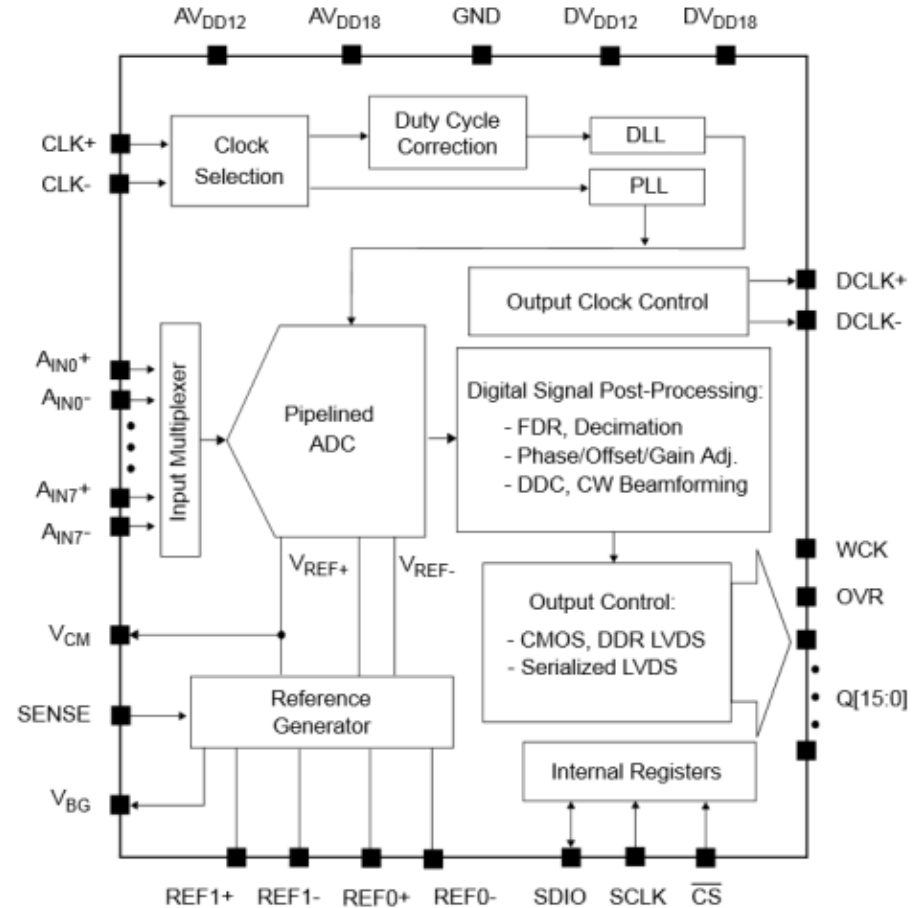
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- Decimation filters for improved SNR
- Phase, offset and gain adjust of each channel
- 8-channel mux
- Fractional delay recovery for time-delay –
  - corrections in multi-channel operations –
  - (dual/octal-channel modes)
- Input channel bandwidth of 500 MHz
- Output data in serial DDR LVDS or CMOS
- Configuration via SPI
- Packaging:
  - TFBGA-121 (8 mm x 8 mm)
    - AEC-Q100 qualified
    - Temperature Grade 1: -40°C to +125°C
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
    - Temperature range: -40°C to +85°C



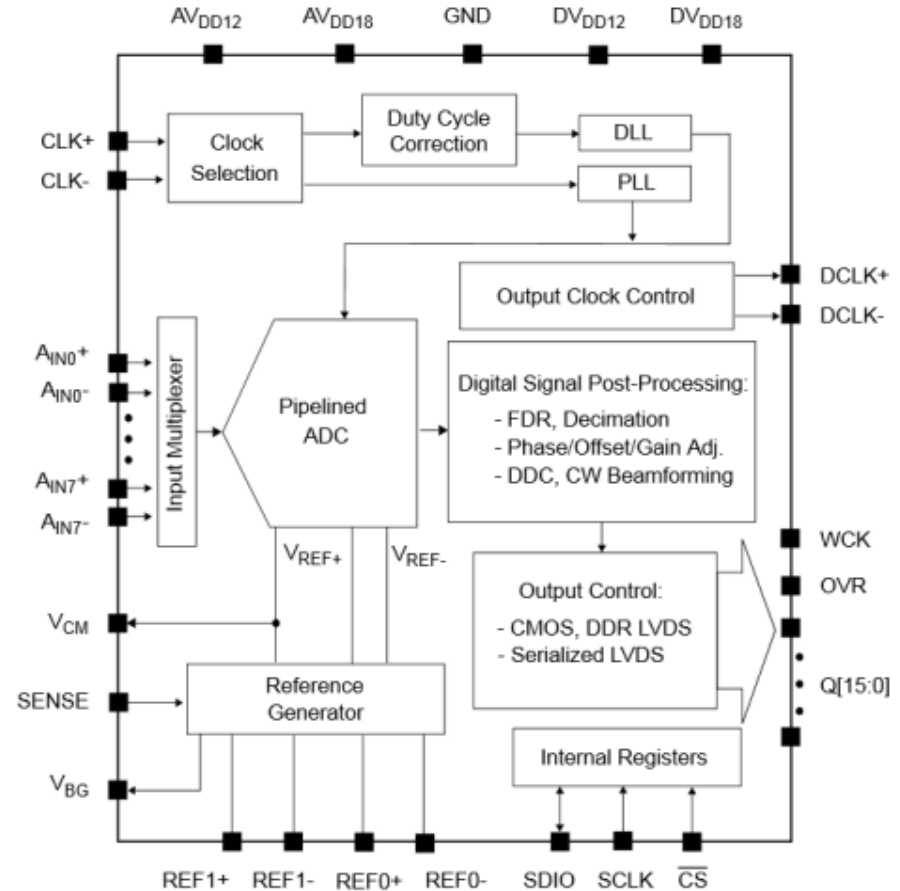
## Features:

- 14-bit resolution
- 200 Msps sampling rate
- Low power 490 mW at full sample rate, LVDS:
  - 144 mW Standby, 28 mW Shutdown
- >74.7 dBFS SNR at 200 Msps
- >90 dBFS SFDR at 200 Msps
- Internal Digital Down-converter (DDC)
- Decimation filters for improved SNR
- Phase, offset and gain adjust of channels
- 8-channel mux
- Fractional delay recovery for time-delay –
  - corrections in multi-channel operations –
  - (dual/octal-channel modes)
- Input channel bandwidth of 500 MHz
- Output data in serial DDR LVDS or CMOS
- Configuration via SPI
- Packaging:
  - TFBGA-121 (8 mm x 8 mm)
    - AEC-Q100 qualified
    - Temperature Grade 1: -40°C to +125°C
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
    - Temperature range : -40°C to +85°C



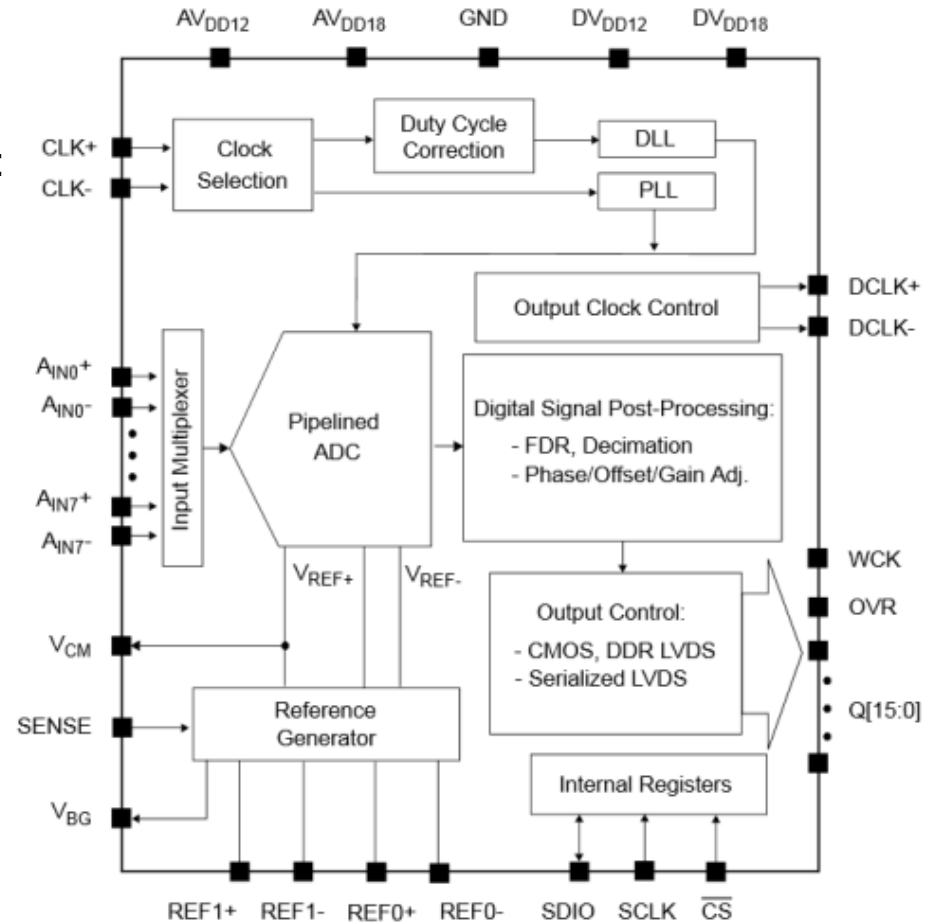
## Features:

- 12-bit resolution
- 200 Msps sampling rate
- Low power 468 mW at full sample rate, LVDS:
  - 144 mW Standby, 28 mW Shutdown
- >74.7 dBFS SNR at 200 Msps
- >90 dBFS SFDR at 200 Msps
- Internal Digital Down-converter (DDC)
- Decimation filters for improved SNR
- Noise-shaping requantizer
- Phase, offset, gain adjust of channels
- 8-channel mux
- Fractional delay recovery for time-delay –  
- corrections in multi-channel operations
- Input channel bandwidth of 500 MHz
- Output data in serial DDR LVDS or CMOS
- Configuration via SPI
- Packaging:
  - TFBGA-121 (8 mm x 8 mm)
    - AEC-Q100 qualified
    - Temperature Grade 1: -40°C to +125°C
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
    - Temperature range: -40°C to +85°C



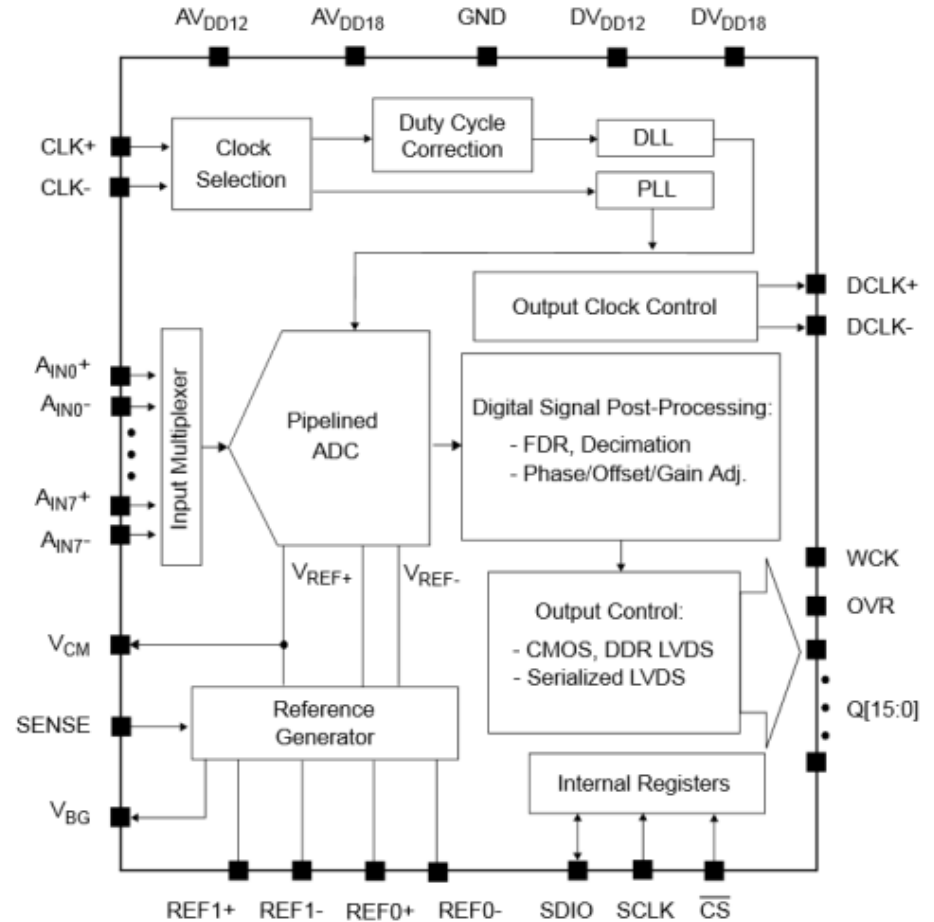
## Features:

- 14-bit resolution
- 200 Msps sampling rate
- Low power 490 mW at full sample rate ,LVDS:
  - 144 mW Standby, 28 mW Shutdown
- >74.7 dBFS SNR at 200 Msps
- >90 dBFS SFDR at 200 Msps
- Decimation filters for improved SNR
- Phase, offset and gain adjust of channels
- 8-channel mux
- Fractional delay recovery for time-delay –
  - corrections in multi-channel operations
- Input channel bandwidth of 500 MHz
- Output data in serial DDR LVDS or CMOS
- Configuration via SPI
- Packaging:
  - TFBGA-121 (8 mm x 8 mm)
    - AEC-Q100 qualified
    - Temperature Grade 1: -40°C to +125°C
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
    - Temperature range : -40°C to +85°C



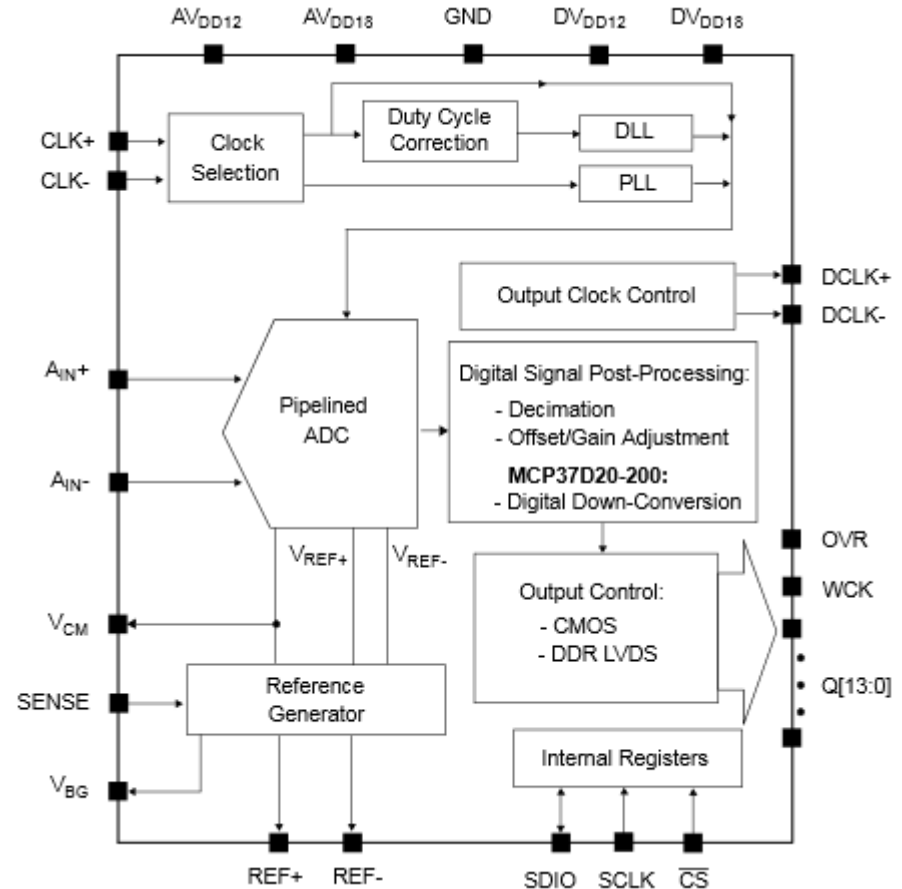
## Features:

- 12-bit resolution
- 200 Mps sampling rate
- Low power 468 mW operation at full –
  - sampling rate, including LVDS digital I/O:
    - 144 mW Standby, 28 mW Shutdown
- >74.7 dBFS SNR at 200 Mps
- >9 dBFS SFDR at 200 Mps
- Decimation filters for improved SNR
- Noise-shaping requantizer
- Phase, offset, gain adjust of channels
- 8-channel mux
- Fractional delay recovery for time-delay –
  - corrections in multi-channel operations
- Input channel bandwidth of 500 MHz
- Output data in serial DDR LVDS or CMOS
- Configuration via SPI
- Packaging:
  - TFBGA-121 (8 mm x 8 mm)
    - AEC-Q100 qualified
    - Temperature Grade 1: -40°C to +125°C
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
    - Temperature range: -40°C to +85°C



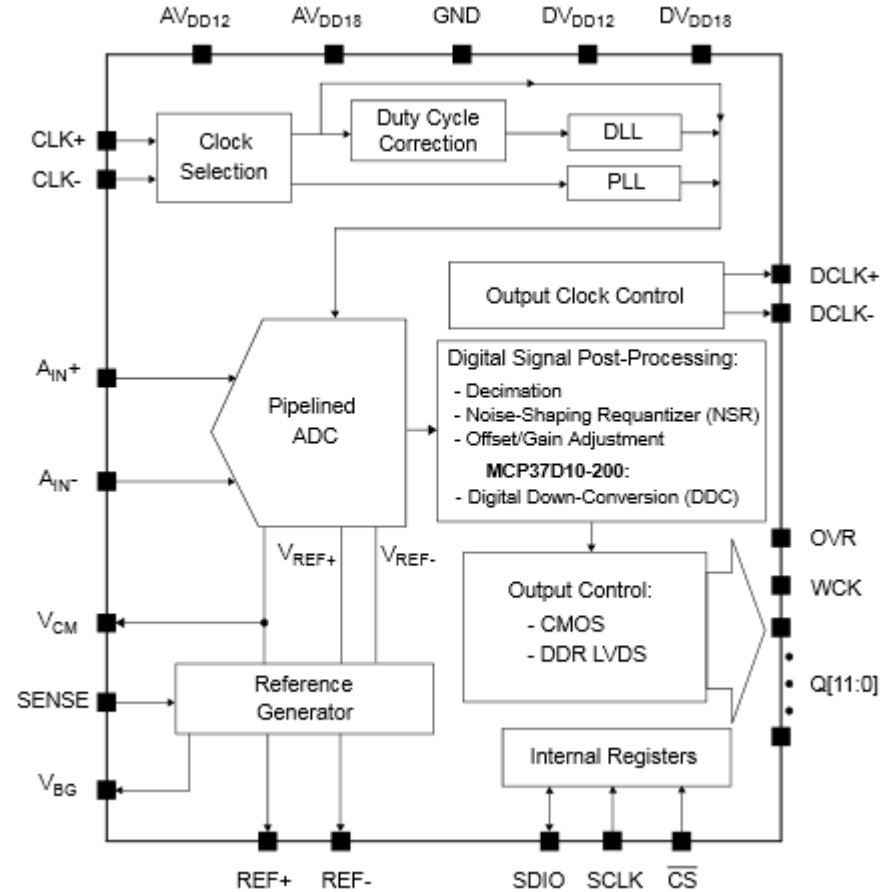
## Features:

- 14-bit resolution
- 200 Msps sampling rate
- Low power consumption: 346 mW with LVDS Digital I/O at full sampling rate
  - 89 mW Standby, 24 mW Shutdown
- 67.8 dBFS SNR at 200 Msps
- 96 dBFS SFDR at 200 Msps
- Decimation filters for improved SNR
- Phase, offset and gain adjustments
- Input channel bandwidth of 650 MHz
- Output data format in serial DDR LVDS or – parallel CMOS
- Configuration via SPI
- Industrial temperature range: -40°C to +85°C
- Packaging:
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
  - TFBGA-121 (8 mm x 8 mm)



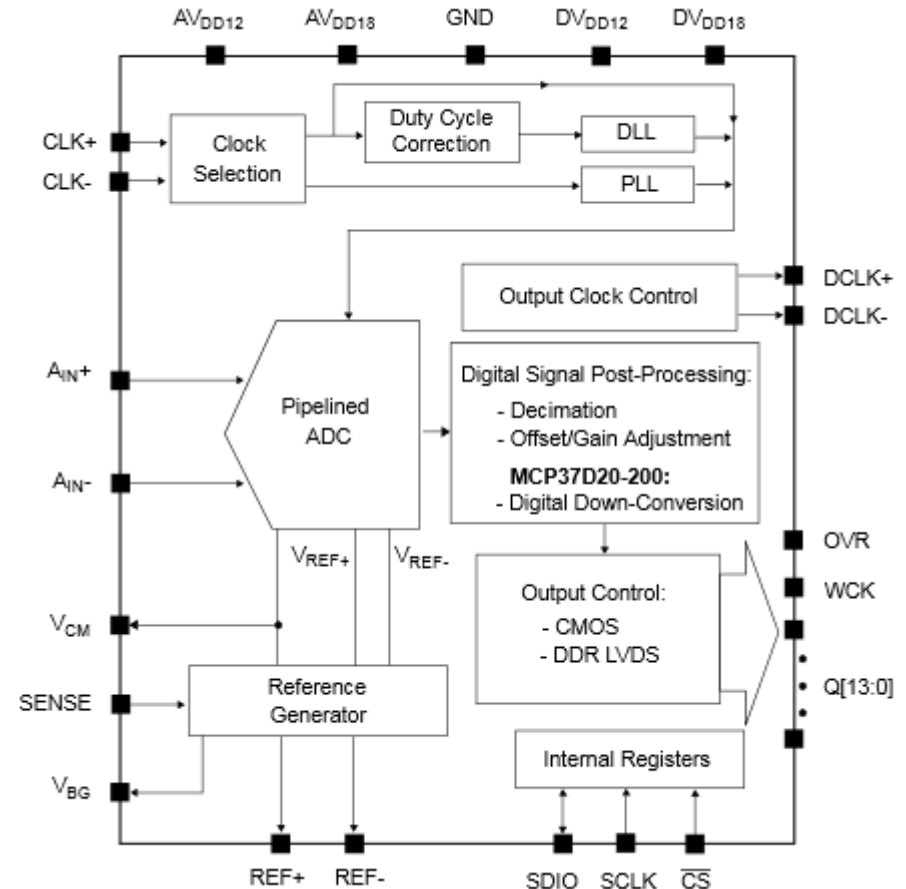
## Features:

- 12-bit resolution
- 200 Msps sampling rate
- Low power consumption: 337 mW with LVDS Digital I/O at full sample rate:
  - 89 mW Standby, 24 mW Shutdown
- 67 dBFS SNR at 200 Msps
- 96 dBFS SFDR at 200 Msps
- Decimation filters for improved SNR
- Phase, offset and gain adjustments
- Input channel bandwidth of 650 MHz
- Output data format in serial DDR LVDS or – parallel CMOS
- Configuration via SPI
- Industrial temperature range: -40°C to +85°C
- Packaging:
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
  - TFBGA-121 (8 mm x 8 mm)



## Features:

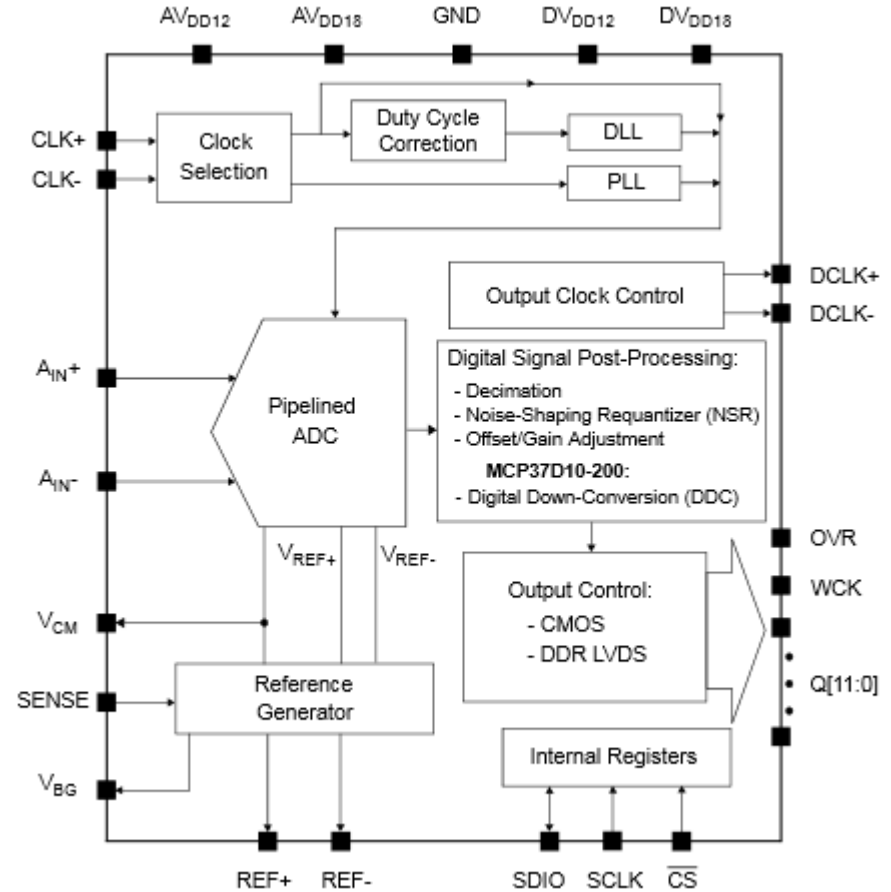
- 14-bit resolution
- 200 Msps sampling rate
- Low power consumption: 346 mW with LVDS Digital I/O at full sample rate
  - 89 mW Standby, 24 mW Shutdown
- 67.8 dBFS SNR at 200 Msps
- 96 dBFS SFDR at 200 Msps
- Integrated digital down-converter
- Decimation filters for improved SNR
- Phase, offset and gain adjustments
- Input channel bandwidth of 650 MHz
- Output data format in serial DDR LVDS or – parallel CMOS
- Configuration via SPI
- Industrial temperature range: -40°C to +85°C
- Packaging:
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
  - TFBGA-121 (8 mm x 8 mm)





## Features:

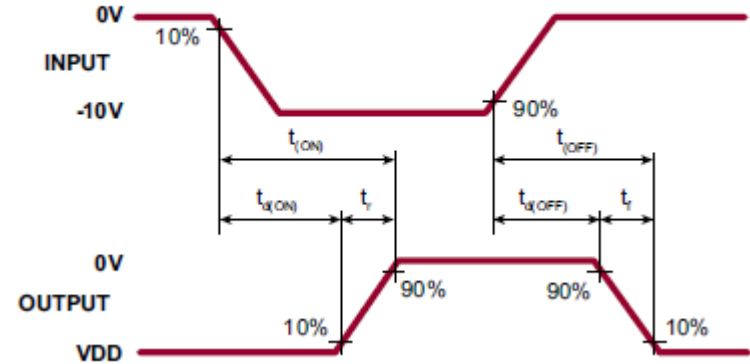
- 12-bit resolution
- 200 Msps sampling rate
- Low power consumption: 337 mW with LVDS Digital I/O at full sample rate
  - 89 mW Standby, 24 mW Shutdown
- 67 dBFS SNR at 200 Msps
- 96 dBFS SFDR at 200 Msps
- Integrated digital down-converter
- Decimation filters for improved SNR
- Phase, offset and gain adjustments
- Input channel bandwidth of 650 MHz
- Output data format in serial DDR LVDS or - parallel CMOS
- Configuration via SPI
- Industrial temperature range: -40°C to +85°C
- Packaging:
  - VTLA-124 (9 mm x 9 mm x 0.9 mm)
  - TFBGA-121 (8 mm x 8 mm)



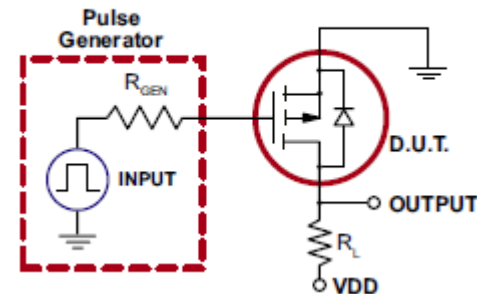
## Features:

- $BV_{DSS}$ : -16.5V min
- $R_{DS(ON)}$ : 1.5 $\Omega$  max
- Ultra-low threshold
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Freedom from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOIC-8

## Switching Waveform



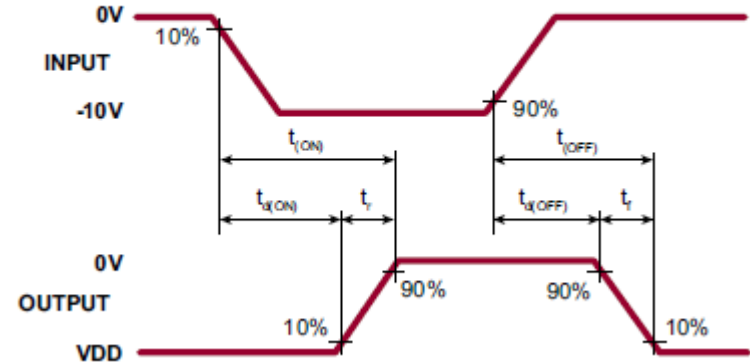
## Test Circuit



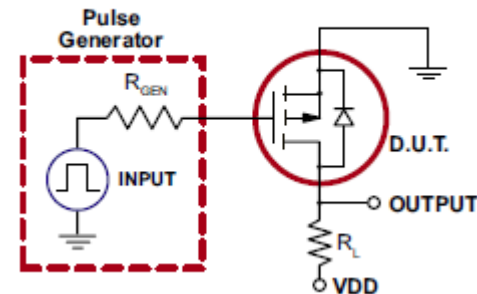
## Features:

- $BV_{DSS}$ : -40V min
- $R_{DS(ON)}$ : 2.0 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 95pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



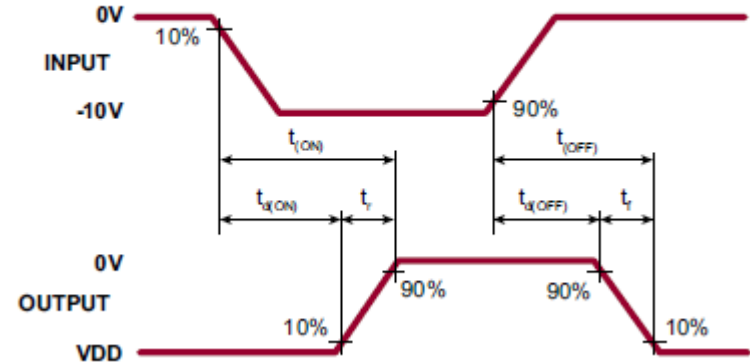
## Test Circuit



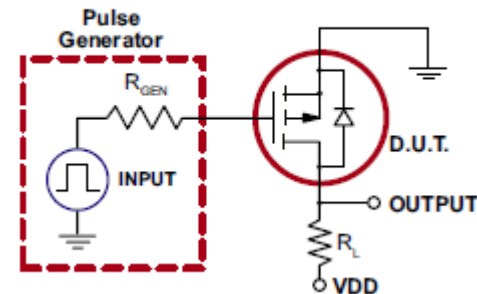
## Features:

- $BV_{DSS}$ : -60V min
- $R_{DS(ON)}$ : 10 $\Omega$  max
- High input impedance and high gain
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- Free from secondary breakdown
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23

## Switching Waveform



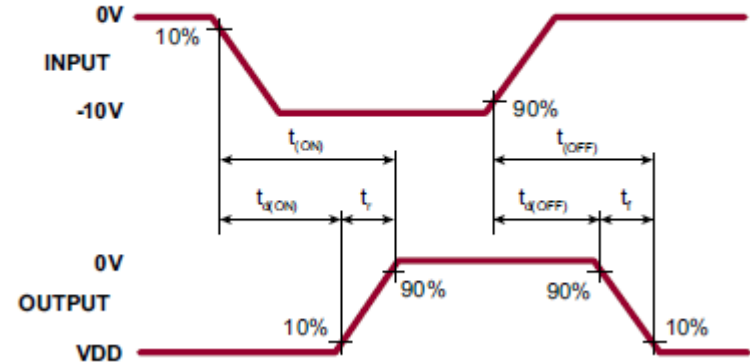
## Test Circuit



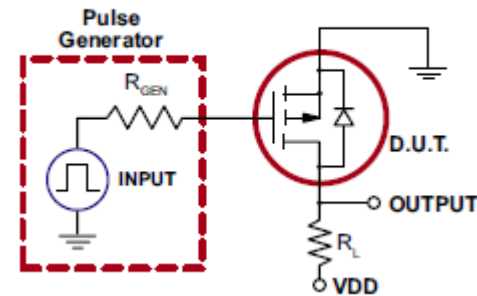
## Features:

- $BV_{DSS}$ : -200V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 85pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



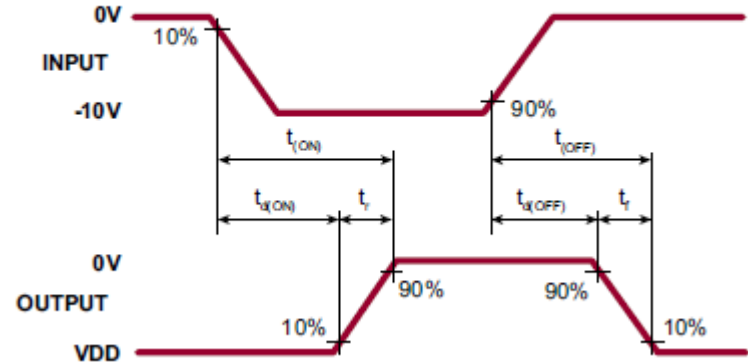
## Test Circuit



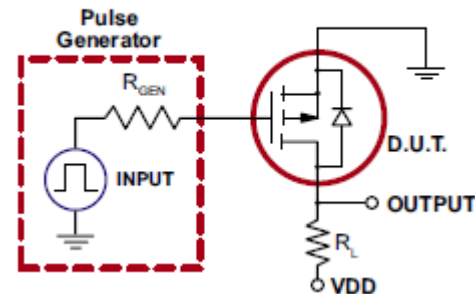
## Features:

- $BV_{DSS}$ : -40V min
- $R_{DS(ON)}$ : 6.0 $\Omega$  max
- High input impedance and high gain
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- Free from secondary breakdown
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-23

## Switching Waveform



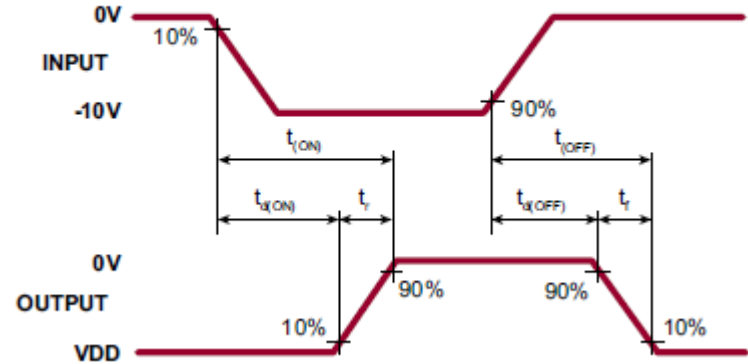
## Test Circuit



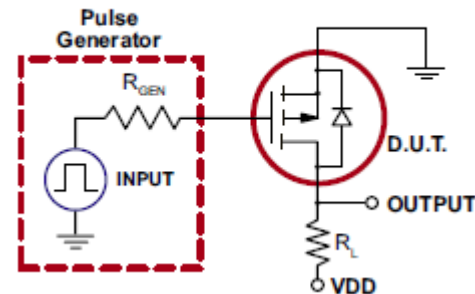
## Features:

- $BV_{DSS}$ : -240V min
- $R_{DS(ON)}$ : 8.0 $\Omega$  max
- Low threshold
- High input impedance
- Low input capacitance
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



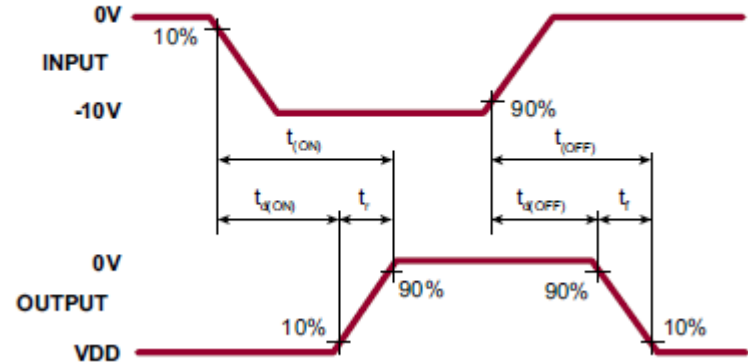
## Test Circuit



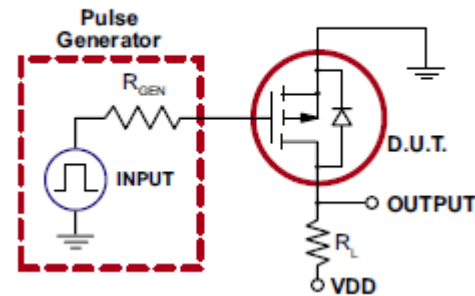
## Features:

- $BV_{DSS}$ : -350V min
- $R_{DS(ON)}$ : 15 $\Omega$  max
- Low threshold
- High input impedance
- Low input capacitance
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



## Test Circuit

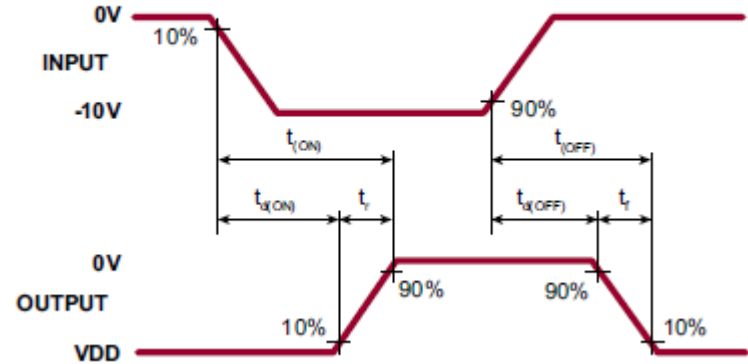




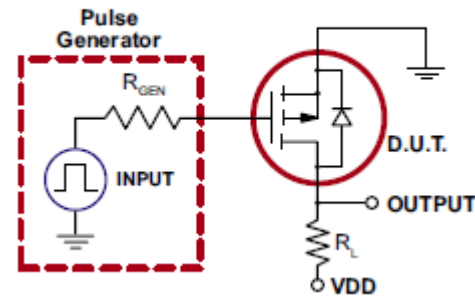
## Features:

- $BV_{DSS}$ : -20V min
- $R_{DS(ON)}$ : 2.0 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



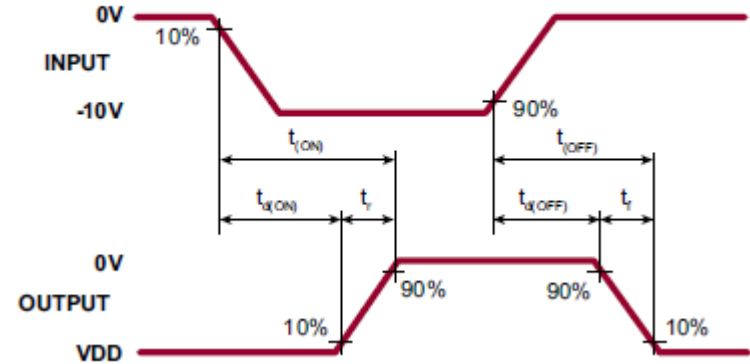
## Test Circuit



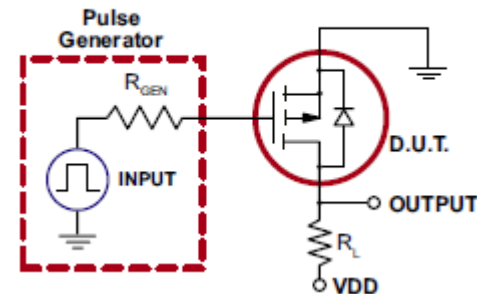
## Features:

- $BV_{DSS}$ : -100V min
- $R_{DS(ON)}$ :  $3.5\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Package Option: SOT-89

## Switching Waveform



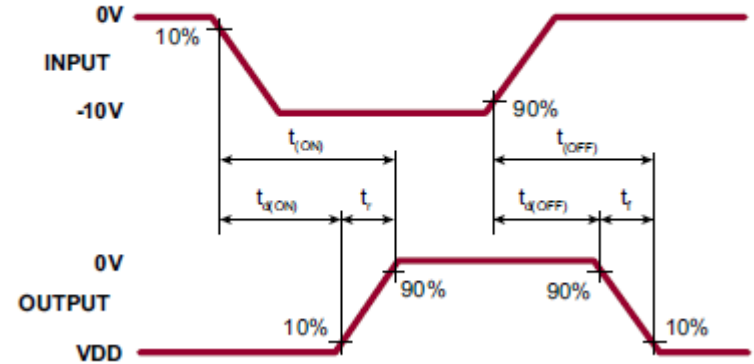
## Test Circuit



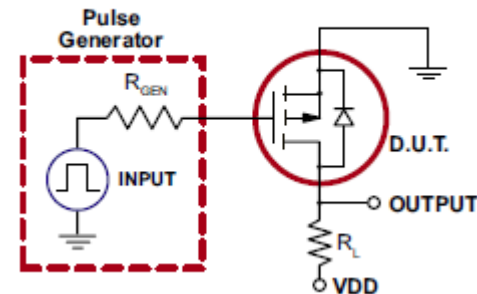
## Features:

- $BV_{DSS}$ : -200V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



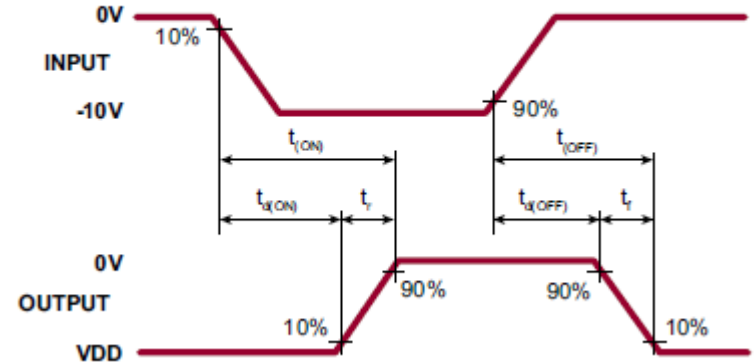
## Test Circuit



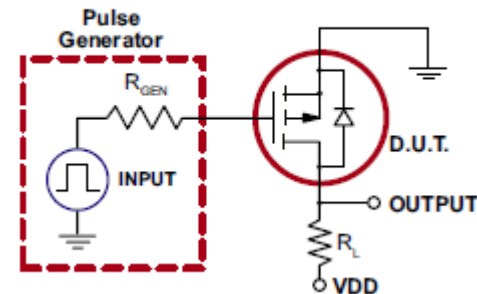
## Features:

- $BV_{DSS}$ : -220V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



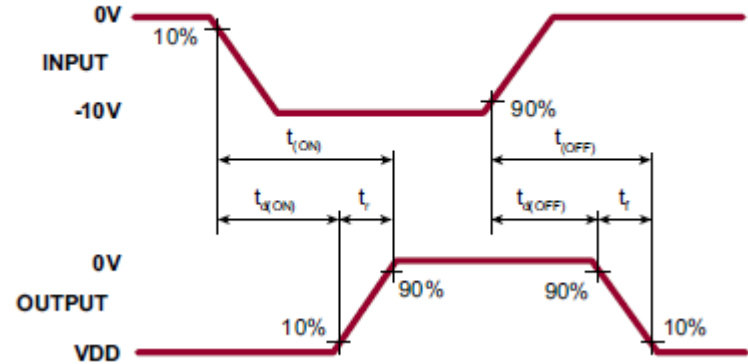
## Test Circuit



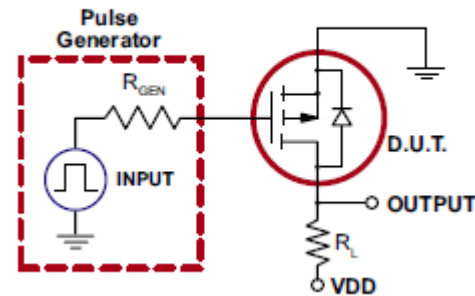
## Features:

- $BV_{DSS}$ : -350V min
- $R_{DS(ON)}$ : 25 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 60pF typ
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



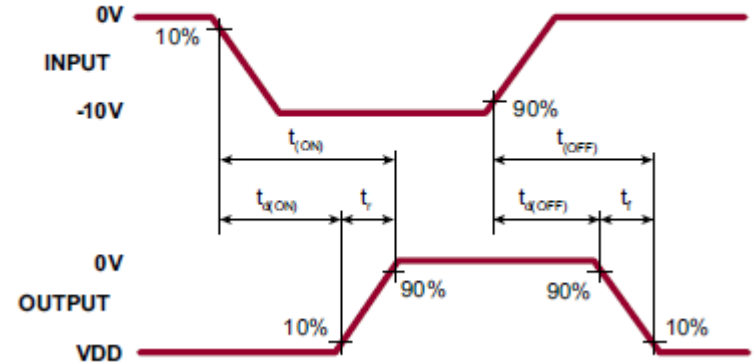
## Test Circuit



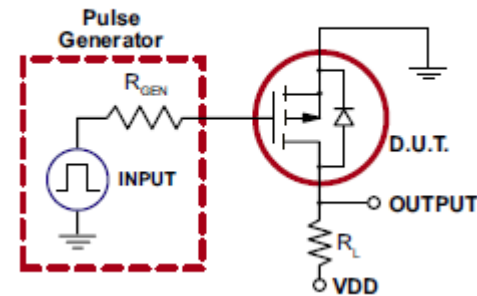
## Features:

- $BV_{DSS}$ : -400V min
- $R_{DS(ON)}$ : 25 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 60pF typ
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, TO-92, SOT89

## Switching Waveform



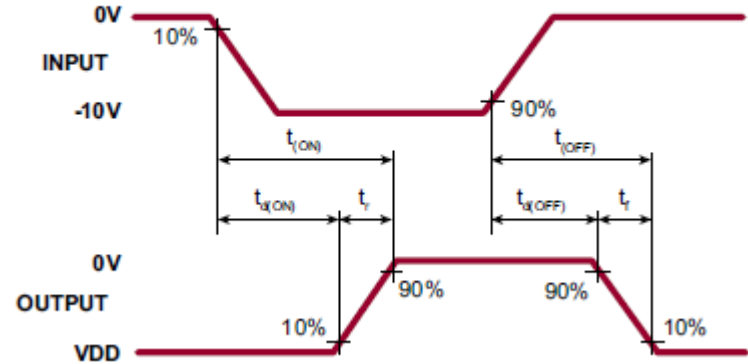
## Test Circuit



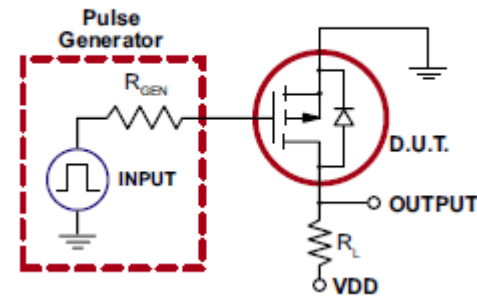
## Features:

- $BV_{DSS}$ : -350V min
- $R_{DS(ON)}$ : 15 $\Omega$  max
- Low threshold: -2.0V max
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



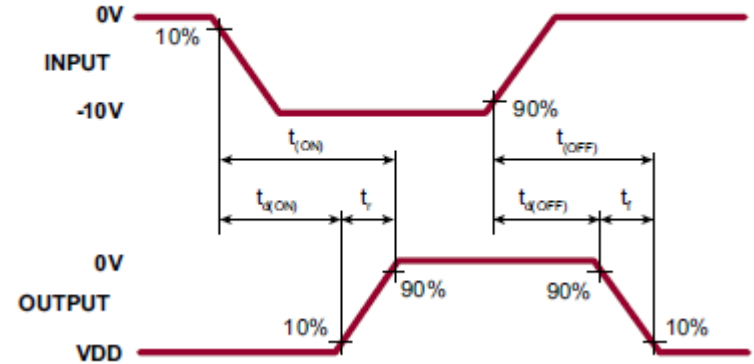
## Test Circuit



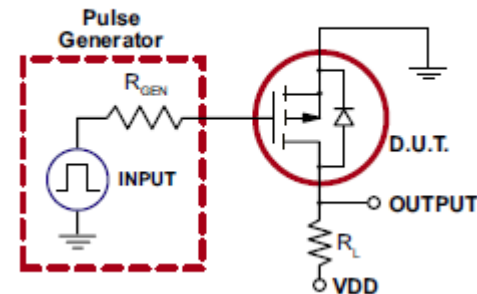
## Features:

- $BV_{DSS}$ : -400V min
- $R_{DS(ON)}$ : 15 $\Omega$  max
- Low threshold: -2.0V max
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



## Test Circuit

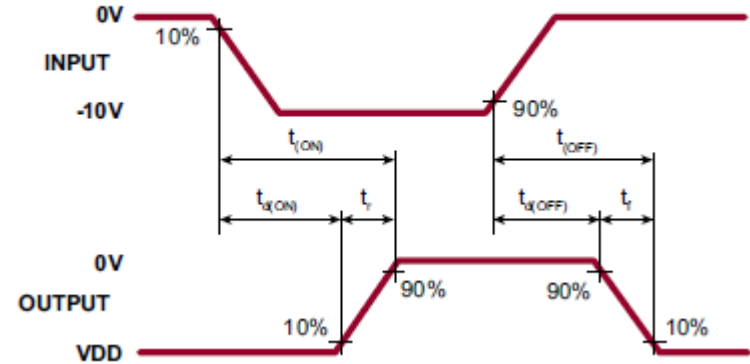




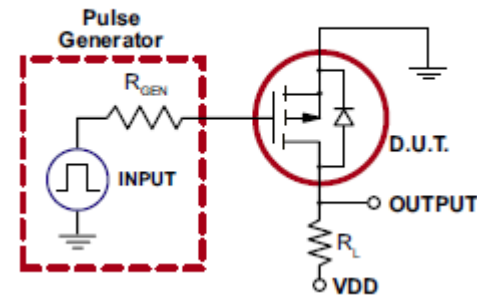
## Features:

- $BV_{DSS}$ : -220V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Low threshold: -2.4V max
- High input impedance
- Low input capacitance: 110pf max
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-23

## Switching Waveform



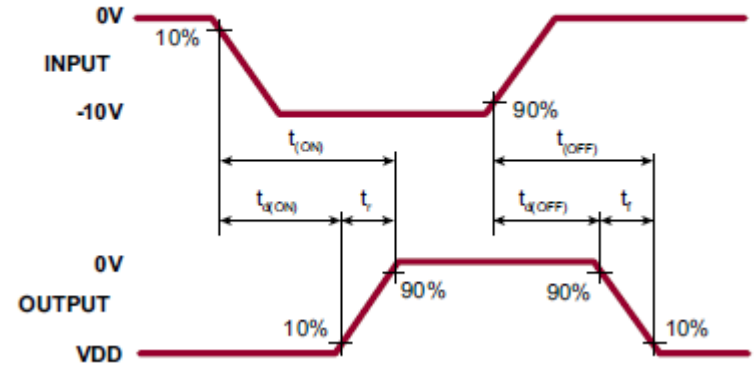
## Test Circuit



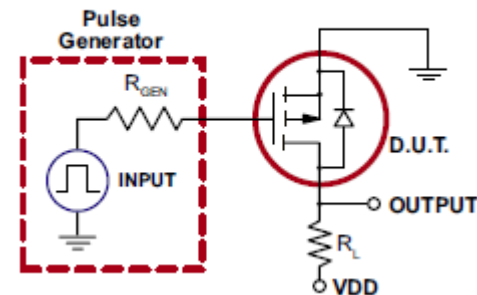
## Features:

- $BV_{DSS}$ : -350V min
- $R_{DS(ON)}$ : 30 $\Omega$  max
- High input impedance and high gain
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- Free from secondary breakdown
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23

## Switching Waveform



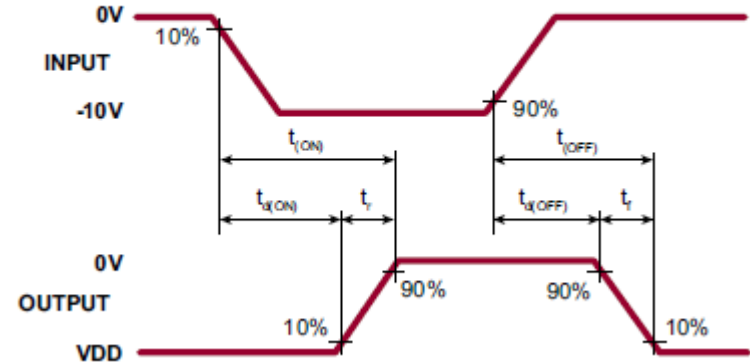
## Test Circuit



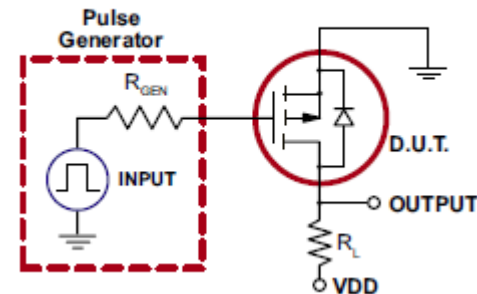
## Features:

- $BV_{DSS}$ : -40V min
- $R_{DS(ON)}$ : 8.0Ω max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



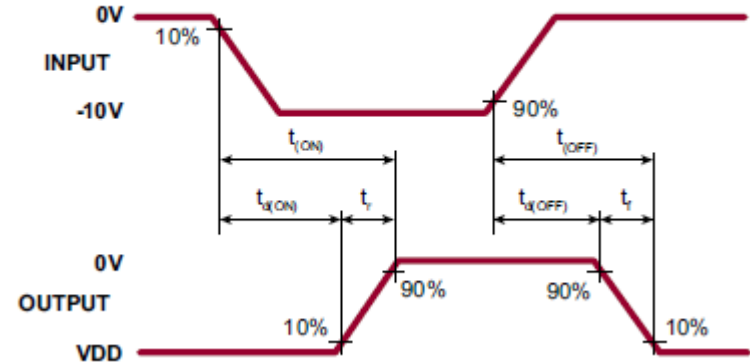
## Test Circuit



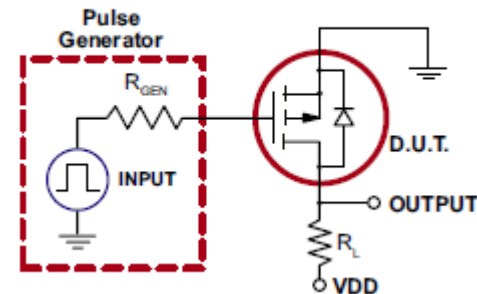
## Features:

- $BV_{DSS}$ : -60V min
- $R_{DS(ON)}$ : 8.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



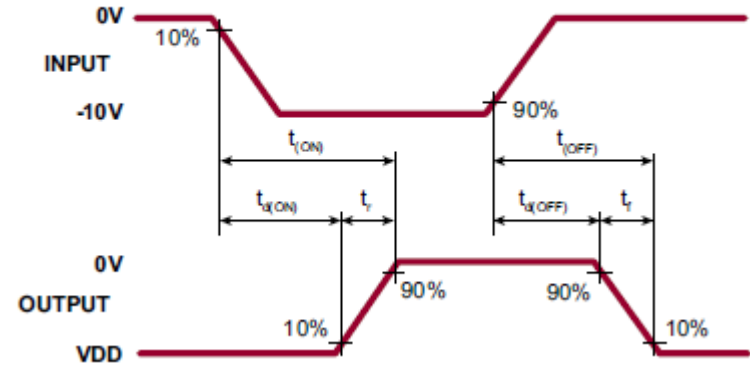
## Test Circuit



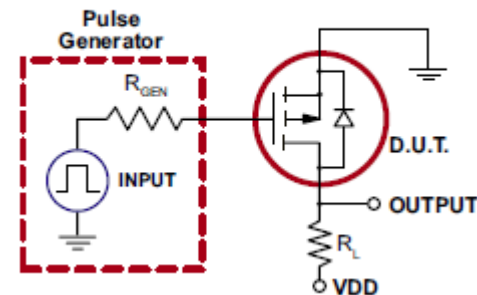
## Features:

- $BV_{DSS}$ : -90V min
- $R_{DS(ON)}$ : 8.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



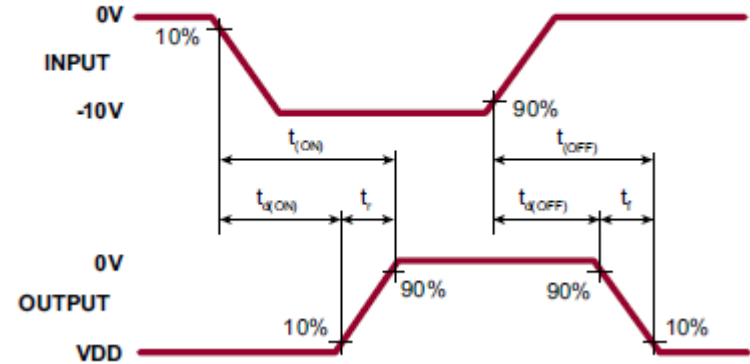
## Test Circuit



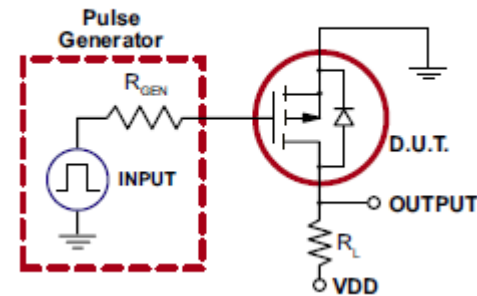
## Features:

- $BV_{DSS}$ : -500V min
- $R_{DS(ON)}$ : 125 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



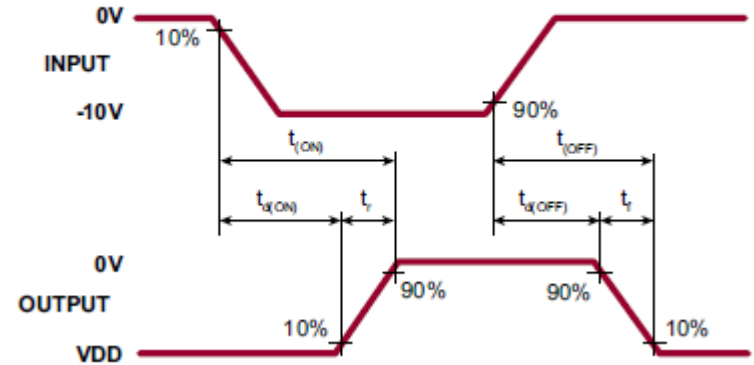
## Test Circuit



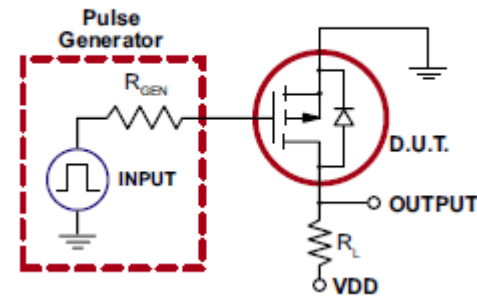
## Features:

- $BV_{DSS}$ : -80V min
- $R_{DS(ON)}$ : 5.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



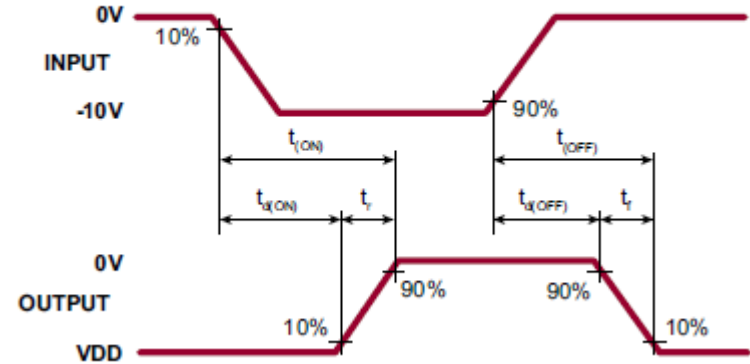
## Test Circuit



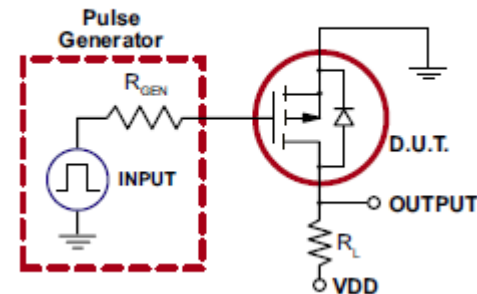
## Features:

- $BV_{DSS}$ : -60V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



## Test Circuit

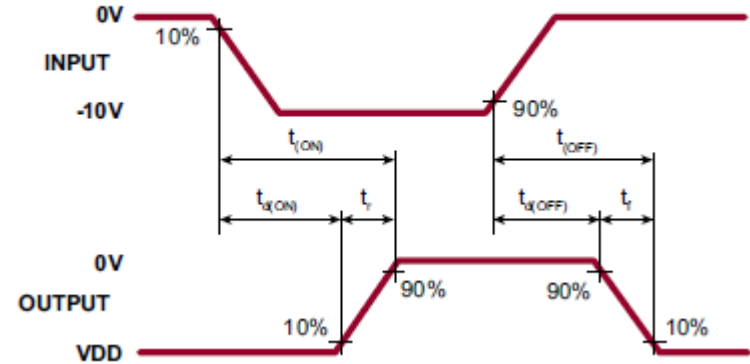




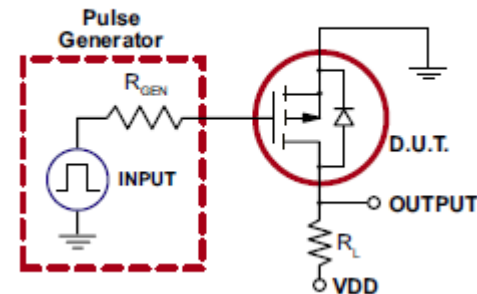
## Features:

- $BV_{DSS}$ : -100V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23

## Switching Waveform



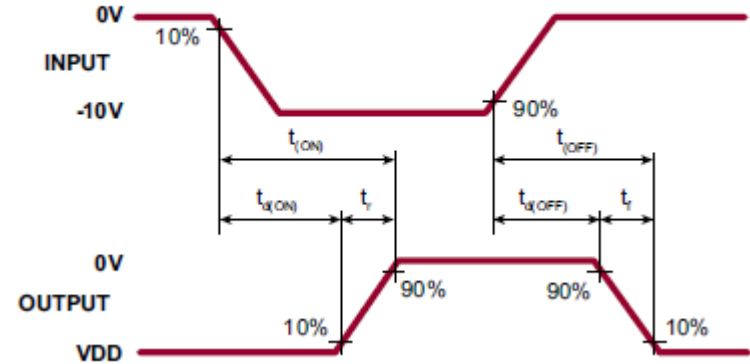
## Test Circuit



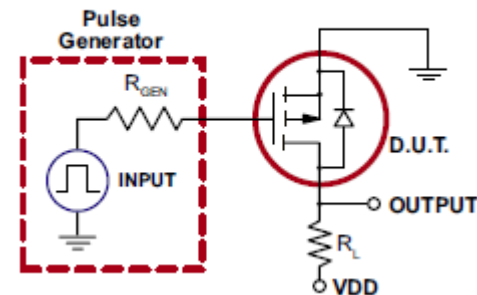
## Features:

- $BV_{DSS}$ : -60V min
- $R_{DS(ON)}$ : 0.9 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-to-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-39, TO-92

## Switching Waveform



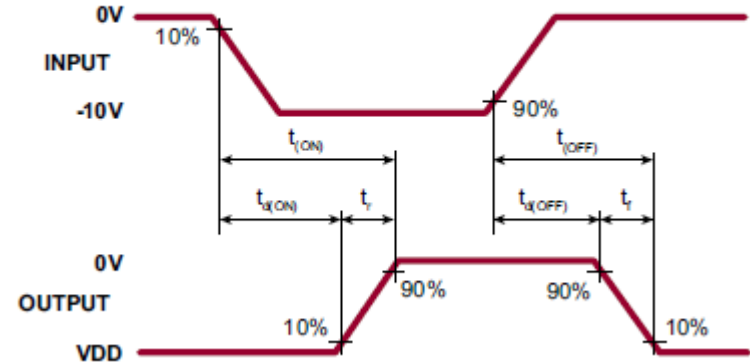
## Test Circuit



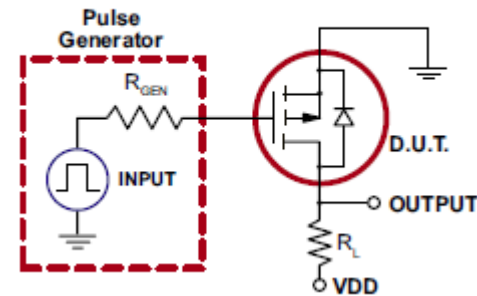
## Features:

- $BV_{DSS}$ : -500V min
- $R_{DS(ON)}$ : 30 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-to-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-89

## Switching Waveform



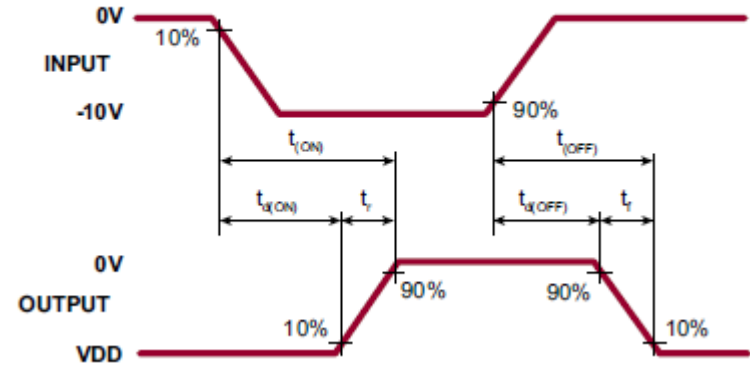
## Test Circuit



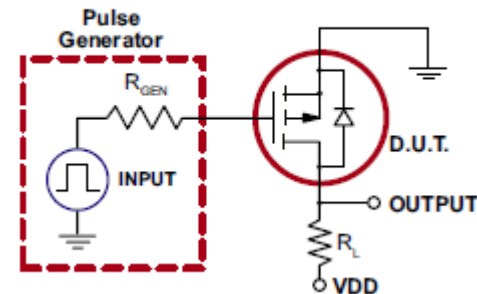
## Features:

- $BV_{DSS}$ : -30V min
- $R_{DS(ON)}$ : 0.6 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-to-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-89

## Switching Waveform



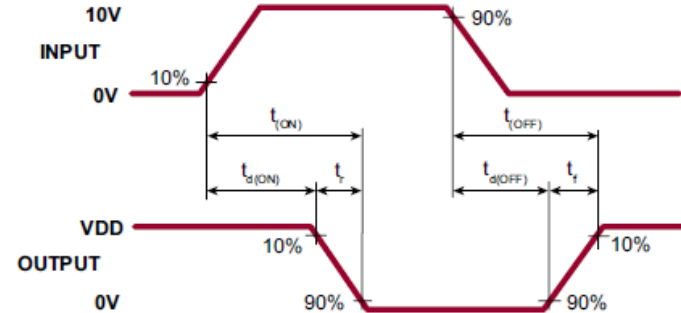
## Test Circuit



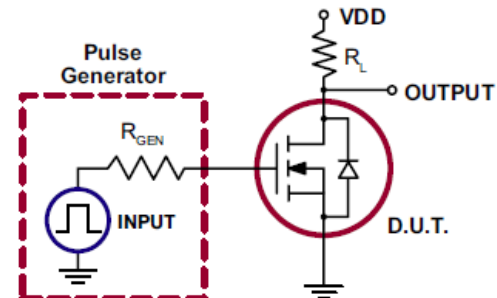
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 3.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-39 Metal Can

## Switching Waveform



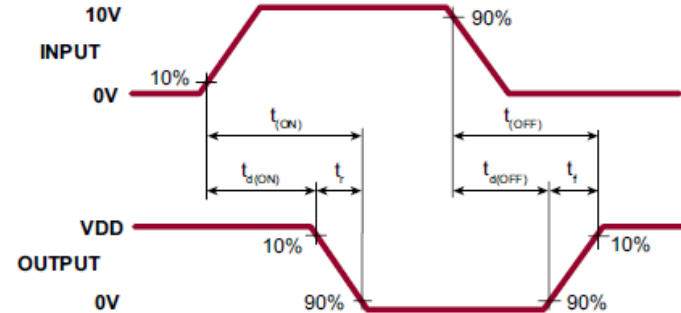
## Test Circuit



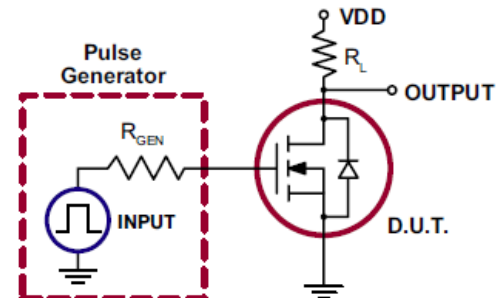
## Features:

- $BV_{DSS}$ : 90V min
- $R_{DS(ON)}$ : 4.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-39 metal can

## Switching Waveform



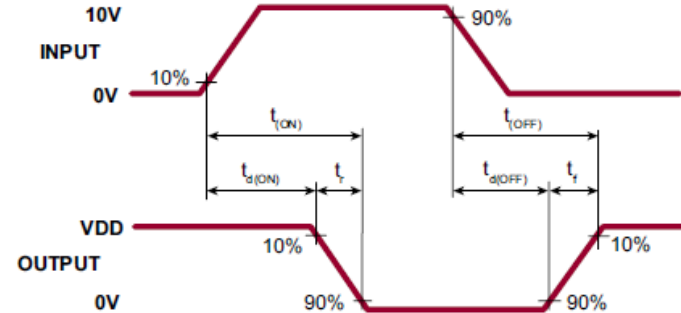
## Test Circuit



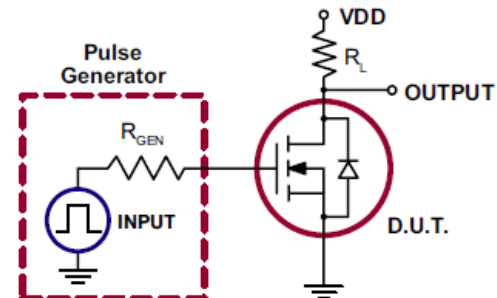
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 5.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



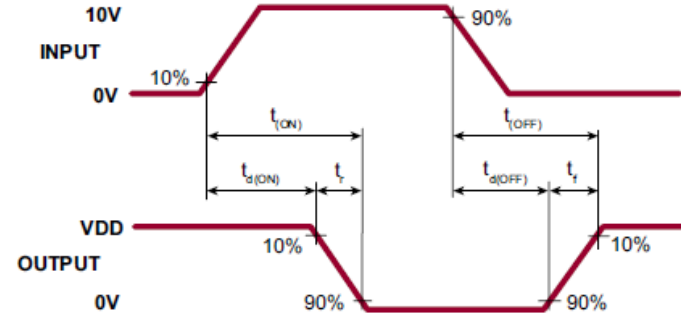
## Test Circuit



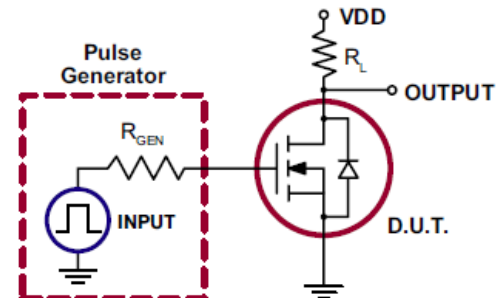
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 7.5 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23 (TO-236AB)

## Switching Waveform



## Test Circuit

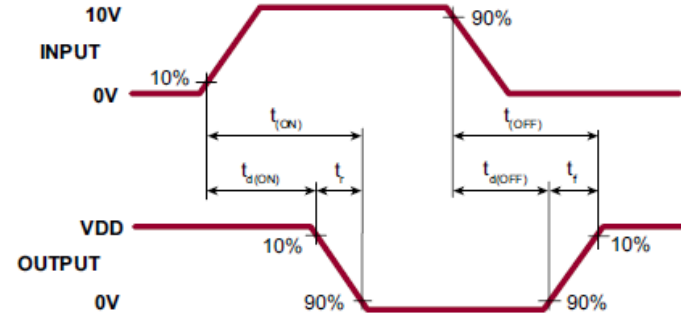




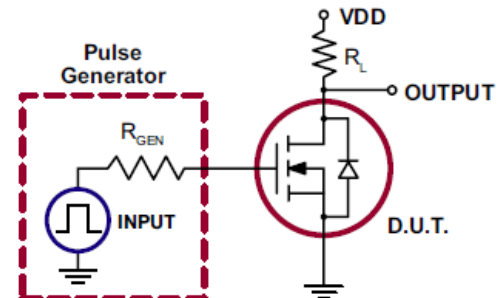
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 7.5 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



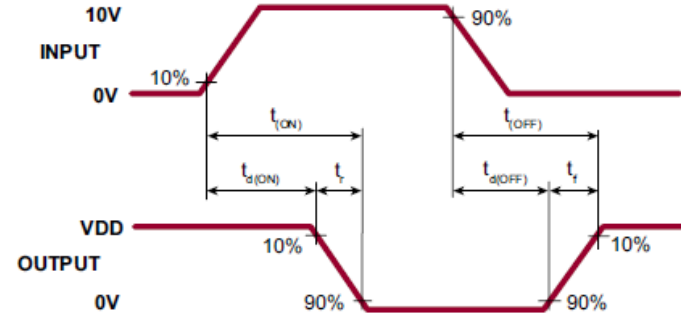
## Test Circuit



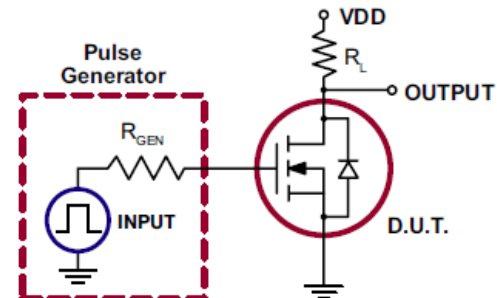
## Features:

- $BV_{DSS}$ : 40V min
- $R_{DS(ON)}$ : 1.8 $\Omega$  max for TO-92 pkg
- $R_{DS(ON)}$ : 2.0 $\Omega$  max for SOT-89 pkg
- Low threshold: 1.6V max
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-89

## Switching Waveform



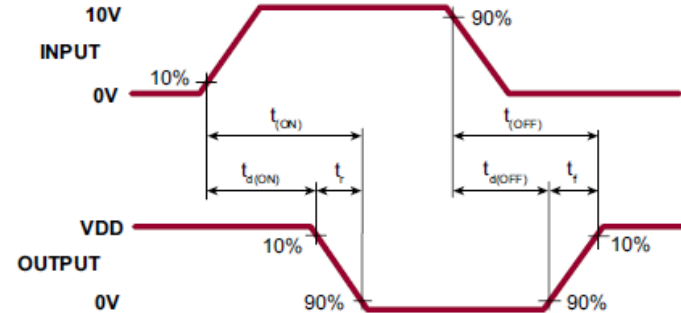
## Test Circuit



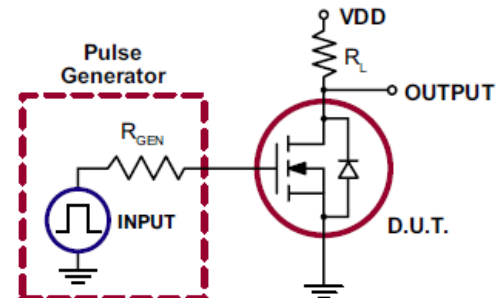
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 3.0 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 50pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



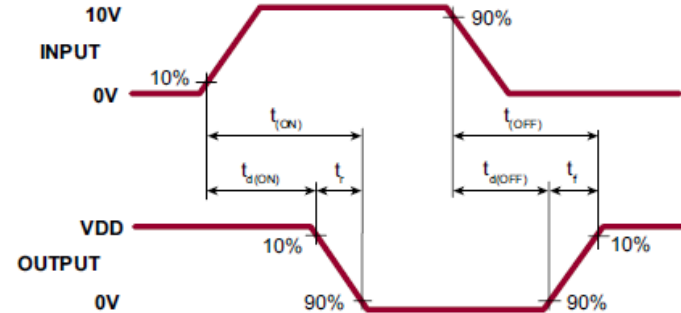
## Test Circuit



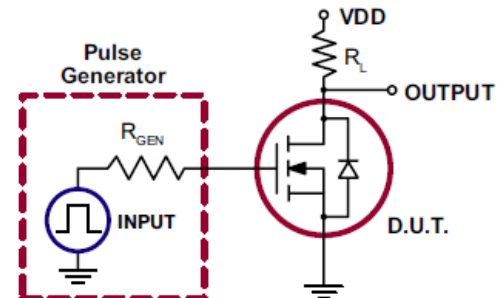
## Features:

- $BV_{DSS}$ : 100V min
- $R_{DS(ON)}$ : 3.0 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 50pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



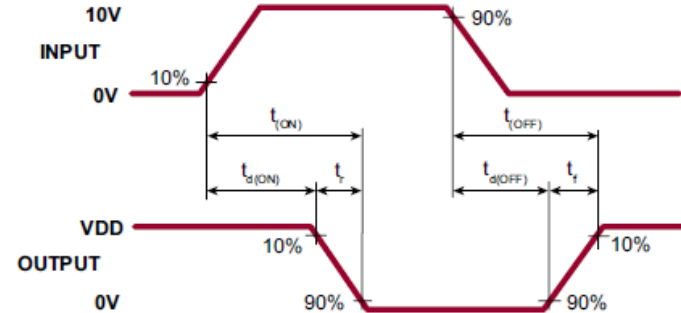
## Test Circuit



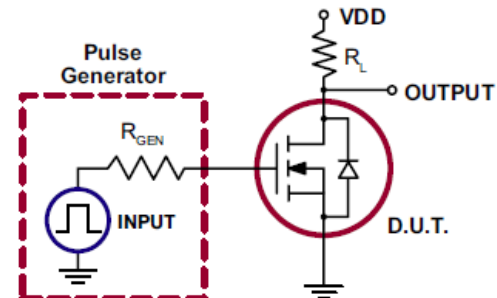
## Features:

- $BV_{DSS}$ : 40V min
- $R_{DS(ON)}$ : 0.75 $\Omega$  max
- Low threshold: 1.6V max
- High input impedance
- Low input capacitance: 140pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



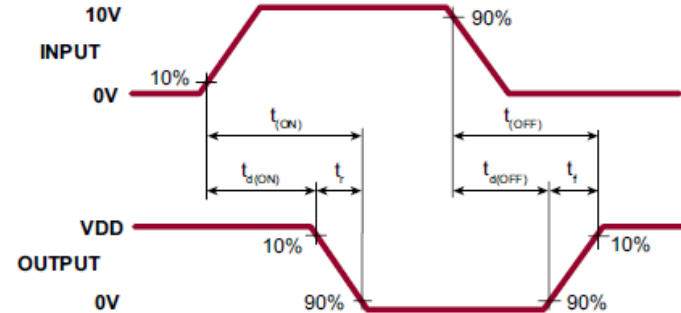
## Test Circuit



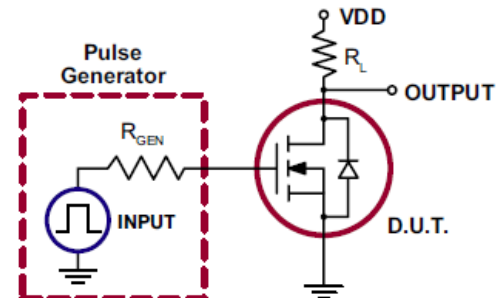
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 1.5 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 100pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



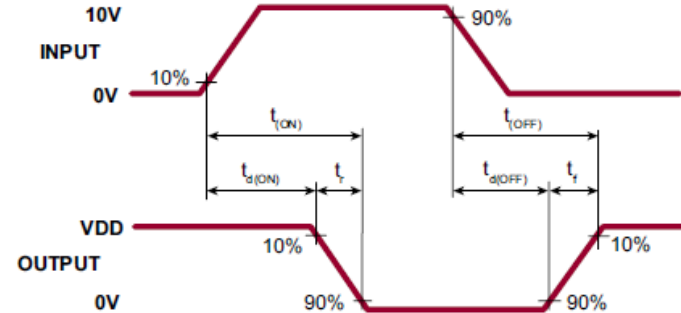
## Test Circuit



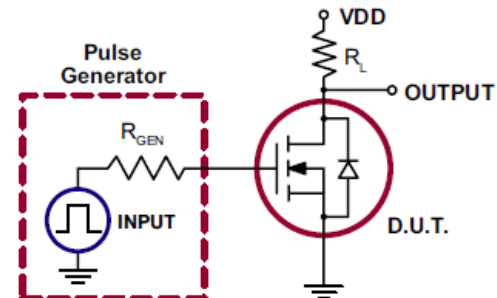
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 1.5 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 100pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



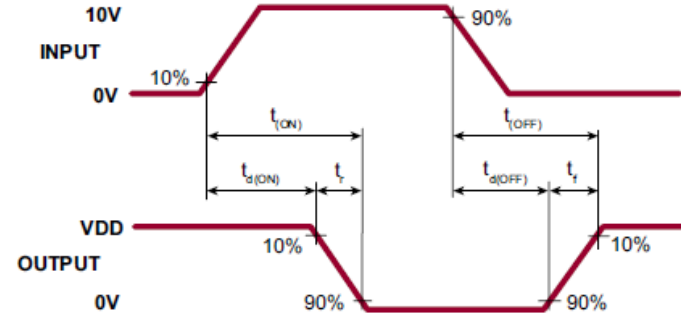
## Test Circuit



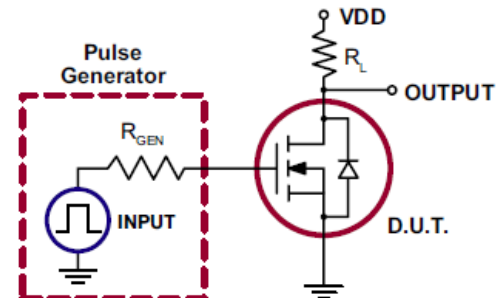
## Features:

- $BV_{DSS}$ : 100V min
- $R_{DS(ON)}$ : 1.5 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 100pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



## Test Circuit

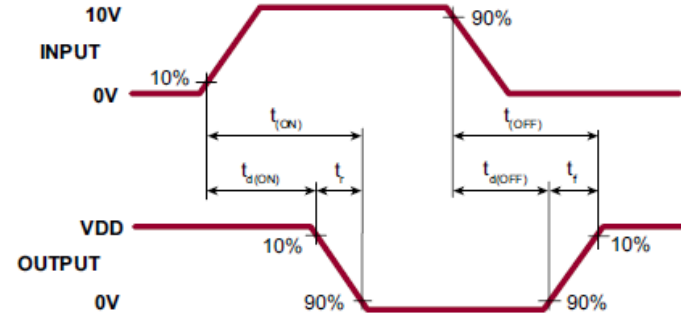




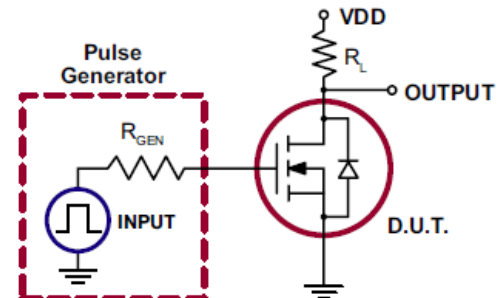
## Features:

- $BV_{DSS}$ : 200V min
- $R_{DS(ON)}$ : 6.0 $\Omega$  max
- Low threshold: 1.6V max
- High input impedance
- Low input capacitance: 110pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



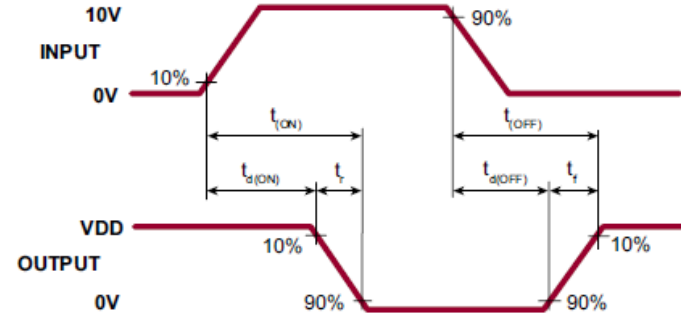
## Test Circuit



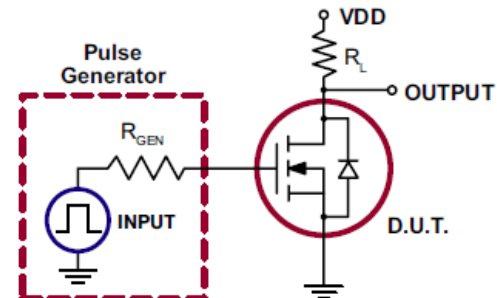
## Features:

- $BV_{DSS}$ : 20V min
- $R_{DS(ON)}$ : 1.3 $\Omega$  max
- Low threshold: 1.6V max
- High input impedance
- Low input capacitance: 130pF typ
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



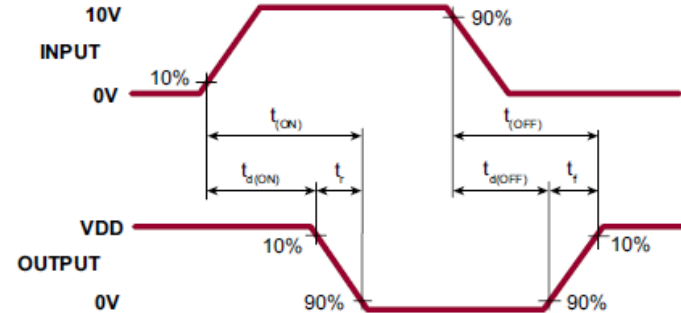
## Test Circuit



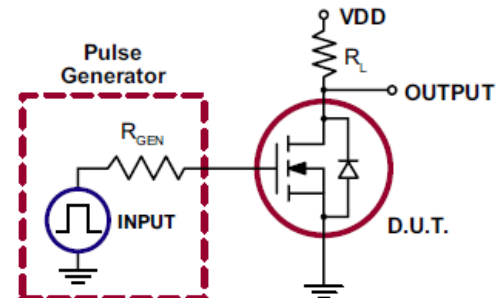
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 2.5 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-23

## Switching Waveform



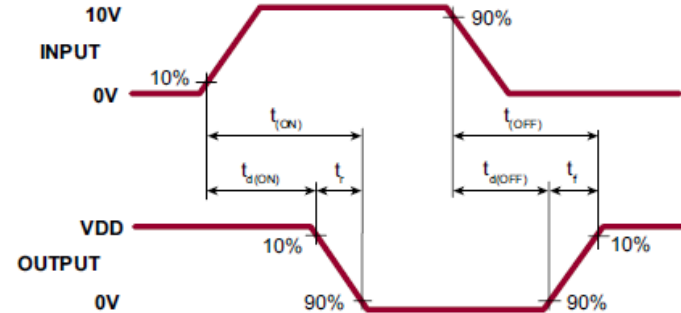
## Test Circuit



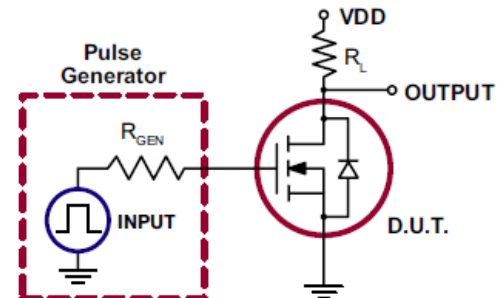
## Features:

- $BV_{DSS}$ : 240V min
- $R_{DS(ON)}$ : 15 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23

## Switching Waveform



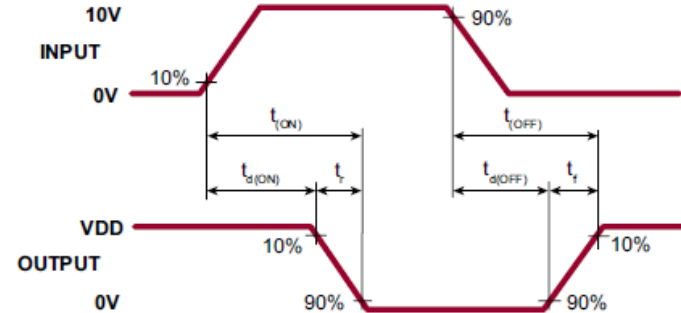
## Test Circuit



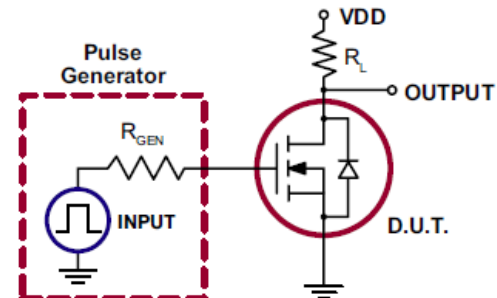
## Features:

- $BV_{DSS}$ : 300V min
- $R_{DS(ON)}$ : 25 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23

## Switching Waveform



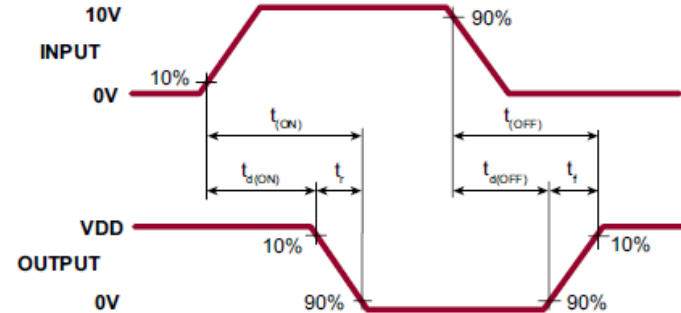
## Test Circuit



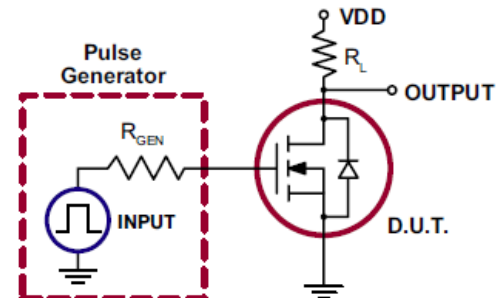
## Features:

- $BV_{DSS}$ : 250V min
- $R_{DS(ON)}$ : 3.5 $\Omega$  max
- Low threshold
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



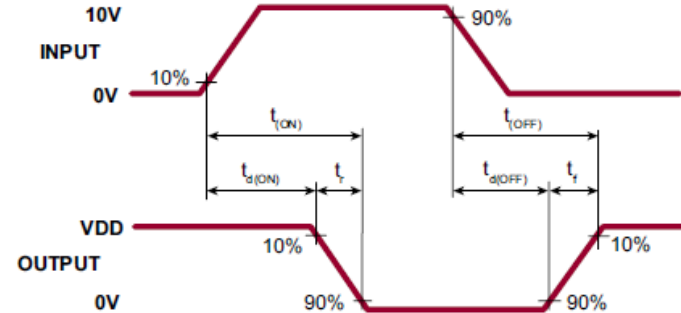
## Test Circuit



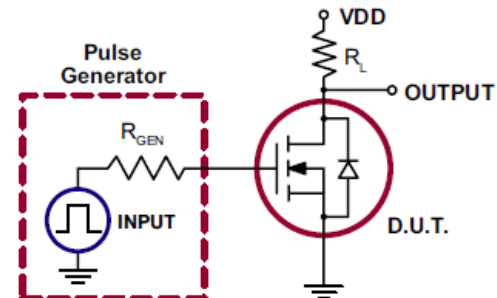
## Features:

- $BV_{DSS}$ : 350V min
- $R_{DS(ON)}$ : 6.0 $\Omega$  max
- Low threshold
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



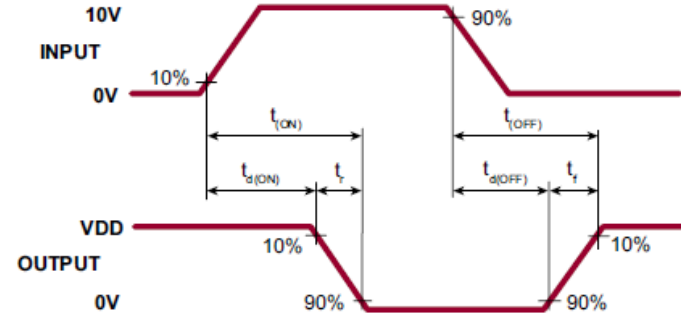
## Test Circuit



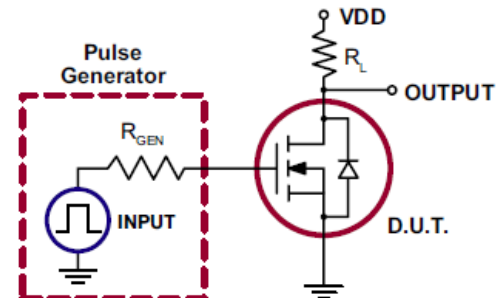
## Features:

- $BV_{DSS}$ : 18V min
- $R_{DS(ON)}$ : 2.5 $\Omega$  max
- Low threshold
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



## Test Circuit

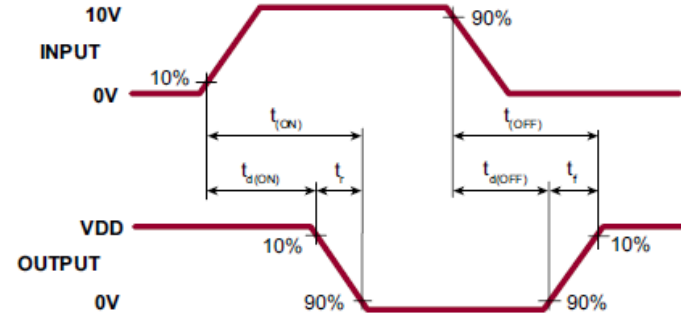




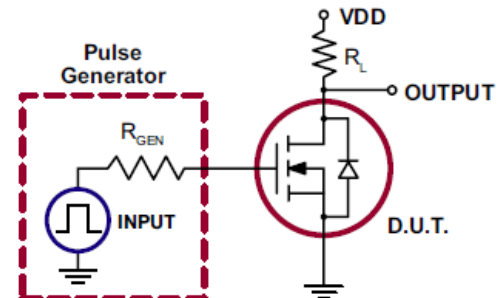
## Features:

- $BV_{DSS}$ : 40V min
- $R_{DS(ON)}$ : 1.0 $\Omega$  max
- Low threshold: 1.6V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



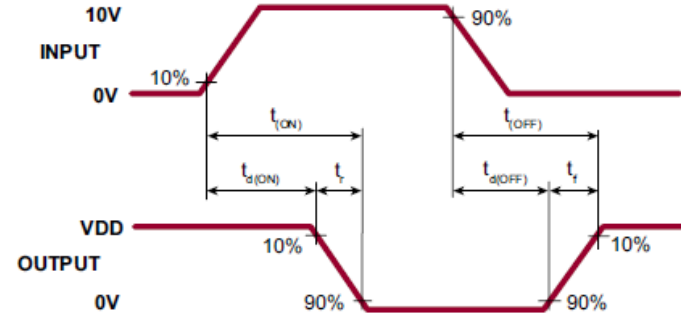
## Test Circuit



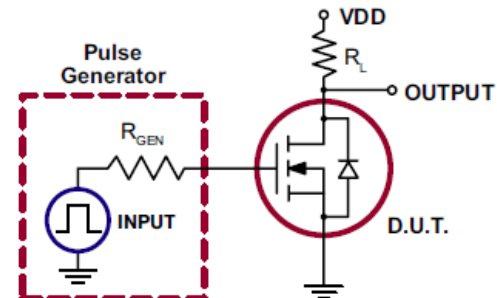
## Features:

- $BV_{DSS}$ : 100V min
- $R_{DS(ON)}$ : 1.5 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



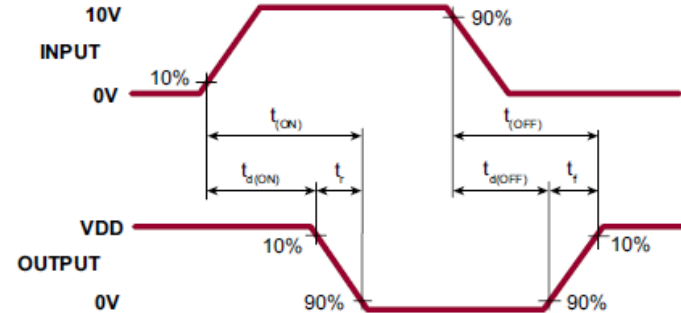
## Test Circuit



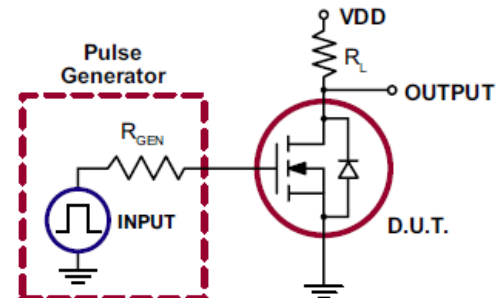
## Features:

- $BV_{DSS}$ : 240V min
- $R_{DS(ON)}$ : 6.0 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-89

## Switching Waveform



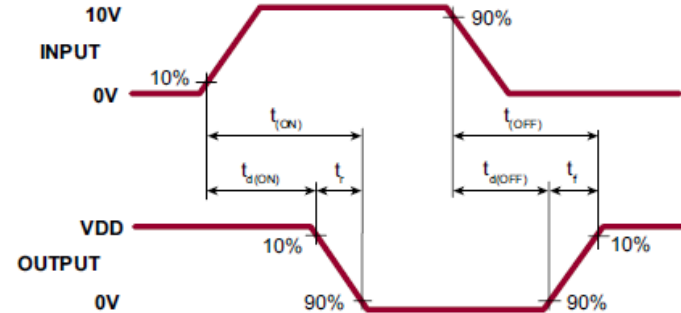
## Test Circuit



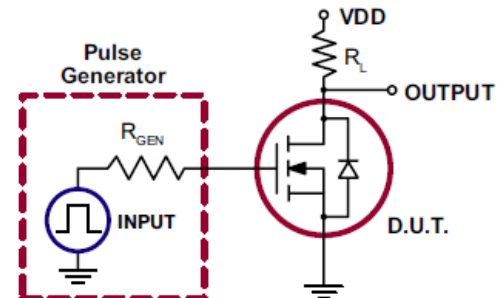
## Features:

- $BV_{DSS}$ : 400V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-89

## Switching Waveform



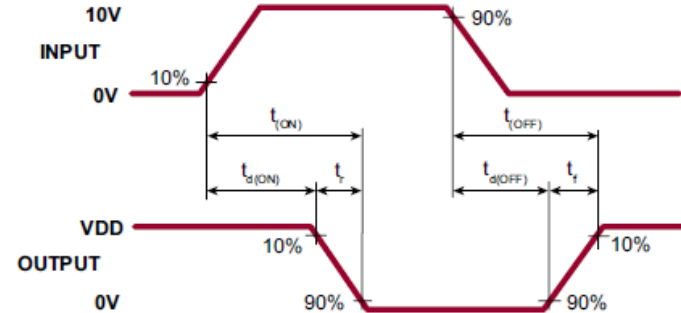
## Test Circuit



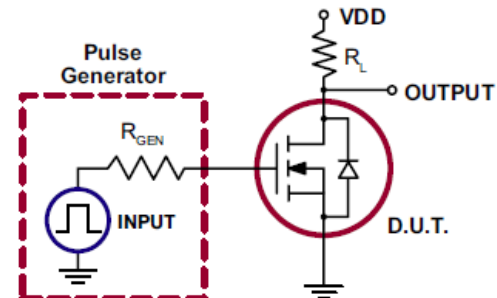
## Features:

- $BV_{DSS}$ : 400V min
- $R_{DS(ON)}$ : 5.0 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-252, TO-92, SOIC-8

## Switching Waveform



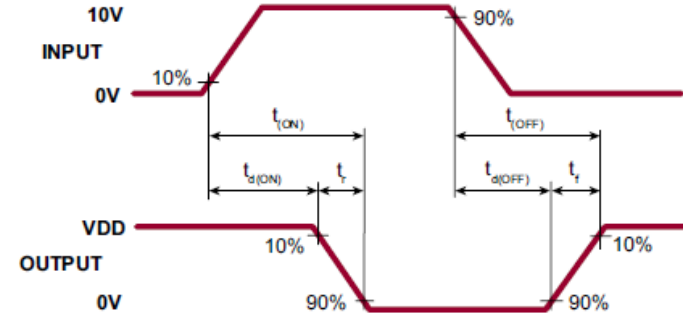
## Test Circuit



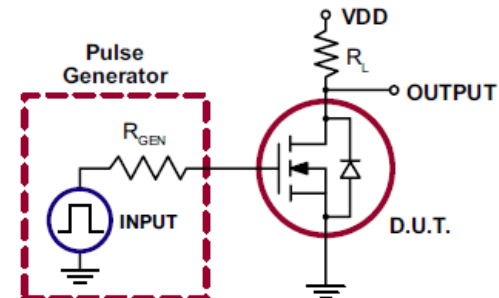
## Features:

- $BV_{DSS}$ : 250V min
- $R_{DS(ON)}$ : 7.0 $\Omega$  max
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23, TO-92, SOT-89

## Switching Waveform



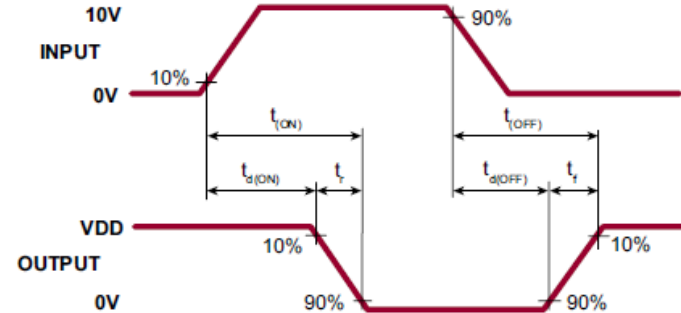
## Test Circuit



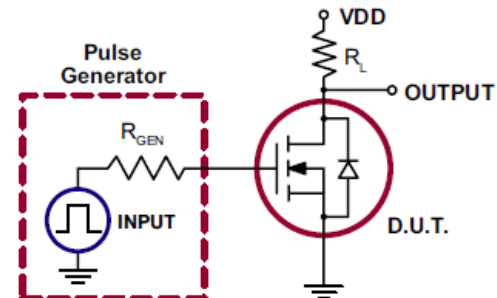
## Features:

- $BV_{DSS}$ : 350V min
- $R_{DS(ON)}$ : 15 $\Omega$  max
- Low threshold
- High input impedance
- Low input capacitance
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23, SOT-89

## Switching Waveform



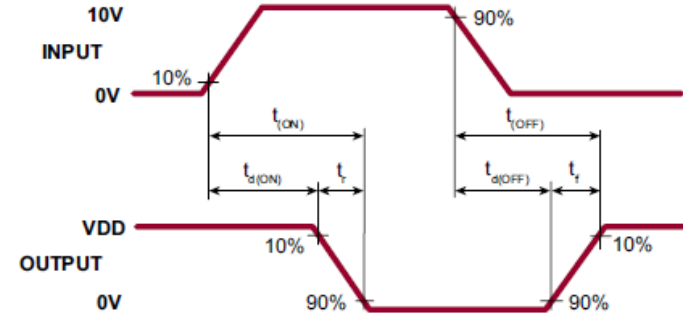
## Test Circuit



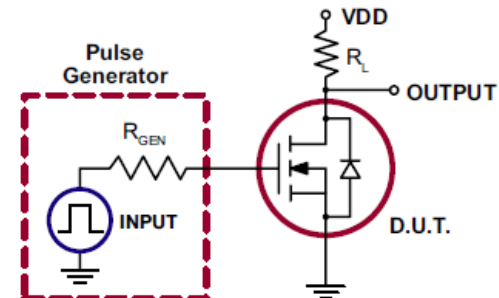
## Features:

- $BV_{DSS}$ : 40V min
- $R_{DS(ON)}$ : 3.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



## Test Circuit

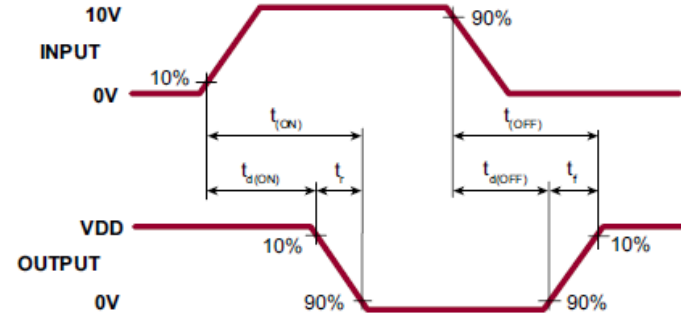




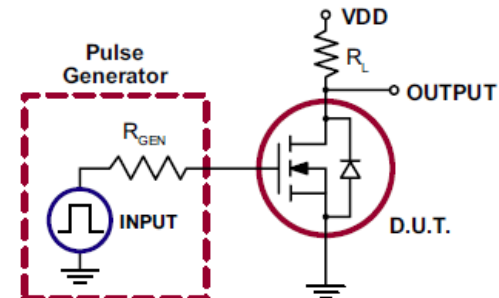
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 3.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



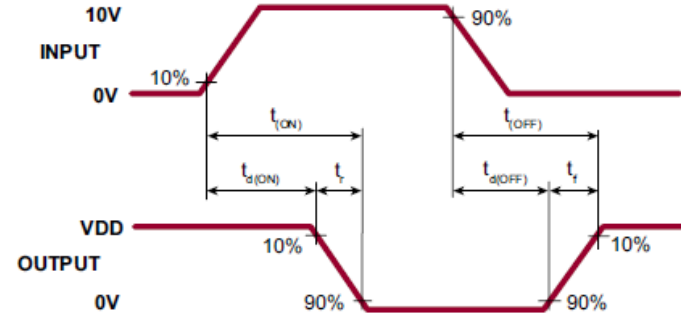
## Test Circuit



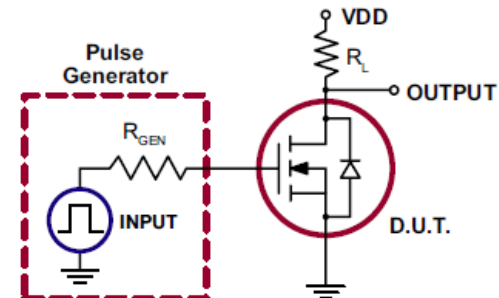
## Features:

- $BV_{DSS}$ : 90V min
- $R_{DS(ON)}$ : 3.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



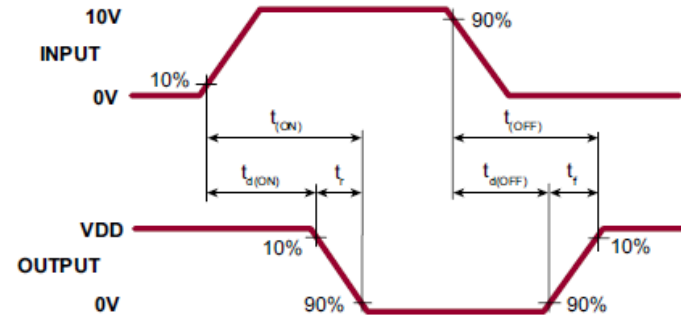
## Test Circuit



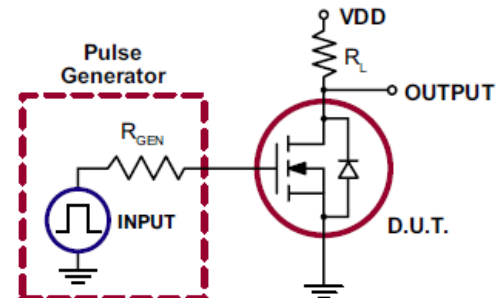
## Features:

- $BV_{DSS}$ : 30V min
- $R_{DS(ON)}$ : 1.2 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



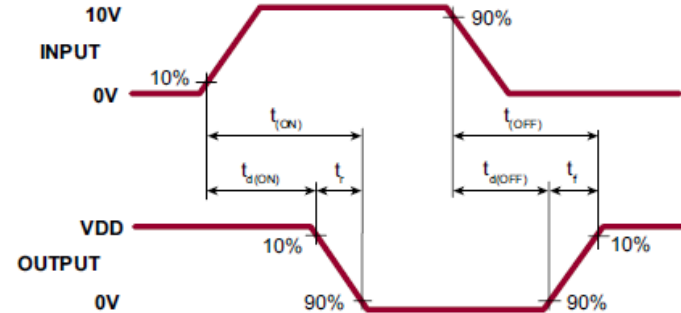
## Test Circuit



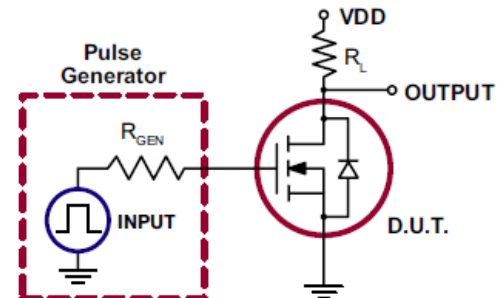
## Features:

- $BV_{DSS}$ : 500V min
- $R_{DS(ON)}$ : 60 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



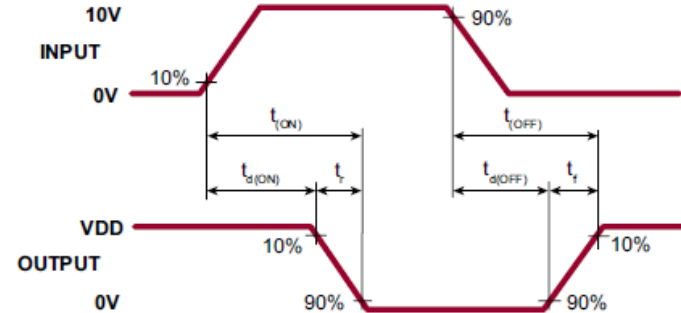
## Test Circuit



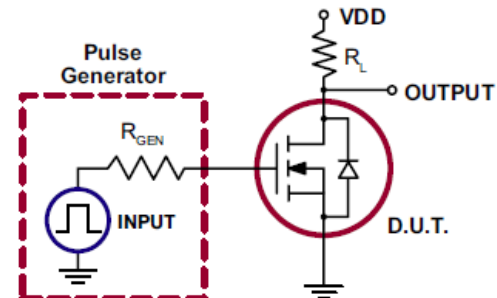
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 3.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



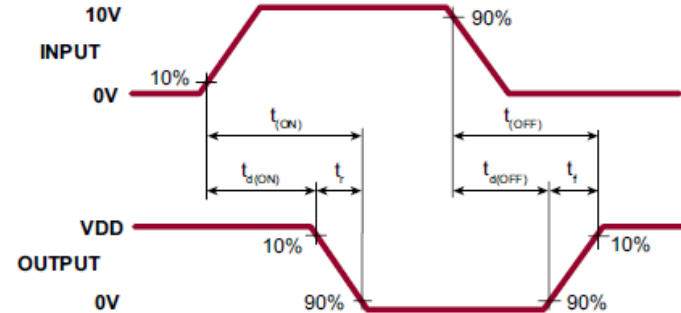
## Test Circuit



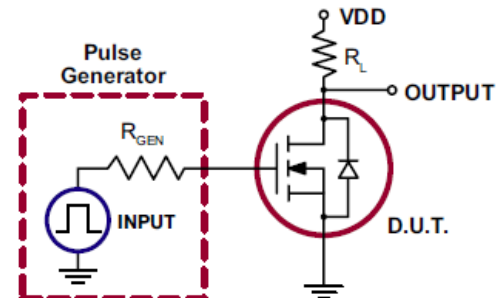
## Features:

- $BV_{DSS}$ : 80V min
- $R_{DS(ON)}$ : 4.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



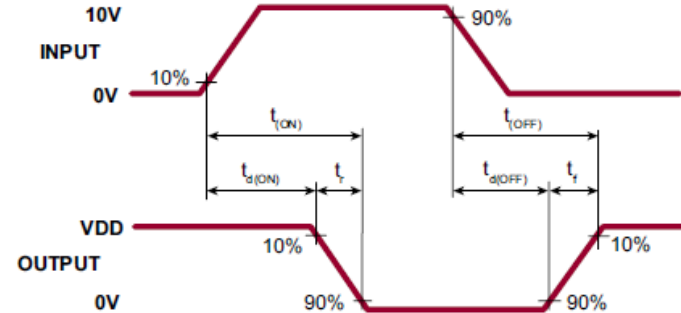
## Test Circuit



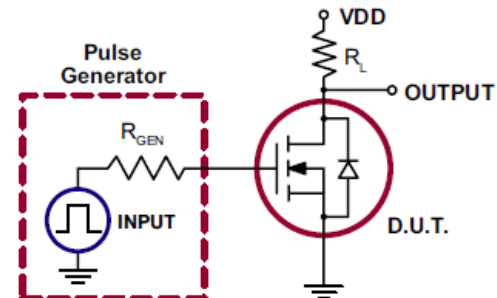
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 5.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



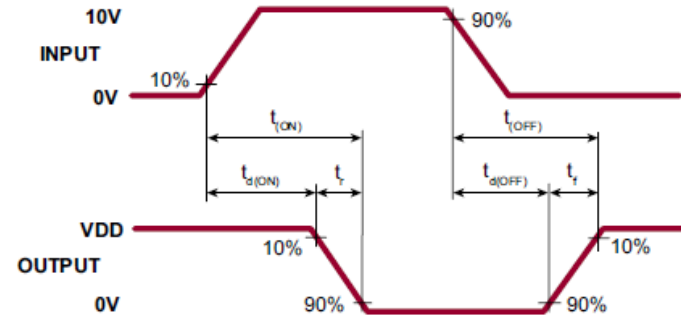
## Test Circuit



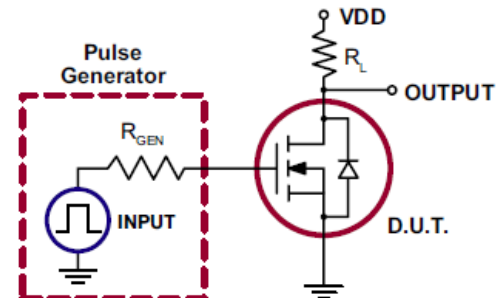
## Features:

- $BV_{DSS}$ : 120V min
- $R_{DS(ON)}$ : 6.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



## Test Circuit

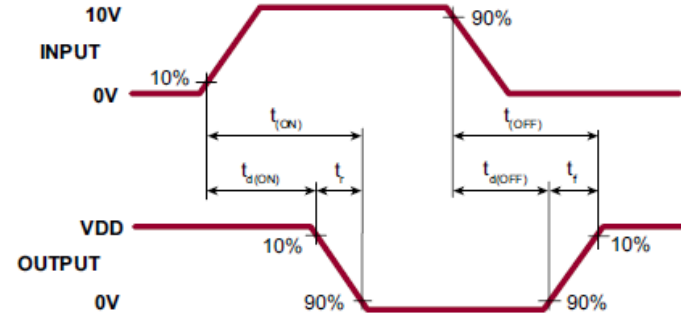




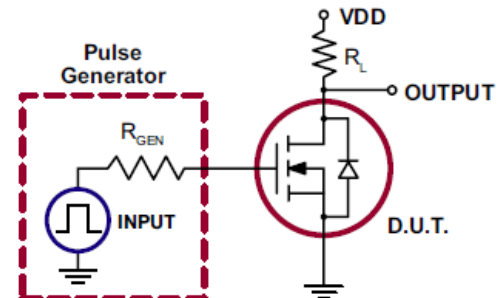
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 4.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



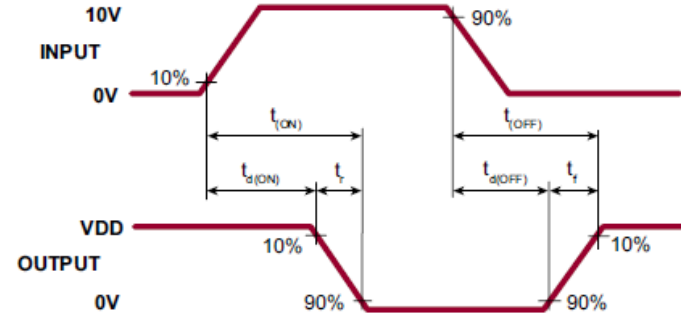
## Test Circuit



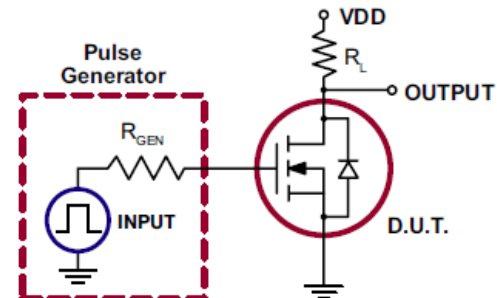
## Features:

- $BV_{DSS}$ : 100V min
- $R_{DS(ON)}$ : 4.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOT-23

## Switching Waveform



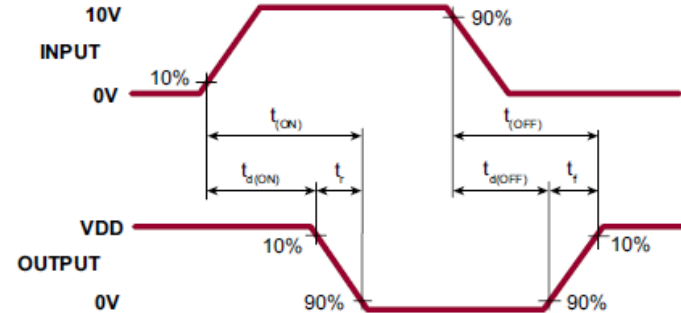
## Test Circuit



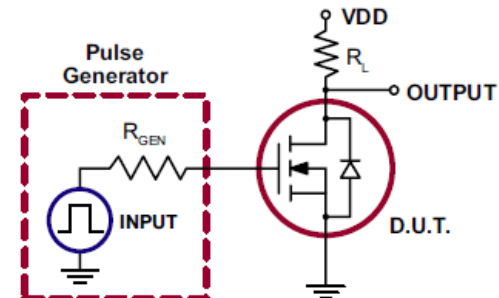
## Features:

- $BV_{DSS}$ : 100V min
- $R_{DS(ON)}$ : 0.35 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-39, TO-92

## Switching Waveform



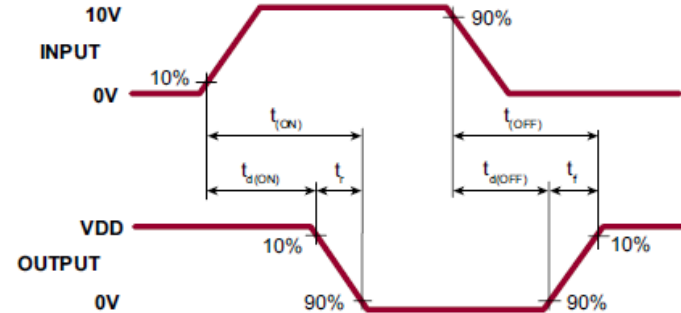
## Test Circuit



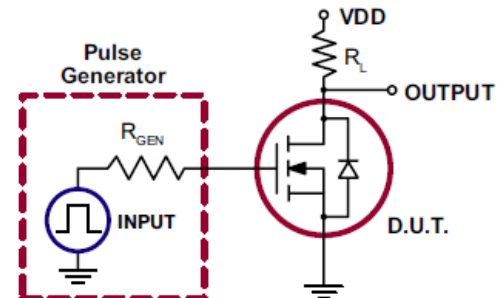
## Features:

- $BV_{DSS}$ : 60V min
- $R_{DS(ON)}$ : 7.5 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



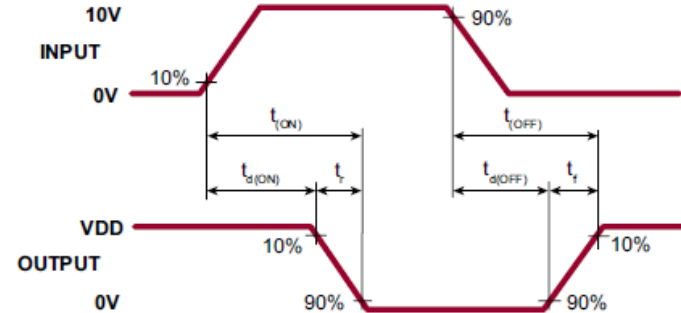
## Test Circuit



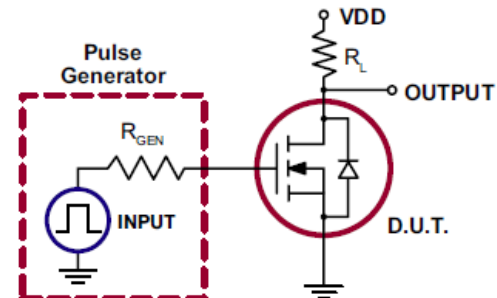
## Features:

- $BV_{DSS}$ : 240V min
- $R_{DS(ON)}$ : 1.25 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



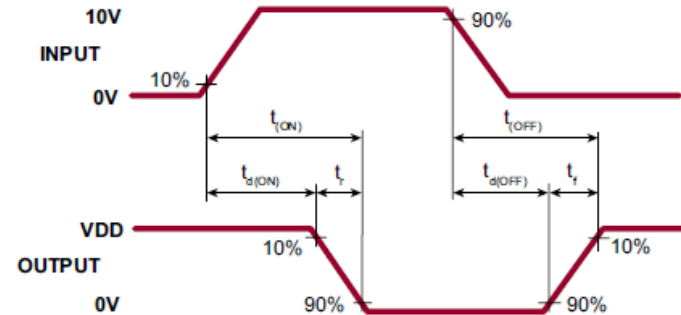
## Test Circuit



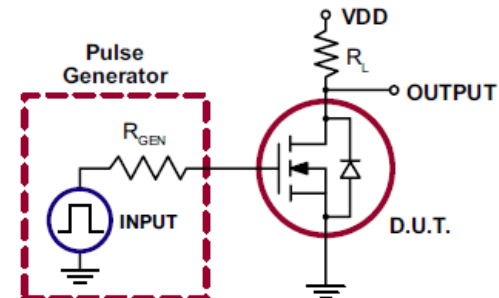
## Features:

- $BV_{DSS}$ : 240V min
- $R_{DS(ON)}$ : 6.0 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



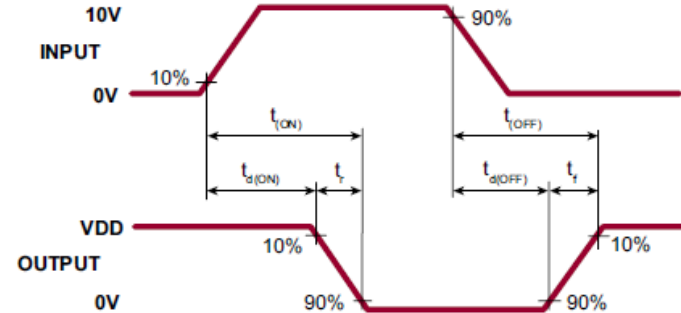
## Test Circuit



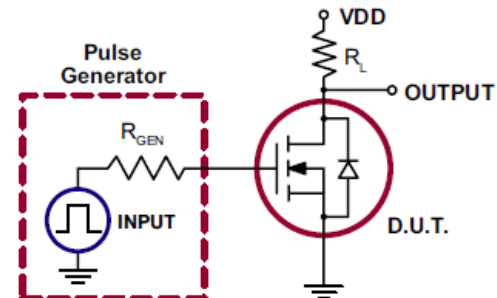
## Features:

- $BV_{DSS}$ : 240V min
- $R_{DS(ON)}$ : 10 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform



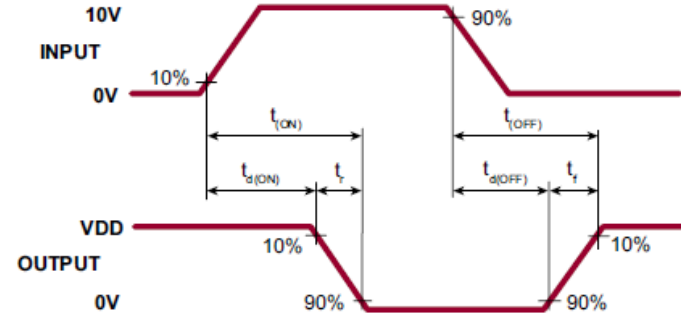
## Test Circuit



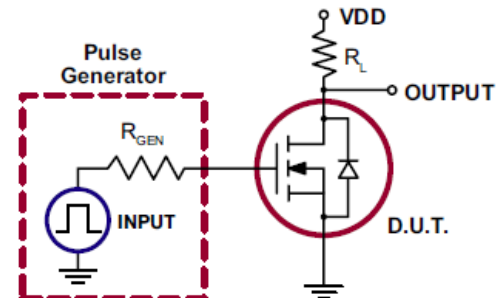
## Features:

- $BV_{DSS}$ : 500V min
- $R_{DS(ON)}$ : 13 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-89

## Switching Waveform



## Test Circuit

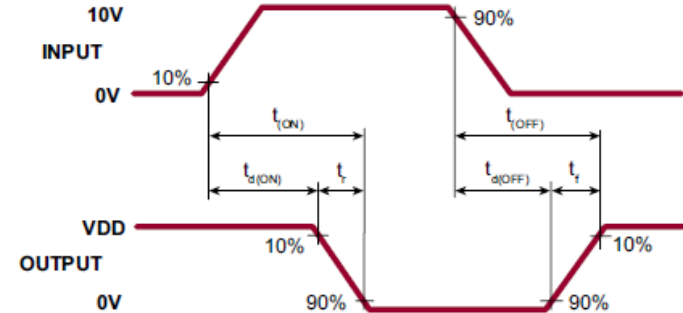




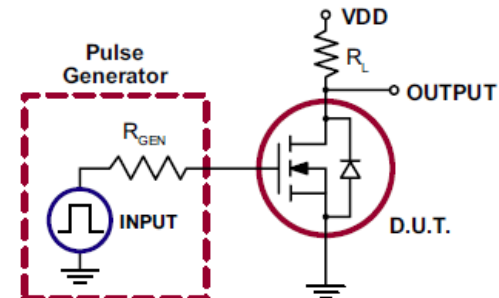
## Features:

- $BV_{DSS}$ : 600V min
- $R_{DS(ON)}$ : 20 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-89

## Switching Waveform



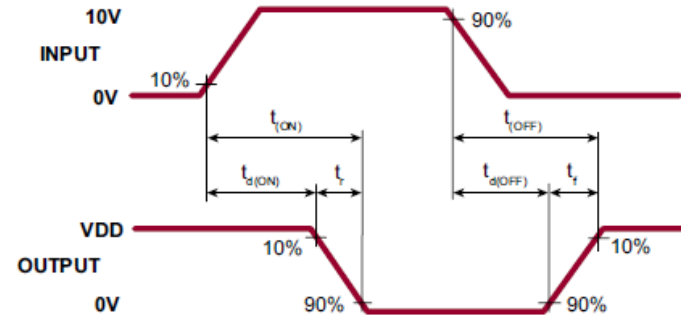
## Test Circuit



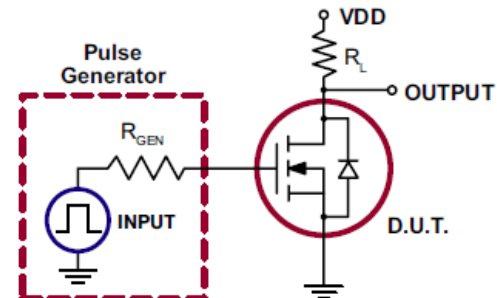
## Features:

- $BV_{DSS}$ : 50V min
- $R_{DS(ON)}$ : 0.3 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92, SOT-89

## Switching Waveform



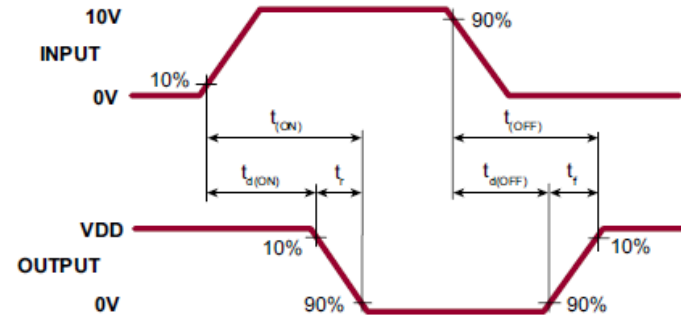
## Test Circuit



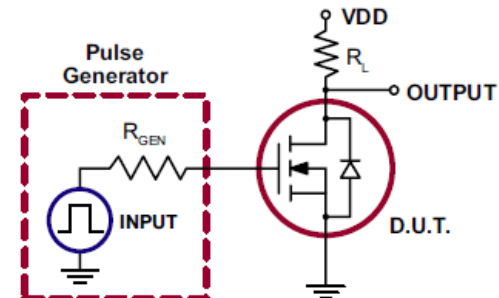
## Features:

- $BV_{DSS}$ : 400V min
- $R_{DS(ON)}$ : 12 $\Omega$  max
- Free from secondary breakdown
- Low power drive requirement
- Ease of paralleling
- Low  $C_{ISS}$  and fast switching speeds
- Excellent thermal stability
- Integral source-drain diode
- High input impedance and high gain
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: TO-92

## Switching Waveform

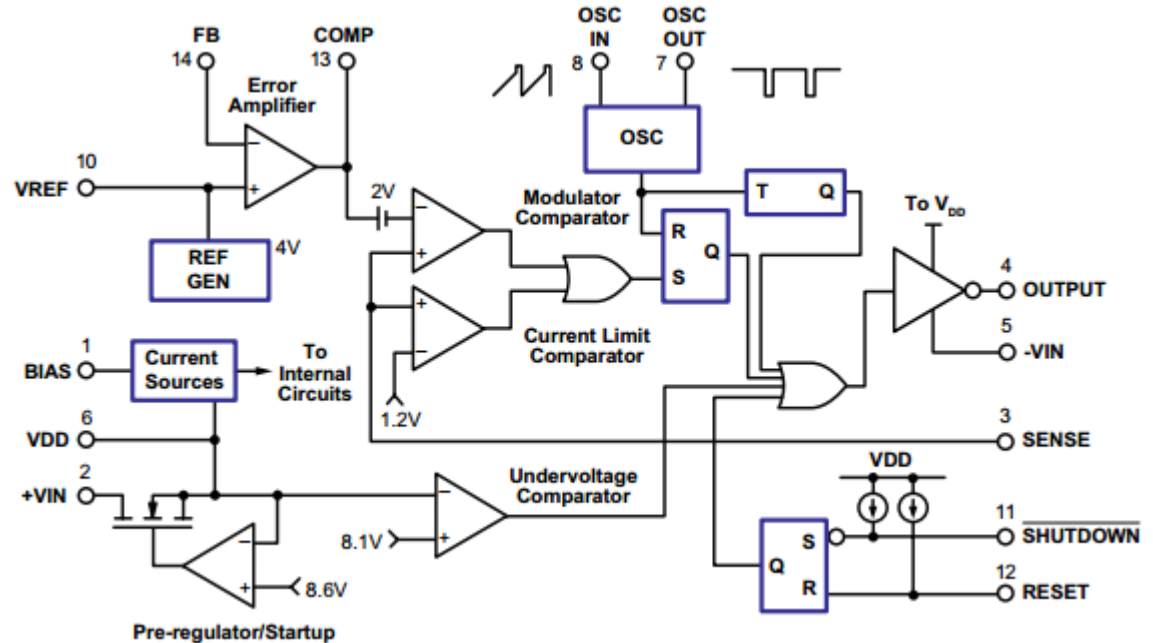


## Test Circuit



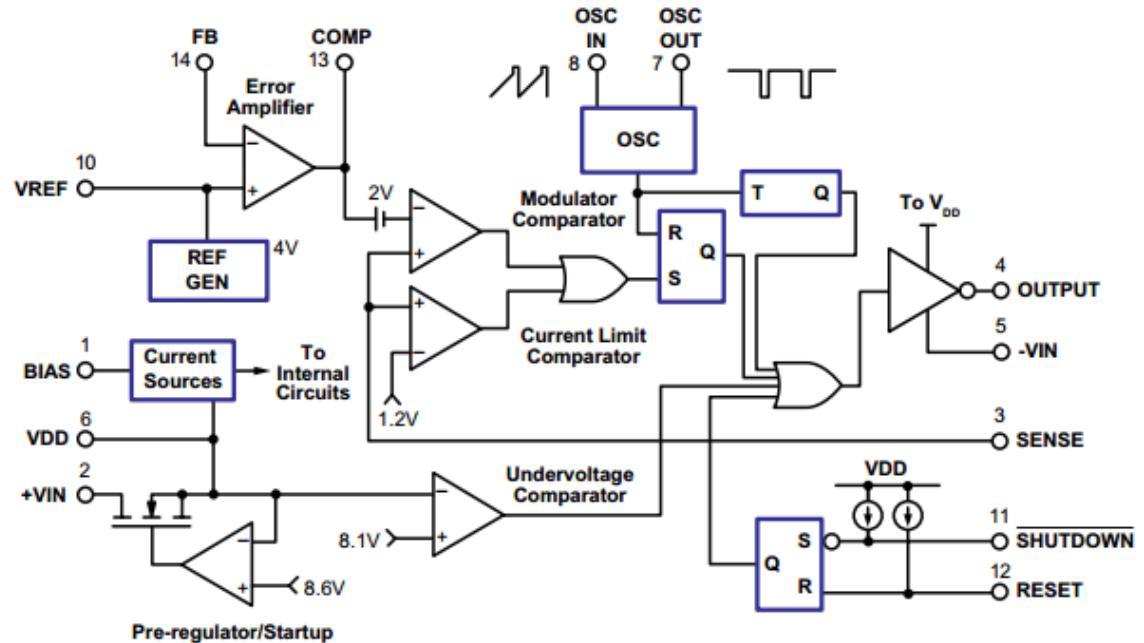
## Features:

- 10 to 120V input voltage range
- Current-mode control
- High efficiency
- Up to 1.0MHz internal oscillator
- Internal start-up circuit
- Low internal noise
- 50% maximum duty cycle
- Operating Temperature Range:
  - -55°C to +125°C
- Package Option: SOIC-14



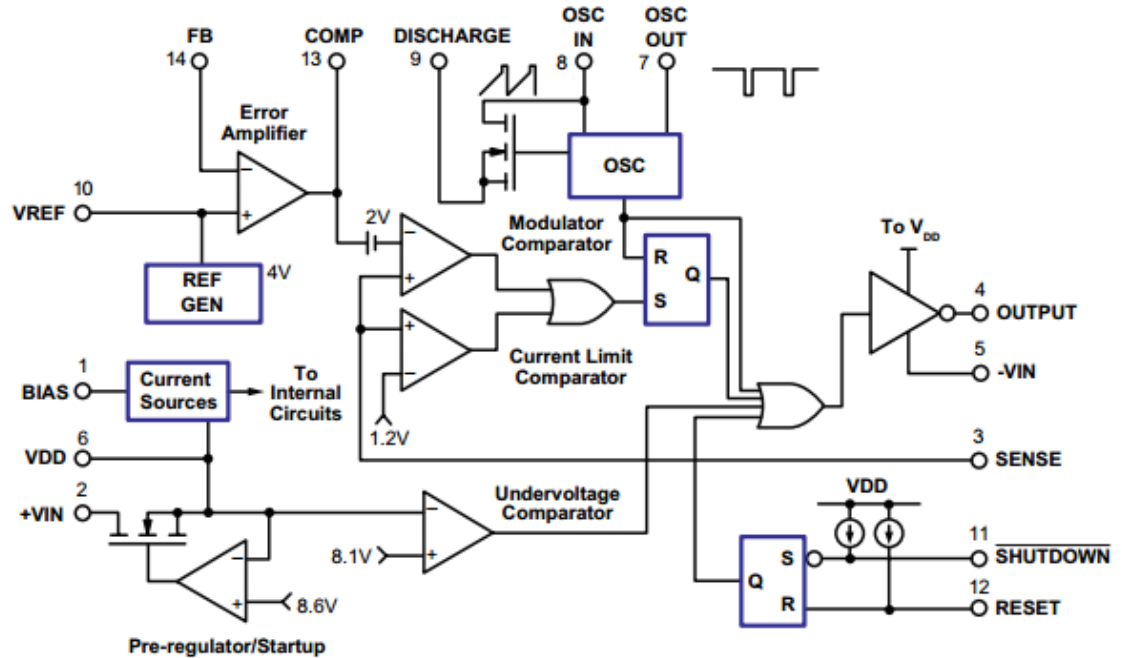
## Features:

- 9.0 to 80V input voltage range
- Current-mode control
- High efficiency
- Up to 1.0MHz internal oscillator
- Internal start-up circuit
- Low internal noise
- 50% maximum duty cycle
- Operating Temperature Range:
  - -55°C to +125°C
- Package Option: SOIC-14



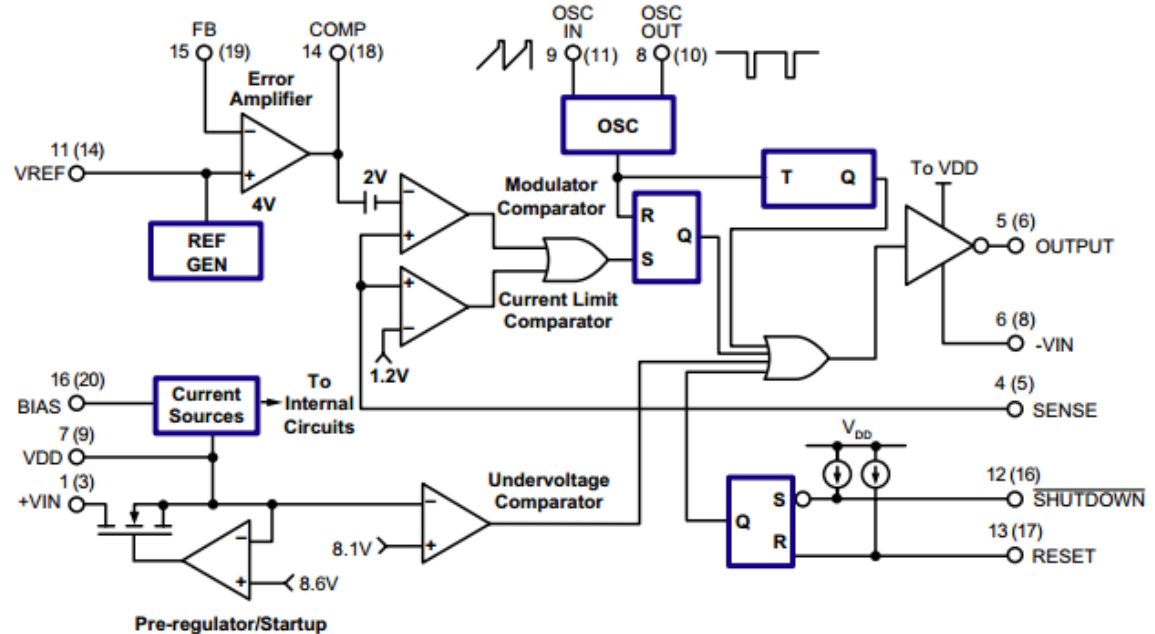
## Features:

- 10 to 120V input voltage range
- Current-mode control
- High efficiency
- Up to 1.0MHz internal oscillator
- Internal start-up circuit
- Low internal noise
- 99% maximum duty cycle
- Operating Temperature Range:
  - -55°C to +125°C
- Package Option: SOIC-14



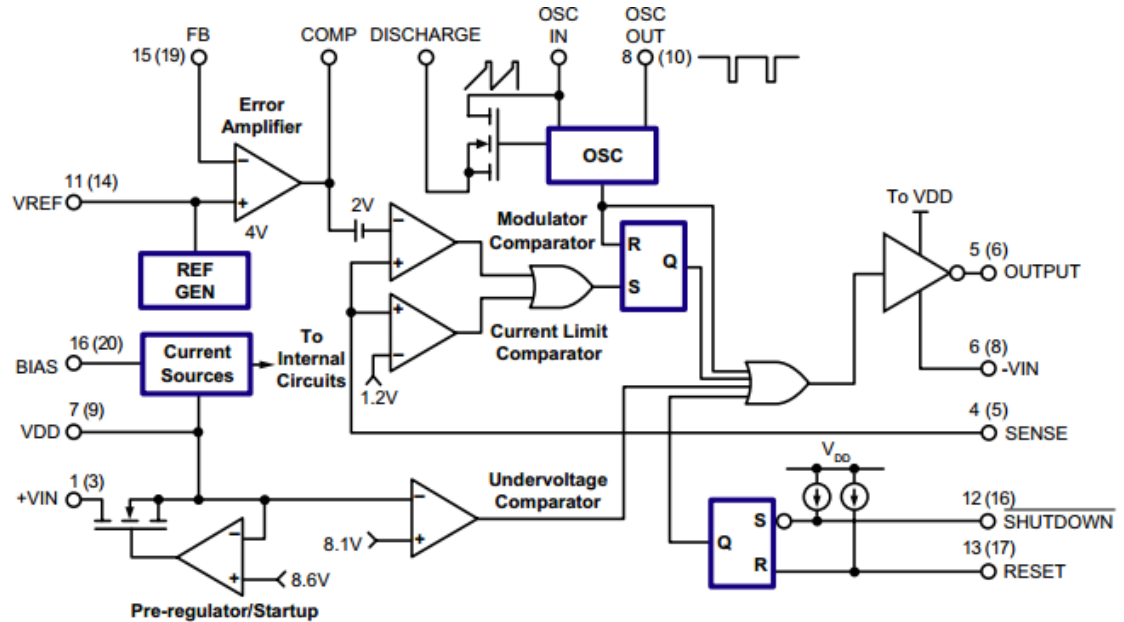
## Features:

- 10 to 450V input voltage range
- <1.3mA supply current
- >1.0MHz clock
- >20:1 dynamic range @ 500KHz
- 49% Maximum duty cycle version
- Low internal noise
- Operating Temperature Range:
  - -55°C to +125°C
- Package Option: SOIC-16



## Features:

- 10 to 450V input voltage range
- <1.3mA supply current
- >1.0MHz clock
- >20:1 dynamic range @ 500kHz
- 99% Maximum duty cycle version
- Low internal noise
- Operating Temperature Range:
  - -55°C to +125°C
- Package Option: SOIC-16

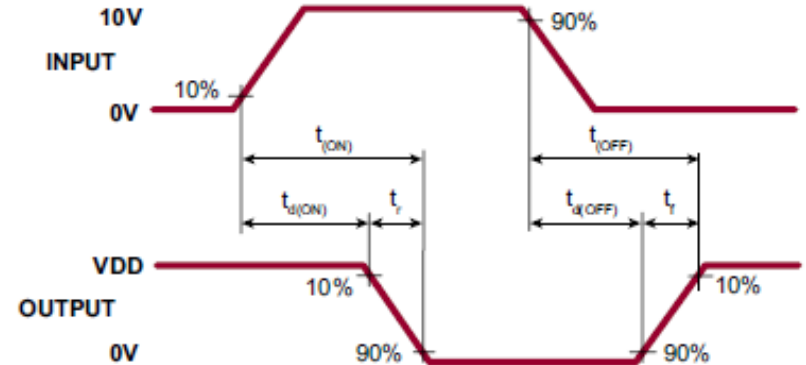




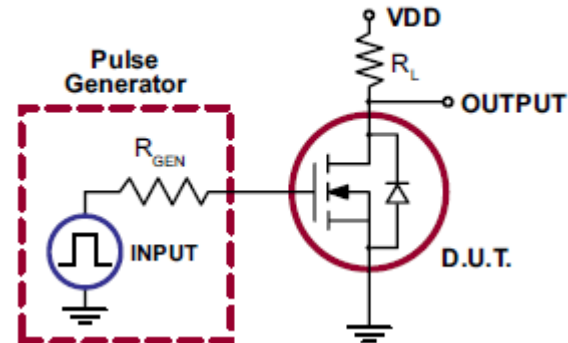
## Features:

- $BV_{DSS}$ : 240V min
- $R_{DS(ON)}$ : 6 $\Omega$  max
- Dual N-channel devices
- Low threshold: 2.0V max
- High input impedance
- Low input capacitance: 125pF max
- Fast switching speeds
- Low on-resistance
- Free from secondary breakdown
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOIC-8

## Switching Waveform



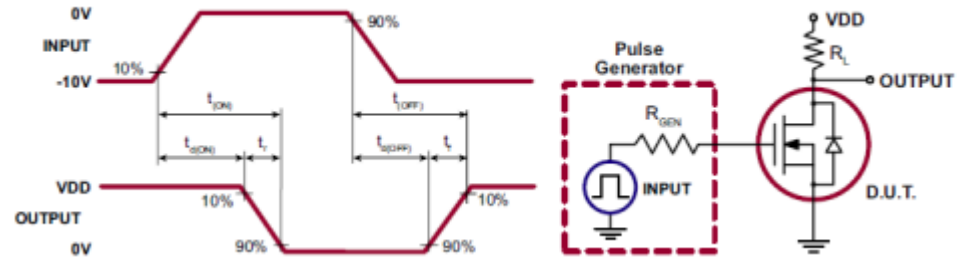
## Test Circuit



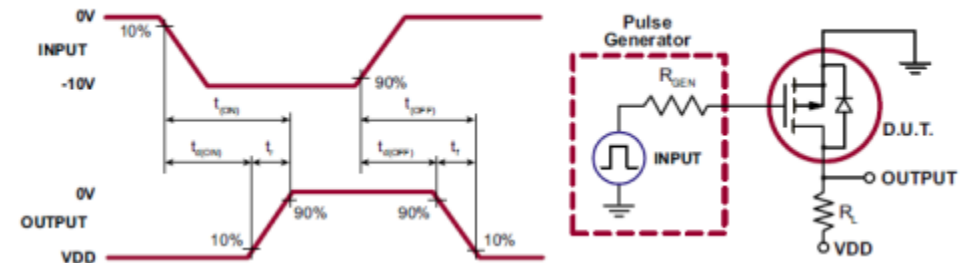
## Features:

- N-Channel:
  - $BV_{DSS}$ : 500V min,  $R_{DS(ON)}$ : 60 $\Omega$  max
- P-Channel:
  - $BV_{DSS}$ : -500V min,  $R_{DS(ON)}$ : 125 $\Omega$  max
- Independent N- and P-channels
- Electrically isolated N- and P-channels
- Low input capacitance
- Fast switching speeds
- Free from secondary breakdowns
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOIC-8

N-Channel Switching Waveform and Test Circuit



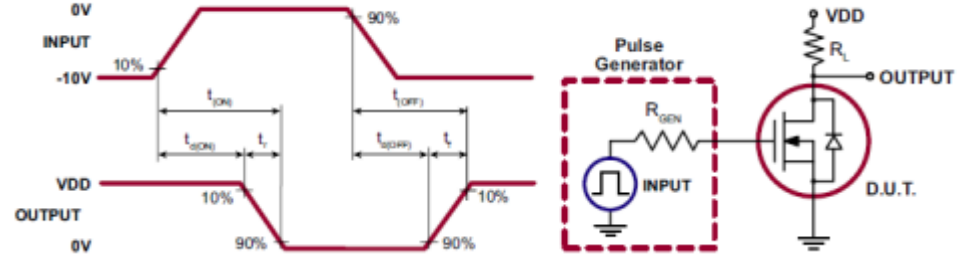
P-Channel Switching Waveform and Test Circuit



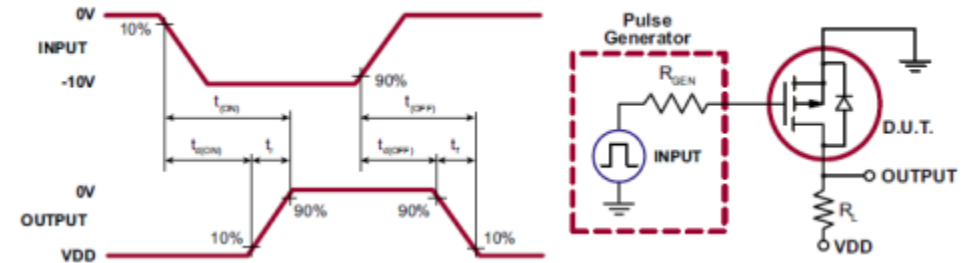
## Features:

- N-Channel:
  - $BV_{DSS}$ : 200V min,  $R_{DS(ON)}$ : 7.0 $\Omega$  max
- P-Channel:
  - $BV_{DSS}$ : -200V min,  $R_{DS(ON)}$ : 12 $\Omega$  max
- Low threshold
- Low on-resistance
- Low input capacitance
- Fast switching speeds
- Freedom from secondary breakdown
- Low input and output leakage
- Independent, electrically isolated N- and –  
– P-channels
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOIC-8

N-Channel Switching Waveform and Test Circuit



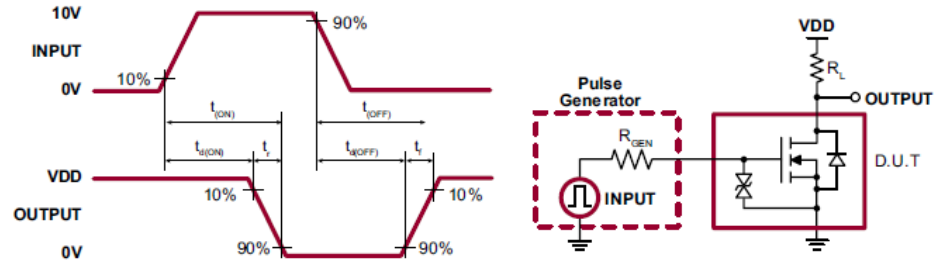
P-Channel Switching Waveform and Test Circuit



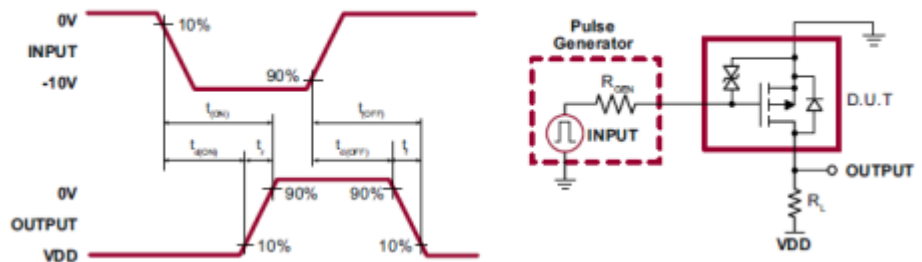
## Features:

- N-Channel
  - $BV_{DSS}$ : 150V min,  $R_{DS(ON)}$ : 4.0 $\Omega$  max
- P-Channel
  - $BV_{DSS}$ : -150V min,  $R_{DS(ON)}$ : 7.0 $\Omega$  max
- Back to back gate-source Zener diodes
- Guaranteed  $R_{DS(ON)}$  at 4.0V gate drive
- Low threshold and low on-resistance
- Independent N- and P-channels
- Electrically isolated N- and P-channels
- Low input capacitance
- Fast switching speeds
- Free from secondary breakdowns
- Low input and output leakage
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOIC-8

N-Channel Switching Waveform and Test Circuit



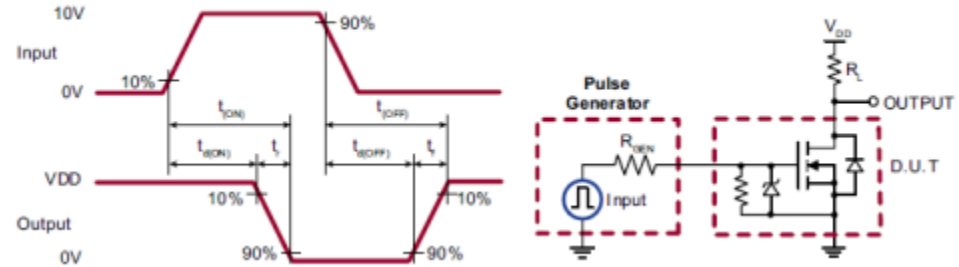
P-Channel Switching Waveform and Test Circuit



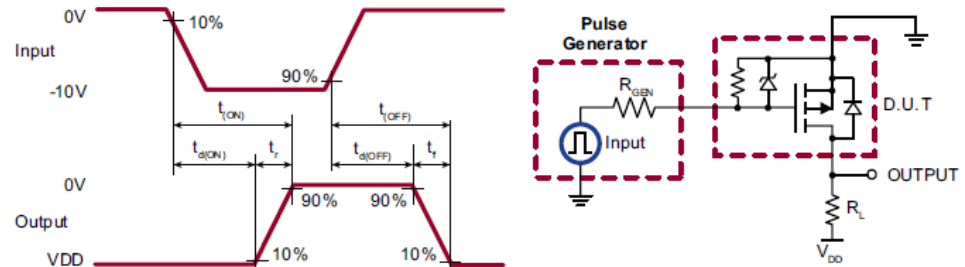
## Features:

- N-Channel:
  - $BV_{DSS}$ : 200V min,  $R_{DS(ON)}$ : 7.0 $\Omega$  max
- P-Channel:
  - $BV_{DSS}$ : -200V min,  $R_{DS(ON)}$ : 8.0 $\Omega$  max
- Integrated GATE-to-SOURCE resistor
- Integrated GATE-to-SOURCE Zener diode
- Low threshold and low on-resistance
- Low input capacitance
- Fast switching speeds
- Free from secondary breakdown
- Low input and output leakage
- Independent, electrically isolated N- and –  
- P-channels
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: SOIC-8, VDFN-8

### N-Channel Switching Waveform and Test Circuit

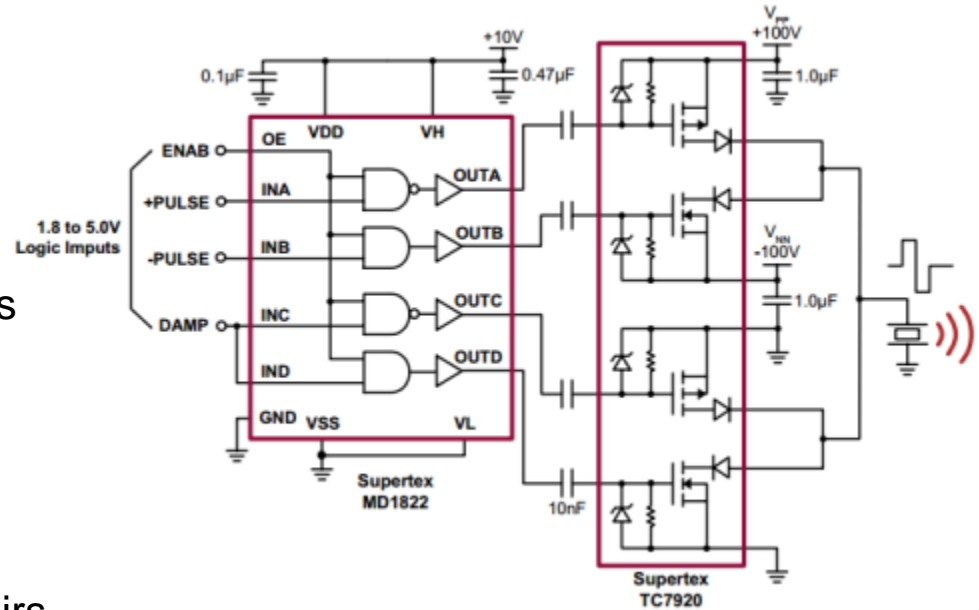


### P-Channel Switching Waveform and Test Circuit



## Features:

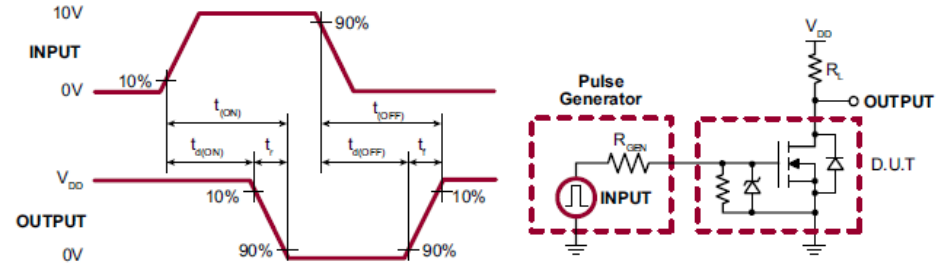
- N-Channel:
  - $BV_{DSS}$ : 200V min,  $R_{DS(ON)}$ : 7.0 $\Omega$  max
- P-Channel:
  - $BV_{DSS}$ : -200V min,  $R_{DS(ON)}$ : 8.0 $\Omega$  max
- High voltage, vertical DMOS technology
- Integrated drain output high voltage diodes
- Integrated gate-to-source resistor
- Integrated gate-to-source Zener diode
- Low threshold, Low on-resistance
- Low input & output capacitance
- Fast switching speeds
- Electrically isolated N- and P-MOSFET pairs
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: VDFN-12



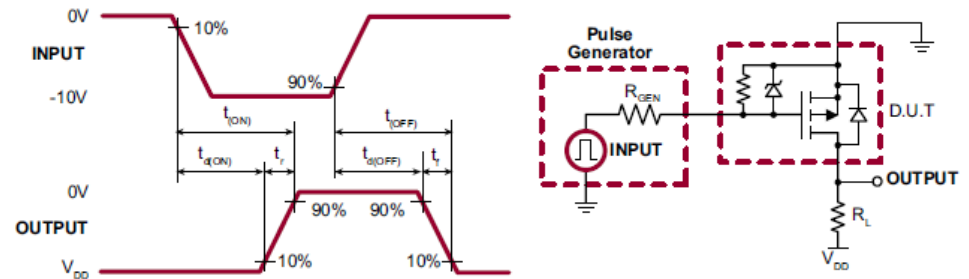
## Features:

- N-Channel:
  - $BV_{DSS}$ : 200V min
  - $R_{DS(ON)}$ : 8.0Ω max
- P-Channel:
  - $BV_{DSS}$ : -200V min
  - $R_{DS(ON)}$ : 9.5Ω max
- High voltage, vertical DMOS technology
- Integrated gate-to-source resistor
- Integrated gate-to-source Zener diode
- Typical peak output +/-3.5A at 50V
- Low threshold, low on-resistance
- Low input & output capacitance
- Fast switching speeds
- Electrically isolated N- and –  
- P-MOSFET pairs
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: VQFN-56

N-Channel Switching Waveform and Test Circuit



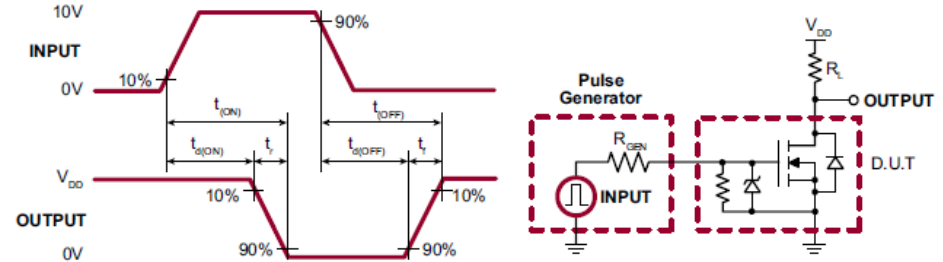
P-Channel Switching Waveform and Test Circuit



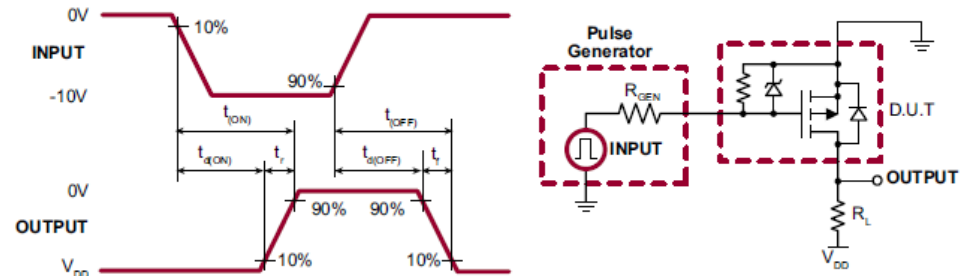
## Features:

- N-Channel:
  - $BV_{DSS}$ : 200V min
  - $R_{DS(ON)}$ : 5.3 $\Omega$  max
- P-Channel:
  - $BV_{DSS}$ : -200V min
  - $R_{DS(ON)}$ : 6.5 $\Omega$  max
- High voltage, vertical DMOS technology
- Integrated gate-to-source resistor
- Integrated gate-to-source Zener diode
- Typical peak output +/-3.5A at 50V
- Low threshold, low on-resistance
- Low input & output capacitance
- Fast switching speeds
- Electrically isolated N- and –  
- P-MOSFET pairs
- Operating Temperature Range:
  - -55°C to +150°C
- Package Option: VDFN-12

N-Channel Switching Waveform and Test Circuit



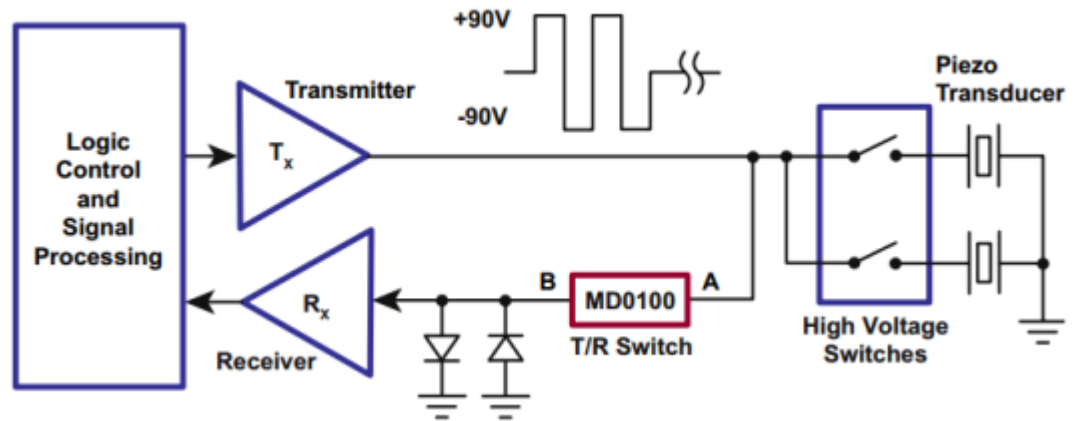
P-Channel Switching Waveform and Test Circuit





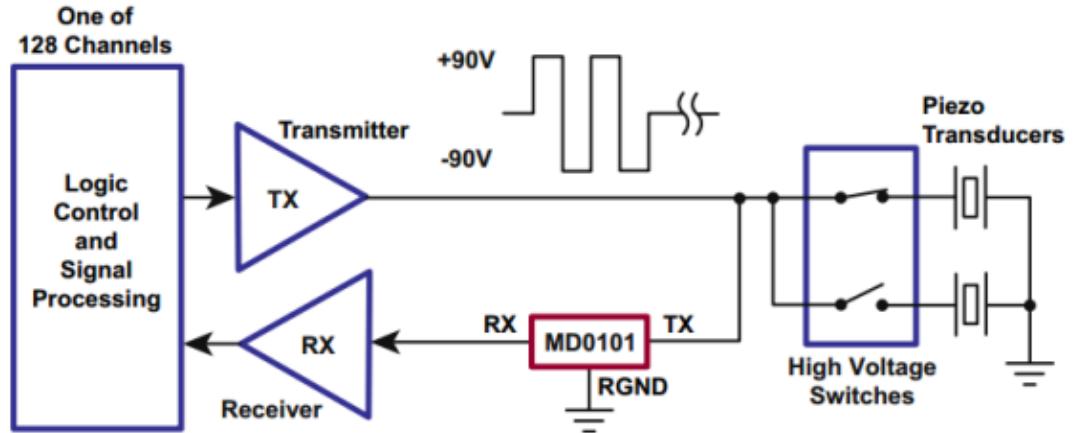
## Features:

- Up to  $\pm 100\text{V}$  input voltage –  
- protection
- Low on resistance -  $15\Omega$  typical
- Fast switching speed
- Effectively, a simple two –  
- terminal device
- No external supplies needed
- Dual & single channel versions –  
- of device
- Operating Temperature Range:
  - $0^\circ\text{C}$  to  $+125^\circ\text{C}$
- Package Option: DFN-8, SOT-89



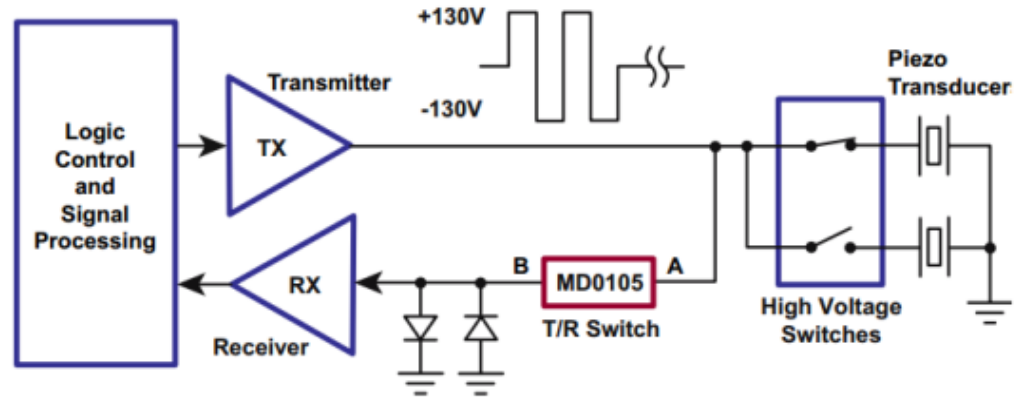
## Features:

- Up to  $\pm 100\text{V}$  input voltage –
  - protection
- Low on resistance -  $15\Omega$  typical
- Integrated clamp diodes
- Fast switching speed
- Four electrically isolated –
  - channels
- No external supplies needed
- Operating Temperature Range:
  - $0^\circ\text{C}$  to  $+125^\circ\text{C}$
- Package Option: DFN-18



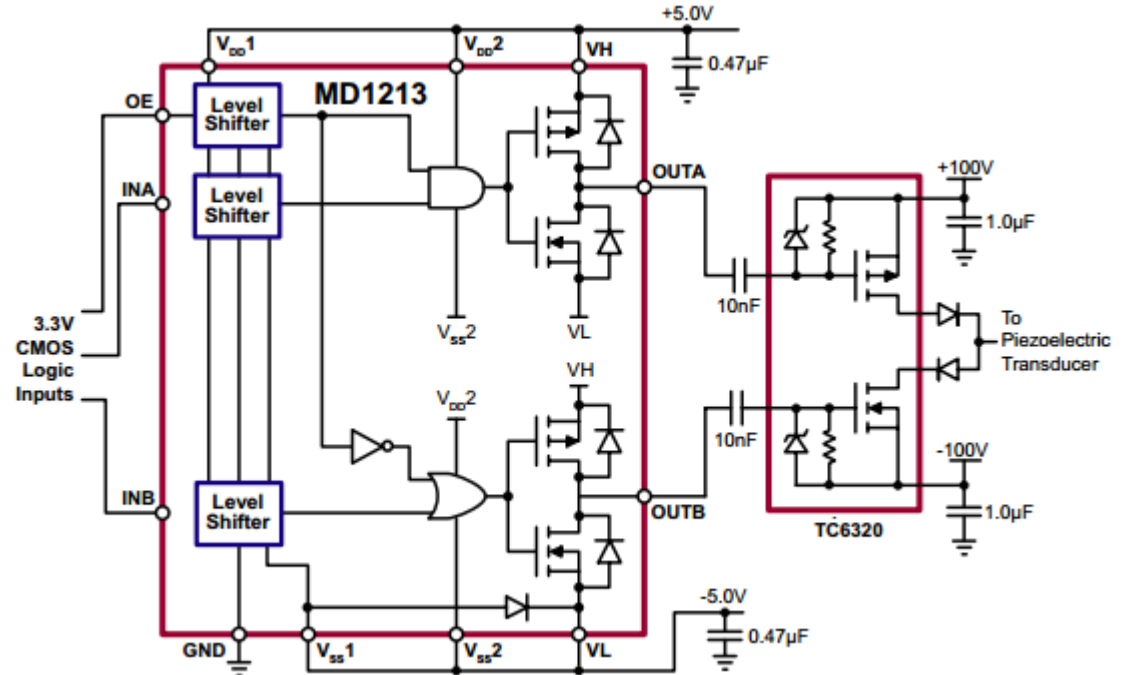
## Features:

- Up to  $\pm 130\text{V}$  input voltage – protection
- Low on resistance -  $15\Omega$  typical
- Fast switching speed
- Four electrically isolated channels
- No external supplies needed
- Operating Temperature Range:
  - $0^\circ\text{C}$  to  $+125^\circ\text{C}$
- Package Option: DFN-18



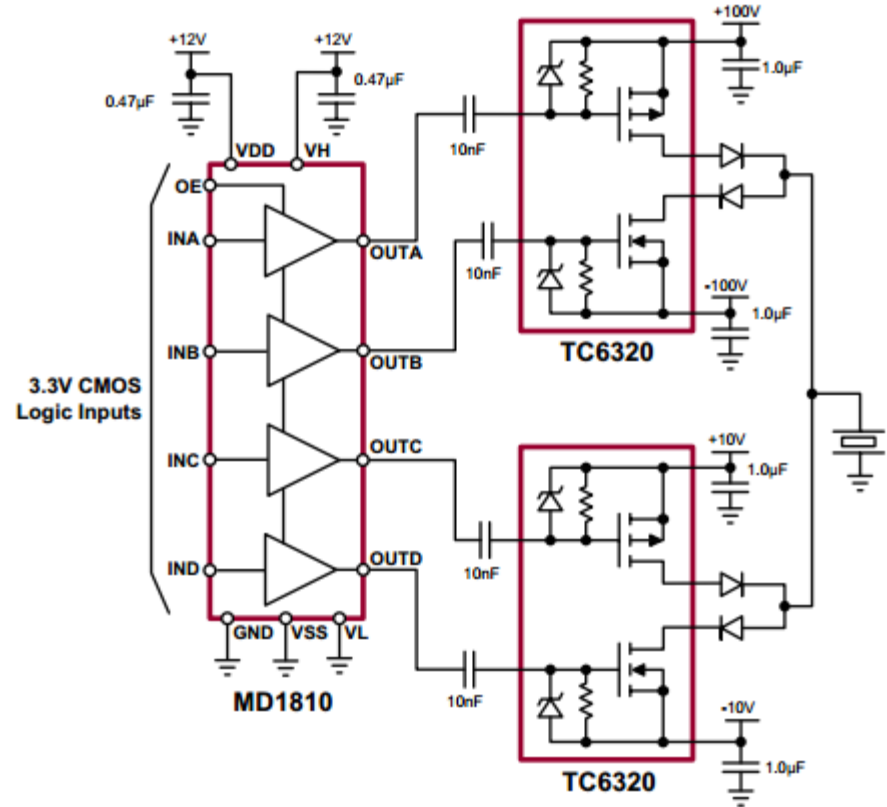
## Features:

- 6.0ns rise and fall time with –  
– 1000pF load
- 2.0A peak output source/sink –  
– current
- 1.8 to 5.0V input CMOS –  
– compatible
- 4.5 to 13V total supply voltage
- Smart logic threshold
- Low jitter design
- Two matched channels
- Outputs can swing below ground
- Low inductance package
- Thermally-enhanced package
- Operating Temperature Range:
  - -20°C to +85°C
- Package Option: QFN-12



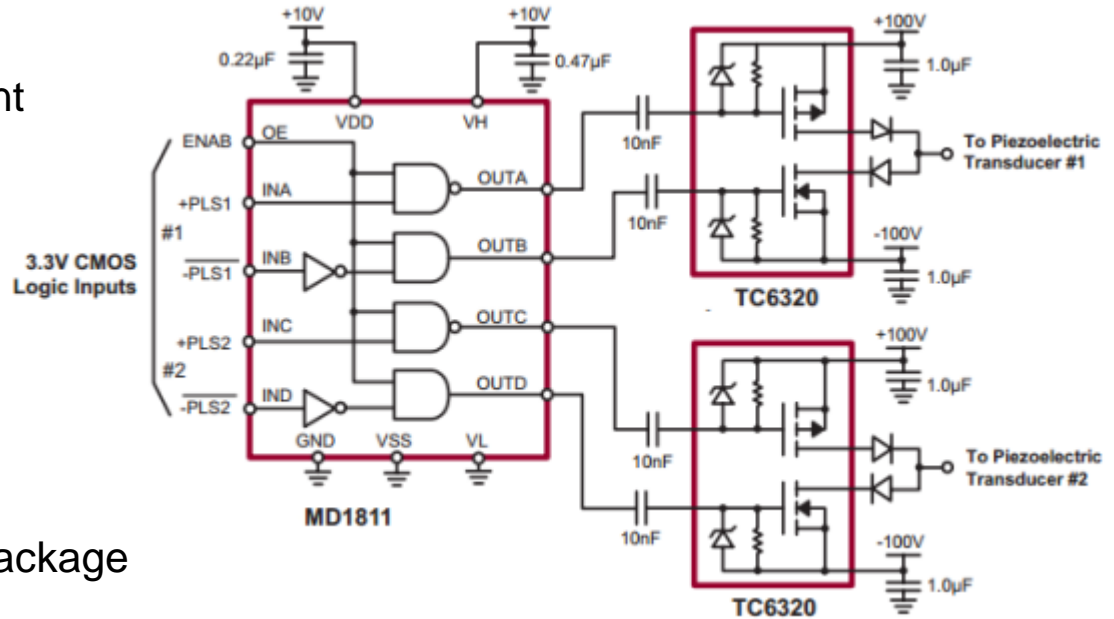
## Features:

- 6.0ns rise and fall time with 1000pF load
- 2.0A peak output source/sink current
- 1.8 to 5.0V input CMOS compatible
- 5.0 to 12V total supply voltage
- Smart logic threshold
- Low jitter design
- Four matched channels
- Outputs can swing below ground
- Output is high impedance when disabled
- Low inductance package
- Operating Temperature Range:
  - -20°C to +85°C
- Package Option: QFN-16



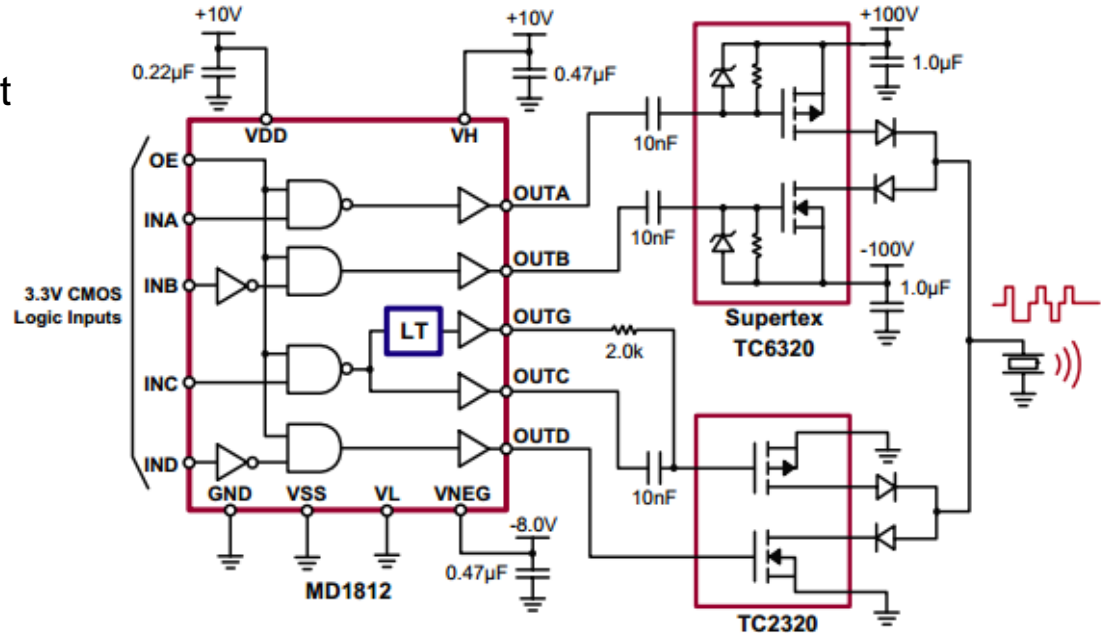
## Features:

- 6.0ns rise and fall time
- 2.0A peak output source/sink current
- 1.8 to 5.0V input CMOS compatible
- 5.0 to 12V total supply voltage
- Smart logic threshold
- Low jitter design
- Quad matched channels
- Drives two P- and two N-channel –  
– MOSFETs
- Outputs can swing below ground
- Low inductance quad flat no-lead package
- Operating Temperature Range:
  - -20°C to +85°C
- Package Option: QFN-16



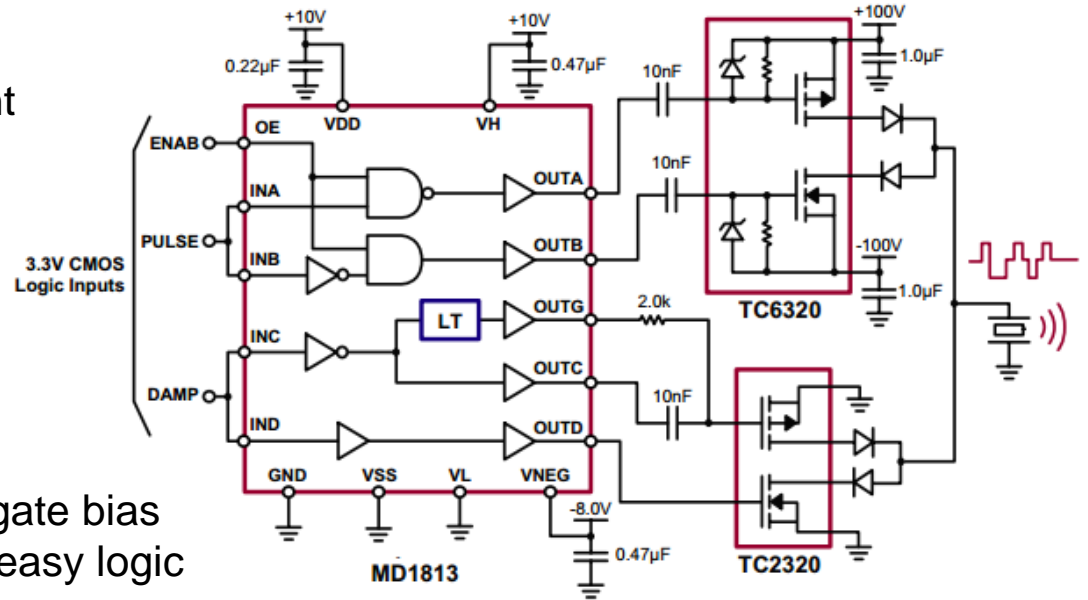
## Features:

- 6.0ns rise and fall time
- 2.0A peak output source/sink current
- 1.8 to 5.0V input CMOS compatible
- Smart logic threshold
- Low jitter design
- Quad matched channels
- Drives two N and two P-channel – MOSFETs
- Outputs can swing below ground
- Built-in level translator for negative – gate bias
- User-defined damping for return-to – zero application
- Low inductance quad flat no-lead package
- Operating Temperature Range:
  - -25°C to +125°C
- Package Option: QFN-16



## Features:

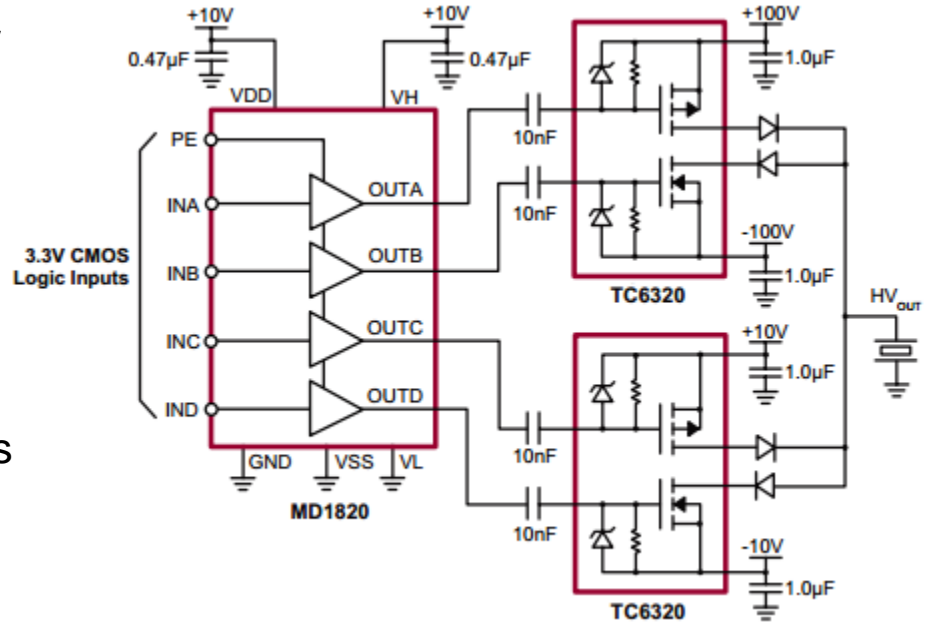
- 6ns rise and fall time
- 2.0A peak output source/sink current
- 1.8 to 5.0V input CMOS compatible
- Smart Logic threshold
- Low jitter design
- Quad matched channels
- Drives two N and two P-channel – MOSFETs
- Outputs can swing below ground
- Built-in level translator for negative gate bias
- Non-inverting gate driver OUTD for easy logic
- Operating Temperature Range:
  - -20°C to +85°C
- Package Option: QFN-16





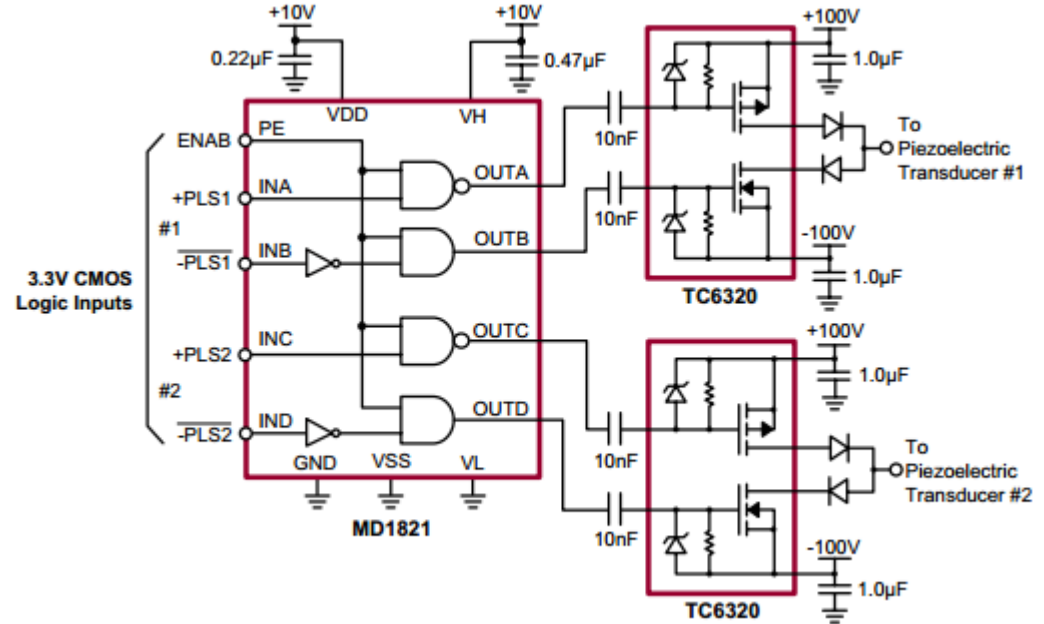
## Features:

- Non-inverting, four channel MOSFET driver
- 6.0ns rise and fall time
- 2.0A peak output source/sink current
- 1.8 to 5.0V input CMOS compatible
- 5.0 to 10V total supply voltage
- Smart logic threshold
- Low jitter design
- Four matched channels
- Drives two P- and two N-channel MOSFETs
- Outputs can swing below ground
- Operating Temperature Range:
  - -20°C to +85°C
- Package Option: QFN-16



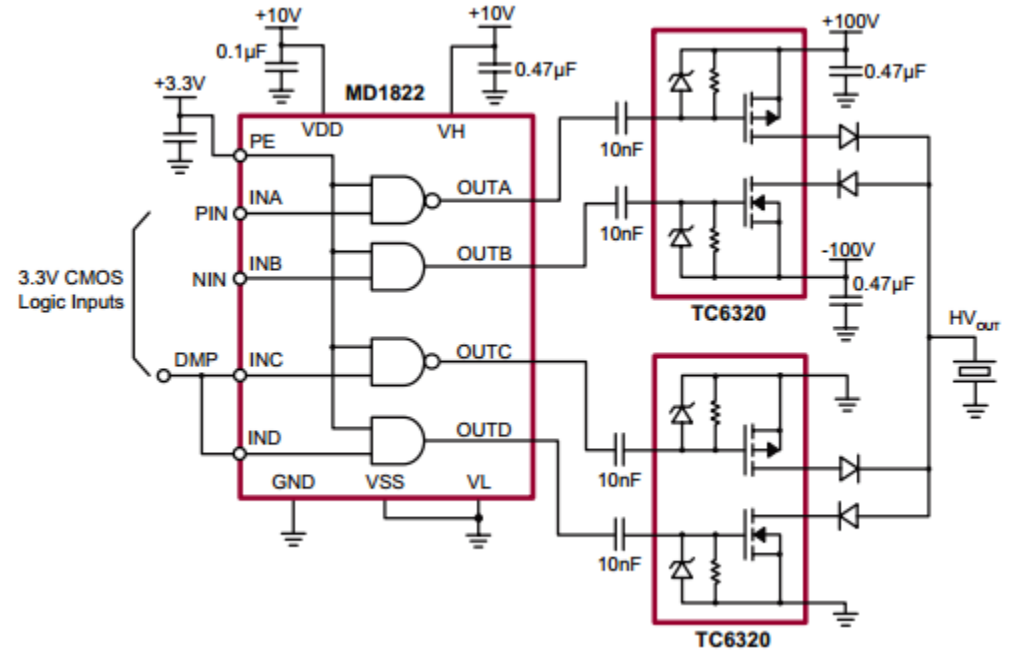
## Features:

- Inverting MOSFET driver
- 6.0ns rise and fall time
- 2.0A peak output source/sink current
- 1.8 to 5.0V input CMOS compatible
- 5.0 to 10V total supply voltage
- Smart logic threshold
- Low jitter design
- Four matched channels
- Drives two P- and two N-channel –  
– MOSFETs
- Outputs can swing below ground
- Operating Temperature Range:
  - 20°C to +85°C
- Package Option: QFN-16



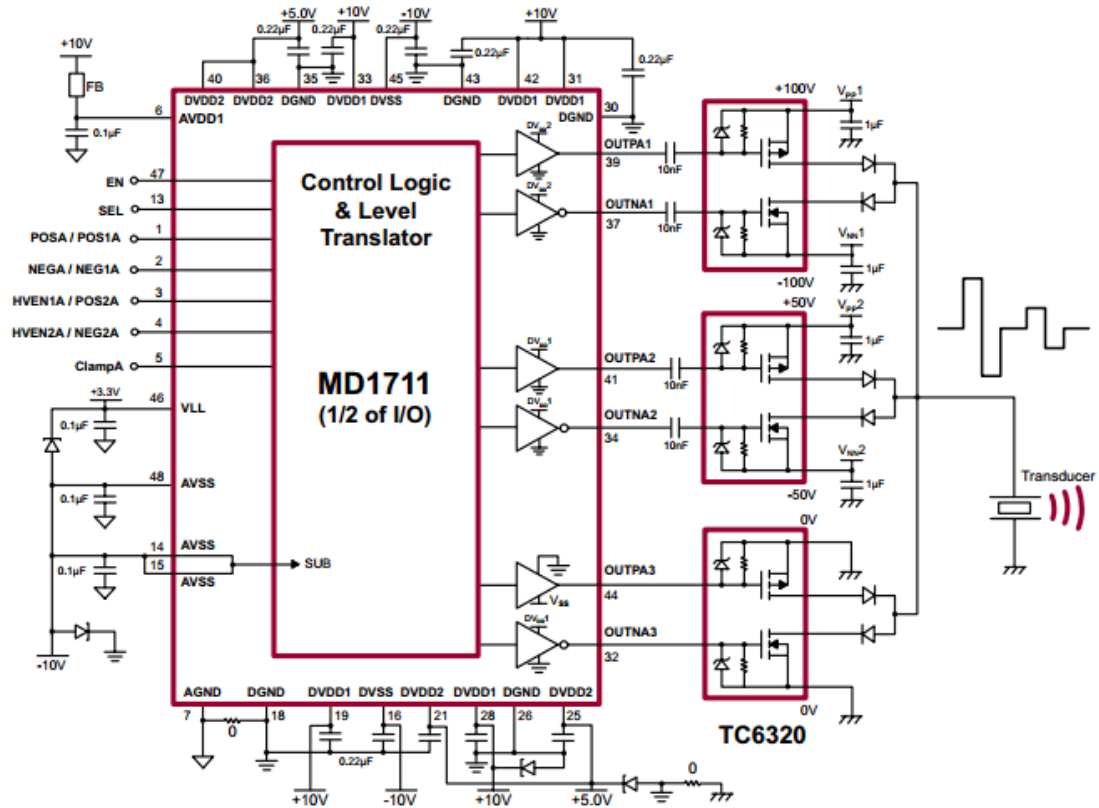
## Features:

- Mixed inversion MOSFET driver
- 6.0ns rise and fall time
- 2.0A peak output source/sink current
- 1.8 to 5.0V input CMOS compatible
- 5.0 to 10V total supply voltage
- Smart logic threshold
- Low jitter design
- Four matched channels
- Drives two P- and two N-channel –  
– MOSFETs
- Outputs can swing below ground
- Operating Temperature Range:
  - $-20^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Package Option: QFN-16



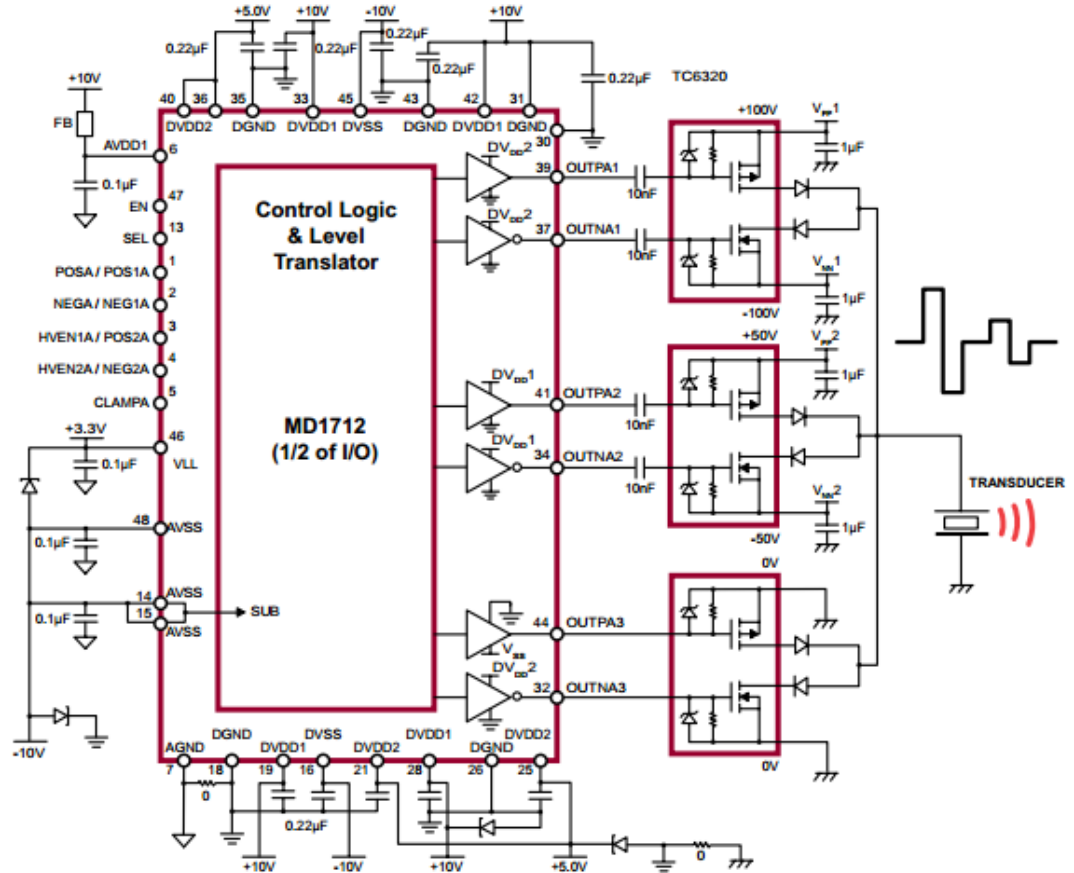
## Features:

- Drives two ultrasound transducer –  
– channels
- Generates 5-level waveform
- Drives 12 high voltage MOSFETs
- $\pm 2.0A$  source and sink peak current
- Up to 20MHz output frequency
- 12V/ns slew rate
- $\pm 3ns$  matched delay times
- Second harmonic is less than -40dB
- Two separate gate drive voltages
- 1.8 to 3.3V CMOS logic interface
- Operating Temperature Range:
  - $0^{\circ}C$  to  $+125^{\circ}C$
- Package Option: LQFP-48, QFN-48



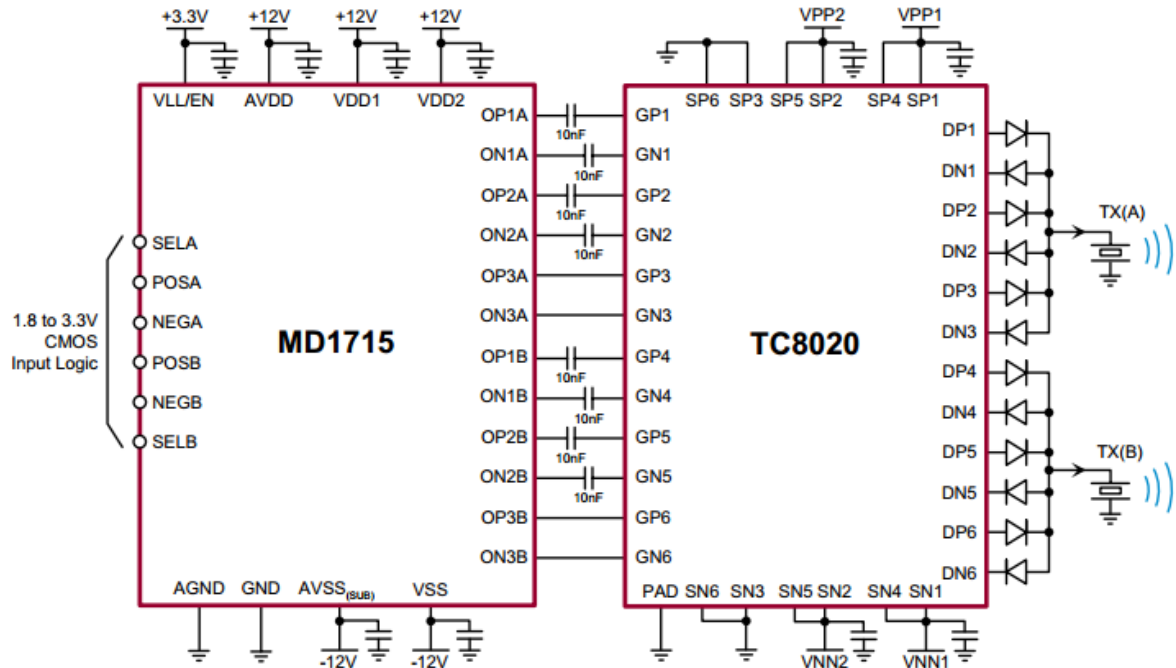
## Features:

- Drives two ultrasound transducer – channels
- Generates five-level waveform
- Drives 12 high voltage MOSFETs
- $\pm 2.0A$  source and sink peak – current
- Up to 20MHz output frequency
- 12V/ns slew rate
- $\pm 3.0ns$  matched delay times
- Second harmonic is less than – 40dB
- Two separate gate drive voltages
- 1.8 to 3.3V CMOS logic interface
- Operating Temperature Range:
  - $0^{\circ}C$  to  $+125^{\circ}C$
- Package Option: LQFP-48, - QFN-48



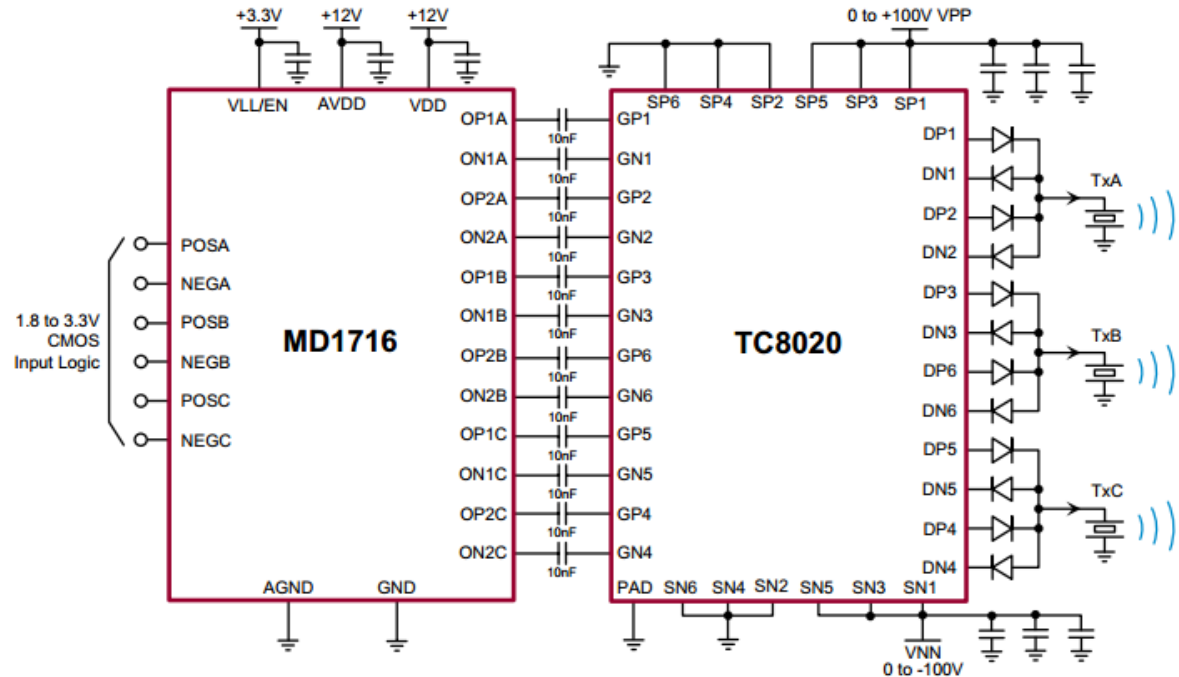
## Features:

- Advanced CMOS technology
- $\pm 4.75$  to 12.9V gate drive –  
- voltage
- 2A output source and sink –  
- current
- 6.5ns rise and fall time with –  
- 1nF load
- 10ns propagation delay
- $\pm 2$ ns matched delay times
- 12 matched channels
- 1.8V to 3.3V CMOS logic –  
- interface
- Smart logic threshold
- Low inductance package
- Operating Temperature Range:
  - 0°C to +70°C
- Package Option: QFN-40



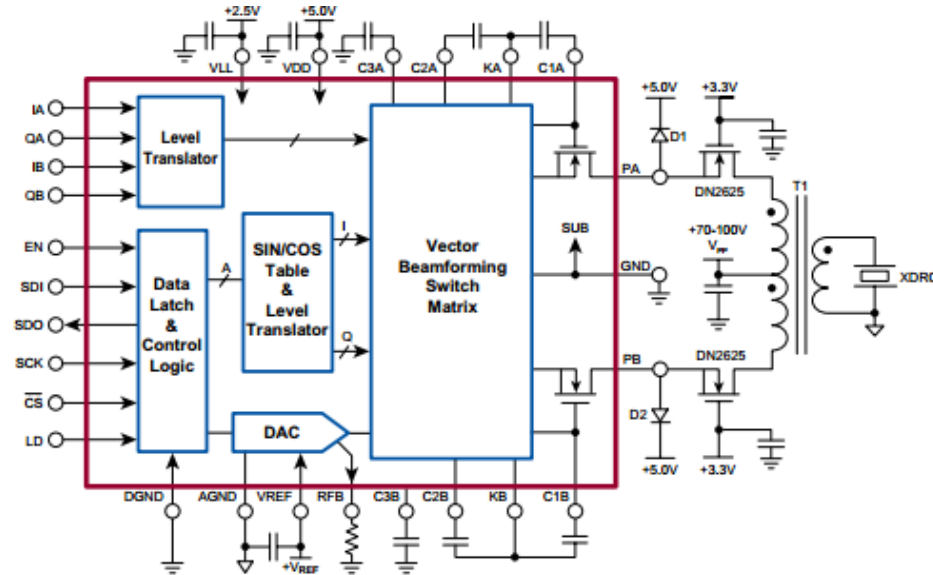
## Features:

- Advanced CMOS technology
- 4.5 to 12.5V power supply –  
- voltage
- 2.0A output source and sink –  
- current
- 6.5ns rise and fall time with –  
- 1.0nF load
- 10ns propagation delay
- $\pm 2$ ns matched delay times
- 12 matched channels
- 1.8 to 3.3V CMOS logic –  
- interface
- Smart logic threshold
- Operating Temperature Range:  
• 0°C to +125°C
- Package Option: QFN-40



## Features:

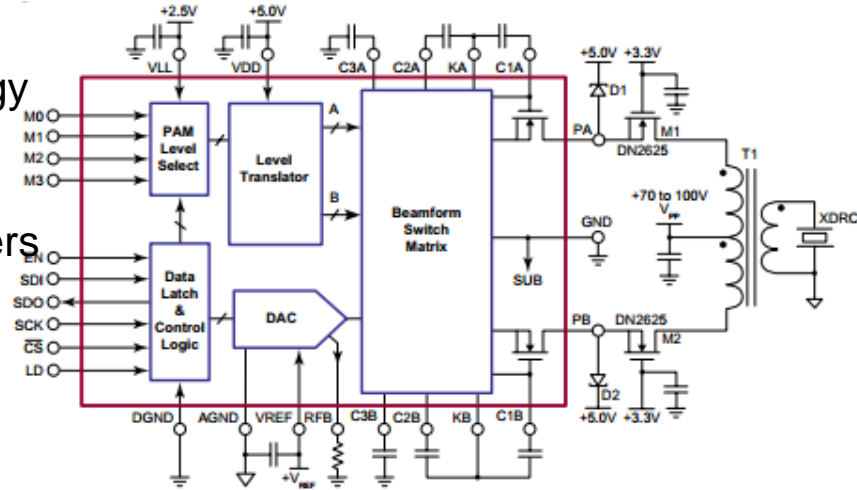
- High resolution transmitting waveform
- Up to 3.0A push-pull source-driving current
- 230VP-P maximum output, uses two DN2625 FETs
- Angle vector beamforming I-Q switcher –  
- matrix
- 8-bit apodization DAC and 7.5° angular –  
- resolution
- Flexible frequency-resolution trade-off
- Programmable aperture windowing
- 250MHz maximum sampling rate
- 25MHz ultrasound maximum frequency
- PWM modulation push-pull current source
- Focusing phase adjustment & chirp waveform
- Fast SPI interface
- 2.5V CMOS logic interface
- Low second order harmonic distortions
- Operating Temperature Range: 0°C to +70°C
- Package Option: QFN-40





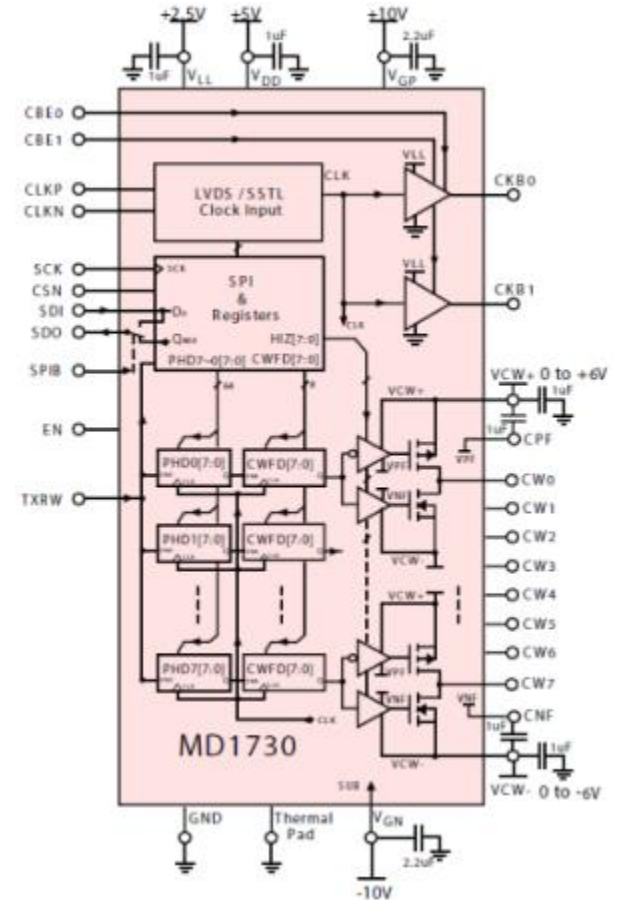
## Features:

- Multiple-level ultrasound pulser
- Fast switching current source for push-pull topology
- 250MHz maximum frequency
  - 4.0ns input to output delay
- 15 independent programmable output level registers
- Pulse amplitude modulation (PAM) with 8-bit – resolution
- 8-bit apodization DAC for peak output current –
- Very low second order harmonic distortion
- Picoseconds time-jitter from input to output
- Fast SPI write and read-back of level & DAC registers
- +5.0V power supply, 2.5V CMOS logic interface
- Drives DN2625 MOSFETs output up to 230VP-P
- Programmable aperture windowing
- Operating Temperature Range: 0°C to +70°C
- Package Option: QFN-40



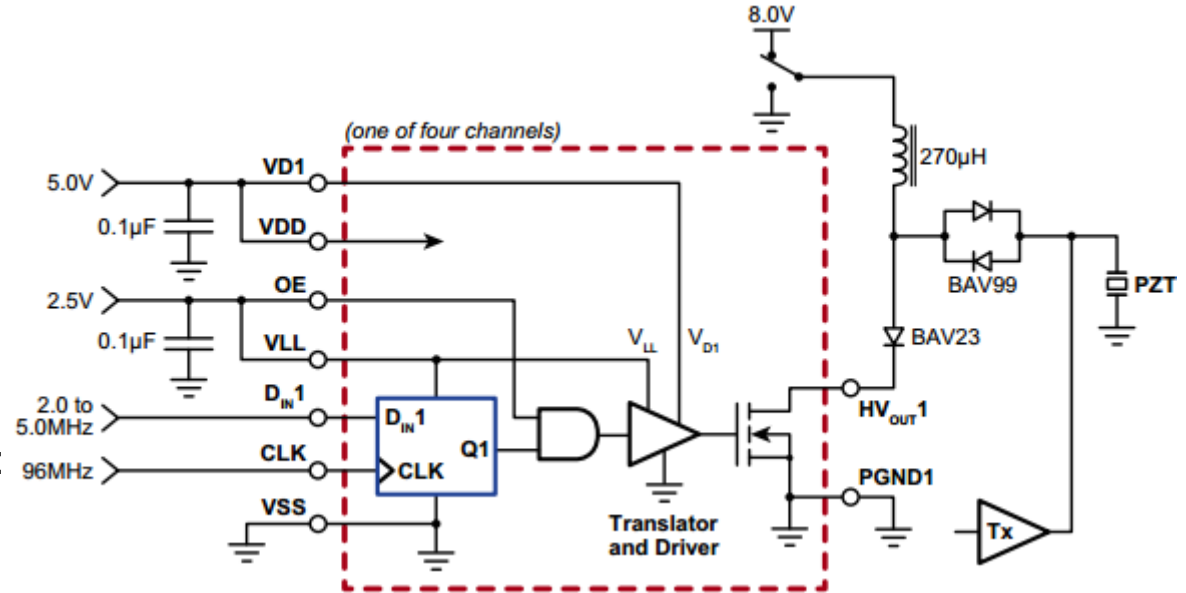
## Features:

- 8-Channel Ultrasound Continuous Waveform (CW) –  
- Transmitter with Integrated Beamformer
- CW Output  $\pm 1V$  to  $\pm 6V_{p-p}$  with Low  $R_{ON}$
- -160 dbc/Hz Ultra-Low Phase Noise at 1 kHz Offset –  
- and 5 MHz
- 8-bit Programmable Per-Channel Beamforming Phase –  
- Delay
- 8-bit Programmable Dividers for CW Frequency with –  
- Input Clock Frequency
- Input Clock Compatible with LVDS/SSTL or Single –  
- Ended LVCMOS
- LVCMOS 2.5V Logic for the Control I/O pins
- Fast SPI Interface Supports up to 200 MHz
- SPI Interface Supports Daisy Chaining and –  
- Broadcasting Mode



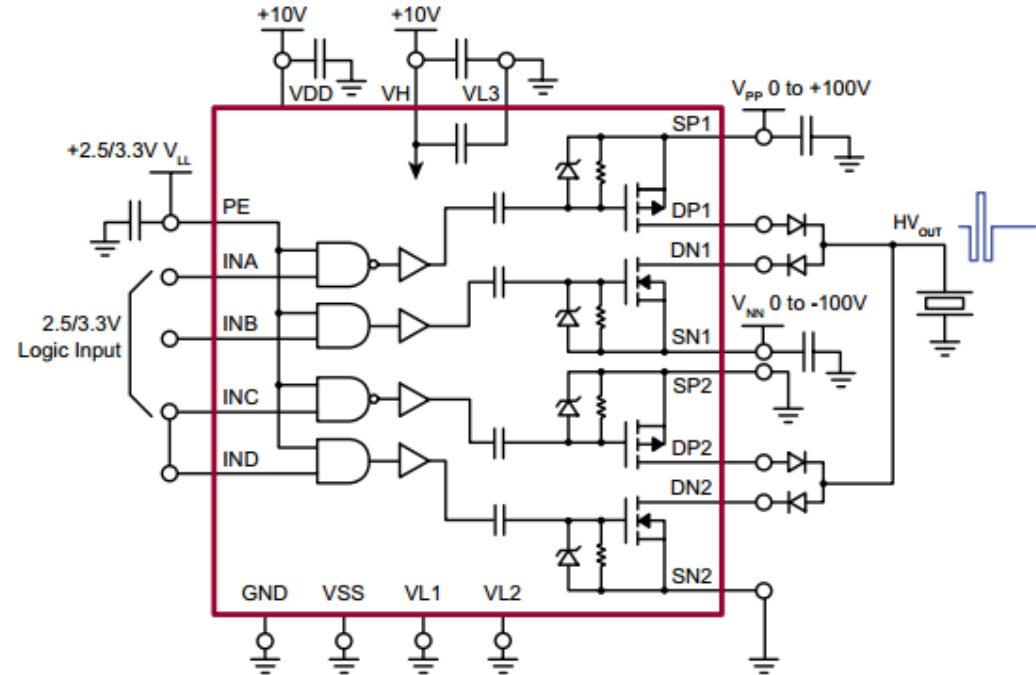
## Features:

- Low phase noise
- 100V open drain N-channel
- High speed D flip-flop
- High speed MOSFET gate – driver
- Up to 200MHz clock input
- $V_{DD}$  and  $V_{LL}$  under-voltage – lockout
- Operating Temperature Range:
  - 0°C to +70°C
- Package Option: QFN-24



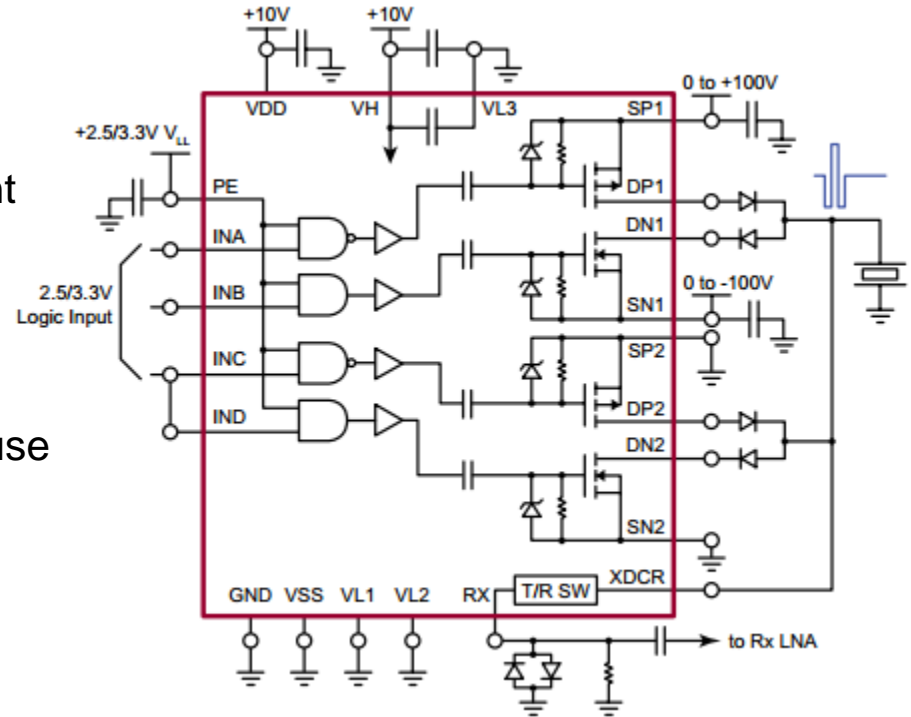
## Features:

- HVCMOS® technology for high –  
- performance
- High density integration AC coupled –  
- pulser
- 0 to  $\pm 100\text{V}$  output voltage
- $\pm 2.5\text{A}$  source and sink minimum –  
- pulse current
- Up to 35MHz operating frequency
- 2.0ns matched delay times
- 2.5, 3.3 or 5.0V CMOS logic interface
- Low power consumption and very –  
- simple to use
- Operating Temperature Range:
  - $0^\circ\text{C}$  to  $+70^\circ\text{C}$
- Package Option: LFGA-22



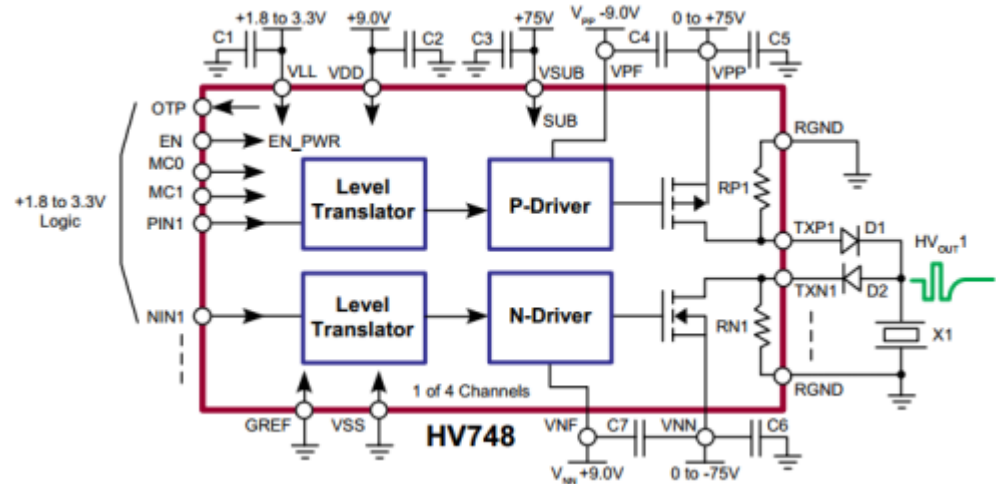
## Features:

- HVCMOS® technology for high performance
- High density integration AC coupled pulser
- 0 to  $\pm 100\text{V}$  output voltage
- $\pm 2.5\text{A}$  source and sink minimum pulse current
- Up to 35MHz operating frequency
- 2.0ns matched delay times
- 2.5, 3.3 or 5.0V CMOS logic interface
- Built-in two terminal, low noise T/R switch
- Low power consumption and very simple to use
- Operating Temperature Range:
  - $0^\circ\text{C}$  to  $+70^\circ\text{C}$
- Package Option: LFGA-22



## Features:

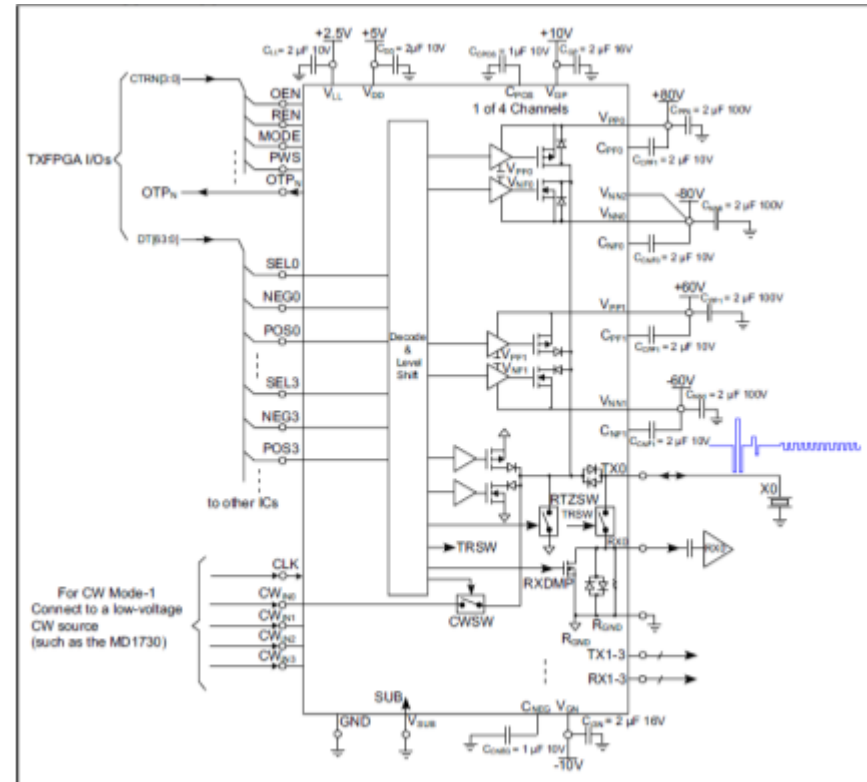
- HVCMOS technology for high –  
- performance
- High density integration ultrasound –  
- transmitter
- 0 to  $\pm 75V$  output voltage
- $\pm 1.25A$  source and sink current in pulse –  
- mode
- $\pm 400mA$  source and sink current in CW –  
- mode
- Up to 20MHz operating frequency
- Matched delay times
- 1.2V to 5.0V CMOS logic interface
- Built-in output drain bleed resistors
- Operating Temperature Range:
  - $0^{\circ}C$  to  $+70^{\circ}C$
- Package Option: QFN-48



## Features:

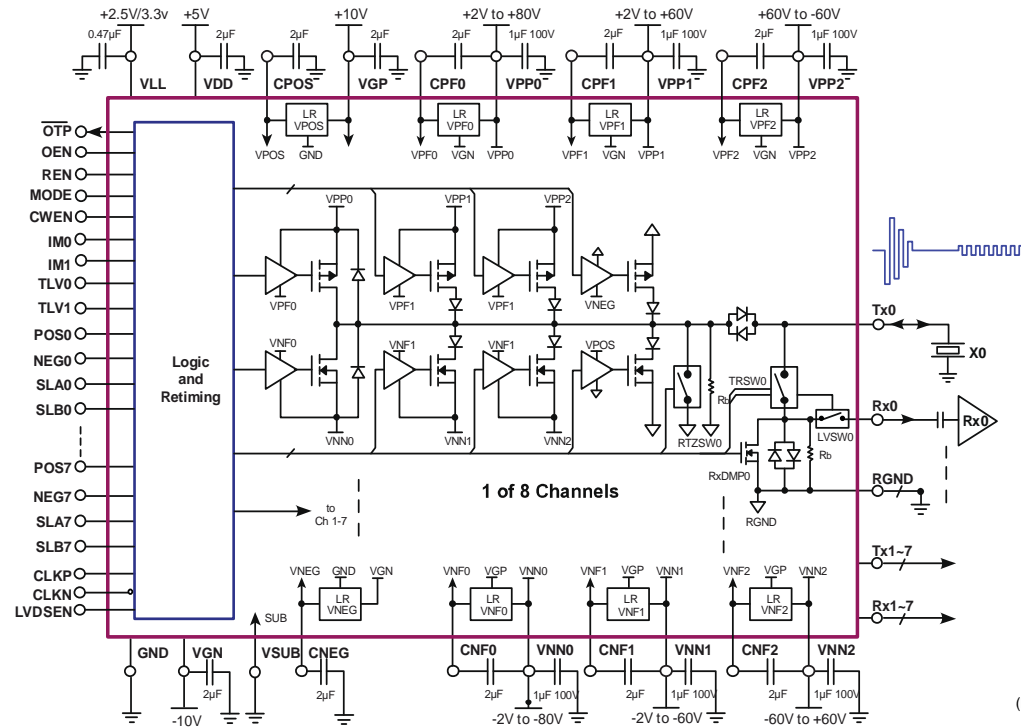
- Power sequencing free 5 output levels –
  - including RTZ (Return-to-Zero)
- -44 dB single-cycle pulse-inversion second –
  - harmonic distortion (HD2) at 5 MHz
- Output voltage up to  $\pm 80V$
- $\pm 2.5$  peak output current
- $\pm 300$  mA current from VPP1/VNN1 in CW –
  - Mode-0
- Integrated T/R switch & RX damper switch
- Bleeder switches achieve true zero during –
  - RTZ
- Supports both transparent and re-timing mode
- Re-timing clock frequency supports up to 220 –
  - MHz
- Built-in output protection diodes and clamp –
  - diodes
- 2.5/3.3V input logic
- Built-in CW switches to pair with external CW –
  - transmitters (CW Mode-1)
- 9x9 64-lead VQFN package

## Typical application circuit



## Features:

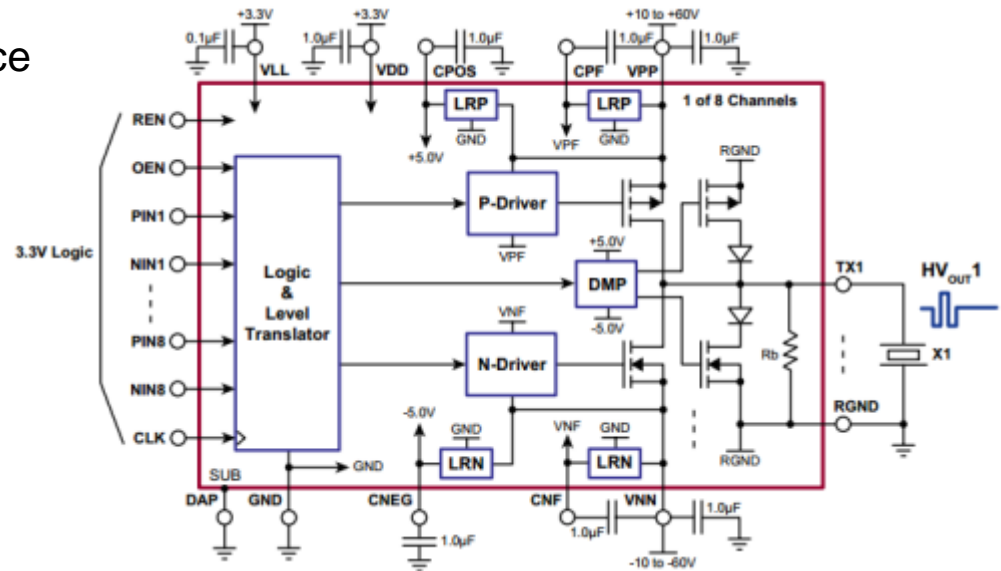
- 8-Channel true-5-level/pseudo 7-level
- $\pm 80V$  w/ active return to zero.
- Programmable output current: 0.5A, 1A, 1.5A and 2A
- Integrated output protection diode, clamp diode, and damping circuit
- Integrated dual T/R switch
- TON(1:0) for adjusting the TR switch on delay time
- Output frequency up to 20MHz
- Retiming clock frequency up to 220MHz.
- -40dBc HD2 at 5MHz
- Package: 12 x 12 mm BGA





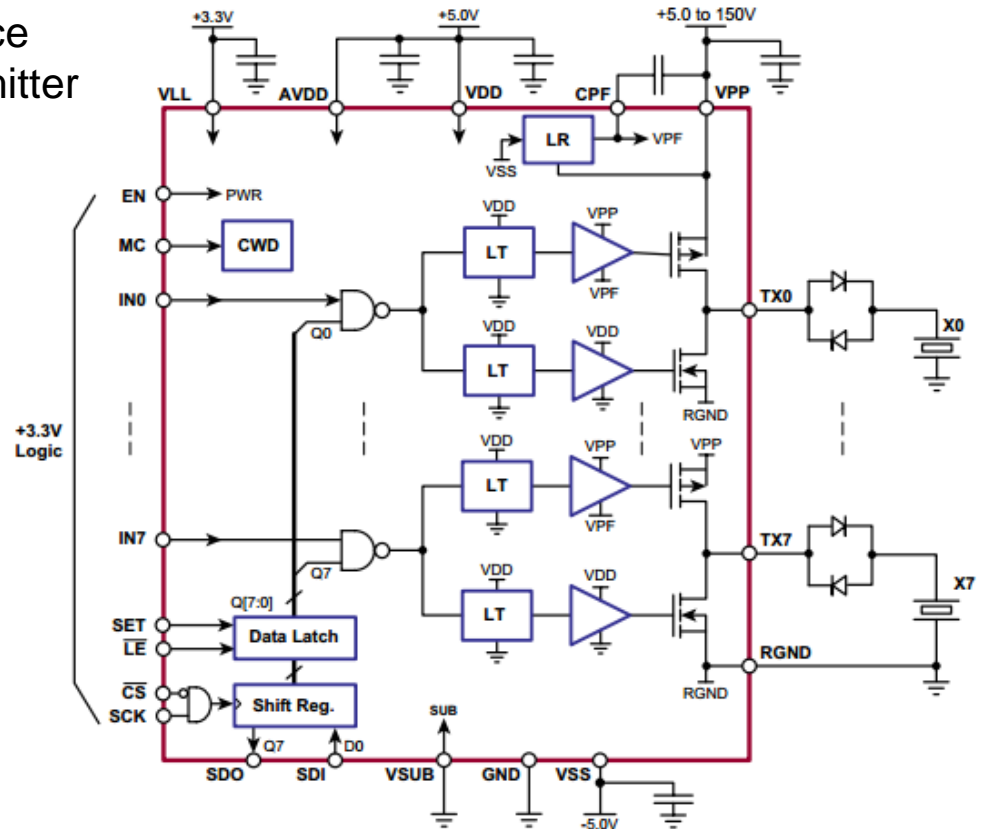
## Features:

- HVCMOS technology for high performance
- High density integrated ultrasound –  
- transmitter
- 0 to  $\pm 60V$  output voltage
- $\pm 1.0A$  source and sink current in pulse –  
- mode
- $\pm 1.0A$  source and sink current in RTZ –  
- mode
- Up to 20MHz operating frequency
- Matched delay times
- Optional clock re-alignment
- 3.3V CMOS logic interface and reference
- +3.3V low voltage supply for  $V_{DD}$
- Built-in linear regulators for floating gate –  
- driver
- Built-in output drain diodes & bleed –  
- resistors
- Operating Temperature Range:
  - $0^{\circ}C$  to  $+70^{\circ}C$
- Package Option: QFN-56



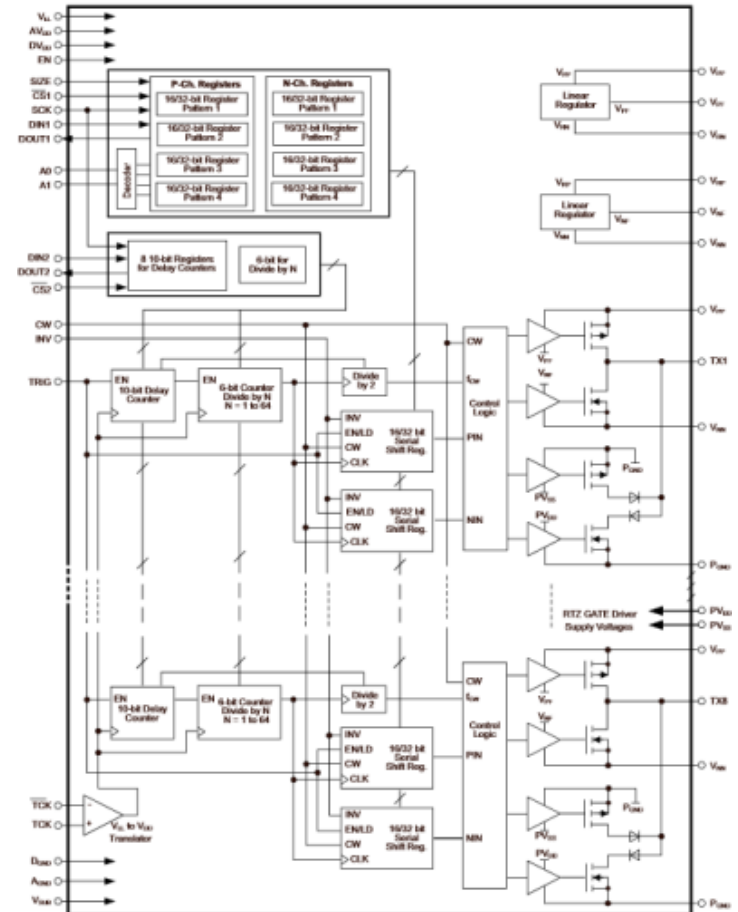
## Features:

- HVCMOS technology for high performance
- High density integrated ultrasound transmitter
- 0 to +150V output voltage
- $\pm 1.5A$  source and sink current (min.)
- $\pm 300mA$  current in CW mode
- Up to 18MHz operating frequency
- Matched delay times
- Built-in gate driver floating voltage – regulator
- 2.5 to 3.3V CMOS logic interface
- Operating Temperature Range:
  - $0^{\circ}C$  to  $+70^{\circ}C$
- Package Option: QFN-56



## Features:

- Eight channels with Return to Zero (RTZ)
- Up to  $\pm 70V$  Output Voltage
- $\pm 3.0A$  Output Current
- Built-in digital transmit beamformer
  - Pulse-Echo mode and CW mode
  - Stores up to four 64-bit transmit patterns
  - 6-bit divide by N counter for controlling the -  
- transmit frequency
  - 10-bit delay counter for each channel
  - INV pin for inverting the transmit pattern –  
- for pulse inversion harmonic imaging
- Differential clock input supports up to 200Mhz
- 80Mhz daisy-chainable SPI interface for fast –  
- device programming
- 3.3V CMOS logic interface
- Power-up sequence free
- 11x11 mm QFN-80 package

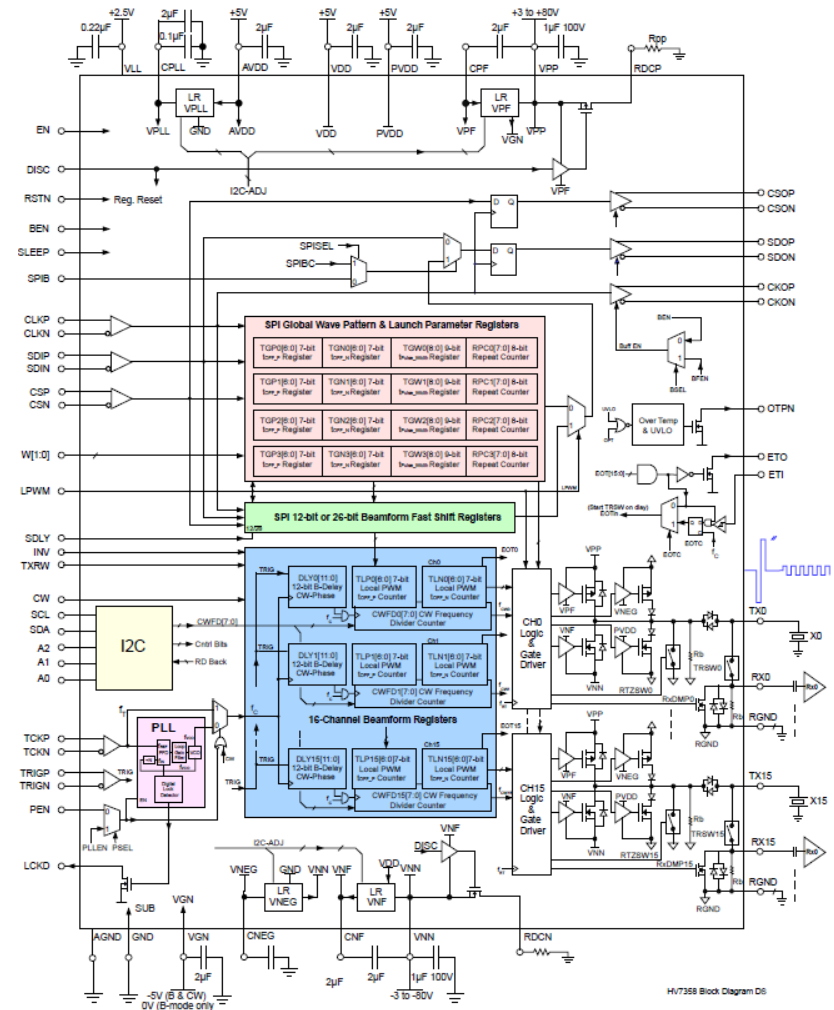


# HV7358 16-Ch 3-L $\pm 80V$ Beamformer

with TRSW, RTZSW, RXDMP & 240MHz PLL

## Features

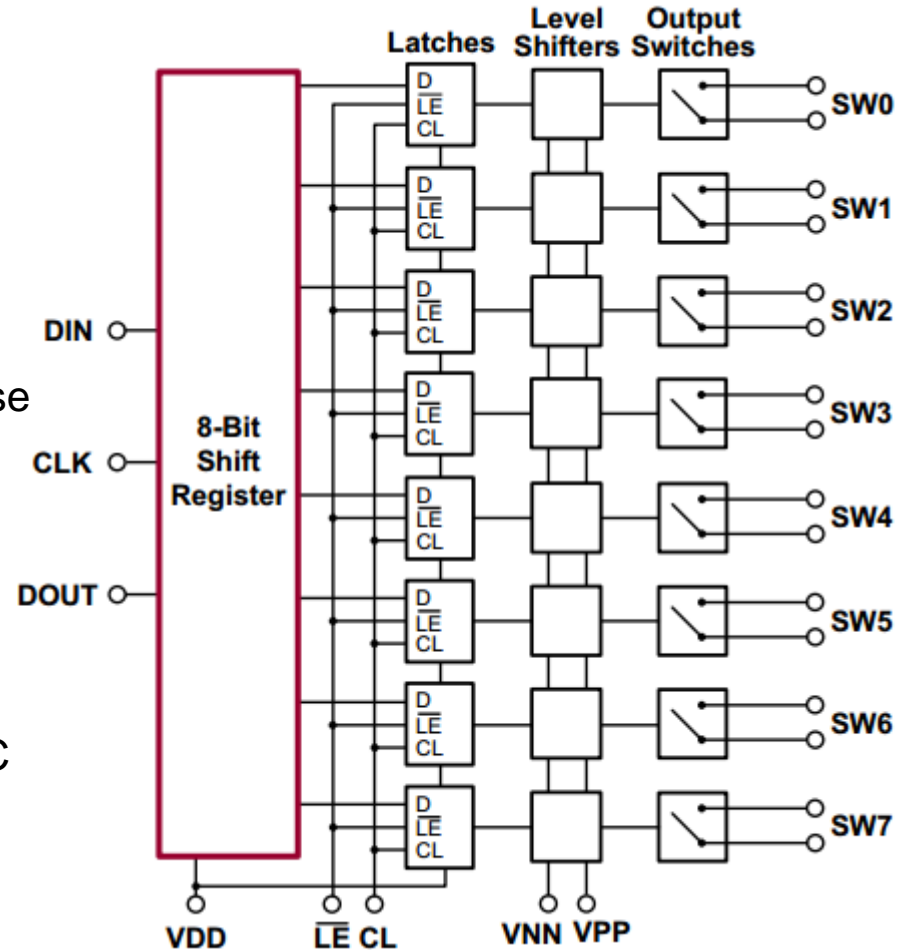
- 16-channel  $\pm 80V$  output with T/R switches
- $\pm 0.3, 0.6, 1.2$  &  $1.6A$  programmable peak current
- $-40dB$  HD2 at 5MHz pulse inversion
- PLL up to 240MHz Tx clock frequency
- 200MHz of SPI with LVDS interface
- 2-wire I2C interface for control, status
- 12-bit delay for beamform per Ch.
- Store Up to 4 Tx Patterns with PWM
- Support 16 or 32-bit register width
- Programmable CW frequency divider
- 13x13mm TFBGA pkg & 0.8 mm pitch.



HV7358 Block Diagram D1

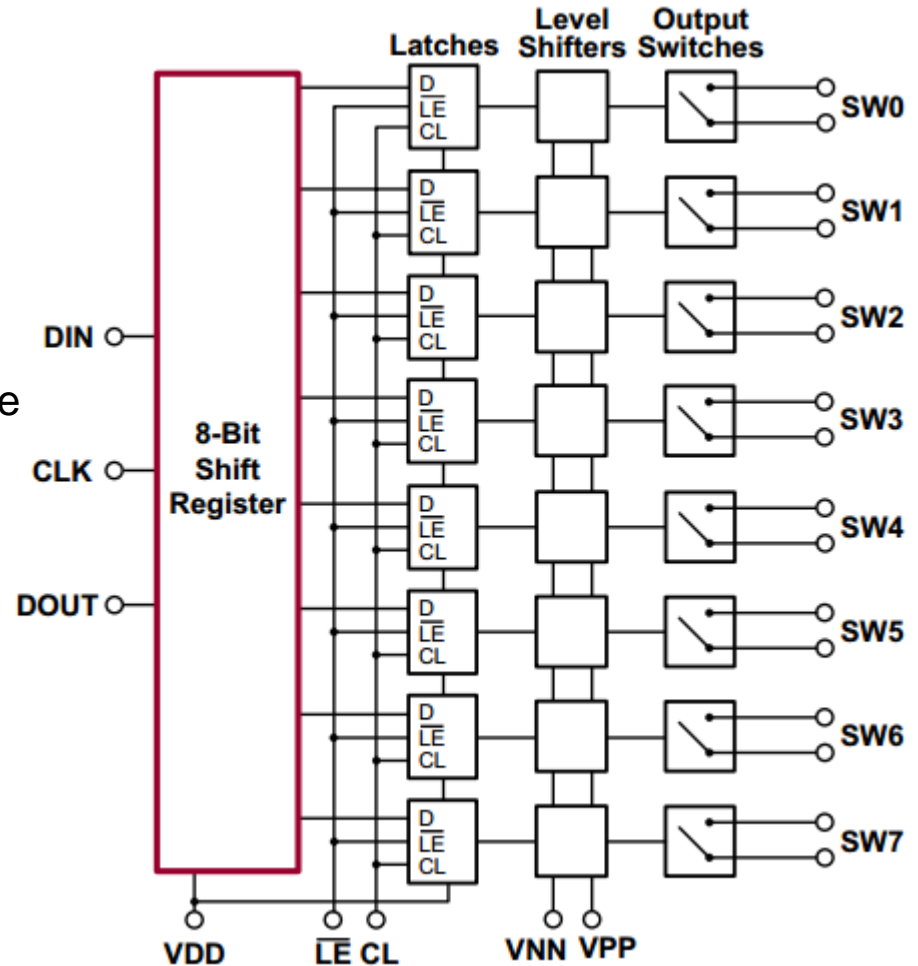
## Features:

- 8 Channel SPST
- 5.0V to 12.0V CMOS logic compatibility
- 5MHz data shift clock frequency
- HVCMOS® technology for high performance
- Very low quiescent power dissipation (10µA)
- Output on-resistance typically 22Ω
- Low parasitic capacitances
- DC to 50MHz small signal frequency response
- -60dB typical output off isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- On-chip shift register, latch and clear –  
- logic circuitry
- Flexible high voltage supplies
- Operating Temperature Range: 0°C to +70°C
- Package Option: LQFP-48, PLCC-28



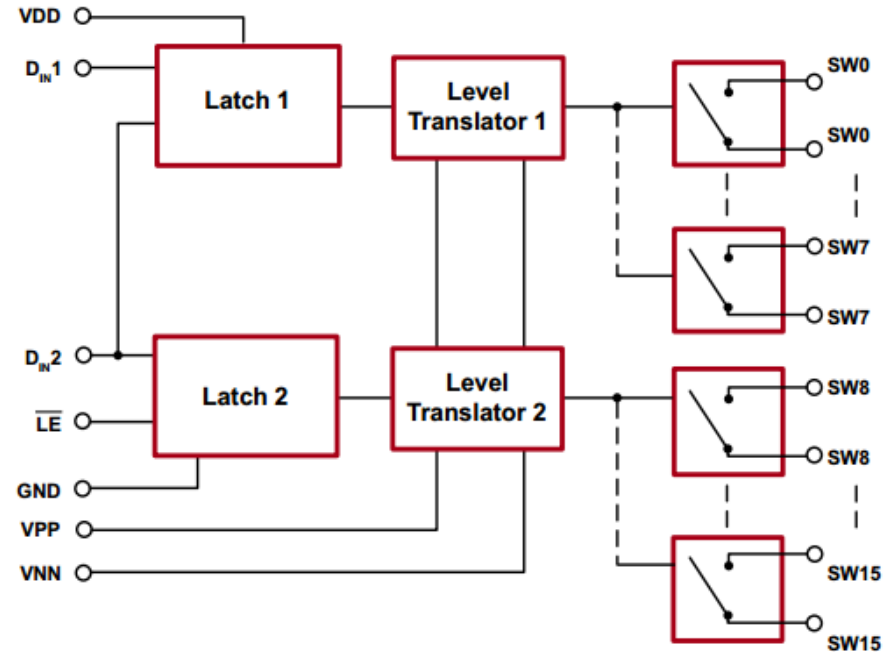
## Features:

- 8 Channel SPST
- 5.0V to 12.0V CMOS logic compatibility
- 5MHz data shift clock frequency
- HVCMOS® technology for high performance
- Very low quiescent power dissipation (10µA)
- Output on-resistance typically 22Ω
- Low parasitic capacitances
- DC to 50MHz small signal frequency response
- -60dB typical output off isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- On-chip shift register, latch and clear logic circuitry
- Flexible high voltage supplies
- Operating Temperature Range: 0°C to +70°C
- Package Option: PLCC-28



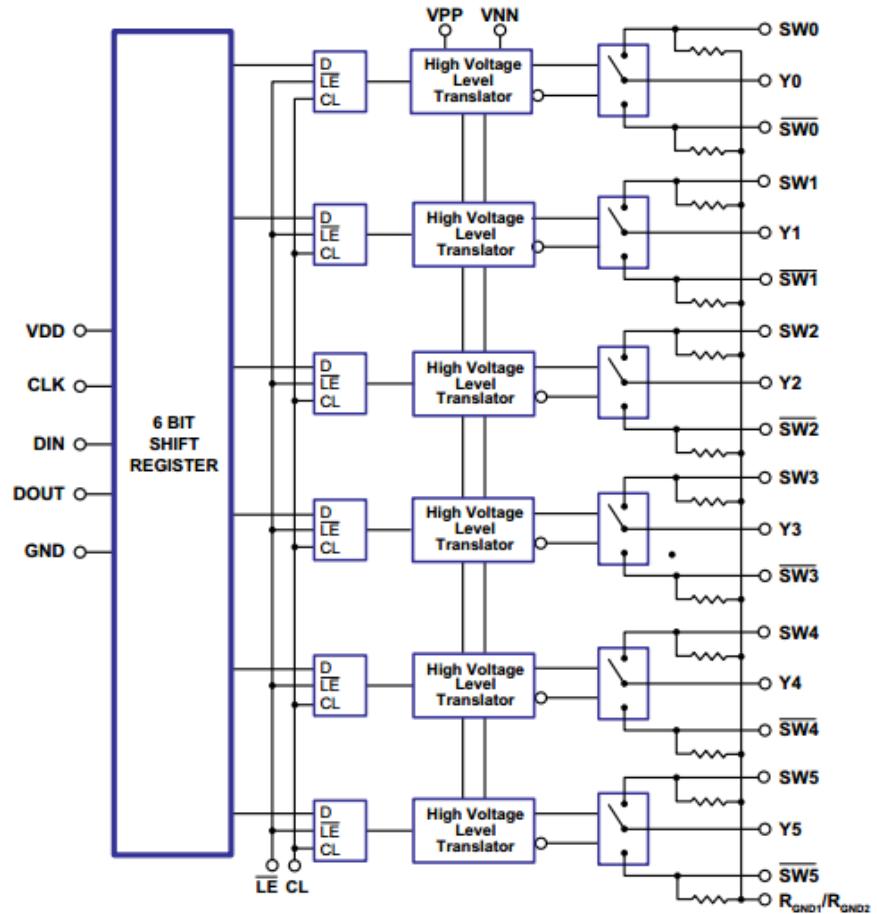
## Features:

- HVCMOS® technology for high performance
- Two Banks of 8 x SPST Configuration
- Support bank switching
- 220V operating conditions
- Output on-resistance typically 22Ω
- 5.0 and 12.0V CMOS logic compatibility
- Very low quiescent current consumption – (-10μA)
- -45dB min off isolation at 7.5MHz
- Low parasitic capacitance
- Excellent noise immunity
- Flexible high voltage supplies
- Operating Temperature Range:
  - 0°C to +70°C
- Package Option: LQFP-48



## Features:

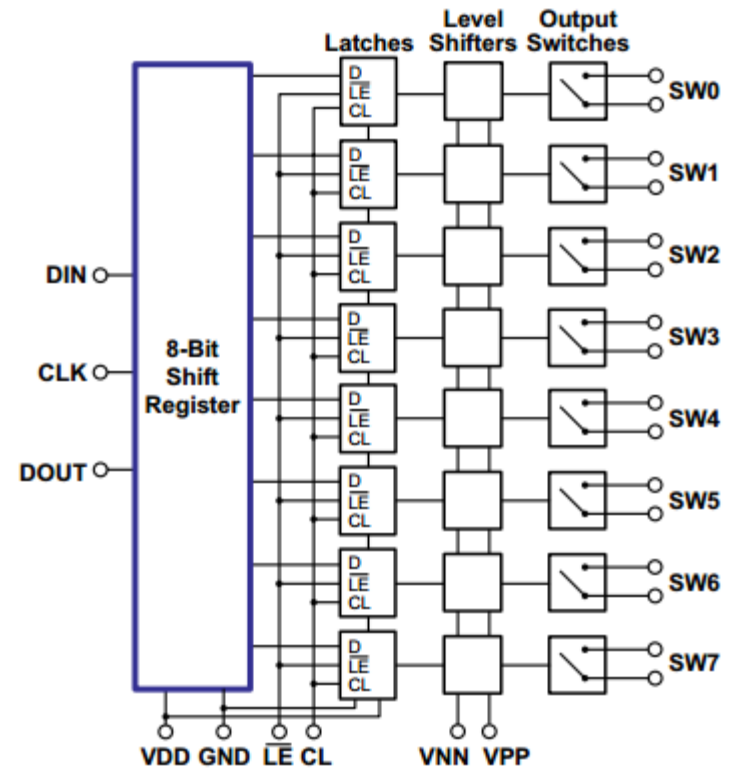
- 6 x 2:1 Mux Configuration
- 5Mhz data shift clock frequency
- HVCMOS® technology for high performance
- Operating voltage of up to 200V
- Output on-resistance typically 22Ω
- Integrated bleed resistors on the outputs
- 5.0V to 12.0V CMOS logic compatibility
- Very low quiescent current consumption
- -58dB typical off isolation at 5.0MHz
- Low parasitic capacitance
- Excellent noise immunity
- Flexible high voltage supplies
- Operating Temperature Range:
  - 0°C to +70°C
- Package Option: LQFP-48





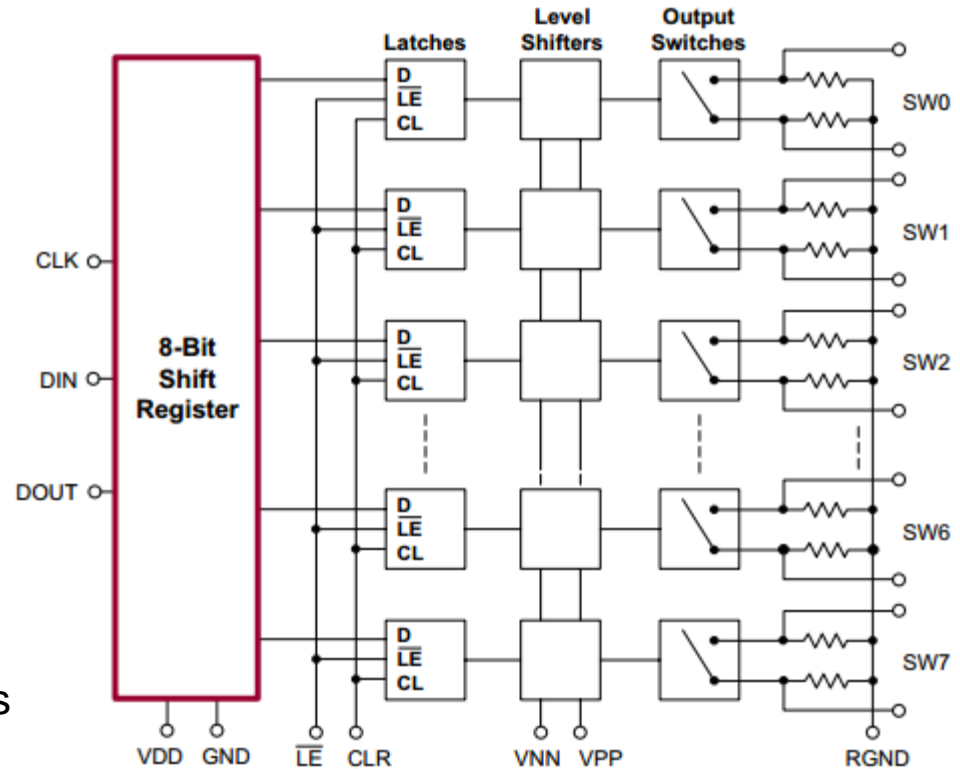
## Features:

- 8 Channel SPST
- 5.0V to 12.0V CMOS logic compatibility
- 5MHz data shift clock frequency
- HVCMOS® technology for high performance
- Very low quiescent power dissipation
- Output on-resistance typically 11Ω
- Low parasitic capacitance
- DC to 50MHz small signal frequency –  
- response
- -60dB typical off-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Serial shift register logic control with latches
- Flexible operating supply voltages
- Surface mount packages
- Operating Temperature Range:
  - 0°C to +70°C
- Package Option: LQFP-48, PLCC-28



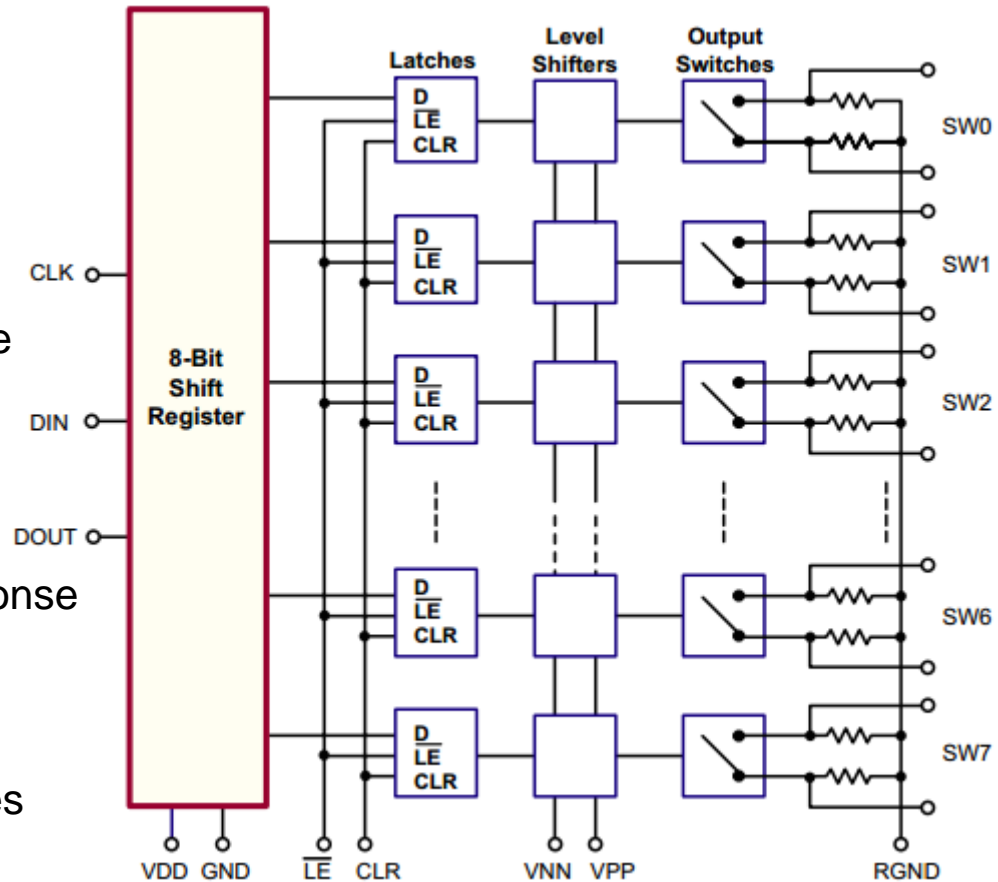
## Features:

- 8 Channel SPST
- HV2201 without bleed resistors
- HV2301 with integrated bleed resistors
- HVCMOS technology for high performance
- 8 Channels of high voltage analog switch
- 3.3 or 5.0V CMOS input logic level
- 20MHz data shift clock frequency
- Very low quiescent power dissipation
- Low parasitic capacitance
- DC to 50MHz analog signal frequency
- -60dB typical off-isolation at 5MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Cascadable serial data register with latches
- Flexible operating supply voltages
- Operating Temperature Range:
  - 0°C to +70°C
- Package Option: LQFP-48, PLCC-28



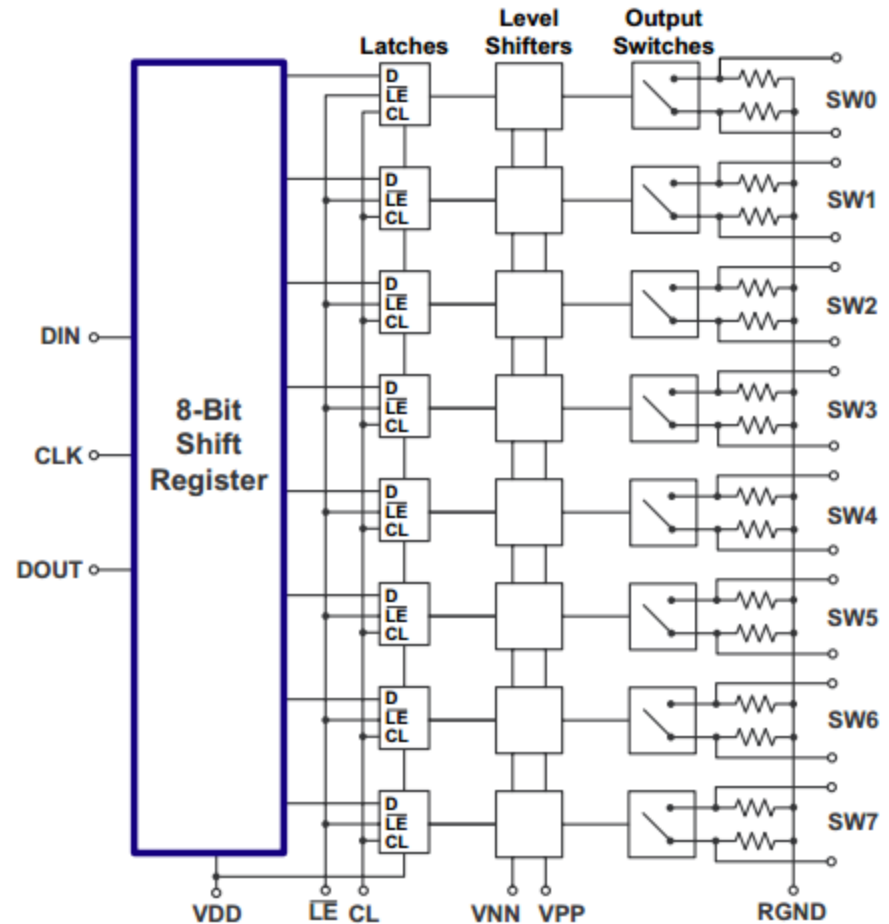
## Features:

- Unipolar with Negative High Voltage
- 8 Channel SPST
- Low Charge Injection
- HV2221 without bleed resistors
- HV2321 with bleed resistors
- Low on-resistance, 15Ω max.
- HVCMOS technology for high performance
- 3.3 or 5.0V CMOS input logic level
- 20MHz data shift clock frequency
- Very low quiescent power dissipation
- Low parasitic capacitance
- DC to 50MHz small signal frequency response
- -60dB typical off-isolation at 5MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Cascadable serial data register with latches
- Flexible operating supply voltages
- Operating Temperature Range: 0°C to +70°C
- Package: LQFP-48



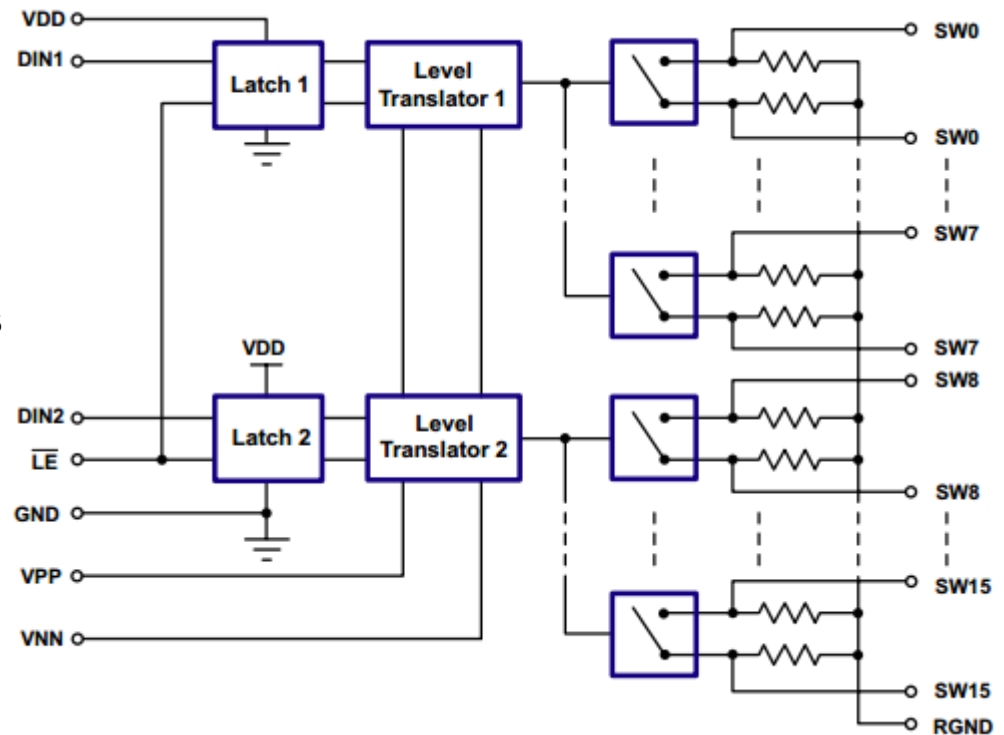
## Features:

- 8 Channel SPST
- HVCMOS® technology for high performance
- Very low quiescent power dissipation –  
- (10µA max.)
- Output on-resistance (22Ω typ.)
- Integrated bleed resistors on the outputs
- Low parasitic capacitances
- DC to 50MHz small signal frequency response
- -60dB typical output off isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- 5.0V to 12.0V CMOS logic compatibility
- 5Mhz data shift clock frequency
- On-chip shift register, latch and clear logic –  
- circuitry
- Flexible high voltage supplies
- Temperature Range: 0°C to +70°C
- Package : LQFP-48, PLCC-28



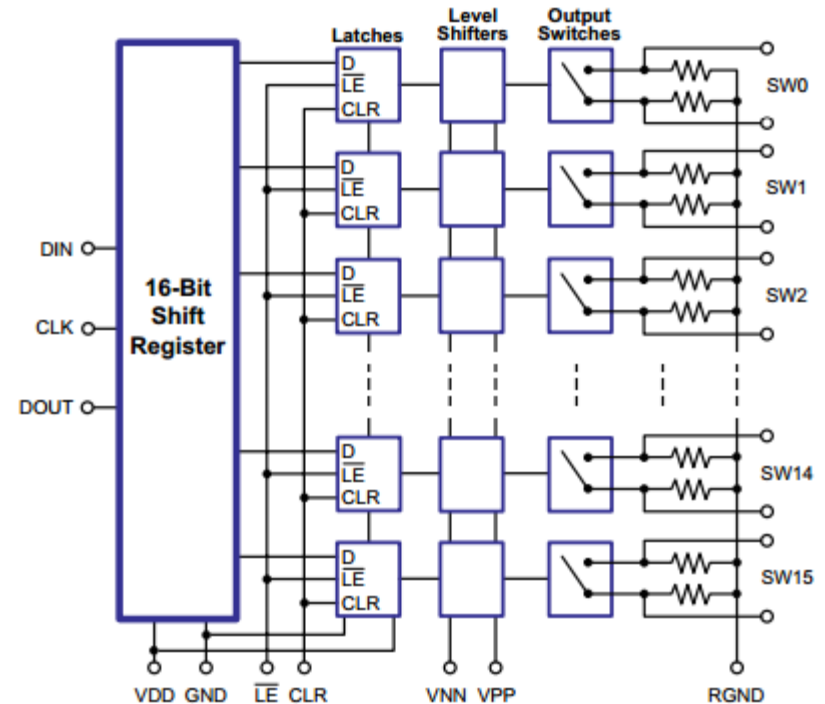
## Features:

- HVCMOS® technology for high – performance
- Two Banks of 8 x SPST configuration
- Support bank switching
- 220V operating conditions
- Output on-resistance typically 22Ω
- Integrated bleed resistors on the outputs
- 5.0 and 12.0V CMOS logic compatibility
- Very low quiescent power dissipation – (-10μA)
- -45dB min off isolation at 7.5MHz
- Low parasitic capacitance
- Excellent noise immunity
- Flexible operating supply voltages
- Operating Temperature Range:
  - 0°C to +70°C
- Package Option: LQFP-48



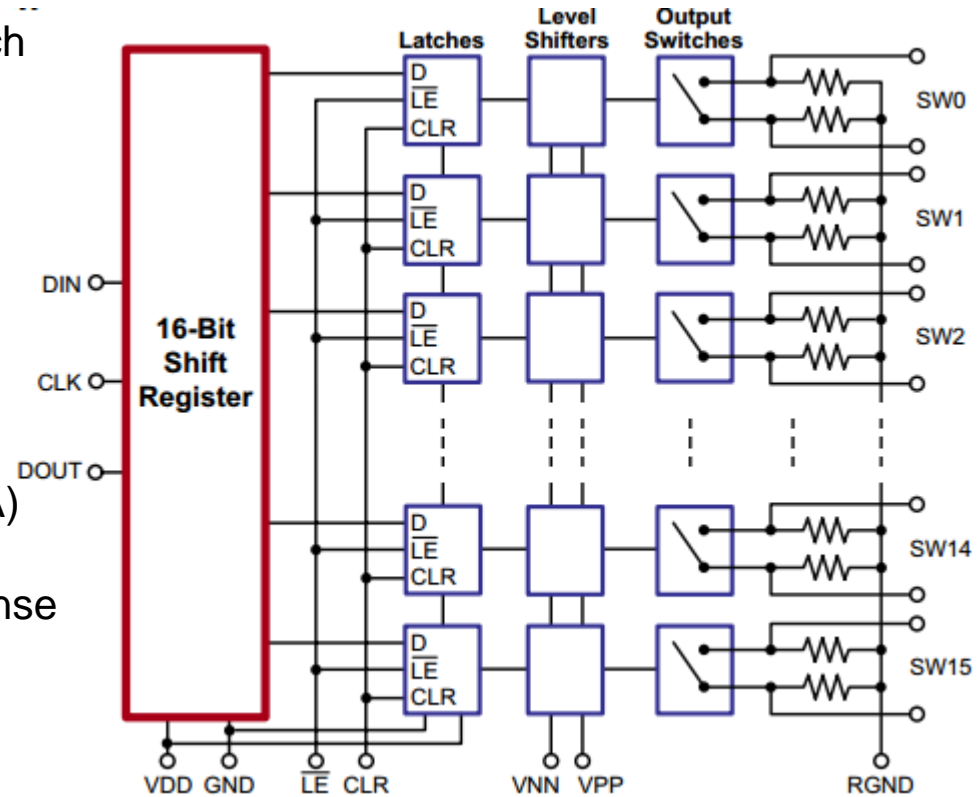
## Features:

- 16-channel SPST high voltage analog switch
- HV2601 without bleed resistors
- HV2701 with bleed resistors
- HVCMOS technology for high performance
- Integrated bleed resistors on the outputs
- 3.3V and 5V input logic level compatible
- 20MHz data shift clock frequency
- Very low quiescent power dissipation ( $-10\mu\text{A}$ )
- Low parasitic capacitance
- DC to 50MHz small signal frequency response
- $-60\text{dB}$  typical OFF-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Cascadable serial data register with latches
- Flexible operating supply voltages
- Temperature Range:
  - $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
- Package: LQFP-48, Bumped Die



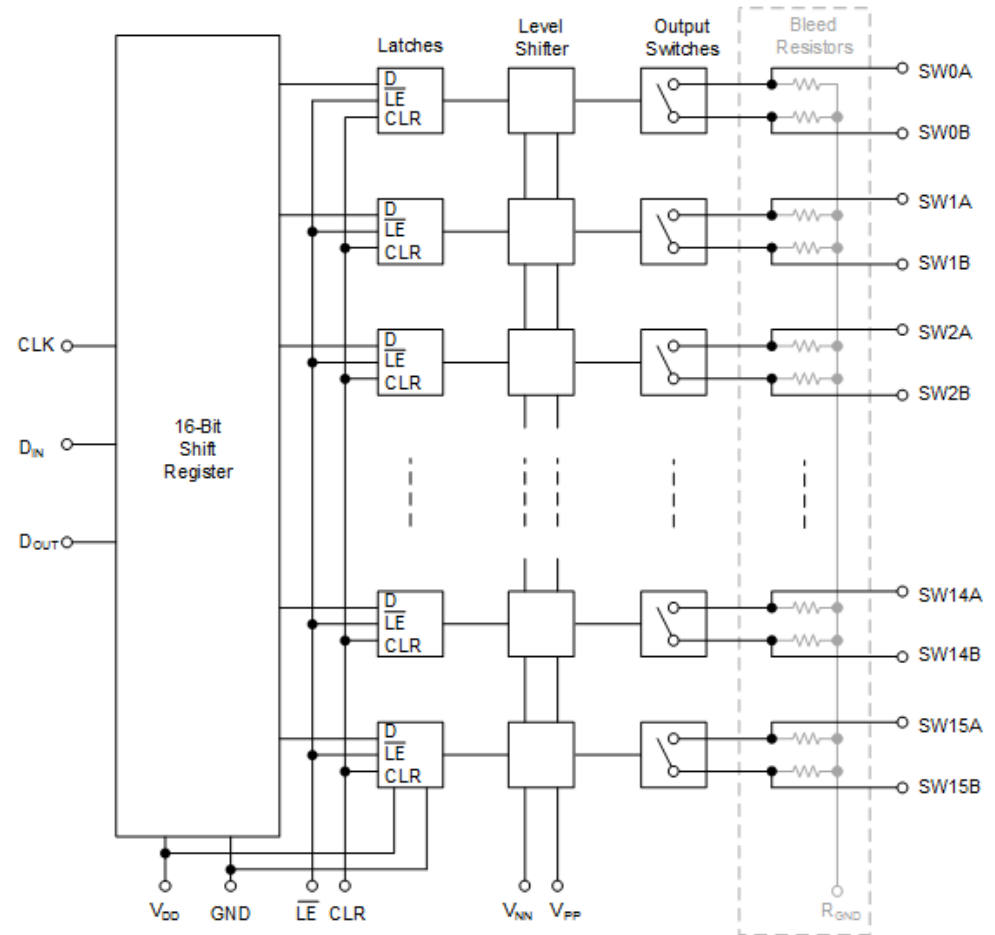
## Features:

- 16-channel SPST high voltage analog switch
- Low Harmonic Distortion
  - C<sub>sg</sub> on/off = 13/10pF
- HV2605 is without bleed resistors
- HV2705 is with bleed resistors
- HVCMOS technology for high performance
- Integrated bleed resistors on the outputs
- 3.3V and 5V input logic level compatible
- 20MHz data shift clock frequency
- Very low quiescent power dissipation (10μA)
- Low parasitic capacitance
- DC to 50MHz small signal frequency response
- -60dB typical off-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Low harmonic distortion
- Cascadable serial data register with –
  - latches
- Flexible operating supply voltages
- Operating Temperature Range: 0°C to +70°C
- Package: LQFP-48, Bumped Die



## Features

- 300V high voltage analog switches
- 16-channel integration, SPST
- 3.3/5V input logic level compatible
- 33MHz data shift clock frequency
- 10 $\mu$ A Very low quiescent Current
- 50MHz small signal frequency BW
- -60dB typical off-isolation at 5.0MHz
- Flexible operating supply voltages  
V<sub>PP</sub>/V<sub>NN</sub>=+260V/-40, +150/-150, +60/-240V
- 9x9mm QFN-64 package

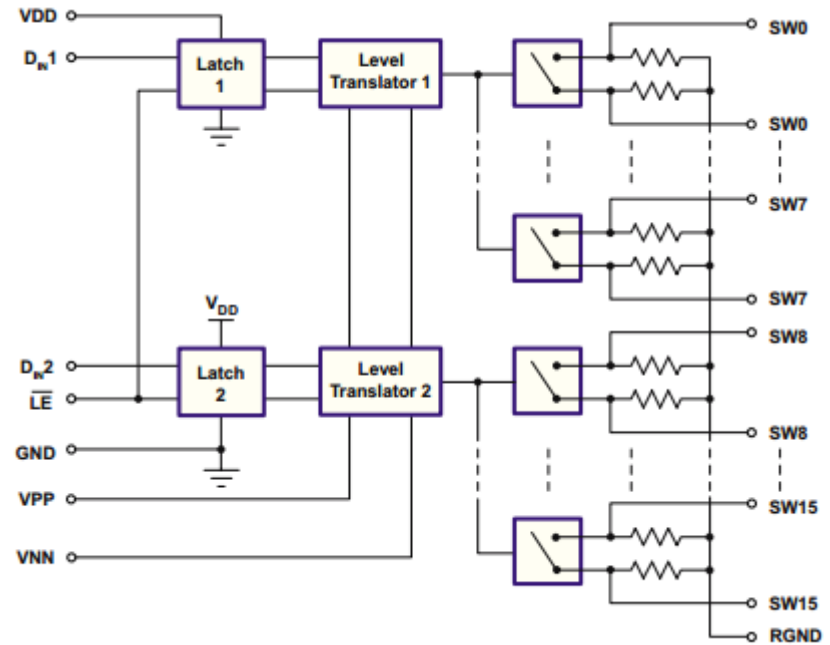


HV2721 has bleed resistors at SWxA and SWxB  
HV2722 has bleed resistors at SWxA only



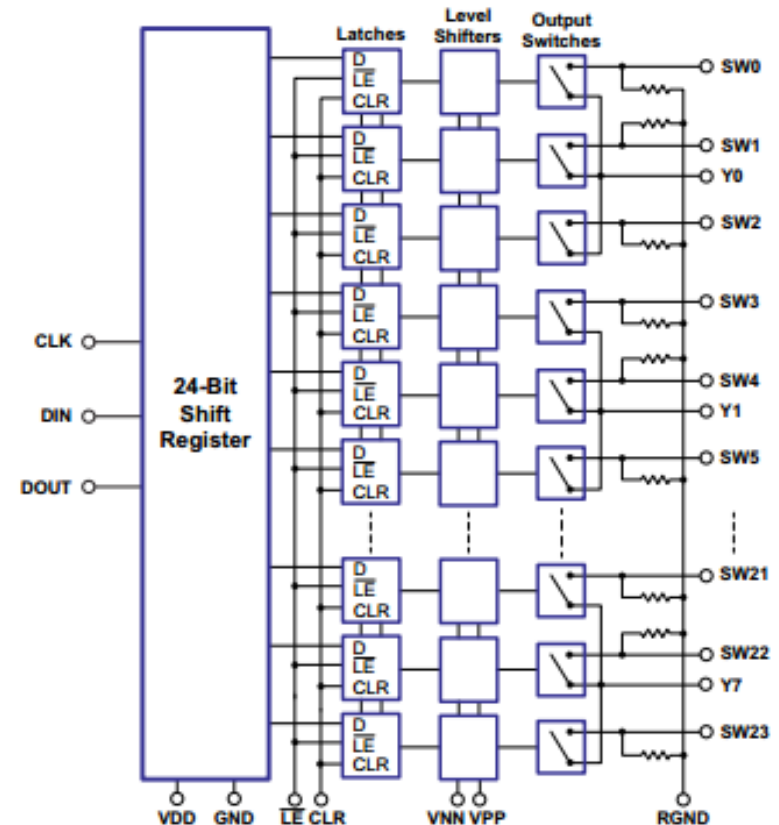
## Features:

- Two Banks of 8 x SPST configuration
- Support bank switching
- HV2631 without bleed resistors
- HV2731 with bleed resistors
- HVCMOS® technology for high performance
- 220V operating conditions
- 22Ω typical output on-resistance
- Integrated bleed resistors on the outputs
- 3.3V and 5.0V CMOS logic compatibility
- Very low quiescent power dissipation (-10μA)
- -45dB min off isolation at 7.5MHz
- Low parasitic capacitance
- Excellent noise immunity
- Flexible operating supply voltages
- 48-lead LQFP package
- Temperature Range:
  - 0°C to +70°C
- Package: LQFP-48



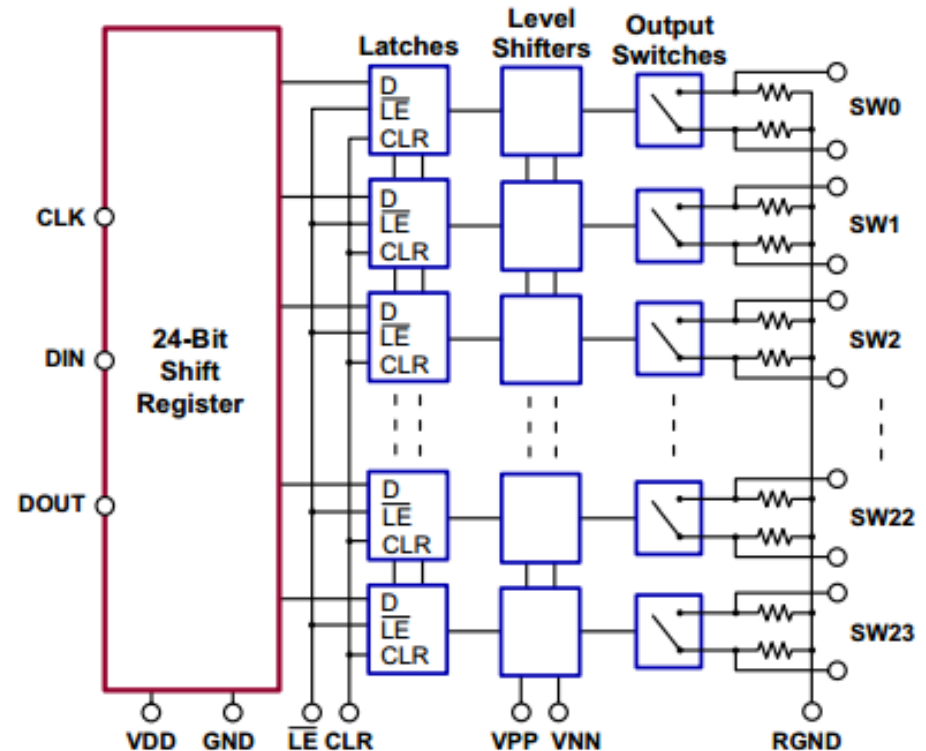
## Features:

- HV2661 without bleed resistors
- HV2761 with bleed resistors
- 24-channel high voltage analog switch
- Integrated bleed resistors on the outputs
- 3.3 or 5.0V CMOS input logic level
- 3:1 MUX-deMUX with 8 states
- 20MHz data shift clock frequency
- HVCMOS technology for high performance
- Very low quiescent power dissipation, 10µA
- Low parasitic capacitance
- DC to 50MHz analog signal frequency
- -60dB typical OFF-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Cascadable serial data register with latches
- Flexible operating supply voltages
- Temperature Range:
  - 0°C to +70°C
- Package: LQFP-48



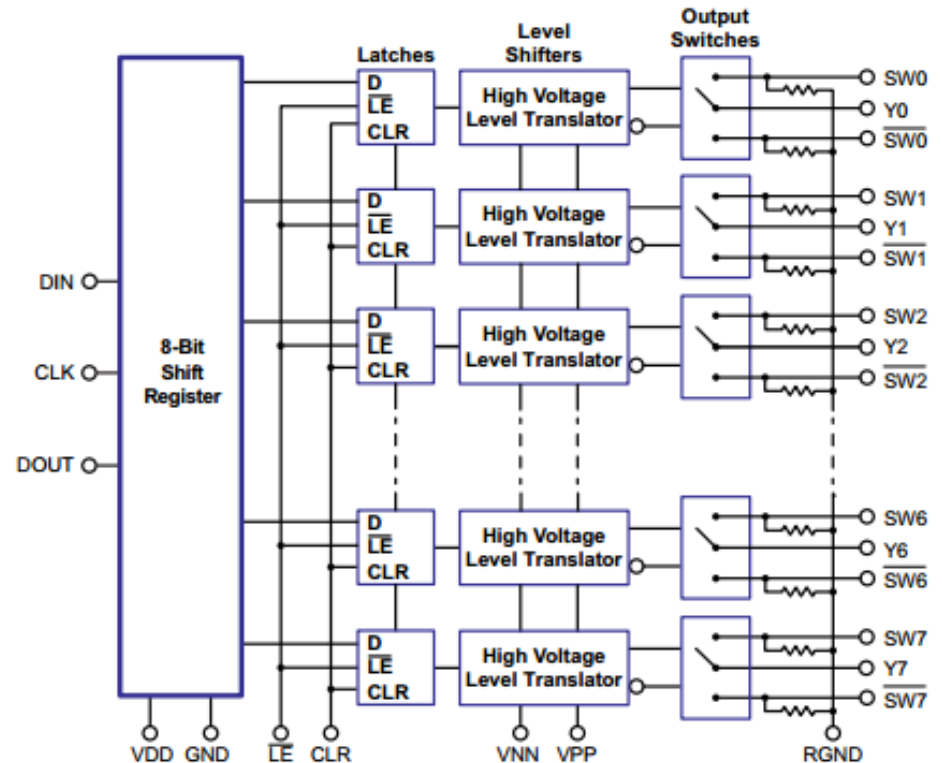
## Features:

- 24 Channel SPST configuration
- Low Harmonic Distortion
- Csg on/off = 12/9 pF
- HV2662 without bleed resistors
- HV2762 with bleed resistors
- 3.3 or 5.0V CMOS input logic level
- 20MHz data shift clock frequency
- HVCMOS technology for high performance
- Very low quiescent power dissipation –  
- (10 $\mu$ A)
- DC to 50MHz analog signal frequency
- -60dB typical OFF-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Cascadable serial data register with latches
- Flexible operating supply voltages
- Temperature Range: 0°C to +70°C
- Package : LFGA-64



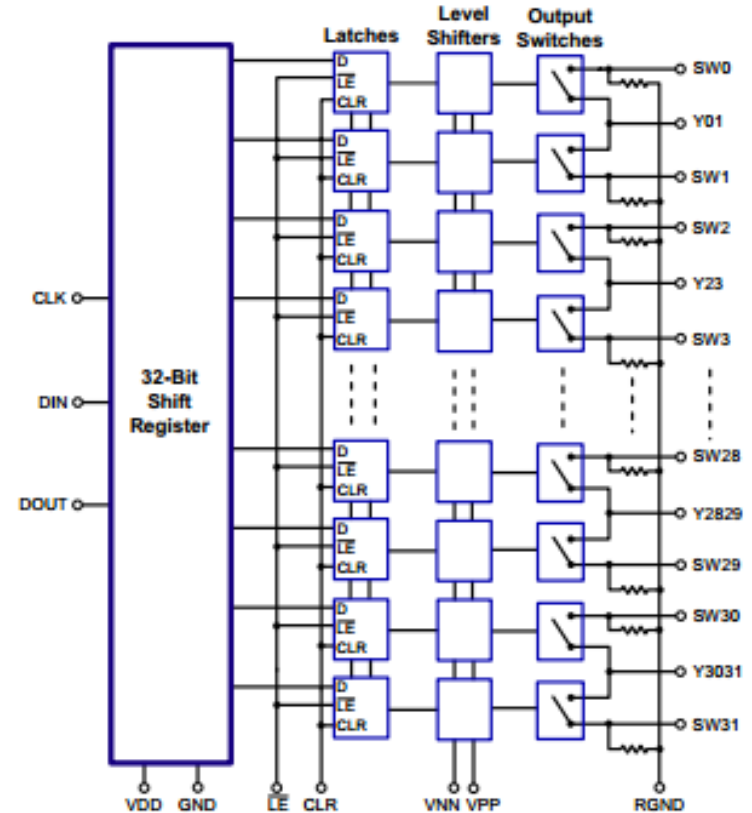
## Features:

- 8 x SPDT Configuration
- Low harmonic distortion
- Integrated bleed resistors on the outputs
- 3.3 and 5.5V CMOS input logic level
- 20MHz data shift clock frequency
- HVCMOS technology for high –  
- performance
- Very low quiescent power dissipation –  
- (-10µA)
- Low parasitic capacitance
- DC to 50MHz small signal frequency –  
- response
- CMOS logic circuitry for low power
- Excellent noise immunity
- Cascadable serial data register with –  
- latches
- Flexible operating supply voltages
- Temperature Range: 0°C to +70°C
- Package: LQFP-48



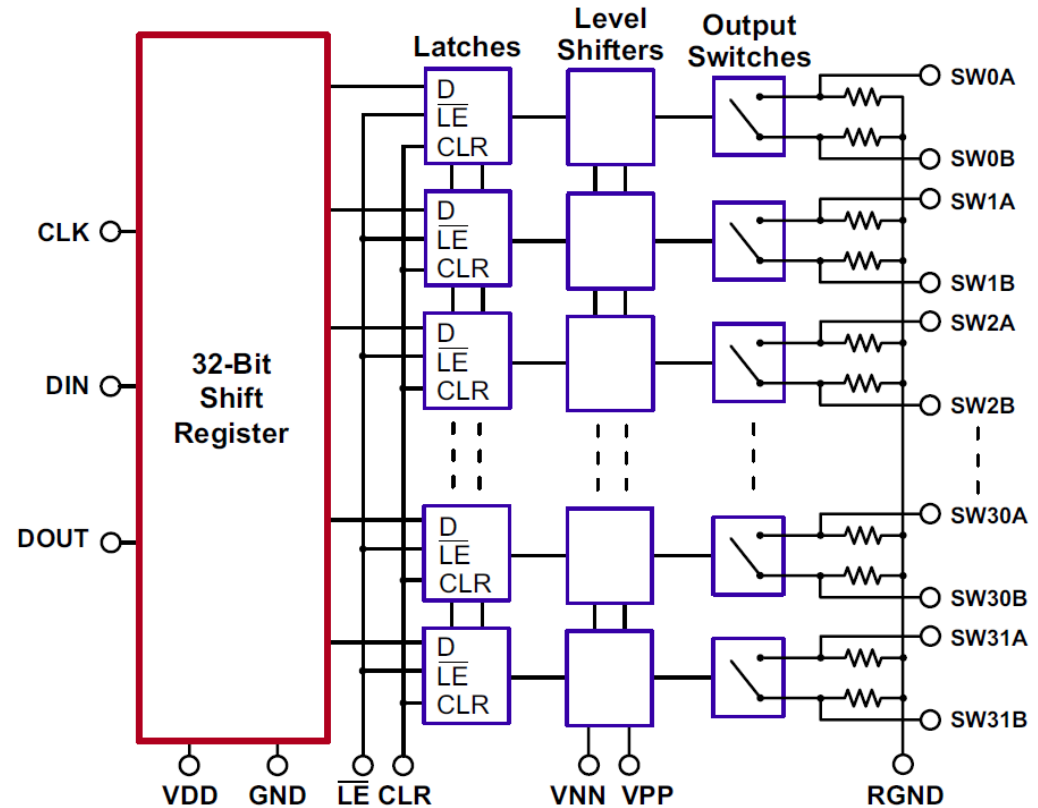
## Features:

- 16 x 2:1 Mux configuration
- HV2801 without bleed resistors
- HV2901 with bleed resistors
- 3.3V or 5.0V CMOS input logic level
- 20MHz data shift clock frequency
- HVCMOS technology for high performance
- Very low quiescent power dissipation -10 $\mu$ A
- Low parasitic capacitance
- DC to 50MHz analog signal frequency
- -60dB typical OFF-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Cascadable serial data register with latches
- Flexible operating supply voltages
  - 0°C to +70°C
- Package: QFN-64



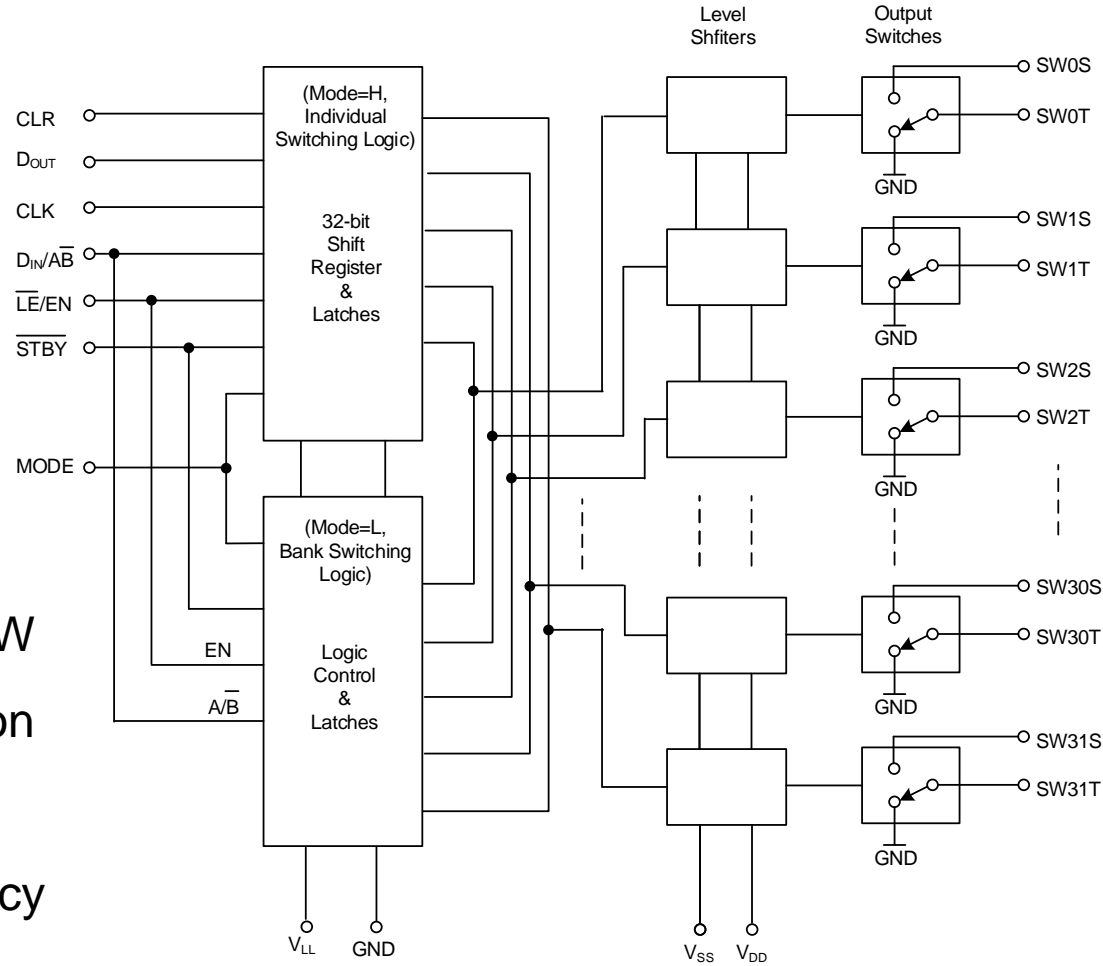
## Features:

- 32-Channel SPST high voltage –  
- analog switch
- Low Harmonic Distortion
- C<sub>gs</sub> on/off = 13/10 pF
- +/-100V Analog Signal Voltage Range
- 20Mhz data shift clock frequency
- Integrated 35K $\Omega$  bleeder resistor –  
- (HV2902 only)
- -60dB off isolation
- 22 $\Omega$  on-resistance
- 3.0A peak analog signal current per –  
- channel
- DC to 50Mhz analog signal bandwidth
- Low parasitic capacitance
- CMOS logic circuitry for low power
- Package: 78-Ball BGA 9x9 mm



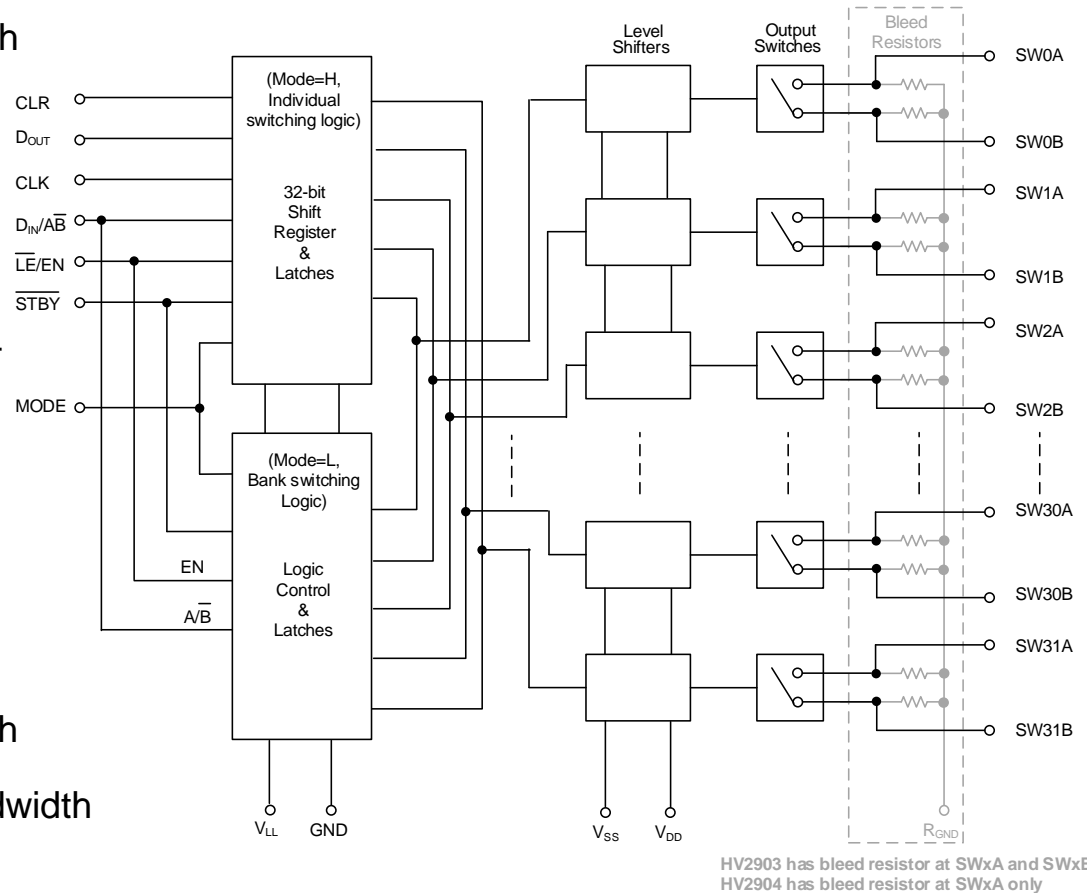
## Feature

- 32-Ch  $\pm 100\text{V}$  Analog L-Switches SPST
- Bias voltages  $V_{DD}/V_{SS} = \pm 5\text{V}$
- $R_{on} = 4.5\Omega$ ,  $I_{pk} = 3.7\text{A}$
- 20pF  $C_{sg-on}$ , 11pF  $C_{sg-off}$
- DC to 100MHz small signal BW
- 100KHz to 50MHz large signal BW
- -70dBc second harmonic distortion
- -66dB Off-Isolation at 5.0MHz
- 3.3V Logic 66MHz Clock frequency
- 10x10mm TFBGA-121 package



## Features:

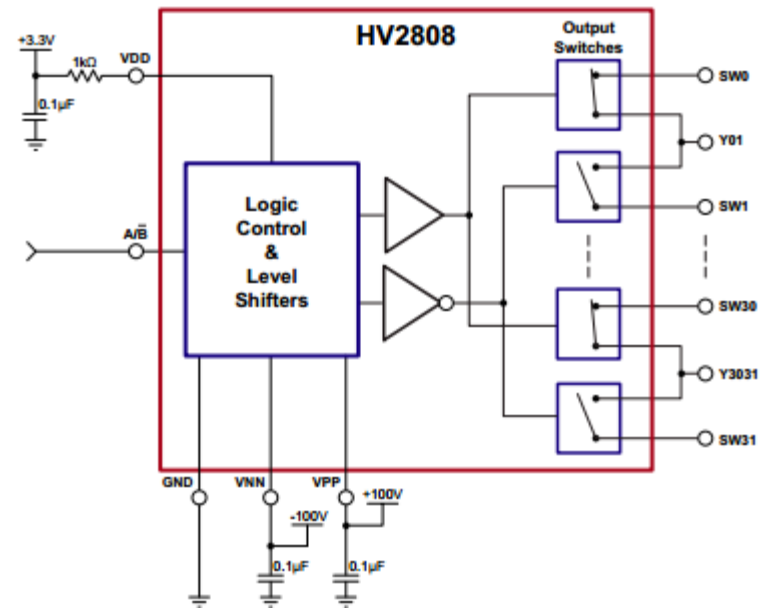
- 32-Channel SPST high voltage analog switch
- $\pm 100V$  Analog Signal Voltage Range
- $\pm 5V$  bias supply voltages
- 66Mhz data shift clock frequency
- Integrated Rb two for HV2903, one HV2904
- -70dB typical off isolation at 5MHz
- 10 $\Omega$  switch-on resistance
- Csg(on)/off=27pF/9pF
- 3A peak analog signal current per channel
- DC to 50Mhz Small-Signal Analog Bandwidth
- 200kHz to 50Mhz Large-Signal Analog Bandwidth
- 12mm x 12mm x 1.1mm TFBGA package





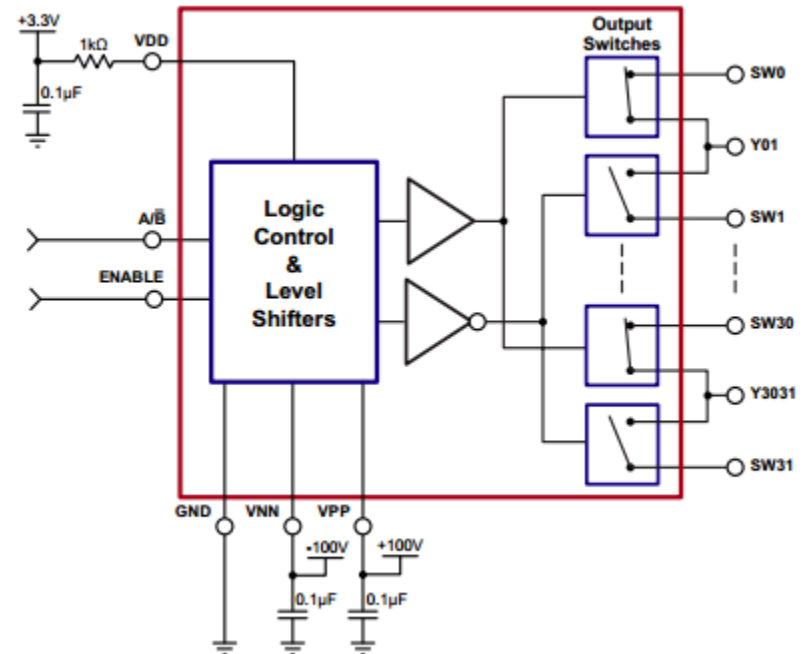
## Features:

- Two Banks of 16 SPST configuration
- Support bank switching
- 3.3 or 5.0V CMOS input logic level
- HVCMOS technology for high performance
- Very low quiescent power dissipation -10 $\mu$ A
- Low parasitic capacitance
- DC to 50MHz analog signal frequency
- -60dB typical OFF-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Flexible operating supply voltages
- Temperature Range:
  - 0°C to +70°C
- Package: QFN-56
- Ideal for ultrasound probe slot multiplexing



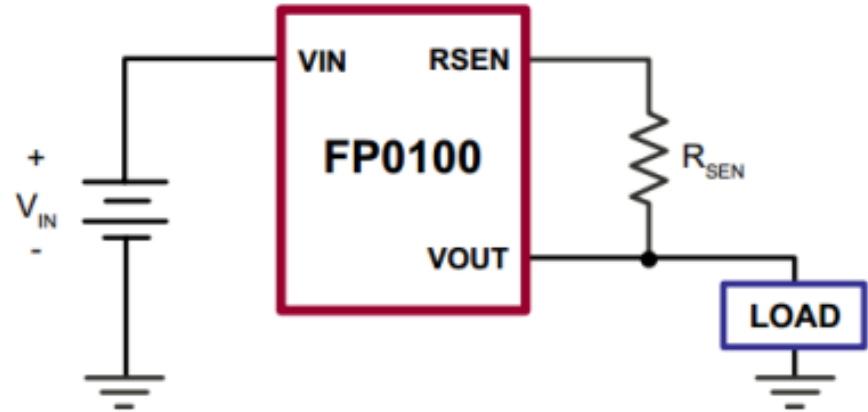
## Features:

- Two banks of 16 SPST configuration
- Support bank switching
- Enable control for all-OFF state
- 3.3 or 5.0V CMOS input logic level
- HVCMOS technology for high performance
- Very low quiescent power dissipation, 10 $\mu$ A
- Low parasitic capacitance
- DC to 50MHz analog signal frequency
- -60dB typical OFF-isolation at 5.0MHz
- CMOS logic circuitry for low power
- Excellent noise immunity
- Flexible operating supply voltages
- Temperature Range:
  - 0°C to +70°C
- Package: QFN-56
- Ideal for ultrasound probe slot multiplexing



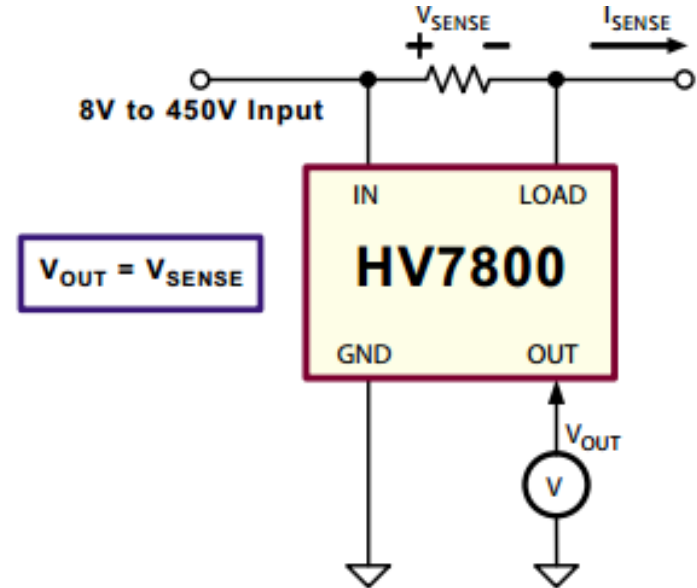
## Features:

- Up to 100V input voltage protection
- Low on resistance – 4.0Ω typical
- Fast switching speed
- No external supplies needed
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOT-89



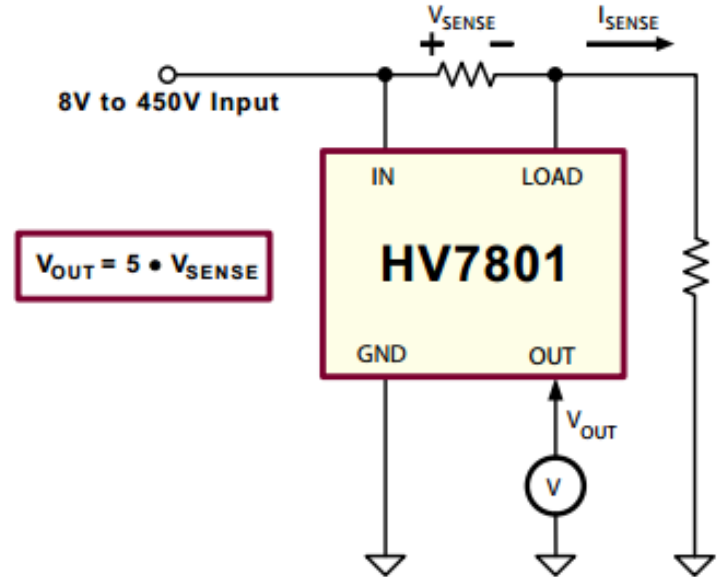
## Features:

- Supply voltage 8.0 to 450V
- Voltage output device
- Typical gain  $1.0 \pm 1\%$
- Max  $V_{SENSE}$  500mV
- Fast rise and fall times, 700ns to 2.0 $\mu$ s
- Maximum quiescent current 50 $\mu$ A
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: 5L SOT-23



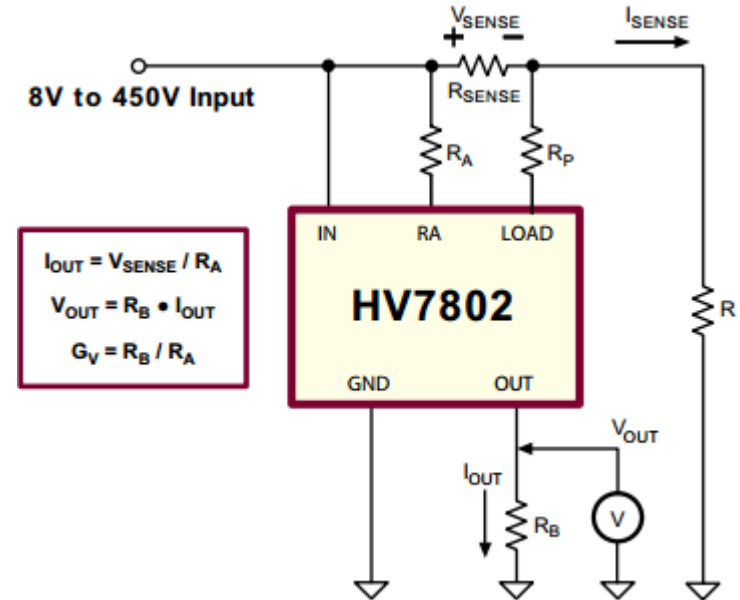
## Features:

- Supply voltage 8.0 to 450V
- Voltage output device
- Typical gain  $5.0 \pm 1\%$
- Max  $V_{SENSE}$  500mV
- Fast rise and fall times, 700ns to 2.0 $\mu$ s
- Maximum quiescent current 50 $\mu$ A
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: 5L SOT-23



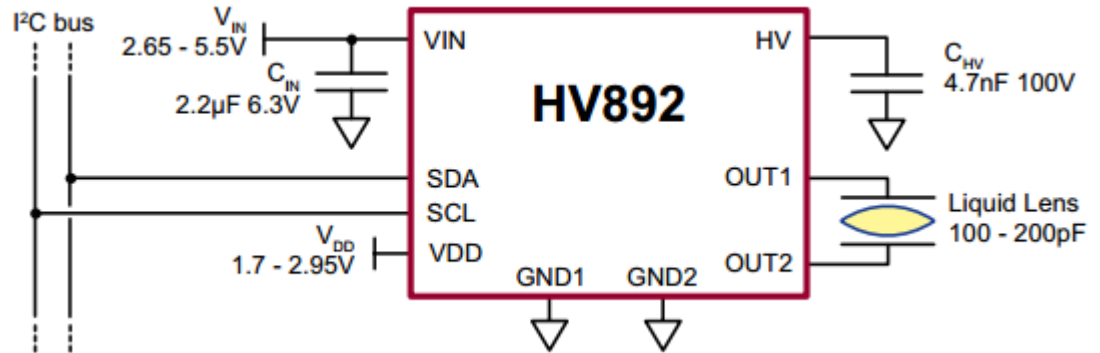
## Features:

- Supply voltage 8V to 450V
- Configurable as a current or –  
- voltage output device
- Maximum sense amplifier –  
- offset of 15mV
- Max VSENSE of 500mV
- Fast rise and fall times, from –  
- 700ns to 2.0µs
- Maximum quiescent current of 50µA
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: MSOP-8



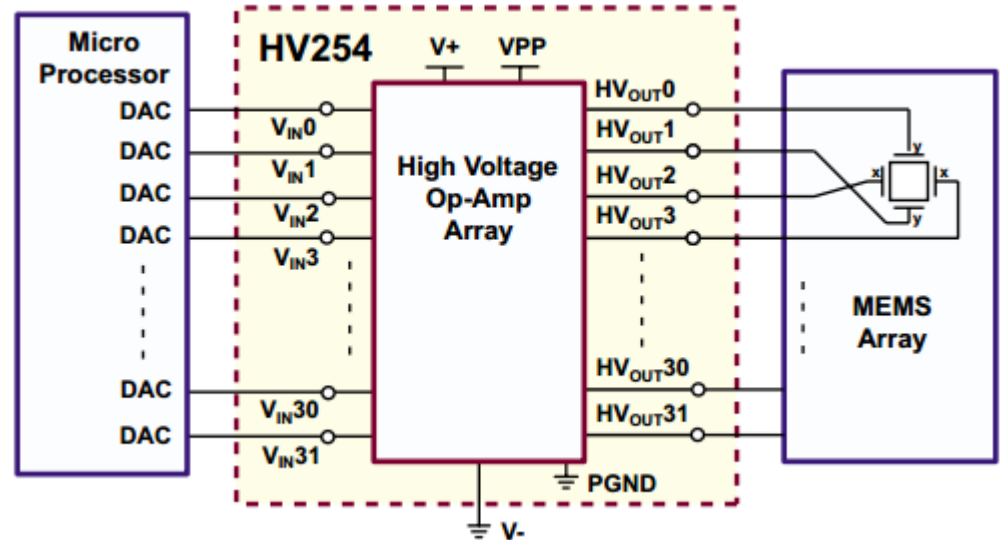
## Features:

- Drives capacitive loads up to –  
– 200pF
- Programmable drive amplitude –  
– (compatible with 40VRMS to –  
– 60VRMS lenses)
- On-chip boost converter
- No external inductor
- I<sup>2</sup>C interface
- Low operating current ( $\leq 20\text{mA}$ )
- Low standby current ( $\leq 1.0\mu\text{A}$ )
- Controlled drive edge reduces –  
– EMI
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Package Option: WDFN-10



## Features:

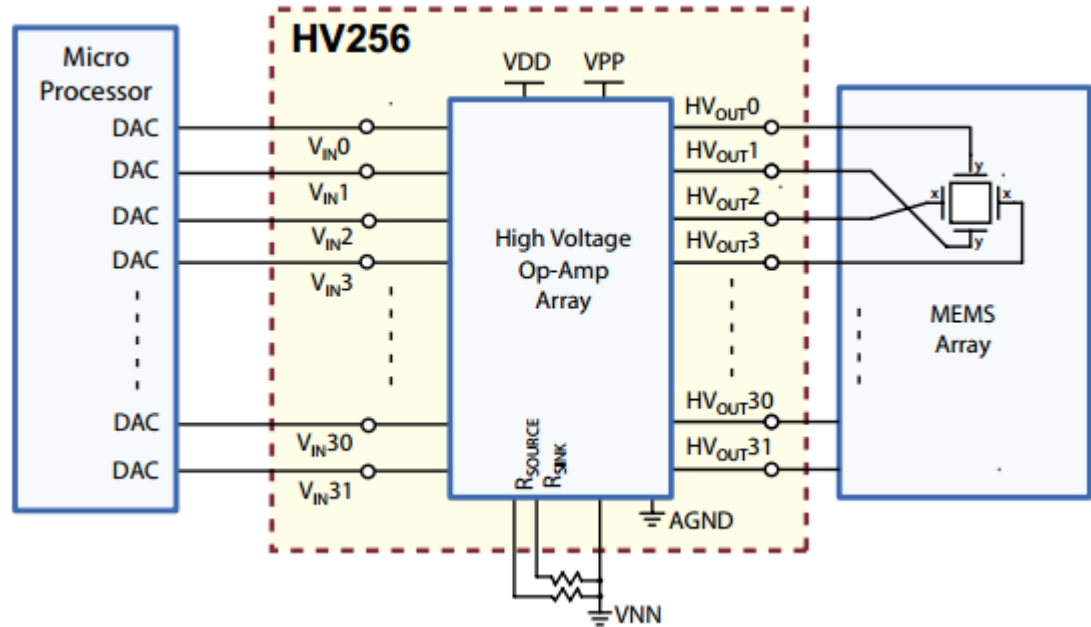
- 32 independent high voltage amplifiers
- Up to 250V output voltage
- 3.0V/ $\mu$ s typical output slew rate
- Very low operating current (typically –  
– 45 $\mu$ A per channel)
- High value internal feedback resistors
- Fixed gain of 50V/V
- Integrated silicon diode for –  
– temperature sensing
- Operating Temperature Range:
  - -10°C to +125°C
- Package Option: MQFP-100





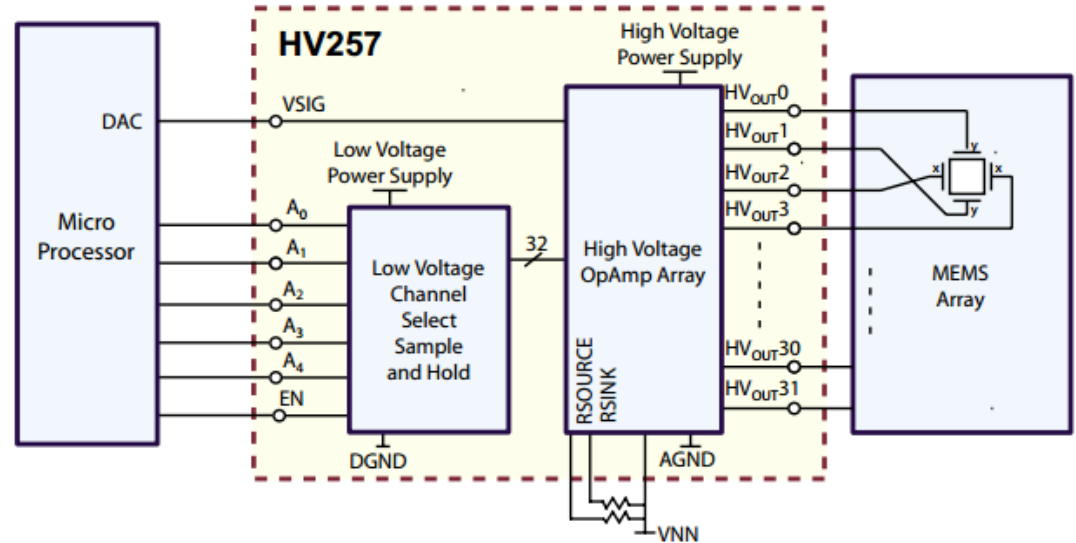
## Features:

- 32 independent high voltage – amplifiers
- 300V operating voltage
- 295V output voltage
- 2.2V/ $\mu$ s typical output slew rate
- Adjustable output current – source limit
- Adjustable output current sink – limit
- Internal closed loop gain of – 72V/V
- 12M $\Omega$  feedback impedance
- Operating Temperature Range:
  - -10°C to +85°C
- Package Option: MQFP-100



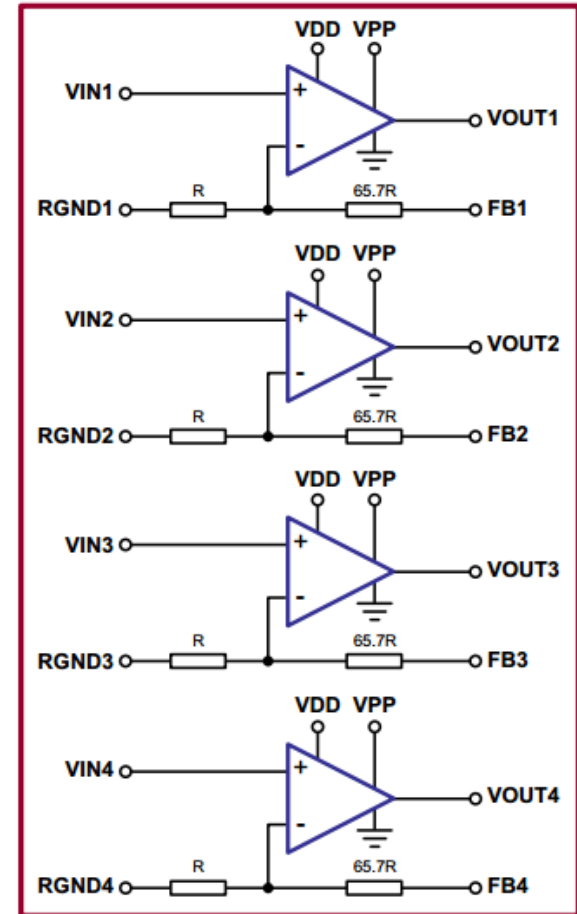
## Features:

- 32 independent high voltage –  
- amplifiers
- 300V operating voltage
- 295V output voltage
- 2.2V/ $\mu$ s typical output slew rate
- Adjustable output current source –  
- limit
- Adjustable output current sink limit
- Internal closed loop gain of 72V/V
- 12M $\Omega$  feedback impedance
- Layout ideal for die applications
- Operating Temperature Range:
  - -10°C to +85°C
- Package Option: MQFP-100



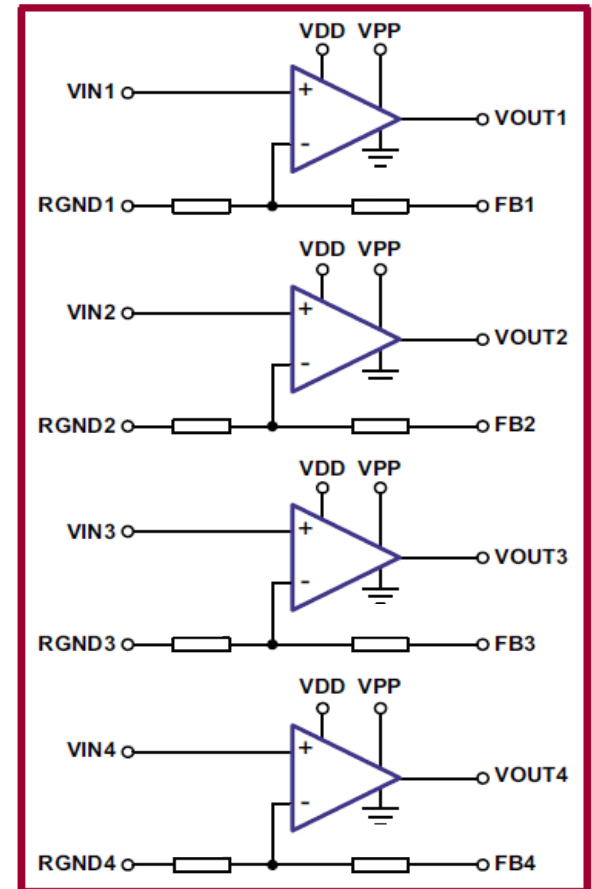
## Features:

- Four independent high voltage amplifiers
- 190V output swing
- 9.0V/ $\mu$ s typical output slew rate
- Fixed gain of 66.7V/V
- High value internal feedback resistors
- Very low operating current
- Operating Temperature Range:
  - -40°C to +100°C
- Package Option: TSSOP-24



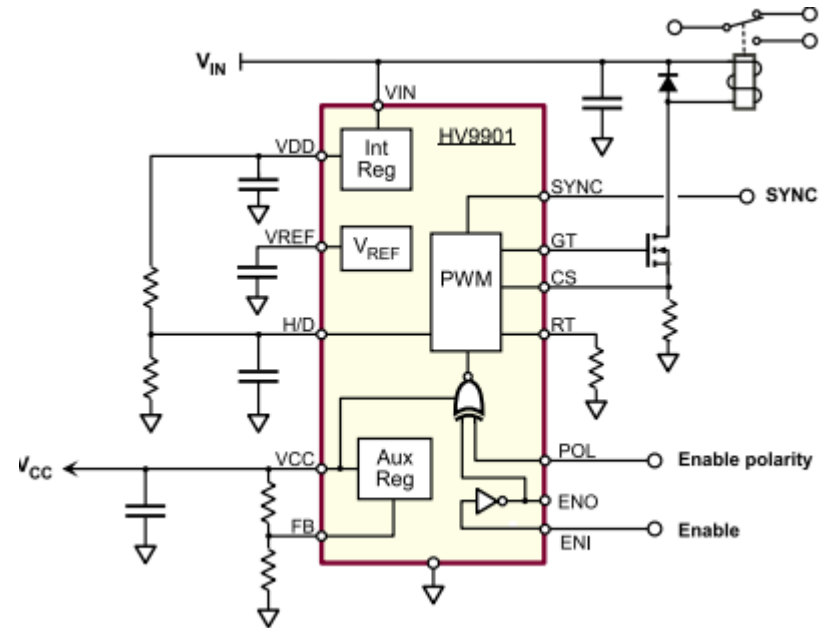
### Features:

- Four Channels High Voltage Amplifier
- Capacitive Load: 100-200pF
- Min Output Slew Rate: 0.02V/us  
(200V in 10 milliseconds)
- Maximum Settling Time: 10ms
- Minimum Gain Bandwidth Product: 30kHz
- Fixed Gain of 82 V/V
- Internal Gain Resistor Network
- Output Impedance: <1k
- Crosstalk Rejection: 80dB
- Very Low Operating Current
- Operating Junction Temperature : -40°C to +125°C
- Package: 24-Lead TSSOP



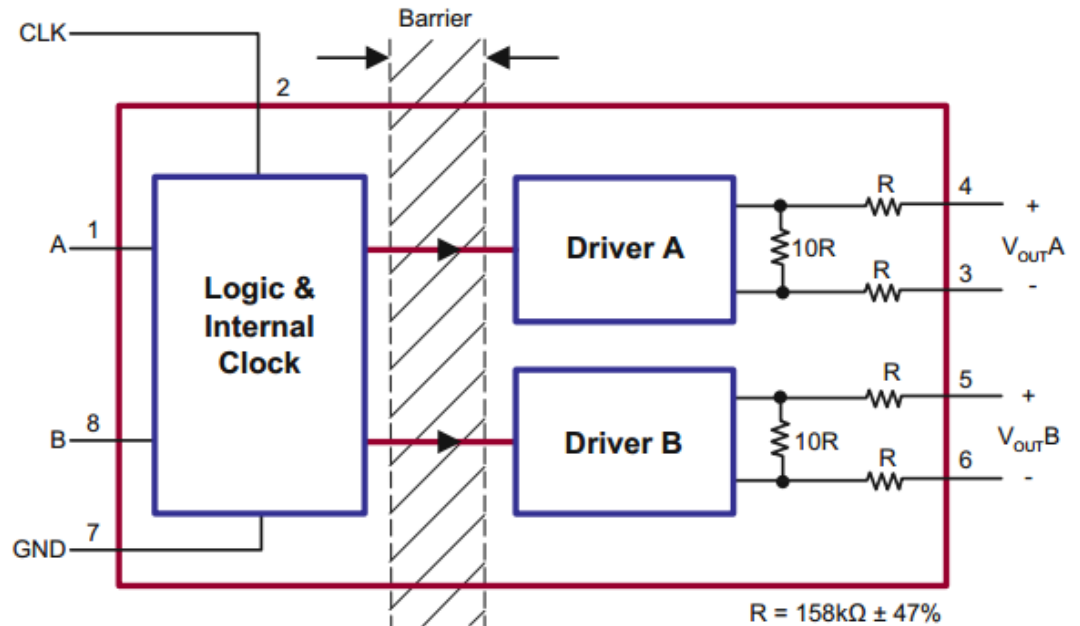
## Features:

- 10 to 450V input voltage range
- Energy saving hold current mode
- Adjustable microcontroller supply
- Low supply current <1.0mA
- Constant current coil
- Programmable pull-in current, pull-in time, -  
- and hold current
- Efficient PWM operation using the relay –  
- coils' inductance
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: SOIC-16



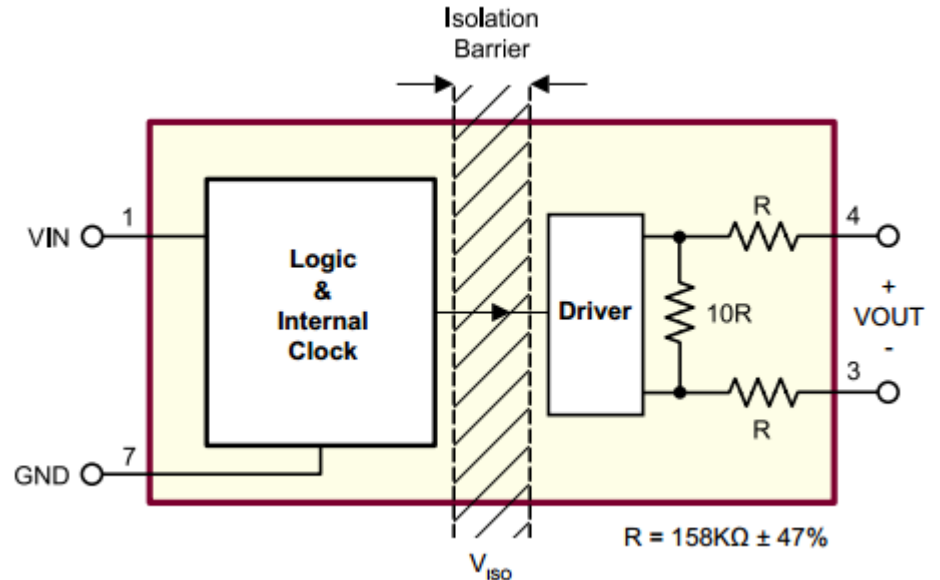
## Features:

- $\pm 400\text{V}$  input to output isolation
- $\pm 700\text{V}$  isolation between outputs
- No external voltage supply required
- Dual isolated output drivers
- Option of internal or external clock
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Package Option: VDFN-10, SOIC-8



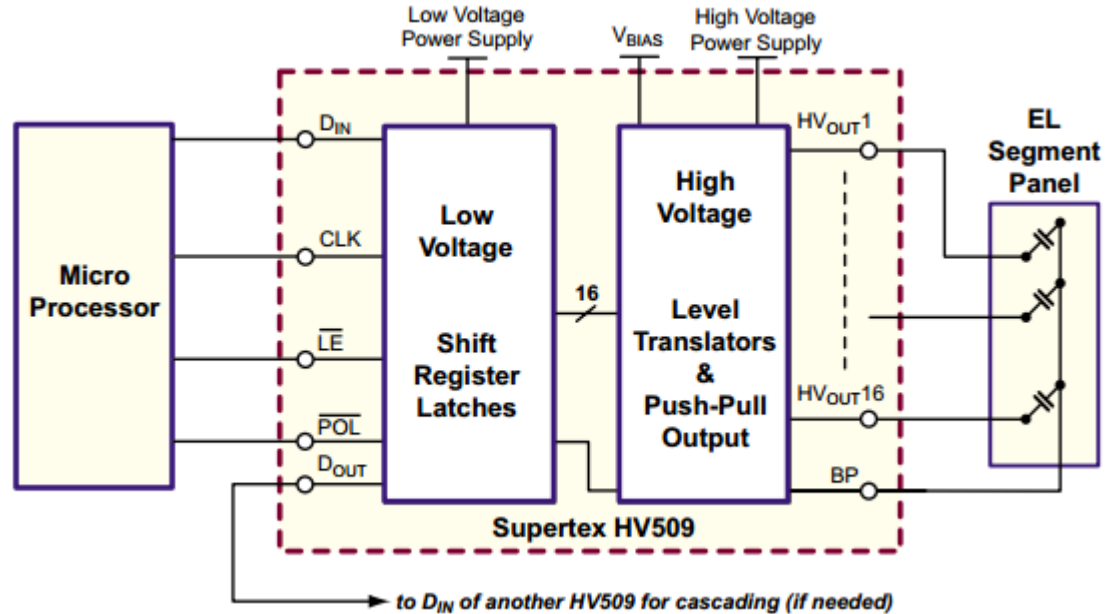
## Features:

- $\pm 400\text{V}$  input to output isolation
- Low input logic current,  $500\mu\text{A}$  max
- No external voltage supply required
- Floating isolated output drivers
- 5.0V logic compatible
- Operating Temperature Range:
  - $-40^\circ\text{C}$  to  $+85^\circ\text{C}$
- Package Option: SOIC-8



## Features:

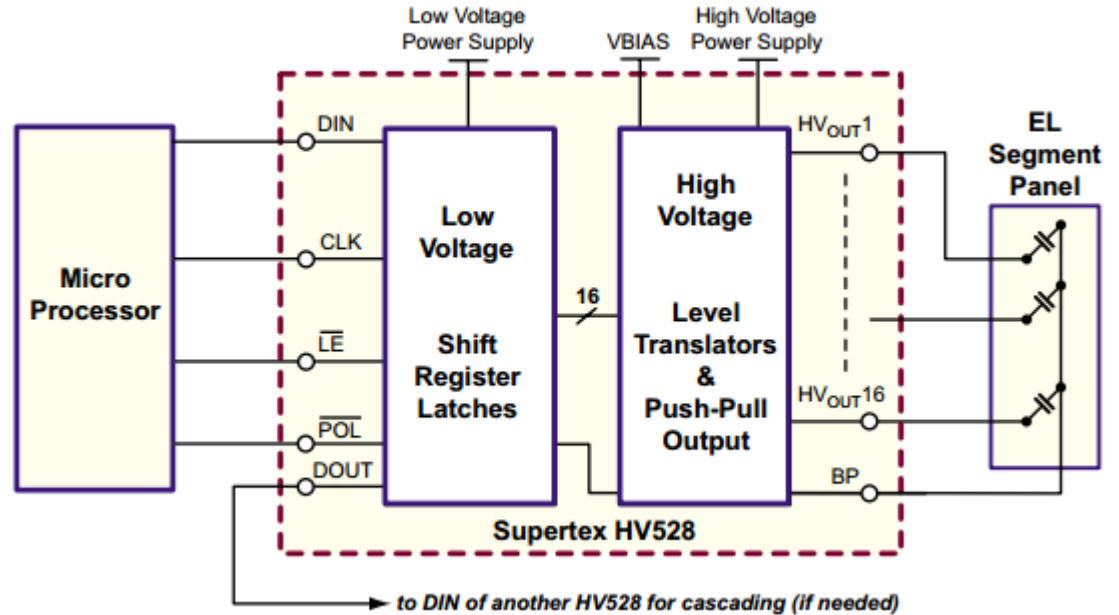
- Output voltage up to +200V
- Shift register speed 500kHz –  
- @  $V_{DD} = 2.0V$
- 16 high voltage outputs
- High voltage backplane driver
- CMOS input levels
- Operating Temperature Range:
  - $-40^{\circ}C$  to  $+125^{\circ}C$
- Package Option: VQFN-32





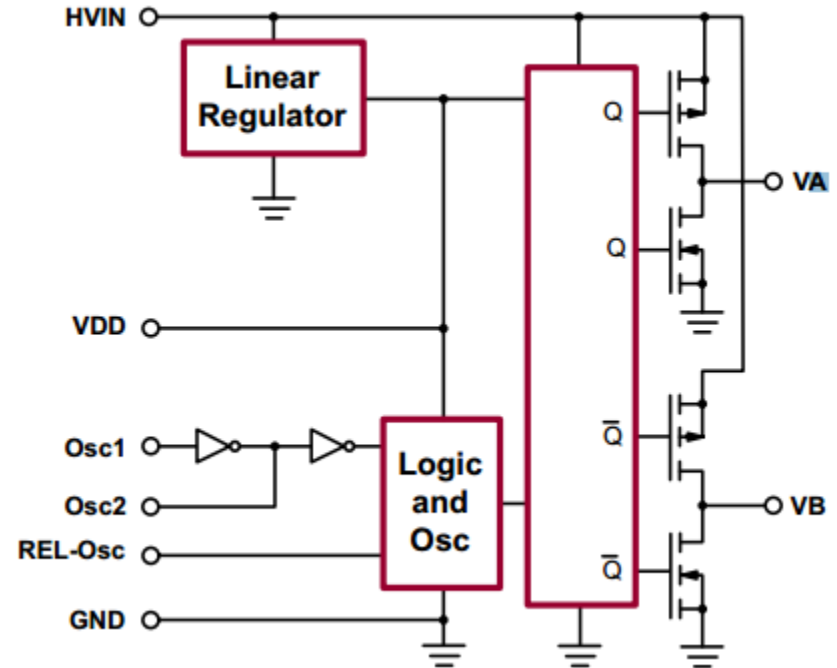
## Features:

- Output voltage up to +200V
- Shift register speed 500kHz –  
- @  $V_{DD} = 1.7V$
- 16 high voltage outputs
- High voltage backplane driver
- CMOS input levels
- Operating Temperature Range:
  - $-40^{\circ}C$  to  $+125^{\circ}C$
- Package Option: VQFN-3



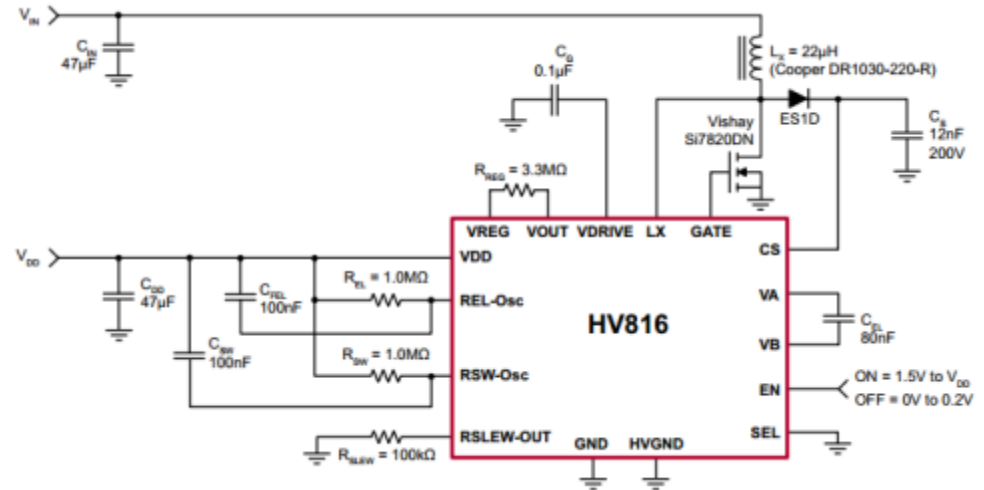
## Features:

- Input voltage up to 200V DC
- 400V peak-to-peak output voltage
- Output load up to 350nF (100in<sup>2</sup> for -  
- 3.5nF/in<sup>2</sup> lamp)
- Adjustable output lamp frequency
- Adjustable on/off pulsing frequency
- Operating Temperature Range:
  - -25°C to +85°C
- Package Option: SOIC-8, SOIC-8 w/HS



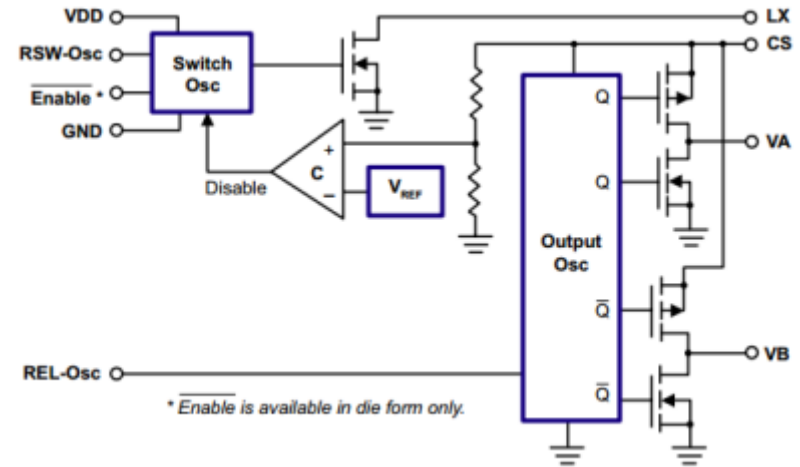
## Features:

- 360V<sub>PP</sub> output voltage for high –  
- brightness
- Large output load capability of up to –  
- 150nF
- 2.7 to 5.5V operating supply voltage
- Single lithium ion cell compatible
- Adjustable output regulation for –  
- dimming
- External switching MOSFET
- Low audible noise
- Output discharge slew rate control
- 1.5V logic
- Dedicated Enable pin
- Two EL frequency controls
- Independent lamp and converter –  
- frequency setting
- Split supply capability
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: QFN-16



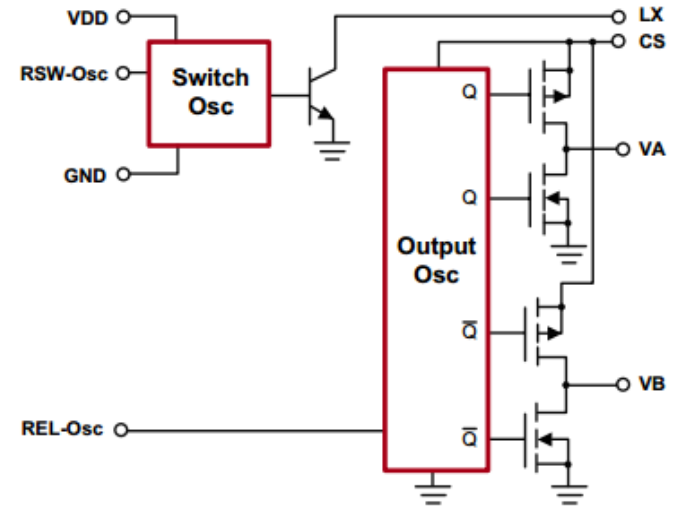
## Features:

- 2.0 to 9.5V operating supply voltage
- DC to AC conversion
- 180V peak-to-peak typical output voltage
- Large output load capability typically 50nF
- Permits the use of high-resistance elastomeric –  
- lamp components
- Adjustable output lamp frequency to control –  
- lamp color, lamp life, and power consumption
- Adjustable converter frequency to eliminate –  
- harmonics and optimize power consumption
- Enable/disable function
- Low current draw under no load condition
- Operating Temperature Range:
  - -25°C to +85°C
- Package Option: SOIC-8



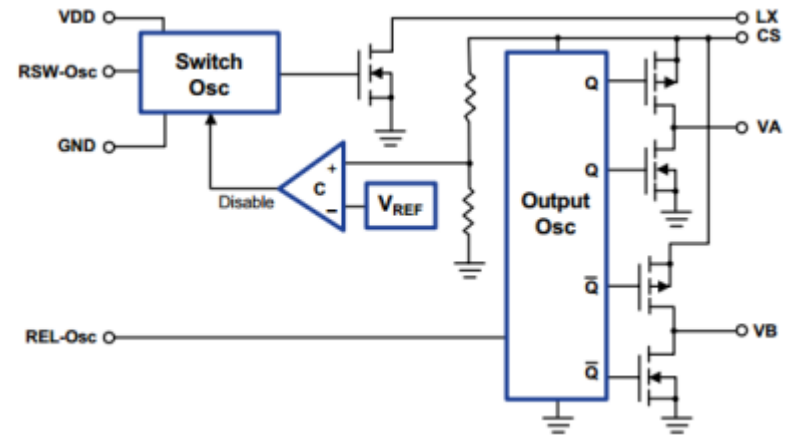
## Features:

- 1.0 to 1.6V operating supply voltage
- DC to AC conversion
- Output load of typically up to 6.0nF
- Adjustable output lamp frequency
- Adjustable converter frequency
- Enable function
- Operating Temperature Range:
  - -25°C to +85°C
- Package Option: SOIC-8, MSOP-8



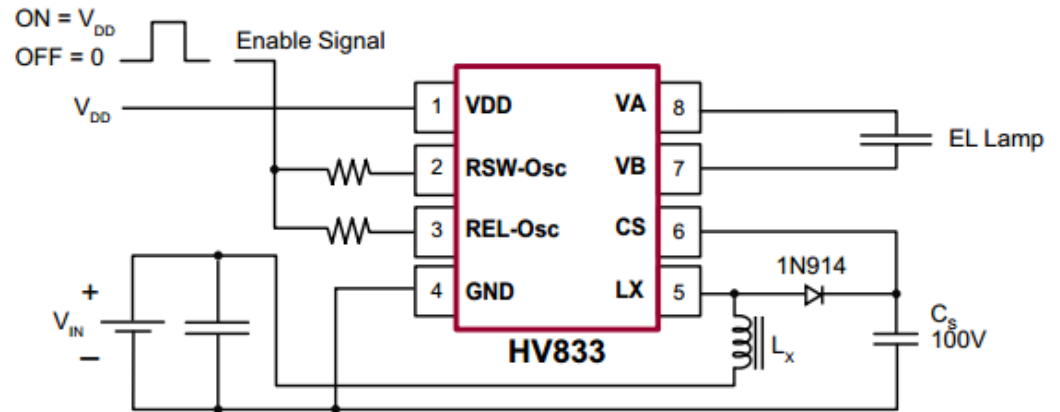
## Features:

- 2.0 to 9.5V operating supply voltage
- DC to AC conversion
- 200V peak-to-peak typical output voltage
- Large output load capability typically 50nF
- Permits the use of high-resistance elastomeric –  
- lamp components
- Adjustable output lamp frequency to control –  
- lamp color, lamp life, and power consumption
- Enable/disable function
- Low current draw under no load condition
- Very low standby current - 30nA typical
- Operating Temperature Range:
  - -25°C to +85°C
- Package Option: SOIC-8, MSOP-8



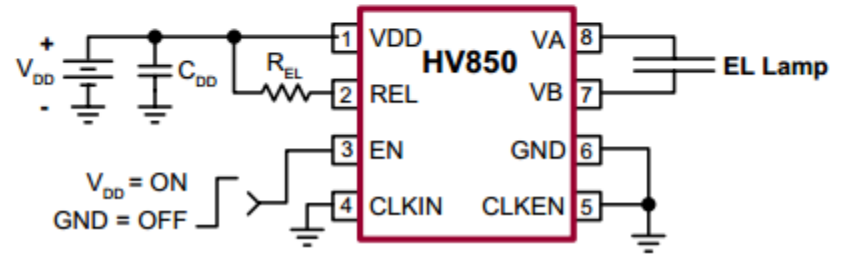
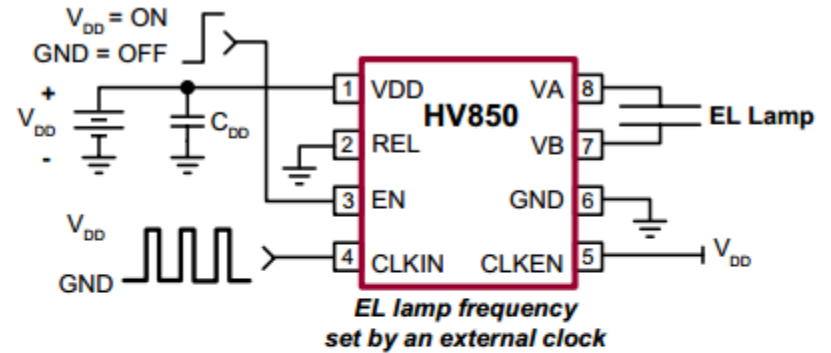
## Features:

- 1.8 to 6.5V operating supply voltage
- DC to AC conversion
- Separately adjustable lamp and –  
- converter frequency
- Output voltage regulation
- Enable/disable function
- Patented output timing for high –  
- efficiency
- <100nA shutdown current
- Split supply capability
- LCD backlighting
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: MSOP-8



## Features:

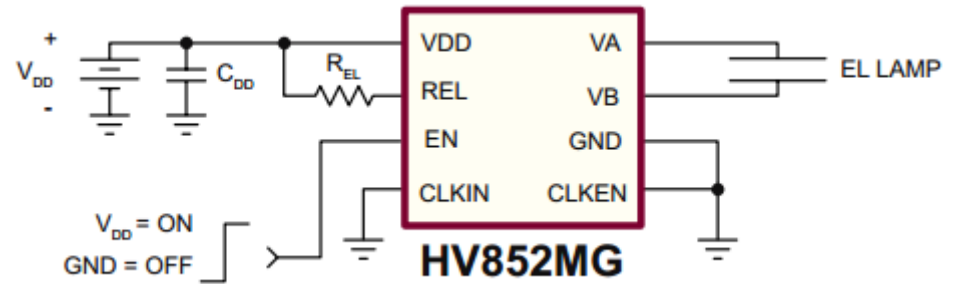
- No external components required when –
  - using an external EL clock frequency
- EL frequency can be set by an external –
  - resistor
- Low noise
- DC to AC converter
- Drives up to 5.0nF load (approx. 1.5in2 –
  - lamp)
- Output voltage regulation
- Enable function
- EL Lamp dimming
- Operating Temperature Range:
  - -25°C to +85°C
- Package Option: MSOP-8





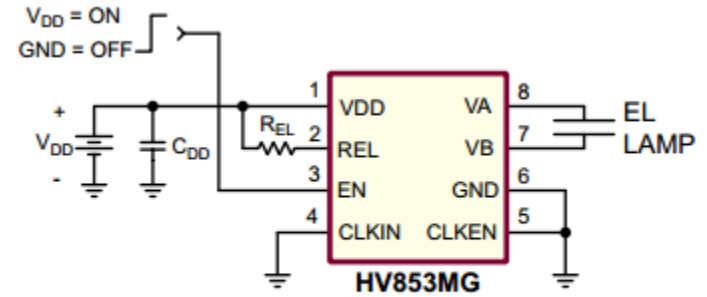
## Features:

- No external components required when –
  - using an external EL clock frequency
- EL frequency can be set by an external –
  - resistor
- Low Noise
- DC to AC converter
- Drives up to 5.3nF (approx. 1.5in<sup>2</sup> lamp)
  - load
- Output voltage regulation
- Enable function
- EL Lamp dimming
- Operating Temperature Range:
  - -25°C to +85°C
- Package Option: MSOP-8, WDFN-10

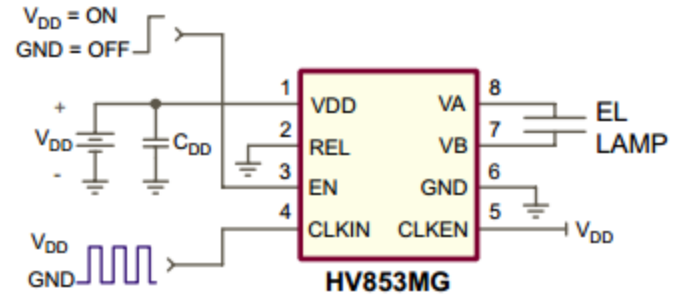


## Features:

- No external components required when using –
  - an external EL clock frequency
- Audible noise reduction with improved EMI
- EL frequency can be set by an external resistor
- DC to AC converter
- Drives up to 5.3nF (approx. 1.5in2 lamp) load
- Output voltage regulation
- Enable function
- EL Lamp dimming
- Operating Temperature Range:
  - -25°C to +85°C
- Package Option: MSOP-8, WDFN-10



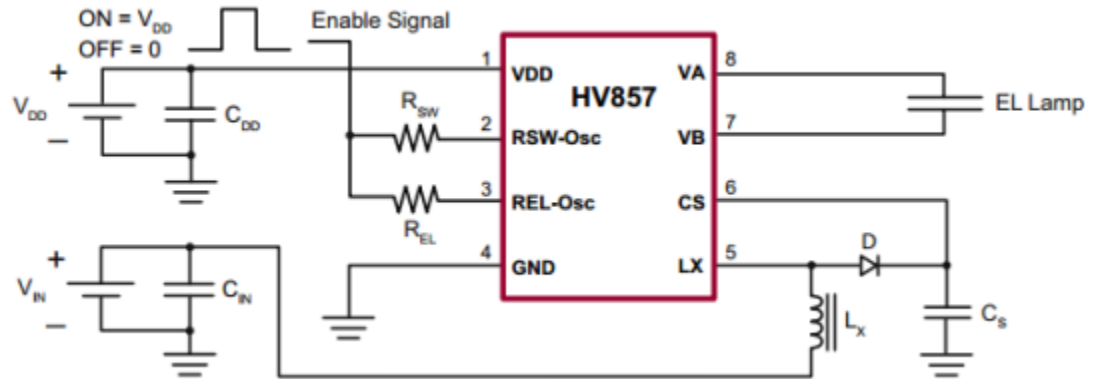
EL Lamp Frequency set by  $R_{EL}$



EL Lamp Frequency set by External Clock

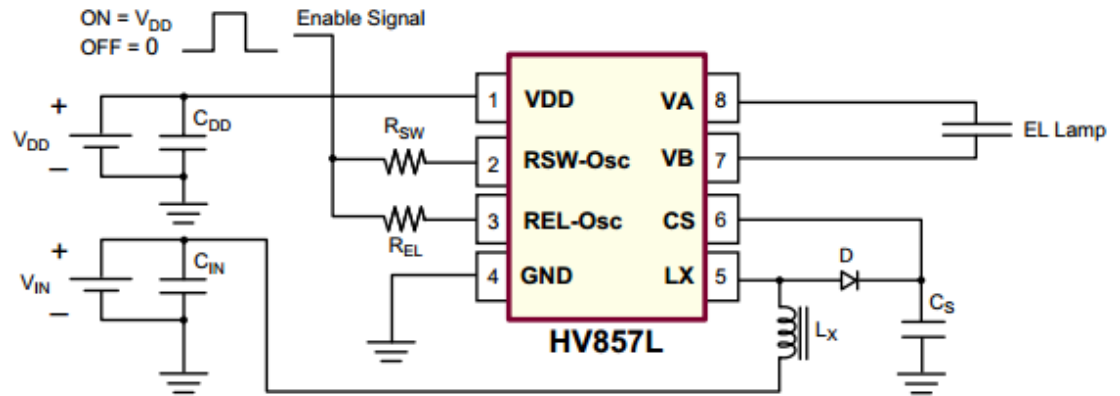
## Features:

- Patented audible noise reduction
- Patented lamp aging –  
- compensation
- Patented output timing for high –  
- efficiency
- 190 V<sub>PP</sub> output voltage for –  
- higher brightness
- Single cell lithium ion compatible
- 150nA shutdown current
- Wide input voltage range 1.8V to –  
- 5.0V
- Separately adjustable lamp and –  
- converter frequencies
- Output voltage regulation
- Split supply capability
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: WDFN-8, MSOP-8



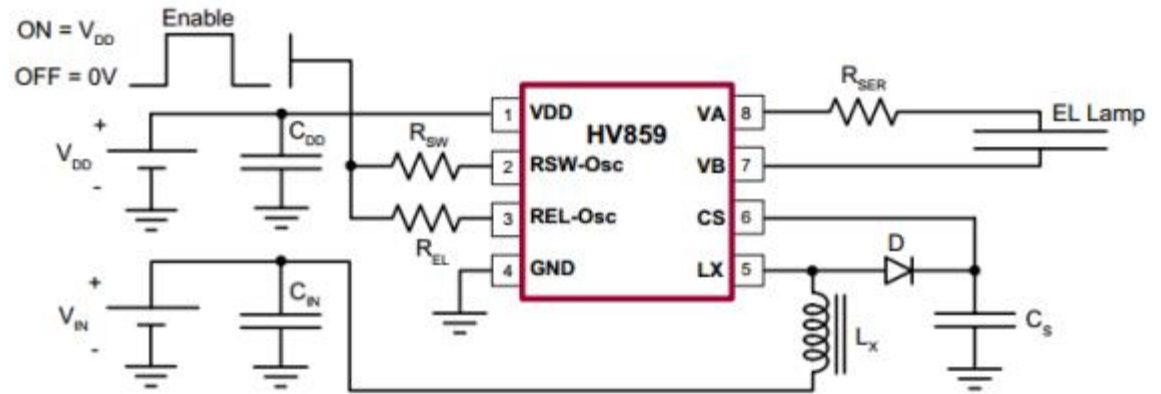
## Features:

- Audible noise reduction
- 190 V<sub>PP</sub> output voltage for –  
- higher brightness
- Single cell lithium ion compatible
- 150nA shutdown current
- Wide input voltage range 1.8V –  
- to 5.0V
- Separately adjustable lamp and –  
- converter frequencies
- Output voltage regulation
- Split supply capability
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: WDFN-8, MSOP-8



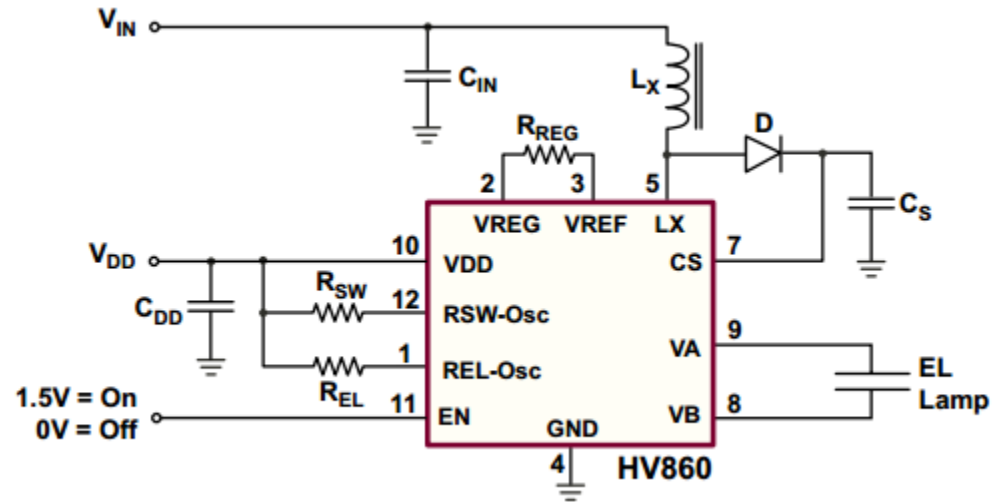
## Features:

- Patented audible noise –
  - reduction & lamp aging –
  - compensation
- Patented output timing for high –
  - efficiency
- 210 V<sub>PP</sub> output voltage for –
  - higher brightness
- Single cell lithium ion –
  - compatible
- 150nA shutdown current
- Wide input voltage range 1.8 to 5.0V
- Separately adjustable lamp and –
  - converter frequencies
- Output voltage regulation
- Split supply capability
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: WDFN-8, MSOP-8



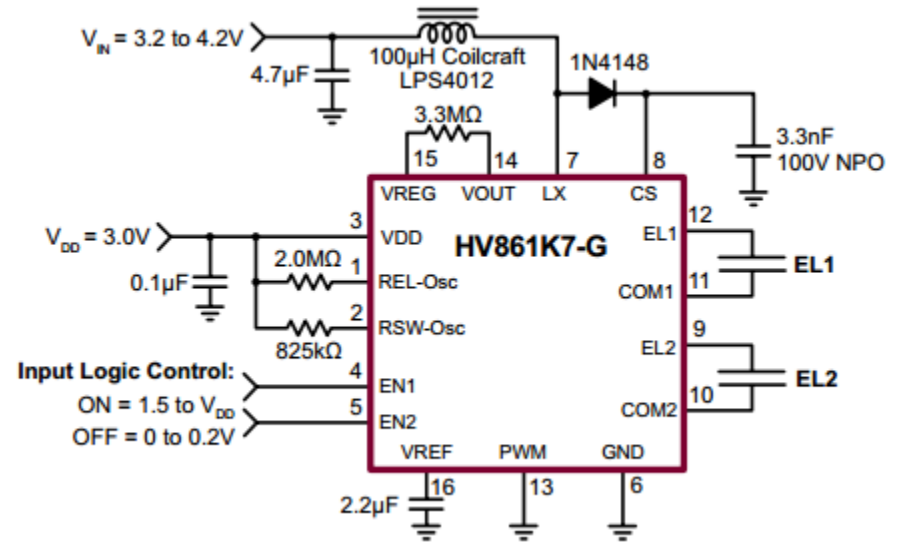
## Features:

- Adjustable output regulation for dimming
- 220V<sub>PP</sub> output voltage for higher brightness
- Single cell lithium ion compatible
- 150nA shutdown current
- Separately adjustable lamp and converter frequencies
- Split supply capability
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: WQFN-12



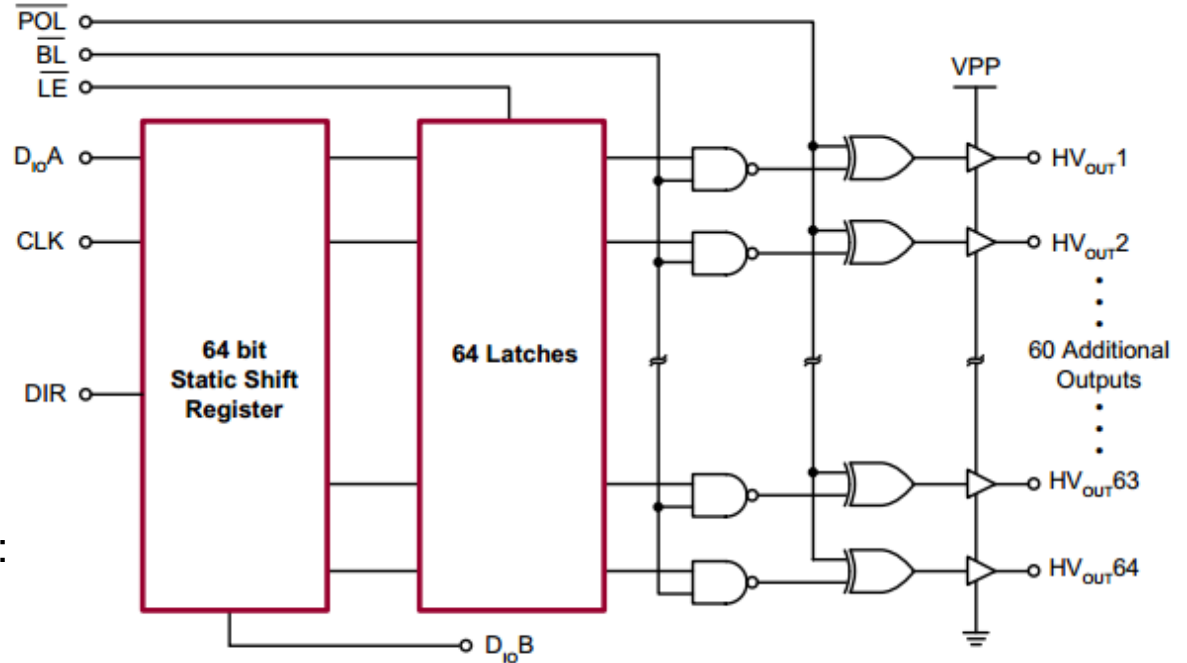
## Features:

- Adjustable output regulation for –
  - dimming
- Lamp fade-in/fade-out capability
- Low audible noise
- 180VPP output voltage for higher –
  - brightness
- 1.5V enable input logic high
- Single cell lithium ion compatible
- One miniature inductor to power both –
  - lamps
- Separately adjustable lamp and –
  - converter frequencies
- Split supply capability
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: WQFN-16



## Features:

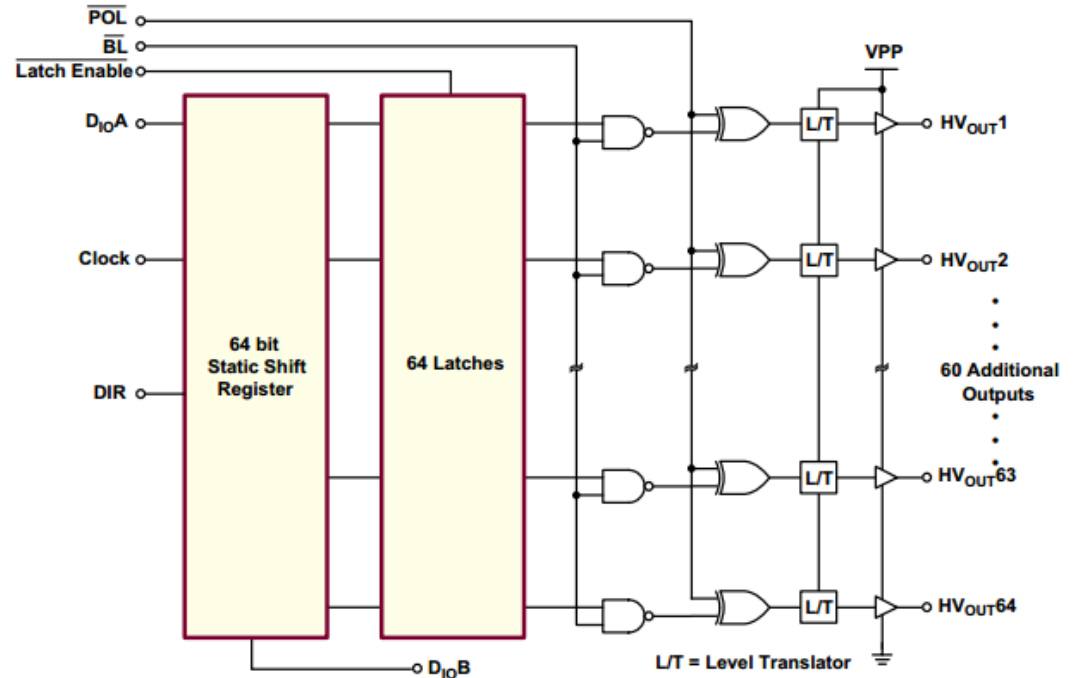
- Output voltages to 180V
- Low power level shifting
- Shift register speed:
  - 6.0MHz @  $V_{DD} = 5.0V$
  - 12MHz @  $V_{DD} = 12V$
- Latched data outputs
- Output polarity and blanking
- CMOS compatible inputs
- Forward and reverse shifting – options
- Operating Temperature Range:
  - $-40^{\circ}C$  to  $+85^{\circ}C$
- Package Option: PQFP-80





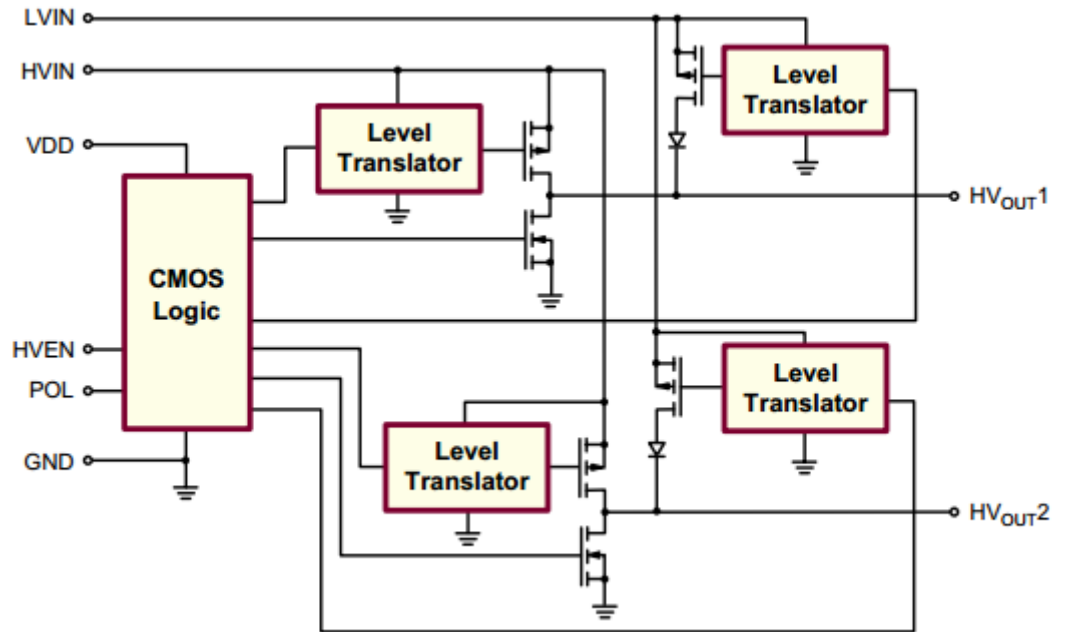
## Features:

- Operating output voltages to 300V
- Low power level shifting from 5.0 – - to 300V
- Shift register speed: 8.0MHz @ -  
-  $V_{DD} = 5.0V$
- 64 latched data outputs
- Output polarity and blanking
- CMOS compatible inputs
- Forward and reverse shifting options
- Operating Temperature Range:
  - $0^{\circ}C$  to  $+70^{\circ}C$
- Package Option: PQFP-80



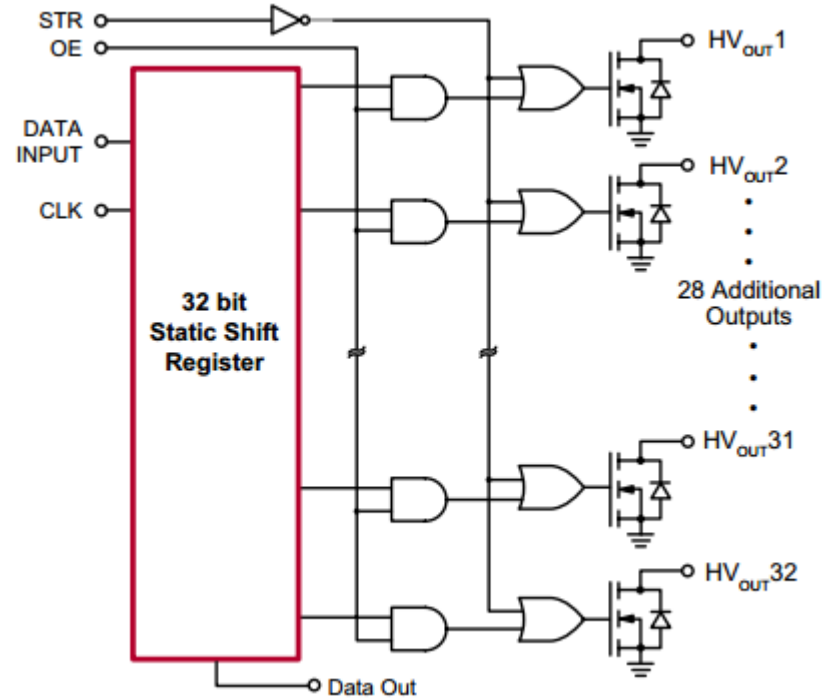
## Features:

- Logic-selectable output voltage
- 100nF drive capability
- Up to 90V<sub>P-P</sub>
- 25μs response time
- Operating Temperature Range:
  - -5°C to +60°C
- Package Option: SOIC-8



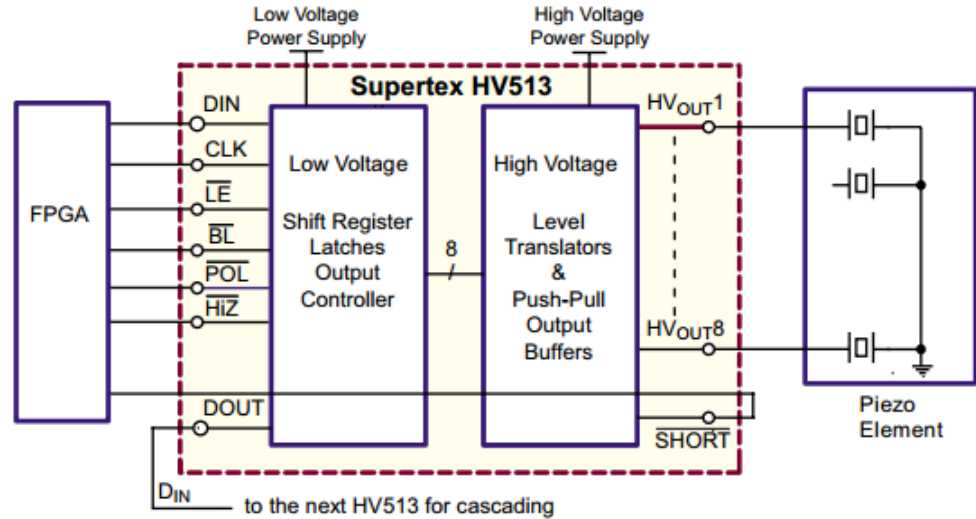
## Features:

- Output voltages to 225V using a –  
– ramped supply voltage
- SINK current minimum 100mA
- Shift register speed 8.0MHz
- Strobe and enable inputs
- CMOS compatible inputs
- Forward and reverse shifting options
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44, PLCC-44



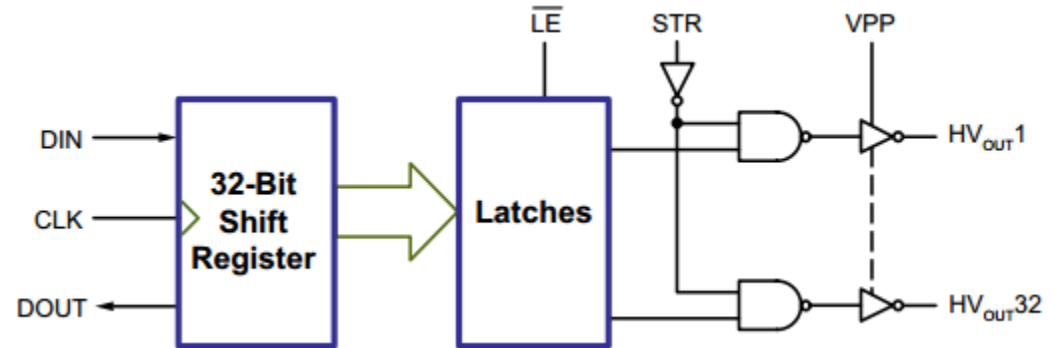
## Features:

- Operating output voltage of 250V
- Low power level shifting from 5.0 – - to 250V
- Shift register speed 8.0MHz @ -  
-  $V_{DD} = 5.0V$
- 8 latch data outputs
- Output polarity and blanking
- Output short circuit detect
- Output high-Z control
- CMOS compatible inputs
- Operating Temperature Range:
  - $-40^{\circ}C$  to  $+85^{\circ}C$
- Package Option: WQFN-32, -  
- SOIC-24 (300mil)



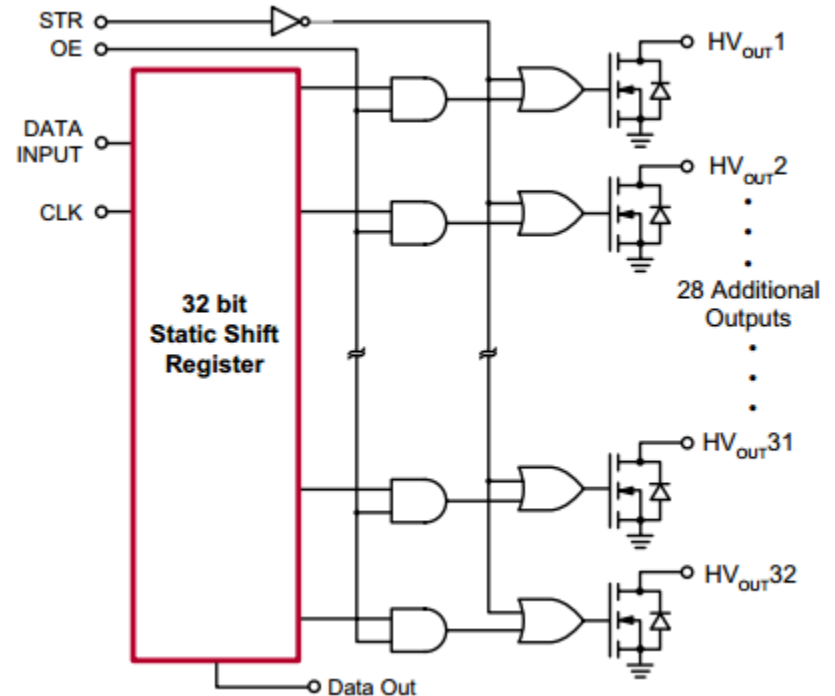
## Features:

- 32 output lines
- 90V output swing
- Active pull-down
- Latches on all outputs
- Up to 6.0MHz @  $V_{DD} = 5.0V$
- Operating Temperature Range:
  - $-40^{\circ}C$  to  $+85^{\circ}C$
- Package Option: PDIP-40, PLCC-44



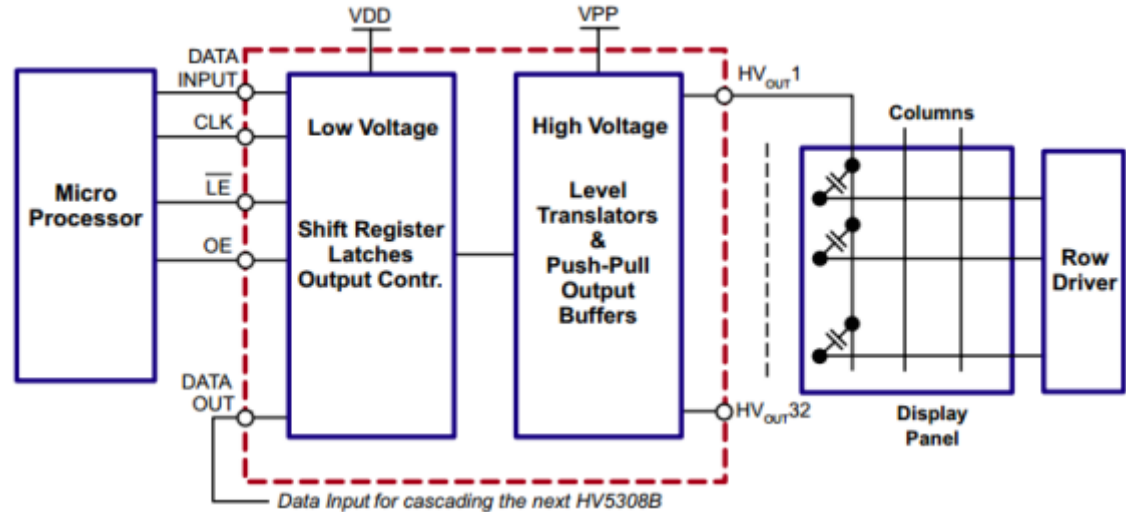
## Features:

- Output voltages to 225V using a –  
– ramped supply voltage
- SINK current minimum 100mA
- Shift register speed 8.0MHz
- Strobe and enable inputs
- CMOS compatible inputs
- Forward and reverse shifting options
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44, PLCC-44



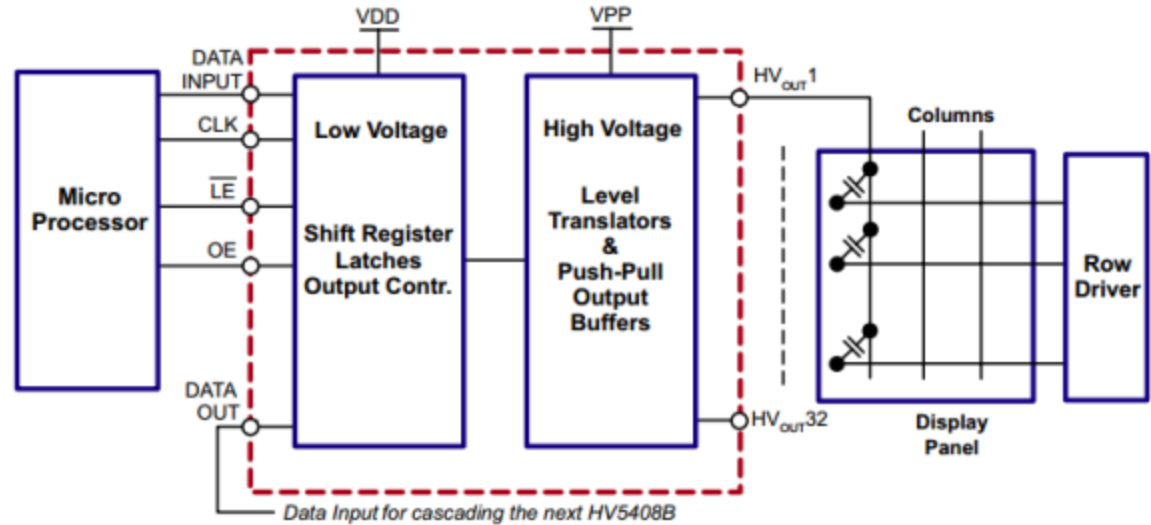
## Features:

- Processed with HVCMOS® -  
- technology
- Low power level shifting
- Source/sink current minimum  
– 20mA
- Shift register speed 8.0MHz
- Latched data outputs
- CMOS compatible inputs
- Forward and reverse shifting –  
- options
- Diode to  $V_{PP}$  allows efficient –  
- power recovery
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44, -  
- PLCC-44



## Features:

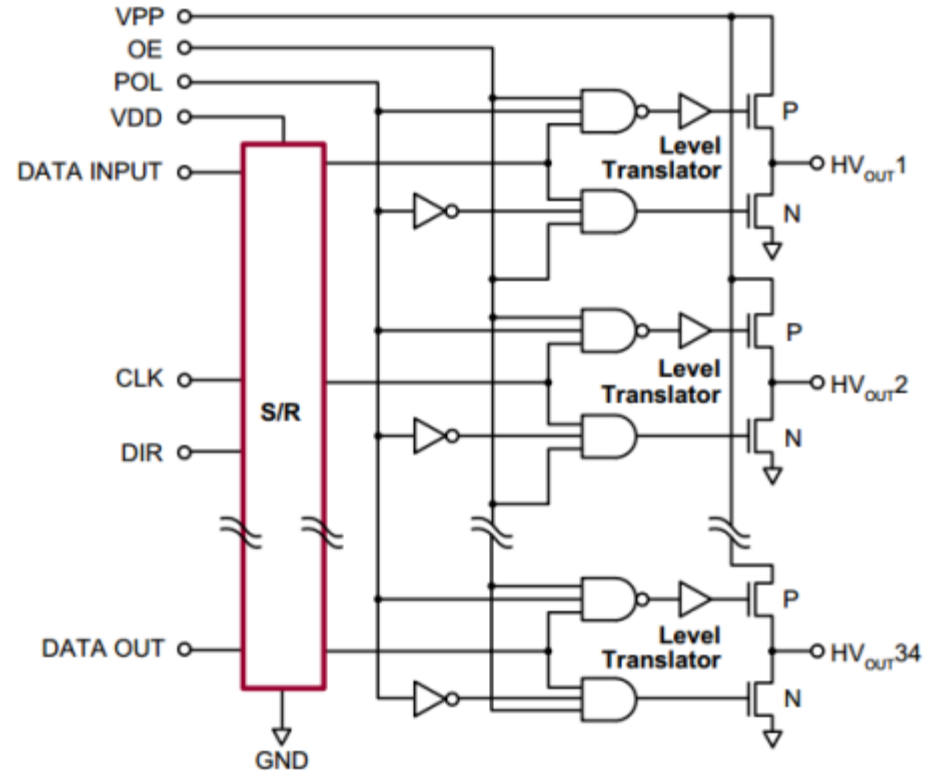
- Processed with HVCMOS® -  
- technology
- Low power level shifting
- SOURCE/SINK current –  
- minimum 20mA
- Shift register speed 8.0MHz
- Latched data outputs
- CMOS compatible inputs
- Forward and reverse shifting –  
options
- Diode to  $V_{PP}$  allows efficient –  
- power recovery
- Operating Temperature -  
- Range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Package Option: PQFP-44, -  
- PLCC-44





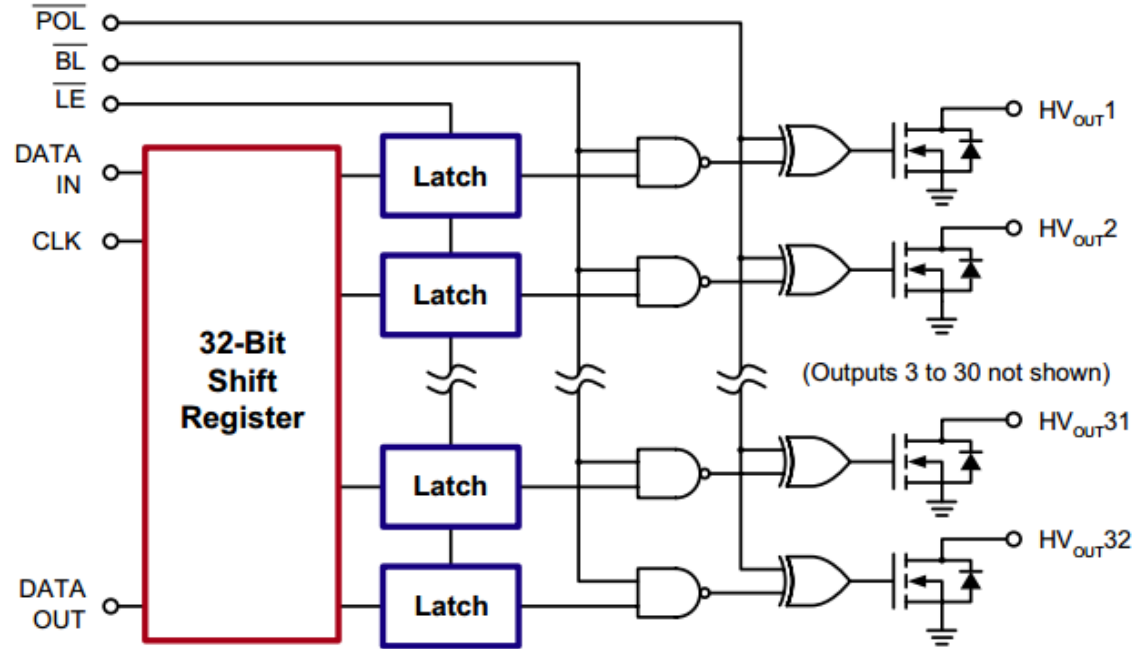
## Features:

- HVCMOS® technology
- Symmetric row drive (reduces latent imaging in ACTFEL displays)
- Output voltage up to +230V
- Low power level shifting
- Source/sink current minimum 70mA
- Shift register speed 4.0MHz
- Pin-programmable shift direction
  - -40°C to +85°C
- Package Option: PLCC-44



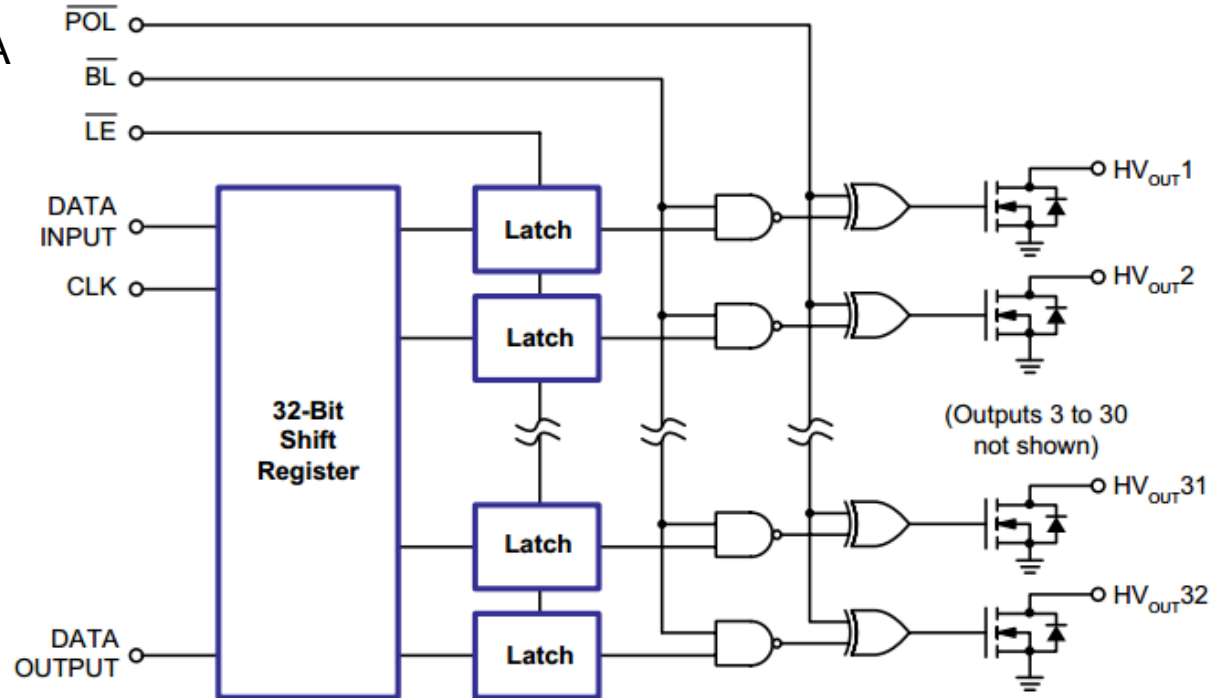
## Features:

- Sink current minimum 100mA
- Shift register speed 8.0MHz
- Polarity and blanking inputs
- CMOS compatible inputs
- Forward and reverse shifting – options
- Diode to VPP allows efficient – power recovery
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44, - PLCC-44



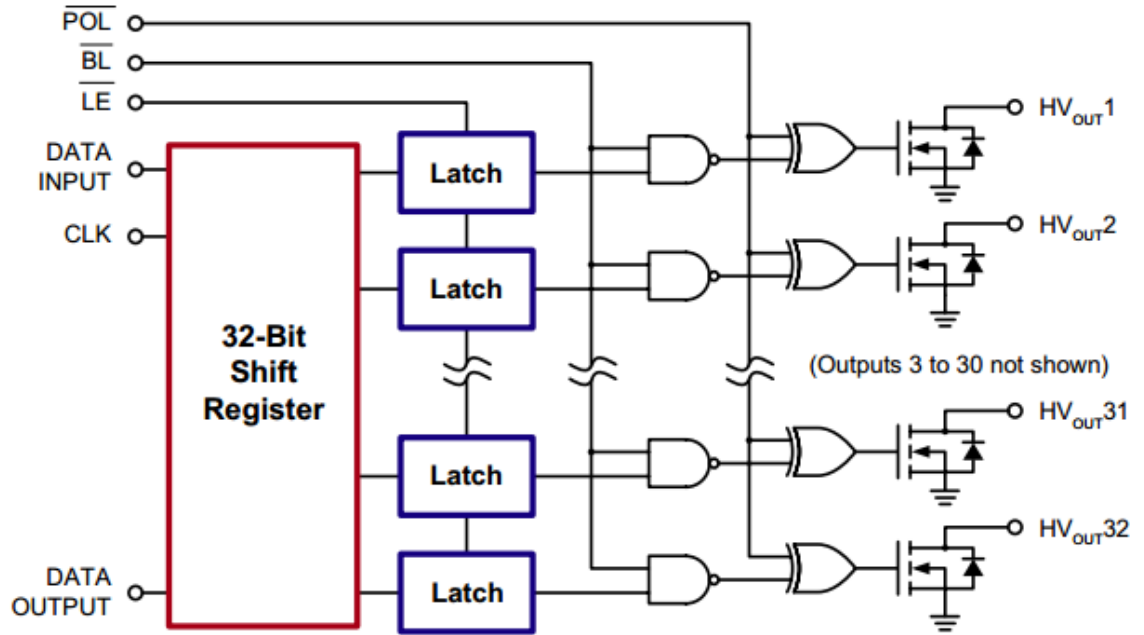
## Features:

- Sink current minimum 100mA
- Shift register speed 16MHz
- Polarity and blanking inputs
- CMOS compatible inputs
- Operating Temperature –
  - -40°C to +85°C
- Package Option: WQFN-44



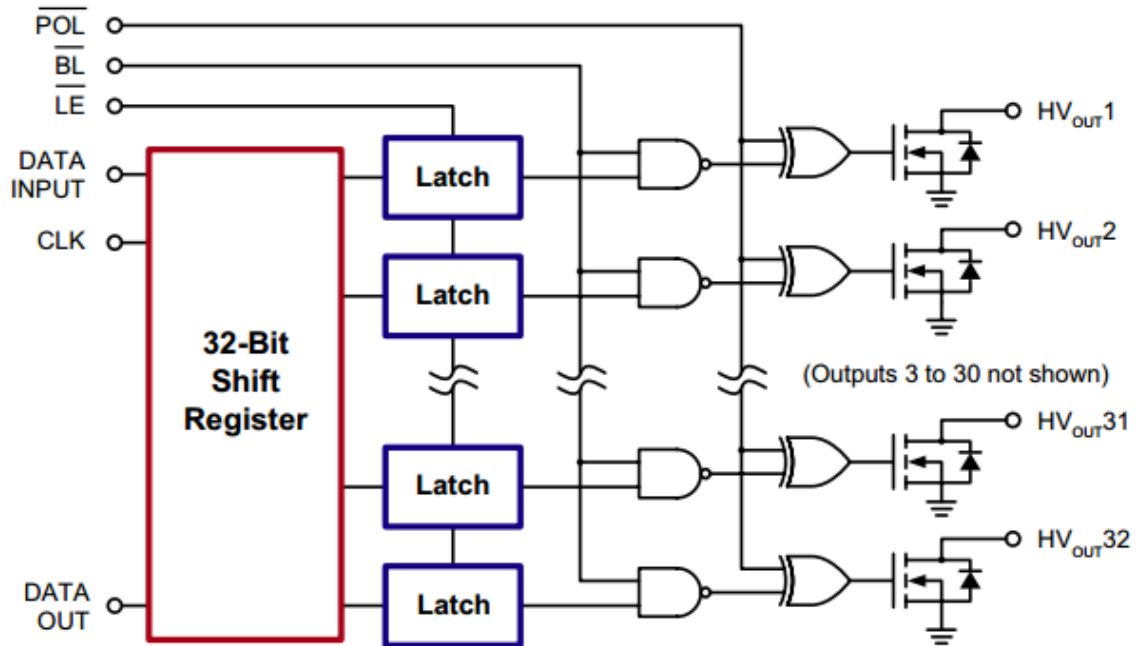
## Features:

- Sink current minimum 100mA
- Shift register speed 8.0MHz
- Polarity and blanking inputs
- CMOS compatible inputs
- Forward and reverse shifting – options
- Diode to  $V_{PP}$  allows efficient – power recovery
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Package Option: PQFP-44, – PLCC-44



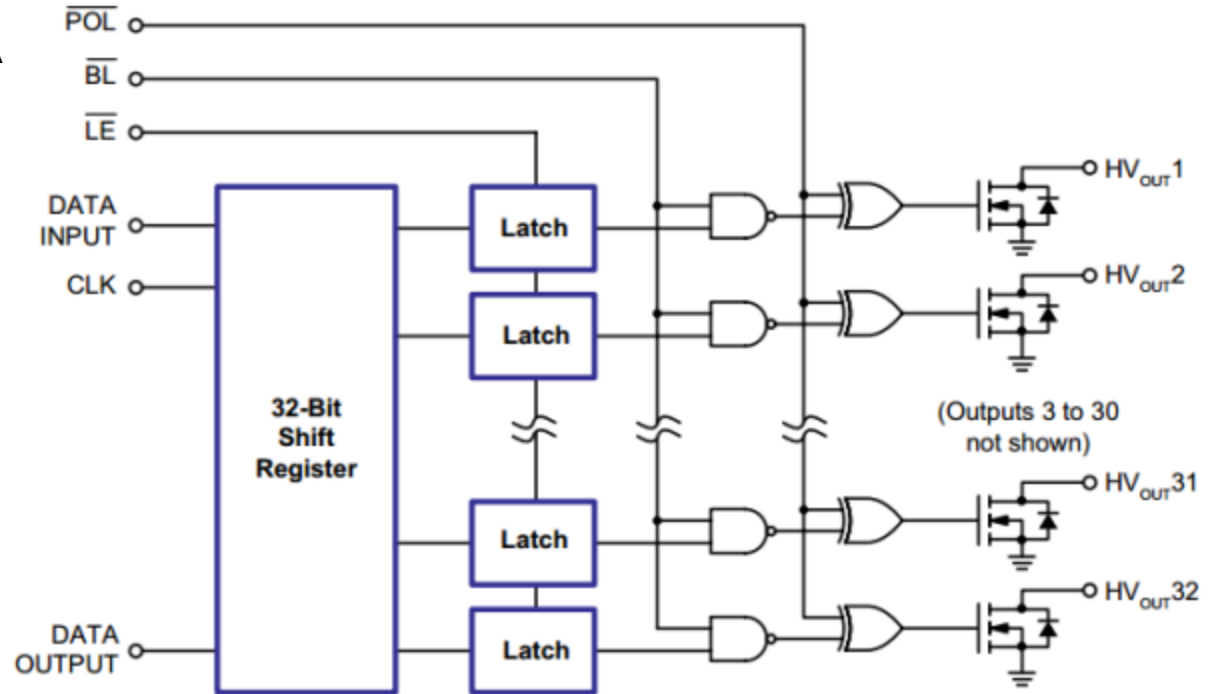
## Features:

- Sink current minimum 100mA
- Shift register speed 8.0MHz
- Polarity and blanking inputs
- CMOS compatible inputs
- Forward and reverse shifting – options
- Diode to VPP allows efficient – power recovery
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44, - PLCC-44



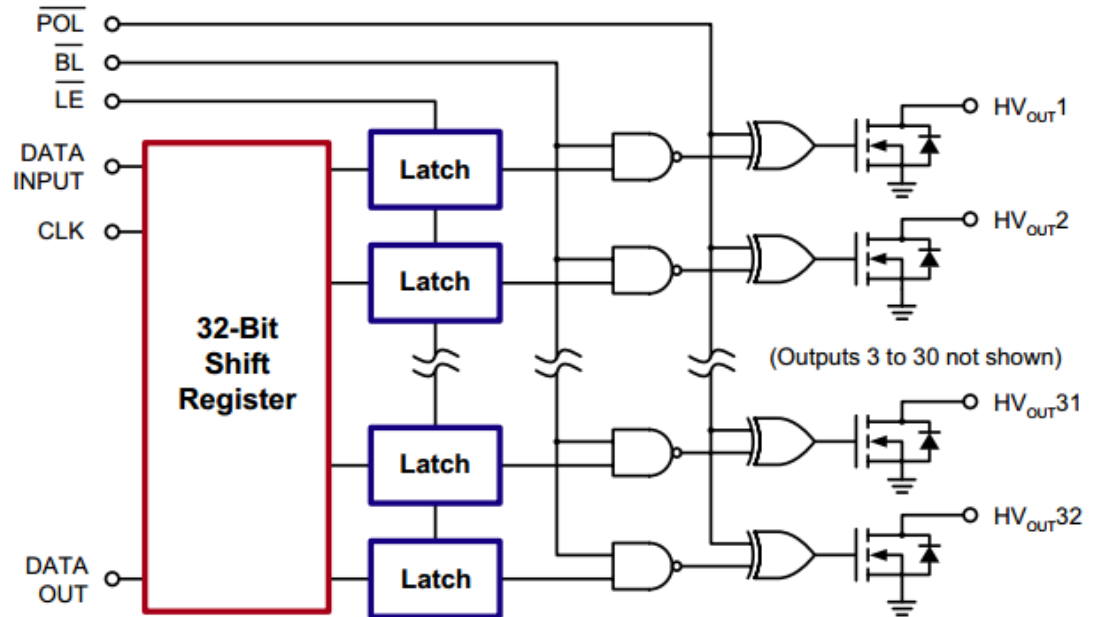
## Features:

- Sink current minimum 100mA
- Shift register speed 16MHz
- Polarity and blanking inputs
- CMOS compatible inputs
- Operating Temperature –
  - -40°C to +85°C
- Package Option: WQFN-44



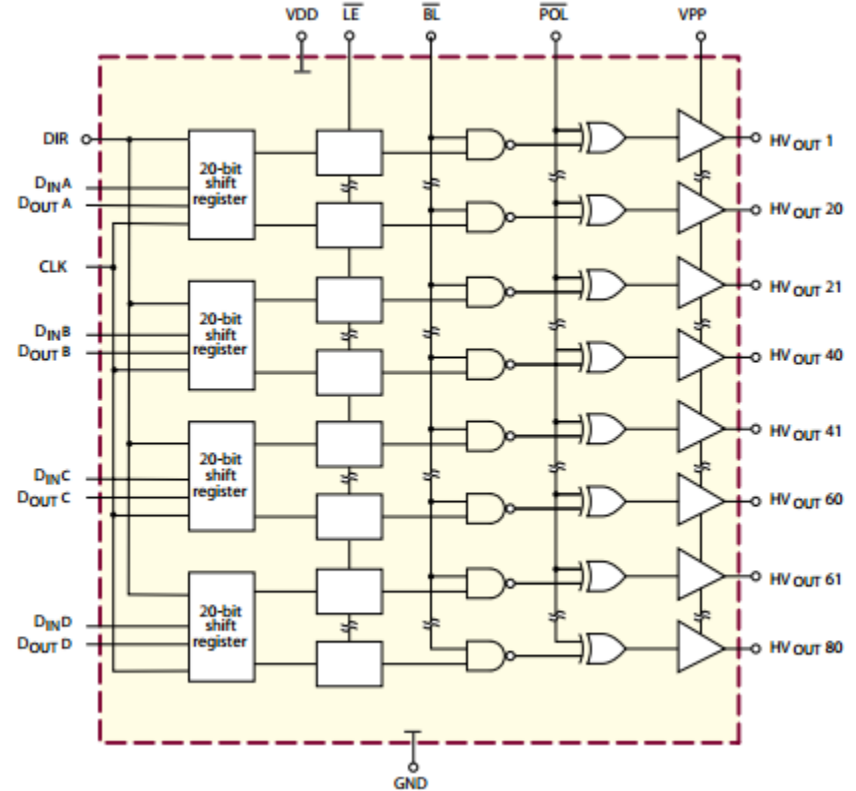
## Features:

- Sink current minimum 100mA
- Shift register speed 8.0MHz
- Polarity and blanking inputs
- CMOS compatible inputs
- Forward and reverse shifting – options
- Diode to VPP allows efficient – power recovery
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PLCC-44



## Features:

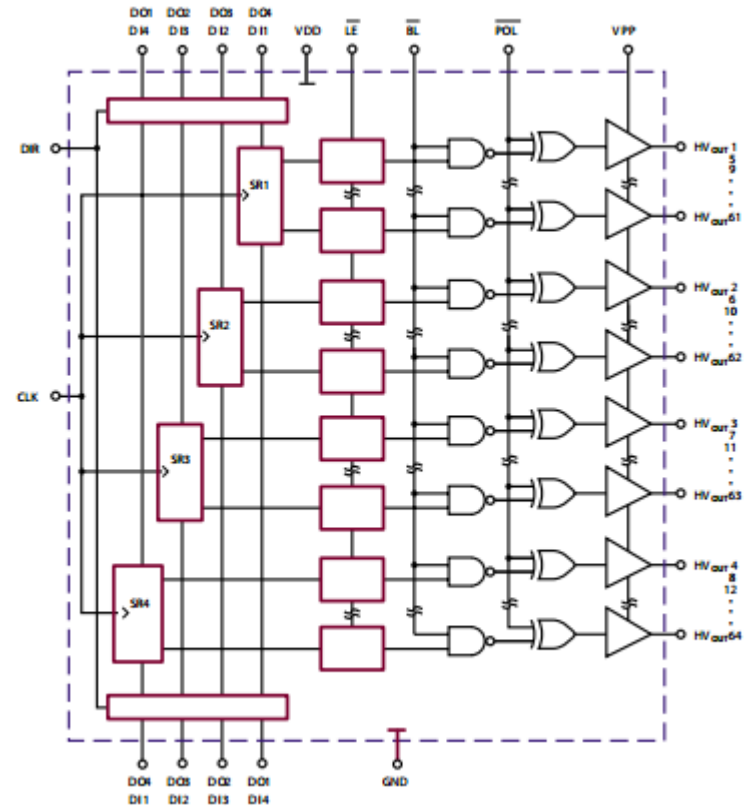
- 5.0V CMS Logic
- Output voltage up to 80V
- Low power level shifting
- 100MHz equivalent data rate using four –  
- dynamic shift registers
- Latched data outputs
- Forward and reverse shifting options –  
- (DIR pin)
- Diode to VPP allows efficient power –  
- recovery
- Outputs may be hot switched
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-100





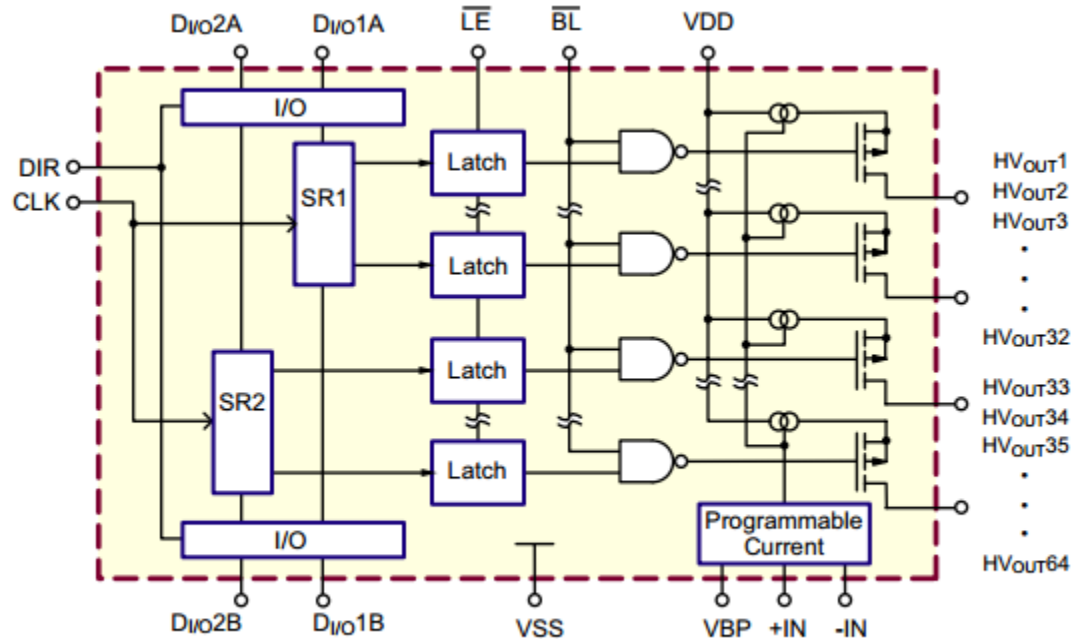
## Features:

- 5.0V CMS Logic
- Output voltage up to +80V
- Low power level shifting
- 32MHz equivalent data rate
- Latched data outputs
- Forward and reverse shifting options –  
- (DIR pin)
- Diode to VPP allows efficient power –  
- recovery
- Outputs may be hot switched
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-80



## Features:

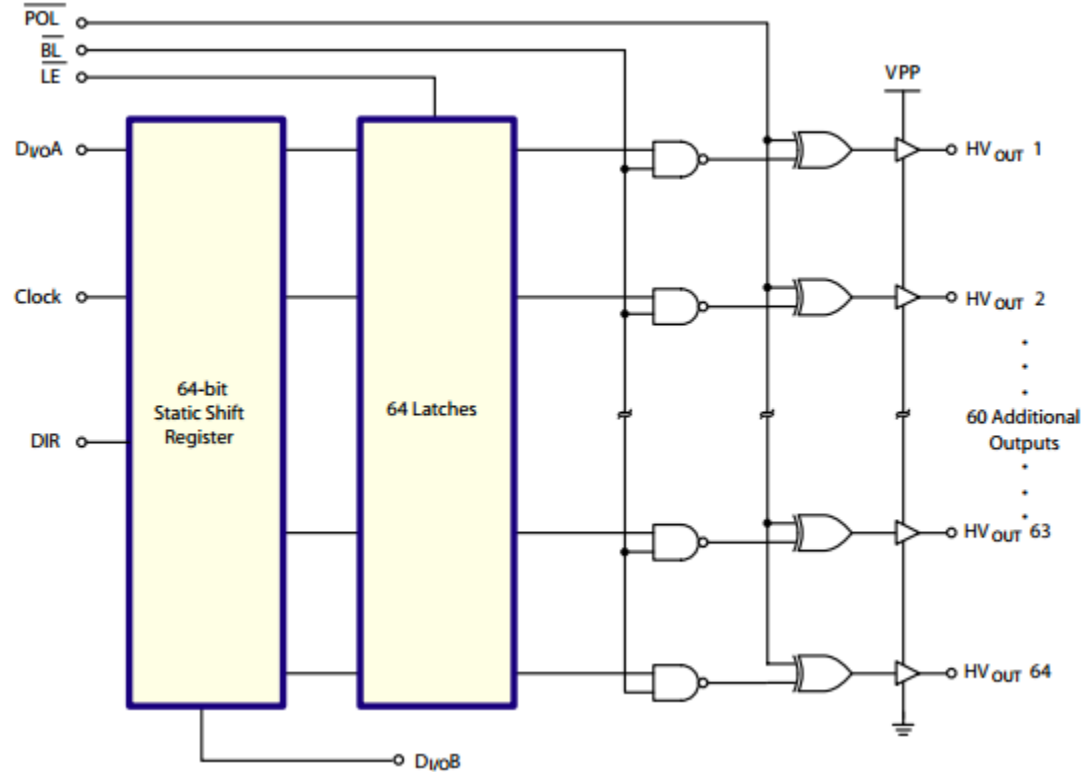
- 5.0V CMOS Logic
- Output voltage up to -85V
- Output current source control
- 16MHz equivalent data rate
- Latched data outputs
- Forward and reverse shifting – options (DIR pin)
- Diode to  $V_{DD}$  allows efficient – power recovery
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Package Option: PQFP-44



**Note:**  
Each SR (shift register) provides 32 outputs. SR1 supplies outputs 1 to 32 and SR2 supplies outputs 33 to 64.

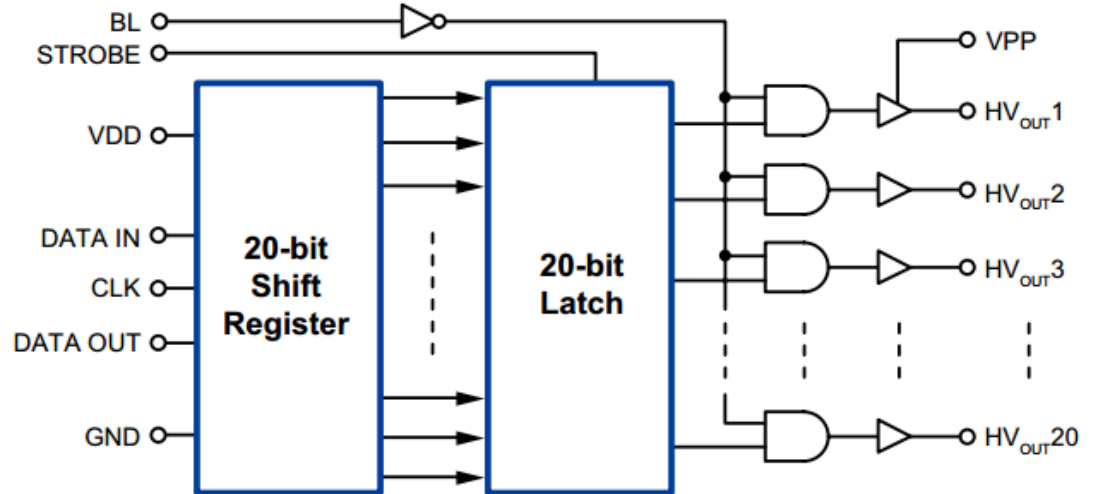
## Features:

- 5.0V CMS Logic
- Output voltage up to +80V
- Low power level shifting
- 8.0MHz data rate
- Latched data outputs
- Forward and reverse shifting – options (DIR pin)
- Diode to VPP allows efficient – power recovery
- Outputs may be hot switched
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-80



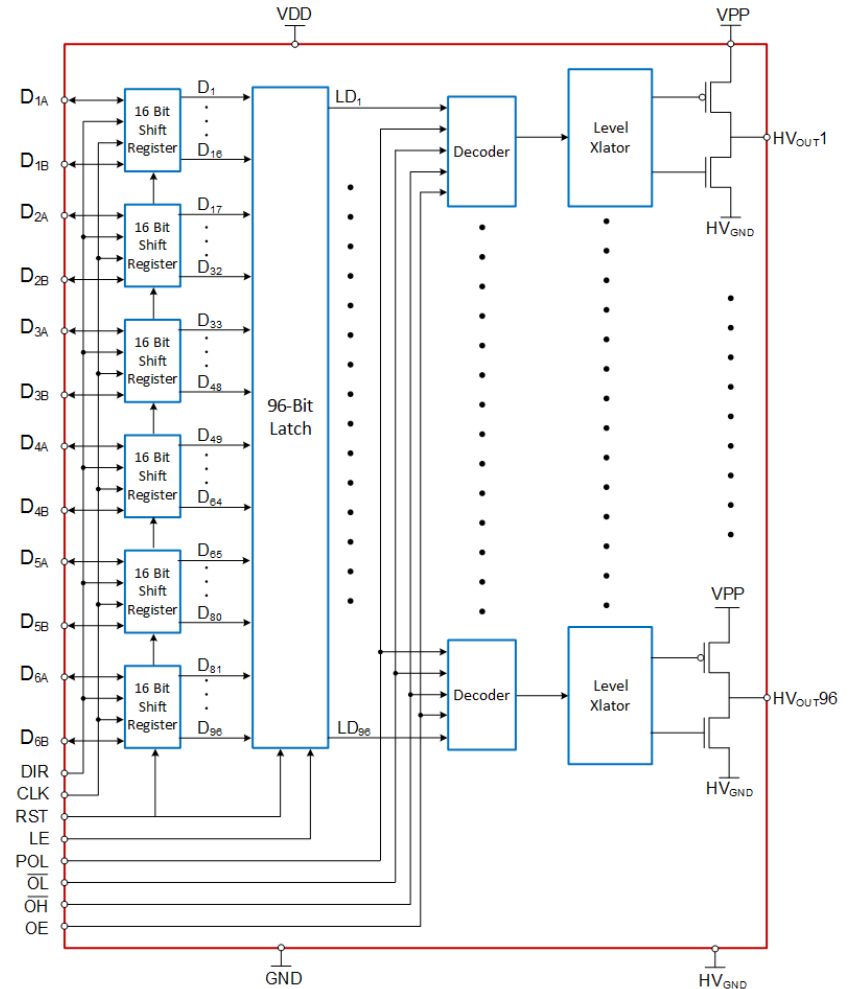
## Features:

- Operating voltage up to 80V
- High speed source driver
- 5.0V CMOS logic circuitry
- Up to 5.0MHz data input rate
- Excellent noise immunity
- Flexible high voltage supplies
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: PDIP-28, -  
- PLCC-28, SOIC-28 (300mil)



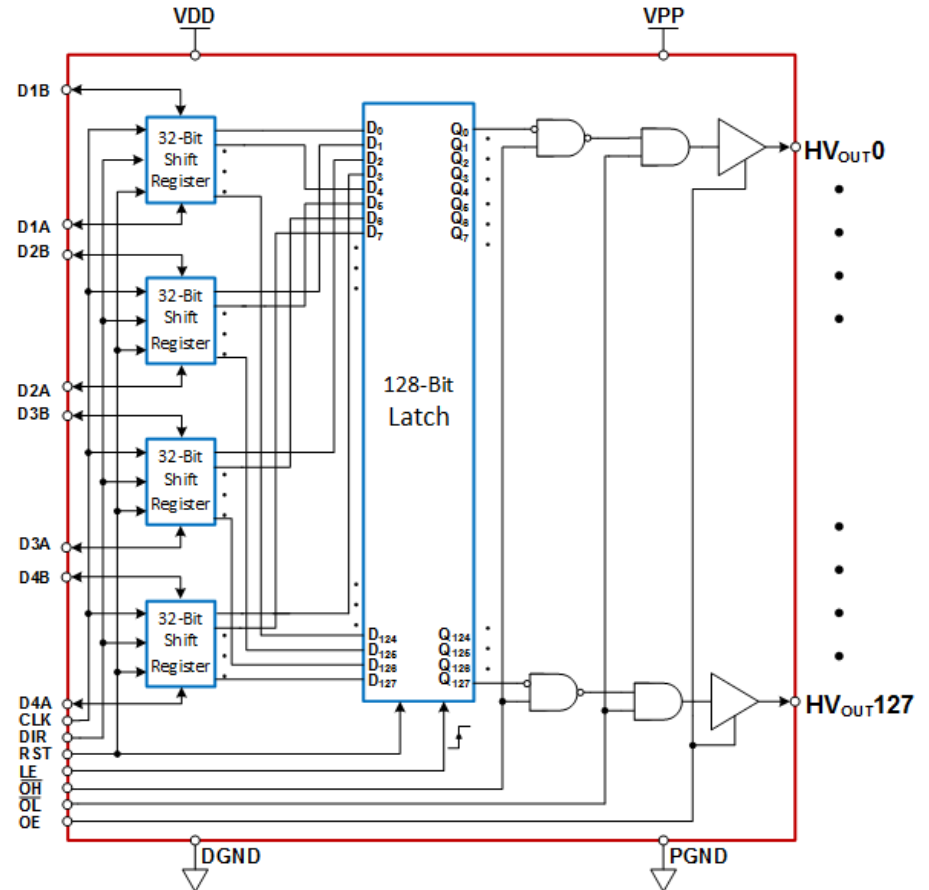
## Features:

- 96 High Voltage Channels
  - Up to 80V Operating Output Voltage
  - 75 mA sink/source peak current
- 6 Interleaved 16-bit Shift Registers
  - Clockwise and Counter-Clockwise –  
- Data Shifting via DIR pin
- 30 MHz Data Rate
- Operating Junction Temperature: -40°C –  
- to 125°C
- Package 169- Ball 10x10x1.1mm TFBGA



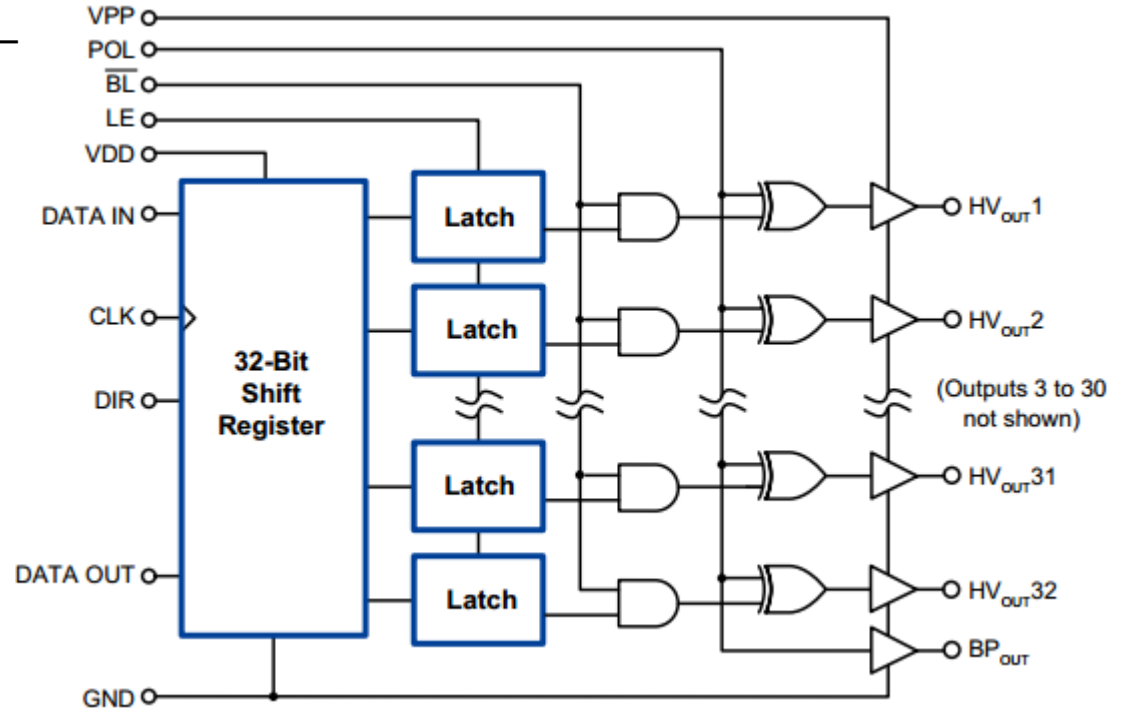
## Features:

- 128 High Voltage Channels
- Up to 80V Operating Output Voltage
- 30 mA sink/source peak current
- 4 Interleaved 32-bit Shift Registers
- Clockwise and Counter-Clockwise Data –  
- Shifting via DIR pin
- 40 MHz Data Rate
- Operating Junction Temperature: -25°C  
– to 125°C
- Package 169- Ball 10x10x1.1mm TFBGA



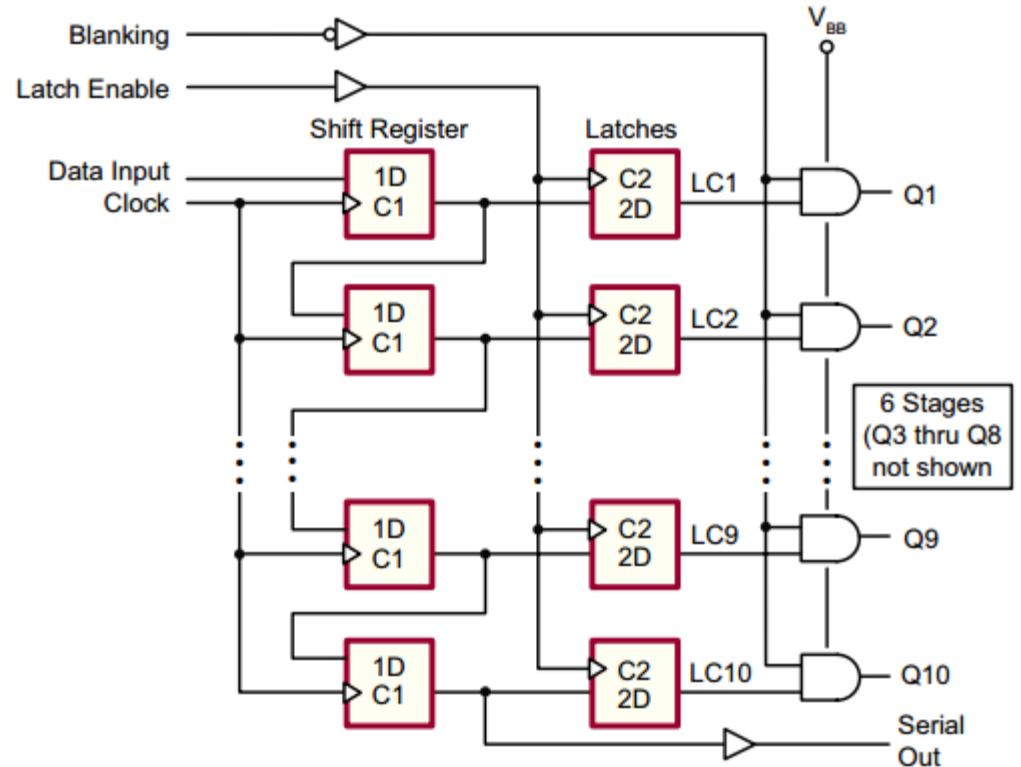
## Features:

- 32 push-pull CMOS output up to –60V
- Low power level shifting
- Shift register speed 5.0MHz
- Latched data outputs
- Bidirectional shift register (DIR)
- Backplane output
- Operating Temperature Range: -40°C to +85°C
- Package Option: PQFP-44, -PLCC-44



## Features:

- High output voltage 80V
- High speed 5MHz @5.0V<sub>DD</sub>
- Low power I<sub>BB</sub> ≤ 0.1mA (all high)
- Active pull down 100μA min @25OC
- Output source current 25mA @60V – - V<sub>BB</sub>
- Each device drives 10 lines
- High-speed serially-shifted data input
- 5.0V CMOS-compatible inputs
- Latches on all driver outputs
- Operating Temperature Range:
  - -45°C to +85°C
- Package Option: SOIC-20 (300mil)

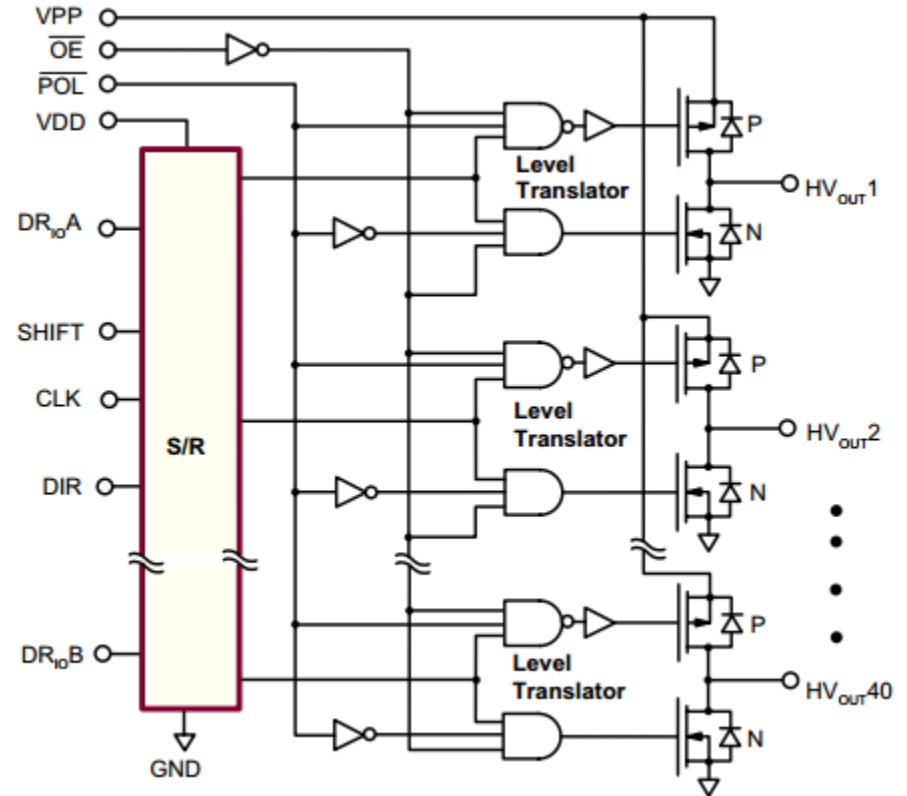


Logic Diagram (positive logic)



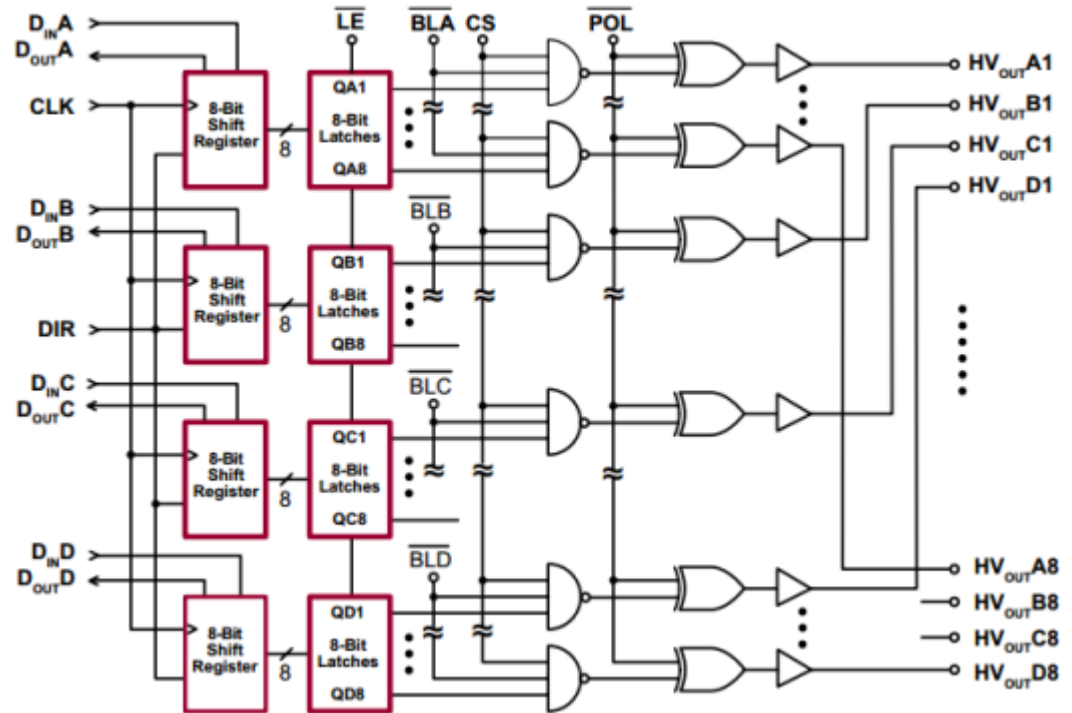
## Features:

- Symmetric row drive (reduces latent imaging in ACTFEL displays)
  - Output voltage up to +240V
  - Low power level shifting
  - Source/sink current minimum 70mA
  - Shift register speed 3.0MHz
  - Pin-programmable shift direction
- Operating Temperature Range:
- -40°C to +85°C
- Package Option: PQFP-64



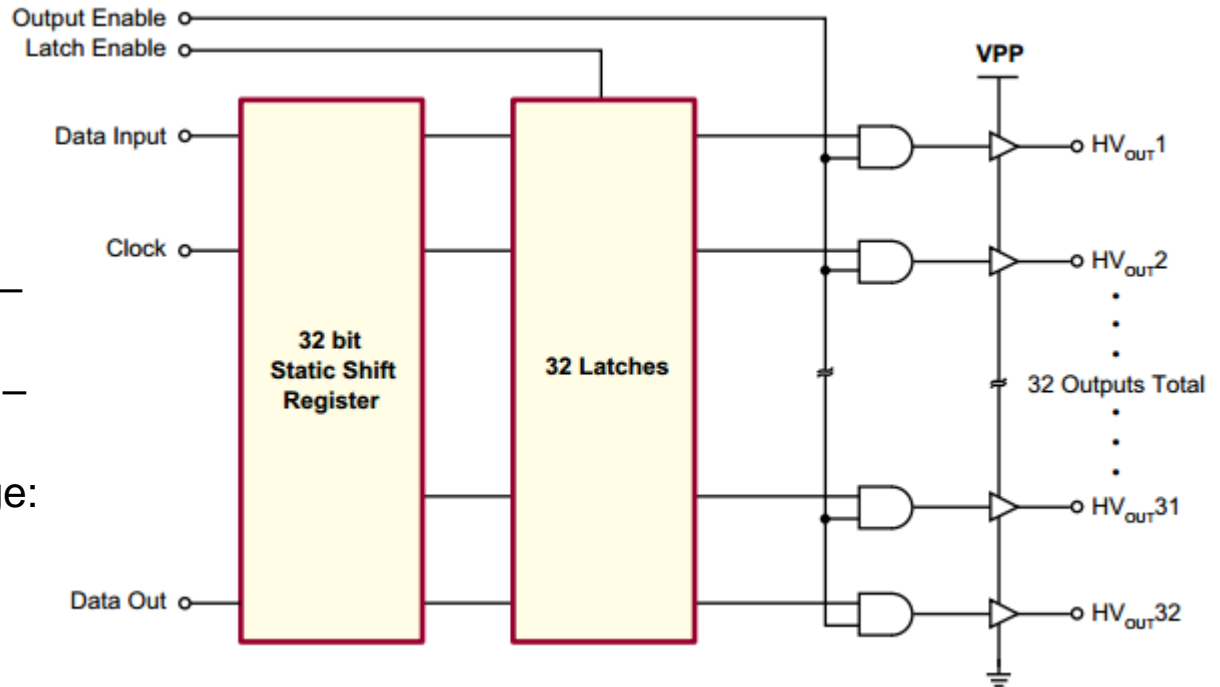
## Features:

- 5.0V logic and 12V supply rail
- Output voltage up to +200V
- Low power level shifting
- Source/sink current minimum 50mA
- 40MHz equivalent data rate
- Latched data outputs
- Forward and reverse shifting options
- Chip select
- Polarity function
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-64



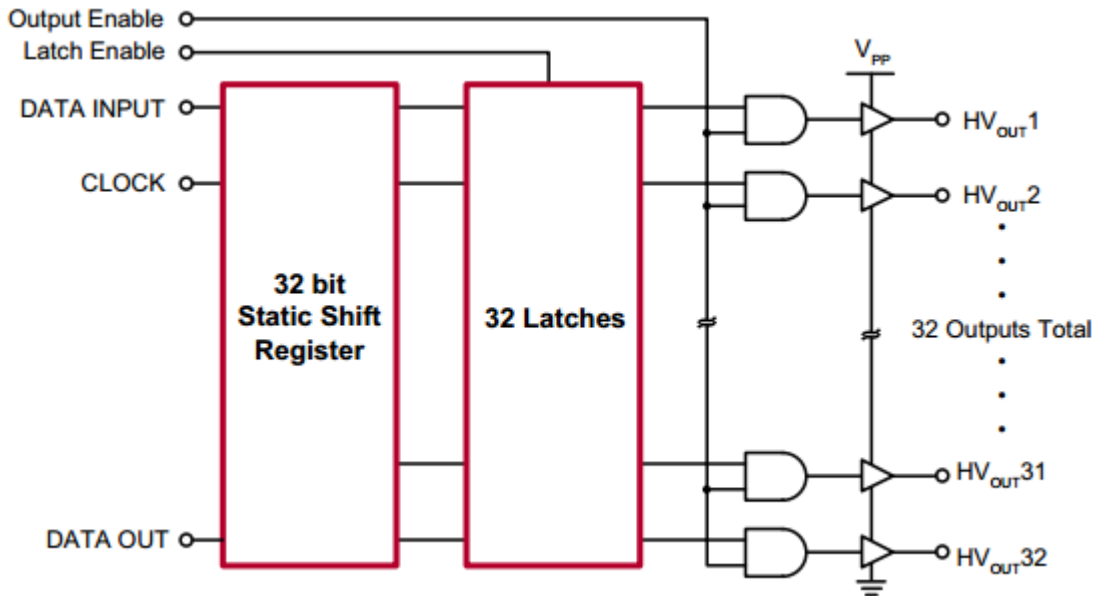
## Features:

- Low power level shifting
- Shift register speed 8.0MHz
- Latched data outputs
- 5.0V CMOS compatible –  
- inputs
- Forward and reverse shifting –  
- options
- Diode to VPP allows efficient –  
- power recovery
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44



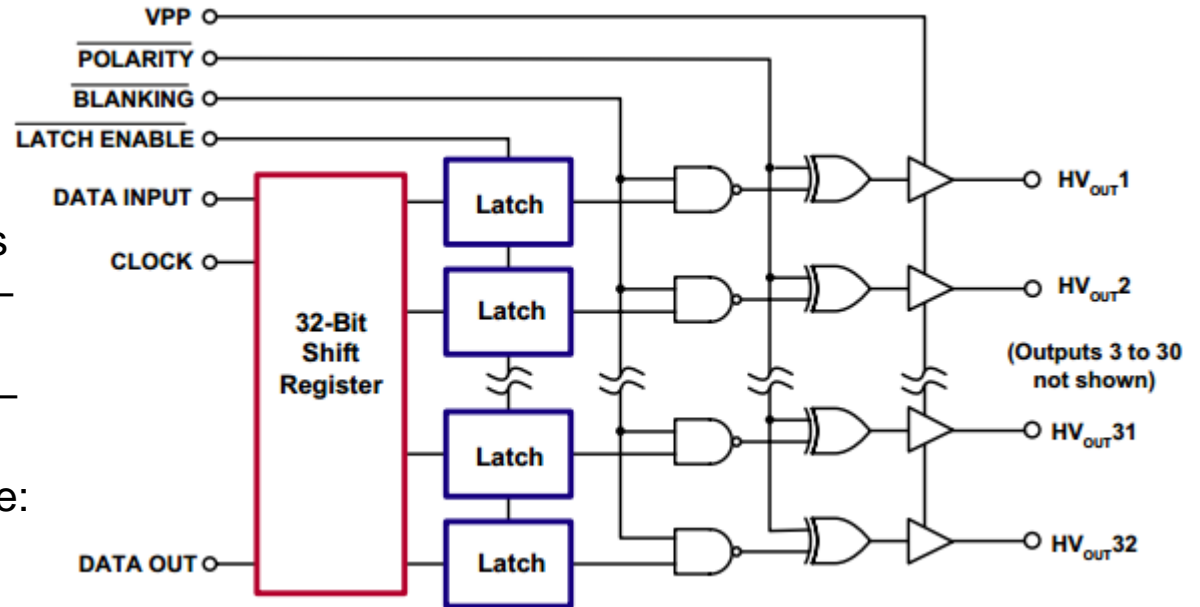
## Features:

- Output voltages up to 80V
- Low power level shifting
- Shift register speed 8.0MHz
- Latched data outputs
- 5.0V CMOS compatible inputs
- Forward and reverse shifting –  
- options
- Diode to VPP allows efficient –  
- power recovery
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44



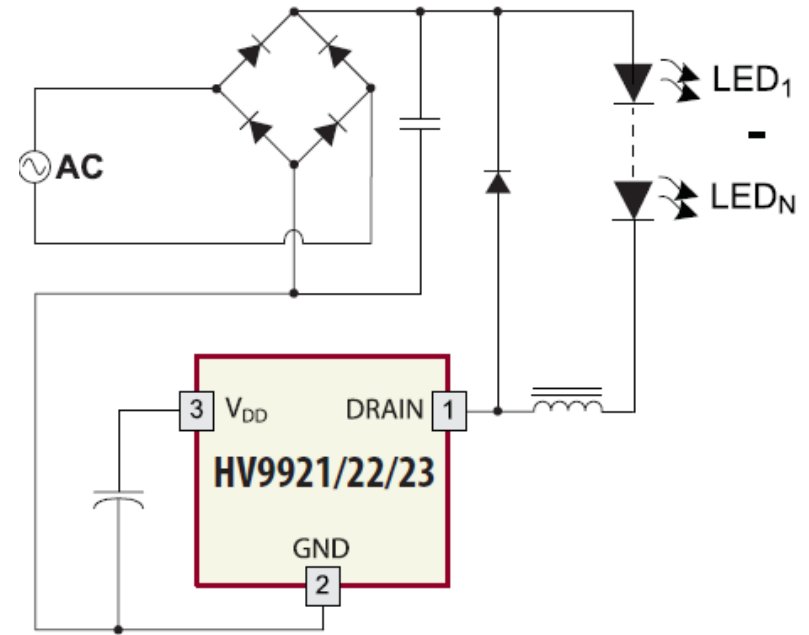
## Features:

- Output voltages up to 80V
- Low power level shifting
- Shift register speed 8.0MHz
- Latched data outputs
- 5.0V CMOS compatible inputs
- Forward and reverse shifting –  
- options
- Diode to VPP allows efficient –  
- power recovery
- Operating Temperature Range:
  - -40°C to +85°C
- Package Option: PQFP-44



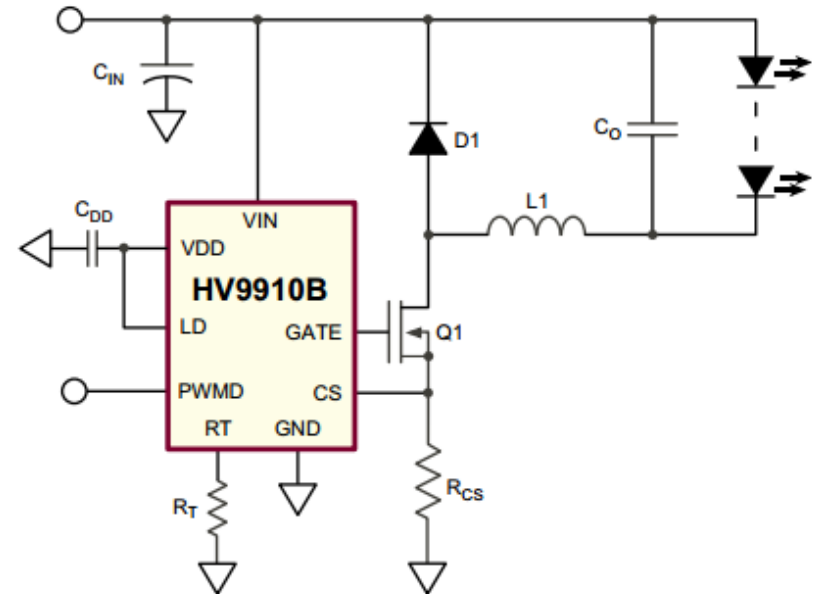
## Features:

- Constant Output Current:
  - 20mA HV9921
  - 50mA HV9922
  - 30mA HV9923
- Universal 85 - 265VAC Operation
- Fixed OFF-Time Buck Converter
- Internal 475V Power MOSFET
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: TO-92, SOT-89



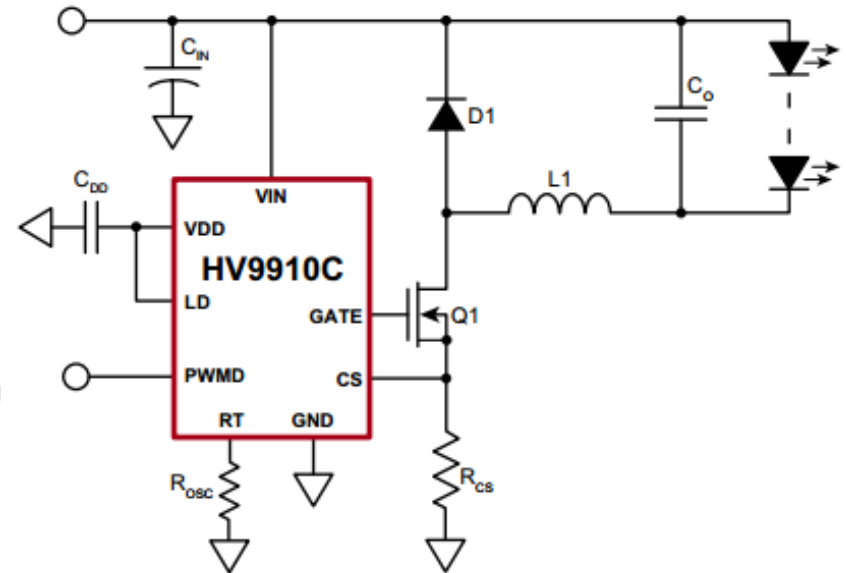
## Features:

- Features:
- Switch mode controller for single switch –  
- LED drivers
- Open loop peak current controller
- Internal 8.0 to 450V linear regulator
- Constant frequency or constant off-time –  
- operation
- Linear and PWM dimming capability
- Requires few external components for –  
- operation
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-8, SOIC-16



## Features:

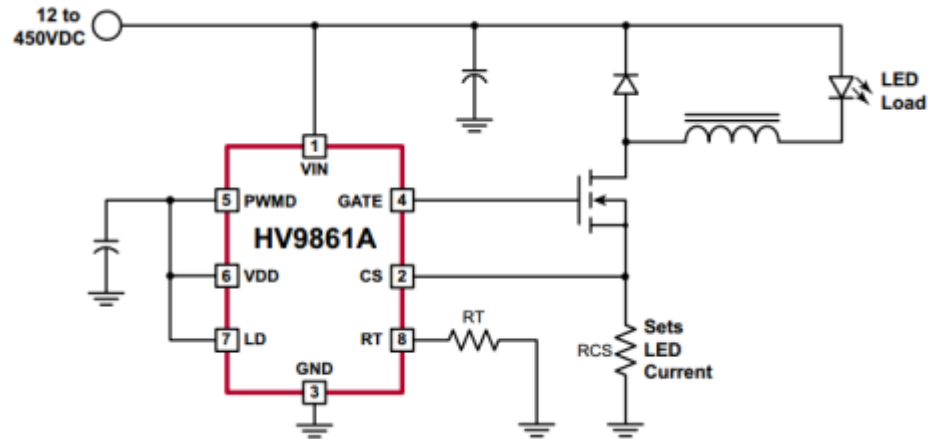
- Switch mode controller for single switch –
  - LED drivers
- Open loop peak current controller
- Internal 15 to 450V linear regulator
- Constant frequency or constant off-time –
  - operation
- Linear and PWM dimming capability
- Requires few external components for operation
- Over-temperature protection
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-8, SOIC-16, SOIC-8 w/HS





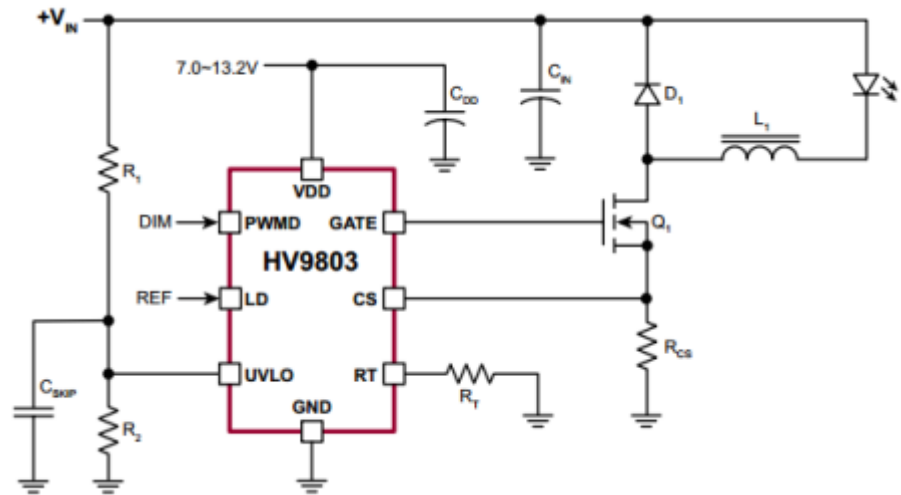
## Features:

- Fast average current control
- Programmable constant off-time –  
- switching
- PWM / linear dimming input
- Output short circuit protection with –  
- skip mode
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-8, SOIC-16



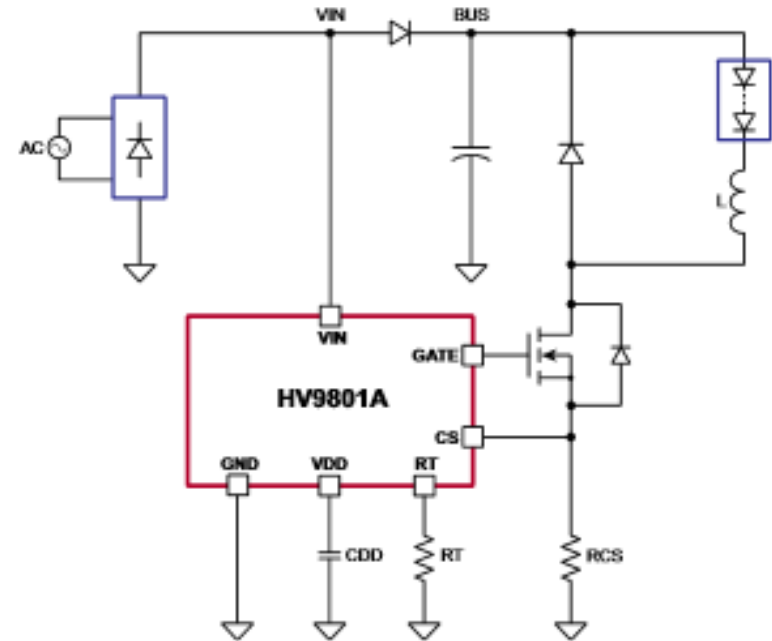
## Features:

- Fast average current control
- Correction for propagation delay and –  
- offset voltage
- Fixed off-time switching mode
- Linear dimming input
- PWM dimming input
- Output short circuit protection with –  
- programmable skip mode
- Input under-voltage shutdown
- Operating Temperature Range:  
• -40°C to +150°C
- Package Options: SOIC-8



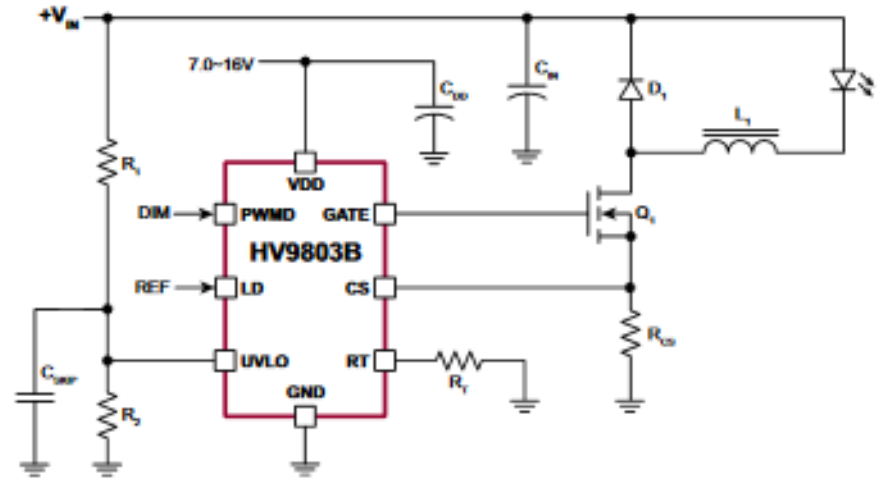
## Features:

- Four level switch dimming
- Very accurate current regulator
- Output over-current/short circuit protection
- IC over-temperature protection
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-8, SOIC-16



## Features:

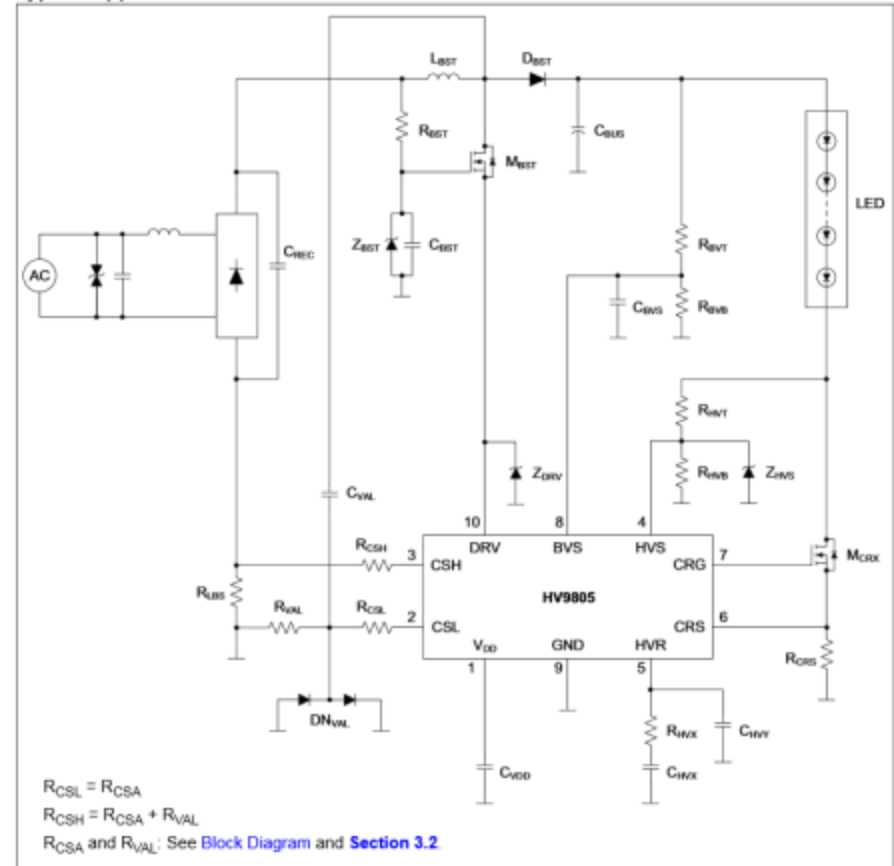
- Fast average current control
- Correction for propagation delay and offset voltage
- Fixed off-time switching mode
- Linear dimming input
- PWM dimming input
- Output short circuit protection
- Input under-voltage shutdown
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-8



## Features:

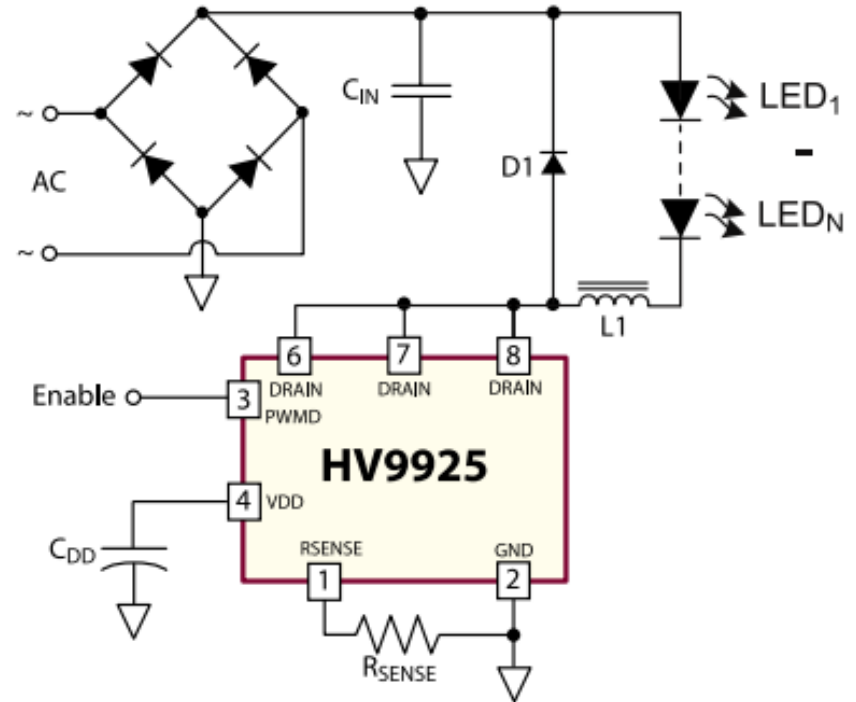
- Provides True DC Light and protects –
  - load from line voltage transients
- Driver topology includes: Boundary –
  - Conduction Mode (BCM) Boost –
  - Converter with Power Factor Correction
    - High Power Factor(98%+)
    - High Efficiency (90%+)
- Linear Post-Regulator with Low Overhead Voltage
  - Zero LED Current/Brightness Ripple
  - Overvoltage Protection for LEDs
  - High Efficiency
  - $\pm 4\%$  Reference over Temperature
- Simple  $V_{DD}$  Supply: No Auxiliary Winding
  - Boost Converter Cascode Switch: Internal Switch rated at 700 mA peak
  - Supports up to 25W at 120VAC
  - Supports up to 50W at 230VAC
- Compatibility with SEPIC Topology for Low Output Voltage Applications

Typical Application Circuit



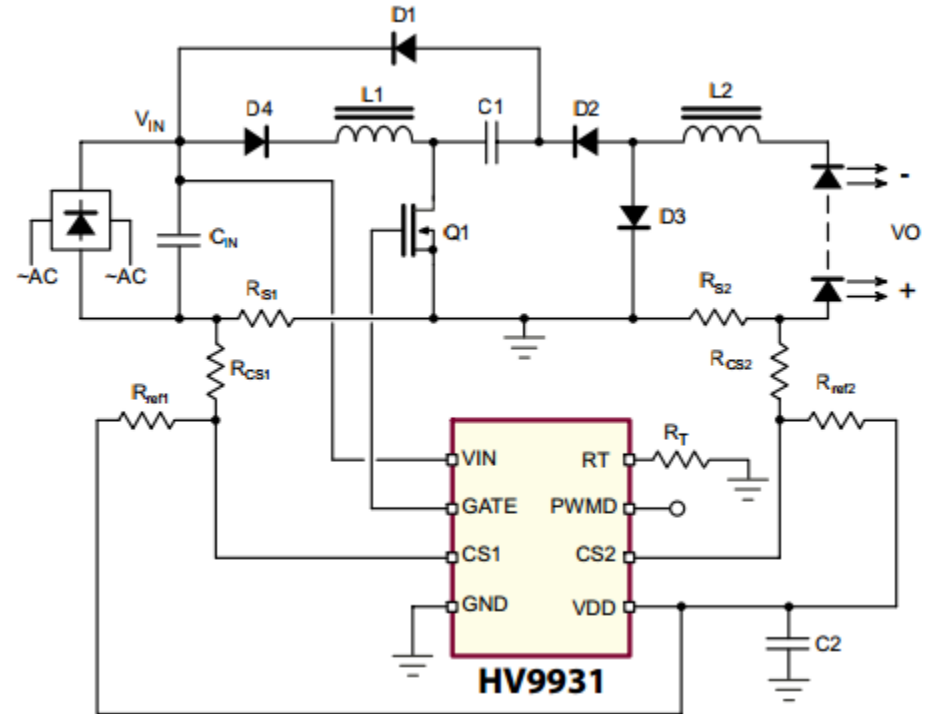
## Features:

- Programmable output current to 50mA
- PWM dimming / enable
- Universal 85 - 264VAC operation
- Fixed off-time buck converter
- Internal 475V power MOSFET
- Over-temperature protection with hysteresis
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-8 w/Heat Slug



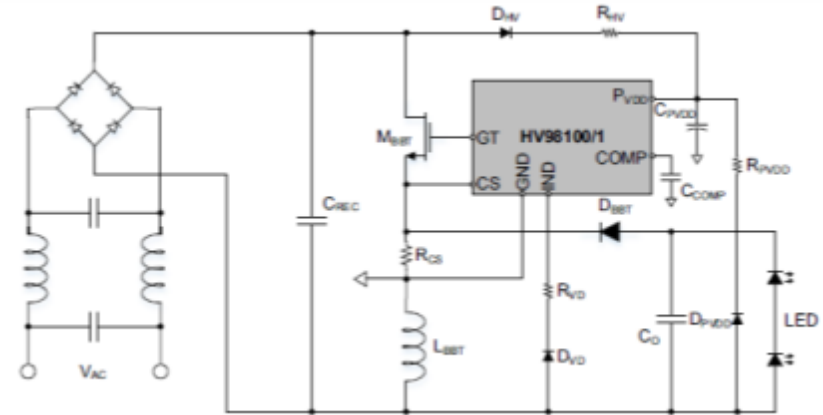
## Features:

- Constant output current
- Large step-down ratio
- Unity power factor
- Low input current harmonic distortion
- Fixed frequency or fixed off-time – - operation
- Internal 450V linear regulator
- Input and output current sensing
- Input current limit
- Enable, PWM and phase dimming
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-8 w/Heat Slug



## Features:

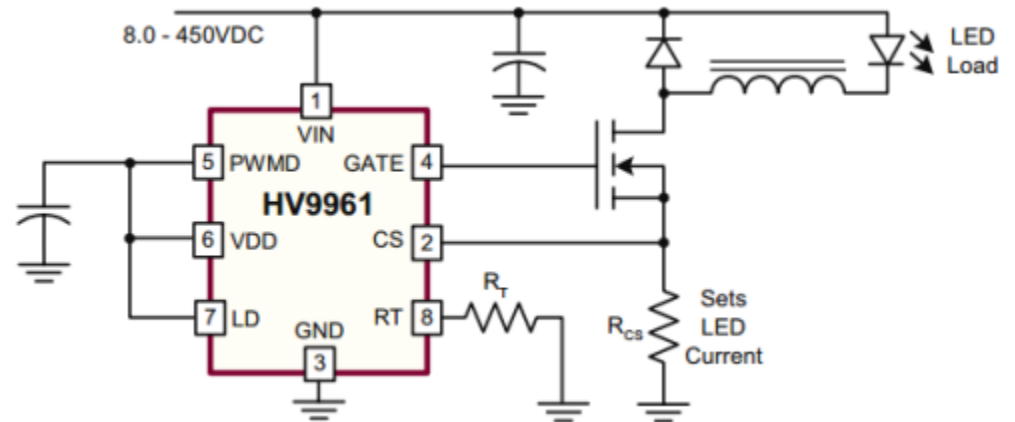
- Good LED Current Regulation:
  - Better than 5% accuracy
- Valley Switching Buck-Boost Converter with –
  - Power Factor Correction (PFC):
    - 0.97 Power Factor (typical)
    - 5% Total Harmonic Distortion (THD) (typical)
- Uses a Standard Off-the-Shelf Inductor:
  - No auxiliary winding required
- Single Input Voltage Range:
  - HV98100: 110VAC $\pm$ 15%
  - HV98101: 230VAC $\pm$ 15%
- Supports 5W-15W Output Power
- Space-saving SOT-23-6L Package





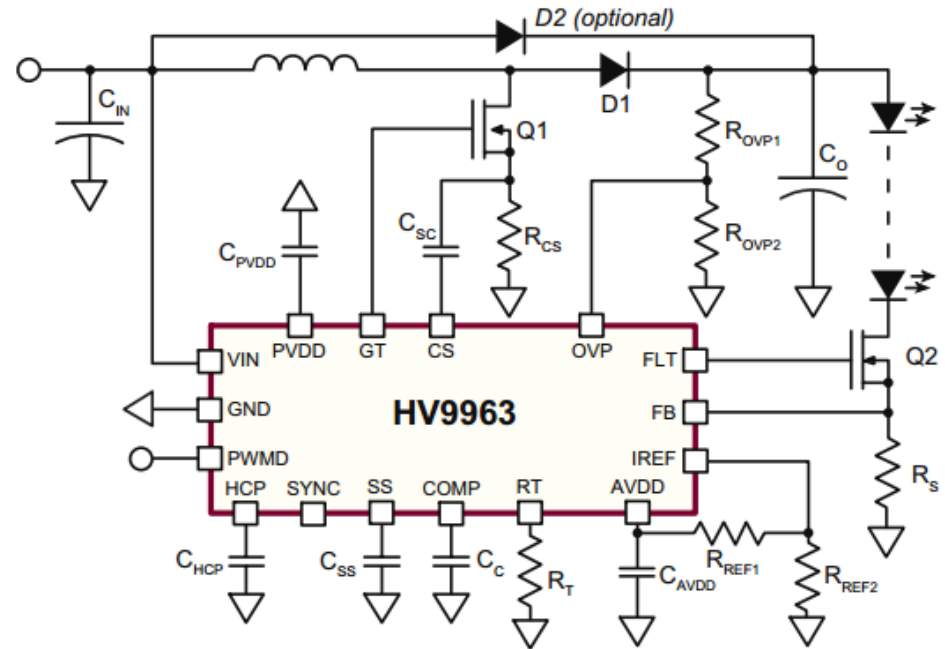
## Features:

- Fast average current control
- Programmable constant off-time –  
- switching
- Linear dimming input
- PWM dimming input
- Output short circuit protection with –  
- skip mode
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-8, SOIC-16



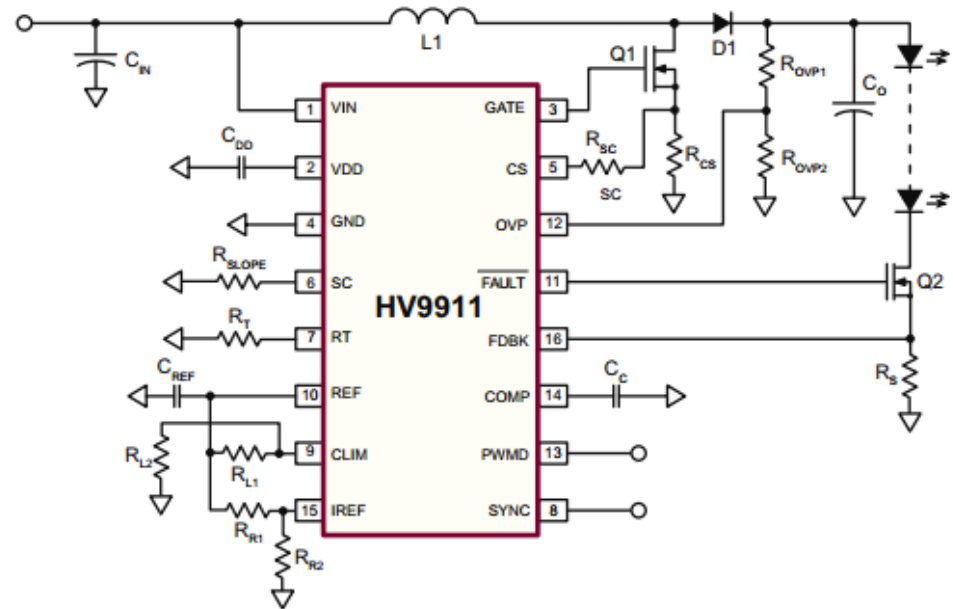
## Features:

- Switch mode controller for single switch -
  - converters: Buck, Boost, Buck-boost –
  - and SEPIC
- High output current accuracy
- High PWM dimming ratio (>5000:1)
- Internal 40V linear regulator
- Internal  $\pm 2\%$  voltage reference
- Constant frequency operation with sync –
- capability
- Programmable soft start
- 10V GATE drivers
- Hiccup mode protection for both short –
- circuit and open circuit conditions
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Package Options: SOIC-16



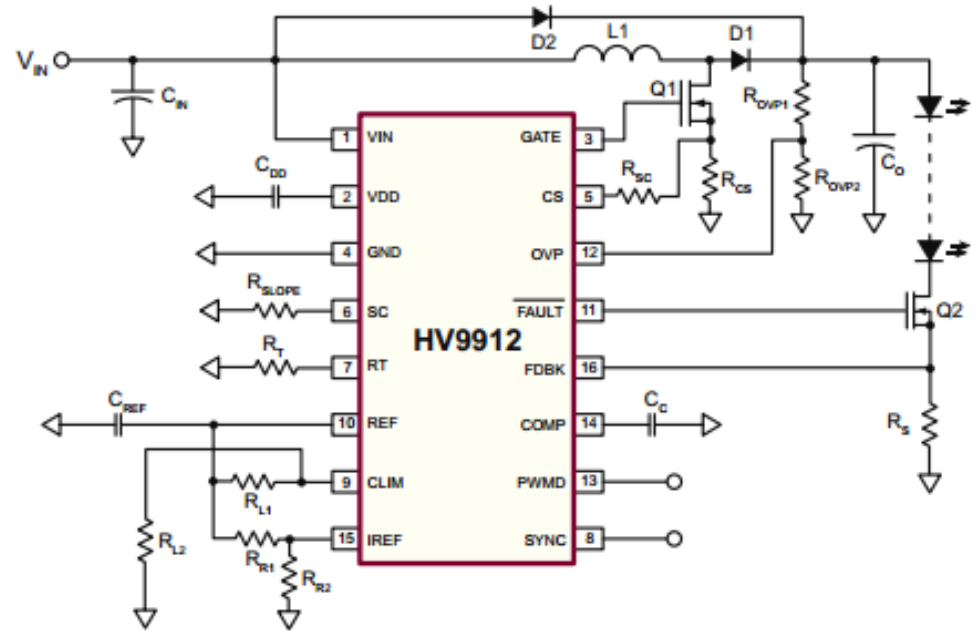
## Features:

- Switch mode controller for single –
  - switch drivers: Buck, Boost, -
  - Buck-boost, and SEPIC
- Closed loop control of output current
- High PWM dimming ratio
- Programmable slope compensation
- Enable & PWM dimming
- Output short circuit & over voltage –
  - protection
- Synchronization capability
- Programmable MOSFET current limit
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-8, SOIC-16



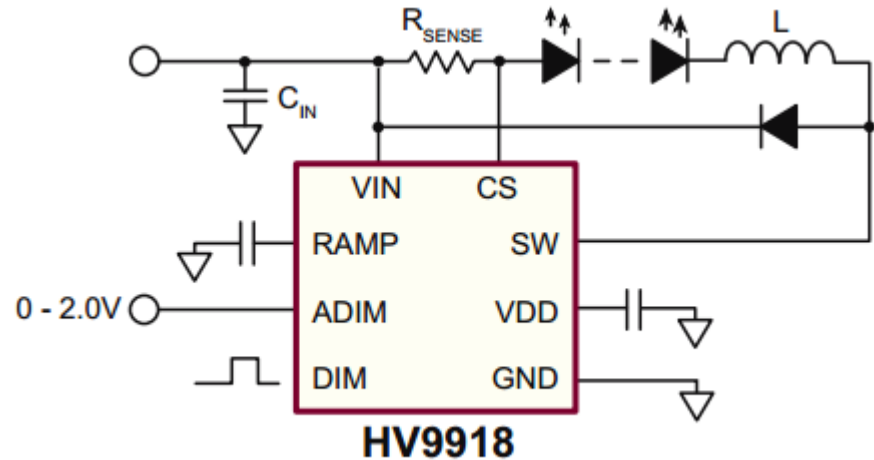
## Features:

- Switch mode controller for single –
  - switch drivers: Buck, Boost, Buck – boost, and SEPIC
- Works with high side current sensors
- Closed loop control of output current
- High PWM dimming ratio
- Programmable slope compensation
- Linear & PWM dimming
- Hiccup mode protection for both –
  - short circuit and open circuit –
  - conditions
- Synchronization capability
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-16



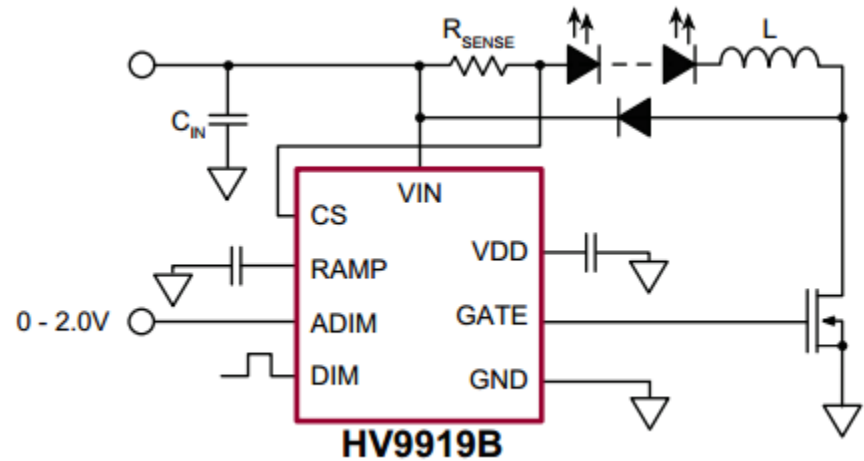
## Features:

- Hysteretic control with high-side current – sensing
- Integrated 40V 1.0Ω MOSFET
- >90% Efficiency
- Wide input voltage range: 4.5 to 40V
- ±5% LED current accuracy
- Up to 2.0MHz switching frequency
- Adjustable constant LED current
- Analog or PWM control signal for PWM – dimming
- Over-temperature protection
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: WDFN-8 (3x3)



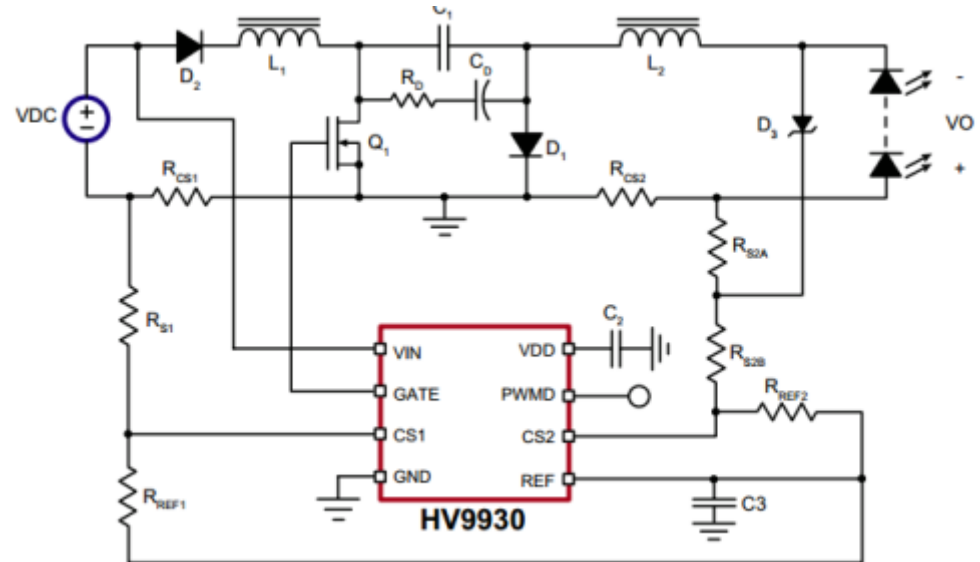
## Features:

- Hysteretic control with high-side current –  
- sensing
- Wide input voltage range: 4.5 to 40V
- >90% Efficiency
- Typical  $\pm 5\%$  LED current accuracy
- Up to 2.0MHz switching frequency
- Adjustable constant LED current
- Analog or PWM control signal for PWM –  
- dimming
- Over-temperature protection
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Option: WDFN-8 (3x3)



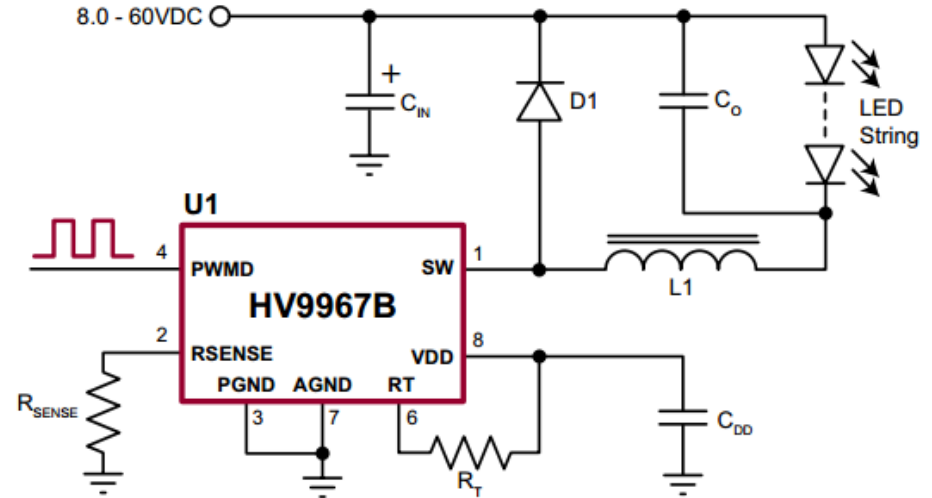
## Features:

- Constant output current LED driver
- Steps output voltage up or down
- Low EMI
- Variable frequency operation
- Internal 8.0 - 200V linear regulator
- Input and output current sensing
- Input current limit
- Enable & PWM dimming
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: SOIC-8



## Features:

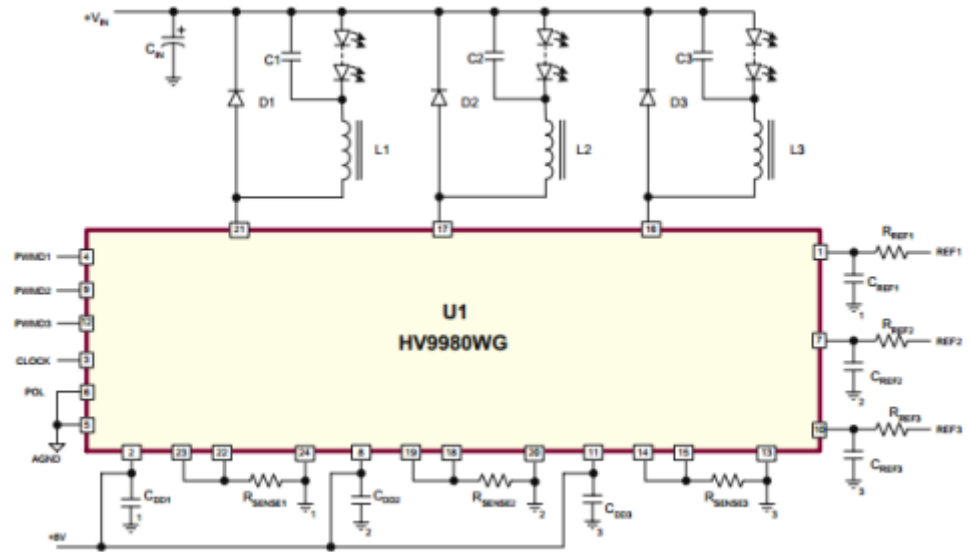
- 3% accurate LED current
- Integrated 60V, 0.8 $\Omega$  MOSFET
- Low sensitivity to external component –  
- variation
- Single resistor LED current setting
- Fixed off-time control
- PWM dimming input
- Output short circuit protection with skip –  
- mode
- Over-temperature protection
- Operating Temperature Range:
  - -40°C to +150°C
- Package Options: DFN-8, MSOP-8





## Features:

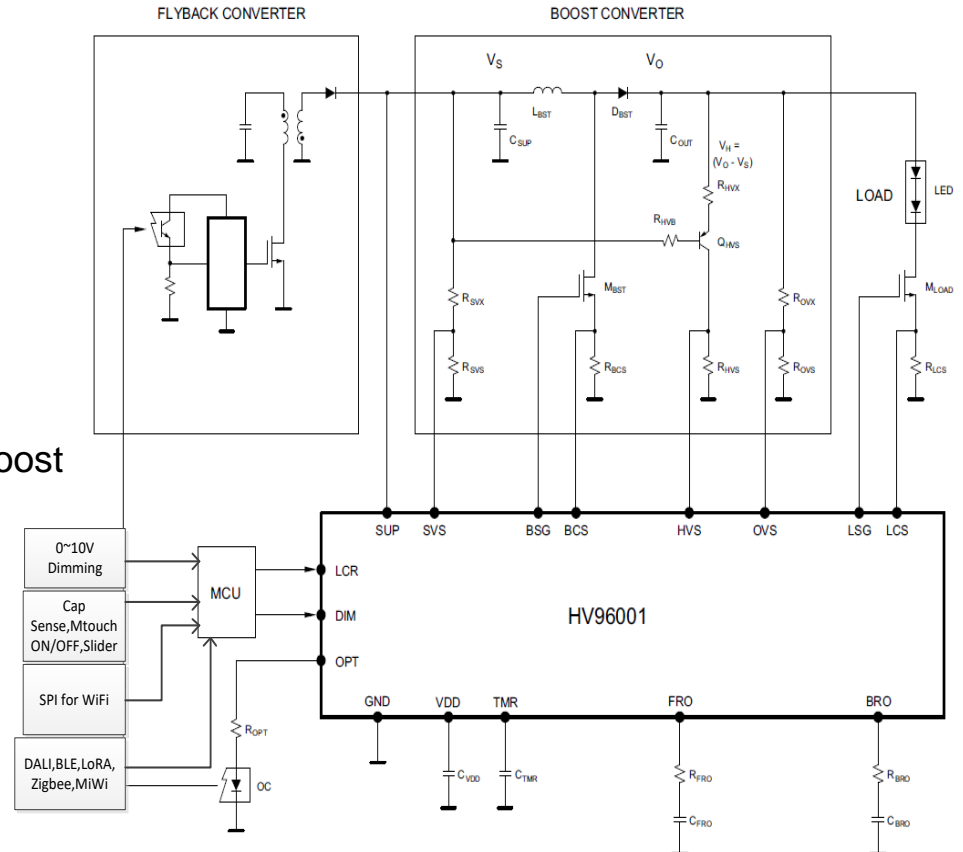
- Integrated 200V, 25Ω (typ.) MOSFETs
- Programmable output current to 80mA -  
– per channel
- TTL compatible PWM dimming inputs
- 3-Phase synchronous operation
- Leading edge blanking
- Short circuit protection with skip mode
- Over-temperature protection
- Operating Temperature Range:
  - -40°C to +150°C
- Package Options: SOIC-24 (300mil)



## Secondary-side Controller for Digital Solution with Deep Dimming

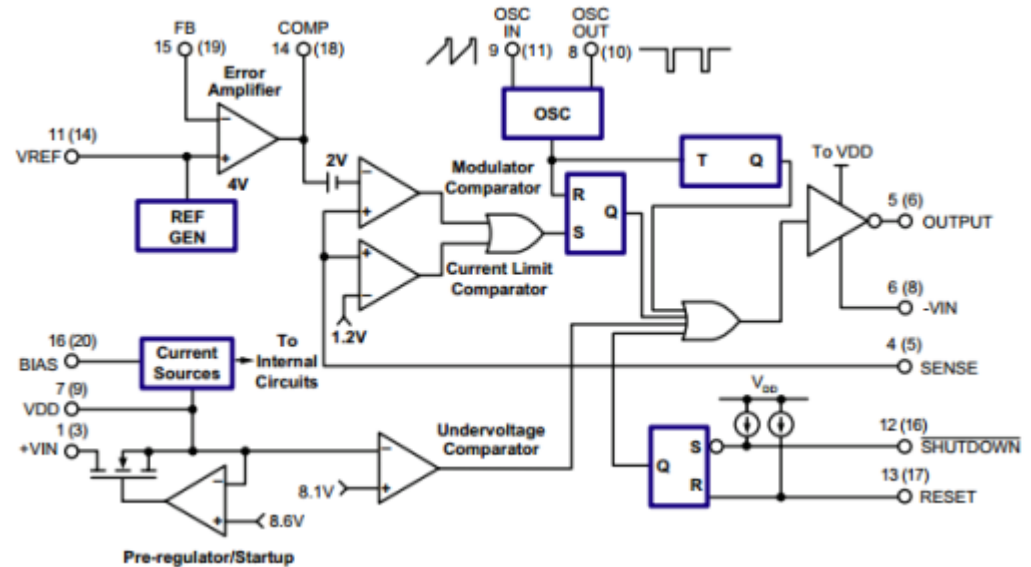
### Features:

- Deep Dimming Performance
  - PWM Dim down to 0.1% and lower
  - PWM pulse width down to 250ns
  - Wide range of linear Dimming
- Boost Converter controls
  - Peak Current Mode Logic
  - 200KHz frequency switching
  - SEPIC Topology compatible
- Fly back Converter controls
  - Adaptive control of output voltage or boost
  - Opto-coupled feedback control signal
- 8V-60V input voltage range
- 5V/10mA VDD regulator for house keeping
- Output OVP / OCP / UVLO protections
- Load short protection
- DIM stuck at zero detection
- 16-pin SOIC, 3mmx3mm QFN package



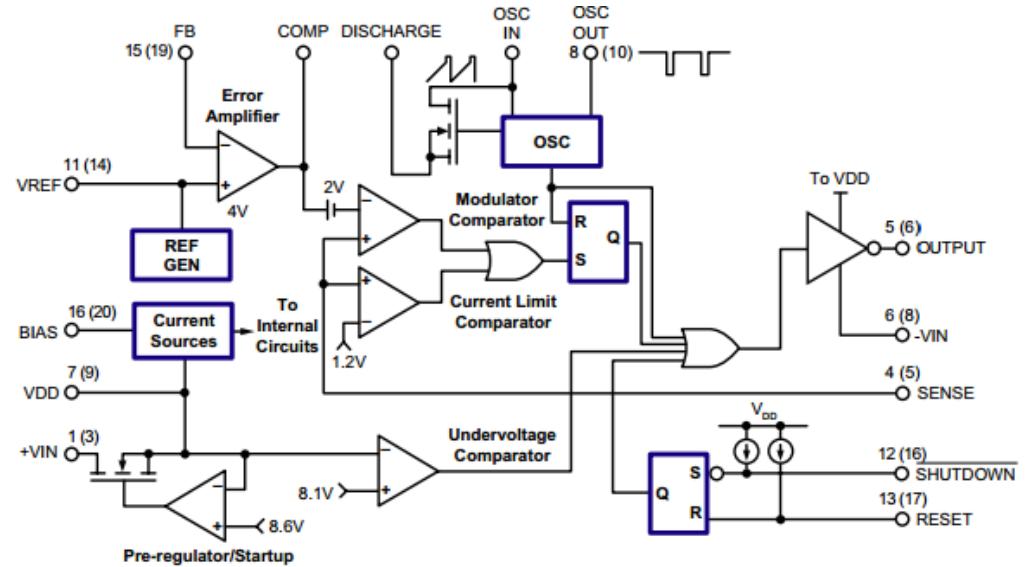
## Features:

- 10 to 450V input voltage range
- <1.3mA supply current
- >1.0MHz clock
- >20:1 dynamic range @ 500KHz
- 49% Maximum duty cycle version
- Low internal noise
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-16, PDIP-16



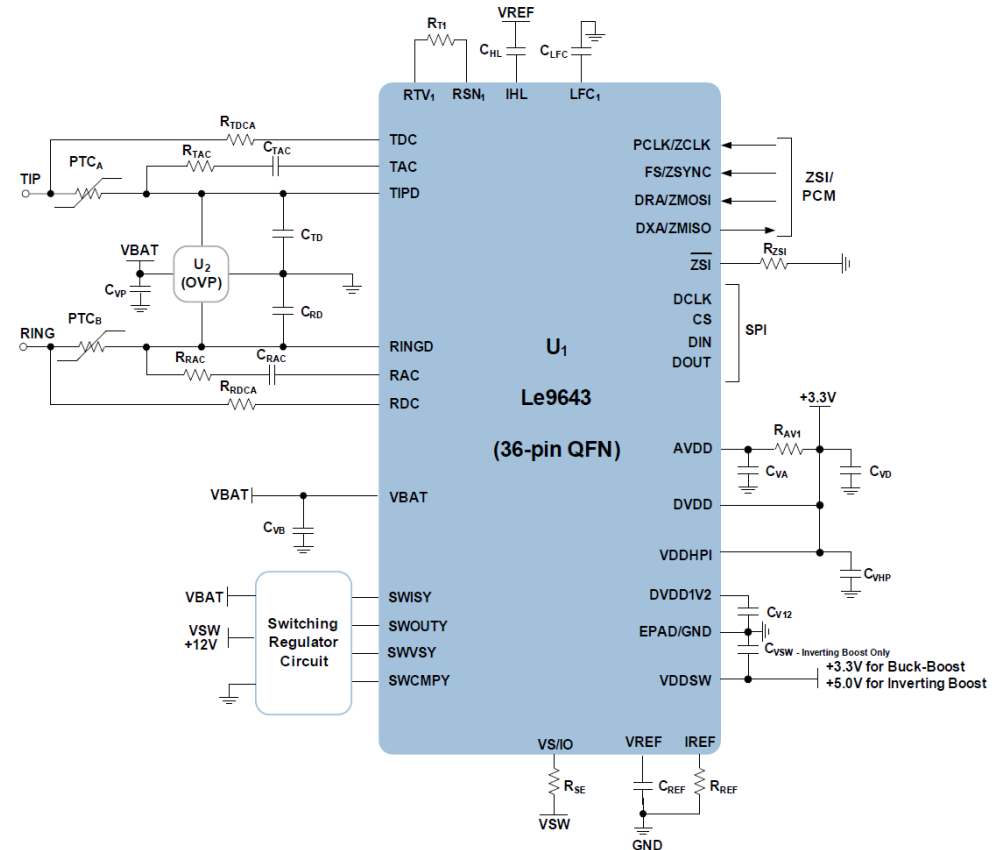
## Features:

- 10 to 450V input voltage range
- <1.3mA supply current
- >1.0MHz clock
- >20:1 dynamic range @ 500KHz
- 99% Maximum duty cycle version
- Low internal noise
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-16, PDIP-16



## Features:

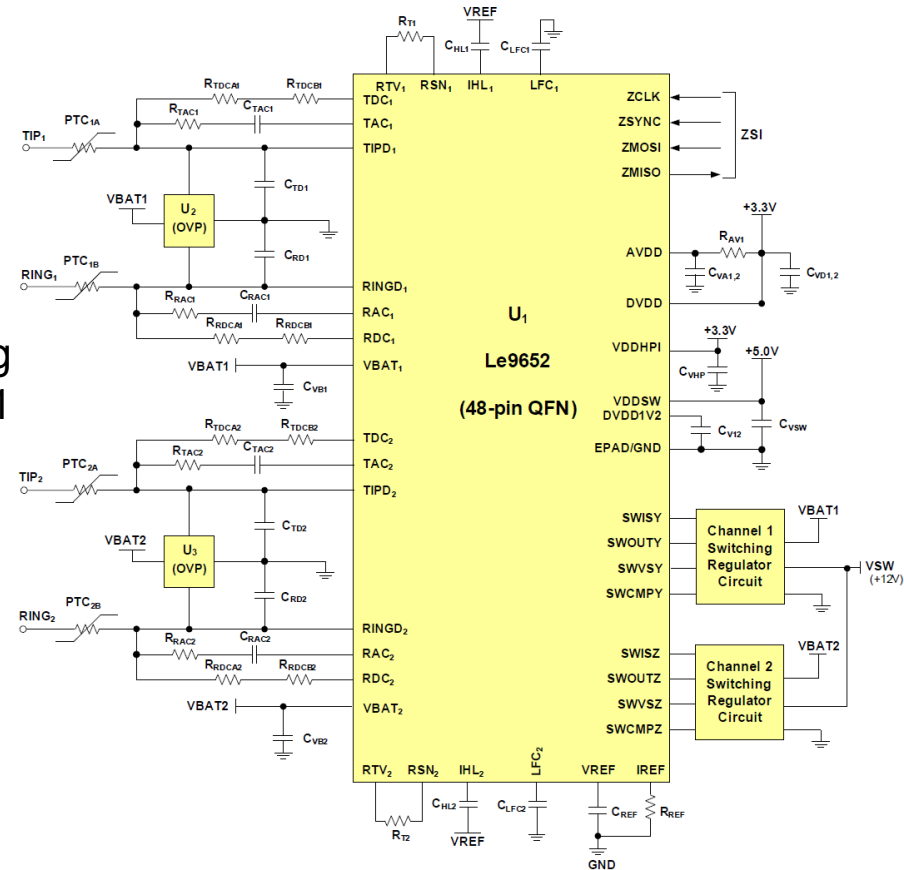
- Two ring voltage options
  - Le9643 95V
  - Le9653 150V
- Easy Upgrade (SW and HW)
  - Software compatible with Le9641/51
  - All the features of the Le9641/51
  - Same pin order as Le9641/51
- Package
  - 36-pin, 4x6 QFN
  - 0.4mm pin pitch
  - Increased HV pin spacing
  - 50% smaller than Le9641/51



World's Smallest 1 FXS with PCM Interface

## Features:

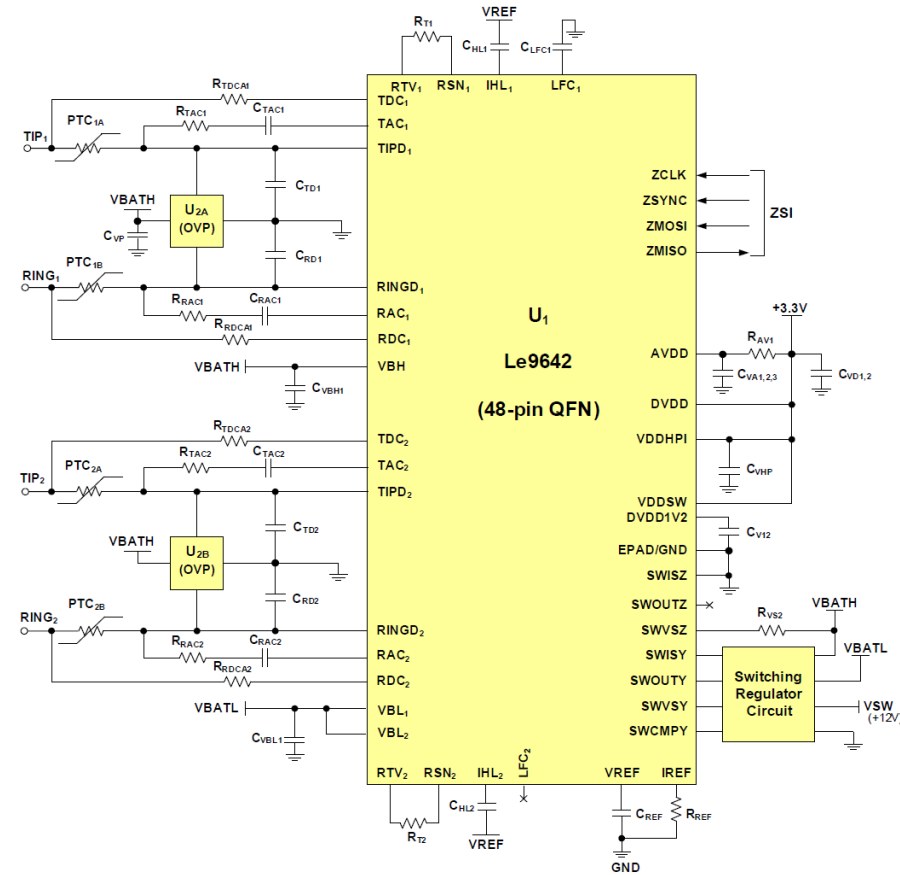
- High voltage ringing capability
  - 150V with Flyback power supply
  - 135V with Inverting Boost supply
- ZSI interface to SoC
  - Ideal for dual FXS with high voltage ringing
  - Single channel population option w/Le9651
- Simple 4-wire interface
  - Interfaces to leading partner solutions
- Package
  - 48-pin, 7x7 QFN
  - 0.5mm pin pitch



**Ideal for 2 FXS Solutions with High Voltage Ringing**

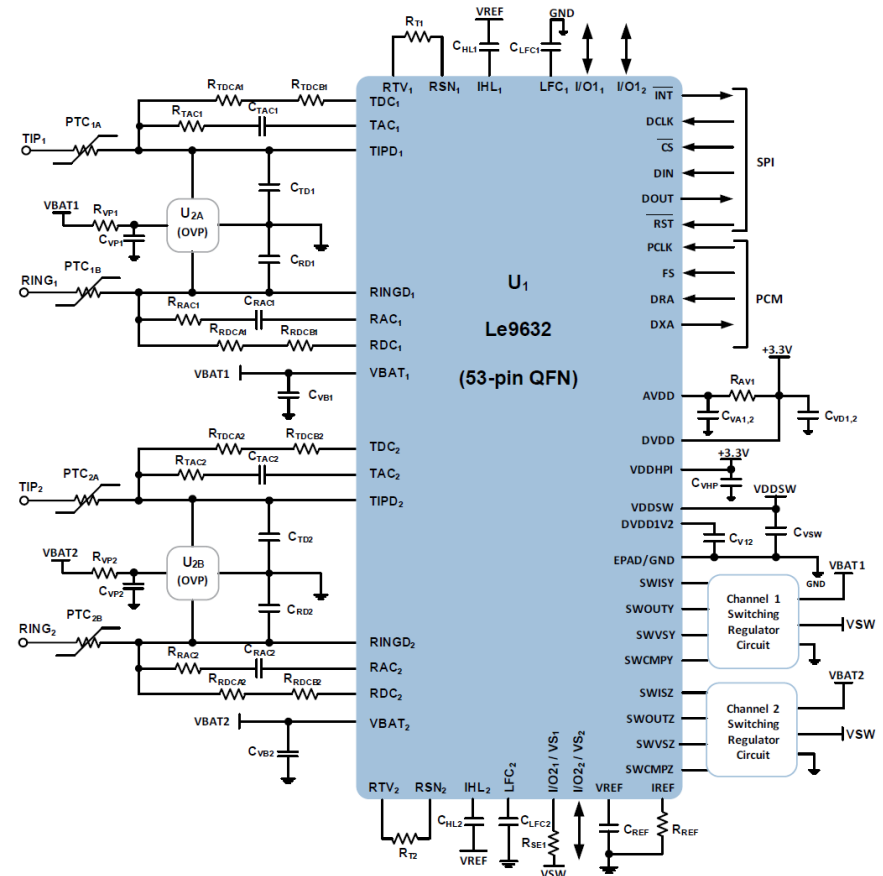
## Features:

- Shared battery up to 120V
  - Also supports 90V BBABS for 2 channels
- ZSI interface to SoC
  - Ideal for dual FXS with shared power supply
  - Single channel population option w/Le9641
- Simple 4-wire interface
  - Interfaces to leading partner solutions
- Package
  - 48-pin, 7x7 QFN
  - 0.5mm pin pitch



## Features:

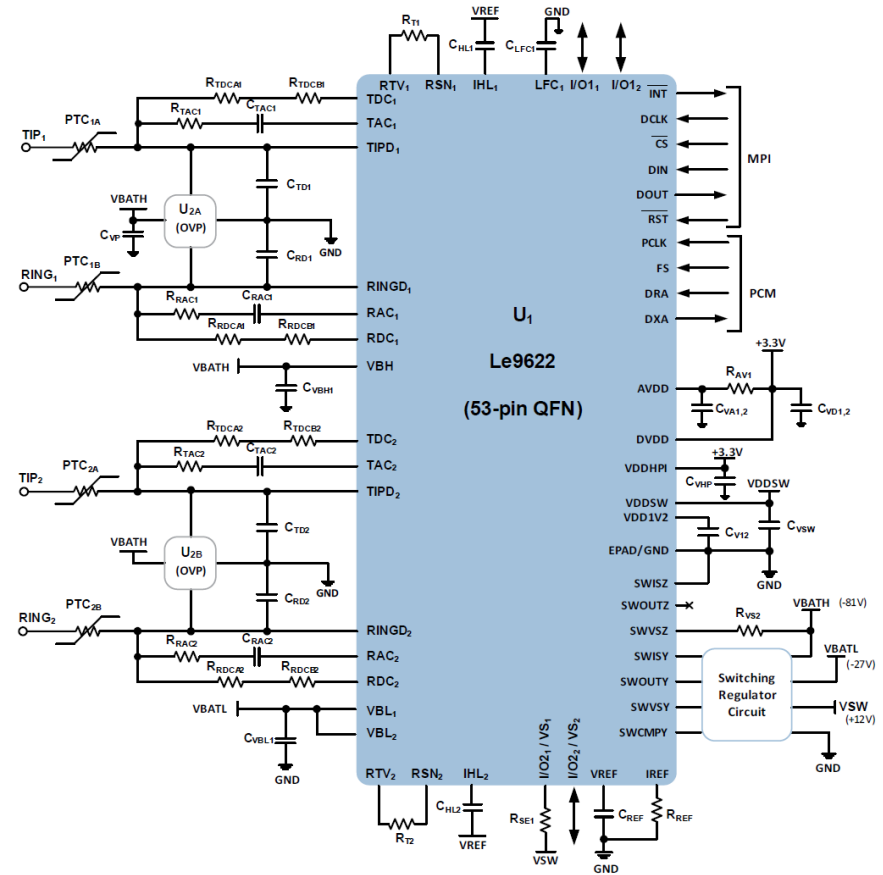
- High voltage ringing capability
  - 150V with Flyback power supplies
  - 135V with Inverting Boost supplies
- PCM/SPI interface to SoC
  - Suitable for 4 or more FXS
- Easy Upgrade (SW and HW)
  - Software compatible with ZL88701/2
  - All the features of the ZL88702
  - Same pin order as ZL88702
- Package
  - 53-pin, 7x7 QFN
  - 0.4mm pin pitch
  - Increased HV pin spacing





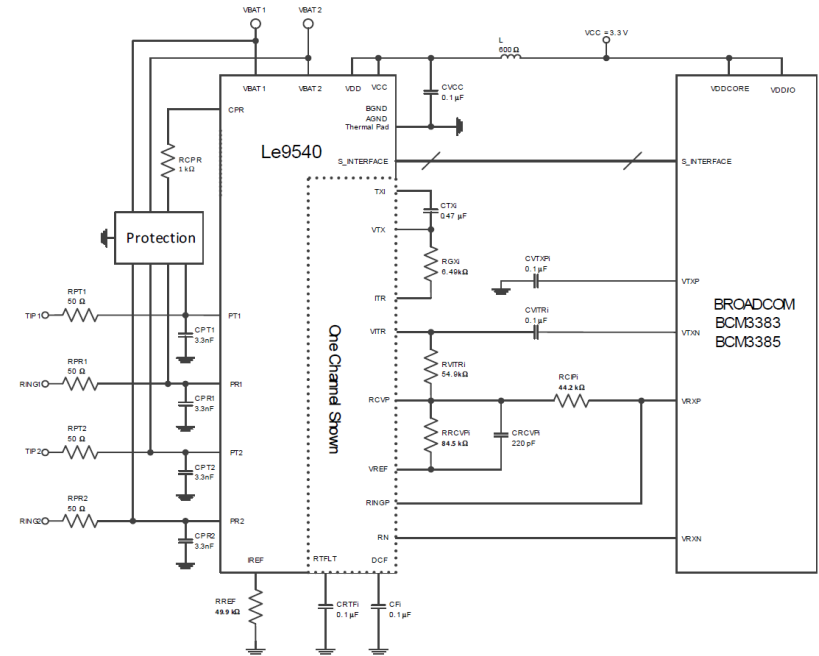
## Features:

- Shared Battery up to 120V
  - BBABS for 2 Channels
  - 2 x IB for 4-8 Channels
- PCM/SPI interface to SoC
  - Suitable for 4 or more FXS
- Easy Upgrade (SW and HW)
  - Software compatible with ZL88601/2
  - All the features of the ZL88602
  - Same pin order as ZL88602
- 2 and 3 battery reference designs for 8 lines
  - Extends loop reach
  - 12V and -48V input options
- Package
  - 53-pin, 7x7 QFN
  - 0.4mm pin pitch



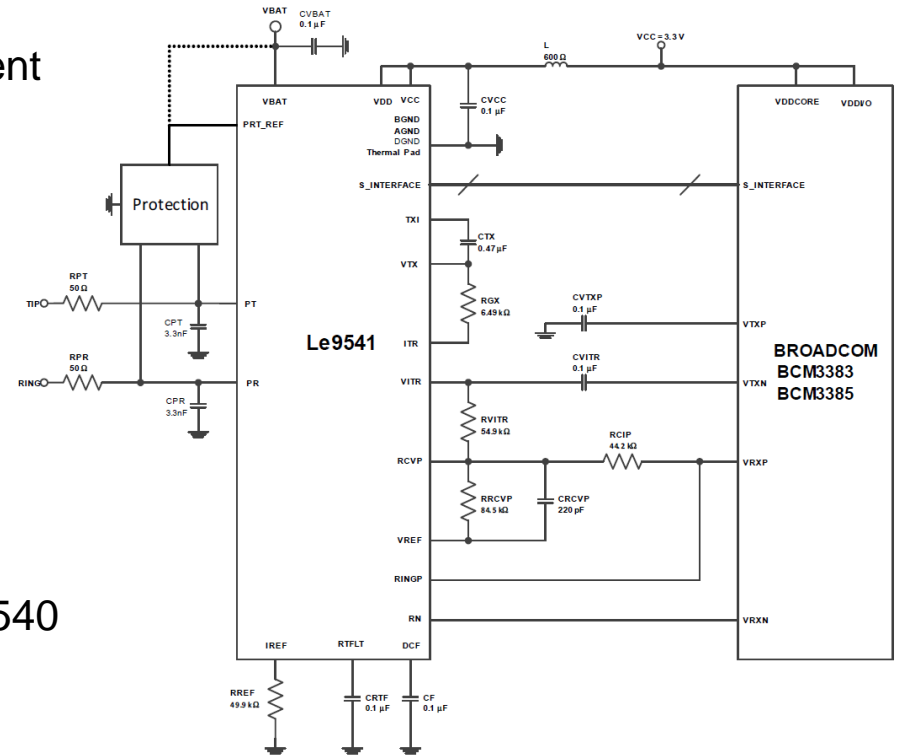
## Features:

- Dual channel SLIC which interfaces to current generation Broadcom Cable and PON SoCs (BCM3384, BCM3390, BCM6838, etc.)
- Two ring voltage options
  - Le9540C 100V
  - Le9540D 145V
- Same 40-pin QFN (6x6mm) package for Le9540 and Le9541
  - Pin out supports a dual footprint
  - Allows use of a common PCB with common components
- Package
  - 40-pin, 6x6 QFN
  - 0.5mm pin pitch



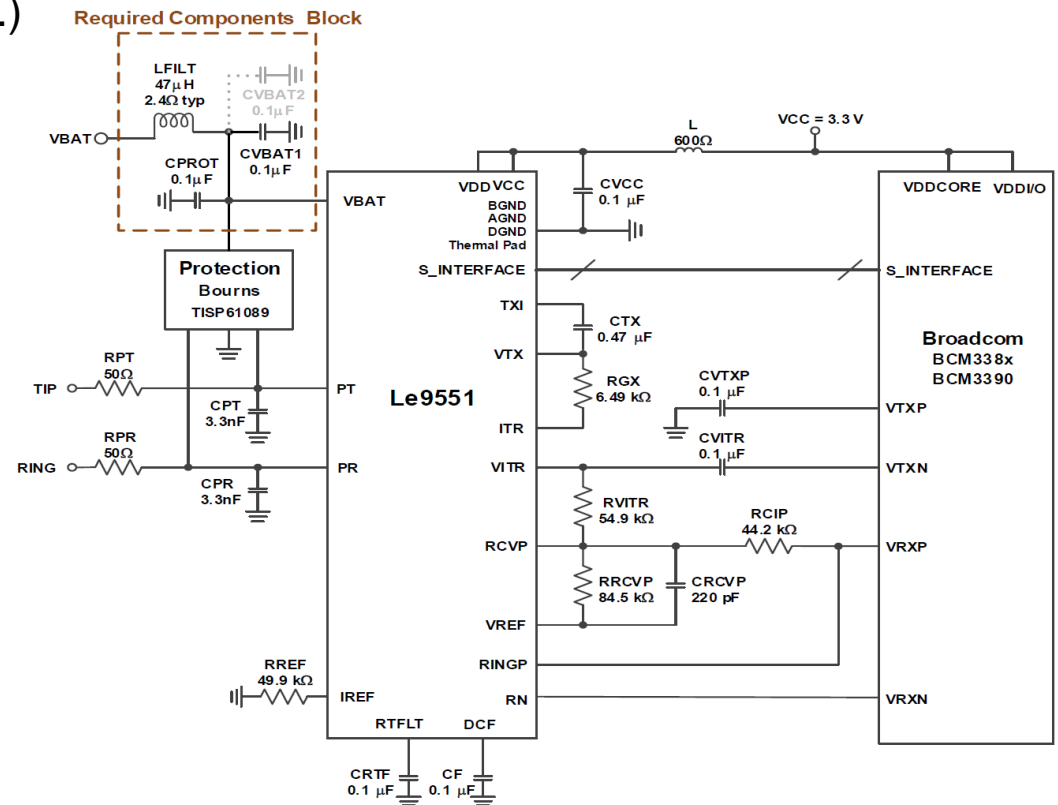
## Features:

- Single channel SLIC which interfaces to current generation Broadcom Cable and PON SoCs (BCM3384, BCM3390, BCM6838, etc.)
- Two ring voltage options
  - Le9541C 100V
  - Le9541D 145V
- Identical functionality of Le9540 in a single channel device
- Same 40-pin QFN (6x6mm) package for Le9540 and Le9541
  - Pin out supports a dual footprint
  - Allows use of a common PCB with common components
- Package
  - 40-pin, 6x6 QFN
  - 0.5mm pin pitch



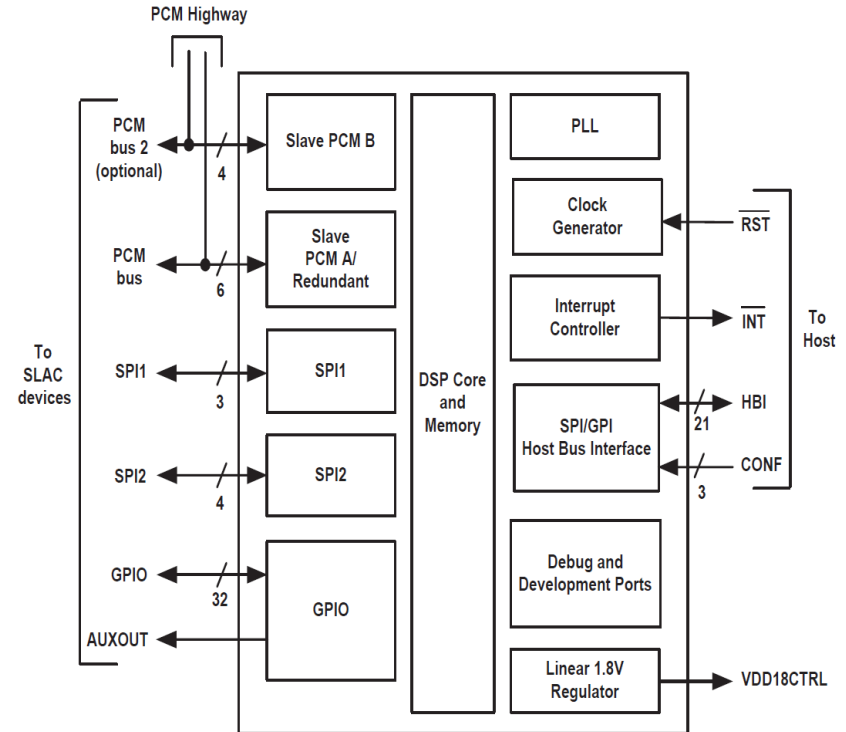
## Features:

- Single channel SLIC which interfaces to current generation Broadcom Cable and PON SoCs (BCM3384, BCM3390, BCM6838, etc.)
- Two ring voltage options
  - Le9551C 100V
  - Le9551D 145V
- Easy Upgrade (SW and HW)
  - All the features of the Le9541
  - Same pin order as Le9541
- Package
  - 28-pin, 4x5 QFN
  - 0.5mm pin pitch
  - 55% smaller than Le9541



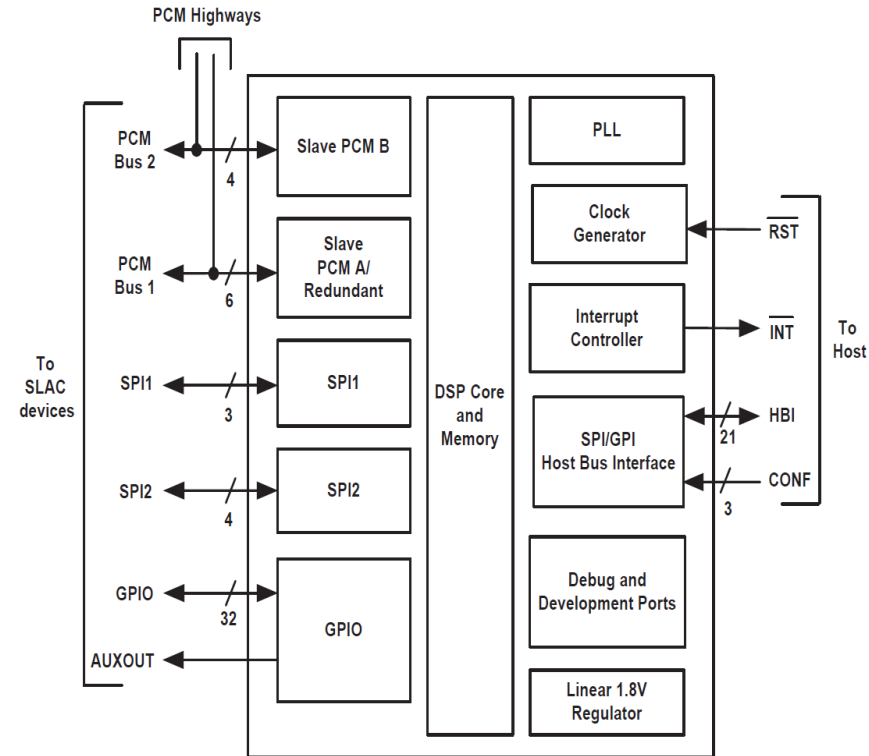
## Features:

- Aggregated call control lowers demand on host micro-processor
  - 72 channels of call control
- Provides expanded line and circuit testing in conjunction with Microsemi's NGCC chipset
  - Provides 4 channels of simultaneous line testing
- Software interface using VoicePath™ API-II
- Software downloadable, field upgradeable, expandable
- Serial and parallel host controller interface options
- Complete control of up to 9 Octal NGSLAC devices



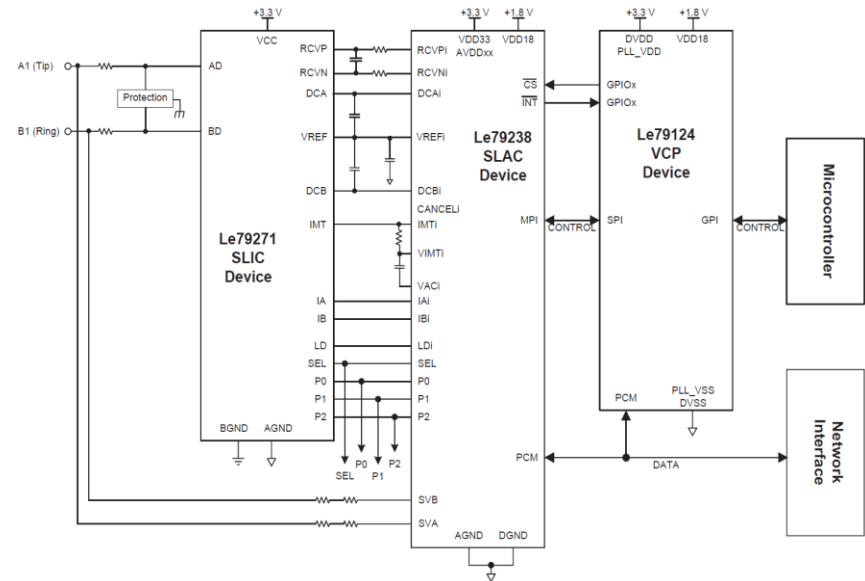
## Features:

- Aggregated call control lowers demand on host micro-processor
  - 128 channels of call control
- Provides expanded line and circuit testing in conjunction with Microsemi's NGCC chipset
  - Provides 4 channels of simultaneous line testing
- Software interface using VoicePath™ API-II
- Software downloadable, field upgradeable, expandable
- Serial and parallel host controller interface options
- Complete control of up to 16 Octal NGSLAC devices



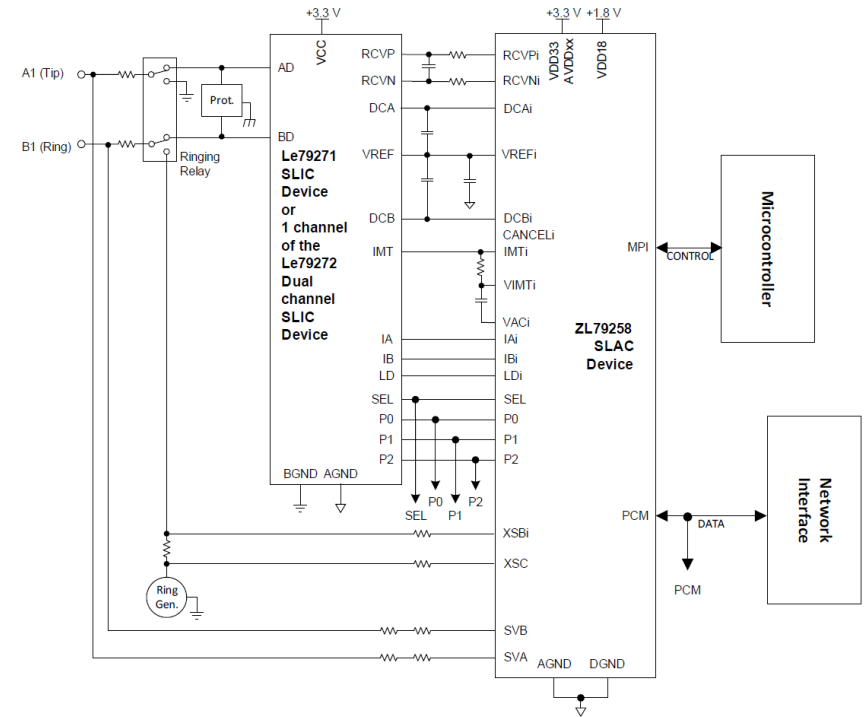
## Features:

- Eight channel Subscriber Line Access Circuit
  - Next Generation Carrier Class for long loop applications
- Ideal for high density, medium and large line count applications
- Wideband 16 kHz sampling mode capability
- High performance digital signal processor provides programmable control of all major line card functions
- GR-844 equivalent testing with Voice Control Processor
- Enhanced line control and line-test support



## Features:

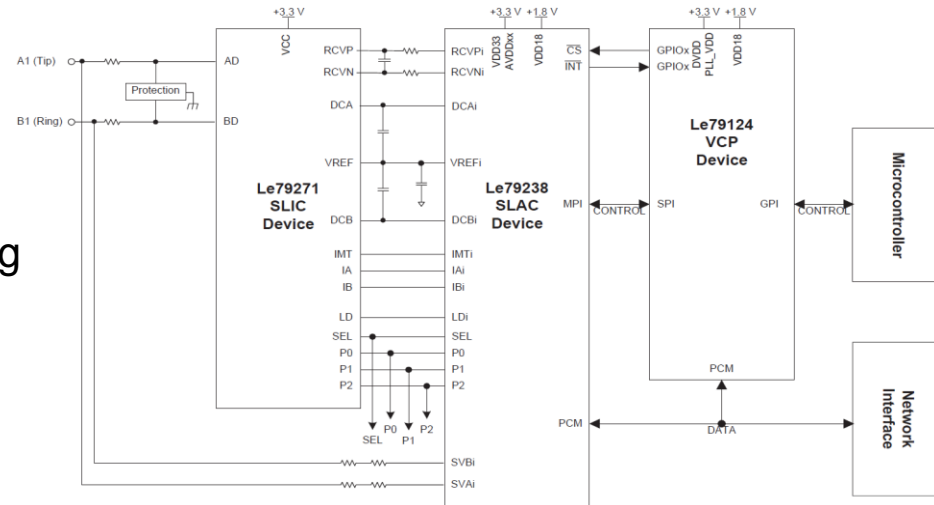
- Eight channel Subscriber Line Access Circuit
  - Next Generation Carrier Class for long loop applications
- External / Internal ringing option
- Ideal for high density, medium and large line count applications
- Wideband 16 kHz sampling mode capability
- High performance digital signal processor provides programmable control of all major line card functions
- GR-844 equivalent testing with Voice Control Processor
- Enhanced line control and line-test support





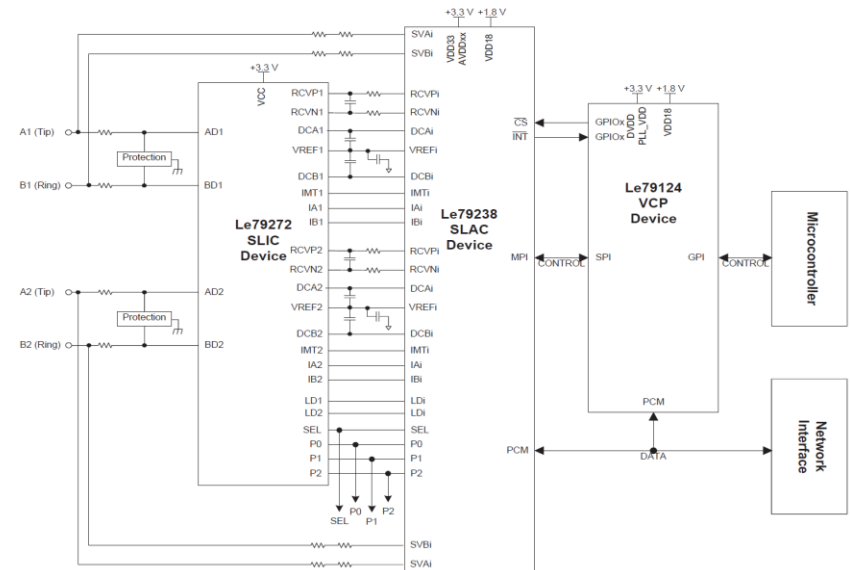
## Features:

- Single channel Subscriber Line Interface Circuit
  - Next Generation Carrier Class for long loop applications
  - 150Vpk Ringing
- 3.3 V and battery supplies
  - Supports two negative and one positive battery
- Dual battery operation for system power saving
  - Automatic battery switching
  - Intelligent thermal management
- 5 REN with DC offset
- Tip-open mode supports ground start signaling
- Metering capable
- Designed to minimize POTS transients, optimizing
- Best-in-class GR-844 equivalent testing
  - Integrated test load switch



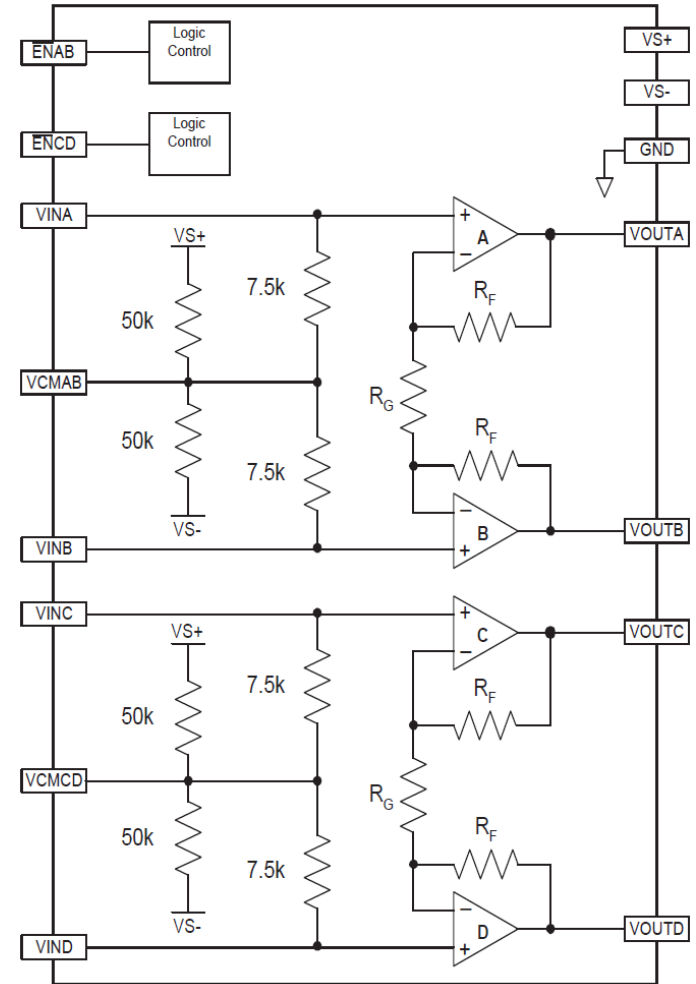
## Features:

- Dual channel Subscriber Line Interface Circuit
  - Next Generation Carrier Class for long loop applications
  - 150Vpk Ringing
- 3.3 V and battery supplies
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- Tip-open mode supports ground start signaling
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- Designed to minimize POTS transients, optimizing
- Best-in-class GR-844 equivalent testing
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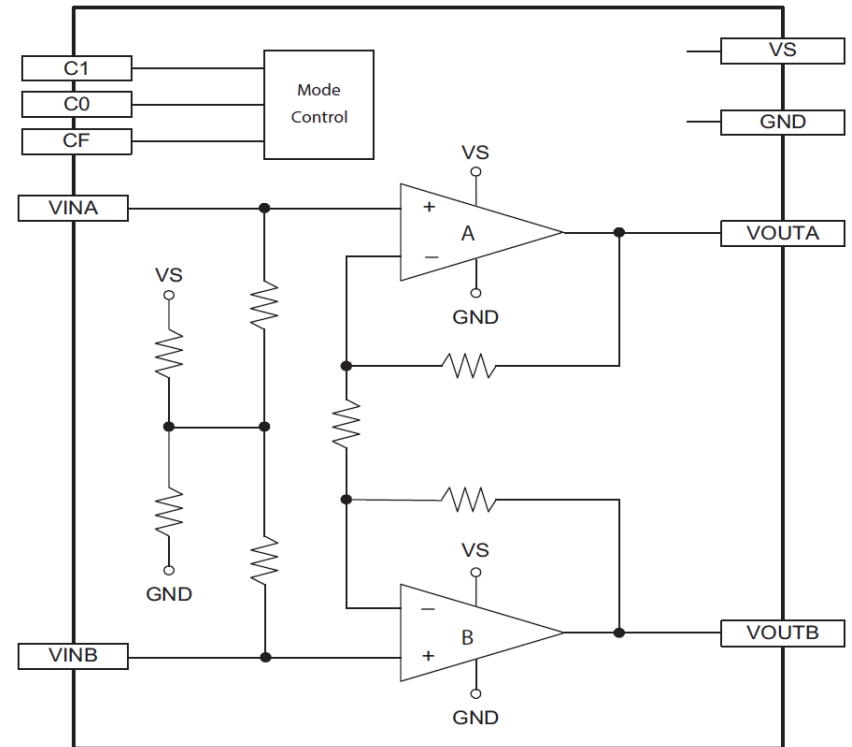
## Features:

- Fixed Voltage Gain Of 13
- 450 mA Peak Output Drive Capability
- Dual and Single Supply Option
  - $\pm 5$  V to  $\pm 12$  V Dual Supplies
  - 10 V to 24 V Single Supply
- 44 V<sub>p-p</sub> Differential Output Into a 100  $\Omega$  Load
- 40.5 V<sub>p-p</sub> Differential Output Into a 60  $\Omega$  Load
- Low-power Disable Mode For Each Driver
- 4 mA Per Amplifier Quiescent Supply Current
- -75 dBc THD With 1 MHz Signal Into 60  $\Omega$
- 16-pin (4 mm x 4 mm) QFN Package



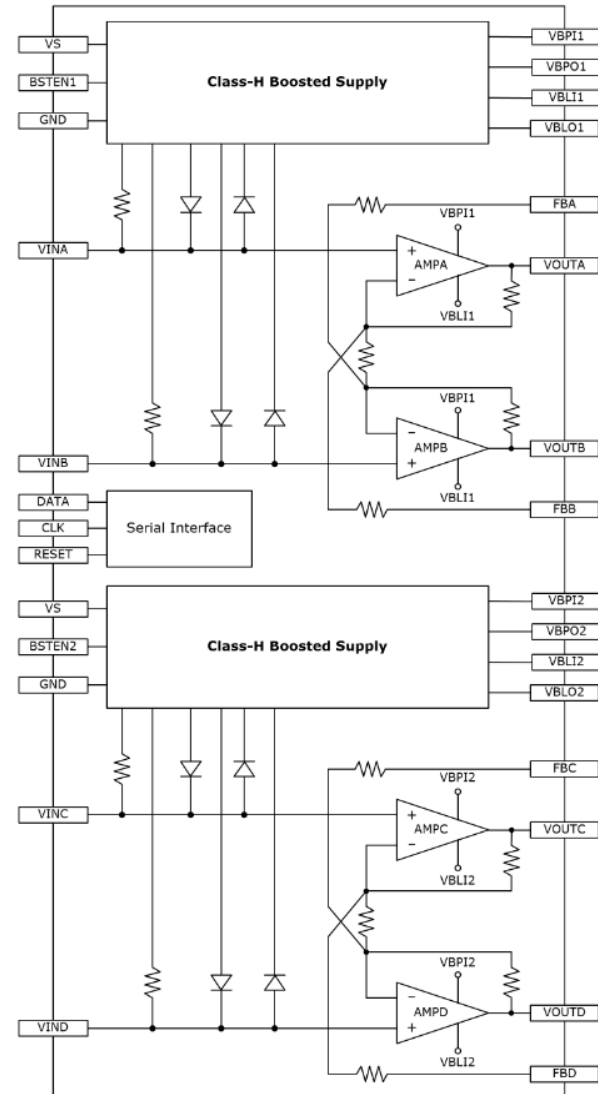
## Features:

- VDSL2 30a profile, 14.5 dBm Line Driver
- Very low power dissipation
  - Class AB operation
- Up to 8 programmable states
- No external gain resistors required
- Small footprint package
  - 16-pin (4 mm x 4 mm) QFN



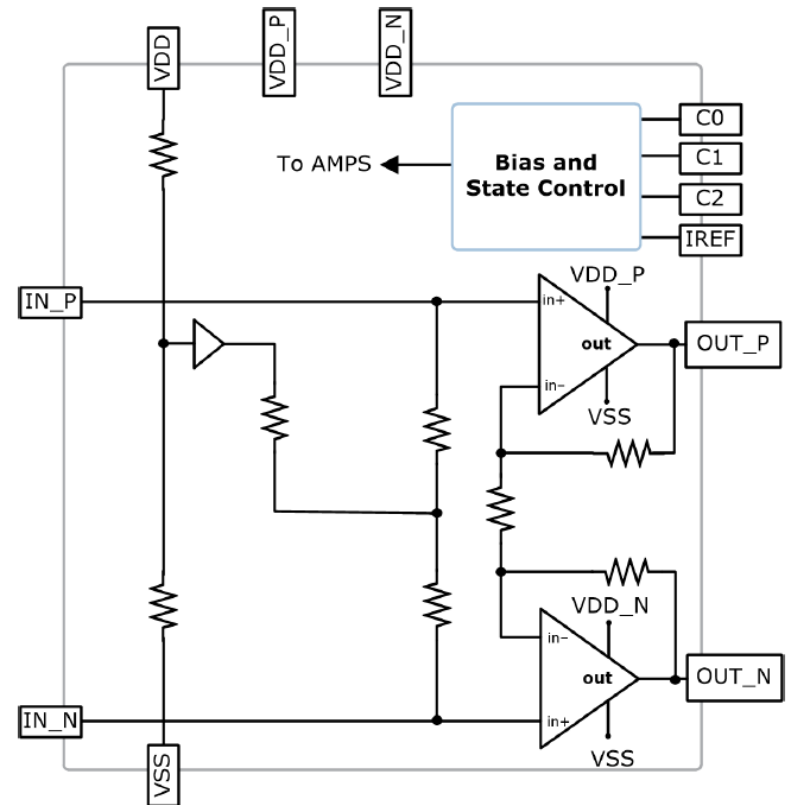
## Features:

- Support ADSL2+ and VDSL2 profiles up to 35b
  - Delivers signal strengths up to 20 dBm
- Very low power dissipation
  - Class H operation
- Independent channel state control
- Serial control interface
- No external gain resistors required
- Small footprint package
  - 32-pin (5 mm x 5 mm) QFN



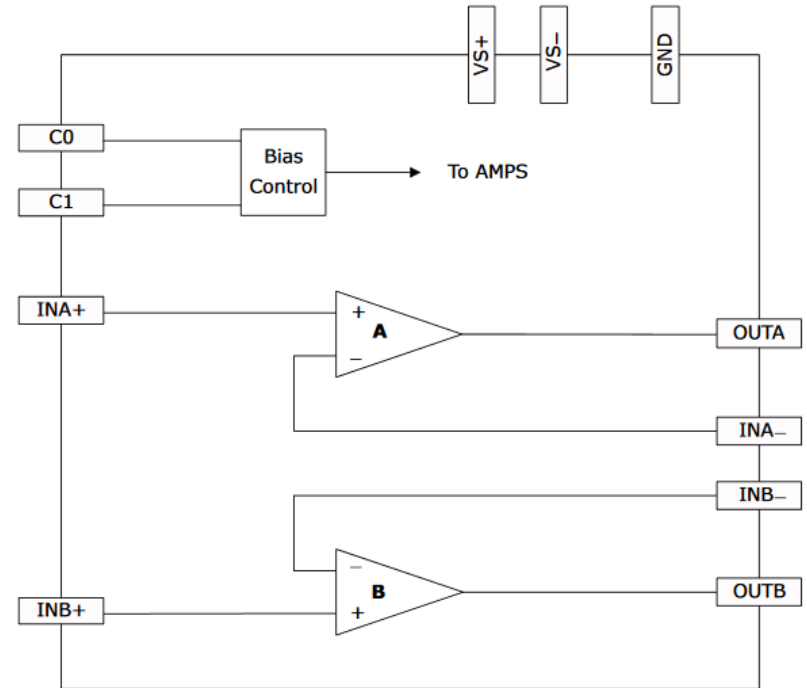
## Features:

- High-power differential output
  - Delivers line power up to 14 dBm
  - Operates at 14V  $\pm$ 10%
- Class AB amplifiers
- Four biased up states for VDSL applications
- Four biased up state for ADSL applications
- Power down states
- Thermal shutdown circuitry
- Miniature 4 x 4mm thermally enhanced package
- RoHS compliant



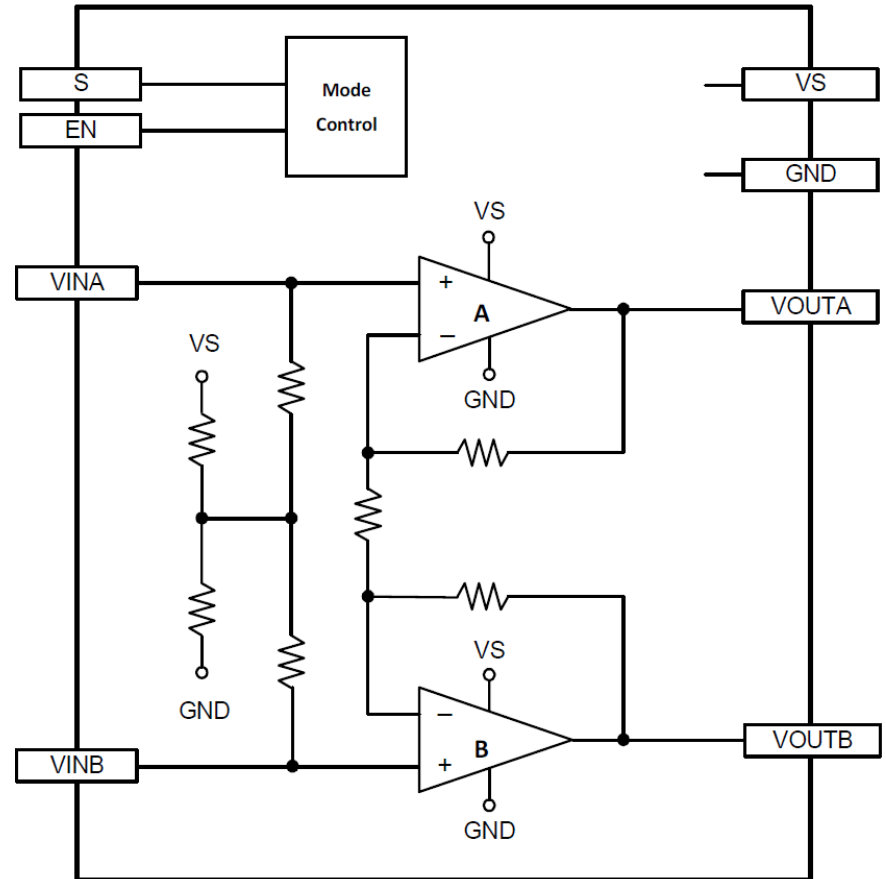
## Features:

- High-power differential output
  - Delivers signal strengths up to 21dBm
  - Operates up to 12V from single supply or  $\pm 6V$  from dual power supplies
  - Driver capability up to 750mA from a single 12V supply
- User settable gain and bandwidth
  - Bandwidth up to 300MHz
- Class AB amplifiers
- Four operational states, lower power operation
- Thermal shutdown circuitry
- Miniature 4 x 4mm thermally enhanced package
- RoHS compliant
- Pin-compatible with industry standard line drivers



## Features:

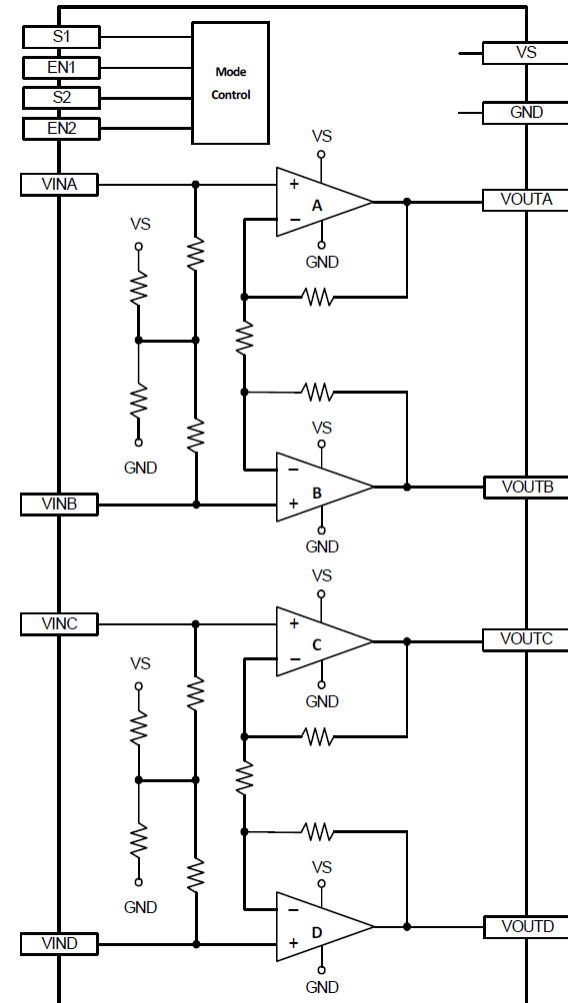
- Supports high frequency G.Fast transmission
- Supports VDSL2 and ADSL2+ operation
- Very low power dissipation
  - Class AB operation
- 5 programmable states
- No external gain resistors required
- Small footprint package
  - 16-pin (4 mm x 4 mm) QFN





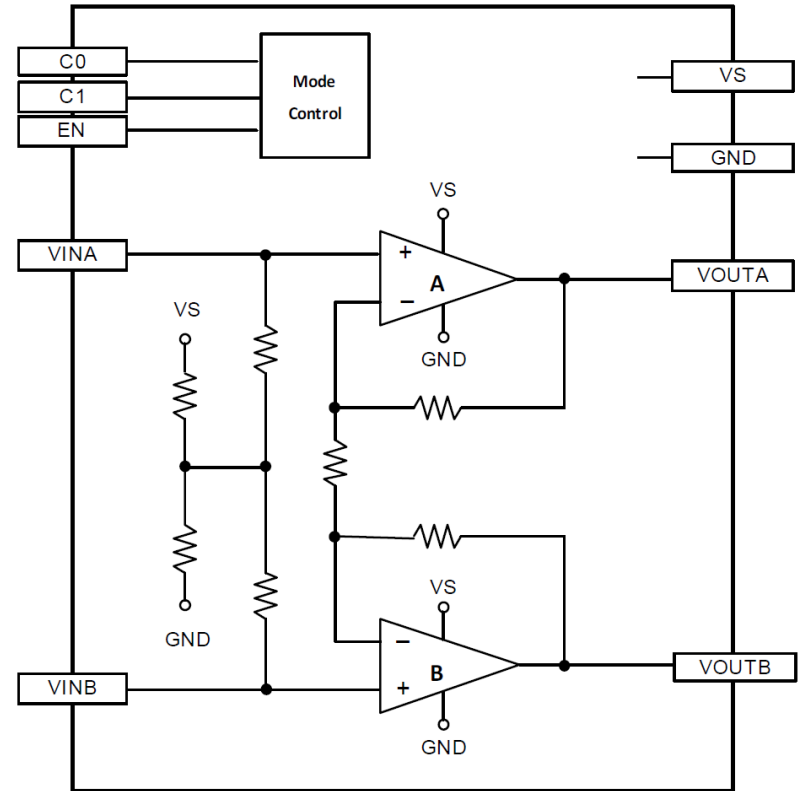
## Features:

- Supports two independent channels of high frequency G.Fast transmission
- Supports VDSL2 and ADSL2+ operation
- Very low power dissipation
  - Class AB operation
- 5 programmable states
  - Independent channel control
- No external gain resistors required
- Operates from a wide range of supply voltages
- Small footprint package
  - 28-pin (4 mm x 5 mm) QFN



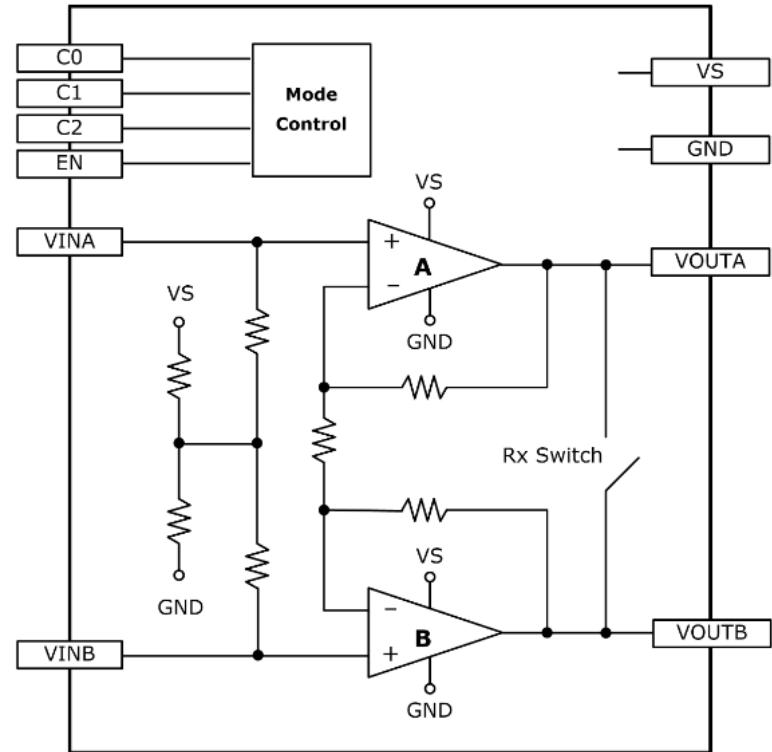
## Features:

- Supports high frequency G.Fast transmission
- Supports VDSL2 and ADSL2+ operation
- Very low power dissipation
  - Class AB operation
- 5 programmable states
- No external gain resistors required
- Small footprint package
  - 16-pin (4 mm x 4 mm) QFN



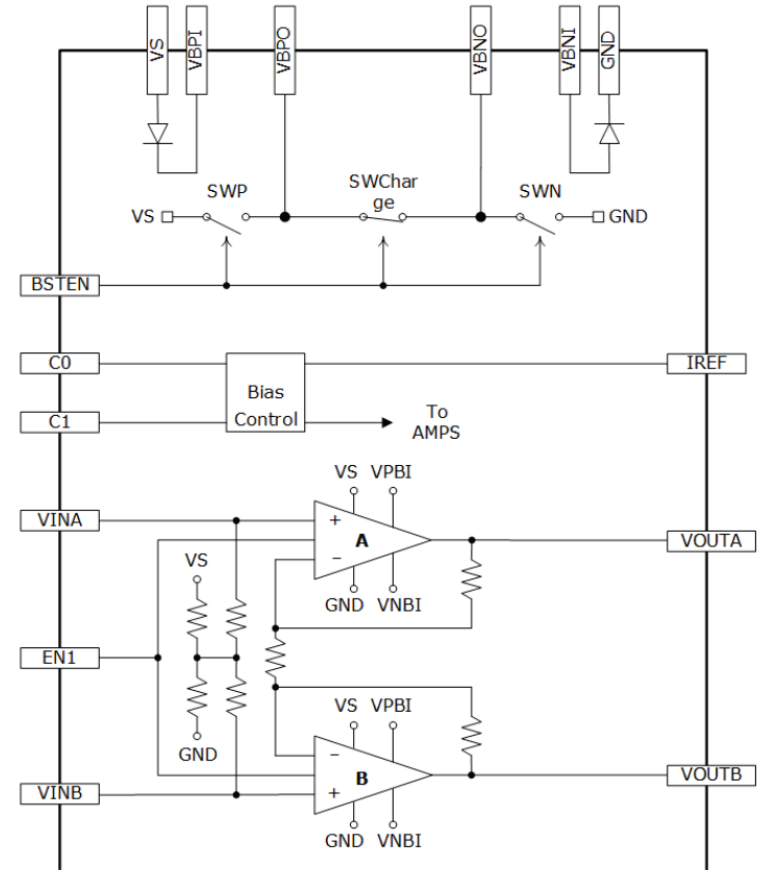
## Features:

- Support high frequency (up to 212 MHz) G.Fast transmission
- Very low power dissipation
  - Class AB operation
- 2 programmable gain levels
- 3 programmable transmit (TX) states and Receive (RX) states
- No external gain resistors required
- Small footprint package
  - 16-pin (4 mm x 4 mm) QFN



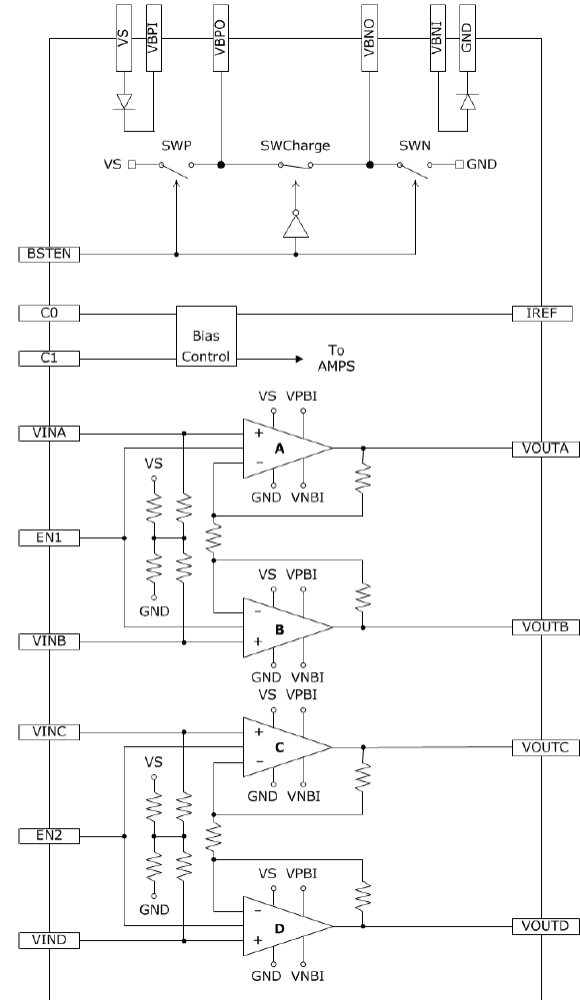
**Features:**

- Designed for HPAV2 Standard
- Class GH Operation
- Operation to 86 MHz
- MIMO or SISO Operation
- Supports HPAV2 Power Save Mode
- Channel Enable/Disable Control
- Drives Line Impedance Between 12  $\Omega$  to 100  $\Omega$
- High Signal Level Operation
  - -54.5 dBm/Hz, 2 - 30 MHz
  - -85.0 dBm/Hz, 30 - 86 MHz
- +12 V Operation
- Low Power Operation
- Small 16-pin, 4x4 mm Package



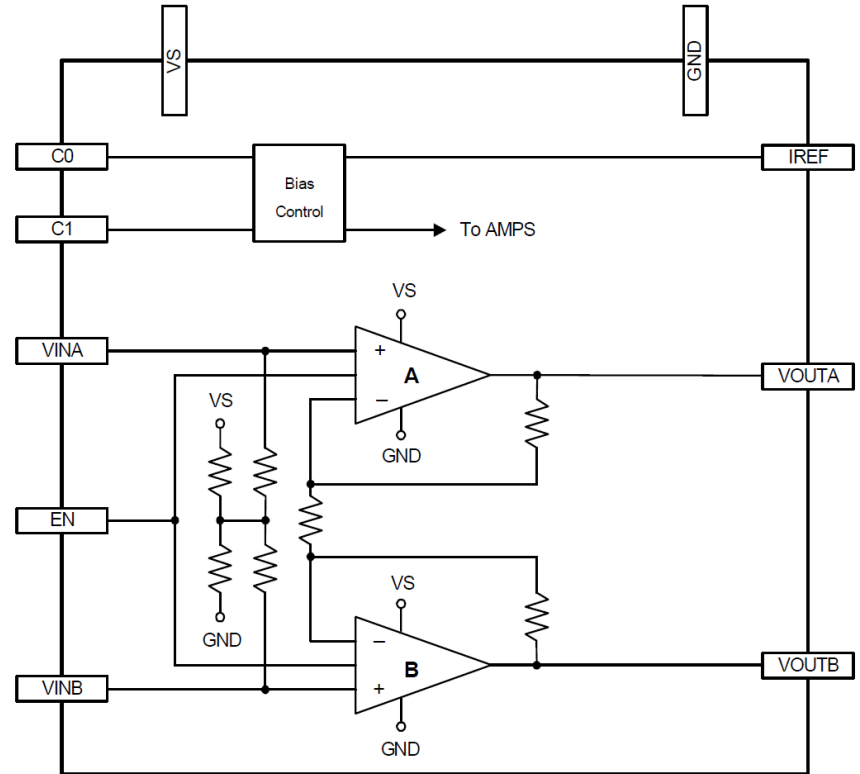
## Features:

- Designed for HPAV2 Standard
- Dual Channel Architecture
- Class GH Operation
- Operation to 86 MHz
- MIMO or SISO Operation
- Supports HPAV2 Power Save Mode
- Independent Channel Enable/Disable Control
- Drives Line Impedance Between 12  $\Omega$  to 100  $\Omega$
- High Signal Level Operation
  - -54.5 dBm/Hz, 2 - 30 MHz
  - -85.0 dBm/Hz, 30 - 86 MHz
- +12 V Operation
- Low Power Operation
- Small 28-pin, 4x5 mm Package



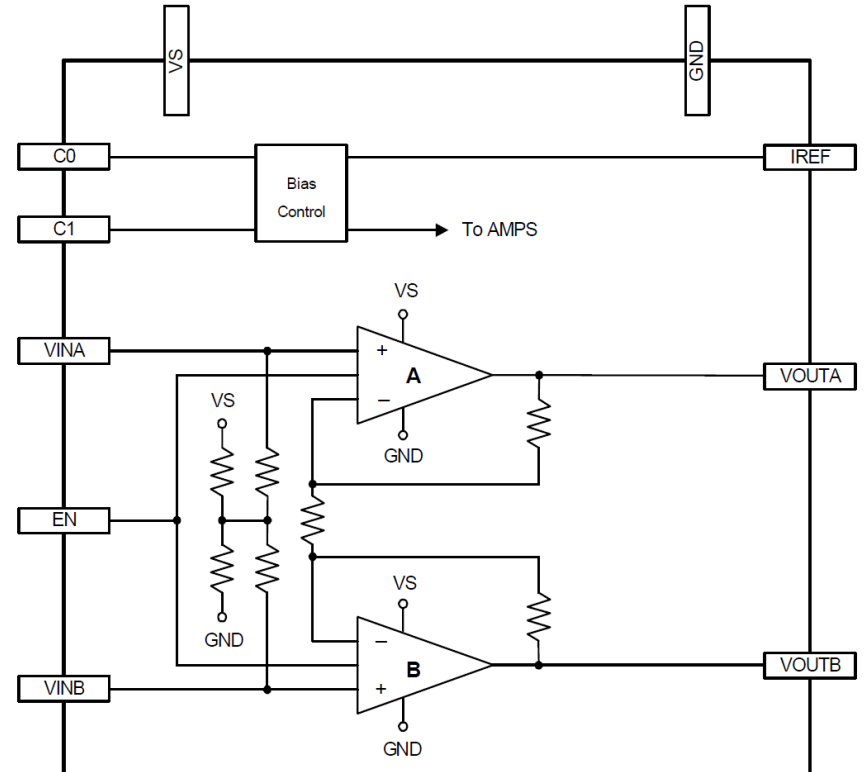
**Features:**

- Class AB Operation
- Operation to 86 MHz
- Enable/Disable Control
- Drives Line Impedance Between 12  $\Omega$  to 100  $\Omega$
- Low Power Operation
- Small 16-pin, 4x4 mm Package



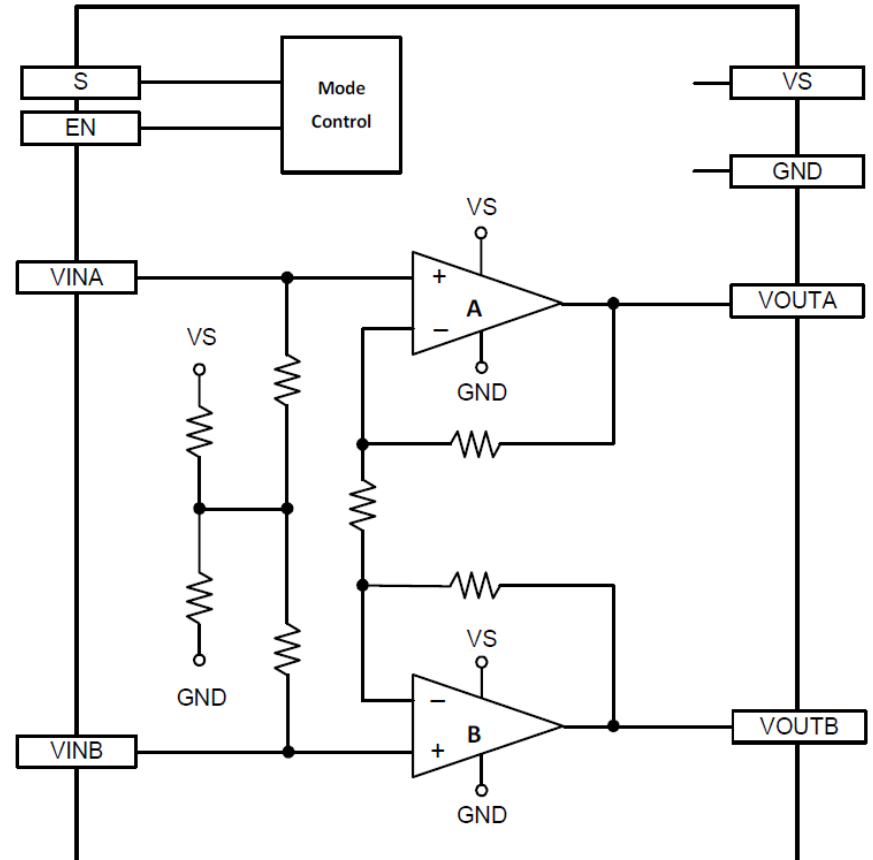
**Features:**

- High Voltage Gain - 25 dB
- Class AB Operation
- Operation to 86 MHz
- Enable/Disable Control
- Drives Line Impedance Between 50  $\Omega$  to 200  $\Omega$
- Low Power Operation
- Small 16-pin, 4x4 mm Package



**Features:**

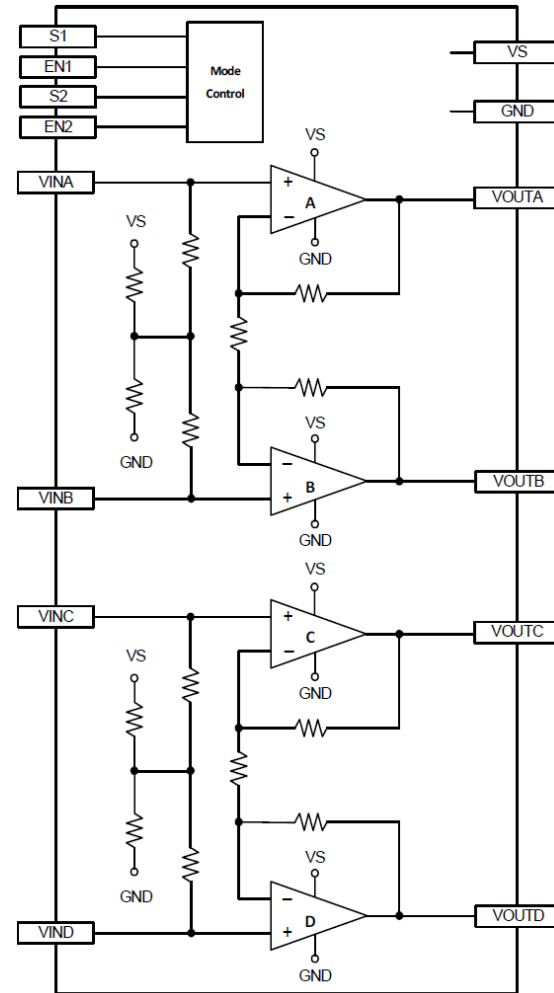
- Class AB Operation
- Very Low Power Operation
- 4 Programmable States
- No External Gain Resistors Required
- Small 16-pin, 4x4 mm Package





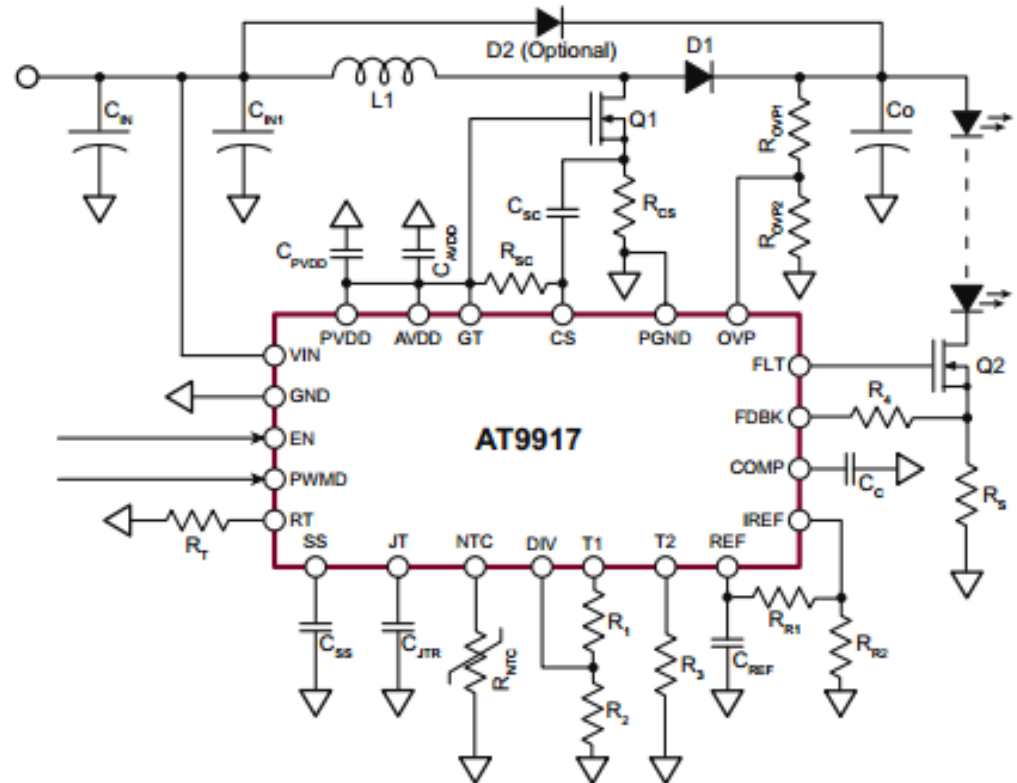
**Features:**

- Class AB Operation
- Very Low Power Operation
- 4 Programmable States
- No External Gain Resistors Required
- Small 28-pin, 4x5 mm Package



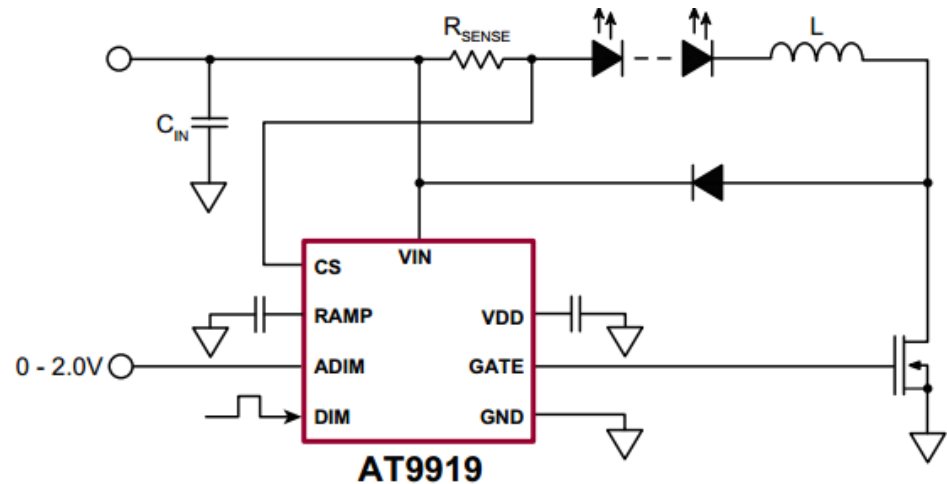
## Features:

- Switch mode controller for boost, -  
- SEPIC & buck converters
- Closed loop control of output current
- Constant frequency operation with –  
- programmable slope compensation
- Linear and PWM dimming
- Programmable jitter to reduce EMI
- Output short circuit & over voltage –  
- protection
- Programmable hiccup timer
- Temperature fold-back with external –  
- NTC resistor
- Meets AEC-Q100 requirements
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: TSSOP-24
- Recommended for Automotive Design



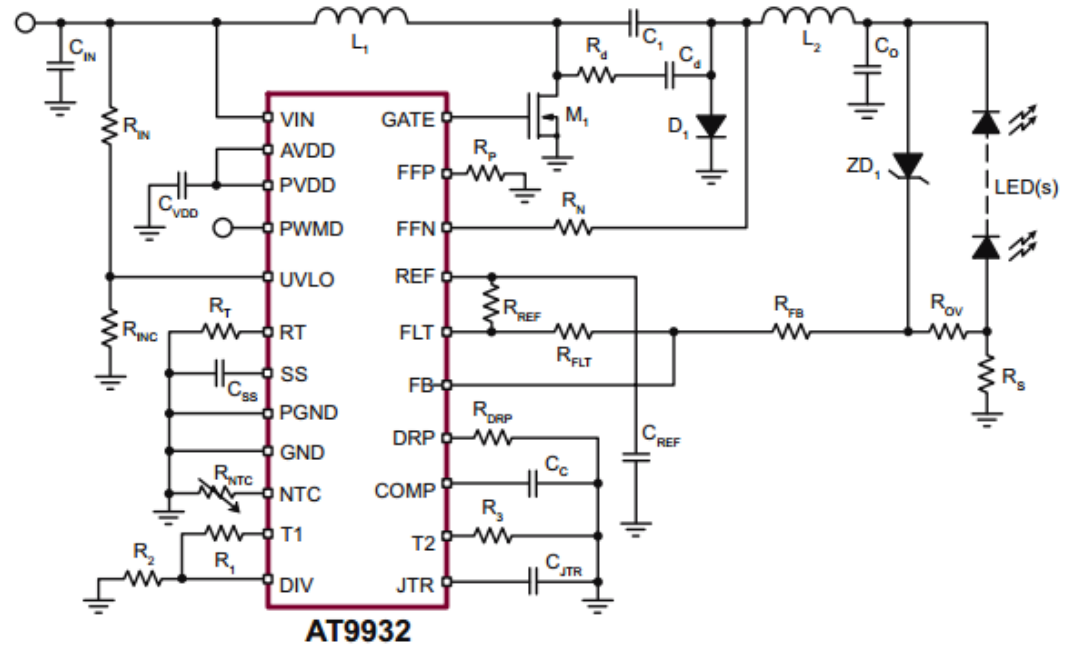
### Features:

- Hysteretic control with high-side –  
- current sensing
- Wide input voltage range: 4.5 to 40V
- >90% Efficiency
- Typical  $\pm 5\%$  LED current accuracy
- Up to 2.0MHz switching frequency
- Adjustable constant LED current
- Analog or PWM control signal for –  
- PWM dimming
- Over-temperature protection
- Meets AEC-Q100 requirements
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Option: WDFN-8 (3x3)
- Recommended for Automotive Design



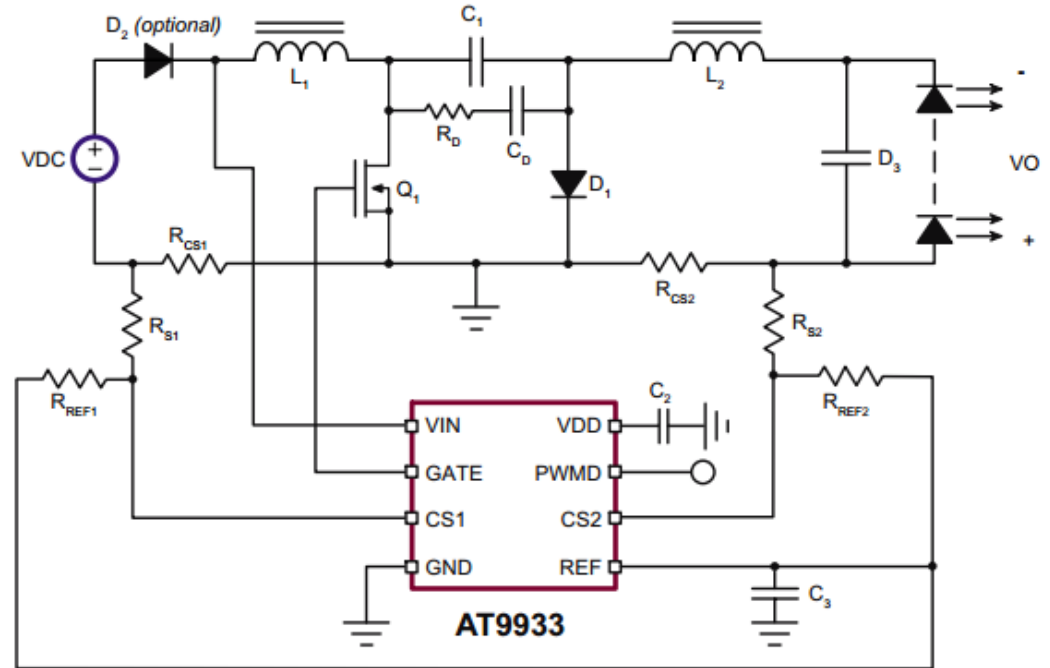
## Features:

- Constant output current
- Steps output voltage up or down
- Externally programmable fixed –  
- switching frequency
- Temperature fold-back with –  
- external NTC resistor
- Internal 40V voltage regulator
- ±1A MOSFET gate driver
- Short LED & Open LED protection
- Input under voltage protection
- Enable & PWM dimming
- Trimmed reference (±3% accurate)
- Meets AEC-Q100 requirements
- Operating Temperature Range:  
• -40°C to +125°C
- Package Option: TSSOP-24
- Recommended for Automotive Design



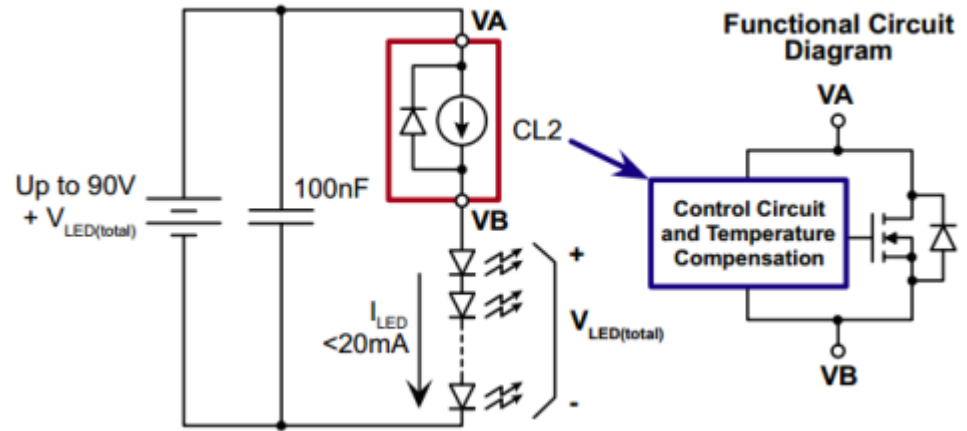
## Features:

- Constant current LED Driver
- Steps input voltage up or down
- Low EMI
- Variable frequency operation
- Internal 75V linear regulator
- Input and output current sensing
- Input current limit
- Enable & PWM dimming
- Meets AEC-Q100 requirements
- Operating Temperature Range:
  - -40°C to +125°C
- Package Option: TSSOP-24
- Recommended for Automotive Design



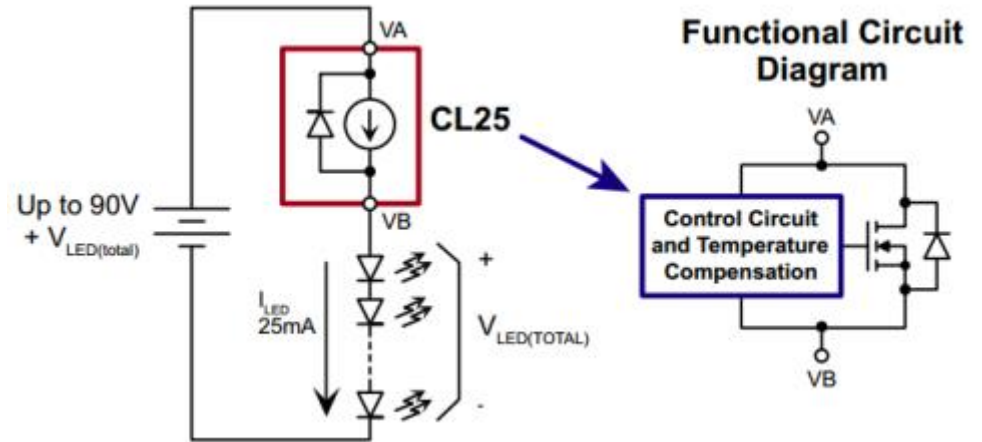
## Features:

- 5.0 to 90V operating range (VA-B)
- 20mA  $\pm 10\%$  at 5.0 - 90V
- 0.01%/ $^{\circ}\text{C}$  typical temperature –  
- coefficient
- Can be paralleled for higher current
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options: SOT-89, TO-252 –  
- (D-PAK), TO-92



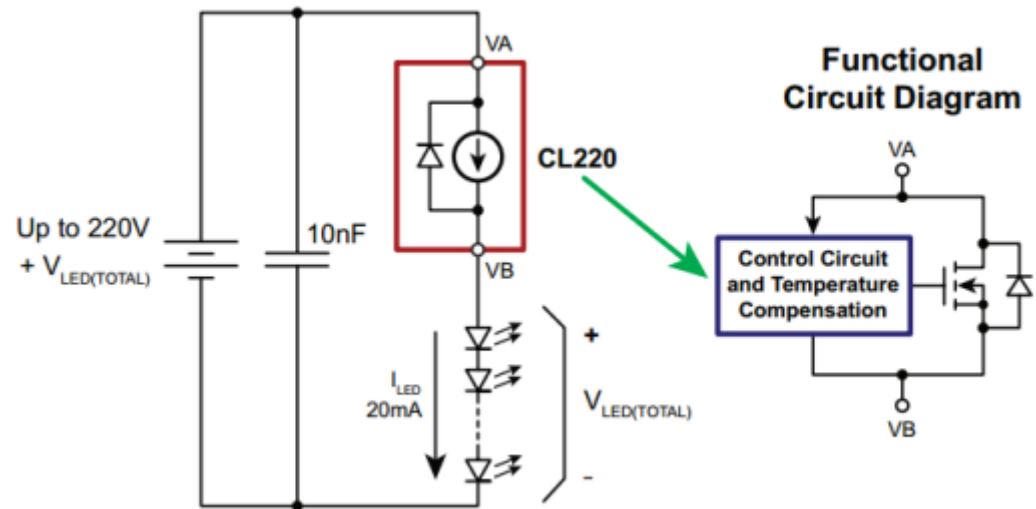
## Features:

- 5.0 - 90V operating range (VA-B)
- 25mA  $\pm 10\%$  at 5.0 - 90V
- 0.01%/ $^{\circ}\text{C}$  typical temperature coefficient
- No external components (two terminal – - device)
- Can be paralleled for higher current
- Operating Temperature Range:
  - -40 $^{\circ}\text{C}$  to +125 $^{\circ}\text{C}$
- Package Options: SOT-89, TO-92



## Features:

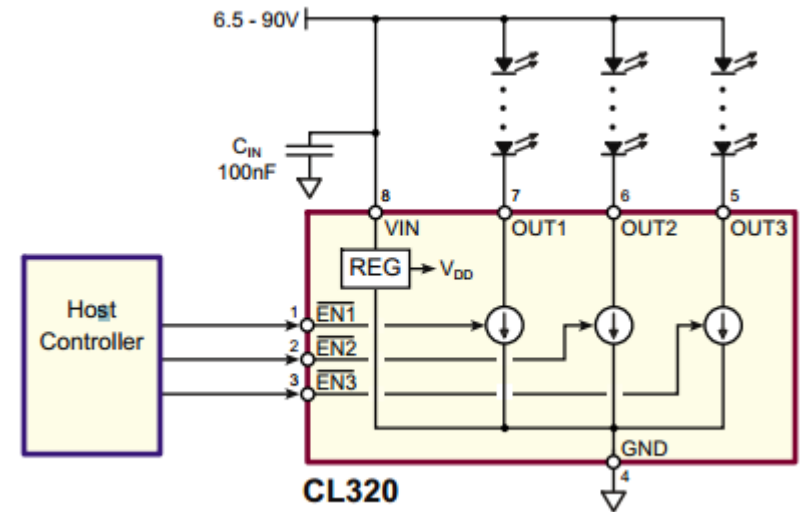
- 5.0 to 220V operating range (VA-B)
- 20mA  $\pm 10\%$  at 5.0 - 160V
- 0.01%/°C typical temperature –  
- coefficient
- Can be paralleled for higher current
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: TO-252 (DPAK), -  
- TO-220





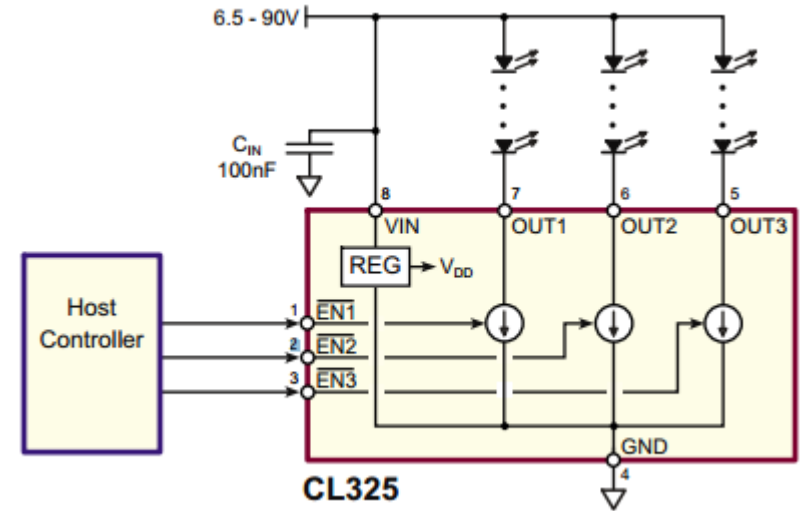
## Features:

- $\pm 6.0\%$  current accuracy @ 4.0 -15V
- 90V standoff voltage
- Separate enable pins for each channel allow –  
- for PWM dimming
- Over-temperature protection
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options: SOIC-8 w/Heat Slug



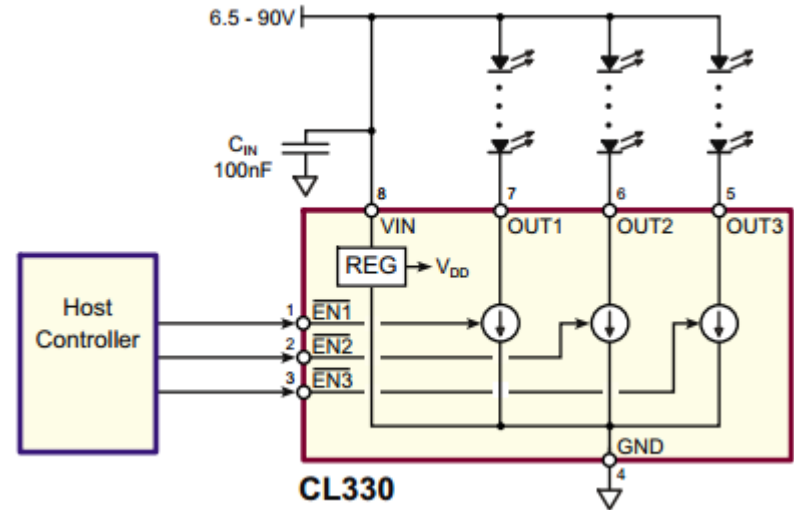
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- $\pm 6\%$  current accuracy @ 4.0 -15V
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- Separate enable pins for each channel allow –  
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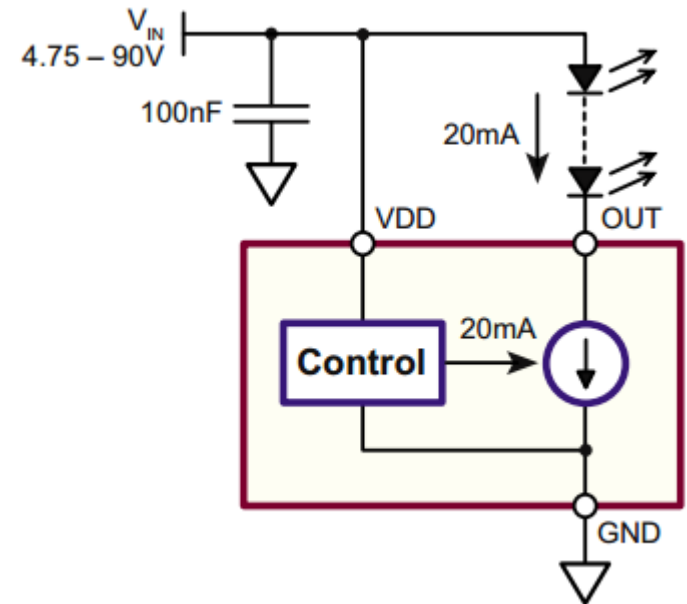
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  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options: SOIC-8 w/Heat Slug



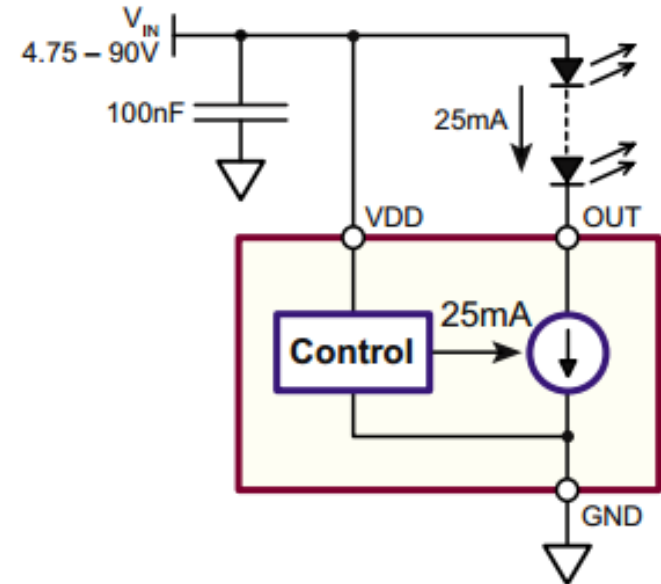
## Features:

- 20mA  $\pm 10\%$  constant current drive
- 1.0V dropout
- 90V rating for transient immunity
- Temperature compensated
- 4.75 - 90V supply range
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: TO-252 (DPAK), TO-92



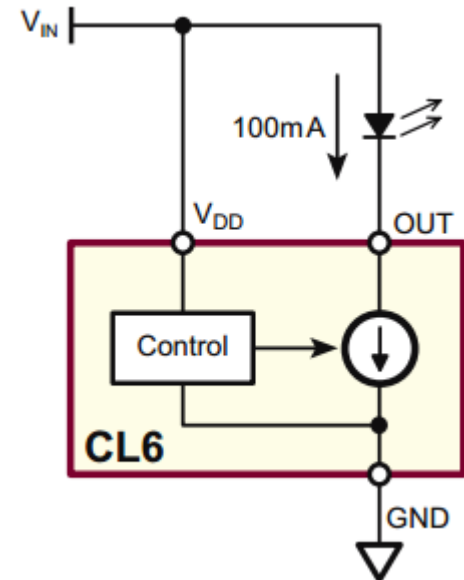
## Features:

- 25mA  $\pm 10\%$  constant current drive
- 1.0V dropout
- 90V rating for transient immunity
- Temperature compensated
- 4.75 - 90V supply range
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: TO-252 (DPAK), TO-92



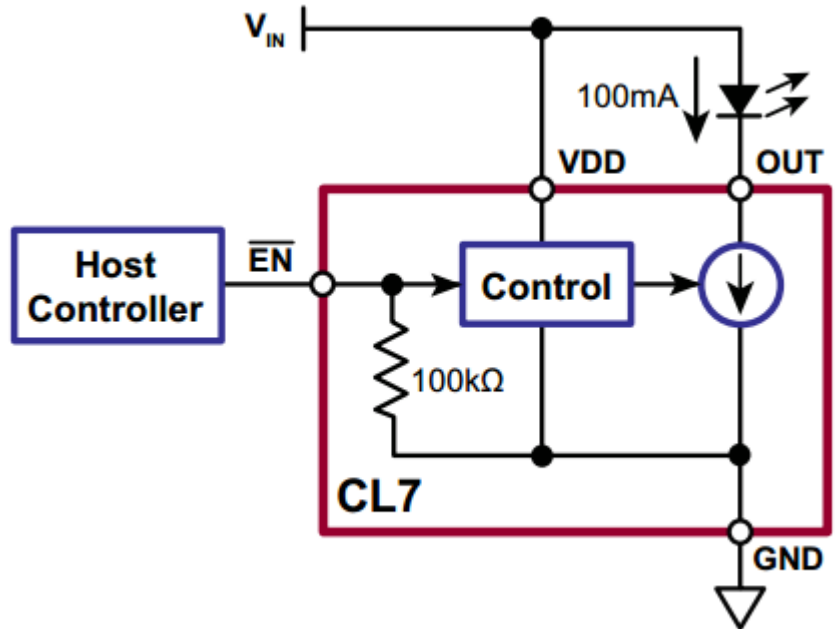
## Features:

- 100mA  $\pm 5\%$  constant current drive
- Built-in reverse polarity protection
- Dimmable via PWM supply
- Over temperature protection
- Tab ground allows direct heat sinking to chassis
- 90V max rating for transient immunity
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options: TO-252 (DPAK), TO-220



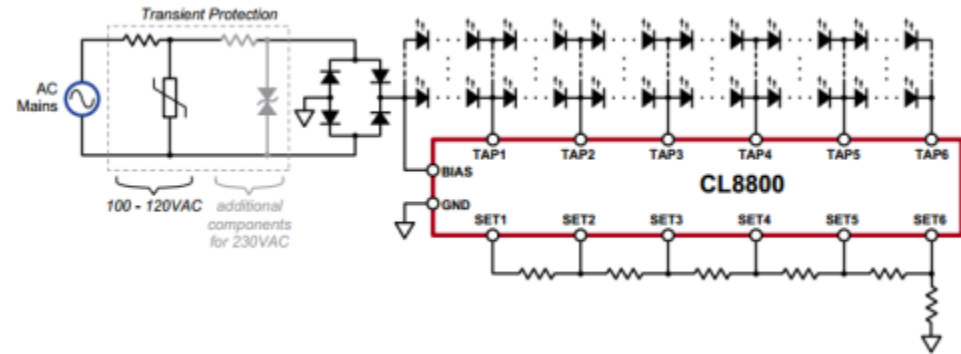
## Features:

- 100mA  $\pm 5\%$  constant current drive
- Built-in reverse polarity protection
- Logic level enable
- Dimmable via EN pin
- Over temperature protection
- 90V max rating for transient immunity
- Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options: SOIC-8 w/Heat Slug



## Features:

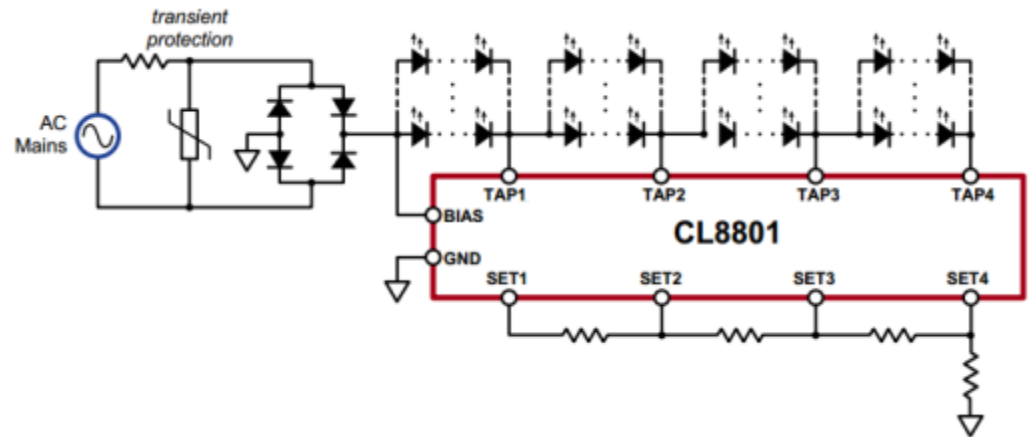
- Minimal component count (base –  
- config: CL8800 + 6 resistors + -  
- diode bridge)
- No magnetics, no capacitors
- Up to 7.5W output (13W w/ heat sink)
- >110Lm/W using efficient LEDs
- 85% typical electrical efficiency
- >0.95 power factor
- <20% THD line current
- Low conducted EMI w/o filters
- 85% LED luminous utilization
- Phase dimmer compatible with an –  
- RC network
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: VQFN-33 (6x6)





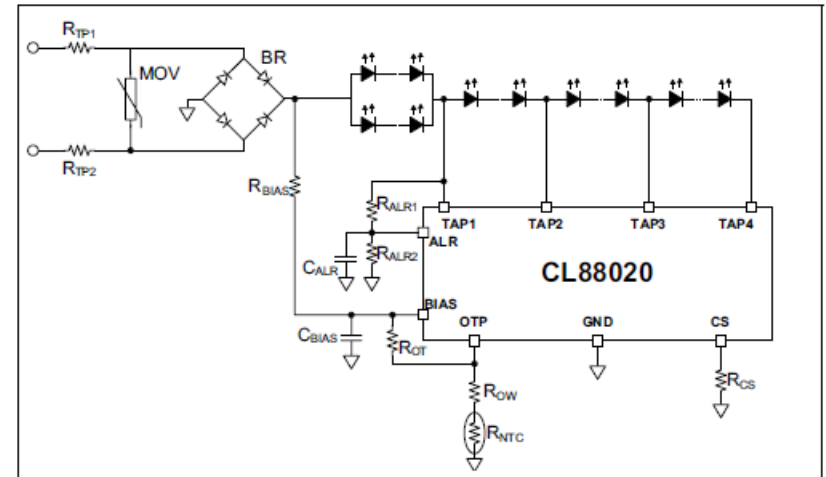
## Features:

- Minimal component count (base –  
– config: CL8801 + 4 resistors + –  
– diode bridge)
- No magnetics, no capacitors
- Up to 7.5W output (13W w/ heat –  
– sink)
- >110Lm/W using efficient LEDs
- 85% typical electrical efficiency
- >0.95 power factor
- <30% THD line current
- Low conducted EMI w/o filters
- 85% LED luminous utilization
- Phase dimmer compatible with an –  
– RC network
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: VQFN-33 (6x6)



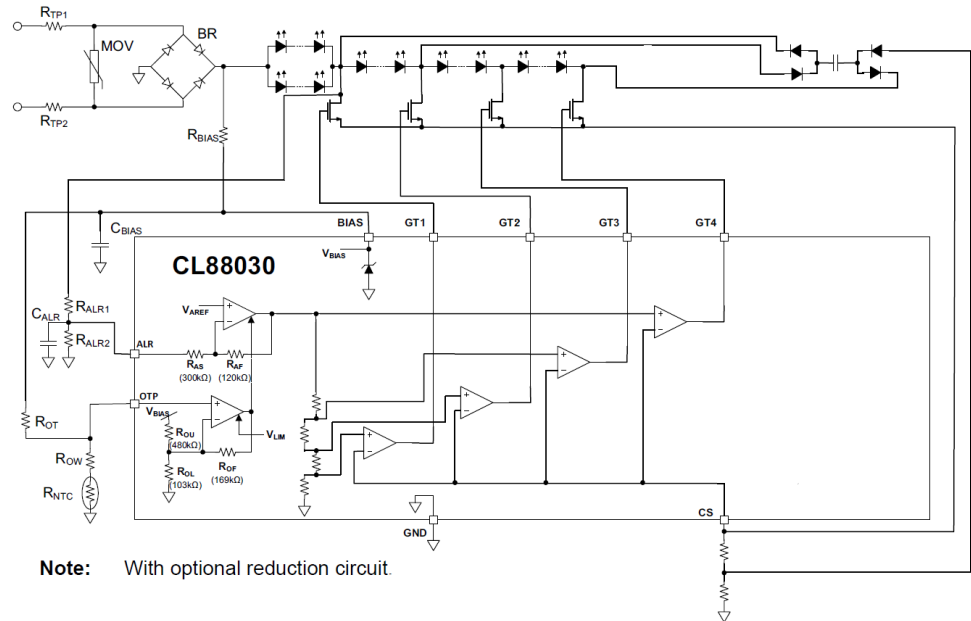
## Features:

- Optimized for 120 VAC Nominal Input Voltage:
  - 120 VAC  $\pm$  15% input voltage
- Targeted for 8.5W Output Power
- Programmable Over-temperature Protection:
  - Gradual Reduction in Light Output
- Active Line Regulation:
  - Typical Line Regulation of  $-12\%$  to  $+0\%$
- Four Taps with Two Current Set Resistors:
  - Allows Optimization of THD
- Percent Flicker = 90.3%, Flicker Index = 0.288
- Optional Reduced Light Output Ripple:
  - Provides Continuous Power to the LED
  - Eliminates Strobing
  - Uses an External Ceramic Storage Capacitor
- TRIAC Dimmer Compatible
- Thermally Enhanced 8-Lead SOIC Package:
  - Larger Creepage Distances between High – Voltage and Low Voltage Pins



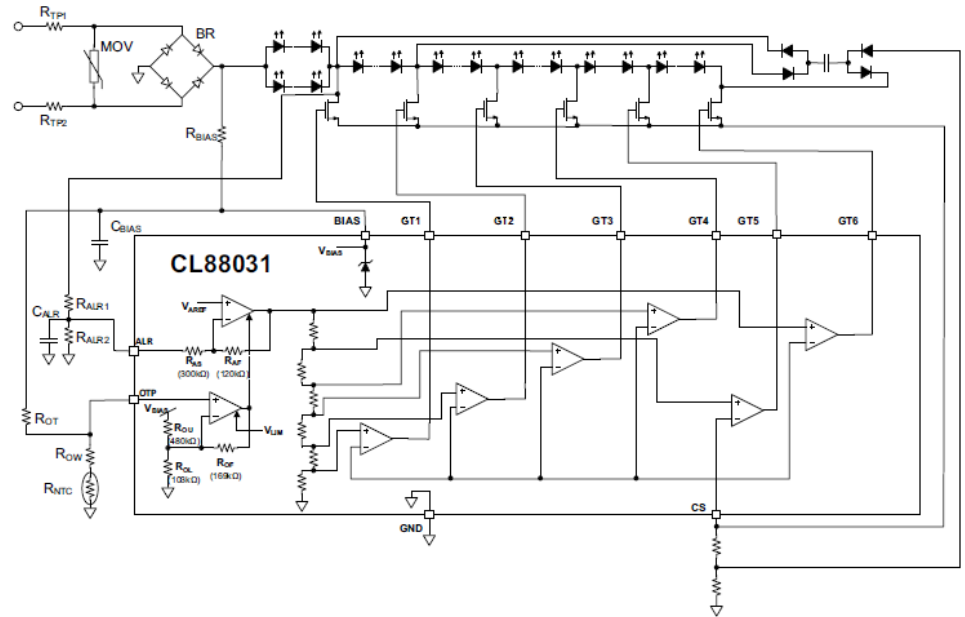
## Features:

- Suitable for 120VAC/230VAC/277VAC nominal input voltage
  - $\pm 15\%$  input voltage tolerance recommended
- Programmable Overtemperature Protection
  - Provides gradual reduction in light output with increasing temperature
- Active Line Regulation
  - Provides fairly constant output power over variations in AC line voltage
  - Adjustable “knee” of regulation
- 4 Taps with two Current Set Resistors
  - Allows optimization of THD
- Optional Reduced Flicker Index
  - Provides near-continuous power to the LEDs
  - Reduces Strobing
  - Uses an external Capacitor
- Compatible with Phase-cut Dimming, both leading and Trailing Edge



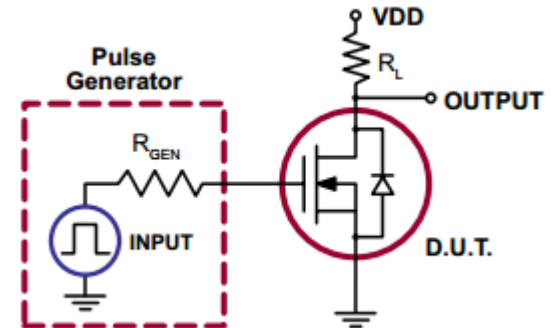
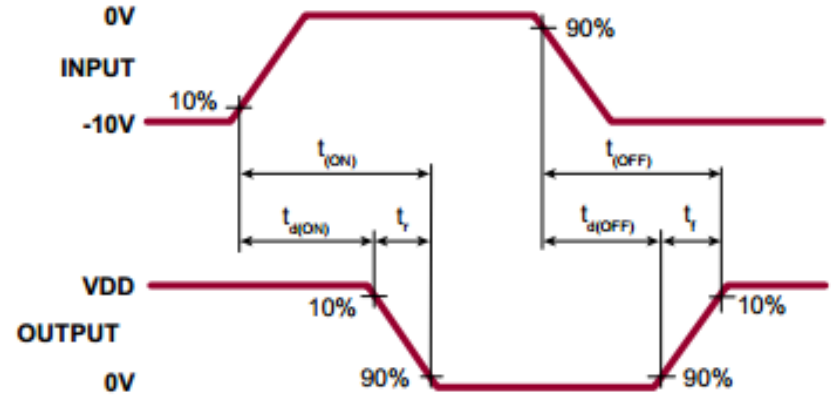
## Features:

- Suitable for 120VAC/230VAC/277VAC nominal input voltage
  - $\pm 15\%$  input voltage tolerance recommended
- Programmable Overtemperature Protection
  - Provides gradual reduction in light output with increasing temperature
- Active Line Regulation
  - Provides fairly constant output power over variations in AC line voltage
  - Adjustable “knee” of regulation
- 6 Taps with two Current Set Resistors
  - Allows optimization of THD
- Optional Reduced Flicker Index
  - Provides near-continuous power to the LEDs
  - Reduces Strobbing
  - Uses an external Capacitor
- Compatible with Phase-cut Dimming, both leading and Trailing Edge



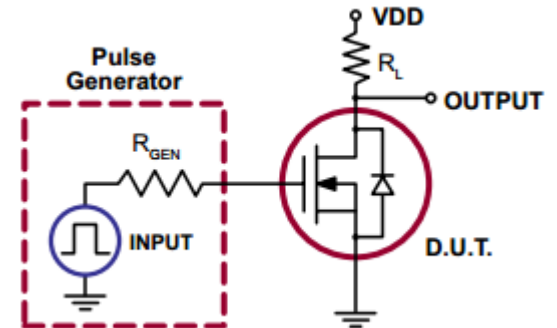
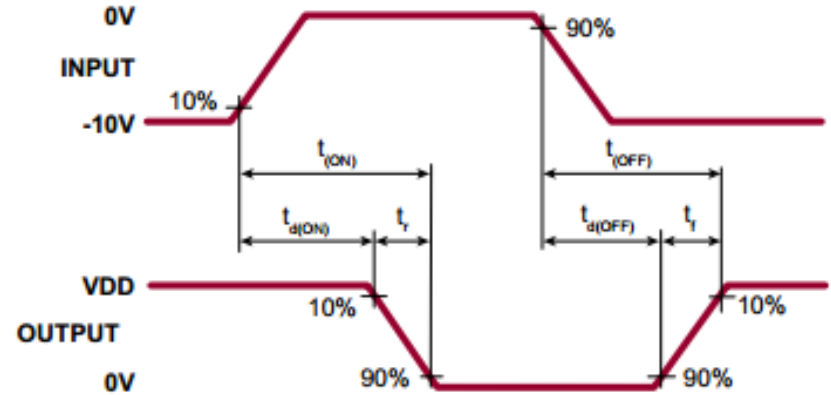
## Features:

- 90V  $BV_{DSX(min)}$
- $6.0\Omega$   $R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package:
  - 3L SOT-89, 5L SOT-23



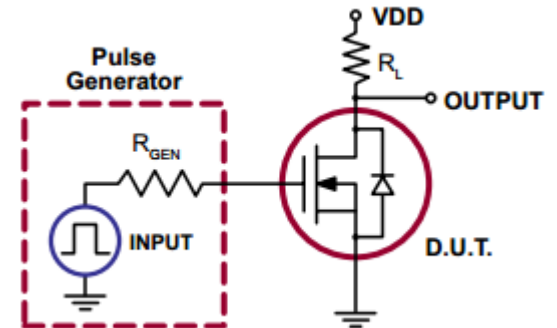
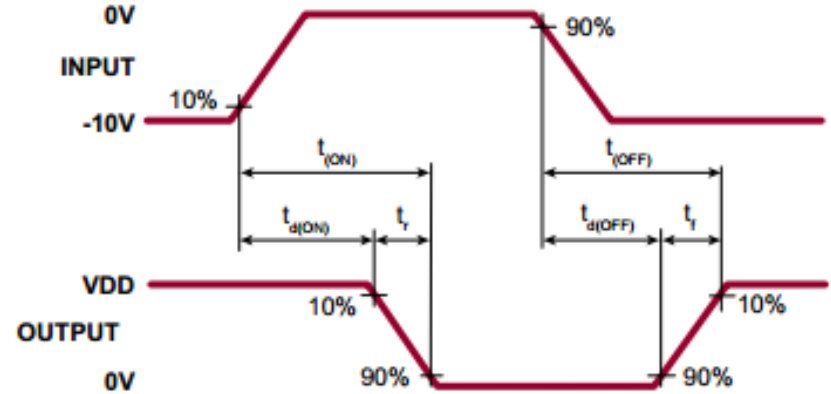
## Features:

- 500V  $BV_{DSX(min)}$
- $10\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package:
  - TO-252 (DPAK), SOT-89



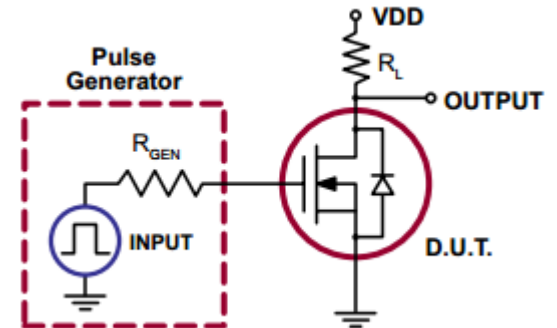
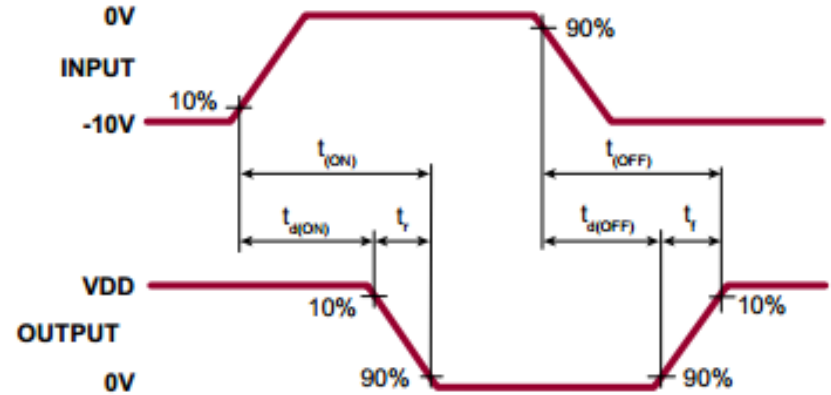
## Features:

- 700V  $BV_{DSX(min)}$
- $42\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package:
  - TO-252 (DPAK)



## Features:

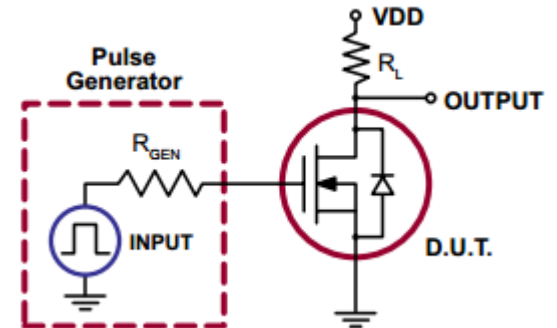
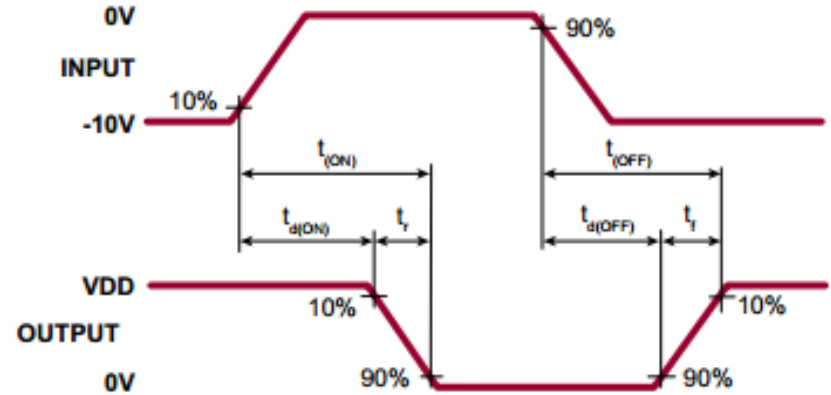
- 300V  $BV_{DSX(min)}$
- $12\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package:
  - TO-92, SOT-89





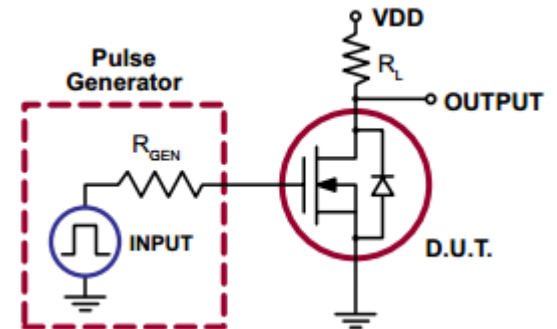
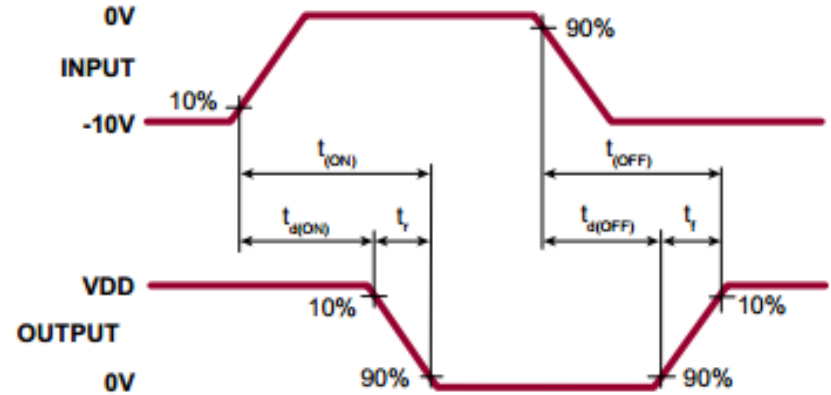
## Features:

- 350V  $BV_{DSX(min)}$
- $25\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package:
  - TO-92, TO-220



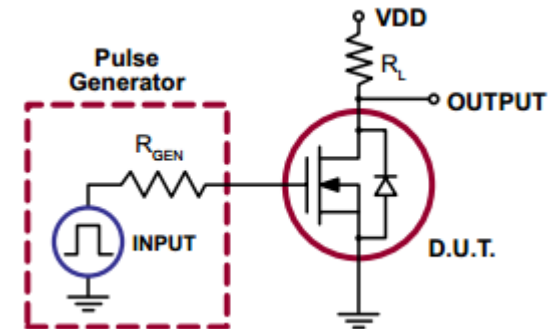
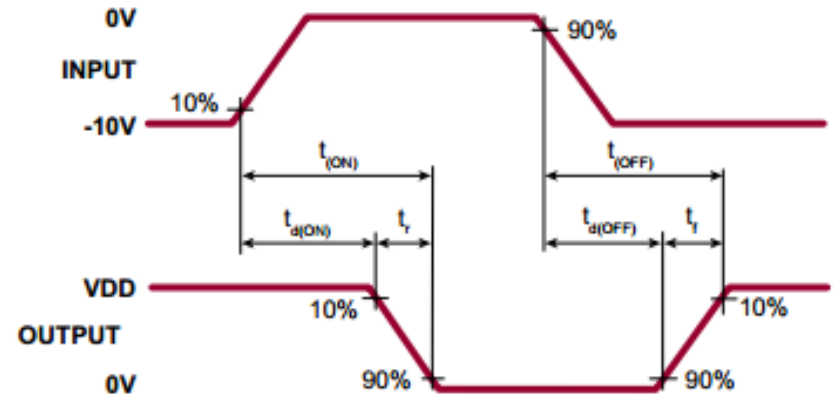
## Features:

- 400V  $BV_{DSX(min)}$
- $25\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: -
  - TO-92, TO-220, SOT-89



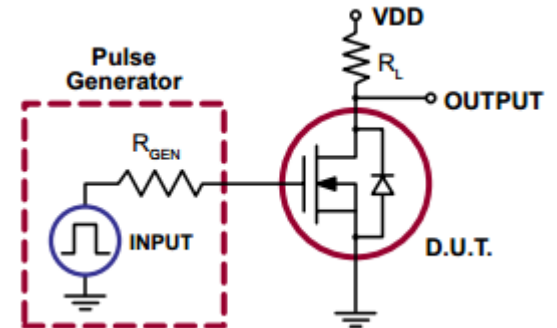
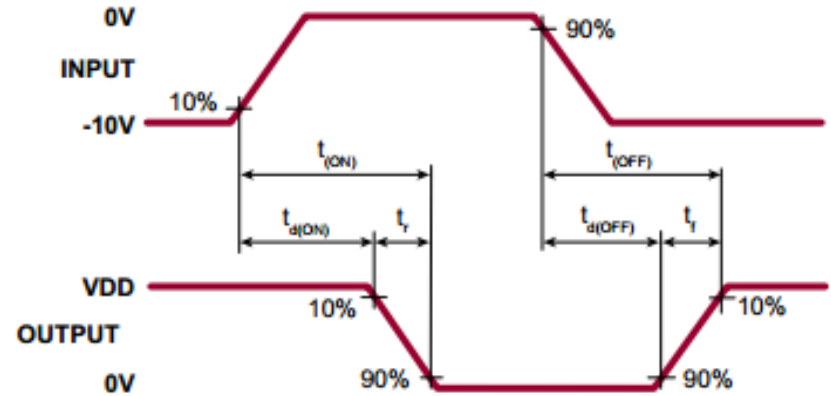
## Features:

- 250V  $BV_{DSX(min)}$
- $3.5\Omega$   $R_{DS(on)(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: -  
- TO-252 (DPAK)



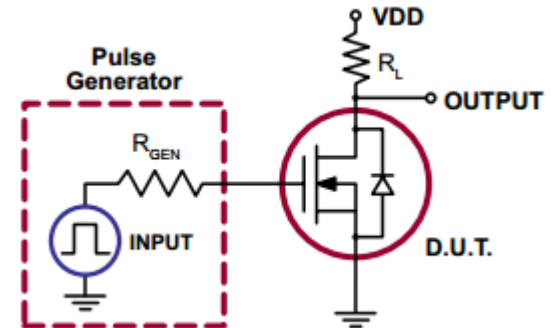
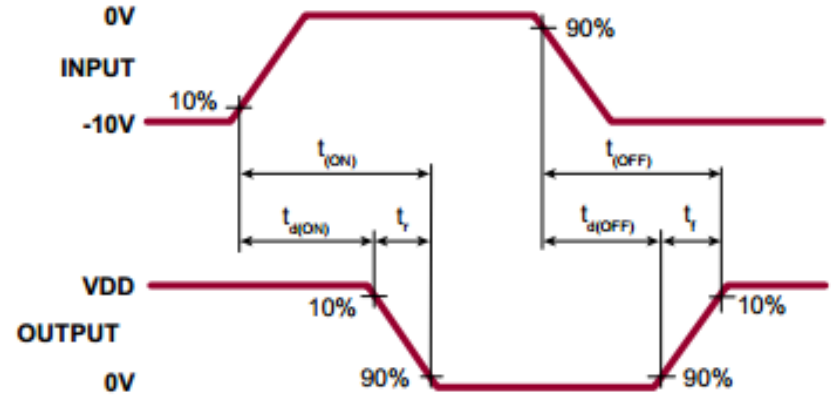
## Features:

- 350V  $BV_{DSX(min)}$
- $35\Omega$   $R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: -
  - SOT-23, SOT-89



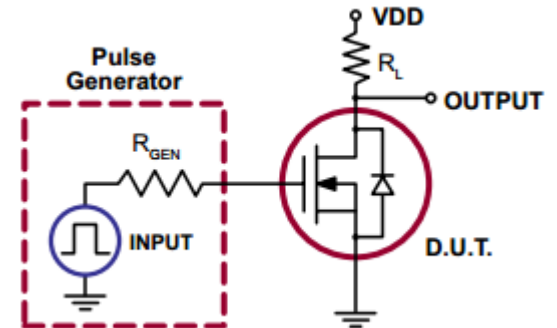
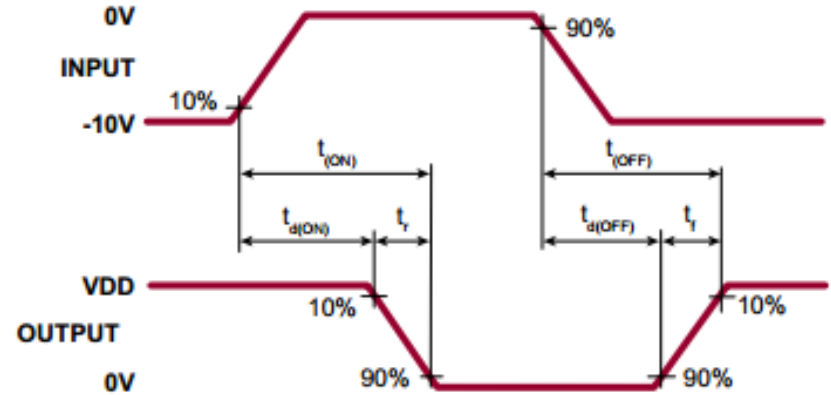
## Features:

- 450V  $BV_{DSX(min)}$
- $60\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: SOT-89



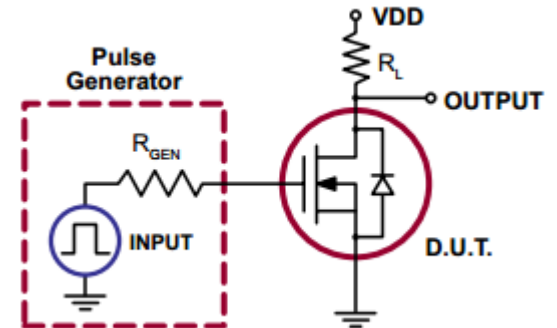
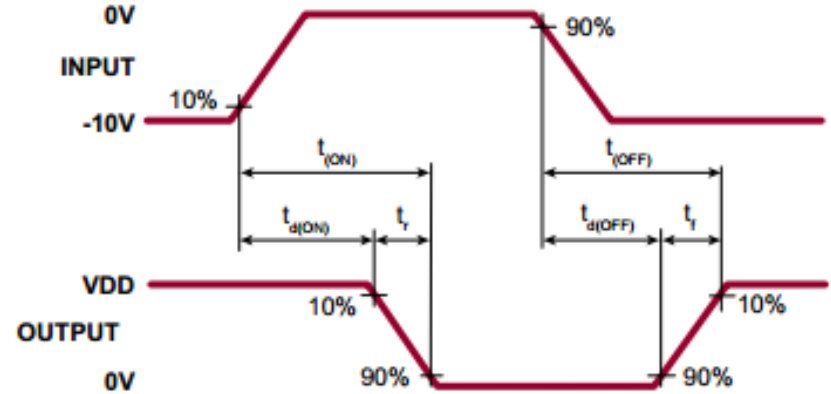
## Features:

- 250V  $BV_{DSX(min)}$
- $6.0\Omega$   $R_{DS(on)(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: SOT-89



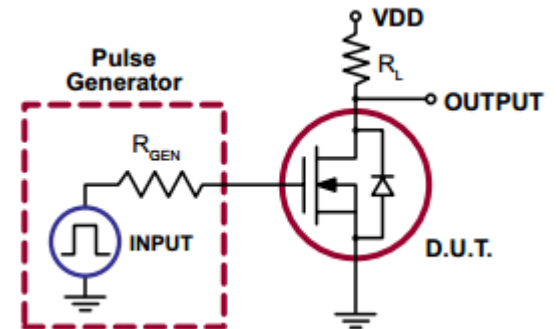
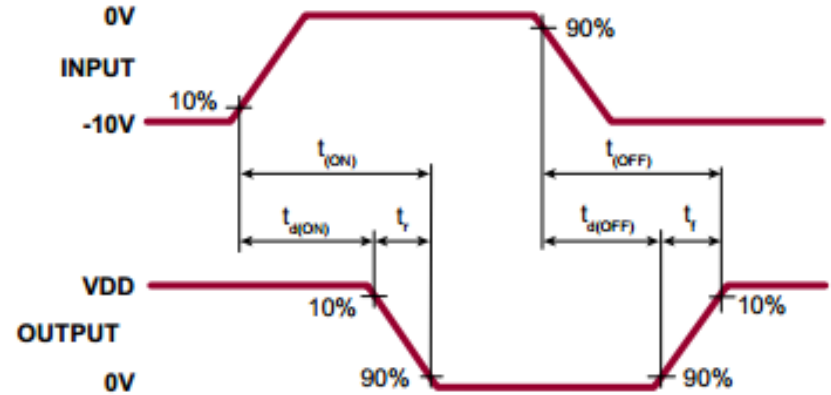
## Features:

- 350V  $BV_{DSX(min)}$
- $10\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: SOT-89



## Features:

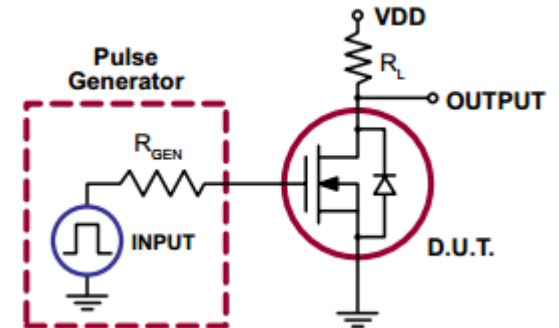
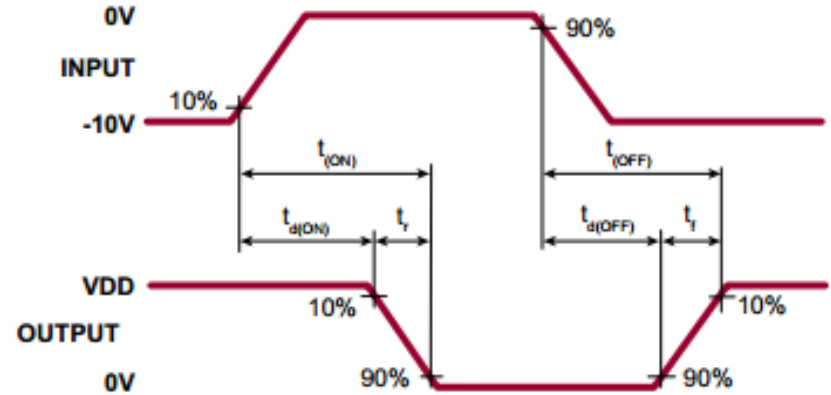
- 450V  $BV_{DSX(min)}$
- $20\Omega R_{DSON(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: -
  - TO-92, SOT-89





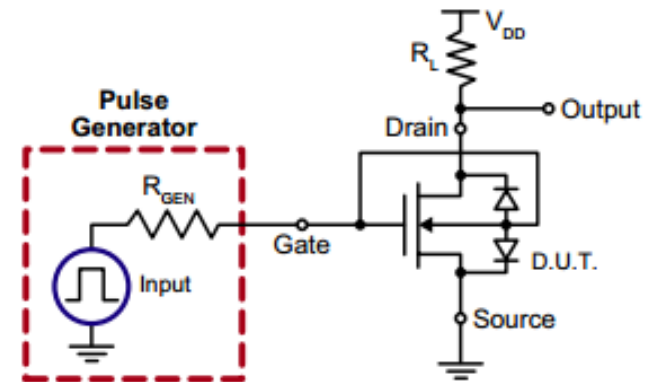
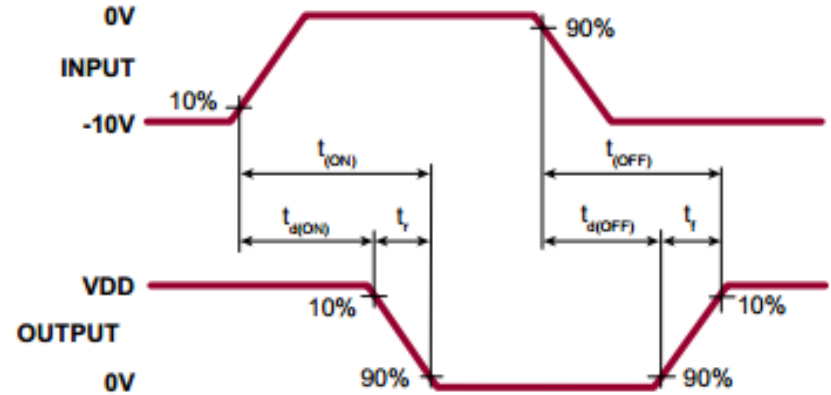
## Features:

- 650V  $BV_{DSX(min)}$
- $8.0\Omega$   $R_{DS(on)(max)}$
- High Input Impedance
- Low Input Capacitance
- Fast Switching Speeds
- Low On-Resistance
- Free from Secondary Breakdown
- Low Input and Output Leakages
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: -  
- TO-252 (DPAK)



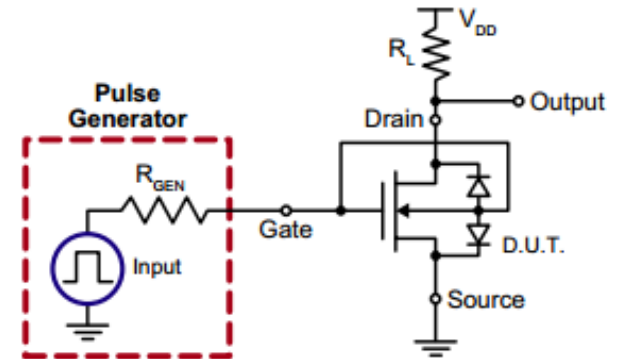
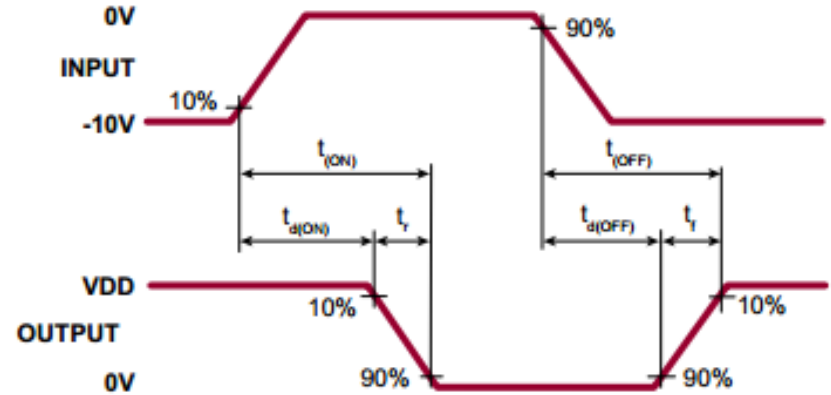
## Features:

- 9.0V  $BV_{DSX(min)}$
- $1.4\Omega R_{DSON(max)}$
- Bi-directional
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speeds
- High Input Impedance and High Gain
- Low Power Drive Requirement
- Ease of Paralleling
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: -  
- 5L SOT-23



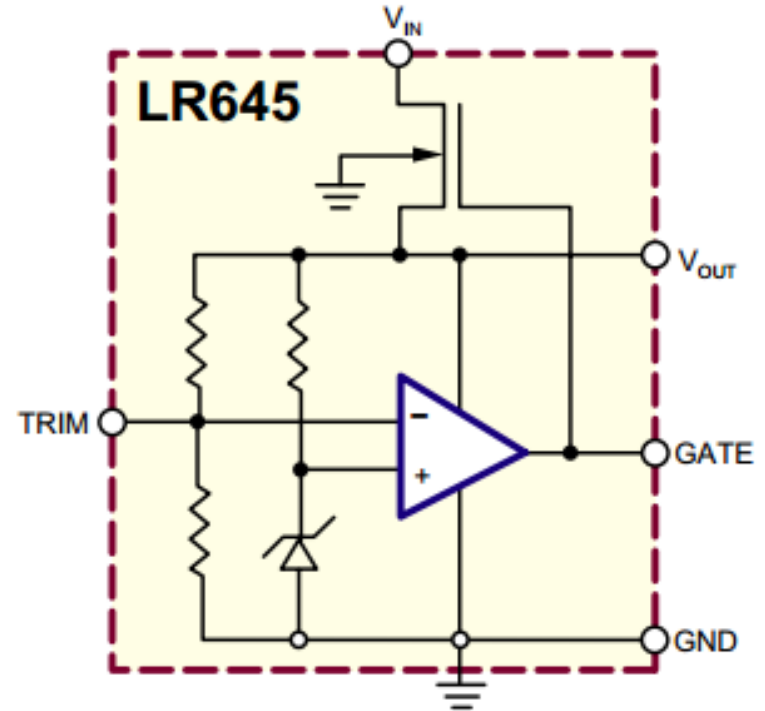
## Features:

- 500V  $BV_{DSX(min)}$
- $1000\Omega$   $R_{DS(on)(max)}$
- Bi-directional
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speeds
- High Input Impedance and High Gain
- Low Power Drive Requirement
- Ease of Paralleling
- Operating Temperature Range:
  - $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- RoHS Compliant Package: -
  - SOT-23, TO-92, SOT-89



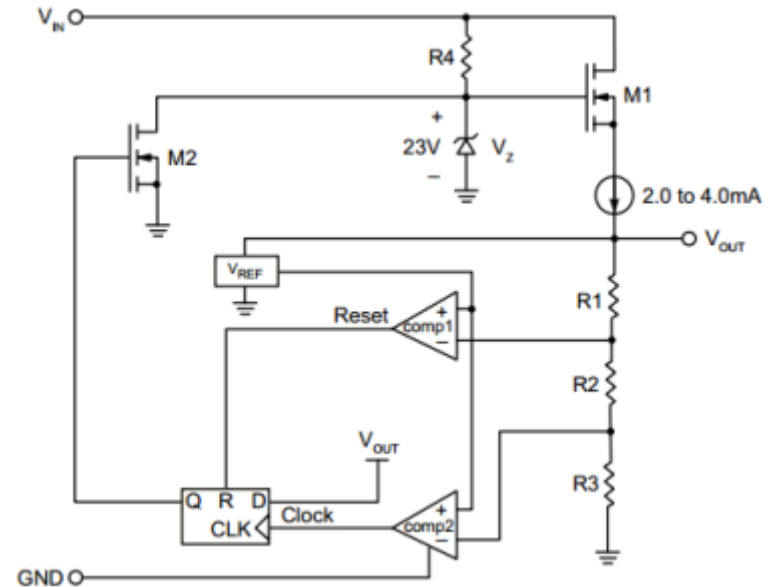
## Features:

- Accepts Inputs from 15V to 450V
- Output currents up to 3.0mA –
  - continuous, 30mA peak
- Supply Current Typically 50 $\mu$ A
- Line regulation typically 0.1mV/V
- Output can be trimmed from 8.0 to 12V
- Output current can be increased –
  - to 150mA with external FET
- Operating Temperature Range:
  - -55 $^{\circ}$ C to +150 $^{\circ}$ C
- Package Options: SOIC-8, TO-92, -
  - TO-220, SOT-89



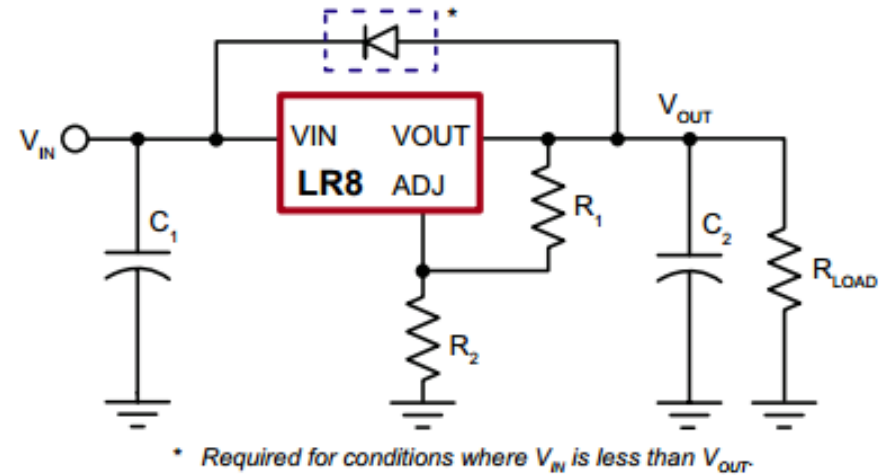
## Features:

- Accepts Inputs from 35V to 450V
- Output Current Limiting
- For PWM ICs with Start-up Threshold
- Voltage of 13.9V – 18.0V
- Very Low Power Consumption After Start-up
- Operating Temperature Range:
  - -55°C to +150°C
- Package Options: TO-92, SOT-89



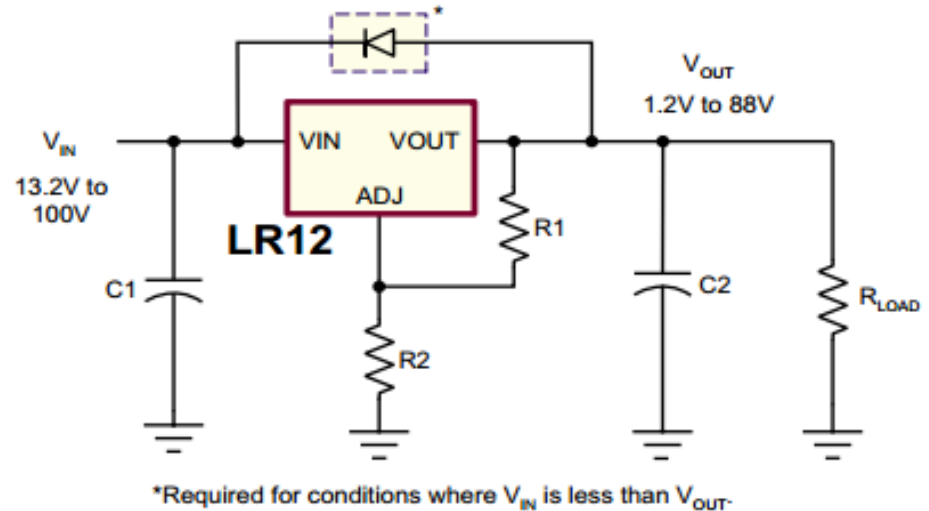
## Features:

- 13.2V - 450V input voltage range
- Adjustable 1.2V - 440V output regulation
- 5% output voltage tolerance
- Output current limiting
- 10 $\mu$ A typical ADJ current
- Internal junction temperature limiting
- Operating Temperature Range:
  - -55 $^{\circ}$ C to +150 $^{\circ}$ C
- Package Options: TO-252 (DPAK), -  
- TO-92, SOT-89



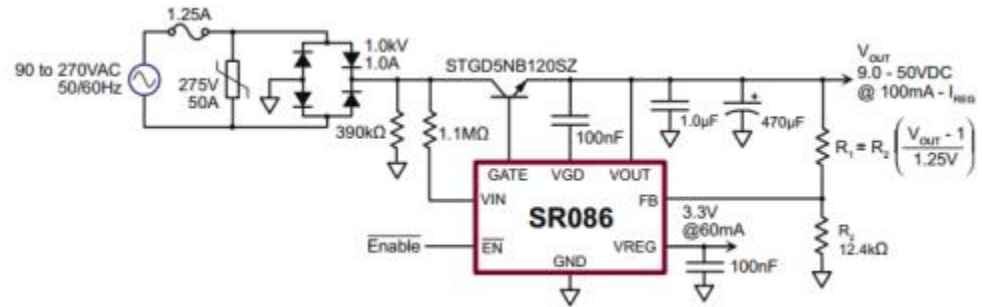
## Features:

- 13.2V to 100V input voltage range
- Stable with 100nF output capacitor
- Adjustable 1.2V to 88V output –  
- regulation
- 5% reference voltage tolerance
- Output current limiting, 50mA min.
- 10 $\mu$ A typical ADJ current
- Over temperature protection
- Operating Temperature Range:
  - -55 $^{\circ}$ C to +150 $^{\circ}$ C
- Package Options: TO-252 (DPAK), -  
- TO-92, SOIC-8



## Features:

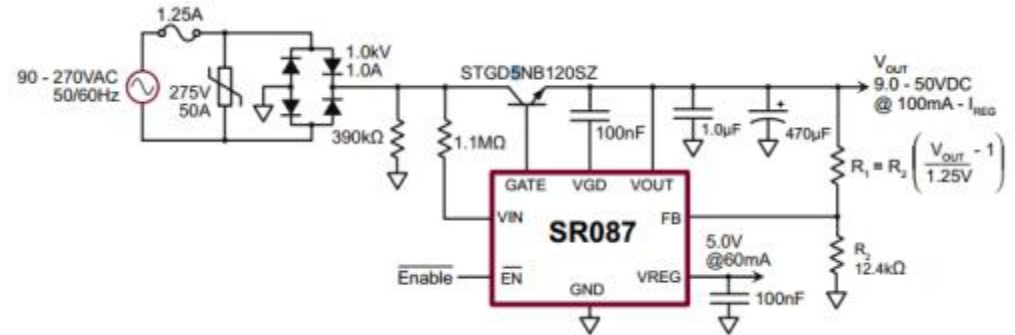
- Efficient operation without magnetics
- No high voltage capacitors
- Adjustable main output voltage –  
- (9.0 to 50V)
- Additional 3.3V internal regulator
- Up to 100mA combined output current
- Single BOM for 120VAC/230VAC
- Built-in soft start
- Less than 200mW standby power
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-8 w/Heat Slug





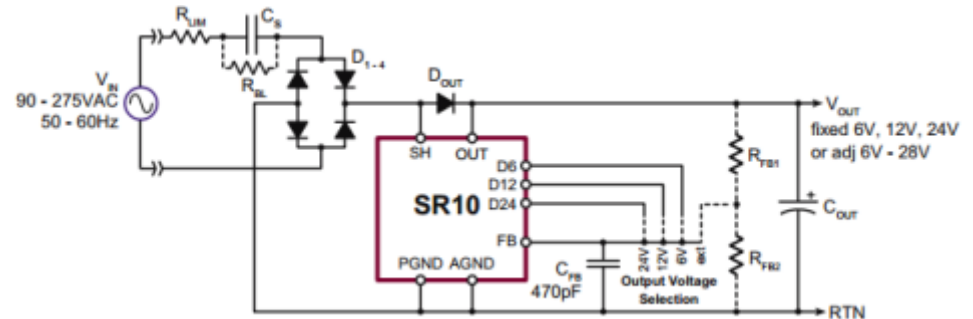
## Features:

- Efficient operation without magnetics
- No high voltage capacitors
- Adjustable main output voltage –  
- (9.0 to 50V)
- Additional 5.0V internal regulator
- Up to 100mA combined output current
- Single BOM for 120VAC/230VAC
- Built-in soft start
- Less than 200mW standby power
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-8 w/Heat Slug



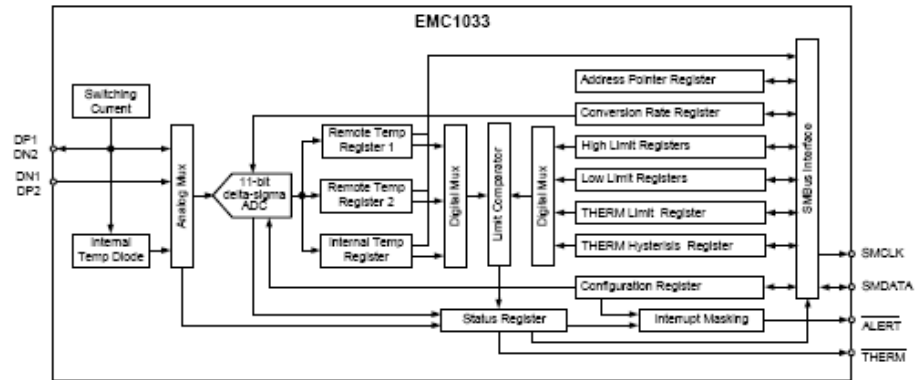
## Features:

- Efficiencies up to 75% at 20mA
- Less than 20mW standby power
- Optional 6.0V, 12V or 24V fixed –  
- output voltage, or adjustable –  
- from 6.0V to 28V
- Output current scalable up to 50mA
- 120VAC to 240VAC input
- No magnetics
- Inherent short circuit protection
- Operating Temperature Range:
  - -40°C to +125°C
- Package Options: SOIC-8



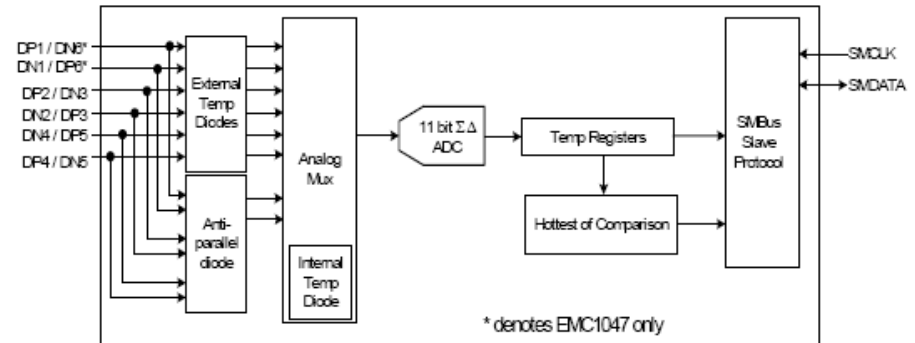
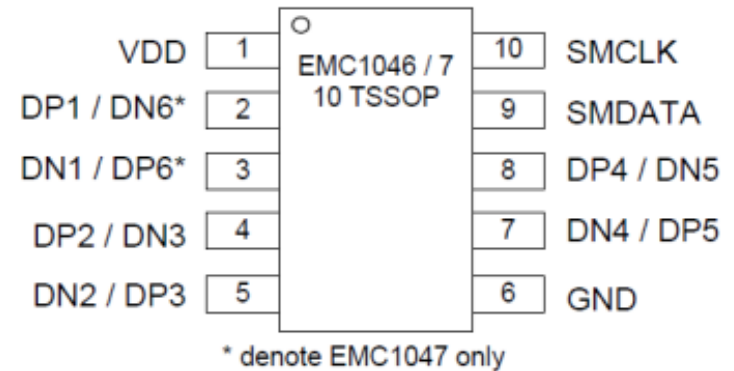
## Features:

- Resistance Error Correction
- Ideality Factor Configuration
- Remote Thermal Zones
- $\pm 1.0^{\circ}\text{C}$  Accuracy ( $40^{\circ}\text{C}$  to  $80^{\circ}\text{C}$ )
- $0.125^{\circ}\text{C}$  resolution
- Internal Thermal Zone
- $\pm 3.0^{\circ}\text{C}$  Accuracy ( $0^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ )
- Maskable Interrupt
- One-shot Command during standby
- Programmable Temperature Conversion Rate
- Extended temperature ( $-64^{\circ}\text{C}$  to  $191^{\circ}\text{C}$ )
- Over-limit Filtering with Consecutive Counter
- SMBus Interface
- 8-pin TSSOP



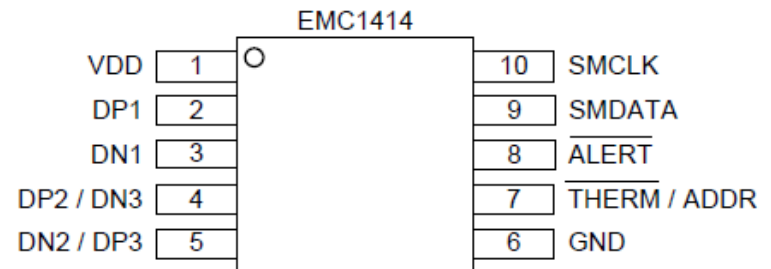
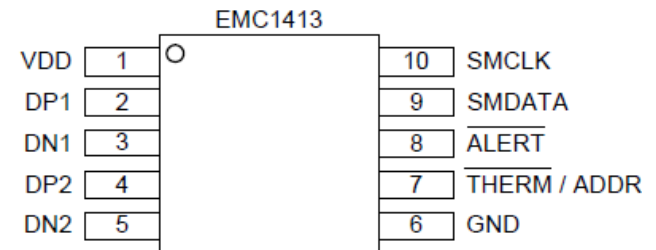
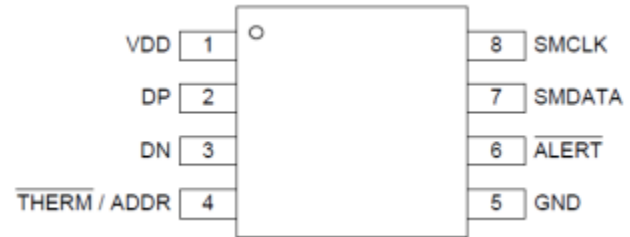
## Features:

- 6 / 7 (EMC1046/EMC1047) channel –
  - temp sensor
- Supports diodes requiring the BJT or transistor model such as substrate and CPU diodes
- Resistance Error Correction
- Up to six External Temperature Monitors:
  - $\pm 1^\circ\text{C}$  Accuracy ( $60^\circ\text{C} < T_{\text{DIODE}} < 100^\circ\text{C}$ )
  - 0.125°C Resolution
  - Supports up to 2.2nF filter capacitor
  - Anti-parallel diodes for extra diode – support and compact design
- Internal Temperature Monitor
  - $\pm 2^\circ\text{C}$  accuracy
- 3.3V Operation
- 10-pin TSSOP



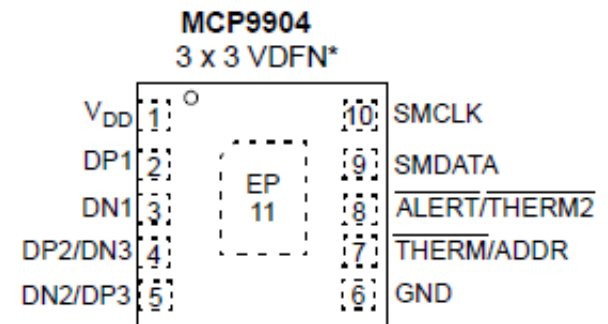
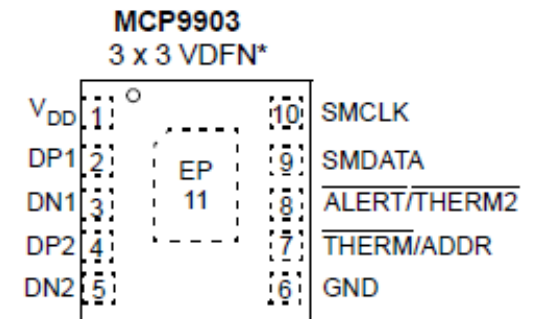
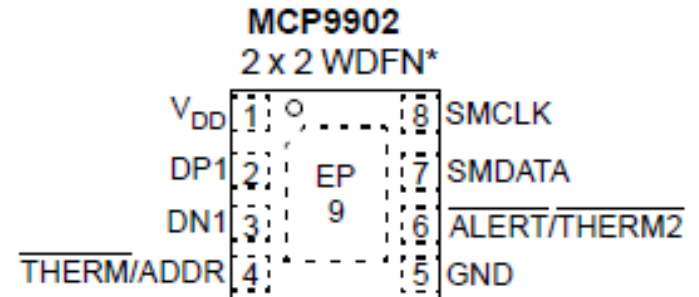
## Features:

- 2 Channel temperature sensor (EMC1412)
- 3 Channel temperature sensor (EMC1413)
- 4 Channel temperature sensor (EMC1414)
- Remote temperature sensors (1,2,or 3 channels):
  - Automatically determines external diode type
  - Supports BJT/transistor model for –
    - substrate diode
  - Resistance Error Correction
- EMC1412 compatible w ADM1032, MAX6649, LM99
- External temperature monitor accuracy:
  - $\pm 1^{\circ}\text{C}$  Accuracy ( $20^{\circ}\text{C} < T_{\text{DIODE}} < 110^{\circ}\text{C}$ )
  - $0.125^{\circ}\text{C}$  resolution
  - Supports up to 2.2nF diode filter capacitor
- Internal temperature monitor accuracy:
  - $\pm 1^{\circ}\text{C}$  accuracy
- Programmable temperature limits for ALERT# -  
- and THERM#
- Programmable or fixed SMBus/I<sup>2</sup>C Address
- 3.3V Operation
- 8-pin 2x3 TDFN, MSOP; 10-pin DFN, MSOP



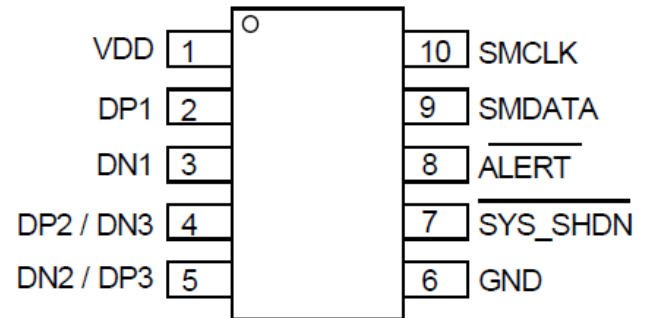
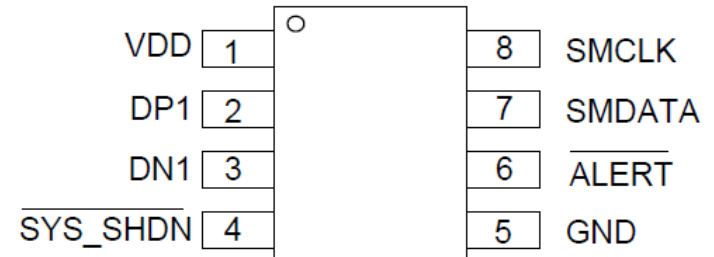
## Features:

- 2, 3, 4 temperature sensor optimized for low – temperature
- External temperature monitor accuracy
- $\pm 1^{\circ}\text{C}$  maximum accuracy ( $-40^{\circ}\text{C} < T_{\text{DIODE}} < 65^{\circ}\text{C}$ )
- $\pm 2^{\circ}\text{C}$  maximum accuracy ( $85^{\circ}\text{C} < T_{\text{DIODE}} < +125^{\circ}\text{C}$ )
- $0.125^{\circ}\text{C}$  resolution
- Supports up to 2.2nF diode filter capacitor
- Remote temperature sensor:
  - Automatically determines external diode type
  - Supports BJT/transistor model for substrate diode
  - Resistance Error Correction
- Internal temperature monitor accuracy:
  - $\pm 1^{\circ}\text{C}$  accuracy
  - $0.125^{\circ}\text{C}$  resolution
- Programmable temperature limits for ALERT# - and THERM#
- Programmable or fixed SMBus/I<sup>2</sup>C Address
- 3.3V Operation
- 8-Lead 2x2 mm WDFN package
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$



## Features:

- 2 Channel temperature sensor (EMC1422)
- 3 Channel temperature sensor (EMC1423)
- 4 Channel temperature sensor (EMC1424)
- Remote temperature sensors (1,2,or 3 channels):
  - Automatically determines external diode type
  - Supports BJT/transistor model for substrate diode
  - Resistance Error Correction
- EMC1422 compatible with ADM1032, MAX6649, LM99
- Hardware Thermal Shutdown with dedicated pin:
  - Configured range 77°C to 112°C in 1°C steps
  - Cannot be disabled or modified by software
- External temperature monitor accuracy:
  - $\pm 1^\circ\text{C}$  Accuracy ( $60^\circ\text{C} < T_{\text{DIODE}} < 100^\circ\text{C}$ )
  - 0.125°C resolution
  - Anti-parallel diodes for extra diode support
- Internal temperature monitor accuracy:
  - $\pm 2^\circ\text{C}$  accuracy
- Programmable temperature limits for ALERT#
- 3.3V Operation
- 8-pin MSOP, 10-pin MSOP

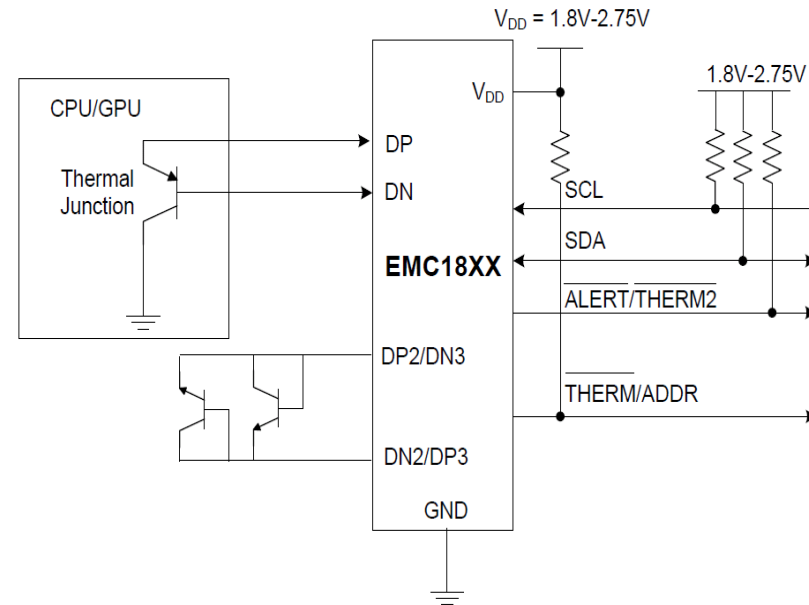


# EMC1812/3/4/5 EMC1833

2 to 5 Channel Temperature Sensor with Rate of Change Measurement

## Features:

- Measures Temperature Rate of Change Calculation with Preemptive Alert(s) Limits
- Up to four External Temperature Monitors
- Accuracy:
  - $\pm 1^{\circ}\text{C}$  (max)  $+25^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  TA,  $0^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  TD
  - $\pm 2^{\circ}\text{C}$  (max)  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  TA,  $-40^{\circ}\text{C}$  to  $+127^{\circ}\text{C}$  TD
- Internal Temperature Sensor:
  - $\pm 1^{\circ}\text{C}$  maximum accuracy,  $-40^{\circ}\text{C}$  to  $+127^{\circ}\text{C}$
  - Resolution (Internal/External):  $0.125^{\circ}\text{C}$
- 2-Wire/I<sup>2</sup>C-Compatible Interface (up to 400 kHz)
- Programmable or fixed address options
- Configurable Alert Pins
- Operating Voltage: 1.62V to 3.6V
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Other Features: Auto-Beta Compensation, Configurable Ideality Factor, Hottest Diode Compare, Resistance Error Correction
- Available in 8-Lead 2x2 mm WDFN and 10-Lead 2.5x2.0 mm VDFN Packages



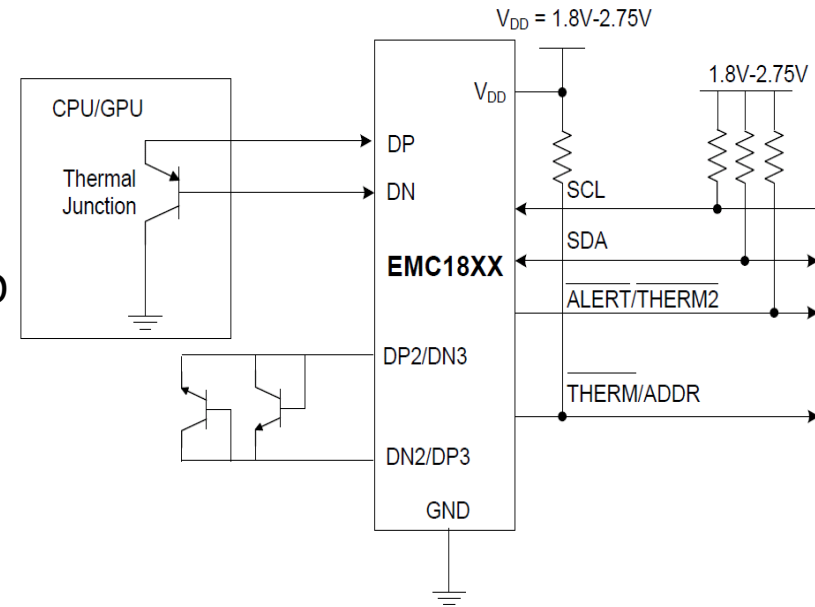


# EMC1822/3/4/5 EMC1843

2 to 5 Channel Temperature Sensor with Rate of Change Measurement

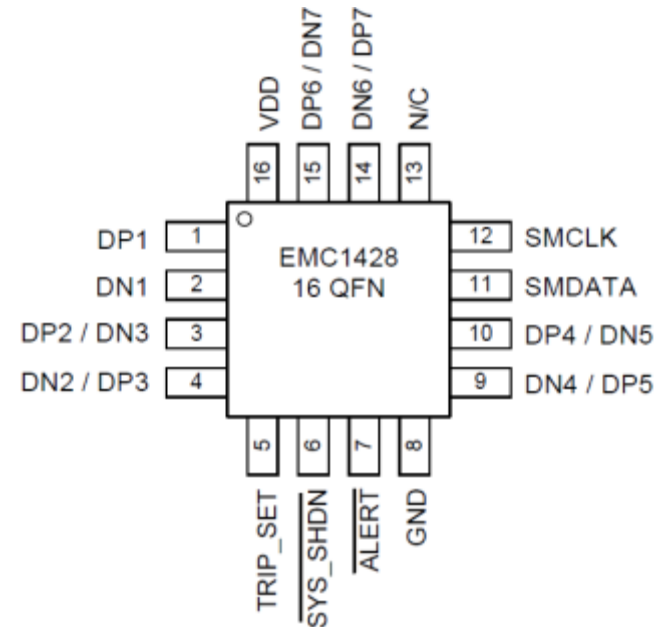
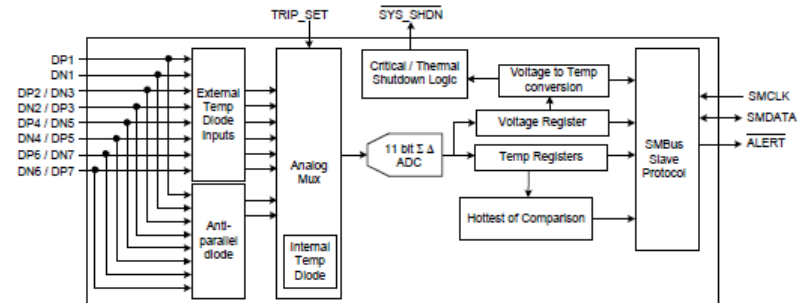
## Features:

- Measures Temperature Rate of Change Calculation with Preemptive Alert(s) Limits
- Up to four External Temperature Monitors
- Accuracy:
  - $\pm 1^{\circ}\text{C}$  (max)  $-20^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$  TA,  $0^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  TD
  - $\pm 1.5^{\circ}\text{C}$  (max)  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  TA,  $-40^{\circ}\text{C}$  to  $+127^{\circ}\text{C}$  TD
- Internal Temperature Sensor:
  - $\pm 1^{\circ}\text{C}$  maximum accuracy,  $-40^{\circ}\text{C}$  to  $+127^{\circ}\text{C}$
  - Resolution (Internal/External):  $0.125^{\circ}\text{C}$
  - 2-Wire/I2C-Compatible Interface (up to 400 kHz)
  - Programmable or fixed address options
  - Configurable Alert Pins
- Operating Voltage: 1.62V to 3.6V
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Other Features: Auto-Beta Compensation, Configurable Ideality Factor, Hottest Diode Compare, Resistance Error Correction
- Available in 8-Lead 2x2 mm WDFN and 10-Lead 2.5x2.0 mm VDFN Packages



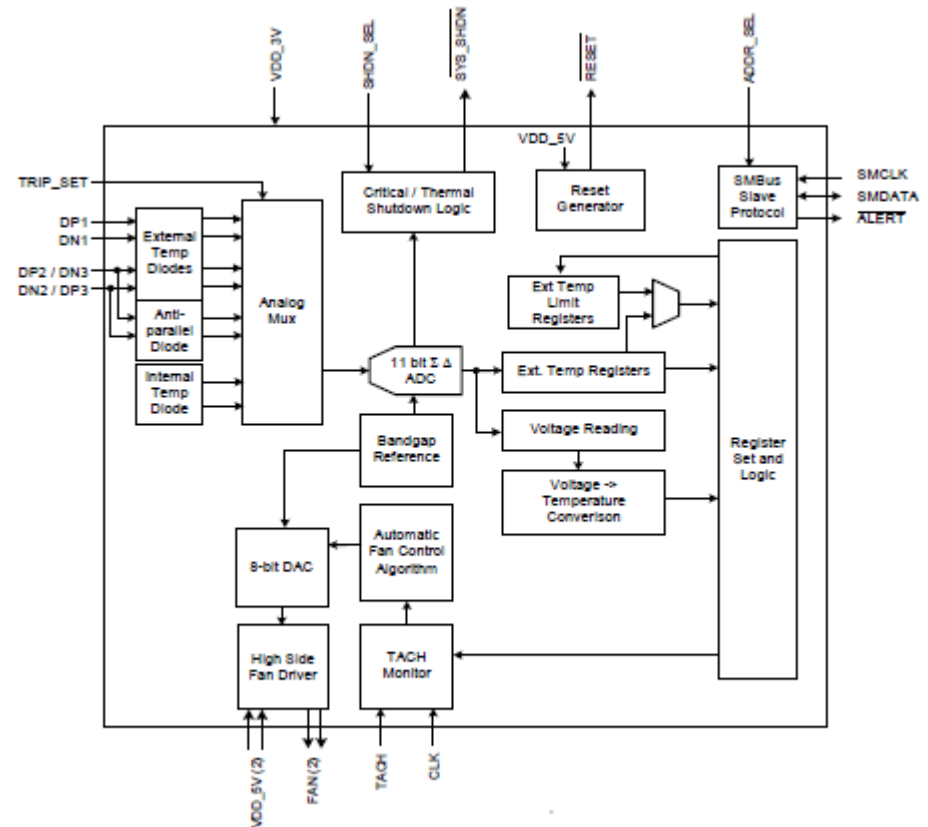
## Features:

- 8 Channel temperature sensor
- Hardware Thermal Shutdown
- Triggers dedicated SYS\_SHDN pin
- Configured range 77°C to 112°C in 1°C steps
- Cannot be disabled or modified by software
- Support for diodes requiring BJT/transistor model
- Designed to support 45nm, 65nm and 90nm –  
- processors
- Resistance Error Correction
- Up to 7 External Temperature Monitors:
  - ±1°C Accuracy ( $60^{\circ}\text{C} < T_{\text{DIODE}} < 100^{\circ}\text{C}$ )
  - 0.125°C resolution
- Supports up to 2.2nF diode filter capacitor
- Anti-parallel diodes for extra diode support
- Internal Temperature Monitor:
  - ±2°C accuracy
- Programmable temperature limits for ALERT#
- 3.3V Operation
- 16-pin 4x4 QFN



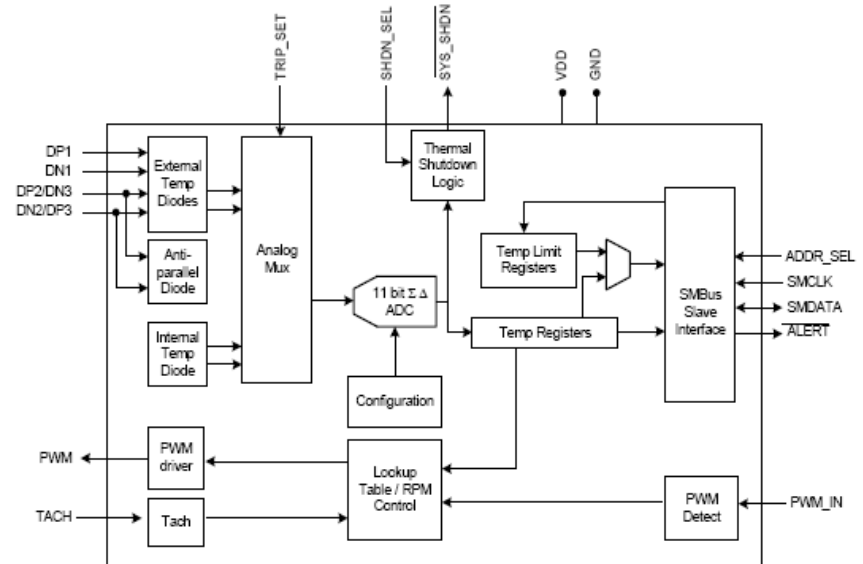
## Features:

- 3.0 – 3.6V Supply Voltage
- Closed-Loop RPM-Based Fan Controller:
  - 1% accuracy with external clock input
  - 3% accuracy with internal clock
  - Internal clock can be used as a source
  - Aging fan detection
- Integrated Linear Fan Driver:
  - 600mA drive capability
- HW Thermal Shutdown (SYS\_SHDN#)
- Reset Function (RESET#) On 5V Supply
- Up to Three Remote Thermal Zones:
  - $\pm 1^{\circ}\text{C}$  accuracy ( $60^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ )
  - $0.125^{\circ}\text{C}$  resolution
  - Designed to support 45nm, 65nm, and 90nm CPU Diodes
  - Eliminates temperature offset due to –
    - series resistance from PCB traces –
    - and thermal 'Diode'
- I<sup>2</sup>C/SMBus Interface
- 20-pin 4x4 QFN package



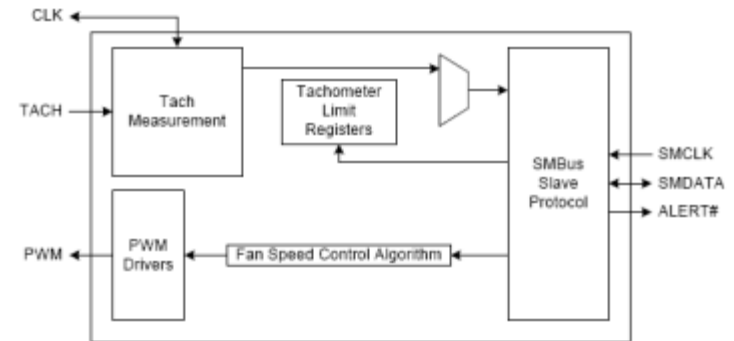
## Features:

- Programmable Fan Control circuit:
  - 4-wire fan compatible
  - Both low and high frequency PWM
- RPM-based fan control algorithm:
  - 2% accurate from 500 – 16k RPM
- Temperature Look-Up Table:
  - Eight steps that incorporate up to four – temperature zones
- Up to Three External Temperature Channels
- Hardware Programmable Thermal Shutdown
- Internal Temperature Monitor
- 3.3V Supply Voltage
- Open-drain interrupt pin
- SMBus 2.0 Interface
- 16-pin 4x4 QFN package



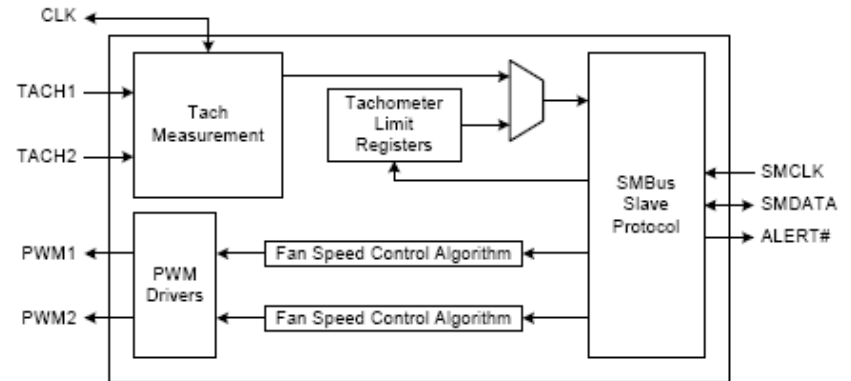
## Features:

- Programmable Fan Control circuit:
  - 4-wire fan compatible
  - High and low speed PWM
  - Optional detection of aging fans
  - Fan Spin Up Control and Ramp Rate Control
  - Alert on fan stall
- Watchdog Timer
- RPM-based fan control algorithm:
  - 0.5% accuracy from 500 – 16k RPM (ext. xtal)
  - 1% accuracy from 500 – 16k RPM (int. clock)
- SMBUS 2.0 Interface
- CLK Pin can provide a clock source output
- 8-pin MSOP



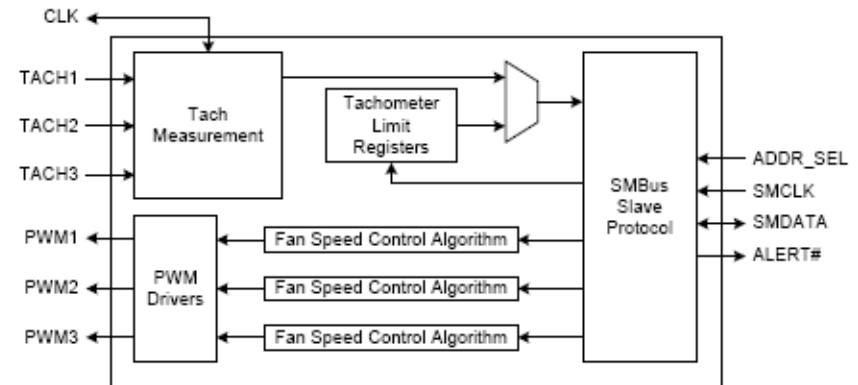
## Features:

- Two Programmable Fan Control circuits:
  - 4-wire fan compatible
  - High and low speed PWM
  - Optional detection of aging fans
  - Fan Spin Up Control and Ramp Rate – Control
  - Alert on fan stall
- Watchdog Timer
- RPM-based fan control algorithm:
  - 0.5% accuracy from 500 – 16k RPM (ext. xtal)
  - 1% accuracy from 500 – 16k RPM (int. clock)
- SMBUS 2.0 Interface
- CLK Pin can provide a clock source output
- 10-pin MSOP



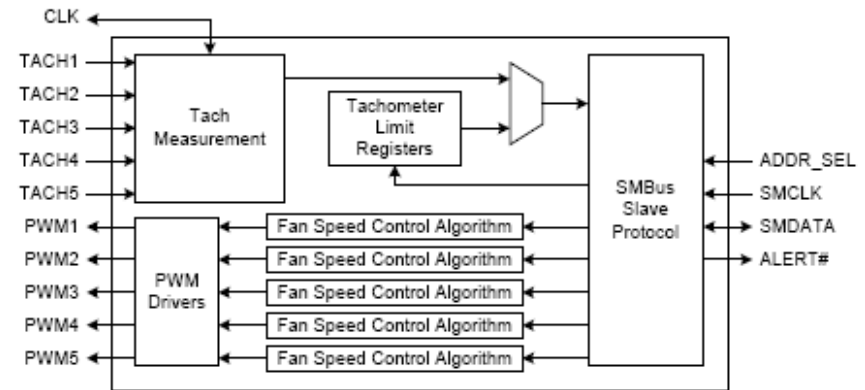
## Features:

- Three Programmable Fan Control circuits:
  - 4-wire fan compatible
  - High and low speed PWM
  - Optional detection of aging fans
  - Fan Spin Up Control and Ramp Rate – Control
  - Alert on fan stall
- Watchdog Timer
- RPM-based fan control algorithm:
  - 0.5% accuracy from 500 – 16k RPM (ext. xtal)
  - 1% accuracy from 500 – 16k RPM (int. clock)
- SMBUS 2.0 Interface
- CLK Pin can provide a clock source output
- 12-pin 4x4 QFN



## Features:

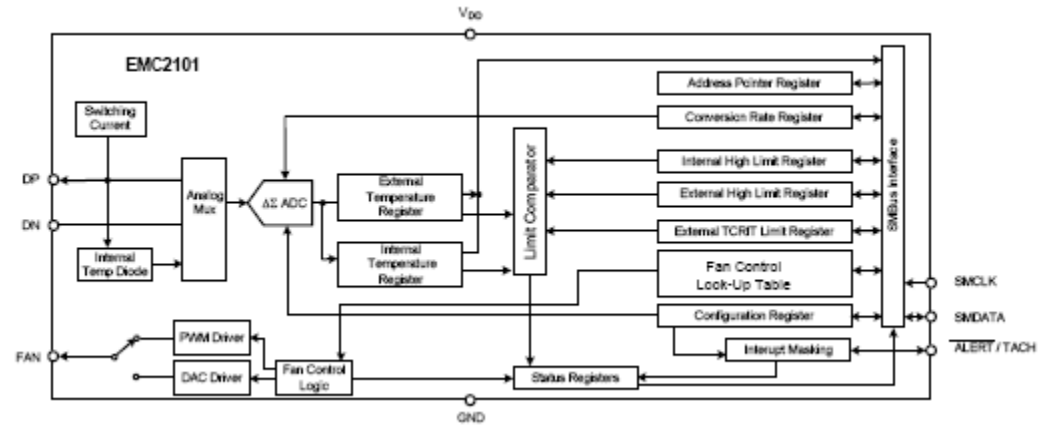
- Five Programmable Fan Control circuits:
  - 4-wire fan compatible
  - High and low speed PWM
  - Optional detection of aging fans
  - Fan Spin Up Control and Ramp Rate – Control
  - Alert on fan stall
- Watchdog Timer
- RPM-based fan control algorithm:
  - 0.5% accuracy from 500 – 16k RPM (ext. xtal)
  - 1% accuracy from 500 – 16k RPM (int. clock)
- SMBUS 2.0 Interface
- CLK Pin can provide a clock source output
- 16-pin 4x4 QFN





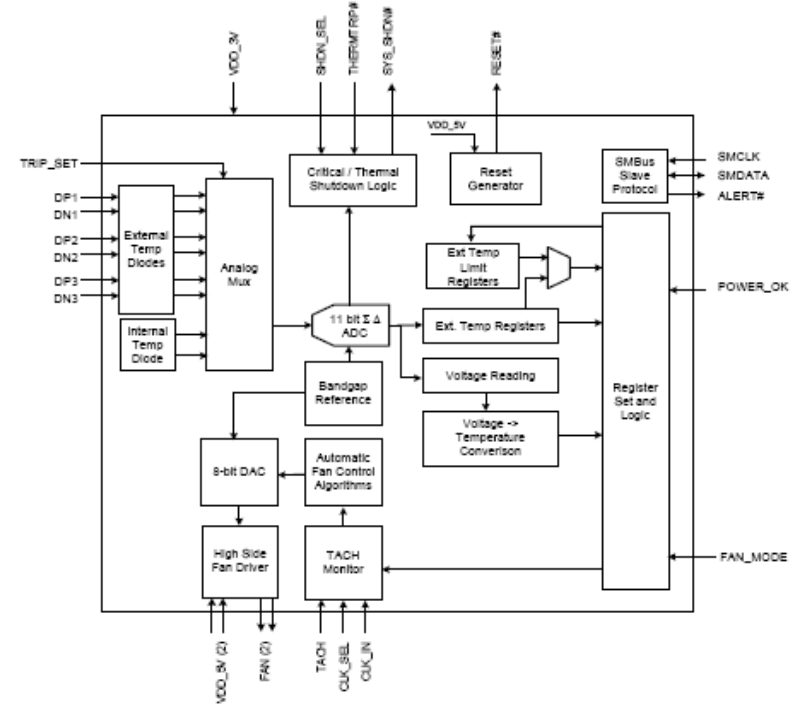
## Features:

- 3.3V Operation
- Automatic Beta Compensation
- Resistance Error Correction
- Self-programming with EEPROM
- Selectable PWM or DAC fan driver – output
- Temperature Monitors:
  - External channel  $\pm 1^{\circ}\text{C}$  accuracy
  - Internal channel  $\pm 2^{\circ}\text{C}$  accuracy
- SMBus 2.0 Interface
- 8-pin MSOP and SOIC



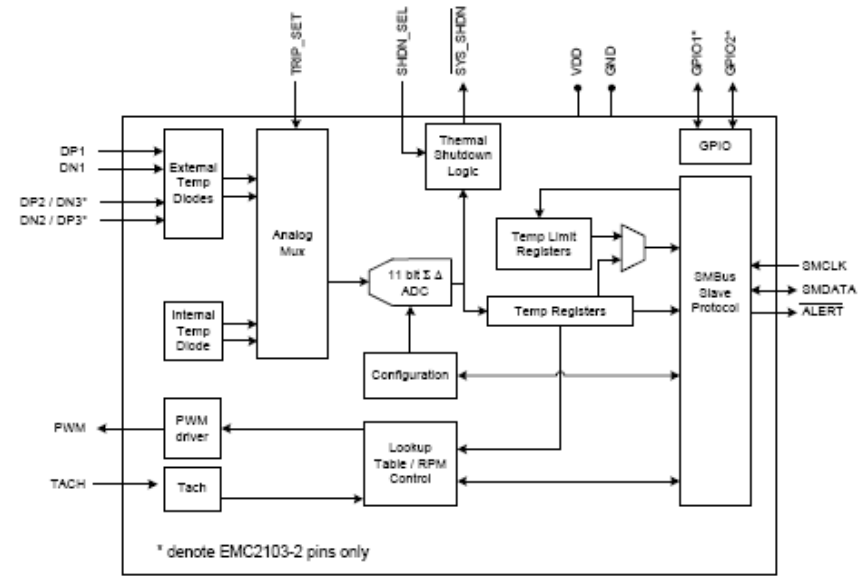
## Features:

- Supports 45nm, 65nm, 90nm CPU Diodes
- Supports BJT and transistor models
- 3.0 – 3.6V Operation
- Closed-loop RMP based Fan Controller
- Integrated Linear Fan Driver:
  - 600 mA drive capability
- HW Thermal Shutdown
- Reset Function on 5V Supply
- Three Remote Thermal Zones:
  - $\pm 1^\circ\text{C}$  accuracy ( $60^\circ\text{C}$  to  $100^\circ\text{C}$ )
  - $1^\circ\text{C}$  Resolution
- Resistance Error Correction
- 28-pin 5x5 QFN



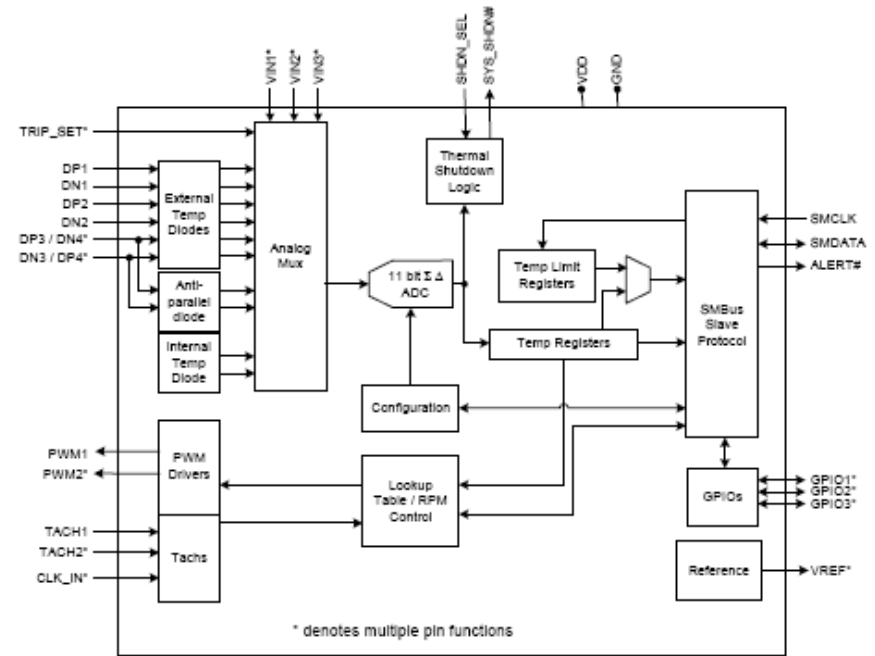
## Features:

- 3.3V Operation
- Programmable Fan Control circuit:
  - 4-wire fan compatible
  - High and low frequency PWM
- RPM-based fan control algorithm:
  - 2.5% accuracy from 500 – 16k RPM
- Temperature Look-up Table:
  - Controls fan speed or PWM drive
  - Supports DTS data from CPU
- Up to Three External Temperature Channels:
  - Supports 45nm, 65nm, 90nm CPU Diodes
  - Supports BJT and transistor models
  - Resistance error correction
  - Supports discrete transistors (i.e. 2N3904)
  - $\pm 1^{\circ}\text{C}$  accuracy ( $60^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ )
  - $0.125^{\circ}\text{C}$  Resolution
- Hardware Programmable Thermal Shutdown
- Internal Temperature Monitor
- SMBus 2.0 Interface
- 12-pin 4x4 QFN and 16-pin 4x4 QFN



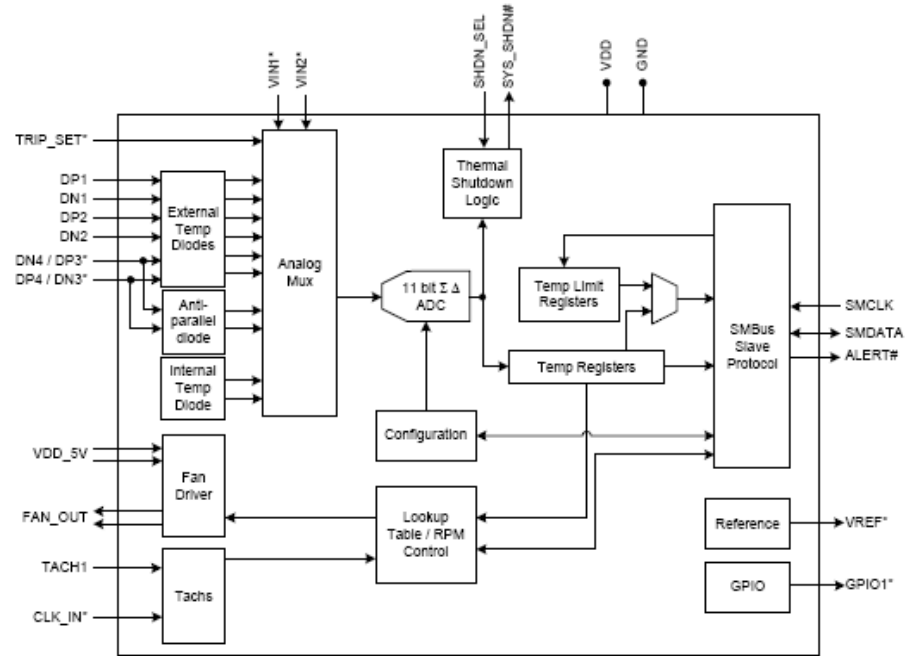
## Features:

- 3.3V Operation
- Two Programmable Fan Control circuit:
  - 4-wire fan compatible
  - High and low frequency PWM
- RPM-based fan control algorithm:
  - 2.5% accuracy from 500 – 16k RPM
- Temperature Look-up Table:
  - Controls fan speed or PWM drive
  - Supports DTS data from CPU
- Up to Four External Temperature Channels:
  - Supports 45nm, 65nm, 90nm CPU Diodes
  - Supports BJT and transistor models
  - Resistance error correction
  - $\pm 1^{\circ}\text{C}$  accuracy ( $60^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ )
  - $0.125^{\circ}\text{C}$  Resolution
- Up to three thermister compatible voltage inputs
- Hardware Programmable Thermal Shutdown
- Internal Temperature Monitor
- SMBus 2.0 Interface
- 20-pin 4x4 QFN



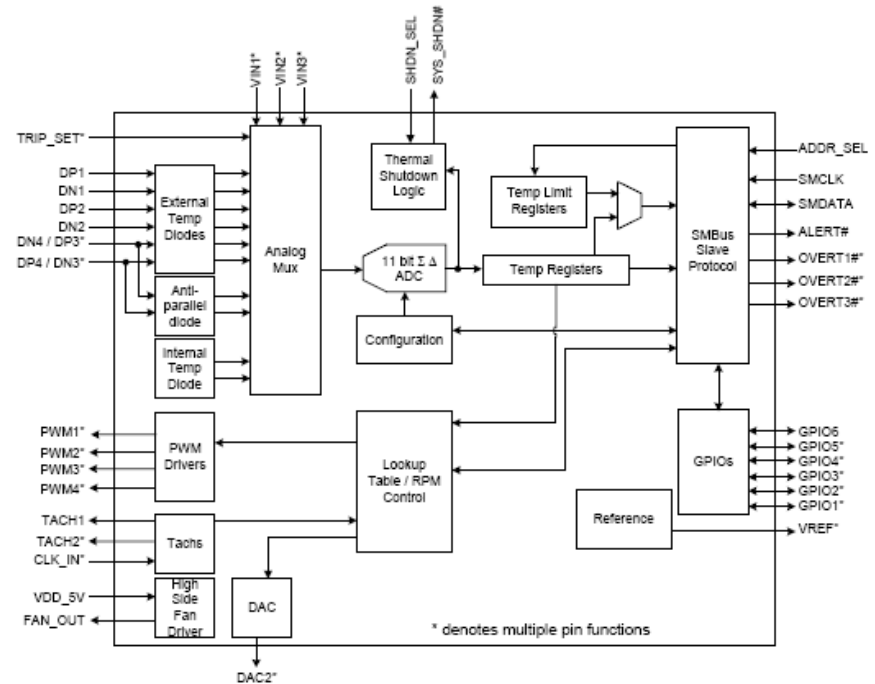
## Features:

- 3.3V Operation
- Programmable Fan Control circuit:
  - 600 mA, 5V, high side fan driver
- RPM based fan control algorithm:
  - 2% accuracy from 500 – 16k RPM
- Temperature Look-up Table:
  - 1 to 4 thermal zones
  - Controls fan speed or fan drive
  - Allows external data to control fan –  
- drivers including two DTS channels
- Up to Four External Temperature Channels:
  - Supports 45nm, 65nm, 90nm CPU –  
- Diodes and BJT and transistor models
  - Resistance error correction
  - $\pm 1^{\circ}\text{C}$  accuracy ( $60^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ )
  - $0.125^{\circ}\text{C}$  Resolution
- SMBus 2.0 Interface
- 20-pin 4x4 QFN



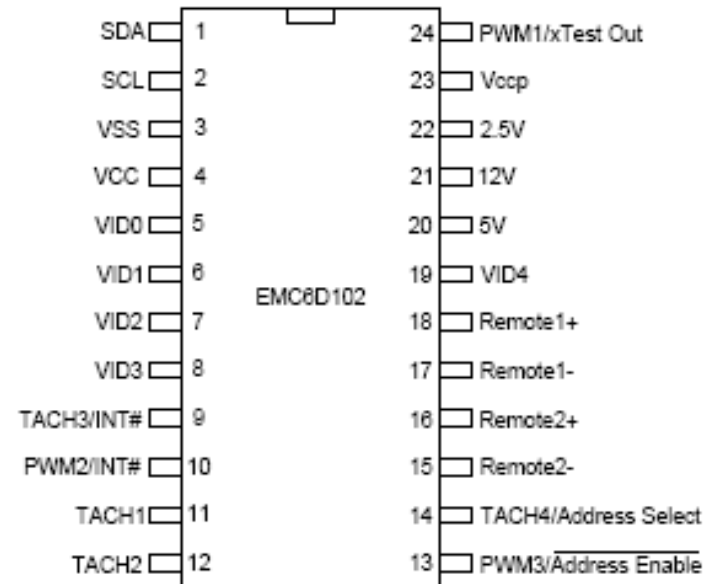
## Features:

- 3.3V Operation
- Two Programmable Fan Control circuit:
  - 4-wire fan compatible
  - High and Low speed PWM
  - 600 mA, 5V, high side fan driver
- RPM based fan control algorithm:
  - 2% accuracy from 500 – 16k RPM
- Temperature Look-up Table:
  - 1 to 4 thermal zones
  - Controls fan speed or fan drive
  - Allows external data to control fan drivers – including two DTS channels
- Up to Four External Temperature Channels:
  - Supports 45nm, 65nm, 90nm CPU – Diodes and BJT and transistor models
  - Resistance error correction
  - $\pm 1^{\circ}\text{C}$  accuracy ( $60^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ )
  - $0.125^{\circ}\text{C}$  Resolution
- SMBus 2.0 Interface
- 28-pin 5x5 QFN



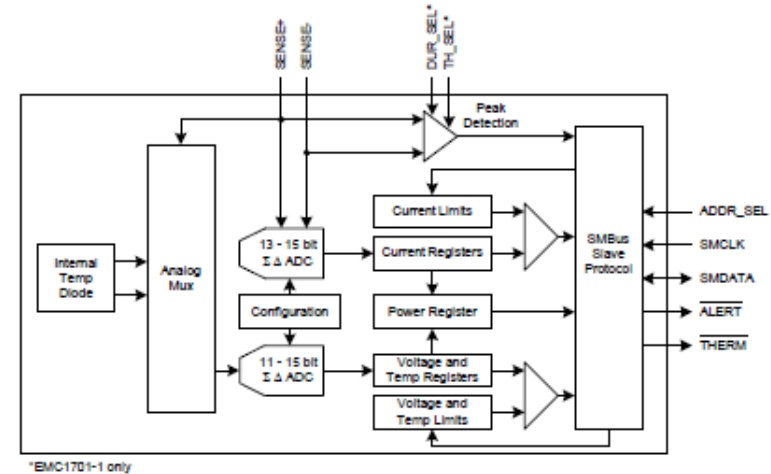
## Features:

- 3.3V Operation
- Fan Control:
  - Three PWM Outputs
  - Four Fan Tachometer Inputs
  - Fan ramp rate control for noise reduction
- Temperature Monitor:
  - Monitoring two remote thermal diodes
  - Internal ambient temperature measurement
- Voltage Monitor:
  - Monitor power supplies (2.5V, 5V, 12V, Vcc)
- Power saving modes
- 5 VID (Voltage Identification Inputs)
- XNOR Tree Test Mode
- SMBus 2.0 Interface
- 24-pin SSOP



## Features:

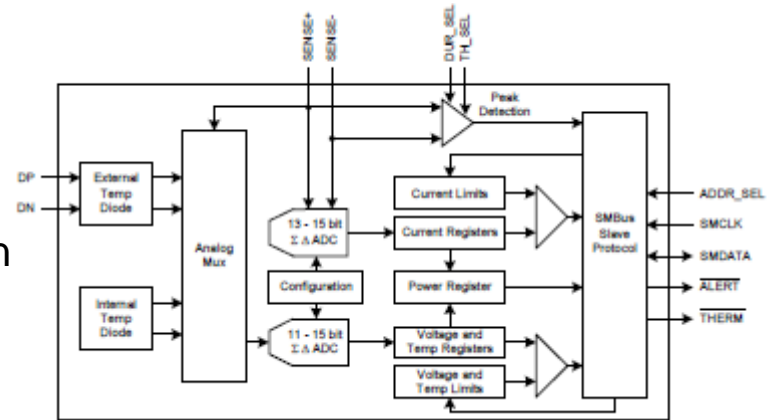
- High-side current sensor:
  - Bi-directional current measurement
  - Measures bus voltage
  - 1% current measurement accuracy
  - Integrated over 82ms to 2.6sec, 11-bit – resolution
  - 3V to 24V voltage bus voltage range
- Calculates proportional power
- Independent hardware set instantaneous –
  - current peak detector (EMC1701-1 only):
    - Software controls to program time duration –
    - and magnitude threshold
- Power supply options:
  - Bus or separately powered
- Internal temperature monitor:
  - $\pm 1^{\circ}\text{C}$  accuracy ( $-5^{\circ}\text{C} < \text{TA} < 85^{\circ}\text{C}$ )
- Voltage, and out-of-current limit reporting
- I<sup>2</sup>C/SMBus 2.0 Interface
- Industrial temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- 10-pin MSOP, 12-pin 4x4 QFN





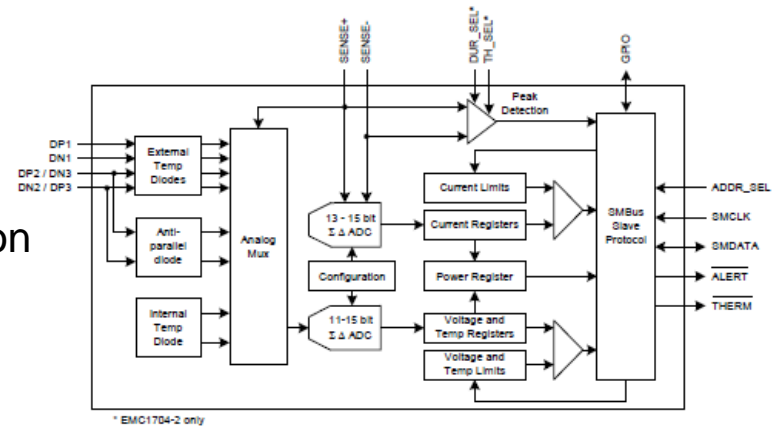
## Features:

- High-side current sensor:
  - Bi-directional current measurement
  - Measures bus voltage
  - 1% current measurement accuracy
  - Integrated over 82ms to 2.6sec, 11-bit resolution
  - 3V to 24V voltage bus voltage range
- Calculates proportional power
- Hardware instantaneous current peak detector
- Power supply options:
  - Bus or separately powered for low voltage operation
- Internal temperature monitor:
  - $\pm 1^\circ\text{C}$  accuracy ( $-5^\circ\text{C} < T_A < 85^\circ\text{C}$ )
- One external temperature monitor:
  - $1^\circ\text{C}$  accuracy ( $20^\circ\text{C} < T_{\text{DIODE}} < 110^\circ\text{C}$ ) with -  
- 0.125°C resolution
- ALERT# and THERM# outputs for temperature, -  
- voltage, and out-of-current limit reporting
- I<sup>2</sup>C/SMBus 2.0 interface
- Industrial temperature range:  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$
- 12-pin 4x4 QFN



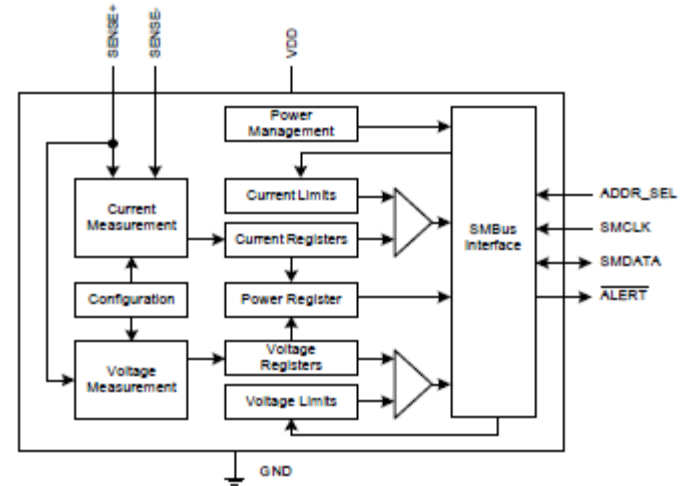
## Features:

- High-side current sensor:
  - Bi-directional current measurement
  - Measures bus voltage
  - 1% current measurement accuracy
  - Integrated over 82ms to 2.6sec, 11-bit resolution
  - 3V to 24V voltage bus voltage range
- Calculates proportional power
- Hardware set instantaneous current peak detector
- Bus or separately powered for low voltage operation
- Internal temperature monitor
  - $\pm 1^\circ\text{C}$  accuracy ( $-5^\circ\text{C} < T_A < 85^\circ\text{C}$ )
- Up to 3 external temperature monitor:
  - $1^\circ\text{C}$  accuracy ( $20^\circ\text{C} < T_{\text{DIODE}} < 110^\circ\text{C}$ ) with –  
– 0.125°C resolution
- ALERT# and THERM# outputs for temperature, -  
- voltage, and out-of-current limit reporting
- General purpose I/O
- I<sup>2</sup>C/SMBus 2.0 interface
- Industrial temperature range: 40°C to +85°C
- 14-pin SOIC, 16-pin 4x4 QFN



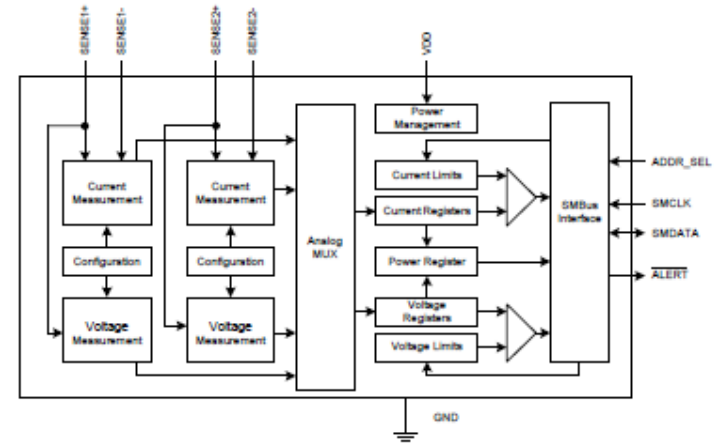
## Features:

- High-side current sensor:
  - Current measurement is integrated over
  - 2.5ms to 2.6sec with up to 11-bit resolution
  - 1% current measurement accuracy
  - Measures  $V_{SOURCE}$  voltage
- Calculates proportional power
- $V_{SOURCE}$  voltage range 0V to 40V:
  - Bi-directional current sensing
- Auto-zero input offset voltage
- Digital averaging
- 5 $\mu$ A typical Standby current
- Programmable sense voltage range:
  - $\pm 10\text{mV}$ ,  $\pm 20\text{mV}$ ,  $\pm 40\text{mV}$ , and  $\pm 80\text{mV}$
- Industrial temperature range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- ALERT# output for voltage and current out of limit transients
- SMBus 2.0 communications interface
- Sample time configurable from 2.5ms-320ms:
  - With averaging effective sampling times up to 2.6sec
- Power supply range 3.0V to 5.5V
- 10-pin 3x3 DFN



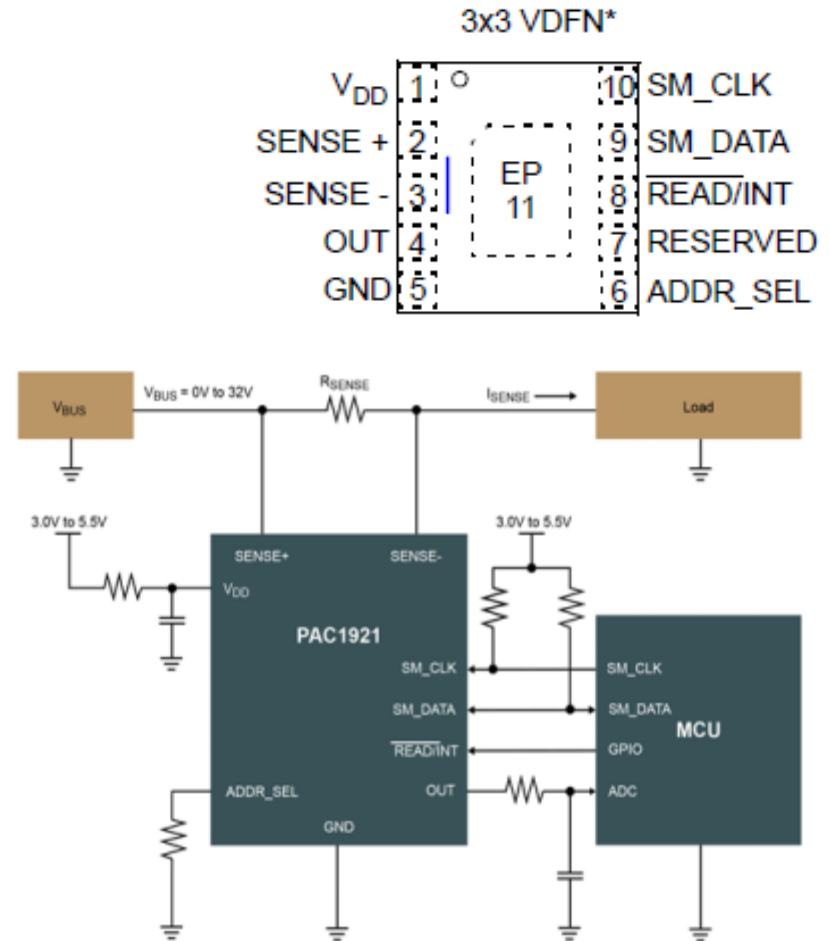
## Features:

- Dual High-side current sensor:
  - Current measurement is integrated over 2.5ms to 2.6sec with up to 11-bit resolution
  - 1% current measurement accuracy
  - Measures  $V_{SOURCE}$  voltage
- Calculates proportional power
- $V_{SOURCE}$  voltage range 0V to 40V:
  - Bi-directional current sensing
- Auto-zero input offset voltage
- Digital averaging
- 5 $\mu$ A typical Standby current
- Programmable sense voltage range:
  - $\pm 10\text{mV}$ ,  $\pm 20\text{mV}$ ,  $\pm 40\text{mV}$ , and  $\pm 80\text{mV}$
- Industrial temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- ALERT# output for voltage and current out of limit transients
- SMBus 2.0 communications interface
- Sample time configurable from 2.5ms-320ms:
  - With averaging effective sampling times up to 2.6sec
- Power supply range 3.0V to 5.5V
- 10-pin 3x3 DFN



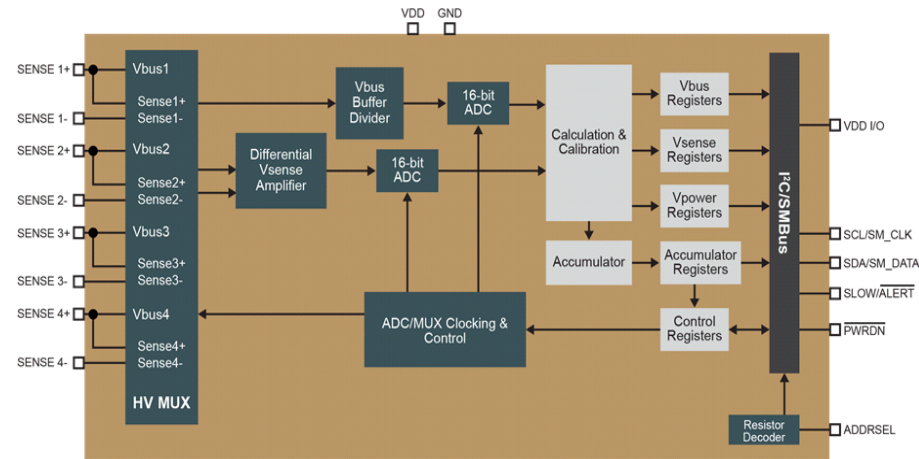
## Features:

- High-side current sensor:
  - Power, current & voltage available on
  - 2-wire and configurable analog output
  - 100mV full scale current sense voltage – range
  - 1% power measurement accuracy
  - 2nd order  $\Delta\Sigma$  ADC : 11- or 14-bit – resolution
  - Selectable current gain: 1X - 128X
- Configurable measurement type output:
  - Measured power, current, or bus voltage
  - Output voltage range 1V, 1.5V, 2V, or 3V
- 2 Wire digital, I<sup>2</sup>C compatible
- Bus range 0V to 32V
- Power supply:
  - $V_{DD} = 3.3V$  nominal, (3V-5.5V)



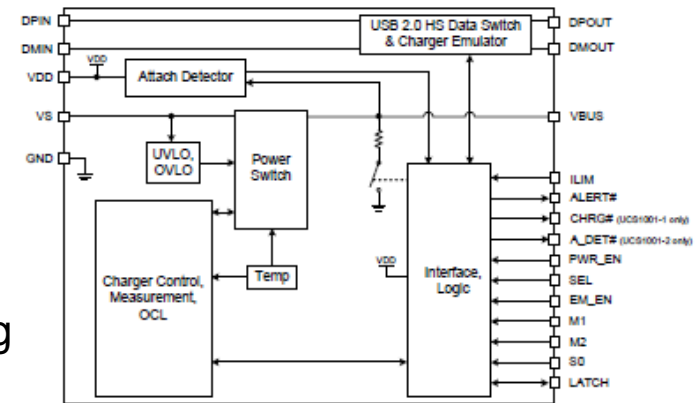
## Features:

- High-Side Current sensor (1, 2, 3 and 4 Channels)
  - 100 mV full scale voltage sense range
  - 16-bit resolution
  - Bidirectional or unidirectional options
- Wide Bus Voltage Range for Voltage Monitoring
  - 0V to 32V input common-mode voltage
  - 16-bit resolution for voltage measurements
- 2.7V to 5.5V supply operation
  - Separate I/O pin for digital I/O
  - 1.62-5.5V capable
  - I2C Fast Mode Plus (1Mb/S) and SMBus 3.0
- 1% power measurement accuracy over full range
- On-Chip accumulation of 28-bit power results for energy measurement
  - 48-bit power accumulator register for recording accumulated power data
  - 24-bit accumulator count
  - User programmable sampling rates of 8, 64, 256, and 1024 samples per second
  - 17 minutes of power data accumulation at 1024 samples per second
- Alert for overflow events and conversion complete
- WLCSP package (2.225 x 2.17 1, 2, 3, 4 channels)
- 16-lead 4 x 4 x 0.5 uQFN for 2, 3, 4 channels only



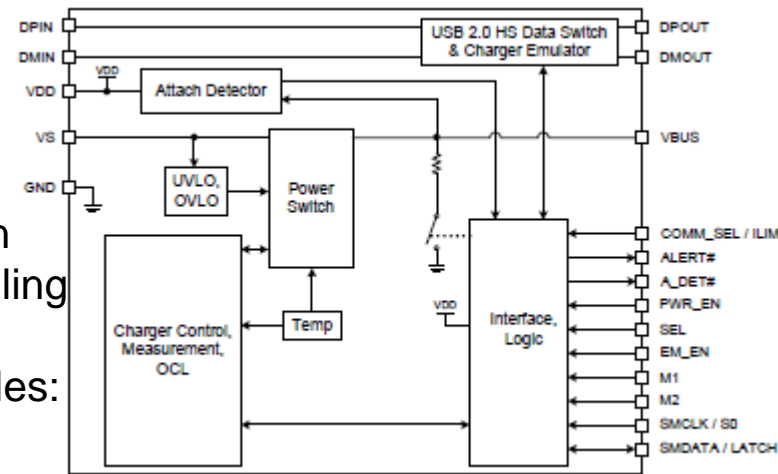
## Features:

- Port power switch with two current limit behaviors:
  - 2.9 V to 5.5 V source voltage range
  - Up to 2.5 A current with 55 mΩ On Resistance
  - Over-current trip or constant current limiting
  - Under- and over-voltage lockout
  - Back-drive, back-voltage protection
  - Latch or auto-recovery (low test current) fault handling
  - BC1.2 VBUS discharge port renegotiation function
- Selectable/automatic cycling of charger emulation profiles:
  - USB-IF BC1.2 charging downstream port (CDP) and dedicated charging port (DCP) modes, YD/T-1591, and most Apple® and RIM® protocols standard
  - USB 2.0 compliant high-speed data switch
  - Nine preloaded charger emulation profiles
- Fault Alert open-drain output
- Optional split supply support for VBUS and V<sub>DD</sub>
- Wake on Attach USB (UCS1001-2)
- Industrial temperature range: -40°C to +85°C
- IEC61000-4-2 8 / 15 kV ESD immunity
- UL recognized and EN/IEC 60950-1 (CB) certified



## Features:

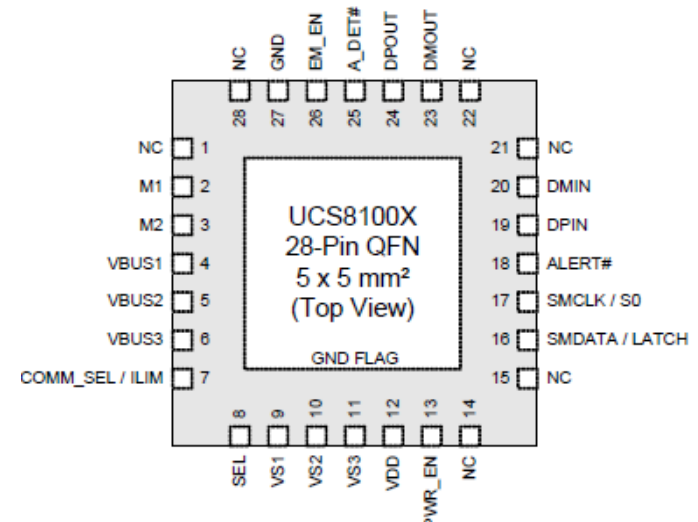
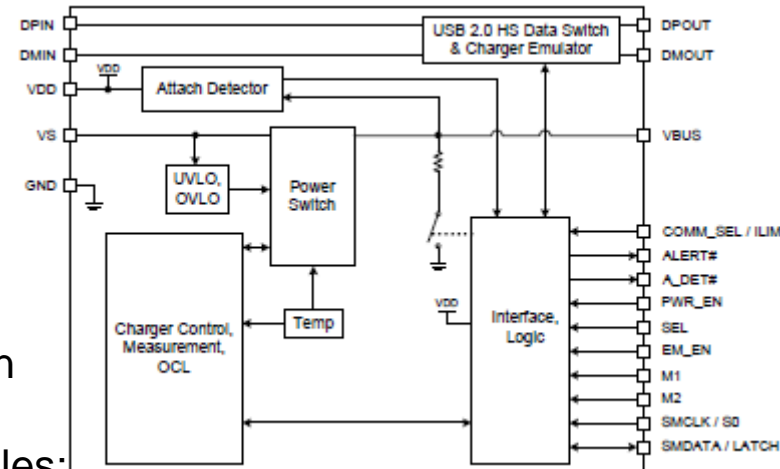
- Port power switch with two current limit behaviors:
  - 2.9 V to 5.5 V source voltage range
  - Up to 2.5 A current with 55 mΩ On Resistance
  - Over-current trip or constant current limiting
  - UVLO/OVLO & Back-drive, back-voltage protection
  - Latch or auto-recovery (low test current) fault handling
  - BC1.2 VBUS discharge port renegotiation function
- Selectable/automatic cycling of charger emulation profiles:
  - USB-IF BC1.2 charging downstream port (CDP) – and dedicated charging port (DCP) modes, - YD/T = 1591, and most Apple® and RIM® protocols
  - USB 2.0 compliant high-speed data switch
  - Nine preloaded charger emulation profiles
  - One custom programmable charger profile
  - Self-contained current monitoring and charge rationing
  - Automatic shutdown when Battery Full & Sleep modes
- Wake on Attach USB
- SMBus 2.0/I<sup>2</sup>C communications
- IEC61000-4-2 8 / 15 kV ESD immunity
- UL recognized and EN/IEC 60950-1 (CB) certified





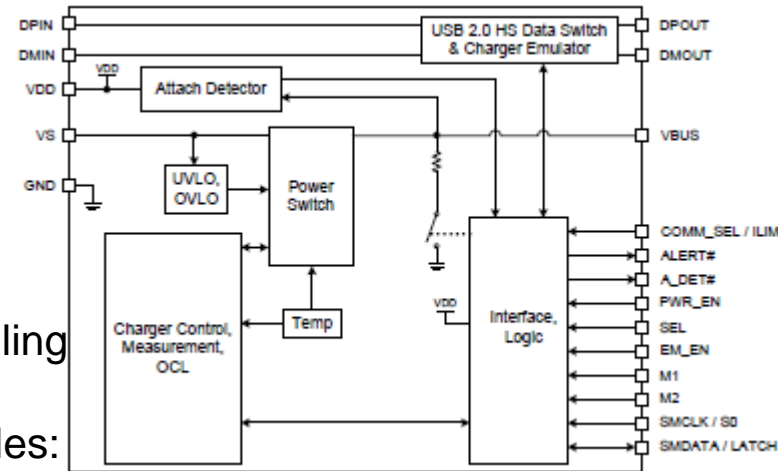
## Features:

- Port power switch with two current limit behaviors:
  - 2.9 V to 5.5 V source voltage range
  - Up to 2.5 A current with 55 mΩ On Resistance
  - Over-current trip or constant current limiting
  - Programmable current limit
  - Dynamic thermal management
  - ULVO/OVLU & Back-drive, back-voltage protection
  - BC1.2 VBUS discharge port renegotiation function
- Selectable/automatic cycling of charger emulation profiles:
  - USB-IF BC1.2 charging downstream port (CDP) and dedicated charging port (DCP) modes, YD/T-1591, and most Apple® and RIM® protocols standard
  - USB 2.0 compliant high-speed data switch
  - Nine preloaded charger emulation profiles
  - One custom programmable charger profile
- Automatic shutdown when Battery Full & Sleep modes
- Wake on Attach USB
- UCS81002 issues an Alert on Reset
- SMBus 2.0/I<sup>2</sup>C communications
- IEC61000-4-2 8 / 15 kV ESD immunity
- Recommended for Automotive Design



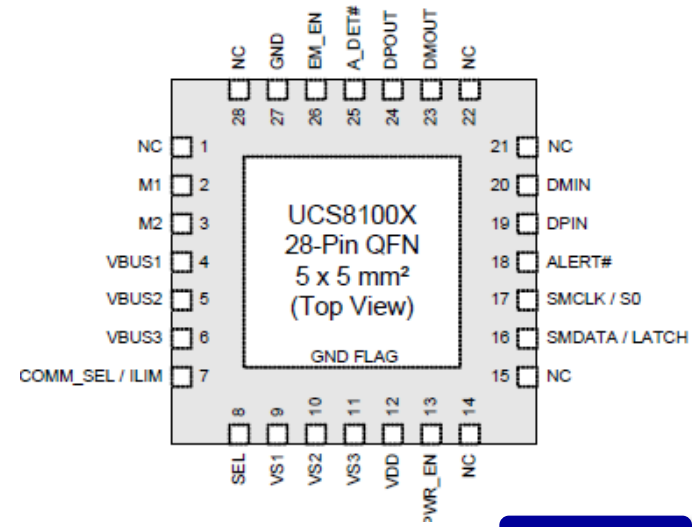
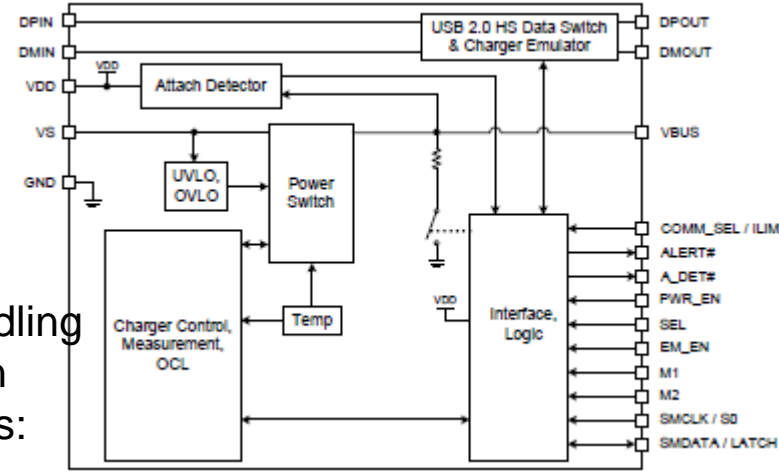
## Features:

- Port power switch with two current limit behaviors:
  - 2.9 V to 5.5 V source voltage range
  - Up to 2.7 A current with 55 mΩ On Resistance
  - Over-current trip or constant current limiting
  - Programmable current limit
  - UVLO/OVLO, Back-drive, back-voltage protection
  - Latch or auto-recovery (low test current) fault handling
  - BC1.2 VBUS discharge port renegotiation function
- Selectable/automatic cycling of charger emulation profiles:
  - USB-IF BC1.2 charging downstream port (CDP) and dedicated charging port (DCP) modes, YD/T-1591, and most Apple®, Samsung & RIM® protocols
  - USB 2.0 compliant high-speed data switch
  - Nine preloaded charger emulation profiles
  - One custom programmable charger profile
- Automatic shutdown when Battery Full & Sleep modes
- Low power Attach Detection and open-drain A\_DET# pin
- Wake on Attach USB
- SMBus 2.0/I<sup>2</sup>C communications
- Industrial temperature range: 40°C to +85°C



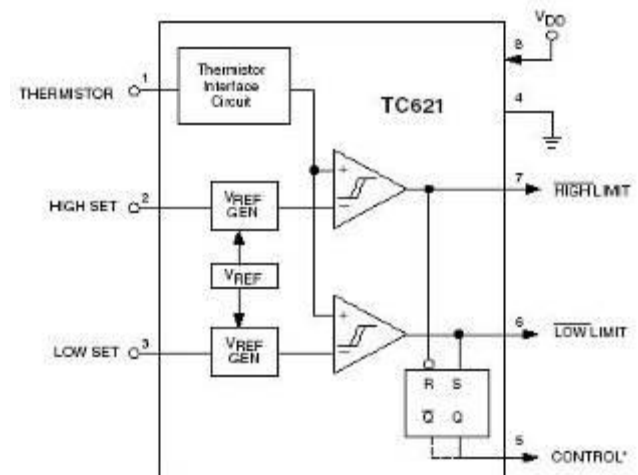
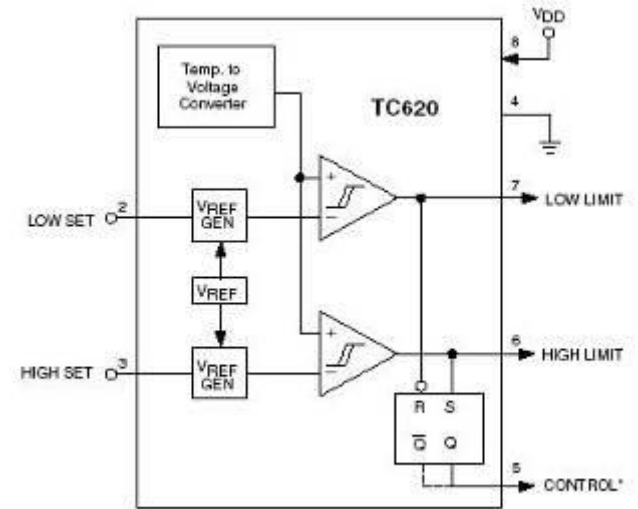
## Features:

- Port power switch with two current limit behaviors:
  - 2.9 V to 5.5 V source voltage range
  - Up to 2.7 A current with 55 mΩ On Resistance
  - Over-current trip or constant current limiting
  - Programmable current limit
  - UVLO/OVLO, Back-drive, back-voltage protection
  - Latch or auto-recovery (low test current) fault handling
  - BC1.2 VBUS discharge port renegotiation function
- Selectable/automatic cycling charger emulation profiles:
  - USB-IF BC1.2 charging downstream port (CDP) – and dedicated charging port (DCP) modes, YD/T-1591, and most Apple®, Samsung & RIM® protocols
  - USB 2.0 compliant high-speed data switch
  - Nine preloaded charger emulation profiles
  - One custom programmable charger profile
- Automatic shutdown when Battery Full and Sleep modes
- Wake on Attach USB
- SMBus 2.0/I<sup>2</sup>C communications
- Industrial temperature range: -40°C to +85°C
- IEC61000-4-2 8 / 15 kV ESD immunity
- Recommended for Automotive Design



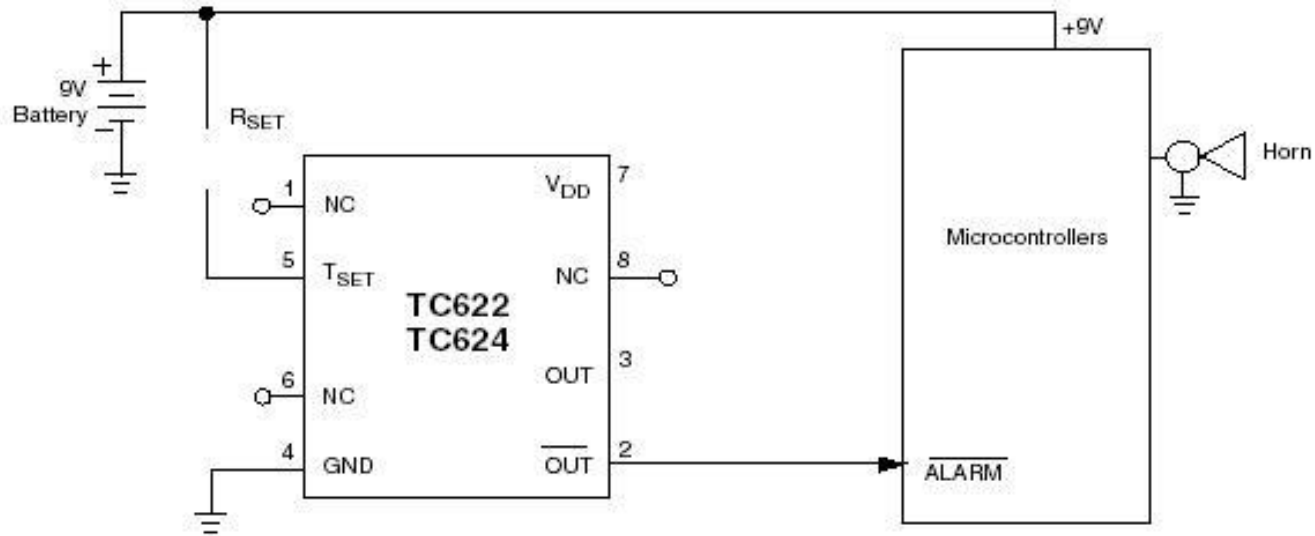
## Features:

- User Programmable Hysteresis and –  
–Temperature Set Point
- Easily Programs with 2 External Resistors
- Wide Temperature Detection Range:
  - 0°C to 70°C: (TC620/TC621CCX)
  - -40°C to +125°C: (TC620/TC621CVX)
  - -40°C to +85°C: (TC620/TC621CEX)
  - -55°C to +125°C: (TC620/TC621CMX)
- Onboard Temperature Sensing Applications (TC620X)
- External NTC Thermistor for Remote Sensing –  
– Applications (TC621X)
- Available in 8-Pin PDIP and SOIC Packages
- Recommended for Automotive Design (TC621)



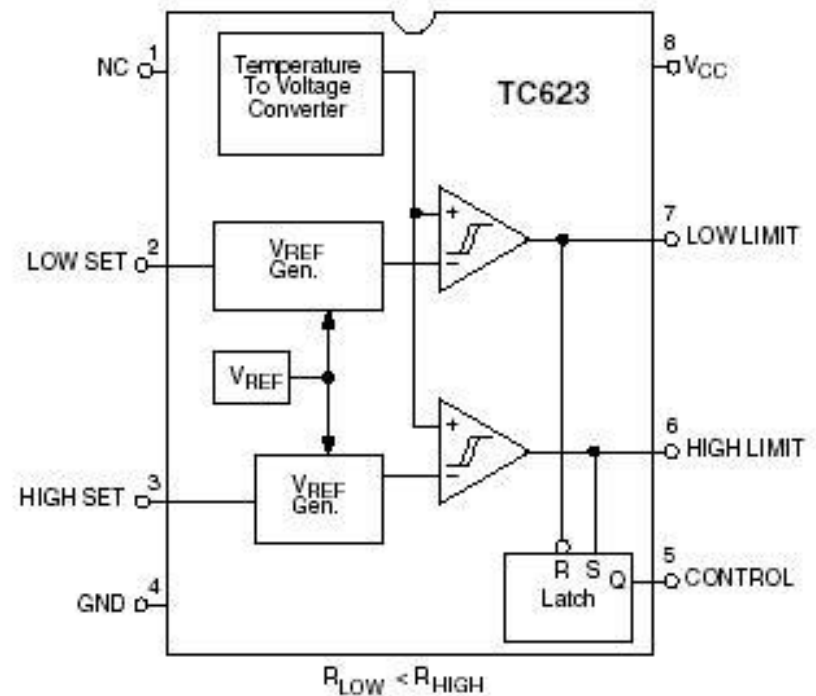
## Features:

- Temperature Set Point Easily Programs with –
  - a Single External Resistor
- Operates with 2.7V Power Supply (TC624)
- TO-220 Package for Direct Mounting to –
  - Heatsink (TC622XAT) or Standard 8-Pin –
  - PDIP and SOIC



## Features:

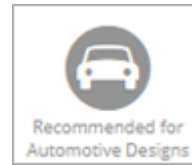
- Integrated Temp Sensor and Detector
- Operate from a Supply Voltage as Low as 2.7V
- Replaces Mechanical Thermostats and Switches
- On-Chip Temperature Sense
- 8-Pin DIP or SOIC for Direct PCB Mounting
- 2 User Programmable Temperature Set Points
- 2 Independent Temperature Limit Outputs
- Heat/Cool Regulate Output





# MCP9700/9701 MCP9700A/9701A

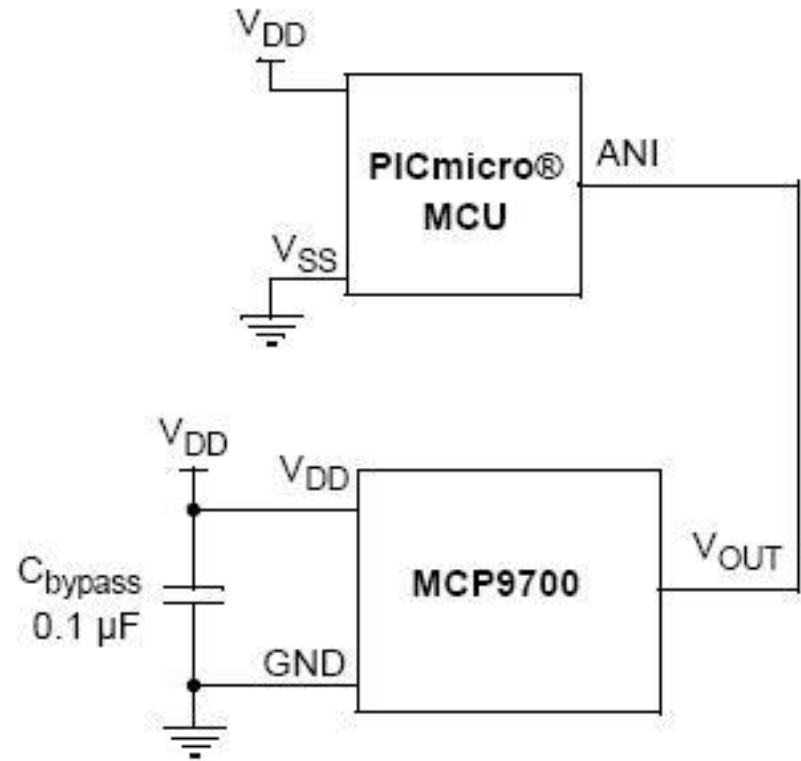
Low-Power Linear Active Thermistor ICs



Online  
Datasheet

## Features:

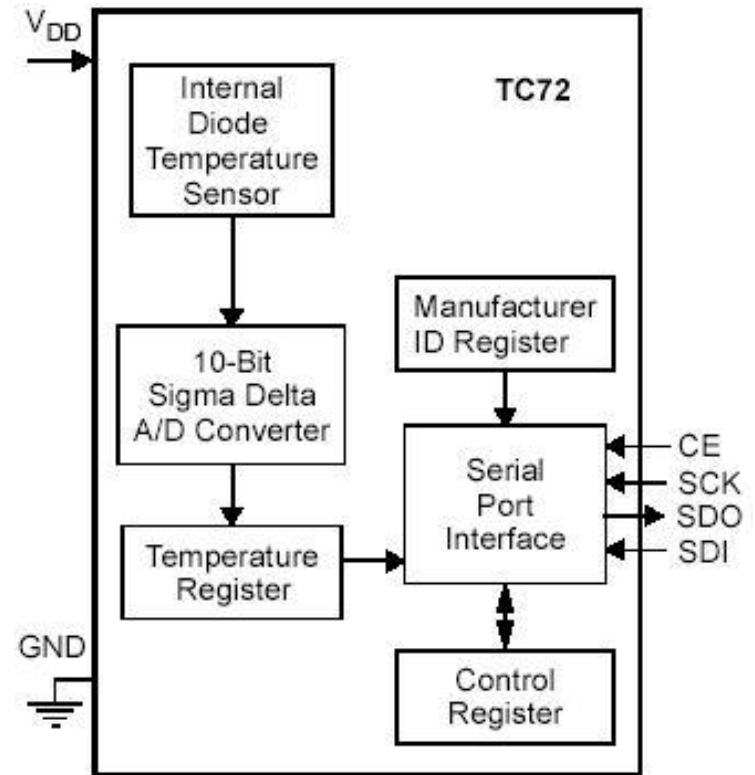
- Tiny Analog Temperature Sensor
- Available Packages: SC-70-5, SOT-23-5, -  
- TO-92-3
- Wide Temperature Measurement Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Accuracy:
  - $\pm 2^{\circ}\text{C}$  (max.),  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  (MCP9700A/9701A)
  - $\pm 4^{\circ}\text{C}$  (max.),  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  (MCP9700/9701)
- Optimized for Analog-to-Digital Converters –  
- (ADCs):
  - $10.0\text{ mV}/^{\circ}\text{C}$  (typ.) MCP9700/9700A
  - $19.5\text{ mV}/^{\circ}\text{C}$  (typ.) MCP9701/9701A
- Wide Operating Voltage Range:
  - $V_{\text{DD}} = 2.3\text{V}$  to  $5.5\text{V}$  MCP9700/9700A
  - $V_{\text{DD}} = 3.1\text{V}$  to  $5.5\text{V}$  MCP9701/9701A
- Low Operating Current:  $6\text{ }\mu\text{A}$  (typ.)
- Optimized to Drive Large Capacitive Loads
- Recommended for Automotive Design (MCP9700/1)



<< BACK

## Features:

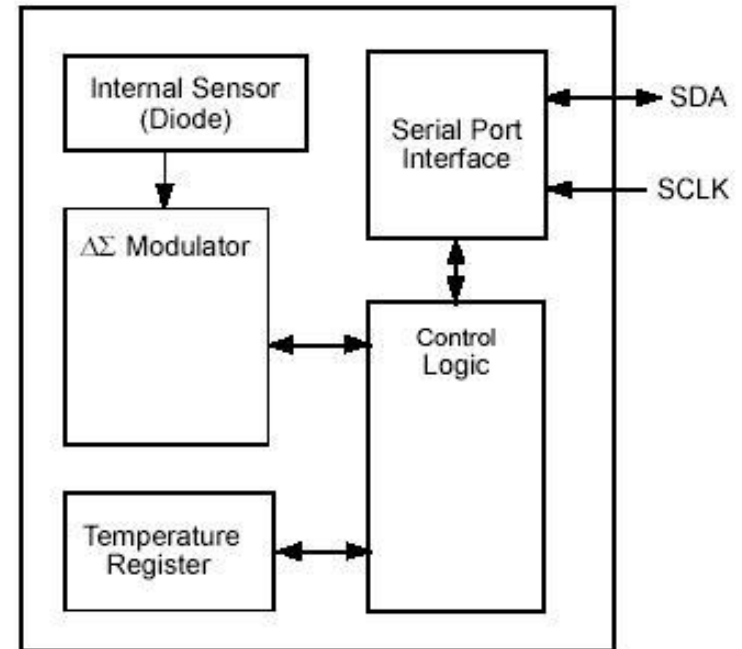
- Temperature-to-Digital Converter
- SPI™ Compatible Interface
- 10-Bit Resolution (0.25°C/Bit)
- ±2°C (max.) Accuracy from -40°C to +85°C
- ±3°C (max.) Accuracy from -55°C to +125°C
- 2.65V to 5.5V Operating Range
- Low Power Consumption:
  - 250µA (typ.) Continuous Temperature
  - Conversion Mode
  - 1µA (max.) Shutdown Mode
- Power Saving One-Shot Temperature –  
- Measurement
- Industry Standard 8-Pin MSOP Package
- Space Saving 8-Pin DFN (3x3 mm) Package





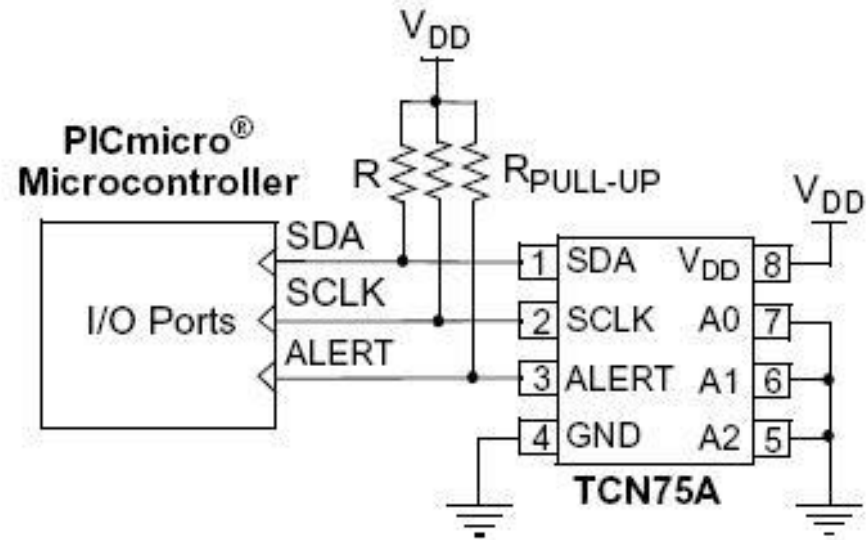
## Features:

- Digital Temperature Sensing in SOT-23-5 or –  
– TO-220 Packages
- Outputs Temperature as an 8-Bit Digital Word
- Simple SMBus/I<sup>2</sup>C™ Serial Port Interface
- Solid-State Temperature Sensing:
  - $\pm 2^{\circ}\text{C}$  (max.) Accuracy from  $+25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - $\pm 3^{\circ}\text{C}$  (max.) Accuracy from  $0^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- 2.65V to 5.5V Operating Range
- Supply voltage of 2.7V to 5.5V
- Low Power Consumption:
  - 250 $\mu\text{A}$  (typ.) Operating Current
  - 1 $\mu\text{A}$  (max.) Standby Mode Current



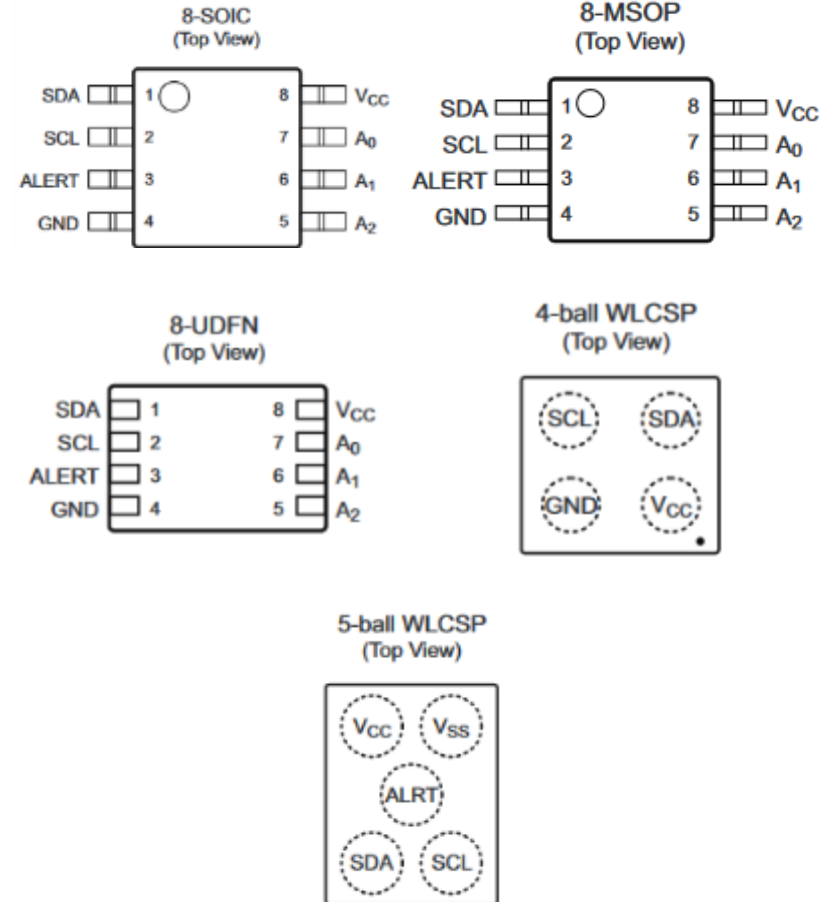
## Features:

- Temperature-to-Digital Converter
- Accuracy:
  - $\pm 1^{\circ}\text{C}$  (typ.) from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
  - $\pm 2^{\circ}\text{C}$  (max.) from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- User-selectable Resolution:
- $0.5^{\circ}\text{C}$  to  $0.0625^{\circ}\text{C}$
- Operating Voltage Range: 2.7V to 5.5V
- 2-wire Interface: I<sup>2</sup>C™ Compatible
- Operating Current: 200 $\mu\text{A}$  (typ.)
- Shutdown Current: 2 $\mu\text{A}$  (max.)
- Power-saving One-shot Temperature –  
- Measurement
- Available Packages:
  - MSOP-8, SOIC-8
- Recommended for Automotive Design



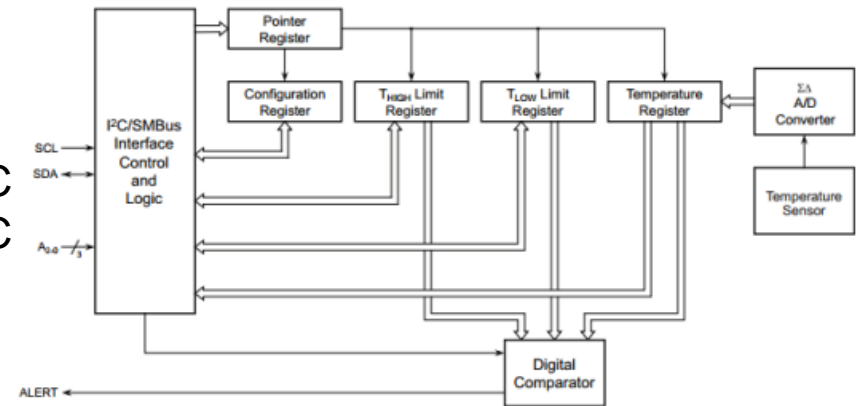
## Features:

- Temperature-to-Digital Converter
- High Accuracy with 12-bit Resolution:
  - $\pm 2^{\circ}\text{C}$  (max.) accuracy from  $-20^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$
  - $\pm 3^{\circ}\text{C}$  (max.) accuracy from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- User-selectable Resolution: 9 - 12 bit
- 1.7V to 5.5V Operating Voltage Range
- I<sup>2</sup>C™/SMBus Compatible Interface
- Low Power
- 85 $\mu\text{A}$  (typ.) Operating Current
- 1 $\mu\text{A}$  (typ.) Shutdown Mode
- Power-saving One-shot Measurement
- Built-in noise Suppression Filtering for Clock and Data Input Signals
- Pin and Software Compatible to Industry standard LM75-type Devices
- Packages: SOIC-8, MSOP-8, 2x3 DFN-8, 4-ball WLCSP, 5-ball WLCSP



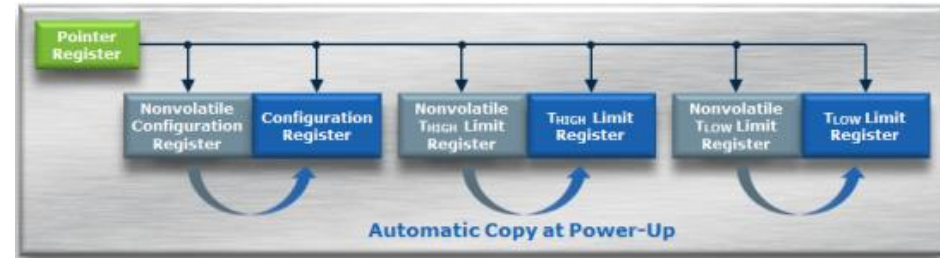
## Features:

- Temperature-to-Digital Converter
- High Accuracy with 12-bit Resolution
  - $\pm 1^{\circ}\text{C}$  (max.) accuracy from  $0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - $\pm 2^{\circ}\text{C}$  (max.) accuracy from  $-25^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
  - $\pm 3^{\circ}\text{C}$  (max.) accuracy from  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- User-selectable Resolution: 9 - 12 bit
- 1.7V to 5.5V Operating Voltage Range
- I<sup>2</sup>C™/SMBus Compatible Interface
- Low Power
- 85 $\mu\text{A}$  (typ.) Operating Current
- 1 $\mu\text{A}$  (typ.) Shutdown Mode
- Power-saving One-shot Measurement
- Built-in noise Suppression Filtering for Clock and Data Input Signals
- Pin and Software Compatible to Industry standard LM75-type Devices
- Packages: SOIC-8, MSOP-8, 2x3 DFN-8



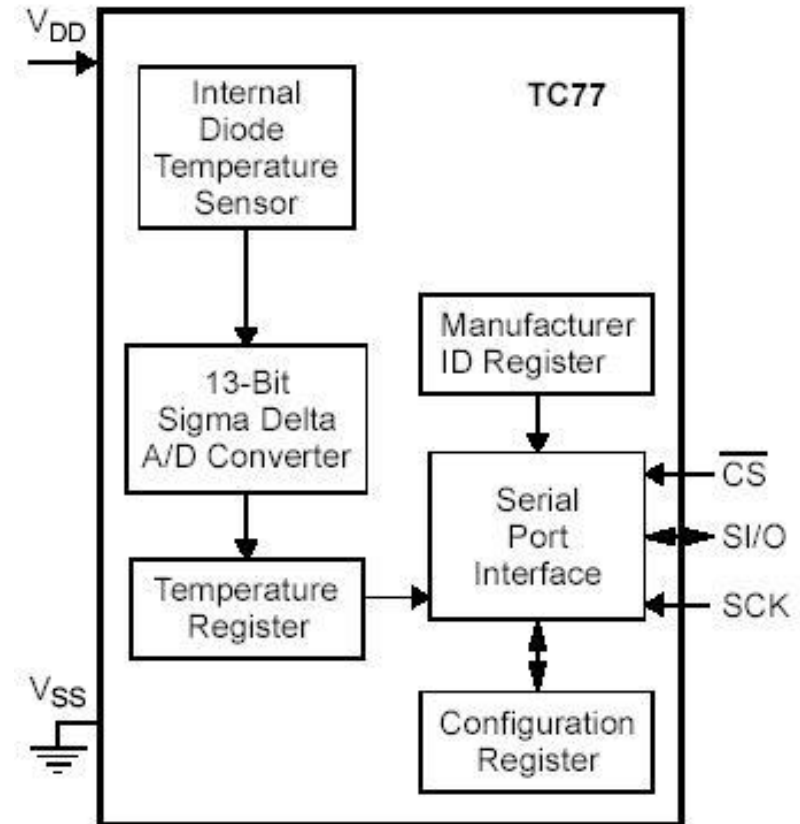
## Features:

- Temperature-to-Digital Converter
- High Accuracy with 12-bit Resolution:
  - ±1°C (max.) accuracy, 0°C to +85°C
  - ±2°C (max.) accuracy, -25°C to +105°C
  - ±3°C (max.) accuracy, -40°C to +125°C
- Nonvolatile Registers to Retain Configuration
- User-selectable Resolution: 9 - 12 bit
- 1.7V to 5.5V Operating Voltage Range
- I<sup>2</sup>C™/SMBus Compatible
- Low Power
- 75µA (typ.) Operating Current
- 1µA (typ.) Shutdown Mode
- Power-saving One-shot Temperature Measurement
- Pin and Software Compatible to Industry standard LM75
- Packages: SOIC-8, MSOP-8, 2x3 DFN-8



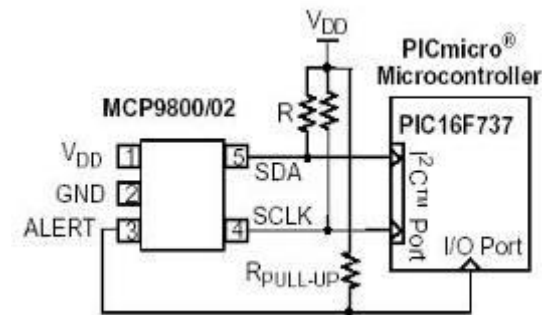
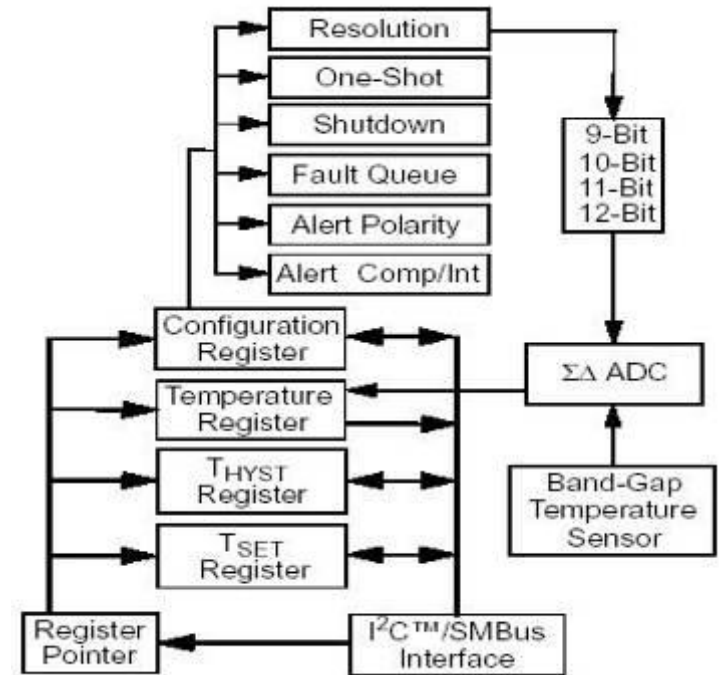
## Features:

- Digital Temperature Sensing in 5-Pin SOT-23A –  
- and 8-Pin SOIC Packages
- Outputs Temperature as a 13-Bit Digital Word
- SPI and MICROWIRE™ Compatible Interface
- Solid State temperature Sensing:
  - $\pm 1^{\circ}\text{C}$  (max.) accuracy from  $+25^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$
  - $\pm 2^{\circ}\text{C}$  (max.) accuracy from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - $\pm 3^{\circ}\text{C}$  (max.) accuracy from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- 2.7V to 5.5V Operating Voltage Range
- Lower Power
- $250\mu\text{A}$  (typ.) Continuous Conversion Mode
- $0.1\mu\text{A}$  (typ.) Shutdown Mode
- Recommended for Automotive Design



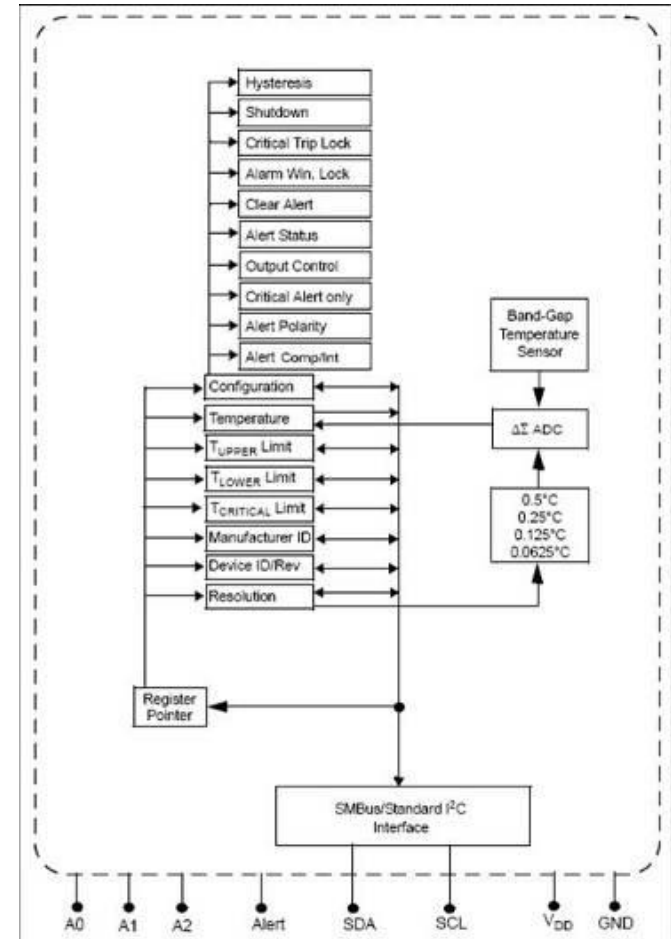
## Features:

- Temperature-to-Digital Converter
- Accuracy with 12-bit Resolution:
  - $\pm 1^{\circ}\text{C}$  (max.) accuracy from  $-10^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - $\pm 2^{\circ}\text{C}$  (max.) accuracy from  $-10^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
  - $\pm 3^{\circ}\text{C}$  (max.) accuracy from  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- User-selectable Resolution: 9 - 12 bit
- 2.7V to 5.5V Operating Voltage Range
- 2-wire Interface: I<sup>2</sup>C™/SMBus Compatible
- Lower Power
- 200 $\mu\text{A}$  (typ.) Operating Current
- 1 $\mu\text{A}$  (max.) Shutdown Mode
- Power-saving One-shot Temperature Measurement
- Packages: SOT-23-5, MSOP-8, SOIC-8
- Recommended for Automotive Design (MCP9800/3)



## Features:

- Accuracy:
  - - ±0.25°C (typical) from -40°C to +125°C
  - - ±1°C (maximum) from -40°C to +125°C
- User Selectable Measurement Resolution:
  - 0.5°C, 0.25°C, 0.125°C, 0.0625°C
- User Programmable Temperature Limits:
  - - Temperature Window Limit
  - - Critical Temperature Limit
- User Programmable Temperature Alert Output
- Operating Voltage Range: 2.7V to 5.5V
- Operating Current: 200 µA (typical)
- Shutdown Current: 0.1 µA (typical)
- 2-wire Interface: I<sup>2</sup>C/SMBus Compatible
- Packages: 2x3 DFN-8, MSOP-8
- Recommended for Automotive Design

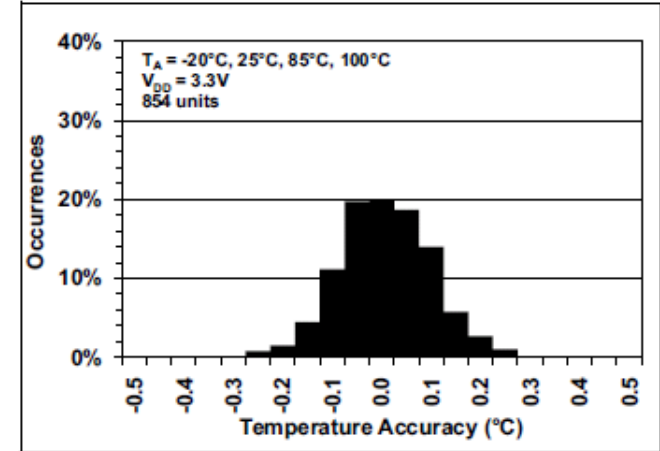




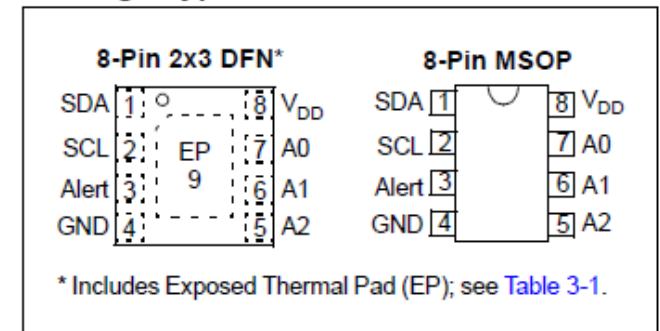
## Features:

- Accuracy:
  - ±0.25 (typical) from -40°C to +125°C
  - ±0.5°C (maximum) from -20°C to 100°C
  - ±1°C (maximum) from -40°C to +125°C
- User-Selectable Measurement Resolution:
  - +0.5°C, +0.25°C, +0.125°C, +0.0625°C
- User-Programmable Temperature Limits:
  - Temperature Window Limit
  - Critical Temperature Limit
- User-Programmable Temperature Alert Output
- Operating Voltage Range: 2.7V to 5.5V
- Operating Current: 200 µA (typical)
- Shutdown Current: 0.1 µA (typical)
- 2-wire Interface: I<sup>2</sup>C™/SMBus Compatible
- Available Packages: 2x3 DFN-8, MSOP-8

## Temperature Accuracy

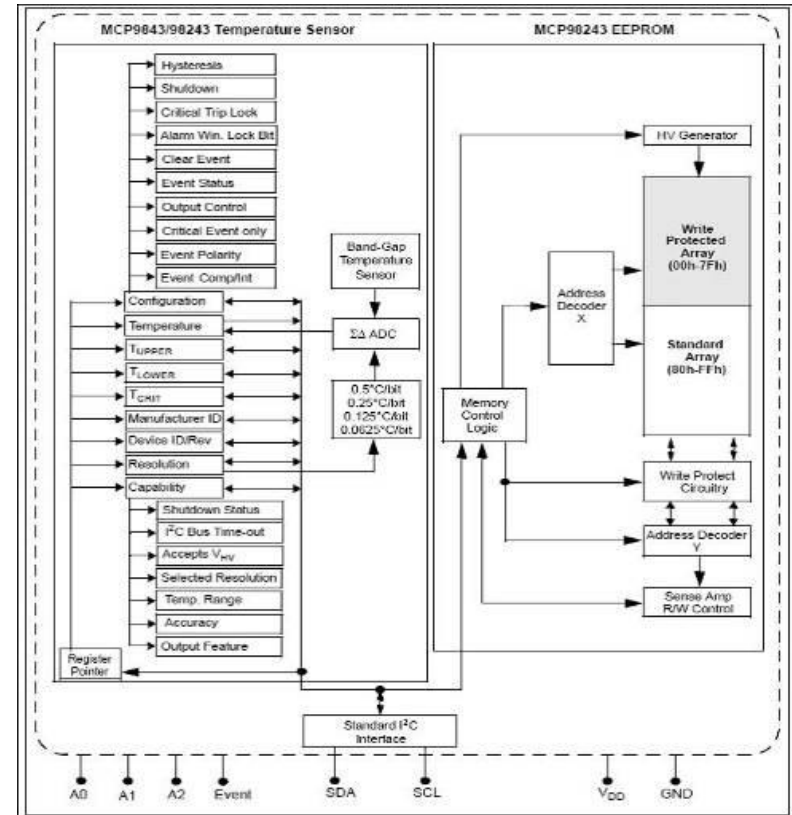


## Package Types



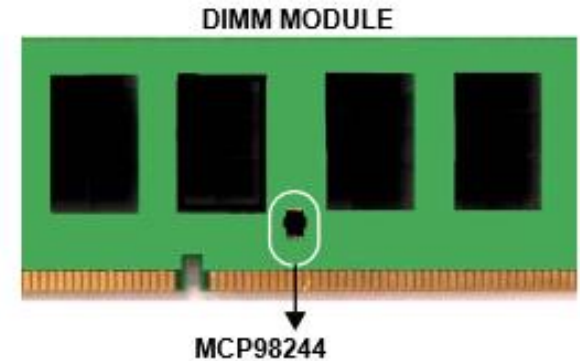
## Features:

- Temperature Sensor
  - JC42.4-TSE2002B3
  - Temperature Sensor with 2 Kbit Serial
- EEPROM for Serial Presence Detect (SPD)
- I<sup>2</sup>C/SMBus Interface
- Temperature Sensor Features (Grade B):
  - $\pm 0.2^{\circ}\text{C}/\pm 1^{\circ}\text{C}$  (typ./max.),  $+75^{\circ}\text{C}$  to  $+95^{\circ}\text{C}$
  - $\pm 0.5^{\circ}\text{C}/\pm 2^{\circ}\text{C}$  (typ./max.),  $+40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
  - $\pm 1^{\circ}\text{C}/\pm 3^{\circ}\text{C}$  (typ./max.),  $-20^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Operating Current: 200  $\mu\text{A}$  (typical)
- $V_{\text{DD}}$ : 2.7V to 5.5V
- Serial EEPROM Features:
  - $V_{\text{DD}}$ : 1.8V to 5.5V
  - Write : 1.1 mA (typical) for 3.5 ms
  - Read : 100  $\mu\text{A}$  (typical)
- Permanent & Reversible Software Write Protect
- Packages: DFN-8, TDFN-8, UDFN-8, TSSOP-8
- Recommended for Automotive Design



## Features:

- Meets JEDEC Specification:
  - JC42.4-TSE2004B1 Temp-Sensor w/ 4 Kbit Serial EEPROM for Serial Presence Detect (SPD)
- 1MHz, 2-wire I<sup>2</sup>C Interface
- V<sub>DD</sub>: 1.7V to 3.6V
- Operating Current: 100  $\mu$ A (typ., EEPROM Idle)
- Temperature Sensor Features (Grade B):
  - $\pm 0.2^{\circ}\text{C}/\pm 1^{\circ}\text{C}$  (typ./max.),  $+75^{\circ}\text{C}$  to  $+95^{\circ}\text{C}$
  - $\pm 0.5^{\circ}\text{C}/\pm 2^{\circ}\text{C}$  (typ./max.),  $+40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
  - $\pm 1^{\circ}\text{C}/\pm 3^{\circ}\text{C}$  (typ./max.),  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Serial EEPROM Features:
  - Write: 250  $\mu$ A (typical) for 3 ms
  - Read :100  $\mu$ A (typical)
- Reversible Software Write Protect
- Software Write Protection for each 1 Kbit Block
- Organized as two banks of 256 x 8-bit (2 Kbit x 2)
- Package: TDFN-8

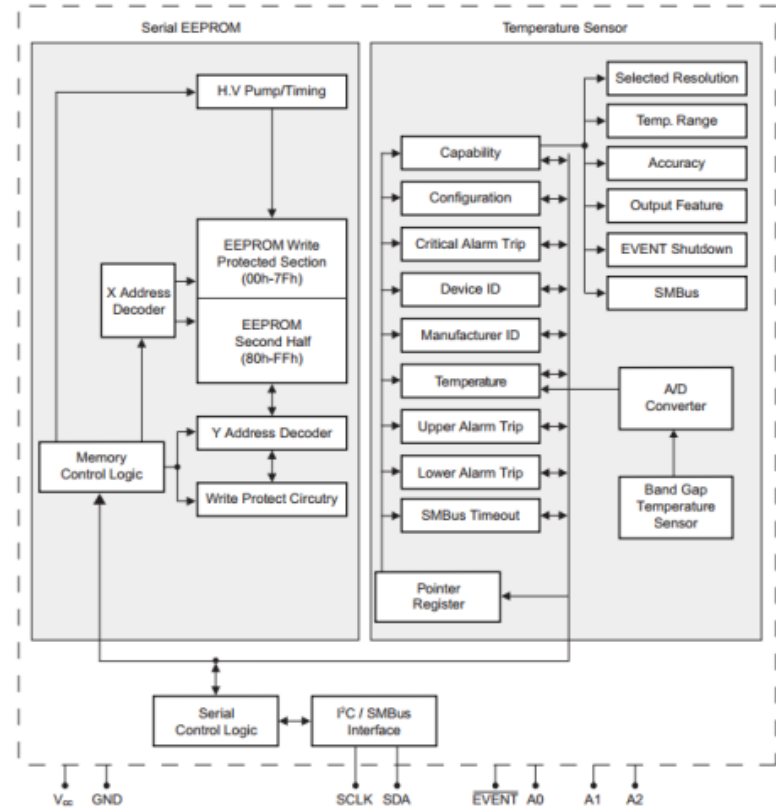


## 8-Pin 2x3 TDFN\*

A0	1		8	V <sub>DD</sub>
A1	2	EP	7	Event
A2	3	9	6	SCL
GND	4		5	SDA

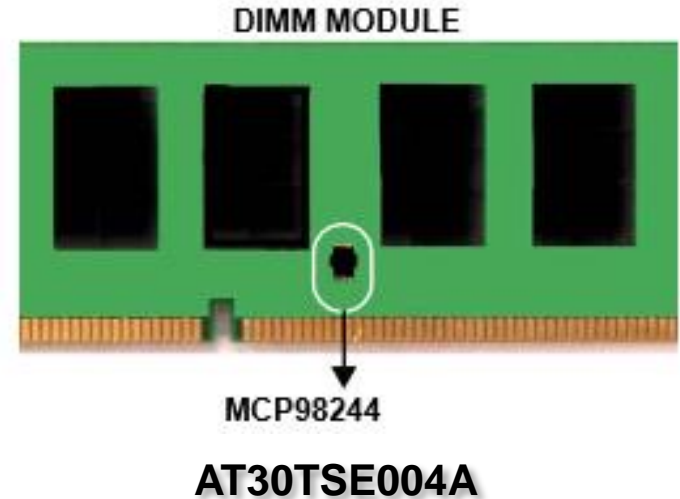
## Features:

- Temperature Sensor with 2Kb Serial EEPROM
  - JC42.4-TSE2002B3
  - EEPROM for Serial Presence Detect (SPD)
- I<sup>2</sup>C/SMBus Interface
- Package: UDFN-8
- Temperature Sensor Features:
  - Sensor Accuracy (Grade B):
    - $\pm 1^{\circ}\text{C}$  (max.)  $\rightarrow +75^{\circ}\text{C}$  to  $+95^{\circ}\text{C}$
    - $\pm 2^{\circ}\text{C}$  (max.)  $\rightarrow +40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
    - $\pm 3^{\circ}\text{C}$  (max.)  $\rightarrow -20^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Operating Current: 200  $\mu\text{A}$  (typical)
- $V_{\text{DD}}$ : 2.7V to 3.6V
- Serial EEPROM Features:
- Operating Current:
  - Write : 1.5 mA (typical)
  - Read : 200  $\mu\text{A}$  (typical)
- Permanent and Reversible Software Write Protect
- Endurance: 1 Million Write Cycles



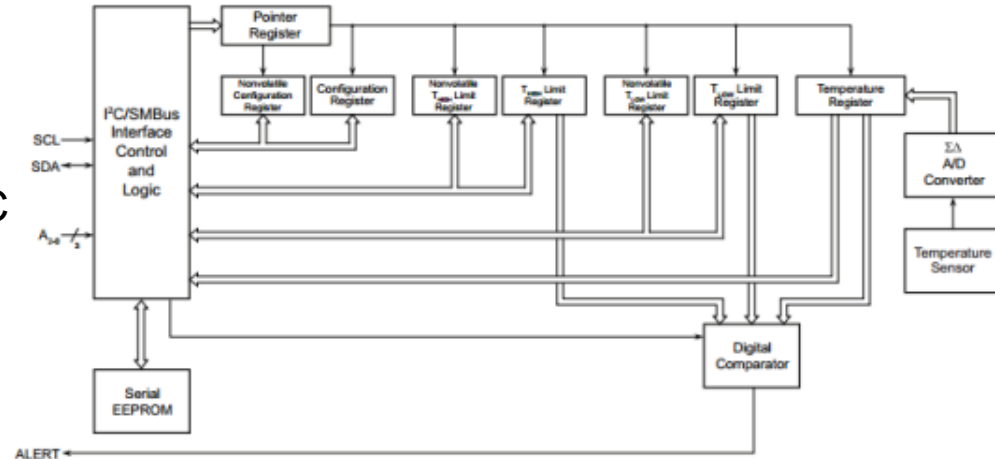
## Features:

- Meets JEDEC Specification:
  - JC42.4-TSE2004B1 Temperature Sensor –  
- with 4 Kbit
- Serial EEPROM for Serial Presence Detect (SPD)
- 1MHz, 2-wire I<sup>2</sup>C Interface
- V<sub>DD</sub>: 1.7V to 3.6V
- Operating Current: 200  $\mu$ A (typ., EEPROM Idle)
- Package: TDFN-8, UDFN-8
- Temperature Sensor:
  - Sensor Accuracy (Grade B):
    - $\pm 1^{\circ}\text{C}$  (max.) between  $+75^{\circ}\text{C}$  to  $+95^{\circ}\text{C}$
    - $\pm 2^{\circ}\text{C}$  (max.) between  $+40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
    - $\pm 3^{\circ}\text{C}$  (max.) between  $-20^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Serial EEPROM Features:
  - Operating Current:
    - Write: 1.5mA (typical)
    - Read: 200  $\mu$ A (typical)
- Reversible Software Write Protect
- Software Write Protection for each 1 Kbit Block



## Features:

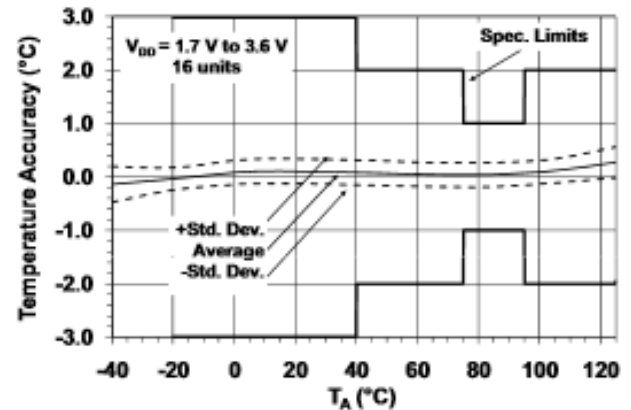
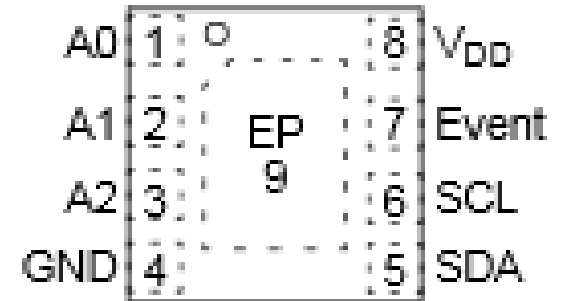
- Temperature-to-Digital Converter
- High Accuracy with 12-bit Resolution:
  - $\pm 1^{\circ}\text{C}$  (max.) accuracy,  $0^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - $\pm 2^{\circ}\text{C}$  (max.) accuracy,  $25^{\circ}\text{C}$  to  $+105^{\circ}\text{C}$
  - $\pm 3^{\circ}\text{C}$  (max.) accuracy,  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Nonvolatile Registers to Retain Config
- 2/4/8Kb of Serial EEPROM
- User-selectable Resolution:
  - 9 - 12 bit
- 1.7V to 5.5V Operating Voltage Range
- I<sup>2</sup>C™, SMBus Compatible
- Low Power:
  - 75 $\mu\text{A}$  (typ.) Operating Current
  - 1 $\mu\text{A}$  (typ.) Shutdown Mode
- Power-saving One-shot Measurement
- Pin and Software Compatible to Industry standard LM75
- Packages: SOIC-8, MSOP-8, 2x3 UDFN-8



## Features:

- User Selectable Measurement Resolution:
  - +0.5°C, +0.25°C, +0.125°C, +0.0625°C
- User Programmable Temperature Limits:
  - Temperature Window Limit
  - Critical Temperature Limit
- User Programmable Temperature Alert Output
- I<sup>2</sup>C Interface
- V<sub>DD</sub>: 1.7V to 3.6V
- Operating Current: 100 µA (typ.)
- Package: 8-lead TDFN
- Temperature Sensor Features (Grade B):
  - ±0.2°C/±1°C (typ./max.), +75°C to +95°C
  - ±0.5°C/±2°C (typ./max.), +40°C to +125°C
  - ±1°C/±3°C (typ./max.), -40°C to +125°C

## 8-Pin 2x3 TDFN \*

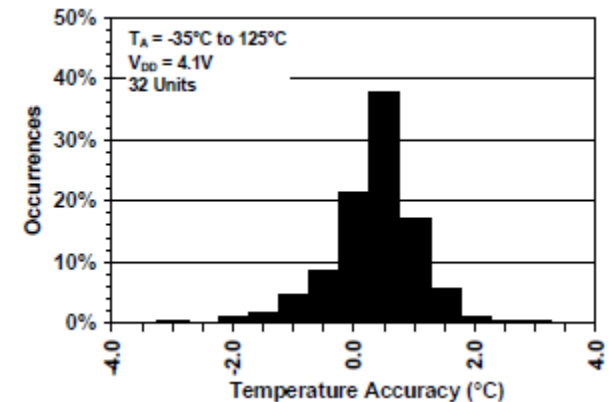
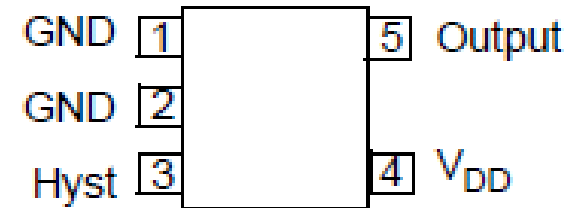


## Features:

- Factory Set Temperature Switch
- Wide Operating Voltage Range: 2.7V to 5.5V
- Low Supply Current: 25  $\mu$ A (typ.)
- Temperature Switch Accuracy:
  - $\pm 1^\circ\text{C}$  (typical)
  - $\pm 4^\circ\text{C}$  (maximum)  $-15^\circ\text{C}$  to  $+75^\circ\text{C}$
  - $\pm 6^\circ\text{C}$  (maximum)  $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Switch Threshold Options (Hot/Cold):
  - Rising Temp: MCP9501/2 (Hot Option)
  - Falling Temp: MCP9503/4 (Cold Option)
- Output Configuration Options:
  - Active Low, Open-Drain Output: MCP9501/3
  - Uses External Pull-up Resistor
  - Active-High, Push-Pull Output: MCP9502/4
- User Selectable Hysteresis:  $2^\circ\text{C}$  or  $10^\circ\text{C}$  (typical)
- 5-lead SOT-23 package

## MCP9501/2/3/4

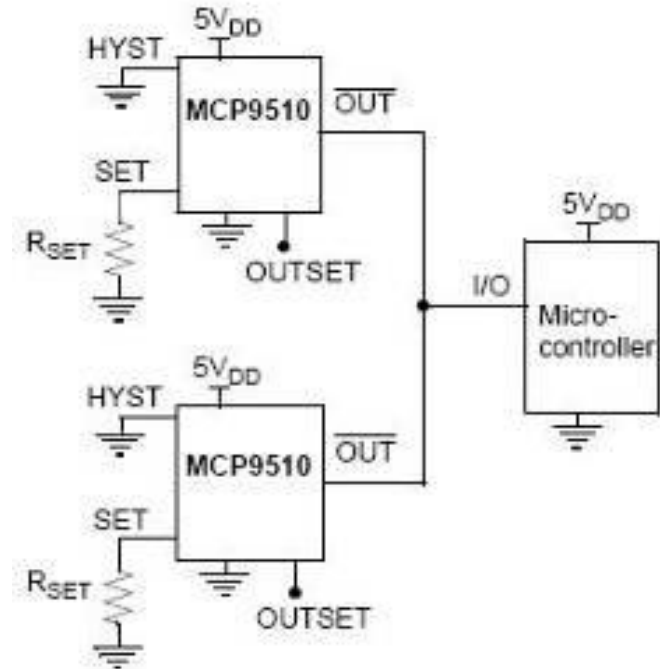
### SOT-23-5





## Features:

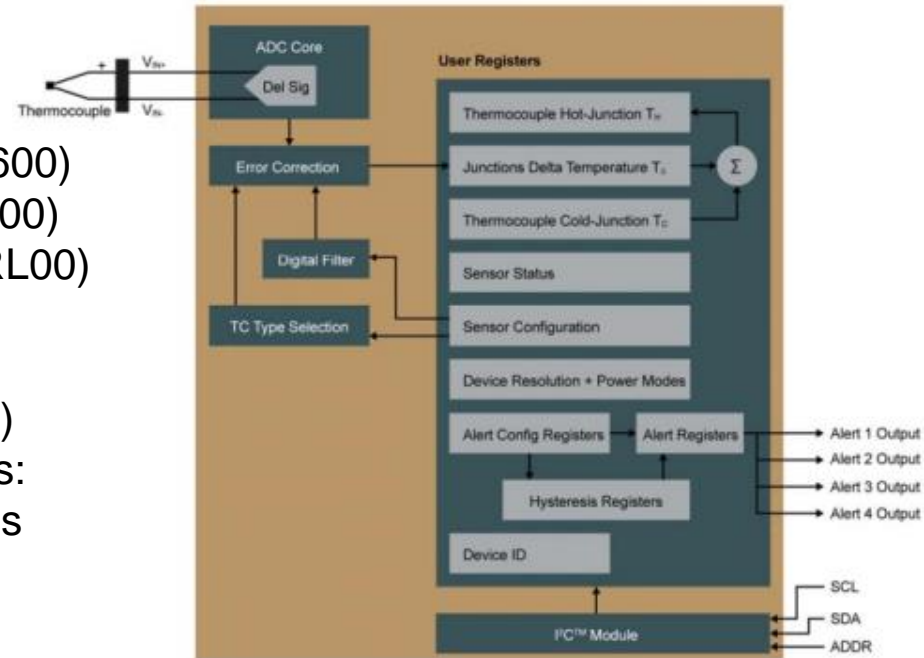
- Resistor-Programmable Temperature Switch
- Wide Operating Voltage Range: 2.7V to 5.5V
- Low Supply Current: 30 $\mu$ A (typ.)
- Temperature Switch Accuracy:
  - $\pm 0.5^{\circ}\text{C}$  (typ.) at  $+25^{\circ}\text{C}$ ,  $+45^{\circ}\text{C}$
  - $\pm 1^{\circ}\text{C}$  (typ.)  $0^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
  - $\pm 3.5^{\circ}\text{C}$  (max.)  $0^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
  - $\pm 4.5^{\circ}\text{C}$  (max.)  $-20^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
  - $\pm 2^{\circ}\text{C}$  (typ.)  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Sensor Options available:
  - Switch for rising temperature: Cold to Hot (H)
  - Switch for falling temperature: Hot to Cold (C)
- Output Configurations:
  - Open-Drain:
    - External Pull-up Resistor: MCP9509
    - Internal Pull-up Resistor: MCP9510
  - Active-Low, Push-Pull: MCP9510
  - Active-High, Push-Pull: MCP9510
- User Selectable Hysteresis:  $2^{\circ}\text{C}$  or  $10^{\circ}\text{C}$  (typ.)
- Space-Saving SOT-23-5, SOT-23-6 Packages
- Recommended for Automotive Design (MCP9510)



*MCP9510 Wired-Or Output Configuration  
with Internal Pull-up Resistor.*

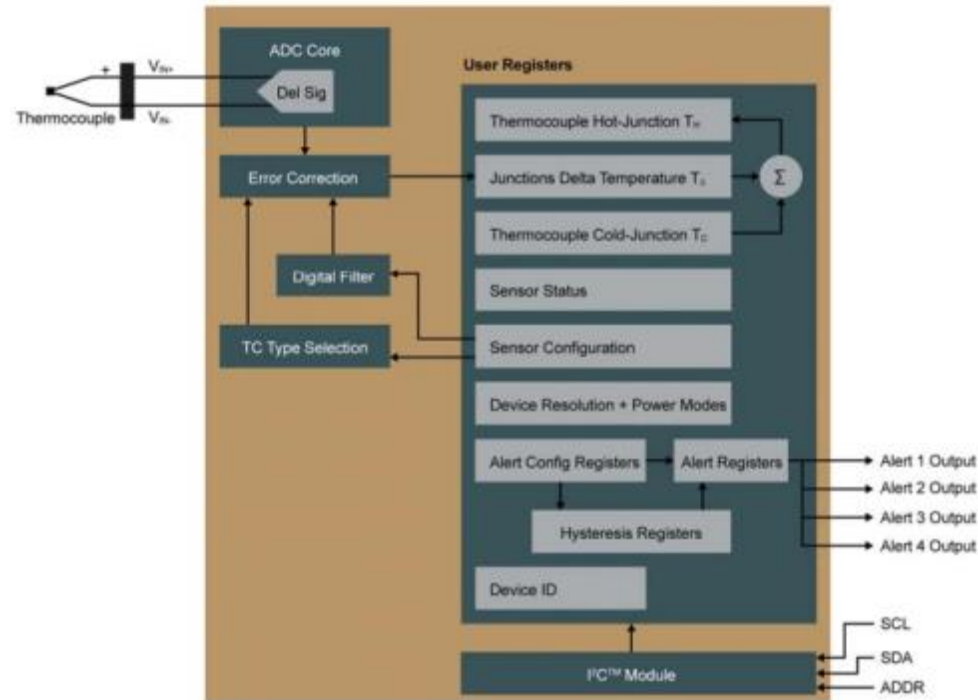
## Features:

- Thermocouple Voltage to  $^{\circ}\text{C}$  Converter
  - Integrated Cold-Junction Compensation
- Supported Types (NIST ITS-90):
  - Types K, J, T, N, S, E, B and R
- $\pm 1.5^{\circ}\text{C}$  (Max.) Measurement Accuracy (MCP9600)
- $\pm 4^{\circ}\text{C}$  (Max.) Measurement Accuracy (MCP96L00)
- $\pm 8^{\circ}\text{C}$  (Max.) Measurement Accuracy (MCP96RL00)
- $\pm 1.0^{\circ}\text{C}$  (Max.) Cold-Junction (MCP9600/L00)
- Temperature Measurement Resolution:
  - Hot and Cold-Junctions:  $0.0625^{\circ}\text{C}$  (typical)
- Four Programmable Temperature Alert Outputs:
  - Monitor Hot or Cold-Junction Temperatures
  - Detect rising or falling temperatures
  - Up to  $255^{\circ}\text{C}$  of Programmable Hysteresis
- Programmable Digital Filter for Temperature
- Low Power: Shutdown Mode and Burst Mode
- I<sup>2</sup>C Compatible
  - 100 kHz, supports up to 8 devices/bus
- Operating Voltage Range: 2.7V to 5.5V
- Operating Current: 500  $\mu\text{A}$  (typical)
- Package: 20-lead MQFN



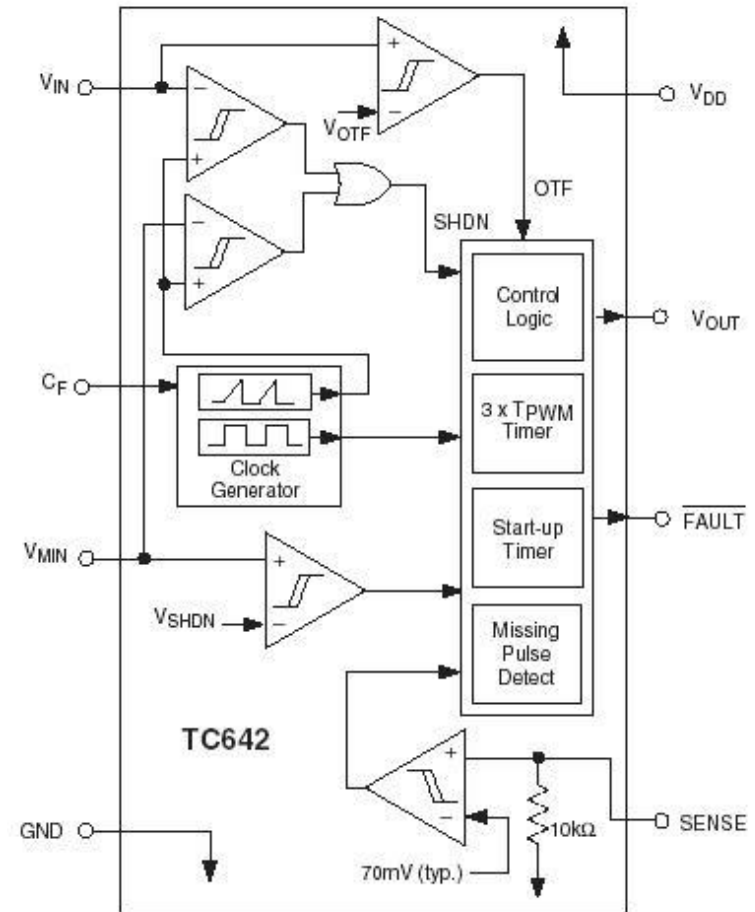
## Features:

- Thermocouple Voltage to °C Converter
  - Integrated Cold-Junction Compensation
  - Integrated Thermocouple open-circuit and short-circuit detection
- Supported Types (NIST ITS-90):
  - Types K, J, T, N, S, E, B and R
- $\pm 1.5^{\circ}\text{C}$  (Max.) Measurement Accuracy (MCP9601)
- $\pm 4^{\circ}\text{C}$  (Max.) Measurement Accuracy (MCP96L01)
- $\pm 8^{\circ}\text{C}$  (Max.) Measurement Accuracy (MCP96RL01)
- $\pm 1.0^{\circ}\text{C}$  (Max.) Cold-Junction (MCP9601/L01/RL01)
- Temperature Measurement Resolution:
  - Hot and Cold-Junctions:  $0.0625^{\circ}\text{C}$  (typical)
- Four Programmable Temperature Alert Outputs:
  - Monitor Hot or Cold-Junction Temperatures
  - Detect rising or falling temperatures
  - Up to  $255^{\circ}\text{C}$  of Programmable Hysteresis
- Programmable Digital Filter for Temperature
- Low Power: Shutdown Mode and Burst Mode
- I<sup>2</sup>C Compatible
  - 100 kHz, supports up to 8 devices/bus
- Operating Voltage Range: 2.7V to 5.5V
- Operating Current: 500  $\mu\text{A}$  (typical)
- Package: 20-lead MQFN



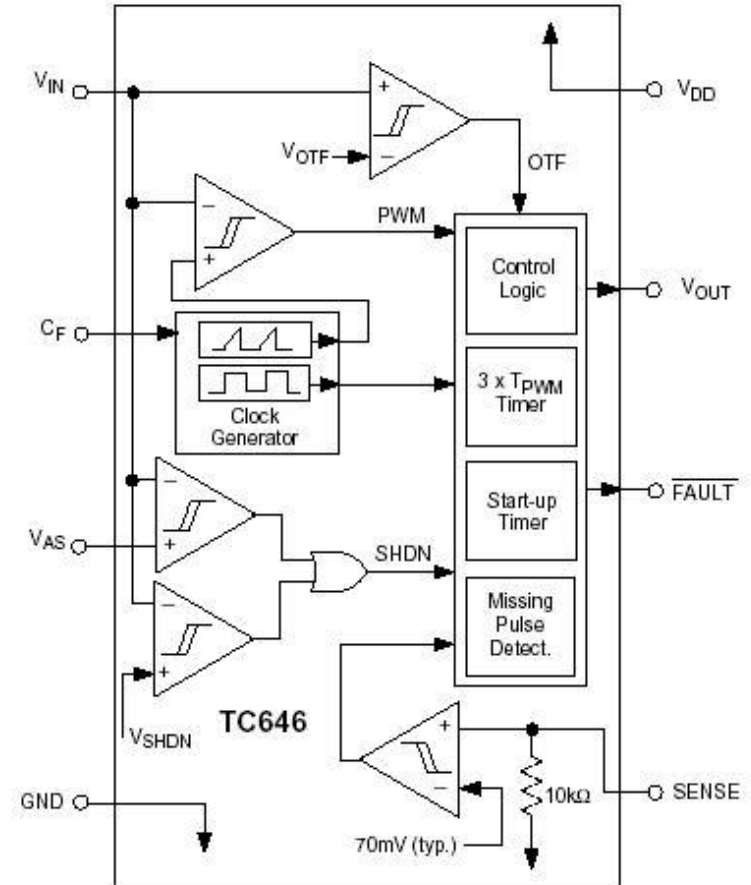
## Features:

- Temperature Proportional Fan Speed for –
  - Acoustic Control and Longer Fan Life
- Efficient PWM Fan Drive
- 3.0V to 5.5V Supply Range:
  - Fan Voltage Independent of TC647
  - Supply Voltage
- Supports any Fan Voltage
- FanSense™ Fault Detection Circuits Protect –
  - Against Fan Failure and Aid System Testing
- Shutdown Mode for “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Over-temperature Indication
- Space Saving 8-Pin MSOP Package



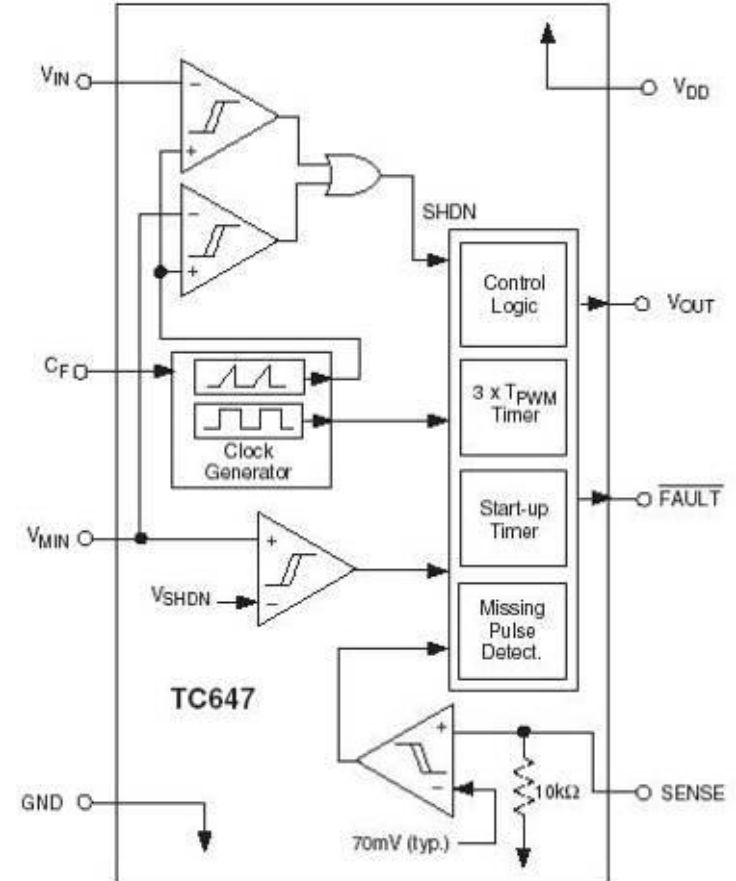
## Features:

- Temperature Proportional Fan Speed for –
  - Acoustic Control and Longer Fan Life
- Efficient PWM Fan Drive
- 3.0V to 5.5V Supply Range:
  - Fan Voltage Independent of TC646 –
    - Supply Voltage
  - Supports any Fan Voltage
- FanSense™ Fault Detection Circuits Protect –
  - Against Fan Failure and Aid System Testing
- Shutdown Mode for “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Over-temperature Indication



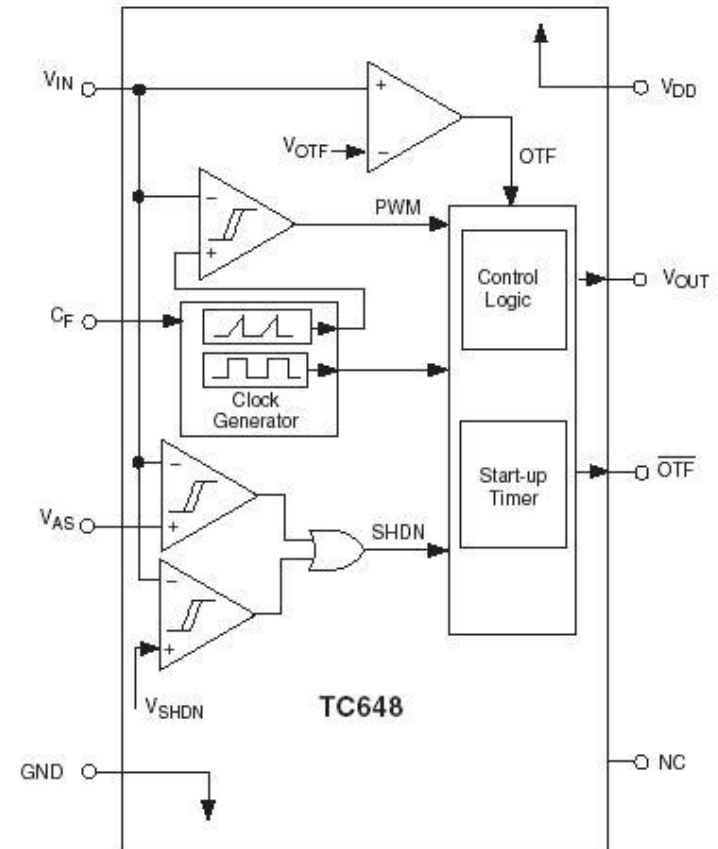
## Features:

- Temperature Proportional Fan Speed for Acoustic –  
- Control and Longer Fan Life
- Efficient PWM Fan Drive
- 3.0V to 5.5V Supply Range:
  - Fan Voltage Independent of TC647 Supply –  
- Voltage
  - Supports any Fan Voltage
- FanSense™ Fault Detection Circuits Protect –  
- Against Fan Failure and Aid System Testing
- Shutdown Mode for “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Over-temperature Indication
- Space Saving 8-Pin MSOP Package



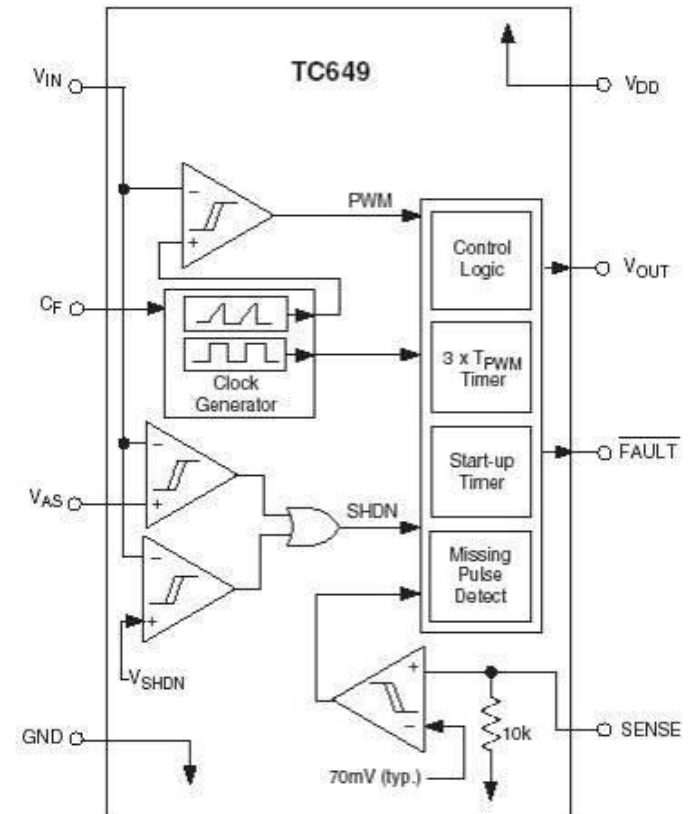
## Features:

- Temperature Proportional Fan Speed for Acoustic – Control and Longer Fan Life
- Efficient PWM Fan Drive
- 3.0V to 5.5V Supply Range:
  - Fan Voltage Independent of TC647 Supply – Voltage
  - Supports any Fan Voltage
- Over-temperature Fan Detection
- Shutdown Mode for “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Space Saving 8-Pin MSOP Package



## Features:

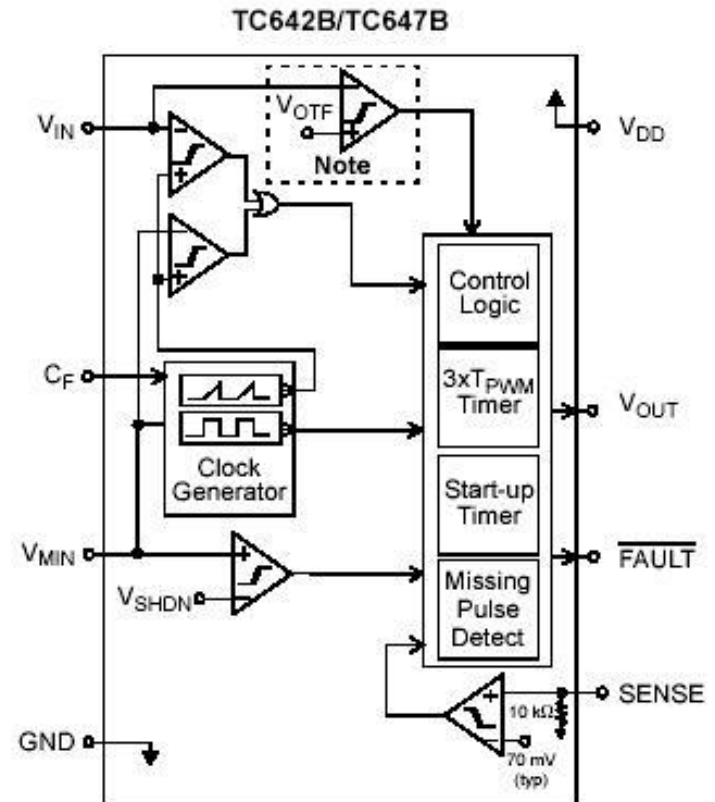
- Temperature Proportional Fan Speed for Acoustic –  
- Control and Longer Fan Life
- Efficient PWM Fan Drive
- 3.0V to 5.5V Supply Range:
  - Fan Voltage Independent of TC649 Supply –  
- Voltage
  - Supports any Fan Voltage
- FanSense™ Fault Detection Circuits
- Protect Against Fan Failure and Aid  
System Testing
- Shutdown Mode for “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Over-temperature Indication
- Space Saving 8-Pin MSOP Package





## Features:

- Temperature Proportional Fan Speed for Acoustic –
  - Control and Longer Fan Life
- Efficient PWM Fan Drive
- 3.0V to 5.5V Supply Range:
  - Fan Voltage Independent of TC642B/TC647B –
    - Supply Voltage
  - Supports any Fan Voltage
- FanSense™ Fault Detection Circuits Protect Against –
  - Fan Failure and Aid System Testing
- Shutdown Mode for “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Over-temperature Indication
- Fan Auto-Restart
- Space Saving 8-Pin MSOP Package



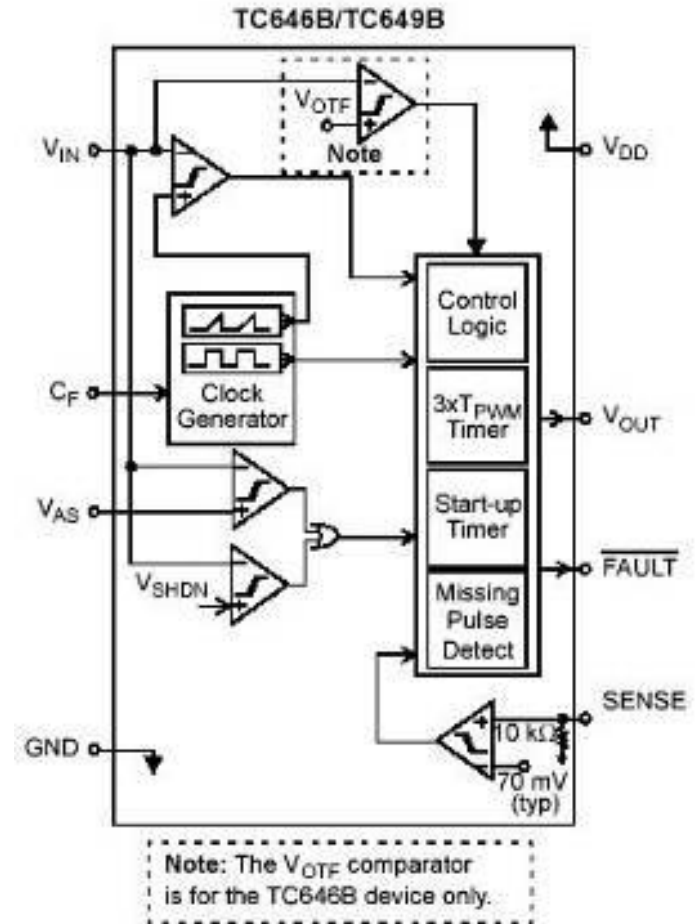
Note: The  $V_{OTF}$  comparator is for the TC642B device only.

# TC646B/648B/649B

PWM Fan Speed Controllers With Auto-Shutdown, Fan Restart and FanSense™ Technology for Fault Detection

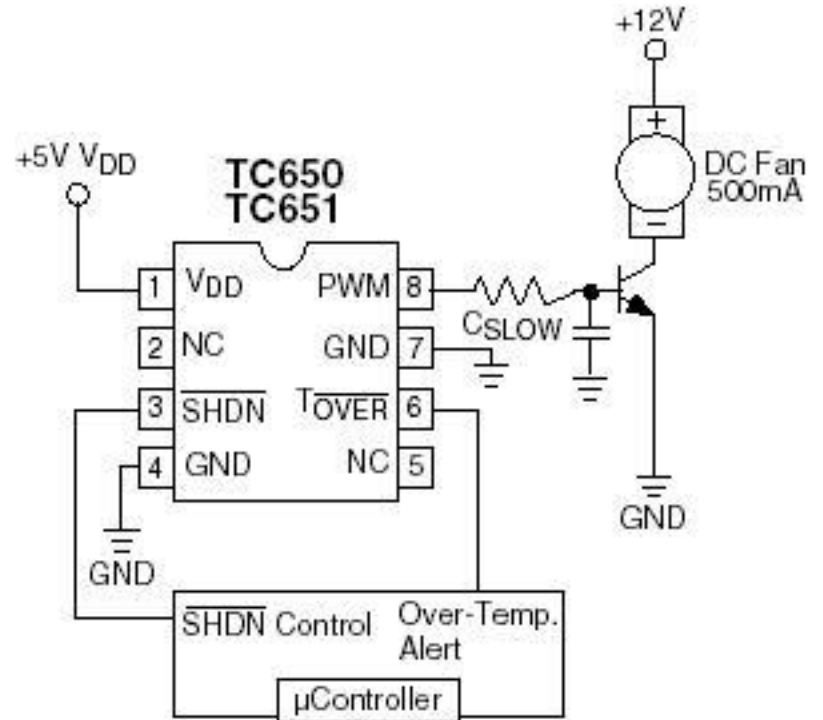
## Features:

- Temperature Proportional Fan Speed for Acoustic –
  - Control and Longer Fan Life
- Efficient PWM Fan Drive
- 3.0V to 5.5V Supply Range:
  - Fan Voltage Independent of –
    - TC646B/TC648B/TC649B Supply Voltage
  - Supports any Fan Voltage
- FanSense™ Fault Detection Circuits Protect Against –
  - Fan Failure and Aid System Testing
  - (TC646B/TC649B)
- Shutdown Mode for “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Over-temperature Indication (TC646B/TC648B)
- Fan Auto-Restart
- Space Saving 8-Pin MSOP Package



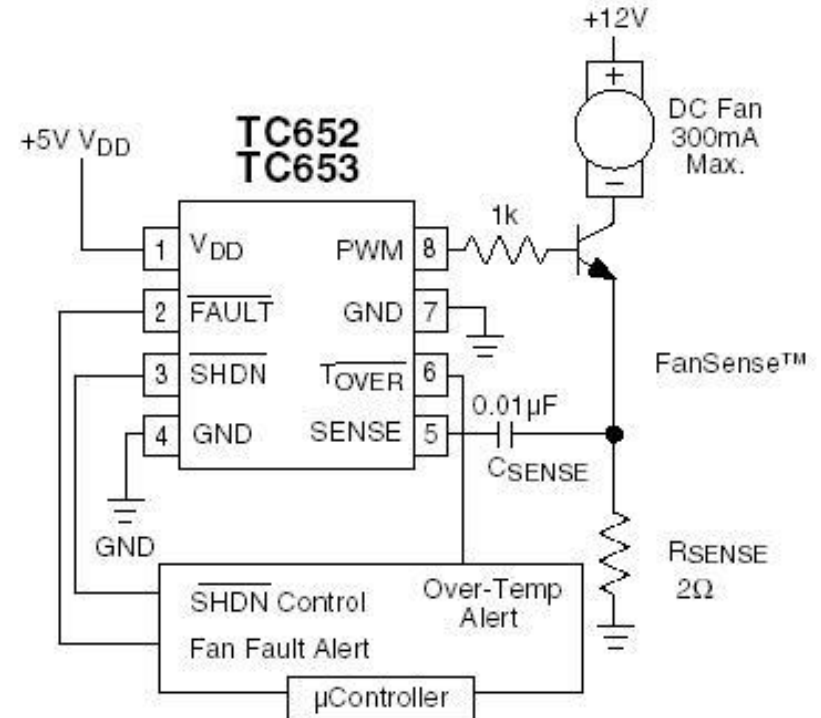
## Features:

- Integrated Temperature Sensing and Multi –  
– Speed Fan Control
- Built-in Over Temperature Alert
- Temperature Proportional Fan Speed Control -  
– for Acoustic Noise Reduction and Longer –  
– Fan Life
- Pulse Width Modulation Output Drive for Cost  
– and Power Savings
- Solid-State Temperature Sensing
- $\pm 1^{\circ}\text{C}$  (typ.) accuracy  $+25^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
- 2.8V to 5.5V Operating Range
- TC651 includes Auto Fan Shutdown
- Low Operating Current  $50\mu\text{A}$  (typ.)



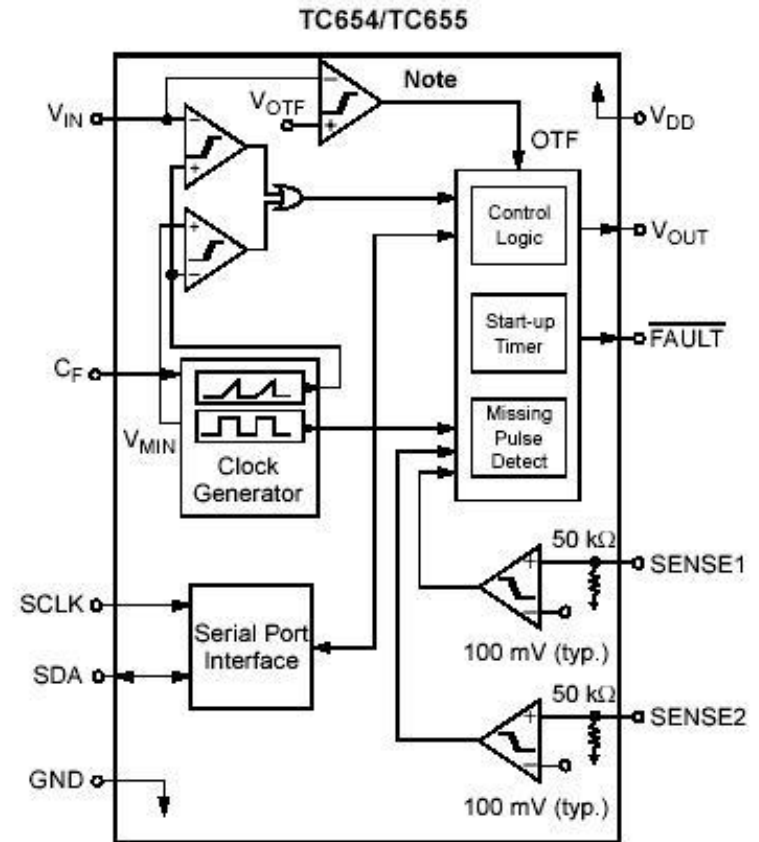
## Features:

- Integrated Temperature Sensing and Multi –
  - Speed Fan Control
- FanSense™ Fan Fault Detect Circuitry
- Built-in Over Temperature Alert
- Temperature Proportional Fan Speed Control –
  - for Acoustic Noise Reduction and Longer –
  - Fan Life
- Pulse Width Modulation Output Drive for Cost –
  - and Power Savings
- Solid-State Temperature Sensing
- $\pm 1^{\circ}\text{C}$  (typ.) Accuracy  $+25^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$
- 2.8V to 5.5V Operating Range
- TC653 includes Auto Fan Shutdown
- Low Operating Current  $50\mu\text{A}$  (typ.)



## Features:

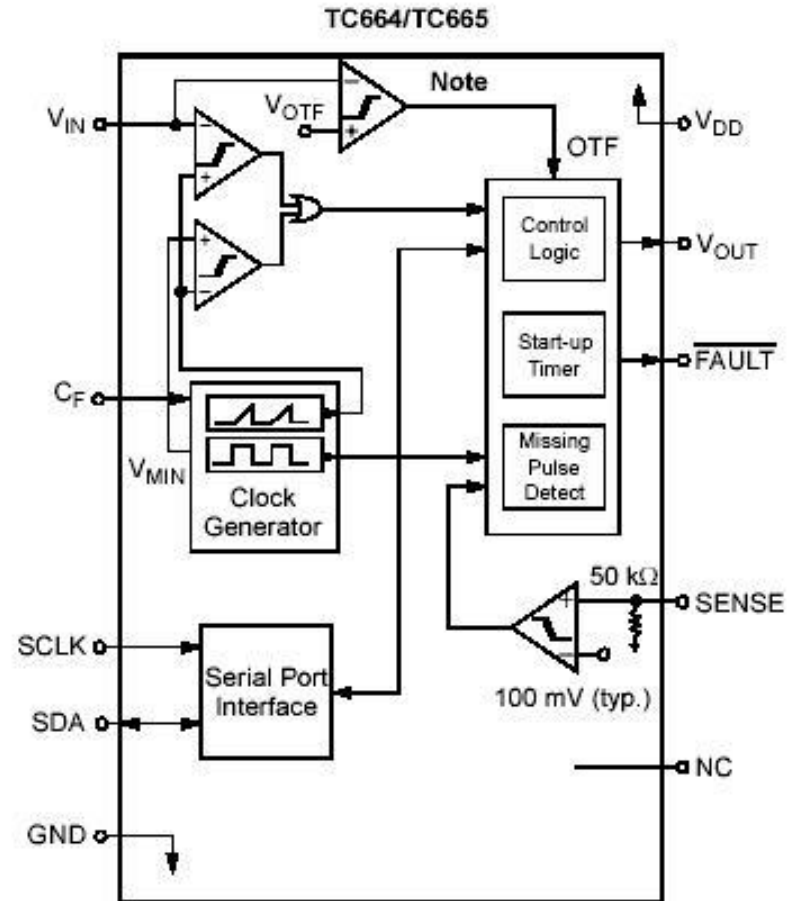
- FanSense™ Protects against Fan Failure and – Eliminates the Need for 3-wire Fans
- Temperature Proportional Fan Speed Control –  
- for Acoustic Noise Reduction and Longer –  
- Fan Life
- Over Temperature Detection (TC655)
- Provides RPM Data
- 2-Wire SMBus™ Compatible Interface
- Software Controlled Shutdown Mode for –  
- “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Space Saving 10-pin MSOP Package
- Temperature Range: -40°C to +85°C



Note: OTF condition applies for the TC655 device only.

## Features:

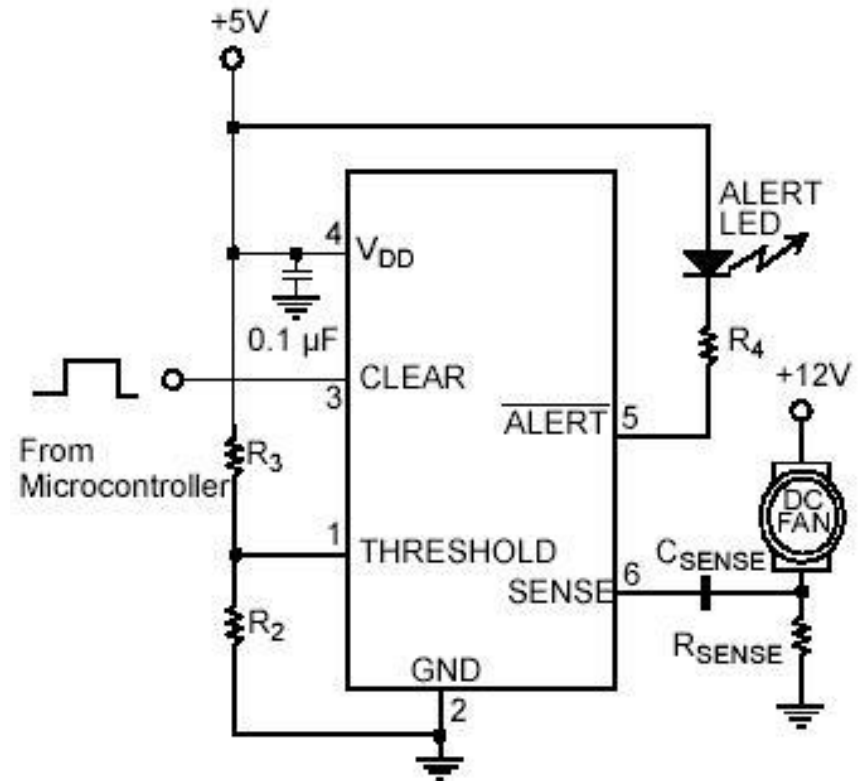
- FanSense™ Protects against Fan Failure and –
  - Eliminates the Need for 3-wire Fans
- Temperature Proportional Fan Speed Control –
  - for Acoustic Noise Reduction and Longer –
  - Fan Life
- Over Temperature Detection (TC665)
- Provides RPM Data
- 2-Wire SMBus™ Compatible Interface
- Supports any Fan Voltage
- Software Controlled Shutdown Mode for –
  - “Green” Systems
- Supports Low Cost NTC/PTC Thermistors
- Space Saving 10-pin MSOP Package
- Temperature Range: -40°C to +85°C



Note: OTF condition applies for the TC665 device only.

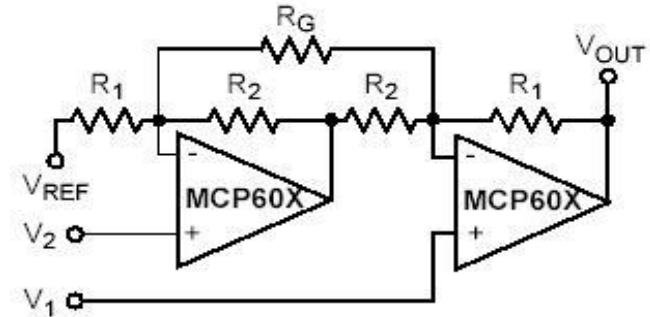
## Features:

- Fan Wear-Out Detection for 2-Wire Linear -  
- Controlled Fans
- Replacement System for 3-Wire Fans
- Fan Alert Signal when Fan Speed is below –  
- Programmed Threshold
- CLEAR Capability for Eliminating False Alarm
- Low Operating Current, 90 $\mu$ A (typ.)
- $V_{DD}$  Range 3.0V to 5.5V
- Available in a 6-Pin SOT-23 Package



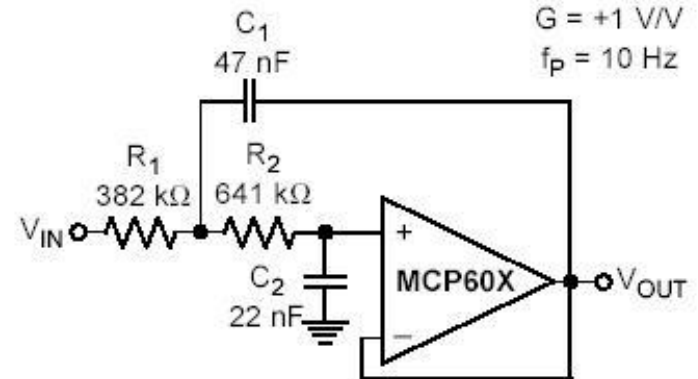
## Features:

- Gain Bandwidth Product:
  - 2.8MHz (typ.)
- Low Quiescent Current:
  - 230µA/amplifier (typ.)
- Input Offset Voltage (max):
  - ±2 mV
- Single-Supply:
  - 2.7V to 6V
- Rail-to-Rail Output
- Input Range Includes Ground
- Unity-Gain Stable
- Chip Select (CS): MCP603 only
- Temperature Ranges:
  - Industrial: -40°C to +85°C
  - Extended: -40°C to +125°C
- Available in Single, Dual and Quad
- Recommended for Automotive Design (MCP601/2/4)



$$V_{OUT} = (V_1 - V_2) \left( 1 + \frac{R_1}{R_2} + \frac{2R_1}{R_G} \right) + V_{REF}$$

*Two-Op Amp Instrumentation Amplifier*



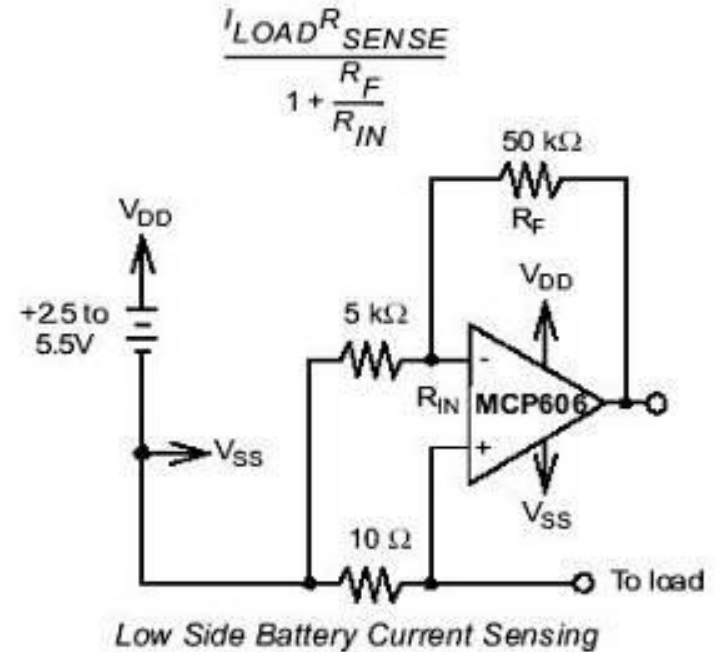
$G = +1 \text{ V/V}$   
 $f_p = 10 \text{ Hz}$

*Second-Order, Low-Pass Sallen-Key Filter*



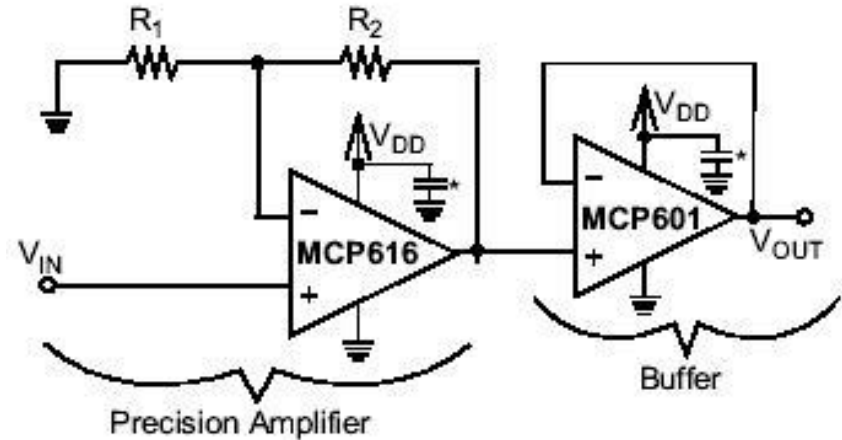
## Features:

- Gain Bandwidth Product:
  - 155 kHz
- Low Quiescent Current:
  - 25µA (max.)
- Low Input Offset Voltage:
  - ±250µV (max.)
- Power Supply Voltage:
  - 2.5V to 6V
- Low Input Bias Current:
  - 80pA (max.) at 85°C
- Unity Gain Stable
- Rail to Rail Output
- Chip Select Capability: MCP608
- Industrial Temperature Range:
  - -40°C to +85°C
- Available in Single, Dual and Quad Packages
- Available in PDIP, SOIC, MSOP, TSSOP
- Recommended for Automotive Design (MCP606/9)



## Features:

- Gain Bandwidth Product:
  - 190 kHz
- Low Quiescent Current:
  - 25 $\mu$ A (max.)
- Low Input Offset Voltage:
  - $\pm 150\mu$ V (max.)
- Power Supply Voltage:
  - 2.3V to 5.5V
- Low Noise:
  - 2.2 $\mu$ VP-P (typ.), 0.1Hz to 10Hz
- Low Input Offset Current:
  - 0.3nA (typ.)
- Rail to Rail Output
- Unity Gain Stable
- Chip Select Capability: MCP618
- Industrial Temperature Range:
  - -40 $^{\circ}$ C to +85 $^{\circ}$ C
- Available in Single, Dual and Quad
- Available in PDIP, SOIC, MSOP, TSSOP
- Recommended for Automotive Design (MCP619)

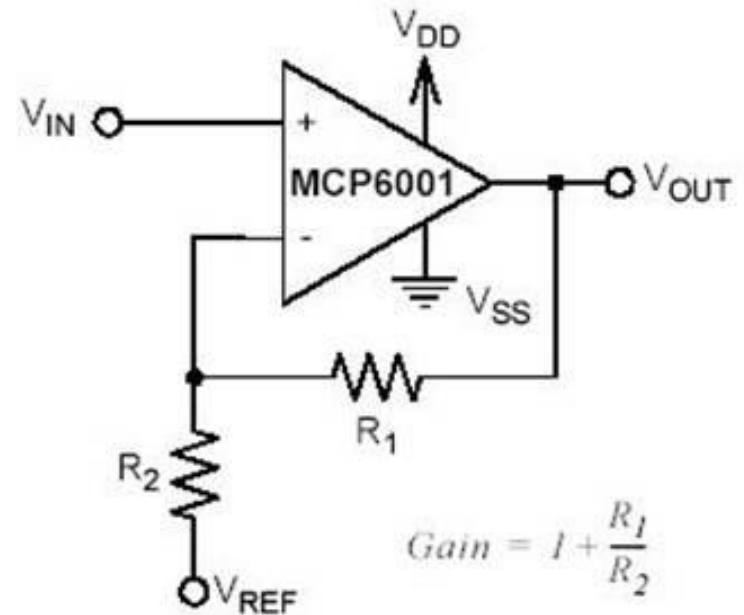


\*Bypass Capacitor, 1  $\mu$ F

*Precision Gain with Good Load Isolation*

## Features:

- Gain Bandwidth Product:
  - 1MHz (typ.)
- Supply Current:
  - 100µA (typ.)
- Input Offset Voltage (max):
  - ±4.5 mV
- Supply Voltage:
  - 1.8V to 6V
- Rail to Rail Input/Output
- Phase Margin: 90° (typ.)
- Temperature Ranges:
  - Industrial: -40°C to +85°C
  - Extended: -40°C to +125°C
- Available Packages:
  - Single: SOT23, SC70
  - Dual: MSOP, 2x3 DFN
  - Quad: SOIC, TSSOP
- Recommended for Automotive Design

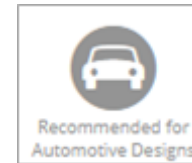


**Non-Inverting Amplifier**



# MCP6401/2/4 MCP6406/7/9

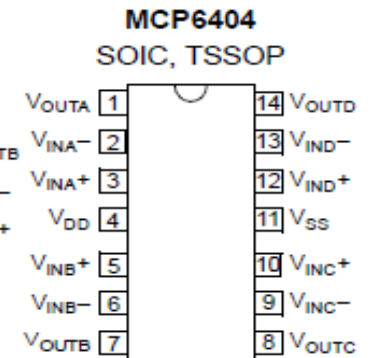
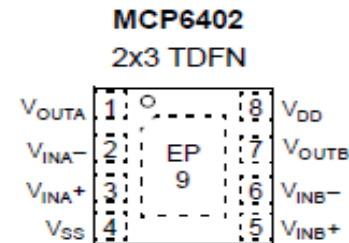
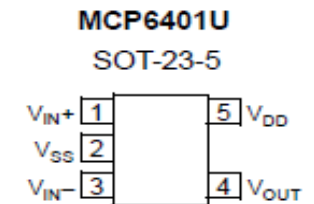
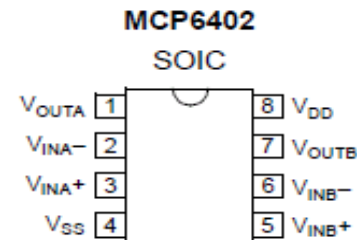
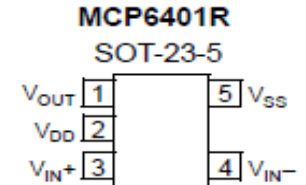
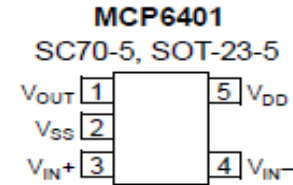
1 MHz, 45  $\mu$ A Op Amps



Online  
Datasheet

## Features:

- Gain Bandwidth Product:
  - 1MHz (typ.)
- Supply Current:
  - 45 $\mu$ A (typ.)
- Input Offset Voltage (max):
  - $\pm 4.5$  mV
- Supply Voltage:
  - 1.8V to 6V
- Phase Margin: 65° (typ.)
- Rail to Rail Input/Output
- Temperature Ranges:
  - Extended: -40°C to +125°C
  - H-Temp: -40°C to +125°C (MCP6406/7/9 only)
- Available Packages:
  - Singles: SC70, SOT23
  - Dual: SOIC, 2x3 TDFN
  - Quad: TSSOP, SOIC
- Recommended for Automotive Design





# MCP6Lxx

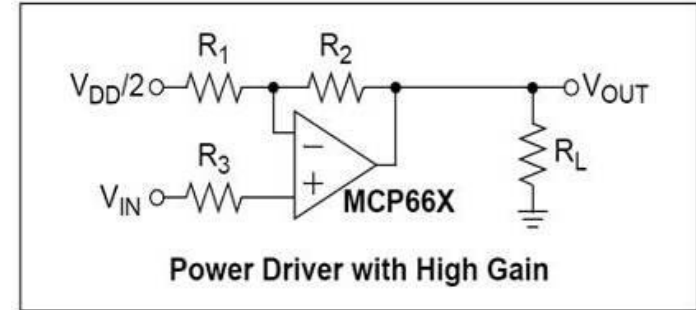
1 MHz, 85  $\mu$ A Op Amps

Product	# per Package	GBWP (kHz)	Iq Max ( $\mu$ A)	Vos Max ( $\mu$ V)	Operating Voltage Range (V)	Rail-To-Rail	Packages	Online Datasheet
MCP6L01/2/4	1/2/4	1000	170	5000	1.8 - 6.0	In/Out	Singles: SC70, SOT23  Duals: MSOP, SOIC  Quads: TSSOP, SOIC	<a href="#">MCP6L01/2/4 Datasheet</a>
MCP6L71/2/4	1/2/4	2000	240	4000	2.0 - 6.0	In/Out		<a href="#">MCP6L71/2/4 Datasheet</a>
MCP6L1/2/4	1/2/4	2800	330	3000	2.7 - 6.0	Out		<a href="#">MCP6L1/2/4 Datasheet</a>
MCP6L91/2/4	1/2/4	10000	1350	4000	2.4 - 6.0	In/Out		<a href="#">MCP6L91/2/4 Datasheet</a>

## Features:

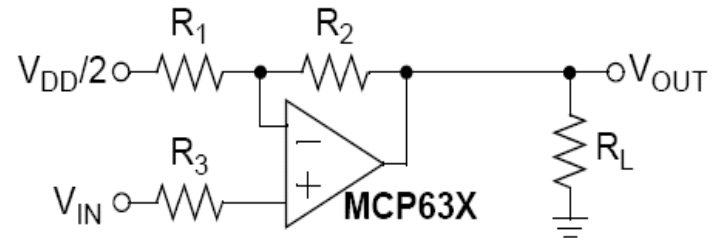
- Gain Bandwidth Product:
  - 60 MHz (typical)
- Supply Current:
  - 6.0 mA (typical)
- Input Offset Voltage (max):  $\pm 8$  mV
- Supply Voltage:
  - 2.5V to 5.5V
- Short Circuit Current: 90 mA (typical)
- Noise: 6.8 nV/ $\sqrt{\text{Hz}}$  (typical, at 1 MHz)
- Rail-to-Rail Output
- Slew Rate: 32 V/ $\mu$ s (typical)
- Available in Single, Dual and Quad
- Chip Select: MCP663, MCP665, MCP669
- Extended Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Recommended for Automotive Design (MCP661/2/4)

## Typical Application Circuit



## Features:

- Gain Bandwidth Product:
  - 24 MHz (typical)
- Supply Current:
  - 2.5 mA (typical)
- Input offset voltage (max):  $\pm 8$  mV
- Power Supply:
  - 2.5V to 5.5V
- Short Circuit Current:
  - 70 mA (typical)
- Noise: 10 nV/ $\sqrt{\text{Hz}}$  (typical, at 1 MHz)
- Rail-to-Rail Output
- Slew Rate: 10 V/ $\mu\text{s}$  (typical)
- Available in Single, Dual and Quad
- Chip Select: MCP633, MCP635, MCP639
- Extended Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Recommended for Automotive Design (MCP631/2/4)

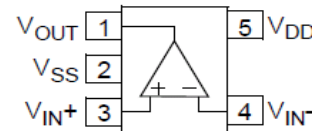


**Power Driver with High Gain**

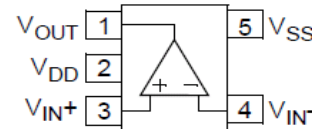
## Features:

- Gain Bandwidth Product :
  - 10MHz (typ.)
- Low Supply Current:
  - 1mA (typ.)
- Low Offset Voltage:
- Industrial Temperature:
  - $\pm 500\mu\text{V}$  (max.)
- Extended Temperature:
  - $\pm 250\mu\text{V}$  (max.)
- Power Supply Range:
  - 2.5V to 5.5V
- Low Noise:
  - $8.7\text{nV}/\sqrt{\text{Hz}}$ , at 10kHz (typ.)
- Rail-to-Rail Input/Output
- Mid-Supply  $V_{\text{REF}}$ : MCP6021 and MCP6023
- Unity Gain Stable
- Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Recommended for Automotive Design (MCP6021/2/4)

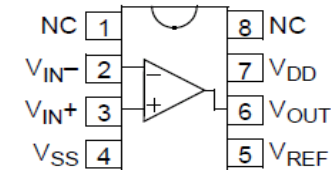
**MCP6021**  
SOT-23-5



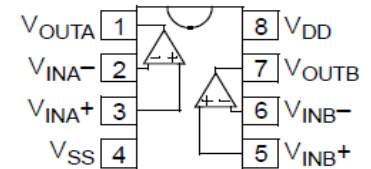
**MCP6021R**  
SOT-23-5



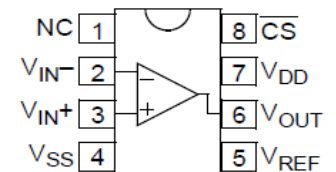
**MCP6021**  
PDIP SOIC,  
MSOP, TSSOP



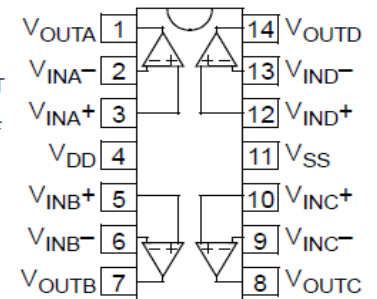
**MCP6022**  
PDIP SOIC, TSSOP



**MCP6023**  
PDIP SOIC, TSSOP



**MCP6024**  
PDIP SOIC, TSSOP

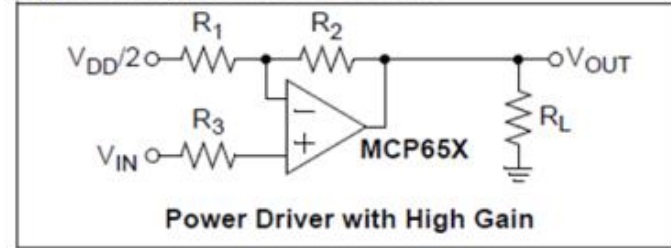




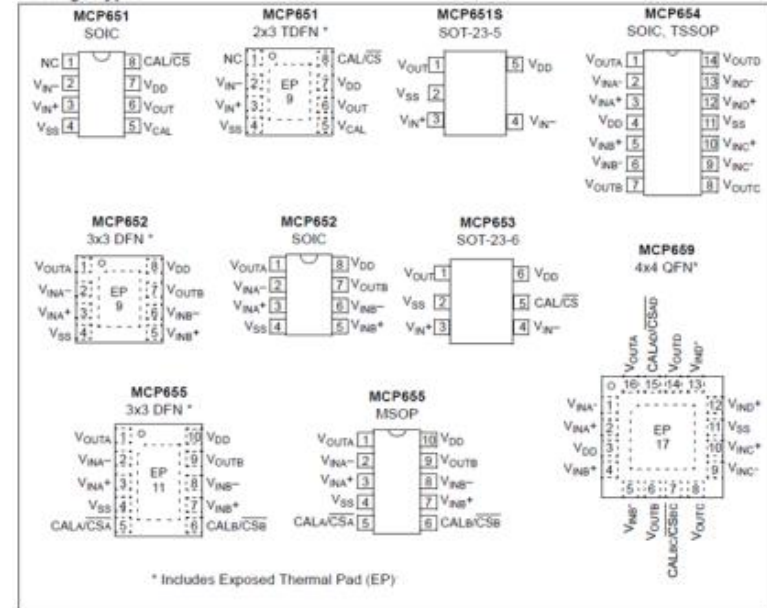
## Features:

- Gain Bandwidth:
  - 50MHz (typ.)
- Low Supply Current:
  - 6mA (typ.)
- Calibrated Offset Voltage:
  - $\pm 200\mu$ V (max.)
- Power Supply Range:
  - 2.5V to 5.5V
- Short Circuit Current:
  - 100mA (typ.)
- Low Noise:
  - $7.5\text{nV}/\sqrt{\text{Hz}}$ , at 1MHz (typ.)
- Slew Rate: 30V/ $\mu$ s (typ.)
- Rail-to-Rail Output
- Calibrate/Chip Select Pin Options
- Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  (Extended)
- Recommended for Automotive Design (MCP651S/52/54)

## Typical Application Circuit



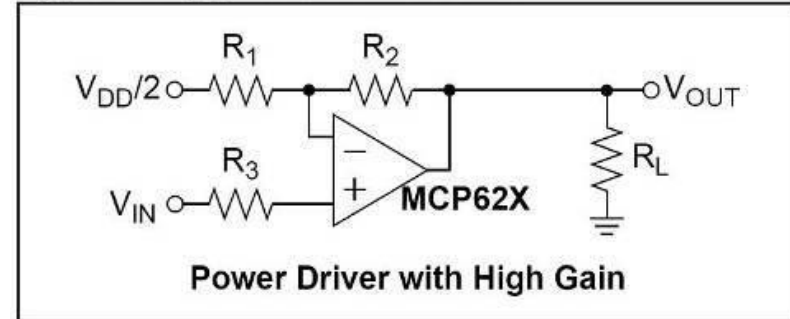
## Package Types



## Features:

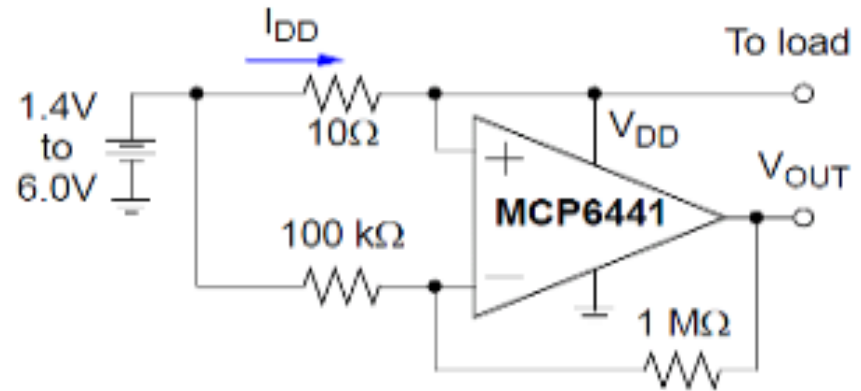
- Gain Bandwidth Product:
  - 20MHz (typ.)
- Single/Dual/Quad
- Supply Current:
  - 2.5mA (typ.)
- Calibrated Input Offset:
  - $\pm 200\mu$ V (max.)
- Power Supply:
  - 2.5V to 5.5V
- Short Circuit Current:
  - 70mA (typ.)
- Noise: 13nV/ $\sqrt{\text{Hz}}$  (typ., at 1MHz)
- Rail-to-Rail Output
- Slew Rate: 10V/ $\mu$ s (typ.)
- Calibrate/Chip Select Pin Options
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design (MCP621S/4)

## Typical Application Circuit



## Features:

- Gain Bandwidth Product:
  - 9kHz (typ.)
- Low Supply Current:
  - 450nA/Amplifier (typ.)
- Input Offset Voltage (max):
  - $\pm 4.5$  mV
- Supply Voltage Range:
  - 1.4V to 6V (max.)
- Rail-to-Rail Input/ Output
- Unity Gain Stable
- Available Packages:
  - Singles: SC70, SOT23
  - Dual: SOIC, MSOP
  - Quad: TSSOP, SOIC
- Recommended for Automotive Design

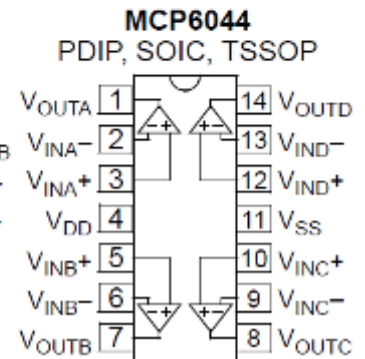
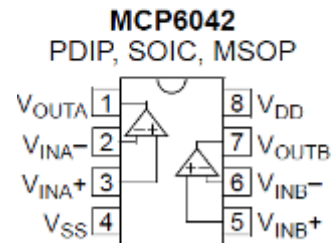
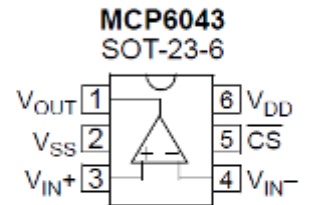
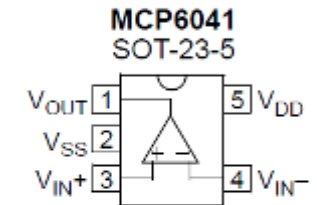
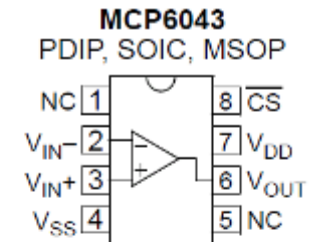
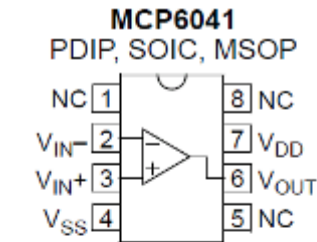


$$I_{DD} = \frac{V_{DD} - V_{OUT}}{(10 \text{ V/V}) \cdot (10 \Omega)}$$

## Battery Current Sensing

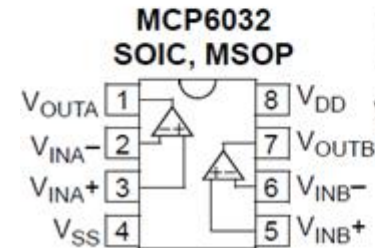
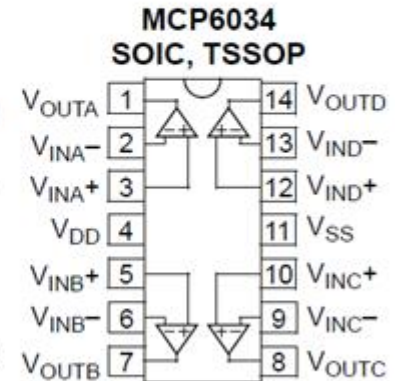
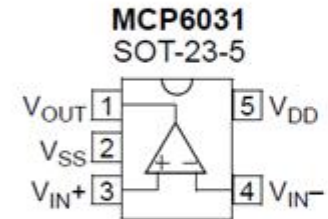
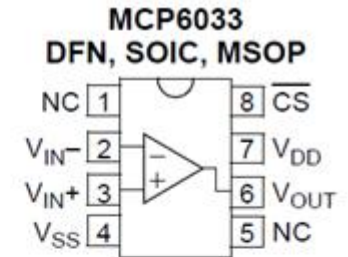
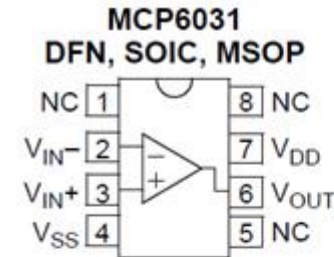
## Features:

- Gain Bandwidth Product: 14kHz (typ.)
- Low Supply Current: 600nA/Amplifier (typ.)
- Input Offset Voltage (max):  $\pm 3$  mV
- Supply Voltage Range: 1.4V to 6V (max.)
- Rail-to-Rail Input/ Output
- Unity Gain Stable
- Available in Single, Dual and Quad
- Chip Select (CS) with MCP6043
- Recommended for Automotive Design (MCP6041/2/4)



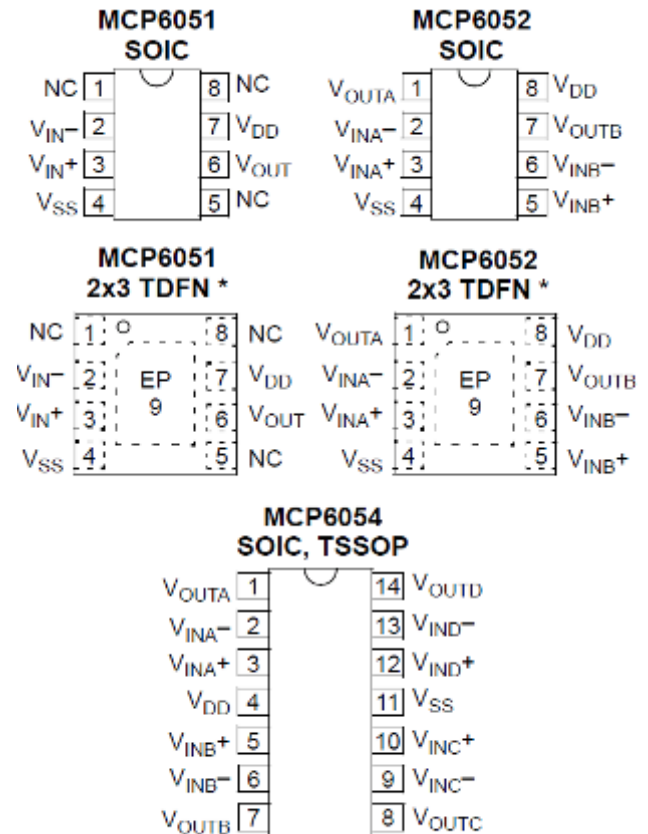
## Features:

- Gain Bandwidth Product: 10 kHz (typ.)
- Ultra Low Quiescent Current: 0.9 $\mu$ A (typ.)
- Low Offset Voltage:  $\pm 150\mu$ V (max.)
- Wide Power Supply Voltage: 1.8V to 5.5V
- Rail-to-Rail Input and Output
- Unity Gain Stable
- Chip Select (CS) capability: MCP6033
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design (MCP6031/2/4)



## Features:

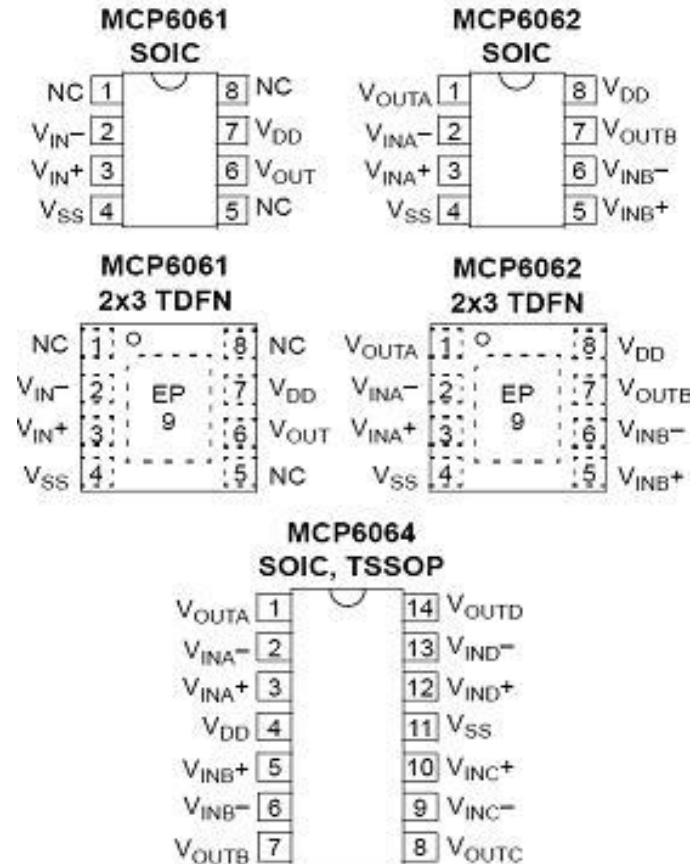
- Gain Bandwidth Product: 385kHz (typ.)
- Ultra Low Quiescent Current: 30 $\mu$ A (typ.)
- Low Offset Voltage:  $\pm 150\mu$ V (max.)
- Wide Power Supply Voltage: 1.8V to 6.0V
- Rail-to-Rail Input and Output
- Unity Gain Stable
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design



\* Includes Exposed Thermal Pad (EP); see Table 3-1.

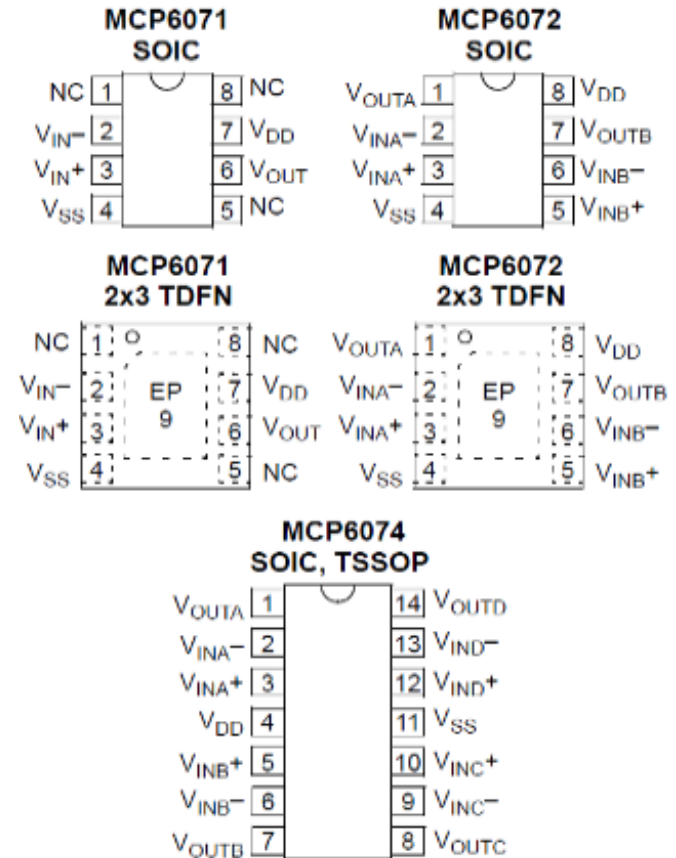
## Features:

- Gain Bandwidth Product: 730kHz (typ.)
- Ultra Low Quiescent Current: 60 $\mu$ A (typ.)
- Low Offset Voltage:  $\pm 150\mu$ V (max.)
- Wide Power Supply Voltage: 1.8V to 6.0V
- Rail-to-Rail Input and Output
- Unity Gain Stable
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design (MCP6061/4)



## Features:

- Gain Bandwidth Product: 1.2MHz (typ.)
- Ultra Low Quiescent Current: 110 $\mu$ A (typ.)
- Low Offset Voltage:  $\pm 150\mu$ V (max.)
- Wide Power Supply Voltage: 1.8V to 6.0V
- Rail-to-Rail Input and Output
- Unity Gain Stable
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design

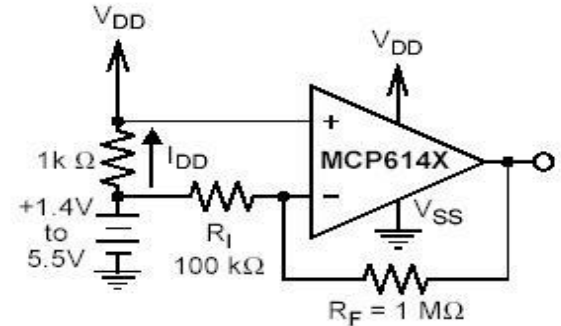


\* Includes Exposed Thermal Pad (EP); see Table 3-1.



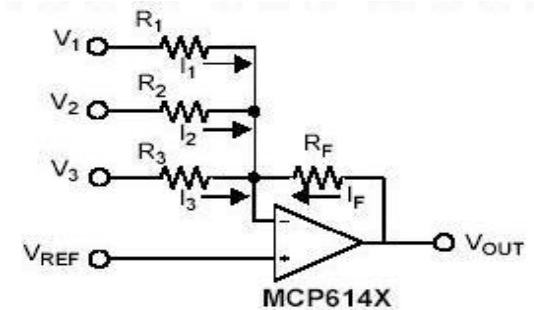
## Features:

- Gain Bandwidth Product: 100kHz (typ.)
- Low Quiescent Current: 600nA/amplifier (typ.)
- Input Offset Voltage:  $\pm 3$  mV (max)
- Wide Supply Voltage Range: 1.4V to 6V
- Stable for gains of 10 V/V or higher
- Rail-to-Rail Input/Output
- Available in Single, Dual, and Quad
- Chip Select (CS) with MCP6143
- Available in 5-lead and 6-lead SOT-23
- Temperature Ranges:
  - Industrial:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
  - Extended:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Recommended for Automotive Design (MCP6141/2/4)



High Side Battery Current Sensor

$$G_n = \left(1 + \frac{R_F}{R_I}\right) \geq 10\text{V/V}$$

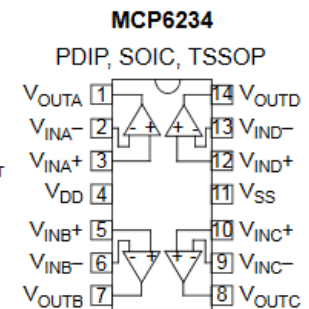
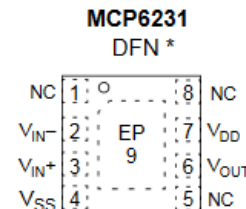
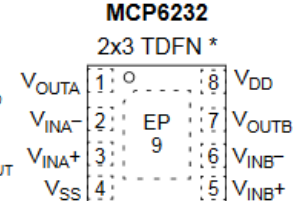
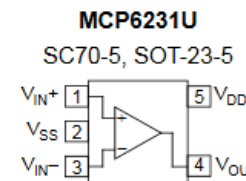
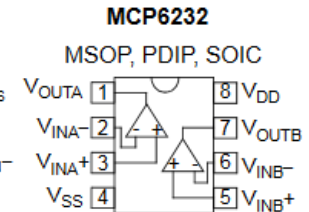
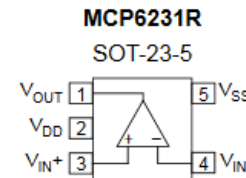
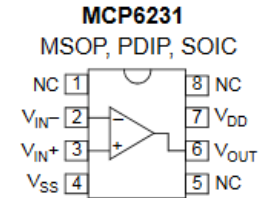
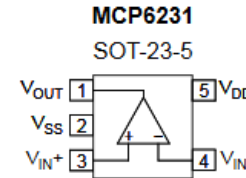


Summing Amplifier

$$G_n = 1 + R_F \left( \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right) \geq 10\text{V/V}$$

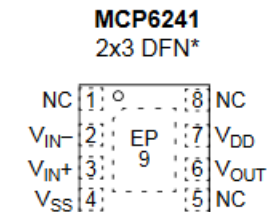
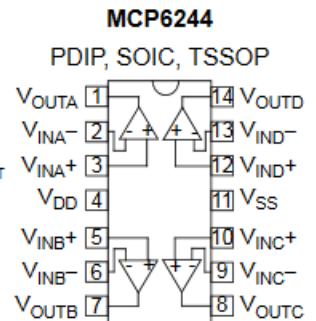
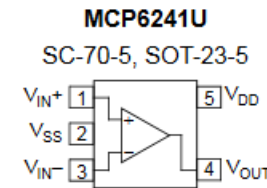
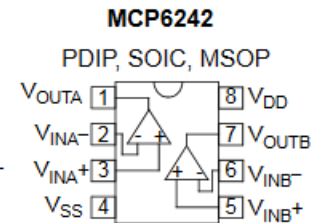
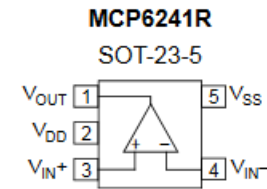
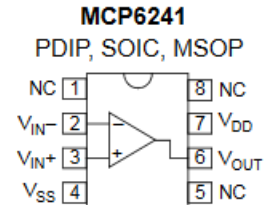
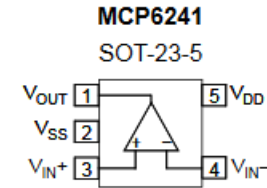
## Features:

- Gain Bandwidth Product: 300kHz (typ.)
- Supply Current:  $I_Q = 20\mu\text{A}$  (typ.)
- Input Offset voltage:  $\pm 5\text{ mV}$  (max)
- Supply Voltage: 1.8V to 6V
- Rail-to-Rail Input/Output
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Available in 5-pin SC-70 and SOT-23
- Recommended for Automotive Design



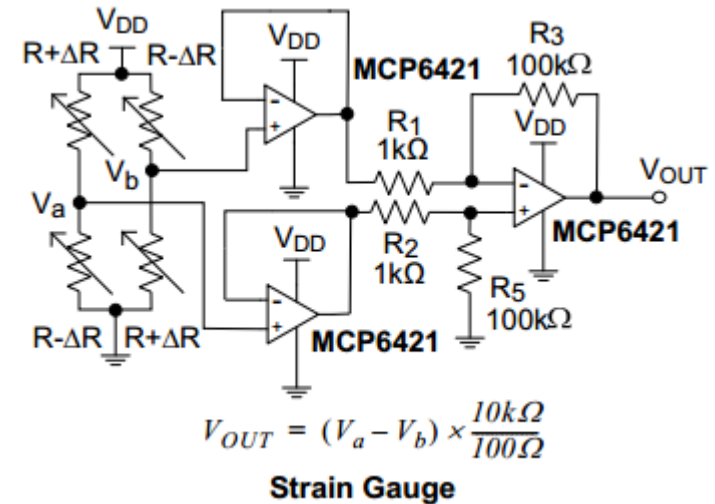
## Features:

- Gain Bandwidth Product: 550kHz (typ.)
- Supply Current:  $I_Q = 50\mu\text{A}$  (typ.)
- Input Offset Voltage:  $\pm 5\text{ mV}$  (max)
- Supply Voltage: 1.8V to 5.5V
- Rail-to-Rail Input/Output
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Available in 5-pin SC-70 and SOT-23
- Recommended for Automotive Design



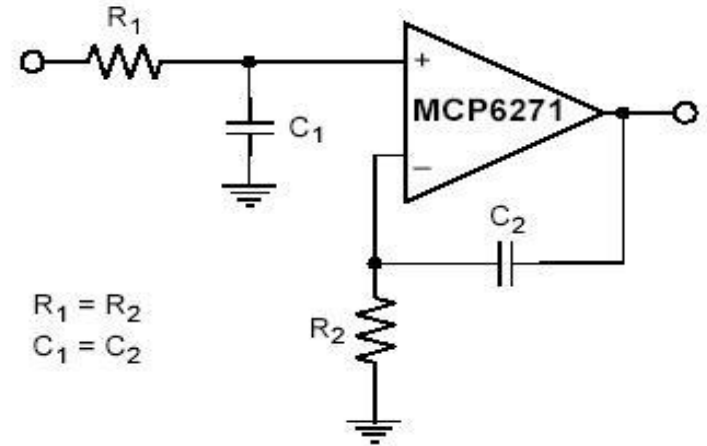
## Features:

- Gain Bandwidth Product: 90kHz (typ.)
- Supply Current:  $I_Q = 4.4 \mu\text{A}$  (typ.)
- Input Offset Voltage:  $\pm 1 \text{ mV}$  (max)
- Supply Voltage: 1.8V to 5.5V
- Rail-to-Rail Input/Output
- Enhanced EMI Protection:
- Electromagnetic Interference Rejection Ratio –  
- (EMIRR) 97 dB at 1.8 GHz
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Available in Single, Dual and Quad Packages
- Recommended for Automotive Design

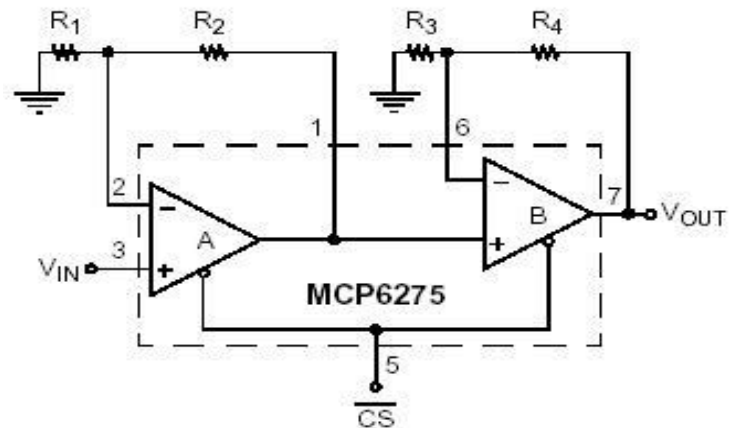


## Features:

- Gain Bandwidth Product: 2MHz (typ.)
- Supply Current:  $I_Q = 170\mu\text{A}$  (typ.)
- Input Offset Voltage:  $\pm 3\text{ mV}$  (max)
- Supply Voltage: 2.0V to 6V
- Rail-to-Rail Input/Output
- Dual with Chip Select (MCP6275)
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Available in Single, Dual and Quad Packages
- Recommended for Automotive Design (MCP6271/2/4)



Non-Inverting Integrator



Cascaded Gain with Chip Select

MCP6285 >>

MCP6281/2/3/4 >>

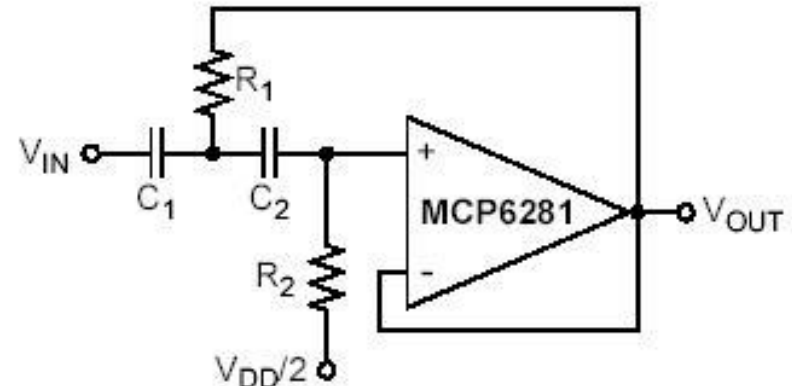
MCP6295 >>

MCP6291/2/3/4 >>

<< BACK

## Features:

- Gain Bandwidth Product: 5MHz (typ.)
- Supply Current:  $I_Q = 450\mu\text{A}$  (typ.)
- Input Offset Voltage:  $\pm 3\text{ mV}$  (max)
- Supply Voltage: 2.2V to 6V
- Rail-to-Rail Input/Output
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Available in Single, Dual and Quad Packages
- Recommended for Automotive Design  
(MCP6281/2/4)



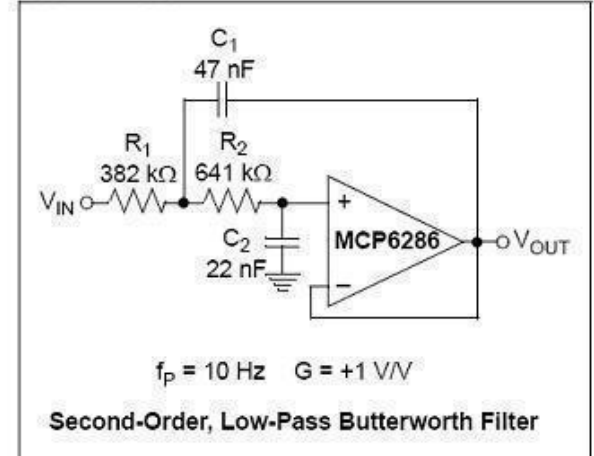
Sallen-Key Highpass Filter

[MCP6275 >>](#)[MCP6285 >>](#)[MCP6295 >>](#)[MCP6271/2/3/4 >>](#)[MCP6291/2/3/4 >>](#)[<< BACK](#)

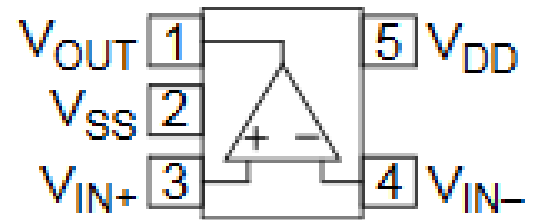
## Features:

- Low Noise: 5.4nV/ $\sqrt{\text{Hz}}$  (typ.)
- Gain Bandwidth Product: 3.5MHz (typ.)
- Low Quiescent Current: 520 $\mu\text{A}$  (typ.)
- Input Offset voltage:  $\pm 1.5$  mV (max)
- Wide Supply Voltage Range: 2.2V to 5.5V
- PSRR: 100 dB (typ.), CMRR: 95 dB (typ.)
- Extended Temperature Range:
  - -40°C to +125°C
- Unity Gain Stable
- Small Package: SOT- 23
- Recommended for Automotive Design

## Typical Application

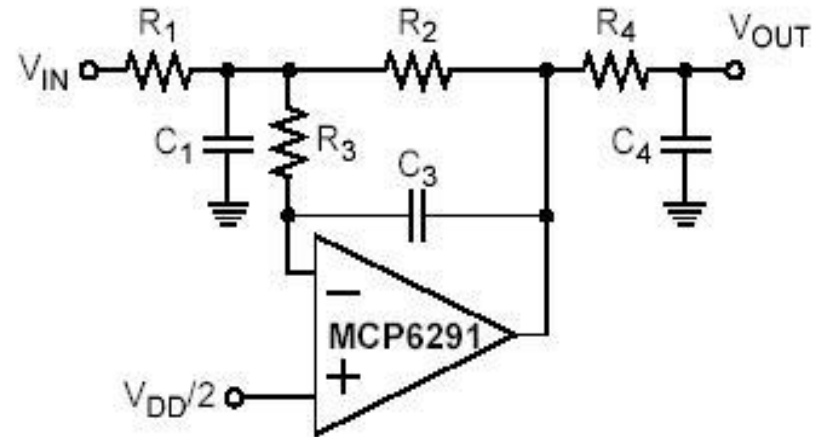


## MCP6286 SOT-23-5



## Features:

- Gain Bandwidth Product: 10MHz (typ.)
- Supply Current:  $I_Q = 1.0 \text{ mA}$  (typ.)
- Supply Voltage: 2.4V to 6V
- Input Offset Voltage:  $\pm 3 \text{ mV}$  (max)
- Rail-to-Rail Input/Output
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Available in Single, Dual and Quad Packages
- Recommended for Automotive Design  
(MCP6291/2/4)



Multiple Feedback Lowpass Filter

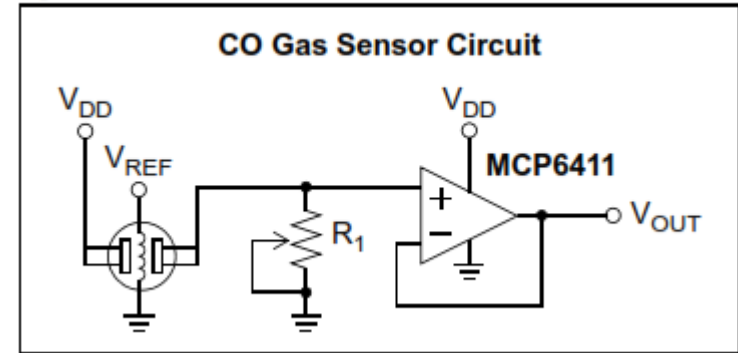
[MCP6275 >>](#)[MCP6285 >>](#)[MCP6295 >>](#)[MCP6271/2/3/4 >>](#)[MCP6291/2/3/4 >>](#)[<< BACK](#)



## Features:

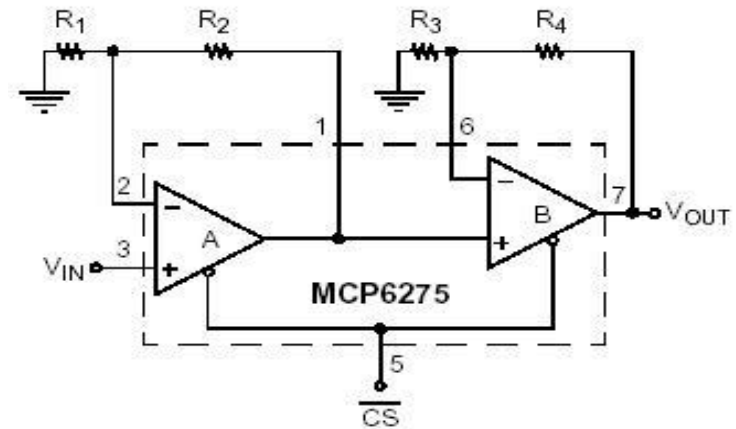
- Low Quiescent Current: 50  $\mu$ A (typical)
- Low Input Offset Voltage:
  - $\pm 1.0$  mV (maximum)
- Enhanced EMI Protection:
  - EMIRR 97 dB at 1.8 GHz
- Supply Voltage Range: 1.7V to 5.5V
- Gain Bandwidth Product: 1 MHz (typical)
- Rail-to-Rail Input/Output
- Slew Rate: 0.5 V/ $\mu$ s (typical)
- Unity Gain Stable
- No Phase Reversal
- Small Packages: SC70-5, SOT-23-5
- Extended Temperature Range:
  - - 40°C to +125°C

## Typical Application



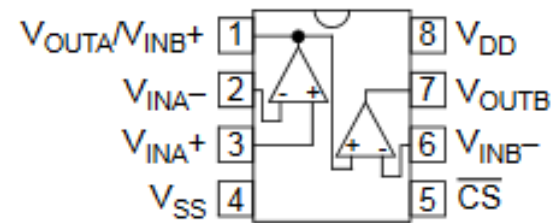
## Features:

- Gain Bandwidth Product: 2 MHz (typ.)
- Supply Current:  $I_Q = 170 \mu\text{A}$  (typ.)
- Input Offset Voltage:  $\pm 3 \text{ mV}$  (max)
- Supply Voltage: 2.0V to 6V
- Rail-to-Rail Input/Output
- Dual with Chip Select
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$



Cascaded Gain with Chip Select

### MCP6275 PDIP, SOIC, MSOP



[MCP6281/2/3/4 >>](#)

[MCP6285 >>](#)

[MCP6271/2/3/4 >>](#)

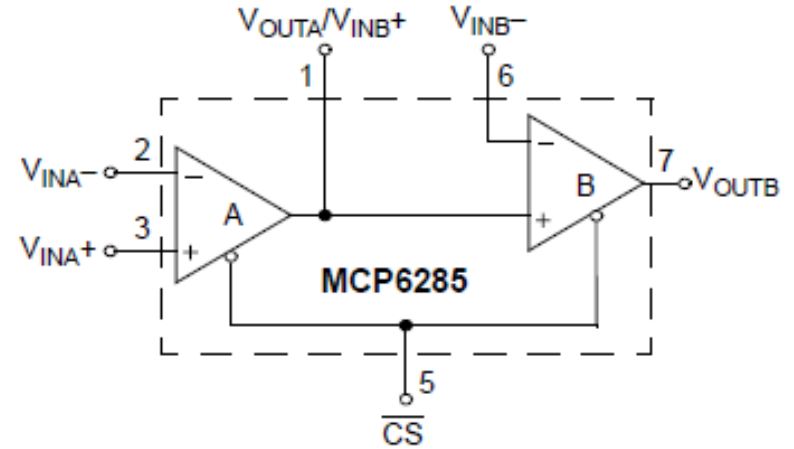
[MCP6295 >>](#)

[MCP6291/2/3/4 >>](#)

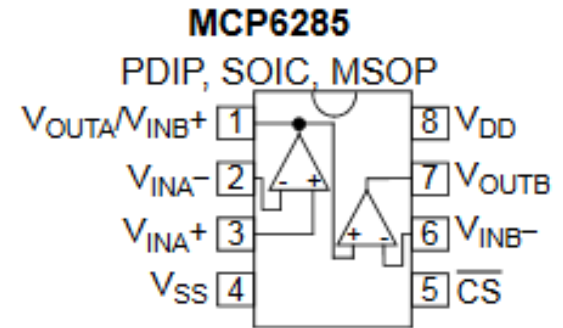
[<< BACK](#)

## Features:

- Gain Bandwidth Product: 2 MHz (typ.)
- Supply Current:  $I_Q = 170 \mu\text{A}$  (typ.)
- Input Offset Voltage:  $\pm 3 \text{ mV}$  (max)
- Supply Voltage: 2.0V to 6V
- Rail-to-Rail Input/Output
- Dual with Chip Select
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$



*Cascaded Gain Amplifier*



[MCP6275 >>](#)

[MCP6281/2/3/4 >>](#)

[MCP6271/2/3/4 >>](#)

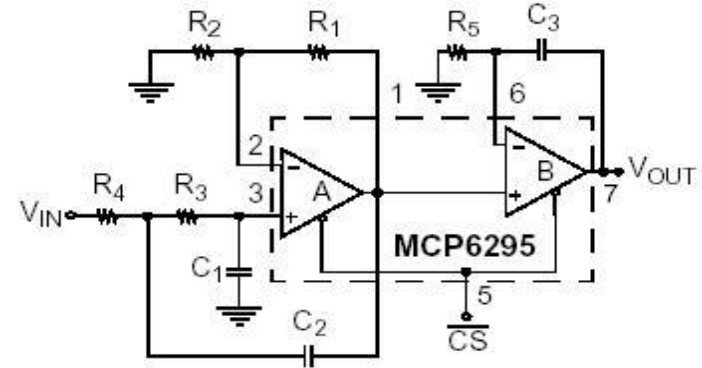
[MCP6295 >>](#)

[MCP6291/2/3/4 >>](#)

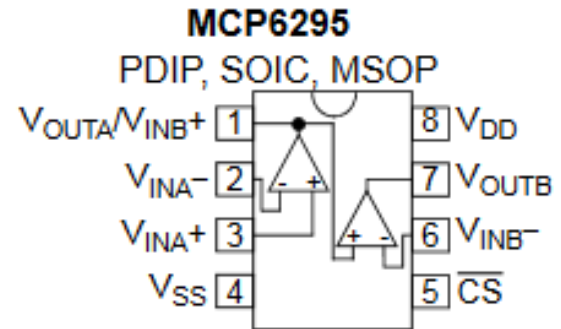
[<< BACK](#)

## Features:

- Gain Bandwidth Product: 10 MHz (typ.)
- Supply Current:  $I_Q = 1.0$  mA (typ.)
- Input Offset Voltage:  $\pm 3$  mV (max)
- Supply Voltage: 2.4V to 6V
- Rail-to-Rail Input/Output
- Dual with Chip Select
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$



Second-Order Sallen-Key Low-Pass Filter with an Extra Pole-Zero Pair and a Chip Select.



[MCP6275 >>](#)

[MCP6281/2/3/4 >>](#)

[MCP6285 >>](#)

[MCP6271/2/3/4 >>](#)

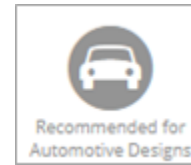
[MCP6291/2/3/4 >>](#)

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# MCP6471/2/4

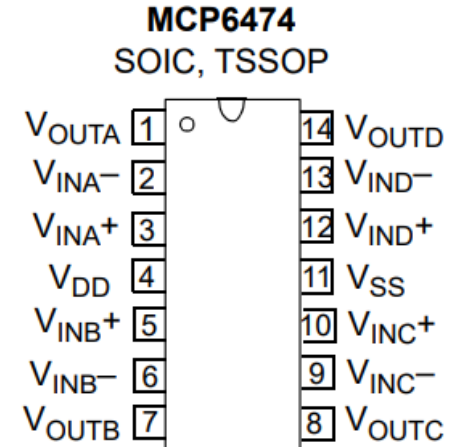
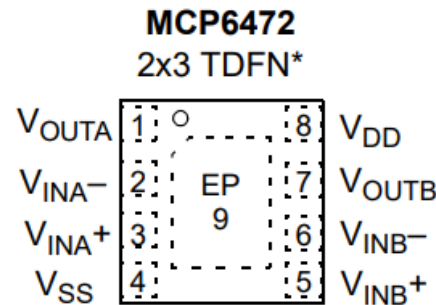
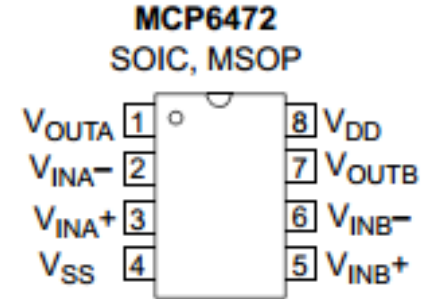
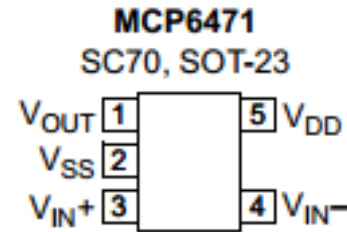
2 MHz, Low-Input Bias Current Op Amps



Online  
Datasheet

## Features:

- Gain Bandwidth Product: 2 MHz (typ.)
- Supply Current: 100  $\mu$ A (typ.)
- Input Offset Voltage:  $\pm 1.5$  mV (max)
- Supply Voltage: 2.0V to 5.5V
- Rail-to-Rail Input/Output
- Extended Temperature Range:
  - -40°C to +125°C
- Available in Single, Dual and Quad Packages
- Recommended for Automotive Designs



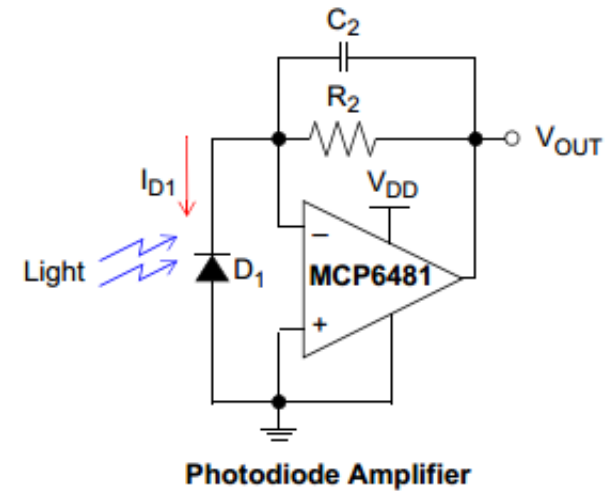
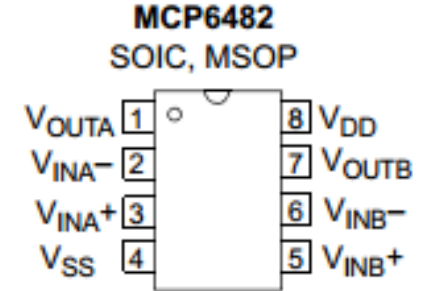
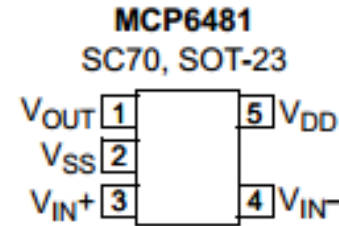
[MCP6481/2/4 >>](#)

[MCP6291/2/3/4 >>](#)

[<< BACK](#)

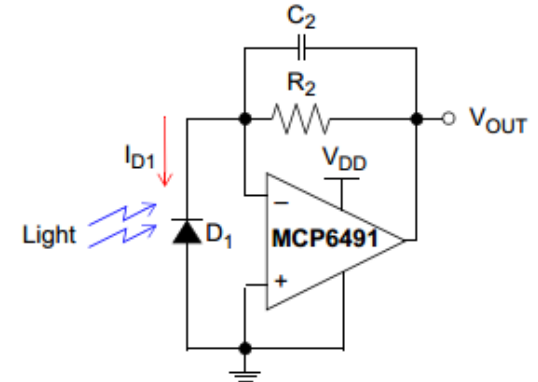
## Features:

- Gain Bandwidth Product: 4 MHz (typ.)
- Supply Current:  $I_Q = 240 \mu\text{A}$  (typ.)
- Input Offset Voltage:  $\pm 1.5 \text{ mV}$  (max)
- Supply Voltage: 2.0V to 5.5V
- Rail-to-Rail Input/Output
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$
- Available in Single, Dual and Quad Packages
- Recommended for Automotive Design

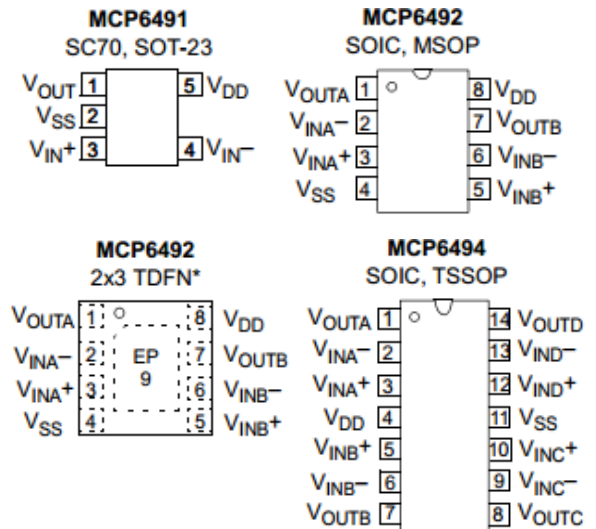


## Features:

- Gain Bandwidth Product: 7.5 MHz (typ.)
- Supply Current:  $I_Q = 530 \mu A$  (typ.)
- Input Offset Voltage:  $\pm 1.5 \text{ mV}$  (max)
- Supply Voltage: 2.0V to 5.5V
- Rail-to-Rail Input/Output
- Extended Temperature Range:
  - $-40^\circ C$  to  $+125^\circ C$
- Available in Single, Dual and Quad Packages
- Recommended for Automotive Design (MCP6491/2/4)

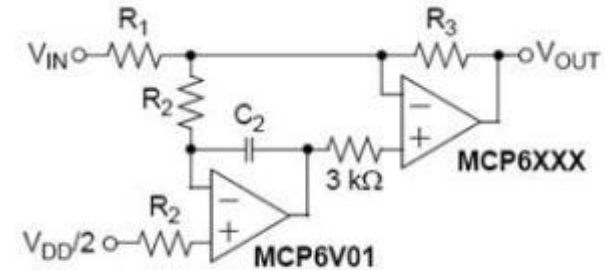


Photodiode Amplifier

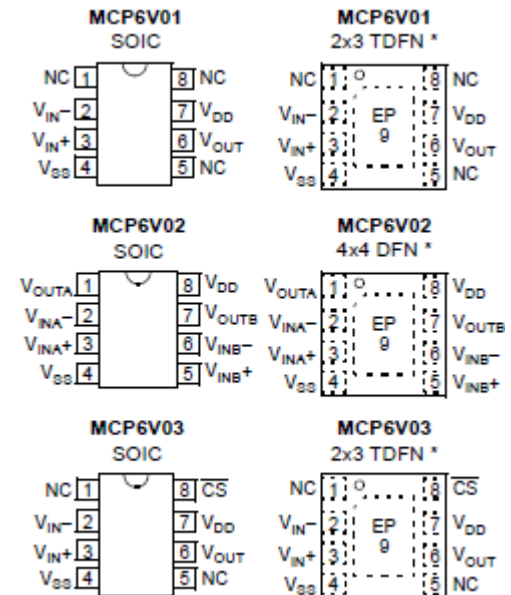


## Features:

- Gain Bandwidth Product: 1.3 MHz (typ.)
- Low Power and Supply Voltages:
  - $I_Q$ : 300 $\mu$ A/amplifier (typ.)
  - Wide Supply Voltage Range: 1.8V to 5.5V
- High DC Precision:
  - VOS Drift:  $\pm 50$ nV/ $^{\circ}$ C (max.)
  - Input Offset Voltage:  $V_{OS} = \pm 2$   $\mu$ V (max.)
  - AOL: 130 dB (min.)
  - PSRR: 130 dB (min.)
  - CMRR: 130 dB (min.)
  - $Eni$ : 2.5  $\mu$ V<sub>P-P</sub> (typ.),  $f = 0.1$ Hz to 10Hz
  - $Eni$ : 0.79  $\mu$ V<sub>P-P</sub> (typ.),  $f = 0.01$ Hz to 1Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Available in Single and Dual
  - Single with Chip Select (CS): MCP6V03
- Extended Temperature Range: -40 $^{\circ}$ C to +125 $^{\circ}$ C
- Recommended for Automotive Design (MCP6V01/2)



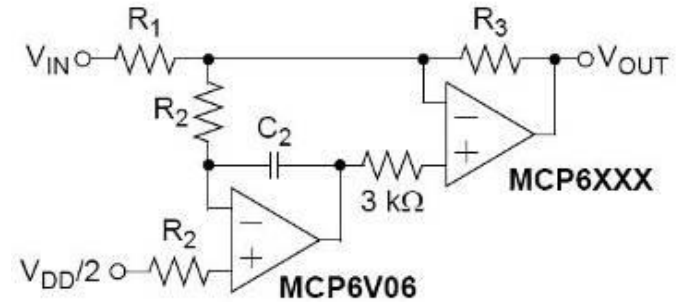
Offset Voltage Correction for Power Driver



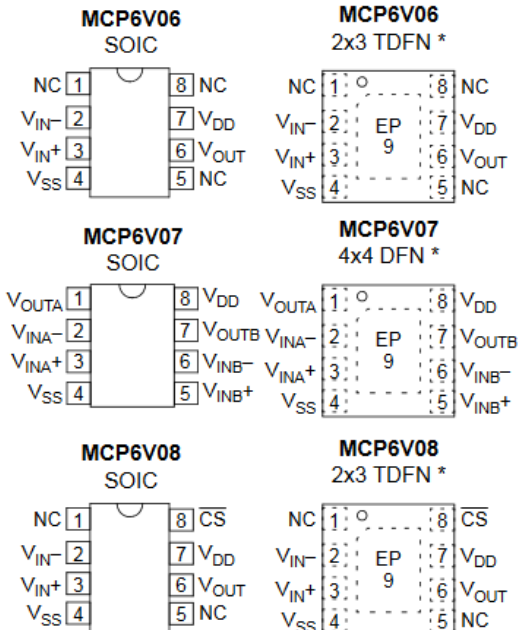


## Features:

- Gain Bandwidth Product: 1.3 MHz (typ.)
- Low Power and Supply Voltages:
  - $I_Q$ : 300 $\mu$ A/amplifier (typ.)
  - Wide Supply Voltage Range: 1.8V to 5.5V
- High DC Precision:
  - Input Offset Voltage:  $\pm 3$   $\mu$ V (max.)
  - VOS Drift:  $\pm 50$ nV/ $^{\circ}$ C (max.)
  - AOL: 125 dB (min.)
  - PSRR: 125 dB (min.)
  - CMRR: 120 dB (min.)
  - $Eni$ : 1.7  $\mu$ VP-P (typ.),  $f = 0.1$ Hz to 10Hz
  - $Eni$ : 0.54  $\mu$ VP-P (typ.),  $f = 0.01$ Hz to 1Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Available in Single and Dual
  - Single with Chip Select (CS): MCP6V08
- Extended Temperature Range: -40 $^{\circ}$ C to 125 $^{\circ}$ C
- Recommended for Automotive Design (MCP6V06/7)

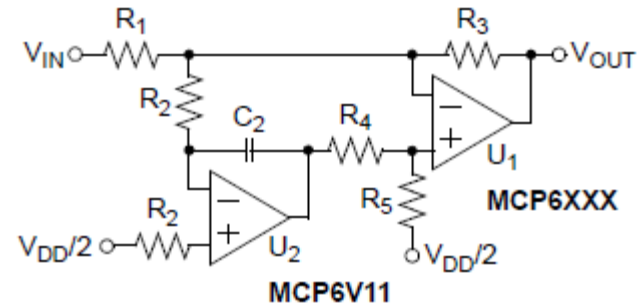
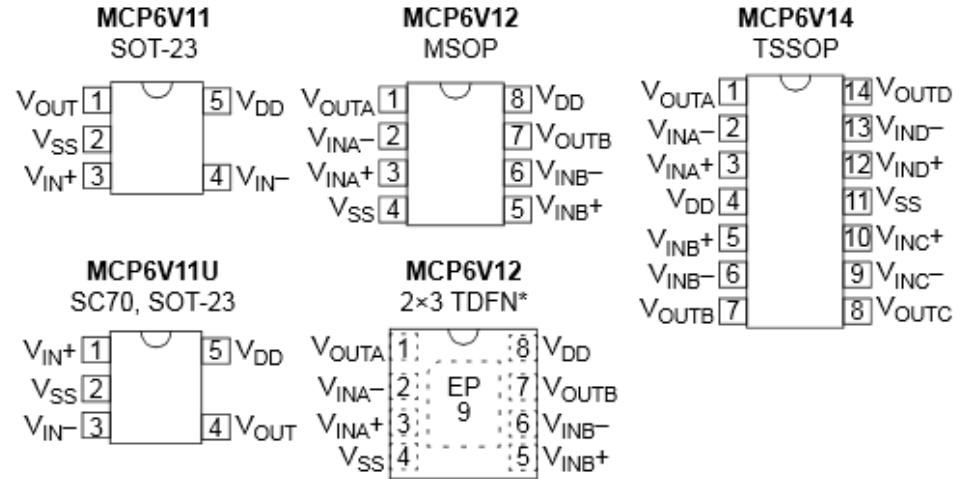


## Offset Voltage Correction for Power Driver



## Features:

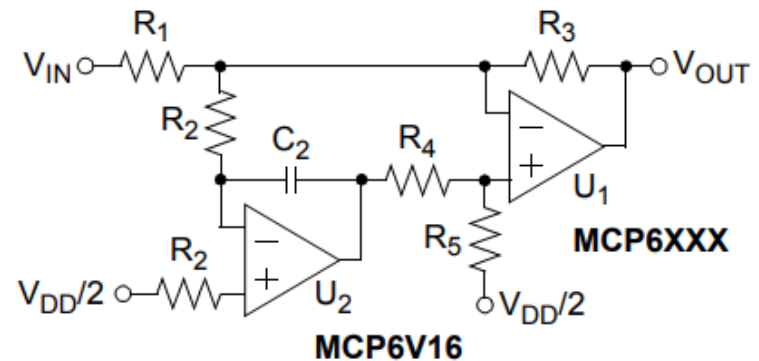
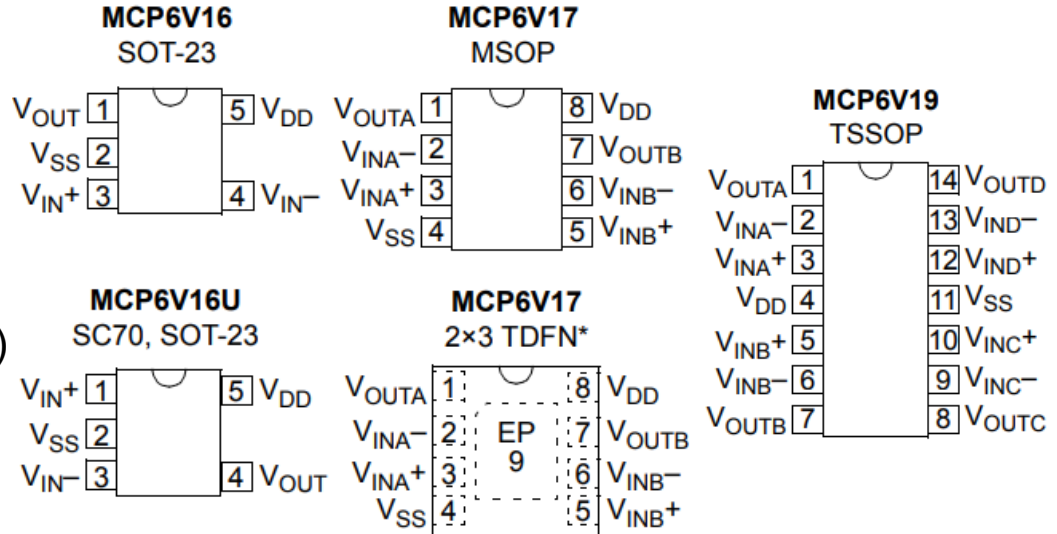
- Gain Bandwidth Product: 80 kHz (typ.)
- Low Power and Supply Voltages:
  - $I_Q$ : 7.5  $\mu$ A/amplifier (typ.)
  - Wide Supply Voltage Range:
    - 1.6V to 5.5V
- High DC Precision:
  - Input Offset Voltage:  $\pm 8$   $\mu$ V (max.)
  - VOS Drift:  $\pm 50$ nV/ $^{\circ}$ C (max.)
  - AOL: 112 dB (min.)
  - PSRR: 118 dB (min.)
  - CMRR: 119 dB (min.)
  - $Eni$ : 2.1  $\mu$ V<sub>P-P</sub> (typ.),  $f = 0.1$ Hz to 10Hz
  - $Eni$ : 0.67  $\mu$ V<sub>P-P</sub> (typ.),  $f = 0.01$ Hz to 1Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Small Packages:
  - Singles in SC70, SOT-23
  - Duals in MSOP-8, 2x3 TDFN
  - Quad in TSSOP-14
- Extended Temperature Range: -40 $^{\circ}$ C to 125 $^{\circ}$ C
- Recommended for Automotive Design



Offset Voltage Correction for Power Driver

## Features:

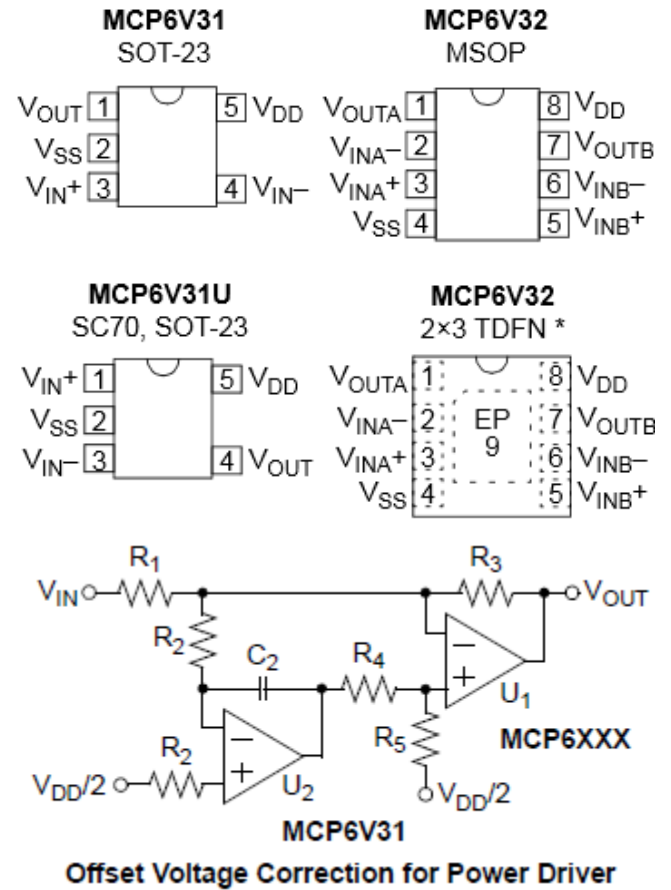
- Gain Bandwidth Product: 80 kHz (typ.)
- Low Power and Supply Voltages:
  - $I_Q$ : 7.5  $\mu$ A/amplifier (typ.)
  - Wide Supply Voltage Range:
    - 1.6V to 5.5V
- High DC Precision:
  - Input Offset Voltage:  $\pm 25$   $\mu$ V (max.)
  - VOS Drift:  $\pm 150$  nV/ $^{\circ}$ C (max.)
  - AOL: 102 dB (min.)
  - PSRR: 108 dB (min.)
  - CMRR: 109 dB (min.)
  - $Eni$ : 2.1  $\mu$ V<sub>P-P</sub> (typ.),  $f = 0.1$ Hz to 10Hz
  - $Eni$ : 0.67  $\mu$ V<sub>P-P</sub> (typ.),  $f = 0.01$ Hz to 1Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Small Packages:
  - Singles in SC70, SOT-23
  - Duals in MSOP-8, 2x3 TDFN
  - Quad in TSSOP-14
- Extended Temperature Range: -40 $^{\circ}$ C to 125 $^{\circ}$ C



Offset Voltage Correction for Power Driver

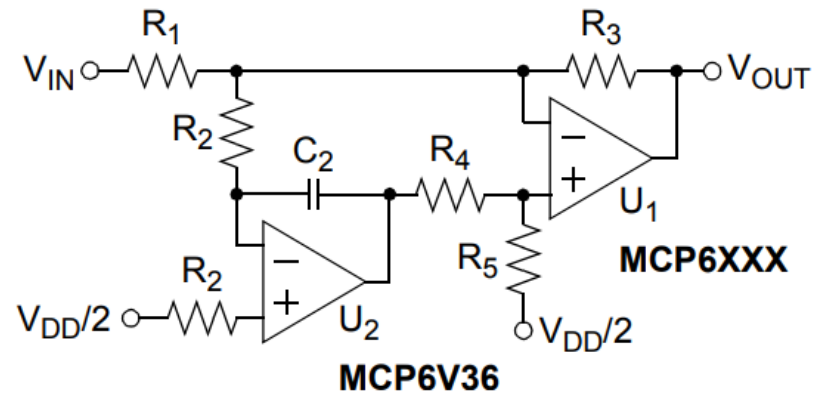
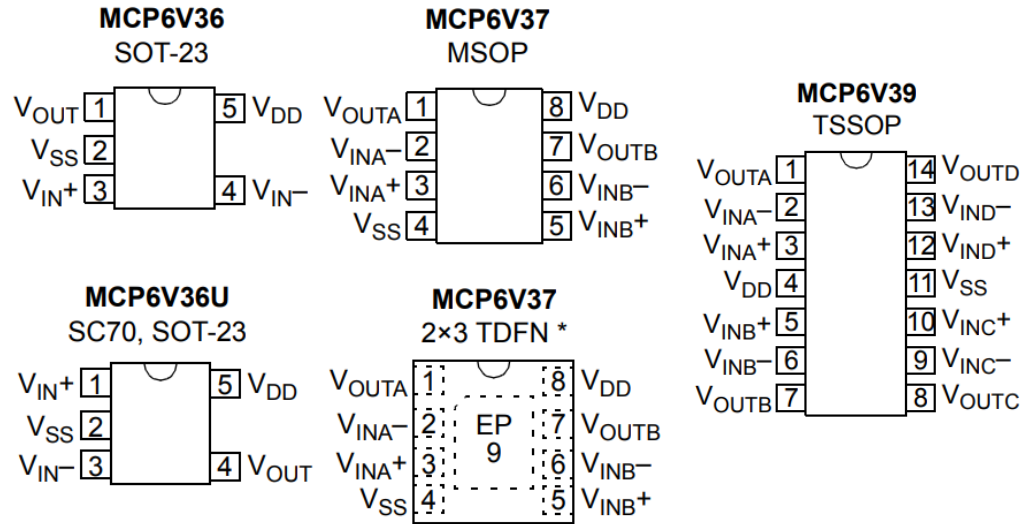
## Features:

- Gain Bandwidth Product: 300 kHz (typ.)
- Low Power and Supply Voltages:
  - IQ: 23  $\mu$ A/amplifier (typ.)
  - Wide Supply Voltage Range: 1.8V to 5.5V
- High DC Precision:
  - Input Offset Voltage:  $\pm 8$   $\mu$ V (max.)
  - VOS Drift:  $\pm 50$  nV/ $^{\circ}$ C (max.)
  - AOL: 120 dB (min.)
  - PSRR: 120 dB (min.)
  - CMRR: 120 dB (min.)
  - Eni: 1.0  $\mu$ VP-P (typ.),  $f = 0.1$ Hz to 10Hz
  - Eni: 0.33  $\mu$ VP-P (typ.),  $f = 0.01$ Hz to 1Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Small Packages:
  - Singles in SC70, SOT-23
  - Duals in MSOP-8, 2x3 TDFN
  - Quad in TSSOP-14
- Extended Temperature Range:  $-40^{\circ}$ C to  $125^{\circ}$ C
- Recommended for Automotive Design



## Features:

- Gain Bandwidth Product: 300 kHz (typ.)
- Low Power and Supply Voltages:
  - IQ: 23  $\mu$ A/amplifier (typ.)
  - Wide Supply Voltage Range: 1.8V to 5.5V
- High DC Precision:
  - Input Offset Voltage:  $\pm 25$   $\mu$ V (max.)
  - VOS Drift:  $\pm 150$  nV/ $^{\circ}$ C (max.)
  - AOL: 110 dB (min.)
  - PSRR: 110 dB (min.)
  - CMRR: 110 dB (min.)
  - Eni: 1.0  $\mu$ VP-P (typ.),  $f = 0.1$ Hz to 10Hz
  - Eni: 0.33  $\mu$ VP-P (typ.),  $f = 0.01$ Hz to 1Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Small Packages:
  - Singles in SC70, SOT-23
  - Duals in MSOP-8, 2x3 TDFN
  - Quad in TSSOP-14
- Extended Temperature Range:  $-40^{\circ}$ C to  $125^{\circ}$ C

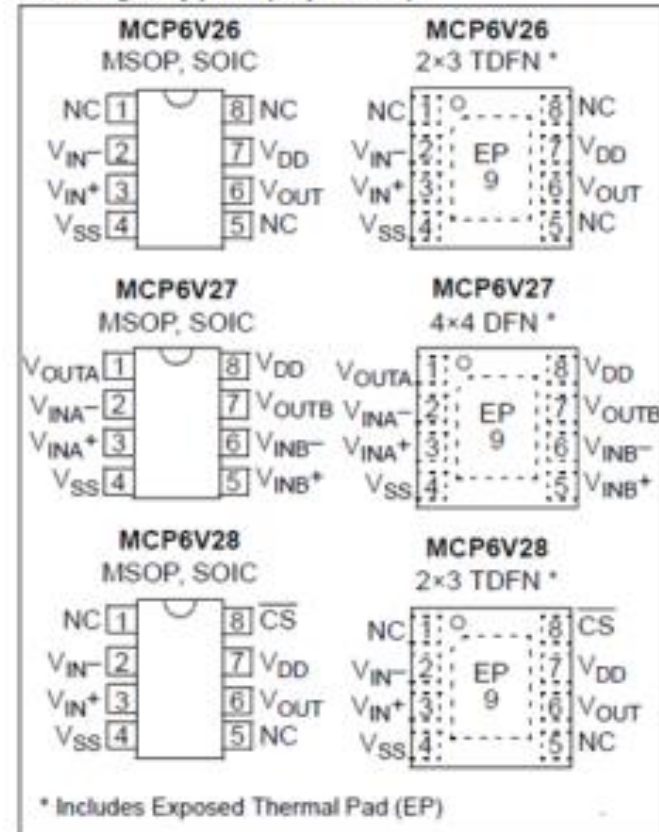


Offset Voltage Correction for Power Driver

## Features:

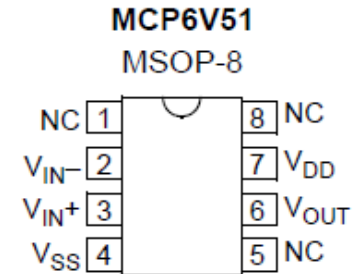
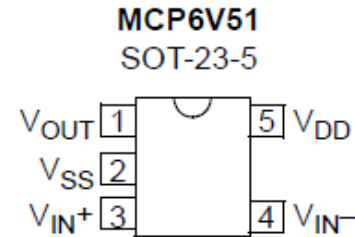
- Gain Bandwidth Product: 2 MHz (typ.)
- Supply Current: 620  $\mu$ A/amplifier (typ.)
- Input Offset Voltage (max):  $\pm 2$   $\mu$ V (max.)
- Supply Voltage Range: 2.3V to 5.5V
- Single and Dual Channel
- High DC Precision:
  - VOS Drift:  $\pm 50$  nV/ $^{\circ}$ C (max.)
  - AOL: 133 dB (min.)
  - PSRR: 125 dB (min.)
  - CMRR: 125 dB (min.)
  - Eni: 1  $\mu$ VP-P (typ.), f = 0.1 Hz to 10 Hz
  - Eni: 0.32  $\mu$ Vp-p (typ.), f = 0.01 Hz to 1 Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- 8-Pin SOIC and 4x4 DFN Packages
- Extended Temperature Range:  $-40^{\circ}$ C to  $+125^{\circ}$ C
- Recommended for Automotive Design (MCP6V26/7)

## Package Types (top view)

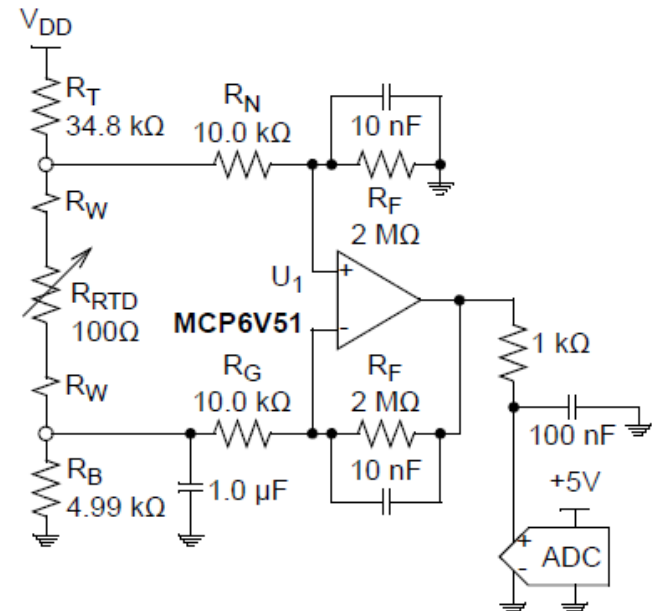


## Features:

- Single Channel
- High DC Precision:
  - $V_{os}$  Drift: 15 nV/°C (max.)
  - $V_{os}$ : ±15 µV (max.)
  - Open-Loop Gain: 140 dB (min.)
  - CMRR: 135 dB (min.)
  - PSRR: 134 dB (min.)
- Low Noise:
  - 10.2 nV/√Hz at 1 kHz
  - $E_{ni}$ : 0.21 µV<sub>p-p</sub>, f = 0.1 Hz to 10 Hz
- Easy to Use:
  - Input Range Includes Negative Rail
  - Rail-to-Rail Output
  - EMI Filtered Inputs
  - Gain Bandwidth Product: 2 MHz
  - Unity Gain Stable
- Small Packages:
  - 5-pin SOT-23
  - 8-pin MSOP
- Extended Temperature Range:
  - -40°C to +125 °C

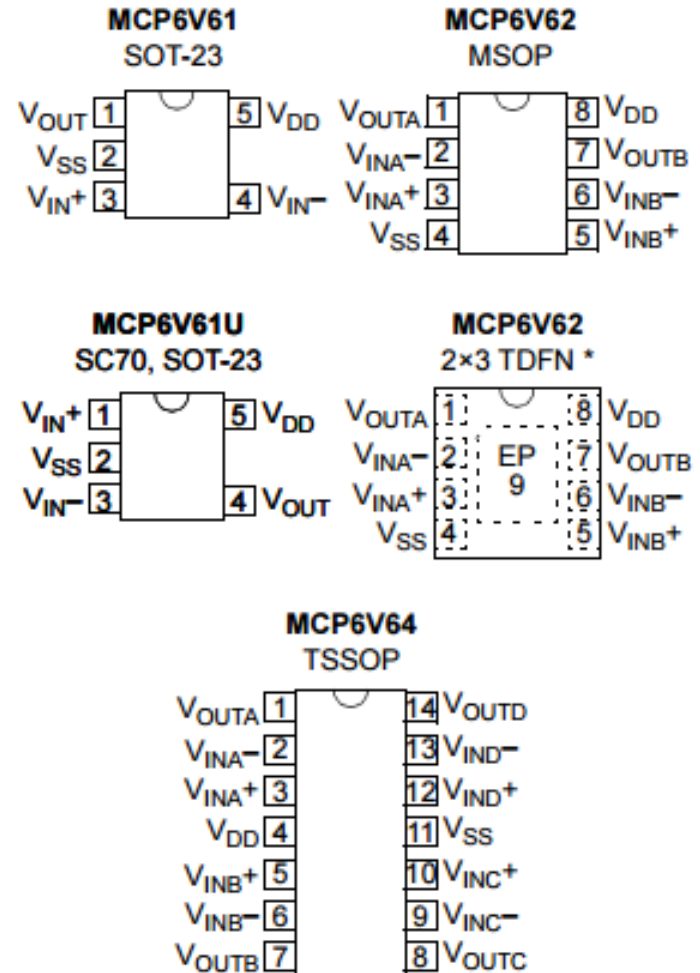


## RTD Sensor Interface Example



## Features:

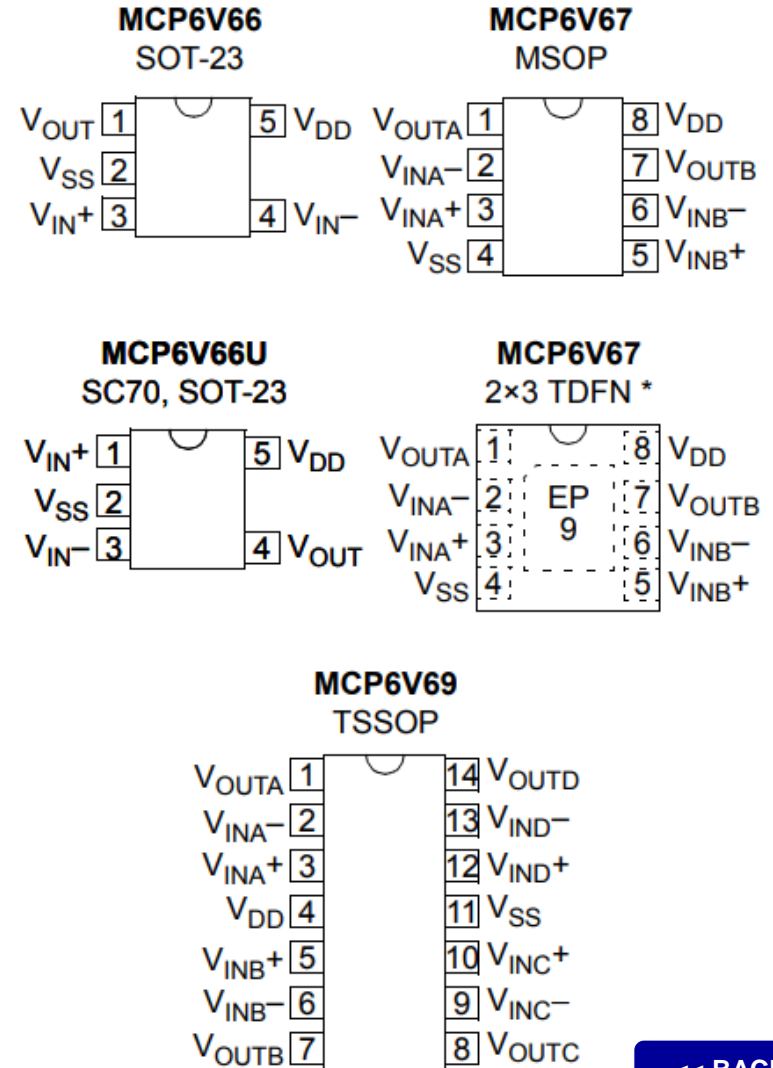
- Gain Bandwidth Product: 1 MHz (typ.)
- Supply Current: 80  $\mu$ A/amplifier (typ.)
- Input Offset Voltage (max):  $\pm 8$   $\mu$ V (max.)
- Supply Voltage Range: 1.8V to 5.5V
- High DC Precision:
  - VOS Drift:  $\pm 15$  nV/ $^{\circ}$ C (max.)
  - AOL: 125 dB (min.)
  - PSRR: 117 dB (min.)
  - CMRR: 120 dB (min.)
  - Eni: 0.54  $\mu$ VP-P (typ.),  $f = 0.1$  Hz to 10 Hz
  - Eni: 0.17  $\mu$ Vp-p (typ.),  $f = 0.01$  Hz to 1 Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Enhanced EMI Rejection
- Small Packages
- Single: 5-pin SC-70, SOT-23
- Dual: 8-pin MSOP, 8-pin 2x3 TDFN
- Quad: 14-pin TSSOP
- Extended Temperature Range:  $-40^{\circ}$ C to  $+125^{\circ}$ C
- Recommended for Automotive Design





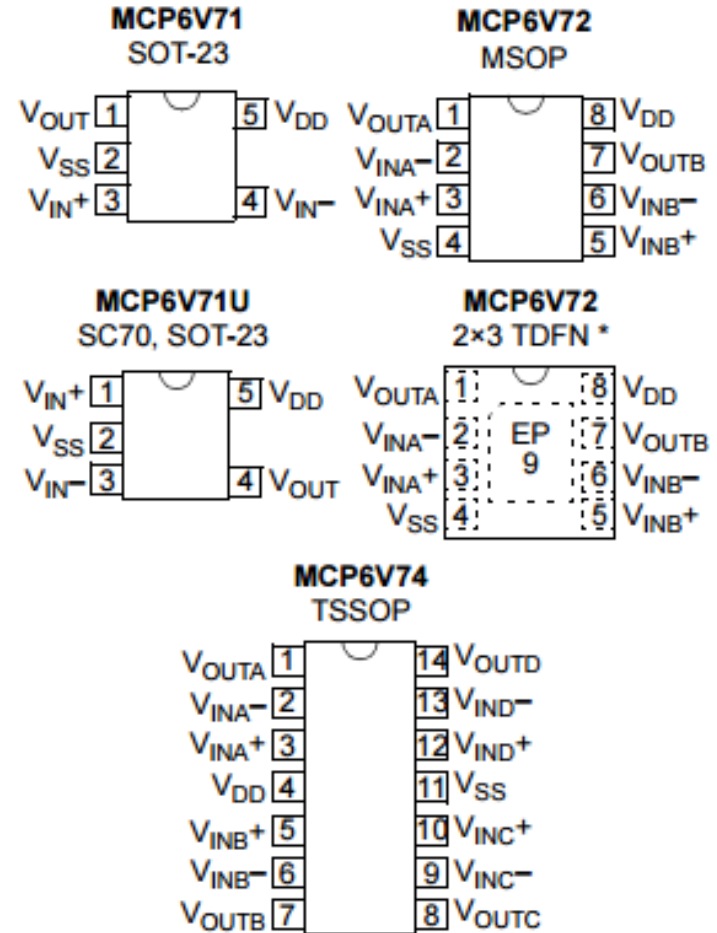
## Features:

- Gain Bandwidth Product: 1 MHz (typ.)
- Supply Current: 80  $\mu$ A/amplifier (typ.)
- Input Offset Voltage (max):  $\pm 25$   $\mu$ V (max.)
- Supply Voltage Range: 1.8V to 5.5V
- High DC Precision:
  - VOS Drift:  $\pm 150$  nV/ $^{\circ}$ C (max.)
  - AOL: 110 dB (min.)
  - PSRR: 110 dB (min.)
  - CMRR: 111 dB (min.)
  - Eni: 0.54  $\mu$ VP-P (typ.),  $f = 0.1$  Hz to 10 Hz
  - Eni: 0.17  $\mu$ Vp-p (typ.),  $f = 0.01$  Hz to 1 Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Enhanced EMI Rejection
- Small Packages
- Single: 5-pin SC-70, SOT-23
- Dual: 8-pin MSOP, 8-pin 2x3 TDFN
- Quad: 14-pin TSSOP
- Extended Temperature Range:  $-40^{\circ}$ C to  $+125^{\circ}$ C
- Recommended for Automotive Design



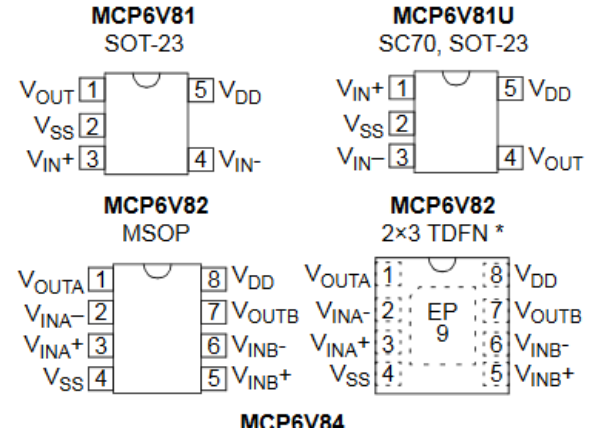
## Features:

- Gain Bandwidth Product: 2 MHz (typ.)
- Supply Current: 170  $\mu$ A/amplifier (typ.)
- Input Offset Voltage (max):  $\pm 8$   $\mu$ V (max.)
- Supply Voltage Range: 2.0V to 5.5V
- High DC Precision:
  - VOS Drift:  $\pm 15$  nV/ $^{\circ}$ C (max.)
  - AOL: 126 dB (min.)
  - PSRR: 115 dB (min.)
  - CMRR: 117 dB (min.)
  - Eni: 0.45  $\mu$ Vp-P (typ.),  $f = 0.1$  Hz to 10 Hz
  - Eni: 0.15  $\mu$ Vp-p (typ.),  $f = 0.01$  Hz to 1 Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Enhanced EMI Rejection
- Small Packages
- Single: 5-pin SC-70, SOT-23
- Dual: 8-pin MSOP, 8-pin 2x3 TDFN
- Quad: 14-pin TSSOP
- Extended Temperature Range:  $-40^{\circ}$ C to  $+125^{\circ}$ C
- Recommended for Automotive Design

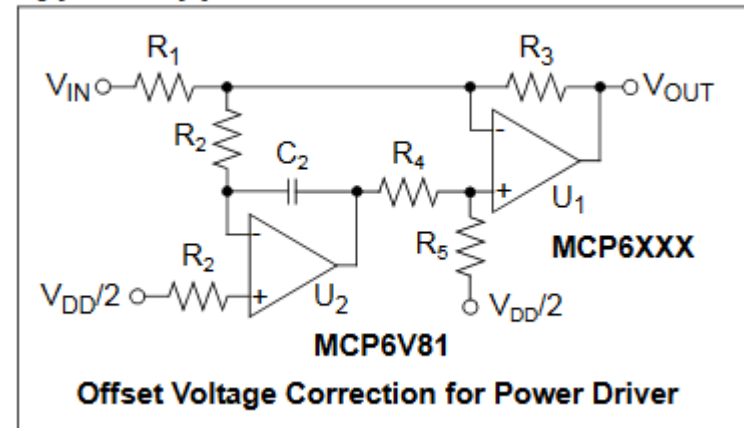


## Features:

- Gain Bandwidth Product: 5 MHz (typ.)
- Supply Current: 500  $\mu$ A/amplifier (typ.)
- Input Offset Voltage (max):  $\pm 9$   $\mu$ V (max.)
- Supply Voltage Range: 2.2V to 5.5V
- High DC Precision:
  - VOS Drift:  $\pm 20$  nV/ $^{\circ}$ C (max.)
  - AOL: 126 dB (min.)
  - PSRR: 117 dB (min.)
  - CMRR: 118 dB (min.)
  - Eni: 0.28  $\mu$ Vp-P (typ.),  $f = 0.1$  Hz to 10 Hz
  - Eni: 0.10  $\mu$ Vp-p (typ.),  $f = 0.01$  Hz to 1 Hz
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Enhanced EMI rejection
- Packages
  - Single: 5-pin SC-70, SOT-23
  - Dual: 8-pin MSOP, 8-pin 2x3 TDFN
  - Quad: 14-pin TSSOP
- Extended Temperature Range:  $-40^{\circ}$ C to  $+125^{\circ}$ C
- Recommended for Automotive Design

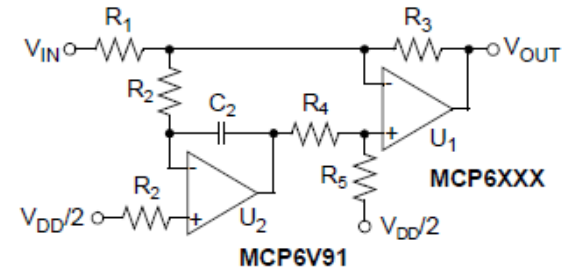
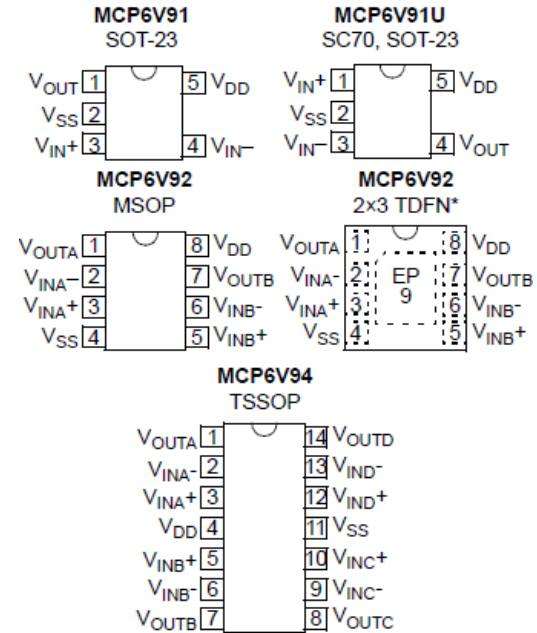


## Typical Application Circuit



## Features:

- Gain Bandwidth Product: 10 MHz (typ.)
- Supply Current: 1100  $\mu$ A/amplifier (typ.)
- Input Offset Voltage (max):  $\pm 9$   $\mu$ V (max.)
- Supply Voltage Range: 2.4V to 5.5V
- High DC Precision:
  - Vos Drift:  $\pm 20$  nV/ $^{\circ}$ C (max.)
  - AOL: 126 dB (min.)
  - PSRR: 117 dB (min.)
  - CMRR: 118 dB (min.)
- Rail-to-Rail Input/Output
- Unity Gain Stable
- Enhanced EMI rejection
- Packages:
  - Single: 5-pin SC-70, SOT-23
  - Dual: 8-pin MSOP, 8-pin 2x3 TDFN
  - Quad: 14-pin TSSOP
- Extended Temperature Range:  $-40^{\circ}$ C to  $+125^{\circ}$ C
- Recommended for Automotive Design



Offset Voltage Correction for Power Driver



# MCP6Hxx

1.2 MHz, 16V Op Amps

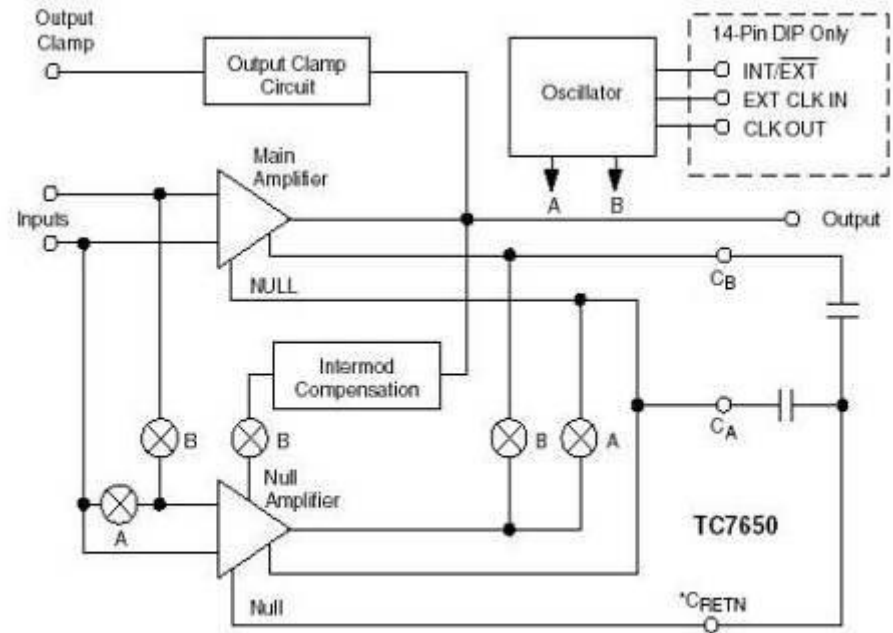


Product	# per Package	GBWP (kHz)	Iq Typical (&micro;A)	Iq Max (uA)	Vos Max (uV)	Operating Voltage Range (V)	Rail-To-Rail	Packages	Online Datasheet
MCP6H01/2/4	1/2/4	1200	135	185	3500	3.5 - 16	Out	5/SC-70, 8/TDFN, 8/SOIC, 14/TSSOP, 14/SOIC,	<a href="#">MCP6H01/2/4 Datasheet</a>
MCP6H71/2/4	1/2/4	2700	480	600	4000	3.5 - 12	Out		<a href="#">MCP6H71/2/4 Datasheet</a>
MCP6H81/2/4	1/2/4	5500	700	1300	4000	3.5 - 12	Out		<a href="#">MCP6H81/2/4 Datasheet</a>
MCP6H91/2/4	1/2/4	10000	2000	2800	4000	3.5 - 12	Out		<a href="#">MCP6H91/2/4 Datasheet</a>

- Recommended for Automotive Design
  - MCP6H01/2/4
  - MCP6H74
  - MCP6H82/4
  - MCP6H94

## Features:

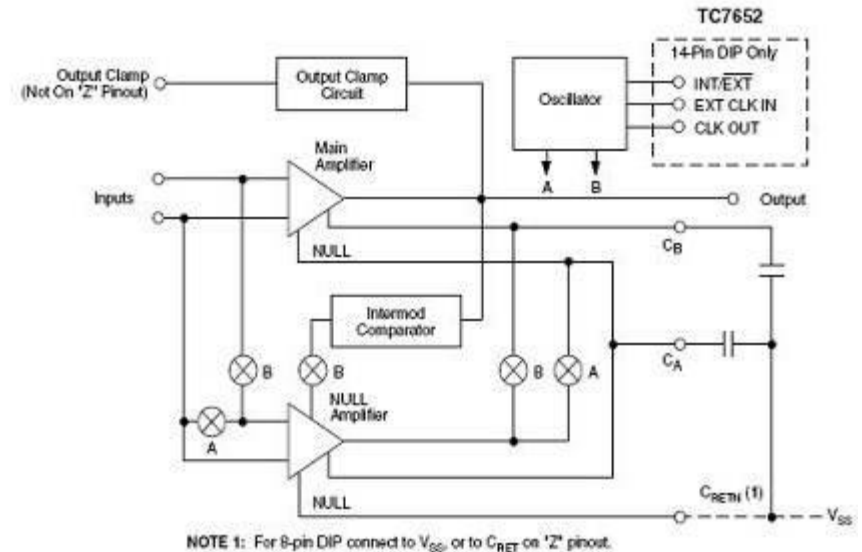
- Gain Bandwidth: 2 MHz
- Supply current: 3.5 mA (max)
- Low Input Offset Voltage:  $\pm 5 \mu\text{V}$  (typ.)
- Supply Voltage Range: 4.5V to 16V
- Low Input Offset Voltage Drift:
  - $0.05 \mu\text{V}/^\circ\text{C}$  (max.)
- Low Input Bias Current: 10pA (max.)
- High Impedance Differential CMOS Inputs:
  - $10^{12} \Omega$
- High Open Loop Voltage Gain:
  - 120dB (min.)
- Low Input Noise Voltage:  $2.0 \mu\text{V}_{\text{P-P}}$
- High Slew Rate:  $2.5\text{V}/\mu\text{s}$
- Low Power Operation: 20mW
- Output Clamp Speeds Recovery Time
- Compensated Internally for Stable Unity Gain
- Direct Replacement for ICL7650
- Packages: 8-Pin PDIP, 14-Pin PDIP



\* For 8-Pin DIP, connect to  $V_{SS}$

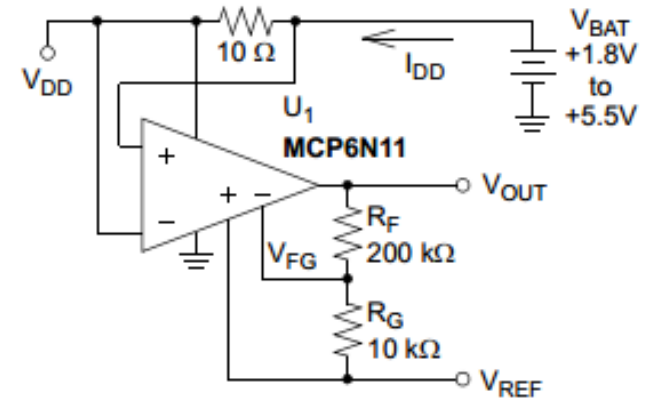
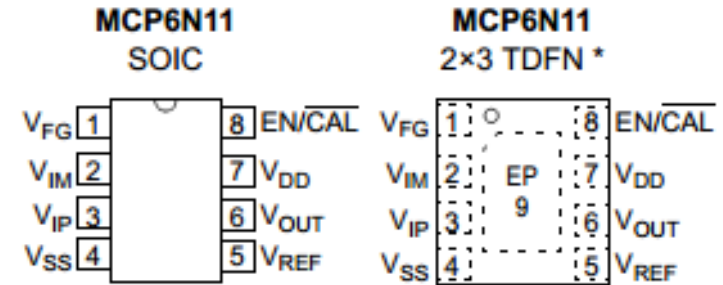
## Features:

- Gain Bandwidth Product: 0.4 MHz
- Supply Current: 3 mA (max)
- Low Offset Over Temperature Voltage: 10 $\mu$ V
- Supply Voltage Range: 5V to 16V
- Ultra Low Long Term Drift: 150nV/month
- Low Temperature Drift: 100nV/ $^{\circ}$ C
- Low DC Input Bias Current: 15pA
- High Gain, CMRR and PSRR: 110dB (min.)
- Low Input Noise Voltage: 0.2 $\mu$ V<sub>P-P</sub> (DC to 1Hz)
- Compensated Internally for Stable Unity Gain
- Clamp circuit for Fast Overload Recovery



## Features:

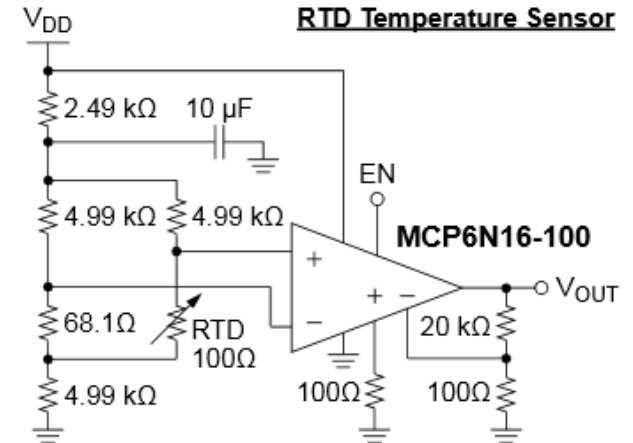
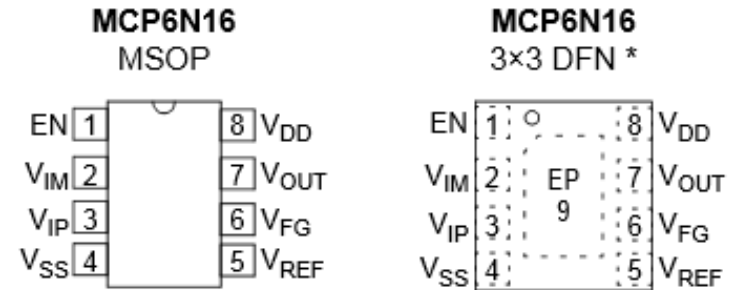
- Bandwidth: 500 kHz (typical, Gain = GMIN)
- Rail-to-Rail Input and Output
- Gain Set by 2 External Resistors
- Minimum Gain (GMIN) Options:
  - n1, 2, 5, 10 or 100 V/V
- Common Mode Rejection Ratio (CMRR):
  - 115 dB (typical, GMIN = 100)
- Power Supply Rejection Ratio (PSRR):
  - 112 dB (typical, GMIN = 100)
- Supply Current: 800  $\mu$ A/channel (typical)
- Single Channel
- Enable/VOS Calibration pin: (EN/CAL)
- Power Supply:
  - 1.8V to 5.5V
- Extended Temperature Range: -40°C to +125°C





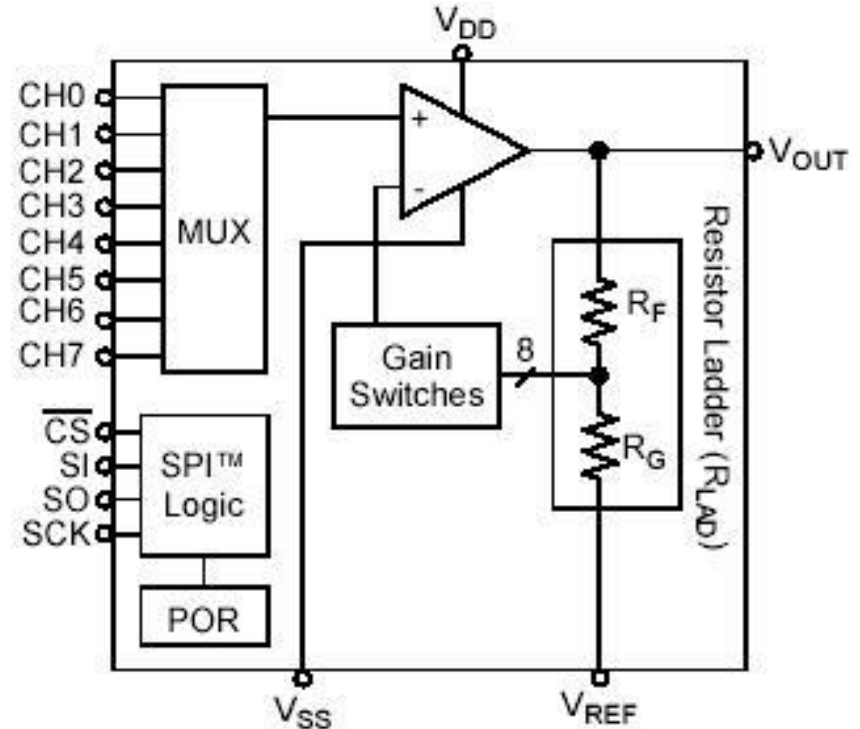
## Features:

- Zero-Drift Architecture
  - Low  $V_{os}$ , 17  $\mu\text{V}$  ( $G_{min} = 100$ )
  - Low offset drift:  $\pm 60 \text{ nV}/^\circ\text{C}$
  - No  $1/f$  noise
  - CMRR: 112 dB minimum
  - PSRR: 110 dB minimum
- Flexibility:
  - Rail to rail input/output
  - Gain set by two external resistors
- Enhanced EMI Protection
- Bandwidth of 500 kHz
- Operating voltage: 1.8 to 5.5V
- Recommended for Automotive Design



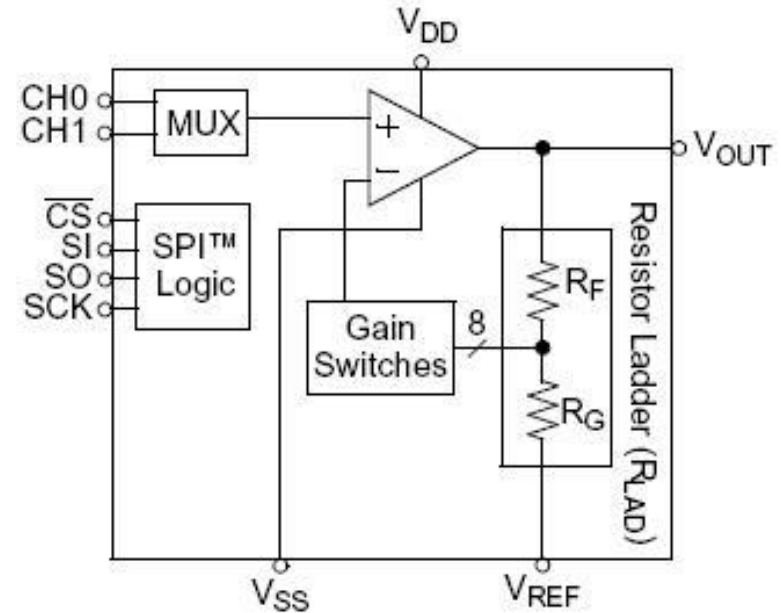
## Features:

- Multiplexed Inputs: 1, 2, 6 or 8 Channels
- 8 Gain Selections:
  - +1, +2, +4, +5, +8, +10, +16, or +32 V/V
- Serial Peripheral Interface (SPI)
- Rail-to-Rail Input and Output
- Low Gain Error:  $\pm 1\%$  (max.)
- Low Offset:  $\pm 275\mu\text{V}$  (max.)
- High Bandwidth: 2 to 12MHz (typ.)
- Low Noise:  $10\text{nV}/\sqrt{\text{Hz}}$  @ 10kHz (typ.)
- Low Supply Current 1.0mA (typ.)
- Single Supply: 2.5V to 5.5V



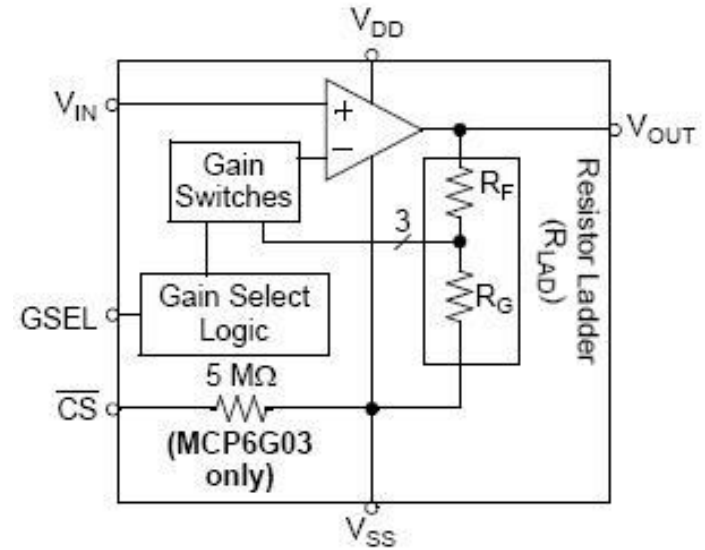
## Features:

- Multiplexed Inputs: 1 or 2 Channels
- 8 Gain Selections:
  - +1, +2, +4, +5, +8, +10, +16, or +32 V/V
- Serial Peripheral Interface (SPI)
- Rail-to-Rail Input and Output
- Low Gain Error:  $\pm 1\%$  (max.)
- Offset Mismatch Between Channels:  $0\mu\text{V}$
- High Bandwidth: 1 to 18MHz (typ.)
- Low Noise:  $10\text{ nV}/\sqrt{\text{Hz}}$  @ 10kHz (typ.)
- Low Supply Current 1.0mA (typ.)
- Single Supply: 2.5V to 5.5V
- Extended Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Recommended for Automotive Design (MCP6S91/2)



## Features:

- 3 Gain Selections:
  - +1, +10, +50 V/V
- One Gain Select Input per Amplifier
- Rail-to-Rail Input and Output
- Low Gain Error:  $\pm 1\%$  (max.)
- High Bandwidth: 250 to 900kHz (typ.)
- Low Supply Current: 110 $\mu$ A (typ.)
- Single Supply: 1.8V to 5.5V
- Extended Temperature Range:
  - -40°C to +125°C

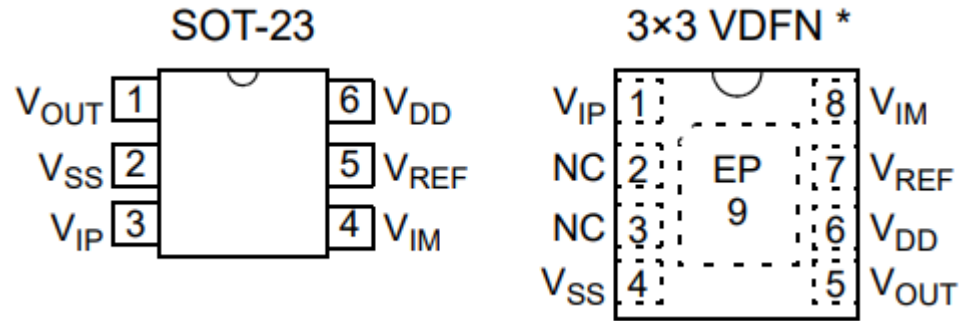


Gain (V/V)	GSEL Voltage (Typ.) (V)
1	$V_{DD}/2$ (or open)
10	0
50	$V_{DD}$

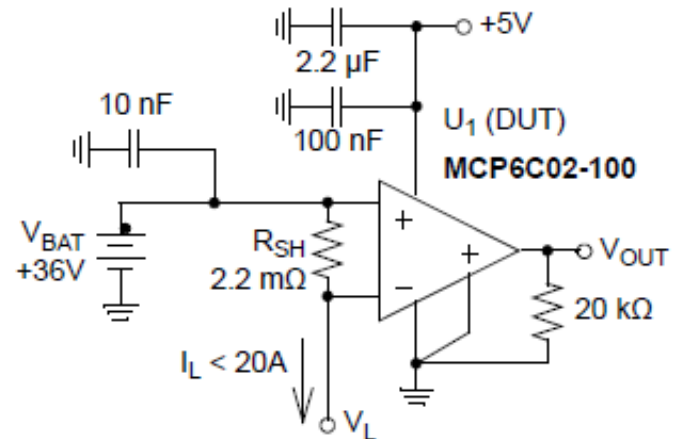
Note:  $V_{SS}$  is assumed to be 0V

## Features:

- Bidirectional or Unidirectional
- Input (Common-Mode) Voltages:
  - +3.0V to +65V, specified
  - +2.8V to +68V, operating
  - -0.3V to +70V, survival
- Power Supply:
  - 2.0V to 5.5V
  - Single or Dual (split) Supplies
- High DC Precision:
  - $V_{os}$ :  $\pm 1.65 \mu\text{V}$  (typical)
  - CMRR: 154 dB (typical)
  - PSRR: 138 dB (typical)
  - Gain Error:  $\pm 0.1\%$  (typical)
- Preset Gains: 20, 50 and 100 V/V
- Bandwidth: 500 kHz (typical)
- Supply Current: 490  $\mu\text{A}$  (typical)
- Enhanced EMI Protection:
  - EMIRR: 118 dB at 2.4 GHz (typical)
- Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$  (SOT-23 Package)
  - $-40^\circ\text{C}$  to  $+150^\circ\text{C}$  (VDFN Package)
- Recommended for Automotive Designs

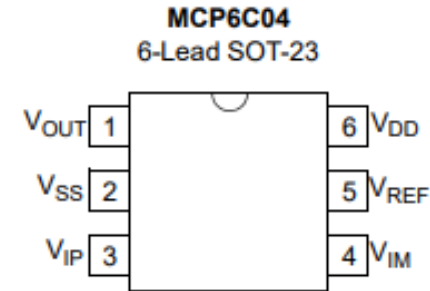


## Typical Application Circuit

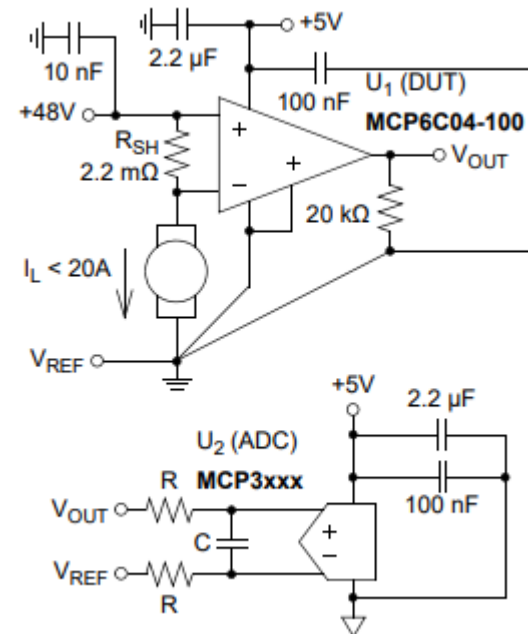


## Features:

- Bidirectional or Unidirectional
- Input (Common-Mode) Voltages:
  - +3.0V to +52V, specified
  - +2.8V to +54V, operating
  - -0.3V to +56V, survival
- Power Supply:
  - 2.0V to 5.5V
  - Single or Dual (split) Supplies
- High DC Precision:
  - $V_{os}$ :  $\pm 3.3 \mu\text{V}$  (typical)
  - CMRR: 150 dB (typical)
  - PSRR: 127 dB (typical)
  - Gain Error:  $\pm 0.2\%$  (typical)
- Preset Gains: 20, 50 and 100 V/V
- Bandwidth: 500 kHz (typical)
- Supply Current: 500  $\mu\text{A}$  (typical)
- Enhanced EMI Protection:
  - EMIRR: 118 dB at 2.4 GHz (typical)
- Extended Temperature Range:
  - $-40^\circ\text{C}$  to  $+125^\circ\text{C}$

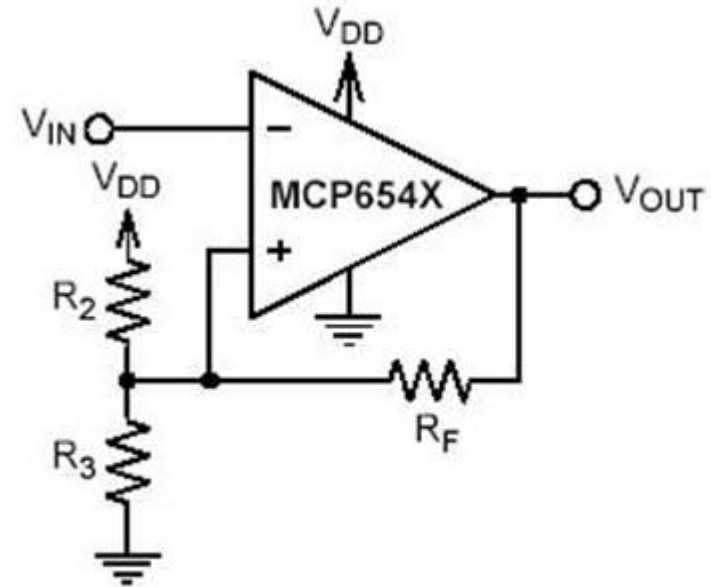


## Motor Current Monitor



## Features:

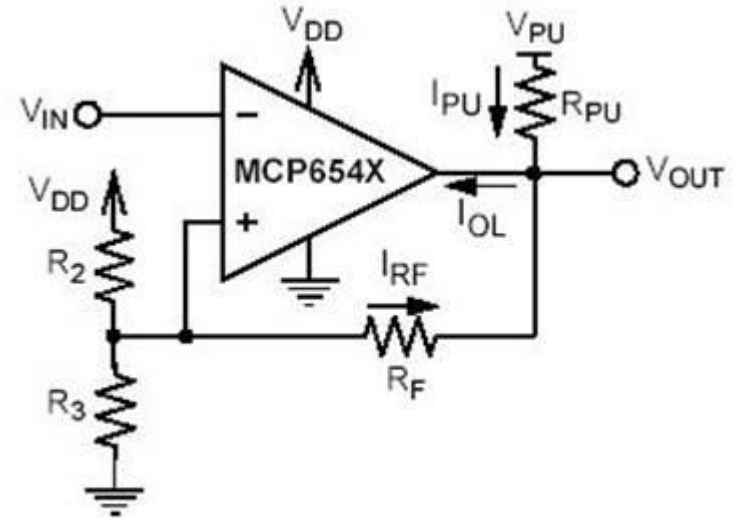
- Low Quiescent Current:
  - 600nA/comparator (typ.)
- Rail-to-Rail Input:
  - $V_{SS} - 0.3V$  to  $V_{DD} + 0.3V$
- CMOS/TTL-Compatible Output
- Propagation Delay:
  - 4 $\mu$ s (typ.), 100mV Overdrive
- Wide Supply Voltage Range: 1.6V to 5.5V
- Available in Single, Dual and Quad
- Single available in SOT-23-5, SC-70-5
- Chip Select (CS) with MCP6543
- Low Switching Current
- Internal Hysteresis: 3.3mV (typ.)
- Temperature Ranges:
  - Industrial: -40°C to +85°C
  - Extended: -40°C to +125°C
- Recommended for Automotive Design (MCP6541/2/4)



*Inverting Circuit With Hysteresis*

## Features:

- Low Quiescent Current:
  - 600nA/comparator (typ.)
- Rail-to-Rail Input:
  - $V_{SS} - 0.3V$  to  $V_{DD} + 0.3V$
- Open-Drain Output:  $V_{OUT} \leq 10V$
- Propagation Delay:
  - 4 $\mu$ s (typ.), 100 mV Overdrive
- Wide Supply Voltage Range: 1.6V to 5.5V
- Single available in SOT-23-5, SC-70-5
- Available in Single, Dual and Quad
- Chip Select (CS) with MCP6548
- Low Switching Current
- Internal Hysteresis: 3.3mV (typ.)
- Temperature Range:
  - Industrial: -40°C to +85°C
  - Extended: -40°C to +125°C
- Recommended for Automotive Design (MCP6546/7/9)



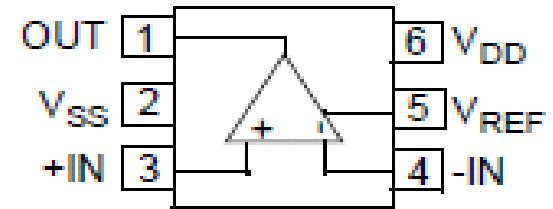
*Inverting circuit with hysteresis*



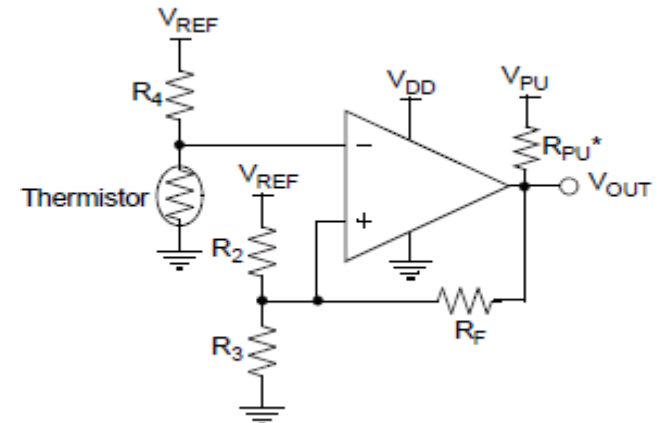
## Features:

- Integrated Reference Voltage
  - Factory Set Reference Voltage:
    - 1.21V or 2.4V
  - Tolerance:  $\pm 1\%$  (typ.)
- Low Quiescent Current: 2.5  $\mu$ A (typ.)
- Propagation Delay:
  - 4 $\mu$ s (typ.), 100mV Overdrive
- Input Offset Voltage:  $\pm 3$ mV (typ.)
- Rail-to-Rail Input:
  - $V_{SS} - 0.3$ V to  $V_{DD} + 0.3$ V
- CMOS/TTL-Compatible Output
- Wide Supply Voltage Range:
  - 1.8V to 5.5V
- Output Options:
  - MCP65R41 Push-Pull
  - MCP65R46 Open-Drain
- SOT-23-6
- Extended Temperature Ranges:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$

**MCP65R41/6**  
SOT23-6



Over Temperature Alert

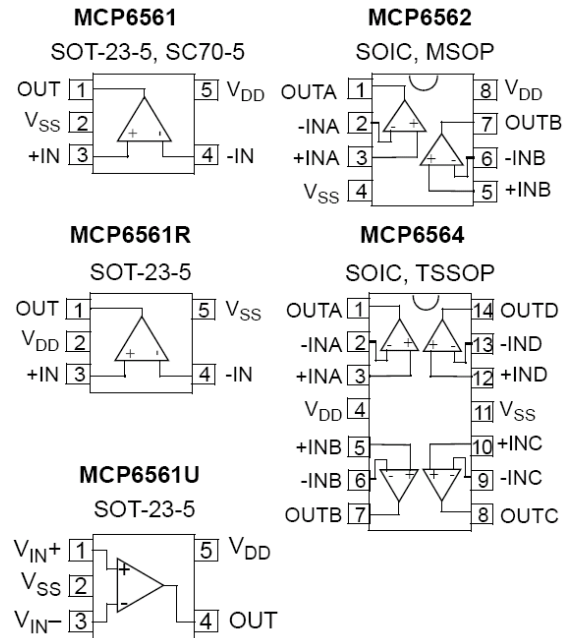
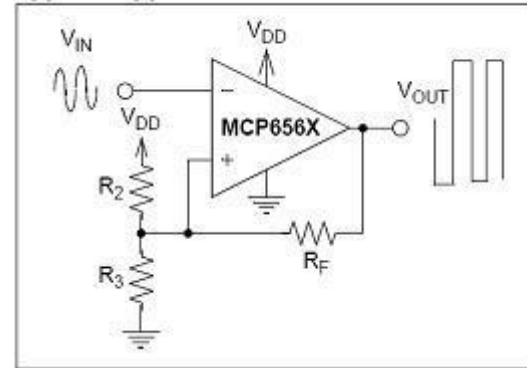


\* Pull-up resistor required for the MCP65R46 only.

## Features:

- Propagation Delay at 1.8V<sub>DD</sub>:
  - 56ns (typ.) High to Low
  - 49ns (typ.) Low to High
- Low Quiescent Current: 100µA (typ.)
- Input Offset Voltage: ±3mV (typ.)
- Rail-to-Rail Input:  $V_{SS} - 0.3V$  to  $V_{DD} + 0.3V$
- CMOS/TTL Compatible Output
- Wide Supply Voltage Range: 1.8V to 5.5V
- Available in Single, Dual, and Quad
- Packages: SC70-5, SOT-23-5, SOIC, MSOP, TSSOP
- Recommended for Automotive Design (MCP6561/2/4)

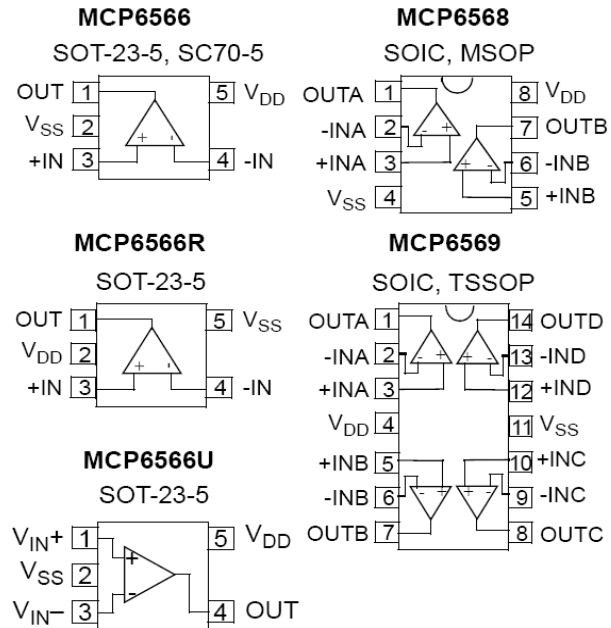
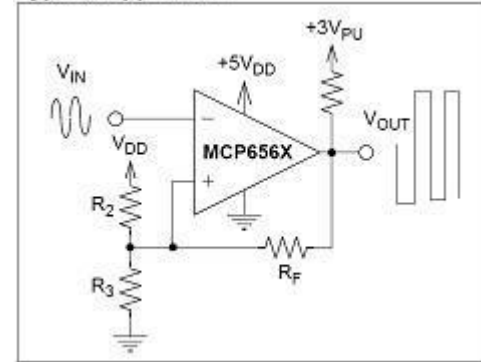
## Typical Application



## Features:

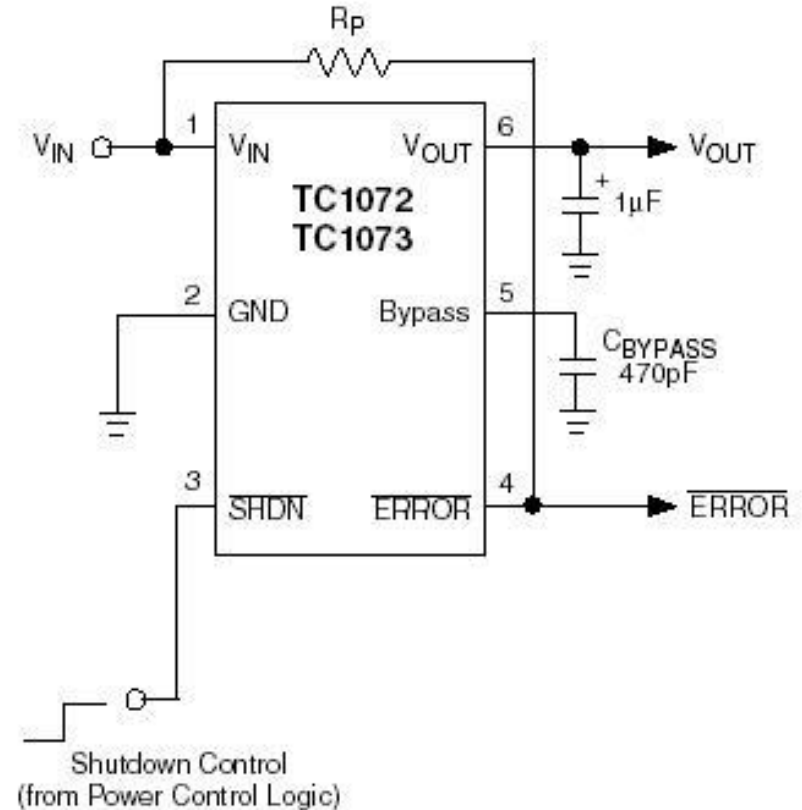
- Propagation Delay at 1.8V<sub>DD</sub>:
  - 56ns (typ.) High to Low
- Low Quiescent Current: 100µA (typ.)
- Input Offset Voltage: ±3mV (typ.)
- Rail-to-Rail Input:  $V_{SS} - 0.3V$  to  $V_{DD} + 0.3V$
- Open-Drain Output
- Wide Supply Voltage Range: 1.8V to 5.5V
- Available in Single, Dual, and Quad
- Packages: SC70, SOT-23-5, SOIC, MSOP, TSSOP
- Recommended for Automotive Design (MCP6566/7/9)

### Typical Application



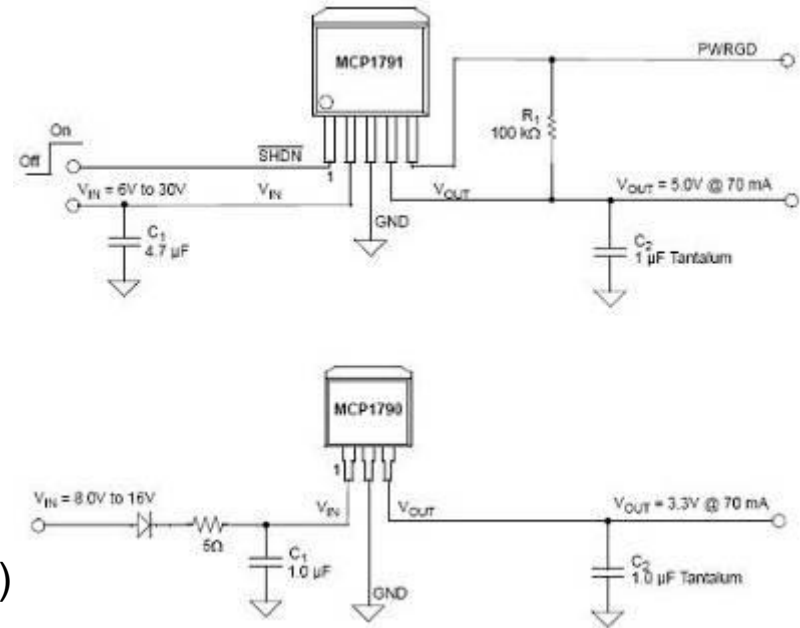
## Features:

- 50 $\mu$ A Ground Current for Longer Battery Life
- Very Low Dropout Voltage
- Choice of 50mA (TC1072) and 100mA (TC1073) - Output
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Power-Saving Shutdown Mode
- ERROR Output Can Be Used as a Low Battery – Detector or Processor Reset Generator
- Bypass Input for Low Noise Operation
- Overcurrent and Overtemperature Protection
- Space-Saving 6-Pin SOT-23 Package
- Pin Compatible Upgrades for Bipolar Regulators
- Standard Output Voltage Options:
  - 1.8V, 2.5V, 2.6V, 2.7V, 2.8V, 2.85V, 3.0V,
  - 3.3V, 3.6V, 4.0V, 5.0V
- Other output voltages are available.



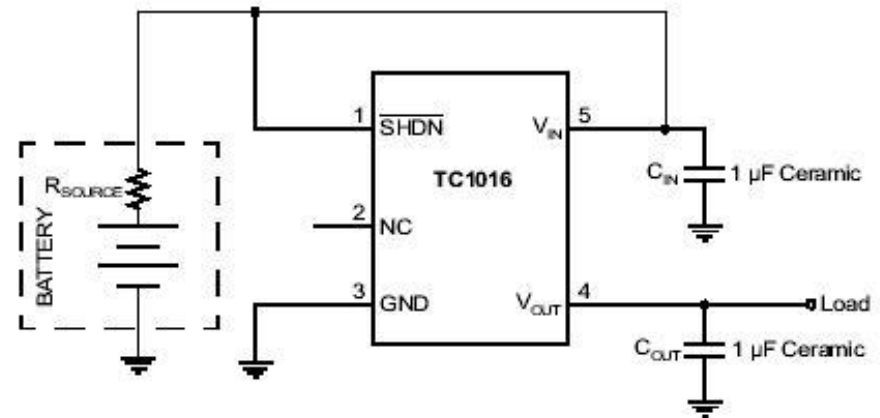
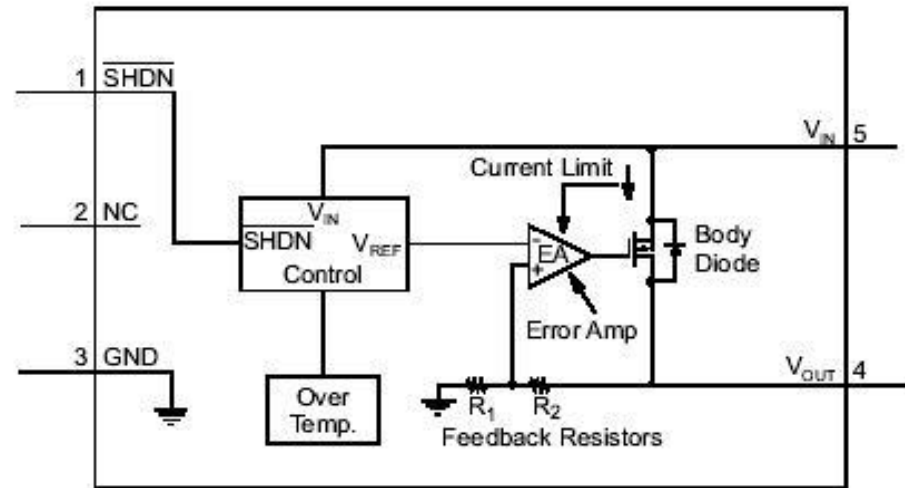
## Features:

- 48V (43.5V  $\pm$ 10%) load dump protected for 180ms with a 30 second repetition rate (FORD Test Pulse G Loaded)
- Wide steady state supply voltage, 6.0V to 30.0V
- Extended Temperature Range: -40°C to +125°C
- Fixed output voltages: 3.0V, 3.3V, 5.0V
- Low quiescent current: 70 $\mu$ A (typ.)
- Low shutdown quiescent current: 10 $\mu$ A (typ.)
- Output Voltage Tolerances of  $\pm$ 2.5%
- Maximum output current of 70mA @ +125°C
- Maximum continuous input voltage of 30V
- Internal thermal overload protection +157°C (typ.)
- Internal short circuit current limit
- Short Circuit Current Foldback
- Shutdown Input option (MCP1791)
- Power Good Output option (MCP1791)
- High PSRR, -90 dB @100Hz (typ.)
- Stable with 1 $\mu$ F to 1000 $\mu$ F tantalum and electrolytic Capacitors
- Stable with 4.7 $\mu$ F to 1000 $\mu$ F ceramic capacitors
- Recommended by Automotive Design



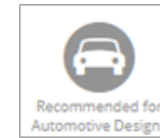
## Features:

- Space-Saving 5-Pin SC-70 Package
- Low Operating Current: 53 $\mu$ A (typ.) –  
– Shutdown Mode: 0.05 $\mu$ A (typ.)
- Very Low Dropout Voltage
- Rated 80mA Output Current
- Requires only 1 $\mu$ F Ceramic Output –  
– Capacitance
- High Output Voltage Accuracy:
  - $\pm 0.5\%$  (typ.)
- 10 $\mu$ s (typ.) Wake-Up Time from SHDN
- Overcurrent and Over temperature –  
– Protection
- Pin Compatible Upgrades for Bipolar –  
– Regulators
- Recommended for Automotive Design





# TC2014/54 TC2015/55 TC2185/86 Families

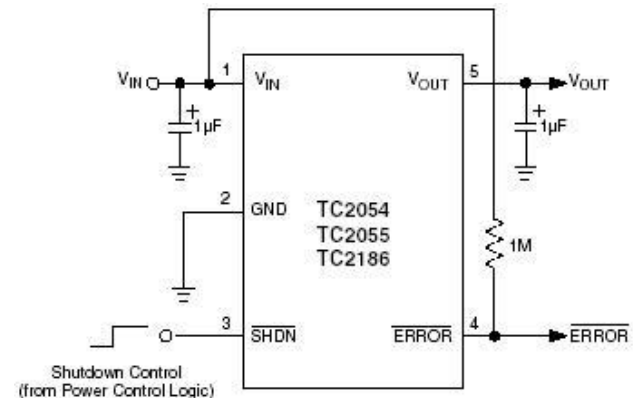
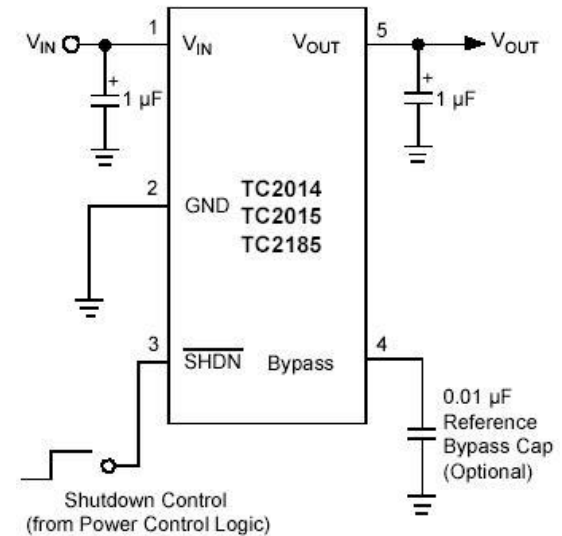


Online  
Datasheet

50 mA, 100 mA, 150 mA CMOS LDOs with Shutdown and Reference Bypass

## Features:

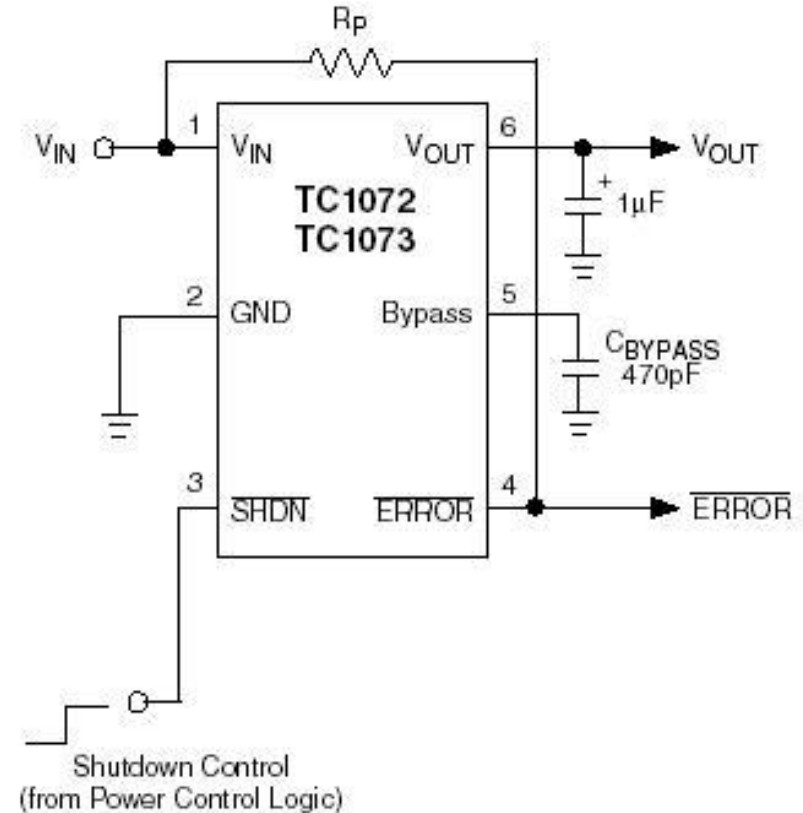
- Output Current: 50mA (TC2014/54) 100mA –  
– (TC2015/55) 150mA (TC2185/6)
- Low Supply Current: 55  $\mu$ A (typical)
- Low Dropout Voltage: 90 mV (typ.) @ 100 mA
- High-Output Voltage Accuracy:  $\pm 0.4\%$  (typ.)
- Standard or Custom Output Voltages
- Power-Saving Shutdown Mode
- Fast Shutdown Response Time: 60 $\mu$ s (typ.)
- Over-current and Over-temperature Protection
- Space-Saving 5-Pin SOT-23A Package
- Stable with Ceramic Output Capacitors
- Wide Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- TC2014/054/185: Reference Bypass Input for Ultra –  
– Low-Noise Operation
- TC2054/055/186: Error Output Can Be Used as a –  
– Low Battery Detector or Microcontroller Reset –  
– Generator
- Recommended for Automotive Design (TC2014,  
TC2185)



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## Features:

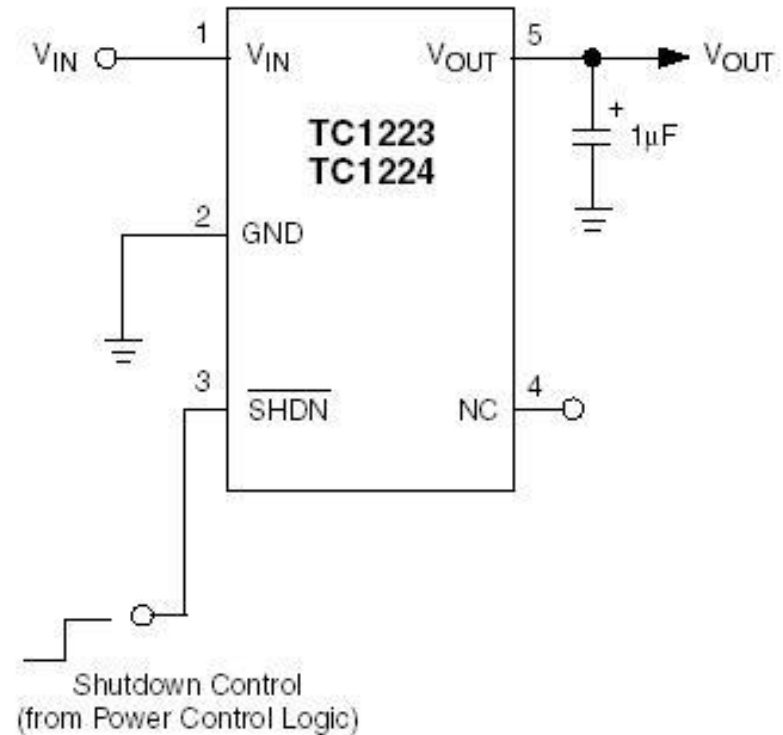
- 50 $\mu$ A Ground Current for Longer Battery Life
- Adjustable Output Voltage
- Very Low Dropout Voltage
- Choice of 50mA (TC1070), 100mA (TC1071) and 150mA (TC1187) Output
- Power-Saving Shutdown Mode
- Overcurrent and Overtemperature Protection
- Space-Saving 5-Pin SOT-23 Package
- Pin Compatible with Bipolar Regulators





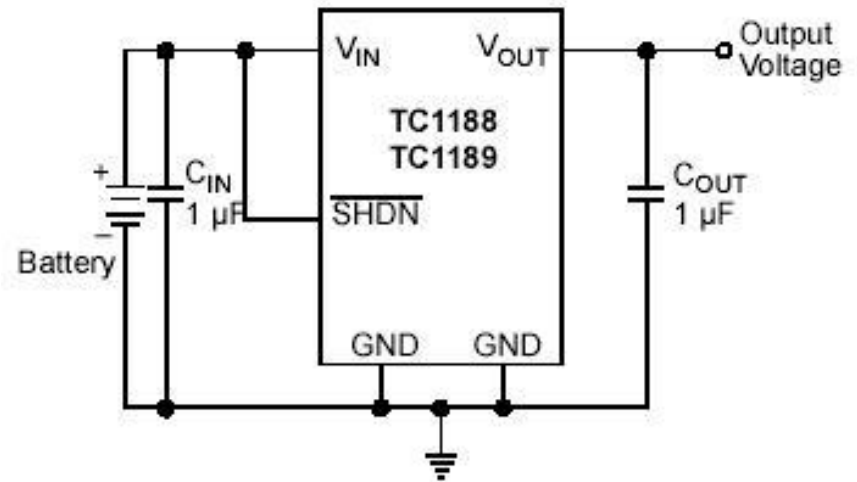
## Features:

- Low Ground Current for Longer Battery Life
- Low Dropout Voltage
- Choice of 50mA (TC1223), 100mA (TC1224) –  
- Output Current
- High Output Voltage Accuracy
- Standard of Custom Output Voltages
- Power Saving Shutdown Mode
- Overcurrent and Overtemperature Protection
- Space-Saving 5-Pin SOT-23A Package
- Pin Compatible Upgrades for Bipolar Regulators



## Features:

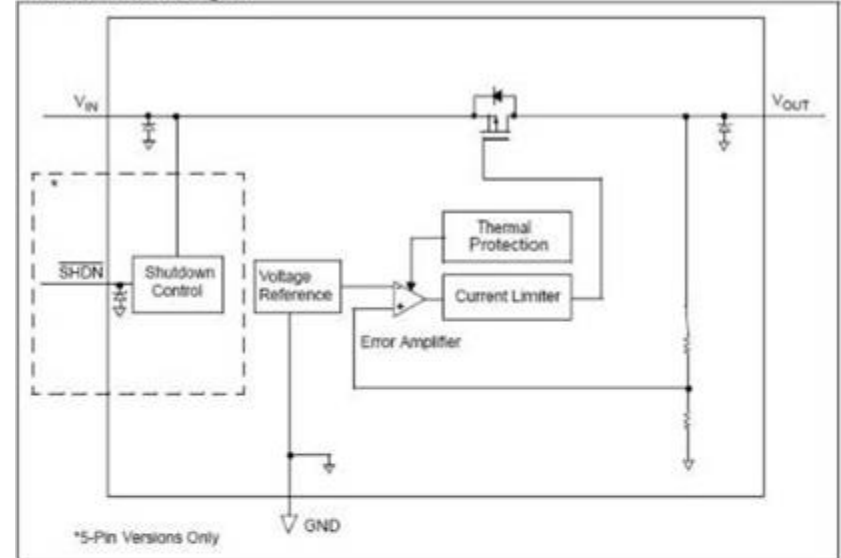
- Input Voltage Range: 2.7V to 6.0V
- 120mA Output Current
- Low Supply Current: 50 $\mu$ A, (typ.)
- Low Dropout Voltage:
  - 110mV (typ.) @ 100mA
- Fast Turn-On from Shutdown:
  - 140 $\mu$ s (typ.)
- Low Output Noise
- Overcurrent and Overtemperature Protection
- Low Power Shutdown Mode
- Auto Discharge of Output Capacitor (TC1189)



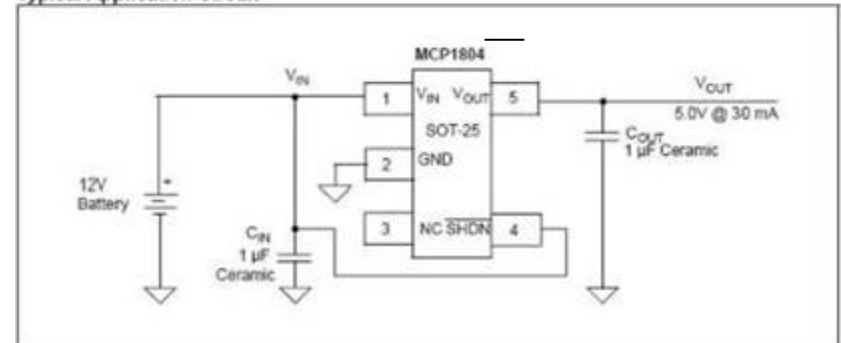
## Features:

- 150 mA Output Current
- Low Dropout Voltage, 260mV typ. @ 20mA, -  
- VR=3.3V
- 50  $\mu$ A Typical Quiescent Current
- 0.01  $\mu$ A Typical Shutdown Current
- Input Operating Voltage Range: 2.0V to 28.0V
- Standard Output Voltage Options (1.8V, -  
- 2.5V, 3.0V, 3.3V, 5.0V, 10.0V, 12.0V)
- Output Voltage Accuracy:  $\pm 2\%$
- Output voltages from 1.8V to 18.0V in 0.1V –  
- increments are available upon request
- Stable with Ceramic output capacitors
- Current Limit Protection With Current Foldback
- Shutdown pin
- High PSRR: 50 dB typical @ 1 kHz

Functional Block Diagram



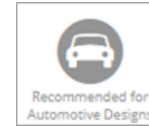
Typical Application Circuit





# TC1014/54/70 TC1015/55/71 TC1185/6/7 Families

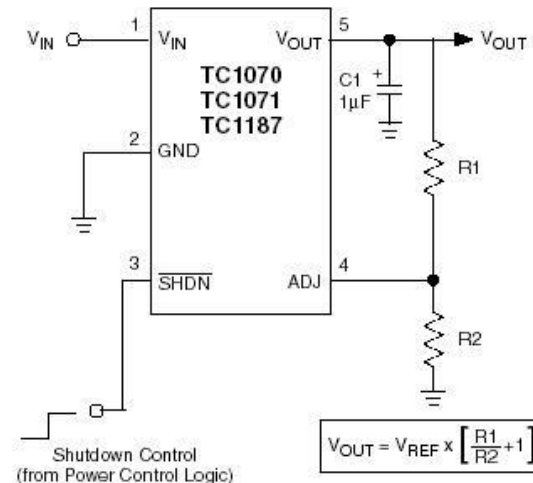
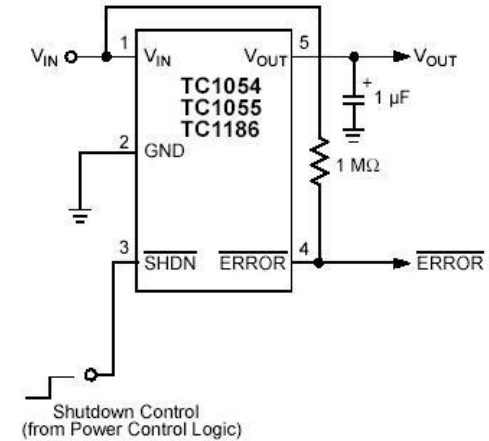
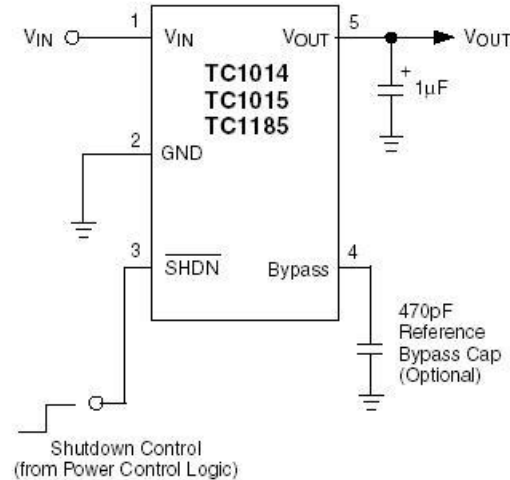
50 mA, 100 mA and 150 mA CMOS LDOs with Shutdown  
and Reference Bypass



Online  
Datasheet

## Features:

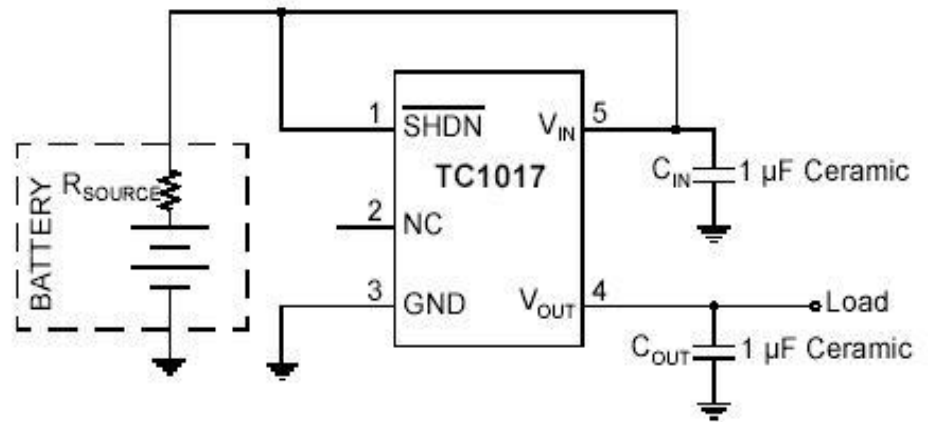
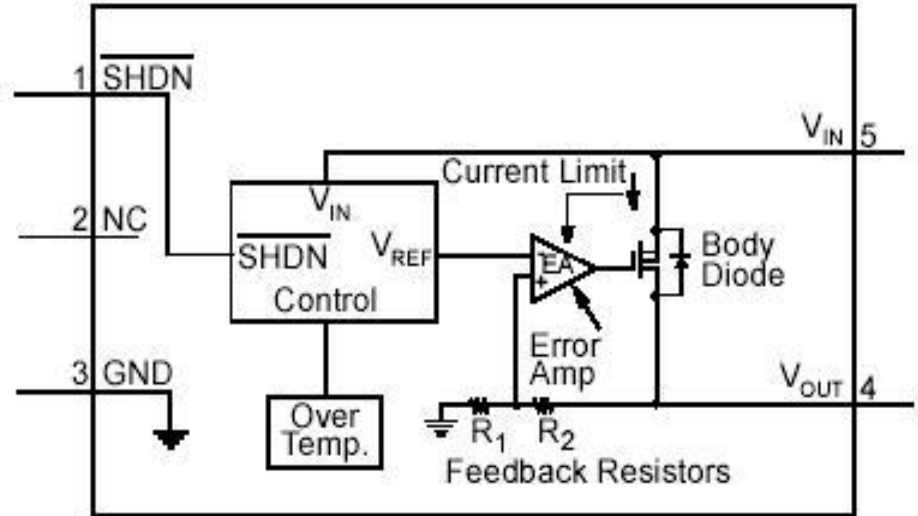
- Low Supply Current: 50µA (typ.)
- Low Dropout Voltage
- Output current: 50mA (TC1014/54/70) –  
- 100mA (TC1015/55/71) 150mA –  
- (TC1185/6/7)
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Power-Saving Shutdown Mode
- Overcurrent and Over temperature –  
- Protection
- Space-Saving 5-Pin SOT-23 Package
- TC1014/015/185: Reference Bypass –  
- Input for Ultra Low-Noise Operation
- TC1054/055/1186: Error Output Can –  
- Be Used as a Low Battery Detector –  
- or Microcontroller Reset Generator
- TC1070/1071/1187: Adjustable Output Voltage
- Recommended for Automotive Design:
  - TC1014/15
  - TC1185/7



<< BACK

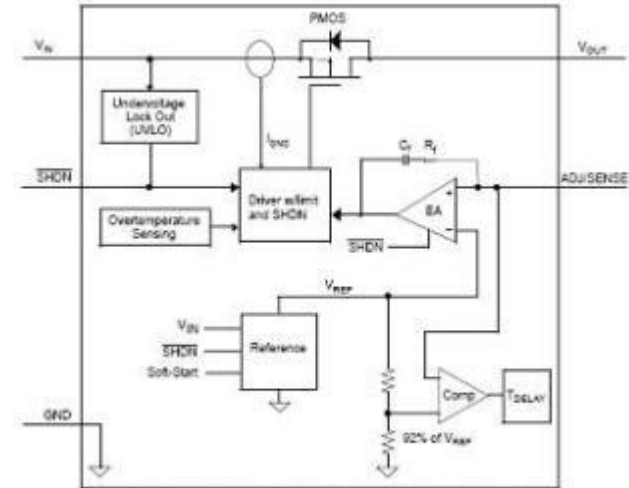
## Features:

- Space Saving 5-Pin SC-70 and SOT-23 –  
- Packages
- Low Operating Current: 53 $\mu$ A (typ.) –  
- Shutdown Mode: 0.05 $\mu$ A (typ.)
- High Output Voltage Accuracy:
  - $\pm 0.5\%$  (typ.)
- Very Low Dropout Voltage
- Rated 150mA Output Current
- Wake-Up Time from SHDN:
  - 10 $\mu$ s (typ.)
- Overcurrent and Over temperature –  
- Protection
- Pin Compatible Upgrades for Bipolar –  
- Regulators
- Requires Only 1 $\mu$ F Ceramic Output –  
- Capacitance

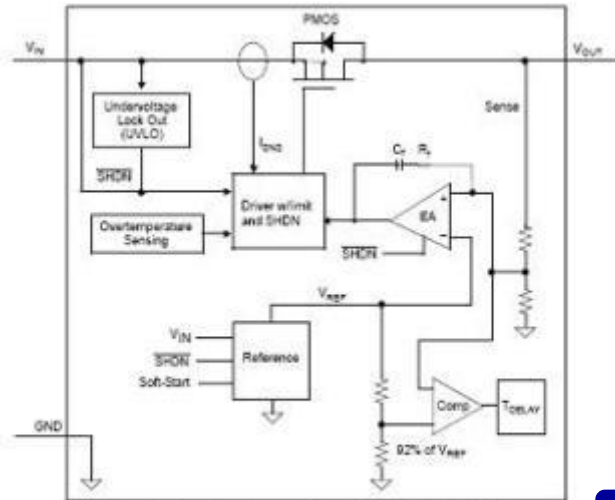


## Features:

- 300mA Output Current Capability
- Input Operating Voltage Range: 2.1V to 6.0V
- Adjustable Output Voltage: 0.8V to 5.0V (MCP1824)
- Standard Fixed Output Voltages:
  - 0.8V, 1.2V, 1.8V, 2.5V, 3.0V, 3.3V, 5.0V
- Other Fixed Output Voltage Options Available Upon Request
- Low Dropout Voltage: 200mV (typ.) @ 300mA
- Typical Output Voltage Tolerance: 0.4%
- Stable with 1.0µF Ceramic Output Capacitor
- Fast Response to Load Transients
- Low Supply Current: 120µA (typ.)
- Shutdown Current: 0.1µA (typ.) (MCP1824)
- Fixed Delay on Power Good Output (MCP1824)
- Short Circuit Current Limiting and Over temperature Protection
- Packages: SOT-223, SOT-23
- Recommended for Automotive Design (MCP1824)



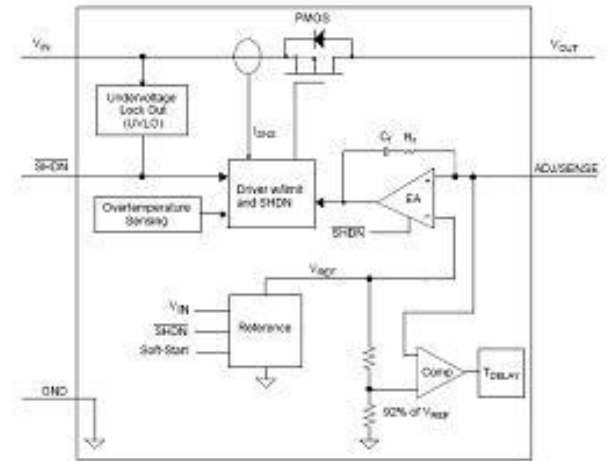
Functional Block Diagram - Adjustable Output (MCP1824)



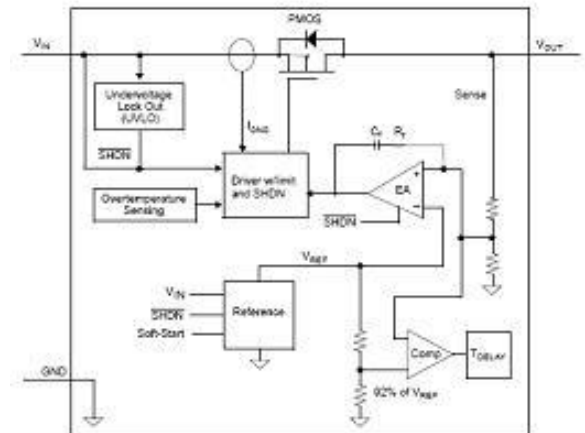
Functional Block Diagram - Fixed Output (MCP1824S)

## Features:

- 500mA Output Current Capability
- Input Operating Voltage Range: 2.1V to 6.0V
- Adjustable Output Voltage Range:
  - 0.8V to 5.0V (MCP1825)
- Standard Fixed Output Voltages:
  - 0.8V, 1.2V, 1.8V, 2.5V, 3.0V, 3.3V, 5.0V
- Other Fixed Output Voltage Options Available Upon Request
- Low Dropout Voltage: 210mV (typ.) at 500mA
- Typical Output Voltage Tolerance: 0.5%
- Stable with 1.0 $\mu$ F Ceramic Output Capacitor
- Fast response to Load Transients
- Low Supply Current: 120 $\mu$ A (typ.)
- Low Shutdown Supply Current:
  - 0.1 $\mu$ A (typ.) (MCP1825)
- Fixed Delay on Power Good Output (MCP1825 only)
- Short Circuit Current Limiting and Over temperature Protection
- Packages: TO-263 (DDPAK), TO-220, SOT-223
- Recommended for Automotive Design



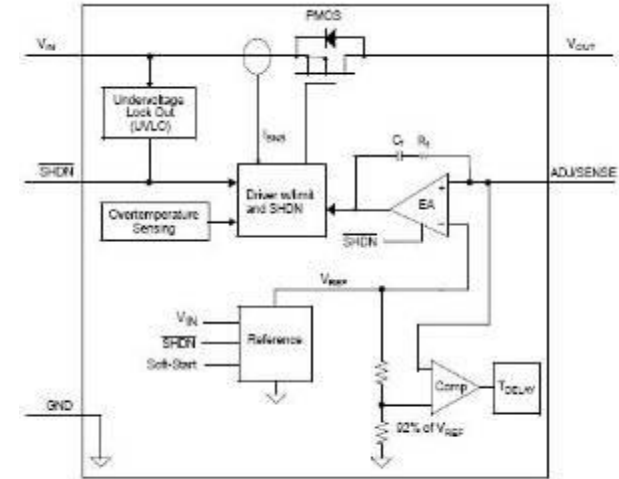
Functional Block Diagram - Adjustable Output



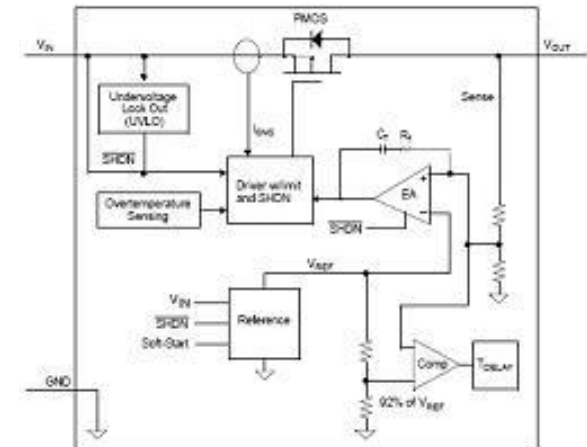
Functional Block Diagram - Fixed Output (3-Pin)

## Features:

- 1000mA Output Current Capability
- Input Operating Voltage Range:
  - 2.3V to 6.0V
- Adjustable Output Voltage Range:
  - 0.8V to 5.0V (MCP1826)
- Standard Fixed Output Voltages:
  - 0.8V, 1.2V, 1.8V, 2.5V, 3.0V, 3.3V, 5.0V
- Other Fixed Output Voltage Options
- Available Upon Request
- Low Dropout Voltage: 250mV (typ.) @ 1000mA
- Typical Output Voltage Tolerance: 0.5%
- Stable with 1.0 $\mu$ F Ceramic Output Capacitor
- Fast response to Load Transients
- Low Supply Current: 120 $\mu$ A (typ.)
- Low Shutdown Supply Current:
  - 0.1 $\mu$ A (typ.) (MCP1826)
- Fixed Delay on Power Good Output (MCP1826 only)
- Short Circuit Current Limiting & Overtemp Protection
- Packages: TO-263-5 (DDPAK), TO-220, SOT-223
- Recommended for Automotive Design (MCP1826S)



Functional Block Diagram - Adjustable Output

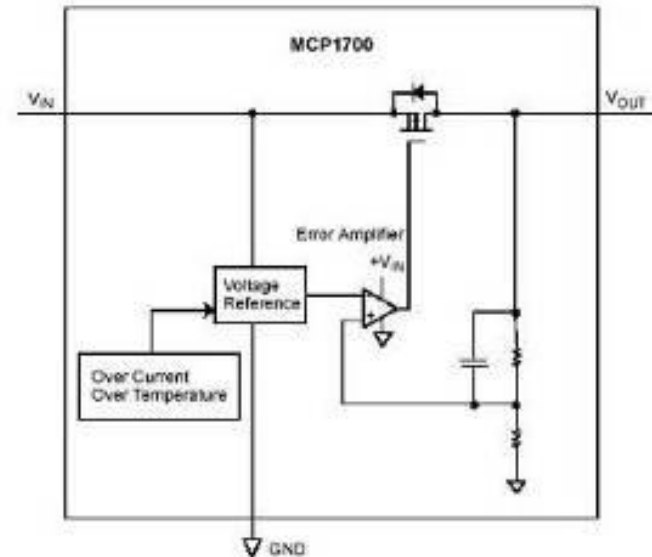
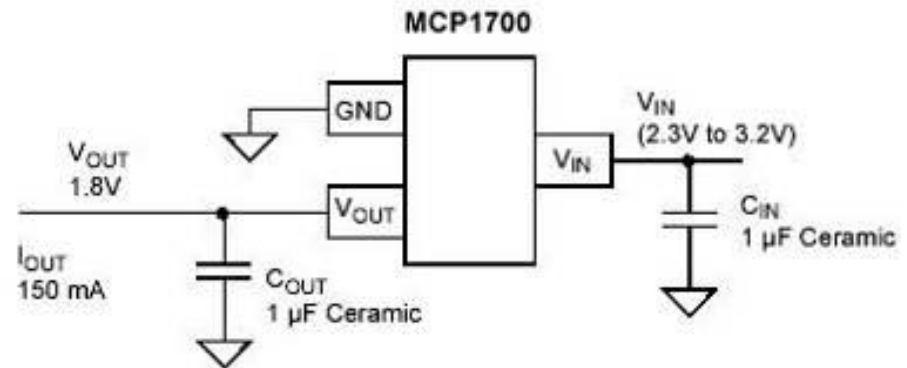


Functional Block Diagram - Fixed Output (3-Pin)



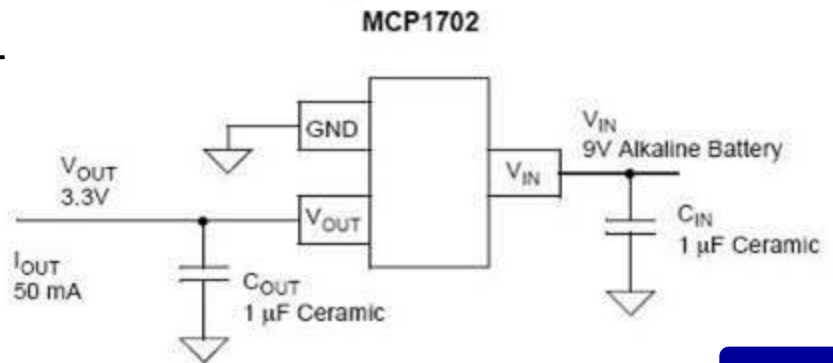
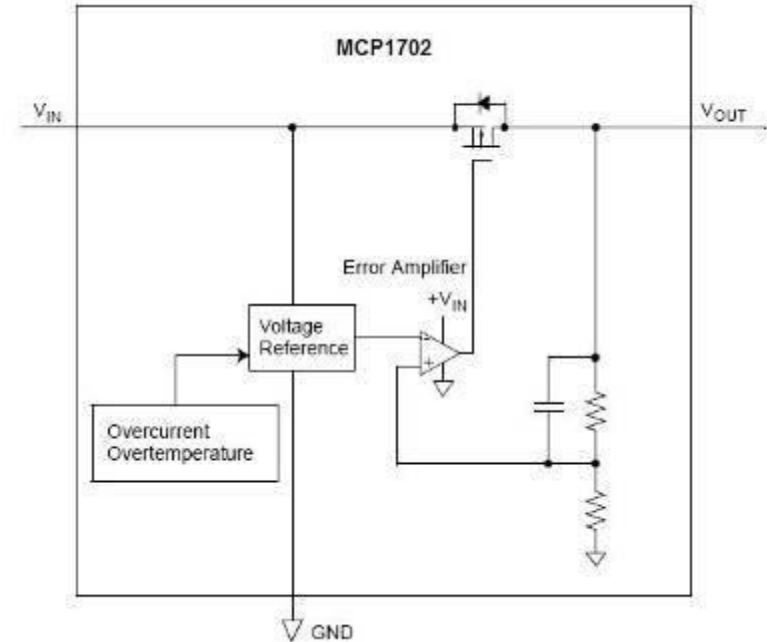
## Features:

- 1.6 $\mu$ A (typ.) Quiescent Current
- Input Operating Voltage Range:
  - 2.3V to 6.0V
- Output Voltage Range:
  - 1.2V to 5.0V
- 250mA Output Current for Output –
  - Voltages  $\geq$  2.5V
- 200mA Output Current for Output –
  - Voltages  $<$  2.5V
- Low Dropout voltage: 178mV (typ.) –
  - @ 250mA for  $V_{OUT} = 2.8V$
- 0.4% (typ.) Output Voltage Tolerance
- Stable with 1.0 $\mu$ F Ceramic Output Capacitor
- Short Circuit Protection
- Over temperature Protection
- Recommended for Automotive Design



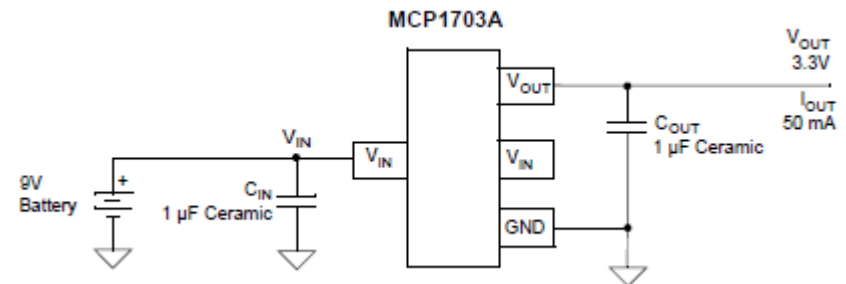
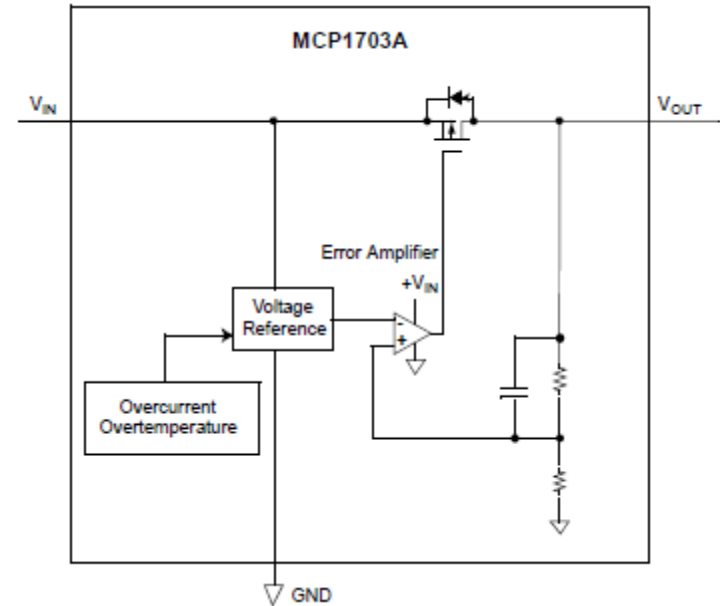
## Features:

- 2.0 $\mu$ A Quiescent Current (typ.)
- Input Operating Voltage Range:
  - 2.7V to 13.2V
- 250mA Output Current for Output –
  - Voltages  $\geq$  2.5V
- 200mA Output Current for Output –
  - Voltages  $<$  2.5V
- Output voltage range 1.2V to 5.5V –
  - in 0.1V increments (50mV increments –
  - available upon request)
- Stable with 1.0 $\mu$ F to 22 $\mu$ F Output Capacitor
- Short-Circuit Protection
- Overtemperature Protection
- Package Options: 3-Pin SOT-23A, 3-Pin SOT-89, TO-92-3
- Recommended for Automotive Design



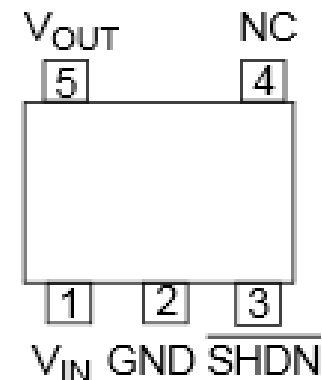
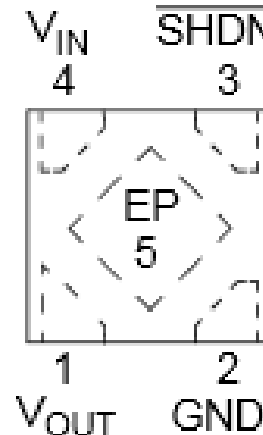
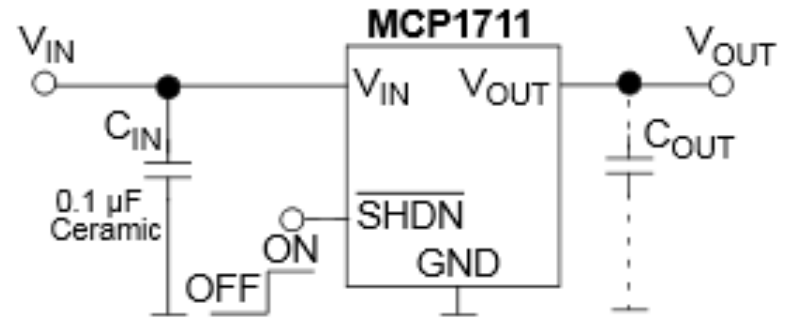
## Features:

- 2.0 $\mu$ A Quiescent Current (typ.)
- Input Operating Voltage Range: 2.7V to 16V
- 250mA Output Current for Output –  
- Voltages  $\geq 2.5$ V
- 200mA Output Current for Output –  
- Voltages  $< 2.5$ V
- 0.4% (typ.) Output Voltage Tolerance
- Output voltage range 1.2V to 5.5V in 0.1V –  
- increments (50mV increments available –  
- upon request)
- Stable with 1.0 $\mu$ F to 22 $\mu$ F Output Capacitor
- Short-Circuit Protection
- Overtemperature Protection
- Package Options: 3-Pin SOT-23A, 3-Pin SOT-89, TO-92-3, 2x3 DFN
- Recommended for Automotive Design



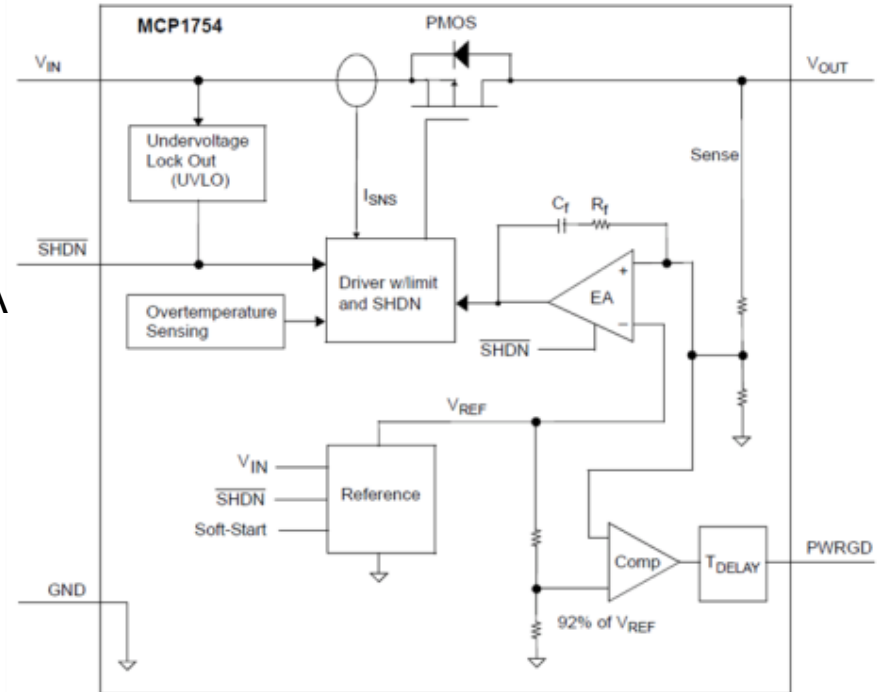
## Features:

- Ultra-Low Quiescent Current: 600 nA (typ)
- Shutdown Supply Current: 10 nA (typ)
- Input Operating Voltage Range: 1.4V to 6.0V
- 150 mA Output Current Capability
- Output Capacitor:
  - Low Equivalent Series Resistance (ESR)
  - or Capacitorless Compatible
- Low Dropout Voltage:
  - 450 mV Maximum at 200 mA
- Stable with 1.0  $\mu$ F Ceramic Output Capacitor
- Protection Circuits:
  - Current Limiter, Short Circuit, Foldback
- Space Saving 4L 1x1 DFN and 5L SOT-23



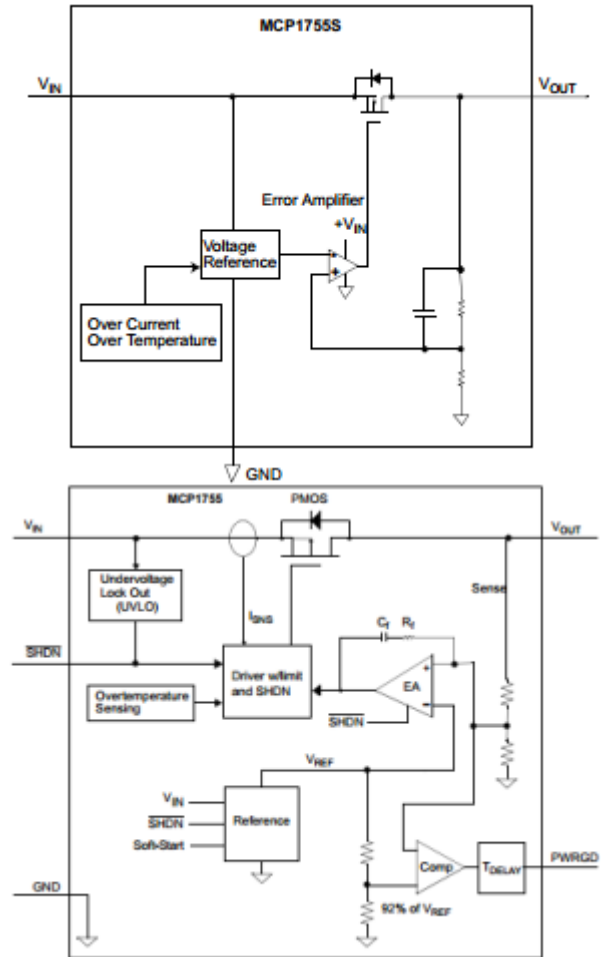
## Features:

- High PSRR: >70 dB @ 1 kHz typical
- 56.0  $\mu$ A Typical Quiescent Current
- Input Operating Voltage Range:
  - 3.6V to 16.0V
- 150 mA Output Current
- Low Dropout Voltage: 300 mV (typ.) @ 150 mA
- 0.4% Typical Output Voltage Tolerance
- Standard Output Voltage Options: 1.8V, 2.5V, 2.8V, 3.0V, 3.3V, 4.0V, 5.0V
- Output Voltage Range 1.8V to 5.5V in 0.1V increments
- Output Voltage Tolerances of  $\pm 2.0\%$
- Stable with min. 1.0  $\mu$ F Output Capacitance
- Power Good Output
- Shutdown Input
- True Current Foldback Protection
- Short-Circuit Protection
- Over temperature Protection
- Packages: SOT-23, SOT-89, SOT-223, 2x3 DFN
- Recommended for Automotive Design (MCP1754)



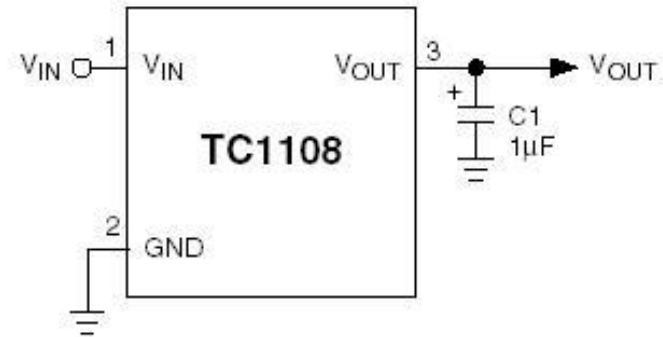
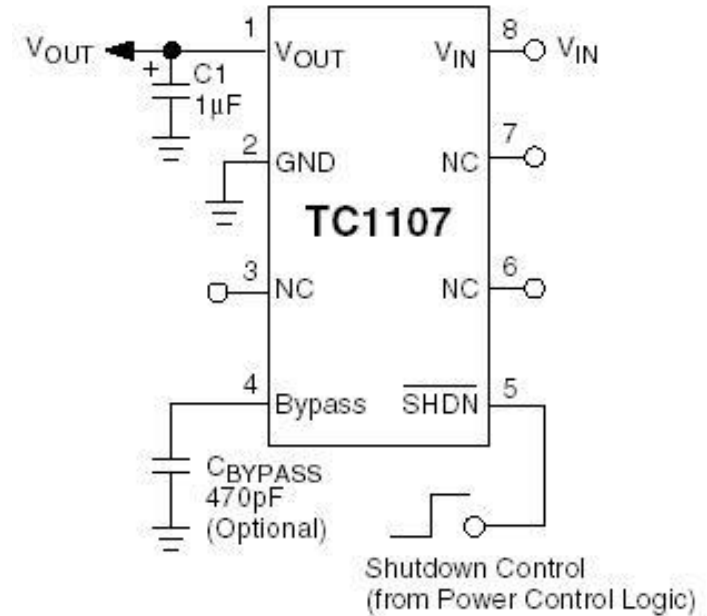
## Features:

- High PSRR: >70 dB @ 1 kHz typical
- 68.0  $\mu$ A Typical Quiescent Current
- Input Operating Voltage Range: 3.6V to 16.0V
- 300 mA Output Current
- Low Dropout Voltage, 300 mV Typical @ 300 mA
- 0.85% Typical Output Voltage Tolerance
- Standard Output Voltage Options: 1.8V, 2.5V, 2.8V, 3.0V, 3.3V, 4.0V, 5.0V
- Output Voltage Range 1.8V to 5.5V in 0.1V increments
- Output Voltage Tolerances of  $\pm 2.0\%$
- Stable with Minimum 1.0  $\mu$ F Output Capacitance
- Power Good Output
- Shutdown Input
- True Current Foldback Protection
- Short-Circuit Protection
- Overtemperature Protection
- Package Options: SOT-23, SOT-223, 2x3 DFN
- Recommended for Automotive Design (MCP1755)



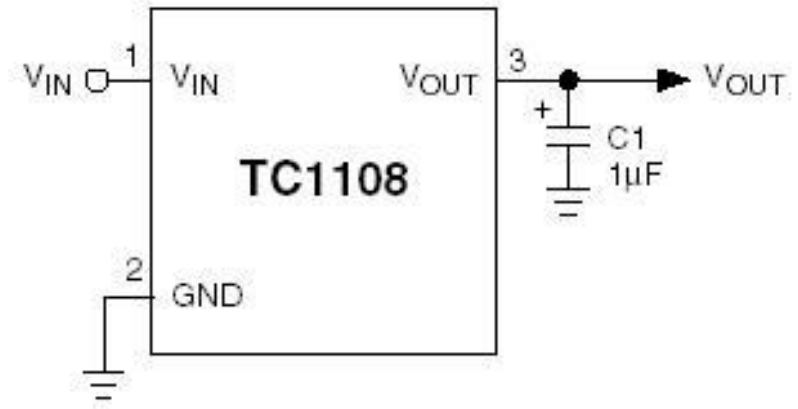
## Features:

- Extremely Low Supply Current: 50 $\mu$ A (typ.)
- Very Low Dropout Voltage
- 300mA Output Current
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Overcurrent and Overtemperature Protection
- Power Saving Shutdown Mode (TC1107)
- Bypass Input for Ultra-Quiet Operation (TC1107)
- TC1107: 8L SOIC, MSOP
- TC1108: 3L SOT-223



## Features:

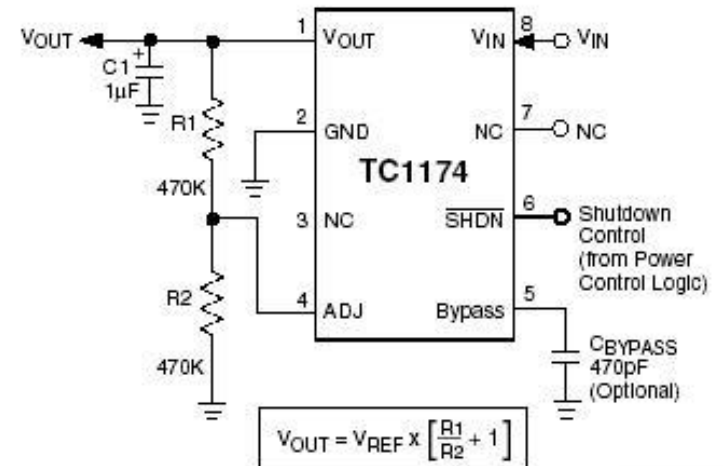
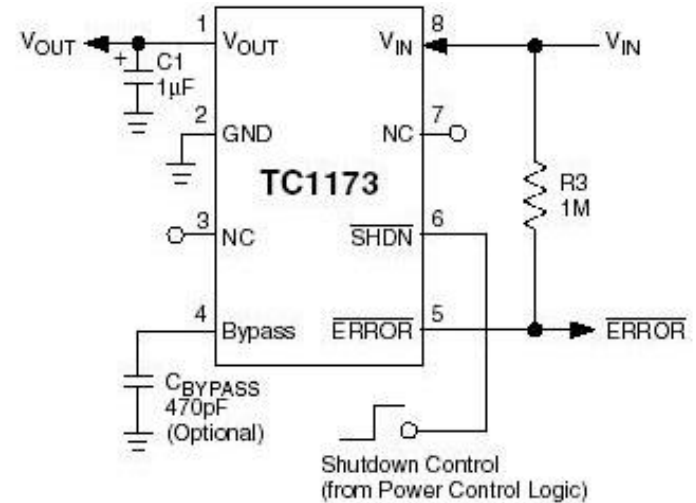
- Extremely Low Supply Current: 50 $\mu$ A (typ.)
- Very Low Dropout Voltage
- 300mA Output Current
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Overcurrent and Overtemperature Protection





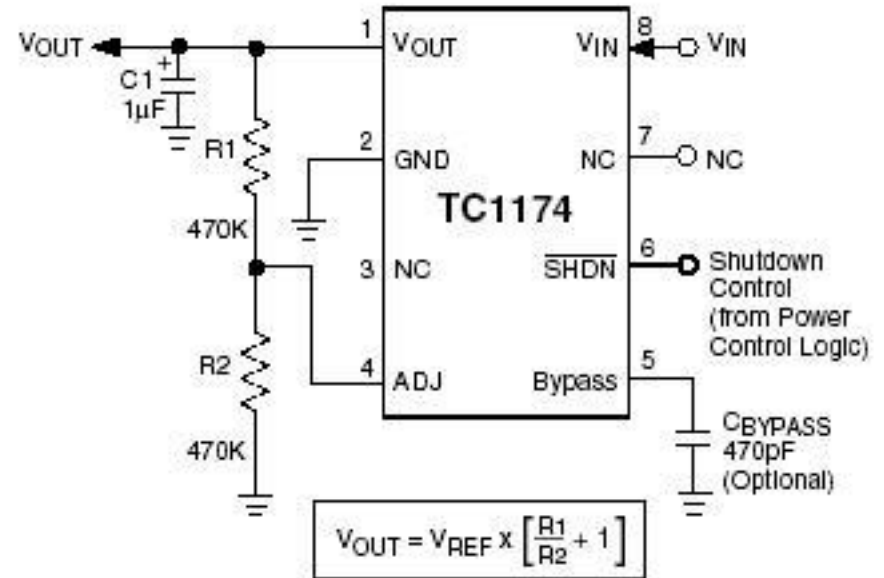
## Features:

- Extremely Low Supply Current
- Very Low Dropout Voltage
- 300mA Output Current
- Bypass Input for Ultra-Quiet Operation
- Standard or Custom Output Voltages
- Overcurrent and Overtemperature Protection
- ERROR Output can be used as a Low Battery –
  - Detector or Processor Reset Generator –
  - (TC1173)
- Shutdown Mode (TC1173)
- Packages: 8L SOIC, 8L MSOP



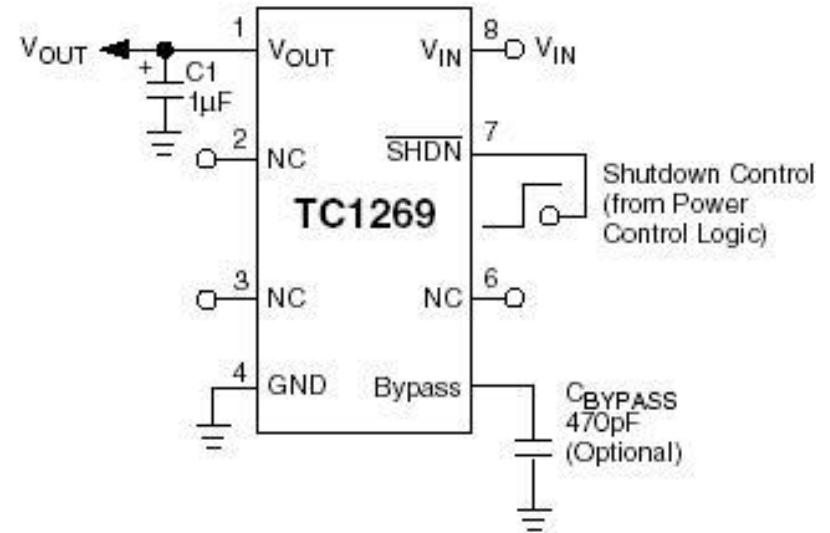
## Features:

- Extremely Low Supply Current: 50µA (typ.)
- Very Low Dropout Voltage
- 300mA Output Current
- Adjustable Output Voltage
- Power Saving Shutdown Mode
- Bypass Input for Ultra-Quiet Operation
- Overcurrent and Overtemperature Protection
- Space Saving MSOP Package Option



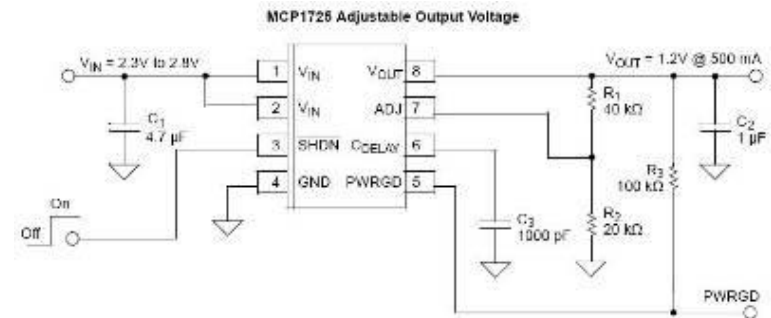
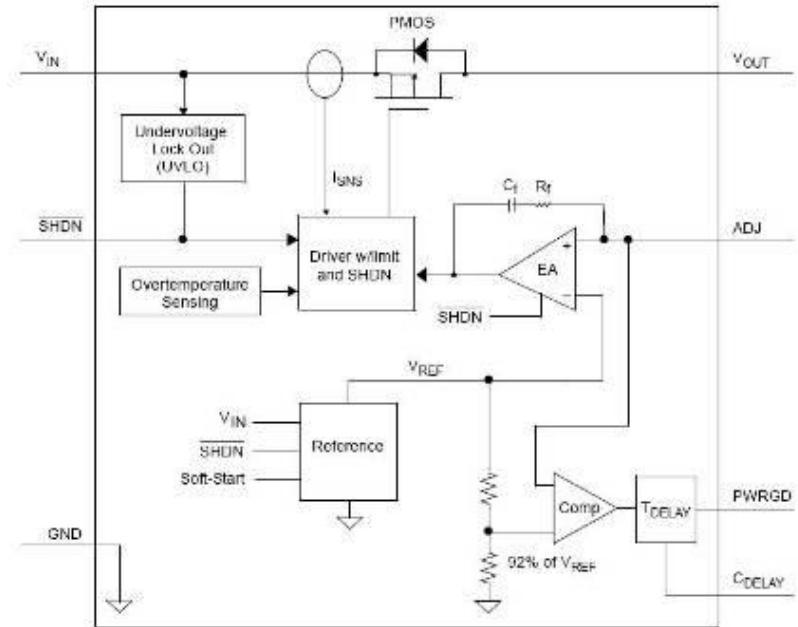
## Features:

- Very Low Ground Current for Longer –  
- Battery Life
- Very Low Dropout Voltage
- 300mA Output Circuit
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Power Saving Shutdown Mode
- Bypass Input for Ultra-Quiet Operation
- Over Current and Over Temperature Protection
- Space-Saving MSOP Package



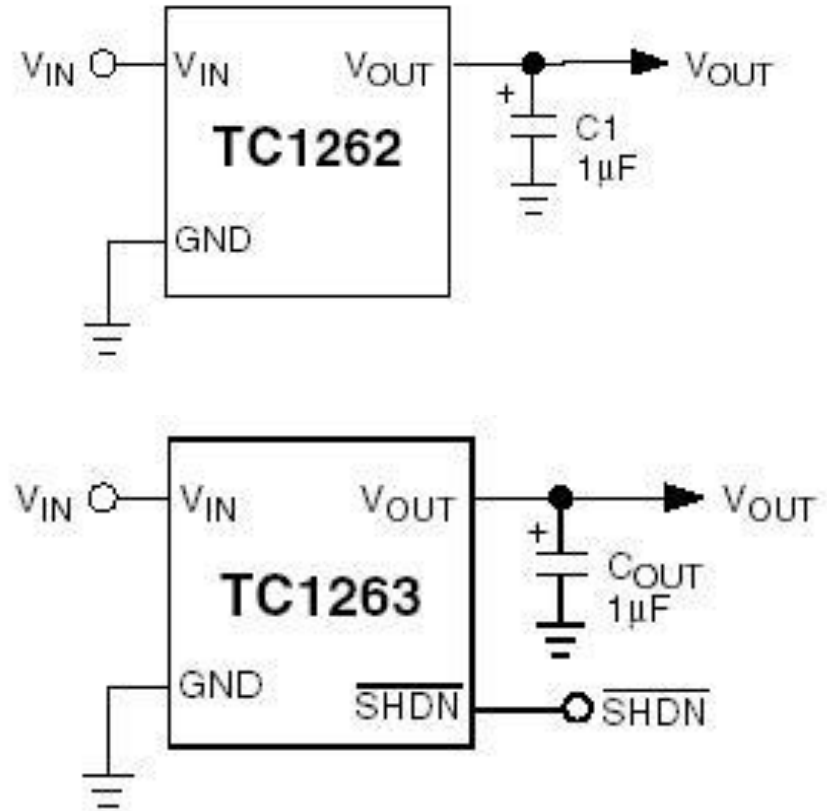
## Features:

- 500mA Output Current Capability
- Input Operating Voltage Range: 2.3V to 6.0V
- Adjustable Output Voltage Range: 0.8V to 5.0V
- Standard Fixed Output Voltages:
  - 0.8V, 1.2V, 1.8V, 2.5V, 3.0V, 3.3V, 5.0V
- Other Fixed Output Voltage Options Available Upon Request
- Low Dropout Voltage: 210mV (typ.) @ 500mA
- Output Voltage Tolerance: 0.5% (typ.)
- Stable with 1.0 $\mu$ F Ceramic Output Capacitor
- Low Supply Current: 120 $\mu$ A (typ.)
  - Shutdown Current: 0.1  $\mu$ A (typ)
- Adjustable Delay on Power Good Output
- Short Circuit Current Limiting and Overtemperature Protection
- Small Packaging: 2x3 DFN-8 and SOIC-8 Packages



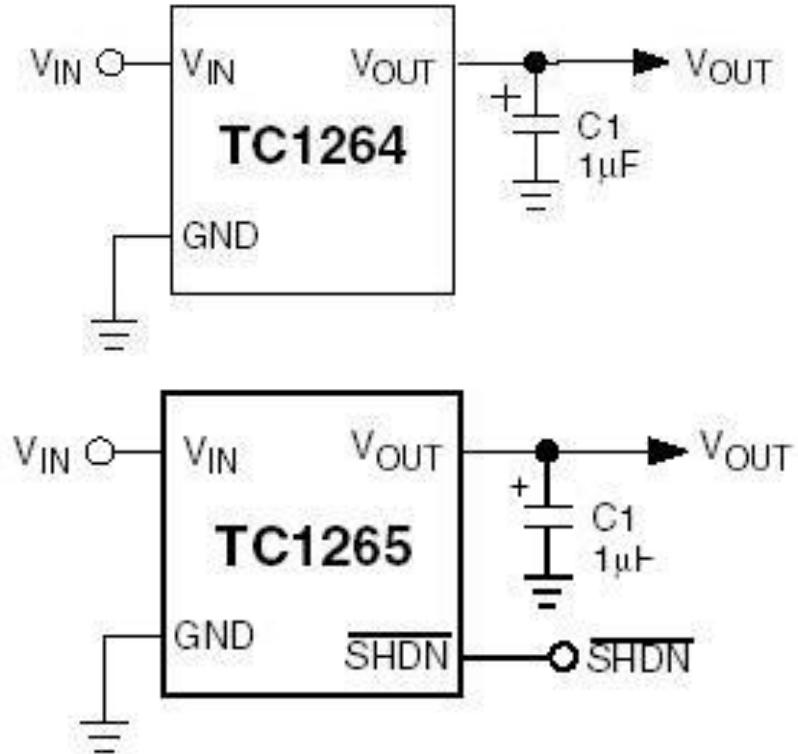
## Features:

- Very Low Dropout Voltage
- 500mA Output Current
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Overcurrent Protection
- Overtemperature Protection
- Shutdown Mode (TC1263)
- ERROR Output can be used as a Low Battery Detector (SOIC only, TC1263)
- Recommended for Automotive Design (TC1262)



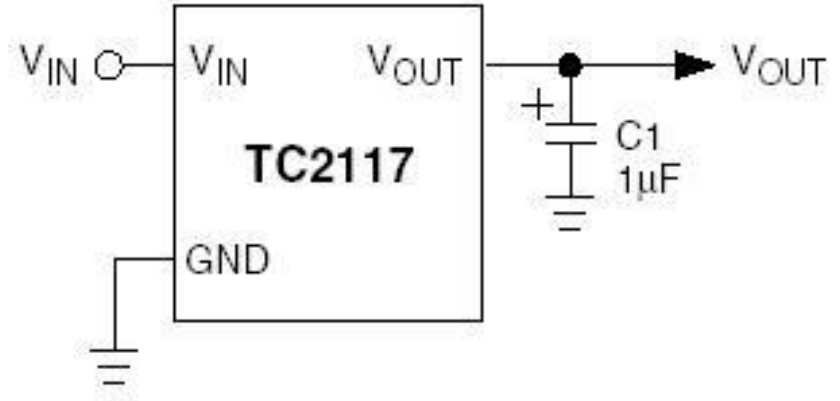
## Features:

- Very Low Dropout Voltage
- 800mA Output Current
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Overcurrent Overtemperature Protection
- SHDN Input for Active Power Management (TC1265)
- ERROR Output to Detect Low Battery (SOIC only, TC1265)



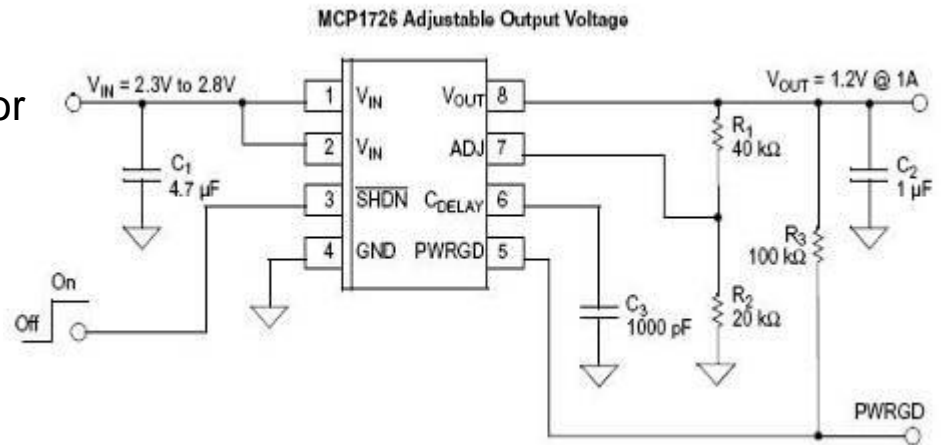
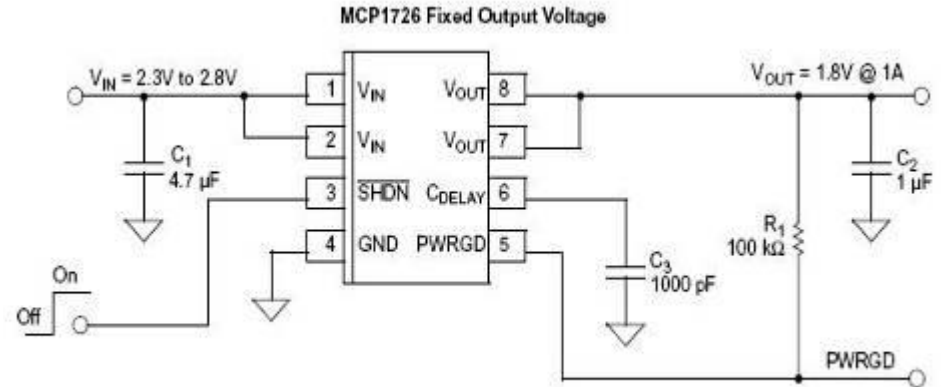
## Features:

- Very Low Dropout Voltage
- 800mA Output Current
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Overcurrent and Overtemperature Protection
- Space Saving SOT-223 Package
- Fixed Output Voltages:
  - 1.8V, 2.5V, 3.0V, 3.3V



## Features:

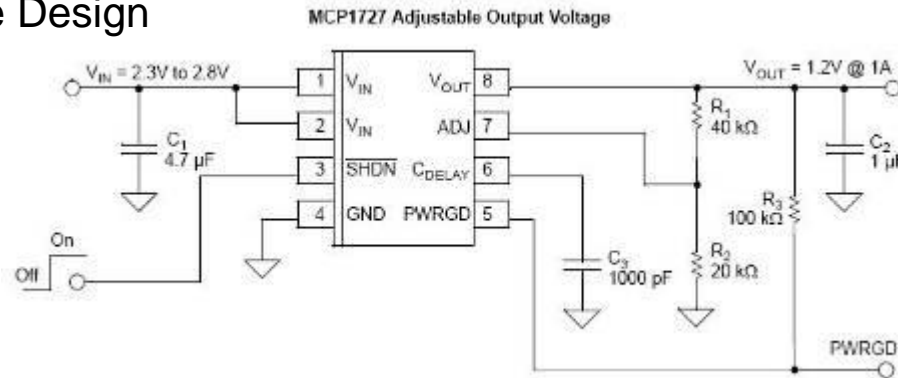
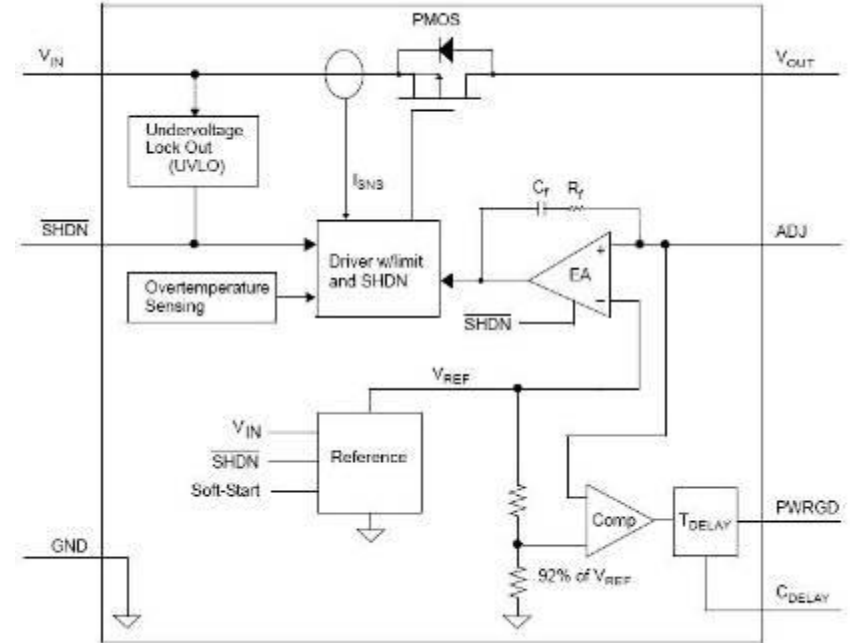
- 1A Output Current Capability
- Input Operating Voltage Range:
  - 2.3V to 6.0V
- Adjustable Output Voltage Range:
  - 0.8V to 5.0V
- Standard Fixed Output Voltages:
  - 0.8V, 1.2V, 1.8V, 2.5V, 3.0V, -
  - 3.3V, 5.0V
- Low Dropout Voltage: 220mV (typ.) @ 1A
- Output Voltage Tolerance: 0.4% (typ.)
- Stable with 1.0 $\mu$ F Ceramic Output Capacitor
- Fast response to Load Transients
- Low Supply Current: 140 $\mu$ A (typ.)
  - Shutdown Current: 0.1  $\mu$ A (typ)
- Adjustable Delay on Power Good Output
- Short Circuit Current Limiting and
- Overtemperature Protection
- 3x3 DFN-8 and SOIC-8 Package Options
- Recommended for Automotive Design





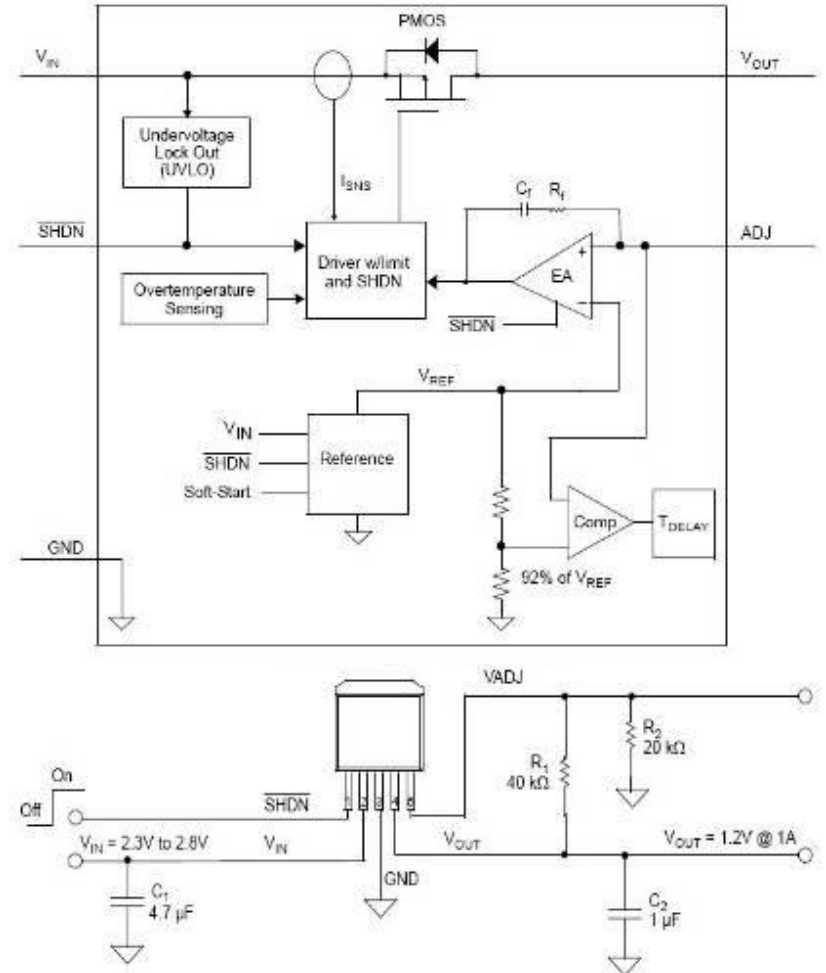
## Features:

- Up to 1.5A output load current
- Low Dropout Voltage: 330mV (typ.) @ 1.5A
- Output voltage from 0.8V to 5.0V, both fixed –  
– and adjustable
- Stable with 1.0 $\mu$ F ceramic output capacitor
- Output Voltage Tolerance: 0.5% (typ.)
- Power good output with adjustable delay
  - Shutdown Current: 0.1  $\mu$ A (typ)
- Short Circuit Current Limiting and –  
– Overtemperature Protection
- DFN-8 3x3 and SOIC-8 Pb-free packages
- Recommended for Automotive Design



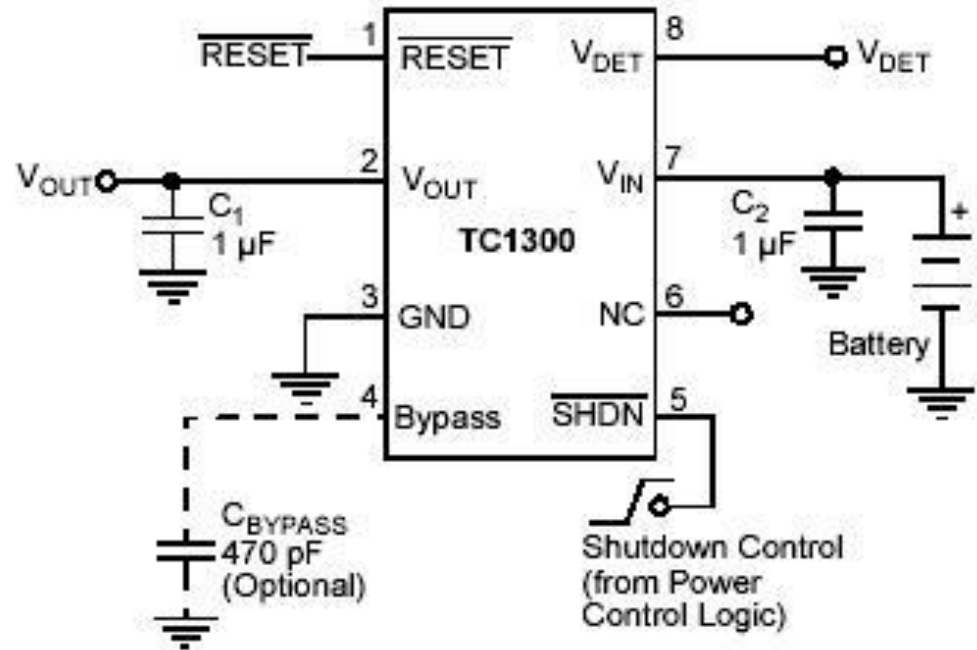
## Features:

- 1.5A Output Current Capability
- Input Operating Voltage Range:
  - 2.3V to 6.0V
- Adjustable Output Voltage Range:
  - 0.8V to 5.0V (MCP1827)
- Standard Fixed Output Voltages:
  - 0.8V, 1.2V, 1.8V, 2.5V, 3.0V, 3.3V, 5.0V
- Other Fixed Output Voltage Options Available Upon Request
- Low Dropout Voltage: 330mV (typ.) @ 1.5A
- Output Voltage Tolerance: 0.5% (typ.)
- Stable with 1.0 $\mu$ F Ceramic Output Capacitor
- Fast response to Load Transients
- Low Supply Current: 120 $\mu$ A (typ.)
  - Shutdown Current: 0.1  $\mu$ A (typ.) (MCP1827)
- Fixed Delay on Power Good Output (MCP1827)
- Short Circuit Current Limiting and –
  - Over temperature Protection
- Packages: DDPAK, TO-220



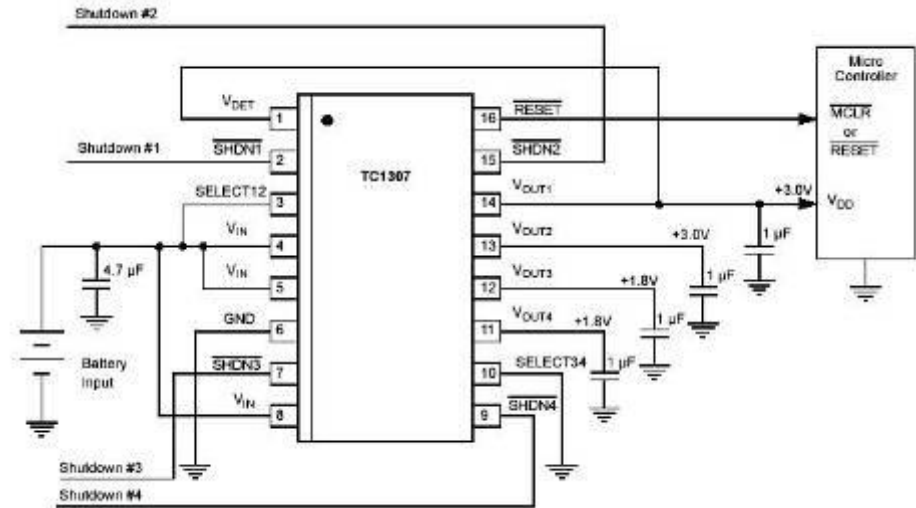
## Features:

- LDO with Integrated Microprocessor –
  - Reset Monitor Functionality
- Low Supply Current: 80 $\mu$ A (typ.)
- Stable with Any Type of Capacitor
- Very Low Dropout Voltage
- 10 $\mu$ s (typ.) Wake Up Time from SHDN
- Standard or Custom Output and –
  - Detected Voltages
- Power-Saving Shutdown Mode
- Bypass Input for Ultra-Quiet Operation
- Separate Input and Detected Voltage
- 140ms Guaranteed Minimum RESET –
  - Output Duration



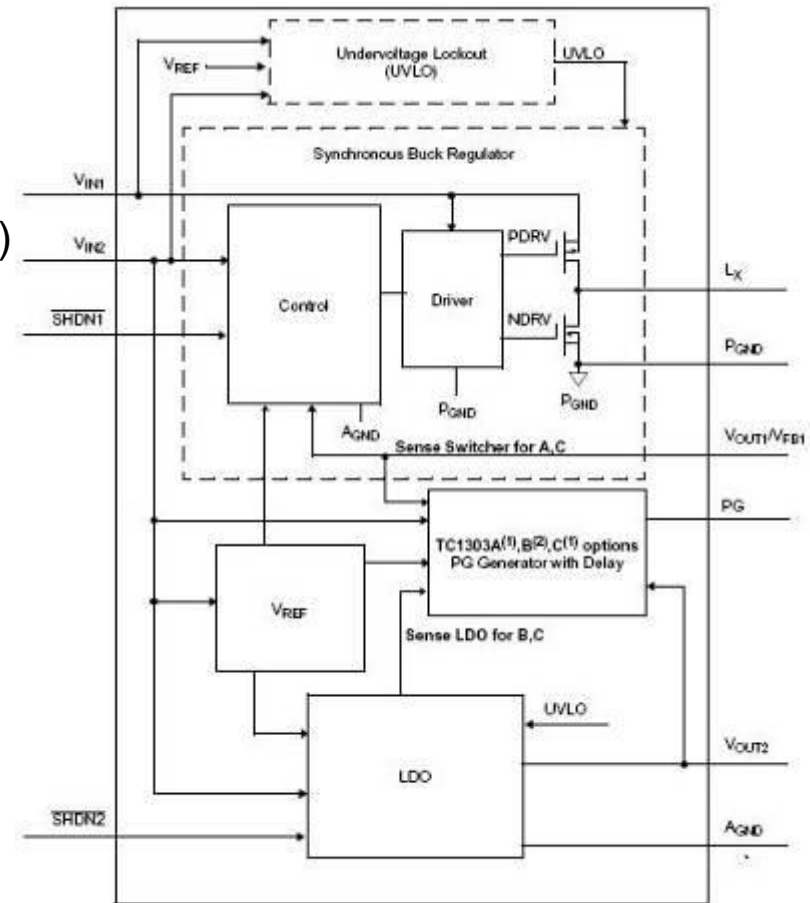
## Features:

- Four Independent 150mA LDOs
- Low Supply Current 220 $\mu$ A (typ.)
- SelectMode™: Selectable Output –  
- Voltages for High Design Flexibility
- Low Dropout Voltage: 100mV (typ.) –  
- with 150mA load
- 10 $\mu$ s (typ.) Wake Up Time from SHDN
- High Output Voltage Accuracy: 0.5% (typ.)
- Power-Saving Shutdown Mode
- RESET Output used as a Low Battery –  
- Detector or Processor Reset Generator
- Overcurrent and Overtemperature Protection
- Small 16-Pin QSOP Package



## Features:

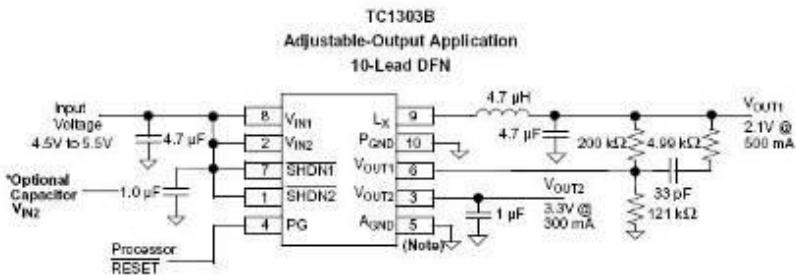
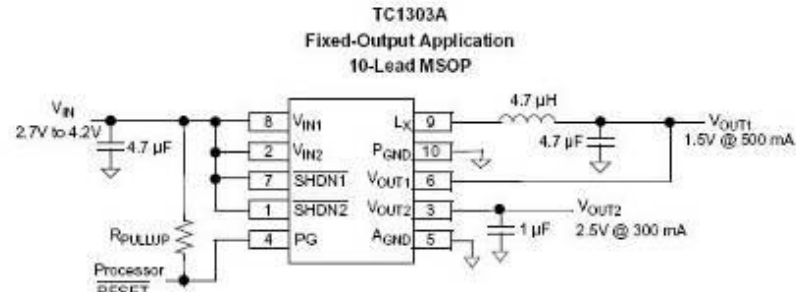
- Dual-Output Regulator
  - 500mA Buck Regulator and 300mA LDO
- Power-Good Output with 300ms Delay
- Quiescent Current: 65 $\mu$ A (typ.)
- Independent Shutdown for Buck & LDO (TC1303)
- Synchronous Buck Regulator:
  - Over 90% (typ.) Efficiency
  - 2.0MHz Fixed-Frequency PWM
  - Automatic PWM to PFM Mode Transition
- Low-Dropout Regulator:
  - Dropout Voltage: 137mV @ 200mA (typ.)
  - Standard Fixed Output Voltages
- Power-Good Function:
  - Monitors Buck Output Function (TC1303A)
  - Monitors LDO Output Function (TC1303B)
  - Monitors Both Buck and LDO Output Function (TC1303C and TC1304)
- Sequenced Startup and Shutdown (TC1304)
- Packages: 3x3 DFN or MSOP Package



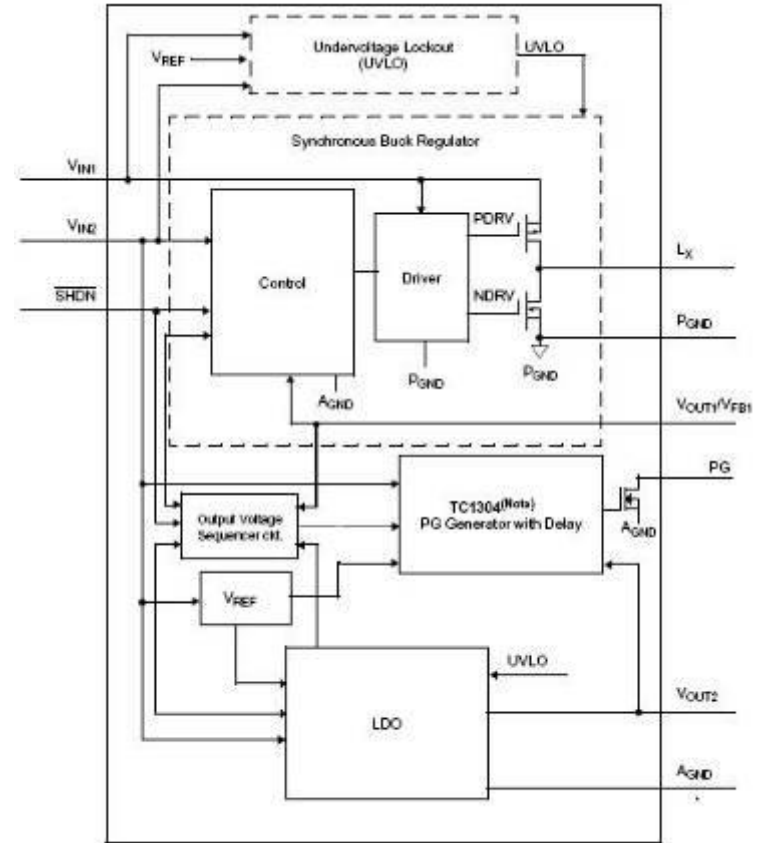
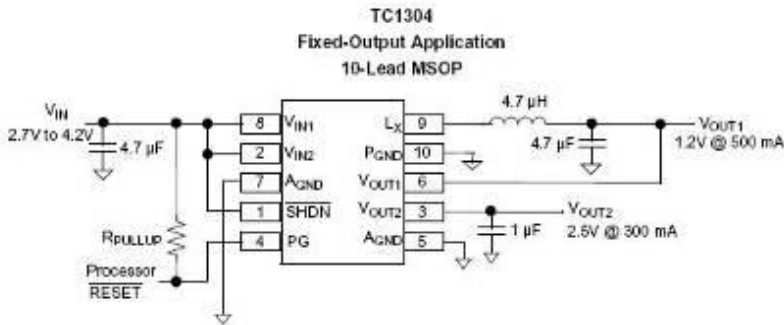
Note 1: PG open-drain for A,C options  
2: PG push-pull output for B option

# TC1303/4 (cont.)

500 mA Synchronous Buck Regulator + 300 mA LDO w/ Power-Good Output



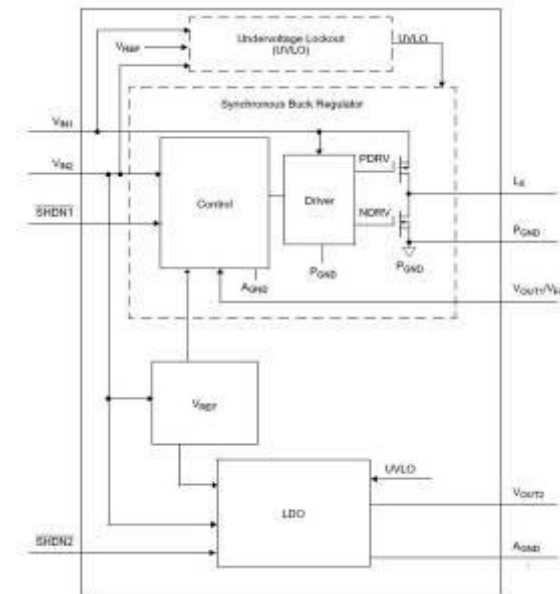
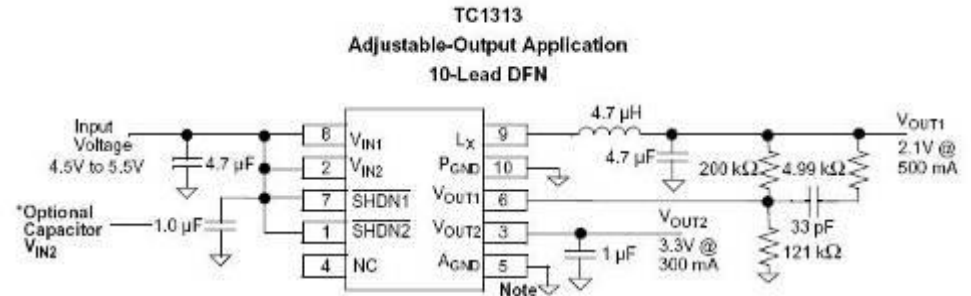
Note: Connect DFN package exposed pad to AGND.



Note: PG open-drain for TC1304

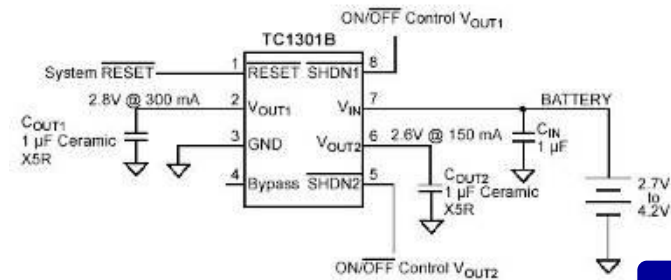
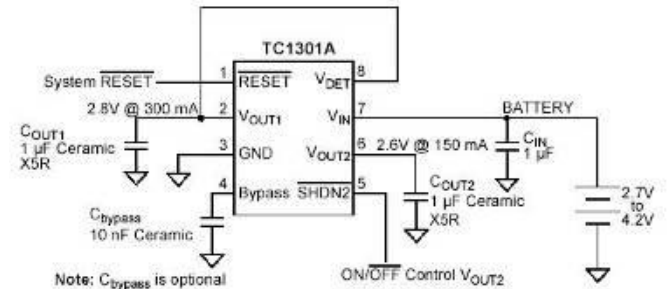
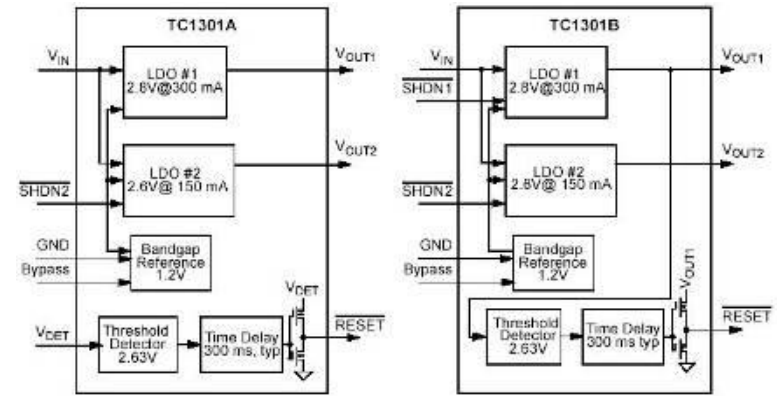
## Features:

- Dual-Output Regulator (500mA Buck – - Regulator and 300mA LDO)
- Quiescent Current: 57 $\mu$ A (typ.)
- Independent Shutdown for Buck and – - LDO Outputs
- Synchronous Buck Regulator:
  - Over 90% (typ.) Efficiency
  - 2.0MHz Fixed-Frequency PWM
  - Automatic PWM to PFM Mode Transition
  - Adjustable and Standard Output Voltages
- Low-Dropout Regulator:
  - Dropout Voltage: 137mV @ 200mA (typ.)
  - Standard Fixed Output Voltages
- Undervoltage Lockout (UVLO)
- Output Short Circuit Protection
- Overtemperature Protection
- Small 10-Pin 3x3 DFN or MSOP Package



## Features:

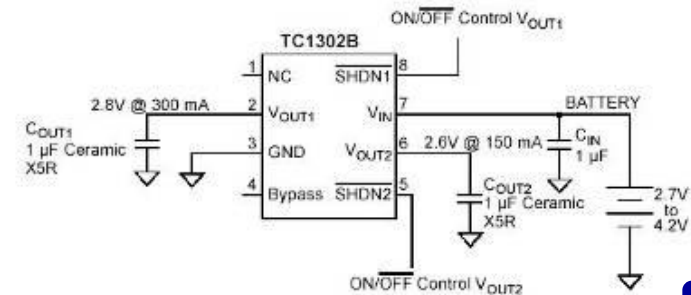
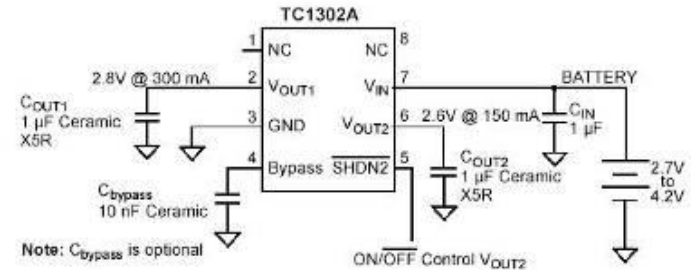
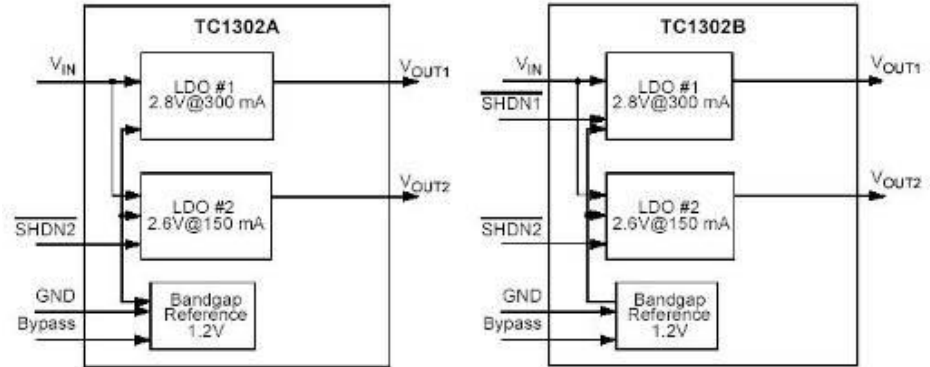
- Dual Output LDO with Microcontroller Reset
- Monitor Functionality:
  - $V_{OUT1} = 1.5$  to  $3.3V @ 300mA$
  - $V_{OUT2} = 1.5V$  to  $3.3V @ 150mA$
  - $V_{RESET} = 2.20V$  to  $3.20V$
- Output Voltage and RESET Threshold Voltage Options Available (See Table 8-1)
- Low Dropout Voltage:
  - $V_{OUT1}: 104mV @ 300mA$  (typ.)
  - $V_{OUT2}: 150mV @ 150mA$  (typ.)
- Low Supply Current:  $116\mu A$  (typ.)
- Reference Bypass Input for Low Noise
- Output Stable with a Min.  $1\mu F$  Ceramic Capacitor
- Separate Input for RESET Detect Voltage (TC1301A)
- Separate  $V_{OUT1}$  &  $V_{OUT2}$  SHDN Pins (TC1301B)
- Power Saving Shutdown Mode
- Packages: DFN and MSOP





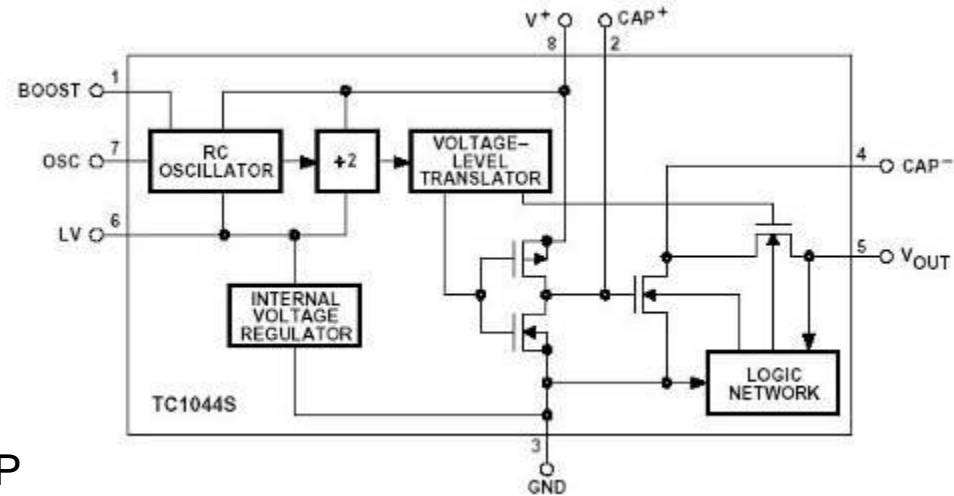
## Features:

- Dual Output LDO:
  - $V_{OUT1} = 1.5$  to  $3.3V @ 300mA$
  - $V_{OUT2} = 1.5V$  to  $3.3V @ 150mA$
  - $V_{RESET} = 2.20V$  to  $3.20V$
- Output Voltage Options (See Table 8-1)
- Low Dropout Voltage:
  - $V_{OUT1}: 104mV @ 300mA$  (typ.)
  - $V_{OUT2}: 150mV @ 150mA$  (typ.)
- Low Supply Current:  $116\mu A$  (typ.)
- Reference Bypass Input for Low Noise
- Output Stable with Min.  $1\mu F$  Ceramic Capacitor
- Separate  $V_{OUT1}$  and  $V_{OUT2}$  SHDN Pins (TC1302B)
- Power Saving Shutdown Mode
- Overtemperature & Overcurrent Protection
- Small 8-Pin DFN and MSOP Packages
- Recommended for Automotive Design (TC1302B)



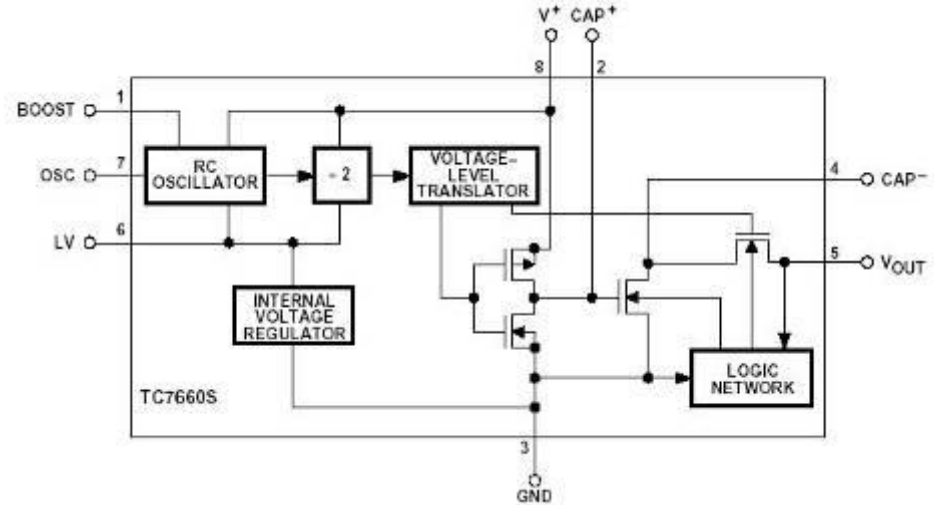
## Features:

- Converts +5V Logic Supply to  $\pm 5V$  System
- Wide Input Voltage Range: 1.5V to 12V
- Efficient Voltage Conversion: 99.9%
- Excellent Power Efficiency: 98%
- Low Power Consumption:  $80\mu A$  @  $V_{IN} = 5V$
- Low Cost and Easy to Use
- Only Two External Capacitors Required
- RS-232 Negative Power Supply
- Available in 8-Pin SOIC and 8-Pin Plastic DIP Packages
- Improved ESD Protection: Up to 10kV
- No External Diode Required for High Voltage Operation
- Frequency Boost Raises  $F_{OSC}$  to 45kHz



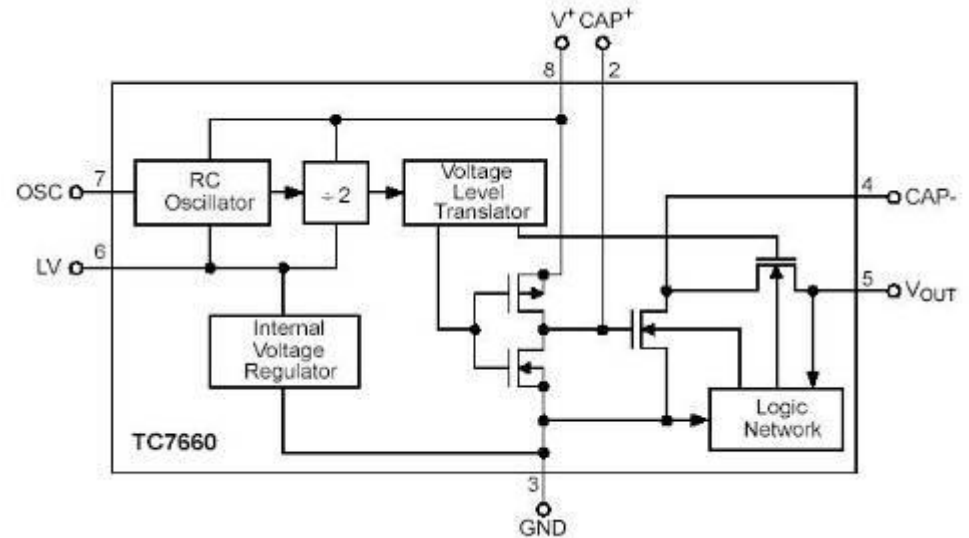
## Features:

- Oscillator Boost from 10kHz to 45kHz
- Converts +5V Logic Supply to  $\pm 5V$  System
- Wide Input Voltage Range: 1.5V to 12V
- Efficient Voltage Conversion: 99.9%
- Excellent Power Efficiency: 98%
- Low Power Consumption:  $80\mu A$  @  $V_{IN} = 5V$
- Low Cost and Easy to Use
- Only Two External Capacitors Required
- Available in 8-Pin SOIC Package
- Improved ESD Protection: Up to 10kV
- No External Diode Required for High Voltage Operation
- Recommended for Automotive Design



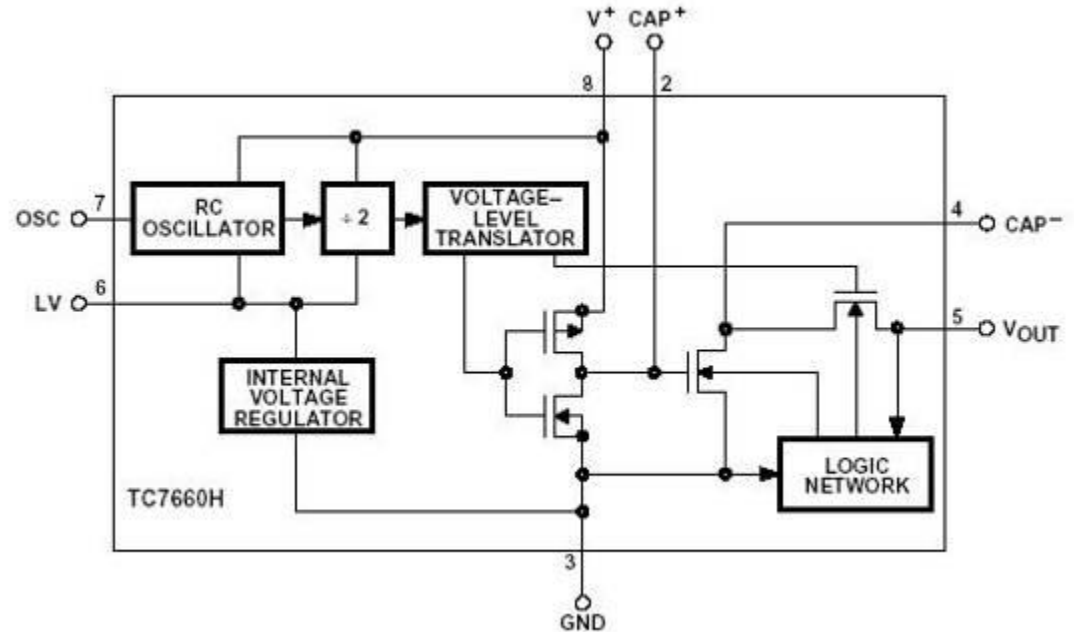
## Features:

- Wide Input Voltage Range: 1.5V to 12V
- Efficient Voltage Conversion: 99.9%
- Excellent Power Efficiency: 98%
- Low Power Consumption: 80 $\mu$ A @ -  
-  $V_{IN} = 5V$
- Low Cost and Easy to Use
- Only Two External Capacitors Required
- Available in 8-Pin SOIC Package, PDIP, -  
- and CERDIP Packages
- Improved ESD Protection: 3kV HBM
- No External Diode Required for High –  
- Voltage Operation



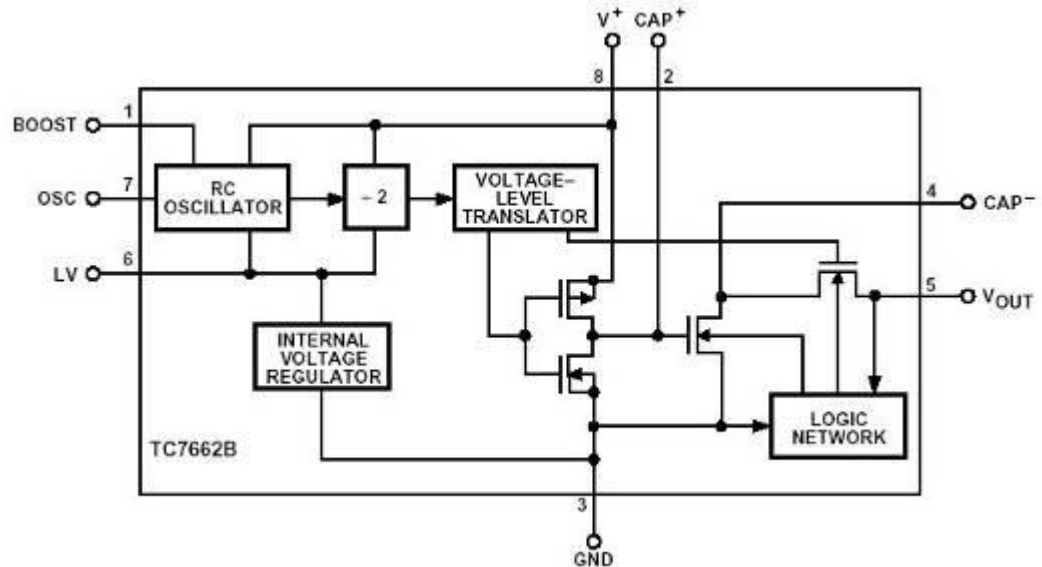
## Features:

- Wide Input Voltage Range:
  - 1.5V to 10V
- Efficient Voltage Conversion: 99.7%
- Power Efficiency: 85%
- Pin Compatible with TC7660, High –
  - Frequency Performance DC-to-
  - DC Converter
- Low Cost, Only Two External
  - Capacitors Required (1 $\mu$ F)
- Available in 8-Pin SOIC Package and
- PDIP Packages



## Features:

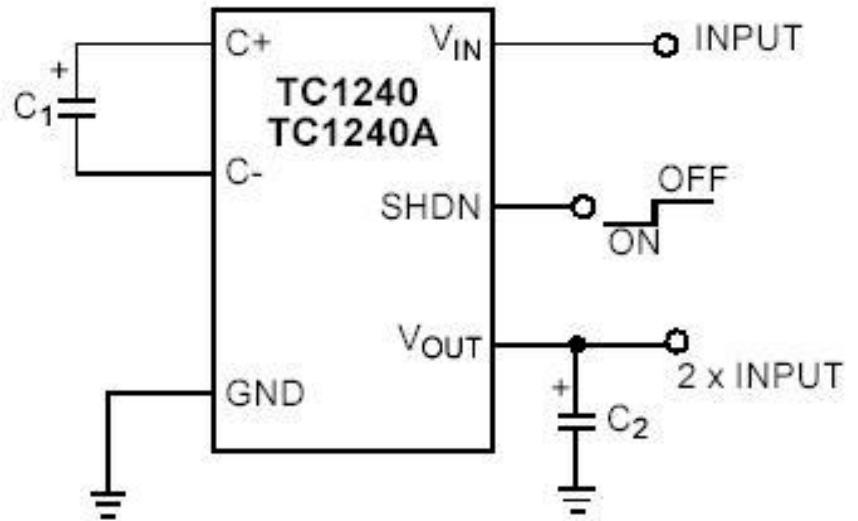
- Wide Operating Voltage Range:
  - 1.5V to 15V
- Boost Pin (Pin 1) for Higher –  
- Switching Frequency
- High Power Efficiency: 96%
- Easy to Use:
  - Requires Only 2 External –  
- Non-Critical Passive  
- Components
- Improved Direct Replacement for
- Industry Standard ICL7660 and –  
- Other Second Source Devices



## Features:

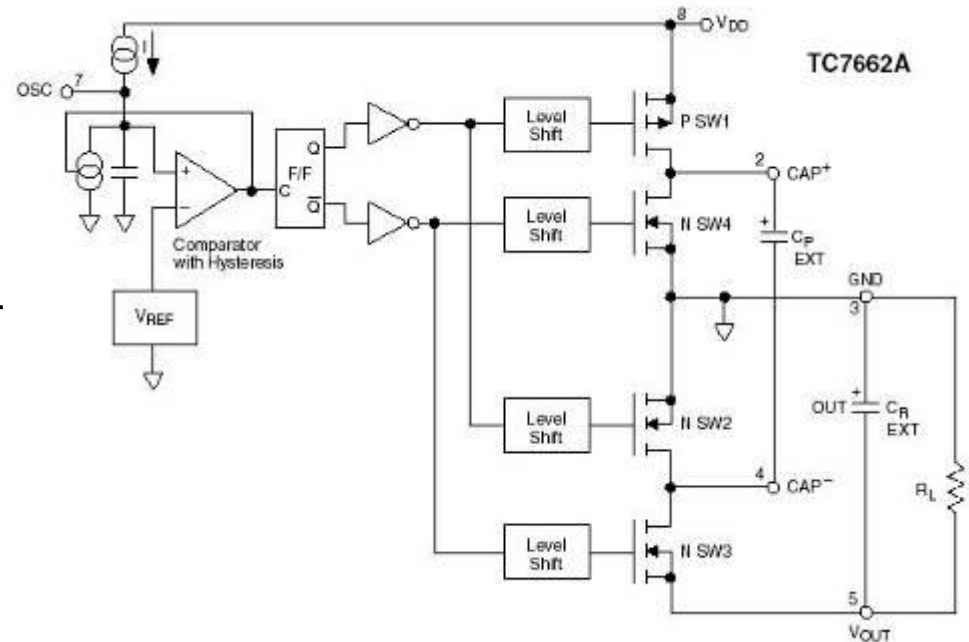
- 6-Pin SOT-23A Package
- >99% Typical Voltage Conversion Efficiency
- Voltage Doubling
- Input Voltage Range:
  - TC1240: +2.5 to +4.0V
  - TC1240A: +2.5V to +5.5V
- Low Output Resistance:
  - TC1240: 17Ω (typ.)
  - TC1240A: 17Ω (typ.)
- Only Two External Capacitors Required
- Low Supply Current
  - TC1240: 180μA (typ.)
  - TC1240A: 550μA (typ.)
- Power-Saving Shutdown Mode: 1μA (max.)
- Fully Compliant with 1.8V Logic Systems

## Positive Voltage Doubler



## Features:

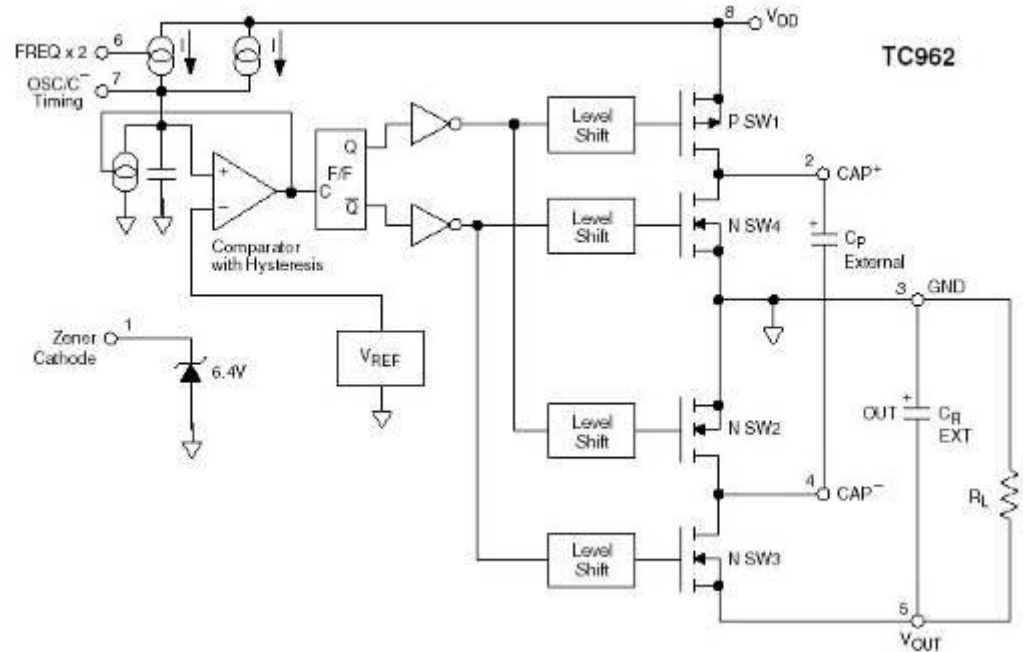
- Wide Operating Range: 3V to 18V
- 40mA Output Current
- Pin Compatible with –  
- ICL7662/SI7661/TC7660/ LTC1044
- No External Diodes Required
- Low Output Impedance @  $I_L = 20\text{mA}$ , -  
-  $40\Omega$  (typ.)
- No Low-Voltage Terminal Required
- CMOS Construction
- Available in 8-Pin PDIP Package





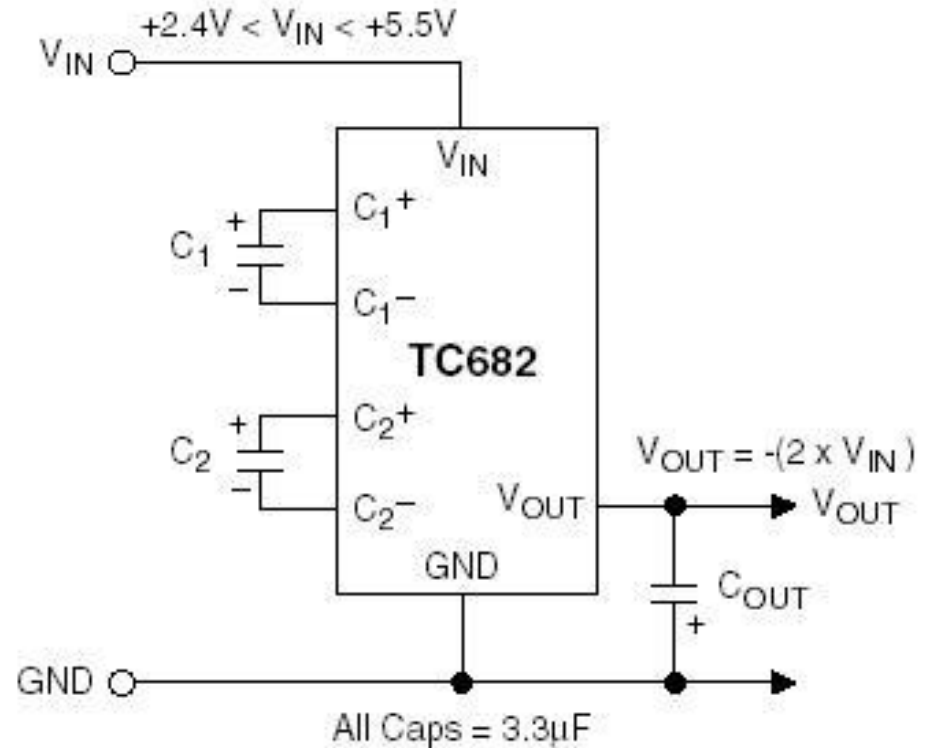
## Features:

- Pin Compatible With –  
- TC7662/ICL7662/SI7661
- High Output Current: 80mA
- No External Diodes Required.
- Wide Operating Range: 3V to 18V
- Low Output Impedance: 28Ω (typ.)
- No Low Voltage Terminal Required
- Application Zener On Chip
- OSC Frequency Doubling Pin –  
- Option for Smaller Output Capacitors



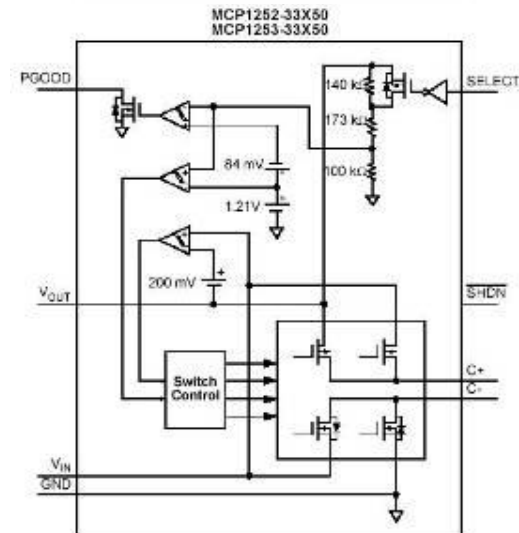
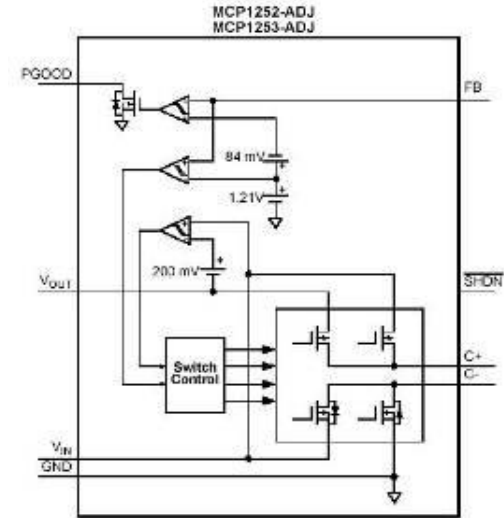
## Features:

- Doubling/Inverting Functionality
- 99.9% Voltage Conversion Efficiency
- 92% Power Conversion Efficiency
- Wide Input Voltage Range:
  - +2.4V to +5.5V
- Only 3 External Capacitors Required
- 185 $\mu$ A Supply Current
- Space Saving 8-Pin SOIC and –  
- PDIP Packages



## Features:

- Inductorless, Buck/Boost, DC/DC Converter
- Low Power: 80 $\mu$ A (typ.)
- High Output Voltage Accuracy:
  - $\pm 2.5\%$  ( $V_{OUT}$  Fixed)
- 120mA Output Current
- Wide Operating Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Thermal Shutdown and Short-Circuit Protection
- Uses Small Ceramic Capacitors
- Switching Frequency:
  - MCP1252: 650kHz
  - MCP1253: 1MHz
- Low Power Shutdown Mode: 0.1 $\mu$ A (typ.)
- Shutdown Input Compatible 1.8V Logic
- $V_{IN}$  Range: 2.1V to 5.5V
- Selectable Output Voltage (3.3V or 5.0V) or –  
– Adjustable Output Voltage
- Space-saving, 8-Lead MSOP
- Soft-Start Circuitry to Minimize In-Rush Current
- Recommended for Automotive Design

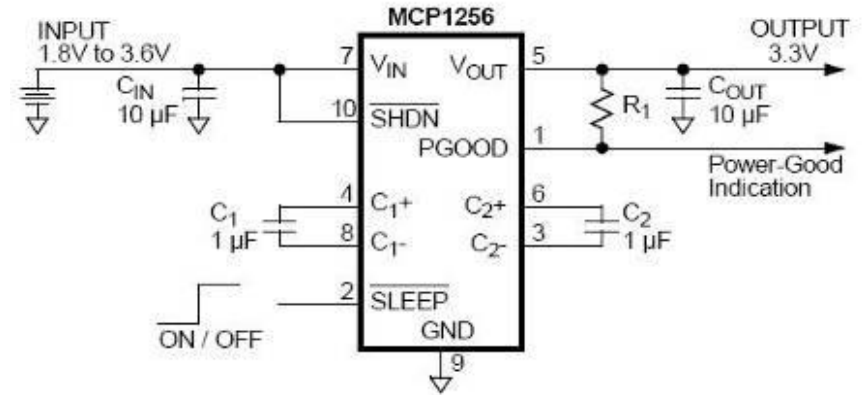


# MCP1256/7/8/9

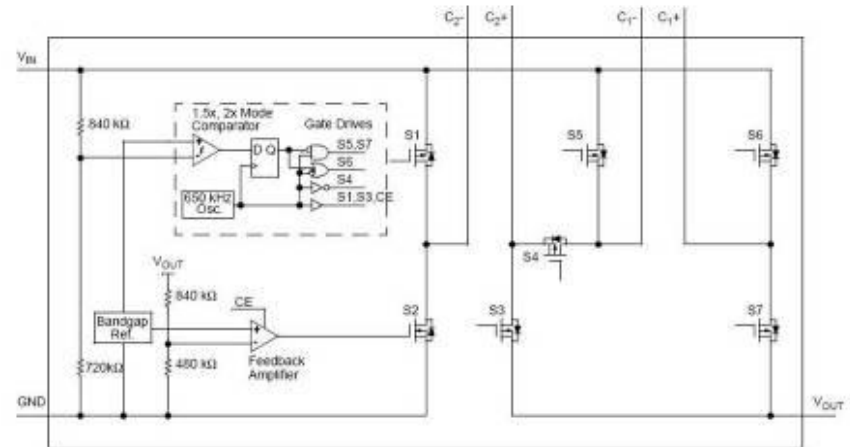
Regulated 3.3V, Low-Ripple Charge Pump with Low-Operating Current SLEEP Mode or BYPASS Mode

## Features:

- Inductorless 1.5x, 2x Boost DC/DC Converter
- Output Voltage: 3.3V
- Voltage Accuracy:  $\pm 3.0\%$  ( $V_{OUT}$  Fixed)
- Output Current Up To 100mA
- 20mVP-P Output Voltage Ripple
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Thermal Shutdown and Short Circuit Protection
- Uses small Ceramic Capacitors
- Switching Frequency: 650kHz
- Power Good Output
- Low Power SLEEP Mode: MCP1256/7
- Low Power Shutdown Mode:  $0.1\mu\text{A}$  (typ.)
- Shutdown Input Compatible with 1.8V Logic
- $V_{IN}$  Range: 1.8V to 3.6V
- Soft-Start Circuitry to Minimize In-Rush Current
- Packages: 10-Pin MSOP, 10-Lead 3x3 DFN

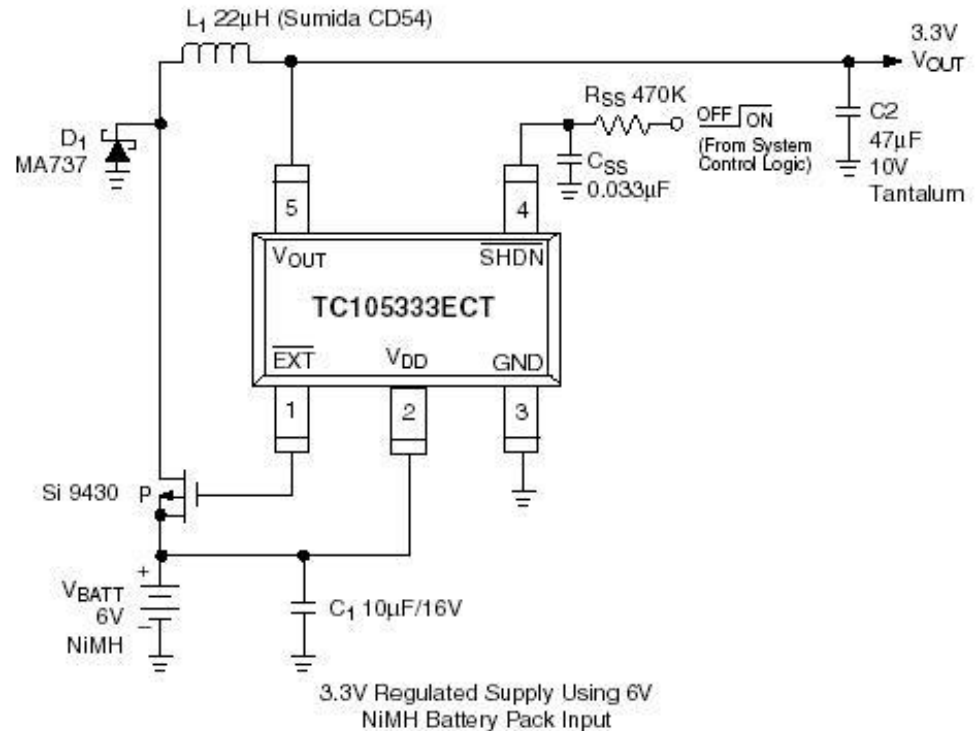


Typical Application with Power-Good Indication



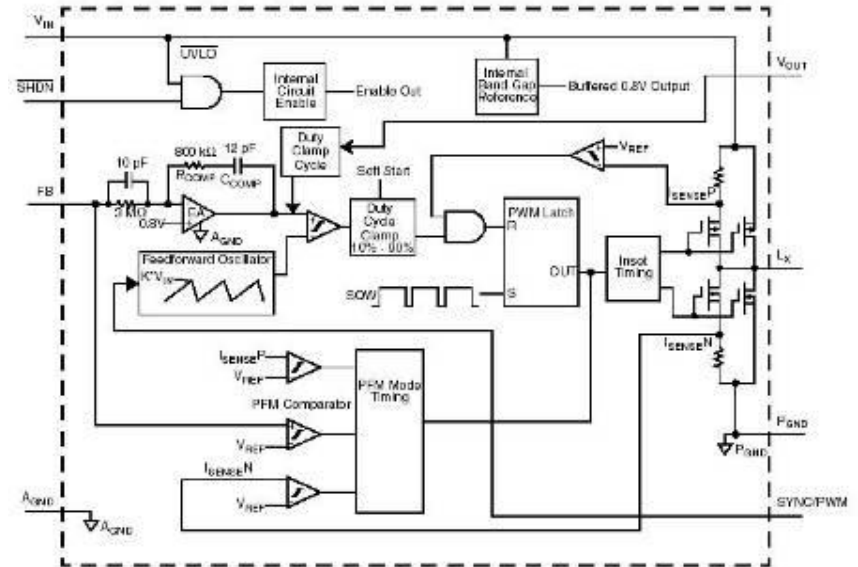
## Features:

- 57 $\mu$ A (typ.) Supply Current
- 1A Output Current
- 0.5 $\mu$ A Shutdown Mode
- 300 kHz Switching Frequency for –  
- Small Inductor Size
- Programmable Soft-Start
- 92% Efficiency (typ.)
- Small Package: 5-Pin SOT-23A

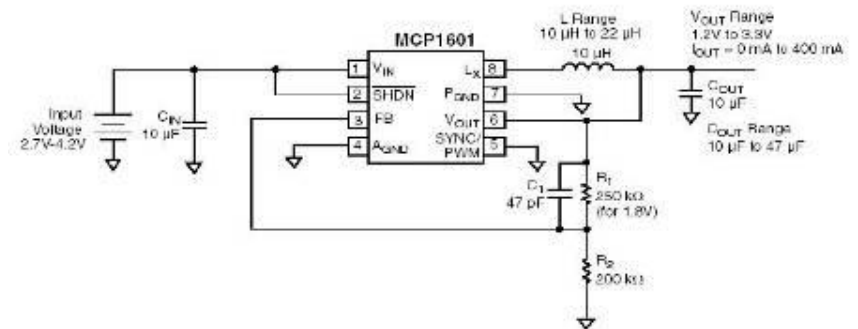


## Features:

- Input Range: 2.7V to 5.5V
- Low Output Voltage Capability: 0.9V
- 500mA Continuous Output Current
- 3 operating modes: PWM, PFM and LDO
- Auto-Switching from PWM/PFM Operation
- Integrated Buck and Synchronous Switches
- Ceramic or Electrolytic Filtering Capacitors
- Shutdown mode
- 750kHz Fixed Switching Frequency
- Oscillator Synchronization to 1.0MHz PWM
- Integrated UVLO, Soft-start, and –  
– Overtemperature protection
- Short circuit protection
- Temperature Range: -40°C to +85°C
- Small 8-Pin MSOP Package

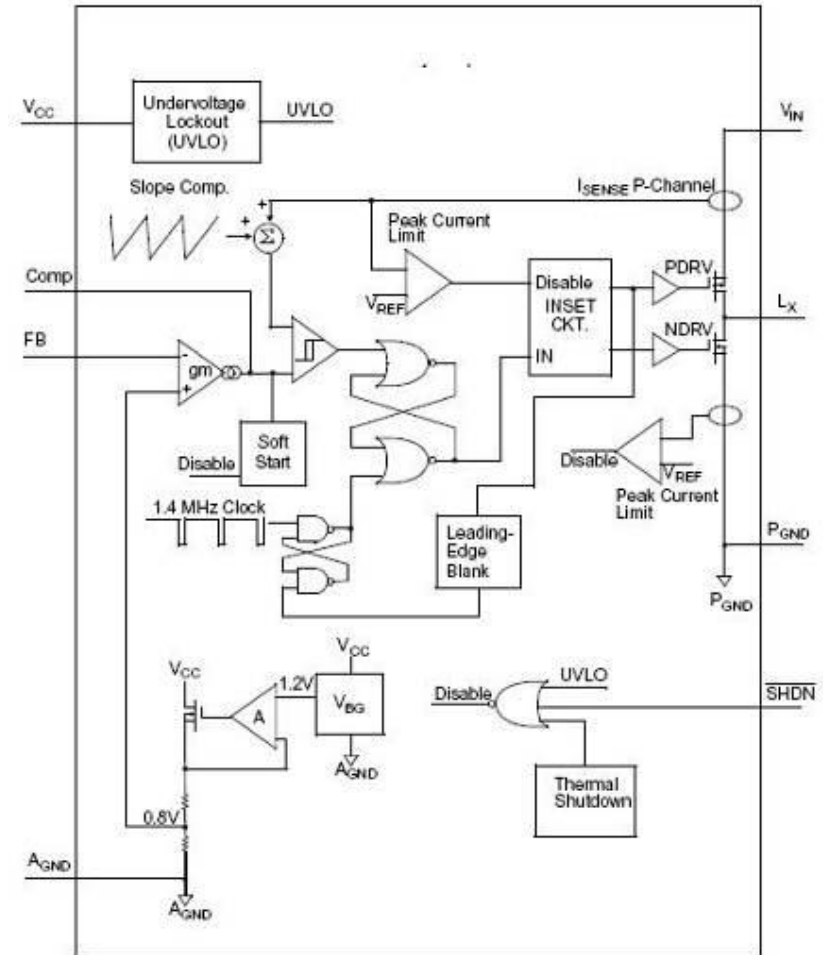


Typical Application (2.7V to 4.2V)



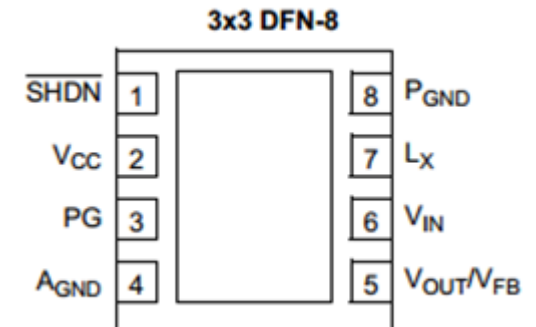
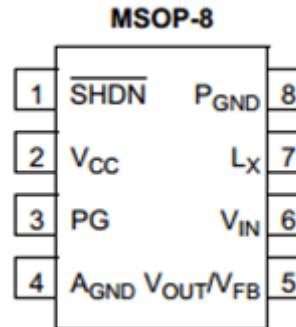
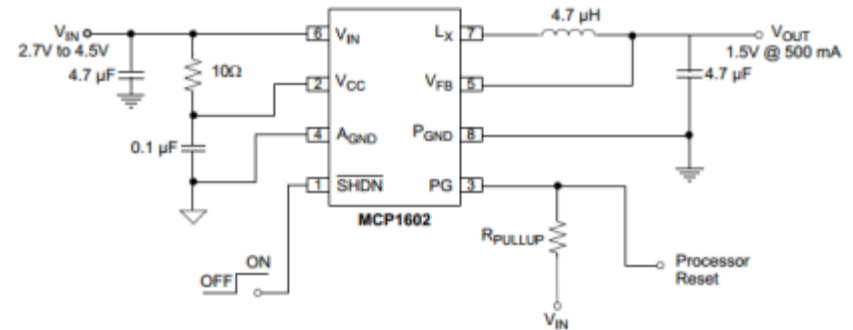
## Features:

- Input Voltage Range: 2.7V to 5.5V
- Fixed switching frequency: 1.4MHz
- Integrated Buck and Synchronous Switches
- Continuous Output Current: 1A
- Adjustable Output Voltage Range:
  - 0.8V to 5.0V
- 100% duty cycle capability for Low Input –  
– Voltages
- Shutdown Control with  $I_Q < 0.01\mu\text{A}$  (typ.)
- Overvoltage, Overcurrent, and Thermal –  
– Protection
- Under Voltage Lockout (UVLO)
- Integrated soft start
- Space Saving 8-Pin MSOP, DFN Packages
- Extended Temperature Range:  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$



## Features:

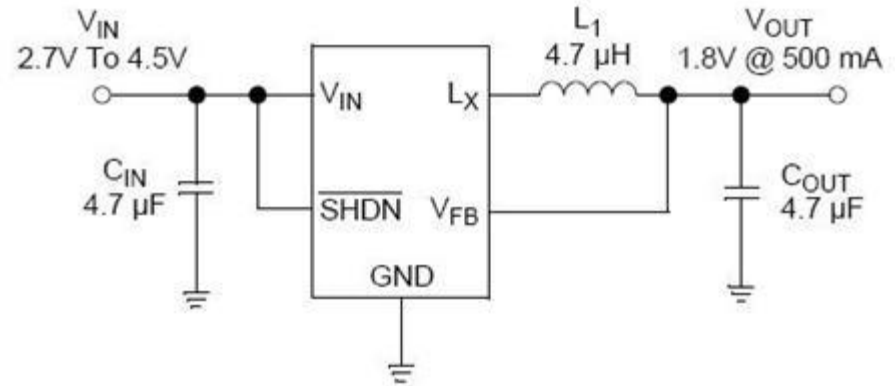
- Power-Good Output with 262ms Delay
- Over 90% Efficiency (typ.)
- Output Current: up to 500mA
- Low Quiescent Current: 45 $\mu$ A (typ.)
- Low Shutdown Current: 0.05 $\mu$ A (typ.)
- Automatic PWM to PFM Mode Transition
- Adjustable Output Voltage:
  - 0.8V to 4.5V
- Fixed Output Voltage:
  - 1.2V, 1.5V, 1.8V, 2.5V, 3.3V
- 2.0MHz Fixed-Frequency PWM (Heavy –  
– Load)
- Internally Compensated
- Under voltage Lockout (UVLO)
- Over temperature Protection
- Overcurrent Protection
- 8-Lead MSOP, 8-Lead 3x3 DFN





## Features:

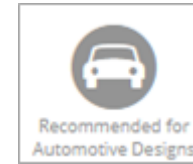
- Over 90% Efficiency (typ.)
- Output Current: up to 500mA
- Low Quiescent Current: 45 $\mu$ A (typ.)
- Low Shutdown Current: 0.01 $\mu$ A (typ.)
- Automatic PWM to PFM Mode Transition
- Adjustable Output Voltage:
  - 0.8V to 4.5V
- Fixed Output Voltage:
  - 1.2V, 1.5V, 1.8V, 2.5V, 3.3V
- 2.0MHz Fixed-Frequency PWM (Heavy Load)
- Internally Compensated
- Undervoltage Lockout (UVLO)
- Overtemperature Protection
- 100% Duty Cycle Operation
- Packages: 5-Lead TSOT, 8-Lead 2x3 DFN





# MCP16311/12

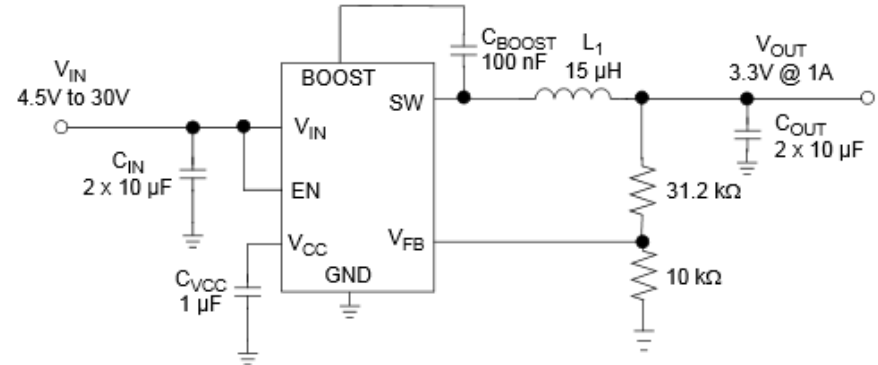
30V Input, 1A Output, High-Efficiency, Integrated Synchronous Switch Step-Down Regulator



Online  
Datasheet

## Features:

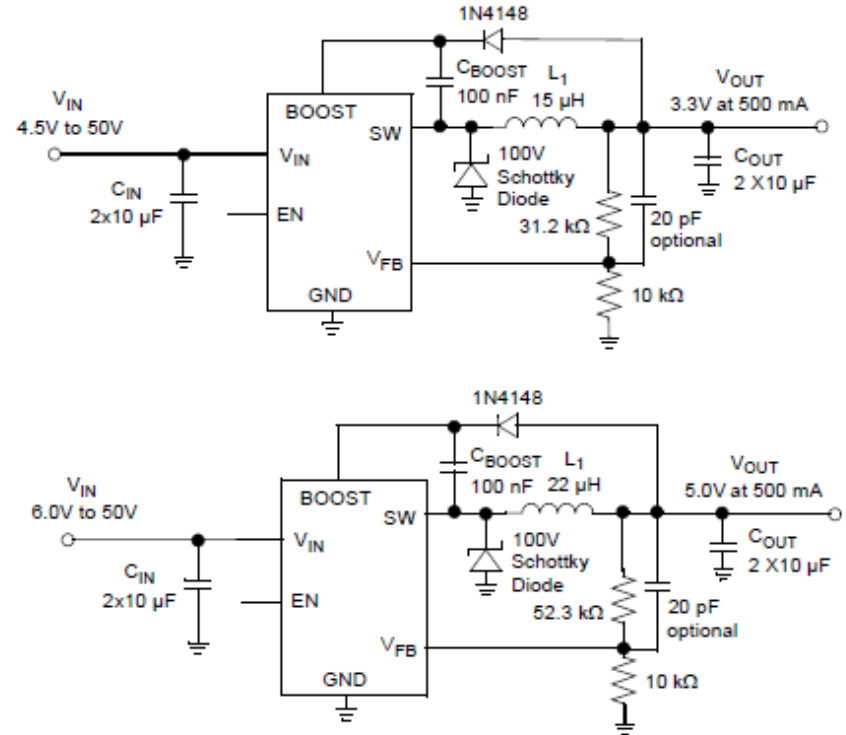
- Up to 95% Typical Efficiency
- Input Voltage Range: 4.4V to 30V
- 1A Output Current Capability
- Output Voltage Range: 2.0V to 24V
- Integrated N-Channel High-Side Switch:
  - 300 m $\Omega$
- Integrated N-Channel Low-Side Switch:
  - 170 m $\Omega$
- Stable Reference Voltage: 0.8V
- Automotive PFM/PWM Operation
  - 500 kHz PWM Operation
  - MCP16312 proved PWM-Only Operation
- Low Quiescent Current
  - 44  $\mu$ A (PFM Mode, typical)
  - 3  $\mu$ A Shutdown (typical)
- Peak Current Mode Control
- Undervoltage Lockout (UVLO)
- Overtemperature Protection
- 8-lead MSOP and 2x3 TDFN
- Recommended for Automotive Design



<< BACK

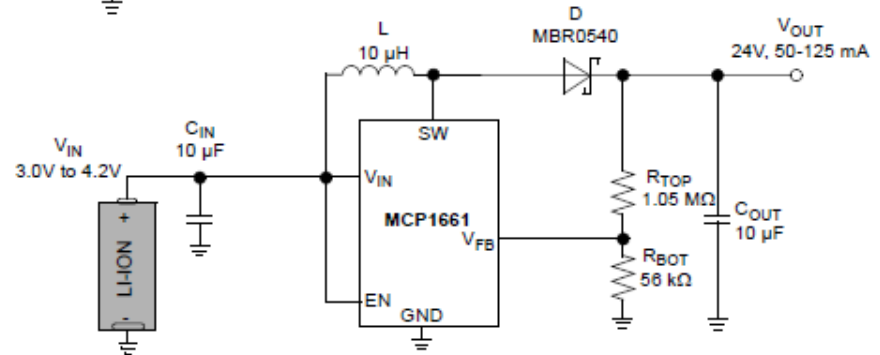
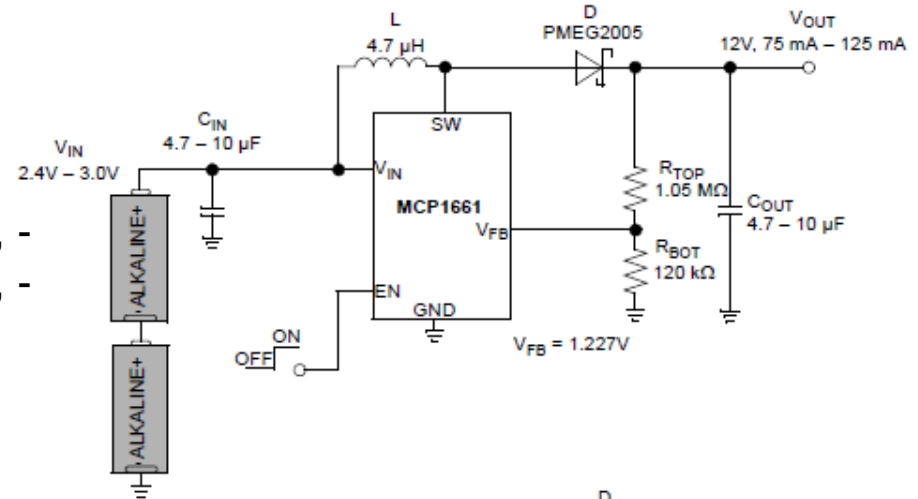
## Features:

- Up to 96% Efficiency
- Input Voltage Range: 4.4V to 50V
- Output Voltage Range: 2.0V to 24V
- 2% Output Voltage Accuracy
- AEC-Q100 Rev. G, Grade 1 (-40°C to 125°C)
- Minimum 500 mA Output Current
  - Figure 2-9 for Max Output Current vs  $V_{IN}$
  - Up to 1.2A Output Current at 3.3V and -5V  $V_{OUT}$ ,  $V_{IN} > 12V$ , SOT-23 at 25°C
  - Up to 0.8A Output Current at 12V  $V_{OUT}$ , -  $V_{IN} > 18V$ , SOT-23 at 25°C
- 500 kHz Fixed Frequency
- Low Device Shutdown Current
- Peak Current Mode Control
- Internal Compensation
- Internal Soft-Start
- Internal pull up on EN
- Cycle-by-Cycle Peak Current Limit
- UVLO & Overtemperature Protection
- Packages: 6-Lead SOT-23, 8-Lead 2x3 TDFN
- Recommended for Automotive Design



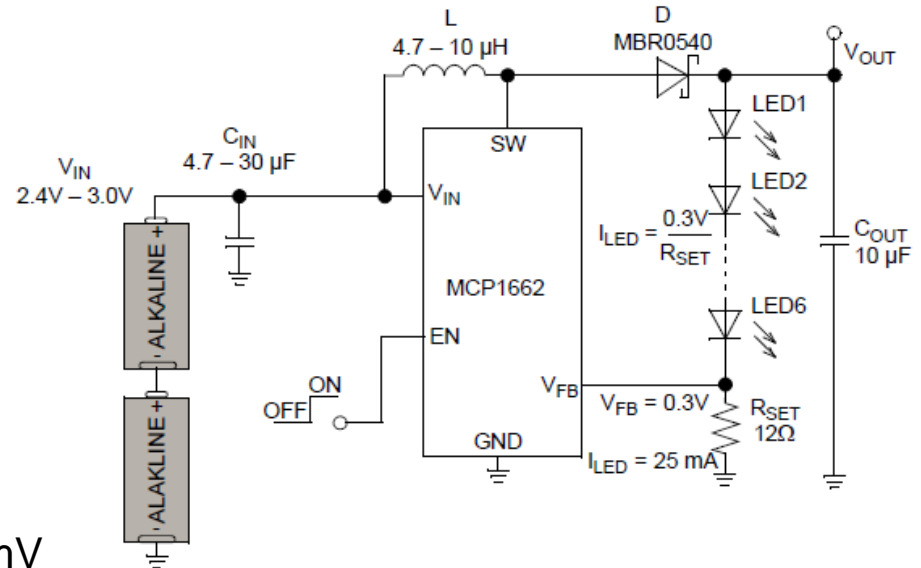
## Features:

- Up to 92% Efficiency
- High Output Voltage Range: up to 32V
- 1.3A Peak Input Current Limit:
  - $I_{OUT} > 200 \text{ mA}$  @  $5.0\text{V } V_{IN}$ , -
  - $12\text{V } V_{OUT}$   $I_{OUT} > 125 \text{ mA}$  @  $3.3\text{V } V_{IN}$ , -
  - $12\text{V } V_{OUT}$   $I_{OUT} > 100 \text{ mA}$  @  $4.2\text{V } V_{IN}$ , -
  - $24\text{V } V_{OUT}$  Input Voltage:  $2.4\text{V}$  to  $5.5\text{V}$
- Undervoltage Lockout (UVLO):
- No Load Input Current:  $250 \mu\text{A}$ , typical
- Sleep mode:  $200 \text{ nA}$
- PWM Operation with Skip mode:  $500 \text{ kHz}$
- Feedback Voltage Reference:  $1.227\text{V}$
- Cycle-by-Cycle Current Limiting
- Internal Compensation
- Inrush Current Limiting & Internal Soft-Start
- Output Overvoltage Protection (OVP)
- Overtemperature Protection
- Easily Configurable for SEPIC or Flyback Topologies
- Packages: 5-Lead SOT-23, 2x3 8-Lead TDFN



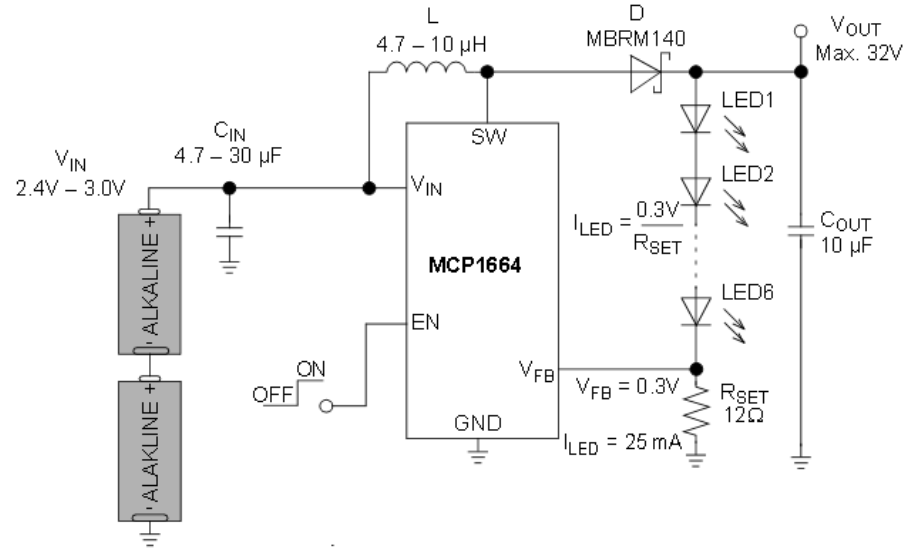
## Features:

- Up to 92% Efficiency
- Drive LED Strings in Constant Current
- 1.3A Peak Input Current Limit:
  - I<sub>LED</sub> up to 200 mA @ 5.0V V<sub>IN</sub>, -  
- 4 White LEDs
  - I<sub>LED</sub> up to 125 mA @ 3.3V V<sub>IN</sub>, -  
- 4 White LEDs
  - I<sub>LED</sub> up to 100 mA @ 4.2V V<sub>IN</sub>, -  
- 8 White LEDs
- Input Voltage Range: 2.4V to 5.5V
- Feedback Voltage Reference: V<sub>Fb</sub> = 300 mV
- Undervoltage Lockout (UVLO):
- Sleep Mode: 200 nA
- PWM Operation: 500 kHz Switching Frequency
- Cycle-by-Cycle Current Limiting
- Internal Compensation
- Inrush Current Limiting and Internal Soft Start
- Open Load Protection (OLP)
- Overtemperature Protection
- Packages: 5-Lead SOT-23, 8-Lead 2x3 TDFN



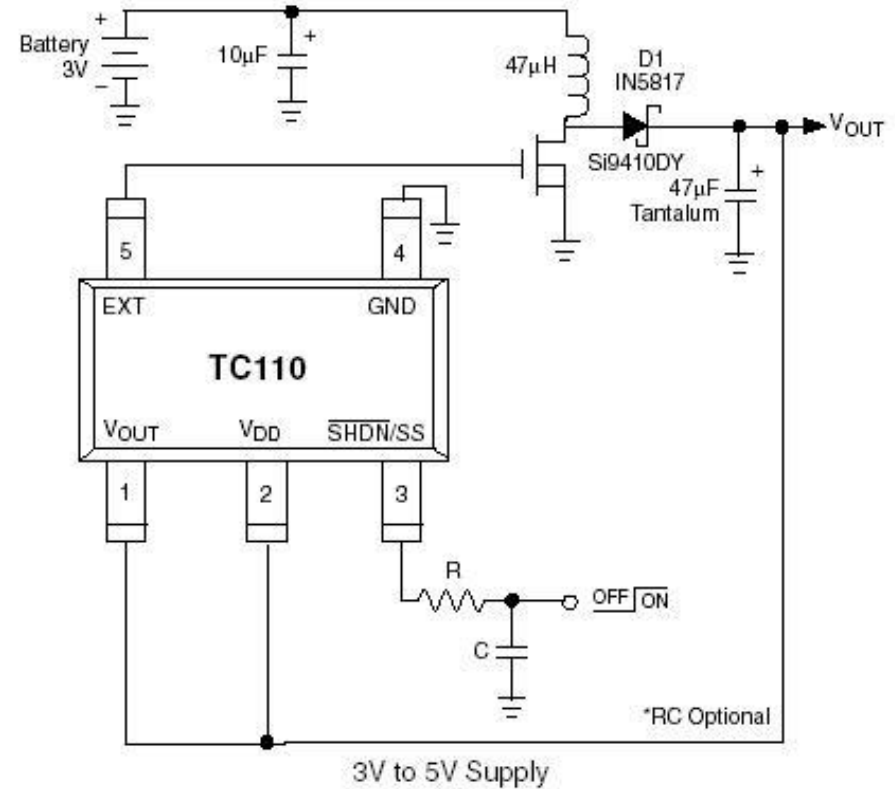
## Features:

- Up to 92% Efficiency
- High Output Voltage Range: up to 32V
- 1.8A Peak Input Current Limit:
  - I<sub>LED</sub> up to 300 mA @ 5.0V V<sub>IN</sub>,  
- 4 White LEDs
  - I<sub>LED</sub> up to 200 mA @ 3.3V V<sub>IN</sub>,  
- 4 White LEDs
  - I<sub>LED</sub> up to 150 mA @ 4.2V V<sub>IN</sub>,  
- 8 White LEDs
- Input Voltage Range: 2.4V to 5.5V
- Undervoltage Lockout (UVLO)
- No Load Input Current: 250  $\mu$ A, typical
- Sleep mode: 200 nA Typical
- PWM Operation with Skip mode: 500 kHz
- Feedback Voltage Reference: V<sub>FB</sub> = 300 mV
- Cycle-by-Cycle Current Limiting
- Inrush Current Limiting and Internal Soft-Start
- Output Overvoltage Protection (OVP)
- Overtemperature Protection
- Packages: 5-Lead SOT-23 or 2x3 8-Lead TDFN



## Features:

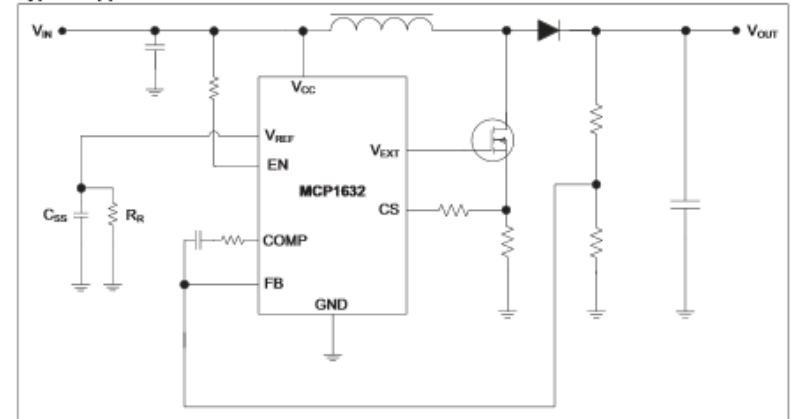
- Guaranteed Start-Up at 0.9V
- Supply Current: 50 $\mu$ A @ 100kHz (typ.)
- Shutdown Mode: 0.5 $\mu$ A
- 300mA Output Current @  $V_{IN} \geq 2.7V$
- 100KHz and 300KHz Switching –  
- Frequency Options
- Programmable Soft-Start
- 84% Efficiency
- Small Package: 5-Pin SOT-23A



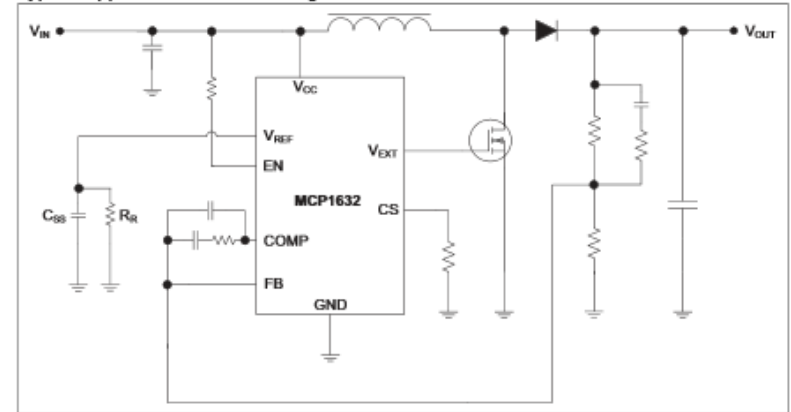
## Features:

- High-Speed PWM Controller
- Fixed Switching Frequency Options (f<sub>SW</sub>):
  - 300 or 600 kHz
- Integrated Low-Side MOSFET Driver support –
  - many Low-Side Power Conversion Topologies
- Configurable as either a Peak Current Mode –
  - Controller or a Voltage Mode Controller
- Internal UVLO, OVLO, and over temperature –
  - protection
- Low Operating Current < 5 mA (typical)
- Extended Temperature Range:
  - -40°C to +125°C

Typical Application Circuit – Peak Current Mode Control



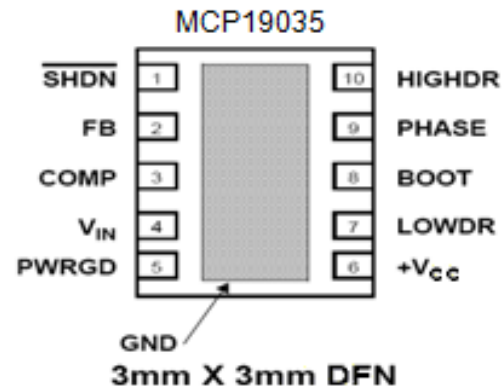
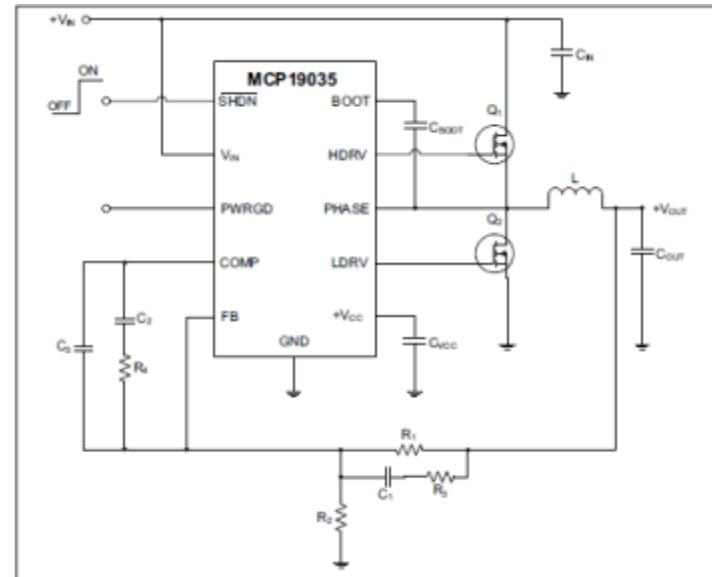
Typical Application Circuit – Voltage Mode Control





## Features:

- $V_{IN}$  Range: 5.0V to 30.0V
- Voltage Mode Controller
- Switching Freq:
  - 300 kHz
  - 600 kHz
- Dead Time Options: 12ns/20ns
- Integrated Current limit
- Integrated MOSFET Driver
- Logic-Level (5V) Drive
- 1/2A – Source/Sink Drive Strength
- Over temperature Protection
- Package: 10-lead 3x3 DFN
- Extended Temperature Range:
  - -40°C to +125°C





# MCP19110/1

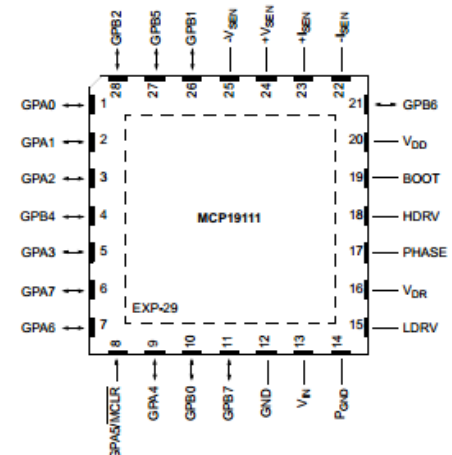
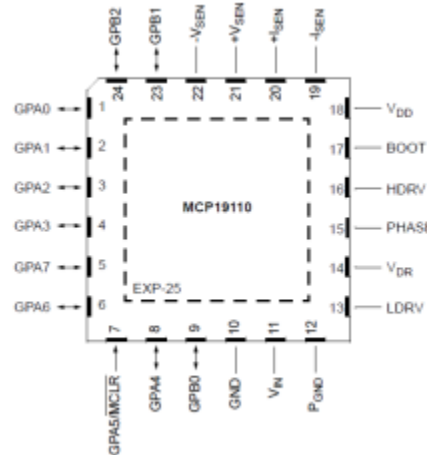
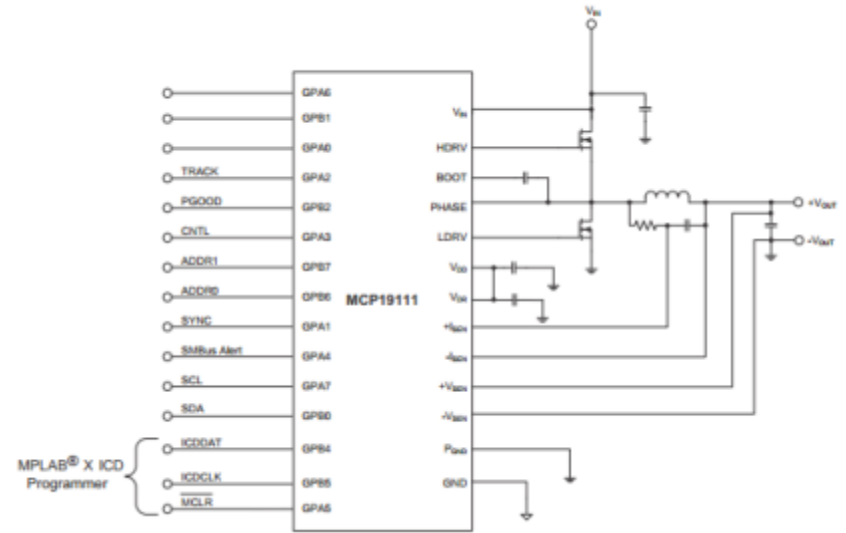
Digitally-Enhanced Power Analog Controller  
with Integrated Synchronous Driver



Online  
Datasheet

## Features:

- Wide Operating Voltage Range: 4.5-32V
- Analog Peak-Current Mode PWM Control
- Integrated 8-Bit PIC® Microcontroller
- Significant Configurability: Adjustable Analog –
  - Compensation, Switching Frequency, -
  - MOSFET Deadtime, Etc...
- PMBUS® Compliant I<sup>2</sup>C Interface
- Integrated Synchronous High- and Low-Side –
  - MOSFET Drivers
- Integrated Current Sense
- Minimal External Components Needed
- Custom Algorithm Support
- Package:
  - MCP19110 – 24 lead 4x4 mm QFN
  - MCP19111 – 28 lead 5x5 mm QFN
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design (MCP19111)



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# MCP19118/9

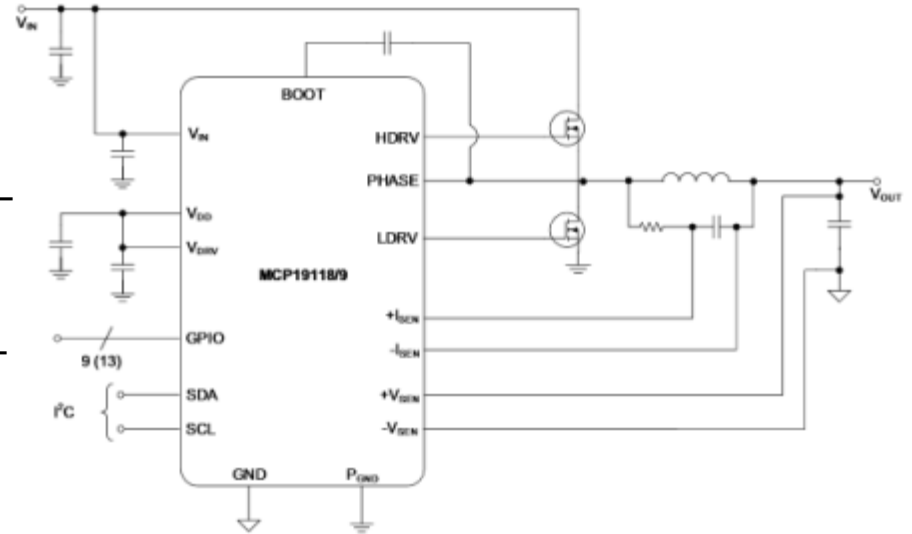
Digitally-Enhanced Power Analog Controller  
with Integrated Synchronous Driver



Online  
Datasheet

## Features:

- Wide Operating Voltage Range: 4.5-40V
- Analog Peak-Current Mode PWM Control
- Integrated 8-Bit PIC® Microcontroller
- Significant Configurability: Adjustable Analog –
  - Compensation, Switching Frequency, -
  - MOSFET Deadtime, Etc...
- Integrated Synchronous High- and Low-Side –
  - MOSFET Drivers
- Integrated Current Sense
- Integrated 10 bit A/D Converter
- Minimal External Components Needed
- Custom Algorithm Support
- Package:
  - MCP19118 – 24 lead 4x4 mm QFN
  - MCP19119 – 28 lead 5x5 mm QFN
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design

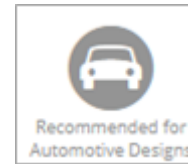


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# MCP19122/3

Digitally Enhanced Power Analog Controller  
w/ Integrated Synchronous Driver



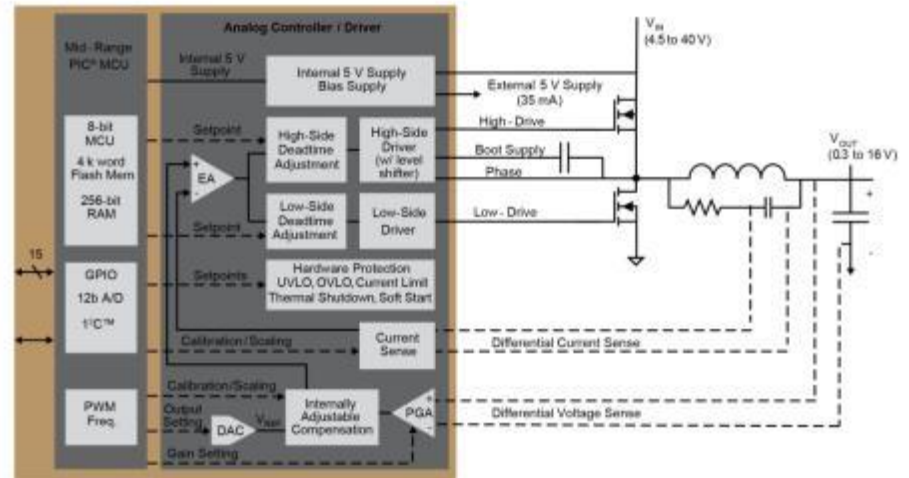
Online  
Datasheet

## Features:

- $V_{IN}$  range: 4.5V to 40V
  - 48V load dump capability
- Integrated MOSFET Driver:
  - Logic-level drive (5V)
  - 2A source/4A sink drive current
- Fully programmable (midrange core):
  - MPLABX support, GUI-configurable
  - 4k word flash, 256B RAM
  - Internal, adjustable compensation
  - Adjustable deadtime control
  - Switching freq: 100kHz to 1.6MHz
- 11/15 general purpose I/O
- PMBus™ / I<sup>2</sup>C™ compatible interface
- Low current (75  $\mu$ A) sleep mode
- DC current measurement <5% Acc.
- Dual capture / compare module
- Master/Slave and multi-phase operation
- Packages: 24L 4x4mm QFN, 28L 5x5mm QFN
- Recommended for Automotive Design (MCP19123)



MCP19123 Digitally-Enhanced Power Analog

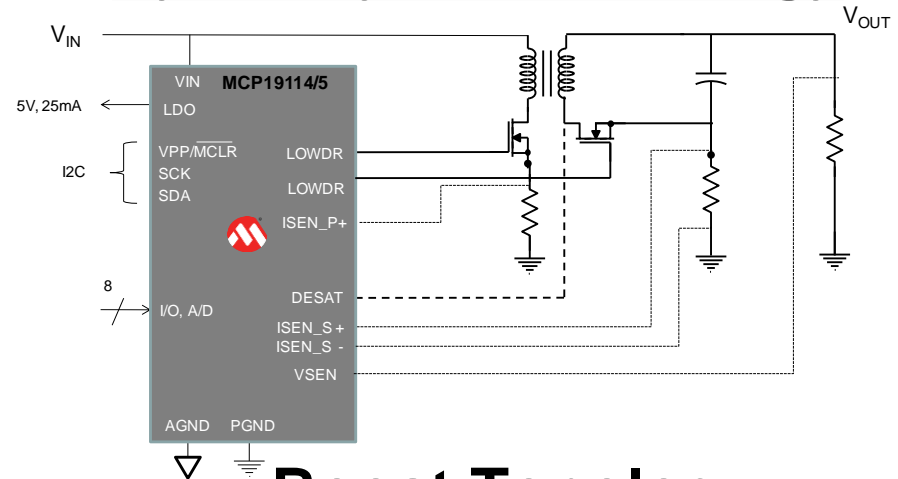


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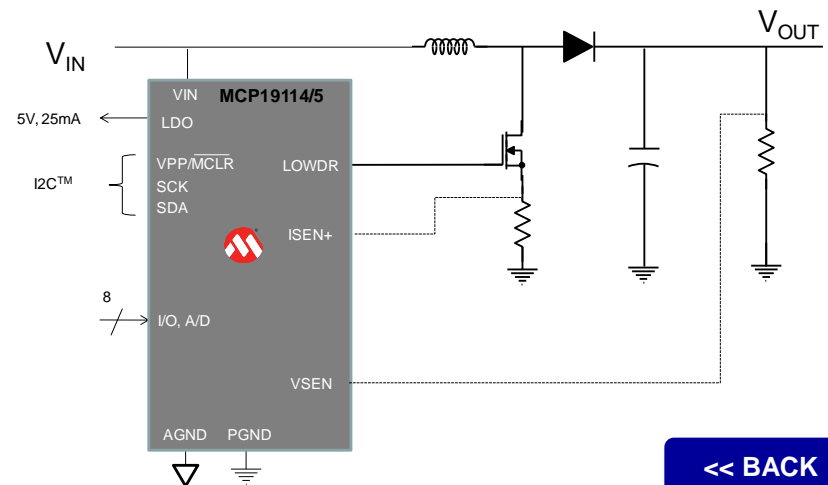
## Features:

- Dual low-side gate drive outputs
- $V_{IN}$  Range: 4.5V to 42.0V
- Switching Freq: 100kHz to 1MHz
  - Supports Quasi-Resonant Mode
- 5V LDO w/ 15mA auxiliary output
- Integrated, Low-Side MOSFET Driver
  - 1A Source, 1.5A Sink
  - Supports Flyback, SEPIC, Boost, -  
- and Ćuk Topologies.
- Fully Programmable – Integrated PIC16 Core
  - MPLABX Support, GUI-Configurable
  - 4k word Flash, 256b RAM
  - Adjustable Current limit/ULVO/OVLO/...
  - Up to 12 General Purpose I/O
  - I<sup>2</sup>C™ Communication Interface
- Operating Temperature: -40°C to +125°C
- Packages: 24L QFN 4x4mm , 28L QFN 5x5mm
- Recommended for Automotive Design

## Sync. Flyback Topology



## Boost Topology





# MCP19116/7

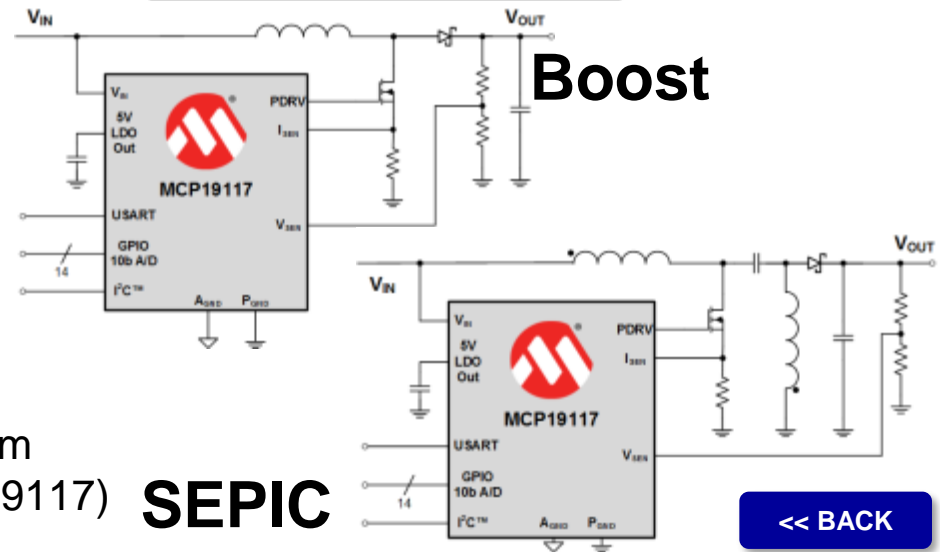
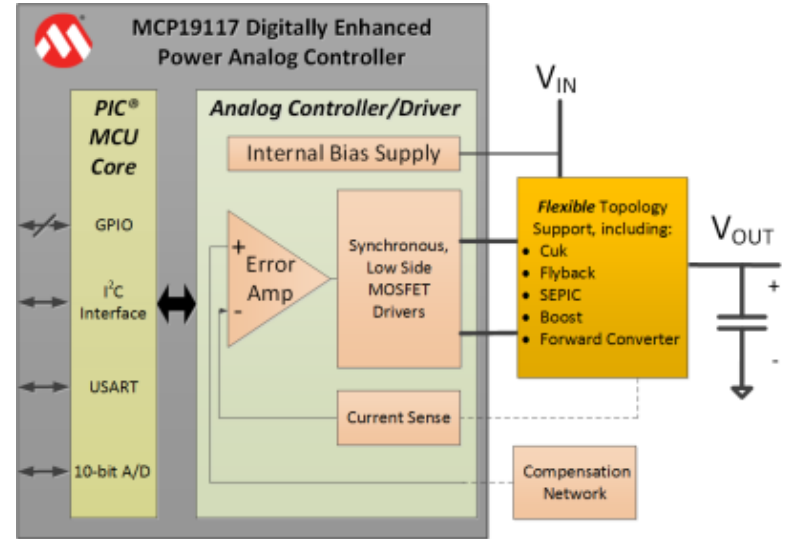
Digitally Enhanced Power Analog Synchronous Low-Side  
PWM Controller with Improved 8k Word Core



Online  
Datasheet

## Features:

- Extremely accurate current regulation:
  - $\pm 1\%$  at 25C,  $\pm 2.5\%$  over full temperature
- Capable of dynamic current output adjustments
- Dual low-side gate drive outputs; 1A source/sink
- Supports flyback, SEPIC, boost, and Ćuk designs
- Fully Programmable PIC® core:
  - MPLABX Support, GUI-Configurable
  - 8k word Flash, 336B RAM
  - Up to 12 General Purpose I/O
  - I<sup>2</sup>C™ and USART Communication
- Optional debug interface (MCP19117)
- V<sub>IN</sub> Range: 4.5V to 42.0V
- Switching Freq: 31kHz to 2.0MHz
- Supports Quasi-Resonant Mode
- 5V LDO w/ 15mA auxiliary output
- Adjustable Current limit/ULVO/OVLO/thermal - responses
- Operating Temperature: -40°C to +125°C
- Packages: 24L QFN 4x4mm , 28L QFN 5x5mm
- Recommended for Automotive Design (MCP19117)



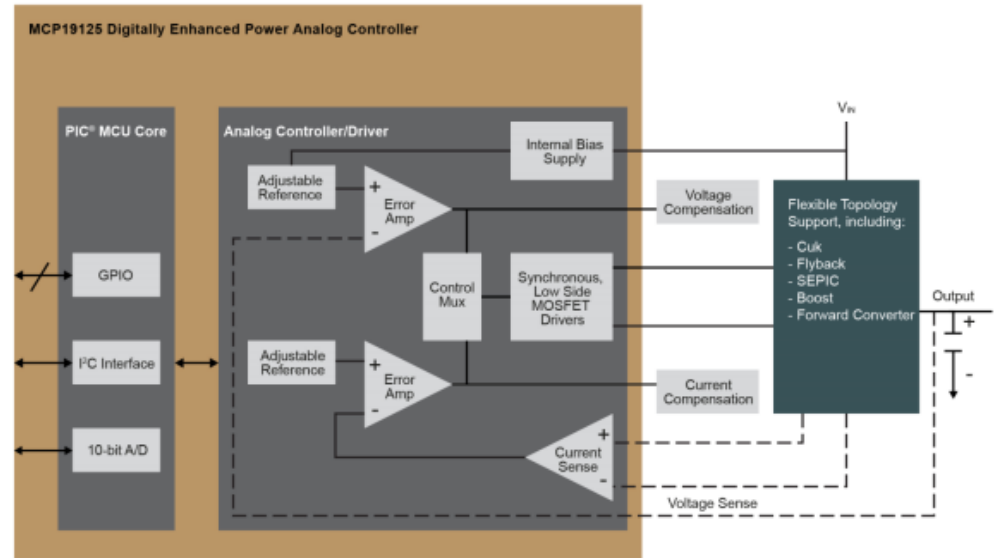
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## Features:

- $V_{IN}$  Range: 4.5V to 42.0V
  - 48V Load Dump Capability
- Switching Freq: 32kHz to 2MHz
- Integrated MOSFET Drivers, LDO
- External Compensation
- Two Independent Control Loops
  - Voltage control loop with  $V_{ref}$
  - Current control loop with  $I_{ref}$
- Fully Programmable
  - Integrated mid-range PIC core
  - MPLABX Support, GUI-Configurable
  - 4k word Flash, 256B RAM
  - Adjustable Current limit/ULVO/-  
- OVLO/Freq
  - Up to 13 General Purpose I/O
  - I<sup>2</sup>C™ Communication Interface
- Operating Temperature: -40°C to +125°C
- Packages: 24L 4x4mm QFN, 28L 5x5mm QFN



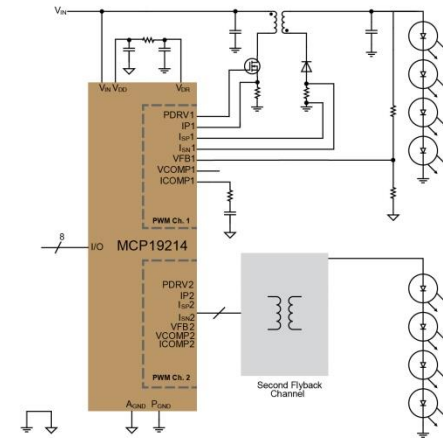
## MCP19125 Digitally Enhanced Power Analog Controller



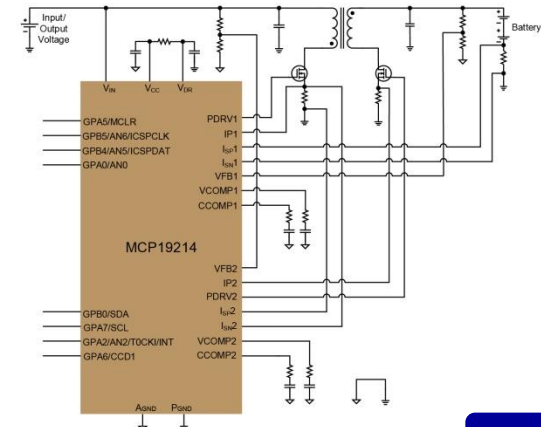
## Features:

- Dual Channel Control and Drive
- $V_{IN}$  Range: 4.5V to 42.0V:
  - 48V Load Dump Capability
- Integrated MOSFET Drivers
- Fixed Switching Freq: 100kHz to 2.0MHz
- Fully Programmable (per channel):
  - Integrated PIC12F (mid-range) Core
  - MPLABX Support, GUI-Configurable
  - 8k word Flash, 336B RAM
  - Current limit/ULVO/OVLO/fault protection
- Up to 12 General Purpose I/O
- I<sup>2</sup>C™ and UART Communication Interfaces
- Low current sleep mode
- Operating Temperature: -40°C to +125°C
- Packages: 28L 5x5mm QFN, 32L 5x5mm QFN

 **MCP19214/5 Dual LED Driver**



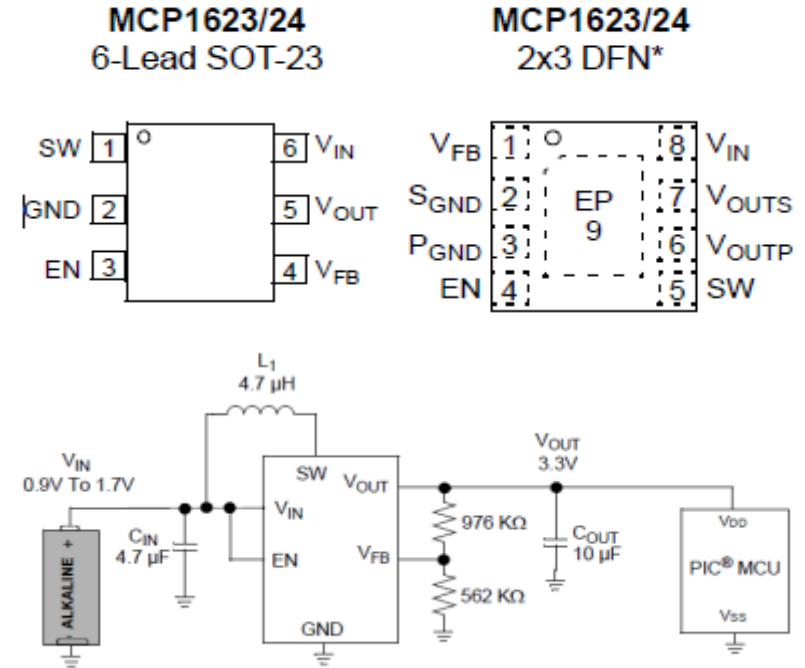
 **MCP19214/5 Bidirectional Converter**





## Features:

- Up to 96% Typical Efficiency
- 425 mA Typical Peak Input Current Limit:
  - $I_{OUT} > 50 \text{ mA}$  @  $1.2\text{V } V_{IN}, 3.3\text{V } V_{OUT}$
  - $I_{OUT} > 175 \text{ mA}$  @  $2.4\text{V } V_{IN}, 3.3\text{V } V_{OUT}$
  - $I_{OUT} > 175 \text{ mA}$  @  $3.3\text{V } V_{IN}, 5.0\text{V } V_{OUT}$
- Low Start-up Voltage:  $0.65\text{V}$ , @  $3.3\text{V}_{OUT}/1 \text{ mA}$
- Operating Input Voltage:  $0.35\text{V}$  @  $3.3\text{V}_{OUT}/1 \text{ mA}$
- Adjustable Output Voltage:  $2.0\text{V}$  to  $5.5\text{V}$
- Maximum Input Voltage:  $V_{OUT} < 5.5\text{V}$
- Automatic PFM/PWM Operation (MCP1624):
  - PFM Only Operation (MCP1623)
  - $500 \text{ kHz}$  PWM Operation
- Low Quiescent Current:  $19 \mu\text{A}$  typ. (PFM Mode)
- Internal Synchronous Rectifier
- Internal Compensation
- Inrush Current Limiting and Internal Soft-Start
- Shutdown Current:  $< 1 \mu\text{A}$
- Low Noise, Anti-Ringing Control
- Over temperature Protection
- Packages: SOT23-6, 2x3 8-Lead DFN

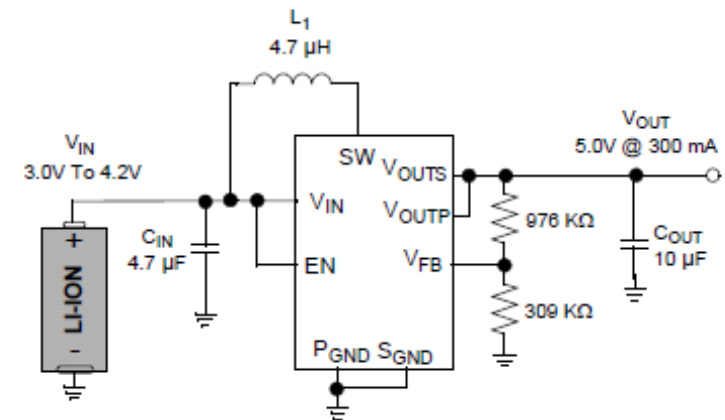
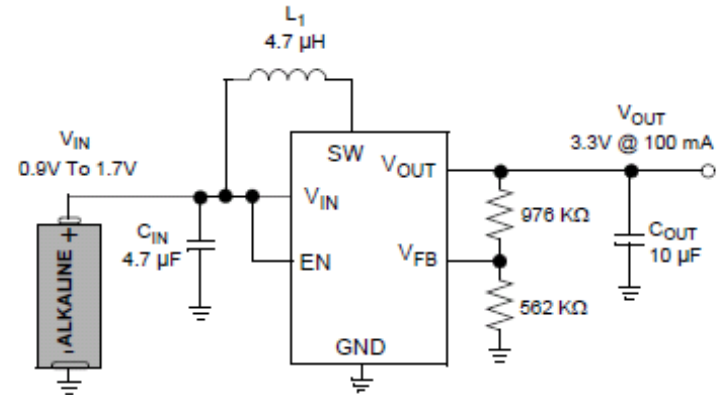


# MCP1640/40B/40C/40D

0.65V Start-Up Synchronous Boost Regulator with True Output Disconnect or Input/Output Bypass Option

## Features:

- Up to 96% Typical Efficiency
- 800 mA Typical Peak Input Current Limit:
  - $I_{OUT} > 100 \text{ mA}$  @  $1.2\text{V } V_{IN}$ ,  $3.3\text{V } V_{OUT}$
  - $I_{OUT} > 350 \text{ mA}$  @  $2.4\text{V } V_{IN}$ ,  $3.3\text{V } V_{OUT}$
  - $I_{OUT} > 350 \text{ mA}$  @  $3.3\text{V } V_{IN}$ ,  $5.0\text{V } V_{OUT}$
- Low Start-up Voltage:  $0.65\text{V}$  @  $3.3\text{V}_{OUT}/1 \text{ mA}$
- Operating Input Voltage:  $0.35\text{V}$  @  $3.3\text{V}_{OUT}/1 \text{ mA}$
- Adjustable Output Voltage:  $2.0\text{V}$  to  $5.5\text{V}$
- Maximum Input Voltage:  $V_{OUT} < 5.5\text{V}$
- Automatic PFM/PWM Operation (MCP1640/C):
  - PFM Operation Disabled (MCP1640B/D)
  - PWM Operation:  $500 \text{ kHz}$
- Low Quiescent Current:  $19 \mu\text{A}$  typ. (PFM Mode)
- Internal Synchronous Rectifier & Compensation
- Inrush Current Limiting and Internal Soft-Start
- Selectable, Logic Controlled, Shutdown States:
  - True Load Disconnect Option (MCP1640B)
  - Input to Output Bypass Option (MCP1640C/D)
- Over temperature Protection
- Packages: SOT23-6, 2x3 8-Lead DFN



## Features:

- Up to 96% Typical Efficiency
- 1.8A Typical Peak Input Current Limit
- Up to 550 mA LED Load Current
- Low Start-up Voltage: 0.65V
- Low Operating Input Voltage: down to 0.35V
- Output Voltage Range:
  - Reference Voltage,  $V_{FB} = 1.21V$
  - 1.8V to 5.5V for adjustable version
  - 1.8V, 3.0V, 3.3V and 5.0V fixed options
- Max Input Voltage  $\leq V_{OUT} < 5.5V$
- PWM Operation: 1 MHz
- Power Good Open-Drain Output
- Internal Synchronous Rectifier
- Internal Compensation
- Selectable, Logic-Controlled Shutdown States:
  - True Load Disconnect: MCP1642B
  - Input-to-Output Bypass: MCP1642D
- Shutdown Current: 1  $\mu A$
- Inrush Current Limiting and Internal Soft-Start
- Packages: MSOP-8, 2x3 DFN-8

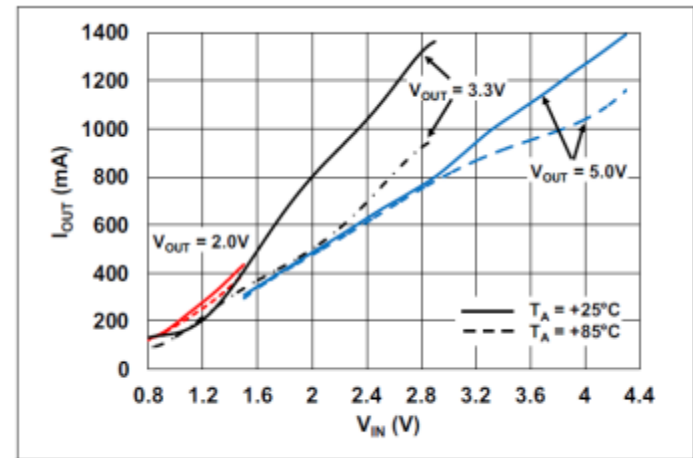
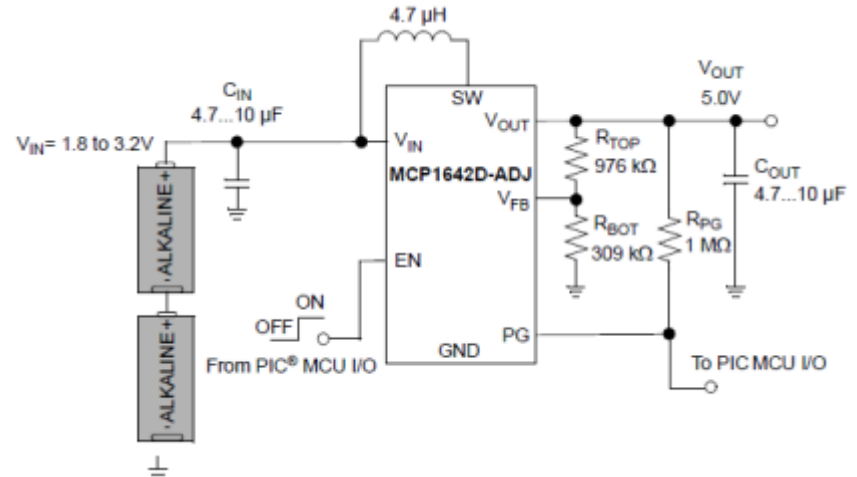
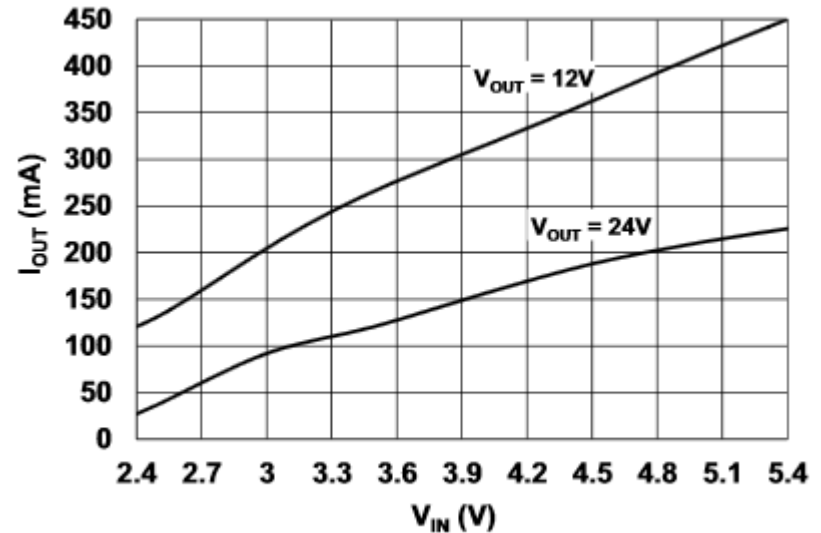
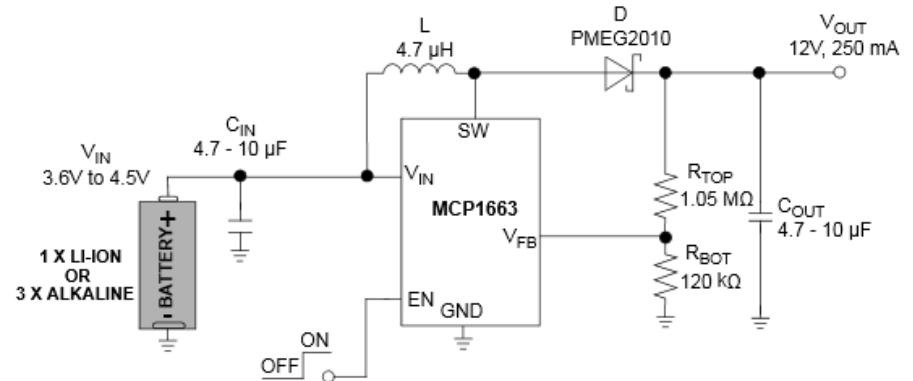


FIGURE 2-7: Maximum  $I_{OUT}$  vs.  $V_{IN}$ .

## Features:

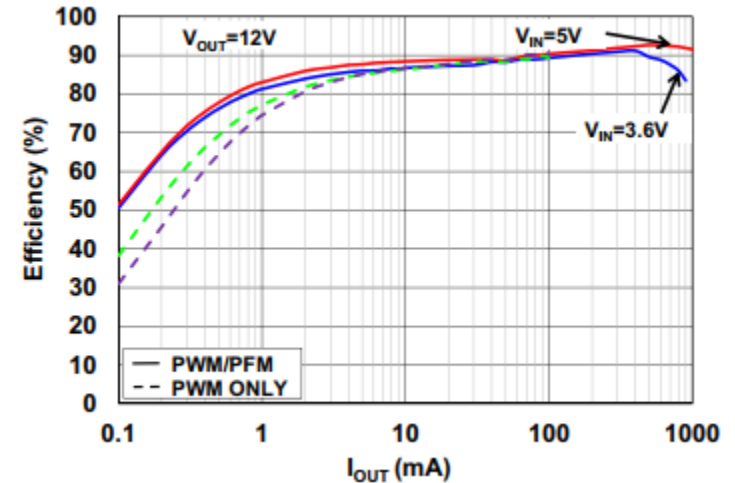
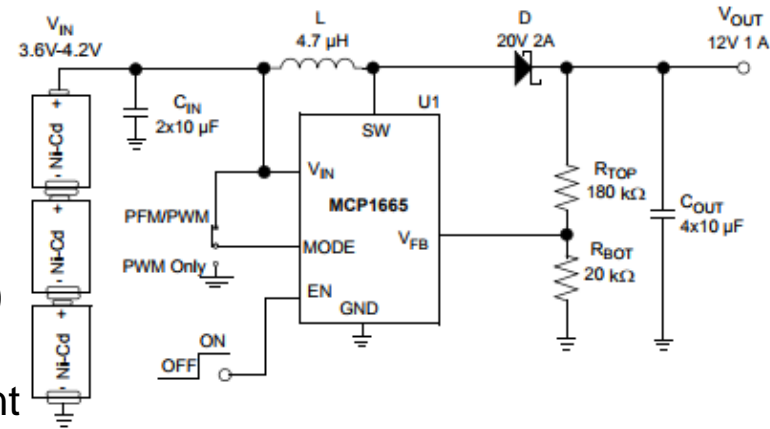
- Up to 92% Efficiency
- High Output Voltage Range: up to 32V
- 1.8A Peak Input Current Limit:
- Input Voltage Range: 2.4V to 5.5V
- Undervoltage Lockout (UVLO)
- No Load Input Current: 250  $\mu$ A, typical
- Sleep mode with 200 nA Typical Quiescent –  
– Current
- PWM Operation with Skip mode: 500 kHz
- Feedback Voltage Reference:  $V_{FB} = 1.227V$
- Cycle-by-Cycle Current Limiting
- Internal Compensation
- Inrush Current Limiting & Internal Soft-Start
- Output Overvoltage Protection (OVP):
- Feedback pin shorted to GND
- Disconnected feedback divider
- Overtemperature Protection
- Configurable for SEPIC or Flyback Topologies
- Packages: 5-Lead SOT-23, 2x3 8-Lead TDFN



Maximum Output Current vs. Input Voltage

## Features:

- Up to 92% Efficiency
- Output Voltage Range: Up to 32V
- 3.6A Typical Peak Input Current Limit:
- Input Voltage Range: 2.9V to 5V
- Input Undervoltage Lockout (UVLO)
- No Load Input Current: 250  $\mu$ A Typically for PFM, 500  $\mu$ A Typically for PWM
- Shutdown Mode with 0.4  $\mu$ A Typical Quiescent Current
- Automatically PFM/PWM or Selected by the MODE Pin, for High Efficiency
- 500 kHz PWM Operation with Skipping Mode Operation Selectable by Dedicated MODE Pin
- Feedback Voltage Reference:  $V_{FB} = 1.2V$
- Cycle-by-Cycle Current Limiting
- Internal Compensation
- Inrush Current Limiting and Internal Soft Start
- Output Overvoltage Protection (OVP) and Open-Load Protection (OLP)
- Easily Configurable for SEPIC, Cuk or Flyback
- Available Package: 10-Lead 2x2 mm VQFN





# MCP1643

## 1.6A LED Driver

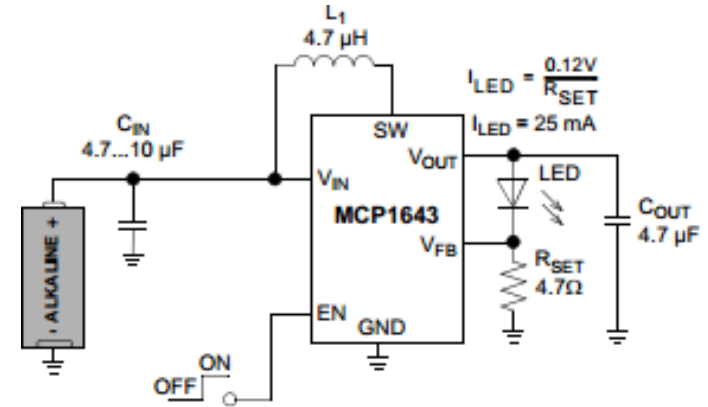
1 MHz Low Start-up Voltage Synchronous Boost  
LED Constant Current Regulator



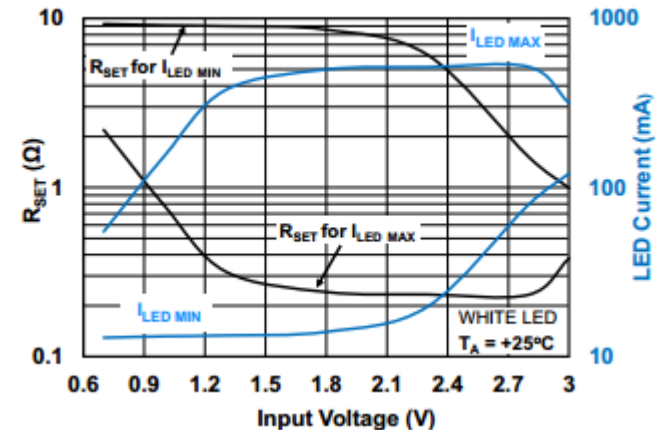
Online  
Datasheet

### Features:

- 1.6A Typical Peak Input Current Limit
- Up to 550 mA LED Load Current
- Low Start-up Voltage: 0.65V (typical, 25 mA – LED Current)
- Low Operating Input Voltage: down to 0.5V
- Maximum Input Voltage  $< V_{LED} < 5.0V$
- Maximum Output Voltage: 5.0V
- Overvoltage Protection
- Low Reference Voltage:  $V_{FB} = 120\text{ mV}$
- Pulse-Width Modulation Mode (1 MHz)
- Internal Synchronous Rectifier
- Internal Compensation
- Inrush Current Limiting
- Internal Soft-Start (240  $\mu\text{s}$  typical)
- Shutdown (EN = GND): True Load Disconnect
- Dimming Control by Variable Duty Cycle
- Shutdown Current: 1.2  $\mu\text{A}$  (typical)
- Overtemperature protection
- Packages: MSOP-8, 2x3 DFN-8
- Recommended for Automotive Design



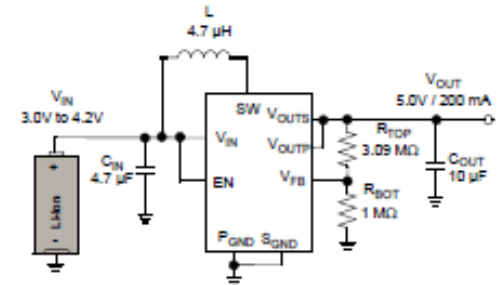
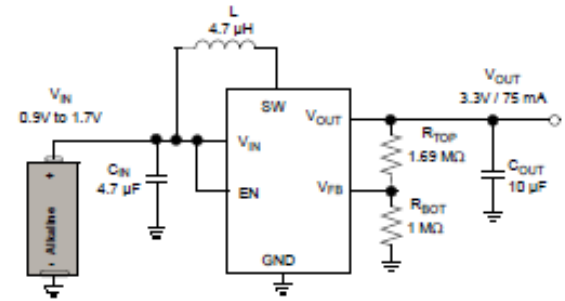
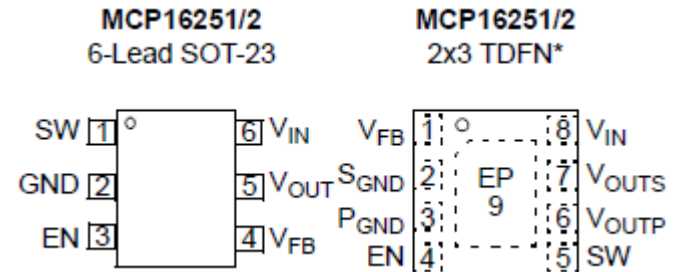
$R_{SET}$  Minimum and Maximum Limits for  $I_{LED}$  in Regulation, with  $\pm 6\%$  Tolerance



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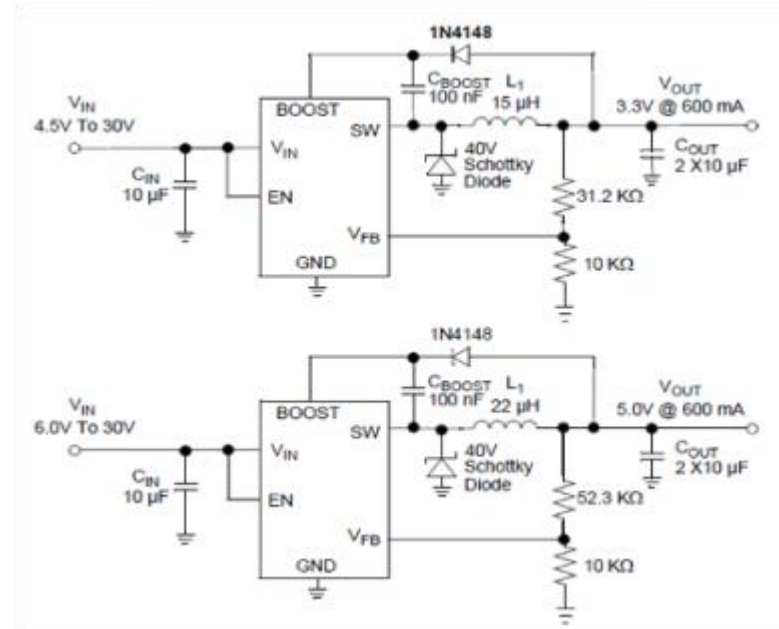
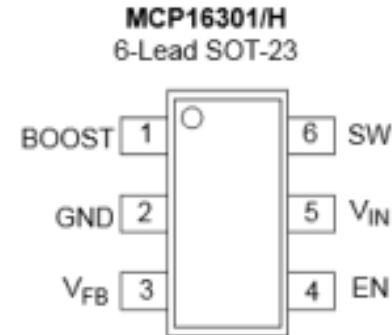
## Features:

- Up to 96% Typical Efficiency
- 650mA Typical Peak Input Current Limit:
  - $I_{OUT} > 100 \text{ mA}$  @  $3.3\text{V } V_{OUT}$ ,  $1.2\text{V } V_{IN}$
  - $I_{OUT} > 250 \text{ mA}$  @  $3.3\text{V } V_{OUT}$ ,  $2.4\text{V } V_{IN}$
  - $I_{OUT} > 225 \text{ mA}$  @  $5.0\text{V } V_{OUT}$ ,  $3.3\text{V } V_{IN}$
- Low Power:  $<4 \mu\text{A}$  Quiescent,  $0.6 \mu\text{A}$  Shutdown
- Low Start-up Voltage:  $0.82\text{V}$ ,  $1 \text{ mA}$  load
- Low Operating Input Voltage: down to  $0.35\text{V}$
- Adjustable Output Voltage Range:  $1.8\text{V}$  to  $5.5\text{V}$
- Maximum Input Voltage  $\leq V_{OUT} < 5.5\text{V}$
- Automatic PFM/PWM Operation:
  - PWM Operation:  $500 \text{ kHz}$
  - PFM Output Ripple:  $150 \text{ mV}$  typical
- Internal Synchronous Rectifier & Compensation
- Inrush Current Limiting and Internal Soft Start
- Selectable, Logic Controlled, Shutdown States:
  - True Load Disconnect Option (MCP16251)
  - Input to Output Bypass Option (MCP16252)
- Anti-Ringing Control, Over-temperature Protection
- Packages: SOT-23-6, 8-L 2x3 TDFN



## Features:

- Up to 96% Typical Efficiency
- Input Voltage Range:
  - 4.0V to 30V (MCP16301)
  - 4.7V to 36V (MCP16301H)
- Output Voltage Range: 2.0V to 15V
- 2% Output Voltage Accuracy
- Integrated N-Channel Buck Switch
- 600 mA Output Current
- 500 kHz Fixed Frequency
- Adjustable Output Voltage
- Low Device Shutdown Current
- Peak Current Mode Control
- Internal Compensation
- Stable with Ceramic Capacitors
- Internal Soft-Start
- Cycle by Cycle Peak Current Limit
- Under Voltage Lockout (UVLO): 3.5V
- Overtemperature Protection
- SOT-23-6 Package
- Temperature Range: -40°C to +85°C
- Recommended for Automotive Design (MCP16301)

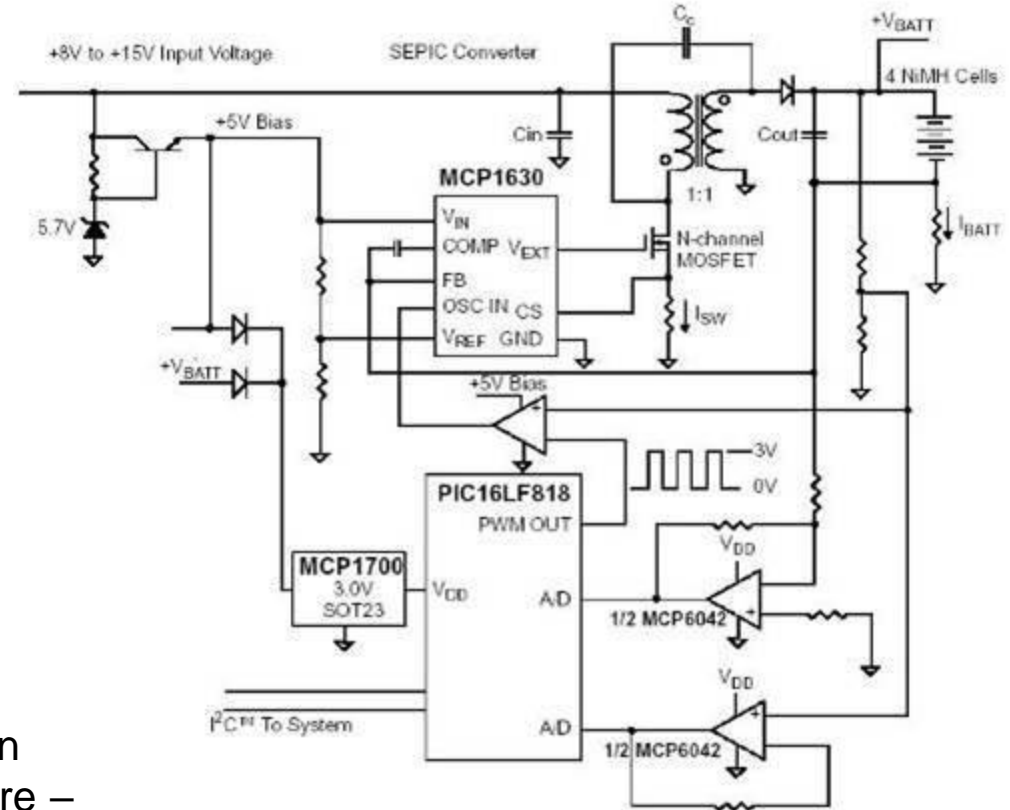




## Features:

- High-Speed PWM Operation (12ns –  
- Current Sense to Output Delay)
- Operating Temperature Range:
  - -40°C to +125°C
- Precise Peak Current Limit –  
- (±5% MCP1630)
- Voltage Mode and Average Current –  
- Mode Control (MCP1630V)
- CMOS Output Driver
- External Oscillator Input
- External voltage Reference Input
- Peak Current Mode Operation > 1MHz
- Low Operating Current: 2.8mA (typ.)
- Fast Output Rise and Fall Times:
  - 5.9ns and 6.2ns
- Undervoltage Lockout (UVLO) Protection
- Output Short Circuit and Overtemperature –  
- Protection
- Space Saving 8-Pin MSOP
- Recommended for Automotive Design (MCP1630)

MCP1630 NiMH Battery Charger and Fuel Gauge Application Diagram





# MCP1631/HV MCP1631V/VHV

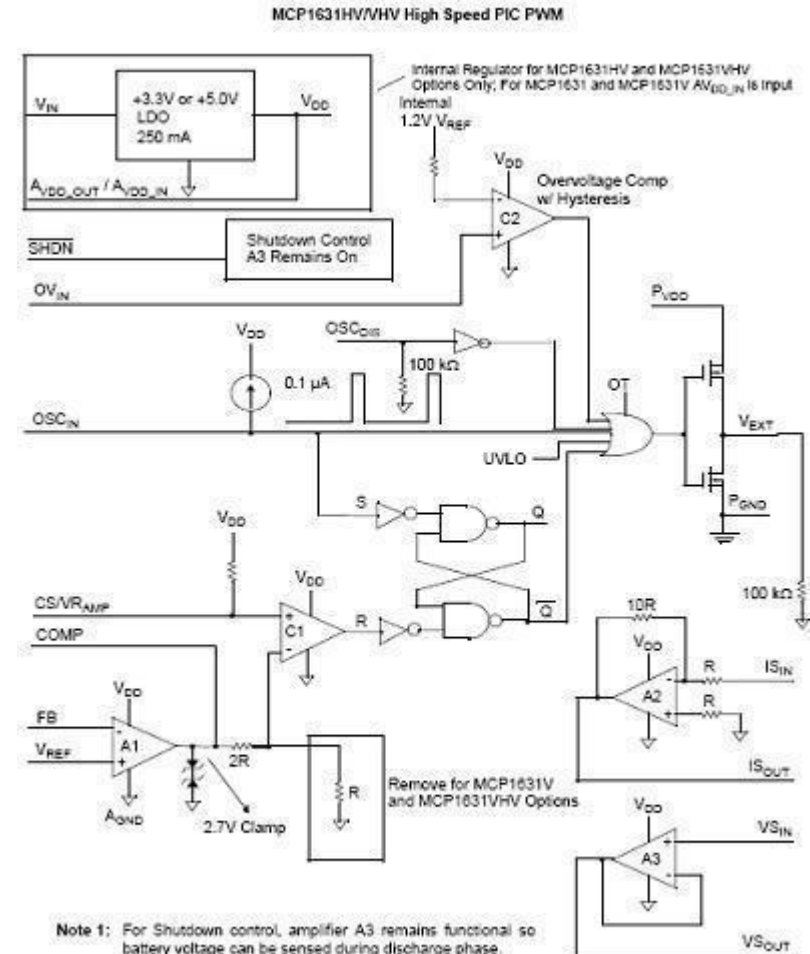
High-Speed, Pulse Width Modulator



Online  
Datasheet

## Features:

- Programmable Switching Battery Charger – - Designs
- High-Speed Analog PWM Controller: 2MHz
- Peak Current Mode Control (MCP1631)
- Voltage Mode Control (MCP1631V)
- High Voltage Options Operate to +16V Input:
  - MCP1631HV Current Mode
  - MCP1631VHV Voltage Mode
- Output Voltage Options: +5.0V or +3.3V, 250mA
- External Oscillator and Ext. Reference Inputs
- Error Amplifier, Battery Current ISNS Amplifier, - - Battery Voltage VSNS Amplifier Integrated
- Integrated Overvoltage Comparator
- Integrated Low Side MOSFET Driver: 1A Peak
- Shutdown mode reduces IQ to 2.4µA (typ.)
- Internal Overtemperature Protection
- Undervoltage Lockout (UVLO)
- Package Options:
  - 4x4 20-Lead QFN (MCP1631/MCP1631V)
  - 20-Lead TSSOP, 20-Lead SSOP (all devices)
- Recommended for Automotive Design (MCP1631)



Note 1: For Shutdown control, amplifier A3 remains functional so battery voltage can be sensed during discharge phase.

Note 2: For HV options, internal Low Drop Out Regulator provides +3.3V or +5.0V bias to VDD.

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# MCP1631/HV MCP1631V/VHV

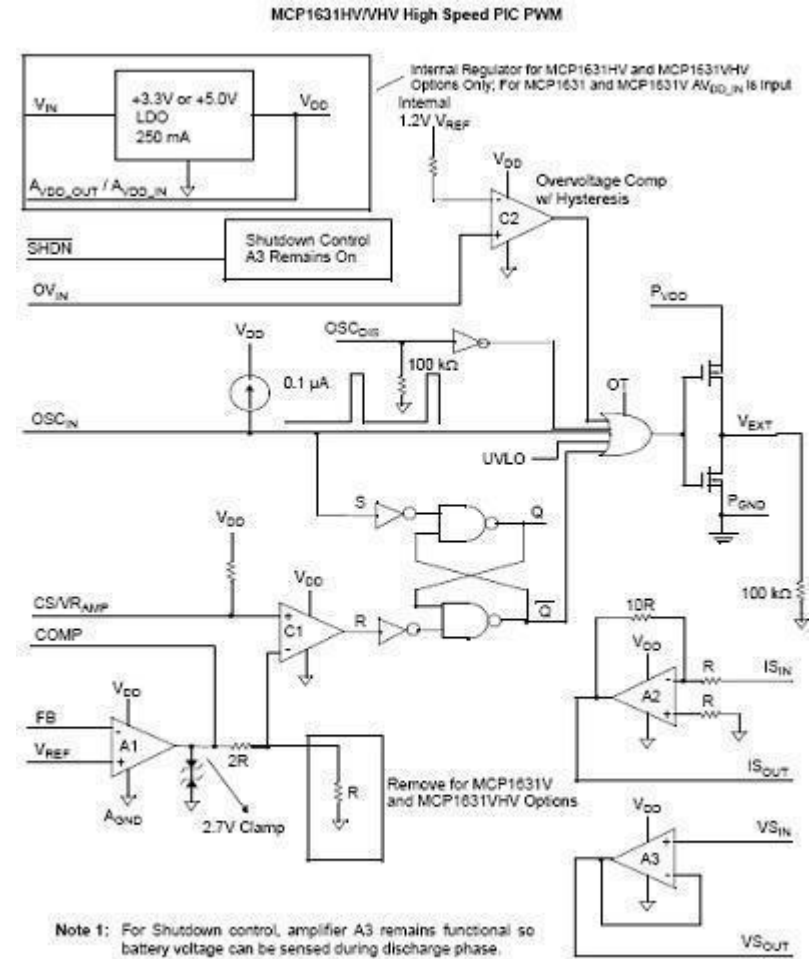
High-Speed, Pulse Width Modulator



Online  
Datasheet

## Features:

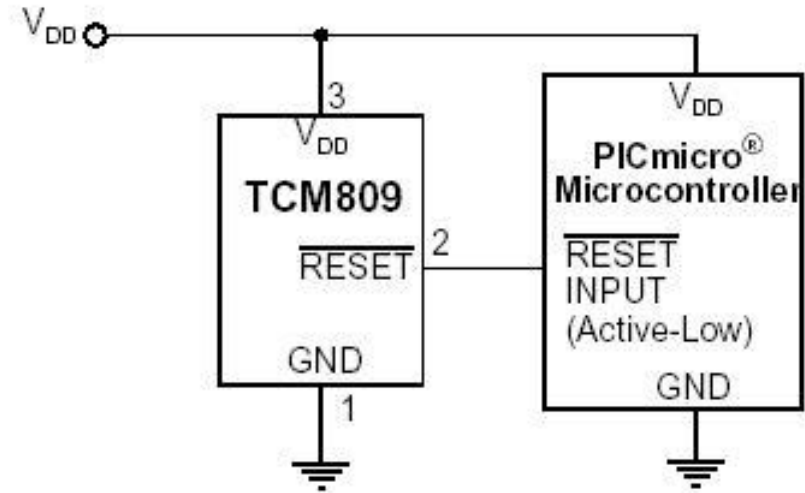
- Programmable Switching Battery Charger Designs
- High-Speed Analog PWM Controller: 2MHz
- Peak Current Mode Control (MCP1631)
- Voltage Mode Control (MCP1631V)
- High Voltage Options Operate to +16V Input:
  - MCP1631HV Current Mode
  - MCP1631VHV Voltage Mode
- Output Voltage Options: +5.0V or +3.3V, 250mA
- External Oscillator and Ext. Reference Inputs
- Error Amplifier, Battery Current ISNS Amplifier, -  
- Battery Voltage  $V_{SNS}$  Amplifier Integrated
- Integrated Overvoltage Comparator
- Integrated Low Side MOSFET Driver: 1A Peak
- Shutdown mode reduces  $I_Q$  to 2.4 $\mu$ A (typ.)
- Internal Overtemperature Protection
- Undervoltage Lockout (UVLO)
- Package Options:
  - 4x4 20-Lead QFN (MCP1631/MCP1631V)
  - 20-Lead TSSOP, 20-Lead SSOP (all devices)
- Recommended for Automotive Design (MCP1631)



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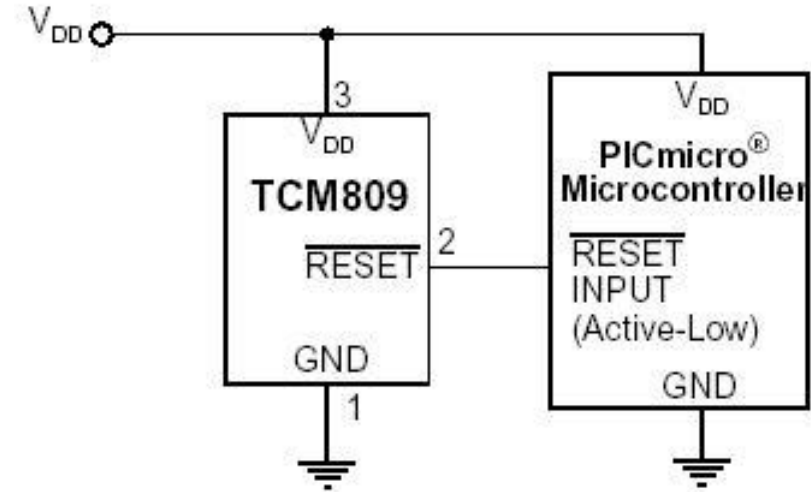
## Features:

- Precision VCC Monitor for 2.5V, 3.0V, 3.3V, -  
- 5.0V Nominal Voltage Supplies
- 140ms Minimum RESET Time Out Period
- RESET Output Guaranteed to  $V_{CC} = 1.0V$  –  
- (TCM809)
- Low 12 $\mu$ A Supply Current
- Push-Pull RESET Output
- No External Components
- Temperature Range:
  - Industrial SC-70 (E): -40°C to +85°C
  - Extended SOT-23 (V): -40°C to +125°C



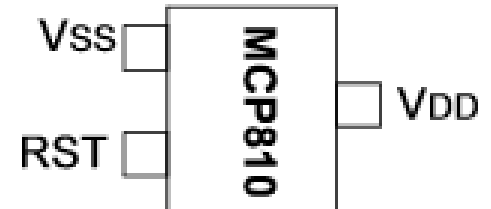
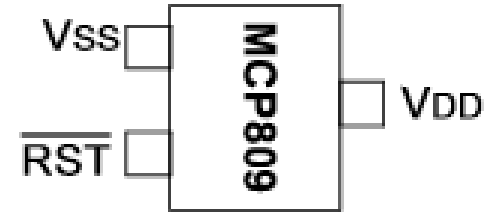
## Features:

- Precision VCC Monitor for 2.5V, 3.0V, 3.3V, -  
- 5.0V Nominal Voltage Supplies
- 140ms Minimum RESET Time Out Period
- RESET Output Guaranteed to  $V_{CC} = 1.0V$  -  
- (TCM809)
- Low 12 $\mu$ A Supply Current
- Push-Pull RESET Output
- No External Components
- Temperature Range:
  - Industrial SC-70 (E): -40°C to +85°C
  - Extended SOT-23 (V): -40°C to +125°C
- Recommended for Automotive Design (TCM809)



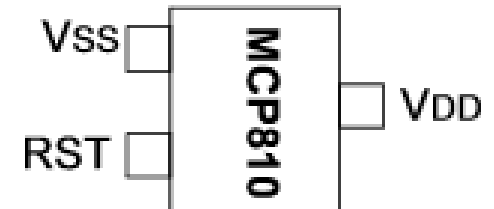
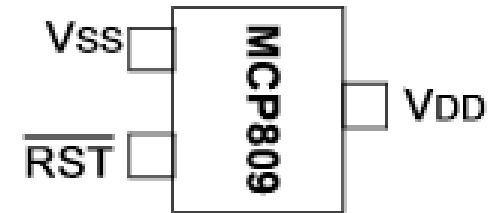
## Features:

- Holds microcontroller in reset until supply –  
- voltage reaches stable operating voltage
- Resets microcontroller during power loss
- Precision monitoring of 3V, 3.3V and 5V systems
- Active low RESET pin (MCP809)
- Active high RESET (MCP810)
- Push-pull output
- Holds RESET for 350ms (typical)
- RESET to  $V_{DD} = 1.0V$
- Accuracy:
  - $\pm 125mV$  for 5V systems
  - $\pm 75mV$  for 3V systems
- 45uA typical operating current
- Industrial Temperature Range:  $-40^{\circ}C$  to  $+85^{\circ}C$
- Recommended for Automotive Design (MCP809)



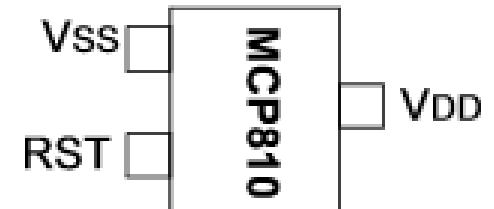
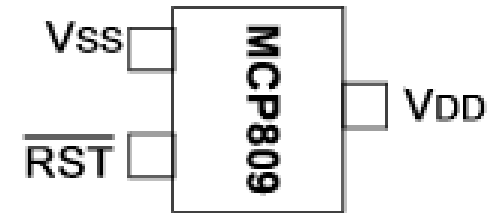
## Features:

- Holds microcontroller in reset until supply –  
- voltage reaches stable operating voltage
- Resets microcontroller during power loss
- Precision monitoring of 3V, 3.3V and 5V systems
- Active low RESET pin (MCP809)
- Active high RESET (MCP810)
- Push-pull output
- Holds RESET for 350ms (typical)
- RESET to  $V_{DD} = 1.0V$
- Accuracy:
  - $\pm 125mV$  for 5V systems
  - $\pm 75mV$  for 3V systems
- 45uA typical operating current
- Industrial Temperature Range:  $-40^{\circ}C$  to  $+85^{\circ}C$
- Recommended for Automotive Design (MCP809)



## Features:

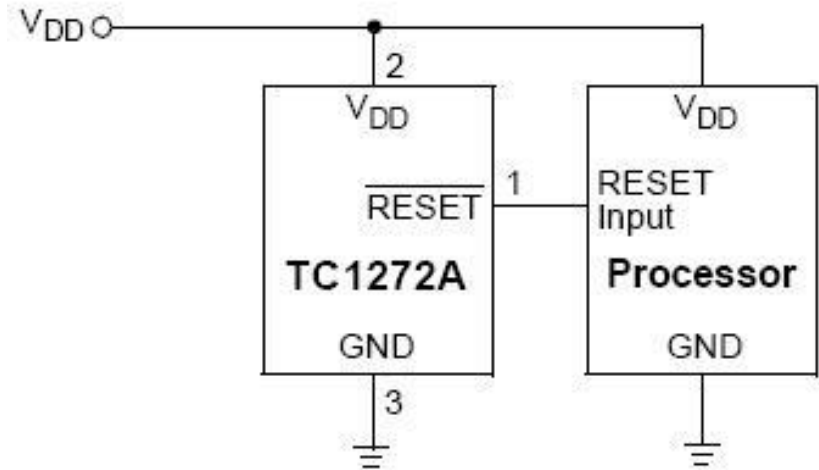
- Holds microcontroller in reset until supply –  
- voltage reaches stable operating voltage
- Resets microcontroller during power loss
- Precision monitoring of 3V, 3.3V and 5V systems
- Active low RESET pin (MCP809)
- Active high RESET (MCP810)
- Push-pull output
- Holds RESET for 350ms (typical)
- RESET to  $V_{DD} = 1.0V$
- Accuracy:
  - $\pm 125mV$  for 5V systems
  - $\pm 75mV$  for 3V systems
- 45uA typical operating current
- Industrial Temperature Range:  $-40^{\circ}C$  to  $+85^{\circ}C$
- Recommended for Automotive Design (MCP809)





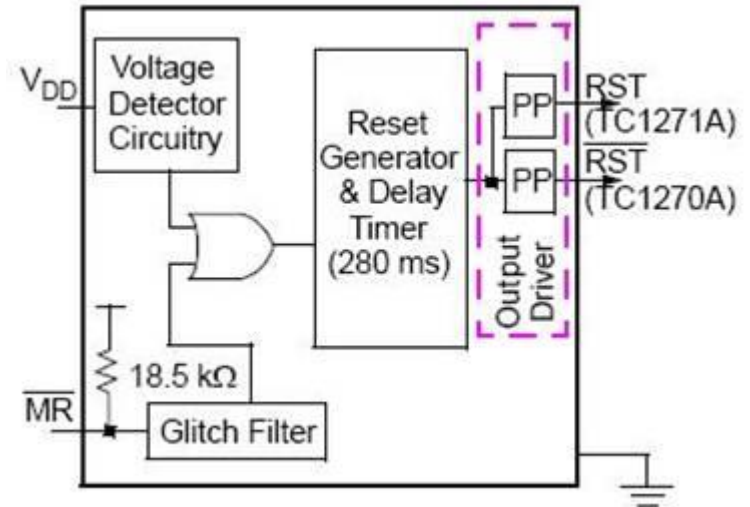
## Features:

- Precision  $V_{DD}$  Monitor
- 140ms Minimum RESET Output Duration
- Output Valid to  $V_{DD} = 1.2V$
- $V_{DD}$  Transient Immunity
- Small 3-Pin SOT-23B Package
- No External Components



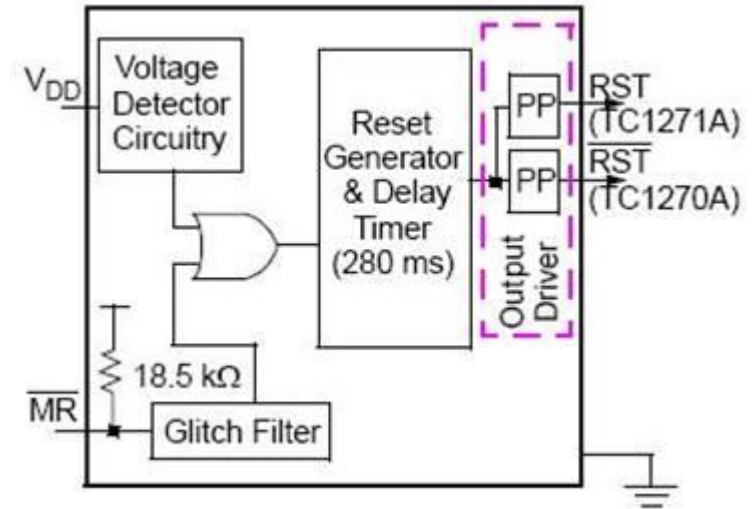
## Features:

- Precision Voltage Monitor: 2.63V, 2.93V, - 3.08V, 4.38V and 4.63V trip points (typ.)
- Manual Reset input
- Reset Time-Out Delay:
  - Standard: 280ms (typ.)
  - Optional: 2.19ms, and 35ms (typ.)
- Power Consumption  $\leq 15\mu\text{A}$  (max.)
- Active Low Output Options:
  - Push-Pull Output and Open-Drain Output
- Active High Output Option: Push-Pull Output
- Replacement for (Specification compatible):
  - TC1270, TC1271, TCM811, TCM812
- Low Voltage Operation: (1.0V)
- ESD protection:
  - $\geq 4\text{kV}$  Human Body Model (HBM)
  - $\geq 400\text{V}$  Machine Model (MM)
- Extended (E) Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options:
  - 4-lead SOT-143, 5-lead SOT-23
- Recommended for Automotive Design
  - (TC1270AN & TC1270A)



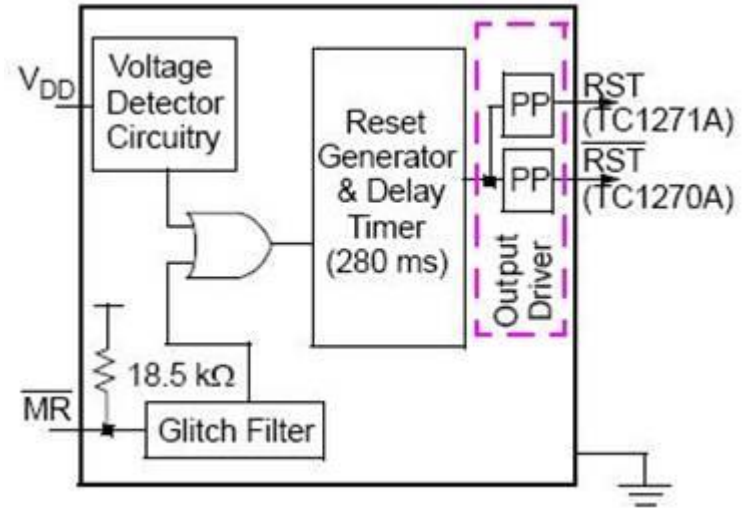
## Features:

- Precision Voltage Monitor: 2.63V, 2.93V, - 3.08V, 4.38V and 4.63V trip points (typ.)
- Manual Reset Input
- Reset Time-Out Delay:
  - Standard: 280ms (typ.)
  - Optional: 2.19ms, and 35ms (typ.)
- Power Consumption  $\leq 15\mu\text{A}$  (max.)
- Active Low Output Options:
  - Push-Pull Output and Open-Drain Output
- Active High Output Option: Push-Pull Output
- Replacement for (Specification compatible):
  - TC1270, TC1271, TCM811, TCM812
- Low Voltage Operation: (1.0V)
- ESD protection:
  - $\geq 4\text{kV}$  Human Body Model (HBM)
  - $\geq 400\text{V}$  Machine Model (MM)
- Extended (E) Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options:
  - 4-lead SOT-143, 5-lead SOT-23
- Recommended for Automotive Design
  - (TC1270AN & TC1270A)



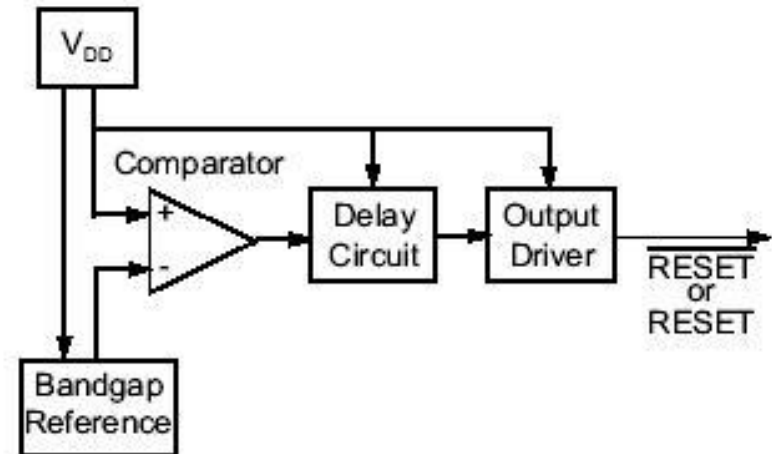
## Features:

- Precision Voltage Monitor: 2.63V, 2.93V, -  
- 3.08V, 4.38V and 4.63V trip points (typ.)
- Manual Reset input
- Reset Time-out Delay:
  - Standard: 280ms (typ.)
  - Optional: 2.19ms, and 35ms (typ.)
- Power Consumption  $\leq 15\mu\text{A}$  (max.)
- Active Low Output Options:
  - Push-Pull Output and Open-Drain Output
- Active High Output Option: Push-Pull Output
- Replacement for (Specification compatible):
  - TC1270, TC1271, TCM811, TCM812
- Low Voltage Operation: (1.0V)
- ESD protection:
  - $\geq 4\text{kV}$  Human Body Model (HBM)
  - $\geq 400\text{V}$  Machine Model (MM)
- Extended (E) Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Package Options:
  - 4-lead SOT-143, 5-lead SOT-23
- Recommended for Automotive Design
  - (TC1270AN & TC1270A)



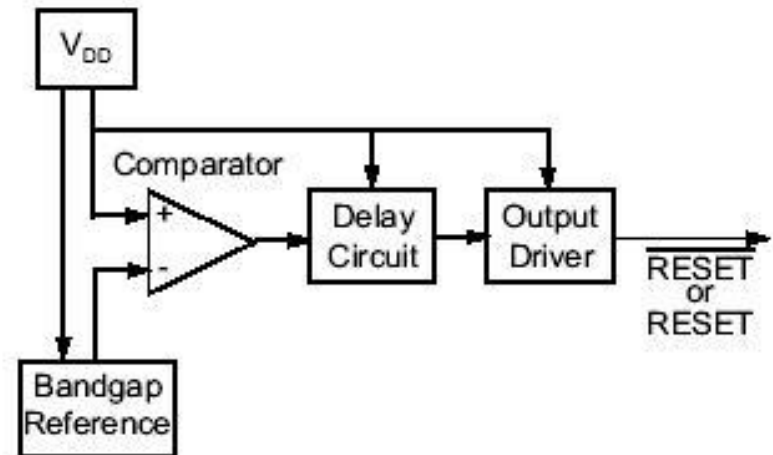
## Features:

- Holds Microcontroller in Reset until Supply
  - Voltage Reaches Stable Operating Level
- Resets Microcontroller during Power Loss
- Precision Monitoring of 3.0V, 3.3V, and 5V –  
- Systems
- 7 Voltage Trip Points Available
- Active Low RESET Pin (MCP100) of –  
- Active high RESET (MCP101)
- Push-Pull Output
- Holds RESET'/RESET for 350ms (typ.)
- RESET'/RESET to  $V_{DD} = 1.0V$
- Accuracy of  $\pm 125mV$  for 5V Systems -  
- and  $\pm 75mV$  for 3V Systems Over –  
- Temperature
- 45 $\mu A$  Typical Operating Current
- Temperature Range:
  - -40°C to +85°C



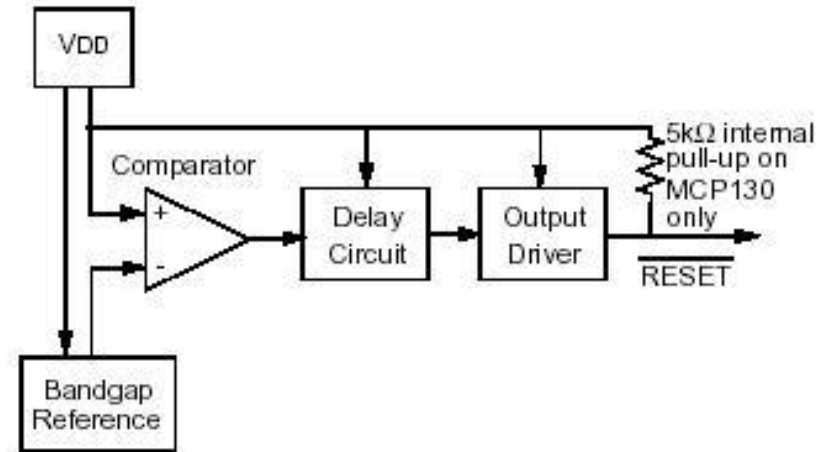
## Features:

- Holds Microcontroller in Reset until Supply –
  - Voltage Reaches Stable Operating Level
- Resets Microcontroller during Power Loss
- Precision Monitoring of 3.0V, 3.3V, and 5V –
  - Systems
- 7 Voltage Trip Points Available
- Active Low RESET Pin (MCP100) or Active –
  - high RESET (MCP101)
- Push-Pull Output
- Holds RESET'/RESET for 350ms (typ.)
- RESET'/RESET to  $V_{DD} = 1.0V$
- Accuracy of  $\pm 125mV$  for 5V Systems and  $\pm 75$  –
  - mV for 3V Systems Over Temperature
- 45 $\mu A$  Typical Operating Current
- Temperature Range:
  - -40°C to +85°C



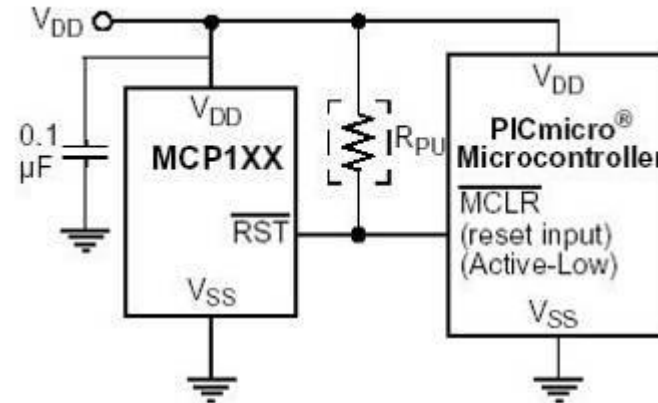
## Features:

- Holds Microcontroller in Reset until Supply –
  - Voltage Reaches Stable Operating Level
- Resets Microcontroller during Power Loss
- Precision Monitoring of 3.0V, 3.3V, and 5V –
  - Systems
- 7 Voltage Trip Points Available
- Active Low RESET Pin
- Open Drain Output
- Internal Pull-Up Resistor: 5k $\Omega$  (MCP130)
- Holds RESET for 350ms (typ.)
- RESET to  $V_{DD} = 1.0V$
- Accuracy of  $\pm 125mV$  for 5V Systems –
  - and  $\pm 75mV$  for 3V Systems Over –
    - Temperature
- 45 $\mu A$  (typ.) Operating Current
- Temperature Range:
  - -40 $^{\circ}C$  to +85 $^{\circ}C$
- Recommended for Automotive Design (MCP130)

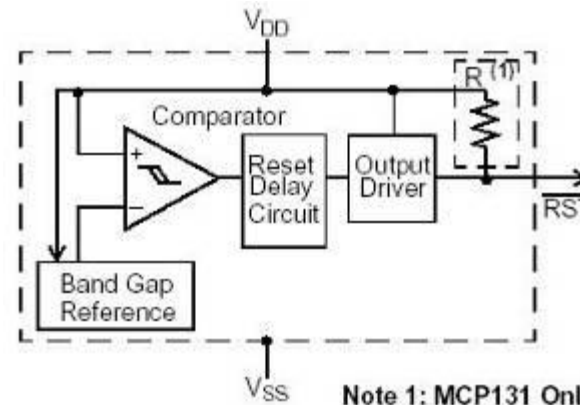


## Features:

- Ultra Low Supply Current: 1.75 $\mu$ A (max.)
- Precision Monitoring of: 1.90V, 2.32V, -  
- 2.63V, 2.93V, 3.08V, 4.38V and 4.63V
- Resets Microcontroller during Power Loss
- Active Low RESET Pin
- MCP121: Active-Low, Open-Drain
- MCP131: Active-Low, Open-Drain with –  
- Internal Pull-Up Resistor Reset Delay Timer:  
- 120ms Delay (typ.)
- MCP102 and MCP103: Active-Low, Push-Pull
- Space Saving SOT-23-3, TO-92 and SC70 –  
- Packages
- Temperature Range:
  - -40°C to +125°C (except MCP1xx-195)
  - -40°C to +85°C
- Recommended for Automotive Design
  - MCP103/121/131



**Note 1:** Resistor  $R_{PU}$  may be required with the MCP121 due to the open-drain output. Resistor  $R_{PU}$  may not be required with the MCP131 due to the internal pull-up resistor. The MCP102 and MCP103 do not require the external pull-up resistor.

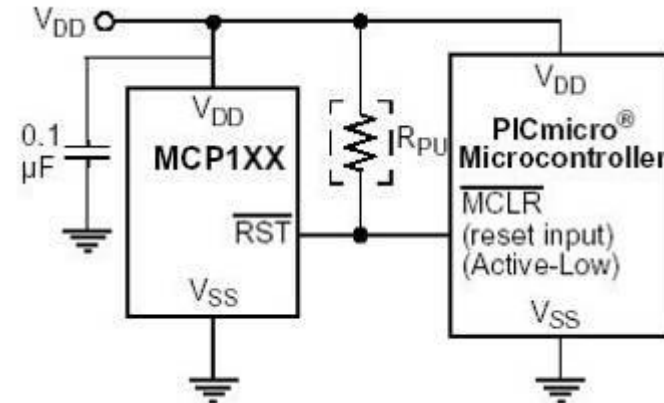


Note 1: MCP131 Only

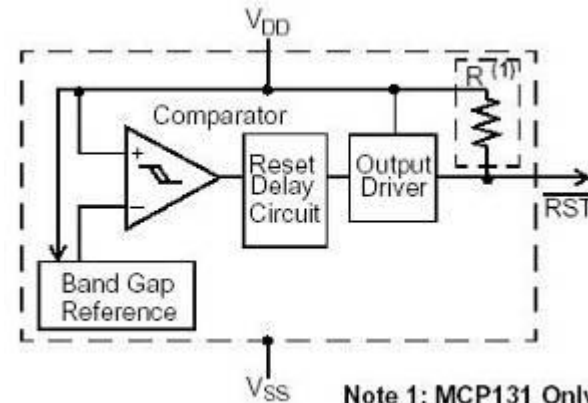


## Features:

- Ultra Low Supply Current: 1.75 $\mu$ A (max.)
- Precision Monitoring of: 1.90V, 2.32V, -  
- 2.63V, 2.93V, 3.08V, 4.38V and 4.63V
- Resets Microcontroller during Power Loss
- Active Low RESET Pin
- MCP121: Active-Low, Open-Drain
- MCP131: Active-Low, Open-Drain with –  
- Internal Pull-Up Resistor
- MCP102 and MCP103: Active-Low, Push-Pull
- Reset Delay Timer: 120ms Delay (typ.)
- Space Saving SOT-23-3, TO-92 and SC70 –  
- Packages
- Temperature Range:
  - -40°C to +125°C (except MCP1xx-195)
  - -40°C to +85°C
- Recommended for Automotive Design
  - MCP103/121/131



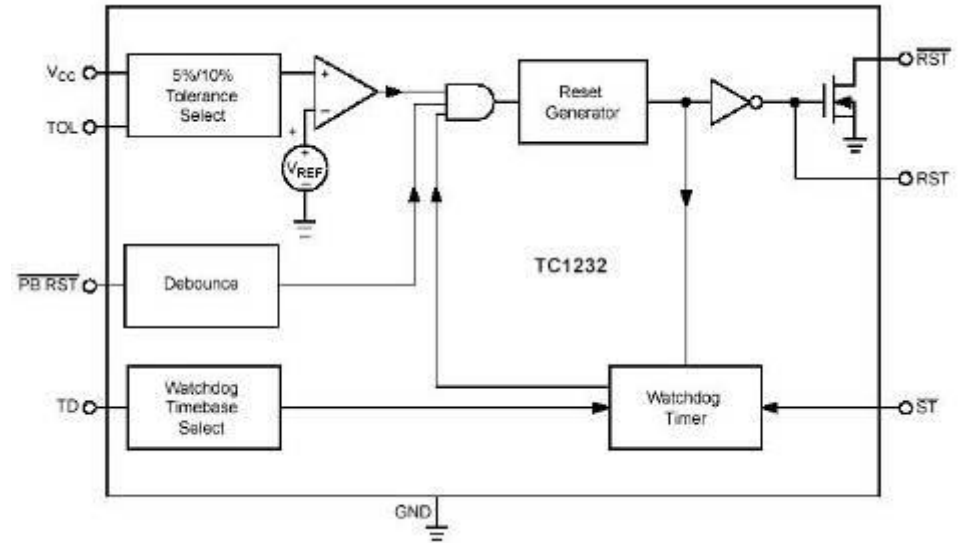
**Note 1:** Resistor  $R_{PU}$  may be required with the MCP121 due to the open-drain output. Resistor  $R_{PU}$  may not be required with the MCP131 due to the internal pull-up resistor. The MCP102 and MCP103 do not require the external pull-up resistor.



Note 1: MCP131 Only

## Features:

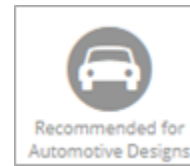
- Precision Voltage Monitor:
  - Adjustable +4.5V or +4.75V
- Reset Pulse Width: 250ms (min.)
- No External Components
- Adjustable Watchdog Timer:
  - 150ms, 600ms or 1.2s
- Debounced Manual Reset Input –  
- for External Override





# MCP1316/17/18/19/ 20/21/22

Voltage Supervisor

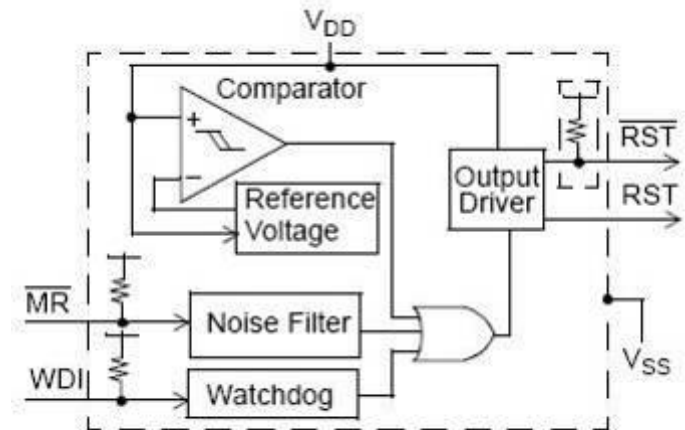


Online  
Datasheet

## Features:

- Low supply current: 1 $\mu$ A (typ.)
- Precision monitoring trip point options:
  - 2.9V and 4.6V (Standard)
  - 2.0V to 4.7V in 100 mV increments
- Resets MCU in a power loss event
- Reset Delay Time Out Option:
  - 1.4ms, 30ms, 200ms, or 1.6s (typ.)
- Watchdog Timer Input Time Out Options:
  - 6.3ms, 102ms, 1.6s, or 25.6s (typ.)
- Manual Reset (MR) Input (Active-low)
- Single and Complementary Reset Output(s)
- Reset Output Options:
  - Push-Pull (Active-high or Active-low)
  - Open-Drain (Internal or External Pull-up)
- Temperature Range:
  - -40°C to +85°C for trip points 2.0 to 2.4V
  - -40°C to +125°C for trip points > 2.5V
- Voltage Range: 1.0V to 5.5V
- Packages: SOT-23-5
- Recommended for Automotive Design

Device	Reset Output A			Reset Output B			WDI Input	$\overline{\text{MR}}$ Input
	Type	Pull-up Resistor	Active Level	Type	Pull-up Resistor	Active Level		
MCP1316	Push-Pull	—	Low	—	—	—	Yes	Yes
MCP1316M	Open-Drain	Internal	Low	—	—	—	Yes	Yes
MCP1317	Push-Pull	—	High	—	—	—	Yes	Yes
MCP1318	Push-Pull	—	Low	Push-Pull	—	High	Yes	No
MCP1318M	Open-Drain	Internal	Low	Push-Pull	—	High	Yes	No
MCP1319	Push-Pull	—	Low	Push-Pull	—	High	No	Yes
MCP1319M	Open-Drain	Internal	Low	Push-Pull	—	High	No	Yes
MCP1320	Open-Drain	External	Low	—	—	—	Yes	Yes
MCP1321	Open-Drain	External	Low	Push-Pull	—	High	Yes	No
MCP1322	Open-Drain	External	Low	Push-Pull	—	High	No	Yes



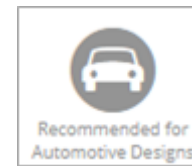
Note: Features available depend on the device

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# MCP1316/17/18/19/ 20/21/22

Voltage Supervisor

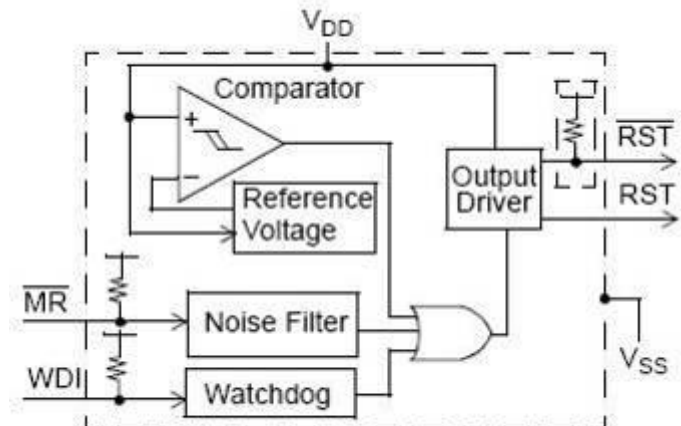


Online  
Datasheet

## Features:

- Low supply current: 1 $\mu$ A (typ.)
- Precision monitoring trip point options:
  - 2.9V and 4.6V (Standard)
  - 2.0V to 4.7V in 100 mV increments
- Resets MCU in a power loss event
- Reset Delay Time Out Option:
  - 1.4ms, 30ms, 200ms, or 1.6s (typ.)
- Watchdog Timer Input Time Out Options:
  - 6.3ms, 102ms, 1.6s, or 25.6s (typ.)
- Manual Reset (MR) Input (Active-low)
- Single and Complementary Reset Output(s)
- Reset Output Options:
  - Push-Pull (Active-high or Active-low)
  - Open-Drain (Internal or External Pull-up)
- Temperature Range:
  - -40°C to +85°C for trip points 2.0-2.4V
  - -40°C to + 125°C for trip points > 2.5V
- Voltage Range: 1.0V to 5.5V
- Packages: SOT-23-5
- Recommended for Automotive Design

Device	Reset Output A			Reset Output B			WDI Input	$\overline{\text{MR}}$ Input
	Type	Pull-up Resistor	Active Level	Type	Pull-up Resistor	Active Level		
MCP1316	Push-Pull	—	Low	—	—	—	Yes	Yes
MCP1316M	Open-Drain	Internal	Low	—	—	—	Yes	Yes
MCP1317	Push-Pull	—	High	—	—	—	Yes	Yes
MCP1318	Push-Pull	—	Low	Push-Pull	—	High	Yes	No
MCP1318M	Open-Drain	Internal	Low	Push-Pull	—	High	Yes	No
MCP1319	Push-Pull	—	Low	Push-Pull	—	High	No	Yes
MCP1319M	Open-Drain	Internal	Low	Push-Pull	—	High	No	Yes
MCP1320	Open-Drain	External	Low	—	—	—	Yes	Yes
MCP1321	Open-Drain	External	Low	Push-Pull	—	High	Yes	No
MCP1322	Open-Drain	External	Low	Push-Pull	—	High	No	Yes



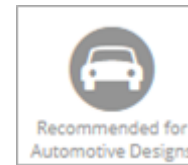
Note: Features available depend on the device

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# MCP1316/17/18/19/ 20/21/22

Voltage Supervisor

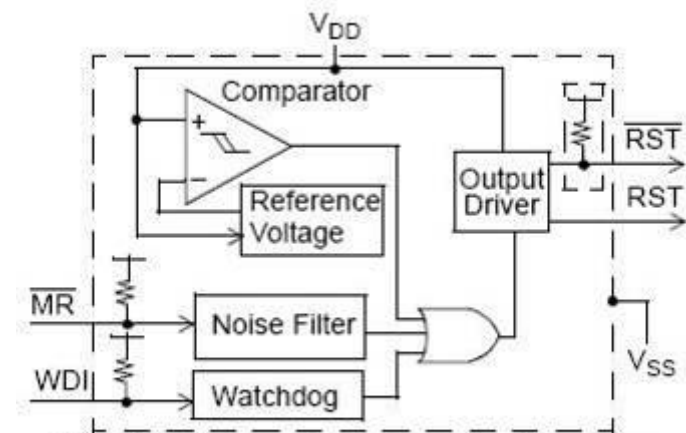


Online  
Datasheet

## Features:

- Low supply current: 1 $\mu$ A (typ.)
- Precision monitoring trip point options:
  - 2.9V and 4.6V (Standard)
  - 2.0V to 4.7V in 100 mV increments
- Resets MCU in a power loss event
- Reset Delay Time Out Option:
  - 1.4ms, 30ms, 200ms, or 1.6s (typ.)
- Watchdog Timer Input Time Out Options:
  - 6.3ms, 102ms, 1.6s, or 25.6s (typ.)
- Manual Reset (MR) Input (Active-low)
- Single and Complementary Reset Output(s)
- Reset Output Options:
  - Push-Pull (Active-high or Active-low)
  - Open-Drain (Internal or External Pull-up)
- Temperature Range:
  - -40°C to +85°C for trip points 2.0 to 2.4V
  - -40°C to +125°C for trip points > 2.5V
- Voltage Range: 1.0V to 5.5V
- Packages: SOT-23-5
- Recommended for Automotive Design

Device	Reset Output A			Reset Output B			WDI Input	$\overline{\text{MR}}$ Input
	Type	Pull-up Resistor	Active Level	Type	Pull-up Resistor	Active Level		
MCP1316	Push-Pull	—	Low	—	—	—	Yes	Yes
MCP1316M	Open-Drain	Internal	Low	—	—	—	Yes	Yes
MCP1317	Push-Pull	—	High	—	—	—	Yes	Yes
MCP1318	Push-Pull	—	Low	Push-Pull	—	High	Yes	No
MCP1318M	Open-Drain	Internal	Low	Push-Pull	—	High	Yes	No
MCP1319	Push-Pull	—	Low	Push-Pull	—	High	No	Yes
MCP1319M	Open-Drain	Internal	Low	Push-Pull	—	High	No	Yes
MCP1320	Open-Drain	External	Low	—	—	—	Yes	Yes
MCP1321	Open-Drain	External	Low	Push-Pull	—	High	Yes	No
MCP1322	Open-Drain	External	Low	Push-Pull	—	High	No	Yes



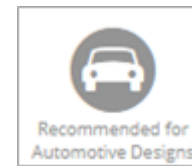
Note: Features available depend on the device

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# MCP1316/17/18/19/ 20/21/22

Voltage Supervisor

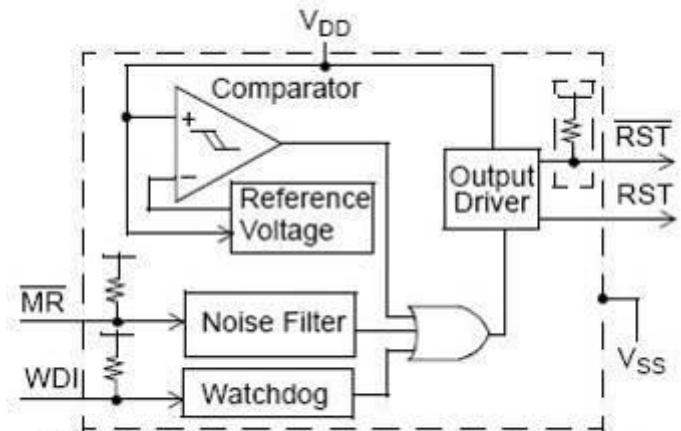


Online  
Datasheet

## Features:

- Low supply current: 1 $\mu$ A (typ.)
- Precision monitoring trip point options:
  - 2.9V and 4.6V (Standard)
  - 2.0V to 4.7V in 100 mV increments
- Resets MCU in a power loss event
- Reset Delay Time Out Option:
  - 1.4ms, 30ms, 200ms, or 1.6s (typ.)
- Watchdog Timer Input Time Out Options:
  - 6.3ms, 102ms, 1.6s, or 25.6s (typ.)
- Manual Reset (MR) Input (Active-low)
- Single and Complementary Reset Output(s)
- Reset Output Options:
  - Push-Pull (Active-high or Active-low)
  - Open-Drain (Internal or External Pull-up)
- Temperature Range:
  - -40°C to +85°C for trip points 2.0 to 2.4V
  - -40°C to +125°C for trip points > 2.5V
- Voltage Range: 1.0V to 5.5V
- Packages: SOT-23-5
- Recommended for Automotive Design

Device	Reset Output A			Reset Output B			WDI Input	$\overline{\text{MR}}$ Input
	Type	Pull-up Resistor	Active Level	Type	Pull-up Resistor	Active Level		
MCP1316	Push-Pull	—	Low	—	—	—	Yes	Yes
MCP1316M	Open-Drain	Internal	Low	—	—	—	Yes	Yes
MCP1317	Push-Pull	—	High	—	—	—	Yes	Yes
MCP1318	Push-Pull	—	Low	Push-Pull	—	High	Yes	No
MCP1318M	Open-Drain	Internal	Low	Push-Pull	—	High	Yes	No
MCP1319	Push-Pull	—	Low	Push-Pull	—	High	No	Yes
MCP1319M	Open-Drain	Internal	Low	Push-Pull	—	High	No	Yes
MCP1320	Open-Drain	External	Low	—	—	—	Yes	Yes
MCP1321	Open-Drain	External	Low	Push-Pull	—	High	Yes	No
MCP1322	Open-Drain	External	Low	Push-Pull	—	High	No	Yes

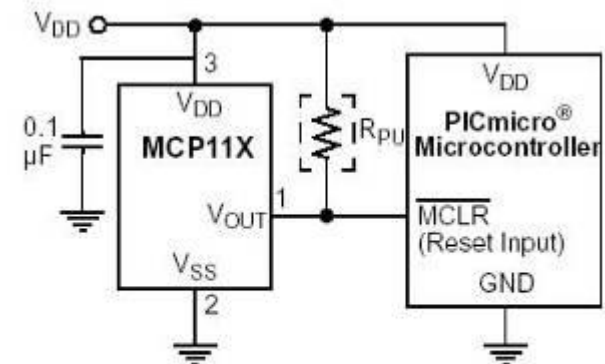
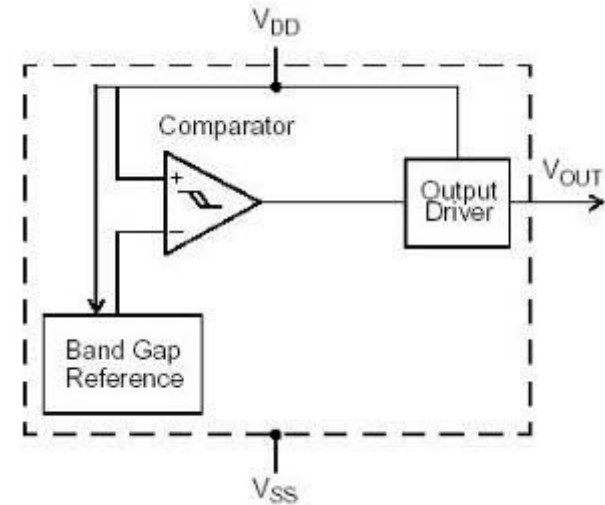


Note: Features available depend on the device

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## Features:

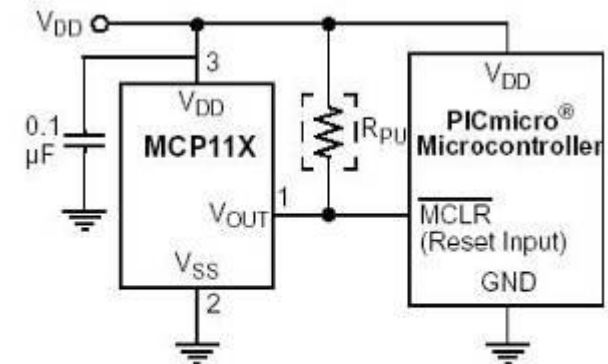
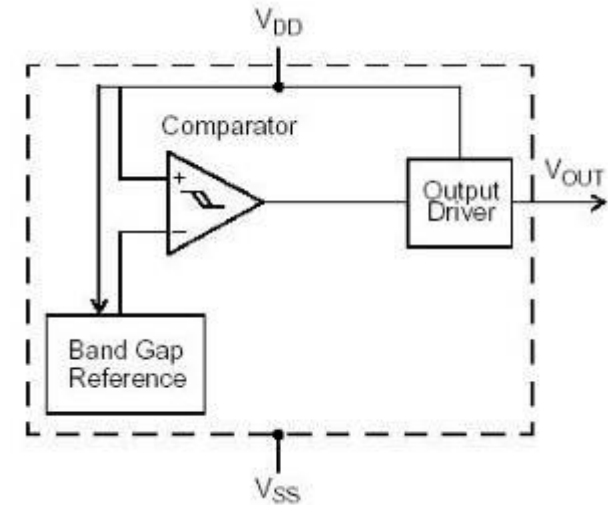
- Low Supply Current: 1.75 $\mu$ A (max.)
- Precision Monitoring Options:
  - 1.90V, 2.32V, 2.63V, 2.90V, 2.93V, -
  - - 3.08V, 4.38V and 4.63V
- Resets Microcontroller in a Power-loss Event
- Active-low VOUT Pin:
  - MCP111: Active-low, Open-drain
  - MCP112: Active-low, Push-pull
- Temperature Range:
  - -40°C to +125°C (except MCP1xx-195)
  - -40°C to +85°C
- Packages: SC-70, SOT23-3 and TO-92
- Recommended for Automotive Designs



**Note 1:** R<sub>PU</sub> may be required with the MCP111 due to the open-drain output. Resistor R<sub>PU</sub> is not required with the MCP112.

## Features:

- Low Supply Current: 1.75 $\mu$ A (max.)
- Precision Monitoring Options:
  - 1.90V, 2.32V, 2.63V, 2.90V, 2.93V, 3.08V,
  - 4.38V and 4.63V
- Resets Microcontroller in a Power-loss Event
- Active-low VOUT Pin:
  - MCP111: Active-low, Open-drain
  - MCP112: Active-low, Push-pull
- Temperature Range:
  - -40°C to +125°C (except MCP1xx-195)
  - -40°C to +85°C
- Packages: SC-70, SOT23-3 and TO-92
- Recommended for Automotive Design

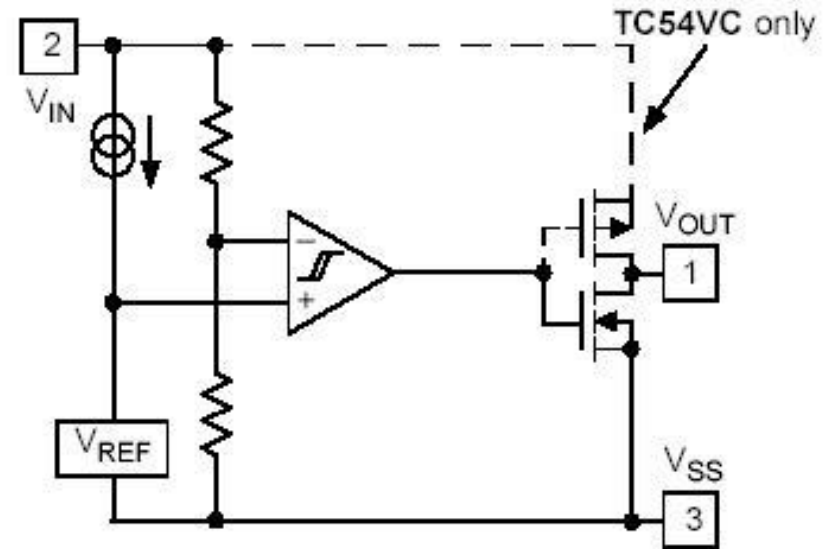


**Note 1:** R<sub>PU</sub> may be required with the MCP111 due to the open-drain output. Resistor R<sub>PU</sub> is not required with the MCP112.



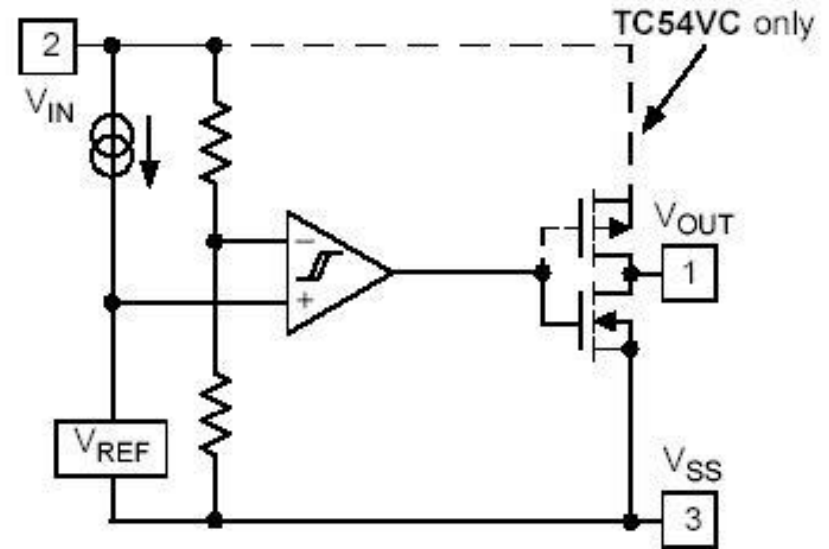
## Features:

- Precise Detection Thresholds:
  - Standard  $\pm 2.0\%$ , Custom  $\pm 1.0\%$
- Small Packages:
  - 3-Pin SOT-23A
  - 3-Pin SOT-89
- Low Current Drain:  $1\mu\text{A}$  (typ.)
- Wide Detection Range:
  - 1.1V to 6.0V
- Wide Operating Voltage Range:
  - 0.7V to 10V
- Packages: 3-pin SOT-23A and SOT-89



## Features:

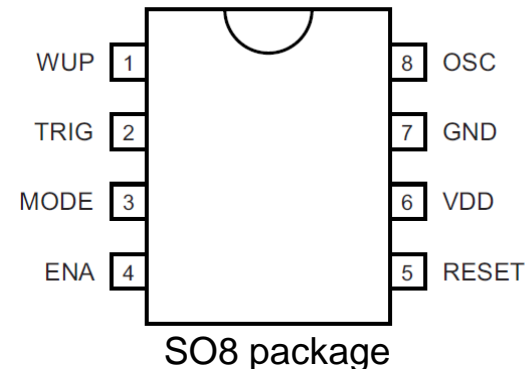
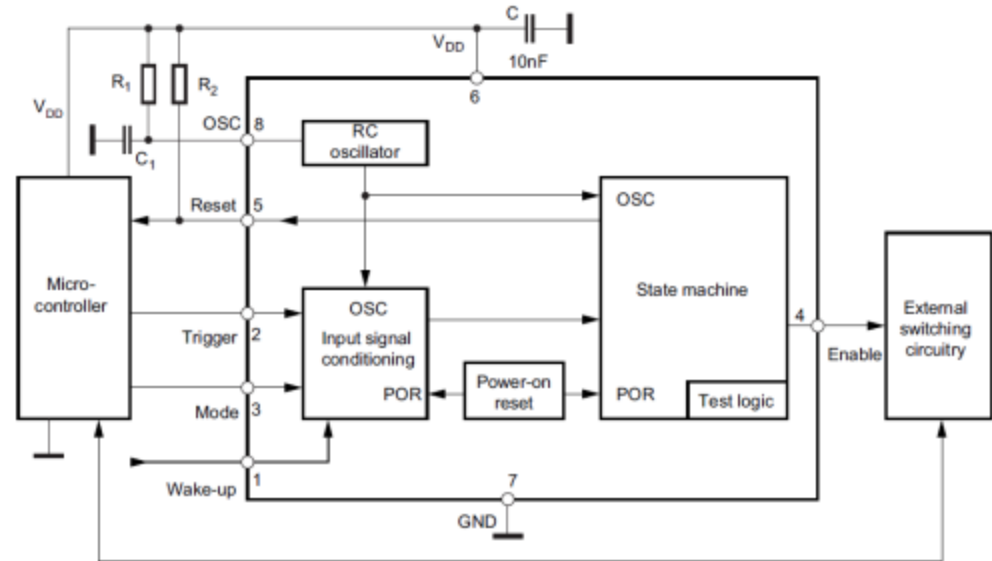
- Precise Detection Thresholds:
- Standard  $\pm 2.0\%$ , Custom  $\pm 1.0\%$
- Small Packages:
  - 3-Pin SOT-23A
  - 3-Pin SOT-89
- Low Current Drain:  $1\mu\text{A}$  (typ.)
- Wide Detection Range:
  - 1.1V to 6.0V
- Wide Operating Voltage Range:
  - 0.7V to 10V
- Packages: 3-pin SOT-23A and SOT-89



TC54VN has open-drain output.  
TC54VC has complementary output.

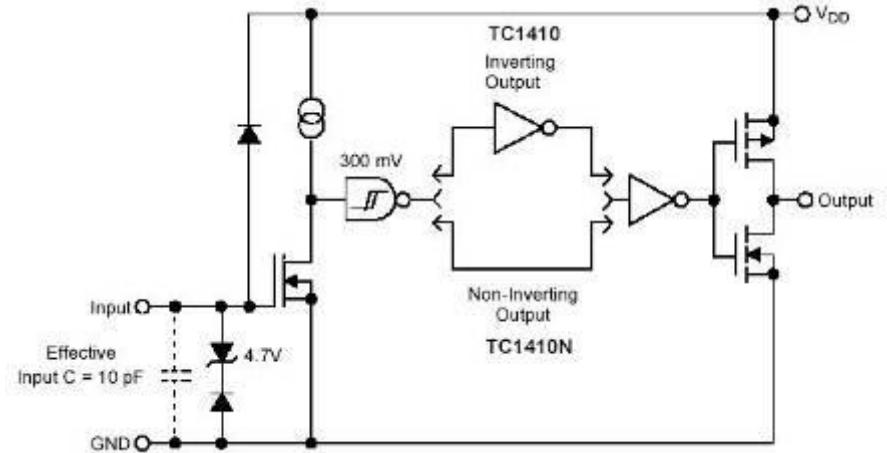
## Features:

- Low current consumption:
  - $I_{VDD} < 25\mu A$
- RC oscillator
- Internal reset during power-up and –  
– supply voltage drops (POR)
- “Short” trigger window for active mode
- “Long” trigger window for sleep mode
- Cyclical wake-up of the microcontroller –  
– in sleep mode
- Trigger input
- Single wake-up input
- Reset output
- Enable output
- Qualified according to AEC-Q100



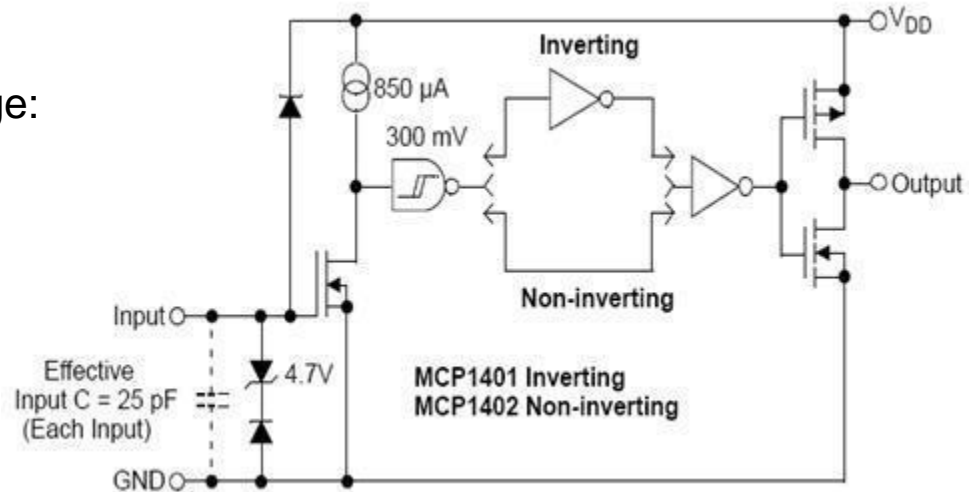
## Features:

- Latch-Up Protected:
  - Will Withstand 500mA Reverse Current
- Input Will Withstand Negative Inputs Up to 5V
- ESD Protected: 4kV
- High Peak Output Current: 0.5A
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 16V
- High Capacitive Load Drive Capability:
  - 500pF in 25ns (typ.)
- Short Delay Time: 30ns (typ.)
- Consistent Delay Times With Changes in –
  - Supply Voltage
- Matched Delay Times
- Low Supply Current
  - With Logic '1' Input: 500 $\mu$ A
  - With Logic '0' Input: 100 $\mu$ A
- Low Output Impedance: 16 $\Omega$
- Pinout Same as TC1411/TC1412/TC1413
- Packages: 8-pin MSOP



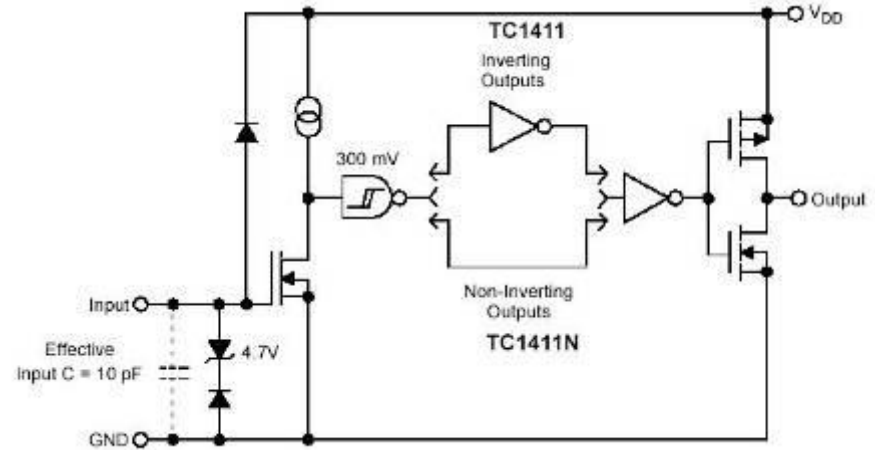
## Features:

- High Peak Output Current: 500mA (typ.)
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- Low Shoot-Through/Cross-Conduction –  
- Current in Output Stage
- High Capacitive Load Drive Capability:
  - 470pF in 19ns (typ.)
  - 1000pF in 34ns (typ.)
- Short Delay Times: 35ns (typ.)
- Matched Rise/Fall Times
- Low Supply Current:
  - With Logic '1' Input – 0.85mA (typ.)
  - With Logic '0' Input – 0.10mA (typ.)
- Latch-Up Protected: Will Withstand 500mA –  
- Reverse Current
- Logic Input Will Withstand Negative Swing –  
- Up To 5V
- Packages: 5-Pin SOT-23
- Recommended for Automotive Design  
(MCP1401)



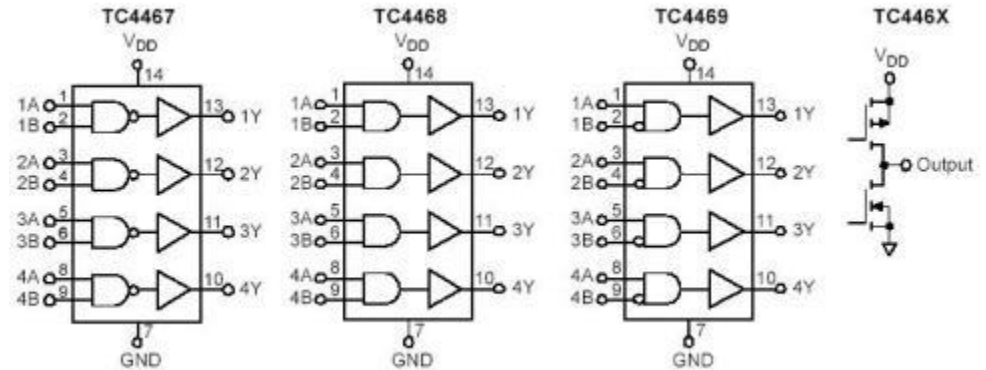
## Features:

- Latch-Up Protected: Will Withstand 500mA –  
- Reverse Current
- Input Will Withstand Negative Inputs Up to 5V
- ESD Protected: 4kV
- High Peak Output Current: 1A
- Wide Input Supply Voltage Operating
  - Range: 4.5V to 16V
- High Capacitive Load Drive Capability:
  - 1000pF in 25ns (typ.)
- Short Delay Time: 30ns (typ.)
- Matched Delay Times
- Low Supply Current
  - With Logic '1' Input: 500 $\mu$ A
  - With Logic '0' Input: 100 $\mu$ A
- Low Output Impedance: 8 $\Omega$
- Available in Space-Saving 8-pin MSOP Package
- Pinout Same as TC1410/TC1412/TC1413



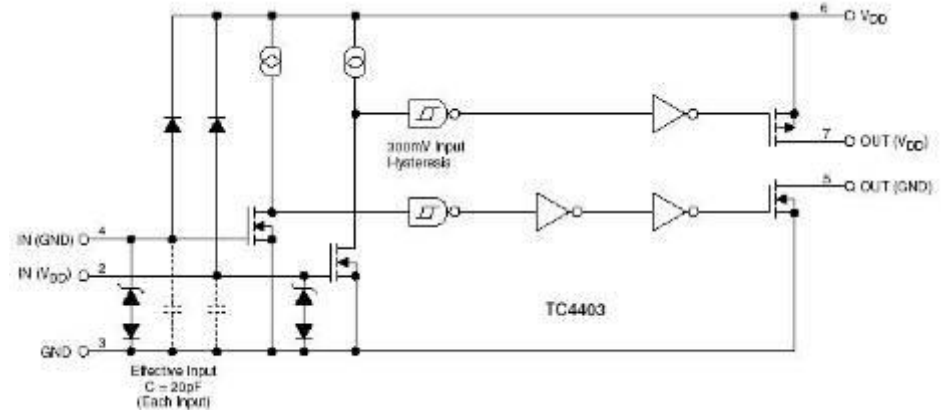
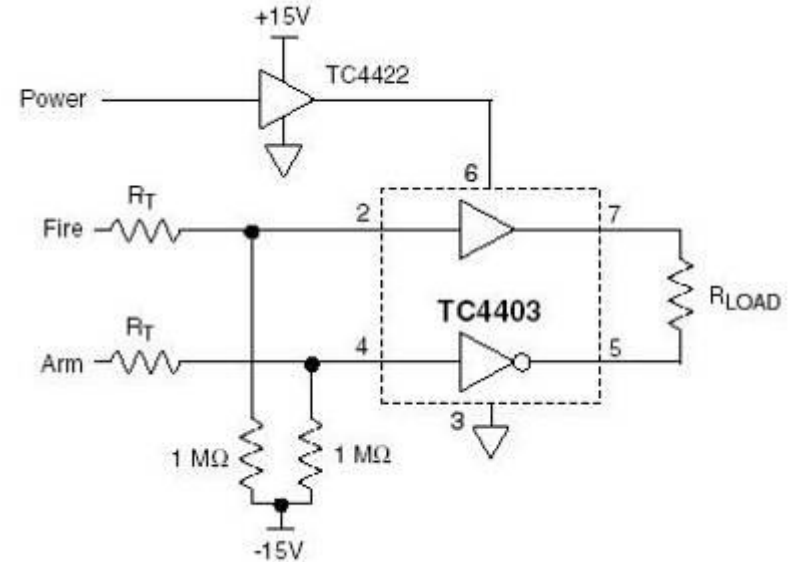
## Features:

- High Peak Output Current: 1.2A
- Wide Operating Range: 4.5V to 18V
- Symmetrical Rise/Fall Times: 25ns
- Short, Equal Delay Times: 75ns
- Latch-proof. Will Withstand 500mA –  
- Inductive Kickback
- 3 Input Logic Choices: AND / NAND / -  
- AND + Inv
- ESD Protection on all pins: 2kV



## Features:

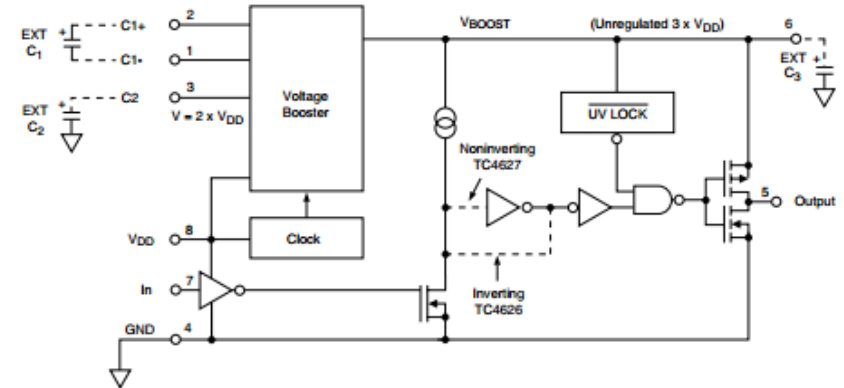
- Low Quiescent Current: 300 $\mu$ A (max.)
- Capacitive Inputs With 300mV Hysteresis
- Both Inputs Must Be Driven to Drive Load
- Low Output Leakage
- High Peak Current Capability
- Fast Output Rise Time
- Outputs Individually Testable





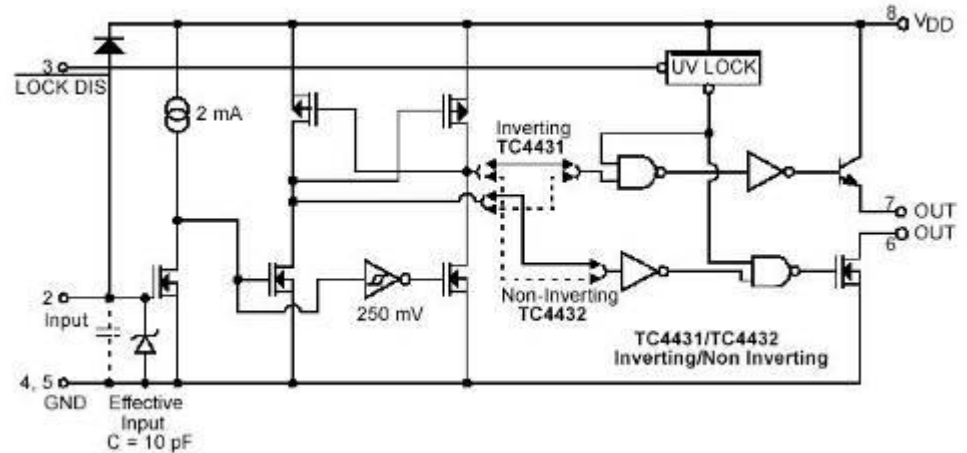
## Features:

- Power Driver With On Board Voltage Booster
- Low  $I_{DD}$ : <4mA
- Small Package: 8-Pin PDIP
- Under-Voltage Circuitry
- Fast Rise-Fall Time: <40ns @1000pF
- Below-Rail Input Protection



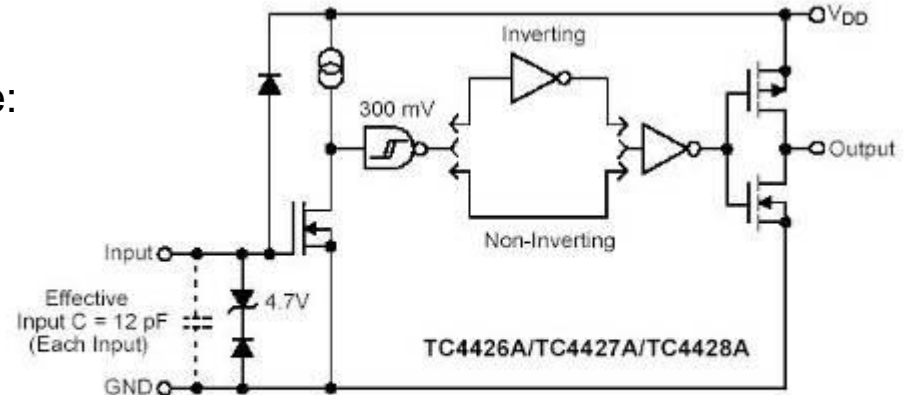
## Features:

- High Peak Output Current: 1.5A
- Wide Operating Range: 4.5V to 30V
- High Capacitive Load Drive –
  - Capability: 1000pF in 25ns
- Short Delay Times: < 78ns (typ.)
- Low Supply Current:
  - With Logic '1' Input: 2.5mA
  - With Logic '0' Input: 300µA
- Low Output Impedance: 7Ω (typ.)
- Latch-Up Protected: Will Withstand -
  - > 300mA Reverse Current
- ESD Protected: 4kV
- Recommended for Automotive Design (TC4431)



### Features:

- High Peak Output Current: 1.5A
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- High Capacitive Load Drive Capability:
  - 1000pF in 25ns (typ.)
- Short Delay Times: 30ns (typ.)
- Matched Rise, Fall and Delay Times
- Low Supply Current:
  - With Logic '1' Input: 1mA (typ.)
  - With Logic '0' Input: 100µA (typ.)
- Low Output Impedance: 7Ω (typ.)
- Latch-Up Protected: Will Withstand 0.5A –  
- Reverse Current
- Input Will Withstand Negative Inputs Up to 5V
- ESD Protected: 4kV
- Pin-compatible with TC426/27/28 and -  
- TC4426/27/28
- 8-Pin MSOP and 8-Pin 6x5 DFN Packages
- Recommended for Automotive Design  
(TC4426A/27/28)

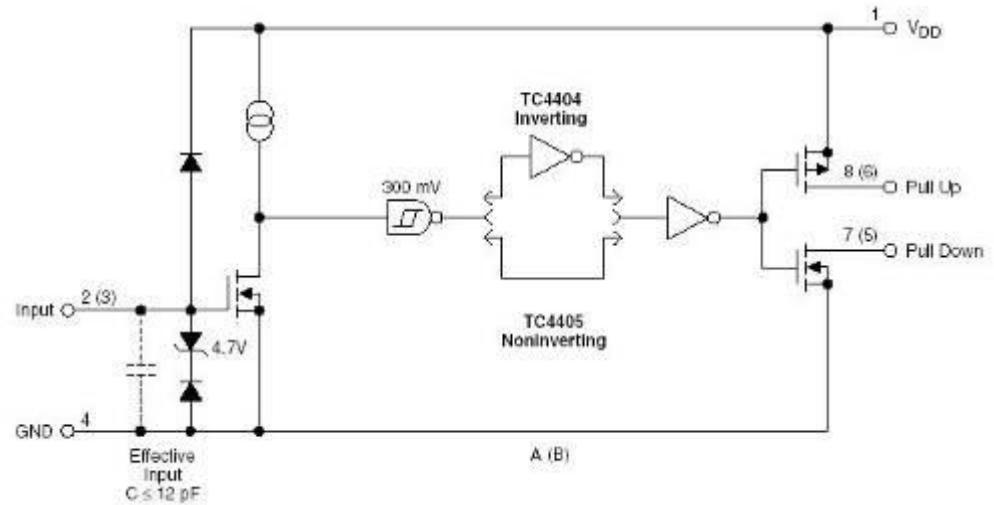


**Note 1:** TC4426A has two inverting drivers; TC4427A has two non-inverting drivers; TC4428A has one inverting and one non-inverting driver.

**2:** Ground any unused driver input.

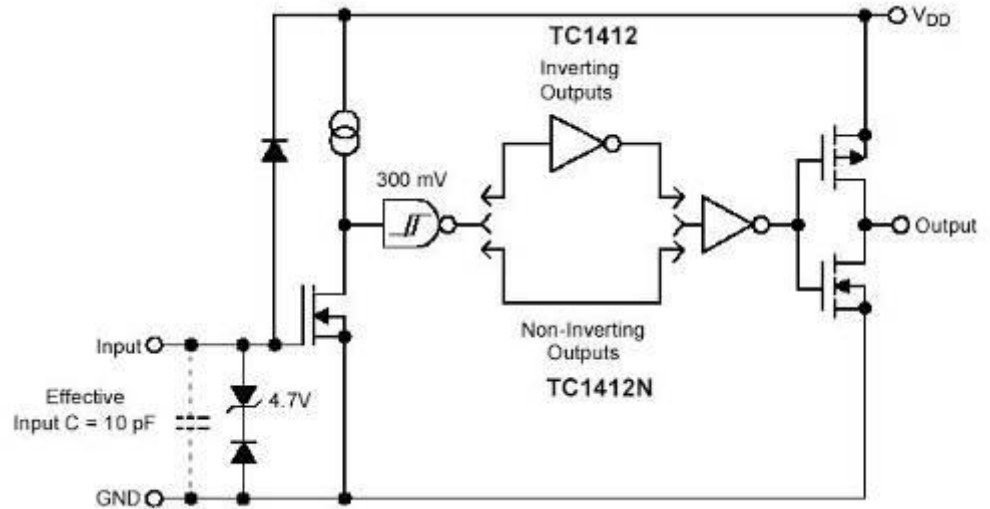
## Features:

- Independently-Programmable Rise –  
– and Fall Times
- Low Output Impedance: 7Ω (typ.)
- High Speed  $t_R$ ,  $t_F$ :
  - < 30ns with 1000pF Load
- Short Delay Times: < 30ns
- Wide Operating Range: 4.5V to 18V
- Latch-Up Protected:
  - Will Withstand > 500mA
  - Reverse Current (Either Polarity)
- Input Withstands Negative Swings –  
– Up to -5V



## Features:

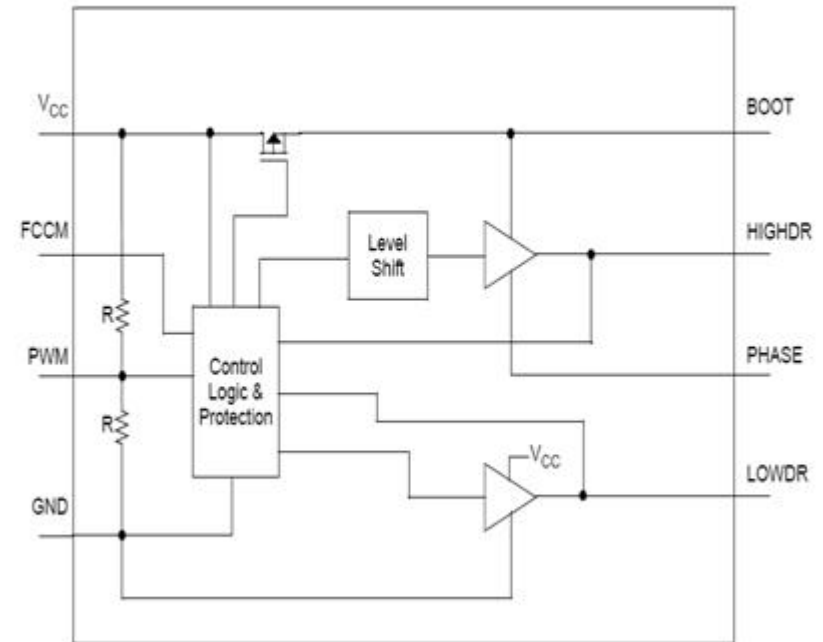
- High Peak Output Current: 2A
- Latch-Up Protected: Will Withstand –  
– 500mA Reverse Current
- Input Will Withstand Negative –  
– Inputs Up to 5V
- ESD Protected: 4kV
- Wide Operating Range: 4.5V to 16V
- High Capacitive Load Drive Capability:
  - 1000pF in 18ns
- Short Delay Time: 35ns (typ.)
- Matched Delay Times
- Low Supply Current:
  - With Logic '1' Input: 500 $\mu$ A (typ.)
  - With Logic '0' Input: 100 $\mu$ A (typ.)
- Low Output Impedance: 4 $\Omega$  (typ.)
- Pinout Same as TC1410/11/13
- Space Saving 8-Pin MSOP Package



### Features:

- Dual Output MOSFET Driver for –
  - Synchronous Applications
- High Peak Output Current: 2A (typ.)
- Adaptive Cross Conduction Protection
- Internal Bootstrap Blocking Device
- +36V BOOT Pin Maximum Rating
- Enhanced Light Load Efficiency Mode
- Low Supply Current: 80 $\mu$ A (typ.)
- High Capacitive Load Drive Capability:
  - 3300pF in 10ns (typ.)
- Tri-State PWM Pin for Power Stage Shutdown
- Input Voltage Under voltage Lockout Protection
- Space Saving Packages:
  - 8-Lead SOIC, 8-Lead 3x3 DFN

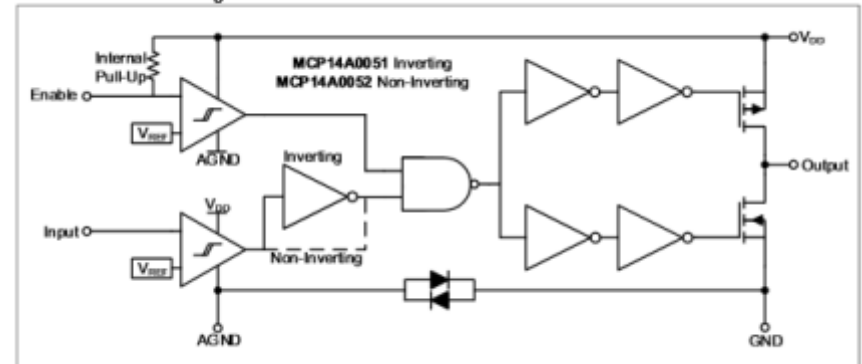
Functional Block Diagram



## Features:

- Peak Output Current: 0.5 A (typical)
- Wide Supply Voltage Range: 4.5 V to 18 V
- Low Shoot-Through/Cross-Conduction –  
- Current in Output Stage
- High Capacitive Load Drive Capability:
  - 1000 pF in 40 ns (typ.)
  - Short Delay: 33 ns ( $t_{D1}$ ), 24 ns ( $t_{D2}$ ) (typ.)
- Low Supply Current: 375  $\mu$ A (typ.)
- Low Voltage Threshold Input and Enable
  - Hysteresis: 1.2 to 1.6 V
- Latch-Up Protected:
  - Withstands 500 mA Reverse Current
- Small Packages: 6-lead SOT-23 and 2x2 DFN

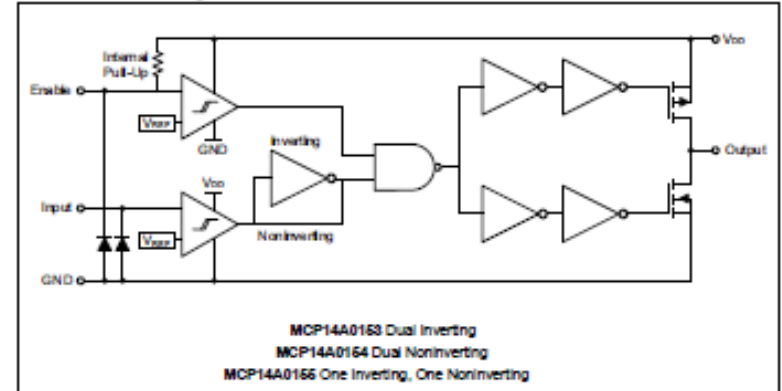
Functional Block Diagram



## Features:

- High Peak Output Current:
  - 1.5A (typical)
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- Low Shoot-Through/Cross-Conduction –
  - Current in Output Stage
- High Capacitive Load Drive Capability:
  - 1000 pF in 11.5 ns (typical)
- Short Delay Times: 25 ns ( $t_{D1}$ ), 24 ns ( $t_{D2}$ ) –
  - (typical)
- Low Supply Current: 750  $\mu$ A (typical)
- Low-Voltage Threshold Input and Enable –
  - with Hysteresis
- Latch-Up Protected: Withstands 500 mA –
  - Reverse Current
- Space-Saving Packages:
  - 8-Lead MSOP
  - 8-Lead SOIC
  - 8-Lead 2x3 TDFN

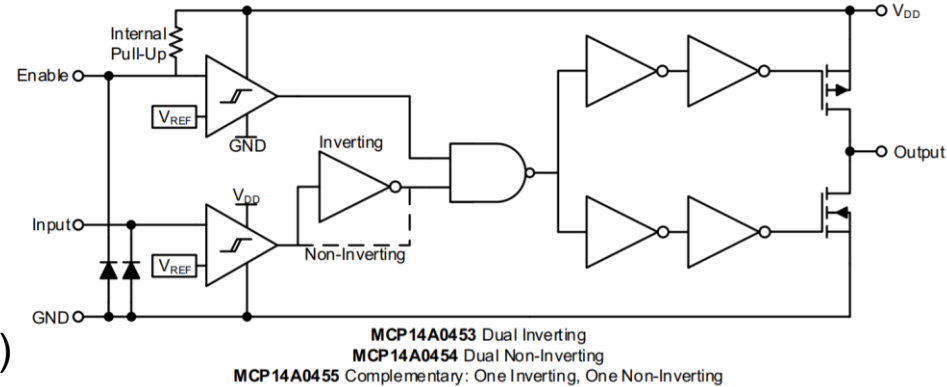
Functional Block Diagram



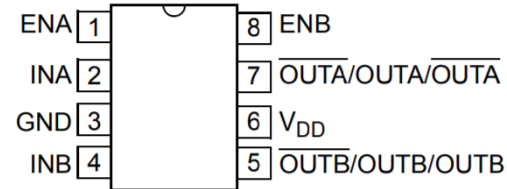


## Features:

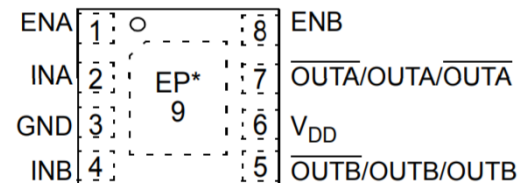
- Peak Output Current: 4.5 A
- Wide Supply Voltage Range: 4.5 V to 18 V
- Low Shoot-Through / Cross-Conduction Current in Output Stage
- High Capacitive Load Drive Capability:
  - 2200 pF in 12 ns, ( $t_r$  and  $t_f$ , typ.)
  - Short Delay: 16 ns ( $t_{D1}$ ), 19 ns ( $t_{D2}$ , typ.)
- Low Supply Current: 620  $\mu$ A (typ.)
- Low Voltage Threshold Input and Enable, with hysteresis, for use with low-voltage MCUs
  - 1.3 V to 1.6 V
- Latch-Up Protected:
  - Withstands 500 mA Reverse Current
- Small Packages:
  - 8- Lead MSOP
  - 8- Lead SOIC
  - 8- Lead 2x3 TDFN



### MCP14A0453/4/5 MSOP/SOIC

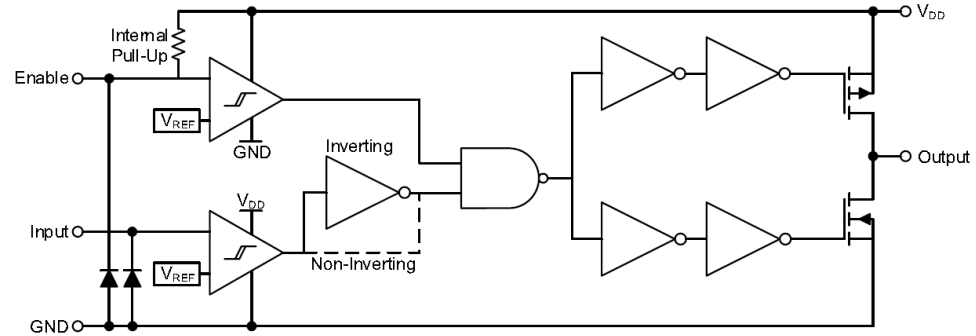


### MCP14A0453/4/5 2 x 3 TDFN\*



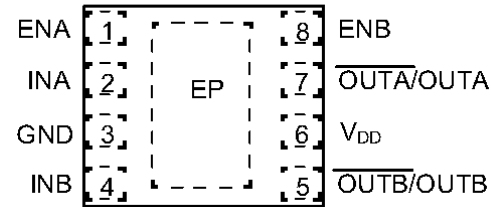
## Features:

- Peak Output Current: 3.0 A
- Wide Supply Voltage Range: 4.5 V to 18 V
- Low Shoot-Through / Cross-Conduction Current in Output Stage
- High Capacitive Load Drive Capability:
  - 1800 pF in 12 ns, ( $t_r$  and  $t_f$ , typ.)
  - Short Delay: 17 ns ( $t_{D1}$ ), 21 ns ( $t_{D2}$ , typ.)
- Low Supply Current: 620  $\mu$ A (typ.)
- Low Voltage Threshold Input and Enable, with hysteresis, for use with low-voltage MCUs
  - 1.3 V to 1.6 V
- Latch-Up Protected:
  - Withstands 500 mA Reverse Current
- Small Packages:
  - 8- Lead MSOP
  - 8- Lead SOIC
  - 8- Lead 2x3 TDFN

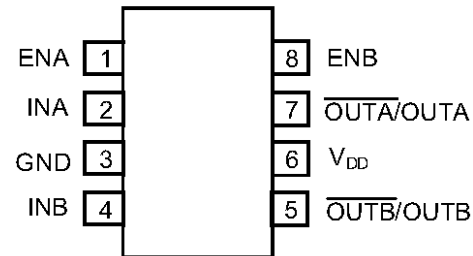


**MCP14A0303/4/5**

2 x 3 TDFN\*



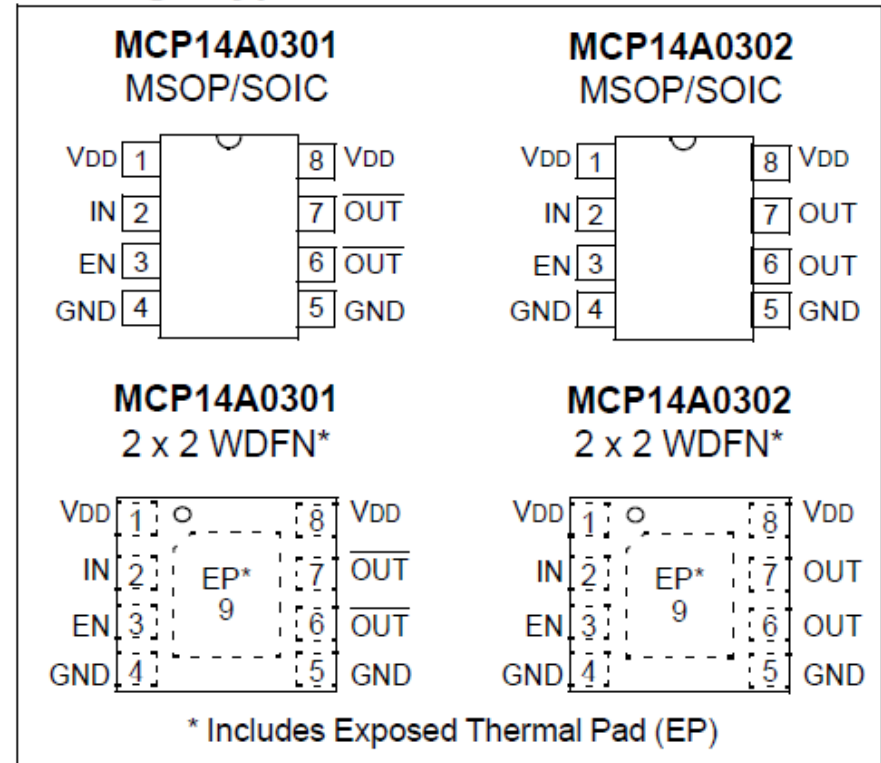
8-pin MSOP/SOIC



## Features:

- Peak Output Current: 3.0 A (typical)
- Wide Supply Voltage Range: 4.5 V to 18 V
- Low Shoot-Through/Cross-Conduction –  
- Current in Output Stage
- High Capacitive Load Drive Capability:
  - 1800 pF in 13 ns (typ.)
  - Short Delay: 15 ns (tD1), 18 ns (tD2) –  
- (typ.)
- Low Supply Current: 360  $\mu$ A (typ.)
- Low Voltage Threshold Input and Enable with Hysteresis
- Latch-Up Protected:
  - Withstands 500 mA Reverse Current
- Small Packages:
  - 8- Lead MSOP
  - 8- Lead SOIC
  - 8- Lead 2x2 WDFN

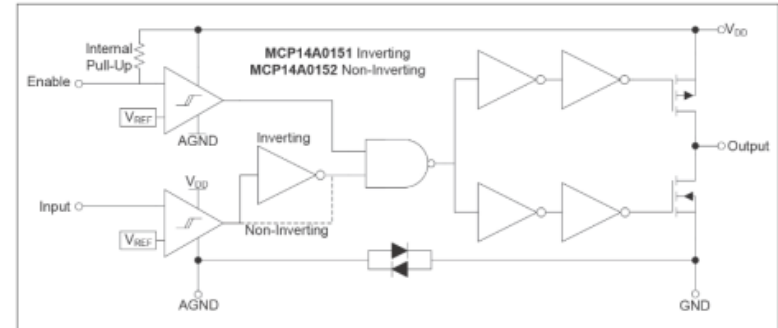
## Package Types



### Features:

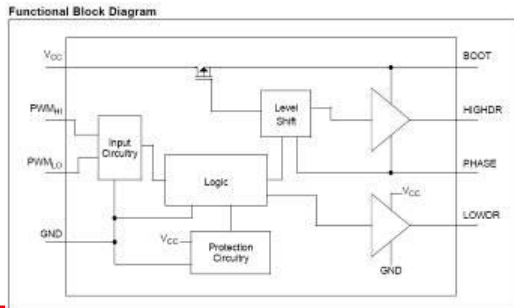
- Peak Output Current: 1.5 A (typical)
- Wide Supply Voltage Range: 4.5 V to 18 V
- Low Shoot-Through/Cross-Conduction Current –  
- in Output Stage
- High Capacitive Load Drive Capability:
  - 1000 pF in 11.5 ns (typ.)
  - Short Delay: 33 ns ( $t_{D1}$ ), 24 ns ( $t_{D2}$ ) (typ.)
- Low Supply Current: 375  $\mu$ A (typ.)
- Low Voltage Threshold Input and Enable
  - Hysteresis: 1.2 to 1.6 V
- Latch-Up Protected:
  - Withstands 500 mA Reverse Current
- Small Packages: 6-lead SOT-23 and 2x2 DFN

Functional Block Diagram

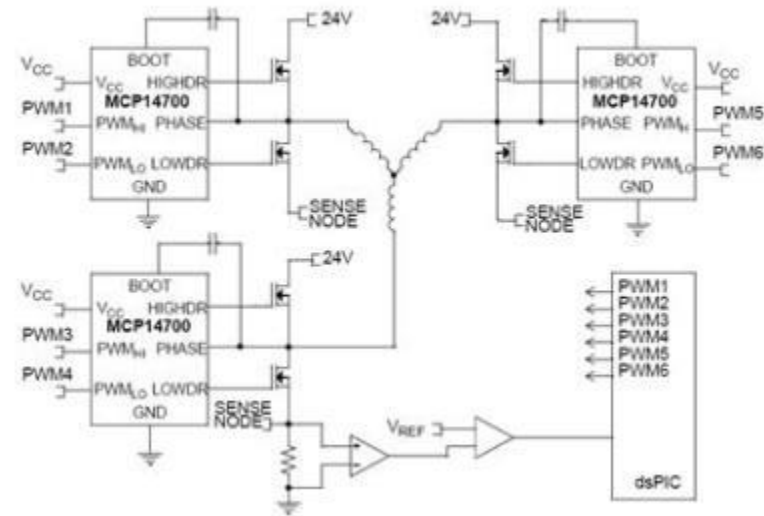


## Features:

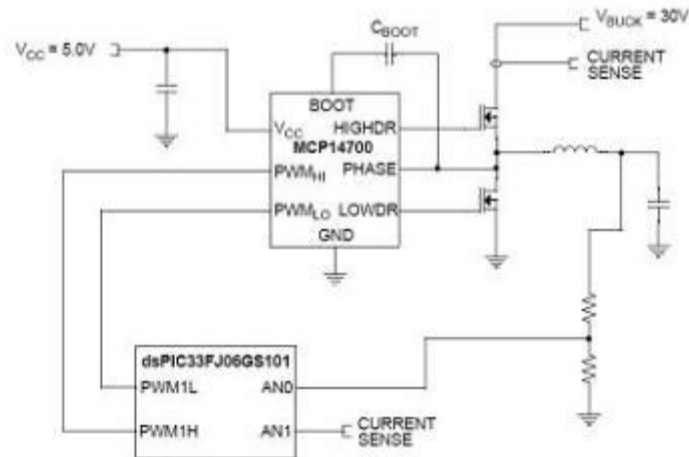
- Independent PWM Input Control for –
  - High-Side and Low-Side Gate Drive
- Logic Level Threshold 3.0V TTL Compatible
- Dual Output MOSFET Drive for Synchronous Applications
- High Peak Output Current: 2A (typ.)
- Internal Bootstrap Blocking Device
- +36V BOOT Pin Maximum Rating
- Low Supply Current: 45 $\mu$ A (typ.)
- High Capacitive Load Drive Capability:
  - 3300pF in 10.0ns (typ.)
- Under voltage Lockout Protection
- Over temperature Protection
- Packages: 8-Lead SOIC, 8-Lead 3x3 DFN
- Recommended for Automotive Design



3-Phase BLDC Motor Control Application



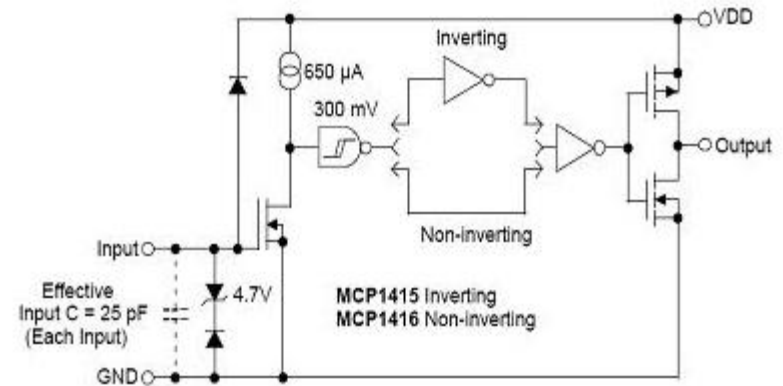
Synchronous Buck Application



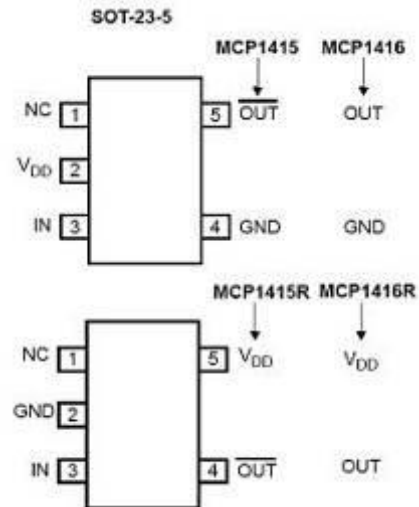
## Features:

- High Peak Output Current:
  - 1.5A (typ.)
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- Low Shoot-Through/Cross-Conduction -  
- Current in Output Stage
- High Capacitive Load Drive Capability:
  - 470pF in 13ns (typ.)
  - 1000pF in 20ns (typ.)
- Short Delay Times: 41ns ( $t_{D1}$ ), 48ns ( $t_{D2}$ ), (typ.)
- Low Supply Current:
  - With Logic '1' Input: 0.65mA (typ.)
  - With Logic '0' Input: 0.1mA (typ.)
- Latch-Up Protected: Will Withstand 500mA –  
- Reverse Current
- Logic Input Withstands Negative Swing up to 5V
- Space-saving 5-SOT-23 Package
- Recommended for Automotive Design

Functional Block Diagram

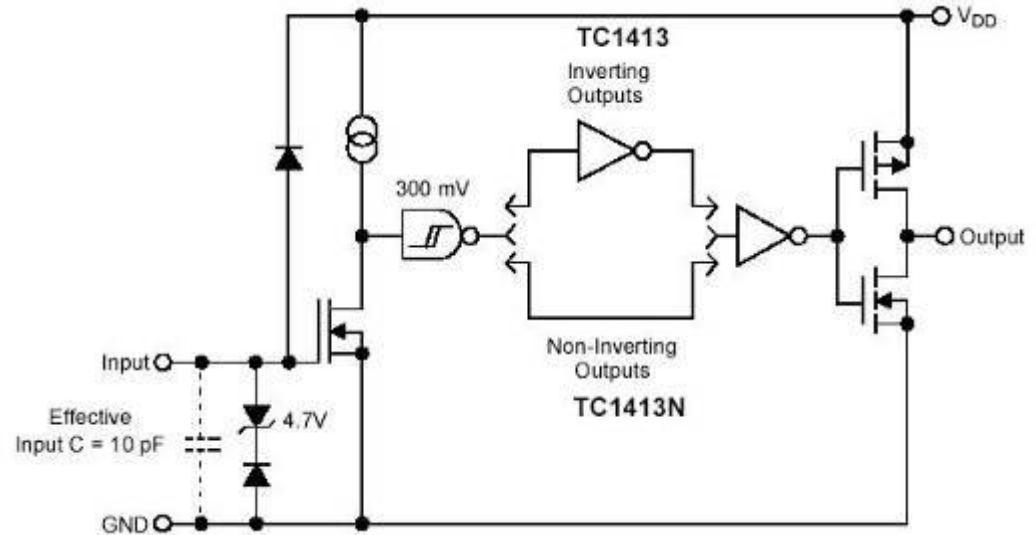


Note: Unused inputs should be grounded.



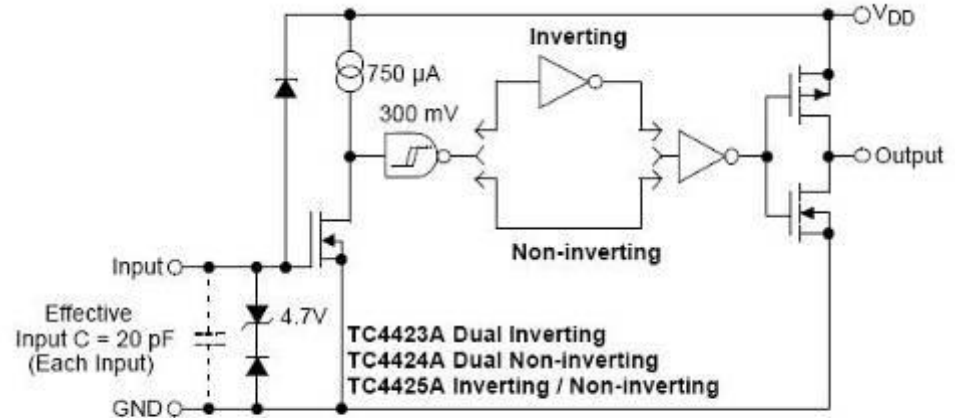
## Features:

- High Peak Output Current: 3A
- Latch-Up Protected: Will Withstand –  
– 500mA Reverse Current
- Input Will Withstand Negative Inputs –  
– Up to 5V
- ESD Protected: 4kV
- Wide Operating Range: 4.5V to 16V
- High Capacitive Load Drive Capability:
  - 1800pF in 20ns
- Short Delay Time: 35ns (typ.)
- Matched Delay Times
- Low Supply Current:
  - With Logic '1' Input: 500 $\mu$ A
  - With Logic '0' Input: 100 $\mu$ A
- Low Output Impedance: 2.7 $\Omega$
- Pinout Same as TC1410/11/12
- Space Saving 8-Pin MSOP Package



## Features:

- High Peak Output Current: 4.5A
- Wide Input Supply Voltage Operating –  
- Range: 4.5V to 18V
- High Capacitive Load Drive Capability:
  - 1800pF in 12ns
- Short Delay Times: 40ns (typ.)
- Matched Rise/Fall Times
- Low Supply Current:
  - With Logic '1' Input: 1.0mA (max.)
  - With Logic '0' Input: 150µA (max.)
- Low Output Impedance: 2.5Ω (typ.)
- Latch-up protected: will withstand –  
- 1.5A reverse current
- Logic input will withstand negative –  
- swing up to 5V
- Pin compatible with the TC4423/24/25 –  
and TC4426A/27A/28A
- Packages: 8-Pin SOIC, 8-Pin 6x5 DFN
- Recommended for Automotive Design  
(TC4424A)

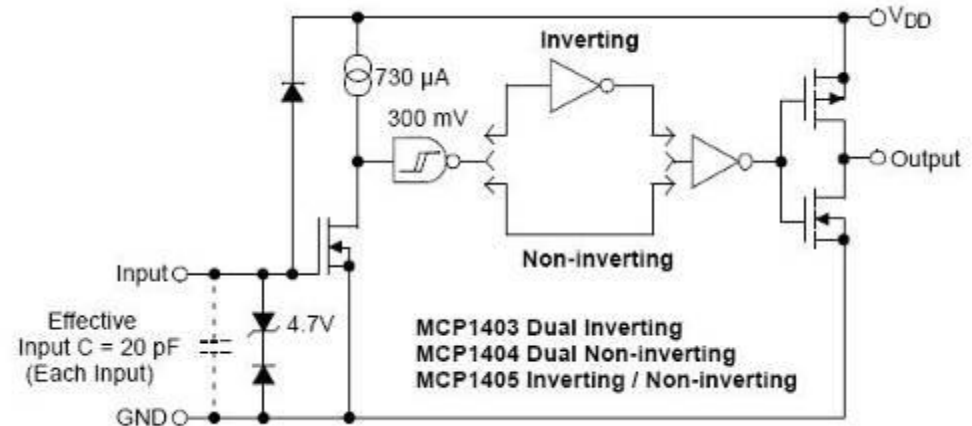


Note 1: Unused inputs should be grounded.



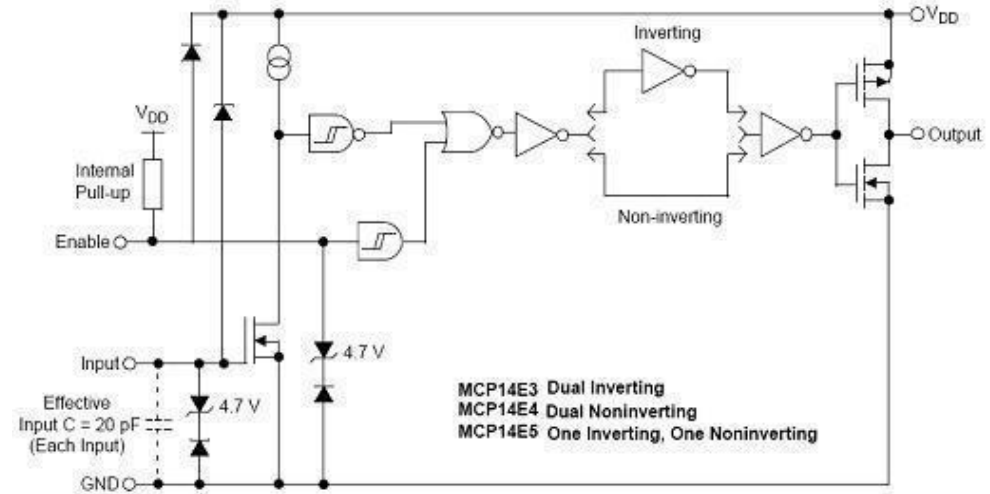
## Features:

- High Peak Output Current: 4.5A
- Wide Input Supply Voltage Operating –  
- Range: 4.5V to 18V
- High Capacitive Load Drive Capability:
  - 2200pF in 15ns
- Short Delay Times: 40ns (typ.)
- Low Supply Current:
  - With Logic '1' Input: 1.0mA (max.)
  - With Logic '0' Input: 150µA (max.)
- Latch-Up Protected: Will Withstand 1.5A
- Reverse Current
- Logic Input Will Withstand Negative
- Swing up to 5V
- Packages: 8-Pin SOIC, PDIP, 6x5 DFN, and 16-Pin SOIC
- Recommended for Automotive Design (MCP1404/5)



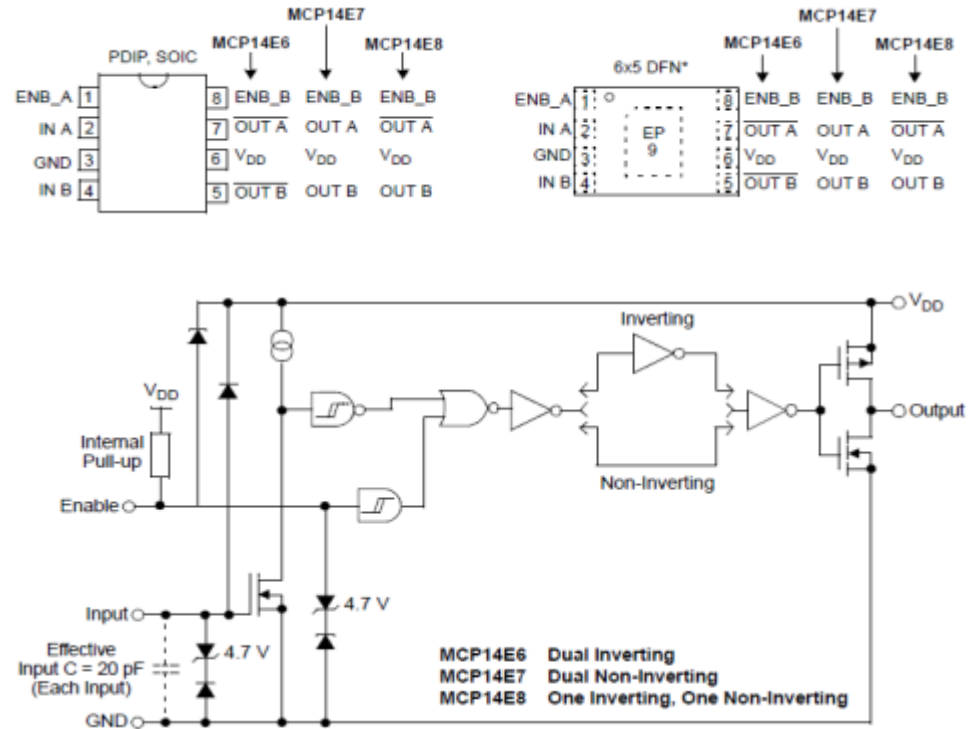
## Features:

- High Peak Output Current: 4.0A
- Independent Enable Function for –
  - Each Driver Output
- Low Shoot-Through/Cross –
  - Conduction Current in Output –
  - Stage
- Wide Input Supply Voltage –
  - Operating Range: 4.5V to 18V
- High Capacitive Load Drive Capability:
  - 2200pF in 15ns (typ.)
  - 5600pF in 26ns (typ.)
- Short Delay Times: 50ns (typ.)
- Latch-Up Protected: Will Withstand –
  - 1.5A Reverse Current
- Logic Input Will Withstand Negative –
  - Swing Up To 5V
- Packages: 8-Pin 6x5 DFN, PDIP, SOIC
- Recommended for Automotive Design (MCP14E4)



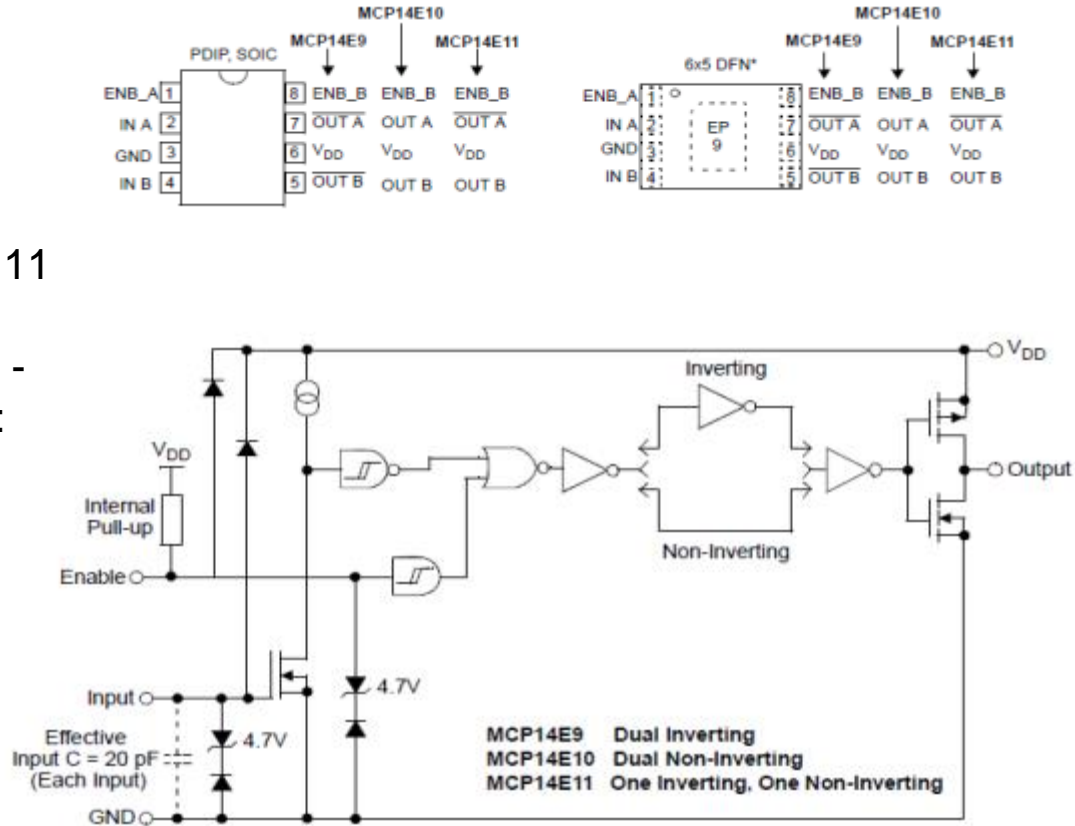
## Features:

- High peak output Current: 2A (typ.)
- Dual Outputs:
  - Dual inverting: MCP14E6
  - Dual non-inverting: MCP14E7
  - Complementary outputs: MCP14E8
- Enable Function for each Driver
- Low Shoot-Through/Cross-Conduction –  
- Current in output Stage
- Wide Input Operating Range: 4.5v to 18V
- High Capacitive Load drive Capability:
  - - 1000 pF in 15 nsec (typ.)
- Short Delay Times: 45 nsec (typ.)
- Latch-up Protected Passed JEDEC –  
- JESD78A
- Input are TTL/CMOS compatible and –  
- will withstand negative swings up to 5V
- ESD Protected: 4kV
- Packages: 8-Pin 6x5 DFN, PDIP, SOIC



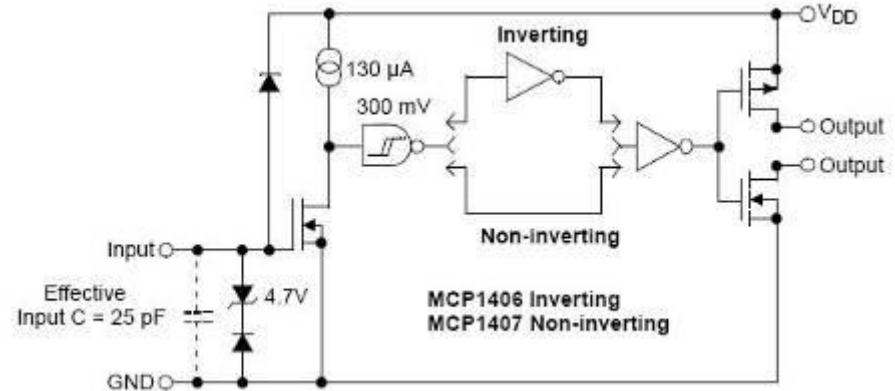
## Features:

- High peak output Current: 3A (typ.)
- Dual Outputs (E9/10/11):
  - Dual inverting: MCP14E9
  - Dual non-inverting: MCP14E10
  - Complementary outputs: MCP14E11
- Enable Function for each Driver
- Low Shoot-Through/Cross-Conduction -
- Current Wide Input Operating Range:
  - 4.5v to 18V
- High Capacitive Load drive Capability:
  - 1800 pF in 17 nsec (typ.)
- Short Delay Times: 45 nsec (typ.)
- Latch-up Protected Passed JEDEC –
- JESD78A
- Input are TTL/CMOS compatible –
- and will withstand negative swings –
- Up To 5V
- ESD Protected: 4kV
- Packages: 8-Pin 6x5 DFN, PDIP, SOIC



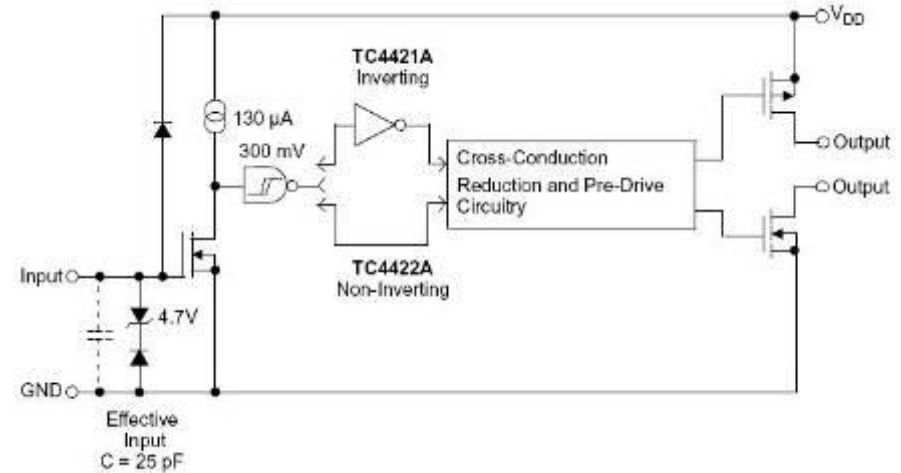
## Features:

- High Peak Output Current: 6.0A (typ.)
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- High Capacitive Load Drive Capability:
  - 2500pF in 20ns
  - 6800pF in 40ns
- Short Delay Times: 40ns (typ.)
- Matched Rise/Fall Times
- Low Supply Current:
  - With Logic '1' Input: 130 $\mu$ A (typ.)
  - With Logic '0' Input: 35 $\mu$ A (typ.)
- Latch-Up Protected: Will Withstand 1.5A
- Reverse Current
- Logic Input Will Withstand Negative –
  - Swing up to 5V
- Pin compatible with the TC4420/TC4429
- Packages: 8-Pin SOIC, PDIP and 6x5 DFN



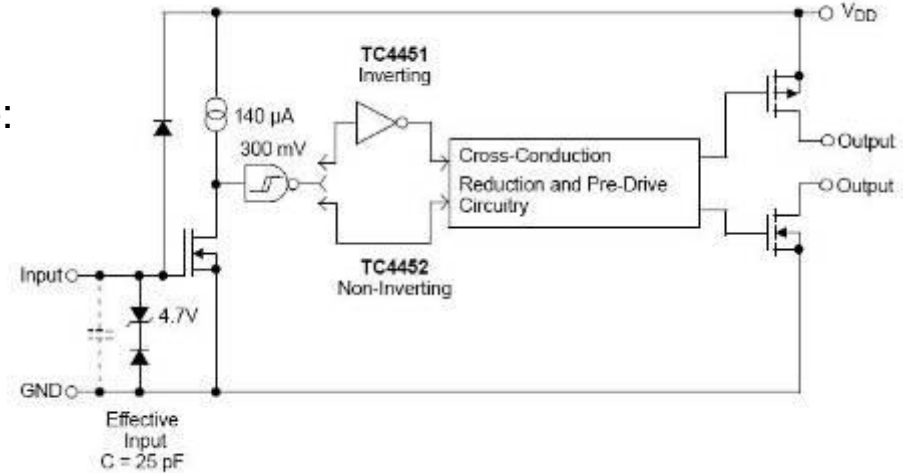
## Features:

- High Peak Output Current: 9A
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- High Continuous Output Current: 2A (max.)
- Fast Rise and Fall Times:
  - 30ns with 4,700pF Load
  - 180ns with 47,000pF Load
- Short Propagation Delays: 30ns (typ.)
- Low Supply Current:
  - With Logic '1' Input: 200 $\mu$ A (typ.)
  - With Logic '0' Input: 55 $\mu$ A (typ.)
- Low Output Impedance: 1.4 $\Omega$  (typ.)
- Latch-Up Protected: Will Withstand 1.5A
  - Output Reverse Current
- Input Will Withstand Negative Inputs up to 5V
- Pin-Compatible with the TC4420/TC4429
- Space-saving 8-Pin 6x5 DFN Package
- Recommended for Automotive Design



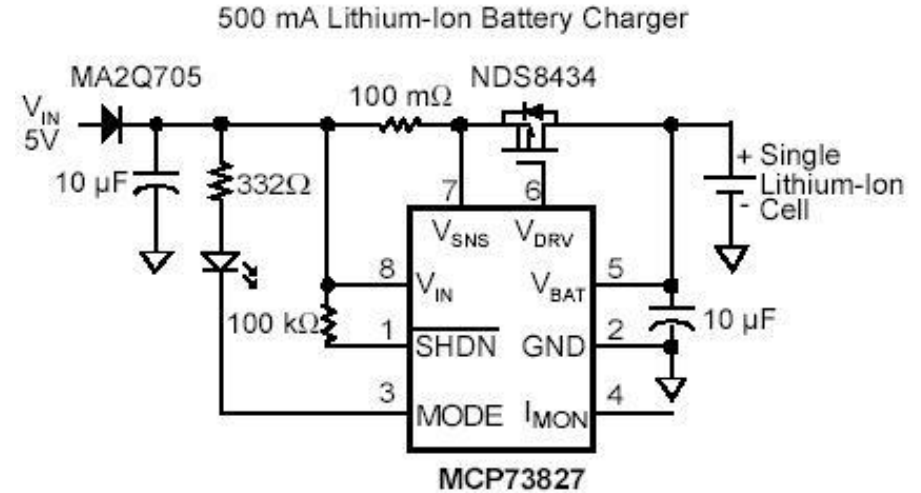
## Features:

- High Peak Output Current: 13A (typ.)
- Wide Input Supply Voltage Operating Range:
  - 4.5V to 18V
- High Continuous Output Current:
  - 2.6A (max.)
- Matched Fast Rise and Fall Times:
  - 21ns with 10,000 pF Load
  - 42ns with 22,000 pF Load
- Matched Propagation Delays: 44ns (typ.)
- Low Supply Current:
  - With Logic '1' Input: 140 $\mu$ A (typ.)
  - With Logic '0' Input: 40 $\mu$ A (typ.)
- Low Output Impedance: 0.9 $\Omega$  (typ.)
- Latch-Up Protected: Will Withstand 1.5A –  
- Output Reverse Current
- Input Will Withstand Negative Inputs up to 5V
- Pin-Compatible with the TC4420/TC4429, -  
- TC4421/TC4422 and TC4421A/TC4422A
- Space-Saving, Thermally-Enhanced, - 8-Pin DFN Package
- Recommended for Automotive Design (TC4451)



## Features:

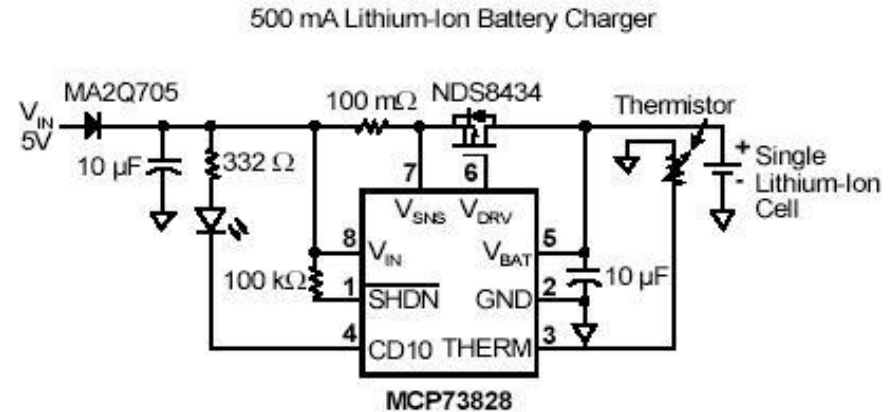
- Linear Charge Management Controller for Single Lithium-Ion Cells
- High Accuracy Preset Voltage Regulation:  $\pm 1\%$  (max.)
- Two Preset Voltage Regulation Options:
  - 4.1V, MCP73827-4.1
  - 4.2V, MCP73827-4.2
- Programmable Charge Current
- Automatic Cell Preconditioning of Deeply Depleted Cells
  - Minimizes Heat Dissipation in Initial Charge
- Charge Status Output for LED Drive or MCU
- Charge Current Monitor Output
- Automatic Power-Down when Input Power Removed
- Temperature Range:  $-20^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packaging: 8-Pin MSOP





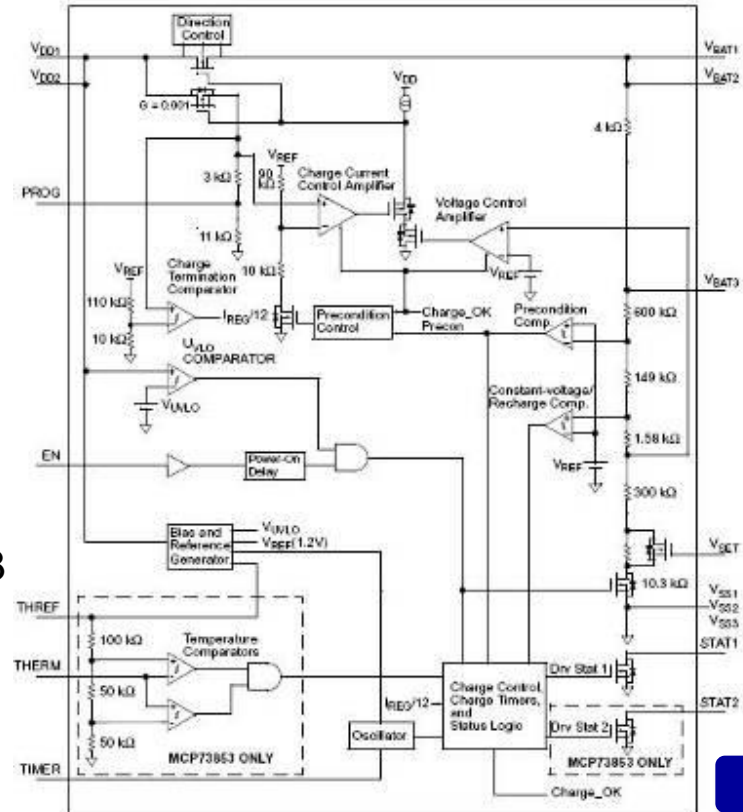
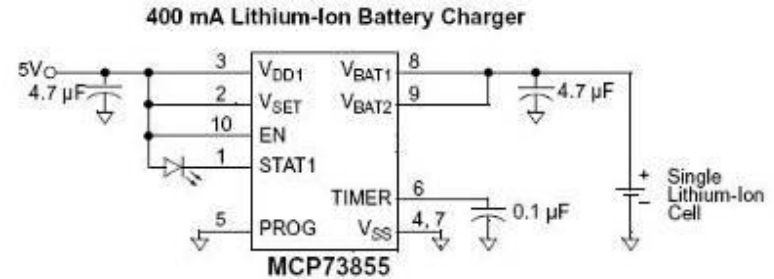
## Features:

- Linear Charge Management Controller –
  - for Single Lithium-Ion Cells
- High Accuracy Preset Voltage Regulation:
  - $\pm 1\%$  (max.)
- Two Preset Voltage Regulation
  - 4.1V, MCP73828-4.1
  - 4.2V, MCP73828-4.2
- Programmable Charge Current
- Automatic Cell Preconditioning of Deeply –
  - Depleted Cells, Minimizing Heat -
  - Dissipation During Initial Charge Cycle
- Charge Complete Output CD10 for LED –
  - Drive or Microcontroller Interface
- Continuous Temperature Monitoring
- Automatic Power-Down when Input Power –
  - Removed
- Temperature Range:  $-20^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packaging: 8-Pin MSOP



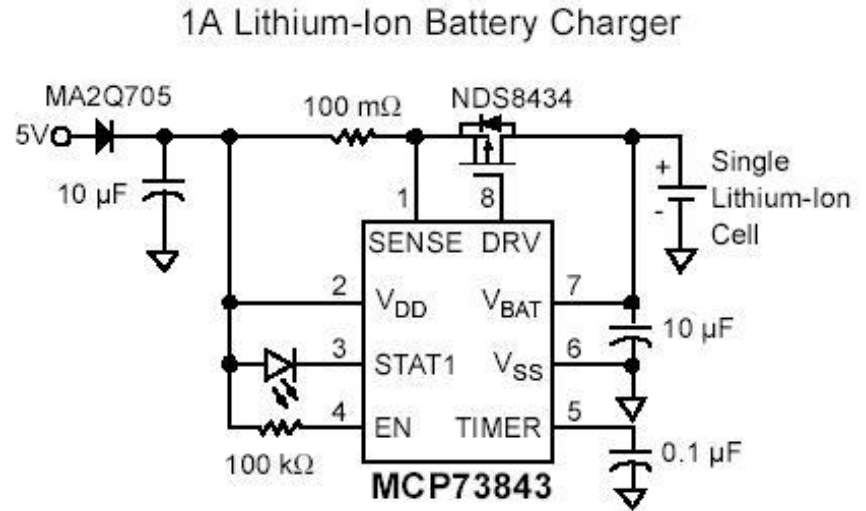
## Features:

- Linear Charge Management Controllers
  - Integrated Pass Transistor
  - Integrated Current Sense
  - Reverse Blocking Protection
- High-Accuracy Preset Voltage Regulation:
  - $\pm 0.5\%$  (max.)
- Two Selectable Voltage Regulation Options:
  - 4.1V, 4.2V
- Programmable Charge Current
- USB Compatible Charge Current Settings
- Programmable Safety Charge Timers
- Preconditioning of Deeply Depleted Cells
- Automatic End-of-Charge Control
- Cell Temperature Monitoring (MCP73853)
- Charge Status Output for Direct LED Drive
- Fault Output for Direct LED Drive - MCP73853
- Automatic Power-Down
- Thermal Regulation
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packaging: 16-L 4x4 QFN, 10-L 3x3 DFN



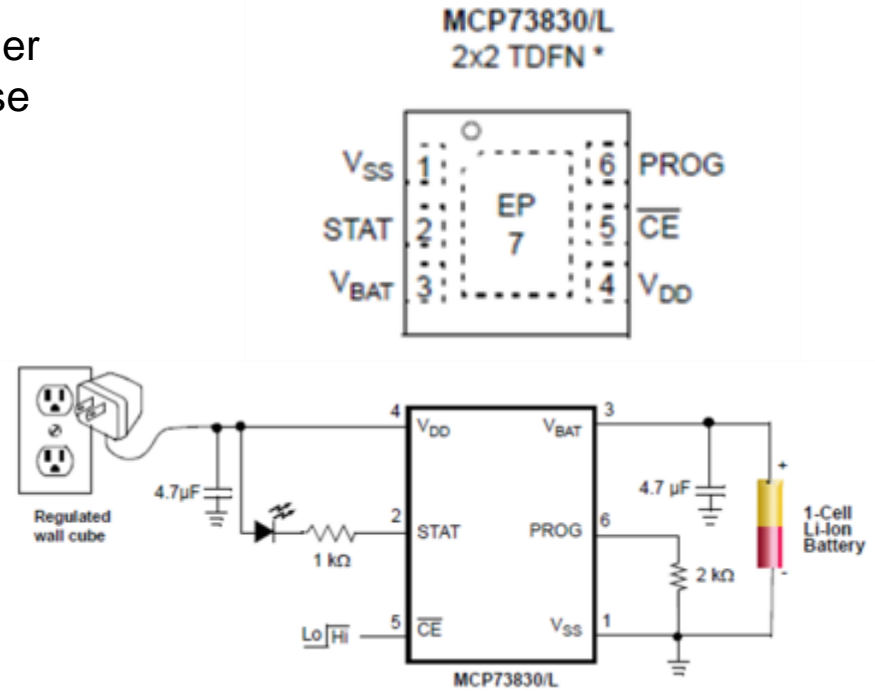
## Features:

- Linear Charge Management Controllers
- High-Accuracy Preset Voltage Regulation:
  - $\pm 0.5\%$  (max.)
- Four Preset Voltage Regulation Options:
  - 4.1V, MCP73841-4.1, MCP73843-4.1
  - 4.2V, MCP73841-4.2, MCP73843-4.2
  - 8.2V, MCP73842-8.2, MCP73844-8.2
  - 8.4V, MCP73842-8.4, MCP73844-8.4
- Programmable Charge Current
- Programmable Safety Charge Timers
- Preconditioning of Deeply Depleted Cells
- Automatic End-of-Charge Control
- Optional Continuous Cell Temperature -  
- Monitoring (MCP73841 and MCP73842)
- Charge Status Output for Direct LED Drive
- Automatic Power-Down when Power Removed
- Temperature Range:  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- Packaging:
  - MSOP-10: MCP73841, MCP73842
  - MSOP-8: MCP73843, MCP73844



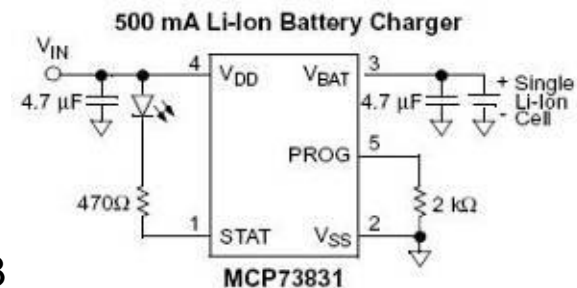
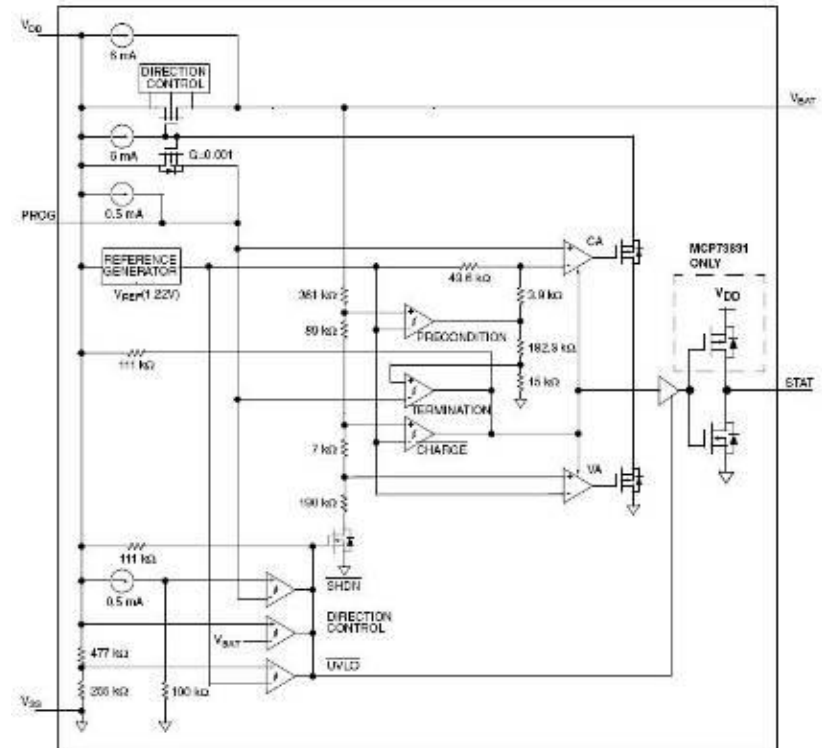
## Features:

- Complete Linear Charge Management Controller
  - Integrated Pass Transistor & Current Sense
  - Integrated Reverse Discharge Protection
- Constant Current/Constant Voltage Operation
- High Accuracy Preset Voltage Regulation:
  - 4.20V + 0.75% over temperature
- Programmable Charge Current:
  - MCP73830L: 20 mA – 200 mA
  - MCP73830: 100 mA – 1000 mA
- Soft-start to avoid inrush current
- Preconditioning: 10% and No Preconditioning
- Fixed Elapse Timer: 0 Hour or 4 Hours
- Fixed Preconditioning Timer: 1 Hour
- Automatic Recharge: Optional
- Automatic End-of-Charge Control Termination:
- Automatic Power-Down when Input Removed
- Under Voltage Lockout (UVLO)
- Packaging: TDFN-6 (2x2 mm)
- Pin-to-pin functional compatible to LTC4065LX
- Temperature Range: -40°C to +85°C



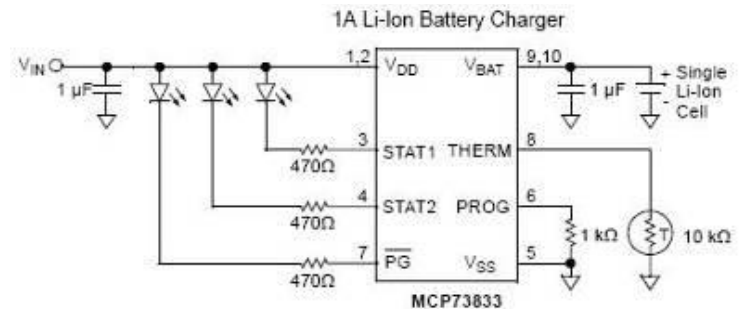
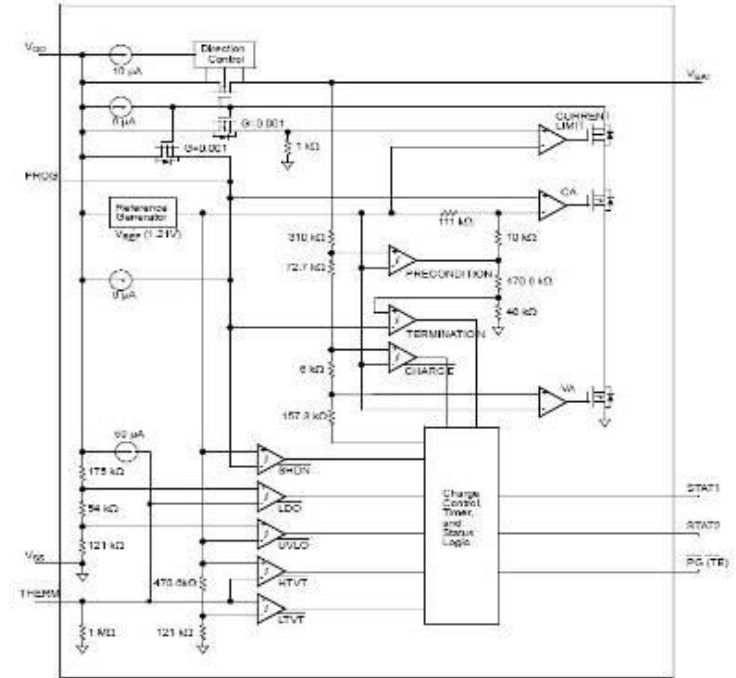
## Features:

- Linear Charge Management Controller:
  - Integrated Pass Transistor
  - Integrated Current Sense
  - Reverse Discharge Protection
- High Accuracy Preset Voltage Regulation:
  - $\pm 0.75\%$
- Four Voltage Regulation Options:
  - 4.20V, 4.35V, 4.40V, 4.50V
- Programmable Charge Current: 15mA to 500mA
- Selectable Preconditioning:
  - 10%, 20%, 40%, or Disable
- Selectable End-of-Charge Control:
  - 5%, 7.5%, 10%, or 20%
- Charge Status Output
- Tri-State Output - MCP73831
- Open-Drain Output - MCP73832
- Automatic Power-Down
- Thermal Regulation
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packaging: 8-Pin, 2x3 mm DFN, 5-Lead, SOT-23



## Features:

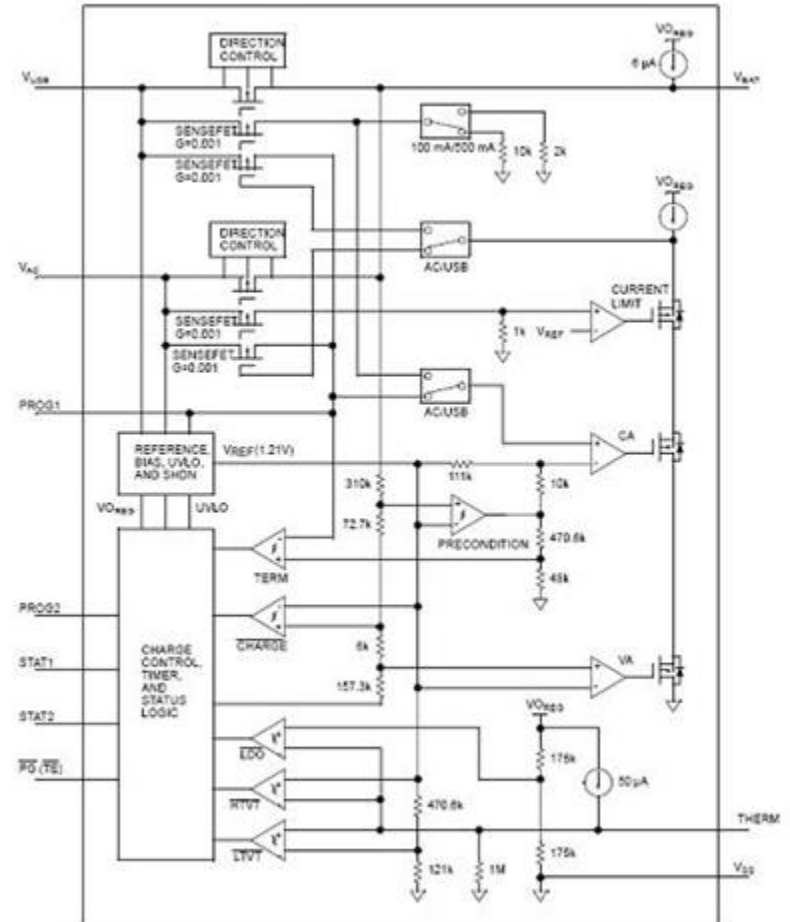
- Complete Linear Charge Management Controller:
  - Integrated Pass Transistor, Current Sense and Reverse Discharge Protection
- Constant Current / Constant Voltage Operation with Thermal Regulation
- High Accuracy Preset Voltage Regulation:
  - 4.2V, 4.35V, 4.4V, or 4.5V,  $\pm 0.75\%$
- Programmable Charge Current: 1A (max.)
- Preconditioning of Deeply Depleted Cells:
  - Selectable Current Ratio & Voltage Threshold
- Automatic End-of-Charge Control
- Selectable Current Threshold
- Selectable Safety Time Period
- Automatic Recharge
- Two Charge Status Outputs
- Cell Temperature Monitor
- Low-Dropout Linear Regulator Mode
- Automatic Power-Down when Input Removed
- Under Voltage Lockout
- Packages: 3x3 DFN-10, MSOP-10



## Features:

- High Accuracy Preset Voltage Regulation: + 0.5%
- Available Voltage Regulation Options:
  - 4.20V, 4.35V, 4.4V, or 4.5V
- Complete Linear Charge Management Controller:
  - Autonomous Power Source Selection
  - Integrated Pass Transistors, Current Sense and Reverse Discharge Protection
- Constant Current / Constant Voltage Operation
- Selectable USB-Port Charge Current
- Programmable AC-Adapter Charge: 15mA-1000mA
- Power-Good Monitor: MCP73837
- Timer Enable: MCP73838
- Automatic Recharge
- Automatic End-of-Charge Control
- Battery Cell Temperature Monitor
- UVLO (Undervoltage Lockout)
- Automatic Power-Down when Power is Removed
- Low-Dropout (LDO) Linear Regulator Mode
- Temperature Range: -40°C to 85°C
- Packaging: 10-Lead 3x 3 DFN, 10-Lead MSOP

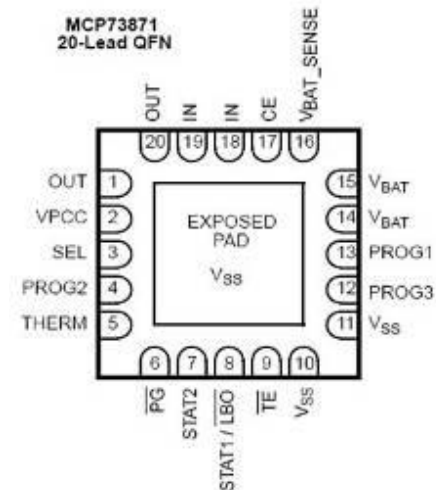
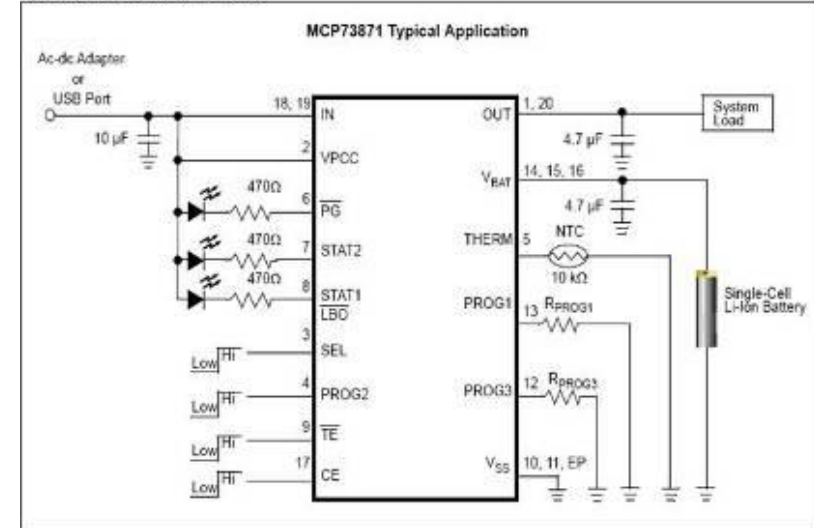
Functional Block Diagram (MCP73837/8)



## Features:

- Integrated System Load Sharing and Battery - Charge Management:
  - Simultaneously Power the System and - Charge the Li-Ion Battery
  - Programmable Fast Charge: 50mA–1A
- Integrated Pass Transistors, Current Sense and Reverse Discharge Protection
- Selectable Power Sources: USB Port/Wall Adapter
- Charge Voltage Options: 4.1V, 4.2V, 4.35V, 4.4V
- Regulation Tolerance:  $\pm 0.5\%$  (typ.)
- 0.1°C Preconditioning for Deeply Depleted Cells
- Resistor Programmable Termination Set Point
- Automatic Recharge and End-of-Charge Control
- Safety Timer With Timer Enable/Disable Control
- Battery Cell Temperature Monitor
- Undervoltage Lockout (UVLO)
- Low Battery Status Indicator (LBO)
- Power-Good Status Indicator (PG)
- Temperature Range: -40°C to 85°C
- Packaging: 20-Lead 4x4 QFN

Typical Application Circuit

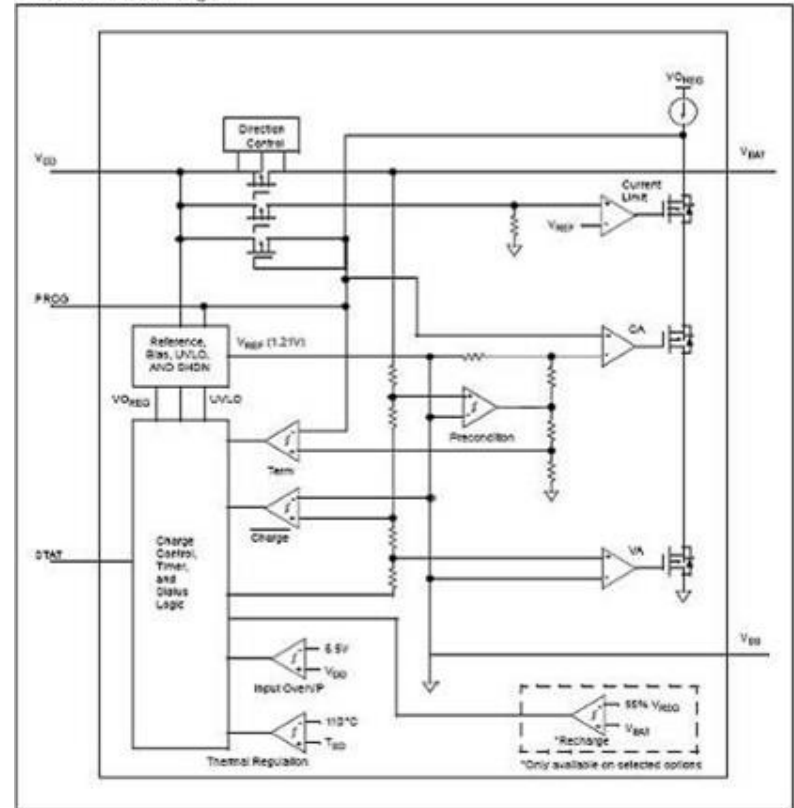




## Features:

- Complete Linear Charge Management Controller:
  - Integrated Input Overvoltage Protection
  - Integrated Pass Transistor
  - Integrated Current Sense
  - Integrated Reverse Discharge Protection
- Constant Current / Constant Voltage Operation with Thermal Regulation
- 4.15V Undervoltage Lockout (UVLO)
- 18V Absolute Maximum Input with OVP
- High Accuracy Voltage Regulation:  $\pm 0.5\%$
- Charge Voltage Options: 4.1V, 4.2V, 4.35V, 4.4V
- Programmable Fast Charge Current: 130mA–1.1A
- Preconditioning of Deeply Depleted Cells
- Integrated Precondition Timer
- Automatic End-of-Charge Control:
- Automatic Recharge: 95% or Disable
- Charge Status Output
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packaging: 3x3 DFN-10

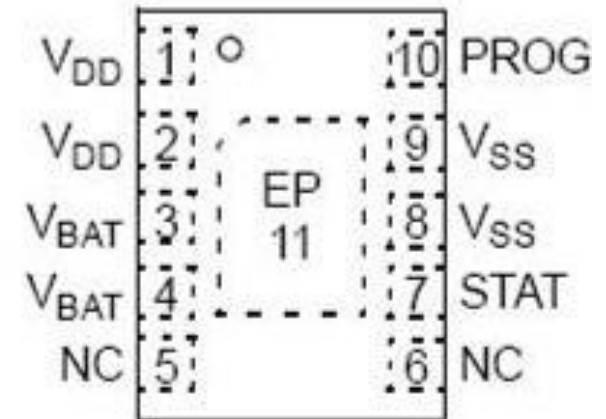
Functional Block Diagram



## Features:

- Complete Linear Charge Management Controller:
  - Integrated Input Overvoltage Protection, Pass Transistor, Current
- Sense, Reverse Discharge Protection
- Constant Current / Constant Voltage Operation
- 4.15V Undervoltage Lockout (UVLO)
- 18V Absolute Maximum Input with OVP
- High Accuracy Preset Voltage Regulation (-5°C to +55°C): ±0.5% (MCP73123), ±0.6% (MCP73223)
- Battery Charge Voltage Options:
  - 3.6V (MCP73123) and 7.2V (MCP73223)
- Programmable Fast Charge Current: 30mA – 1.1A
- Preconditioning of Deeply Depleted Cells Option
- Integrated Precondition Timer: 32 min or Disable
- Automatic End-of-Charge Control:
  - Selectable Current Ratio: 5%, 7.5%, 10%, 20%
  - Elapse Safety Timer: 4 HR, 6 HR, 8 HR or Disable
  - Automatic Recharge: 95% or Disable
- Temperature Range: -40°C to +85°C
- Packaging: 3x3 DFN-10

**MCP73123/223**  
3x3 DFN \*



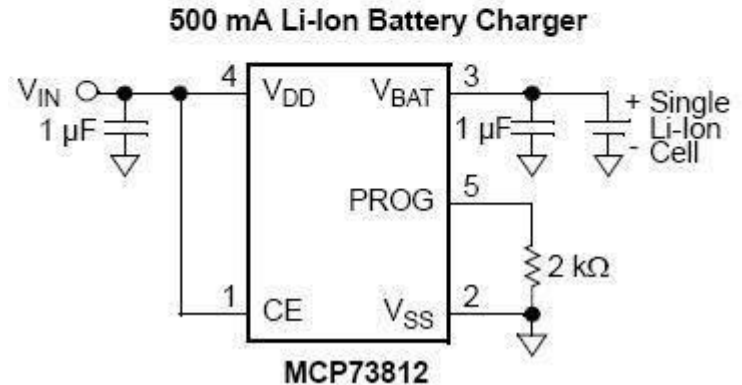
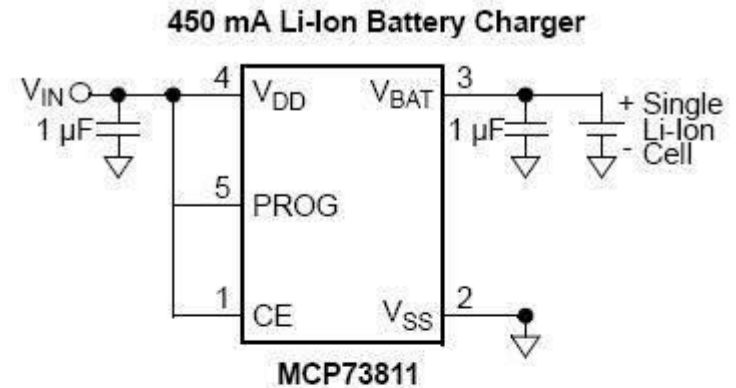
## Features:

- Complete Linear Charge Management Controller:
  - Integrated Input Overvoltage Protection, Pass Transistor, Current
- Sense, Reverse Discharge Protection
- Constant Current / Constant Voltage Operation
- 4.15V Undervoltage Lockout (UVLO)
- 13V Input Overvoltage Protection
- High Accuracy Preset Voltage Regulation (-5°C to +55°C):  $\pm 0.6\%$
- Charge Voltage Options: 8.20V, 8.40V, 8.7V, 8.8V
- Programmable Fast Charge Current: 130mA–1.1A
- Preconditioning of Deeply Depleted Cells Option
- Integrated Precondition Timer: 32 Minutes or Disable
- Automatic End-of-Charge Control:
  - Selectable Min Current Ratio: 5%, 7.5%, 10%, 20%
  - Elapse Safety Timer: 4 HR, 6 HR, 8 HR or Disable
  - Automatic Recharge: 95% or Disable
  - Preset Charge Status Output: On/Off or Flashing
- Temperature Range: -40°C to +85°C
- Packaging: 3x3 DFN-10



## Features:

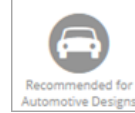
- Complete Linear Charge Management Controller
- Integrated Pass Transistor
- Integrated Current Sense
- Integrated Reverse Discharge Protection
- Constant Current / Constant Voltage Operation –  
- with Thermal Regulation
- High Accuracy Preset Voltage Regulation:  $\pm 1\%$
- Voltage Regulation: 4.20V
- Selectable Charge Current:
- MCP73811: 85mA / 450mA
- Programmable Charge Current:
- MCP73812: 50mA to 500mA
- Minimum External Components Required
- No Preconditioning
- External End-of-Charge Control
- Automatic Power-Down when Input Removed
- Active High Charge Enable
- Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Packaging: 5-Lead SOT-23





# MCP33131D/21D/11D-10/05

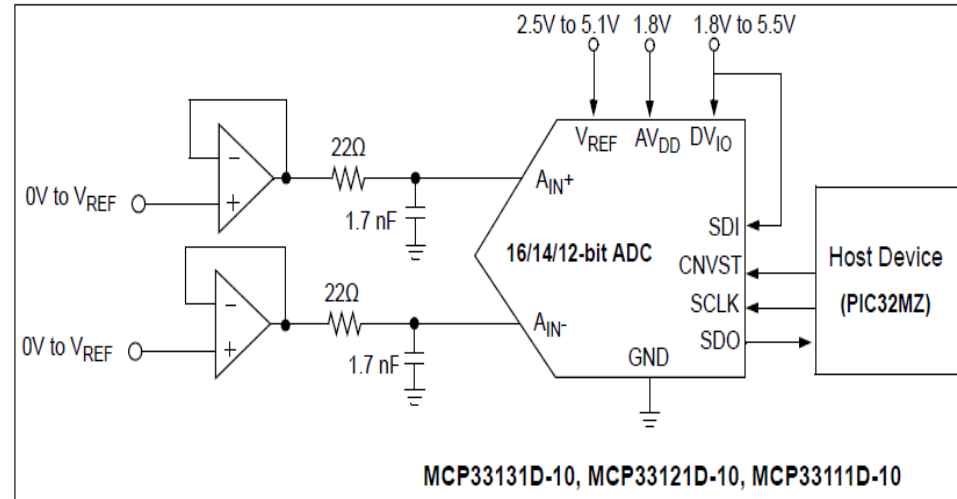
16/14/12-Bit Differential Input SAR A/D  
Converter with SPI Serial Interface



Online  
Datasheet

## Features:

- Sample Rate (Throughput):
  - MCP33131D/21D/11D-10: 1Msps
  - MCP33131D/21D/11D-05: 500 kSPS
- 16/14/12-Bit Resolution with No Missing Codes
- Wide Operating Voltage Range:
  - Analog Supply Voltage (AVDD): 1.8V
  - Digital I/O Interface Voltage (DVIO): 1.7V - 5.5V
  - External Reference (VREF): 2.5V - 5.1V
- Differential Input Operation:
  - Input Full-Scale Range: -VREF to +VREF
- Ultra Low Current Consumption (typ):
  - Standby Mode (typical): ~ 0.8  $\mu$ A
  - Conversion Mode (typical): ~1.6mA (for 1Msps) and ~1.4mA (for 500 kSPS)
- Typical Performance
  - MCP33131D-10/05: 91.3 dBFS SNR / 103.5 dB SFDR / -99.3 dB THD /  $\pm$ 2 LSB INL /  $\pm$  0.8 LSB DNL
  - MCP33121D-10/05: 85.1 dBFS SNR / 103.5 dB SFDR / -99.2 dB THD /  $\pm$ 0.5 LSB INL /  $\pm$  0.25 LSB DNL
  - MCP33111D-10/05: 73.9 dBFS SNR / 99.3 dB SFDR / -96.7 dB THD /  $\pm$ 0.12 LSB INL /  $\pm$  0.06 LSB DNL
- SPI-Compatible Serial Communication:
  - SCLK Clock Rate: up to 100 MHz
- ADC Self-Calibration for Offset, Gain, and Linearity Errors
- AEC-Q100 Qualified (Temperature Range: -40°C to +125°C)
- Package Options: MSOP-10 and TDFN-10



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# MCP33151D/41D-10/05

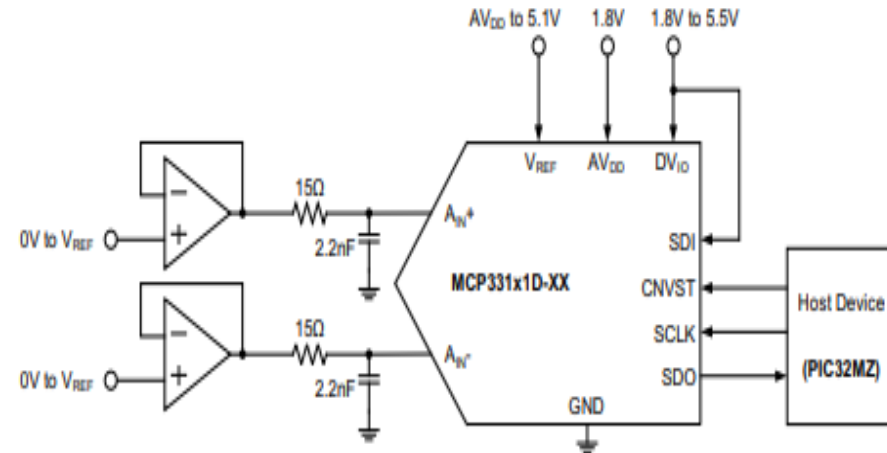
14/12-Bit Differential Input SAR A/D Converter with SPI Serial Interface



Online  
Datasheet

## Features:

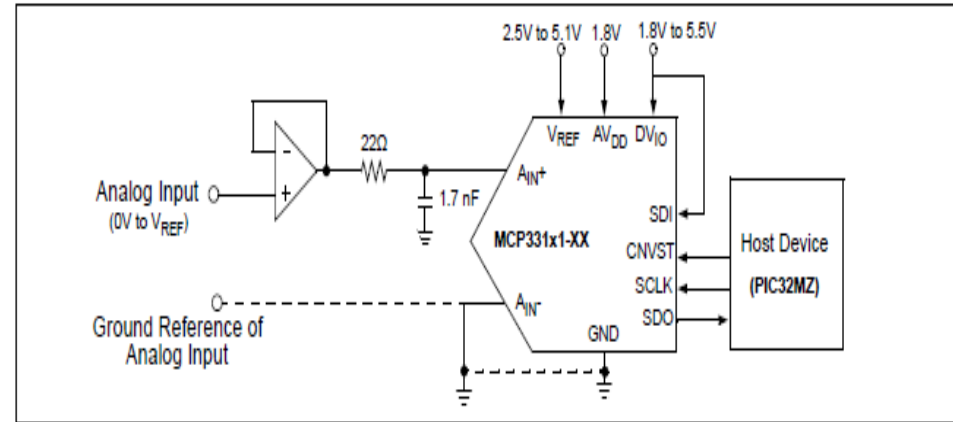
- Sample Rate (Throughput):
  - MCP33151D/41D-10: 1Msps
  - MCP33151D/41D-05: 500 kSPS
- 14/12-Bit Resolution with No Missing Codes
- Wide Operating Voltage Range:
  - Analog Supply Voltage (AVDD): 1.8V
  - Digital I/O Interface Voltage (DVIO): 1.7V - 5.5V
  - External Reference (VREF): AVDD - 5.1V
- Differential Input Operation:
  - Input Full-Scale Range: -VREF to +VREF
- Ultra Low Current Consumption (typ):
  - Standby Mode (typical): ~ 1.5  $\mu$ A
  - Conversion Mode (typical): ~0.66mA (for 1Msps) and ~0.33mA (for 500 kSPS)
- Typical Performance
  - MCP33151D-10: 83.8 dBFS SNR / 107.3 dB SFDR / -104.7 dB THD /  $\pm$ 0.27 LSB INL /  $\pm$ 0.11 LSB DNL
  - MCP33141D-10: 73.8 dBFS SNR / 100 dB SFDR / -101.5 dB THD /  $\pm$ 0.07 LSB INL /  $\pm$ 0.05 LSB DNL
  - MCP33151D-05: 83.7 dBFS SNR / 103.8 dB SFDR / -100.9 dB THD /  $\pm$ 0.27 LSB INL /  $\pm$ 0.11 LSB DNL
  - MCP33141D-05: 73.8 dBFS SNR / 99.8 dB SFDR / -98.9 dB THD /  $\pm$ 0.07 LSB INL /  $\pm$ 0.05 LSB DNL
- SPI-Compatible Serial Communication:
  - SCLK Clock Rate: up to 100 MHz
- ADC Self-Calibration for Offset, Gain, and Linearity Errors
- AEC-Q100 Qualified (Temperature Range: -40°C to +125°C)
- Package Options: MSOP-10 and TDFN-10



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## Features:

- Sample Rate (Throughput):
  - MCP33131/21/11-10: 1Msps
  - MCP33131/21/11-05: 500 kSPS
- 16/14/12-Bit Resolution with No Missing Codes
- Wide Operating Voltage Range:
  - Analog Supply Voltage (AVDD): 1.8V
  - Digital I/O Interface Voltage (DVIO): 1.7V - 5.5V
  - External Reference (VREF): 2.5V - 5.1V
- Pseudo-Differential Input Operation:
  - Input Full-Scale Range: 0V to +VREF
- Ultra Low Current Consumption (typ):
  - Standby Mode (typical): ~ 0.8  $\mu$ A
  - Conversion Mode (typical): ~1.6mA (for 1Msps) and ~1.4mA (for 500 kSPS)
- Typical Performance
  - MCP33131-10/05: 86.7 dBFS SNR / 98.9 dB SFDR / -97.4 dB THD /  $\pm$ 2.2 LSB INL /  $\pm$  0.9 LSB DNL
  - MCP33121-10/05: 83.5 dBFS SNR / 98.8 dB SFDR / -97.2 dB THD /  $\pm$ 0.55 LSB INL /  $\pm$  0.25 LSB DNL
  - MCP33111-10/05: 73.8 dBFS SNR / 95.9 dB SFDR / -93.7 dB THD /  $\pm$ 0.12 LSB INL /  $\pm$  0.06 LSB DNL
- SPI-Compatible Serial Communication:
  - SCLK Clock Rate: up to 100 MHz
- ADC Self-Calibration for Offset, Gain, and Linearity Errors
- AEC-Q100 Qualified (Temperature Range: -40°C to +125°C)
- Package Options: MSOP-10 and TDFN-10





# MCP33151/41-10/05

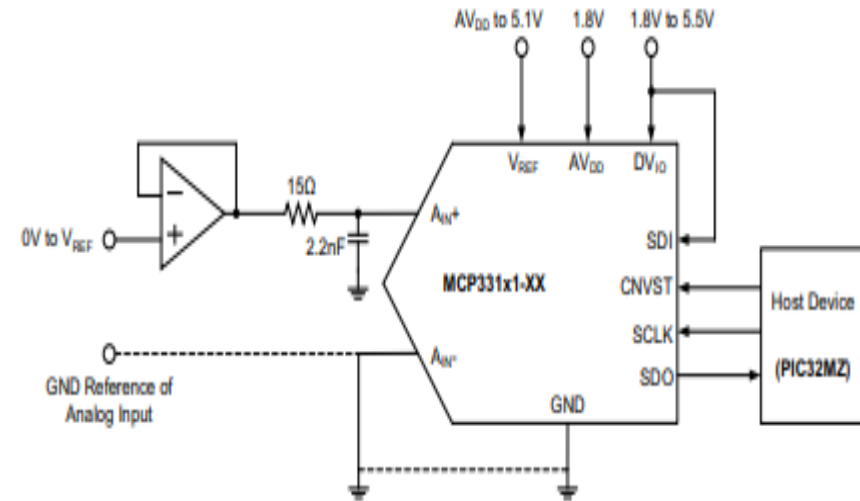
14/12-Bit Single-Ended Input SAR A/D  
Converter with SPI Serial Interface



Online  
Datasheet

## Features:

- Sample Rate (Throughput):
  - MCP33151/41-10: 1Msps
  - MCP33151/41-05: 500 kSPS
- 14/12-Bit Resolution with No Missing Codes
- Wide Operating Voltage Range:
  - Analog Supply Voltage (AVDD): 1.8V
  - Digital I/O Interface Voltage (DVIO): 1.7V - 5.5V
  - External Reference (VREF): AVDD - 5.1V
- Differential Input Operation:
  - Input Full-Scale Range: 0 to +VREF
- Ultra Low Current Consumption (typ):
  - Standby Mode (typical): ~ 1.5  $\mu$ A
  - Conversion Mode (typical): ~0.66mA (for 1Msps) and ~0.33mA (for 500 kSPS)
- Typical Performance
  - MCP33151-10: 80.4 dBFS SNR / 103.9 dB SFDR / -102.5 dB THD /  $\pm$ 0.39 LSB INL /  $\pm$ 0.11 LSB DNL
  - MCP33141-10: 73.3 dBFS SNR / 102 dB SFDR / -100.4 dB THD /  $\pm$ 0.09 LSB INL /  $\pm$ 0.05 LSB DNL
  - MCP33151-05: 80.4 dBFS SNR / 102.7 dB SFDR / -100.9 dB THD /  $\pm$ 0.39 LSB INL /  $\pm$ 0.11 LSB DNL
  - MCP33141-05: 73.3 dBFS SNR / 99.9 dB SFDR / -99.2 dB THD /  $\pm$ 0.09 LSB INL /  $\pm$ 0.05 LSB DNL
- SPI-Compatible Serial Communication:
  - SCLK Clock Rate: up to 100 MHz
- ADC Self-Calibration for Offset, Gain, and Linearity Errors
- AEC-Q100 Qualified (Temperature Range: -40°C to +125°C)
- Package Options: MSOP-10 and TDFN-10

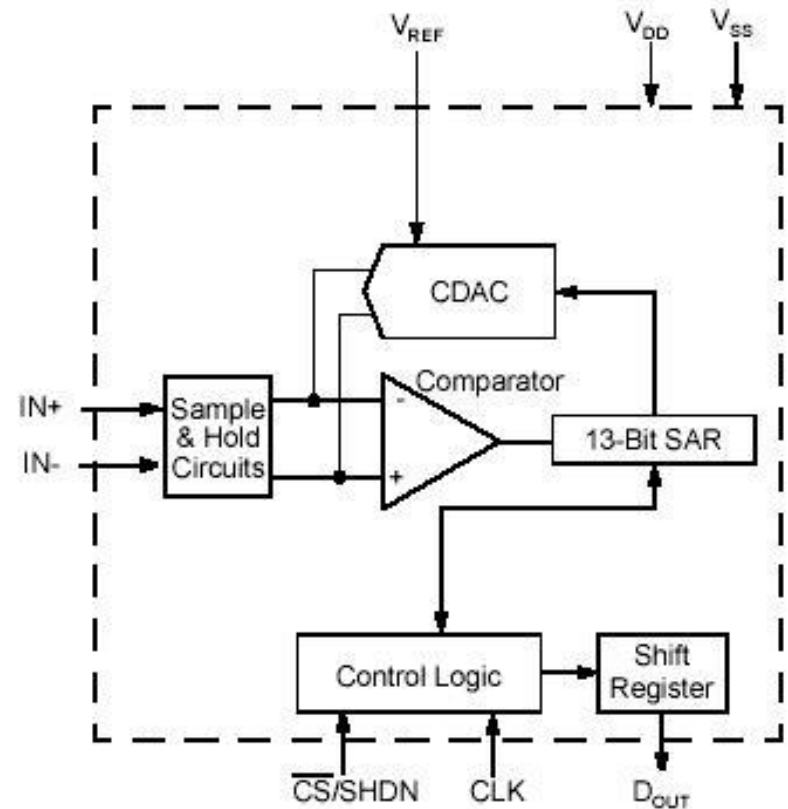


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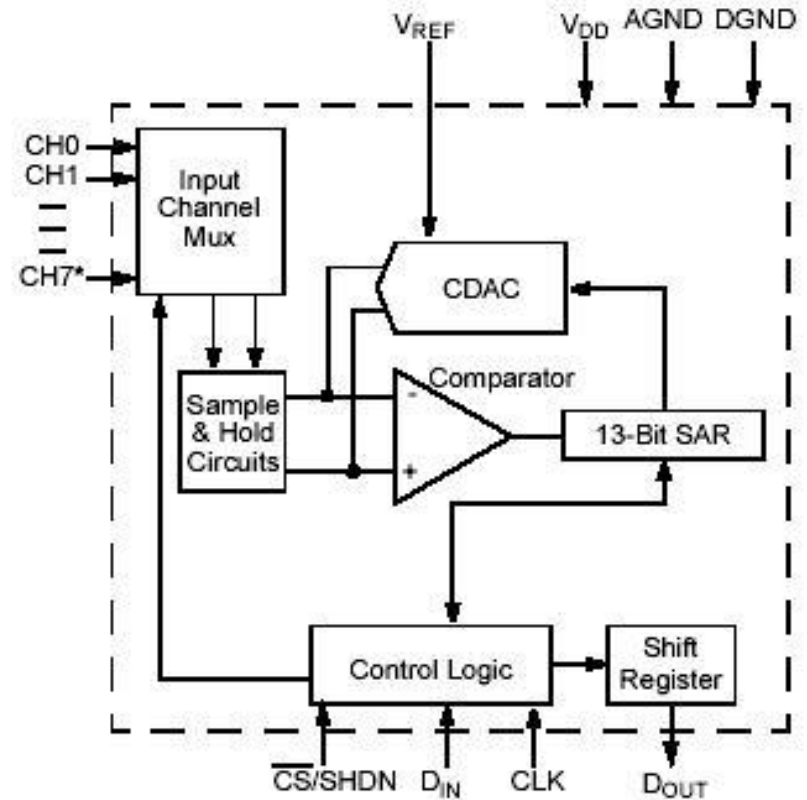
## Features:

- Full Differential Inputs
- 13-bit Resolution
- $\pm 1$  LSB (max.) DNL
- $\pm 1$  LSB (max.) INL (MCP3301-B)
- $\pm 2$  LSB (max.) INL (MCP3301-C)
- Single Supply Operation:
  - 2.7V to 5.5V
- 100 ksp/s Sampling Rate with 5V Supply Voltage
- 50 ksp/s Sampling Rate with 2.7V Supply Voltage
- 50nA (typ.) Standby Current
- 450 $\mu$ A (max.) Active Current at 5V
- Industrial Temperature Range:
  - -40°C to +85°C
- 8-Pin MSOP, PDIP and SOIC Packages
- MXDEV™ Evaluation Kit Available
- Recommended for Automotive Design



## Features:

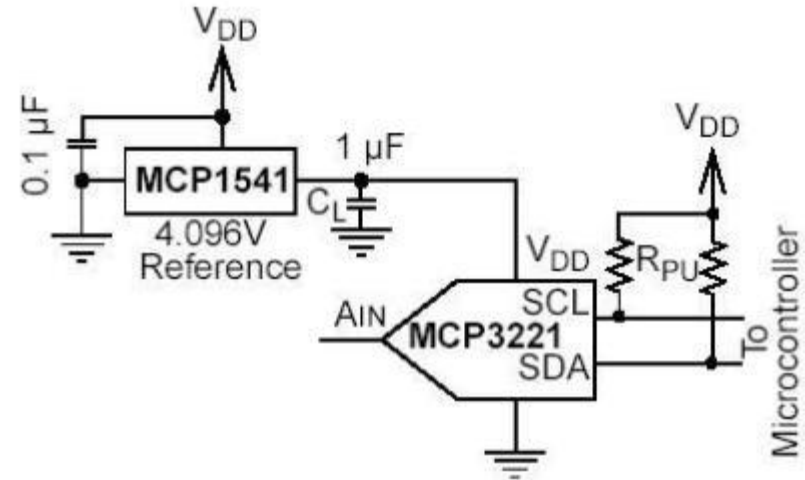
- Full Differential Inputs
- 13-bit Resolution
- MCP3302: 2 Differential or 4 Single Ended Inputs
- MCP3304: 4 Differential or 8 Single Ended Inputs
- $\pm 1$  LSB (max.) DNL
- $\pm 1$  LSB (max.) INL (MCP3302/04-B)
- $\pm 2$  LSB (max.) INL (MCP3302/04-C)
- Single Supply Operation:
  - 2.7V to 5.5V
- 100 kps Sampling Rate with 5V Supply Voltage
- 50 kps Sampling Rate with 2.7V Supply Voltage
- 50nA (typ.) Standby Current
- 450 $\mu$ A (max.) Active Current at 5V
- Industrial Temperature Range:
  - -40°C to +85°C
- 14 and 16-Pin PDIP, SOIC and TSSOP Packages
- MXDEV™ Evaluation Kit Available



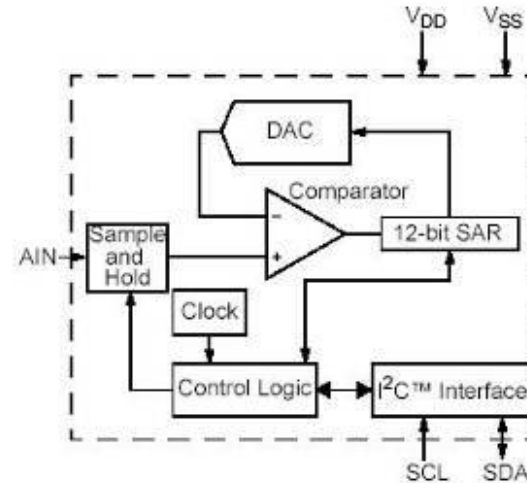
\* Channels 5-7 available on MCP3304 Only

## Features:

- 12-bit Resolution
- $\pm 1$  LSB DNL,  $\pm 2$  LSB INL (max.)
- 250 $\mu$ A (max.) Conversion Current
- 5nA (typ.) Standby Current
- I<sup>2</sup>C™ Compatible Serial Interface:
  - 100 kHz Standard Mode
  - 400 kHz Fast Mode
- Up to 8 Devices on a Single 2-Wire Bus
- Single-Ended Analog Input Channel
- On-Chip Sample and Hold
- On-Chip Conversion Clock
- Single-Supply: 2.7V to 5.5V
- Temperature Range:
  - Extended: -40°C to +125°C
- Small SOT-23 Package
- Recommended for Automotive Design

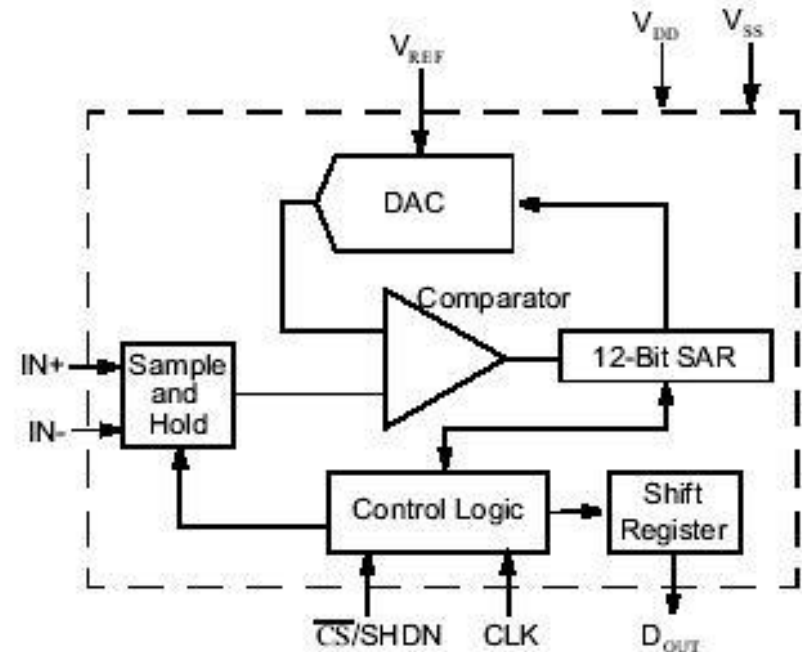


*Stable Power and Reference Configuration*



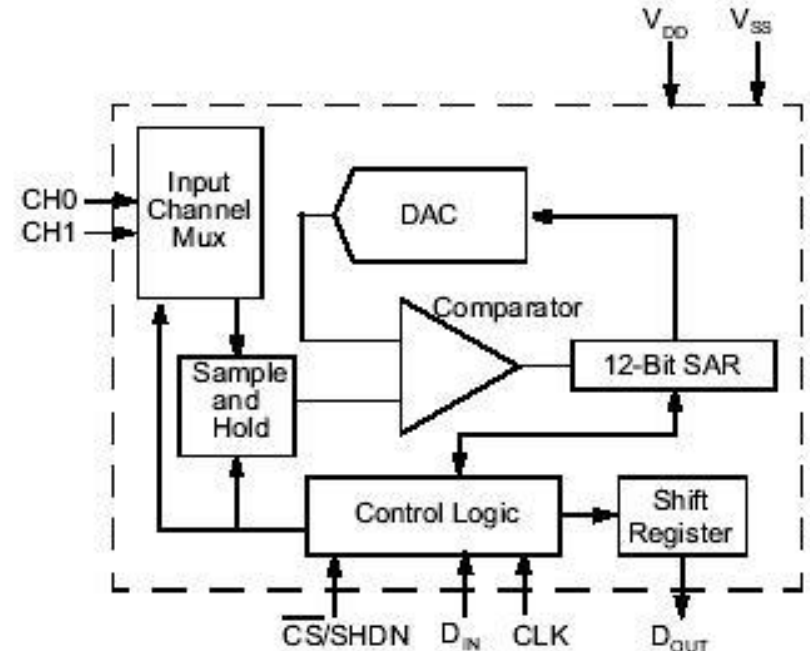
## Features:

- 12-bit Resolution
- $\pm 1$  LSB (max.) DNL
- $\pm 1$  LSB (max.) INL (MCP3301-B)
- $\pm 2$  LSB (max.) INL (MCP3301-C)
- SPI Serial Interface:
  - Modes 0,0 and 1,1
- Single Supply Operation:
  - 2.7V to 5.5V
- 100 ksp/s (max.) Sampling Rate at 5V
- 50 ksp/s (max.) Sampling Rate at 2.7V
- 500nA (typ.) Standby Current
- 400 $\mu$ A (max.) Active Current at 5V
- On-Chip Sample and Hold
- Recommended for Automotive Design
- Industrial Temperature Range:
  - -40°C to +85°C
- 8-Pin MSOP, PDIP, SOIC and TSSOP –  
- Packages



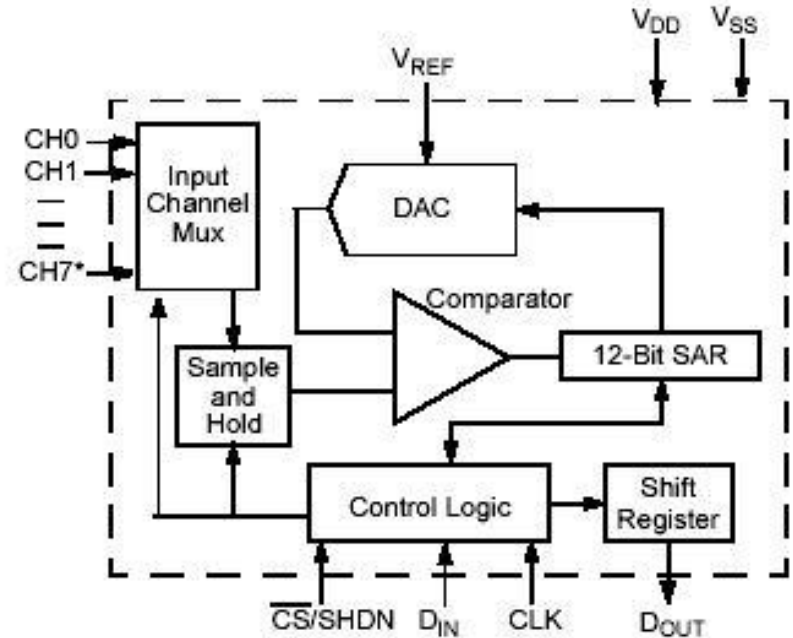
## Features:

- 12-bit Resolution
- $\pm 1$  LSB (max.) DNL
- $\pm 1$  LSB (max.) INL (MCP3302-B)
- $\pm 2$  LSB (max.) INL (MCP3302-C)
- 2 Input Channels
- Analog Inputs Programmable as Single –  
– Ended or Pseudo-Differential Pairs
- SPI Serial Interface: Modes 0,0 and 1,1
- Single Supply Operation: 2.7V to 5.5V
  - 100 ksp/s (max.) Sampling Rate at 5V
  - 50 ksp/s (max.) Sampling Rate at 2.7V
- 500nA (typ.) Standby Current
- 550 $\mu$ A (max.) Active Current at 5V
- On-Chip Sample and Hold
- Industrial Temperature Range: -40°C to +85°C
- Packages: 8-Pin MSOP, PDIP, SOIC, TSSOP
- Recommended for Automotive Design



## Features:

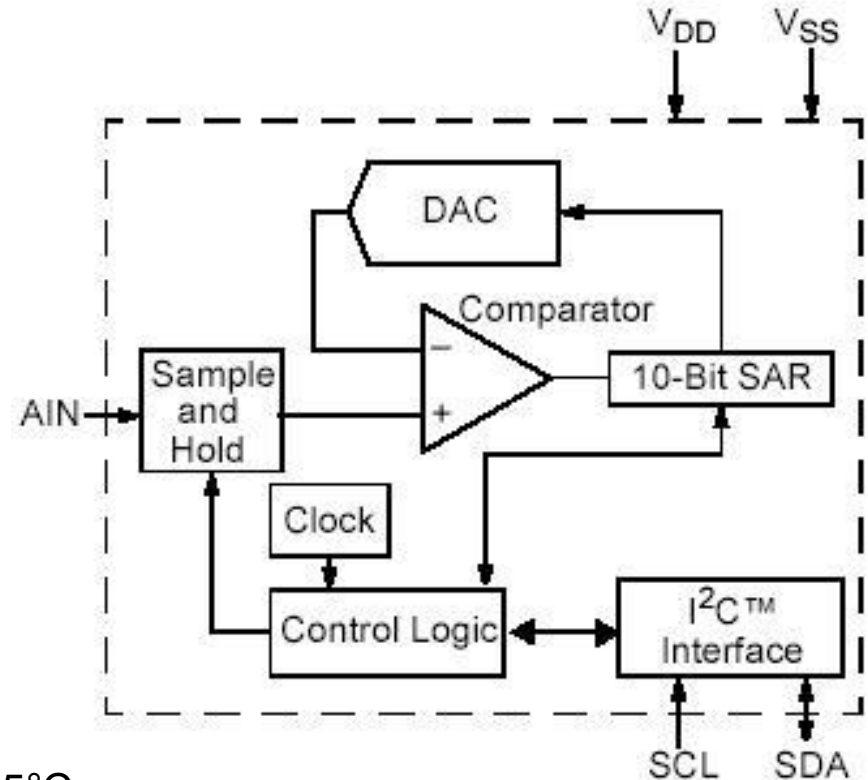
- 12-bit Resolution
- $\pm 1$  LSB (max.) DNL
- $\pm 1$  LSB (max.) INL (MCP3304/08-B)
- $\pm 2$  LSB (max.) INL (MCP3304/08-C)
- 4 (MCP3204) or 8 (MCP3208) Input Channels
- Analog Inputs Programmable as Single-Ended –  
– or Pseudo-Differential Pairs
- SPI Serial Interface: Modes 0,0 and 1,1
- Single Supply Operation: 2.7v to 5.5V
  - 100 ksp/s (max.) Sampling Rate at 5V
  - 50 ksp/s (max.) Sampling Rate at 2.7V
- 500nA (typ.) Standby Current
- 400 $\mu$ A (max.) Active Current at 5V
- On-Chip Sample and Hold
- Industrial Temperature Range: -40°C to +85°C
- Packages: PDIP, SOIC and TSSOP
- Recommended for Automotive Design  
(MCP3208)



\* Note: Channels 5-7 available on MCP3208 Only

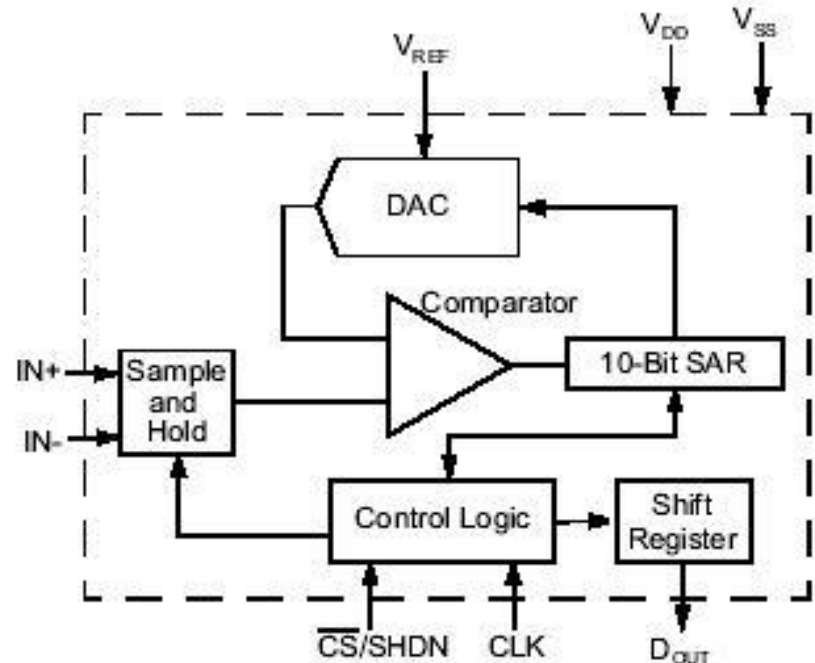
## Features:

- 10-bit Resolution
- Singly Supply:
  - 2.7V to 5.5V
- $\pm 1$  LSB DNL,  $\pm 1$  LSB INL (max.)
- 250 $\mu$ A (max.) Conversion Current
- 5nA (typ.) Standby Current, 1 $\mu$ A (max.)
- I<sup>2</sup>C<sup>™</sup> Compatible Serial Interface:
  - 100 kHz Standard Mode
  - 400 kHz Fast Mode
- 22.3 ksps in Fast Mode
- Up to 8 Devices on Single 2-Wire Bus
- Single-Ended Analog Input Channel
- On-Chip Sample and Hold
- On-Chip Conversion Clock
- Extended Temperature Range: -40°C to +125°C
- Small SOT-23 Package
- Recommended for Automotive Design



## Features:

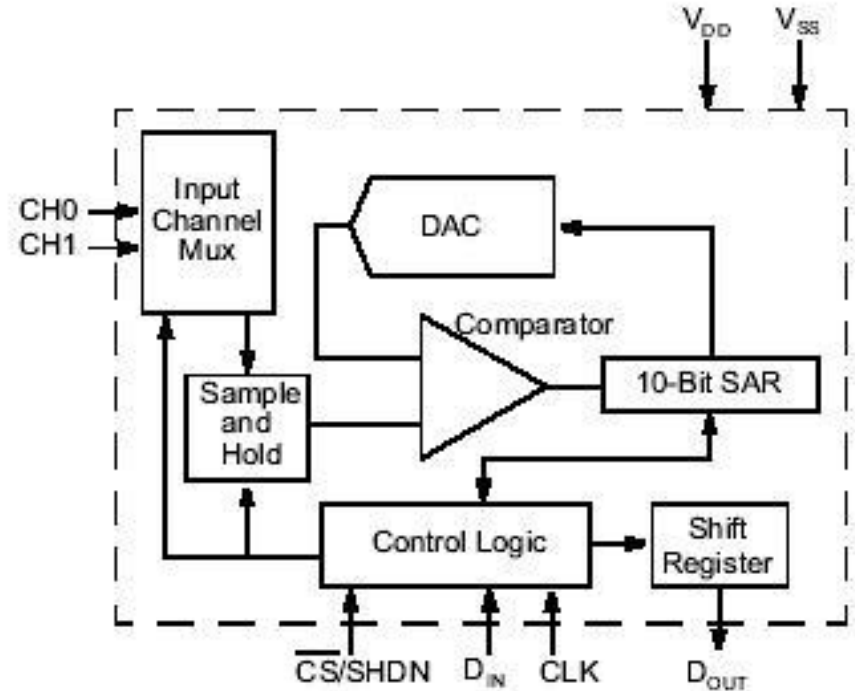
- 10-bit Resolution
- Singly Supply: 2.7V to 5.5V
  - 200 ksps Sampling Rate at 5V
  - 75 ksps Sampling Rate at 2.7V
- $\pm 1$  LSB DNL,  $\pm 1$  LSB INL (max.)
- SPI Serial Interface: modes 0,0 and 1,1
- On-Chip Sample and Hold
- Low Power CMOS Technology:
  - 5nA (typ.) Standby Current, 2 $\mu$ A (max.)
  - 500 $\mu$ A (max.) Active Current at 5V
- Industrial Temperature Range:
  - -40°C to +85°C
- Packages: 8-Pin SOIC, MSOP, TSSOP, PDIP





## Features:

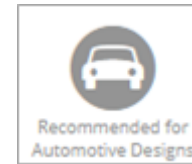
- 10-bit Resolution
- Singly Supply: 2.7V to 5.5V
  - 200 ksps Sampling Rate at 5V
  - 75 ksps Sampling Rate at 2.7V
- $\pm 1$  LSB DNL,  $\pm 1$  LSB INL (max.)
- Analog Inputs:
- Single-Ended or Pseudo-Differential Pairs
- SPI Serial Interface: modes 0,0 and 1,1
- On-Chip Sample and Hold
- Low Power CMOS Technology:
  - 5nA (typ.) Standby Current, 2 $\mu$ A (max.)
  - 550 $\mu$ A (max.) Active Current at 5V
- Industrial Temperature Range:
  - -40°C to +85°C
- Packages: 8-Pin SOIC, MSOP, TSSOP, PDIP





# MCP3004/8

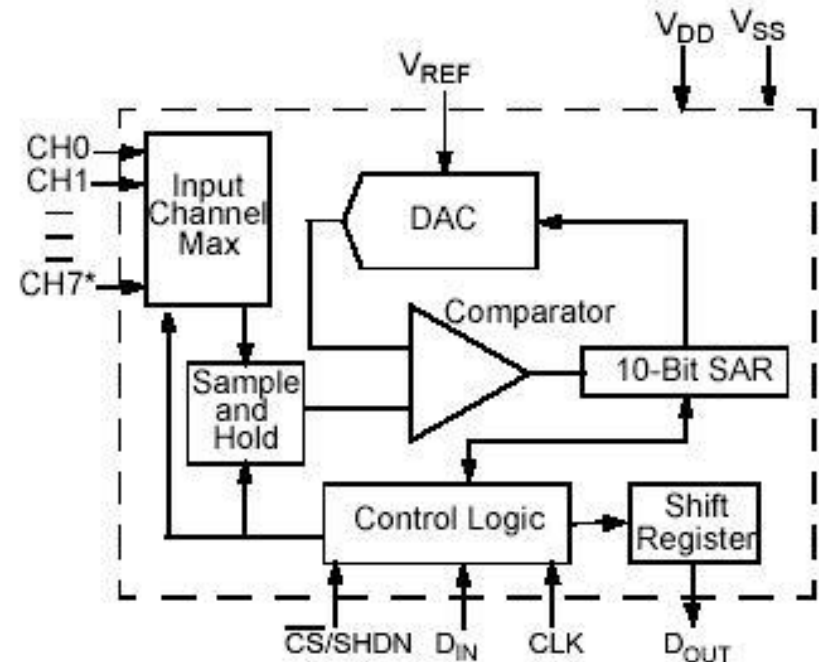
2.7V 4-Channel/8-Channel 10-Bit A/D Converters  
with SPI Serial Interface



Online  
Datasheet

## Features:

- 10-bit Resolution
- Singly Supply: 2.7V to 5.5V
  - 200 ksps Sampling Rate at 5V
  - 75 ksps Sampling Rate at 2.7V
- 4 (MCP3004) or 8 (MCP3008) Input Channels
- $\pm 1$  LSB DNL,  $\pm 1$  LSB INL (max.)
- Analog Inputs:
  - Single-Ended or Pseudo-Differential Pairs
- SPI Serial Interface: modes 0,0 and 1,1
- On-Chip Sample and Hold
- Low Power CMOS Technology:
  - 5nA (typ.) Standby Current, 2 $\mu$ A (max.)
  - 500 $\mu$ A (max.) Active Current at 5V
- Industrial Temperature Range: -40°C to +85°C
- SOIC, TSSOP and PDIP Packages
- Recommended for Automotive Design



\* Note: Channels 4-7 available on MCP3008 Only

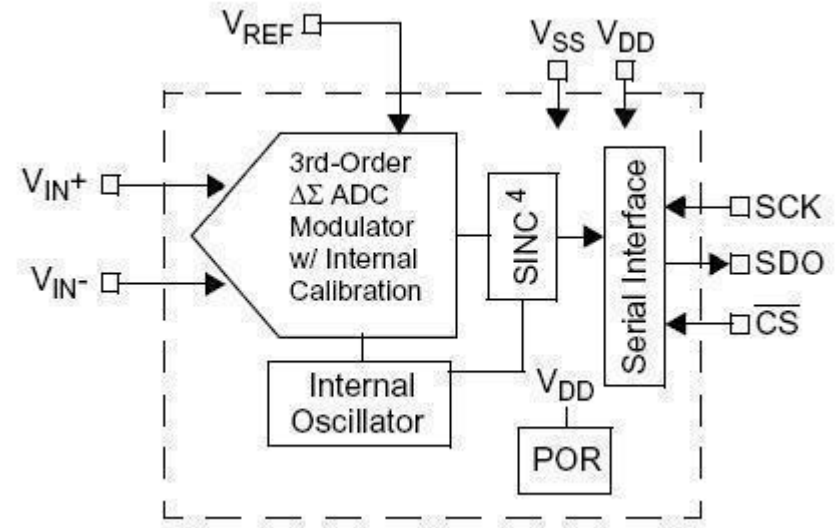
MCP3002 >>

MCP3001 >>

<< BACK

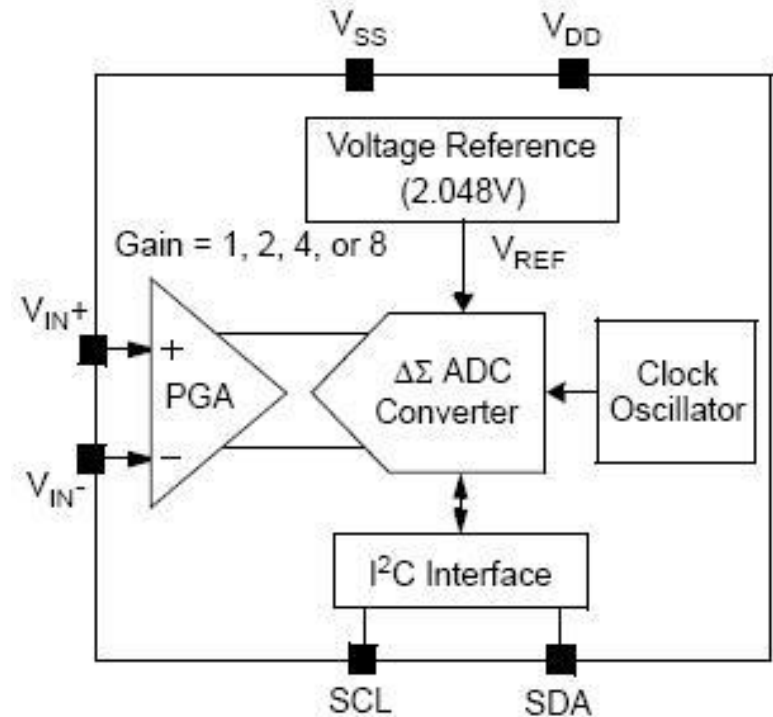
## Features:

- 22-bit ADC in Small 8-pin MSOP Package
- Ultra-Low Conversion Current (MCP3550/1):
  - 100 $\mu$ A (typ.) ( $V_{DD} = 2.7V$ )
  - 120 $\mu$ A (typ.) ( $V_{DD} = 5.0V$ )
- Low-Output Noise of 2.5 $\mu$ V<sub>RMS</sub> with Effective
- Resolution of 21.9 bits (MCP3550/1)
- Offset Error: 3 $\mu$ V (typ.)
- Full Scale Error: 2ppm (typ.)
- INL Error: 6ppm (max.)
- Total Unadjusted Error Less Than 10ppm
- Data rate:
  - MCP3550/1: 15sps
  - MCP3553: 60sps
- No Digital Filter Settling Time, Single-Command -
  - Conversions through 3-wire SPI Interface
- 50/60Hz Rejection (MCP3550/1)
- Differential Input with  $V_{SS}$  to  $V_{DD}$  Common -
  - Mode Range
- 2.7V to 5.5V Single-Supply Operation
- Extended Temperature Range: -40°C to +125°C



## Features:

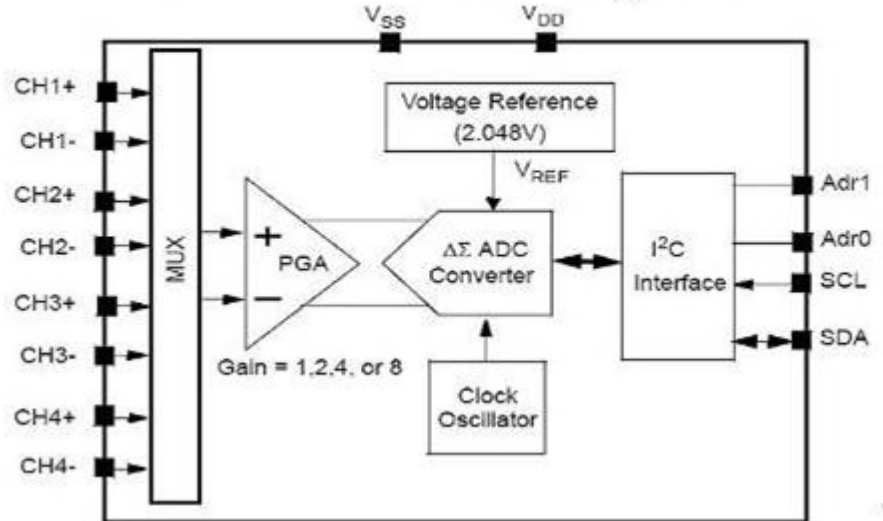
- 18-bit  $\Delta\Sigma$  ADC in a SOT-23-6 package
- On-board Voltage Reference
- On-board Programmable Gain Amplifier:
  - Gains of 1, 2, 4 or 8
- One-Shot or Continuous Conversion
- Low current consumption:
  - 145 $\mu$ A (typ.),  $V_{DD} = 3V$ , Continuous
  - 39 $\mu$ A (typ.),  $V_{DD} = 3V$ , One-Shot
- Programmable Data Rate Options:
  - 3.75 sps (18 bits), 15 sps (16 bits),
  - 60 sps (14 bits), 240 sps (12 bits)
- INL: 10ppm of FSR (FSR = 4.096V/PGA)
- Self Calibration of Internal Offset and Gain per each Conversion
- Differential Input Operation
- Supports I<sup>2</sup>C™ Serial Interface:
  - Standard, Fast and High Speed Modes
- Single Supply Operation: 2.7V to 5.5V
- On-board Oscillator
- Extended Temperature Range: -40°C to 125°C
- Recommended for Automotive Design



## Features:

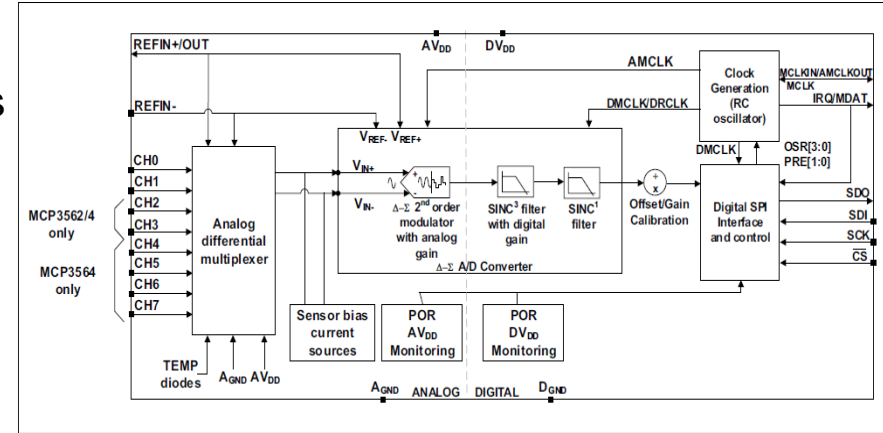
- 18-bit  $\Delta\Sigma$  ADC
- Multi-Channel inputs:
  - 2-channel (MCP3422/3)
  - 4-channel (MCP3424)
- On-board Voltage Reference
- On-board Programmable Gain Amplifier:
  - Gains of 1, 2, 4 or 8
- One-Shot or Continuous Conversion
- Low current consumption:
  - 145 $\mu$ A (typ.),  $V_{DD} = 3V$ , Continuous
  - 39 $\mu$ A (typ.),  $V_{DD} = 3V$ , One-Shot
- Programmable Data Rate Options:
  - 3.75 sps (18 bits), 15 sps (16 bits),
  - 60 sps (14 bits), 240 sps (12 bits)
- INL: 10ppm of FSR (FSR = 4.096V/PGA)
- Self Calibration of Internal Offset and Gain
- Differential Input Operation
- I<sup>2</sup>C™ Serial Interface
- Single Supply Operation: 2.7V to 5.5V
- Extended Temperature Range: -40°C to 125°C

## Functional Block Diagram



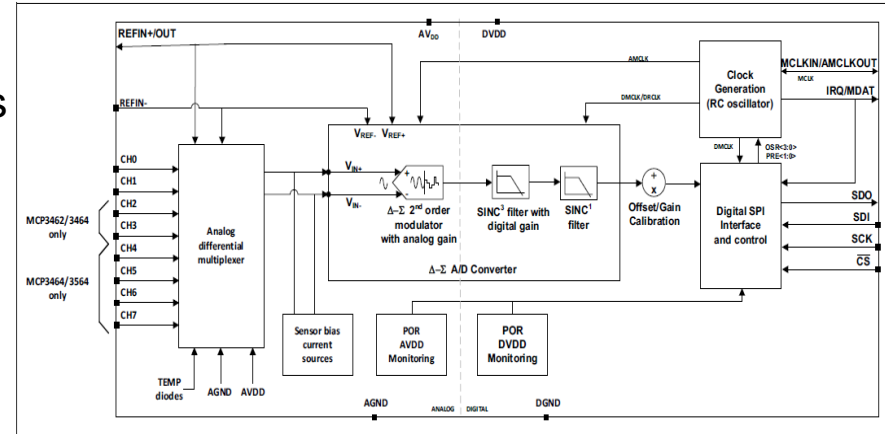
## Features:

- 24-bit Resolution
- 1/2/4 Differential or 2/4/8 Single-ended Channels
- Programmable Data Rate: up to 153.6kSPS
- Programmable Gain: 0.33X to 64X
- Low Noise: 90nVRMS (Gain=16x, 12.5sps)
- Low Temperature Drift
  - Offset error drift: 4 nV/°C (AZ\_MUX = 1, Gain = 1X)
  - Gain error drift: 0.5 ppm/°C (Gain = 1X)
- Internal Oscillator or External Clock Selection
- Internal temperature sensor
- Internal Conversions Sequencer (SCAN Mode)
- Burnout Current Sources for Sensor Open/Short Detection
- Advanced Security Features:
  - 16-bit CRC for secure SPI communications
  - 16-bit CRC and IRQ for securing configuration
  - Register map lock with 8-bit secure key
  - Monitor controls for measurement integrity
- 20Mhz SPI-Compatible Interface
- AVDD: 2.7V to 3.6V
- DVDD: 1.8V to 3.6V
- Extended Temperature Range: -40°C to +125°C
- Package: 3mmX3mm UQFN-20 and 6.4mmX6.4mm TSSOP-20



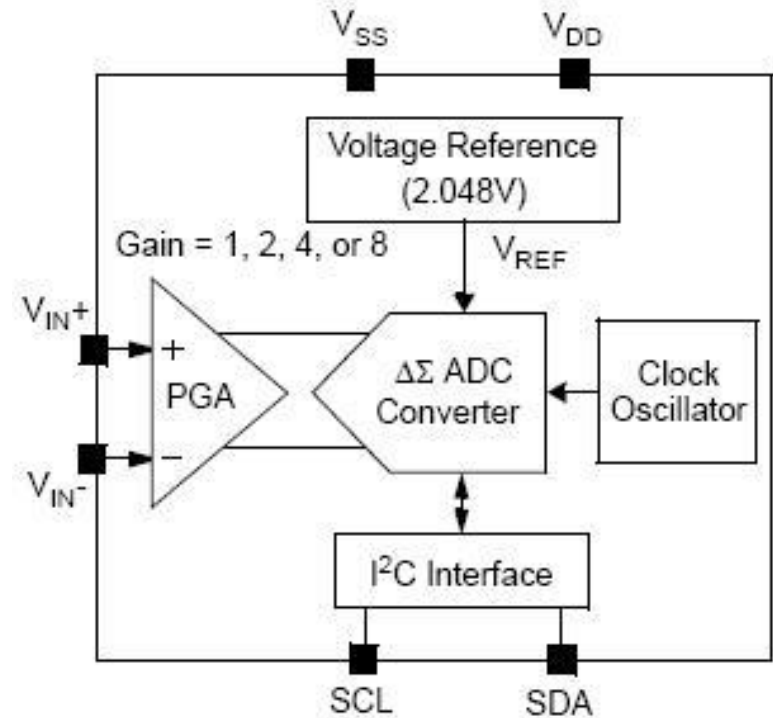
## Features:

- 16-bit Resolution
- 1/2/4 Differential or 2/4/8 Single-ended Channels
- Programmable Data Rate: up to 153.6kSPS
- Programmable Gain: 0.33X to 64X
- Low Noise: 90nVRMS (Gain=16x, 12.5sps)
- Low Temperature Drift
  - Offset error drift: 4 nV/°C (AZ\_MUX = 1, Gain = 1X)
  - Gain error drift: 0.5 ppm/°C (Gain = 1X)
- Internal Oscillator or External Clock Selection
- Internal temperature sensor
- Internal Conversions Sequencer (SCAN Mode)
- Burnout Current Sources for Sensor Open/Short Detection
- Advanced Security Features:
  - 16-bit CRC for secure SPI communications
  - 16-bit CRC and IRQ for securing configuration
  - Register map lock with 8-bit secure key
  - Monitor controls for measurement integrity
- 20Mhz SPI-Compatible Interface
- AVDD: 2.7V to 3.6V
- DVDD: 1.8V to 3.6V
- Extended Temperature Range: -40°C to +125°C
- Package: 3mmX3mm UQFN-20 and 6.4mmX6.4mm TSSOP-20



## Features:

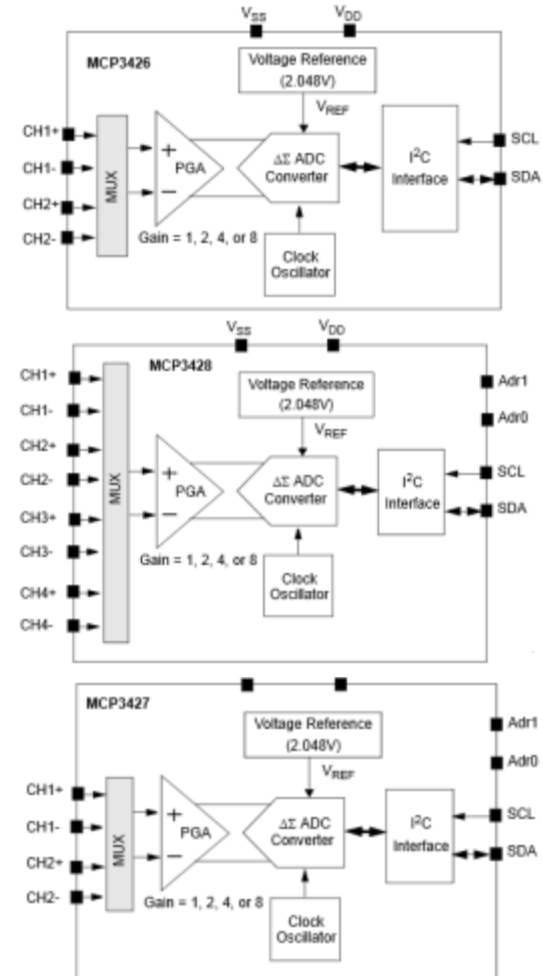
- 16-bit  $\Delta\Sigma$  ADC in a SOT-23-6 package
- Differential Input Operation
- Self Calibration of Internal Offset and Gain
- On-board Voltage Reference Accuracy:
  - 2.048V  $\pm$ 0.05%
- Programmable Gain Amplifier up to 8x
- Internal Oscillator
- INL: 10ppm of FSR (FSR = 4.096V/PGA)
- Programmable Data Rate Options: 15 sps @16-bits, 60 sps @14-bits, 240 sps @12-bits
- One-Shot or Continuous Conversion options
- One-Shot Conversion:
  - 9.7 $\mu$ A (typ.) with 16-bit mode
  - 2.4 $\mu$ A (typ.) with 14-bit mode
  - 0.6 $\mu$ A (typ.) with 12-bit mode
- Low current consumption:
  - 145 $\mu$ A typical ( $V_{DD}$  = 3V, Continuous)
- I<sup>2</sup>C™ Serial Interface
- Single Supply Operation: 2.7V to 5.5V
- Extended Temperature Range: -40°C to 125°C





## Features:

- 16-bit  $\Delta\Sigma$  ADC:
  - 2 channels: MCP3426 and MCP3427
  - 4 channels: MCP3428
- Differential Input Full Scale Range Operation
- Self Calibration of Internal Offset and Gain
- Voltage Reference: 2.048V  $\pm$ 0.05%
- Programmable Gain Amplifier: Up to 8x
- On-board Oscillator
- INL: 10ppm of FSR
- Programmable Data Rate Options: 15 sps @16-bits, 60 sps @14-bits, 240 sps @12-bits
- One-Shot or Continuous Conversion options
- One-Shot Conversion for power savings
- Low current consumption:
  - 135  $\mu$ A typical (VDD = 3V, Continuous)
- Supports I<sup>2</sup>C™ Serial Interface:
  - User configurable address pins (MCP3427/MCP3428)
- Single Supply Operation: 2.7V to 5.5V
- Extended Temperature Range: -40°C to 125°C





# MCP39F501

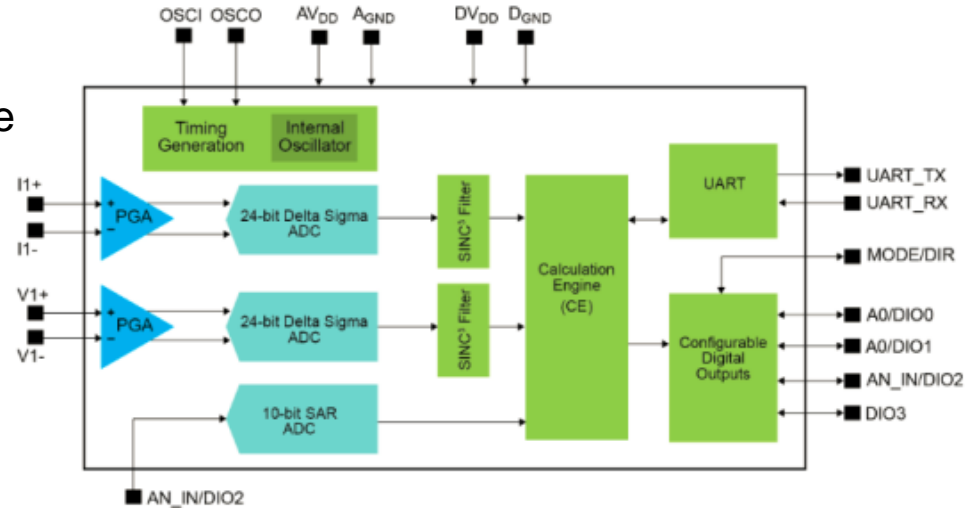
Single-Phase, Power-Monitoring IC with  
Calculation and Event Detection



Online  
Datasheet

## Features:

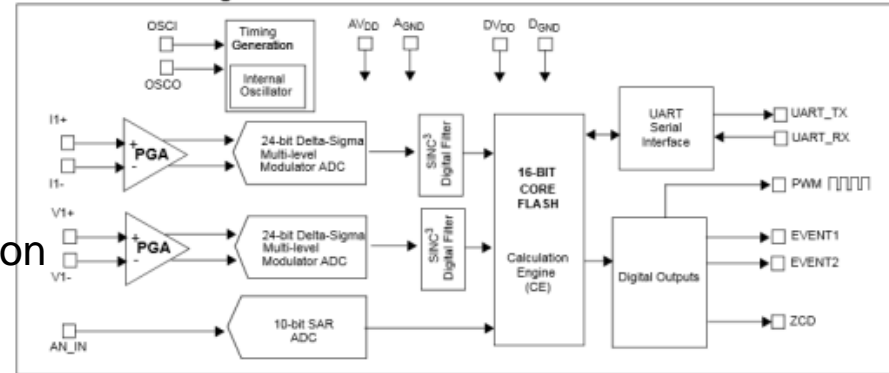
- Power Monitoring Accuracy capable of 0.1% error across 4000:1 dynamic range
- Built-in calculations:
  - Active, Reactive and Apparent Power
  - RMS Current, RMS Voltage
  - Line Frequency, Power Factor
- Fast Calibration Routine
- Programmable Event Notifications –
  - such as overcurrent and voltage –
  - sag, surge protection
- 512 bytes User-accessible EEPROM
- Non-volatile On-chip Memory, no –
  - external memory required
- 2-wire UART interface
- Low-Drift Internal Voltage Reference:
  - 10 ppm/°C typical
- 28-lead 5x5 QFN package
- Extended Temperature Range:
  - -40°C to +125°C



## Features:

- Power Monitoring Accuracy capable of 0.1% error across 4000:1 dynamic range
- Built-In Calculations:
  - Active, Reactive, Apparent Power
  - Active and Reactive Energy Accumulation
  - RMS Current, RMS Voltage
  - Line Frequency, Power Factor
- Dedicated Zero Crossing Detection (ZCD) Pin
- Dedicated PWM Output Pin
- Automatic Event Pin Control through Fast Voltage Surge Detection
- Fast Calibration Routines
- 2-wire UART: Baud Rate up to 115.2kbps
- 512 bytes User-accessible EEPROM
- Low-Drift Internal Voltage Reference:
  - 10 ppm/°C typical
- 28-lead 5x5 QFN package
- Extended Temperature Range:
  - -40°C to +125°C

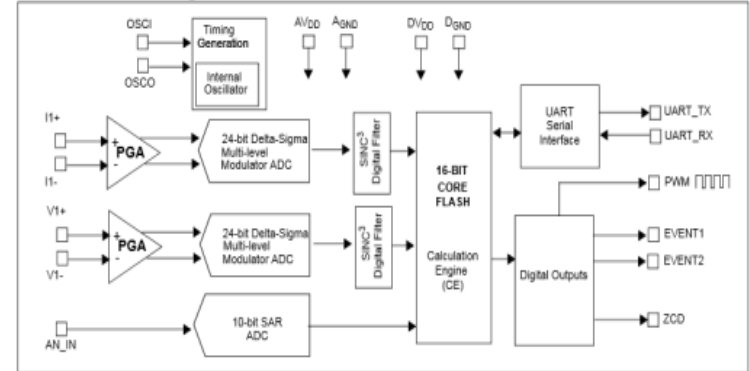
Functional Block Diagram



## Features:

- Real-Time Measurement of Input AC or DC Power
- Automatic sensing and switching between AC and DC modes
- Capable of 0.1% accuracy across 4000:1 dynamic range
- Built-In Calculations:
  - Active, Reactive, Apparent Power
  - Active and Reactive Energy Accumulation
  - RMS Current, RMS Voltage
  - Line Frequency, Power Factor
- Automatic Saving and Loading Energy Accumulation Registers to/from EEPROM at Power Off/On
- Automatic Event Pin Control through Fast Voltage Surge Detection
- Fast Calibration Routines
- 2-wire UART: Baud Rate up to 115.2kbps
- 512 bytes User-accessible EEPROM
- Low-Drift Internal Voltage Reference: 10ppm/°C(typ)
- 28-lead 5x5 QFN package
- Extended Temperature Range : -40°C to +125°C

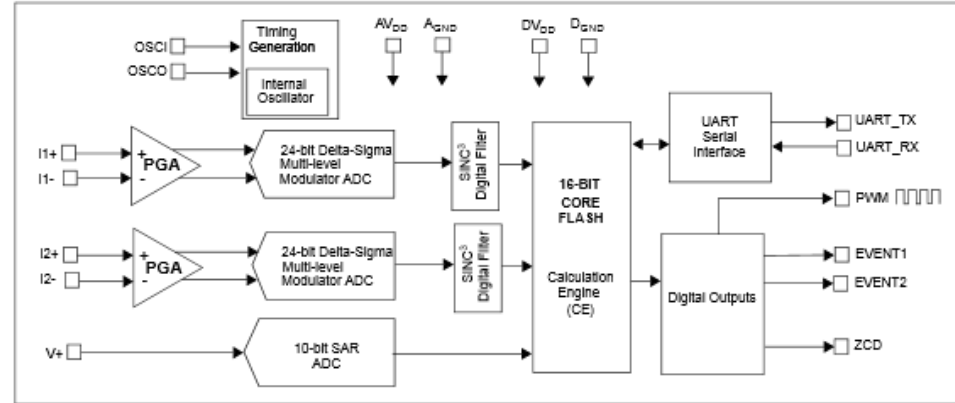
Functional Block Diagram



## Features:

- Power Monitoring of Two Loads
- Capable of 0.5% error across 4000:1 dynamic range
- Built-In Calculations:
  - Active, Reactive, Apparent Power
  - Active, Reactive Energy Accumulation
  - True RMS Current, RMS Voltage
  - Line Frequency, Power Factor
- Dedicated Zero Crossing Detection (ZCD) Pin
- Dedicated PWM Output Pin
- Automatic Event Pin Control through –
  - Fast Voltage Surge Detection
- Fast Calibration Routines
- 2-wire UART: Up to 115.2kbps
- 512 bytes User-accessible EEPROM
- Internal Voltage Reference: 10 ppm/°C
- 28-lead 5x5 QFN package
- Extended Temperature Range:
  - -40°C to +125°C

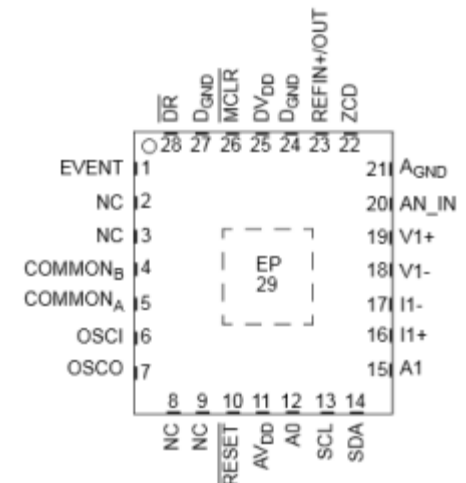
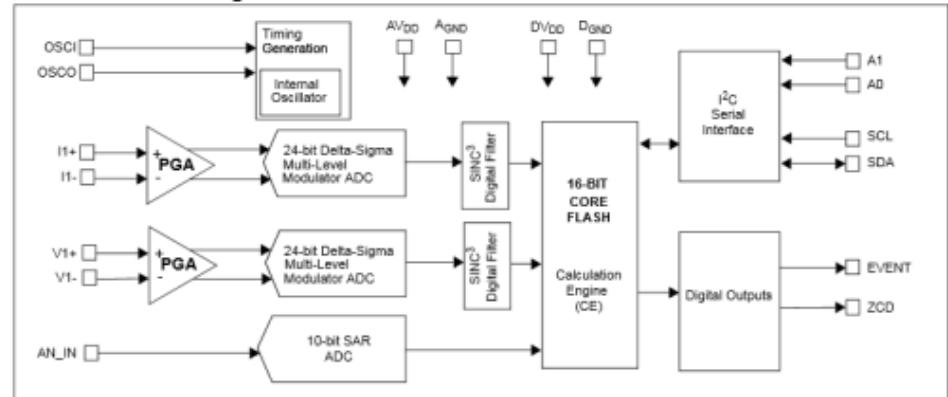
Functional Block Diagram



## Features:

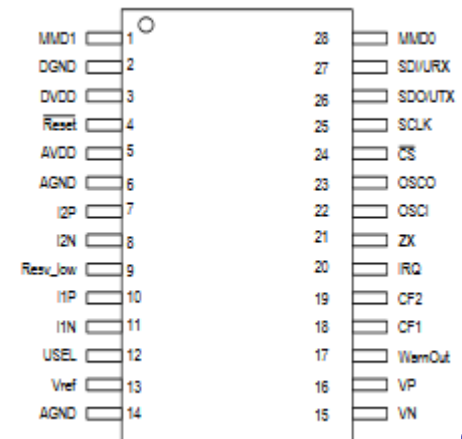
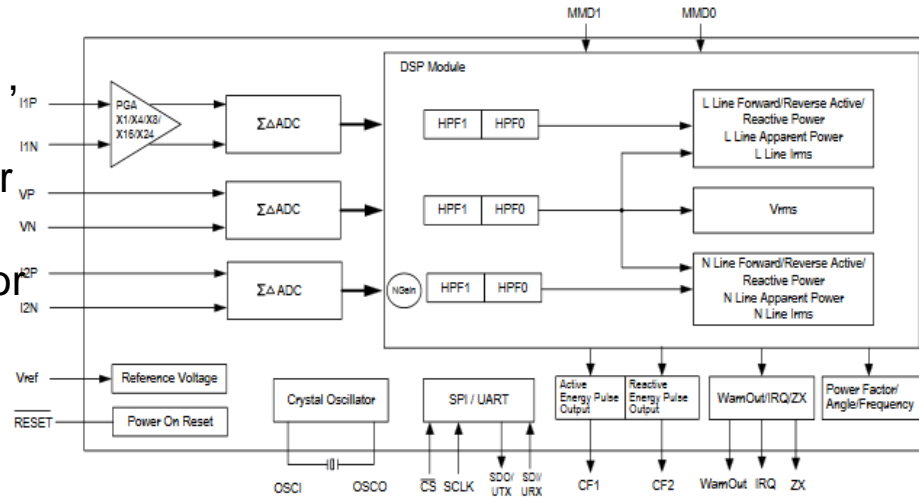
- Power Monitoring Accuracy capable of 0.1% error across 4000:1 dynamic range
- Built-In Calculations:
  - Active, Reactive, Apparent Power
  - Active, Reactive Energy Accumulation
  - RMS Current, RMS Voltage
  - Line Frequency, Power Factor
- Dedicated Zero Crossing Detection Pin
- Automatic Event Pin Control through Fast Voltage Surge Detection
- Fast Calibration Routines
- I<sup>2</sup>C Interface
- 512 bytes User-accessible EEPROM –  
- through page read/write commands
- Non-volatile On-chip Memory
- Internal Voltage Reference: 10 ppm/°C
- 28-lead 5x5 QFN package
- Extended Temperature Range:
  - -40°C to +125°C

Functional Block Diagram



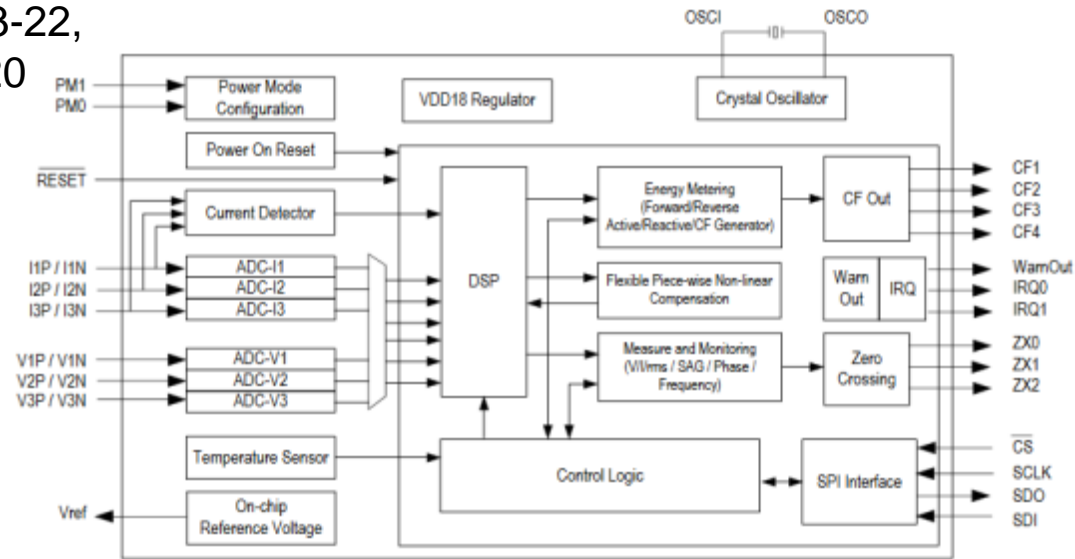
## Features:

- Fully compliant with IEC standard IEC62052-11, IEC62053-21 and IEC62053-23
- Class 1 or class 2 single-phase watt-hour meter or class 2 single-phase var-hour meter
- Accuracy of 0.1% for active energy and 0.2% for reactive energy for a 5000:1 dynamic range
- Voltage Reference: 15ppm/°C (typical)
- Less than  $\pm 0.5\%$  fiducial error for  $V_{rms}$ ,  $I_{rms}$ , mean active / reactive / apparent power, frequency, power factor and phase angle
- SPI or UART interface
- Dedicated ADC and different gains for L line and N line current sampling circuits
- L line and/or N line metering modes:
  - Anti-tampering mode (larger power)
  - L line mode (fixed L line)
  - L+N mode (applicable for single-phase – three-wire system)
  - Flexible mode
- Package: 28-lead SSOP



## Features:

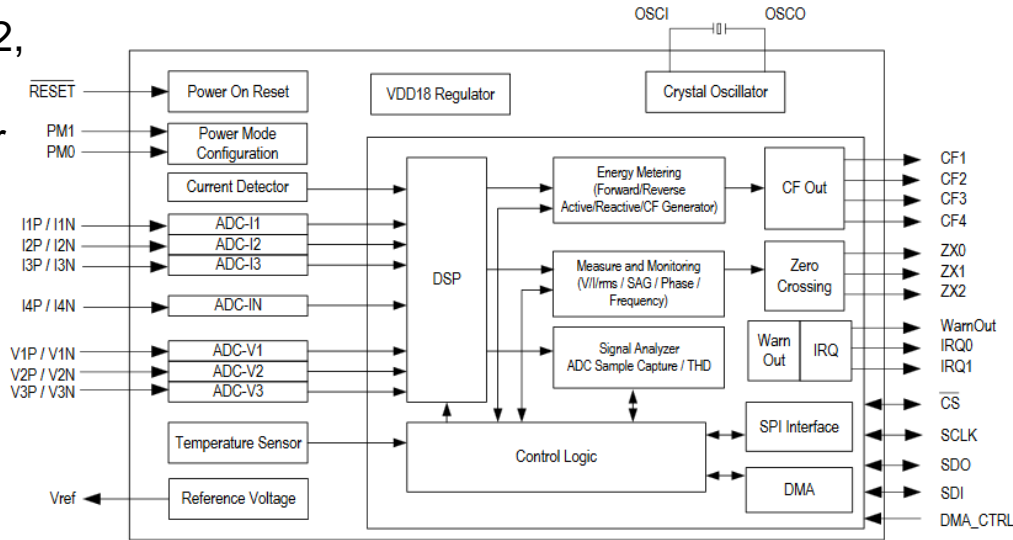
- Compliant with IEC62052-11, IEC62053-22, IEC62053-23, ANSI C12.1, ANSI C12.20
- Class 0.5S or class 1 poly-phase –
  - watt-hour meter or class 2 poly –
  - phase var-hour meter
- Accuracy of  $\pm 0.1\%$  for active –
  - energy &  $\pm 0.2\%$  for reactive –
  - energy for 6000:1 dynamic range
- 6 dedicated ADCs
- Voltage Reference: 6 ppm/ $^{\circ}\text{C}$  (typ)
- $\pm 1^{\circ}\text{C}$  (typical) temperature sensor
- Less than  $\pm 0.5\%$  fiducial error for  $V_{\text{rms}}$ ,  $I_{\text{rms}}$ , mean active/reactive/apparent power, frequency, power factor and phase angle
- Event detection: sag, over voltage, phase loss, over current, reverse V/I phase sequence, reverse flow, calculated neutral line current INC over-current and frequency
- SPI interface
- Package: TQFP-48





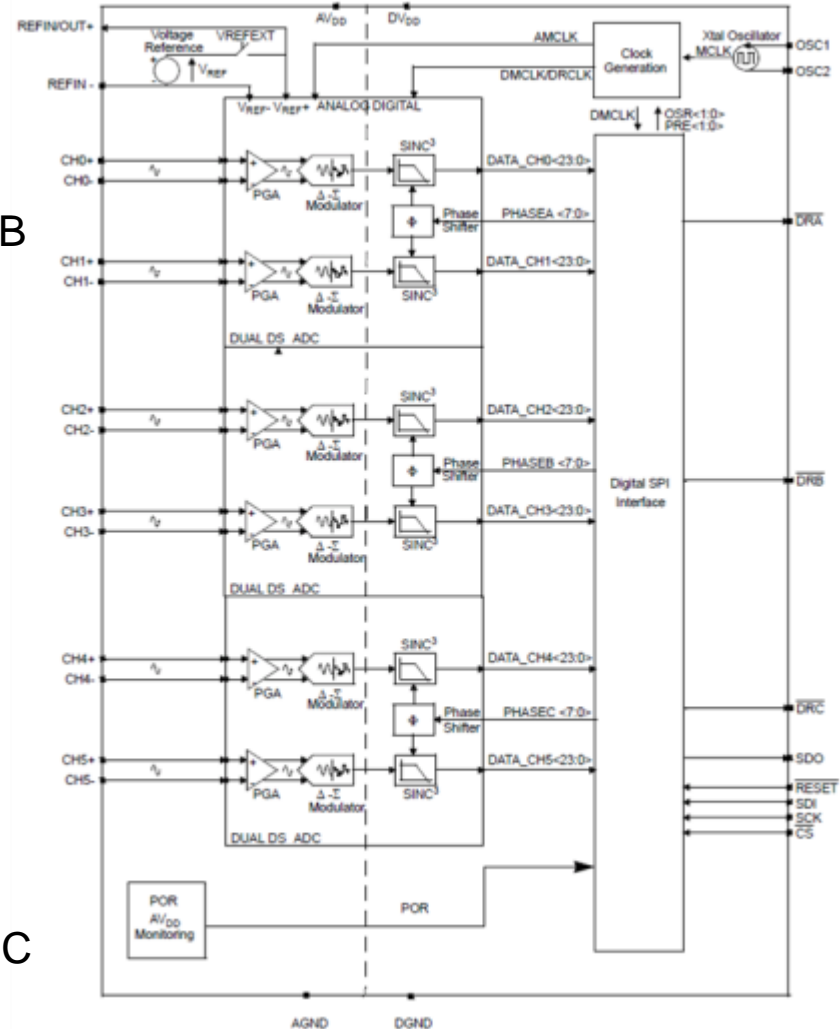
## Features:

- Compliant with IEC62052-11, IEC62053-22, IEC62053-23, ANSI C12.1, ANSI C12.20
- Class 0.5S or class 1 poly-phase watt-hour meter or class 2 poly phase var-hour meter
- Accuracy of  $\pm 0.1\%$  for active energy &  $\pm 0.2\%$  for reactive energy for 6000:1 range
- 7 dedicated ADCs
- Voltage Reference: 6 ppm/ $^{\circ}\text{C}$  (typ)
- $\pm 1^{\circ}\text{C}$  (typ) temperature sensor
- Less than  $\pm 0.5\%$  fiducial error for  $V_{\text{rms}}$ ,  $I_{\text{rms}}$ , mean active/reactive/apparent power, frequency, power factor and phase angle
- Fundamental (0.2%) and harmonic (1%) active energy
- Total Harmonic Distortion (THD) and Discrete Fourier Transform (DFT) functions for 2~32 order harmonic component analysis for each phase's voltage and current.
- SPI interface with DMA
- Package: TQFP-48



## Features:

- MCP3901: 2-Ch AFE
- MCP3903: 6-Ch AFE
- Synchronous sampling 16/24-bit  $\Delta\Sigma$  ADCs
  - Up to 91 dB SINAD, -104 dBc THD, 109 dB SFDR for each channel
- Programmable data rate up to 64 ksp/s
- Ultra low power shutdown mode with  $<2 \mu\text{A}$
- Up to -133 dB Crosstalk
- Low Drift Internal Voltage Reference
- Differential Voltage Reference Input Pins
- High Gain PGA on each channel: Up to 32x
- Phase Delay Compensation
- Separate Modulator outputs for each channel
- High-Speed Addressable SPI Interface
- 4.5V - 5.5V  $\text{AV}_{\text{DD}}$ , 2.7V - 5.5V  $\text{DV}_{\text{DD}}$
- MCP3901 in 20-lead SSOP
- MCP3903 in 28-lead SSOP
- Extended Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$





# MCP3905A/06

2 & 6-Ch AFEs



Online  
Datasheet

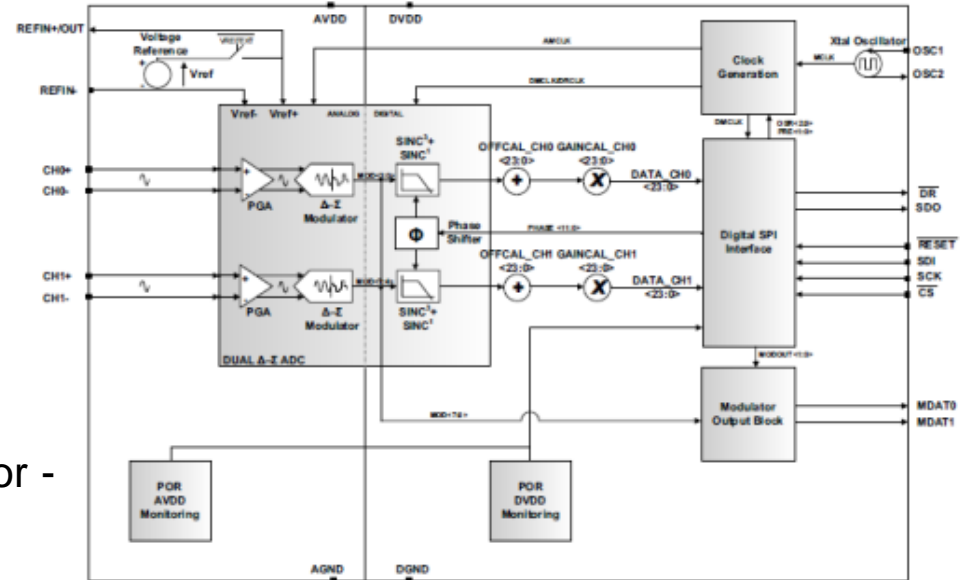
## Features:

- MCP3901: 2-Ch AFE
- MCP3903: 6-Ch AFE
- Synchronous sampling 16/24-bit  $\Delta\Sigma$  ADCs -
  - Up to 91 dB SINAD, -104 dBc THD, 109 dB - SFDR for each channel
- Programmable data rate up to 64 ksps
- Ultra low power shutdown mode with  $<2 \mu\text{A}$
- Up to -133 dB Crosstalk
- Low Drift Internal Voltage Reference
- Differential Voltage Reference Input Pins
- High Gain PGA on each channel: Up to 32x
- Phase Delay Compensation
- Separate Modulator outputs for each channel
- High-Speed Addressable SPI Interface
- 4.5V - 5.5V  $\text{AV}_{\text{DD}}$ , 2.7V - 5.5V  $\text{DV}_{\text{DD}}$
- MCP3901 in 20-lead SSOP
- MCP3903 in 28-lead SSOP
- Extended Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$

<< BACK

## Features:

- 2.7V - 3.6V  $AV_{DD}$ ,  $DV_{DD}$
- Two Synchronous Sampling 16/24-bit  $\Delta\Sigma$  ADCs
- 94.5 dB SINAD, -106.5 dB THD, 111 dB SFDR
- Programmable Data Rate: up to 125 ksp/s
- Oversampling Ratio up to 4096
- -122 dB Crosstalk between Channels
- 1.2V Internal Voltage Reference: 7 ppm/°C
- Differential Voltage Reference Input Pins
- PGA on Each Channel: Up to 32V/V
- Phase Delay Compensation
- Modulator Outputs for Each Channel
- Data Ready Pin for Easy Synchronization
- Individual 24-bit Digital Offset and Gain Error -  
- Correction for Each Channel
- High-Speed 20 MHz SPI Interface
- Continuous Read/Write Modes
- Low Power: Down to 5.6 mW @3.3V
- Extended Temperature Range: -40°C to +125°C
- 20-lead QFN and SSOP Packages
- Pin-to-pin Compatible with MCP3901
- Recommended for Automotive Design

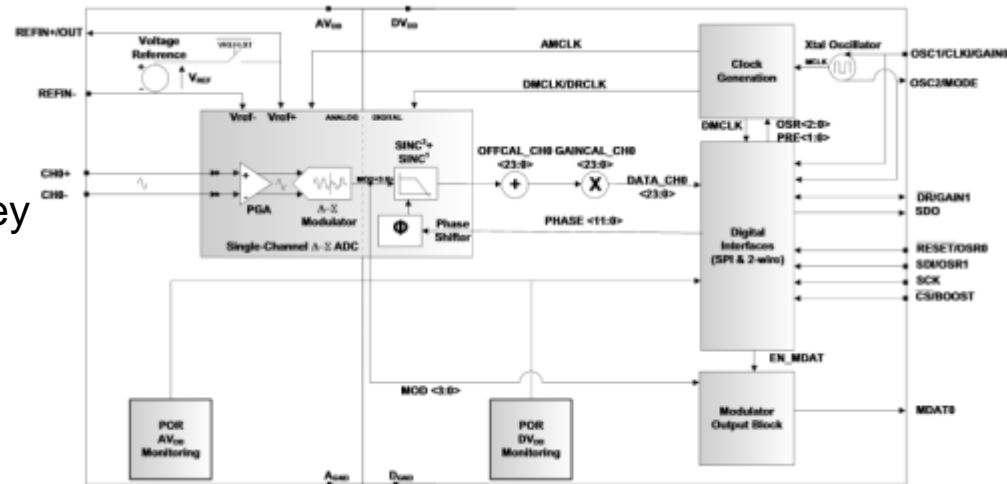


<< Delta-Sigma ADC

<< Power Monitoring &  
Metering ICs

## Features:

- Single 24-bit  $\Delta\Sigma$  ADC
- 93.5 dB SINAD, -107 dBc THD, 112 dBFS SFDR
- 2-Wire Interface mode ideal for Polyphase Shunt Energy Meters
- Advanced Security Features:
  - 16-bit CRC checksum
  - Register map lock with 8-bit secure key
- Programmable Data Rate, up to 125 ksp/s
- Oversampling Ratio up to 4096
- Internal Voltage Reference: 9 ppm/ $^{\circ}\text{C}$  drift
- PGA: up to 32 V/V
- Phase Delay Compensation
- Separate Data Ready Pin for Synchronization
- 24-bit Digital Offset and Gain Error Correction
- High-Speed 20 MHz SPI interface
- Continuous Read/Write Modes for –
  - Minimum Communication Time
- Extended Temperature Range:  $-45^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- 20-lead SSOP and QFN Packages
- Recommended for Automotive Design

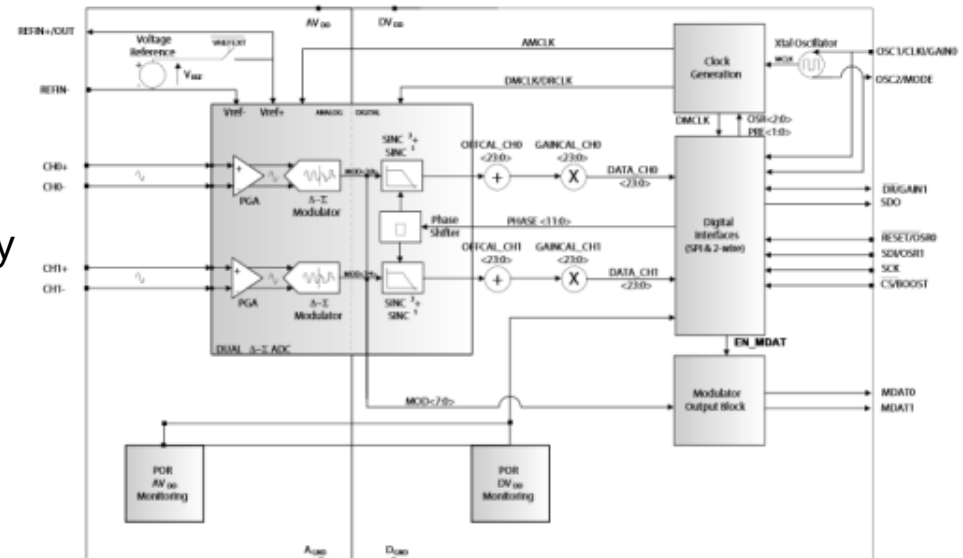


<< Delta-Sigma ADC

<< Power Monitoring & Metering ICs

## Features:

- Two 24-bit  $\Delta\Sigma$  ADC
- 93.5 dB SINAD, -107 dBc THD, 112 dBFS SFDR
- Enables 0.1% Typical Active Power Error over a 10,000:1 Dynamic Range
- 2-Wire Interface mode ideal for Polyphase Shunt Energy Meters
- Advanced Security Features:
  - 16-bit CRC checksum
  - Register map lock with 8-bit secure key
- Programmable Data Rate, up to 125 ksp/s
- Oversampling Ratio up to 4096
- -122 dB Crosstalk between Channels
- Internal Voltage Reference: 9 ppm/°C
- PGA on Each Channel: up to 32 V/V
- Phase Delay Compensation
- Separate Data Ready Pin for Synchronization
- 24-bit Digital Offset and Gain Error Correction
- High-Speed 20 MHz SPI interface
- Extended Temperature Range: -45°C to +125°C
- 20-lead SSOP and QFN Packages
- Recommended for Automotive Design

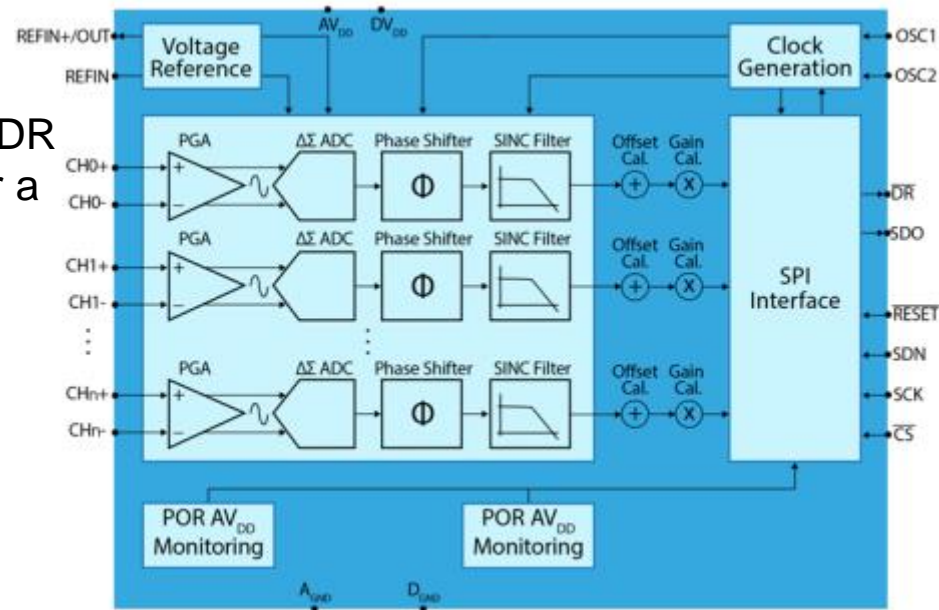


<< Delta-Sigma ADC

<< Power Monitoring & Metering ICs

## Features:

- Three Synchronous Sampling 24-bit  $\Delta\Sigma$  – ADCs
- 93.5 dB SINAD, -107 dBc THD, 112 dBFS SFDR
- Enables 0.1% Typical Active Power Error over a 10,000:1 Dynamic Range
- Advanced Security Features:
  - 16-bit CRC checksum
  - Register map lock with 8-bit secure key
- Programmable Data Rate up to 125 ksp/s
- Oversampling Ratio up to 4096
- -122 dB Crosstalk between Channels
- Internal Voltage Reference: 9 ppm/°C
- PGA on Each Channel (up to 32 V/V)
- Phase Delay Compensation: 1  $\mu$ s Time – Resolution
- Separate Data Ready Pin for Synchronization
- 24-bit Digital Offset and Gain Error Correction
- SPI interface with 2-Wire Interface Mode
- Extended Temperature Range: -40°C to +125°C
- 28-lead QFN and SSOP Packages
- Recommended for Automotive Design

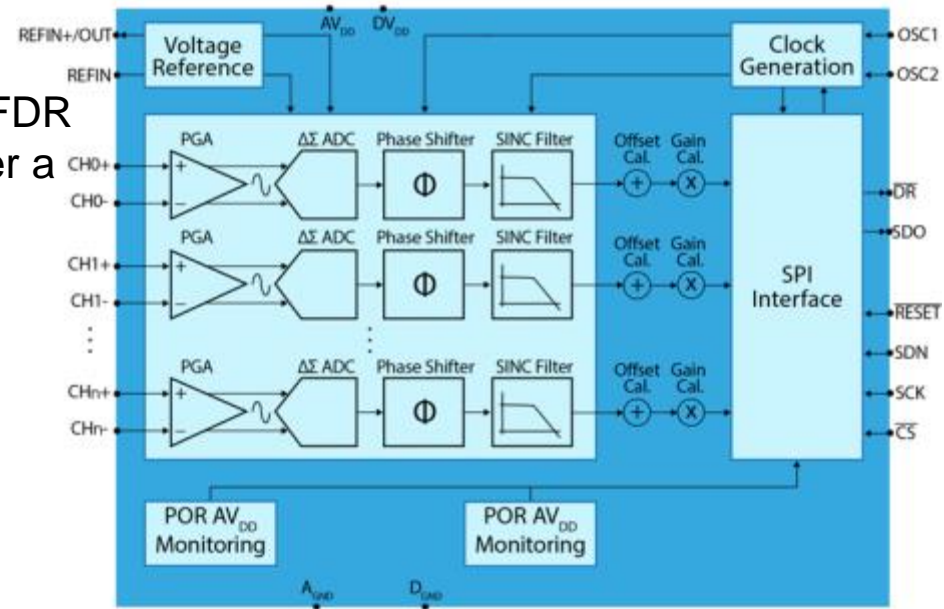


<< Delta-Sigma ADC

<< Power Monitoring & Metering ICs

## Features:

- Four Synchronous Sampling 24-bit  $\Delta\Sigma$  ADCs
- 93.5 dB SINAD, -107 dBc THD, 112 dBFS SFDR
- Enables 0.1% Typical Active Power Error over a 10,000:1 Dynamic Range
- Advanced Security Features:
  - 16-bit CRC checksum
  - Register map lock with 8-bit secure key
- Programmable Data Rate up to 125 ksp/s
- Oversampling Ratio up to 4096
- -122 dB Crosstalk between Channels
- Internal Voltage Reference: 9 ppm/°C
- PGA on Each Channel (up to 32 V/V)
- Phase Delay Compensation
- Separate Data Ready Pin for Synchronization
- 24-bit Digital Offset and Gain Error Correction
- High-Speed 20 MHz SPI interface
- Extended Temperature Range: -40°C to +125°C
- 28-lead QFN and SSOP Packages
- Recommended for Automotive Design



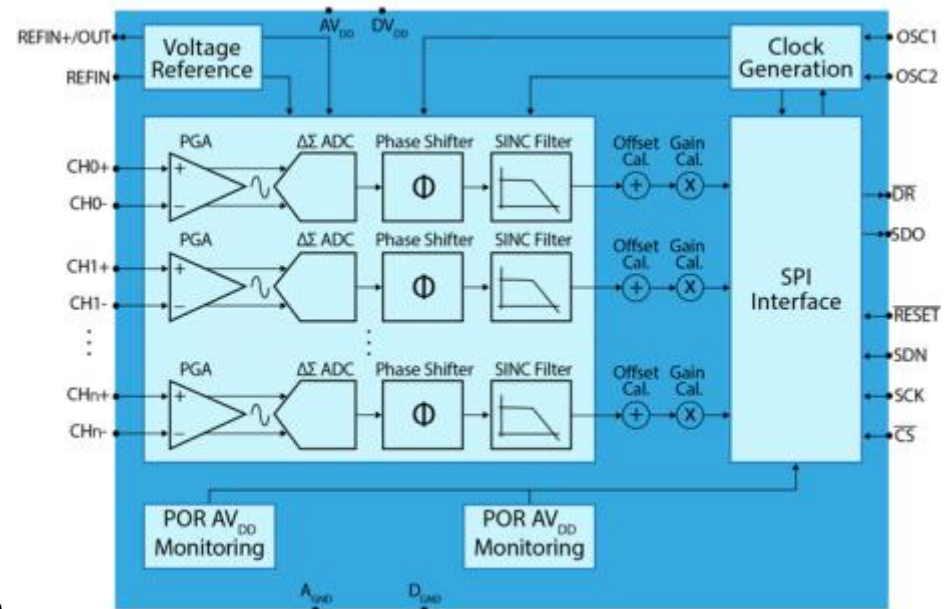
<< Delta-Sigma ADC

<< Power Monitoring & Metering ICs



## Features:

- Six Synchronous Sampling 24-bit  $\Delta\Sigma$  – ADCs
- 94.5 dB SINAD, -107 dBc THD, 112 dBFS – SFDR
- Enables 0.1% Typical Active Power –
  - Measurement Error over a 10,000:1 –
  - Dynamic Range
- Advanced Security Features:
  - 16-bit CRC checksum
  - Register map lock with 8-bit secure key
  - Programmable Data Rate up to 125 ksp/s
  - Oversampling Ratio up to 4096
  - -122 dB Crosstalk between Channels
  - Internal Voltage Reference: 9 ppm/°C
  - PGA on Each Channel (up to 32 V/V)
  - Phase Delay Compensation
- Separate Data Ready Pin for Synchronization
- 24-bit Digital Offset and Gain Error Correction
- High-Speed 20 MHz SPI interface
- Extended Temperature Range: -40°C to +125°C
- 28-lead SSOP and 40-lead  $\mu$ QFN Package
- Recommended for Automotive Design

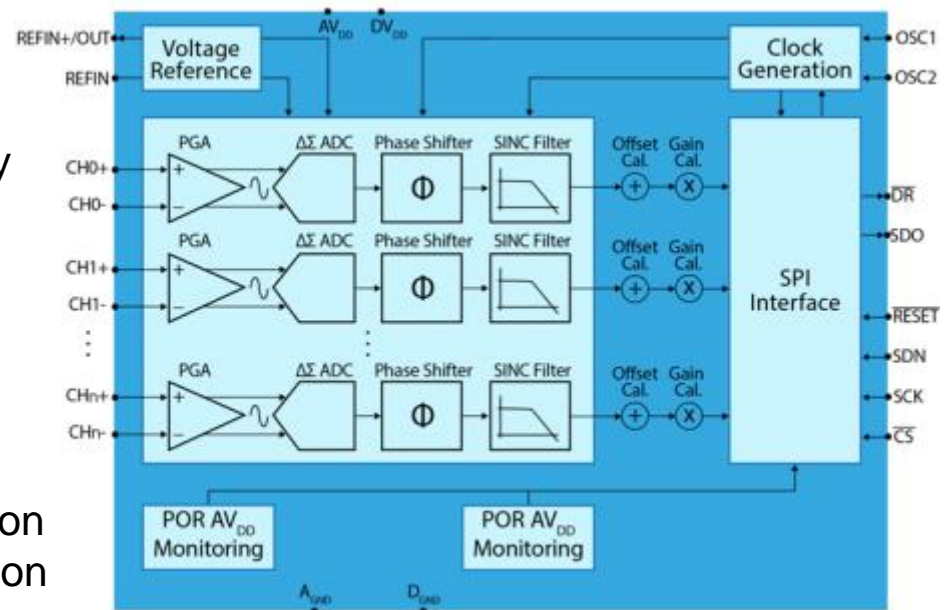


<< Delta-Sigma ADC

<< Power Monitoring &  
Metering ICs

## Features:

- Eight Synchronous Sampling 24-bit  $\Delta\Sigma$  ADCs
- 94.5 dB SINAD, -107 dBc THD, 112 dBFS SFDR
- Enables 0.1% Typical Active Power Error over a 10,000:1 Dynamic Range
- Advanced Security Features:
  - 16-bit CRC checksum
  - Register map lock with 8-bit secure key
- Programmable Data Rate up to 125 ksp/s
- Oversampling Ratio up to 4096
- -122 dB Crosstalk between Channels
- Internal Voltage Reference: 9 ppm/°C
- PGA on Each Channel: up to 32 V/V
- Phase Delay Compensation
- Separate Data Ready Pin for Synchronization
- 24-bit Digital Offset and Gain Error Correction
- High-Speed 20 MHz SPI interface
- Extended Temperature Range: -40°C to +125°C
- 28-lead SSOP and 40-lead  $\mu$ QFN Package
- Recommended for Automotive Design



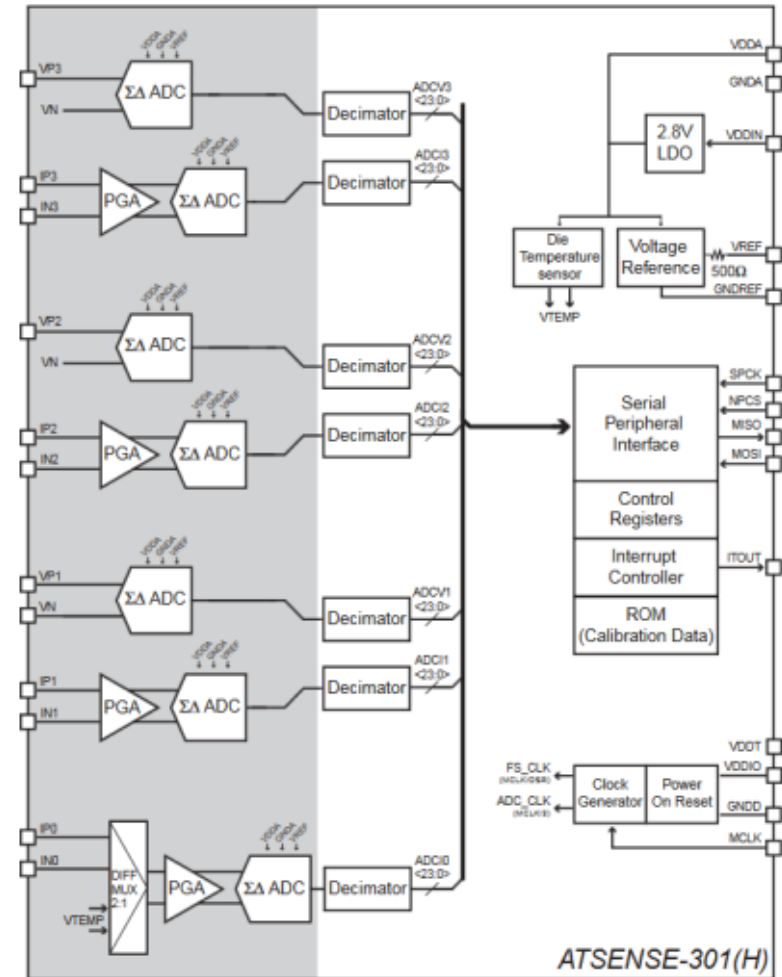
<< Delta-Sigma ADC

<< Power Monitoring & Metering ICs

## Features:

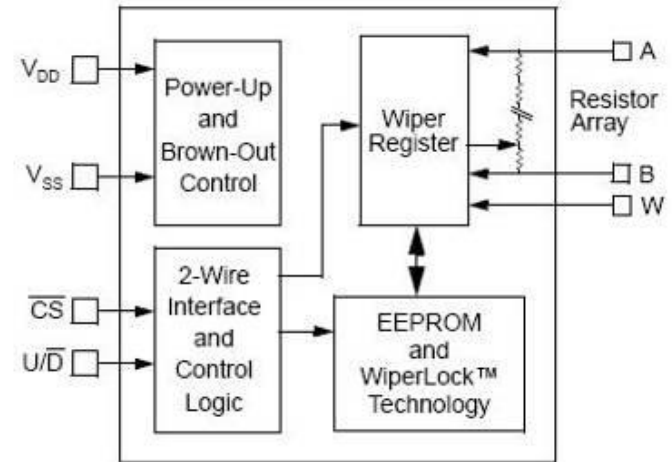
- 3-Ch Single-phase ATSENSE101
- 4-Ch Dual-phase ATSENSE201(H)
- 7-Ch Poly-phase ATSENSE301(H)
- 84 dB SINAD
- Suitable for Atmel MCUs and Metrology Library
- Compliant with Class 0.2 Standards (ANSI – - C12.20-2002 and IEC 62053-22)
- Current Channels Gain: x1, x2, x4, x8
- Integrated SINC Decimation Filters
- Output Data Rate: 16 kSps typical
- 3.0V to 3.6V Operation
- Low Power: < 2.5 mW typical/Channel @3.3V
- Industrial Temperature Range: -40°C to +85°C
- Voltage Reference: 50 ppm/°C (typ.) or 10 ppm (typ.) (ATSENSE201H/ATSENSE301H)
- 8 MHz Serial Peripheral Interface (SPI)
- Packages:
  - ATSENSE-101: 20-lead SOIC
  - ATSENSE-201/301(H): 32-lead 7x7 TQFP

ATSENSE-301(H) Functional Block Diagram

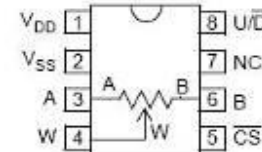


## Features:

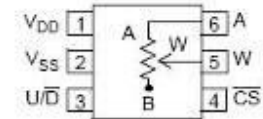
- Nonvolatile Digital Potentiometer in SOT-23,
- MSOP and SOIC Packages
- 64 Taps: 63 Resistors with Taps to  $V_{SS}$  and  $V_{DD}$
- Simple Up/Down (U/D) Protocol
- Automatic Recall of Potentiometer Wiper Settings
- Resistance Values: 2 k $\Omega$ , 5 k $\Omega$ , 10 k $\Omega$ , 50 k $\Omega$
- Low Tempco:
- Absolute (Rheostat): <100ppm (typ.)
- Ratiometric (Potentiometer): <10ppm (typ.)
- Low Wiper Resistance: 75 $\Omega$  (typ.)
- WiperLock™ Technology to Secure the EEPROM
- Low-Power Operation: 1 $\mu$ A (max.) Static Current
- Wide Operating Voltage:
  - 2.7V to 5.5V
- Extended Temperature Range: -40°C to +125°C
- Recommended for Automotive Design (MCP4021/2/3)



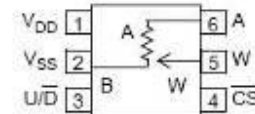
**MCP4021**  
MSOP, SOIC  
Potentiometer



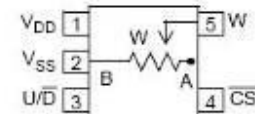
**MCP4022**  
SOT-23-6  
Rheostat



**MCP4023**  
SOT-23-6  
Potentiometer

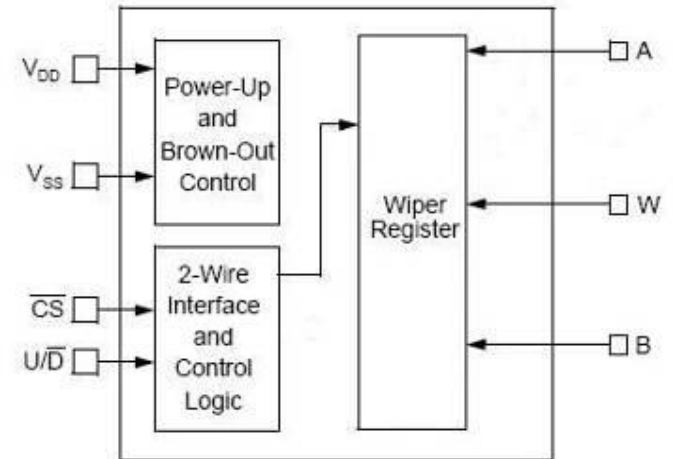


**MCP4024**  
SOT-23-5  
Rheostat



## Features:

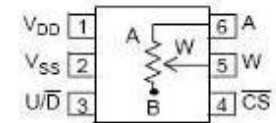
- Volatile Digital Potentiometer in SOT-23,
- MSOP and SOIC Packages
- 64 Taps: 63 Resistors with Taps to  $V_{SS}$  and  $V_{DD}$
- Simple Up/Down (U/D) Protocol
- Automatic Recall of Potentiometer Wiper Settings
- Resistance Values: 2.1 k $\Omega$ , 5 k $\Omega$ , 10 k $\Omega$ , 50 k $\Omega$
- Low Tempco:
- Absolute (Rheostat): 50ppm (typ.)
- Ratiometric (Potentiometer): 10ppm (typ.)
- Low Wiper Resistance: 75 $\Omega$  (typ.)
- High-Voltage Tolerant Digital Inputs: up to 12V
- Low-Power Operation: 1 $\mu$ A (max.) Static Current
- Wide Operating Voltage:
  - 2.7V to 5.5V
- Extended Temperature Range: -40 $^{\circ}$ C to +125 $^{\circ}$ C



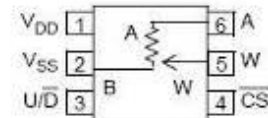
**MCP4011**  
MSOP, SOIC  
Potentiometer



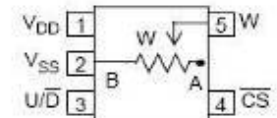
**MCP4012**  
SOT-23-6  
Rheostat



**MCP4013**  
SOT-23-6  
Potentiometer



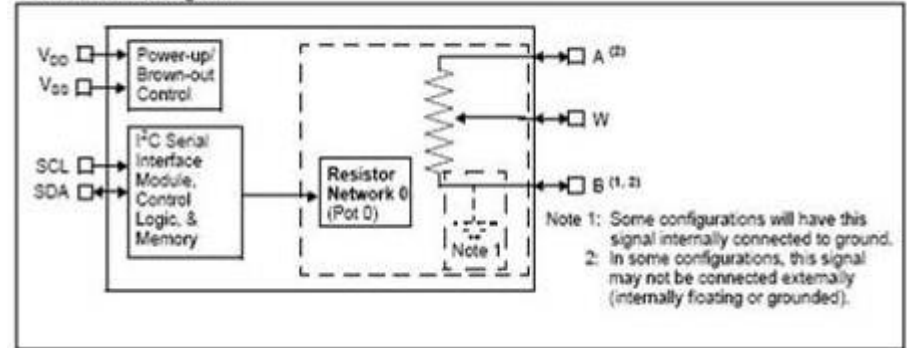
**MCP4014**  
SOT-23-5  
Rheostat



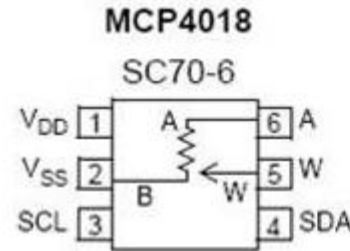
## Features:

- Potentiometer or Rheostat configuration
- 7-bit: Resistor Network Resolution
  - 127 Resistors (128 Steps)
- Zero Scale to Full Scale Wiper operation
- R<sub>AB</sub> Resistances: 5kΩ, 10kΩ, 50kΩ, 100kΩ
- Low Wiper Resistance: 100Ω (typ.)
- Low Tempco:
  - Absolute (Rheostat): 50ppm (typ), 0°C-70°C
  - Ratiometric (Potentiometer): 10ppm (typ)
- I<sup>2</sup>C™ Interface
- Brown-out reset protection: 1.5V (typ)
- Power-on Default Wiper Setting (mid-scale)
- Low-Power Operation: 2.5μA (typ)
- Wide Operating Voltage Range:
  - 2.7V to 5.5V - Characteristics Specified
  - 1.8V to 5.5V - Device Operation
- Wide Bandwidth (-3dB): 2MHz (typ)
- Extended temperature range: -40°C to +125°C
- Packages: SC-70
- Recommended for Automotive Design (MCP4017/8)

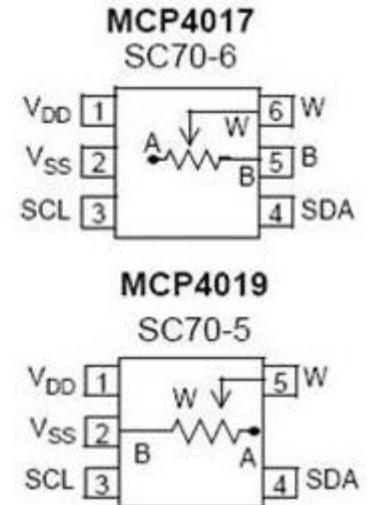
Device Block Diagram



### Potentiometer



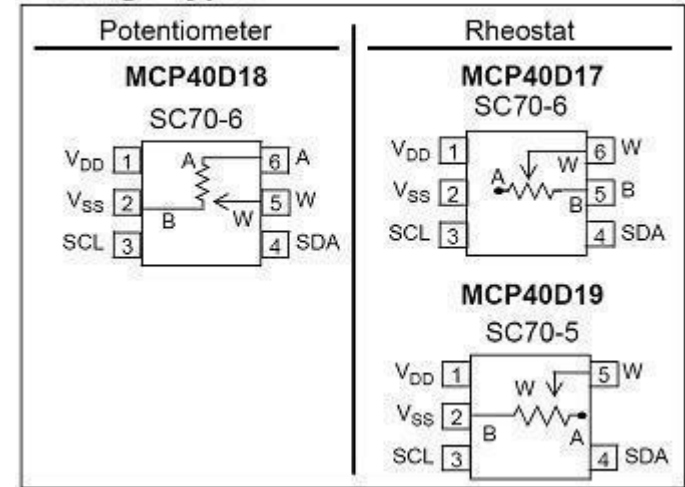
### Rheostat



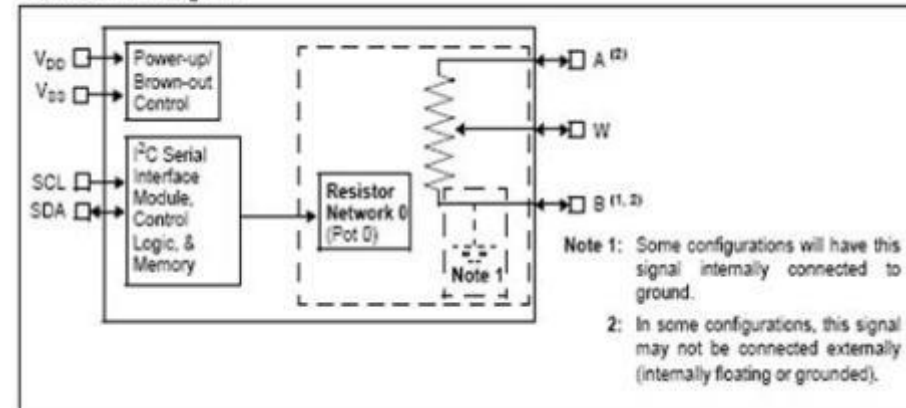
## Features:

- Potentiometer or Rheostat configurations
- 7-bit: Resistor Network Resolution: 127 –  
– Resistors (128 Steps)
- Zero Scale to Full Scale Wiper operation
- R<sub>AB</sub> Resistances: 5kΩ, 10kΩ, 50kΩ, 100kΩ
- Low Wiper Resistance: 100Ω (typ.)
- Low Tempco:
  - Absolute (Rheostat): 50ppm (typ), 0°C-70°C
  - Ratiometric (Potentiometer): 15ppm (ty.)
- I<sup>2</sup>C Interface
- Brown-out reset protection: 1.5V (typ)
- Power-on Default Wiper Setting (mid-scale)
- Low-Power Operation: 2.5μA (ty.)
- Wide Operating Voltage Range:
  - 2.7V to 5.5V - Characteristics Specified
  - 1.8V to 5.5V - Device Operation
- Wide Bandwidth (-3dB): 2 MHz (typ)
- Extended temperature range: -40°C to +125°C
- Packages: SC-70

## Package Types

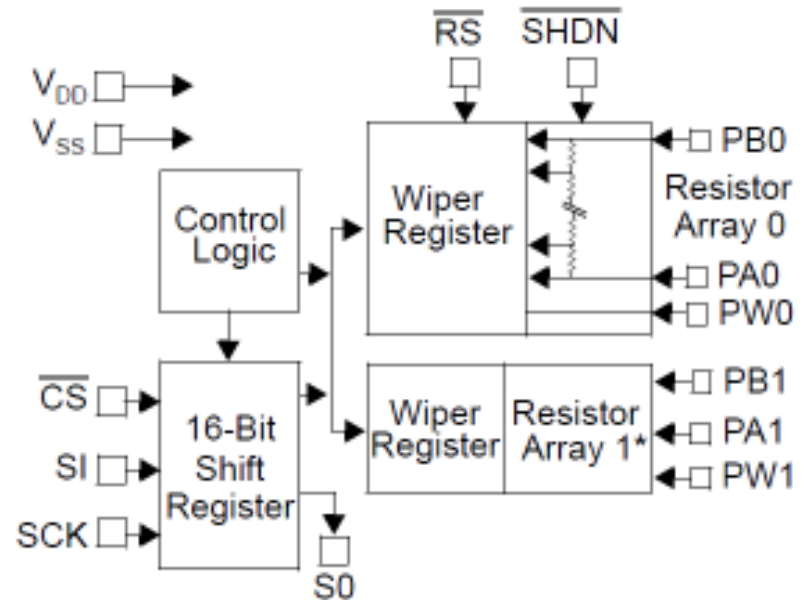


## Device Block Diagram



## Features:

- 256 taps for each potentiometer
- Potentiometer values for 10 kΩ, 50 kΩ and 100 kΩ
- Single and dual versions
- SPI™ serial interface (mode 0,0 and 1,1)
- ±1 LSB max INL & DNL
- Low power CMOS technology
- 1 μA maximum supply current in static operation
- Multiple devices can be daisy-chained together (MCP42xxx only)
- Shutdown feature open circuits of all resistors for maximum power savings
- Hardware shutdown pin available on MCP42xxx only
- Single supply operation (2.7V - 5.5V)
- Industrial temperature range: -40°C to +85°C
- Extended temperature range: -40°C to +125°C



\*Potentiometer P1 is only available on the dual MCP42XXX version.





# MCP413x/415x/423x/425x

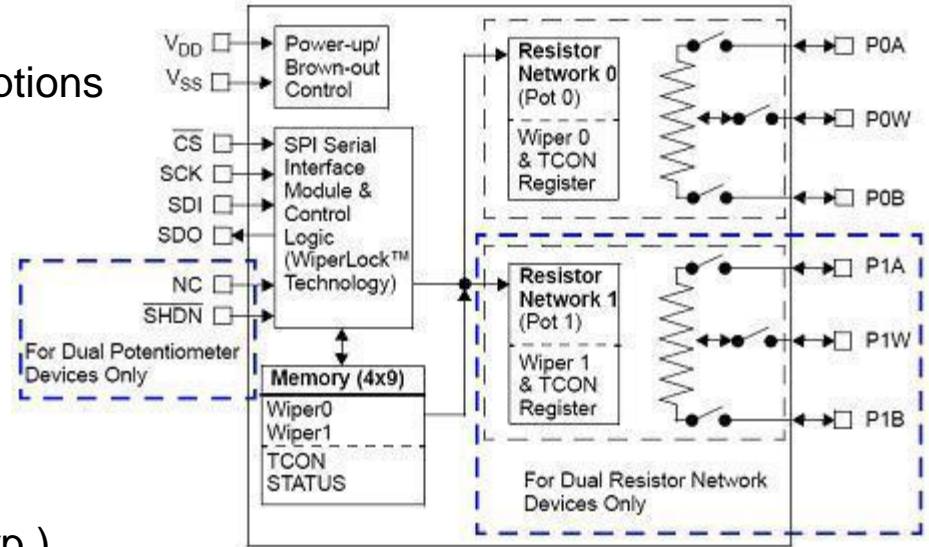
7/8-Bit Single/Dual SPI Digital POT with Volatile Memory



Online  
Datasheet

## Features:

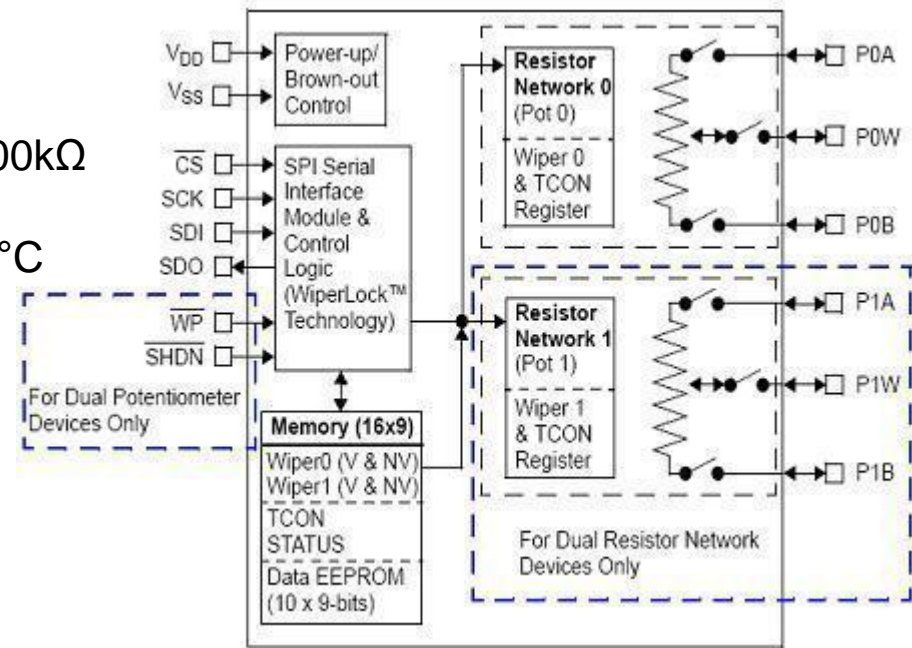
- Single or Dual Resistor Network options
- Potentiometer or Rheostat Configuration Options
- Resistor Network Resolution:
  - 7-bit: 128 Resistors (129 Steps)
  - 8-bit: 256 Resistors (257 Steps)
- $R_{AB}$  Resistances options of:
  - 5k $\Omega$ , 10k $\Omega$ , 50k $\Omega$ , 100k $\Omega$
- Low Tempco:
  - Absolute (Rheostat):
    - 50ppm (typ.) 0°C to 70°C
  - Ratiometric (Potentiometer): 15ppm (typ.)
- SPI Interface (10MHz, modes 0,0 & 1,1):
  - SDI/SDO multiplexing (MCP41X1 only)
- High-Voltage Tolerant Digital Inputs: Up to 12.5V
- Supports Split Rail Applications
- Wide Operating Voltage:
  - 2.7V to 5.5V - Characteristics Specified
  - 1.8V to 5.5V - Device Operation
- Wide Bandwidth (-3dB): 2MHz (typ.)
- Extended temperature range: -40°C to +125°C
- Recommended for Automotive Design (MCP4132/4151/4231)



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## Features:

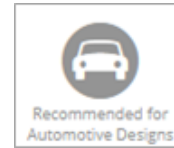
- Single or Dual Resistor Network options
- Potentiometer or Rheostat configurations
- Resistor Network Resolution:
  - 7-bit: 128 Resistors (129 Steps)
  - 8-bit: 256 Resistors (257 Steps)
- $R_{AB}$  Resistances options: 5k $\Omega$ , 10k $\Omega$ , 50k $\Omega$ , 100k $\Omega$
- Low Tempco:
  - Absolute (Rheostat): 50ppm (typ.) 0°C-70°C
  - Ratiometric (Potentiometer): 15ppm (typ.)
- SPI Interface (10MHz, modes 0,0 & 1,1):
  - Serially enabled EEPROM write protect
  - SDI/SDO multiplexing (MCP41X1 only)
- Write Protect Feature
- Supports Split Rail Applications
- Wide Operating Voltage:
  - 2.7V to 5.5V – Device Characteristics Specified
  - 1.8V to 5.5V - Device Operation
- Wide Bandwidth (-3dB) Operation: 2MHz (typ.)
- Extended temperature range: -40°C to +125°C
- Recommended for Automotive Design (MCP4141/4161/4241/4242)





# MCP454x/456x/464x/466x

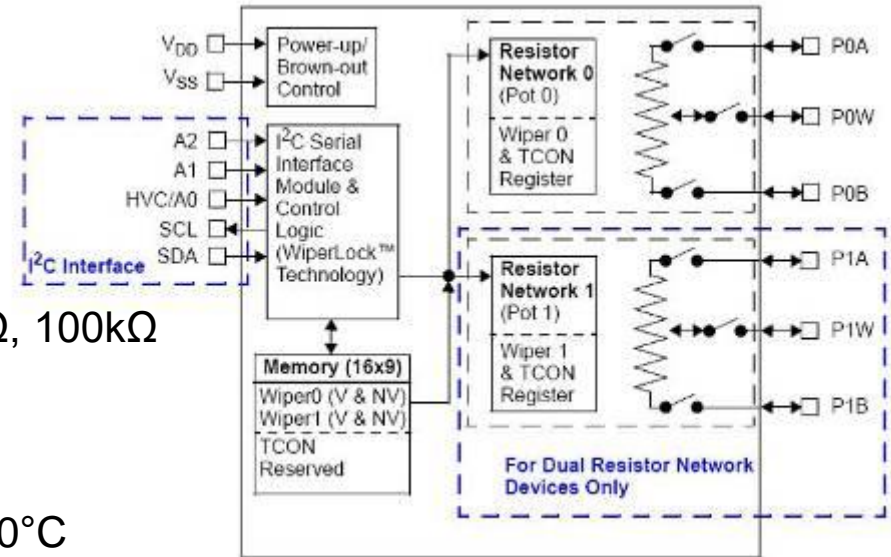
7/8-Bit Single/Dual I<sup>2</sup>C Digital POT with Nonvolatile Memory



Online  
Datasheet

## Features:

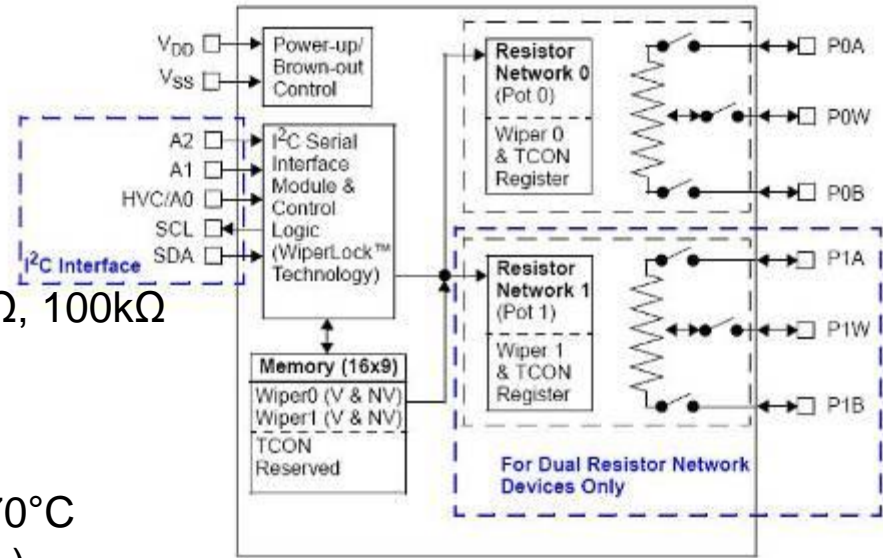
- Single or Dual Resistor Network options
- Potentiometer or Rheostat configurations
- Resistor Network Resolution:
  - 7-bit: 128 Resistors (129 Steps)
  - 8-bit: 256 Resistors (257 Steps)
- R<sub>AB</sub> Resistances options of: 5kΩ, 10kΩ, 50kΩ, 100kΩ
- Zero-Scale to Full-Scale Wiper operation
- Low Wiper Resistance: 75Ω (typ.)
- Low Tempco:
  - Absolute (Rheostat): 50ppm (typ.) 0°C-70°C
  - Ratiometric (Potentiometer): 15ppm (typ.)
- Non-volatile Memory for Configuration
- I<sup>2</sup>C™ Serial interface
- Resistor Network Terminal Disconnect Feature
- Control (TCON) Register
- Write Protect Feature
- High-Voltage Tolerant Digital Inputs: up to 12.5V
- Operating Voltage: 1.8V to 5.5V
  - 2.7V to 5.5V - Device Characteristics Specified
- Extended temperature range: -40°C to +125°C
- Recommended for Automotive Design (MCP4541/2)



<< BACK

## Features:

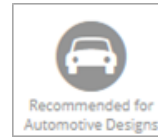
- Single or Dual Resistor Network options
- Potentiometer or Rheostat configurations
- Resistor Network Resolution:
  - 7-bit: 128 Resistors (129 Steps)
  - 8-bit: 256 Resistors (257 Steps)
- R<sub>AB</sub> Resistances options of: 5kΩ, 10kΩ, 50kΩ, 100kΩ
- Zero-Scale to Full-Scale Wiper operation
- Low Wiper Resistance: 75Ω (typ.)
- Low Tempco:
  - Absolute (Rheostat): 50ppm (typ.) 0°C-70°C
  - Ratiometric (Potentiometer): 15ppm (typ.)
- I<sup>2</sup>C™ interface
- Resistor Network Terminal Disconnect Feature
- Brown-out reset protection: 1.5V (typ.)
- Serial Interface Inactive current: 2.5μA (typ.)
- High-Voltage Tolerant Digital Inputs: up to 12.5V
- Wide Operating Voltage:
  - 2.7V to 5.5V - Device Characteristics Specified
  - 1.8V to 5.5V - Device Operation
- Extended temperature range: -40°C to +125°C
- Recommended for Automotive Design (MCP4551)





# MCP433x/434x/435x/436x

7/8-Bit Quad SPI Digital POT with Volatile Memory

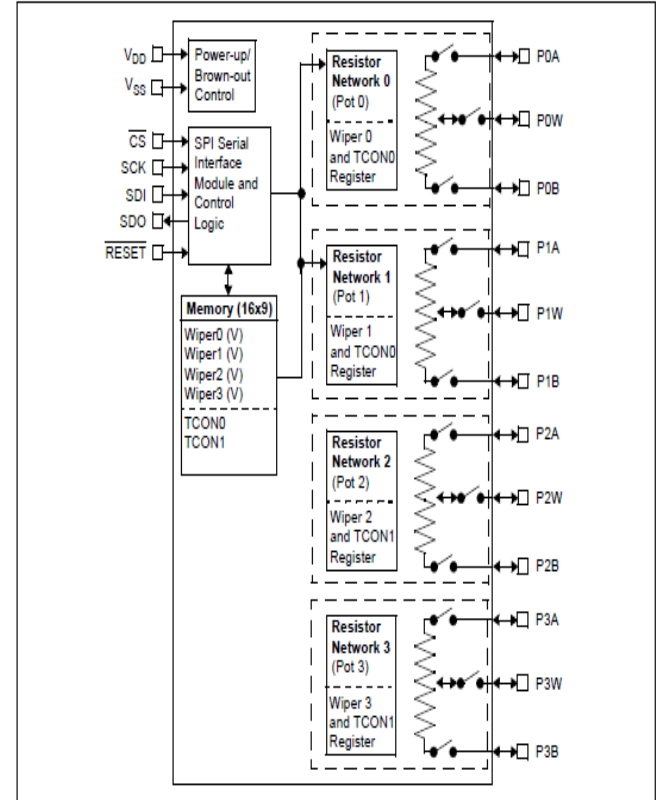


Online  
Datasheet

## Features:

- Quad Resistor Network
- Volatile and nonvolatile memory options
- Potentiometer or Rheostat Configurations
- Resistor Network Resolution:
  - 7-bit: 128 Resistors (129 Taps)
  - 8-bit: 256 Resistors (257 Taps)
- $R_{AB}$  Resistances Options of: 5/10/50/100 k $\Omega$
- Zero Scale to Full Scale Wiper Operation
- Low Wiper Resistance: 75  $\Omega$  (typical)
- Low Tempco:
  - Absolute (Rheostat): 50 ppm (0°C to 70°C)
  - Ratiometric (Potentiometer): 15 ppm
- SPI Interface
- Resistor Network Terminal Disconnect Feature
- Reset Input Pin
- High-Voltage Tolerant Digital Inputs: Up to 12.5V
- Wide Operating Voltage:
  - 2.7V to 5.5V Device Specified:
  - 1.8V to 5.5V Device Operation
- Extended Temperature Range: -40°C to +125°C
- Recommended for Automotive Design (MCP4361)

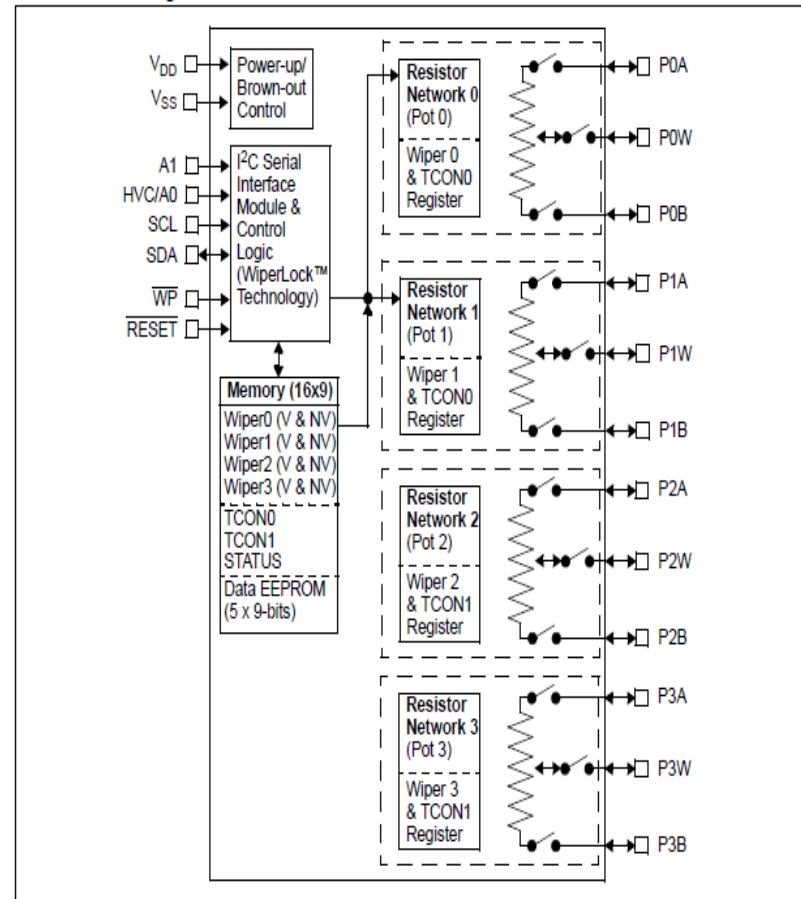
Device Block Diagram



## Features:

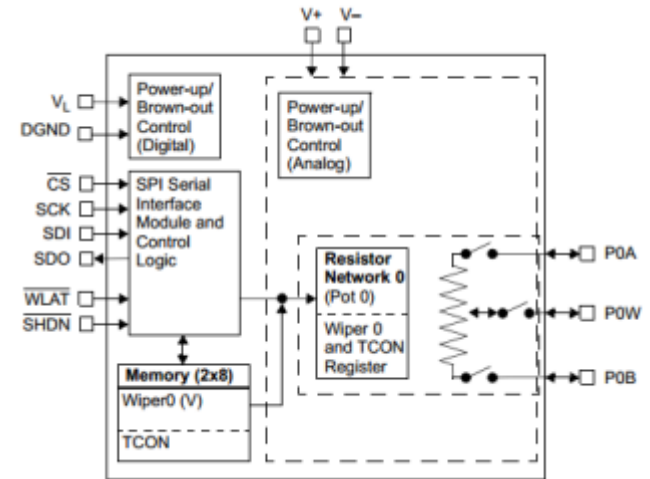
- Quad Resistor Network
- Potentiometer or Rheostat Configurations
- Resistor Network Resolution:
  - 7-bit – 128 Resistors (129 Taps)
  - 8-bit – 256 Resistors (257 Taps)
- Four R<sub>AB</sub> Resistances options: 5kohm, -  
- 10kohm, 50kohm, 100kohm
- Zero-scale to Full-scale Wiper Operation
- Low Wiper Resistance – 75 Ω typical
- I<sup>2</sup>C Interface
- Brown-out Reset Protection – 1.5V typical
- Serial Interface Inactive Current – 2.5 uA typical
- High-Voltage Tolerant Digital Inputs Up to 12.5V
- Wide Operating Voltage:
  - 2.7V to 5.5V - Device Specified
  - 1.8V to 5.5V - Device Operation
- Wide Bandwidth (-3 dB) Operation: 2 MHz
- Extended Temperature Range: -40°C to +125°C
- Packages: 4x4 QFN-20 TSSOP-20, TSSOP-14

Device Block Diagram



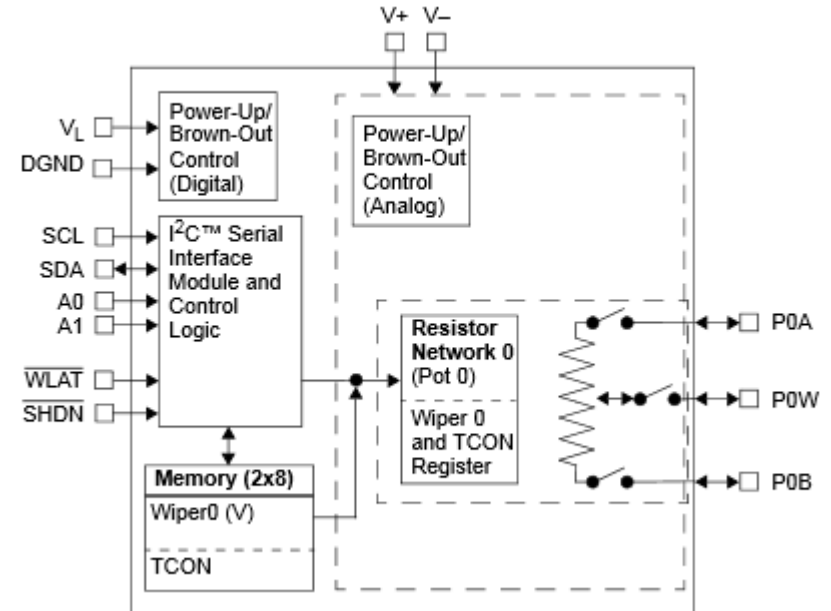
## Features:

- High-Voltage Analog Support:
  - +36V Terminal Voltage Range (DGND = V-)
  - $\pm 18V$  Terminal Voltage Range (DGND = V- + 18V)
- Wide Operating Voltage:
  - Analog: 10V to 36V
  - Digital: 2.7V to 5.5V
- Resistor Network Resolution:
  - 7-bit: 127 Resistors (128 Taps) MCP41HV31
  - 8-bit: 255 Resistors (256 Taps) MCP41HV51
- $R_{AB}$  Resistance Options: 5/10/50/100 k $\Omega$
- Zero-Scale to Full-Scale Wiper Operation
- Low Wiper Resistance: 75  $\Omega$  (Typical)
- Low Tempco:
  - Absolute (Rheostat): 50 ppm (0°C to +70°C)
  - Ratiometric (Potentiometer): 15 ppm
- SPI Serial Interface
- Resistor Network Terminal Disconnect
- Write Latch (WLAT) Pin
- Extended Temperature Range: -40°C to +125°C
- Packages: TSSOP-14 and QFN-20 (5x5)



## Features:

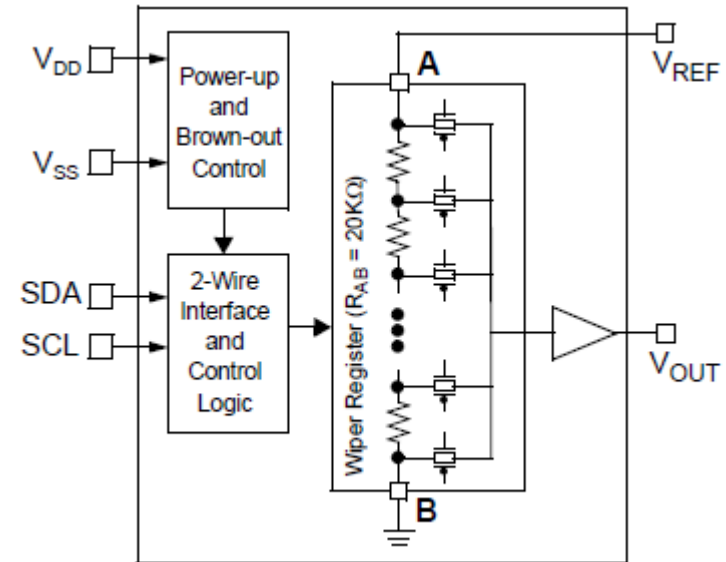
- High-Voltage Analog Support:
  - +36V Terminal Voltage Range
  - $\pm 18V$  Terminal Voltage Range
- Wide Operating Voltage:
  - Analog: 10V to 36V
  - Digital: 2.7V to 5.5V
- Resistor Network Resolution:
  - 7-bit: 127 Resistors (128 Taps) MCP45HV31
  - 8-bit: 255 Resistors (256 Taps) MCP45HV51
- $R_{AB}$  Resistance Options: 5/10/50/100 k $\Omega$
- Zero-Scale to Full-Scale Wiper Operation
- Low Wiper Resistance: 75  $\Omega$  (Typical)
- Low Tempco:
  - Absolute (Rheostat): 50 ppm (0°C to +70°C)
  - Ratiometric (Potentiometer): 15 ppm
- I<sup>2</sup>C Serial Interface
- Resistor Network Terminal Disconnect
- Write Latch (WLAT) Pin
- Extended Temperature Range: -40°C to +125°C
- Packages: TSSOP-14 and 5x5 QFN-20





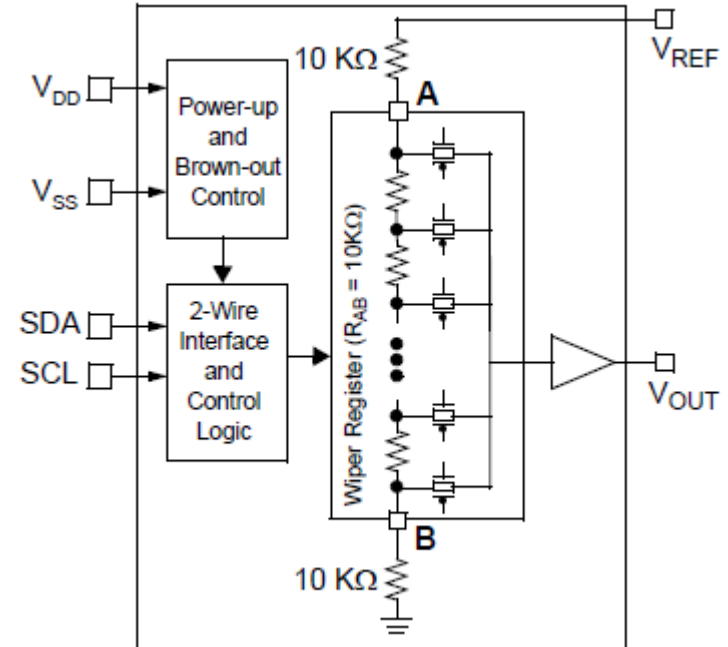
## Features:

- 6-bit DAC:
  - 65 Taps: 64 Resistors with Taps to Full – Scale and Zero-Scale
- $V_{REF}$  Pull-down Resistance: 20 kOhms (typical)
- $V_{OUT}$  Voltage Range:  $V_{SS}$  to  $V_{REF}$  SMBus/I<sup>2</sup>C – Compatible Interface
- Brown-out Reset Protection (1.5V typical)
- Power-on Default Wiper Setting (Mid-scale)
- Low-Power Operation: 90  $\mu$ A Static Current (typ.)
- Wide Operating Voltage Range:
  - - 1.8V to 5.5V
- Low Tempco: 15 ppm (typ.)
- 100 kHz (typical) Bandwidth (-3 dB) Operation
- Extended Temperature Range:
  - -40°C to +125°C
- 6-lead SC70



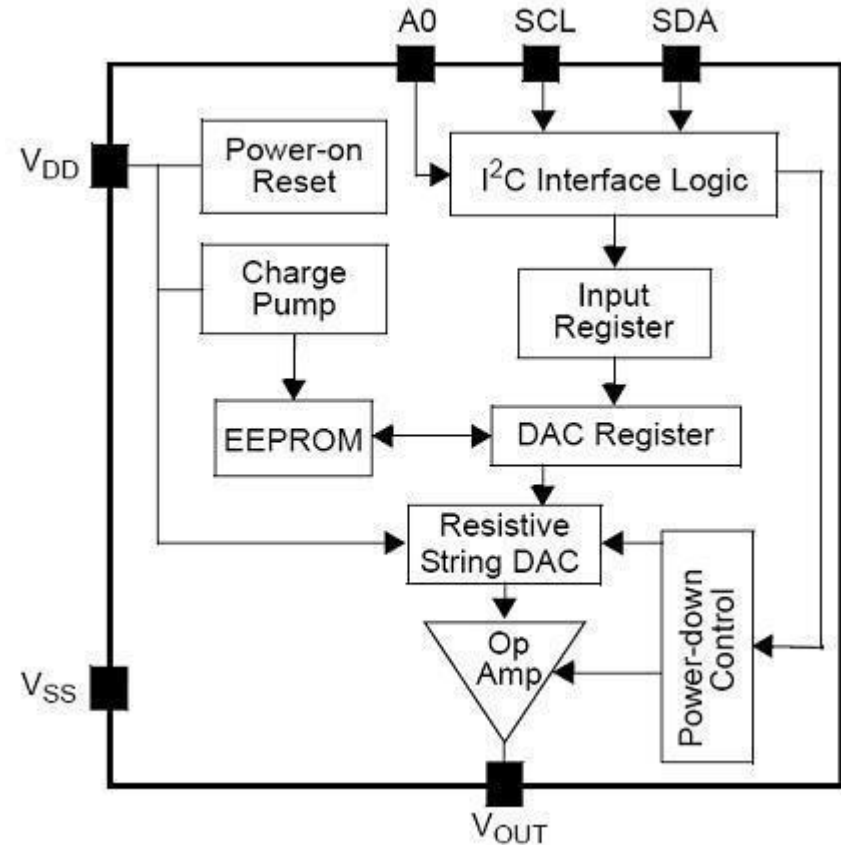
## Features:

- 6-bit DAC:
  - 65 Taps: 64 Resistors with Taps to Full –
    - Scale and Zero-Scale (Wiper Code 00h –
    - to 40h)
  - 7-bit Serial Data (00h to 7Fh, 00h –
    - 20h = Zero Scale and 60h - 7Fh = Full-Scale)
- $V_{REF}$  Pull-down Resistance: 30 k $\Omega$  (typ.)
- $V_{OUT}$  Voltage Range:
  - $1/3 * V_{REF}$  to  $2/3 * V_{REF}$
- SMBus/ I<sup>2</sup>C Compatible Interface
- Brown-out Reset Protection (1.5V typ.)
- Power-on Default Wiper Setting (Mid-scale)
- Low-Power Operation: 90  $\mu$ A Static Current (typ.)
- Wide Operating Voltage Range:
  - 2.7V to 5.5V - Device Characteristics Specified
  - 1.8V to 2.7V - Device Operation
- Low Tempco: 15 ppm (typ.)
- 100 kHz (typical) Bandwidth (-3 dB) Operation
- Extended Temperature Range: -40°C to +125°C
- 6-lead SOT-23, SC70



## Features:

- 12-bit Resolution
- On-Board Non-Volatile Memory (EEPROM)
- $\pm 0.2$  LSB DNL (typ.)
- External A0 Address Pin
- Normal or Power-Down Mode
- Fast Settling Time of  $6\mu\text{s}$  (typ.)
- External Voltage Reference ( $V_{DD}$ )
- Rail-to-Rail Output
- Low Power Consumption
- Single-Supply Operation: 2.7V to 5.5V
- I<sup>2</sup>C™ Interface:
  - Eight Available Addresses
- Extended Temperature Range:
  - $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- 6-lead SOT-23 Package
- Recommended for Automotive Design





# MCP4706/16/26

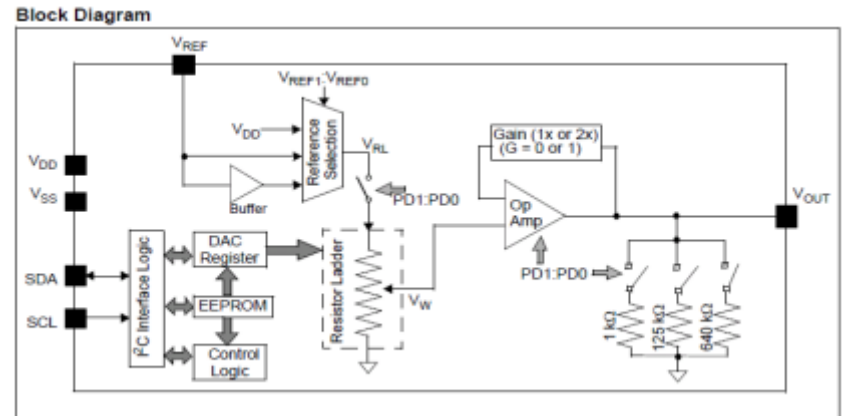
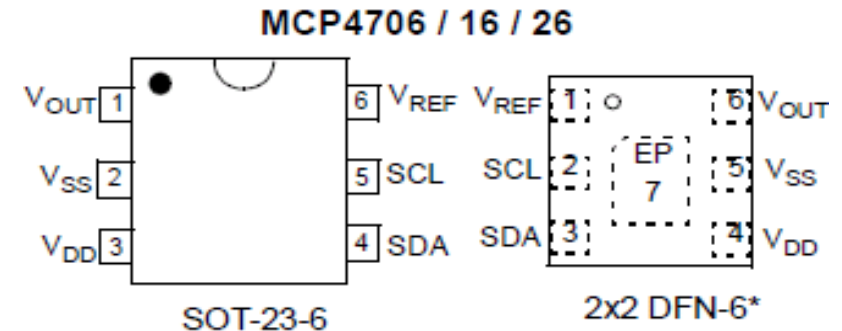
8-/10-/12-Bit Voltage Output Digital-to-Analog Converter  
with EEPROM and I<sup>2</sup>C™ Interface



Online  
Datasheet

## Features:

- Output Voltage Resolutions:
  - 12-bit: MCP4726
  - 10-bit: MCP4716
  - 8-bit: MCP4706
- Fast Settling Time of 6 $\mu$ s (typ.)
- Rail-to-Rail Output
- DAC Voltage Reference Options:
  - $V_{DD}$  or  $V_{REF}$  Pin
- Output Gain Options: Unity (1x) or 2x
- Nonvolatile Memory (EEPROM):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- Low Power Consumption:
  - Normal Operation: 210  $\mu$ A (typ.)
  - Power Down: 60 nA (typ.)
- Power Down Modes
- Single-Supply Operation: 2.7V to 5.5V
- I<sup>2</sup>C™ Interface
- Small 6-lead SOT-23 and 2x2 DFN Packages
- Extended Temperature Range: -40°C to +125°C
- Recommended for Automotive Design (MCP4716/26)

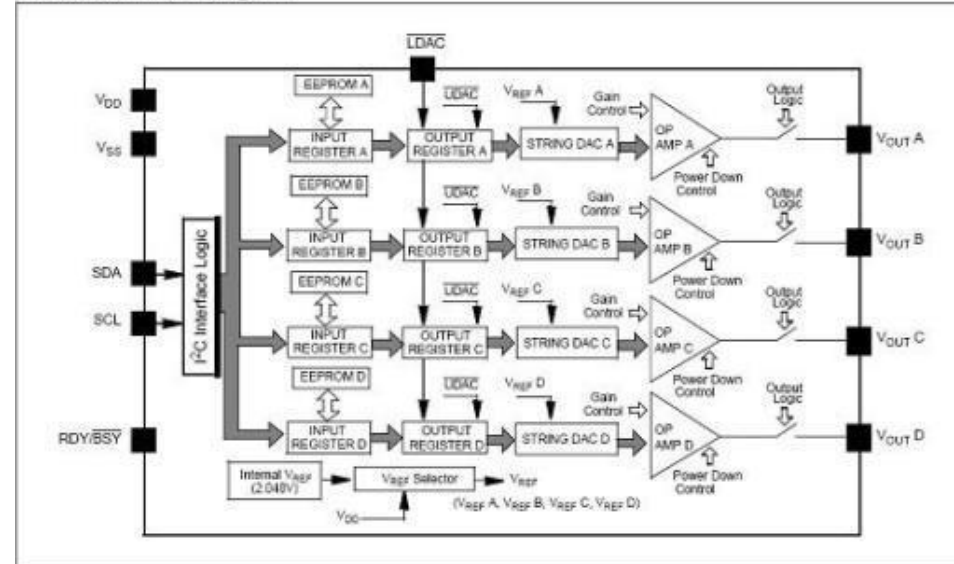


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## Features:

- 12-Bit Voltage DAC with 4-Buffered Outputs
- On-Board Non-Volatile Memory for Config
- Internal/External Voltage Reference
- $\pm 0.2$  LSB DNL (typ.)
- Fast Settling Time: 6 $\mu$ s (typ.)
- Normal or Power-Down Mode
- Low Power Consumption
- Single-Supply Operation: 2.7V to 5.5V
- I<sup>2</sup>C Interface:
  - Address bits: User Programmable –  
– to EEPROM
  - Standard (100 kbps), Fast (400 –  
– kbps) and High Speed (3.4 Mbps) –  
– Modes
- 10-Lead MSOP Package
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design

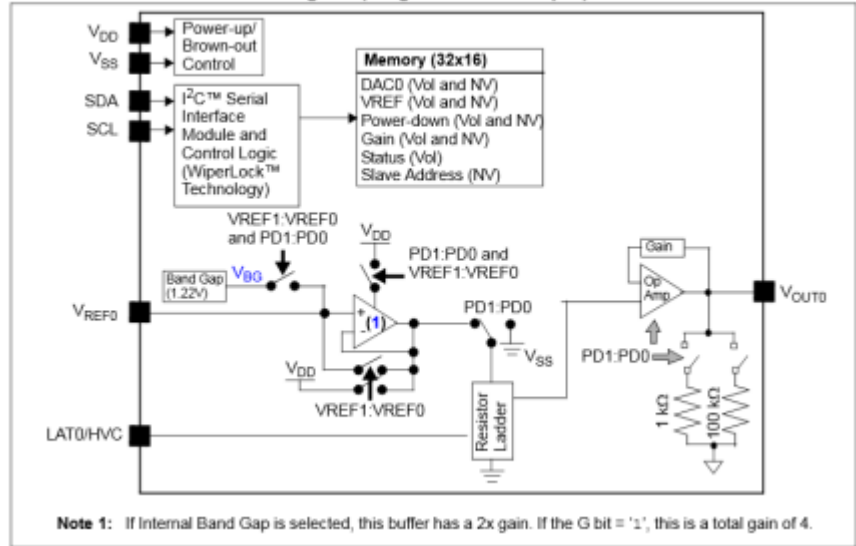
Functional Block Diagram



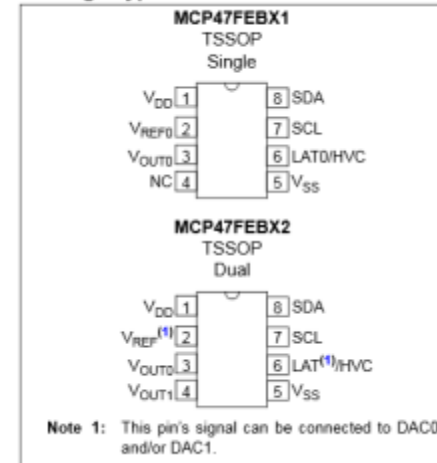
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V - Full Specifications
  - 1.8V to 2.7V - Reduced Device Spec
- Single Output Voltage Resolutions:
  - 8-bit: MCP47FEB01
  - 10-bit: MCP47FEB11
  - 12-bit: MCP47FEB21
- Rail-to-Rail Output
- Fast Settling Time of 6  $\mu$ s (typical)
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.22V typical)
- Output Gain Options: Unity (1x) or 2x
- Nonvolatile Memory (EEPROM):
  - User-programmed Power-on Reset
- (POR)/Brown-out Reset (BOR):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- I<sup>2</sup>C™ Interface
- 8-lead TSSOP

MCP47FEBX1 Device Block Diagram (Single-Channel Output)



## Package Types

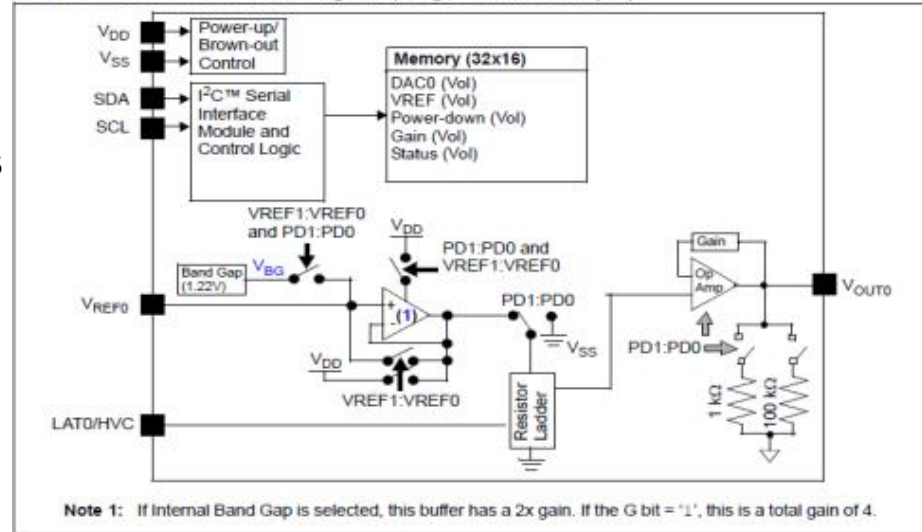




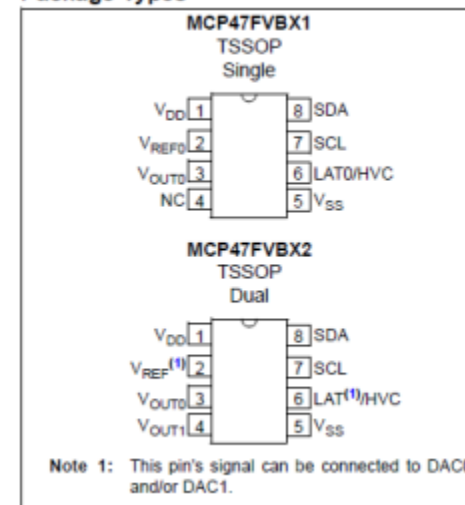
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V - Full Specifications
  - 1.8V to 2.7V - Reduced Specifications
- Single Output Voltage Resolutions:
  - 8-bit: MCP47FVB01
  - 10-bit: MCP47FVB11
  - 12-bit: MCP47FVB21
- Rail-to-Rail Output
- Fast Settling Time of 6  $\mu$ s (typical)
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.22V typical)
- Output Gain Options: Unity (1x) or 2x
- (POR)/Brown-out Reset (BOR):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- I<sup>2</sup>C™ Interface
- 8-lead TSSOP

MCP47FVBX1 Device Block Diagram (Single-Channel Output)



## Package Types

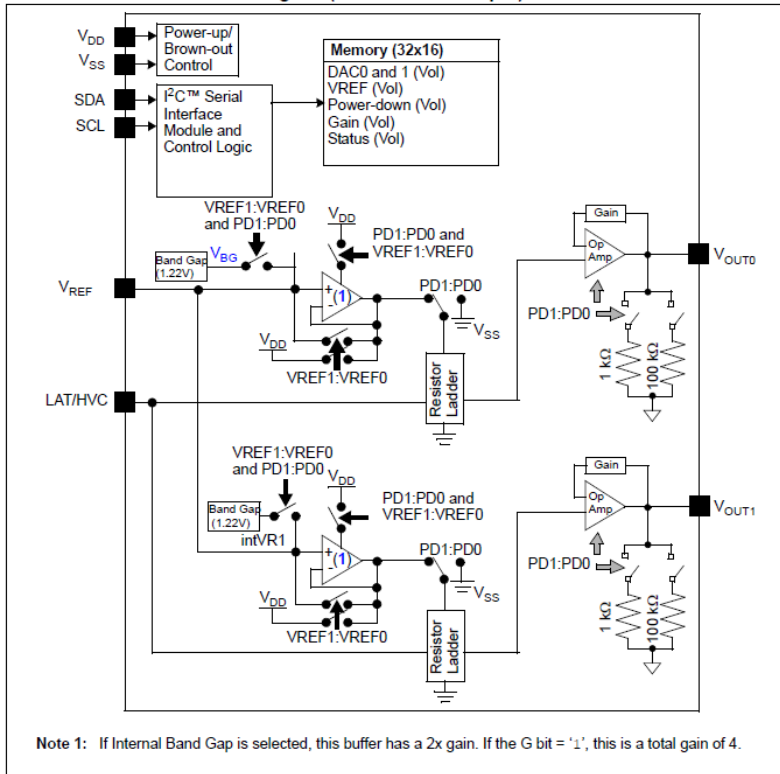




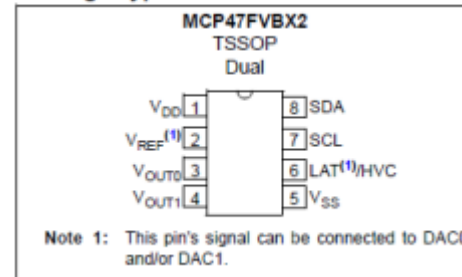
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V - Full Specifications
  - 1.8V to 2.7V - Reduced Specifications
- Dual Output Voltage Resolutions:
  - 8-bit: MCP47FVB02
  - 10-bit: MCP47FVB12
  - 12-bit: MCP47FVB22
- Rail-to-Rail Output
- Fast Settling Time of 6 μs (typical)
- DAC Voltage Reference Source Options:
  - Device V<sub>DD</sub> or External V<sub>REF</sub> pin
  - Internal Band Gap (1.22V typical)
- Output Gain Options: Unity (1x) or 2x
- (POR)/Brown-out Reset (BOR):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- I<sup>2</sup>C™ Interface
- 8-lead TSSOP

MCP47FVBX2 Device Block Diagram (Dual-Channel Output)



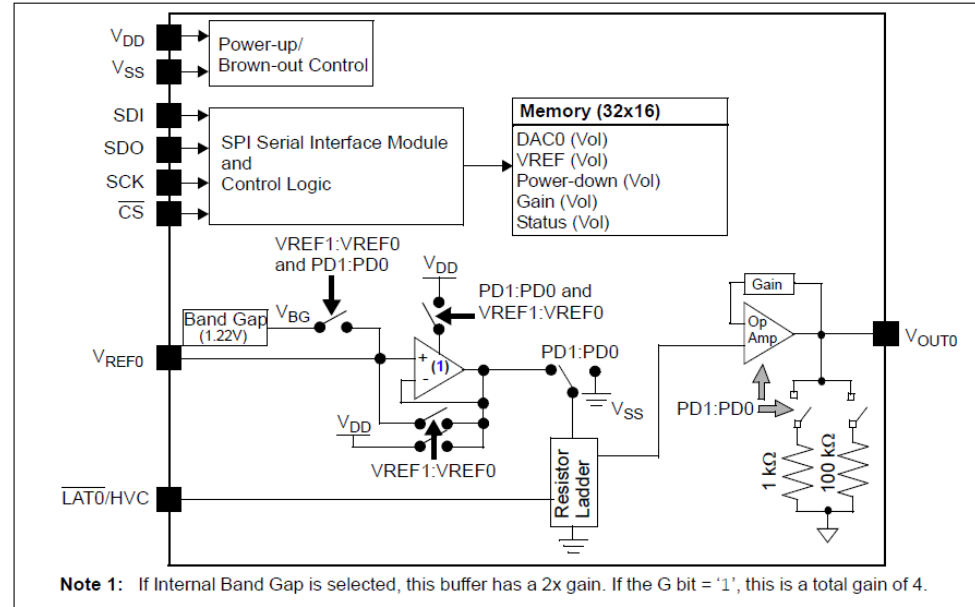
## Package Types



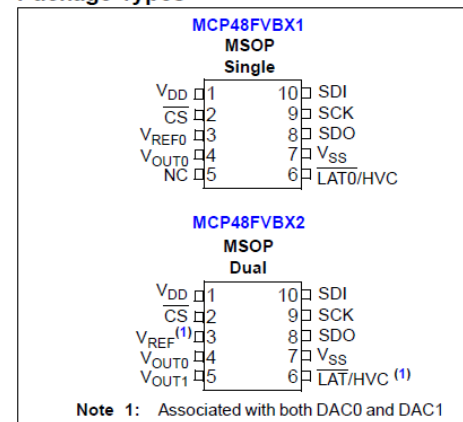
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V - Full Specifications
  - 1.8V to 2.7V - Reduced Specifications
- Single Output Voltage Resolutions:
  - 8-bit: MCP47FVB01
  - 10-bit: MCP47FVB11
  - 12-bit: MCP47FVB21
- Rail-to-Rail Output
- Fast Settling Time of 6  $\mu$ s (typical)
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.22V typical)
- Output Gain Options: Unity (1x) or 2x
- (POR)/Brown-out Reset (BOR):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- SPI Interface
- 10-lead TSSOP

MCP48FVBX1 Device Block Diagram (Single-Channel Output)



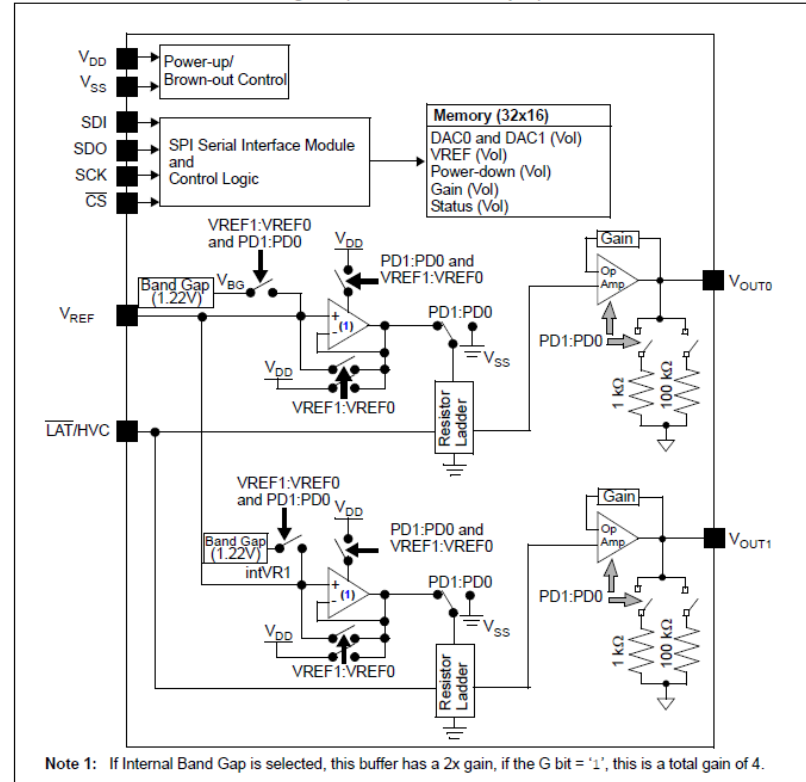
## Package Types



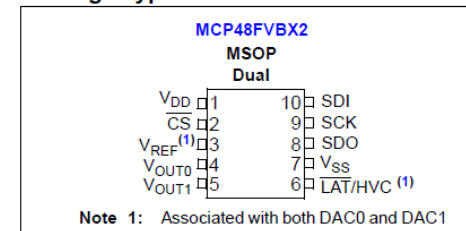
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V - Full Specifications
  - 1.8V to 2.7V - Reduced Specifications
- Dual Output Voltage Resolutions:
  - 8-bit: MCP47FVB02
  - 10-bit: MCP47FVB12
  - 12-bit: MCP47FVB22
- Rail-to-Rail Output
- Fast Settling Time of 6  $\mu$ s (typical)
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.22V typical)
- Output Gain Options: Unity (1x) or 2x
- (POR)/Brown-out Reset (BOR):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- SPI Interface
- 10-lead TSSOP

MCP48FVBX2 Device Block Diagram (Dual-Channel Output)

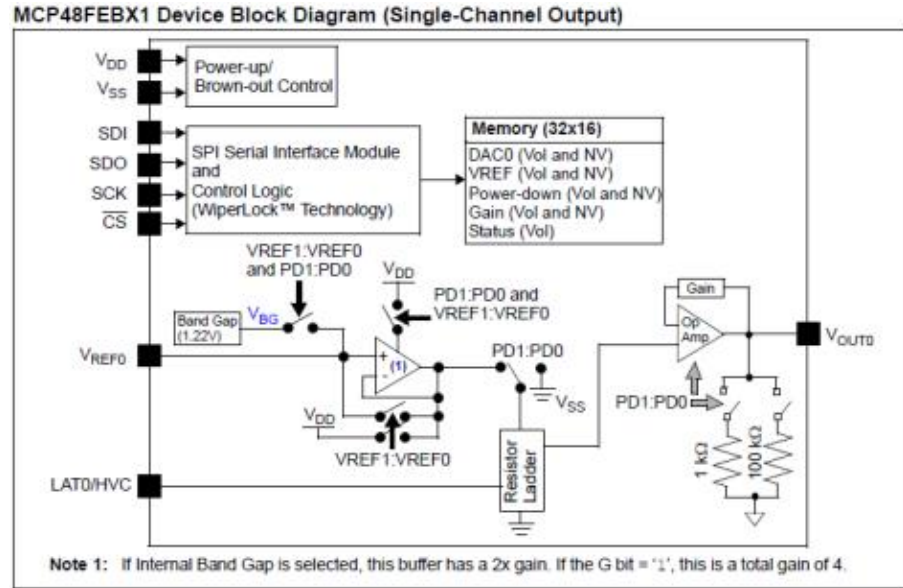


## Package Types

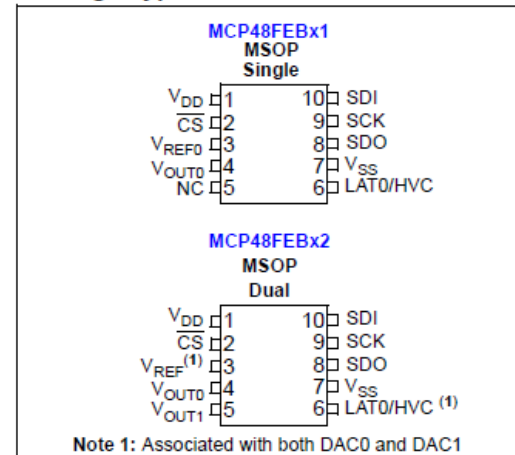


## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V - Full Specifications
  - 1.8V to 2.7V - Reduced Specifications
- Single Output Voltage Resolutions:
  - 8-bit: MCP48FEB01
  - 10-bit: MCP48FEB11
  - 12-bit: MCP48FEB21
- Rail-to-Rail Output
- Fast Settling Time of 7.8  $\mu$ s (typical)
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.22V typical)
- Output Gain Options: Unity (1x) or 2x
- Nonvolatile Memory (EEPROM):
  - User-programmed Power-on Reset
- (POR)/Brown-out Reset (BOR):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- SPI Interface
- 10-lead MSOP



## Package Types



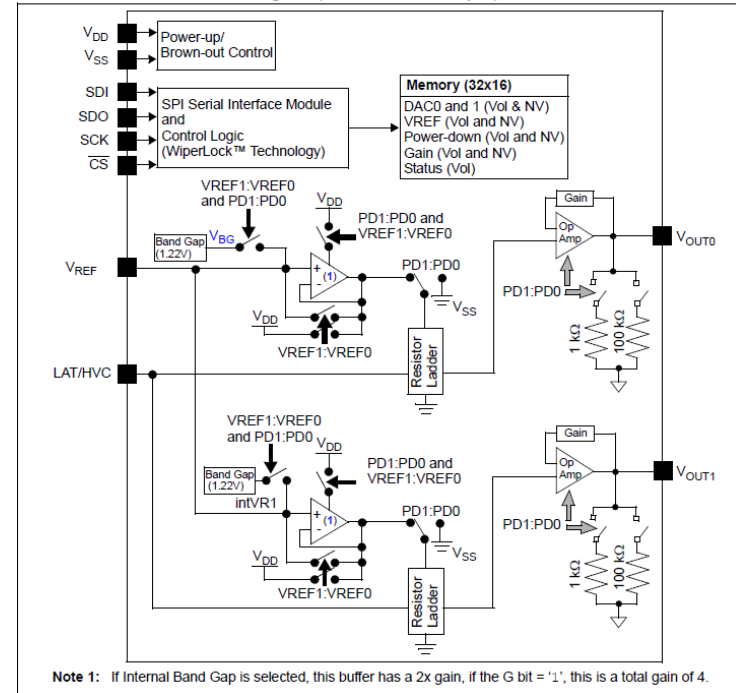
# MCP48FEBX2

8-/10-/12-Bit Dual Voltage Output Nonvolatile Digital-to-Analog Converters with SPI Interface

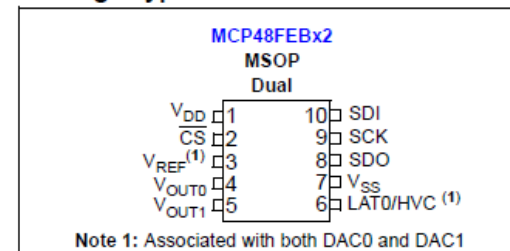
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V - Full Specifications
  - 1.8V to 2.7V - Reduced Specifications
- Dual Output Voltage Resolutions:
  - 8-bit: MCP48FEB02
  - 10-bit: MCP48FEB12
  - 12-bit: MCP48FEB22
- Rail-to-Rail Output
- Fast Settling Time of 7.8  $\mu$ s (typical)
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.22V typical)
- Output Gain Options: Unity (1x) or 2x
- Nonvolatile Memory (EEPROM):
  - User-programmed Power-on Reset
- (POR)/Brown-out Reset (BOR):
  - Auto Recall of DAC register setting
  - Auto Recall of Device Configuration
- SPI Interface
- 10-lead MSOP

MCP48FEBX2 Device Block Diagram (Dual-Channel Output)



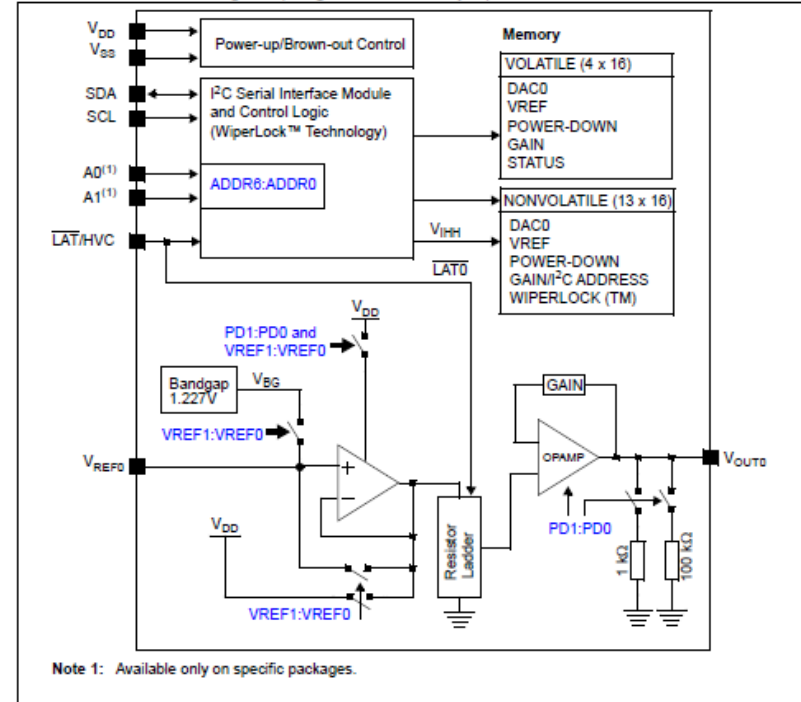
## Package Types



## Features:

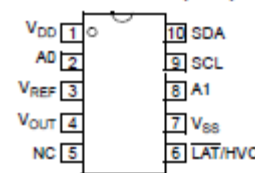
- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Single Output Voltage Resolutions:
  - 8-bit: MCP47CMB01
  - 10-bit: MCP47CMB11
  - 12-bit: MCP47CMB21
- Nonvolatile Memory (MTP) Size: 32 Locations
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- I2C™ Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

MCP47CVBX1 Block Diagram (Single-Channel Output)

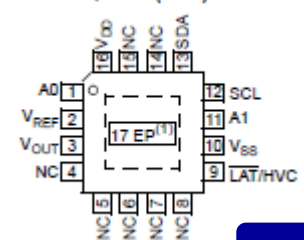


MCP47CXBx1 (Single)

MSOP-10, DFN-10 (3 x 3)



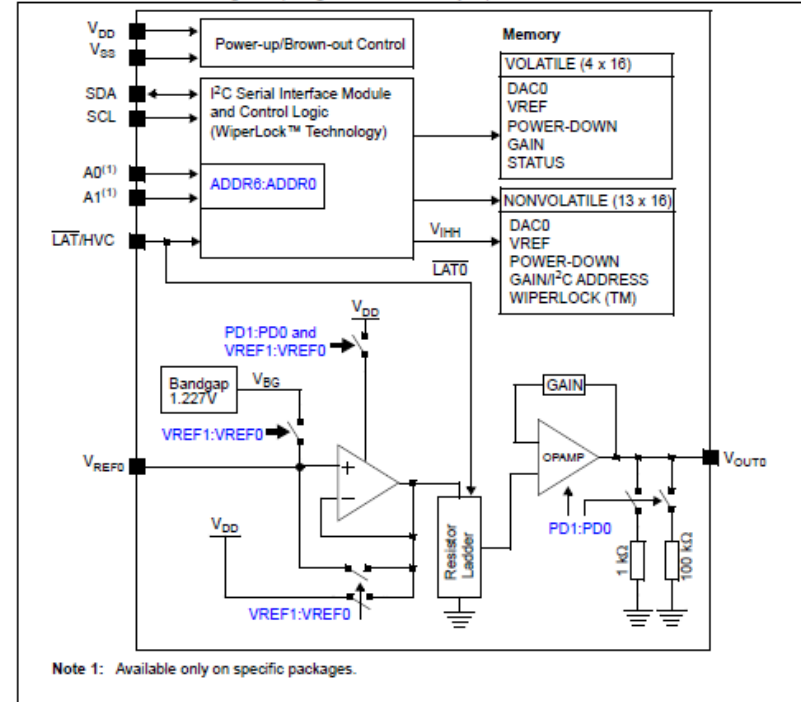
QFN-16 (3 x 3)



## Features:

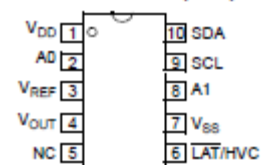
- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Single Output Voltage Resolutions:
  - 8-bit: MCP47CVB01
  - 10-bit: MCP47CVB11
  - 12-bit: MCP47CVB21
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- I2C™ Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

MCP47CVBx1 Block Diagram (Single-Channel Output)

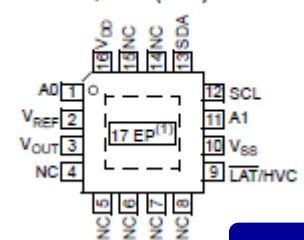


MCP47CVBx1 (Single)

MSOP-10, DFN-10 (3 x 3)



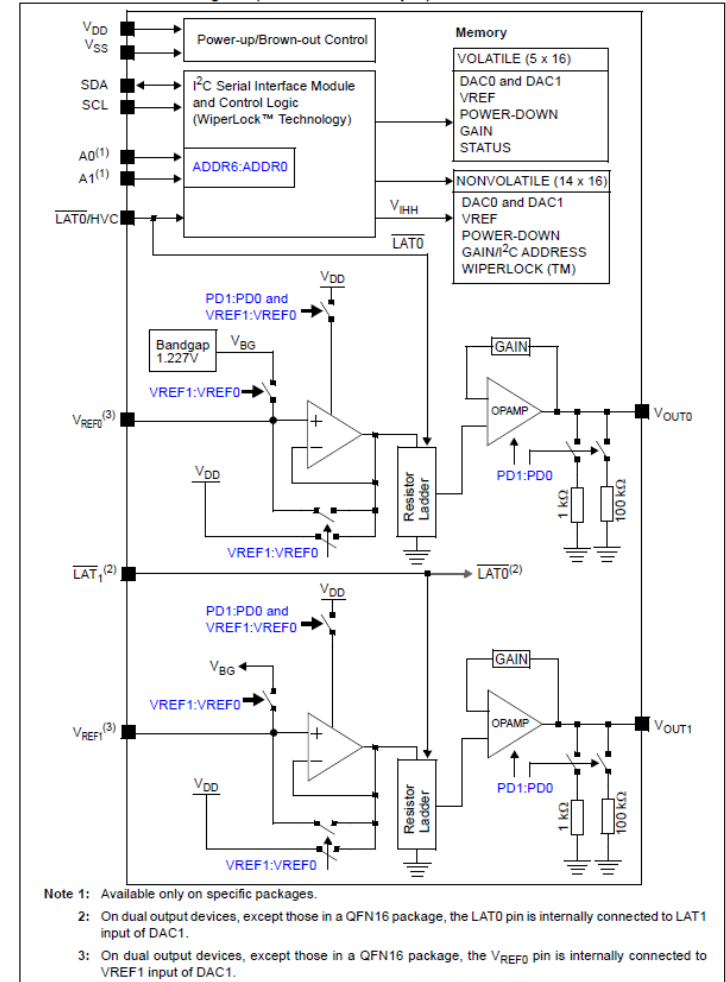
QFN-16 (3 x 3)



## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Dual Output Voltage Resolutions:
  - 8-bit: MCP47CMB02
  - 10-bit: MCP47CMB12
  - 12-bit: MCP47CMB22
- Nonvolatile Memory (MTP) Size: 32 locations
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- I<sup>2</sup>C™ Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

MCP47CVBx2 Block Diagram (Dual-Channel Output)

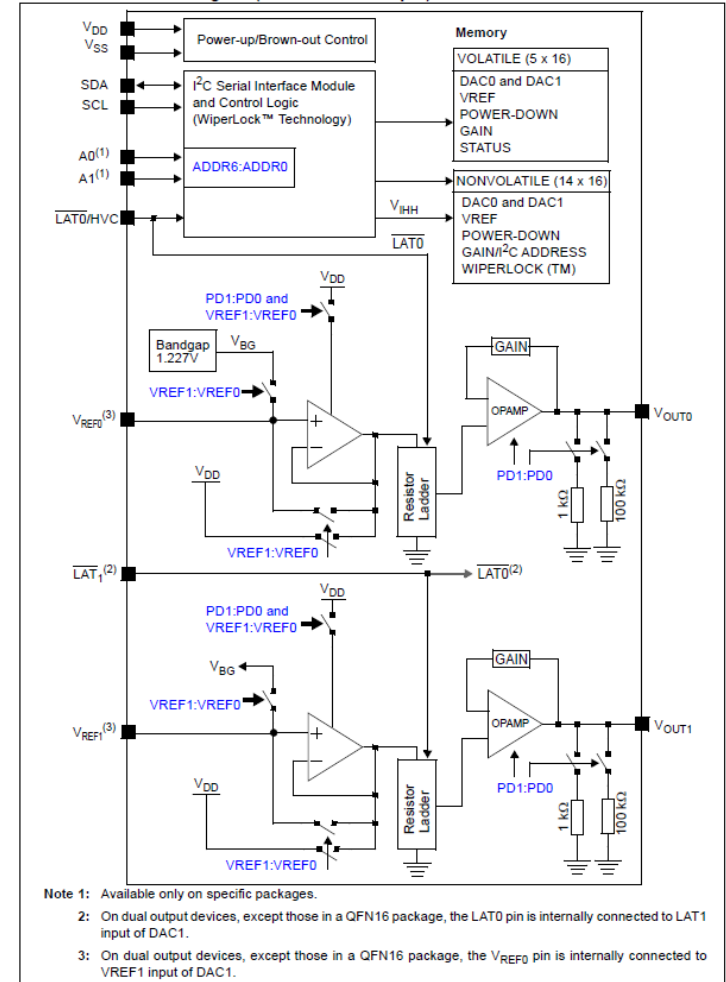




## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Dual Output Voltage Resolutions:
  - 8-bit: MCP47CVB02
  - 10-bit: MCP47CVB12
  - 12-bit: MCP47CVB22
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- I<sup>2</sup>C™ Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

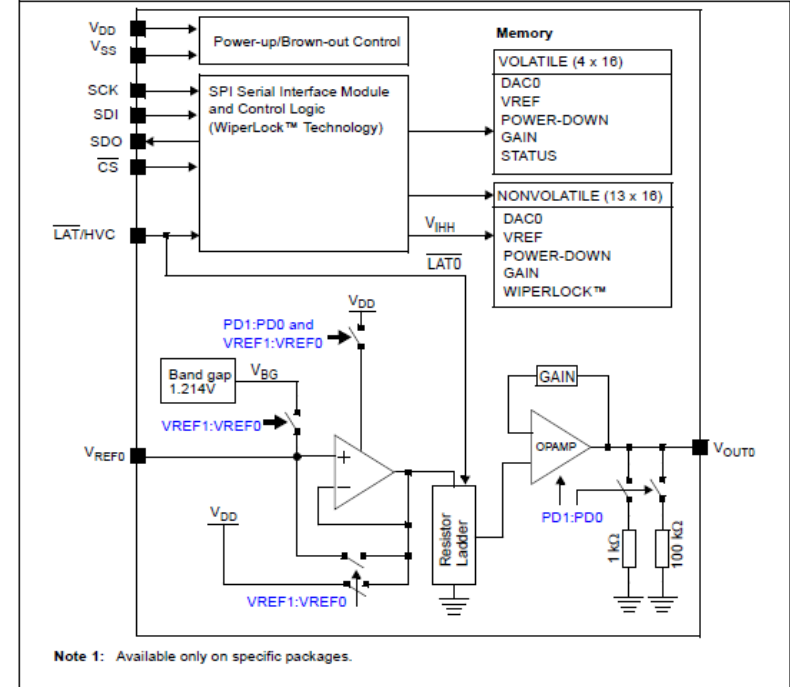
MCP47CVBx2 Block Diagram (Dual-Channel Output)



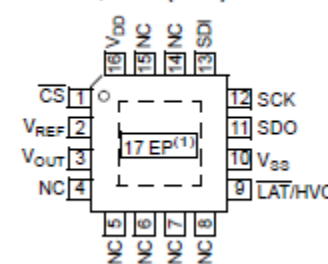
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Single Output Voltage Resolutions:
  - 8-bit: MCP48CMB01
  - 10-bit: MCP48CMB11
  - 12-bit: MCP48CMB21
- Nonvolatile Memory (MTP) Size: 32 Locations
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- SPI Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

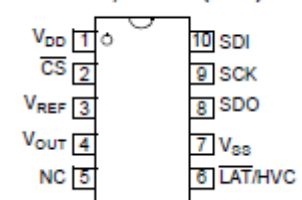
MCP48CVBx1 Block Diagram (Single-Channel Output)



QFN-16 (3 x 3)



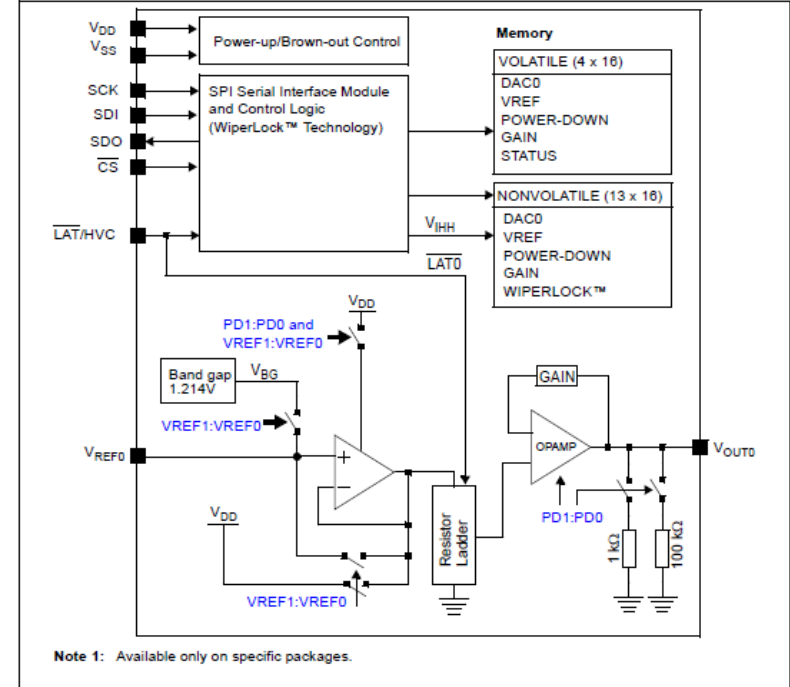
MSOP-10, DFN-10 (3 x 3)



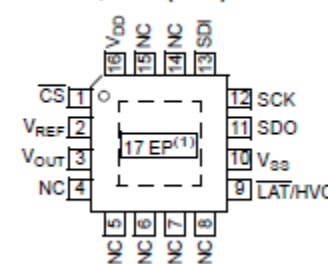
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Single Output Voltage Resolutions:
  - 8-bit: MCP48CVB01
  - 10-bit: MCP48CVB11
  - 12-bit: MCP48CVB21
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- SPI Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

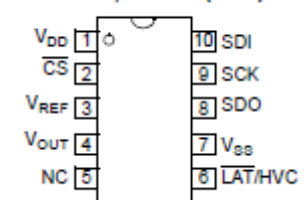
MCP48CVBx1 Block Diagram (Single-Channel Output)



QFN-16 (3 x 3)



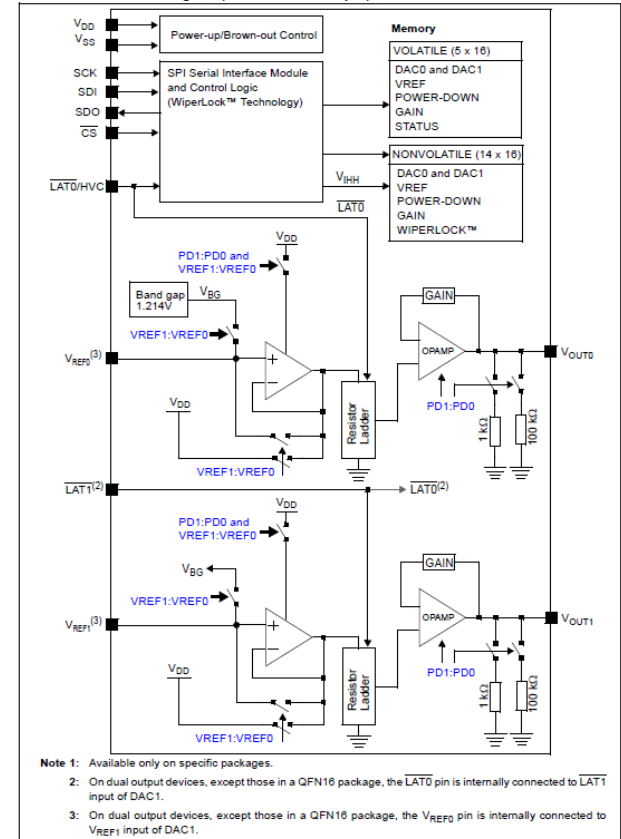
MSOP-10, DFN-10 (3 x 3)



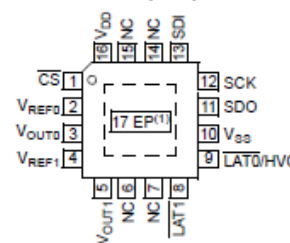
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Dual Output Voltage Resolutions:
  - 8-bit: MCP48CMB02
  - 10-bit: MCP48CMB12
  - 12-bit: MCP48CMB22
- Nonvolatile Memory (MTP) Size: 32 locations
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- SPI Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

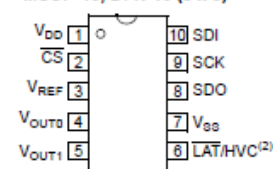
MCP48CVBx2 Block Diagram (Dual-Channel Output)



QFN-16 (3 x 3)



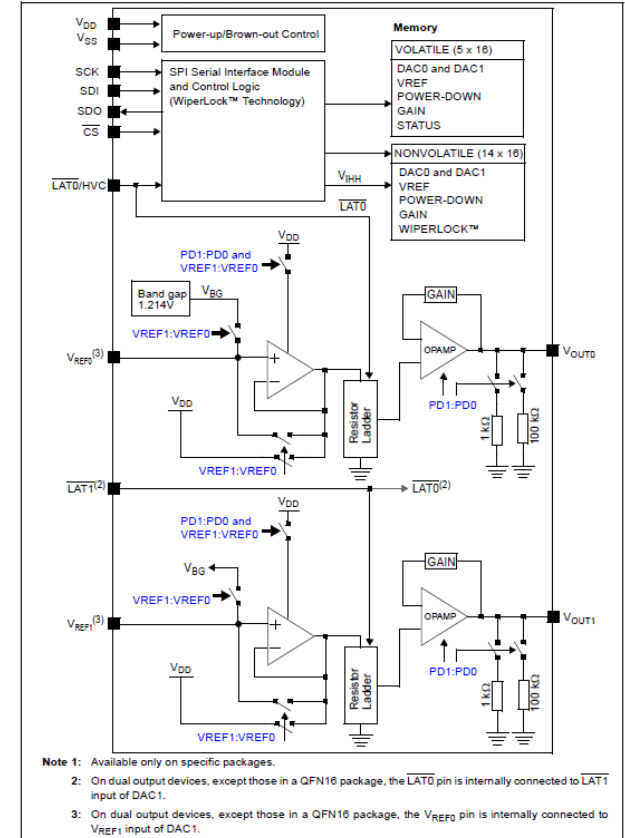
MSOP-10, DFN-10 (3 x 3)



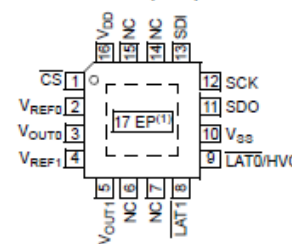
## Features:

- Operating Voltage Range:
  - 2.7V to 5.5V – Full specifications
  - 1.8V to 2.7V – Reduced device specifications
- Dual Output Voltage Resolutions:
  - 8-bit: MCP48CVB02
  - 10-bit: MCP48CVB12
  - 12-bit: MCP48CVB22
- Fast Settling time of 16  $\mu$ s (typ)
- 1 LSB Integral Nonlinearity (INL) Error
- DAC Voltage Reference Source Options:
  - Device  $V_{DD}$  or External  $V_{REF}$  pin
  - Internal Band Gap (1.227V Typ)
- Output Gain Options: Unity (1x) or (2x)
- Power-on/Brown-out Reset (POR/BOR) Protection
- SPI Interface
- Package Types
  - 16-lead 3x3 QFN
  - 10-lead MSOP
  - 10-lead 3x3 DFN
- Extended Temperature Range: -40°C to +125°C

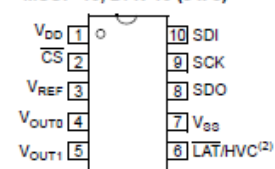
MCP48CVB2 Block Diagram (Dual-Channel Output)



QFN-16 (3 x 3)



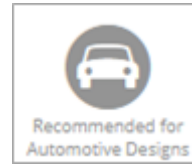
MSOP-10, DFN-10 (3 x 3)





# MCP4801/4811/4821

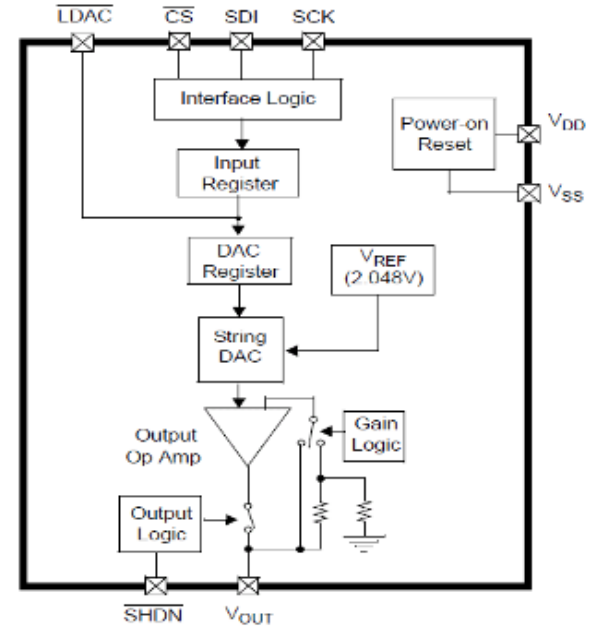
8/10/12-Bit Voltage Output Digital-to-Analog Converter  
with Internal  $V_{REF}$  and SPI Interface



Online  
Datasheet

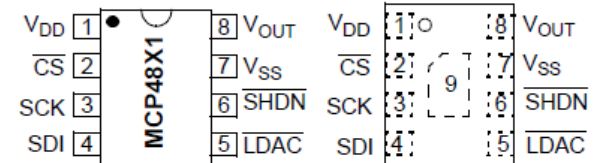
## Features:

- MCP4801: 8-Bit Voltage Output DAC
- MCP4811: 10-Bit Voltage Output DAC
- MCP4821: 12-Bit Voltage Output DAC
- Rail-to-Rail Output
- SPI Interface with 20 MHz Clock Support
- Simultaneous Latching of the DAC Output –  
- with LDAC Pin
- Fast Settling Time of 4.5  $\mu$ s
- Selectable Unity or 2x Gain Output
- 2.048V Internal Voltage Reference
- 50ppm/ $^{\circ}$ C  $V_{REF}$  Temperature Coefficient
- 2.7V to 5.5V Single-Supply Operation
- Extended Temperature Range:
  - -40 $^{\circ}$ C to +125 $^{\circ}$ C
- Recommended for Automotive Design (MCP4821)



PDIP, SOIC, MSOP

DFN (2x3)\*



**MCP4801:** 8-bit single DAC

**MCP4811:** 10-bit single DAC

**MCP4821:** 12-bit single DAC

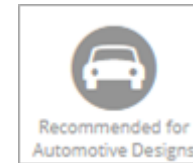
\* Includes Exposed Thermal Pad (EP)

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# MCP4802/4812/4822

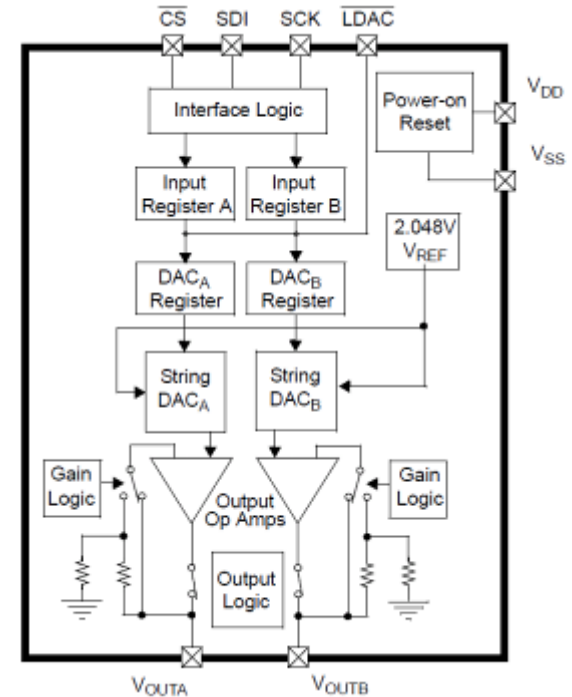
8/10/12-Bit Dual Voltage Output Digital-to-Analog Converter  
with Internal  $V_{REF}$  and SPI Interface



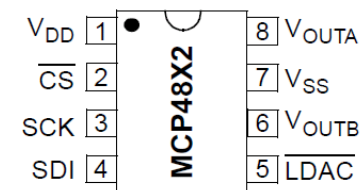
Online  
Datasheet

## Features:

- MCP4802: Dual 8-Bit Voltage Output DAC
- MCP4812: Dual 10-Bit Voltage Output DAC
- MCP4822: Dual 12-Bit Voltage Output DAC
- Rail-to-Rail Output
- SPI Interface with 20 MHz Clock Support
- Simultaneous Latching of the Dual DACs with –  
– LDAC pin
- Fast Settling Time of 4.5  $\mu$ s
- Selectable Unity or 2x Gain Output
- 2.048V Internal Voltage Reference
- 50ppm/ $^{\circ}$ C  $V_{REF}$  Temperature Coefficient
- 2.7V to 5.5V Single-Supply Operation
- Extended Temperature Range:
  - -40 $^{\circ}$ C to +125 $^{\circ}$ C
- Recommended for Automotive Design (MCP4802)



8-Pin PDIP, SOIC, MSOP



**MCP4802:** 8-bit dual DAC  
**MCP4812:** 10-bit dual DAC  
**MCP4822:** 12-bit dual DAC

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# MCP4901/4911/4921

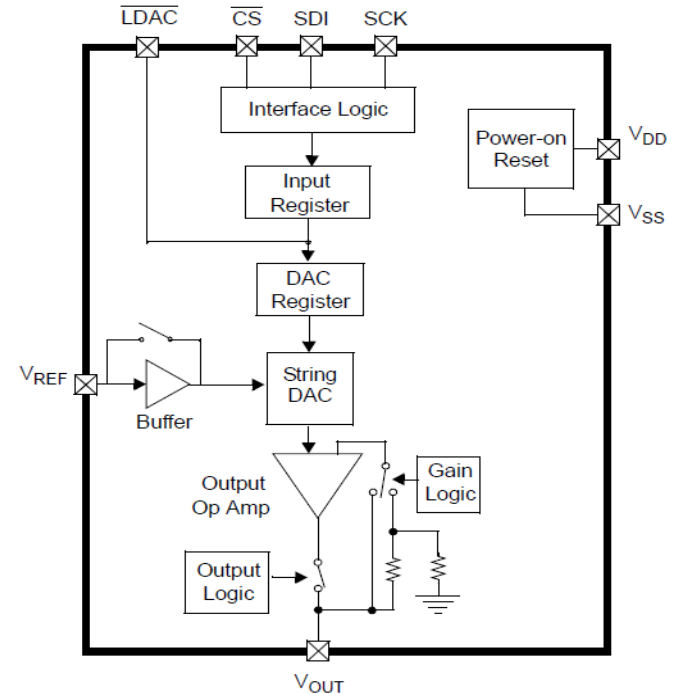
8/10/12-Bit Voltage Output Digital-to-Analog Converter  
with SPI Interface



Online  
Datasheet

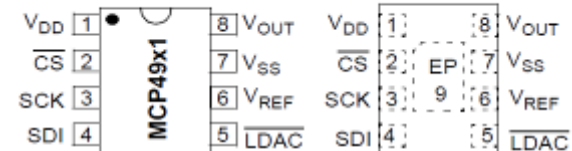
## Features:

- MCP4901: 8-Bit Voltage Output DAC
- MCP4911: 10-Bit Voltage Output DAC
- MCP4921: 12-Bit Voltage Output DAC
- Rail-to-Rail Output
- SPI Interface with 20 MHz Clock Support
- Simultaneous Latching of the DAC Output –  
- with LDAC Pin
- Fast Settling Time of 4.5  $\mu$ s
- Selectable Unity or 2x Gain Output
- External Voltage Reference Input
- External Multiplier Mode
- 2.7V to 5.5V Single-Supply Operation
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design (MCP4921)



8-Pin PDIP, SOIC, MSOP

DFN-8 (2x3)\*



**MCP4901:** 8-bit single DAC  
**MCP4911:** 10-bit single DAC  
**MCP4921:** 12-bit single DAC

\* Includes Exposed Thermal Pad (EP)

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# MCP4902/4912/4922

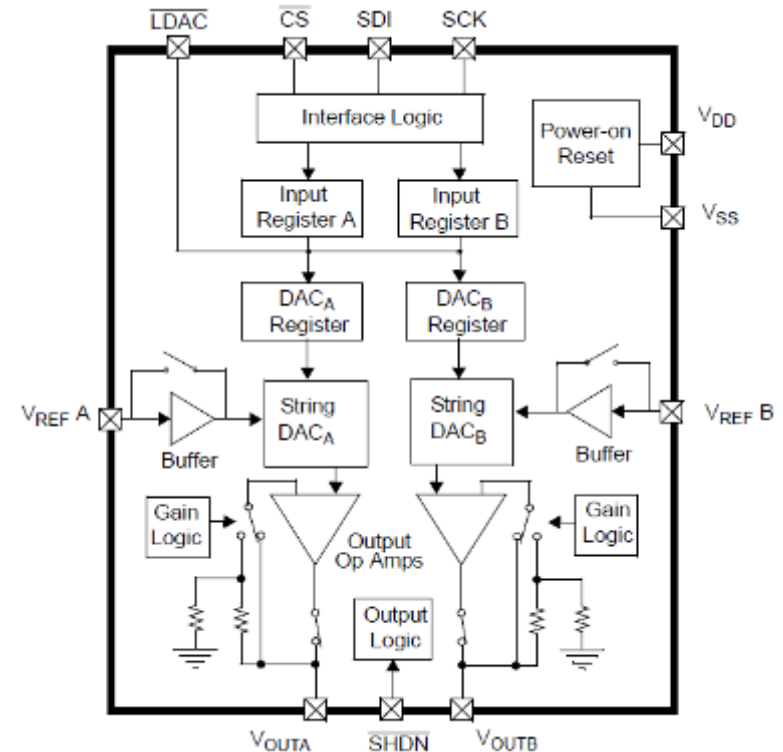
8/10/12-Bit Dual Voltage Output Digital-to-Analog Converter with SPI Interface



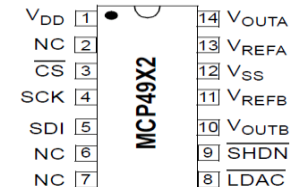
Online  
Datasheet

## Features:

- MCP4902: Dual 8-Bit Voltage Output DAC
- MCP4912: Dual 10-Bit Voltage Output DAC
- MCP4922: Dual 12-Bit Voltage Output DAC
- Rail-to-Rail Output
- SPI Interface with 20 MHz Clock Support
- Simultaneous Latching of the Dual DACs –  
- with LDAC pin
- Fast Settling Time of 4.5  $\mu$ s
- Selectable Unity or 2x Gain Output
- External Voltage Reference Inputs
- External Multiplier Mode
- 2.7V to 5.5V Single-Supply Operation
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design (MCP4912/22)



14-Pin PDIP, SOIC, TSSOP

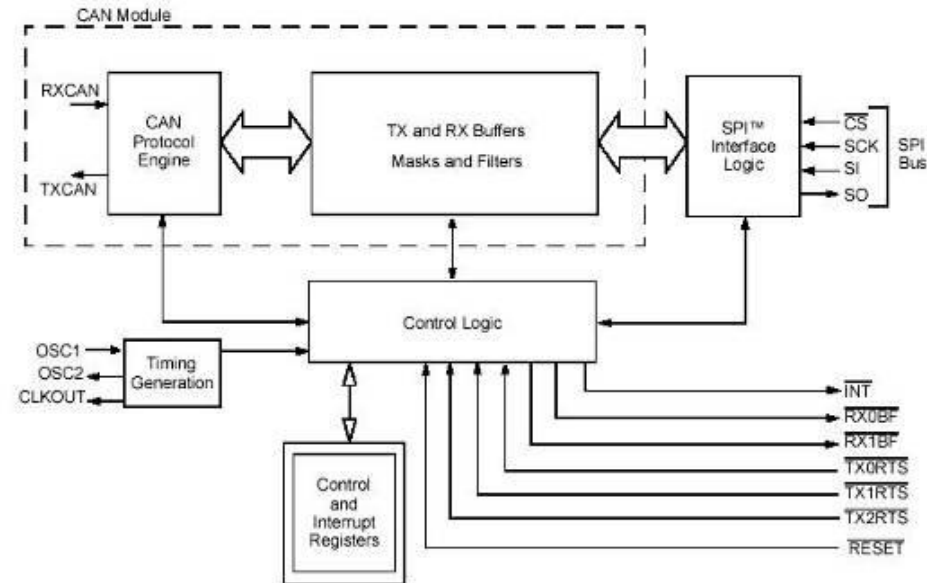


**MCP4902:** 8-bit dual DAC  
**MCP4912:** 10-bit dual DAC  
**MCP4922:** 12-bit dual DAC

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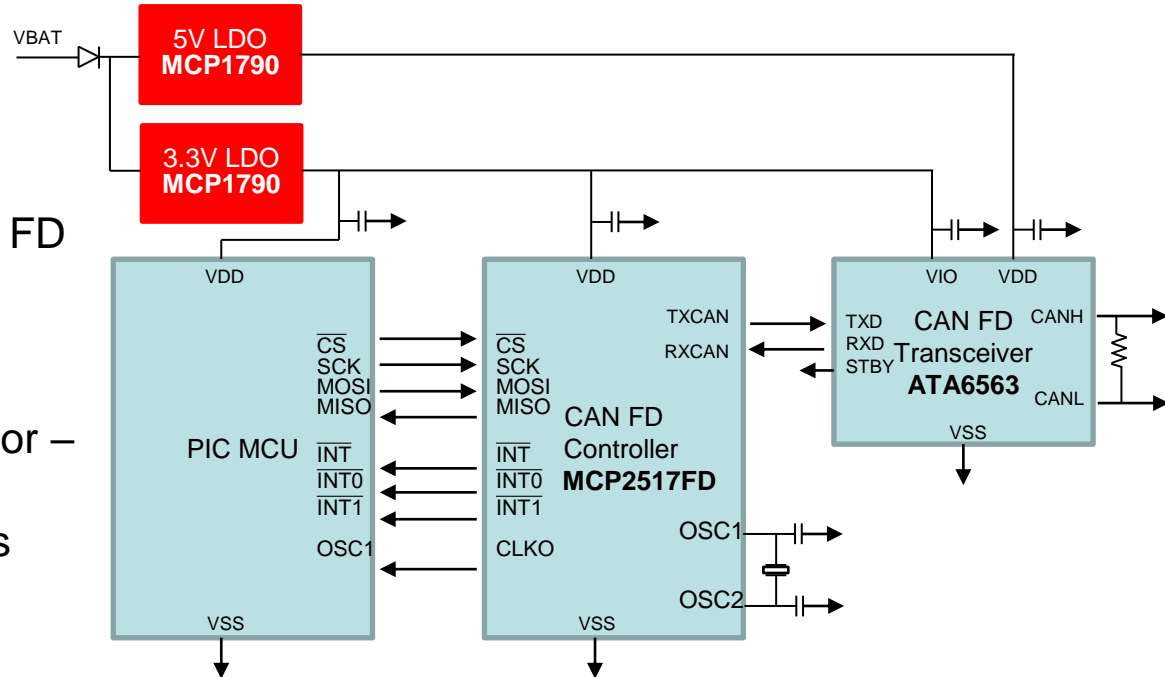
## Features:

- Implements CAN V2.0B at 1 Mb/s
- 0 - 8 byte length in the data field
- Standard and extended data & remote frames
- Receive buffers, masks and filters
- Data byte filtering on the first two data bytes
- Three transmit buffers
- High-speed SPITM Interface (10MHz):
- One-Shot mode
- Clock out pin with programmable prescaler
- Start-of-Frame (SOF) signal
- Interrupt output pin with selectable enables
- Buffer Full output pins configurable as
- Interrupt output for receive buffer
- General purpose Output
- Request-to-Send (RTS) input pins configurable:
  - Control pins
  - General Purpose inputs
- Operates from 2.7V to 5.5V
- 5mA active (typ.), 1µA standby (typ.)
- Extended Temperature range: -40°C to +125°C
- Recommended for Automotive Design



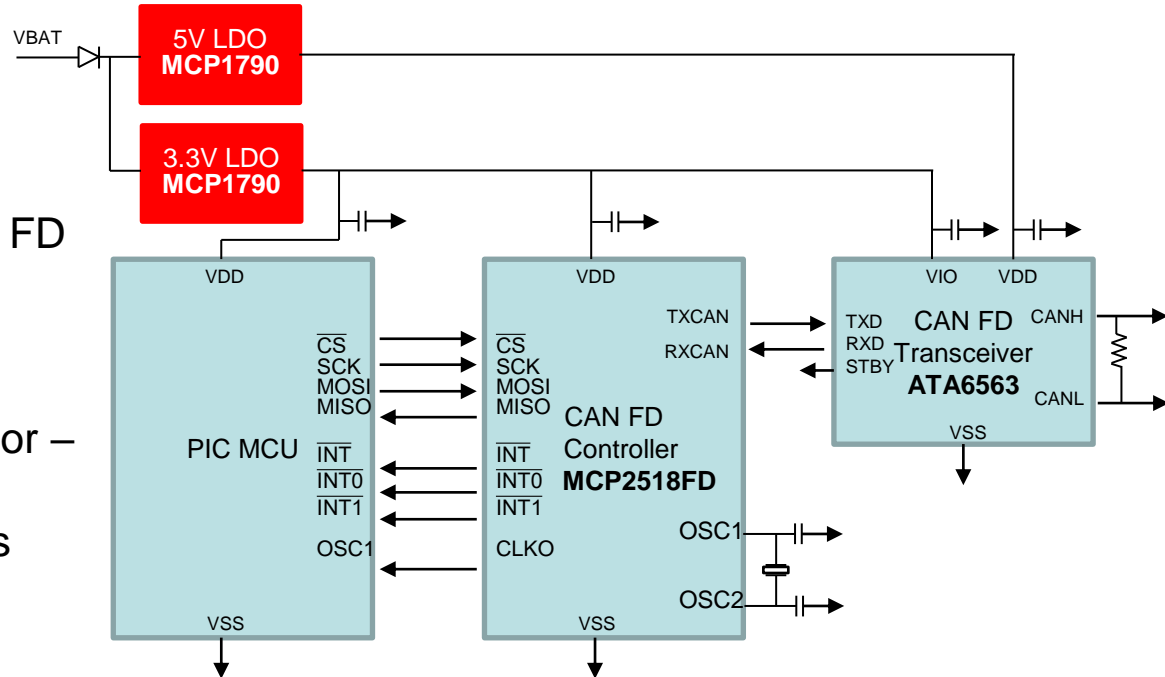
## Features:

- External CAN Flexible Data-rate –
  - Controller w/SPI Interface
- Conforms to ISO11898-1:2015
- Supports both CAN 2.0B and CAN FD
- Arbitration Bit Rate up to 1 Mbps
- Data Bit Rate up to 8 Mbps
- Up to 20MHz SPI Clock Speed
- 31 FIFOs configurable as transmit or –
  - receive
- 32 Flexible Filter and Mask Objects
- One Transmit Queue
- 32-bit Time Stamp
- Bus Health Diagnostics and Error Counters
- VDD: 2.7V-5.5V
- Active Current Max: 12mA @ 5.5V, 40 –
  - MHz CAN Clock
- Sleep Current: 10uA, Typical
- Temperature Range: -40°C to +150°C
- Packages: VDFN14 (Wettable Flanks), - SOIC14
- Recommended for Automotive Design



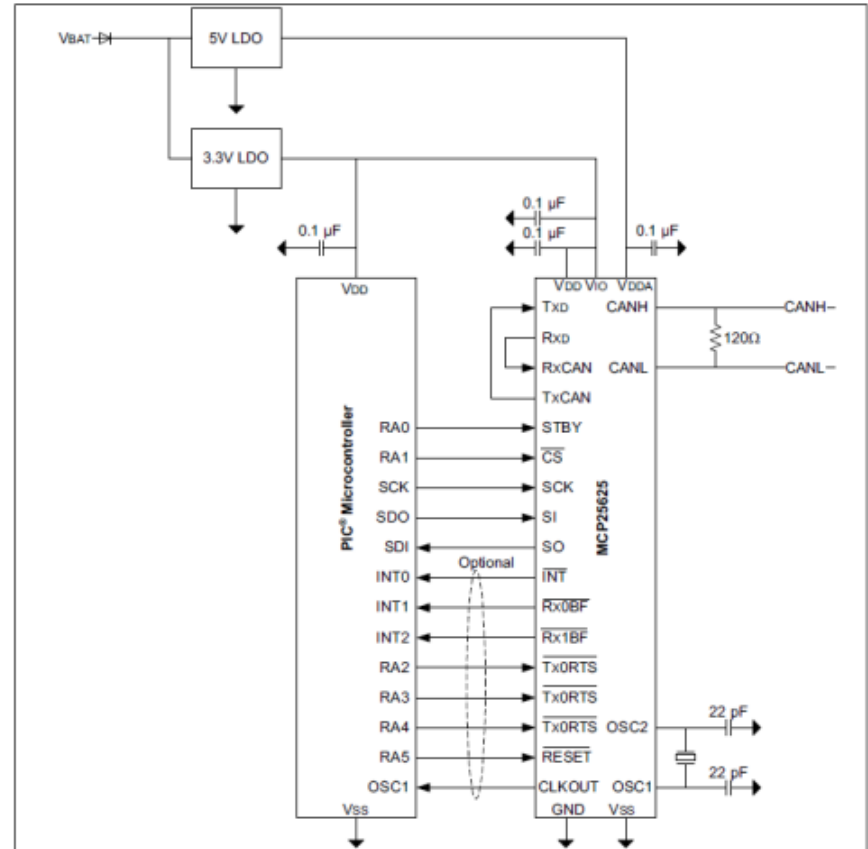
## Features:

- External CAN Flexible Data-rate –
  - Controller w/SPI Interface
- Conforms to ISO11898-1:2015
- Supports both CAN 2.0B and CAN FD
- Arbitration Bit Rate up to 1 Mbps
- Data Bit Rate up to 8 Mbps
- Up to 20MHz SPI Clock Speed
- 31 FIFOs configurable as transmit or –
  - receive
- 32 Flexible Filter and Mask Objects
- One Transmit Queue
- 32-bit Time Stamp
- Bus Health Diagnostics and Error Counters
- VDD: 2.7V-5.5V
- Active Current Max: 12mA @ 5.5V, 40 –
  - MHz CAN Clock
- Low power mode: max 10  $\mu$ A over temp.
- Temperature Range: -40°C to +150°C
- Packages: VDFN14 (Wettable Flanks), - SOIC14
- Recommended for Automotive Design



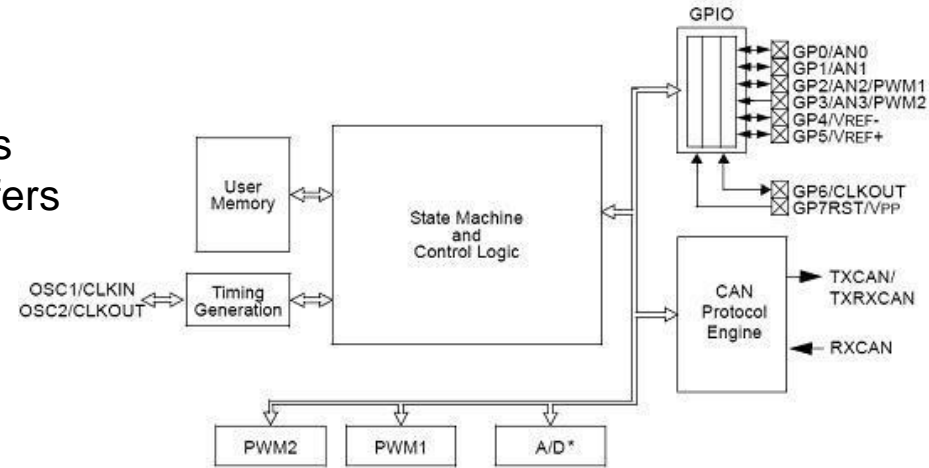
## Features:

- Stand-Alone CAN2.0B Controller with
- Integrated CAN Transceiver and Serial Peripheral Interface (SPI)
- Up to 1 Mb/s Operation
- Very Low Standby Current (10  $\mu$ A, typical).
- Up to 10 MHz SPI Clock Speed
- Interfaces Directly with Microcontrollers with 2.7V to 5.5V I/O
- Packages: SSOP-28L and 6x6 QFN-28L
- Extended Temperature Range:
  - -40°C to +125°C
- Recommended for Automotive Design



## Features:

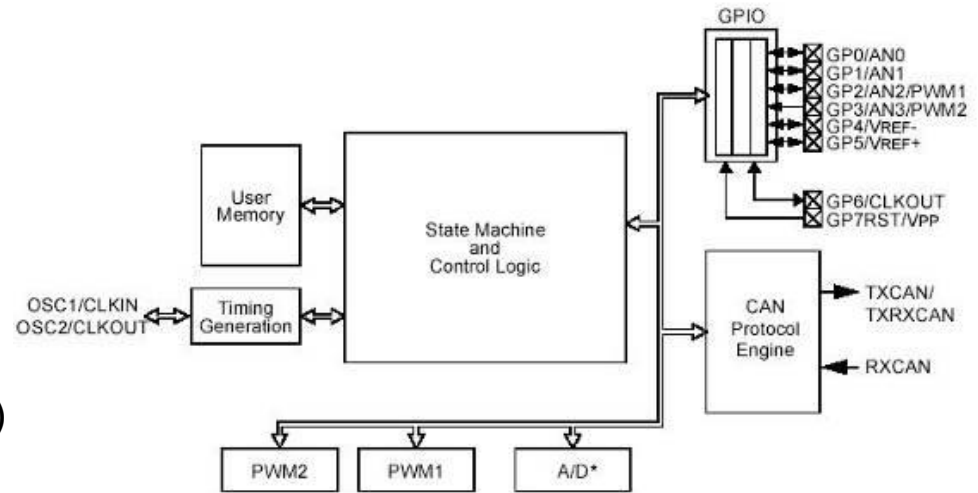
- Implements CAN V2.0B
- Programmable bit rate up to 1 Mb/s
- Programmable mask, two programmable filters
- Three auto-transmit buffers, two message buffers
- Enables simple CAN nodes without an MCU
- Non-volatile memory for user configuration
- 8 GPIO lines
- Individually selectable transmit-on-pin change
- Programmable conversion clock and –
  - $V_{REF}$  sources (MCP2505X devices only)
- Message scheduling capability
- Two 10-bit PWM outputs
- Configuration can be modified via CAN bus
- In-Circuit Serial Programming™ (ICSP™)
- Optional 1-wire CAN bus operation
- Operates from 2.7V to 5.5V
- 10mA active current (typ.), 30µA standby (typ.)
- Packaging: 14-pin PDIP and SOIC
- Industrial (I): -40°C to +85°C
- Extended (E): -40°C to +125°C



\* Only the MCP2505X devices have the A/D module.

## Features:

- Implements CAN V2.0B
- Programmable bit rate up to 1 Mb/s
- Non-volatile memory for configuration
- Eight general-purpose I/O lines
- Individually selectable transmit-on-pin –  
- change for each input
- Programmable conversion clock and –  
-  $V_{REF}$  sources (MCP2505X devices only)
- Message scheduling capability
- Two 10-bit PWM outputs
- In-Circuit Serial Programming™ (ICSP™)
- Optional 1-wire CAN bus operation
- Low-power CMOS technology
- Operates from 2.7V to 5.5V
- 30 $\mu$ A standby current (CAN Sleep mode)
- 14-pin PDIP and SOIC packages
- Available temperature ranges:
  - Industrial (I): -40°C to +85°C
  - Extended (E): -40°C to +125°C



\* Only the MCP2505X devices have the A/D module.



# 12V CAN Transceiver Choice Matrix

Device	Classical CAN Transceiver Only	CAN FD Capable Transceiver (Mb/s)	Basic Remote Wake	Wake-up Pattern	Wake-up Frame (CAN PN)	Silent Mode	Standby Mode	3V & 5V Compatible	Split pin	Vio pin (range)	ISO Compliance	Package Type
ATA6560	NO	2, 5Mb/s	YES	NO	NO	YES	YES	NO	No	NO	ISO-11898-2,5 ISO 11898-2:2016	DFN 8/SOIC 8
ATA6561	NO	2, 5Mb/s	YES	NO	NO	NO	YES	YES	No	2.8V-5.5V	ISO-11898-2,5 ISO 11898-2:2016	DFN 8/SOIC 8
ATA6562	NO	2, 5Mb/s	NO	YES	NO	YES	YES	NO	No	NO	ISO-11898-2,5 ISO 11898-2:2016	DFN 8/SOIC 8
ATA6563	NO	2, 5Mb/s	NO	YES	NO	NO	YES	YES	No	2.8V-5.5V	ISO-11898-2,5 ISO 11898-2:2016	DFN 8/SOIC 8
ATA6564	NO	2, 5Mb/s	N.A.	N.A.	NO	YES	NO	YES	No	2.8V-5.5V	ISO-11898-2 ISO 11898-2:2016	DFN 8/SOIC 8
ATA6566	NO	2Mb/s	NO	YES	NO	NO	YES	YES	No	2.8V-5.5V	ISO-11898-2,5 ISO 11898-2:2016	DFN 8/SOIC 8
ATA6565	NO	2, 5Mb/s	NO	YES	NO	No	YES	NO	No	NO	ISO-11898-2,5 ISO 11898-2:2016	DFN 14/SOIC 14
ATA6570	NO	2, 5Mb/s	NO	YES	YES	YES	YES	YES	No	2.8V-5.5V	ISO-11898-2,5,6 ISO 11898-2:2016	DFN 14/SOIC 14

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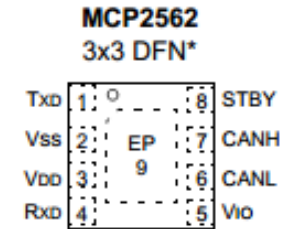
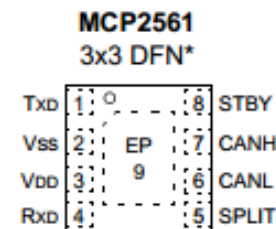
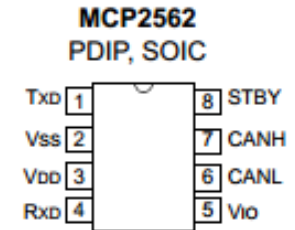
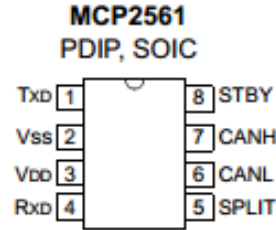
# 24V CAN Transceiver Choice Matrix

Device	Classic CAN Transceiver Only	CAN FD Capable Transceiver (Mb/s)	CAN 2.0 Controller	Basic Remote Wake	Wake-up Pattern	Silent Mode	Standby Mode	3V & 5V Compatible TXD/Stby	Split pin	Vio pin (range)	ISO Compliance	Package Type
MCP2557FD	NO	2,5,8Mb/s	NO	NO	NO	YES	NO	YES	No	NO	ISO-11898-2,5 ISO/DIS-11898-2	8/DFN 8/SOIC 8/TDFN
MCP2558FD	NO	2,5,8Mb/s	NO	NO	NO	YES	NO	NO	No	1.7V-5.5V	ISO-11898-2,5 ISO/DIS-11898-2	8/DFN 8/SOIC 8/TDFN
MCP2542FD	NO	2,5,8Mb/s	NO	YES	NO	NO	YES	YES	No	1.7V-5.5V	ISO-11898-2,5 ISO/DIS-11898-2	8/DFN 8/SOIC 8/TDFN
MCP2542WFD	NO	2,5,8Mb/s	NO	NO	YES	NO	YES	YES	No	1.7V-5.5V	ISO-11898-2,5 ISO/DIS-11898-2	8/DFN 8/SOIC 8/TDFN
MCP2544FD	NO	2,5,8Mb/s	NO	YES	NO	NO	YES	YES	No	NO	ISO-11898-2,5 ISO/DIS-11898-2	8/DFN 8/SOIC 8/TDFN
MCP2544WFD	NO	2,5,8Mb/s	NO	NO	YES	NO	YES	YES	No	NO	ISO-11898-2,5 ISO/DIS-11898-2	8/DFN 8/SOIC 8/TDFN
MCP25612FD	NO	2,5,8Mb/s	NO	YES	NO	NO	YES	NO	No	NO	ISO-11898-2, 5	14/SOIC
MCP2561FD	NO	2,5,8Mb/s	NO	YES	NO	NO	YES	NO	YES	NO	ISO-11898-2, 5	8/PDIP 8/SOIC 8/DFN
MCP2562FD	NO	2,5,8Mb/s	NO	YES	NO	NO	YES	YES	No	1.8V-5.5V	ISO-11898-2, 5	8/PDIP 8/SOIC 8/DFN
MCP2561	YES	NO	NO	YES	NO	NO	YES	NO	YES	NO	ISO-11898-2, 5	8/PDIP 8/SOIC 8/DFN
MCP2562	YES	NO	NO	YES	NO	NO	YES	YES	No	1.8V-5.5V	ISO-11898-2, 5	8/PDIP 8/SOIC 8/DFN
MCP25625	YES	NO	YES	YES	NO	NO	YES	YES	No	2.7V-5.5V	ISO-11898-2, 5	28/SSOP 28/QFN

[<< BACK](#)

## Features:

- Supports 1 Mb/s operation
- Implements ISO-11898-5 standard
- Very low standby current: 5µA (typ.)
- VIO supply pin (MCP2562) to interface directly to CAN controllers & MCUs
- SPLIT output pin (MCP2561) to stabilize common mode in biased split termination schemes
- Permanent dominant detection on TXD and bus
- Power-on Reset and brown-out protection
- Short-circuit protection
- Protection against high-voltage transients
- Thermal Shutdown protection
- Suitable for 12V and 24V systems
- Up to 112 nodes can be connected
- High-noise immunity
- ESD protection on CANH/CANL, IEC61000-4-2 > 8kV
- Available in PDIP-8L, SOIC-8L and 3x3 DFN-8L.
- Recommended for Automotive Design
- Temperature ranges:
  - Extended (E): -40°C to +125°C
  - High (H): -40°C to +150°C



## Features:

- Optimized for CAN FD (Flexible Data rate):
  - 2, 5 & 8 Mbps
- Maximum Propagation Delay: 120 ns
- Loop Delay Symmetry: -10%/+10% (2 Mbps)
- Implements ISO-11898-2 & ISO-11898-5
- Low Standby Current: 5  $\mu$ A (typical)
- VIO Pin Interfaces to CAN Controllers & MCUs
- SPLIT Output Pin
- Detection of Ground Fault
- Power-on Reset & Brown-Out Protection
- Short-Circuit Protection
- Protection Against High-Voltage Transients
- Automatic Thermal Shutdown Protection
- Suitable for 12V and 24V Systems
- Meets/exceeds automotive requirements
- ESD Protection on CANH & CANL, IEC61000-4-2 up to  $\pm 14$  kV
- Packing: PDIP-8L, SOIC-8L, 3x3 DFN-8L
- Extended Temperature (E):  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- High Temperature (H):  $-40^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Recommended for Automotive Design (MCP2562FD)

FIGURE 1-1: MCP2561FD WITH SPLIT PIN

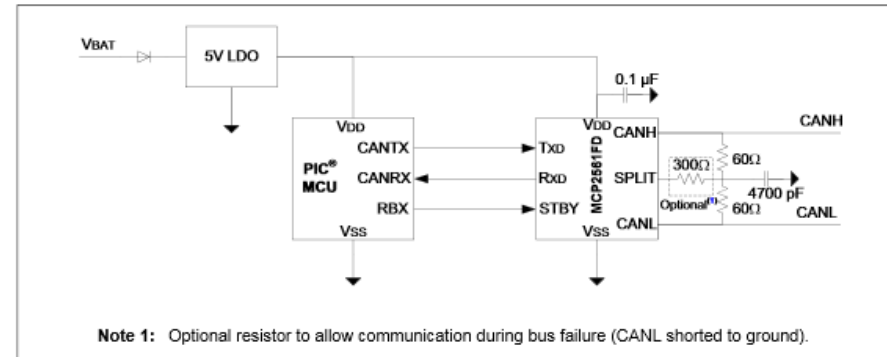
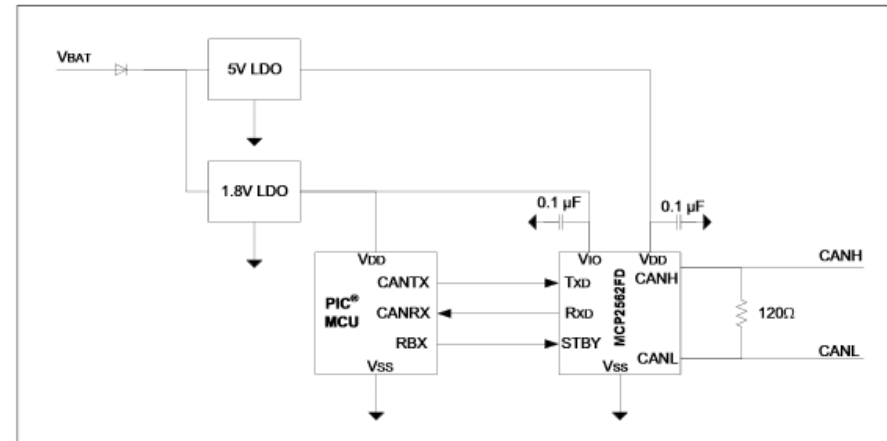


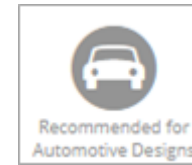
FIGURE 1-2: MCP2562FD WITH VIO PIN





# MCP2542FD & MCP2544FD

CAN FD Transceiver with Wake-Up Pattern (WUP) Option

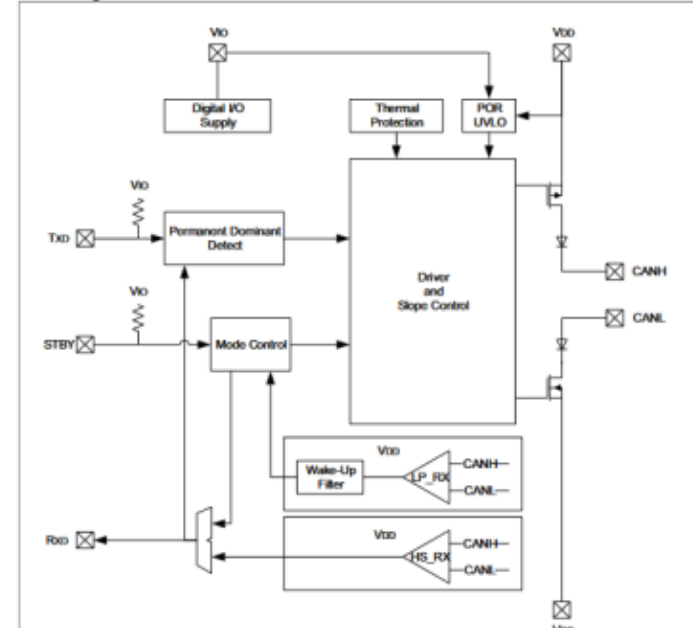


Online Datasheet

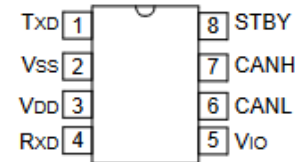
## Features:

- MCP2544FD with No Connect pin 5
- MCP2542FD with VIO pin (internal level shifting)
- Classic CAN or CAN Flexible Data Rate applications
  - Optimized for CAN FD: 2, 5 and 8 Mbps
- Meets ISO/DIS 11898-2:2015 specification
- Supports Wake-up pattern
- AEC-Q100 Grade 0
- Very Low Standby Current: 5  $\mu$ A, typical
- VIO Supply Pin Interface to CAN Controllers & MCUs
- Detection of Ground Fault
- Power-on Reset and Voltage Brown-Out Protection
- Protection Against Short-Circuit Conditions
- Protection Against High-Voltage Transients
- Automatic Thermal Shutdown Protection
- Suitable for 12V and 24V Systems
- Extremely robust meeting automotive EMC requirements
- Packing: Smallest 2x3 DFN, SOIC and 3x3 DFN
- Recommended for Automotive Design (MCP2542FD)
- Temperature ranges:
  - Extended (E): -40°C to +125°C
  - High (H): -40°C to +150°C

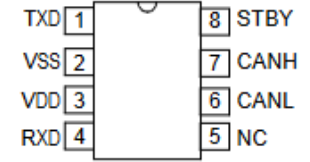
Block Diagram



**MCP2542FD**  
**MCP2542WFD**  
8-Lead SOIC



**MCP2544FD**  
**MCP2544WFD**  
8-Lead SOIC



Also Available in 2x3 DFN and 3x3 DFN

<< BACK



# MCP2557FD & MCP2558FD

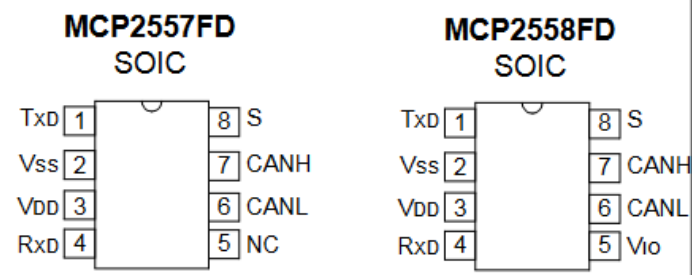
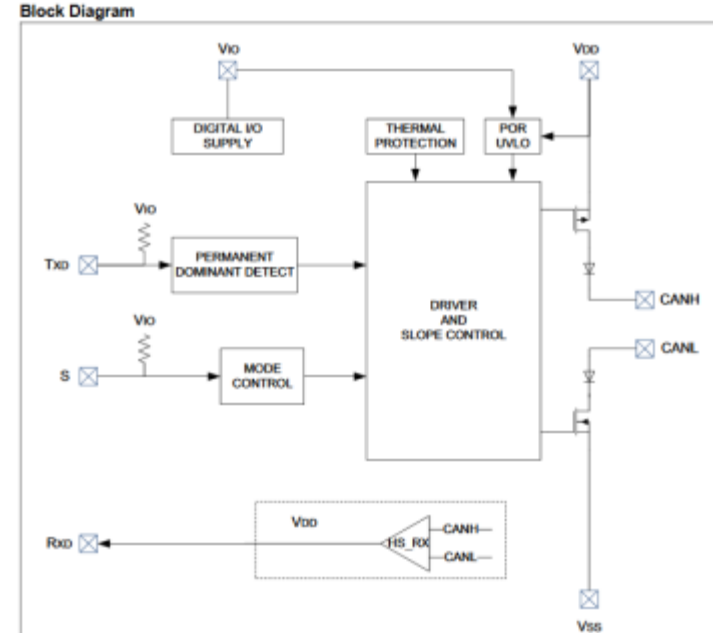
CAN FD Transceiver with Silent Mode



Online Datasheet

## Features:

- MCP2557FD with No Connect pin 5
- MCP2558FD with VIO pin (internal level shifting)
- Classic CAN or CAN Flexible Data Rate
  - Optimized for CAN FD: 2, 5 and 8 Mbps
- Meets latest ISO/DIS 11898-2:2015 specification
- Supports Silent Mode
- Prevent disruption on the network due to fault
- Increased system reliability through redundancy
- Test connection of the network
- AEC-Q100 Grade 0
- VIO Supply Pin Interfaces to CAN Controllers & MCUs
- CAN Bus Pins Disconnected when Device Unpowered
- Detection of Ground Fault:
- Power-on Reset and Voltage Brown-Out Protection
- Protection Against Damage Due to Short-Circuit
- Protection Against High-Voltage Transients
- Suitable for 12V and 24V Systems
- Extremely robust meeting automotive EMC requirements
- Packaging: Smallest 2x3 TDFN, SOIC and 3x3 DFN
- Temperature ranges: High (H): -40°C to +150°C



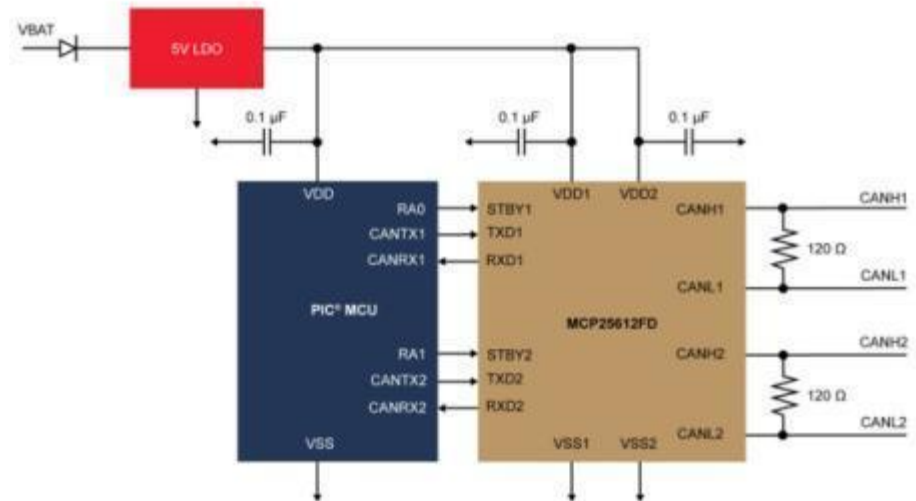
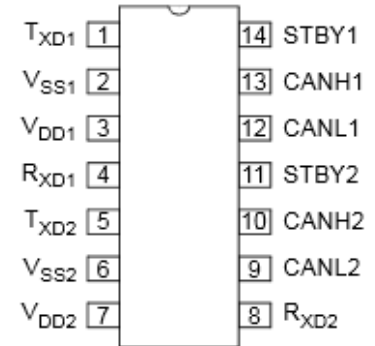
Also Available in 2x3 and 3x3 DFN

<< BACK

## Features:

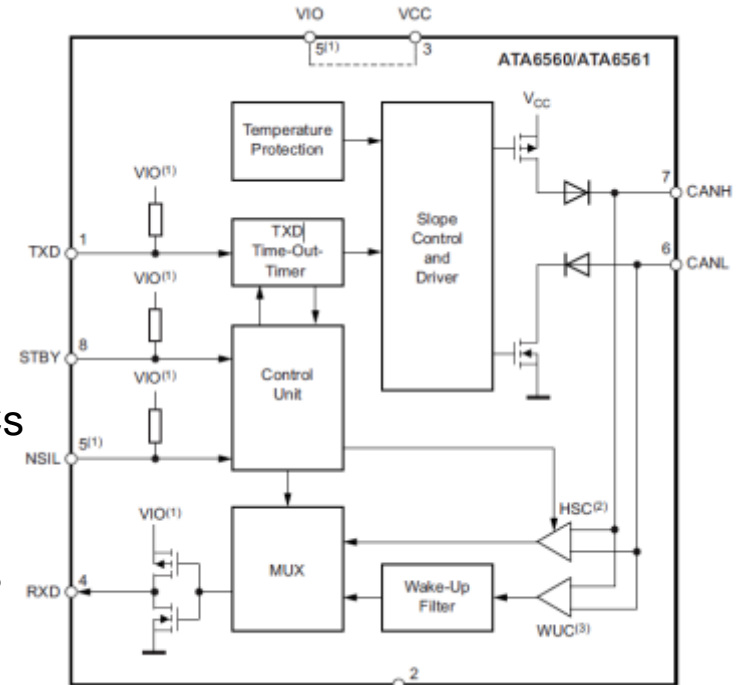
- Support both 'Classic CAN' and CAN FD
- Optimized for up to 8Mb/s Operation
- $V_{DD} = 4.5V$  to  $5.5V$
- Standby Current:  $5\mu A$ , (typ.) per transceiver
- ISO 11898-2 and ISO 11898-5 compliant
- 14-lead SOIC
- Temperature Ranges:
  - Extended Temp (E):  $-40^{\circ}C$  to  $+125^{\circ}C$
  - High Temp (H):  $-40^{\circ}C$  to  $+150^{\circ}C$

**MCP25612FD**  
SOIC

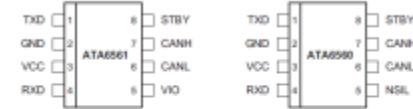


## Features:

- Fully ISO 11898-2, ISO11898-5, ISO11898-2: 2016 and SAE J2962-2 compliant
- CAN FD ready, Communication speed up to 5Mbit/s
- Low electromagnetic emission (EME) and high – - electromagnetic immunity (EMI)
- Differential receiver with wide common mode range
- ATA6560: Silent mode (receive only)
- ATA6561: VIO Pin to interface direct to 2.8V – 5.5V  $\mu$ Cs
- Remote wake-up capability via CAN bus
- Basic wake up
- Functional behavior defined under all supply conditions
- Transceiver disengages from the bus when unpowered
- RXD recessive clamping detection
- High ESD handling – capability on the bus pins
- Bus pins protected against automotive transients
- Transmit data (TXD) dominant time-out function
- Under-voltage detection on VCC and VIO pins
- Bus pins short-circuit and over-temperature – protected
- AEC-Q100 qualified
- Fulfills the OEM Hardware Requirements Rev. 1.3



S08 Pinning



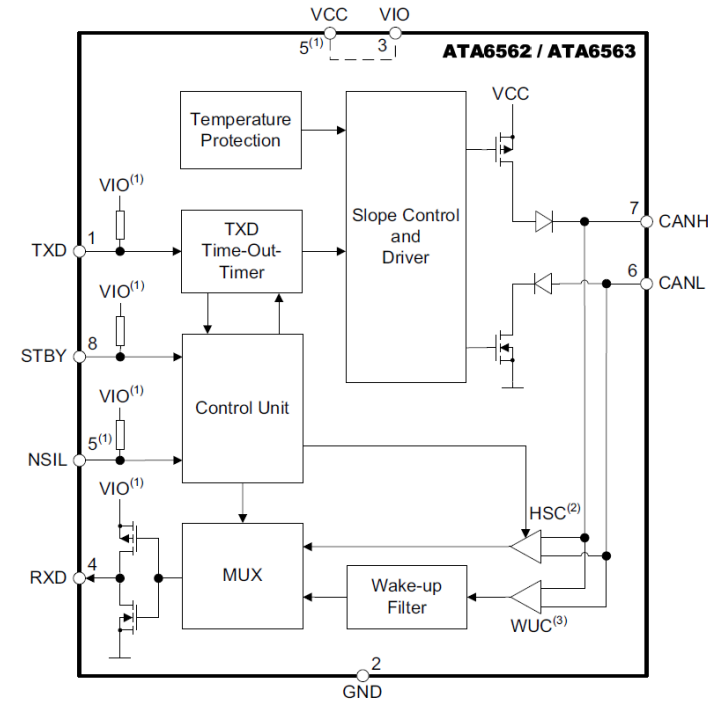
DFN8 Pinning



DFN package with  
wetttable flanks

## Features:

- Fully ISO 11898-2, ISO 11898-5, ISO 11898-2: 2016 and SAE J2962-2 compliant
- Communication speed up to 5Mbit/s (CAN FD – capable)
- Low EME and high EMI
- Differential receiver with wide common mode range
- ATA6562: Silent mode (receive only)
- ATA6563: VIO Pin to interface direct to 2.8V – 5.5V  $\mu$ Cs
- Wake-Up via CAN Bus - Wake-Up on Pattern (WUP), - acc. ISO 11898-2: 2016, 3.8  $\mu$ s Activity Filter Time
- Functional behavior defined under all supply conditions
- Transceiver disengages from the bus when unpowered
- RXD recessive clamping detection
- High ESD handling capability on the bus pins
- Bus pins protected against automotive transients
- Transmit data (TXD) dominant time-out function
- Under-voltage detection on VCC and VIO pins
- Bus pins short-circuit and over- temperature protected
- Fulfills the OEM Hardware Requirements, Rev. 1.3
- AEC-Q100 qualified
- Two Ambient Temperature Grades: +125°C and +150°C



SO8 Pinning



DFN8 Pinning

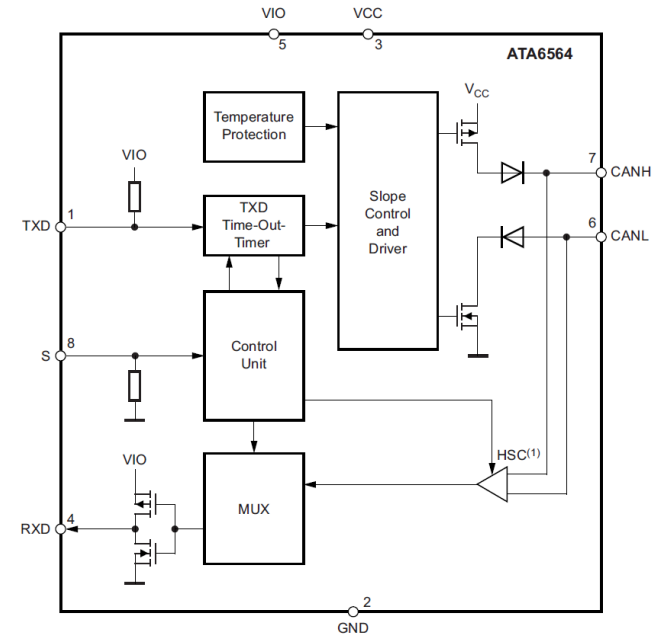


DFN package with wettable flanks

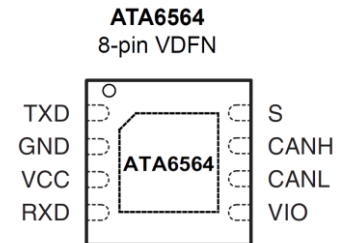
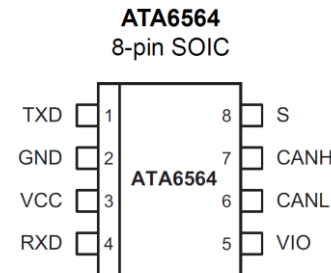


## Features:

- Fully ISO 11898-2, ISO 11898-2: 2016 and SAE – - J2962-2 compliant
- Communication speed up to 5Mbit/s (CAN FD capable)
- Low EME and high EMI
- Differential receiver with wide common mode range
- Compatible to 2.8V – 5.5V microcontrollers
- Functional behavior defined under all supply conditions
- Transceiver disengages from the bus when unpowered
- RXD recessive clamping detection
- High ESD handling capability on the bus pins
- Bus pins protected against automotive transients
- Transmit data (TXD) dominant time-out function
- Under-voltage detection on VCC and VIO pins
- Bus pins short-circuit and over- temperature protected
- Fulfills the OEM Hardware Requirements, Rev. 1.3
- Qualified according to AEC-Q100
- Two Ambient Temperature Grades:
  - +125°C and +150°C
- Packages: 8- pin SOIC and 8- pin VDFN



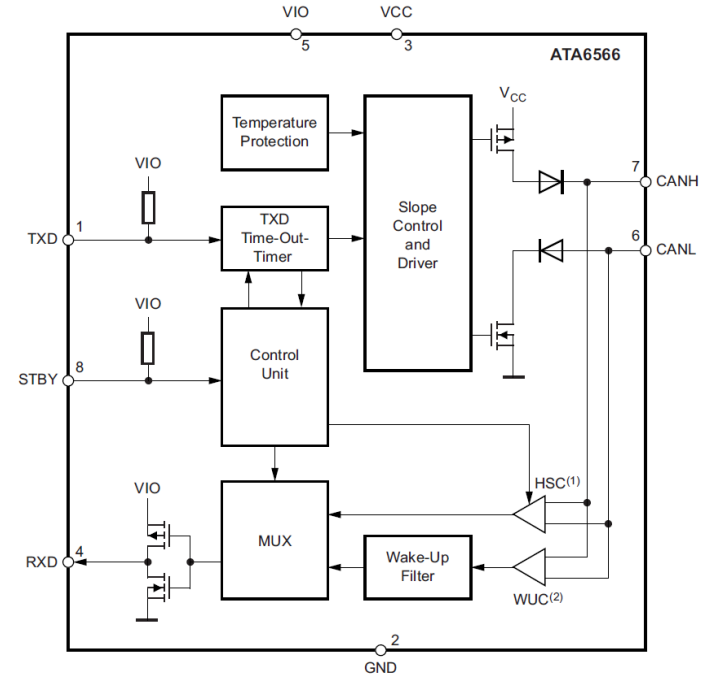
Note 1: HSC: High-speed comparator.



DFN package with wettable flanks

## Features:

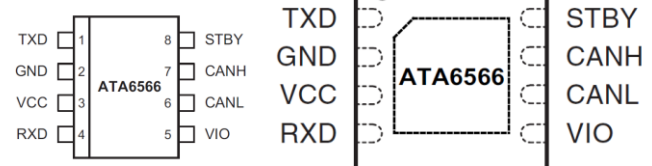
- Compliant with Japanese OEM Requirements
- Certified according latest VeLIO Test Specification
- Fully ISO 11898-2, ISO 11898-5, ISO 11898-2: 2016 – - and SAE J2962-2 compliant
- Communication speed up to 2 Mbit/s (CAN FD capable)
- Low EME and high EMI
- Differential receiver with wide common mode range
- VIO Pin to interface direct to 2.8V – 5.5V microcontroller
- Wake-Up via CAN Bus - Wake-Up on Pattern (WUP), - - acc. ISO 11898-2: 2016, 3.8  $\mu$ s Activity Filter Time
- Transceiver disengages from the bus when unpowered
- RXD recessive clamping detection
- High ESD handling capability on the bus pins
- Bus pins protected against automotive transients
- Transmit data (TXD) dominant time-out function
- Under-voltage detection on VCC and VIO pins
- Bus pins short-circuit and over- temperature protected
- Fulfills the OEM Hardware Requirements, Rev. 1.3
- Qualified according to AEC-Q100
- Two Ambient Temperature Grades: +125°C and +150°C



Note 1: HSC: High-speed comparator.  
2: WUC: Wake-up comparator.

**ATA6566**  
8-pin VDFN

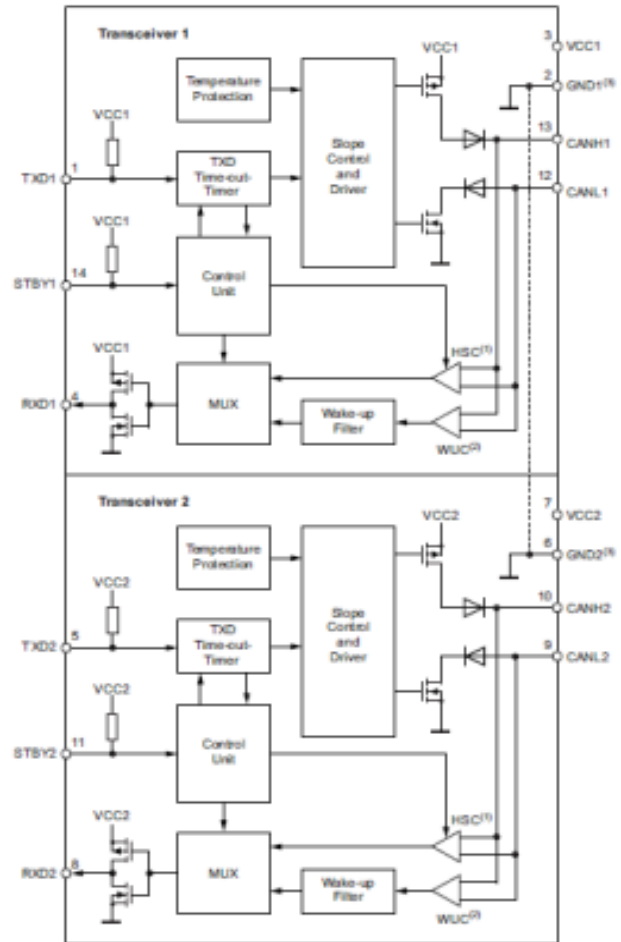
**ATA6566**  
8-pin SOIC



VDFN8 package with wettable flanks

## Features:

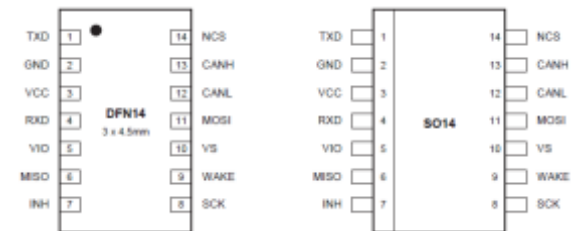
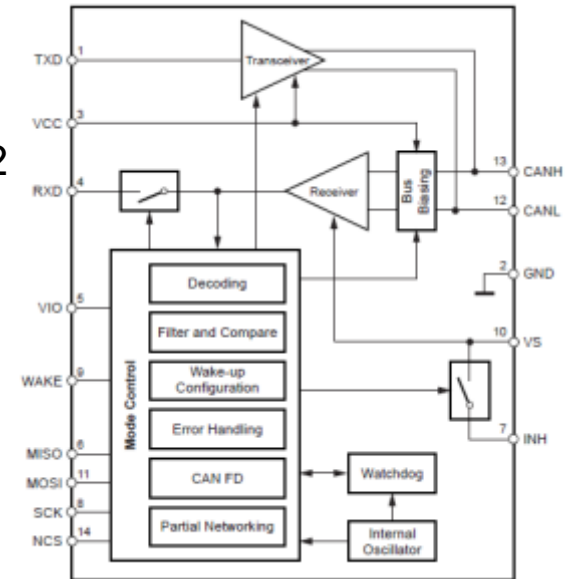
- Fully ISO 11898-2, ISO 11898-5, ISO 11898-2: 2016 and SAE J2962-2 compliant
- Communication speed up to 5Mbit/s (CAN FD capable)
- Low EME and high EMI
- Differential receiver with wide common mode range
- Wake-Up via CAN Bus - Wake-Up on Pattern (WUP), acc. ISO 11898-2: 2016, 3.8  $\mu$ s Activity Filter Time
- Functional behavior defined under all supply conditions
- Transceiver disengages from the bus when unpowered
- RXD recessive clamping detection
- High ESD handling capability on the bus pins
- Bus pins protected against automotive transients
- Transmit data (TXD) dominant time-out function
- Under-voltage detection on VCC pins
- Bus pins short-circuit and over-temperature protected
- Fulfills the OEM Hardware Requirements Rev. 1.3
- AEC-Q100 qualified
- Two Ambient Temperature Grades: +125°C and +150°C
- Packages: SOIC14 and VDFN14 with wettable flanks



- Notes:
1. HSC: High-speed comparator
  2. WUC: Wake-up comparator
  3. GND1 and GND2 are internally connected

## Features:

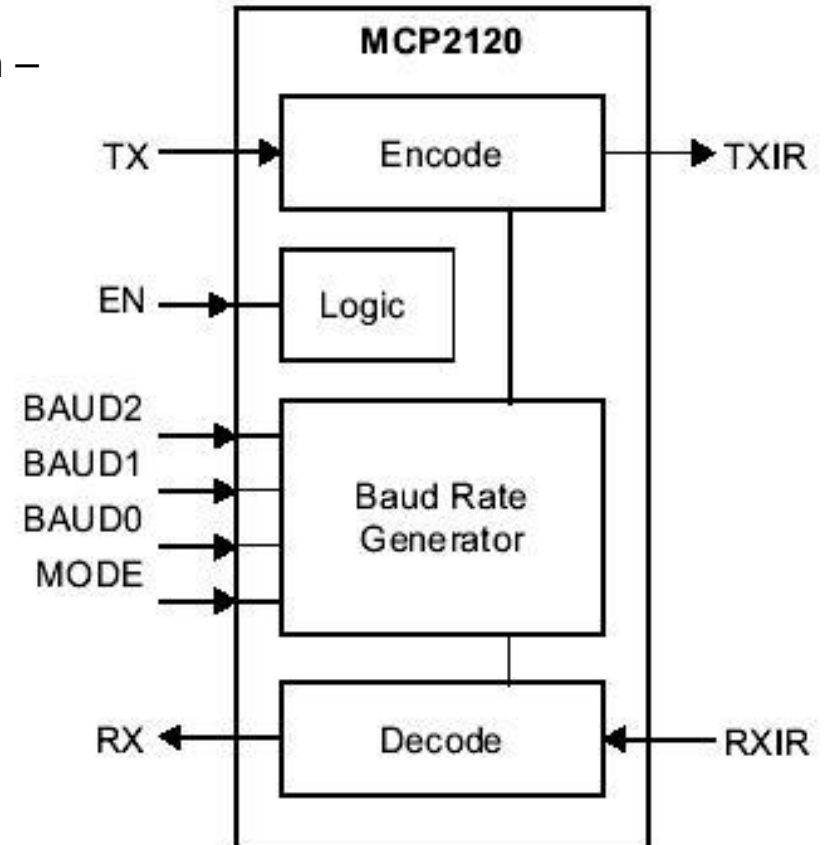
- High speed CAN transceiver compliant to ISO 11898-2, ISO11898-5/6, ISO 11898-2: 2016 and SAEJ2962-2
- Fulfills the OEM Requirements for Partial Networking Rev. 2.2
- Watchdog with clock source, Window & Timeout mode
- Fulfills the Auto OEM Hardware Requirements for CAN – Interfaces in Automotive Applications, Rev. 1.3
- CAN data rate up to 1Mbit/s and CAN FD data rate to 5Mbit/s
- 3.3V to 5V microcontrollers can interfaced via the VIO pin
- Battery supply and CAN bus pins protected against transients according to ISO7637
- Six operation modes:  
Power off / MCU Reset / Sleep / Standby / Normal / Over-temp mode
- Four wake-up sources with wake-up source recognition
- Local wake-up via pin WAKE
- Remote wake-up pattern according to ISO 11898-2: 2016
- Remote wake-up frame according to ISO 11898-2: 2016
- Host wake-up via SPI
- Packages: SOIC14 and VDFN14 with wettable flanks
- AEC-Q100 qualified



DFN package with wettable flanks

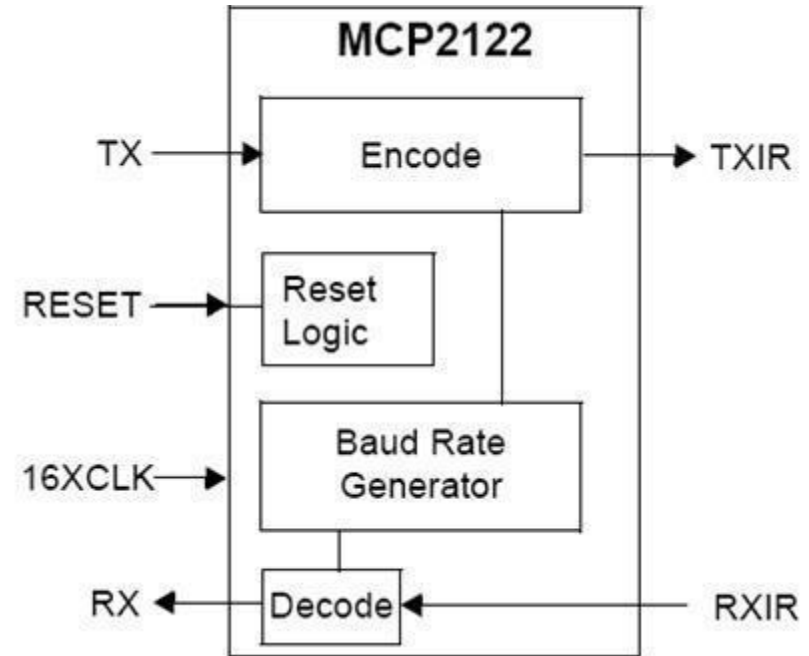
## Features:

- Supports with IrDA® Physical Layer Specification –  
- (version 1.3)
- UART to IR Encoder/Decoder
  - Interfaces with IrDA Compliant Transceivers
  - Used with any UART, including standard –  
- 16550 UART and microcontroller UART
- Transmit/Receive formats supported:
  - 1.63µs
- Hardware or Software Baud rate selection
  - Up to IrDA standard 115.2 kbaud operation
  - Up to 312.5 kbaud operation (at 20MHz)
  - Low power mode



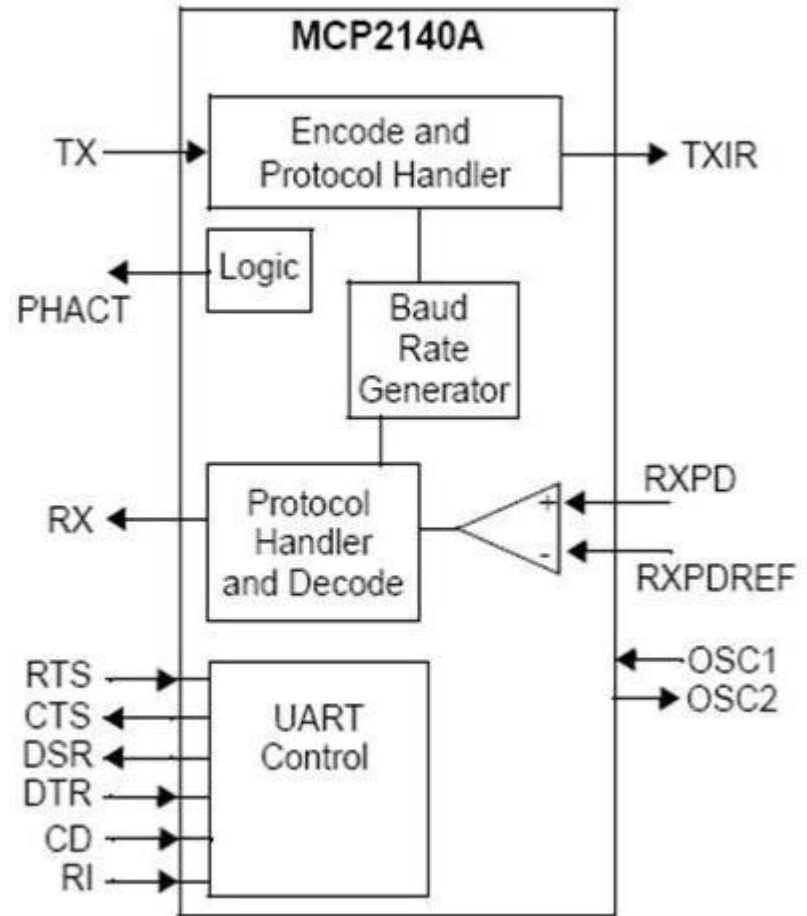
## Features:

- Pinout compatible with HSDL-7000
- Compliant with IrDA® Standard Physical Layer – Specification (version 1.3)
- UART to IrDA Standard Encoder/Decoder –
  - Interfaces with IrDA Standard Compliant –
  - Transceiver
- Baud Rates:
  - Up to IrDA Standard 115.2 kbaud –
  - Operation
- Transmit/Receive Formats (Bit Width) –
  - Supported:
    - 1.63μs
- Low-power Mode (2μA at 1.8V, +125°C)
- Recommended for Automotive Design



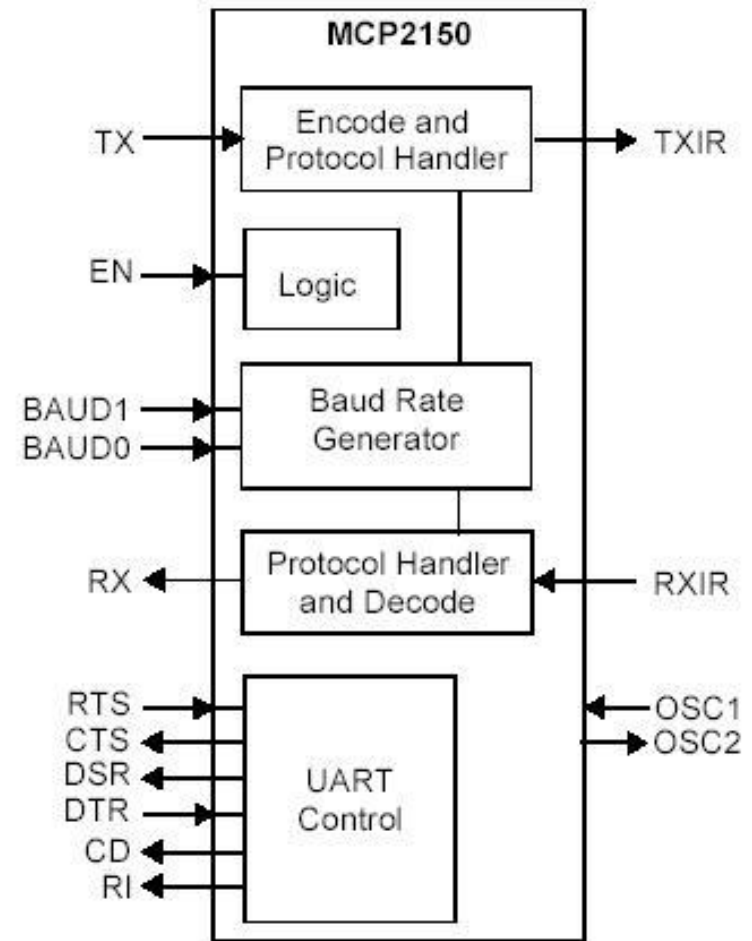
## Features:

- Implements the IrDA® standard
- Provides IrDA standard physical signal layer
- Includes UART-to-IrDA standard encoder/ - decoder functionality
- Stack Library
- UART interface
- (DCE) or Data Terminal Equipment (DTE)
- Infrared Supported:
  - 9.6 kbaud baud rate, 64 Byte Packet Size (60 Data Bytes)
- Operates as Secondary Device
- Wide Operating Voltage: 2.0V to 5.5V
- Low power consumption:
  - - < 407µA (max.) @ 2.0V, 3.6864 MHz
- Automatic Low Power mode:
  - < 23µA (max.) @ 2.0V
- Footprint Compatibility with MCP2140
- Industrial temperature range: -40°C to +85°C



## Features:

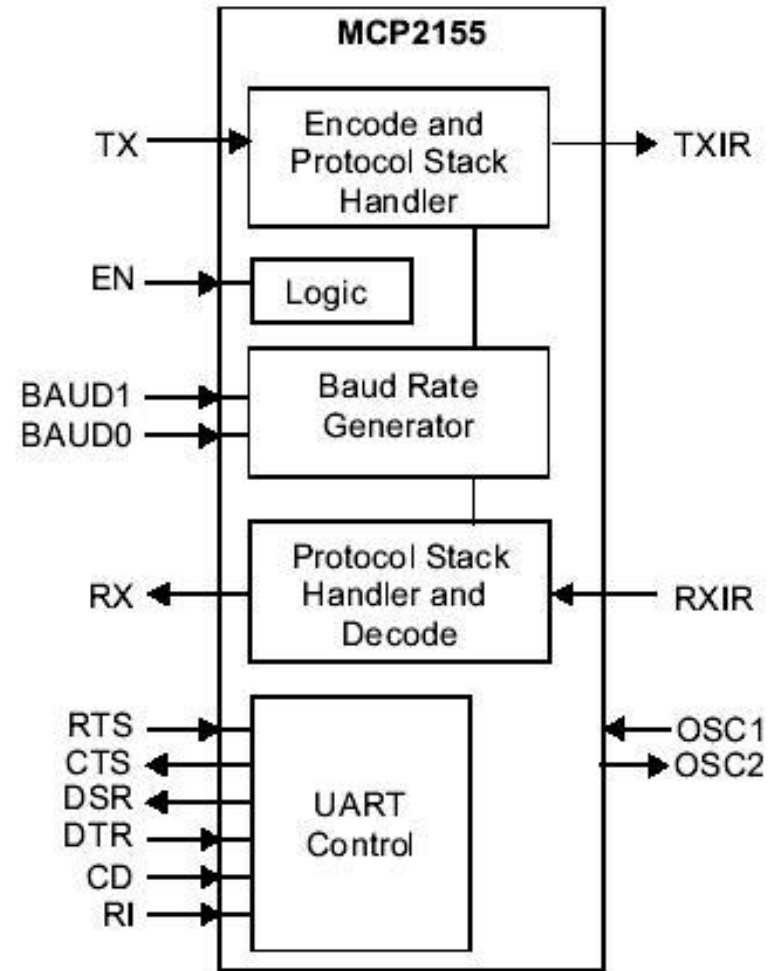
- Implements the IrDA® standard including:
  - IrLAP, IrLMP, IAS, TinyTP, IrCOMM
- Provides IrDA standard physical signal layer
- Bidirectional communication, CRC implementation
- Data communication rates up to 115.2 kbaud
- Includes UART to IrDA standard encoder/ - decoder functionality
- UART interface for Data Terminal Equipment (DTE)
- Transmit/Receive formats (bit width) supported:
  - 1.63µs
- Infrared baud rates supported:
  - 9.6/19.2/57.6/115.2 kbaud
- 64 Byte Data Packet Size
- Programmable Device ID String
- Operates as Secondary Device
  - Low power consumption
    - < 1mA @ 3.3 V, 11.0592MHz (typ.), 3µA (typ.) @ 5.0V when disabled
- Industrial Temperature Range: -40°C to +125°C





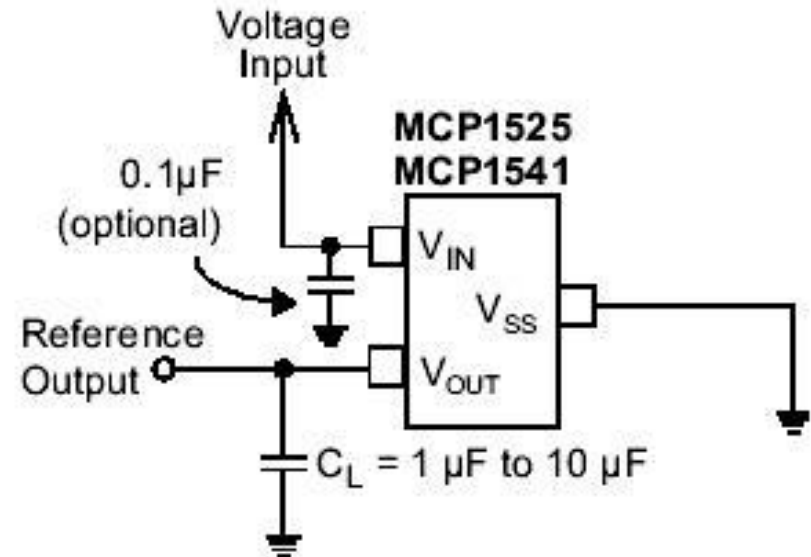
## Features:

- Implements the IrDA® standard including:
  - IrLAP, IrLMP, IAS, TinyTP, IrCOMM
- Provides IrDA standard physical signal layer
- Bidirectional communication, CRC implementation
- Data communication rates up to 115.2 kbaud
- Includes UART to IrDA standard encoder/ - decoder functionality:
- UART interface for Data Terminal Equipment
- Transmit/Receive formats supported: 1.63µs
- Hardware baud rate selection for UART:
- 9.6 kbaud, 19.2 kbaud, 57.6 kbaud, 115.2 kbaud,
- Infrared baud rates supported:
  - 9.6/19.2/38.4/57.6/115.2 kbaud
- 64 Byte Data Packet Size
- Programmable Device ID String
- Operates as Secondary Device
- Industrial Temperature Range: -40°C to +125°C
- Low power: < 1mA @ 3.3V, 11.0592MHz



## Features:

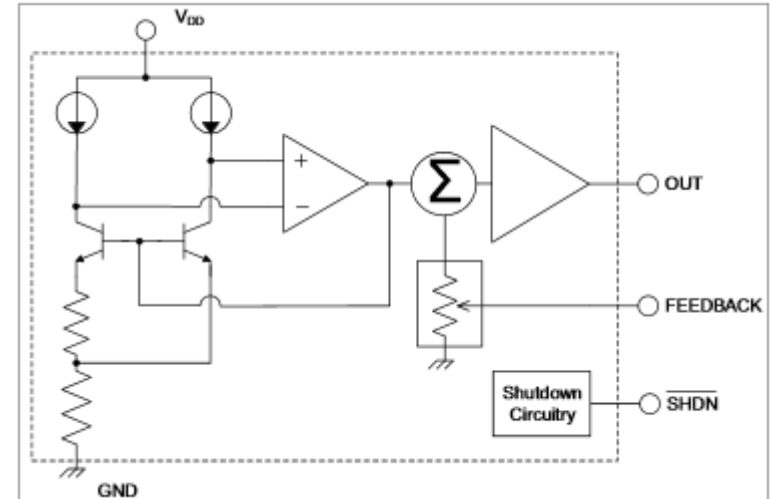
- Precision Voltage Reference
- Output Voltages of 2.5V and 4.096V
- Initial Accuracy of  $\pm 1\%$  (max.)
- Temperature Drift:  $\pm 50\text{ppm}/^\circ\text{C}$  (max.)
- Output Current Drive:  $\pm 2\text{mA}$
- Operating Current:  $100\mu\text{A}$  @  $25^\circ\text{C}$  (max.)
- Small SOT23-3 and TO-92 Packages
- Industrial Temperature Range:
  - $-40^\circ\text{C}$  to  $+85^\circ\text{C}$
- Recommended for Automotive Design (MCP1525)



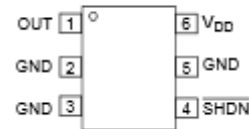
## Features:

- Maximum Temperature Coefficient:
  - 50 ppm/°C from -40°C to +125°C
- Initial Accuracy: 0.10%
- Operating Temperature Range: -40 to +125°C
- Low Typical Operating Current: 140µA
- Line Regulation: 50 ppm/V maximum
- Load Regulation: 40 ppm/mA maximum
- 8 Voltage variants available:
  - 1.024V, 1.250V, 1.800V, 2.048V, 2.500V,
  - 3.000V, 3.300V, 4.096V
- Output Noise (0.1 Hz to 10 Hz): < 20 µVP-P
- Packages: 8L 2x2 WDN, 6L SOT-23, 8L SOIC

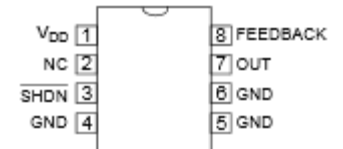
BLOCK DIAGRAM



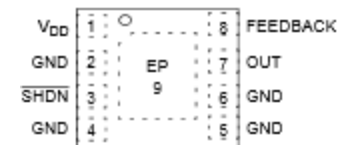
6-Lead SOT-23



8-Lead SOIC

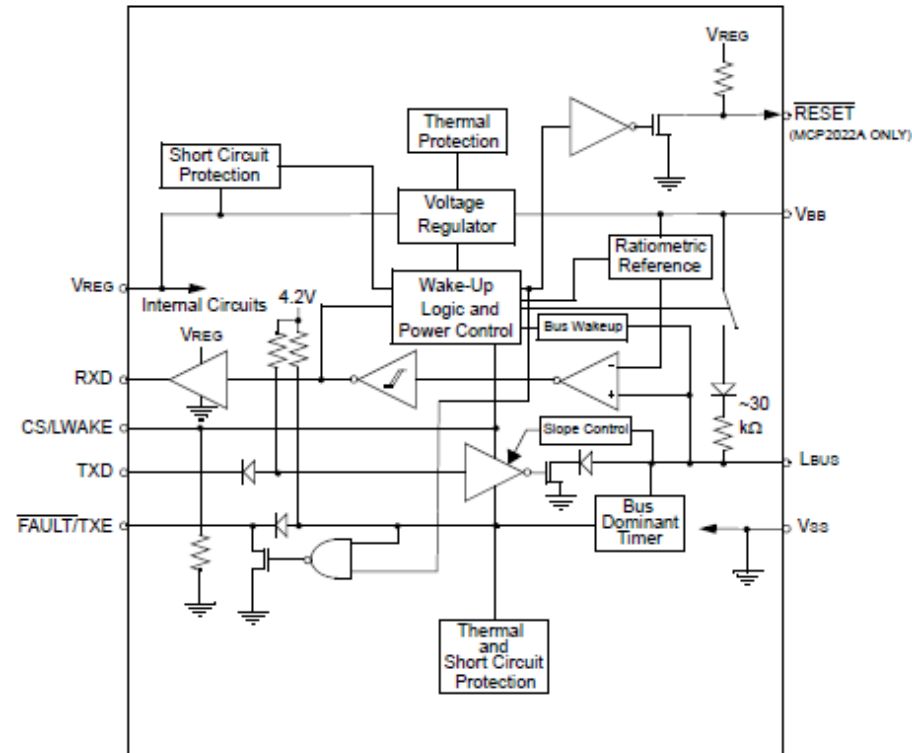


2x2 WDFN\*



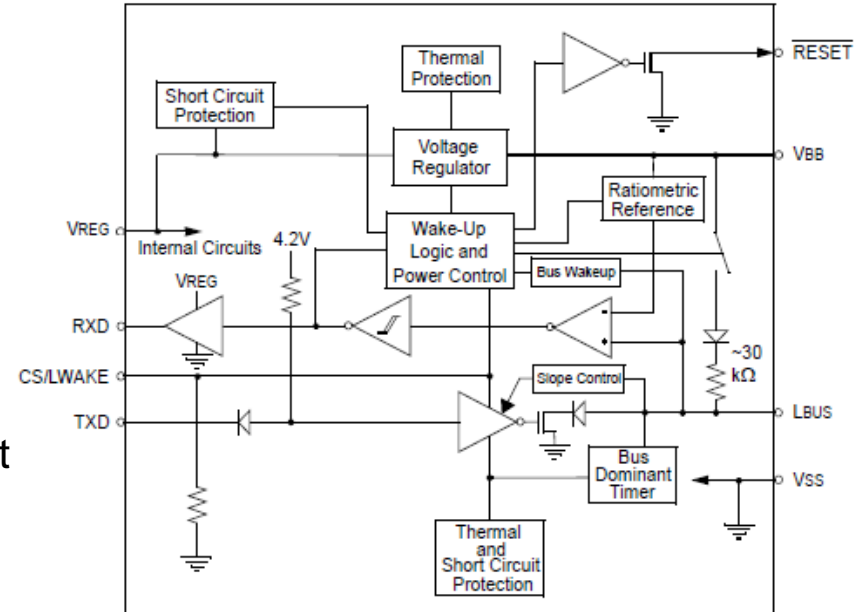
## Features:

- The MCP2021A/2A is compliant with:
  - LIN Bus Specifications Version 1.3/2.x.
  - SAE J2602-2
- Support Baud Rates up to 20 kBaud
- 43V Load Dump Protected
- Maximum Continuous Input Voltage: 30V
- Wide LIN Compliant Supply Voltage: 6.0-18.0V
- Interface to PIC® EUSART & Standard USART
- Wake-up on LIN Bus Activity or Local Wake
- TXD and LIN Bus Dominant Time-out Function
- Two Low-Power Modes:
  - TRANSMITTER OFF Mode: 90  $\mu$ A (typ)
  - POWER DOWN Mode: 4.5  $\mu$ A (typ)
- Output Indicating Internal RESET State
- MCP2021A/2A On-chip Voltage Regulator
- Robust ESD Performance:  $\pm 15$  kV
- Transient Protection for LBUS and VBB (ISO7637)
- Extended Temperature Range: -40 to +125°C
- Packages: 8L 4x4 mm DFN, PDIP, SOIC, TSSOP
- Meets Stringent Automotive Design Requirements



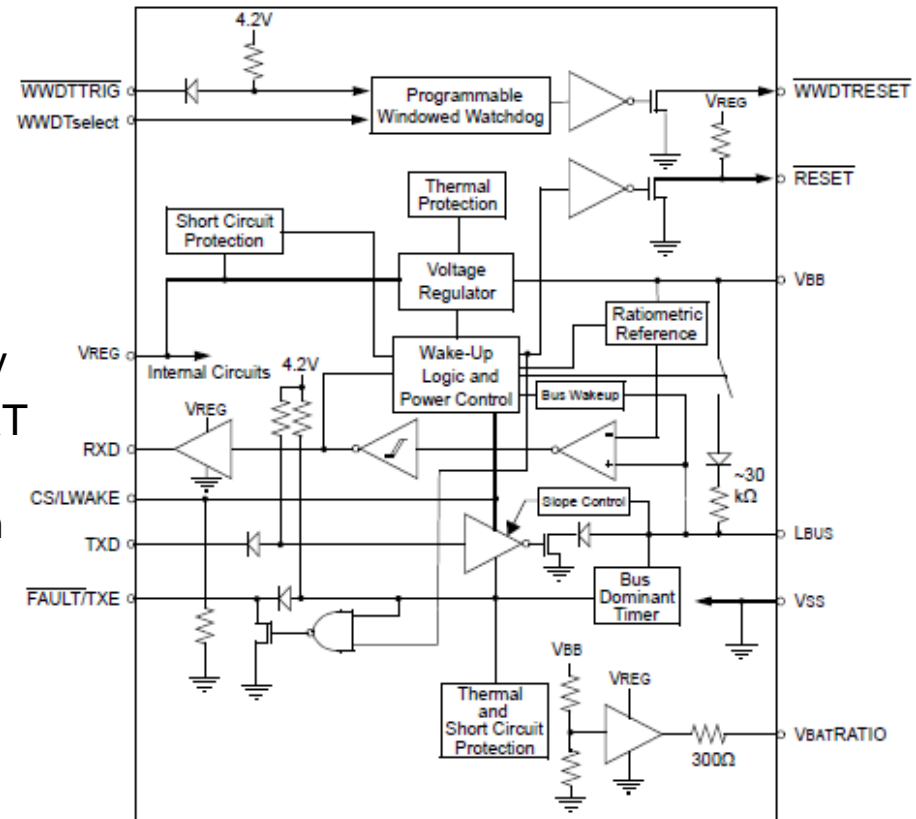
## Features:

- The MCP2025 is compliant with:
  - LIN Bus Specifications Version 1.3, 2.x
  - SAE J2602-2
- Supports Baud Rates up to 20 kBaud
- 43V Load Dump Protected
- Maximum Continuous Input Voltage of 30V
- Wide LIN Compliant Supply Voltage: 6.0-18.0V
- Interface to PIC® EUSART & Standard USART
- Wake-up on LIN Bus Activity or Local Wake Input
- TXD and LIN Bus Dominant Time-out Function
- Two Low-power Modes:
  - TRANSMITTER-OFF: 90  $\mu$ A (typical)
  - POWER-DOWN mode: 4.5  $\mu$ A (typical)
- MCP2025 On-chip Voltage Regulator
- High EMI, Low EME (Electromagnetic Emission)
- Robust ESD Performance:  $\pm 15$  kV (IEC61000-4-2)
- Transient Protection for LBUS & VBB pins (ISO7637)
- Extended Temperature Range: -40 to +125°C
- 8-lead 4x4 mm DFN, PDIP, and SOIC
- Meets Stringent Automotive Design Requirements



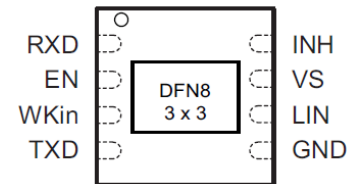
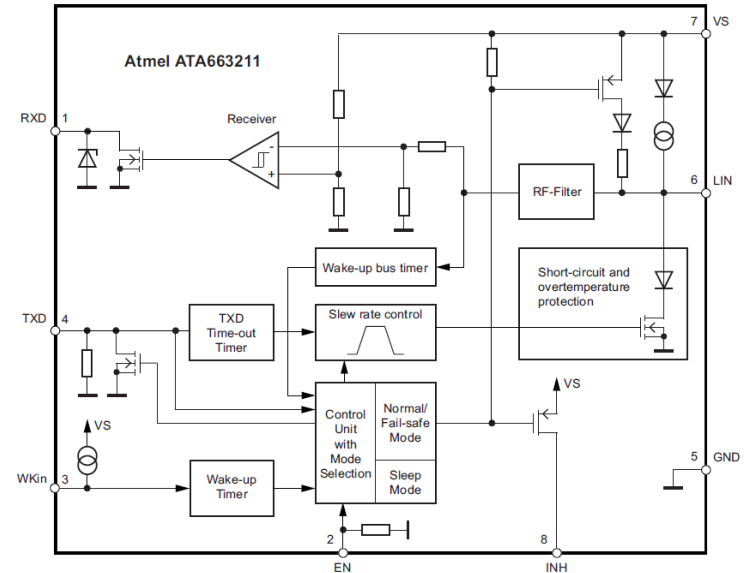
## Features:

- The MCP2050 is compliant with:
  - LIN Bus Specifications Version 1.3, 2.x
  - SAE J2602-2
- Support Baud Rates Up to 20 kBaud
- 43V Load Dump Protected
- Maximum Continuous Input Voltage: 30V
- Wide LIN Compliant Supply Voltage: 6.0-18.0V
- Interface to PIC® EUSART & Standard USART
- Wake-up on LIN Bus Activity or Local Wake
- TXD and LIN Bus Dominant Time-out Function
- Two Low-power Modes:
  - TRANSMITTER OFF Mode: 90  $\mu$ A (typ)
  - POWER DOWN Mode: 4.5  $\mu$ A (typ)
- MCP2050 On-chip Voltage Regulator
- Programmable Windowed Watchdog Timer
- Ratio metric Output of  $V_{BAT}$  Voltage
- Robust ESD Performance:  $\pm 15$  kV (IEC61000-4-2)
- Transient Protection for LBUS & VBB (ISO7637)
- Meets Stringent Automotive Design Requirements
- Extended Temperature Range: -40 to +125°C

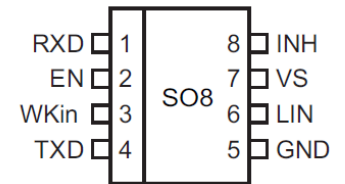


## Features:

- Supply voltage up to 40V
- Operating voltage VS = 5V to 28V
- Very low supply current
- Sleep mode: typically 9µA
- Fail-safe mode: typically 80µA
- Normal mode: typically 250µA
- Fully compatible with 3.3V and 5V devices
- According to LIN 2.0, 2.1, 2.2, 2.2A and –  
– SAEJ2602-2
- Wake-up capability via LIN bus (100µs dominant)
- External wake-up via WKin pin (100µs low level)
- INH output
- Wake-up source recognition
- TXD time-out timer
- Bus pin is over-temperature & short-circuit protected
- Advanced EMC and ESD performance
- Fulfills the OEM Hardware Requirements for  
LIN Interfaces in Automotive Applications
- Interference and damage protection ISO7637
- Qualified according to AEC-Q100

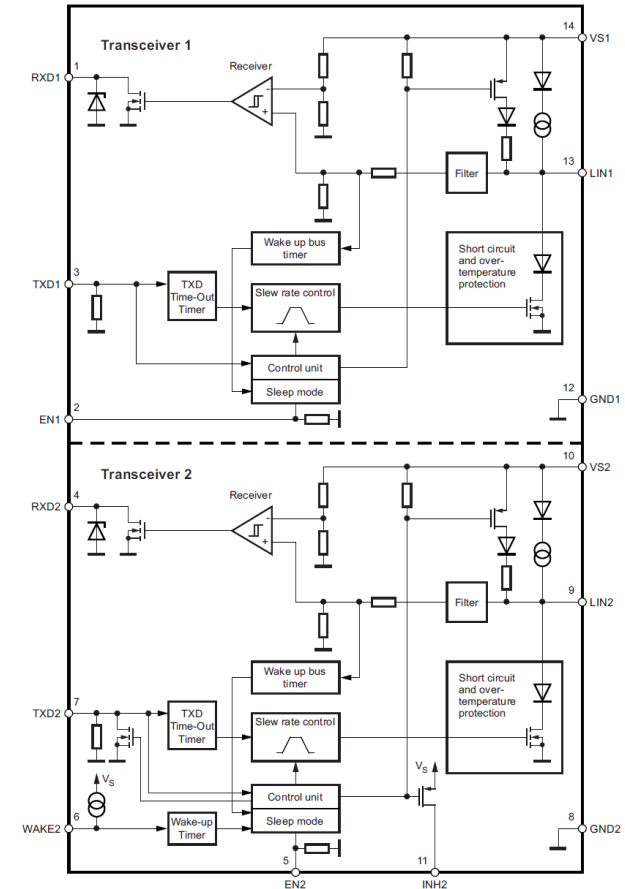


DFN8 package with  
wetable flanks



## Features:

- Operating range from 5V to 27V
- Baud rate up to 20Kbaud
- According to LIN specification 2.0, 2.1 and SAEJ2602-2
- Fully compatible with 3.3V and 5V devices
- TXD dominant timeout timer
- Normal and sleep mode
- Wake-up capability via LIN bus (90µs dominant)
- Very low standby current during sleep mode (10µA)
- Bus pin is over-temperature and short-circuit protected -  
- versus GND and battery
- LIN input current < 2µA if  $V_{BAT}$  is disconnected
- Over-temperature protection
- High EMC level
- Interference and damage protection according to –  
- ISO/CD 7637
- Fulfills the OEM Hardware Requirements for LIN –  
- Interfaces in automotive applications
- Transceiver 2: additional INH high side switch output –  
- and high voltage WAKE input
- Qualified according to AEC-Q100

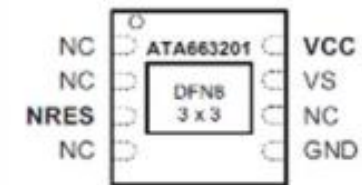
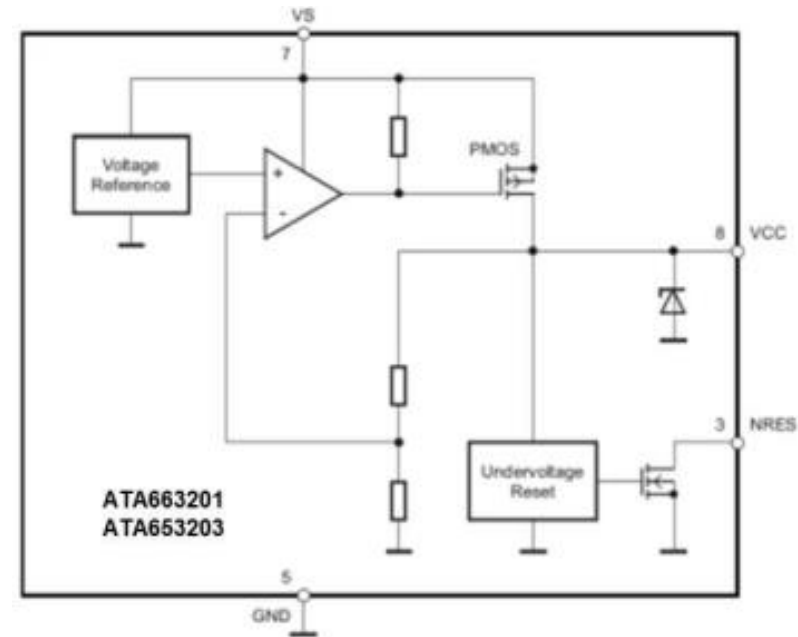


DFN14 package with  
wetable flanks



## Features:

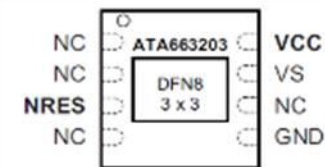
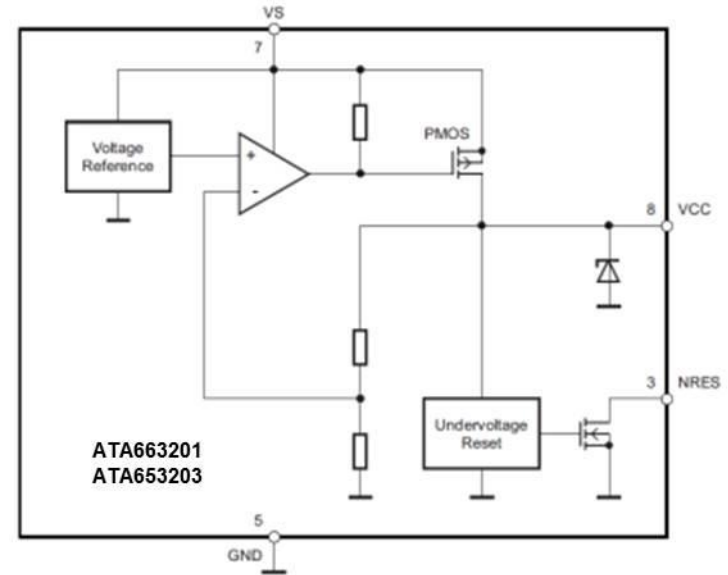
- Footprint compatible with ATA663231 LIN SBC
- Supply voltage up to 40V
- Operating voltage  $V_S = 5V$  to  $28V$
- Very low current consumption at low supply –  
- voltages ( $2V < V_S < 5.5V$ ): typically  $130\mu A$
- Linear low-drop voltage regulator,  $85mA$  –  
- current capability:
  - MLC (multi-layer ceramic) capacitor with –  
-  $0\Omega$  ESR
  - ATA663201:  $V_{CC} = 3.3V \pm 2\%$
  - $V_{CC}$  under-voltage detection with open –  
- drain reset output (NRES, 4ms reset time)
- Voltage regulator is short-circuit and over –  
- temperature protected
- Advanced EMC and ESD performance
- Interference and damage protection according –  
- to ISO7637
- Qualified according to AEC-Q100



DFN8 package with  
wetable flanks

## Features:

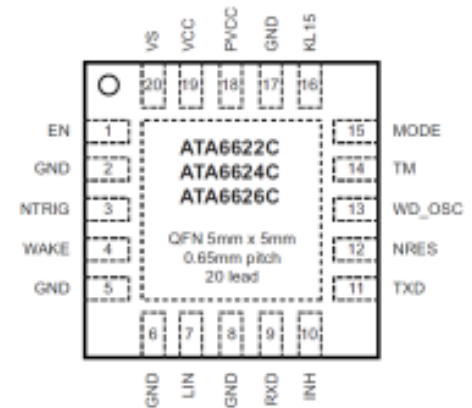
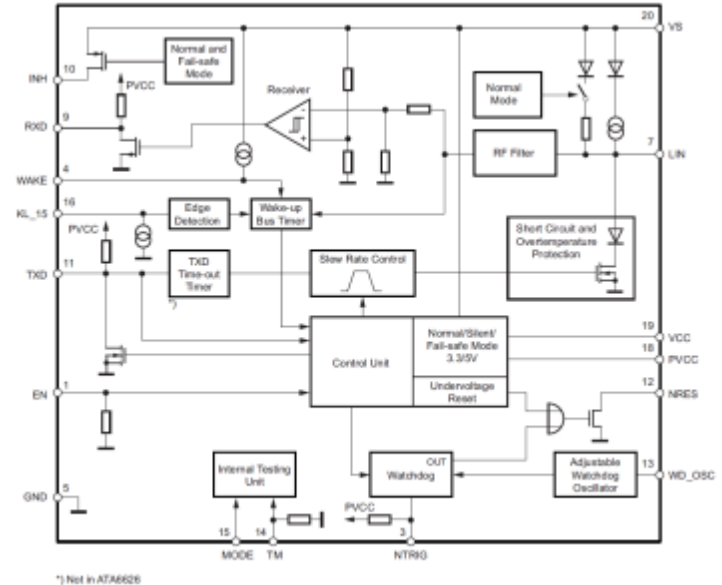
- Footprint compatible with ATA663254 LIN SBC
- Supply voltage up to 40V
- Operating voltage  $V_S = 5V$  to 28V
- Very low current consumption at low supply –  
- voltages ( $2V < V_S < 5.5V$ ): typically  $130\mu A$
- Linear low-drop voltage regulator, 85mA current –  
- capability:
  - MLC (multi-layer ceramic) capacitor with  $0\Omega$  - ESR
  - ATA663203:  $V_{CC} = 5.0V \pm 2\%$
  - $V_{CC}$  under-voltage detection with open drain –  
- reset output (NRES, 4ms reset time)
- Voltage regulator is short-circuit and over –  
- temperature protected
- Advanced EMC and ESD performance
- Interference and damage protection according to –  
- ISO7637
- Qualified according to AEC-Q100



DFN8 package with  
wetable flanks

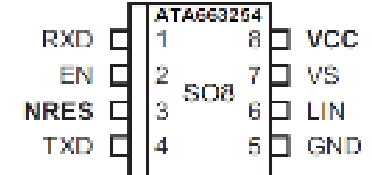
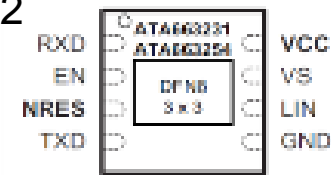
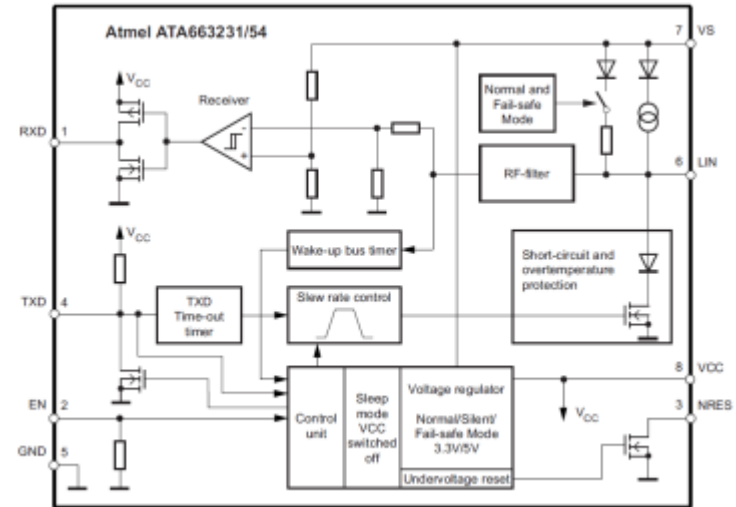
## Features:

- Supply voltage up to 40V
- Operating voltage  $V_S = 5V$  to  $27V$
- Typically  $10\mu A$  supply current during Sleep Mode
- Typically  $57\mu A$  supply current in Silent Mode
- Linear low-drop voltage regulator, 85mA capability
- Boosting voltage regulator possible with NPN transistor
- LIN physical layer to LIN 2.0, 2.1, SAEJ2602-2
- TXD time-out timer; ATA6626C: TXD time-out disabled
- Bus pin is over-temperature and short circuit protected
- Adjustable watchdog time via external resistor
- Negative trigger input for the window watchdog
- Advanced EMC and ESD performance
- Fulfills the OEM Hardware Requirements for LIN Interfaces in automotive Applications
- Interference and damage protection ISO7637
- Qualified according to AEC-Q100



## Features:

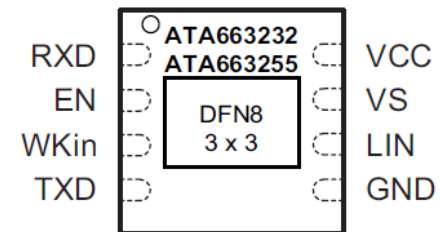
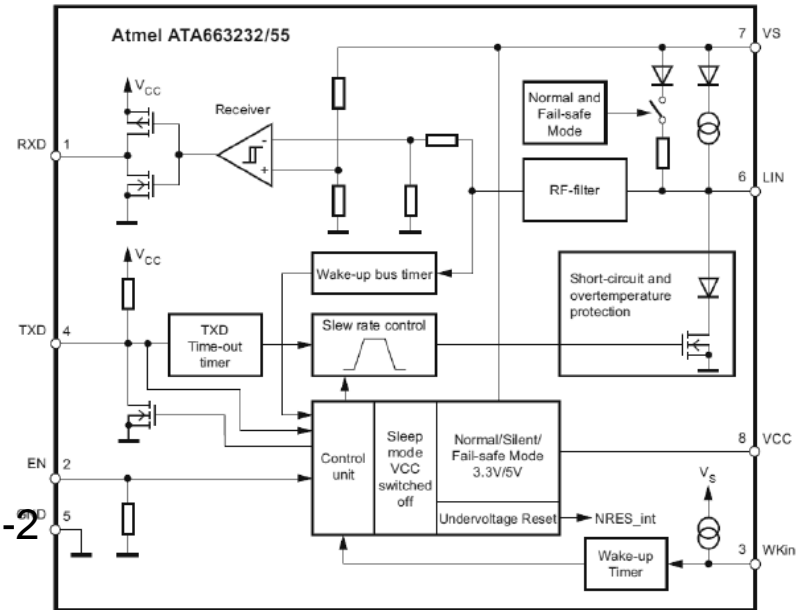
- Supply voltage up to 40V
- Operating voltage VS = 5V to 28V
- Typically 9µA supply current during sleep mode
- Typically 47µA supply current in silent mode
- Low current (2V < VS < 5.5V): 130µA (typ)
- Linear low-drop voltage regulator, 85mA capability:
  - MLC capacitor with 0Ω ESR
  - Normal, fail-safe, and silent mode
  - ATA663254: V<sub>CC</sub> = 5.0V ±2%
  - ATA663231: V<sub>CC</sub> = 3.3V ±2%
- LIN physical layer LIN 2.0, 2.1, 2.2, 2.2A, SAEJ2602-2
- Wake-up capability via LIN bus (100µs dominant)
- Wake-up source recognition
- TXD time-out timer
- Bus pin is over-temperature & short-circuit protected
- Advanced EMC and ESD performance
- Fulfills the OEM Hardware Requirements for LIN – Interfaces in Automotive Applications
- Interference and damage protection ISO7637
- Qualified according to AEC-Q100



DFN package with  
wetable flanks

## Features:

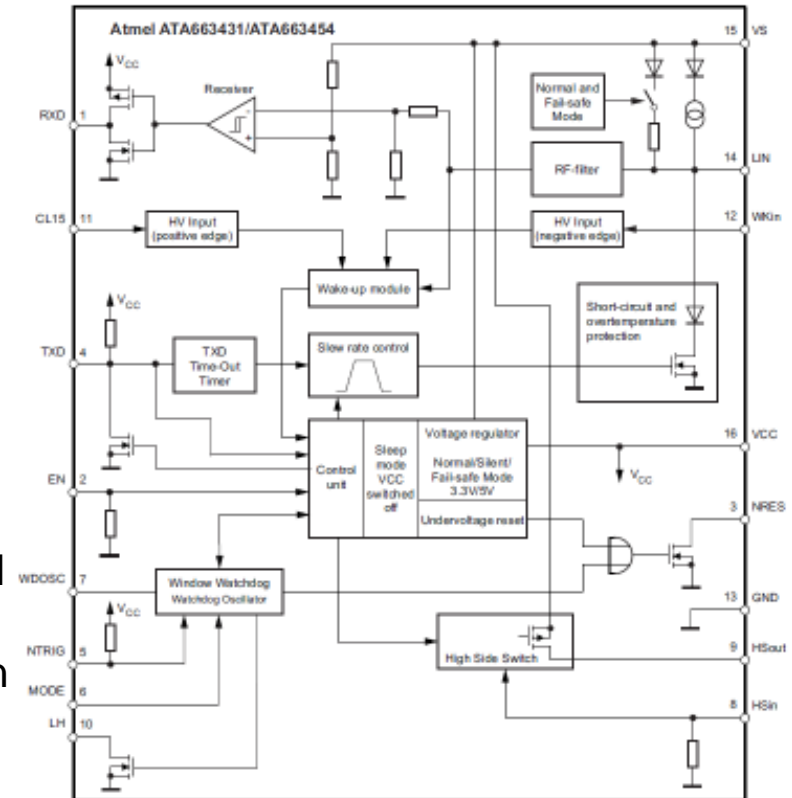
- Supply voltage up to 40V
- Operating voltage  $V_S = 5V$  to  $28V$
- Typically  $9\mu A$  supply current during sleep mode
- Typically  $47\mu A$  supply current in silent mode
- Very low current ( $2V < V_S < 5.5V$ ):  $130\mu A$  (typ)
- Linear low-drop voltage regulator:  $85mA$ :
  - MLC capacitor with  $0\Omega$  ESR
  - Normal, fail-safe, and silent mode
  - ATA663255:  $V_{CC} = 5.0V \pm 2\%$
  - ATA663232:  $V_{CC} = 3.3V \pm 2\%$
- LIN physical layer: 2.0, 2.1, 2.2, 2.2A, SAEJ2602-2
- Wake-up capability via LIN bus and Wkin pin
- Wake-up source recognition
- TXD time-out timer
- Bus pin is over-temperature & short-circuit protected
- Advanced EMC and ESD performance
- Fulfills the OEM Hardware Requirements for LIN Interfaces in Automotive Applications
- Interference and damage protection ISO7637
- Qualified according to AEC-Q100



DFN package with  
wettable flanks

## Features:

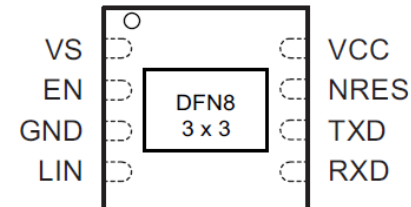
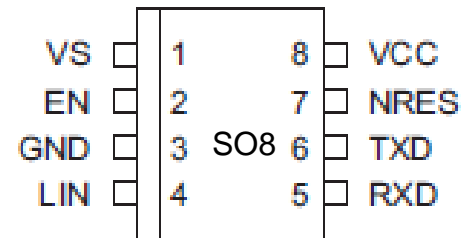
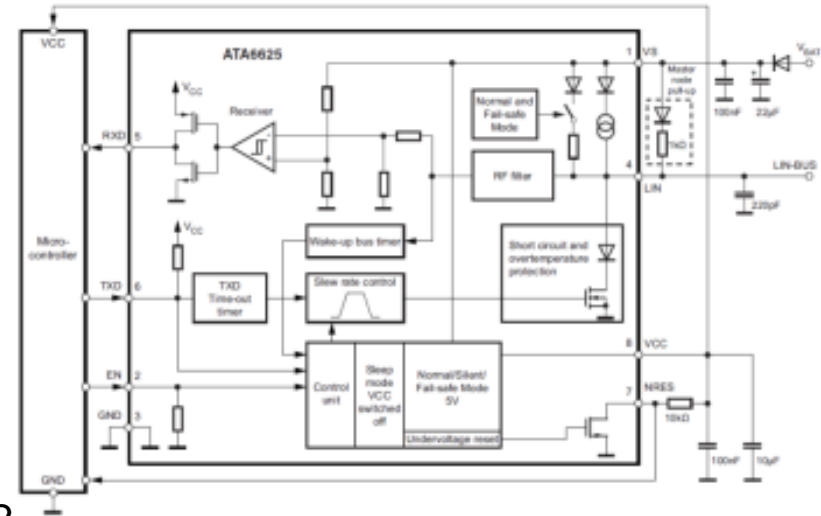
- Supply voltage up to 40V
- Operating voltage VVS = 5V to 28V
  - Sleep mode: typically 10µA
  - Silent mode: typically 47µA
  - Very low current ( $2V < VVS < 5.5V$ ): 150µA
- LDO voltage regulator, 85mA current capability
- $V_{CC}$  under-voltage detection with reset output
- Adjustable watchdog time via external resistor
- Limp Home watchdog failure output
- Physical layer LIN 2.0, 2.1, 2.2, 2.2A, SAEJ2602-2
- Bus pin is over-temperature & short-circuit protected
- High-side switch
- Wake-up capability via LIN Bus, WKin pin, CL 15 pin
- Wake-up source recognition
- TXD time-out timer
- Advanced EMC and ESD performance
- Fulfills the OEM Hardware Requirements for LIN Interfaces in Automotive Applications
- Interference and damage protection ISO7637
- Qualified according to AEC-Q100



DFN package with  
wetttable flanks

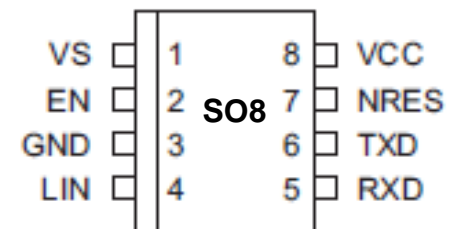
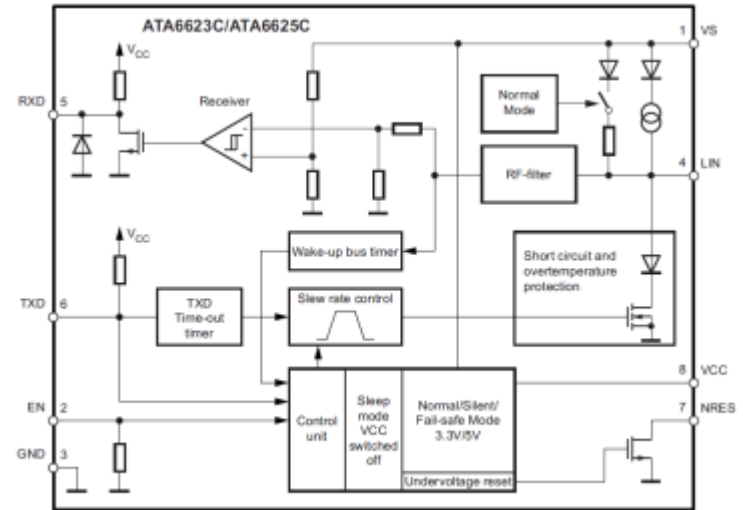
## Features:

- Supply voltage up to 40V
- Operating voltage  $V_S = 5V$  to 28V
- Typically  $9\mu A$  supply current during sleep mode
- Typically  $47\mu A$  Supply current in silent mode
- Very low current ( $2V < V_S < 5.5V$ ):  $130\mu A$  (typ)
- $5.0V \pm 2\%$  LDO: 85mA :
  - MLC capacitor with  $0\Omega$  ESR
  - Normal, sleep, fail-safe, and silent mode
  - VCC under-voltage detection with reset
- LIN physical layer 2.0, 2.1, 2.2, 2.2A, SAEJ2602-2
- Wake-up capability via LIN bus
- TXD time-out timer
- Bus pin is over-temperature and short-circuit protected
- Advanced EMC and ESD performance
- Fulfills the OEM Hardware Requirements for  
-LIN Interfaces in Automotive Applications Rev. 1.3
- Interference and damage protection acc. ISO7637
- AEC-Q100 qualified
- Package: SO8 and DFN8 with wettable flanks
- Successor of ATA6625C



## Features:

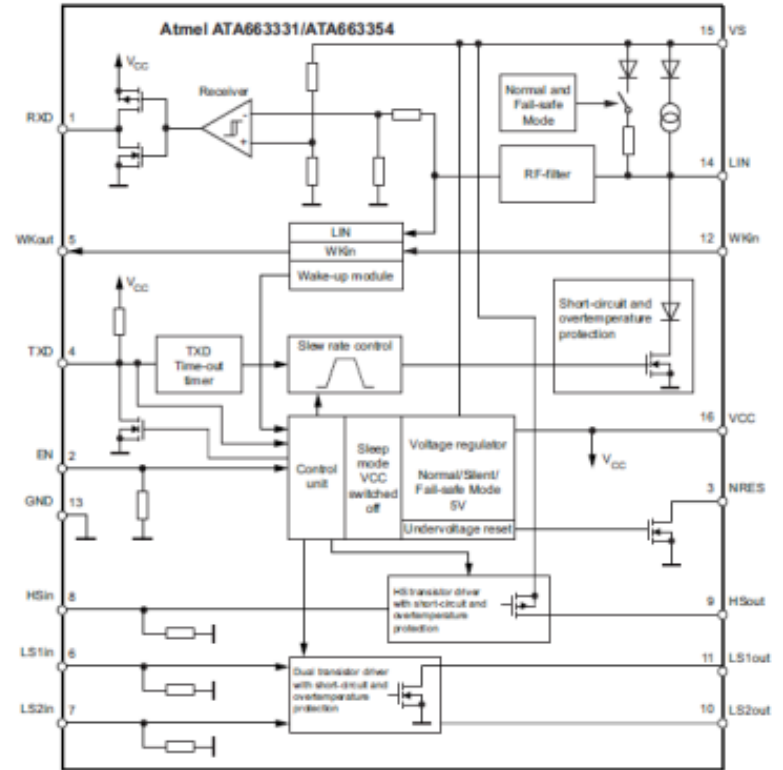
- Supply voltage up to 40V
- Operating voltage VS = 5V to 27V
- Typically 10µA supply current during sleep mode
- Typically 57µA Supply current in silent mode
- Linear low-drop voltage regulator: 85mA:
  - Normal, fail-safe, and silent mode
    - ATA6623C:  $V_{CC} = 3.3V \pm 2\%$
    - ATA6625C:  $V_{CC} = 5.0V \pm 2\%$
  - $V_{CC}$  under-voltage detection with reset
- LIN physical layer LIN 2.0, 2.1, SAEJ2602-2
- Wake-up capability via LIN bus (90µs dominant)
- TXD time-out timer
- Bus pin is over-temperature and short-circuit protected
- Advanced EMC and ESD performance
- Fulfills the OEM Hardware Requirements for LIN –
  - Interfaces in Automotive Applications
- Interference and damage protection ISO7637
- Qualified according to AEC-Q100
- Package: SO8





## Features:

- Target application: Motor control via relays like – Window Lifter Trunk opener, Sunroof, seat adjust
- Supply voltage up to 40V
- Operating voltage  $V_{VS} = 5V$  to 28V
- Sleep mode: typically  $10\mu A$
- Silent mode: typically  $47\mu A$
- Very low current ( $2V < V_{VS} < 5.5V$ ):  $130\mu A$  (typ)
- LDO voltage regulator, 85mA current capability:
  - MLC capacitor with  $0\Omega$  ESR
  - Normal, fail-safe, and silent mode:
- LIN Physical layer 2.0, 2.1, 2.2, 2.2A, SAEJ2602-2
- Bus pin is over-temp. and short-circuit protected
- Two low-side and one high side protected switches
- Wake-up capability via LIN bus and WKin pin
- Wake-up source recognition
- TXD time-out timer
- Fulfills the OEM Hardware Requirements for LIN Interfaces in Automotive Applications
- Interference/damage protection ISO7637
- Qualified according to AEC-Q100

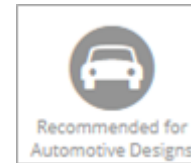


DFN package with  
wetable flanks



# ATA6612C/ATA6613C

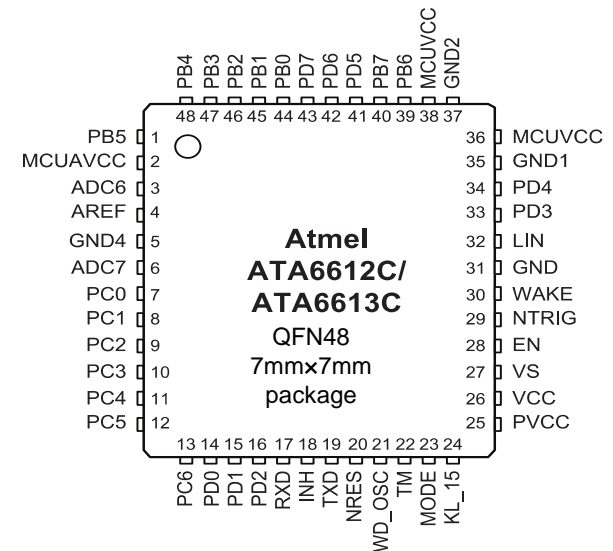
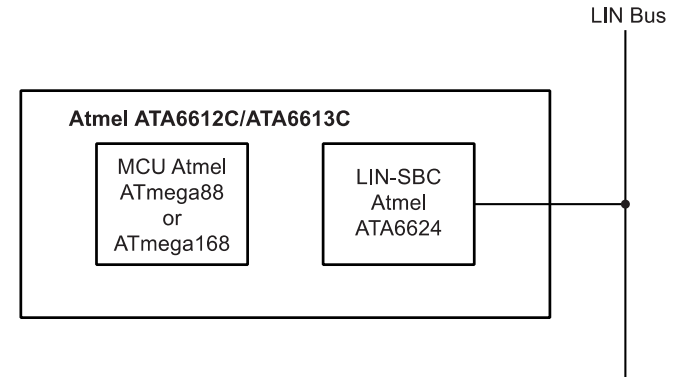
8K/16K Flash Microcontroller with LIN Transceiver, 5V Regulator and Watchdog



Online Datasheet

## Features:

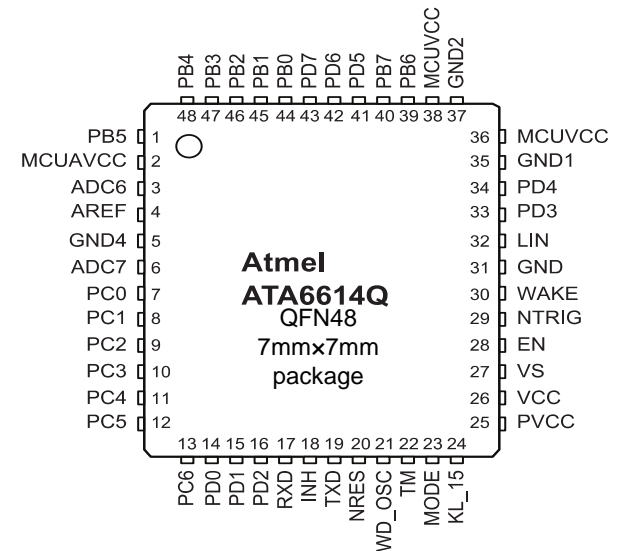
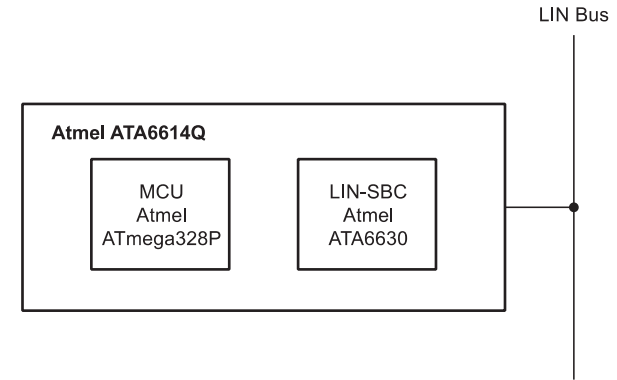
- Single package microcontroller + LIN Transceiver
- Integrated 5V voltage regulator
- Very low current consumption in sleep mode
- 8Kbytes/16Kbytes flash memory
- 512bytes EEPROM
- 1Kbyte internal SRAM
- Two 8-bit TC/ One 16-bit TC
- 8-channel 10 bit ADC
- Master/Slave SPI interface
- 23 programmable I/O lines
- LIN physical layer according to LIN 2.0, 2.1, 2.2 –  
- specification and SAEJ2602-2
- Wake-up capability via LIN-bus, wake pin, or KI\_15 pin
- INH output to control an external voltage regulator or –  
- o switch off the master pull Up resistor
- TXD time-out timer
- Bus pin is over temperature and short circuit –  
- protected versus GND and battery
- Qualified according to AEC-Q100



<< BACK

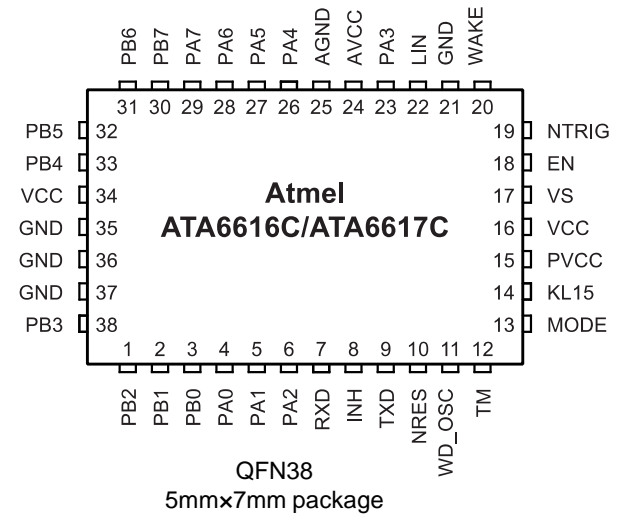
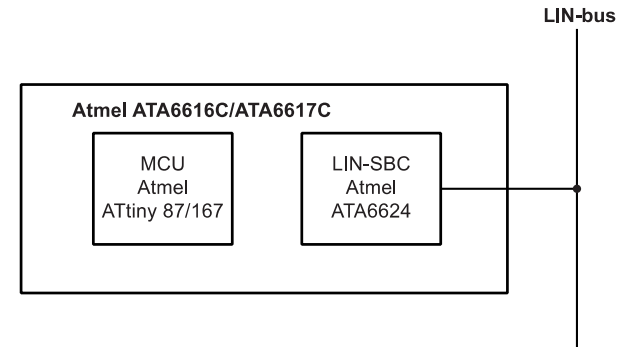
## Features:

- Single package microcontroller + LIN Transceiver
- Integrated 5V voltage regulator
- Very low current consumption in sleep mode
- 32Kbytes flash memory
- 1Kbytes EEPROM
- 2Kbyte internal SRAM
- Two 8-bit TC/ One 16-bit TC
- 8-channel 10 bit ADC
- Master/Slave SPI interface
- 23 programmable I/O lines
- LIN physical layer according to LIN 2.0, 2.1, 2.2 – specification and SAEJ2602-2
- Wake-up capability via LIN-bus, wake pin, or – KL\_15 pin
- INH output to control an external voltage – regulator or to switch off the master pull Up – resistor
- TXD time-out timer
- Bus pin is over temperature & short circuit protected
- Qualified according to AEC-Q100



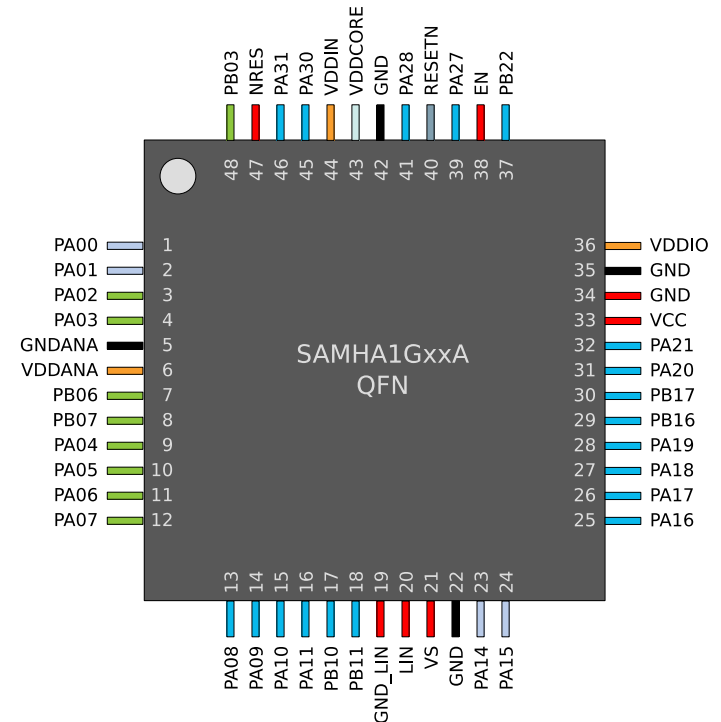
## Features:

- Single package microcontroller + LIN SBC
- Integrated 5V voltage regulator
- Very low current consumption in sleep mode
- 8Kbytes/16Kbytes flash memory
- 512bytes EEPROM
- 512bytes internal SRAM
- One 8-bit TC/ One 16-bit TC
- 11-channel 10 bit ADC
- Master/Slave SPI interface
- 16 programmable I/O lines
- LIN 2.1 and 1.3 controller or 8-bit UART
- LIN physical layer according to LIN 2.0, 2.1, 2.2 –  
- specification and SAEJ2602-2
- Wake-up capability via LIN-bus, wake pin, or KI\_15 pin
- INH output to control an external voltage regulator or –  
- to switch off the master pull Up resistor
- TXD time-out timer
- Bus pin is over temperature and short circuit protected –  
- versus GND and battery
- Qualified according to AEC-Q100



## Features:

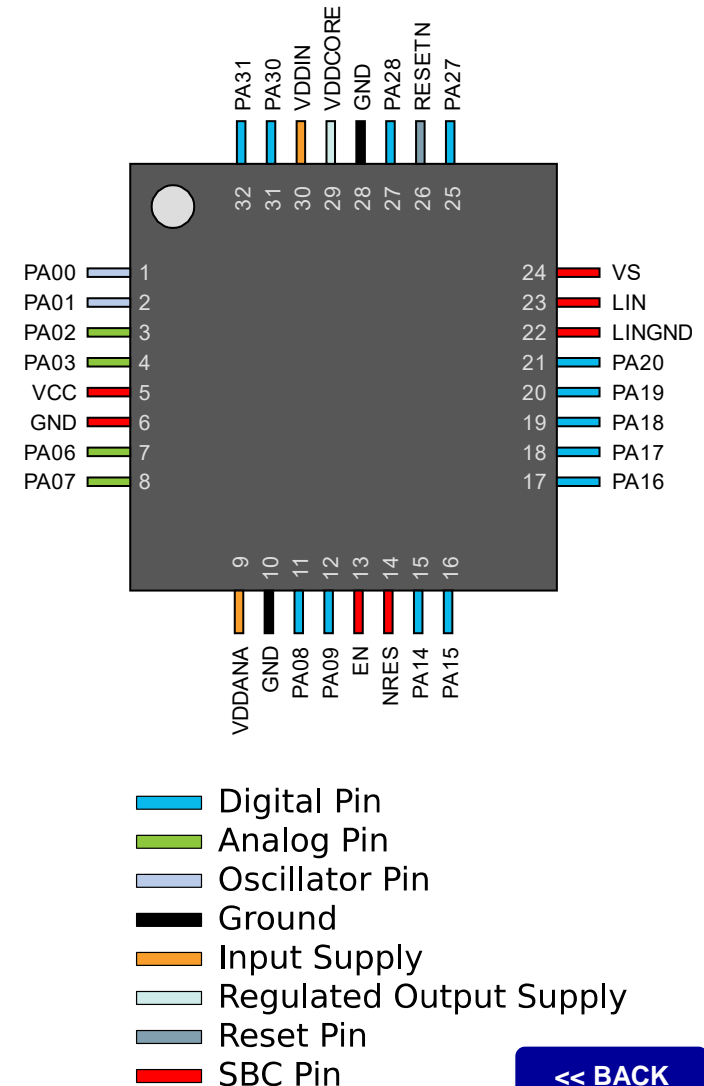
- Single package CM0+ microcontroller + LIN SBC
- Integrated 3.3V voltage regulator
- 16/32/64Kbytes flash memory
- 512/1024/2048 bytes RWW-Dataflash
- 4/4/8K internal SRAM
- 4+1 16-bit TC (One for internal use only, no PWM)
- 3 16-bit TCC (Timer counter for control)
- 13-channel 12-bit ADC
- 5 SERCOM modules capable of LIN/SPI/USART/I<sup>2</sup>C –  
- 32 programmable I/O lines
- 9 Self capacitance touch channels
- 1 10-bit DAC
- 8 Channel DMA, Event system
- LIN physical layer according to LIN 2.0, 2.1, 2.2 –  
- specification and SAEJ2602-2
- Wake-up capability via LIN-bus
- TXD time-out timer
- Bus pin is over temperature and short circuit protected –  
- versus GND and battery
- AEC-Q100 qualified



- █ Digital Pin
- █ Analog Pin
- █ Oscillator Pin
- █ Ground
- █ Input Supply
- █ Regulated Output Supply
- █ Reset Pin
- █ SBC Pin

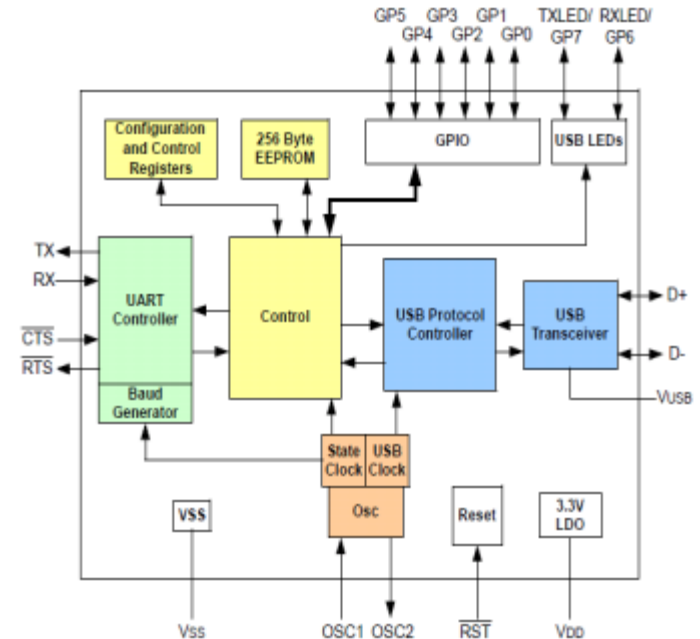
## Features:

- Single package CM0+ microcontroller + LIN SBC
- Integrated 3.3V voltage regulator
- 16/32/64Kbytes flash memory
- 512/1024/2048 bytes RWW-Dataflash
- 4/4/8K internal SRAM
- 3+2 16-bit TC (Two for internal use only, no PWM)
- 3 16-bit TCC (Timer counter for control)
- 6-channel 12 bit ADC
- 4 SERCOM modules capable of LIN/SPI/USART/I<sup>2</sup>C –  
- 19 programmable I/O lines
- 4 Self capacitance touch channels
- 1 10-bit DAC
- 8 Channel DMA, Event system
- LIN physical layer according to LIN 2.0, 2.1, 2.2 –  
- specification and SAEJ2602-2
- Wake-up capability via LIN-bus
- TXD time-out timer
- Bus pin is over temperature and short circuit protected –  
- versus GND and battery
- AEC-Q100 qualified



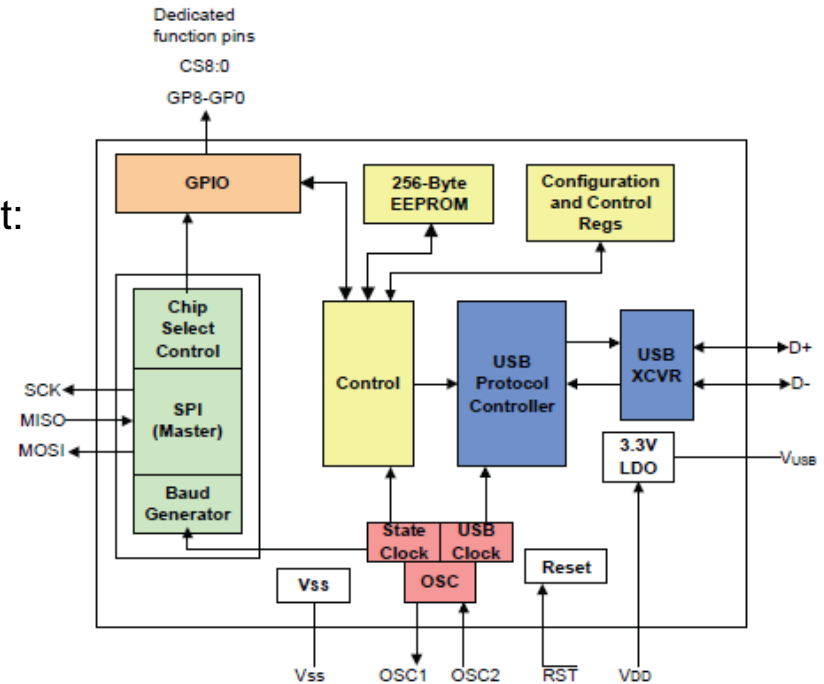
## Features:

- Universal Serial Bus (USB):
  - Supports full-speed USB (12 Mb/s)
  - Implements USB protocol composite device CDC device for communications
  - 128 byte buffer
  - Fully configurable VID and PID assignments
  - USB 2.0 Compliant
- USB Driver and Software Support:
  - Uses standard Microsoft® Windows® drivers – for Virtual Com Port (VCP)
  - Configuration utility for initial configuration
- UART Interface:
  - Supports baud rates: 300-1000k
- 8 General Purpose Input/Output (GPIO) Pins
- EEPROM: 256 bytes of user EEPROM
- Operating voltage: 3.0-5.5V
- Oscillator input: 12 MHz
- ESD protection > 4 kV HBM
- Industrial Operating Temperature: -40°C to +85°C
- Packages :20-lead 5x5 QFN, SOIC, SSOP
- Recommended for Automotive Design



## Features:

- Universal Serial Bus (USB):
  - Supports Full-Speed USB (12 Mb/s)
  - Human Interface Device (HID) device
  - 128-Byte Buffer to Handle Data Throughput:
  - Fully Configurable VID, PID Assignments
  - USB 2.0 Compliant
- USB Driver and Software Support:
  - Uses Standard HID Drivers
  - Configuration Utility
  - Utility for USB-SPI Communication
- SPI Master Peripheral:
  - Bit Rates from 1500 bps up to 12 Mbps
  - Up to 9 Chip Select lines
- 8 General Purpose Input/Output (GPIO) Pins
- EEPROM: 256 Bytes of User EEPROM
- Operating Voltage: 3.3-5.5V
- Oscillator Input: 12 MHz
- Packages 20-lead 5x5 QFN, SOIC, SSOP
- Recommended for Automotive Design

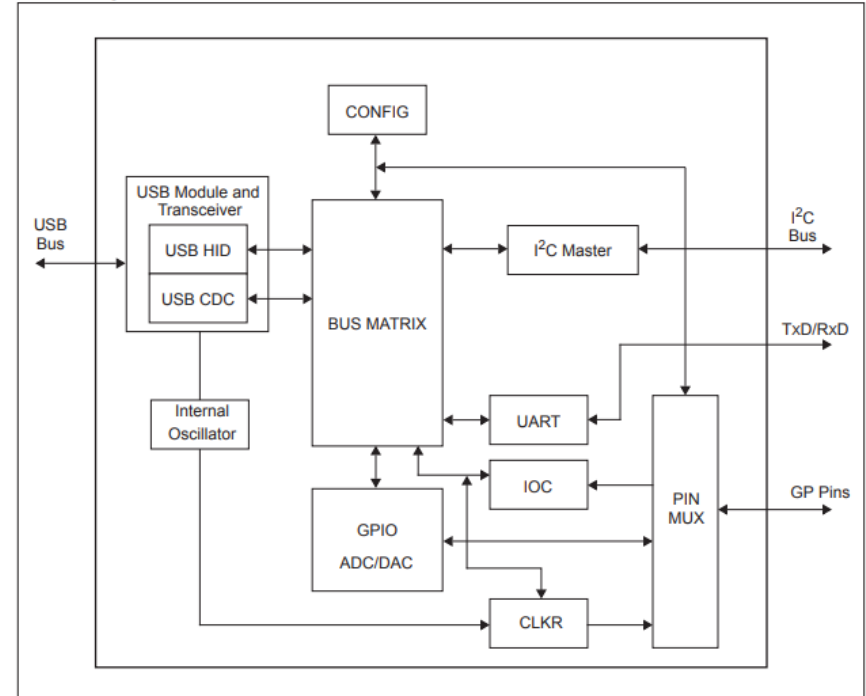




## Features:

- Supports Full-Speed USB (12 Mb/s)
- Implements USB Protocol Composite Device:
  - Communication Device Class (CDC)
  - Human Interface Device (HID) for I<sup>2</sup>C™ -  
- Chip Control and Configuration
- 128-byte Buffer to handle data throughput at any UART baud rate –
  - Throughput:
    - 64-byte Transmit, 64-byte Receive
- Fully configurable VID and PUD assignments and string descriptors
- Selectable clock output option
- Highly Configurable device and USB –
  - descriptors and assignments
- Bus-powered or Self-powered
- USB 2.0 Compliant: TID# 40001594
- General Purpose Input/Output (GPIO) pins
- Recommended for Automotive Design
- SMBus Master
  - up to 400 kHz clock rate

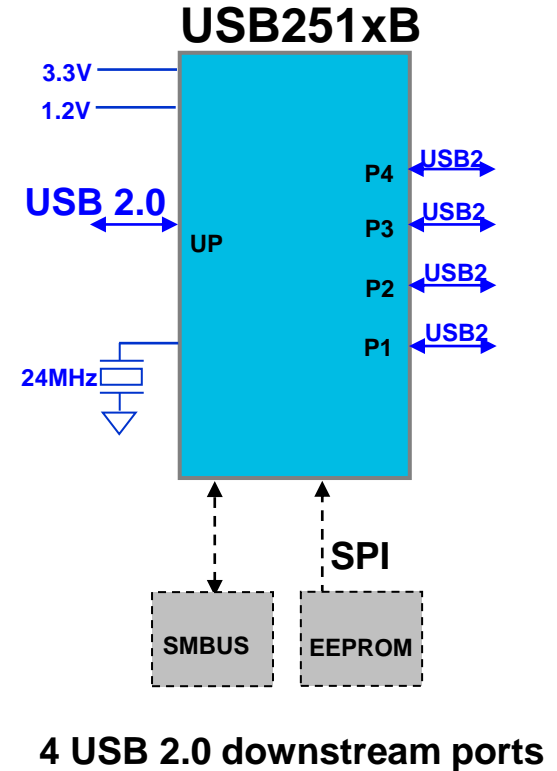
Block Diagram



## Features:

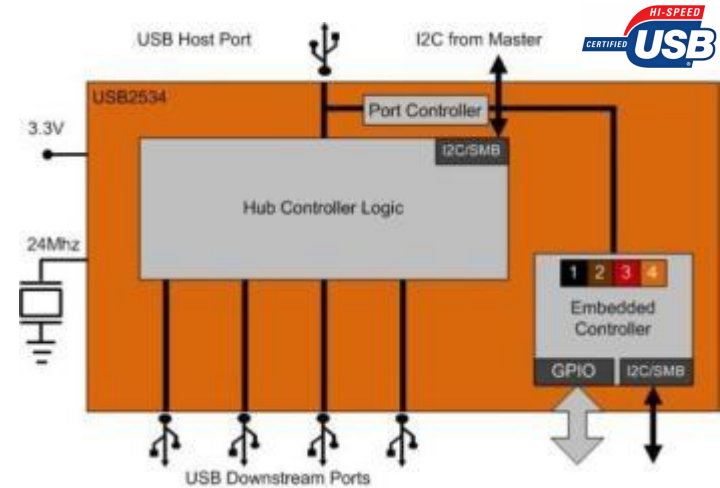
- Full Featured 5th generation USB 2.0
- 2 to 4 Ports
- Fully configurable via EPPROM, SMBus
- Supports Battery Charging USB BC 1.1
- PHYBoost, PortMap, PortSwap, MultiTRAK™ Technology
- Self & Bus Powered
- Overcurrent Protection Ganged & Individual Modes
- LED Drivers
- Package: QFN36
- World class interoperability & customer support

		<u>Next Gen Hubs</u>		
USB2514B	→	USB2534	}	36pin low power
USB2513B	→	USB2533		
USB2512B	→	USB2532		
USB3503 (HSIC)	→	USB3613 (HSIC)	}	Mobile apps WLCSP
USB3803	→	USB3813		
USB2412	→	USB2422	}	24pin lower cost
		USB4604 (I/O Bridging)		
		USB4624 (+HSIC)		



### Features:

- Integrated Controller with “Quad Page” –
  - Configuration Management for utmost flexibility
- Flex Connect (Port Reversal) 0,1
- I/O Bridging with Programmable Interfaces
  - USB to SPI, UART, I<sup>2</sup>C
- BC1.1, BC1.2, Apple Charging and China –
  - Charger compatibility
- 2/3/4 port options in 36-pin QFN package
- HSIC versions available to interface with many –
  - major processors
- USB3x13 in miniature WLCSP ideal for mobile –
  - applications
- USB46x4 in 48-pin QFN package
- Pin Compatible versions w/USB2514B



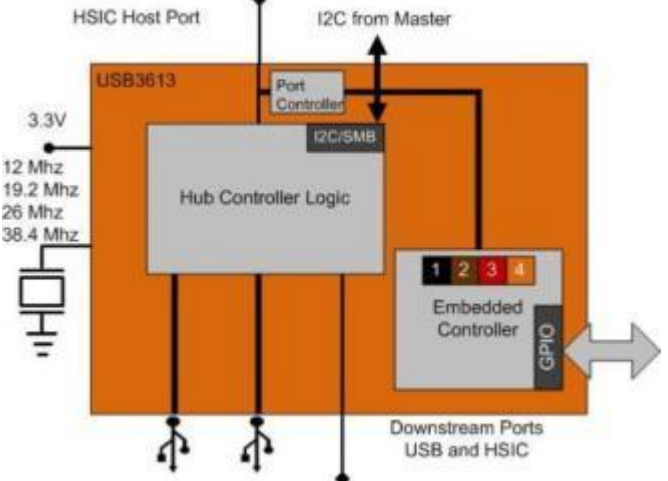
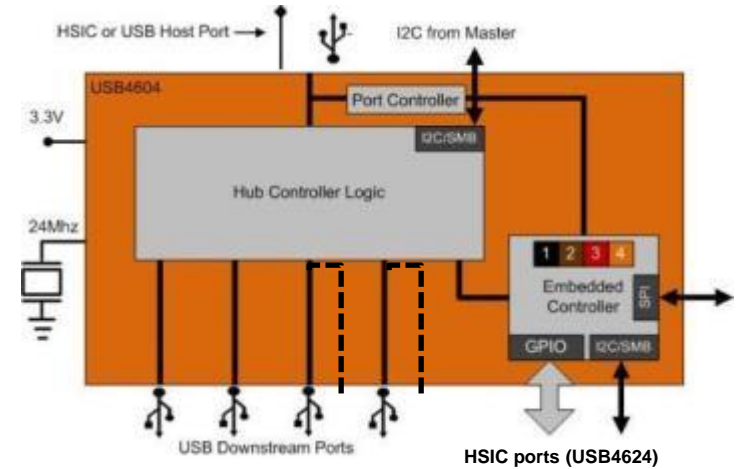
## Features:

- Same features as the USB253x Family
- USB4604 and USB4624

SPECS	USB4604	USB4624
Upstream Port	USB2.0 or HSIC	
Downstream Ports	4 x USB2.0	2 x USB2.0 / 2 x HSIC
Package	48-pin QFN	

- USB3613 and USB3813

SPECS	USB3613	USB3813
Upstream Port	HSIC	USB2.0
Downstream Ports	2 x USB2.0 / 1 x HSIC	
Ref Clock	12/19.2/26/38.4Mhz*	
Package	30-ball WLCSP	



\* Can share system reference clock

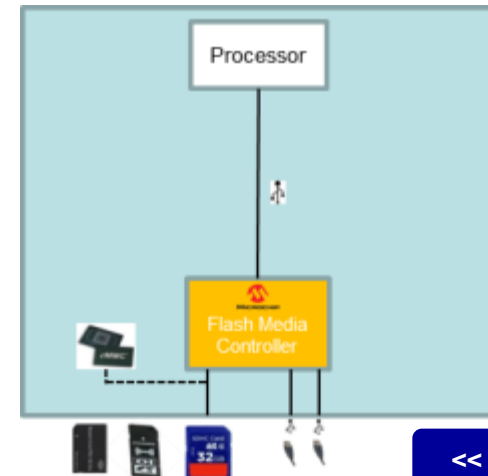
# USB Flash Media Controller Overview

USB Card Reader Products	USB2244	USB2250	USB2640	USB2660	USB4640
Up Stream Interface	USB 2.0	USB 2.0	USB 2.0	USB 2.0	HSIC (USB 2.0)
Down Stream Output	SD, MMC	SD, MMC, CF, MS, xD	SD, MMC, MS, xD	2xSD, 2xMMC, MS, xD	SD, MMC, MS, xD
Down Stream USB Ports	None	None	2	2	2
Logical Units	1	1	1	1	1
Package Body size (mm)	36 QFN (6 x 6 x 0.9)	128 VTQDP (14 x 14 x 1.1)	48 QFN (7 x 7 x 0.9)	64 QFN (9 x 9 x 0.9)	48 QFN (7 x 7 x 0.9)

SD – SecureDigital, MMC – MultiMediaCard, CF – Compact Flash, MS – Memory Stick, xD – xD Picture Card

## Features:

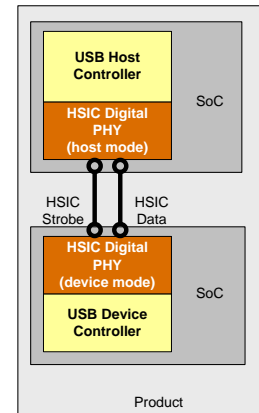
- Ultra-fast flash media reader/writer for external memory –
  - card storage or embedded flash memory
    - SD, MMC/eMMC, MS / MS-Pro / MS-Pro-HG, xD
- USB interface for design ease and flexibility on placement
- USB port expansion options



## Features:

- High-Speed Inter-Chip [HSIC]; USB2 chip-to-chip interconnect
  - HSIC removes the analog transceivers designed for 5M cables in USB2 –
    - Eco Systems
  - Absolutely 100% software compatible as “USB Host” sees no different –
    - behavior

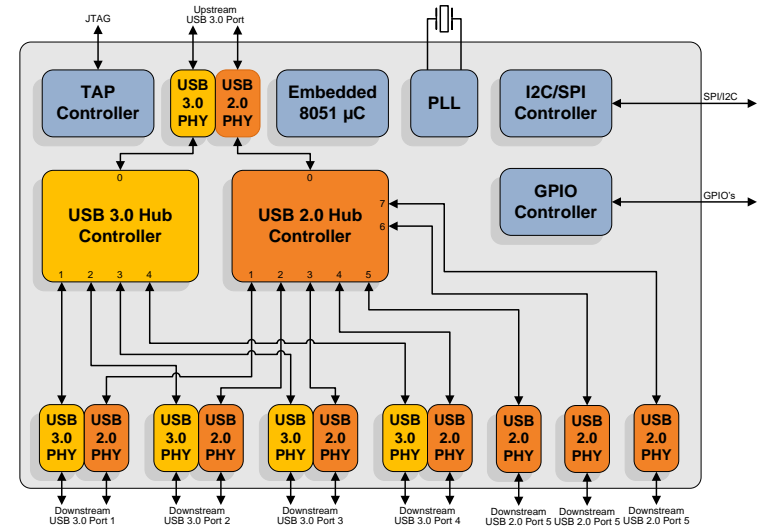
Product	Upstream	Downstream	Package	Applications
USB4640-HZH	HSIC	USB x2	48 QFN	Hub Combo (w/card reader)
USB4624-1080HN	HSIC/USB	USB x2 / HSIC x2	48 QFN	<b>Hub</b> Controller
USB4604-1080HN	HSIC/USB	USB x4	48 QFN	<b>Hub</b> Controller
USB3503A-1-GL	HSIC	USB x3	25 WLCSP	Mobile <b>Hub</b> with HSIC
USB3813-1080XY	USB	USB x2 / HSIC x1	30 WLCSP	Mobile <b>Hub</b> Controller
USB3613-1080XY	HSIC	USB x2 / HSIC x1	30 WLCSP	Mobile Low-Power <b>Hub</b> Controller



HSIC **lowers power** with 1.2V signaling  
 \*\*note USB2 Signaling is 3.3V

## Features:

- Leveraging leadership position and expertise in –  
- USB
- Third generation of USB3.0 hub solutions:
  - USB-IF compliant hub
  - Hybrid solutions (USB2.0/3.0 ports)
  - High levels of integration featuring integrated -  
- controller providing ease-of-use and flexibility
  - Battery charger detection support
    - USB-IF Battery Charger v1.2
    - Apple charger, China charger, RIM
  - Industry's Most Complete Hub Product Line



Part Number	Downstream	USB3 Logo
USB5537B-6080AKZE	7 Port Hybrid	TID 330000054
USB5537B-6070AKZE	7 Port Hybrid	TID 330000054
USB5534B-6080JZX	4 Port	TID 330000054
USB5533B-6080JZX	4 Port	TID 330000054
USB5532B-6080JZX	4 Port	TID 330000054

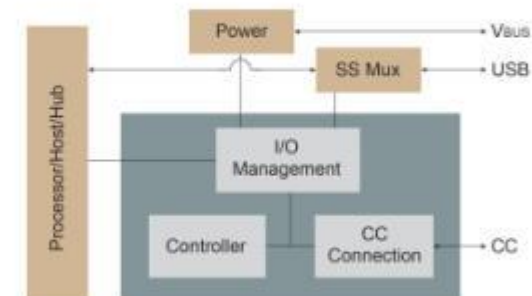
## Features:

- Basic USB-C™ Controller
- Simple and Fast Time-to-Market Solution
  - Add NEW USB-C Connector to Any Product
  - Flexible and Programmable Solution
- USB-C Cable Detection and Reversibility
  - Integrated control for optional switch mux
- Enables Default Power Control
  - Supports USB-IF standard 5V power profiles
  - Default, 5V/1.5A, 5V/3A
  - Vconn power enablement
- Integrated ADC for Voltage Monitoring on CC Pins
- Minimal External Discrete Components
- Interfaces to Microchip's USB Controller Hubs
- Package: 3x3 QFN16



MICROCHIP UTC2000

PART NUMBER	GRADE	MEDIA
UTC2000T/MG	Commercial	Tape/Reel
UTC2000T-I/MG	Industrial	Tape/Reel
UTC2000T-E/MG	Extended	Tape/Reel
UTC2000T-E/MG042	Automotive	Tape/Reel
UTC2000-E/MG042	Automotive	Tube*





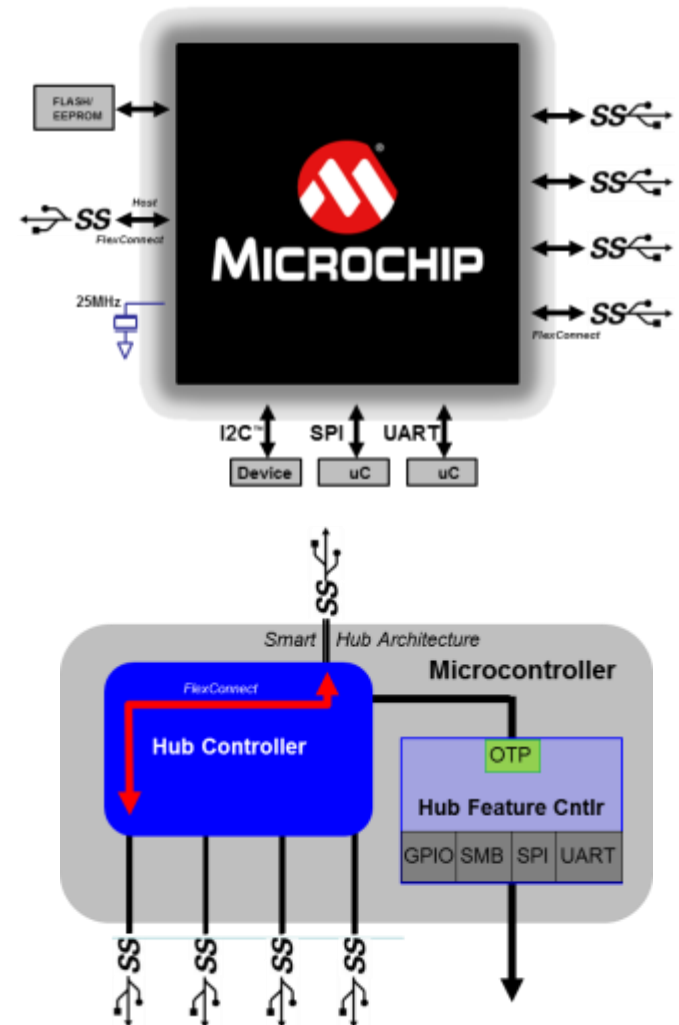


# USB3.1 Gen1 Compliant SmartHubs – USB57xx

Online  
Datasheet

## Features:

- More Intelligence - Smart Hub:
  - I/O Bridging
  - Host Role Swap (FlexConnect)
  - Host Switching (FlexConnect)
- Easier to Design/Manufacture:
  - Improved Signal Integrity
  - Turnkey Solutions – Boot Strapping
  - Config/Prod Tool – MPLAB Connect Configurator
- Smallest QFN Package in the Industry (7x7mm)
- Supporting USB Type-C™ designs
- Silicon UPGRADE as of 6/1/2018
  - USB-IF logo testing to support the new USB Type-C™ industry initiative
    - Pending Header Packet (HP) Timer
    - Power Management (PM) Timer
    - Unacknowledged Connect / Remote Wake Failure



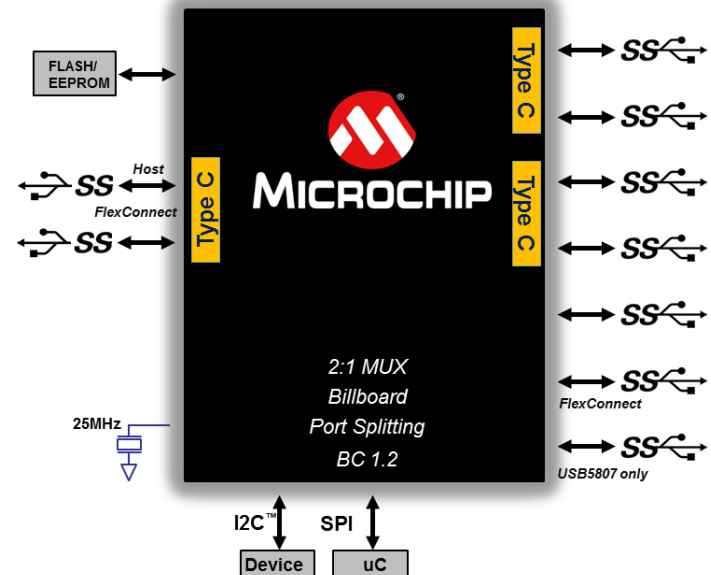
Part Number	Downstream	USB3 Logo
USB5734	4 Ports	TID 330000076
USB5744	4 Ports	TID 330000076
USB5742	2 Ports	TID 330000076

[USB58/59xx Family >>](#)

[<< BACK](#)

## Features:

- Expansion of SmartHub Functionality
  - Up to 7 USB3.1 Gen 1/USB 2.0 downstream ports
  - FlexConnect and I/O Bridging
  - Onboard 2:1 MUX supporting USB-C™ configurations
  - Port Splitting for optimal interfacing
  - Billboard class support for Power Delivery
  - BC1.2 and Legacy Battery Charging on DFPs
- Easier to Design/Manufacture:
  - Improved Signal Integrity
  - Turnkey Solutions – Boot Strapping
  - Config/Prod Tool – MPLAB Connect Configurator
- Supporting USB Type-C™ designs
- Available in 100-pin (12mm x 12mm) SQFN

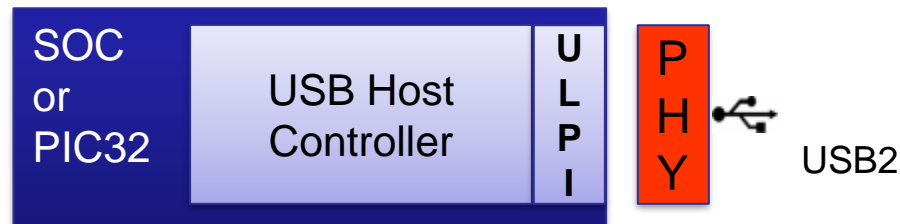


P/N	Downstream	Package	USB-C Up	USB-C Down	Industrial Grade	USB-IF Logo
USB5807	7	100-pin SQFN	-	0	Yes	TID 330000064
USB5806/5906	6	100-pin SQFN	USB5906 only	0	Yes	TID 330000064
USB5816/5916	6	100-pin SQFN	USB5916 only	1 Port	Yes	-
USB5826/5926	6	100-pin SQFN	USB5926 only	2 Ports	Yes	-



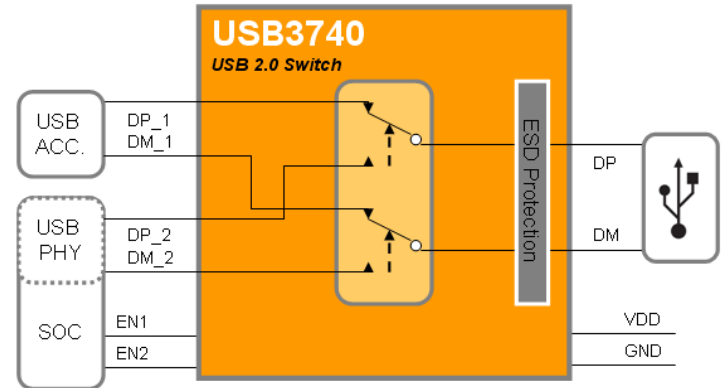
# USB Transceiver Product Overview

USB PHY Products	USB3450	USB3500	USB3280 USB3290	USB3300	USB334x	USB333x
PHY Interface	UTMI+ (Device or Host)	UTMI+ (Device, Host, or OTG)	UTMI (Device)	ULPI (Device, Host, or OTG)	ULPI (Device, Host, or OTG)	ULPI (Device, Host, or OTG)
HS & FS USB	Yes	Yes	Yes	Yes	Yes	Yes
LS USB	Yes	Yes	No	Yes	Yes	Yes
Data Interface	8 bit Bidir	8 bit Bidir	8 bit Bidir	8 bit Bidir	8 bit Bidir	8 bit Bidir
Internal Reg	Yes	Yes	Yes	Yes	Yes	Yes
Package Body size (mm)	40 QFN (6 x 6 x 0.9)	56 QFN (8 x 8 x 0.9)	36 QFN (6 x 6 x 0.9) 40 VFBGA (4 x 4 x 0.9)	32 QFN (5 x 5 x 0.9)	24 QFN (4 x 4 x 0.9) 25 BGA (3 x 3 x 0.8)	25 WLCSP (1.9 x 1.9 x 0.5)



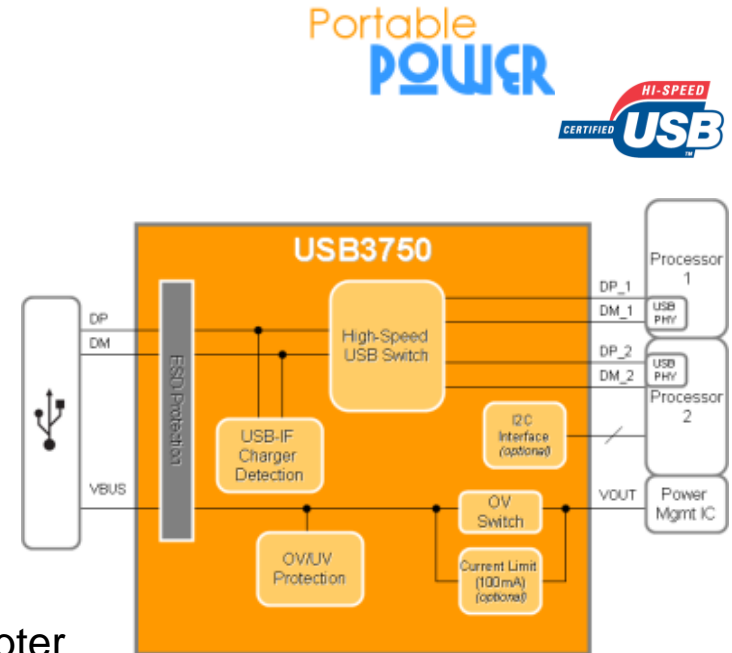
## Features:

- High-bandwidth USB 2.0 Switch with Dual Enables
  - For high-speed USB 2.0 data
- Multiplex differential outputs from a USB host –  
- device to one of two corresponding outputs
  - Enable DP/DM multiplexing
  - Flexible solution for embedded applications
- Ultra-low Current Consumption
  - Active (switch ON) = 5  $\mu$ A ( $V_{CC} = 3V$ )
  - Standby (switch OFF) = 0.01  $\mu$ A ( $V_{CC} = 3V$ )
- Competitive USB 2.0 Switch Specifications
  - Designed to pass USB signals from 0 to 3.3V
  - USB Mux on resistance < 6 ohms
  - USB Mux off leakage < 0.5  $\mu$ A
  - Off isolation < -40 dB
  - On capacitance < 6 pF
  - High bandwidth: 1 GHz
- Extreme ESD Protection  $\pm 15$  kV (IEC)
- Package:
  - 10-lead 1.3x1.8 QFN with 0.4 mm pitch
  - 10-lead 1.6x2.1 QFN with 0.5 mm pitch



## Features:

- Integrated and Flexible USB Port Protection and Detection with Hi-Speed USB Switch
- ESD Protection: Up to  $\pm 15$  kV
- VBUS Overvoltage Protection
  - Low resistance switch
  - Up to 28V of protection
- High-speed USB Switch for Port Sharing
  - Enable DP/DM multiplexing
  - Flexible solution for embedded applications
- Complete Battery Charger Detection Capability:
  - USB-IF 1.1 battery charging (up to 1.5A)
  - Dedicated charging port (DCP) i.e. Wall A/C adapter
  - Charging downstream port (CDP) i.e. USB-IF BC 1.1 port
  - Standard downstream port (SDP) i.e. PC or hub
  - Supports detection of majority USB (SE1) chargers
- Optional I<sup>2</sup>C Interface
- Package: 16-lead 3x3 QFN





# MCP2003/4 MCP2003A/4A

LIN J2602 Transceiver

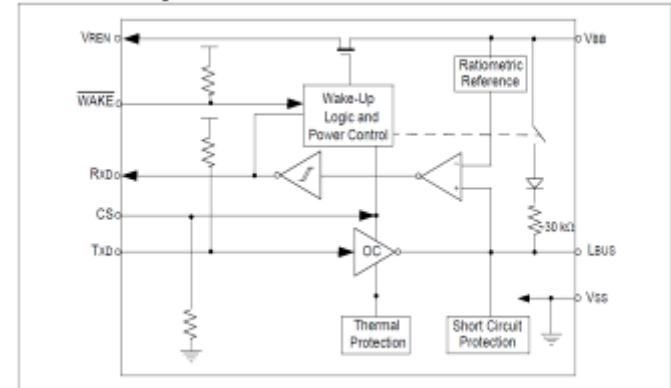


Online  
Datasheet

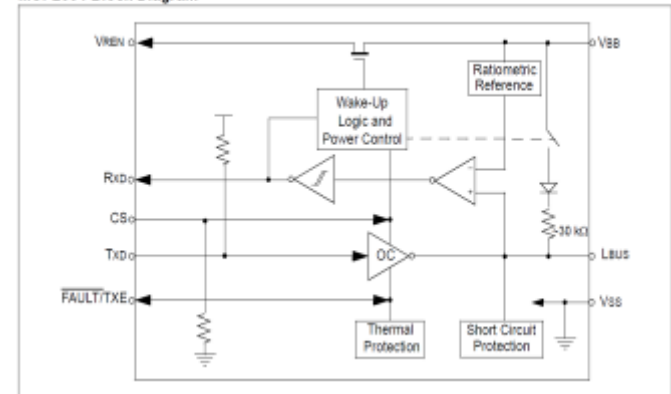
## Features:

- Compliant with LIN Bus Specifications 1.3, 2.0, and – 2.1 and are compliant to SAE J2602
- MCP2003/3A is industry standard pin-out
- MCP2004/4A supports Fault/TXE pin (Fault – - Output/Transmitter Enable)
- Support Baud Rates up to 20 Kbaud
- 43V load dump protected
- Very low EMI meets stringent OEM requirements
- Very high ESD immunity
  - >20kV on VBB (IEC 61000-4-2)
  - >14kV on LBUS (IEC 61000-4-2)
- Very high immunity to RF disturbances: Meets – - stringent OEM requirements
- Wide supply voltage, 6.0V - 18.0V continuous
- Extended Temperature Range: -40 to +125°C
- Interface to PIC® EUSART and standard USARTs
- Local Interconnect Network (LIN) bus pi
- Automatic thermal shutdown
- Low-power mode:  $\cong 5 \mu\text{A}$
- Software Library support for most
- Recommended for Automotive Design (MCP2003/4)

MCP2003 Block Diagram



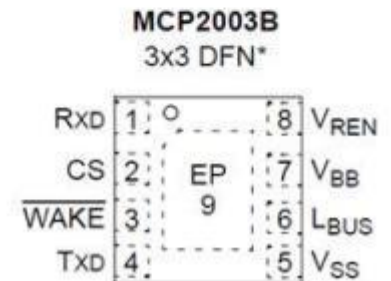
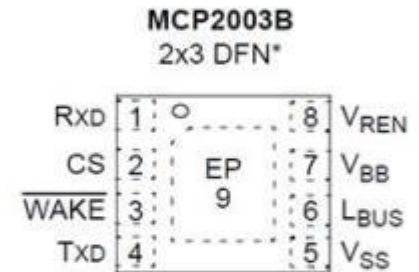
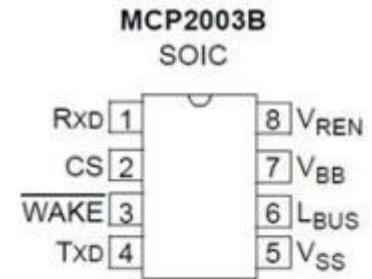
MCP2004 Block Diagram



<< BACK

## Features:

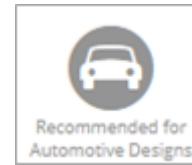
- Compliant with Local Interconnect Network (LIN) Bus Specifications 1.3, 2.0, 2.1, 2.2, SAE J2602, and ISO17987
- Up to 20 Kbaud with LIN-Compatible Output Driver
- 60V Load Dump Protected
- Very High EMI Meets Stringent OEM Requirements
- Direct Capacitor Coupling Robustness without Transient Voltage Suppressor (TVS):
  - $\pm 35\text{V}$  on LBUS (SAE J2962-1)
  - $\pm 85\text{V}$  on VBB (SAE J2962-1)
- High Electrostatic Discharge (ESD) Immunity without TVS:
  - $>25\text{kV}$  on LBUS (SAE J2962-1)
  - $>15\text{kV}$  on VBB (IEC 61000-4-2)
  - $>6\text{ kV}$  on LBUS (IEC 61000-4-2)
- Very High Immunity to RF Disturbances Meets OEM Requirements
- Wide Supply Voltage: 5.5V – 30.0V Continuous
- Extended (E) Temperature Range:  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- High (H) Temperature Range:  $-40^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Automatic Thermal Shutdown
- Low-Power Mode:
- Receiver monitoring bus and transmitter off ( $\sim 5\ \mu\text{A}$ )





# MCP23008 / 23S08

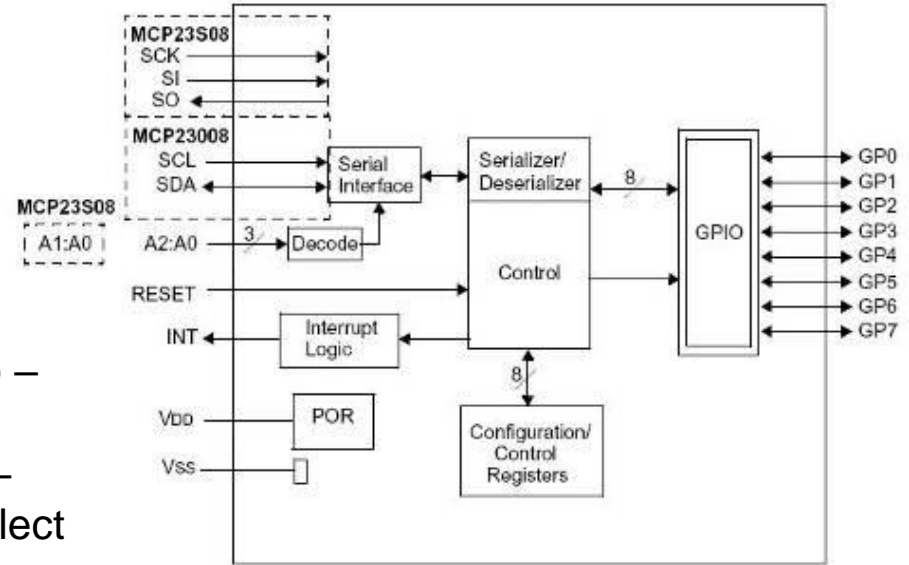
8-Bit I/O Expander with Serial Interface



Online  
Datasheet

## Features:

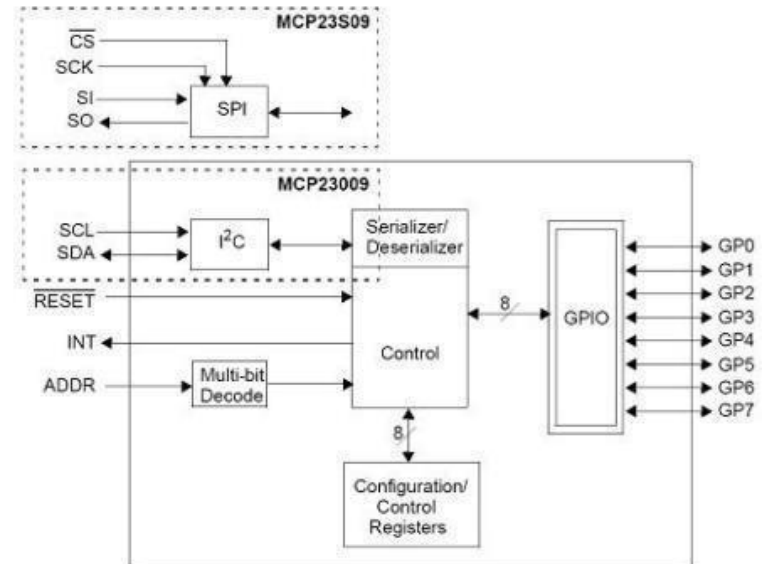
- 8-bit Remote Bidirectional I/O Port
- High-speed I<sup>2</sup>C™ Interface (MCP23008):
- 100kHz, 400kHz and 1.7MHz Modes
- High-speed SPI Interface (MCP23S08):
  - 10MHz
- Hardware Address pins:
  - Three for the MCP23008 to allow up to –
    - Eight Devices on the bus
  - Two for the MCP23S08 to allow up to –
    - Four Devices using the same chip-select
- Configurable Interrupt Output Pin:
- Active-high, Active-low or Open-drain
- Configurable interrupt source
- Polarity Inversion Register to Configure the
- Polarity of the Input Port Data
- External Reset Input
- Low standby current: 1µA (max.)
- Operating voltage: 1.8V to 5.5V
- Recommended for Automotive Design





### Features:

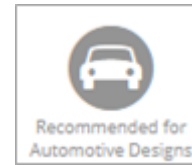
- 8-bit remote bidirectional I/O port:
  - I/O pins default to input
- Open-drain outputs:
  - 5.5V tolerant, 25mA sink capable (per pin), - 200 mA total
- High-speed I<sup>2</sup>C™ interface: (MCP23009)
  - 100 kHz, 400 kHz, 3.4MHz
- High-speed SPI interface: (MCP23S09):
  - 10MHz
- Single hardware address pin: (MCP23009)
  - Voltage input to allow up to eight devices
  - Configurable interrupt output pins
- Configurable as active-high, active-low or open drain
- Configurable interrupt source
- Polarity inversion register to configure the polarity, of the input port data
- External reset input
- Low standby current as low as 1µA
- Operating voltage: 1.8V to 5.5V
- Packages: 3x3 QFN, PDIP, SOIC, SSOP





# MCP23017 / 23S17

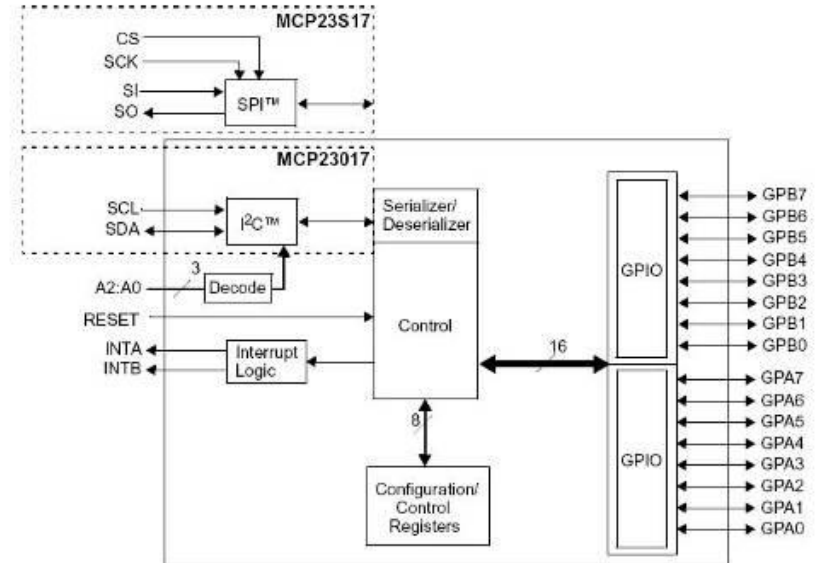
16-Bit I/O Expander with Serial Interface



Online  
Datasheet

## Features:

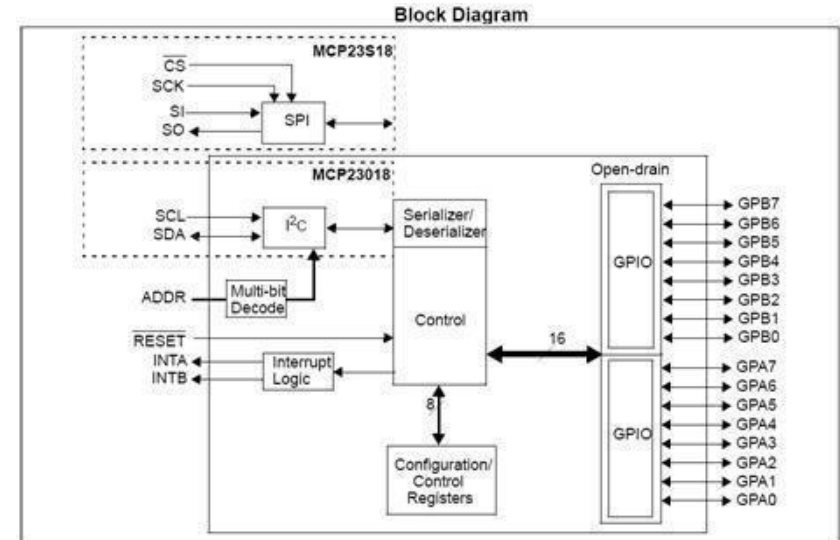
- 16-bit remote bidirectional I/O Port:
- High-speed I<sup>2</sup>C™ interface (MCP23017):
- 100kHz, 400kHz and 1.7MHz modes
- High-speed SPI interface (MCP23S17):
- 10MHz (max.)
- 8 device addresses
- Configurable Interrupt Output Pins:
- Configurable as Active-high, Active-low or Open-drain
- INTA and INTB can be Configured to Operate Independently or Together
- Configurable Interrupt Source:
- Interrupt-on-change from configured register defaults or pin changes
- Polarity Inversion Register to Configure the -Polarity of the Input Port Data
- External Reset Input
- Low standby current: 1μA (max.)
- Operating voltage: 1.8V to 5.5V
- Packages: 28-pin PDIP, SOIC, SSOP and QFN
- Recommended for Automotive Design



<< BACK

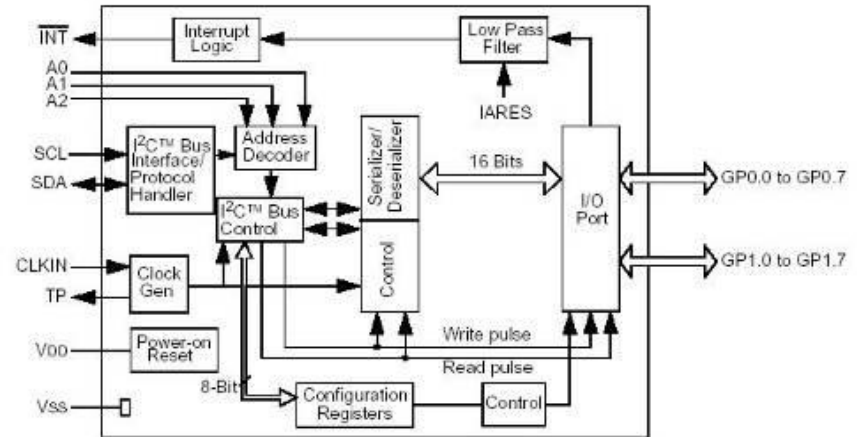
## Features:

- 16-bit remote bidirectional I/O port:
  - I/O pins default to input
- Open-drain outputs:
  - 5.5V tolerant, 25mA sink capable –  
- (per pin), 400mA total
- High-speed I<sup>2</sup>C™ interface: (MCP23018)
- High-speed SPI interface: (MCP23S18)
- Single hardware address pin: (MCP23018)
  - Voltage input allow up to eight devices
- Configurable interrupt output pins:
  - Configurable as active-high, active-low or open-drain
- Configurable interrupt source
- Polarity inversion register to configure the polarity of the input port data
- External reset input
- Low standby current: 1µA (-40°C ≤ TA ≤ +85°C)
- Operating voltage: 1.8V to 5.5V
- Packages: PDIP, SOIC, QFN, SSOP (MCP23S18)
- Recommended for Automotive Design



## Features:

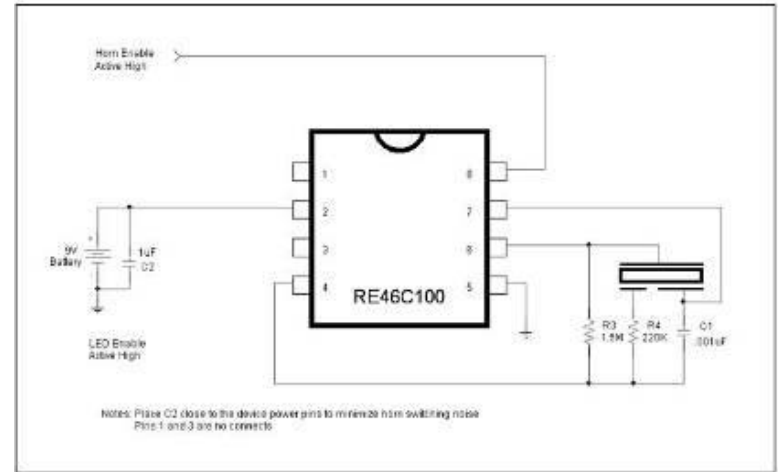
- 16-Bit Remote Bidirectional I/O Port
- Fast I<sup>2</sup>C™ bus Clock Frequency (0 to 400 – - kbits/s)
- Three Hardware Address Pins allow use – - of up to Eight Devices
- High-current Drive Capability per I/O: ±25mA
- Open-drain interrupt output on input change
- Interrupt Port Capture Register
- Internal Power-On Reset (POR)
- Polarity Inversion Register to Configure the
- Polarity of the Input Port Data
- Compatible with most Microcontrollers
- Industrial temperature range: -40°C to +85°C



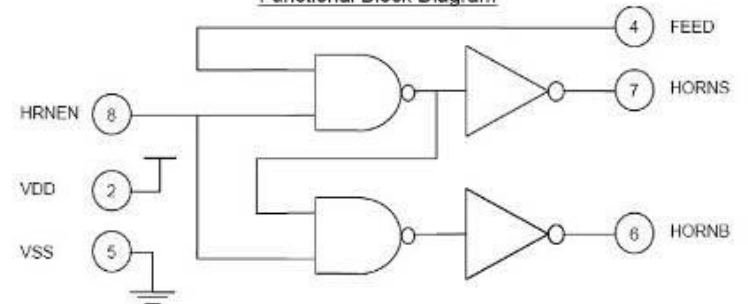
## Features:

- Low Quiescent Current (<100nA)
- Low Driver RON: 20Ω (typ.) at 9V
- Wide Operating Voltage Range
- 8-pin PDIP and SOIC Packages
- Available in RoHS Compliant Pb-free Packaging

Typical Application



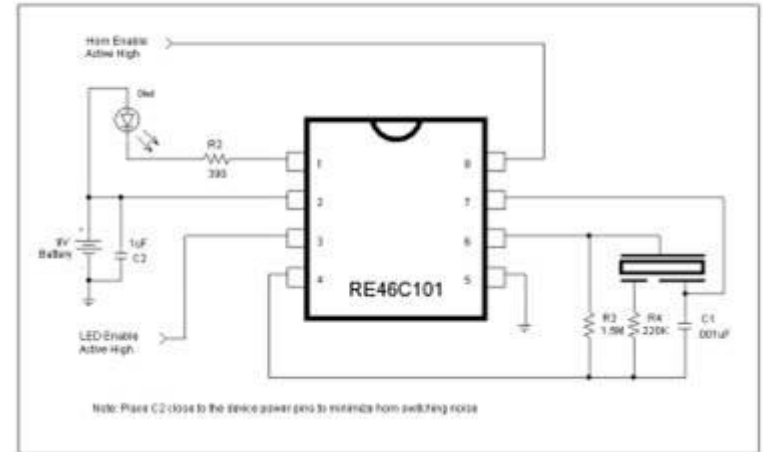
Functional Block Diagram



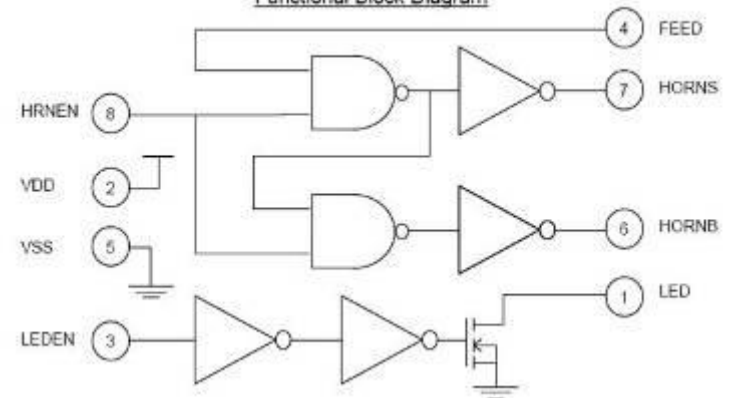
## Features:

- Low Quiescent Current (<100nA)
- Low Driver RON: 20Ω (typ.) at 9V
- Wide Operating Voltage Range
- 8-pin PDIP and SOIC Packages
- Available in RoHS Compliant Pb-free Packaging

Typical Application

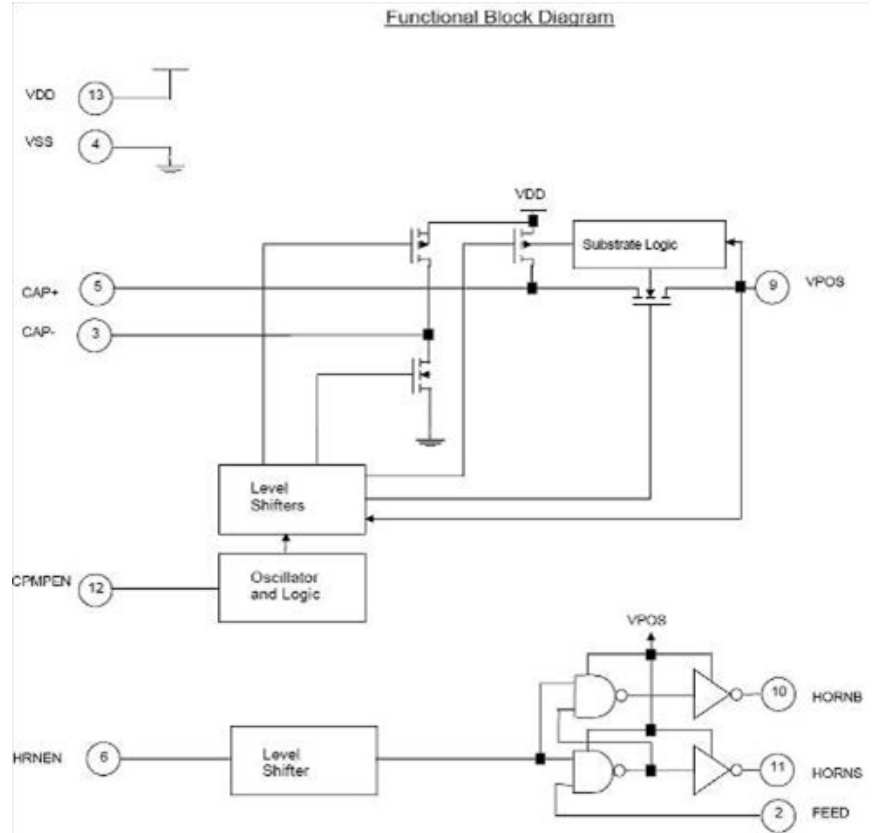
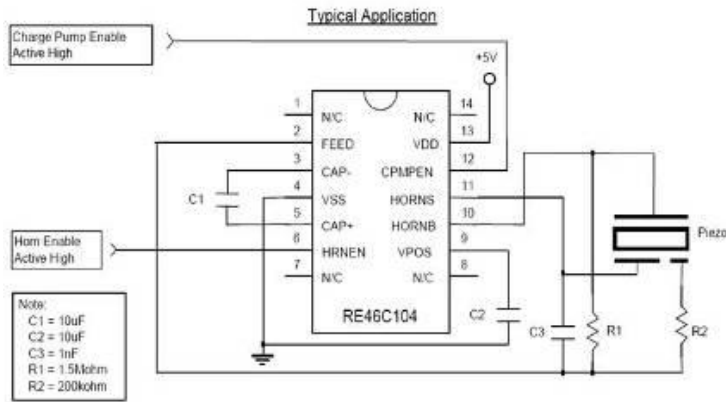


Functional Block Diagram



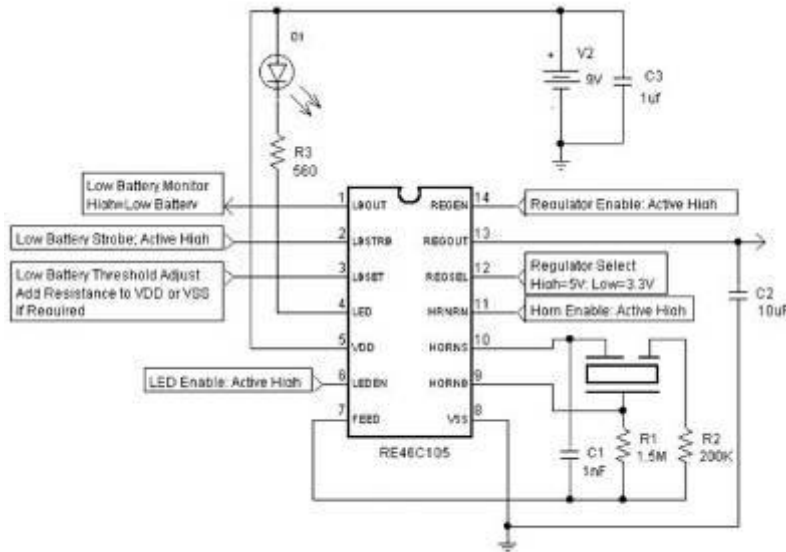
## Features:

- Low Quiescent Current
- Low Driver RON
- Wide Operating Voltage Range
- Available in RoHS Compliant Pb –  
- Free Packaging



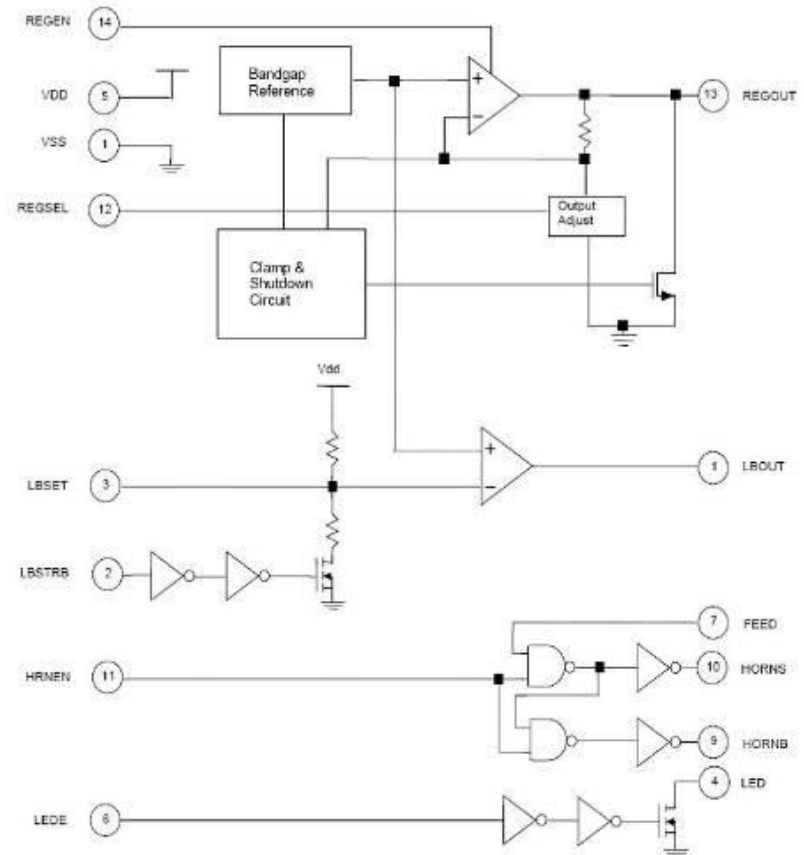
## Features:

- Low Quiescent Current
- Low Horn Driver RON
- Voltage Regulation to 3.3V or 5V
- Low Battery Detection
- Available in PDIP and SOIC packaging



Typical Application Using Self Resonating Piezoelectric Horn

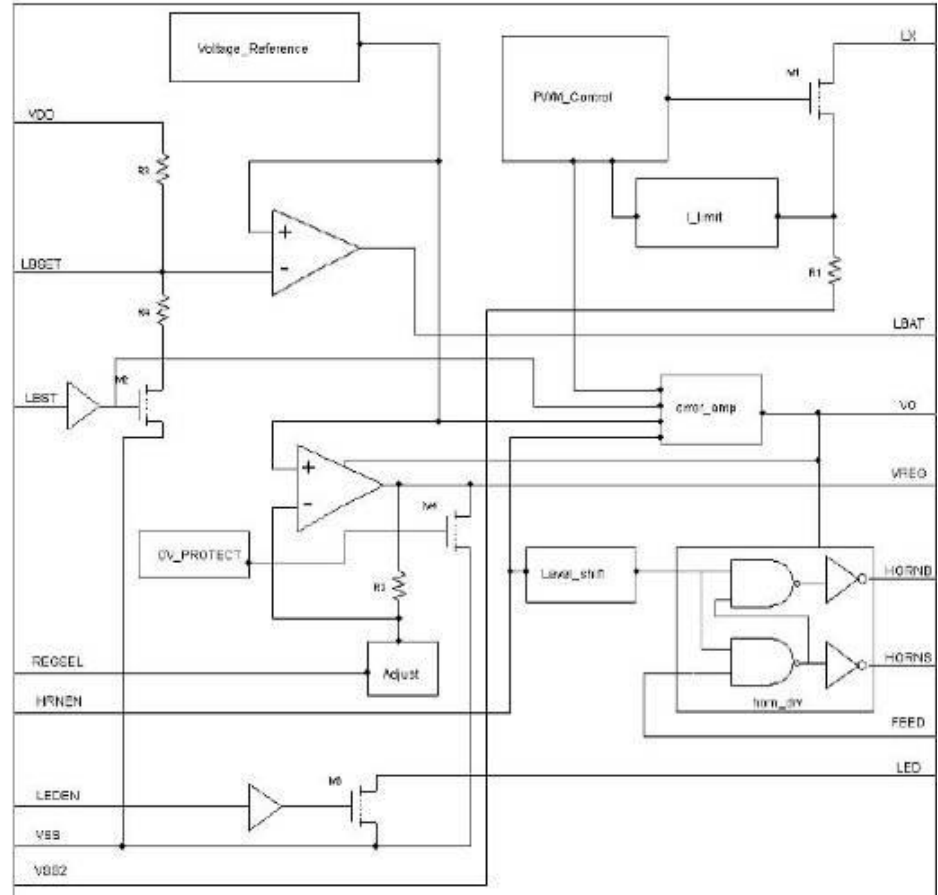
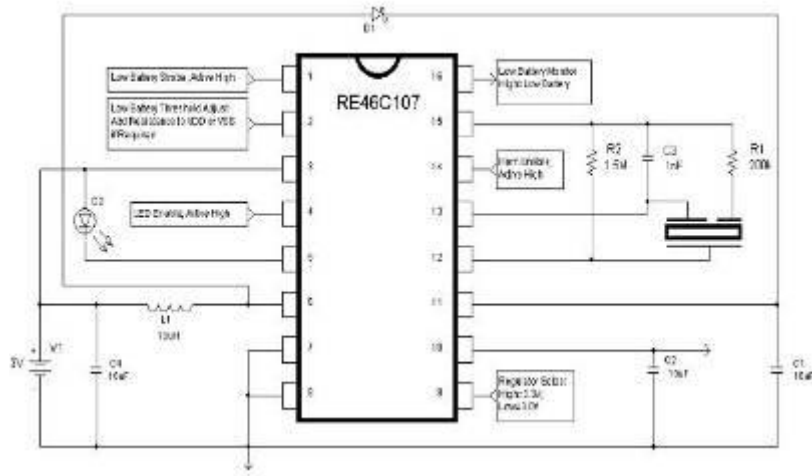
Functional Block Diagram





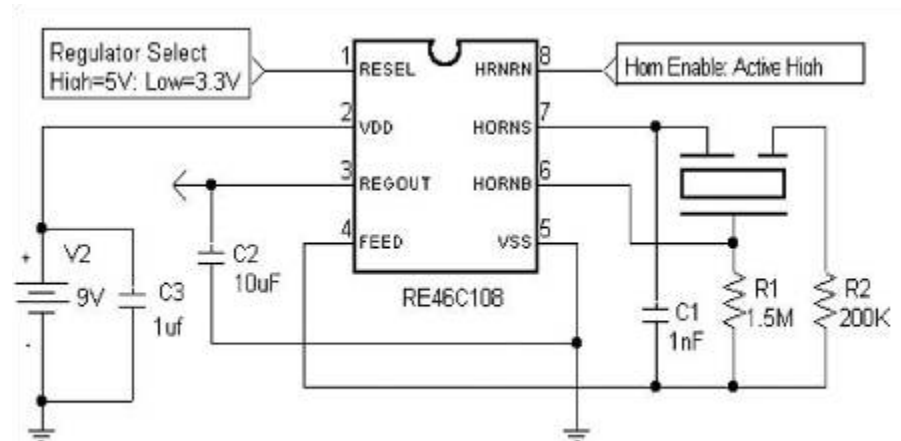
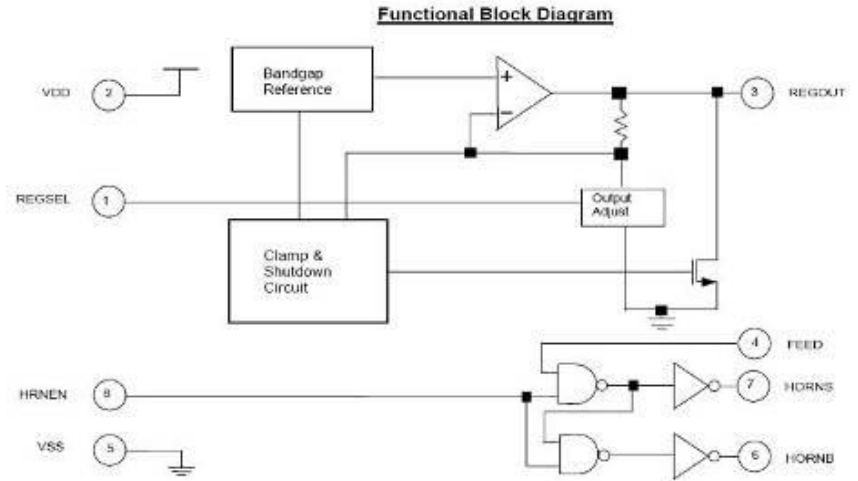
## Features:

- Low Quiescent Current
- 10V Up Converter
- Low Horn Driver  $R_{ON}$
- Voltage Regulation to 3.0V or 3.3V
- Low Battery Detection



## Features:

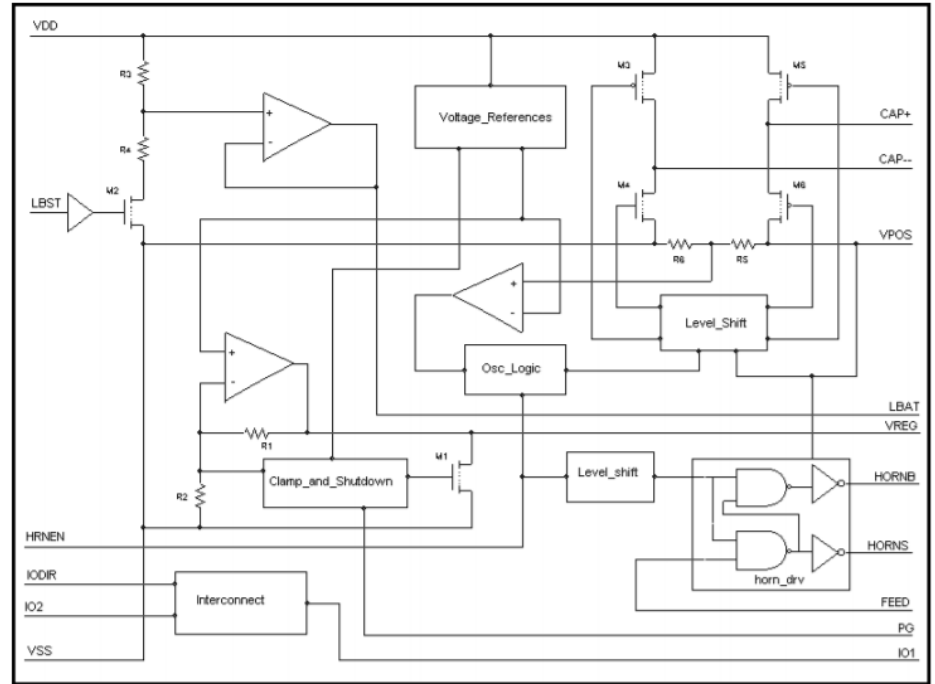
- Low Quiescent Current
- Low Horn Driver  $R_{ON}$
- Voltage Regulation to 3.3V or 5V
- Available in PDIP and SOIC packages



Typical Application Using Self Resonating Piezoelectric Horn

## Features:

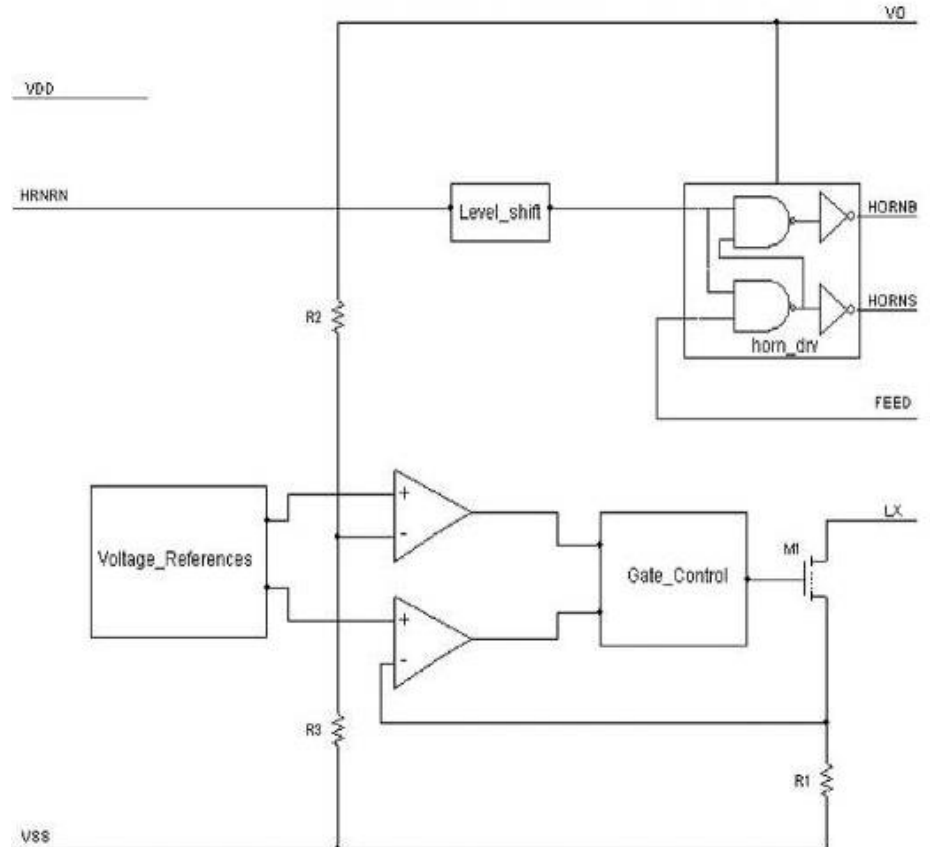
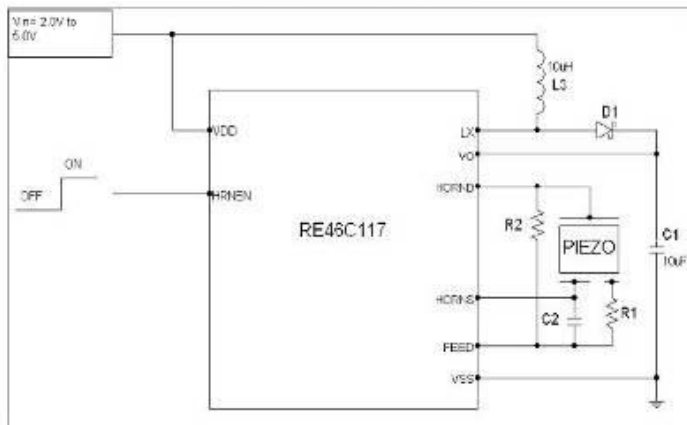
- Low Quiescent Current
- 12V Boost Regulator
- Low Horn Driver  $R_{ON}$
- 3V Regulator, other Options Available
- Low Battery Detection Interface
- Power Good and Brownout Circuits
- Device interconnection
- Available in PDIP and SOIC packages



## Features:

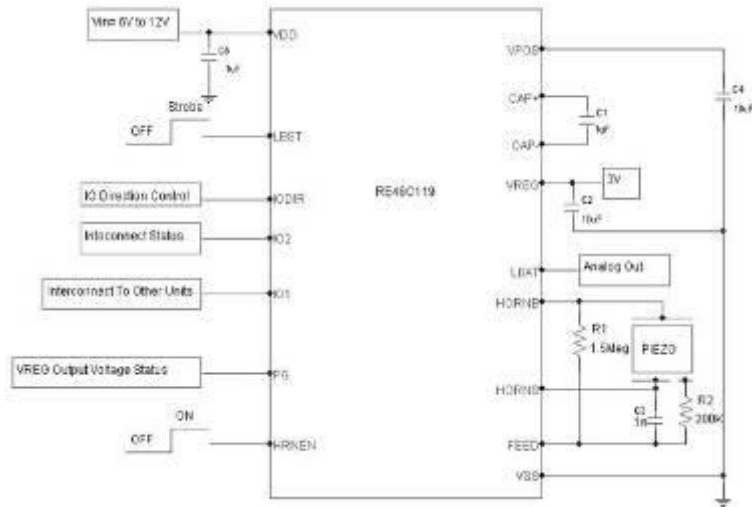
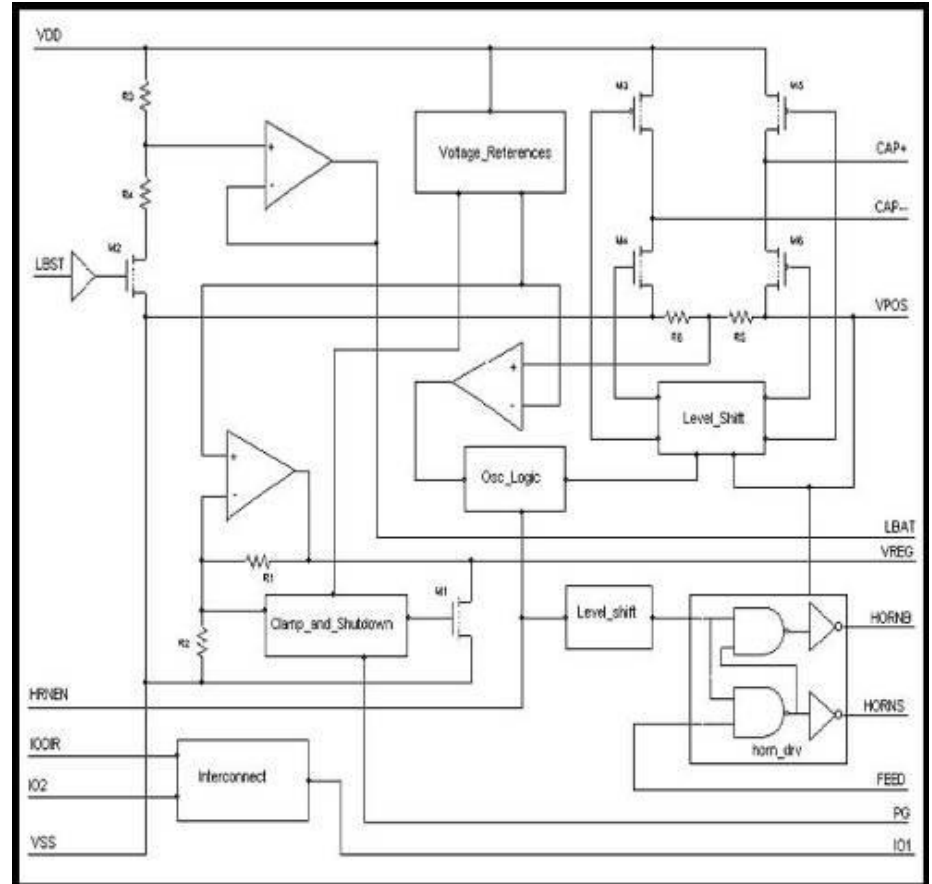
- Low Quiescent Current
- 10V Up Converter
- Low Horn Driver  $R_{ON}$
- Available in PDIP and SOIC Packages

Typical Application Circuit



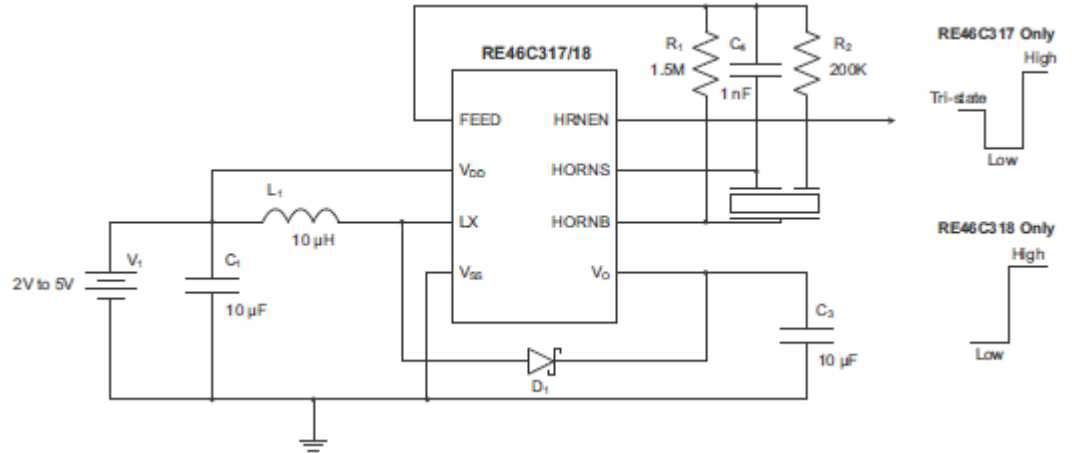
## Features:

- Low Quiescent Current
- 12V Boost Regulator
- Low Horn Driver  $R_{ON}$
- 3V Regulator, other Options Available
- Low Battery Detection Interface
- Power Good Circuit
- Device interconnection
- Available in PDIP and SOIC packages



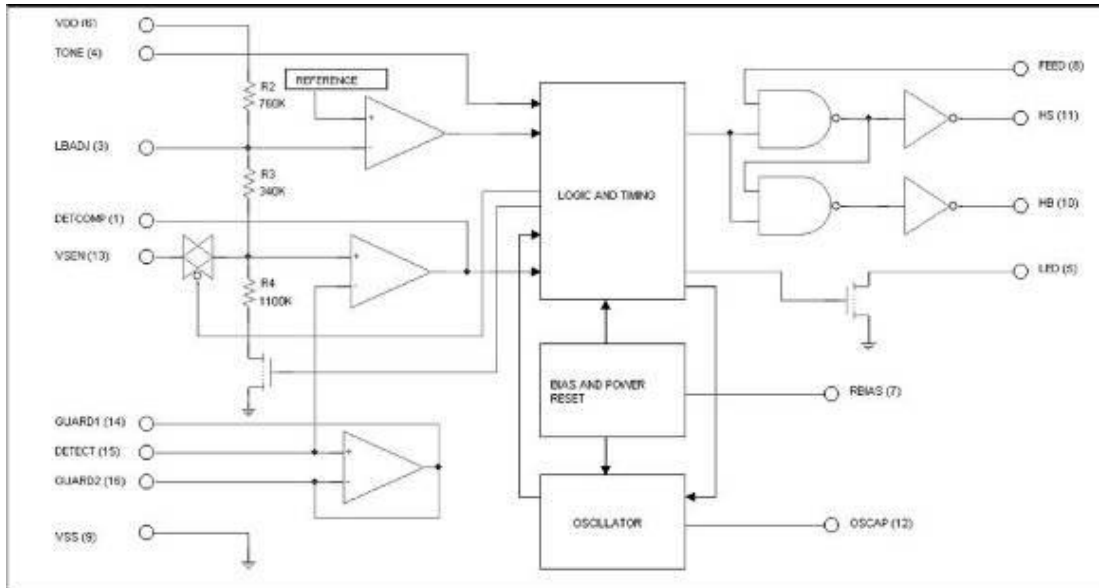
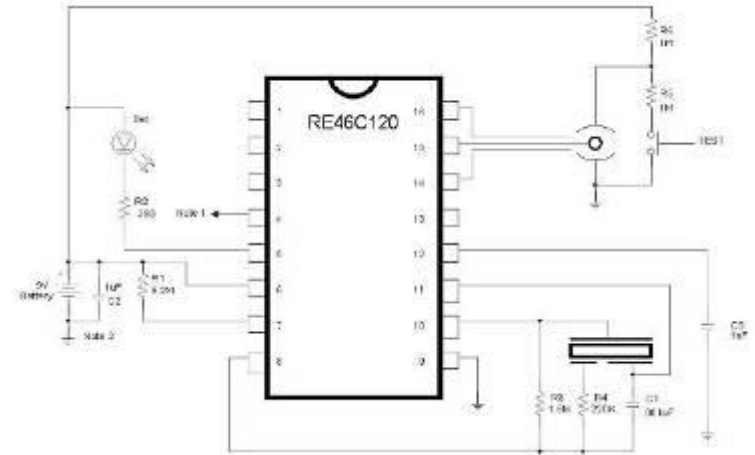
## Features:

- 3V Operation
- Low Quiescent Current
- 10V Up Converter
- Low Horn Driver  $R_{ON}$
- Horn Enable:
  - RE46C317: Three states
  - RE46C318: Two states
- Compatible with RE46C117
- Available in 8-lead PDIP and SOIC



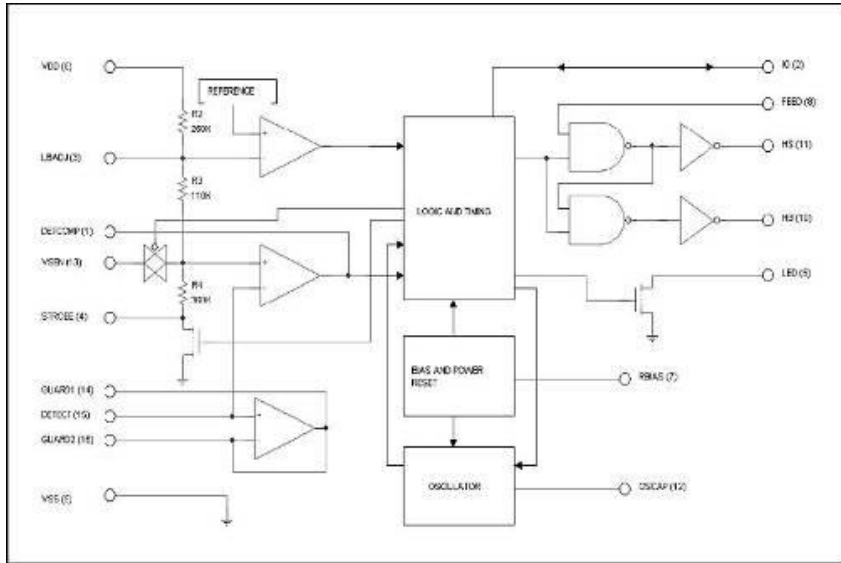
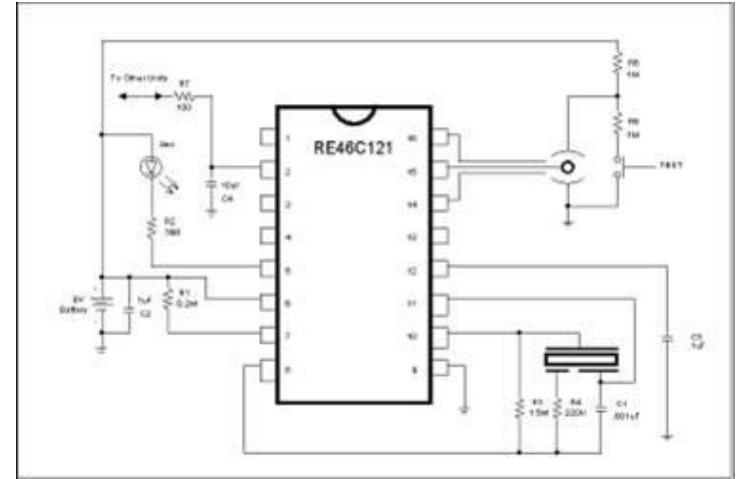
## Features:

- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Internal Reverse Battery Protection
- Internal Low Battery Detection
- Pin Selectable Horn Pattern
- Low Quiescent Current Consumption ( $< 6.5\mu\text{A}$ )
- 16-lead PDIP
- ESD Protection on all Pins



## Features:

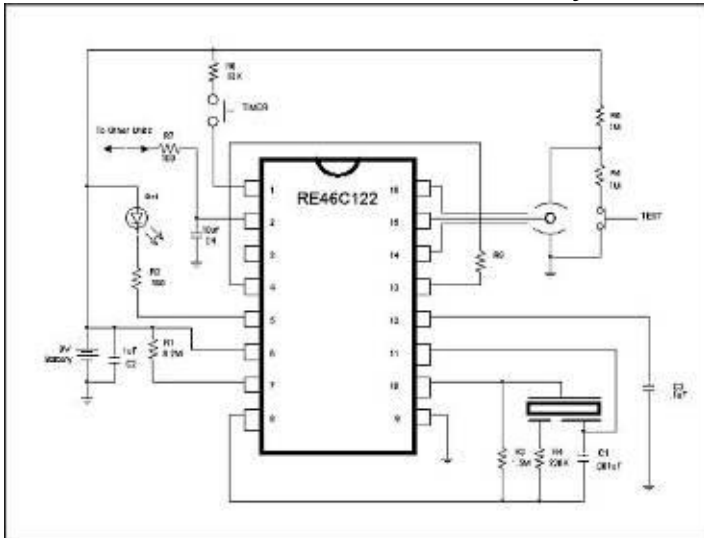
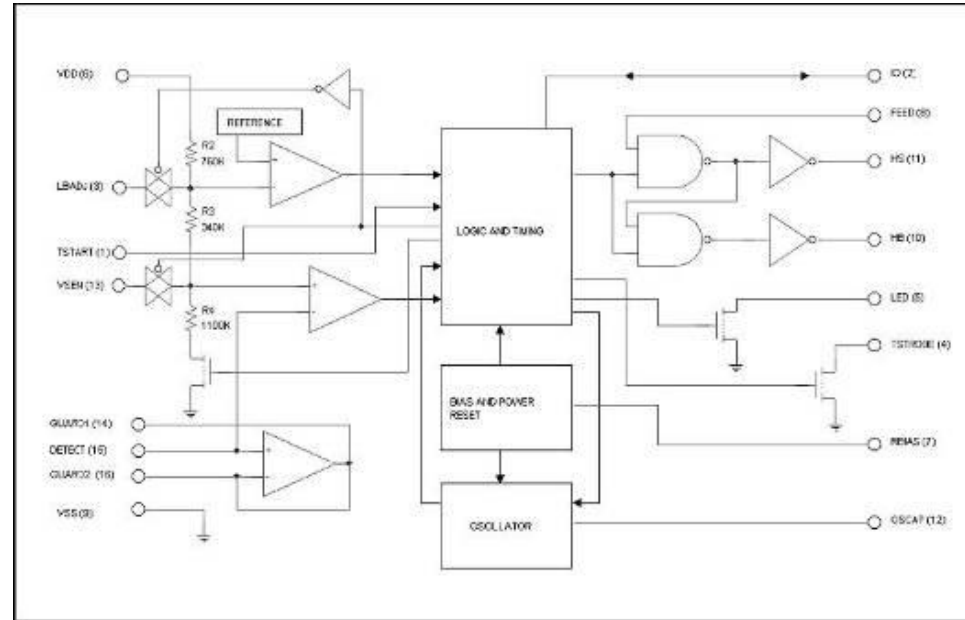
- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Internal Reverse Battery Protection
- Internal Low Battery Detection
- Low Quiescent Current Consumption ( $< 6.5\mu\text{A}$ )
- Available in 16-lead PDIP or 16-lead SOIC
- ESD Protection on all Pins
- Interconnect up to 40 Detectors





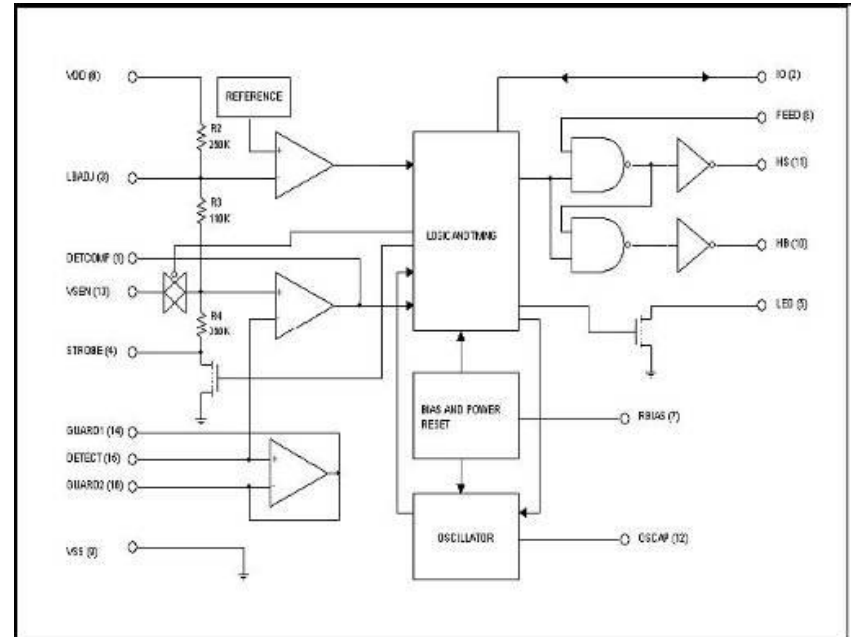
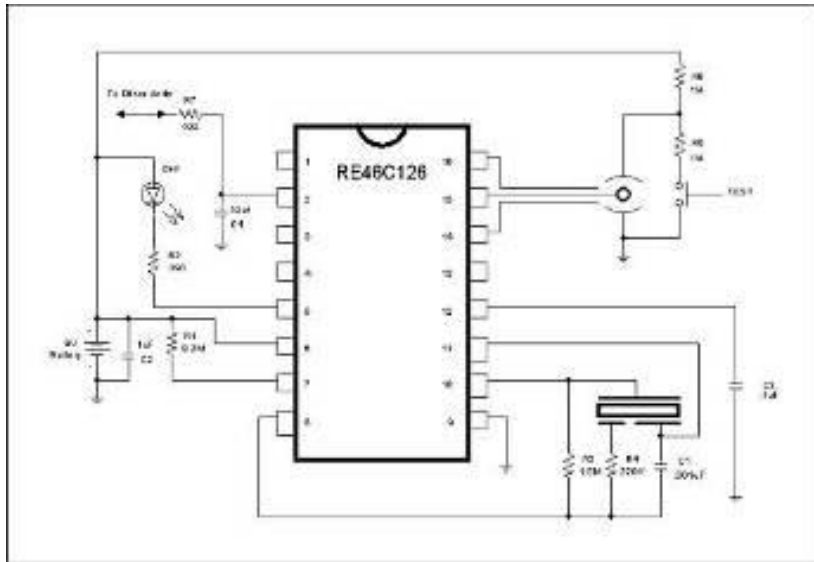
## Features:

- >1500V ESD Protection (HBM) on all Pins
- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Internal Reverse Battery Protection
- Low Quiescent Current:  $< 6.5\mu\text{A}$
- Packages: 16-lead PDIP or 16-lead SOIC
- Internal Low Battery Detection
- Power Up Low Battery Test
- Interconnect up to 40 Detectors
- 10 Minute Timer for Sensitivity Control



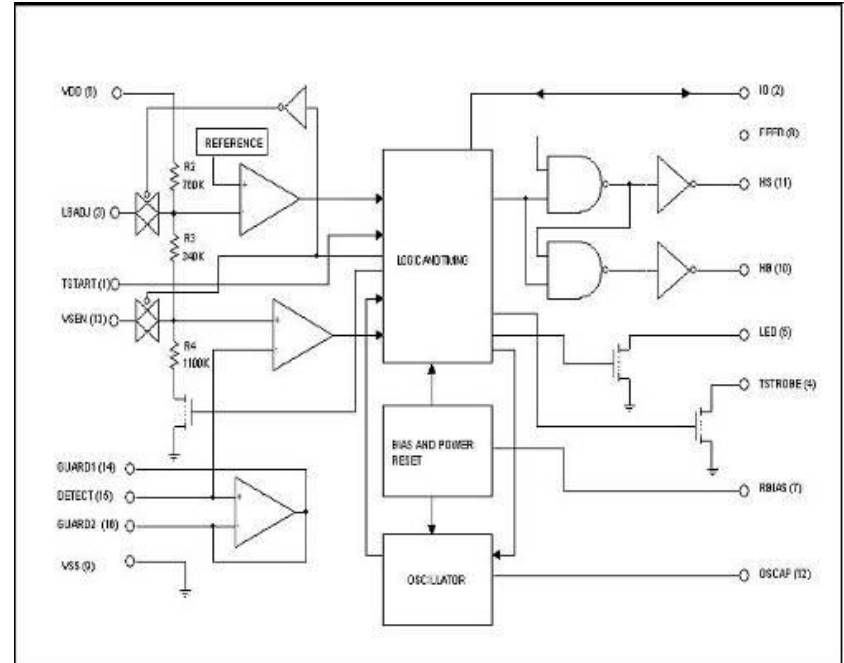
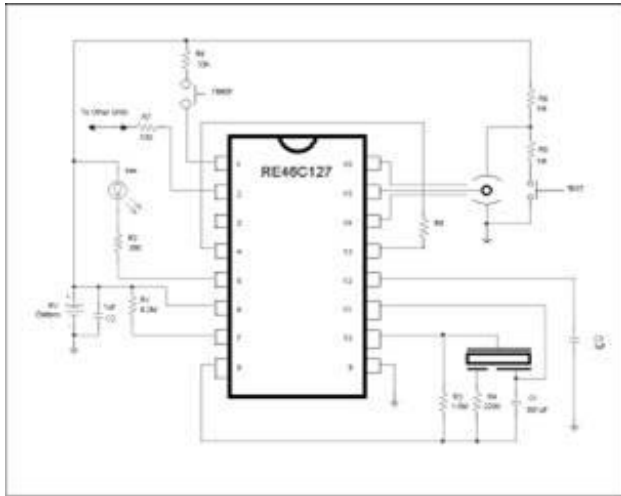
## Features:

- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Internal Reverse Battery Protection
- Internal Low Battery Detection
- Low Quiescent Current Consumption ( $< 6.5\mu\text{A}$ )
- Available in 16-lead PDIP or 16-lead SOIC
- ESD Protection on all Pins
- Interconnect up to 40 Detectors



## Features:

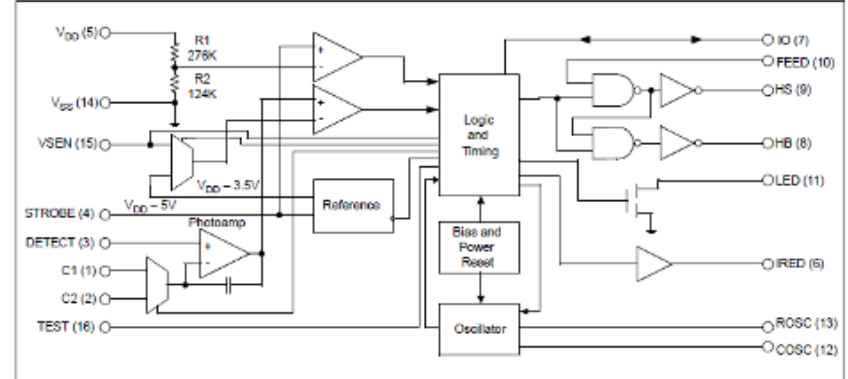
- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Internal Reverse Battery Protection
- Low Quiescent Current Consumption ( $< 6.5\mu\text{A}$ )
- Available in 16-lead PDIP or 16-lead SOIC
- ESD Protection on all Pins
- Internal Low Battery Detection
- Interconnect up to 40 Detectors
- 8 Minute Timer for Sensitivity Control



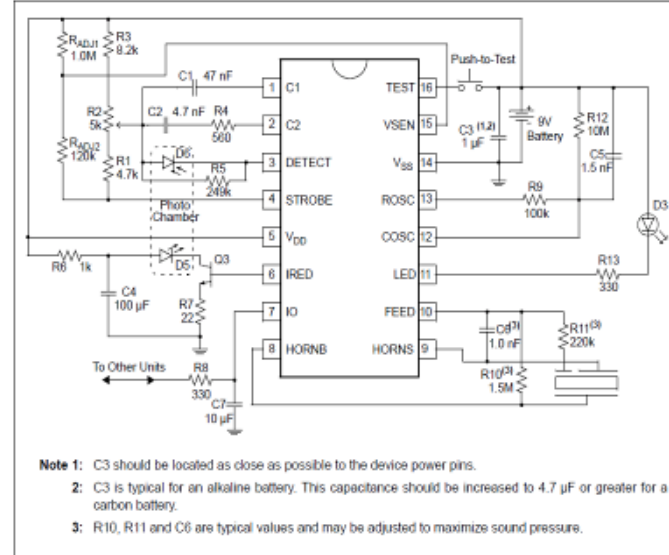
## Features:

- Temporal Horn Pattern or Continuous Tone
- Alarm Memory
- Sensitivity Control Times:
  - 9 minutes (RE46C165/6)
  - 1.2 minutes (RE46C167/8)
- I/O Filter and Charge Dump
- Interconnect up to 40 Detectors
- Internal Power-on Reset
- >2000V ESD Protection (HBM) on All Pins
- Low Quiescent Current Consumption (<8  $\mu$ A)
- Internal Low Battery Detection / Chamber Test
- RoHS Compliant Lead-Free Packaging:
  - PDIP, SOIC

Functional Block Diagram



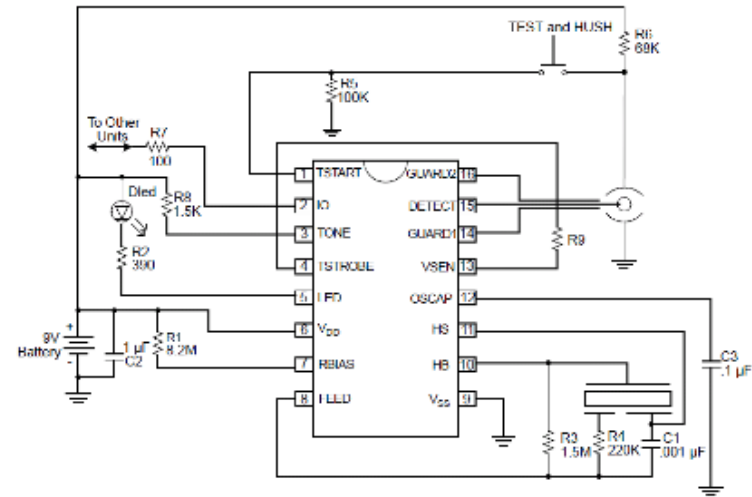
Typical Application



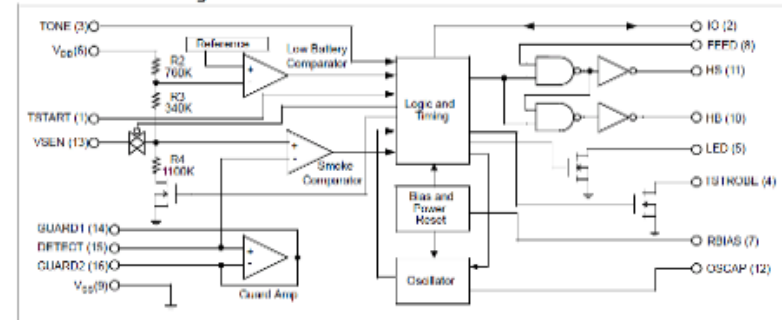
## Features:

- Pin Selectable Horn Patterns:
- Temporal or Continuous Horn Patterns
- Alarm Memory
- Sensitivity Control Timer:
  - 8 minute Timer for RE46C162
  - 1 minute Timer for RE46C163
- >1500V ESD Protection (HBM) on All Pins
- Guard Outputs for Ion Detector Input
- $\pm 0.75$  pA Detect Input Current
- Internal Reverse Battery Protection
- Low Quiescent Current Consumption ( $< 6.5$   $\mu$ A)
- I/O Filter and Charge Dump
- Internal Low Battery Detection
- Power-up Low Battery Test
- Interconnect up to 66 Detectors
- RoHS Compliant, Lead Free Packaging: PDIP

RE46C162 Typical Application – Temporal Horn Pattern

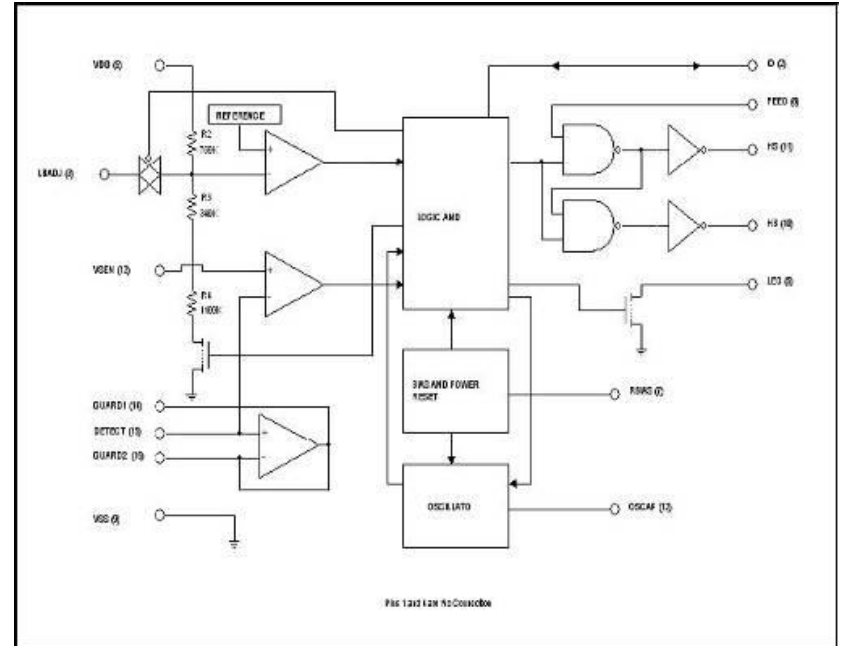
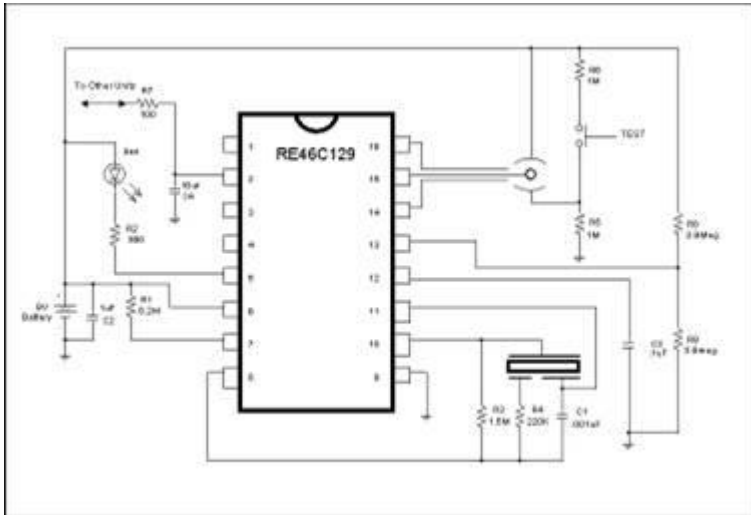


Functional Block Diagram



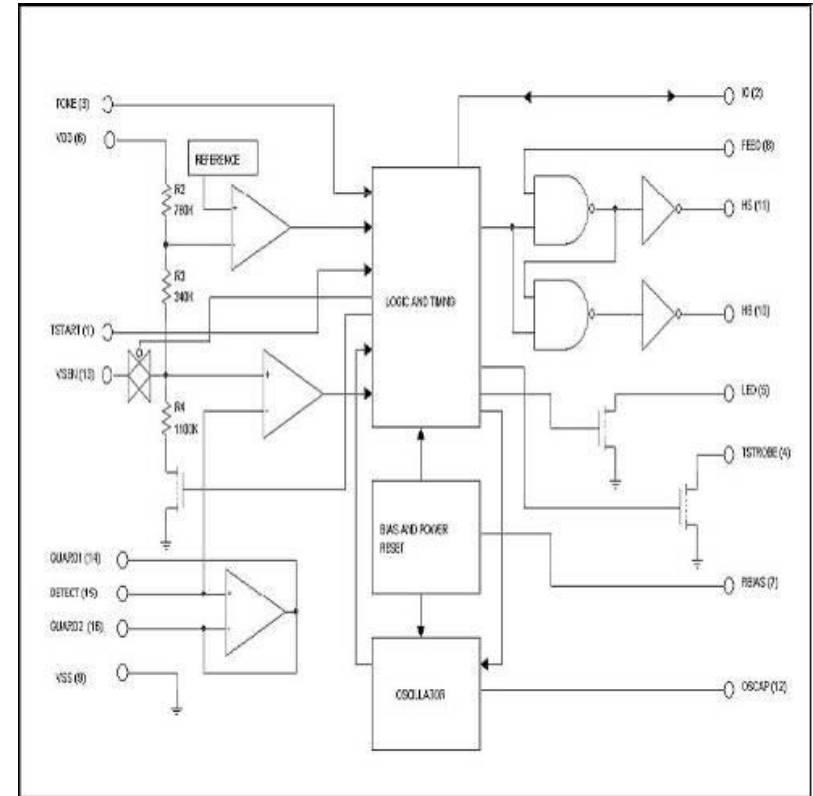
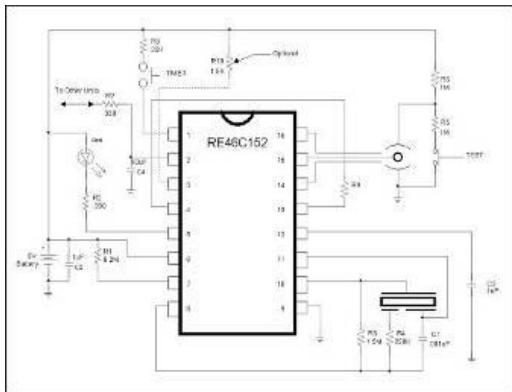
## Features:

- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Internal Reverse Battery Protection
- Low Quiescent Current Consumption ( $< 6.5\mu\text{A}$ )
- Available in 16-lead PDIP or 16-lead SOIC
- ESD Protection on all Pins
- Internal Low Battery Detection
- Interconnect up to 40 Detectors



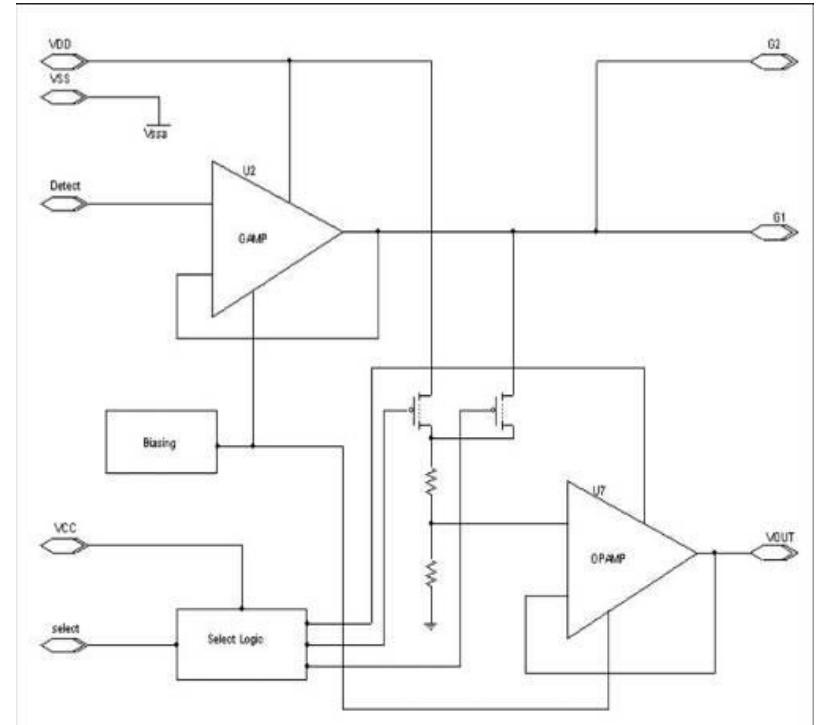
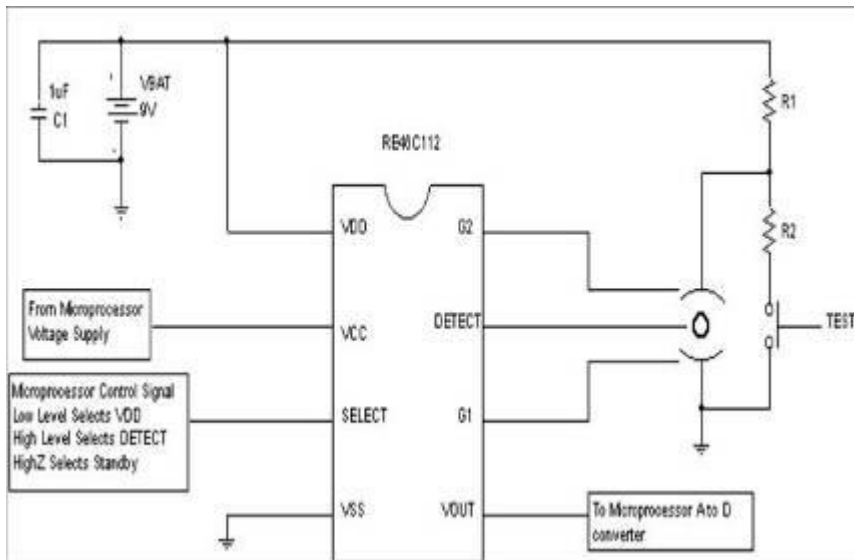
## Features:

- >1500V ESD Protection (HBM) on all Pins
- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Internal Reverse Battery Protection
- Low Quiescent Current Consumption ( $< 6.5\mu\text{A}$ )
- Available in 16-lead PDIP package
- Internal Low Battery Detection
- Power Up Low Battery Test
- Interconnect up to 40 Detectors
- Pin selectable horn patterns
- 8 Minute Timer for Sensitivity Control



## Features:

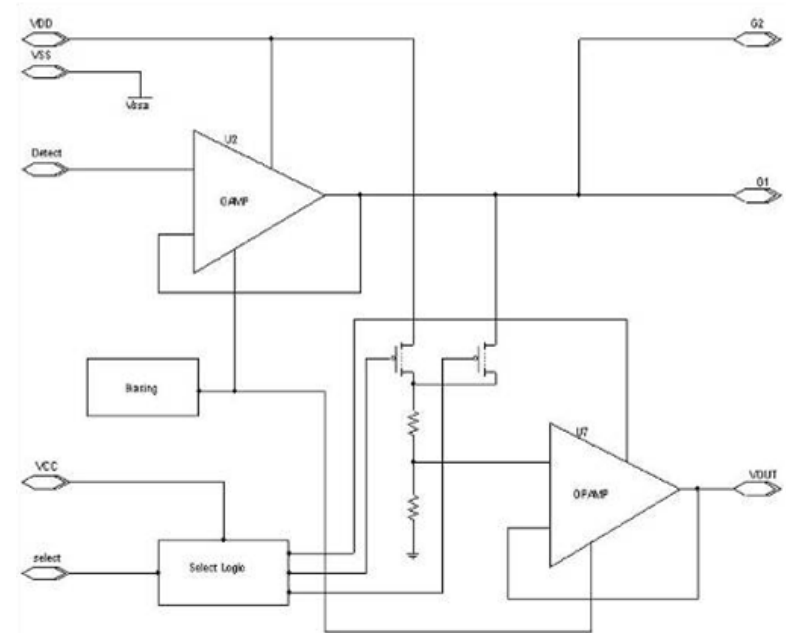
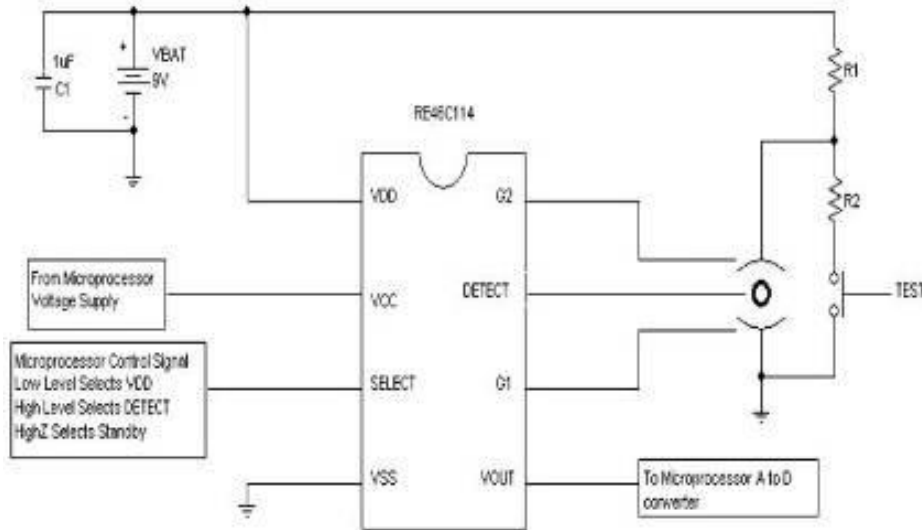
- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Microprocessor A/D Compatible Analog Output
- Low Quiescent Current Consumption ( $< 10\mu\text{A}$ )
- Available in 8-lead PDIP or 8-lead SOIC
- 2000V ESD Protection (HBM)





## Features:

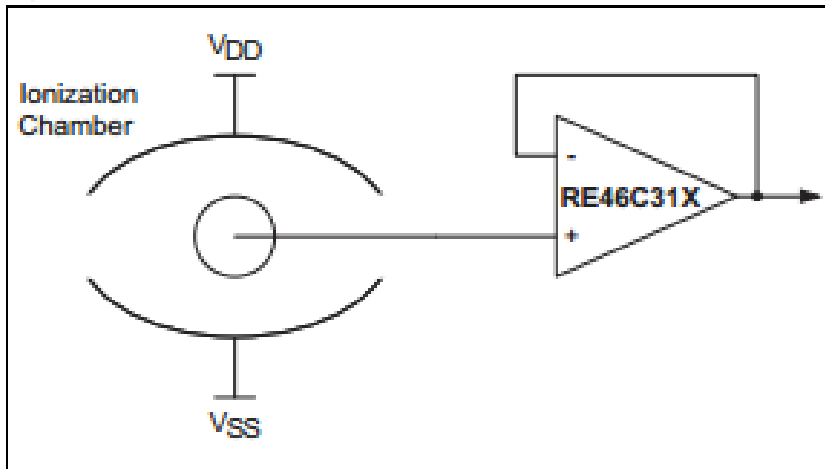
- Guard Outputs for Ion Detector Input
- $\pm 0.75\mu\text{A}$  Detect Input Current
- Microprocessor A/D Compatible Analog Output
- Low Quiescent Current Consumption ( $< 10\mu\text{A}$ )
- Available in 8-lead PDIP or 8-lead SOIC
- 2000V ESD Protection (HBM)



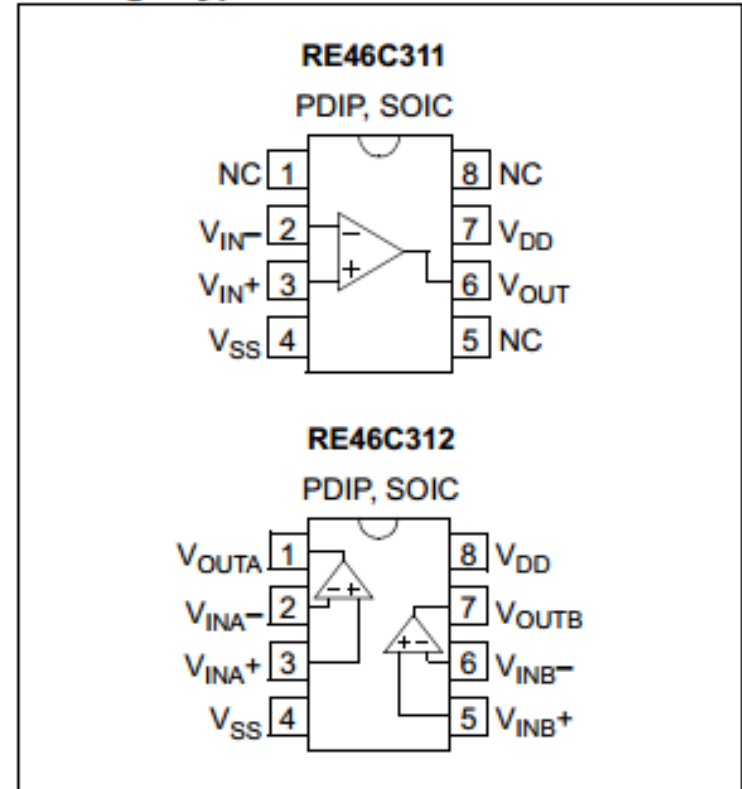
## Features:

- Low Quiescent Current: 600 nA/Amplifier (typical)
- Rail-to-Rail Input/Output
- Gain Bandwidth Product: 10 kHz (typical)
- Wide Supply Voltage Range: 1.8V to 5.5V
- Unity Gain Stable
- Temperature Ranges: -10°C to +60°C
- Single: RE46C311
- Dual: RE46C312

## Typical Application

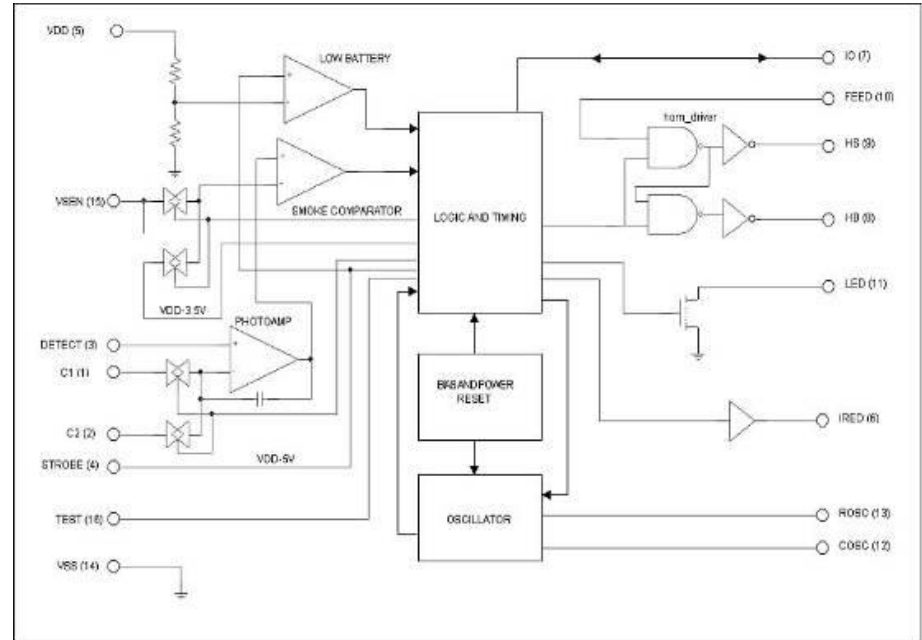
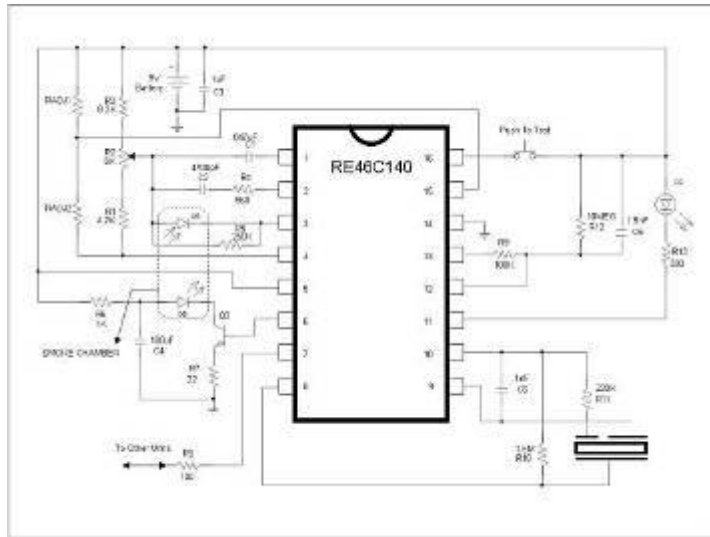


## Package Types



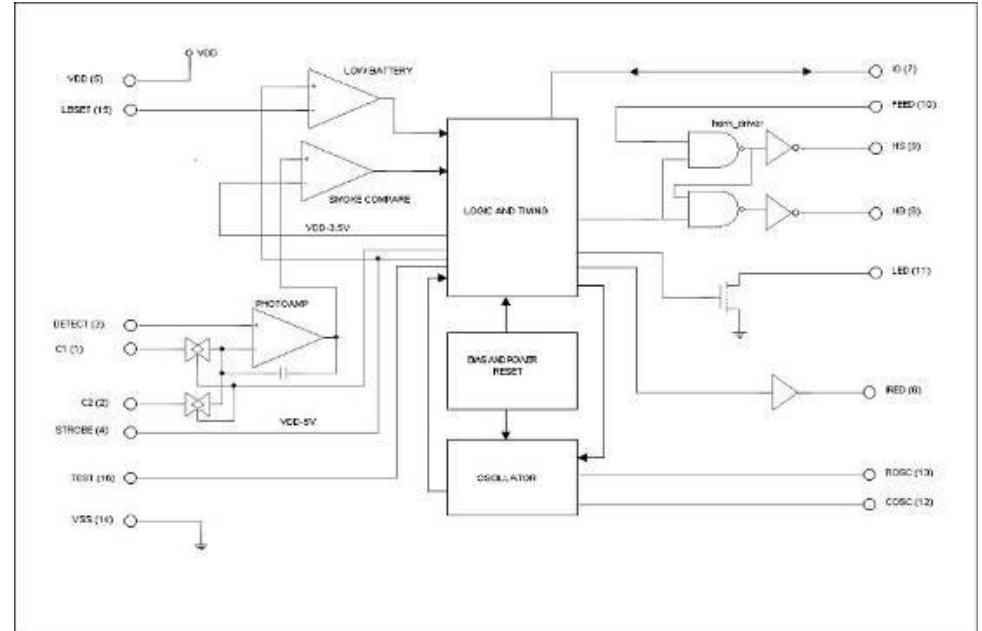
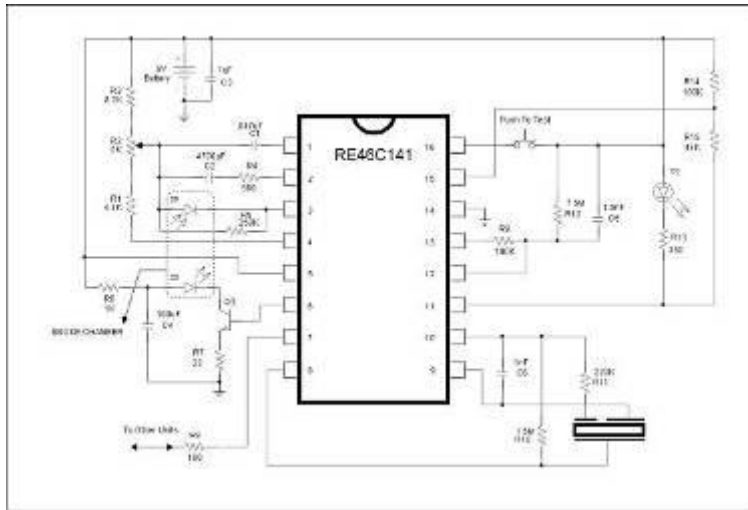
## Features:

- Internal Power On Reset
- Low Quiescent Current Consumption
- Available in 16-lead PDIP or SOIC
- ESD Protection on all Pins
- Interconnect up to 40 Detectors
- 10 Minute Timer for Sensitivity Control
- Temporal Horn Pattern
- Internal Low Battery and Chamber Test



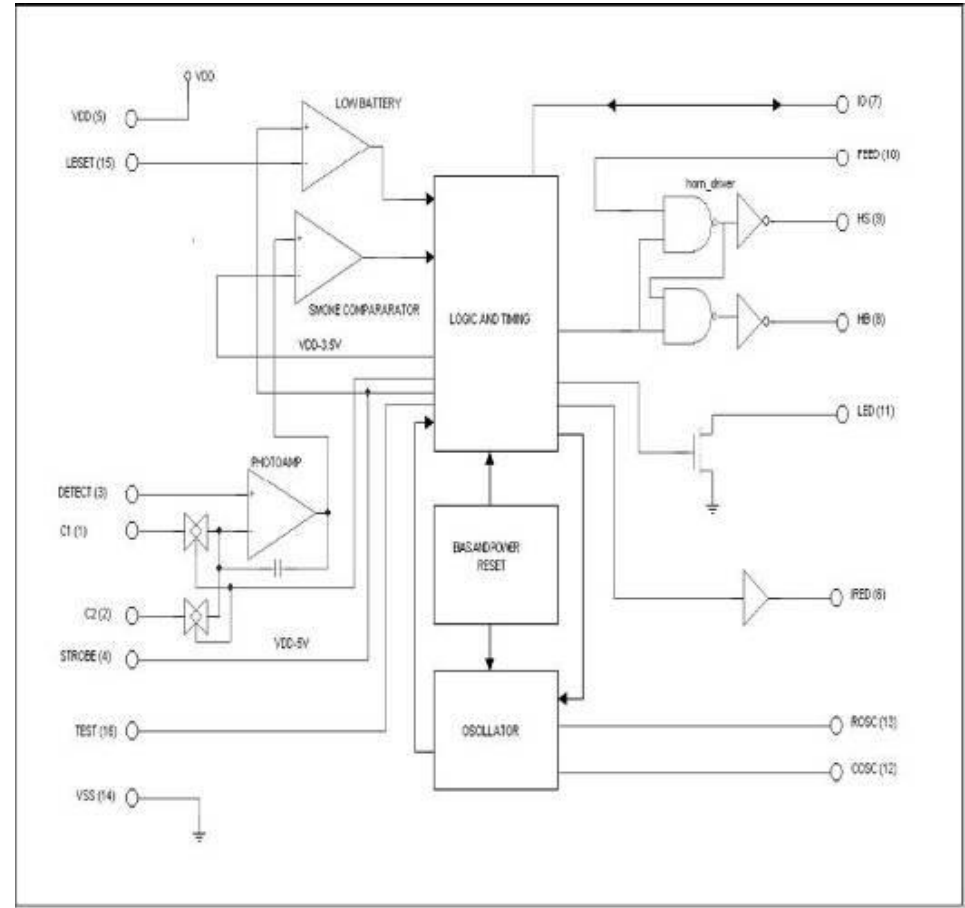
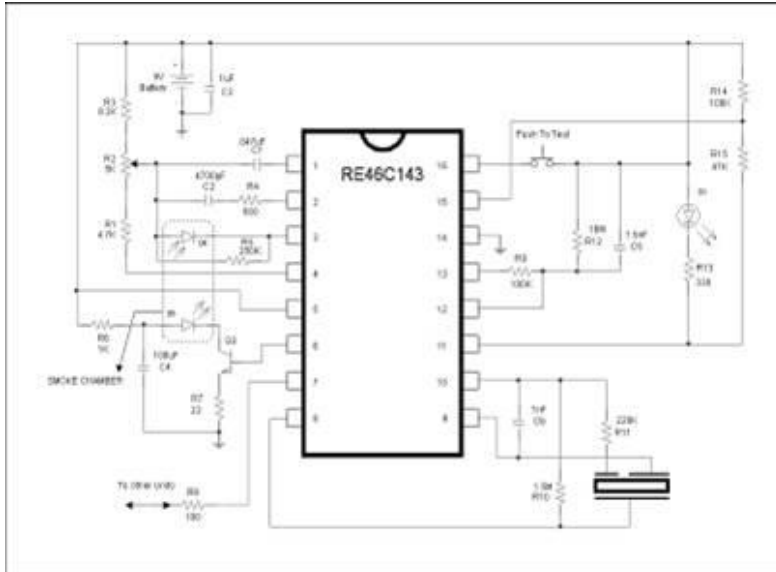
## Features:

- Internal Power On Reset
- Low Quiescent Current Consumption
- Available in 16-lead PDIP or SOIC
- ESD Protection on all Pins
- Interconnect up to 40 Detectors
- Temporal Horn Pattern
- Low Battery and Chamber Test



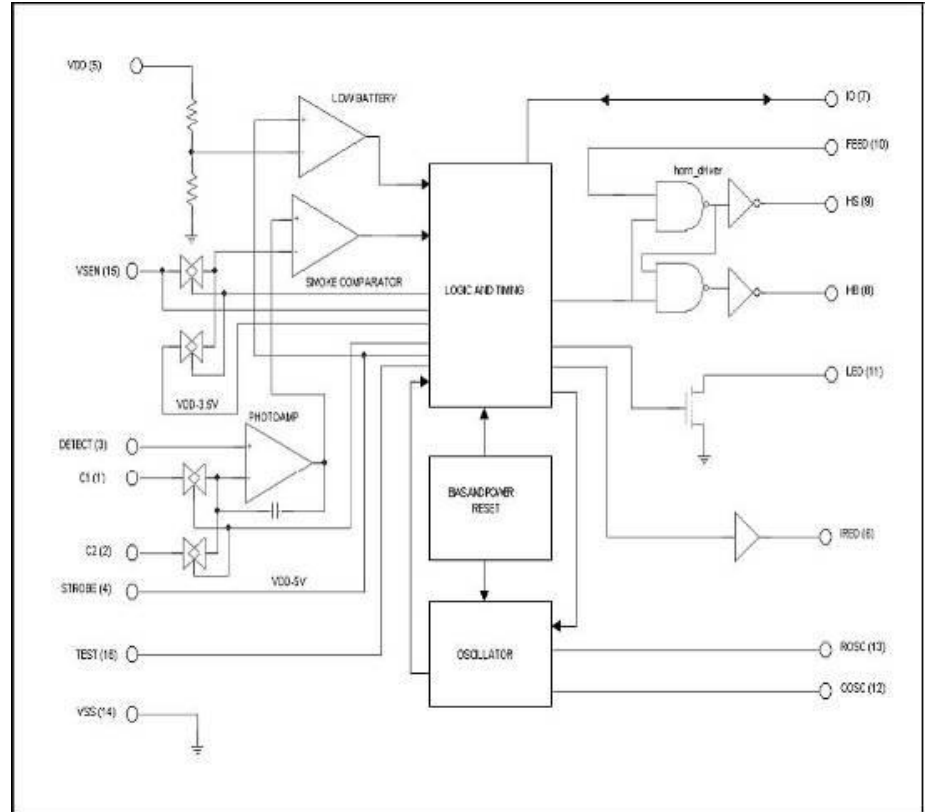
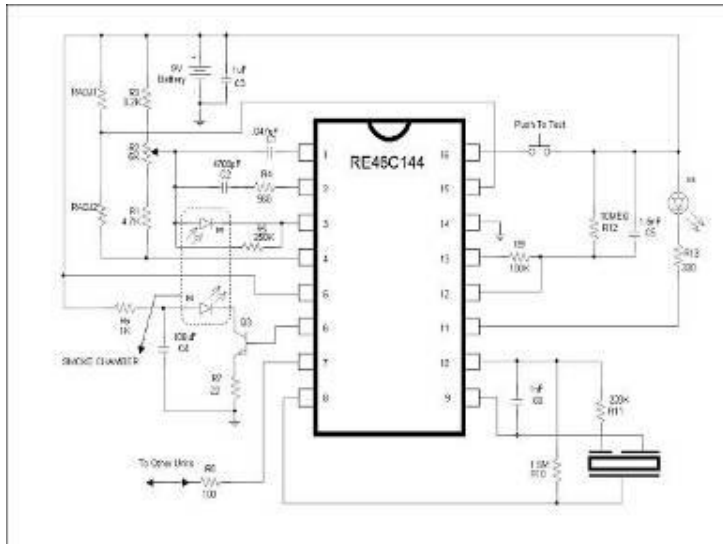
## Features:

- Internal Power On Reset
- Low Quiescent Current Consumption
- Available in 16-lead PDIP or SOIC
- ESD Protection on all Pins
- Interconnect up to 40 Detectors
- Continuous Horn Pattern
- Low Battery and Chamber Test



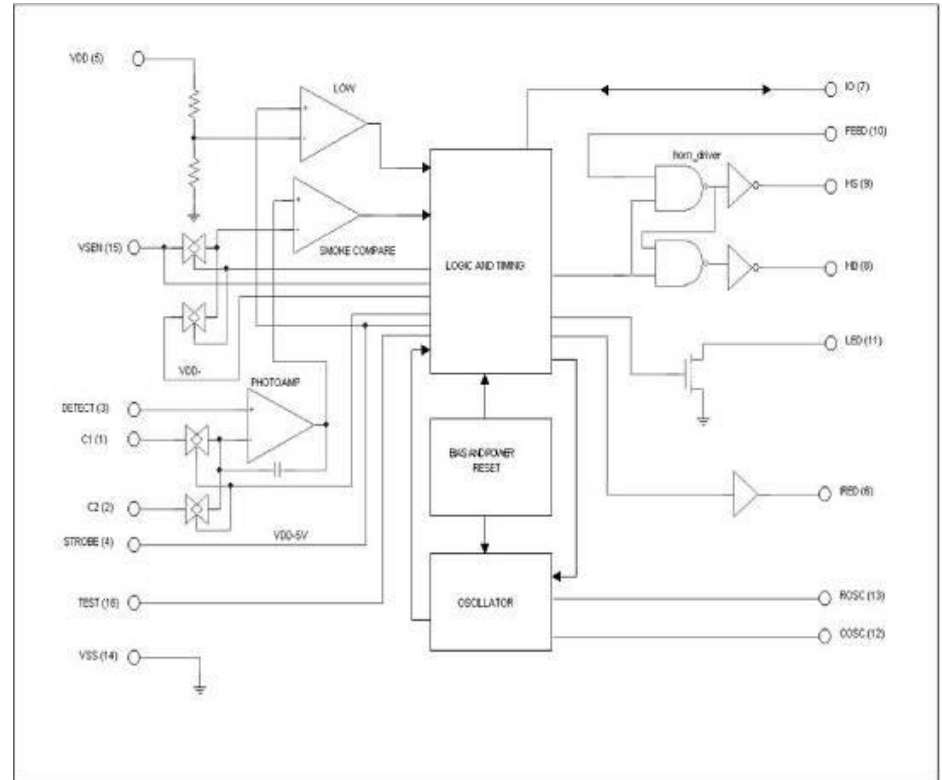
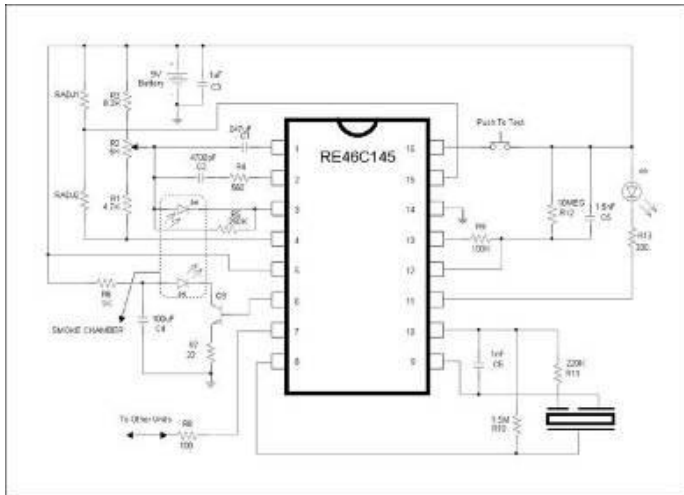
## Features:

- Internal Power On Reset
- Low Quiescent Current Consumption
- Available in 16-lead PDIP or SOIC
- ESD Protection on all Pins
- Interconnect up to 40 Detectors
- 10 Minute Timer for Sensitivity Control
- Continuous Horn Pattern
- Internal Low Battery and Chamber Test



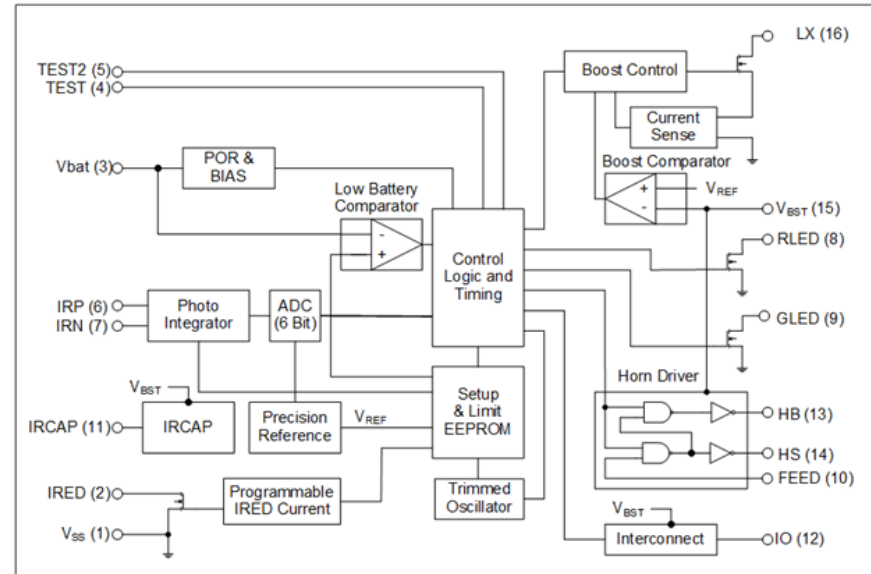
## Features:

- Internal Power On Reset
- Low Quiescent Current Consumption
- Available in 16-lead PDIP or SOIC
- ESD Protection on all Pins
- Interconnect up to 40 Detectors
- 10 Minute Timer for Sensitivity Control
- Temporal Horn Pattern
- Internal Low Battery and Chamber Test
- Alternate Diagnostic Mode



## Features:

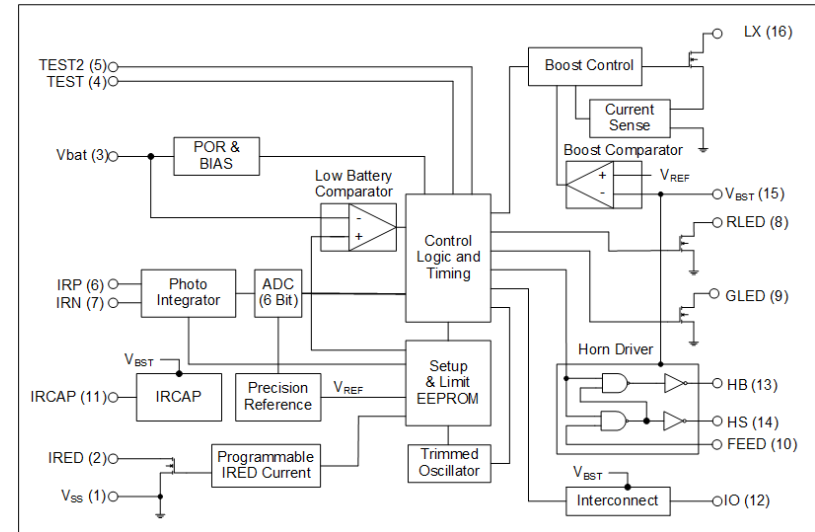
- Two AA battery Operation
- Low Quiescent Current Consumption
- Programmable IRED Current
- Programmable Photo Amplifier
- 6-Bit ADC
- Programmable Smoke Alarm Levels
- Long Term Drift Adjustment
- 9 Minute Timer for Sensitivity Control
- Chamber Test with Programmable Alarm Level
- Low Battery Test with Programmable Threshold
- Interconnect up to 40 Detectors
- Local Alarm Memory
- Temporal or Continuous Horn Pattern
- 10 Year End of Life Indicator
- Pin-for-Pin Compatible with the RE46C190





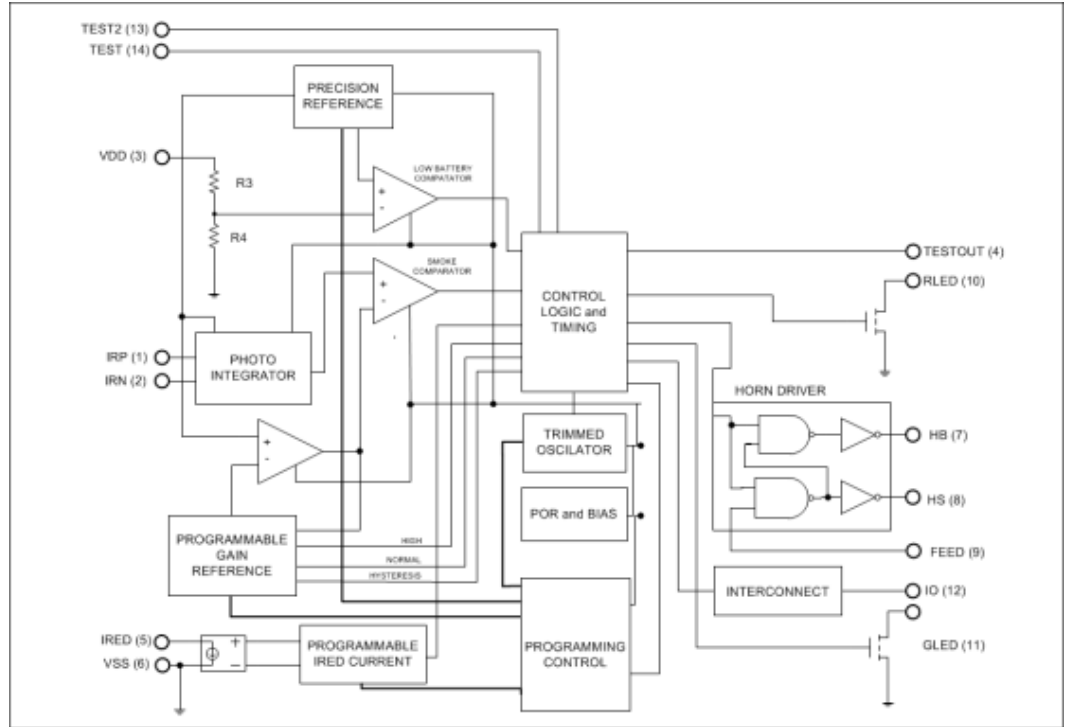
## Features:

- Two AA battery Operation
- Low Quiescent Current Consumption
- Programmable IRED Current
- Programmable Photo Amplifier
- 6-Bit ADC
- Programmable Smoke Alarm Levels
- Long Term Drift Adjustment
- 9 Minute Smart Hush
- Hush with No Alarm
- Chamber Test with Programmable Alarm Level
- Low Battery Test with Programmable Threshold
- Interconnect up to 40 Detectors
- Local Alarm Memory
- Temporal or Continuous Horn Pattern
- CO Temporal Horn Pattern
- Pin-for-Pin Compatible with the RE46C190/1



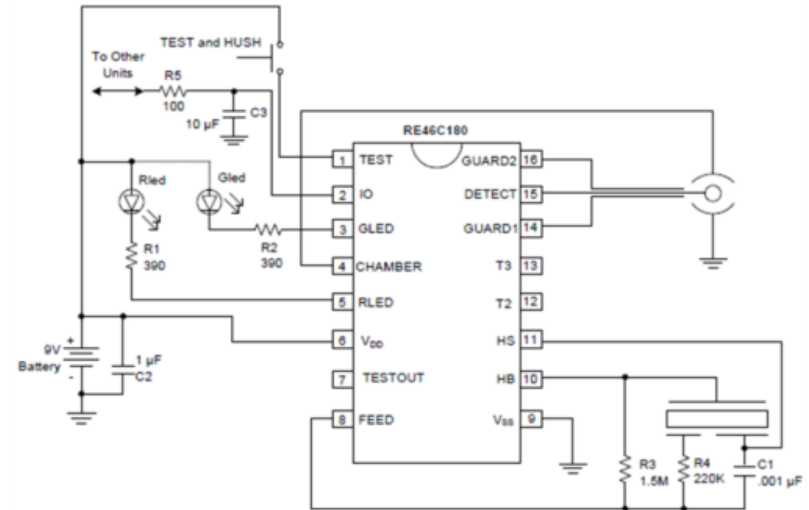
## Features:

- 6.5 - 12V Operation
- Low Quiescent Current
- Programmable IRED Current
- Programmable Photo Amplifier
- Programmable Alarm Levels
- 6-Bit ADC
- Long Term Drift Adjustment
- Programmable Low Battery Test
- Programmable Low Battery Hush
- Programmable Horn Pattern
- Horn Synchronization
- Automatic Alarm Locate
- 10-year End-of-Life Indication
- Local Alarm Memory
- Smart IO for CO alarm option
- 9 Minute or 80 Second Hush Timer
- Smart HUSH option



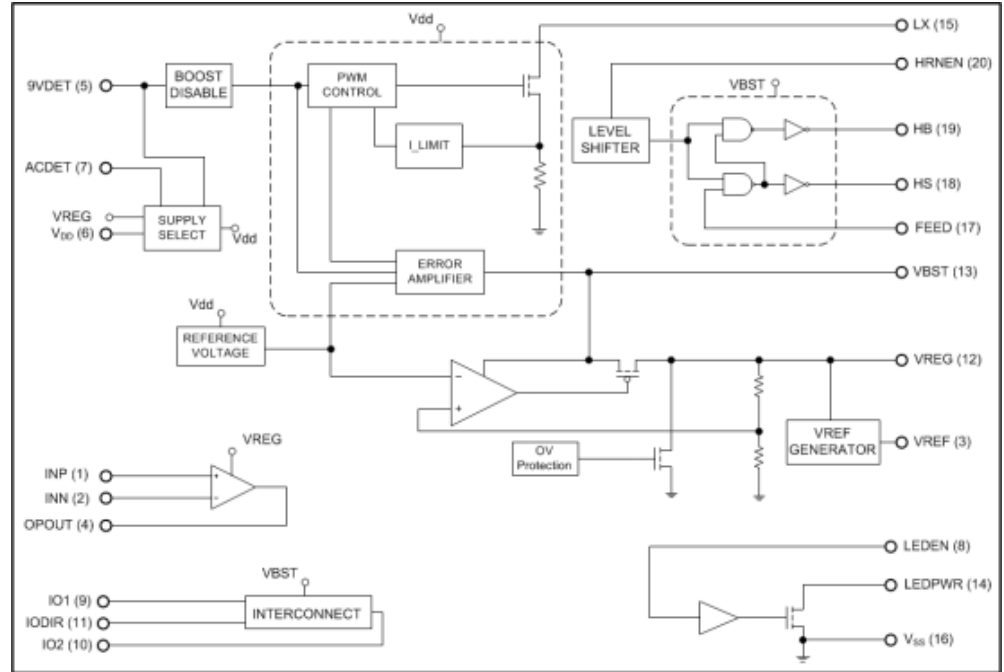
## Features:

- 6 – 12V Operation
- Low Quiescent Current Consumption
- Programmable Standby and HUSH Sensitivity
- Programmable Hysteresis
- Programmable Chamber Voltage for Push-to-Test (PTT) and Chamber Test
- Programmable  $\pm 150$  mV Low Battery Set Point
- Internal Ionization Chamber Test
- Internal Low Battery Test
- Internal Power-On Reset and Power-up Low
- Alarm Memory, Auto Alarm Locate
- Horn Synchronization
- IO Filter and Charge Dump
- Smart Interconnect, up to 40 Detectors
- $\pm 5\%$  All Internal Oscillator
- 9 Minute or 80 Second Timer
- Temporal or Continuous Horn Pattern
- Guard Outputs for Ion Detector Input
- $\pm 0.75$  pA Detect Input Current
- 10-year End-of-Life Indication



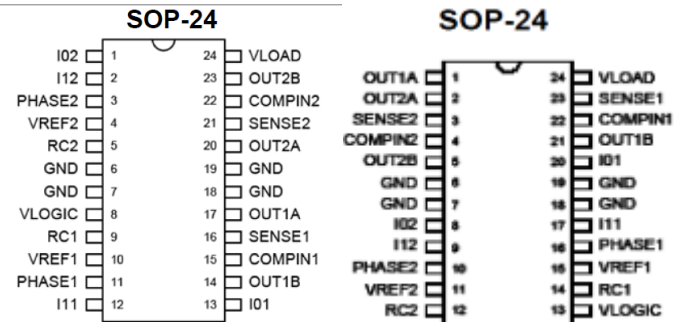
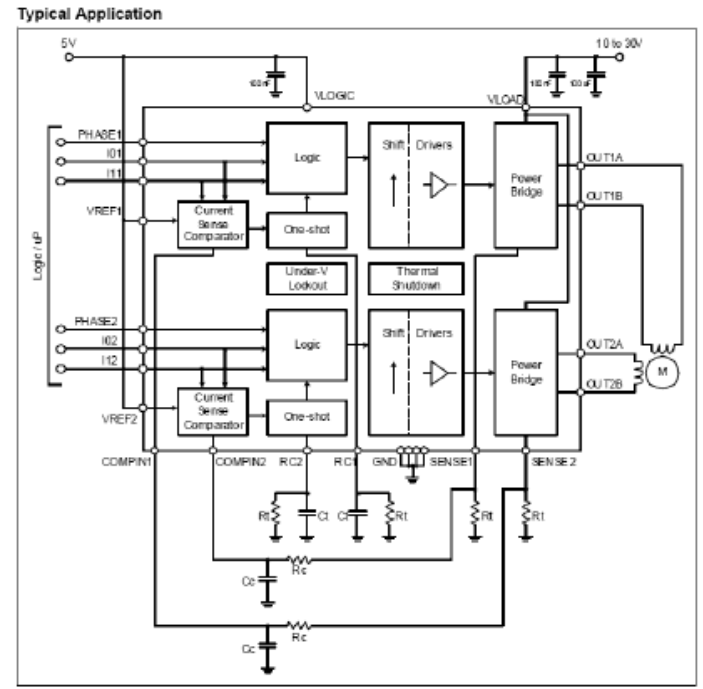
## Features:

- Low Quiescent Current
- Operation from 2V to 12V
- 9.8V Boost Regulator
- Horn Driver
- LED Driver
- Bidirectional Interconnect
- 3.3V Regulator
- Internal Operation Amplifiers
  - $\pm 1\text{mV}$  Input Offset
  - Rail to Rail Input and Output
  - 10kHz Gain Bandwidth Product
  - Unity Gain Stable
- Package: 20-lead SSOP



## Features:

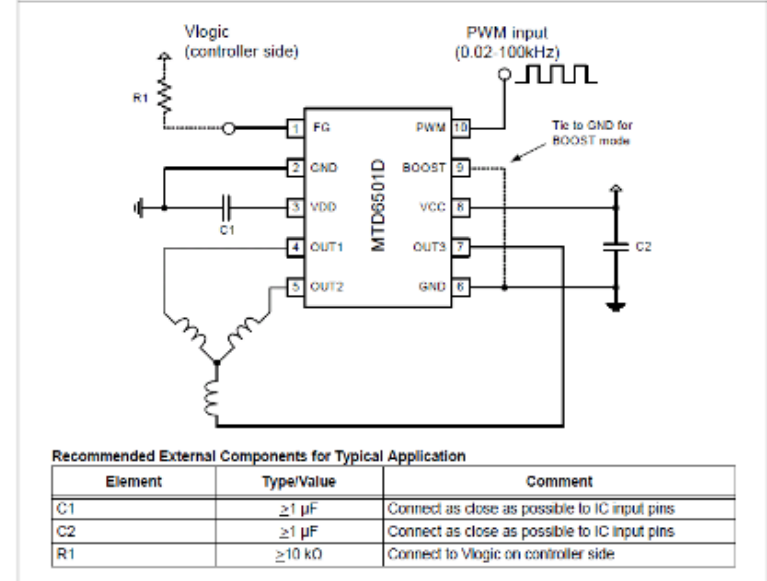
- Able to drive both windings of a bipolar stepper –  
- motor
- Load voltage supply range: 10V to 40V
- Output current upto 750mA (each bridge)
- Internal fixed Toff time PWM current control
- Built-in protection diodes
- Internal thermal shutdown
- Under-voltage lockout
- LS-TTL compatible logic inputs with pull up –  
- resistors
- Low Ron output resistance
- Low quiescent current



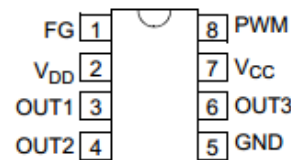
## Features:

- Position sensorless BLDC drivers (no Hall – - sensor required)
- 180° sinusoidal drive, for high efficiency and – - low acoustic noise
- Support 2V to 14V power supplies
- Speed control through PAM and/or PWM
- Built-in frequency generator
- Built-in lockup protection and automatic – - recovery circuit (external capacitor not – - necessary)
- Built-in over current limitation and short circuit – - protection
- Built-in thermal shutdown protection
- No external tuning required
- Boost Mode (Optional BEMF Pre-Amplification – - in MTD6501D)
- 20 kHz (MTD6501C/D), 23 kHz (MTD6501G)

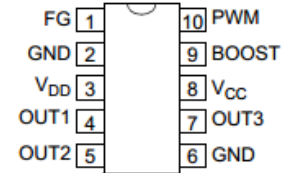
Typical Application – Fan Motor Driver Using the MTD6501D



MTD6501C, MTD6501G  
SOP-8

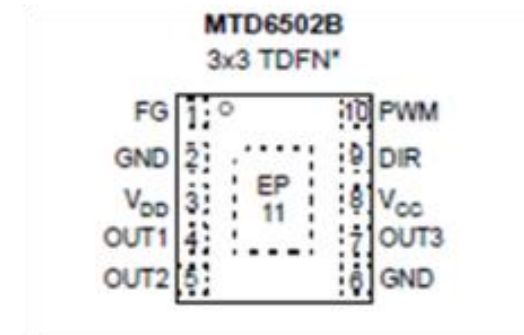
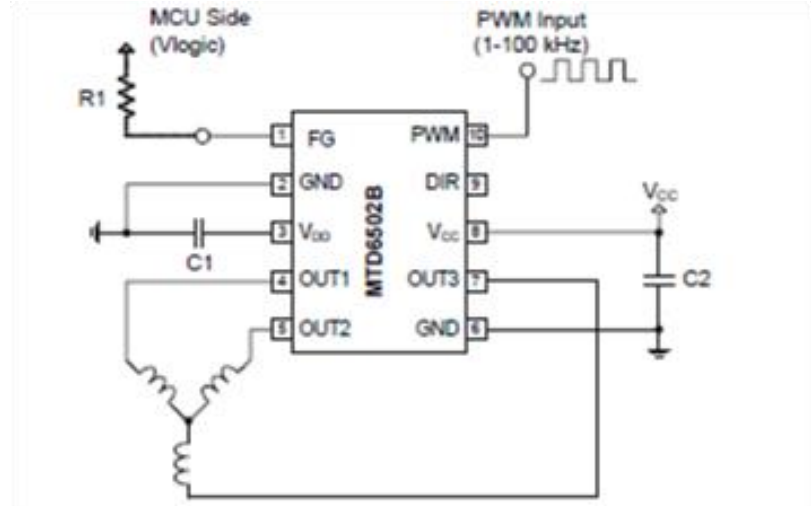


MTD6501D  
MSOP



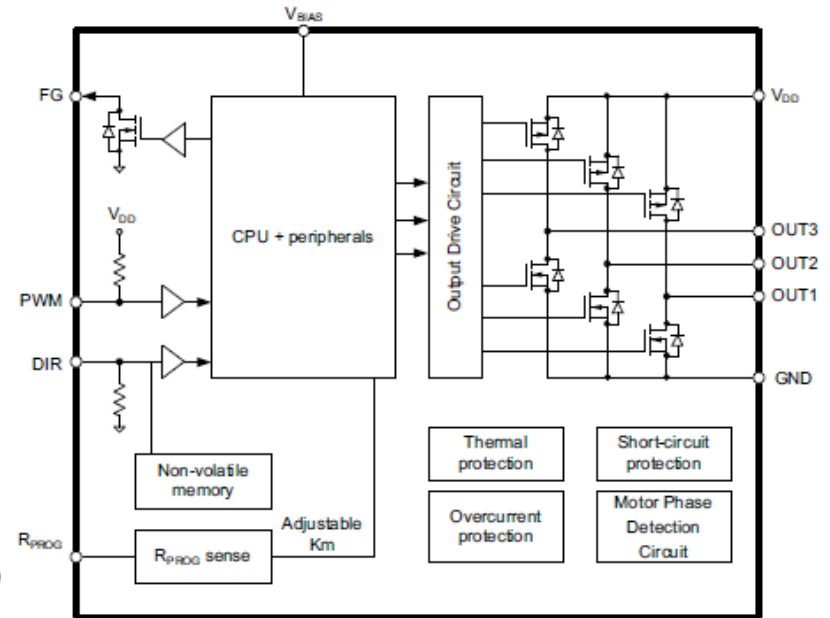
## Features:

- Position Sensorless BLDC Drivers (No Hall – - Sensor Required)
- 180° Sinusoidal Drive for High Efficiency and – - Low Acoustic Noise
- Support 2V to 5.5V Power Supplies
- Direction Control:
  - Forward direction: connect DIR pin to GND - - or leave floating
  - Reverse direction: connect DIR pin to  $V_{DD}$
- Speed Control through Power Supply Modulation – - (PSM) and/or Pulse-Width Modulation (PWM)
- Built-in Frequency Generator (FG Output Signal)
- Built-in Lock-up Protection and Automatic
- Recovery Circuit (External Capacitor not – - Necessary)
- Built-in Over Current Limitation
- Built-in Thermal Shutdown Protection
- No External Tuning Required
- 10-lead 3x3 TDFN
- Extended Temperature Range: -40°C to +125°C

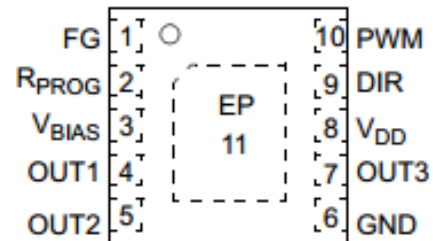


## Features:

- 180° Sinusoidal Drive
  - High efficiency low acoustic noise
- Position Sensorless BLDC Drivers
- Integrated Power Transistors
- Supports 2V to 5.5V Power Supplies
- Programming Resistor (RPROG) setting
- Direction Control:
- Speed Control through Power Supply –
  - Modulation (PSM) and/or Pulse-Width –
  - Modulation (PWM)
- Built-in Frequency Generator (FG Output Signal)
- Built-in Lockup Protection and Automatic –
  - Recovery Circuit
- Built-in Overcurrent Limitation
- Built-in Thermal Shutdown Protection
- Built-in Over Voltage Protection
- No External Tuning Required
- Extended Temperature Range: -40°C to +125°C
- 10-Lead 3mm x 3mm UDFN



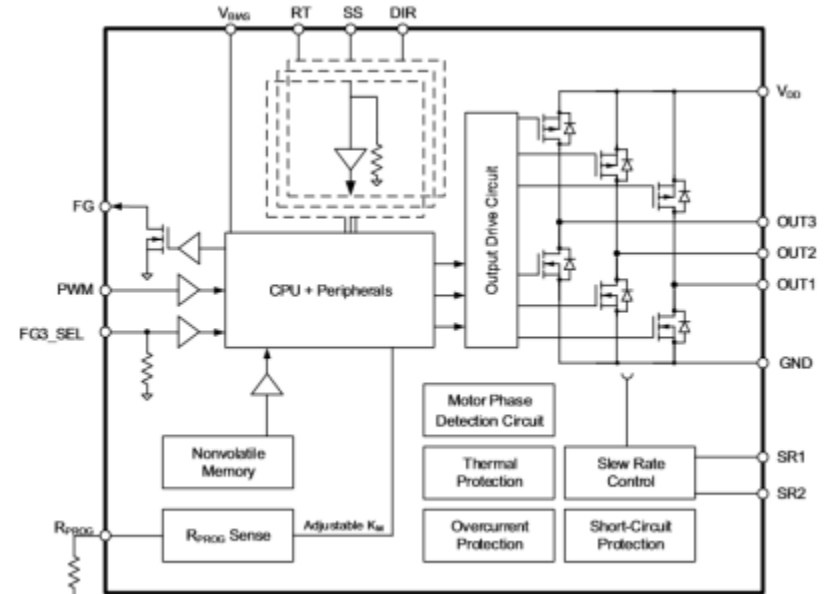
**MTD6505**  
3x3 UDFN\*



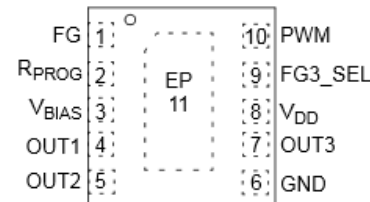


## Features:

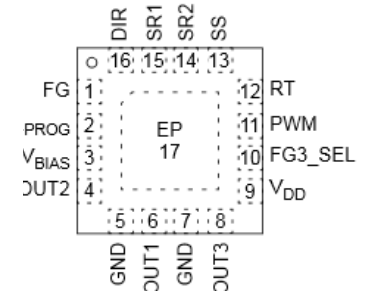
- Start-up output current controlled by PWM
- Output PWM Slew Rate Control (Adj. Ver)
- Phase Target Selection for Regulation (Adj. Ver)
- Start-up Strength Selection (Adj. Ver)
- 180° Sinusoidal Drive:
  - High efficiency and low acoustic noise
- Position Sensorless BLDC Drivers:
  - No Hall-effect sensor required
- Integrated Power Transistors
- 2V to 5.5V Operating Voltage
- Programming Resistor (R<sub>PROG</sub>) setting
- Direction Control
- Speed Control through Power Supply –
  - Modulation (PSM) and/or Pulse-Width –
  - Modulation (PWM)
- Frequency Generator (FG Output Signal)
- Lockup Protection and Automatic Recovery Circuit
- Overcurrent Limitation
- Thermal Shutdown Protection



**MTD6508**  
3x3 UDFN-10\*

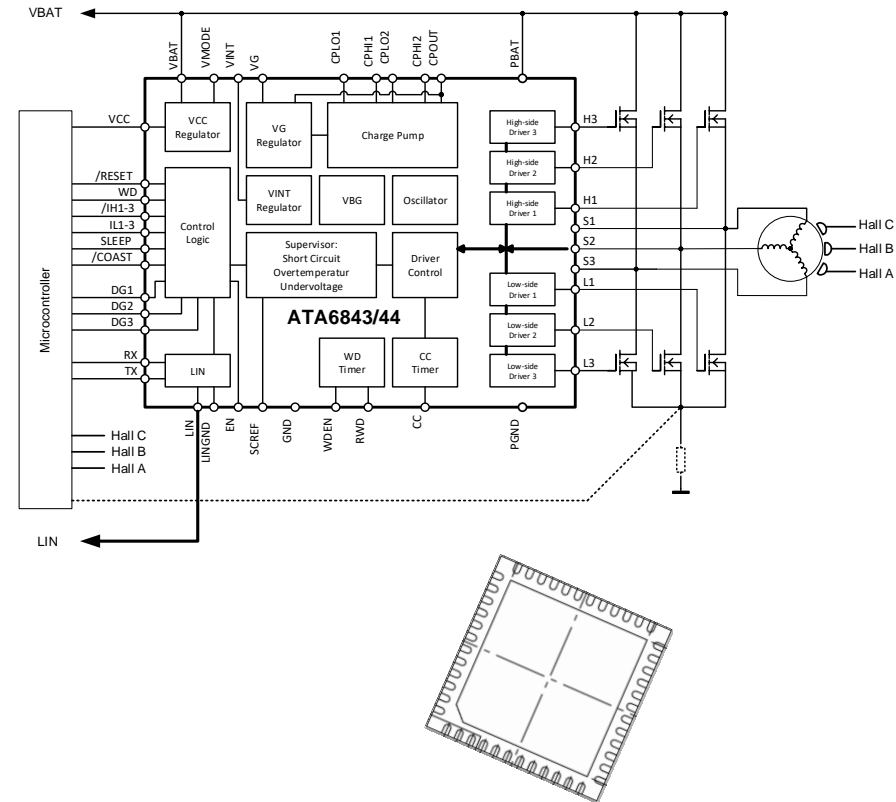


**MTD6508**  
4x4 UQFN-16\*



## Features:

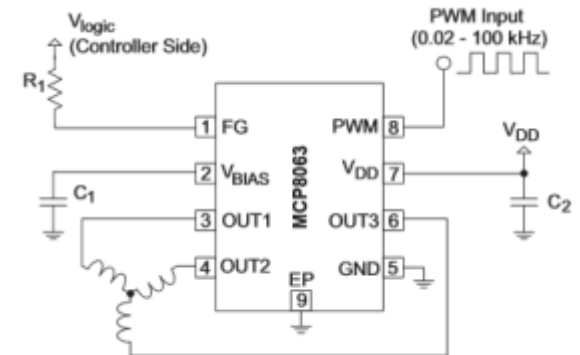
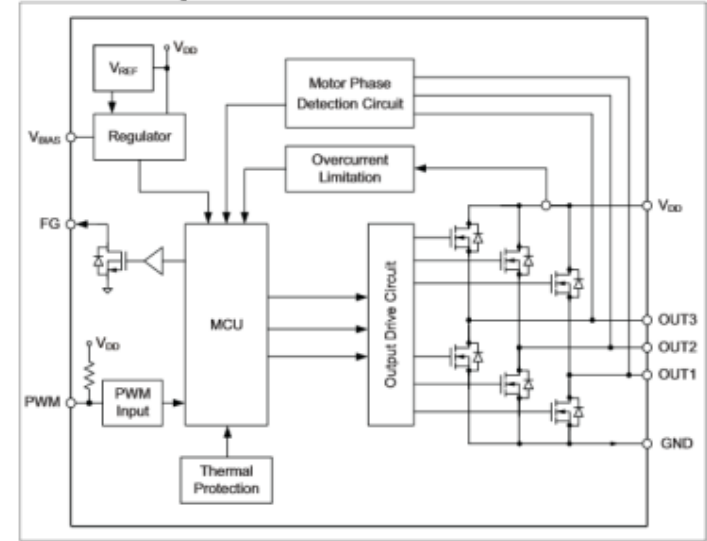
- Driving of 6 external NMOS transistors with maximum 50kHz switching frequency
- Broad operation voltage range from 5.25V to 32V
- Integrated charge pump to provide gate voltages for MOSFET gate drive a D-gate of the external battery reverse protection MOSFET
- Build-in 5V / 3.3V LDO with current limitation
- Sleep mode with supply current <math><45\mu\text{A}</math>
- Wake-up via LIN or positive high voltage input signal
- Programmable window watch dog
- Battery over and under voltage protection
- Overtemperature warning and protection (shutdown)
- Jump start compatible
- LIN transceiver conformal to LIN 2.1 and SAEJ2602-2
  - Without timeout function
- ATA6844 extended temperature range  $T_j=200^\circ\text{C}$
- QFN48 7x7mm package



## Features:

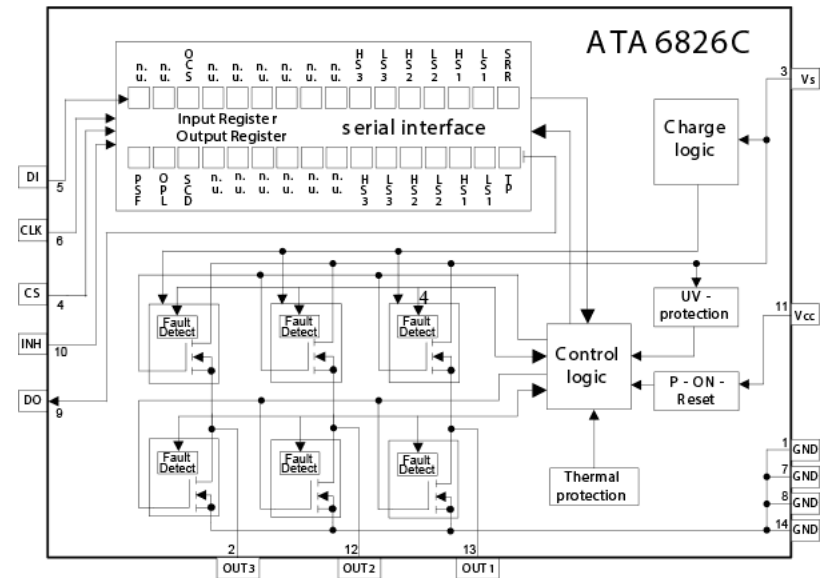
- Automotive AEC-Q100 Qualified
- Position Sensorless BLDC Drivers
  - No Hall Sensor Required
- 23 kHz PWM Output Frequency
- 180° Sinusoidal Drive
  - High Efficiency And Low Acoustic Noise
- Support 2V to 14V Power Supplies
- Speed Control Through Power Supply and/or –  
– PWM
- Built-in 1.5A Over Current Limitation
- Built-in Frequency Generator (FG Output Signal)
- Built-in Lock Protection and Automatic –  
– Recovery Circuit
- Built-in Thermal Shutdown Protection
- No External Tuning Required
- 8-lead 4x4 DFN
- Recommended for Automotive Design
- Extended Temperature Range:
  - -40 to +125°C

Functional Block Diagram

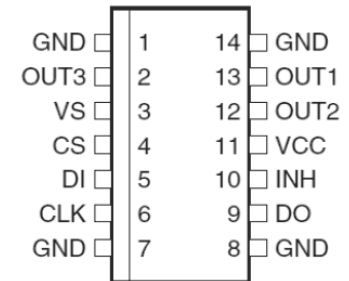


## Features:

- Three half-bridge outputs
- Typical loads DC motors, relays, ...
- Supply voltage up to 40V
- RDSon typically 0.8Ω, Max 1.5Ω at 150°C
- Up to 1.0A output current
- No shoot-through current
- Quiescent current IS < 2μA
- Outputs short-circuit protected
- Over-temperature protection and pre-warning –  
- for each switch
- Undervoltage protection
- Diagnostic: Short circuit, open-load, over-  
- temperature and power-supply fail detection
- SPI, daisy chain capable, up to 2MHz clock –  
- frequency
- SO14 package
- Recommended for Automotive Design

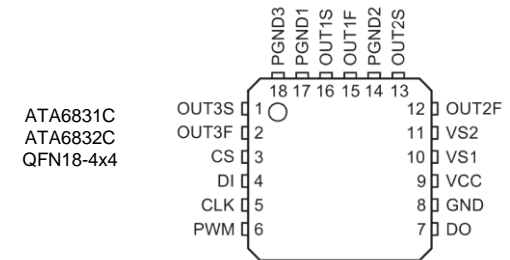
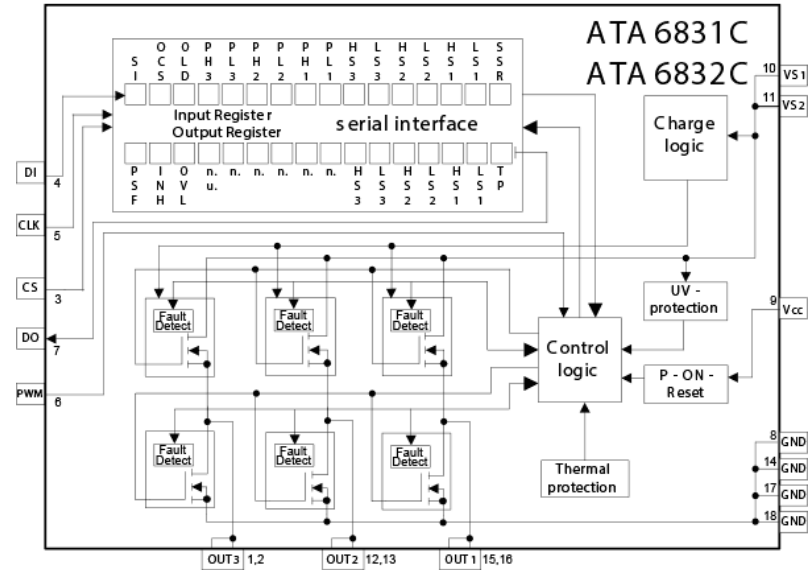


ATA6826C  
SO14



## Features:

- Three half-bridge outputs
- Typical loads DC motors, Relays, ...
- PWM capability up to 25kHz
- Supply voltage up to 40V
- RDSon typically 0.8Ω, Max 1.5Ω at 150°C
- ATA6832C: High temperature, max Tj 200°C, -  
- RDSon Max 1.8Ω at 200°C
- Up to 1.0A output current
- No shoot-through current
- Quiescent current IS < 2μA
- Outputs short-circuit protected
- Over-temperature protection and pre-warning –  
- for each switch
- Under-voltage protection
- Diagnostic: Short circuit, open-Load, over-  
- temperature and power-supply fail detection
- SPI, daisy chain capable, up to 2MHz clock –  
- frequency
- QFN18 package
- Recommended for Automotive Design





# ATA6836C/38C

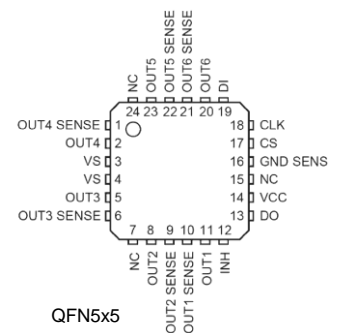
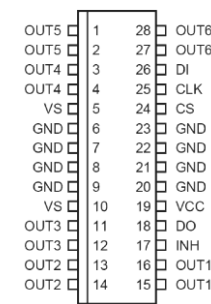
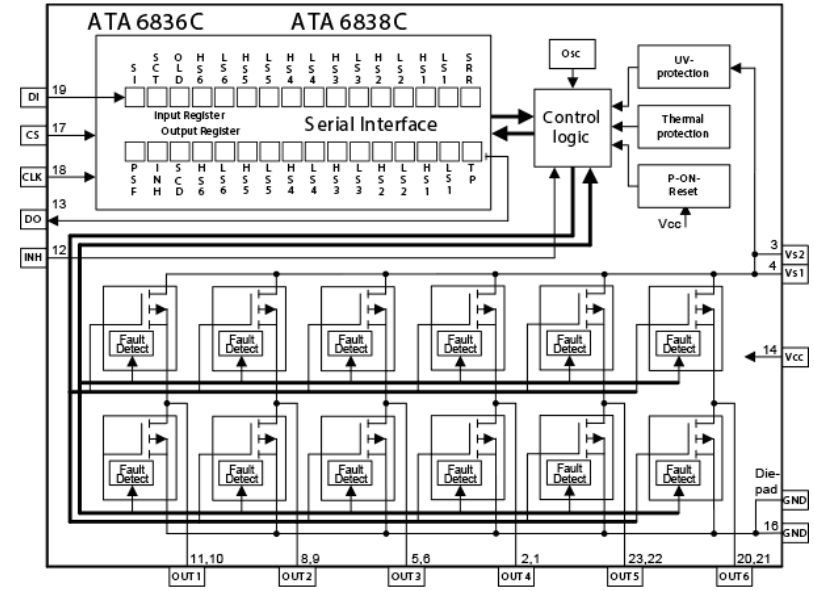
Hex Half-bridge Driver with Serial Input Control



Online Datasheet

## Features:

- Six half-bridge outputs
- Typical loads DC motors, relays, ...
- Supply voltage up to 40V
- RDSon typically 1.0Ω, Max 1.8Ω at 150°C
- Up to 650mA output current each
- ATA6838C: Up to 950mA output current each
- No shoot-through current
- Quiescent current IS < 2μA
- Outputs short-circuit protected
- Over-temperature protection and pre-warning –  
- for each switch
- Under-voltage protection
- Diagnostic: Short circuit, open-load, over –  
- temperature and power-supply fail detection
- SPI, daisy chain capable, up to 2MHz clock –  
- frequency
- SO28 or QFN24 power package
- Recommended for Automotive Design

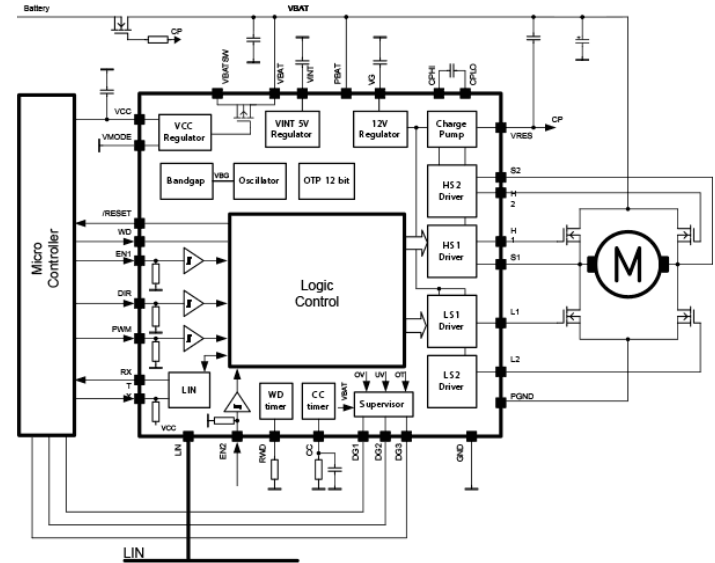


SO28

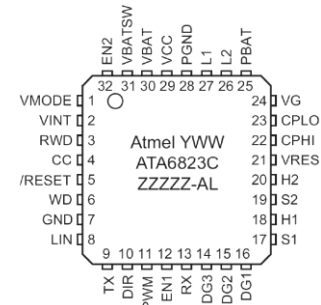
<< BACK

## Features:

- H-bridge motor driver SBC
- PWM and direction control
- Motor operation 7V – 21V
- Integrated charge pump:
  - for driving 4 external NMOS transistors
  - for driving reverse protection NMOS transistor
- 5V / 3.3V LDO with current limitation
- Sleep mode current < 45µA
- Wake up via LIN or ignition key (KL15)
- Programmable window watchdog
- Battery over- and under-voltage detection / -  
- protection
- Over-temperature warning / protection
- LIN2.1 compliant
- QFN32 package
- Recommended for Automotive Design

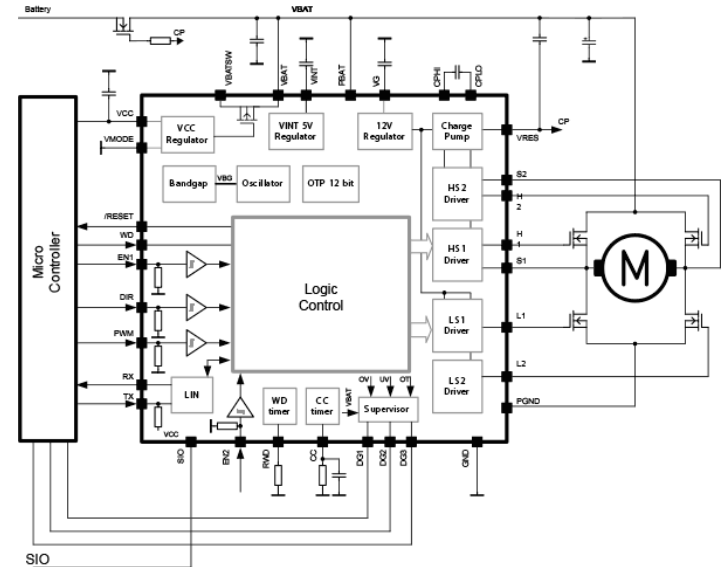


ATA6823C  
QFN32-7x7

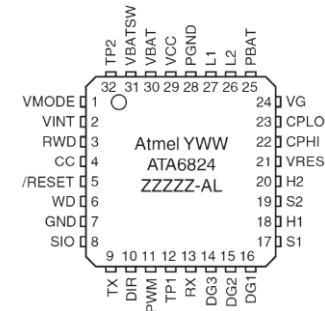


## Features:

- H-bridge motor driver SBC
- High temperature max.  $T_j = 200^\circ\text{C}$
- PWM and direction control
- Motor operation 7V – 21V
- Integrated charge pump:
  - for driving 4 external NMOS transistors
  - for driving reverse protection NMOS transistor
- 5V / 3.3V LDO with current limitation
- Programmable window watchdog
- Battery over- and under-voltage detection / - protection
- Over-temperature warning / protection
- High voltage serial interface (SIO)
- QFN32 package
- Recommended for Automotive Design



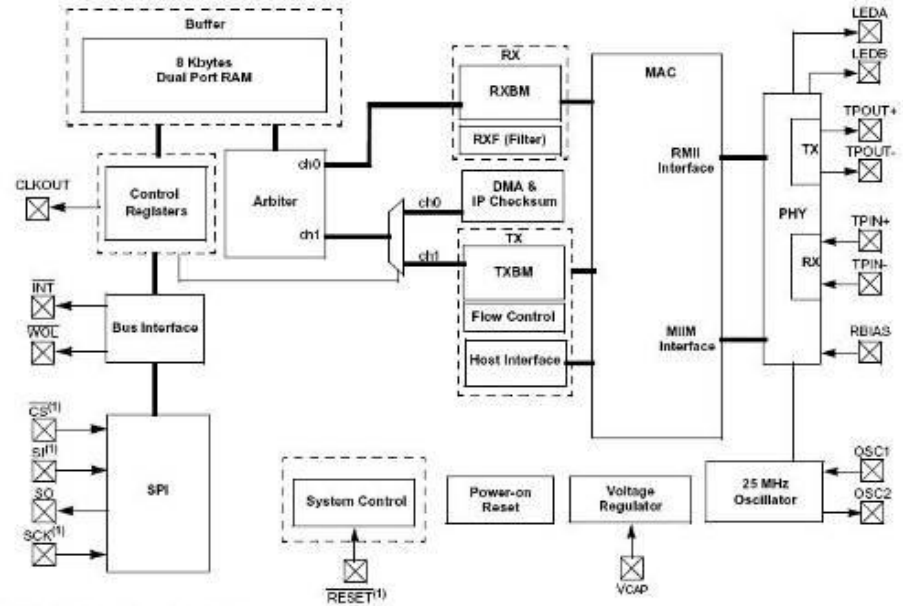
ATA6824C  
TQFP32-7x7





## Features:

- IEEE 802.3 compatible Ethernet Controller
- Integrated MAC and 10BASE-T PHY
- Supports one 10BASE-T port with –
  - Automatic Polarity Detection and –
  - Correction
- Supports Full and Half-Duplex modes
- Programmable Automatic Retransmit -
  - on Collision
- Programmable Padding and CRC –
  - Generation
- Programmable Automatic Rejection of -
  - Erroneous Packets
- SPI Interface: Clock Speeds up to 20MHz



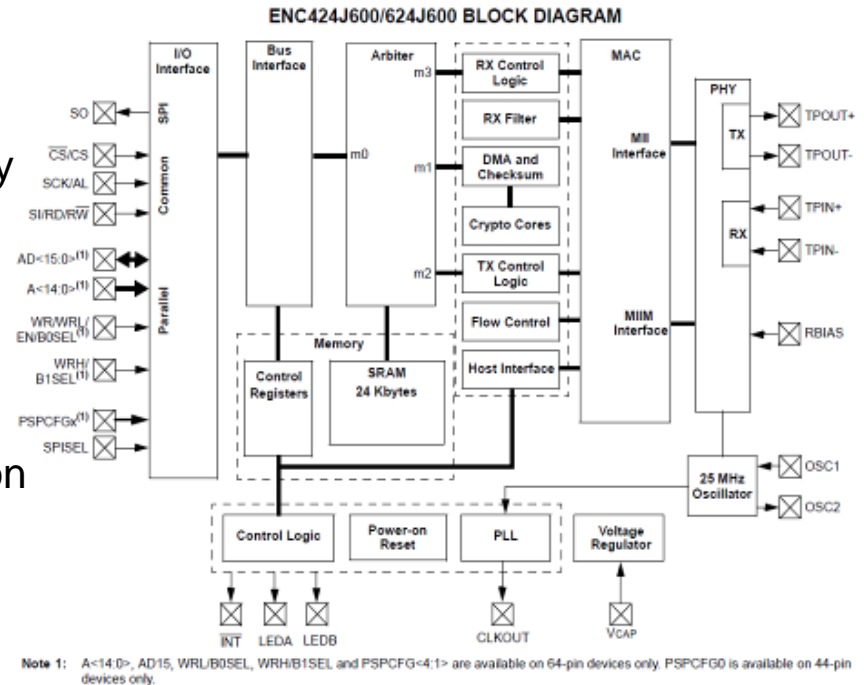
Note 1: These pins are 5V tolerant.

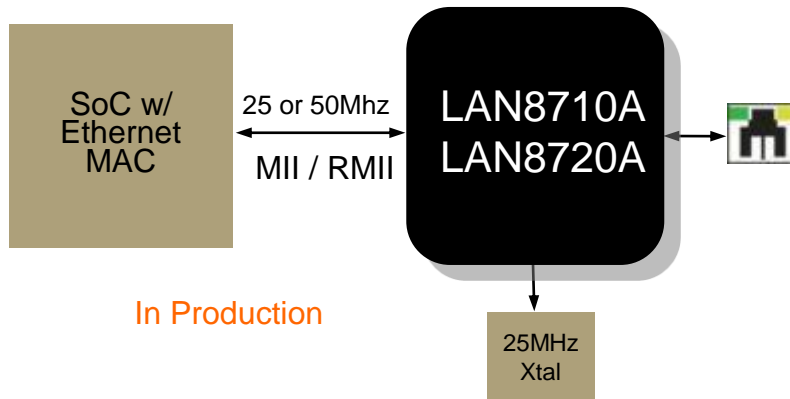
# ENC424 & ENC624/J600

Stand-Alone 10/100 Ethernet Controller  
with SPI or Parallel Interface

## Features:

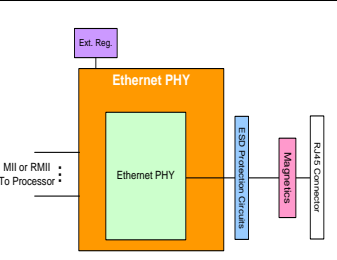
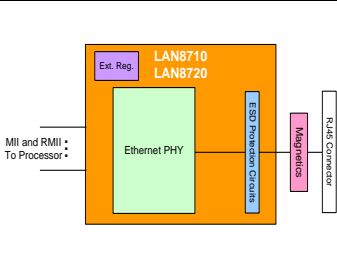
- IEEE 802.3™ Compliant Fast Ethernet –  
- Controller - Integrated
- MAC and 10/100Base-T PHY Hardware Security
- Acceleration Engines
- Factory Preprogrammed Unique MAC Address
- Supports Auto-Negotiation
- Support for Pause Control Frames
- Supports Half and Full-Duplex Operation
- Programmable Automatic Retransmit on Collision
- Available MCU Interfaces:
  - 14 Mbit/s SPI interface
  - 8-bit multiplexed parallel interface
- Security Engines:
  - High-performance, modular exponentiation engine with up to 1024-bit operands
  - Supports RSA® and Diffie-Hellman key exchange algorithms
  - Fast MD5 hash computations
  - Fast SHA-1 hash computations
- Package: 44-Pin (TQFP and QFN)

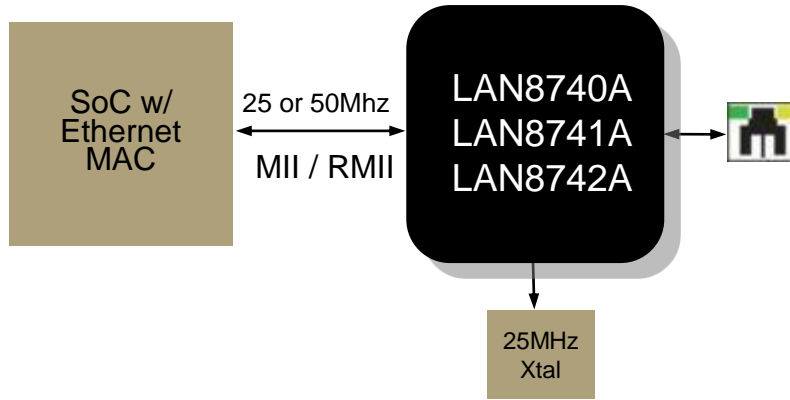




## Features:

- Excellent ESD Protection levels without – any external protection devices:
  - Meets / exceeds IEC requirements
- Integrated DSP with adaptive equalizer
- Integrated 1.2V Linear Regulator
- Incorporates SMSC flexPWR®
  - Flexible I/O voltage down to 1.8V
  - Extremely low energy detect – - standby mode
- Uses a low cost 25MHz xtal for RMII
- Lead free ROHS compliant packages:
  - LAN8710: 32QFN 5x5mm – - (MII/RMII)
  - LAN8720: 24QFN 4x4mm (RMII – - only)
- Commercial (0 to +70C) and Industrial - - (- 40 to +85C) temperature supported

	Other Solutions	SMSC Solutions
		
Ethernet PHY	Discrete	Single Solution!
Regulator	Discrete	
ESD protection	External	
Passive	30+	
		20



## Target Applications

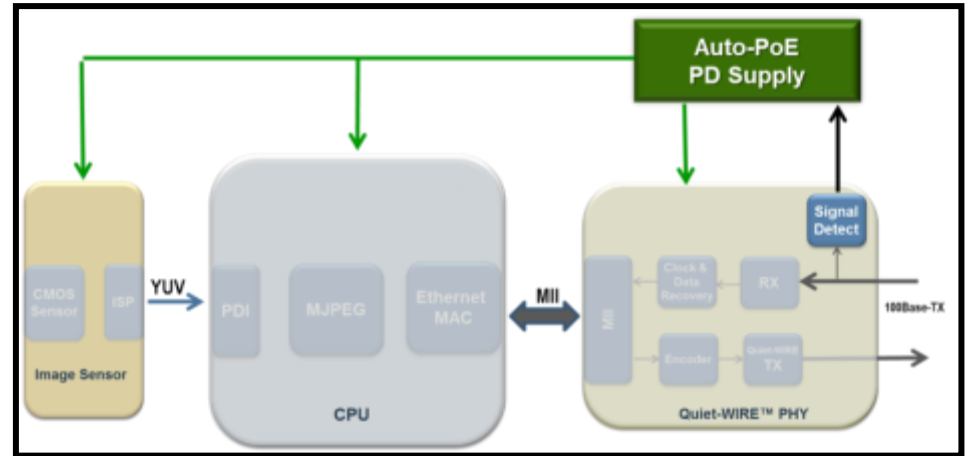
- PC Docking
- Port Replicators
- USB to eNet Dongle
- Digital Signage
- Networked Printers
- Netbook/Tablet
- PVR, STB
- Digital TV
- SoC Reference Platforms

Commercial (0 to +70C) and Industrial (-40 to +85C)  
temperature supported

## Features:

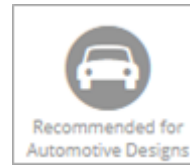
- Energy Efficient Ethernet 802.3az
- Wake On LAN support (WoL)
- Cable Diagnostics
- HP Auto-MDIX
- Compliant with IEEE 802.3/802.3u
- Integrated DSP with adaptive equalizer
- Integrated 1.2V Linear Regulator
- Uses a low cost 25MHz xtal for RMII
- Lead free ROHS compliant packages:
  - LAN8740A/41A: 32QFN (MII/RMII)
  - LAN8742A: 24QFN (RMII only)

- **Quiet-WIRE™ Enhanced EMI –**
  - performance
- Automotive & Industrial
- **EtherGREEN™ PHY technology:**
  - 150mW total power consumption
  - IEEE 802.3az Energy Efficient –
    - Ethernet (EEE)
  - Ultra-Low Power Standby with –
    - signal detect wakeup (<1uA)
- **Deterministic**
  - Fixed latency / Fast link up –
    - (<20ms)
- **LinkMD+™ Link Quality Indicator**
- **32-Pin QFN (5mmx 5mm) package**
- **-40 °C to 105°C ambient**
- **AEC-Q100 Automotive Grade 2 Qualified**



# KSZ8051MNL/RNL

## Single-port, 10/100 PHY Transceiver



### ◆ Green Fast Ethernet

- Low Power (~50% power reduction vs. KSZ8041)

### ◆ Key Features

- MAC Interface: MII / RMII
- Management: MDC/MDIO, Interrupt output
- LED outputs
- LinkMD cable diagnostics

### ◆ Reduced System BOM cost

- On-chip line termination
- Flexible VDDIO: 1.8V, 2.5V, 3.3V

### ◆ 32-QFN Package

### ◆ AEC-Q100 qualified

- KSZ8051MNLV/RNLV: Grade 2 -40degC to +105degC
- KSZ8051MNLV/RNLU: Grade 3 -40degC to +85degC

32-pin QFN (5x5 mm)



- **Green Fast Ethernet:**
  - Low Power (~50% power reduction vs. KSZ8041)
- **Key Features:**
  - DSP-based design with Baseline Wander –  
- correction
  - MAC Interface: MII / RMII
  - Management: MDC/MDIO, Interrupt output
  - LED outputs
  - LinkMD cable diagnostics
- **Reduced System BOM cost:**
  - On-chip line termination
  - Flexible VDDIO: 1.8V, 2.5V, 3.3V
- **I Temp Support**
- **Package:**
  - 24-QFN: Smallest 10/100 PHY Package
  - 32-QFN, 48-LQFP

32-pin QFN (5x5 mm)



24-pin QFN (4x4 mm)

- **Pin compatible with KSZ8081**
- **Green Fast Ethernet:**
  - Low Power
  - Energy Efficient Ethernet (IEEE 802.3az)
  - Wake on LAN (WoL)
- **Key Features:**
  - DSP-based design with Baseline Wander correction
  - MAC Interface: MII / RMII
  - Management: MDC/MDIO, Interrupt output
  - LED outputs
  - LinkMD cable diagnostics
- **Reduced System BOM cost:**
  - On-chip line termination
  - Flexible VDDIO: 1.8V, 2.5V, 3.3V
- **I Temp Support**
- **Package:**
  - 24-QFN: Smallest 10/100 PHY Package with EEE
  - 32-QFN, 48-LQFP

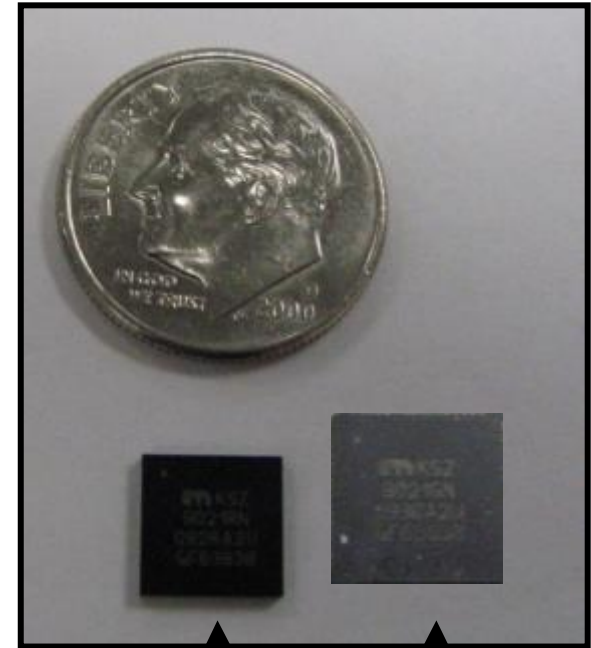
32-pin QFN (5x5 mm)



24-pin QFN (4x4 mm)



- **Green Gigabit Ethernet**
  - Lowest Power GigE PHY
  - Energy Efficient Ethernet (IEEE 802.3az)
  - Wake on LAN (WoL)
- **Flexible I/O Voltages**
  - 1.8V, 2.5V, 3.3V
- **Pin & Package Compatible with KSZ9021**
  - Functional drop in replacement
  - EEE function enabled by firmware
  - WoL function enabled by firmware and strapping options pins (MODE0..3)
- **Automotive Grade 3 Qualified (-40 to +85C )**
- **Automotive Grade 2 Qualified (-40 to +105C )**



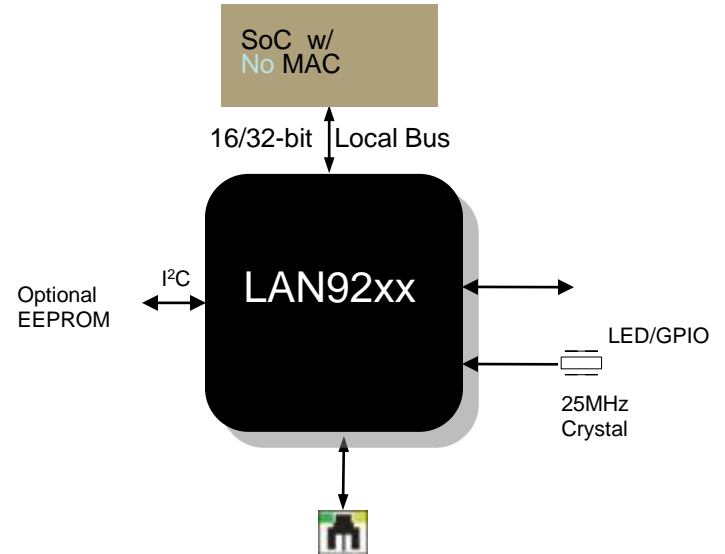
KSZ9031RN  
(7x7 mm QFN)

Small GigPHY  
package

KSZ9031GN  
(8x8 mm QFN)

## Features:

- Ethernet Controller Family
- High performance 16/32-bit local bus – Ethernet controllers
- Support HP Auto MDIX™
- Minimizes dropped packets:
  - Internal buffer memory can store over – 200 packets
  - Automatic PAUSE and back-pressure – flow control
- Reduced host CPU MIPS consumption
- Reduced-power modes:
  - Numerous power management modes
  - Wake on LAN
  - Magic packet wakeup
  - Wakeup indicator event signal
  - Link status change
- Flexible address filtering modes
- Full Driver Support for popular OS

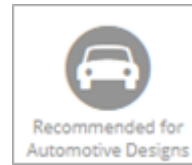


	LAN9221	LAN9220	LAN9217	LAN9218
Bus Interface	16-bit	16-bit	16-bit	32-bit
I/O voltage supported	1.8v to 3.3v	1.8v to 3.3v	3.3v	3.3v
Performance	High	Standard	High	High
External MII			◆	
Mixed Endian	◆	◆		
Industrial Temp available	◆			◆
Checksum Offload Engine	◆	◆		
Package	56 QFN	56 QFN	100 TQFP	100 TQFP
Datasheet	<a href="#">LAN9221</a>	<a href="#">LAN9220</a>	<a href="#">LAN9217</a>	<a href="#">LAN9218</a>



# LAN89218 10/100

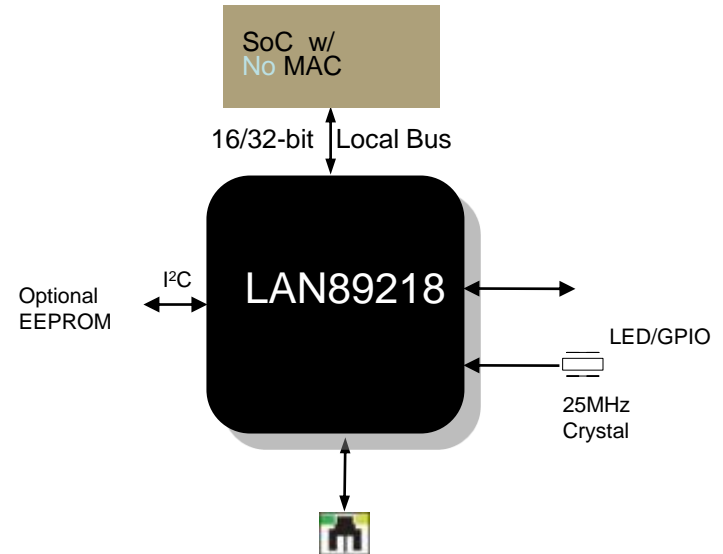
Small Form Factor Single-Chip Ethernet Controller with  
HP Auto-MDIX Support



Online  
Datasheet

## Features:

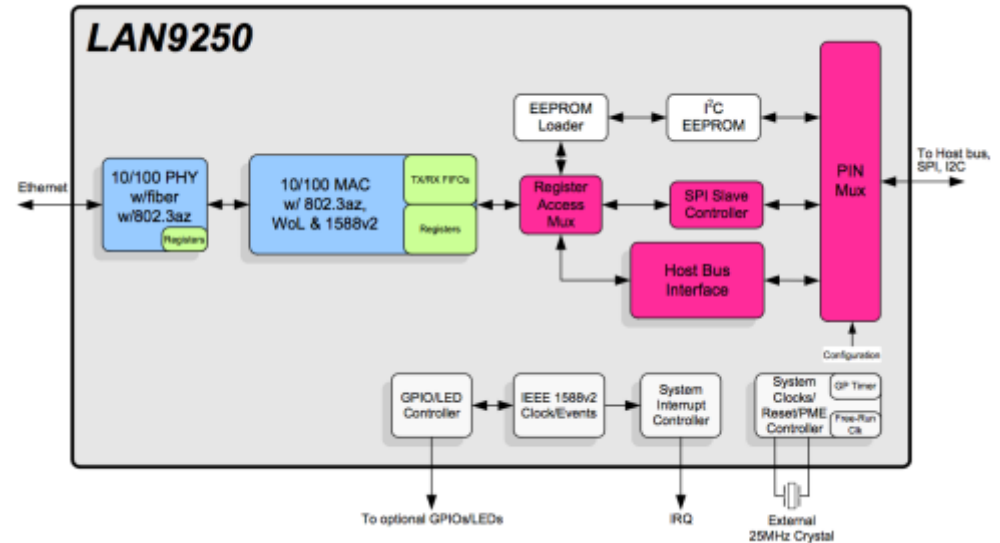
- Ethernet Controller Family
- High performance 16/32-bit local bus –
  - Ethernet controllers
- Support HP Auto MDIX™
- 16K Byte TX/RX RAM Buffer
- Interrupt Pin support
- Reduced host CPU MIPS consumption
- Flexible address filtering modes
- Full Driver Support for popular OS
- AEC-Q100 Automotive Grade 3 Qualified (-40 to +85C )



<< BACK

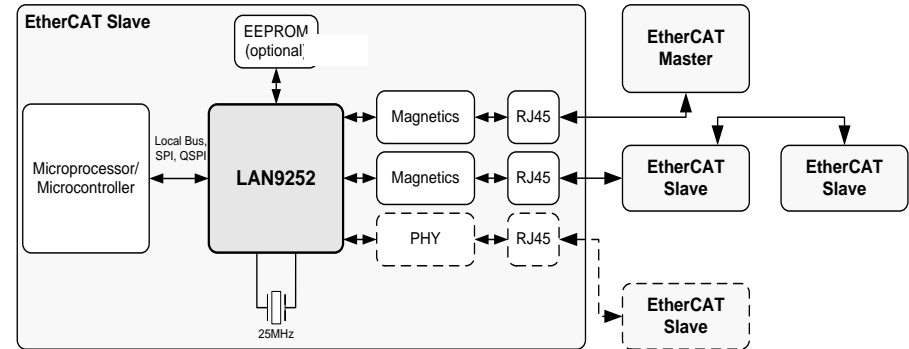
## Features:

- Industrial Ethernet Controller:
- 16/32-bit local bus Ethernet controllers
- IEEE1588v2 Support
- Minimizes dropped packets:
- Internal buffer memory can store over –  
– 200 packets
- Automatic PAUSE and back flow control
- Reduced host CPU MIPS consumption
- Reduced-power modes:
- Power management modes including –  
– Energy Efficient Ethernet (IEEE802.3az)
- Wake on LAN
- Magic packet wakeup
- Wakeup indicator event signal
- Link status change
- Flexible address filtering modes
- Full Driver Support for popular OS



## Features:

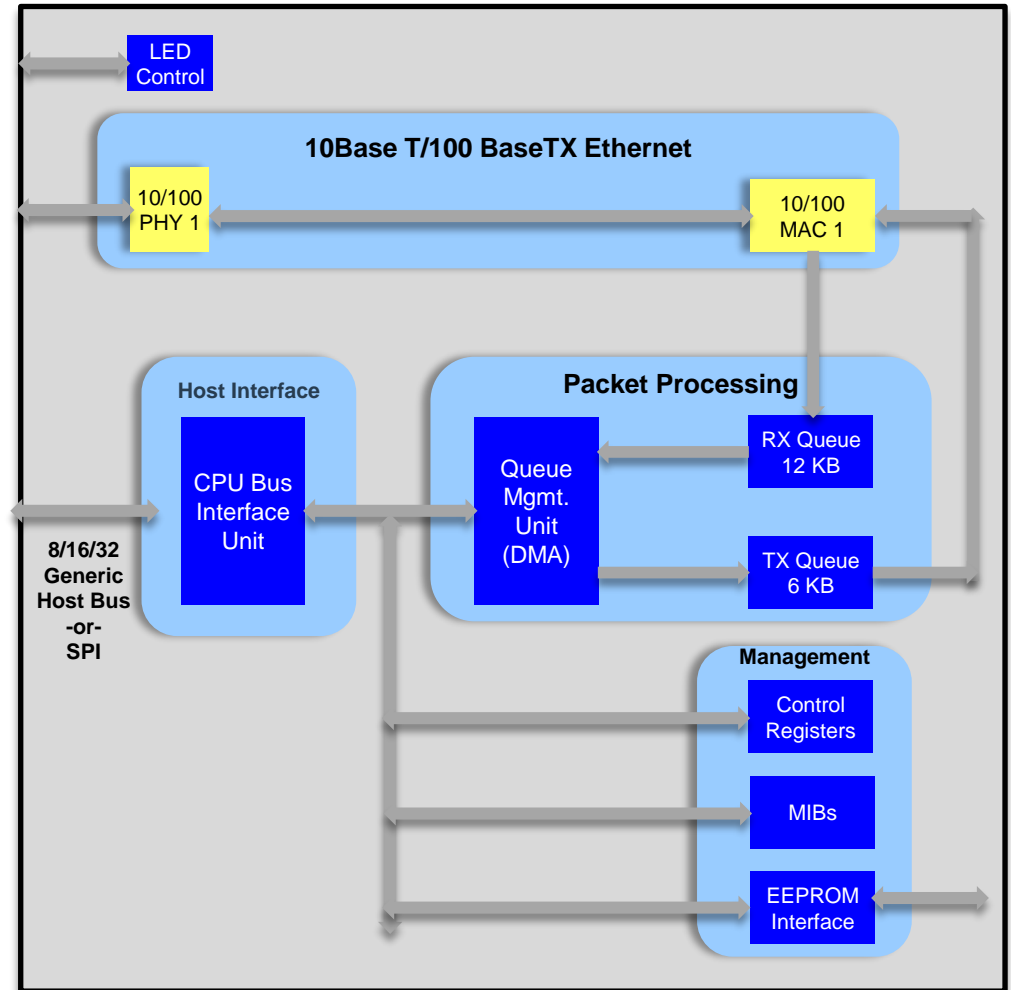
- 2/3-port EtherCAT slave controller
- 3 Field Bus Memory management Units
- 4 Sync managers
- Interfaces 8/16/32-bit embedded controllers
- SPI/SQI PIC32MX
- Dual integrated 10/100 PHY's
- Auto-MDIX
- Low power mode
- 1.6V to 3.6V variable I/O voltage
- IEEE 802.3u 100Base-FX Fiber Interface
- Cable Diagnostics: Open, Short, Cable – length detection
- Integrated 1.2V regulator enables 3.3V supply
- Commercial (0 to +85C), Industrial (-40 – to +85C) and Extended temp. (-40 – to +105C) supported
- Packaging: 64-pin QFN / TQFP-EP



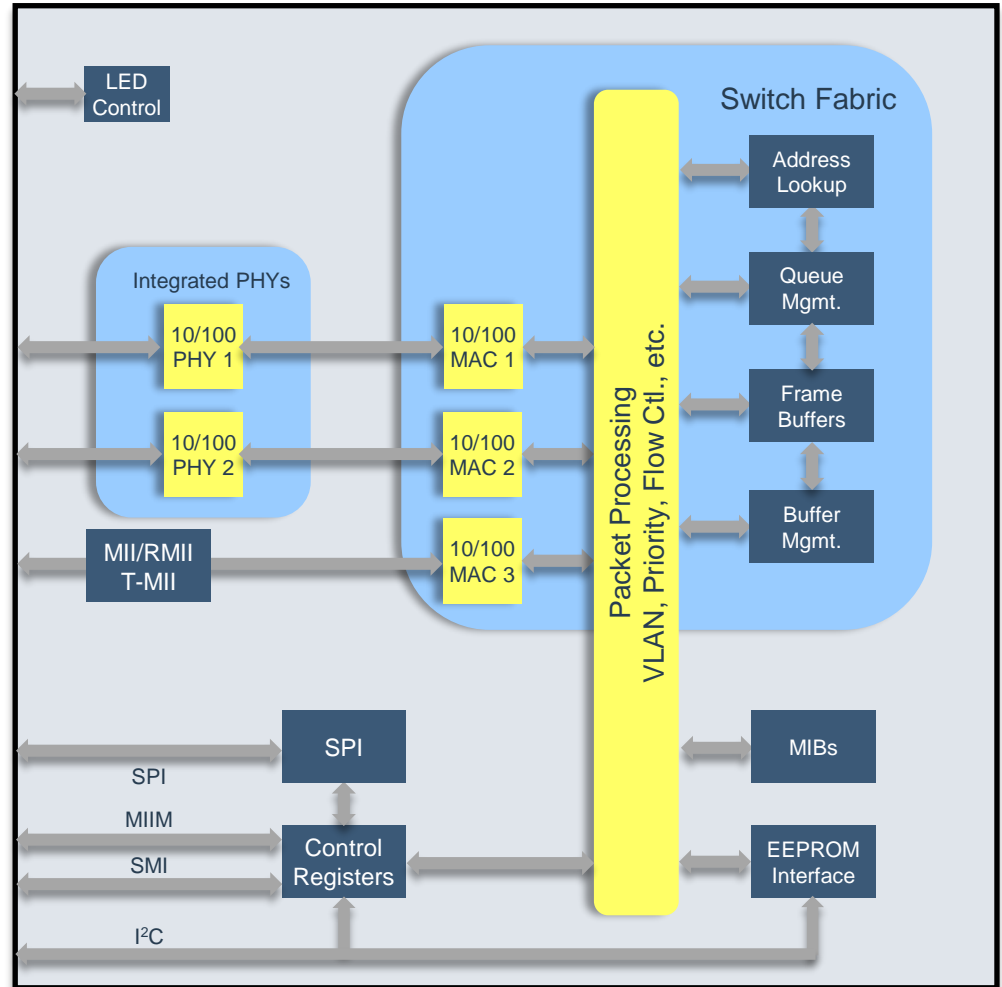
## Applications

- Motor Motion Control
- Process / Factory Automation
- Communication Modules
- Interface cards
- Sensors
- Hydraulic & Pneumatic Valve systems
- Robotics

- **Low Power:**
  - <280 mW @ VDD= 3.3 V
  - Advanced power management
  - VDDIO: 1.8/2.5/3.3V options
- **Qualified for wide range of – environments:**
  - Commercial, Industrial, - Extended Temperature (125°C)
- **Flexible host interfaces:**
  - 8/16/32-bit Generic Bus
  - SPI (40 MHz) version
  - 32-pin package for low-end apps.
- **High-Performance:**
  - Queue Management Unit – achieves >80 Mbps throughput
  - 4 x HD Video Streaming
  - HBM 6KV ESD rating
- **AEC-Q100 Automotive Grade 3 Qualified (-40°C to + 85°C)**



- **Low power, Highly compact 3-port 10/100 switch:**
  - 48-pin LQFP (7 x 7mm)\*
  - 64-pin LQFP (10x 10mm)\*\*
  - 3.3 V single supply (< 250 mw)
- **2x Integrated MAC/PHYs:**
  - 10/100BASE-TX/FX support
- **Flexible MAC interfaces:**
  - MII/RMII
  - Internal 50 MHz clock –  
- eliminates expensive oscillator
- **Distributed Topology support:**
  - Bypass mode
  - Source address filtering
- **KSZ8873MLL AEC-Q100 Automotive Grade 3 Qualified (-40 to +85C )**

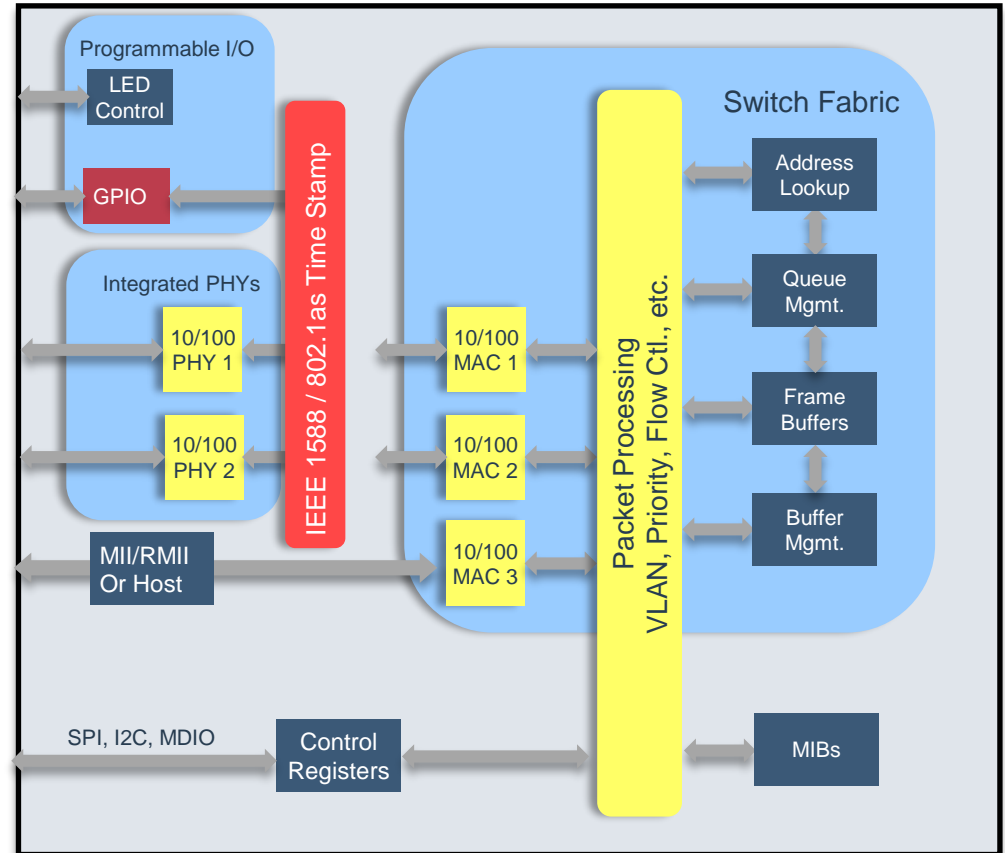


\* KSZ8863

\*\*KSZ8873

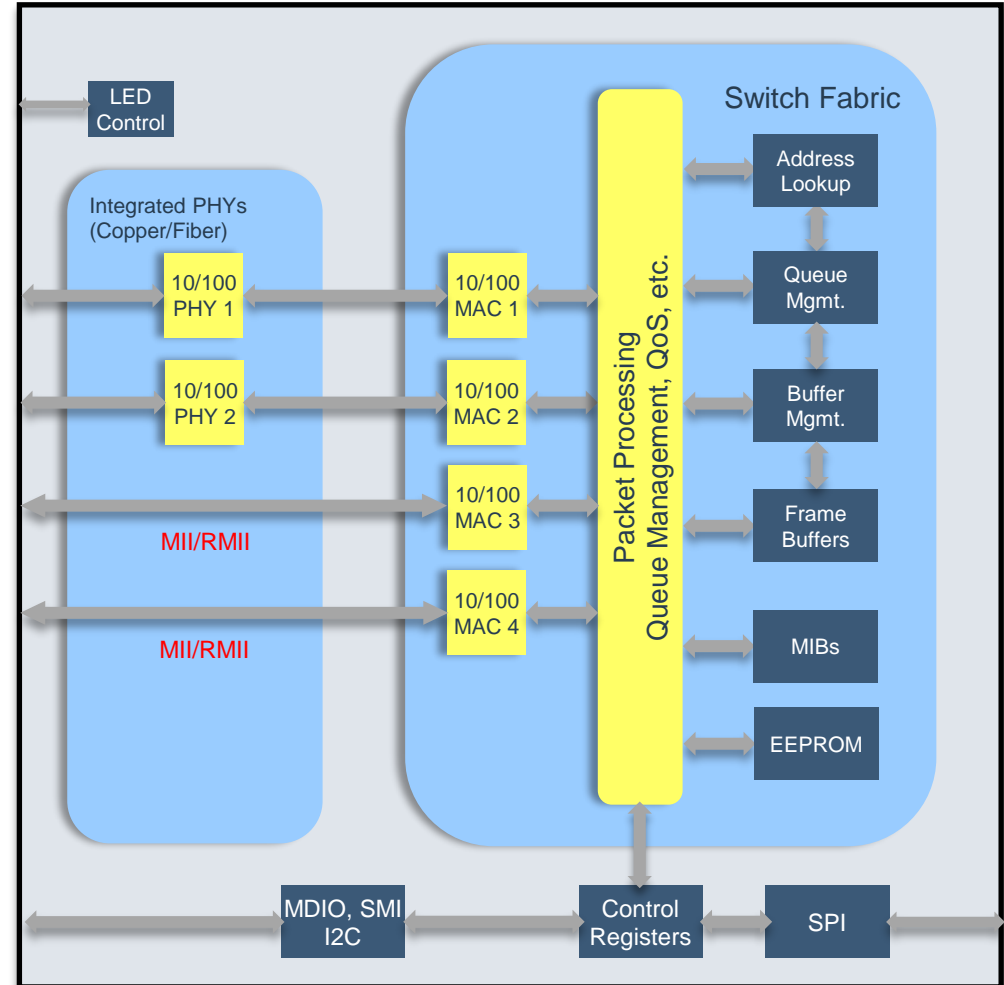
## Features:

- 802.1AS / IEEE 1588v2:
  - Flexible timing modes:
    - MC,SC,TC / E2E, P2P
  - Superior PTP\* operations:
    - One-step TC h/w corrections
    - Two-step also supported
  - Precision GPIO
  - 802.1AS/PTP software stack
- Highly integrated:
  - 3-port, 10/100 switch w/ -
    - integrated EEE PHYs
  - Supports Copper & Fiber PHY –
    - ports
  - Ring topology filtering support
  - MII/RMII or 16-bit Host interface
  - <300mW total power consumption
  - 64-pin LQFP (10mm x 10mm)

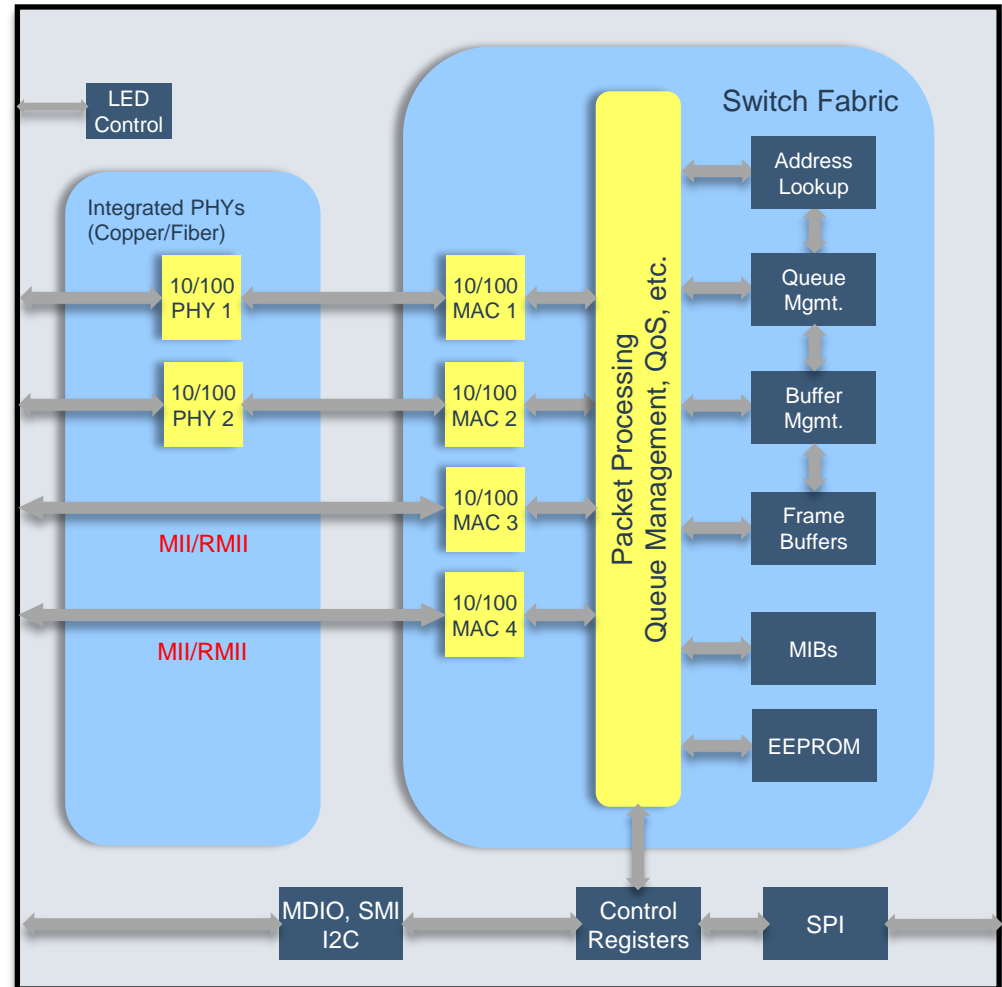




- **Unique 4-Port Switch:**
  - 2x copper PHYs (Ports 1&2)
  - 2x MAC interfaces (Ports 3&4)
  - 64-pin QFN package
- **Cable Diagnostics:**
  - LinkMD cable diagnostics
- **Flexible MAC interfaces:**
  - MII/RMII selectable by strap pin
  - PHY/MAC modes configurable by – register
  - 50MHz input/25MHz input (RMII) - configurable by strap pin
- **EtherGREEN™:**
  - <500mW total power-consumption
- **AEC-Q100 Automotive Grade 3 Qualified (-40 to +85C )**

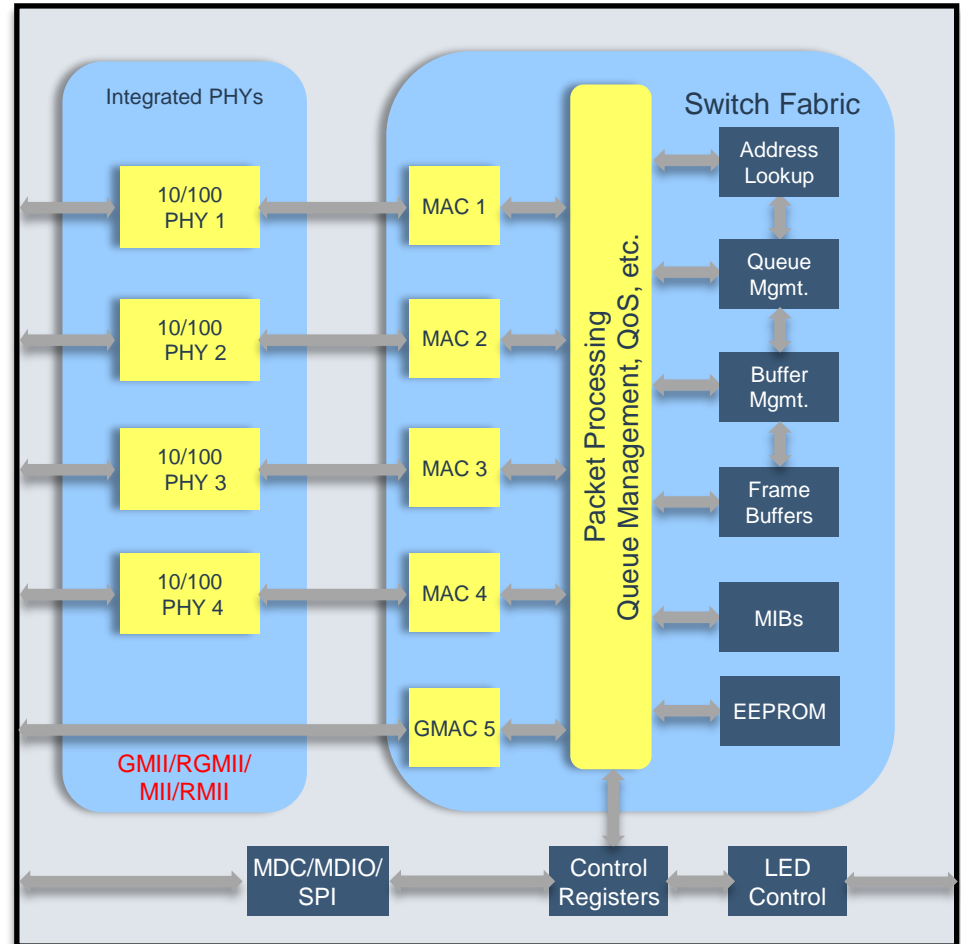


- **Unique 4-Port Switch:**
  - 2x copper PHYs (Ports 1&2)
  - 2x MAC interfaces (Ports 3&4)
  - 64-pin QFN package
- **Cable Diagnostics:**
  - LinkMD cable diagnostics
- **Flexible MAC interfaces:**
  - MII/RMII selectable by strap pin
  - PHY/MAC modes configurable –
    - by register
  - 50MHz input/25MHz input –
    - (RMII) configurable by strap –
    - pin
- **EtherGREEN™:**
  - <500mW total power consumption
- **AEC-Q100 Automotive Grade 3 Qualified (-40 to +85C )**

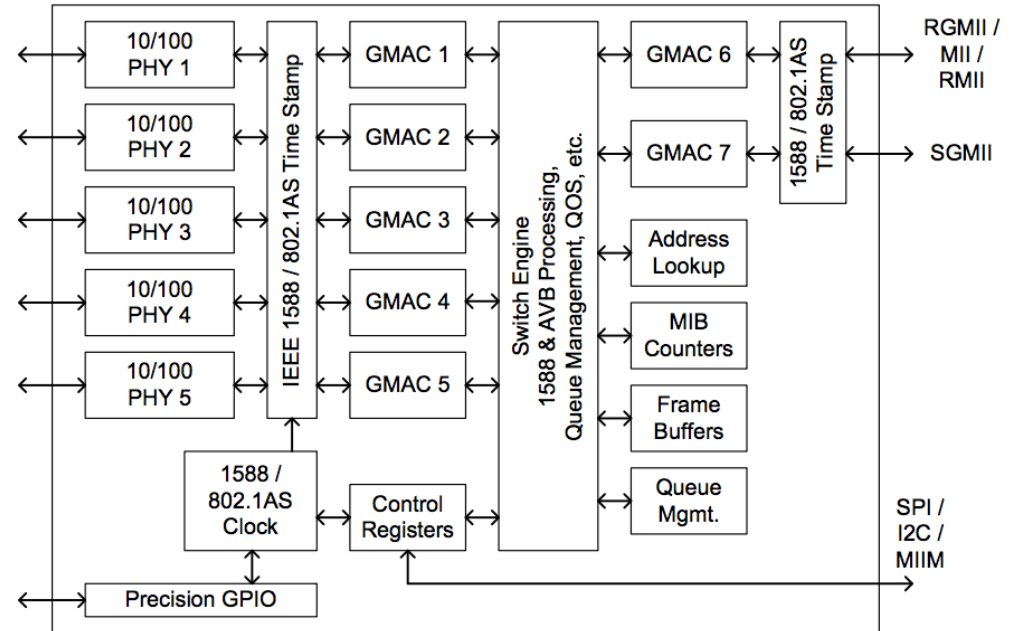


- **Green Ethernet Design:**
  - 1.8/2.5/3.3V VDDIO
  - < 500mW (typical)
  - Energy Efficient Ethernet – (IEEE802.3az)
  - Wake on LAN (WoL)
- **Advanced QoS functions:**
  - Bi-directional rate limiting – packet/sec
  - 16-entry ACL for packet control
  - QoS with 4 queues priority
- **Small Footprint:**
  - 80-LQFP (10x10) for – KSZ8795/8775/8765
  - 64-QFN (8x8) for KSZ8794

	PHY	MAC
<a href="#">KSZ8795</a>	4x 10/100 TX	1xGMII/RGMII/MII/RMII
<a href="#">KSZ8775</a>	3x 10/100 TX	1x MII/RMII 1x RGMII/RMII/MII
<a href="#">KSZ8794</a>	3x 10/100 TX	1x RGMII/MII/RMII
<a href="#">KSZ8765</a>	2x 10/100 TX 2x 100 FX	1xGMII/RGMII/MII/RMII



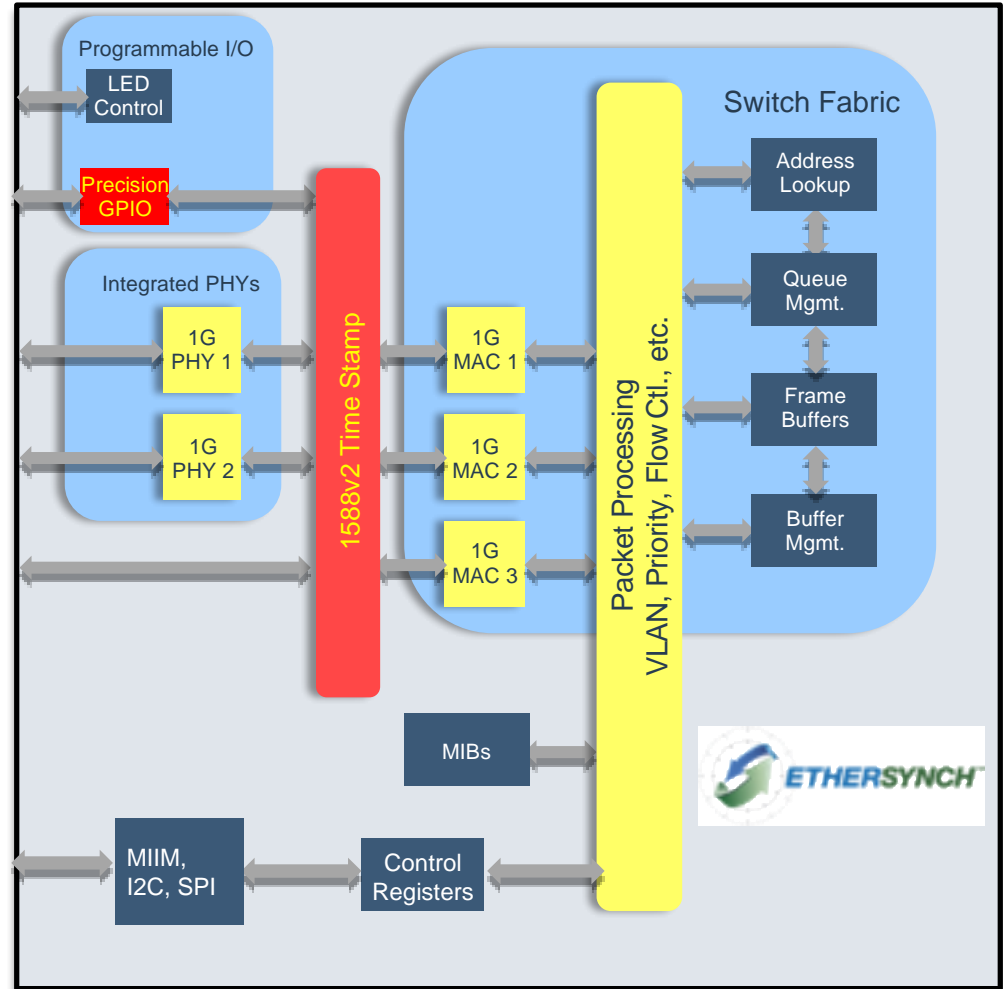
- **Green Ethernet Design:**
  - 1.8/2.5/3.3V VDDIO
  - Energy Efficient Ethernet – (IEEE802.3az)
  - Wake on LAN (WoL)
- **Advanced functions:**
  - IEEE 1588 v2 Precision Time – Protocol
  - 802.1X Authentication
  - ACL Filtering
  - Full VLAN and QoS support
  - Flexible management options
  - SPI, I<sup>2</sup>C, In-Band, MIIM
- **Packaging:**
  - 128-Pin TQFP-EP (14mm x 14mm)



	PHY	MAC
KSZ8563	2 x 10/100 TX	1 x RGMII/MII/RMII
KSZ8565	5 x 10/100 TX	1 x RGMII/MII/RMII
KSZ8567	5 x 10/100 TX	2 x RGMII/RMII/MII

## Features:

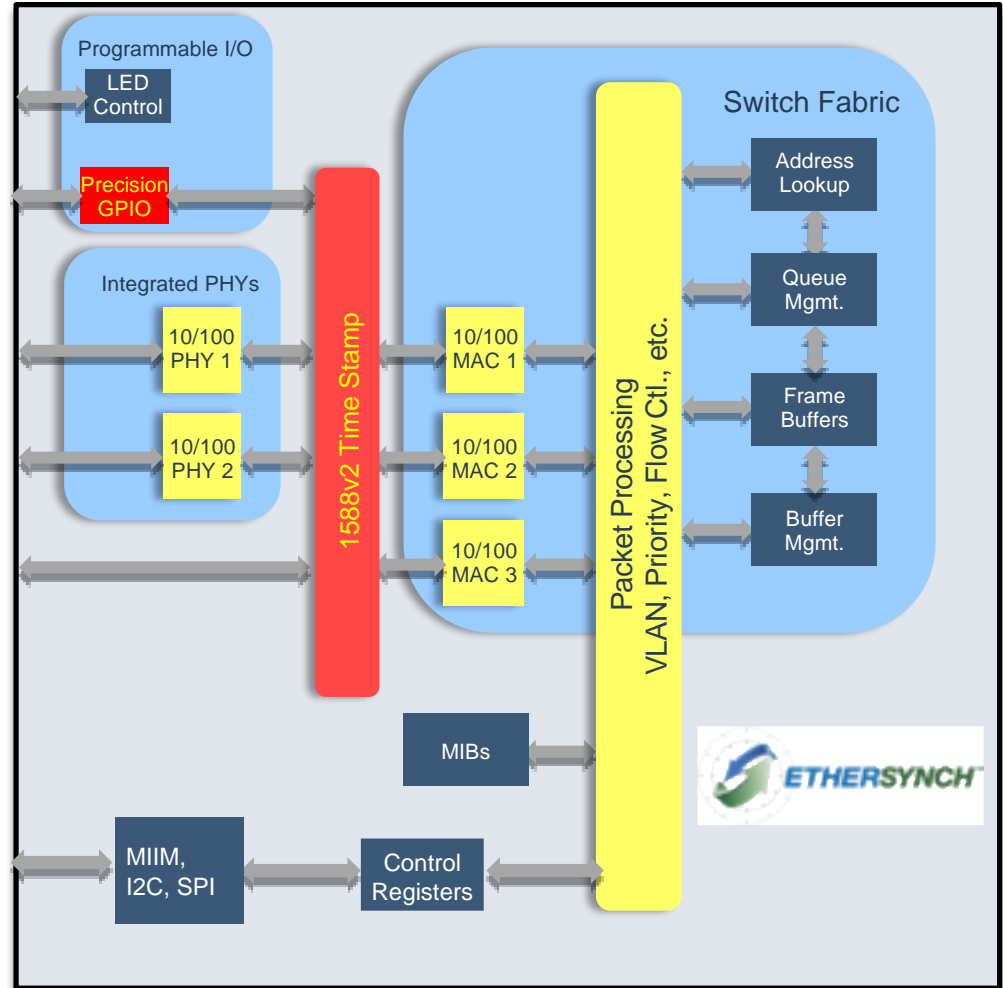
- EtherSync™
  - IEEE 1588v2 PTP
  - Precision GPIO
- EtherGREEN™:
  - Low-power GE PHY design
  - Flexible IO supply (1.8/2.5/3.3V)
  - Advanced Power Management
  - Energy Efficient Ethernet (IEEE802.3az)
  - Wake-on-LAN (WoL)
- Fully Managed
  - VLAN / Priority based QoS
  - ACL rule-based packet processing
  - IEEE802.1x Authentication
- Flexible MAC Interface
  - RGMII / MII / RMII
- Small Package
  - 64-Pin QFN, 8x8 mm
- Industrial Temp Support



KSZ9563 3-Port Gigabit Ethernet Switch

## Features:

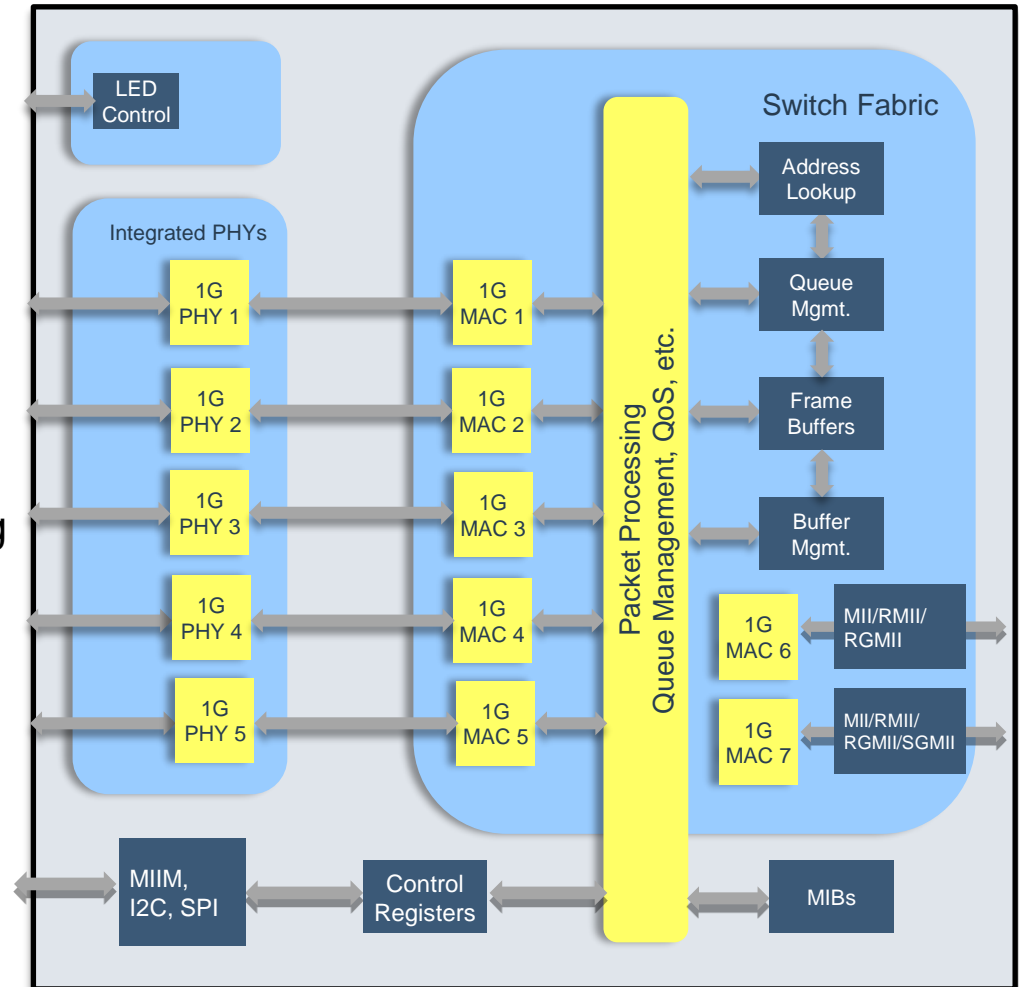
- EtherSync™
  - IEEE 1588v2 PTP
  - Precision GPIO
- EtherGREEN™:
  - Low-power GE PHY design
  - Flexible IO supply (1.8/2.5/3.3V)
  - Advanced Power Management
  - Energy Efficient Ethernet (IEEE802.3az)
  - Wake-on-LAN (WoL)
- Fully Managed
  - VLAN / Priority based QoS
  - ACL rule-based packet processing
  - IEEE802.1x Authentication
- Flexible MAC Interface
  - RGMII / MII / RMII
- Small Package
  - 64-Pin QFN, 8x8 mm
- Industrial Temp Support



KSZ8563 3-Port Gigabit Ethernet Switch

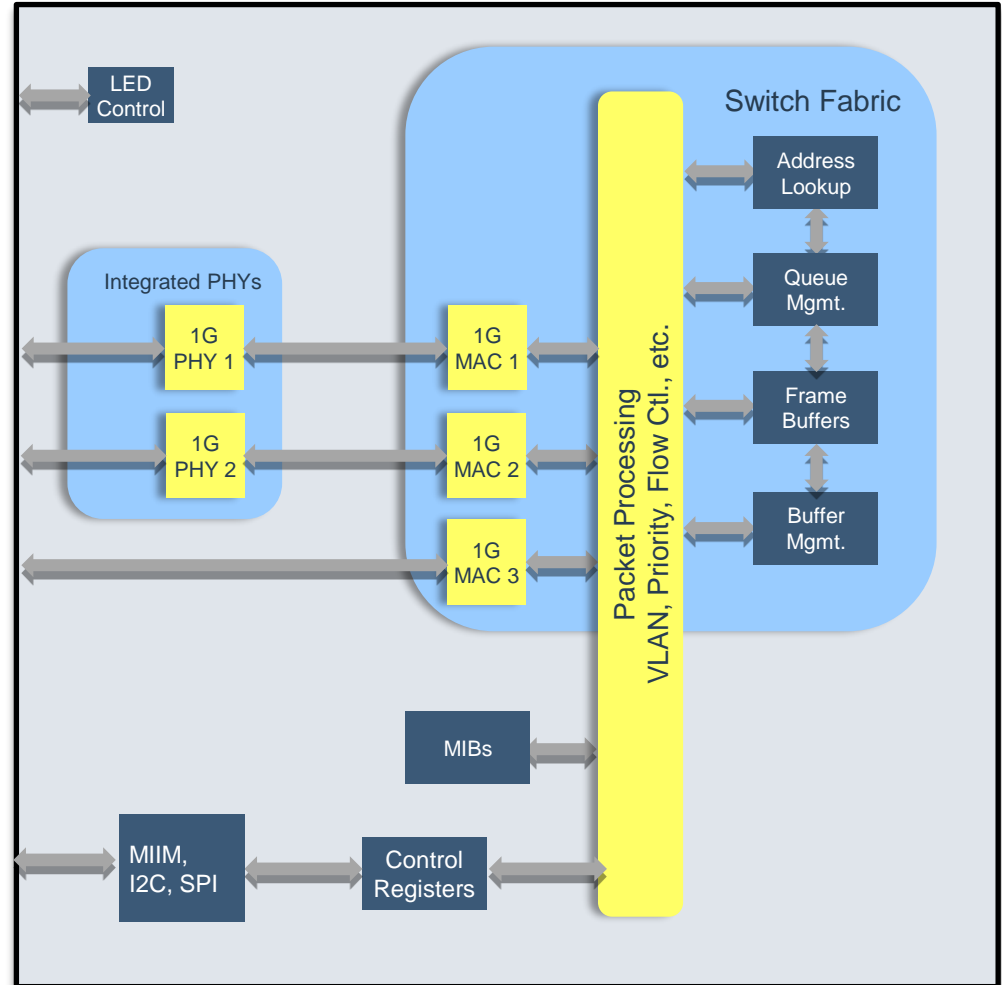
## Features:

- EtherGREEN™:
  - Low-power GE PHY design
  - Flexible IO supply (1.8/2.5/3.3V)
  - Advanced Power Management
  - Energy Efficient Ethernet – (IEEE802.3az)
  - Wake-on-LAN (WoL)
- Fully Managed Switch:
  - VLAN / Priority based QoS
  - ACL rule-based packet – processing
  - IEEE802.1x Authentication
- Flexible MAC interfaces:
  - GMII / MII
  - RGMII / RMII
  - SGMII / SerDes (7-Port only)
- Packages:
  - 128-pin LQFP, 14x14 mm
- Industrial Temp Support



## Features:

- EtherGREEN™:
  - Low-power GE PHY design
  - Flexible IO supply (1.8/2.5/3.3V)
  - Advanced Power Management
  - Energy Efficient Ethernet (IEEE802.3az)
  - Wake-on-LAN (WoL)
- Fully Managed
  - VLAN / Priority based QoS
  - ACL rule-based packet processing
  - IEEE802.1x Authentication
- Flexible MAC Interface
  - RGMII / MII / RMII
- Small Package
  - 64-Pin QFN, 8x8 mm
- Industrial Temp Support

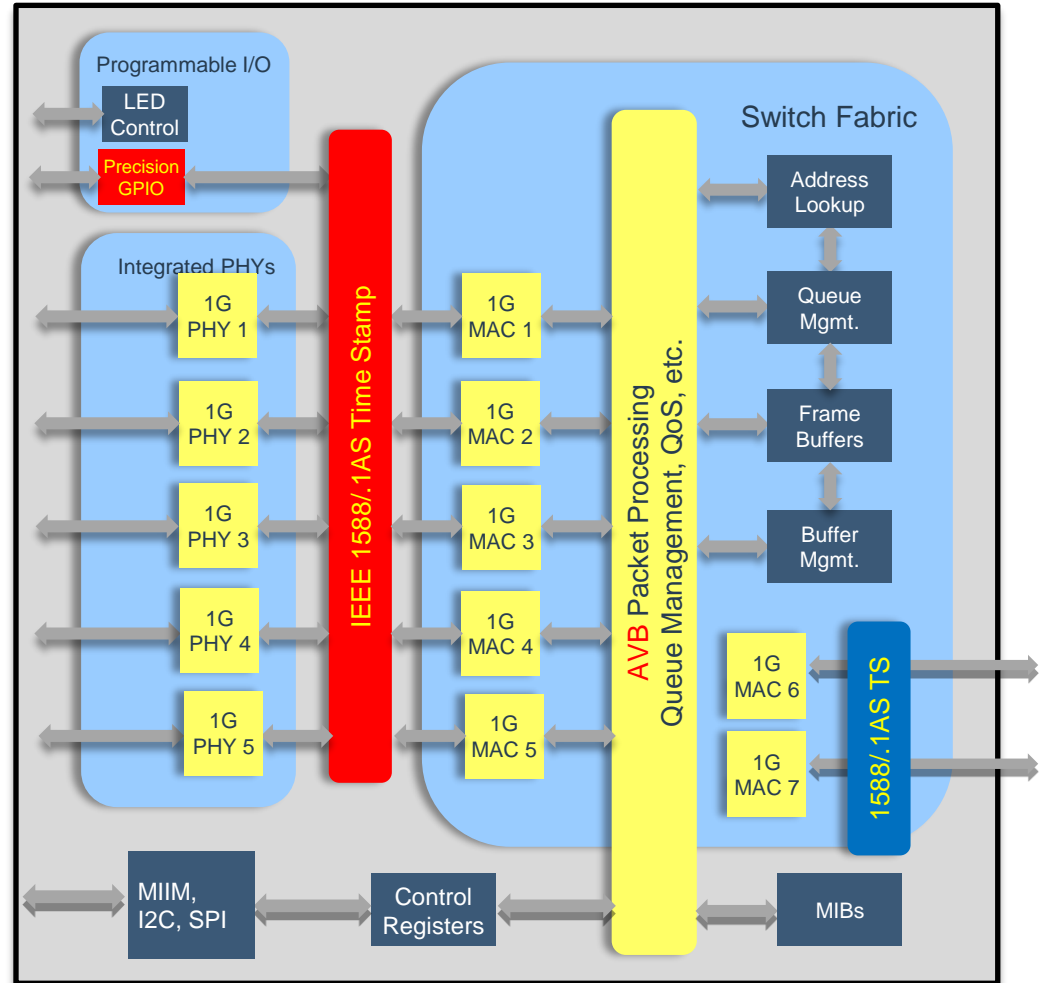


KSZ9893 3-Port Gigabit Ethernet Switch



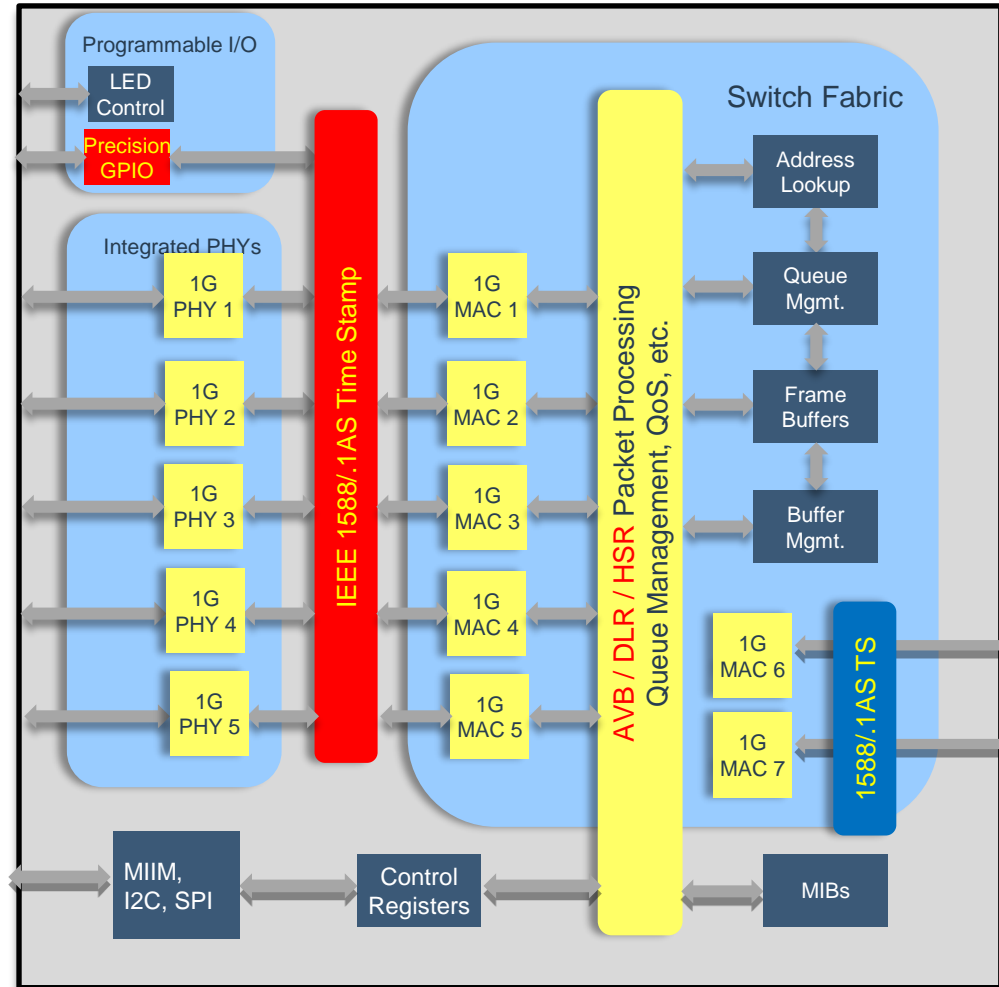
## Features:

- EtherGREEN™:
  - Low-power GE PHY design
  - Flexible IO supply (1.8/2.5/3.3V)
  - Advanced Power Management
  - Energy Efficient Ethernet
  - Wake-on-LAN (WoL)
- EtherSynch™
  - IEEE1588v2 PTP
  - Precision GPIO
- Flexible MAC interfaces:
  - GMII / MII / RGMII / RMII / -
  - SGMII / SerDes
- Package:
  - 128-pin LQFP, 14x14 mm
- I Temp Support

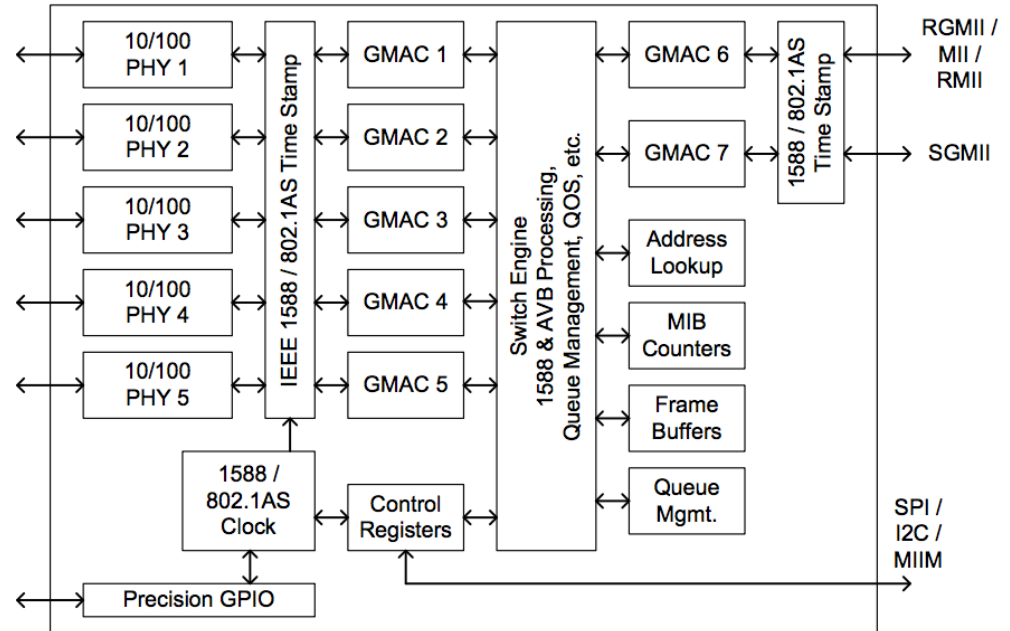


## Features:

- Pin & Functionally Compatible to –  
- KSZ9567
- Same features as KSZ9567 plus:
  - Network Fault Recovery:
    - Hardware-assisted HSR & DLR
- Flexible MAC interfaces:
  - GMII / RGMII / SGMII / MII / RMII
- 128-Pin LQFP
- I Temp support



- **Green Ethernet Design:**
  - 1.8/2.5/3.3V VDDIO
  - Energy Efficient Ethernet – (IEEE802.3az)
  - Wake on LAN (WoL)
- **Advanced functions:**
  - Audio Video Bridging (AVB)
  - IEEE 1588 v2 Precision Time – Protocol
  - 802.1X Authentication
  - ACL Filtering
  - Full VLAN and QoS support
  - Flexible management options
  - SPI, I<sup>2</sup>C, In-Band, MIIM
- **Packaging:**
  - 128-Pin TQFP-EP (14mm x 14mm)



	PHY	MAC
KSZ8563	2 x 10/100 TX	1 x RGMII/MII/RMII
KSZ8565	5 x 10/100 TX	1 x RGMII/MII/RMII
KSZ8567	5 x 10/100 TX	2 x RGMII/RMII/MII

## Features:

- Supports full duplex bi-directional
- Ethernet speeds up to 100Mbps
- Transmit and receive signal up to –
  - 180m (based on application) over –
  - 75Ω coax
- Supports auto-mute functionality for -
  - lowest application power
- Supports simultaneous power-over-coax (PoC)

Coax Interface	
Connectors	BNC True 75Ω
Cable Impedance	75Ω ± 3Ω
Connector/Coax Return Loss	Return Loss > 25 dB @ 1–200 MHz
Data Throughput	200 Mbps (Simultaneous 100 Mbps in both directions (for all cable lengths))
Aux Interface	
Connector (Head End)	RJ45 (PoE Device Compliant)
Connector (Camera Side)	RJ45 (PoE PSE Compatible)
Cable Type	Category 5 or above, Straight through or cross over (Auto MDI/MDIX)
Rates Supported	100Base-T/10Base-T, full/half duplex. Virtual wire operation with AutoNegotiation to match best capabilities of network equipment at each end
Power Supply Input (Head End Input)	
PoE via RJ45	Fully IEEE 802.3af Power over Ethernet Standard Compliant, nominal 48 V
DC Feed via Aux Power Connector	Min. 12 Vdc, Max. 48 Vdc (inner positive) PoE on RJ45 is disconnected if DC power applied via Aux Power rst Min. 24V recommended if camera is to be powered
Power Supply Output (Camera Side Output)	
PoE via RJ45	PoE Compatible, Vin @ Head End –2V-Coax DC drop (varies with cable type/length)
DC Feed via Coax	Vin @ Head End –2V-Coax DC drop per hop (varies with cable type/length) PoE on RJ45 is disconnected when DC output is used
Environmental	
Operating Temperature	0°C to +50°C
Relative Humidity	Up to 85% non-condensing
Storage Temperature	–20°C to +70°C

## Features:

- Supports full duplex bi-directional
- Ethernet speeds up to 1.25Gbps.
- Transmit and receive signal up to –
  - 70m (based on application) over –
  - 75Ω coax
- Supports auto-mute functionality for –
  - lowest application power
- Supports simultaneous power-over -
  - coax (PoC)

Coax Interface	
Connectors	BNC True 75Ω
Cable Impedance	75Ω ± 3Ω
Connector/Coax Return Loss	Return Loss > 25 dB @ 1–200 MHz
Data Throughput	200 Mbps (Simultaneous 100 Mbps in both directions (for all cable lengths))
Aux Interface	
Connector (Head End)	RJ45 (PoE Device Compliant)
Connector (Camera Side)	RJ45 (PoE PSE Compatible)
Cable Type	Category 5 or above, Straight through or cross over (Auto MDI/MDIX)
Rates Supported	100Base-T/10Base-T, full/half duplex. Virtual wire operation with AutoNegotiation to match best capabilities of network equipment at each end
Power Supply Input (Head End Input)	
PoE via RJ45	Fully IEEE 802.3af Power over Ethernet Standard Compliant, nominal 48 V
DC Feed via Aux Power Connector	Min. 12 Vdc, Max. 48 Vdc (inner positive) PoE on RJ45 is disconnected if DC power applied via Aux Power rst Min. 24V recommended if camera is to be powered
Power Supply Output (Camera Side Output)	
PoE via RJ45	PoE Compatible, Vin @ Head End –2V-Coax DC drop (varies with cable type/length)
DC Feed via Coax	Vin @ Head End –2V-Coax DC drop per hop (varies with cable type/length) PoE on RJ45 is disconnected when DC output is used
Environmental	
Operating Temperature	0°C to +50°C
Relative Humidity	Up to 85% non-condensing
Storage Temperature	–20°C to +70°C

## Features:

- Supports full duplex bi-directional
- Ethernet speeds up to 100Mbps
- Transmit and receive signal up to –
  - 80m (based on application) over –
  - 50Ω coax
- Supports auto-mute functionality for –
  - lowest application power
- Supports simultaneous power-over –
  - coax (PoC)

Coax Interface	
Connectors	BNC True 75Ω
Cable Impedance	50Ω ± 3Ω
Connector/Coax Return Loss	Return Loss > 25 dB @ 1–200 MHz
Data Throughput	200 Mbps (Simultaneous 100 Mbps in both directions (for all cable lengths))
Aux Interface	
Connector (Head End)	RJ45 (PoE Device Compliant)
Connector (Camera Side)	RJ45 (PoE PSE Compatible)
Cable Type	Category 5 or above, Straight through or cross over (Auto MDI/MDIX)
Rates Supported	100Base-T/10Base-T, full/half duplex. Virtual wire operation with AutoNegotiation to match best capabilities of network equipment at each end
Power Supply Input (Head End Input)	
PoE via RJ45	Fully IEEE 802.3af Power over Ethernet Standard Compliant, nominal 48 V
DC Feed via Aux Power Connector	Min. 12 Vdc, Max. 48 Vdc (inner positive) PoE on RJ45 is disconnected if DC power applied via Aux Power rst Min. 24V recommended if camera is to be powered
Power Supply Output (Camera Side Output)	
PoE via RJ45	PoE Compatible, Vin @ Head End –2V-Coax DC drop (varies with cable type/length)
DC Feed via Coax	Vin @ Head End –2V-Coax DC drop per hop (varies with cable type/length) PoE on RJ45 is disconnected when DC output is used
Environmental	
Operating Temperature	0°C to +50°C
Relative Humidity	Up to 85% non-condensing
Storage Temperature	–20°C to +70°C

## Features:

- Supports full duplex bi-directional
- Ethernet speeds up to 1.25Gbps
- Transmit and receive signal up to –
  - 40m (based on application) over –
  - 50Ω coax
- Supports auto-mute functionality for –
  - lowest application power
- Supports simultaneous power-over –
  - coax (PoC)

Coax Interface	
Connectors	BNC True 75Ω
Cable Impedance	50Ω ± 3Ω
Connector/Coax Return Loss	Return Loss > 25 dB @ 1–200 MHz
Data Throughput	200 Mbps (Simultaneous 100 Mbps in both directions (for all cable lengths))
Aux Interface	
Connector (Head End)	RJ45 (PoE Device Compliant)
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Environmental	
Operating Temperature	0°C to +50°C
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Storage Temperature	–20°C to +70°C



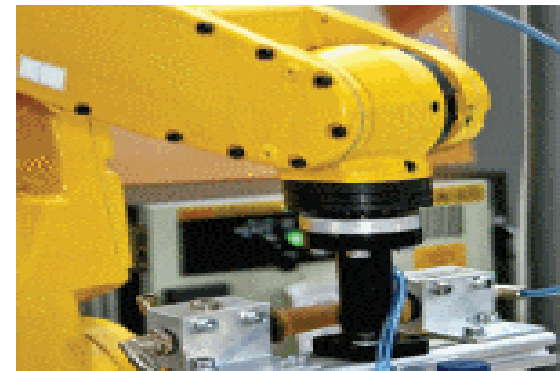
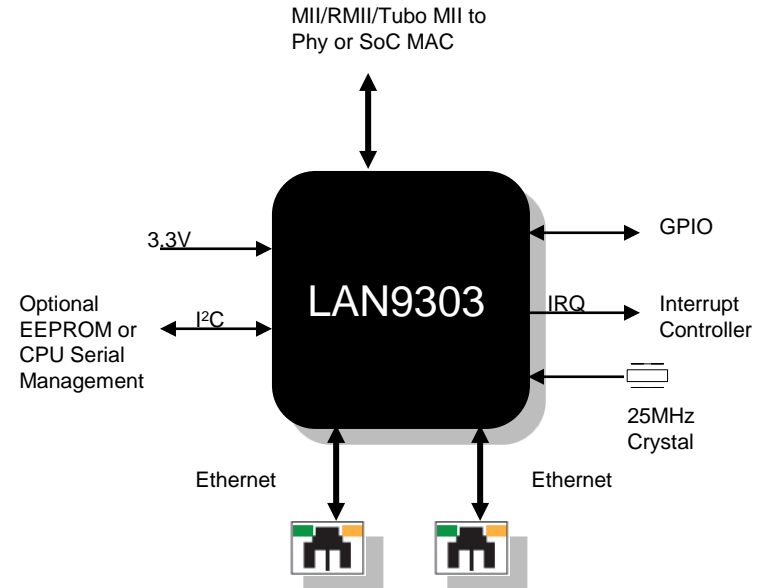
# LAN9303 Enhanced

3-Port 10/100 Managed Ethernet Switch with  
Single MII/RMII/Turbo MII or Dual RMII

Online  
Datasheet

## Features:

- High-performance, full-featured 3 port switch
- IEEE 802.1Q VLAN support
- IGMP snooping for multicast packet filtering
- Up to 200Mbps network speed via Turbo MII –  
- interface
- Optional EEPROM or external CPU serial –  
- management support via I<sup>2</sup>C interface
- Unique virtual PHY feature simplifies software –  
- development by mimicking multiple switch ports –  
- as a single-port PHY
- Integrated reg enables single 3.3V supply
- +/- 8kV/15kV per port ESD protection
- Lead free ROHS compliant packages
- LAN9303: 56-pin QFN 8x8mm
- LAN9303M: 72-pin QFN 10x10mm
- Commercial (0 to +70C) and Industrial (-40 –  
- to +85C) temperature supported

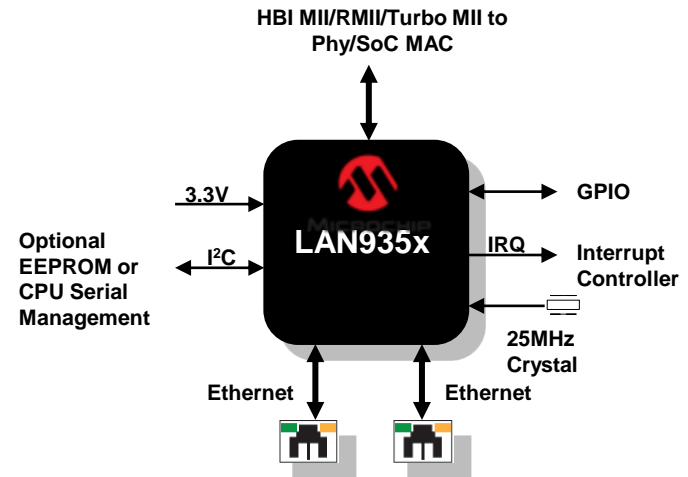


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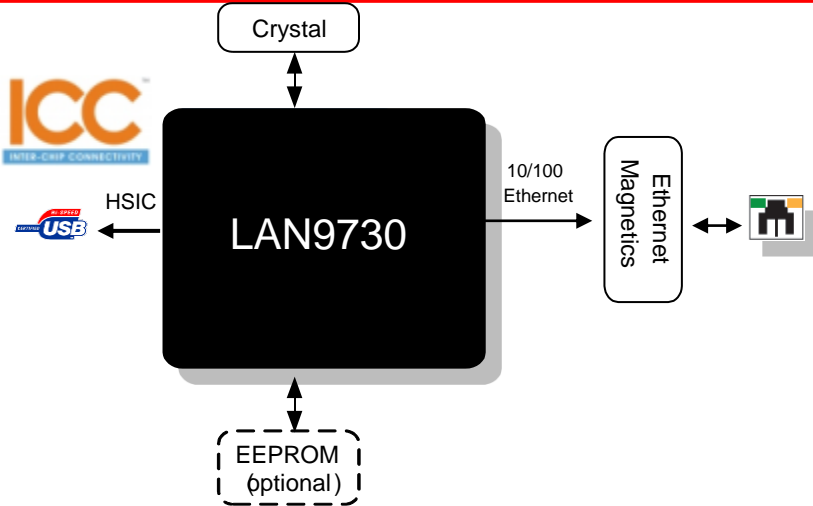
## Features:

- Enhanced 2/3 Port Switches
- IEEE 1588-2008 Compliant:
  - Supports UDP/IPv4/IPv6 and layer 2
  - Transparent and Boundary clocks
  - Smaller packet size & Increased update rate
- IEEE 802.3u 100Base-FX Fiber Interface
- IEEE 802.3az Energy Efficient Ethernet
- WoL for additional system power savings
- Cable Diagnostics: detection of Open, Short –  
- and Cable length
- Optional EEPROM or external SoC serial -  
- management support via I<sup>2</sup>C interface
- Virtual PHY support to simplify s/w development
- Integrated reg enables single 3.3V supply
- Packaging:
  - LAN9353M/2xRMII: 64-pin QFN/ 64 pin –  
- QFP-EP
  - LAN9354 RMII: 56-pin QFN
  - LAN9355/2xMII: 88-pin QFN/ 80-pin QFP-EP



## Applications

- Industrial PC
- VoIP gateway
- SOHO/SMB router
- Telecom
- Financial Transactions
- Industrial Networks
- Power Grid/Meter
- Security / Surveillance
- Transportation
- Mill/Aero



## Target Applications

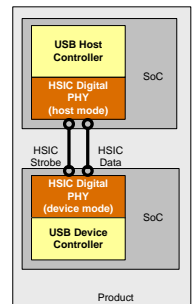
- IP TV Players
- Set Top Box
- Digital TV
- Docking (wireless)
- Digital Signage
- Netbook/Tablet
- SoC Reference Platforms
- TI OMAP5, Nvidia Tegra, Marvell

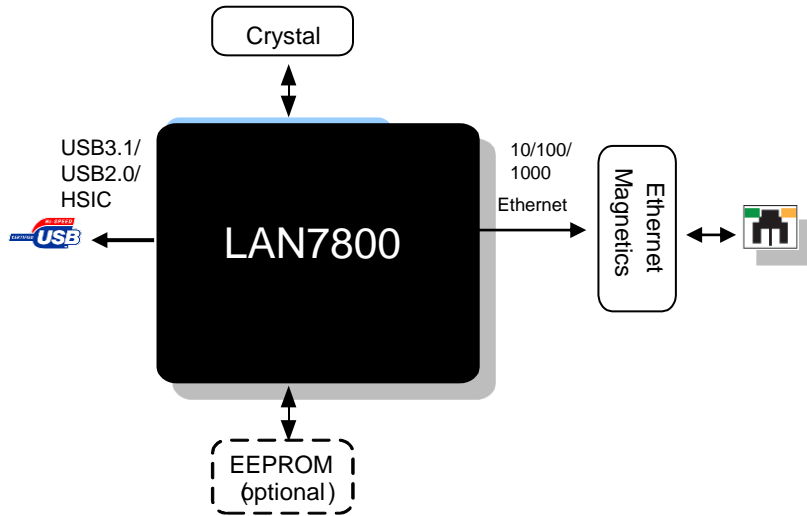
Commercial (0 to +70C) and Industrial (-40 to +85C) temperature supported

## Features:

- Software compatibility - Transparent to –
  - USB software stack and device drivers
- Fully supports IEEE 802.3/802.3u standards
- Power savings - Eliminate two USB PHY's –
  - in on-board USB chip-to-chip connection:
    - 2-pin interface: Clock, Data
- Implements WoL support for reduced –
  - system power consumption
- Supports EEPROM-less operation for
  - reduced BOM costs
- UniClock Technology requires single 25 MHz
  - crystal for USB & Ethernet
- Lead free ROHS compliant –
  - packages
- LAN9730: 56-pin QFN 8x8mm

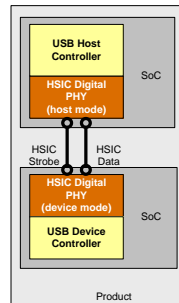
*What is HSIC - USB chip-to-chip interconnect. HSIC removes the analog transceivers found in normal USB. HSIC is meant to be a point to point connection between a host and device on the same PCB.*





## Target Applications

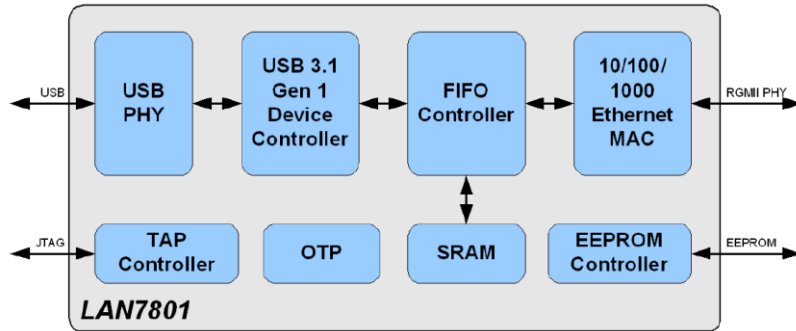
- PC Docking
- Port Replicators
- USB to eNet Dongle
- Digital Signage
- Networked Printers
- Netbook/Tablet
- PVR, STB
- Digital TV
- SoC Reference Platforms



*What is HSIC - USB chip-to-chip interconnect. HSIC removes the analog transceivers found in normal USB. HSIC is meant to be a point to point connection between a host and device on the same PCB.*

## Features:

- Three product SKUs
  - LAN7800 – USB3.1 Gen1 to GigE
  - LAN7801 – USB3.1 Gen1 to RGMII - (use with external PHY)
  - LAN7850 – HSIC to GigE
- Software compatibility - Transparent to -
  - USB software stack and device drivers
- Fully supports IEEE 802.3/802.3u -
  - standards
- Implements NetDetach™ and WoL support -
  - for reduced system power consumption
- Supports EEPROM-less operation for -
  - reduced BOM costs
- UniClock Technology requires single 25 -
  - MHz crystal for USB & Ethernet
- Recommended for Automotive Design
- Temperature range: Commercial –
  - (0 to +70C) and Industrial (-40 to +85C)



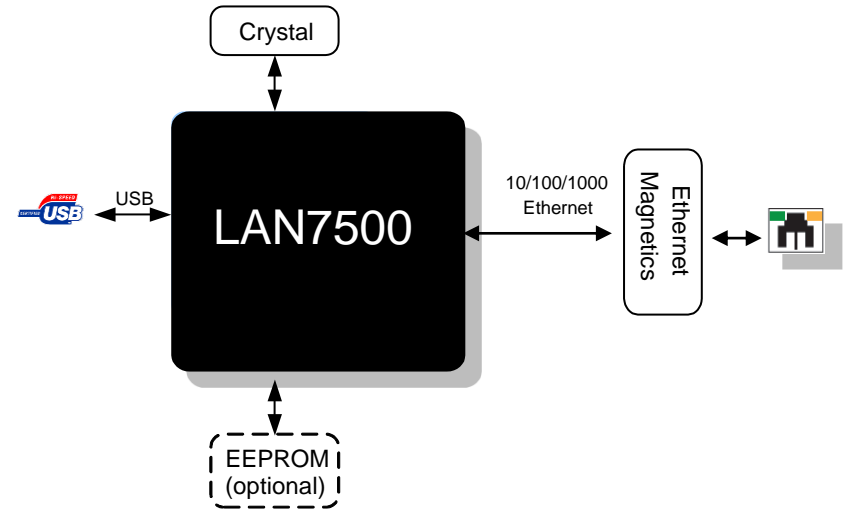
## Features

- Single-chip, Super-Speed USB 3.1 Gen 1 to 10/100/1000 Ethernet controller
- Interface to external PHY via RGMII
- IEEE 802.3az - Energy Efficient Ethernet (EEE)
- Implements NetDetach™ and WoL support for reduced system power consumption
- Supports PCI-like PME Wake
- Supports checksum offloads (IPv4, IPv6, TCP, UDP)
- IEEE 802.1q VLAN tag based packet filtering
- Supports Win8's & Win10's Connected Standby with flexible address filtering modes, Wakeup packet support, ARP and NS offload
- Supports EEPROM-less operation for reduced BOM costs (1K OTP)
- UniClock Technology requires single 25 MHz crystal
- 64-pin SQFN (9 x 9 mm)



## Features:

- Fully supports IEEE 802.3/802.3u/802.3ab - standards
- Implements NetDetach™ for reduced system - power consumption
- Excellent ESD Protection levels without any - external protection device
  - ±8kV / ±15kV for contact/air discharge - mode per IEC61000-4-2
- Supports EEPROM-less operation for reduced - BOM costs
- UniClock Technology requires single 25 MHz - crystal for both USB and Ethernet
- Package:
  - 56-pin QFN 8x8mm
  - Commercial (0 to +70C) and Industrial (-40 to - +85C) temperature supported



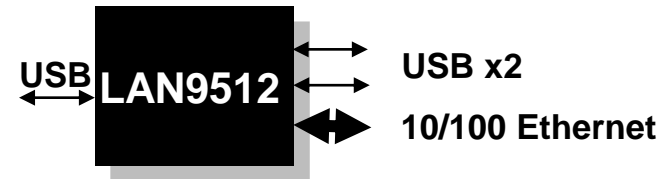
## Target Applications

- |                      |                           |
|----------------------|---------------------------|
| • PC Docking         | • Netbook/Tablet          |
| • Port Replicators   | • PVR, STB                |
| • USB to eNet Dongle | • Digital TV              |
| • Digital Signage    | • SoC Reference Platforms |
| • Networked Printers |                           |

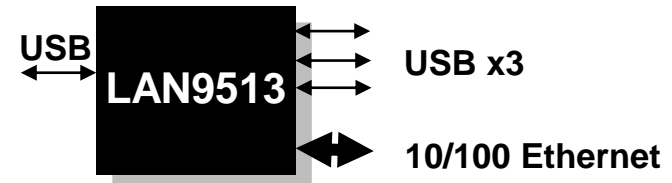
## Features:

- USB to Ethernet controller with USB2.0 hub –
  - integrated
- First in the industry
- 2, 3 or 4 additional USB downstream ports –
  - and 10/100 Ethernet
- LAN9512 → 2 downstream ports
- LAN9513 → 3 downstream ports
- LAN9514 → 4 downstream ports
- Unique BOM cost saving features
- Only a single 25MHz crystal needed for both –
  - USB and Ethernet
- Built in 8kv/15kv contact/air discharge ESD –
  - protection
- 24MHz clock out provided to connect additional –
  - SMSC USB hub if needed
- Extensive power management features
- WOL, Magic Packet, GPIO assertion, Link –
  - Status Change
- Package: 64QFN 9x9mm Package

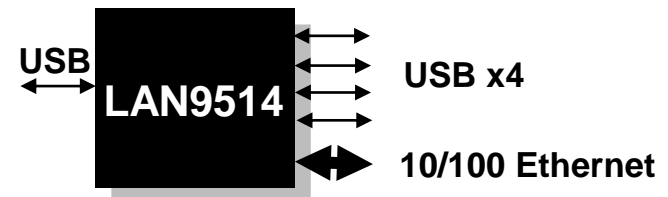
### Integrated 3 Port USB Hub



### Integrated 4 Port USB Hub

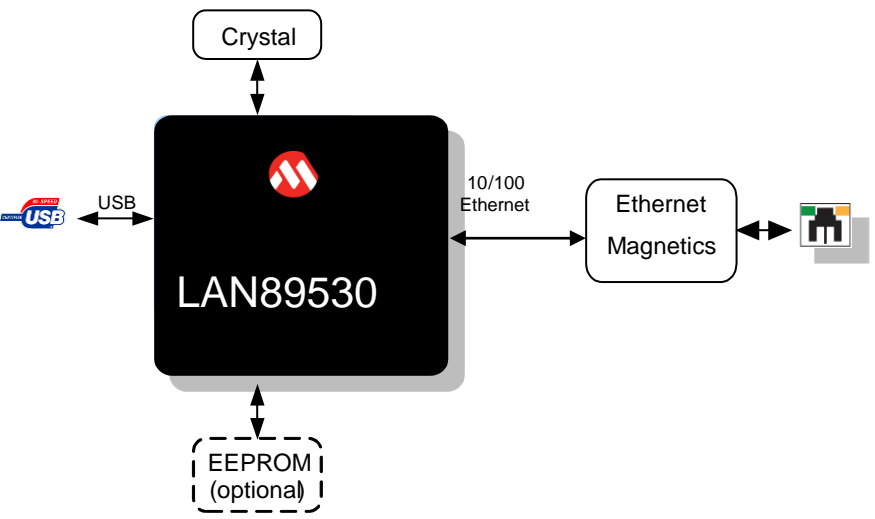


### Integrated 5 Port USB Hub



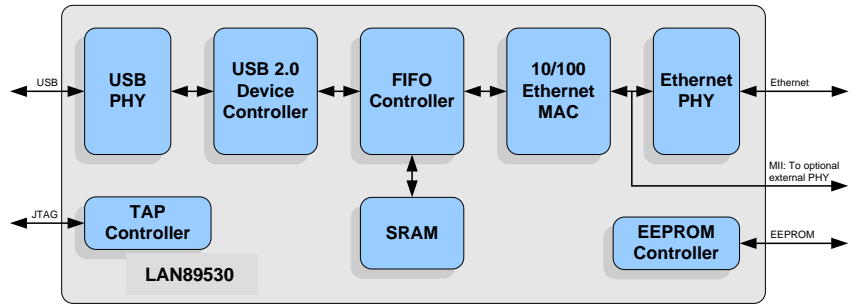
### Target Applications

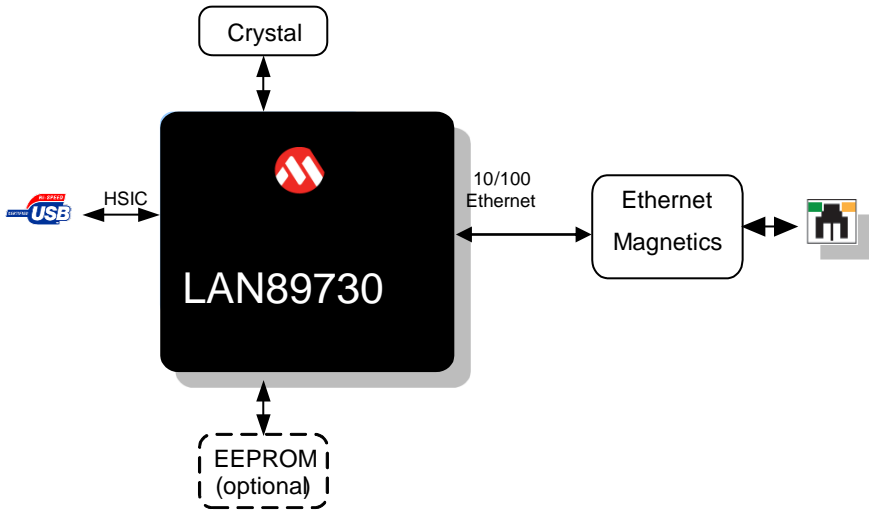
- PC Docking
- Port Replicators
- USB to eNet Dongle
- Digital Signage
- Networked Printers
- Netbook/Tablet
- PVR, STB
- Digital TV
- SoC Reference Platforms



## Features

- Single Chip USB 2.0 to 10/100 Ethernet Controller
- NetDetach™ for reduced system power consumption
- EEPROM-less operation - reduced BOM costs
- UniClock™ Technology enables single 25 MHz crystal for both USB and Ethernet
- Driver support for Win 8/7/XP/Vista, Linux, CE, MAC
- Supports bus-powered and self-powered operation
- Supports MII MAC interface for external PHYs
- Extensive power management features
- GPIO assertion, WOL, Magic Packet™, Link Status Change, PME
- AEC-Q100 Grade 3 (-40 to +85C )
- 56-Pin QFN (8 x 8mm)





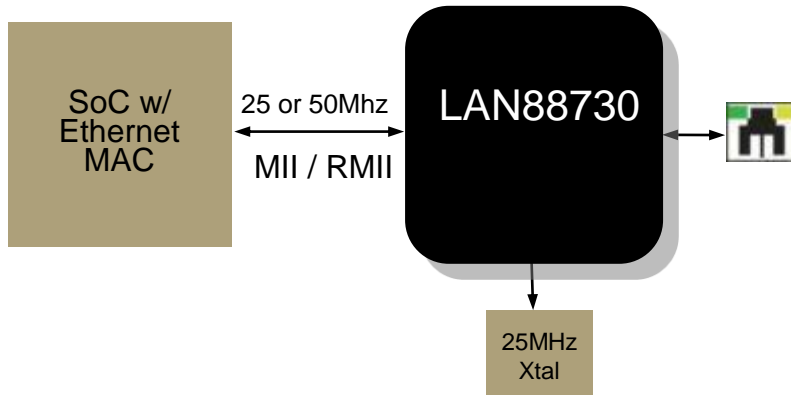
## Features

- Single Chip HSIC to 10/100 Ethernet Controller
- System power savings through chip-to-chip USB connectivity.
- Eliminate two USB PHYs
- Software compatibility - Transparent to USB software stack and device drivers
- NetDetach™ for reduced system power consumption
- EEPROM-less operation - reduced BOM costs
- Driver support for Win 8/7/XP/Vista, Linux, CE, MAC
- UniClock™ Technology - single 25 MHz crystal
- Supports MII (Turbo mode) for external PHYs
- Extensive power management features
- AEC-Q100 Grade 3 (-40 to +85C )
- 56-Pin QFN (8 x 8mm)

**Ideal for following SoC Platforms;**  
*AMD, nVIDIA Tegra, Qualcomm Snapdragon,  
 Samsung Exynos, Marvell, and others*

**Industry's first Single-chip, HSIC to 10/100 Ethernet controller**





## Features:

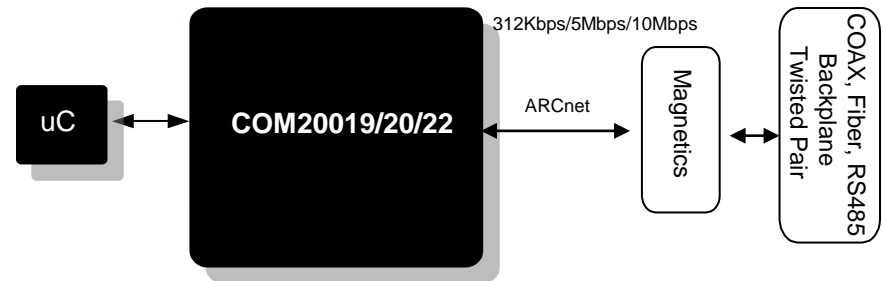
- Excellent ESD Protection levels without – any external protection devices:
  - Meets / exceeds IEC requirements
- Integrated DSP with adaptive equalizer
- Integrated 1.2V Linear Regulator
- Incorporates flexPWR®
  - Flexible I/O voltage down to 1.8V
- Uses a low cost 25MHz xtal for RMII
- Small footprint (5mm x 5mm) 32-pin VQFN,
- Automotive Grade 3 Qualified (-40 to +85C )
- Automotive Grade 2 Qualified (-40 to +105C )

# ARCnet Controllers

## COM20019i/20i/22i

### Features:

- ANSI Standard 878.1
- Deterministic protocol based on Token –  
- Passing.
  - Perfect for Automation and Process –  
- applications
- 3.3v Power Supply
- Low software overhead
- Simple address & data interface
  - Compatible with any SoC
  - 8/16 bit bus
- COM20019 312Kbps data rate
- COM20020 5Mbps data rate
- COM20022 10Mbps data rate
- Devices come in either 28PLCC or 48TQFP
  - COM20022 48TQFP only
- Commercial (0 to +70C) and Industrial –  
- (-40 to +85C) temperature supported



Additional information available at the ARCnet  
Trade Association WEB site [www.arcnet.com](http://www.arcnet.com)

### Target Applications

- Transportation
- Gaming
- Photo Development  
Equipment
- Medical Equipment
- Process Equipment
- Building Automation
- ATM's
- Robotics
- Power generation

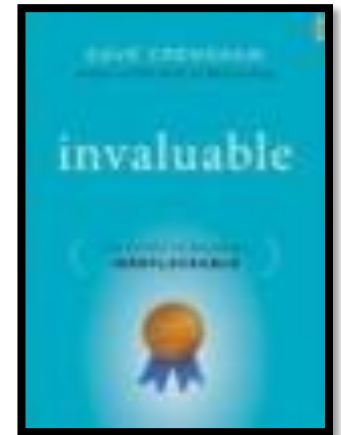


# LANCheck Design Review Service

LANCheck Online Review is a personalized, value-added service available at no charge to customers who have selected our Ethernet offerings for their application design-in. LANCheck will support your design process by providing guidance through the complete design cycle – from initial schematic design to PCB design.

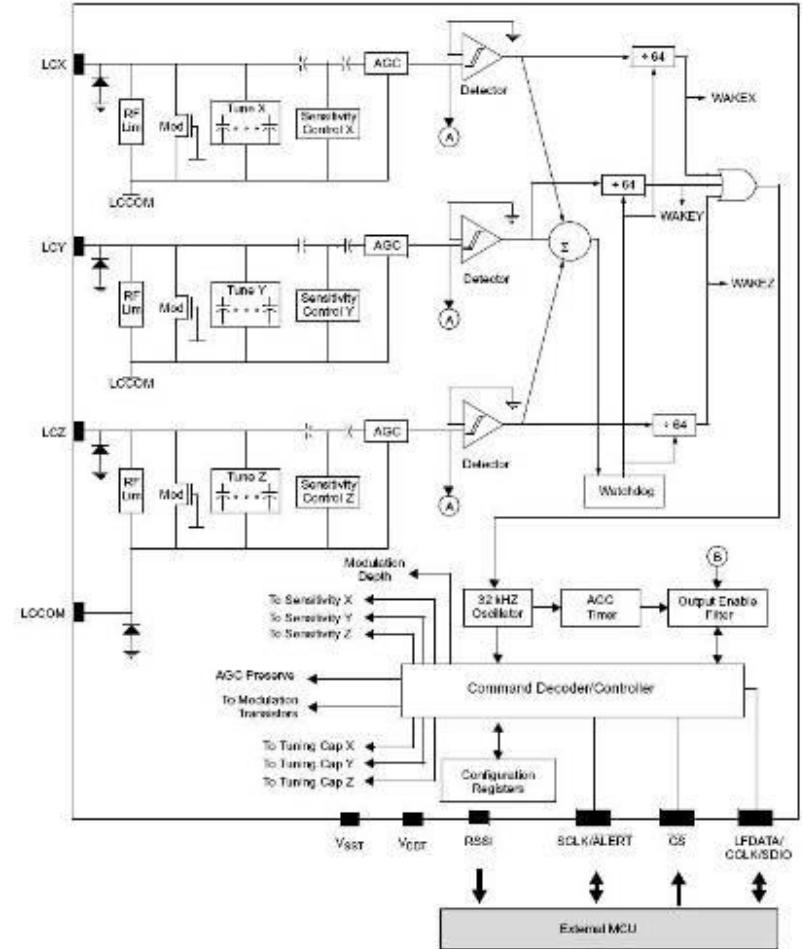
## Benefits:

- Accelerated design cycle, reduced design risk & improves –
  - time-to-market
- Savings in PCB costs by reducing spins
- Address EMI and ESD compliance requirements early on in –
  - the design cycle
- “Heads-up” provided in the LANCheck feedback on subtle –
  - specifications for companion parts (magnetics, crystals, -  
- oscillators)
- On-line documentation allows the customer to “help themselves” –
  - and eliminates any back-and-forth between the factory, -  
- saving time



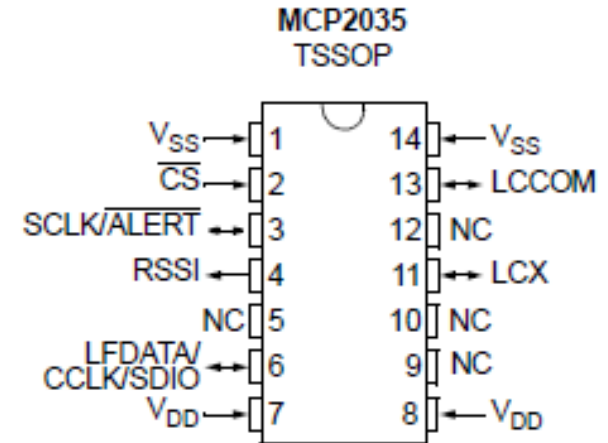
## Features:

- Three input pins for analog input signals
- High input detection sensitivity:  $3\text{mV}_{\text{P-P}}$  (typ.)
- High modulation depth sensitivity
- Three output selections: Demodulated –  
- data, Carrier clock, RSSI
- Input carrier frequency:  $125\text{kHz}$  (typ.)
- Input data rate:  $10\text{ kbps}$ , maximum
- 8 internal Configuration registers
- Bidirectional transponder communication
- Programmable antenna tuning capacitance
- Programmable output enable filter
- Low standby current:  $4\mu\text{A}$  (typ.), 3-Ch enabled
- Low operating current:  $13\mu\text{A}$  (typ.), 3-Ch enabled
- SPI
- Supports Battery Back-Up mode and battery -  
- less operation with external circuits
- Industrial Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$



## Features:

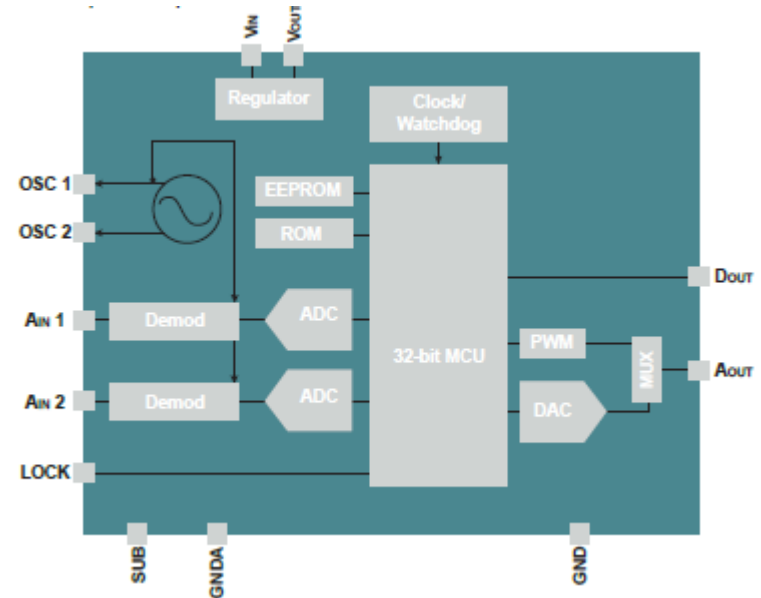
- Single Analog Input Pin for Signal Detection
- High Input Detection Sensitivity (3 mVPP, typical)
- High Modulation Depth Sensitivity (as low as 8%)
- Three Output Type Selections:
  - Demodulated Data
  - Carrier Clock
  - Received Signal Strength Indicator (RSSI)
- Input Carrier Frequency: 125 kHz, typical
- Input Data Rate: 10 Kbps, maximum
- 8 Internal Configuration Registers
- Bidirectional Transponder Communication via the –  
- same input pin (LF talk-back)
- Programmable Antenna Tuning Capacitance (up –  
- to 63 pF, 1 pF/step)
- Programmable Output Enable Filter
- Low Standby Current: 2  $\mu$ A, typical
- Low Operating Current: 10  $\mu$ A, typical
- Serial Peripheral Interface (SPI) with external devices
- Industrial Temperature Range: -40°C to +85°C
- 14-lead TSSOP



The LX3301A is an Automotive Grade 1, 125°C device with analog and PWM outputs that features an analog front-end with signal processing and control for six calibration segments to shape the output response.

## Features List:

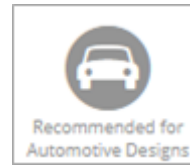
- Six Calibration Segments
- Analog and PWM output
- 12 bit output Resolution
- Sensor offset correction
- 12bit origin offset adjust
- Automatic Gain (AGC) Oscillator/demodulator
- Redundant Sensor IC Support
- AEC-Q100 Grade 1
- Temperature Range : -40 °C to 125 °C
- 14-pin TSSOP





# LX3302A

Inductive Position Sensor IC with Analog, PWM, SENT, PSI5, and Sine/Cosine outputs

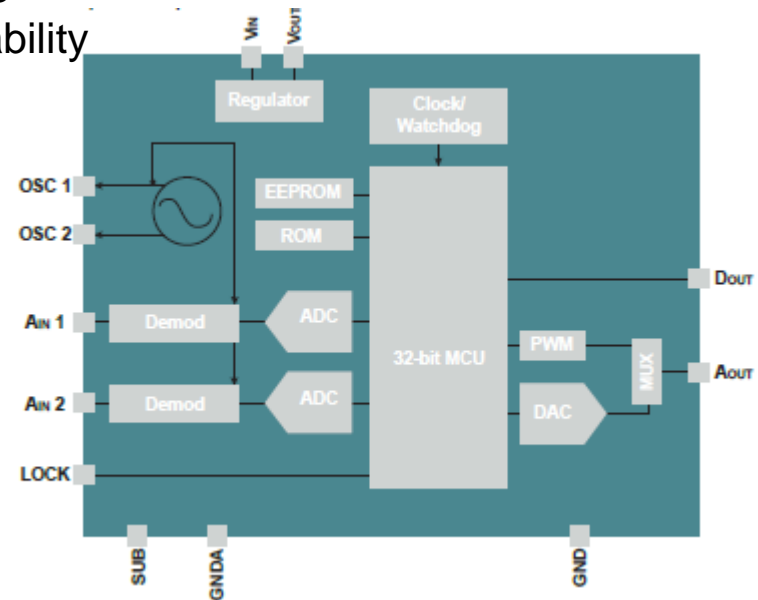


Online  
Datasheet

The LX3302A Automotive Grade 0, 150°C device with SENT, PSI5, analog and PWM outputs features eight calibration segments for simple sensor accuracy improvements along with an options for Sine/cosine outputs, and both power line and GPIO programmability options for embedded applications

## Feature List:

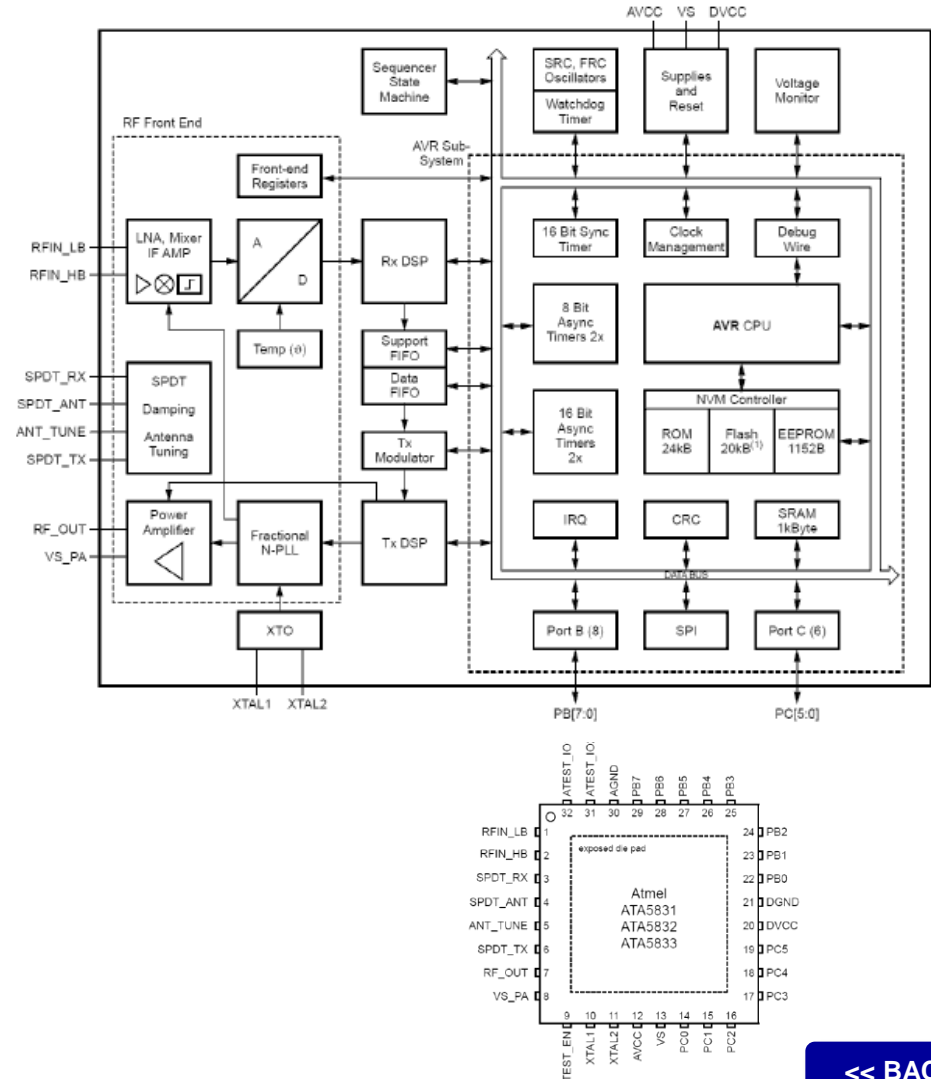
- Eight Calibration Segments
- SENT and PSI5 Digital outputs
- Analog and PWM output
- 12 bit output Resolution
- Sine/cosine output for resolver function
- Programmable with GPIO or Power Pins
- 10 Bit ADC for External Sensor
- On Board Temperature Sensor
- Redundant Sensor IC Support
- AEC-Q100 Grade 0
- Temperature Range: -40 °C to 150 °C
- 14-pin TSSOP



<< BACK

## Features:

- AVR® microcontroller core
- ATA5831: 20Kbyte user flash
- ATA5832: 20Kbyte user ROM
- ATA5833: No user memory
- Supported frequency ranges
- Low-band 310...318 MHz, 418...  
- 477 MHz
- High-band 836...956 MHz
- 315.00/433.92/868.30/915.00 MHz –  
- with one 24.305 MHz crystal
- Low current consumption
- Typical OFF Mode current of 5nA
- Programmable output power -  
-12dBm to +14.5dBm
- Supply voltage ranges 1.9V to 3.6V –  
- and 2.4V to 5.5V
- Temperature range: -40°C to +105°C
- Small 5x5mm QFN32 package

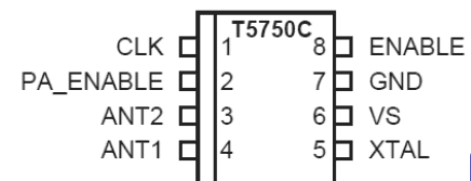
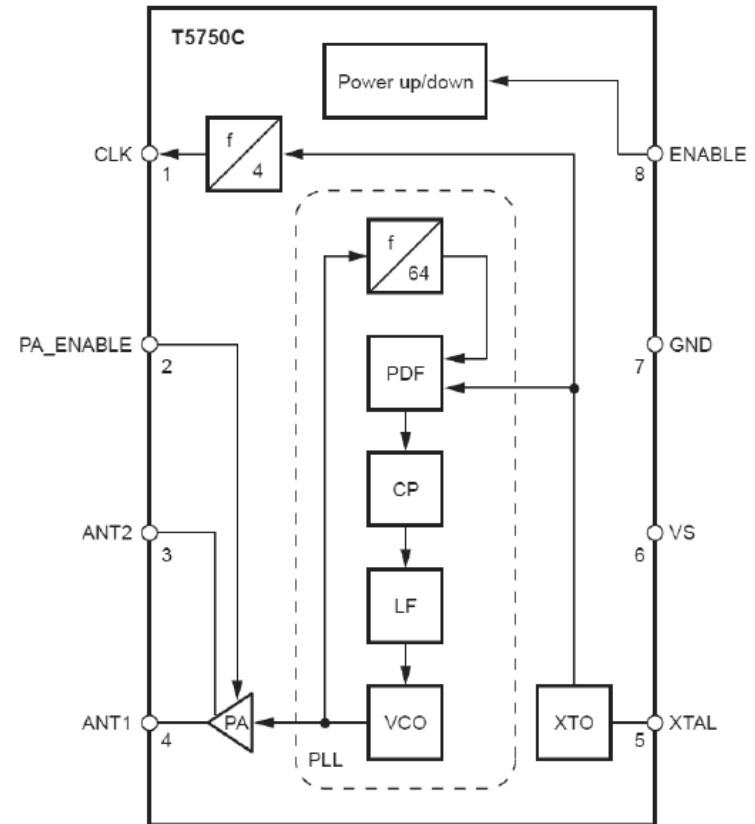






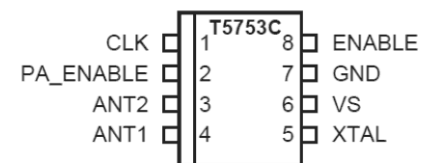
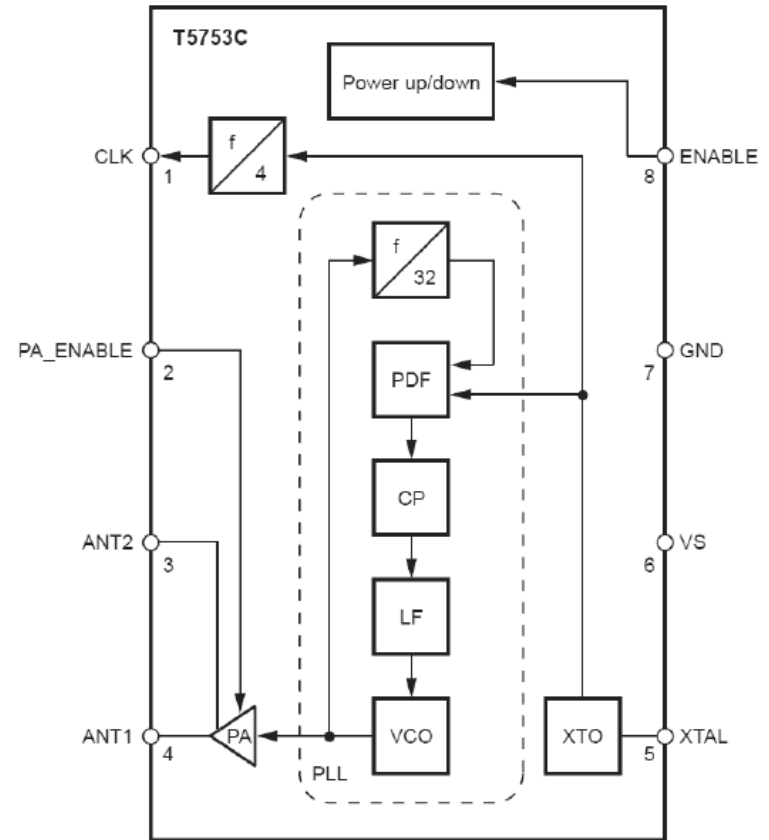
## Features:

- Transmitting frequency range is 868-928 MHz
- Integrated PLL loop filter
- ESD protection also at ANT1/ANT2
- High output power with low supply current
- Modulation scheme ASK/FSK
- FSK modulation is achieved by connecting –
  - an additional capacitor between the XTAL -
  - load capacitor and the open drain output –
  - of the modulating microcontroller
- Easy to design-in due to excellent isolation –
  - of the PLL from the PA and Power supply
- Single Li-cell for power supply
- Supply voltage 2.0V to 4.0V in the -
  - temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}/+125^{\circ}\text{C}$
- Package TSSOP8L
- Single-ended antenna output with high –
  - efficient power amplifier
- CLK output for clocking the microcontroller
- One-chip solution with min external circuitry



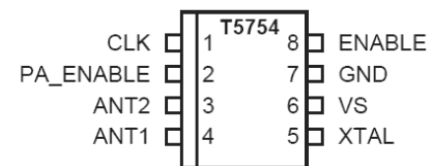
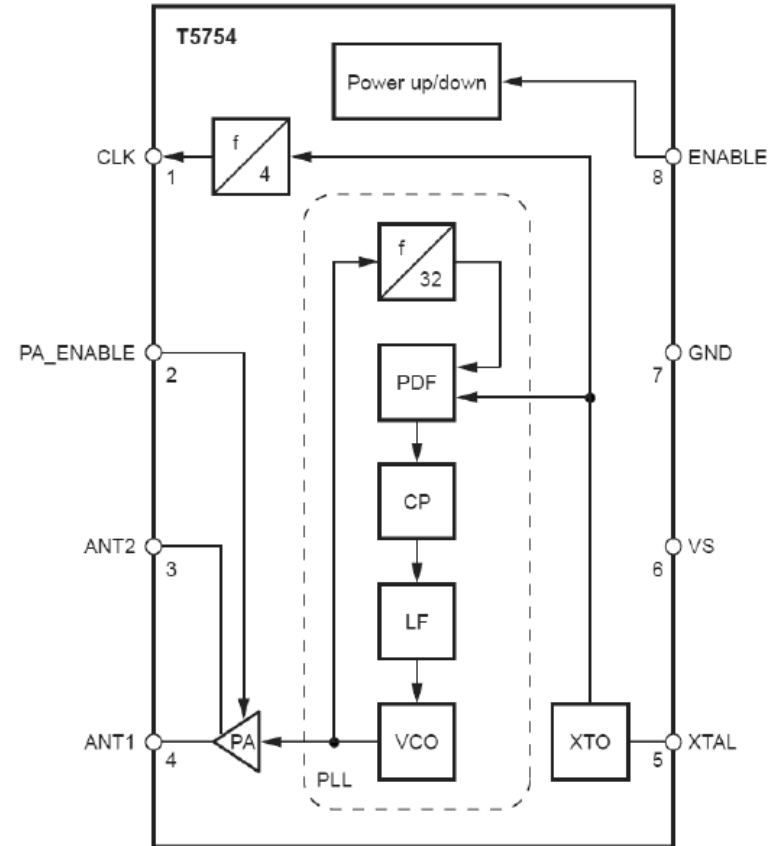
## Features:

- Transmitting frequency range is 310-350MHz
- Integrated PLL loop filter
- ESD protection also at ANT1/ANT2 -
  - (3kV HBM/150V MM; except pin 2: 3kV
  - HBM/100V MM)
- High output power with low supply current
- Modulation scheme ASK/FSK
- FSK modulation is achieved by connecting an –
  - additional capacitor between the XTAL load –
  - capacitor and the open drain output of the –
  - modulating microcontroller
- Single Li-cell for power supply
- Supply voltage 2.0V to 4.0V
- Temperature range: -40°C to +85°C/+125°C
- Package TSSOP8L
- Single-ended antenna output with high efficient –
  - power amplifier
- CLK output for clocking the microcontroller
- One-chip solution with minimum external circuitry



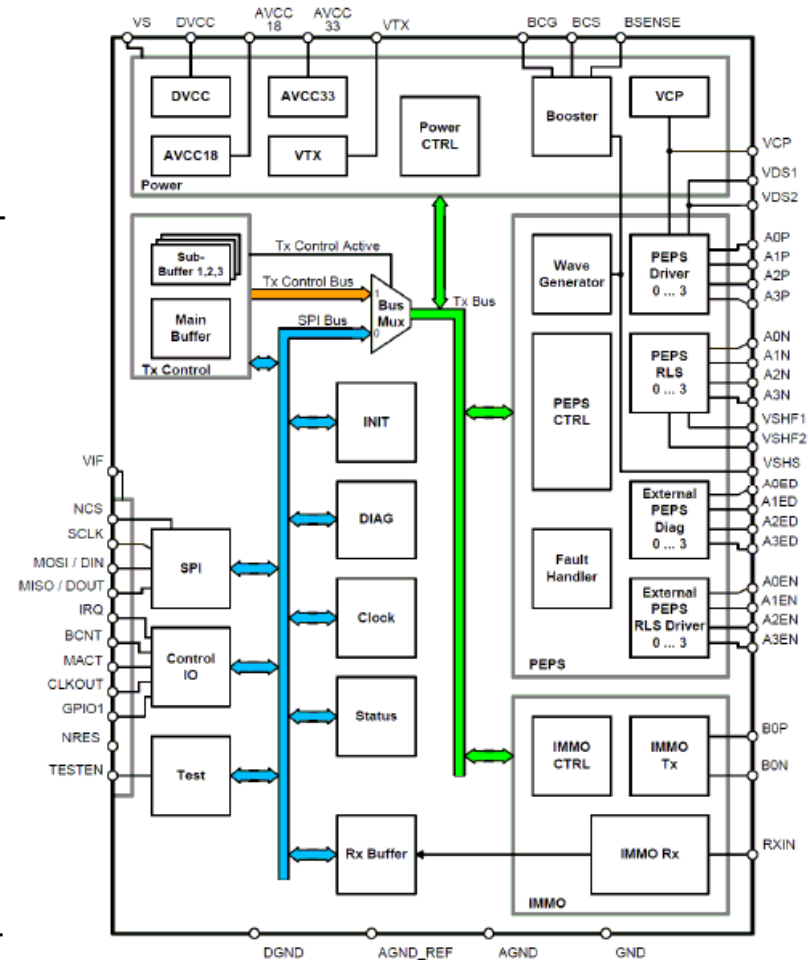
## Features:

- Transmitting frequency range is 429MHz to –  
– 439MHz
- Integrated PLL loop filter
- ESD protection also at ANT1/ANT2 -  
– (3kV HBM/150V MM; except pin 2: 3kV –  
– HBM/100V MM)
- High output power with low supply current
- Modulation scheme ASK/FSK
- FSK modulation is achieved by connecting an –  
– additional capacitor between the XTAL load –  
– capacitor and the open drain output of the –  
– modulating microcontroller
- Single Li-cell for power supply
- Supply voltage 2.0V to 4.0V in the -  
– temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}/+125^{\circ}\text{C}$
- Package TSSOP8L
- Single-ended antenna output with high efficient –  
– power amplifier
- CLK output for clocking the microcontroller
- One-chip solution with minimum external circuitry



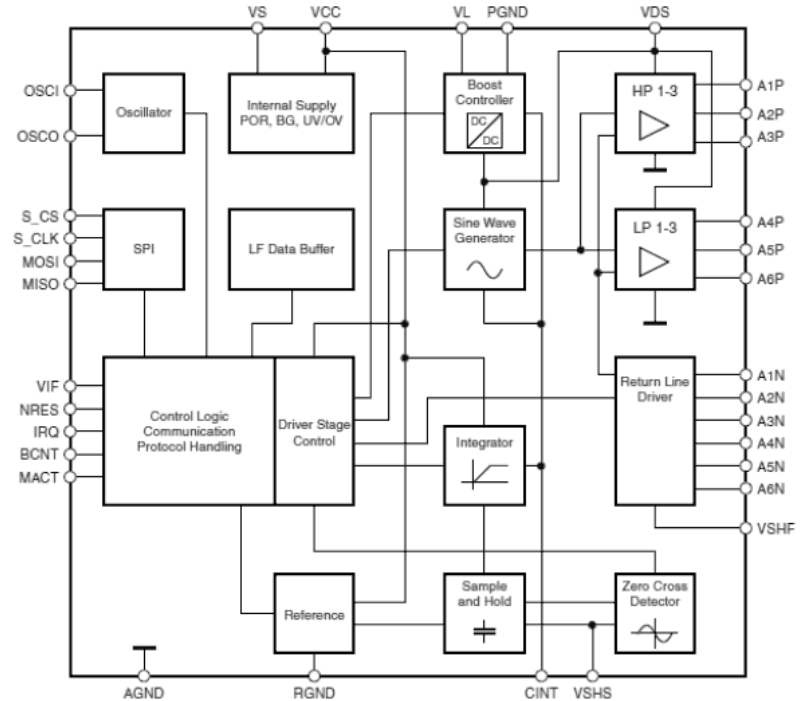
## Features:

- 4 integrated LF drivers, programmable peak –
  - current up to  $1A_p$ , adjustable in 20 steps
  - Support of  $2A_p$  per Antenna
- Integrated mux (4 int., 4 ext.) with the ability to –
  - drive any 2 coils simultaneously
- Independent, integrated LF Transceiver for –
  - immobilizer; stand-alone or shared
- Digital filter with excellent noise suppression –
  - for remote antenna system
- Operating supply: 7-16.5V
- Jump Start: 7V-28V; Immo down to 5V
- Integrated Boost Converter control
- Programmable carriers (sinus/square/ -
  - custom) for best EMC
- Autonomous polling mode
- Fast 2Mbit/s SPI interface
- Temperature Range: -40C to 125C
- Full diagnostic coverage for all channels Short –
  - to GND,  $V_{CC}$ , other Coils, Open detection
- Package QFN48 (7x7)



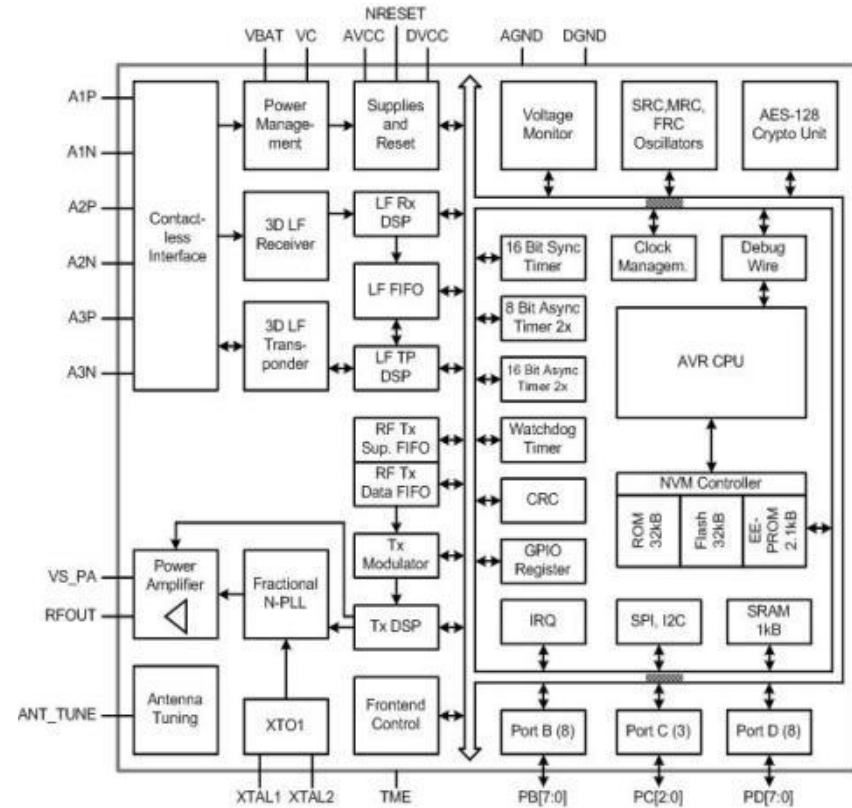
## Features:

- 4 integrated LF drivers, programmable peak –  
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- for remote antenna system
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- Integrated Boost Converter control
- Programmable carriers (sinus/square/ custom) –  
- for best EMC
- Autonomous polling mode
- Fast 2Mbit/s SPI interface
- Temperature Range: -40C to 125C
- Full diagnostic coverage for all channels Short –  
- to GND,  $V_{CC}$ , other Coils, Open detection
- Package QFN48 (7x7)



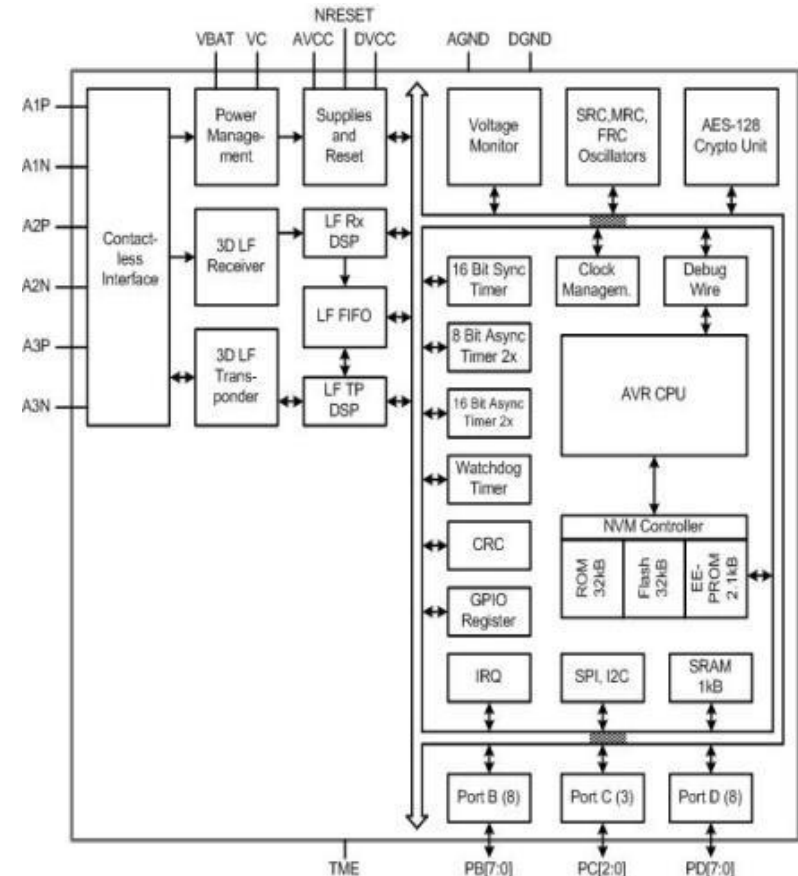
## Features:

- PEPS/Immobilizer keyfob IC with AES128
- 3D Immobilizer and 3D LF wake-up
- Resonance and Q trimming for 3D antenna
- Data rates: 1.95/3.9/7.8 kbit/s
- Programmable sensitivity: 100/250/500 $\mu$ Vpp
- Current @3.9kbit/s: 5.4/4.7/4.7  $\mu$ A
- Conversion time of 1 ms
- Integrated Codec's: BPLM, QPLM (Downlink), -  
- Manchester (Uplink)
- Programmable Immobilizer Stack
- Programmable Frac-N PLL UHF Transmitter
- Support 3 UHF bands with single 24.3MHz crystal
- Programmable RF Output Power: -12...14.5dBm
- UHF modulations: ASK, FSK, GFSK
- Supply voltage: 1.9V to 4.2V
- AVR core, 32kB User Flash/2 KB User EEPROM
- 19 GPIOs incl. debug wire, SPI, TWI
- Internal SRC (125kHz), MRC (1 MHz), FRC (6 MHz)
- Timers: 2 async. 8bit, 2 async. 16bit, sync. watchdog
- Package QFN35 (5x7)



## Features:

- PEPS/Immobilizer keyfob IC with AES128 for –
  - 100...150 kHz
- 3D Immobilizer and 3D LF wake-up
- Resonance and Q trimming for 3D antenna
- Data rates: 1.95/3.9/7.8 kbit/s
- Programmable sensitivity: 100/250/500 $\mu$ Vpp
- Current @3.9kbit/s: 5.4/4.7/4.7  $\mu$ A
- Conversion time of 1 ms
- Integrated Codec's: BPLM, QPLM (Downlink), -  
- Manchester (Uplink)
- Programmable Immobilizer Stack
- Supply voltage: 1.9V to 4.2V
- AVR core, 32kB User Flash/2 KB User EEPROM
- 19 GPIOs incl. debug wire, SPI, TWI
- Internal SRC (125kHz), MRC (1 MHz), FRC –  
- (6 MHz) oscillators
- Timers: 2 async. 8bit, 2 async. 16bit, sync. 16bit –  
- and watchdog
- Package QFN35 (5x7)





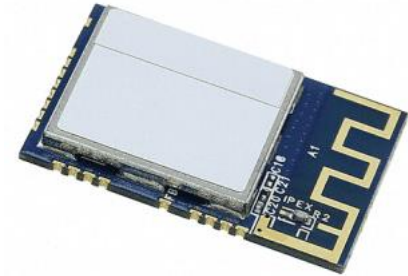
## Features:

- IEEE®802.11 b/g/n 20MHz (1x1) solution
- Single spatial stream in 2.4GHz ISM band
- Integrated PA and T/R Switch
- Superior Sensitivity and Range
- Advanced Equalization and Channel Estimation
- Advanced Carrier and Timing Synchronization
- Wi-Fi Direct and Soft-AP support
- Supports IEEE 802.11 WEP, WPA, WPA2 Security
- Superior MAC throughput via hardware accelerated –
  - two-level A-MSDU/A-MPDU frame aggregation and –
  - block acknowledgement
- On-chip memory management engine
- SPI and SDIO host interfaces
- 2/3 wire Bluetooth coexistence interface
- Operating temperature range of -40°C to +85°C
- Power save modes:
  - <math><1\mu\text{A}</math> Power Down mode typical @3.3V I/O
  - 380 $\mu\text{A}$  Doze mode with chip settings preserved
- On-chip low power sleep oscillator



## Features:

- IEEE®802.11 b/g/n 20MHz (1x1) solution with Bluetooth Low Energy 5
- Single spatial stream in 2.4GHz ISM band
- Integrated PA and T/R Switch
- Superior Sensitivity and Range
- Advanced Equalization and Channel Estimation
- Advanced Carrier and Timing Synchronization
- Wi-Fi Direct and Soft-AP support
- Supports IEEE 802.11 WEP, WPA, WPA2 Security Personal and Enterprise
- Superior MAC throughput via hardware accelerated –
  - two-level A-MSDU/A-MPDU frame aggregation and –
  - block acknowledgement
- On-chip memory management engine
- SPI and SDIO host interfaces
- 2/3 wire Bluetooth coexistence interface
- Operating temperature range of -40°C to +85°C
- Power save modes:
  - <math><1\mu\text{A}</math> Power Down mode typical @3.3V I/O
  - 380 $\mu\text{A}$  Doze mode with chip settings preserved
- On-chip low power sleep oscillator

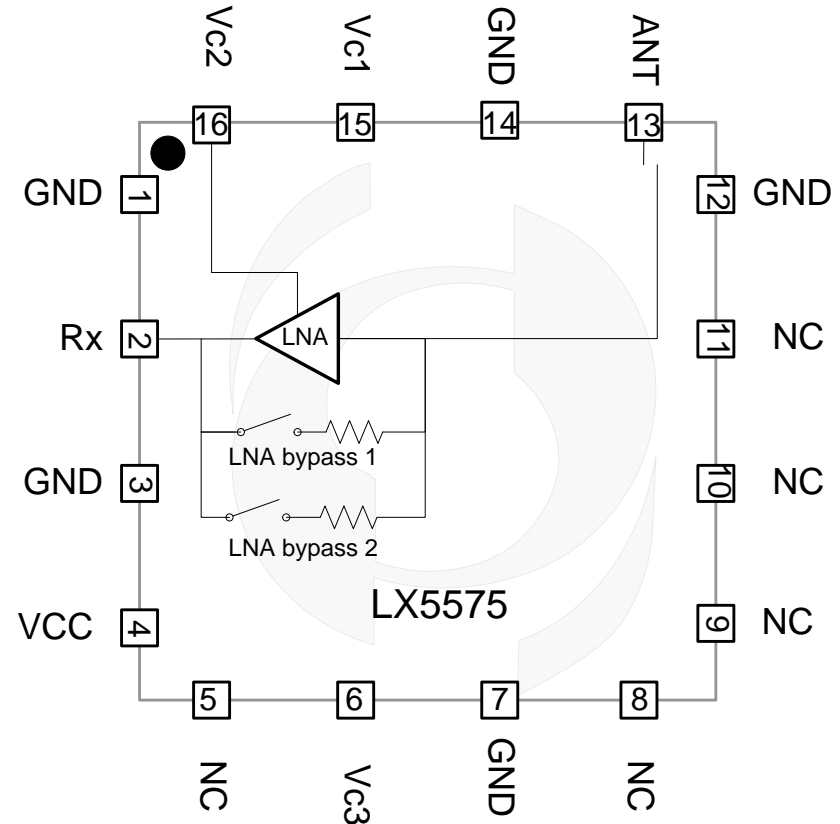


## Features:

- 5GHz LNA, footprint compatible with LX5586H
- 2 bypass modes
- 3-5V supply voltage
- 2.5x2.5x0.4mm QFN package
- Digital enabled

## Key Performance:

- 12 dB gain in HG mode
- 9 dB loss in bypass1 mode; 21 dB gain step
- 20 dB loss in bypass 2 mode for high isolation state
- 1.7dB noise figure
- IIP3 12dBm in HG
- 27dBm in BP mode
- 10mA current consumption

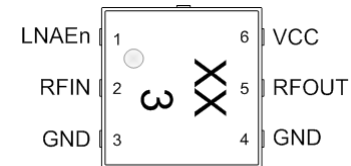
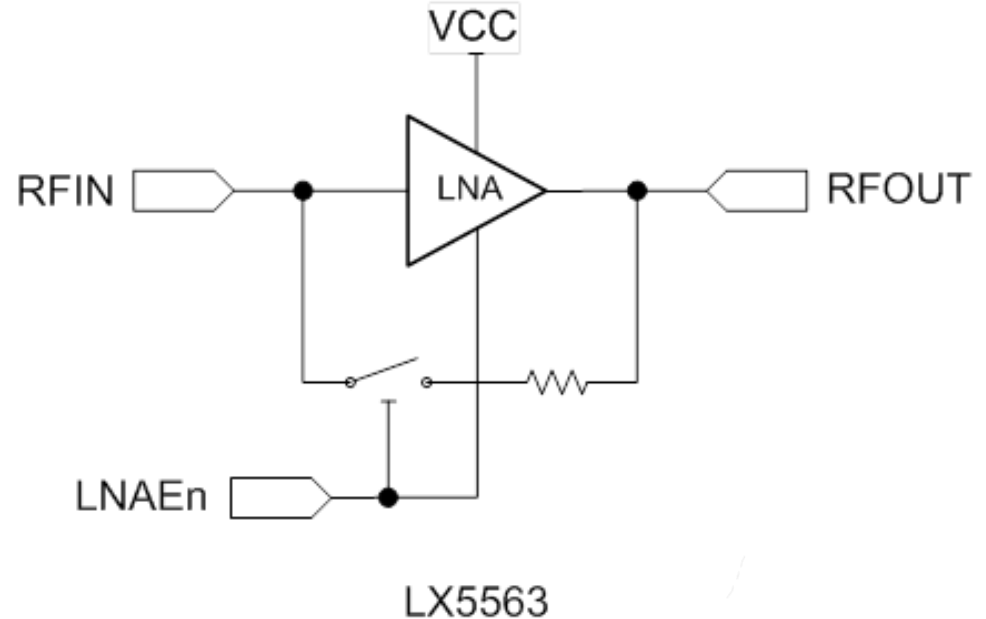


## Features:

- 802.11ac
- 2.412GHz to 2.472GHz
- 3.0-3.6V supply voltage
- 1.5x1.5x0.5mm DFN package
- >1500V ESD

## Key Performance:

- 15dB gain in high gain mode
- 7dB loss in bypass mode
- 1.3dB noise figure
- Input IP3 = +9 dBm (high gain)
- Input P1dB = 0 dBm (high gain) or +17dBm (bypass)
- Single control enables LNA in high gain mode,
  - or places LNA into bypass mode.

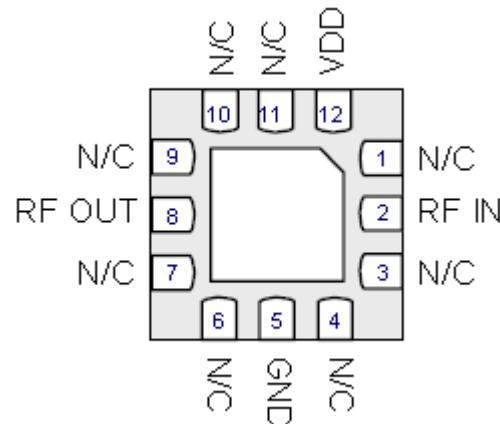
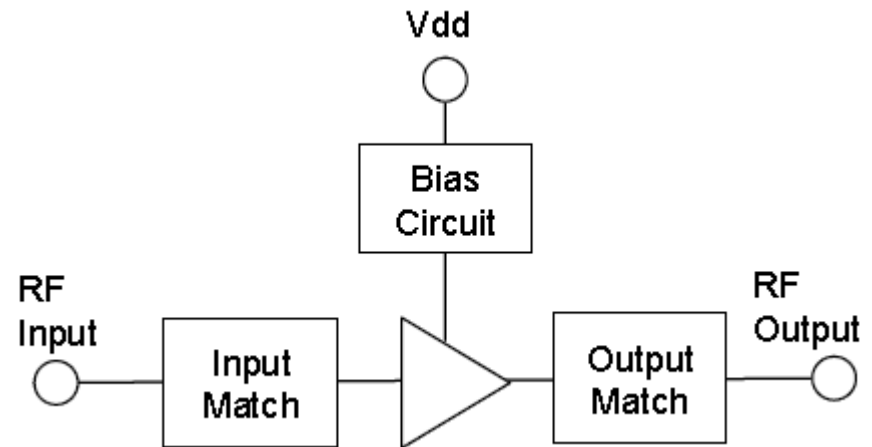


## Features:

- 802.11b/g
- 0.5 $\mu$ m InGaAs E-mode pHEMT
- 2.4 – 2.5GHz Operation
- Single 3.3V Supply
- On-Chip Bias Circuit
- On-Chip Input/Output Match
- 2mm x 2mm MLPQ-12L
- Low Profile 0.5mm

## Key Performance:

- Gain ~ 13.0dB
- Noise Figure ~ 1.5dB
- Input IP3 ~ +6.5dBm
- Input P1dB ~ +2.5dBm

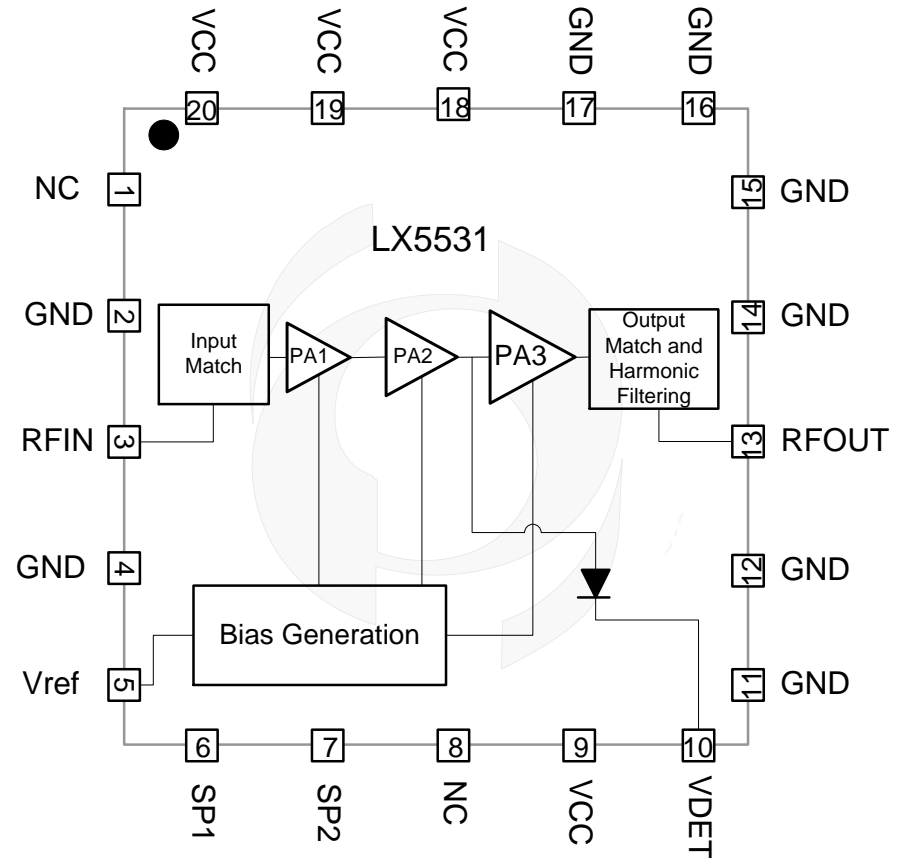


## Features:

- High Power 5GHz Power Amplifier with integrated detector
- 802.11ac compliant
- 5V supply voltage
- 4x4x0.9mm QFN package
- Fully matched
- Vref controlled

## Key Performance:

- <-40 dB EVM floor
- 23 dBm MCS9 (-35 dB)
- 27 dBm MCS0
- 31 dB gain
- Harmonics at -50dBm/MHz @ 27dBm
- Detector meets 200mV no RF, 0.8V at 27 dBm with square law response

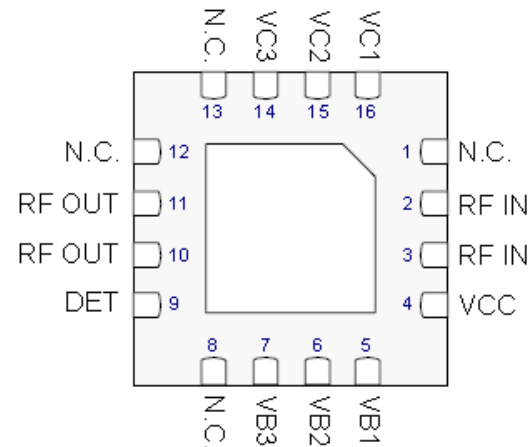
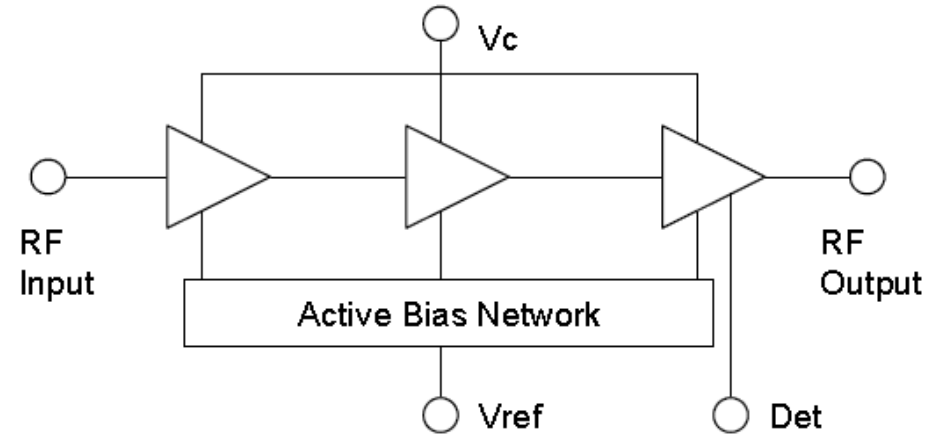


## Features:

- 802.11a/n
- Broadband 4.9 – 5.9GHz
- Single-Polarity 3 – 5V Supply
- Complete On-Chip Input Match
- Simple Output Match for Optimal
- On-Chip RF Decoupling
- 3x3x0.9mm QFN package

## Key Performance:

- Power Gain up to ~ 33dB for  $V_C=5V$ ,  $I_{cq} = 250mA$
- $P_{out} \sim +25dBm$  over 4.9-5.85GHz (ACPR ~ -50dBc @  $\pm 30MHz$  Offset)
- Broadband EVM
- Temperature-Compensated On-Chip Output Power Detector with Wide Dynamic Range

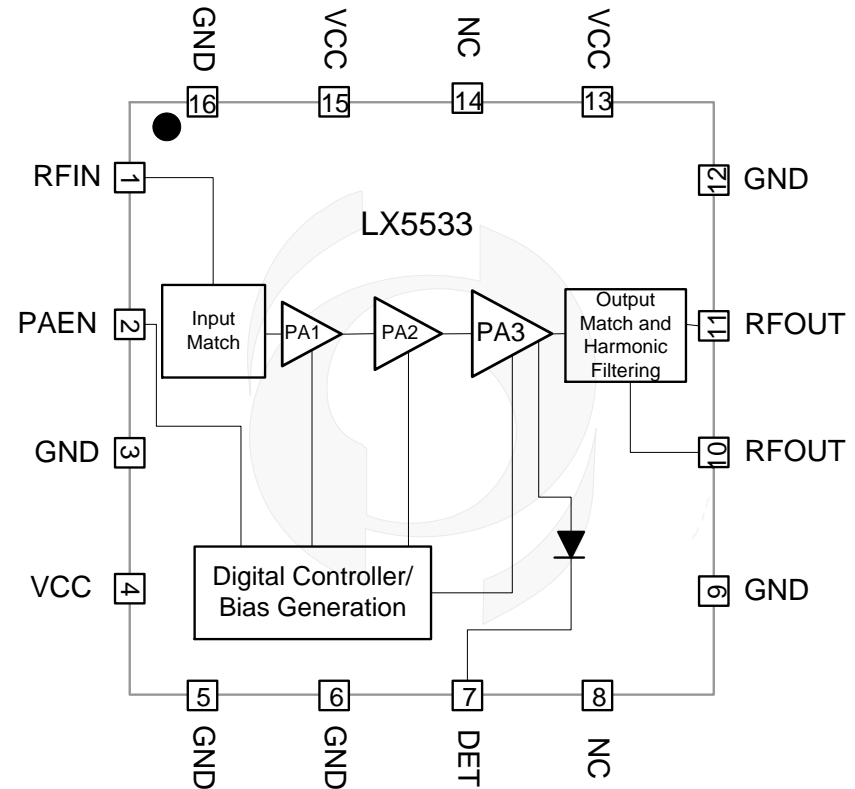


## Features:

- High Power 2.4GHz Power Amplifier
- 802.11n/ac compliant
- 5V supply voltage
- 3x3x0.9mm QFN package
- Digital logic control

## Key Performance:

- 23 dBm MCS9 (-35 dB)
- 25 dBm MCS7 (-30 dB)
- 27 dBm 802.11b 1Mbps mask
- 350 mA at 23 dBm
- >30 dB gain
- DEVM meets specs out to 5ms burst length



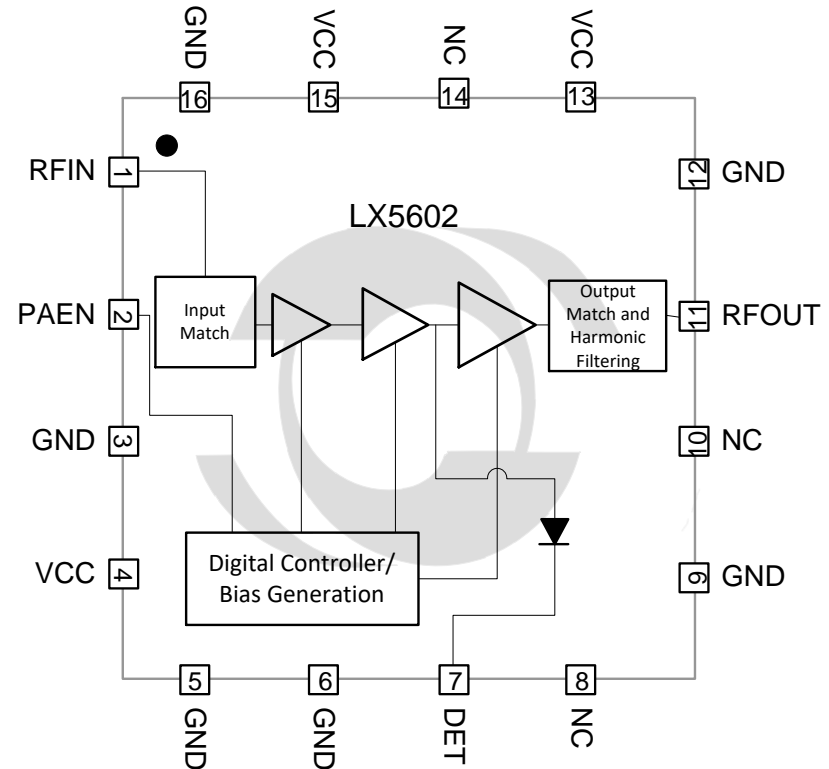


## Features:

- 802.11n
- High Power 2.4GHz Power Amplifier
- 802.11n compliant
- 5V supply voltage
- 3x3x0.9mm QFN package
- Digital logic control

## Key Performance:

- 26 dBm MCS7 (-30 dB)
- 26.5 dBm MCS0 mask
- 350 mA at 23 dBm
- 30 dB gain

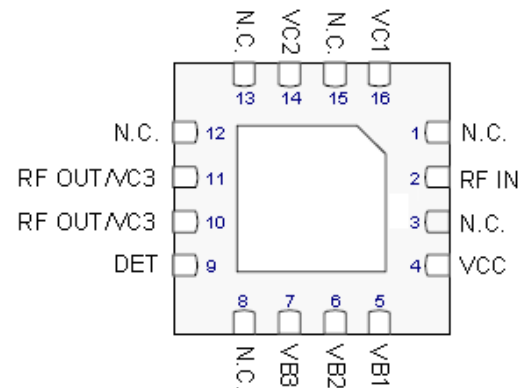
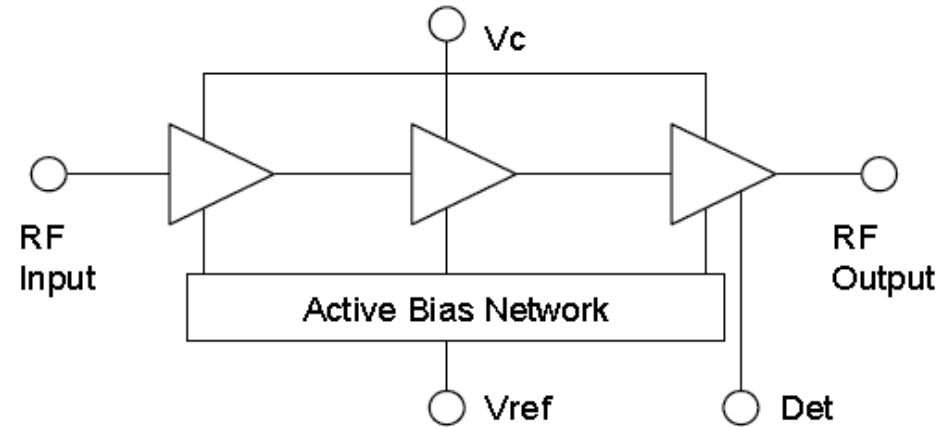


## Features:

- 802.11b/g & 802.16 WiMAX
- Advanced InGaP HBT
- 2.4-2.5GHz Operation
- Single-Polarity 3-5V Supply
- 3x3x0.9mm MLPQ package
- Complete On-Chip Input Match
- Simple Output Match for Optimal EVM

## Key Performance:

- Power Gain 32 dB
- Quiescent Current 120mA
- Power for EVM~3.5% 54Mbps/64QAM : 25dBm
- Total Current 260mA for Pout=25dBm, 802.11g
- 802.11b mask-compliant power : 28dBm
- Total Current 370mA for Pout=+28dBm, 802.11b

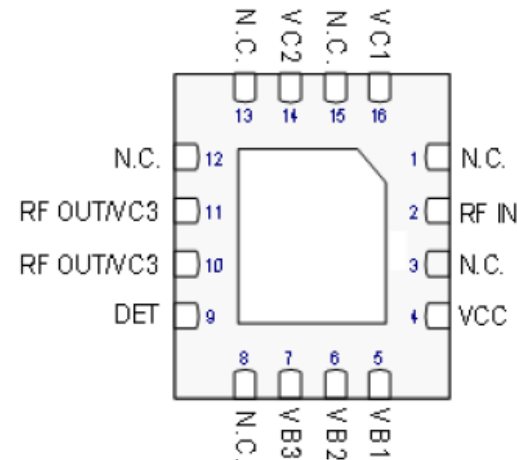
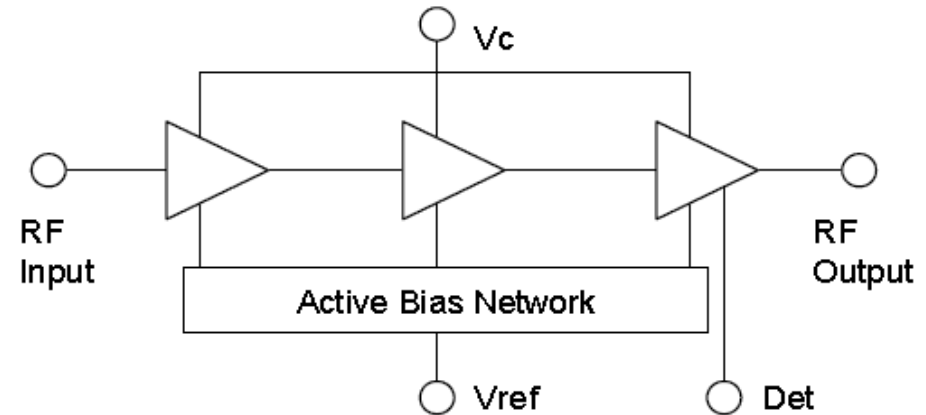


## Features:

- 802.11b/g/n
- Advanced InGaP HBT
- 2.4-2.5GHz Operation
- Single-Polarity 3-5V Supply
- 3x3x0.9mm QFN package
- Complete On-Chip Input Match
- Simple Output Match for Optimal EVM

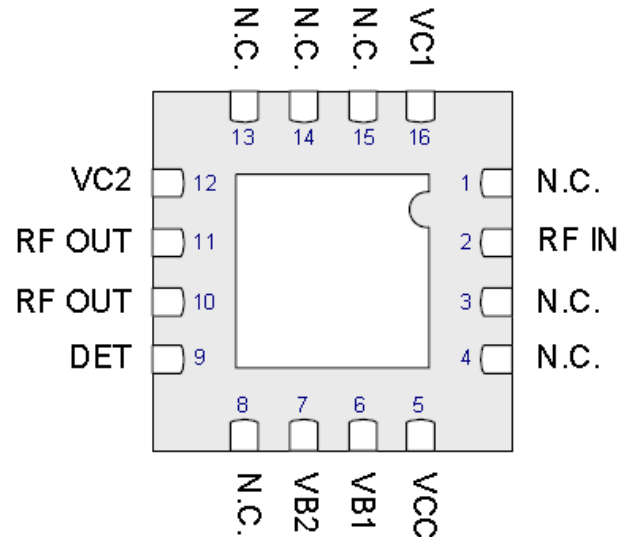
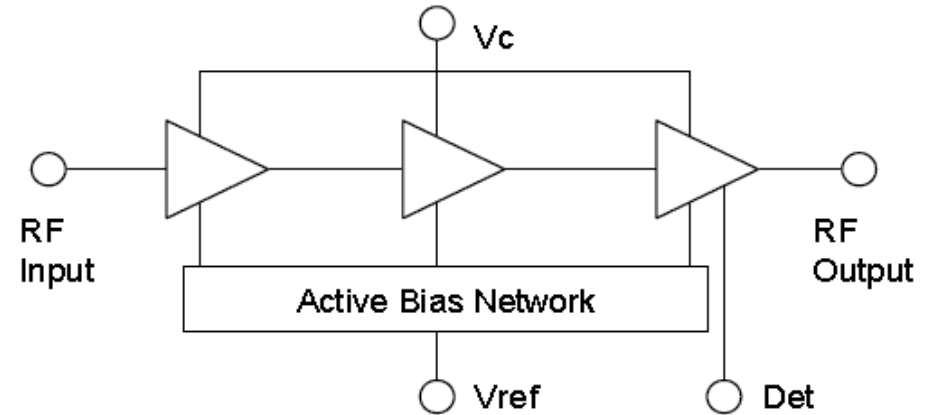
## Key Performance:

- Transmit Power
- 26dBm @3%EVM,802.11g/5V
- 24dBm @3.5%EVM,80211g/3.3V
- 28dBm @CCK,802.11b/5V
- 27dBm @CCK,802.11b/3.3V
- 24.5% Efficiency @28dBm/5V
- Power gain ~30 dB



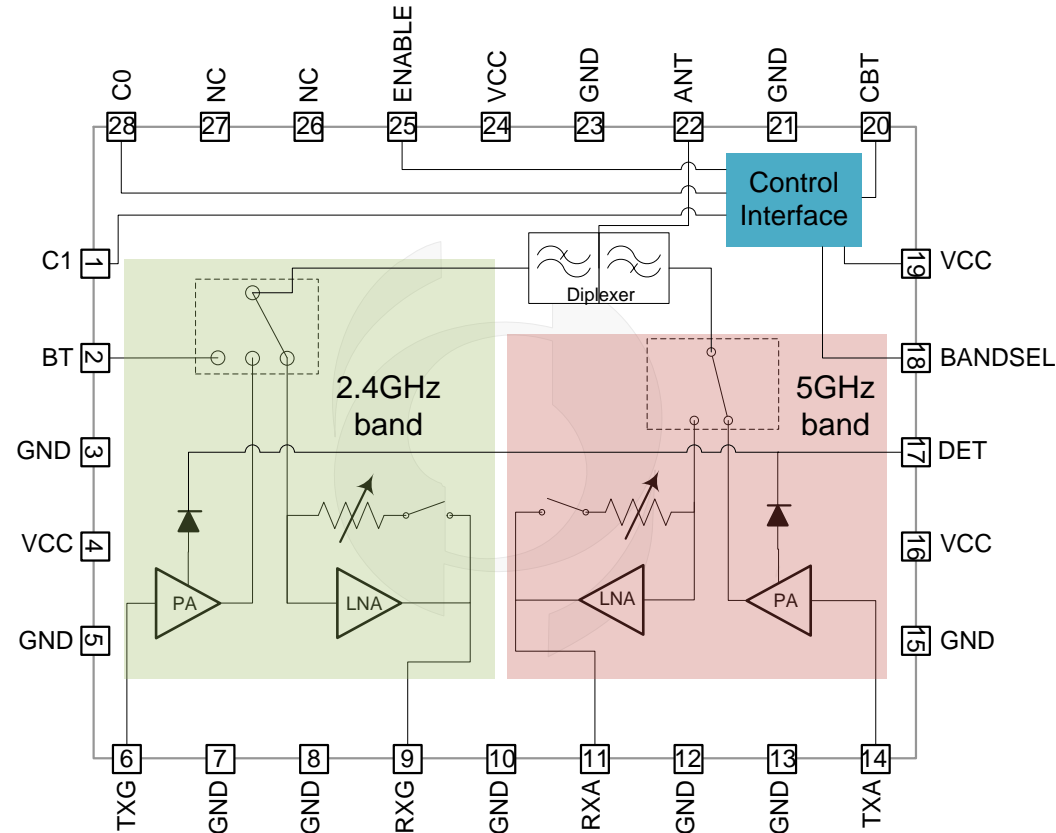
## Features:

- 802.11b/g
- Advanced InGaP HBT
- 2.3-2.5GHz Operation
- Single-Polarity 3.3V Supply
- 3x3x0.9mm QFN package
- Quiescent Current 90mA
- Power Gain 26 dB
- Total Current 150mA for
- Pout=18 dBm OFDM
- EVM<3 %, 2.4% Typical
- 54Mbps/64QAM



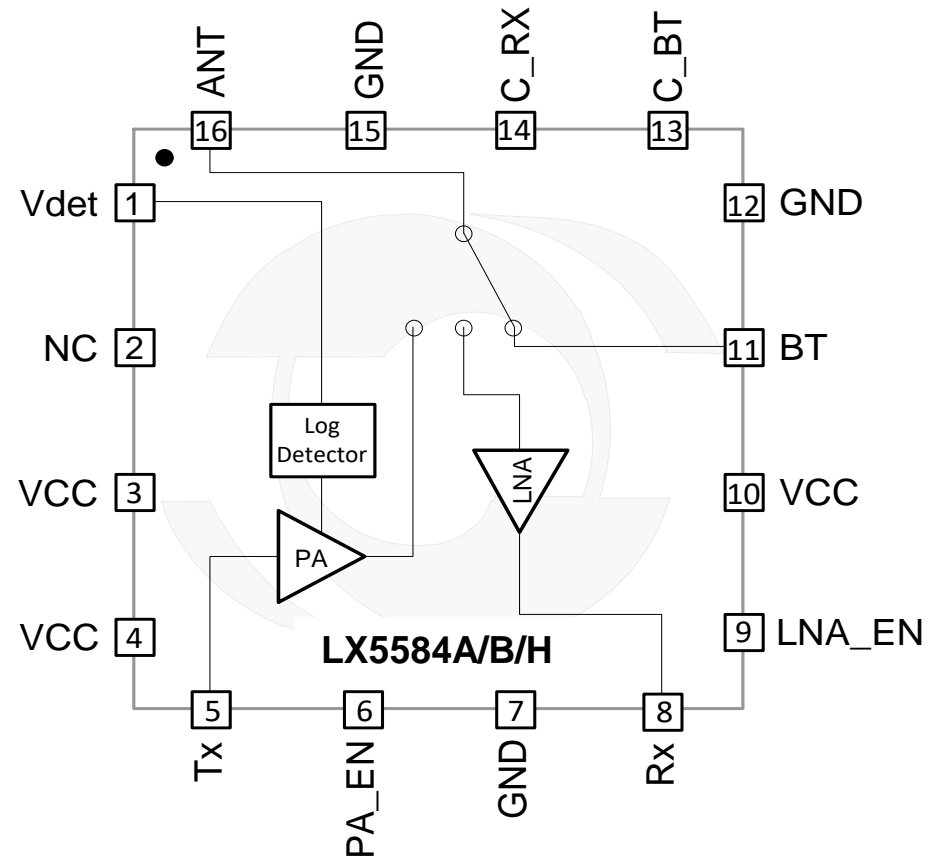
## Features:

- 802.11ac compliant
- 3.3V supply voltage
- 4x3x0.9mm package
- >1 kV ESD on all pins
- Dual band non-concurrent operation
- DEVM meets specs out to 5ms burst length
- Detector meets 220mV no RF
  - 925-1000mV at maximum output power



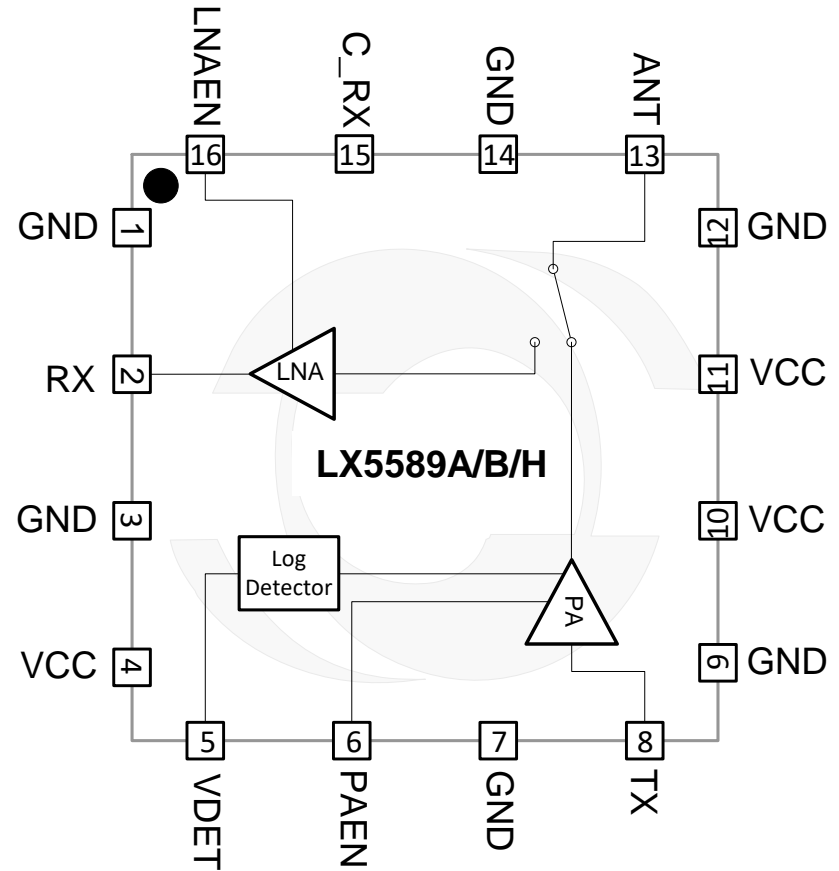
## Features:

- 2.4GHz 802.11b/g/n/ac Wi-Fi modules
  - LX5584A: 3.3V, 3x3mm
  - LX5584B: 5.0V, 3x3mm
  - LX5584H: 5.0V, 2.5x2.5mm
- Digital Logic Control
- Tx Log Detector
- DEVM meets 5mS burst



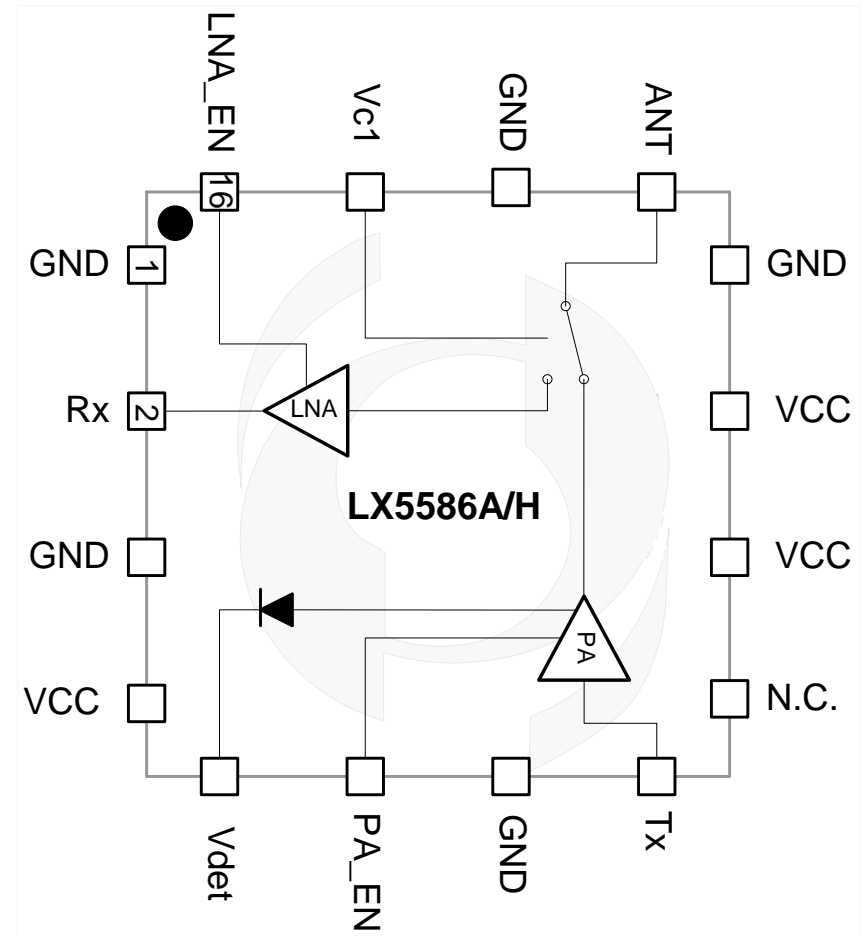
## Features:

- 5GHz 802.11ac Wi-Fi modules
  - LX5589A: 3.3V, 2.5x2.5mm
  - LX5589B: 5.0V, 3x3mm
  - LX5589H: 5.0V, 2.5x2.5mm
- Digital Logic Control
- Tx Log Detector
- DEVM meets 5mS burst
- Rx embedded 2.4GHz rejection



## Features:

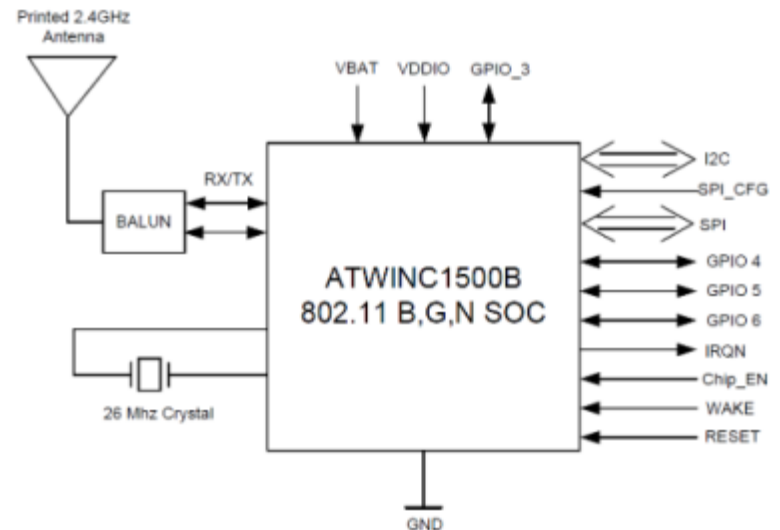
- 5GHz 802.11ac Wi-Fi modules
  - LX5586A: 3.3V, 2.5x2.5mm
  - LX5586H: 5.0V, 2.5x2.5mm
- Digital Control
  - 4mA Control pin current
- Detector meets 200mV no RF
  - 750mV at 21 dBm with square law response





## Features:

- Fully-certified single-band 2.4GHz b/g/n Wi-Fi module
- Extreme low power
- Compact footprint: 21.5 x 14.5 x 2.1 mm
- Integrated PCB antenna
- Operating voltage: 3.0V to 4.2V
- Serial host interface: SPI or UART
- Security protocols supported: WPA/WPA2 Personal and Enterprise, TLS, SSL
- Network services: DHCP, DNS, TCP/IP (IPv4), UDP, HTTP, HTTPS
- Wi-Fi Station and Softcat support
- ATWINC1510 supports Host File Download
- Agency Certified in the US, Canada, Europe, Japan, Korea, China, India and Taiwan



## Features:

- Fully-certified single-band 2.4GHz b/g/n Wi-Fi module plus Bluetooth Low Energy 5
- Extreme low power
- Compact footprint: 22.4 x 14.7 mm
- Integrated chip antenna
- Operating voltage: 2.7V to 3.6V
- Serial host interface: SPI for Wi-Fi with UART for Bluetooth
- Security protocols supported: WPA/WPA2 Personal and Enterprise, TLS, SSL
- Network services: DHCP, DNS, TCP/IP (IPv4), UDP, HTTP, HTTPS
- Wi-Fi Station and SoftAP support
- Agency Certified in the US, Canada, Europe, Japan, Korea, China, India and Taiwan



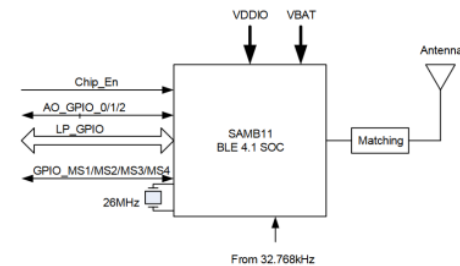
## Features:

- IEEE 802.11 b/g/n (1x1) for up to 72 Mbps
- Includes a SAMD21 ARM® Cortex®-M0+
- Integrated PA and T/R switch
- Superior sensitivity & range via advanced PHY signal processing
- Wi-Fi Direct, station mode and SoftAP support
- Supports IEEE 802.11 WEP, WPA
- On-chip memory management engine to reduce host load
- 4 Mbit internal flash memory with OTA firmware upgrade
- Serial host interface SPI or UART
- TCP/IP protocol stack (client/server) sockets
  - applications
- Security protocols; WPA/WPA2 Personal,
  - TLS, and SSL
- Network services; DHCP, DNS, TCP/IP (IPv4), -
  - UDP, HTTP, and HTTPS
- Operates without a host in most applications
- Compact footprint: 33.86 x 14.88 mm
- FCC, CE, IC, and TELEC Certified



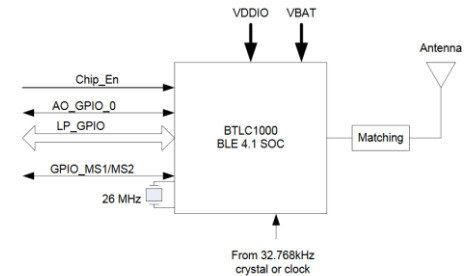
## Features:

- BLE 4.1 compliant SoC and protocol stack
- Lowest BLE power consumption in industry
- ARM Cortex-M0 with 128KB RAM, 256KB flash
- Small package format: 22.88 x 15.36 mm
- Wide operating voltage range: 2.3V – 3.6V
- Fully-certified (FCC, ETSI/CE, TELEC)
- SAMB11 SoC available in small QFN package



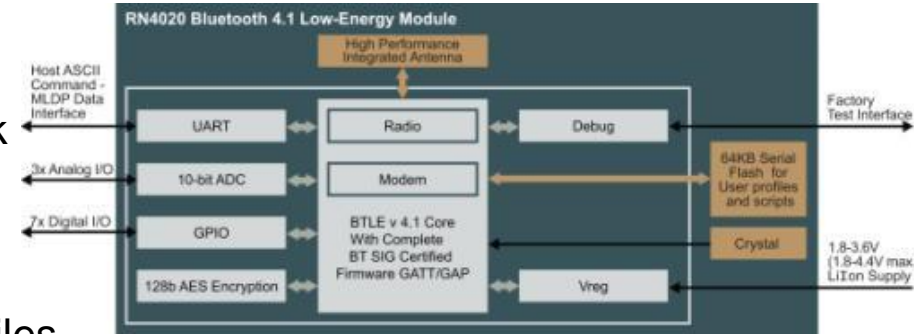
## Features:

- Ultra-low power Bluetooth SMART (BLE 4.1) module
- Lowest BLE power consumption in industry
- Small form factor (12.70 X 20.15 mm)
- Integrated chip antenna
- Optimized system cost - high level of -
  - integration on chip reduces external Bill -
  - of Material significantly
- Wide operating voltage range: 1.8 – 4.3V
- Parameter host interface: UART
- Fully-certified (FCC, ETSI/CE, TELEC)
- RoHS compliant
- BTLC1000 SoC available in small QFN or WLCSP –
  - package



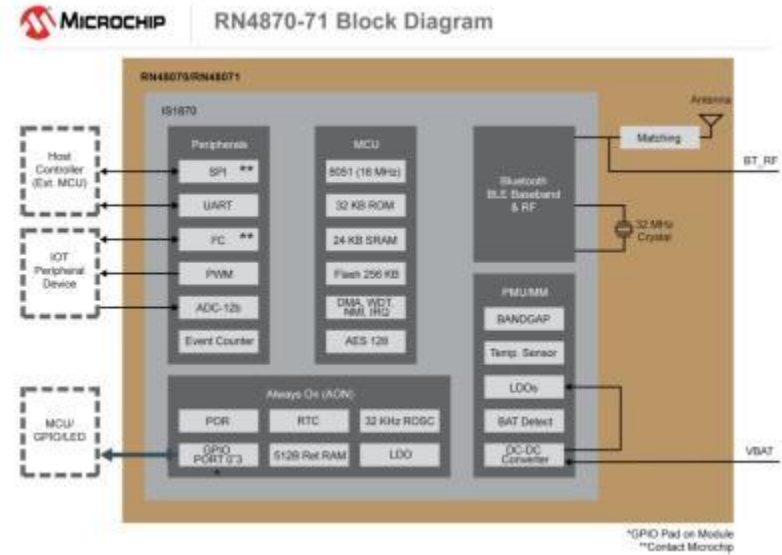
## Features:

- Fully-certified Bluetooth® version 4.1 module
- On-board embedded Bluetooth low energy stack
- Simple ASCII command interface over UART
- Multiple IOs for control and status
- Secure AES128 encryption
- GAP, GATT, SM, L2CAP & integrated public profiles
- Create custom services using command API
- Data streaming with Microchip's Low Energy Data – Profile (MLDP)
- 7 dBm transmit power for 100m+ range
- Field-upgradeable via UART interface or over-the-air
- Software configurable role as peripheral, central, - client or server
- Compact form factor 11.5 x 19.5 x 2.5mm
- Low power modes
- UART interface, GPIO, ADC
- 64KB internal serial flash
- Castellated SMT pads for easy and reliable - PCB mounting
- Certifications: FCC, IC, CE, QDID



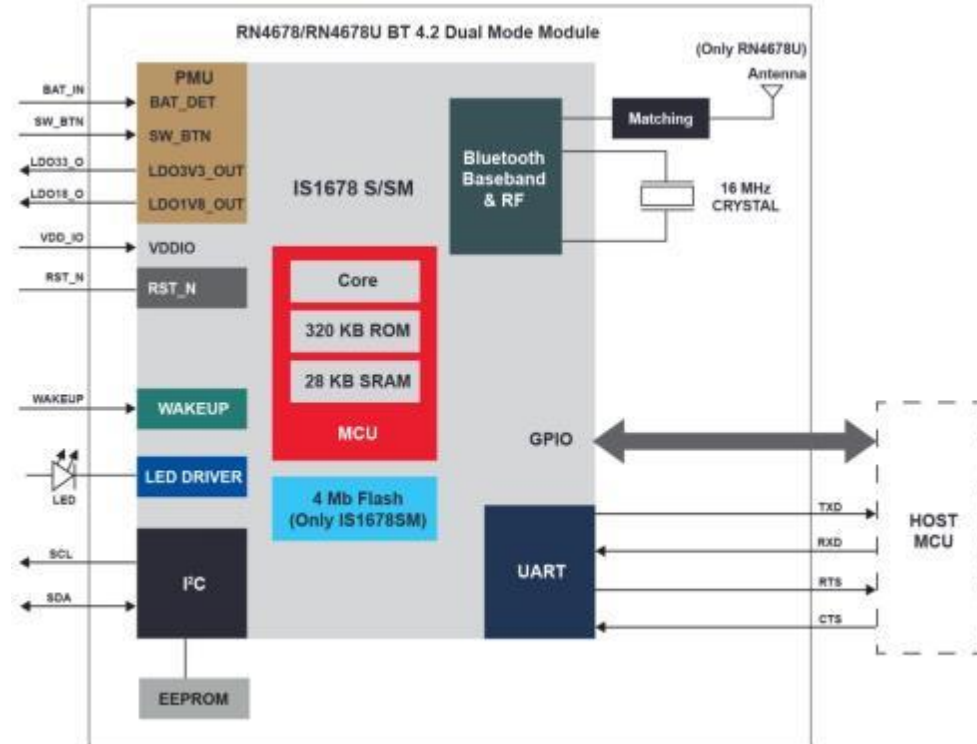
## Features:

- Bluetooth® Smart 4.2 BLE compliant
- ASCII interface commands for -  
- communication with the host -  
- microcontroller
- Scripting features to allow for operation -  
- without a host microcontroller.
- Increased privacy features
- White list for determining connections
- MLDP compatibility with RN4020
- Remote configuration capability
- 1.9V~3.6V operating range
- Antenna: Ceramic chip Antenna or -  
- external antenna connection



## Features:

- Fully-certified Bluetooth Version 4.2 Module
- Bluetooth Classic and Bluetooth Low – Energy Support
- Easy to use RN-style ASCII interface
- On-board embedded Bluetooth Stack - (GAP, SDP, SPP, GATT)
- Easy to use transparent mode for data transfer via UART
- Multiple I/O pins for control and status
- Secure AES128 encryption
- +2 dBm Transmit Power
- Receiver Sensitivity -90 dBm (Classic); 92 – dBm (LE)
- Firmware can be field upgradable via UART
- Compact surface mount module: 22 x 12 - x 2.4 mm
- Temperature Range from -20°C to +70°C
- Operating Voltage: 3.3 – 4.3V
- Bluetooth SIG Certified
- Worldwide regulatory certifications

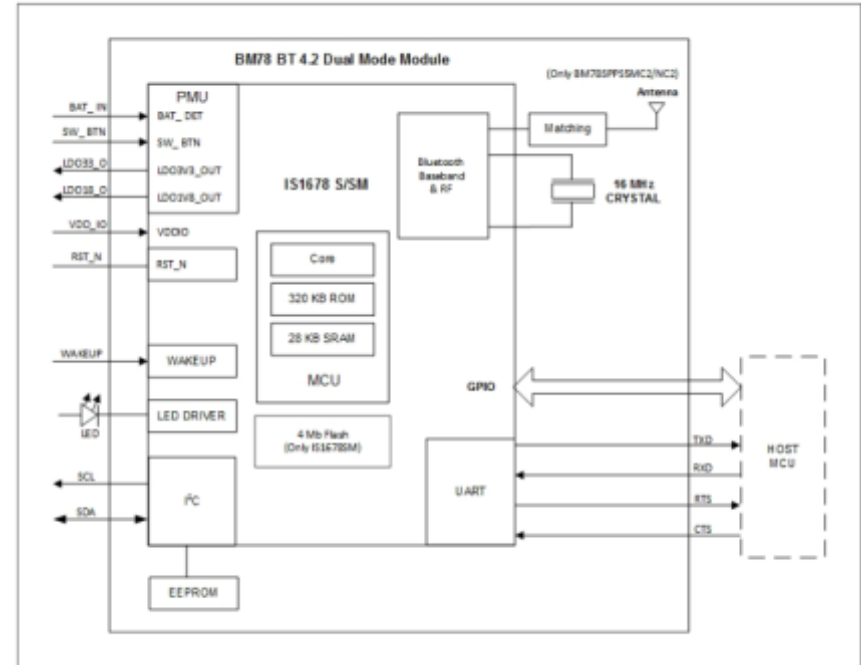




## Features:

- Fully certified Bluetooth Version 4.2 -  
- Module (BM78SPPx5MC2-0002AA)
- Bluetooth Classic and Bluetooth Low -  
- Energy Support
- Bluetooth SIG Certified
- On-board embedded Bluetooth Stack
- Easy to use transparent mode for data -  
- transfer via UART
- Easy to configure with Windows® GUI -  
- or direct by MCU
- Multiple I/O pins for control and status
- Secure AES128 encryption
- GAP, SDP, SPP, GATT profiles
- Firmware can be field upgradable via -  
- UART
- Compact surface mount module: 22 x -  
- 12 x 2.4 mm
- Castellated surface mount pads for -  
- easy and reliable host PCB mounting
- Worldwide regulatory certifications

FIGURE 1-1: INTERNAL BLOCK DIAGRAM OF BM78



## Features:

- Bluetooth® Smart 4.2 BLE compliant
- 1.9V~3.6V operating range
- UART/ I2C/ SPI interface supported
- 3 x PWM supported
- Main Crystal : 32MHz
- Temperature sensor supported
- 12 bits ADC supported for 8CH input ports –  
- and battery voltage detection
- Wake up by any GPIO
- Peak current: TX 13mA/RX 13mA
- RSSI Monitor

## RF/Analog Features:

- ISM Band 2.402 to 2.480 GHz operation
- Channels 0-39
- Rx Sensitivity: -90 dBm@ BLE, in typical
- Tx Power: +2 dBm

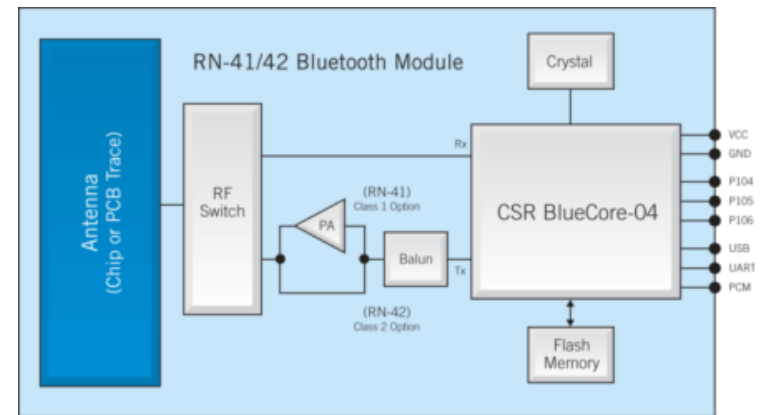
## Antenna:

- Ceramic Chip Antenna: BM70BLES1FC2/BM71BLES1FC2
- External Antenna Connection:
  - BM70BLE01FC2/BM71BLES1FC2



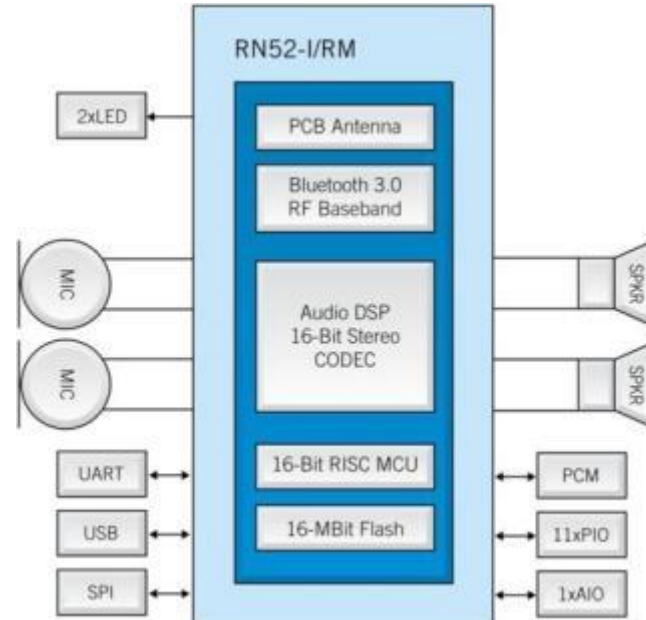
### Features:

- Fully certified Class 1 (RN41), Class 2 (RN42) Bluetooth 2.1 + EDR module
- Onboard embedded Bluetooth stack
- UART (SPP or HCI) and USB (HCI only) data connection hardware interfaces
- Supports data link to iPhone/iPad/iPod Touch
- Supports HID profile for making accessories such as keyboards, mouse, pointing devices
- Programmable low power modes
- Secure communications, 128 bit encryption
- Error correction for guaranteed packet delivery
- UART local and over-the-air RF configuration
- Auto-discovery/pairing requires no software configuration (instant cable replacement)
- Castellated SMT pads for PCB mounting
- The standard part number (RN41-I/RM/RN42-I/RM) supports SPP and DUN profiles
- Available in multiple configurations
- Available without antenna (RN41N-I/RM)
- Bluetooth SIG qualified



## Features:

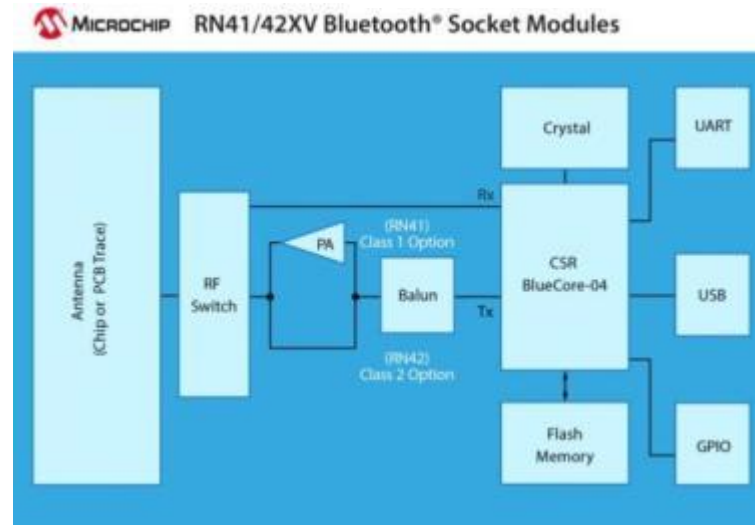
- Fully certified Bluetooth version 3.0 audio module, fully compatible with Bluetooth version 2.1+EDR, 1.2, 1.1
- Software configurable through commands over UART console
- Embedded Bluetooth stack profiles: SPP, A2DP, HFP/HSP, and AVRCP
- Supports iAP profile discovery for iPhone® and iPod® Bluetooth accessories
- Available as A2DP audio source or sink
- Postage-stamp-sized form factor, 13.5 x 26 x 2.7mm
- Dual-channel, differential audio input and output for highest quality audio
- External audio codecs supported via I2S and S/PDIF interface
- Castellated SMT pads for easy and reliable PCB mounting



Bluetooth® Audio Module  
(Part # RN52-I/RM)

## Features:

- Fully certified Bluetooth® version 2.1 module, supports version 2.1 + Enhanced Data Rate (EDR)
- Backwards-compatible with Bluetooth version 2.0, 1.2, and 1.1
- Pin compatible with widely used 2 x 10 (2mm) socket
- Low power: 30 mA, < 10mA sniff mode
- UART (SPP or HCI) and USB (HCI only) data connection interfaces
- Sustained SPP data rates: 240 Kbps (slave), 300 Kbps (master)
- HCI data rates: 1.5 Mbps sustained, 3.0 Mbps burst in HCI mode
- Bluetooth SIG certified
- Certifications: FCC, IC, CE
- 2 antenna options available: Chip antenna (RN41XVC-I/RM) and U.FL connector for external antenna (RN41XVU-I/RM)

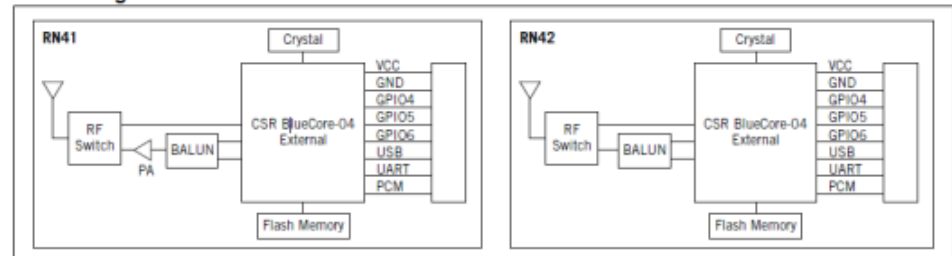


## Features:

- Socket module with UART interface
- 3.3/5V logic CMOS I/O (RS-232 as well)
- Fully qualified Bluetooth 2.1/2.0/1.2/1.1
- Bluetooth v2.1+EDR support
- Low power (8-30 mA, 2 mA idle)
- UART supports baud rates from 1,200 to 3Mbit
- Sustained SPP data rates - 240Kbps (slave),
- 300Kbps (master)
- HCI data rates - 1.5Mbps sustained, 3.0Mbps burst in HCI mode
- Embedded Bluetooth stack profiles included (requires no host stack): GAP, SDP, RFCOMM and L2CAP, with SPP, DUN and HID profiles.
- Bluetooth SIG Qualified
- Class 1 high power amplifier
- Certifications: FCC, ICS, CE
- Environmentally friendly, RoHS compliant

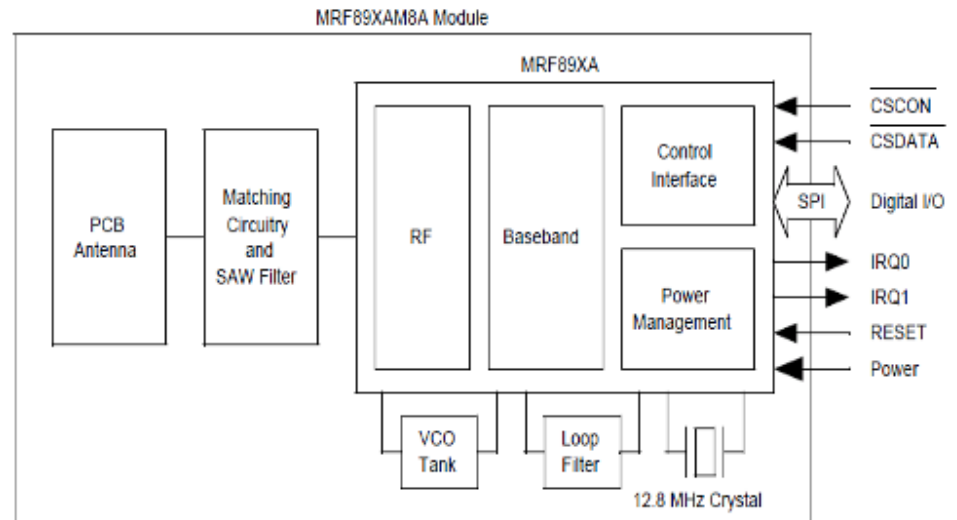


Block Diagram:



## Features:

- Fully integrated ultra low-power, sub-GHz transceiver
- Wide-band half-duplex transceiver
- Supports proprietary sub-GHz wireless protocols
- Simple 4-wire SPI-compatible interface
- CMOS/TTL-compatible I/Os
- On-chip oscillator circuit
- Dedicated clock output
- Operating voltage: 2.1V-3.6V
- Low-current consumption
- Supports Industrial temperature
- Complies with ETSI EN 300 220 and FCC part 15
- Small, 32-pin TQFN package





# MRF24J40/MA/MD/ME

2.4 GHz IEEE Std. 802.15.4™ RF Transceiver Module with PA/LNA and External Antenna Connector

[Online Datasheet](#)

MRF24J40 is a complete IEEE 802.15.4 radio and operates in the 2.4GHz freq band. The MRF24J40 supports ZigBee™, MiWi™ protocols and proprietary protocols to provide an ideal solution for wireless sensor networks, home automation, building automation and consumer applications.

The MRF24J40MA/MD/ME are all modules built with the MRF24J40 chip

## Features:

- IEEE 802.15.4™-2003 and IEEE 802.15.4-2006 Standard Compliant RF transceiver
- Multiple air data rates:
- 250 kbps (IEEE 802.15.4)
- Configurable TX output power: -17.5 to 0 dBm
- Frame header duration scales with selected data rate
- On-the-fly, per-frame air-data-rate detection
- 20/10/5/2.5 MHz Clock Output:
- Operating Voltage: 2.4-3.6V (3.3V typ.)
- Simple, Four-Wire SPI Interface
- Low-Current Consumption



MRF24J40MA (pictured) is a 2.4 GHz IEEE Std. 802.15.4™ RF Transceiver Module with PCB Antenna

MRF24J40MD is a 2.4 GHz IEEE Std. 802.15.4 RF Transceiver Module with PA/LNA, PCB Antenna

MRF24J40ME is a 2.4 GHz IEEE Std. 802.15.4 RF Transceiver Module with PA/LNA, External Antenna Connector: Ultra Miniature Coaxial (U.FL), 50Ω

[<< BACK](#)

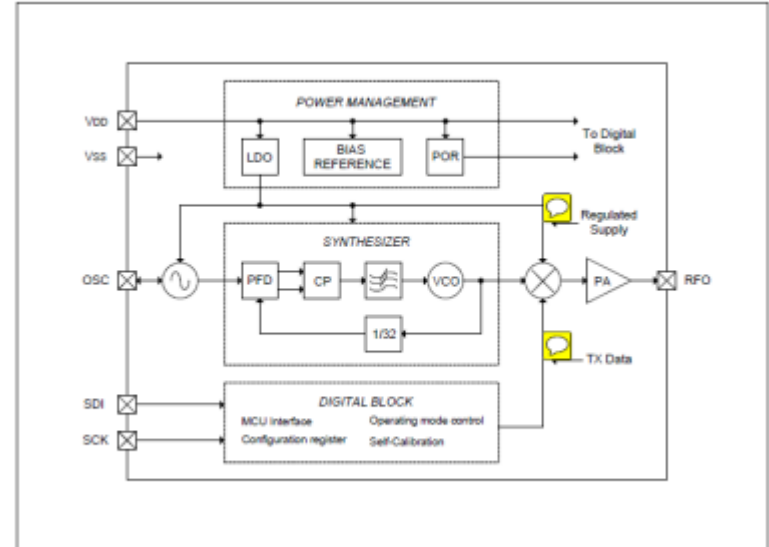


## Features:

- Fully Integrated Low-Power Sub-GHz RF Transmitter
- Single-Pin Crystal Oscillator with Integrated, -  
- Programmable Load Capacitor
- Wide Operating Voltage Range: 1.8V to 3.6V
- Industrial Temperature Range (-40°C to +85°C)
- Low Current Consumption: 0.2  $\mu$ A in Sleep Mode, -  
- 11.7 mA in +10 dBm Transmit Mode
- Data Rate: up to 115.2 kbps NRZ, 57.6 kbps –  
- Manchester Encoded
- On-Off Keying (OOK) Modulation with Power Ramp-  
- up Control
- Small Footprint 6-Pin SOT-23 Package



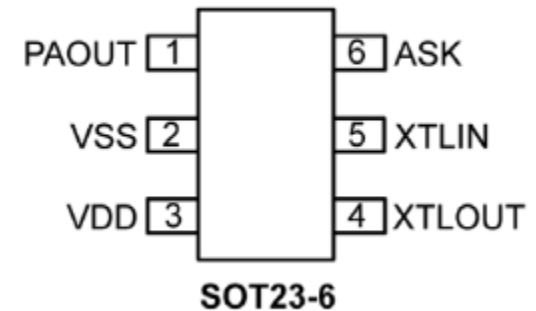
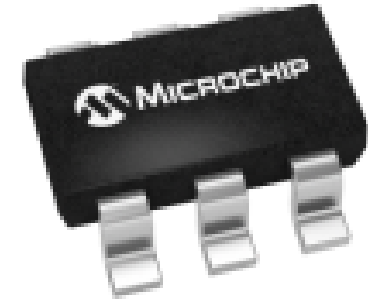
FIGURE 1-1: MICRF114 ARCHITECTURE BLOCK DIAGRAM



The MICRF113 is a high-performance, easy-to-use, single-chip ASK Transmitter IC for remote wireless applications in the 300MHz to 450MHz frequency band. This transmitter IC is a true "data-in, antenna-out" monolithic device.

MICRF113 has three strong attributes: power delivery, operating voltage and operating temperature. In terms of power, the MICRF113 is capable of delivering +10dBm into a 50Ω load. This power level enables a small form factor transmitter (lossy antenna) such as a key fob transmitter to operate near the maximum limit of transmission regulations. In terms of operating voltage, the MICRF113 operates from 1.8V to 3.6V. Many transmitter ICs in the same frequency band stop operating below 2.0V. The MICRF113 will work with most batteries to the end of their useful limits. In terms of operating temperature, the MICRF113 operates from -40°C to +85°C.

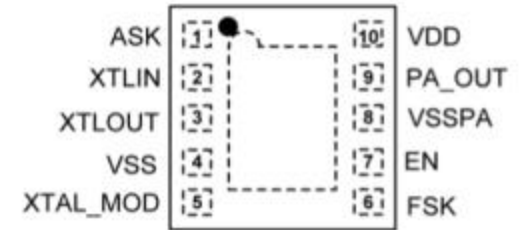
The MICRF113 transmitter solution is ideal for industrial and consumer applications where simplicity and form factor are important.



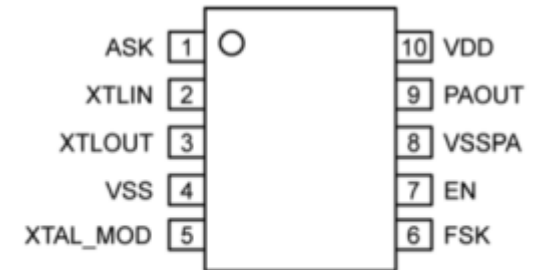
The MICRF112 is a high performance, easy to use, single chip ASK / FSK Transmitter IC for remote wireless applications in the 300 to 450MHz frequency band. This transmitter IC is a true "data-in, antenna-out" monolithic device.

MICRF112 is high performance in three areas: power delivery, operating voltage, and operating temperature. In terms of power, the MICRF112 is capable of delivering +10 dBm into a 50Ω load. This power level enables a small form factor transmitter (lossy antenna) such as a key fob transmitter to operate near the maximum limit of transmission regulations. In terms of operating voltage, the MICRF112 operates from 3.6V to 1.8V. Many transmitter ICs in the same frequency band stop operating below 2.0V. The MICRF112 will work with most batteries to the end of their useful limits. In terms of operating temperature, the MICRF112 operates from -40°C to +125°C. This wide operating temperature range makes MICRF112 an ideal candidate for the demanding applications such as a tire pressure monitoring system.

## Pin Configuration



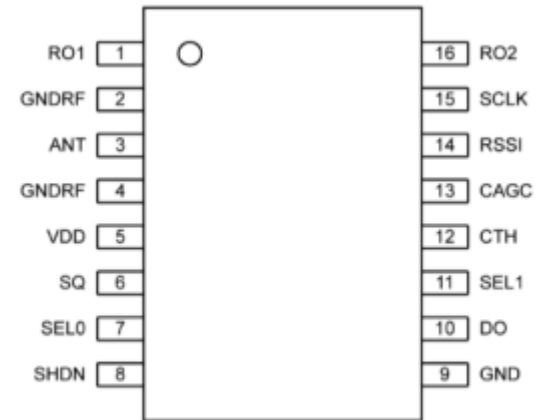
10-Pin Ultra-Thin DFN (MU)  
(2mm x 2mm x 0.4mm)  
Top View



10-Pin MSOP (MM)  
Top View

## Features:

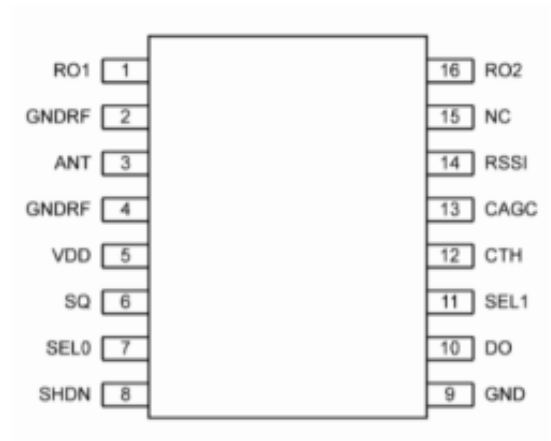
- -110dBm sensitivity at 1kbps with 0.1% BER
- Auto-polling mode with bit checking
- Supports bit rates up to 20kbps at 433.92MHz
- 25dB image-reject mixer
- No IF filter required
- 60dB analog RSSI output range
- 3.0V to 3.6V supply voltage range
- 4.3mA supply current at 315MHz
- 6.0mA supply current at 434MHz
- 13 $\mu$ A supply current in sleep mode
- 0.1 $\mu$ A supply current in shutdown mode
- 16-pin QSOP package (4.9mm x 6.0mm)
- -40°C to +105°C temperature range



MICRF219AAYQS

## Features:

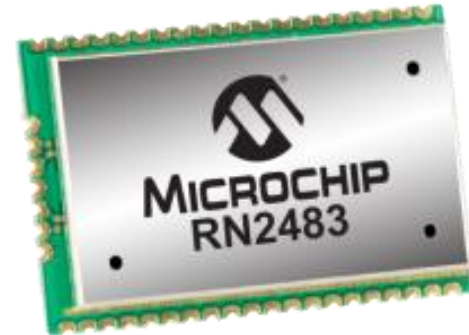
- -110dBm sensitivity at 1kbps with 0.1% BER
- Supports bit rates up to 20kbps at 433.92MHz
- 25dB image-reject mixer
- No IF filter required
- 60dB analog RSSI output range
- 3.0V to 3.6V supply voltage range
- 4.3mA supply current at 315MHz
- 6.0mA supply current at 434MHz
- 0.1 $\mu$ A supply current in shutdown mode
- Data output squelch until valid bits detected
- 16-pin QSOP package (4.9mm x 6.0mm)
- -40°C to +105°C temperature range



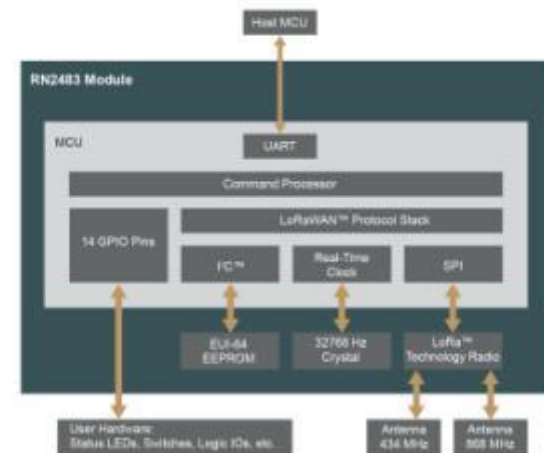
MICRF220AYQS

## Features:

- Low-Power Long Range Transceiver operating in the 433 MHz and 868 MHz frequency bands
- High Receiver Sensitivity: down to -148 dBm
- TX Power: adjustable up to +14 dBm high
- FSK, GFSK, and LoRa Technology modulation
- IIP3 = -11 Db
- >15 km coverage at suburban and >5 km coverage at urban area
- On-board LoRaWAN™ Class A protocol stack
- Compact form factor 17.8 x 26.7 x 3 mm
- Castellated SMT pads for reliable PCB mounting
- Device Firmware Upgrade (DFU) over UART

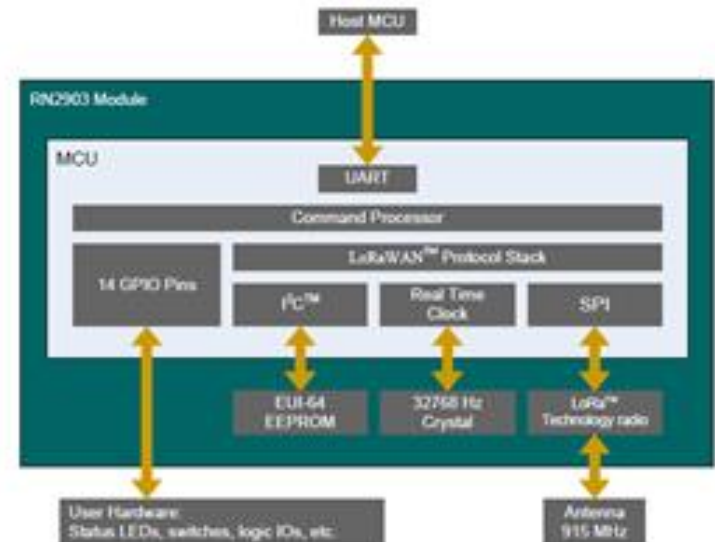
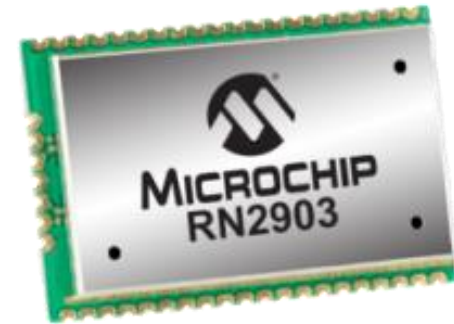


RN2483



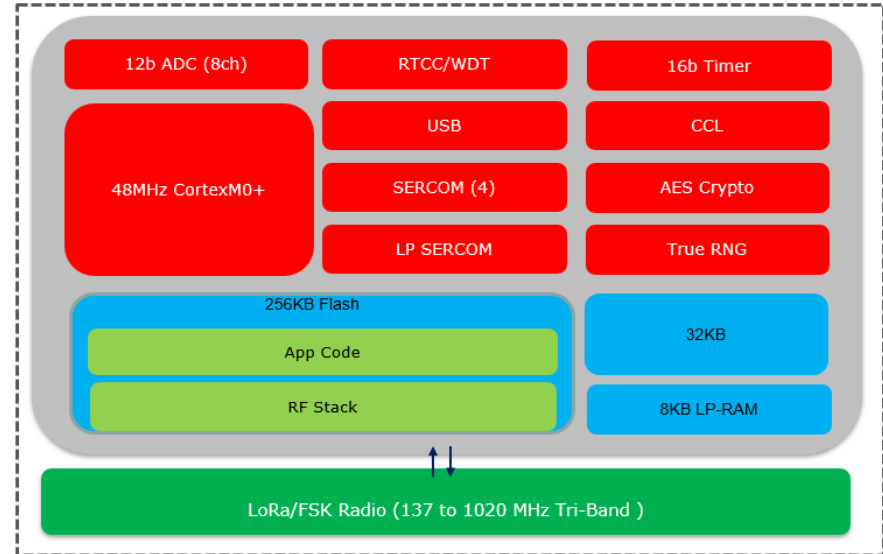
## Features:

- On-board LoRaWAN™ Class A protocol stack
- ASCII command interface over UART
- Compact form factor 17.8 x 26.7 x 3 mm
- Castellated SMT pads for easy and reliable PCB mounting
- Device Firmware Upgrade (DFU) over UART
- 14 GPIO for control, status, and ADC
- Highly integrated module with MCU, crystal, EUI 64 Node Identity Serial EEPROM, Radio transceiver with analog front end, and matching circuitry
- Environmentally friendly, RoHS compliant
- FCC and IC Certified



## Features:

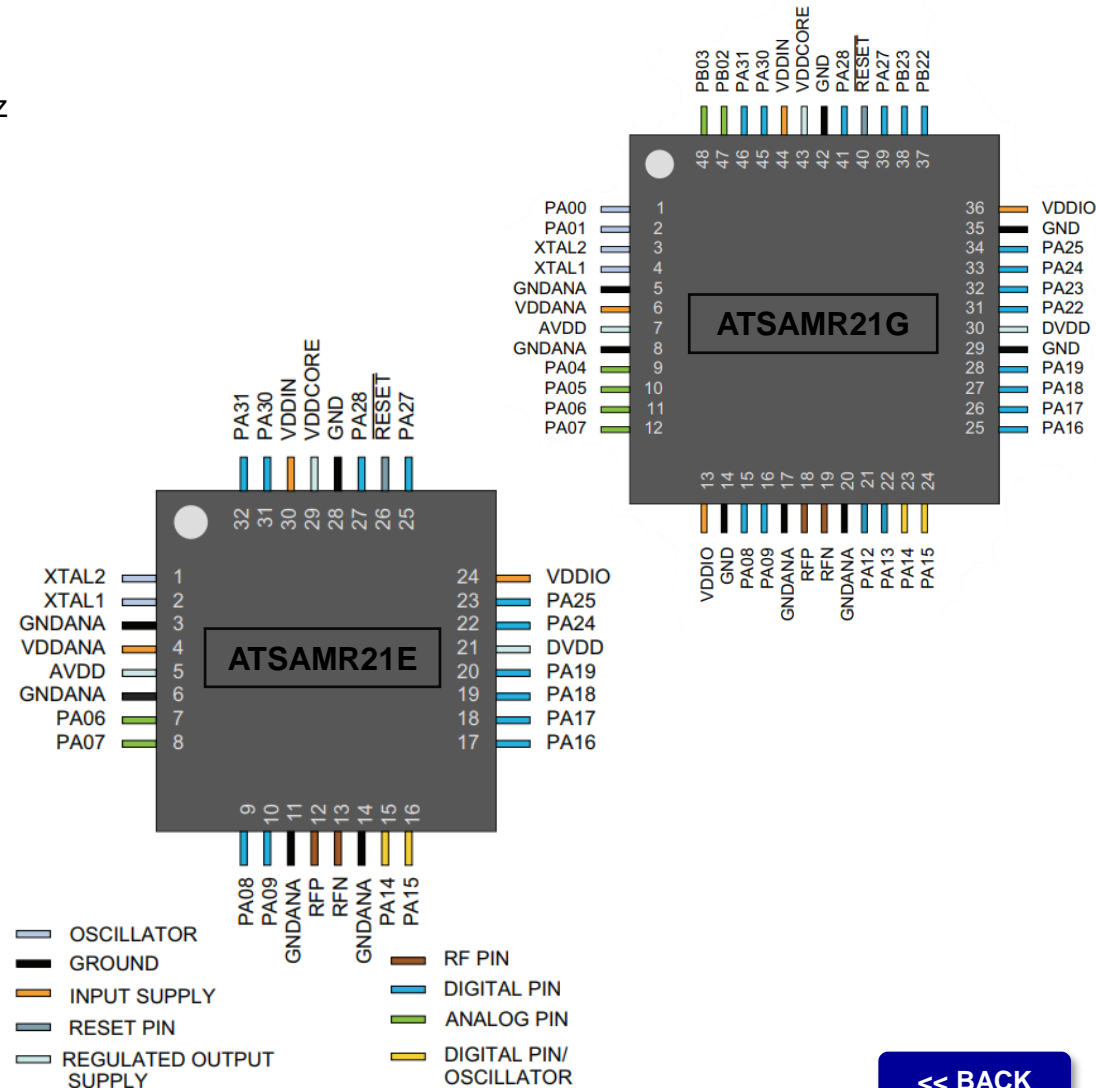
- Industry's lowest power LoRa® SiP device
- 32-bit Arm® Cortex M0+ MCU and LoRa Transceiver
- Small form factor: 6x6 mm compact BGA package
- Up to 256KB Flash and 40 KB RAM accommodates application code and stack
- Most cost and size effective solution, eliminating need for external MCU
- Fully supported 862 to 1020 MHz frequency coverage
- Down to -148 dBm Receive Sensitivity
- Up to 20 dBm maximum transmit power
- Low RX current of 17mA (typical)
- LoRa Technology, (G)FSK, (G)MSK and OOK Modulation





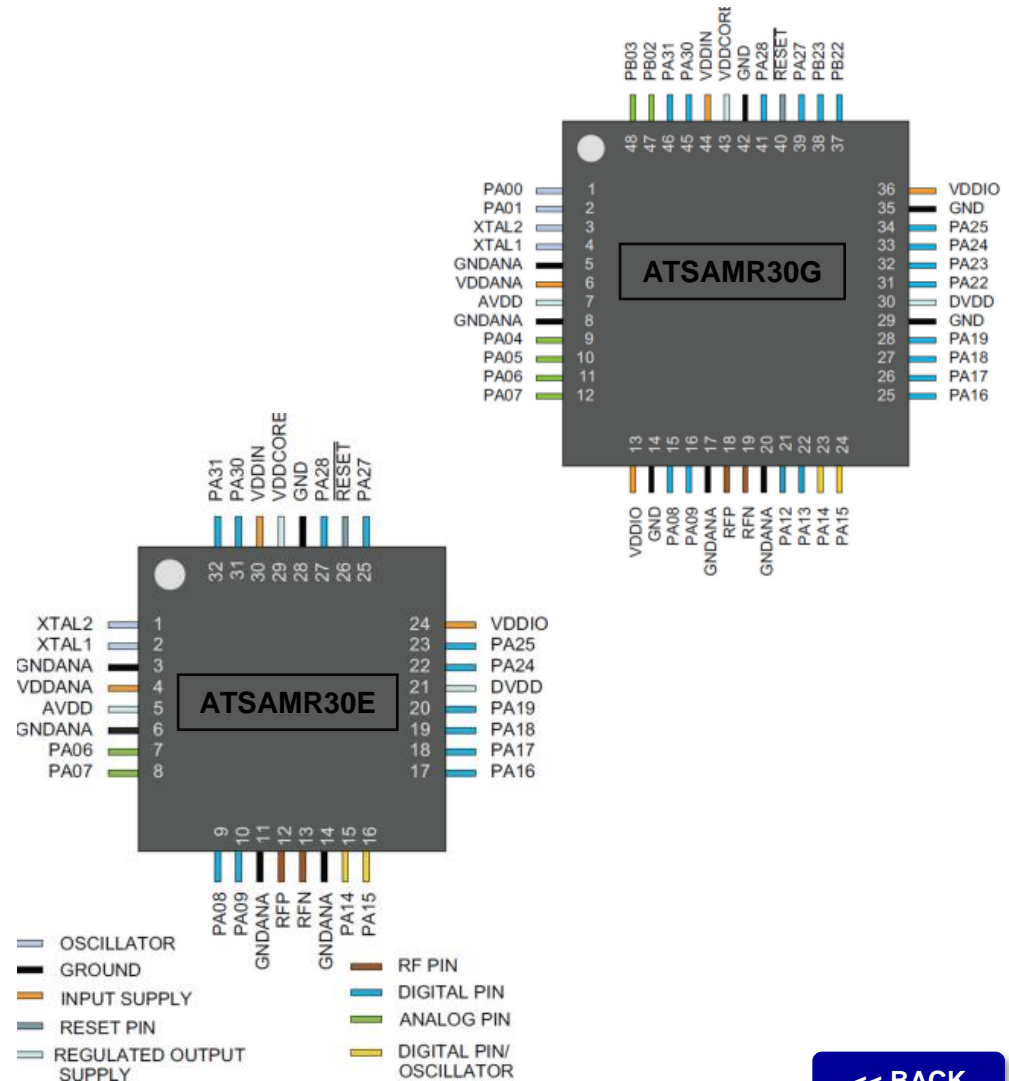
## Features:

- Processor
  - ARM Cortex-M0+ CPU running at up to 48MHz
    - Single-cycle hardware multiplier
    - Micro Trace Buffer (MTB)
- Memories
  - 768(1)/256/128/64KB in-system Self-programmable Flash
  - 32/16/8KB SRAM
- Low Power
  - Idle and standby sleep modes
  - SleepWalking peripherals
- I/O and Package
  - 16/28 programmable I/O pins
  - 32-pin QFN (ATSAMR21G)
  - 48-pin QFN (ATSAMR21E)
- Operating Voltage
  - 1.8V – 3.6V
- Temperature Range
  - -40°C to +85°C Industrial
  - -40°C to +125°C Industrial
- Single-chip ARM® Cortex®-M0+ based 32-bit Microcontroller
- Low power 2.4GHz transceiver for IEEE 802.15.4 and zigbee applications



## Features:

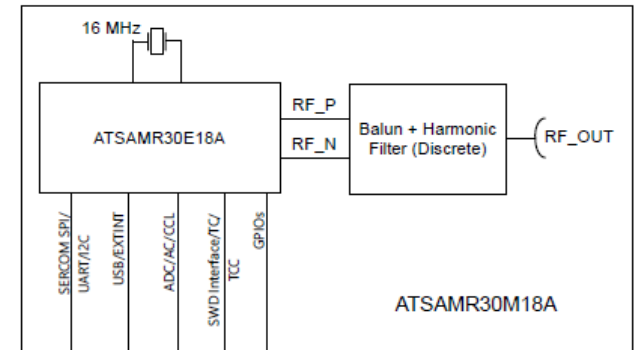
- Cortex M0+ MCU + Sub-GHz Transceiver in a single package
- 256 KB flash / 32KB RAM
- 8 KB Low Power Mode retained RAM
- USB Host and Device
- Ultra-low power consumption
  - 700 nA typical with RTC
- Hardware AES Crypto accelerators
- True Random Number Generator
- High performance ADC and analog peripherals for sensor nodes
- IEEE 802.15.4-2003/2006/2011 compliant
- 769-935 MHz band support
- I/O and Package
  - 16/28 programmable I/O pins
  - 5 x 5 mm 32-pin QFN available ([ATSAMR30E18A](#))
  - 7 x 7 mm 48-pin QFN available ([ATSAMR30G18A](#))
- Operating Voltage
  - 1.8V – 3.6V
- Temperature Range
  - -40°C to 85°C Industrial



## Features:

- Compact 802.15.4 Sub-GHz module
- ATSAMR30E18A SiP with ARM Cortex-M0+ MCU and Sub-GHz transceiver
- Integrated Ultra Low Power Transceiver for 700/800/900MHz ISM band
- 256 KB Flash
- 16 Input/Output pins
- Maximum operating frequency 48 MHz
- 128-bit Advanced Encryption Standard (AES) crypto engine
- 32-bit Medium Access Control (MAC) symbol counter
- Automatic retransmission modes
- Single 1.8V - 3.6V supply
- FCC / ETSI compliant RF front end with harmonic filter
- Two Serial Communication interface (SERCOM) units left for external applications
- High precision 16 MHz crystal oscillator
- 12-bit, 350 kbps Analog-to-Digital Converter (ADC)
- I2C up to 3.4 MHz
- Full-speed (12 Mbps) Universal Serial Bus (USB) 2.0 interface
- 16 External General Purpose Input/Output (GPIO) lines

Figure 3-1. Module Block Diagram

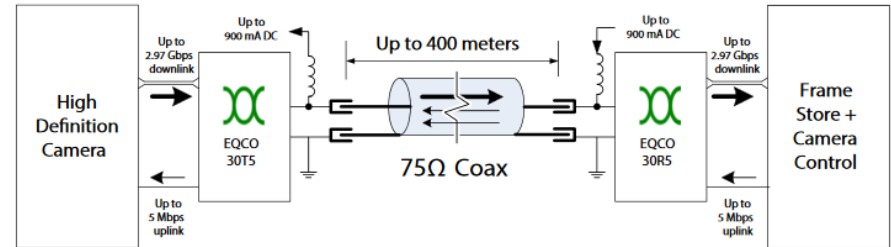


# EQCO30T5.2 & EQCO30R5.D HD-CCTV

EQCO30T5.2 3G/HD-SDI Video Cable Driver

## Features:

- 270Mbps to 3Gbps SDI Video Downlink
- Up to 5Mbps Uplink for camera control
- Supports distance up to 470m @ 270Mbps
- Supports distance up to 220m @3Gbps over RG-6 Coax
- Supports up to SMPTE 424M
- Supports 8b/10b coding up to 3.75Gbps
- Support power-over-coax (PoC) cable up to 900mA DC
- Operating Voltage: 3.15V to 3.45V
- Power Consumption: 150mW @ 1.2V
- Packaging: 16-lead 4x4 QFN
- Industrial Temperature Range:
  - -40°C to +85°C

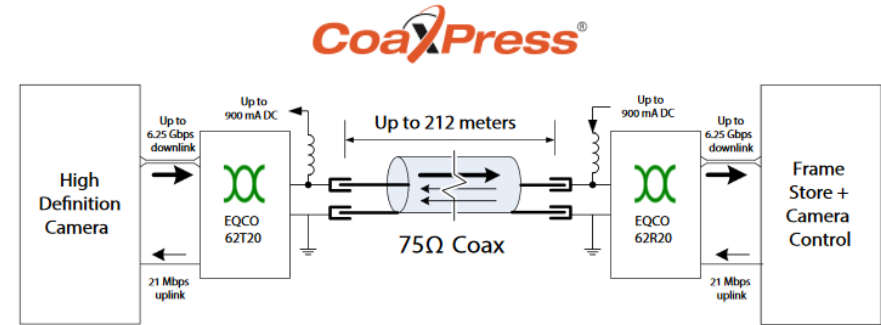


# EQCO31T20.3 & EQCO31R20.3

Asymmetric Coax Driver

## Features:

- The EQCO31T/R20 are lower-speed -\ - versions of EQCO62T/R20
- 1.25 Gbps to 3.125 Gbps Video Downlink
- Up to 20Mbps Uplink for camera control
- Supports distance up to 380m @ 1.25Gbps
- Supports distance up to 100m 3.125Gbps over RG-6 Coax
- Enables nanosecond precise triggering for camera control
- Supports 8b/10b coding up to 3.125Gbps
- Supports power over coax cable up to - 900mA DC
- Operating Voltage: 1.15V to 1.25V
- Power Consumption: <70mW @ 1.2V
- Packaging: 16-lead 4x4 QFN
- Industrial Temperature Range:
  - -40°C to +85°C

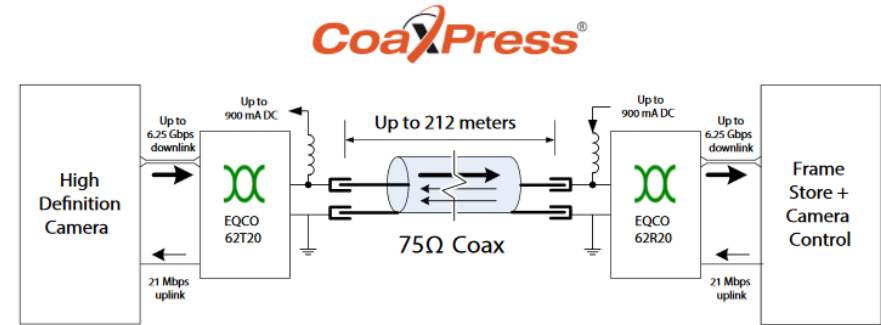


# EQCO62T20.3 & EQCO62R20.3

Asymmetric Coax Driver

## Features:

- 1.25 Gbps to 6.25 Gbps Video Downlink
- Up to 20Mbps Uplink for camera control
- Supports distance up to 212m @ 1.25Gbps
- Supports distance up to 68m @ 6.25Gbps over RG-6 Coax
- Enables nanosecond precise triggering for camera control
- Also supports 8b/10b coding up to 6.25Gbps
- Support power over coax cable up to 900mA DC
- Operating Voltage: 1.15V to 1.25V
- Power Consumption: <70mW @ 1.2V
- Packaging: 16-lead 4x4 QFN
- Industrial Temperature Range:
  - -40°C to +85°C

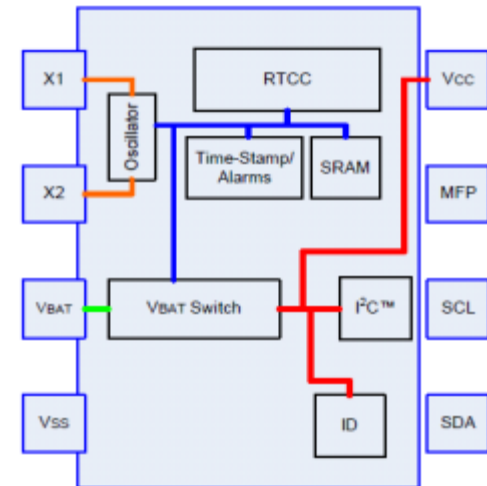


## Features:

- Battery Backed Real-Time Clock/Calendar:
  - Hours, Minutes, Seconds, Day of Week, Day, Month & Year
  - Dual Alarms
- On-Chip Digital Trimming/Calibration
- Open-Drain Output:
  - Selectable Frequency Clock Output
  - Alarm Output
- Power-Fail Time-Stamp
- Low-Power CMOS Technology:
  - Battery Backup Current: <700nA @ 1.8V
- 400 kHz I<sup>2</sup>C™
- Packages: 8-Lead SOIC, TSSOP, 2x3 TDFN, MSOP
- Industrial Temperature Range:
  - -40°C to +85°C
- 64 Bytes Battery Backed SRAM
- Protected 64-Bit Unique ID memory space:
  - EUI-48™ or EUI-64™ MAC address
  - Custom ID Programming

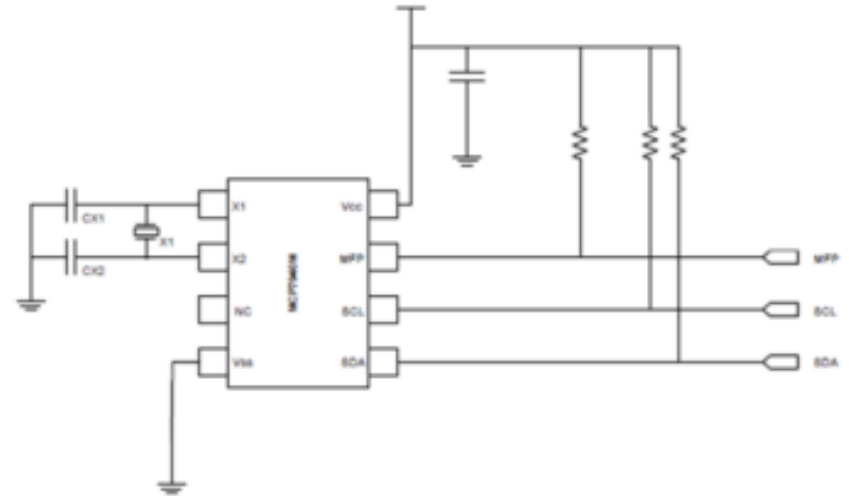
## Device Selection Table:

Part Number	Unique ID
MCP79400	Blank
MCP79401	EUI-48™
MCP79402	EUI-64™



## Features:

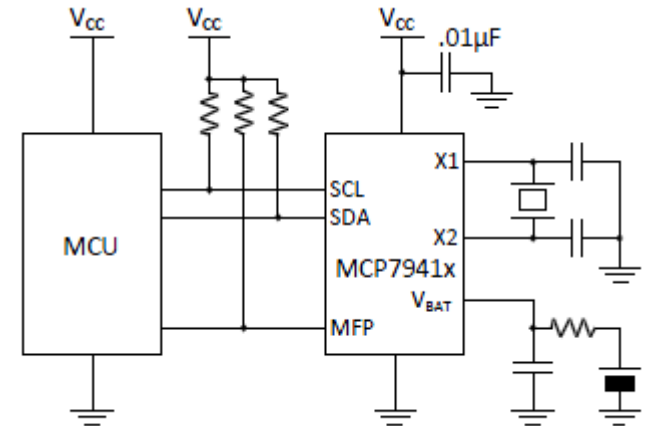
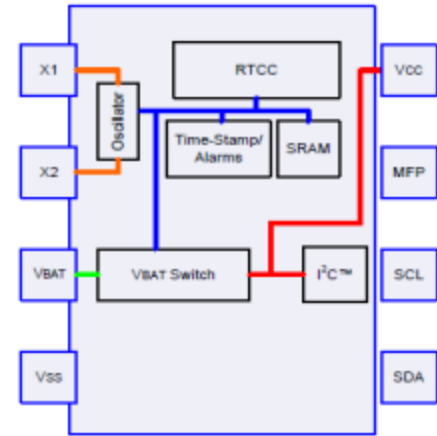
- Real-Time Clock/Calendar (RTCC):
  - Hours, Minutes, Seconds, Day of Week, -  
- Day, Month & Year
- Dual Alarms
- On-Chip Digital Trimming/Calibration
- Open-Drain Output:
- Selectable Frequency Clock Output
- Alarm Output
- 400 kHz I<sup>2</sup>C™
- Packages: 8-Lead SOIC, TSSOP, 2x3 –  
- TDFN, MSOP, PDIP
- Industrial Temperature Range:
  - -40°C to +85°C (Industrial)
- 64 Bytes SRAM





## Features:

- Battery Backed Real-Time Clock/Calendar (RTCC):
- Hours, Minutes, Seconds, Day of Week, Day, Month & Year
- Dual alarms
- On-Chip Digital Trimming/Calibration
- Open-Drain Output:
  - Selectable Frequency Clock Output
  - Alarm Output
- Power-Fail Time-Stamp
- Low-Power CMOS Technology:
  - Battery Backup Current: <700nA @ 1.8V
- 400 kHz I<sup>2</sup>C™
- Packages: 8-Lead SOIC, TSSOP, 2x3 TDFN, MSOP, PDIP
- Temperature Ranges:
  - -40°C to +85°C (Industrial)
  - -40°C to +125°C (Extended)
- 64 Bytes Battery Backed SRAM

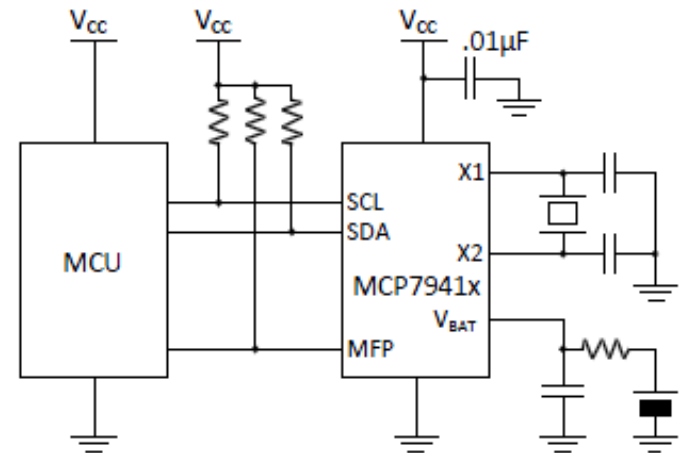


## Features:

- Battery Backed Real-Time Clock/Calendar (RTCC):
- On-Chip Digital Trimming/Calibration:
- Open-Drain Output:
- Selectable Frequency Clock Output
- Alarm Output
- Power-Fail Time-Stamp
- Low-Power CMOS Technology:
  - Battery Backup Current: <700nA @ 1.8V
- 400 kHz I<sup>2</sup>C™
- Packages: 8-Lead SOIC, TSSOP, 2x3 TDFN, MSOP
- Industrial Temperature Range:
  - -40°C to +85°C (Industrial)
- 64 Bytes Battery Backed SRAM
- 1 Kbits EEPROM (128x8)
- Protected 64-Bit Unique ID memory space:
  - EUI-48™ or EUI-64™ MAC address
  - Custom ID programming

## Device Selection Table:

Part Number	Unique ID
MCP79410	Blank
MCP79411	EUI-48™
MCP79412	EUI-64™





# MCP79510/11/12 and MCP79520/21/22

Battery-Backed SPI Real-Time Clock/Calendar

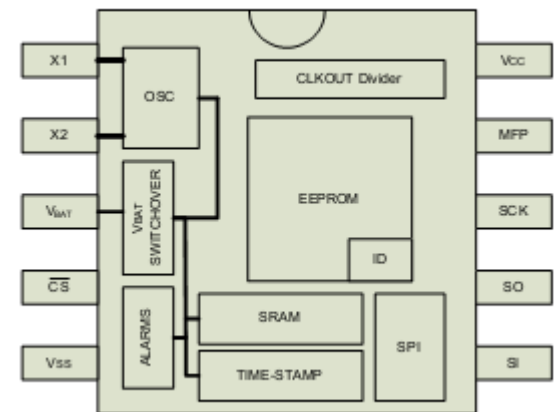
Online  
Datasheet

## Features:

- Battery Backed Real-Time Clock/Calendar
- Open-Drain Output:
  - Selectable Frequency Clock Output
  - Alarm Output
- On-Chip Digital Trimming/Calibration
- Power-Fail Time-Stamp
- 1.8V to 3.6V Operating Voltage
- Low Operating Current:
  - $V_{BAT}$  Timekeeping Curr: <700nA @ 1.8V
- 5 MHz SPI
- 10-lead MSOP & TDFN
- Industrial Temperature Range:
  - -40°C to +85°C
- 64-Byte Battery-Backed SRAM
- 2 Kbit and 1 Kbit EEPROM Memory
- Protected 128-Bit Unique ID memory space:
  - EUI-48™ or EUI-64™ MAC address
  - Custom ID programming

## Device Selection Table:

Part Number	EEPROM (Kbits)	Unique ID
MCP79510	1	Blank
MCP79520	2	Blank
MCP79511	1	EUI-48™
MCP79521	2	EUI-48™
MCP79512	1	EUI-64™
MCP79522	2	EUI-64™



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# MCP795W10/11/12 and MCP795W20/21/22

Battery-Backed SPI Real-Time Clock/Calendar with Enhanced Features

Online  
Datasheet

## Features:

- Battery Backed Real-Time Clock/Calendar
- Open-Drain Output:
  - Selectable Frequency Clock Output
- On-Chip Digital Trimming/Calibration
- Power-Fail Time-Stamp
- 1.8V to 3.6V Operating Voltage
- Low Operating Current:
  - $V_{BAT}$  Timekeeping Curr: <700nA @ 1.8V
- 10 MHz SPI
- 14-Lead SOIC & TSSOP
- Industrial Temperature: -40°C to +85°C
- Programmable Watchdog Timer with
- High-Speed Digital Event Detect (EVHS)
- Debounced Low-Speed Event Detect (EVLS)
- 64-Byte Battery-Backed SRAM
- 2 Kbit and 1 Kbit EEPROM Memory
- Protected 128-Bit Unique ID memory space:
  - EUI-48™ or EUI-64™ MAC address
  - Custom ID programming

## Device Selection Table:

Part Number	EEPROM (Kbits)	Unique ID
MCP79510	1	Blank
MCP79520	2	Blank
MCP79511	1	EUI-48™
MCP79521	2	EUI-48™
MCP79512	1	EUI-64™
MCP79522	2	EUI-64™

MCP7951X/2X >>

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# **Appendix for Demo and Eval Boards**

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# PoE PD EVB PD70211EVB51F-12

## Key Features:

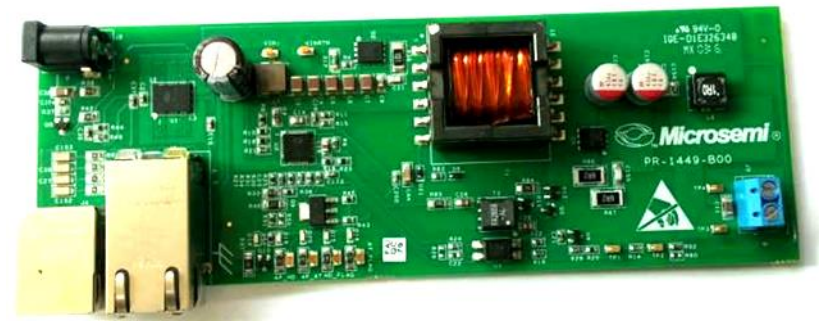
- Featuring PD70211 and PD70224
- IEEE 802.3af/at/Dual-AT/POH standard compliant
- 51W - 12V / 4.25A output voltage / current
- Flyback topology
- Wall adaptor support
- Power is supplied through the 4-pairs of the Cat5 cable
- Wall adapter input – standard barrel jack available for connecting to an external 48V wall adapter.
- Data pass-through connector
- On board LED indicators: PSE class type; 2,3,4 and 6-events
- On board Power Good LED indicator which may be configured to monitor PD Front End or VPP UVLO.
- Ta: 0° to +70°C (with derating curve)
- RoHS compliant

## Kit content:

- PD70211EVB51F-12 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70211EVB51F-12 evaluation board provides designers with an environment needed for evaluating the performance and implementation of PD applications based on PD70211 controller. The board is using a single PD controller, PD70211ILQ, to support the Detection, Class, and Power Supplying phases on the 4 pairs of the Cat5 cable. The board supports sync detection of the 4 pairs. PD70211ILQ supports the current of the HDBaseT over 4 pairs, which is more than twice the power of a standard IEEE 802.3at Type 2 interface.



## Key Features:

- Featuring PD70211 and PD70224
- IEEE 802.3af/at/Dual-AT/POH standard compliant
- 72W – 12V / 6A output voltage / current
- Forward topology
- Wall adaptor support
- Power is supplied through the 4-pairs of the Cat5 cable
- Wall adapter input – standard barrel jack available for connecting to an external 48V - 54V wall adapter.
- Data pass-through connector
- On board LED indicators: PSE class type; 2,3,4 and 6-events
- On board power good LED indicator which may be configured to monitor PD front end or VPP UVLO.
- Ta: -40°C to +70°C (with derating curve)
- RoHS compliant

## Kit content:

- PD70211EVB72FW-12 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70211EVB72FW-12 evaluation board provides designers with an environment needed for evaluating the performance and implementation of PD applications based on PD70211 controller. The board is using a single PD controller, PD70211ILQ, to support the detection, class, and power supplying phases on the 4 pairs of the Cat5 cable. The board supports sync detection of the 4 pairs. PD70211ILQ supports the current of the HDBaseT over 4 pairs, which is more than twice the power of a standard IEEE 802.3atType 2 interface.



# PoE PD EVB PD70211EVB50FW-3

## Key Features:

- Featuring PD70211 and PD70224
- IEEE 802.3af/at/Dual-AT/POH standard compliant
- 50W - 3.3V / 15A output voltage / current
- Active clamp forward topology
- Wall adaptor support
- Power is supplied through the 4-pairs of the Cat5 cable
- Wall adapter input – standard barrel jack available for connecting to an external 42-54V Wall Adapter.
- Data pass-through connector
- On board LED indicators: PSE class type; 2,3,4 and 6-events
- On board Power Good LED indicator which may be configured to monitor PD front end or VPP UVLO.
- TA= -40°C to +70°C
- RoHS compliant

## Kit content:

- PD70211EVB50FW-3 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70211EVB50FW-3 evaluation board provides designers with an environment needed for evaluating the performance and implementation of PD applications based on PD70211 controller. The board is using a single PD controller, PD70211ILQ, to support the Detection, Class, and Power Supplying phases on the 4 pairs of the Cat5 cable. The board supports sync detection of the 4 pairs. PD70211ILQ supports the current of the HDBaseT over 4 pairs, which is more than twice the power of a standard IEEE 802.3at Type 2 interface.





## Key Features:

- Featuring PD70211 and PD70224
- IEEE 802.3af/at/Dual-AT/POH standard compliant
- 50W - 5V / 10A output voltage / current
- Active clamp forward topology
- Wall adaptor support
- Power is supplied through the 4-pairs of the Cat5 cable
- Wall adapter input – standard barrel jack available for connecting to an external 48V Wall Adapter.
- Data pass-through connector
- On board LED indicators: PSE class type; 2,3,4 and 6-events
- On board Power Good LED indicator which may be configured to monitor PD front end or VPP UVLO.
- Ta: 0° to +70°C (with derating curve)
- RoHS compliant

## Kit content:

- PD70211EVB50FW-5 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70211EVB50FW-5 evaluation board provides designers with an environment needed for evaluating the performance and implementation of PD applications based on PD70211 controller. The board is using a single PD controller, PD70211ILQ, to support the Detection, Class, and Power Supplying phases on the 4 pairs of the Cat5 cable. The board supports sync detection of the 4 pairs. PD70211ILQ supports the current of the HDBaseT over 4 Pairs, which is more than twice the power of a standard IEEE802.3AT Type 2 interface.



## Key Features:

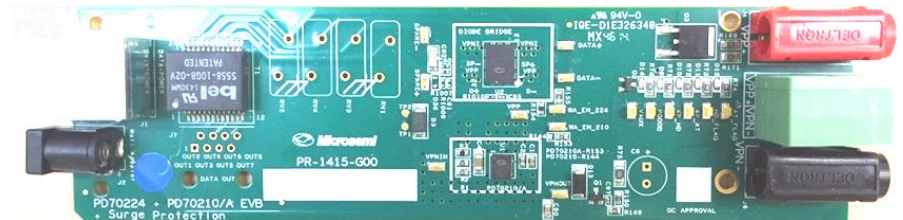
- Featuring PD70210A and PD70224
- PD70210A IEEE 802.3af/at/Dual-AT/POH standard compliant
- PD70224 IEEE 802.3af/at/bt/Dual-AT/POH standard compliant
- 95W max power
- Wall adaptor support
- Designed to support data and spare current using a single PD70210A device
- Data and power in RJ45 connector
- Output voltage connector
- Wall adapter connector
- On board LED indicators: 2,3,4 and 6-events
- Evaluation board working temperature: 0°C to +70°C
- RoHS compliant

## Kit content:

- PD70224EVB\_wAuxPwr evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70224EVB with auxiliary power evaluation board provides designers with the environment needed for evaluating the performance and implementation of PD applications based on PD70224 and PD70210A devices. The board uses a single PD device, PD70210AILD, to support the detection, class, and power supplying phases on the 2/4 pairs of the Cat5 cable. EVB supports a standard Twin HDBaseT interface and compatible to IEEE802.3AT Type 2 interface. This version features the PD70210A which has a wall adapter pin (WA\_EN) for adapter priority.



## Key Features:

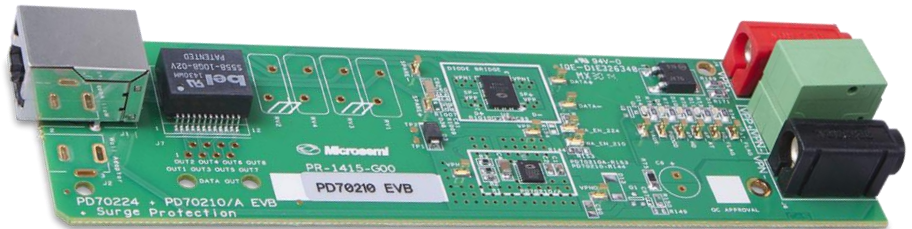
- Featuring PD70210 and PD70224
- PD70210 IEEE 802.3af/at/Dual-AT/POH standard compliant
- PD70224 IEEE 802.3af/at/bt/Dual-AT/POH standard compliant
- 95W Max power
- Designed to support data and spare current using a single PD70210 device
- Data and Power in RJ45 connector
- Output voltage connector
- On board Power Good LED indicator
- On board LED indicators: 2,3,4 and 6-events
- Evaluation Board working temperature: 0°C to +70°C
- RoHS compliant

## Kit content:

- PD70224EVB evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

PD70224EVB evaluation board provides designers with the environment needed for evaluating the performance and implementation of PD applications based on PD70224 and PD70210 devices. The board uses a single PD device, PD70210ILD, to support the detection, class, and power supplying phases on the 2/4 pairs of the Cat5 cable. The EVB supports a standard Twin HDBaseT interface and compatible to IEEE802.3AT Type 2 interface. PD70210ILD has a power good signal pin.



## Key Features:

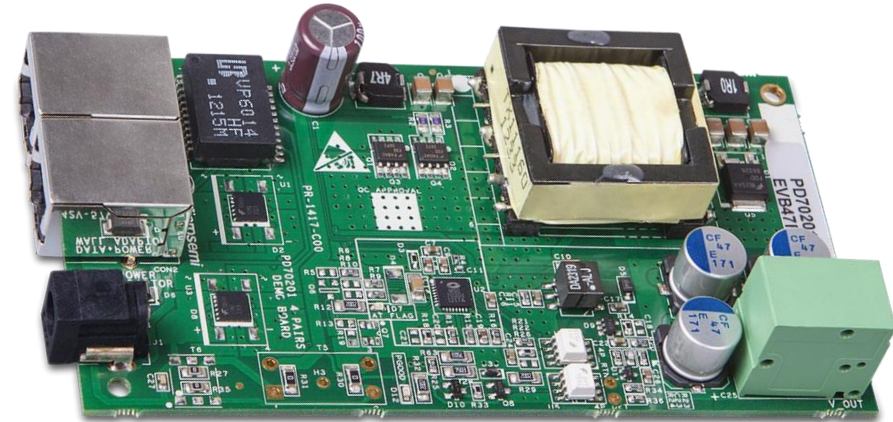
- Featuring PD70201
- IEEE 802.3af/at standard compliant
- 47.7W - 12 V / 4 A output voltage / current
- Flyback topology
- Power is supplied through the 4-pairs of the Cat5 cable
- Two RJ45 connectors (data and power in, data out)
- Wall adapter – DC in connector
- Output voltage connector.
- On board power good LED indicator
- On board AT detected LED indicator
- Pulse transformer for routing the data to PD application to enable full PD evaluation.
- Evaluation Board working temperature: 0° to +70°C
- RoHS compliant

## Kit content:

- PD70201EVB47F evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70201EVB47F evaluation board provides designers with an environment needed to evaluate the performance and implementation of PD applications based on PD70201 device. The board is using a single PD device PD70201ILQ to support the detection, Class and Power supplying phases on the 4 pairs of the Cat5 cable. PD70201ILQ supports the current of the 4 pairs, which is twice the level of a standard IEEE802.3AT Type 2 interfaces.



# PoE PD EVB PD70201EVB25F-12

## Key Features:

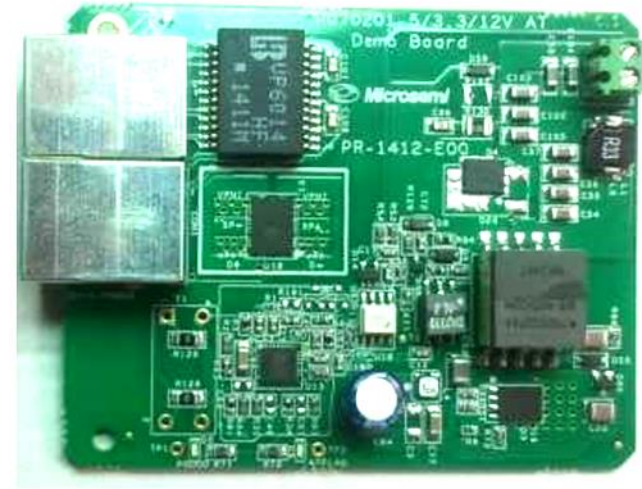
- Featuring PD70201
- IEEE 802.3af/at standard compliant
- 25W - 12V / 2.1A output voltage / current
- Flyback topology
- Two RJ45 connectors (data and power in, data out)
- Output voltage connector
- On board power good LED indicator
- On board AT detected LED indicator
- Pulse transformer for routing the data to PD application to enable full PD evaluation
- Evaluation board working temperature: 0°C to +70°C
- RoHS compliant

## Kit content:

- PD70201EVB25F-12 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70201EVB25F-12 evaluation board provides designers with the environment needed for evaluating the performance and implementation of PD applications based on the PD70201 device. The board uses a single PD device, PD70201ILQ, to support the detection, class, and power supplying phases on the 2/4 pairs of the Cat5 cable. PD70201ILQ supports a standard IEEE 802.3at Type 2 interface.



# PoE PD EVB PD70201EVB25F-5

## Key Features:

- Featuring PD70201
- IEEE 802.3af/at standard compliant
- 25W - 5V / 5A output voltage / current
- Flyback topology
- Two RJ45 connectors (data and power in, data out)
- Output voltage connector.
- On board power good LED indicator
- On board AT detected LED indicator
- Pulse transformer for routing the data to PD application to enable full PD evaluation.
- Evaluation board working temperature: 0°C to +70°C
- RoHS compliant

## Kit content:

- PD70201EVB25F-5 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70201EVB25F-5 evaluation board provides designers with the environment needed for evaluating the performance and implementation of PD applications based on the PD70201 device. The board uses a single PD device, PD70201ILQ, to support the detection, class, and power supplying phases on the 2/4 pairs of the Cat5 cable. PD70201ILQ supports a standard IEEE 802.3at Type 2 interface.



# PoE PD EVB PD70201EVB25F-3

**Key Features:**

- Featuring PD70201
- IEEE 802.3af/at standard compliant
- 25W - 3.3V / 7.5A output voltage / current
- Flyback topology
- Wall adaptor support
- Two RJ45 connectors (Data and Power In, Data Out)
- Output voltage connector.
- On board power good LED indicator
- On board AT detected LED indicator
- Pulse transformer for routing the data to PD application to enable full PD evaluation.
- Evaluation board working temperature: -40°C to +70°C
- RoHS compliant

**Kit content:**

- PD70201EVB25F-3 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

**Description:**

The PD70201EVB25F-3 evaluation board provides designers with the environment needed for evaluating the performance and implementation of PD applications based on the PD70201 device. The board uses a single PD device, PD70201ILQ, to support the detection, class, and power supplying phases on the 2/4 Pairs of the Cat5 cable. PD70201ILQ supports a standard IEEE 802.3at Type 2 interface.



# PoE PD EVB PD70201EVB25FW-3

**Key Features:**

- Featuring PD70201
- IEEE 802.3af/at standard compliant
- 25W - 3.3V / 7.5A output voltage / current
- Active clamp forward topology
- Power is supplied through the 4-pairs of the Cat5 cable
- Wall adapter input – standard barrel jack available for connecting to an external 48-54V wall adapter.
- Data pass-through connector
- On board AT detected LED indicator
- On board power good LED indicator
- $T_A = -40^{\circ}$  to  $+70^{\circ}\text{C}$
- RoHS compliant

**Kit content:**

- PD70201EVB25FW-3 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

**Description:**

PD70201EVB25FW-3 evaluation board provides designers with an environment needed for evaluating the performance and implementation of PD applications based on PD70201 controller. The board is using a single PD controller, PD70201ILQ, to support the detection, class, and power supplying phases on the 4 pairs of the Cat5 cable. The board supports sync detection of the 4 pairs. PD70201ILQ supports the current of the HDBaseT over 4 Pairs, which is more than twice the power of a standard IEEE 802.3at Type 2 interface.





## Key Features:

- Featuring PD70201
- IEEE 802.3af/at standard compliant
- 25W - 5V / 5A output voltage / current
- Wide inputs voltage 17-54V
- Flyback topology
- Wall adaptor support
- Two RJ45 connectors (data and power input, data output)
- Output voltage connector
- On board AT detected LED indicator
- Pulse transformer for routing the data to PD application to enable full PD evaluation
- Wide input voltage range
- Evaluation board working temperature: 0°C to 70°C
- RoHS compliant

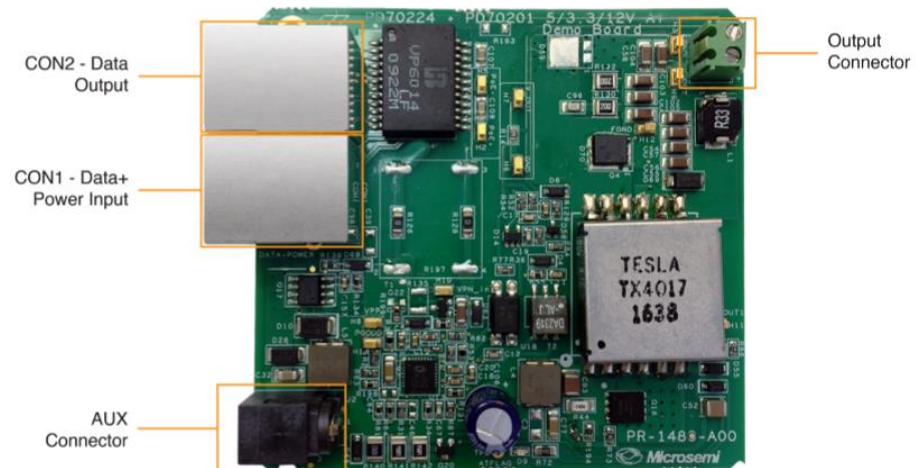
## Kit content:

- PD70201EVB-U-25F-5 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70201EVB-U-25F-5 board is used for evaluating the performance of the PD70201 device in both standard IEEE 802.3at and non-standard applications with input 17-54 V. The board is a 25 W PD consisting of DC isolated DC-DC converter to step down voltage to 5 V. The AUX input gets priority in supplying the load, when it is connected to the application and the PD inputs act as backup power if the AUX is disconnected.

The evaluation board provides designers with the environment needed for evaluating the performance and implementation of PD applications based on the PD70201 device. The board uses a single PD device (PD70201ILQ) to support the detection, classification, and power supplying phases on the 2/4 pairs of the Cat5 cable. PD70201ILQ supports a standard IEEE 802.3at Type 2 interface as well as wide range non-standard input voltage.



# PoE PD EVB PD70101EVB15F-12

## Key Features:

- Featuring PD70101
- IEEE 802.3af/at standard compliant
- 13.2W - 12 V / 1.1 A output voltage / current
- Flyback topology
- Designed to support one PD-chip application (2-pairs)
- Two RJ45 connectors (data and power in, data out)
- Optional Wall adapter – DC in connector
- Output voltage connector.
- On board LED indicator
- Pulse transformers and common mode chocks
- Evaluation board working temperature: 0°C to +70°C
- RoHS compliant
- Optional standby circuitry
- RoHS compliant

## Kit content:

- PD70101EVB15F-12 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70101EVB15F-12 evaluation board provides designers with the needed environment to evaluate the performance and implementation of PD applications based on PD70101 PD-chip. The evaluation board enables PD designers to evaluate Microchip's PD-chip solution.



# PoE PD EVB PD70101EVB15F-5

## Key Features:

- Featuring PD70101
- IEEE 802.3af/at standard compliant
- 13W - 5 V / 2.6 A output voltage / current
- Flyback topology
- Designed to support one PD-chip application (2-pairs)
- Two RJ45 connectors (data and power in, data out)
- Optional wall adapter – DC in connector
- Output voltage connector
- On board LED indicator
- Pulse transformers and common mode chocks
- Evaluation board working temperature: 0°C to +70°C
- Optional standby circuitry
- RoHS compliant

## Kit content:

- PD70101EVB15F-5 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

The PD70101EVB15F-5 evaluation board provides designers with the needed environment to evaluate the performance and implementation of PD applications based on PD70101 PD-chip. The evaluation board enables PD designers to evaluate Microchip's PD-chip solution.





# PoE PD EVB PD70101EVB3F

Online  
Datasheet

## Key Features:

- Featuring PD70101
- IEEE 802.3af/at standard compliant
- 3.3W - 3.3V / 1A output voltage / current
- Flyback topology
- RoHS compliant

## Description:

The PD70101EVB3F evaluation board provides designers with the needed environment to evaluate the performance and implementation of PD applications based on PD70101 PD-chip. The evaluation board enables PD designers to evaluate Microchip's PD-chip solution.

## Kit content:

- PD70101EVB3F evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files



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# PoE PD EVB PD70101EVB6F

Online  
Datasheet

## Key Features:

- Featuring PD70101
- IEEE 802.3af/at standard compliant
- 6W - 5V / 1.2A output voltage / current
- Flyback topology
- Designed to support one PD-chip application (2-pairs)
- Two RJ45 connectors (data and power in, data out)
- Optional wall adapter – DC in connector
- Output voltage connector
- On board LED indicator
- Pulse transformers and common mode chocks
- Evaluation board working temperature: 0°C to +70°C
- RoHS compliant
- Optional standby circuitry
- RoHS compliant

## Kit content:

- PD70101EVB6F evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

Microchip's PD70101EVBx $F$  evaluation board provides designers with the needed environment to evaluate the performance and implementation of PD applications based on PD70101 PD-chip. The evaluation board enables PD designers to evaluate Microchip's PD-chip solution.



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**Key Features:**

- Featuring PD70100
- IEEE 802.3af/at/ standard compliant
- 15W power
- Buck topology
- Designed to support one PDchip application (2-pairs)
- Two RJ45 connectors (data and power in, data out)
- Optional Wall adapter – DC in connector
- Output voltage connectors
- On board LED indicator
- Pulse transformers and common mode chocks
- Evaluation board working temperature: 0° to +70°C

**Kit content:**

- PD70100EVB15B evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

**Description:**

The PD70100EVB15B evaluation board provides designers with the needed environment to evaluate the performance and implementation of PD applications based on PD70100 PDchip. The evaluation board enables PD designers to evaluate Microchip's PDchip solution.



## Key Features:

- Featuring PD69208T4, PD69204T4, PD69200
- IEEE 802.3af/at/bt/PoH standard compliant
- 4 x 2-pair + 4 x 4-pair type4 ports
- Supporting 4 x 45W + 4 x 90W ports
- LED Stream
- UART/USB host interface
- Two gangs (each contains 4 RJ45 connectors)
- Switch domain isolated from PoE domain
- Switch domain USB interface
- PoE controller manual reset
- LED status indication for all ports (LED stream)
- Requires single power source only
- 0°C to 40°C working temperature
- RoHS compliant

## Kit content:

- PD-IM-7604-4T4H evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files
- Software package
  - Communication protocol
  - Graphics user interface
  - API
  - S19

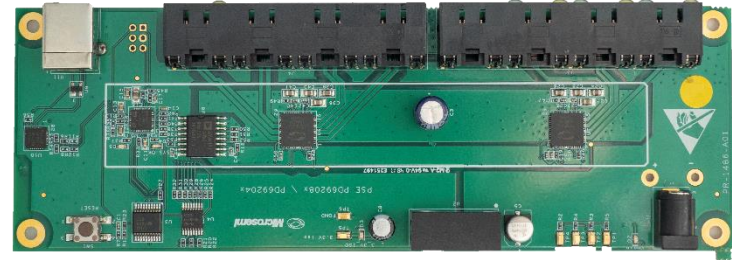
## Description:

4 x 2-pair + 4 x 4-pair type4 ports PD69208T4 / PD69204T4-based evaluation board.

The PD-IM-7604-4T4H evaluation board is developed based on PD69208T4, PD69204T4 and PD69200 chipsets, and demonstrates the operation of four 4-pair ports and four 2-pair ports systems.

The evaluation system provides designers with the required environment to evaluate the performance and implementation of PD69204T4 (four ports) and PD69208T4 (eight ports) PoE managers and PD69200 PoE controller.

The evaluation board enables PoE designers to evaluate Microchip's PoE solution with flexibility and easy configuration.



## Key Features:

- Featuring PD69208M, PD69200, PD70224, PD70211
- IEEE 802.3af/at/bt/PoH standard compliant
- 8 ports
- Supporting 8 x 30W / 4 x 60W ports
- LED stream
- UART / USB host interface
- 8 RJ45 PoE output ports
- 2 RJ45 PoE input ports + 1 Aux DC Input
- Switch domain isolated from PoE domain
- Switch domain USB interface
- PoE controller manual reset
- Option for external power supply
- 0°C to 40°C working temperature
- RoHS compliant

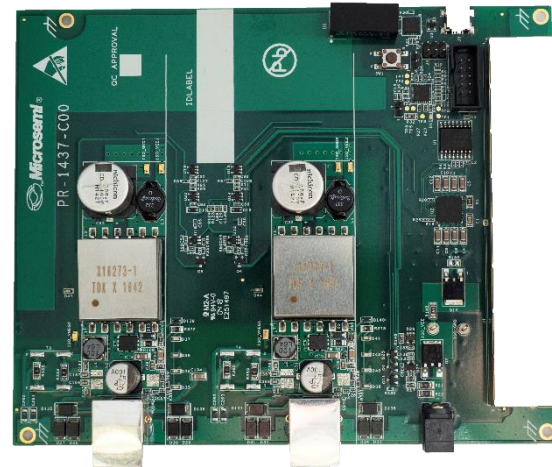
## Kit content:

- PD-IM-7608M-2 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files
- Software package
  - Communication protocol
  - Graphics user interface
  - API
  - S19

## Description:

8-port PoE system powered from 2 PD ports evaluation board featuring PD69208M PSE manager, PD69200 PSE Controller, PD70224 ideal diode bridge and PD70211 PD IC. PD-IM-7608M-2 evaluation board provides a dual input PD-PSE system, each PD supports up to 60 watt with additional support of AUX DC input. The AUX input gets priority in supplying the load and when it is connected to the application the PD inputs are acting as backup power in case that the AUX is disconnected. When powering from two PD inputs, a current sharing mechanism is activated in order to share the current between the inputs. In this case (of feeding from two PD inputs), the overall system power is twice the lower Type PD.

The evaluation board provides designers with an environment needed for evaluating the performance and implementation of PD-PSE applications.





## Key Features:

- Featuring PD69208M, PD69200
- IEEE 802.3af/at/bt Type3 standard compliant
- 8 ports
- Supporting 8 x 30W / 4 x 60W ports
- LED stream
- UART / USB host interface
- Two gangs (each contains 4 RJ45 connectors)
- Switch domain isolated from PoE domain
- Switch domain USB interface
- PoE controller manual reset
- LED status indication for all ports (LED stream)
- Requires single power source only
- 0°C to 40°C working temperature
- RoHS compliant

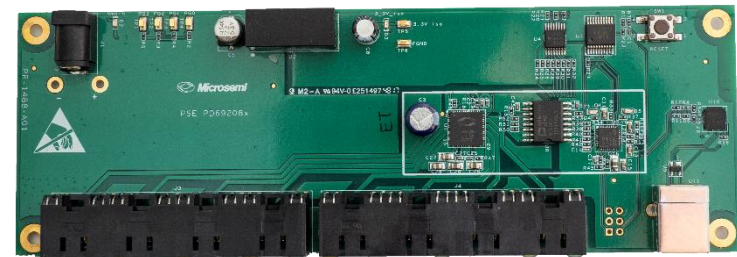
## Kit content:

- PD-IM-7608M evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files
- Software package
  - Communication protocol
  - Graphics user interface
  - API
  - S19

## Description:

8-port PD69208M-based enhanced evaluation board evaluation board. The PD-IM-7608M evaluation board is developed based on PD69208M and PD69200 chipsets. PD-IM7608M demonstrates the operation of eight 2-pair ports systems; for 4-pair systems, refer to the PD-IM7604+4MH or PD-IM-7604+4T4H evaluation boards. Microchip's PD69208M Power over Ethernet (PoE) manager IC integrates power, analog, and state-of-the-art logic into a single 56-pin, plastic QFN package. The device is used in Ethernet switches and midspans to allow network devices to share power and data over the same cable. The PD69208M device is an 8-port mixed-signal and high-voltage PoE driver. Together with the PD69200 external MCU, it perform as a PSE system. Microchip's PD69200 PoE controller is a cost-effective and pre-programmed MCU designed to implement enhanced mode.

The evaluation board enables PoE designers to evaluate Microchip's PoE solution with flexibility and easy configuration. The application circuit of PD69208M and PD69200 chipset is compact in size.



# PoE PSE EVB PD-IM-7604-4MH

## Key Features:

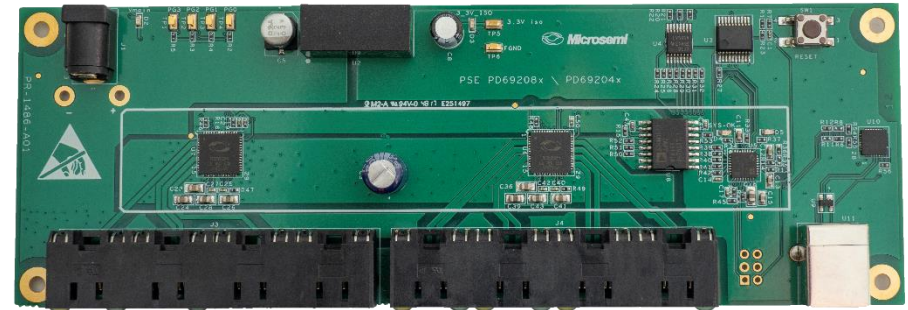
- Featuring PD69208M, PD69200
- IEEE 802.3af/at/bt Type 3 standard compliant
- 4 x 2-pair + 4 x 4-pair Type3 ports
- Supporting 4 x 30W + 4 x 60W ports
- LED Stream
- UART / USB host interface
- Two gangs (each contains 4 RJ45 connectors)
- Switch domain isolated from PoE domain
- Switch domain USB interface
- PoE controller manual reset
- LED status indication for all ports (LED stream)
- Requires single power source only
- 0 °C to 40 °C working temperature
- RoHS compliant

## Kit content:

- PD-IM-7604-4MH evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files
- Software package
  - Communication protocol
  - Graphics user interface
  - API
  - S19

## Description:

4 x 2-pair + 4 x 4-pair Type3 ports PD69208M-based evaluation board. The PD-IM-7604-4MH evaluation board is developed based on PD69208M and PD69200 chipsets and demonstrates the operation of four 4-pair ports and four 2-pair ports systems. The evaluation system provides designers with the required environment to evaluate the performance and implementation of PD69208M (eight ports) PoE manager and PD69200 PoE controller. The evaluation board enables PoE designers to evaluate Microchip's PoE solution with flexibility and easy configuration.



## Key Features:

- Featuring PD69104B1
- IEEE 802.3af/at standard compliant
- 4 ports
- Supporting 4 x 30W or 2 x 60W ports
- LED stream
- Designed to support four RJ45 ports, PoE application, and PoE extended mode (2-pairs)
- $V_{in}$  connector – DC jack
- On-board LEDs indicators
- Reset button
- EEPROM support
- I<sup>2</sup>C and UART communication connectors.
- Marketing board working temperature: 0°C to +50°C
- RoHS compliant

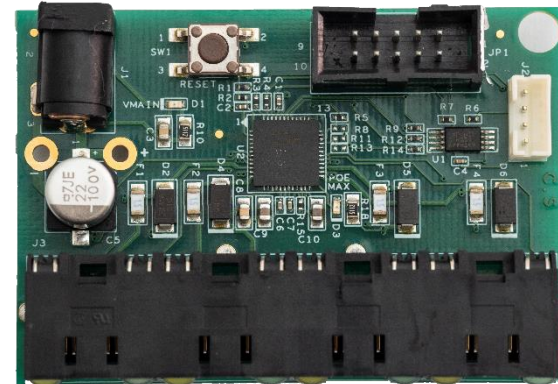
## Kit content:

- PD-IM-7504B evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

## Description:

Microchip's PD-IM-7504B1 marketing board provides designers with the needed environment to evaluate the performance and implementation of PoE and PoE extended mode applications, based on PD69104B1 PoE manager.

The evaluation board enables PoE designers to evaluate Microchip's PoE solution with maximum flexibility and ease in configuration.



## Key Features:

- Featuring PD69101
- IEEE 802.3af/at
- IEEE 802.3at compliant
- Design to support one port PoE application (2-pairs or 4-pairs)
- Two RJ45 connectors (data in, data and power out)
- Vin connectors – DC in connector
- On board LEDs indicators
- Reset button
- Pulse transformers and common mode chocks
- Easy configuration of switch's board
- Evaluation board working temperature: 0°C to +50°C
- RoHS compliant

## Kit content:

- PD-IM-7401 evaluation board
- [Design files](#)
  - Schematics
  - User guide
  - Featured IC datasheet
  - Layout and assembly files

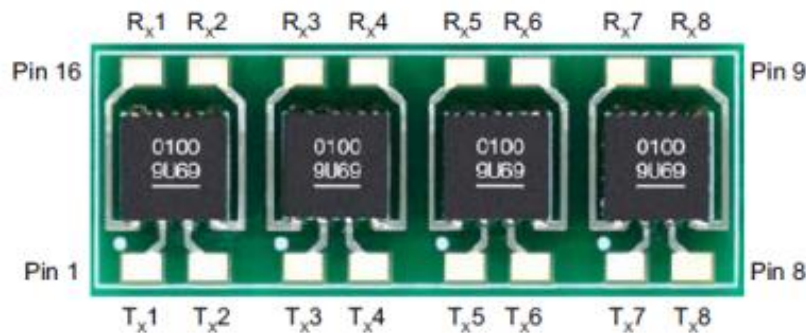
## Description:

Microchip's PD-IM-7401 evaluation board provides the designer with the needed environment to evaluate the performance and the implementation of PoE applications based on the PD69101 PoE Manager.

The evaluation board enables PoE designers to evaluate Microchip's PoE solution with maximum flexibility and ease in configuration.

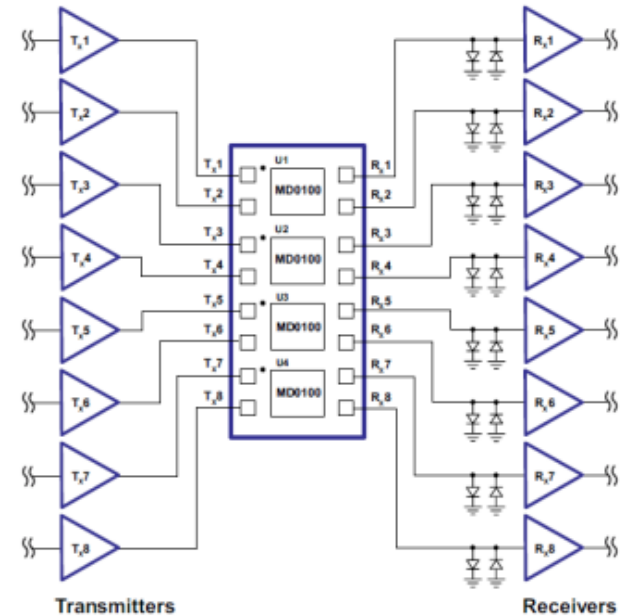


The MD0100DB1 demo board contains four MD0100DK6-G dual packages providing 8 T/R switches in the system. There are no other external components on the board. This demo board replaces 8 discrete diode bridge protection circuits. The input of the MD0100DB1 is called TX which is connected to the output of the transmitter, and the output is called RX which is connected to the input of the receiver. The TX and RX are interchangeable. The MD0100DB is especially laid out so that all the inputs are on one side and all the outputs are on other side of the board. It provides for easy replacement on the system for testing.

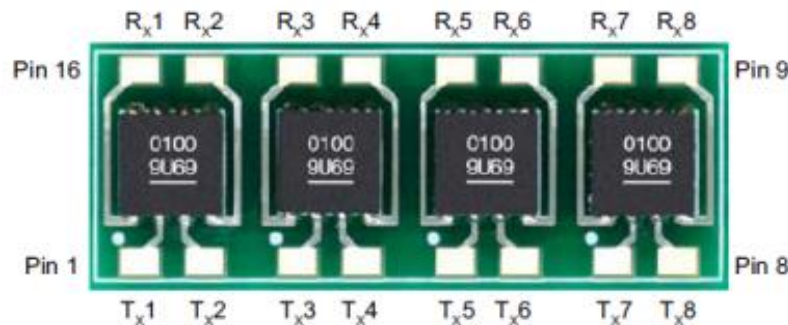


## Products supported:

- MD0100

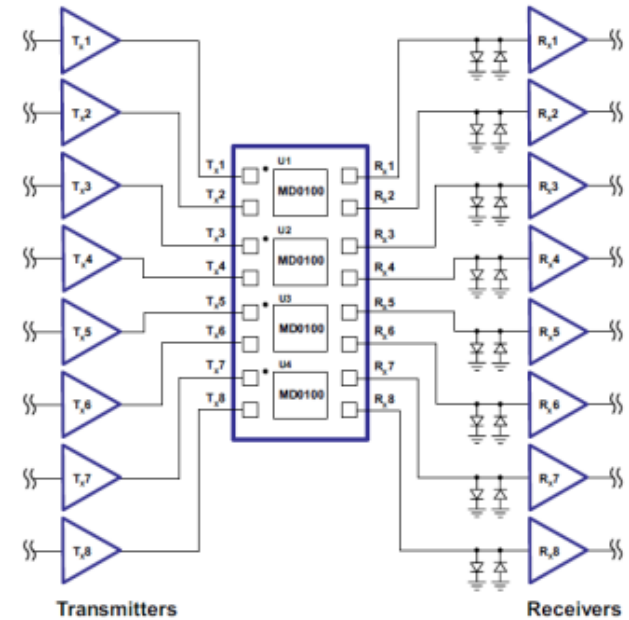


The MD0100DB1 demo board contains four MD0100DK6-G dual packages providing 8 T/R switches in the system. There are no other external components on the board. This demo board replaces 8 discrete diode bridge protection circuits. The input of the MD0100DB1 is called TX which is connected to the output of the transmitter, and the output is called RX which is connected to the input of the receiver. The TX and RX are interchangeable. The MD0100DB is especially laid out so that all the inputs are on one side and all the outputs are on other side of the board. It provides for easy replacement on the system for testing.



## Products supported:

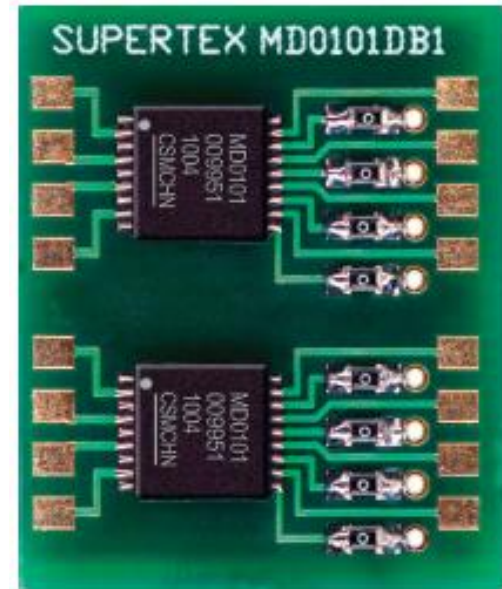
- MD0100



The MD0101DB1 demo board contains two MD0101 packages providing eight T/R switches in the system. This demo board replaces eight discrete diode bridge protection circuits. The input of the MD0101DB1 is called TX, which is connected to the output of the transmitter, and the output is called RX, which is connected to the input of the receiver. The clamping diodes are integrated between the RX and RGND. There is a 0Ω resistor connected between the RGND and the ground plane of the board. If external diodes are desired, the 0Ω resistor has to be removed and the external diodes can then be connected between the RX and RGND. The MD0101DB1 is especially laid out so that all inputs are on one side and all outputs are on the other side of the board. This provides easy access and replacement on the system for testing.

## Products supported:

- MD0101





# MCP37X3X-200 16-bit ADC Evaluation Board

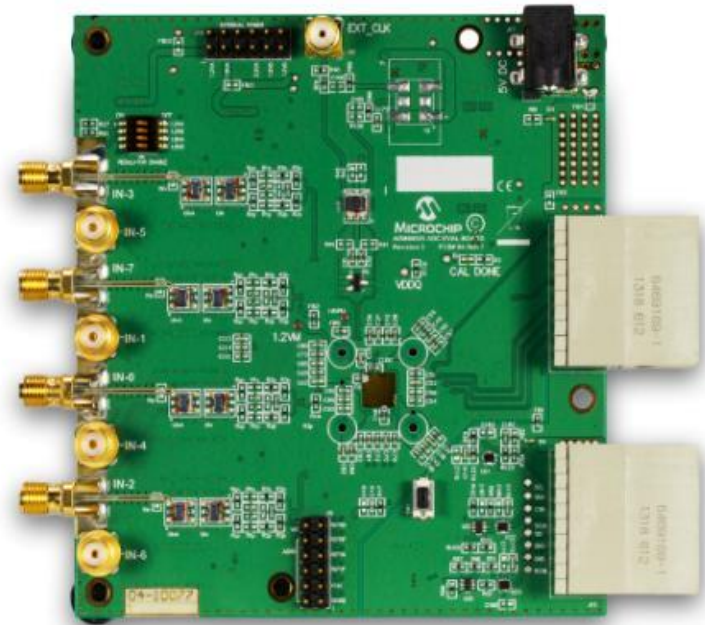
[Online Datasheet](#)

The MCP37X3X-200 16-bit VTLA ADC Evaluation Board (ADM00505) provides the opportunity to evaluate the performance of the MCP37X3X-200 16-bit device families. With the MCP37D31-200, 200Msps pipelined A/D converter on-board, the user can evaluate the functionality of the 200Msps A/D converters and the digital signal processing features. With the help of a compatible data capture card, the evaluation board can provide the user with performance analysis features through the PC GUI.

For proper operation, this evaluation board must be used with a compatible data capture card (ADM00506).

## Products supported:

- MCP37D31-200
- MCP3421
- MCP1727







# MCP37X1X-200 12-bit ADC Evaluation Board

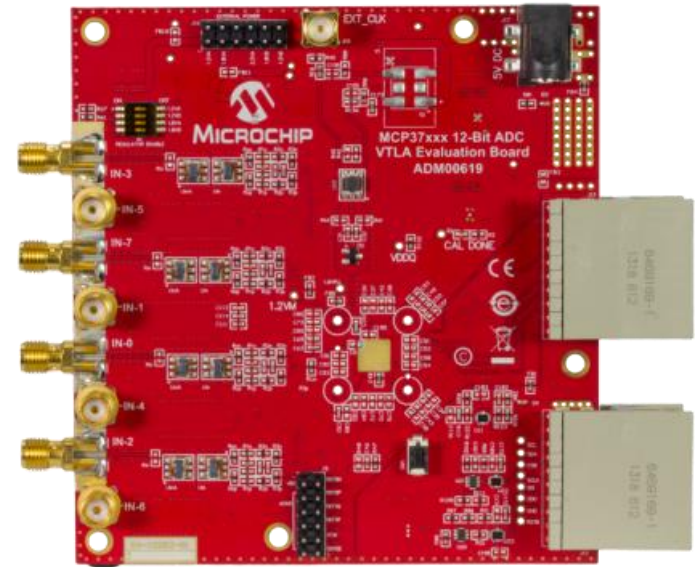
[Online Datasheet](#)

The MCP37X1X-200 12-bit VTLA ADC Evaluation Board (ADM00619) provides the opportunity to evaluate the performance of the MCP37X1X-200 12-bit device families. With the MCP37D11-200, 200Msps pipelined A/D converter on-board, the user can evaluate the functionality of the 200Msps A/D converters and the digital signal processing features. With the help of a compatible data capture card, the evaluation board can provide the user with performance analysis features through the PC GUI.

For proper operation, this evaluation board must be used with a compatible data capture card (ADM00506).

## Products supported:

- MCP37D11-200
- MCP3421
- MCP1727





# MCP37XXX-200 14-bit ADC Evaluation Board

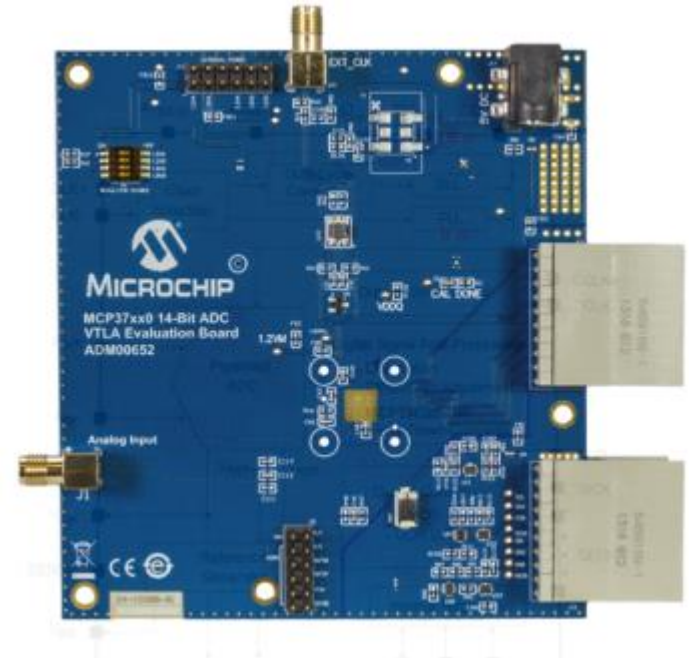
[Online Datasheet](#)

The MCP37XX0-200, 14-bit 200 Msps ADC VTLA Evaluation Board (ADM00652) provides the opportunity to evaluate the performance of the MCP37XX0-200 Device Family. With the MCP37D20-200, 14-bit 200 Msps single channel pipelined A/D converter on-board, the user can evaluate the functionality of the 14-bit (or 12-bit) 200 Msps A/D converters and the digital signal processing features. With the help of a compatible data capture card, the evaluation board can provide the user with performance analysis features through the PC GUI.

For proper operation, this evaluation board must be used with a compatible data capture card (ADM00506).

## Products supported:

- MCP37XX0-200
- MCP3421
- MCP1727



# MCP37XXX Data Capture Card

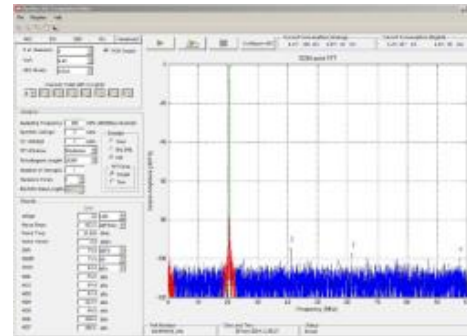
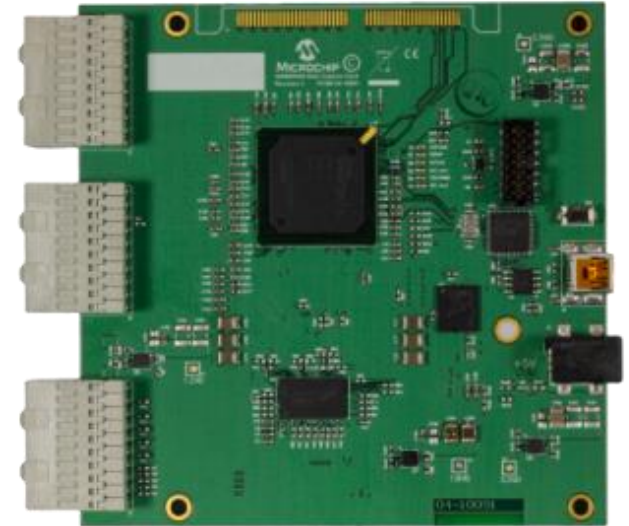
The MCP37xxx Data Capture Card (ADM00506) is an FPGA-based memory buffer for the digital data received from the Analog to Digital Converter (ADC) on board the MCP37xxx Evaluation Boards. The data capture card connects to a PC via a USB cable, providing the user with two functionalities:

- The ability to send user commands directly to the MCP37xxx device using the PC GUI.
- The ability to collect data from the Evaluation Board and send it to the PC GUI.

For proper operation, this data capture card must be used with a compatible evaluation board.

## Products supported:

- MCP37XXX

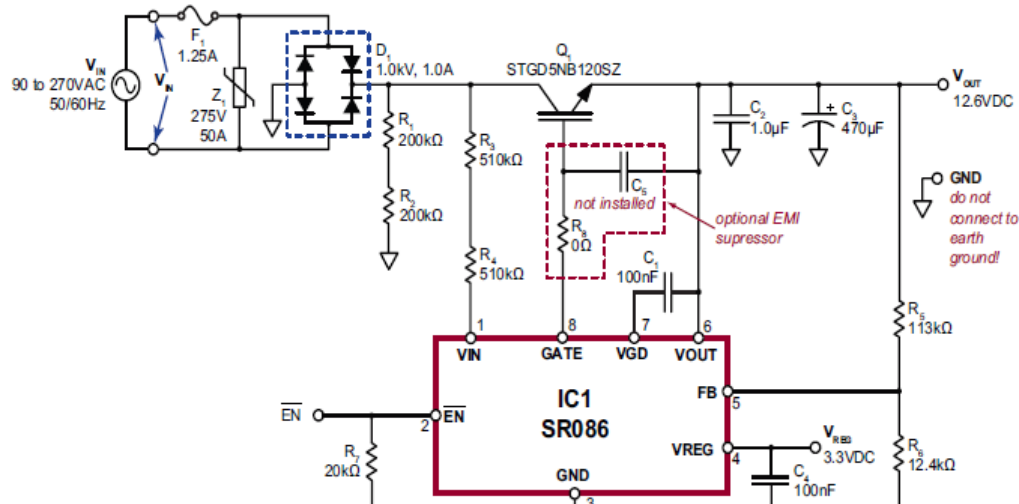


# SR086DB1 Demo Board

The SR086DB1 demoboard is an inductorless switching power supply intended for operation directly from a 120/230VAC line. Two outputs, 12.6V and 3.3V are provided. The operating principle is to turn on a pass transistor when the rectified AC input is below the output voltage, and to turn it off when the output storage capacitor is charged up to the regulation point. Since the output capacitor charges up on the rising edge of a sine wave, reasonable efficiencies can be obtained without the use of magnetics.

**Products supported:**

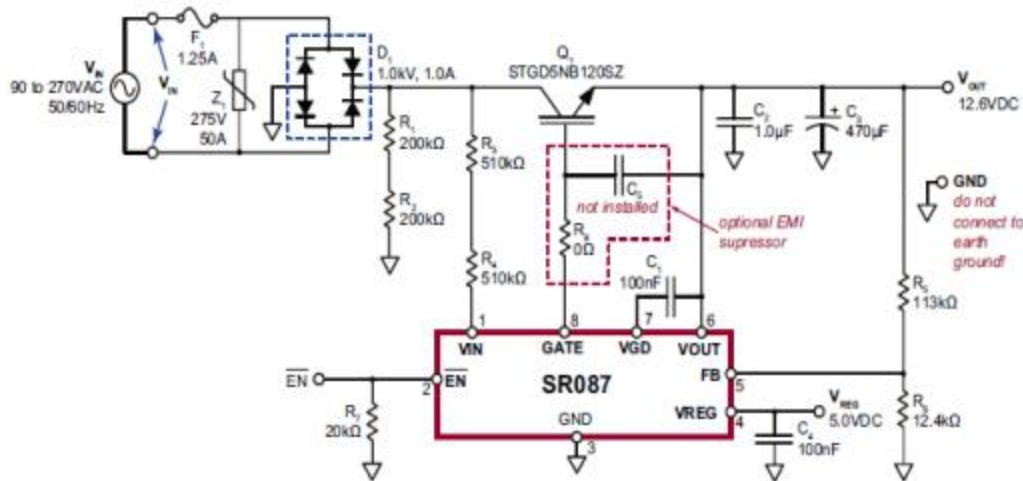
- SR086



The SR087DB1 demoboard is an inductorless switching power supply intended for operation directly from a 120/230VAC line. Two outputs, 12.6V and 5.0V are provided. The operating principle is to turn on a pass transistor when the rectified AC input is below the output voltage, and to turn it off when the output storage capacitor is charged up to the regulation point. Since the output capacitor charges up on the rising edge of a sine wave, reasonable efficiencies can be obtained without the use of magnetics.

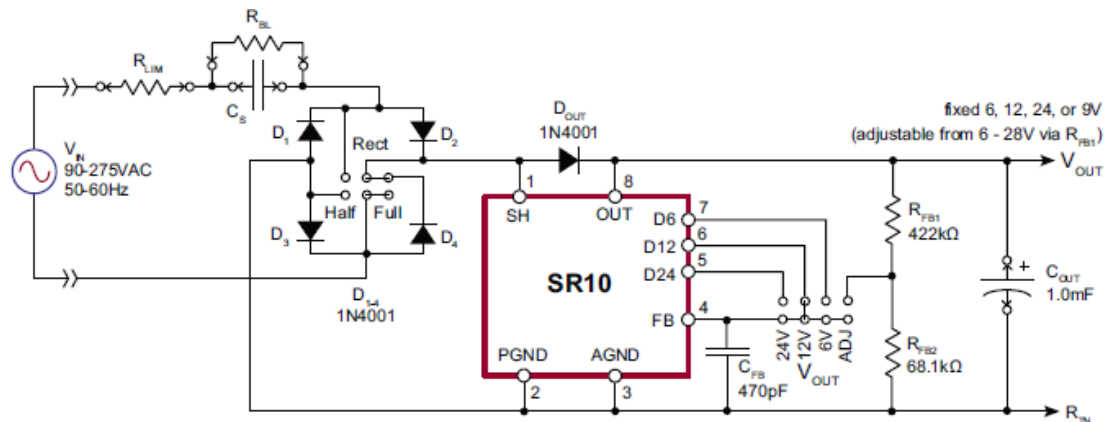
**Products supported:**

- SR087



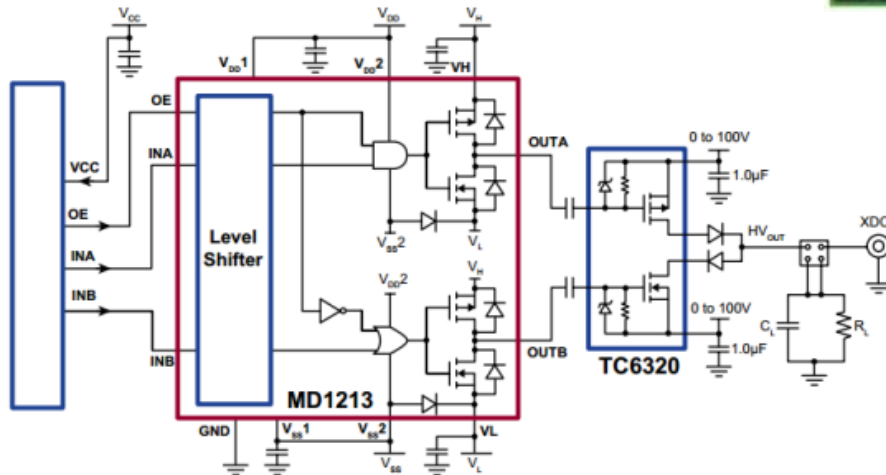
The SR10 is an inductorless switching power supply controller intended for operation directly from a rectified 120/240VAC line. Due to the capacitor-coupled, switched shunt topology (CCSS), it exhibits low standby power and good efficiency while employing no magnetics nor high voltage electrolytic capacitors. To meet a wide variety of applications, the SR10DB1 is highly configurable. Many components are socketed. Half or full-wave rectification is jumper-selectable. Output voltage is jumper-selectable to 3 fixed voltages or may be set anywhere in the range of 6 - 28V using an on-board feedback divider.

**Products supported:**  
 SR10



The MD1213DB1 can drive a transducer as a single channel transmitter for ultrasound and other applications. The demoboard consists of one MD1213 combined with TC6320. Logic control inputs INA, INB and OE of the MD1213 are controlled via the six-pin head connector on the board. Due to the fast signal rise and fall time requirement, every ground wire of the ribbon cable must be used to connect from the logic signal source. When OE is enabled, it should receive the same voltage as the logic source circuit's power supply.

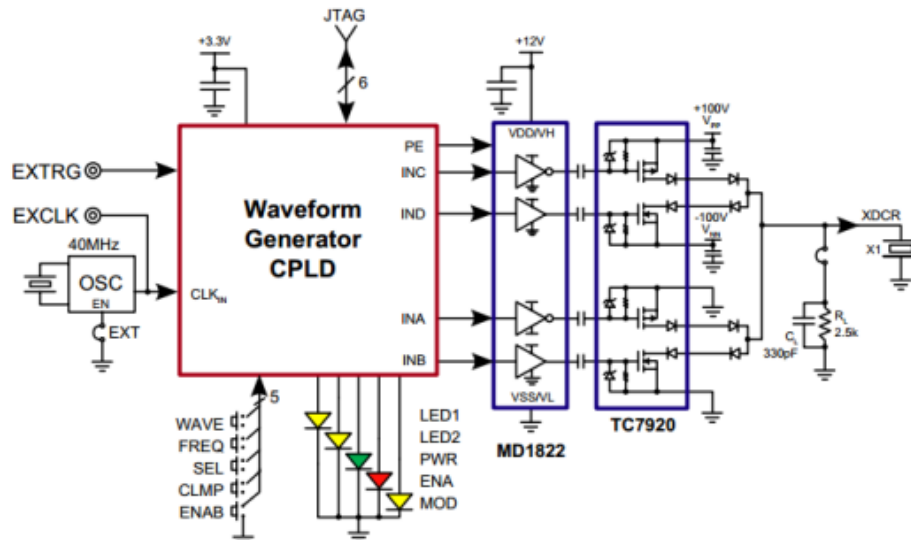
**Products supported:**  
 MD1213K6-G



The MD1822DB1 is a demoboard for the three level  $\pm 100\text{V}$  2.5A pulser chip-set of the MD1822 MOSFET driver and the TC7920 MOSFET. The demoboard consists of one MD1822 in the 3x3 QFN-16 package driving the TC7920 which has two pairs of high speed and high voltage complementary P- and N-Channel MOSFETs in one 4x4 DFN-8 package. This circuit is an ideal, cost-optimized, high voltage and high current RTZ ultrasound transmit pulser.

## Products supported:

- MD1822
- TC7920

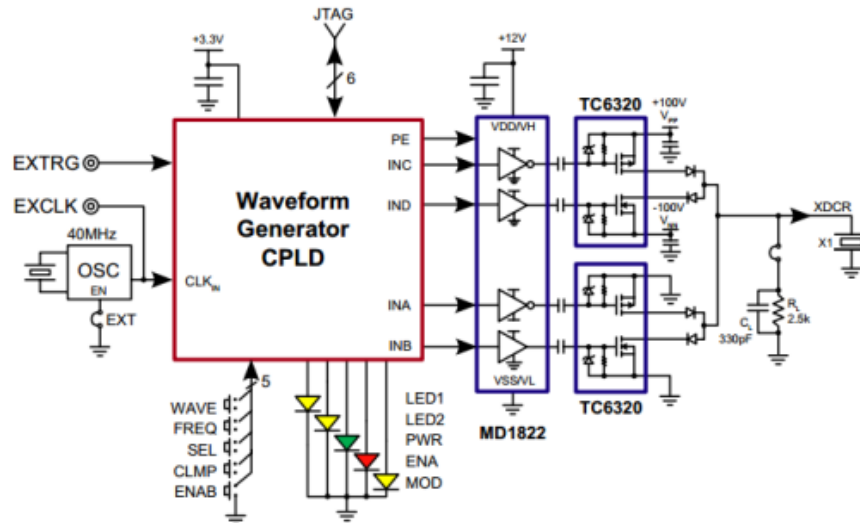




The MD1822DB2 is a demoboard for the three level  $\pm 100\text{V}$  2.5A pulser chip-set of the MD1822 MOSFET driver and the TC6320 MOSFET. The demoboard consists of one MD1822 in a 3x3mm, 16-lead QFN package driving the TC6320, which has one pair of high speed and high voltage complementary P- and N-Channel MOSFETs in one 4x4mm, 8-lead DFN package. This circuit is an ideal, cost-optimized, high voltage and high current RTZ ultrasound transmit pulser.

## Products supported:

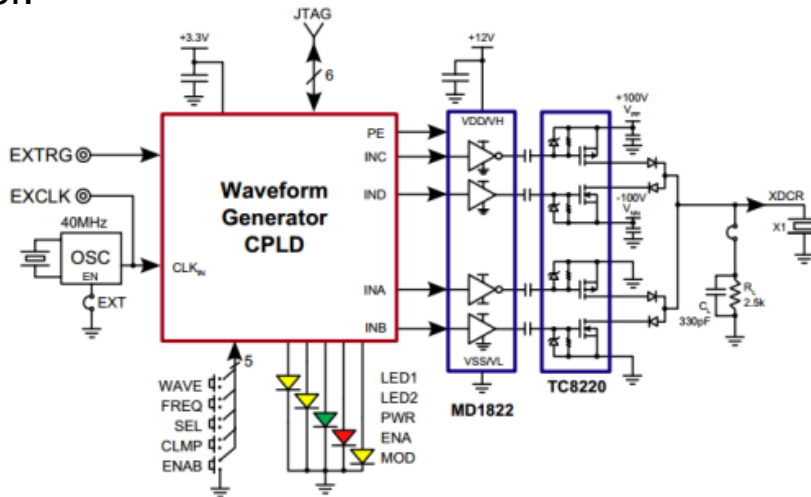
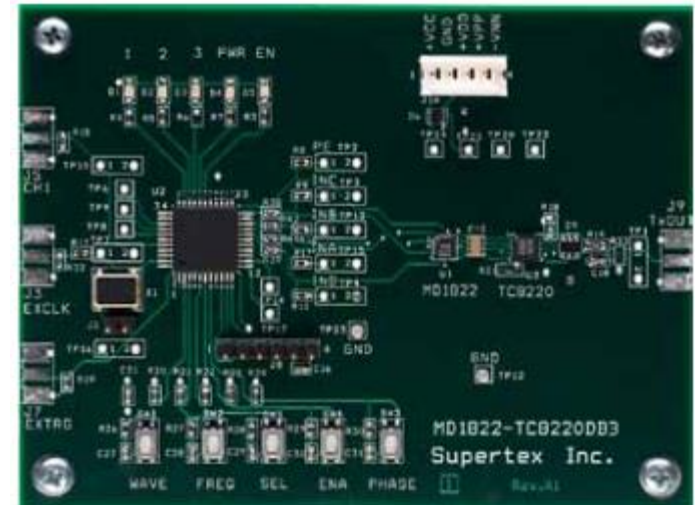
- MD1822
- TC6320



The MD1822DB3 is a demoboard for the three level  $\pm 100\text{V}$  2.5A pulser chip-set of the MD1822 MOSFET driver and the TC8220 MOSFET. The demoboard consists of one MD1822 in the 3x3mm 16-lead QFN package driving the TC8220 which has two pairs of high speed and high voltage complementary P- and N-MOSFETs in in one 4x4mm, 8-lead DFN package. This circuit is an ideal, cost-optimized, high voltage and high current RTZ ultrasound transmit pulser.

## Products supported:

- MD1822
- TC8220



The MD1711DB2 demoboard is as a five-level, dual-channel, +/-100V, 2.0A, return-to-zero pulser. It can directly drive two 50 or 75Ω impedance transducers for 1.0MHz to 20MHz medical ultrasound imaging or NDT applications.

The MD1711DB2 consists of one MD1711 in a 48-Lead LQFP package driving six TC6320 complementary high voltage MOSFET pairs in 8-Lead SOIC packages. The external logic signal connector, J13, connects all the input control signals of the MD1711 to the user's logic control source via a short ribbon cable. In typical two-, three- or five-level bipolar pulsing, PW or CW waveforms can be generated by the proper input control signal listed below. Jumpers are provided for the output, such that it can drive either the on-board RC load 220pF capacitor in parallel with a 1.0KΩ resistor or with an external load of cable to the user's ultrasound testing transducer.

## Products supported:

- MD1711
- TC6320

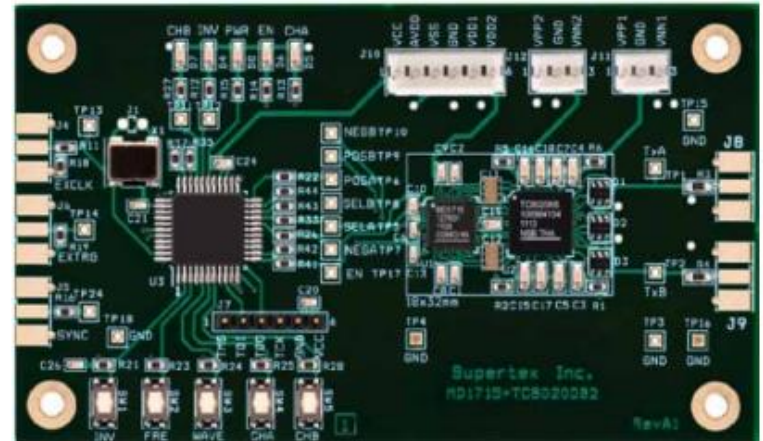


The MD1715DB2 demoboard can drive two transducers as a five-level, two channel transmitter for ultrasound and other applications.

The demoboard consists of one MD1715 in a 6x6mm 40-lead QFN package driving 12 high voltage FETs in six TC8020s in one 8x8mm 56-lead QFN package. The CPLD programmable logic circuit 40MHz crystal oscillator generates accurate timing high-speed waveforms on a separate CPL board. There are multiple frequency and waveform combinations that can be selected as bipolar pulse waveforms. External clock input can be used if the on board oscillator is disabled. The external trigger input can be used to synchronize the output waveforms. There are five push buttons for selecting the demo waveform, frequency, phase, mode selection functions. Color LEDs indicate the demo selection states. Jumpers on board for select the SMA connector to the external loads or the 220pF//1k on board dummy load.

## Products supported:

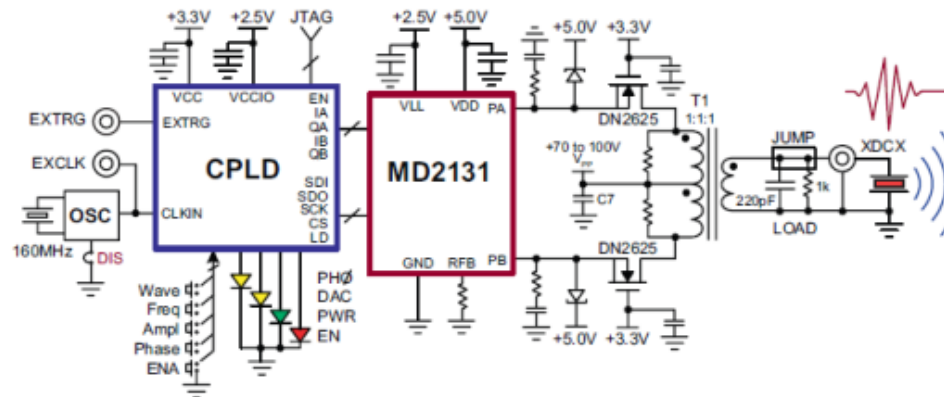
- MD1715
- TC8020



# MD2131DB1 Demo Board

The MD2131DB1 demoboard is used to generate the ultrasound transmit beamforming waveform with the Gaussian profile, and the adjustable frequency, amplitude and phase angle. The MD2131DB1 circuit uses two depletion-mode MOSFETs in the push-pull mode to drive the center tapped, wide band, ultrasound output transformer. The sources of the MOSFETs are directly driven by the MD2131's two outputs, whose maximum peak sinking current is up to 3.0A. These current source outputs are controlled by the MD2131's internal angular vector switch matrix and the in-phase and quadrature PWM input signals.

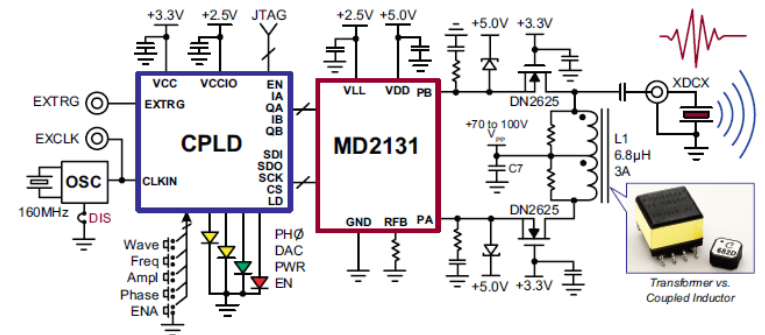
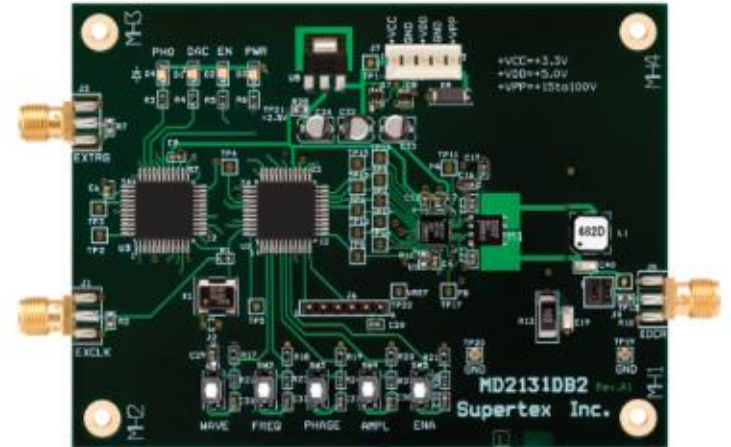
**Products supported:**  
 MD2131



The MD2131DB2 demoboard is to used to generate the ultrasound transmit beamforming waveform with the Gaussian profile, and the adjustable frequency, amplitude and phase angle. It also provides information about how to design a user application circuit and PCB using the Supertex MD2131 and DN2625 devices. The MD2131DB2 circuit uses two depletion-mode MOSFETs in the push-pull mode to drive the center tapped, coupled, RF power inductor. The sources of the MOSFETs are directly driven by the MD2131's two outputs, whose maximum peak sinking current is up to 3.0A. These current source outputs are controlled by the MD2131's internal angular vector switch matrix and the in-phase and quadrature PWM input signals.

## Products supported:

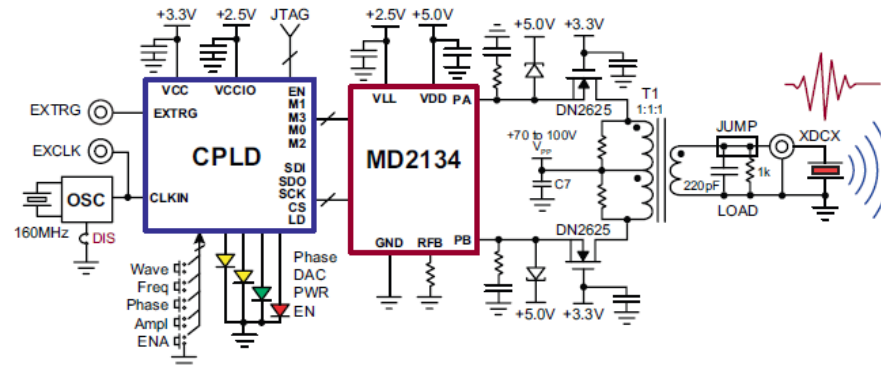
- MD2131



# MD2134DB1 Demo Board

The MD2134DB1 demoboard is used to generate the ultrasound transmit beam forming waveform with the Gaussian profile, and the adjustable frequency, amplitude and phase angle. The MD2134DB1 circuit uses a pair of depletion mode, high voltage, DN2625 MOSFETs in the push-pull mode to drive the center-tap wide band ultrasound output transformer. The MOSFETs are in one 8-Lead DFN surface mount package. The sources of the MOSFETs are directly driven by the MD2134's two outputs, whose maximum peak sinking current is up to 3.3A. These current-source outputs are controlled by the MD2134's internal current source switch array and the input signals M[3:0].

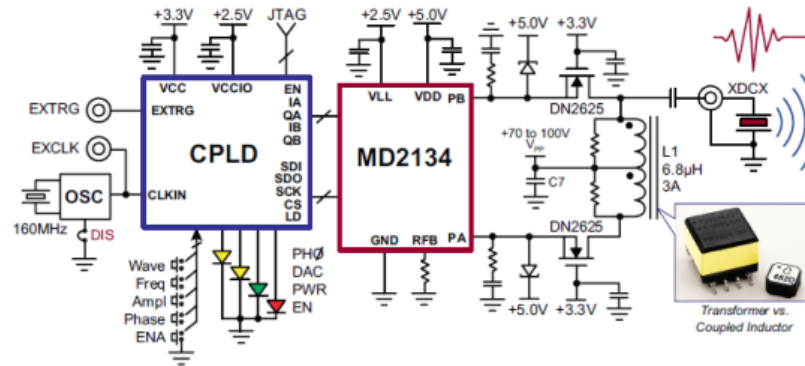
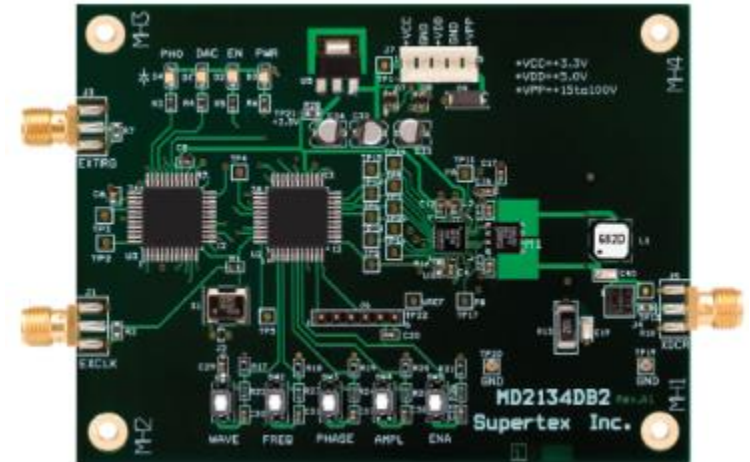
**Products supported:**  
 MD2134



# MD2134DB2 Demo Board

The MD2134DB2 demoboard is to used to generate the ultrasound transmit beamforming waveform with the Gaussian profile, and the adjustable frequency, amplitude and phase angle. It also provides information on how to design a user application circuit and PCB using the Supertex MD2134 and DN2625 devices. The MD2134DB2 circuit uses two depletion-mode MOSFETs in the push-pull mode to drive the coupled inductor. The sources of the MOSFETs are directly driven by the MD2134's two outputs, whose maximum peak sinking current is up to 3.0A. These current source outputs are controlled by the MD2134's internal array-switch of the fast PAM current sources.

**Products supported:**  
 MD2134

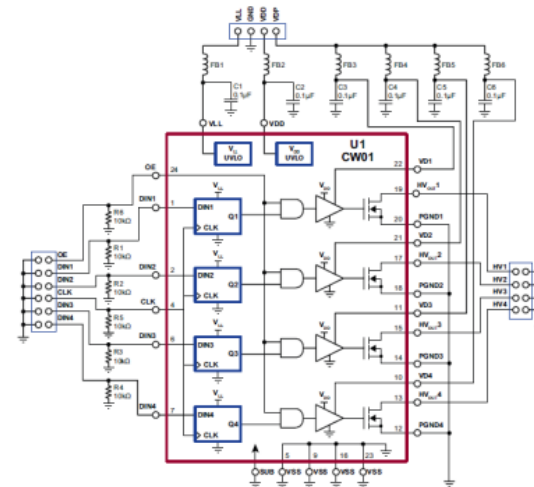




The CW01 has 6 logic inputs; OE, CLK, DIN1, DIN2, DIN3, and DIN4. Every logic input has a 10kΩ pull down resistor. There are 3 power input voltages: VLL, VDD and VDX. VLL is the input logic level, typically 2.5V. VDD is the level translator, typically 5.0V. VDX is the gate drive voltage, and is at the same voltage level as VDD. High peak currents will be drawn from VDX during switching. Each supply has a series ferrite bead and a 0.1μF ceramic chip capacitor to keep the supply clean from high frequency noise. There are 4 outputs: HV1, HV2, HV3 and HV4. These are the connections to the drains of 100V, 7.0Ω, N-channel MOSFETs.

**Products supported:**

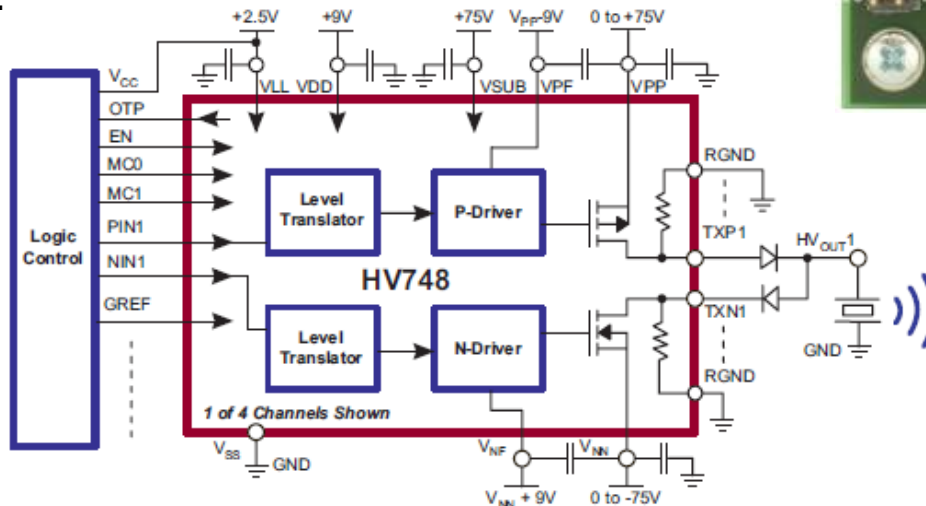
- CW01



# HV748DB1 Demo Board

The HV748DB1 demoboard is used to generate the basic high voltage pulse waveform as an ultrasound transmitting pulser. The HV748 circuit uses the DC coupling method in all level translators. There are no external coupling capacitors needed. The VPP and VNN rail voltages can be changed rather quickly, compared to a high voltage capacitor gate coupled driving pulser. This direct coupling topology of the gate drivers not only saves two high voltage capacitors per channel, but also makes the PCB layout easier.

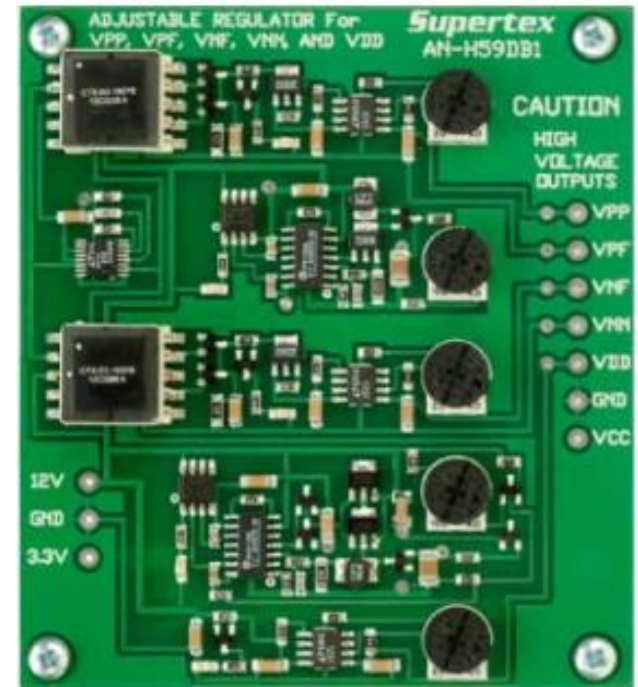
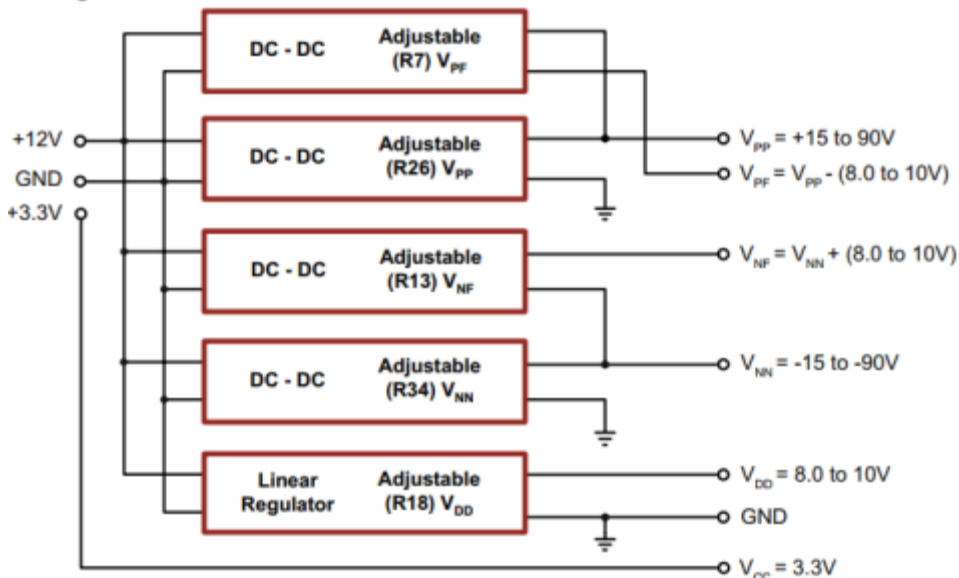
**Products supported:**  
□ HV748



The AN-H59DB1 is a high voltage DC/DC converter power supply demoboard designed to provide the required voltages needed for the HV748DB1 ultrasound transmitter demo board. It generates five output voltages from the 12V input.

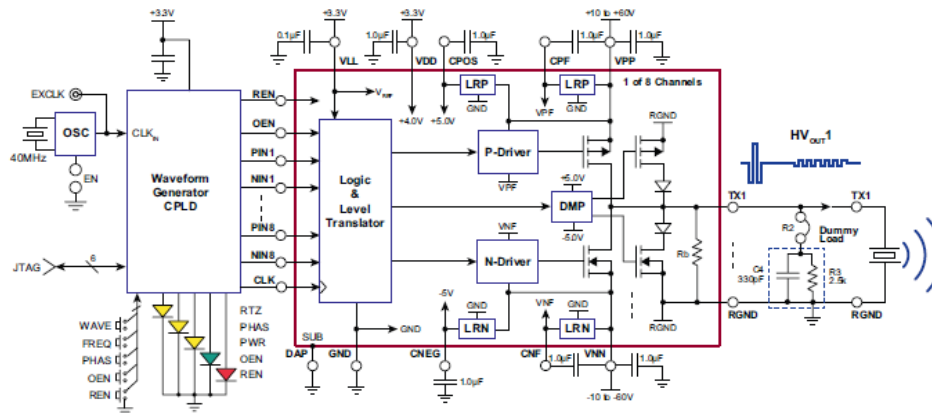
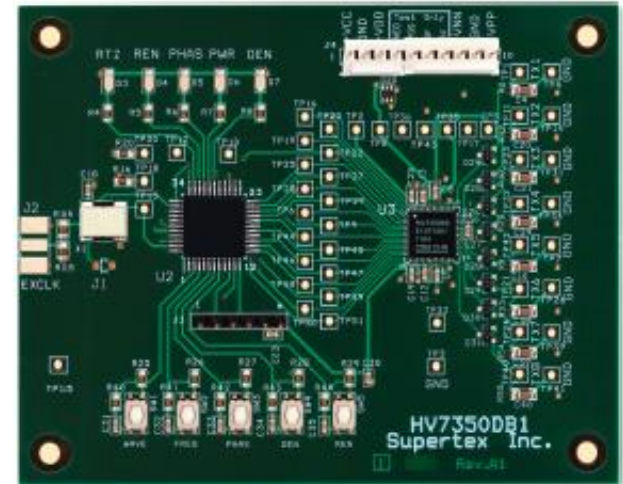
## Products supported:

- HV748



The HV7350DB1 demoboard is used to generate the basic high voltage pulse waveform as an ultrasound transmitting pulser. The HV7350 circuit uses DC coupling from a 3.3V logic input to output Tx1~8 internally, therefore the chip needs three sets of voltage supply rails: VLL +3.3V, VDD +5.0V and VPP/VNN ±10 to ±60V. The VPP and VNN rail voltages can be changed rather quickly, compared to the capacitor gate coupled driving pulsers. This direct coupling topology of the gate drivers not only saves two high voltage capacitors per channel, but also makes the PCB layout easier.

**Products supported:**  
 HV7350

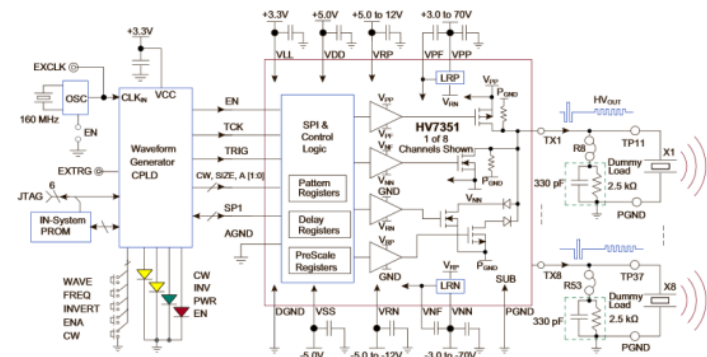


# HV7351 Demo Board

HV7351 is an 8-channel programmable high-voltage ultrasound-transmit beamformer. Each channel is capable of swinging up to +/-70V with an active discharge back to 0V. The outputs can source and sink up to 3.0A to achieve fast output rise time and fall times.

There are two complex programmable logic devices (CPLDs) and one serial EEPROM on the HV7351 demo board to provide multiple demo waveform patterns. The output waveforms can be directly displayed using an oscilloscope, by connecting the oscilloscope probe to the test points TX1 - TX8 on the demo board. The dummy load, 330 pF || 2.5K Ohm, is also provided on board for each channel.

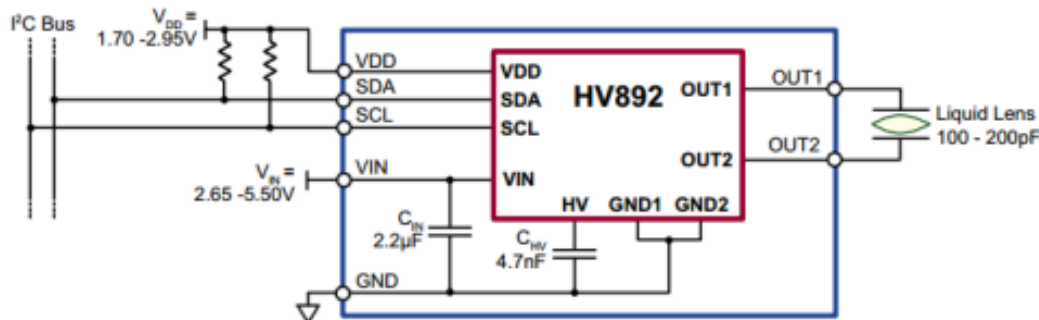
**Products supported:**  
 HV7351



The HV892DB1 liquid lens driver demoboard is controlled via an I2C interface, is capable of driving capacitive loads of up to 200pF, and is compatible with 40VRMS to 60VRMS lenses. A charge pump boost converter integrated on-chip provides the high voltage necessary for driving the lens. No external inductors or diodes are needed. The board requires only two ceramic chip capacitors to complete a lens driver circuit. An H-bridge output stage provides AC drive to the lens, allowing the use of a single high voltage boost converter while providing alternating polarity to the lens. Controlled rising and falling edges on the drive waveform reduces EMI.

**Products supported:**

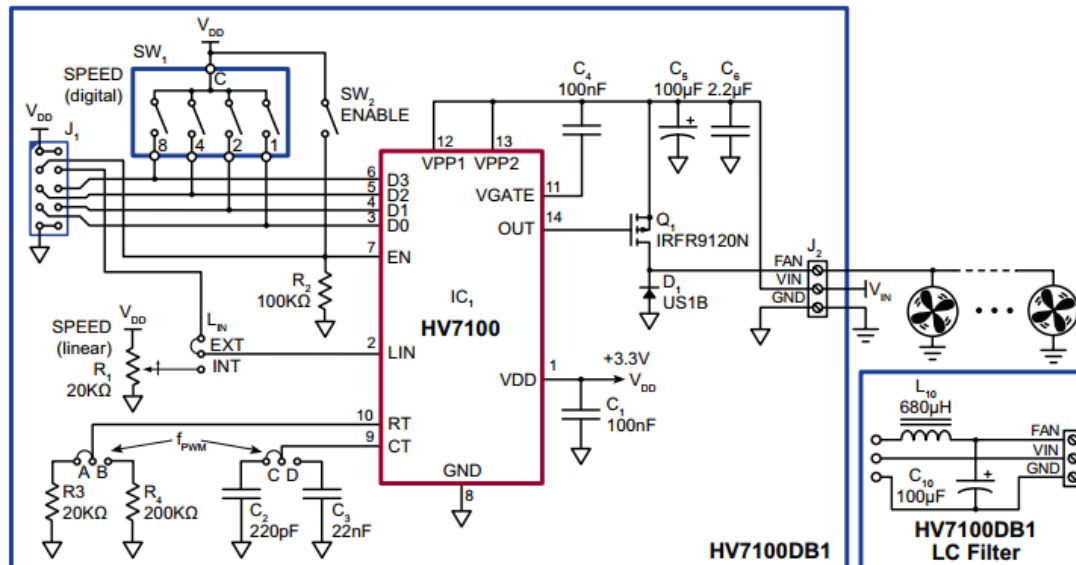
- HV892



The HV7100DB1 is a fan controller/driver designed to operate from +24 or +48V supplies. Fan speed is controlled by pulse width modulating the supply voltage provided to the fans. For fans that do not work properly with a PWM supply, an included daughter board contains an LC filter for converting the pulse width modulated output of the main board to a DC output voltage

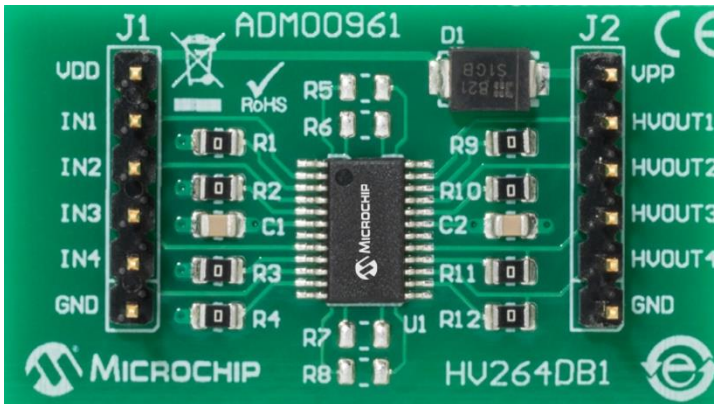
**Products supported:**

- HV7100



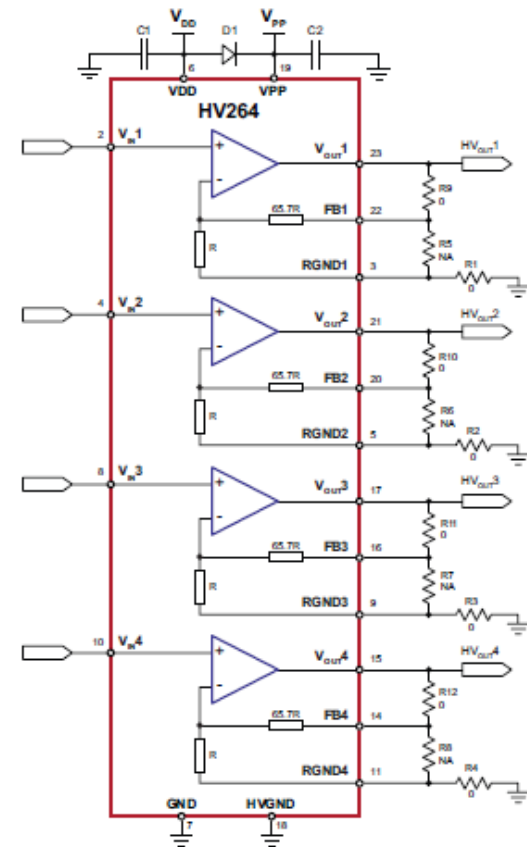
# HV264DB1 Demo Board

The HV264TS-G is a quad high voltage amplifier array device in a 24-pin TSSOP package. The HV264DB1 demo board provides a platform to evaluate this device. This demoboard requires only a minimum setup including a VDD low voltage supply, a VPP high voltage supply, and a signal source. The demoboard provides the input/output connections through two 6-pin headers.



## Products supported:

- HV264TS-G





# HV9910BDB1 Demo Board

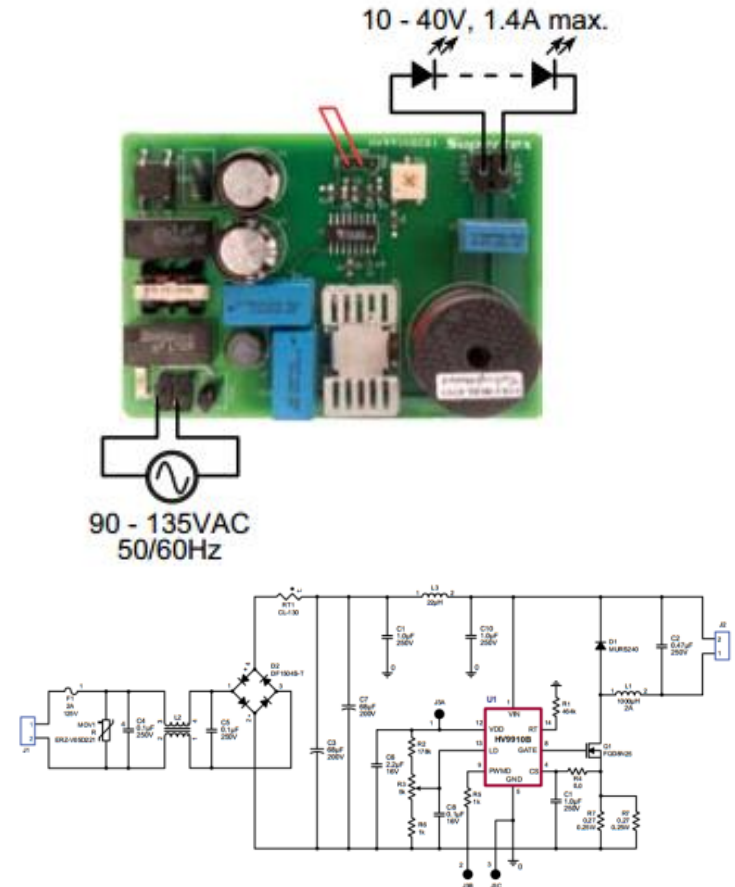
The HV9910BDB1 demoboard is an offline, high current LED driver designed to drive a 40V LED string at 1.4A from a 110V input. The demoboard uses HV9910B LED driver IC to drive a buck converter.

The HV9910BDB1 has a typical full load efficiency of 88%, with the buck converter efficiency (excluding the diode bridge rectifier and EMI filter) at 93%. The demoboard also meets CISPR-15 conducted EMI standards.

The output current can be adjusted in two ways – either with linear dimming using the onboard potentiometer or with PWM dimming by applying a TTL-compatible square wave signal at the PWMD terminal. Using linear dimming, the output current of the HV9910DB1 can be lowered to about 0.1A (note: zero output current can be obtained only by PWM dimming).

## Products supported:

- HV9910BNG-G



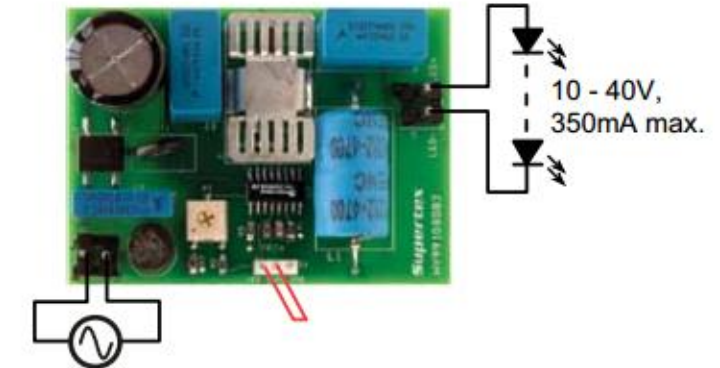
# HV9910BDB2 Demo Board

The HV9910BDB2 demoboard is a high brightness LED power driver to supply a string of LEDs using the HV9910B IC from a universal AC input. The HV9910BDB2 can supply a maximum output current of 350mA to drive 10 - 40V LED strings from a wide input voltage - 90 to 265VAC, 50/60Hz. The power conversion stage of the HV9910BDB2 consists of a diode bridge rectifier, followed by a current-controlled buck converter operating at a switching frequency of 50kHz. The nominal output current of the demoboard can be adjusted to any value between 30 and 350mA using the on-board trimming potentiometer. PWM dimming can be achieved by applying a pulse-width-modulated square wave signal between the PWMD and GND pins. Zero output current can be obtained only by PWM dimming.

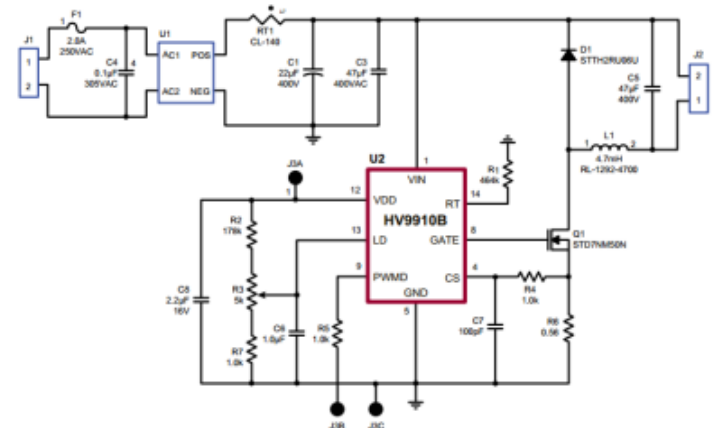
The HV9910BDB2 is not CISPR-15 compliant. Additional filtering is required to make the board meet CISPR-15 limits.

## Products supported:

- HV9910BNG-G



90 - 265VAC  
50/60Hz

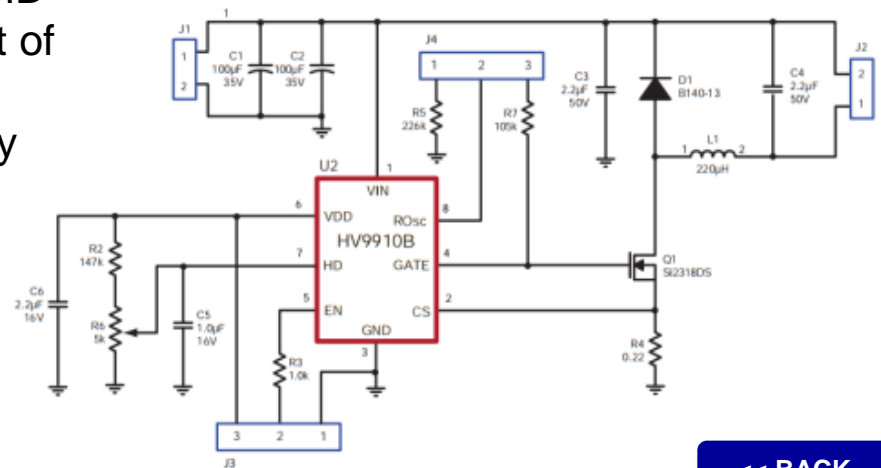
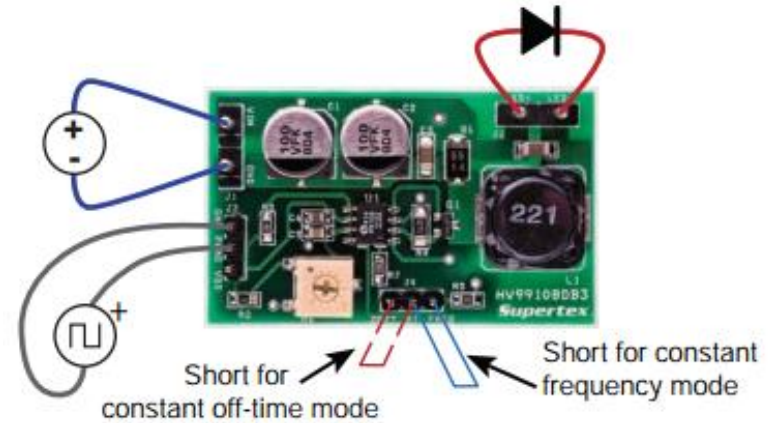


# HV9910BDB3 Demo Board

The HV9910BDB3 demoboard is a high current LED driver designed to drive one LED or two LEDs in series at currents up to 1.0A from a 10 – 30VDC input. The demoboard uses HV9910B Universal LED driver IC to drive a buck converter. The HV9910BDB3 can be configured to operate in either a constant frequency mode (for driving a single LED) or in a constant off-time mode (for driving two LEDs). The output current can be adjusted in two ways – either with linear dimming using the onboard potentiometer or with PWM dimming by applying a TTL – compatible square wave signal at the PWMD terminal. Using linear dimming, the output current of the HV9910DB1 can be lowered to about 0.01A (note: zero output current can be obtained only by PWM dimming).

## Products supported:

- HV9910BLG-G

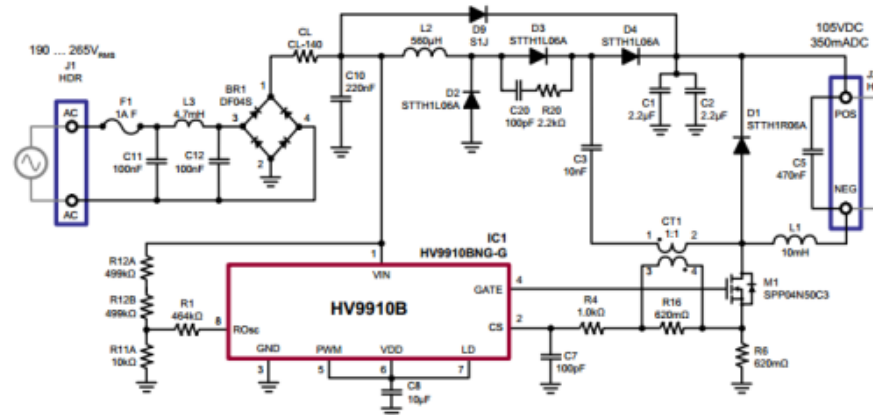
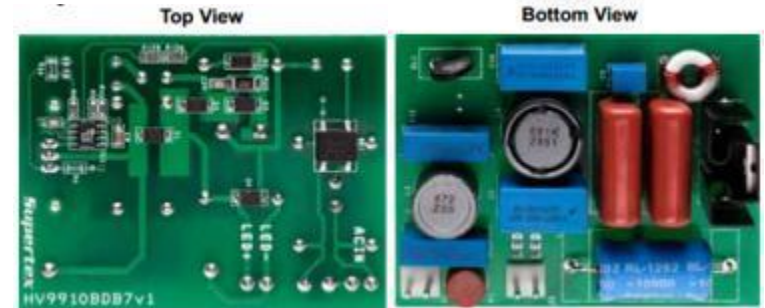


# HV9910BDB7 Demo Board

The HV9910BDB7 demonstrates the use of an HV9910B control IC in an off-line, High Brightness LED driver application. The board incorporates power factor correction (PFC) and satisfies the limits for harmonic currents according to the EN61000-3-2 Class C standard having total harmonic distortion (THD) less than 20%. The board features a low component count and long life operation due to the absence of electrolytic capacitors. The board is designed to supply a string of LEDs with a current of 350mA and a voltage in the 65 to 105V range from a 220/230VAC line.

## Products supported:

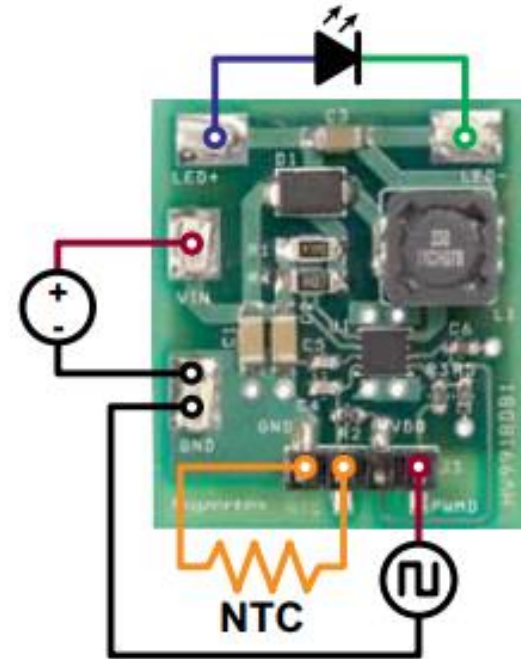
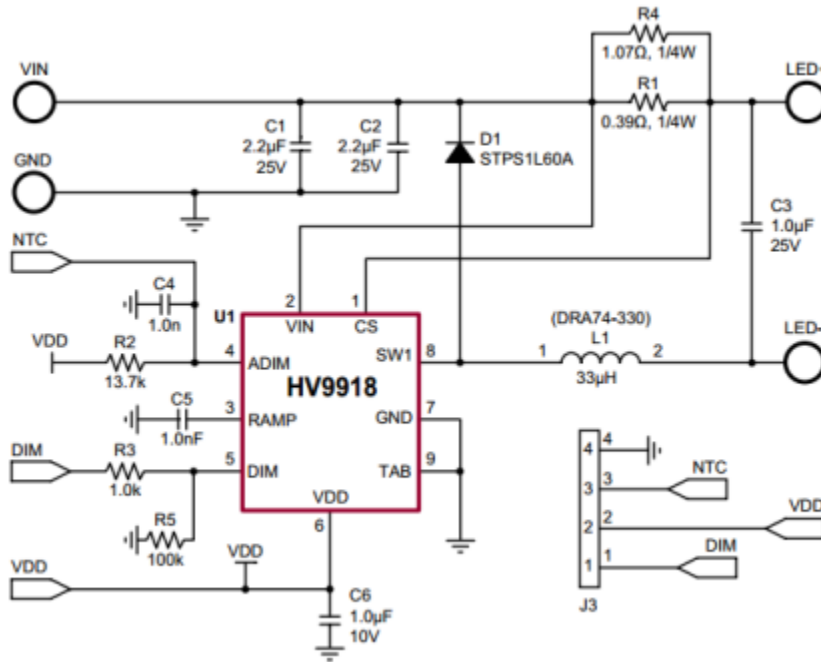
- HV9910BLG-G



The HV9918DB1 demoboard is a high current LED driver designed to drive one or two LEDs at 700mA from a 9.0 - 16VDC input. The demoboard uses HV9918 hysteretic buck LED driver IC.

## Products supported:

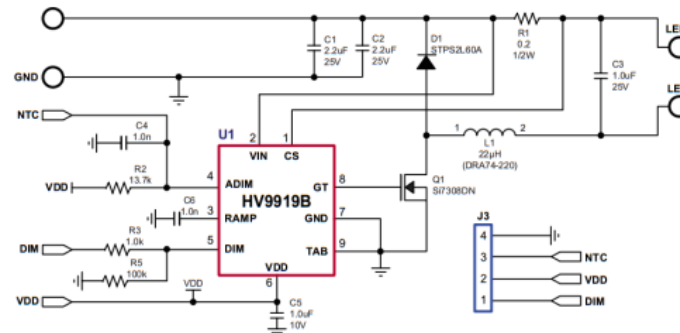
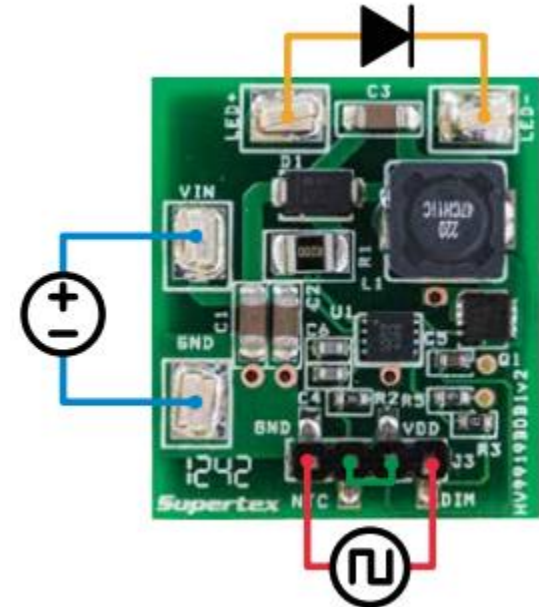
- HV9918K7-G



The HV9919BDB1 demoboard is a high current LED driver designed to drive one LED at 1.0A from a 9.0 - 16V DC input. The demoboard uses HV9919 hysteretic buck LED driver IC. The HV9919BDB1 includes two PWM dimming modes. The analog control of the PWM dimming mode allows the user to dim the LED using a 0 - 2.0V analog signal applied between the ADIM and GND pins (0V gives 0% and 2.0V gives 100%). In this mode, the PWM dimming frequency is set to 1kHz on the board. The digital control of PWM dimming mode allows the user to dim the LEDs using an external, TTL-compatible square wave source applied between DIM and GND. In this case, the PWM dimming frequency and duty ratio are set by the external square wave source.

**Products supported:**

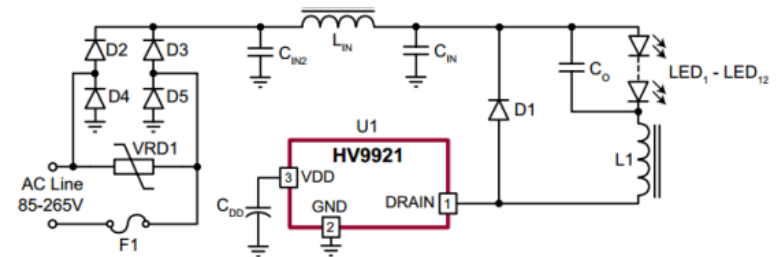
- HV9919BK7-G



The HV9921DB1 demoboard is a complete LED power driver to supply a string of LEDs using the HV9921, an integrated 3-pin high input voltage constant-current buck regulator IC. The HV9921 integrates a 500V switching MOSFET and can operate directly from the rectified universal AC line voltage range of 80 to 265VAC. The current in the LED string is internally programmed to 20mA  $\pm$ 15%. The HV9921DB1 is ideally suited for driving strings of LEDs having forward voltage from 20 to 50V at high efficiency (typically 80% at 120VAC). The HV9921DB1 is a peak current-controlled buck converter operating with fixed off-time of 10.5 $\mu$ s. Its fixed off-time control scheme provides good stability and tight regulation of the LED current throughout the input AC line voltage range. As its switching frequency varies over the AC line cycle, the HV9921 inherently introduces frequency dither and simplifies the compliance with EMI regulations.

## Products supported:

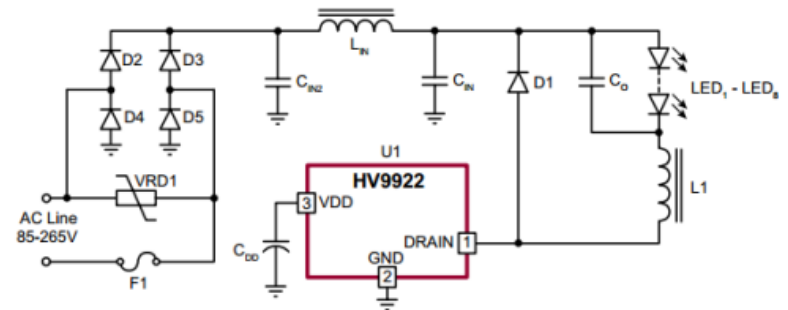
- HV9921N3-G



The HV9922DB1 demoboard is a complete LED power driver to supply a string of LEDs using the HV9922, an integrated 3-pin high input voltage constant-current buck regulator IC. The HV9922 integrates a 500V switching MOSFET and can operate directly from the rectified universal AC line voltage range of 80 to 265VAC. The current in the LED string is internally programmed to 20mA  $\pm$ 15%. The HV9922DB1 is ideally suited for driving strings of LEDs having forward voltage from 20 to 30V at high efficiency (typically 80% at 120VAC). The HV9922DB1 is a peak current-controlled buck converter operating with fixed off-time of 10.5 $\mu$ s. Its fixed off-time control scheme provides good stability and tight regulation of the LED current throughout the input AC line voltage range. As its switching frequency varies over the AC line cycle, the HV9922 inherently introduces frequency dither and simplifies the compliance with EMI regulations.

## Products supported:

- HV9922N3-G

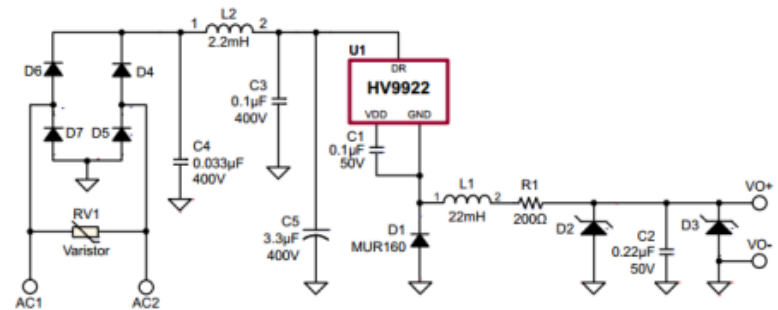




The HV9922DB2 is a universal input, offline, non-isolated auxiliary power supply using HV9922 constant current switching regulator IC. The output voltage is regulated to 23V +/-5% and is referenced to the negative side of the diode bridge rectifier (i.e. ground of the rectified DC voltage). The demoboard is protected against output open circuit and short circuit conditions and meets FCC Class B (residential) EMI limits. The HV9922 acts as a constant 50mA current source which is sourced into an output zener diode. On the demoboard, a 22V zener diode is used at D2 to regulate the output voltage to 23V within +/-5%. Lower output voltages can be obtained by using an appropriate 2W zener diode in parallel to D2 in the space provided on the demoboard (D3).

## Products supported:

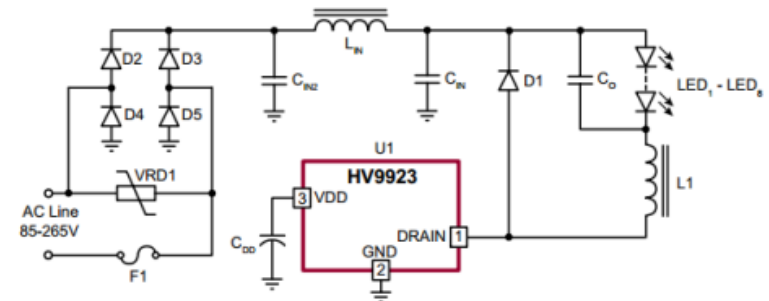
- HV9922N3-G



The HV9923DB1 demoboard is a complete LED power driver to supply a string of LEDs using the HV9923, an integrated 3-pin high input voltage constant-current buck regulator IC. The HV9923 integrates a 500V switching MOSFET and can operate directly from the rectified universal AC line voltage range of 80 to 265VAC. The current in the LED string is internally programmed to 30mA  $\pm$ 15%. The HV9923DB1 is ideally suited for driving strings of LEDs having forward voltage from 20 to 30V at high efficiency (typically 80% at 120VAC). The HV9923DB1 is a peak current-controlled buck converter operating with fixed off-time of 10.5 $\mu$ s. Its fixed off-time control scheme provides good stability and tight regulation of the LED current throughout the input AC line voltage range. As its switching frequency varies over the AC line cycle, the HV9923 inherently introduces frequency dither and simplifies the compliance with EMI regulations.

## Products supported:

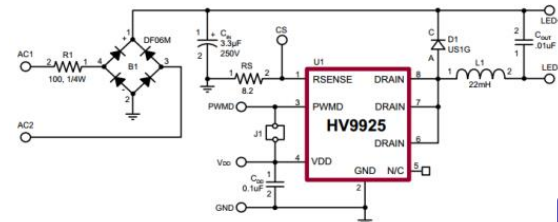
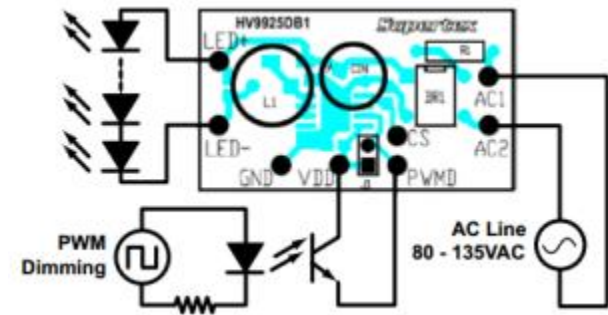
- HV9923N3-G



The HV9925DB1 demo board is a complete LED power driver to supply a string of LEDs using the HV9925, an integrated, high-voltage, buck regulator IC featuring programmable output current and PWM dimming. The HV9925 includes a 500V switching MOSFET and can operate directly from rectified AC line voltages of 80 to 135VAC. The current in the LED string is externally programmed to  $50\text{mA} \pm 10\%$  by a single resistor  $R_S$ . The HV9925DB1 is ideally suited for driving strings of LEDs having forward voltage from 20V to 60V at high efficiency. The HV9925DB1 is a peak current-controlled buck converter operating with a fixed off-time of  $10.5\mu\text{s}$ . Its fixed off-time control scheme provides good stability and tight regulation of the LED current throughout the input AC line voltage range. As its switching frequency varies over the AC line cycle, the HV9925 inherently introduces frequency dither and simplifies the compliance with EMI regulations.

## Products supported:

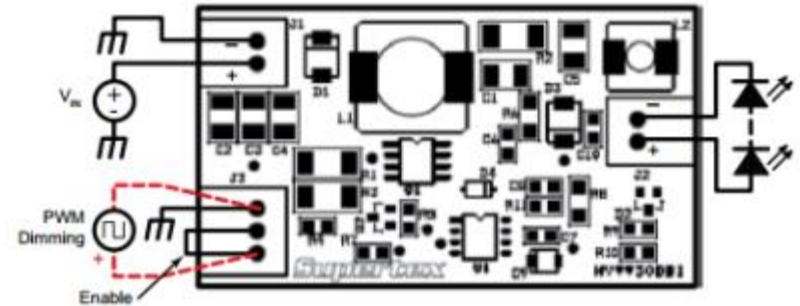
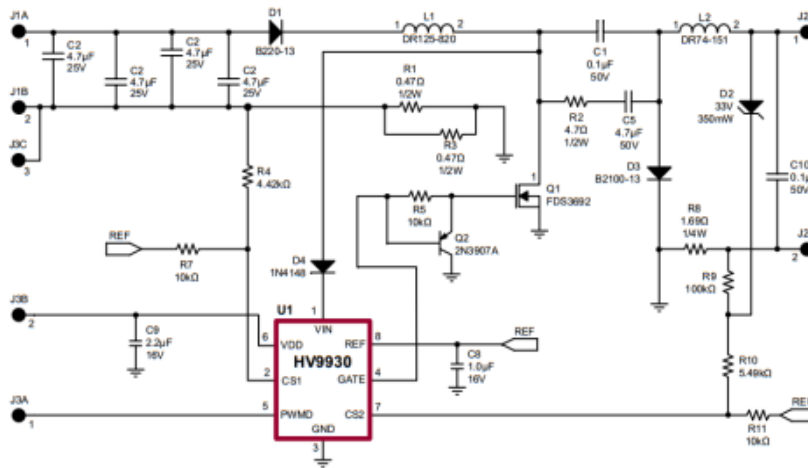
- HV9925N3-G



The HV9930DB1 is an LED driver demoboard capable of driving up to 7 1-watt LEDs in series from an automotive input of 9 - 16VDC. The demoboard uses HV9930 in a boost-buck topology. The converter operates at frequencies in excess of 300kHz and has excellent output current regulation over the input voltage range. It can also withstand transients up to 42V and operate down to 6V input. The converter is also protected against open LED and output short circuit conditions. Protection against reverse polarity up to 20V is also included.

**Products supported:**

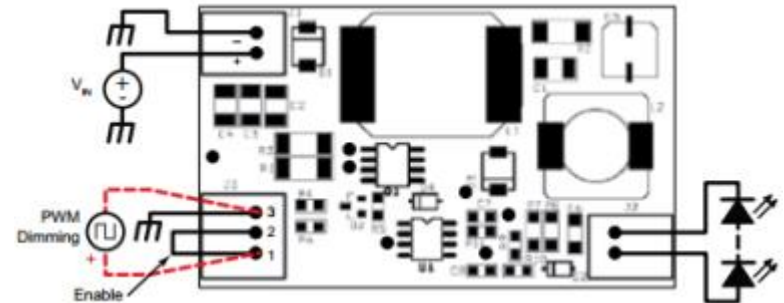
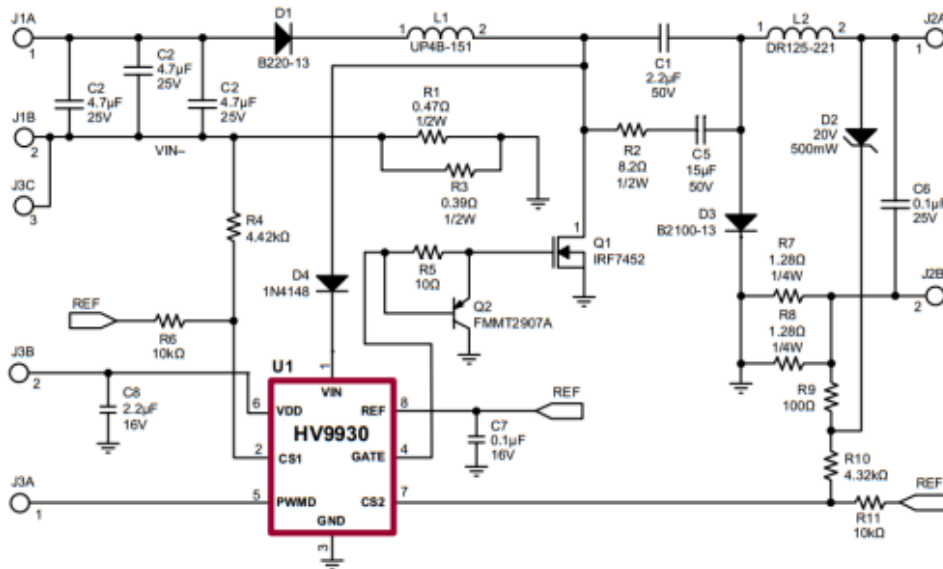
- HV9930LG-G



The HV9930DB2 is a LED driver demoboard capable of driving 4 3-watt LEDs in series from an input of 9 - 25V DC. The demoboard uses HV9930 in a boost-buck topology. The converter has excellent line and load regulation over the entire input and output voltage range. The full load efficiency of the converter is typically greater than 80%. The converter is also protected against open LED and output short circuit conditions.

## Products supported:

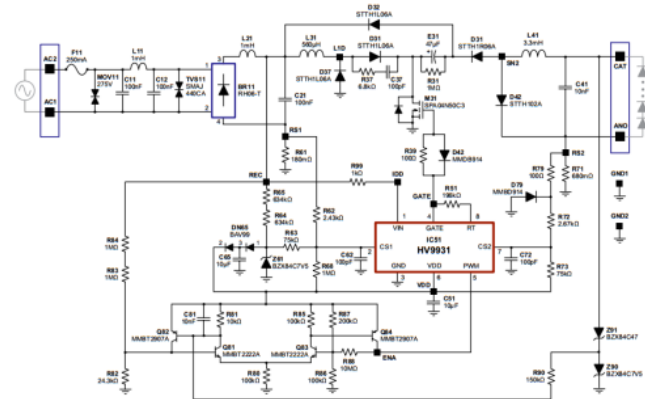
- HV9930LG-G



# HV9931DB1 Demo Board

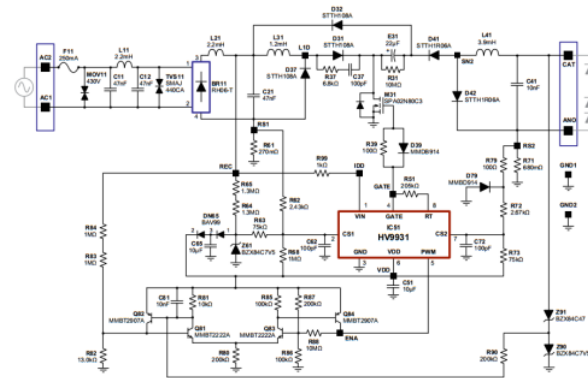
The HV9931 LED driver is primarily targeted at low to medium power LED lighting applications where galvanic isolation of the LED string is not an essential requirement. The driver provides near unity power factor and constant current regulation using a two stage topology driven by a single MOSFET and control IC. Triac dimming of this design is possible with the addition of some components for preloading and inrush current shaping. The HV9931DB1 is designed for a fixed string current of 350mA and a string voltage of 40V for a load power of about 14W. The board will regulate current for an output voltage down to 0V. Nominal input is 120VAC. Design for universal input (85 to 265VAC) is by all means possible but does increase cost and size while lowering efficiency.

**Products supported:**  
 HV9931LG-G



The HV9931 LED driver is primarily targeted at low to medium power LED lighting applications where galvanic isolation of the LED string is not an essential requirement. The driver provides near unity power factor and constant current regulation using a two stage topology driven by a single MOSFET and control IC. Triac dimming of this design is possible with the addition of some components for preloading and inrush current shaping. The HV9931DB2 IS designed for a fixed string current of 350mA and a string voltage of 40V for a load power of about 14W. The boards will regulate current for an output voltage down to 0V. Nominal input voltage is 230VAC. Design for universal input (85 to 265VAC) is by all means possible but does increase cost and size while lowering efficiency.

**Products supported:**  
 HV9931LG-G

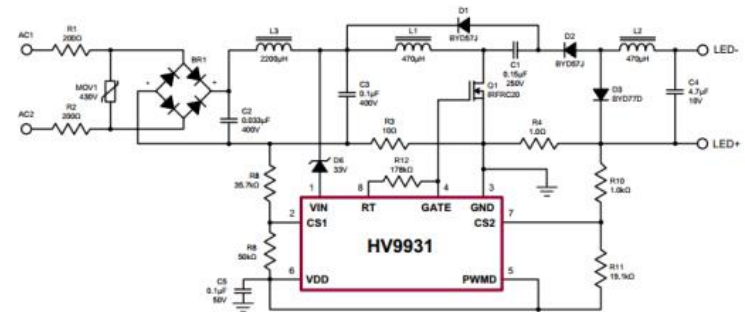


The HV9931DB5 demoboard is a high brightness (HB) LED power driver to supply one HB LED, using the HV9931 IC from either a 110 or 220VAC supply. The HV9931DB5 is ideal for incandescent retrofit applications, as it features a very small size and a low component count. The HV9931DB5 avoids the use of electrolytic capacitors, which reduce the lifetime of the circuit in high ambient temperatures (which would be found in the base of a bulb). The demo board can be used to test the performance of the HV9931 as a constant current driver to power LEDs. The HV9931DB5 uses a unique cascaded converter circuit, with a single active switch, to achieve the high step down conversion ratio required for operating low voltage LEDs from a high input voltage. This circuit allows the converter to operate at a high switching frequency, about 120kHz, while still regulating the output current at all times. The HV9931DB5 supplies 350mA to a 4.0V(max) LED with input voltages ranging from 90 – 265VAC 50/60Hz.

**P/N: HV9931DB5**

## Products supported:

- HV9931LG-G

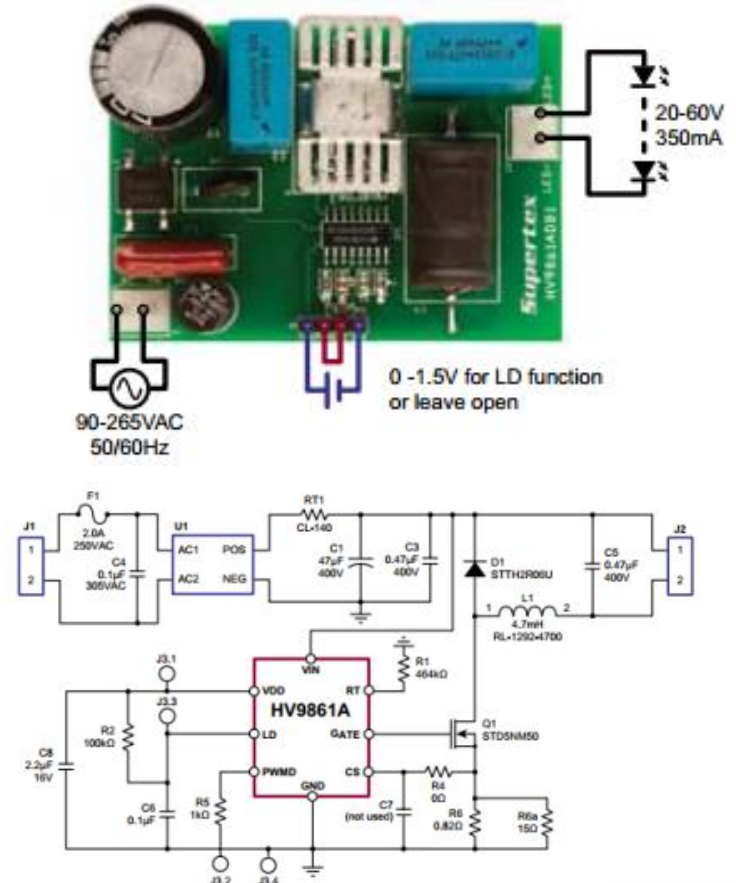




The HV9861ADB1 demoboard is a high-brightness LED driver employing the patented average-mode, constant current control scheme. The power conversion stage of the HV9861ADB1 consists of a diode bridge rectifier followed by a buck converter operating with fixed off-time of 20 $\mu$ s. The HV9861ADB1 LED driver features tight regulation of the LED current within a few milliamps over the entire range of the input AC line and the output LED string voltage. The LED current accuracy is almost insensitive to the passive component tolerances, such as the output filter inductance or the timing resistor. The accuracy of the LED current is mainly determined by the internal 270mV  $\pm$  3% reference voltage of the HV9861A control IC and by the external current sense resistor tolerance.

## Products supported:

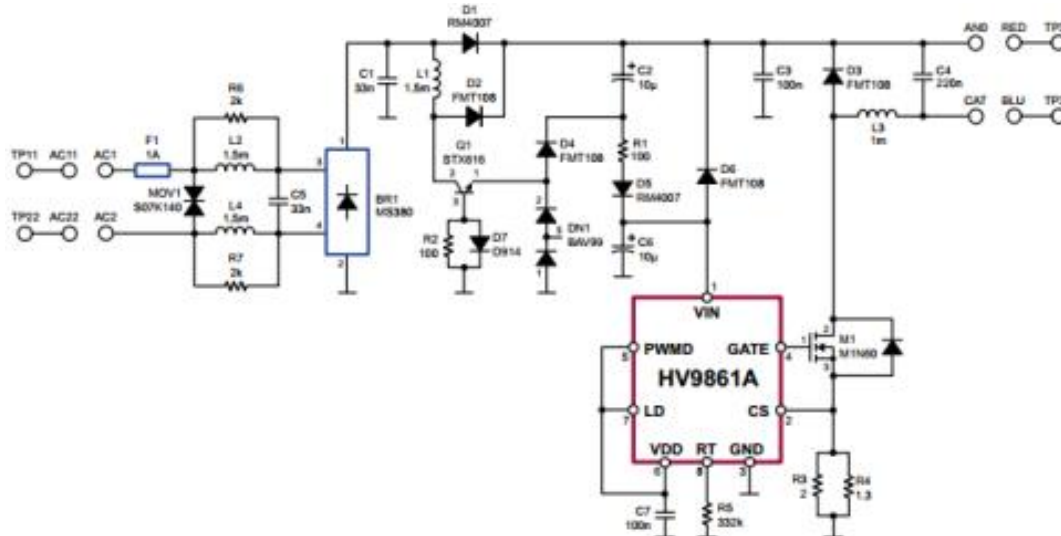
- HV9861ANG-G



Certain target markets for LED lighting require a power factor of at least 90%. A power factor over 90% can be attained using valley fill power factor correction with the addition of a small boost converter. The boost converter lowers line current distortion by adding line current draw in the valley and lowering the peak amplitude of the valley fill capacitor recharging current.

## Products supported:

- HV9861LG-G

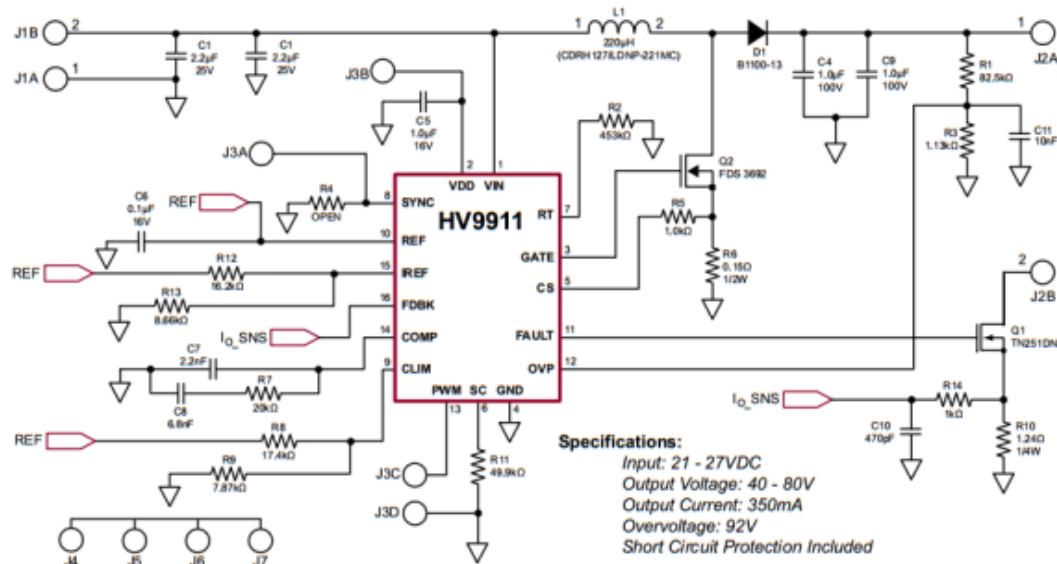


# HV9911DB1 Demo Board

The HV9911DB1 is an LED driver capable of driving up to 20 one-watt LEDs in series from an input of 21 - 27VDC. The demoboard uses HV9911 in a boost topology. The converter has a very good initial regulation ( $\pm 5\%$ ) and excellent line and load regulation over the entire input and output voltage range ( $< \pm 1\%$ ). The full load efficiency of the converter is typically greater than 90%.

**Products supported:**

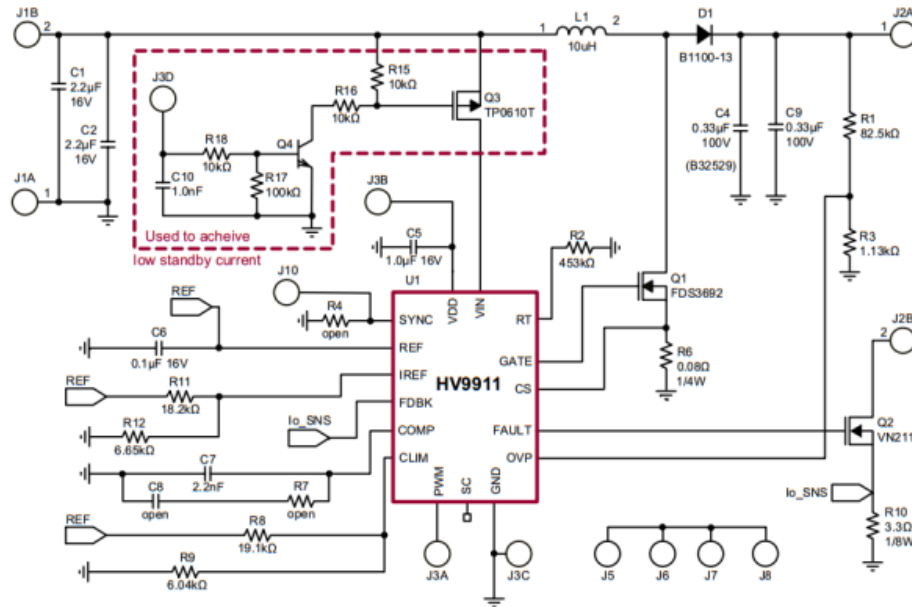
- HV9911NG-G



# HV9911DB2 Demo Board

The HV9911DB2 is an LED driver capable of driving up to twenty 100mA LEDs in series from an input of 9 - 16V DC. The demoboard uses HV9911 IC in a boost topology. The converter has a very good initial regulation, (+/-5%), and excellent line and load regulation over the entire input and output voltage range (<+/- 1%). The full load efficiency of the converter is typically greater than 85%.

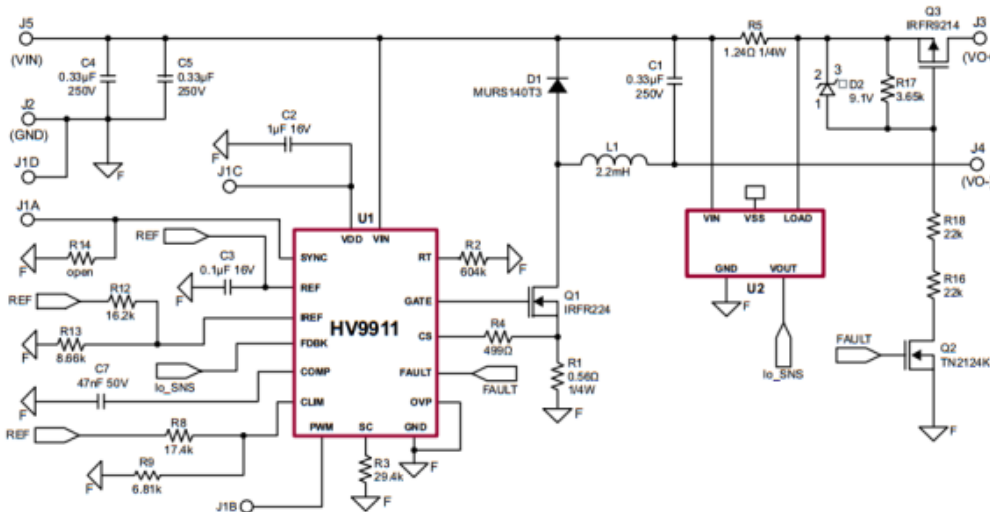
**Products supported:**  
 HV9911NG-G



The HV9911DB3 is an LED driver capable of driving up to 25 one-watt LEDs in series from an input of 130 - 200VDC. The demoboard uses Supertex's HV9911 in a buck topology with the HV7800 used for high side current sensing. The converter has a very good initial regulation ( $\pm 5\%$ ) and excellent line and load regulation over the entire input and output voltage range ( $< \pm 2\%$ ). The full load efficiency of the converter is typically greater than 85%.

**Products supported:**

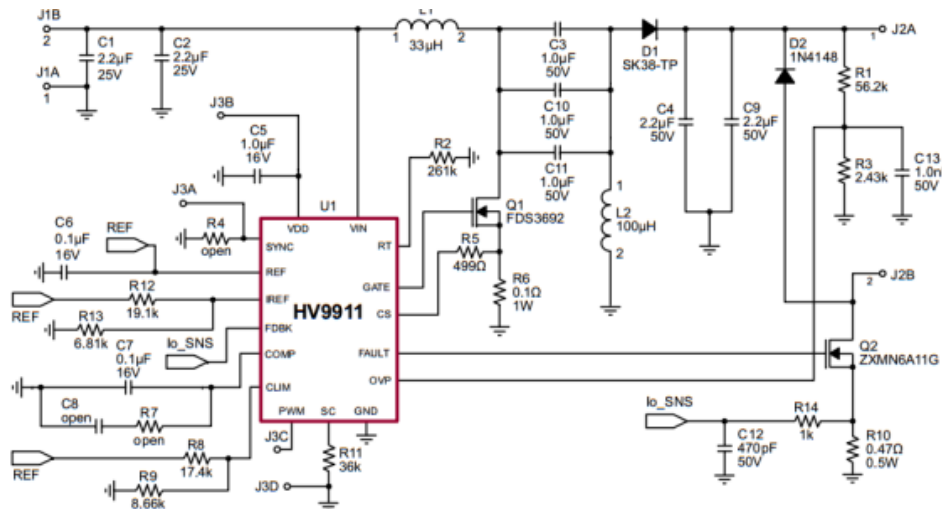
- HV9911NG-G



The HV9911DB4 is an LED driver demoboard capable of driving one to six three-watt LEDs in series from an input of 9.0 - 16VDC. The demoboard uses HV9911 in a SEPIC topology to drive LED string voltages higher or lower than the input voltage. The converter has a very good initial regulation ( $\pm 5\%$ ), and excellent line and load regulation over the entire input and output voltage range ( $< \pm 1\%$ ). The full load efficiency of the converter is typically greater than 85%.

**Products supported:**

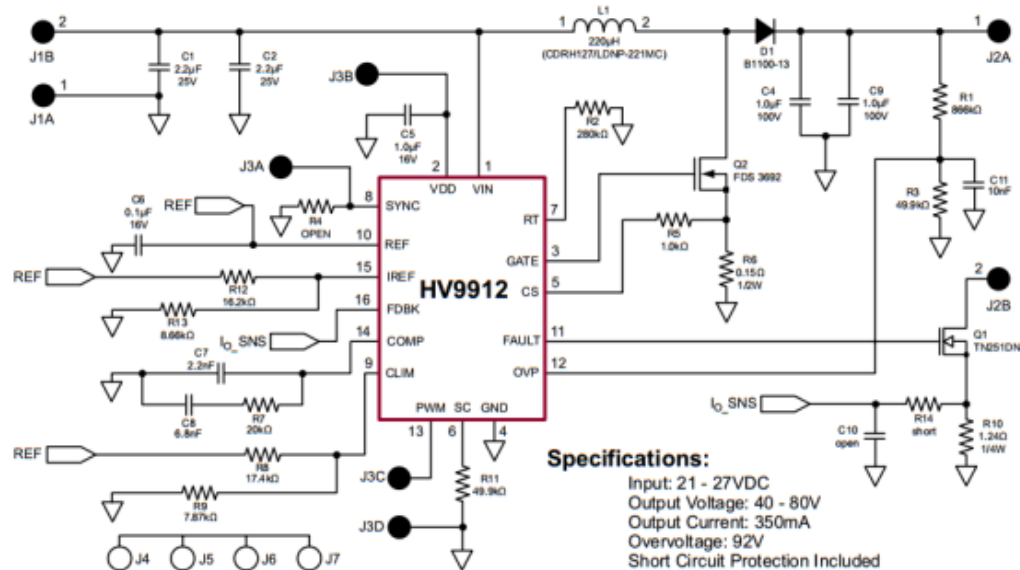
- HV9911NG-G



# HV9912DB1 Demo Board

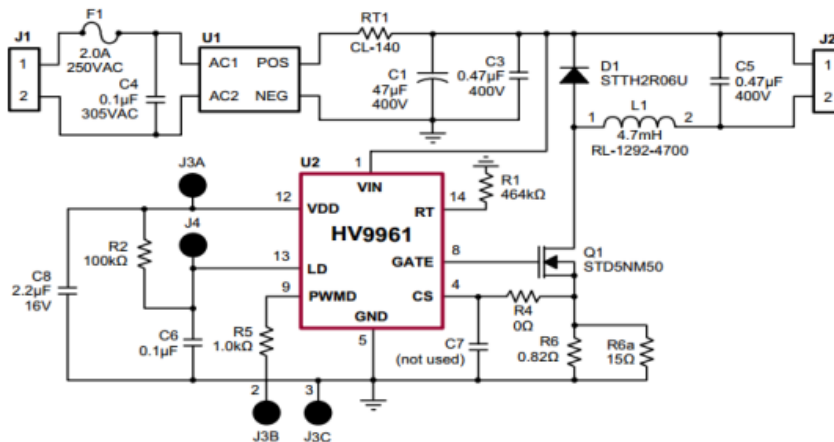
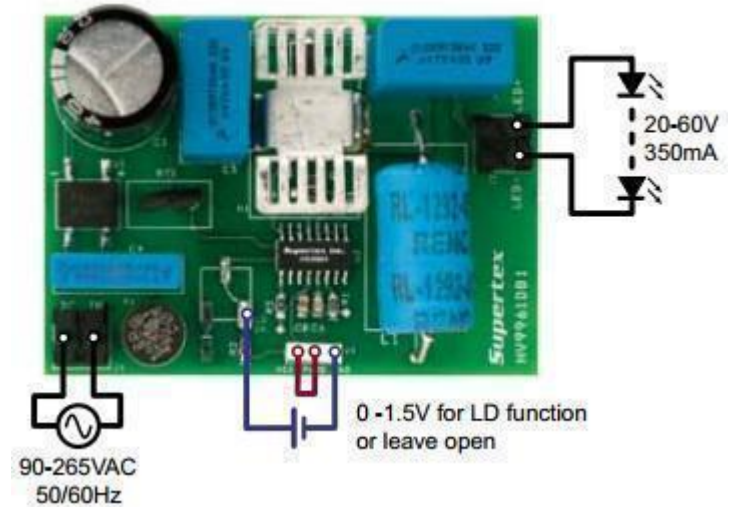
The HV9912DB1 is an LED driver demoboard capable of driving up to 20 one-watt LEDs in series from an input of 21 - 27VDC. It uses the HV9912 in a boost topology. The converter has very good initial regulation ( $\pm 5\%$ ) and excellent line and load regulation over the entire input and output voltage range ( $< \pm 1\%$ ). The full load efficiency of the converter is typically greater than 90%.

**Products supported:**  
 HV9912NG-G



The HV9961 demoboard is a high-brightness LED driver employing the patent-pending average-mode constant current control scheme. The power conversion stage of the HV9961DB1 consists of a diode bridge rectifier followed by a buck converter operating with fixed off-time of 20 $\mu$ s. The HV9961DB1 LED driver features tight regulation of the LED current within a few milliamps over the entire range of the input AC line and the output LED string voltage

**Products supported:**  
 HV9961NG-G

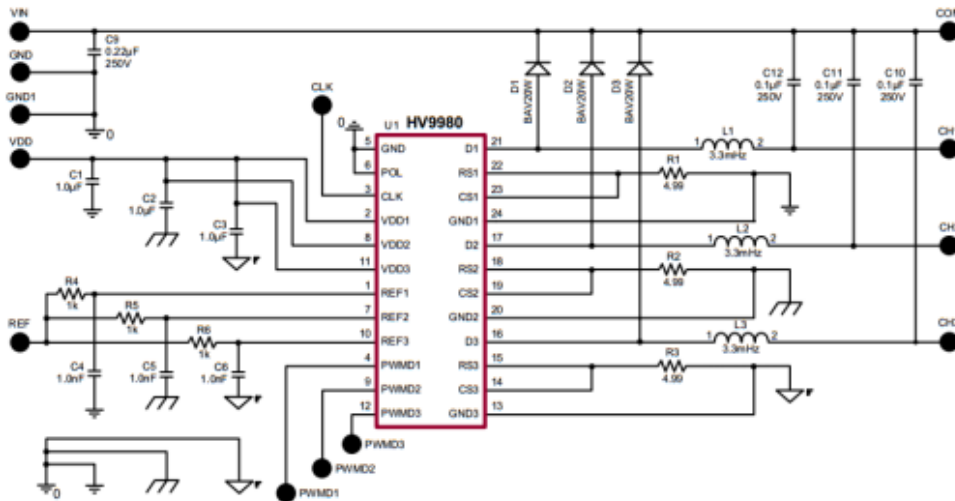
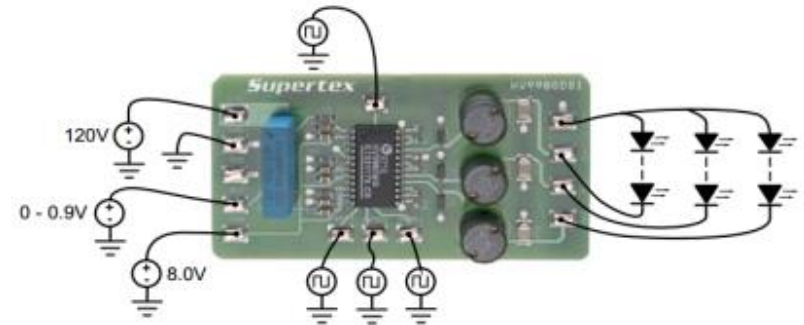




The HV9980B1 demoboard is an RGB or multi-channel white LED backlight driver designed to drive LEDs for a large-screen TV. The HV9980DB1 can drive three common-anode LED strings from a 100 - 140V input at currents up to 70mA in steady state. It can also drive the LEDs at currents as large as 160mA for short durations to facilitate backlight scanning mode.

## Products supported:

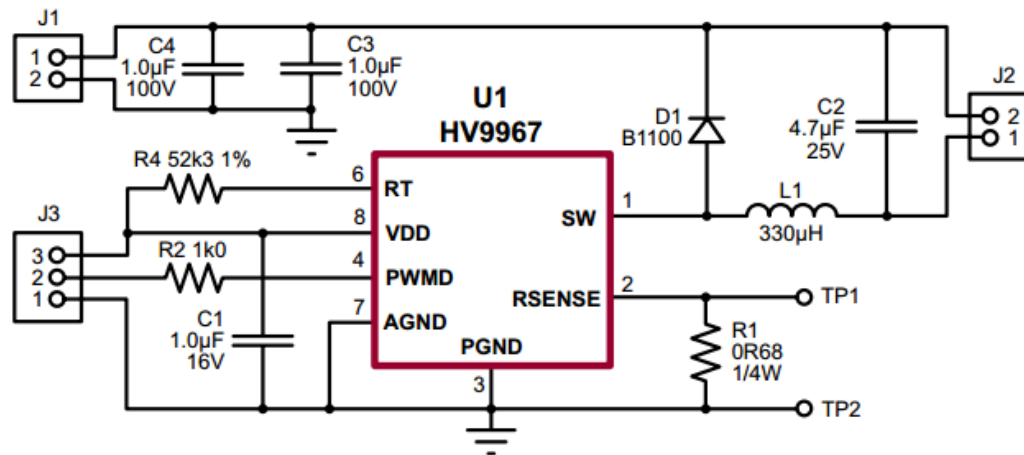
- HV9980WG-G



The HV9967BDB1 demoboard is a high-brightness LED driver designed to drive 4 LEDs in series at currents up to 350mA from a 20 - 60V DC input. The demoboard uses the HV9967B in a buck configuration in a constant off-time mode. The HV9967BDB1 LED driver features tight regulation of the LED current within a few milliamps over the entire range of the input voltage (i.e. 20 - 60VDC). The LED current accuracy is almost insensitive to the passive component tolerances, such as the inductance or the timing resistor

**Products supported:**

- HV9967BMG-G



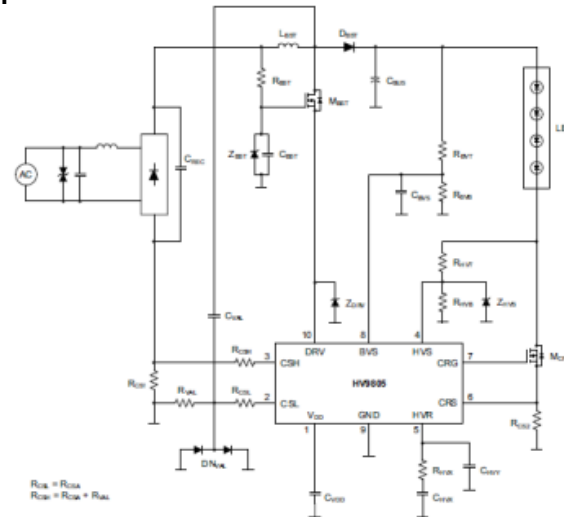
# HV9805 230V Boost Evaluation Board

The HV9805 230V<sub>AC</sub> Off-Line LED Driver Evaluation Board is used to evaluate and demonstrate Microchip Technology Inc.'s HV9805 device in the following topology:

420-430V output Boost Converter application followed by a LED-side linear current regulator, supplied from the mains 230V<sub>AC</sub>, to drive a 130-150 LED string.

The HV9805 230V<sub>AC</sub> Off-Line LED Driver Evaluation Board was developed to help engineers reduce the product design cycle time.

**Products supported:**  
 HV9805MG-G



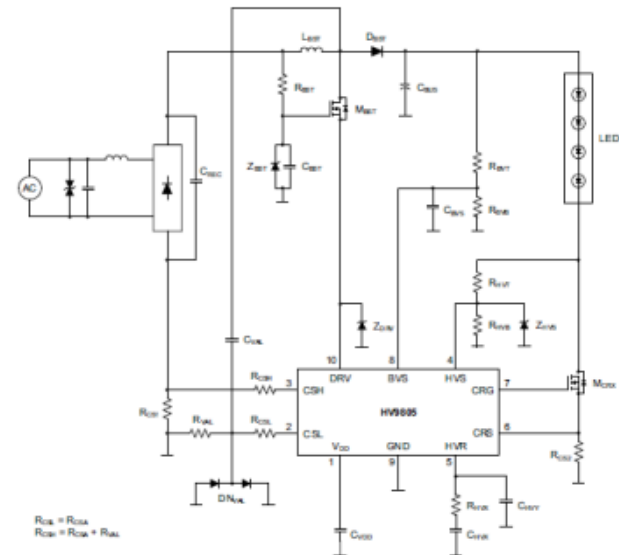
# HV9805 230V SEPIC Evaluation Board

The HV9805 230V<sub>AC</sub> SEPIC Evaluation Board is used to evaluate and demonstrate Microchip Technology Inc.'s HV9805 device in the following topology:

The HV9805 230V<sub>AC</sub> SEPIC Evaluation Board is suited for driving a 125V/100 mA LED load from a 230VAC source.

The Single-ended primary-inductor converter (SEPIC) configuration extends the application range of the HV9805 driver Integrated Circuit (IC) to lower LED load voltages than otherwise possible with the boost configuration. Many features of the boost configuration are retained, such as a true direct current drive of the LED load, high input power factor, high efficiency and simple magnetics.

**Products supported:**  
□ HV9805MG-G



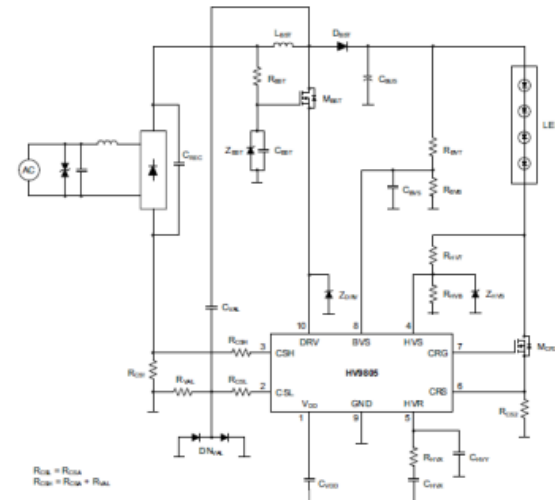
# HV9805 120V Boost Evaluation Board

The HV9805 120V<sub>AC</sub> Off-Line LED Driver Evaluation Board is used to evaluate and demonstrate Microchip Technology Inc.'s HV9805 device in the following topology:

215-265V output Boost Converter application followed by a LED-side linear current regulator, supplied from the mains 120V<sub>AC</sub>, to drive a 70-90 LED string.

The HV9805 120V<sub>AC</sub> Off-Line LED Driver Evaluation Board was developed to help engineers reduce the product design cycle time.

**Products supported:**  
 HV9805MG-G





# HV98100/101 Buck-Boost Evaluation Board

Online  
Datasheet

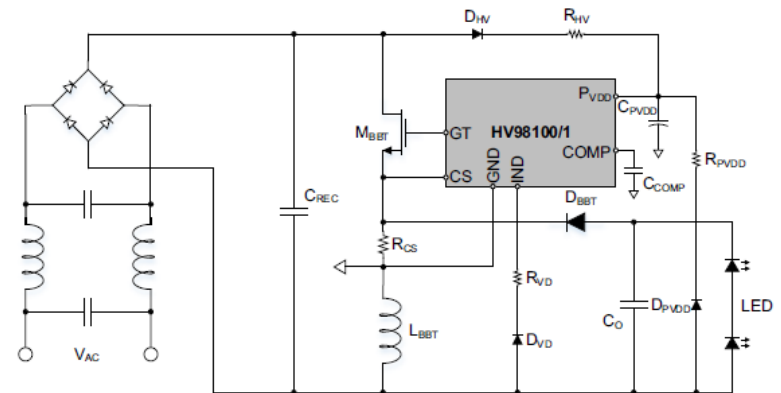
The HV98100/101 Off-Line LED Driver Evaluation Board is used to evaluate and demonstrate Microchip Technology Inc.'s HV98100/101 device in the following topology:

- HV98100: Buck-Boost Converter application, supplied from the mains  $120V_{AC}$ , to drive an 92-133V LED load
- HV98101: Buck-Boost Converter application, supplied from the mains  $230V_{AC}$ , to drive an 88-122V LED load

The HV98100/101 Off-Line LED Driver Evaluation Board was developed to help engineers reduce product design cycle time.

## Products supported:

- HV98100T-E/CH
- HV98101T-E/CH



The MIC3202 is a hysteretic, step-down, constant-current, High-Brightness LED (HB LED) driver. It provides an ideal solution for interior/exterior lighting, architectural and ambient lighting, LED bulbs, and other general illumination applications.

The MIC3202 is well suited for lighting applications requiring a wide-input voltage range. The hysteretic control gives good supply rejection and fast response during load transients and PWM dimming. The high-side current sensing and on-chip current-sense amplifier delivers LED current with  $\pm 5\%$  accuracy. An external high-side current-sense resistor is used to set the output current.

## Products supported:

- MIC3202



The MIC3203 is a hysteretic, step-down, constant-current, High-Brightness LED (HB LED) driver. It provides an ideal solution for interior/exterior lighting, architectural and ambient lighting, LED bulbs, and other general illumination applications.

The MIC3203 is well suited for lighting applications requiring a wide-input voltage range. The hysteretic control gives good supply rejection and fast response during load transients and PWM dimming. The high-side current sensing and on-chip current-sense amplifier delivers LED current with  $\pm 5\%$  accuracy. An external high-side current-sense resistor is used to set the output current.

The MIC3203 offers a dedicated PWM input (DIM) which enables a wide range of pulsed dimming. A high-frequency switching operation up to 1.5MHz allows the use of smaller external components minimizing space and cost. The MIC3203 offers frequency dither feature for EMI control.

**P/N: MIC3203YM-EV**

**Products supported:**  
 MIC3203





The MIC3223 is a constant current boost LED driver capable of driving a series string of high power LEDs. The MIC3223 can be used in general lighting, bulb replacement, garden pathway lighting, and other solid state illumination application.

The MIC3223 is a peak current mode control PWM boost regulator and the 4.5V and 20V operating input voltage range allows multiple applications from a 5V or a 12V bus.

The MIC3223 implements a fixed internal 1MHz switching frequency to allow for a reduction in the design footprint size. Power consumption has been minimized through the implementation of a 200mV feedback voltage that provides an accuracy of  $\pm 5\%$ . The MIC3223 can be dimmed through the use of a PWM signal and features an enable pin for a low power shutdown state.

## Products supported:

- MIC3223



The MIC3231 is a constant current boost switching controller specifically designed to power one or more strings of high power LEDs. The MIC3231 has an input voltage range from 6V to 45V and are ideal for a variety of solid state lighting applications.

The MIC3231 utilizes an external power device which offers a cost conscious solution for high power LED applications. The powerful drive circuitry can deliver up to 70W to the LED system. Power consumption has been minimized through the implementation of a 250mV feedback voltage reference providing an accuracy of  $\pm 3\%$ . The MIC323x family is dimmable via a pulse width modulated (PWM) input signal and also features an enable pin for low power shutdown.

## Products supported:

- MIC3231



The MIC3263 is a high-efficiency pulse-width modulation (PWM) boost switching regulator that is optimized for constant-current WLED driver backlighting applications. The MIC3263 drives six channels of up to ten WLEDs per channel. Each channel is matched in current to within  $\pm 3\%$  for constant brightness across the screen and can be programmed from 15mA to 30mA.

The MIC3263 provides a very flexible dimming control scheme with better accuracy and noise immunity. The dimming frequency can be set to any value between 100Hz and 20kHz by an external resistor. The dimming ratio is determined by the duty cycle of a dimming ratio control input signal and can be set to one of 16 levels with a minimum ratio of 1%. The LED dimming current is set by an external resistor to allow programming of LED current between 15mA and 30mA.

## Products supported:

- MIC3263



The MIC4801 is a high efficiency White LED (WLED) driver designed to drive a single LED up to 600mA. The MIC4801 constant current driver is designed to drive high power LEDs in various lighting applications. The MIC4801 provides the highest possible efficiency as this architecture has no switching losses present in traditional charge pumps or inductive boost circuits. It features a typical dropout of 130mV at 400mA. This allows the LEDs to be driven directly from the voltage source eliminating switching noise/losses present with the use of boost circuitry. The high accuracy ( $\pm 1\%$  typical) current regulated WLED channel helps ensure uniform display illumination under all conditions. The brightness is controlled through an Ultra Fast PWM™ Control interface operating down to less than 1% duty cycle.

## Products supported:

- MIC4801



The MIC4802 is a high efficiency White LED (WLED) driver designed to drive a single LED up to 800mA. The MIC4802 constant current driver is designed to drive high power LEDs in various lighting applications. The MIC4802 provides the highest possible efficiency as this architecture has no switching losses present in traditional charge pumps or inductive boost circuits. It features a typical dropout of 280mV at 800mA. This allows the LEDs to be driven directly from the voltage source eliminating switching noise/losses present with the use of boost circuitry. The high accuracy ( $\pm 1\%$  typical) current regulated WLED channel helps ensure uniform display illumination under all conditions. The brightness is controlled through an Ultra Fast PWM™ Control interface operating down to less than 1% duty cycle.

## Products supported:

- MIC4802



The MIC4811 is a high efficiency linear White LED (WLED) driver designed to drive up to six high current WLEDs for signage lighting. The MIC4811 provides the highest possible efficiency as this architecture has no switching losses present in traditional charge pumps or inductive boost circuits. The MIC4811 provides six linear drivers which maintain constant current for up to six WLEDs. It features a typical dropout of 100mV at 50mA.

The MIC4811 features Dynamic Average Matching™ (DAM™) which is specifically designed to provide optimum matching across all WLEDs. The high accuracy ( $\pm 1\%$  typical) current regulated WLED channels ensure uniform display illumination under all conditions. The brightness is controlled through an Ultra Fast PWM™ interface operating down to less than 1% duty cycle.

## Products supported:

- MIC4811

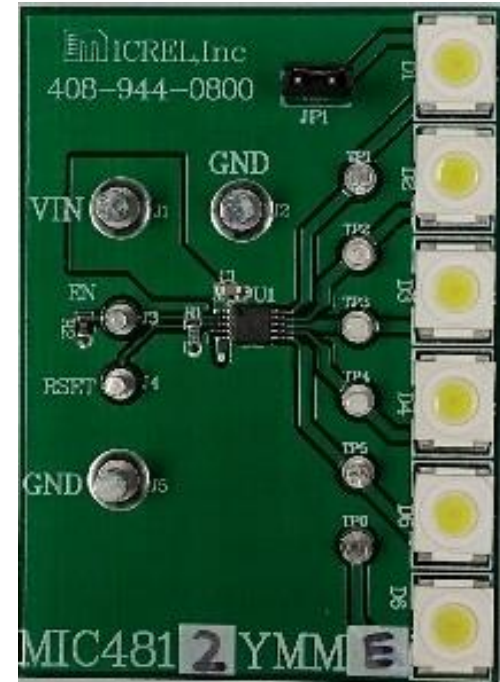


The MIC4812 is a high efficiency linear White LED (WLED) driver designed to drive up to six high current WLEDs for signage lighting. The MIC4812 provides the highest possible efficiency as this architecture has no switching losses present in traditional charge pumps or inductive boost circuits. The MIC4812 provides six linear drivers which maintain constant current for up to six WLEDs. It features a typical dropout of 190mV at 100mA.

The MIC4812 features Dynamic Average Matching™ (DAM™) which is specifically designed to provide optimum matching across all WLEDs. The high accuracy ( $\pm 1\%$  typical) current regulated WLED channels ensure uniform display illumination under all conditions. The brightness is controlled through an Ultra Fast PWM™ interface operating down to less than 1% duty cycle.

## Products supported:

- MIC4812



The MAQ3203 is a hysteretic, step-down, constant current, High-Brightness LED (HB LED) driver. It provides an ideal solution for interior/exterior lighting, architectural and ambient lighting, LED bulbs, and other general illumination applications.

The MAQ3203 is well suited for lighting applications requiring a wide-input voltage range. The hysteretic control gives good supply rejection and fast response during load transients and PWM dimming. The high-side current sensing and on-chip current-sense amplifier delivers LED current with  $\pm 5\%$  accuracy. An external high-side current sense resistor is used to set the output current.

## Products supported:

- MAQ3203





This board enables the evaluation of the MIC2298, a fully integrated 7W net output minimum high power white LED driver. The board includes components necessary to set the LED current to 20%, 50% and 100% of the nominal LED current (1A). The external inputs also allow the LED current to be programmed either with additional resistors or voltages on the DIM or BRT pins. Also the enable pin can be driven to force the part into low Iq mode.

## Products supported:

- MIC2298



This board enables the evaluation of the 3.5A switch, high power white LED driver MIC2299. The board includes components necessary to set the LED current to 20%, 50%, and 100% of the nominal LED current (1A).

The evaluation board includes a push button switch which sends a one shot pulse of 300ms to the enable pin to prevent overheating when testing high power LEDs. Also the enable pin can be driven to force the part into low Iq mode.

## Products supported:

- MIC2299



The MIC2297 is a 600kHz PWM White LED Driver optimized for 6 to 10 series WLEDs. With an output voltage of up to 42V and a guaranteed 1.2A on the internal power switch, the MIC2297 can easily drive 10WLEDs at 20mA continuous current. The MIC2297 features WLED brightness control using the BRT pin and has output over voltage protection (OVP) to protect the device in case the WLEDs are disconnected unexpectedly.

## Products supported:

- MIC2297



The MIC2870 is a high-current, high-efficiency flash LED driver for one or two high-brightness camera flash LEDs.

The LED driver current is generated by an integrated inductive boost converter with 2MHz switching frequency which allows the use of a very-small inductor and output capacitor. These features make the MIC2870 an ideal solution for high-resolution camera phone LED flashlight driver applications.

MIC2870 supports two 750mA white-LEDs (WLEDs) or a single 1.5A WLED configuration. When two WLEDs are connected, their currents are matched automatically.

MIC2870 operates in either flash or torch modes that can be controlled through either an I<sup>2</sup>C interface or external pins. The brightness in the flash and torch mode can be adjusted via two external resistors individually. High-speed mode I<sup>2</sup>C interface provides a simple control at a clock speed up to 3.4MHz to support most camera functions such as auto-focus, white balance, and image capture (flash mode).

## Products supported:

- MIC2870



# CL88020 120V<sub>AC</sub> Offline LED Driver Eval Board

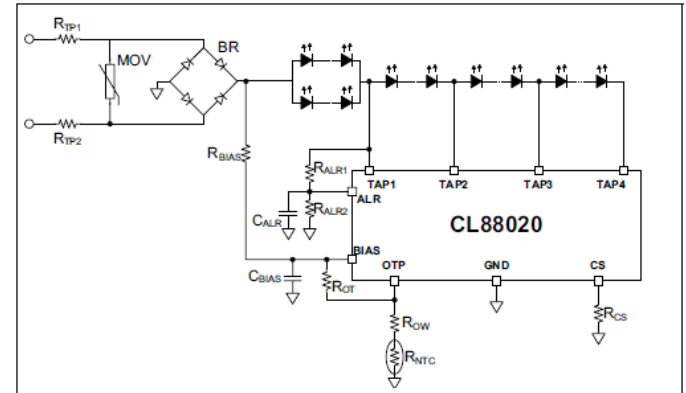
The CL88020 120V<sub>AC</sub> Offline LED Driver Evaluation Board is a complete solution consisting of an LED Driver (ADM00766) and an LED Load Board (ADM00767) powered directly from the 120V<sub>AC</sub> line.

## Features:

- CL88020 LED Driver Evaluation Board (ADM00766):
  - Input Voltage: 120V<sub>rms</sub> +/-15%, 50/60 Hz
  - Typical Output Capability: up to 130mA
  - Efficiency: Over 83%
  - Max Output Power: 8.5W
  
- CL88020 LED Driver Load Board (ADM00767):
  - 10 LEDs (GW P9LR31.EM) (4-tap groups)
  - An 8-wire Flat Cable Input Connector
  - One NTC For Over-temperature Protection

## Products supported:

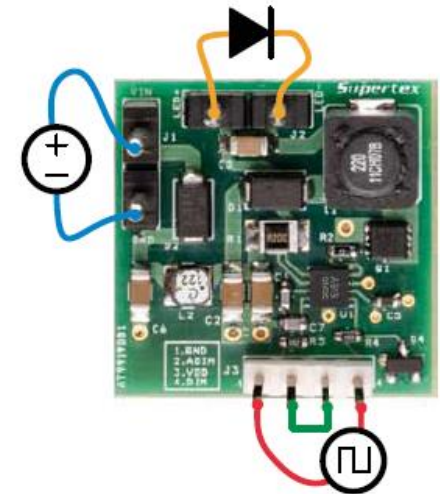
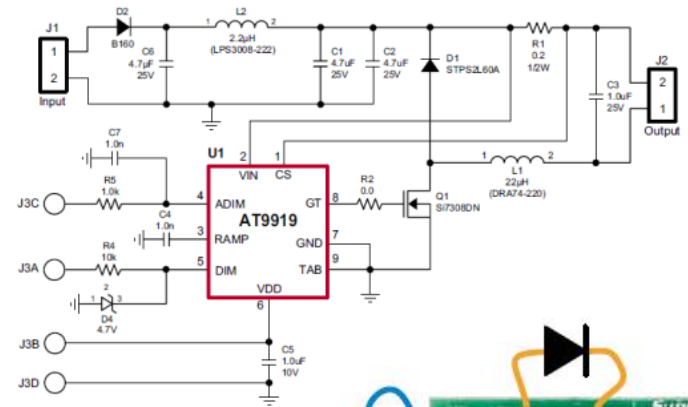
- CL88020T-E/SE



The AT9919BDB1 demoboard is a high current LED driver designed to drive one LED at 1.0A from a 9.0 - 16VDC input. AT9919DB1 includes two PWM dimming modes. The analog control of the PWM dimming mode allows the user to dim the LED using a 0 - 2.0V analog signal applied between the ADIM and GND pins (0V gives 0% and 2.0V gives 100%). In this mode, the PWM dimming frequency is set to 1kHz on the board. The digital control of PWM dimming mode allows the user to dim the LEDs using an external, TTL-compatible square wave source applied between DIM and GND. In this case, the PWM dimming frequency and duty ratio are set by the external square wave source.

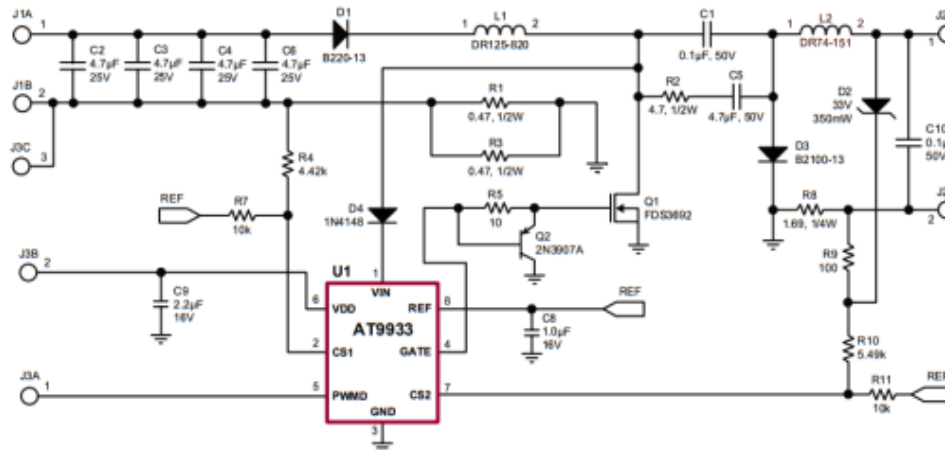
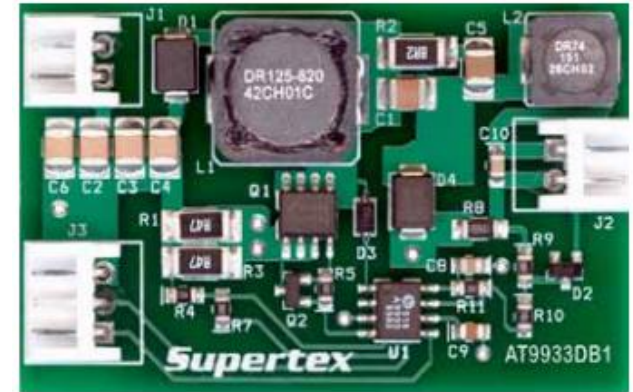
## Products supported:

- AT9919K7-G



The AT9933DB1 is an LED driver capable of driving up to 7 1-watt LEDs in series from an automotive input of 9 - 16V DC. The demoboard uses AT9933LG-G in a boost-buck topology. The converter operates at frequencies in excess of 300kHz and has excellent output current regulation over the input voltage range. It can also withstand transients up to 42V and operate down to 6V input. The converter is also protected against open LED and output short circuit conditions. Protection against reverse polarity up to 20V is also included.

**Products supported:**  
 AT9933LG-G

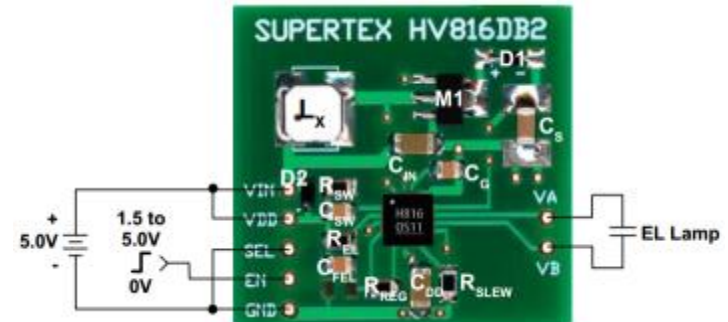
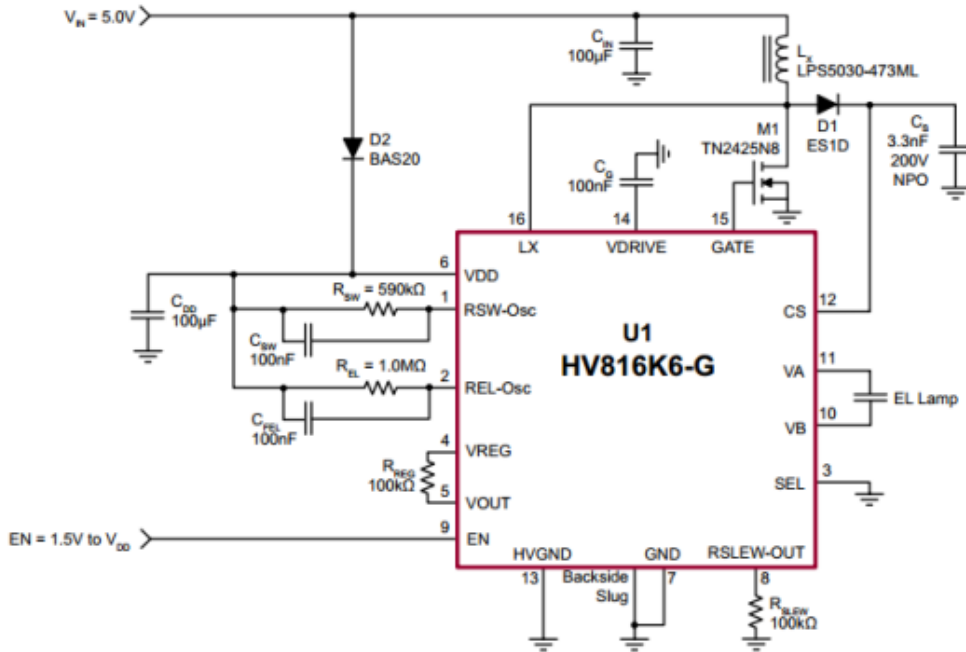


# HV816DB2 Demo Board

The HV816DB2 is a high brightness demoboard with the circuitry to drive a 10in2 EL lamp using the HV816 in a 4x4 QFN-16 package.

**Products supported:**

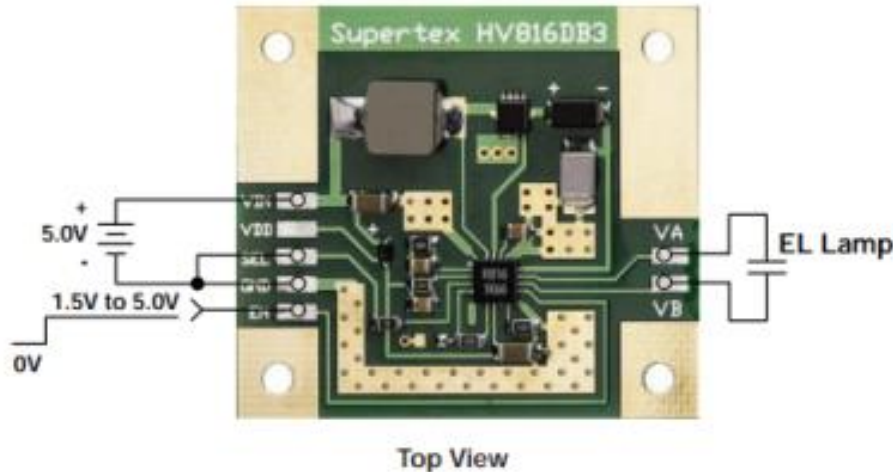
- HV816K6-G





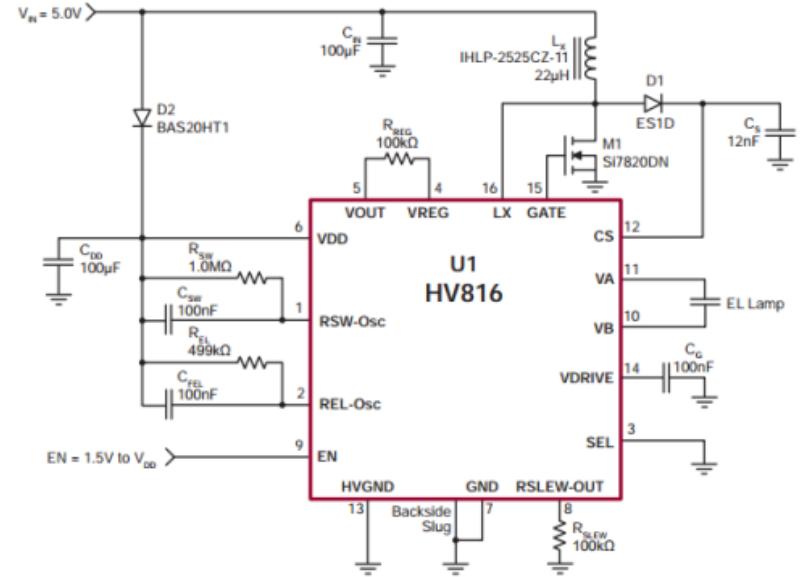
# HV816DB3 Demo Board

The HV816DB3 is a demoboard designed for high power applications using the HV816 4x4 QFN-16 package. The HV816DB3 board has the circuitry to drive a 16.5in<sup>2</sup> EL lamp. For applications requiring smaller lamps and/or lower power, please refer to the HV816DB2 demoboard datasheet.

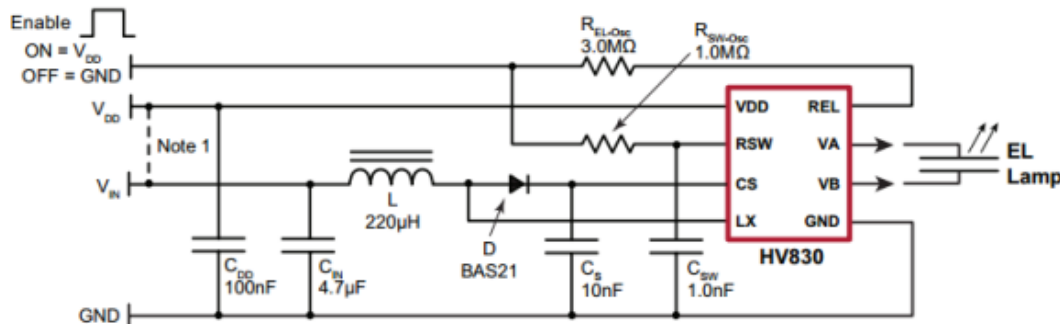


## Products supported:

- HV816K6-G

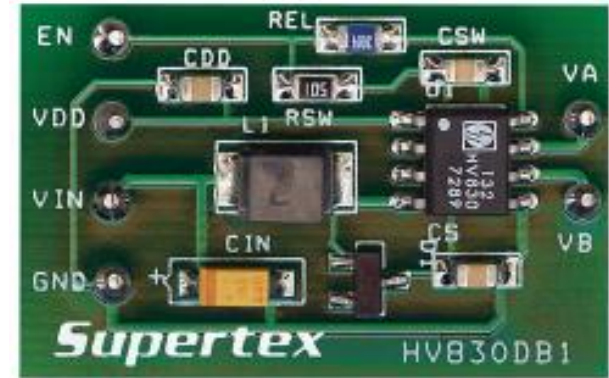


The HV830DB1 EL Driver demoboard contains all the circuitry necessary to drive an EL (Electroluminescent) lamp. The supplied circuit has been optimized to drive an 8.0in2 lamp from a 3.0 to 3.3V supply. The circuit may be customized with different component values to suit a particular application.

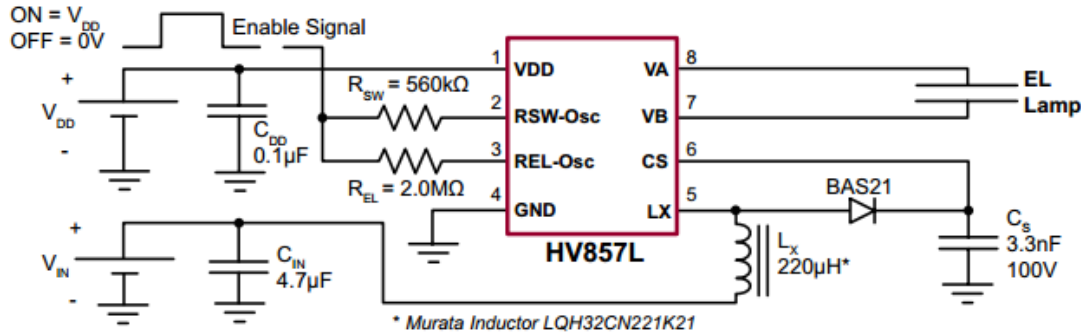


**Products supported:**

- HV830



The HV857LDB1 demoboard contains all necessary circuitry to demonstrate the features of the HV857L EL lamp driver.

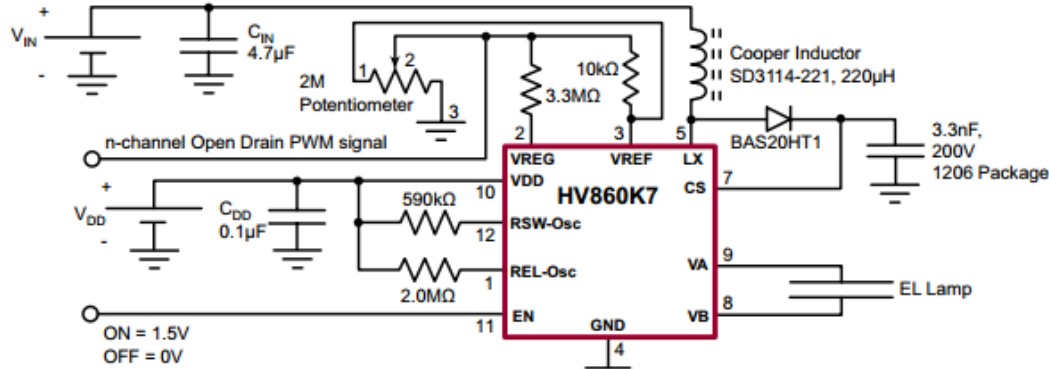


**Products supported:**

- HV857LMG-G



The HV860DB1 demoboard contains all necessary circuitry to demonstrate the features of the HV860 EL lamp driver.



**Products supported:**

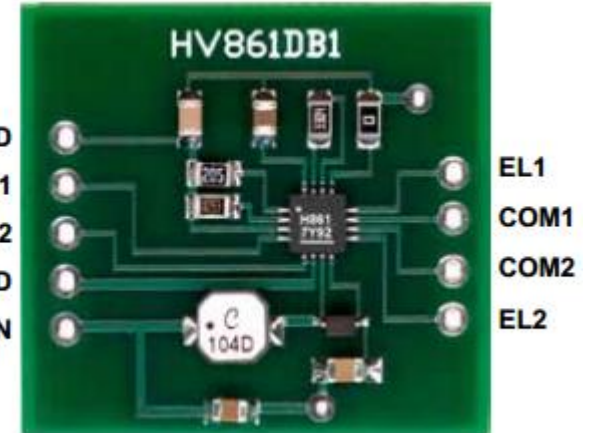
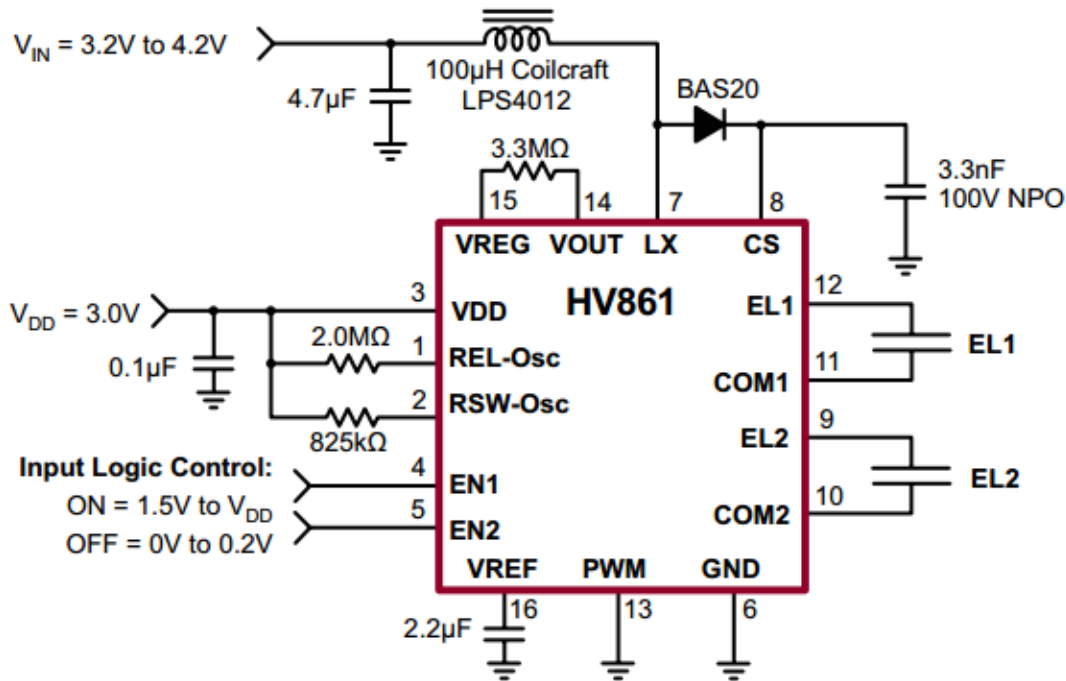
- HV860K7-G



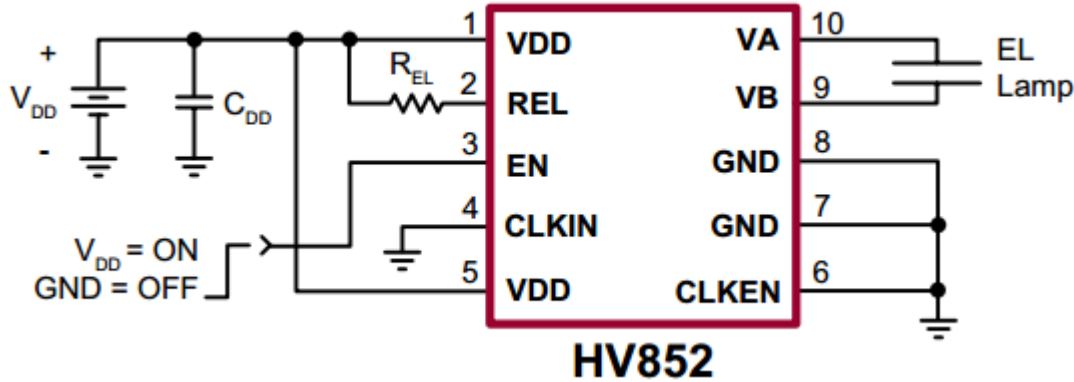
The HV861DB1 demoboard contains all the necessary circuitry to demonstrate the features of the HV861 dual EL Lamp driver

## Products supported:

- HV861K7-G

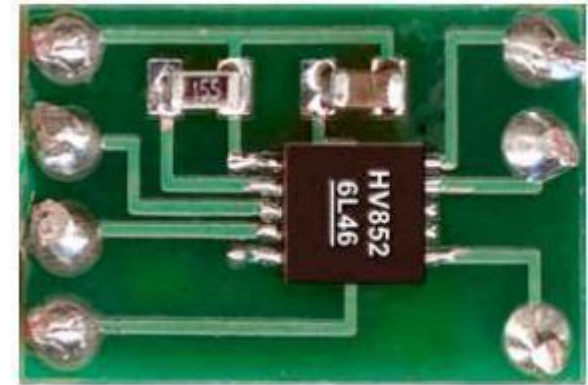


The HV852DB1 demoboard contains all necessary circuitry to demonstrate the features of the HV852 EL lamp driver.

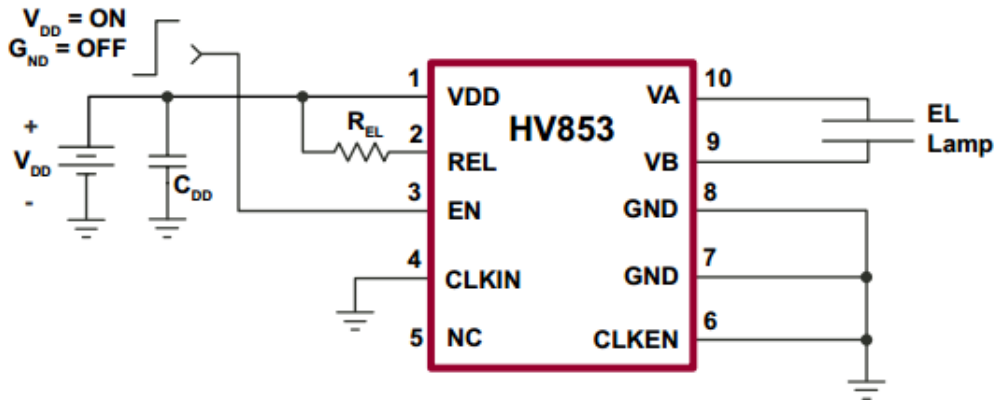


**Products supported:**

- HV852K7-G



The HV853DB1 demoboard contains all the necessary circuitry to demonstrate the features of the HV853 EL lamp driver. The HV853 is the low noise version of the EL driver HV852 with improved EMI performance.

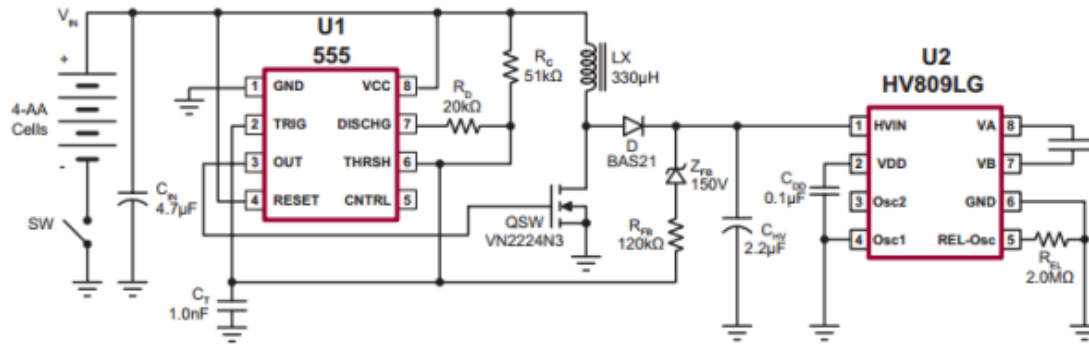


## Products supported:

- HV853K7-G



The HV809DB2 EL Driver demoboard contains all the circuitry necessary to drive an EL (Electroluminescent) lamp.



**Products supported:**

- HV809





# Ethernet PHY (Transceiver) Eval Boards



**EVB8742**



**PIC32 Ethernet Starter Kit II  
(Part # DM320004-2)  
with LAN8720A**



**KSZ8061MNX 32-QFN Evaluation Board  
(Part # KSZ8061MNX-EVAL)**

# Ethernet Controller & EtherCAT Eval Boards

LAN9252  
3-Port EtherCAT Slave Controller



**EVB-LAN9252-3PORT**

LAN9252  
EtherCAT Slave Controller w/HBI



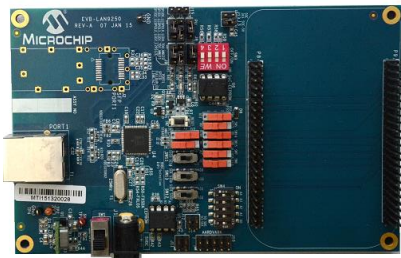
**EVB-LAN9252-HBI**

LAN9252  
EtherCAT Slave Controller w/DIGI-IO



**EVB-LAN9252-DIGIO**

LAN9250  
10/100 Ethernet Controller



**EVB-LAN9250**

KSZ8851  
10/100 Ethernet Controller



**ATETHERNET1-XPRO**



**KSZ8851SNL-EVAL**

# Ethernet Switch Eval Boards

LAN9303  
3-Port Managed Ethernet Switch



**EVB9303M**

LAN935x  
3-Port Ethernet Switch



**EVB-LAN9355**

KSZ9897/9477  
7-Port Gigabit Ethernet Switches



**KSZ9897-EVAL**



LAN9303 PHY Switch Daughter Board  
(Part # AC320004-4)



**KSZ9477-EVAL**

# Ethernet Bridge Eval Boards

LAN9500A USB 2.0 to 10/100  
Ethernet Evaluation Boards



**EVB-LAN9500A-LC**



**EVB-LAN9500A-MII**

LAN9730 USB 2.0 HSIC to 10/100  
Ethernet Evaluation Board



**EVB-LAN9730-MII**

LAN7500 USB 2.0 to 10/100/1000  
Ethernet Evaluation Boards



**EVB-LAN7500-LC**



**EVB-LAN7500**

LAN7800 USB 3.1 Gen1 to 10/100/1000  
Ethernet Evaluation Boards



**EVB-LAN7800**



**EVB-LAN7800LC**

LAN951x USB 2.0 to 10/100  
Ethernet Hub Evaluation Boards



**EVB9514**



**EVB9512**

Microchip's Ethernet over coax adapters uniquely provide Power over Ethernet (PoE) bridging over the coax link to provide ample power (PoC) for remote devices, eliminating the need to bring separate power cables to cameras in remote locations.

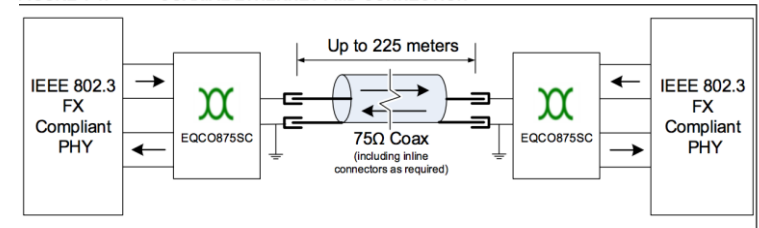
- Uses legacy analog video cabling (75Ω coax)
- Fully transparent 100Base-T full duplex Ethernet including link status pass-through
- Full 100 Mbps FDX over 250 meter coax runs\*
- Can be concatenated using repeaters for even longer cable runs
- Supports 10/100Base-T Ethernet standard- definition and high- definition video camera including PoE-powered devices
- Optional DC power pass-through for remote powering of low-voltage cameras
- Small 70 mm x 37 mm enclosure can be wall mounted or the board—without enclosure—can be placed inside the camera enclosure

Microchip's Ethernet over Coax adapters (EQCO- FastECoax7501) are installed in pairs. The Head-End adapter takes conventional 100Base-T Ethernet from the NVR and passes it through the PoE-compliant Ethernet switch, or a PoE injector, to the Camera-Side unit. It can be optionally powered by an AC adapter. Power and bidirectional data is passed over the coax cable to the Camera Side adapter at the far end which optionally powers the camera.

## Products supported:

- EQCO875SC.3

FIGURE 1-1: COAXIAL ETHERNET PMD CONNECTION





# EQCO-SDI-30-7502 HD-SDI Repeater Module

Online  
Datasheet

Microchip's EQCO-SDI30-7501 is an extender solution for HD-SDI links, operating over a standard 75Ω coax cable. Each unit receives an attenuated HD-CCTV signal and extends it up to 220m over the coax cable.

The repeater contains three critical components to correct and then retransmit the signal:

## Features:

- Adaptive Equalizer to return the signal to its original
- amplitude and modulation
- Reclocker to resynchronize the signal—bringing it back to its original condition
- Cable Driver to retransmit the signal with its original characteristics restored
- Power can be transmitted from the recorder (DVR) side to the camera over the coax cable
- Up to five repeaters may be powered from the first repeater at the DVR side over the cable; if only one or two repeaters are used, the remaining power may also be adequate to power the SDI camera at the remote end
- A control signal (RS485) can be transmitted from the recorder (DVR) side to the camera over the coax cable
- The repeater enables simultaneous signal transmission camera control, and power, over a single cable

Parameter Name	Value
Temp Range (°C)	0 to 50
Storage Temp Range (°C)	-20 to 70
Distance (meters)	220m over RG6 @ 1.5Gbps
Downlink Speed	3Gbps
Uplink Speed	38.4Kbps
Supply Voltage	12VDC or 24VDC
Power over Coax (mW)	up to 9000
Interface Connector	75-ohm BNC to BNC



# CoaXPress Transmitter Eval Board

The CoaXPress (CXP) machine vision standard uses asymmetric data transmission over Coax cables - with speeds of up to 6.2Gbit/s from the camera and up to 20Mbit/s control data from the frame grabber to the camera. Microchip offers fully qualified board-sets (transmitter and receiver) as an evaluation and development aid to customers.

## Products supported:

- EQCO62T20.3
- EQCO31T20.3



CoaXPress<sup>®</sup> CXP Evaluation Board - Transmitter  
(Part # EVB-DBSUB1584)

# CoaXPress Receiver EVB-DBSUB1586

The CoaXPress (CXP) machine vision standard uses asymmetric data transmission over Coax cables - with speeds of up to 6.2Gbit/s from the camera and up to 20Mbit/s control data from the frame grabber to the camera. Microchip offers fully qualified board-sets (transmitter and receiver) as an evaluation and development aid to customers.

## Products supported:

- EQCO62R20.3
- EQCO31R20.3



CoaXPress® CXP Evaluation Board - Receiver  
(Part # EVB-DBSUB1586)

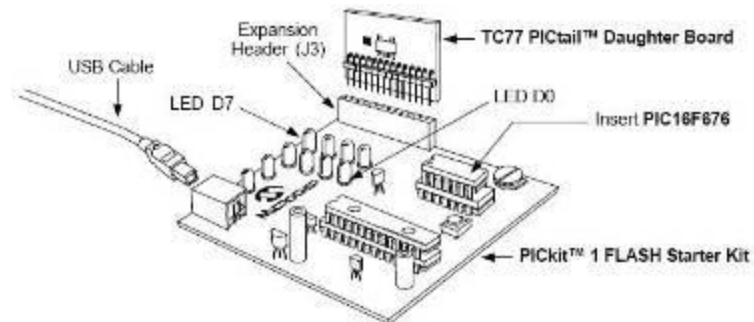
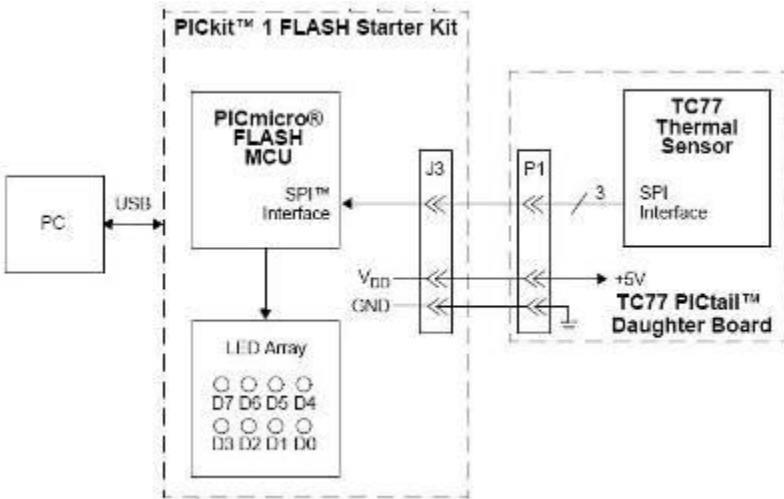


The TC77 Thermal Sensor PICtail™ Demo Board demonstrates how to interface the TC77 device to a microcontroller. A PIC16F676 14-pin Flash-based 8-bit CMOS microcontroller is included with the demo board, which can be used with the PICKit™ 1 Flash Starter Kit, along with firmware that provides the SPI interface and temperature conversion routines, to communicate with the TC77.

The Demo Board can also be used as a stand-alone module to quickly add thermal-sensing capability to any existing application. This basic sensor functionality is implemented on a small PCB.

## Products supported:

- TC77
- PIC16F676

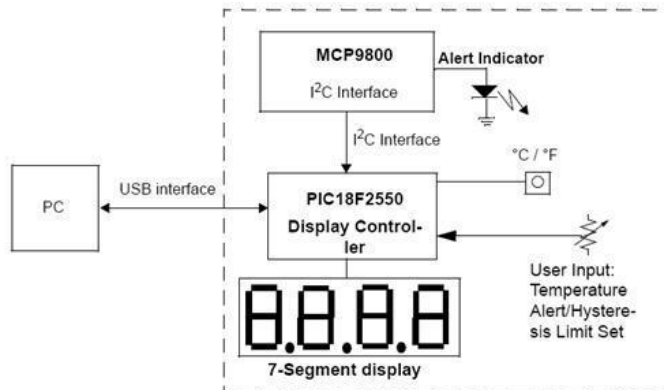
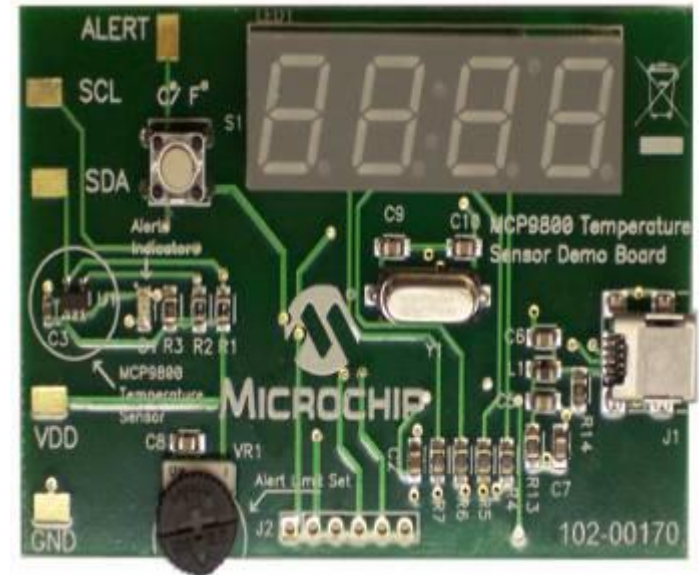


# MCP9800 Temperature Sensor Demo Board

The MCP9800 Temperature Sensor Demo Board demonstrates the sensor's features. Users can connect the demo board to a PC with USB interface and evaluate the sensor performance. The 7-Segment LED displays temperature in degrees Celsius or degrees Fahrenheit; the temperature alert feature can be set by the users using an on board potentiometer. An alert LED is used to indicate an over temperature condition. In addition, temperature can be datalogged using the Microchip Thermal Management Software Graphical User Interface (GUI). The sensor registers can also be programmed using the GUI.

## Products supported:

- MCP9800
- PIC18F2550



# MCP9902 Evaluation Board

The MCP9902 Temp Sensor Evaluation Board that demonstrates all of the MCP9902 features, and allows a user to view and modify registers. A user may:

- Plot the temperature of the two temperature channels
- Set alert temperatures associated with those channels.

LEDs indicating status information and test points are included to enable system voltages monitoring, using a voltmeter or an oscilloscope. The board requires only one universal serial bus (USB) connection to power the board.

**Products supported:**  
□ MCP9902





# EMC1833 Evaluation Board

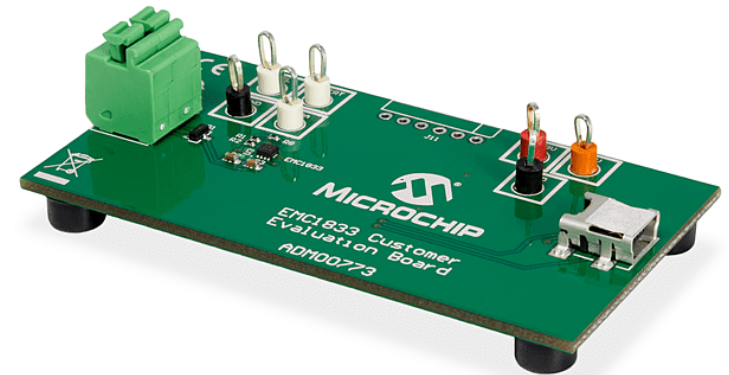
Online  
Datasheet


Also Serves as an Evaluation Board for EMC1812/3/4/5 and EMC1822/3/4

The EMC1833 Temp Sensor Evaluation Board demonstrates the EMC1833 as well as features for the EMC1812/3/4/5, EMC1822/3/4/5 and EMC1833/43. The board allows a user to view and modify registers. A user may:

- Plot the temperature of the three temperature channels
- Set alert temperatures associated with those channels
- Evaluate the rate of change measurement and alert functions

Test points are included to enable system voltages monitoring, using a voltmeter or an oscilloscope. The board requires only one universal serial bus (USB) connection to power the board.



EMC1833 3-Channel Temperature Evaluation Board  
(Part # ADM00773)  MICROCHIP

P/N ADM00773

<< BACK

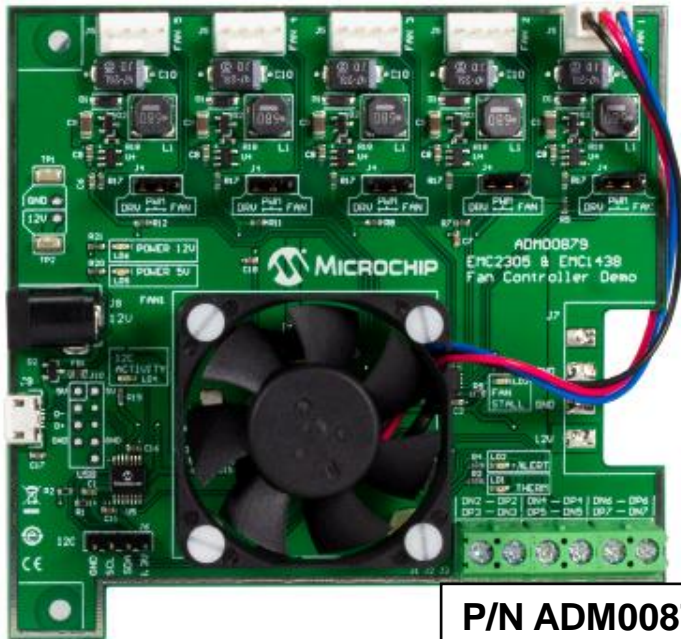


# EMC2305 & EMC1438 Fan Ctrl and Temp Demo

Online  
Datasheet

The ADM00879 Fan Controller Demo Board provides an example of a 12V fan control application using the EMC2305 fan controller and EMC1438 temperature sensor. There are 5 fan channels, 2 on board temperature sensors and 6 remote temperature sensor inputs available.

The demo GUI has options to manually set up all the parameters for the thermal sensor and fan controller, as well as providing a fully automatic temperature control interface where any fan channel can be linked to any temperature channel



P/N ADM00879

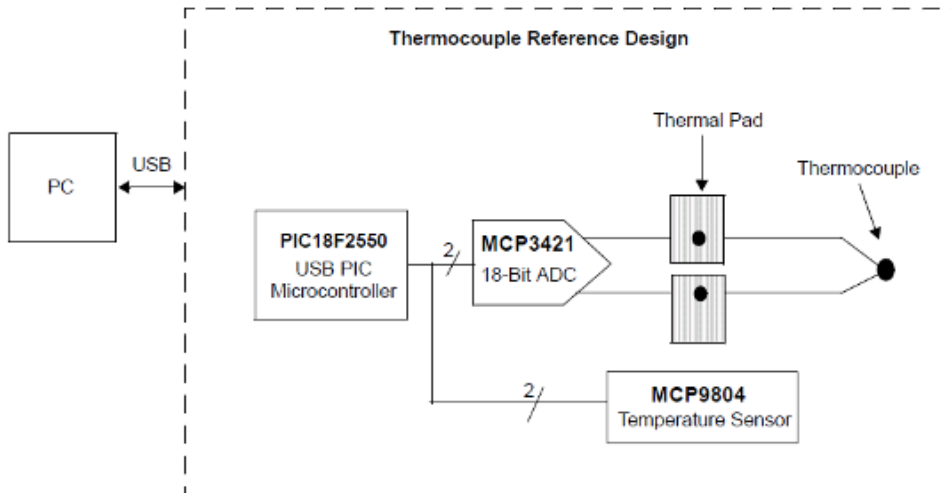
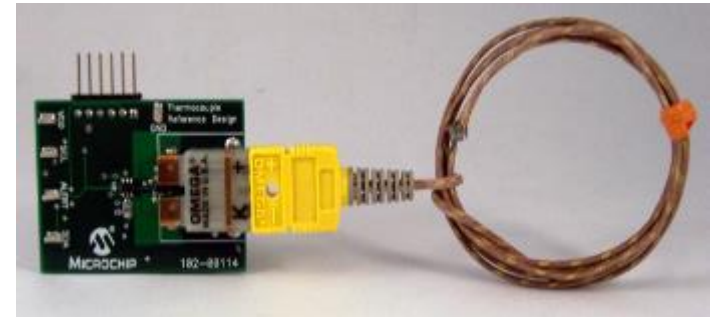
<< BACK to Fan Control

<< BACK to Thermal

The Thermocouple Reference Design demonstrates Microchip's solution to accurately measure temperature using a Thermocouple and an 18-bit ADC, MCP3421. This solution eliminates the need for the traditional analog instrumentation system calibration or gain and offset trimming techniques. In addition, the Thermocouple linearization techniques can be implemented in firmware or software.

## Products supported:

- ❑ MCP9804
- ❑ MCP3421
- ❑ PIC18F2550

[<< BACK to ADC](#)[<< BACK to Temp. Sensors](#)

The MCP9600 Thermocouple IC Evaluation Board is used to evaluate MCP9600 Thermocouple EMF voltage to degree Celsius converter. Users can easily evaluate all device features using a Type K thermocouple. The device also supports Types J, T, N, E, B, S and R thermocouples. Each of these types can be evaluated by replacing the Type K thermocouple connector with the corresponding connectors. In addition, the MCP9600 Thermocouple IC Evaluation Board connects to a PC via a USB interface. Temperature can be data-logged using the Microchip Thermal Management Software Graphical User Interface (GUI).

## Products supported:

- MCP9600
- PIC18F2520



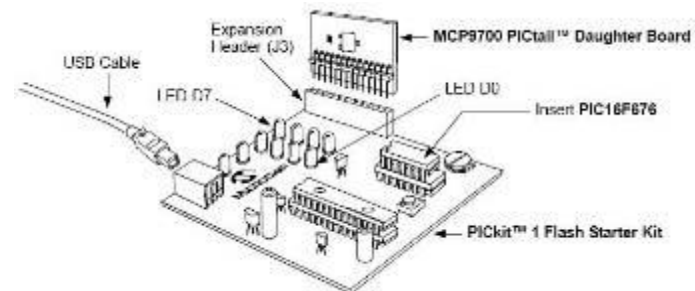
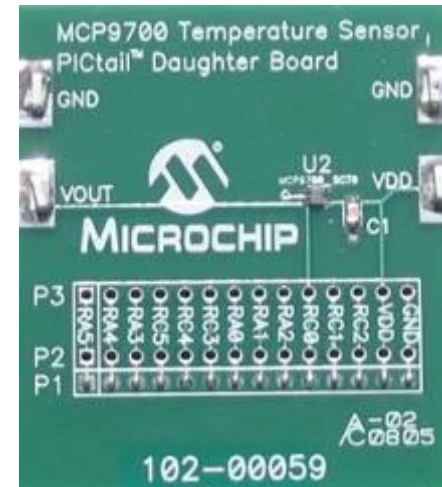
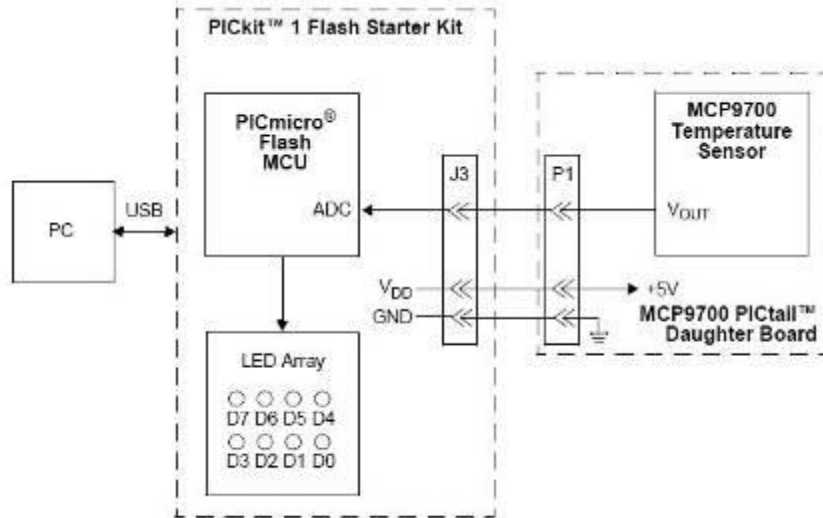
# MCP9700 PICtail™ Demo Board

The MCP9700 Temperature-to-Voltage Converter PICtail™ Demo Board demonstrates how to interface the MCP9700 to a PIC® microcontroller using the PICkit™ 1 Flash Starter Kit as a platform. A PIC16F676 14-pin, Flash-based, 8-bit CMOS microcontroller device is included with the demo board that can be used with the PICkit™ 1 Flash Starter Kit, along with firmware that provides the interface to the MCP9700 Temperature-to-Voltage Converter PICtail™ Demo Board and the voltage-to-temperature conversion routines.

The demo board can also be used as a stand-alone module to quickly add thermal sensing capability to any existing application. This basic sensor functionality is implemented on a small PCB and an interface via a standard 100 mil header.

## Products supported:

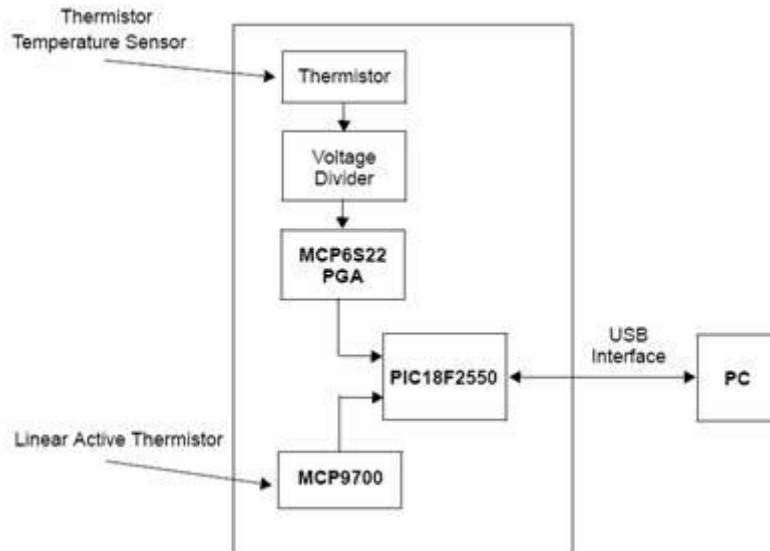
- MCP9700
- PIC16F676





# MCP9700 Thermistor Demo Board

The MCP9700 Thermistor Demo Board contains the analog circuitry to measure temperature. It uses BC Components' 232264055103 NTC thermistor to convert temperature to resistance. The thermistor is placed in a voltage divider which converts resistance to voltage. This voltage is filtered and placed at the MCP6S22 Programmable Gain Amplifier's (PGA) CH0 input. The PGA gains and buffers the thermistor. In addition, the board includes the MCP9700 Linear Active Thermistor. The MCP9700 outputs voltage proportional to temperature. A PIC18F2550 is used to both measure the voltage output of the MCP9700 and the MCP6S22 using an integrated 10-bit Analog to Digital Converter and communicate to a PC via USB interface. Temperature can be data logged using Microchip Thermal Management Software Graphical User Interface (GUI).



## Products supported:

- MCP9700
- MCP6S22
- PIC18F2550

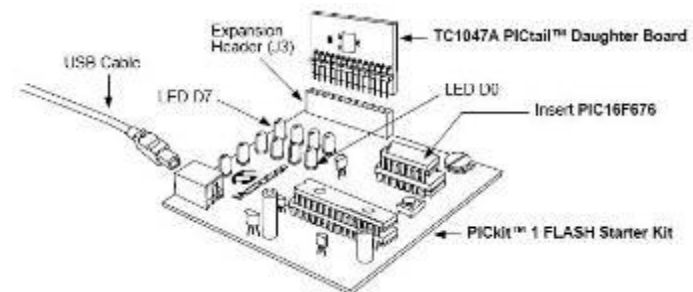
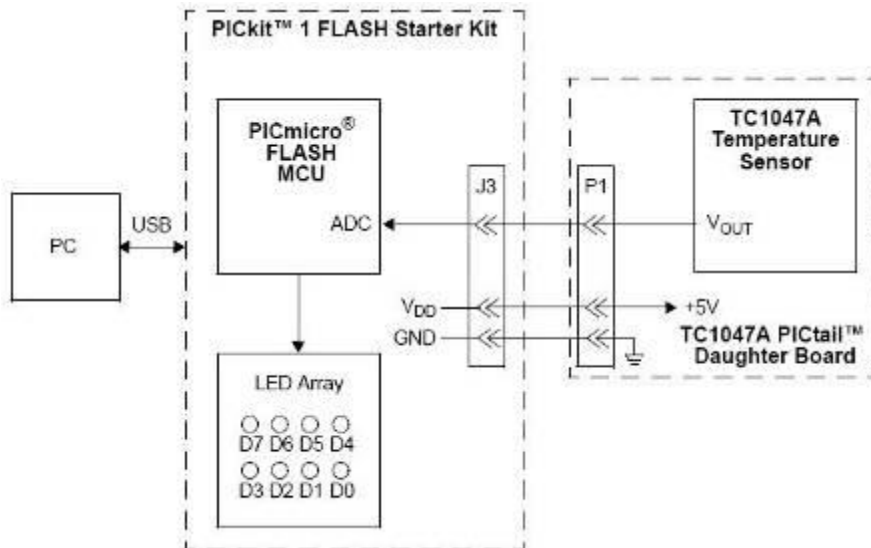
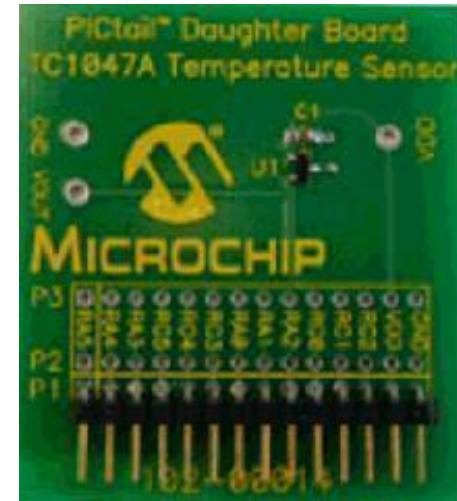


The TC1047A Temperature-to-Voltage Converter PICtail™ Demo Board demonstrates how to interface the TC1047A to a PIC® microcontroller using the PICkit™ 1 Flash Starter Kit as a platform. A PIC16F676 14-pin, Flash-based, 8-bit CMOS microcontroller device is included with the demo board that can be used with the PICkit™ 1 Flash Starter Kit, along with firmware that provides the interface to the TC1047A Temperature-to-Voltage Converter PICtail™ Demo Board and the voltage-to-temperature conversion routines.

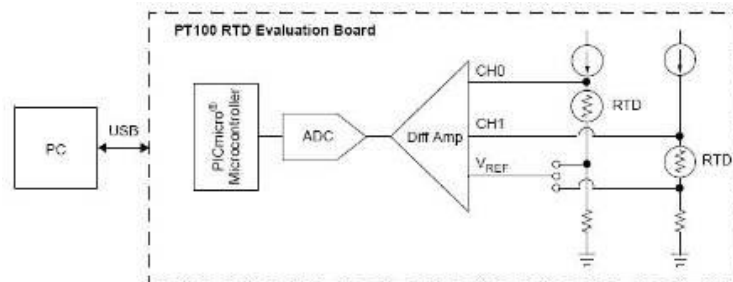
The demo board can also be used as a stand-alone module to quickly add thermal sensing capability to any existing application. This basic sensor functionality is implemented on a small PCB and an interface via a standard 100 mil header.

## Products supported:

- TC1047A
- PIC16F676



The PT100 RTD Evaluation Board allows the user to evaluate Microchip's solution to accurately measure temperature using RTD. When biasing RTDs to measure temperature, self-heat due to power dissipation has to be considered. RTD resistance availability typically ranges from 100 $\Omega$  to 5,000 $\Omega$ . In order to measure the output voltage across the RTD over a wide temperature range, the biasing current has to be relatively high. This higher current causes more power dissipation through heat and skews the temperature reading. Microchip's solution to this challenge is to use a MCP6S26 Programmable Gain Amplifier (PGA) to increase the sensor dynamic output range and increase measurement resolution while significantly reducing the biasing current magnitude.



## Products supported:

- MCP6S26
- MCP3301
- MCP6024
- MCP41010
- MCP6002
- TC1071
- PIC18F2550



The EMC1412 Evaluation Board provides the means to demonstrate the EMC1412 features and to view and modify registers through USB. LED indicators and test points are included to show status information and a fan driver circuit linearly drives a 5V fan to 3 different speeds based on programmable temperature limits.

## Products supported:

- EMC1412

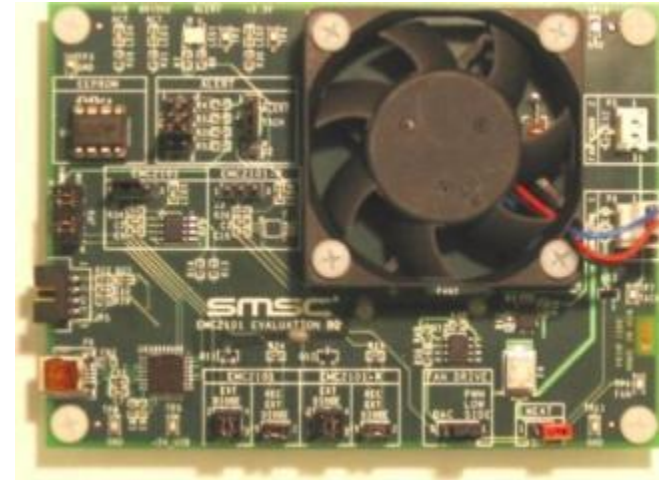


The EMC2101 EVB is a USB-based platform that provides the means to demonstrate EMC2101 features and to view and modify registers. A +12V fan and power supply are provided to demonstrate the fan control functionality. LEDs indicate status information and test points are included to monitor system voltages with a user provided voltmeter or oscilloscope. Also included are:

- Headers for connecting a remote diode or CPU/GPU thermal diode
- Chip Manager (SMSC application) allows:
  - Viewing and changing register values
  - Graphing of any register
  - Resistance Error Correction verification
- Autonomous register loading via included EEPROM (EMC2101-R only)
- USB communication to evaluation board
- An external SMBus master may also be used via jumper settings

## Products supported:

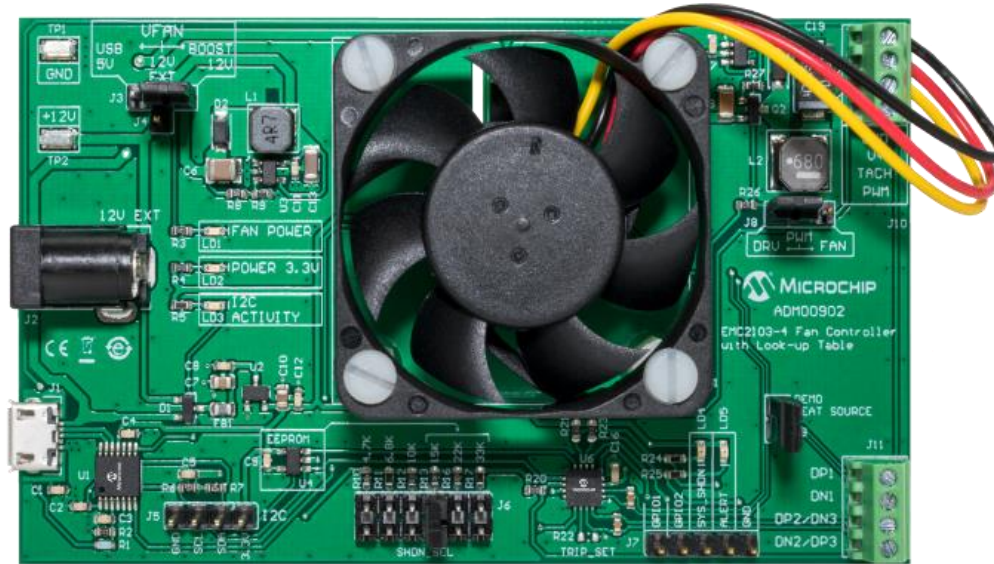
- EMC2101



**P/N ADM00902**

## Features List:

- The EMC2103-4 Fan Controller and Temperature Sensor evaluation board provides development platform with access to all device registers and settings such as spin up, ramp rate control and alerts. The board can drive 3 or 4 wire fans and provides access to all 3 external temperature channels.



- The GUI reports and plots the temperature and fan speed and also has a demo mode with a PID fan control implemented that automatically adjusts the fan speed to keep the temperature in check. The PID constants are user accessible so they can be fine tuned based on a specific setup.
- All device registers and configuration settings are editable from the GUI and they can also be saved either on the PC for later access or to the on-board EEPROM to be loaded at startup (specific feature for the EMC2103-4).

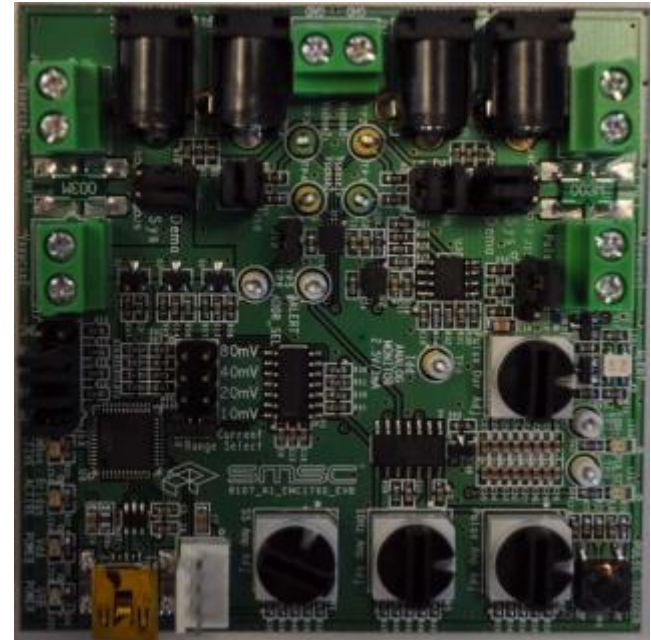
The PAC1710/20 Single-Dual High Side DC Current Sense Eval Board provides the means to evaluate features and to view and modify registers of both PAC1710 and PAC1720. There are two modes of EVB current monitoring operation: Demo Mode, which monitors an onboard current source, and Sys Mode, which monitors an external current source. LEDs indicate status information, and test points are included to monitor system voltages with a user-provided voltmeter or oscilloscope

## Features:

- Chip Manager software allows viewing and changing register values
- USB to SMBus bridge for power and communications
- Test points and LEDs for monitoring onboard function
- Screw terminal connections for monitoring external system current up to 20A
- Multiple onboard adjustable current sources (steady state, square wave, test pulse)
- Capability to connect directly to external SMBus master

## Products supported:

- PAC1710
- PAC1720



The PAC1921 is a dedicated power monitoring device with a configurable analog output. This device is unique in that all power related information is available on the 2-wire/I<sup>2</sup>C compatible interface and power, current, or voltage is available on the analog output..

The evaluation system has the ADM00592, a LabView based application, & allows the user to:

- View and change register values
- Save of settings of all registers allowing for quick configuration at a later time
- Graphing of any register

The hardware platform provides the user:

- Headers for connecting a Sense Resistor
- USB-to-SMBus bridge for communications
- Capability to connect directly to an external SMBus master

## Products supported:

- PAC1921



**PAC1921 High-Side Power and Current Monitor  
Evaluation Board  
(Part # ADM00592)**



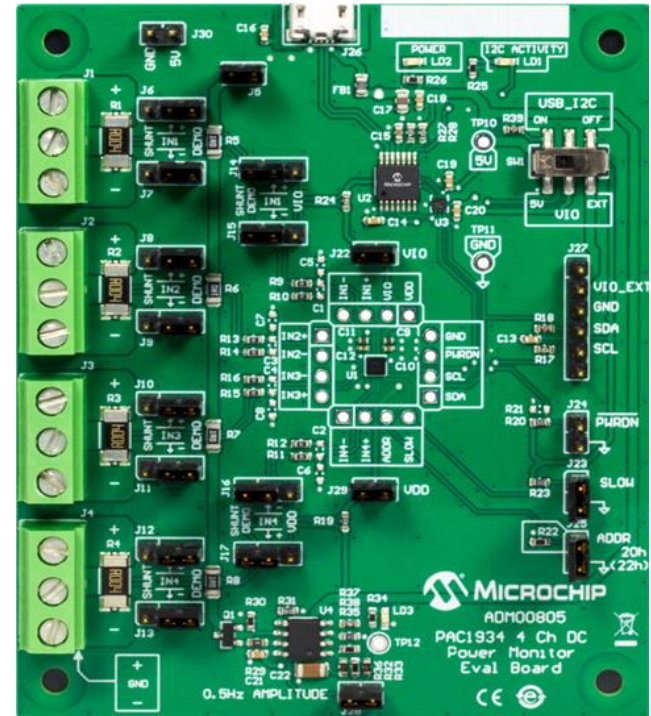
The PAC1934 Quad DC Power/Energy Monitor evaluation board provides the means to evaluate features and to view and modify registers of PAC1934. There are two modes of EVB : Demo Mode, which monitors an onboard current source, and System Mode, which monitors allows external connections.

## Features:

- GUI software allows viewing of up to 4 system voltage rails
- USB to SMBus bridge for power and communications
- Screw terminal connections for monitoring external system current
- Square wave on board source for Demo Mode
- Capability to connect directly to external SMBus master

## Products supported:

- PAC1934

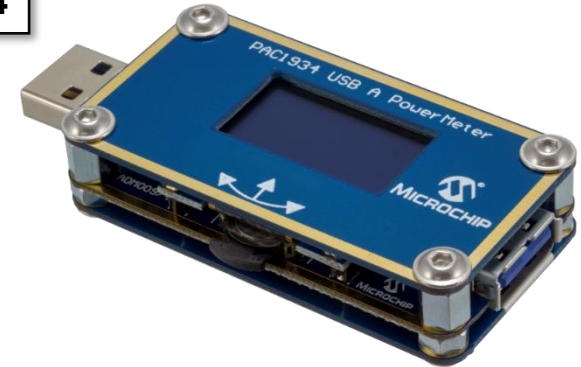




# PAC1934 USB A Power Meter

[Online  
Datasheet](#)

P/N ADM00974



It measures USB voltage and current, automatically calculates instantaneous power and accumulates power over time, making it suitable for power and energy monitoring. The power meter features a user-friendly joystick control and an OLED display. It features PAC1934, a Quad DC Power/Energy Monitor with Accumulation IC.

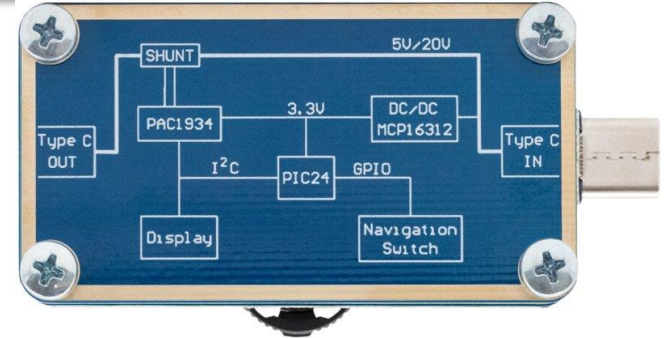
PAC1934's internal 48-bit power accumulator and 24-bit sample counter registers offloads the Power Meter MCU processing load, reducing the device power consumption and making room for additional high-level features.

PAC1934's internal high-speed data sampling rate (1024) ensures high accuracy metering data reporting with no MCU processing required. Up to 10 measurements can be saved in device FLASH memory. The device counters can be reset to 0 or can be restored to the data saved previously in the FLASH memory.

[<< BACK](#)

# PAC1934 USB C Power Meter

P/N ADM00921



It measures USB voltage and current, automatically calculates instantaneous power and accumulates power over time, making it suitable for power and energy monitoring. The power meter features a user-friendly joystick control and an OLED display. It features PAC1934, a Quad DC Power/Energy Monitor with Accumulation IC.

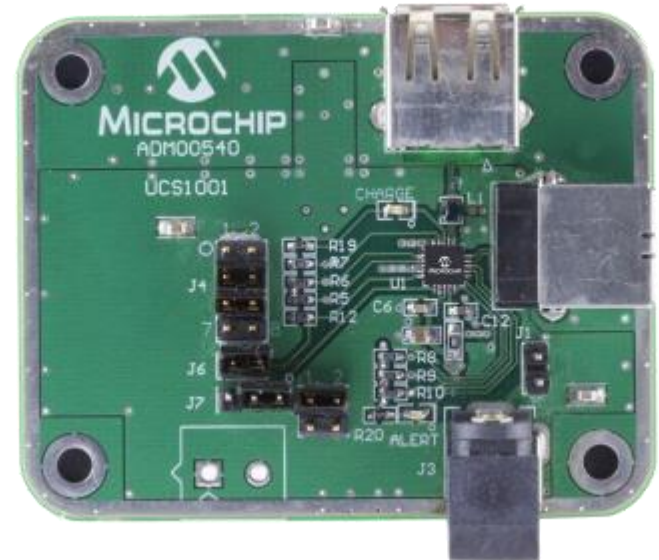
PAC1934's internal 48-bit power accumulator and 24-bit sample counter registers offloads the Power Meter MCU processing load, reducing the device power consumption and making room for additional high-level features.

PAC1934's internal high-speed data sampling rate (1024) ensures high accuracy metering data reporting with no MCU processing required. Up to 10 measurements can be saved in device FLASH memory. The device counters can be reset to 0 or can be restored to the data saved previously in the FLASH memory.

The UCS1001 Evaluation Board is intended for evaluation of stand-alone USB charging. The UCS1001 supports popular emulation profiles for Apple, Samsung, and BC1.2 compliant devices. Jumper configurations allow selection of operation for Dedicated Charging Emulation, Charging Downstream Port, Standard Downstream Port, and USB Pass Through

## Products supported:

- UCS1001-1
- UCS1001-2



The UCS1002 Evaluation Board allows the user to use a graphical user interface to demonstrate the Highest Current Algorithm, apply charger emulation profiles, and set up for full BC1.2 CDP, DCP, and SDP modes. Options in the GUI include custom profile register configuration, dead battery routines, charge ration operation, and configuration of fault handling.

## Products supported:

- UCS1002





# MCP6S22 PICtail™ Demo Board

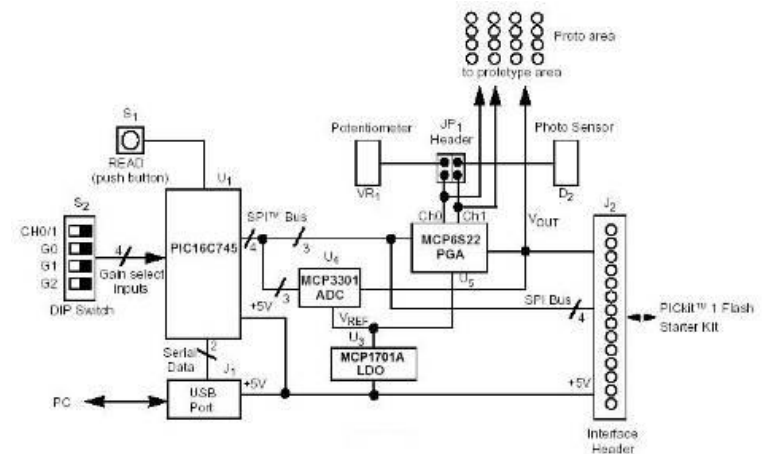
Online  
Datasheet

The MCP6S22 PGA PICtail™ Demo Board is used to evaluate and demonstrate Microchip Technology's Programmable Gain Amplifier (PGA) family, MCP6S21/2/6/8. This board has a user interface program the MCP6S22 two-channel PGA. It can also be interfaced with Microchip's PICkit™ 1 Flash Starter Kit Development Board. This platform allows the user to develop firmware that selects the PGA gains and channels using SPI interface.

The demo board can also be used stand-alone, with a user interface that allows the PGA gains and channels to be selected without a firmware development. The board uses a USB interface to communicate with a PC, while the PICkit™ software can be used as a Graphical User Interface (GUI) to display the PGA output voltage.

## Products supported:

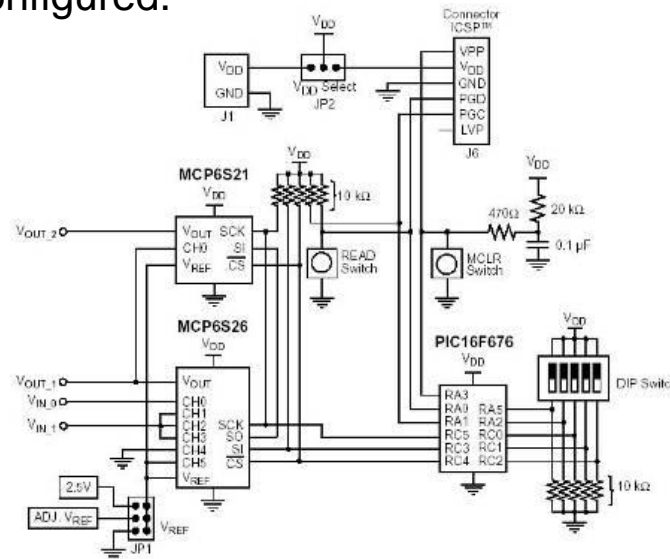
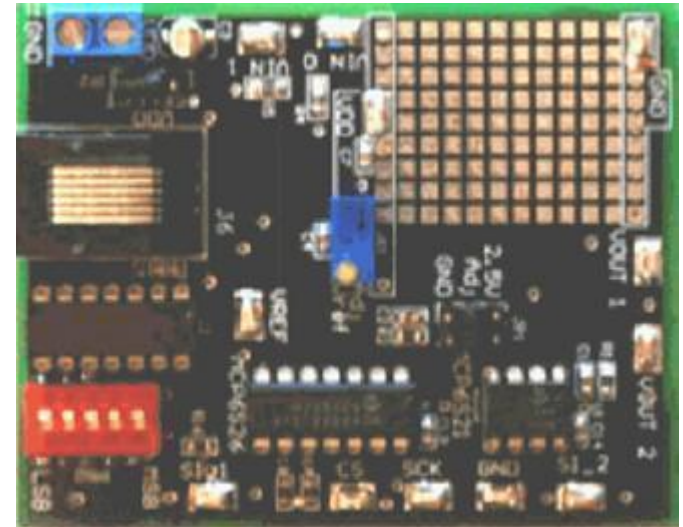
- MCP6S22
- MCP3301
- MCP1701A
- PIC16C745



The single-channel MCP6S21 and six-channel MCP6S26 have been selected for this evaluation board. The PIC16F676 microcontroller is used on-board DIP switch settings that are configured according to the table printed on the evaluation board. This allows the user to program the channel, gain and shutdown of each PGA. Either PGA or both PGAs can be shut down. The six channels of the MCP6S26 and the PGA gains of 1, 2, 4, 5, 8, 10, 16 and 32 V/V can be configured.

## Products supported:

- MCP6S21
- MCP6S26
- PIC16F676

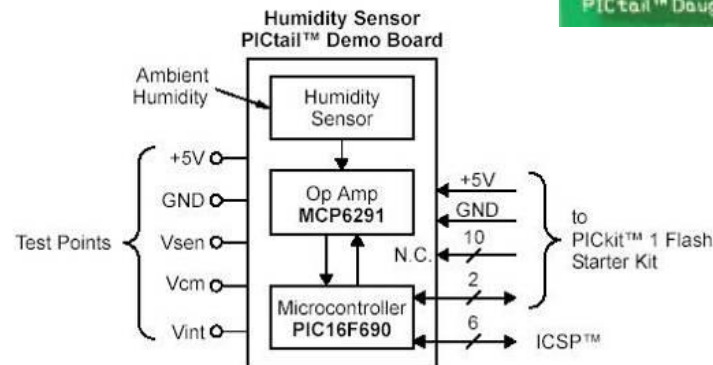
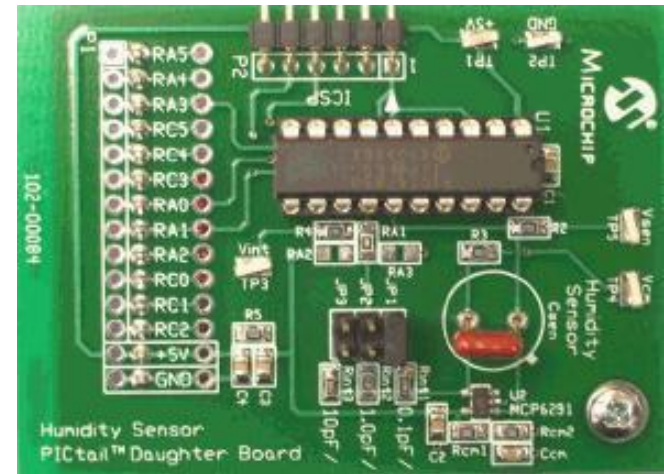


# Humidity Sensor PICtail™ Demo Board

The Humidity Sensor PICtail™ Demo Board senses the ambient relative humidity by changes in the capacitance of the humidity sensor (HS1101LF from Humirel). This sensor is connected to a MCP6291 op amp and a resistor to form an inverting (Miller) integrator. The PIC16F690 microcontroller sends a square wave to the input of the integrator, which the integrator converts to a triangle wave at its output. The firmware controls the magnitude of the triangle wave and measure the integration time. The microcontroller measure the time it takes for the triangle wave to rise and fall. These times are converted to a capacitance value.

## Products supported:

- MCP6291
- PIC16F690



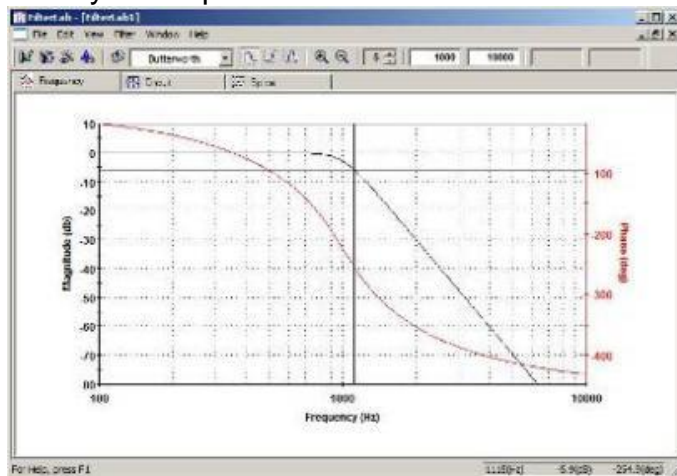


FilterLab® is an innovative software tool that simplifies active filter design. Available at no cost, the FilterLab® active filter software design tool provides full schematic diagrams of the filter circuit with component values and displays the frequency response.

**Features:**

- Allows the design of low-pass filters up to an 8th order filter with Chebyshev, Bessel or Butterworth responses from frequencies of 0.1 Hz to 10 MHz
- Selection of flat passband or sharp transition from passband to stopband
- Options, such as minimum ripple factor, sharp transition and linear phase delay, are available
- Changes in capacitor values can be implemented
- Generates a spice model of the designed filter allowing time domain analysis in spice simulations

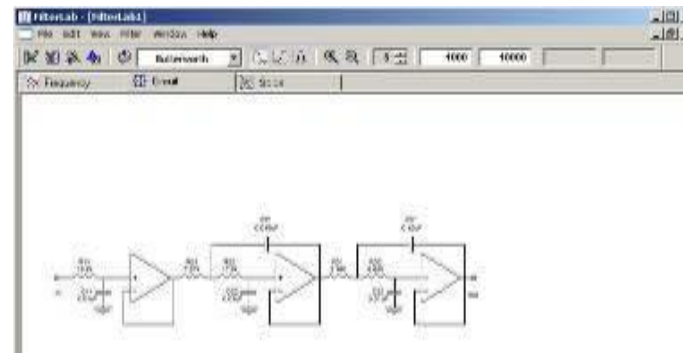
**Products supported:**  
 □ MCP6xxx



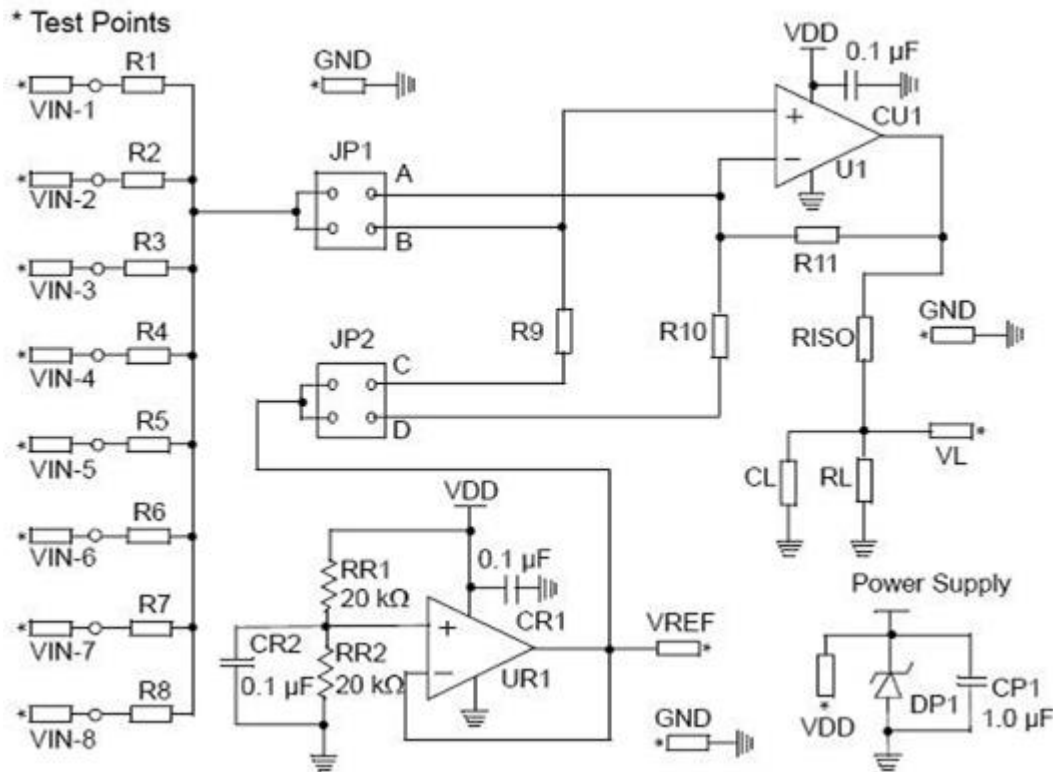
\*\*\*\*\* SUBCIRCUIT FOR SINGLE SUPPLY LOWPASS FILTER \*\*\*\*\*  
 \* CREATED USING FILTERLAB ON 3/13/2006 AT 17:28:55 \*  
 \* This model is being supplied as an aid to circuit designers. \*  
 \* While it reflects reasonable close similarity to the actual \*  
 \* filter in terms of performance, it is NOT suggested as a \*  
 \* replacement for breadboarding. Simulation should be used as \*  
 \* a complement to a supplement to traditional lab testing. \*  
 \* Neither this model nor any part may be copied without the \*  
 \* express written consent of Microchip Technology, Inc. \*  
 \* \*\*\*\*\*  
 \* 5TH ORDER BUTTERWORTH FILTER \*  
 \* GAIN EQUALS 1 \*  
 \* CONNECTIONS: \*  

	INPUT	OUTPUT	
*	1	1	POSITIV
*	1	1	NE
*	1	1	!
*	1	1	!
*	1	2	3 4
*	1	2	3 4

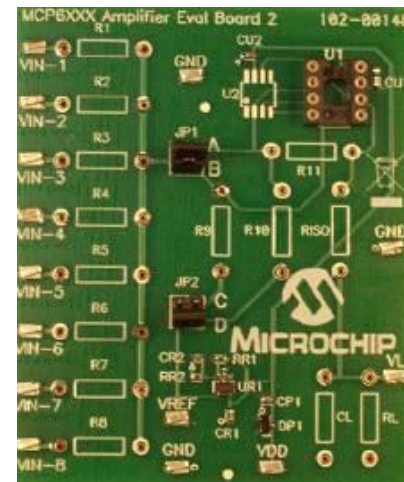
 \* SUBCIRCT FILTERLAB1 10 40 3 4 \*  
 \*\*\*\*\* Stage 1 \*\*\*\*\*  
 R11 10 11 18000.000  
 C11 11 0 0.00000001  
 X11 13 30 3 4 30  
 \*\*\*\*\* Stage 2 \*\*\*\*\*  
 R21 20 21 7870.000  
 R22 21 22 17800.000  
 For Help, press F1



The MCP6XXX Amplifier Evaluation Board 2 is designed to support inverting/non-inverting summing amplifiers.

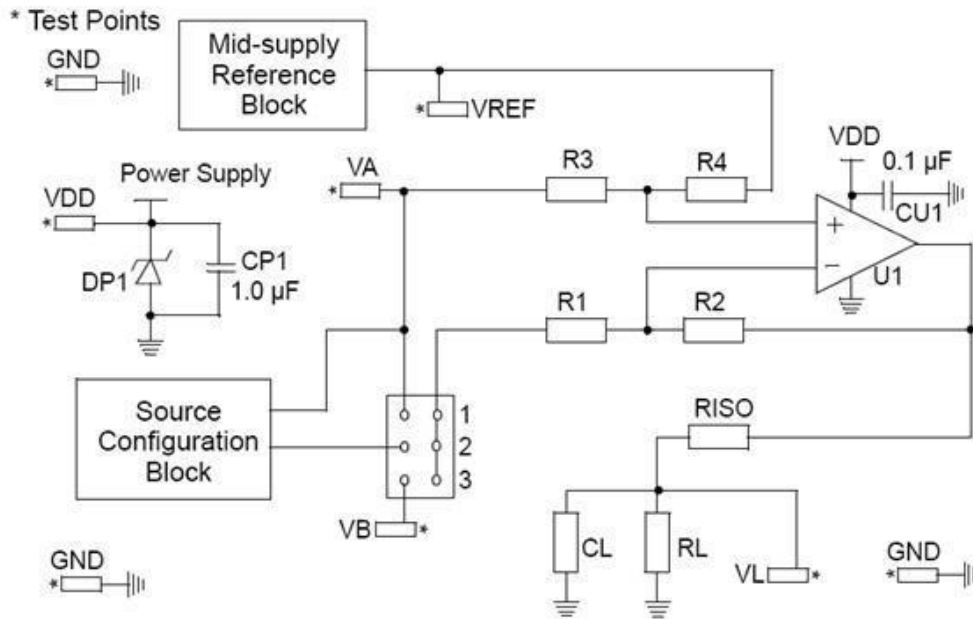


**Products supported:**  
 MCP6XXX



# MCP6XXX Amplifier Evaluation Board 3

The MCP6XXX Amplifier Evaluation Board 3 is intended to support the difference amplifier circuits.



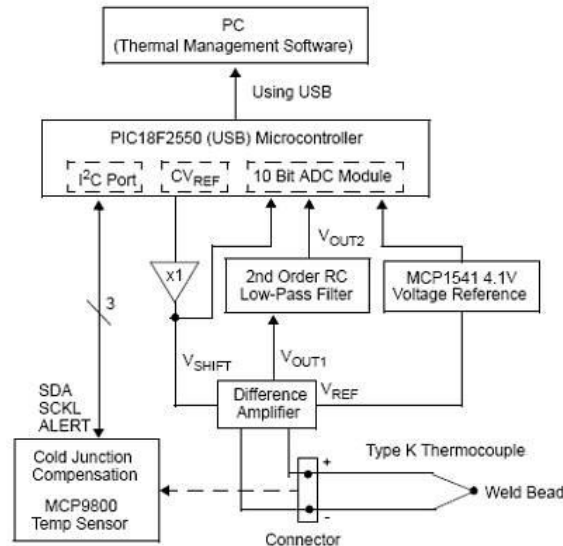
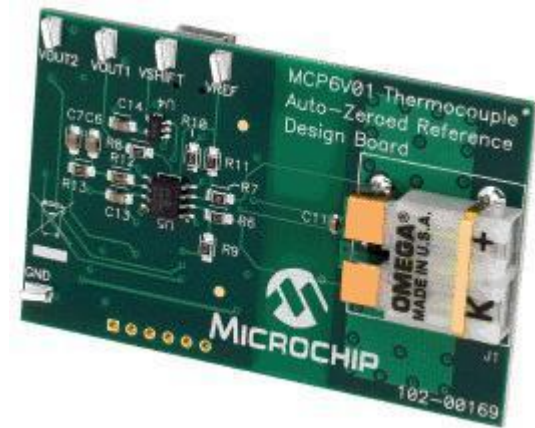
**Products supported:**  
 MCP6XXX



The MCP6V01 Thermocouple Auto-Zeroed Reference Design demonstrates how to use a difference amplifier system to measure electromotive force (EMF) voltage at the cold junction of thermocouple in order to accurately measure temperature at the hot junction. This can be done by using the MCP6V01 auto-zeroed op amp because of its ultra low offset voltage ( $V_{OS}$ ) and high common mode rejection ratio (CMRR)

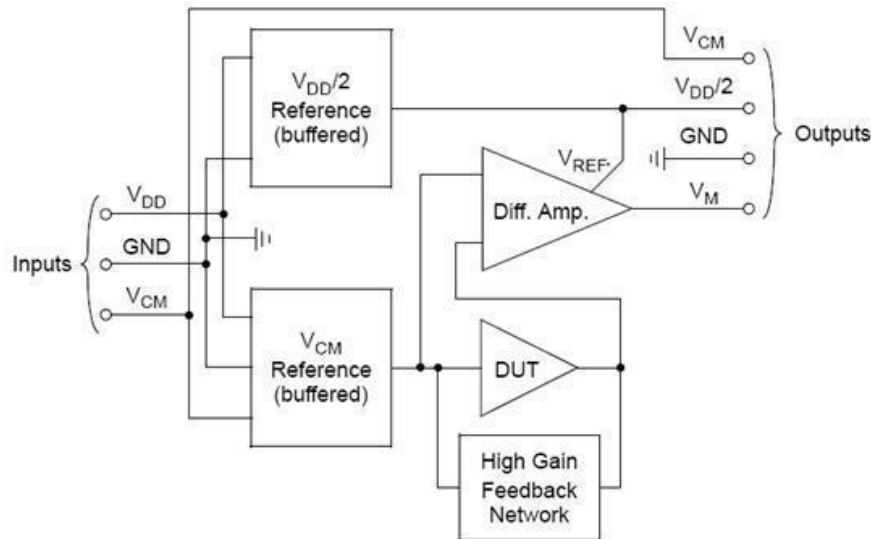
## Products supported:

- ❑ MCP6V01
- ❑ MCP9800
- ❑ MCP1541
- ❑ PIC18F2550



# MCP6V01 Input Offset Demo Board

The MCP6V01 Input Offset Demo Board is intended to provide a simple means to measure the MCP6V01/2/3 op amps input offset voltage ( $V_{OS}$ ) under a variety of bias conditions. This  $V_{OS}$  includes the specified input offset voltage value found in the data sheet plus changes due to power supply voltage (PSRR), common mode voltage (CMRR), output voltage ( $A_{OL}$ ) and temperature ( $I_{VOS}/I_{TA}$ ).



## Products supported:

- MCP6V01
- MCP6V03
- MCP6V06
- MCP6V08



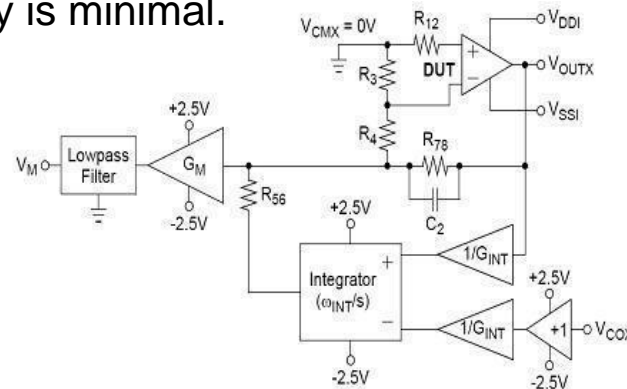
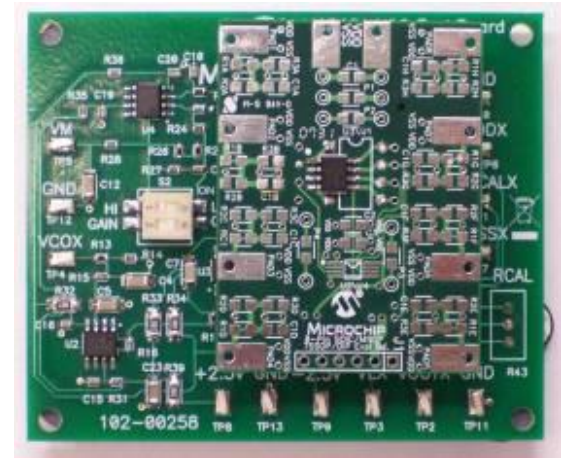
# MCP651 Input Offset Evaluation Board

The MCP651 Input Offset Evaluation Board is intended to provide a simple means to measure the MCP651 op amp's input offset voltage under a variety of operating conditions. The measured input offset voltage includes the input offset voltage specified in the data sheet plus changes due to: power supply voltage (PSRR), common mode voltage (CMRR), output voltage, input offset voltage drift over temperature and 1/f noise.

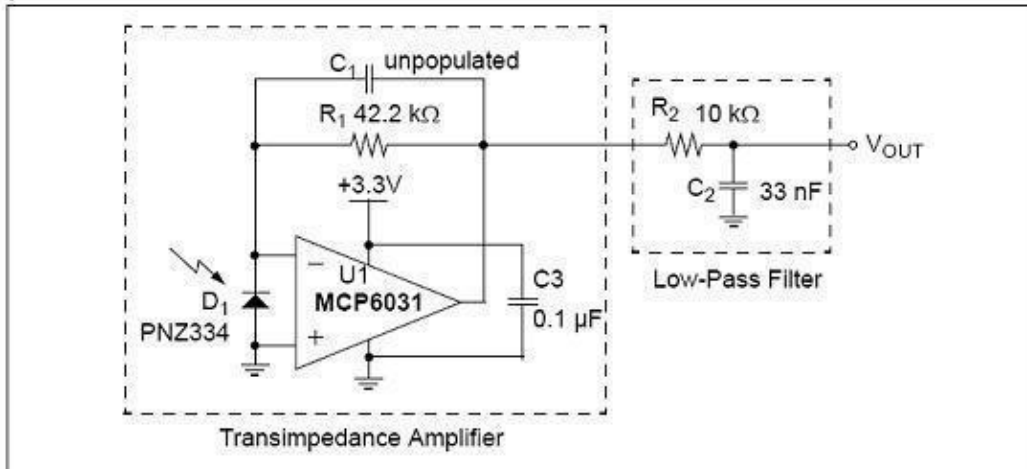
The MCP651 Input Offset Evaluation Board works most effectively at room temperature (near +25°C). Measurements at other temperatures should be done in an oven where the air velocity is minimal.

## Products supported:

- MCP651
- MCP6V01



The MCP6031 Photodiode PICtail™ Plus Demo Board demonstrates how to use a trans-impedance amplifier, which consists of MCP6031 high precision op amp and external resistors, to convert photo-current to voltage.



**FIGURE 1-4:** MCP6031 Photodiode PICtail™ Plus Demo Board Circuit Diagram.

**Products supported:**

- MCP6031



# MCP661 Line Driver Demo board

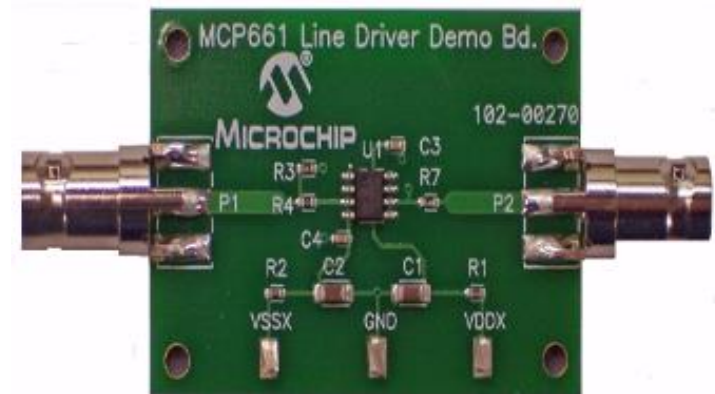
This demo board uses the MCP661 in a very basic application for high-speed op amps; a 50 $\Omega$  line (coax) driver:

- A 30 MHz solution
- High speed PCB layout techniques
- A means to test AC response, step response and distortion

Both the input and the output are connected to lab equipment with 50 $\Omega$  BNC cables. There are 50 $\Omega$  terminating resistors and transmission lines on the board. The op amp is set to a gain of 2V/V to overcome the loss at its output caused by the 50 $\Omega$  resistor at that point. Connecting lab supplies to the board is simple; there are three surface mount test points provided for this purpose.

## Products supported:

- MCP661
- MCP662
- MCP665







# MCP6N11 Wheatstone Bridge Reference Design

Online  
Datasheet

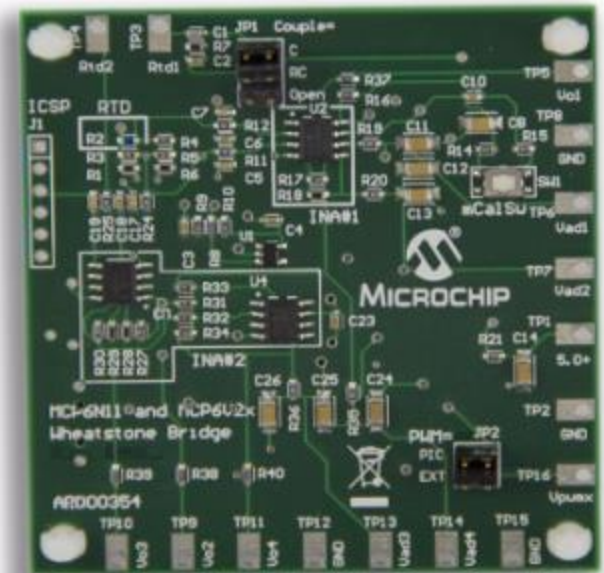
This board demonstrates the performance of Microchip's MCP6N11 instrumentation amplifier (INA) and a traditional three op amp INA using Microchip's MCP6V26 and MCP6V27 auto-zeroed op amps. The input signal comes from an RTD temperature sensor in a Wheatstone bridge. Real world interference is added to the bridge's output, to provide realistic performance comparisons. Data is gathered and displayed on a PC, for ease of use. The USB PICmicro® microcontroller and included Graphical User Interface (GUI) provides the means to configure the board and collect sample data.

## This Kit Contains:

- 1x MCP6N11 Wheatstone Bridge Reference Design
- 1x Mini USB Cable

## Products supported:

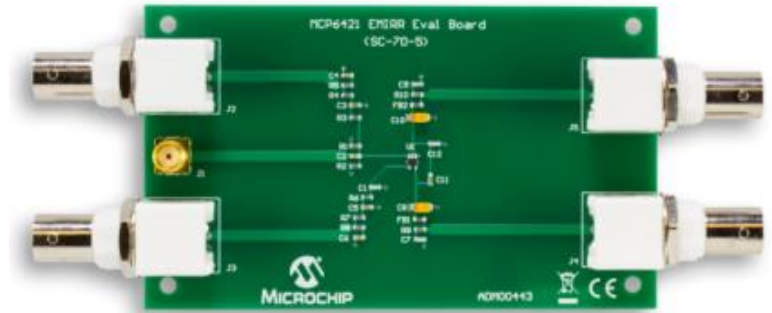
- MCP6N11
- MCP6001
- MCP6V26/7
- PIC18F2553



# MCP6421 EMIRR Eval Board

The MCP6421 EMIRR Evaluation Board is intended to support the electromagnetic interference rejection ratio (EMIRR) measurement and to show the electromagnetic interference (EMI) rejection capability of the MCP6421 operational amplifier.

**Products supported:**  
□ MCP6421



This evaluation board is designed to provide an easy and flexible platform when evaluating the performance of the MCP6N16, a Zero-Drift instrumentation amplifier. The evaluation board is populated with the MCP6N16-100, which is optimized for gains of 100V/V or higher. If one of the other gain option models is desired (e.g. MCP6N16-001 for gain of  $\geq 1\text{V/V}$ , or the MCP6N16-010 for gain of  $\geq 10\text{V/V}$ ), exchanging the DUT and adjusting the gain setting resistors can easily be accomplished with standard soldering tools.

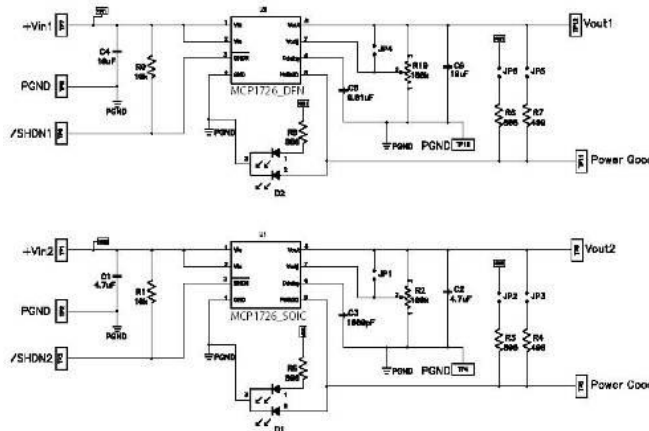
The board includes differential input filtering, two jumper selectable gain settings and output filtering, in addition to an external voltage reference circuit to allow for an adjustable output common-mode level shifting.

**Products supported:**  
□ MCP6N16



The MCP1726 1A LDO Evaluation Board allows the user to evaluate both the fixed and adjustable versions of the part in the 8-pin SOIC and 8-lead 3x3 DFN packages. An on-board potentiometer allows the user to easily set the output voltage of the adjustable voltage version of the device. Status LEDs indicate when input voltage is applied and when the Power Good (PWRGD) output is in a high condition (output voltage is in regulation).

Connection terminals are provided for the input voltage, output voltage, ground, power good and shutdown.



**Products supported:**  
 MCP1726



# SOT223-5 Voltage Regulator Eval Board

The SOT223-5 Voltage Regulator Evaluation Board is designed to be used to facilitate the evaluation of Microchip's voltage regulators or to be used as a standalone voltage regulator board. Jumpers have been placed on the board to facilitate testing of specific voltage regulator parameters. The jumpers may also be used to select pull-up and pull-down voltage levels.

## Features:

- Input and Output headers for future connection to Line Step and Load Step modules
- Ample test points to attach multi-meters, power supplies, and loads
- Jumper to select ground current measurement
- Jumper to select input capacitor
- Jumper to select two different load resistors
- Jumper to select shutdown pin input:  $V_{DD}$ , GND, or use test point
- Jumper to connect input capacitor to circuit
- SMT0805 PCB footprints for user Power-Good pull-up resistor
- SMT0805 PCB footprints for user Adjustable Voltage resistor divider
- SMT0805 PCB footprints for user Bypass Capacitor

**P/N: SOT223-5EV-VREG**

## Products supported:

- MCP1790
- MCP1824
- MCP1825
- MCP1826



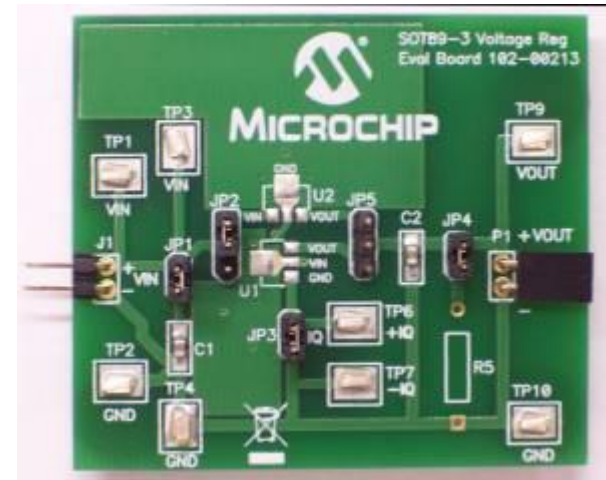
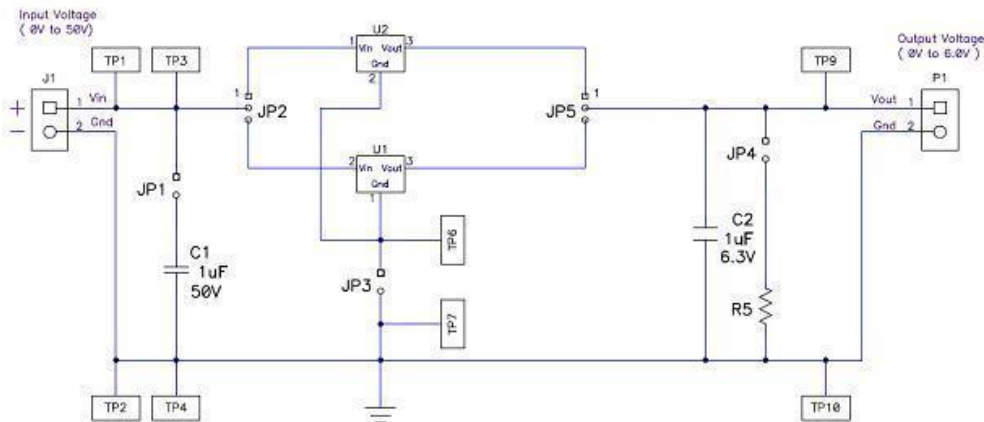
# SOT89-3 Voltage Regulator Eval Board

The SOT89-3 Voltage Regulator Evaluation Board is designed to provide functional evaluation of Microchip Voltage Regulators that utilize the SOT89-3 package.

The SOT89-3 Voltage Regulator Evaluation Board does not come with a voltage regulator soldered onto the board. This allows the user to attach the voltage regulator of their choosing to the board and perform quiescent current, ground current, PSRR, and other desired tests.

## Products supported:

- MCP1700
- MCP1701A
- MCP1702
- MCP1703



The MIC38150 is a 1.5A continuous output current step down converter. This is a follow on product in the new High Efficiency Low DropOut Regulators (HELDO®) family, that provide the benefits of an LDO with respect to ease of use, fast transient performance, high PSRR and low noise while offering the efficiency of a switching regulator.

## Products supported:

- MIC38150



The MIC38300 is a 3A peak, 2.2A continuous output current step down converter. This is the first device in a new generation of High Efficiency Low Dropout (HELDO®) regulators that provide the benefits of an LDO in respect to ease of use, fast transient performance, high PSRR and low noise while offering the efficiency of a switching regulator.

## Products supported:

- MIC38300





The MIC47100 is a high speed, low  $V_{IN}$  LDO capable of delivering up to 1A and designed to take advantage of point-of-load applications that use multiple supply rails to generate a low-voltage, high-current power supply.

The MIC47100 has an NMOS output stage offering very low output impedance. The NMOS output stage offers a unique ability to respond very quickly to sudden load changes such as that required by a microprocessor, DSP, or FPGA. The MIC47100 consumes little quiescent current and therefore can be used for driving the core voltages of mobile processors, post regulating a core DC/DC converter in any portable device.

## Products supported:

- MIC47100



The MIC49200 is a high-bandwidth, low-dropout, 2A voltage regulator ideal for powering core voltages of low-power microprocessors. The MIC49200 implements a dual supply configuration allowing for very low output impedance and very fast transient response.

The MIC49200 requires a bias input supply and a main input supply, allowing for ultra-low input voltages on the main supply rail. The input supply operates from 1.4V to 6.5V and the bias supply requires between 3V and 6.5V for proper operation. The MIC49200 offers fixed output voltages from 0.9V to 1.8V and adjustable output voltages down to 0.9V.

## Products supported:

- MIC49200



The MIC5165 is a dual regulator controller designed specifically for low-voltage memory termination applications such as DDR3 and GDDR3/4/5. The MIC5165 offers a simple, low-cost JEDEC-compliant solution for terminating high-speed, low-voltage digital buses with a Power Good (PG) signal.

The MIC5165 controls two external N-Channel MOSFETs to form two separate regulators. It operates by switching between either the high-side MOSFET or the low-side MOSFET, depending on whether the current is being sourced to the load or being sunk by the regulator.

## Products supported:

- MIC5165



The MIC5166 is a 3A, high-speed, linear, low  $V_{IN}$ , double data rate (DDR), memory terminator power supply. The part is small and requires small output capacitors making it a tiny overall solution. This allows it to be conveniently placed close to the DDR memory, minimizing circuit board layout inductance which may cause excessive voltage ripple at the DDR memory.

The MIC5166 contains a precision voltage divider network in order to take in the  $V_{DDQ}$  voltage as a reference voltage and conveniently output the terminator voltage ( $V_{TT}$ ) at one half of the  $V_{DDQ}$  input voltage.

## Products supported:

- MIC5166



The MIC5234 is a low-quiescent current,  $\mu$ Cap low-dropout regulator. With a maximum operating input voltage of 30V and quiescent current of  $20\mu\text{A}$ , it is ideal for supplying keep-alive power in systems with high-voltage batteries.

Capable of 150mA output, the MIC5234 has a dropout voltage of only 320mV. It can also survive an input transient of -20V to +32V. The MIC5234 requires only a  $2.2\mu\text{F}$  output capacitor for stable operation.

**Products supported:**  
□ MIC5234



The MIC59150 is a high-bandwidth, low-dropout, 1.5A linear voltage regulator ideal for powering core voltages of low-power microprocessors. The MIC59150 implements a dual supply configuration allowing for a very low output impedance and a very fast transient response.

The MIC59150 requires a bias input supply and a main input supply, allowing for ultra-low input voltages on the main supply rail. The device operates from an input supply of 1.0V to 3.8V and bias supply between 3V and 5.5V. The MIC59150 offers adjustable output voltages down to 0.5V.

## Products supported:

- MIC59150



The MIC59300 is a high-bandwidth, low-dropout, 3A linear voltage regulator ideal for powering core voltages of low-power microprocessors. The MIC59300 implements a dual supply configuration allowing for a very low output impedance and a very fast transient response.

The MIC59300 requires a bias input supply and a main input supply, allowing for ultra-low input voltages on the main supply rail. The device operates from an input supply of 1.0V to 3.8V and bias supply between 3V and 5.5V. The MIC59300 offers fixed output voltages and adjustable output voltages down to 0.5V.

## Products supported:

- MIC59300



The MIC68400 is a high peak current LDO regulator designed specifically for powering applications such as FPGA core voltages that require high start up current with lower nominal operating current. Capable of sourcing 4A of current for start-up, the MIC68400 provides high power from a small MLF<sup>®</sup> lead-less package. The MIC68400 can also implement a variety of power-up and power-down protocols such as sequencing, tracking, and ratiometric tracking.

## Products supported:

- MIC64200





The MIC69101/103 is the 1A output current member of the MIC69xxx family of high-current, low-voltage regulators that support currents of 1A, 1.5A, 3A, and 5A. The MIC69101/103 operates from a single low voltage supply, yet offers high precision and ultra-low dropout of 500mV under worst case conditions.

The MIC69101/103 operates from an input voltage of 1.65V to 5.5V. It is designed to drive digital circuits requiring low voltage at high currents (i.e. PLDs, DSP, microcontroller, etc.). These regulators are available in adjustable and fixed output voltages including 1.8V. The adjustable version can support output voltages down to 0.5V.

## Products supported:

- MIC69103



The MIC69153 is the 1.5A output-current member of the MIC69xxx family of high current, low voltage regulators that support currents of 1A, 1.5A, 3A, and 5A. The MIC69153 operates from a single low voltage supply, yet offers high precision and ultra-low dropout of 500mV under worst case conditions.

The MIC69153 operates from an input voltage of 1.65V to 5.5V. It is designed to drive digital circuits requiring low voltage at high currents (i.e. PLDs, DSP, microcontroller, etc.). These regulators are available in adjustable and fixed output voltages including 1.8V. The adjustable version can support output voltages down to 0.5V.

## Products supported:

- MIC69153



The MIC69302 is the 3A output current member of the MIC69xxx family of high-current, low-voltage regulators, which support currents of 1A, 1.5A, 3A, and 5A. This family operates from a single low voltage supply, yet offers high precision and ultra-low dropout of 500mV under worst case conditions.

The MIC69302 operates from an input voltage of 1.65V to 5.5V. It is designed to drive digital circuits requiring low voltage at high currents (i.e., PLDs, DSP, microcontroller, etc.). These regulators are available in adjustable and fixed output voltages. The adjustable version can support output voltages down to 0.5V.

## Products supported:

- MIC69302



The MIC69502 is a 5A, low dropout linear regulator that provides low-voltage, high-current outputs with a minimum of external components. It offers high precision and ultra-low dropout of 500mV under worst case conditions.

The MIC69502 operates from an input voltage of 1.65V to 5.5V. It is designed to drive digital circuits requiring low voltage at high currents (i.e. PLDs, DSP, microcontroller, etc.). The MIC69502 output is adjustable to a min of 0.5V.

The  $\mu$ Cap design of the MIC69502 is optimized for stability with low value, low-ESR ceramic output capacitors.

## Products supported:

- MIC69502

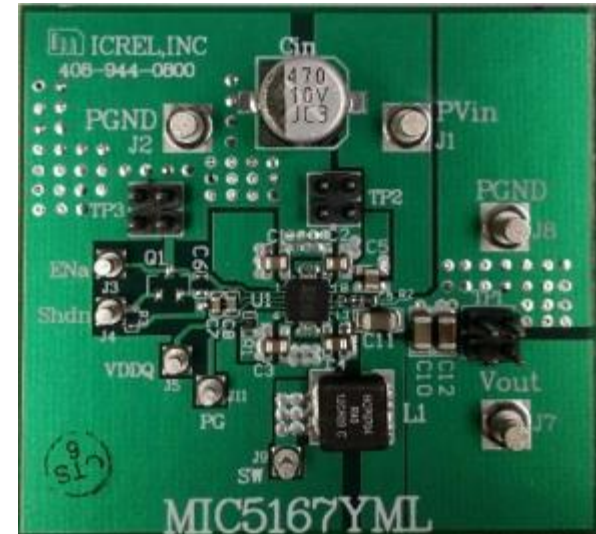


The MIC5167 is a high-efficiency, 6A, integrated switch, synchronous buck (step-down) regulator designed for use as a double data rate (DDR) or quad data rate (QDR) terminator. The MIC5167 is optimized for highest efficiency, achieving more than 94% efficiency while still switching at 1MHz over a broad range. The device works with a small 0.4 $\mu$ H inductor and 300 $\mu$ F output capacitor. The ultra-high speed control loop keeps the output voltage within regulation even under extreme transient load swings commonly found in FPGAs and low-voltage ASICs.

The output voltage is controlled externally by input to the VDDQ pin. The output voltage is one-half the voltage applied to the VDDQ pin. The output voltage can be adjusted down to 0.6V to address low voltage power needs. The MIC5167 will source 6A and sink up to 6A.

## Products supported:

- MIC5167



The MAQ5280 is a high performance, linear regulator, offering a very low noise output with a very wide input voltage operating range, from 4.5V to 120V DC input voltage.

Ideal for high input voltage applications such as automotive and telecom, the MAQ5280 offers 2% initial accuracy, extremely high power supply rejection ratio (PSRR > 80dB) and low ground current (typically 31 $\mu$ A). The MAQ5280 can also be put into a zero-off-mode current state, drawing minuscule amount of current when disabled.

The MAQ5280 has a very wide input voltage range, with DC rated from -24V to +120V. This wide input range covers the automotive load dump range and the MAQ5280 is optimized for line transient response, making it ideal for harsh environment applications.

The MAQ5280 evaluation board requires an input power source that is able to deliver greater than 0.1A at +120VDC.

## Products supported:

- MAQ5280



The MIC5280 is a high performance, low dropout regulator, offering a very low noise output with a very wide input voltage operating range, up to 120V DC input voltage.

Ideal for high input voltage applications such as industrial and telecom, the MIC5280 offers 2% initial accuracy, extremely high power supply rejection ratio (PSRR >80dB) and low ground current (typically 31 $\mu$ A). The MIC5280 can also be put into a zero off-mode current state, drawing a minuscule amount of current when disabled.

## Products supported:

- MIC5280



The MIC5380/1 is an advanced dual LDO ideal for powering space constrained portable devices.

Ideal for battery powered applications, the MIC5380/1 offers  $\pm 1\%$  typical accuracy, low dropout voltage (155mV at 150mA) and low ground current. The MIC5380/1 can also be put into a zero off-mode current state, drawing virtually no current when disabled.

## Products supported:

- MIC5380





The MIC47050 is a high-speed, ultra-low dropout, dual-supply NMOS ULDO™ designed to take advantage of point-of-load applications that use multiple supply rails to generate a low-voltage, high-current power supply. The MIC47050 can source 500mA of output current while only requiring a 1µF ceramic output capacitor for stability. A 1.5% output voltage accuracy, low dropout voltage (44mV at 500mA), and low ground current makes this device ideally suited for mobile and point-of-load applications.

The MIC47050 has an NMOS output stage offering very low output impedance. The NMOS output stage makes for a unique ability to respond very quickly to sudden load changes such as those required by a microprocessor, DSP or FPGA. The MIC47050 consumes little quiescent current and can be used for driving the core voltages of mobile processors, post regulating a core DC/DC converter in any processor.

## Products supported:

- MIC47050



The MIC5301 is a high performance, single output ultra-low LDO (ULDO) regulator, offering low total output noise. The MIC5301 is capable of sourcing 150mA output current and offers high PSRR and low output noise, making it an ideal solution for RF applications.

For battery-operated applications, the MIC5301 offers 2% accuracy, extremely low dropout voltage (40mV at 150mA), and low ground current (typically 85 $\mu$ A total). The MIC5301 can also be put into a zero off-mode current state, drawing no current when disabled.

## Products supported:

- MIC5301



The MIC5308 is a high performance,  $\mu$ Cap low dropout regulator, offering ultra-low operating current while maintaining very fast transient response. The MIC5308 can source up to 150mA of output current and can regulate down from a low input supply voltage to increase system efficiency.

Ideal for battery-operated applications; the MIC5308 offers extremely low dropout voltage (45mV typically at 150mA) and low ground current at all load conditions (typically 23 $\mu$ A). The MIC5308 can also be put into a zero off-mode current state, drawing virtually no current when disabled.

## Products supported:

- MIC5308



The MIC5365 is an advanced general purpose linear regulator offering high power supply rejection (PSRR) in an ultra-small 1mm x 1mm package. The MIC5365 is capable of sourcing 150mA output current and offers high PSRR, making it a great solution for any portable electronic application.

Ideal for battery-powered applications, the MIC5365 offers 2% initial accuracy, low dropout voltage (180mV at 150mA), and low ground current (typically 32 $\mu$ A). The MIC5365 can also be put into a zero off-mode current state, drawing virtually no current when disabled.

## Products supported:

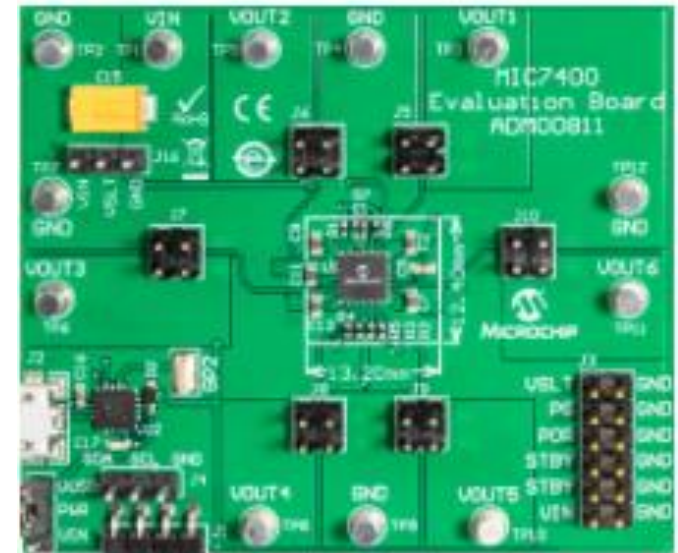
- MIC5365



The MIC7400 is a powerful, highly-integrated, configurable, power-management IC (PMIC) featuring five synchronous buck regulators, one boost regulator and high-speed I2C interface with an internal EEPROM. The device offers two distinct modes of operation “standby mode” and “normal mode”. In normal mode, the programmable switching converters can be configured to support a variety of features, including start-up sequencing, timing, soft-start ramp, output voltage levels, current-limit levels, and output discharge for each channel. In standby mode the PMIC can be configured in a low power state by either disabling an output or by changing the output voltage to a lower level. Independent exit from standby mode can be achieved either by I2C communication or the external STBY pin.

## Products supported:

- MIC7400



The MIC7401 is a powerful, highly-integrated, configurable, power-management IC (PMIC) featuring five synchronous buck regulators, one boost regulator, and high-speed I2C interface with an internal EEPROM and micro-power shutdown. The device offers two distinct modes of operation “standby mode” and “normal mode”. In normal mode, the programmable switching converters can be configured to support a variety of features, including start-up sequencing, timing, soft-start ramp, output voltage levels, current-limit levels, and output discharge for each channel. In standby mode the PMIC can be configured in a low power state by either disabling an output or by changing the output voltage to a lower level. Independent exit from standby mode can be achieved either by I2C communication or the external STBY pin.

## Products supported:

- MIC7401



The MIC23099 is a high-efficiency, low-noise, dual-output, integrated power-management solution for single-cell alkaline or NiMH battery applications. The synchronous boost output voltage ( $V_{OUT1}$ ) is enabled first and is powered from the battery. Next the synchronous buck output ( $V_{OUT2}$ ), which is powered from the boost output voltage, is enabled. This configuration allows  $V_{OUT2}$  to be independent of battery voltage, thereby allowing the buck output voltage to be higher or lower than the battery voltage.

The MIC23099 evaluation board requires only a single power supply with at least 1A current capability. The output load can either be an active (electronic) or passive (resistive) load.

## Products supported:

- MIC23099



This board enables evaluation of the MIC23450, a fully-integrated, triple-output, 2A, 3MHz switching regulator that features HyperLight Load mode and power (PG) output indicators. The MIC23450 is highly efficient throughout the output current range, drawing just 23 $\mu$ A of quiescent current for each channel in operation.

## Products supported:

- MIC23450

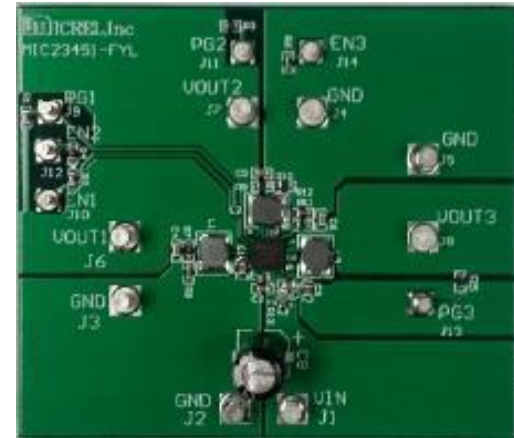




The MIC23451 is a high-efficiency, 3MHz, triple 2A, synchronous buck regulator with HyperLight Load<sup>®</sup> mode. HyperLight Load provides very-high efficiency at light loads and ultra-fast transient response, which is ideal for supplying processor core voltages. An additional benefit of this proprietary architecture is very low output ripple voltage throughout the entire load range with the use of small output capacitors.

## Products supported:

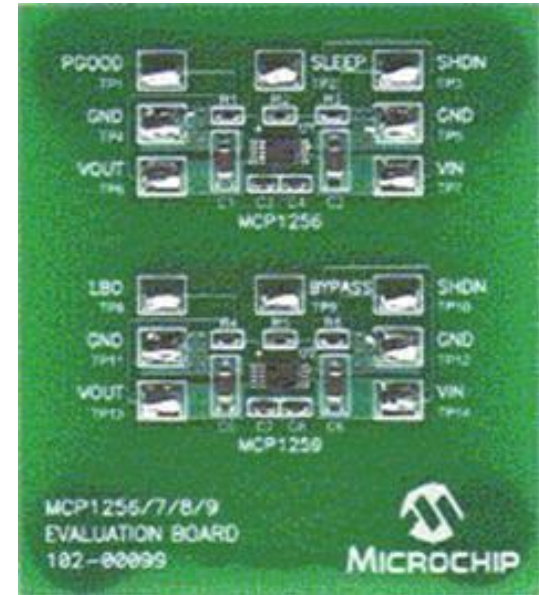
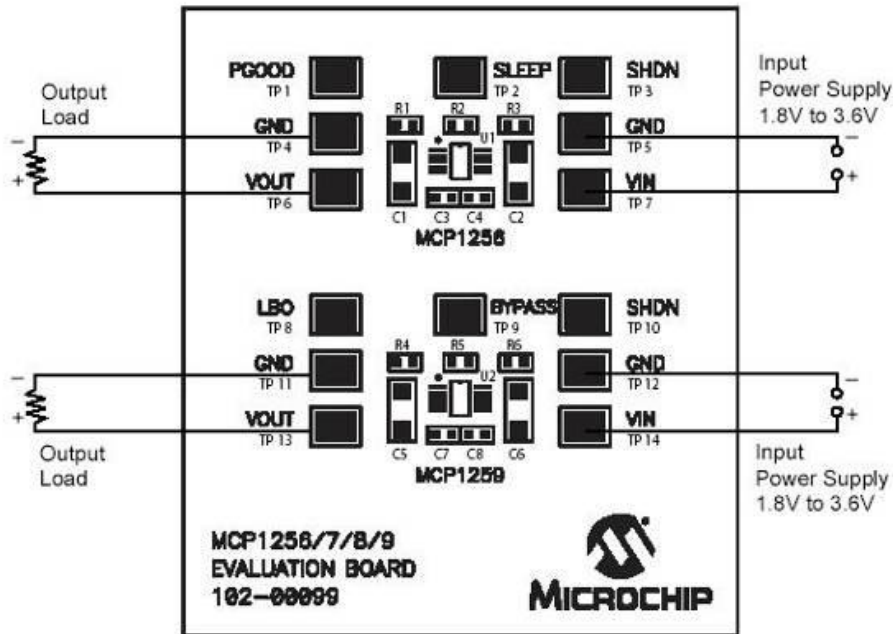
- MIC23451



The MCP1256/7/8/9 Charge Pump Evaluation Board is an evaluation and demonstration tool for Microchip Technology's MCP1256/7/8/9 Regulated 3.3V Low-Ripple Charge Pumps with low-operating current SLEEP mode or BYPASS mode. The design provides for dynamic versatility.

## Products supported:

- MCP1256
- MCP1257
- MCP1258
- MCP1259

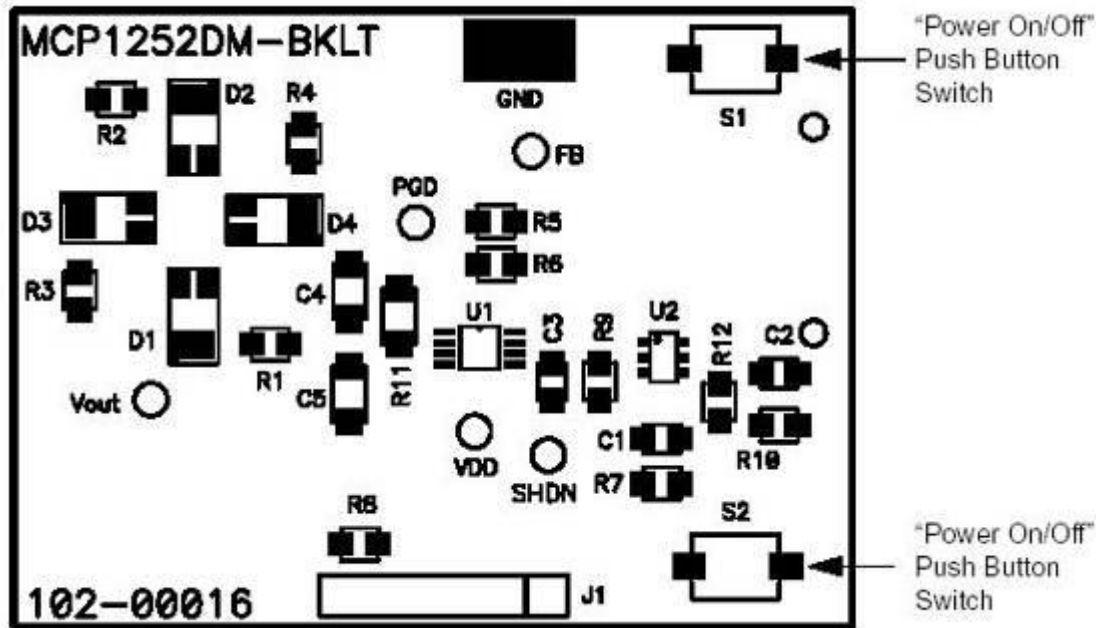


# MCP1252 Backlight Demo Board

The MCP1252 Charge Pump Backlight LED Demo Board demonstrates the use of a charge pump device in a LED application. The board also serves as a platform to evaluate the MCP1252 device generally.

## Products supported:

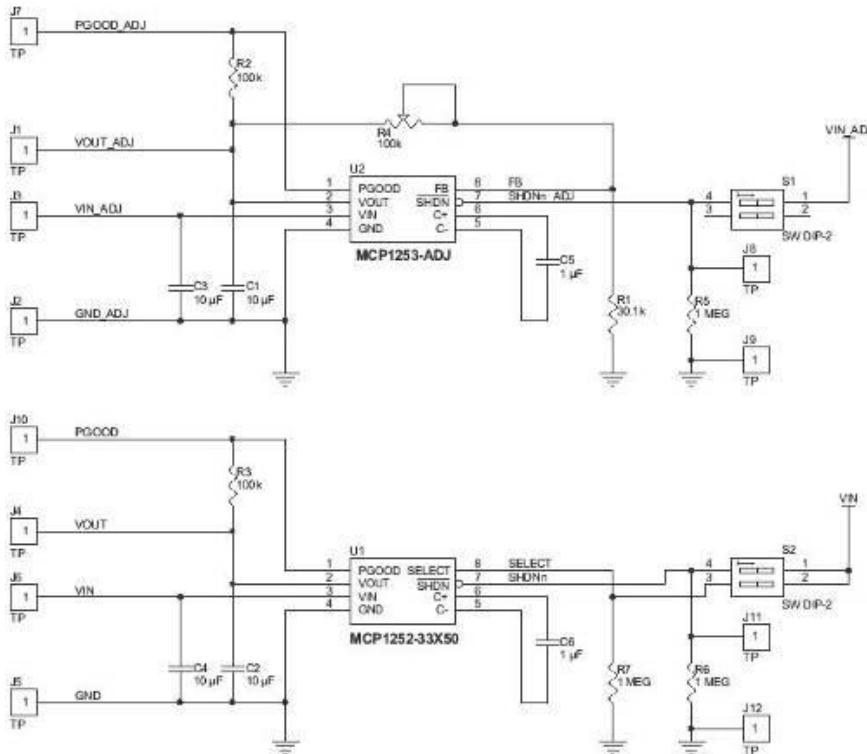
- MCP1252



The MCP1252/3 Evaluation Board is an evaluation kit designed to support Microchip's MCP1252\*33X50, MCP1252-ADJ, MCP1253-33X50 and MCP1253-ADJ low noise, positive-regulated charge pump devices.

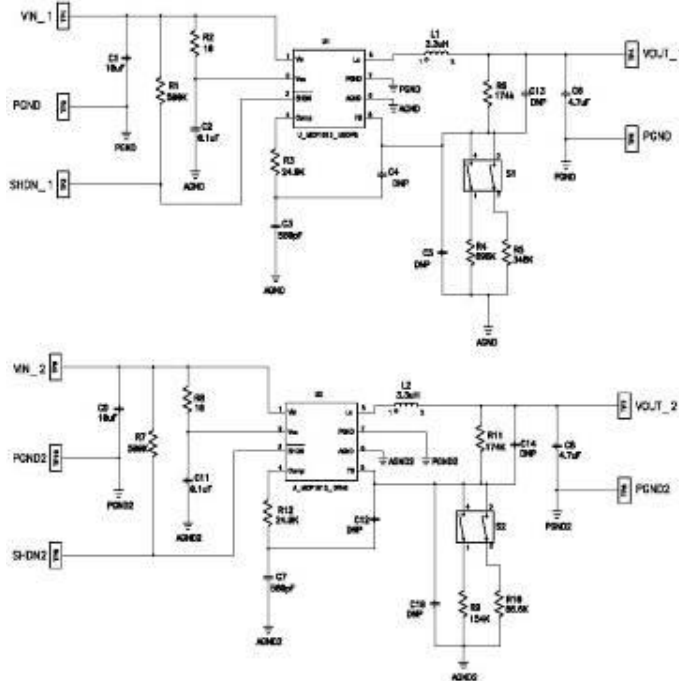
## Products supported:

- MCP1252
- MCP1253

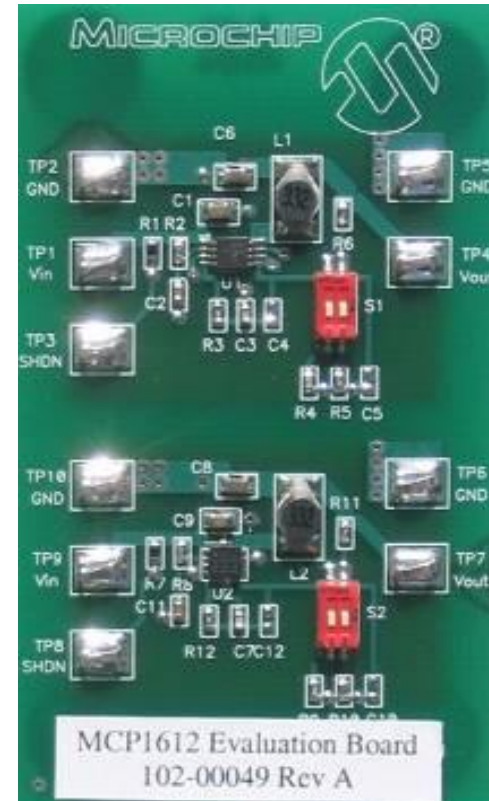


The MCP1612 is a 1A, 1.4 MHz, fully integrated buck regulator. The output voltage is selectable from 0.8V to  $V_{IN}$  by use of an external resistor divider.

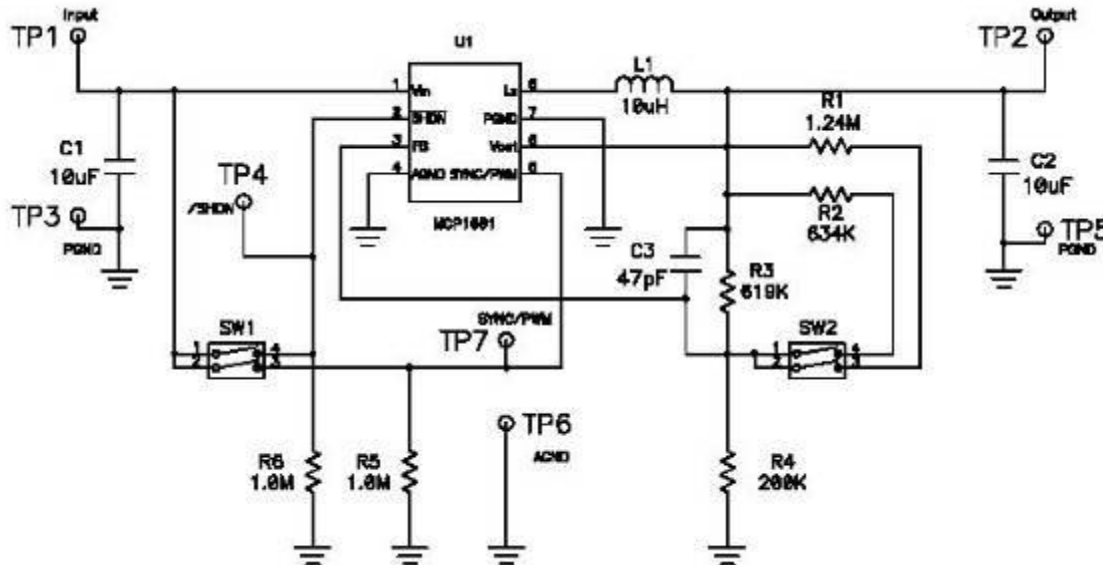
The MCP1612 Evaluation Board contains two independent buck regulators featuring the 8-pin MSOP and 8-pin DFN packages. The output voltage is set to one of eight different preset values (four per regulator circuit) by use of a two-position DIP switch. Each regulator circuit can supply an output current of 0 to 1A.



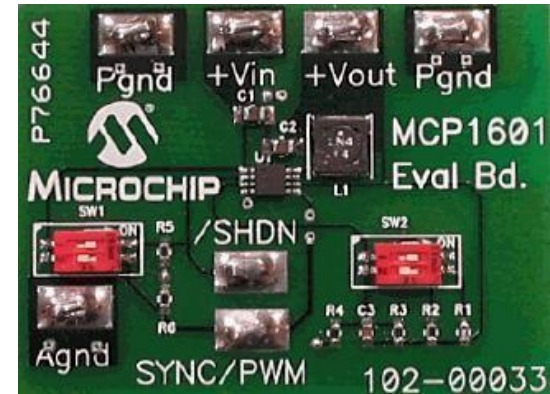
**Products supported:**  
 MCP1612



The MCP1601 is a 500mA synchronous buck regulator. Both the high-side buck P-channel and the low-side N-channel switches are integrated within the device. The integrated synchronous switch makes the MCP1601 very efficient, even when converting unregulated input voltages to low-voltage, fixed outputs. This evaluation board is designed for a wide range of output voltages and currents. For specific applications, smaller inductors, shielded inductors, tantalum capacitors and different output voltage settings can improve the total DC/DC converter performance and cost.



**Products supported:**  
 MCP1601



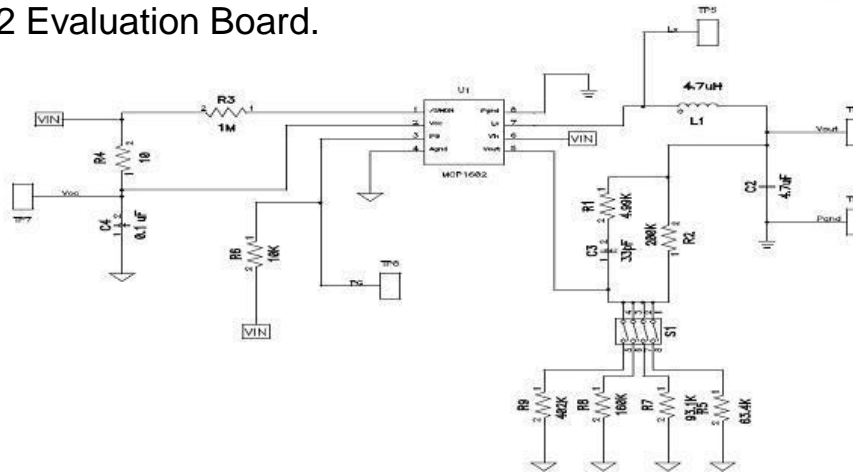


# MCP1602 Buck Converter Eval Board

Online  
Datasheet

The MCP1602 Evaluation Board demonstrates the features and capabilities of Microchip's MCP1602 Evaluation Board 500mA PFM/PWM Synchronous Buck Regulator. The MCP1602 is a step-down (Buck) switching regulator with a Power-Good monitor to provide a highly integrated solution for systems that require supply voltage between 0.8V to 4.5V. The MCP1602 requires input voltage range from 2.7V to 5.5V. The MCP1602 Evaluation Board includes a MCP1602 circuit that has a Shutdown feature and a 4-position Dip Switch to select between different output voltages. MCP1602 Evaluation Board is available in 0.8V, 1.2V, 1.8V, 2.5V and 3.3V. Additional test points are available on the MCP1602 Evaluation Board for reviewing the performances and features of MCP1602 Evaluation Board.

**Products supported:**  
□ MCP1602



# MCP1603 Buck Converter Eval Board

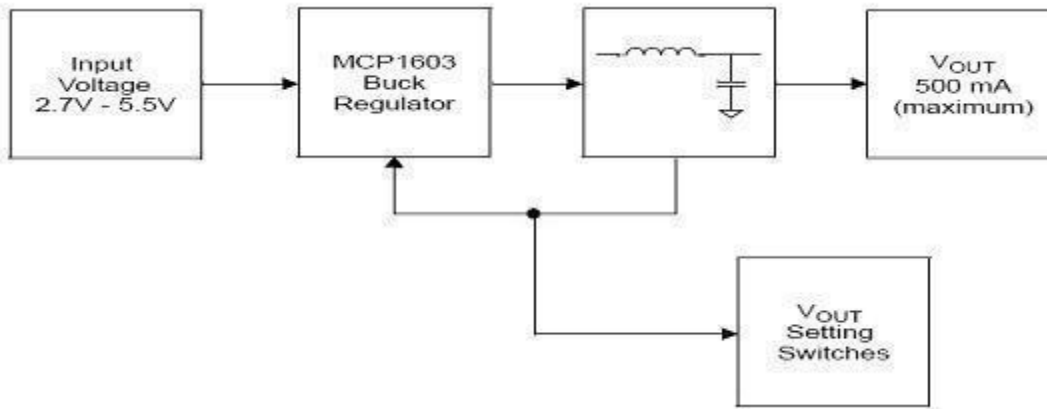
The MCP1603 Buck Converter Evaluation Board is designed to demonstrate Microchip's MCP1603 in an adjustable output voltage configuration. The MCP1603 is a 500mA synchronous buck regulator that features both Pulse Frequency Modulation (PFM) and Pulse Width Modulation (PWM). The PFM mode is used at light loads to improve system efficiency, while the 2.0 MHz PWM mode is entered at heavy loads. The transition between PFM and PWM modes automatically occurs without any external intervention. The MCP1603 is available in both adjustable parts that require an external divider to set the output voltage and fixed output voltage parts.

**Features:**

- Compact size and low profile 500mA Converter design
- Wide Input voltage range from 2.7V to 5.5V
- Five different output voltage settings: 0.8V, 1.8V, 2.5V, and 3.3V
- Test points for connecting input voltage source and external load

**Products supported:**

- MCP1603



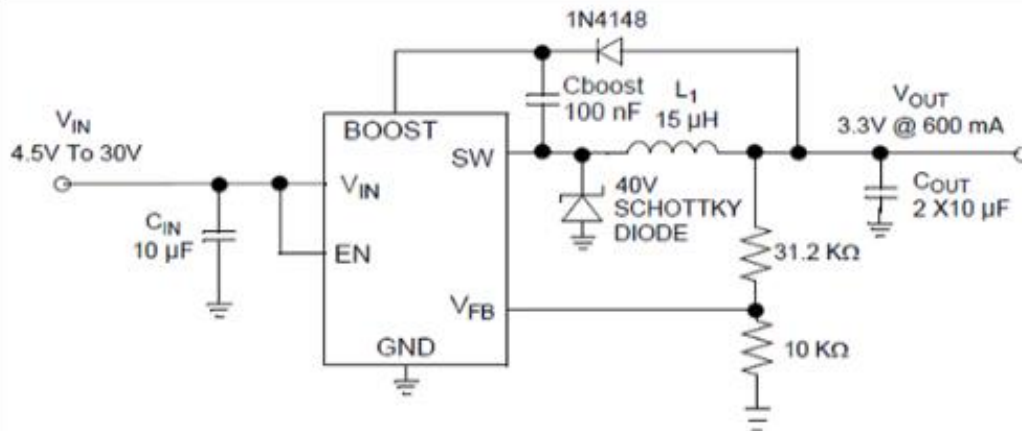


# MCP16301 HV Buck Converter Demo Board

MCP16301 High Voltage Buck Converter 600 mA Demo Board supports the development of MCP16301 device. The MCP16301 is a highly integrated, high-efficiency, fixed frequency, step-down DC-DC converter in a popular 6-pin SOT23 package that operates from input voltage sources up to 30V. Integrated features include a high-side switch, fixed-frequency peak-current mode control, internal compensation, peak current limit and over-temperature protection. Minimal external components are necessary to develop a complete step-down DC-DC converter power supply.

**Products supported:**

- MCP16301





# MCP16301 HV Buck Converter Demo Board

[Online Datasheet](#)

Demo board supporting the development of MCP16301 high input voltage, 300mA, D2PAK buck converter.

## This Kit Contains:

- MCP16301 300mA D2PAK Demo Board

## Products supported:

- MCP16301



MCP16301 300mA D2PAK footprint Demo Board  
(Part # ARD00360)



# MCP16301 HV Cuk LED Driver Demo Board

Online  
Datasheet

The MCP16301 High-Voltage Single-Inductor Cuk LED Driver Demo Board is designed to operate from a 6V to 18V input and regulate the output current to 300 mA. Test points for input power are provided to demonstrate the capability of the demo board over the entire range. The demo board was designed using small surface-mount components to show application size for a high-voltage single-inductor Cuk LED driver design. Compared with the traditional asynchronous buck converter, the MCP16301 High-Voltage Single-Inductor Cuk LED Driver Demo Board has an additional resistor and capacitor for compensation.

## Features:

- 6V to 18V Input Voltage
- Input voltage can be lower or higher than the output voltage
- 300 mA output current
- Four 3W LEDs
- Dimming can be achieved by pulsing the enable pin on the MCP16301

## Products supported:

- MCP16301



# MCP16301 5V/600mA Low Noise Eval Board

The MCP16301 5V/600mA Low Noise Evaluation Board is used to demonstrate a high voltage input DC-DC converter design, which can deliver high efficiency, while minimizing high-frequency switching noise. The board steps down high input voltages, up to 30V, to a low output voltage, having more than 90% efficiency and a minimum of 30 mV output ripple. High-frequency input/output noise generated by the switching converters can reach high-noise levels that interfere with other devices powered from the same source. The high amplitude of high-frequency noise can disturb some RF systems. High efficiency is achieved with the MCP16301 buck converter by switching the integrated N-Channel MOSFET at a high speed. The evaluation board is optimized for 12V Input and 100 mA load.

## Features:

- Input voltage: 6 to 30V
- Output voltage: 5V
- Output capability: 600 mA load current
- Output ripple plus noise: 30 mV<sub>p-p</sub> @ 12V input and 100 mA load
- Low radiated noise
- Efficiency: up to 91% @ 12V input

## Products supported:

- MCP16301





# MCP16301 High Voltage Buck-Boost Demo Board

Online  
Datasheet

The MCP16301 High Voltage Buck-Boost Demo Board is designed to operate from a 5V to 30V input and regulate the output to 12V. Test points for input power and load are provided to demonstrate the capability of the demo board over the entire range. The MCP16301 High Voltage Buck-Boost Demo Board was designed using small surface-mount components to show application size for a high voltage buck-boost design

## Features:

- Input Voltage Range: 4.0V to 30V
- Output Voltage Range: 2.0V to 15V
- Up to 96% Typical Efficiency
- 2% Output Voltage Accuracy
- Integrated N-Channel Switch: 460 m $\Omega$
- 500 kHz Fixed Frequency

## Products supported:

- MCP16301





# MCP16311/2 Synchronous Buck Conv. Eval Board

Online  
Datasheet

The MCP16311/2 Synchronous Buck Converter Evaluation Board is used to evaluate and demonstrate Microchip Technology's MCP16311/2 product. This board demonstrates the MCP16311 (PFM/PWM – low quiescent current) and the MCP16312 (PWM only – low output voltage ripple) in two buck converter applications with two output voltages. It can be used to evaluate both package options: 8LD MSOP and 8LD 2 x 3 TDFN. The MCP16311/2 Synchronous Buck Converter Evaluation Board was developed to help engineers reduce the product design cycle time. Two common output voltages can be selected: 3.3V and 5.0V. The first converter with the 8LD MSOP package is a PWM/PFM device with a fixed output of 3.3V, while the second converter with the 2 x 3 8LD TDFN package is a PWM-only device, with a fixed output of 5V.

## Features:

- Input Voltage Range (VIN): 4V to 30V
- Fixed Output Voltage: 3.3V and 5.0V
- Output Current: Typically 1A @ 3.3V Output, 12V Input
- Automatic PFM/PWM Operation for MCP16311, or PWM-only for MCP16312
- PWM Switching Frequency: 500 kHz
- Internal Compensation
- Internal Soft Start
- Overtemperature Protection

## Products supported:

- MCP16311
- MCP16312



# MCP16331 Buck Converter Eval Board

The MCP16331 Buck Converter Evaluation Board is used to evaluate and demonstrate Microchip Technology's MCP16331 product in the SOT-23 package. This board demonstrates the MCP16331 in a buck-converter application with two selectable output voltages. Test points are provided for the input and output, allowing the board to be connected directly to a system. Additional test points are provided to access the EN pin, in order to modify the state of the converter and also access the SW pin, in order to see the switching waveform. The MCP16331 High-Voltage Buck Converter Evaluation Board was developed to help engineers reduce product design cycle time.

## Features:

- Input voltage range,  $V_{IN}$ : 6V to 50V
- Converter can be turned on/off by using a jumper
- Fixed output voltage: 3.3V or 5.0V (selectable)
- Typical output current: 500 mA
- PWM Switching Frequency = 500 kHz
- Internal compensation
- Internal soft-start
- Over-temperature protection

## Products supported:

- MCP16331



This evaluation board uses the MIC2172 switching regulator IC to generate positive and/or negative voltages suitable for powering LCDs (liquid crystal displays). The MIC2172 regulator IC features a switching frequency of 100kHz and combines a switching transistor, control circuitry and reference in a single package.

This evaluation board demonstrates the following:

- Positive and/or negative voltage output greater than the input voltage (boost function).
- Thermistor-controlled [temperature] adjusted output voltage. (For LCDs that requires a power source with a negative temperature coefficient.)
- Soft-start circuitry.
- P-channel MOSFET switch-controlled positive output which provides a true, zero-voltage shutdown.

## Products supported:

- MIC2172

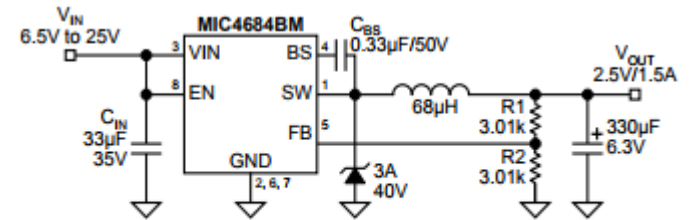




The MIC4684 is a high-efficiency 200kHz stepdown (buck) switching regulator. Power conversion efficiency of above 85% is easily obtainable for a wide variety of applications.

## Products supported:

- MIC4684



**Adjustable Buck Converter**

The MIC2207 is a high efficiency PWM buck (step-down) regulator that provides up to 3A of output current. The MIC2207 operates at 2MHz and has proprietary internal compensation that allows a closed loop bandwidth of over 200 KHz.

The MIC2207 evaluation board requires an input power source that is able to deliver greater than 2.7V at over 3A. The output load can either be an active or passive source.

## Products supported:

- MIC2207



The MIC22205 is a high-efficiency, 2A, integrated switch, synchronous buck (step-down) regulator. The MIC22205 is optimized for highest efficiency, achieving more than 95% efficiency while still switching at 1MHz. The ultra-high speed control loop keeps the output voltage within regulation even under the extreme transient load swings commonly found in FPGAs and low-voltage ASICs. The output voltage is pre-bias safe and can be adjusted down to 0.7V to address all low-voltage power needs.

The MIC22205YML-EV requires a power supply of 2.9V to 5.5V, and a test load. Make sure that the power supply can provide the wattage needed for the chosen test load. The load can be active (electronic load) or passive (resistor). Additionally, monitor the Power Good output (PG) with a multimeter or an oscilloscope.

## Products supported:

- MIC22205



The MIC22405 is a high efficiency, 4A integrated switch synchronous buck (step-down) regulator. The MIC22405 is optimized for highest efficiency, achieving more than 95% efficiency while still switching at 1MHz. The ultra-high speed control loop keeps the output voltage within regulation even under the extreme transient load swings commonly found in FPGAs and low-voltage ASICs. The output voltage is pre-bias safe and can be adjusted down to 0.7V to address all low-voltage power needs.

The MIC22405YML-EV requires a power supply of 2.9V to 5.5V, and a test load. Ensure that the power supply can provide the wattage required for the chosen test load. The load can be active (electronic load) or passive (resistor). Additionally, monitor the Power Good Output (PG) with a multimeter or an oscilloscope if desired.

## Products supported:

- MIC22405



The MIC22705 is a high-efficiency, 7A integrated switch synchronous buck (step-down) regulator. The MIC22705 is optimized for highest efficiency, achieving more than 95% efficiency while still switching at 1MHz. The ultra-high speed control loop keeps the output voltage within regulation even under the extreme transient load swings commonly found in FPGAs and low-voltage ASICs. The output voltage is pre-bias safe and can be adjusted down to 0.7V to address all low-voltage power needs.

The MIC22705YML-EV requires a power supply of 2.9V to 5.5V, and a test load. Ensure that the power supply can provide the wattage required for the chosen test load. The load can be active (electronic load) or passive (resistor). Additionally, monitor the Power Good output (PG) with a multimeter or an oscilloscope if desired.

## Products supported:

- MIC22705



The MIC4720 is a high efficiency PWM buck (step-down) regulator that provides up to 2A of output current. The MIC4720 operates at 2.0MHz and has proprietary internal compensation that allows a closed loop bandwidth of over 200kHz.

The low on-resistance internal p-channel MOSFET of the MIC4720 allows efficiencies over 92%, reduces external components count and eliminates the need for an expensive current sense resistor.

The MIC4720 operates from 2.7V to 5.5V input and the output can be adjusted down to 1V. The devices can operate with a maximum duty cycle of 100% for use in low-dropout conditions.

## Products supported:

- MIC4720



The MIC4723 is a high efficiency PWM buck (step-down) regulator that provides up to 3A of output current. The MIC4723 operates at 2.0MHz and has proprietary internal compensation that allows a closed loop bandwidth of over 200kHz.

The low on-resistance internal p-channel MOSFET of the MIC4723 allows efficiencies over 92%, reduces external components count and eliminates the need for an expensive current sense resistor.

The MIC4723 operates from 2.7V to 5.5V input and the output can be adjusted down to 1V. The devices can operate with a maximum duty cycle of 100% for use in low-dropout conditions.

## Products supported:

- MIC4723



The MIC4724 is a high efficiency PWM buck (step-down) regulator that provides up to 3A of output current. The MIC4724 operates at 2.0MHz and has proprietary internal compensation that allows a closed loop bandwidth of over 200kHz.

The low on-resistance internal p-channel MOSFET of the MIC4724 allows efficiencies over 92%, reduces external components count and eliminates the need for an expensive current sense resistor.

The MIC4724 operates from 3.0V to 6.0V input and the output can be adjusted down to 1V. The devices can operate with a maximum duty cycle of 100% for use in low-dropout conditions.

## Products supported:

- MIC4724

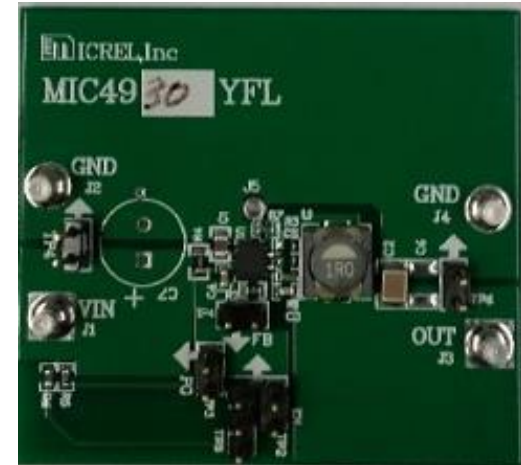




The MIC4930 is a high-efficiency, 3A synchronous buck regulator with ultra-fast transient response perfectly suited for supplying processor core and I/O voltages from a 5V or 3.3V bus. The MIC4930 provides a switching frequency up to 3.3MHz while achieving peak efficiencies up to 95%. An additional benefit of high-frequency operation is very low output ripple voltage throughout the entire load range with the use of a small output capacitor. The MIC4930 is designed for use with a very small inductor, down to 1 $\mu$ H, and an output ceramic capacitor as small as 10 $\mu$ F without the need for external ripple injection. A wide range of output capacitor types and values can also be accommodated.

## Products supported:

- MIC4930



The MIC23050 is a 500mA 4MHz switching regulator. The MIC23050 is highly efficient throughout the load range and only draws 20µA of quiescent current.

The MIC23050 evaluation board requires an input power source that is able to deliver greater than 650mA at 2.7V. The output load can either be an active or passive load.

## Products supported:

- MIC23050



P/N: MIC23050-4YML-EV  
MIC23050-CYML-EV  
MIC23050-GYML-EV  
MIC23050-SYML-EV

The MIC23031 is a 400mA 4MHz switching regulator. The MIC23031 is highly efficient throughout the entire output current range, drawing just 21 $\mu$ A of quiescent current in operation. The MIC23031 provides accurate output voltage regulation under the most demanding conditions and responds extremely quickly to a load transient with exceptionally small output voltage ripple.

The MIC23031 evaluation board requires an input power source that is able to deliver greater than 500mA at 2.7V to the MIC23031. The output load can either be an active (electronic) or passive (resistive) load.

## Products supported:

- MIC23031



The MIC23030 is a 400mA 8MHz switching regulator. The MIC23030 is highly efficient throughout the entire output current range, drawing just 21 $\mu$ A of quiescent current in operation. The MIC23030 provides accurate output voltage regulation under the most demanding conditions and responds extremely quickly to a load transient with exceptionally small output voltage ripple. Factoring in the output current, the internal circuitry of the MIC23030 automatically selects between two modes of operation for optimum efficiency.

The MIC23030 evaluation board requires an input power source that is able to deliver greater than 500mA at 2.7V to the MIC23030. The output load can either be an active (electronic) or passive (resistive) load.

## Products supported:

- MIC23030



This board enables the evaluation of the MIC23153, a fully integrated 2A, 4MHz switching regulator featuring HyperLight Load mode, Power Good output indicator, and programmable soft-start.

## Products supported:

- MIC23153

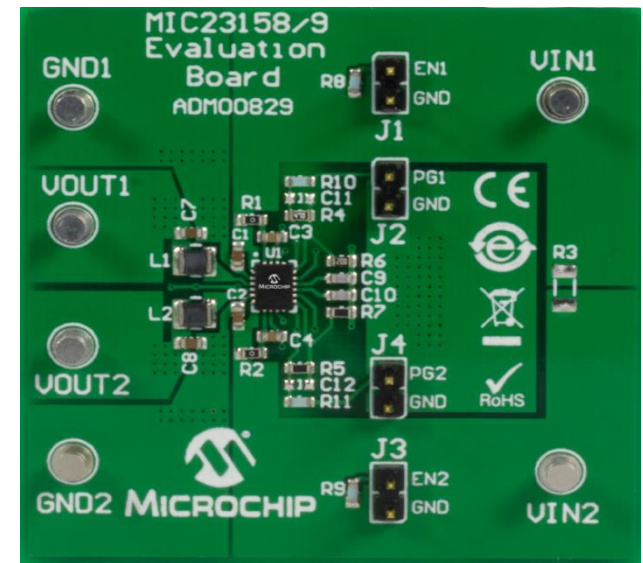


The MIC23158/9 is a high efficiency 3MHz dual 2A synchronous buck regulator with HyperLight Load<sup>®</sup> mode, Power Good output indicator, and programmable soft start. The MIC23159 also provides an auto discharge feature that switches in a 225Ω pull down circuit on its output to discharge the output capacitor when disabled. HyperLight Load<sup>®</sup> provides very high efficiency at light loads and ultra fast transient response which makes the MIC23158/9 perfectly suited for supplying processor core voltages.

This board requires a single 15W bench power source adjustable from 2.7V to 5.5V. The loads can either be active (electronic load) or passive (resistor) with the capability to dissipate 7W. It is ideal to have an oscilloscope available to view the circuit waveforms, but not essential. For the simplest tests, three voltage meters are required to measure input and two output voltages. For efficiency measurements, three voltage meters and three ammeters are required to prevent errors due to measurement inaccuracies.

## Products supported:

- MIC23158/9



The MIC23250 is a high efficiency 4MHz dual 400mA synchronous buck regulator with HyperLight Load<sup>®</sup> mode. HyperLight Load<sup>®</sup> provides very high efficiency at light loads and ultra-fast transient response which is perfectly suited for supplying processor core voltages. An additional benefit of this proprietary architecture is very low output ripple voltage throughout the entire load range with the use of small output capacitors.

The MIC23250 evaluation board requires an input power source that is able to deliver greater than 800mA at 2.7V. The output loads can either be an active (electronic) or passive (resistive) load.

## Products supported:

- MIC23250



P/N: MIC23250-AAYMT-EV  
MIC23250-C4YMT-EV  
MIC23250-G4YMT-EV  
MIC23250-S4YMT-EV

The MIC23303 is a high efficiency 4MHz 3A synchronous buck regulator with HyperLight Load<sup>®</sup> mode, Power Good output indicator, and programmable soft-start. HyperLight Load<sup>®</sup> provides very high efficiency at light loads and ultra-fast transient response which makes the MIC23303 perfectly suited for supplying processor core voltages. An additional benefit of this proprietary architecture is very low output ripple voltage throughout the entire load range with the use of small output capacitors.

## Products supported:

- MIC23303





The MIC23603 is a high-efficiency 4MHz 6A synchronous buck regulator with HyperLight Load<sup>®</sup> mode. HyperLight Load<sup>®</sup> provides very high efficiency at light loads and ultrafast transient response which is perfectly suited for supplying processor core voltages. An additional benefit of this proprietary architecture is very low output ripple voltage throughout the entire load range with the use of small output capacitors. The tiny 4mm x 5mm DFN package saves precious board space and requires few external components

## Products supported:

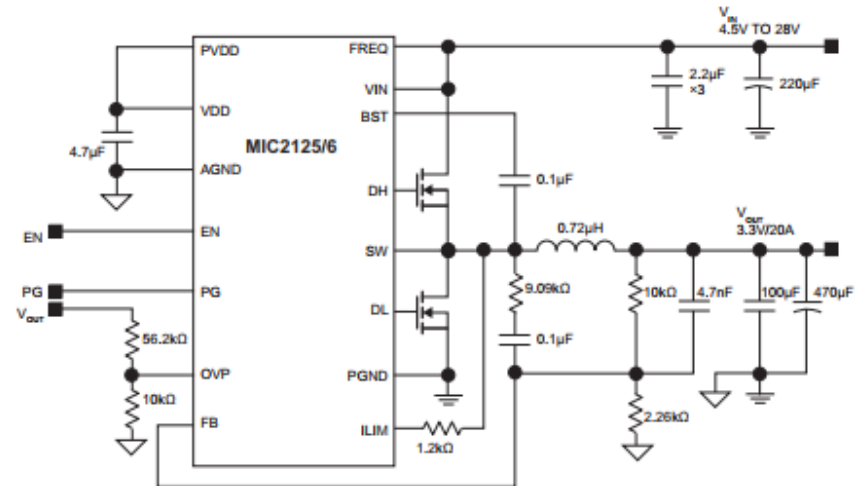
- MIC23603



The MIC2125 and MIC2126 are constant-frequency synchronous buck controllers featuring a unique adaptive ON-time control architecture. The MIC2125/6 operate over an input voltage range from 4.5V to 28V and can be used to supply load current up to 25A. The output voltage is adjustable down to 0.6V with an accuracy of  $\pm 1\%$ . The device operates with programmable switching frequency from 200 kHz to 750 kHz. HyperLight Load® architecture operates in pulse-skipping mode at light loads, but operates in fixed-frequency CCM mode from medium loads to heavy loads. Hyper Speed Control® architecture operates in fixed-frequency CCM mode under all load conditions.

## Products supported:

- MIC2125
- MIC2126



The MIC24051 is a constant-frequency, synchronous buck regulator featuring a unique adaptive on-time control architecture. The MIC24051 operates over an input supply range of 4.5V to 19V and provides a regulated output of up to 6A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ , and the device operates at a switching frequency of 600kHz.

## Products supported:

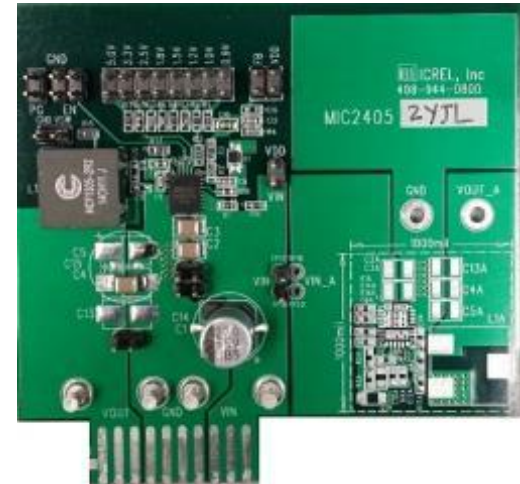
- MIC24051



The MIC24052 is a constant-frequency, synchronous DC/DC buck regulator featuring adaptive on-time control architecture. The MIC24052 operates over a supply range of 4.5V to 19V. It has an internal linear regulator which provides a regulated 5V to power the internal control circuitry. The MIC24052 operates at a constant 600kHz switching frequency in continuous-conduction mode and can be used to provide up to 6A of output current. The output voltage is adjustable down to 0.8V.

## Products supported:

- MIC24052



The MIC24053 is a constant-frequency, synchronous buck regulator featuring a unique adaptive on-time control architecture. The MIC24053 operates over an input supply range of 4.5V to 19V and provides a regulated output of up to 9A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ , and the device operates at a switching frequency of 600kHz.

## Products supported:

- MIC24053



The MIC24054 is a constant-frequency, synchronous DC/DC buck regulator featuring adaptive on-time control architecture. The MIC24054 operates over a supply range of 4.5V to 19V. It has an internal linear regulator which provides a regulated 5V to power the internal control circuitry. The MIC24054 operates at a constant 600kHz switching frequency in continuous conduction mode and can be used to provide up to 9A of output current. The output voltage is adjustable down to 0.8V.

## Products supported:

- MIC24054



The MIC24055 is a constant-frequency, synchronous buck regulator featuring a unique adaptive on-time control architecture. The MIC24055 operates over an input supply range of 4.5V to 19V and provides a regulated output of up to 12A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ , and the device operates at a switching frequency of 600kHz.

## Products supported:

- MIC24055



The MIC24056 is a constant-frequency, synchronous DC/DC buck regulator featuring adaptive on-time control architecture. The MIC24056 operates over a supply range of 4.5V to 19V. It has an internal linear regulator which provides a regulated 5V to power the internal control circuitry. MIC24056 operates at a constant 600kHz switching frequency in continuous-conduction mode and can be used to provide up to 12A of output current. The output voltage is adjustable down to 0.8V..

## Products supported:

- MIC24056

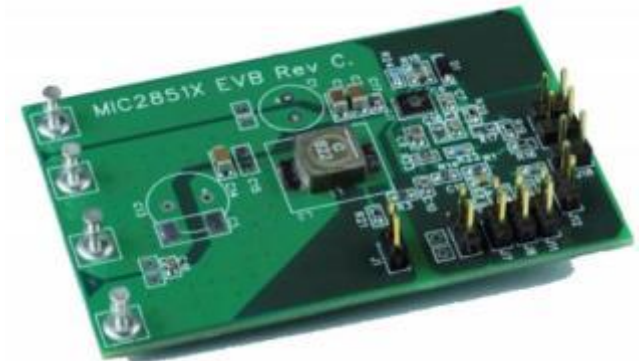




The MIC28511 is a synchronous step-down switching regulator with internal power switches capable of providing up to 3A output current from a wide input supply range from 4.6V to 60V. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ . A constant switching frequency can be programmed from 200kHz to 680kHz. The Hyper Speed Control™ and HyperLight Load® architectures of the MIC28511 allow for high  $V_{IN}$  (low  $V_{OUT}$ ) operation and ultra-fast transient response while reducing the required output capacitance and providing very good light load efficiency.

## Products supported:

- MIC28511-1
- MIC28511-2



The MIC28512 eval board is used to demonstrate the features of the MIC28512, a synchronous step-down regulator featuring unique adaptive on-time control architecture with integrated power MOSFETs. The MIC28512 operates over an input supply range of 4.6V to 70V, and can be used to supply up to 2A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$  from 0°C to 85°C. The device operates with a programmable switching frequency from 200kHz to 680kHz (nominal). The MIC28512 evaluation board requires only a single power supply with at least 5A current capability. For applications where  $V_{IN}$  is less than +5.5V, the internal LDO can be bypassed by tying VDD to  $V_{IN}$ .

## Products supported:

- MIC28512-1
- MIC28512-2

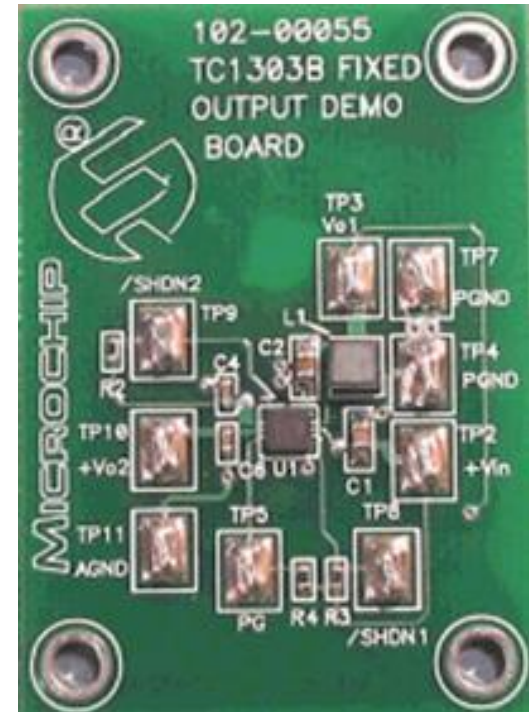
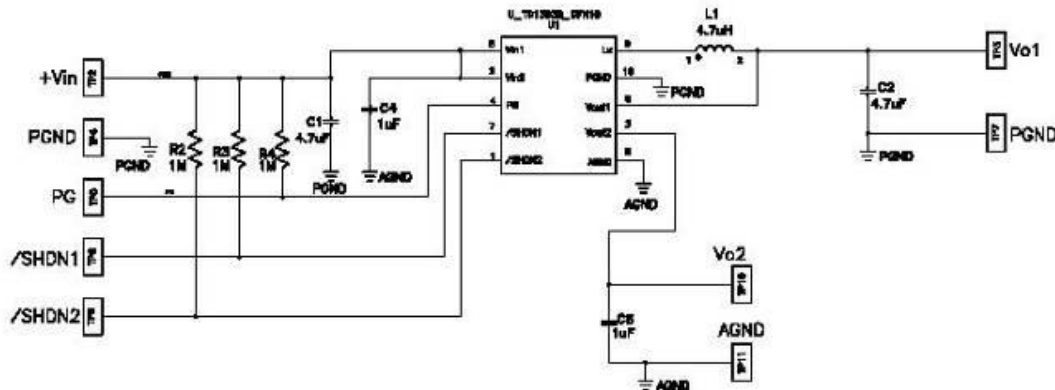


The TC1303B Dual-Output Regulator with Power-Good Output Demo Board can be used to evaluate the TC1303B device over the input voltage range and output current range for both the synchronous buck regulator output and the low-dropout linear regulator output.

Test points are provided for input power, output loads, shutdown control and power-good monitoring.

**Products supported:**

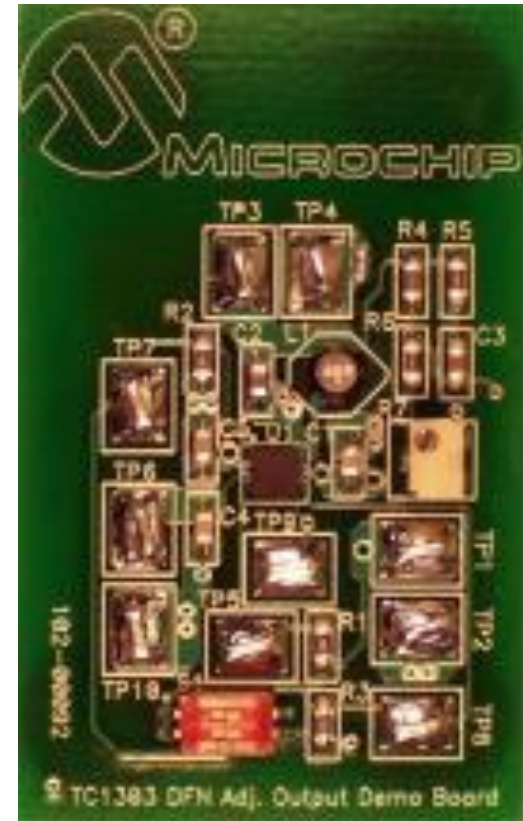
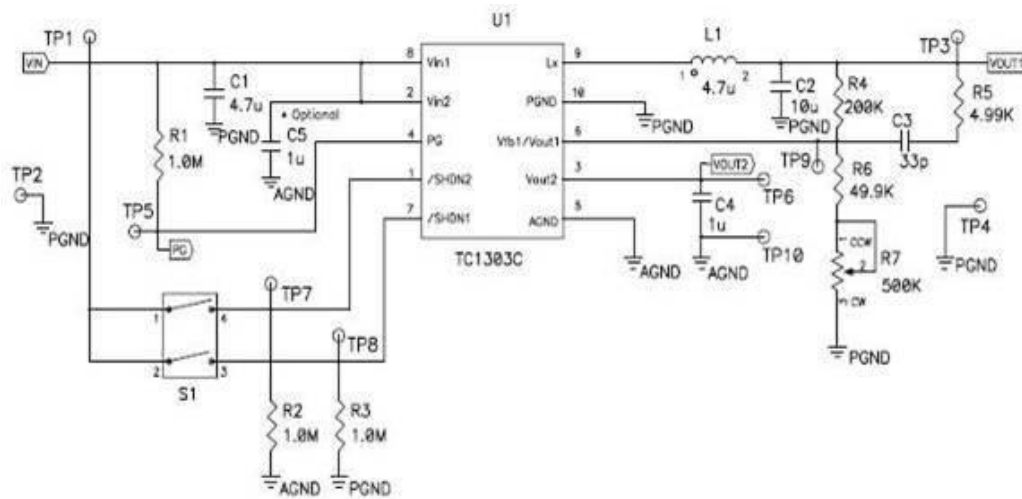
- TC1303B



The TC1303C DFN Adjustable Output demo board demonstrates the use of Microchip's TC1303C device in applications that require dual supply voltage. The demo board is used to evaluate the TC1303C device over the input voltage range, output voltage and current range for both the synchronous buck regulator output and the low dropout linear regulator output.

## Products supported:

- TC1303C





# MCP1632 300 kHz Boost Converter Demo Board

Online  
Datasheet

The MCP1632 300 kHz Boost Converter Demo Board is a compact, highly efficient, step-up voltage converter that will convert the input voltage rail (typically 5V) to a regulated 12V output voltage. The maximum output current for this demo board is 0.9A. The board demonstrates the capabilities of the MCP1632 PWM controller. Test points for various signals are provided for measuring different parameters of the converter. The Demo Board can be modified to support output voltages from 9V to 15V by changing a single resistor.

## Features:

- Input Voltage Range: 3.6V to 5.5V
- Output Voltage: 12V (9V to 15V adjustable)
- Maximum Output Current: 0.9A
- 90% typical efficiency at 12V/0.8A output and 5V input
- 300 kHz fixed switching frequency
- Overcurrent Protection for MOSFETs
- Shutdown input for low-power Standby mode
- UVLO with 2.7V and 2.8V typical thresholds

## Products supported:

- MCP1632





# MCP19035 300 kHz Buck Controller Eval Board

Online  
Datasheet

The MCP19035 300 kHz Synchronous Buck Controller Evaluation Board is a compact, highly efficient, step-down voltage regulator that will convert the input voltage rail (typically 12V) to 1.8V regulated output voltage. The maximum output current for this step-down converter is 15A. The board demonstrates the capabilities of the MCP19035 300 kHz synchronous buck converter, as well as Microchip's high-performance power MOSFET transistors. Test points for various signals are provided for measuring different parameters of the converter. The evaluation board can be modified to support output voltages from 0.9V to 3.3V by changing a single resistor. Microchip's companion Power MOSFETs are used in the design.

## Products supported:

- MCP19035
- MCP87050
- MCP87022



# MCP19035 600 kHz Buck Controller Eval Board

The MCP19035 600 kHz Synchronous Buck Controller Evaluation Board is a compact, highly efficient, step-down voltage regulator that will convert the input voltage rail (typically 12V) to 1.8V regulated output voltage. The maximum output current for this step-down converter is 10A. The board demonstrates the capabilities of the MCP19035 600 KHz Synchronous Buck Converter, as well as Microchip's high-performance power MOSFET transistors. Test points for various signals are provided for measuring different parameters of the converter. The evaluation board can be modified to support output voltages ranging from 0.9V to 3.3V by changing a single resistor.

**Features:**

- Input Voltage Range: 8V to 14V
- Output Voltage: 1.8V (can be adjusted by changing one resistor between 0.9V and 3.3V)
- Maximum Output Current: 10A
- 88% typical efficiency at 1.8V/10A output and 12V input
- 600 kHz fixed switching frequency
- On-board High Performance Power MOSFET Transistors
- Overcurrent Protection for High and Low-Side MOSFETs
- Power Good (PGOOD) output for monitoring the output voltage quality
- Shutdown input for placing the converter in low-power standby mode
- Under Voltage Lockout (UVLO) with 4.2V and 3.6V typical thresholds

**Products supported:**

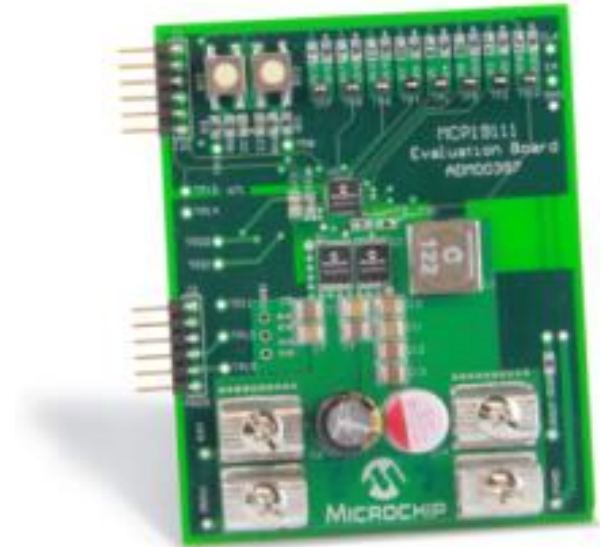
- ❑ MCP19035
- ❑ MCP87050
- ❑ MCP87022



The MCP19111 Evaluation Board demonstrates how the MCP19111 device operates in a synchronous buck topology over a wide input voltage and load range. Nearly all operational and control system parameters are programmable by utilizing the integrated PIC microcontroller core. MPLAB X IDE can be used in conjunction with a Graphical User Interface (GUI) plug-in to easily configure the MCP19111. Alternatively, the user can program the MCP19111 using their own firmware, tailoring it to their application. The evaluation board contains headers for ICSP™ (In-Circuit Serial Programming™) as well as I<sup>2</sup>C communication, pull-up and pull-down resistor pads and test point pads on each GPIO pin, and two push buttons for system development.

## Products supported:

- ❑ MCP19111
- ❑ MCP87050
- ❑ MCP87018





# MCP19114 Flyback Standalone Eval Board

The MCP19114 Flyback Standalone Evaluation Board and Graphical User Interface (GUI) demonstrate the MCP19114 performance in a synchronous Flyback topology. It is configured to regulate load current, and is well suited to drive LED loads. Nearly all operational and control system parameters are programmable through the integrated PIC MCU core. The MCP19114 evaluation board comes preprogrammed with firmware designed to operate with the GUI interface. Microchip's MPLABX IDE (Integrated Development Environment) can be used to develop and program user-defined firmware, thus customizing it to the specific application. The evaluation board contains headers for ICSPTM (In-Circuit Serial Programming) as well as I2C™ communication. Several test points have been designed into the PWB for easy access and development purposes. The MCP19114-Flyback Standalone Evaluation Board also demonstrates an optimized PCB (Printed Circuit Board) layout that minimizes parasitic inductance, while increasing efficiency and power density. Proper PCB layout is critical to achieve optimum MCP19114 operation as well as power train efficiency and noise minimization.

## Features

- Ceramic and bulk capacitors on the input reduce RMS ripple current and tame input voltage deviation caused by load transients
- Ceramic capacitors on the output reduce voltage ripple and provide energy to the output while the primary side is being re-energized
- PC software provides simple interface to evaluating the evaluation board
- Vin range: 8V to 14V
- Adjustable Vout range: 0V to 50V
- Maximum output current: 500mA with proper air flow
- Programming and I2C communication headers

**P/N: ADM00578**

## Products supported:

- MCP19114



# MCP19125 Flyback Battery Charger

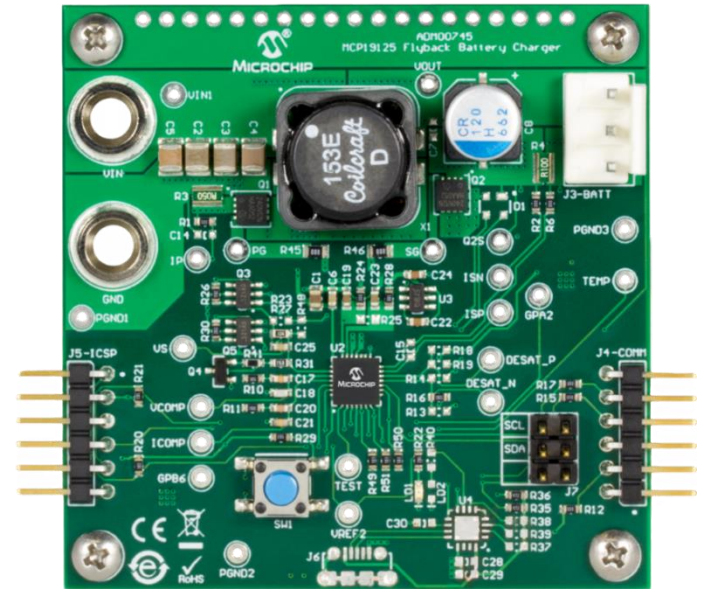
The MCP19125 Flyback Battery Charger Evaluation Board demonstrates a multi-chemistry synchronous battery charging circuit. It regulates the amount of charge current and the type of charging, while tracking the battery status. This is completely configurable using the integrated PIC® microcontroller, with the MPLAB X IDE and a Graphical User Interface (GUI). Alternatively, the user can program the MCP19125 using their own firmware.

## Features:

- Vin Range: 4.5V to 42V
- Maximum Charge Current: 1A
- Capable of charging:
  - Lithium Ion (Li-Ion): 2-4 Cells
  - Nickel Metal Hydride (NiMH): 2-7 Cells
  - Valve Regulated Lead Acid (VRLA): 3-6 Cells
- Programming and I2C headers
- Factory programmed for use with downloadable Graphical User Interface (GUI)

## Products supported:

- MCP19124
- MCP19125
- TC1240



# MCP19215 Boost / SEPIC Eval Board

The MCP19215 Dual Channel Controller Evaluation Board demonstrates how the MCP19215 device operates in Boost and SEPIC topologies over a wide input voltage and load range. Nearly all operational and control system parameters are programmable by utilizing the integrated PIC controller.

## Features:

- Input voltage range: 8V to 15V
- Output voltage: default 20V for both channels (can be –  
- software adjusted from input voltage + 1V to 24V for –  
- channel 1 and 9V to 24V for channel 2)
- Default output current: 0.2A (can be software adjusted –  
- from 0A to 1A)
- 300 kHz switching frequency
- Status report (including errors, input voltage, output –  
- voltage and current) via I2C communication
- Under voltage lockout (UVLO) and overvoltage lockout –  
- (OVLO) with programmable thresholds (via software)

## Products supported:

- MCP19215



The MIC2101/02 are constant-frequency, synchronous buck controllers featuring a unique adaptive ON-time control architecture. The MIC2101/02 operates over an input supply range from 4.5V to 38V and can be used to supply up to 15A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ . The device operates with programmable switching frequency from 200kHz to 600kHz.

The MIC2101 and MIC2102 evaluation board requires only a single power supply with at least 10A current capability. The MIC2101/02 has internal VDD LDO so no external linear regulator is required to power the internal biasing of the IC. In the applications with  $V_{IN} < +5.5V$ , VDD should be tied to  $V_{IN}$  to by-pass the internal linear regulator. The output load can either be a passive or an active load.

## Products supported:

- MIC2101
- MIC2102



The MIC2169A is a high-efficiency, simple to use 500kHz PWM synchronous buck control IC housed in a small MSOP-10 package. The MIC2160A allows compact DC-to-DC solutions with a minimal external component count and cost. The output voltage can be precisely regulated down to 0.8V. The adaptive all N-Channel MOSFET drive scheme allows efficiencies over 95% across a wide load range.

## Products supported:

- MIC2169



# MIC2196 LED Driver Evaluation Board

The MIC2196 current mode boost controller is used to implement a LED Driver with PWM DIM control. The LED series string is pulsed on and off by the PWM DIM input signal to provide true PWM dimming. When pulsed on the LED, current is regulated by the high frequency current mode boost converter.

## Products supported:

- MIC2196



The MIC2104 is a constant-frequency, synchronous buck controller featuring a unique adaptive ON-time control architecture. The MIC2104 operates over an input supply range from 4.5V to 75V and can be used to supply up to 15A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ . The device operates with programmable switching frequency from 200kHz to 600kHz.

The MIC2104 evaluation board requires only a single power supply with at least 10A current capability. The MIC2104 has internal VDD LDO so no external linear regulator is required to power the internal biasing of the IC. In the applications with  $V_{IN} < +5.5V$ , VDD should be tied to  $V_{IN}$  to by-pass the internal linear regulator. The output load can either be a passive or an active load.

## Products supported:

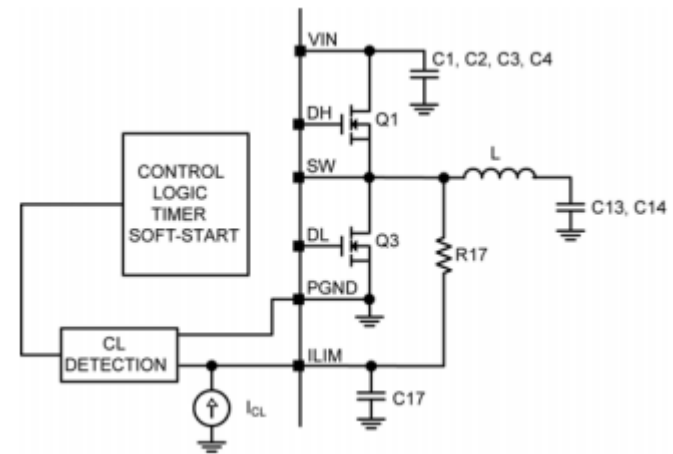
- MIC2104



The MIC2103/04 are constant-frequency synchronous buck controllers featuring a unique adaptive on-time control architecture. The MIC2103/04 operates over an input supply range of 4.5V to 75V and can be used to supply up to 15A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ . The device operates with programmable switching frequency from 200kHz to 600kHz.

## Products supported:

- MIC2103





The MIC2130/1 evaluation board is a high voltage input PWM synchronous buck converter. The MIC2130/1 is a voltage mode controller with a fast hysteretic control loop (FHyCL) employed during fast line and load transients. The MIC2130/1 has an internal transconductance error amplifier, gate drivers, current limit, enable and under voltage lock out and soft start circuitry. The internal gate drivers are designed to drive high current MOFETs. The evaluation board output voltage is selected by a jumper for pre-selected voltage divider network, 1.8V, 3.3V, 5V or leaving the jumper open for 0.7V. The maximum current limit is set a 9A. The input voltage is 8V to 40V.

## Products supported:

- MIC2130
- MIC2131



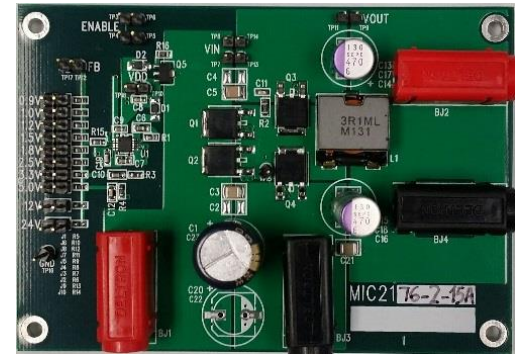
# MIC2176 5A Evaluation Board

The MIC2176-1/-2/-3 is a family of constant frequency, synchronous buck controllers featuring a unique digitally modified adaptive ON-time control architecture. The MIC2176 family operates over an input supply range of 4.5V to 75V. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of +/-1% typically, and the device operates at a switching frequency of 100kHz, 200kHz, and 300kHz.

The MIC2176 evaluation board requires only a single power supply with at least 10A current capability. A linear regulator, which includes a Zener and an NPN transistor, has been installed on the board to provide housekeeping for the MIC2176 controller. The output load can either be a passive or an active load.

## Products supported:

- MIC2176-2



The MCP1640 Synchronous Boost Converter Evaluation Board uses the MCP1640 in a high-efficiency (up to 96%), fixed frequency (500MHz), step-up DC-DC converter.

It demonstrates:

- Easy-to-use and minimum number of external components power supply solution for applications powered by one-cell, two-cell, or three-cell alkaline, NiCd/NiMH; one-cell Li-Ion or Li-Polymer batteries
- Selection of the best operating mode for efficiency (PWM/PFM)
- A wide input voltage range (0.35 to 5.5V) and low start-up voltage (0.65V)
- PCB layouts recommendation for SOT23-6 and 2x3mm-8 DFN packages
- Three common output voltages to evaluate: 2.0V, 3.3V and 5.0V enable selection (when disabled, the MCP1640 disconnects the path from input to output for “true-disconnect”).

## Products supported:

- MCP1640





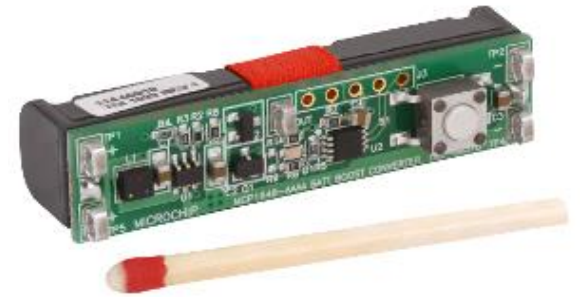
# MCP1640 Single AAAA Battery Boost Ref. Design

Online  
Datasheet

The MCP1640 Single Quadruple-A Battery Boost Converter Reference Design demonstrates how the MCP1640 device, with the True Output Disconnect Shutdown option, works attached to a microcontroller application. This board demonstrates how to optimize battery life using the MCP1640, and an 8-bit low cost PIC microcontroller, to reduce the No Load Input Current for applications that operate in Standby mode for a long period of time. During Standby, the enable signal for the MCP1640 has a low frequency, with less than 1% positive duty cycle. This maintains the output of the MCP1640 device up to 2.3V, which is sufficient to keep the PIC microcontroller live. This solution reduces up to 80% of the No Load Input Current the MCP1640 consumes in PFM Mode.

## Products supported:

- MCP1640
- PIC12F617



# MCP1640 12V/50mA Two Cells Input Ref. Design

The MCP1640 12V/50 mA Two Cells Input Boost Converter Reference Design is designed to demonstrate the MCP1640 device's high-voltage boost capability above its typical output range of 5.5V. This board boosts the low-voltage input to 12V and up to 70 mA load. By changing specific resistors, a lower/higher output than 12V can be obtained. The MCP1640 Input Boost Converter was developed to help engineers reduce product design cycle time. At 2.0V input and 12V output, the board is capable of a maximum of 50 mA load current.

## This Kit Contains:

- 1x MCP1640 12V/50 mA Two Cells Input Boost Converter Board

## Products supported:

- MCP1640B



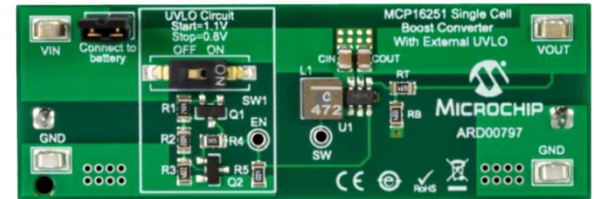
The MCP16251 Single Cell Boost Converter With External UVLO Reference Design provides an example of how to optimize applications powered from a single AA cell battery by incorporating a ultra low power external under-voltage lockout circuit with hysteresis.

## Features:

- Converter will not (re)start if the battery voltage is lower –
  - than 1.14V and will stop working if the battery voltage –
  - drops below 0.83V.
- External ULVO circuit drains approximately 0.1-0.4 $\mu$ A –
  - before start-up and 1 -2 $\mu$ A after start-up.
- Output voltage: 3.3V
- Output current: < 125 mA
- Typical Efficiency: Up to 96%
- Automatic PFM/PWM operation

## Products supported:

- MCP16251





# MCP1642B Two-Cells to USB Power Eval Board

Online  
Datasheet

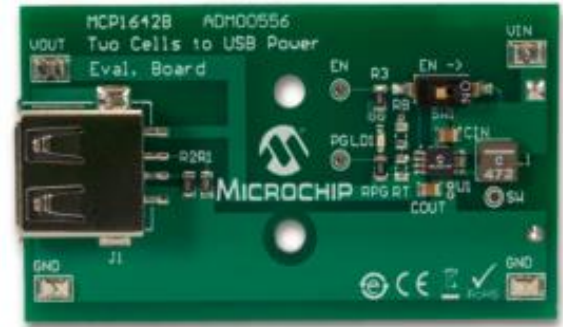
This board demonstrates the MCP1642B capabilities in a boost-converter application supplied from two AA batteries or from an external voltage source. A USB cable can be connected to the output of MCP1642B Two-Cells to USB Power Evaluation Board and used to provide power to portable electronic devices when necessary. It can be used to evaluate the MSOP-8 package. The MCP1642B Two-Cells to USB Power Evaluation Board was developed to help engineers reduce the product design cycle time. On the MCP1642B Two-Cells to USB Power Evaluation Board, the output voltage has the value of 5.0V (the fixed value MCP1642B-50 device is used), resulting in a simple and compact application. The footprints for RT and RB (resistor divider connected to the FB pin) are not populated and will only be used if MCP1642B-ADJ, the adjustable option, will be tested.

## Features:

- Can be powered by two AA batteries or external power supply
- Output voltage: 5.0V
- Power Good indicator 2 mA LED
- Enable state selectable using EN switch with “true-disconnect”
- USB A output connector

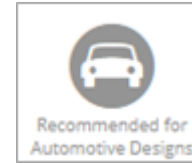
## Products supported:

- MCP1642B





# MCP1643 1.6A LED Driver Eval Board



Online  
Datasheet

The MCP1643 Synchronous Boost LED Constant Current Regulator Evaluation Board is used to evaluate and demonstrate Microchip Technology's MCP1643 device. This board demonstrates the MCP1643 in a boost converter application supplied by one AA battery, or from an external voltage source, which drives an LED with three selectable currents. This evaluation board was developed to help engineers reduce the product design cycle time.

Four output currents can be selected: 25, 50, 75 and 100mA. The output current can be changed with a dual switch that changes the external LED current sense equivalent resistance. An enable switch is used to enable and disable the converter. When enabled, the MCP1643 will regulate the output current; when disabled, the MCP1643 disconnects the path from input to output for "true-disconnect". In this state, the current consumed from the battery is 1  $\mu$ A, typically.

## Features:

- Can be powered by one-cell Alkaline, NiCd, or NiMH batteries, or by external power supply
- Input voltage range,  $V_{IN}$ : 0.35V to 2.5V, with  $V_{IN} < V_{OUT}$
- Start-up voltage: 0.65V
- Fixed output current: 25 mA 50 mA, 75 mA or 100 mA, selected
- PWM Switching Frequency: 1 MHz
- Mechanical battery reverse polarity protection

## Products supported:

- MCP1643





The MCP1663 Evaluation Board is used to evaluate and demonstrate Microchip Technology's MCP1663 step-up switching regulator. This board comes with two distinct applications. The 1st circuit can be used to evaluate the MCP1663 in the typical boost configuration 9V/12V selectable output. The board also provides an example of how a higher input voltage application can be implemented.

## Features:

- Typical 9V/12V Output supplied from low input voltage source:
  - Input Voltage range: 2.4V to 5.5V, with  $V_{IN} - < V_{OUT}$
  - Output Current: typical 250 mA @ 12V Output, - 3.3V Input
  - Enable state selectable using EN switch
- 24V Output supplied from high input voltage source:
  - Input Voltage range ( $V_{IN}$ ): 9V to 16V

## Products supported:

- MCP1663



# MCP1664 LED Driver Eval Board

The MCP1664 LED Driver Evaluation Board is used to evaluate and demonstrate Microchip Technology's MCP1664 product. This board demonstrates the MCP1664 in a boost converter application supplied from an external voltage source, which drives a string of LEDs with three selectable currents. The MCP1664 LED Driver Evaluation Board was developed to help engineers reduce the product design cycle time.

## Features:

- Adjustable Output Current: 90 mA, 180 mA or 270 mA, - selected using a dual switch on-board
- Input Voltage range ( $V_{IN}$ ): 2.4V to 5.5V, with  $V_{IN} < V_{OUT}$
- PWM Dimming using PWM generator on board
- 1.8A Peak Input Current Limit

## Products supported:

- MCP1664



# MCP16251 & MCP1640B Synchronous Boost

The MCP16251 and MCP1640B Synchronous Boost Converters Evaluation Board is used to evaluate and demonstrate Microchip Technology's MCP16251 and MCP1640B products. This board demonstrates the MCP16251/MCP1640B in two boost-converter applications with multiple output voltages. It can be used to evaluate both package options (SOT-23-6 and 2x3 mm 8-(T)DFN). The MCP16251 and MCP1640B Synchronous Boost Converters Evaluation Board was developed to help engineers reduce the product design cycle time. Three common output voltages can be selected: 2.0V, 3.3V and 5.0V. The output voltage can be changed with a mini-dip switch that changes the external resistor divider. A switch connected to the EN pin is used to enable and disable the converters. When enabled, the MCP16251/MCP1640B will regulate the output voltage; when disabled, the MCP16251/MCP1640B disconnects the path from input to output for "true-disconnect".]

## Features:

- Can be powered by one-cell, two-cell, or three-cell alkaline, NiCd, NiMH, one-cell Li-Ion or Li-Polymer batteries
- Input voltage range ( $V_{IN}$ ): 0.35V to 5.5V, with  $V_{IN} \leq V_{OUT}$
- Fixed output voltage: 2.0V or 3.3V and 3.3V or 5.0V, selected using a mini-dip switch on board
- Output current: typical 125 mA @ 3.3V Output, 1.5V Input or 200 mA @ 5.0V Output, 3V Input

**P/N: ADM00458**

## Products supported:

- MCP16251
- MCP1640B



# MCP1662 LED Driver Eval Board

This board demonstrates the MCP1662 in a boost-converter application supplied by two AA batteries, or from an external voltage source, which drives a string of LEDs with three selectable currents: 30 mA, 60 mA and 90 mA. The output current can be changed with a dual switch that changes the external LED current sense equivalent resistance (RSET). An enable switch is used to enable and disable the converter. When enabled, the MCP1662 will regulate the output current; when disabled, the current consumed from the battery by the device is typically less than 20 nA.

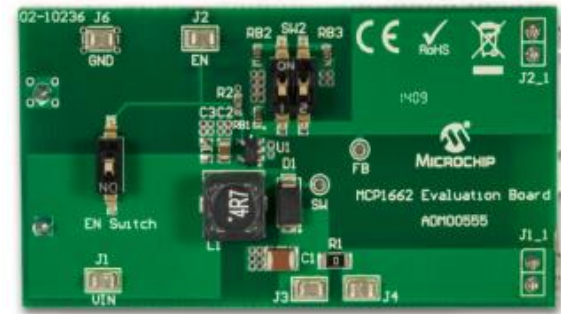
## Features:

- Can be powered by two-cell Alkaline, NiCd, NiMH or Lithium AA cell batteries
- Input Voltage range ( $V_{IN}$ ): 2.4V to 5.5V,
- Undervoltage Lockout: 2.3V to Start; 1.85V to Stop
- Adjustable Output Current: 30 mA, 60 mA or 90 mA, selected using a dual switch on-board
- PWM Switching Frequency: 500 kHz
- Enable converter using switch on board
- 1.3A Peak Input Current Limit
- Overtemperature Protection
- Open Load Protection in case of: LED fail or FB disconnected/fault

**P/N: ADM00555**

## Products supported:

- MCP1662





# MCP1661 HV Boost & SEPIC Converters Eval Board

Online  
Datasheet

The MCP1661 High-Voltage Boost and SEPIC Converters Evaluation Board is used to evaluate Microchip Technology's MCP1661 product. This board demonstrates the MCP1661 capabilities in two different topologies:

- 12V output Boost Converter application supplied from an external voltage source ( $V_{IN} < 5.5V$  e.g. two cell boost to 12V)
- 3.3V output SEPIC Converter application supplied from a Li-Ion Cell. It can be used to evaluate the SOT-23-5 package. The MCP1661 High-Voltage Boost and SEPIC Converters Evaluation Board was developed to help engineers reduce product design cycle time.

In both the MCP1661 Boost Application and MCP1661 SEPIC Application, the output voltage is set to the proper value using an external resistor divider, resulting in a simple and compact solution.

In the MCP1661 SEPIC Application, a switch is used to enable and disable the converter. When enabled, the MCP1661 will regulate the output voltage; when disabled, the MCP1661 SEPIC Application will disconnect the path from input to output

## Features:

- MCP1661 device can be evaluated in two separate applications: Boost and SEPIC
- Start-up Voltage: 2.3V (UVLO Start)
- Input Voltage range ( $V_{IN}$ ) after start-up: 2.4V to 5.5V,
- Output Voltage:
  - 12V (for MCP1661 Boost Application)
  - 3.3V (for MCP1661 SEPIC Application)
- Output Current: typical 125 mA @ 12V Output, 3.3V Input (Boost)

**P/N: ADM00566**

## Products supported:

- MCP1661



<< BACK

The MIC2601 is a 1.2MHz/2MHz, PWM DC/DC boost switching regulator. High power density is achieved with the MIC2601's internal 40V/1.2A switch, allowing it to power large loads in a tiny footprint.

The MIC2601 implements constant frequency 1.2MHz/2MHz PWM current mode control. The MIC2601 offers internal compensation that provides excellent transient response and output regulation performance. The high frequency operation saves board space by allowing small, low-profile external components. The fixed frequency PWM scheme also reduces spurious switching noise and ripple to the input power source.

## Products supported:

- MIC2601



The MIC2605/6 is a 1.2MHz/2MHz, PWM DC/DC boost switching regulator. High power density is achieved with the MIC2605/6's internal 40V/0.5A switch and Schottky diode, allowing it to power large loads in a tiny footprint.

The MIC2605/6 implements constant frequency 1.2MHz/2MHz PWM current mode control. The MIC2605/6 offers internal compensation that offers excellent transient response and output regulation performance. The high frequency operation saves board space by allowing small, low-profile external components. The fixed frequency PWM scheme also reduces spurious switching noise and ripple to the input power source.

## Products supported:

- MIC2605
- MIC2606



The MIC2619 is a 1.2MHz pulse width modulated (PWM) step-up switching regulator that is optimized for low power, high output voltage applications. With a maximum output voltage of 35V, and a switch current of over 350mA, the MIC2619 can easily supply most high voltage bias applications, such as TV tuners.

The MIC2619 implements a constant frequency 1.2MHz PWM current-mode control scheme. The high frequency PWM operation saves board space by reducing external component sizes. The additional benefit of the constant frequency PWM control scheme as opposed to variable frequency control schemes is lower output noise and smaller input ripple injected back to the battery source. The MIC2619 has programmable overvoltage protection to ensure output protection in case of fault condition.

## Products supported:

- MIC2619





The MIC2875/6 is a compact and highly-efficient 2MHz synchronous boost regulator with a 4.8A switch. It features a bi-directional load disconnect function which prevents any leakage current between the input and output when the device is disabled. The MIC2875 operates in bypass mode automatically when the input voltage is greater than the target output voltage. At light loads, the boost converter goes to the PFM mode to improve the efficiency.

## Products supported:

- MIC2875
- MIC2876



The MIC2250 is a general purpose DC/DC boost switching regulator that features low noise, EMI reduction circuitry, and high efficiency across a wide output current range. The MIC2250 is optimized for noise-sensitive hand held battery powered applications. A proprietary control method allows low ripple across the output voltage and current ranges. The MIC2250 incorporates a pseudo-random dithering function to reduce EMI levels up to 10dB enabled by the DITH pin.

The MIC2250 is designed for use with inductor values from 4.7 $\mu$ H to 22 $\mu$ H, and is stable with ceramic capacitors from 1 $\mu$ F to 22 $\mu$ F.

The MIC2250 attains a high peak efficiency up to 90% at 100mA and excellent light load efficiency of 80% at 1mA. High power density is achieved with the MIC2250's internal 34V/2A rated switch, allowing it to power large loads in a tiny footprint.

The MIC2250 evaluation board requires an input power source that is able to deliver at least 3A over the desired input voltage range. For the load, a 10W, variable resistor is recommended or an electronic load (E-Load) capable of constant resistance setting can be used. Note that noise/EMI measurements must employ a resistive load as electronic loads can introduce noise at light loads.

**P/N: MIC2250YML-EV**

## Products supported:

- MIC2250



The MIC2295 is a small 1.2MHz constant frequency PWM DC/DC step-up switching regulator. The MIC2295 evaluation boards requires an input power source that is able to deliver greater than 1.2A at 2.5V.

## Products supported:

- MIC2295





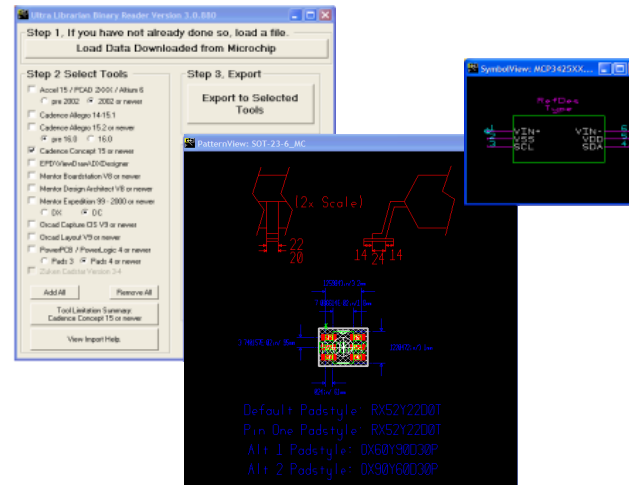
# CAD/CAE Schematic Symbols and Footprints

Online  
Datasheet

Microchip and Accelerated Designs Inc. have collaborated together to provide Microchip customers with schematic symbols and PCB footprints for Microchip products.

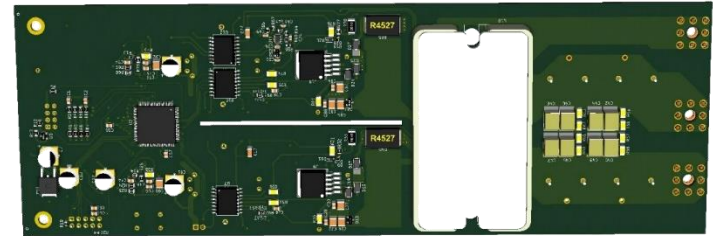
Both PCB footprints and schematic symbols are available for download in a vendor neutral format which can then be exported to the leading EDA CAD/CAE design tools using the Ultra Librarian Reader. The reader is available for free download

Providing components based on parametric data through the Ultra Librarian Reader will allow Microchip customers to reliably create consistent quality CAD entities to an established standard with minimal effort. It is anticipated that this free download service will save Microchip's customers significant time

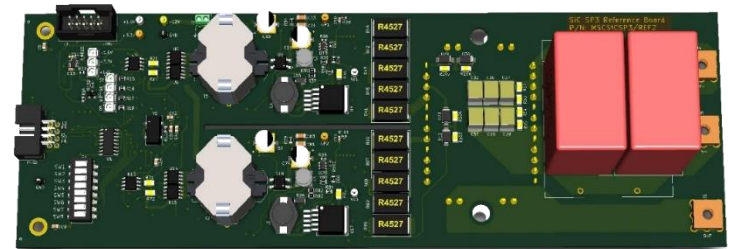


<< BACK

- Half Bridge Driver
- Up to 400 kHz switching frequency
- 12 V  $V_{IN}$  supply
- Capable of 16W of gate drive power/side
- 30 A peak Source output current
- Minimum 100 kV/ $\mu$ S CMTI
- -5 V/+20 V output gate drive
- Low propagation delay: 55 ns typ.
- Fault signaling
- Under voltage lockout protection
- Programmable dead time protection
- Desaturation protection
- Screw output terminals



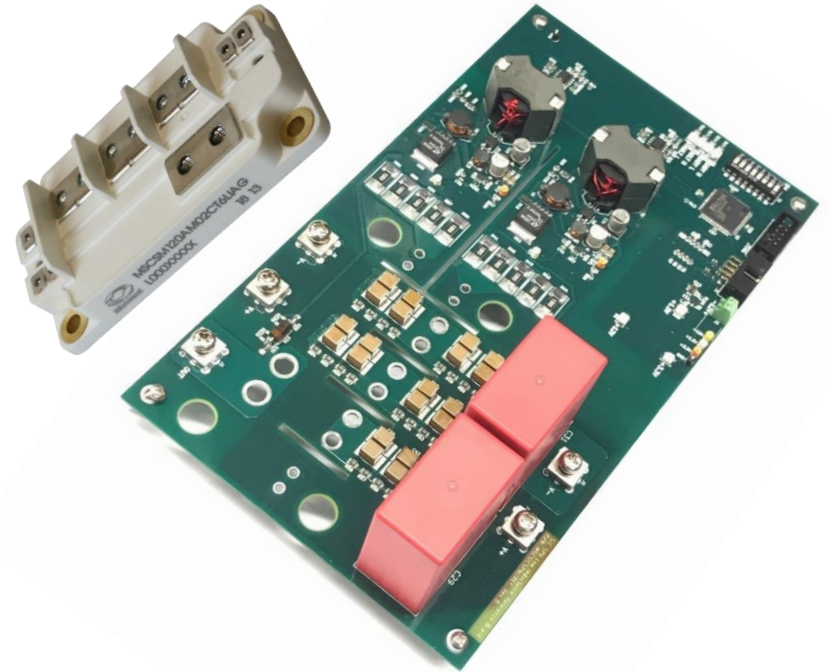
SP3F standard  
package  
compatible



<< Power Silicon Carbide

<< Power MOSFET Drivers

- Featuring **new low inductance SP6LI**
  - Stray inductance < 3 nH with SiC devices
  - Designed to be easy to parallel
- Half Bridge Driver
- Up to 1200 V and 586 A
- Up to 400 kHz switching frequency
- 12 V VIN supply
- Capable of 16 W of gate drive power/side
- 30 A Peak Source output current
- Minimum 100 KV/ $\mu$ S CMTI
- -5 V/+20 V output gate drive
- Low propagation delay variability
- Fault signaling
- Under voltage lockout protection
- Programmable dead time protection
- Desaturation protection



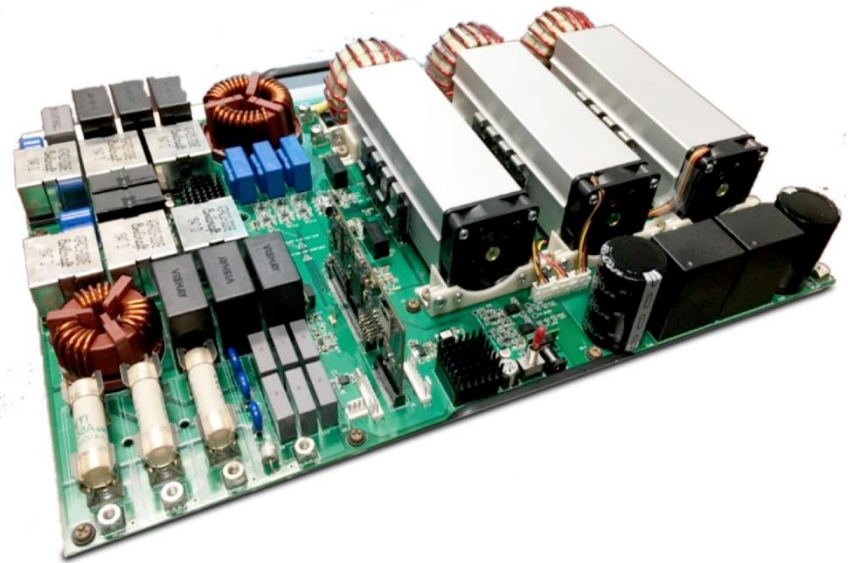
<< Power Silicon Carbide

<< Power MOSFET Driver

# MSCSICPFC/REF5

## 3-Phase Vienna PFC Reference Design

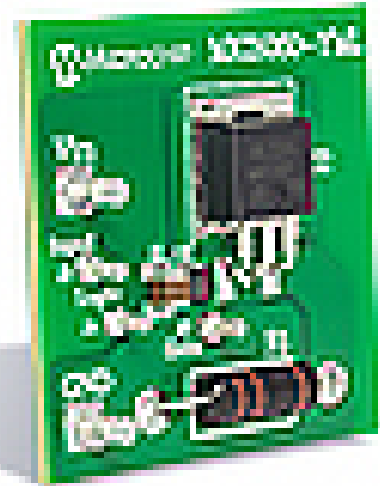
- 30 kW Vienna rectifier topology with greater than 98.5 % peak efficiency
- 3-phase input at 400 VAC/208 VAC, 50 Hz/60 Hz with output at 780 V DC
- 140 kHz pulse width modulation (PWM) switching frequency
- SiC MOSFETS mounted on AVVID MaxClip heat sinks to reduce communication loop inductance and voltage spikes across devices
- AlN spacers to reduce capacitance and common-mode noise
- Professional PCB layout with consideration for safety, current stress, mechanical stress, and noise immunity
- dsPIC33CH controller with verified open-source software using 3-level modulation for digital control



The MIC5060 MOSFET driver is designed for gate control of N-channel, enhancement-mode, and power MOSFETs used as high-side or low-side switches. The MIC5060 can sustain an on-state output indefinitely. The MIC5060 features an internal charge pump that can sustain a gate voltage greater than the available supply voltage. The driver is capable of turning on a logic-level MOSFET from a 2.75V supply or a standard MOSFET from a 5V supply. The gate-to-source output voltage is internally limited to approximately 15V. The MIC5060 is protected against automotive load dump, reversed battery, and inductive load spikes of  $-20V$ .

## Products supported:

- MIC5060





The MIC4102 are high frequency, 100V Half Bridge MOSFET driver ICs featuring fast 30ns propagation delay times. The low-side and high-side gate drivers are independently controlled and matched to within 3ns typical. The MIC4102 include a high voltage internal diode that charges the high-side gate drive bootstrap capacitor.

## Products supported:

- MIC4102



The MIC4224 is a dual 4A, high-speed, low-side MOSFET driver with logic-level driver enables. The device parallel Bipolar and CMOS output stage architecture provides high current throughout the MOSFETs Miller Region allowing the driver to sink and source 4A of peak current from a 12V supply and quickly charge and discharge a 2000pF load capacitance in under 15ns, while allowing the outputs to swing within 0.3V of  $V_{DD}$  and 0.16V of ground.

## Products supported:

- MIC4224



The MIC4605 is an 85V half-bridge MOSFET driver that features adaptive-dead-time and shoot-through protection. The adaptive-dead-time circuitry actively monitors the half-bridge outputs to minimize the time between high-side and low-side MOSFET transitions, thus maximizing power efficiency. Anti-shoot-through circuitry prevents erroneous inputs and noise from turning both MOSFETs on at the same time.

The MIC4605 also offers a wide 5.5V to 16V operating supply range to maximize system efficiency. The low 5.5V operating voltage allows longer run times in battery-powered applications. Additionally, the MIC4605's adjustable gate drive sets the gate drive voltage to VDD for optimal MOSFET  $R_{DS(ON)}$ , which minimizes power loss due to the MOSFET's  $R_{DS(ON)}$ .

## Products supported:

- MIC4605-1
- MIC4605-2



P/N: MIC4605-1YM-EV  
MIC4605-1YMT-EV  
MIC4605-2YM-EV  
MIC4605-2YMT-EV

The MIC4606 is an 85V full-bridge MOSFET driver that features adaptive dead time and shoot-through protection. The adaptive dead time circuitry actively monitors both sides of the full-bridge to minimize the time between high-side and low-side MOSFET transitions, thus maximizing power efficiency. Antishoot-through circuitry prevents erroneous inputs and noise from turning both MOSFETs of each side of the bridge on at the same time.

The MIC4606 also offers a wide 5.5V to 16V operating supply range to maximize system efficiency. The low 5.5V operating voltage allows longer run times in battery-powered applications. Additionally, the MIC4606's adjustable gate drive sets the gate drive voltage to  $V_{DD}$  for optimal MOSFET  $R_{DS(ON)}$ , which minimizes power loss due to the MOSFET's  $R_{DS(ON)}$ .

## Products supported:

- MIC4606-1
- MIC4606-2

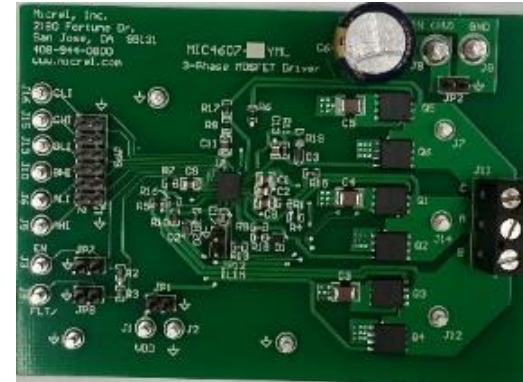


The MIC4607 is an 85V, three-phase MOSFET driver. The MIC4607 features a fast (35ns) propagation delay time and 20ns driver rise/fall times for a 1nF capacitive load. TTL inputs can be separate high- and low-side signals or a single PWM input with high and low drive generated internally. High- and low-side outputs are guaranteed to not overlap in either mode. The MIC4607 includes overcurrent protection as well as a high-voltage internal diode that charges the high-side gate drive bootstrap capacitor.

A robust, high-speed, and low-power level shifter provides clean level transitions to the high-side output. The robust operation of the MIC4607 ensures that the outputs are not affected by supply glitches, HS ringing below ground, or HS slewing with high-speed voltage transitions. Undervoltage protection is provided on both the low-side and high-side drivers.

## Products supported:

- MIC4607

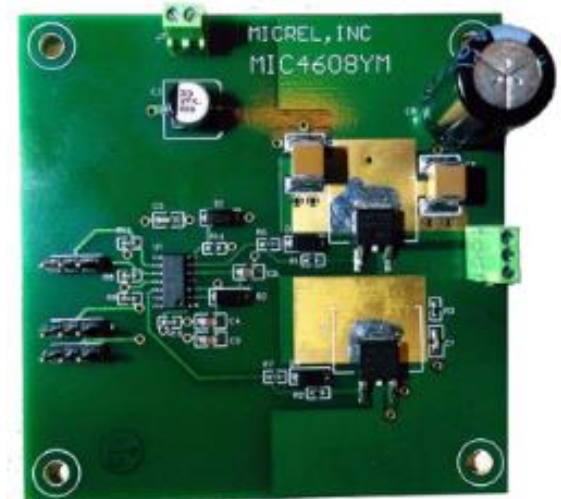


The MIC4608 is a 600V Half Bridge IGBT or MOSFET driver. The MIC4608 features a 450ns propagation delay including a 200ns input filtering time to prevent unwanted pulses. The low-side and high-side gate drivers are independently controlled (with shoot thru protection) or controlled with a single PWM signal. The MIC4608 has TTL input thresholds.

The robust operation of the MIC4608 ensures that the outputs are not affected by supply glitches, HS ringing below ground, or HS slewing with high-speed voltage transitions. Undervoltage protection is provided on both the low-side and high-side drivers.

## Products supported:

- MIC4608



The MIC4414 and MIC4415 are low-side MOSFET drivers designed to switch an N-channel enhancement type MOSFET in low-side switch applications. The MIC4414 is a non-inverting driver and the MIC4415 is an inverting driver. These drivers feature short delays and high peak current to produce precise edges and rapid rise and fall times.

## Products supported:

- MIC4414
- MIC4415



The MIC5019 is a high-side MOSFET driver with integrated charge pump designed to switch an N-Channel enhancement type MOSFET control signal in high-side or low-side applications.

The MIC5019 operates from a 2.7V to 9V supply, and generates gate voltages of 9.2V from a 3V supply, and 16V from a 9V supply. The device consumes a low 77 $\mu$ A of supply current and less than 1 $\mu$ A of supply current in shutdown mode.

## Products supported:

- MIC5019



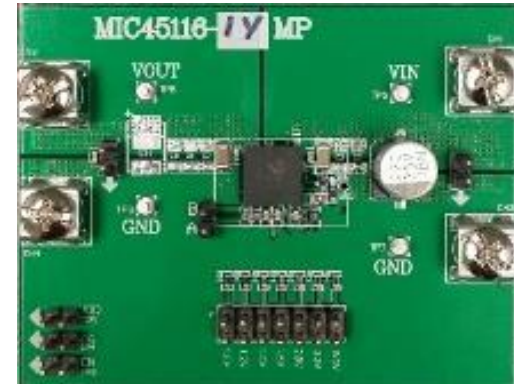


The MIC45116 is a synchronous step-down regulator module, featuring a unique adaptive ON-time control architecture. The module incorporates a DC/DC controller, power MOSFETs, bootstrap diode, bootstrap capacitor, and an inductor in a single package; simplifying the design and layout process for the end user.

This highly integrated solution expedites system design and improves product time-to-market. The internal MOSFETs and inductor are optimized to achieve high efficiency at a low output voltage. The fully optimized design can deliver up to 6A current under a wide input voltage range of 4.75V to 20V without requiring additional cooling.

## Products supported:

- MIC45116-1
- MIC45116-2



The MIC45205 is a synchronous step-down regulator module, featuring a unique adaptive ON-time control architecture. The module incorporates a DC-to-DC controller, power MOSFETs, bootstrap diode, bootstrap capacitor, and an inductor in a single package; simplifying the design and layout process for the end user.

This highly-integrated solution expedites system design and improves product time-to-market. The internal MOSFETs and inductor are optimized to achieve high efficiency at a low output voltage. The fully-optimized design can deliver up to 6A current under a wide input voltage range of 4.5V to 26V, without requiring additional cooling.

## Products supported:

- MIC45205-1
- MIC45205-2



The MIC45208 is a synchronous step-down regulator module, featuring a unique adaptive ON-time control architecture. The module incorporates a DC-to-DC controller, power MOSFETs, bootstrap diode, bootstrap capacitor, and an inductor in a single package; simplifying the design and layout process for the end user.

This highly-integrated solution expedites system design and improves product time-to-market. The internal MOSFETs and inductor are optimized to achieve high efficiency at a low output voltage. The fully-optimized design can deliver up to 10A current under a wide input voltage range of 4.5V to 26V, without requiring additional cooling.

## Products supported:

- MIC45208-1
- MIC45208-2



The MIC45212 is a synchronous step-down regulator module, featuring a unique adaptive ON-time control architecture. The module incorporates a DC-to-DC controller, power MOSFETs, bootstrap diode, bootstrap capacitor, and an inductor in a single package; simplifying the design and layout process for the end user.

This highly-integrated solution expedites system design and improves product time-to-market. The internal MOSFETs and inductor are optimized to achieve high efficiency at a low output voltage. The fully-optimized design can deliver up to 14A current under a wide input voltage range of 4.5V to 26V, without requiring additional cooling.

## Products supported:

- MIC45212-1
- MIC45212-2



The MIC28304 is synchronous step-down regulator module, featuring a unique adaptive ON-time control architecture. The module incorporates a DC-to-DC controller, power MOSFETs, bootstrap diode, bootstrap capacitor and an inductor in a single package. The MIC28304 operates over an input supply range from 4.5V to 70V and can be used to supply up to 3A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of  $\pm 1\%$ . The device operates with programmable switching frequency from 200kHz to 600kHz.

## Products supported:

- MIC28304



P/N: MIC28304-1-12V-EV  
MIC28304-1-5V-EV  
MIC28304-2-12V-EV  
MIC28304-2-5V-EV

The MIC33030 is a high-efficiency, 8MHz, 400mA synchronous buck regulator with an internal inductor and HyperLight Load<sup>®</sup> mode. HyperLight Load<sup>®</sup> provides very high efficiency at light loads and ultra-fast transient response that is perfectly suited for supplying processor core voltages. An additional benefit of this proprietary architecture is the very low output ripple voltage throughout the entire load range with the use of small output capacitors.

## Products supported:

- MIC33030



The MIC33050 is a high efficiency 600mA PWM synchronous buck (step-down) regulator with internal inductor featuring HyperLight Load<sup>®</sup>, a patent-pending switching scheme that offers best-in-class light load efficiency and transient performance while providing very small external components and low output ripple at all loads.

The MIC33050 also has a very low typical quiescent current draw of 20 $\mu$ A and can achieve over 83% efficiency even at 1mA.

## Products supported:

- MIC33050



P/N: MIC33050-4YHL-EV  
MIC33050-AYHL-EV  
MIC33050-CYHL-EV  
MIC33050-GYHL-EV  
MIC33050-SYHL-EV

The MIC33153 is a high-efficiency 4MHz 1.2A synchronous buck regulator with an internal inductor, HyperLight Load<sup>®</sup> mode, Power Good (PG) output indicator, and programmable soft start. HyperLight Load<sup>®</sup> provides very high efficiency at light loads and ultra-fast transient response which makes the MIC33153 perfectly suited for supplying processor core voltages. An additional benefit of this proprietary architecture is very low output ripple voltage throughout the entire load range with the use of small output capacitors.

## Products supported:

- MIC33153





The MIC3385 is a high efficiency inductorless buck regulator that features a LowQ<sup>®</sup> LDO standby mode that draws only 18 $\mu$ A of quiescent current. The MIC3385 requires no external inductor enabling an ultra-low noise, small size, and high efficiency solution for portable power applications.

In PWM mode, the MIC3385 operates with a constant frequency 8MHz PWM control. Under light load conditions, such as in system sleep or standby modes, the PWM switching operation can be disabled to reduce switching losses. In this light load LowQ<sup>®</sup> mode, the LDO maintains the output voltage and draws only 18 $\mu$ A of quiescent current. The LDO mode of operation saves battery life while not introducing spurious noise and high ripple as experienced with pulse skipping or bursting mode regulators.

## Products supported:

- MIC3385



The MIC45404 device is a 19V, 5A ultra-low profile, synchronous step-down regulator module optimized for high efficiency at low output voltages. The module incorporates a DC-to-DC regulator, bootstrap capacitor, high-frequency input capacitor and an inductor in a single package. The module pinout is optimized to simplify the Printed Circuit Board (PCB) layout process. This highly integrated solution expedites system design and improves product time to market. The internal MOSFETs and inductor are optimized to achieve high efficiency at low output voltage. Due to the fully optimized design, MIC45404 can deliver up to 5A current with a wide input voltage range of 4.5V to 19V.

## Products supported:

- MIC45404



The MIC95410 is a high-side load switch for computing and ultra-dense embedded computing boards where high-current low-voltage rails from sub-1V to 5.5V have to be sectioned. The integrated 6.6mΩ RDS(ON) N-channel MOSFET ensures low voltage drop and low power dissipation while delivering up to 7A of load current.

The basic parameters of the MIC95410 evaluation board are the IN supply of 1V to 5.5V and the separated bias voltage from 2.7V to 9V. It also includes a TTL-logic level turn-on command (CTL) and an output discharge function when disabled.

## Products supported:

- MIC95410



# MIC94161/2/3/4/5 Eval Board

The MIC94161/2/3/4/5 is a family of high-side load switches designed to operate from 1.7V to 5.5V input voltage. The load switch pass element is an internal 14.5mΩ RDSON N-Channel MOSFET which enables the device to support up to 3A of continuous current. Additionally, the load switch supports 1.5V logic level control and shutdown features in a tiny 1.5mm × 1mm 6-ball WLCSP package.

The MIC9416x provides reverse current protection when the device is disabled. The device will not allow the flow of current from the output to the input when the device is turned OFF. Additionally, the MIC94161 features overvoltage protection to protect the load when the input voltage is above 4.55V, as well as a precise enable threshold which keeps the MIC94161 in the default OFF state until the EN pin rises above 1.15V.

**P/N: MIC94161YCS-EV  
MIC94162YCS-EV  
MIC94163YCS-EV  
MIC94164YCS-EV  
MIC94165YCS-EV**

## Products supported:

- MIC94161
- MIC94162
- MIC94163
- MIC94164
- MIC94165



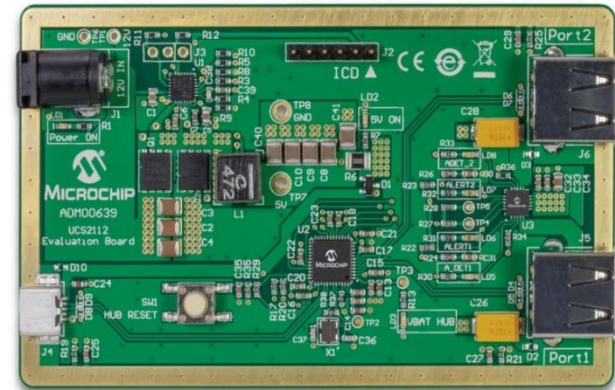
The UCS2112 Dual USB Port Power Evaluation Board demonstrates the features of two USB ports, capable of data transfer and charging up to 6A. Charging limits, accumulated current, alerts and attachment status can all be configured, exercised and/or observed on a graphical user interface.

## Features:

- The Graphical User Interface running on the PC allows advanced configuration and monitoring of the UCS2112 registers (current measurement and accumulated charge indication, current limit configuration, status indication)
- LED indicators for supply voltage detection, fault indication and attach detection on each port.

## Products supported:

- UCS2112





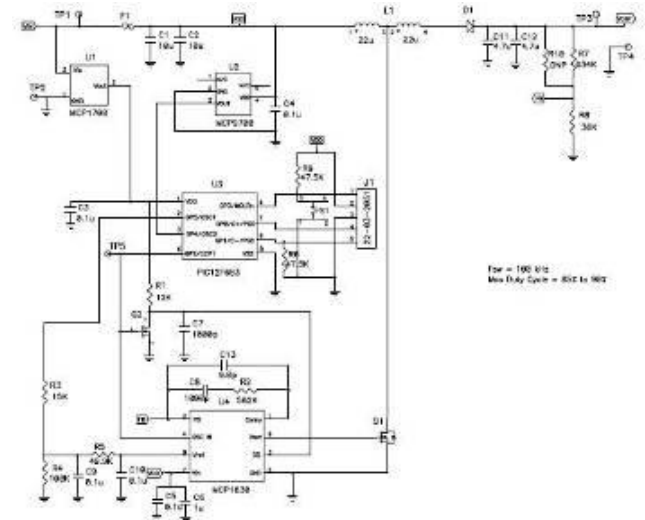
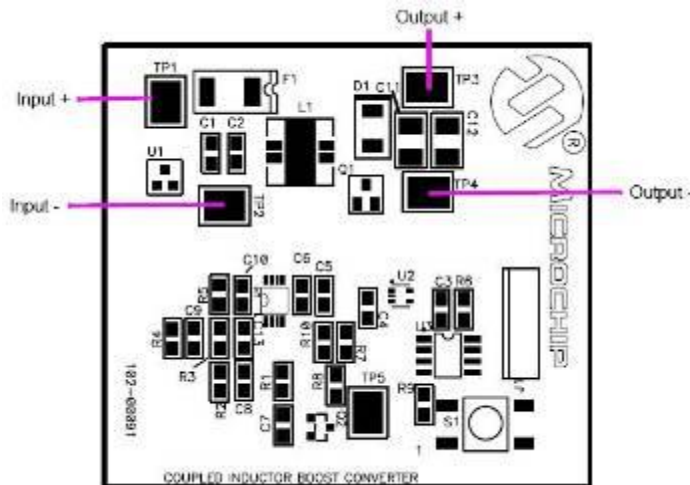
# MCP1630 Coupled Inductor Boost Demo Board

Online  
Datasheet

The MCP1630 Coupled Inductor Boost Converter Demo Board demonstrates Microchip's High-Speed Pulse Width Modulator (PWM) used in a coupled inductor design. When used in conjunction with a microcontroller, the MCP1630 device will control the power system duty cycle to provide different regulated output voltages using push button S1. The PIC12F683 microcontroller is used to generate oscillator pulses, can also be programmed to monitor the board ambient temperature using the MCP9700 Linear Active Thermistor™ device and provide different regulated output voltages for different thermal readings. The MCP1630 device generates duty cycle based on various external inputs. External signals include the input oscillator pulses, reference voltage from PIC12F683 device, and the feedback voltage. The output signal is a square-wave pulse given to drive the MOSFET.

## Products supported:

- MCP1630
- PIC12F683
- MCP9700





# MCP1630 Boost Mode LED Driver Demo Board

Online  
Datasheet

The MCP1630 Boost Mode LED Driver Demo Board is a step-up, switch-mode, DC-DC converter used for power LED applications. The demo board provides a 350mA or 700mA constant current source. Other output currents can be obtained with minor modifications to the board.

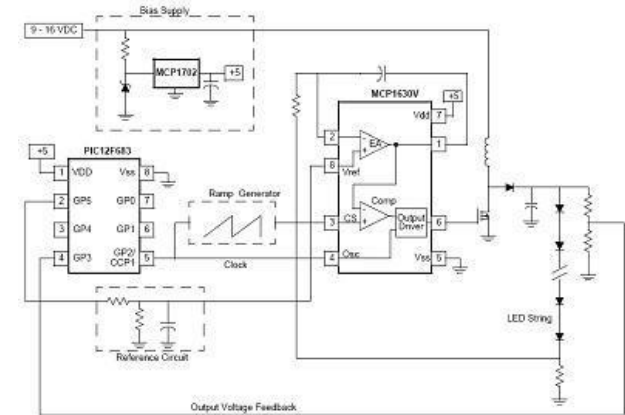
The demo board utilized Microchip's MCP1630V high-speed pulse width modulator (PWM). The 8-pin MCP1630 device contains the analog components necessary for an analog switch-mode control loop including an error amplifier, PWM comparator, and a high current driver pin. The switching frequency and maximum duty cycle for the MCP1630V are determined by an external clock source. An 8-pin PIC12F683 microcontroller is used to provide a 500 kHz switching clock for the MCP1630V. In addition, the PIC12F683 firmware supervises the circuit output voltage and can optionally dim the LEDs when a potentiometer is attached.

## Features:

- Compact size with high output power
- High efficiency over entire operating input voltage range
- Selectable output current: 350mA or 700mA
- Maximum output power: 30W
- Optional software dimming control
- Factory programmed source code provided
- Switching frequency, maximum duty cycle, and MCP1630 reference voltage can be modified in firmware

## Products supported:

- MCP1630V
- PIC12F683
- MCP1702





# MCP1630 Automotive Boost Conv. Demo Board

Online  
Datasheet

The MCP1630 Automotive Input Boost Converter Demo Board demonstrates the use of a conventional boost topology with automotive input. The board also serves as a platform to evaluate the MCP1630/V devices.

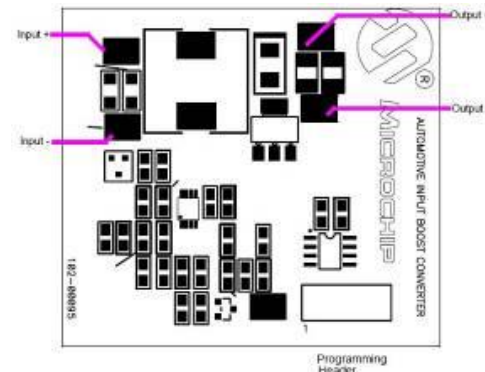
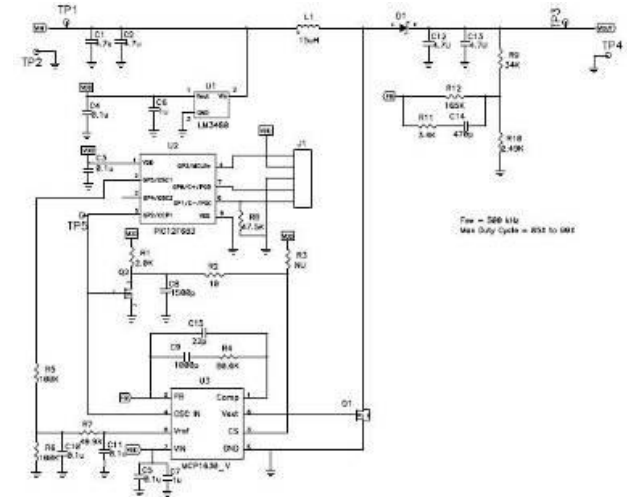
The MCP1630/V inputs were developed to be easily attached to the I/O of a microcontroller. The microcontroller unite (MCU) supplies the oscillator pulses and reference voltage ( $V_{REF}$ ) to the MCP1630/V devices to provide the most flexible and adaptable power system. The power system switching frequency and maximum duty cycle are stet using the I/O of the MCU. The reference input to the high-speed PWM can be external, a D/A Converter (DAC) output or as simple as an I/O output from the MCU. This enables the power system to adapt to many external signals.

The board utilizes Microchip's MCP1630/V integrated with the PIC12F683 Flash-based MCU. The converter is capable of delivering an output voltage of 36.5V at 400mA load current with maximum power of 14.6W.

P/N: MCP1630DM-DDBS1

## Products supported:

- MCP1630
- PIC12F683

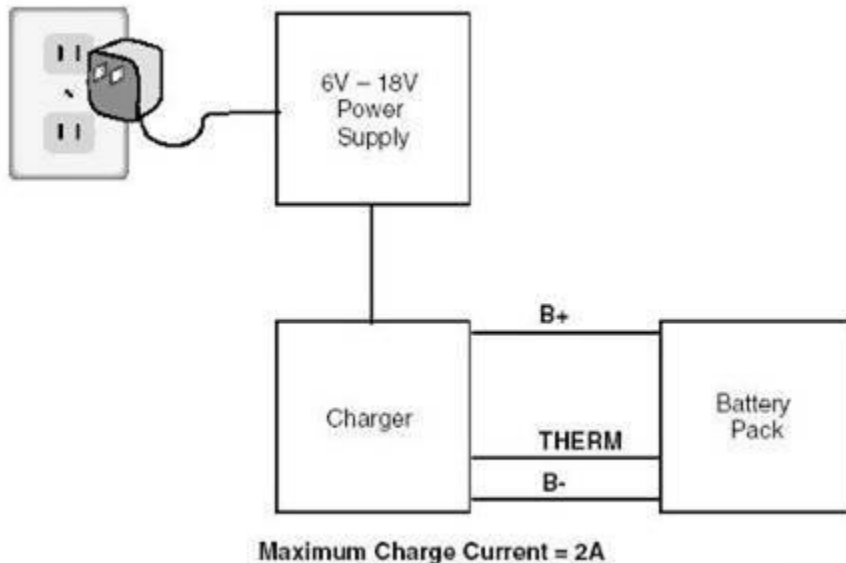


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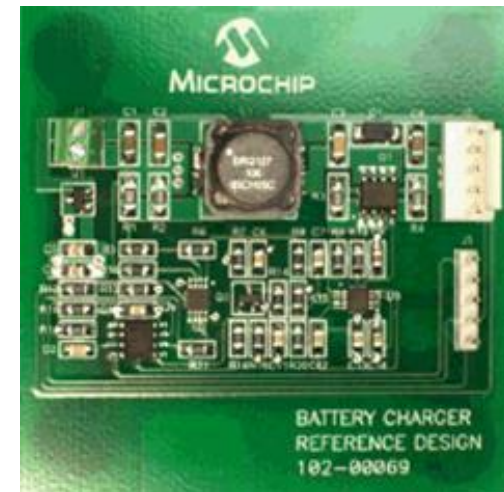
# MCP1630 Li-Ion Battery Charger Ref. Design

The MCP1630 Low-Cost Li-Ion Battery Charger is used to evaluate Microchip's MCP1630 in a SEPIC power converter application. As provided, the MCP1630 Low-Cost Li-Ion Battery Charger is capable of charging a single-cell, Li-Ion battery pack from an input voltage of 6V to 18V. The MCP1630 Low-Cost Li-Ion Battery Charger provides a constant current, constant voltage charge with preconditioning, cell temperature monitoring and battery pack fault monitoring. Also, the charger provides a status or fault indication. The MCP1630 Low-Cost Li-Ion Battery Charger automatically detects the insertion or removal of a battery pack.



## Products supported:

- MCP1630
- MCP6292
- PIC12F683

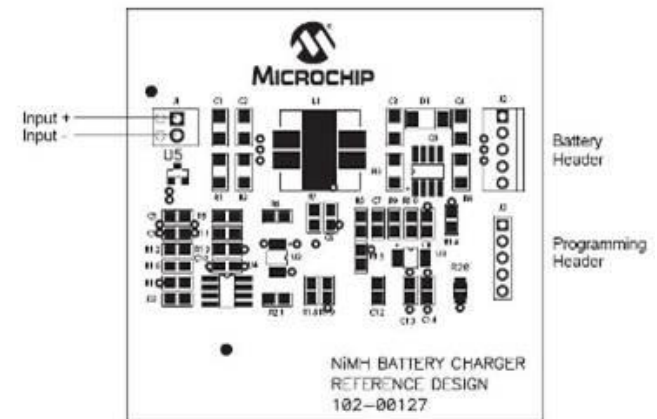
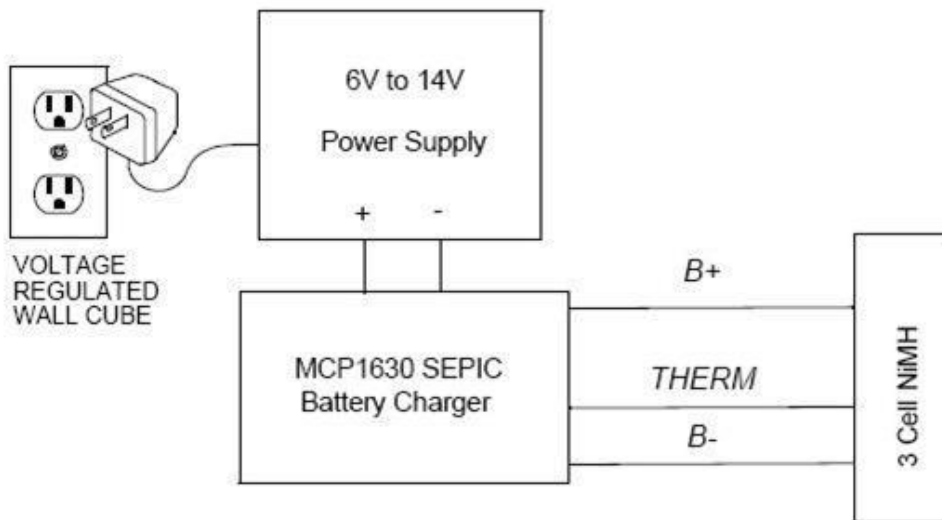


# MCP1630 NiMH Battery Charger Ref. Design

The MCP1630 Low-Cost NiMH Battery Charger Reference Design is used to charge three series cell NiMH or NiCd batteries. The board uses the MCP1630 high-speed analog PWM and PIC12F683 to generate the charge algorithm for NiMH or NiCd batteries.

## Products supported:

- MCP1630
- MCP6292
- PIC12F683
- MCP1702





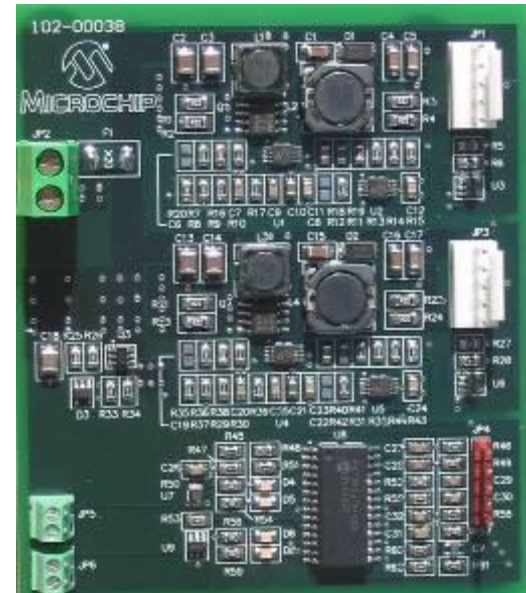
# MCP1630 Li-Ion Multi-Bay Battery Ref. Design

Online  
Datasheet

The MCP1630 Li-Ion Multi-Bay Battery Charger is a complete, stand-alone, constant-current, constant-voltage battery charger for single-cell Li-Ion battery packs. Different battery chemistries (i.e. three NiMH or NiCd batteries connected in series) can be charged with minor modifications to the firmware. This board utilizes Microchip's MCP1630 high-speed PWM, MCP6292 dual op-amp and PIC18F2410 Flash MCU. The input voltage range is 10V to 28V. The output is capable of charging at a fast-charge rate of 2A constant current.

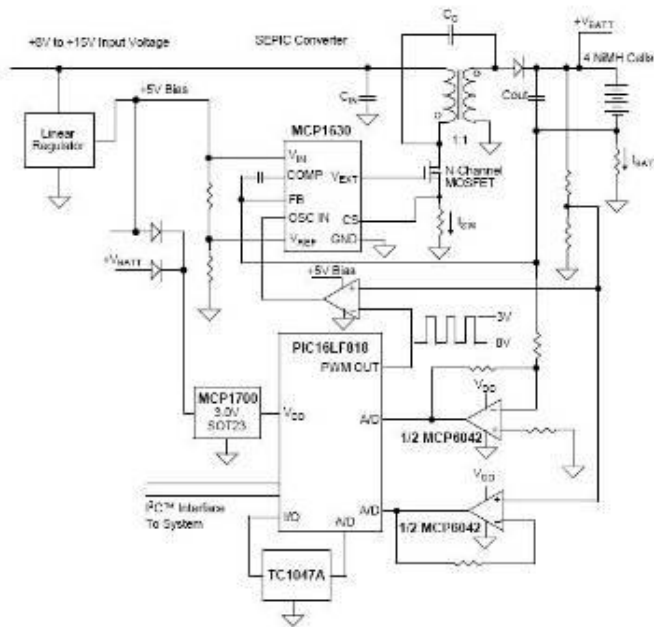
## Products supported:

- MCP1630
- MCP6292
- PIC18F2410



The MCP1630 NiMH Demo Board is a complete stand-alone constant current battery charger and simple fuel gauge for four NiMH series batteries. This board utilizes Microchip's MCP1630 high-speed PWM, MCP1700 LDO Regulator, MCP6042T Op-Amp, PIC16LF818 Flash MCU, TC54 Voltage detector and TC1047A Temperature-Voltage Converter. The input voltage range for the demo board is 8V to 15V. The output is capable of charging four NiMH batteries with up to 1.6V per cell at a fast charge rate of 500mA constant current.

MCP1630 NiMH Battery Charger and Fuel Gauge Application Diagram



## Products supported:

- MCP1630
- MCP6042
- TC1047A
- MCP1700
- TC54
- PIC16LF818



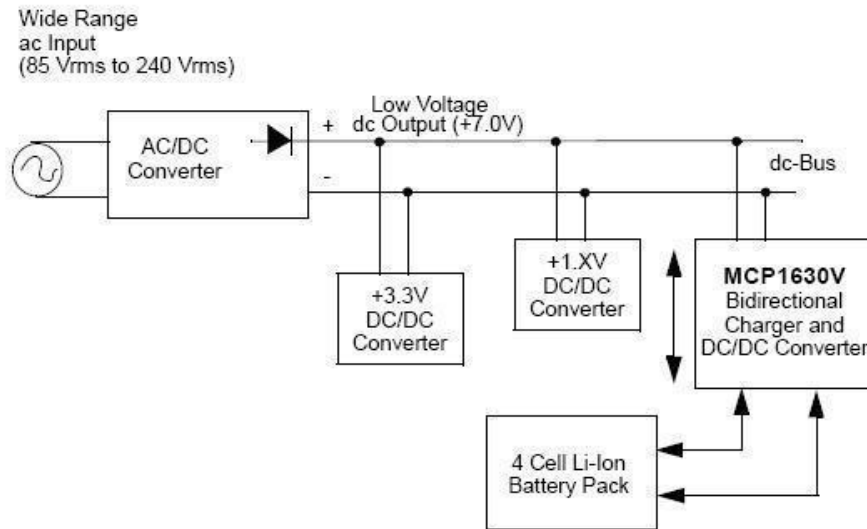
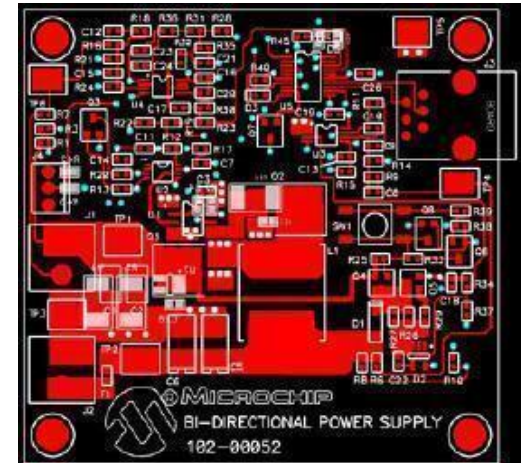
# MCP1630V Bidirectional 4-cell Li-Ion Charger Ref Design

Online  
Datasheet

The MCP1630V Bidirectional 4 Cell Li-Ion Charger Reference Design demonstrates the use of a bidirectional buck-boost converter used to charge multiple series cell Li-Ion batteries with the presence of an input source (boost) and provide a regulated output voltage when the input source is removed (buck). The board also serves as a platform to evaluate the MCP1630V device.

## Products supported:

- MCP1630V
- MCP6022
- PIC16F88





# MCP1631HV Programmable Current Source Design

Online  
Datasheet

The MCP1631HV Digitally Controlled Programmable Current Source Reference Design is used to drive and dim one or more power LEDs in a series or parallel topology (depending on the LED's capability). The reference design may also be used to charge one to four cell NiMH/NiCd or one to two cell Li-Ion battery packs. The board uses the MCP1631HV high-speed analog PWM controller and PIC16F616 microcontroller to generate the proper dimming ratio for LEDs or charge algorithm for NiMH, NiCd and Li-Ion batteries. The boards is used to evaluate Microchip's MCP1631HV in a SEPIC power converter application.

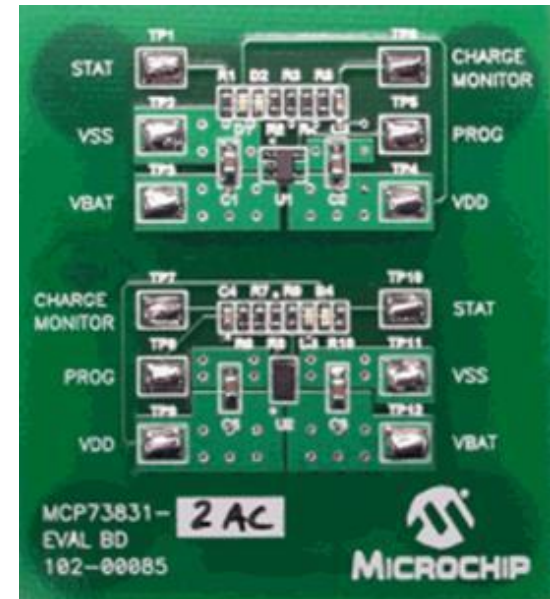
## Products supported:

- MCP1631HV
- PIC16F616



The MCP73831 Evaluation Board is an evaluation and demonstration tool for Microchip's MCP73831 miniature single-cell, fully-integrated Li-Ion, Li-Polymer charge-management controllers. Two evaluation boards are provided in the MCP73831 Evaluation kit. The boards are set up to evaluate simple, stand-alone, linear charging of single-cell Li-Ion/Li-Polymer battery packs (the battery packs are not included). Each board design provides constant current charging followed by constant voltage charging with automatic charge termination. In addition, the MCP73831-2AC board provides preconditioning of deeply depleted cells.

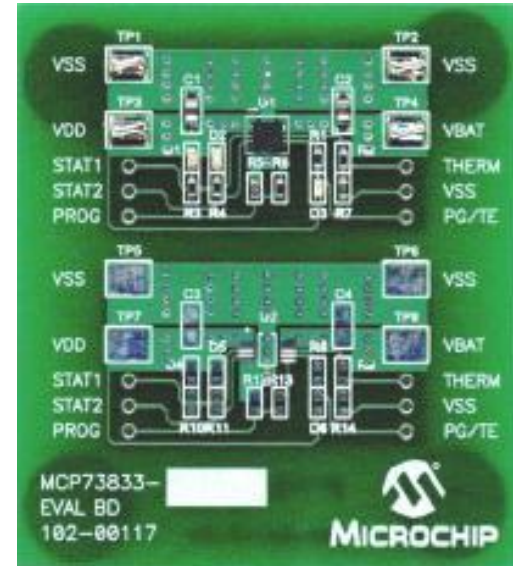
**Products supported:**  
□ MCP73831



The MCP73833 Li-Ion Battery Charger Evaluation Board is an evaluation and demonstration tool for Microchip's MCP73833/4 Stand-Alone Linear Li-Ion/Li-Polymer Charge Management Controllers. The evaluation board has two circuits provided with one circuit fully assembled and tested. Each circuit is set up to evaluate simple, stand-alone, linear charging of single cell Li-Ion/Li-Polymer battery packs (the battery packs are not included). The circuits can be evaluated independently. Each circuit design provides constant current charging followed by constant voltage charging with automatic charge termination and battery temperature monitoring. In addition, the assembled MCP73833/4-FC circuit provides preconditioning of deeply depleted cells.

## Products supported:

- MCP73833
- MCP73834



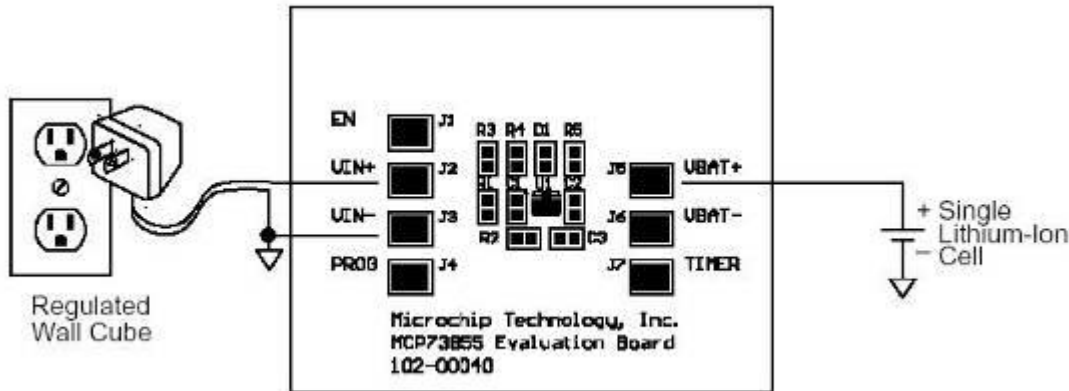


The MCP73855 Evaluation Board is an evaluation and demonstration tool for Microchip Technology's MCP73855 USB Compatible Li-Ion/Li-Polymer Charge Management Controller. The design provides for dynamic versatility while being able to handle accurate measurements.

The MCP73855 Evaluation Board allows for the evaluation of the MCP73855 device in a variety of applications.

## Products supported:

- MCP73855

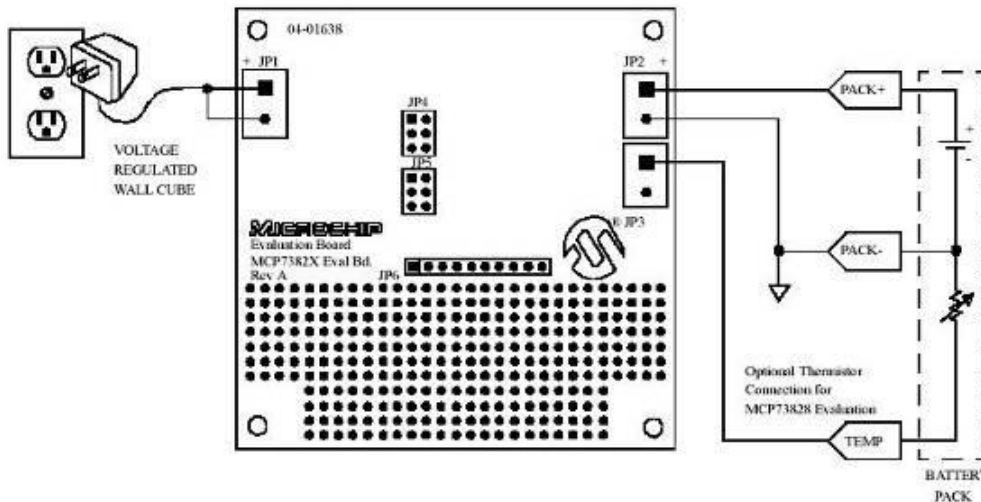


The MCP7382X Evaluation Board is an evaluation and demonstration tool for Microchip Technology's MCP7382X Single Cell Li-Ion Charge Management Controllers. The design provides for dynamic versatility while being able to handle accurate measurements.

The MCP7382X Evaluation Board allows for the evaluation of the MCP7382X device in a variety of applications.

**Products supported:**

- MCP7382x



The MCP7381X Li-Ion Battery Charger Evaluation Board demonstrates the features and abilities for Microchip's MCP7381X Li-Ion Battery Charger Evaluation Board Simple, Miniature Single-Cell, Fully Integrated Li-Ion / Li-Polymer Charge Management Controllers. The MCP73811/2 are stand-alone highly integrated linear Li-Ion battery chargers that employ a constant current/constant voltage (CCCV) charge algorithm for cost sensitive and space limited applications.

## Products supported:

- MCP73811
- MCP73812



The MCP73113 OVP Single-Cell Li-Ion Battery Charger Evaluation Board demonstrates the features of Microchip's MCP73113 "Single-Cell Li-Ion / Li-Polymer Battery Charge Management Controller with Input Overvoltage Protection".

## Products supported:

- MCP73113
- MCP73114

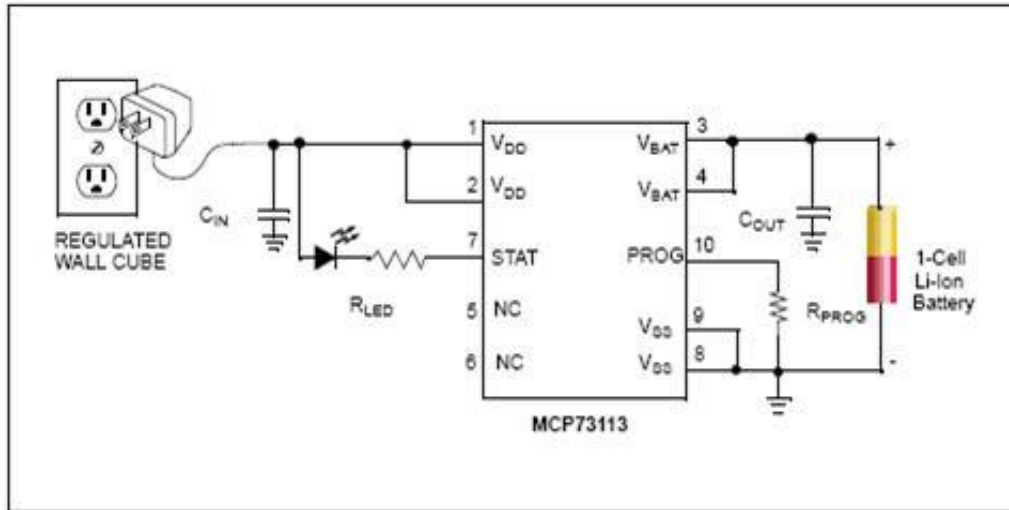


FIGURE 1-1: MCP73113 Typical Application.



The MCP73213 OVP Dual-Cell Li-Ion Battery Charger Evaluation Board demonstrates the features of Microchip's MCP73213 "Dual-Cell Li-Ion / Li-Polymer Battery Charge Management Controller with Input Overvoltage Protection".

**Products supported:**

- MCP73213

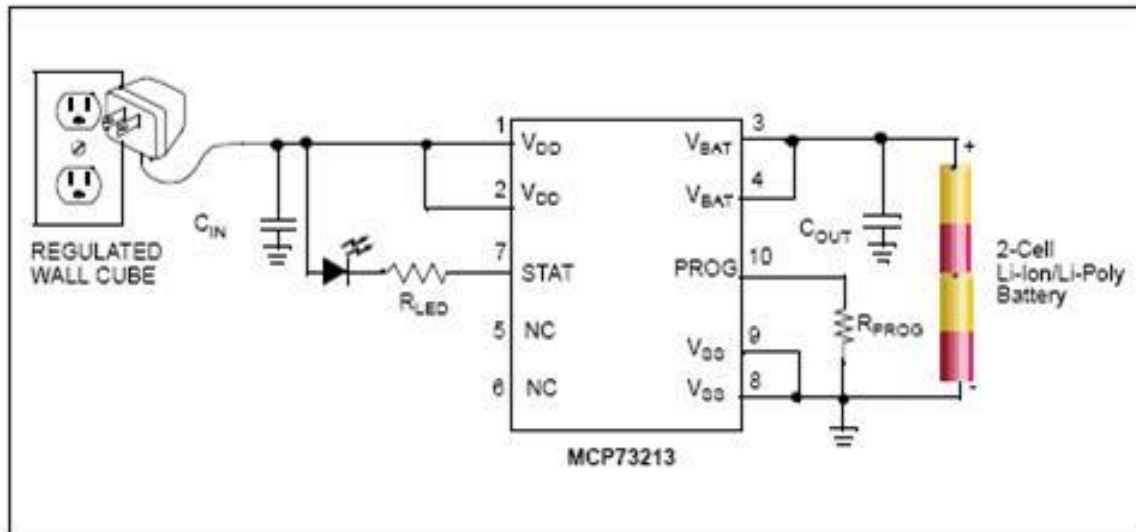


FIGURE 1-1: MCP73213 Typical Application.



# MCP73X23 LiFePO<sub>4</sub> Battery Charger Eval Board

Online  
Datasheet

The MCP73123/223 is a highly integrated Li-Ion battery charge management controller for use in space-limited and cost-sensitive applications.

The MCP73123/223 provides specific charge algorithms for Lithium Iron Phosphate batteries to achieve optimal capacity and safety in the shortest charging time possible. Along with its small physical size, the low number of external components makes the MCP73123/223 ideally suitable for low-cost and small-capacity (less than 2000 mAh) LiFePO<sub>4</sub> battery applications. It will take longer time to complete a charge cycle for larger capacity LiFePO<sub>4</sub> battery packs.

## Products supported:

- MCP73123
- MCP73223

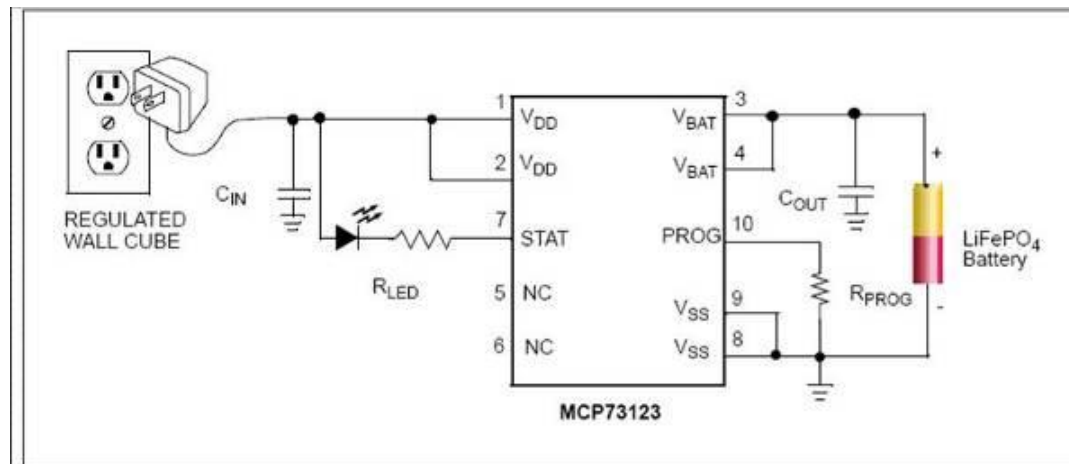


FIGURE 1-1: MCP73123 Typical Application.

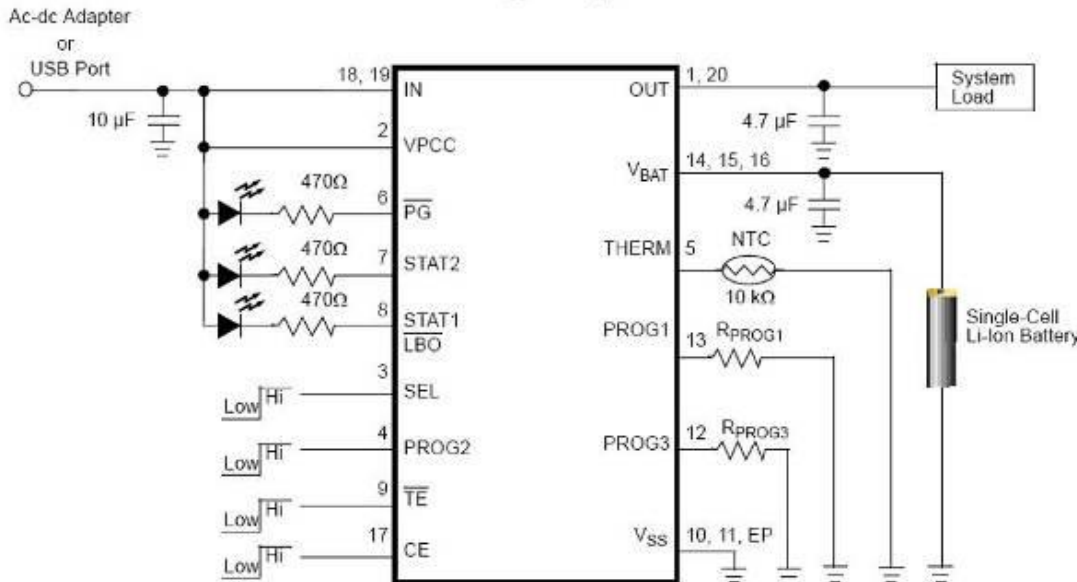
The MCP73871 Evaluation Board is designed to demonstrate Microchip's stand-alone linear Li-Ion battery charger with system power path and load sharing management control solution. The system load is also supported by the Li-Ion battery when input power is disconnected. A number of device options allow the MCP73871 device to be utilized in a variety of applications.

**Products supported:**

- MCP73871



MCP73871 Typical Application





# MCP7383X Li-Ion Power Path Management Design

Online  
Datasheet

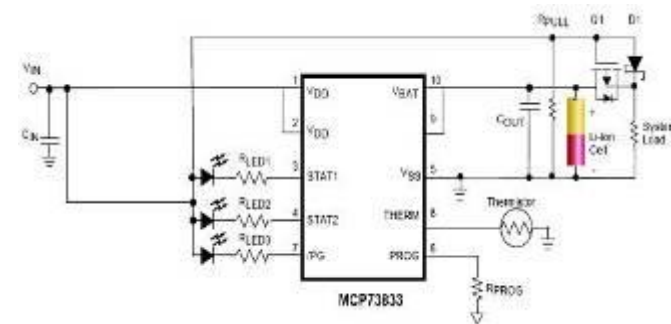
This reference design is developed to assist product designers in reducing product design cycle and time by utilizing Microchip's favorite stand-alone Li-Ion battery charge management controllers with system power path management.

## Features:

- Load sharing system power path management that support charging single cell Li-Ion battery and system load at the same time without affecting charging algorithm of Microchip's stand-alone charge management controllers.
- The system load is supported by Li-Ion battery when input power source is removed
- Blue LED indicates charge status
- Additional Red LED to indicate Power-Good (PG) and Green LED to indicate charge complete (Available from MCP73833)
- Dip Switch to select programmable fast charge current between 1000mA (H) and 50mA (L) for MCP73833 and 400mA (H) and 25mA (L) for MCP73832
- Available THERM pin on the MCP73833 for temperature monitoring with a thermistor. It is disabled by default and can be enabled to use with NTC thermistor

## Products supported:

- MCP73831
- MCP73832
- MCP73833
- MCP73834







# MCP73871 Demo w/ Voltage Prop. Current Control

Online  
Datasheet

The MCP73871 Demo Board with Voltage Proportional Current Control is designed to demonstrate Microchip's stand-alone linear Li-Ion battery charger with system power path and load sharing management control solution. The MCP73871 integrates the required elements to meet design challenges when developing new Li-Ion / Li-Polymer batteries powered products.

The MCP73871 Demo Board with Voltage Proportional Current Control is designed to deliver minimum 1.5A total current to system load and to a single cell Li-Ion battery at 4.2V preset voltage regulation (4.1V, 4.35V and 4.4V options are also available for MCP73871). The board has a dip switch helping to decide the input power source between AC-DC wall adapter and USB port (AC/USB) and control input current limits, enable charge timer and enable charging.

The MCP73871 Demo Board with Voltage Proportional Current Control comes with a factory preset low-battery indicator (LBO) when input is absent. The preset value is 3.2V and STAT1 LED (green) with turn ON if the battery voltage is below the threshold voltage.

## Products supported:

- MCP73871





# MCP73837/8 AC/USB Dual Input Battery Charger Board

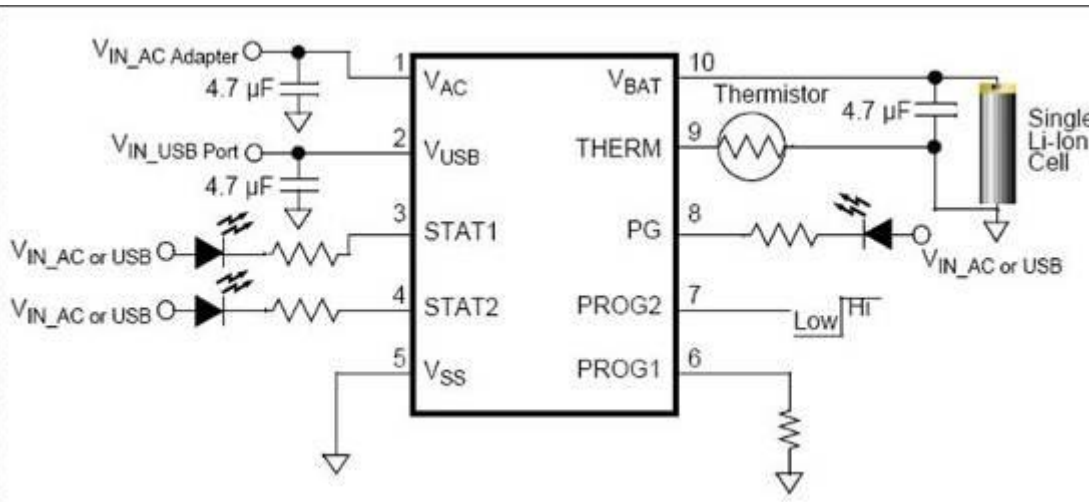
Online  
Datasheet

The MCP73837/8 AC/USB Dual Input Battery Charger Evaluation Board demonstrates Microchip's stand-alone Linear Li-Ion Battery Chargers - MCP73837 and MCP73838.

The MCP73837/8 require only minimum components to implement a complete battery charge management circuit. The MCP73837/8 are designed to select AC-Adapter or USB-Port Power Source automatically where AC-Adapter provides the charge current when both sources are present.

## Products supported:

- MCP73837
- MCP73838



P/N: MCP7383XEV-DIBC

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# MCP3421 Weight Scale Demo Board

[Online Datasheet](#)

The MCP3421 Weight Scale Demo Board is designed to evaluate the performance of the low-power consumption, 18-bit ADC in an electronic weight scale design. Next to the MCP3421 there is a low-noise, auto-zero MCP6V07 op amp. This can be used to investigate the impact of extra gain added before the ADC for performance improvement. The PIC18F4550 is controlling the LCD and the USB communication with the PC. The GUI is used to indicate the performance parameters of the design and for calibration of the weight scale.

## Products supported:

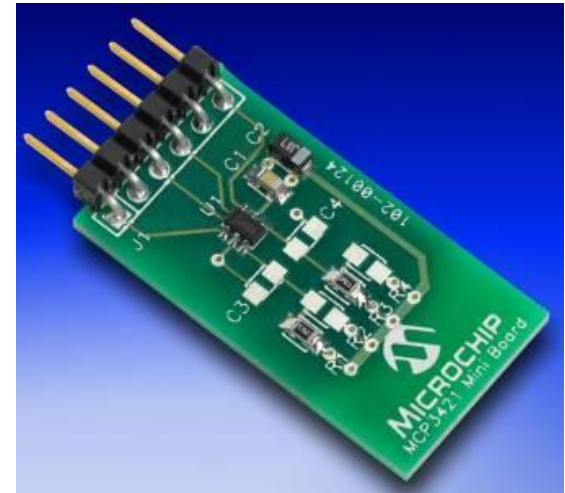
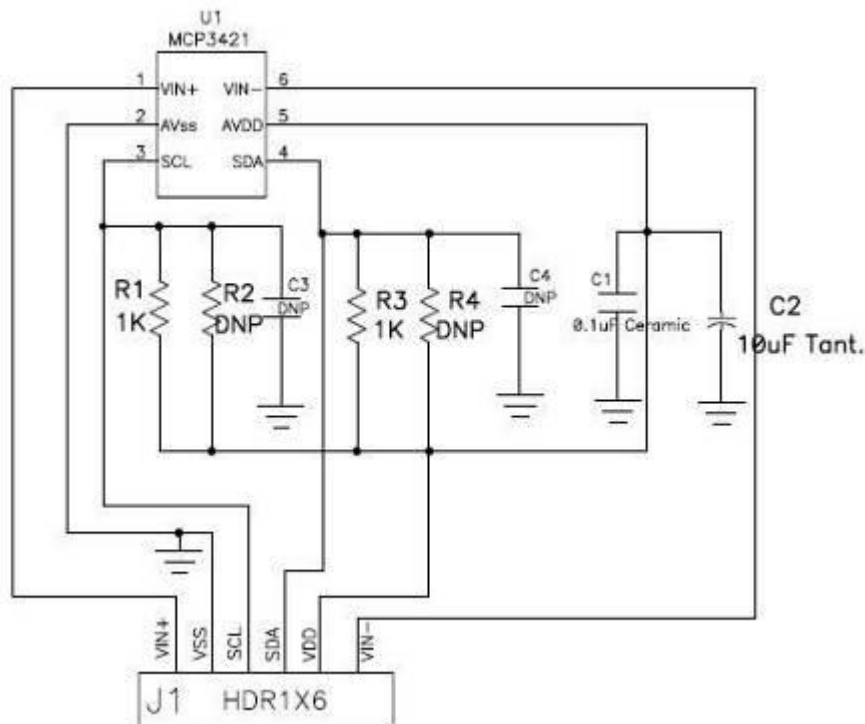
- MCP3421
- MCP6V07



The MCP3421 Evaluation Board assists in the evaluation of the MCP3421 device in a simple way.. The evaluation board contains minimum components: MCP3421, two bypass capacitors, and two loading resistors for the I<sup>2</sup>C™ bus.

**Products supported:**

- MCP3421





# MCP3421 Battery Fuel Gauge Demo Board

Online  
Datasheet

The MCP3421 Battery Fuel Gauge Demo Board demonstrates how to measure the battery voltage and discharging current using the MCP3421.

The MCU algorithm calculates the battery fuel being used. This demo board is shipped with 1.5V AAA non-rechargeable battery. The demo board displays the following parameters:

- (a) Measured battery voltage.
- (b) Measured battery discharging current.
- (c) Battery Fuel Used (calculated).

The MCP3421 Battery Fuel Gauge Demo Board also can charge a single-cell 4.2V Li-Ion battery. This feature, however, is disabled by firmware since the demo kit is shipped to customer with non-rechargeable 1.5V AAA battery.

Please contact Microchip Technology Inc if you want to use the battery rechargeable feature.

## Products supported:

- MCP3421
- MCP73831
- MCP1702
- PIC18F4550



The MCP342x Evaluation Boards enable the easy evaluation of the MCP3422/3/4/5 Delta-Sigma Analog-to-Digital Converters (ADCs). Each board has analog input connection pads and various test pads. The user can connect inputs and test the conversion results using the PICKit™ Serial Analyzer and its PC graphic user interface (GUI).

## Features:

- Evaluate the MCP342x using the PICKit Serial Analyzer
- The user can write the MCP342x configuration register and read output codes by using the PICKit Serial Analyzer
- The sensor signal can be connected to the input pads of the board
- I<sup>2</sup>C™ communication signal (SCL and SDA) can be monitored at the SCL and SDA pins on the board
- Evaluate the MCP342x performance using by simply connecting the SCL and SDA pins to the user's PC board

## Products supported:

- MCP3422
- MCP3423
- MCP3424
- MCP3425

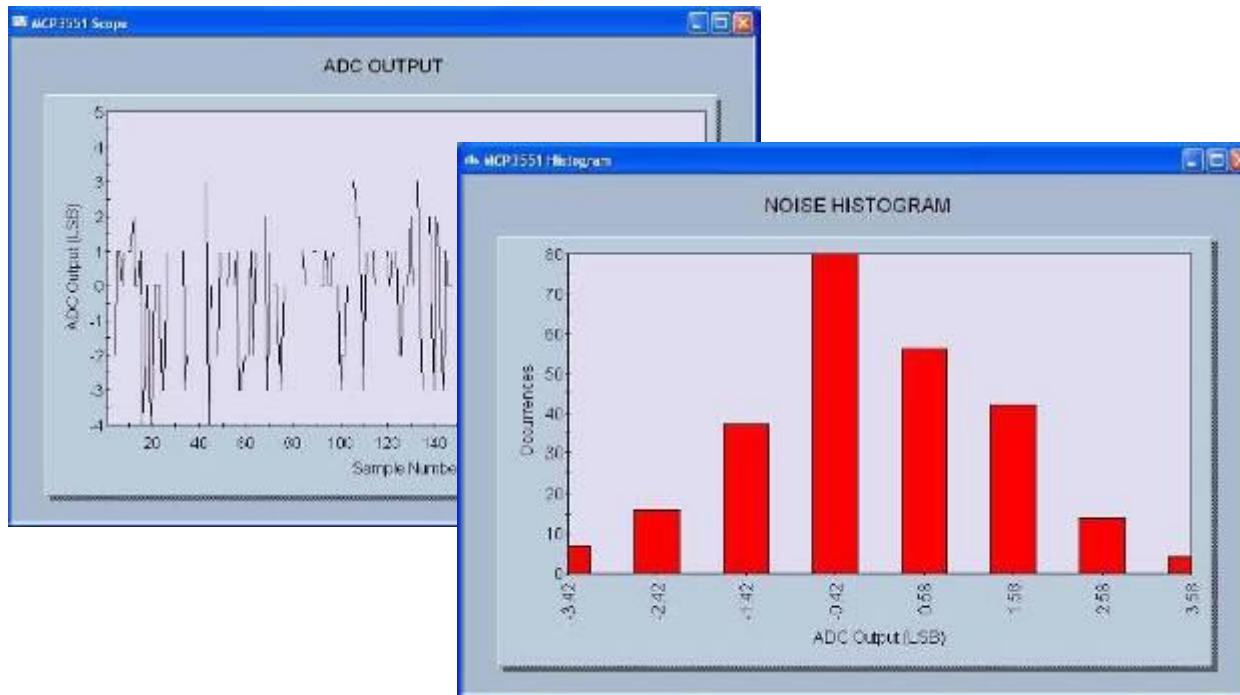


# MCP3551 PICtail™ Demo Board

The MCP3551 PICtail™ Demo Board allows the system designer to evaluate the operation of the MCP3551 22-Bit Delta-Sigma ADC. The board demonstrates the MCP3551 performance in a low-noise environment.

## Products supported:

- MCP3551
- PIC18F4550

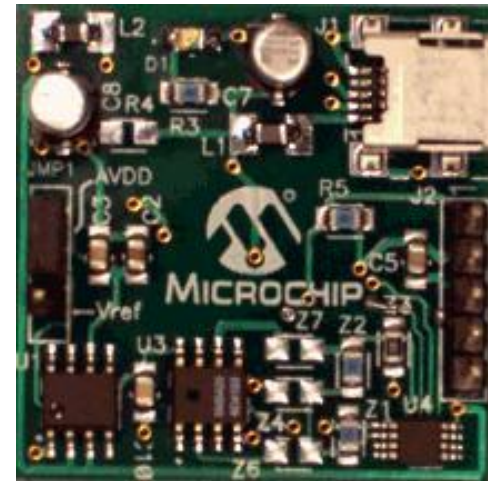
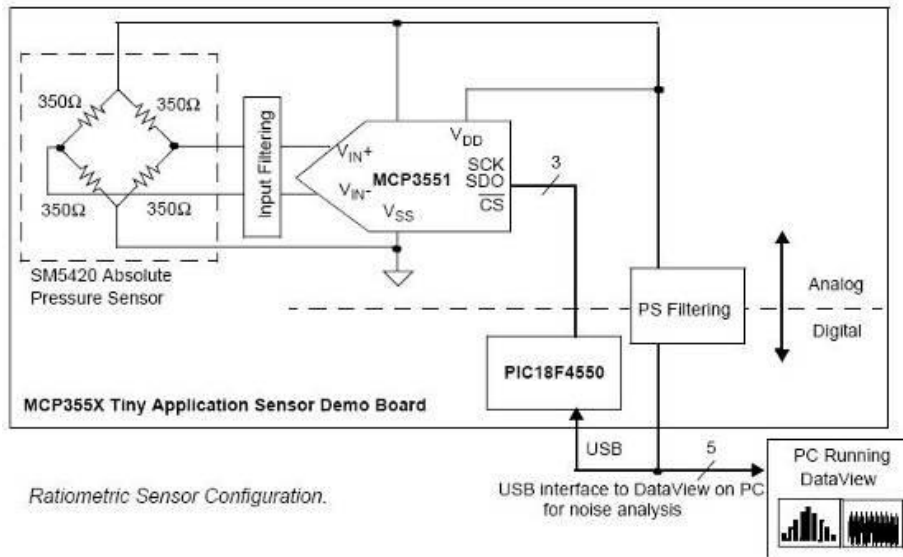


# MCP355X Tiny Application Sensor Demo Board

The MCP3550/1/3 devices are 2.7V to 5.5V low-power, 22-bit Delta-Sigma ADCs. The MCP355x Tiny Application Sensor Demo Board is used to demonstrate the most basic application of the devices using a ratiometric connection with  $V_{DD}$  as  $V_{REF}$ . The board includes all the necessary PCB circuits and layout tips required to obtain the performance demonstrated on the PC.

## Products supported:

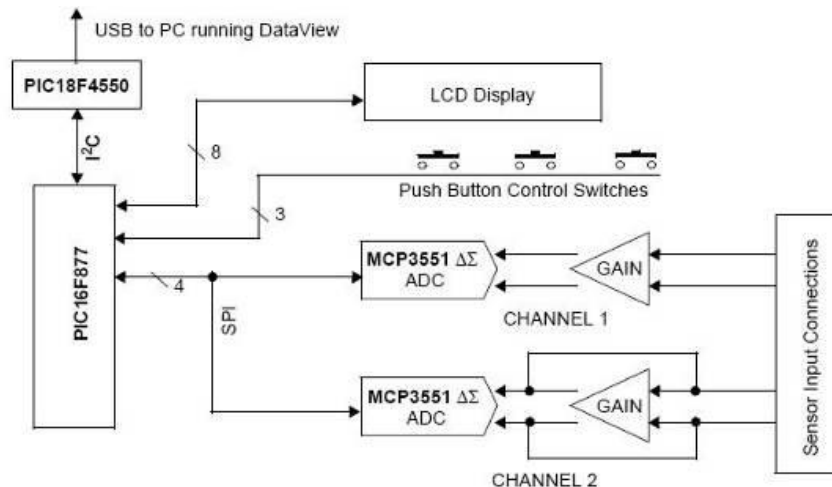
- MCP3550
- MCP3551
- MCP3553
- PIC18F4550





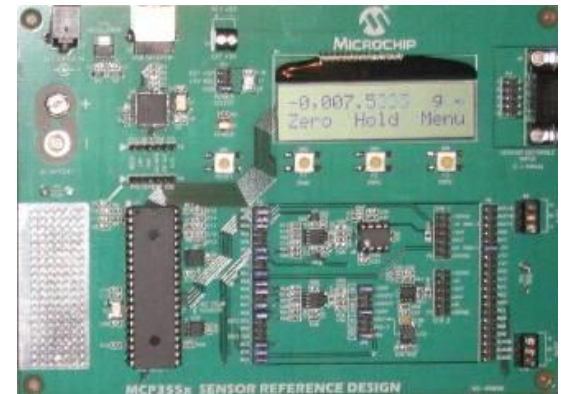
# MCP355X Sensor Application Dev Board

The MCP355X Sensor Application Developer's Board allows for the easy system design of high resolution systems such as weigh scale, temperature sensing, or other small signal systems requiring precise signal conditioning circuits. The reference design includes firmware that performs all the necessary functions including ADC sampling, USB communication for PC data analysis, LCD display output, zero cancellation, full scale calibration, and units display in gram (g), kilogram (kg), or ADC output units.



## Products supported:

- MCP3550
- MCP3551
- MCP3553
- MCP617
- PIC18F4550
- PIC16F877

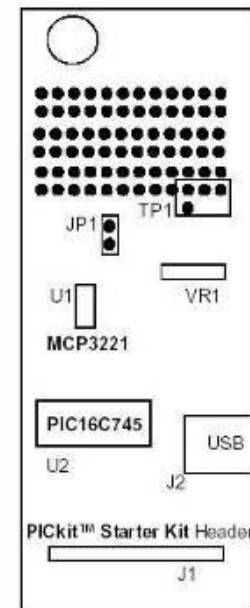
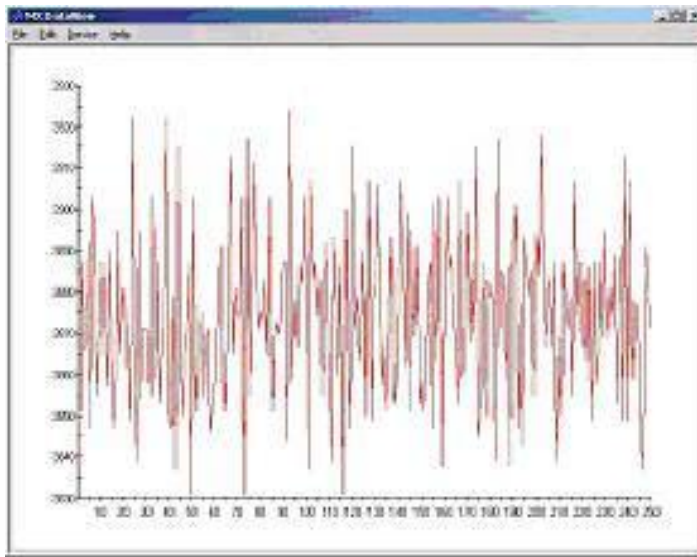


# MCP3221 PICtail™ Demo Board

The MCP3221 device is a low-power, 12-bit A/D Converter (ADC) in a SOT-23 package. It communicates via an I<sup>2</sup>C™ interface. A stand-alone demonstration is possible using a USB port and the DataView™ software. The MCP3221 Pictail™ Demo Board is also used to evaluate and demonstrate the MCP3221 device using the PICkit™ 1 Flash Starter Kit.

## Products supported:

- MCP3221
- PIC16C745





# ATM90E32AS Poly-Phase Reference Design

NDA  
Needed

## Features:

- Based on SAM4LC4C/SAML22 MCU and ATM90E32AS Poly-Phase Energy Metering AFE
- On-board AC-DC converter with wide AC input range: 85V to 500V
- Exceeds class 0.2s accuracy over wide current range of 1(100)A
- Four independent LEDs for pulse outputs of active energy (CF1), reactive/apparent energy (CF2), fundamental energy (CF3) and harmonic energy respectively (CF4).
- Four isolated metering pulse outputs connectors.
- Two buttons for scrolling LCD display menu or waking up MCU
- One isolated RS485 com port, one IrDA com port
- One serial EEPROM for meter data storage or event recording
- Standard JTAG port for programming and debugging.
- Includes ATSHA204 Atmel Crypto Authentication device to demonstrate hardware anti-cloning and secure key storage features (for M90E32AS-RD)
- Temperature compensated high accuracy RTC.
- Compliant with CT or Rogowski coil sensors.
- Battery-backed with power fail detection.
- Real-time event recording
- NDA required

## Products supported:

- ATM90E32AS
- SAM4LC4C
- SAML22



P/N: M90E32AS-RD (SAM4L+ATM90E32AS)  
M90R2232A-RD (SAML22+ATM90E32AS)

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# ATM90E36A Poly-Phase Reference Design

NDA  
Needed

## Features:

- Based on SAM4LC4C/SAML22 MCU and ATMM90E36A Poly-Phase Energy Metering AFE
- On-board AC-DC converter with wide AC input range: 85V to 500V
- Exceeds class 0.2s accuracy over wide metering span of 1(100)A, .
- 6-channel (voltage and current) fundamental and up to 32nd order of harmonic component analysis
- Dedicated 7th ADC channel for neutral line current.
- Four independent LEDs for pulse outputs of active energy(CF1), reactive/apparent energy (CF2), fundamental energy (CF3) and harmonic energy respectively (CF4).
- Four isolated metering pulse outputs connectors.
- Two buttons for scrolling LCD display menu or waking up MCU
- One isolated RS485 com port, one IrDA com port.
- One serial EEPROM for meter data storage or event recording
- Standard JTAG port for programming and debugging.
- Includes ATSHA204 Atmel Crypto Authentication device to demonstrate hardware anti-cloning and secure key storage features. (for M90E36A-RD).
- Temperature compensated high accuracy RTC
- Compliant with CT or Rogowski coil sensors
- Battery-backed with power fail detection
- NDA required

## Products supported:

- ATM90E36A
- SAM4LC4C
- SAML22



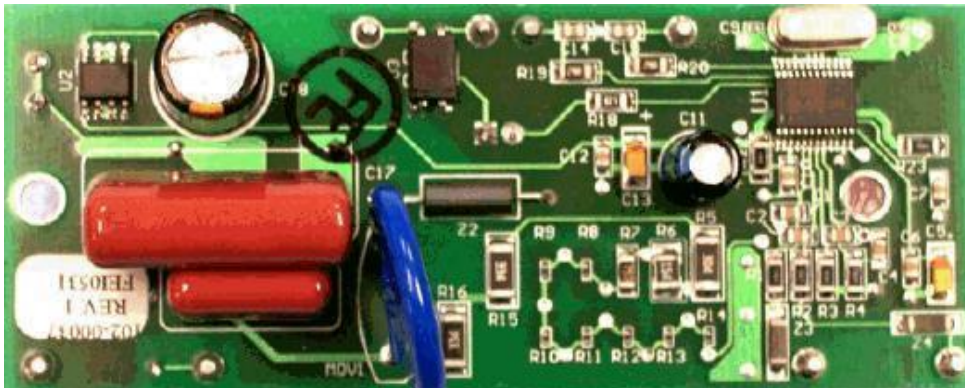
P/N: M90E36A-RD (SAM4LC4C+M90E36A)  
M90R2236A-RD (SAML22+M90E36A)

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# MCP3905A Reference Design

The MCP3905A/06A device is an energy metering IC that supplies average active power information via a pulse output with direct drive for mechanical counters. It also includes a higher-frequency output that supplies instantaneous power information for calibration. The device contains function blocks specific for IEC energy meter compliance, such as a no-load threshold and startup current.

The MCP3905A/06A Energy Meter Reference Design Printed Circuit Board (PCB) is used as a reference design for single-phase, residential meters.



## Products supported:

- MCP3905A
- MCP3906A

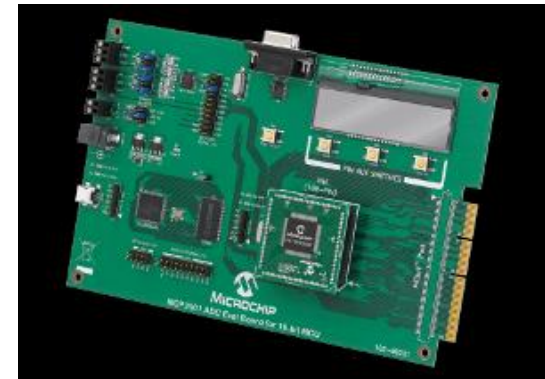
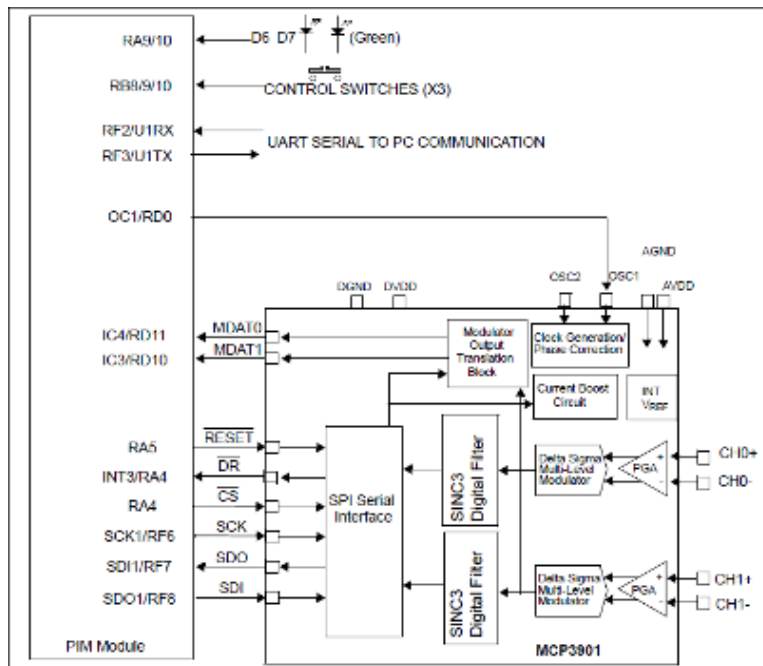


# MCP3901 Eval Board for 16-bit MCUs

The MCP3901 ADC Evaluation Board for 16-Bit MCUs system provides the ability to evaluate the performance of the MCP3901 dual channel ADC. It also provides a development platform for 16-bit PIC based applications, using existing 100-pin PIM systems.

## Products supported:

- MCP3901
- PIC24F
- PIC24H
- dsPIC33
- PIC18F86J55





# MCP3910 Eval Board for 16-bit MCUs

Online  
Datasheet

The MCP3910 ADC Evaluation Board for 16-Bit MCUs provides the opportunity to evaluate the performance of the MCP3910 dual-channel ADCs in a multiple device, isolated system. It comes with four MCP3910s, three of which are isolated and operate in 2-wire Serial Interface Mode. It also provides a development platform for 16-bit PIC® microcontroller-based applications, using existing 100-pin PIM systems, compatible with the Explorer 16 and other high pin count PIC device demo boards. The system comes with programmed PIC24FJ256GA110 PIM modules that communicate with the PC software for viewing data samples sent from the board.

## Features:

- Four MCP3910 devices for complete 3-phase isolated and neutral system evaluation
- Selectable Phase A, B, C, or N (neutral) MCP3910 dual channel output display on the PC Software Interface
- Simultaneous 55 ksps at 95 dB SINAD performance on any MCP3910 channel
- Single-phase MCP3910 performance analysis through graphical PC tools showing Noise Histogram, Frequency Domain (FFT), Time domain scope plot, and statistical numerical analysis
- PICtail® Plus connectors for Explorer 16 daughter board compatibility

## Products supported:

- MCP3911
- PIC24F
- dsPIC33



# MCP3911 Eval Board for 16-bit MCUs

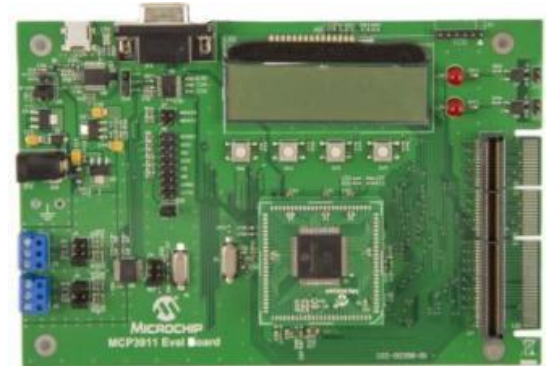
The MCP3911 ADC Evaluation Board for 16-Bit MCUs system provides the ability to evaluate the performance of the MCP3911 dual-channel ADC. It also provides a development platform for 16-bit PIC-based applications, using existing 100-pin PIM systems compatible with the Explorer-16 and other high pin count PIC demo boards. The system comes with a programmed PIC24FJ256GA110 PIM module that communicates with the included PC software for data exchange and ADC configuration.

## Features:

- Dual ADC MCP3911 output display using serial communication to PC software (Energy Management Utility)
- Simultaneous 55 ksps at 95 dB SINAD performance
- System and ADC performance analysis through graphical PC tools showing Noise Histogram, Frequency Domain (FFT), Time domain scope plot, and statistical numerical analysis
- PICtail Plus connectors for Explorer-16 daughter board compatibility

## Products supported:

- MCP3911
- PIC24F
- dsPIC33





# MCP3919 Eval Board for 16-bit MCUs

The MCP3919 ADC Evaluation Board for 16-Bit MCUs system provides the opportunity to evaluate the performance of the MCP3919 three-channel AFE. It also provides a development platform for 16-bit PIC® based applications, using existing 100-pin PIC microcontroller Plug-in Module (PIM) systems that are compatible with the Explorer 16 and other high pin count PIC® based demo boards. The system comes with a programmed PIC24FJ256GA110 PIM module that communicates with the Energy Management Utility software.

## Features:

- Three-Channel ADC MCP3919 output display using serial communication to PC software
- Simultaneous 57 ksps at OSR32 address loop ALL or 95 dB SINAD at OSR512 performance on MCP3919
- System and ADC performance analysis showing Noise Histogram, Frequency Domain (FFT), Time domain scope plot, and statistical numerical analysis
- PICtail Plus connectors for Explorer-16 daughter board compatibility

**P/N: ADM00573**

## Products supported:

- MCP3919
- PIC24F
- dsPIC33



# MCP3912 Eval Board for 16-bit MCUs

The MCP3912 ADC Evaluation Board for 16-Bit MCUs system provides the opportunity to evaluate the performance of the MCP3912 four-channel AFE. It also provides a development platform for 16-bit PIC® based applications, using existing 100-pin PIC microcontroller Plug-in Module (PIM) systems that are compatible with the Explorer 16 and other high pin count PIC® based demo boards. The system comes with a programmed PIC24FJ256GA110 PIM module that communicates with the Energy Management Utility software.

## Features:

- Four-Channel ADC MCP3912 output display using serial communication to PC software
- Simultaneous 57 ksps at OSR32 address loop ALL or 95 dB SINAD at OSR512 performance on MCP3912
- System and ADC performance analysis showing Noise Histogram, Frequency Domain (FFT), Time domain scope plot, and statistical numerical analysis
- PICtail Plus connectors for Explorer-16 daughter board compatibility

P/N: ADM00499

## Products supported:

- MCP3912
- PIC24F
- dsPIC33



# MCP3913 Eval Board for 16-bit MCUs

The MCP3913 ADC Evaluation Board for 16-Bit MCUs system provides the opportunity to evaluate the performance of the MCP3913 six-channel AFE. It also provides a development platform for 16-bit PIC® based applications, using existing 100-pin PIC microcontroller Plug-in Module (PIM) systems that are compatible with the Explorer 16 and other high pin count PIC® based demo boards. The system comes with a programmed PIC24FJ256GA110 PIM module that communicates with the Energy Management Utility software.

## Features:

- Six-Channel ADC MCP3913 output display using serial communication to PC software
- Simultaneous 57 ksps at OSR32 address loop ALL or 95 dB SINAD at OSR512 performance on MCP3913
- System and ADC performance analysis showing Noise Histogram, Frequency Domain (FFT), Time domain scope plot, and statistical numerical analysis
- PICtail Plus connectors for Explorer-16 daughter board compatibility

**P/N: ADM00522**

## Products supported:

- MCP3913
- PIC24F
- dsPIC33



# MCP3914 Eval Board for 16-bit MCUs

The MCP3914 ADC Evaluation Board for 16-Bit MCUs system provides the opportunity to evaluate the performance of the MCP3914 eight-channel AFE. It also provides a development platform for 16-bit PIC® based applications, using existing 100-pin PIC microcontroller Plug-in Module (PIM) systems that are compatible with the Explorer 16 and other high pin count PIC® based demo boards. The system comes with a programmed PIC24FJ256GA110 PIM module that communicates with the Energy Management Utility software.

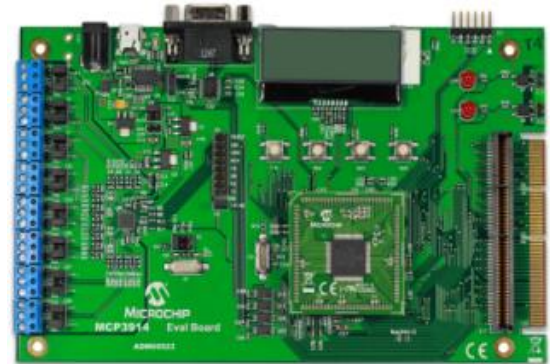
## Features:

- Eight-Channel ADC MCP3914 output display using serial communication to PC software
- Simultaneous 57 ksps at OSR32 address loop ALL or 95 dB SINAD at OSR512 performance on MCP3914
- System and ADC performance analysis showing Noise Histogram, Frequency Domain (FFT), Time domain scope plot, and statistical numerical analysis
- PICtail Plus connectors for Explorer-16 daughter board compatibility

**P/N: ADM00523**

## Products supported:

- MCP3914
- PIC24F
- dsPIC33



# MCP3903 Eval Board for 16-bit MCUs

The MCP3903 ADC Evaluation Board for 16-bit MCU system provides the ability to evaluate the performance of the MCP3903 six channel sigma-delta ADC. It also provides a development platform for 16-bit PIC-based applications, using existing 100-pin PIM systems.

## Features:

- MCP390x DataVIEW PC software interface for communicating and controlling the MCP3903 Evaluation board through the virtual COM port created by the on-board MCP2200
- System and ADC performance analysis through graphical PC tools showing noise histogram, frequency domain (FFT), time domain scope plot, and statistical numerical analysis
- Robust hardware design with analog grounding and analog/digital separation, allowing low noise evaluation of the MCP3903 device.
- Separate power supplies and power planes - 4 layer board
- PICtail Plus connectors for Explorer-16 daughter board compatibility

## Products supported:

- MCP3903
- PIC24F
- PIC24H
- dsPIC33



## ATM90E26 Single-Phase Energy Metering AFE :

- Supports resistive Shunt or Current Transformer (CT)
- Energy pulses:
  - Active energy pulse indicator and isolated output
  - Reactive energy pulse indicator and isolated output
- One communication connector
- 8.192MHz Crystal
- External 3.3V input

## ATM90E32AS & ATM90E36A Poly-phase Metering AFE :

- Supports Current Transformer (CT) or Rogowski Coil
- Isolated Energy pulse outputs for Active, Reactive, Apparent, Fundamental and Harmonic Energy
- 16.384MHz Crystal
- 100-240VAC or 9VDC input power

## Products supported:

- ATM90E26
- ATM90E32AS
- ATM90E36A



P/N: ATM90E2x-DB

ATM90E32AS-DB

ATM90E36A-DB

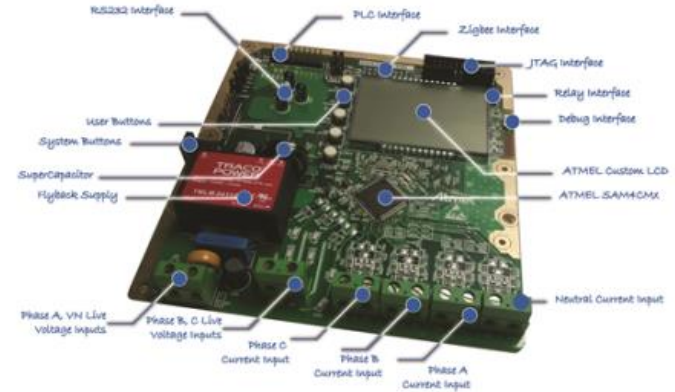
# ATSAM4CMX 1-Phase & Poly-Phase Meter Demo

## Support for ATSAM4CMS & ATSAM4CMP:

- Connectors for customer current sensors
- Voltage dividers on-board
- LCD (Custom Atmel), Buttons
- Atmel ATSHA204 Crypto Memory
- Atmel AT30TS75 Temp. Sensor
- Metrology LEDs (Wh, ...)
- ANSI or IEC base fitting
- Adesto AT25DF321A
- Supercap backup supply
- PLC connectors
- JTAG debug port
- RF/Zigbee Connectors
- Flyback Supply
- Opto ports
- Metrology Library
- Application Firmware

## Products supported:

- ATMSAM4CMS
- ATMSAM4CMP



**P/N: Single Phase: ATSAM4CMS-DB (1MB flash device), ATSAM4CMS32-DB (2MB flash device)**

**Poly-Phase: ATSAM4CMP-DB (1MB flash device), ATSAM4CMP32-DB (2MB flash device)**

The MCP39F501 Power Monitor Demonstration Board is a fully functional single-phase power monitor. This low-cost design does not use any transformers and requires few external components. The device calculates typical power quantities as defined in the MCP39F501 data sheet. The MCP39F501 Power Monitor Utility software is used to calibrate and monitor the system, and can be used to create custom calibration setups. For some accuracy requirements, only a single point calibration may be needed.

## Features:

- Displays Active, Reactive and Apparent Power, RMS Current, RMS Voltage, Line Frequency, Power Factor and Temperature using PC software
- Event notifications, such as Over Current, Over Power, Over/Under Frequency, Over/Under Temperature, and Voltage Sag/Surge
- Device configuration through PC software, including Event Notifications, Gain Calibration, EEPROM, Calculation Multipliers, and I/O settings
- 120V and 220V operation

P/N: ARD00455

## Products supported:

- MCP39F501







# MCP39F501 Power Monitor PICTail™ Board

Online  
Datasheet

The MCP39F501 Power Monitor PICTail™ Evaluation Board duals as a fully functional single-phase power monitor and development platform. This low-cost design does not use any transformers and requires few external components. The device calculates active power, reactive power, RMS current, RMS voltage, power factor, line frequency and other typical power quantities as defined in the MCP39F501 data sheet. The MCP39F501 Power Monitor Utility software is used to calibrate and monitor the system and can be used to create custom calibration setups. For some accuracy requirements only a single point calibration may be needed.

## Features:

- PICTail board allows development with Microchip's 16-bit and 32-bit microcontrollers using the Explorer 16 Development Board (DM240001)
- PC software displays power quantities, event notifications and allows device configuration

## Products supported:

- MCP39F501
- PIC® MCUs



The MCP39F511 Power Monitor Demonstration Board is a fully functional single-phase power and energy monitoring system. The system calculates and displays active power, reactive power, RMS current, RMS voltage, active energy (both import and export), and four quadrant reactive energy.

It connects by USB to the “MCP39F511 Power Monitor Utility Software” that offers control to allow you to easily experiment with all system configuration settings such as PWM output frequencies, zero crossing detection options, and event configurations, among many others.

## Features:

- Displays Active, Reactive, Apparent Power, RMS Current, RMS Voltage, Line Frequency, Import/Export Active Energy and 4 Quadrant Reactive Energy
- Event notifications including Over Current, Over Power, Voltage Sag and Voltage Surge
- Device configuration through PC software
- Direct connect to 90V-240VAC operation
- 15A maximum recommended load

**P/N: ADM00667**

## Products supported:

- MCP39F511



The MCP39F521 Power Monitor Demonstration Board is a fully functional I<sup>2</sup>C bus single-phase power and energy monitoring system. The system calculates and displays active power, reactive power, RMS current, RMS voltage, active energy (both import and export), and four quadrant reactive energy.

It connects through USB to the “Power Monitor Utility Software” that offers automated control to allow you to easily experiment with all system configuration settings such as zero crossing detection options and event configurations.

## Features:

- Displays Active, Reactive, Apparent Power, RMS Current, RMS Voltage, Line Frequency, Import/Export Active Energy and 4 Quadrant Reactive Energy
- Event notifications including Over Current, Over Power, Voltage Sag and Voltage Surge
- Device configuration through PC software
- Direct connect to 90V-240VAC operation
- 15A maximum recommended load

P/N: ADM00686

## Products supported:

- MCP39F521



The MCP39F511N Power Monitor Demonstration Board is a fully functional dual channel single-phase power and energy monitoring system. The system calculates and displays active power, reactive power, RMS current, RMS voltage, active energy (both import and export), and four quadrant reactive energy), on 2 independent channels, simultaneously. It connects through USB to the “Power Monitor Utility Software” that offers automated control to allow you to easily experiment with all system configuration settings such as PWM output frequencies, zero crossing detection options, and event configurations, among many others.

## Features:

- Dual channel display of Active, Reactive, Apparent Power, RMS Current, RMS Voltage, Line Frequency, Import/Export Active Energy and 4 Quadrant Reactive Energy
- Event notifications including Over Current, Over Power, Voltage Sag and Voltage Surge
- Device configuration through PC software
- Direct connect to 90V-240VAC operation
- 15A maximum recommended load

P/N: ADM00706

## Products supported:

- MCP39F11N





# MCP3911 PIC18F85K90 Anti-Tamper Meter

Online  
Datasheet

The MCP3911 and PIC18F85K90 Single-Phase Anti-Tamper Energy Meter is a fully functional single-phase meter with enhanced capabilities, such as battery backup, RTC and anti-tamper features. The two current channels are measured with the MCP3911 device and the voltage channel is measured with the 12-bit SAR ADC integrated in the microcontroller. This design has two sensors for the current measurements: a current transformer and a shunt. The PIC18F85K90 microcontroller directly drives the LCD and communicates via UART with the MCP2200, offering an isolated USB connection for meter calibration and access to the device power calculations. The system calculates active and reactive energy, active, reactive and apparent power, power factor, RMS current, RMS voltage and the line frequency. The Microchip Energy Meter Software is used to calibrate and monitor the system.

## Features:

- Rated 5(60)A 220V 3200 imp/kWh IEC62053-22 Class 0.5 Meter
- Calculates active and reactive energy, active, reactive and apparent power, power factor, RMS current, RMS voltage and the line frequency
- Anti-tamper monitoring including neutral monitoring, current circuit reversal, magnetic field disturbance and cover opening detection
- Microchip Energy Meter Software to calibrate & monitor the system
- Calibration can be done in closed loop or open loop

P/N: ARD00385

## Products supported:

- MCP3911
- PIC18F85K90



<< BACK

The MCP6L2 and PIC18F66J93 Energy Meter is a fully functional single-phase meter that uses the 12-bit successive approximation analog-to-digital converter (SAR ADC) integrated in the microcontroller. This low-cost design has a shunt as the current sensor. The signal from the shunt is amplified by two external operational amplifiers and applied to the input of the ADC. The PIC18F66J93 directly drives the LCD and communicates via UART with the MCP2200, offering an isolated USB connection for meter calibration and access to the device power calculations. The system calculates active and reactive energy; active, reactive and apparent power; power factor; RMS current; RMS voltage, and line frequency. The Microchip energy meter software is used to calibrate and monitor the system. The calibration can be done in closed loop or open loop. When connected to a stable source of voltage and current, the meter can do an auto-calibration by including the open loop calibration routine and formulas in the firmware.

## Features:

- Energy meter software allows calibration and system monitoring
- Isolated USB connection
- Calculates active and reactive energy, active and apparent power, power factor, RMS current, RMS voltage, and line frequency

## Products supported:

- MCP6L2
- PIC18F66J93



The MCP4725 SOT-23-6 Evaluation Board is a quick and easy evaluation tool for the MCP4725 12-bit DAC device. It works with Microchip's popular PICKit™ Serial Analyzer or independently with the customer's applications board.

Connect the MCP4725 SOT-23-6 Evaluation Board to the PICKit™ Serial Analyzer and type in the DAC input data in the PICKit™ Serial Analyzer's PC Graphical User Interface program.

The PICKit™ Serial Analyzer will then send the user's data to the DAC device automatically. The DAC's analog output will be available immediately at the output pin. The user will appreciate the simplicity of evaluating the DAC device using this kit.

The customer also can connect the MCP4725 SOT-23-6 Evaluation Board directly to their applications board and test out their systems functions immediately.

The MCP4725 SOT-23-6 Evaluation Board kit includes two of the Evaluation Boards. The PICKit™ Serial Analyzer is sold separately

## Products supported:

- MCP4725





# MCP4725 PICtail™ Plus Daughter Board

[Online  
Datasheet](#)

The MCP4725 PICtail™ Plus Daughter Board (P/N MCP4725DM-PTPLS) contains an MCP4725 12-bit Digital-to-Analog Converter (DAC). This daughter board has the following two interfaces:

- Explorer 16 Starter Kit (P/N: DV164033) for 16-bit MCU environment
- PICkit™ Serial Analyzer (P/N: DV164122) for reading and writing the DAC register and observing the DAC output

The user can connect this daughter board to one of the above tools and perform their own experiments.

## Products supported:

- MCP4725







# MCP4726 PICtail™ Plus Daughter Board

Online  
Datasheet

The MCP47X6 PICtail™ Plus Daughter Board allows customers to evaluate the capabilities of the MCP4726, MCP4716, and MCP4706 devices. This board can be controlled by the MCU of the Explorer 16 Development Board (P/N: DV164033) or by a PICkit™ Serial Analyzer. The board also provides easy access via test points to desired signals to monitor device operation. A buzzer is supplied that is connected to the output of the MCP4726, which allows generation of an audible sound. The buzzer has a volume control.

## Products supported:

- MCP4706
- MCP4716
- MCP4726



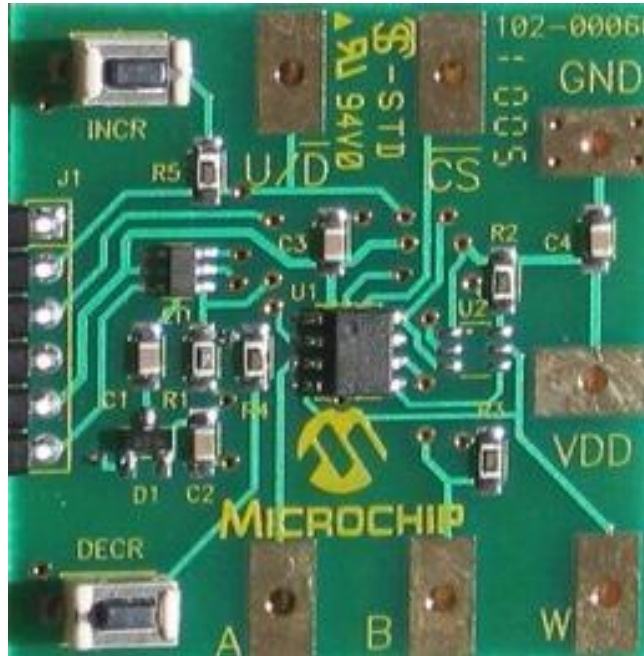
The MCP4728 Evaluation Board is a tool for quick and easy evaluation of the MCP4728 4-channel 12-bit DAC device.

It contains the MCP4728 device and connection pins for the Microchip's popular PICkit™ Serial Analyzer. Simply connect the MCP4728 Evaluation Board to the PICkit™ Serial Analyzer and type in the DAC input data in the PICkit™ Serial Analyzer's PC Graphical User Interface program. The PICkit™ Serial Analyzer will then send the user's data to the DAC device automatically. The new DAC's analog outputs will be available immediately at the DAC output pins.

**Products supported:**  
□ MCP4728



The MCP402X Digital Potentiometer Evaluation Board (MCP402XEV) allows the system designer to quickly evaluate the operation of Microchip Technology's MCP401X/2X Digital Potentiometer products.



## Products supported:

- MCP4011
- MCP4012
- MCP4013
- MCP4014
- MCP4021
- MCP4022
- MCP4023
- MCP4024

The MCP401XEV Evaluation Board allows the system designer to quickly evaluate the operation of the MCP40D18 Digital Potentiometer device. The board uses the SC70EV Generic PCB and has been populated for the MCP40D18. The 6-pin header (PICkit Serial) has been jumpered to the MCP40D18's appropriate pins. This allows the PICkit Serial to communicate with the device.

## Products supported:

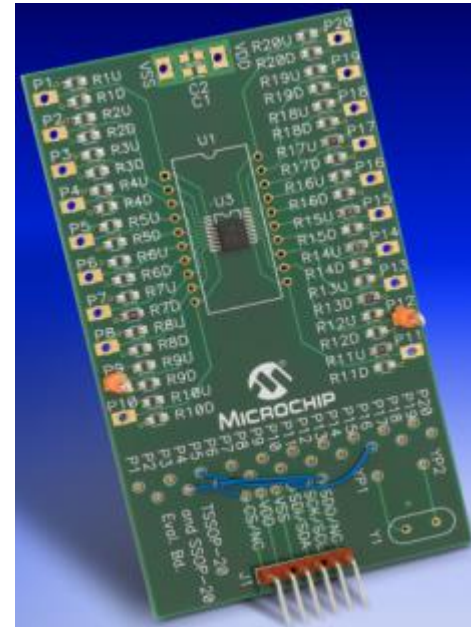
- MCP40D17
- MCP40D19
- MCP4017
- MCP4018
- MCP4019



The MCP42XX Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's MCP4261 Digital Potentiometer device. The board uses the TSSOP20EV Generic PCB and has been populated for the MCP4261. The 6-pin header (PICkit Serial) has been jumpered to the MCP4261's appropriate pins. This allows the PICkit Serial to communicate with the device.

## Products supported:

- MCP4231
- MCP4241
- MCP4251
- MCP4261



The MCP43XX Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's MCP4361 Digital Potentiometer device. The board uses the TSSOP20EV Generic PCB and has been populated for the MCP4361. The 6-pin header (PICkit Serial) has been jumpered to the MCP4361's appropriate pins. This allows the PICkit Serial to communicate with the device.

## Products supported:

- MCP4331
- MCP4341
- MCP4351
- MCP4361



The MCP46XX Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's MCP4661 Digital Potentiometer device. The board uses the TSSOP20EV Generic PCB and has been populated for the MCP4661. The 6-pin header (PICkit Serial) has been jumpered to the MCP4661's appropriate pins. This allows the PICkit Serial to communicate with the device.

## Products supported:

- MCP4631
- MCP4641
- MCP4651
- MCP4661





# MCP42XX PICtail™ Plus Daughter Board

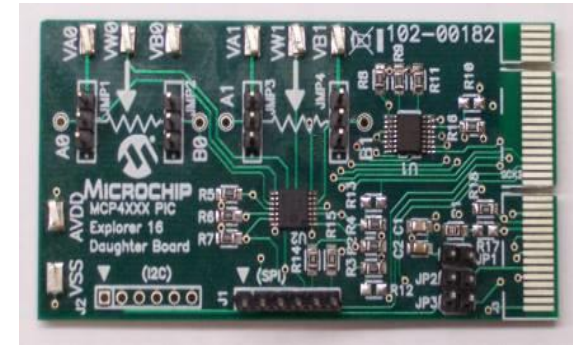
Online  
Datasheet

The MCP42XX PICtail™ Plus Daughter Board is used to demonstrate the operation of the MCP42XX Digital Potentiometers. The operation of the MCP41XX devices is similar to the MCP42XX devices. Therefore, this demo board can be used as a development platform for either device family.

This board is designed to be used in conjunction with either the PIC24 Explorer 16 Demo Board or the PICkit™ Serial Analyzer.

## Products supported:

- MCP4231/2
- MCP4241/2
- MCP4251/2
- MCP4261/2



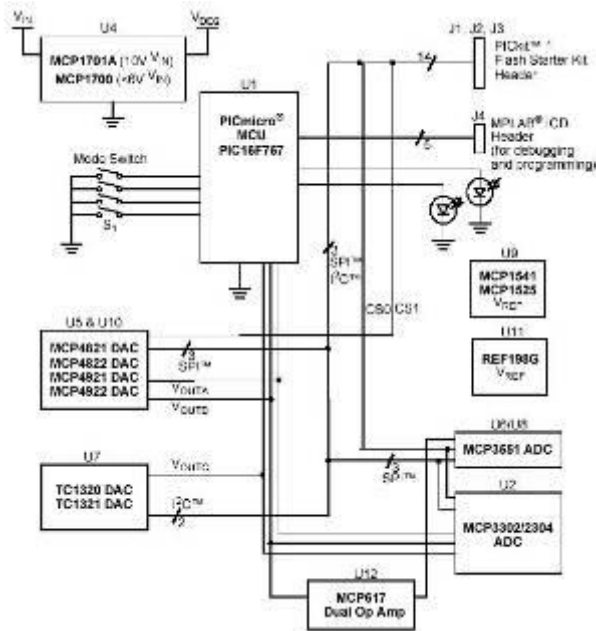


# Mixed Signal PICtail™ Demo Board

The Mixed Signal PICtail™ Demo Board allows the system designer to quickly evaluate the suitability of several Microchip analog products for their product's design. Microchip's Digital-to-Analog Converters (DACs), Analog-to-Digital Converters (ADCs),  $V_{REF}$ , Low Dropout Output (LDO) regulators and the PIC16F7X devices are supported. Evaluation precision analog products for specific applications can be challenging for practical reasons. First, many products are only available in surface-mount packages. Secondly, analog circuits tend to be affected adversely by system noise. Common bread boarding techniques are not practical for these reasons. The Mixed Signal PICtail™ Demo Board utilizes a 4-layer PCB with attention paid to reducing system noise.

## Products supported:

- MCP3551
- MCP3302/04
- MCP482x
- MCP492x
- TC132x
- MCP617
- MCP15xx
- MCP1701A
- MCP1700
- PIC16F767

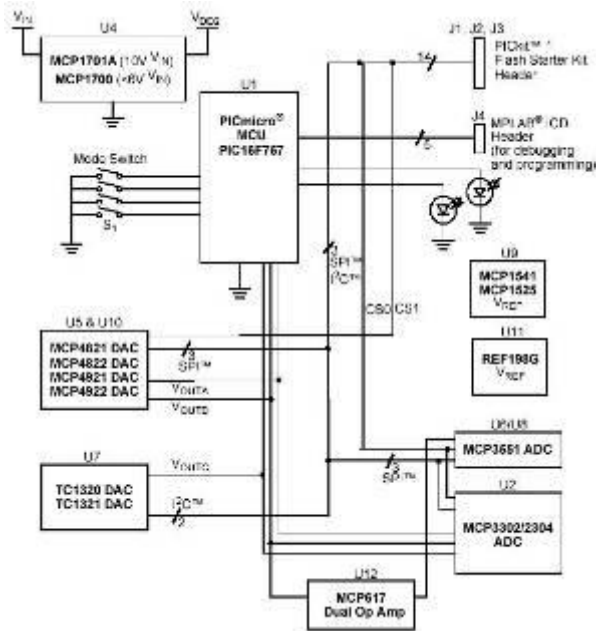


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## Products supported:

- MCP3551
- MCP3302/04
- MCP482x
- MCP492x
- TC132x
- MCP617
- MCP15xx
- MCP1701A
- MCP1700
- PIC16F767





# MCP2515 PICtail™ Plus Daughter Demo Board

[Online  
Datasheet](#)

The MCP2515 PICtail™ Plus Daughter Board is a simple Controller Area Network (CAN) board designed to be used with boards containing the PICtail Plus connector.

The board also has the PICkit™ Serial connector for interfacing to the PICkit Serial Analyzer tool. The CAN node consists of the MCP2515 Stand-Alone CAN controller and MCP2551 CAN transceiver.

The PICkit Plus and PICkit Serial connectors allow the board to be interfaced to a variety of PIC® micros so that the user can develop a CAN node. The board also contains headers or test points for most of the MCP2515 pins to allow the external functions to be monitored/evaluated.

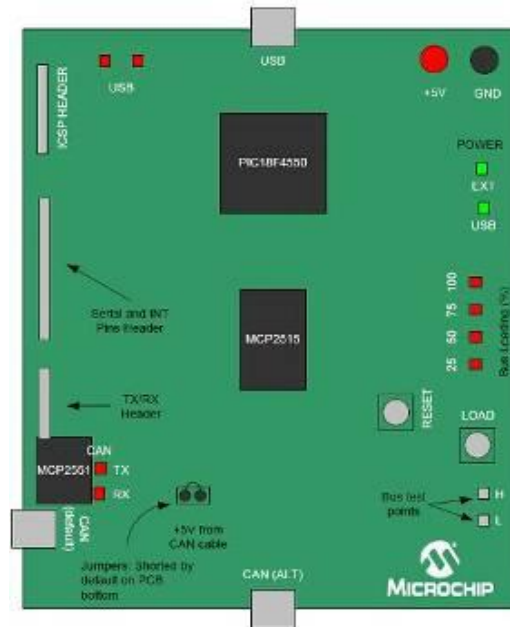
## Products supported:

- MCP2515
- MCP2551



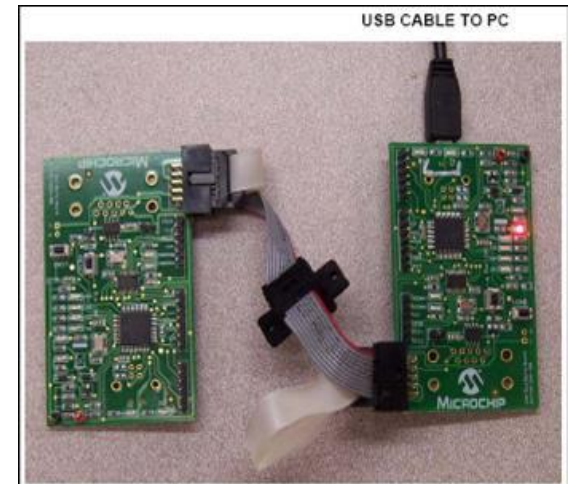
# MCP2515 CAN Bus Monitor Demo Board

The MCP2515 CAN Bus Monitor Demo Board kit contains two identical boards which can be connected together to create a simple two node Controller Area Network (CAN) bus, which can be controlled and/or monitored via the included PC interface. The board(s) can also be connected to an existing CAN bus.



## Products supported:

- MCP2515
- MCP2551





# MCP25625 PICtail Plus Daughter Board

[Online  
Datasheet](#)

The MCP25625 PICtail™ Plus Daughter Board is a simple Controller Area Network (CAN) board designed to be used with boards containing the PICtail Plus connector.

The board also has the PICkit™ Serial connector for interfacing to the PICkit Serial Analyzer tool. The single-chip solution CAN node consists of the MCP25625 CAN Controller with Integrated Transceiver.

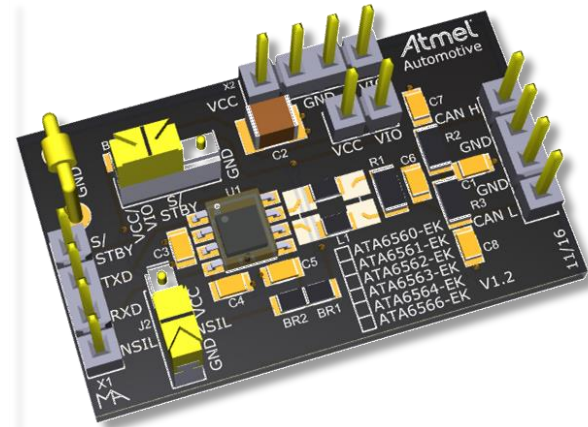
The PICkit Plus and PICkit Serial connectors allow the board to be interfaced to a variety of PIC® microcontrollers so that the user can develop a CAN node. The board also contains headers and test points for most of the MCP25625 pins that allow the external functions to be monitored/evaluated. Additionally, there are multiple external components and jumper configurations for added flexibility.

**Products supported:**  
□ MCP25625



## Development Kit ATA656x-EK

- Evaluation tool for a quick start
- Easy to use due to pre-defined setup
- Easy access to all TRX pins
- Usable for SO8 and DFN8 package
- Switching into Normal- Silent- or Standby- Mode via two jumpers
- Choice of ATA6560, ATA6561, ATA6562, ATA6563, ATA6564 or ATA6566 application by assembly option



## Application note:

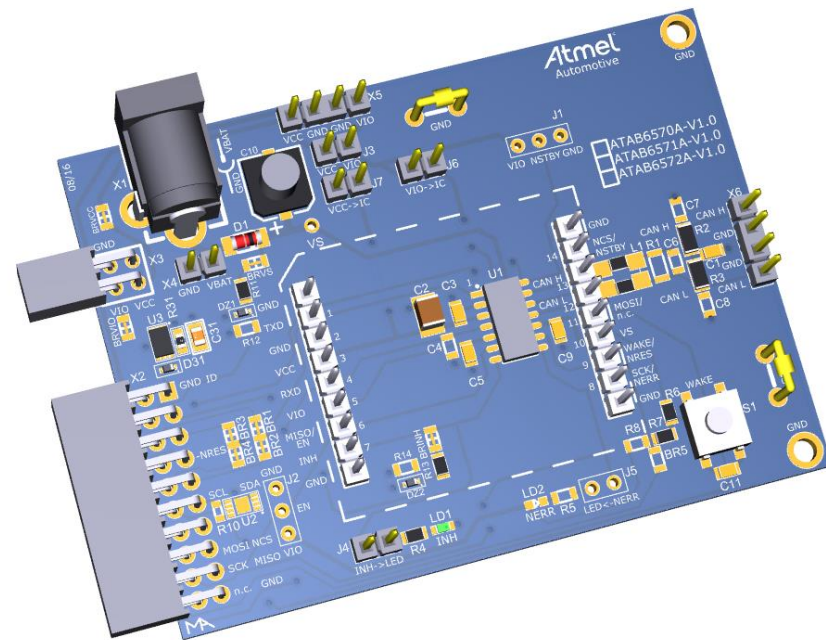
- ATAN0103 Board description

## Models:

- ATA656x CAN Trx VHDL Model

The development board enables users to rapidly carry out prototyping and testing of new CAN designs and supports the following features:

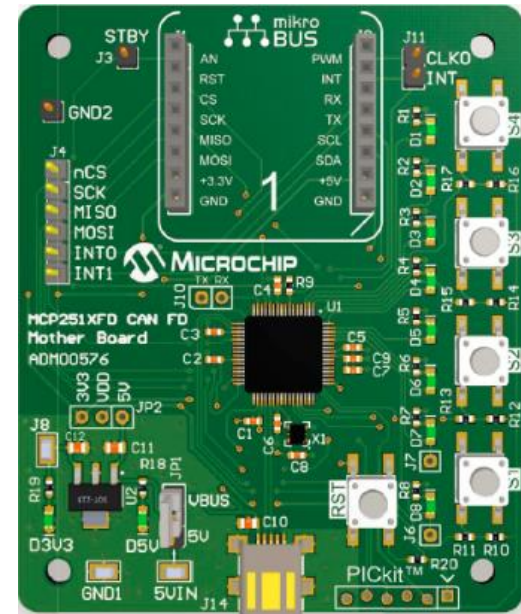
- Evaluation tool for a quick start
- Easy to use due to pre-defined setup
- Easy access to all TRX pins
- Usable for SO14- package
- Placeholders for some optional components for extended functions are included (e.g. common-mode choke)
- Control of the device via SPI



- The MCP251XFD CAN FD Motherboard provides a simple, low-cost board to evaluate the MCP2517FD family of devices. The board features one mikroBUS™ socket to accommodate the MCP2517FD click Board.
- The MCP251XFD CAN FD Motherboard together with the MCP2517FD click Board can be used to implement a CAN FD node.
- The MCP251XFD CAN FD Motherboard contains a PIC32MX470F512H microcontroller with a Service Provider Interface (SPI) peripheral. The microcontroller controls the MCP2517FD via the SPI interface.
- A firmware Application Program Interface (API) is available for rapid application development, which is written in C programming language for MPLAB® Harmony Integrated Software Framework. It can be easily ported to other microcontroller.

## Products supported:

- MCP2517FD



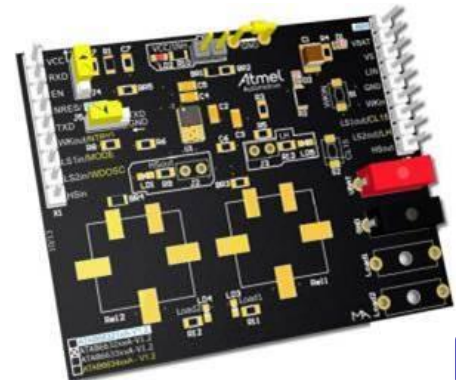


The development board for the complete device family is shipped with all components necessary to quickly begin the development of a LIN node. Depending on which device is soldered on the development board, different components are assembled. The development supports the following features:

- All components necessary needed for the supported devices
- All pins easily accessible
- Choice of master or slave operation (D2 and R2 mounted per default for master operation)
- Switching into normal, silent or sleep mode via two jumpers
- LEDs for operation indication
- Ground coulter clip for easy probe connection while measuring with oscilloscope
- Easily adaptable watchdog times by replacing a single resistor
- Push buttons included for creating a local wake-up from sleep or silent mode
- Relays for application specific tests of the ATA663331/54

## Products supported:

- ATA663201
- ATA663203
- ATA663231
- ATA663232
- ATA663254
- ATA663255
- ATA663331
- ATA663354
- ATA663431
- ATA663454

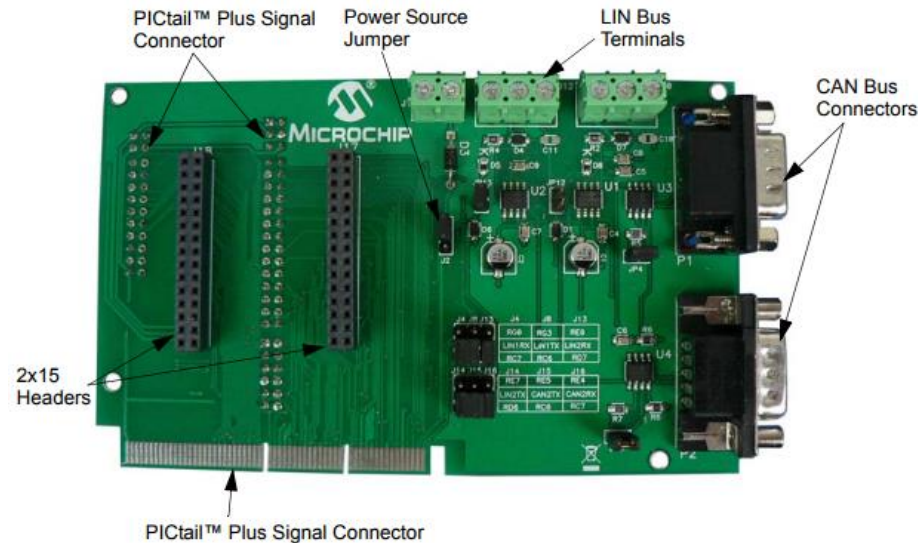


# CAN/LIN PICtail Plus Daughter Board

The CAN/LIN PICtail™ (Plus) Daughter Board (AC164130-2) can be used with either the Explorer 16 Board or the PIC18 Explorer Board. This daughter board is used to facilitate rapid implementation and evaluation of applications that use Controller Area Network (CAN) and Local Interconnect Network (LIN) interfaces. The PICtail Plus interface is used for connection to Explorer 16 Development Board for 16-bit and 32-bit MCUs. The PICtail interface is used for connection to the PIC18 Explorer for PIC18 8-bit microcontrollers.

## Products supported:

- CP2551
- MCP2021



# PICDEM CAN-LIN 2 Demo Board

Microchip offers two similar PICDEM CAN-LIN demonstration boards to support different PICmicro® devices. All demonstrate the main features of the devices, especially those features of the integrated CAN module. In addition to the CAN network, the board also employs a LIN sub-network using Microchip's PIC16C43X and PIC18F320 device families.



## Products supported:

- 28-pin PIC18F258 and PIC18F2680/2682/2685
- 40-pin PDIP PIC18F458 and PIC18F4680/4682/4685 devices
- 20-pin PDIP PIC16C432 with integrated LIN Bus transceiver

The LIN Serial Analyzer development system enables a Personal Computer (PC) to communicate with a LIN (Local Interface Network) bus. The PC program uses a graphical user interface to enter and display message frames occurring on the target bus. The LIN Serial Analyzer consists of several components, that together, make a network debug and analysis tool.

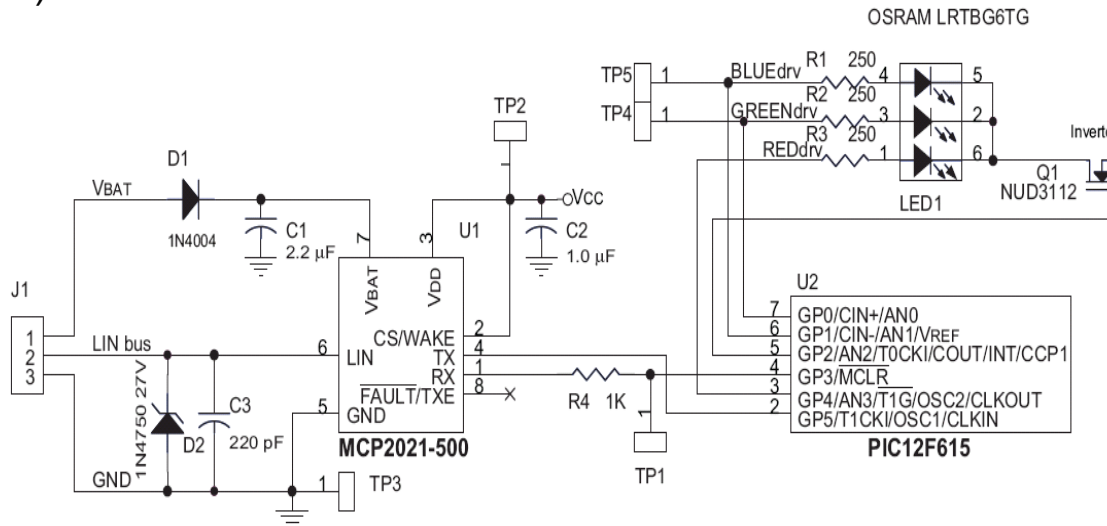
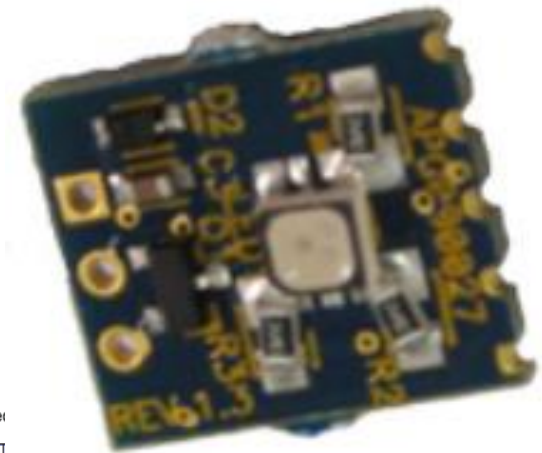


# Automotive Ambient Lighting Module

The Automotive Ambient Interior Lighting Module Reference Design demonstrates microcontroller-based control of RGB LED devices. This module can be controlled remotely by a master body controller via a LIN bus. These modules are offered in a very compact form-factor board and comprise of a PIC12F615 MCU, an MCP2021 LIN transceiver/voltage regulator, and RGB LED. LIN commands are interpreted by the module to control color mixing (16,383 colors) and intensity (1023 levels).

## Products supported:

- MCP2120
- PIC12F615



The MCP23X17 Evaluation Board allows the system designer to evaluate the operation of the MCP23X17 General Purpose I/O (GPIO) expander. The board demonstrates the MCP23X17 performance in a simple circuit (4 inputs and 12 outputs).

## Products supported:

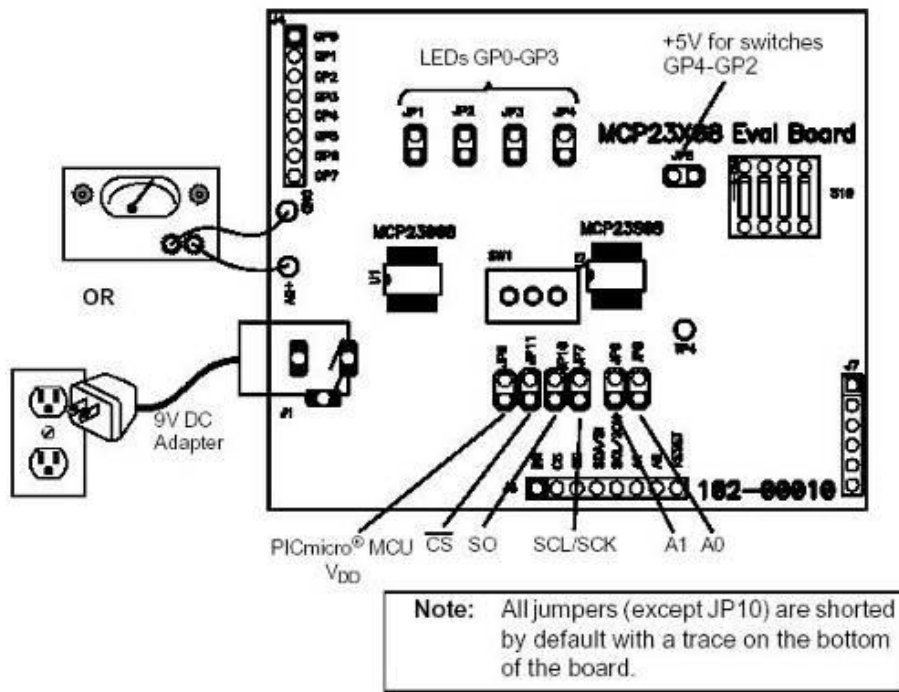
- MCP23017
- MCP23S17



The MCP23008/MCP23S08 Evaluation Board allows the system designer to quickly evaluate the operation of the MCP2X08 8-bit GPIO expanders. The board demonstrates the I/O expansion capabilities/operation of both the MCP213008 (I<sup>2</sup>C™ Interface) and MCP23S08 (SPI interface).

## Products supported:

- MCP23008
- MCP23S08

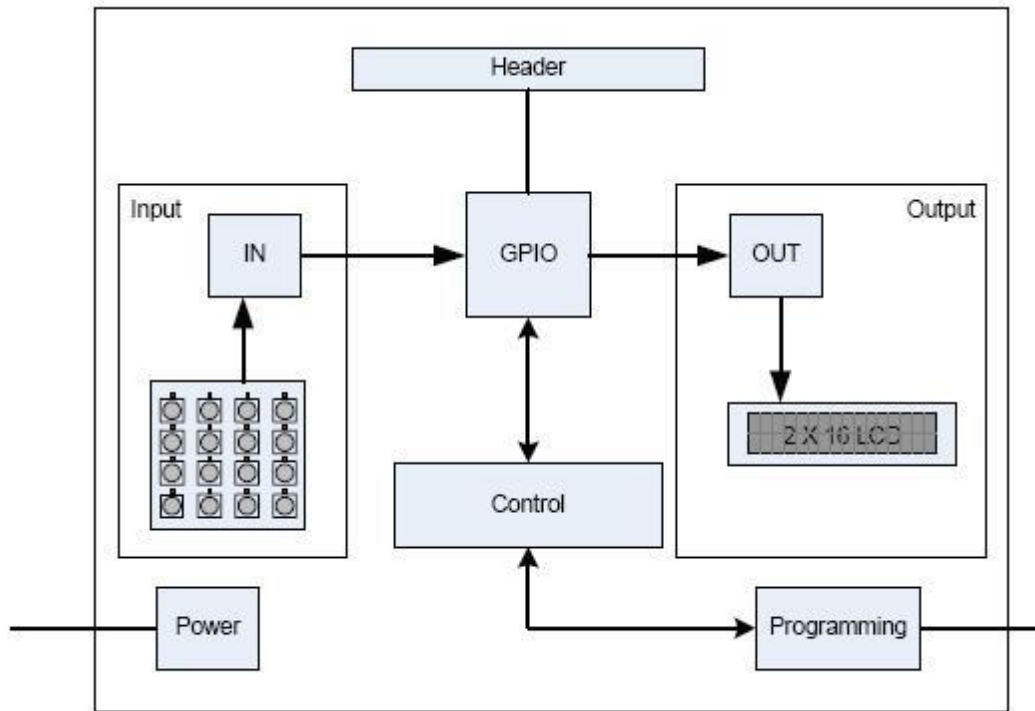


# GPIO Expander Keypad Demo Board

The GPIO Expander Keypad and LCD Demo Board allows the system designer to evaluate the operation of the MCP23X17 and MCP23X08 General Purpose I/O (GPIO) Expanders. The board demonstrates the GPIO Expanders' performance in keypad and LCD example.

## Products supported:

- MCP23008
- MCP23S08
- MCP23017
- MCP23S17
- MCP1702
- PIC18F4550

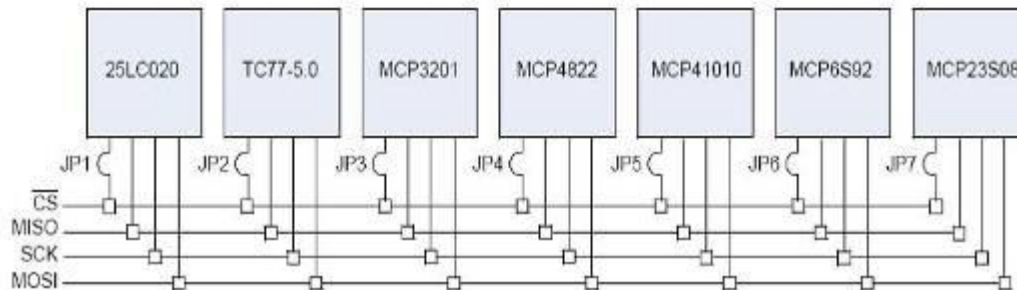




The PICKit™ Serial SPI Demo Board demonstrates SPI serial communications and operation of the following devices:

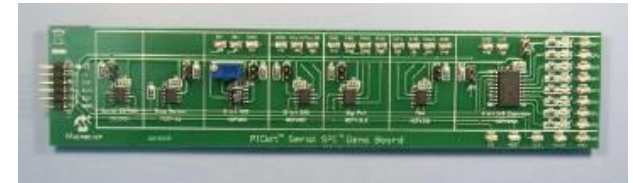
- 25LC020A – 2K SPI Bus Serial EEPROM
- TC77-5.0 – Thermal Sensor with SPI Interface
- MCP3201 – 2.7V 12-bit A/D Converter with SPI Serial Interface
- MCP4822 – 12-bit DAC with Internal  $V_{REF}$  and SPI Interface
- MCP41010 – Single/Dual Digital Potentiometer with SPI Interface
- MCP6S92 – Single-Ended, Rail-to-Rail I/, Low-Gain PGA
- MCP23S08 – 8-bit I/O Expander with Serial Interface

The PICKit™ Serial SPI Demo Board was designed to easily connect to the PICKit Serial Analyzer (DV164122). The PICKit Serial Analyzer provides the SPI master mode serial communications and power. The PICKit™ Serial SPI Demo Board devices all operate in the SPI slave mode and can easily be connected to virtually any demo or development board by connecting the communications lines to connector P1.



## Products supported:

- TC77
- MCP3201
- MCP4822
- MCP41010
- MCP6S92
- MCP23S08
- 25LC020A



# PICKit™ Serial I2C™ Demo Board

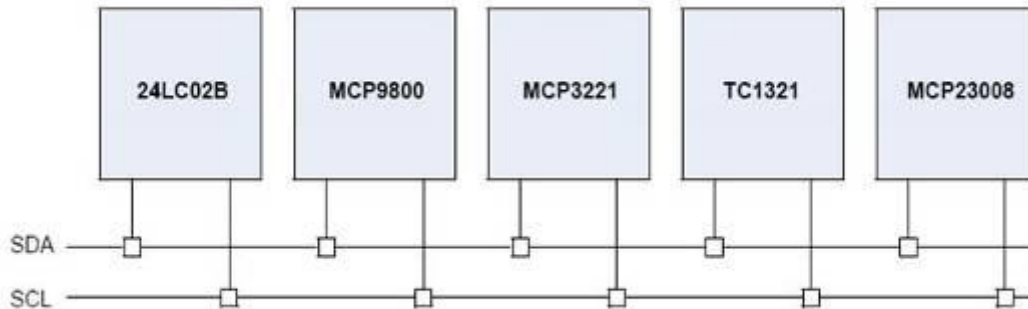
The PICKit™ Serial I2C™ Demo Board demonstrates I2C™ serial communications and operation of the following devices:

- 24LC02B – 2K Serial EEPROM
- MCP9801 – High-Accuracy Temperature Sensor
- MCP3221 – Low-Power 12-bit A/D Converter
- TC1321 – 10-bit DAC
- MCP23008 – 8-bit I/O Expander

The PICKit™ Serial I2C™ Demo Board was designed to easily connect to the PICKit Serial Analyzer (DV164122). The PICKit Serial Analyzer provides the I2C™ master mode serial communications and power. The board devices all operate in the I2C™ slave mode and can easily be connected to virtually any demo or development board by connecting the communications lines to connector P1.

## Products supported:

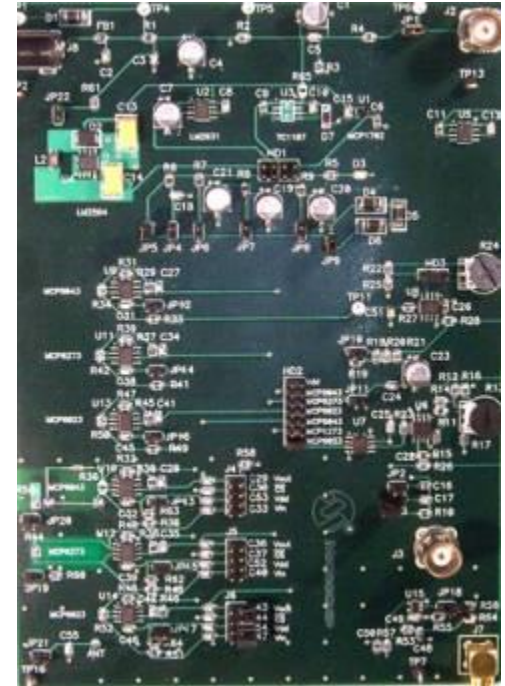
- MCP9801
- MCP3221
- TC1321
- MCP23008
- 24LC02B



# PSRR & Digital Noise Eval Board

The PSRR and Digital Noise Evaluation Board (104-00139) is designed to explore and quantify the effects of power and digital noise on system performance. These experiments will help system designers understand the impact that power and digital noise can have in their design.

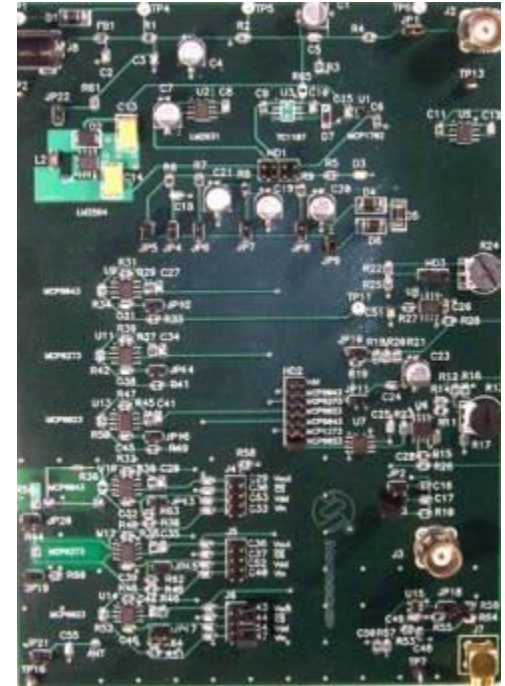
The PSRR and Digital Noise Evaluation Board supports measurement of Power Supply Rejection Ratio (PSRR) performance of Operational Amplifiers, as well as illustrates effects of Digital Interface spikes on Chip Select pins (and  $V_{DD}$ ,  $V_{OUT}$ ,  $V_{IN}$  pins). The various measurements demonstrate importance of  $I_{DDQ}$  on PSRR and Digital Noise performance.



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# Electrical Field Eval Board

The E-Field Evaluation Board (EFIELDDEV) is designed to demonstrate E-field coupling under various conditions on a Printed Circuit Board (PCB). These experiments will help system designers understand the impact PCB layout techniques have on controlling E-field noise in their design.

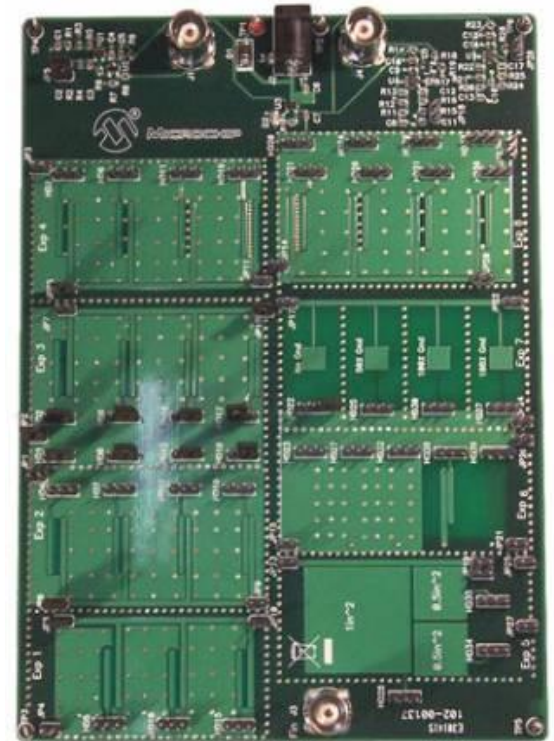
The E-Field Evaluation Board PCB supports measurement of capacitive trace-trace coupling, in 1-layer, 2-layer, and 3-layer experiments; in each experiment, Transmitter-to-Receiver PCB trace spacings are varied, to demonstrate how coupling changes with distance.



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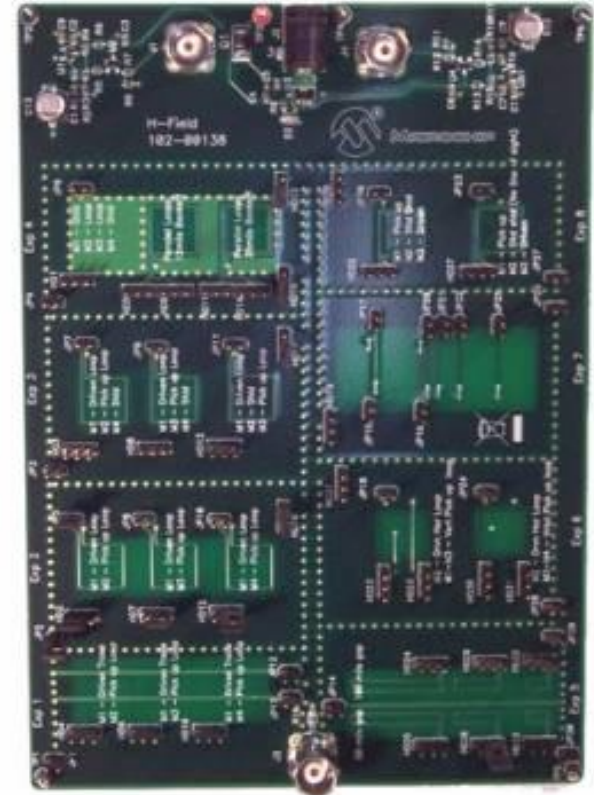
The E-Field Evaluation Board PCB supports measurement of capacitive trace-trace coupling, in 1-layer, 2-layer, and 3-layer experiments; in each experiment, Transmitter-to-Receiver PCB trace spacings are varied, to demonstrate how coupling changes with distance.



# Magnetic Field Eval Board

The Magnetic Field Evaluation Board (104-00138) is designed to demonstrate H-field coupling under various conditions. These experiments will help system designers understand the impact PCB layout techniques have on controlling magnetic coupling in their design.

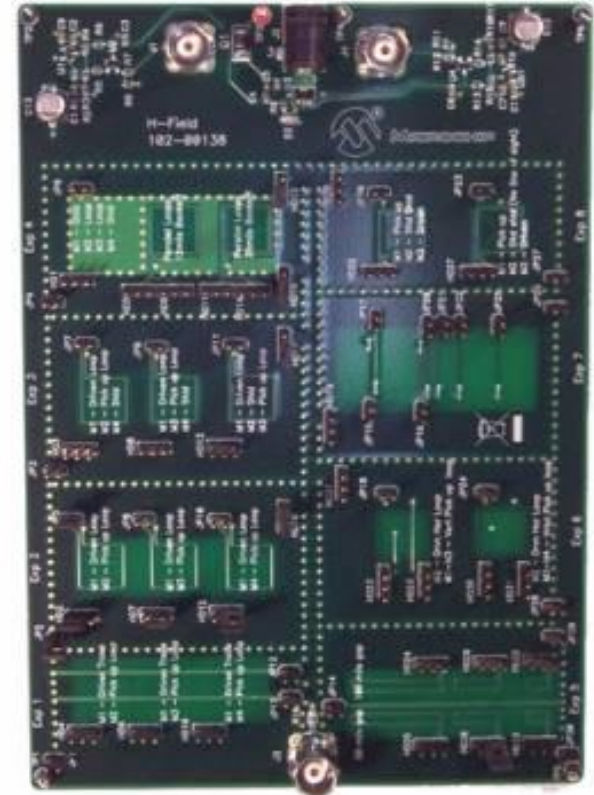
The Magnetic Field Evaluation Board supports measurement of inductive (magnetic) trace-to-loop and loop-to-loop coupling, with and without shielding by planes.



# Magnetic Field Eval Board

The Magnetic Field Evaluation Board (104-00138) is designed to demonstrate H-field coupling under various conditions. These experiments will help system designers understand the impact PCB layout techniques have on controlling magnetic coupling in their design.

The Magnetic Field Evaluation Board supports measurement of inductive (magnetic) trace-to-loop and loop-to-loop coupling, with and without shielding by planes.





The Serial Programmer (MICUSB) is a hardware and software solution supporting I<sup>2</sup>C, SWI, and other serial bus based products. MICUSB operates as a bus master to communicate with slave devices using a USB-to-serial converter, supporting both generic bus interface mode and hardware-specific profiles for command and control of semiconductor products.

## Products supported:

- MIC2870
- MIC2871
- MIC23156
- MIC7400



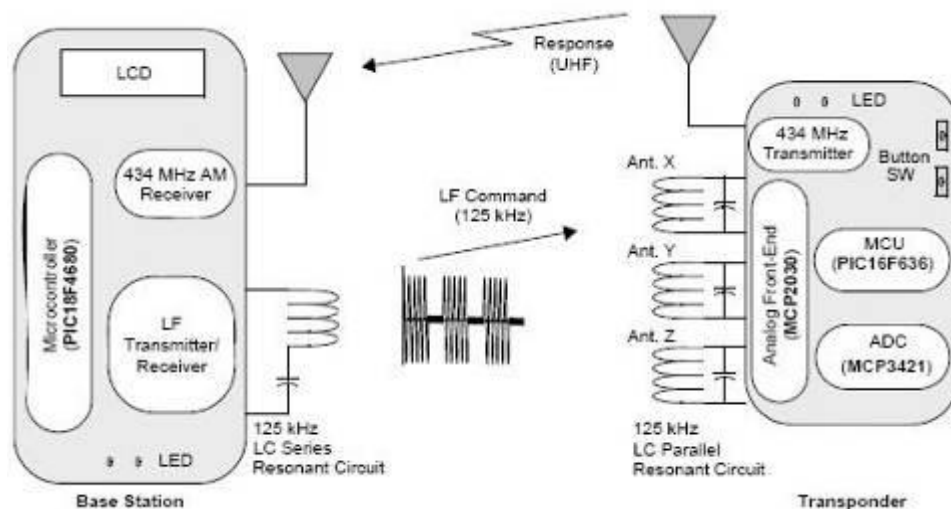


# MCP2030 Bidirectional Communication Demo Kit

Online  
Datasheet

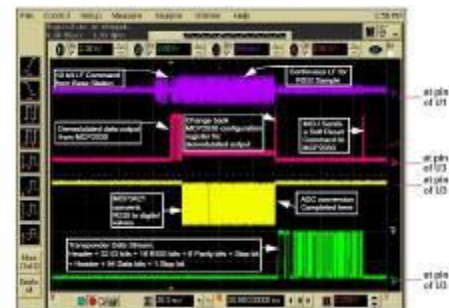
The MCP2030 Bidirectional communication Demo Kit consists of two Transponders and a Base Station unit. The Transponder consists of an MCP2030 (stand-alone, three-axis analog front-end device), a PIC16F636, and a MCP3421 (18-bit delta-sigma analog-to-digital converter). Unlike the existing PKE Reference Design System (P/N: APGRD001) from Microchip Technology, this Transponder uses stand-alone devices for the bidirectional passive keyless entry (PKE) operation. This system also demonstrates the received signal strength indicator (RSSI) function using the MCP3421 delta-sigma ADC.

The MCP2030 Bidirectional Communication Demo Kit has been designed for easy modification by customers. The firmware of both the Transponder and Base Station units can be easily modified using the MPLAB® in-circuit serial programmers.



## Products supported:

- MCP2030
- MCP3421
- TC4421
- PIC18F4680
- PIC16F636





# RN2483 PICtail/PICtail Plus Board

[Online Datasheet](#)

The RN2483 LoRa® Technology PICtail™/PICtail Plus Daughter Board is a demonstration board that showcases the Microchip RN2483 Low-Power Long Range, LoRa Technology Transceiver Module. The RN2483 LoRa Technology PICtail/PICtail Plus Daughter Board provides access to the RN2483 UART and General Purpose Input and Output (GPIO) ports.

The high-speed UART interface and the GPIO ports are available on the module to configure, control, and transfer data. The RN2483 LoRa Technology PICtail/PICtail Plus Daughter Board has PICtail and PICtail Plus connectors to interface with a PIC® microcontroller (MCU) on the development boards that support PICtail or PICtail Plus interface with the required pin mapping. The PICtail board also has an on-board PIC18 MCU available for custom user functions. It is pre-programmed to provide a simple USB-to-UART serial bridge enabling easy serial connection. Demonstration of the RN2483 is performed by plugging the daughter board into a USB port of a PC. The USB port powers the daughter board and enables the user to communicate using the RN2483's ASCII commands.

Development of the RN2483 with Microchip's PIC MCU line is possible via the 28-pin PICtail connector to a PIC18 Explorer or 30-pin card edge PICtail Plus connector to an Explorer 16.



[<< BACK](#)

The RN2483 LoRa™ Mote is a LoRaWAN™ Class A end-device based on the RN2483 LoRa™ modem. As a standalone battery-powered node, the Mote provides a convenient platform to quickly demonstrate the long-range capabilities of the modem, as well as interoperability when connected to LoRaWANv1.0 compliant gateways and infrastructure.

The Mote includes light and temperature sensors to generate data, which are transmitted either on a fixed schedule or initiated by a button-press. An OLED display provides feedback on connection status, sensor values and downlink data or acknowledgements. A standard USB interface is provided for connection to a host computer, providing a bridge to the UART interface of the RN2483 modem. As with all Microchip RN family of products, this enables rapid setup and control of the on-board LoRaWAN™ protocol stack using the high level ASCII command set.

**Key Features:**

- 868/915 MHz High-Frequency SMA Connector
- 433 MHz Low-Frequency Antenna Point
- Module Breakout Header 1
- Module Breakout Header 2
- Module Connector
- SSD1306 (128 x 64) Dot Matrix OLED
- Module ICSP™ Programming Pads
- Mote ICSP Programming Through Hole
- Sharp (GA1A1S202WP) Ambient Light Sensor
- MCP9700T – Linear Active Thermistor
- MCP1825S – LDO Regulator
- PIC18LF25K50 8-bit MCU



**RN2483 LoRa™ Mote Board  
(Part # DM164138)**



# RN2903 PICtail/PICtail Plus Board

Online  
Datasheet

The RN2903 LoRa® Technology PICtail™/PICtail Plus Daughter Board is a development board that showcases the Microchip RN2903 Low-Power Long Range, LoRa® Technology Transceiver Module.

Development of a LoRa system with the RN2903 connected to Microchip's PIC MCU line is possible on PIC18 Explorer boards via the 28-pin PICtail connector, or on Explorer 16 boards using the 30-pin card edge PICtail Plus connector.

The PICtail board also has an on-board PIC18 MCU available for custom user functions. It is pre-programmed to provide a simple USB-to-UART serial bridge enabling easy serial connection. Demonstration of the RN2903 is performed by plugging the daughter board into a USB port of a PC. The USB port powers the daughter board and enables the user to communicate using the RN2903's simple ASCII command interface.

## Key Features

- Microchip RN2903 Low-Power Long Range, LoRa® Technology Transceiver Module
- SMA connector for 915 MHz band
- Solder pads around the module for GPIOs, power pins and communication signals
- Supply Current measurement points
- On-board LDO
- UART traffic LEDs
- ICSP header to program the on-board PIC18 MCU
- USB connector
- PICtail connection interface
- PICtail Plus connection interface
- PIC18 MCU for custom functions



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The RN2903 LoRa<sup>®</sup> Mote is a LoRaWAN<sup>™</sup> Class A end-device based on the RN2903 LoRa modem. As a standalone battery-powered node, the Mote provides a convenient platform to quickly demonstrate the long-range capabilities of the modem, as well as to verify inter-operability when connecting to LoRaWANv1.0 compliant gateways and infrastructure.

The Mote includes light and temperature sensors to generate data, which are transmitted either on a fixed schedule or initiated by a button-press. An OLED display provides feedback on connection status, sensor values and downlink data or acknowledgements. A standard USB interface is provided for connection to a host computer, providing a bridge to the UART interface of the RN2903 modem. As with all Microchip RN family of products, this enables rapid setup and control of the on-board LoRaWAN<sup>™</sup> protocol stack using the high level ASCII command set.

## Key Features:

- 915 MHz High-Frequency SMA Connector
- USB Mini-B Connector
- PIC18LF25K50 8-bit MCU
- Mote ICSP Programming
- OLED Display
- S1 & S2 Switches (for Menu Navigation)
- Ambient Light Sensor
- Linear Active Thermistor (MCP9700T)
- LDO Regulator (MCP1825S)
- Descriptive LEDs, (2) Controlled by PIC18, (2) Controlled by Module
- (2) AAA Battery Pack



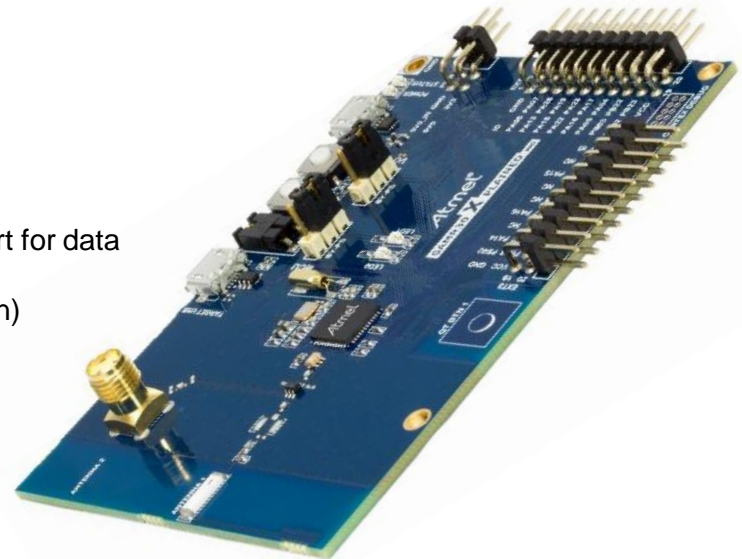
**RN2903 LoRa<sup>®</sup> Mote Board**  
(Part # DM164139)

## Description:

The SAM R30 Xplained Pro is a hardware platform designed to evaluate the ATSAMR30G18A SoC. This kit is supported by the Atmel Studio, an integrated development platform, which provides predefined application examples. This kit provides easy access to various features of the ATSAMR30G18A SoC and offers additional peripherals to extend the features of the board and ease the development of custom designs.

## Features:

- Kit supports 868 MHz and 915 MHz dual (wideband) ISM band
- On-board Embedded Debugger (EDBG)
- Embedded current measurement circuitry with Data Visualizer support for data visualization
- Two mechanical buttons (User configurable button and RESET button)
- Two user LED (Soft Orange and Green Color)
- One QTouch® button
- USB interface, device and reduced host mode
- Two Xplained Pro extension headers
  - Three possible power sources:
    - External power
    - Embedded Debugger(EDBG) USB
    - Target USB
- Clock Source
  - 32.768 kHz crystal, a clock source for the controller in SAM R30 device
  - 16 MHz crystal for RF die in SAM R30 device
- Supported with application examples in Atmel Software Framework (ASF)
- FCC and CE (RED) Certified



## Description:

The SAM W25 Xplained Pro evaluation kit is a wireless hardware platform to evaluate the ATSAMW25H18-MR510PB Wi-Fi module which is based on the industry - leading low - power 2.4GHz IEEE ® 802.11 b/g/n Wi-Fi ATWINC1500 SoC (System on Chip) combined with the ARM® Cortex ® - M0+ ATSAMD21G18A microcontroller from Atmel. Supported by the Atmel Studio integrated development platform, the kit provides easy access to the features of the Atmel ATSAMW25H18-MR510PB Wi-Fi module and explains how to integrate the device in a custom design. The Xplained Pro MCU series evaluation kits include an on-board Embedded Debugger and no external tools are necessary to program or debug the ATSAMW25H18-MR510PB Wi-Fi module. The Xplained Pro extension kits offers additional peripherals to extend the features of the board and ease the development of custom designs.

## Key Features:

- The ATSAMW25H18-MR510PB Wi-Fi module with 2.4GHz IEEE ® 802.11 b/g/n Wi-Fi ATWINC1500 SoC (System on Chip) combined with the ARM® Cortex ® - M0+ ATSAMD21G18A microcontroller
- Embedded debugger (EDBG) — USB interface. Programming and debugging on board SAM W25 through Serial Wire Debug (SWD). Virtual COM-port interface to target via UART. Atmel Data Gateway Interface (DGI) to target via SPI, I2C, GPIO. One yellow status LED. One green LED - Board Power status.
- Three possible power sources — 1: External power. 2: Target USB. 3: Embedded debugger USB
- Two mechanical buttons (user and reset button)
- One yellow user LED
- One Wi-Fi Status LED
- One extension header
- Embedded debugger USB





**Description:**

The ATWINC1500-XSTK Xplained Pro starter kit is a hardware platform for evaluating the ATWINC1500 low cost, low power 802.11 b/g/n Wi-Fi network controller module. Supported by the Atmel Studio integrated development platform, the kit provides easy access to the features of the ATWINC1500 and explains how to integrate the device in a custom design. The Xplained Pro series of evaluation kits include an on-board Embedded Debugger, and no external tools are necessary to program or debug the SAMD21 host MCU that drives the ATWINC1500. The Xplained Pro extension kits offer additional peripherals to extend the features of the board and ease the development of custom designs.

**Key Features:**

- ATWINC1500 module mounted on ATWINC1500 Xplained Pro Extension
- ATSAMD21-XPRO host MCU board for driving the ATWINC1500 Xplained Pro Extension
- I/O1 Xplained Pro for sensor and SD-card input to host MCU
- Embedded debugger (EDBG) for programming SAMD21 host MCU
- Virtual COM-port interface to host MCU via UART
- Wired firmware updates for ATWINC1500 module via virtual COM-port interface
- Data Gateway Interface (DGI) to host MCU via SPI and TWI
- ATECC108 CryptoAuthentication device connected to host MCU
- Two extension headers
- Three possible power sources
- External power
- Target USB
- 32KHz crystal
- 16MHz crystal



# MRF24WN0MA Wi-Fi PICtail/PICtail Plus Board

Online  
Datasheet

The MRF24WN0MA Wi-Fi PICtail/PICtail Plus Daughter Board is a demonstration board for evaluating Wi-Fi connectivity using PIC microcontrollers and the MRF24WN0MA module. This product is compatible with the Explorer 16 Development Board ([DM240001](#)), and PIC32 Starter Kit ([DM320001](#)) with I/O Expansion Board ([DM320002](#)).

The TCP/IP stack and demo applications can be downloaded from [www.microchip.com/harmony](http://www.microchip.com/harmony)

## Key Features:

- Supports low-power, 802.11b/g/n to 5mbps data-rate
- Wi-Fi FCC (USA), IC (Canada), ETSI (Europe) Certified
- Integrated PCB Antenna with Simple four-wire SPI interface to PIC® microcontroller
- WEP, WPA-PSK, WPA2-PSK Security
- SoftAP, WPS, and Wi-Fi Direct Client functionality



# ATWILC1000-SD Evaluation Kit

## Description:

The ATWILC1000-SD evaluation kit is a hardware platform to evaluate the ATWILC1000-MR110PB module.

The WILC1000 is an IEEE 802.11 b/g/n IOT link controller SoC. It is the ideal add-On to existing MCU solutions bringing Wi-Fi through UART or SPI/SDIO-to-Wi-Fi interface. The WILC1000 connects to any Atmel AVR or SMART MCU with minimal resource requirements. The WILC1000 most advanced mode is a single stream 1x1 802.11n mode providing up to 72 Mbps PHY throughput. WILC1000 features fully integrated Power Amplifier, LNA, Switch and Power Management. The WILC1000 provides multiple peripheral interfaces including UART, SPI, SDIO and I2C. The only external clock source needed for the WILC1000 is a high-speed crystal or oscillator with a wide variety of reference clock frequencies supported (between 12 – 32 MHz). The WILC1000 is available in a QFN package.

## Key Features:

- ATWILC1000 module mounted on ATWILC1000-SD board
- Connects to standard SD/MMC connector
- The ATWILC1000-MR110PB module is a single-band 2.4GHz Wi-Fi connectivity link controller solution
- Optional external Power supply and Debug headers included
- Supported with standard SDIO drivers on github





# BM70 PICtail™ / PICtail Plus Board

Online  
Datasheet

The BM-70-PICtail/PICtail Plus Board is designed to emulate the function of Microchip's BM70 BLE module. It also enables the customer to evaluate and demonstrate the capabilities of the BM70 BLE module.

The board includes an integrated configuration and programming interface for plug-and-play capability. It also provides an integrated test environment for all functions supported in the BM70 BLE module. The development kit includes the BM70BLES1FC2 module and the BM70BLES1FC2 carrier board.

## Features:

- Bluetooth® 4.2 Compliant BM70 module with on-board antenna and 2dBm output power
- Develop immediately using the USB interface and Microchip's Windows-based Configuration Tool
- PICtail interface for connection to Microchip's most popular Microcontroller development platforms, such as Explorer16
- USB indication, module status and User configurable LEDs
- Coin cell Battery, USB or PICtail power options
- Access to all BM70 Module pins



BM70 PICtail™/PICtail Plus Daughter Board  
(Part # BM-70-PICtail)

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# BM78 Bluetooth Dual Mode PICtail™ / PICtail Plus Board

[Online  
Datasheet](#)

The BM78 PICtail/PICtail Plus Board provides rapid prototyping and developing for Bluetooth data applications for Classic SPP or Bluetooth Low Energy. It can be powered via USB host or external battery. The BM-78-PICtail utilizes the BM78 module, a fully certified Bluetooth 4.2 dual mode RF module supporting Bluetooth Classic SPP (Serial Port Profile) and Bluetooth Low Energy (BTLE), to provide a Bluetooth serial data connection. The BM-78-PICtail provides a USB to UART converter allowing a flexible interface to the host PC, a PC terminal utility, and Smartphone Apps to drive both classic SPP and BTLE data connections.



## Features:

- Fully certified on board Bluetooth 3.0+EDR and Bluetooth 4.2 stack
- Class 2 transmitter, +2dBm typical
- Transparent serial data connection over Bluetooth Classic Serial Port Profile (SPP) and Bluetooth Low Energy transparent serial data service
- Automatic configuration mode for quick setup (default)
- Manual configuration mode where MCU can access configuration settings
- Embedded MCP2200 USB-UART converter, no need for extra converter board or cable
- Integrated programming interface to update firmware and configuration settings

[<< BACK](#)

The RN4020 PICtail / PICtail Plus Board is a Bluetooth® Low Energy demonstration board that showcases the Microchip [RN4020](#) module, a fully-certified Bluetooth Version 4.1 low energy module for designers who want to easily add low power wireless capability to their products. This flexible development board includes the [RN4020](#) paired with an eXtreme Low Power PIC18F25K50 microcontroller.

This convenient development board includes a USB to UART interface for plug-and-play capability. The high-speed UART interface and the General Purpose Input Output (GPIO) ports are available on the RN4020 module to configure, control and transfer data. The RN-4020-PICtail also includes PICtail and PICtail Plus interfaces for connecting to Microchip development boards. The on-board PIC18 microcontroller can be custom programmed via the available PICKit serial programmer / debugger interface. The board also includes on-board connection and data status LEDs enabling rapid prototyping and fast time to market.

### Key Features:

- Enables flexible development with the [RN4020](#) BTLE Module
- USB to UART Interface, to quickly get started
- Connection and data status LEDs
- PICtail™ and PICtail Plus interfaces for connection to Microchip development boards
- eXtreme Low Power PIC18F25K50 MCU on-board
- PICKit™ serial programmer / debugger interface
- Multiple options for programming and experimentation



P/N = RN-4020-PICtail



# RN4678 Bluetooth 4.2 Dual Mode PICtail™ Board

[Online Datasheet](#)

RN4678 PICtail™ / PICtail Plus Board provides rapid prototyping and developing for Bluetooth data applications for Classic SPP or Bluetooth Low Energy. It can be powered via USB host or external battery. The RN-4678-PICtail utilizes the RN4678 module, a fully-certified Bluetooth 4.2 dual mode RF module supporting Bluetooth Classic SPP (Serial Port Profile) and Bluetooth Low Energy (BLE), to provide a Bluetooth serial data connection. The RN-4678-PICtail provides a USB to UART converter allowing a flexible interface to the host PC, a PC terminal utility, and Smartphone Apps to drive both classic SPP and BLE data connections.



## Features:

- Easy to use development board with on-board Bluetooth 4.2 stack
- Class 2 transmitter, +2dBm typical
- Transparent serial data connection over Bluetooth Classic Serial Port Profile (SPP) and Bluetooth Low Energy transparent serial data service
- Automatic configuration mode for quick setup (default)
- Manual configuration mode where MCU can access configuration settings
- Embedded MCP2200 USB-UART converter, no need for extra converter board or cable
- Integrated programming interface to update firmware and configuration settings

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# RN4870 Bluetooth Low Energy PICtail Board

## Features:

- Bluetooth® 4.2 Compliant [RN4870](#) module with on-board antenna and 2dBm output power
- Plug-and-Play USB interface for configuring and controlling the module
- PICtail interface for connection to Microchip's most popular Microcontroller development platforms, such as Explorer 16
- USB indication, module status and User configurable LEDs
- Coin cell Battery, USB or PICtail power options
- Plug-in Sensor board with Potentiometer and Light sensor
- iOS app for demonstration





The RN-41-EK / RN-42-EK is a fully certified Class 1 Bluetooth evaluation kit for the RN41-I/RM / RN42-I/RM module. It has the flexibility to connect directly to a PC via a standard USB interface or to embedded processors through the TTL UART interface. The status LEDs, switches, and signal headers enable rapid prototyping and integration into existing systems.

## Key Features:

- Evaluation board with USB interface
- Fully certified Bluetooth 2.1 + EDR/2.1/2.0/1.1 module
- Low power (8-30 mA connected, 2 mA idle)
- Embedded Bluetooth stack profiles included (requires no host stack): GAP, SDP, RFCOMM and L2CAP, with SPP, HID, and DUN profiles
- Supports various modes including HCI and SPP/DUN
- FCC, IC, CE certified, RoHS compliant



P/N = RN-41-EK



P/N = RN-42-EK

# RN52 Bluetooth Audio Evaluation Kit

## Features:

- Based on RN52 Bluetooth audio module
- Demonstrates key features of RN52 module for embedded systems
- Allows designers to develop prototypes and proof of concept
- Dual channel audio output and input available in analog and digital formats
- Provides interface to external devices
- USB port to supply power and access to command interface
- Built-in amplifier for stereo audio output and 6 function buttons
- Additional support for codecs such as aptX<sup>®</sup>, AAC, MP3, and others

## Supported Bluetooth Profiles:

- A2DP stereo audio (sink mode, SBC codec)
- AVRCP media player remote control
- HFP/HSP can accept a phone call from mobile phone
- SPP allows serial data over UART
- iAP Profile discovery



P/N = RN-52-EK

## Kit Contents:

- RN52 Evaluation board
- USB cable
- Two stereo mini-speakers
- Microphone



# PIC32 Bluetooth Audio Development Kit

Online  
Datasheet

## Key Features:

- PIC32MX450/470 MCU
- HCI Bluetooth module Daughter Card (QDID Certified Module)
- 16/24-bit, 32-192KHz DAC/Amp Daughter Card
- USB Host/Device audio support
- USB Charging
- 2 inch color LCD Display
- Headphone/Line Out
- Audio Control function

## Bluetooth /USB Audio Software Support for:

- Apple\*
- Samsung Audio
- Google/Android AOA Audio
- Bluetooth Audio w/ SBC & AAC Decode
- Bluetooth Stack QDID Certified

\* For Apple USB Authenticated applications contact  
[applesupport@microchip.com](mailto:applesupport@microchip.com)



PIC32 Bluetooth® Audio Development Kit  
(Part # DV320032)

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# MRF89XAM8A Pictail / Pictail Plus Daughter Card

Online  
Datasheet

The MRF89XAM8A PICtail/PICtail™ Plus Daughter Board is a demonstration and development daughter board for the 868 MHz radio transceiver module which conforms to the European ETSI standard.

The module is surface mounted to a PICtail/PICtail Plus daughter board that plugs into multiple Microchip demonstration and development boards like the PICDEM PIC18 Explorer Board (DM183032) for 8-bit microcontroller development, or the Explorer 16 Development Board (DM240001) for 16-bit microcontroller development.

Targeted for the MiWi™ Development Environment and other proprietary wireless protocol applications, the MRF89XAM8A is a perfect solution for low-cost, low-power, complete embedded wireless applications. Supporting software stacks and application notes may be downloaded from [www.microchip.com/wireless](http://www.microchip.com/wireless).



**Part #AC164138-1**

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# ZENA Wireless Adapter 915 MHz

Online  
Datasheet

The **ZENA™ Wireless Adapter** is a multi-function Universal Serial Bus (USB) wireless adapter connecting USB-equipped desktop or notebook computers with Microchip wireless products for development or application uses.

As a development tool, the ZENA Wireless Adapter can be used as a protocol analyzer or as a diagnostic tool. It can also be used to connect the computer as a wireless node to the network for application use.

The ZENA Wireless Adapter is capable of performing a variety of functions and each function can be programmed into the adapter using the USB boot loader.

The ZENA Wireless Adapter is preprogrammed with a [MiWi™ Wireless Protocol](#) Sniffer application. This allows the user to display MiWi Wireless Protocol packets in a graphical format in the Wireless Development Studio.

Upload firmware applications from the [Wireless Development Studio](#)

**Part #AC182015-3**



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# ZENA Wireless Adapter 868 MHz

Online  
Datasheet

The **ZENA™ Wireless Adapter** is a multi-function Universal Serial Bus (USB) wireless adapter connecting USB-equipped desktop or notebook computers with Microchip wireless products for development or application uses.



As a development tool, the ZENA Wireless Adapter can be used as a protocol analyzer or as a diagnostic tool. It can also be used to connect the computer as a wireless node to the network for application use.

The ZENA Wireless Adapter is capable of performing a variety of functions and each function can be programmed into the adapter using the USB boot loader.

The ZENA Wireless Adapter is preprogrammed with a [MiWi™ Wireless Protocol](#) Sniffer application. This allows the user to display MiWi Wireless Protocol packets in a graphical format in the Wireless Development Studio.

Upload firmware applications from the [Wireless Development Studio](#)  
**Part #AC182015-2**

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# MiWi Demo Kit 868 MHz MRF89XA

Online  
Datasheet

**MiWi Demo Kit – 868 MHz MRF89XA** is an easy-to-use evaluation and development platform for 868 MHz applications. This kit includes Microchip's MRF89XAM8A transceiver module and also features Microchip's PIC18 XLP microcontroller family. The kit includes complete hardware needed to rapidly prototype wireless applications. The demonstration kit is pre-programmed with MiWi™ protocol stack and you can find the demo instructions in the user's guide. To learn more about MiWi wireless protocol, please visit [www.microchip.com/MiWi](http://www.microchip.com/MiWi).

Developers can reprogram or modify the PIC18 MCU Flash memory and develop and debug application code all on the same platform.



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# MRF89XAM9A Pictail / Pictail Plus Daughter Board

Online  
Datasheet

The MRF89XAM9A PICtail/PICtail™ Plus Daughter Board is a demonstration and development daughter board for the 915 MHz radio transceiver module which is FCC certified.

The module is surface mounted to a PICtail/PICtail Plus daughter board that plugs into multiple Microchip demonstration and development boards like the PICDEM PIC18 Explorer Board (DM183032) for 8-bit microcontroller development, or the Explorer 16 Development Board (DM240001) for 16-bit or 32-bit microcontroller development.

Targeted for the MiWi™ Development Environment and other proprietary wireless protocol applications, the MRF89XAM9A is a perfect solution for low-cost, low-power, complete embedded wireless applications. Supporting software stacks and application notes may be downloaded from [www.microchip.com/wireless](http://www.microchip.com/wireless).



**Part #AC164138-2**

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# MiWi Demo Kit 915 MHz MRF89XA

Online  
Datasheet

**MiWi Demo Kit – 915 MHz MRF89XA** is an easy-to-use evaluation and development platform for 868 MHz applications. This kit includes Microchip's MRF89XAM8A transceiver module and also features Microchip's PIC18 XLP microcontroller family. The kit includes complete hardware needed to rapidly prototype wireless applications. The demonstration kit is pre-programmed with MiWi™ protocol stack and you can find the demo instructions in the user's guide. To learn more about MiWi wireless protocol, please visit [www.microchip.com/MiWi](http://www.microchip.com/MiWi).

Developers can reprogram or modify the PIC18 MCU Flash memory and develop and debug application code all on the same platform.



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# Remote Control Demo Board w/ ZENA Wireless Adapter

Online  
Datasheet

RF based Remote Controls are becoming more prevalent as they enable non line-of-sight and provide bi-directional communication. A high-end remote control typically has a graphics display, a number of keys and a radio to communicate with the target devices.

**Microchip's Remote Control Demo Board** (Part # DM240315-2) integrates Graphics, mTouch, USB and RF4CE into a single demo. The board demonstrates a remote populated with PIC24FJ256DA210 MCU, 3.5" Graphical TFT LCD with resistive touch screen, capacitive touch keys with plastic overlay, MRF24J40 2.4 GHz transceiver and ZENA™ wireless Adapter.



Remote Control Demo Board with ZENA Wireless Adapter  
(Part # DM240315-2)

**Part #DM240315-2**

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# ZENA Wireless Adapter 2.4 GHz MRF24J40

Online  
Datasheet

The **ZENA™ Wireless Adapter** is a multi-function Universal Serial Bus (USB) wireless adapter connecting USB-equipped desktop or notebook computers with Microchip wireless products for development or application uses.



**Part #AC182015-1**

As a development tool, the ZENA Wireless Adapter can be used as a protocol analyzer or as a diagnostic tool. It can also be used to connect the computer as a wireless node to the network for application use.

The ZENA Wireless Adapter is capable of performing a variety of functions and each function can be programmed into the adapter using the USB boot loader.

The ZENA Wireless Adapter is preprogrammed with a [MiWi™ Wireless Protocol](#) Sniffer application. This allows the user to display MiWi Wireless Protocol packets in a graphical format in the Wireless Development Studio.

Upload firmware applications from the [Wireless Development Studio](#)

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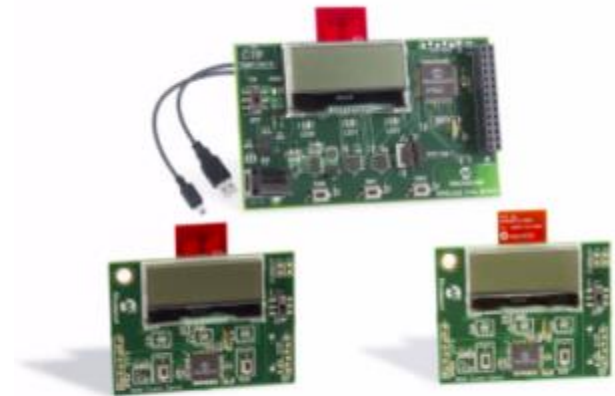
# MiWi Protocol to Wi-Fi Wireless Demo Kit

Online  
Datasheet

MiWi™ Protocol to Wi-Fi® Wireless Demo kit allows developers to evaluate and experiment with MiWi protocol to Wi-Fi gateway solutions. The kit includes a Wireless Evaluation Board with both the MiWi protocol and Wi-Fi transceivers. The kit also includes two MiWi Demo Boards to create a three node MiWi protocol network. The Wireless Evaluation Board can be connected to a client device, such as a laptop or a mobile phone, using the Wi-Fi network. Based on the application running on the MiWi protocol nodes, the information exchanged can be displayed on the client device. To learn more about MiWi wireless protocol, please visit [www.microchip.com/MiWi](http://www.microchip.com/MiWi) & To learn more about WiFi solutions, please visit [www.microchip.com/WiFi](http://www.microchip.com/WiFi).

## Demo Software

The demo software can be downloaded from the “Microchip Libraries of Applications” at [www.microchip.com/MLA](http://www.microchip.com/MLA). After installing the MLA, you can find the demo source code at ..\Microchip Solutions \ Combo folder.



MiWi™ Protocol to Wi-Fi® Wireless Demo Kit  
(Part # DM182018)

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# MiWi Demo Kit 2.4 GHz MRF24J40

Online  
Datasheet

**MiWi Demo Kit – 2.4 GHz MRF24J40** is an easy-to-use evaluation and development platform for IEEE 802.15.4 application designers. This kit includes Microchip's MRF24J40MA transceiver module and also features Microchip's PIC18 XLP microcontroller family. The kit includes complete hardware needed to rapidly prototype wireless applications. The demonstration kit is pre-programmed with MiWi™ protocol stack and you can find the demo instructions in the user's guide. To learn more about MiWi wireless protocol, please visit [www.microchip.com/MiWi](http://www.microchip.com/MiWi).

Developers can reprogram or modify the PIC18 MCU Flash memory and develop and debug application code all on the same platform.



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# MRF24J40MA Pictail / PICtail Plus

Online  
Datasheet

The MRF24J40MA PICtail/PICtail Plus Daughter Board is a demonstration and development daughter board for the agency-certified MRF24J40MA 2.4GHz IEEE Std. 802.15.4™ +0 dBm RF Transceiver Module.

The module is surface-mounted to a PICtail/PICtail Plus daughter board that allows it to plug into multiple Microchip Technology Demonstration and development boards like the PIC18 Explorer Board (DM183022) for 8-bit microcontroller development or the Explorer 16 Development Board (DM240001) 16-bit microcontroller development.

Targeted for ZigBee® and MiWi™ Development Environment wireless protocol applications, the MRF24J40MA is a perfect solution for low-cost, low-power complete embedded wireless PAN applications. Supporting software stacks and application notes may be downloaded from the Microchip website at

<http://www.microchip.com/wireless>



**Part #AC164134-1**

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# MRF24J40MD Pictail/PICtail Plus Daughter Board

Online  
Datasheet

The MRF24J40MD PICtail/PICtail Plus Daughter Board is a demonstration and development daughter board for the MRF24J40MD 2.4GHz IEEE Std. 802.15.4™ 20 DBm RF Transceiver Module. The MRF24J40MD module has an onboard PCB antenna, matching circuitry and it supports the ZigBee®, MiWi™, MiWi P2P and MiWi Pro protocols.

The daughter board can plug into multiple Microchip demonstration and development boards. For example, for 8-bit microcontroller development, use the PIC18 Explorer Board (DM183032) or for 16-bit microcontroller development use the Explorer 16 Development Board (DM240001).

Supporting software stacks and application notes may be downloaded from the Microchip website at

[www.microchip.com/wireless](http://www.microchip.com/wireless)



**Part #AC164134-3**

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# MRF24J40ME Pictail/PICtail Plus Daughter Board

Online  
Datasheet

The MRF24J40ME PICtail™/PICtail Plus Daughter Board is a demonstration and development daughter board for the MRF24J40ME 2.4 GHz IEEE Std. 802.15.4 RF Transceiver Module with PA/LNA and External Antenna Connector

The daughter board can be plugged into multiple Microchip Technology demonstration and development boards. For example, the daughter board is appropriate for 8-bit microcontroller development using the PIC18 Explorer Board (DM183032) or for 16-bit and 32-bit microcontroller development using the Explorer 16 Development Board (DM240001)

Supporting software stacks and application notes may be downloaded from the Microchip website at

[www.microchip.com/wireless](http://www.microchip.com/wireless)



**Part #AC164134-3**

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# Wireless Network Software

Online  
Datasheet

Microchip offers three FREE wireless protocol stacks to our customers to aid them in their IEEE 802.15.4 short-range wireless networking development and now we offer the Certified ZigBee PRO protocol stack for those customers needing the advanced features of this new protocol.

## **ZigBee® PRO**

- Certified ZigBee PRO protocol stack
- Part of Microchip's Certified ZigBee PRO Compliant Platform

## **ZigBee® Residential**

- Certified ZigBee 2006 protocol stack
- Part of Microchip's Certified ZigBee Compliant Platform

## **MiWi™**

- Microchip Wireless Proprietary protocol stack
- Based on IEEE 802.15.4 standard
- Small footprint, highly optimized Mesh and Star Network protocol

## **MiWi™ P2P**

- Microchip Wireless Proprietary peer-to-peer protocol stack
- Based on IEEE 802.15.4 standard
- Ultra-Small footprint (3KB), Peer-to-Peer Network protocol

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# Wireless Network Software

Online  
Datasheet

Microchip offers three FREE wireless protocol stacks to our customers to aid them in their IEEE 802.15.4 short-range wireless networking development and now we offer the Certified ZigBee PRO protocol stack for those customers needing the advanced features of this new protocol.

## **ZigBee® PRO**

- Certified ZigBee PRO protocol stack
- Part of Microchip's Certified ZigBee PRO Compliant Platform

## **ZigBee® Residential**

- Certified ZigBee 2006 protocol stack
- Part of Microchip's Certified ZigBee Compliant Platform

## **MiWi™**

- Microchip Wireless Proprietary protocol stack
- Based on IEEE 802.15.4 standard
- Small footprint, highly optimized Mesh and Star Network protocol

## **MiWi™ P2P**

- Microchip Wireless Proprietary peer-to-peer protocol stack
- Based on IEEE 802.15.4 standard
- Ultra-Small footprint (3KB), Peer-to-Peer Network protocol

<< BACK



# Ethernet PICtail™ Daughter Board

Online  
Datasheet

The Ethernet PICtail™ Daughter Board is an Ethernet demonstration board for evaluating.

Microchip Technology's ENC28J60 stand-alone 10 Base-T Ethernet controller. It is an expansion board compatible with a number of PICDEM™ demonstration boards. A complete list of compatible PICDEM™ demonstration boards is available on Microchip's web site.

## Products supported:

- ENC28J60
- 25LC256



UTC2000  
USB-C Controller



**EVK-UTC2000**

USB57x4  
USB3.1 Gen1 Smart Hub Controller



**EVB-USB5734**

USB46x4  
USB2.0 Smart Hub Controller



**EVB-USB4604**

USB253x  
USB2.0 Hub Controller



**EVB-USB2534**

USB251x  
USB2.0 Hub Controller w/BC1.2



**EVB-USB2534BC**

USB553x  
USB3.0 Hub Controller



**EVB-USB5537**

USB3740  
USB2.0 2-Port Switch



**EVB-USB3740**

USB375x  
USB2.0 Port Protection w/Switch



**EVB-USB3750**

USB333x  
USB2.0 PHY (Mobile)



**EVB-USB3330**

USB264x USB2.0 Flash Media  
Controller w/Hub



**EVB-USB2642**

USB334x  
USB2.0 PHY (General)



**EVB-USB3340**



# MCP2200 USB to RS232 Demo Board

Online  
Datasheet

The MCP2200EV-VCP is a USB to RS232 development and evaluation board for the MCP2200 USB to UART device. The board allows for easy demonstration and evaluation of the MCP2200. The accompanying software allows the special device features to be configured and controlled.

The board is powered from USB. Each I/O has an associated test point. In addition, two I/O are connected to LEDs which are used to indicate USB to UART traffic when the associated pins are configured as TxLED and RxLED pins respectively.

**Products supported:**  
□ MCP2200





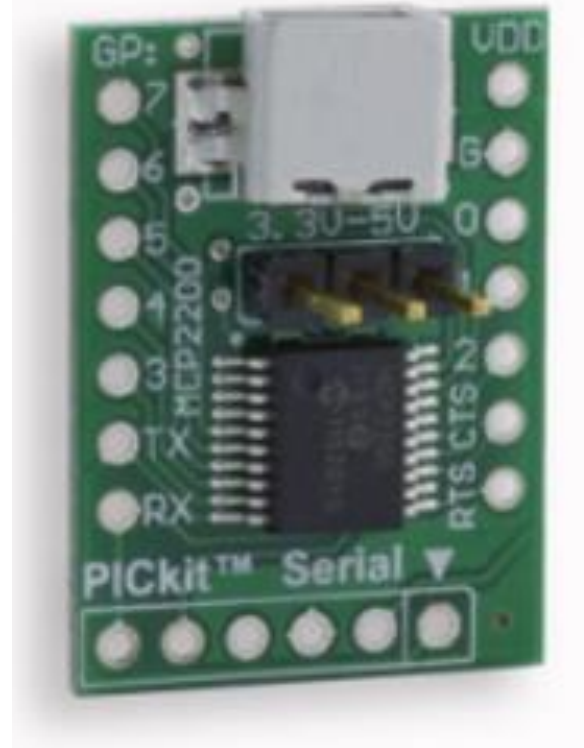
# MCP2200 Breakout Module

[Online Datasheet](#)

The MCP2200 Breakout Module is a development and evaluation platform for the USB-to-UART (Universal Serial Bus-to-Universal Asynchronous Receiver/Transmitter) serial converter MCP2200 device. The module is comprised of a single Dual In-Line Package (DIP) form-factor board.

## Products supported:

- MCP2200

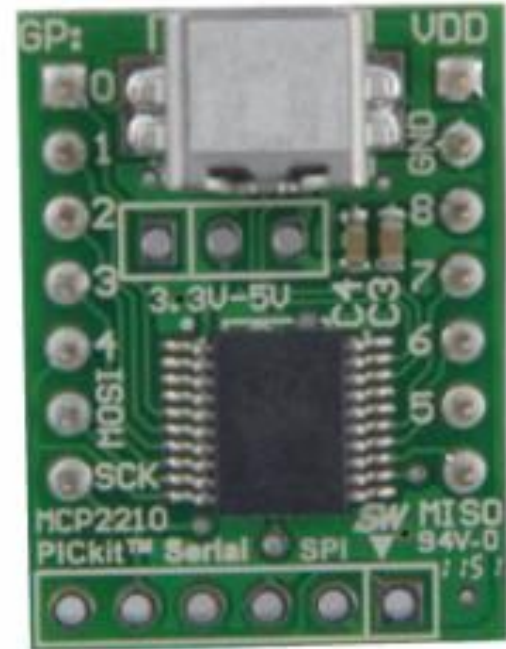


# MCP2210 Breakout Module

The MCP2210 Breakout Module can be used with either the MCP2210 Motherboard or as a standalone USB to SPI (Master) bridge module. The breakout board provides all the needed signals in order to assist the user in building their own boards using the MCP2210. The MCP2210 Utility software allows custom device configuration. In addition, a DLL package is also available in order to allow development of custom software utilizing the MCP2210.

## Products supported:

- MCP2210





The MCP2210 Evaluation Kit is a development and evaluation platform for the MCP2210 device. The MCP2210 Motherboard is designed to work together with the MCP2210 Breakout Board (included). The motherboard provides the test points needed for measurements and it also contains the following SPI slave chips:

- MCP23S08 – 8 bit I/O expander
- MCP3204 – 4 channel, 12-bit ADC
- 25LC02 – 2kbit EEPROM
- TC77 – temperature sensor

All the mentioned chips are SPI slaves controlled by the MCP2210. The MCP2210 Eval Board Demo software can be used to demonstrate the MCP2210 as a USB-to-SPI (Master) device and allow I/O control. In addition, the MCP2210 Utility software allows custom device configuration. A DLL package is also available in order to allow development of custom software using the MCP2210.



## Products supported:

- ❑ MCP2210
- ❑ MCP3204
- ❑ TC77
- ❑ 25LC02



# MCP2221 Breakout Module

The MCP2221 Breakout Module is a development and evaluation platform comprised of a single DIP form factor board. The provided supporting software demonstrates the capabilities of the MCP2221 device as a USB-to-UART/I2C/SMBus protocol converter. Additionally, these tools provide simple access for I/O control and the ability to establish custom device configuration. Custom tools can also be created through the use of the provided DLL package.

## Features:

- UART Tx and Rx signals
- I2C/SMBus clock and data lines (SCL and SDA)
- Four GP lines, configurable for GPIO, dedicated or alternate function operation
- User-selectable (jumper) power supply of 3.3V or 5V (up to 500 mA)
- DIP form factor
- PICkit™ Serial Analyzer header — used for UART and I2C/SMBus communication only

## Products supported:

- MCP2221



The demo board is a complete stand-alone smoke detector application with a smoke chamber emulator. The demo board allows evaluation of all the functions of the RE46C190. Key test points of the device are available at the bottom edge of the demo board.

The demo board is designed for battery operation using a CR123A battery or can be operated using a power supply.

The RE46C190 application circuit is on the right side of the board by the battery holder and piezo horn and the smoke chamber emulator is on the left. The smoke chamber emulator can be disconnected from the application circuit and a photo smoke chamber or its components can be connected to the demo board.

## Products supported:

- RE46C190
- RE46C191



The MTS2916A Dual Full-Bridge Stepper Motor Driver Evaluation Board demonstrates the capabilities of the MTS2916A to control both windings of a bipolar stepper motor. The board also demonstrates the capabilities of the MTS62C19A, which has the same functionality, but different pin assignments. A PIC16F883 is utilized for motor control processing.

This evaluation board incorporates features through the implementation of push button switches and a variable speed input potentiometer to exercise a stepper motor in Full-Step, Half-Step, Modified Half-Step and Microstepping modes. LEDs indicate a binary representation of which mode has been selected. The evaluation board and the stepper motor can be powered from a single power input J1 (7 VDC to 12 VDC) with jumper JP2 installed. For higher motor voltages, make sure JP2 is not installed, and connect VLOAD at J4. Numerous test points have been designed into the board to allow easy access.

**Products supported:**  
□ MTS2916A





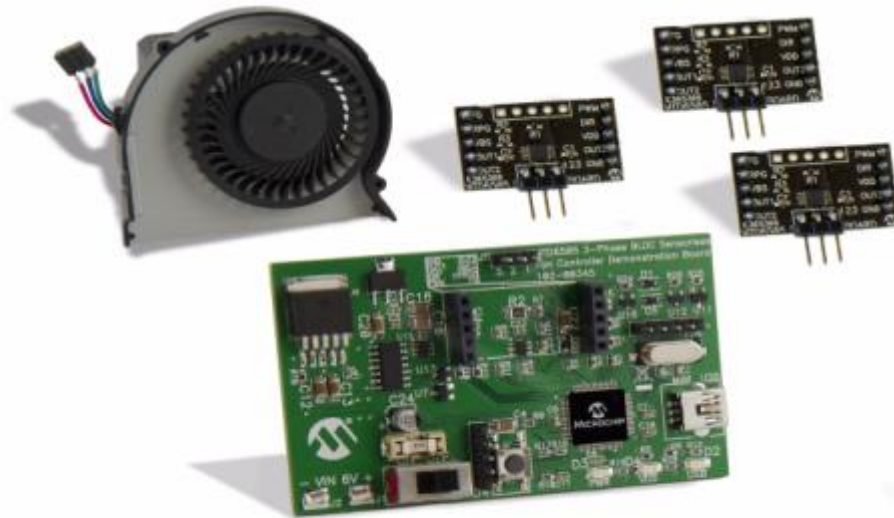
# MTD6505 3-Phase BLDC Sensorless Demo Board

Online  
Datasheet

The MTD6505 3-Phase BLDC Sensorless Fan Controller Demonstration Board allows the control and monitoring of the MTD6505 device using PC software connected to the board via a USB connection. The included board software provides several features including  $V_{DD}$  control and monitoring, pulse-width modulation (PWM) control, speed and current consumption monitoring. It also allows selecting the  $R_{PROG}$  resistor value for fan fitting.

## Products supported:

- MTD6505



MTD6505 3 Phase BLDC Sensorless Fan Controller Demonstration Board  
(Part # ADM00345)

P/N: ADM00345

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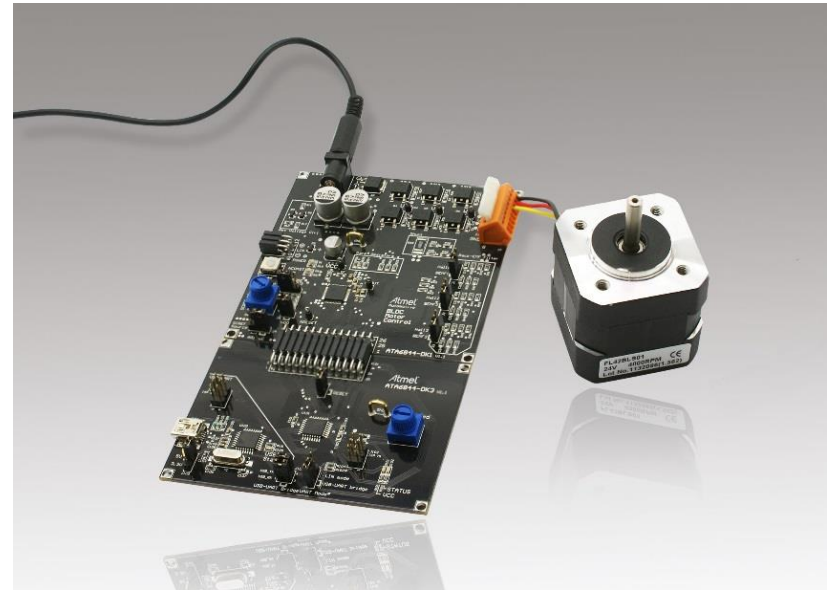
# ATA6844-DK Demo Board

The development kit contains a main board featuring the BLDC gate driver ATA6844, external FETs, and DC motor.

The attached microcontroller board is equipped with an ATmega32M1 for BLDC motor control with B-EMF position control loop method. The ATmega32U2 establishes UART communication via USB port.

## Products supported:

- ATA6843
- ATA6844





# MCP8063 12V 3-Phase Controller Kit

Online  
Datasheet

The MCP8063 12V 3-Phase BLDC Sensorless Fan Controller Demonstration Kit allows the control and monitoring of Microchip 12V fan driver devices, such as the MCP8063 or MTD6501, using a PC software connected to the demo board via a USB connection. The MCP8063 12V 3-Phase BLDC Sensorless Fan Controller Demonstration Board software provides several features, such as fan driver power supply control and monitoring, pulse-width modulation (PWM) control, and speed and current consumption monitoring. It also allows automatic application testing.

## Features:

- PC software allows controlling and monitoring the MCP8063 3-Phase Fan Controller via USB connection
- VDD voltage control and IDD current measurement
- PWM control for speed setting
- FG measurement for speed monitoring
- Automated test measurement

## Products supported:

- MCP8063



# ATA6826-DK Demo Board

The application board allows loads to be easily adapted via its row connector pins. Design software controls its SPI interface via the PC parallel port. The board contains everything needed to start operation, including a link cable to PC 25-lead 1:1, application note and datasheet.

## Products supported:

- ATA6826C





# ATA6831-DK Demo Board

Application board that allows loads to be easily adapted via its row connector pins. Design software controls its SPI interface via the PC parallel port. The board contains everything needed to start operation, including a link cable to PC 25-lead 1:1, application note and datasheet.

## Products supported:

- ATA6831C
- ATA6832C



The development board contains an Atmel triple half bridge driver (ATA6832C), Atmel ATmega88 microcontroller, and ATA6625 LIN SBC as a voltage regulator. Only high-temperature components populate this board. The board also includes a BLDC motor control kit with BLDC motor and a power supply cable with banana plugs. The BLDC motor control is fully integrated from the signal generation to the full BLDC motor control chain

## Products supported:

- ATA6831C
- ATA6832C



# ATA6836-DK Demo Board

PC-controlled application board for an Atmel ATA6836C in the QFN5x5 package. Using the application board, loads can easily be adapted via row connector pins. The design software controls the application board's SPI interface via the PC parallel port. The design kits include everything needed to start operation: a link cable to PC 25-lead 1:1, corresponding application notes, and datasheet.

## Products supported:

- ATA6836C
- ATA6838C



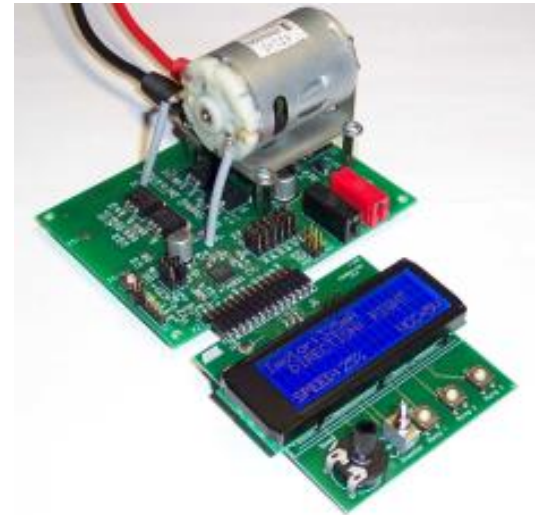
# ATA6823-DK Demo Board

The development kit contains a main board with an Atmel H-bridge gate driver (ATA6823), external FETs, and DC motor.

The attached controller board is equipped with an Atmel ATmega88 microcontroller and LCD display for user interface purpose.

## Products supported:

- ATA6823C
- ATA6824C



A high-temperature H-bridge motor driver designed for DC motor control applications in automotive high temperature environments. With a maximum junction temperature of 200°C, this driver is suitable for applications with an ambient temperature up to 150°C. The IC includes four driver stages to control four external power MOSFETs. A microcontroller ATmega88 provides the direction signal and the PWM frequency.

The application is set up for operating in 150°C ambient environment, e.g. EGR exhaust gas recirculation.

## Products supported:

- ATA6823C
- ATA6824C





# MCP7941x PICtail™ Plus Daughter Board

Online  
Datasheet

The MCP7941x RTCC PICtail™ Plus Daughter Board demonstrates the features and abilities of the MCP7941x and MCP7940x Real-Time Clock/Calendar family in standard development platforms. By designing this daughter board with the PICtail Plus, PICtail and PICkit™ Serial connectors, it will operate with the Explorer 16 Development Board, the PICDEM PIC18 Explorer Board, the XLP16-bit Development Board and the PICkit Serial Analyzer tool. Also included is a 3V coin cell battery that can be installed in the coin cell holder for backup power.

## Products supported:

- MCP79410
- MCP79411
- MCP79412
- MCP79400
- MCP79401
- MCP79402
- MCP7940N



MCP79410 RTCC PICtail™ Plus Daughter Board  
(Part # AC164140)

P/N: AC164140

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# MCP795xx PICtail™ Plus Daughter Board

[Online  
Datasheet](#)

The MCP795XX RTCC PICtail™ Plus Daughter Board demonstrates the features and abilities of the MCP795xx SPI Real-Time Clock/Calendar (RTCC) family in standard development platforms. This daughter board will support the full featured 14-pin MCP795W2x and MCP795W1x devices along with the mid-range 10-pin MCP7952x and MCP7951x devices. By designing this daughter board with both PICtail and PICtail Plus connectors, it will operate with the Explorer 16 Development Board and the PICDEM PIC18 Explorer Board. Also included is a 3V coin cell battery for backup power to the RTCC.

## Products supported:

- MCP7951x
- MCP7952x
- MCP795W1x
- MCP795W2x



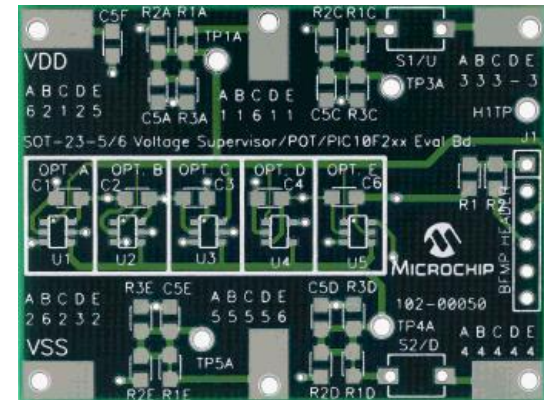
# 5 and 6-pin SOT-23 Eval Board

The Voltage Supervisor SOT-23-5/6 Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's Voltage Supervisors and Voltage Detectors in the SOT-23-5 (5-pin SOT-23) or SOT-23-6 (6-pin SOT023) packages. This board has been made generic so that other devices in the SOT-23-5 and SOT-23-6 packages may be supported with this board.

The Voltage Supervisor SOT-23-5/6 Evaluation Board PCB supports the four different SOT-23-6 pinouts (which also supports compatible SOT-23-5 footprints) and one SOT-23-5 footprint.

## Products supported:

- 5-pin SOT-23 packages
- 6-pin SOT-23 packages





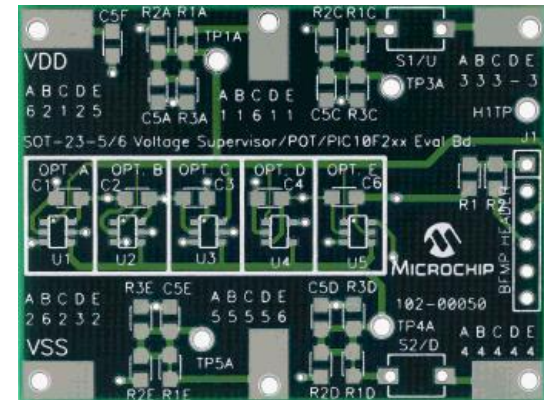
# 5 and 6-pin SOT-23 Eval Board

The Voltage Supervisor SOT-23-5/6 Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's Voltage Supervisors and Voltage Detectors in the SOT-23-5 (5-pin SOT-23) or SOT-23-6 (6-pin SOT023) packages. This board has been made generic so that other devices in the SOT-23-5 and SOT-23-6 packages may be supported with this board.

The Voltage Supervisor SOT-23-5/6 Evaluation Board PCB supports the four different SOT-23-6 pinouts (which also supports compatible SOT-23-5 footprints) and one SOT-23-5 footprint.

## Products supported:

- 5-pin SOT-23 packages
- 6-pin SOT-23 packages



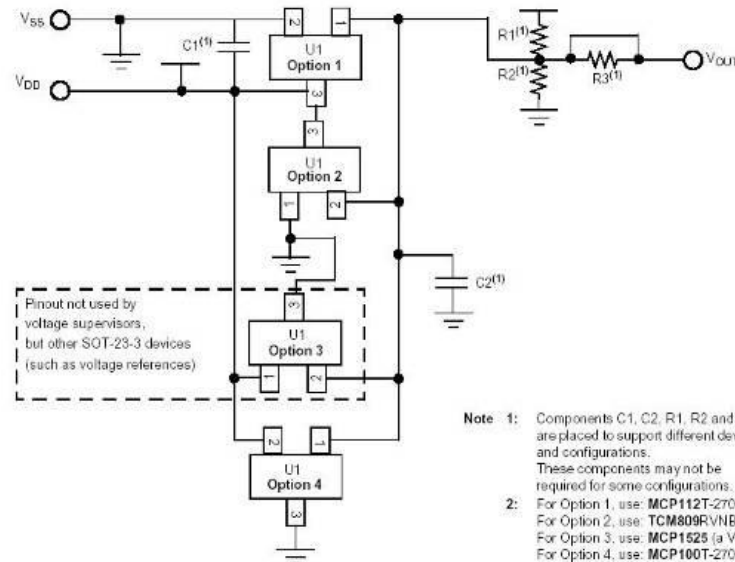
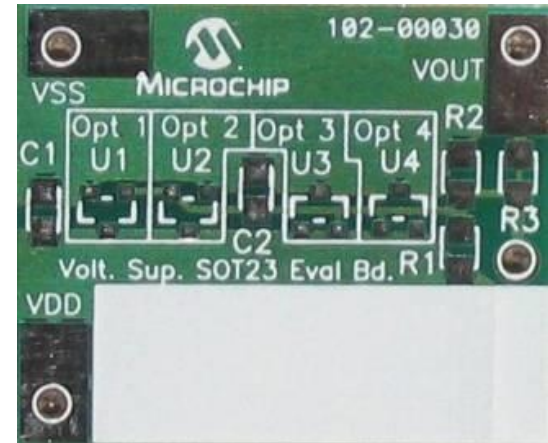
# 3-pin SOT-23 Eval Board

The Voltage Supervisor SOT-23 Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's Voltage Supervisors and Voltage Detectors in the SOT-23-3 (3-pin SOT-23) package.

The Voltage Supervisor SOT-23 Evaluation Board PCB supports the four different SOT-23-3 pinouts for the product family. This board has been made generic so that other devices in the SOT-23-3 package may be supported with this board.

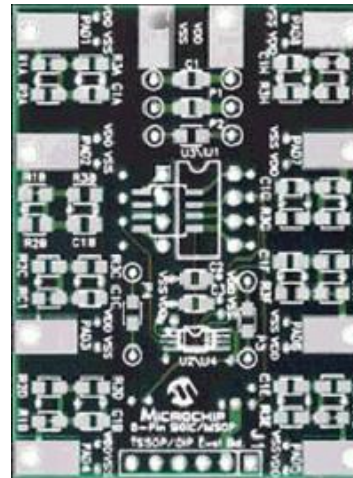
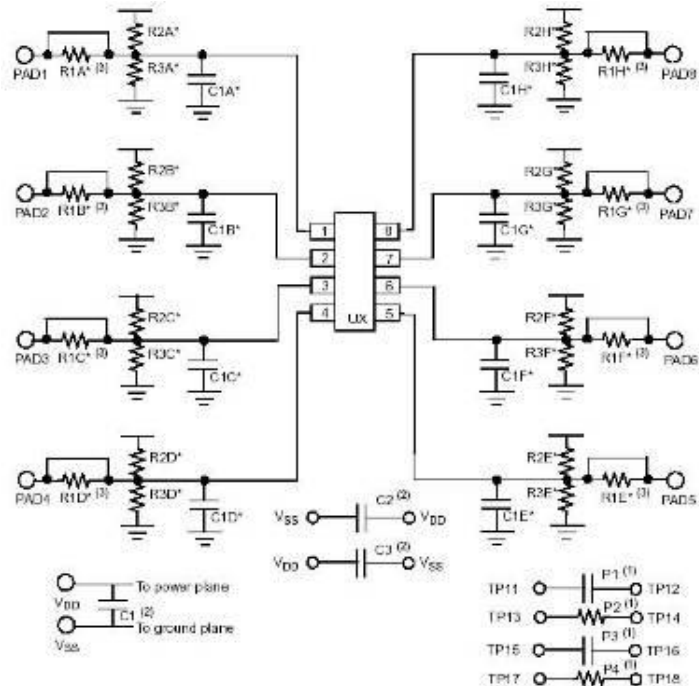
## Products supported:

- 3-pin SOT-23 packages



# 8-pin SOIC/MSOP/ TSSOP/PDIP Eval Board

The 8-Pin SOIC/MSOP/TSSOP/DIP Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's devices in any of the following 8-pin packages: SOIC, MSOP, DIP, TSSOP



## Products supported:

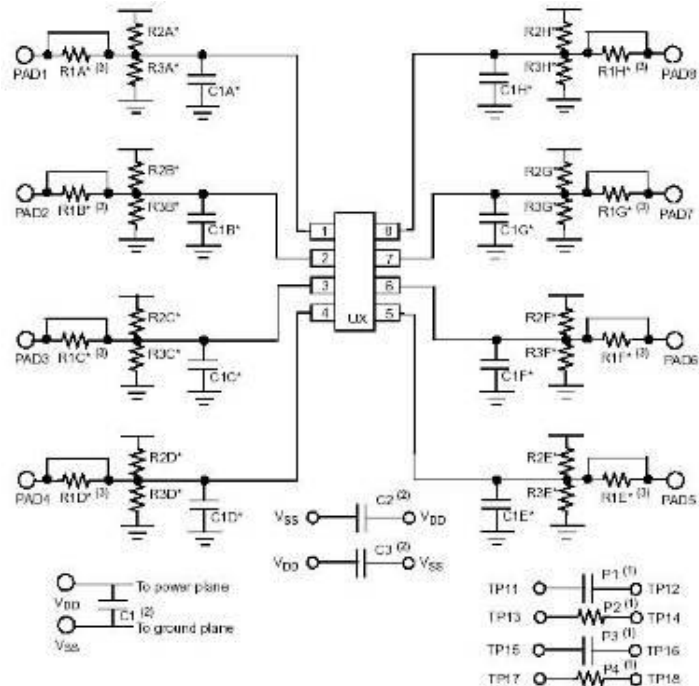
- 8-pin SOIC packages
- 8-pin MSOP packages
- 8-pin TSSOP packages
- 8-pin PDIP packages

\* Optional components, circuit-dependent.

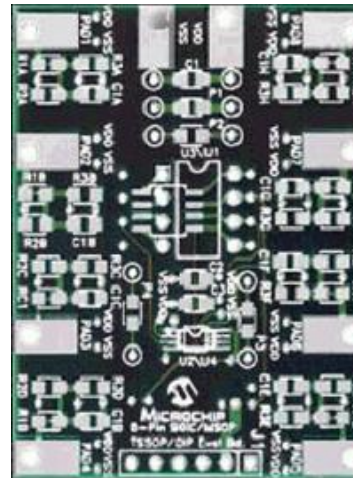
- Note 1: Can be any passive component (R, C, ...) that fits onto a 605 surface-mount footprint.  
 Note 2: Optional power/device filtering capacitors.  
 Note 3: When installing this component, ensure to cut the trace between the two pads of the device.

# 8-pin SOIC/MSOP/ TSSOP/PDIP Eval Board

The 8-Pin SOIC/MSOP/TSSOP/DIP Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's devices in any of the following 8-pin packages: SOIC, MSOP, DIP, TSSOP



Note 1: Can be any passive component (R, C, ...) that fits onto a 605 surface-mount footprint.  
 Note 2: Optional power/device filtering capacitors.  
 Note 3: When installing this component, ensure to cut the trace between the two pads of the device.

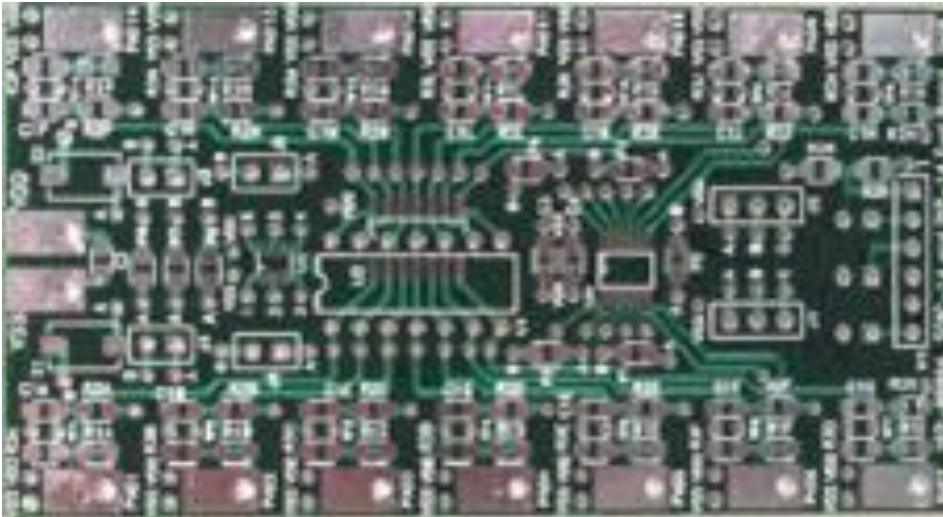


## Products supported:

- 8-pin SOIC packages
- 8-pin MSOP packages
- 8-pin TSSOP packages
- 8-pin PDIP packages

# 14-pin SOIC/TSSOP/PDIP Eval Board

The 14-Pin SOIC/TSSOP/DIP Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's devices in any of the following 14-pin packages: SOIC, DIP, TSSOP

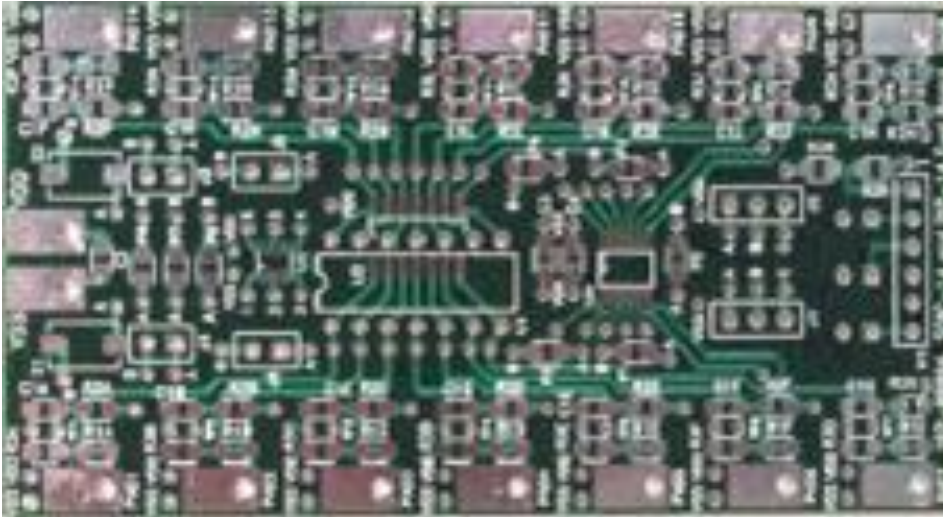


## Products supported:

- 14-pin SOIC packages
- 14-pin TSSOP packages
- 14-pin PDIP packages

# 14-pin SOIC/TSSOP/PDIP Eval Board

The 14-Pin SOIC/TSSOP/DIP Evaluation Board allows the system designer to quickly evaluate the operation of Microchip Technology's devices in any of the following 14-pin packages: SOIC, DIP, TSSOP



## Products supported:

- 14-pin SOIC packages
- 14-pin TSSOP packages
- 14-pin PDIP packages

ClockWorks Configurator is an easy-to-use online tool that allows users to create an orderable part number and get samples within few weeks.

Simply go to [www.microchip.com/clockworks](#) and start configuring your **oscillators and clock generators**.

## Features & benefits:

- User-friendly interface helps you choose the right device for your application
- Provides instant datasheets
- Dashboard supports sample and design tracking
- Performs search by part number, design ID or sample ID

## Products supported:

- ❑ Oscillators
- ❑ Clock Generators
- ❑ Buffers (coming soon)



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# TimeFlash 2 Field Programming Kit

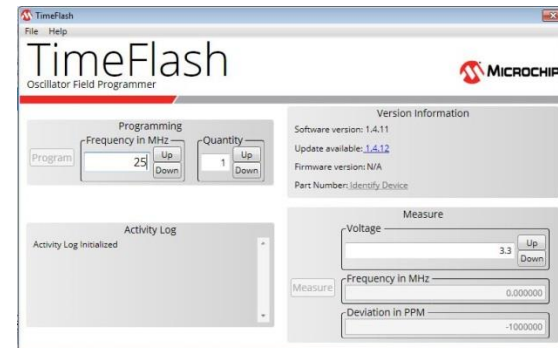
Online  
Datasheet

The TimeFlash programmer allows users to rapidly program Microchip's **field programmable MEMS oscillator** to a custom frequency in seconds, minimizing design time by enabling fast prototyping and testing. Our MEMS oscillators are available in industry standard packages that are drop-in replacements to standard crystal oscillators.

## Features and Benefits:

- Custom frequencies in seconds with immediate design verification
- Supports all Microchip MEMS oscillator package sizes
- Supports CMOS, LVPECL, LVDS, and HCSL output types
- Easy to use interface with auto software update
- Measure Current and stability for all oscillators in the market

**Products supported:**  
□ MEMS Oscillators



DEMO VIDEO

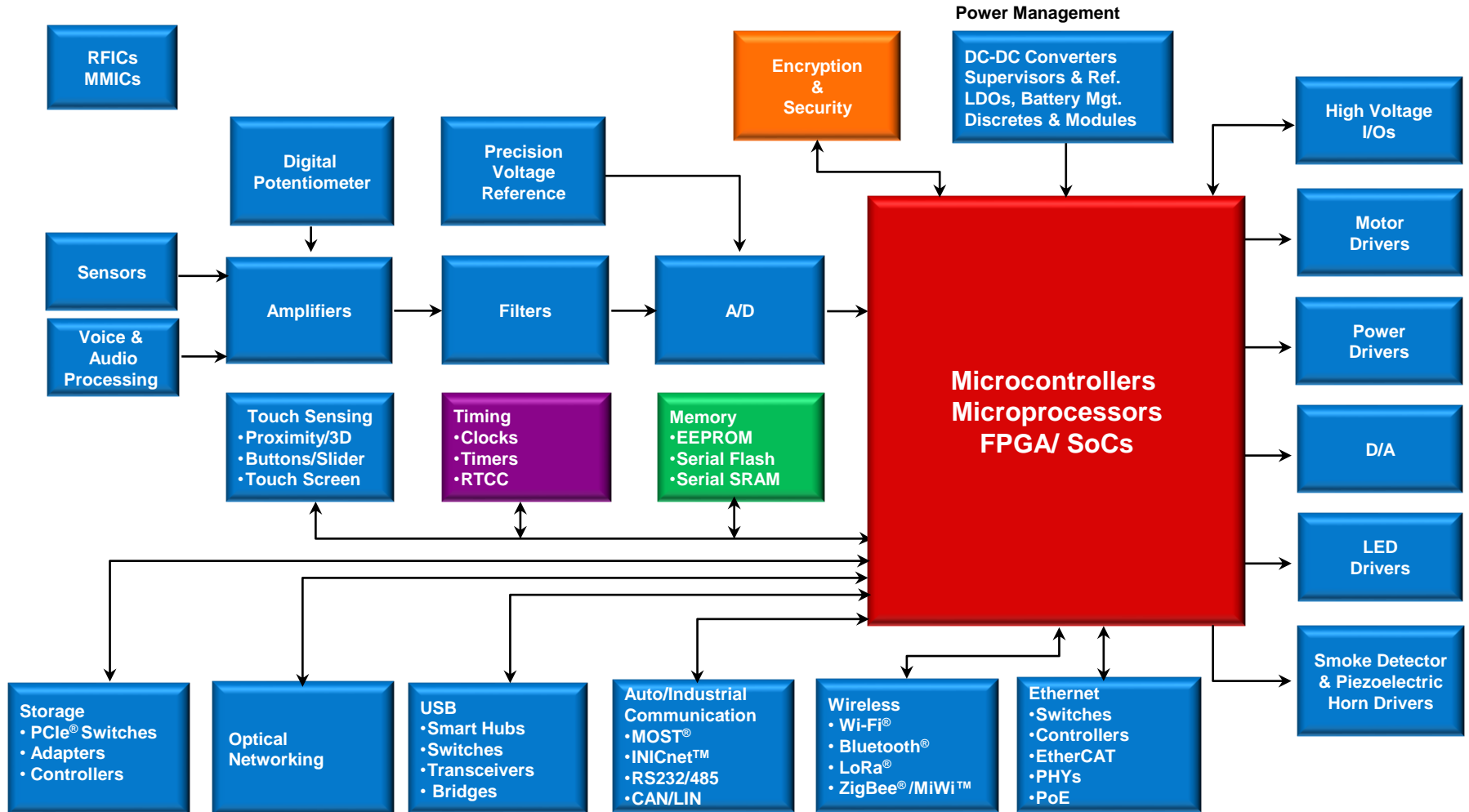
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# Analog & Interface Overview: Providing Complete Solutions

Product Tree

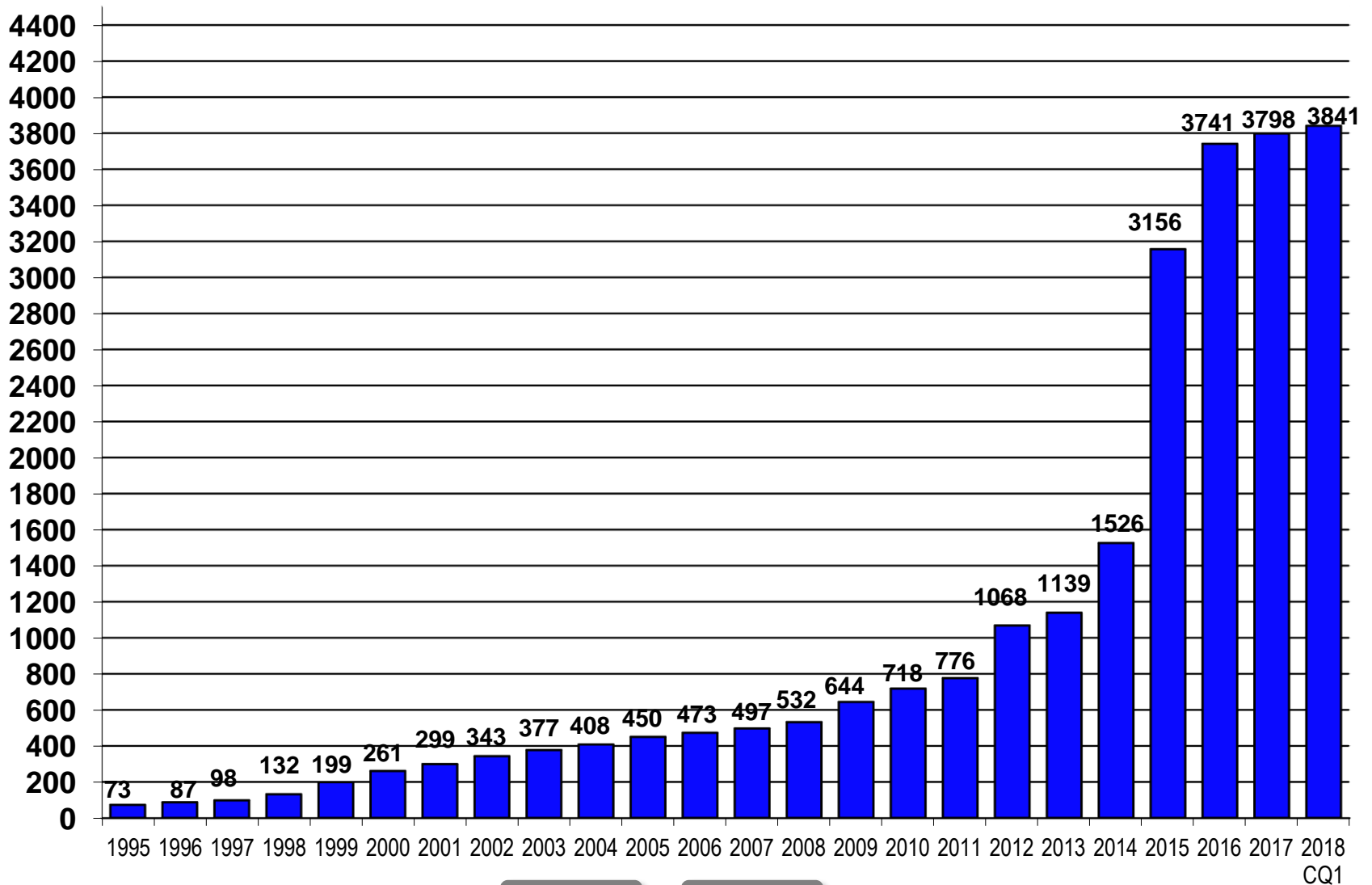


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# Analog & Interface: Product Portfolio Growth



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# Proprietary Enabling Technology

## Low-Power CMOS Process

Lower power than competing processes

## Understanding of Customer Needs

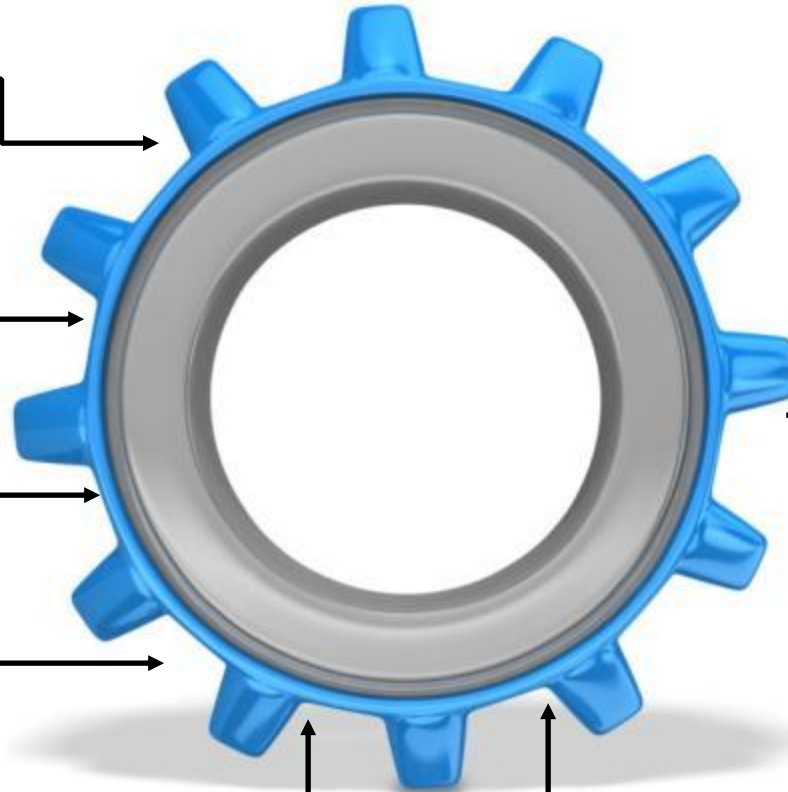
Only necessary features are included, unnecessary power-consuming features are excluded

## Simplified Designs

Proprietary designs reduce circuit complexity for more performance and less power

## Non-volatile Trim

Accuracy achieved through after-package trimming, not complex, power-consuming circuitry



**A  
Complete  
Analog  
Solution**

High-Voltage Capability

Expertise on Multiple  
Process Nodes

Advanced Lithographies

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# Focus on Applications

## Appliance

Beverage Machine

Robot Vacuum Cleaner

## Automotive

HVAC

In-Vehicle Network Communication

LED Control Module (Exterior Lighting)

LED Control Module (Interior Ambient)

Smart Actuators in Turbo Charger

USB Breakout Box

## Consumer

Power Tools (Professional, Household)

Set-Top/PVR Boxes

Weigh Scales

Wireless Handsets

2D Barcode Scanner

Industrial Control Panel

## Computing

Computing (Main board)

Ethernet Switch

Servers

## Home Alarm

Security Systems (Security Panel, Keypad, Sensors)

## Home – CO & Fire Detection

10 Yr Low Voltage

Addressable Smoke Detectors

CO Detector

CO Companion

Low Cost Smoke Detectors

## Lighting

LED lighting

## Medical Equipment

Blood Glucose Meter

Digital Thermometer

ECG/EKG System

Medical Ultrasound

## Motor Control/Drive

High Power

High Integration

## Power Supply

Power Supplies

Distributed Point-of-Load Power Architecture

Power Monitoring

Digital Power

## Temperature Sensing Solutions

Thermocouple, Digital & Analog Out, Fan Controllers

## Utility Metering

Energy Meter

Metering Concentrator

Signal Chain Generic Blk. Dia.

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# Microchip Analog Key Attributes

- **Flexibility to customers**
  - Using both internal and external fabs allows flexibility and safety for our customers
  - Our knowledge of NVM makes analog easier to manufacture and offers flexibility
- **Analog for digital systems**
  - Easy to use development tools
  - Standard digital serial interfaces
- **Design-in support**





# Microchip Analog Key Attributes

---

- **Low power/low voltage**
  - Op amps with lowest power for a given gain bandwidth: 450nA/1.4V/9kHz
  - 0.65V start-up voltage switching regulator
- **Robustness**
  - MOSFET drivers lead the industry in latch-up immunity/stability



# Microchip Analog Key Attributes

---

## □ Integration

- Motor drivers with integrated LIN transceiver, comparator, voltage regulators, op amps
- DEPA integrates MCU, analog controller, drivers

## □ Innovation

- Zero-Drift and mCal calibration technology
- Sinusoidal motor drivers
- Proprietary algorithms for low power high accuracy ADC and high-speed ADC families
- DACs with non-volatile memory

# Microchip Analog Key Attributes

---

## □ **Space savings**

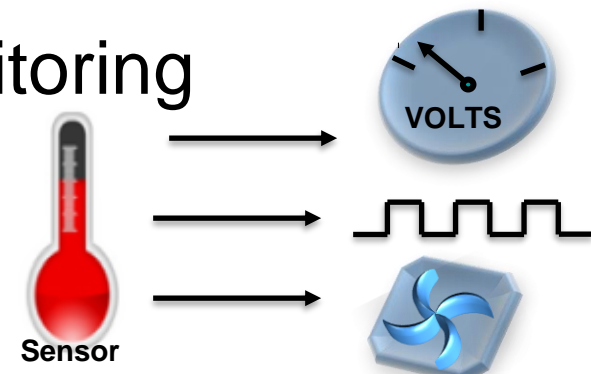
- ADCs, op amps, comparators, supervisors and LDOs in SC70
- ADCs, temperature sensors in SOT-23
- Battery chargers, LDOs in 2x2 DFN

## □ **Accuracy**

- Advanced architectures to optimize accuracy and repeatability



- Offer a complete portfolio of high-accuracy, space-saving, low-power products
  - Offer great cost-to-performance ratio
  - Low voltage operation and low current consumption
  - DC fan speed control/DC fan fault detection
  - Over-, under-temperature monitoring
  - Multi-point temp measurement
  - Thermal calibration



- **Microchip's winning attributes**
  - High-voltage product offering
  - Built-in intelligence
  - Optimized, high-efficiency power conversion
  - Low power, low startup voltage regulators
  - Small footprint
  - Stability & robustness

**Battery  
Charger**

**Switching  
Regulator**

**Controller**

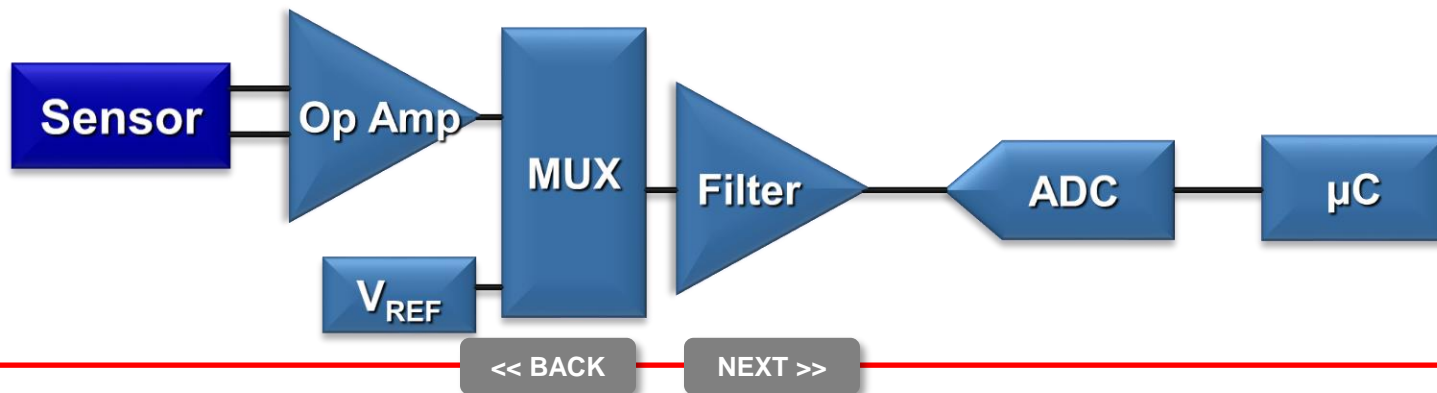
**Voltage  
Regulator**

**Charge  
Pump**

**System  
Supervisor**

- **Provide complete system solutions for sensor signal conditioning & data acquisition applications, while focusing on:**
  - Integration: reduced component count
  - Low power: low operating current and voltage
  - Precision: high resolution, low offset voltage
  - Low system cost: affordable pricing
  - Small footprints

- **Microchip's winning attributes**
  - Lower cost to performance ratio
  - Lowest supply current op amps for a given gain-bandwidth product
  - High accuracy delta-sigma ADCs and high-speed pipelined ADCs
  - Broad digital potentiometer portfolio



- **Enabling flexible connectivity options within automotive, industrial, consumer and many other industries**
  - CAN, CAN FD, LIN transceivers and system basis chips
  - Ethernet, RF, USB bridge devices, GPIO expanders
- **Enable the implementation of wireless/ wire-line communication via inexpensive & easy-to-use products**

- **Addresses a wide range of applications**
  - Wi-Fi<sup>®</sup> operating at 2.4 GHz and 5 GHz, including the new 11ac high data rate standard
  - Bluetooth<sup>®</sup> and ZigBee<sup>®</sup> at 2.4 GHz
  - 3G/4G Femtocells at 2.1-2.3 GHz





# Wi-Fi<sup>®</sup> Solutions

---

- **High power for longer distance**
- **Lower DC power consumption**
- **Smaller footprint, thin package, and low external component count**
- **Highly integrated Front-End Modules (FEM)**
- **Design-in support**

## □ **Microchip's winning attributes**

- Ionization smoke detectors
- Photoelectric smoke detectors
- 3V operation, Li Ion or 2 AA battery operation
- Electronic calibration
- Horn drivers meet loudness requirements
- Piezo horn drivers
  - Piezo alarm system, industrial and consumer
  - CO detectors, MCU smoke detectors
  - E-bike horns





- **Portfolio offering includes**

- PIC<sup>®</sup> MCU and dsPIC<sup>®</sup> DSC companion 3-phase gate drivers
- Dual H-bridge motor drivers
- Highly Integrated 3-phase motor drivers



- **Total solution provider with PIC<sup>®</sup> MCU and dsPIC<sup>®</sup> DSC**

- Lowest supply current Vs. major competitors
- Applications in Industrial & Security, Automotive & Medical, Appliances

## Application Centers of Excellence (ACE) for key applications



ACE Center for Energy Measurement ([Romania](#))



ACE Center for Interface Solutions ([Chandler, AZ, USA](#))



ACE Center for Motor Solutions ([Endwell, NY, USA](#))



ACE Center for Power Supplies ([Endwell, NY, USA](#))



ACE Center for Smoke Detectors ([Norristown, PA, USA](#))



# Worldwide Technical Support Centers



The only non-commissioned sales team in the semiconductor industry

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# Global Development Centers





# Worldwide Manufacturing



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## Broad Portfolio

- Over 3,700 products in > 30 product lines
- Strong **low-power** portfolio
- High-voltage products
- Industry-standard wired and wireless protocols
- Smart integration
- Small, space-saving packages

## Technology

- Proprietary low-power IP
- Use of **NVM trim**
- Expertise on multiple process nodes
- Deep sub-micron
- High-voltage capability
- Internal and external fabs
- Truly **world-class manufacturing** excellence

## Support

- Extensive demo/eval boards
- Reference designs
- Online design support centers
- On-location technical training
- Webinars
- Instructional videos
- Worldwide technical support

# End Equipment

**Appliance**

- Beverage Machine
- Robot Vacuums
- Die Cutting Machine
- HMI Diagnostic A/C

**Automotive**

- HVAC
- Infotainment
- In-Vehicle Network Comm
- LED Control Module
- Electrical Vehicle
- Smart Actuators in Turbo
- USB Breakout Box

**Computing**

- Compact Keyboard
- Computing (Main board)
- Ethernet Switch
- Servers

**Consumer**

- Fitness Equipment
- Power Tools (Professional, Household)
- Set-Top/PVR Boxes
- Weigh Scale
- Wireless Handsets
- 2D Barcode Scanner
- Industrial Control Panel

**Home Detection**

- 10 Yr Low Voltage Smoke Detector
- Low Cost Smoke Detectors
- Addressable Smoke Detector
- CO Detector
- CO Companion
- Gas Detector

**Home Security**

- Security Panel, Keypad, Sensors
- Smart Home Lock

**Lighting**

- LED lighting

**Medical Equipment**

- Blood Glucose Meter
- Digital Thermometer
- ECG/EKG System
- Medical Ultrasound

**Motor Control/Drive**

- High Power
- High Integration

**Utility Metering**

- Energy Meter
- Metering Concentrator

**Power Supply**

- Power Supplies
- Distributed Point-of-Load Power Architecture
- Power Monitoring
- Digital Power

**Temperature Sensing Solutions**

- Thermocouple, Digital & Analog Out, Fan Controllers

**UAV**

- UAV

**Aerospace & Defense**

- Space
- Commercial Aviation
- Military & Defense



**MICROCHIP**

# **Electrical Vehicle Supply Equipment**



# Electrical Vehicle

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**Level 1 & 2 Residential  
EVSE**

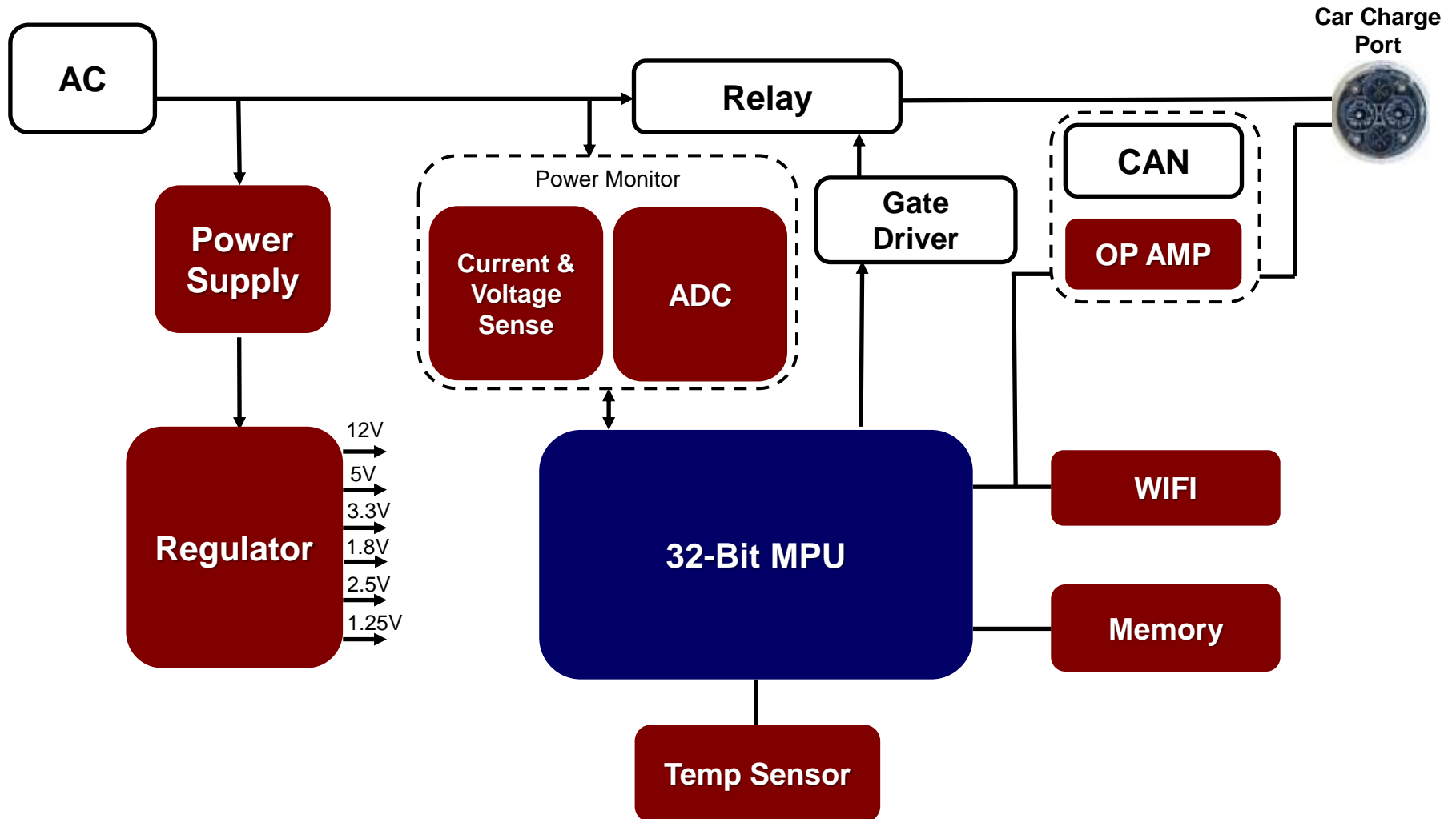
**Level 3 Fast Charging  
EVSE**

**On Board Charger**

**DC/DC Converter**

**Traction Inverter / Motor  
Power Control Unit**

# Level 1 & 2 Residential EVSE



# 32-Bit MPU

Popular Products	Description	Product Web Page
ATSAMA5D2	The ATSAMA5D2 series is a high-performance, ultra-low-power ARM Cortex-A5 processor-based MPU.	<a href="#">ATSAMA5D26</a>

# Temperature Sensor

Popular Products	Description	Product Web Page
MCP9808 Digital temperature sensor	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^\circ\text{C}$ (max.) accuracy	<a href="#">MCP9808</a>
MCP9700 Linear Active Thermistor™ ICs	The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.	<a href="#">MCP9700</a>

# Memory

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
SST26VF064B	The SST26VF064B Serial Quad I/O (SQI) flash device utilizes a 4-bit multiplexed I/O serial interface to boost performance while maintaining the compact form of standard serial flash devices	<a href="#">SST26VF064B</a>

Popular Products	Description	Product Web Page
ATWILC1000	The ATWILC1000 is an IEEE 802.11 b/g/n IoT link controller module. Supports Single stream 1x1 802.11n mode providing tested throughput of up to 46Mbps UDP & 28Mbps TCP/IP.	<a href="#">ATWILC1000</a>
LX5584A	The LX5584A is a complete, integrated 2.4GHz front-end module applications. Includes 2.4GHz power amplifier with power detector, low-noise amplifier with bypass and SP3T antenna switch. Reduces the system footprint, bill of materials, and manufacturing cost. It is available in 16-pin 3x3x0.9mm QFN package.	<a href="#">LX5584A</a>
LX5589B	The LX5589A is a complete, integrated 2.4GHz front-end module applications. Includes 5GHz power amplifier with power detector, low-noise amplifier with bypass and SPDT antenna switch. Reduces the system footprint, bill of materials, and manufacturing cost. It is available in 16-pin 3x3x0.9mm QFN package.	<a href="#">LX5589B</a>

# OP AMP

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP6002	The MCP6002 is a dual general-purpose op amp offering rail-to-rail input and output over the 1.8V to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 Microamperes. Available in 8-lead PDIP, SOIC and MSOP packages.	<a href="#">MCP6002</a>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP3424	The MCP3424 is a four-channel low-noise, high accuracy delta-sigma A/D converter with differential inputs and up to 18-Bits of resolution. Uses two-wire I2C compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">MCP3424</a>



# Current & Voltage Sense

Popular Products	Description	Product Web Page
ATM90E26	The ATM90E26 is a high-performance energy metering device for single-phase two-wire, single-phase three-wire or antitampering active and reactive energy meters. With measurement function is can be used in power instruments which need to measure voltage, current, etc.	<a href="#">ATM90E26</a>
MCP39F511	The MCP39F511 is a highly integrated, single-phase power-monitoring IC designed for real-time measurement of input power for AC/DC power supplies, providing power and energy values.	<a href="#">MCP39F511</a>

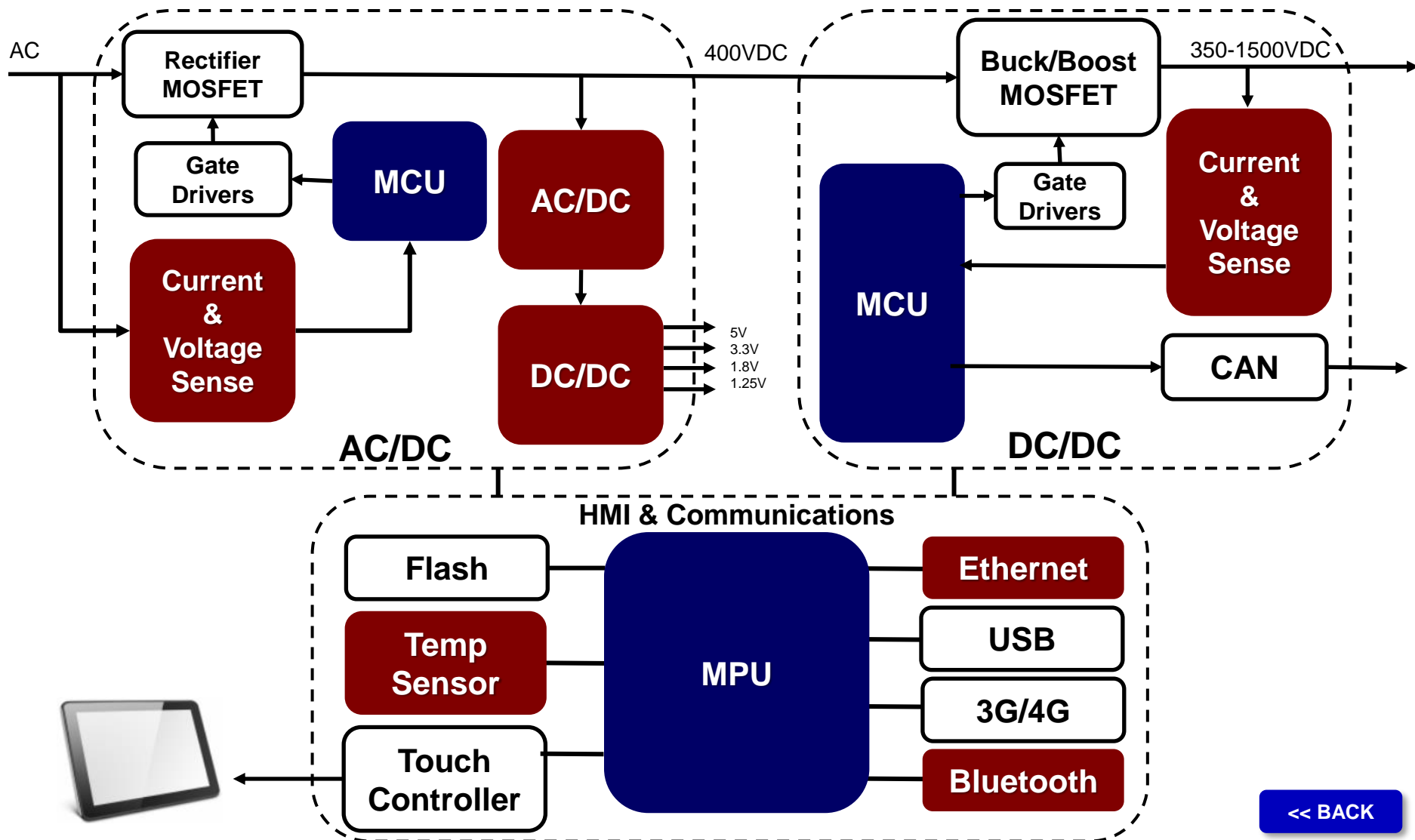
# Power Supply

Popular Products	Description	Product Web Page
LX7309	The LX7309 is a versatile current-mode DC/DC controller for isolated and non-isolated topologies, featuring an internal differential current-sense amplifier for Kelvin connectivity and low 200mV threshold for low sense resistances and high efficiency.	<a href="#">LX7309</a>
HV9120	The HV9120 can self-start due to the unique input circuit from a high voltage input, and subsequently take the power to operate from one of the outputs of the converter it is controlling, allowing very efficient operation while maintaining input-to-output galvanic isolation limited in voltage only by the insulation system of the associated magnetic assembly.	<a href="#">HV9120</a>

# Regulator

Popular Products	Description	Product Web Page
MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>
MIC28514	The MIC28514 is a wide input range (4.5V-75V), integrated FET, 5A, switching regulator.	<a href="#">MIC28514</a>
MIC24046	The MIC24046 is a pin-programmable, high-efficiency, wide input range, 5A, Synchronous step-down regulator.	<a href="#">MIC24046</a>
MIC2800	The MIC2800 is a high-performance power management IC, giving three output voltages with maximum efficiency.	<a href="#">MIC2800</a>

# Level 3 Fast Charging EVSE



# 32-Bit MPU

Popular Products	Description	Product Web Page
ATSAMA5D2	The ATSAMA5D2 series is a high-performance, ultra-low-power ARM Cortex-A5 processor-based MPU.	<a href="#">ATSAMA5D26</a>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
dsPIC33	Microchip's dsPIC33 general purpose DSC family features the highest speed 70 MIPS core with excellent performance and code density. ADC performance, CAN communication, CTMU, Op Amps and Peripheral Trigger Generator (PTG) for high-end general-purpose applications.	<a href="#">dsPIC33</a>

# Temperature Sensor

Popular Products	Description	Product Web Page
MCP9808	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^\circ\text{C}$ (max.) accuracy	<a href="#">MCP9808</a>
MCP9700	The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.	<a href="#">MCP9700</a>

# Current & Voltage Sense

Popular Products	Description	Product Web Page
ATM90E26	The ATM90E26 is a high-performance energy metering device for single-phase two-wire, single-phase three-wire or antitampering active and reactive energy meters. With measurement function is can be used in power instruments which need to measure voltage, current, etc.	<a href="#">ATM90E26</a>



<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
LX7309	The LX7309 is a versatile current-mode DC/DC controller for isolated and non-isolated topologies, featuring an internal differential current-sense amplifier for Kelvin connectivity and low 200mV threshold for low sense resistances and high efficiency.	<a href="#">LX7309</a>
HV9120	The HV9120 can self-start due to the unique input circuit from a high voltage input, and subsequently take the power to operate from one of the outputs of the converter it is controlling, allowing very efficient operation while maintaining input-to-output galvanic isolation limited in voltage only by the insulation system of the associated magnetic assembly.	<a href="#">HV9120</a>

# DC/DC

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>
MIC2800	The MIC2800 is a high-performance power management IC, giving three output voltages with maximum efficiency.	<a href="#">MIC2800</a>

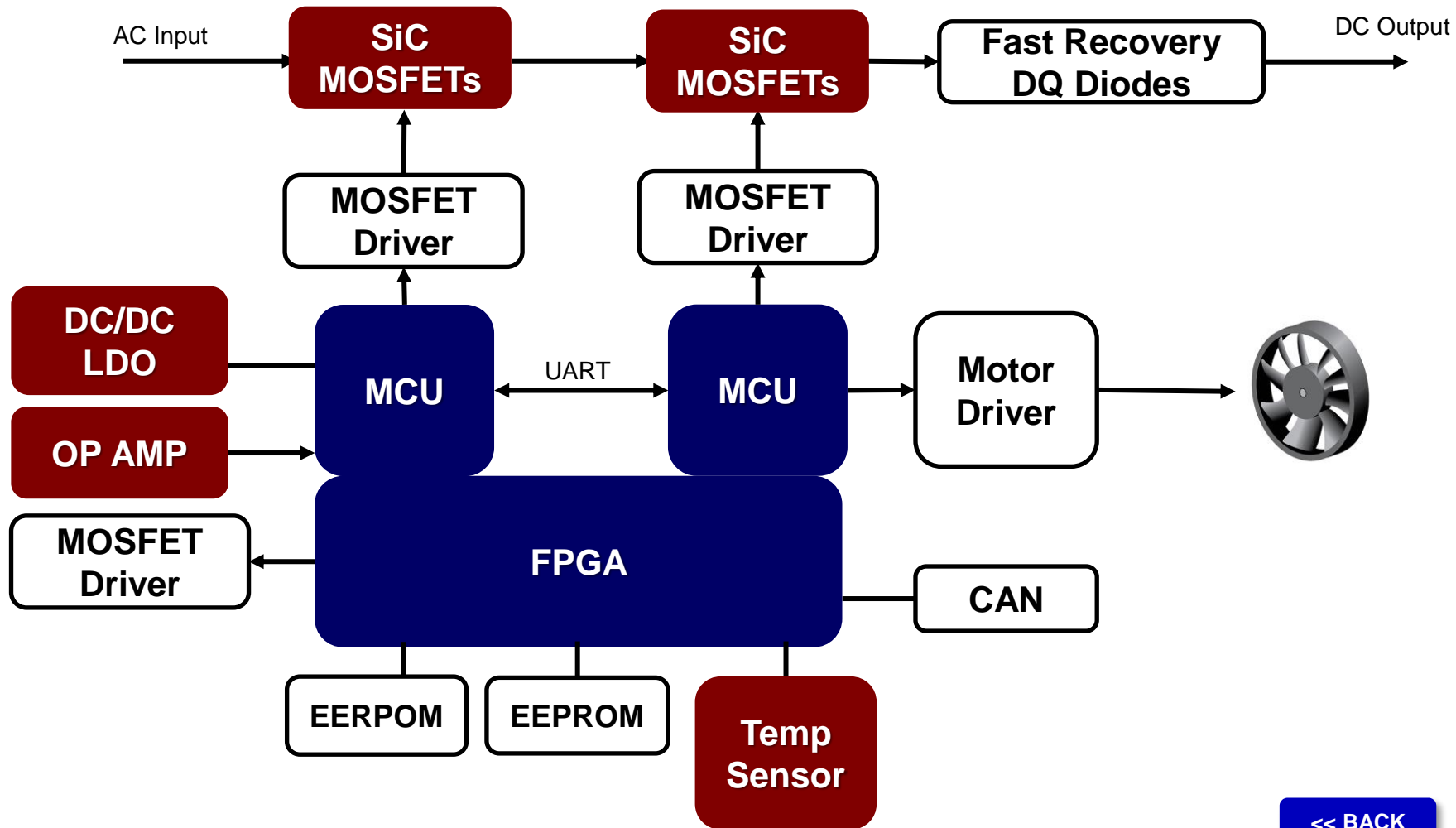
# Ethernet

Popular Products	Description	Product Web Page
KSZ8051	The KSZ8051 is a standard qualified single-supply 10Base-T/100Base-TX Ethernet physical-layer transceiver for automotive applications.	<a href="#">KSZ8051</a>

# Bluetooth

Popular Products	Description	Product Web Page
ATBTLC1000	The ATBTLC1000 is an ultr-low power Bluetooth Low Energy System on a Chip with integrated ARM Cortex-M0 MCU, Transceiver, Modem, MAC, PA, TR Switch, and power management unit (PMU). Can be used as a Bluetooth Low Energy link controller or data pump with external host MCU.	<a href="#">ATBTLC1000</a>

# On Board Charger



<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
dsPIC33	Microchip's dsPIC33 general purpose DSC family features the highest speed 70 MIPS core with excellent performance and code density. ADC performance, CAN communication, CTMU, Op Amps and Peripheral Trigger Generator (PTG) for high-end general-purpose applications.	<a href="#">dsPIC33</a>



# Temperature Sensor

Popular Products	Description	Product Web Page
<p>MCP9808 Digital temperature sensor</p>	<p>The MCP9808 converts temperatures between -20°C and +100°C to a digital word with <math>\pm 0.5^\circ\text{C}</math> (max.) accuracy</p>	<p><a href="#">Click here</a></p>
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">Click here</a></p>

# OP AMP

Popular Products	Description	Product Web Page
MCP6002	The MCP6002 is a dual general-purpose op amp offering rail-to-rail input and output over the 1.8V to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 Microamperes. Available in 8-lead PDIP, SOIC and MSOP packages.	<a href="#">MCP6002</a>



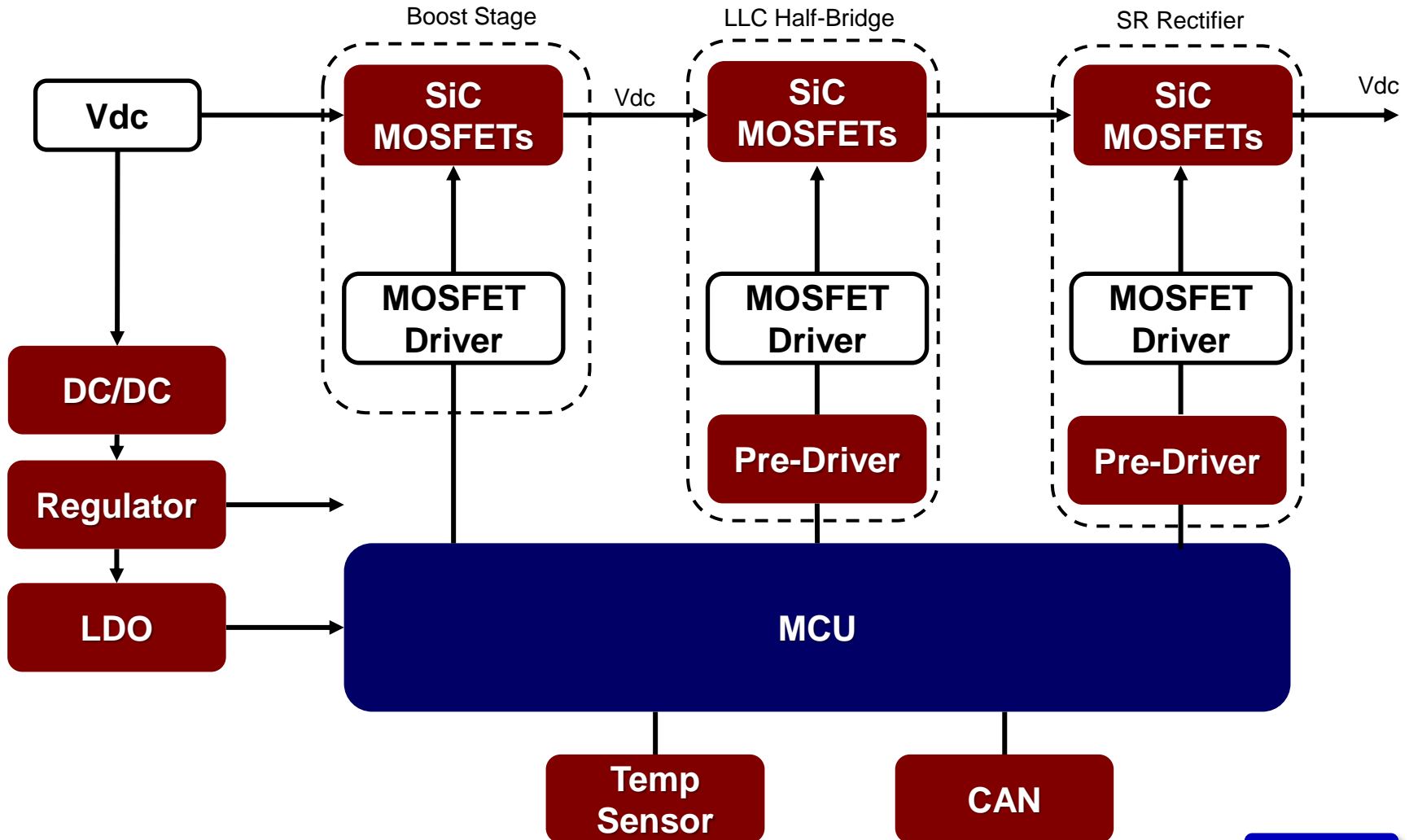
# DC/DC LDO

Popular Products	Description	Product Web Page
MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>
MIC2800	The MIC2800 is a high-performance power management IC, giving three output voltages with maximum efficiency.	<a href="#">MIC2800</a>
LX7309	The LX7309 is a versatile current-mode DC/DC controller for isolated and non-isolated topologies, featuring an internal differential current-sense amplifier for Kelvin connectivity and low 200mV threshold for low sense resistances and high efficiency.	<a href="#">LX7309</a>

# SiC MOSFETs

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MSC0/1/2/SiC Families	Silicon Carbide (SiC) MOSFETs offer superior dynamic and thermal performance over conventional Silicon (Si) power MOSFETs.	<a href="#">SiC MOSFET Family</a>

# DC/DC Converter



<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
dsPIC33	Microchip's dsPIC33 general purpose DSC family features the highest speed 70 MIPS core with excellent performance and code density. ADC performance, CAN communication, CTMU, Op Amps and Peripheral Trigger Generator (PTG) for high-end general-purpose applications.	<a href="#">dsPIC33</a>



# Temperature Sensor

Popular Products	Description	Product Web Page
<p>MCP9808 Digital temperature sensor</p>	<p>The MCP9808 converts temperatures between -20°C and +100°C to a digital word with <math>\pm 0.5^\circ\text{C}</math> (max.) accuracy</p>	<p><a href="#">Click here</a></p>
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">Click here</a></p>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
LX7309	The LX7309 is a versatile current-mode DC/DC controller for isolated and non-isolated topologies, featuring an internal differential current-sense amplifier for Kelvin connectivity and low 200mV threshold for low sense resistances and high efficiency.	<a href="#">LX7309</a>

# Regulator

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP1755	The MCP1755 is a 16-volt, high PSRR voltage regulator with short circuit current foldback. Provides up to 300mA of current and operating voltage range from 3.6V to 16V continuous, and 18V absolute maximum.	<a href="#">MCP1755</a>



<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP2562	The MCP2562 is second generation high-speed CAN transceiver. Reaches high-speed (1 Mbps), low quiescent current, electromagnetic compatibility (EMC) and electrostatic discharge(ESD).	<a href="#">MCP2562</a>

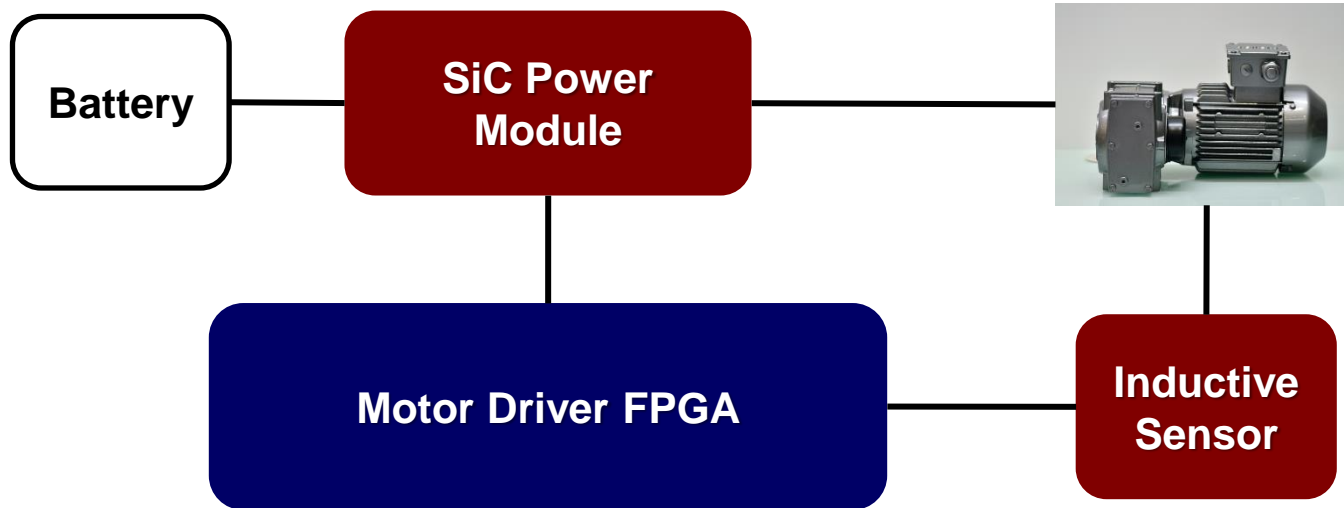
# Pre-Driver

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
TC4427A	The TC4427A is a 1.5A Dual non-inverting, high-speed MOSFET Driver, with wide operating range of 4.5V to 18V. Provides impedance for both ON and OFF states to ensure the intended state will not be affected by large transients.	<a href="#">TC4427A</a>

# SiC MOSFETs

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MSC0/1/2/SiC Families	Silicon Carbide (SiC) MOSFETs offer superior dynamic and thermal performance over conventional Silicon (Si) power MOSFETs.	<a href="#">SiC MOSFET Family</a>

# Traction Inverter / Motor Power Control Unit





# SiC Power Module

Popular Products	Description	Product Web Page
SiC Power Module Family	Silicon Carbide (SiC) MOSFETs offer superior dynamic and thermal performance over conventional Silicon (Si) power diodes. The family includes: Boost Chopper, Full Bridge, Phase Leg, Three Level Inverter, and Triple Phase Leg.	<a href="#">SiC Power Module</a>

# Inductive Sensor

<b>Suggested Products</b>	<b>Description</b>	<b>Product Web Page</b>
LX3301A	Inductive Position Sensor IC with Analog and PWM outputs. The LX3301A is an Automotive Grade 1, 125°C device that features an analog front-end with signal processing and control for six calibration segments to shape the output response.	<a href="#">LX3301A</a>
LX3302A	Inductive Position Sensor IC with Analog, PWM, SENT, PSI5, and Sine/Cosine outputs. The LX3302A Automotive Grade 0, 150°C device features eight calibration segments for simple sensor accuracy improvements along with an options for Sine/cosine outputs, and both power line and GPIO programmability options for embedded applications	<a href="#">LX3302A</a>



**MICROCHIP**

**Microchip Analog Products  
for  
Aerospace and Defense**

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# Military & Defense

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**Military  
Communications**

**Modern Soldier  
Communication**

**Radar Electronic  
Warfare**

**Radar- EW RF Front  
End**

**Military Network  
Attached Storage**

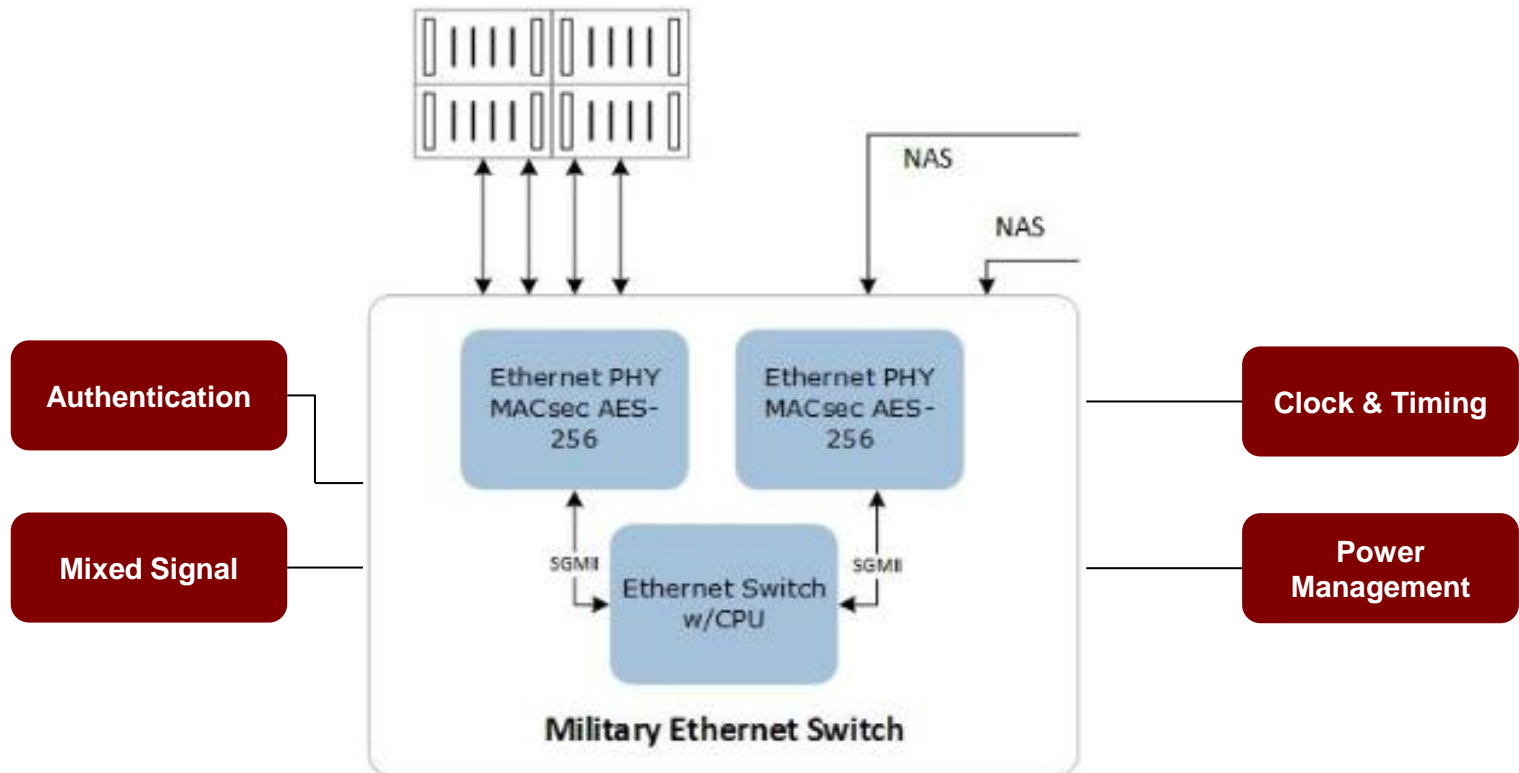
**Unmanned Aerial  
Vehicle**

**Military Ethernet  
Switch**

**High Performance  
Embedded Computing**

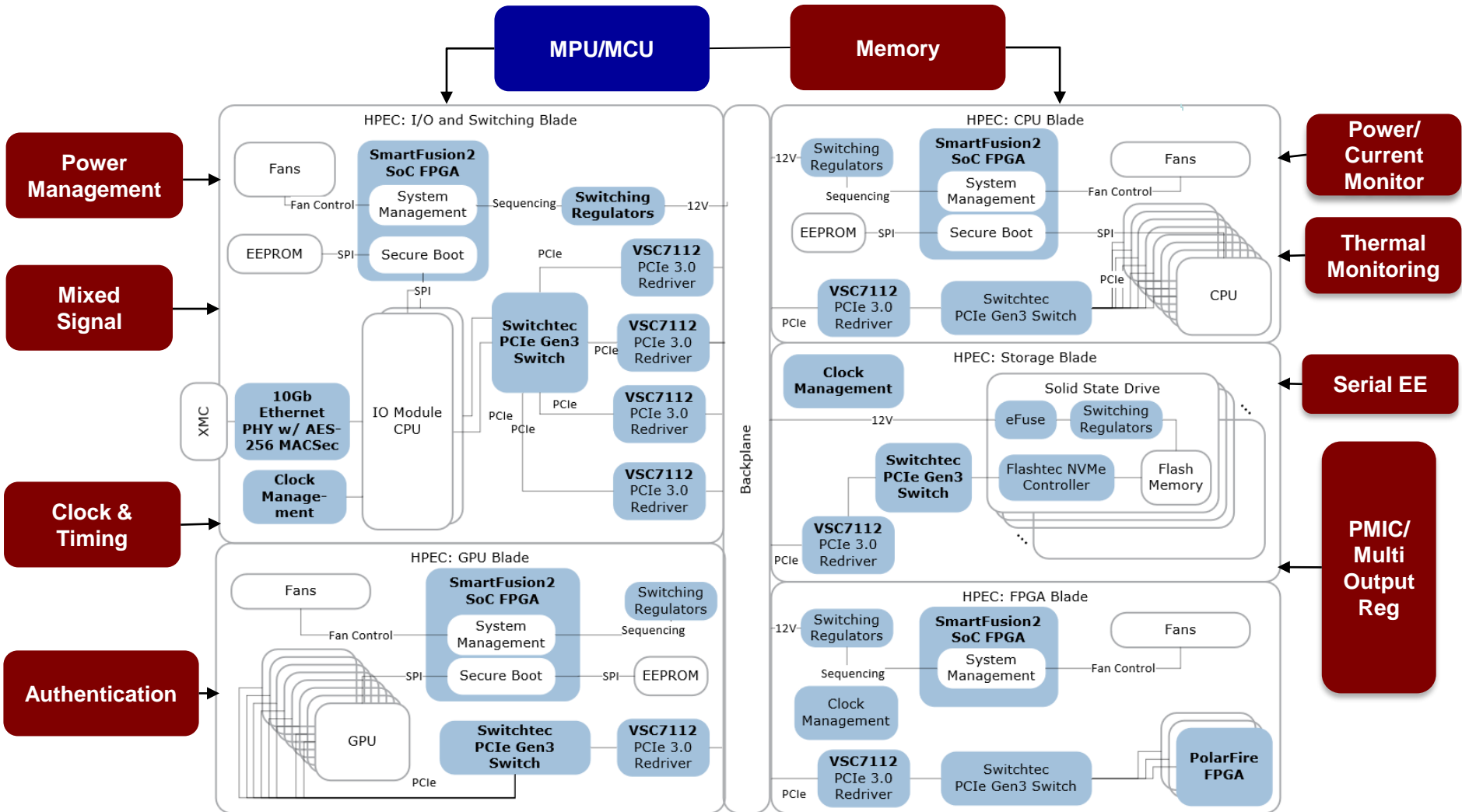


# Military Ethernet Switch

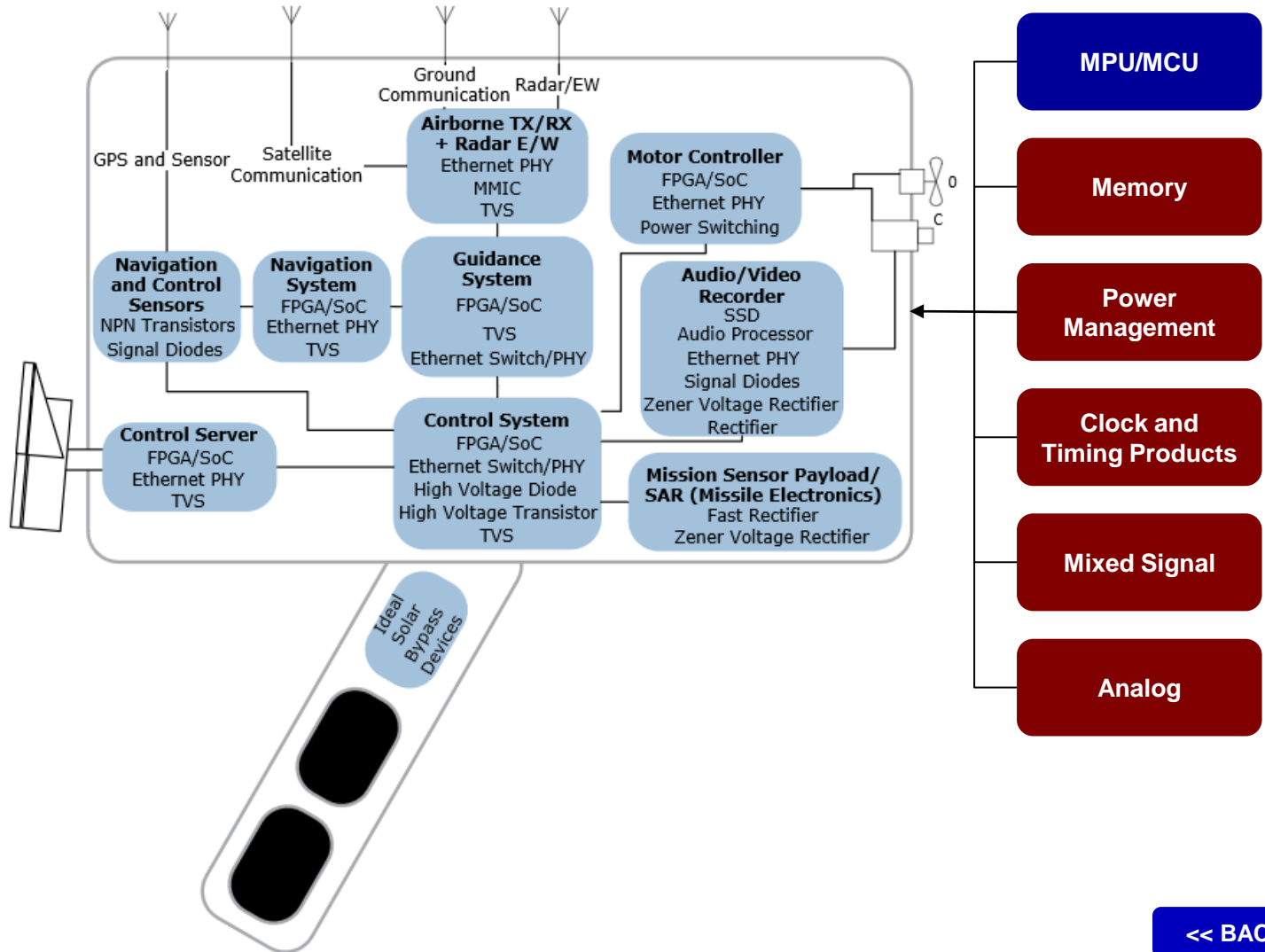




# High Performance Embedded Computing

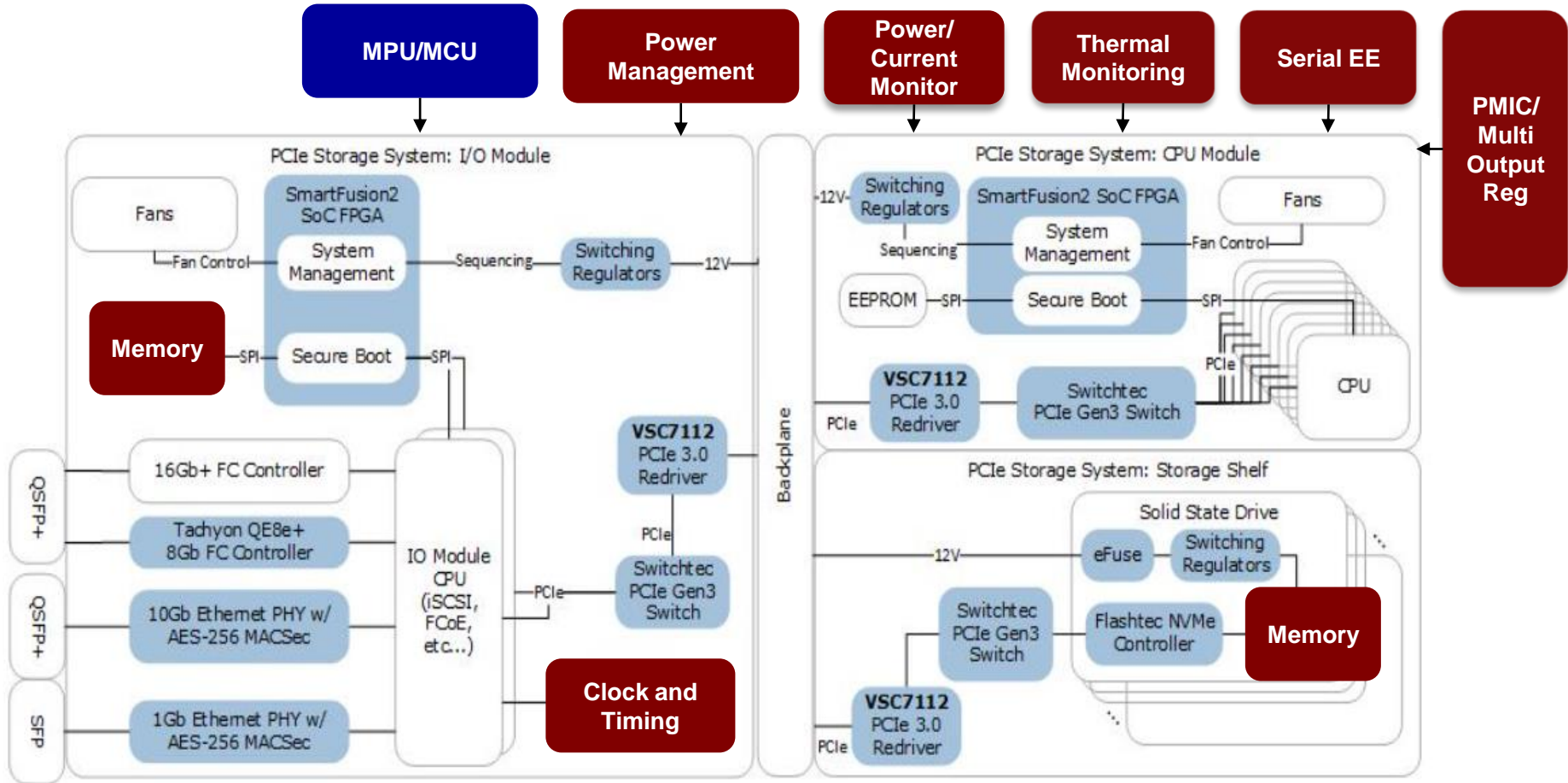


# Unmanned Ariel Vehicle

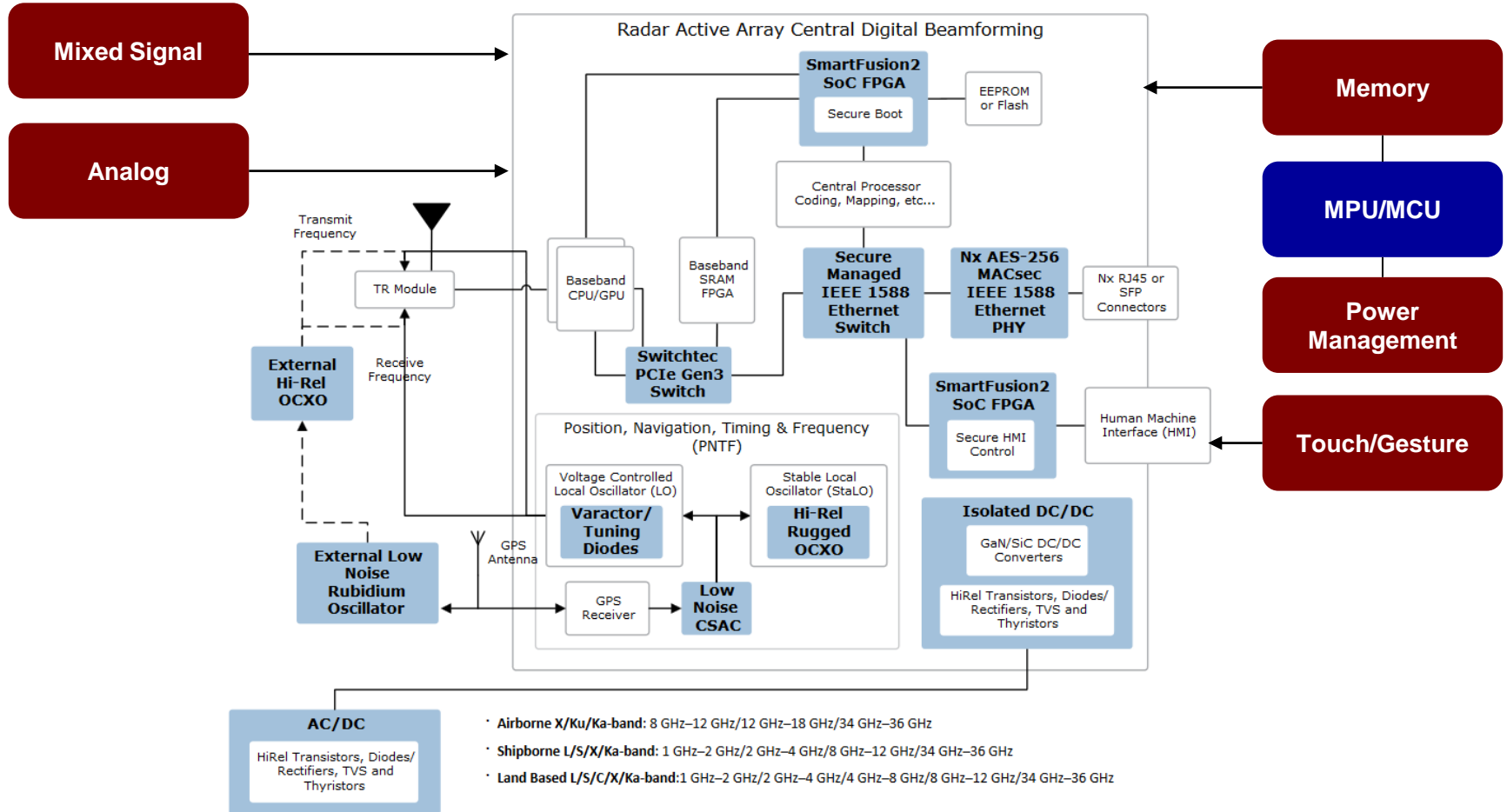




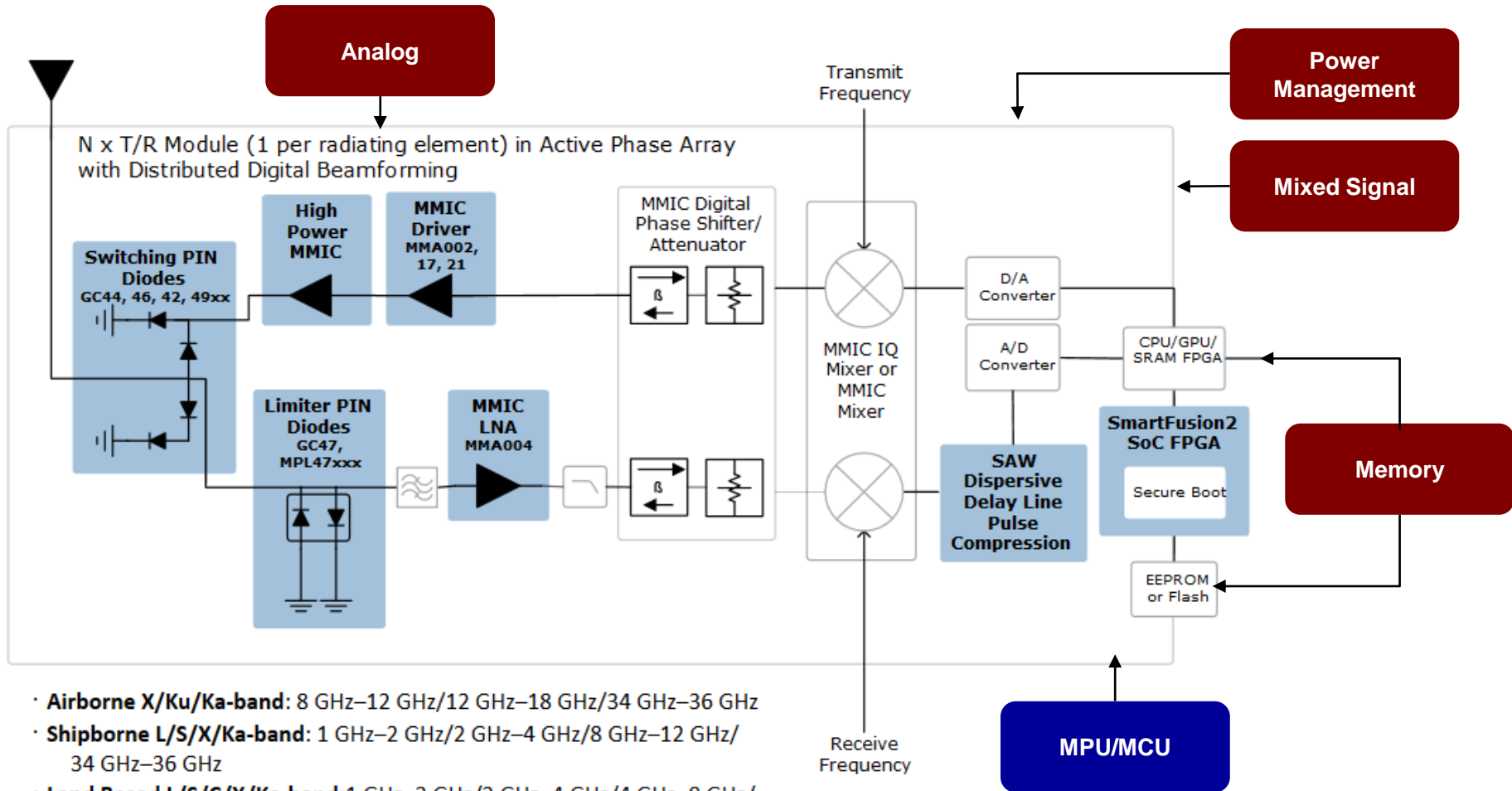
# Military Network Attached Storage



# Radar-EW RF Front End

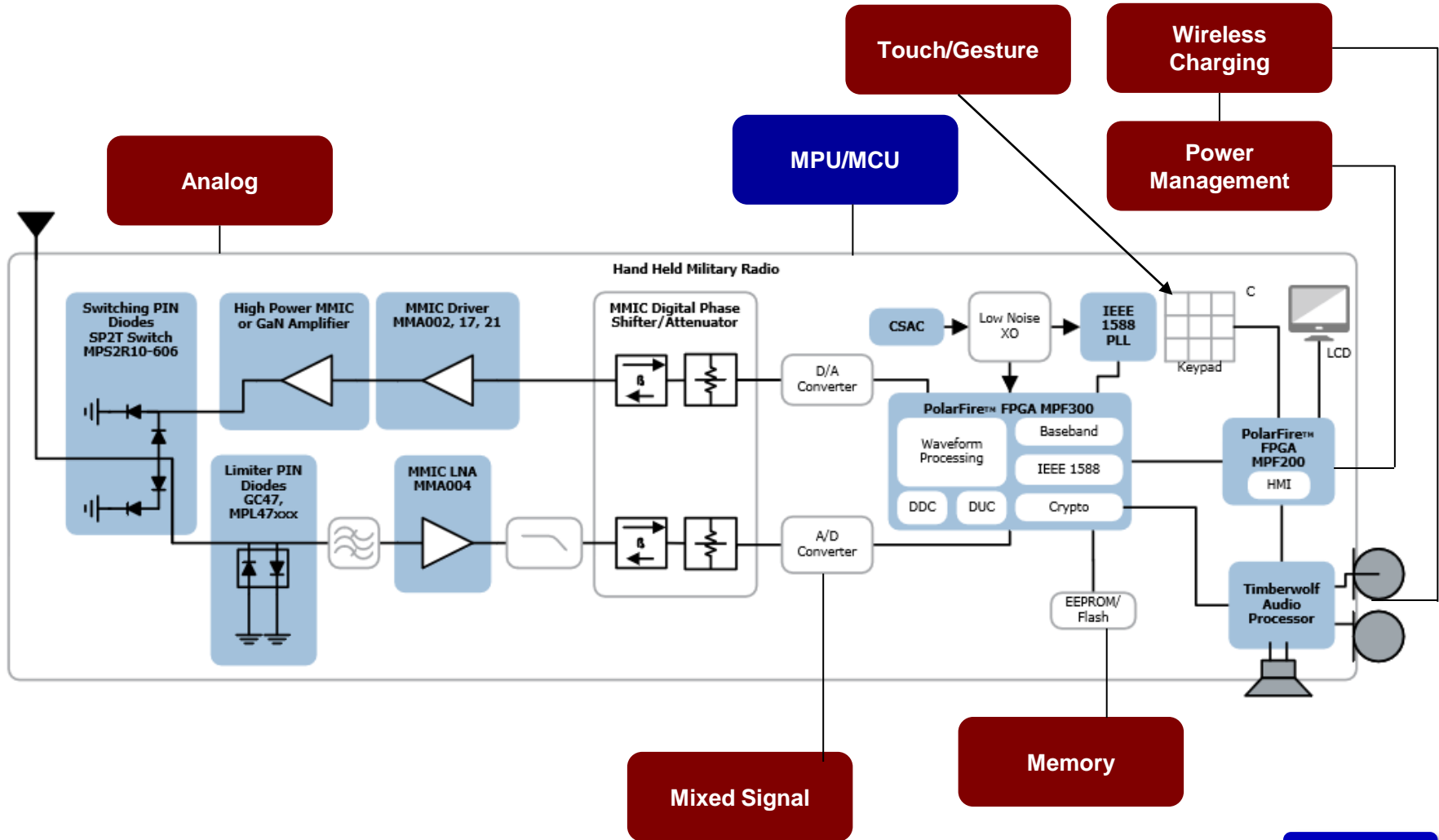


# Radar Electronic Warfare

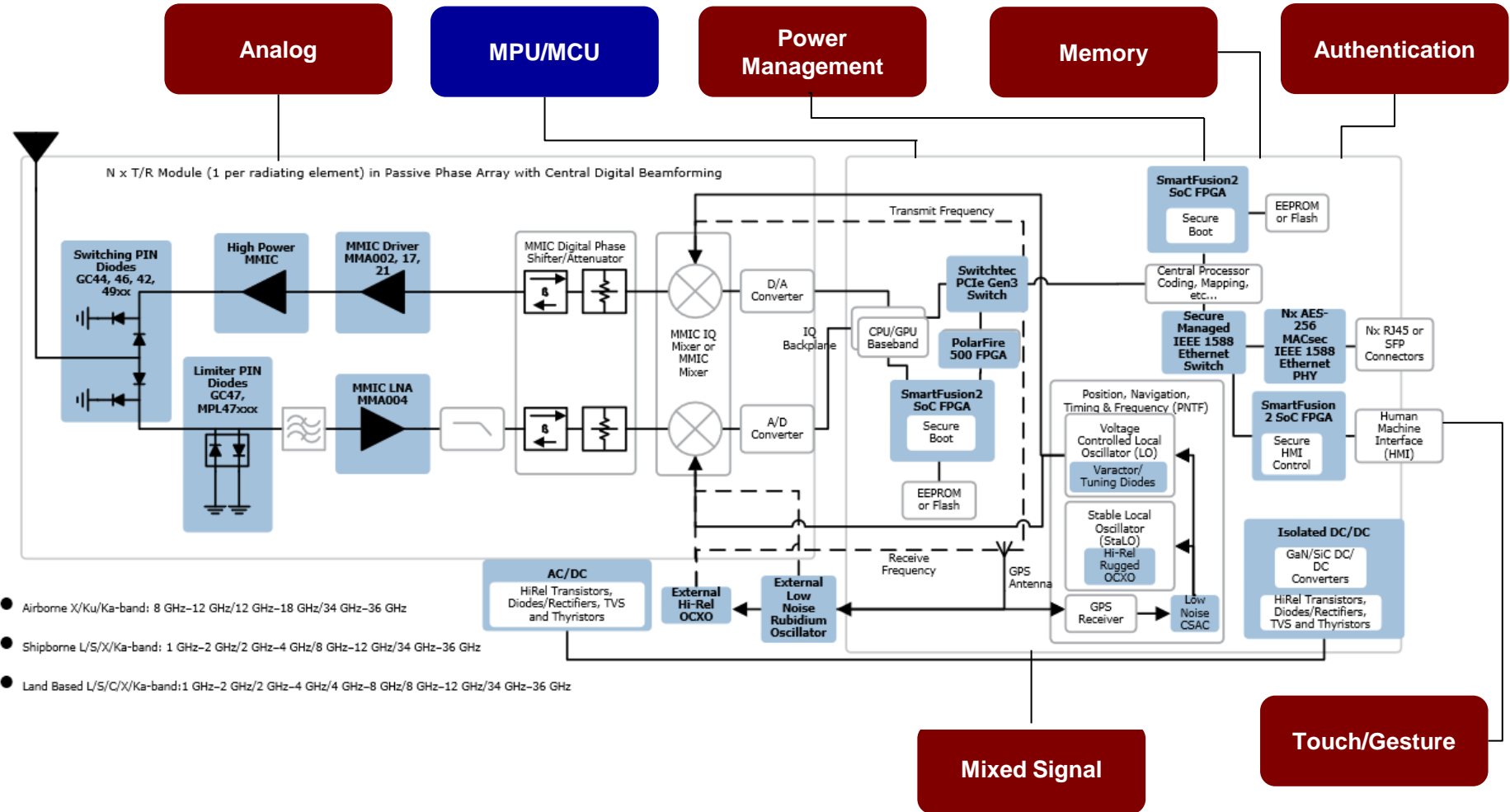


- **Airborne X/Ku/Ka-band:** 8 GHz–12 GHz/12 GHz–18 GHz/34 GHz–36 GHz
- **Shipborne L/S/X/Ka-band:** 1 GHz–2 GHz/2 GHz–4 GHz/8 GHz–12 GHz/  
34 GHz–36 GHz
- **Land Based L/S/C/X/Ka-band:** 1 GHz–2 GHz/2 GHz–4 GHz/4 GHz–8 GHz/  
8 GHz–12 GHz/34 GHz–36 GHz

# Modern Soldier Communication



# Military Communication



- Airborne X/Ku/Ka-band: 8 GHz–12 GHz/12 GHz–18 GHz/34 GHz–36 GHz
- Shipborne L/S/X/Ka-band: 1 GHz–2 GHz/2 GHz–4 GHz/8 GHz–12 GHz/34 GHz–36 GHz
- Land Based L/S/C/X/Ka-band: 1 GHz–2 GHz/2 GHz–4 GHz/4 GHz–8 GHz/8 GHz–12 GHz/34 GHz–36 GHz



# Commercial Aviation

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**Cabin  
Management  
System**

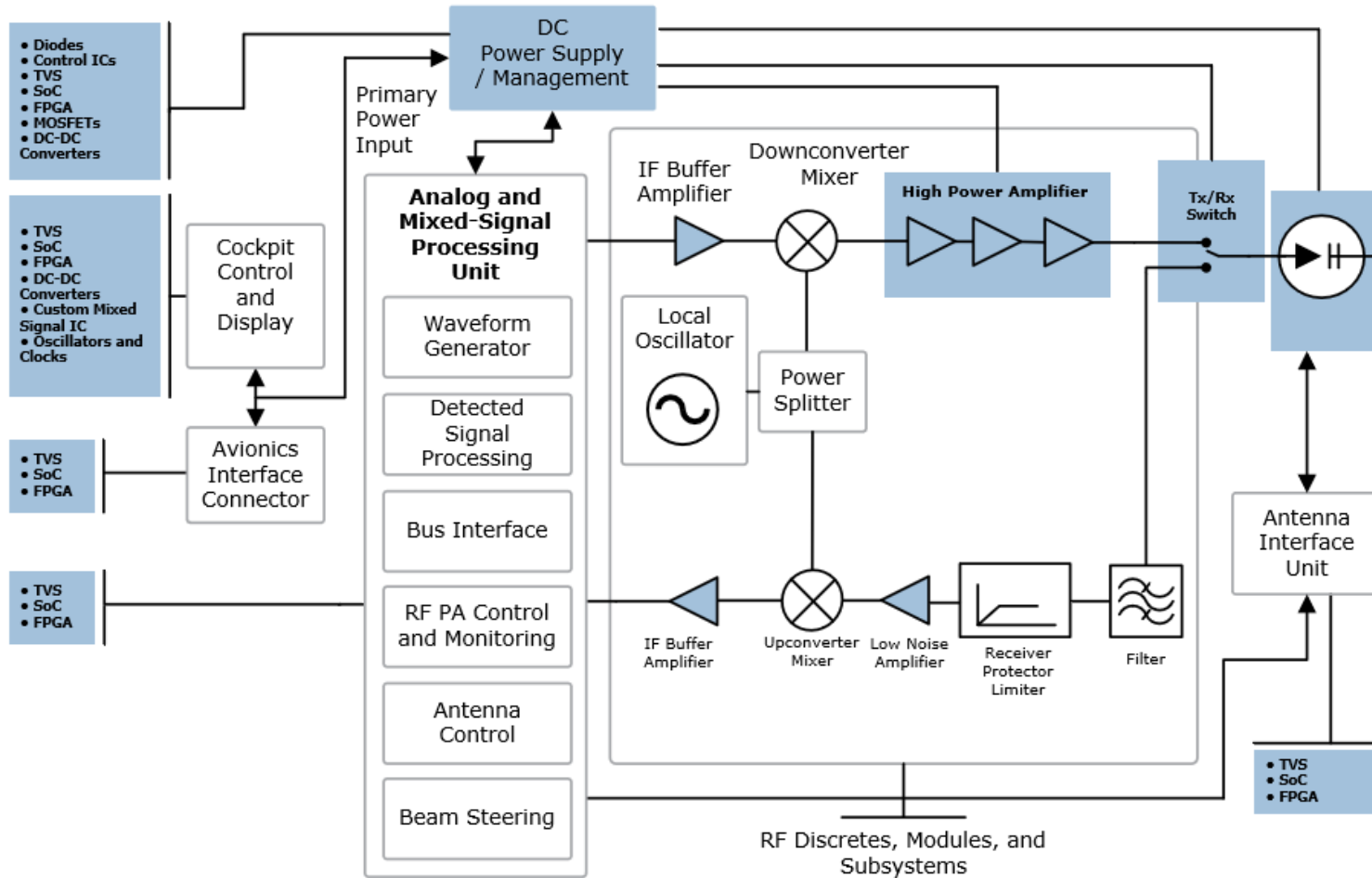
**Engine Systems  
& Controls**

**Cockpit Avionics**

**Actuation  
Systems**

**RF & Microwave  
Systems**

# RF & Microwave Systems



- Diodes
- Control ICs
- TVS
- SoC
- FPGA
- MOSFETs
- DC-DC Converters

- TVS
- SoC
- FPGA
- DC-DC Converters
- Custom Mixed Signal IC
- Oscillators and Clocks

- TVS
- SoC
- FPGA

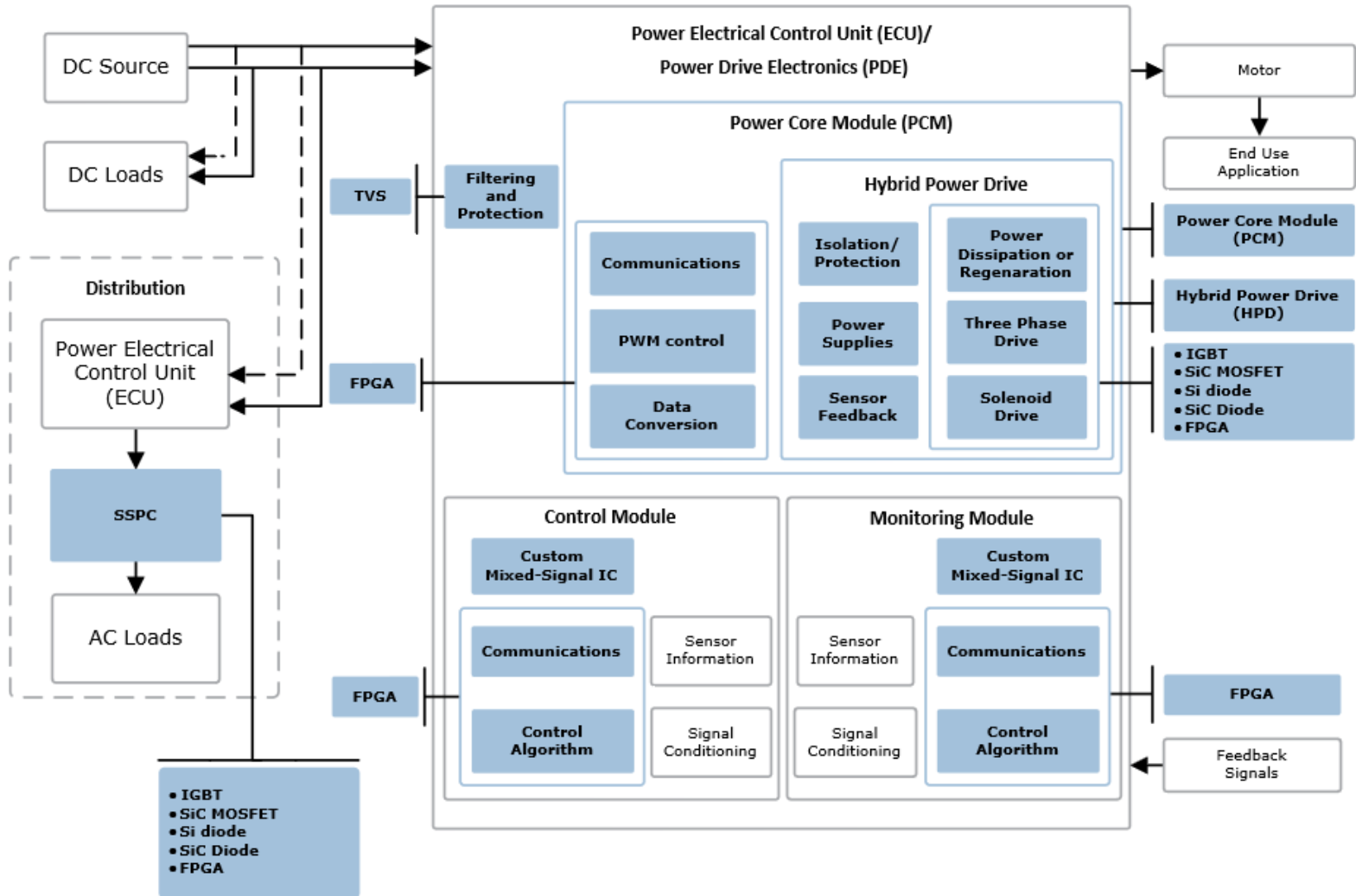
- TVS
- SoC
- FPGA

- TVS
- SoC
- FPGA

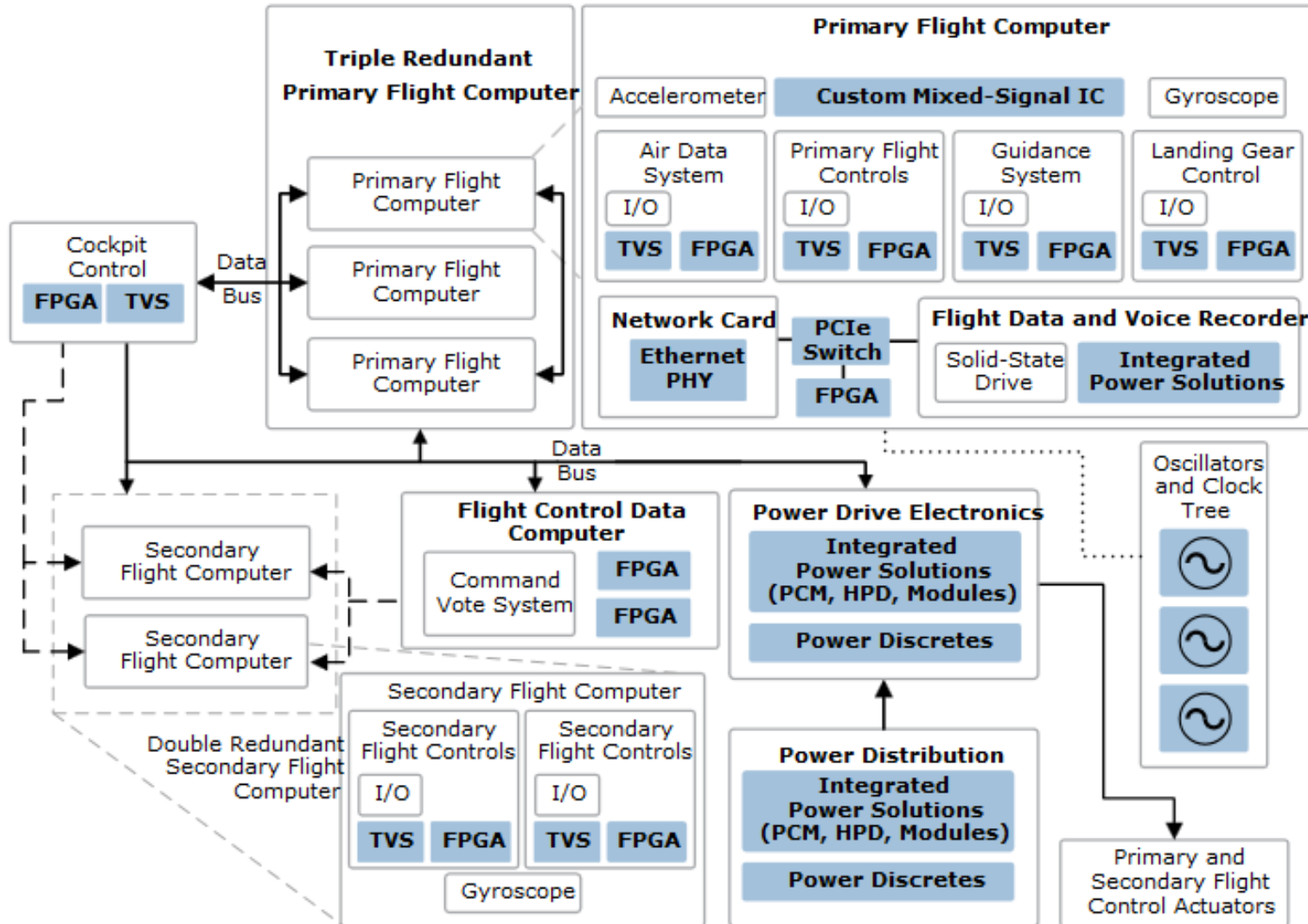
- RF Transmitter & Receiver (Tx/Rx)
- RF Power Transistors
- RF Diodes: PIN, Varactor, Schottky
- Integrated Transceivers
- Power Amplifiers and LNA

- GaN and GaAs Power Amplifiers
- PIN Diode T/R Switches
- GaAs LNA
- MMIC Switches

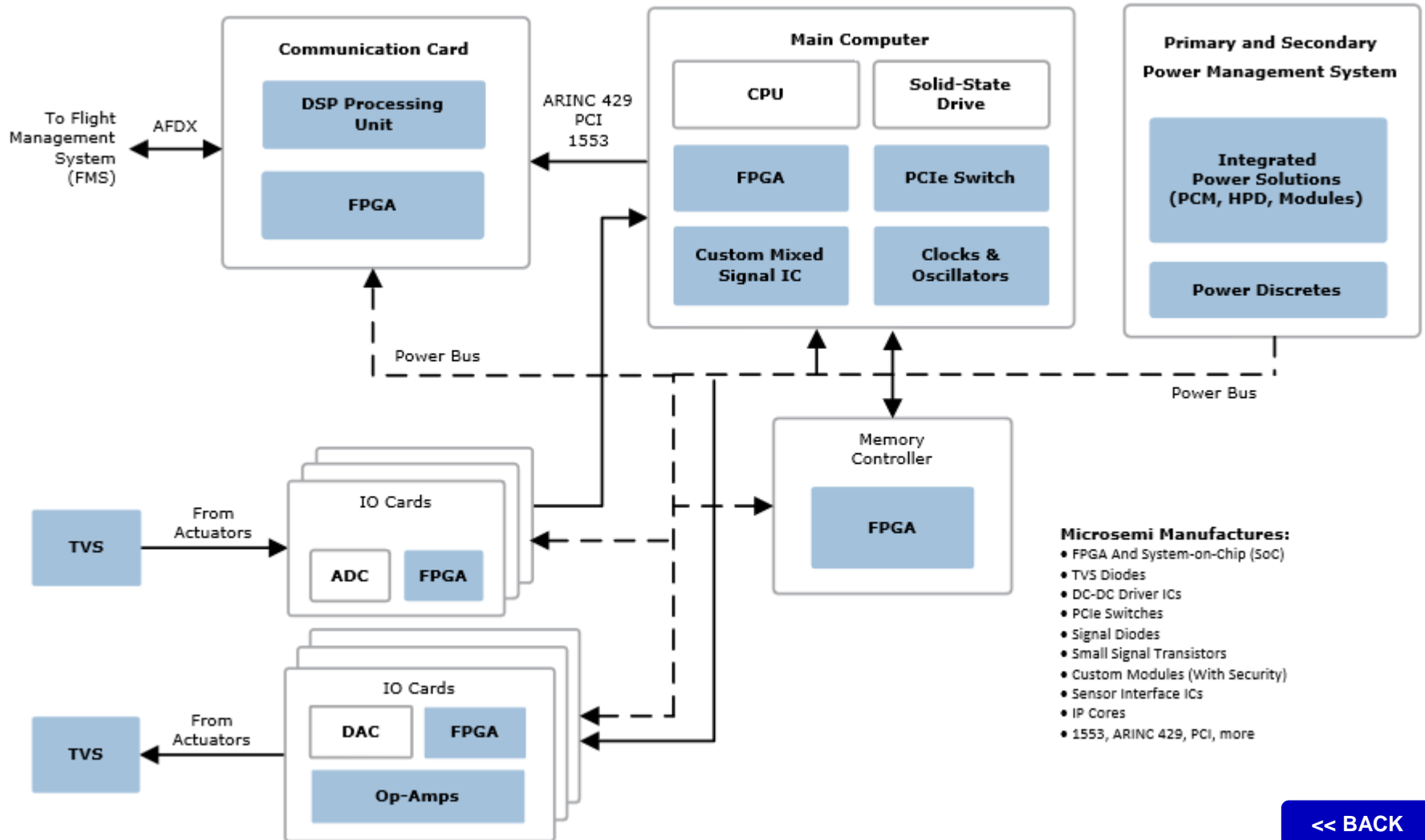
# Actuation Systems



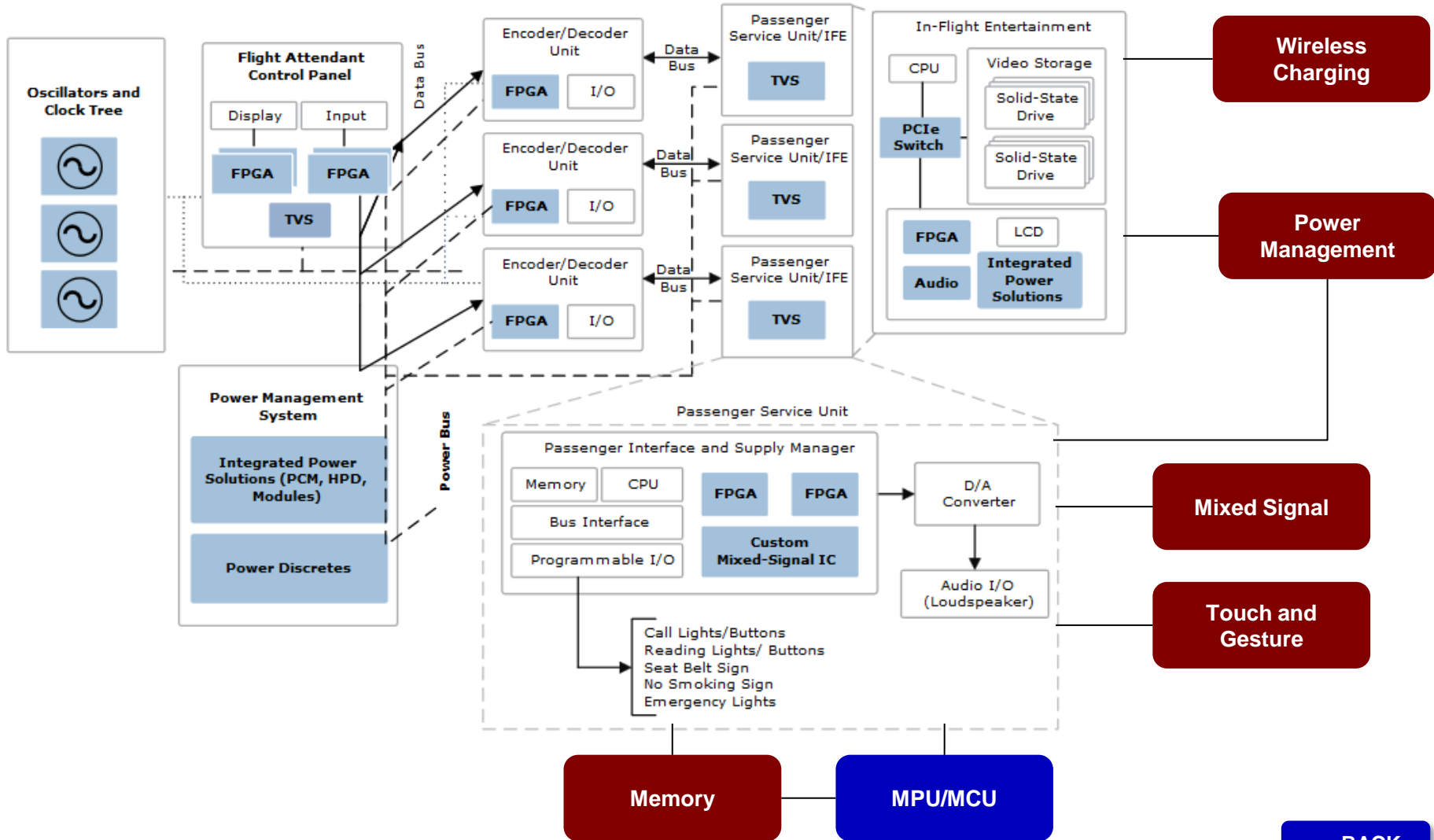
# Cockpit Avionics



# Engine Systems & Controls



# Cabin Management System



# Space

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**Telemetry  
Tracking and  
Control**

**Electrical Power**

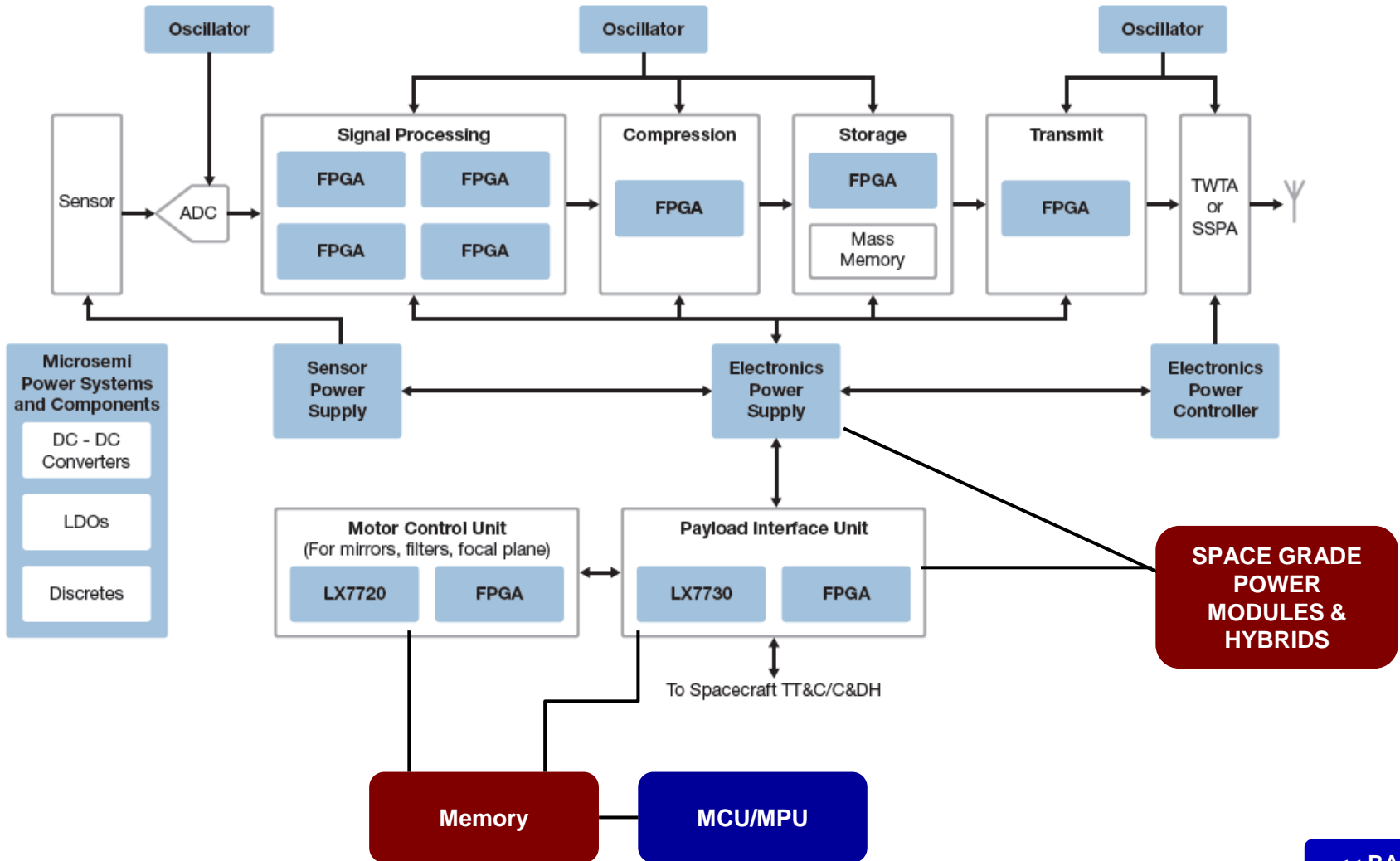
**Digital  
Communication  
Payload**

**Transparent RF  
Transponder**

**Attitude and  
Orbit Control**

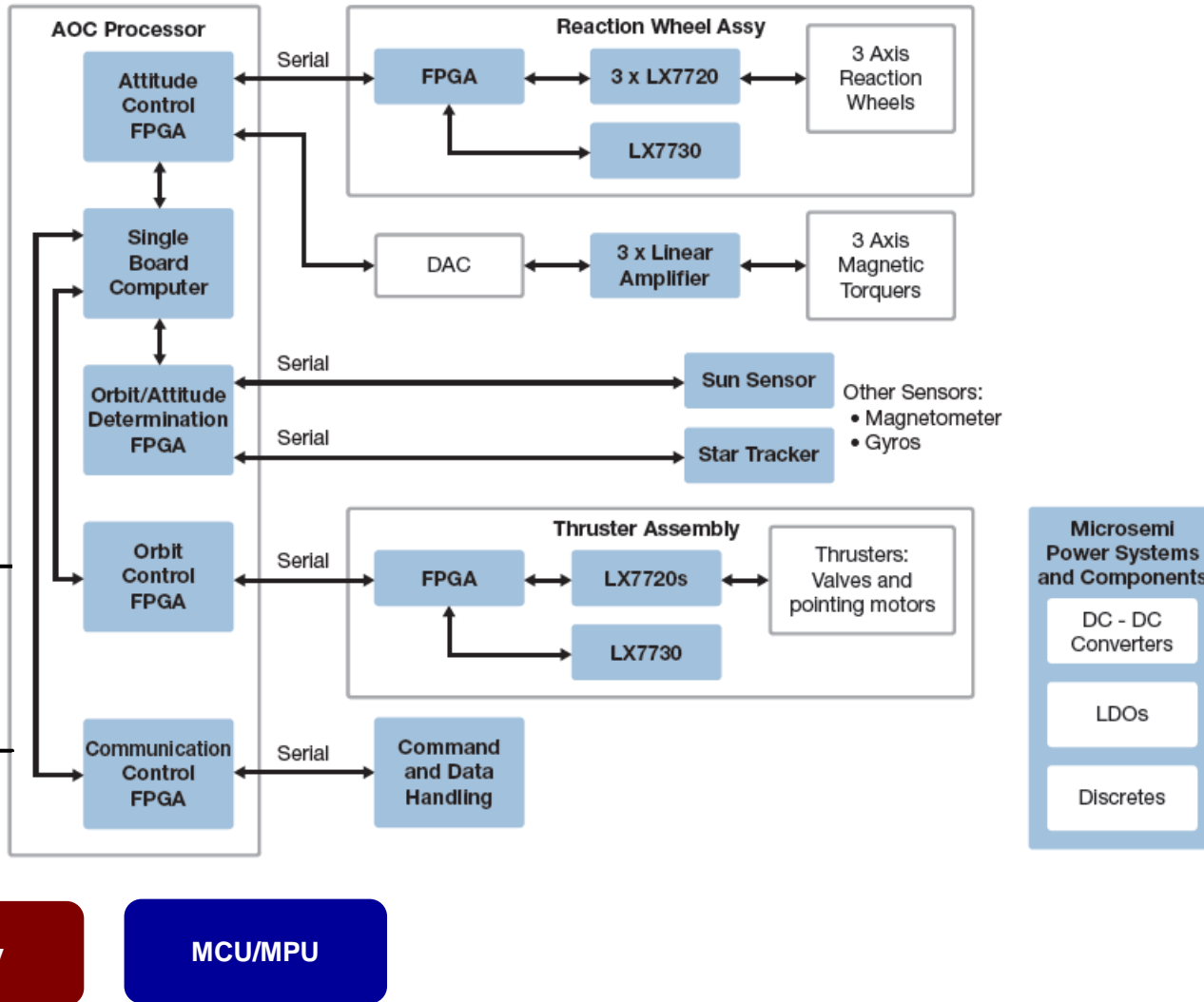
**Remote Sensing  
Payload**

# Remote Sensing Payload

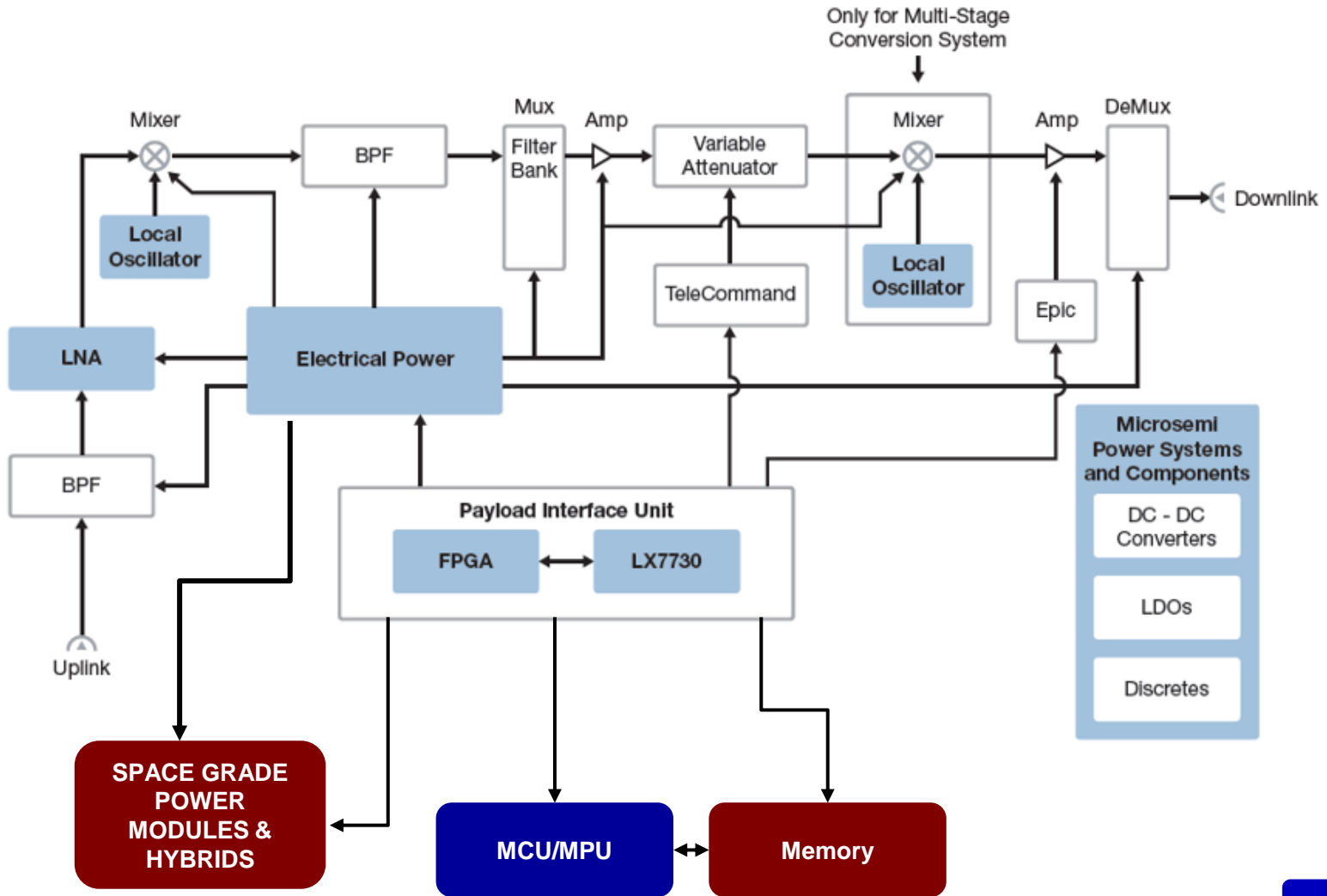




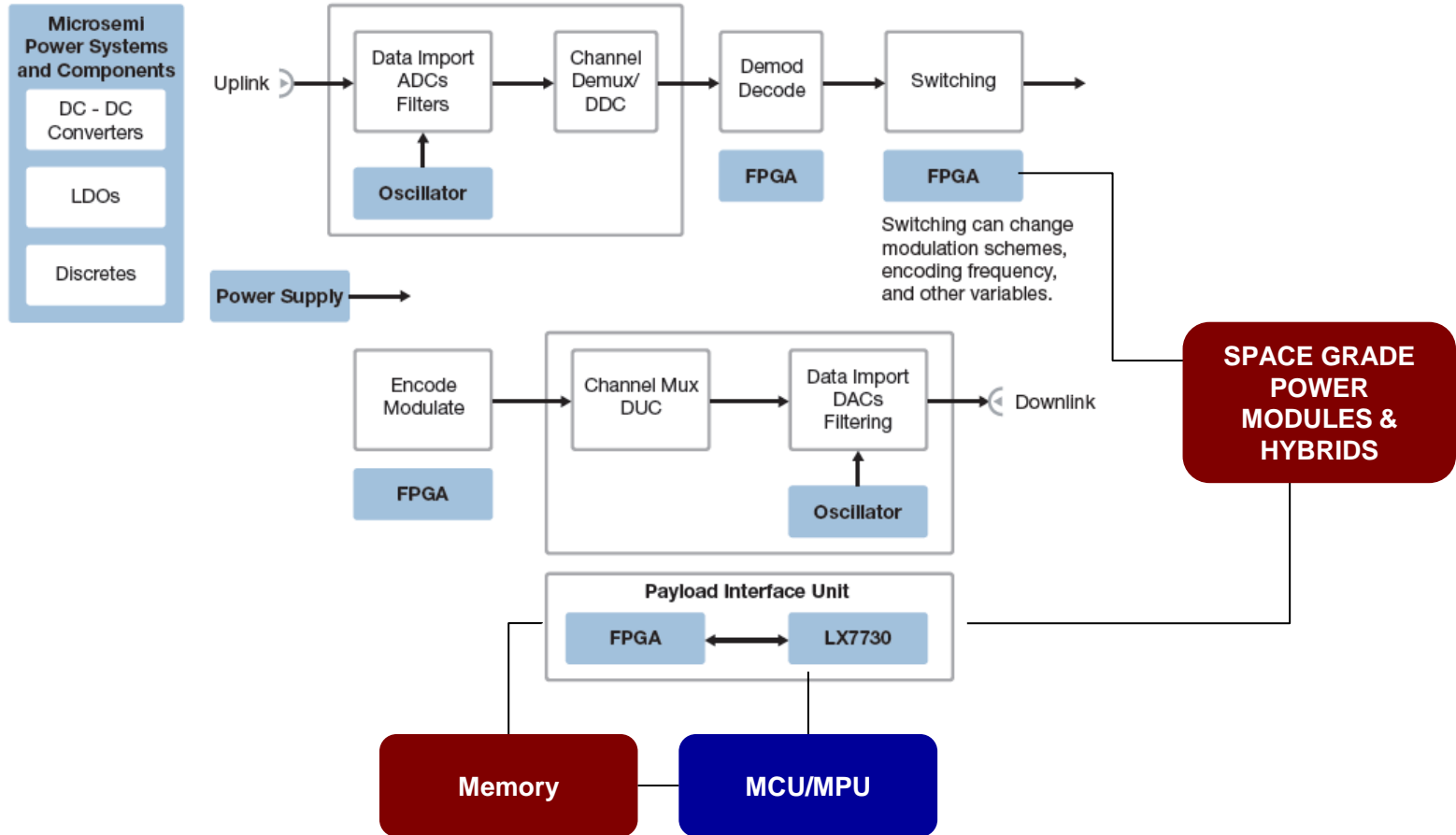
# Attitude and Orbit Control



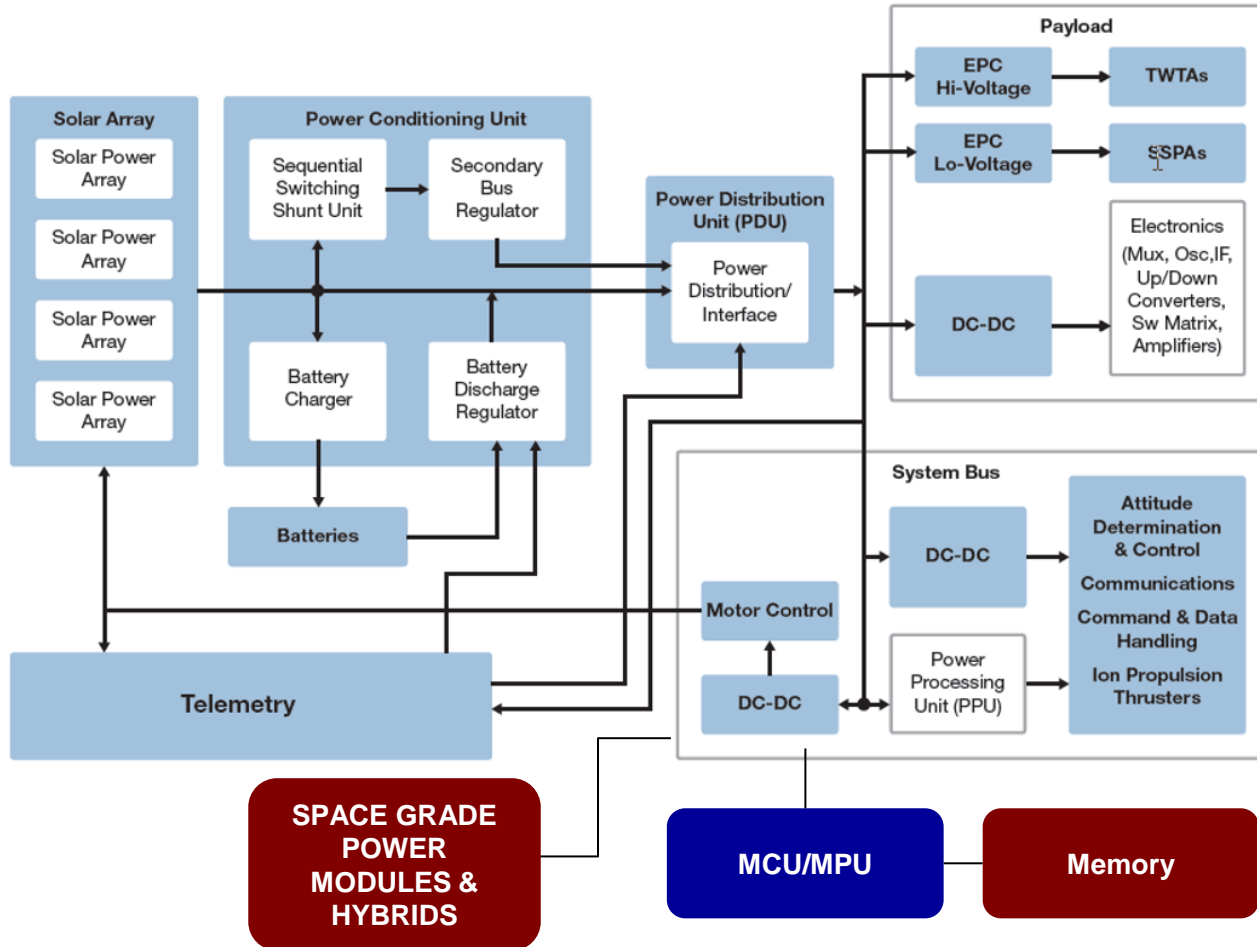
# Transparent RF Transponder



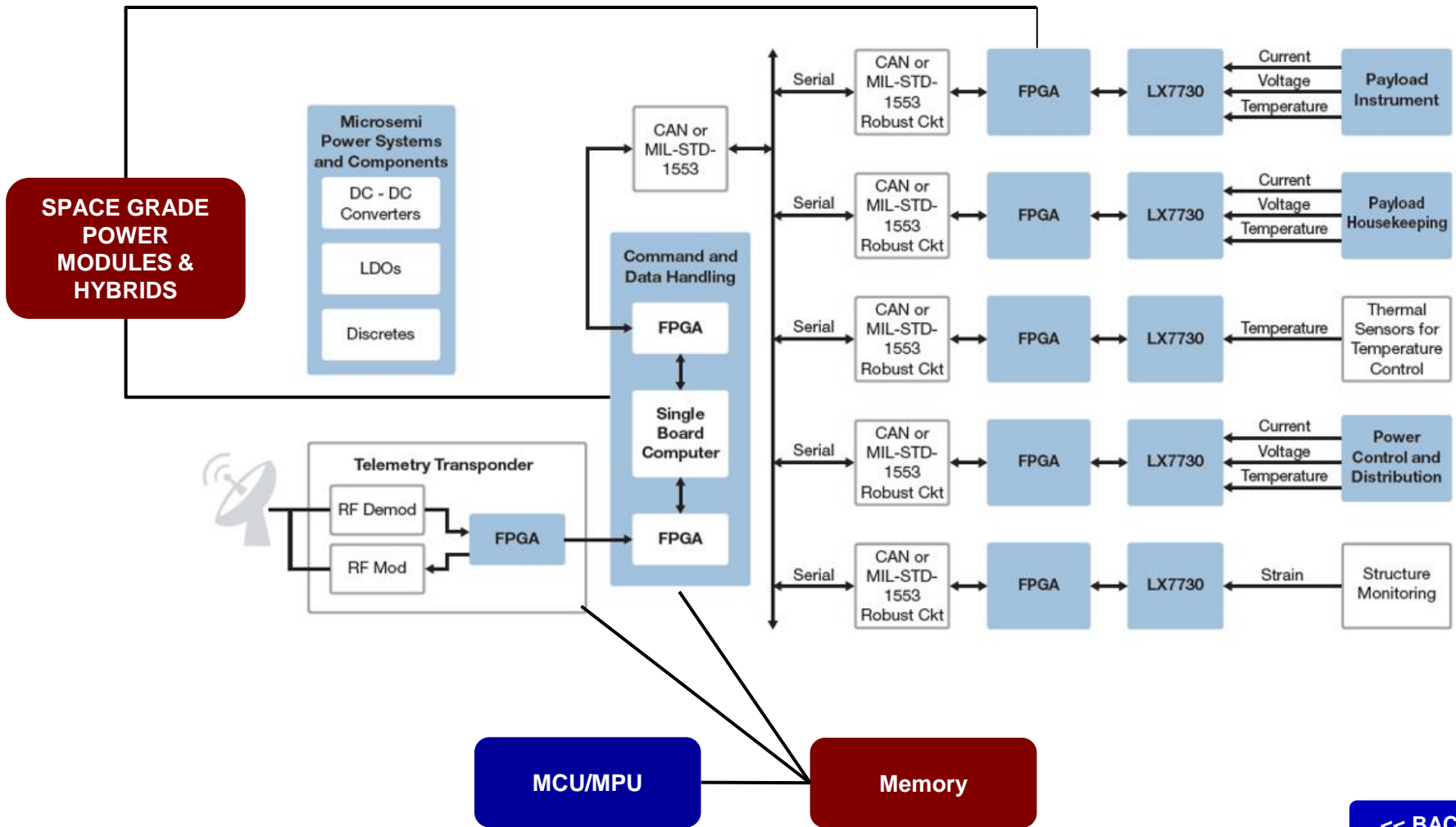
# Digital Communication Payload



# Electrical Power



# Telemetry Tracking and Control





**MICROCHIP**

# **Microchip Analog Products for Motor Control Applications**

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# Microchip's Winning Attributes

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- **Industry standard footprint – Dual H-bridge motor drivers**
- **Lowest supply current Vs. major competitors!**
- **Integrated sensorless sinusoidal algorithm – 3-phase BLDC fan drivers (3mm x 3mm DFN, TDFN, UDFN packages)**
- **Total solution provider with PIC MCU and dsPIC DSC**

NEXT

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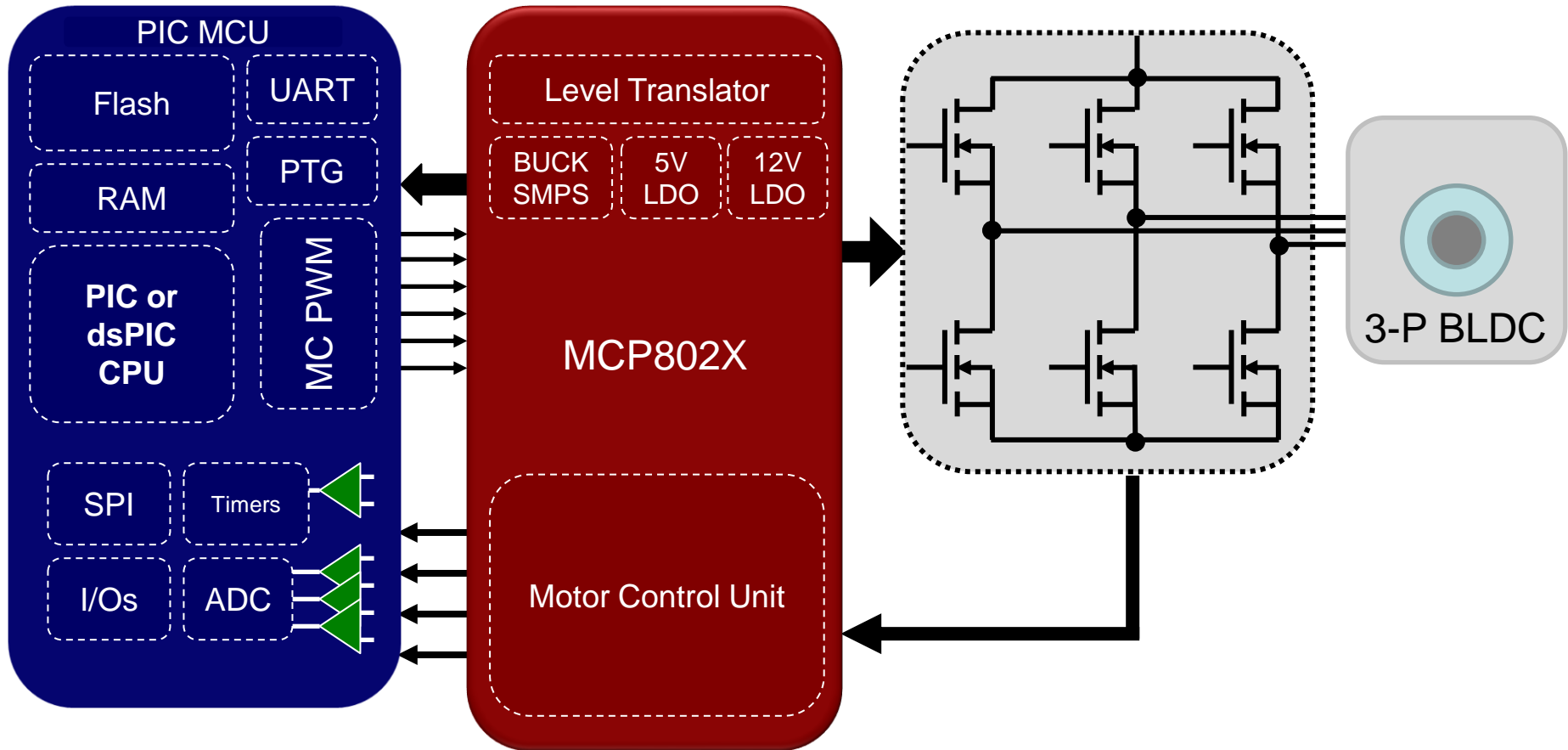
# Microchip's Winning Attributes

---

- ❑ **One of the first & leading suppliers in MOSFET driver and temperature sensor products**
- ❑ **Large offering of DC-DC converters and Resets covering needed voltages**
- ❑ **RR-I/O op amps reduce design concerns**
- ❑ **Attach sell with PICmicro, frequently used**
- ❑ **Great lead times and customer support**
- ❑ **Growing portfolio of Motor Driver ICs**



# High Integration Motor Control/ Drive





# Motor Control MOSFET Gate Driver

- **Function: power MCU/DSC, sense current, drive MOSFETs and provide housekeeping functions**

Popular Products	Description	Product Web Page
MCP8024/6	The three integrated op-amps allows MCP8024/6 provide motor current feedback to broad range of MCUs/DSCs in FOC applications. Both devices operates up to 28V and withstand 48V voltage spikes.	<a href="#">Click here</a>
MCP8025	MCP8025 offers six N-Ch MOSFET drivers to drive MOSFETs efficiently. With zero-crossing output , a standalone op-amp and voltage regulators, it simplifies BLDC design and	<a href="#">Click here</a>

High Power Motor Control/Drive

High Integration Motor Control/Drive

# PIC MCU and dsPIC DSC

---

- ❑ **Function: coordinating all the control and monitor functions - the brain of the system**
- ❑ **Popular products: dsPIC33EPMC, dsPIC33FJMC, PIC16F182X, 178X, 75X, 15XX, 193X**
- ❑ **Attributes:**
  - ❑ Upwards of 32MHz internal OSC
  - ❑ 4 channel Programmable Switch Mode Controller (PSMC)
  - ❑ Integrated high performance comparators, op-amp, 10/12 bit ADC, 5/8/9 bit DAC, CCP, COG, NCO, CLC
  - ❑ Slope compensation
  - ❑ 256 bytes of EEPROM
  - ❑ Available in various packages



# PIC16F178x

## Key Features

---

- Enhanced Mid-Range core (EMR)
- Flash Program Memory with self read/write capability
- Data EEPROM
- Low Power Internal 32kHz/32MHz osc.
- Integrated Temperature Indicator
- Up to 14-Channel 10bit / 12bit ADC w/Vref
- Up to (4) PSMC (Programmable Switch Mode Controller)
- Extended Watchdog Timer (EWDT)



# PIC16F178x

## Key Features (contd.)

---

- Up to (4) High Performance Comparators with selectable Voltage Reference
- Up to (3) Operation Amplifiers with rail-to-rail input/output
- Up to (3) CCP (Capture, Compare, PWM)
- (1) 8-bit DAC (Digital to Analog Converter)
- (3) 5-bit DAC (Digital to Analog Converter) (PIC16F1788/9 ONLY)
- (1) MI<sup>2</sup>C, (1) SPI, (1) EUSART w/auto baud
- (2) 8-bit Timer (TMR0/TMR2) & (1) 16-bit Timer (TMR1)

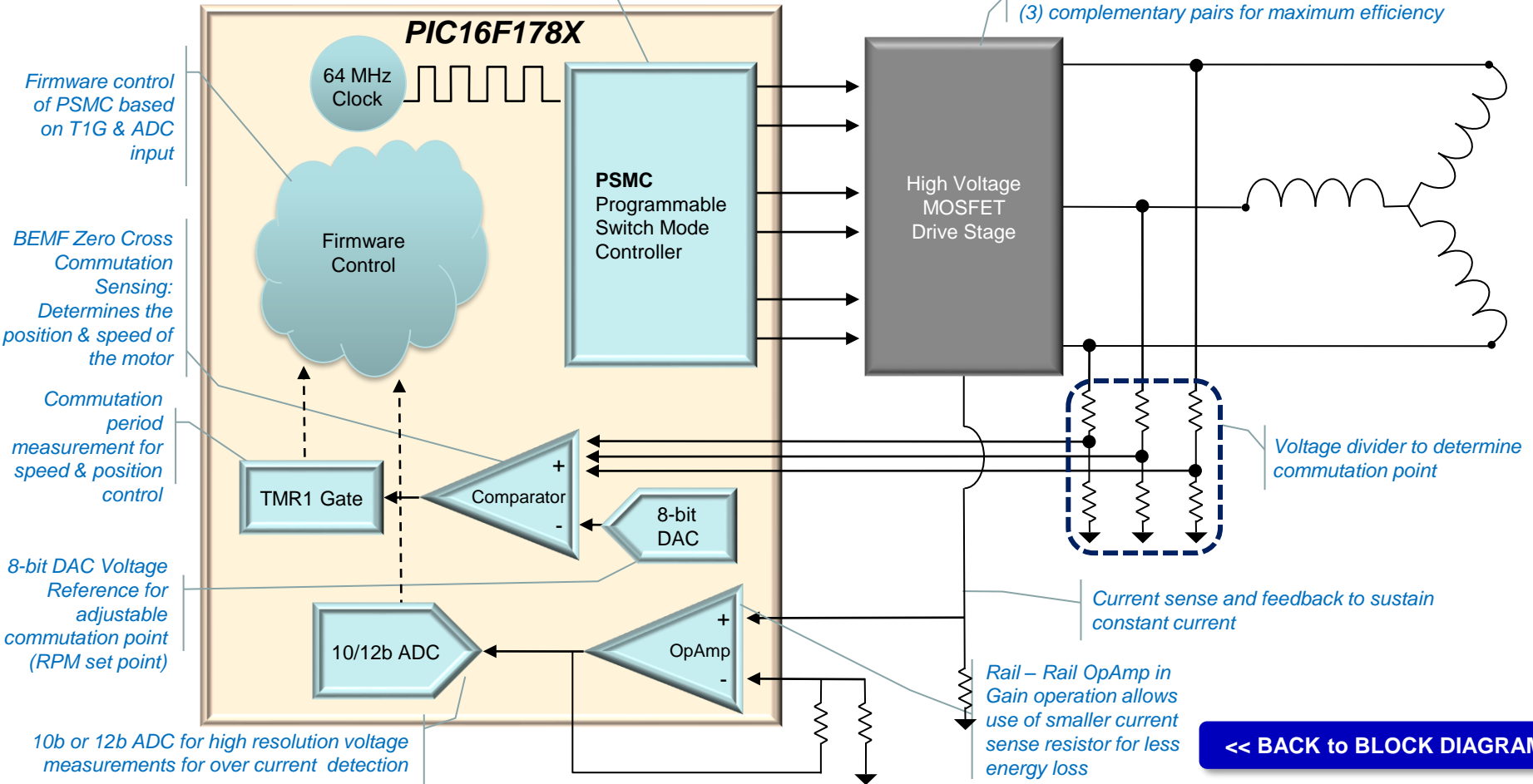


# Application Example: Sensorless 3- $\Phi$ BLDC Motor

- High Efficiency closed-loop control enabling higher RPMs
- Cost effective integration with BOM reductions
  - OpAmp, Voltage Reference, reduced size of inductors, capacitors, & resistors

3-phase drive controlled by PIC16F178X microcontroller with (3) complementary pairs for maximum efficiency

16-bit PWM with dedicated 64MHz clock  
6 steerable outputs or 3 steerable output pairs  
Blanking Control for transient filtering  
Independent rising/falling output control  
Dead band with independent rise & fall control  
Polarity Control / Auto Shutdown & Restart



Firmware control of PSMC based on T1G & ADC input

BEMF Zero Cross Commutation Sensing: Determines the position & speed of the motor

Commutation period measurement for speed & position control

8-bit DAC Voltage Reference for adjustable commutation point (RPM set point)

10b or 12b ADC for high resolution voltage measurements for over current detection

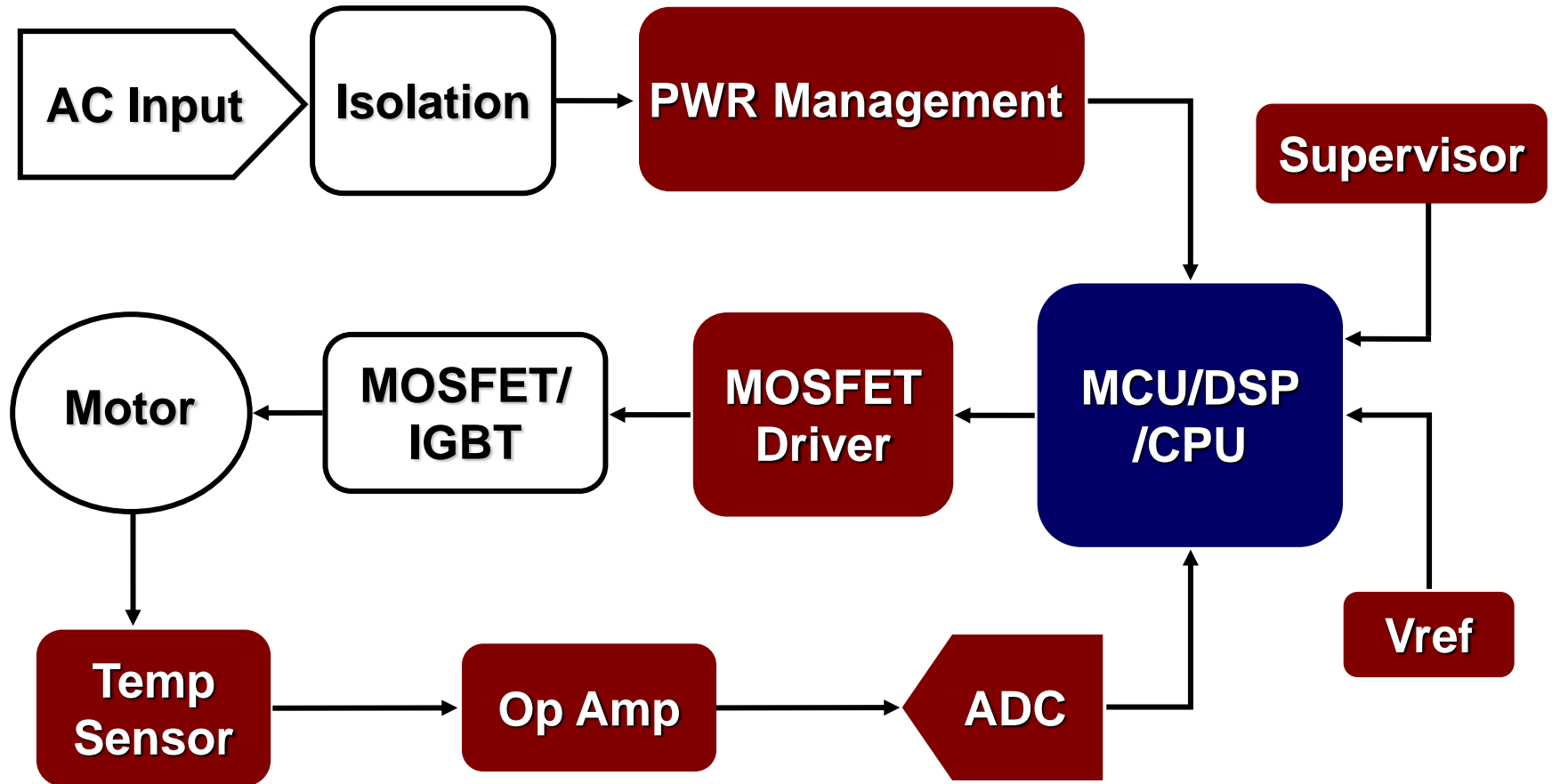
Voltage divider to determine commutation point

Current sense and feedback to sustain constant current

Rail - Rail OpAmp in Gain operation allows use of smaller current sense resistor for less energy loss

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# High Power Motor Control/ Drive



# Temperature Sensors

- Function: Measuring and providing Temperature information

Popular Products	Description	Product Web Page
<p>MCP9808 Digital temperature sensor</p>	<p>The MCP9808 converts temperatures between -20°C and +100°C to a digital word with <math>\pm 0.5^\circ\text{C}</math> (max.) accuracy</p>	<p><a href="#">Click here</a></p>
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">Click here</a></p>





# Temperature Sensors Winning Attributes

---

## □ Attributes:

- Small SC70, SOT-23 and DFN leadless packages
- Very low operating current: 35 to 250 $\mu$ A (typ)
- Very low shutdown current: 1 $\mu$ A (max)
- High temp accuracy:  $\pm 0.25^{\circ}\text{C}$
- Simple operation: no need for external components
- Analog and digital (SPI<sup>TM</sup>, I2C<sup>TM</sup>, SMBus<sup>TM</sup>) devices
- High temperature resolution

# Low-Power LDOs

- **Function: providing regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MCP1700 6V LDO	The MCP1700 can source up to 250mA of current with an extremely low input-output voltage differential of 178mV at 250mA. with the low current consumption of only	<a href="#">Click here</a>
MIC5239 30V LDO	The MIC5239 is a low quiescent current, $\mu$ Cap low-dropout regulator. With a maximum operating input voltage of 30V and a quiescent current of 23 $\mu$ A, it is ideal for supplying keep-alive power in systems with high voltage batteries.	<a href="#">Click here</a>



# Low-Power LDOs Winning Attributes

---

## □ **Attributes:**

- Extremely low operating current: as low as 1 $\mu$ A
- High output voltage accuracy
- Stability with ceramic capacitors
- Wide range of output voltage options
- Space-saving SC70 and SOT-23 packages
- Wide range of features: shutdown mode

# RESET Monitors

- **Function:** System supervisor circuits designed to monitor VCC in digital systems and provide a reset signal to the host processor when needed

Popular Products	Description	Product Web Page
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click here</a>
MCP1xx	The MCP1xx are a family of voltage supervisory devices which also operates as protection from brown-out conditions when the supply voltage drops below a safe operating level	<a href="#">Click here</a>



# RESET Monitors Winning Attributes

---

## □ Attributes:

- Tiny SOT-23 and SC-70 packages
- Very low operating current: as low as 1 $\mu$ A (max)
- High threshold voltage accuracy:  $\pm 2.8\%$  (max)
- $V_{DD}$  transient immunity
- Many available options: push-pull output, open-drain output and internal pull-up resistor



# Half Bridge MOSFET Drivers

- **Function: driving the high power devices (MOSFETs in synch. Buck configuration)**

Popular Products	Description	Product Web Page
MIC4608 600V Half Bridge MOSFET Driver	The MIC4608 is a 600V Half Bridge IGBT or MOSFET driver. The MIC4608 features a 450ns propagation delay including a 200ns input filtering time to prevent unwanted pulses. The low-side and high-side gate drivers are independently controlled (with shoot thru protection) or controlled with a single PWM signal.	<a href="#">Click here</a>
MIC4605 85V Half Bridge MOSFET Driver With Adaptive Dead Time (ADT)	The MIC4605 is an 85V half-bridge MOSFET driver that features adaptive-dead-time and shoot-through protection. The adaptive-dead-time circuitry actively monitors the half-bridge outputs to minimize the time between high-side and low-side MOSFET transitions, thus maximizing power efficiency.	<a href="#">Click here</a>

Winning Attributes

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# Synchronous Buck MOSFET Drivers

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## □ **MIC4608 Attributes:**

- Drives Up to 600V high-side and low-side N-Channel MOSFETs or IGBTs with independent inputs or with a single PWM signal
- Shoot thru protection

## □ **MIC4605 Attributes:**

- Drives Up to 85V high-side and low-side N-Channel MOSFETs with independent inputs or with a single PWM signal
- Adaptive Dead Time and Shoot thru protection

# Operational Amplifiers

- **Function: buffering and filtering sensor feedback**

Popular Products	Description	Product Web Page
MCP6004	The MCP6004 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 microamperes.	<a href="#">Click here</a>
MCP6H04	MCP6H04 has a wide supply voltage range of 3.5V to 16V and rail-to-rail output operation. This device has a gain bandwidth product of 1.2 MHz (typical), while only drawing 135 $\mu$ A/amplifier (typical) of quiescent current.	<a href="#">Click here</a>
MCP6294	MCP6294 provide wide bandwidth of 10 MHz Gain Bandwidth Product. This family also operates from a single supply voltage as low as 2.4V to 6V, while drawing 1 mA (typical) quiescent current.	<a href="#">Click here</a>



## □ **Attributes:**

- Small SC-70, TDFN and SOT-23 packages
- GBWP: 9 kHz to 60MHz
- Excellent operating current-to-GBWP ratio
- Mostly rail-to-rail inputs and outputs
- Offset voltage: as low as 2 $\mu$ V (MCP6V0x)
- Chip Select capability for power savings



# Analog-to-Digital Converters

- **Function: converting analog feedback signals from motor to digital signals for MCU**

Popular Products	Description	Product Web Page
MCP3221	The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 $\mu$ A and 1 $\mu$ A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.	<a href="#">Click here</a>
MCP3201	The MCP3201 is a 100ksps, 1 input channel, 12-bit SAR A/D Converter (ADC) that combines high performance and low power consumption in a small package, making it ideal for embedded control applications. The MCP3201 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click here</a>
MCP33111	The MCP33111 12-bit, 1Msps, SAR A/D Converter (ADC) features a full differential input, high performance and low power consumption in a small package, making it ideal for battery powered systems and remote data acquisition applications. The MCP33111 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click here</a>

Winning Attributes

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## □ **SAR ADC Attributes:**

- Resolution: 10 to 16 bits
- Max sampling rate: up to 1 Msps
- Linearity:  $\pm 1$ LSB DNL,  $\pm 1$ LSB INL
- Current consumption: 175 to 2400 $\mu$ A (max.)
- Single supply voltage: 1.7V to 5.5V
- Small packages: SOT-23 and MSOP

# Voltage References

- **Function: providing the system with an accurate analog voltage for comparison (needed for ADC)**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click here</a>

# Voltage References

---

## □ **Attributes:**

- 1.2V (TC1070), 2.5V or 4.096V output
- Initial accuracy:  $\pm 1\%$  (max)
- Temperature coefficient: 50ppm/°C (max)
- Output current:  $\pm 2\text{mA}$
- Operating current: 100 $\mu\text{A}$  (max)
- Industrial temperature range: -40°C to +85°C
- SOT-23 and TO-92 packages

# PIC MCU and dsPIC DSC

---

- ❑ **Function: coordinating all the control and monitor functions - the brain of the system**
- ❑ **Popular products: dsPIC33EPMC, dsPIC33FJMC, PIC16F182X, 178X, 75X, 15XX, 193X**
- ❑ **Attributes:**
  - ❑ Upwards of 32MHz internal OSC
  - ❑ 4 channel Programmable Switch Mode Controller (PSMC)
  - ❑ Integrated high performance comparators, op-amp, 10/12 bit ADC, 5/8/9 bit DAC, CCP, COG, NCO, CLC
  - ❑ Slope compensation
  - ❑ 256 bytes of EEPROM
  - ❑ Available in various packages



# PIC16F178x

## Key Features

---

- Enhanced Mid-Range core (EMR)
- Flash Program Memory with self read/write capability
- Data EEPROM
- Low Power Internal 32kHz/32MHz osc.
- Integrated Temperature Indicator
- Up to 14-Channel 10bit / 12bit ADC w/Vref
- Up to (4) PSMC (Programmable Switch Mode Controller)
- Extended Watchdog Timer (EWDT)



# PIC16F178x

## Key Features (contd.)

---

- Up to (4) High Performance Comparators with selectable Voltage Reference
- Up to (3) Operation Amplifiers with rail-to-rail input/output
- Up to (3) CCP (Capture, Compare, PWM)
- (1) 8-bit DAC (Digital to Analog Converter)
- (3) 5-bit DAC (Digital to Analog Converter) (PIC16F1788/9 ONLY)
- (1) MI<sup>2</sup>C, (1) SPI, (1) EUSART w/auto baud
- (2) 8-bit Timer (TMR0/TMR2) & (1) 16-bit Timer (TMR1)

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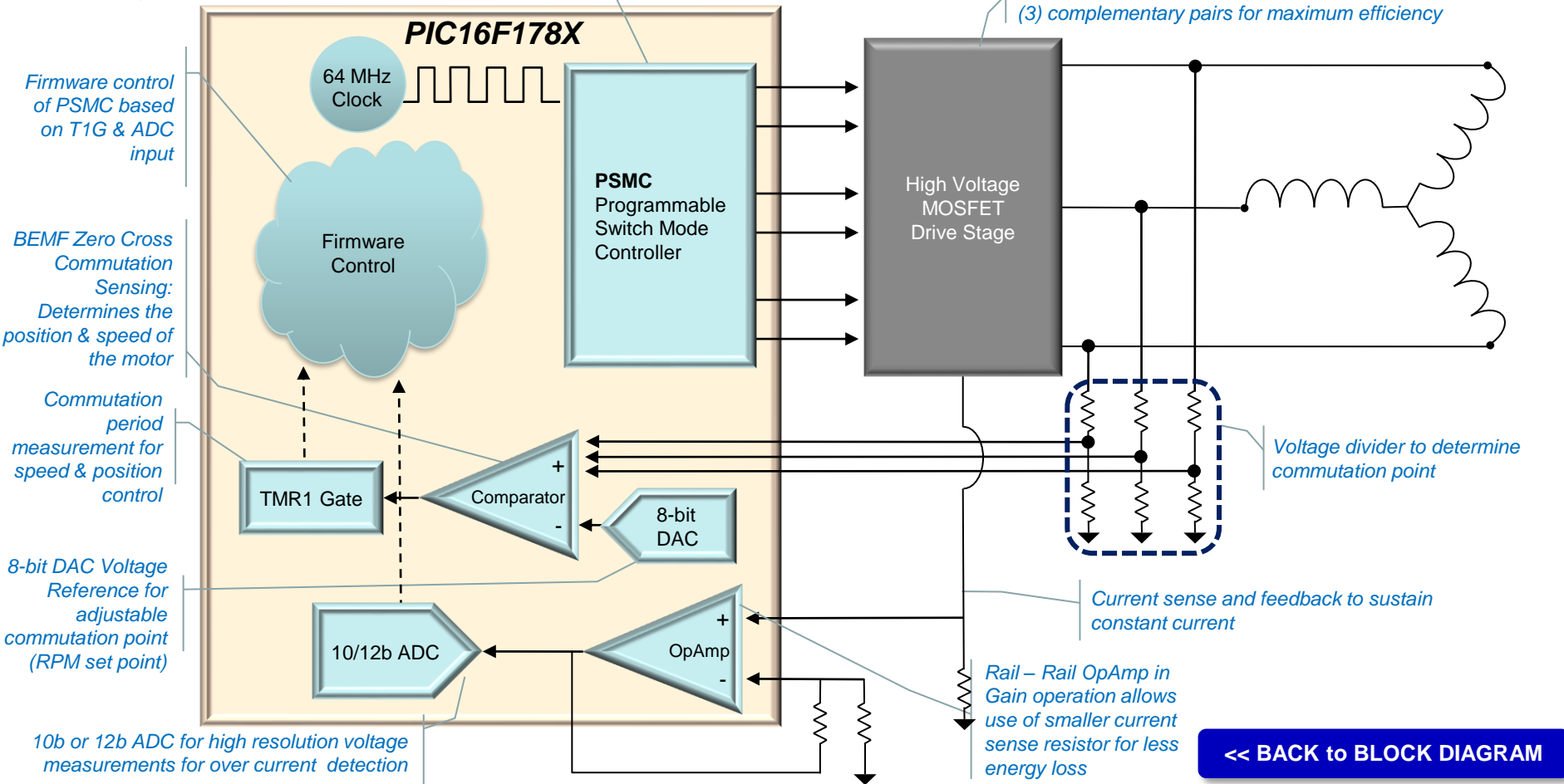


# Sensorless 3-Phase BLDC Motor

- 16-bit PWM with dedicated 64MHz clock
- 6 steerable outputs or 3 steerable output pairs
- Blanking Control for transient filtering
- Independent rising/falling output control
- Dead band with independent rise & fall control
- Polarity Control / Auto Shutdown & Restart

- High Efficiency closed-loop control enabling higher RPMs
- Cost effective integration with BOM reductions
  - OpAmp, Voltage Reference, reduced size of inductors, capacitors, & resistors

3-phase drive controlled by PIC16F178X microcontroller with (3) complementary pairs for maximum efficiency



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**MICROCHIP**

# **Microchip Analog Products for Signal Chains**

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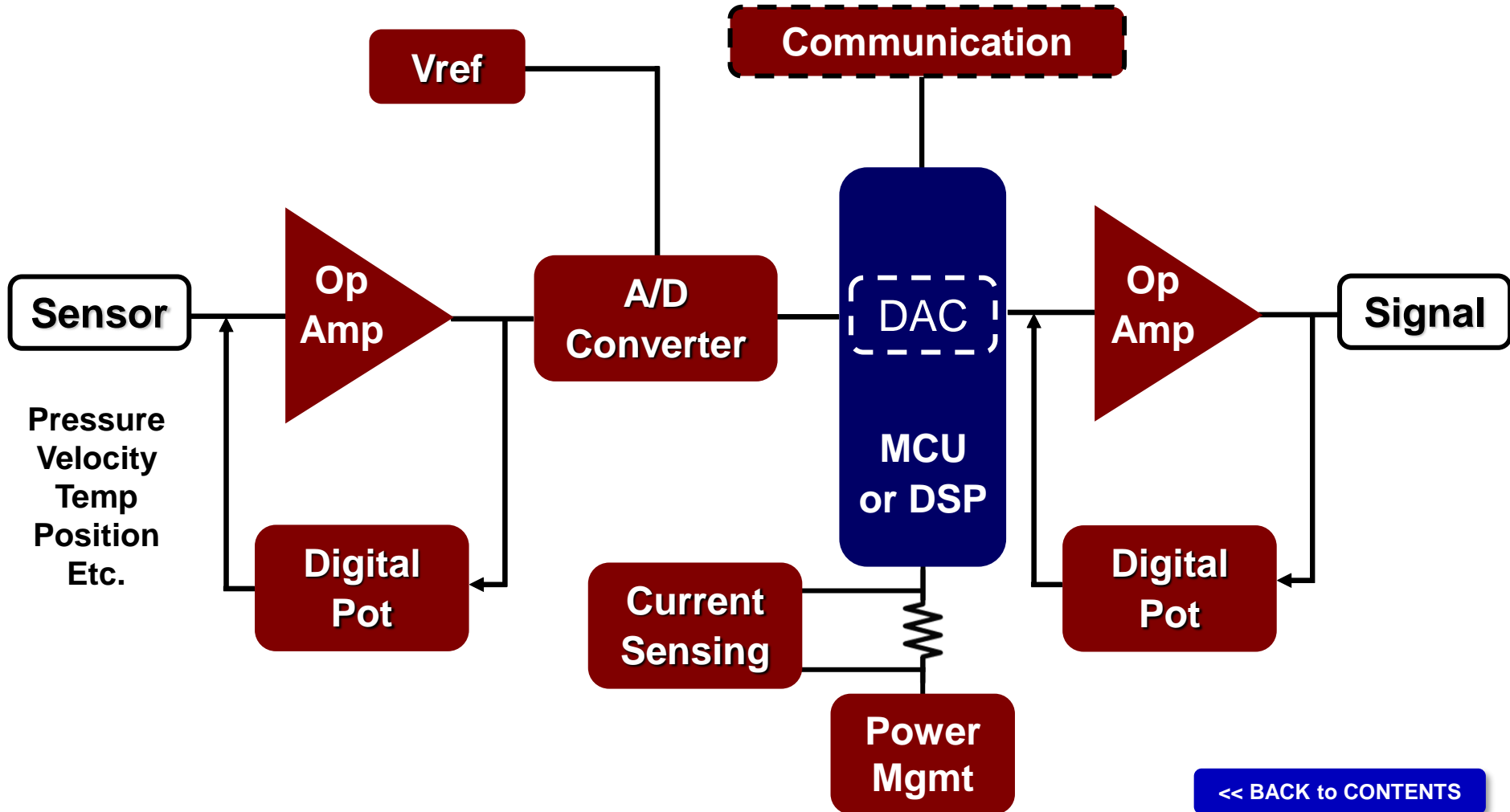


# Microchip's Winning Attributes

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- ❑ **Low operating current to extend battery life**
- ❑ **A wide variety of analog and digital products for complete system solution**
- ❑ **Integration & small packages to occupy smaller footprints on the board and reduce cost**
- ❑ **High accuracy by trimming offset after packaging using non-volatile memory**
- ❑ **Competitive pricing for making the end equipment attractive on the market**
- ❑ **Great lead times and customer support**

# Typical Signal Chain Diagram



# Current Sensing

- **Function: To measurement current and voltage and communicate over SMBus**

Popular Products	Description	Product Web Page
PAC1710	The PAC1710 is a high-side bi-directional current sensing monitor with precision voltage measurement capabilities. The power monitor measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator.	<a href="#">Click here</a>
PAC1720	The PAC1720 is a dual high-side bi-directional current sensing monitor with precision voltage measurement capabilities. Each sensor measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator.	<a href="#">Click here</a>

# Operational Amplifiers

- **Function: buffering and filtering sensor signals for preserving signal characteristics and rejecting unwanted frequencies**

Popular Products	Description	Product Web Page
MCP6404	The MCP6404 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typ. quiescent current of 40microamperes.	<a href="#">Click here</a>
MCP6N11	The MCP6N11 single instrumentation amplifier is optimized for single-supply operation with rail-to-rail input and output performance. Two external resistors set the gain, minimizing gain error and drift over temperature. The supply voltage range of 1.8V to 5.5V is low enough to support many portable applications	<a href="#">Click Here</a>
Additional Suggested Products: MCP60x, MCP644x, MCP600x, MCP603x, MCP6Vxx		

## □ **Attributes:**

- Small SC-70, TDFN and SOT-23 packages
- GBWP: 9 kHz to 60MHz
- Excellent operating current-to-GBWP ratio
- Mostly rail-to-rail inputs and outputs
- Offset voltage: as low as 2 $\mu$ V (MCP6V0x)
- Chip Select capability for power savings



# Analog-to-Digital Converters

- **Function: Converting analog voltage or current signal (pressure, position, temperature, etc.) into digital data that a microcontroller can use**

Popular Products	Description	Product Web Page
MCP3221	The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 $\mu$ A and 1 $\mu$ A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.	<a href="#">Click Here</a>
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>

Winning Attributes

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# Analog-to-Digital Converters

## □ SAR Attributes:

- Resolution: 10 to 16 bits
- Max sampling rate: up to 1 Msps
- Linearity:  $\pm 1$ LSB DNL,  $\pm 1$ LSB INL
- Current consumption: 175 to 2400 $\mu$ A (max.)
- Single supply voltage: 1.7V to 5.5V
- Small packages: SOT-23 and MSOP

## □ Delta-Sigma Attributes:

- Resolution: 16 to 22 bits
- Max sampling rate: up to 240 sps
- Current consumption: 120 to 155  $\mu$ A (max.)
- Single supply voltage: 2.7V to 5.5V
- Small packages: SOT-23 and MSOP

# Digital Potentiometers

- **Function: buffering and filtering sensor signals for preserving signal characteristics and rejecting unwanted frequencies**

Popular Products	Description	Product Web Page
MCP4021	The MCP402X devices are non-volatile, 6-bit (64 wiper steps) digital potentiometers that are programmed/reprogrammed through a simple up/down serial interface.	<a href="#">Click Here</a>
MCP45xx	The MCP45XX devices offer a wide range of product offerings using an I2C™ Compatible interface. This family of devices support a 7-bit resistor network, Non-Volatile memory configurations, and Potentiometer and Rheostat pinouts. WiperLock Technology allows application-specific calibration settings to be secured in the EEPROM.	<a href="#">Click Here</a>
Additional Suggested Products: MCP46xx, 43xx, MCP44xx		

## □ **Attributes:**

- 6 to 8-bit resolution
- 2k, 5k, 10k, 50k and 100k Ohm options
- Low operating and shutdown current
- $\pm 1$  LSB max INL & DNL
- Single or dual per package
- Small SOT-23 & 3x2 DFN packages

# Voltage References

- **Function: providing the system with an accurate analog voltage for comparison (needed for ADC)**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>

# Voltage References

---

## □ **Attributes:**

- 1.2V (TC1070), 2.5V or 4.096V output
- Initial accuracy:  $\pm 1\%$  (max)
- Temperature coefficient: 50ppm/ $^{\circ}\text{C}$  (max)
- Output current:  $\pm 2\text{mA}$
- Operating current: 100 $\mu\text{A}$  (max)
- Industrial temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- SOT-23 and TO-92 packages



# (Low-Iq) Power Management ICs

- **Function: monitoring critical voltage levels and providing regulated, low-noise supply voltages ( $V_{in} > V_{out}$ ) for the system**

Popular Products	Description	Product Web Page
MCP1700	The MCP1700 can source up to 250mA of current with an extremely low input-output voltage differential of 178mV at 250mA. with the low current consumption of only	<a href="#">Click Here</a>
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click Here</a>
MCP1xx	The MCP1xx are a family of voltage supervisory devices which also operates as protection from brown-out conditions when the supply voltage drops below a safe operating level	<a href="#">Click Here</a>

Winning Attributes

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# (Low-Iq) Power Management ICs

---

## □ Attributes:

- Extremely low operating current: as low as 1 $\mu$ A (typ)
- Initial accuracy:  $\pm 2\%$
- Wide range of voltage options
- Industrial temperature range: -40°C to +85°C
- SC-70, SOT-23 and TO-92 packages

# Infrared

- **Function: providing low-cost, wireless two-way data connection**

Popular Products	Description	Product Web Page
MCP2122	Converts serial data from UART bit streams to IrDA standard bit streams (encodes) and from IrDA standard bit streams to UART bit streams (decodes). Requires input clock that is 16x needed baud rate.	<a href="#">Click Here</a>
MCP2140	MCP2140 embeds IrDA protocol handling and bit encoding/decoding, and provides the lowest cost, lowest power consumption solution for adding IrDA connectivity to embedded systems	<a href="#">Click Here</a>
MCP2155	MCP2155 provided IrDA protocol handling PLUS bit encoding/decoding functionality for Data Communication Equipment (DCE) applications in one low pincount device. Supports the IrCOMM (9-wire cooked service class), TinyTP, IrLMP, and IrLAP layers of the IrDA Standard protocol stack PLUS the bit encoding/decoding portion of the IrPHY	<a href="#">Click Here</a>

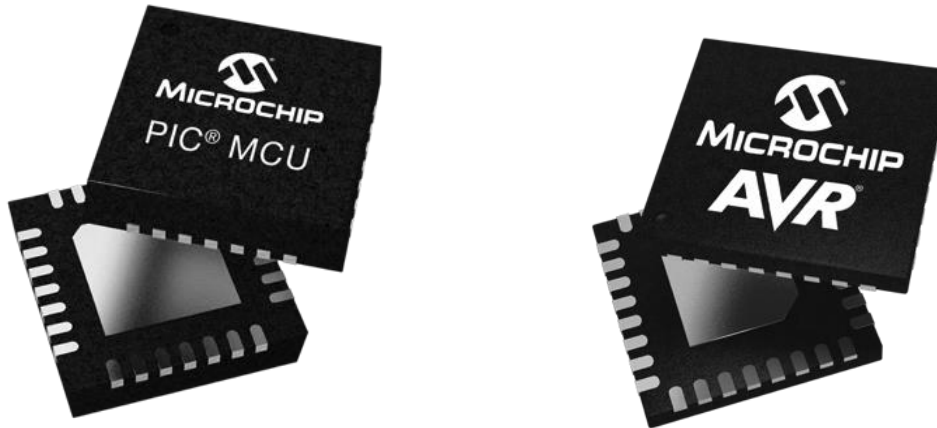


## □ **Attributes:**

- Enable infrared communication to be easily added to existing system
- IrDA® standard protocol embedded on chip (up to 115.2 kbaud)
- DTE and DCE applications supported
- Simple and flexible infrared encoder/decoder
- Easy to use developer's kit

# 8-bit MCU Highlights

- **PIC<sup>®</sup> MCU and AVR<sup>®</sup> Architectures**
  - Rich history in embedded design
  - Industry's strongest product portfolio
  - Powerful, easy-to-use tool chains
  - Best product lifecycle support
  - Innovative new peripherals



# 8-bit MCU Highlights

**More Than 1,250 8-bit MCUs in Our Portfolio!**

## □ **Code-Saving Peripherals**

- Core Independent Peripherals & Event System
- Touch sensing technologies

## □ **Lowest Power**

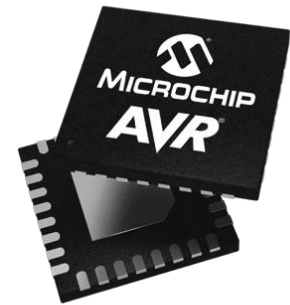
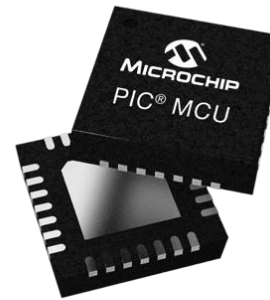
- picoPower & XLP technologies

## □ **Highest Robustness**

- Reliable operation in the harshest environments
- Best in class EMI/EMC performance

## □ **Best Design Community**

- AVR® Freaks community
- MPLAB® Xpress community





# 16-bit MCU Highlights

---

- ❑ **Ideal for Low Power, Motor Control and Digital Power**
  - ❑ Currently 425+ devices in production, 14 pin thru 144 pin
  - ❑ Flash Memory 4KB – 1024KB , RAM 256B – 96KB
  - ❑ 16 – 70 MIPS, DSP options
  - ❑ High-speed control loop execution with fast and predictable interrupts
- ❑ **Flexible Peripherals**
  - ❑ Fast and flexible PWMs and ADCs for Motor Control and Digital Power
  - ❑ Connectivity with USB, CAN and LIN
  - ❑ Integrated drivers for segmented LCD, Graphical TFT and e-Paper displays
  - ❑ Analog: 16-bit Sigma-Delta ADC, 10Msps 12-bit ADC, DAC and Op Amps
  - ❑ Functional Safety peripherals & functions
- ❑ **Lowest power 16-bit MCU**
  - ❑ Down to 9 nA in Deep Sleep
  - ❑ As low as 170 nA with RTCC active
  - ❑ Active mode currents as low as 150  $\mu$ A / MHz



# 16-bit MCU Highlights

---

- **Free Graphical Programming Environment - MCC**
  - Automated Configuration of Peripherals & Functions
  - Intuitive Interface for Quick Start Development
- **Free Software and Reference Designs**
  - USB, Graphics and Wireless stacks
  - DSP math function library (FFT, IIR, etc.) & Class B library
  - Motor Control libraries and Simulink models
  - Reference designs for Digital Power and Lighting applications
- **Typical Applications**
  - Motor Control: BLDC, PMSM, ACIM, Sensorless Control, FOC
  - Digital Power: Platinum Spec AC/DC, DC/DC, Solar Micro Inverter, PFC
  - Portable or Low Power: Run longer, save power, battery friendly
  - Displays: Directly drive Segmented or Graphical displays with single chip
- **Development Support from Microchip**
  - Silicon, Dev Tools, IDE, Compilers all from one vendor



**MICROCHIP**

**Microchip Analog Products  
for  
Wireless Handsets and  
Modules**

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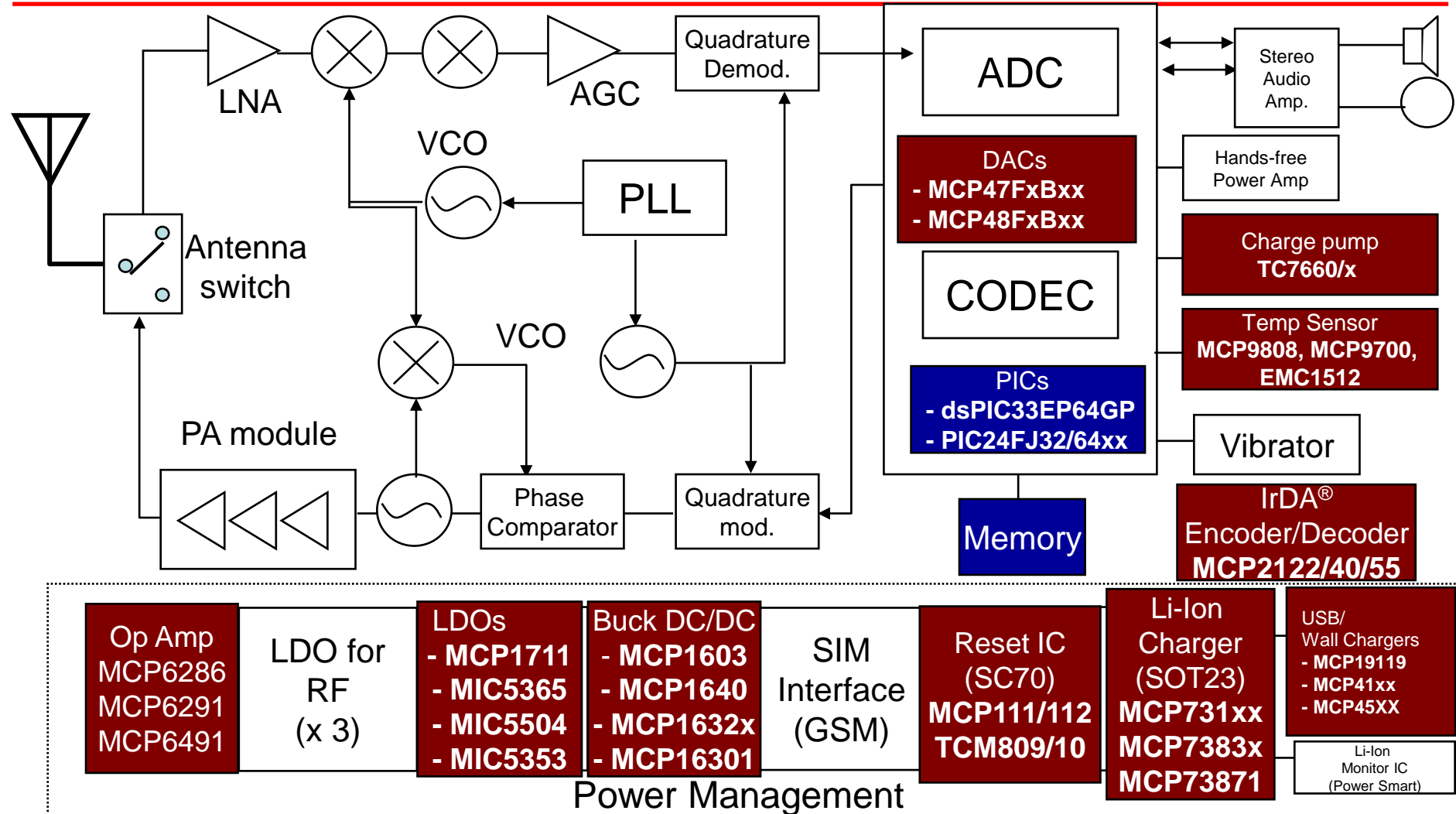
# Microchip's Winning Attributes

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- **Low operating current to extend battery life**
- **Integration & small packages to occupy smaller footprints on the board and reduce cost**
- **Competitive pricing for making the end equipment attractive on the market**
- **Low noise operation for allowing “clean” RF communication**
- **Wide product offering for minimizing customer's transaction and inventory costs**
- **Great lead times and customer support**



# Microchip Products for Wireless Handsets







# USB/ Wall Chargers

Popular Products	Description	Product Web Page
UCS1001	USB Port Power Controller with Charger Emulation	<a href="#">Click Here</a>
UCS1002	Programmable USB Port Power Controller with Charger Emulation	<a href="#">Click Here</a>
UCS1003	Programmable USB Port Power Controller with Charger Emulation, Current Monitoring, and Charge Rationing for Power Allocation	<a href="#">Click Here</a>
MIC2545A	Integrated high-side adjustable 3A current-limited power switch optimized for low-loss DC power switching and other power-management applications.	<a href="#">Click Here</a>
MIC2039	High-Accuracy, High-Side, Adjustable 2.5A Current Limit Power Switch	<a href="#">Click Here</a>

[Winning Attributes](#)

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# USB/Wall Chargers

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## □ **Attributes:**

- Protection for over-current, under-voltage, over-temperature, reverse-current, reverse-voltage conditions.
- Adjustable constant current limiting protects the switch and attached device.
- Integrated soft-start circuit minimizes and controls inrush currents for high capacitive loads.
- Integrated high speed USB2.0 switches for charger emulation supporting BC1.2, Apple, Samsung, and legacy charging profiles.



# Low Dropout Regulators

Function	Popular Products	Description	Product Web Page
Supply power to the analog (baseband) section - RF, IF, audio	MIC5308	150mA High PSRR, Low Iq LDO for noise sensitive RF, IF and Audio applications	<a href="#">Click Here</a>
	MIC5309	300mA High PSRR, Low Iq LDO for noise sensitive RF, IF and Audio applications	<a href="#">Click Here</a>
Supply power to the digital section - modem, DSP, codec	MIC5365	150mA High PSRR, ultra small 1x1 DFN LDO	<a href="#">Click here</a>
	MCP1703A	250mA 16Vin LDO with low Iq	<a href="#">Click Here</a>

Winning Attributes

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# Low Dropout Regulators

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## □ **Attributes:**

- High PSRR to filter incoming noises for noise sensitive applications such as RF, Audio codecs, IF, WiFi Modules.
- Small Package 1x1 DFN allows flexibility on PCB layout
- Low Iq of 2  $\mu$ A can extend the battery life of handsets or any other battery operated applications



# RESET Monitors

- **Function: Resets the CPU, DSP, and modem when supply voltage falls below threshold**

Popular Products	Description	Product Web Page
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click Here</a>
MCP100/1/2/3/21/20/31	The MCP1xx are a family of voltage supervisory devices which also operates as protection from brown-out conditions when the supply voltage drops below a safe operating level	<a href="#">Click Here</a>

Winning Attributes

NEXT: Voltage Detectors

## □ **Attributes:**

- Tiny SOT-23 and SC-70 packages
- Very low operating current: as low as 1 $\mu$ A (max)
- High threshold voltage accuracy:  $\pm 2.8\%$  (max)
- $V_{DD}$  transient immunity
- Manual RESET
- Many available options: push-pull output, open-drain output and internal pull-up resistor

# Voltage Detectors

- **Function: Monitor battery voltage level and indicate low-battery condition, monitor regulated supply voltages to RF, IF, and analog baseband sections**

Popular Products	Description	Product Web Page
MCP111/2	The MCP111/112 Series are CMOS voltage detectors are well suited for portable, consumer electronics applications due to the extremely low 1uA operating current and small surface-mount packaging. These devices are designed to hold the microcontroller in reset until the supply voltage reaches a predetermined operating level. These devices also protect against brownout conditions that occur as a result of the supply voltage dropping below a tolerable level.	<a href="#">Click Here</a>

# Voltage Detectors

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## □ **Attributes:**

- Tiny SOT-23 and SC-70 packages
- Very low operating current: 1 $\mu$ A (typ)
- Precise thresholds:  $\pm 2\%$  (typ)
- Open-drain and push-pull outputs



# Battery Chargers

- **Function: Charge & monitor the Lithium Ion battery**

Popular Products	Description	Product Web Page
MCP731xx	The MCP73811/2 devices are linear charge management controllers that are designed to provide specific charge algorithms for single cell Li-Ion or Li-Polymer battery to achieve optimal capacity in the shortest charging time possible.	<a href="#">Click Here</a>
MCP732xx	The MCP73123/223 is a highly integrated Lithium Iron Phosphate (LiFePO4) battery charge management controller that provide specific charge algorithms for LiFePO4 batteries to achieve optimal capacity and safety in the shortest charging time possible. Along with its small physical size, the low number of external components makes the MCP73123/223 ideally suitable for various applications.	<a href="#">Click Here</a>

# Battery Chargers

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## □ **Attributes:**

- Small thermally efficient DFN and QFN packages
- High-accuracy voltage regulation:  $\pm 0.5\%$  (max)
- Low operating current: 260 $\mu$ A (typ)
- Shutdown and pre-conditioning modes
- Temperature monitor & charge complete indicator
- USB/AC inputs
- Load sharing
- Overvoltage Protection (OVP)

# Operational Amplifiers

- **Function: filtering/amplifying for analog baseband and audio signal processing**

Popular Products	Description	Product Web Page
MCP6286	The MCP6286 operational amplifier provides low noise (5.4 nV/ $\sqrt{\text{Hz}}$ , typical), low power (520 $\mu\text{A}$ , typical) and rail-to-rail output operation. It is unity gain stable and has a gain bandwidth product of 3.5 MHz. This device operates with a single supply voltage from 2.2V to 5.5V.	<a href="#">Click Here</a>
MCP6291	The MCP629x family of operational amplifiers provides wide bandwidth for the current. This family has a 10 MHz gain bandwidth product, operates from a single supply voltage as low as 2.4V, while drawing 1 mA (typical) quiescent current.	<a href="#">Click Here</a>
MCP6491	The MCP649x family of operational amplifiers has low-input bias current (150 pA, typical at 125°C) and rail-to-rail input and output operation. This family is unity gain stable and has a gain bandwidth product of 7.5 MHz. These devices operate with a single-supply voltage as low as 2.4V, while only drawing 530 $\mu\text{A}$ /amplifier (typical) of quiescent current.	<a href="#">Click Here</a>

## □ **Attributes:**

- Small SC-70, TDFN and SOT-23 packages
- GBWP: 9 kHz to 410 MHz
- Excellent operating current-to-GBWP ratio
- Mostly rail-to-rail inputs and outputs
- Offset voltage: as low as 2 $\mu$ V (MCP6V0x)
- Chip Select capability for power savings

# Charge Pumps

- **Function: Provides simple and low cost DC to DC conversion**

Popular Products	Description	Product Web Page
TC7660x	Wide input, efficient voltage conversion DC-to-DC Charge Pump	<a href="#">Click Here</a>

# Charge Pumps

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## □ **Attributes:**

- Wide Input Voltage Range: 1.5 to 10V
- Efficient Voltage Conversion (99.9% typ.)
- Excellent Power Efficiency (98% typ.)
- Low Power Consumption (80uA typ.)
- Low Cost and Easy to Use
  - Only Two External Capacitors Required
- Improved ESD Protection (3kV HBM)



# Temperature Sensors

- Function: adjusting LCD contrast, measuring RF Power Amplifier temperature, thermally compensate RF oscillator

Popular Products	Description	Product Web Page
MCP9808 Digital temperature sensor	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^\circ\text{C}$ (max.) accuracy	<a href="#">Click Here</a>
MCP9700 Linear Active Thermistor™ ICs	The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.	<a href="#">Click Here</a>
EMC1412 Dual SMBus/I <sup>2</sup> C™ Temperature Sensor	This 1°C device has an local temperature channel and a remote temperature channel for reading ASIC temperatures or external temperatures. It is available in a 2x3 package.	<a href="#">Click Here</a>

Winning Attributes

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# Temperature Sensors Winning Attributes

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## □ Attributes:

- Small SC70, SOT-23 and DFN leadless packages
- Very low operating current: 35 to 250 $\mu$ A (typ)
- Very low shutdown current: 1 $\mu$ A (max)
- High temp accuracy:  $\pm 0.25^{\circ}\text{C}$
- Simple operation: no need for external components
- Analog and digital (SPI<sup>TM</sup>, I2C<sup>TM</sup>, SMBus<sup>TM</sup>) devices
- High temperature resolution
- Small SC70, SOT-23 and DFN leadless packages



# Switching Regulators

- **Function: efficiently convert Li-Ion voltage to DC voltage level required by the DSP or CPU**

Popular Products	Description	Product Web Page
MCP163xx	MCP163xx are highly integrated, high-efficiency, fixed frequency, step-down DC-DC converter that operates from input voltage sources up to 30V. Integrated features include a high side switch, fixed frequency Peak Current Mode Control, internal compensation, peak current limit and over temperature protection. Minimal external components are necessary to develop a complete step-down DC-DC converter power supply.	<a href="#">Click Here</a>
MCP1640	The MCP1640 is a compact, high-efficiency, fixed frequency, synchronous step-up DC-DC converter. It provides an easy-to-use power supply solution for applications powered by either one-cell, two-cell, or three-cell alkaline, NiCd, NiMH, one-cell Li-Ion or Li-Polymer batteries.	<a href="#">Click Here</a>
MIC2875	The MIC2875 is a compact and highly-efficient 2MHz synchronous boost regulator with a 4.8A switch. It features a bi-directional load disconnect, bypass mode, and integrated anti-ringing switch to minimize EMI. The MIC2875 is designed to operate with a minimum switching frequency of 45kHz to minimize switching artifacts in the audio band.	<a href="#">Click Here</a>

## □ **Attributes:**

- Small SOT and DFN package
- Auto-switching PWM/PFM operation
- Efficiency as high as 96%
- Very low shutdown current  $<1\mu\text{A}$  (typ)
- Input voltage as high as 30V
- UVLO, Soft-start & over-temperature protection
- Boost Start-up as low as 0.65V
- Bi-directional true load disconnect
- Integrated anti-ringing switch
- Bypass mode for  $V_{\text{IN}} \geq V_{\text{OUT}}$

# Infrared

- **Function: providing low-cost, wireless two-way data connection - infrared port**

Popular Products	Description	Product Web Page
MCP2122	Converts serial data from UART bit streams to IrDA standard bit streams (encodes) and from IrDA standard bit streams to UART bit streams (decodes). Requires input clock that is 16x needed baud rate.	<a href="#">Click Here</a>
MCP2140	MCP2140 embeds IrDA protocol handling and bit encoding/decoding, and provides the lowest cost, lowest power consumption solution for adding IrDA connectivity to embedded systems	<a href="#">Click Here</a>
MCP2155	MCP2155 provided IrDA protocol handling PLUS bit encoding/decoding functionality for Data Communication Equipment (DCE) applications in one low pincount device. Supports the IrCOMM (9-wire cooked service class), TinyTP, IrLMP, and IrLAP layers of the IrDA Standard protocol stack PLUS the bit encoding/decoding portion of the IrPHY	<a href="#">Click Here</a>

## □ **Attributes:**

- Enable infrared communication to be easily added to existing system
- IrDA® standard protocol embedded on chip (up to 115.2 kbaud)
- DTE and DCE applications supported
- Simple and flexible infrared encoder/decoder
- Easy to use developer's kit

- **Function: Convert digital processed signal back to analog output signal**

Popular Products	Description	Product Web Page
MCP47FEB01/2/3 MCP47FEB11/2/3 MCP47FEB21/2/3	Single/Dual, 8-/10-/12-bit DAC with EEPROM and I <sup>2</sup> C Interface	<a href="#">Click Here</a>
MCP48FEB01/2/3 MCP48FEB11/2/3 MCP48FEB21/2/3	Single/Dual, 8-/10-/12-bit DAC with EEPROM and SPI Interface	<a href="#">Click Here</a>

# DACs Winning Attributes

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## □ Attributes:

- Integrated EEPROM to save DAC settings at power-down
- Integrated MTP to save DAC setting at power-down and option to reprogram the settings.
- Selectable  $V_{REF}$  sources for design flexibility
- Low power consumption to extend battery life
- LAT pin allows DAC synchronization to an external event

# Memory

- **Function: NOR flash used in feature phones and voice-centric phones to store boot code, phonebook, ringtone, SMS, or most recent camera images.**

Popular Products	Description	Product Web Page
SST26WF032C	Low power 1.8V 32Mb SQI (serial quad IO) flash, 104 MHz with XIP capability, small footprint	<a href="#">Click Here</a>
SST26WF064C	Low power 1.8V 64Mb SQI (serial quad IO) flash, 104 MHz with XIP capability, small footprint	<a href="#">Click Here</a>
SST39WF1601	Low power 1.8V 16Mb Parallel flash with random access and fast erase/program performance	<a href="#">Click Here</a>
SST39VF1601C	3V 16Mb Parallel flash with random access and fast erase/program performance	<a href="#">Click Here</a>

## □ **Attributes:**

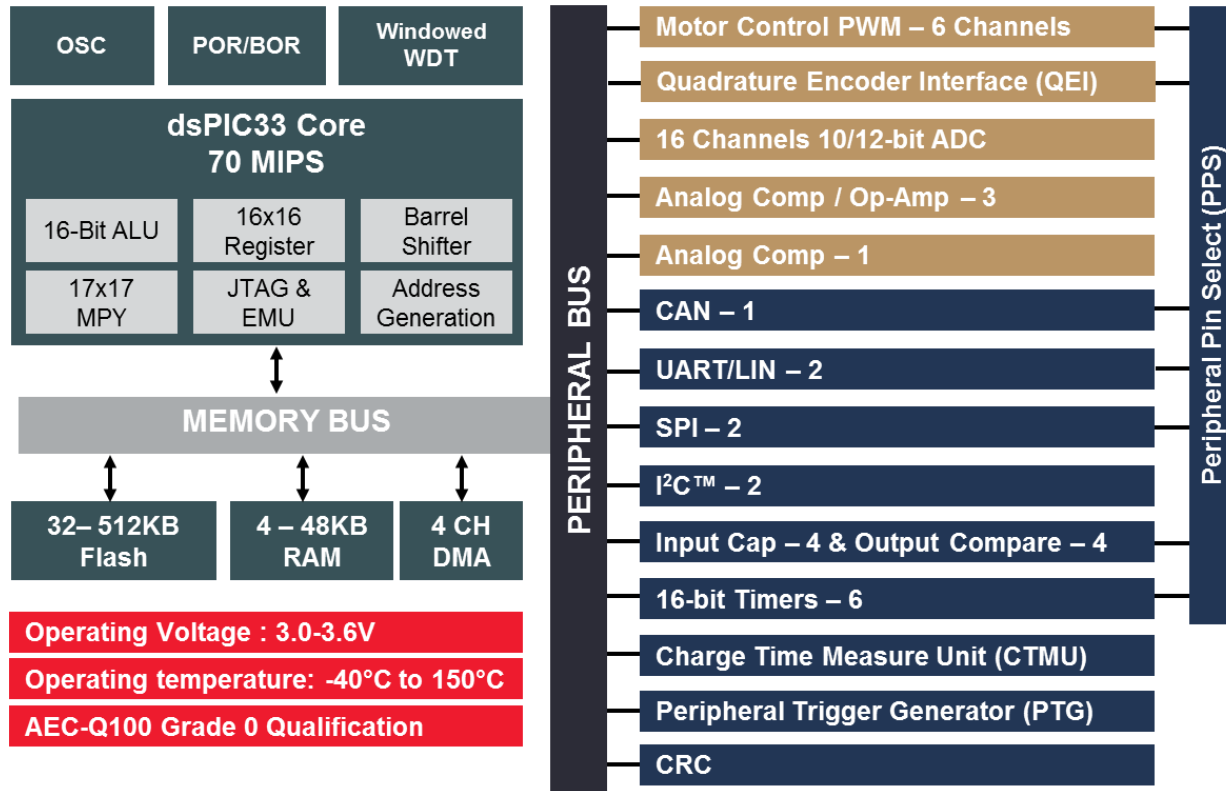
- Extremely fast erase and re-write performance
- Superior reliability with 100 years of data retention
- Low power consumption ideal for any portable application
- Small footprints suitable for compact designs



# PIC Microcontrollers

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- **Function: providing additional processing power for support of specific functions**
  - dsPIC33EP64GP: Echo and Noise Cancelling Support
  - PIC24FJ32/64xx: Monitoring and Supervisor Functions
- **Attributes:**
  - Easy migration in pins and memory
  - dsPIC33 with DSP instructions for math intensive applications
  - PIC24F for low cost and low power applications



**Operating Voltage : 3.0-3.6V**

**Operating temperature: -40°C to 150°C**

**AEC-Q100 Grade 0 Qualification**

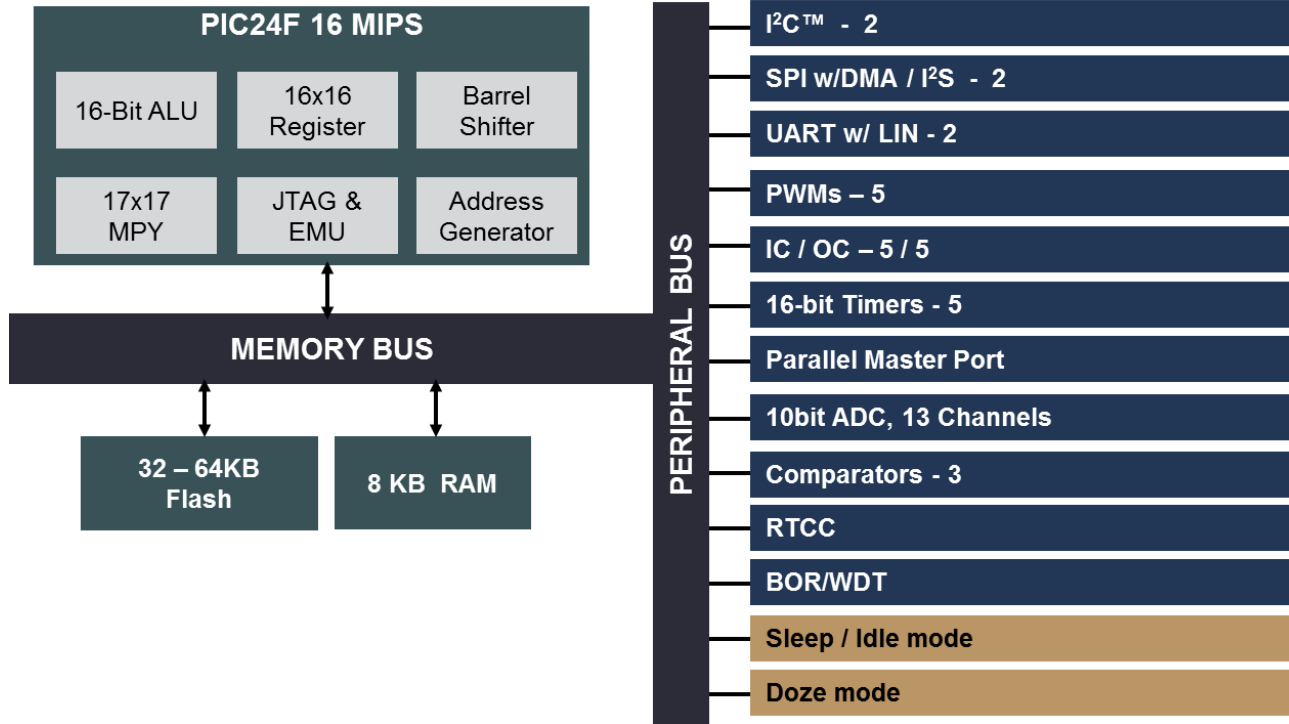
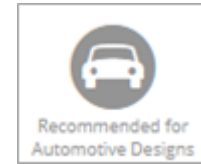
### Package Options

- 28-pin: SPDIP, SOIC, SSOP
- 28-pin QFN-S
- 36-pin VTLA
- 44-pin: TQFP, QFN,
- 48-pin: uQFN
- 64-pin: TQFP, QFN (64KB or higher)

- **Attributes:**
  - Flash range from 32 to 512KB for scalability
  - 70 MIPS performance
  - 16-bit data path
  - 24-bit instructions
  - Robust peripheral set including UART, SPI, I2C, CAN, Timers
  - Peripheral mapping to pins

[LEARN MORE](#)

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- **Attributes:**
  - Flash range from 32 to 64KB for scalability
  - 16 MIPS performance
  - 16-bit data path
  - 24-bit instructions
  - Robust peripheral set including UART, SPI, I2C, Timers
  - Low power and low cost

**Package Options**

- 28-pin: SPDIP, SOIC, SSOP
- 44-pin: TQFP, QFN

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**MICROCHIP**

# **Microchip Analog Products for Power Supplies**

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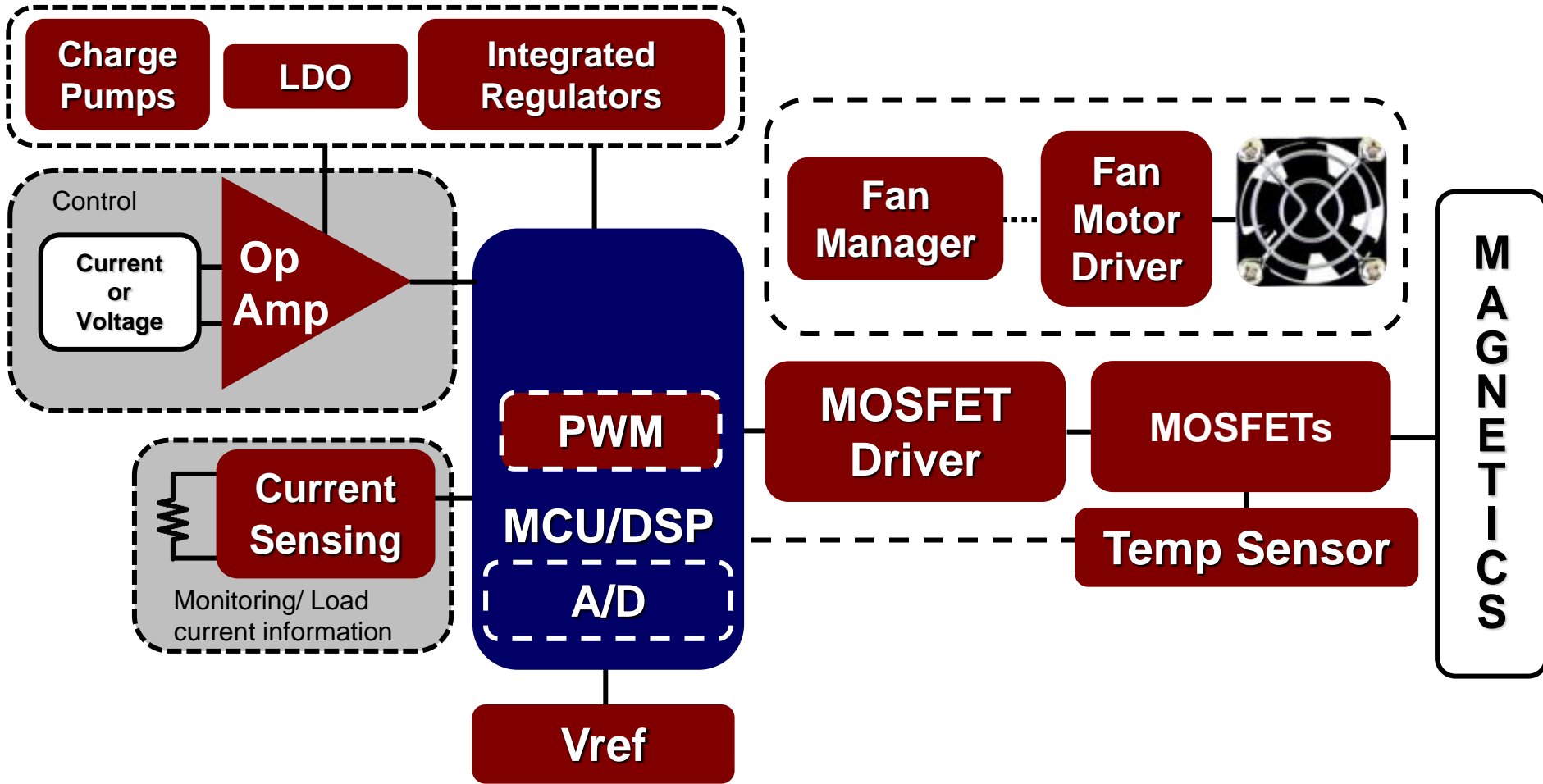
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# Microchip's Winning Attributes

- **A wide variety of analog and digital products for complete system solution**
- **One of the first & leading suppliers in MOSFET driver and temperature sensor products**
- **Great lead times and customer support**
- **Competitive pricing for making the end equipment attractive on the market**
- **Small packages to occupy smaller footprints on the board and reduce cost**

# Power Supply



Metering Concentrator

Power Monitoring

Industrial Control Panel

2D Barcode Scanner

Distributed Point-of-Load Power Architecture

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# Current Sensing

Popular Products	Description	Product Web Page
PAC1710	The PAC1710 is a high-side bi-directional current sensing monitor with precision voltage measurement capabilities. The power monitor measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator.	<a href="#">Click Here</a>
PAC1720	The PAC1720 is a dual high-side bi-directional current sensing monitor with precision voltage measurement capabilities. Each sensor measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator.	<a href="#">Click Here</a>
PAC1921	The PAC1921 is a dedicated power-monitoring device with a configurable analog output that can present power, current or voltage. The PAC1921 is designed for power measurement and diagnostic systems that cannot allow for latency when performing high-speed power management.	<a href="#">Click Here</a>

# Fan Managers

- **Function: controlling fan speed according to ambient temperature for reducing acoustic noise and extending fan life**

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
EMC2101	The EMC2101 is an SMBus 2.0 compliant, integrated fan control solution complete with two temperature monitors, one external and one internal.	<a href="#">Click Here</a>



# Fan Motor Driver

Products		Description	Product Web Page
Three-Phase BLDC Fan Motor Drivers	MTD6501C/D/G (23kHz)	Standalone 3- $\Phi$ Sinusoidal Sensorless BLDC Motor Controller. 12V; $I_{MAX} = 800$ mA	<a href="#">Click Here</a>
	MTD6502B	Standalone 3-Phase Sinusoidal Sensorless BLDC Motor Controller. 5V Application; $I_{MAX} = 750$ mA ; TDFN - 10	<a href="#">Click Here</a>
	MTD6505	Standalone 3-Phase Sinusoidal Sensorless BLDC Motor Controller - 5V Application; $I_{MAX} = 750$ mA ; UDFN – 10; -Programmable BEMF Coefficient	<a href="#">Click Here</a>

# Temperature Sensors

- **Function: Shutting down the system when temperature rises above operating limit**

Popular Products	Description	Product Web Page
TC1047A	Supply Voltage Range: 2.5V to 5.5V, Wide Temperature Measurement Range: -40°C to +125°C, High Temperature Converter Accuracy: $\pm 2^\circ\text{C}$ , Max, at 25°C, Linear Temperature Slope: 10mV/°C, Very Low Supply Current: 35 $\mu\text{A}$ Typical	<a href="#">Click Here</a>
EMC1701	The EMC1701 is a combination high-side current sensing device with precision temperature measurement. It measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator.	<a href="#">Click Here</a>
EMC1412	The EMC1412 is a high accuracy, low cost, System Management Bus (SMBus) temperature sensor. Advanced features such as Resistance Error Correction, Beta Compensation and automatic diode type detection combine to provide a robust solution for complex environmental monitoring applications	<a href="#">Click Here</a>



# MOSFET Drivers

- **Function: driving the high power devices (MOSFETs, bipolar transistors, IGBTs)**

Popular Products	Description	Product Web Page
TC4427A	Supply Voltage Range: 2.5V to 5.5V Wide Temperature Measurement Range: -40°C to +125°C High Temperature Converter Accuracy: $\pm 2^\circ\text{C}$ , Max, at 25°C Linear Temperature Slope: 10mV/°C Very Low Supply Current: 35 $\mu\text{A}$ Typical	<a href="#">Click Here</a>
MCP14A0151/2	The MCP14A0151 and MCP14A0152 are inverting and non-inverting, 1.5 A MOSFET drivers in 2x2 DFN and SOT-23 packages. The small package sizes allow the gate driver to be positioned close to the MOSFET's physical gate connection, which minimizes gate bounce caused by the parasitic effects of PCB layout and reduces EMI. These devices feature a unique architecture with low input thresholds, ideally suited for use with a low-voltage MCU to minimize power losses within the system.	<a href="#">Click Here</a>
MCP14E3/E4/E5	The MCP14E3/E4/E5 devices are a family of 4.5A, dual output buffers/MOSFET drivers with separate enable functions for each output. As MOSFET drivers, the MCP14E3/E4/E5 can easily charge 2200 pF gate capacitance in under 28 nsec (max)	<a href="#">Click Here</a>

# Voltage References

- **Function: providing the system with an accurate analog voltage for comparison**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>



# Analog PWM Controllers

- **Function: PWM generation to maintain stable power supply outputs while managing faults**

Popular Products	Description	Product Web Page
MIC2125/6	Constant-frequency synchronous buck controllers with a unique adaptive ON-time control architecture, and an optional transition to variable frequency, discontinuous conduction mode. Operating from an input from 4.5V to 28V, 200 kHz to 650 kHz with an output voltage adjustable down to 0.6V with a guaranteed accuracy of $\pm 1\%$ .	<a href="#">Click Here</a>
MIC2176-x	Constant-frequency, synchronous buck controllers featuring a unique digitally modified adaptive ON-time control architecture for fast transient response with minimal output capacitance and High $V_{IN}$ /Low $V_{OUT}$ operation. Working over an input supply range from 4.5V to 75V; a constant switching frequency of 100, 200, or 300kHz; and an output voltage is adjustable down to 0.8V with a guaranteed accuracy of $\pm 1\%$ .	<a href="#">Click Here</a>
MCP1630	When used with a microcontroller, the MCP1630 will control the power system duty cycle to provide output voltage or current regulation. The inputs are designed to easily attach to the I/O of a microcontroller, which supplies the reference and oscillator, to generate a flexible and adaptable power system.	<a href="#">Click Here</a>

Winning Attributes

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## □ **Attributes:**

- High speed PWM operation
- Peak current mode operation to 1.0MHz
- Wide operating temperature range, -40°C to +125°C
- MCP1630 accepts variable controlling inputs from  $\mu\text{C}$
- UVLO, short circuit, over current protection circuits
- Precision peak current limiting

# PIC Microcontrollers

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- ❑ **Function: providing all the control functions and the PWM output for the system**
- ❑ **Popular products: PIC16F182X, 178X, 75X, 15XX, 193X**
- ❑ **Attributes:**
  - ❑ Upwards of 32MHz internal OSC
  - ❑ Slope compensation
  - ❑ 4 channel programmable switch mode controller (PSMC)
  - ❑ Integrated high performance comparators, op-amp, 10/12 bit ADC, 5/8/9 bit DAC
  - ❑ 256 bytes of EEPROM
  - ❑ Available in various packages



# Operational Amplifiers

Function	Popular Products	Description	Product Web Page
Sense and gain up output current - low offset voltage required for minimizing measurement error	MCP602x	The MCP6021/2/3/4 op amps have a gain bandwidth of 10 MHz with a low typical operating current of 1mA and an offset voltage that is less than 150 $\mu$ V.	<a href="#">Click Here</a>
	MCP6V01 Zero Drift Op Amps	VOS: $\pm 2$ $\mu$ V (maximum), PSRR: 130 dB (minimum), CMRR: 130 dB (minimum), IQ: 300 $\mu$ A/amplifier (typical) Wide Supply Voltage Range: 1.8V to 5.5V	<a href="#">Click Here</a>
Provide feedback compensation by sensing output voltage and comparing it with reference voltage	MCP6404	The MCP6404 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typ. quiescent current of 40 microamperes.	<a href="#">Click Here</a>
	MCP60x	MCP601/2/3/4 (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 230 $\mu$ A and an offset voltage that is less than 2 mV.	<a href="#">Click Here</a>

Winning Attributes

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## □ **Attributes:**

- Small SC-70, TDFN and SOT-23 packages
- GBWP: 9 kHz to 60MHz
- Excellent operating current-to-GBWP ratio
- Mostly rail-to-rail inputs and outputs
- Offset voltage: as low as 2 $\mu$ V (MCP6V0x)
- Chip Select capability for power savings



# Power Management Linear Regulators (LDOs)

Popular Products	Description	Product Web Page
MCP1703A	With 250 mA maximum output and input voltage capability of up to 16V, this device creates compact systems. This features a low 2 $\mu$ A quiescent current for efficient operation at light load.	<a href="#">Click Here</a>
MIC5239 30V LDO	This is a low quiescent current, $\mu$ Cap low-dropout regulator. With a maximum operating input voltage of 30V and a quiescent current of 23 $\mu$ A, it is ideal for supplying keep-alive power in systems with high voltage batteries.	<a href="#">Click Here</a>
MIC29302A	This high-current, low-cost, low-dropout voltage regulator uses a proprietary Super $\beta$ PNP <sup>®</sup> process with a PNP pass element. The 3A LDO regulator features low 450mV (full load) dropout voltage and very low ground current.	<a href="#">Click Here</a>
MCP1754/5	This 16 volt, high PSRR voltage regulator provides up to 150 mA of current (or 300 mA for MCP1755) with short circuit current foldback. Simplified, low pin count versions of the of these devices are also available.	<a href="#">MCP1754</a> <a href="#">MCP1755</a>
MIC94325	With a 500mA rated output current, fixed or adjustable output voltages, and ripple blocking active noise rejection over a wide frequency band: >50dB from 10Hz to 5Mhz, these LDOs are suitable for a wide variety of applications. Available in Ultra-small 0.84mm x 1.32mm 6-ball CSP and 1.6mm x 1.6mm 6-pin Thin DFN, with enable and auto-discharge output options.	<a href="#">Click Here</a>
MIC550X	Simple, effective 5.5V input LDO in the extremely compact 1x1 DFN.	<a href="#">Click Here</a>

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# Power Management Charge Pumps

- **Function: Compact, low current output boost conversion (increasing from input to output) or inversion (creating a negative output), without large, expensive inductors**

Popular Products	Description	Product Web Page
MCP1253/4	Regulated charge pumps, capable of maintaining a specific regulated output voltage from 2.1V to 5.0V input range, while supplying up to 120 mA load current. 3.3V, 5.0V, or adjustable output options available.	<a href="#">Click Here</a>
TC7660/2	The TC7660 is a charge pump voltage converter that +1.5V to +10V input to a corresponding -1.5V to -10V output using two low-cost capacitors. Can also be used to double the input voltage.	<a href="#">Click Here</a>



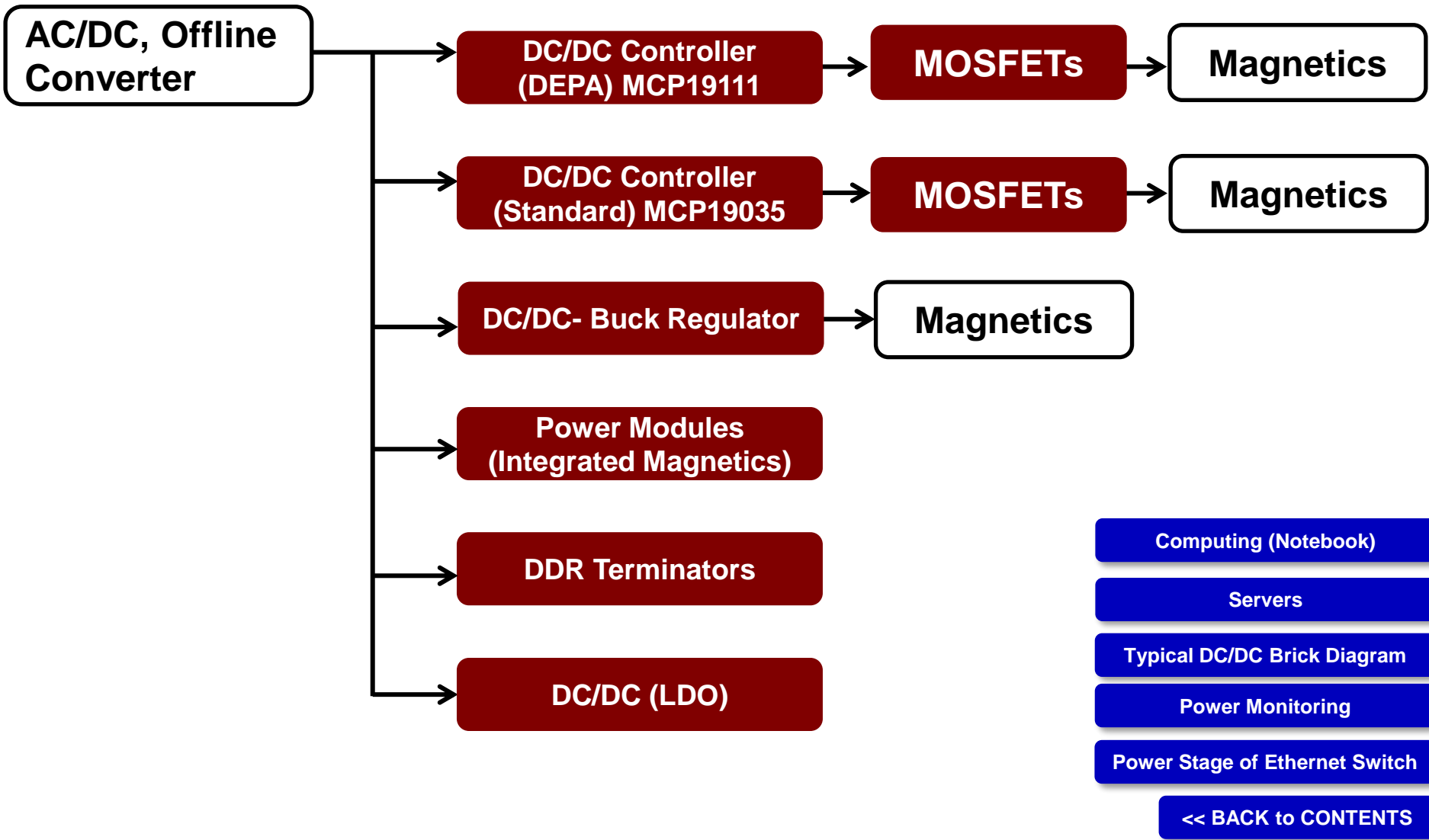
# Power Management Switching Regulators

Popular Products	Description	Product Web Page
MIC24046	<p>Pin-programmable, high-efficiency, wide input range, 5A synchronous step-down regulator perfectly suited for multiple-voltage rail application environments typically found in computing and telecommunication systems. The pin-selectable switching frequency, adjustable output voltage, pin-selected current limit, valley-current mode control technique, high-performance error amplifier, and external compensation allow for the best trade-offs between high efficiency and the smallest possible solution size.</p>	<a href="#">Click Here</a>
MIC2405x	<p>Constant-frequency, synchronous DC/DC buck regulator featuring adaptive on-time control architecture, and an internal linear 5V regulator to operate from 4.5 to 19V; at a constant 600kHz switching frequency in continuous-conduction mode; and can be used to provide up to 6A of output current at an adjustable output voltage down to 0.8V. With the HyperLight Load® architecture it has the ability to transition to variable-frequency, discontinuous-mode operation at light load, and a full suite of protection features to ensure protection of the IC during fault conditions (undervoltage lockout, thermal shutdown, internal soft-start, foldback current limit and “hiccup mode” short-circuit protection).</p>	<a href="#">Click Here</a>
MCP16311/2	<p>The MCP16311/2 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC converter that operates from input voltage sources up to 30V. Integrated features include a high-side and a low-side switch, fixed frequency Peak Current Mode Control, internal compensation, peak-current limit and over temperature protection.</p>	<a href="#">Click Here</a>

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# Distributed Point-of-Load Power Architecture





# Digitally-Enhanced Power Analog Controllers

- **Function: Customizable, analog power controller with digital interfaces and a PIC® MCU core for**

Popular Products	Description	Product Web Page
MCP19110/1	The MCP19111 is a mid-voltage (4.5-32V) synchronous buck analog-based PWM controller family with an integrated 8-bit PIC® Microcontroller. This unique product combines the performance of a high-speed analog solution, including high-efficiency and fast transient response, with the configurability and communication interface of a digital solution. This can produce high-efficiency (>96%) DC/DC power-conversion solutions, with PMBus or digital communication, and on the fly operational adjustments.	<a href="#">Click Here</a>
MCP19118/9	Similar to the MCP19111, capable of 40V operation and 48V transients.	<a href="#">Click Here</a>
MCP19114/5	Brings the flexibility of the MCP19111 control and configuration to single dual low side drive topologies (flyback, boost , SEPIC, Cuk). Ideally suited for current regulation applications with intelligence, like smart LED drive or smart battery charging.	<a href="#">Click Here</a>



# DC/DC Power Controller

- **Function: Analog PWM controller driving external power MOSFETs in high-power, DC-DC applications**

Popular Products	Description	Product Web Page
MIC2125/6	Constant-frequency synchronous buck controllers with a unique adaptive ON-time control architecture, and an optional transition to variable frequency, discontinuous conduction mode. Operating from an input from 4.5V to 28V, 200 kHz to 650 kHz with an output voltage adjustable down to 0.6V with a guaranteed accuracy of $\pm 1\%$ .	<a href="#">Click Here</a>
MIC2176-x	Constant-frequency, synchronous buck controllers featuring a unique digitally modified adaptive ON-time control architecture for fast transient response with minimal output capacitance and High $V_{IN}$ /Low $V_{OUT}$ operation. Working over an input supply range from 4.5V to 75V; a constant switching frequency of 100, 200, or 300kHz; and an output voltage is adjustable down to 0.8V with a guaranteed accuracy of $\pm 1\%$ .	<a href="#">Click Here</a>
MCP1630	When used with a microcontroller, the MCP1630 will control the power system duty cycle to provide output voltage or current regulation. The inputs are designed to easily attach to the I/O of a microcontroller, which supplies the reference and oscillator, to generate a flexible and adaptable power system.	<a href="#">Click Here</a>



# High-Speed MOSFETs

## Function: High-Efficiency, Switched Mode Power Conversion Power Devices

Popular Products	Description	Product Web Page
MCP87xxx	The MCP87xxx family of high-speed MOSFETs have been designed to optimize the trade-off between ultra-low On-state resistance ( $R_{ds-on}$ ) and Gate Charge ( $Q_g$ ) to maximize power conversion efficiency in switched mode power supplies.	<a href="#">Click Here</a>

Winning Attributes

Distributed Point-of-Load Power Architecture

Typical DC/DC Brick Diagram





# High-Speed MOSFETs

- Very low  $R_{ds-on}$  and gate charge ( $Q_g$ ) product
- Optimized for high-efficiency power conversion in high frequency converters (300kHz – 1MHz)

Product ID	Type	Config	Vds (V)	Vgs (V)	Rds_on @ 4.5V (mΩ-typ)	Qg (nC)	Package
MCP87022*	N	Single	25	+10/-8	2.2	25	5x6 DFN
MCP87030	N	Single	25	+10/-8	3	13.3	5x6 DFN
MCP87050*	N	Single	25	+10/-8	5	9	5x6 DFN
MCP87055*	N	Single	25	+10/-8	5.5	6	3.3x3.3 DFN
MCP87090	N	Single	25	+10/-8	9	4	5x6 DFN 3.3x3.3 DFN
MCP87130	N	Single	25	+10/-8	13	2.9	5x6 DFN 3.3x3.3 DFN



# DC-DC Switching Regulator

Popular Products	Description	Web Page
MIC24051	This is a constant-frequency, synchronous buck regulator featuring a unique adaptive on-time control architecture. The device operates over an input supply range of 4.5V to 19V; provides a regulated output with up to 6A current; at an adjustable output voltage; with a guaranteed accuracy of $\pm 1\%$ ; at a switching frequency of 600kHz.	<a href="#">Click Here</a>
MIC24055	A constant-frequency, synchronous buck regulator featuring a unique adaptive on-time control architecture, this device can operate over an input supply range of 4.5V to 19V; provides a regulated output of up to 12A of output current; with an adjustable output voltage down to 0.8V and a guaranteed accuracy of $\pm 1\%$ ; at a switching frequency of 600kHz.	<a href="#">Click Here</a>
MCP16311/2	This is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC converter in a 8-pin MSOP, or 2 x 3 TDFN package that can operate from input voltage sources up to 30V. Integrated features include a high-side and a low-side switch, fixed frequency Peak Current Mode Control, internal compensation, peak-current limit and over temperature protection.	<a href="#">Click Here</a>
MIC24046	This device is a pin-programmable, high-efficiency, wide-input range, 5A, synchronous step-down regulator. It is perfectly suited for multiple-voltage rail application environments typically found in computing and telecommunication systems; can be configured by pin strapping the desired output voltage, switching frequency, and current-limit values. The pin-selectable switching frequency, valley-current-mode control technique, high-performance error amplifier, and external compensation allow for the best tradeoffs between high-efficiency and the smallest possible solution size.	<a href="#">Click Here</a>



# DC-DC Linear Regulator

- **Function: Providing regulated, low-noise supply voltages ( $V_{in} > V_{out}$ ) with minimal components**

Popular Products	Description	Product Web Page
MCP1703A	With 250 mA maximum output and input voltage capability of up to 16V, this device creates compact systems. This features a low 2 $\mu$ A quiescent current for efficient operation at light load.	<a href="#">Click Here</a>
MIC5239 30V LDO	This is a low quiescent current, $\mu$ Cap low-dropout regulator. With a maximum operating input voltage of 30V and a quiescent current of 23 $\mu$ A, it is ideal for supplying keep-alive power in systems with high voltage batteries.	<a href="#">Click Here</a>
MIC29302A	This high-current, low-cost, low-dropout voltage regulator uses a proprietary Super $\beta$ PNP <sup>®</sup> process with a PNP pass element. The 3A LDO regulator features low 450mV (full load) dropout voltage and very low ground current.	<a href="#">Click Here</a>
MCP1754/5	This 16 volt, high PSRR voltage regulator provides up to 150 mA of current (or 300 mA for MCP1755) with short circuit current foldback. Simplified, low pin count versions of the of these devices are also available.	<a href="#">MCP1754</a> <a href="#">MCP1755</a>
MIC550X	Simple, effective 5.5V input LDO in the extremely compact 1x1 DFN.	<a href="#">Click Here</a>



# DC-DC Power Modules

- **Function: Fully integrated DC-DC conversion, with integrated magnetics, for compact, fast, thermally efficient, low EMI system development**

Popular Products	Input Voltage Range	Maximum Output Current	Output Voltage	Package	Product Web Page
MIC45116	4.75V to 20V	6A	Adjustable	8mm x 8mm x 3mm QFN	<a href="#">Click Here</a>
MIC45205	4.5V to 26V	6A	Adjustable	8mm x 8mm x 3mm QFN	<a href="#">Click Here</a>
MIC45208	4.5V to 26V	10A	Adjustable	10mm x 10mm x 4mm QFN	<a href="#">Click Here</a>
MIC45212	4.5V to 26V	14A	Adjustable	12mm x 12mm x 4mm QFN	<a href="#">Click Here</a>

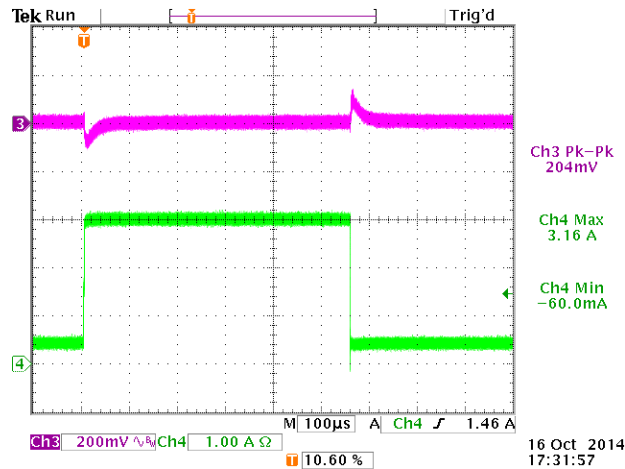
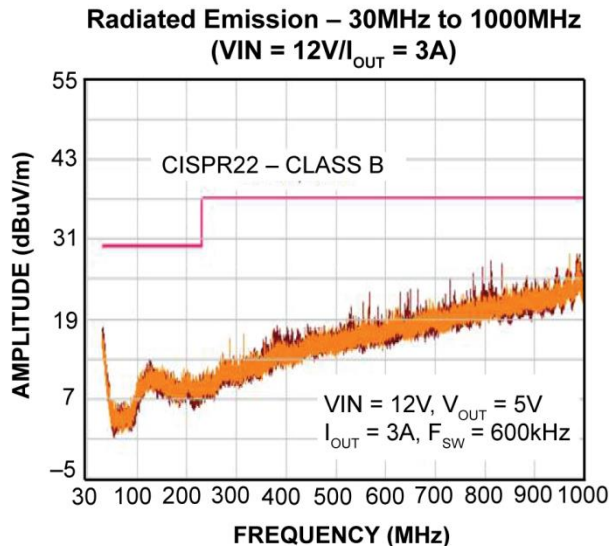
Winning Attributes

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# DC-DC Power Modules

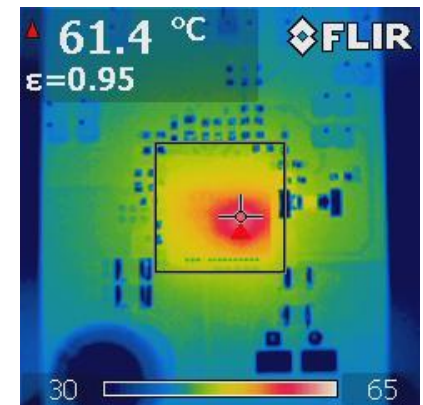
## Attributes:

- Fast transient response
- Enhanced thermal response packaging
- Low EMI



VIN = 24V , VOUT = 5V @ 3A

12mm x 12mm x 3mm



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# DDR Terminators

Popular Products	Description	Product Web Page
MIC5162	The MIC5162 is a dual regulator controller designed for high-speed bus termination. It offers a simple, low-cost JEDEC compliant solution for terminating high-speed, low-voltage digital buses (i.e. DDR, DD2, DDR3, SCSI, GTL, SSTL, HSTL, LV-TTL, Rambus, LV-PECL, LV-ECL, etc).	<a href="#">Click Here</a>
MIC5165	The MIC5165 is a dual regulator controller designed specifically for low-voltage memory termination applications such as DDR3 and GDDR3/4/5. The MIC5165 offers a simple, low-cost JEDEC-compliant solution for terminating high-speed, low-voltage digital buses with a Power Good (PG) signal.	<a href="#">Click Here</a>
MIC5166	The MIC5166 is a 3A, high-speed, linear, low VIN, double data rate (DDR), memory terminator power supply. The part is small and requires small output capacitors making it a tiny overall solution. This allows it to be conveniently placed close to the DDR memory, minimizing circuit board layout inductance which may cause excessive voltage ripple at the DDR memory.	<a href="#">Click Here</a>
MIC5167	The MIC5167 is a high-efficiency, 6A, integrated switch, synchronous buck (step-down) regulator designed for use as a double data rate (DDR) or quad data rate (QDR) terminator. The MIC5167 is optimized for highest efficiency, achieving more than 94% efficiency while still switching at 1MHz over a broad range.	<a href="#">Click Here</a>

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**MICROCHIP**

# **Personal Video Recorders (Set-Top Box)**

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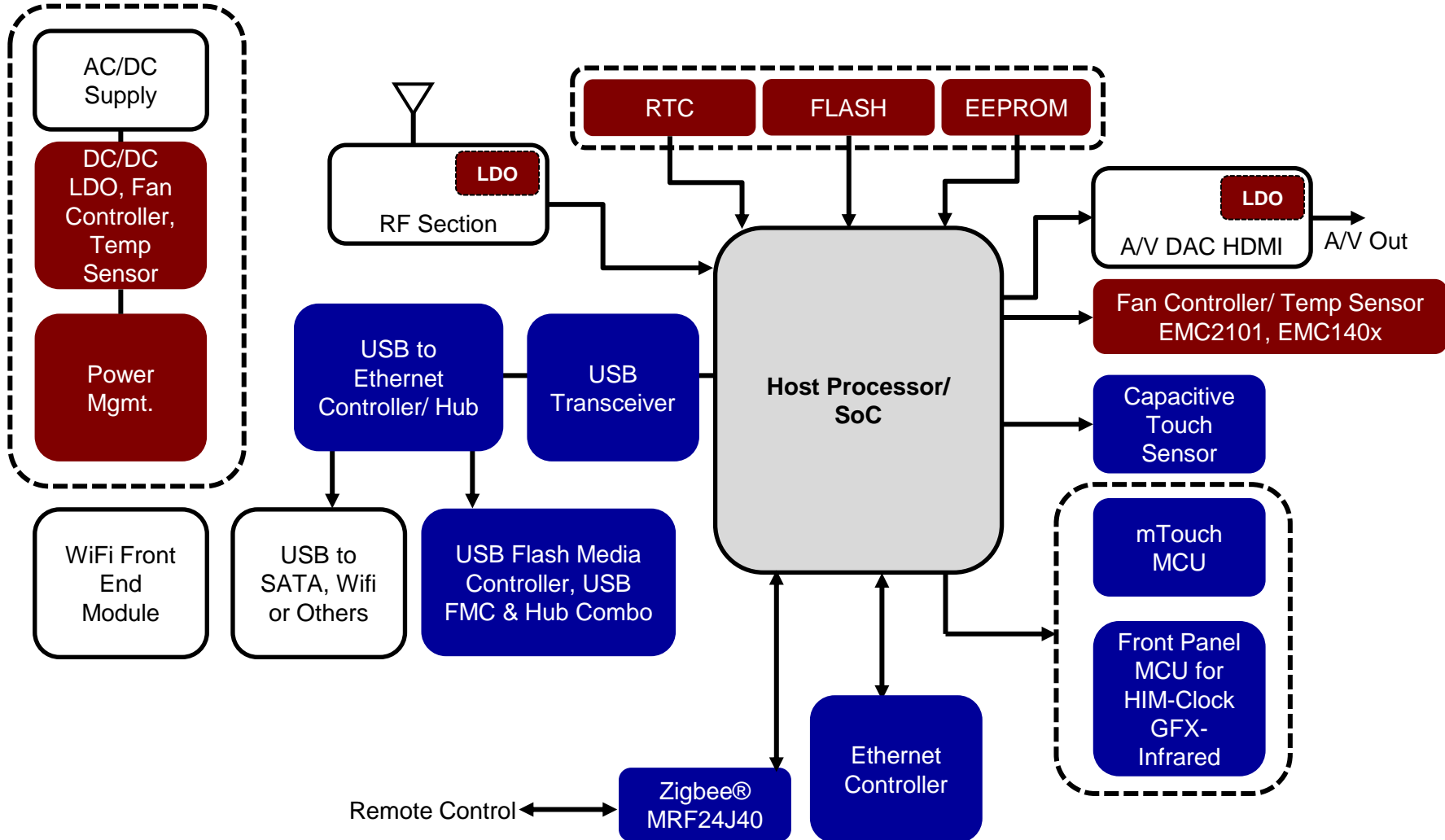
# Microchip's Winning Attributes

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- **Large offering of LDO and Resets covering needed voltages**
- **Heat reducing DC to DC converters at needed voltages**
- **RR-I/O Op Amps reduce design concerns**
- **Attach sell with PICmicro often used in Set-Top Box for system control and power management**
- **Wide product offering for minimizing customer's transaction and inventory costs**
- **Great lead times and customer support**



# Set-Top Box





# Low Noise High PSRR LDO

Popular Products	Description	Product Web Page
MCP1754	The MCP1754/5 is a 16 volt, high PSRR voltage regulator with short circuit current foldback. The MCP1754 regulator provides up to 150 mA of current. The MCP1755 regulator provides up to 300 mA of current. The input operating voltage range is specified from 3.6V to 16V continuous, 18V absolute maximum, 12 VDC systems. Simplified, low pin count versions of the of these devices are also available	<a href="#">Click Here</a>
MCP1755		<a href="#">Click Here</a>

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# RTC/ Memory

Function	Popular Products	Description	Product Web Page
Real Time Clock	MCP79410	The MCP79410 general purpose I2C™ Compatible real-time clock/calendar (RTCC) is highly integrated with nonvolatile memory and advanced features normally found in higher priced devices. These features include a battery switchover circuit for backup power, a timestamp to log power failures and digital trimming for accuracy.	<a href="#">Click Here</a>
EEPROM	24LC256	24AA256/24LC256/24FC256 (24XX256*) is a 32K x 8 (256 Kbit) Serial Electrically Erasable PROM, capable of operation across a broad voltage range (1.7V to 5.5V).	<a href="#">Click Here</a>
FLASH	SST2xVF032x SST2xVF064x	The 25 Series SPI family is among the industry's lowest power 3.0V and 1.8V products. Lower pin count means less space, smaller PCBs, reduced system costs and lower power consumption. The industry's fastest erase times mean cost savings during manufacturing.	<a href="#">Click Here</a>



# Fan Controller/ Temp Sensor

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Function	Popular Products	Description	Product Web Page
Fan Controller	EMC2101	SMBus Fan Control with 1°C Accurate Temperature Monitoring	<a href="#">Click Here</a>
Temperature Sensor	EMC140x	1°C Temperature Sensor with Beta Compensation	<a href="#">Click Here</a>

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# Capacitive Touch Solutions

Function	Popular Products	Description	Product Web Page
Capacitive Touch Solutions	CAP11/12xx	These devices have been carefully designed to filter for common noise sources such as backlight inverters, DC-DC switching regulators and wireless frequencies. They support a wide variety of interfaces such as I2C, SMBus, SMSC BC-Link™ and SPI and also provide world-class ESD protection of ±8kV HBM with no external ESD protection circuits required.	<a href="#">Click Here</a>



# mTouch and Input Sensing Solutions

Popular Products	Description	Product Web Page
AR10xx	<p>The Microchip mTouch™ AR1000 Series Resistive Touch Screen Controller is a complete, easy to integrate, cost-effective and universal touch screen controller chip solution. The AR1000 Series has sophisticated proprietary touch screen decoding algorithms to fully process all touch data and save the host from this overhead. More than the usual “preprocessing” features of other low cost devices, the AR1000 delivers reliable, validated and calibrated touch</p>	<a href="#">Click Here</a>
MTCH6301	<p>The MTCH6301 is a turnkey projected capacitive touch controller that allows easy integration of multi-touch and gestures to create a rich user interface in your design.</p>	<a href="#">Click Here</a>



# USB Transceiver

Popular Products	Description	Product Web Page
USB334x	Highly Integrated, Hi-Speed USB 2.0 ULPI Transceiver Family for Consumer Electronics Applications	<a href="#">Click Here</a>
USB333x	Ultra Small and Highly Integrated, Hi-Speed USB 2.0 ULPI Transceiver Family for Mobile Consumer Electronics Applications	<a href="#">Click Here</a>

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# USB Ethernet Controller or Hub

Popular Products	Description	Product Web Page
USB251x	USB251x is a family of versatile, cost-effective and power-efficient USB 2.0 hub controllers. Leveraging SMSC's innovative MultiTRAK™ technology that delivers industry-leading data throughput in mixed-speed USB environments, the USB251x family is designed for applications that demand low power and a small footprint without compromising on performance	<a href="#">Click Here</a>
USB2602	4th Generation USB 2.0 Flash Media Controller with Integrated Card Power FETs and HS Hub	<a href="#">Click Here</a>





# USB Flash Media Controller

Popular Products	Description	Product Web Page
USB224x	USB 2.0 Flash Media Card Controller with Integrated Card Power FETs	<a href="#">Click Here</a>
USB264x	USB 2.0 Flash Media Controller with Integrated Card Power FETs and HS Hub	<a href="#">Click Here</a>

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# Ethernet Controller and Switches

Popular Products	Description	Product Web Page
LAN921x	High-Performance Small Form Factor Single-Chip Ethernet Controller with HP Auto-MDIX Support	<a href="#">Click Here</a>
LAN922x	High-Performance Small Form Factor Single-Chip Ethernet Controller with 16-bit Non-PCI interface with Variable Voltage I/O	<a href="#">Click Here</a>
LAN9303	3-port 10/100 Ethernet switch with flexible configuration options supporting a wide variety of different applications and architectures.	<a href="#">Click Here</a>
LAN931x	3-port 10/100 Ethernet switch with flexible configuration options supporting a wide variety of different applications and architectures. Additional MII port provided to further expand customer use cases.	<a href="#">Click Here</a>

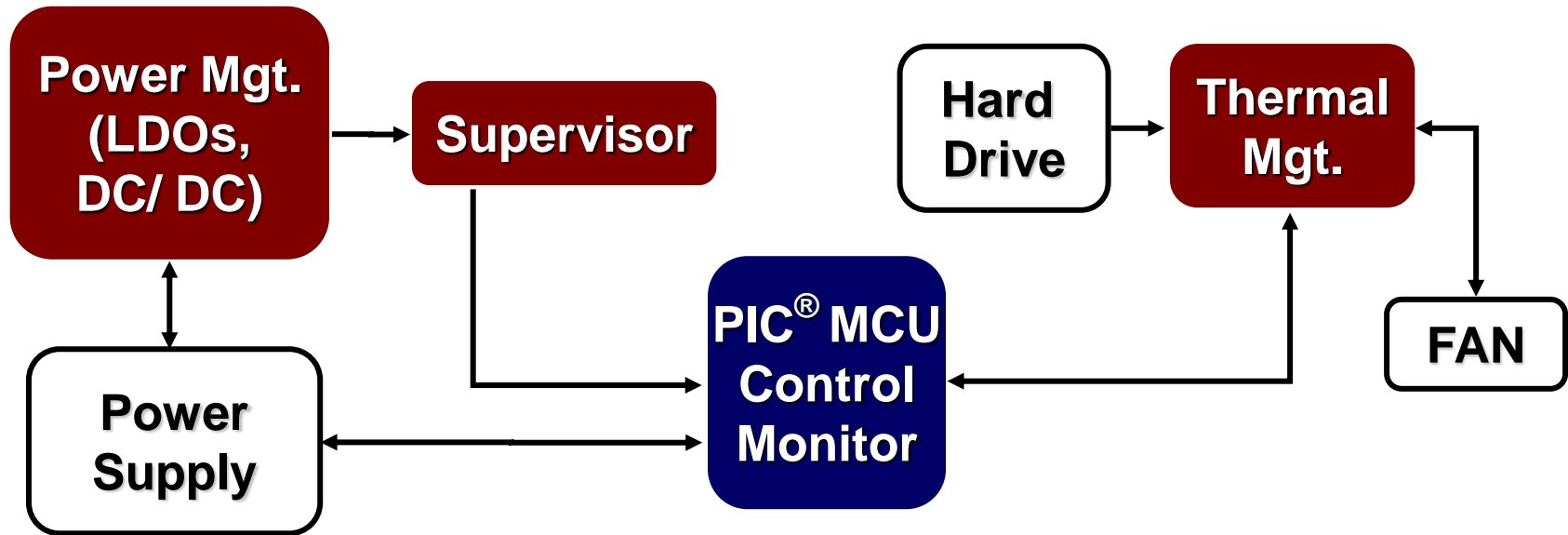
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# Zigbee

Popular Products	Description	Product Web Page
MRF24J40	MRF24J40 is a complete IEEE 802.15.4 radio and operates in the 2.4GHz freq band. The MRF24J40 supports ZigBee™, MiWi™ protocols and proprietary protocols to provide an ideal solution for wireless sensor networks, home automation, building automation and consumer applications	<a href="#">Click Here</a>
PIC18F46J50	This low power and high performance 8-bit MCU with integrated full-speed USB 2.0 and peripheral flexibility comes in a small package for cost sensitive applications in the PIC18 J-series. New features include Deep sleep mode for low power applications, Peripheral Pin Select for design flexibility for mapping peripherals to I/O pins and a CTMU module for easy capacitive touch user interfaces. The PIC18F46J50 family is ideal for applications requiring cost-effective, low-power USB solutions with a robust peripheral set in a small package.	<a href="#">Click Here</a>

# Power Management for Set-Top box



# PIC Microcontrollers

- ❑ **Function: coordinating all the control, some peripheral functions and monitor functions - the brain of the system**
- ❑ **Popular products: PIC16F15XX, 182X, 193X**
- ❑ **Attributes:**
  - ❑ Up to 32 MHz operating speed
  - ❑ On board CCP, CLC, CWG, NCO
  - ❑ Integrated comparators, op-amp, 12-bit ADC, 5/8/9 bit DAC
  - ❑ Up to 256 bytes of EEPROM
  - ❑ Available in UQFN, QFN, PDIP, SOIC, and TSSOP packages



# 1A- 1.5A Low Dropout Regulators

- **Function: converting 5V to low-noise 3.3V, 2.5V, or 1.8V voltage levels for the various system components**

Popular Products	Description	Product Web Page
MCP1727	The MCP1727 is a 1.5A, ceramic output cap stable, low output voltage Low Dropout Regulator (LDO) with shutdown and user-programmable delay for power good function.	<a href="#">Click Here</a>
MIC37101	The MIC37101 is a 1.0A, ceramic output cap stable Low Dropout Regulator (LDO) with reverse battery and reverse current protection with power good function in SOIC-8 package	<a href="#">Click Here</a>

[NEXT: Switching Regulators >>](#)

[Winning Attributes](#)

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# 1A- 1.5A Low Dropout Regulators

## □ Attributes:

- Very low operating current: 80 $\mu$ A (typ)
- High output voltage accuracy:  $\pm 2.5\%$  (max)
- Excellent dynamic performance (line & load regulation)
- Very low dropout voltage: as low as 450mV @ 800mA (typ)
- Package offering: SOT-223, SOIC, TO-220, DDPAK



# Switching Regulators

Popular Products	Description	Product Web Page
MCP16311/2	<p>The MCP16311/2 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC converter in a 8-pin MSOP, or 2 x 3 TDFN package that operates from input voltage sources up to 30V. Integrated features include a high-side and a low-side switch, fixed frequency Peak Current Mode Control, internal compensation, peak-current limit and over temperature protection. The MCP16311/2 provides all the active functions for local DC-DC conversion, with fast transient response and accurate regulation.</p>	<a href="#">Click Here</a>

Winning Attributes

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# Switching Regulators

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## □ **Attributes:**

- Regulator and controller (external FET) solutions
- Small SOT-23, MSOP and SOP packages
- Auto-switching PWM/PFM operation
- 300kHz and 750kHz switching frequency
- UVLO, Soft-start & over-temperature protection
- Efficiency as high as 95%
- Very low operating current

# RESET Monitors

- **Function: Reset the CPU and/or MCU when supply voltage falls below threshold**

Popular Products	Description	Product Web Page
MCP13xx	The MCP13xx voltage supervisors provide precision monitoring trip points, Watch Dog Timer inputs, Manual Reset with a low Supply current of 10 $\mu$ A over extended temperature range from 1.0V to 5.5V supply.	<a href="#">Click Here</a>
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click Here</a>

# RESET Monitors

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## □ Attributes:

- Tiny SOT-23 and SC-70 packages
- Very low operating current: as low as 10 $\mu$ A (max)
- High threshold voltage accuracy:  $\pm 2.8\%$  (max)
- $V_{DD}$  transient immunity
- Watchdog Timer / manual reset (MCP13xx, TC1232)
- Many available options: push-pull output, open-drain output and internal pull-up resistor

# Temperature Sensors

- **Function: To Monitor temperature and initiate actions during over-temperature conditions**

Popular Products	Description	Product Web Page
TCN75	TCN75 is a serially programmable temperature sensor that notifies the host controller when ambient temperature exceeds a user-programmed setpoint. Hysteresis is also programmable.	<a href="#">Click Here</a>
MCP9808 Digital temperature sensor	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^\circ\text{C}$ (max.) accuracy	<a href="#">Click Here</a>

[NEXT: Fan Managers >>](#)

[Winning Attributes](#)

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## □ **Attributes:**

- Small SOT-23 and MSOP-8 packages
- Very low operating current: 250 $\mu$ A (typ)
- Very low shutdown current: 1 $\mu$ A (typ)
- High temp accuracy:  $\pm 1^{\circ}$ C (typ)
- Simple operation: no need for external components
- Analog and digital (SPI<sup>TM</sup>, I<sup>2</sup>C<sup>TM</sup>, SMBus<sup>TM</sup>) devices

# Fan Managers

- **Function: controlling fan speed according to ambient temperature for reducing acoustic noise and extending fan life**

Popular Products	Description	Product Web Page
TC652	The TC652/653 are integrated temperature sensors and brushless DC fan speed controllers with FanSense™ technology. The TC652/653 measure their junction temperature and control the speed of the fan based on that temperature, making them especially suited for applications in modern electronic equipment. The FanSense™ fan fault detect circuitry eliminates the need for a more expensive 3 wire fan.	<a href="#">Click Here</a>

## □ **Attributes:**

- Small MSOP packages
- High temp accuracy:  $\pm 1^{\circ}\text{C}$  (typ)
- Fan failure detection
- Very low power consumption
- Wide range of features: SMBus™ Interface, Auto-shutdown, Minimum fan speed, Over-temp indication, etc.

# Operational Amplifiers

## □ Function: buffering and filtering signals

Popular Products	Description	Product Web Page
MCP6004	The MCP6004 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 microamperes.	<a href="#">Click Here</a>
MCP6H04	MCP6H04 has a wide supply voltage range of 3.5V to 16V and rail-to-rail output operation. This device has a gain bandwidth product of 1.2 MHz (typical), while only drawing 135 $\mu$ A/amplifier (typical) of quiescent current.	<a href="#">Click Here</a>
MCP6294	MCP6294 provide wide bandwidth of 10 MHz Gain Bandwidth Product. This family also operates from a single supply voltage as low as 2.4V to 6V, while drawing 1 mA (typical) quiescent current.	<a href="#">Click Here</a>



## □ **Attributes:**

- Small SC-70, TDFN and SOT-23 packages
- GBWP: 9 kHz to 60MHz
- Excellent operating current-to-GBWP ratio
- Mostly rail-to-rail inputs and outputs
- Offset voltage: as low as 2 $\mu$ V (MCP6V0x)
- Chip Select capability for power savings



# Analog-to-Digital Converters

- **Function: implementing Automatic Gain Control (AGC) for the tuner - frequency adjustment**

Popular Products	Description	Product Web Page
MCP3221	The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 $\mu$ A and 1 $\mu$ A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.	<a href="#">Click Here</a>
MCP3201	The MCP3201 is a 100ksps, 1 input channel, 12-bit SAR A/D Converter (ADC) that combines high performance and low power consumption in a small package, making it ideal for embedded control applications. The MCP3201 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>
MCP33111	The MCP33111 12-bit, 1Msps, SAR A/D Converter (ADC) features a full differential input, high performance and low power consumption in a small package, making it ideal for battery powered systems and remote data acquisition applications. The MCP33111 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>

Winning Attributes

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# Analog-to-Digital Converters

## □ SAR Attributes:

- Resolution: 10 to 16 bits
- Max sampling rate: up to 1 Msps
- Linearity:  $\pm 1$ LSB DNL,  $\pm 1$ LSB INL
- Current consumption: 175 to 2400 $\mu$ A (max.)
- Single supply voltage: 1.7V to 5.5V
- Small packages: SOT-23 and MSOP

## □ Delta-Sigma Attributes:

- Resolution: 16 to 22 bits
- Max sampling rate: up to 240 sps
- Current consumption: 120 to 155  $\mu$ A (max.)
- Single supply voltage: 2.7V to 5.5V
- Small packages: SOT-23 and MSOP



**MICROCHIP**

# **Microchip Analog Products for Medical Applications**

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# Microchip's Winning Attributes

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- ❑ **Large offering of LDO and Resets covering needed voltages**
- ❑ **RR-I/O op amps reduce design concerns**
- ❑ **High Precision Operational Amplifiers**
- ❑ **Low Power consumption**
- ❑ **Attach sell with PICmicro, frequently used**
- ❑ **Great lead times and customer support**

Medical Ultrasound

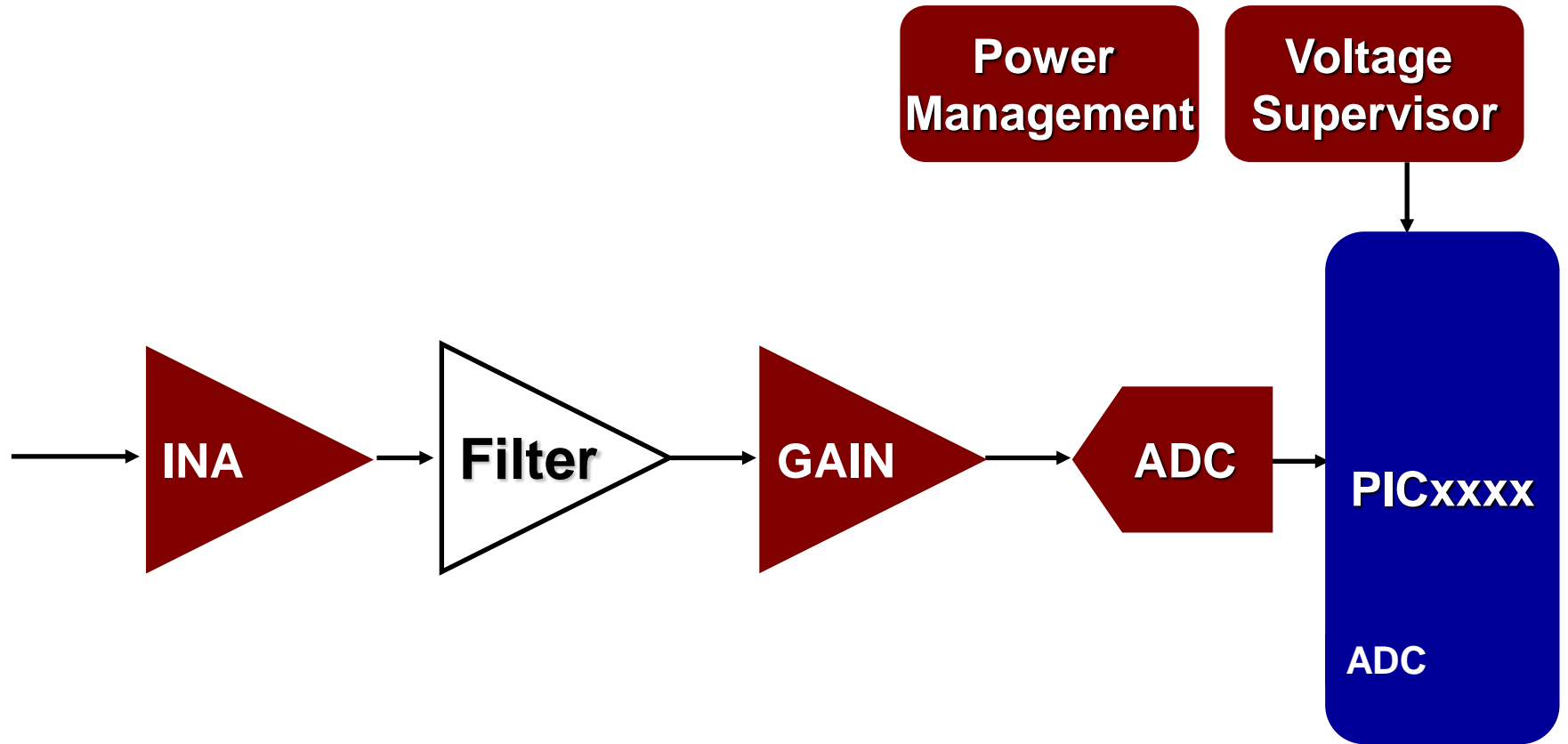
Digital Thermometer

Blood Glucose Meter

ECG/EKG System

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# ECG/EKG Block Diagram



# PIC Microcontrollers

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- **Function: coordinating all the control, some peripheral functions and monitor functions - the brain of the system**
- **Popular products: PIC16F178X, 75X, 15XX**
- **Attributes:**
  - Up to 32 MHz operating speed
  - PWM output (PIC1XF75X)
  - Integrated hi-speed, comparators, op-amp, 12-bit ADC, 5/8/9 bit DAC, CCP, COG
  - Up to 256 bytes of EEPROM
  - Available in UQFN, QFN, PDIP, SOIC, and TSSOP packages

# Instrumentation Amplifiers

- **Function: buffering and filtering sensor signals for preserving signal characteristics and rejecting unwanted frequencies**

Popular Products	Description	Product Web Page
MCP6N16	The MCP6N16 is a zero-drift instrumentation amplifier designed for single-supply operation with rail-to-rail input (no common mode crossover distortion) and output performance. The supply voltage range is low enough to support many portable applications. All devices are fully specified from -40°C to +125°C. Each device has EMI filters at the input pins, providing superior EMI rejection. This family has three minimum gain options (1, 10 and 100 V/V) in order to allow the user to optimize the input offset voltage and input noise for different applications	<a href="#">Click Here</a>



# Operational Amplifiers

## □ Function: Provide gain to small signals

Popular Products	Description	Product Web Page
MCP603x	The MCP6031/2/3/4 op amps have a gain bandwidth of 10 kHz with a low typical operating current of 0.9 $\mu\text{A}$ and an offset voltage that is less than 150 $\mu\text{V}$ .	<a href="#">Click Here</a>
MCP6V11 Zero Drift Op Amps	Gain-Bandwidth Product: 80 kHz, Offset Voltage: $\pm 8 \mu\text{V}$ (max.), IQ: 11 $\mu\text{A}$ (typ.), Wide Supply Voltage Range: 1.6V to 5.5V	<a href="#">Click Here</a>
MCP6444	The MCP6444 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 9 kHz with typ. quiescent current of 450 nA .	<a href="#">Click Here</a>
MCP60x	MCP601/2/3/4 (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 230 $\mu\text{A}$ and an offset voltage that is less than 2 mV.	<a href="#">Click Here</a>



# Analog-to-Digital Converters

- **Function: converting analog feedback signals to digital signals for MCU**

Popular Products	Description	Product Web Page
MCP3221	The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 $\mu$ A and 1 $\mu$ A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.	<a href="#">Click Here</a>
MCP3201	The MCP3201 is a 100ksps, 1 input channel, 12-bit SAR A/D Converter (ADC) that combines high performance and low power consumption in a small package, making it ideal for embedded control applications. The MCP3201 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>
MCP33111	The MCP33111 12-bit, 1Msps, SAR A/D Converter (ADC) features a full differential input, high performance and low power consumption in a small package, making it ideal for battery powered systems and remote data acquisition applications. The MCP33111 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>

# Low-Power LDOs

- **Function: providing regulated, low-noise supply voltages for the system**

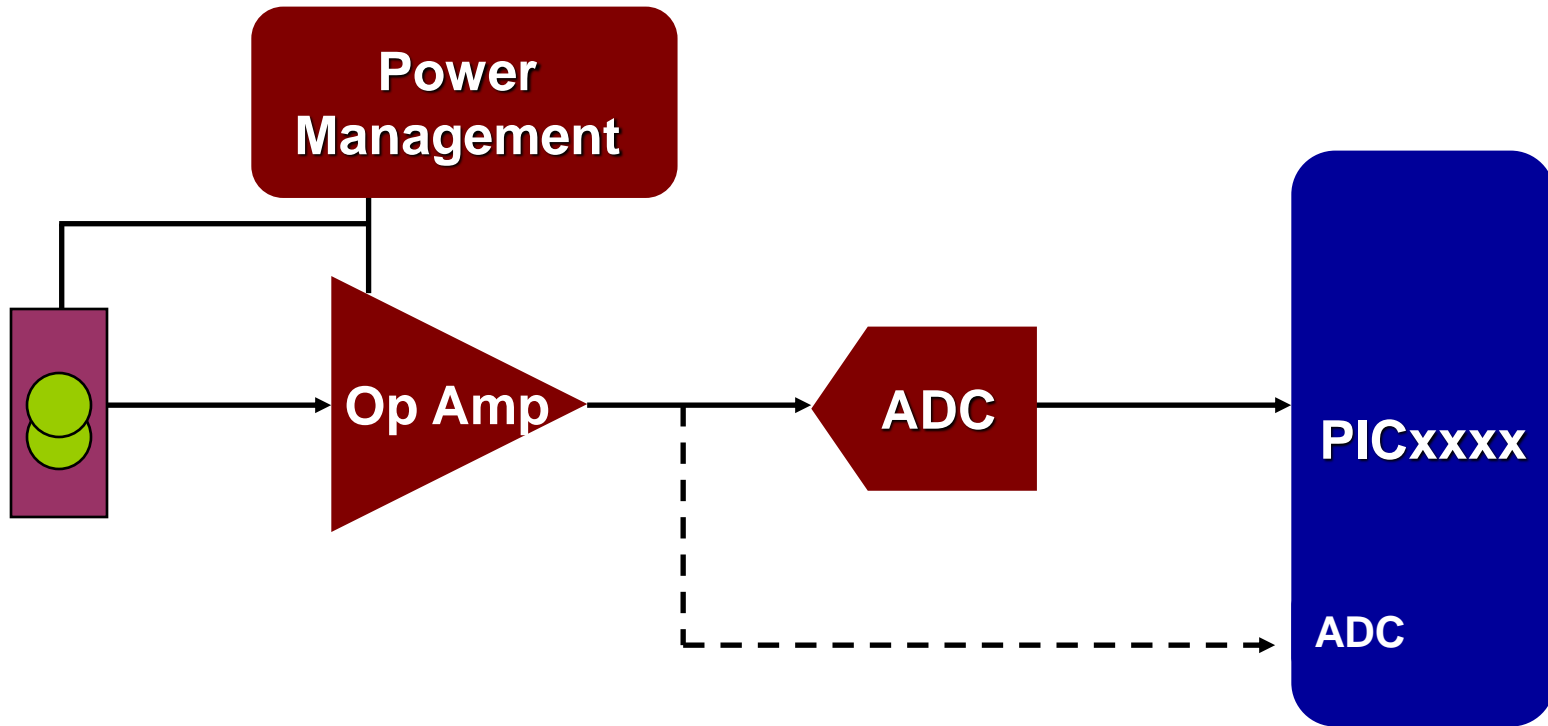
Popular Products	Description	Product Web Page
MCP1700	The MCP1700 can source up to 250mA of current with an extremely low input-output voltage differential of 178mV at 250mA. with the low current consumption of only	<a href="#">Click Here</a>
TC1016	80mA , LDO With Shutdown in SC70	<a href="#">Click Here</a>
MIC94325	<ul style="list-style-type: none"> <li>• Ripple Block family – Active noise rejection over a wide frequency band: &gt;50dB from 10Hz to 5Mhz at 500mA load</li> <li>• Rated to 500mA output current</li> <li>• Fixed and adjustable output voltage</li> <li>• Optional output auto-discharge when disabled</li> <li>• Current-limit and thermal-limit protected</li> <li>• Available in Ultra-small 0.84mm x 1.32mm 6-ball CSP and 1.6mm x 1.6mm 6-pin Thin DFN</li> <li>• Logic-controlled enable pin</li> </ul>	<a href="#">Click Here</a>
MIC2215	<ul style="list-style-type: none"> <li>• Triple outputs, -70dB PSRR@ 1kHz, -40dB PSRR @ 1Mhz</li> <li>• Input voltage range: +2.25V to +5.5V</li> <li>• 250mA continuous current per output</li> <li>• Low quiescent current: 110uA per regulator</li> <li>• Current-limit protection. Available in tiny 16-pin 4mm x 4mm MLF package</li> </ul>	<a href="#">Click Here</a>

# RESET Monitors

- **Function: Reset the CPU and/or MCU when supply voltage falls below threshold**

Popular Products	Description	Product Web Page
MCP13xx	The MCP13xx voltage supervisors provide precision monitoring trip points, Watch Dog Timer inputs, Manual Reset with a low Supply current of 10 $\mu$ A over extended temperature range from 1.0V to 5.5V supply.	<a href="#">Click Here</a>
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click Here</a>

# Blood Glucose Block Diagram



# PIC Microcontrollers

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- ❑ **Function: coordinating all the control, some peripheral functions and monitor functions - the brain of the system**
- ❑ **Popular products: PIC16F178X, 75X, 15XX**
- ❑ **Attributes:**
  - ❑ Up to 32 MHz operating speed
  - ❑ PWM output (PIC1XF75X)
  - ❑ Integrated hi-speed, comparators, op-amp, 12-bit ADC, 5/8/9 bit DAC, CCP, COG
  - ❑ Up to 256 bytes of EEPROM
  - ❑ Available in UQFN, QFN, PDIP, SOIC, and TSSOP packages
  - ❑ 8-pin solutions (PIC12F752)

# Power Management

- **Function: providing regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MCP1700	The MCP1700 can source up to 250mA of current with an extremely low input-output voltage differential of 178mV at 250mA. with the low current consumption of only	<a href="#">Click Here</a>
TC1016	80mA , LDO With Shutdown in SC70	<a href="#">Click Here</a>
MCP16251/2	The MCP16251/2 is a compact, high-efficiency, fixed frequency, synchronous step-up DC-DC converter. This family of devices provides an easy-to-use power supply solution for applications powered by either one-cell, two-cell or three-cell alkaline, NiCd, NiMH and one-cell Li-Ion or Li-Polymer batteries.	<a href="#">Click Here</a>
MIC94325	<ul style="list-style-type: none"> <li>• Ripple Block family – Active noise rejection over a wide frequency band: &gt;50dB from 10Hz to 5Mhz at 500mA load</li> <li>• Rated to 500mA output current. Fixed and adjustable output voltage</li> <li>• Optional output auto-discharge when disabled. Logic-controlled enable pin</li> <li>• Current-limit and thermal-limit protected</li> <li>• Available in Ultra-small 0.84mm x 1.32mm 6-ball CSP and 1.6mm x 1.6mm 6-pin Thin DFN</li> </ul>	<a href="#">Click Here</a>
MIC2215	<ul style="list-style-type: none"> <li>• Triple outputs, -70dB PSRR@ 1kHz, -40dB PSRR @ 1Mhz</li> <li>• Input voltage range: +2.25V to +5.5V, 250mA continuous current per output</li> <li>• Low quiescent current: 110uA per regulator</li> <li>• Current-limit protection. Available in tiny 16-pin 4mm x 4mm MLF package</li> </ul>	<a href="#">Click Here</a>

# Voltage References

- **Function: providing the system with an accurate analog voltage for comparison**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>





# Operational Amplifiers

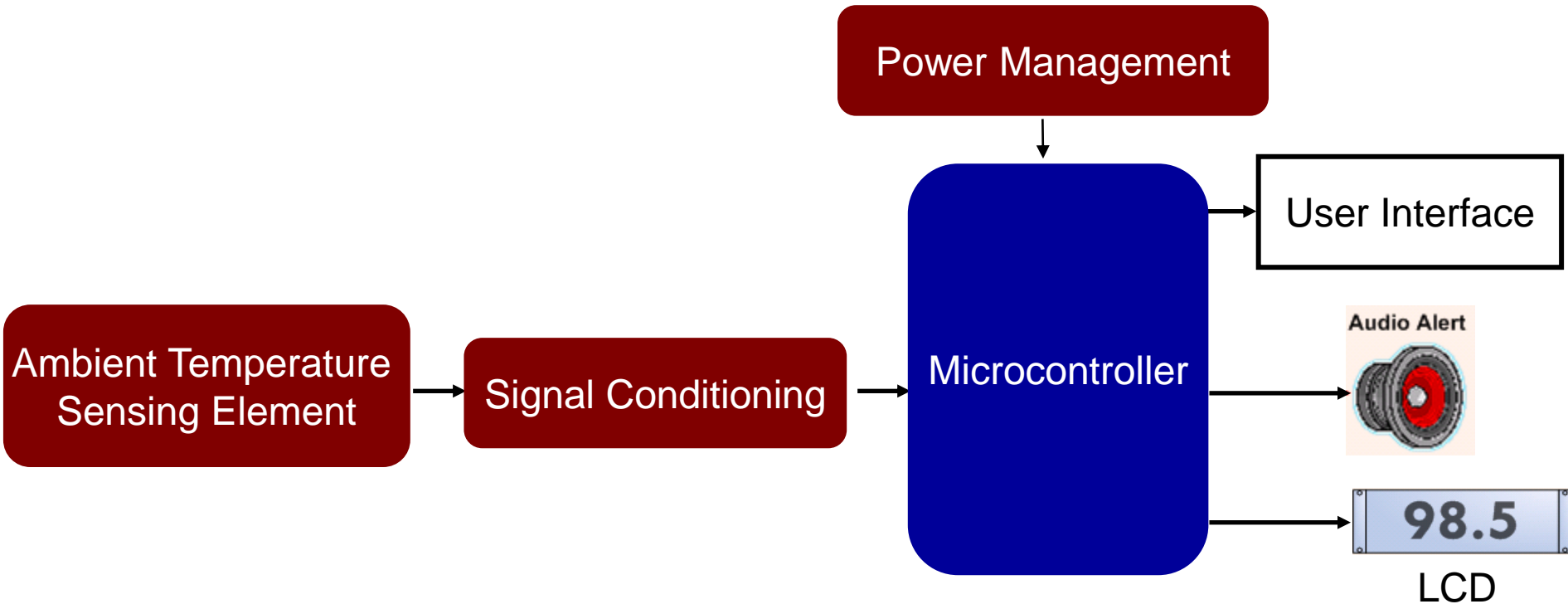
Popular Products	Description	Product Web Page
MCP603x	The MCP6031/2/3/4 op amps have a gain bandwidth of 10 kHz with a low typical operating current of 0.9 $\mu$ A and an offset voltage that is less than 150 $\mu$ V.	<a href="#">Click Here</a>
MCP6444	The MCP6444 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 9 kHz with typ. quiescent current of 450 nA .	<a href="#">Click Here</a>
MCP60x	MCP601/2/3/4 (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 230 $\mu$ A and an offset voltage that is less than 2 mV.	<a href="#">Click Here</a>
MCP6Vxx Family of Zero-Drift Amplifiers	The MCP6Vxx provides high DC precision, including an offset voltage as low as 2 $\mu$ V and offset drift as low as 15nV/ $^{\circ}$ C maximum. They have low quiescent current, no 1/f noise and offer superior CMRR/PSRR performance. The family has an operating voltage as low as 1.6V and are available in small packages (SC-70 and DFN)	<a href="#">Zero-Drift Amplifiers</a>
MCP6Nxx Family of Instrumentation Amplifiers	Microchip expanded its portfolio of amplifiers by first introducing the MCP6N11 the industry's first instrumentation amplifier featuring mCal technology and most recently introducing the MCP6N16 Zero-Drift instrumentation amplifier. <ul style="list-style-type: none"> <li>• Rail-to-Rail Input and Output</li> <li>• Gain Set by two (2) External Resistors</li> <li>• Enable/Vos Calibration Pin (MCP6N11)</li> <li>• Zero-Drift Architecture (MCP6N16)</li> <li>• Operating Voltage Range: 1.8V to 5.5V</li> </ul>	<a href="#">Instrumentation Amplifiers</a>

# Analog-to-Digital Converters

- **Function: converting analog feedback signals to digital signals for MCU**

Popular Products	Description	Product Web Page
MCP3221	The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 $\mu$ A and 1 $\mu$ A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.	<a href="#">Click Here</a>
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>

# Digital Thermometer



# Signal Conditioning

- **Microchip offers high resolution SAR and Delta-Sigma ADC and a wide range of high bandwidth, low current and cost effective operational amplifiers**

Popular Products	Description	Product Web Page
MCP6231/2/4	MCP6231/1R/1U/2/4 - Family of operational amplifiers Gain Bandwidth Product: 300 kHz (typical), Low Supply Current: = 20 $\mu$ A (typical), Wide Supply Voltage: 1.8V to 6.0V	<a href="#">Click Here</a>
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>

# Power Management

- **Function: providing regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MCP1700	The MCP1700 can source up to 250mA of current with an extremely low input-output voltage differential of 178mV at 250mA. with the low current consumption of only	<a href="#">Click Here</a>
TC1016	80mA , LDO With Shutdown in SC70	<a href="#">Click Here</a>
MCP16251/2	The MCP16251/2 is a compact, high-efficiency, fixed frequency, synchronous step-up DC-DC converter. This family of devices provides an easy-to-use power supply solution for applications powered by either one-cell, two-cell or three-cell alkaline, NiCd, NiMH and one-cell Li-Ion or Li-Polymer batteries.	<a href="#">Click Here</a>
MIC94325	<ul style="list-style-type: none"> <li>• Ripple Block family – Active noise rejection over a wide frequency band: &gt;50dB from 10Hz to 5Mhz at 500mA load</li> <li>• Rated to 500mA output current. Fixed and adjustable output voltage</li> <li>• Optional output auto-discharge when disabled. Logic-controlled enable pin</li> <li>• Current-limit and thermal-limit protected</li> <li>• Available in Ultra-small 0.84mm x 1.32mm 6-ball CSP and 1.6mm x 1.6mm 6-pin Thin DFN</li> </ul>	<a href="#">Click Here</a>
MIC2215	<ul style="list-style-type: none"> <li>• Triple outputs, -70dB PSRR@ 1kHz, -40dB PSRR @ 1Mhz</li> <li>• Input voltage range: +2.25V to +5.5V, 250mA continuous current per output</li> <li>• Low quiescent current: 110uA per regulator</li> <li>• Current-limit protection. Available in tiny 16-pin 4mm x 4mm MLF package</li> </ul>	<a href="#">Click Here</a>

# Thermal Compensation

- In many cases ambient temperature compensation requires a second

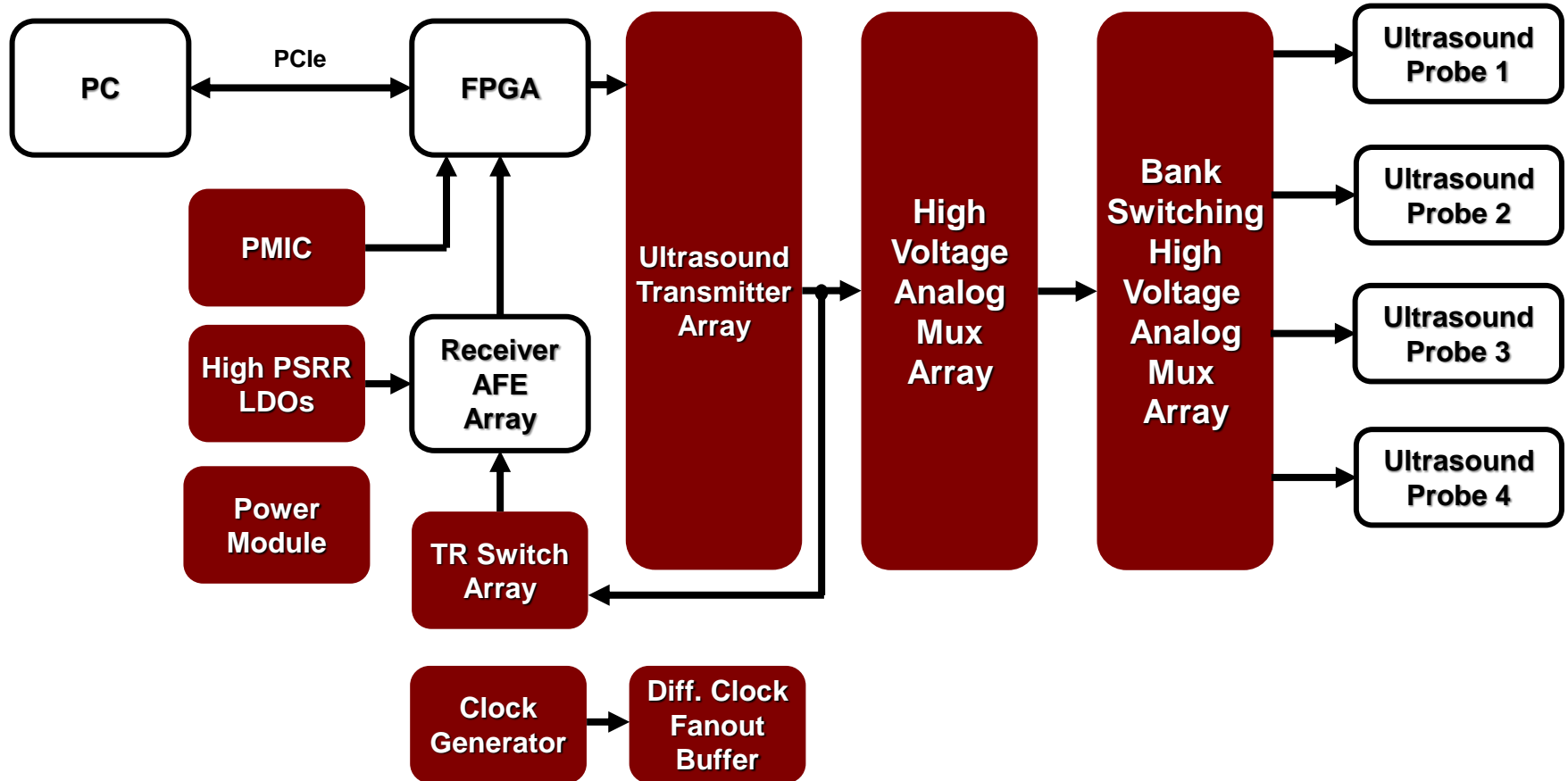
Popular Products	Description	Product Web Page
MCP9808 Digital temperature sensor	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^\circ\text{C}$ (max.) accuracy	<a href="#">Click Here</a>
MCP9700 Linear Active Thermistor™ ICs	The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.	<a href="#">Click Here</a>

# PIC Microcontrollers

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- ❑ **Function: coordinating all the control, some peripheral functions and monitor functions - the brain of the system**
- ❑ **Popular products: PIC16F193X, PIC18F65J90/94**
- ❑ **Attributes:**
  - ❑ Up to 32 MHz operating speed
  - ❑ PWM output (PIC16F193X)
  - ❑ Integrated LCD controller, up to 256 segments
  - ❑ Integrated comparators, op-amp, 12-bit ADC, 5/8/9 bit DAC
  - ❑ Up to 256 bytes of EEPROM

# Medical Ultrasound Imaging System Block Diagram





# High Voltage Analog Mux

- **Function: Ultrasound probe selection relay replacement**

Popular Product	Description	Product Web Page
HV2809	HV2809 is a low harmonic distortion, 32-channel, high voltage analog switch IC, designed for use in medical ultrasound imaging systems as a probe selection relay replacement. It serves as a 16PDT (16-pole, double throw) high voltage analog switch array. The enable function allows the parts to be configured as either a 2:1 or 4:1 multiplexer/demultiplexer. HV2809 is a very fast transducer multiplexer that consumes minimal power and emits no audible noise.	<a href="#">Click Here</a>



# High Voltage Analog Mux

## □ Function: Multiplexing the ultrasound signals to the ultrasound probe

Popular Products	Description	Product Web Page
HV2902	HV2902 is low-charge injection, <b>32-channel SPST</b> , high-voltage analog switches intended for use in applications requiring high-voltage switching controlled by low-voltage control signals, such as medical ultrasound imaging, driving piezoelectric transducers and printers. The HV2902 has integrated bleed resistors which eliminate voltage build-up on capacitive loads such as piezoelectric transducers.	<a href="#">Click Here</a>
HV2901	The HV2901 is a low charge injection <b>32-channel</b> high voltage analog switch integrated circuit (IC) in <b>2:1 Mux configuration</b> , intended for use in applications requiring high voltage switching controlled by low voltage control signals, such as medical ultrasound imaging, piezoelectric transducer driver, and printers. The bleed resistors eliminate voltage built up on capacitive loads such as piezoelectric transducers.	<a href="#">Click Here</a>
HV2705	The HV2705 are low charge injection, <b>16-channel SPST</b> , high voltage analog switch integrated circuits (ICs) with bleed resistors. The devices can be used in applications requiring high voltage switching controlled by low voltage control signals, such as medical ultrasound imaging and piezoelectric transducer drivers.	<a href="#">Click Here</a>



# Ultrasound Transmitter

- **Function: Excites an array of piezo-electric transducer to emit the ultrasound waves.**

Popular Products	Description	Product Web Page
HV7351	The HV7351 is an eight channel monolithic high-voltage ultrasound transmitter with built-in programmable digital transmit-beamforming. Each channel is capable of operating the outputs up to +/-70V with an active discharge back to 0V. The outputs can source and sink up to 3.0A to achieve fast output rise and fall times. The active discharge is also capable of sourcing and sinking 3.0A for a fast return to ground.	<a href="#">Click Here</a>
HV7350	The HV7350 is an eight channel monolithic high voltage high speed pulse generator with built-in fast return to zero damping FETs. This high voltage and high-speed integrated circuit is designed for portable medical ultrasound image devices. HV7350 consists of a controller logic interface circuit, level translators, MOSFET gate drives, and high current power P-channel and N-channel MOSFETs as the output stage for each channel. The output peak currents of each channel are guaranteed to be over $\pm 1.0A$ with up to $\pm 60V$ pulse swings as well as return-to-zero (RTZ) mode. The gate drivers for the output MOSFETs are powered by built-in linear 5.0V regulators referenced to VPP and VNN.	<a href="#">Click Here</a>



# Transmit/Receive Switch

- **Function: Protect the low voltage receiver from the high voltage transmit pulses in ultrasound application**

Popular Products	Description	Product Web Page
MD0100	Single Channel (MD0100N8-G) or Dual Channel (MD0100DK6-G), Up to +/-100V input voltage protection, Low on resistance (15 Ohm Typical), Fast switching speed, No external supplies needed	<a href="#">Click Here</a>
MD0101	4-Channel, Up to +/-100V input voltage protection, Low on resistance (15 Ohm Typical), Integrated clamp diodes, Fast switching speed, No external supplies needed.	<a href="#">Click Here</a>
MD0105	4-Channel, Up to +/-130V input voltage protection, Low on resistance (15 Ohm Typical), Fast switching speed, No external supplies needed	<a href="#">Click Here</a>

# Clock Generator

- **Function: Generating different clock frequency signals for FPGA, Receiver AFE, Transmitter IC, and PCIe.**

<b>Popular Product</b>	<b>Description</b>	<b>Product Web Page</b>
SM803xxx	<ul style="list-style-type: none"><li>• High performance customizable clock generator FLEX2 family</li><li>• 200fs RMS phase jitter</li><li>• Dual-PLL</li><li>• Integrated Fanout Buffer - up to 12 Outputs</li><li>• Independently programmable output logic and frequency</li><li>• Output logic includes LVPECL, LVDS, HCSL, and LVCMOS</li></ul>	<a href="#">Click Here</a>



# Diff. Clock Fanout Buffer

- **Function: Clock Fanout Buffer for driving the receiver AFE sampling clocks & the transmitter retiming clocks**

Popular Products	Description	Product Web Page
SY89826L	<ul style="list-style-type: none"><li>• High performance 1GHz LVDS fanout buffer/translator</li><li>• 22 differential LVDS output pairs</li><li>• Low jitter performance:<ul style="list-style-type: none"><li>• &lt;1 ps rms cycle-to-cycle jitter</li><li>• &lt;1 ps pk-to-pk total jitter</li></ul></li><li>• 2:1 mux input accepts LVDS and LVPECL</li><li>• Output enable function</li><li>• 3.3V supply voltage</li><li>• Available in a 64-Pin EPAD-TQFP package</li></ul>	<a href="#">Click Here</a>



# High PSRR LDOs

- **Function: Filter out the switching power supply's noise for the sensitive high performance analog circuit.**

Popular Products	Description	Product Web Page
MIC94325	<ul style="list-style-type: none"><li>• Ripple Block family – Active noise rejection over a wide frequency band: &gt;50dB from 10Hz to 5Mhz at 500mA load</li><li>• Rated to 500mA output current</li><li>• Fixed and adjustable output voltage</li><li>• Optional output auto-discharge when disabled</li><li>• Current-limit and thermal-limit protected</li><li>• Available in Ultra-small 0.84mm x 1.32mm 6-ball CSP and 1.6mm x 1.6mm 6-pin Thin DFN</li><li>• Logic-controlled enable pin</li></ul>	<a href="#">Click Here</a>
MIC2215	<ul style="list-style-type: none"><li>• Triple outputs, -70dB PSRR@ 1kHz, -40dB PSRR @ 1Mhz</li><li>• Input voltage range: +2.25V to +5.5V</li><li>• 250mA continuous current per output</li><li>• Low quiescent current: 110uA per regulator</li><li>• Current-limit protection. Available in tiny 16-pin 4mm x 4mm MLF package</li></ul>	<a href="#">Click Here</a>
MIC49150	<ul style="list-style-type: none"><li>• 1.5A High PSRR LDO Regulator</li><li>• VIN: 1.4V to 6.5V, VBIAS: 3.0V to 6.5V</li><li>• Adjustable output voltage down to 0.9V</li><li>• Logic controlled shutdown option. Thermal shutdown and current limit protection</li><li>• High PSRR -50dB @ 1Mhz at full load</li><li>• Available in Power MSOP-8 and S-Pack packages</li></ul>	<a href="#">Click Here</a>

[<< BACK to BLOCK DIAGRAM](#)

- **Function: Provide power to the FPGAs & the PC peripherals.**

Popular Product	Description	Product Web Page
MIC7401	<p>Configurable PMIC, Five-Channel Buck Regulator + One-Boost with Hyperlight Load, I2C Control and Enable</p> <ul style="list-style-type: none"> <li>• Input Voltage: 2.4V to 5.5V</li> <li>• Five Independent synchronous bucks up to 3A</li> <li>• One independent non-synchronous boost up to 200 mA</li> <li>• 200 uA quiescent current (all regulators on)</li> <li>• I2C interface up to 3.4Mhz</li> <li>• I2C on-the-fly EEPROM programmability               <ul style="list-style-type: none"> <li>• Buck and boost output voltage scaling</li> <li>• Power-on-reset threshold and delay</li> <li>• Power-up sequencing and sequencing delay</li> <li>• Buck and Boost current limit</li> <li>• Soft-start, ON/OFF, and standby mode...and more...</li> </ul> </li> <li>• 36-pin 4.5mm x 4.5mm x 0.85mm FQFN package</li> <li>• 12mm x 8.5mm x 1.25mm solution size (see the eval board)</li> </ul>	<p><a href="#">Click Here</a></p>



# Power Module

- **Function: Provide power to the PC Module and the digital circuitry**

Popular Products	Description	Product Web Page
MIC45208	<ul style="list-style-type: none"> <li>• Wide input voltage range of 4.5V to 26V. Output voltage: 0.8V to 5.5V with +/- 1% accuracy</li> <li>• Up to 10A output current. No compensation required</li> <li>• Adjustable switching frequency from 200Khz to 600Khz</li> <li>• Enable input and open-drain power good output</li> <li>• Adjustable current limit</li> <li>• Available in 52-pin 10mm x 10mm x 4mm QFN package</li> </ul>	<a href="#">Click Here</a>
MIC45212-1/2	<ul style="list-style-type: none"> <li>• Wide input voltage range of 4.5V to 26V. Output voltage: 0.8V to 5.5V with +/- 1% accuracy</li> <li>• Up to 14A output current. No compensation required</li> <li>• Adjustable switching frequency from 200Khz to 600Khz</li> <li>• Enable input and open-drain power good output</li> <li>• Adjustable current limit</li> <li>• Available in 64-pin 12mm x 12mm x 4mm QFN package</li> </ul>	<a href="#">Click Here</a>
MIC38300	<ul style="list-style-type: none"> <li>• 3A High Efficiency Low Dropout regulator</li> <li>• Unique switcher + LDO architecture</li> <li>• 3A peak output current, 2.2A continuous operating current</li> <li>• Input voltage range: 3.0V to 5.5V, output noise less than 5mV</li> <li>• Available in 4mm x 6mm x 0.9mm MLF package</li> </ul>	<a href="#">Click Here</a>



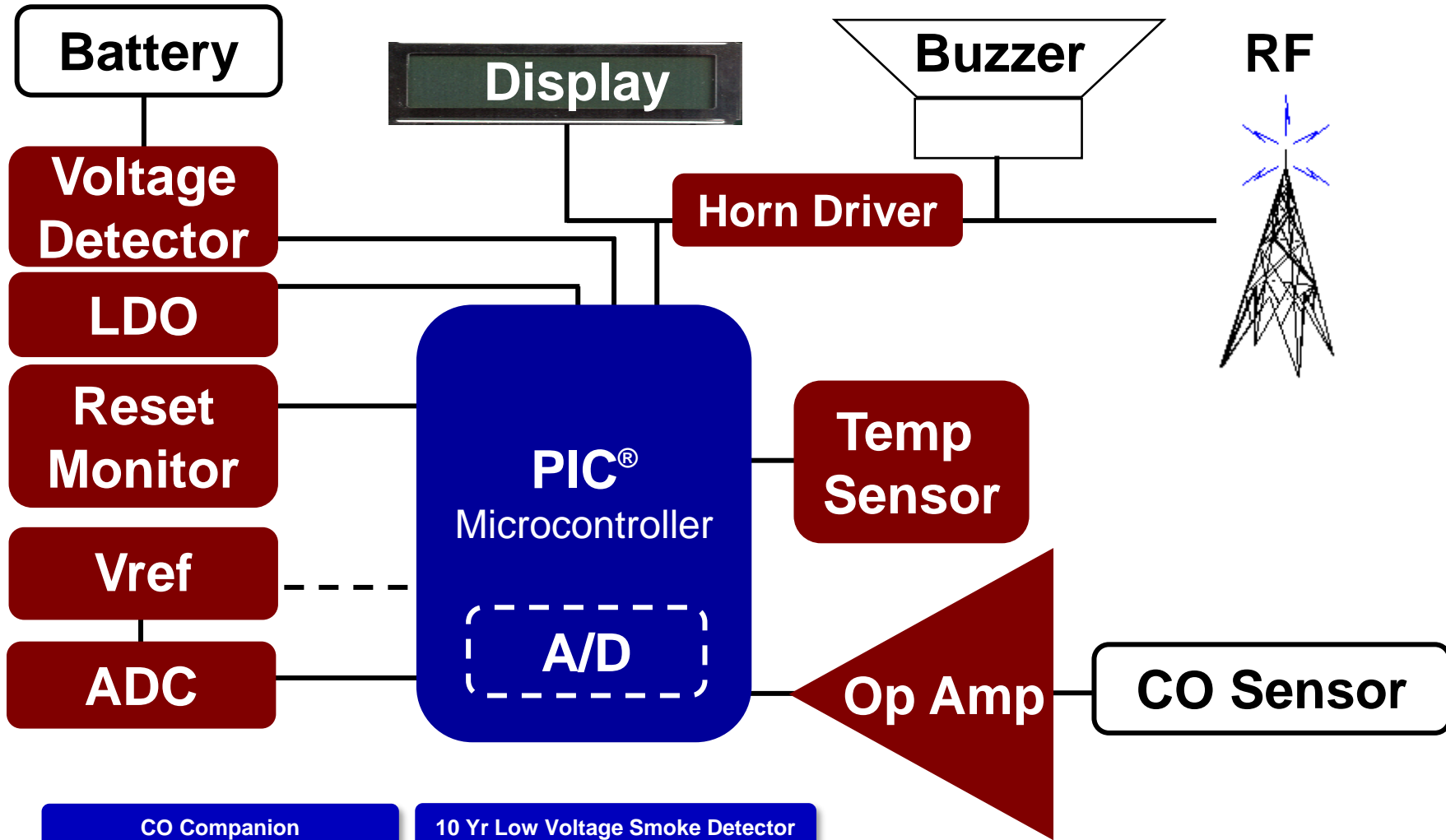
**MICROCHIP**

# **Microchip Analog Products for Smoke and CO Detectors**

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[NEXT](#)

# CO Detector



CO Companion

10 Yr Low Voltage Smoke Detector

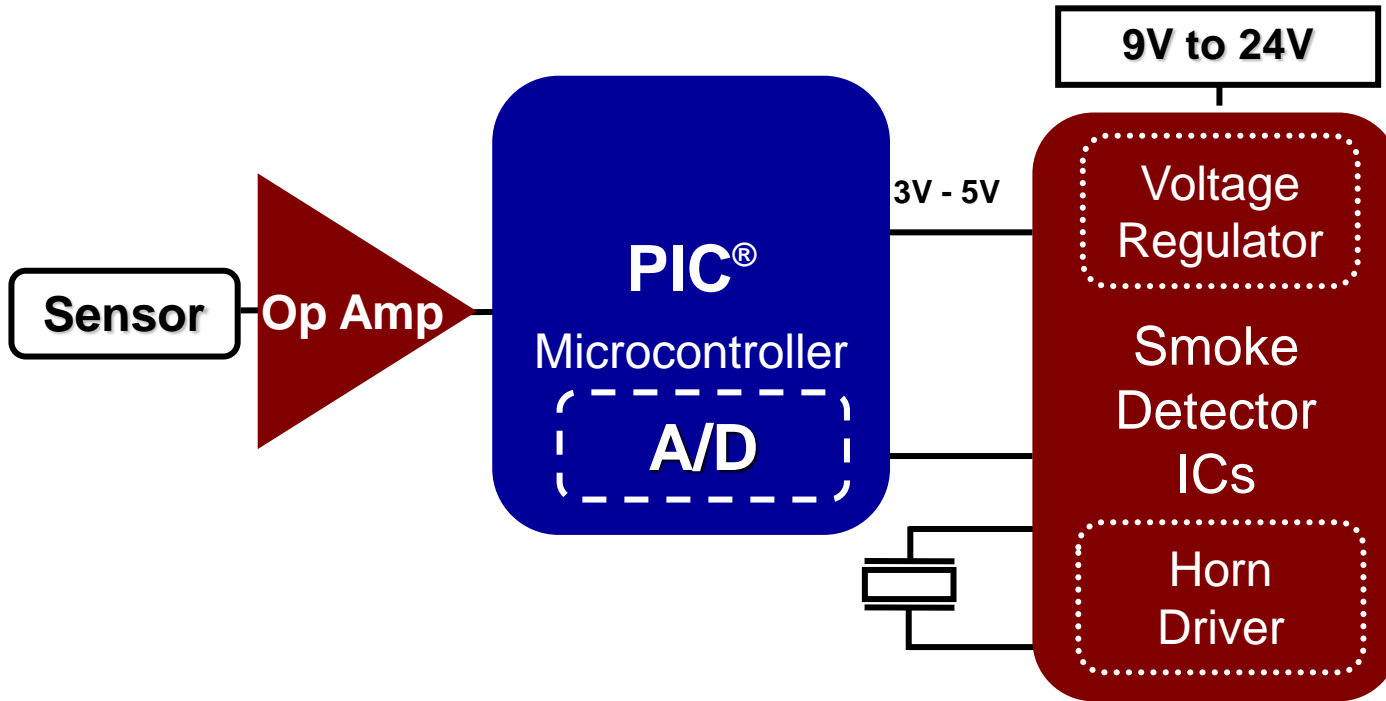
Home Alarm Systems

Low Cost Smoke Detectors

Addressable Smoke Detectors

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# Addressable Smoke Detector



CO Companion

10 Yr Low Voltage Smoke  
Detector

CO Detectors

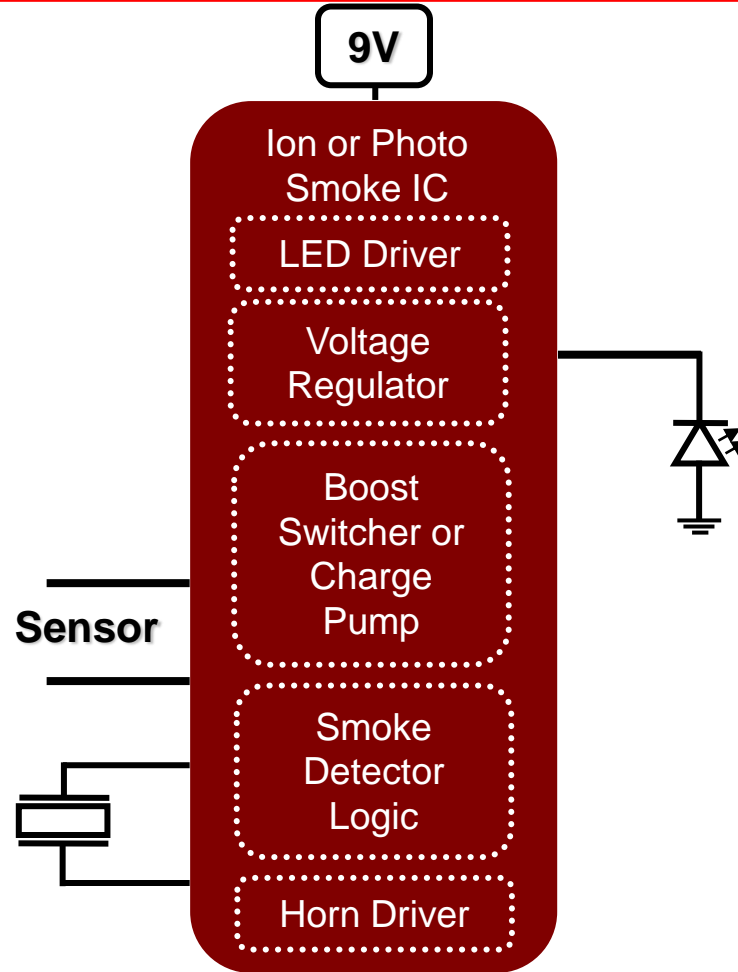
Low cost Smoke Detectors

Home Alarm Systems

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# Low Cost Smoke Detector



CO Companion

10 Yr Low Voltage Smoke Detector

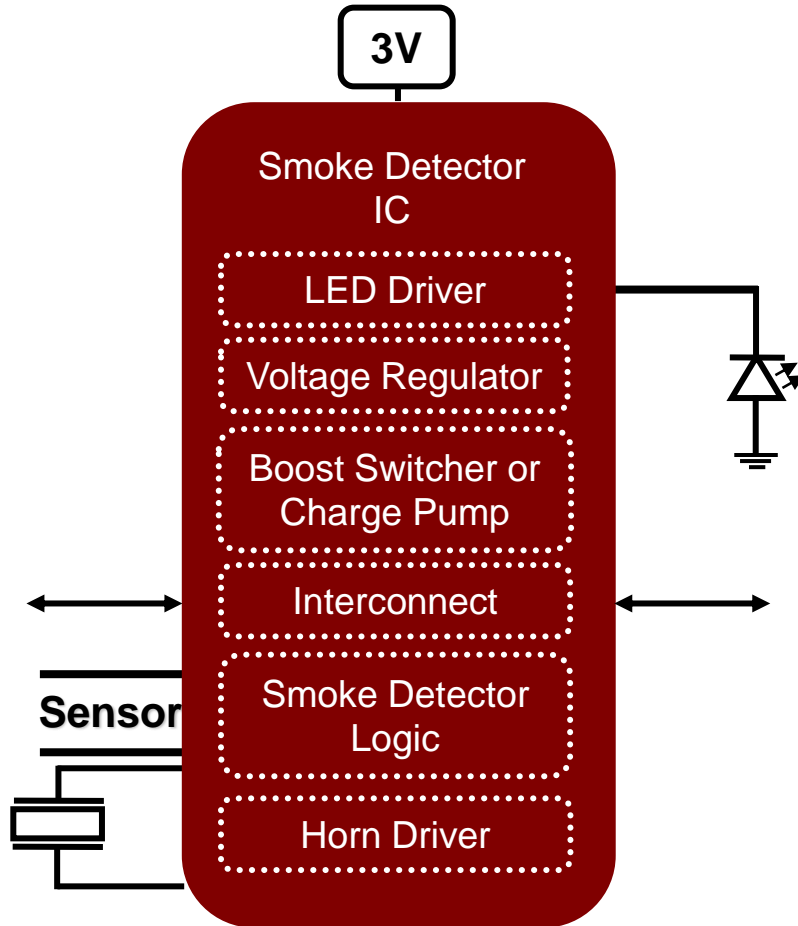
CO Detectors

Addressable Smoke Detectors

Home Alarm Systems

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# 10 Year Low Voltage Smoke Detector



CO Companion

CO Detectors

Low cost Smoke Detectors

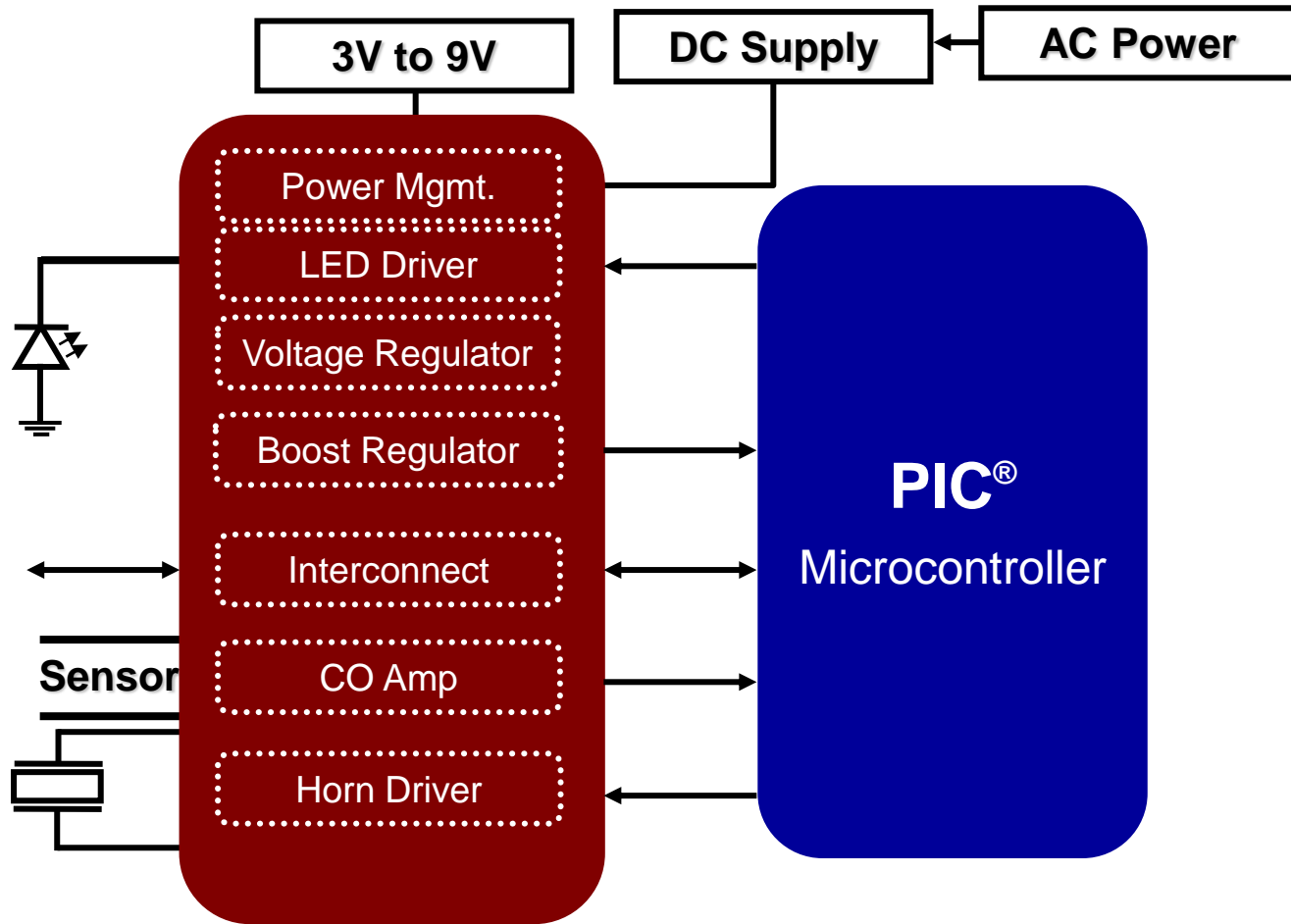
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Home Alarm Systems

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# CO Detector Companion IC



CO Detectors

10 Yr Low Voltage Smoke Detector

Low cost Smoke Detectors

Addressable Smoke Detectors

Home Alarm Systems

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## □ Function: Provide gain to small signals

Popular Products	Description	Product Web Page
MCP603x	The MCP6031/2/3/4 op amps have a gain bandwidth of 10 kHz with a low typical operating current of 0.9 $\mu$ A and an offset voltage that is less than 150 $\mu$ V.	<a href="#">Click Here</a>
MCP6444	The MCP6444 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 9 kHz with typ. quiescent current of 450 nA .	<a href="#">Click Here</a>
MCP6V11 Zero Drift Op Amps	Gain-Bandwidth Product: 80 kHz, Offset Voltage: $\pm 8$ $\mu$ V (max.), IQ: 11 $\mu$ A (typ.), Wide Supply Voltage Range: 1.6V to 5.5V	<a href="#">Click Here</a>



# Comparators

- **Function: Establish alarm thresholds (primarily in smoke detectors)**

Popular Products	Description	Product Web Page
MCP6567	These comparators are optimized for low power, single-supply operation with greater than rail-to-rail input operation. The open drain output of the MCP6566/7/9 family with a pull-up resistor, can be used as a level shifter for any desired voltage from 1.6V to 5.5V.	<a href="#">Click Here</a>



# Analog-to-Digital Converters

- **Function: converting analog feedback signals to digital signals for MCU**

Popular Products	Description	Product Web Page
MCP3221	The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 $\mu$ A and 1 $\mu$ A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.	<a href="#">Click Here</a>
MCP3201	The MCP3201 is a 100ksps, 1 input channel, 12-bit SAR A/D Converter (ADC) that combines high performance and low power consumption in a small package, making it ideal for embedded control applications. The MCP3201 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>
MCP33111	The MCP33111 12-bit, 1Msps, SAR A/D Converter (ADC) features a full differential input, high performance and low power consumption in a small package, making it ideal for battery powered systems and remote data acquisition applications. The MCP33111 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>

# RESET Monitors

- **Function: Reset the CPU and/or MCU when supply voltage falls below threshold**

Popular Products	Description	Product Web Page
MCP13xx	The MCP13xx voltage supervisors provide precision monitoring trip points, Watch Dog Timer inputs, Manual Reset with a low Supply current of 10 $\mu$ A over extended temperature range from 1.0V to 5.5V supply.	<a href="#">Click Here</a>
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click Here</a>

# Voltage References

- **Function: providing the system with an accurate analog voltage for comparison**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>

# Power Management

Popular Products	Description	Product Web Page
MCP13xx	The MCP13xx are voltage supervisor devices designed to keep a microcontroller in reset until the system voltage has reached and stabilized at a proper level for reliable system operation.	<a href="#">Click Here</a>
MCP111/2	The MCP111/112 voltage detectors have extremely low 1uA operating current and small form factor. They hold the microcontroller in reset until the supply voltage reaches a predetermined operating level. These devices also protect against brownout conditions	<a href="#">Click Here</a>
LDO MCP1700 MCP1703A	The MCP1700/3A are CMOS low dropout positive voltage regulators which can source up to 250mA of current with an extremely low input-output voltage differential The low dropout voltage combined with the low current consumption makes this part ideal for battery operation.	<a href="#">MCP1700</a> <a href="#">MCP1703A</a>
MCP16301	The MCP16301 is a highly integrated, high-efficiency, fixed frequency, step-down DC-DC converter in a popular SOT-23 package that operates from input voltage sources up to 30V	<a href="#">Click Here</a>

# Temperature Sensor

## □ Function: provides temperature measurement

Popular Products	Description	Product Web Page
TC1047	The TC1047A is a linear output temperature sensor whose output voltage is directly proportional to measured temperature. For the TC1047A, the output voltage range is typically 100mV at -40C, 500mV at 0C, 750mV at +25C, and 1.75V at +125C. A 10mV/°C voltage slope allows for the wide temperature range.	<a href="#">Click Here</a>
MCP9700 Linear Active Thermistor™ ICs	The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.	<a href="#">Click Here</a>

# PIC Microcontrollers

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- ❑ **Function: coordinating all the control and monitor functions - the brain of the system**
- ❑ **Popular products: PIC16F161X, 527/570, 32X, 182X, 75X, 15XX**
- ❑ **Attributes:**
  - ❑ Up to 32MHz operating speed
  - ❑ PWM output (PIC16F182X)
  - ❑ Programmable switch mode controller (PIC16F75X)
  - ❑ Integrated comparators, op-amp, 12-bit ADC, 8-bit DACs
  - ❑ Up to 256 bytes of EEPROM
  - ❑ Available various packages



# PIC12F675 - PICmicro

## □ Features

- Only 35 instructions to learn
- All single cycle instructions (200 ns), except for two-cycle program branches
- Operating speed:
  - DC – 20 MHz oscillator/clock input
  - DC – 200 ns instruction cycle
- Memory
  - 1024 x 14 words of FLASH
  - 64 x 8 bytes of Data Memory (SRAM)
  - 128 x 8 bytes of EEPROM
- Interrupt capability
- 16 special function hardware registers
- 8-level deep hardware stack
- Direct, Indirect, and Relative Addressing

## □ Peripherals

- 6 I/O pins with individual direction control
- High current sink/source for direct LED drive
- Analog comparator module
- ADC Module
  - 10-bit resolution
  - Programmable 4-Ch input
  - Voltage reference input
- Timer0: 8-bit timer/counter
- Enhanced Timer1:
  - 16-bit timer/counter with prescaler
  - External Gate Input Mode
- 64 bytes of general purpose RAM

Addressable Smoke Detectors

CO Companion

CO Detectors





# Smoke Detector ICs

Smoke Detector Type	Products	Description	Product Web Page
Photoelectric Smoke Detector IC	RE46C191	<ul style="list-style-type: none"><li>• Two AA battery Operation</li><li>• Internal Power On Reset</li><li>• Low Quiescent Current Consumption</li><li>• Internal IRED driver with Programmable IRED Current</li><li>• Programmable Photo Amplifier, Smoke Sensitivity Levels</li><li>• 9 Minute Timer for Sensitivity Control</li><li>• Chamber Test with Programmable Sensitivity Level</li><li>• Internal Low Battery Test with Programmable Threshold</li><li>• Local Alarm Memory</li><li>• Temporal or Continuous Horn Pattern</li><li>• All internal Oscillator</li></ul>	<a href="#">Click Here</a>
Ionization-type Smoke Detector IC	RE46C180	<ul style="list-style-type: none"><li>• 6 -12V Operation</li><li>• Low Quiescent Current Consumption</li><li>• +/- 0.75pA Detect Input Current</li><li>• Guard Outputs for Ion Detector Input</li><li>• Programmable Standby Sensitivity, Hush Sensitivity, Hysteresis, Chamber Voltage for Push-to-Test</li><li>• Low Battery Set Point</li><li>• Local Alarm Memory, Auto Alarm Locate</li><li>• Horn Synchronization</li><li>• 9 Minute or 80 Second Hush Timer</li><li>• Temporal or Continuous Horn Pattern</li><li>• IO Filter and Charge Dump</li><li>• 10-Year End-of-Life Indication</li></ul>	<a href="#">Click Here</a>

# RE46C800

	<b>Description</b>	<b>Product Web Page</b>
RE46C800	<ul style="list-style-type: none"><li>• The RE46C800 provides all of the necessary analog, interface, and power management functions necessary to build a microcontroller based CO or toxic gas detector.</li><li>• The RE46C800 is intended for use with two terminal electrochemical CO and toxic gas sensors.</li><li>• The uncommitted op amp can also be used for heat detector applications</li></ul>	<a href="#">Click Here</a>

# EEPROM Memory

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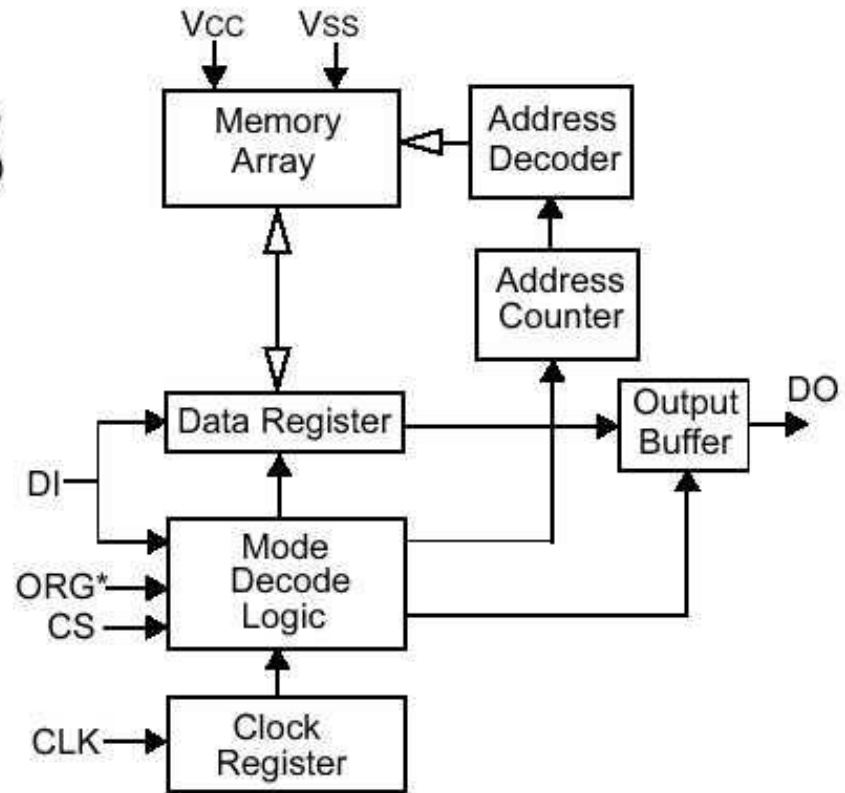
- ❑ **Function: storing factory calibration values and the "life" clock of a CO sensor**
- ❑ **Popular products: 24LCxxx, 93xx46A/B, 25LCxxx**
- ❑ **Attributes:**
  - ❑ SPI™, I<sup>2</sup>C™ and Microwire® Interface
  - ❑ Small SOT-23 and MSOP packages
  - ❑ Densities from 128 to 512k
  - ❑ Supply voltages as low as 1.8V
  - ❑ E/W Cycles: 1M



# 93XX46A/B - Microwire EERPOM

## Features

- Low power CMOS technology
- ORG pin to select word size for '46C version
- 128 x 8-bit organization 'A' ver. devices (no ORG)
- 64 x 16-bit organization 'B' ver. devices (no ORG)
- Self-timed ERASE/WRITE cycles (including auto-erase)
- Automatic ERAL before WRAL
- Power on/off data protection circuitry
- Industry standard 3-wire serial I/O
- Device status signal (READY/BUSY)
- Sequential READ function
- 1,000,000 E/W cycles
- Data retention > 200 years
- Temperature ranges supported
  - Industrial (I)            -40°C to +85°C
  - Automotive (E)        -40°C to +125°C



# Horn Drivers

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- **Horn Drivers allows battery operation of a piezoelectric horn**
  - Piezoelectric horns are a low cost, high efficiency method to achieve the sound pressure required.
- **Horn Drivers provide these advantages:**
  - Realize cost savings by reducing component count
  - Increase battery life, low current low voltage
  - Switchers and charge pumps for even lower voltage operation
  - Self resonance calibration

# Horn Driver Family (1)

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- **Piezoelectric Horn Drivers, baseline ASIC Products**
  - RE46C100 basic model, Vdd 6V - 16V
  - RE46C101 with LED Driver, Vdd 6V - 16V
  - RE46C104 with Voltage Converter, Vdd 4V-8V
  - RE46C117 with Charge Pump, Vdd 2V - 5V

# Horn Driver Family (2)

- **Piezoelectric Horn Drivers with controller Voltage Regulators ASIC products**
  - RE46C108 Vreg pin select 3.3V or 5V, Vdd 6V-12V
  - RE46C105 Vreg pin select 3.3V or 5V, Low Battery, LED Driver, Vdd 6V-12V
  - RE46C107 Vreg pin select 3V or 3.3V, Low Battery, Brownout, Vdd 2V-5V
  - RE46C109 Vreg 3.0V, Low Battery, I/O, Brownout, Vdd 6-12V
  - RE46C119 Vreg 3.0V, Low Battery, I/O, Power Good, 6V-12V

# Smoke Detector ICs

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- **Smoke Detector ICs allows implementation of low power ionization or photoelectric smoke detectors**
- **Advantages:**
  - Low battery detection
  - Integrated horn driver
- **Advantages for selected detectors**
  - Interconnect for sounding multiple units
  - Sensitivity/Hush Timer
  - Reverse battery protection
  - 24V Regulator and step-up regulator





# Ionization Smoke ICs

Popular Products	Description	Product Web Page
RE46C12x	Hush, Interconnect, Continuous or Temporal Pattern, Reverse Chamber Polarity	<a href="#">Click Here</a>
RE46C152	Hush, Interconnect, Pin-select Temporal and Continuous Pattern	
RE46C162/3	Interconnect, Temporal or Continuous Horn Pattern, Alarm Memory	

NEXT



# Photoelectric Smoke ICs

Popular Products	Description	Product Web Page
RE46C140/1/3/5/	Hush Timer, Interconnect, Temporal and Continuous Horn Pattern	<a href="#">Click Here</a>
RE46C165/6/7/8	Hush Timer, Interconnect, Temporal and Continuous Horn Pattern, Alarm Memory. Ideal for new home construction market	

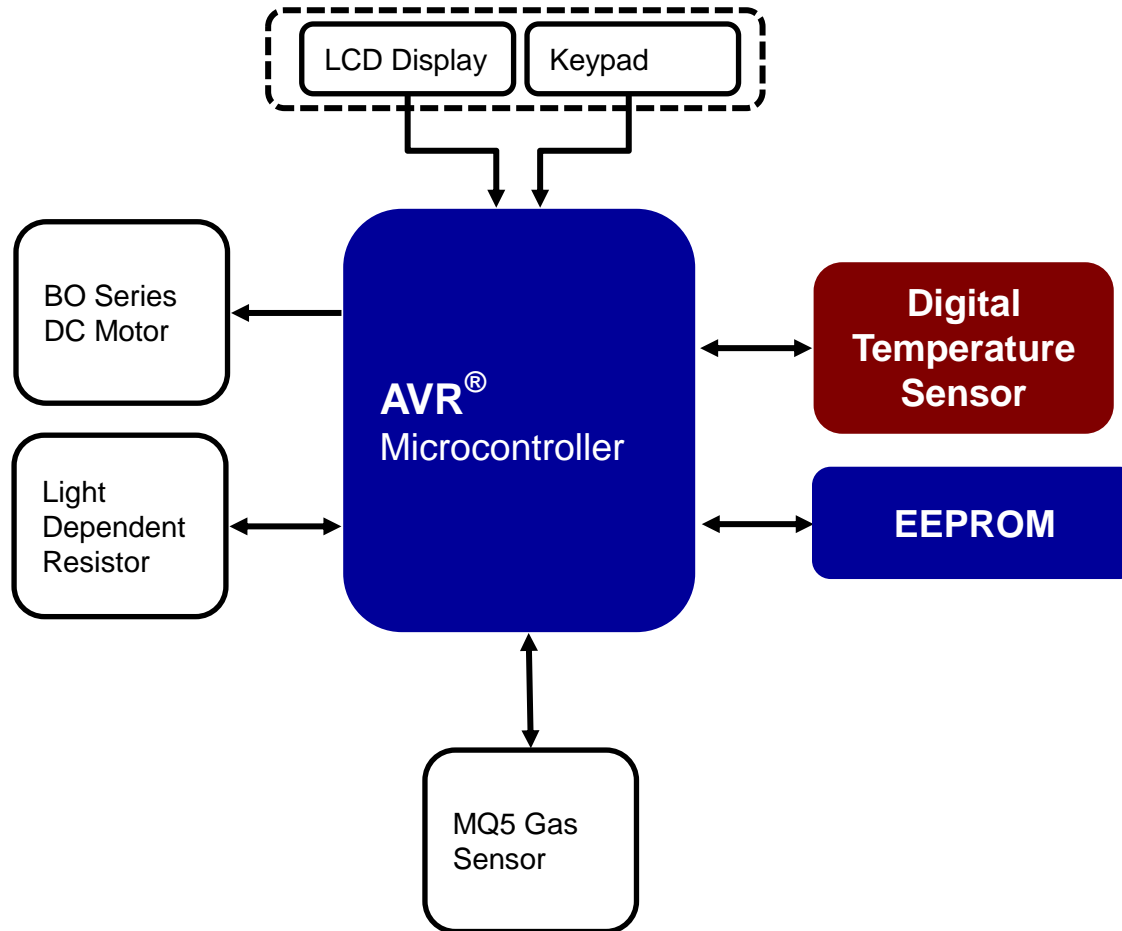
Low cost Smoke Detectors

Addressable Smoke Detectors

CO Detectors

10 Yr Low Voltage Smoke Detector

# Gas Detector & Door Opener





# AVR 8-bit Microcontroller

## □ Function: System control and decision making

Popular Products	Description	Product Web Page
ATmega162	The high-performance, low-power Microchip 8-bit AVR RISC-based microcontroller combines 16KB of programmable flash memory, 1KB SRAM, 512B EEPROM, and a JTAG interface for on-chip debugging. The device supports throughput of 16 MIPS at 16MHz and operates between 2.7-5.5 volts	<a href="#">Click Here</a>



# Digital Temperature Sensor

- **Function: Temperature measurement with digital output**

Popular Products	Description	Product Web Page
MCP9808	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^\circ\text{C}$ (max.) accuracy	<a href="#">Click Here</a>

## □ Function: Data storage

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
25LC1024	The 25LC1024 is a 1024 Kbit serial EEPROM memory with byte-level and page-level serial EEPROM functions. It also features Page, Sector and Chip erase functions. These functions are not required for byte or page write operations. The memory is accessed via SPI compatible serial bus.	<a href="#">Click Here</a>



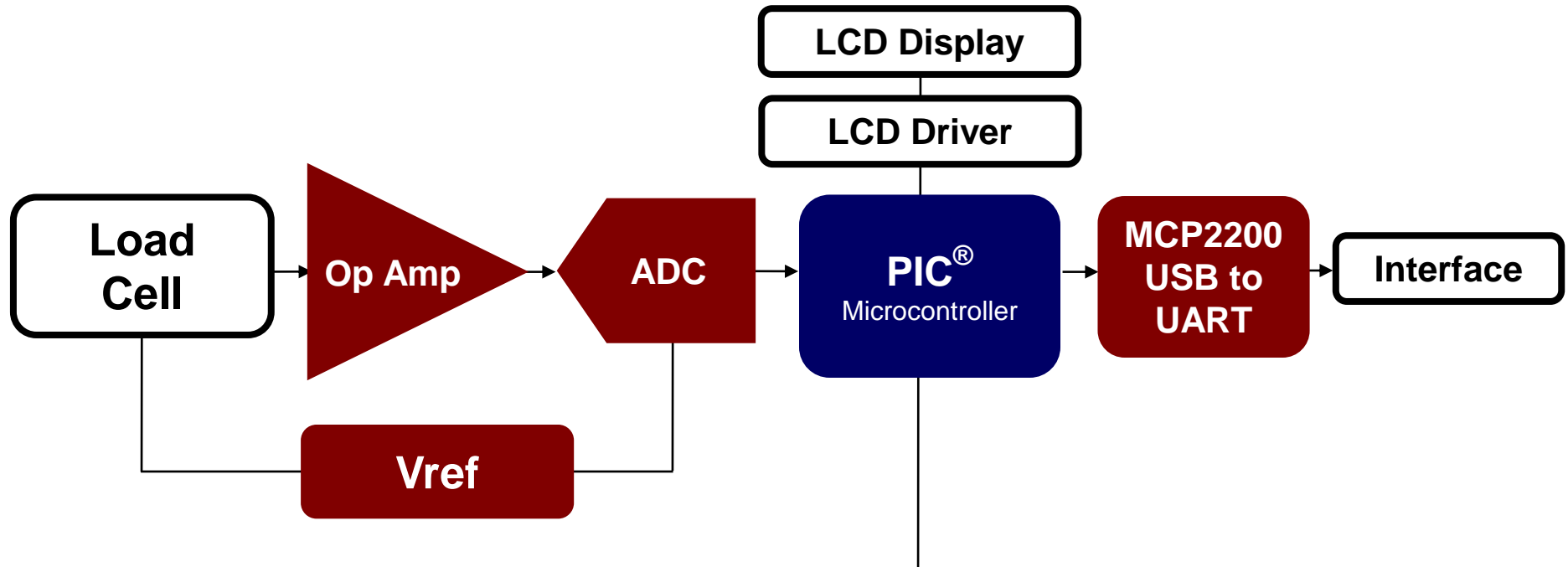
**MICROCHIP**

**Weigh Scale**

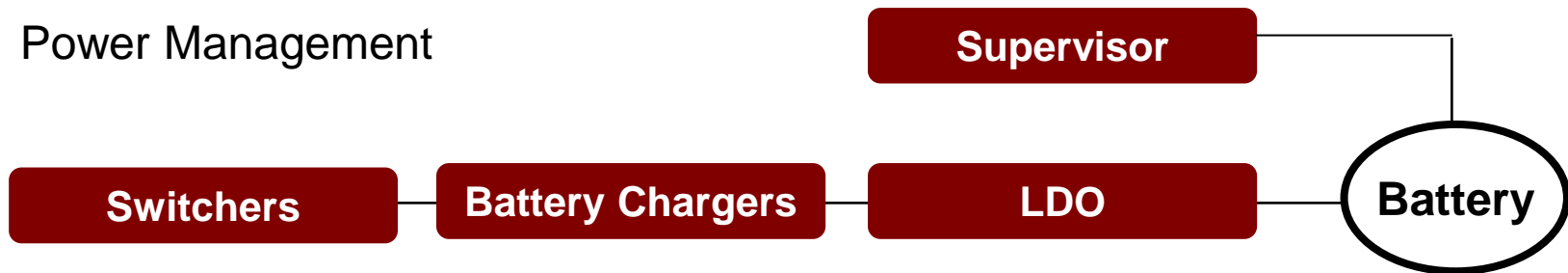
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# Typical Weigh Scale



## Power Management







# Operational Amplifiers

Function	Popular Products	Description	Product Web Page
Sense and gain up output current - low offset voltage required for minimizing measurement error	MCP603x	The MCP6031/2/3/4 op amps have a GBWP of 10 kHz with a low typical operating current of 1.35 $\mu$ A and an offset of 150 $\mu$ V.	<a href="#">Click Here</a>
	MCP6Vxx Family of Zero-Drift Amplifiers	The MCP6Vxx provides high DC precision, including an offset voltage as low as 2 $\mu$ V and offset drift as low as 15nV/ $^{\circ}$ C maximum. They have low quiescent current, no 1/f noise and offer superior CMRR/PSRR performance. The family has an operating voltage as low as 1.6V and are available in small packages (SC-70 and DFN)	<a href="#">Zero-Drift Amplifiers Parametric Table</a>
Provide feedback compensation by sensing output voltage and comparing it with reference voltage	MCP627x/8x/9x	The MCP627/8/9x family general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 2-10 MHz with low quiescent current	<a href="#">Click Here</a>
Load Cell Signal Conditioning	MCP6Nxx Family of Instrumentation Amplifiers	Microchip expanded its portfolio of amplifiers by first introducing the MCP6N11 the industry's first instrumentation amplifier featuring mCal technology and most recently introducing the MCP6N16 Zero-Drift instrumentation amplifier. <ul style="list-style-type: none"> <li>• Rail-to-Rail Input and Output</li> <li>• Gain Set by two (2) External Resistors</li> <li>• Enable/Vos Calibration Pin (MCP6N11)</li> <li>• Zero-Drift Architecture (MCP6N16)</li> <li>• Operating Voltage Range: 1.8V to 5.5V</li> <li>• No Common Mode Crossover Distortion</li> </ul>	<a href="#">Instrumentation Amplifiers Parametric Table</a>

Winning Attributes

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## □ **Attributes:**

- Small SC-70, TDFN and SOT-23 packages
- GBWP: 9 kHz to 60MHz
- Excellent operating current-to-GBWP ratio
- Mostly rail-to-rail inputs and outputs
- Offset voltage: as low as 2 $\mu$ V (MCP6V0x)
- Chip Select capability for power savings

# Voltage References

- **Function: providing the system with an accurate analog voltage for comparison**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>

# USB-to-UART/SPI

- **Function: Enables USB connectivity in applications that have UART/SPI interface**

Popular Products	Description	Product Web Page
MCP2200	The MCP2200 is a USB-to-UART serial converter. The device reduces external components by integrating the USB termination resistors. The MCP2200 also has 256-bytes of integrated user EEPROM. The MCP2200 has eight general purpose input / output pins. Four of the pins have alternate functions to indicate USB and communication status.	<a href="#">Click Here</a>
MCP2210	The MCP2210 is a USB-to-SPI Master converter. The device reduces external components by integrating the USB termination resistors. The MCP2210 also has 256 bytes of integrated user EEPROM. The MCP2210 has nine general purpose input/output pins. Seven pins have alternate functions to indicate USB and communication status.	<a href="#">Click Here</a>

# Battery Chargers

- **Function: Charge & monitor the Lithium battery chemistries**

Popular Products	Description	Product Web Page
MCP731xx	The MCP73811/2 devices are linear charge management controllers that are designed to provide specific charge algorithms for single cell Li-Ion or Li-Polymer battery to achieve optimal capacity in the shortest charging time possible.	<a href="#">Click Here</a>
MCP732xx	The MCP73123/223 is a highly integrated Lithium Iron Phosphate (LiFePO4) battery charge management controller that provide specific charge algorithms for LiFePO4 batteries to achieve optimal capacity and safety in the shortest charging time possible. Along with its small physical size, the low number of external components makes the MCP73123/223 ideally suitable for various applications.	<a href="#">Click Here</a>

# Battery Chargers

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## □ **Attributes:**

- Small thermally efficient DFN and QFN packages
- High-accuracy voltage regulation:  $\pm 0.5\%$  (max)
- Low operating current: 260 $\mu$ A (typ)
- Shutdown and pre-conditioning modes
- Temperature monitor & charge complete indicator
- USB/AC inputs
- Load sharing
- Overvoltage Protection (OVP)

# PIC Microcontrollers

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- **Function: coordinating all the control, some peripheral functions and monitor functions - the brain of the system**
- **Popular products: PIC16F193X, PIC18F65J90/94, K87K90**
- **Attributes:**
  - Up to 32 MHz operating speed
  - PWM output (PIC16F193X)
  - Integrated LCD controller, up to 256 segments
  - Integrated comparators, op-amp, 12-bit ADC, 5/8/9 bit DAC
  - Up to 256 bytes of EEPROM
  - Available in PDIP, SOIC, and TSSOP packages

# Switching Regulators

Popular Products	Description	Product Web Page
MCP1601	The MCP1601 is a synchronous Buck (step-down) switching regulator that can continuously supply 500mA of load current. This device can provide output voltages of 0.9V to $V_{in}$ with an operating efficiency that can exceed 92%.	<a href="#">Click Here</a>
MCP16251/2	The MCP16251/2 is a compact, high-efficiency, fixed frequency, synchronous step-up DC-DC converter. This family of devices provides an easy-to-use power supply solution for applications powered by either one-cell, two-cell or three-cell alkaline, NiCd, NiMH and one-cell Li-Ion or Li-Polymer batteries.	<a href="#">Click Here</a>
MCP1640	The MCP1640 is a compact, high-efficiency, fixed frequency, synchronous step-up DC-DC converter. It provides an easy-to-use power supply solution for applications powered by either one-cell, two-cell, or three-cell alkaline, NiCd, NiMH, one-cell Li-Ion or Li-Polymer batteries.	<a href="#">Click Here</a>



## □ **Attributes:**

- Regulator and controller (external FET) solutions
- Small SOT-23, MSOP and SOP packages
- Auto-switching PWM/PFM operation
- 300kHz and 750kHz switching frequency
- UVLO, Soft-start & over-temperature protection
- Efficiency as high as 95%
- Very low operating current

# RESET Monitors

- **Function: Reset the CPU and/or MCU when supply voltage falls below threshold**

Popular Products	Description	Product Web Page
MCP13xx	The MCP13xx voltage supervisors provide precision monitoring trip points, Watch Dog Timer inputs, Manual Reset with a low Supply current of 10 $\mu$ A over extended temperature range from 1.0V to 5.5V supply.	<a href="#">Click Here</a>
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click Here</a>

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## □ Attributes:

- Tiny SOT-23 and SC-70 packages
- Very low operating current: as low as 10 $\mu$ A (max)
- High threshold voltage accuracy:  $\pm 2.8\%$  (max)
- $V_{DD}$  transient immunity
- Watchdog Timer / manual reset (MCP13xx, TC1232)
- Many available options: push-pull output, open-drain output and internal pull-up resistor

# Low-Power LDOs

- **Function: providing regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MIC5353	The MIC5353 is a 500 mA, ceramic output cap stable, low output voltage, Low Dropout Regulator. The MIC5353 is packaged in very small 1.6x1.6mm DFN package. This part has high PSRR of 60dB with low output noise of 30 uVrms for noise sensitive applications	<a href="#">Click Here</a>
MCP1703A	With 250 mA maximum output, MCP1703 works with input voltage of up to 16V and in combination with its low current consumption of 2 $\mu$ A	<a href="#">Click Here</a>

# ADC Portfolio

- **Function: Converting analog voltage or current signal (pressure) into digital data**

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>
MCP3551	MCP355X devices are 2.7V to 5.5V, 22-bit delta-sigma A/D converters. The family exhibit good linearity, high accuracy and low noise performance for applications where sensor measurements such as pressure are performed.	<a href="#">Click Here</a>



# Delta-Sigma Analog-to-Digital Converters

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## □ **Attributes:**

- Resolution: 16 to 22 bits
- Max sampling rate: up to 240 sps
- Current consumption: 120 to 155  $\mu$ A (max.)
- Single supply voltage: 2.7V to 5.5V
- Small packages: SOT-23 and MSOP



# Product Support Tools

## Devices Supported:

MCP3421, MCP6V07, PIC18F4550

## Summary Description:

The MCP3421 Weight Scale Demo Board is designed to evaluate the performance of the low-power consumption, 18-bit ADC in an electronic weight scale design. Next to the MCP3421 there is a low-noise, auto-zero MCP6V07 op amp. This can be used to investigate the impact of extra gain added before the ADC for performance improvement. The PIC18F4550 is controlling the LCD and the USB communication with the PC. The GUI is used to indicate the performance parameters of the design and for calibration of the weight scale.

## This Kit Contains:

- MCP3421 Weight Scale Demo Board
- 9V Power adapter
- Mini USB cable
- CD with software and documentation



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**MICROCHIP**

# Energy Measurement

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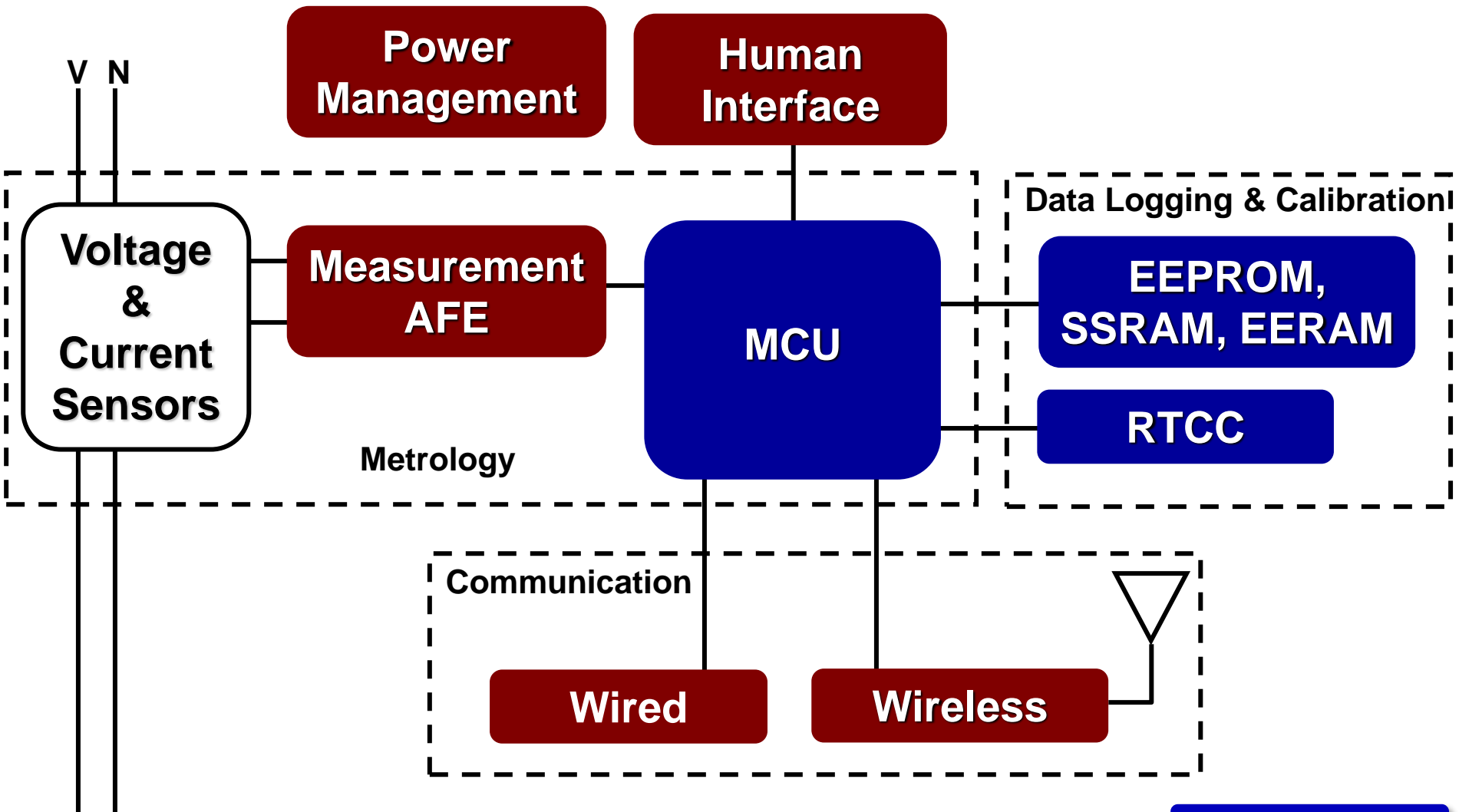


# Microchip's Winning Attributes

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- **Industry leading Analog Front End (AFE) accuracy (SINAD, THD, SFDR)**
- **High performance integration**
- **Full solution**
  - Flexible and upgradable solution with AFE+PIC® MCUs and SoC solutions
  - System solution with wireless, memory, analog
- **Great technical support**
  - Numerous reference designs and evaluation boards
  - ACE Metrology Team

# Energy Meter Block Diagram





# Power Management

Popular Products	Description	Product Web Page
LDO MCP1700 MCP1703A	The MCP1700/3A are CMOS low dropout positive voltage regulators which can source up to 250mA of current with an extremely low input-output voltage differential. The low dropout voltage combined with the low current consumption makes this part ideal for battery operation.	<a href="#">MCP1700</a> <a href="#">MCP1703A</a>
MCP16311/2	The MCP16311/2 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC converter in a 8-pin MSOP, or 2 x 3 TDFN package that operates from input voltage sources up to 30V. Integrated features include a high-side and a low-side switch, fixed frequency Peak Current Mode Control, internal compensation, peak-current limit and over temperature protection. The MCP16311/2 provides all the active functions for local DC-DC conversion, with fast transient response and accurate regulation.	<a href="#">Click Here</a>
MIC2851x	MIC28510 is an adjustable frequency, synchronous buck regulator featuring unique adaptive on time control architecture. The MIC28510 operates over an input supply range of 4.5V to 75V and provides a regulated output of up to 4A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of $\pm 1\%$ .	<a href="#">MIC28510</a>

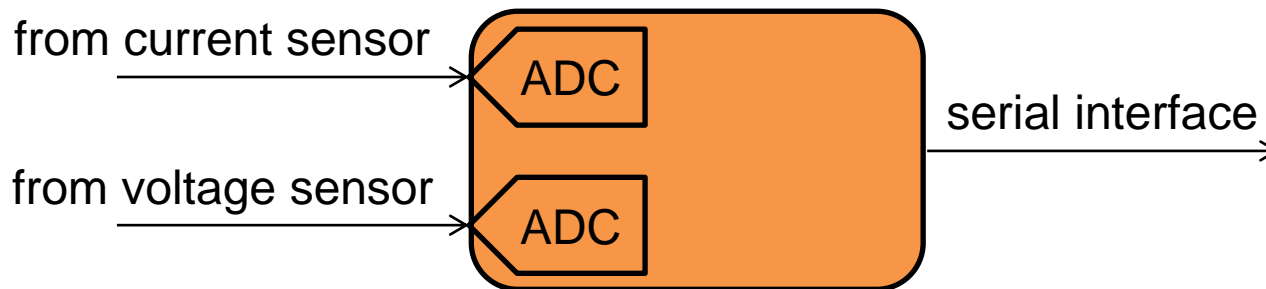
# Sensing Technologies

- **Voltage**
  - Resistive Divider from line voltage
- **Current: 4 main sensor types**

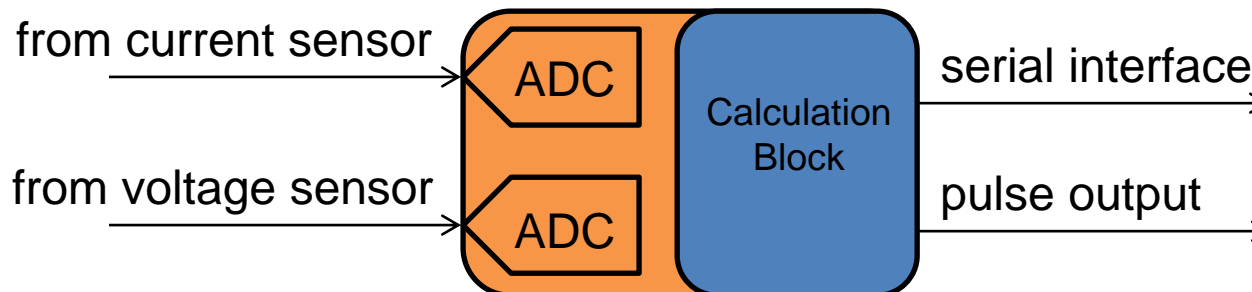
Current Sensor	Cost	Power Consumption	High Current Capability	Description
Current Shunt	Very Low	Medium	Poor	Accurate resistor, 100 $\mu\Omega$ to 500m $\Omega$ , non-isolated
Current Transformer	Medium	Low	Good	Winding with magnetic core, isolated
Rogowski Coil	Low-Med	Low	Very Good	Helical coil, output needs to be integrated, isolated
Hall Effect Transformer	High	Medium	Good	Hall plate, isolated

# Energy Measurement Analog Front Ends

- **Energy Measurement AFEs provide the most flexible and highest accuracy solutions**



- **Energy Calculation ICs provide energy and power calculations, simplifying design**





# Energy Measurement Analog Front Ends

Part Number	# of ADCs	Power Measurement
MCP3918	1	1-Phase or 3-Phase (shunt-based)
MCP3910	2	1-Phase or 3-Phase (shunt-based)
MCP3911	2	1-Phase
MCP3919	3	1-Phase w/ Neutral
MCP3912	4	2-Phase (Dual/Split-Phase)
MCP3913	6	3-Phase
MCP3914	8	3-Phase w/ Neutral
ATSENSE101	3	1-Phase w/ Neutral
ATSENSE201(H)	4	2-Phase (Dual/Split-Phase)
ATSENSE301(H)	7	3-Phase w/ Neutral



# Energy Measurement Analog Front Ends

- Energy measurement AFEs enables the most flexible and highest accuracy solutions

Popular Products	Description	Product Web Page
MCP391X	The MCP391X AFE family provide up to eight simultaneously sampling Delta-Sigma Analog-to-Digital Converters (ADC), PGAs, phase delay compensation block, low-drift voltage reference, digital offset and gain errors calibration registers, and high-speed 20 MHz SPI interface. The family enables 0.1% typical active power measurement error over a 10000:1 dynamic range.	<a href="#">Click Here</a>
ATSENSE	The ATSENSE AFE family integrate three, four or seven simultaneously sampled Sigma-Delta ADCs, a high-precision voltage reference a programmable current signal amplification, a temperature sensor and an SPI interface. When used in combination with the ATSAM4C device family and metrology library, the ATSENSE exceeds ANSI C12.20-2002 and IEC 62053-22 metering accuracy classes of up to 0.2% over 3000:1 dynamic range	<a href="#">Click Here</a>

Winning Attributes

<< BACK to AFEs



# Energy Measurement AFE Winning Attributes

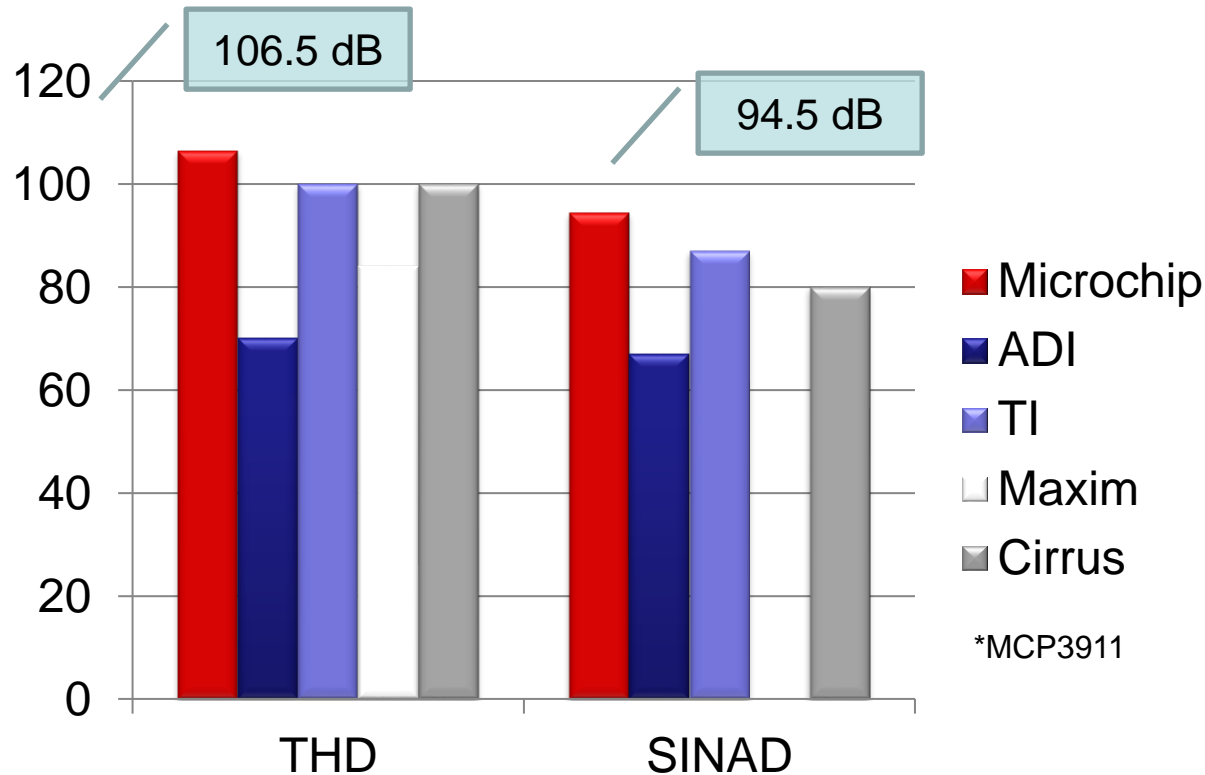
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## □ Attributes:

- MCP391X industry leading accuracy enables 0.1% active power measurement error (typ.) over a 10000:1 dynamic range, use of smaller shunt sensors, and reduction in calibration requirements
  - Programmable data rate up to 125 ksps allows device to run at low power or at high speed for advanced signal acquisition such as for harmonic analysis
- ATSENSE ideal companion chip with ATSAM4C dual cortex-M4 MCU family and metrology library



# Accuracy Comparison



**Total Harmonic Distortion and Signal-to-Noise and Distortion Ratio are measures of a device's accuracy**



# Energy Calculation ICs

- **Energy measurement calculation ICs provide energy and power calculations on one device**

Popular Products	Description	Product Web Page
MCP3905A	The MCP3905A is a 1- $\Phi$ energy meter IC. The output includes a frequency proportional to the average active (real) power.	<a href="#">Click Here</a>
ATM90E26	The ATM90E26 is an energy metering device for 1- $\Phi$ two-wire, 1- $\Phi$ three-wire or anti-tampering active and reactive energy meters.	<a href="#">Click Here</a>
ATM90E32AS	The ATM90E32AS is an enhanced energy metering device for 3- $\Phi$ four-wire (3P4W, Y0) or 3- $\Phi$ three-wire (3P3W, Y or $\Delta$ ) systems. It contains enhanced functions such as piecewise non-linear compensation, anti-tampering monitoring and expanded event-detecting function.	<a href="#">Click Here</a>
ATM90E36A	The ATM90E36A is a energy metering device for 3- $\Phi$ four-wire (3P4W, Y0) or 3- $\Phi$ three-wire (3P3W, Y or $\Delta$ ) systems. It includes Total Harmonic Distortion (THD) and Discrete Fourier Transform (DFT) functions for harmonic component analysis.	<a href="#">Click Here</a>

Winning Attributes

<< BACK to AFEs



# Energy Measurement AFE Winning Attributes

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## □ Attributes:

- Fully compliant with IEC62052
- Accuracy:
  - MCP3905A 500:1 Active Power
  - ATM9026: 0.1% for active energy and 0.2% for reactive energy over 5000:1 dynamic range
  - ATM90E32AS/36A  $\pm 0.1\%$  for active energy and  $\pm 0.2\%$  for reactive energy over 6000:1 dynamic range
- MCP3905A pin-to-pin compatible with ADE7755

- **Function:**

- Power calculations
- More powerful MCUs for (wireless) communications

- **Popular products:**

- ATSAM4Cx, ATSAM4CMx, ATSAM4CPx
- PIC16F15XX
- PIC16F182X
- PIC18F65J90
- PIC24FJ128GA306, PIC24FJ128GA310
- PIC32 (advanced smart meters)



# Microchip Calculation Library

MCU	Phase Sensor	Active Power	V & I rms	Apparent Power	Reactive Power	Harmonic Analysis
PIC18 8-bit, 12 MIPS	1 $\Phi$ -Shunt 3 $\Phi$ -CT	✓	✓	✓	✓	n/a
PIC24F/H 16b, 16-70 MIPS	1 $\Phi$ - Shunt/CT 3 $\Phi$ -Shunt, CT, RGC	✓	✓	✓	✓	TBD
dsPIC33 16b, 40-70 MIPS	1 $\Phi$ -Shunt 3 $\Phi$ -CT	✓	✓	✓	✓	✓
PIC32 32-bit, 80MHz	1 $\Phi$ -Shunt 3 $\Phi$ -CT	✓	✓	✓	✓	✓

CT = Current Transformer, RGC = Rogowski Coil

- **A.C.E metrology team has developed a library of firmware that is available for customer use and can assist in customization**

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# RTCC Monitoring Time of Usage



## □ Energy billing purposes

- Accurate time & energy usage monitored and stored

## □ Smart energy communications

- Timestamp usually included with messages
- MAC address loaded in MCU or RTCC with unique ID

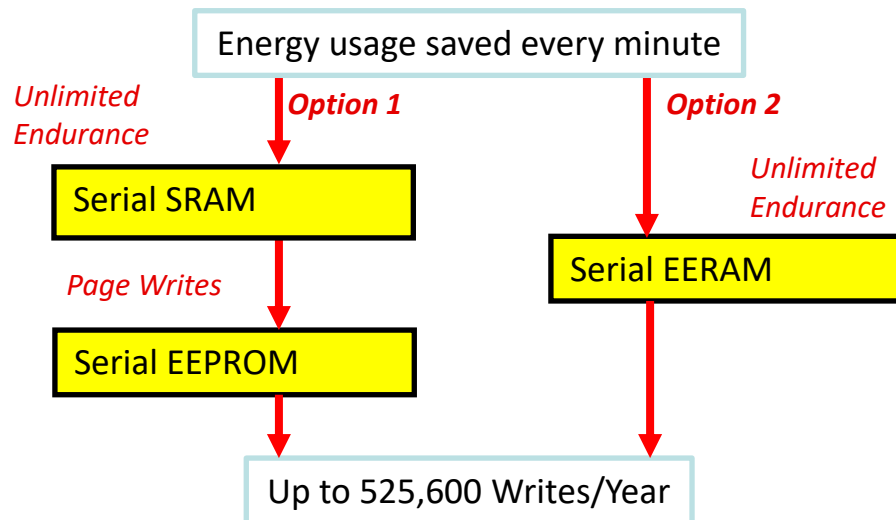
## □ Periodic system status to validate meter operation

- Timestamp logged each time a self diagnostics is performed

# Data Storage & Data Logging in Energy Monitoring

## □ Data Logging:

- Meter operation is periodically monitored & recorded
- Energy usage is measured and stored
  - High endurance memory is a requirement



## □ Calibration:

- Calibration parameters stored in non-volatile memory

## □ Display

- Graphics
- Segmented LCD
- Monochrome
- Full color

## □ Touch sense

- Capacitive touch
- Resistive touch screens
- Tactile buttons
- Rotary switches

## □ Audio and speech



[www.microchip.com/humaninterface](http://www.microchip.com/humaninterface)



- **Methods vary based on application requirements**
  - Physical environments
  - Standard protocol interfaces
- **Wireless**
  - ZigBee, WiFi, MiWi, Z-Wave, proprietary
- **Wired**
  - PLC, Ethernet, USB, Home Plug, BACnet, proprietary
- **Protocols**
  - DLMS, COSEM, Smart Energy Profile





# Microchip Wi-Fi Solution

- ❑ **Driver incorporated into Microchip TCP/IP stack**
- ❑ **Compatibility across nearly every major Microchip MCU family**
- ❑ **Demo Source Code and Applications**
- ❑ **PICtails and PICtail-based development kits shipping now**



NEXT

- **Multiple frequency options**
  - 868/915/950 MHz
  - FSK/OOK Modulation
- **Low current operation**
  - Low Rx Current = 3 mA
  - Low Tx Current = 25 mA @ +10 dBm
- **Integrated power amplifier (+12.5 dBm)**
- **High receiver sensitivity**
  - -107 dBm FSK/ -113dBm OOK)
- **Automatic frequency control (AFC)**
  
- **Module features:**
  - FCC (U.S.A.), IC (Canada), and ETSI (Europe) compliant
  - Surface-mountable PCB





# Microchip 2.4 GHz Solutions

## □ Transceiver Features:

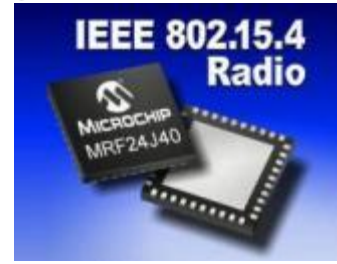
- Supports MiWi™, MiWi P2P & ZigBee®
- 2.4GHz IEEE 802.15.4 compliant
- In-line/stand-alone encryption
- Automatic MAC retransmit
- 18 mA(RX)/22 mA(TX)/2 µA(Sleep)

## □ Module Features:

- Integrated PCB antenna
- FCC (U.S.A.), IC (Canada), and ETSI (Europe) certified



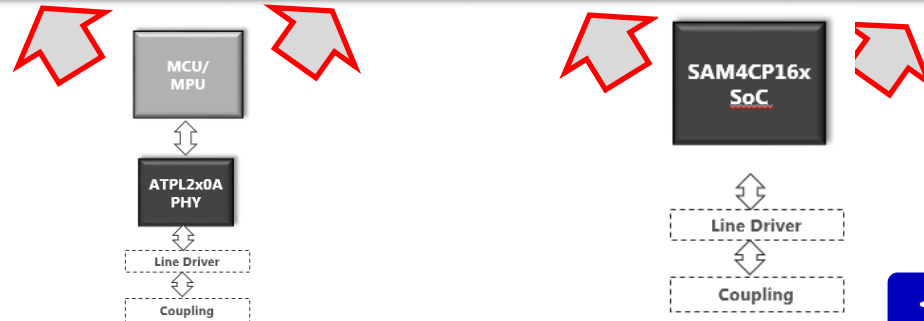
**ZigBee® Alliance**  
Wireless Control That Simply Works



NEXT

# PLC

	ATPL230A	ATPL250A	SAM4CP16B	SAM4CP16C
Standard	PRIME	G3	PRIME	G3
Band	< 500 kHz	< 500 kHz	< 500 kHz	< 500 kHz
Core	-	-	Dual Cortex-M4	Dual Cortex-M4
CPU Clock	-	-	120 MHz @core	120 MHz @core
Flash	-	-	1 MB	1 MB
SRAM	-	-	128+16+8 KB	128+16+8 KB
Package	LQFP80	LQFP80	LQFP176	LQFP176
Pin to Pin	YES		YES	
Availability	In production	In production	In production	In production



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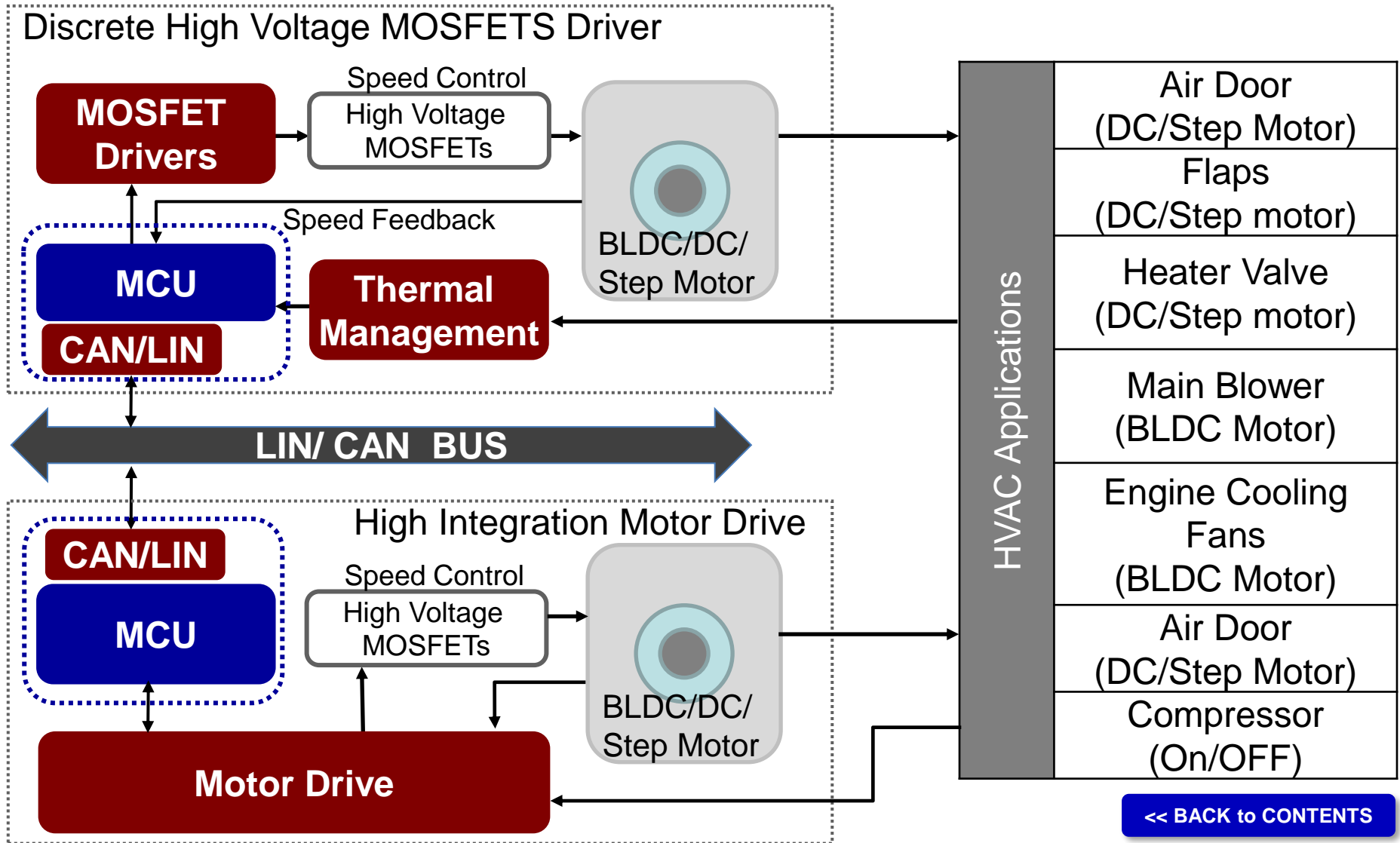
**MICROCHIP**  
**Analog Products in**  
**Automotive:**  
**Heating, Ventilation and Air**  
**Conditioning (HVAC) system**

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- **Automotive HVAC control**
  - Automotive heating, ventilation and air conditioning (HVAC) system is designed to provide passengers' desired cabin temperature while keeping the engine from overheating
- **Microchip offers comprehensive solutions to control HVAC applications such as fans, blowers, pumps, condensers and compressors to efficiently achieve such tasks**

# Automotive - HVAC





# Motor Drive

Popular Products	Description	Product Web Page
MCP8024/5/6 MTD6501 MCP8063 MTD6505/8 ATA6823/24C	Standalone motor controllers/drivers and MCU companion ICs for BLDC (brushless DC), PMS (Permanent Magnetic Synchronous Motor), brush DC, and stepper motors	<a href="#">Motor Drive Parametric Search table</a>
ATA6826C ATA6831/31C ATA6836/38C	3-fold and 6-fold integrated half bridge drivers for controlling up to 5 DC motors up to 1A each	<a href="#">Motor Driver Parametric Search table</a>

# MOSFET Drivers

Popular Products	Description	Product Web Page
MCP140X MCP141X MCP14628 MAQ4123/4/5	Low-side and low-side/high-side drivers	<a href="#">MOSFET Driver's Parametric Search table</a>



# Thermal Management

Suggested Products	Description	Product Web page
MCP9700/ MCP9800/	Improves control of color temperature and detects disconnected LED channel. MCP9700 outputs analog voltage that is proportional to the temperature (-40C to 150C). MCP9800 outputs temperature data (-55C to 125C) via I <sup>2</sup> C™/SMBus two-wire interface.	<a href="#">MCP9700</a> <a href="#">MCP9800</a>
EMC2101	The EMC2101 is an SMBus 2.0 compliant, integrated fan control solution complete with two temperature monitors, one external and one internal. Each temperature channel has programmable high limits that can assert an interrupt.	<a href="#">EMC2101</a>
EMC1412	The EMC1412 is a high accuracy, low cost, System Management Bus (SMBus) temperature sensor. Advanced features such as Resistance Error Correction (REC), Beta Compensation and automatic diode type detection combine to provide a robust solution for complex environmental monitoring applications.	<a href="#">EMC1412</a>

Suggested Products	Description	Product Web page
PIC16F1829LIN	8-bit MCU with an integrated LIN transceiver.	<a href="#">PIC16F1829LIN</a>
PIC18FXX31	8-bit MCU with LIN slave support	<a href="#">PIC18FXX31</a>
PIC18F4680	8-bit MCU with enhanced CAN module and LIN master/slave support	<a href="#">PIC18F4680</a>
PIC24/dsPIC33	16-bit MCU and DSC with enhanced CAN controller and LIN master/slave support. Supports Sensorless field-oriented motor control algorithm to achieve stunning performance.	<a href="#">PIC24/dsPIC33</a>



# CAN/LIN Communication

	Suggested Products	Description	Product Web page
LIN	ATA663203	Stand-alone LIN LDO	<a href="#">LIN Design Center</a>
	ATA663211 ATA6662C/63/4	Globally automotive approved and qualified Stand-alone transceiver	
	ATA6670	Globally automotive approved and qualified Stand-alone Dual LIN transceiver	
	ATA663231/32/54/55 ATA6625, ATA6629/31 MCP2021A/2A/25	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator	
	MCP2050, ATA663431/54 ATA6628/30, ATA6622C/24C/26C	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + Window Watchdog Timer	
	ATA663331/54	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 2x Relay Driver	
	ATA664151	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 8x HV Switches	
	ATA6612C/13C/ 14Q/16C/17C ATSAMHA1G, PIC16F1829LIN	8-bit MCU with an integrated LIN transceiver + Voltage Regulator	
CAN, CAN FD	MCP2515	External CAN controller supports CAN V2.0B specification Can also interface with MCU with Standard SPI.	<a href="#">CAN Design Center</a>
	MCP25625	CAN 2.0 external Controller + Transceiver	
	MCP2561/2	Globally automotive approved and qualified, High Speed CAN Transceivers	
	MCP2561/2FD, ATA6560/61	Globally automotive approved and qualified CAN Flexible Data-rate (CAN FD) Transceivers	
	MCP25612FD	Dual CAN 2.0 or CAN FD Transceiver	

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# Voltage Regulators: Buck Converters

Popular Products	Description	Product Web Page
MIC28511	The MIC28511 is a synchronous step-down switching regulator with integrated high-side and low-side N-channel MOSFETs capable of providing up to 3A output current from a wide input supply range from 4.6V to 60V. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of $\pm 1\%$ . A constant switching frequency can be programmed from 200kHz to 680kHz	<a href="#">Click Here</a>
MIC28512	The MIC28512 is a synchronous step-down switching regulator with integrated high-side and low-side N-channel MOSFETs capable of providing up to 2A output current from a wide input supply range from 4.6V to 70V. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of $\pm 1\%$ . A constant switching frequency can be programmed from 200kHz to 680kHz.	<a href="#">Click Here</a>
MIC28513	The MIC28513 is a synchronous step-down switching regulator with integrated high-side and low-side N-channel MOSFETs capable of providing up to 4A output current from a wide input supply range from 4.6V to 45V. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of $\pm 1\%$ . A constant switching frequency can be programmed from 200kHz to 680kHz.	<a href="#">Click Here</a>

# Automotive Infotainment

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**Head Unit**

**Speakers & Audio  
Amplifier**

**USB Charger Basic  
C Charger**

**USB Charger  
1 Port UPD**

**USB BoB 2 Port Media  
Hub w/ UPD**

**Telematics**

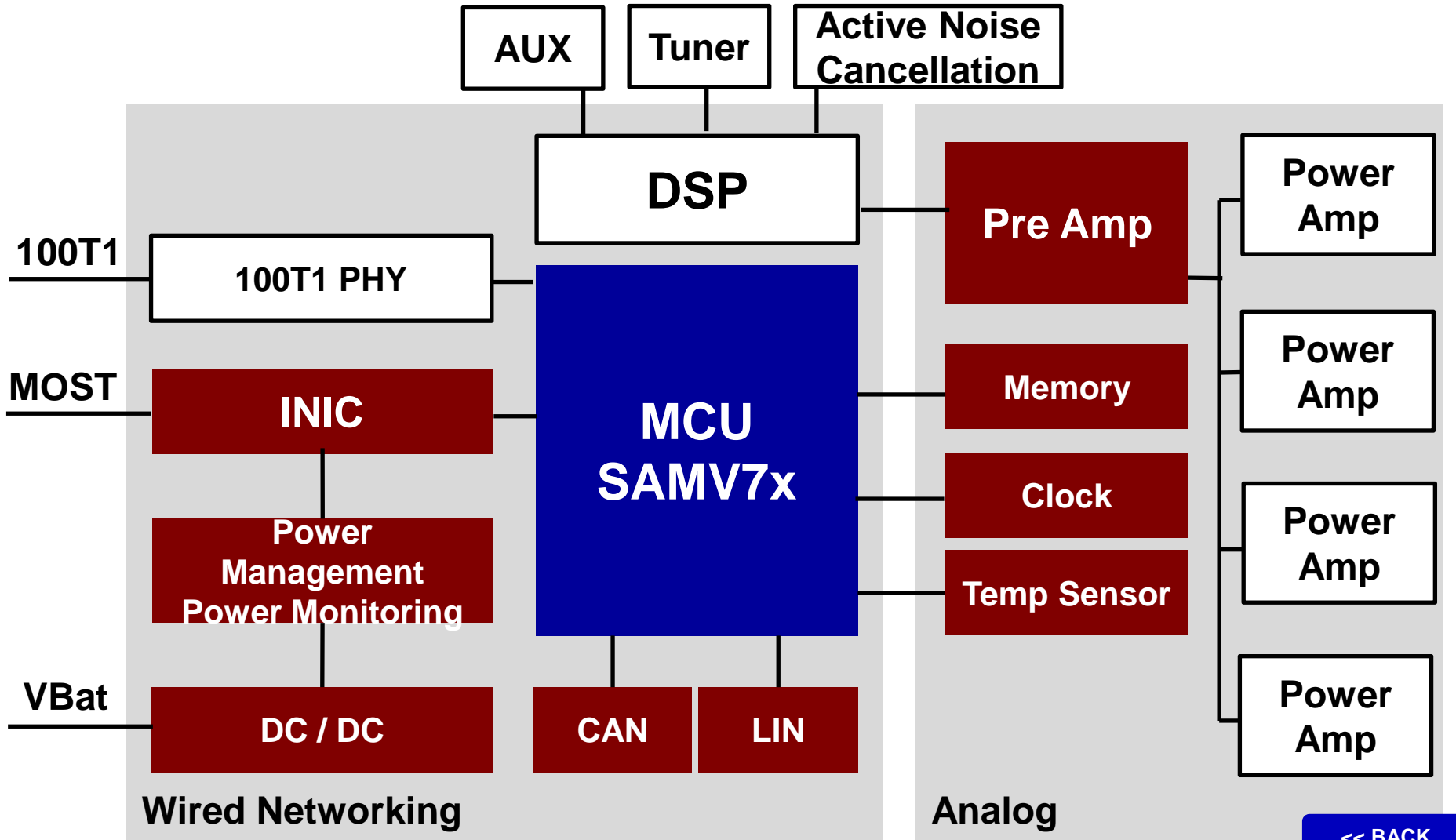
**Wireless Charging**

**USB BoB  
w/ Type C Charging**

**USB BoB  
1 Port UPD**

**USB BoB 2 Port Media  
Hub w/ UPD  
Ground Shift Compensation**

# Speakers & Audio Amplifier





<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
DSC1001	The DSC1001 is a silicon MEMS based CMOS oscillator offering excellent jitter and stability performance over a wide range of supply voltages and temperatures. The device operates from 1 to 150MHz with supply voltages between 1.8 to 3.3 Volts and temperature ranges up to -40°C to 105°C.	<a href="#">DSC1001</a>



# Memory

Popular Products	Description	Product Web Page
USBF4100	USB Hub 512KB Firmware Memory, programmed with binary image for Microchip USB Hubs	<a href="#">USBF4100</a>
EEPROM	Microchip provides a full range of densities and communication protocols to meet your needs in serial EEPROMs and parallel EEPROMs	<a href="#">EEPROM</a>

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# Pre-Amp

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP629x	MCP629x family of operational amplifiers (op amps) provide wide bandwidth for the current. This family has a 10 MHz Gain Bandwidth Product (GBWP) and a 65° phase margin. Also operates from a single supply voltage as low as 2.4V, while drawing 1 mA (typical) quiescent current	<a href="#">MCP629x</a>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>
MIC2800	The MIC2800 is a high-performance power management IC, giving three output voltages with maximum efficiency.	<a href="#">MIC2800</a>



# Temperature Sensor

Popular Products	Description	Product Web Page
<p>MCP9808 Digital temperature sensor</p>	<p>The MCP9808 converts temperatures between -20°C and +100°C to a digital word with <math>\pm 0.5^\circ\text{C}</math> (max.) accuracy</p>	<p><a href="#">MCP9808</a></p>
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">MCP9700</a></p>



# CAN & LIN

Popular Products	Description	Product Web Page
MCP2515	The MCP2515 is a second generation stand-alone CAN controller with SPI interface	<a href="#">MCP2515</a>
MCP2517FD	The MCP2517FD is a cost-effective and small-footprint External CAN FD Controller that can be easily added to a microcontroller with an available SPI interface.	<a href="#">MCP2517FD</a>
ATA6560	The Microchip ATA6560 is a high-speed CAN FD ready CAN transceiver that provides an interface between a controller area network (CAN) protocol controller and the physical two-wire CAN bus.	<a href="#">ATA6560</a>
MCP2561	The MCP2561/2FD is a Microchip Technology Inc. second generation high-speed CAN transceiver.	<a href="#">MCP2561</a>
ATA663211	The Microchip ATA663211 is a fully integrated LIN transceiver designed in compliance with the LIN specification 2.0, 2.1, 2.2, 2.2A and SAEJ2602-2.	<a href="#">ATA663211</a>

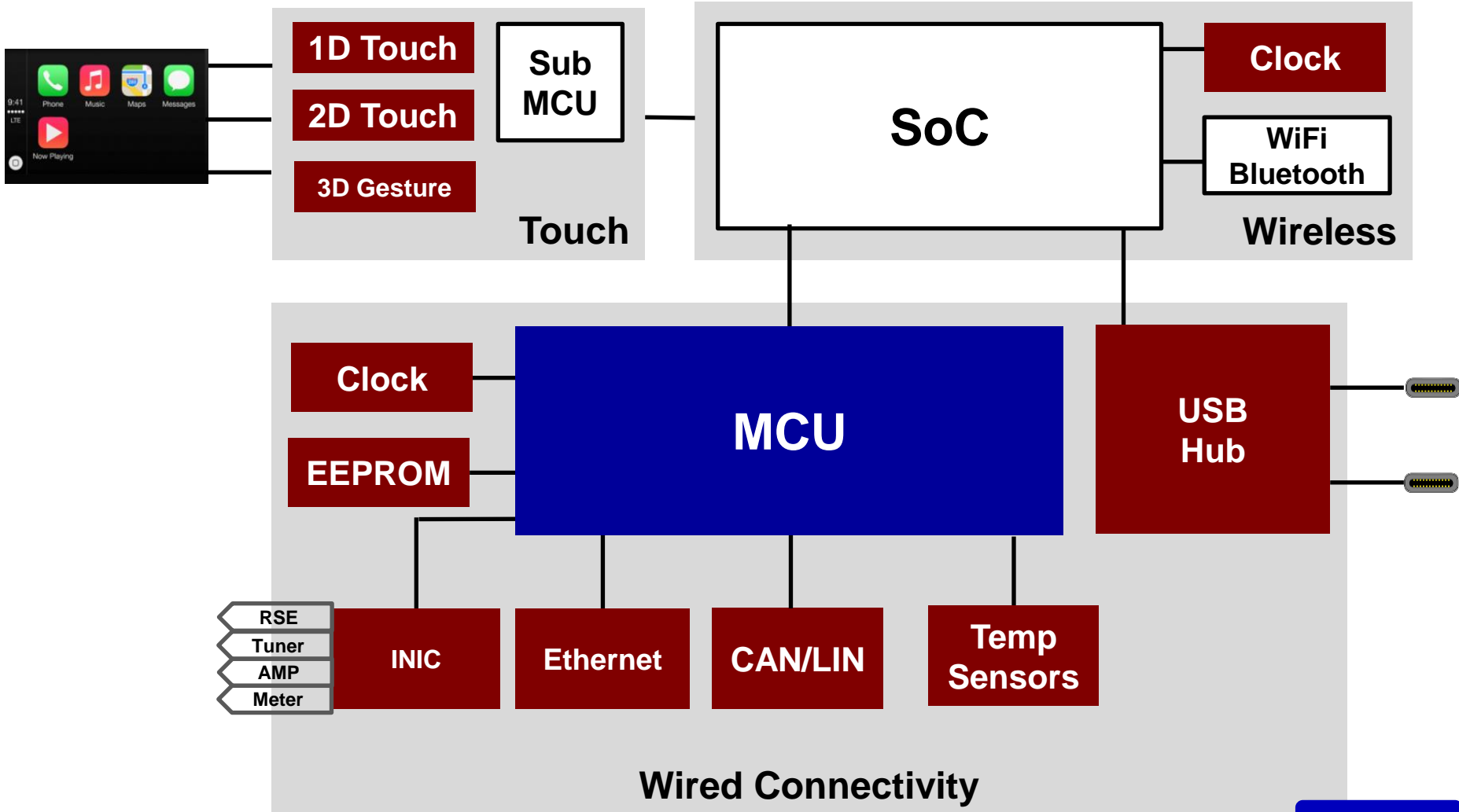
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Popular Products	Description	Product Web Page
ATSAMV71N19	The Microchip SAM V71 devices are a family of Automotive Flash microcontrollers based on the high-performance 32-bit ARM Cortex-M7 processor with a Double Precision Floating Point Unit (FPU).	<a href="#"><u>ATSAMV71N19</u></a>
SAM C MCUs	SAM C Cortex-M0+ based microcontroller (MCU) series builds on decades of innovation and experience in embedded Flash microcontroller technology.	<a href="#"><u>SAM C MCUs</u></a>
SAM E MCUs	Microchip SAM E series MCUs comprise of the mid-performance ARM <sup>®</sup> Cortex <sup>®</sup> -M4F Processors(SAME5X) and the high-performance 32-bit ARM Cortex -M7 RISC processors	<a href="#"><u>SAM E MCUs</u></a>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
OS81xxx	INICnet™ technology simplifies automotive infotainment networking with support for Ethernet, audio, video and control over a single cable.	<a href="#"><u>OS81xxx</u></a>



# Head Unit



Popular Products	Description	Product Web Page
USB4912	The Microchip USB4912 is a USB2.0 Hi-Speed Hub with unique Smart Hub features. This highly integrated chip optimizes board area and reduces overall system costs.	<a href="#">USB4912</a>
USB7002	The Microchip USB7002 SmartHub™ IC is a low-power, OEM configurable, USB 3.1 Gen 1 hub controller with 4 downstream ports and advanced features.	<a href="#">USB7002</a>
USB83340	The USB83340 is optimized for use in applications where a low operating current and standby currents are essential. The device integrates 3.3 V and 1.8 V regulators, making it possible to operative the device from a single power supply.	<a href="#">USB83340</a>

# Memory

Popular Products	Description	Product Web Page
USBF4100	USB Hub 512KB Firmware Memory, programmed with binary image for Microchip USB Hubs	<a href="#">USBF4100</a>
EEPROM	Microchip provides a full range of densities and communication protocols to meet your needs in serial EEPROMs and parallel EEPROMs	<a href="#">EEPROM</a>

# Ethernet

Popular Products	Description	Product Web Page
LAN7431	Microchip's LAN7431 is a PCIe 3.1 (at 2.5GT/s) to Reduced Gigabit Media Independent Interface (RGMII) Gigabit Networking bridge providing an ultra-high-performance and cost-effective PCIe to Ethernet connectivity solution.	<a href="#">LAN7431</a>
LAN89530	Microchip's LAN89530 was specifically designed to provide a high performance, low-cost USB to 10/100 Ethernet connectivity solution with a Hi-Speed USB interface for Automotive applications.	<a href="#">LAN89530</a>
KSZ8051	The KSZ8051 is an AEC-Q100 standard qualified single-supply 10Base-T/100Base-TX Ethernet physical-layer transceiver for automotive applications.	<a href="#">KSZ8051</a>
LAN7801	Microchip's LAN7801 is a Super Speed USB 3.1 Gen 1 to 10/100/1000 Gigabit Ethernet bridge providing an ultra high-performance and cost-effective USB to RGMII connectivity solution.	<a href="#">LAN7801</a>



# Temperature Sensor

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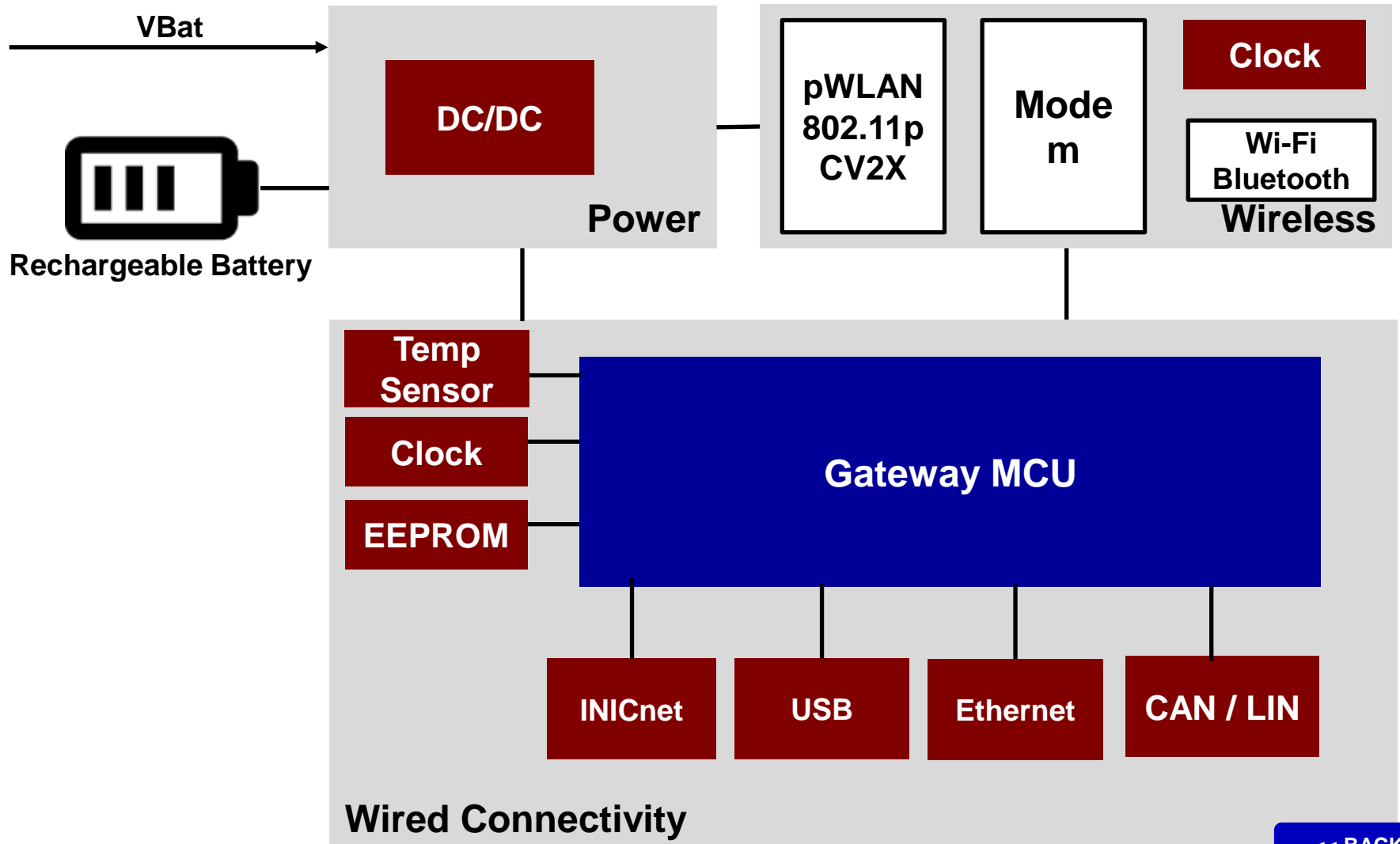


# Touch

Popular Products	Description	Product Web Page
1D Touch	Microchip is your one-stop shop for touch - buttons, sliders, wheels and proximity for any touch sensitive device.	<a href="#">1D Touch</a>
2D Touch	Our proven, turnkey maXTouch <sup>®</sup> touchscreen controllers offer leading-edge multi-touch projected capacitive technology for use in touchpads and touchscreens up to 24" in diagonal size. These solutions offer water tolerance and support for styluses and gloved fingers, along with the highest level of noise robustness for use in automotive and industrial applications.	<a href="#">2D Touch</a>
3D Gesture	The MGC3030, MGC3130 and MGC3140 are the world's first electrical near-field (E-field) 3D gesture controllers. Based on Microchip's patented GestIC <sup>®</sup> technology, they enable user gesture detection and motion tracking.	<a href="#">3D Gesture</a>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
DSC1001	The DSC1001 is a silicon MEMS based CMOS oscillator offering excellent jitter and stability performance over a wide range of supply voltages and temperatures. The device operates from 1 to 150MHz with supply voltages between 1.8 to 3.3 Volts and temperature ranges up to -40°C to 105°C.	<a href="#">DSC1001</a>

# Telematics Unit



<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>
MIC2800	The MIC2800 is a high-performance power management IC, giving three output voltages with maximum efficiency.	<a href="#">MIC2800</a>
LX7309	The LX7309 is a versatile current-mode DC/DC controller for isolated and non-isolated topologies, featuring an internal differential current-sense amplifier for Kelvin connectivity and low 200mV threshold for low sense resistances and high efficiency.	<a href="#">LX7309</a>

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# Ethernet

Popular Products	Description	Product Web Page
LAN7431	Microchip's LAN7431 is a PCIe 3.1 (at 2.5GT/s) to Reduced Gigabit Media Independent Interface (RGMII) Gigabit Networking bridge providing an ultra-high-performance and cost-effective PCIe to Ethernet connectivity solution.	<a href="#">LAN7431</a>
LAN89530	Microchip's LAN89530 was specifically designed to provide a high performance, low-cost USB to 10/100 Ethernet connectivity solution with a Hi-Speed USB interface for Automotive applications.	<a href="#">LAN89530</a>
KSZ8051	The KSZ8051 is an AEC-Q100 standard qualified single-supply 10Base-T/100Base-TX Ethernet physical-layer transceiver for automotive applications.	<a href="#">KSZ8051</a>
LAN7801	Microchip's LAN7801 is a Super Speed USB 3.1 Gen 1 to 10/100/1000 Gigabit Ethernet bridge providing an ultra high-performance and cost-effective USB to RGMII connectivity solution.	<a href="#">LAN7801</a>

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<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
OS81xxx	INICnet™ technology simplifies automotive infotainment networking with support for Ethernet, audio, video and control over a single cable.	<a href="#">OS81xxx</a>





# Temperature Sensor

Popular Products	Description	Product Web Page
<p>MCP9808 Digital temperature sensor</p>	<p>The MCP9808 converts temperatures between -20°C and +100°C to a digital word with <math>\pm 0.5^\circ\text{C}</math> (max.) accuracy</p>	<p><a href="#">MCP9808</a></p>
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">MCP9700</a></p>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
DSC1001	The DSC1001 is a silicon MEMS based CMOS oscillator offering excellent jitter and stability performance over a wide range of supply voltages and temperatures. The device operates from 1 to 150MHz with supply voltages between 1.8 to 3.3 Volts and temperature ranges up to -40°C to 105°C.	<a href="#">DSC1001</a>



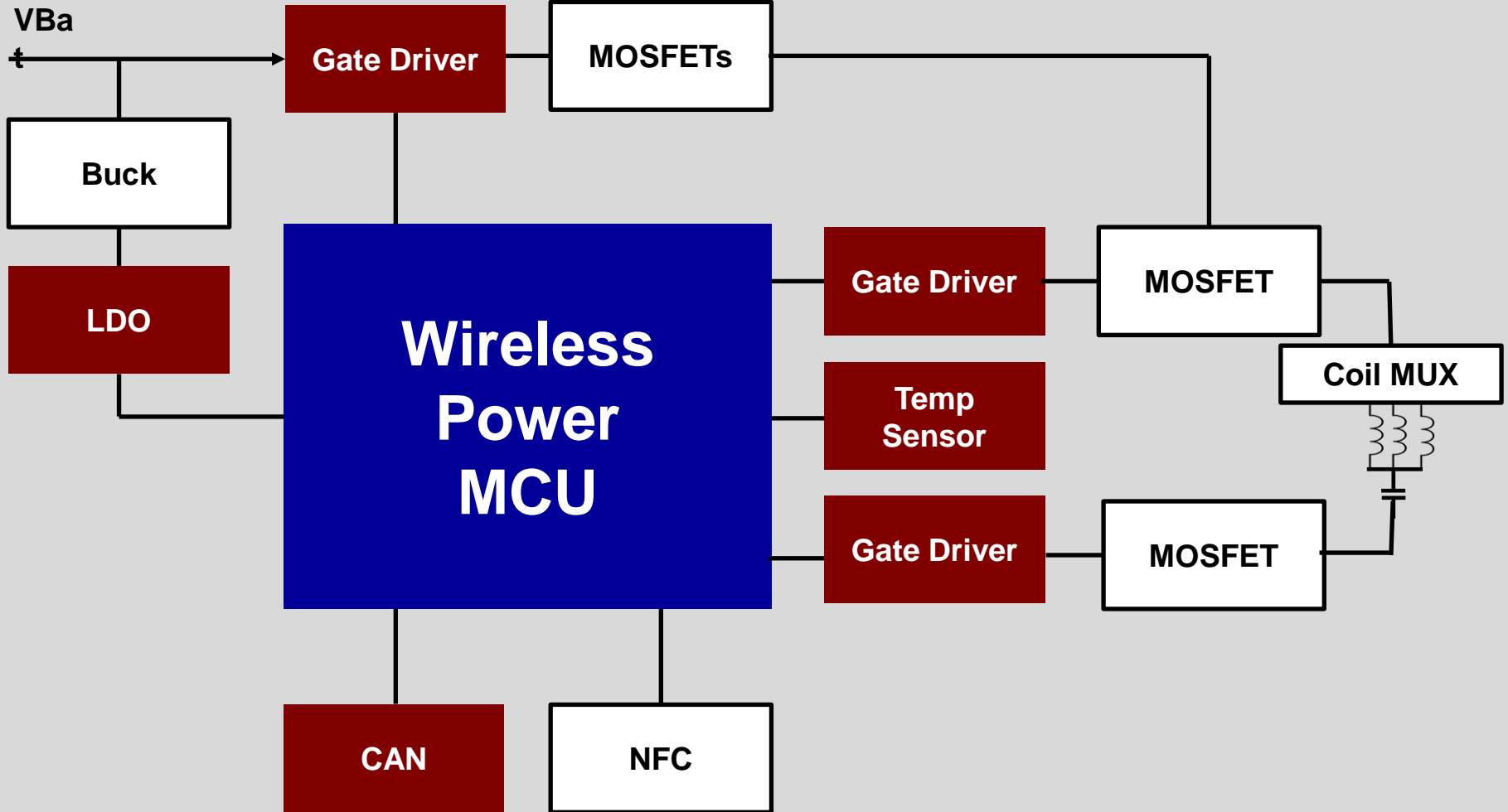
# CAN & LIN

Popular Products	Description	Product Web Page
MCP2515	The MCP2515 is a second-generation stand-alone CAN controller with SPI interface	<a href="#">MCP2515</a>
MCP2517FD	The MCP2517FD is a cost-effective and small-footprint External CAN FD Controller that can be easily added to a microcontroller with an available SPI interface.	<a href="#">MCP2517FD</a>
ATA6560	The Microchip ATA6560 is a high-speed CAN FD ready CAN transceiver that provides an interface between a controller area network (CAN) protocol controller and the physical two-wire CAN bus.	<a href="#">ATA6560</a>
MCP2561	The MCP2561/2FD is a Microchip Technology Inc. second generation high-speed CAN transceiver.	<a href="#">MCP2561</a>
ATA663211	The Microchip ATA663211 is a fully integrated LIN transceiver designed in compliance with the LIN specification 2.0, 2.1, 2.2, 2.2A and SAEJ2602-2.	<a href="#">ATA663211</a>

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Popular Products	Description	Product Web Page
ATSAMV71N19	The Microchip SAM V71 devices are a family of Automotive Flash microcontrollers based on the high-performance 32-bit ARM Cortex-M7 processor with a Double Precision Floating Point Unit (FPU).	<a href="#"><u>ATSAMV71N19</u></a>
SAM C MCUs	SAM C Cortex-M0+ based microcontroller (MCU) series builds on decades of innovation and experience in embedded Flash microcontroller technology.	<a href="#"><u>SAM C MCUs</u></a>
SAM E MCUs	Microchip SAM E series MCUs comprise of the mid-performance ARM <sup>®</sup> Cortex <sup>®</sup> -M4F Processors(SAME5X) and the high-performance 32-bit ARM Cortex -M7 RISC processors	<a href="#"><u>SAM E MCUs</u></a>

# Wireless Charging



# MOSFET Drivers

Popular Products	Description	Product Web Page
MIC4605	The MIC4605 is an 85V half-bridge MOSFET driver that features adaptive-dead-time and shoot-through protection. The adaptive-dead-time circuitry actively monitors the half-bridge outputs to minimize the time between high-side and low-side MOSFET transitions, thus maximizing power efficiency.	<a href="#">Click Here</a>
MIC4604YM	The MIC4604 is an 85V, half-bridge MOSFET driver. The MIC4604 features fast 39ns propagation delay times and 20ns driver rise/fall times for a 1nF capacitive load. The low-side and high-side gate drivers are independently controlled. The MIC4604 has TTL input thresholds. It includes a high-voltage internal diode that helps charge the high-side gate drive bootstrap capacitor.	<a href="#">Click Here</a>

# LDO

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP1725	The MCP1725 is a 500 mA, ceramic output cap stable, low output voltage Low Dropout Regulator (LDO) with shutdown and user-programmable delay power good functions.	<a href="#">MCP1725</a>



# Temperature Sensor

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<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">MCP9700</a></p>





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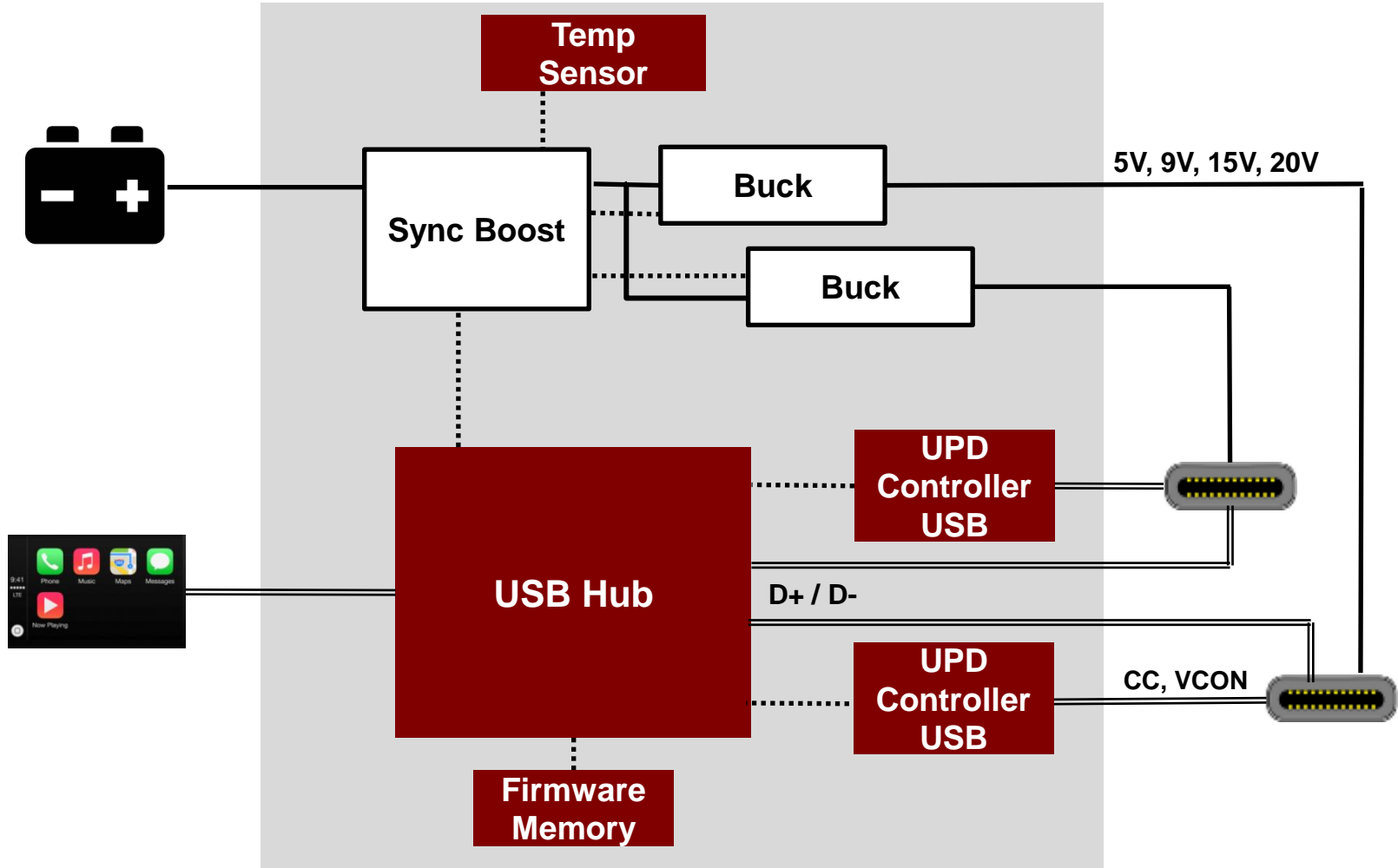


# 16-bit MCU

Popular Products	Description	Product Web Page
dsPIC33CH	The dsPIC33CH has one core that is designed to function as a master while the other is designed as a slave.	<a href="#">dsPIC33CH</a>

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# USB BoB – 2 Port Media Hub w/ UPD



Support UPD Protocol, BC1.2, Apple Profiles Charging Profiles  
Support CarPlay, CarLife, Android Auto



# Memory

Popular Products	Description	Product Web Page
USBF4100	USB Hub 512KB Firmware Memory, programmed with binary image for Microchip USB Hubs	<a href="#">USBF4100</a>
EEPROM	Microchip provides a full range of densities and communication protocols to meet your needs in serial EEPROMs and parallel EEPROMs	<a href="#">EEPROM</a>

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# USB Power

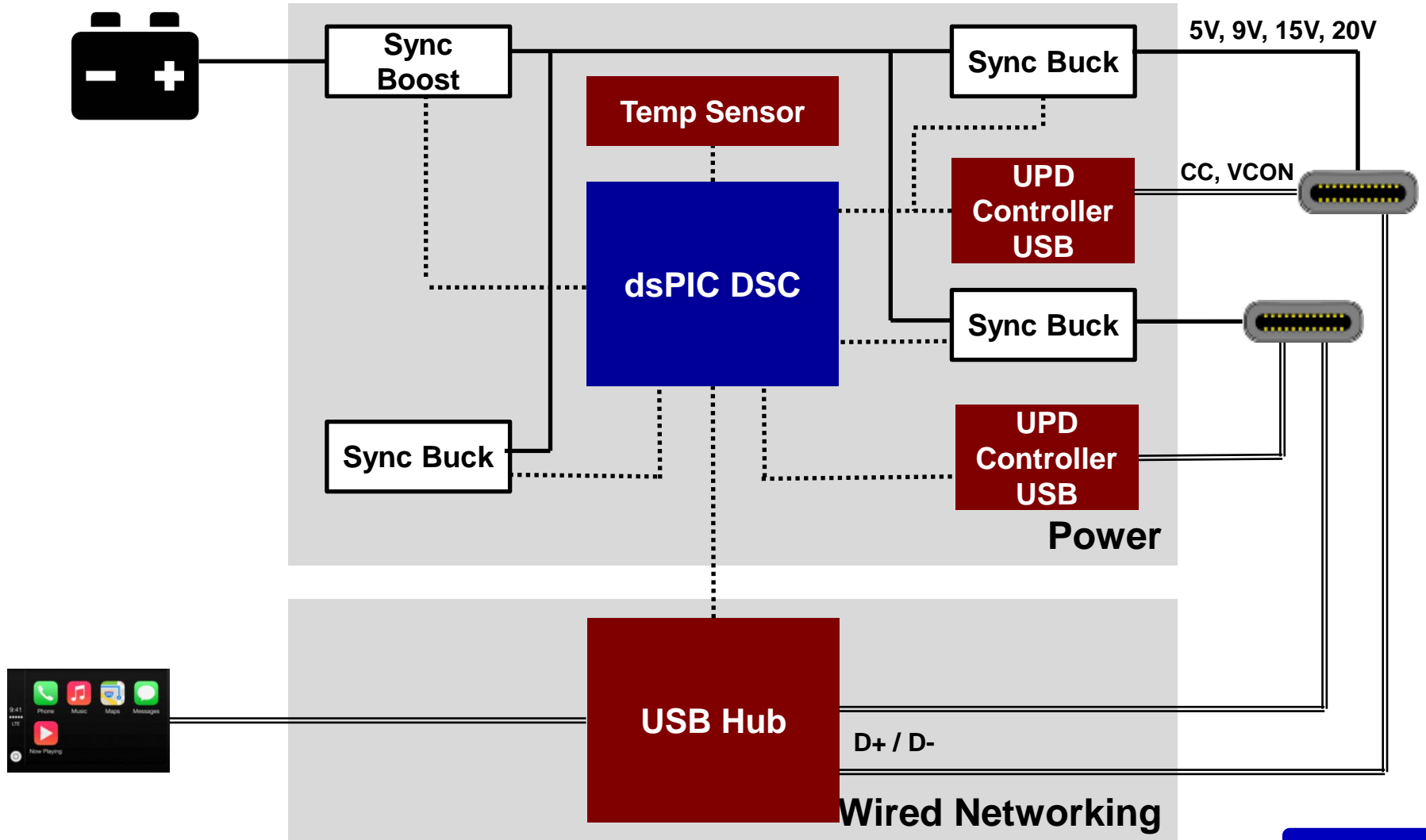
Popular Products	Description	Product Web Page
UCS2114	The UCS2114 is a dual USB port power switch configuration which can provide 3.0A continuous current (3.4A maximum) per VBUS port with precision overcurrent limiting (OCL).	<a href="#">UCS2114</a>
UPD301A	The UPD301A is a stand-alone, small form factor USB Type-C™ Power Delivery (PD) Port Controller designed to adhere to the USB Type-C™ Cable and Connector Specification and USB Power Delivery 3.0 Specification.	<a href="#">UPD301A</a>
UPD350	The UPD350 is a highly integrated small form factor USB Type-C/PD controller compliant with USB Type-C™ specification and USB Power Delivery specification v.3.0. UPD350 provides cable detection and orientation and implements baseband communication with a partner USB Type-C/PD Device.	<a href="#">UPD350</a>

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USB4912	The Microchip USB4912 is a USB2.0 Hi-Speed Hub with unique Smart Hub features. This highly integrated chip optimizes board area and reduces overall system costs.	<a href="#">USB4912</a>
USB7002	The Microchip USB7002 SmartHub™ IC is a low-power, OEM configurable, USB 3.1 Gen 1 hub controller with 4 downstream ports and advanced features.	<a href="#">USB7002</a>
USB83340	The USB83340 is optimized for use in applications where a low operating current and standby currents are essential. The device integrates 3.3 V and 1.8 V regulators, making it possible to operative the device from a single power supply.	<a href="#">USB83340</a>



# USB BoB – 2 Port Media Hub w/ UPD

*Solution for Ground Shift Compensation*



dsPIC runs PD stack, it frees up code space in the USB Hub, USBF4100 is optional

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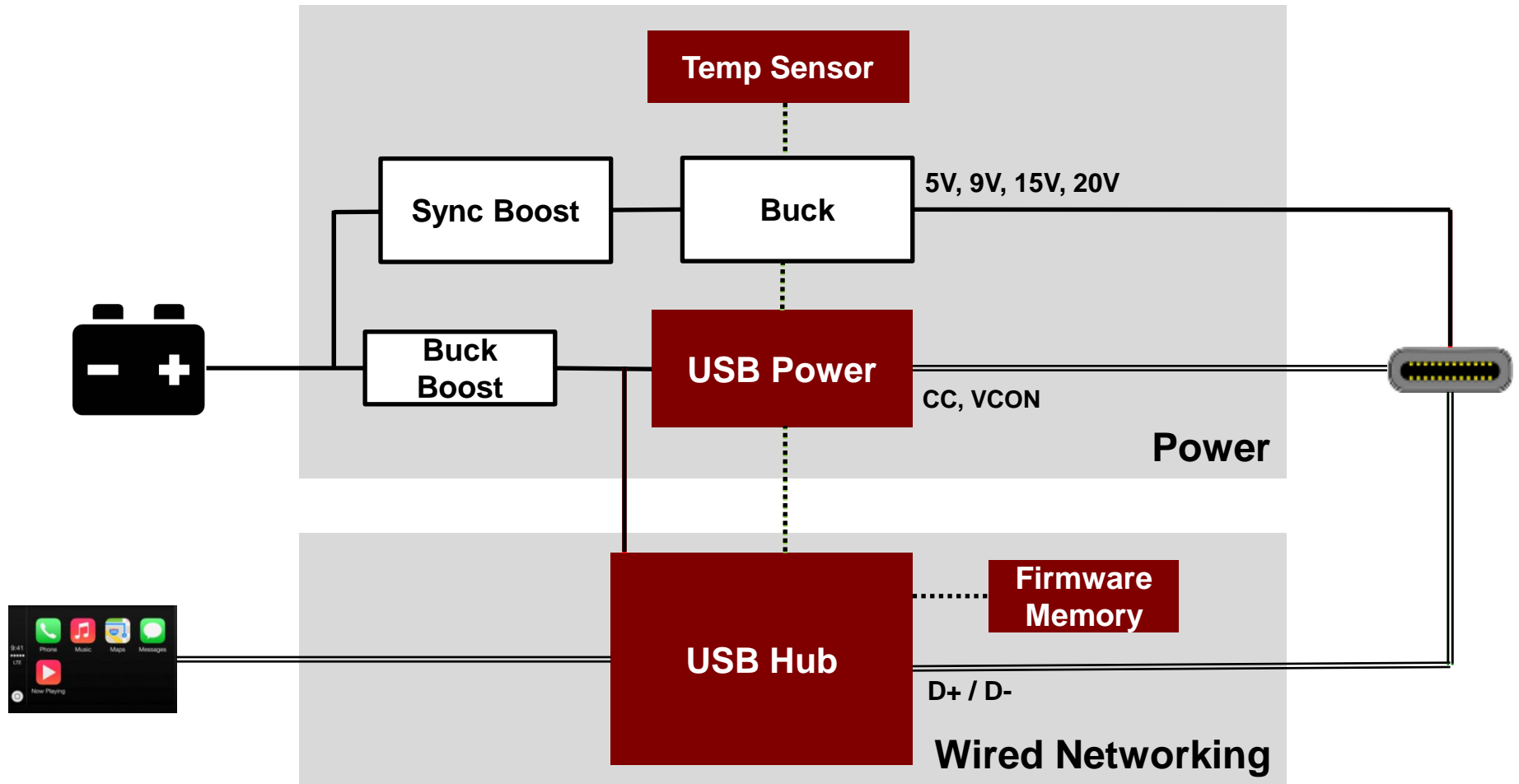
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# USB BoB -- 1 Port UPD Data



Support UPD Protocol, BC1.2, Apple Profiles Charging Profiles  
Support CarPlay, CarLife, Android Auto



# Memory

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USBF4100	USB Hub 512KB Firmware Memory, programmed with binary image for Microchip USB Hubs	<a href="#">USBF4100</a>
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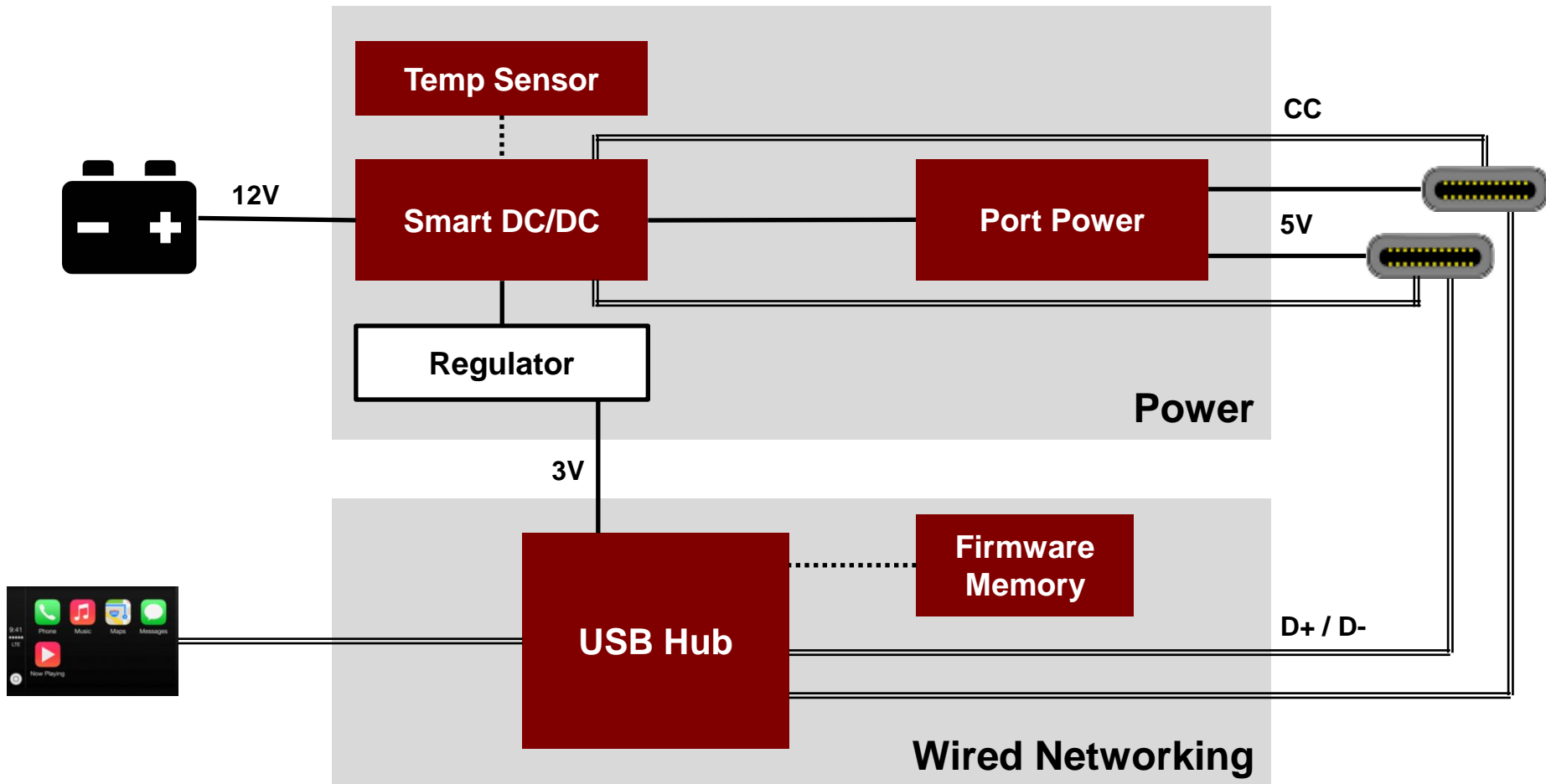




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# USB BoB w/ Type C Charging



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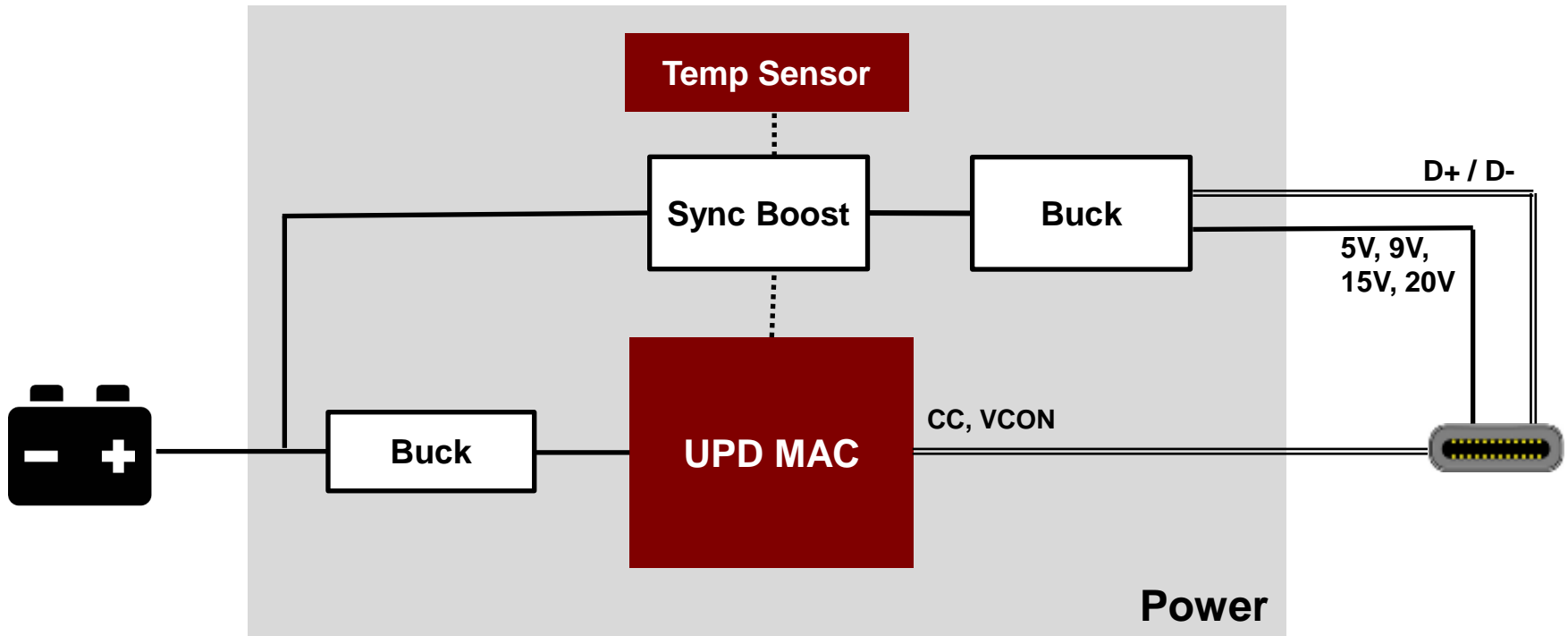
<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>
MIC2800	The MIC2800 is a high-performance power management IC, giving three output voltages with maximum efficiency.	<a href="#">MIC2800</a>
LX7309	The LX7309 is a versatile current-mode DC/DC controller for isolated and non-isolated topologies, featuring an internal differential current-sense amplifier for Kelvin connectivity and low 200mV threshold for low sense resistances and high efficiency.	<a href="#">LX7309</a>
MCP19123	It is a mid-voltage (4.5-40V) analog-based synchronous buck PWM controller with an integrated 8-bit PIC® Microcontroller	<a href="#">MCP19123</a>



# Temperature Sensor

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# USB Charger - 1 Port UPD Charger



Supports UPD Protocol, BC1.2, Apple Profiles

Board area is minimized through intelligent power management

Power measurement in MCP19128

Thermal measurement, programmable behavior

Less required heatsinking, more robust operation



# USB Power

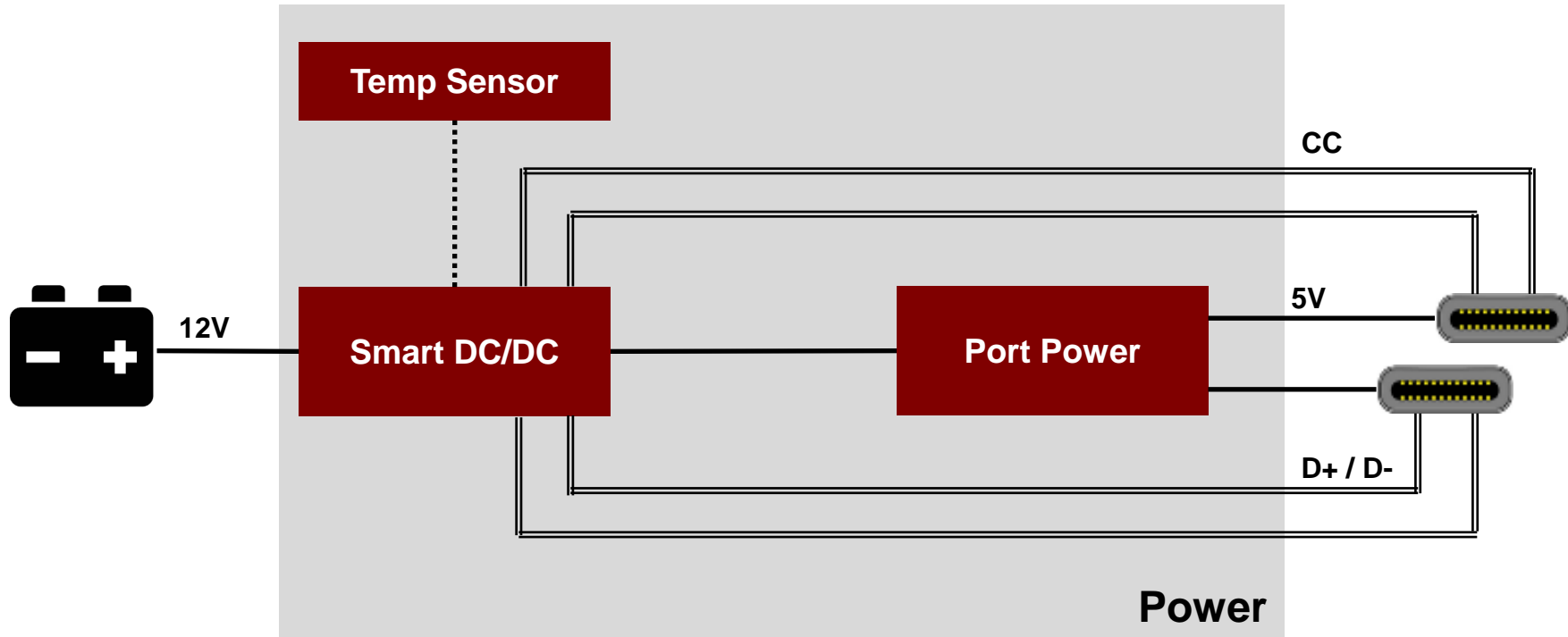
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# USB Charger – Basic C Charger



**Supports Basic Type C, BC1.2, Apple Profiles**

# DC/DC

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MCP16311	The MCP16311 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC Converter in an 8-pin MSOP or TDFN package that operates from input voltage of 30V.	<a href="#">MCP16311</a>
MIC2800	The MIC2800 is a high-performance power management IC, giving three output voltages with maximum efficiency.	<a href="#">MIC2800</a>
LX7309	The LX7309 is a versatile current-mode DC/DC controller for isolated and non-isolated topologies, featuring an internal differential current-sense amplifier for Kelvin connectivity and low 200mV threshold for low sense resistances and high efficiency.	<a href="#">LX7309</a>
MCP19123	It is a mid-voltage (4.5-40V) analog-based synchronous buck PWM controller with an integrated 8-bit PIC® Microcontroller	<a href="#">MCP19123</a>



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**MICROCHIP**

**Analog Products in  
Automotive: Interior LED  
Ambient Module**

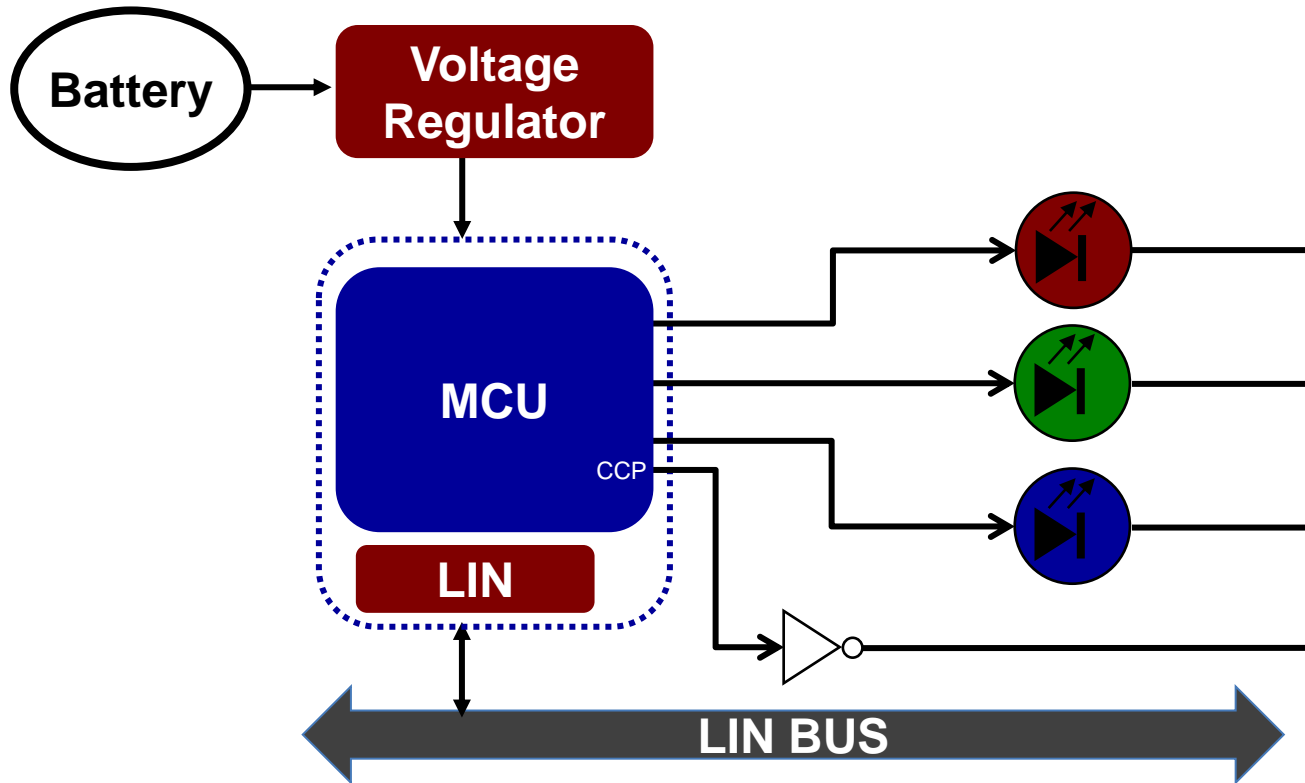
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- **Interior Automotive LED ambient Module:**
  - LED ambient module controls an integrated RGB LEDs unit, which enables real-time LEDs color and brightness control. With this design, interior lightings are no longer monotonous. Adjustable multicolor allows passengers for a more personalized ambient lighting experience. The small size of LEDs also makes implementing lighting in small spaces easier.
- **Application examples**
  - Foot well lights, cup holder lights, cluster backlighting, Tell Tale lights, and LCD panel backlighting



# Automotive: Interior LED Ambient Module



LED ambient module controls an integrated RGB LEDs unit, which enables real-time LEDs color and brightness control



# MCU: RGB LED Controller

Suggested Products	Description	Product Web Page
8-bit PIC12/16/18 MCU	<ul style="list-style-type: none"><li>• Integrated DAC or PWM modules are used to control LEDs color or brightness.</li><li>• The resolution of the DAC or PWM for the selected MCU is directly proportional to the number of color combination capable of being created with the RGB LEDs.</li><li>• CCP module is used to detect defect.</li><li>• NanoWatt XLP microcontrollers from the PIC16/ PIC18 families have the industry leading low quiescent current characteristics.</li><li>• These MCUs further conserve battery life when LEDs are on while ignition is off.</li><li>• Small MCU footprints are available to support the desired styling factor for various lighting components.</li></ul>	<a href="#">Click Here</a>

	Suggested Products	Description	Product Web page
LIN	ATA663203	Stand-alone LIN LDO	<a href="#">LIN Design Center</a>
	ATA663211 ATA6662C/63/4	Globally automotive approved and qualified Stand-alone transceiver	
	ATA6670	Globally automotive approved and qualified Stand-alone Dual LIN transceiver	
	ATA663231/32/54/55 ATA6625, ATA6629/31 MCP2021A/2A/25	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator	
	MCP2050, ATA663431/54 ATA6628/30, ATA6622C/24C/26C	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + Window Watchdog Timer	
	ATA663331/54	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 2x Relay Driver	
	ATA664151	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 8x HV Switches	
	ATA6612C/13C/ 14Q/16C/17C ATSAMHA1G, PIC16F1829LIN	8-bit MCU with an integrated LIN transceiver + Voltage Regulator	
CAN, CAN FD	MCP2515	External CAN controller supports CAN V2.0B specification Can also interface with MCU with Standard SPI.	<a href="#">CAN Design Center</a>
	MCP25625	CAN 2.0 external Controller + Transceiver	
	MCP2561/2	Globally automotive approved and qualified, High Speed CAN Transceivers	
	MCP2561/2FD, ATA6560/61	Globally automotive approved and qualified CAN Flexible Data-rate (CAN FD) Transceivers	
	MCP25612FD	Dual CAN 2.0 or CAN FD Transceiver	

# Voltage Regulators

Suggested Products	Description	Product Web Page
MCP1790/1	The low power, low dropout regulator is used to reduce battery depletion while the vehicle is in the <i>ignition off</i> condition. This product meets the current low power requirements of automakers.	<a href="#">Click Here</a>
MAQ5300	The MAQ5300 is an automotive-qualified, ultra-small, ultra low dropout CMOS regulator (ULDO) that is ideal for today's most demanding automotive applications including infotainment, camera module, image sensors, and anywhere PCB space is limited.	<a href="#">Click Here</a>



**MICROCHIP**

**Analog Products in  
Automotive: Exterior LED  
Control Module**

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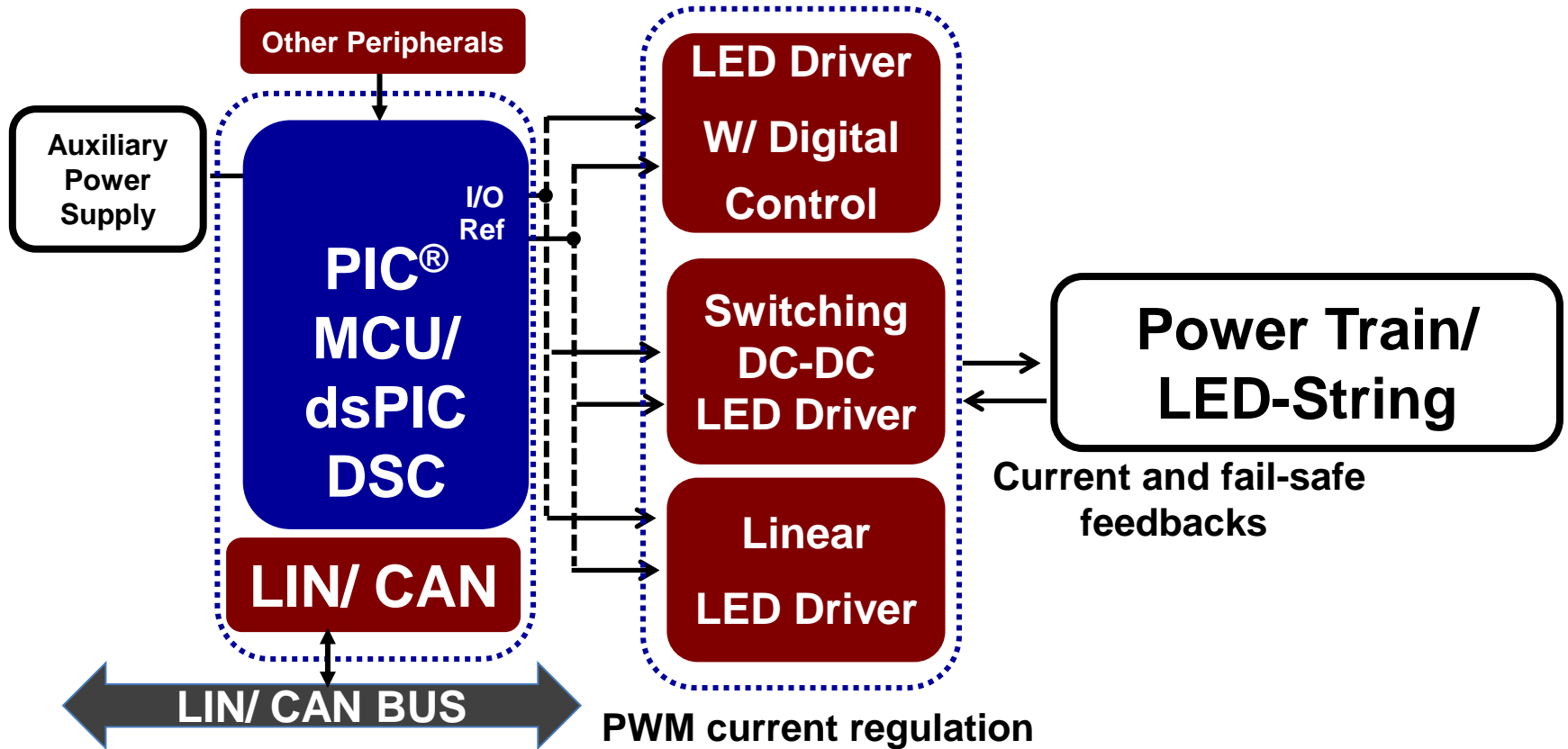
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# Automotive LED Lighting

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- **Microchip offers broad range of high brightness LED control solutions for automotive exterior lightings. These solutions support flexible power train topologies to support constant LED current regulation, fail-safe monitoring and maximization of LEDs lifetime and efficiency.**
- **Example Applications:**
  - Fog lights, Taillights, Daytime running light, position light High/Low Beam, corner light. Headlamp

# Automotive: Exterior LED Control Module



Low- End Single LED String Solution

Mid- Range Mult. LED String Solution

High- End Mult. LED String Solution

Interior LED Ambient Control Module

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Suggested Products	Description	Product Web Page
<p>PIC12F683/ PIC12HV752</p>	<ul style="list-style-type: none"> <li>• Ideal for low-end LED drivers such as fog light/turn light, which has lower stability requirements than most exterior front light units and doesn't require dimming</li> <li>• Hysteretic Current control</li> <li>• Integrated analog peripherals with minimum digital support for low-cost/high performance SMPS applications</li> </ul>	<p><a href="#">PIC12F683</a></p>
<p>dsPIC33F GS family</p>	<ul style="list-style-type: none"> <li>• Ideal for High End Multi. LED String Solution</li> <li>• Multi-channel control (up to 18 LED channels)</li> <li>• Up to 18 high-speed PWM channels (1.04ns resolution)</li> <li>• Each PWM output can be individually adjusted in frequency, duty ratio and phase shift.</li> <li>• Each PWM output can be chopped by a lower frequency to support flexible dimming outputs.</li> </ul>	<p><a href="#">dsPIC33F/E</a></p>
<p>PIC16F1829LIN</p>	<p>8-bit MCU with an integrated LIN transceiver</p>	<p><a href="#">PIC16F1829 LIN</a></p>



# Low-End Single LED String Solution

- **For low-end single LED string solution, a low cost 8-bit PIC MCU can be used to provide close-loop single LED string current regulation.**

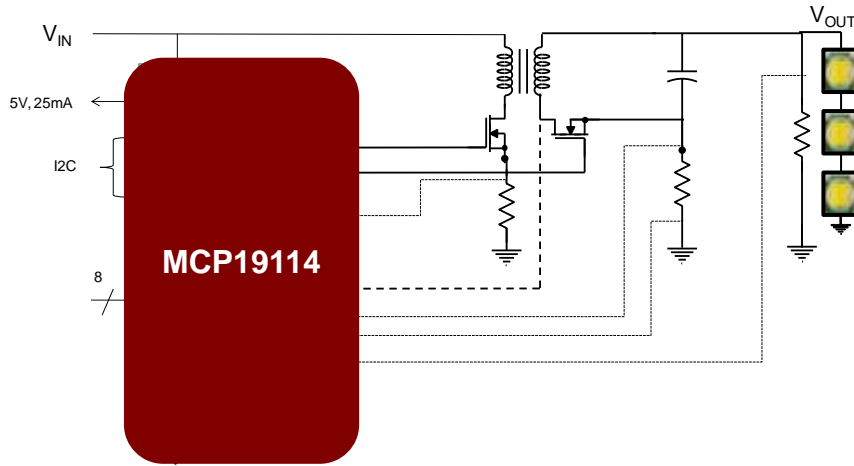
<b>Suggested Products</b>	<b>Description</b>
PIC12F683/PIC12HV752	<ul style="list-style-type: none"><li>• Ideal for low-end LED drivers such as fog light/turn light, which has lower stability requirements than most exterior front light units and doesn't require dimming<ul style="list-style-type: none"><li>• Hysteretic Current control</li></ul></li><li>• Integrated analog peripherals with minimum digital support for low-cost/high performance SMPS applications</li></ul>

# Mid-Range Mult. LED String Solution

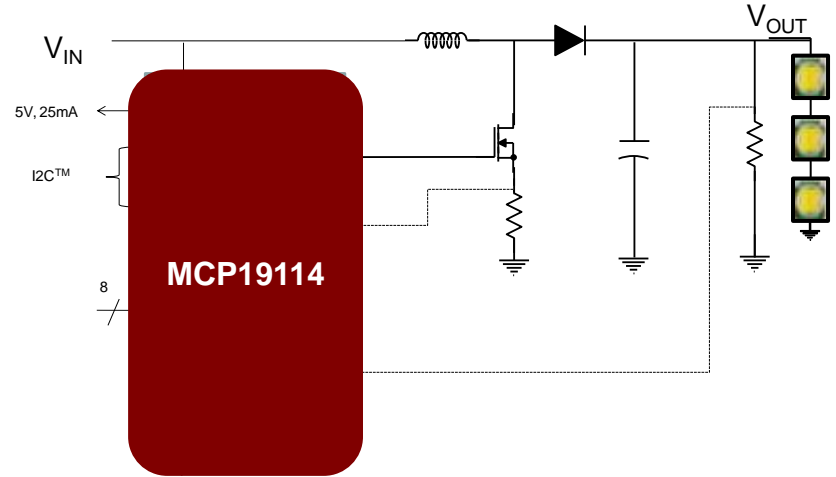
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- **More than one discrete PWM controllers can be added to a low cost PIC MCU to support the additional LED strings.**
  - The PWM controller provides additional built-in analog modules and MOSFET driver needed for each LED string control.
  - This approach is also ideal for an existing system that already has a low cost MCU in place. Instead of replacing the MCU, designer can attach the additional PWM controllers to the MCU.

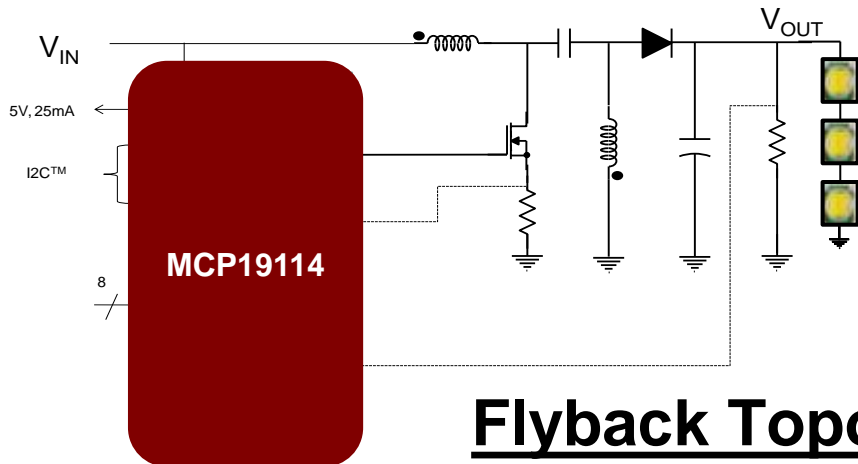
# Programmable LED Driver



**SEPIC Topology**



**Boost Topology**



**Flyback Topology**  
(Synchronous)

*...and more, including Ćuk and Forward Converters (Broad Topology Support)*

# MCP19114

Popular Products	Description	Product Web Page
MCP19114/5	<p>The MCP19114 is a mid-voltage (4.5-42V) analog-based PWM controller with an integrated 8-bit PIC™ Microcontroller. This unique product family combines the performance of a high-speed analog solution, including high-efficiency and fast transient response, with the configurability and communication interface of a digital solution. Combining these solution types creates a new family of devices that maximizes the strengths of each technology to create a more cost-effective, configurable, high-performance power conversion solution.</p>	<p><a href="#">Click Here</a></p>
<p><a href="#">MCP19114 Flyback Standalone Evaluation Board:</a></p> <p>The MCP19114-Flyback Standalone Evaluation Board and Graphical User Interface (GUI) demonstrate the MCP19114 performance in a synchronous Flyback topology. It is configured to regulate load current, and is well suited to drive LED loads.</p>		



# MCU + PWM Controller based LED Driver

Suggested Products	Description	Product Web Page
MCP1630/31/32	<ul style="list-style-type: none"><li>• Small footprint discrete high-speed PWM controllers (2MHz), as stand alone (MCP1632) or in conjunction with a MCU (MCP1630/1)</li><li>• Single MCU attaches multiple PWM controllers for desired number of LED strings control (One LED string per MCP1630/31).</li><li>• Peak Current Mode Control.</li><li>• High Voltage Options Operate to +16V Input.</li><li>• Integrated Overvoltage Comparator and Low Side MOSFET Driver.</li><li>• Over-temperature Protection and Under-voltage Lockout (UVLO).</li></ul>	<a href="#">MCP1630</a> <a href="#">MCP1631</a> <a href="#">MCP1632</a>
App Notes/ Ref. Designs	<ul style="list-style-type: none"><li>• <a href="#">Dimming Power LEDs Using a SEPIC Converter and MCP1631 PIC Attach PWM Controller</a></li><li>• <a href="#">MCP1630 SEPIC Automotive LED Driver Reference Design</a></li><li>• <a href="#">MCP1632 - 300 kHz Boost Converter Demo Board</a></li></ul>	



# DC-DC LED Driver

Suggested Products	Description	Product Web Page
AT9917	The fixed frequency PWM IC designed to control single-switch, boost, SEPIC, and buck LED drivers in a constant current mode. An internal 40V linear regulator powers the IC eliminating the need for a separate power supply for the IC.	<a href="#">AT9917</a>
AT9919	The PWM controller IC designed to drive high brightness LEDs using a buck topology. Operation at high switching frequency is possible since the hysteretic control maintains accuracy even at high frequencies.	<a href="#">AT9919</a>
AT9932	The controller IC designed to control an LED lamp driver using a boost-buck topology that can step the input voltage up or down automatically. Capacitive isolation protects the LED Lamp from failure of the switching MOSFET.	<a href="#">AT9932</a>
AT9933	The controller IC designed to control an LED lamp driver using a low-noise boost-buck (Ćuk) topology. The AT9933 uses patent-pending hysteretic current-mode control to regulate both the input and the output currents.	<a href="#">AT9933</a>
MAQ3203	The is a hysteretic, step-down, constant-current, High-Brightness LED (HB LED) driver. The hysteretic control gives good supply rejection and fast response during load transients and PWM dimming.	<a href="#">MAQ3203</a>

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# Linear LED Driver

Suggested Products	Description	Product Web Page
CL2 / CL25	The is a high voltage, temperature compensated, constant current source and is trimmed to provide a constant current of 20/25mA. The device can be used as a two terminal constant current source or constant current sink.	<a href="#">CL2</a> <a href="#">CL25</a>
CL320 / CL325 / CL330	The family is designed to drive 3 strings of LEDs at a constant current of 20/30/50mA. Separate enable pins for each channel allow for PWM dimming, 3-step linear dimming, or individual disconnection of faulty LED strings.	<a href="#">CL320</a> <a href="#">CL325</a> <a href="#">CL330</a>
CL520 / CL525	This is a fixed, linear current regulator designed for driving LEDs at 20/25mA. The minimum dropout voltage of 1.0V accommodates extra LEDs, permits lower supply voltages, and provides more efficient operation.	<a href="#">CL520</a> <a href="#">CL525</a>
CL6 / CL7	This is a fixed, linear current regulator designed for driving high brightness LEDs at 100mA from nominal 12V, 24V, or 48V supplies.	<a href="#">CL6</a> <a href="#">CL7</a>

# High- End Mult. LED String Solution

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- **For high-end multi LED strings solution, a 16-bit DSC (dsPIC33F GS) is recommended because it has the necessary integrated PWM drivers and analog modules to provide up to 18 LED strings or Matrix control. With this approach, discrete PWM controllers are not needed.**



# dsPIC33F

Suggested Products	Description	Product Web Page
dsPIC33F/E GS family	<ul style="list-style-type: none"> <li>• Ideal for High End Multi. LED String Solution</li> <li>• Multi-channel control (up to 18 LED channels)</li> <li>• Up to 18 high-speed PWM channels (1.04ns resolution)</li> <li>• Each PWM output can be individually adjusted in frequency, duty ratio and phase shift.</li> <li>• Each PWM output can be chopped by a lower frequency to support flexible dimming outputs.</li> </ul>	<a href="#">dsPIC33F/E</a>
App Notes/ Ref. Designs	<ul style="list-style-type: none"> <li>• <a href="#">High Brightness LEDs by dsPIC® “GS” Series (doc# en550157.pdf)</a></li> <li>• <a href="#">Digital LED Lighting Development Kit (DM330014)</a></li> </ul>	



# CAN/ LIN Communication

	Suggested Products	Description	Product Web page
LIN	ATA663203	Stand-alone LIN LDO	<a href="#">LIN Design Center</a>
	ATA663211 ATA6662C/63/4	Globally automotive approved and qualified Stand-alone transceiver	
	ATA6670	Globally automotive approved and qualified Stand-alone Dual LIN transceiver	
	ATA663231/32/54/55 ATA6625, ATA6629/31 MCP2021A/2A/25	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator	
	MCP2050, ATA663431/54 ATA6628/30, ATA6622C/24C/26C	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + Window Watchdog Timer	
	ATA663331/54	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 2x Relay Driver	
	ATA664151	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 8x HV Switches	
	ATA6612C/13C/ 14Q/16C/17C ATSAMHA1G, PIC16F1829LIN	8-bit MCU with an integrated LIN transceiver + Voltage Regulator	
CAN, CAN FD	MCP2515	External CAN controller supports CAN V2.0B specification Can also interface with MCU with Standard SPI.	<a href="#">CAN Design Center</a>
	MCP25625	CAN 2.0 external Controller + Transceiver	
	MCP2561/2	Globally automotive approved and qualified, High Speed CAN Transceivers	
	MCP2561/2FD, ATA6560/61	Globally automotive approved and qualified CAN Flexible Data-rate (CAN FD) Transceivers	
	MCP25612FD	Dual CAN 2.0 or CAN FD Transceiver	

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# Other Analog Peripherals

	Suggested Products	Description	Product Web Page
Voltage Regulators	MCP170X family	The low power, low dropout regulator is used to reduce battery depletion while the vehicle is in the <i>ignition off</i> condition. This product meets the current low power requirements of automakers.	<a href="#">LDO Parametric Table</a>
Temperature Sensors	MCP9700/ MCP9800/	Improves control of color temperature and detects disconnected LED channel. MCP9700 outputs analog voltage that is proportional to the temperature (-40C to 150C). MCP9800 outputs temperature data (-55C to 125C) via I <sup>2</sup> C™/SMBus two-wire interface.	<a href="#">MCP9700</a> <a href="#">MCP9800</a>
	EMC2101	The EMC2101 is an SMBus 2.0 compliant, integrated fan control solution complete with two temperature monitors, one external and one internal. Each temperature channel has programmable high limits that can assert an interrupt.	<a href="#">EMC2101</a>
	EMC1412	The EMC1412 is a high accuracy, low cost, System Management Bus (SMBus) temperature sensor. Advanced features such as Resistance Error Correction (REC), Beta Compensation and automatic diode type detection combine to provide a robust solution for environmental monitoring applications.	<a href="#">EMC1412</a>



**MICROCHIP**

**Analog Products in  
Automotive: Smart Actuators  
in Turbo Charger**

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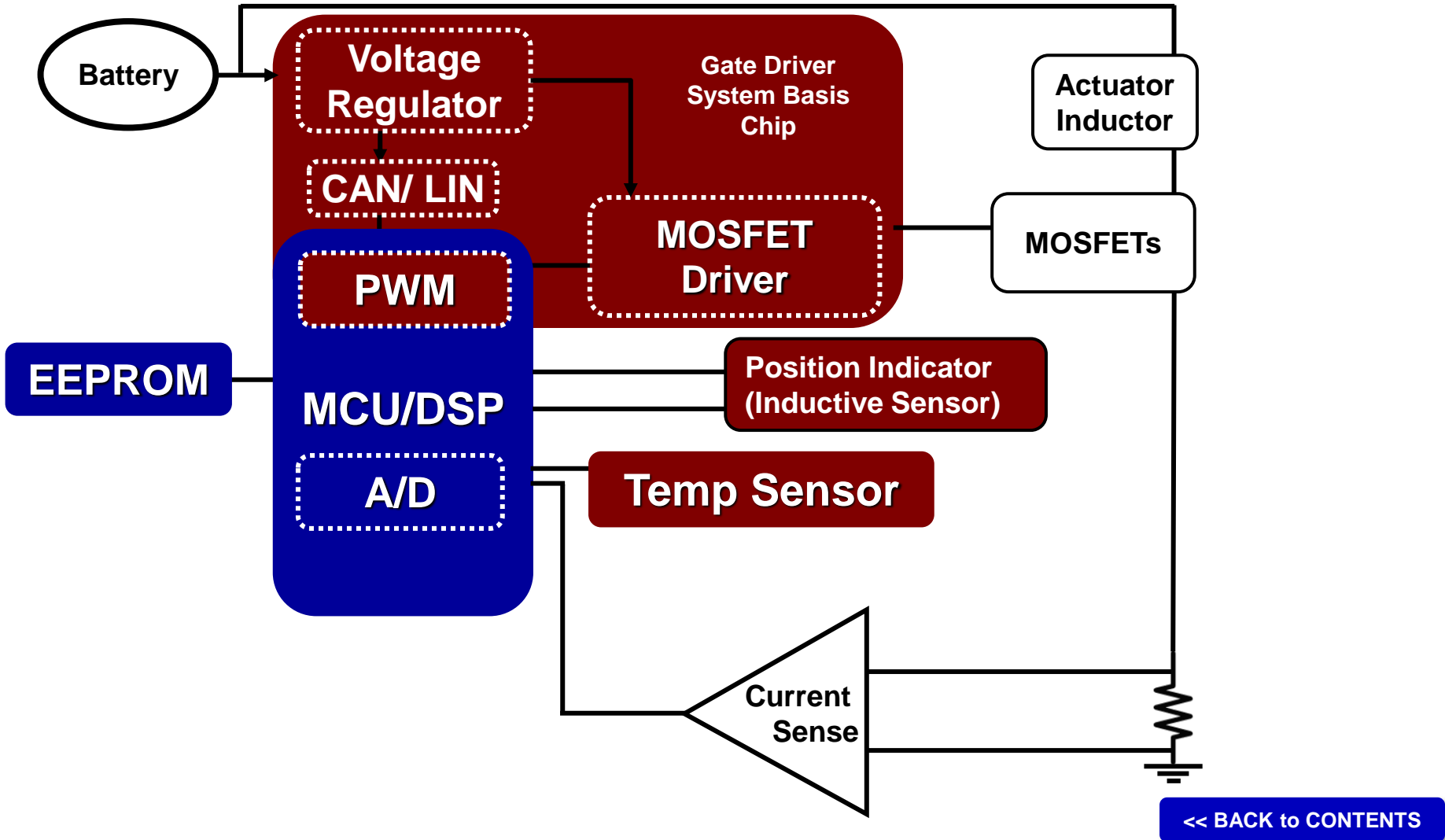
# Automotive: Smart Actuators in Turbo Charger

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- **Smart Actuators are actuators that use microcontrollers to perform intelligent tasks and communicate to automotive system through a bidirectional communication port such as CAN or LIN. They are being utilized more and more in the automotive engine environment to enhance fuel efficiency.**
  
- **Example Applications:**
  - Turbo Charger Waste Gate; the Electrical Turbo Charger Bypass, and the Air/Exhaust Bypassing Valves.
  - Throttle Body air valve control
  - Engine Cooling valves for hybrid vehicles



# Turbo Charger Waste Gate w/Smart Actuator Controller





# CAN/ LIN Communication

	Suggested Products	Description	Product Web page
LIN	MCP2003B	Globally automotive approved and qualified Stand-alone transceiver	<a href="#">LIN Design Center</a>
	MCP2021A/2A MCP2025	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator	
	MCP2050	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + Window Watchdog Timer	
	PIC16F1829LIN	8-bit MCU with an integrated LIN transceiver.	
CAN, CAN FD	MCP2515	External CAN controller supports CAN V2.0B specification Can also interface with MCU with Standard SPI.	<a href="#">CAN Design Center</a>
	MCP25625	CAN 2.0 external Controller + Transceiver	
	MCP2561/2	Globally automotive approved and qualified High Speed CAN Transceivers	
	MCP2561/2FD	Globally automotive approved and qualified CAN Flexible Data-rate (CAN FD) Transceivers	
	MCP25612FD	Dual CAN 2.0 or CAN FD Transceiver	

# Inductive Sensors

<b>Suggested Products</b>	<b>Description</b>	<b>Product Web Page</b>
LX3301A	Inductive Position Sensor IC with Analog and PWM outputs. The LX3301A is an Automotive Grade 1, 125°C device that features an analog front-end with signal processing and control for six calibration segments to shape the output response.	<a href="#">LX3301A</a>
LX3302A	Inductive Position Sensor IC with Analog, PWM, SENT, PSI5, and Sine/Cosine outputs. The LX3302A Automotive Grade 0, 150°C device features eight calibration segments for simple sensor accuracy improvements along with an options for Sine/cosine outputs, and both power line and GPIO programmability options for embedded applications	<a href="#">LX3302A</a>



# Motor Drive

Popular Products	Description	Product Web Page
MCP8024/5/6 MTD6501 MCP8063 MTD6505/8 ATA6823/24C	Standalone motor controllers/drivers and MCU companion ICs for BLDC (brushless DC), PMS (Permanent Magnetic Synchronous Motor), brush DC, and stepper motors	<a href="#">Motor Drive Parametric Search table</a>
ATA6826C ATA6831/31C ATA6836/38C	3-fold and 6-fold integrated half bridge drivers for controlling up to 5 DC motors up to 1A each	<a href="#">Motor Driver Parametric Search table</a>

# Thermal Management

Suggested Products	Description	Product Web page
MCP9700/ MCP9800/	Improves control of color temperature and detects disconnected LED channel. MCP9700 outputs analog voltage that is proportional to the temperature (-40C to 150C). MCP9800 outputs temperature data (-55C to 125C) via I <sup>2</sup> C™/SMBus two-wire interface.	<a href="#">MCP9700</a> <a href="#">MCP9800</a>
EMC2101	The EMC2101 is an SMBus 2.0 compliant, integrated fan control solution complete with two temperature monitors, one external and one internal. Each temperature channel has programmable high limits that can assert an interrupt.	<a href="#">EMC2101</a>
EMC1412	The EMC1412 is a high accuracy, low cost, System Management Bus (SMBus) temperature sensor. Advanced features such as Resistance Error Correction (REC), Beta Compensation and automatic diode type detection combine to provide a robust solution for complex environmental monitoring applications.	<a href="#">EMC1412</a>
MIC280	The MIC280 is a digital thermal supervisor capable of measuring its own internal temperature and that of a remote PN junction. The remote junction may be an inexpensive commodity transistor, e.g., 2N3906, or an embedded thermal diode.	<a href="#">MIC280</a>

# MOSFET Drivers

Popular Products	Description	Product Web Page
MCP140X, MCP141X, MCP14628, MCP14700, MIC441X, MIC442X, MAQ412X	Low-side and low-side/high-side drivers. Used as a low-to-high voltage bridge to allow an MCU with a low voltage output to drive a motor that requires higher voltage	<a href="#">MOSFET Driver's Parametric Search table</a>

# Voltage Regulators

Suggested Products	Description	Product Web Page
MCP1790/1	The low power, low dropout regulator is used to reduce battery depletion while the vehicle is in the <i>ignition off</i> condition. This product meets the current low power requirements of automakers.	<a href="#">MCP1790</a>
MAQ528X	The MAQ5280/5282/5283 high-performance linear regulators offers a very-wide input operating voltage range, up to 120V DC, and supplies an output current of up to 25mA, 50mA, and 150mA, respectively..	<a href="#">MAQ5283</a>

# PWM Controller

Suggested Products	Description	Product Web Page
MCP1630/31	<ul style="list-style-type: none"> <li>• Small footprint discrete high-speed PWM controllers (2MHz) in conjunction with a MCU.</li> <li>• Single MCU attaches multiple PWM controllers for desired number of LED strings control (One LED string per MCP1630/31).</li> <li>• Peak Current Mode Control.</li> <li>• High Voltage Options Operate to +16V Input.</li> <li>• Integrated Overvoltage Comparator and Low Side MOSFET Driver.</li> <li>• Over-temperature Protection and Under-voltage Lockout (UVLO).</li> </ul>	<a href="#">MCP1630</a>  <a href="#">MCP1631</a>

# EEPROM

Suggested Products	Description	Product Web Page
24LCxxx Family 25LCxxx Family	<p>A standalone serial data EEPROM is used to provide cost-effective data storage options for position logging or position calibration.</p>	<p><a href="#">Serial EEPROM</a></p>
11LCxxx Family	<p>Microchip's new UNI/O™ serial EEPROM uses only one connection to the host microcontroller. This compares to two or three pins for I2C™ and three to six pins for Microwire or SPI buses. This new, proprietary bus offers advanced features like a status register and write protection on demand, along with all I/O, memory array and command functions through a single pin.</p>	

Suggested Products	Description	Product Web Page
8-bit PIC12/PIC16 MCU	<p>Provides simple control for rotary or linear switches, such as for use in relays and valves.</p> <p>Acts as a gateway between a specific position indicator interface such as SENT and a standard serial interface such as SPI/I2C.</p> <p>Controls the BLDC motor.</p>	<a href="#">Click Here</a>
16-bit PIC24 MCU / dsPIC33 DSC	<p>Used in applications that require digital filtering and high-end algorithms, such as the calculation of actuator positions from real-time analog Sine and Cosine signals.</p> <p>Controls BLDC motor.</p> <p>Supports AUTOSAR.</p>	<a href="#">Click Here</a>
PIC16F1829LIN	8-bit MCU with an integrated LIN transceiver	<a href="#">Click Here</a>



**MICROCHIP**

**Analog Products in Automotive:  
In-Vehicle Network  
Communication**

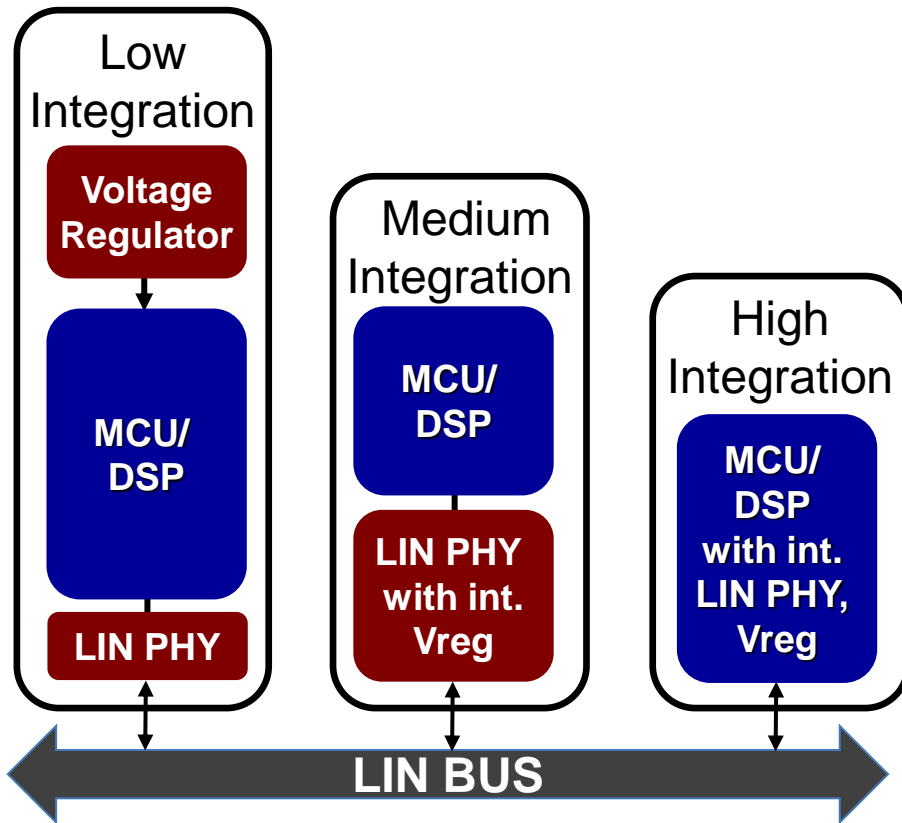
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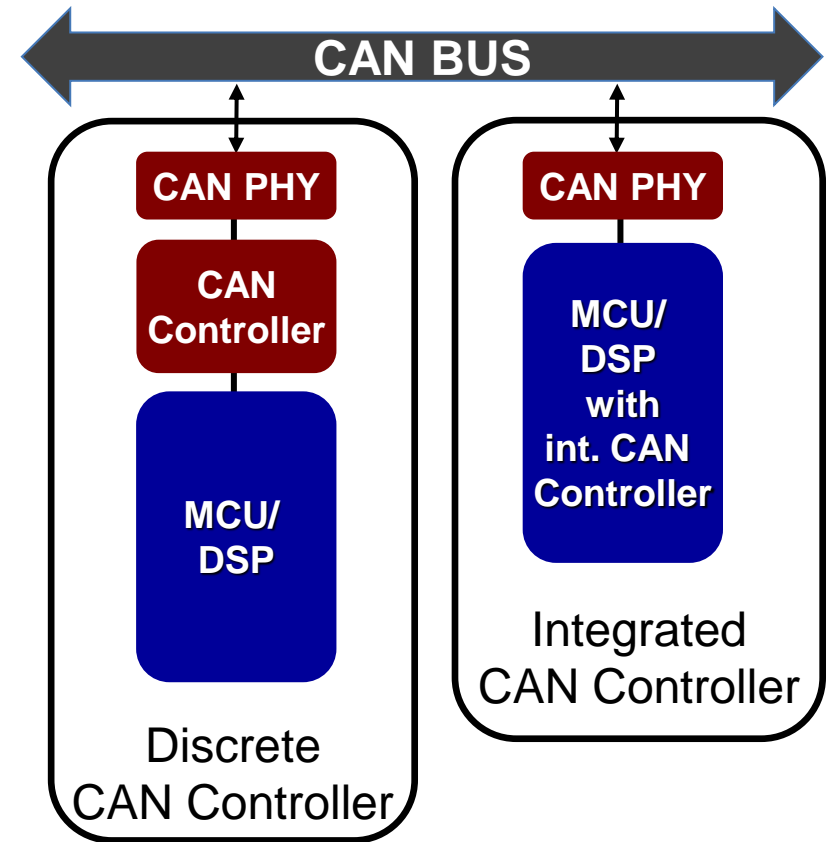


# In-Vehicle Network Communication

LIN Application Diagram



CAN Application Diagram





# Low Integration LIN Communication

Microchip Solutions	Suggested Products	Description
LIN	ATA663211 ATA6663/4 ATA6662C	LIN Transceiver <a href="#">LIN Design Center</a>
	ATA6670	Dual LIN Transceiver
MCU and DSC with CAN/LIN Controller integrated	PIC16F690/PIC16F18 2x	8-bit MCU with LIN slave support
	PIC18F4680	8-bit MCU with enhanced CAN module and LIN master/slave support
	dsPIC30F4012	16-bit DSC with standard CAN module and LIN master/slave support
	PIC24/dsPIC33	16-bit MCU and DSP with enhanced CAN controller and LIN master/slave support
	PIC32Mx5xx/PIC32Mx 7x	32-bit MCU with 32-bit CAN module and LIN master/slave support
Voltage Regulation	MCP1790/1 family	Fast transient response, Power Good, Shutdown <a href="#">Click Here</a>
	MCP1824/5/6/7 family	Fixed & Adjustable, Power Good, Shutdown <a href="#">Click Here</a>
	MAQ5280/1/2/3	120V, 25mA, 50mA, 150mA LDO <a href="#">Click Here</a>
	MAQ5300	5.5V, 300mA LDO <a href="#">Click Here</a>

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# Medium Integration LIN Communication

Microchip Solutions	Suggested Products	Description
LIN	ATA663231/54 ATA663232/55 ATA6625 ATA6629/31 MCP2021A/2A MCP2025	LIN Transceiver + 3.3V or 5V LDO <a href="#">LIN Design Center</a>
	ATA663431/54 ATA6628/30 ATA6622C/24C/26C MCP2050	LIN Transceiver + 3.3V or 5V LDO + Windowed Watchdog Timer <a href="#">LIN Design Center</a>
	ATA663331/54	LIN Transceiver + 3.3V or 5V Voltage Regulator + 2x Relay Driver
	ATA664151	LIN Transceiver + 3.3V or 5V Voltage Regulator + 8x HV Switches
MCU and DSC with CAN/LIN Controller Integrated	PIC16F690/PIC16F182x	8-bit MCU with LIN slave support
	PIC18F4680	8-bit MCU with enhanced CAN module and LIN master/slave support
	dsPIC30F4012	16-bit DSC with standard CAN module and LIN master/slave support
	PIC24/dsPIC33	16-bit MCU and DSP with enhanced CAN controller and LIN master/slave support
	PIC32MX5XX/PIC32MX7X	32-bit MCU with 32-bit CAN module and LIN master/slave support

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# High Integration LIN Communication

Microchip Solutions	Suggested Products	Description
LIN	ATA6612C/13C ATA6614Q ATA6616C/17C ATSAMHA1G PIC16F1829LIN	Small footprint 8-bit MCU + LIN Transceiver + Voltage Regulator <a href="#">LIN Design Center</a>
	ATSAMHA1G	32-bit MCU + LIN Transceiver + Voltage Regulator
MCU and DSC with Integrated CAN/LIN Controller	PIC16F690/PIC16F182x	8-bit MCU with LIN slave support
	PIC18F4680	8-bit MCU with enhanced CAN module and LIN master/slave support
	dsPIC30F4012	16-bit DSC with standard CAN module and LIN master/slave support
	PIC24/dsPIC33	16-bit MCU and DSP with enhanced CAN controller and LIN master/slave support
	PIC32MX5XX/PIC32MX7X	32-bit MCU with 32-bit CAN module and LIN master/slave support

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# Discrete CAN Controller

Microchip Solutions	Suggested Products	Description
CAN	MCP2515, MCP25625	External CAN Controller Products <a href="#">CAN Design Center</a>
	ATA6560/61/62/63/64/65/66/70 MCP2561/2, MCP2561/2(FD), MCP25612FD	CAN and CAN FD Transceivers <a href="#">CAN Design Center</a>
MCU and DSC with Integrated CAN Controller	PIC18F4680	8-bit MCU with enhanced CAN module and LIN master/slave support
	dsPIC30F4012	16-bit DSC with standard CAN module and LIN master/slave support
	PIC24/dsPIC33	16-bit MCU and DSP with enhanced CAN controller and LIN master/slave support
	PIC32MX5XX/PIC32MX7X	32-bit MCU with 32-bit CAN module and LIN master/slave support

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# Integrated CAN Controller

Microchip Solutions	Suggested Products	Description
<b>MCU and DSC with Integrated CAN/LIN Controller</b>	PIC18F4680	8-bit MCU with enhanced CAN module and LIN master/slave support
	dsPIC30F4012	16-bit DSC with standard CAN module and LIN master/slave support
	PIC24/dsPIC33	16-bit MCU and DSP with enhanced CAN controller and LIN master/slave support
	PIC32MX5XX/PIC32MX7X	32-bit MCU with 32-bit CAN module and LIN master/slave support

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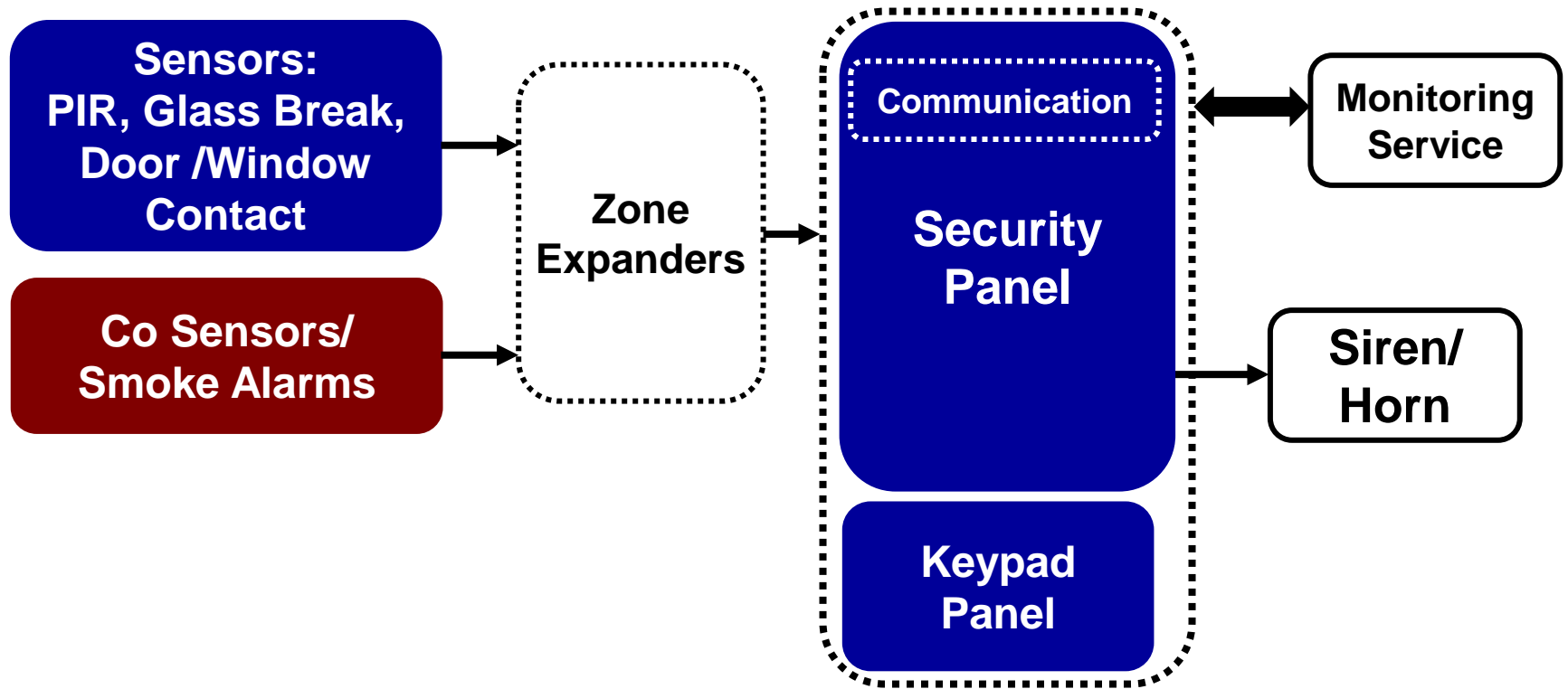
**MICROCHIP**

# **Analog Products in Home Security Alarm Systems**

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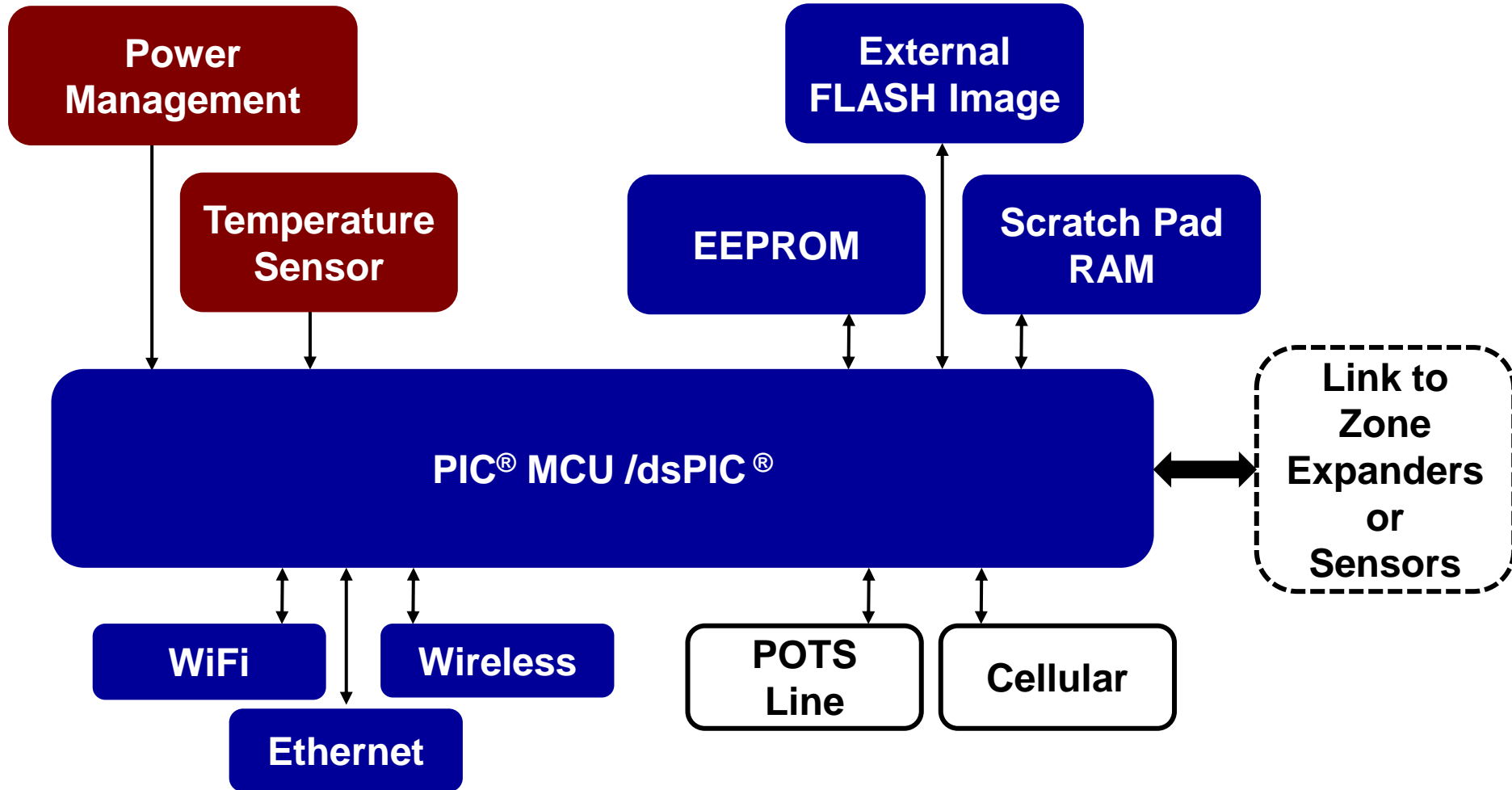
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# Home Security Alarm System

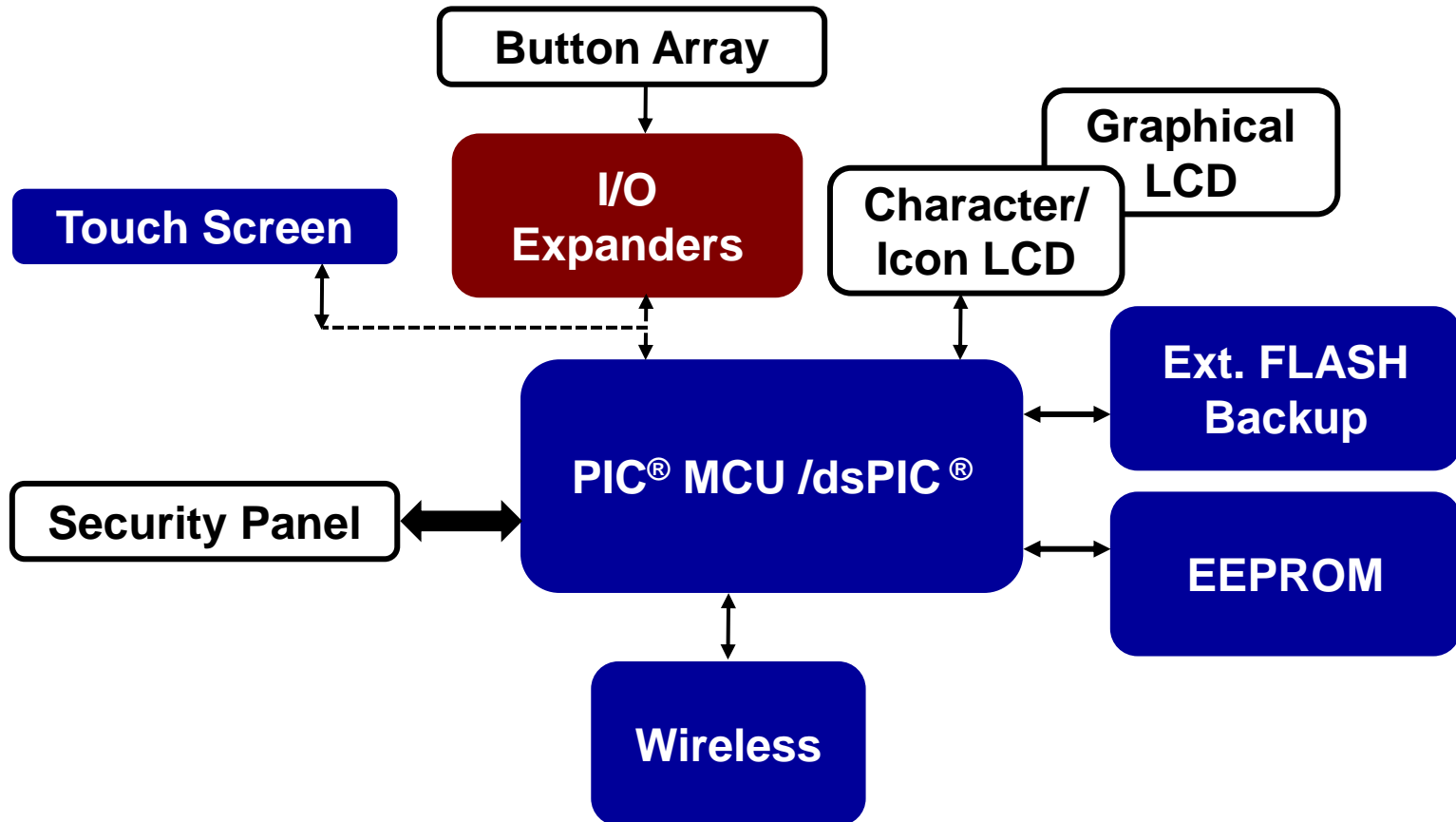




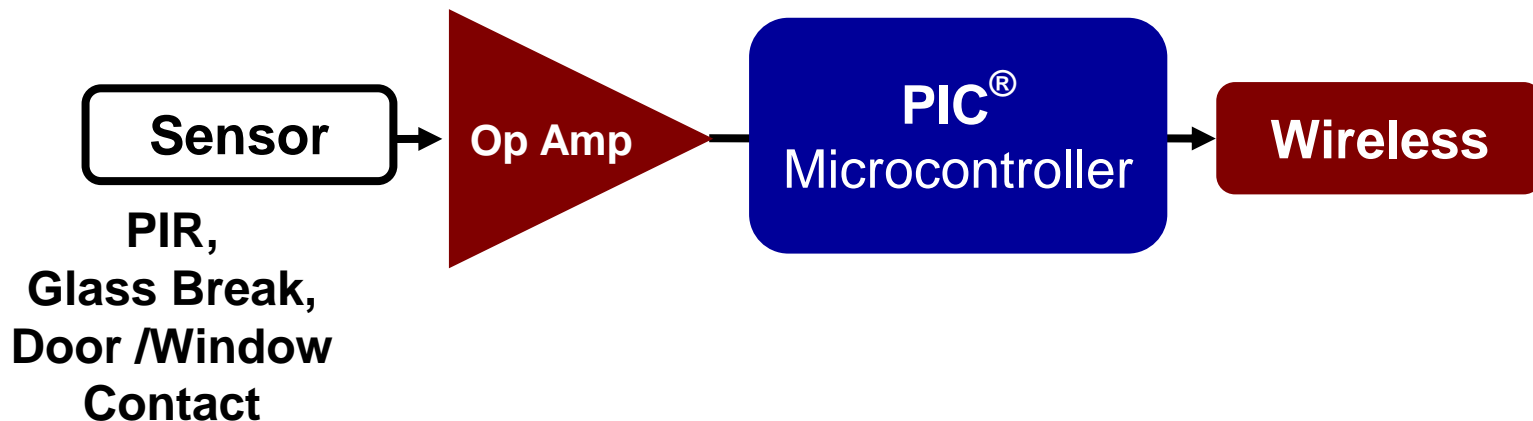
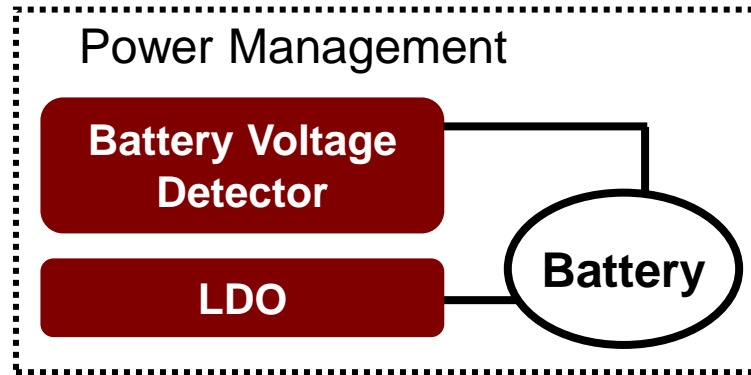
# Security Panel Block Diagram



# Keypad Panel Block Diagram



# Sensor Block Diagram





# 16/32-Bit Microcontroller

Suggested Products	Description	Product Web Page
PIC32M	<p>MIPS M4K Core</p> <ul style="list-style-type: none"><li>• Up to 80 MHz, 1.65 DMIPS/MHz</li><li>• 5 Stage Pipeline devices</li><li>• Temperature Range: -40C to 105C</li><li>• AEC-Q100 qualified</li></ul> <p>Date and Code</p> <ul style="list-style-type: none"><li>• Up to 512 KB Flash</li><li>• Up to 128 KB SRAM</li><li>• Separate Buses for Instructions and Data</li></ul> <p>Connected Peripherals with DMA</p> <ul style="list-style-type: none"><li>• Full-speed USB Host/Device/OTG</li><li>• 10/100 Ethernet MAC with MII/RMII Interfaces</li><li>• 2x CAN 2.0B Ports</li><li>• Up to 6 UART, 5 I<sup>2</sup>C™, 4 SPI Ports, CTMU and I<sup>2</sup>S</li><li>• Up to 8 Additional Channels of General Purpose DMA</li></ul>	<a href="#">Click Here</a>
PIC24F	<p>The PIC24F microcontroller family features cost effective, 16 MIPS 16-bit MCU performance and many devices with Microchip's eXtreme Low Power Technology</p>	<a href="#">Click Here</a>

# 8-Bit Microcontroller

Suggested Products	Description			Product Web Page
PIC12/16/18	<b>Flexible Intelligence</b>	<b>Innovative Integration</b>	<b>eXtreme Low Power</b>	<a href="#">Click Here</a>
	<ul style="list-style-type: none"> <li>■ Continuous re-investment in 8-bit portfolio</li> <li>■ Industry's most robust offering</li> <li>■ Pin and code compatible across families</li> <li>■ 6 pin DFN to 100 pin TQFP</li> <li>■ 375B to 128KB Flash</li> <li>■ 16B to 4KB RAM</li> <li>■ Onboard EEPROM</li> <li>■ 1.8V to 5.5V+ Operation</li> </ul>	<ul style="list-style-type: none"> <li>■ Core Independent Peripherals</li> <li>■ Complementary Output Generator</li> <li>■ Configurable Logic Cell</li> <li>■ Numerically Controlled Oscillator</li> <li>■ Rail to Rail Op-Amps, Fast Comparators</li> <li>■ Programmable Switch Mode Controller</li> <li>■ High Resolution PWM, ADC, DAC</li> <li>■ I2C, SPI, UART, USB, Ethernet</li> </ul>	<ul style="list-style-type: none"> <li>■ Lowest power sleep modes with flexible wake-up sources</li> <li>■ Active currents down to 35 uA/MHz</li> <li>■ Sleep current as low as 20nA</li> <li>■ Battery lifetime ≥ 20 years</li> <li>■ Operation down to 1.8V</li> <li>■ Single cell operation</li> <li>■ Special low power BOR, WDT, RTC</li> </ul>	

# Temperature Sensors

- **Function: Measuring and providing Temperature information**

Popular Products	Description	Product Web Page
MCP9808 Digital temperature sensor	The MCP9808 converts temperatures between $-20^{\circ}\text{C}$ and $+100^{\circ}\text{C}$ to a digital word with $\pm 0.5^{\circ}\text{C}$ (max.) accuracy	<a href="#">Click Here</a>
MCP9700 Linear Active Thermistor™ ICs	The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from $-40^{\circ}\text{C}$ to $+150^{\circ}\text{C}$ with the output calibrated to a slope of $10\text{mV}/^{\circ}\text{C}$ and has a DC offset of $500\text{mV}$ .	<a href="#">Click Here</a>



# Operational Amplifiers

Popular Products	Description	Product Web Page
MCP603x	The MCP6031/2/3/4 op amps have a gain bandwidth of 10 kHz with a low typical operating current of 0.9 $\mu$ A and an offset voltage that is less than 150 $\mu$ V.	<a href="#">Click Here</a>
MCP6444	The MCP6444 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 9 kHz with typ. quiescent current of 450 nA .	<a href="#">Click Here</a>
MCP60x	MCP601/2/3/4 (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 230 $\mu$ A and an offset voltage that is less than 2 mV.	<a href="#">Click Here</a>
MCP6Vxx Family of Zero-Drift Amplifiers	The MCP6Vxx provides high DC precision, including an offset voltage as low as 2 $\mu$ V and offset drift as low as 15nV/ $^{\circ}$ C maximum. They have low quiescent current, no 1/f noise and offer superior CMRR/PSRR performance. The family has an operating voltage as low as 1.6V and are available in small packages (SC-70 and DFN)	<a href="#">Zero-Drift Amplifiers Parametric Table</a>
MCP6Nxx Family of Instrumentation Amplifiers	Microchip expanded its portfolio of amplifiers by first introducing the MCP6N11 the industry's first instrumentation amplifier featuring mCal technology and most recently introducing the MCP6N16 Zero-Drift instrumentation amplifier. <ul style="list-style-type: none"> <li>• Rail-to-Rail Input and Output</li> <li>• Gain Set by two (2) External Resistors</li> <li>• Enable/Vos Calibration Pin (MCP6N11)</li> <li>• Zero-Drift Architecture (MCP6N16)</li> <li>• Operating Voltage Range: 1.8V to 5.5V</li> </ul>	<a href="#">Instrumentation Amplifiers Parametric Table</a>

# I/O Expanders

- **Function: Provide general purpose parallel I/O expansion for I<sup>2</sup>C™ or SPI applications**

Popular Products	Description	Product Web Page
MCP23018/S18	MCP23018/S18 is a 16-bit I/O expander for high speed I <sup>2</sup> C™ Compatible interface. MCP23018 is available in the following packages: 28-pin PDIP (300 mil,)28-pin SOIC (300 mil), 24-pin SSOP, 24-pin QFN (4x4	<a href="#">Click Here</a>





# Power Management

Popular Products	Description	Product Web Page
MCP13xx	The MCP13xx are voltage supervisor devices designed to keep a microcontroller in reset until the system voltage has reached and stabilized at a proper level for reliable system operation.	<a href="#">Click Here</a>
MCP111/2	The MCP111/112 voltage detectors have extremely low 1uA operating current and small form factor. They hold the microcontroller in reset until the supply voltage reaches a predetermined operating level. These devices also protect against brownout conditions	<a href="#">Click Here</a>
MCP1711	The MCP1711 is a 150mA LDO that has ultra low Iq of 0.6uA typ. The MCP1711 is packaged in 1x1mm DFN package with capless capability to minimize the PCB space for battery operated applications	<a href="#">Click Here</a>
MCP16301/H	The MCP16301 is a highly integrated, high-efficiency, fixed frequency, step-down DC-DC converter in a popular SOT-23 package that operates from input voltage sources up to 36V	<a href="#">Click Here</a>

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<< BACK to Keypad Panel Blk Diagram

<< BACK to Security Panel Blk Diagram



# Touch and Input Sensing Solutions

Popular Products	Description	Product Web Page
AR10xx	<p>The Microchip mTouch™ AR1000 Series Resistive Touch Screen Controller is a complete, easy to integrate, cost-effective and universal touch screen controller chip solution. The AR1000 Series has sophisticated proprietary touch screen decoding algorithms to fully process all touch data and save the host from this overhead. More than the usual “preprocessing” features of other low cost devices, the AR1000 delivers reliable, validated and calibrated touch</p>	<a href="#">Click Here</a>
MTCH6301	<p>The MTCH6301 is a turnkey projected capacitive touch controller that allows easy integration of multi-touch and gestures to create a rich user interface in your design.</p>	<a href="#">Click Here</a>

# Memory

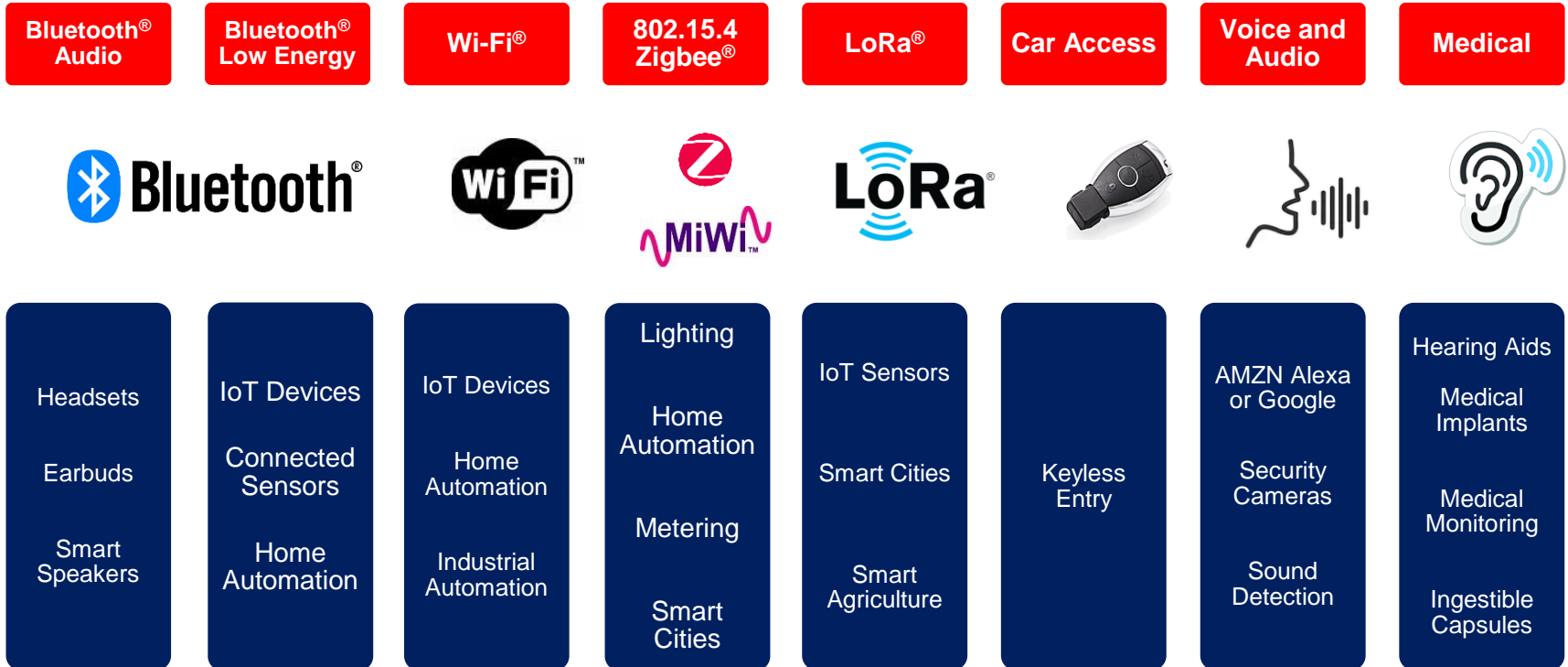
Function Block	Popular Products	Description	Product Web Page
External Flash Image	SST39V	The SST39 Series MPF™ (Multi-Purpose Flash) products, including MPF+ and Advanced MPF+, provide fast read and program times with features such as Erase-Suspend/Erase-Resume, Boot Block, Security ID, Hardware Reset and heightened protection features.	<a href="#">Click Here</a>
	SST25	The SST25xx family of Serial FLASH is among the industry's lowest power 3.0V and 1.8V products.	<a href="#">Click Here</a>
EEPROM	24LC 25LC	Microchip offers the broadest range of Serial EEPROM devices (from 128 bits to 1 Mbit) over the widest operating voltage range (1.7 to 5.5V). Microchip Serial EEPROMs are compatible with the I <sup>2</sup> C®, SPI, Microwire, as well as the new single-I/O UNI/O® bus.	<a href="#">Click Here</a>
Scratch Pad RAM	23LC		

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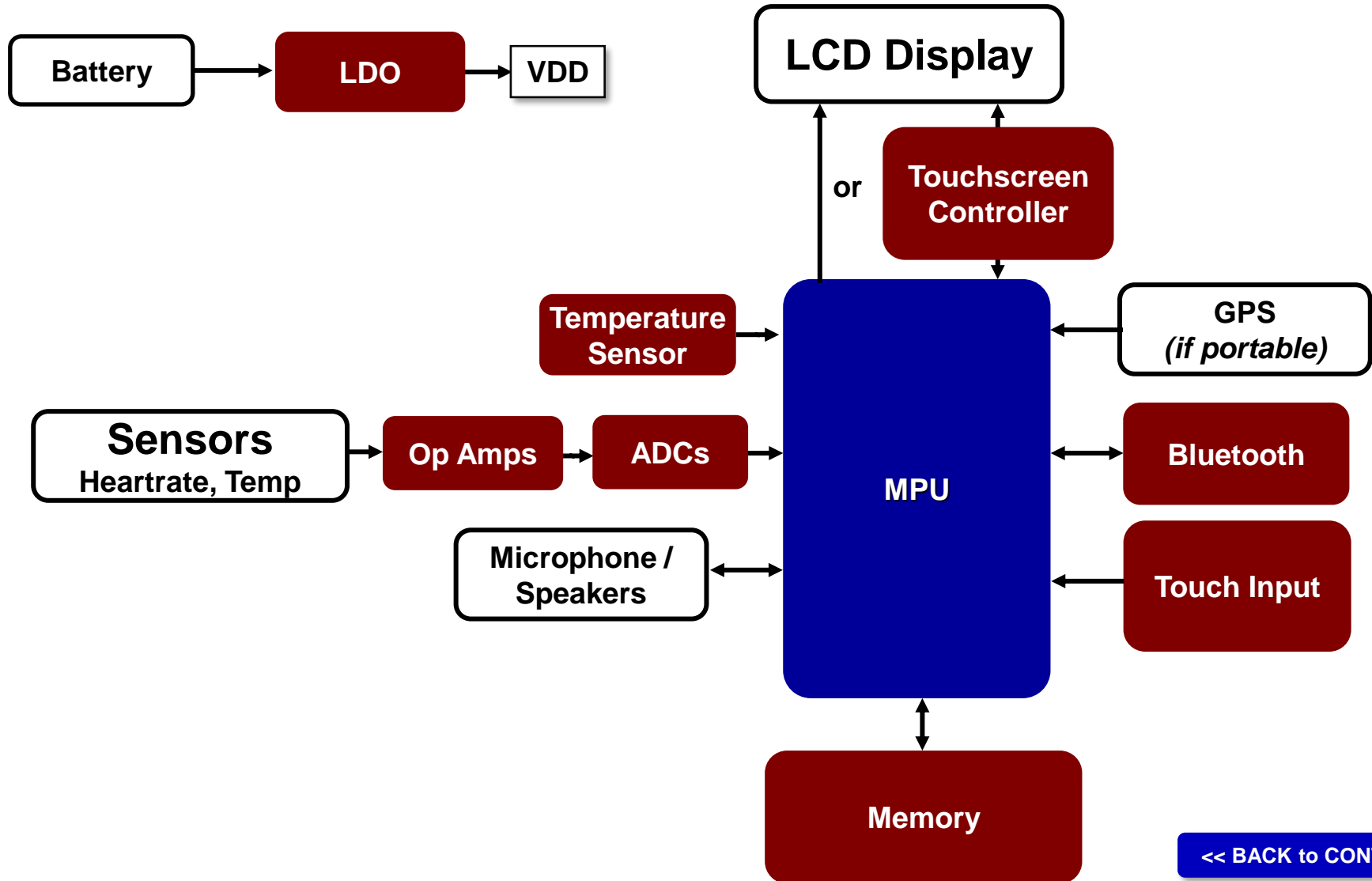
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# Wireless Solutions



# Fitness Equipment



## □ **Function: System control and decision making**

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
SAMA5D	Operating at 850DMIPS at under 150mW, the Atmel SMART SAMA5D3 MPU is ideal for any high-performance, low-power and cost-sensitive industrial application.	<a href="#">Click Here</a>

- **Function: Low power wireless connectivity to user's smart phone**

Popular Products	Description	Product Web Page
ATSAMB11	The ATSAMB11 is an ultra-low power Bluetooth® SMART (BLE 4.1) System on a Chip with Integrated MCU, Transceiver, Modem, MAC, PA, TR Switch, and Power Management Unit (PMU). It is a standalone ARM® Cortex®-M0 applications processor with embedded Flash memory and BLE connectivity.	<a href="#">Click Here</a>

- **Function: Provides regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MIC5353	The MIC5353 is a 500 mA, ceramic output cap stable, low output voltage, Low Dropout Regulator. The MIC5353 is packaged in very small 1.6x1.6mm DFN package. This part has high PSRR of 60dB with low output noise of 30 uVrms for noise sensitive applications	<a href="#">Click Here</a>
MCP1703A	With 250 mA maximum output, MCP1703 works with input voltage of up to 16V and in combination with its low current consumption of 2 $\mu$ A	<a href="#">Click Here</a>



# Digital Temperature Sensor

- **Function: Temperature measurement with digital output (body, system, etc)**

Popular Products	Description	Product Web Page
MCP9808	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^\circ\text{C}$ (max.) accuracy	<a href="#">Click Here</a>

# Analog-to-Digital Converter

- **Function: Convert analog signals from sensors to digital code**

Popular Products	Description	Product Web Page
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>
MCP3551	MCP355X devices are 2.7V to 5.5V, 22-bit delta-sigma A/D converters. The family exhibit good linearity, high accuracy and low noise performance for applications where sensor measurements such as pressure are performed.	<a href="#">Click Here</a>



# Operational Amplifiers

Popular Products	Description	Product Web Page
MCP603x	The MCP6031/2/3/4 op amps have a gain bandwidth of 10 kHz with a low typical operating current of 0.9 $\mu$ A and an offset voltage that is less than 150 $\mu$ V.	<a href="#">Click Here</a>
MCP6444	The MCP6444 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 9 kHz with typ. quiescent current of 450 nA .	<a href="#">Click Here</a>
MCP60x	MCP601/2/3/4 (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 230 $\mu$ A and an offset voltage that is less than 2 mV.	<a href="#">Click Here</a>
MCP6Vxx Family of Zero-Drift Amplifiers	The MCP6Vxx provides high DC precision, including an offset voltage as low as 2 $\mu$ V and offset drift as low as 15nV/ $^{\circ}$ C maximum. They have low quiescent current, no 1/f noise and offer superior CMRR/PSRR performance. The family has an operating voltage as low as 1.6V and are available in small packages (SC-70 and DFN)	<a href="#">Click Here</a>
MCP6Nxx Family of Instrumentation Amplifiers	Microchip expanded its portfolio of amplifiers by first introducing the MCP6N11 the industry's first instrumentation amplifier featuring mCal technology and most recently introducing the MCP6N16 Zero-Drift instrumentation amplifier. <ul style="list-style-type: none"><li>• Rail-to-Rail Input and Output</li><li>• Gain Set by two (2) External Resistors</li><li>• Enable/Vos Calibration Pin (MCP6N11)</li><li>• Zero-Drift Architecture (MCP6N16)</li><li>• Operating Voltage Range: 1.8V to 5.5V</li></ul>	<a href="#">Click Here</a>

# Memory

Popular Products	Description	Product Web Page
24AA256	<p>The 24AA256 is a 256Kb (32K x 8) Serial Electrically Erasable PROM (EEPROM), capable of operation across a broad voltage range (1.7V to 5.5V) and functional up to 125C. This ultra-reliable EEPROM has been developed for advanced, low-power applications and offers the benefit of over 1M Erase/Write cycles.</p>	<p><a href="#">Click Here</a></p>
23K256	<p>The 23K256 is a standalone Serial SRAM that offers designers an easy and inexpensive way to add more RAM to their application. These 8-pin low power, high performance SRAM devices have unlimited endurance and zero write times, making them ideal for applications involving continuous data transfer, buffering, data logging, audio, video, internet, graphics, and other math and data-intensive functions.</p>	<p><a href="#">Click Here</a></p>
SST26VF032B	<p>The SST26VF032B Serial Quad I/O (SQI) flash device utilizes a 4-bit multiplexed I/O serial interface to boost performance while maintaining the compact form factor of standard serial flash devices. Operating at frequencies reaching 104 MHz, the SST26VF032B enables minimum latency execute-in-place (XIP) capability without the need for code shadowing on an SRAM.</p>	<p><a href="#">Click Here</a></p>

## □ Function: Adds touch input functionality

Popular Products	Description	Product Web Page
maxTouch® Touchscreen Controllers	The maXTouch touch controller family provides a leading projected capacitive technology for touchscreens and touch pads. It supports single-finger, multi-fingers and gloved-finger operation. Regardless of the operating environment—hot or cold, dry or wet, noisy power supply or strong radiating surrounding devices—maXTouch controllers are designed for robust and reliable operation without compromising touch performance.	<a href="#">Click Here</a>
1D Touch	Touch turnkey products for buttons, sliders, wheels and proximity.	<a href="#">Click Here</a>



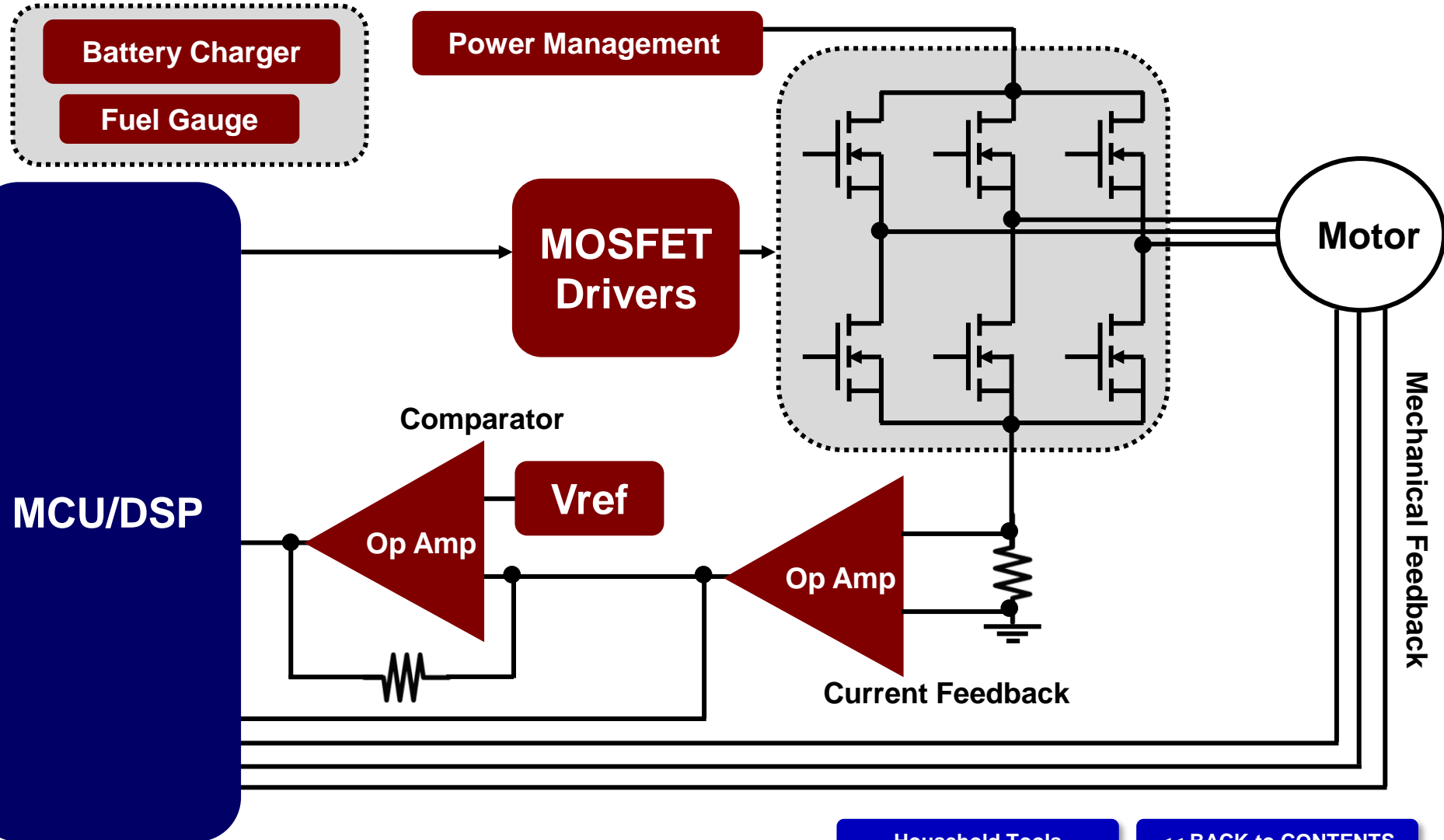
**MICROCHIP**

**Power Tools**

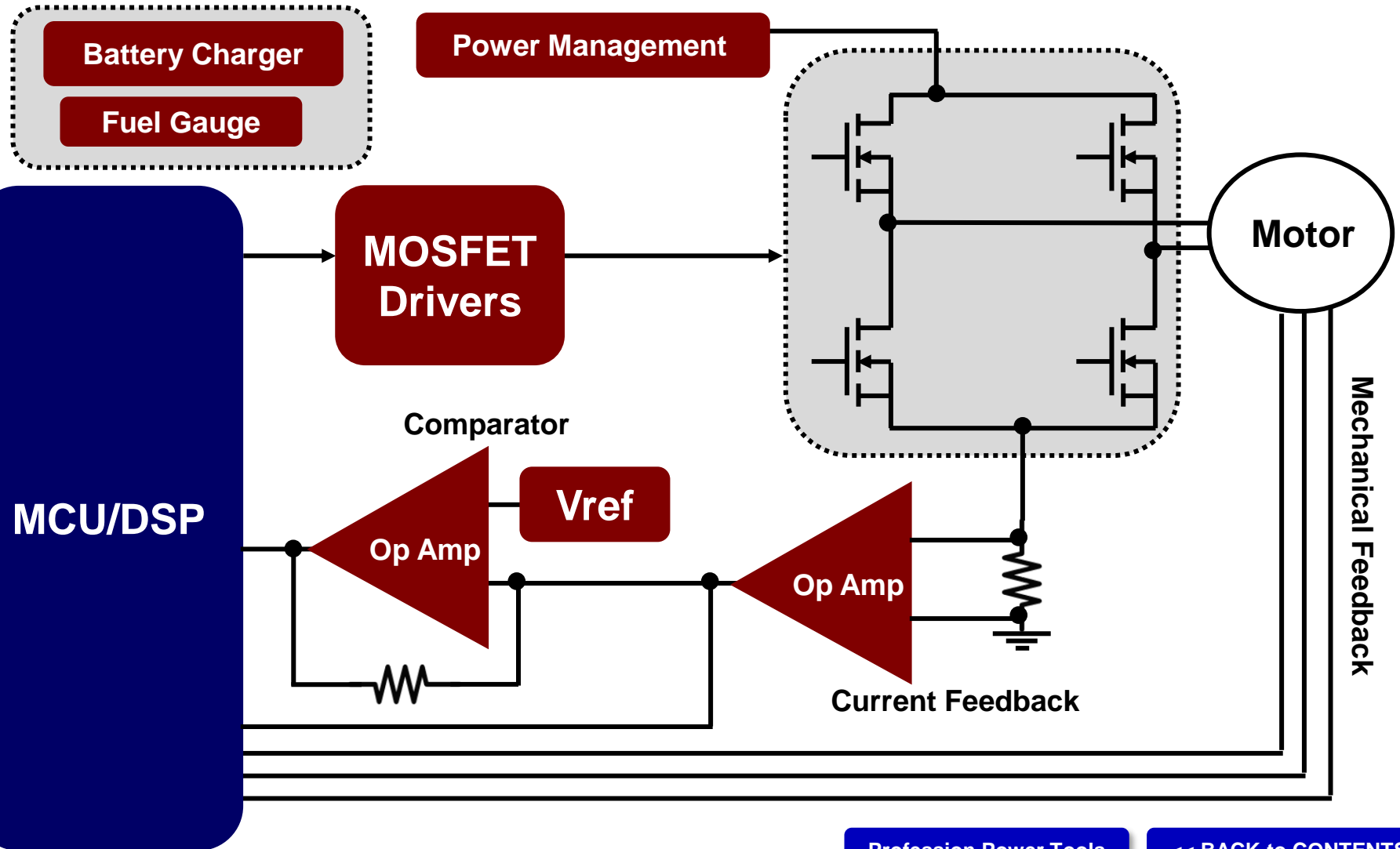
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# Professional Power Tools

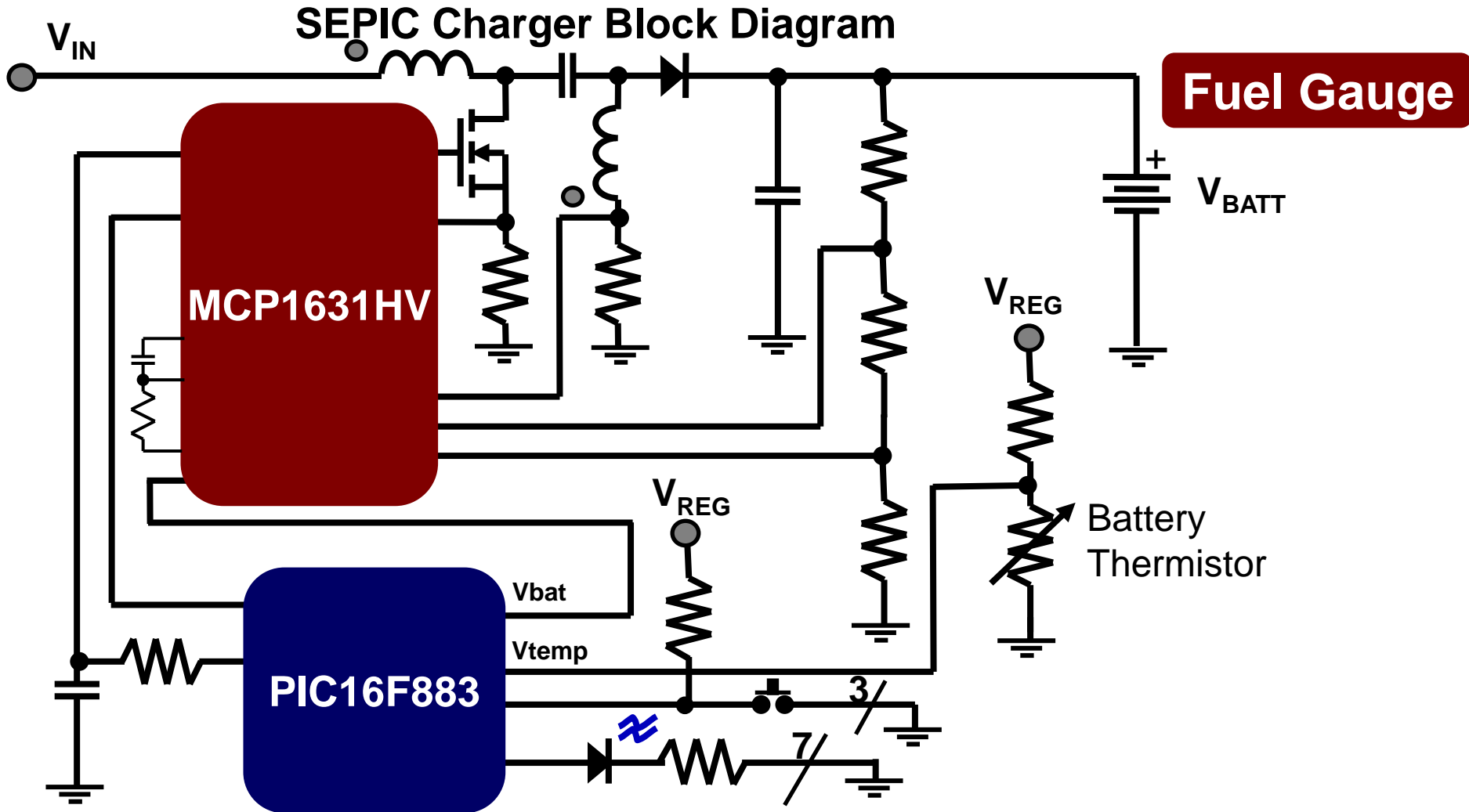


# Household Power Tools





# Battery Charger





# PWM Controller

Suggested Products	Description	Product Web Page
MCP1630/1	<ul style="list-style-type: none"><li>• Small footprint discrete high-speed PWM controllers (2MHz) in conjunction with a MCU.</li><li>• Peak Current Mode Control.</li><li>• High Voltage Options Operate to +16V Input.</li><li>• Integrated Overvoltage Comparator and Low Side MOSFET Driver.</li><li>• Over-temperature Protection and Under-voltage Lockout (UVLO).</li></ul>	<a href="#">MCP1630</a> <a href="#">MCP1631</a>
	MCP1631RD-MCC2: MCP1631HV Multi-Chemistry Battery Charger Reference Design	<a href="#">Click Here</a>
	MCP1631RD-DCPC1: MCP1631HV Digitally Controlled Programmable Current Source Reference Design	<a href="#">Click Here</a>

# PIC Microcontrollers

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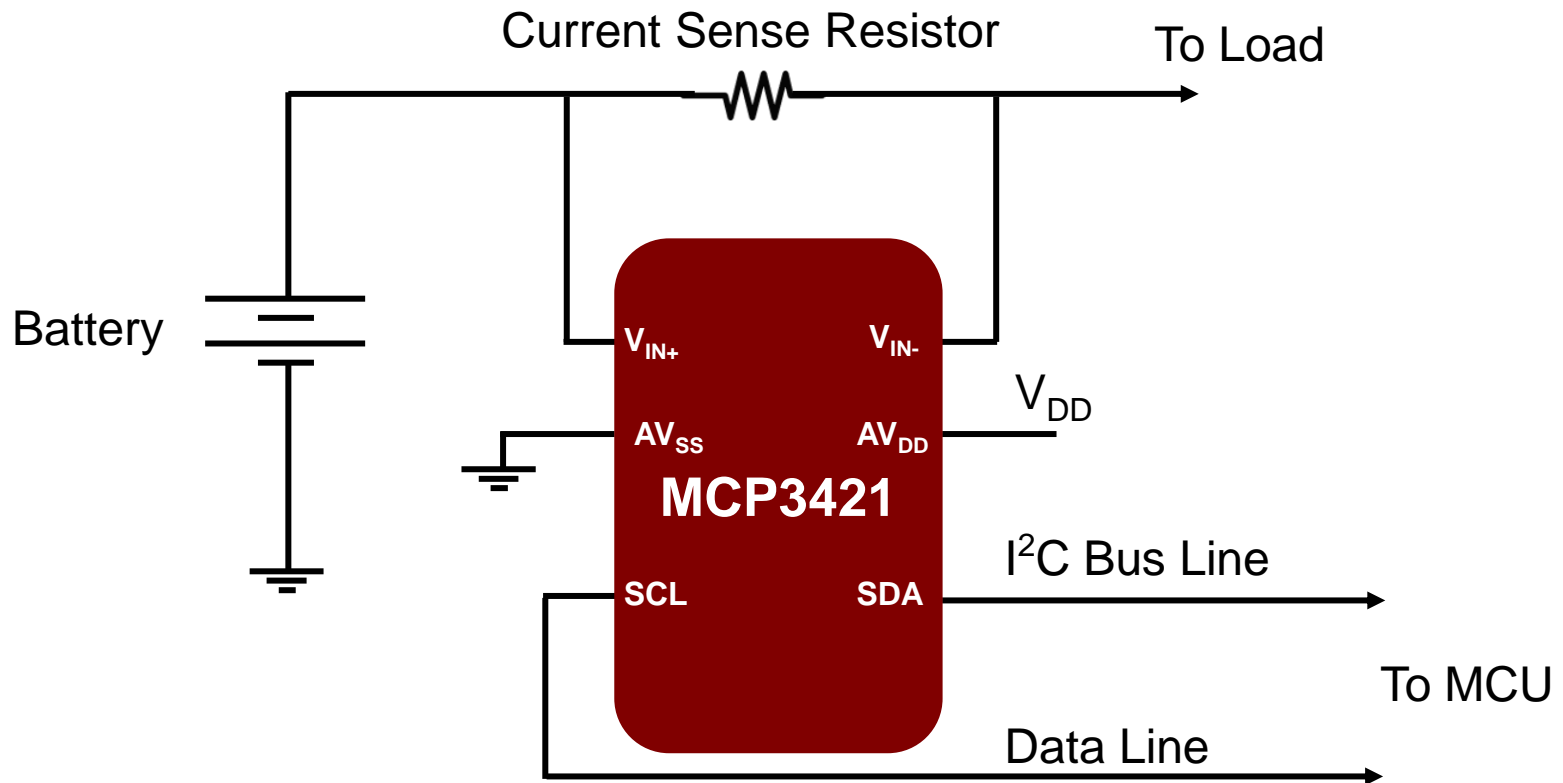
- ❑ **Function: coordinating all the control and monitor functions - the brain of the system**
- ❑ **Popular products: PIC16F182X, 178X, 75X, 15XX, 193X**
- ❑ **Attributes:**
  - ❑ Upwards of 32MHz internal OSC
  - ❑ 4 channel Programmable Switch Mode Controller (PSMC)
  - ❑ Integrated high performance comparators, op-amp, 10/12 bit ADC, 5/8/9 bit DAC, CCP, COG, NCO, CLC
  - ❑ Slope compensation
  - ❑ 256 bytes of EEPROM
  - ❑ Available in various packages

# Microcontroller

<b>Suggested Products</b>	<b>Description</b>	<b>Product Web Page</b>
PIC16F883	<ul style="list-style-type: none"><li>• This powerful yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller in a 28 pin package.</li><li>• The PIC16F883 features 256 bytes of EEPROM data memory, 2 Comparators, 11 channels of 10-bit ADC, 1 capture/compare/PWM and 1 Enhanced capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I<sup>2</sup>C™) bus and an Enhanced Universal Asynchronous Receiver Transmitter (EUSART).</li></ul>	<a href="#">PIC16F833</a>

# Fuel Gauge

- **Function: To track remaining battery level or charging status**



# Analog-to-Digital Converter

- **Function: Converting analog voltage or current signal (pressure) into digital data**

Popular Products	Description	Product Web Page
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>
AN1156: Application Note on Battery Fuel Measurement Using Delta-Sigma ADC Devices		<a href="#">Click Here</a>
MCP3421DM-BFG: Battery Fuel Gauge Demo Board		<a href="#">Click Here</a>

# Linear Products

Function	Popular Products	Description	Product Web Page
Sense and gain up output current. Low offset voltage required for minimizing measurement error	MCP62x	The MCP62x mCAL op amps have a gain bandwidth of 20 MHz with a low typical operating current of 2.5 mA and an offset voltage that is less than 200 $\mu$ V. They feature on-chip Input offset voltage calibration	<a href="#">Click Here</a>
Provide feedback compensation by sensing O/P voltage and comparing it with ref. voltage	MCP60x	MCP601/2/3/4 (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 230 $\mu$ A and an offset voltage that is less than 2 mV.	<a href="#">Click Here</a>
Compares voltage output of the amplifier to a reference to determine over current condition	MCP65xx	These comparators are optimized for low power, single-supply operation with greater than rail-to-rail input operation. Available in push-pull and Open drain outputs, the MCP656x family supports rail-to-rail output swing. The output limits supply current surges, and dynamic power consumption while switching.	<a href="#">Click Here</a>

# 85V MOSFET Drivers

- **Function: driving the high power devices**

Popular Products	Description	Product Web Page
MIC4605 85V Half-Bridge MOSFET Driver With Adaptive Dead Time (ADT)	The MIC4605 is an 85V half-bridge MOSFET driver that features adaptive-dead-time and shoot-through protection. The adaptive-dead-time circuitry actively monitors the half-bridge outputs to minimize the time between high-side and low-side MOSFET transitions, thus maximizing power efficiency.	<a href="#">Click Here</a>
MIC4607 85V 3-Phase MOSFET Driver With Adaptive Dead Time (ADT)	The MIC4607 is an 85V, three-phase MOSFET driver. The MIC4607 features a fast (35ns) propagation delay time and 20ns driver rise/fall times for a 1nF capacitive load. TTL inputs can be separate high- and low-side signals or a single PWM input with high and low drive generated internally. High- and low-side outputs are guaranteed to not overlap in either mode. The MIC4607 includes overcurrent protection as well as a high-voltage internal diode that charges the high-side gate drive bootstrap capacitor.	<a href="#">Click Here</a>



# Power Management

Popular Products	Description	Product Web Page
MCP16311/2	<p>The MCP16311/2 is a compact, high-efficiency, fixed frequency PWM/PFM, synchronous step-down DC-DC converter that operates from input voltage sources up to 30V. Integrated features include a high-side and a low-side switch, fixed frequency Peak Current Mode Control, internal compensation, peak-current limit and over temp. protection.</p>	<a href="#">Click Here</a>
MIC24046	<p>The MIC24046 is a pin-programmable, high-efficiency, wide input range, 5A synchronous step-down regulator. The MIC24046 is perfectly suited for multiple-voltage rail application environments typically found in computing and telecommunication systems. It can be programmed by pin strapping various parameters, such as output voltage, switching frequency, and current-limit values. The pin-selectable switching frequency, valley-current mode control technique, high-performance error amplifier, and external compensation allow for the best trade-offs between high efficiency and the smallest possible solution size.</p>	<a href="#">Click Here</a>

# Voltage Reference

- **Function: providing the system with an accurate analog voltage for comparison**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>



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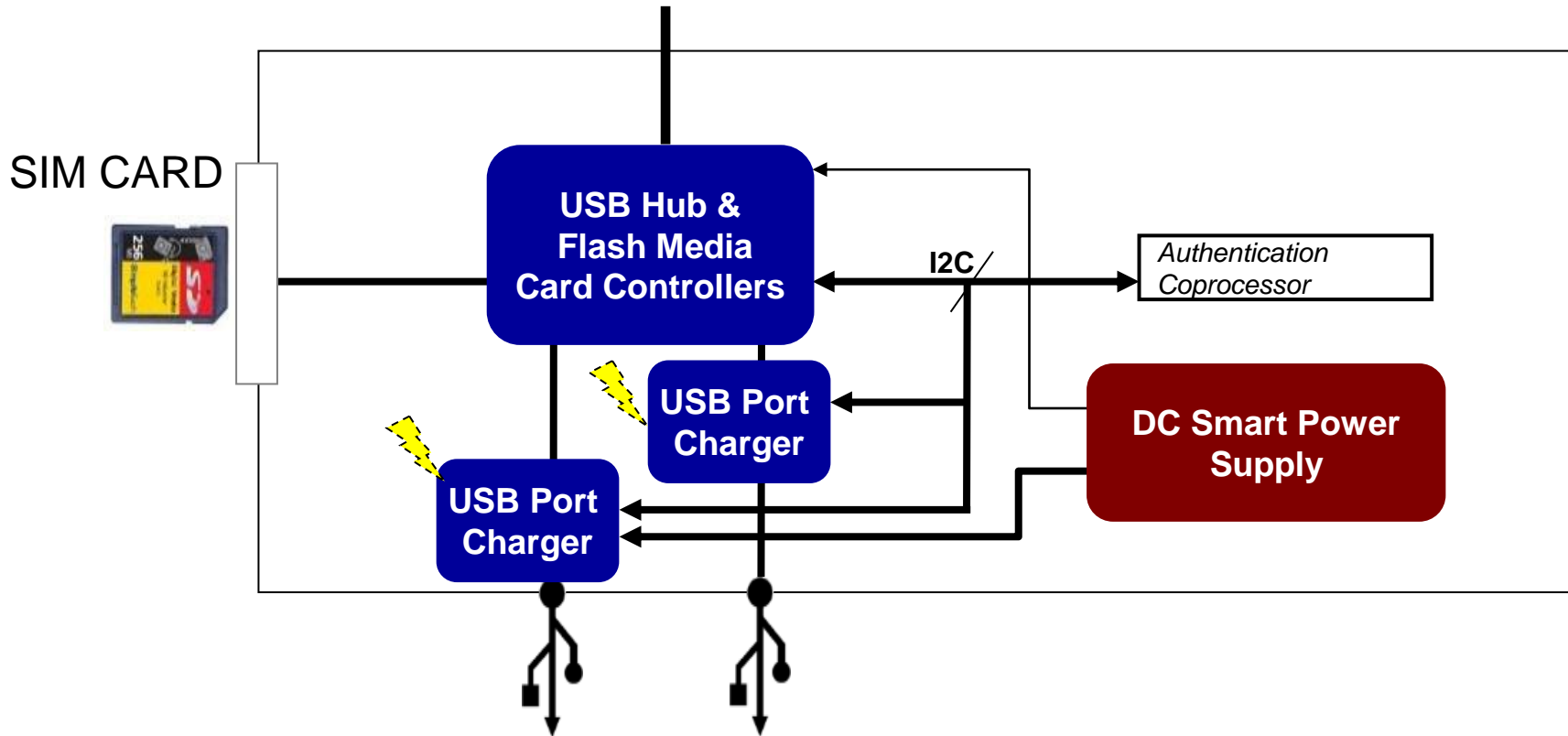
# **USB Breakout Box**

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# USB Breakout Box

Display/Control Interface to In-Vehicle Network





# USB Hub & Flash Media Card Controllers

Popular Products	Description	Product Web Page
USB5744	4 port Smart hub, SuperSpeed (SS)/Hi-Speed (HS), low power, low pin count configurable and fully compliant with the USB 3.1 Gen 1 specification. The USB5744 also supports Full Speed (FS) and Low Speed (LS) USB signaling, offering complete coverage of all defined USB operating speeds	<a href="#">Click Here</a>
USB84602	USB 2.0 hub controller with 2 downstream ports and advanced features for embedded USB applications. FlexConnect technology allows for easy port reversals or “role swapping.”	<a href="#">Click Here</a>
USB224x	USB 2.0 Flash Media Card Controller with Integrated Card Power FETs	<a href="#">Click Here</a>
USB264x	USB 2.0 Flash Media Controller with Integrated Card Power FETs and HS Hub	<a href="#">Click Here</a>

# USB Port Charger

Suggested Products	Description	Product Web Page
UCS81003	<p>The UCS81003 is a USB port power controller with charging emulation. It highlights nine pre-loaded charger emulation profiles and is compatible with BC1.2 CDP, DCP, YD/T-1591 as well as most Apple® and RIM® portable devices, e-books and tablets. Capable of up to 2.7A of continuous current and integrates a USB 2.0 compatible switch. I2C/SMBus communication allowing customer charge emulation profiles. The '8' USC81003 represents automotive part ordering number. Standard part is USC1003.</p>	<p><a href="#">UCS81003</a></p>
UCS2112	<p>The UCS2112 is a dual USB port power switch configuration which can provide 3.0A continuous current (3.4A maximum) per <math>V_{BUS}</math> port with precision overcurrent limiting (OCL), port power switch enables, auto-recovery fault handling, undervoltage and overvoltage lockout, back-drive protection and back-voltage protection, and dynamic thermal management</p>	<p><a href="#">UCS2112</a></p>



# DC Smart Power Supply

Suggested Products	Description	Product Web Page
MCP19119	<p>The MCP19111 is a mid-voltage (4.5-40V) analog-based PWM controller family with an integrated 8-bit PIC(R) Microcontroller. This unique product combines the performance of a high-speed analog solution, including high-efficiency and fast transient response, with the configurability and communication interface of a digital solution. Combining these solution types creates a new family of devices that maximizes the strengths of each technology to create a more cost-effective, configurable, high-performance power conversion solution.</p>	<a href="#">MCP19119</a>



**MICROCHIP**

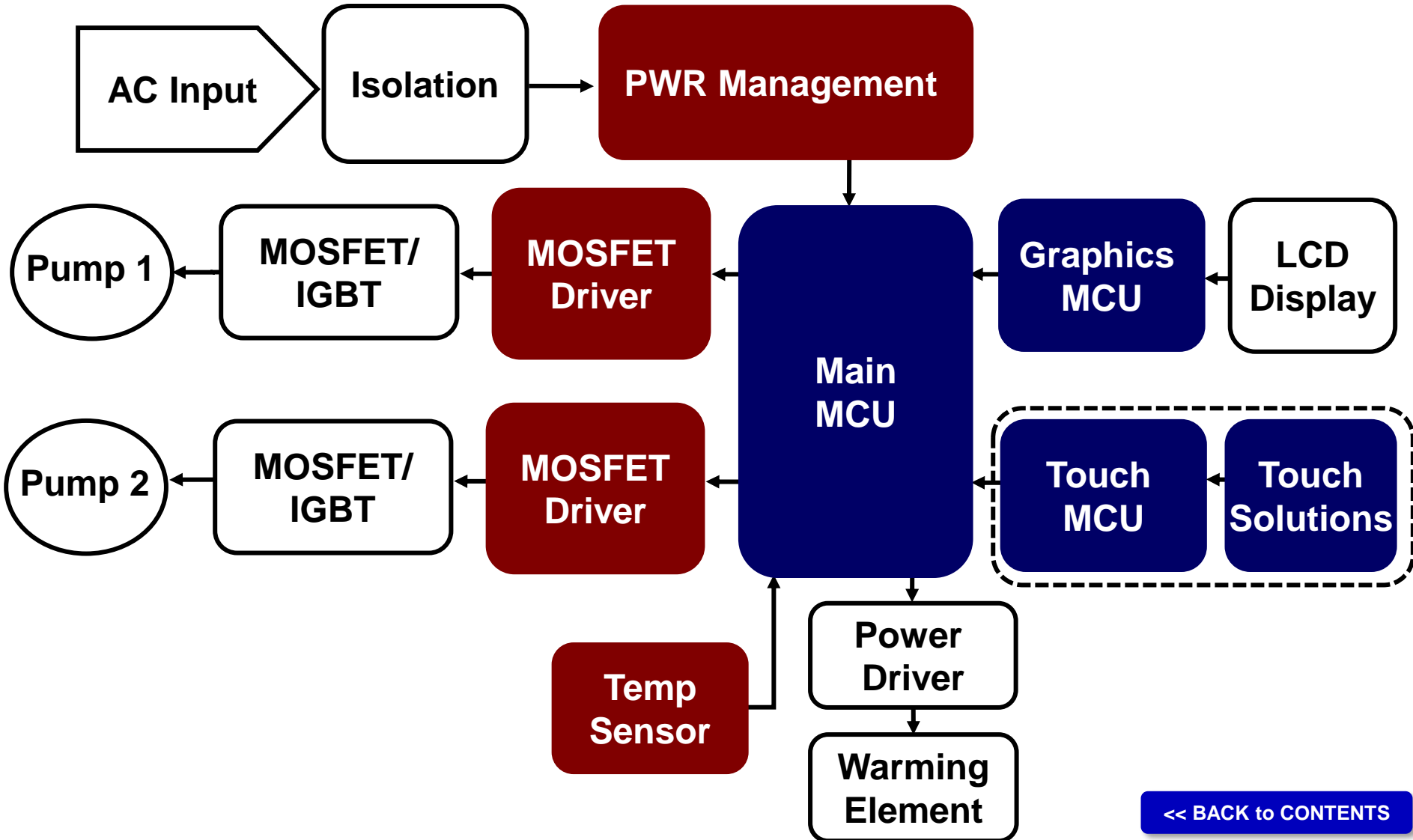
# High End Beverage Machine

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# High End Beverage Machine



# Temperature Sensors

## Function: Measuring and providing Temperature information

Popular Products	Description	Product Web Page
<p>MCP9800 Digital temperature sensor</p>	<ul style="list-style-type: none"> <li>• 2-wire I<sup>2</sup>C™/SMBus Compatible Interface</li> <li>• User Selectable 9- to 12-Bit Resolution               <ul style="list-style-type: none"> <li>• ±1°C Accuracy from -10°C to +85°C</li> <li>• ±2°C Accuracy from +85°C to +125°C</li> </ul> </li> <li>• Low Operating Current: 220 µA (typical)</li> <li>• Shutdown Mode: 1 µA (max)</li> </ul>	<p><a href="#">Click Here</a></p>
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">Click Here</a></p>



# Temperature Sensors Winning Attributes

---

## □ Attributes:

- Small SC70, SOT-23 and DFN leadless packages
- Very low operating current: 35 to 250 $\mu$ A (typ)
- Very low shutdown current: 1 $\mu$ A (max)
- High temp accuracy:  $\pm 0.25^{\circ}\text{C}$
- Simple operation: no need for external components
- Analog and digital (SPI<sup>TM</sup>, I2C<sup>TM</sup>, SMBus<sup>TM</sup>) devices
- High temperature resolution

# Low-Power LDOs

- **Function: providing regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MCP1700	The MCP1700 can source up to 250mA of current with an extremely low input-output voltage differential of 178mV at 250mA. with the low current consumption of only	<a href="#">Click Here</a>
MCP1703A	With 250 mA maximum output, MCP1703 works with input voltage of up to 16V and in combination with its low current consumption of 2 $\mu$ A	<a href="#">Click Here</a>



# Low-Power LDOs Winning Attributes

---

## □ **Attributes:**

- Extremely low operating current: as low as 1 $\mu$ A
- High output voltage accuracy
- Stability with ceramic capacitors
- Wide range of output voltage options
- Space-saving SC70 and SOT-23 packages
- Wide range of features: shutdown mode

# RESET Monitors

- **Function:** System supervisor circuits designed to monitor VCC in digital systems and provide a reset signal to the host processor when needed

Popular Products	Description	Product Web Page
TCM809	The reset output is driven active within 20 $\mu$ sec of VCC falling through the reset voltage threshold. Reset is maintained active for a minimum of 140msec after VCC rises above the reset threshold.	<a href="#">Click Here</a>
MCP1xx	The MCP1xx are a family of voltage supervisory devices which also operates as protection from brown-out conditions when the supply voltage drops below a safe operating level	<a href="#">Click Here</a>



# RESET Monitors Winning Attributes

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## □ Attributes:

- Tiny SOT-23 and SC-70 packages
- Very low operating current: as low as 1 $\mu$ A (max)
- High threshold voltage accuracy:  $\pm 2.8\%$  (max)
- $V_{DD}$  transient immunity
- Many available options: push-pull output, open-drain output and internal pull-up resistor



# Synchronous Buck MOSFET Drivers

- **Function: driving the high power devices (MOSFETs in synch. Buck configuration)**

Popular Products	Description	Product Web Page
MCP14628 Dual Output MOSFET Driver for Synchronous Applications	The MCP14628 is a synchronous MOSFET driver used for driving MOSFETs in a rectified bridge arrangement. There are two separate drivers contained in the MCP14628. The low-side driver output drives a non-floating or ground reference N-Channel MOSFET. The high-side driver is designed to drive a floating N-Channel MOSFET. An external bootstrap capacitor is used to provide the additional voltage.	<a href="#">Click Here</a>
MCP14700 Synchronous MOSFET Driver w/separate High/Low side control	The MCP14700 is a high-speed synchronous MOSFET driver designed to optimally drive a high-side and low-side N-Channel MOSFET. The MCP14700 has two PWM inputs to allow independent control of the external N-Channel MOSFETs.	<a href="#">Click Here</a>

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# Synchronous Buck MOSFET Drivers

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## □ Attributes:

- Operating voltage range: 5V to 30V
- Peak current capability: 2A source, 4A sink
- Internal Bootstrap Blocking Device
- Low Supply Current: 80  $\mu$ A (typical)
- Space Saving Packages: SOIC, DFN

# Operational Amplifiers

- **Function: buffering and filtering sensor feedback**

Popular Products	Description	Product Web Page
MCP6004	The MCP6004 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 microamperes.	<a href="#">Click Here</a>
MCP6H04	MCP6H04 has a wide supply voltage range of 3.5V to 16V and rail-to-rail output operation. This device has a gain bandwidth product of 1.2 MHz (typical), while only drawing 135 $\mu$ A/amplifier (typical) of quiescent current.	<a href="#">Click Here</a>
MCP6294	MCP6294 provide wide bandwidth of 10 MHz Gain Bandwidth Product. This family also operates from a single supply voltage as low as 2.4V to 6V, while drawing 1 mA (typical) quiescent current.	<a href="#">Click Here</a>

## □ **Attributes:**

- Small SC-70, TDFN and SOT-23 packages
- GBWP: 9 kHz to 60MHz
- Excellent operating current-to-GBWP ratio
- Mostly rail-to-rail inputs and outputs
- Offset voltage: as low as 2 $\mu$ V (MCP6V0x)
- Chip Select capability for power savings

# Analog-to-Digital Converters

- **Function: converting analog feedback signals from motor to digital signals for MCU**

Popular Products	Description	Product Web Page
MCP3221	The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 $\mu$ A and 1 $\mu$ A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.	<a href="#">Click Here</a>
MCP3201	The MCP3201 is a 100ksps, 1 input channel, 12-bit SAR A/D Converter (ADC) that combines high performance and low power consumption in a small package, making it ideal for embedded control applications. The MCP3201 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>
MCP33111	The MCP33111 12-bit, 1Msps, SAR A/D Converter (ADC) features a full differential input, high performance and low power consumption in a small package, making it ideal for battery powered systems and remote data acquisition applications. The MCP33111 features SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller.	<a href="#">Click Here</a>

## □ **SAR ADC Attributes:**

- Resolution: 10 to 16 bits
- Max sampling rate: up to 1 Msps
- Linearity:  $\pm 1$ LSB DNL,  $\pm 1$ LSB INL
- Current consumption: 175 to 2400 $\mu$ A (max.)
- Single supply voltage: 1.7V to 5.5V
- Small packages: SOT-23 and MSOP

# Voltage References

- **Function: providing the system with an accurate analog voltage for comparison (needed for ADC)**

Popular Products	Description	Product Web Page
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>

# Voltage References

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## □ **Attributes:**

- 1.2V (TC1070), 2.5V or 4.096V output
- Initial accuracy:  $\pm 1\%$  (max)
- Temperature coefficient: 50ppm/ $^{\circ}\text{C}$  (max)
- Output current:  $\pm 2\text{mA}$
- Operating current: 100 $\mu\text{A}$  (max)
- Industrial temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- SOT-23 and TO-92 packages



# PIC Microcontrollers

Function	Popular Products	Description	Product Web Page
Main MCU (Including Touch & Color Graphics)	PIC32MX	Microchip's 32-bit portfolio with the MIPS microAptiv or M4K core offer high performance microcontrollers, and all the tools needed to develop your embedded projects. With MPLAB® Harmony software framework, low cost development tools, and pin/peripheral compatibility from 16-bit product lines, PIC32 MCUs shorten time to market and allow your designs to grow.	<a href="#">Click Here</a>
Main MCU (Including Touch & Simple Graphics)	PIC16F193x	This versatile 40-pin MCU is also a member of Microchip's extreme low power microcontroller family featuring nanoWatt XLP technology. Debug and Programming support is available via PICkit™ 3, and MPLAB® ICD 3	<a href="#">Click Here</a>





# Capacitive Touch Solutions

Function	Popular Products	Description	Product Web Page
Capacitive Touch Solutions	CAP11/12xx	SMSC's capacitive touch sensor products, featuring RightTouch® technology, set a new standard in simplifying development, improving noise immunity, and lowering BOM costs in PC, LCD monitors, white goods and consumer electronic designs. These devices have been carefully designed to filter for common noise sources such as backlight inverters, DC-DC switching regulators and wireless frequencies. They support a wide variety of interfaces such as I2C, SMBus, SMSC BC-Link™ and SPI and also provide world-class ESD protection of ±8kV HBM with no external ESD protection circuits required.	<a href="#">Click Here</a>



# mTouch and Input Sensing Solutions

Popular Products	Description	Product Web Page
AR10xx	<p>The Microchip mTouch™ AR1000 Series Resistive Touch Screen Controller is a complete, easy to integrate, cost-effective and universal touch screen controller chip solution. The AR1000 Series has sophisticated proprietary touch screen decoding algorithms to fully process all touch data and save the host from this overhead. More than the usual “preprocessing” features of other low cost devices, the AR1000 delivers reliable, validated and calibrated touch</p>	<a href="#">Click Here</a>
MTCH6301	<p>The MTCH6301 is a turnkey projected capacitive touch controller that allows easy integration of multi-touch and gestures to create a rich user interface in your design.</p>	<a href="#">Click Here</a>



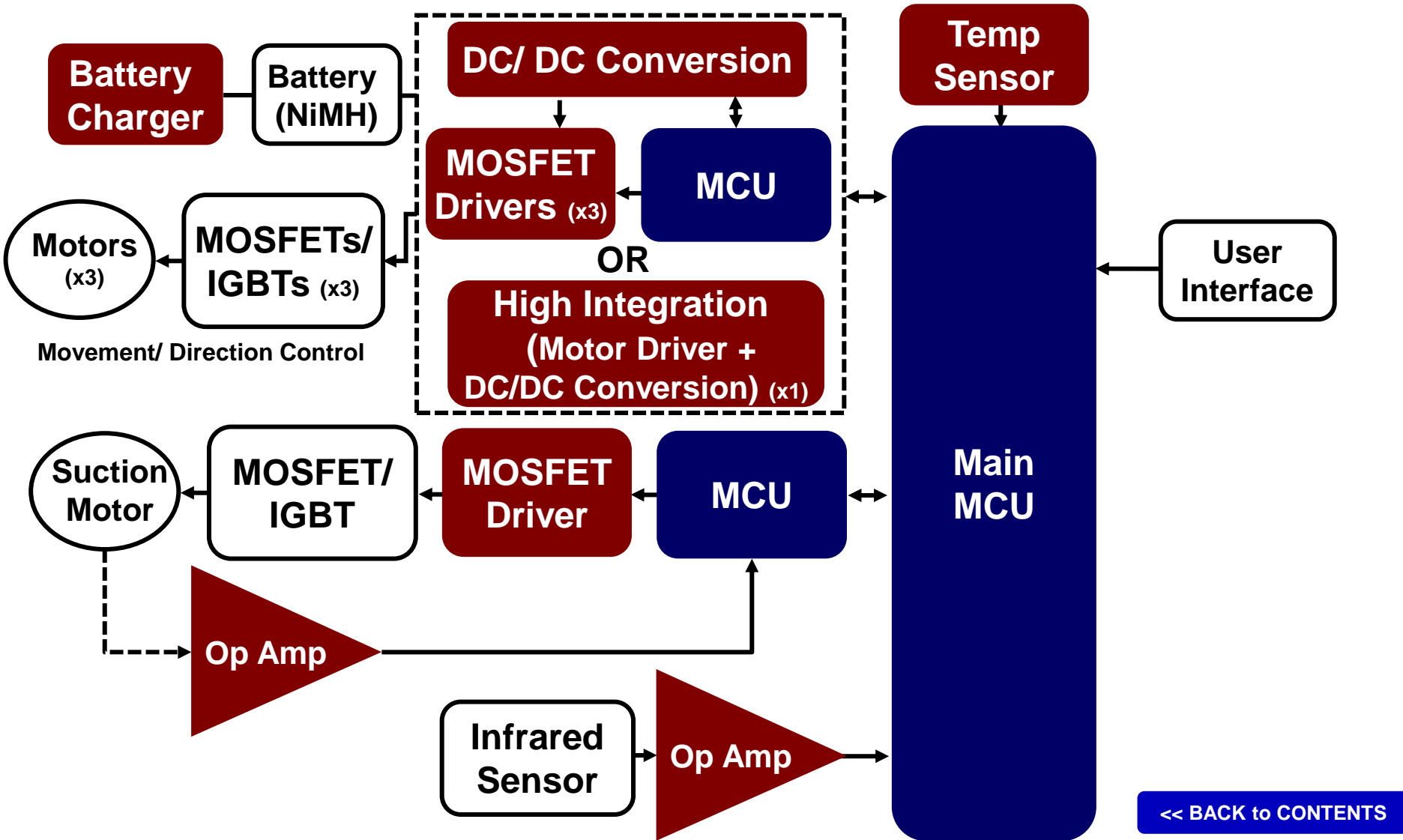
**MICROCHIP**

# Robot Vacuum Cleaner

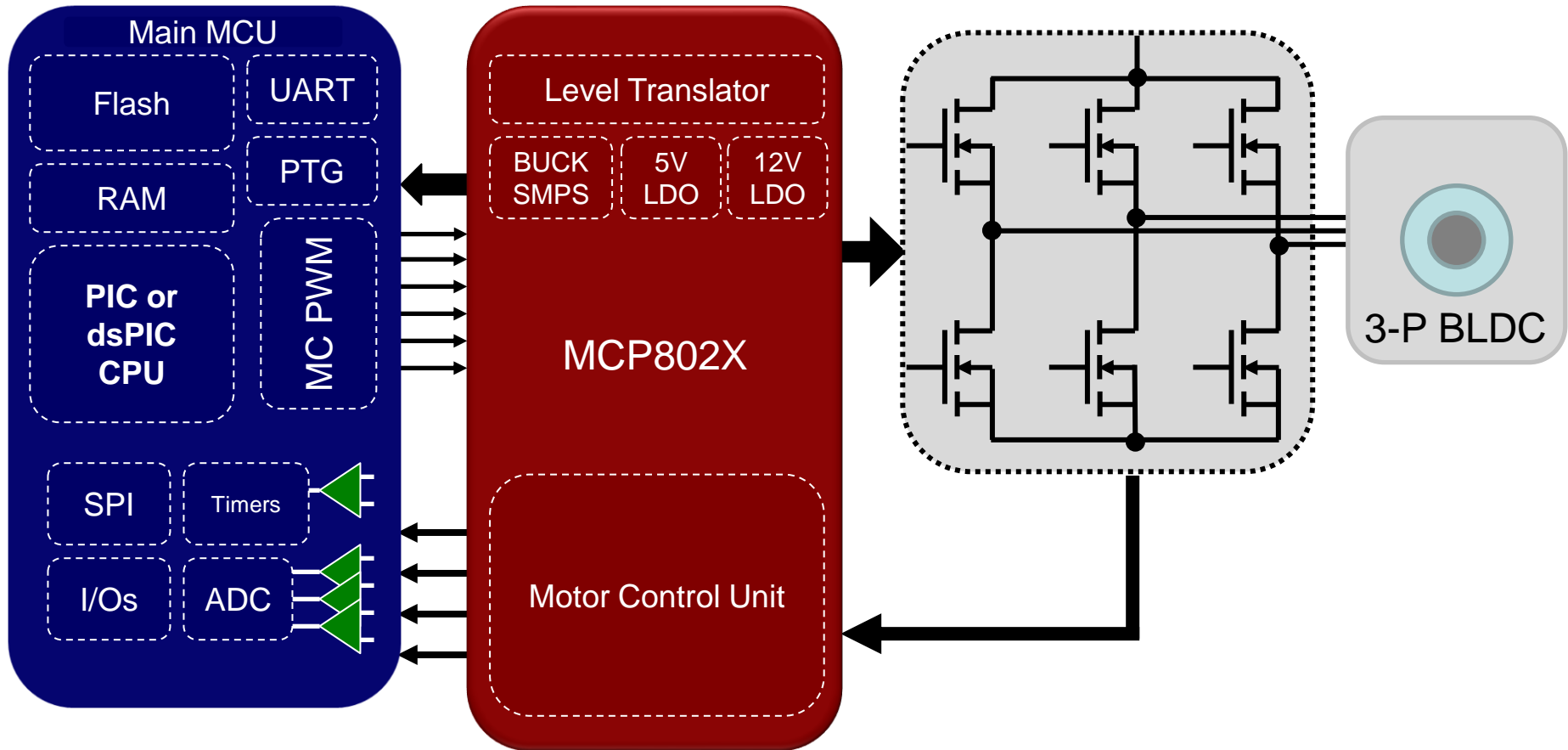
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# Robot Vacuum Cleaner



# High Integration Motor Control/ Drive





# Motor Control MOSFET Gate Driver

- **Function: power MCU/DSC, sense current, drive MOSFETs and provide housekeeping functions**

Popular Products	Description	Product Web Page
MCP8024/6	The three integrated op-amps allows MCP8024/6 provide motor current feedback to broad range of MCUs/DSCs in FOC applications. Both devices operates up to 28V and withstand 48V voltage spikes.	<a href="#">MCP8024</a> <a href="#">MCP8026</a>
MCP8025	MCP8025 offers six N-Ch MOSFET drivers to drive MOSFETs efficiently. With zero-crossing output , a standalone op-amp and voltage regulators, it simplifies BLDC design and	<a href="#">Click Here</a>

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# Low-Power LDOs

- **Function: providing regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MIC29302A	The MIC29302A is a high-current, low-cost, low-dropout voltage regulator which uses Micrel's proprietary Super $\beta$ PNP <sup>®</sup> process with a PNP pass element. The 3A LDO regulator features 450mV (full load) dropout voltage and very low ground current.	<a href="#">Click Here</a>
MCP1703A	With 250 mA maximum output, MCP1703 works with input voltage of up to 16V and in combination with its low current consumption of 2 $\mu$ A	<a href="#">Click Here</a>



# Operational Amplifiers for Sensor Signal Conditioning

Popular Products	Description	Product Web Page
MCP600x	The MCP600x is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 microamperes/ amp.	<a href="#">Click Here</a>
MCP64xx	MCP64xx family of Low Power Op Amps are designed with Microchip's advanced CMOS process. The MCP64xx Op Amps have low Quiescent Current, Input Offset Voltage and GBWP ranging from 9Khz to 7.5 MHz (typ.). Low power and small form factor make these devices ideal of many portable applications.	<a href="#">Click Here</a>
MCP6294	MCP6294 provide wide bandwidth of 10 MHz Gain Bandwidth Product. This family also operates from a single supply voltage as low as 2.4V to 6V, while drawing 1 mA (typical) quiescent current.	<a href="#">Click Here</a>





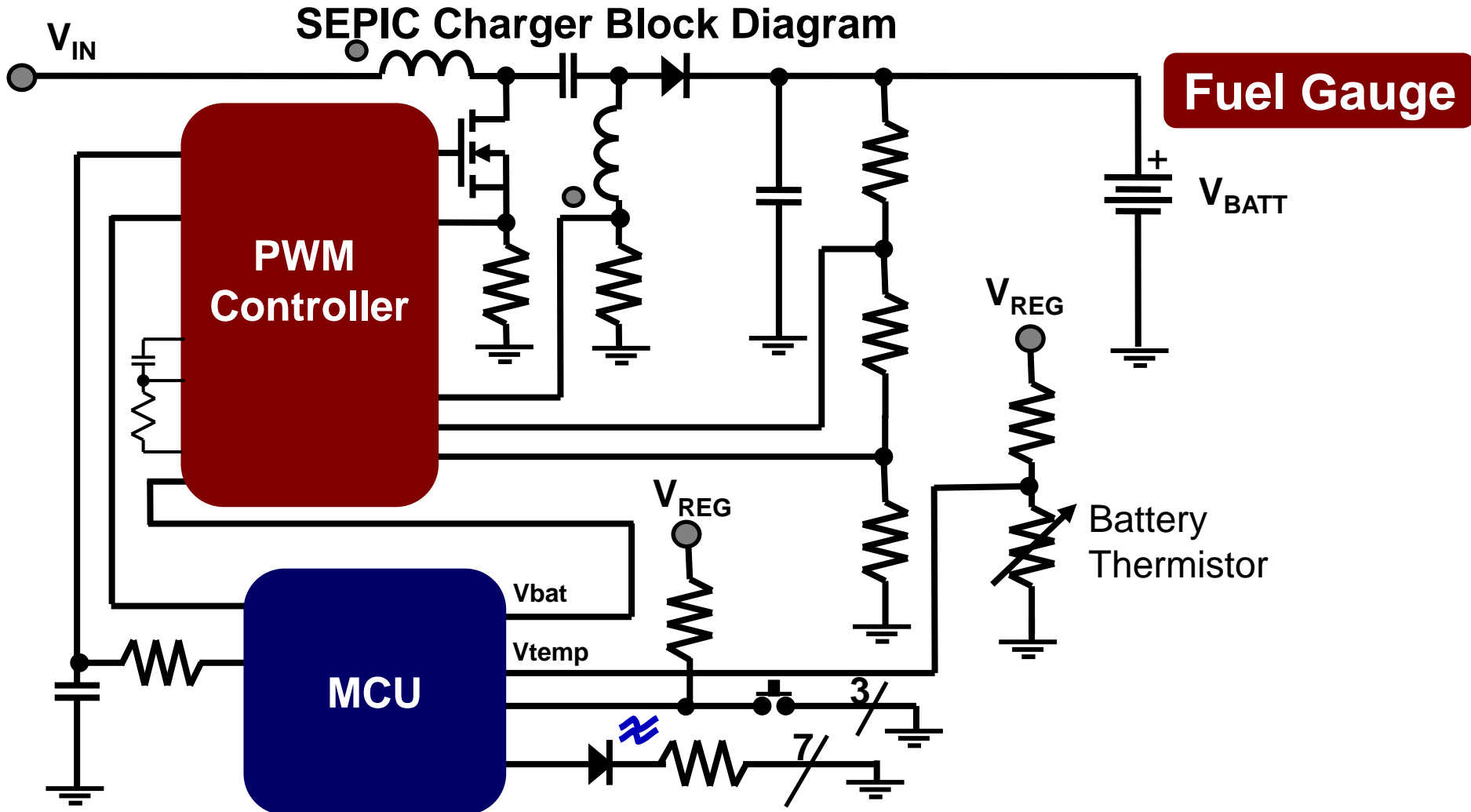
# Operational Amplifiers in the Control Loop

Popular Products	Description	Product Web Page
MCP63x	The MCP63x family of operational amplifiers features high gain bandwidth product (24 MHz) and high output short circuit current. Some devices also provide a Chip Select pin that supports a low power mode of operation. These amplifiers are optimized for high speed, low noise and distortion, single-supply operation with rail-to-rail output and an input that includes the negative rail.	<a href="#">Click Here</a>
MCP66x	The MCP66x family of operational amplifiers features high gain bandwidth product, and high output short circuit current. High Gain Bandwidth of 60 MHz, Short Circuit Current of 90 mA, Noise: 6.8nV/rtHz, Rail-to-Rail Output, Slew Rate: 27 V/us	<a href="#">Click Here</a>
MCP629x	MCP629x family provides wide bandwidth of 10 MHz Gain Bandwidth Product. This family also operates from a single supply voltage as low as 2.4V to 6V, while drawing 1 mA (typical) quiescent current.	<a href="#">Click Here</a>

# MOSFET Drivers

Popular Products	Description	Product Web Page
<p>MIC4605 85V Half-Bridge MOSFET Driver With Adaptive Dead Time (ADT)</p>	<p>The MIC4605 is an 85V half-bridge MOSFET driver that features adaptive-dead-time and shoot-through protection. The adaptive-dead-time circuitry actively monitors the half-bridge outputs to minimize the time between high-side and low-side MOSFET transitions, thus maximizing power efficiency.</p>	<p><a href="#">Click Here</a></p>
<p>MIC4607 85V 3-Phase MOSFET Driver With Adaptive Dead Time (ADT)</p>	<p>The MIC4607 is an 85V, three-phase MOSFET driver. The MIC4607 features a fast (35ns) propagation delay time and 20ns driver rise/fall times for a 1nF capacitive load. TTL inputs can be separate high- and low-side signals or a single PWM input with high and low drive generated internally. High- and low-side outputs are guaranteed to not overlap in either mode. The MIC4607 includes overcurrent protection as well as a high-voltage internal diode that charges the high-side gate drive bootstrap capacitor.</p>	<p><a href="#">Click Here</a></p>

# Battery Charger





# PWM Controller

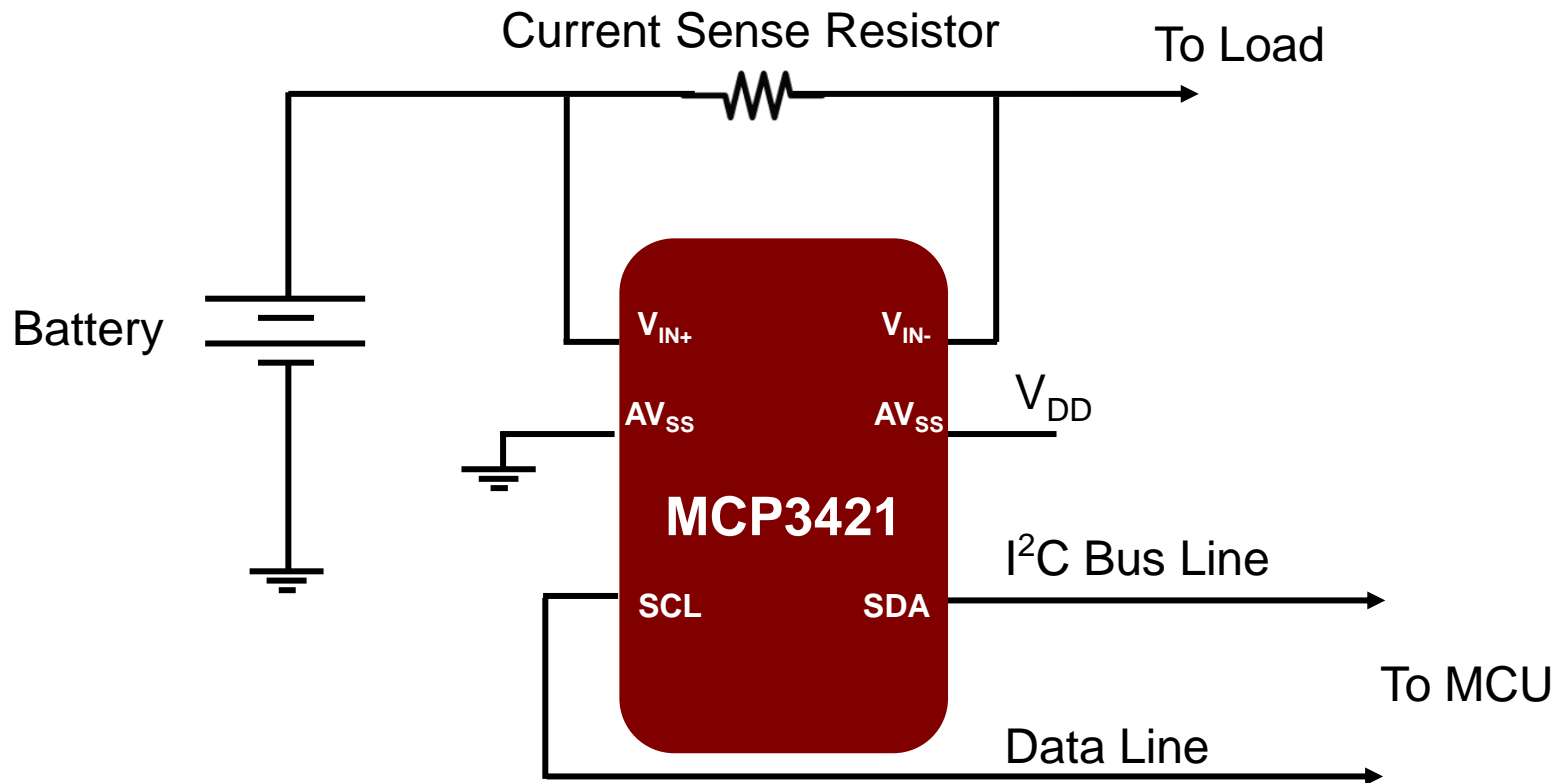
Suggested Products	Description	Product Web Page
MCP1630/1	<ul style="list-style-type: none"><li>• Small footprint discrete high-speed PWM controllers (2MHz) in conjunction with a MCU.</li><li>• Peak Current Mode Control.</li><li>• High Voltage Options Operate to +16V Input.</li><li>• Integrated Overvoltage Comparator and Low Side MOSFET Driver.</li><li>• Over-temperature Protection and Under-voltage Lockout (UVLO).</li></ul>	<a href="#">MCP1630</a> <a href="#">MCP1631</a>
	MCP1631RD-MCC2: MCP1631HV Multi-Chemistry Battery Charger Reference Design	<a href="#">Click Here</a>
	MCP1631RD-DCPC1: MCP1631HV Digitally Controlled Programmable Current Source Reference Design	<a href="#">Click Here</a>

# Microcontroller

<b>Suggested Products</b>	<b>Description</b>	<b>Product Web Page</b>
PIC16F883	<ul style="list-style-type: none"><li>• This powerful yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller in a 28 pin package.</li><li>• The PIC16F883 features 256 bytes of EEPROM data memory, 2 Comparators, 11 channels of 10-bit ADC, 1 capture/compare/PWM and 1 Enhanced capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I<sup>2</sup>C™) bus and an Enhanced Universal Asynchronous Receiver Transmitter (EUSART).</li></ul>	<a href="#">PIC16F833</a>

# Fuel Gauge

- **Function: To track remaining battery level or charging status**





# Analog to Digital Converter

- **Function: Converting analog voltage or current signal (pressure) into digital data**

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>
AN1156: Application Note on Battery Fuel Measurement Using Delta-Sigma ADC Devices		<a href="#">Click Here</a>
MCP3421DM-BFG: Battery Fuel Gauge Demo Board		<a href="#">Click Here</a>

# Temperature Sensors

## Function: Measuring and providing Temperature information

Popular Products	Description	Product Web Page
<p>MCP9800 Digital temperature sensor</p>	<ul style="list-style-type: none"> <li>• 2-wire I<sup>2</sup>C™/SMBus Compatible Interface</li> <li>• User Selectable 9- to 12-Bit Resolution               <ul style="list-style-type: none"> <li>• ±1°C Accuracy from -10°C to +85°C</li> <li>• ±2°C Accuracy from +85°C to +125°C</li> </ul> </li> <li>• Low Operating Current: 220 µA (typical)</li> <li>• Shutdown Mode: 1 µA (max)</li> </ul>	<p><a href="#">Click Here</a></p>
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">Click Here</a></p>



# PIC Microcontrollers

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- ❑ **Function: coordinating all the control and monitor functions - the brain of the system**
- ❑ **Popular products: PIC16F182X, 178X, 75X, 15XX, 193X**
- ❑ **Attributes:**
  - ❑ Upwards of 32MHz internal OSC
  - ❑ 4 channel Programmable Switch Mode Controller (PSMC)
  - ❑ Integrated high performance comparators, op-amp, 10/12 bit ADC, 5/8/9 bit DAC, CCP, COG, NCO, CLC
  - ❑ Slope compensation
  - ❑ 256 bytes of EEPROM
  - ❑ Available in various packages



**MICROCHIP**

**Lighting**

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# LED Lighting

## AC/ DC LED Driver



## DC/ DC LED Driver



## DC/ DC LED Driver



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# AC/ DC LED Driver- Current Regulation

Solutions	Description	
MCU + MOSFET Driver	This solution is implemented using a PIC12F752 and MOSFET drivers	<a href="#">Reference Circuit</a>
Universal Offline Linear Sequential LED Driver	<b>Pros for Linear Solutions:</b> <ul style="list-style-type: none"><li>• Inherently high PF (over 90% at 220V)</li><li>• No EMI (linear solution)</li><li>• Very few external components</li><li>• Small form</li></ul>	<a href="#">Reference Circuit</a>
Universal Offline Switching LED Driver	<b>Pros for Switching Solutions</b> <ul style="list-style-type: none"><li>• No flicker</li><li>• Higher LED utilization</li><li>• More uniform brightness between channels/strings</li><li>• Switching solutions generate less heat</li></ul>	<a href="#">Reference Circuit</a> <a href="#">Product List</a>



# AC-DC LED Driver for SSL

Suggested Products	Description	Product Web Page
CL220	CL220 operates at up to 220V, and is accurate to $\pm 10\%$ over a 5.0 - 160V range. The device can be used as a two terminal constant current source or constant current sink.	<a href="#">CL220</a>
HV9801A	The HV9801A LED driver is ideally suited for switch dimmable applications using LED bulbs and fixtures. Through switch dimming, the lamp can be adjusted to four discrete brightness levels by rapid cycling of the light switch.	<a href="#">HV9801A</a>
HV9805	The HV9805 driver IC is targeted at general LED lighting products. A two-stage topology provides true constant current drive for the LED load while drawing mains power with high power factor.	<a href="#">HV9805</a>
HV9861A / HV9961	The HV9861A / HV9961 are the patented, average-mode, constant current control LED driver IC operating in a constant off-time mode. The output LED current accuracy is $\pm 3\%$ .	<a href="#">HV9861A</a> <a href="#">HV9961</a>
HV9910B / HV9910C	The HV9910B/C is an open loop, current mode, control LED driver IC. The HV9910B/C can be programmed to operate in either a constant frequency or constant off-time mode.	<a href="#">HV9910B</a> <a href="#">HV9910C</a>

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# AC-DC LED Driver for SSL Continued

Suggested Products	Description	Product Web Page
HV9911	The HV9911 is a current mode control LED driver IC designed to control single switch PWM converters (buck, boost, buck-boost, or SEPIC), in a constant frequency or constant off-time mode.	<a href="#">HV9911</a>
HV9921/3/5	The HV992x family is a PWM high-efficiency LED driver control ICs. It allows efficient operation of LED strings from voltage sources ranging up to 400VDC.	<a href="#">HV9921/2/3</a> <a href="#">HV9925</a>
HV9930	The HV9930 is a variable frequency PWM controller IC, designed to control an LED lamp driver using a low-noise boost-buck (Ćuk) topology.	<a href="#">HV9930</a>
HV9931	The HV9931 is a fixed frequency PWM controller IC designed to control an LED lamp driver using a single-stage PFC buckboost-buck topology.	<a href="#">HV9931</a>
HV9980	The HV9980 is a fully integrated 3-channel peak-current PWM controller for driving buck converters in constant output current mode.	<a href="#">HV9980</a>

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# Step-Up Current Regulation

Solutions	Description	
Programmable LED Driver	MCP19114 capable of high efficiency, high current drive in a minimal component count. Highly customizable, to maximize design flexibility, and can be implemented in flyback, SEPIC, and boost topologies.	<a href="#">Reference Circuit</a>
Inductive Boost Converter LED Drive Solutions	MCP1643 is a constant current drive circuit with a low component count, up to 550 mA output current, up to 90% efficient, with a low 1.2 uA shutdown current, and dimmable with a PWM signal. Also, HV99xx for High Voltage and MIC32xx for High Power applications to meet different requirements.	<a href="#">Reference Circuit</a> <a href="#">Product List</a>
Portable & High Brightness Family	The MIC287x family is a high-current, high-efficiency flash LED driver for one or two high-brightness camera flash LEDs.	<a href="#">Reference Circuit</a>
Charge Pump LED Drive Circuit	MCP125x family generates a high accuracy 3.3V output from a 1.8 to 3.6V input, which can be used to supply up to 100mA of output current for LED drive from a variety of battery or DC power sources	<a href="#">Reference Circuit</a>

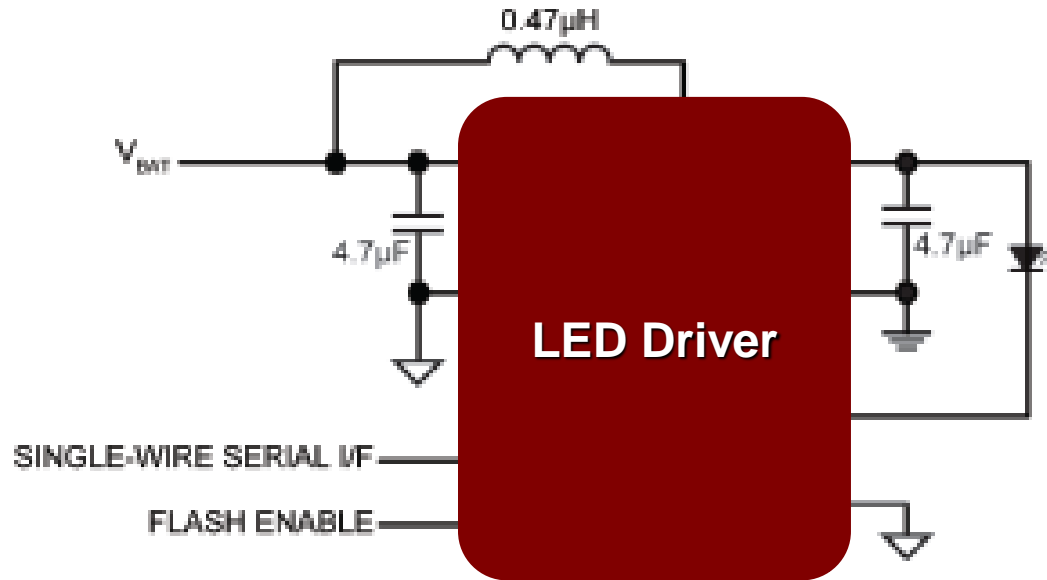
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# DC-DC Boost

Suggested Products	Description	Product Web Page
HV9912	The HV9912 is a current mode control LED driver IC designed to control single switch PWM converters (buck, boost, buck-boost or SEPIC) in a constant frequency mode. Internal 90V regulator.	<a href="#">HV9912</a>
HV9963	The HV9963 is a current mode control LED driver IC designed to control single switch PWM converters (buck, boost, buck-boost or SEPIC) in a constant frequency mode. Internal 40V regulator.	<a href="#">HV9963</a>
HV9985	The HV9985 is a three-channel peak current mode PWM controller for driving single switch converters in a constant output current mode. It can be used for driving either RGB LEDs or multiple channels of white LEDs.	<a href="#">HV9985</a>
MIC3223	The MIC3223 is a constant current boost LED driver capable of driving a series string of high power LEDs. The MIC3223 can be used in general lighting, bulb replacement, garden pathway lighting, and other solid state illumination application.	<a href="#">MIC3223</a>
MIC3230/31/32	The MIC3230/1/2 are constant current boost switching controllers specifically designed to power one or more strings of high power LEDs. The MIC3230/1/2 have an input voltage range from 6V to 45V and are ideal for a variety of solid state lighting applications.	<a href="#">MIC3230/1/2</a>



# MIC2873/4 1.2A High Brightness Flash LED Driver



- **Best-in-class efficiency (up to 92%)**
- **High-accurate LED current control**
- **High switching frequency up to 4MHz**
- **Requires only three external components**
- **Total solution size < 10mm<sup>2</sup>**



# LED Driver

Popular Products	Description	Product Web Page
MIC2874	<p>The MIC2874 is a high-current, high-efficiency flash LED driver. The LED driver current is generated by an integrated inductive boost converter with a 4MHz switching frequency which allows for the use of very small inductor and output capacitor. These features make the MIC2874 an ideal solution for high-resolution camera phone LED flash light driver applications. MIC2874 operates in either flash or torch modes that can be controlled through the single-wire serial interface and/or external control pin. A robust single-wire serial interface allows the host processor to control the LED current and brightness. The MIC2874 is available in a 9-bump 1.30mm x 1.30mm WLCSP package.</p>	<a href="#">Click Here</a>



# Step-Down Current Regulation

Solutions	Description	
LDO+MCU+ MOSFET Driver	Digitally controlled, high brightness LED drive circuit implemented using a discrete buck circuit controlled with a PIC12F752 MCU	<a href="#">Reference Circuit</a>
Buck Current Mode LED Drive circuit	HV9967B is a compact buck LED drive solution with tight (3%) current regulation, short circuit protection, and capable of 60V DC input with the integrated low side MOSFET. Also, Other HV99xx for High Voltage and MIC32xx for High Power applications to meet different requirements.	<a href="#">Reference Circuit</a> <a href="#">Product List</a>
Buck Voltage Mode LED Drive Circuit	MCP16312 is a constant current source to drive one or more LEDs using a buck implementation. Low component count, with integrated MOSFETs and control logic	<a href="#">Reference Circuit</a>
Cuk Converter LED Drive Circuit	MCP16301 is compact, low component count, 300 mA constant current regulation circuit capable of driving up to 15V of LEDs in series	<a href="#">Reference Circuit</a>



# DC-DC Buck

Suggested Products	Description	Product Web Page
HV9967B	The HV9967B is an average-mode current control LED driver IC operating in a constant off-time mode. The IC features an integrated 60V, 0.8Ω MOSFET that can be used as a stand-alone buck converter switch, or connected as a source driver for driving an external high-voltage depletion-mode MOSFET.	<a href="#">HV9967B</a>
HV9918 / HV9919B	The HV9918 is a PWM controller IC designed to drive HB LEDs using a buck topology. It operates from an input voltage of 4.5 to 40VDC and employs hysteretic control with a high-side current sense resistor to set the constant output current up to 700mA.	<a href="#">HV9918</a> <a href="#">HV9919B</a>
MIC3201 MIC3202/3202-1	The MIC3201/2 are hysteretic, step-down, constant-current, HB LED drivers. It provides an ideal solution for interior/exterior lighting, architectural and ambient lighting, LED bulbs, and other general illumination applications.	<a href="#">MIC3201</a> <a href="#">MIC3202</a>
MIC3203/3203-1	The MIC3203 is a hysteretic, step-down, constant-current, HB LED driver. A high-frequency switching operation up to 1.5MHz allows the use of smaller external components minimizing space and cost.	<a href="#">MIC3203</a>
MIC3205	The MIC3205 is a hysteretic, step-down, HB LED driver with a patent pending frequency regulation scheme that maintains a constant operating frequency over input voltage range.	<a href="#">MIC3205</a>

# DC-DC Linear

Suggested Products	Description	Product Web Page
MIC2841A/42A/ 43A/44A/46A	The MIC284x family is a group of high efficiency White LED drivers, greatly extending battery life for portable display backlighting, keypad backlighting and camera flash in mobile devices.	<a href="#">MIC2841A /42A</a> <a href="#">MIC2843A</a> <a href="#">MIC2844A/46A</a>
MIC2860-2D/2P	The MIC2860-2D/2P architecture provides the highest possible efficiency by eliminating switching losses present in traditional charge pumps or inductive boost circuits.	<a href="#">MIC2860-2D</a> <a href="#">MIC2860-2P</a>
MIC4801/02	The MIC4801/2 is a high efficiency White LED (WLED) driver designed to drive a single LED up to 600mA. The constant current driver is designed to drive high power LEDs in various lighting applications.	<a href="#">MIC4801</a> <a href="#">MIC4802</a>
MIC4811/12	The MIC4811 features Dynamic Average Matching™ (DAM™) which is specifically designed to provide optimum matching across all WLEDs. The high accuracy ( $\pm 1\%$ typical) current regulated WLED channels ensure uniform display illumination under all conditions.	<a href="#">MIC4811</a> <a href="#">MIC4812</a>
MM5450/51 MIC5400	The MM545x are monolithic MOS ICs fabricated in an N-Channel, metal-gate process for LED Display.	<a href="#">MM5450/51</a> <a href="#">MIC5400</a>



**MICROCHIP**

**DC/ DC MCU Based  
LED Driver**

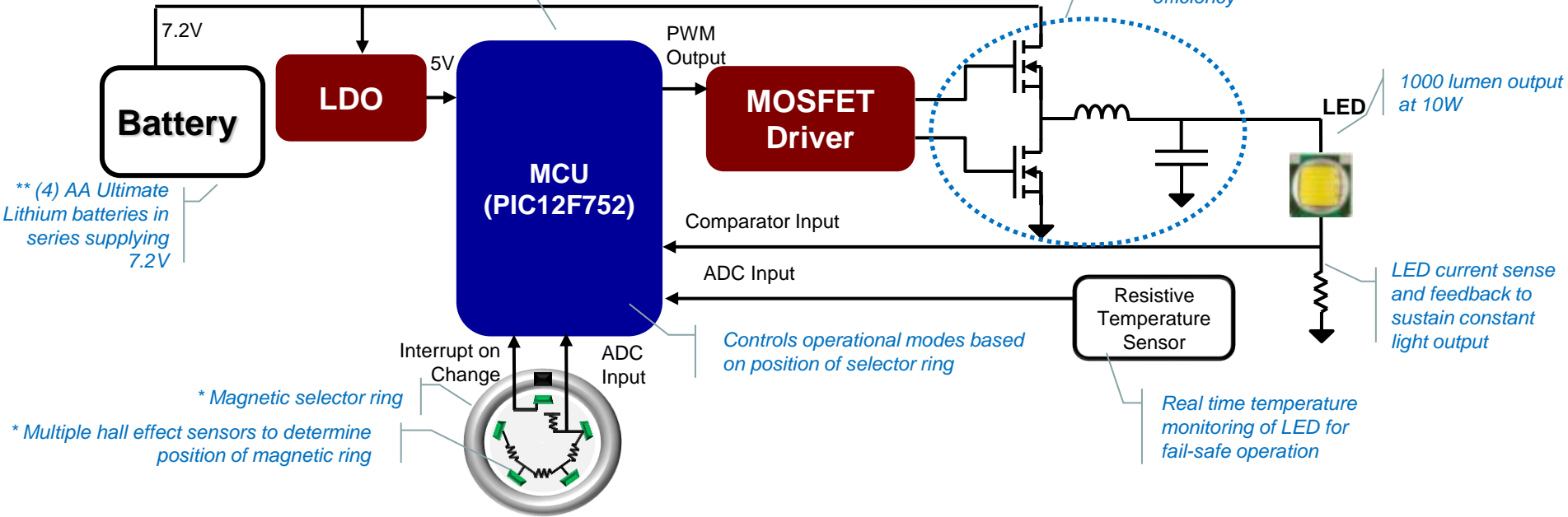
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# DC/ DC MCU Based LED Driver

LED drive and closed loop control determined by current sense and temperature

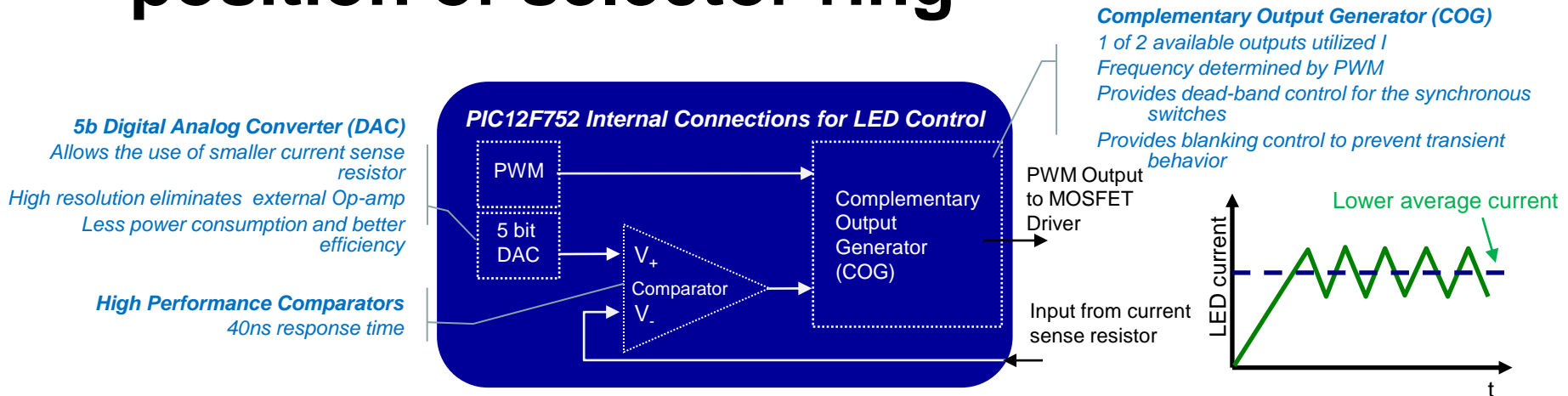
Synchronous Buck Regulator controlled by PIC12F752 microcontroller for maximum efficiency



\* Magnetic selector ring design can be replaced to accommodate mechanical push-buttons and switches

\*\* Battery capacity can be scaled to accommodate specific mechanical capacity and desired run-times

- **LED drive and closed loop control determined by current sense and temperature**
- **Controls operational modes based on position of selector ring**



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# Synchronous Buck MOSFET Drivers

- **Function: driving the high power devices (MOSFETs in synch. Buck configuration)**

Popular Products	Description	Product Web Page
MCP14628 Dual Output MOSFET Driver for Synchronous Applications	The MCP14628 is a synchronous MOSFET driver used for driving MOSFETs in a rectified bridge arrangement. There are two separate drivers contained in the MCP14628. The low-side driver output drives a non-floating or ground reference N-Channel MOSFET. The high-side driver is designed to drive a floating N-Channel MOSFET. An external bootstrap capacitor is used to provide the additional voltage.	<a href="#">Click Here</a>
MCP14700 Synchronous MOSFET Driver w/separate High/Low side control	The MCP14700 is a high-speed synchronous MOSFET driver designed to optimally drive a high-side and low-side N-Channel MOSFET. The MCP14700 has two PWM inputs to allow independent control of the external N-Channel MOSFETs.	<a href="#">Click Here</a>

# Low Power LDOs

- **Function: providing regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MCP1700	The MCP1700 can source up to 250mA of current with an extremely low input-output voltage differential of 178mV at 250mA. with the low current consumption of only	<a href="#">Click Here</a>
MCP1703A	With 250 mA maximum output, MCP1703 works with input voltage of up to 16V and in combination with its low current consumption of 2 $\mu$ A	<a href="#">Click Here</a>



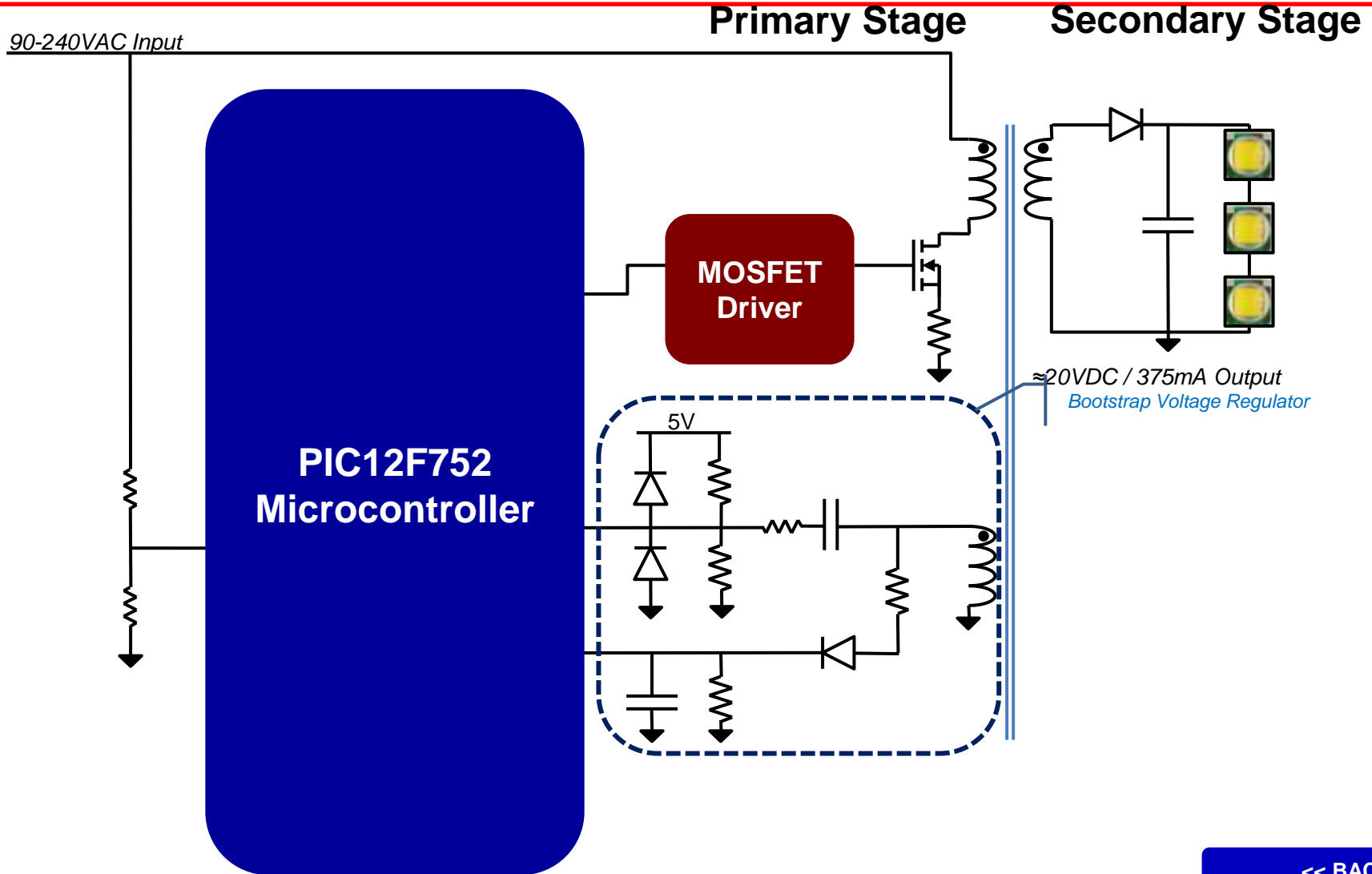
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# **AC/DC LED Driver System**

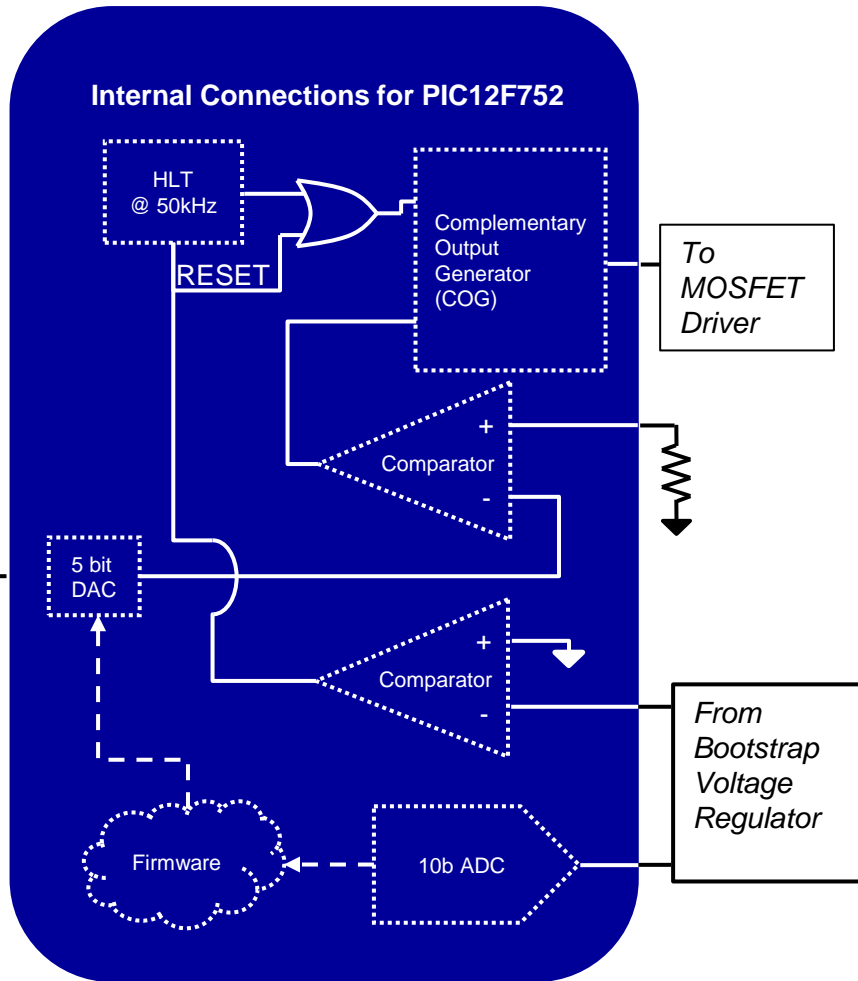
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# AC/DC MCU Based LED Driver System



# PIC12F752



- ❑ **8-Pin Flash-Based, 8-Bit CMOS MCU**
- ❑ **Flash Program Memory with self read/write capability**
- ❑ **Mid-Range Core, Internal 8MHz oscillator**
- ❑ **2 x High Speed Analog Comparators (50nS)**
- ❑ **1 x Capture-Compare-PWM (CCP)**
- ❑ **4 x 10-bit Analog-to-Digital Converter (ADC) with voltage reference,**
- ❑ **1 x Dual Range 5-bit Digital-to-Analog Converter (DAC)**
- ❑ **Complementary Output Generator (COG): Complementary Waveforms from selectable sources**
- ❑ **Watchdog Timer (WDT)**
- ❑ **Power-On/Off-Reset, Brown-Out Reset (BOR)**
- ❑ **In Circuit Serial Programming (ICSP)**
- ❑ **Wide Operating Voltage of PIC12F752 variant**
- ❑ **High Voltage PIC12HV752 variant (2.0V – user defined) with internal shunt regulator**

[Click Here for the Product Page](#)

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# MOSFET Drivers

- **Function: driving the high power devices (MOSFETs, bipolar transistors, IGBTs)**

Popular Products	Description	Product Web Page
TC4427A	Supply Voltage Range: 2.5V to 5.5V Wide Temperature Measurement Range: -40°C to +125°C High Temperature Converter Accuracy: $\pm 2^\circ\text{C}$ , Max, at 25°C Linear Temperature Slope: 10mV/°C Very Low Supply Current: 35 $\mu\text{A}$ Typical	<a href="#">Click Here</a>
MCP1415/16	The MCP1415/16 devices are small footprint Low-Side MOSFET drivers capable of supplying 1.5A peak output current in a SOT23 5L package.	<a href="#">Click Here</a>
MCP14E3/E4/E5	The MCP14E3/E4/E5 devices are a family of 4.5A, dual output buffers/MOSFET drivers with separate enable functions for each output. As MOSFET drivers, the MCP14E3/E4/E5 can easily charge 2200 pF gate capacitance in under 28 nsec (max)	<a href="#">Click Here</a>



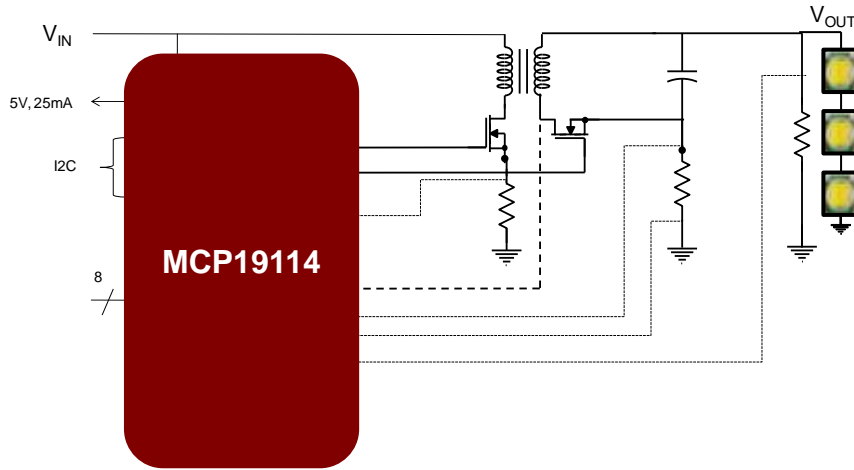
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**LED Driver System  
using MCP19114**

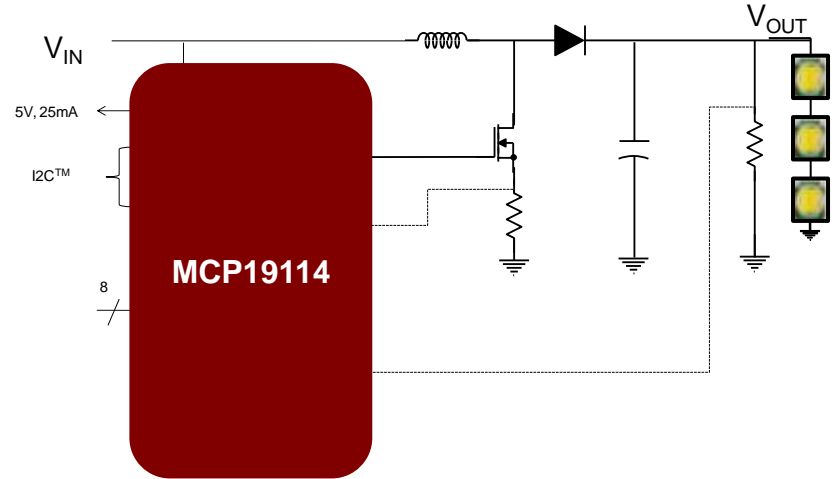
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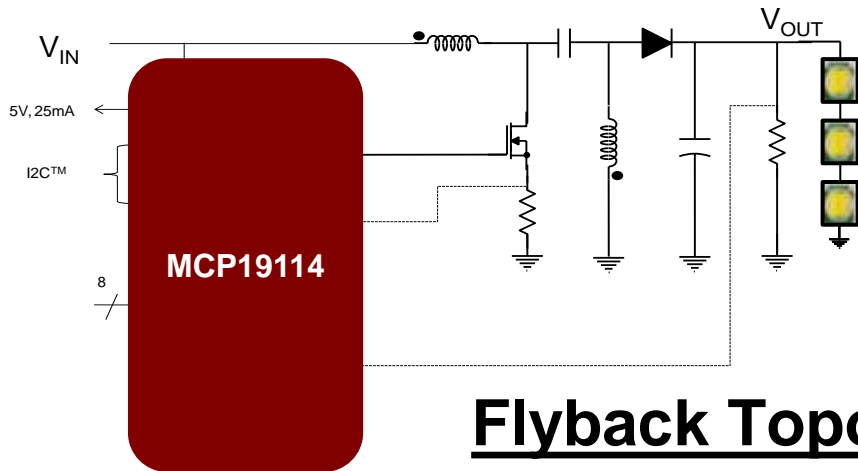
# Programmable LED Driver



**SEPIC Topology**



**Boost Topology**



**Flyback Topology**  
(Synchronous)

*...and more, including Ćuk and Forward Converters (Broad Topology Support)*



# MCP19114

Popular Products	Description	Product Web Page
MCP19114/5	<p>The MCP19114 is a mid-voltage (4.5-42V) analog-based PWM controller with an integrated 8-bit PIC™ Microcontroller. This unique product family combines the performance of a high-speed analog solution, including high-efficiency and fast transient response, with the configurability and communication interface of a digital solution. Combining these solution types creates a new family of devices that maximizes the strengths of each technology to create a more cost-effective, configurable, high-performance power conversion solution.</p>	<a href="#">Click Here</a>
<p><a href="#">MCP19114 Flyback Standalone Evaluation Board</a></p> <p>The MCP19114-Flyback Standalone Evaluation Board and Graphical User Interface (GUI) demonstrate the MCP19114 performance in a synchronous Flyback topology. It is configured to regulate load current, and is well suited to drive LED loads.</p>		



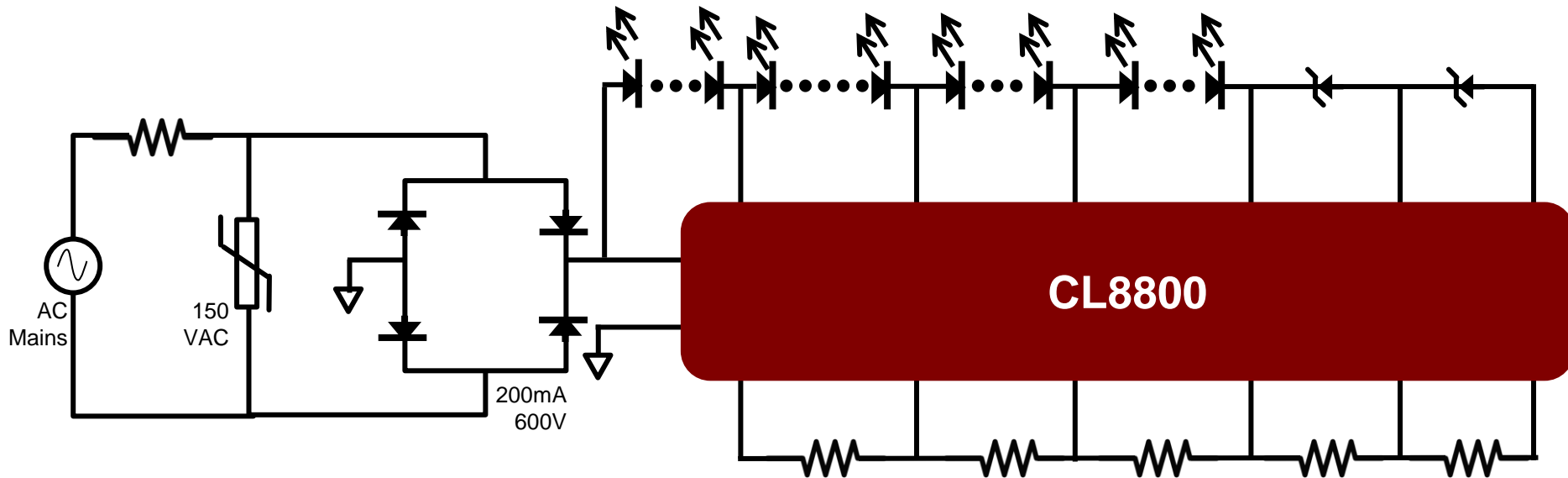
**MICROCHIP**

# Supertex LED Drivers

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# Sequential Linear LED drivers (120V/ 230VAC)

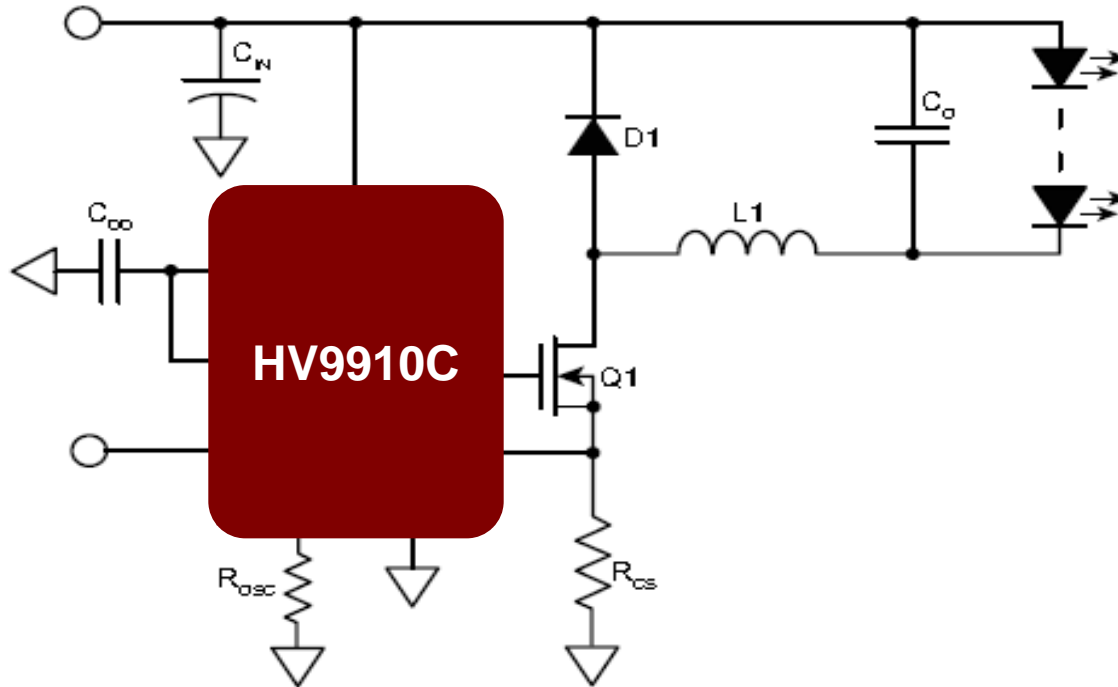


- **Up to 1000 Lumens at 100Lm/W**
- **Direct AC Operation at 120VAC / 230VAC**
- **Inherently Quiet — No EMI Filters Needed**
- **Inherent Dimmer Compatibility**

# CL8800

Popular Products	Description	Product Web Page
CL8800	<p>CL8800 and CL8801, sequential, linear LED drivers designed to drive long strings of low cost, low current LEDs in solid-state replacements for fluorescent tubes, incandescent bulbs and CFL bulbs. Both ICs minimize driver circuit component counts, requiring just four or six resistors and a diode bridge in addition to the IC. Two to four additional components in the circuit provide transient protection, and neither capacitors nor magnetic components are required. Because the ICs are multi-stage linear current regulators, there are no high frequency switching currents and, thus, no need for a front-end EMI filter. CL8800 is intended for 230VAC input, while CL8801 is for 120VAC input. Luminous efficiencies of greater than 115lm/W are achievable with both ICs.</p>	<a href="#">Click Here</a>

# Universal Offline Switching LED driver Solution



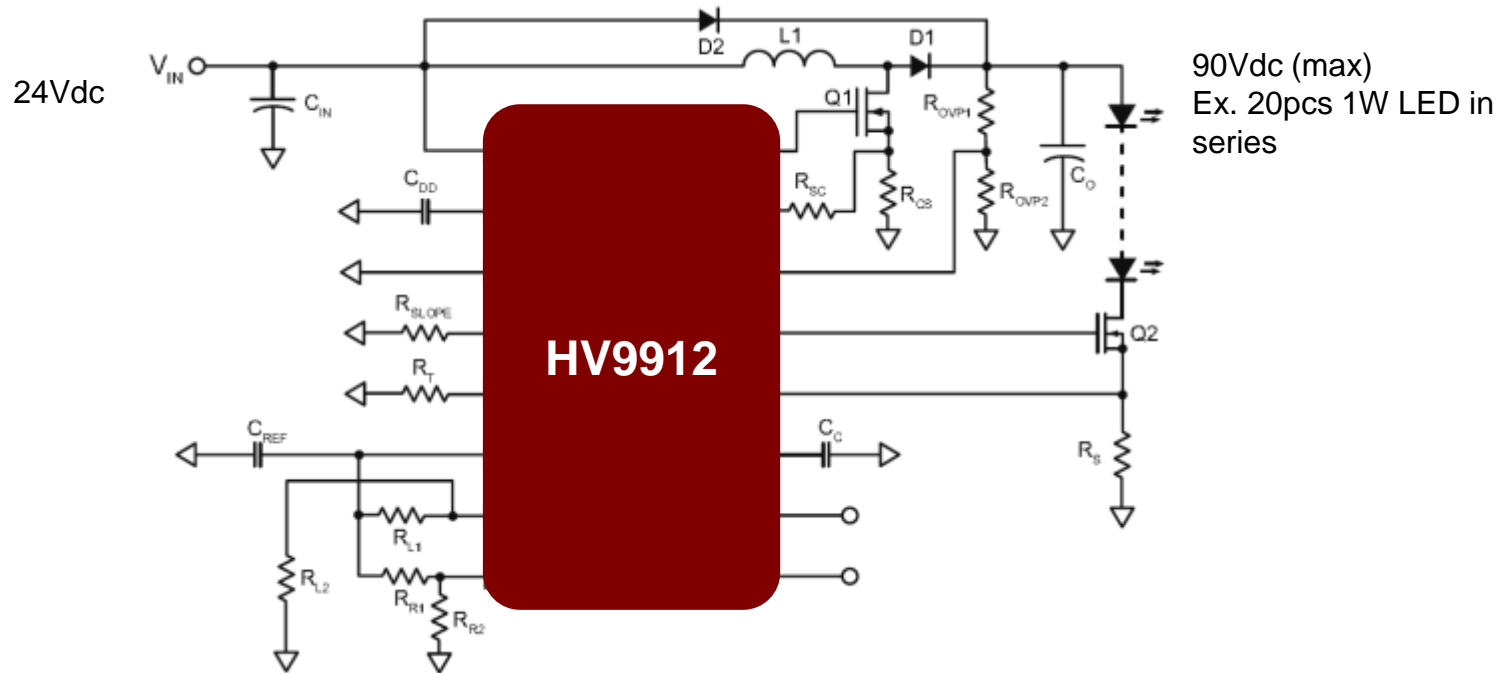
- **Universal Inputs – 110 to 240Vac**
- **High Power Factor – 0.94 or higher**
- **High Efficiency – 88% @ 110Vac & 85% @ 230Vac**
- **Example Application: 20W LED tube**



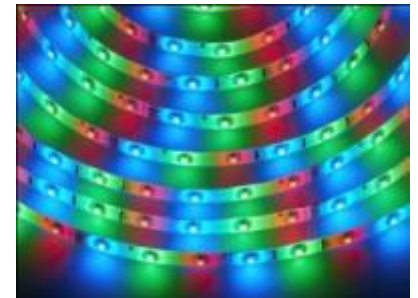
# HV9910C

Popular Products	Description	Product Web Page
HV9910C	<p>HV9910C is designed to convert high voltage supplies (85V – 265VAC rectified) or (15V – 450VDC) to a constant current source for powering a string or a combination of strings of high brightness LEDs. It can be programmed to operate in either a constant frequency or constant off-time mode and includes a 15 – 450V linear regulator which allows it to work from a wide range of input voltages without the need for an external low voltage supply. HV9910C requires only three external components (apart from the power stage) to produce a controlled LED current making it an ideal solution for low system cost. Furthermore, the low component count allows for higher reliability and minimum board space.</p>	<a href="#">Click Here</a>

# HV9912 Based LED Driver



- High Efficiency – greater than 90%
- High output current accuracy - Closed loop control
- High Boost – 10x from  $V_{in}$  of 9V to  $V_{out}$  of 90V
- Example Application: 20W LED Strip

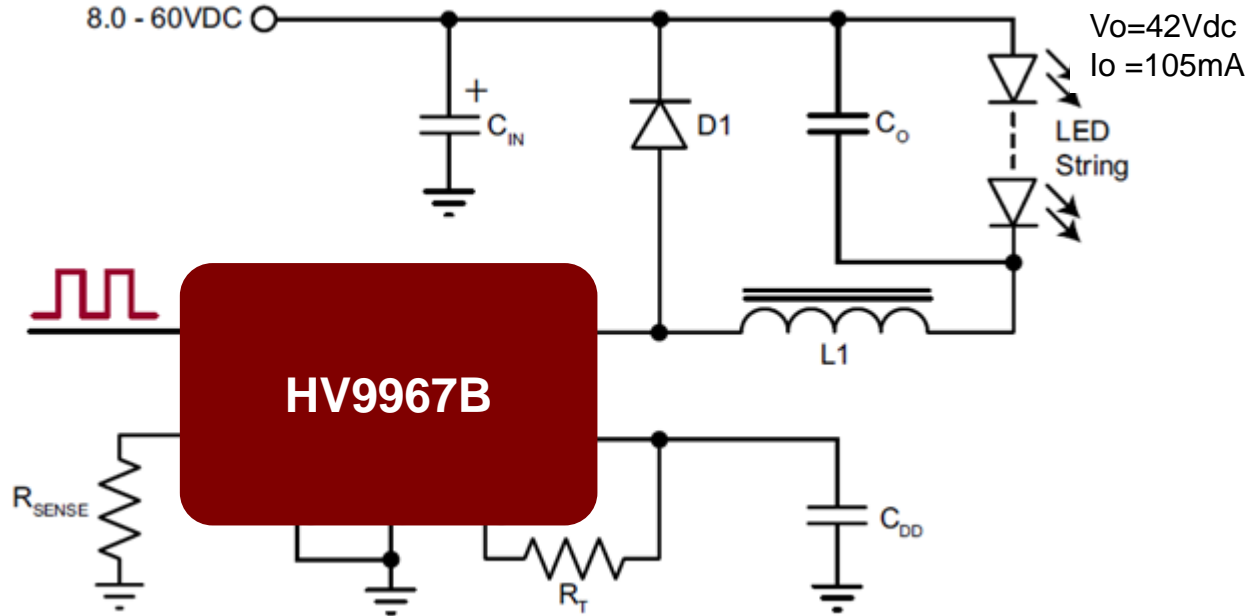


# HV9912

Popular Products	Description	Product Web Page
HV9912	<p>The HV9912 is a current mode control LED driver IC designed to control single switch PWM converters (buck, boost, buck-boost or SEPIC) in a constant frequency mode. The controller uses a peak current-mode control scheme with programmable slope compensation and includes an internal transconductance amplifier to control the output current in closed loop enabling high output current accuracy. In the constant frequency mode, multiple HV9912 ICs can be synchronized to each other or to an external clock using the SYNC pin. Programmable MOSFET current limit enables current limiting during input under voltage and output overload conditions. The IC also includes a 0.2A source and 0.4A sink gate driver that makes the HV9912 suitable for high power applications</p>	<a href="#">Click Here</a>



# HV9967B based Buck LED Driver



- High current accuracy – 3% LED Current control
- Space saving – integrated 60V MOSFET
- Output short circuit & over-temp protection
- Example Application: Cove Lights



# HV9967B

Popular Products	Description	Product Web Page
HV9967B	<p>The HV9967B is an average-mode current control LED driver IC operating in a constant off-time mode. The IC features an integrated 60V, 0.8<math>\Omega</math> MOSFET that can be used as a stand-alone buck converter switch, or connected as a source driver for driving an external high-voltage depletion-mode MOSFET. The HV9967B is powered through its switching output when the integrated switch is off. Hence, the same external MOSFET can be used as a high-voltage linear regulator for powering the IC. The LED current is programmed with one external resistor. The average-mode current control method does not produce a peak-to-average error, and therefore greatly improves current accuracy and line and load regulation of the LED current without any need for loop compensation or direct sensing of the LED current at a high-voltage potential. The auto-zero circuit cancels the effects of the input offset voltage and of the propagation delay of the current sense comparator.</p>	<a href="#">Click Here</a>



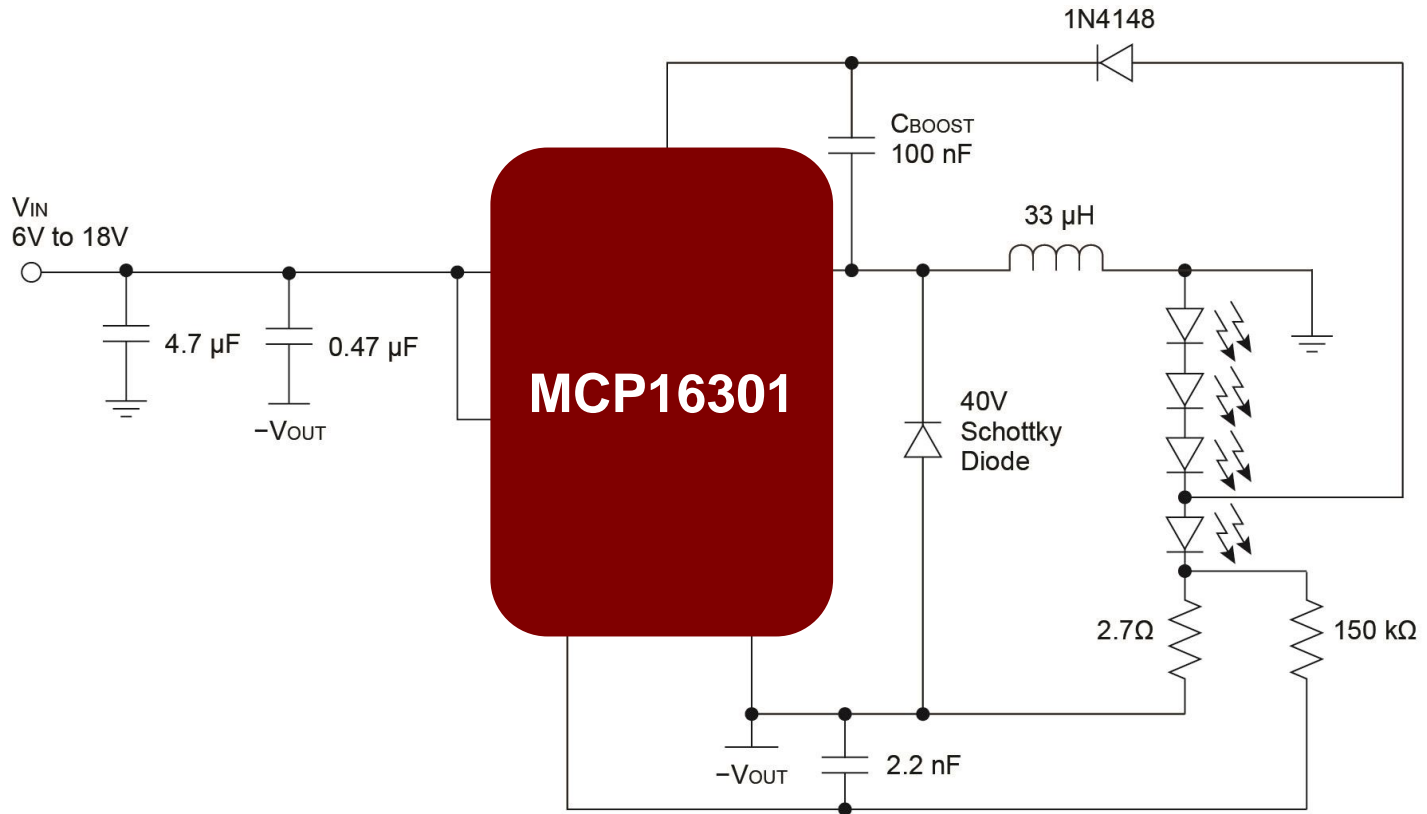
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**LED Driver System  
using Regulators**

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# MCP16301 Cuk LED Drive Circuit

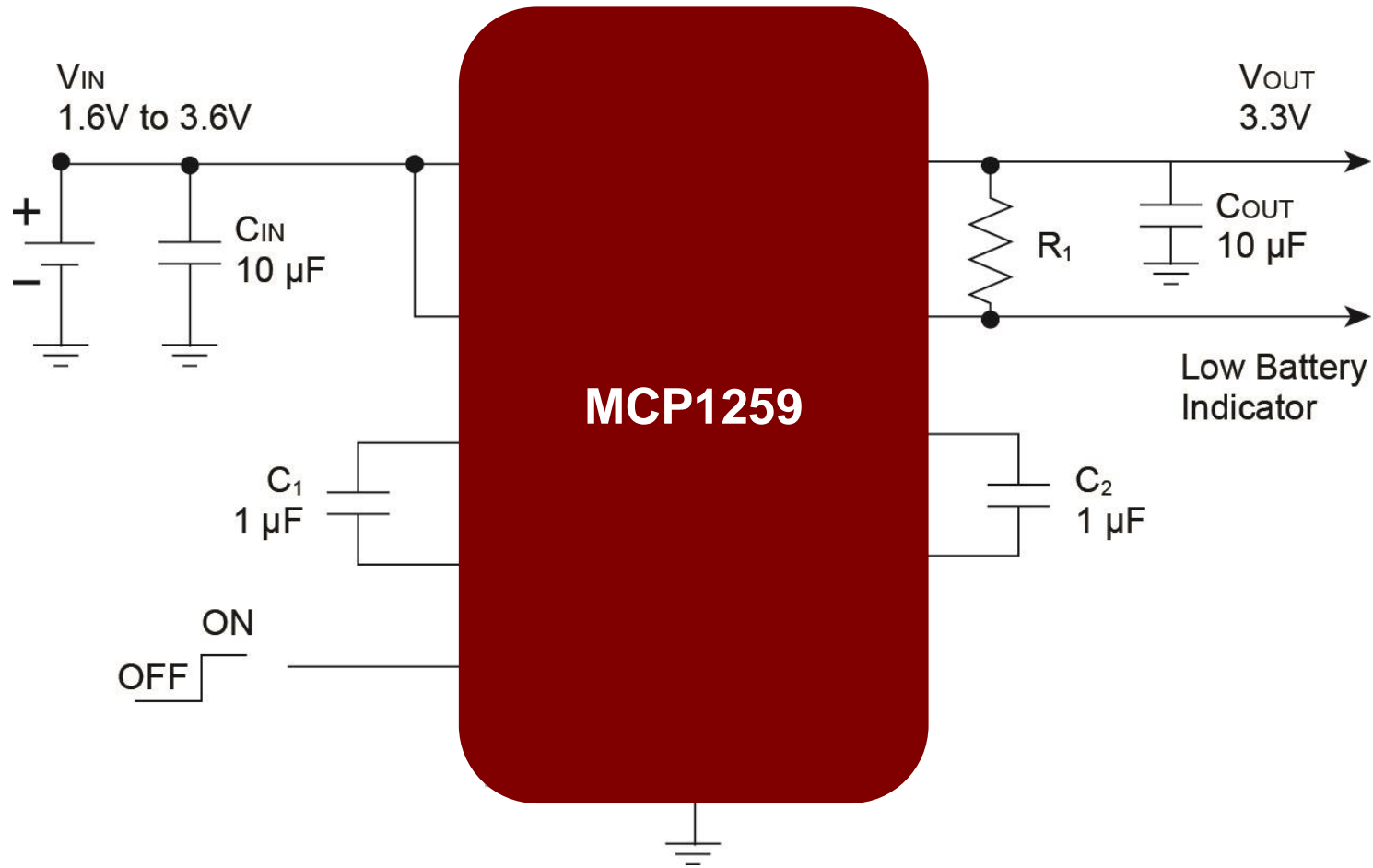


# MCP16301

Popular Products	Description	Product Web Page
MCP16301	<p>The MCP16301 is a high-input voltage step-down regulator, capable of supplying 600 mA to a regulated output voltage from 2.0V to 15V.</p> <ul style="list-style-type: none"><li>•Operation from 6V to 18V input voltage</li><li>•Capable of supplying 300 mA of current</li><li>•Drives up to 15V of LEDs in series</li><li>•Implemented with only 11 components</li><li>•Demo board available on Microchip direct</li></ul>	<a href="#">Click Here</a>



# MCP1259 Charge Pump LED Lighting Circuit

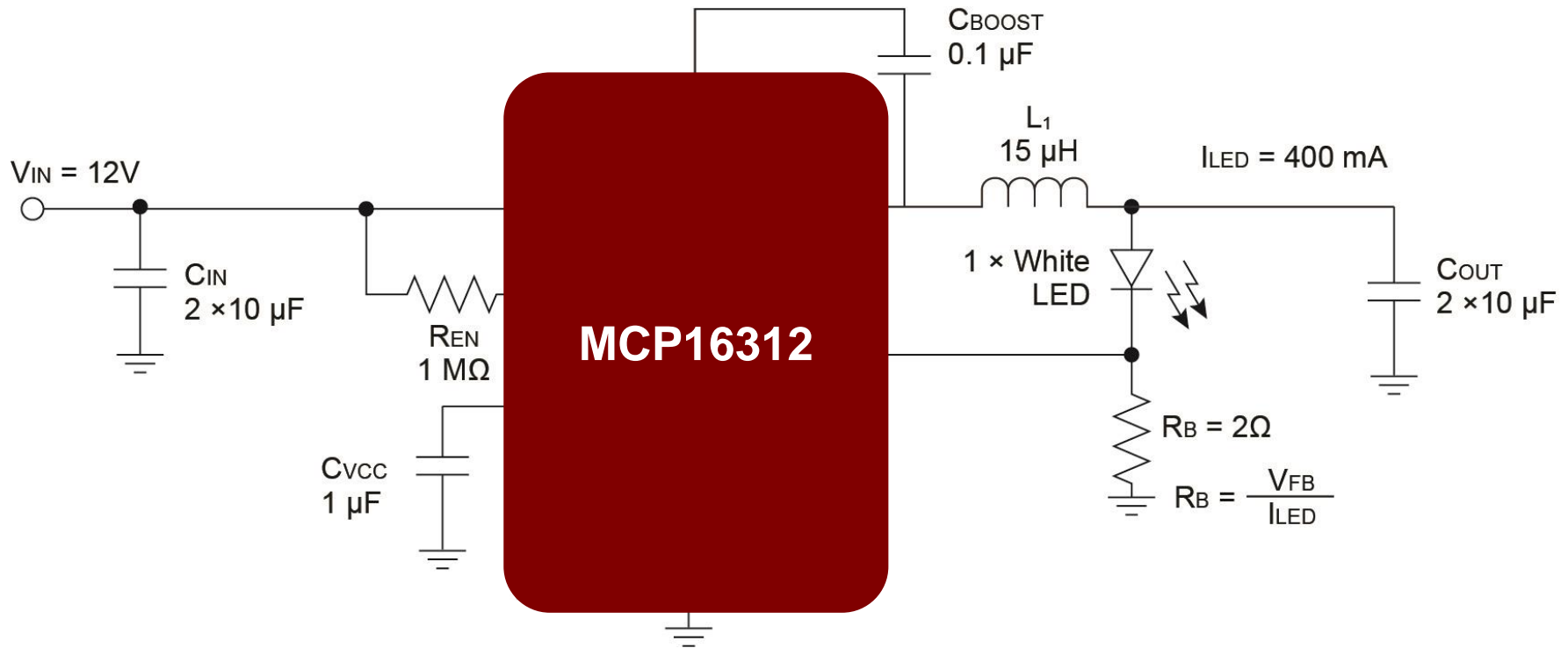




# MCP1259

Popular Products	Description	Product Web Page
MCP1259	<p>The MCP1256-9 family of inductorless, positive regulated charge pump DC/DC converters, generate a regulated 3.3 V output voltage from a 1.8 V to 3.6 V input. They are specifically designed for applications operating from 2 cell alkaline, 2 cell Ni-Cd, 2 cell Ni-MH, or one primary lithium coin cell battery. These devices automatically switch from 1.5x to 2x boost operation modes to maintain high efficiency. In addition, at light output loads, the MCP1256 and MCP1257 can be placed in a sleep mode, lowering the quiescent current while maintaining the regulated output voltage.</p>	<a href="#">Click Here</a>

# MCP16312 Buck Converter LED Drive Application

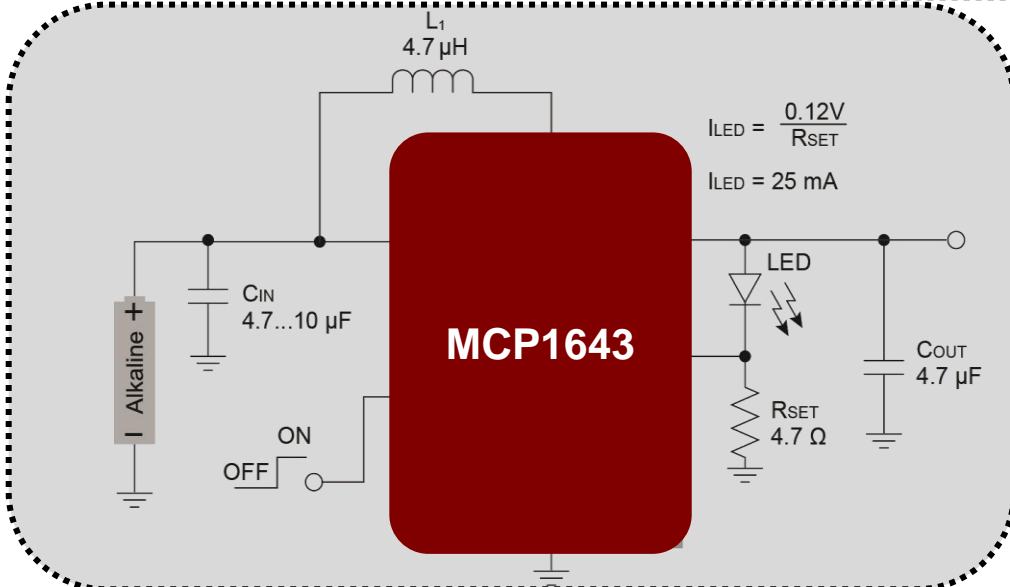
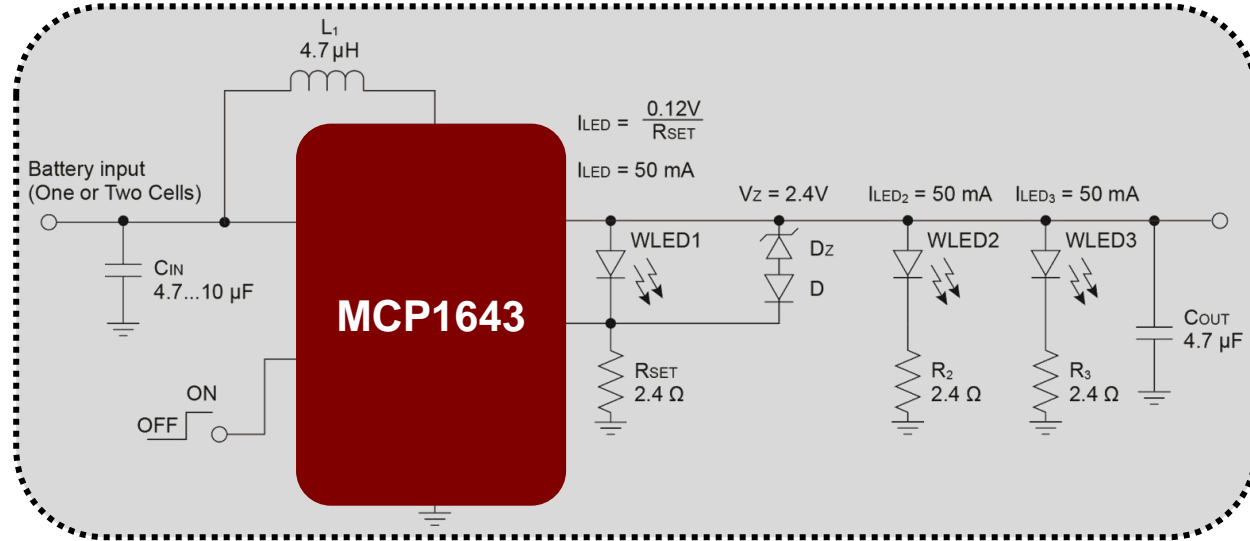




Popular Products	Description	Product Web Page
MCP16312	<ul style="list-style-type: none"> <li>□ Up to 95% Efficiency</li> <li>□ Input Voltage Range: 4.4V to 30V</li> <li>□ 1A Output Current Capability</li> <li>□ Output Voltage Range: 2.0V to 24V</li> <li>□ Integrated N-Channel Low and High-Side Switches</li> <li>□ Low Device Shutdown Current: 3 <math>\mu</math>A typical</li> <li>□ Low Device Quiescent Current: 44 <math>\mu</math>A</li> <li>□ Internal Compensation</li> <li>□ Internal Soft-Start: 300 <math>\mu</math>s (EN low to high)</li> <li>□ Peak Current Mode Control</li> <li>□ Cycle-by-Cycle Peak Current Limit</li> <li>□ Undervoltage Lockout (UVLO)</li> <li>□ Overtemperature Protection</li> <li>□ MSOP-8 or 2x3 TDFN-8 package</li> </ul>	<p style="text-align: center;"><a href="#">Click Here</a></p>



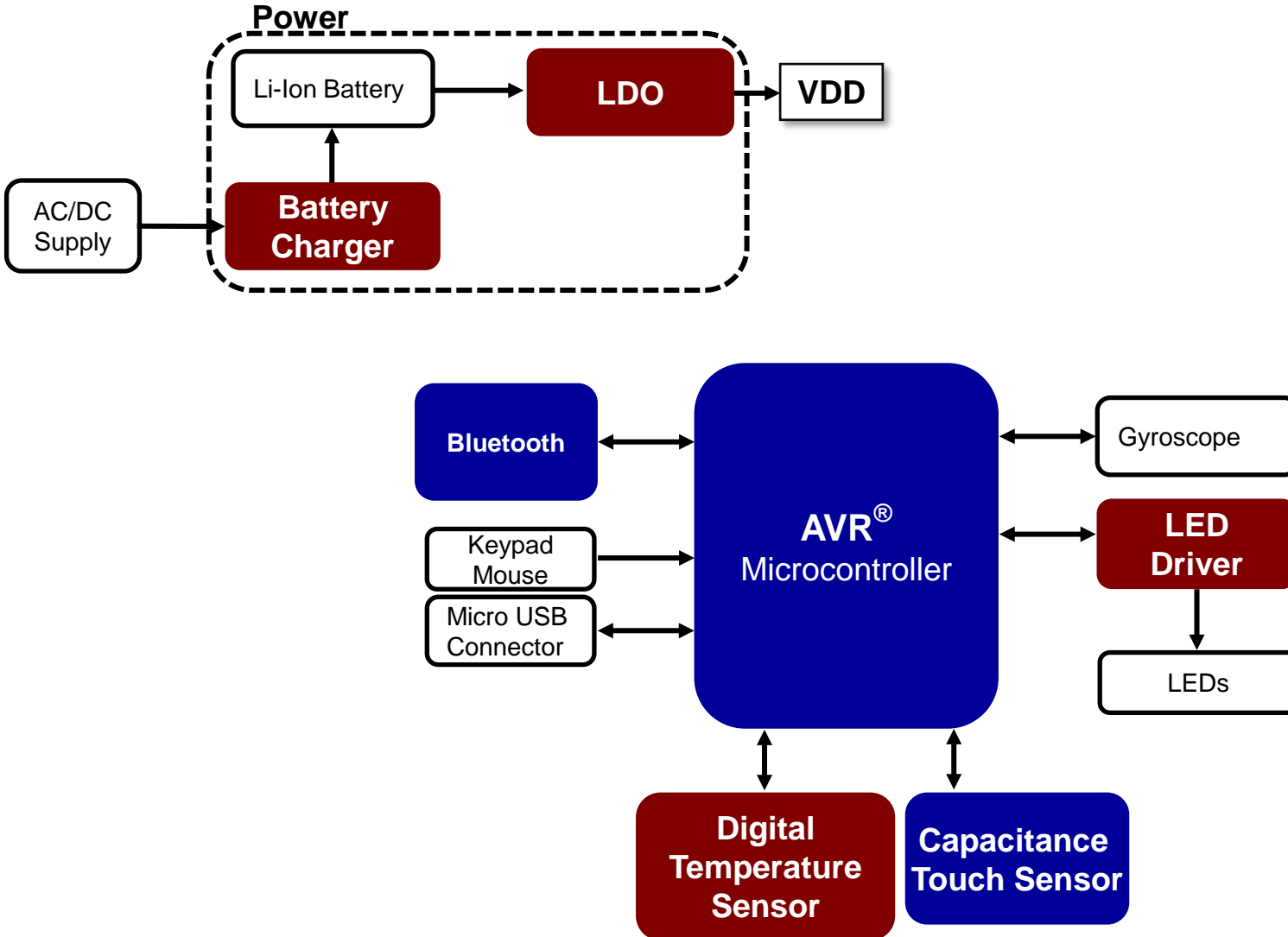
# MCP1643 Boost Converter LED Drive Solutions



# MCP1643

Popular Products	Description	Product Web Page
MCP1643	<p>MCP1643 is a compact, high-efficiency, fixed frequency, synchronous step-up LED driver, that operates from one and two-cell alkaline and NiMH/NiCd batteries and can also drive two red/green/yellow series connection LEDs.</p> <ul style="list-style-type: none"> <li>□ Constant current drive capability with a low component count, area-efficient circuit</li> <li>□ 1 MHz PWM synchronous boost operation with up to 550 mA output current</li> <li>□ Low-voltage reference input to maximize LED efficiency conversion (VFB = 120 mV)</li> <li>□ Capable of start up with only 0.65V input, and continuous operation with an input above 0.5V</li> <li>□ Low 1.2 <math>\mu</math>A shutdown current</li> <li>□ Over-voltage protection halts device operation (floating output) if the LED fails or is disconnected</li> <li>□ Up to 90% efficiency</li> <li>□ 240 <math>\mu</math>s soft start time</li> <li>□ Available in tiny footprint 8-lead 2x3 DFN or 8-pin MSOP packages</li> </ul>	<p><a href="#">Click Here</a></p>

# Multifunction Compact Keyboard (using AVR MCU)



## □ Function: System control and decision making

Popular Products	Description	Product Web Page
ATmega32L	The high-performance, low-power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1KB EEPROM, 2KB SRAM, 54/69 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for boundary-scan and on-chip debugging/programming, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a universal serial interface (USI) with start condition detector, an 8-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, SPI serial port, and five software selectable power saving modes. The device operates between 2.7-5.5V.	<a href="#">Click Here</a>

# Battery Chargers

- **Function: Charge & monitor Lithium battery**

Popular Products	Description	Product Web Page
MCP731xx	The MCP73811/2 devices are linear charge management controllers that are designed to provide specific charge algorithms for single cell Li-Ion or Li-Polymer battery to achieve optimal capacity in the shortest charging time possible.	<a href="#">Click Here</a>

- **Function: Provides regulated, low-noise supply voltages for the system**

Popular Products	Description	Product Web Page
MIC5353	The MIC5353 is a 500 mA, ceramic output cap stable, low output voltage, Low Dropout Regulator. The MIC5353 is packaged in very small 1.6x1.6mm DFN package. This part has high PSRR of 60dB with low output noise of 30 uVrms for noise sensitive applications	<a href="#">Click Here</a>
MCP1703A	With 250 mA maximum output, MCP1703 works with input voltage of up to 16V and in combination with its low current consumption of 2 $\mu$ A	<a href="#">Click Here</a>

# Digital Temperature Sensor

- **Function: Temperature measurement with digital output**

Popular Products	Description	Product Web Page
MCP9808	The MCP9808 converts temperatures between -20°C and +100°C to a digital word with $\pm 0.5^{\circ}\text{C}$ (max.) accuracy	<a href="#">Click Here</a>



## □ Function: Drive LEDs for backlighting

Popular Products	Description	Product Web Page
MIC3263	The MIC3263 is a high-efficiency pulse-width modulation (PWM) boost switching regulator that is optimized for constant-current WLED driver backlighting applications. The MIC3263 drives six channels of up to ten WLEDs per channel. Each channel is matched in current to within $\pm 3\%$ for constant brightness across the screen and can be programmed from 15mA to 30mA. The MIC3263 provides a very flexible dimming control scheme with better accuracy and noise immunity.	<a href="#">Click Here</a>

## □ Function: Adds touch input functionality

Popular Products	Description	Product Web Page
maxTouch® Touchscreen Controllers	The maXTouch touch controller family provides a leading projected capacitive technology for touchscreens and touch pads. It supports single-finger, multi-fingers and gloved-finger operation. Regardless of the operating environment—hot or cold, dry or wet, noisy power supply or strong radiating surrounding devices—maXTouch controllers are designed for robust and reliable operation without compromising touch performance.	<a href="#">Click Here</a>

## □ Function: Low power wireless connectivity

Popular Products	Description	Product Web Page
ATSAMB11	The ATSAMB11 is an ultra-low power Bluetooth® SMART (BLE 4.1) System on a Chip with Integrated MCU, Transceiver, Modem, MAC, PA, TR Switch, and Power Management Unit (PMU). It is a standalone ARM® Cortex®-M0 applications processor with embedded Flash memory and BLE connectivity.	<a href="#">Click Here</a>



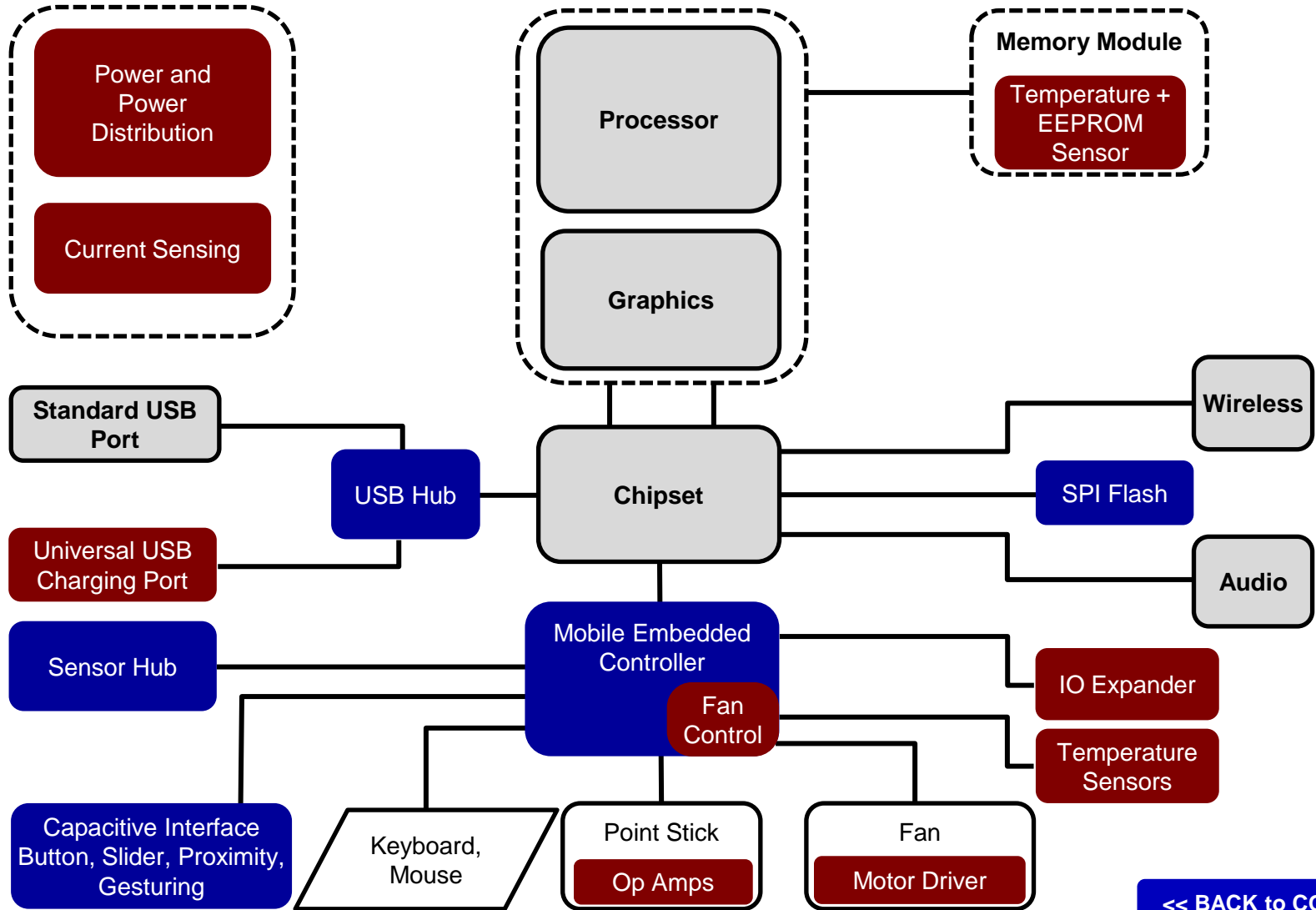
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**Notebook Computing  
Main board**

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# Notebook Computing Main board



# Temperature Sensor

Function	Popular Products	Description	Product Web Page
Temperature Sensor	EMC141x	1°C Multi-Remote Temperature Sensors with Automatic Beta Compensation (3.3V SMBus) These sensors can monitor temperature up to 8 inches (24cm) away from the IC	<a href="#">Click Here</a>
Temperature Sensor	EMC118x	1°C Multi-Remote Temperature Sensors with Automatic Beta Compensation (1.8V SMBus) These sensors can monitor temperature up to 8 inches (24cm) away from the IC	<a href="#">Click Here</a>

# Fan Control

While some systems control fans from the embedded controller, other systems use stand-alone fan controller such as these.

Function	Popular Products	Description	Product Web Page
Fan Controller	EMC2103-1	The EMC2103-1 is a complete system thermal management system. It contains a single closed loop PWM fan driver with tachometer input, 2 temperature monitors, a shutdown and alert output, and an 8 entry fan speed look up table.	<a href="#">Click Here</a>
Fan Controller	EMC2113	The EMC2113 is a complete system thermal management system. It contains a single closed loop PWM fan driver with tachometer input, 4 temperature monitors, a shutdown and alert output, and an 8 entry fan speed look up table.	<a href="#">Click Here</a>



# Temperature Sensor with EEPROM for SPD

JEDEC DIMM module specifications have defined temperature sensors with EEPROM. The devices below can be used for this purpose or for data logging

Function	Popular Products	Description	Product Web Page
Temperature Sensor with EEPROM	MCP98243	The MCP98243 meets JEDEC's JC42.4-TSE2002B3 with 2K bit serial EEPROM. Along with a wide operating voltage range of 1.8V - 5.5V, this device meets class B accuracy with $\pm 0.2^{\circ}\text{C}/\pm 1^{\circ}\text{C}$ (typ./max.) from $+75^{\circ}\text{C}$ to $+95^{\circ}\text{C}$	<a href="#">Click Here</a>
Temperature Sensor with EEPROM	MCP98244	The MCP98244 meets JC42.4-TSE2004B1 with 4K bit serial EEPROM. Along with a wide operating voltage range of 1.8V - 5.5V, this device meets class B accuracy with $\pm 0.2^{\circ}\text{C}/\pm 1^{\circ}\text{C}$ (typ./max.) from $+75^{\circ}\text{C}$ to $+95^{\circ}\text{C}$	<a href="#">Click Here</a>





# Universal USB Charging Port

USB charging is becoming more complicated as it becomes more ubiquitous. The device below can be uniquely configured for a discovery phase for new products, measure current, and be implemented in a system to allow for charging profile updates

Function	Popular Products	Description	Product Web Page
USB Port Power Controller	UCS1003	This USB port power controller turns USB ports into universal charging ports. The UCS1003 uniquely combines a power switch and high speed switch with programmability and current measurement. Using the 9 built-in charging profiles and 1 programmable profile, a system designer can create an updateable USB charging port for new products yet to come. The current measurement function can be used to search for the highest charging current on unknown devices.	<a href="#">Click Here</a>

# Op Amps

Point sticks on notebooks send analog signals through multiple Op Amps for signal conditioning before the signal reaches a controller. The devices below have been used for this function

Function	Popular Products	Description	Product Web Page
Op Amp for point stick or joy stick	MCP6L4T-E/ST	The MCP6L4 quad operational amplifier (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 200 $\mu$ A. This device has a low input offset voltage of 3 mV.	<a href="#">Click Here</a>
Op Amp for point stick or joy stick	MCP6L2T-E/MS	The MCP6L2 dual operational amplifier (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 200 $\mu$ A. This device has a low input offset voltage of 3 mV.	<a href="#">Click Here</a>



# IO Expanders

IO Expanders are often used to insert additional functionality laptops that have an additional function version of a base model

Function	Popular Products	Description	Product Web Page
IO Expander	MCP23017-E/ML	This is a 16-bit I/O port consisting of two 8-bit ports. The system master can enable the I/Os as either inputs or outputs over the I <sup>2</sup> C. The data for each input or output is kept in the corresponding input or output register. All data is readable over the I <sup>2</sup> C with 2 configurable interrupts to limit the need for polling registers.	<a href="#">Click Here</a>
IO Expander	ECE1088 ECE1099 ECE1105	ECE1088 has 20 GPIOs ECE1099 has 32 GPIOs and 23:8 keyscan ECE1105 has 40 GPIOs, 23:8 keyscan, & 2 PS/2	<a href="#">Click Here</a>

# Current Sensing

Current is normally measured using one of two types of devices. First is via an inexpensive op amp with a feedback loop configured for the sense resistor and range possible currents. Second is with a high-side current sensor. Microchip offers this second type of device with an SMBus/I2C interface.

Function	Popular Products	Description	Product Web Page
Op Amps for Current Sensing	MCP6021/3 MCP6291/3	Theses op amps have a gain bandwidth of 10 MHz with a low typical operating current of 1mA and an offset voltage that is less than 150 $\mu$ V	<a href="#">MCP602x</a> <a href="#">MCP629x</a>
High Side Current Sensing	EMC170x PAC1710 PAC1720 PAC1921	Exceptionally well-qualified for the task of measuring dynamic power Longer Sampling Intervals than the industry norm Sensors excel at collecting and reporting all available data Sensors also include alert outputs to safe guard systems from out of limit and transient events	<a href="#">Parametric Table</a>

# Motor Driver

Function	Popular Products	Description	Product Web Page
Motor Driver	MTD6505	<p>The MTD6505 is a 3-phase full-wave sensorless driver for brushless DC (BLDC) motors. It features 180° sinusoidal drive, high torque output and silent drive. With the adaptive features, parameters and wide range of power-supplies (2V to 5.5V), the MTD6505 is intended to cover a broad range of motor characteristics, while requiring minimum external components. Speed control can be achieved through either power supply modulation (PSM) or pulse-width modulation (PWM). The frequency generator (FG) output enables precision speed control in closed-loop applications. The MTD6505 device includes Lockup Protection mode to turn off the output current when the motor is in a lock condition, with an automatic recovery feature.</p>	<a href="#">Click Here</a>



# Mobile Embedded Controllers

Function	Popular Products	Description	Product Web Page
Mobile Embedded Controller	MEC1308	8-bit embedded controller with 64k bytes SRAM, 2 SMBus, 4 PWMs, 2 tachs, 1 serial, ADC, 55 GPIOs, RC-6, 1SMSC BC-Link, 4 PS/2, SPI Flash Memory interface	<a href="#">Click Here</a>
Mobile Embedded Controller	MEC1312	8-bit embedded controller with 96k bytes SRAM, 3 SMBus, PECL, 4 PWMs, 2 tachs, 1 serial, ADC, 63 GPIOs, 1SMS CBC-Link, 4 PS/2, SPI Flash Memory interface	<a href="#">Click Here</a>
Mobile Embedded Controller	MEC1620	32-bit embedded controller with 192k bytes of embedded flash, 1k bytes EEPROM, 16k bytes SRAM, 16 ADC, connected standby, 3 SMBus, 2 SPI, 16 PWM, 6 tachs, 1 serial, HDMI-CEC, 153 GPIOs	<a href="#">Click Here</a>

# Sensor Hub

Function	Popular Products	Description	Product Web Page
Sensor Hub	SSC7102	<p>The SSC7102 sensor fusion hub is a Windows 8.1 certified, HID over I<sup>2</sup>C, low-power, flexible, turnkey solution. SSC7102 makes implementing sensor fusion easy for ultrabooks, tablets, and smartphones. Microchip partnered with multiple industry-leading sensor manufacturers and sensor-fusion specialists to create this solution, enabling faster time to market without the need for sensor-fusion expertise. The SSC7102 consumes only ~4mA while running complex sensor-fusion algorithms, resulting in longer battery life for Windows 8.1 tablet, laptop, ultrabook, and smart phone applications.</p>	<a href="#">Click Here</a>



# USB 2.0 and 3.0 Hubs

Function	Popular Products	Description	Product Web Page
USB 3.0 Hub	USB553xB	These are 2/3/4/7-port hub controllers are SuperSpeed /Hi-Speed, configurable and compliant with USB 3.0. USB 3.0 traffic can also operate in parallel with a USB 2.0 traffic without being not affected by slower data.	<a href="#">Click Here</a>
USB 2.0 Hub	USB251xB	These 2/3/4 port USB 2.0 hub controllers excel at data throughput in mixed-speed USB environments. Programmable features include PortMap, PortSwap, and PHYBoost to simplify PCB layout & optimize BOM cost.	<a href="#">Click Here</a>
USB 2.0 Hub	USB2534	This 4 port hub is compliant with the USB 2.0 and Link Power Management. It provides an additional USB endpoint for use as a USB to I2C interface, allowing external devices to be monitored, controlled, or configured via USB.	<a href="#">Click Here</a>
USB2.0 or HSIC	USB4604	This is an OEM configurable USB 2.0 hub controller with 4 downstream ports. It is compliant with the USB 2.0, USB 2.0 Link Power Management & High-Speed Inter-Chip	<a href="#">Click Here</a>





# Capacitive Sensing and Gesturing

Function	Popular Products	Description	Product Web Page
Proximity, Buttons, and Sliders	Various	Microchip offers both turnkey products for a no code development plug-and-play solution, as well as a proven robust firmware solution that leverage our vast PIC microcontroller portfolio. Our broad range of solutions include high sensitivity proximity detection, keys, sliders, Metal-over-Capacitive (MoC) touch sensing and more	<a href="#">Click Here</a>
Gesturing	Various	Microchip's patented GestIC technology unleashes the 3rd dimension for the realization of revolutionary new User Interfaces. Our E-field sensing technology detects the proximity of a human hand and gives accurate X-Y-Z coordinates and recognized 3D gestures.	<a href="#">Click Here</a>

# SPI Flash

Function	Popular Products	Description	Product Web Page
SPI Flash	Various	<p>Microchip's Serial Quad Interface (SQI™) and SPI flash memories are manufactured with our proprietary, high performance CMOS SuperFlash® Technology, significantly improving performance (erase any block in less than 25ms) and reliability (100 years data retention) while lowering power consumption.</p> <ul style="list-style-type: none"><li>• 512Kb-64Mb in 3V and multiple densities in 1.8V</li><li>• SQI™ flash – Up to 104MHz and includes advanced security features</li></ul>	<a href="#">Click Here</a>



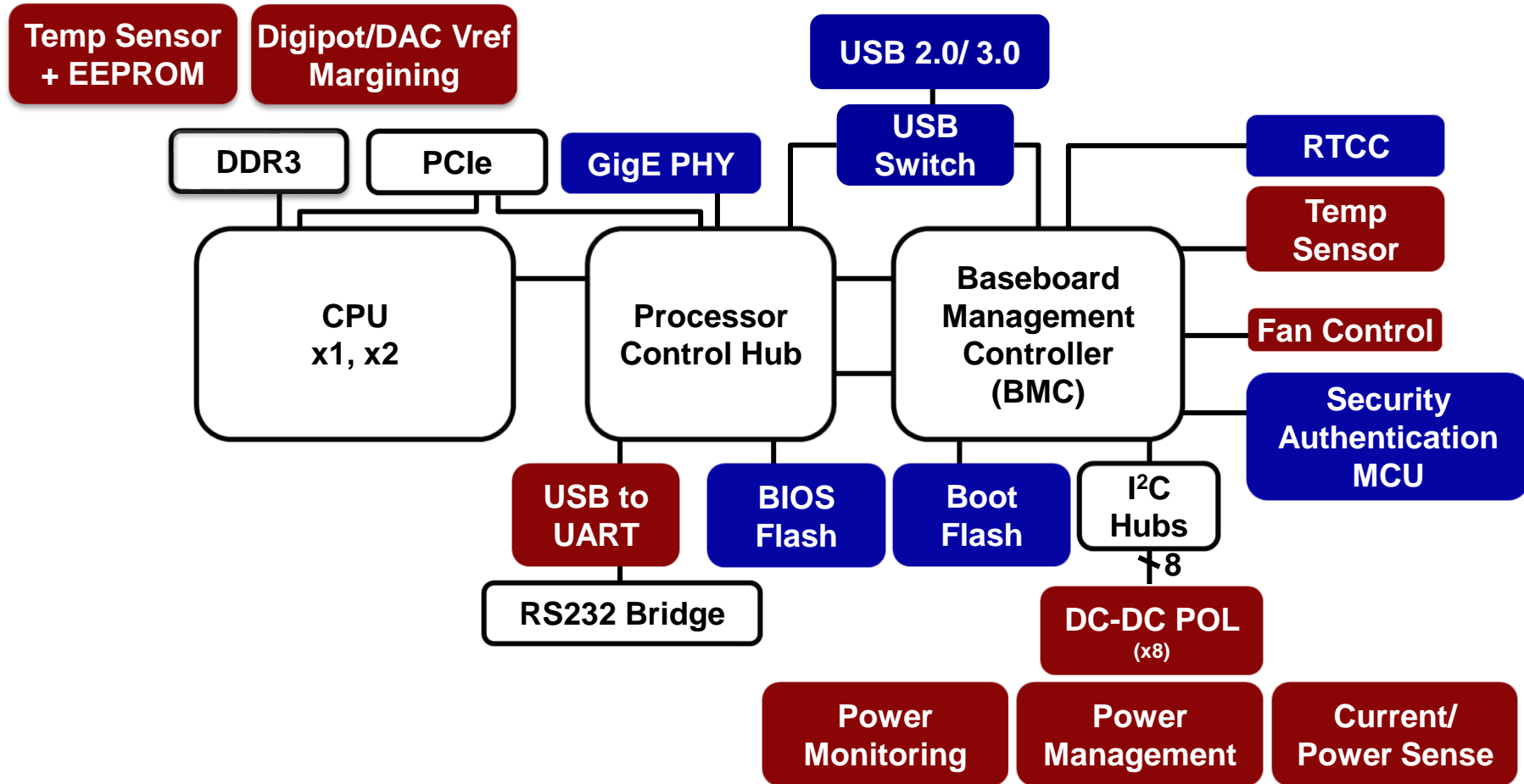
**MICROCHIP**

**Servers  
Main board**

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# Servers



# Temperature Sensor

Popular Products	Description	Product Web Page
EMC141x	<p>1°C Multi-Remote Temperature Sensors with Automatic Beta Compensation (3.3V SMBus)</p> <p>These sensors can monitor temperature up to 8 inches (24cm) away from the IC</p>	<a href="#">Click Here</a>
EMC1428	<p>The EMC1428 is a high accuracy, low cost, System Management Bus (SMBus) temperature sensor. Each device provides <math>\pm 1^\circ</math> accuracy for external diode temperatures and <math>\pm 2^\circ\text{C}</math> accuracy for the internal diode temperature. The EMC1428 monitors up to eight temperature channels (up to seven external and one internal).</p>	<a href="#">Click Here</a>

# Fan Control

While some systems control fans from the embedded controller, other systems use stand-alone fan controller such as these.

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
EMC230x	<p>The EMC230x is an SMBus compliant fan controller with up to five independently controlled PWM fan drivers. Each fan driver is controlled by a programmable frequency PWM driver and Fan Speed Control algorithm that operates in either a closed loop fashion or as a directly PWM-controlled device. The closed loop Fan Speed Control algorithm (FSC) has the capability to detect aging fans and alert the system. It will likewise detect stalled or locked fans and trigger an interrupt. Additionally, the EMC230x offers a clock output so that multiple devices may be chained and slaved to the same clock source for optimal performance in large distributed systems.</p>	<a href="#">Click Here</a>

# Current Sensor

Popular Products	Description	Product Web Page
PAC1710	The PAC1710 is a high-side bi-directional current sensing monitor with precision voltage measurement capabilities. The power monitor measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator.	<a href="#">Click Here</a>
PAC1720	The PAC1720 is a dual high-side bi-directional current sensing monitor with precision voltage measurement capabilities. Each sensor measures the voltage developed across an external sense resistor to represent the high-side current of a battery or voltage regulator.	<a href="#">Click Here</a>
PAC1921	The PAC1921 is a dedicated power-monitoring device with a configurable analog output that can present power, current or voltage. The PAC1921 is designed for power measurement and diagnostic systems that cannot allow for latency when performing high-speed power management.	<a href="#">Click Here</a>



# Temperature Sensor with EEPROM

JEDEC DIMM module specifications have defined temperature sensors with EEPROM. The devices below can be used for this purpose or for data logging

Function	Popular Products	Description	Product Web Page
Temperature Sensor with EEPROM	MCP98243	The MCP98243 meets JEDEC's JC42.4-TSE2002B3 with 2K bit serial EEPROM. Along with a wide operating voltage range of 1.8V - 5.5V, this device meets class B accuracy with $\pm 0.2^{\circ}\text{C}/\pm 1^{\circ}\text{C}$ (typ./max.) from $+75^{\circ}\text{C}$ to $+95^{\circ}\text{C}$	<a href="#">Click Here</a>
Temperature Sensor with EEPROM	MCP98244	The MCP98244 meets JC42.4-TSE2004B1 with 4K bit serial EEPROM. Along with a wide operating voltage range of 1.8V - 5.5V, this device meets class B accuracy with $\pm 0.2^{\circ}\text{C}/\pm 1^{\circ}\text{C}$ (typ./max.) from $+75^{\circ}\text{C}$ to $+95^{\circ}\text{C}$	<a href="#">Click Here</a>





# Digital Potentiometers/ DAC

Function	Popular Products	Description	Product Web Page
DAC	MCP47DA1	The MCP47DA1 devices are volatile, 6-Bit digital Digital-to-Analog converter(DAC)with a windowed output for server voltage margining applications. The MCP47DA1 has a windowed output (1/3 to 2/3 of VREF). The DAC setting is controlled through an I2C™Compatible serial interface. The I2C™Compatible slave addresses of “010 1110” and “011 1110” are supported.	<a href="#">Click Here</a>
Digital Potentiometer	MCP40D18	The MCP40D17/8/9 devices offer a wide range of product offerings using an I2C™Compatible interface. This family of devices support a 7-bit resistor network, volatile memory configuration, and potentiometer and rheostat pinouts. This device family is offered in miniature 5 and 6 lead SC-70 packaging.	<a href="#">Click Here</a>

# USB to UART

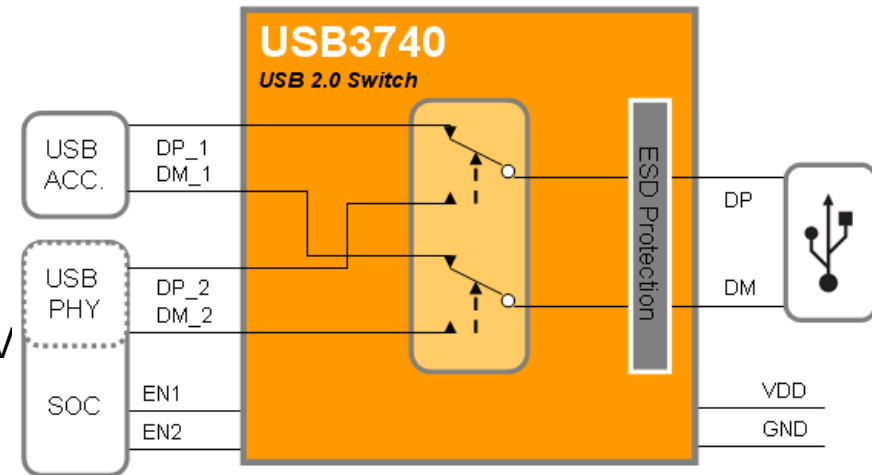
<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP2200	<p>The MCP2200 is a USB-to-UART serial converter which enables USB connectivity in application that have a UART interface. The device reduces external components by integrating the USB termination resistors. The MCP2200 also has 256-bytes of integrated user EEPROM. The MCP2200 has eight general purpose input / output pins. Four of the pins have alternate functions to indicate USB and communication status.</p>	<a href="#">Click Here</a>

# USB Hubs

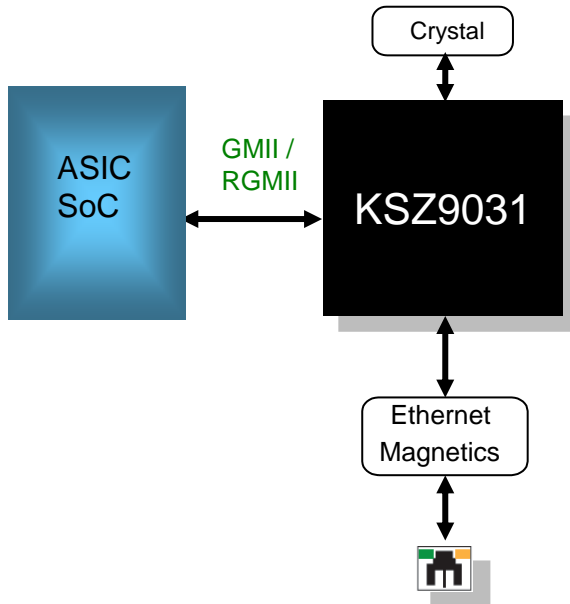
Function	Popular Products	Description	Product Web Page
USB 3.0 Hub	USB553xB	These are 2/3/4/7-port hub controllers are SuperSpeed /Hi-Speed, configurable and compliant with USB 3.0. USB 3.0 traffic can also operate in parallel with a USB 2.0 traffic without being not affected by slower data.	<a href="#">Click Here</a>
USB 2.0 Hub	USB251xB	These 2/3/4 port USB 2.0 hub controllers excel at data throughput in mixed-speed USB environments. Programmable features include PortMap, PortSwap, and PHYBoost to simplify PCB layout & optimize BOM cost.	<a href="#">Click Here</a>
USB 2.0 Hub	USB2534	This 4 port hub is compliant with the USB 2.0 and Link Power Management. It provides an additional USB endpoint for use as a USB to I2C interface, allowing external devices to be monitored, controlled, or configured via USB.	<a href="#">Click Here</a>
USB2.0 or HSIC	USB4604	This is an OEM configurable USB 2.0 hub controller with 4 downstream ports. It is compliant with the USB 2.0, USB 2.0 Link Power Management & High-Speed Inter-Chip	<a href="#">Click Here</a>

## Features:

- High-bandwidth USB 2.0 Switch with Dual Enables
  - For high-speed USB 2.0 data
- Multiplex differential outputs from a USB host device to one of two corresponding outputs
  - Enable DP/DM multiplexing
  - Flexible solution for embedded applications
- Ultra-low Current Consumption
  - Active (switch ON) = 5  $\mu$ A ( $V_{cc} = 3V$ )
  - Standby (switch OFF) = 0.01  $\mu$ A ( $V_{cc} = 3V$ )
- Competitive USB 2.0 Switch Specifications
  - Designed to pass USB signals from 0 to 3.3V
  - USB Mux on resistance < 6 ohms
  - USB Mux off leakage < 0.5  $\mu$ A
  - Off isolation < -40 dB
  - On capacitance < 6 pF
  - High bandwidth: 1 GHz
- Extreme ESD Protection  $\pm 15$  kV (IEC)
- Package:
  - 10-lead 1.3 mm x 1.8 mm QFN with 0.4 mm pitch
  - 10-lead 1.6 mm x 2.1 mm QFN with 0.5 mm pitch



# Gigabit Ethernet



## KSZ9031 Features

- Small Footprint, Low Power
- Auto-MDIX support with IEEE 802.3 specs at 10/100/1000 Mbps operation
- Supports CAT-5 unshielded twisted pair (UTP)
- On-chip termination resistors
- Flexible configurations for LED status indicators
- Features Energy Efficient Ethernet (802.3az)
- Wake on LAN support (WOL)
- Link status change and wake-up detection
- Lead free ROHS compliant packages:
  - KSZ9031RNX: 48QFN 7x7mm (RGMII)
  - KSZ9031MNX: 64QFN 8x8mm (GMII)
- Temperature Range:
  - Commercial 0°C to +70°C
  - Industrial -40°C to +85°C
  - Automotive -40°C to +105°C



# PIC24F128GB204 Product Family with Security

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## □ What's new:

- AES / DES HW encryption
- OTP key storage
- Random Number Generator
- UART with ISO7816

## □ Highlights

- 64 to 128KB Flash
- 8KB RAM
- 28 to 44 pins
- XLP low power with Vbat

## □ Peripherals

- USB OTG
- 4 UARTs w/ ISO7816
- 3 SPI w/ I<sup>2</sup>S, 2 I<sup>2</sup>C™
- 12-bit ADC, 12ch
- CTMU
- 5 16-bit Timer
- 6 IC, 6 OC

Popular Products	Description	Product Web Page
MCP79410	<p>The MCP79410 general purpose I2C™ Compatible real-time clock/calendar (RTCC) is highly integrated with nonvolatile memory and advanced features normally found in higher priced devices. These features include a battery switchover circuit for backup power, a timestamp to log power failures and digital trimming for accuracy. In addition, non-volatile memory is included along with a Unique ID in a locked section of EEPROM that can be unlocked and programmed by the End User.</p>	<a href="#">Click Here</a>



# BIOS and BOOT Flash

Popular Products	Description	Product Web Page
SST26VF032B	<p>The SST26VF032B/032BA Serial Quad I/O (SQI) flash device utilizes a 4-bit multiplexed I/O serial interface to boost performance while maintaining the compact form factor of standard serial flash devices. SST26VF032B/032BA also support full command-set compatibility to traditional Serial Peripheral Interface (SPI) protocol. Operating at frequencies reaching 104 MHz, the SST26VF032B/032BA enables minimum latency execute-in-place (XIP) capability without the need for code shadowing on an SRAM. The device's high performance and reliability make it the ideal choice for Network Appliance, DSL and Cable Modems, Wireless Lan, Computing, Digital TV, Smart Meter, Server, Set Top Box, Automotive and other Industrial applications.</p>	<a href="#">Click Here</a>





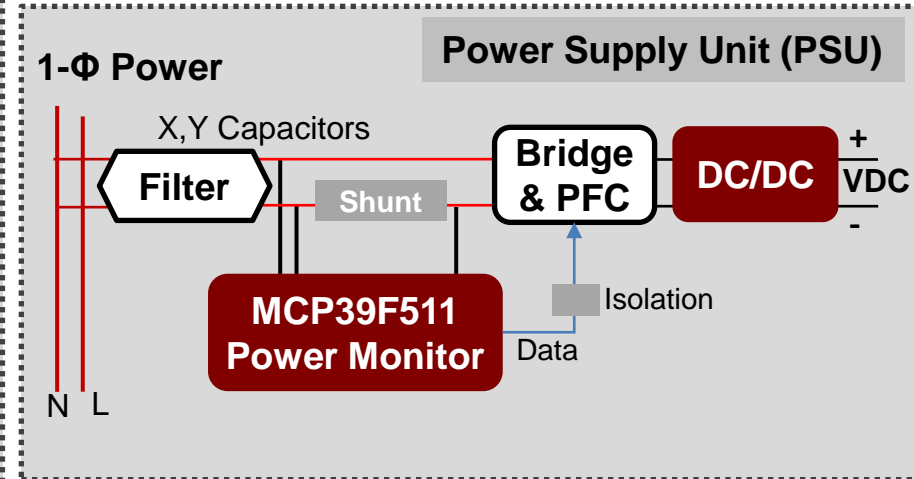
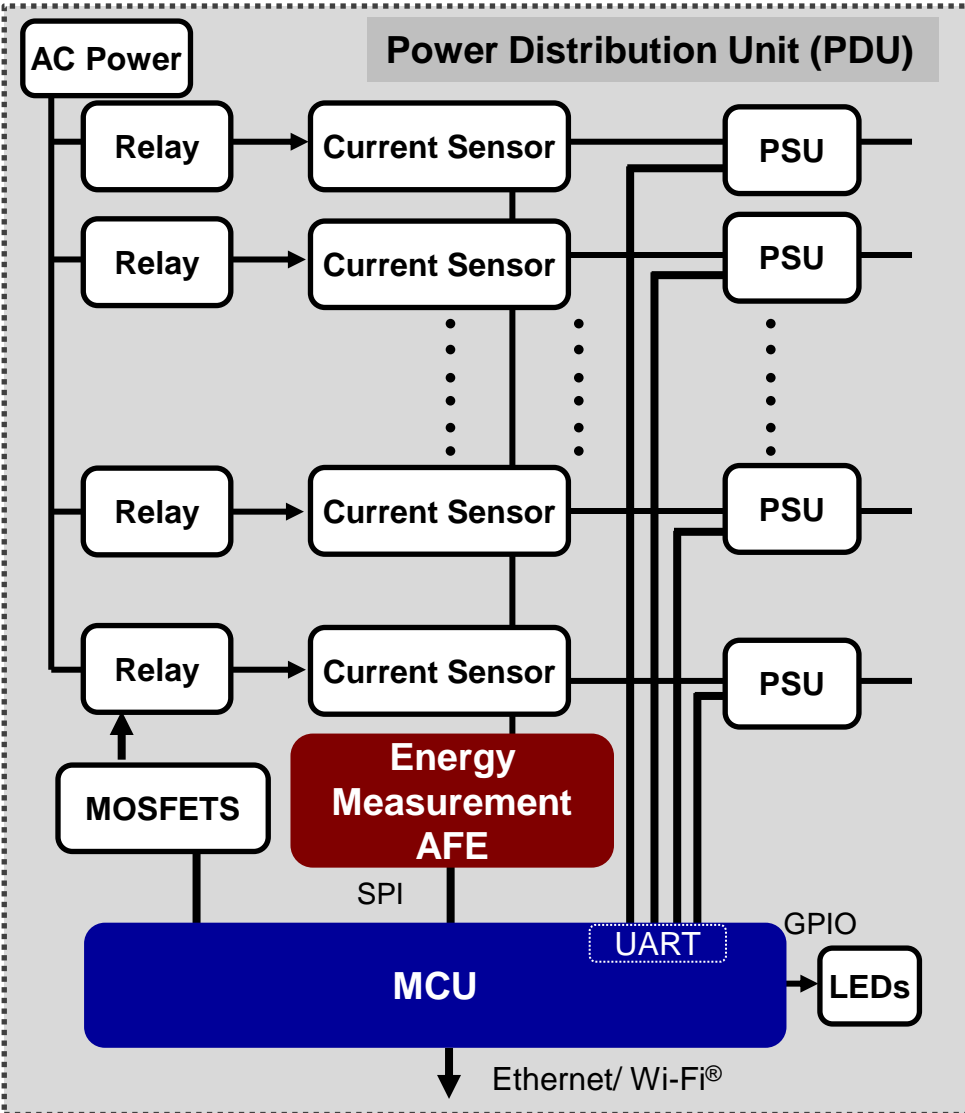
**MICROCHIP**

# Power Monitoring

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# Power Monitoring



# MCP39F511

Popular Products	Description	Product Web Page
MCP39F511	<p>The MCP39F511 is a highly integrated, single-phase power-monitoring IC designed for real-time measurement of input power for AC/DC power supplies, providing power and energy values, as well as zero-crossing and event monitoring. It includes dual-channel delta sigma ADCs, a 16-bit calculation engine, EEPROM and a flexible 2-wire interface. An integrated low-drift voltage reference in addition to the 94.5 dB of SINAD performance on each measurement channel allows for better than 0.1% accurate designs across a 4000:1 dynamic range.</p>	<a href="#">Click Here</a>

# MCP3913/4

Popular Products	Description	Product Web Page
MCP3913/14	<p>The MCP3913/4 device is a 6 and 8-Ch Analog Front End (AFE), containing six synchronous sampling delta-sigma ADCs, six PGAs, phase delay compensation block, low-drift internal voltage reference, digital offset and gain error calibration registers, and high-speed 20 MHz SPI compatible serial interface. The MCP3913/4 AFEs include advanced security features to secure the communications and the configuration settings, such as a CRC-16 checksum on both serial data outputs and static register map configuration. It also includes a register-map lock through an 8-bit secure key to stop unwanted write commands from processing. The MCP3913/14 AFEs are capable of interfacing with a variety of voltage and current sensors, including shunts, current transformers, Rogowski coils and Hall-effect sensors.</p>	<a href="#">Click Here</a>



# Microcontroller

Popular Products	Description	Product Web Page
PIC32MX	32-bit Microcontrollers (up to 512 KB Flash and 128 KB SRAM) with Graphics Interface, USB, CAN, and Ethernet.	<a href="#">Click Here</a>
PIC24F	The PIC24F microcontroller family features cost effective, 16 MIPS 16-bit MCU performance and many devices with Microchip's eXtreme Low Power Technology. Unique features include USB-OTG, to act as a USB Device or Host, a Charge Time Measurement Unit (CTMU) that allows precision time measurement, capacitive measurement for mTouch™ applications and an integrated graphics or segmented display controller. The PIC24 Lite family (PIC24FxxKxxx) features lowest cost and lowest power in small pin count options, with integrated EEPROM, Op Amps, DACs, flexible PWMs and Configurable Logic Cell (CLC) for real time logic control.	<a href="#">Click Here</a>

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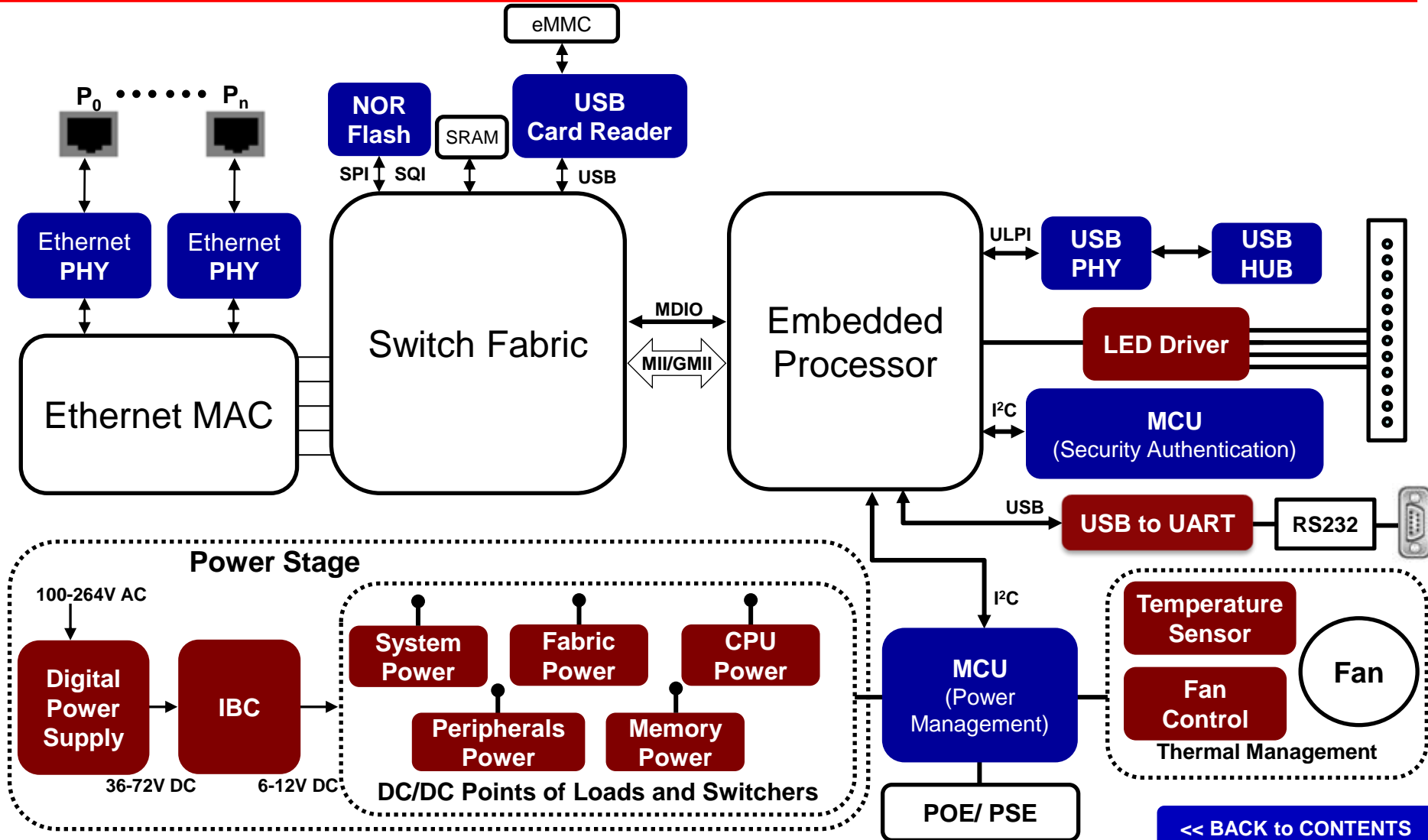
**MICROCHIP**

**Ethernet Switch**

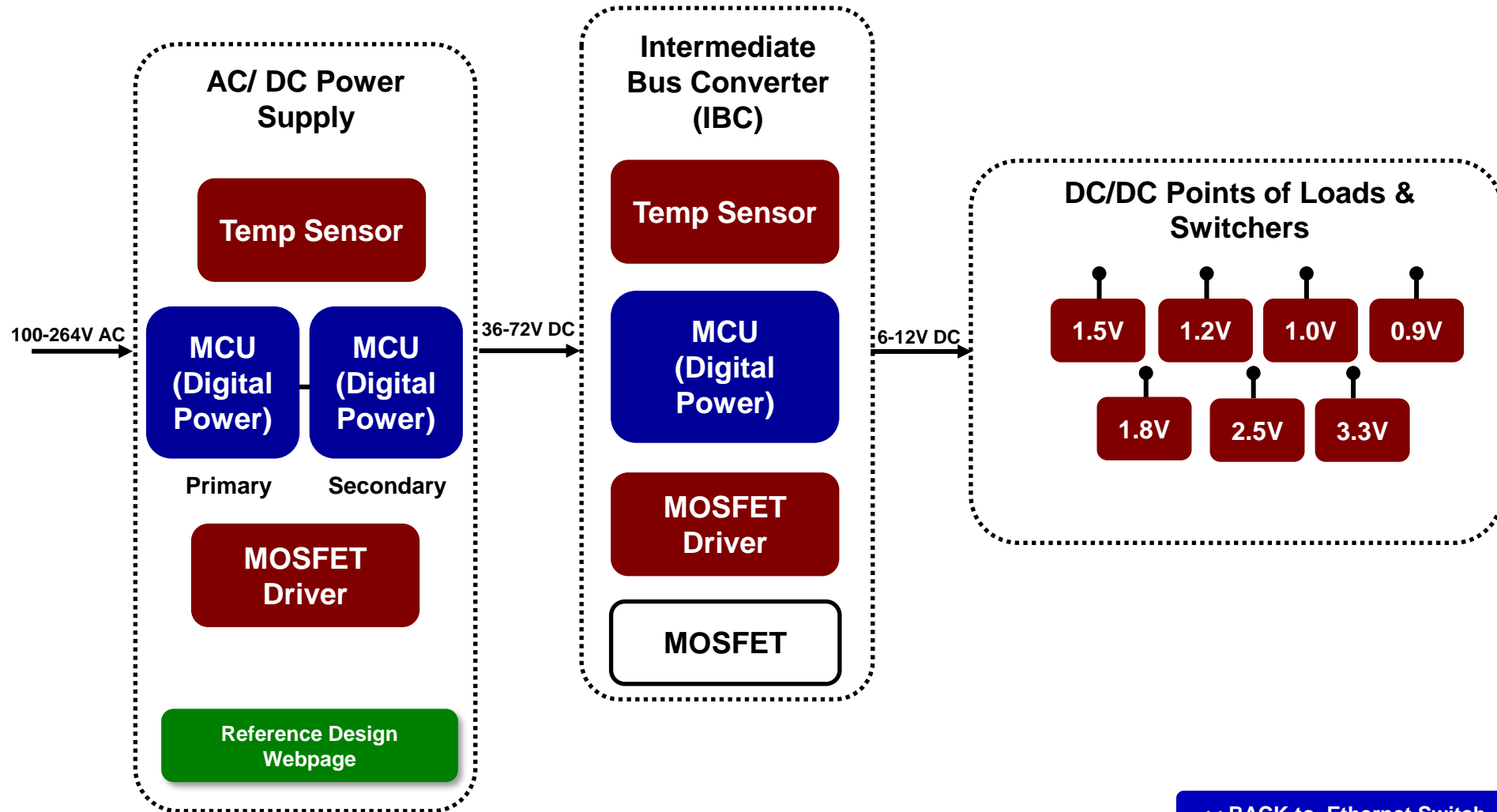
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# Ethernet Switch



# Power Stage (Ethernet Switch)

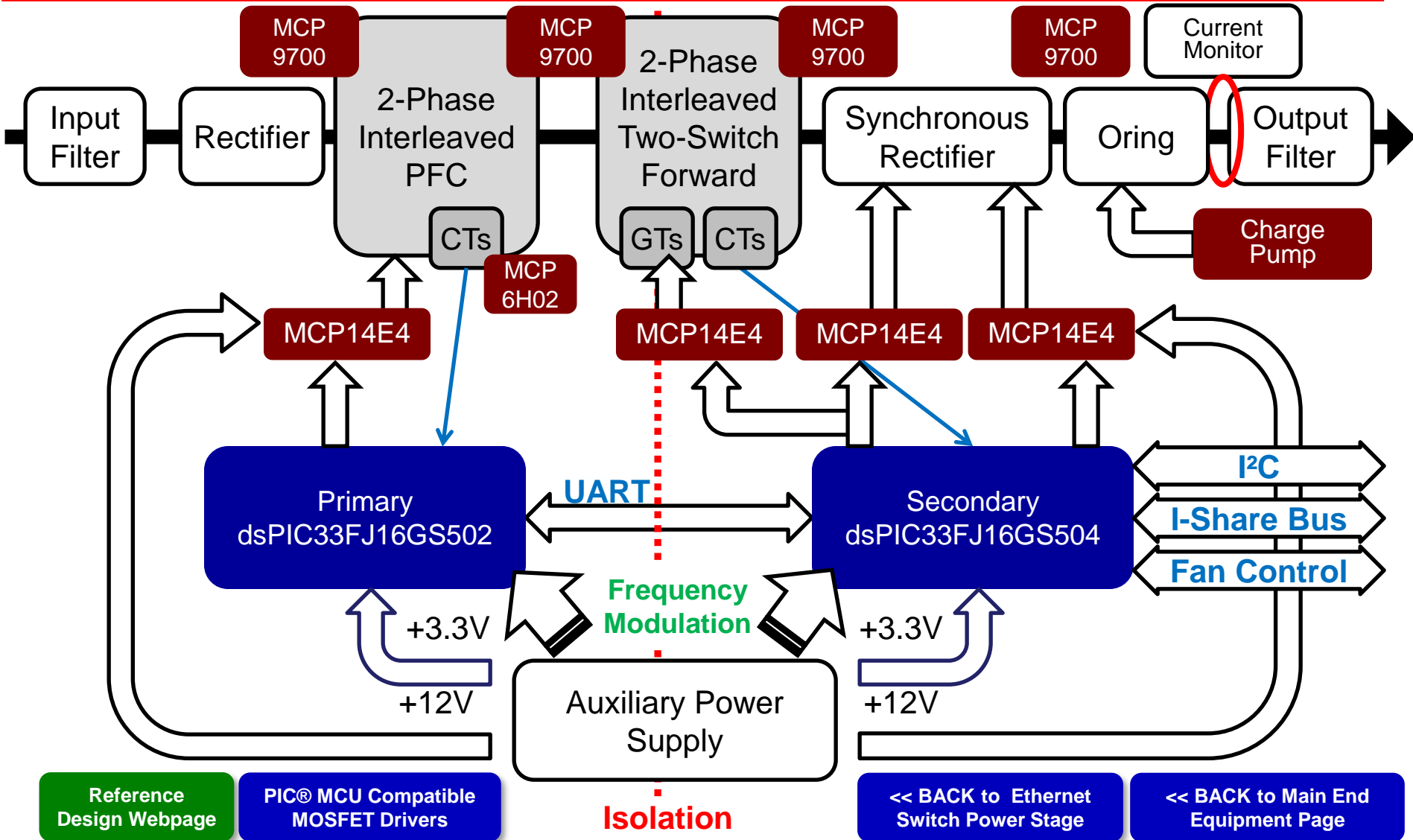






# 720W AC/DC Power Supply Reference Design

## High-Level Block Diagram





# USB 2.0 and 3.0 Hubs

Function	Popular Products	Description	Product Web Page
USB 3.0 Hub	USB553xB	These are 2/3/4/7-port hub controllers are SuperSpeed /Hi-Speed, configurable and compliant with USB 3.0. USB 3.0 traffic can also operate in parallel with a USB 2.0 traffic without being not affected by slower data.	<a href="#">Click Here</a>
USB 2.0 Hub	USB251xB	These 2/3/4 port USB 2.0 hub controllers excel at data throughput in mixed-speed USB environments. Programmable features include PortMap, PortSwap, and PHYBoost to simplify PCB layout & optimize BOM cost.	<a href="#">Click Here</a>
USB 2.0 Hub	USB2534	This 4 port hub is compliant with the USB 2.0 and Link Power Management. It provides an additional USB endpoint for use as a USB to I2C interface, allowing external devices to be monitored, controlled, or configured via USB.	<a href="#">Click Here</a>
USB2.0 or HSIC	USB4604	This is an OEM configurable USB 2.0 hub controller with 4 downstream ports. It is compliant with the USB 2.0, USB 2.0 Link Power Management & High-Speed Inter-Chip	<a href="#">Click Here</a>

# USB-to-UART/SPI

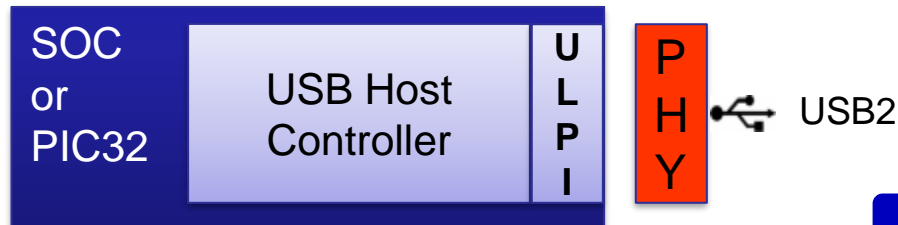
- **Function: Enables USB connectivity in applications that have UART/SPI interface**

Popular Products	Description	Product Web Page
MCP2200	The MCP2200 is a USB-to-UART serial converter. The device reduces external components by integrating the USB termination resistors. The MCP2200 also has 256-bytes of integrated user EEPROM. The MCP2200 has eight general purpose input / output pins. Four of the pins have alternate functions to indicate USB and communication status.	<a href="#">Click Here</a>
MCP2210	The MCP2210 is a USB-to-SPI Master converter. The device reduces external components by integrating the USB termination resistors. The MCP2210 also has 256 bytes of integrated user EEPROM. The MCP2210 has nine general purpose input/output pins. Seven pins have alternate functions to indicate USB and communication status.	<a href="#">Click Here</a>



# USB Transceiver Product Overview

USB PHY Products	USB3450	USB3500	USB3280 USB3290	USB3300	USB334x	USB333x
PHY Interface	UTMI+ (Device or Host)	UTMI+ (Device, Host, or OTG)	UTMI (Device)	ULPI (Device, Host, or OTG)	ULPI (Device, Host, or OTG)	ULPI (Device, Host, or OTG)
HS & FS USB	Yes	Yes	Yes	Yes	Yes	Yes
LS USB	Yes	Yes	No	Yes	Yes	Yes
Data Interface	8 bit Bidir	8 bit Bidir	8 bit Bidir	8 bit Bidir	8 bit Bidir	8 bit Bidir
Internal Reg	Yes	Yes	Yes	Yes	Yes	Yes
Package Body size (mm)	40 QFN (6 x 6 x 0.9)	56 QFN (8 x 8 x 0.9)	36 QFN (6 x 6 x 0.9) 40 VFBGA (4 x 4 x 0.9)	32 QFN (5 x 5 x 0.9)	24 QFN (4 x 4 x 0.9) 25 BGA (3 x 3 x 0.8)	25 WLCSP (1.9 x 1.9 x 0.5)



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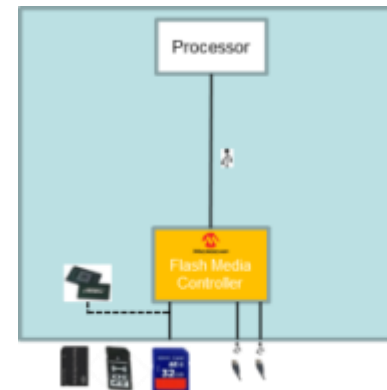


# USB Flash Media Controller Overview

USB Card Reader Products	USB2244	USB2250	USB2640	USB2660	USB4640
Up Stream Interface	USB 2.0	USB 2.0	USB 2.0	USB 2.0	HSIC (USB 2.0)
Down Stream Output	SD, MMC	SD, MMC, CF, MS, xD	SD, MMC, MS, xD	2xSD, 2xMMC, MS, xD	SD, MMC, MS, xD
Down Stream USB Ports	None	None	2	2	2
Logical Units	1	1	1	1	1
Package Body size (mm)	36 QFN (6 x 6 x 0.9)	128 VTQDP (14 x 14 x 1.1)	48 QFN (7 x 7 x 0.9)	64 QFN (9 x 9 x 0.9)	48 QFN (7 x 7 x 0.9)

SD – SecureDigital, MMC – MultiMediaCard, CF – Compact Flash, MS – Memory Stick, xD – xD Picture Card

- **Ultra-fast flash media reader/writer for external memory card storage or embedded flash memory**
  - SD, MMC/eMMC, MS / MS-Pro / MS-Pro-HG, xD
- **USB interface for design ease and flexibility on placement**
- **USB port expansion options**



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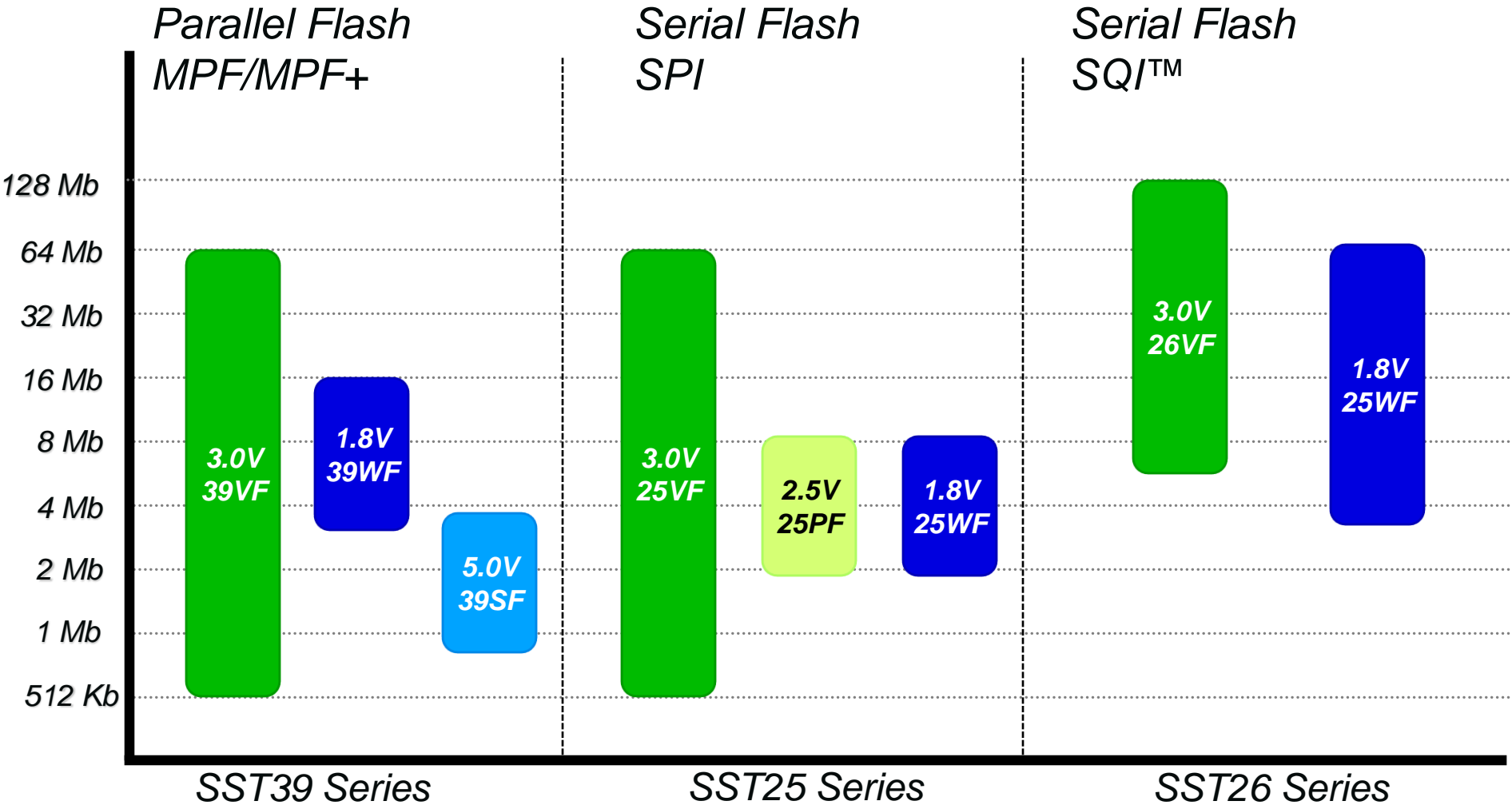
# Ethernet Physical Layer

Popular Products	Description	Product Web Page
LAN8710A/20A	Excellent ESD Protection levels without any external protection devices. Integrated DSP with adaptive equalizer. Integrated 1.2V Linear Regulator. Incorporates SMSC flexPWR. Uses a low cost 25MHz xtal for RMII. Lead free ROHS compliant packages: Commercial (0 to +70C) and Industrial (-40 to +85C) temperature supported	<a href="#">Click Here</a>
LAN8740A/1A/2A	Energy Efficient Ethernet 802.3az, Wake On LAN support (WoL), Cable Diagnostics, HP Auto-MDIX, Compliant with IEEE 802.3/802.3u, Integrated DSP with adaptive equalizer, Integrated 1.2V Linear Regulator, Uses a low cost 25MHz xtal for RMII Lead free ROHS compliant packages	<a href="#">Click Here</a>

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# NOR Flash Product Offerings



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# PIC24F128GB204 Product Family with Security

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## □ What's new:

- AES / DES HW encryption
- OTP key storage
- Random Number Generator
- UART with ISO7816

## □ Highlights

- 64 to 128KB Flash
- 8KB RAM
- 28 to 44 pins
- XLP low power with Vbat

## □ Peripherals

- USB OTG
- 4 UARTs w/ ISO7816
- 3 SPI w/ I<sup>2</sup>S, 2 I<sup>2</sup>C™
- 12-bit ADC, 12ch
- CTMU
- 5 16-bit Timer
- 6 IC, 6 OC





# Thermal Management

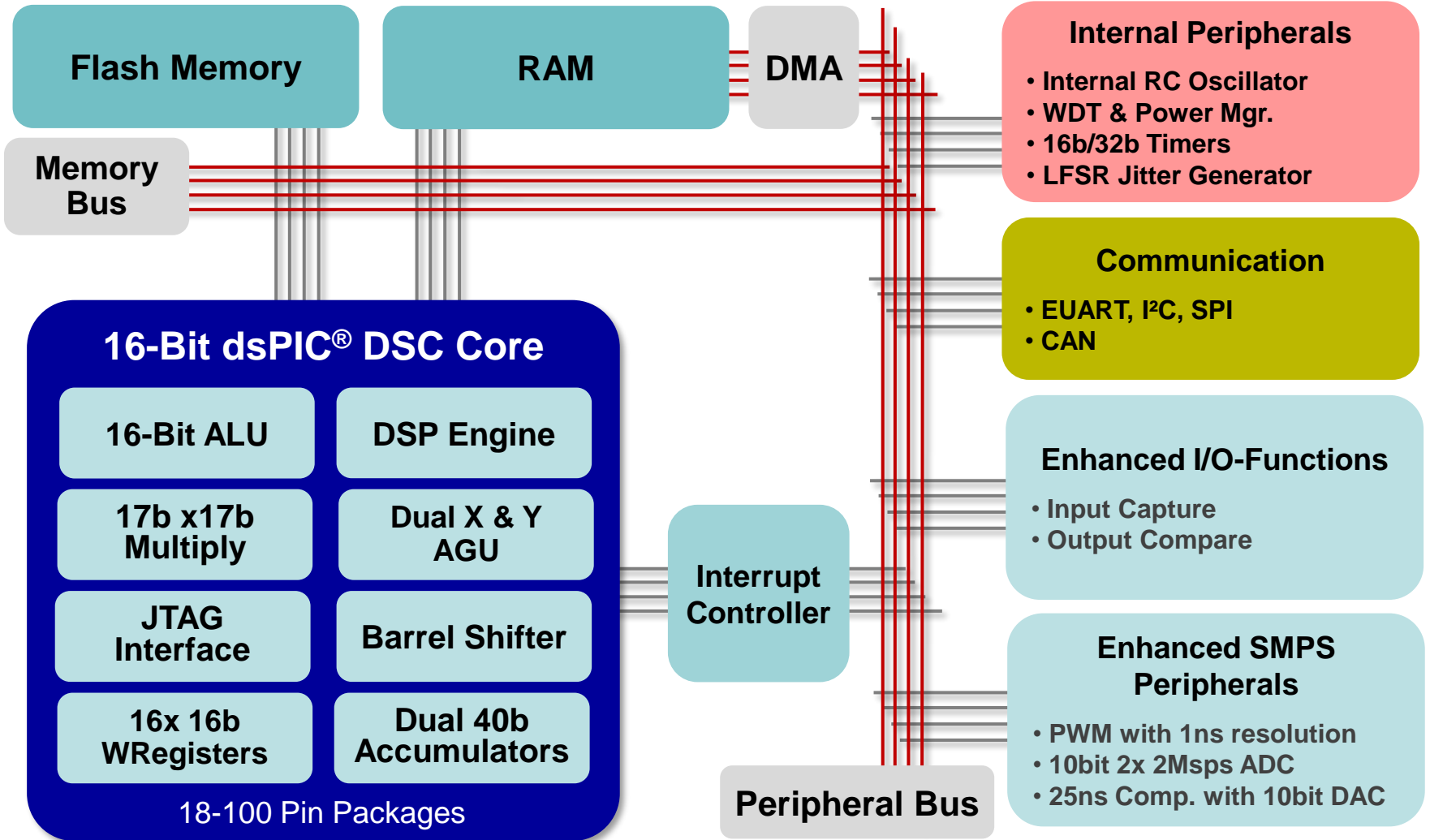
Suggested Products	Description	Product Web page
MCP9700/ MCP9800/	Improves control of color temperature and detects disconnected LED channel. MCP9700 outputs analog voltage that is proportional to the temperature (-40C to 150C). MCP9800 outputs temperature data (-55C to 125C) via I <sup>2</sup> C™/SMBus two-wire interface.	<a href="#">MCP9700</a> <a href="#">MCP9800</a>
EMC2301	The EMC2301 is an SMBus compliant fan controller with a PWM fan driver. The fan driver is controlled by a programmable frequency PWM driver and Fan Speed Control algorithm that operates in either a closed loop fashion or as a directly PWM-controlled device and has the capability to detect aging fans and alert the system. It will likewise detect stalled or locked fans and trigger an interrupt.	<a href="#">EMC2301</a>
EMC1412	The EMC1412 is a high accuracy, low cost, System Management Bus (SMBus) temperature sensor. Advanced features such as Resistance Error Correction (REC), Beta Compensation and automatic diode type detection combine to provide a robust solution for complex environmental monitoring applications.	<a href="#">EMC1412</a>

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# dsPIC33 GS Architecture



# Operational Amplifiers

Suggested Products	Description	Product Web page
MCP6H02	<p>The MCP6H02 operational amplifier (op amp) has a wide supply voltage range of 3.5V to 16V and rail-to-rail output operation. This device is unity gain stable and has a gain bandwidth product of 1.2 MHz (typical), while only drawing 135 <math>\mu</math>A/amplifier (typical) of quiescent current. The MCP6H02 family is fully specified from -40°C to +125°C and is available in 8L-SOIC and 8L- 2x3 TDFN</p>	<p><a href="#">Click Here</a></p>
MCP6H92	<p>The MCP6H92 operational amplifier (op amp) has a wide supply voltage range of 3.5V to 12V and rail-to-rail output operation. This device is unity gain stable and has a gain bandwidth product of 10 MHz (typical), while only drawing 2 mA/amplifier (typical) of quiescent current. The MCP6H92 is fully specified from -40°C to +125°C and is available in 8L-SOIC and 8L- 2x3 TDFN</p>	<p><a href="#">Click Here</a></p>

# MOSFET Drivers

- **Function: driving the high power devices (MOSFETs, bipolar transistors, IGBTs)**

Popular Products	Description	Product Web Page
TC4427A	<p>Supply Voltage Range: 2.5V to 5.5V            Wide Temperature Measurement Range: -40°C to +125°C            High Temperature Converter Accuracy: <math>\pm 2^\circ\text{C}</math>, Max, at 25°C            Linear Temperature Slope: 10mV/°C            Very Low Supply Current: 35<math>\mu\text{A}</math> Typical</p>	<a href="#">Click Here</a>
MCP14A0151/2	<p>The MCP14A0151 and MCP14A0152 are inverting and non-inverting, 1.5 A MOSFET drivers in 2x2 DFN and SOT-23 packages. The small package sizes allow the gate driver to be positioned close to the MOSFET's physical gate connection, which minimizes gate bounce caused by the parasitic effects of PCB layout and reduces EMI. These devices feature a unique architecture with low input thresholds, ideally suited for use with a low-voltage MCU to minimize power losses within the system.</p>	<a href="#">Click Here</a>
MCP14E3/E4/E5	<p>The MCP14E3/E4/E5 devices are a family of 4.5A, dual output buffers/MOSFET drivers with separate enable functions for each output. As MOSFET drivers, the MCP14E3/E4/E5 can easily charge 2200 pF gate capacitance in under 28 ns (max)</p>	<a href="#">Click Here</a>

# Charge Pumps

- **Function: powering white LEDs, providing negative DC bias for LCD or GaAs transmit power amplifier, converting Li-Ion voltage to DC voltage level required by the system**

Popular Products	Description	Product Web Page
MCP1252/3	The MCP1252/3 are inductorless, positive-regulated charge pump DC/DC converters. The devices generate a regulated fixed (3.3V or 5.0V) or adjustable output voltage. They are specifically designed for applications requiring low noise and high efficiency and are able to deliver up to 120 mA output current. The devices allow the input voltage to be lower or higher than the output voltage, by automatically switching between buck/ boost operation.	<a href="#">Click Here</a>



# PIC® MCU Compatible MOSFET Drivers

- **Function: Interfaces low voltage PIC® MCU and dsPIC® DSC devices to high capacitance MOSFETs**

Popular Products	Description	Product Web Page
MCP14A0151/2	1.5 A single, low side MOSFET drivers small package sizes allow the gate driver to be positioned close to the MOSFET's physical gate connection, which minimizes gate bounce caused by the parasitic effects of PCB layout and reduces EMI. Rise time, fall time, propagation delay and cross-conduction current are all minimized. In addition, these devices feature a unique architecture with low input thresholds, ideally suited for use with a low-voltage MCU to minimize power losses within the system.	<a href="#">Click Here</a>
MCP14A0153/4/5	Dual output versions of the fast, compact MCP14A0151/2 drivers.	<a href="#">Click Here</a>
MIC4103/4	High frequency, 100V Half Bridge MOSFET drivers, featuring fast 24ns propagation delay times and 6ns driver fall times. The low-side and high-side gate drivers are independently controlled and matched to within 3ns typical. These include a high voltage internal diode that charges the high-side gate drive bootstrap capacitor, and . a robust, high-speed, and low power level shifter for clean level transitions to the high side output.	<a href="#">Click Here</a>
MIC4608	600V half bridge driver, with a 450ns propagation delay including a 200ns input filtering time to prevent unwanted pulses. The low-side and high-side gate drivers are independently controlled (with shoot thru protection) or controlled with a single PWM signal.	<a href="#">Click Here</a>
MCP14700	The MCP14700 is a high-speed synchronous MOSFET driver designed to optimally drive a high-side and low-side N-Channel MOSFET. The MCP14700 has two PWM inputs to allow independent control of the external N-Channel MOSFETs. Since there is no internal cross condition protection circuitry the external MOSFET dead time can be tightly controlled allowing for more efficient systems or unique motor control algorithms.	<a href="#">Click Here</a>

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# Temperature Sensing Solutions

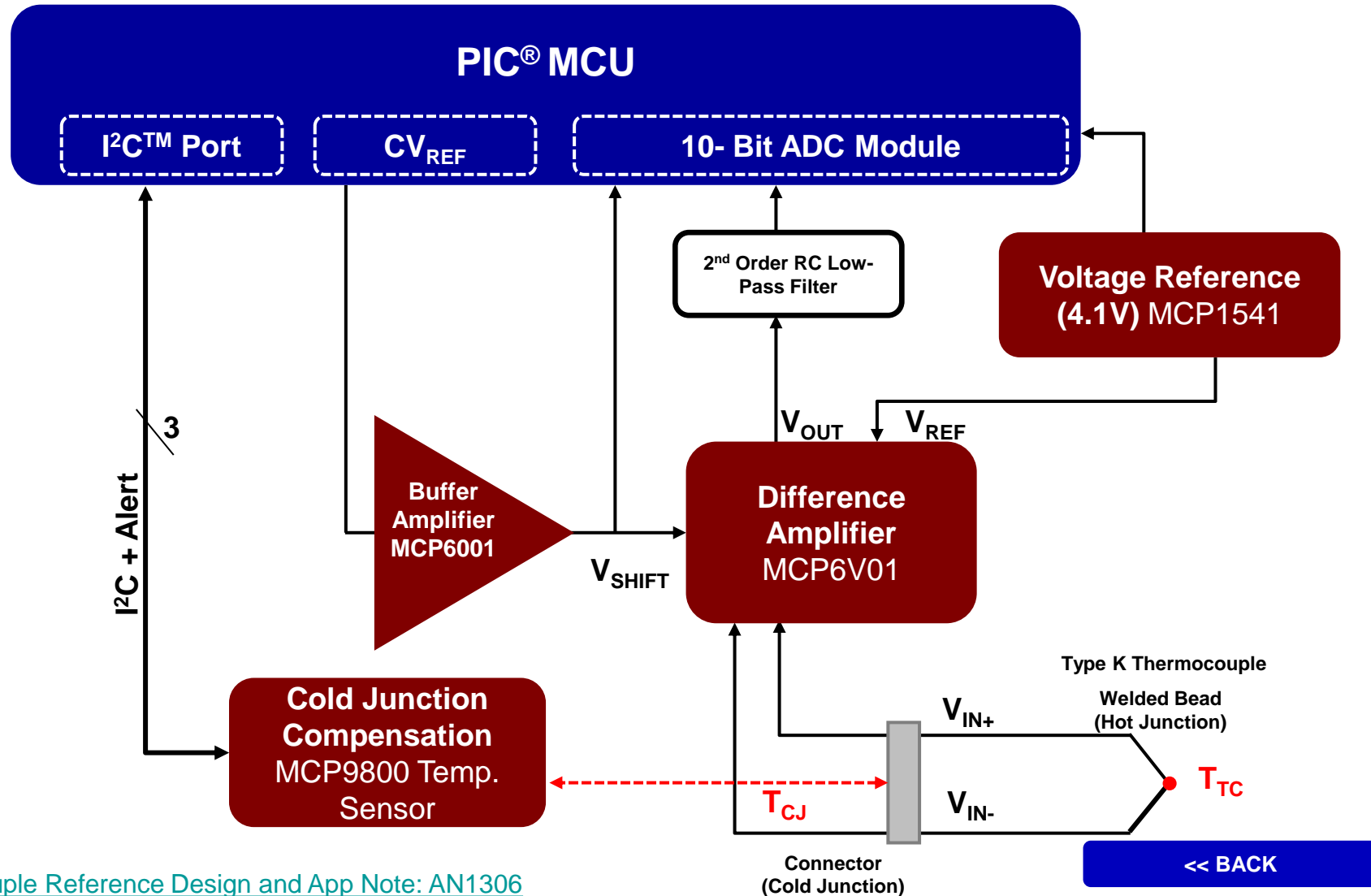
Solutions	Description	
Thermocouple	Thermocouple Reference Design	<a href="#">Reference Circuit</a>
	Thermocouple EMF to Degrees Celsius Converter	<a href="#">Reference Circuit</a>
Voltage Output	Thermistor Vs. MCP9700 Temperature Sensing Solutions	<a href="#">Reference Circuit</a>
Logic Output	TC62x and MCP950x Temperature Switches	<a href="#">Reference Circuit</a>
Serial Output	MCP980x I <sup>2</sup> C/SMBus Temperature Sensors	<a href="#">Reference Circuit</a>
Remote Temperature Monitoring	Temperature Sensors with Multiple Remote Diode Monitors	<a href="#">Reference Circuit</a>
Fan Management	Closed Loop Fan Controllers	<a href="#">Reference Circuit</a>

[Visit Thermal Management on Microchip.com for more information](#)

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# Thermocouple Reference Design





# Voltage Reference

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
MCP1525/41	MCP1525/41 is a low power, high precision voltage reference. It provides a precise output voltage of 4.096V which is then compared to other voltages in the system.	<a href="#">Click Here</a>
MCP1501	The MCP1501 is a high-precision buffered voltage reference with an initial accuracy of 0.10% and is available in 8 voltage options. The MCP1501 is a low-drift bandgap-based reference and uses chopper-based amplifiers which significantly reduces the drift and provides high current output.	<a href="#">Click Here</a>

# Operational Amplifier

Function	Popular Products	Description	Product Web Page
Difference Amplifier	MCP6V01/2/3	The MCP6V01/2/3 family of operational amplifiers has input offset voltage correction for very low offset and offset drift. These devices have a wide bandwidth product and strongly reject switching noise. They are unity gain stable, have no 1/f noise, and have good PSRR and CMRR	<a href="#">Click Here</a>
Buffer Amplifier	MCP6001	The MCP6001 is a single general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 microamperes. The MCP6001 is available in SC-70 and SOT-23 packages.	<a href="#">Click Here</a>

# Temperature Sensors

- **Function: Measuring and providing temperature information**

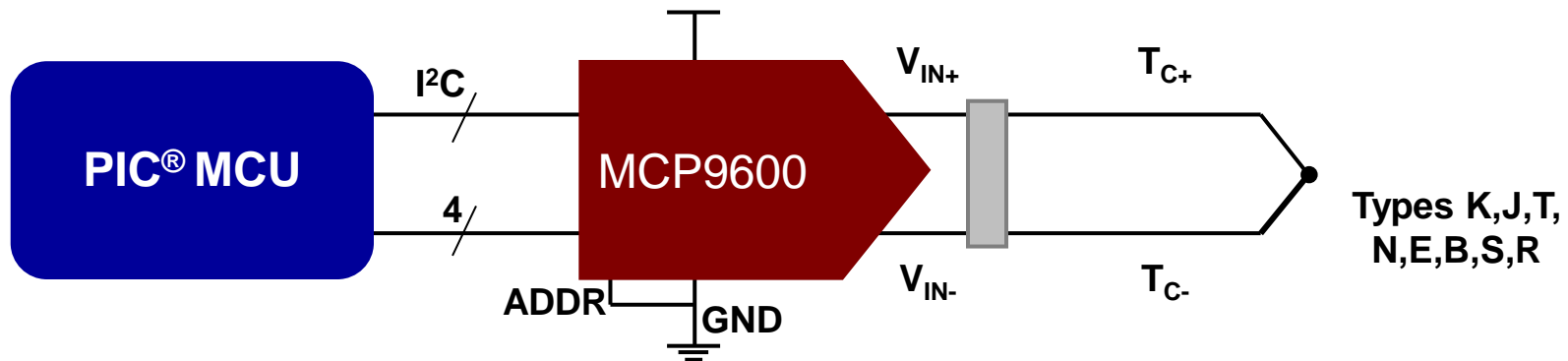
Popular Products	Description	Product Web Page
MCP9800	The MCP9800 is a digital temperature sensor capable of reading temperatures from -55°C to +125°C. Temperature data is measured from an integrated temperature sensor and converted to digital word with a user selectable 9 to 12-bit Sigma Delta Analog to Digital Converter. The MCP9800 notifies the host controller when the ambient temperature exceeds a user programmed set point.	<a href="#">Click Here</a>



# PIC18F2550

Popular Products	Description	Product Web Page
PIC18F2550	<p>Ideal for low power (nanoWatt) and connectivity applications that benefit from the availability of three serial ports: FS-USB (12 Mbit/s), I<sup>2</sup>C™ and SPI™ (up to 10Mbit/s) and an asynchronous (LIN capable) serial port (EUSART). Large amounts of RAM memory for buffering and Enhanced FLASH program memory make it ideal for embedded control and monitoring applications that require periodic connection with a (legacy free) Personal Computer via USB for data upload/download and/or firmware updates. While operating up to 48 MHz, the PIC18F2550 is also mostly software and hardware compatible with the PIC16C745 Low-Speed USB OTP devices.</p>	<a href="#">Click Here</a>

# Thermocouple EMF to DegC Converter

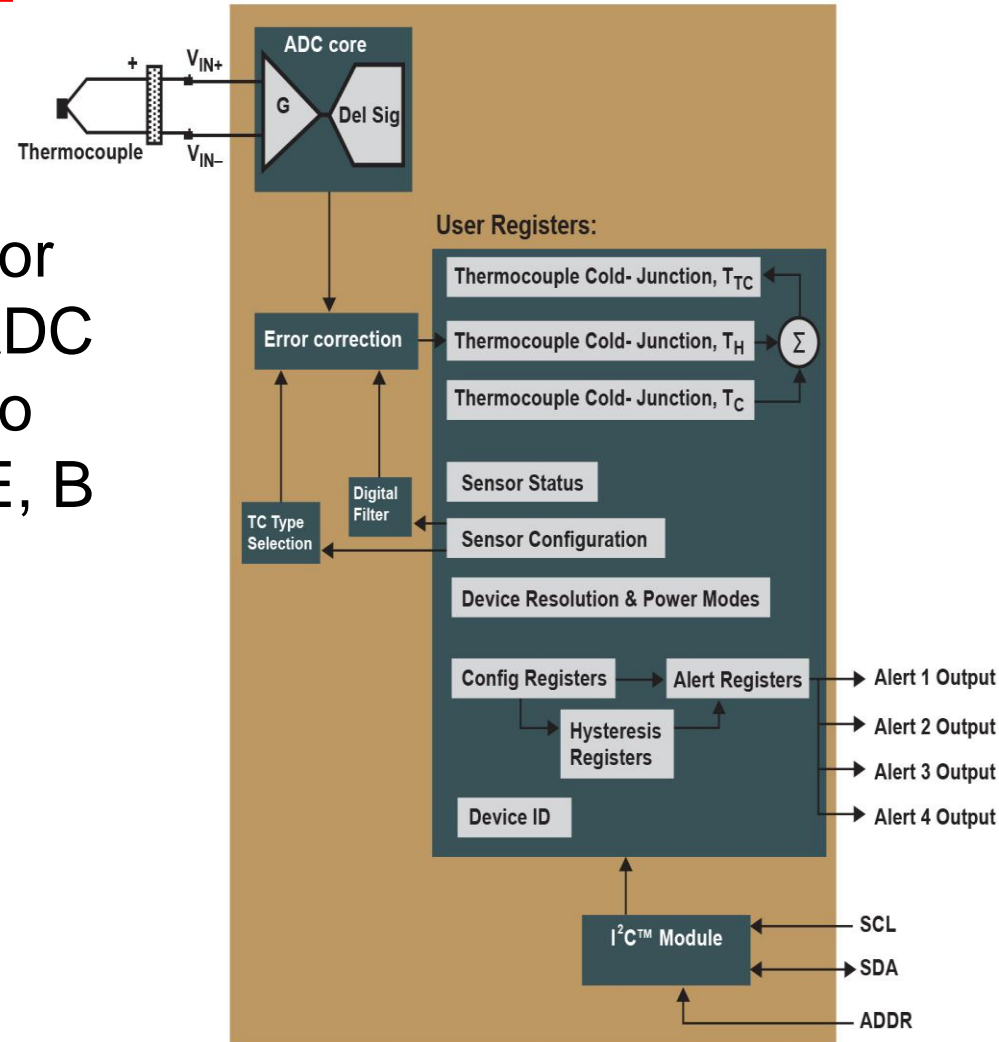


The MCP9600 provides a complete thermocouple EMF to degree Celsius solution with a maximum accuracy of 1.5°C across the entire thermocouple temperature range, with no calibration required.

## Integrates:

- Precision Instrumentation
- Precision Temperature Sensor
- Precision, High-Resolution ADC
- Math Engine with Firmware to Support: Type K, J, T, N, S, E, B and R Thermocouples

[MCP9600 Demo Board](#)  
[MCP9600 Product Page](#)



# PIC Microcontrollers

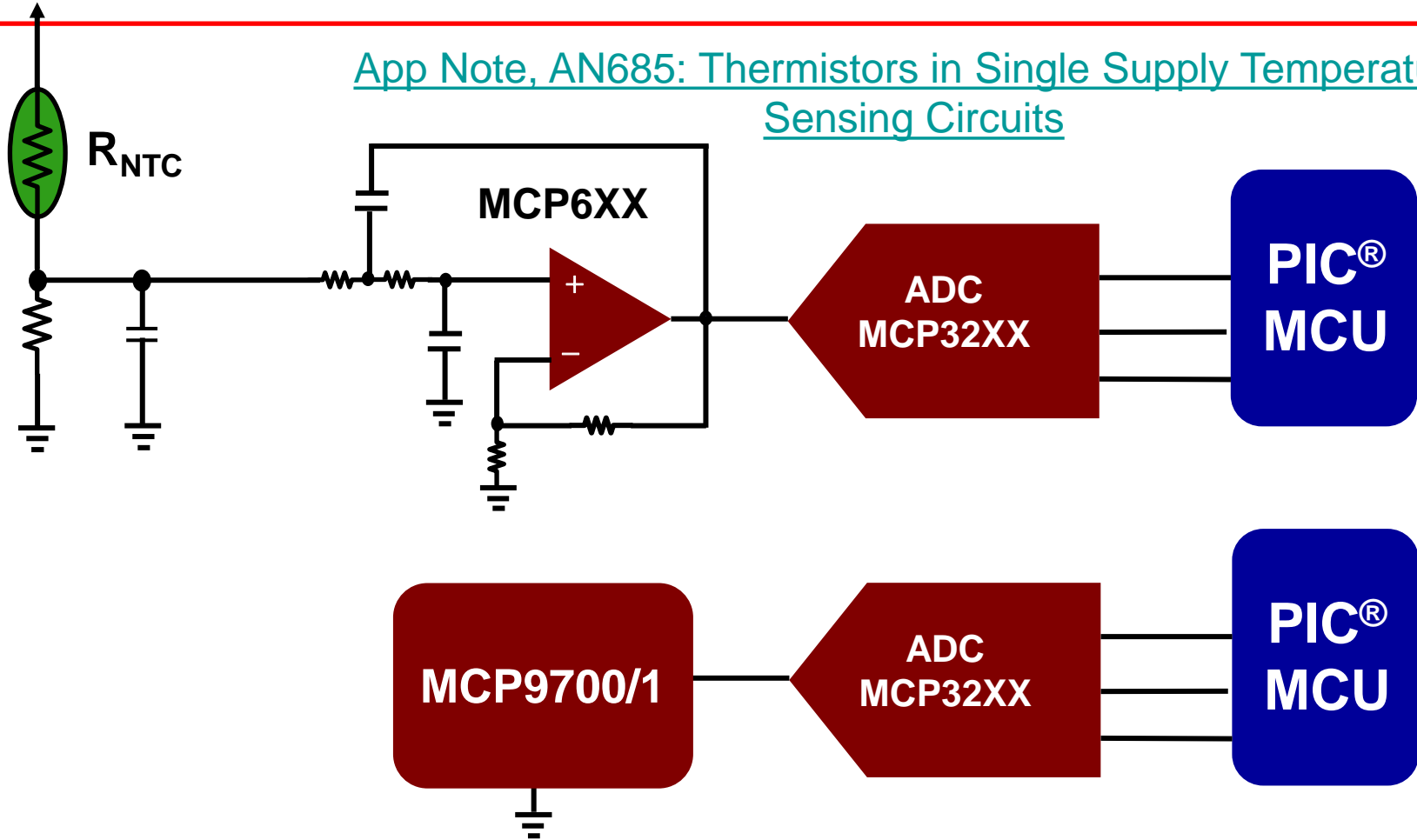
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- ❑ **Function: providing all the control and some peripheral functions**
- ❑ **Popular products: PIC16F627/8, PIC12F675, PIC16C781/2**
- ❑ **Attributes:**
  - ❑ 20MHz operating speed
  - ❑ PWM output (PIC16F627/8)
  - ❑ Integrated comparators, op-amp, ADC, DAC
  - ❑ 128 bytes of EEPROM
  - ❑ Available in PDIP, SOIC, and TSSOP packages
  - ❑ 8-pin solutions (PIC12F675)



# MCP9700 and Thermistor Solutions

[App Note, AN685: Thermistors in Single Supply Temperature Sensing Circuits](#)



[App Note, AN1001: IC Temperature Sensor Accuracy Compensation with a PIC Microcontroller](#)



# Temperature Sensors

## □ Function: Measuring and providing temperature information

Popular Products	Description	Product Web Page
<p>MCP9700 Linear Active Thermistor™ ICs</p>	<p>The output voltage of this device is directly proportional to measured temperature. The MCP9700 can accurately measure temperature from -40C to +150C with the output calibrated to a slope of 10mV/°C and has a DC offset of 500mV.</p>	<p><a href="#">Click Here</a></p>
<p>Demo Boards:</p>		
<p>MCP9700 Temperature-to-Voltage Converter PICtail™ Demo Board</p>	<p>The MCP9700 Temperature-to-Voltage Converter PICtail™ Demo Board demonstrates how to interface the MCP9700 to a microcontroller. This can be used by the system designer as an example of how to integrate an analog temperature sensor into systems</p>	<p><a href="#">Click Here</a></p>



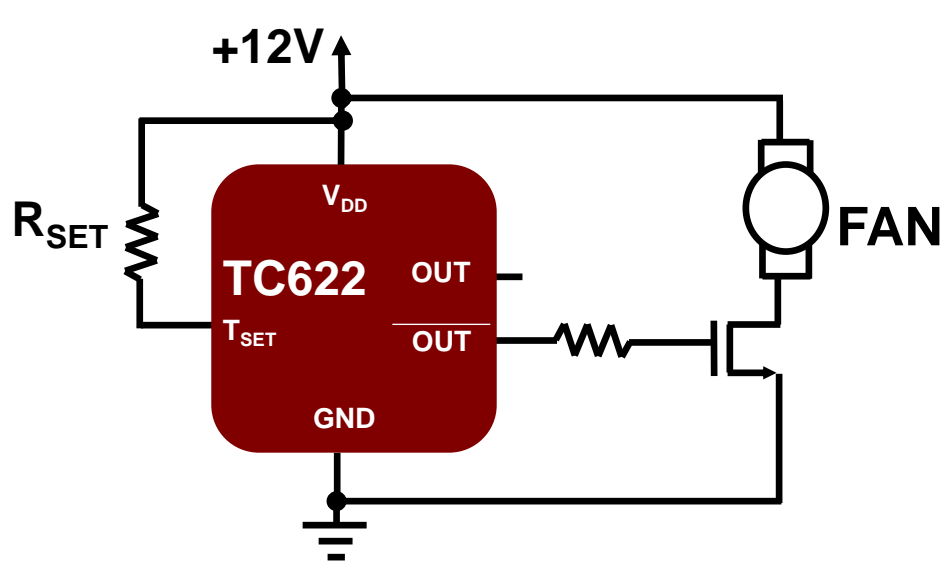
# Analog to Digital Converter

Popular Products	Description	Product Web Page
MCP3221	<p>The MCP3221 is a 12-bit SAR A/D converter. Available in the SOT-23 package, the MCP3221 provides a low max. conversion current and standby current of 250 <math>\mu</math>A and 1 <math>\mu</math>A respectively. Communication to the MCP3221 is performed using a 2-wire I2C™ Compatible interface. The MCP3221 runs on a single supply voltage range of 2.7 V to 5.5 V.</p>	<a href="#">Click Here</a>
MCP3201	<p>The MCP3201 12-bit Analog-to-Digital Converter (ADC) combines high performance and low power consumption in a small package, making it ideal for embedded control applications. The MCP3201 features SAR architecture and a SPI serial interface, allowing 12-bit ADC capability to be added to any PIC® microcontroller. The MCP3201 features 100k samples/second, 1 input channel, low power consumption (5nA typical standby, 400<math>\mu</math>A max. active).</p>	<a href="#">Click Here</a>

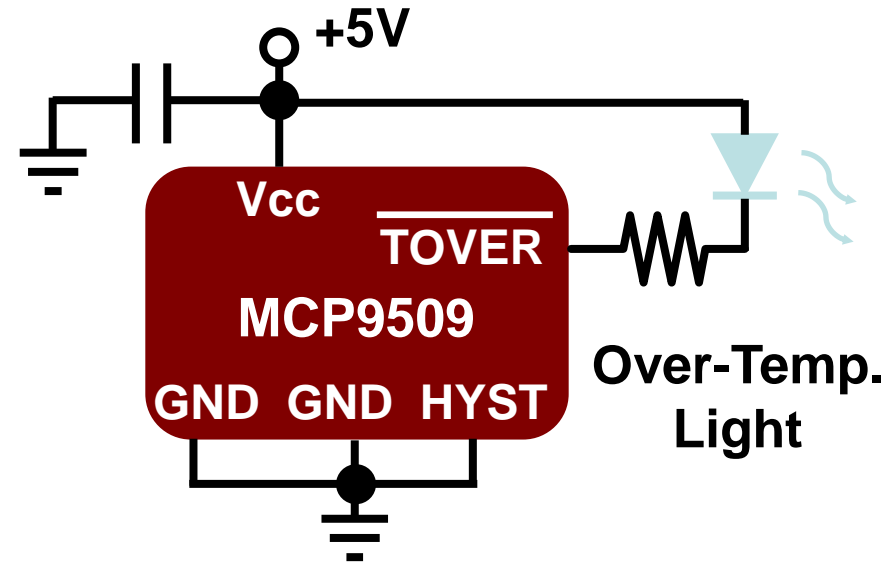
# Operational Amplifiers

Popular Products	Description	Product Web Page
MCP6001/2/4	The MCP6004 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 1 MHz with typical quiescent current of 100 microampere.	<a href="#">Click Here</a>
MCP6H01/2/4	MCP6H04 has a wide supply voltage range of 3.5V to 16V and rail-to-rail output operation. This device has a gain bandwidth product of 1.2 MHz (typical), while only drawing 135 $\mu$ A/amplifier (typical) of quiescent current.	<a href="#">Click Here</a>
MCP6291/2/4	MCP6294 provide wide bandwidth of 10 MHz Gain Bandwidth Product. This family also operates from a single supply voltage as low as 2.4V to 6V, while drawing 1 mA (typical) quiescent current.	<a href="#">Click Here</a>

# Logic-Output Temperature Sensor



Fan on/off Control



Over-temperature Indication



# Logic Output Temperature Sensor

Popular Products	Description	Product Web Page
TC622/4	<p>TC622 and TC624 are programmable solid state temperature sensors designed to replace mechanical switches in sensing and control applications. Both devices integrate the temperature sensor with a voltage reference and all required detector circuitry. The desired temperature set point is set by the user with a single external resistor. Ambient temperature is sensed and compared to the programmed setpoint.</p>	<a href="#">Click Here</a>
MCP9501/2/3/4	<p>MCP9501/2/3/4 family of devices are temperature switches with <math>\pm 1^{\circ}\text{C}</math> (typical) accurate factory set output thresholds. These devices are ideal for high power supply systems where an overtemperature protection circuit is needed. These devices do not require external components, consume 25 <math>\mu\text{A}</math> (typical), and the factory set thresholds provide simplicity</p>	<a href="#">Click Here</a>

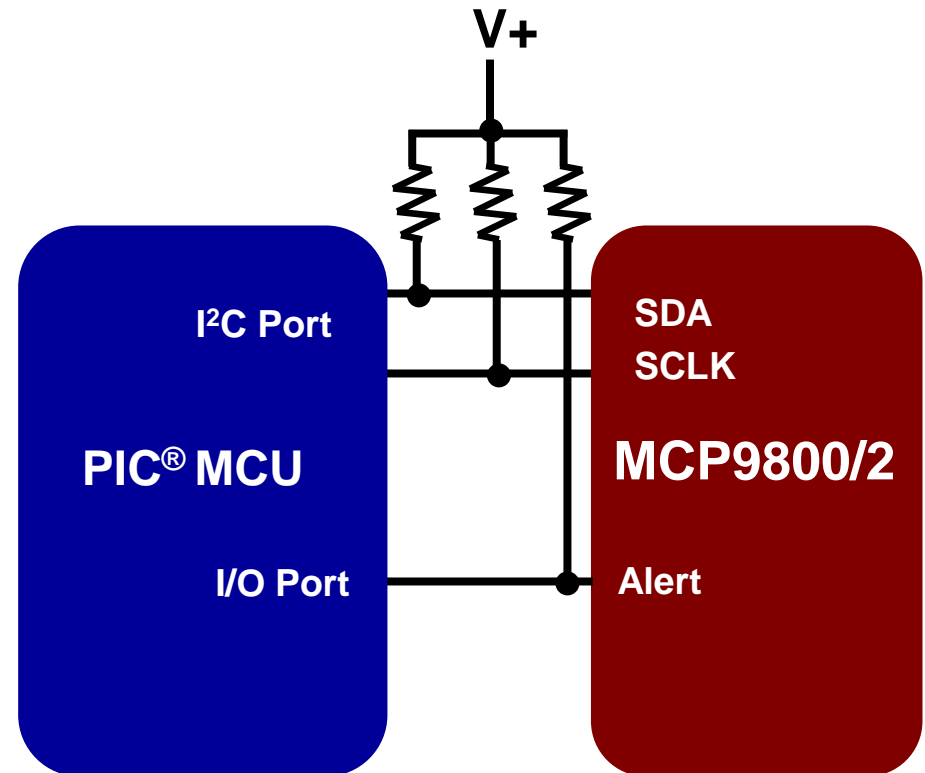
# Serial-Output Temperature Sensor

- **Advantages**

- Direct communication
- Save PCB space
- Minimize design time
- Low power

- **Applications**

- Computers
- Set-top boxes
- Office equipment
- Wireless handsets



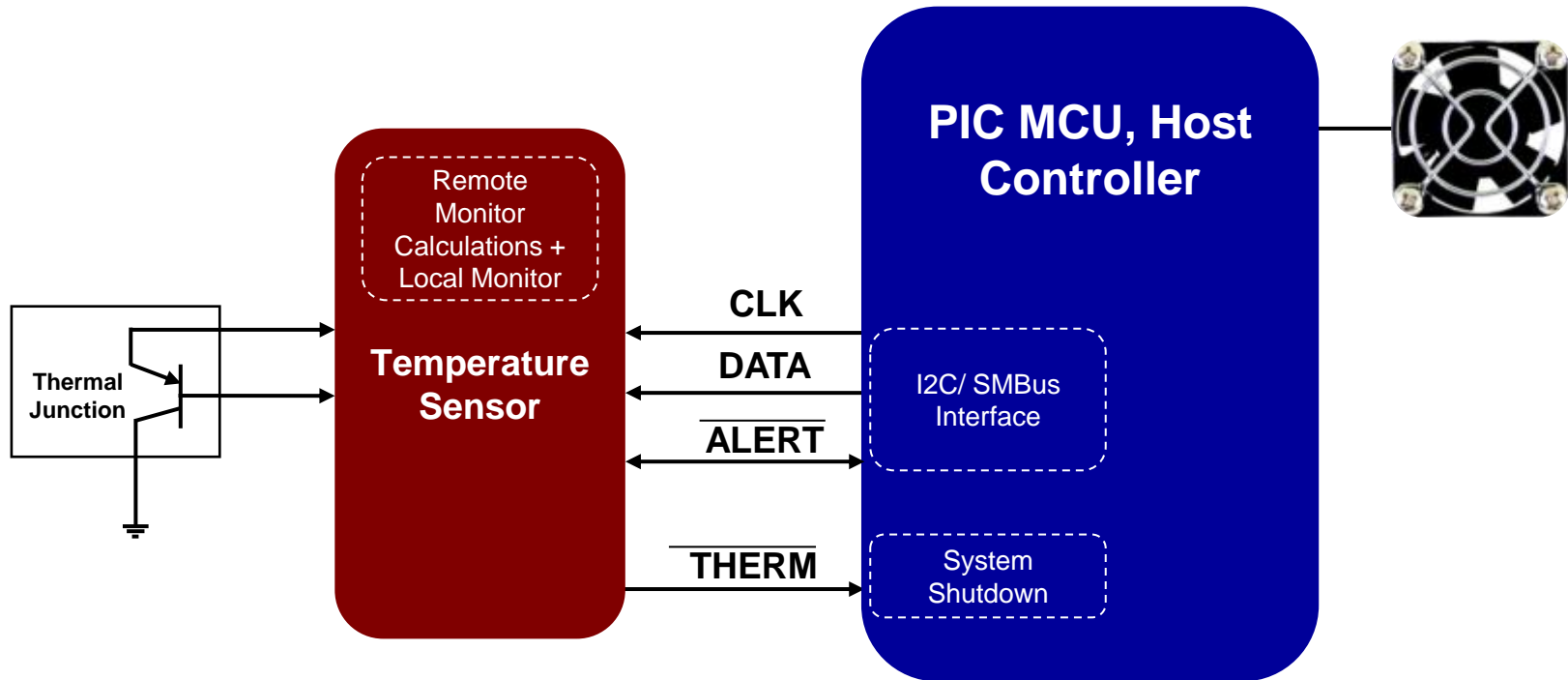


# Temperature Sensors

## □ Function: Measuring and providing temperature information

Popular Products	Description	Product Web Page
MCP9800/02 Digital temperature sensor	<p>Features</p> <ul style="list-style-type: none"><li>• 2-wire I<sup>2</sup>C™/SMBus Compatible Interface</li><li>• User Selectable 9- to 12-Bit Resolution</li><li>• ±1°C Accuracy from -10°C to +85°C</li><li>• ±2°C Accuracy from -10°C to +125°C</li><li>• Low Operating Current: 220 µA (typical)</li><li>• Shutdown Mode: 1 µA (max)</li><li>• Power Saving One-Shot Temperature Conversion Measurement</li><li>• Space Saving SOT-23 Package</li></ul>	<a href="#">Click Here</a>
<p><a href="#">Visit Thermal Management on Microchip.com for more information</a></p>		

# Temperature Sensors with Remote Diode Monitors



[AN12.14 Remote Thermal Sensing Diode Selection Guide](#)

[AN10.14 Using Temperature-Sensing Diodes with Remote Thermal Sensors](#)





# A Wide Selection for Any Number of Temperatures

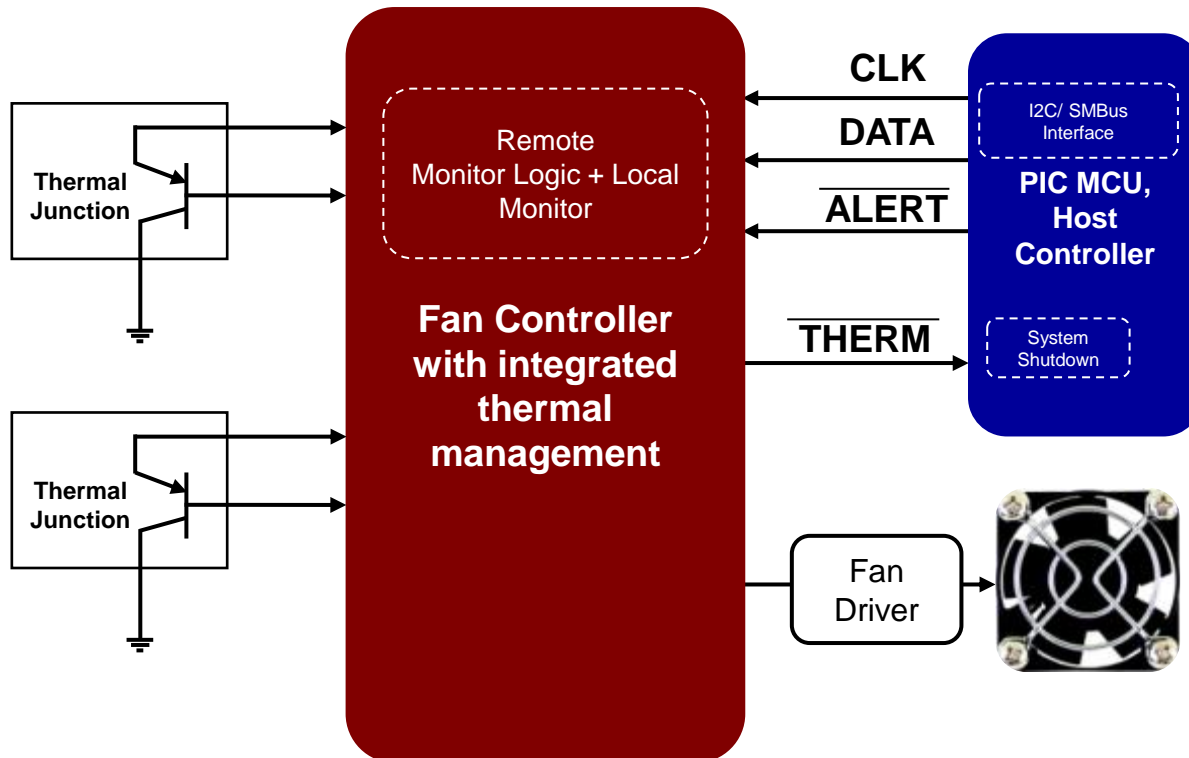
Device	External Sensors	Local Monitor	Alert/ THERM	SYS SHDN	Package	Comments*
EMC1072	1	1	2		MSOP 8	
EMC1073	2	1	2		MSOP 10	
EMC1074	3	1	2		MSOP 10	APD
EMC1412	1	1	2		MSOP 8	REC
EMC1413	2	1	2		MSOP 10	REC
EMC1414	3	1	2		MSOP 10	REC, APD
EMC1422	1	1	1	1	MSOP 8	REC
EMC1423	2	1	1	1	MSOP 10	REC
EMC1043	2	1			MSOP 8	REC, Hottest
EMC1053	2	1			MSOP 8	REC, Hottest
EMC1424	3	1	1	1	MSOP 10	REC, APD
MCP9902	1	1	2		WDFN 8	REC, APD
MCP9903	2	1	2		TDFN 10	REC, APD
MCP9904	2	1	2		TDFN 10	REC, APD
EMC1046	5	1			MSOP 10	REC, APD, Hottest
EMC1047	6	1			MSOP 10	REC, APD, Hottest
EMC1428	7	1	1	1	QFN 16	REC, APD, Hottest
EMC1438	7	1	1	1	QFN 16	REC, APD, Hottest, Block RD

REC – Resistance Error Correction / APD- Anti-parallel Diodes / Hottest- Can report hottest temp

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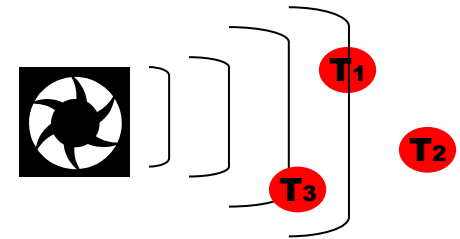
# Closed Loop Fan Controllers

- ❑ Closed-Loop: Fan speed checked & adjusted
- ❑ Fan diagnostics: aging, dust, blocked air path
- ❑ Most have built in thermal management



## □ Technologies

- Remote temperature monitoring
- Multi-zone control and mapping
  - Up to 4 temps control one fan
  - 8 entry lookup tables (speed vs temp)
- Fan ramp rate and Spin-up Control
  - Minimizes acoustic annoyances in fan speed
- Linear drivers connect directly to 5V fan (600mA)



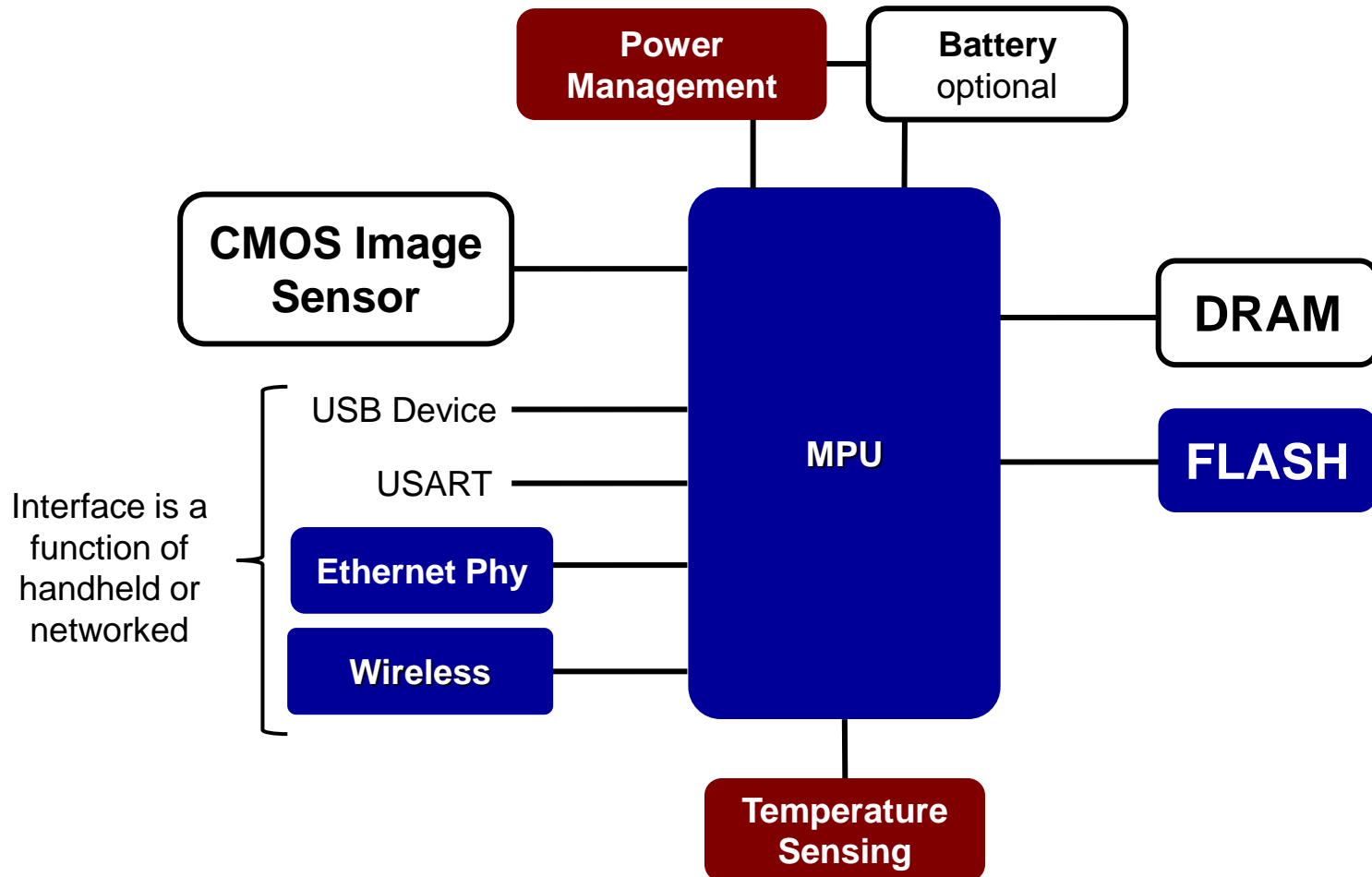


# Fan Controllers for Driving Up to Five Fans

Device	PWM Output	Linear Outputs	Algorithm	Sensors	Hardware MGT	Pkg
EMC2112		1	■ RPM Closed Loop	1 int, 3 ext	◆	20 QFN
EMC2301	1		■ RPM Closed Loop	0	◆	MSOP8
EMC2302	2		■ RPM Closed Loop	0	◆	MSOP10
EMC2303	3		■ RPM Closed Loop	0	◆	12 QFN
EMC2305	5		■ RPM Closed Loop	0	◆	16 QFN
EMC2101	1	PWM or DAC Linear	■ Open Loop Temp / PWM	1 int, 1 ext	◆	MSOP8
EMC2103	1		■ RPM Closed Loop	1 int, 3 ext	◆	12 QFN 16 QFN
EMC2113	1		■ RPM Closed Loop	1 int, 3 ext	◆	16 QFN
EMC2104	2		■ RPM Closed Loop	1 int, 3 ext	◆	28 QFN
EMC2105		1	■ RPM Closed Loop	1 int, 3 ext	◆	20 QFN
EMC2106	4	1	■ RPM Closed Loop	1 int, 3 ext	◆	28 QFN

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# 2D Barcode Scanner



<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
SAM9G20	SMART® ARM®-based SAM9G20 is a 400MHz ARM926-based processor with an extensive range of communication peripherals. It embeds Full Speed USB host and device interfaces, a 10/100 Ethernet MAC and an image sensor interface, as well as standard peripherals such as a multimedia card interface (MCI), I2S, USART, master/slave SPIs, 16-bit timers, TWI and four-channel 10-bit ADC.	<a href="#">Click Here</a>
SAMA5D2	SMART SAMA5D2 series is a high-performance, ultra-low-power ARM Cortex-A5 processor based MPU. The Cortex A5 processor runs up to 500MHz and features the ARM NEON SIMD engine a 128kB L2 cache and a floating point unit.	<a href="#">Click Here</a>

# FLASH

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
SST26VF064B	<p>The SST26VF064B Serial Quad I/O (SQI) flash device utilizes a 4-bit multiplexed I/O serial interface to boost performance while maintaining the compact form factor of standard serial flash devices. Operating at frequencies reaching 104 MHz, the SST26VF064B enables minimum latency execute-in-place (XIP) capability without the need for code shadowing on an SRAM. SST's proprietary, high-performance CMOS SuperFlash® technology, which significantly improves performance and reliability for robust, low-power operation.</p>	<a href="#">Click Here</a>



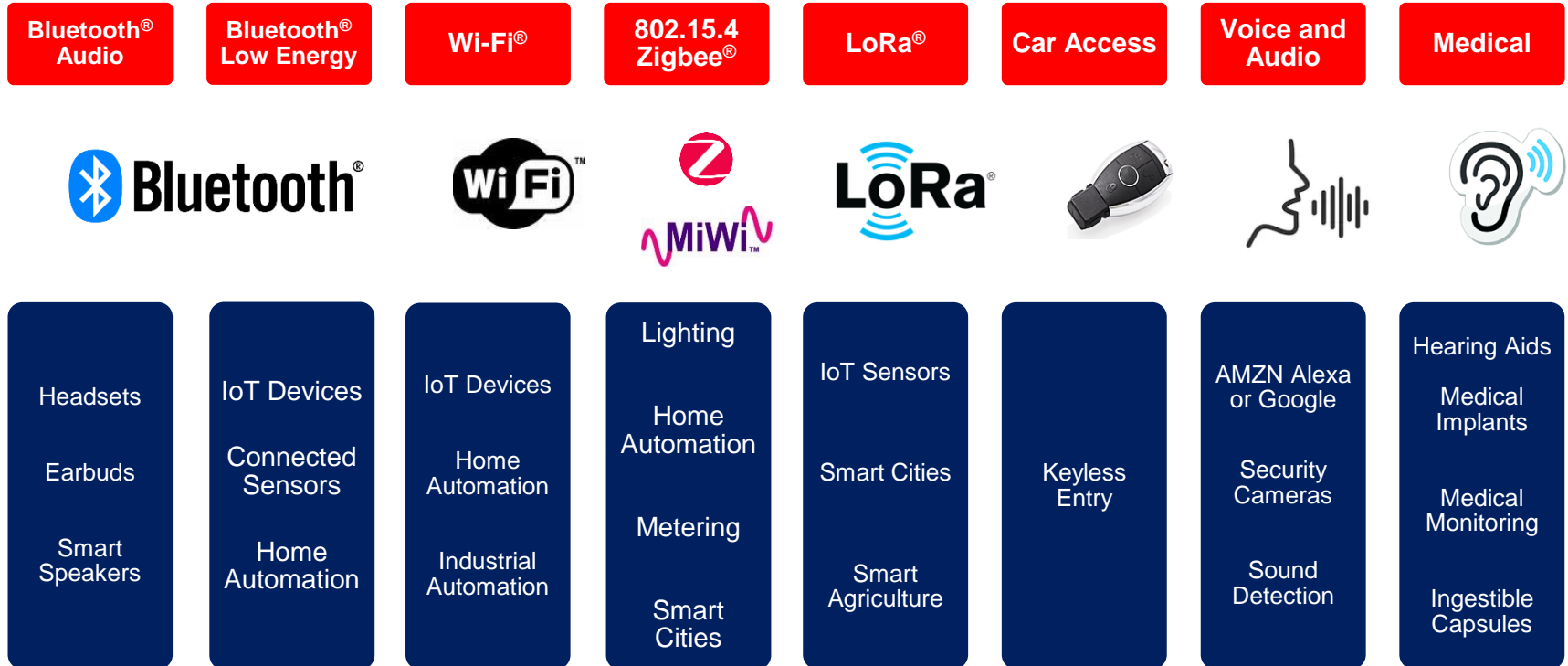
# Ethernet Physical Layer

Popular Products	Description	Product Web Page
LAN8710A/20A	Excellent ESD Protection levels without any external protection devices. Integrated DSP with adaptive equalizer. Integrated 1.2V Linear Regulator. Incorporates SMSC flexPWR. Uses a low cost 25MHz xtal for RMII. Lead free ROHS compliant packages: Commercial (0 to +70C) and Industrial (-40 to +85C) temperature supported	<a href="#">Click Here</a>
LAN8740A/1A/2A	Energy Efficient Ethernet 802.3az, Wake On LAN support (WoL), Cable Diagnostics, HP Auto-MDIX, Compliant with IEEE 802.3/802.3u, Integrated DSP with adaptive equalizer, Integrated 1.2V Linear Regulator, Uses a low cost 25MHz xtal for RMII Lead free ROHS compliant packages	<a href="#">Click Here</a>

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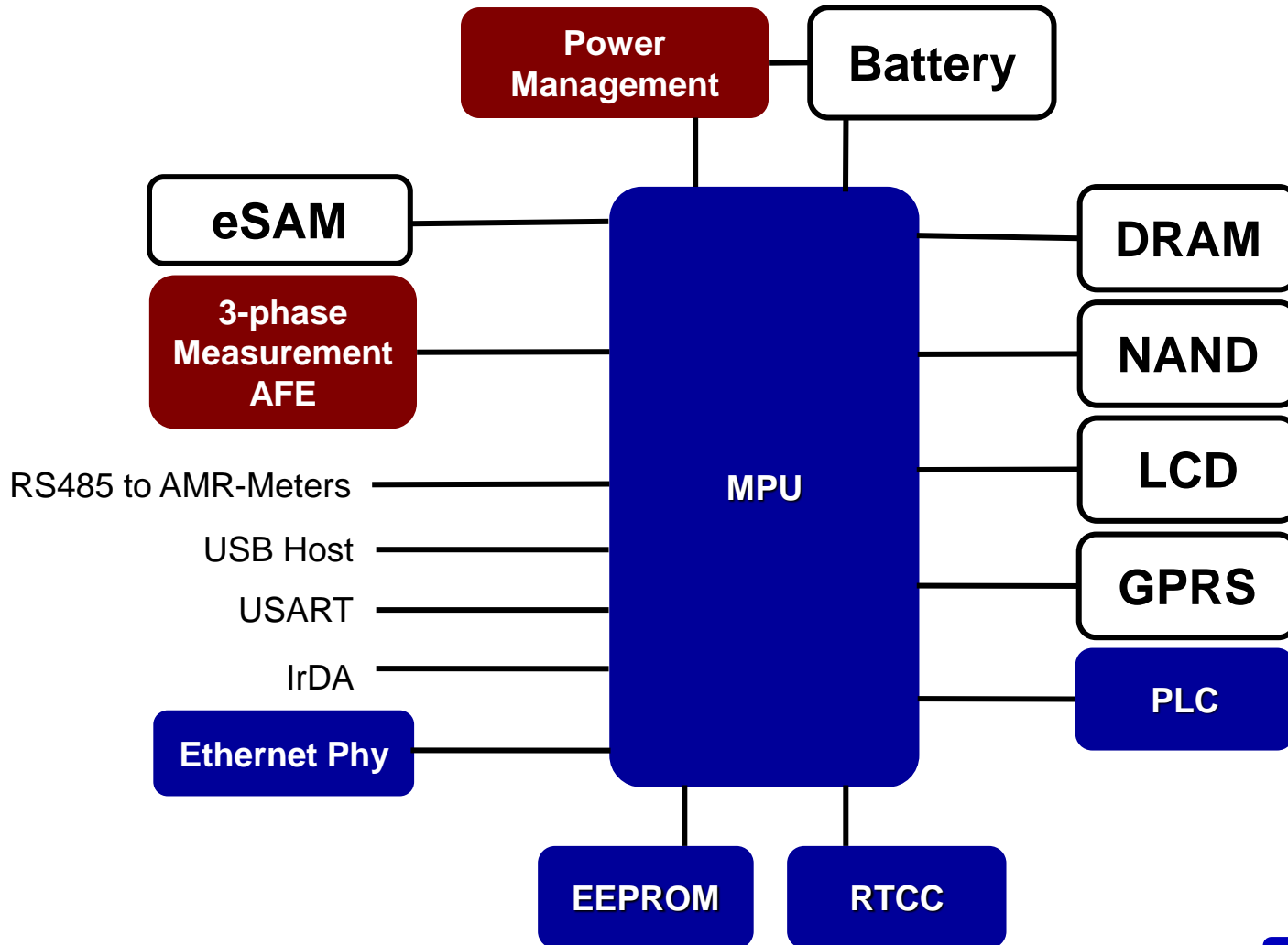


# Wireless Solutions



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# Metering Concentrator



- **Function:**

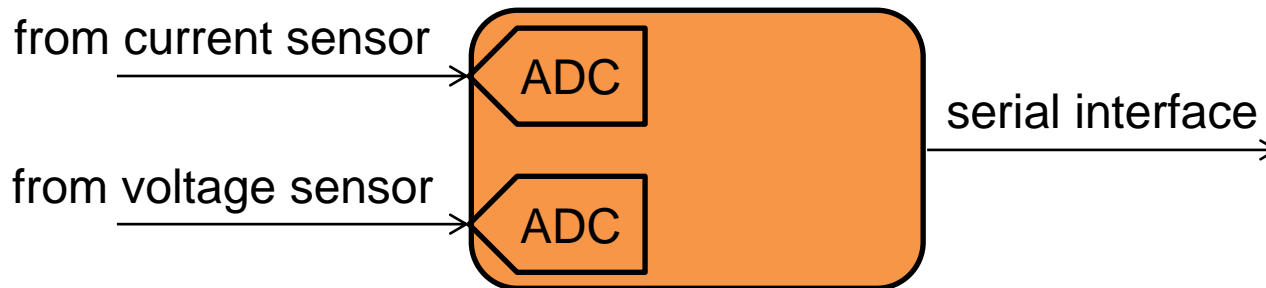
- Power calculations
- More powerful MCUs for (wireless) communications

- **Popular products:**

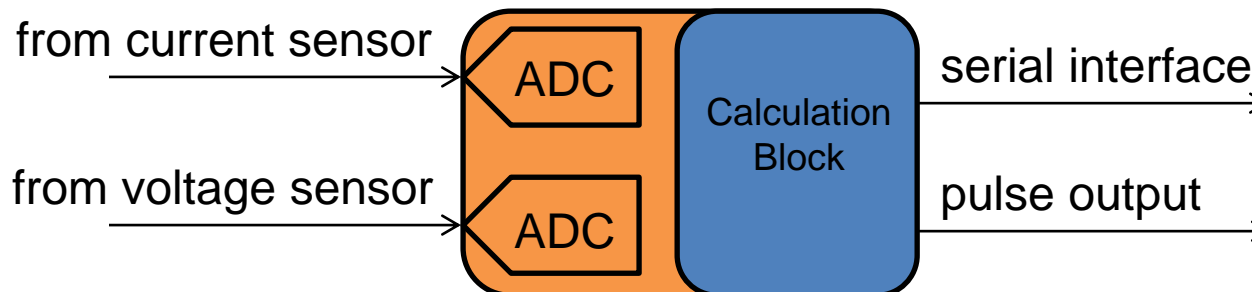
- PIC16F15XX
- PIC16F182X
- PIC18F65J90
- PIC24FJ128GA306, PIC24FJ128GA310
- PIC32 (advanced smart meters)
- ATSAM4Cx, ATSAM4CMx, ATSAM4CPx

# Energy Measurement Analog Front Ends

- **Energy Measurement AFEs provide the most flexible and highest accuracy solutions**



- **Energy Calculation ICs provide energy and power calculations, simplifying design**





# Energy Measurement Analog Front Ends

Part Number	# of ADCs	Power Measurement
MCP3918	1	1-Phase or 3-Phase (shunt-based)
MCP3910	2	1-Phase or 3-Phase (shunt-based)
MCP3911	2	1-Phase
MCP3919	3	1-Phase w/ Neutral
MCP3912	4	2-Phase (Dual/Split-Phase)
MCP3913	6	3-Phase
MCP3914	8	3-Phase w/ Neutral
ATSENSE101	3	1-Phase w/ Neutral
ATSENSE201(H)	4	2-Phase (Dual/Split-Phase)
ATSENSE301(H)	7	3-Phase w/ Neutral



# Energy Measurement Analog Front Ends

- Energy measurement AFEs enables the most flexible and highest accuracy solutions

Popular Products	Description	Product Web Page
MCP391X	The MCP391X AFE family provide up to eight simultaneously sampling Delta-Sigma Analog-to-Digital Converters (ADC), PGAs, phase delay compensation block, low-drift voltage reference, digital offset and gain errors calibration registers, and high-speed 20 MHz SPI interface. The family enables 0.1% typical active power measurement error over a 10000:1 dynamic range.	<a href="#">Click Here</a>
ATSENSE	The ATSENSE AFE family integrate three, four or seven simultaneously sampled Sigma-Delta ADCs, a high-precision voltage reference a programmable current signal amplification, a temperature sensor and an SPI interface. When used in combination with the ATSAM4C device family and metrology library, the ATSENSE exceeds ANSI C12.20-2002 and IEC 62053-22 metering accuracy classes of up to 0.2% over 3000:1 dynamic range	<a href="#">Click Here</a>

Winning Attributes

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# Energy Measurement AFE Winning Attributes

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## □ Attributes:

- MCP391X industry leading accuracy enables 0.1% active power measurement error (typ.) over a 10000:1 dynamic range, use of smaller shunt sensors, and reduction in calibration requirements
  - Programmable data rate up to 125 ksps allows device to run at low power or at high speed for advanced signal acquisition such as for harmonic analysis
- ATSENSE ideal companion chip with ATSAM4C dual cortex-M4 MCU family and metrology library



# EEPROM and RTCC

Popular Products	Description	Product Web Page
24AA512	<p>The 24AA512 is a 512Kb (64K x 8) Serial Electrically Erasable PROM (EEPROM), capable of operation across a broad voltage range (1.7V to 5.5V) and functional up to 125C. This ultra-reliable EEPROM has been developed for advanced, low-power applications and offers the benefit of over 1M Erase/Write cycles. This device also has a page write capability of up to 128 bytes of data. This 24AA512 is capable of both random and sequential reads up to the 512K boundary.</p>	<a href="#">Click Here</a>
MCP79410	<p>The MCP79410 I<sup>2</sup>C™ Compatible real-time clock/calendar (RTCC) is highly integrated with nonvolatile memory and advanced features that include a battery switchover circuit for backup power, a timestamp to log power failures and digital trimming for accuracy. Using a low-cost 32.768 kHz crystal or other clock source, time is tracked in either a 12-hour or 24-hour format with an AM/PM indicator and timing to the second, minute, hour, day of the week, day, month and year. In addition, non-volatile memory is included along with a Unique ID in a locked section of EEPROM.</p>	<a href="#">Click Here</a>



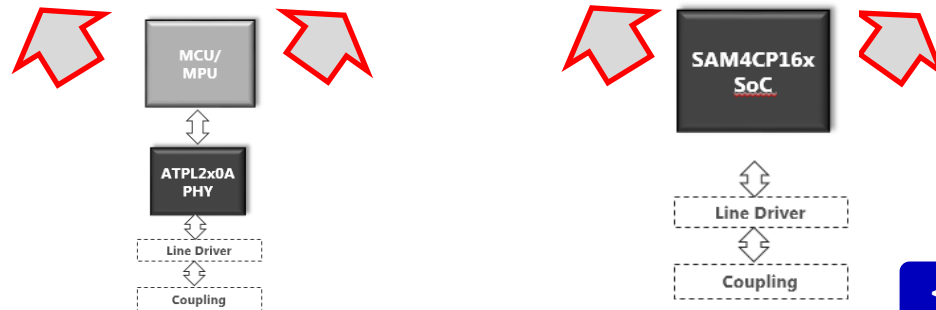


# Ethernet Physical Layer

Popular Products	Description	Product Web Page
LAN8710A/20A	Excellent ESD Protection levels without any external protection devices. Integrated DSP with adaptive equalizer. Integrated 1.2V Linear Regulator. Incorporates SMSC flexPWR. Uses a low cost 25MHz xtal for RMII. Lead free ROHS compliant packages: Commercial (0 to +70C) and Industrial (-40 to +85C) temperature supported	<a href="#">Click Here</a>
LAN8740A/1A/2A	Energy Efficient Ethernet 802.3az, Wake On LAN support (WoL), Cable Diagnostics, HP Auto-MDIX, Compliant with IEEE 802.3/802.3u, Integrated DSP with adaptive equalizer, Integrated 1.2V Linear Regulator, Uses a low cost 25MHz xtal for RMII Lead free ROHS compliant packages	<a href="#">Click Here</a>

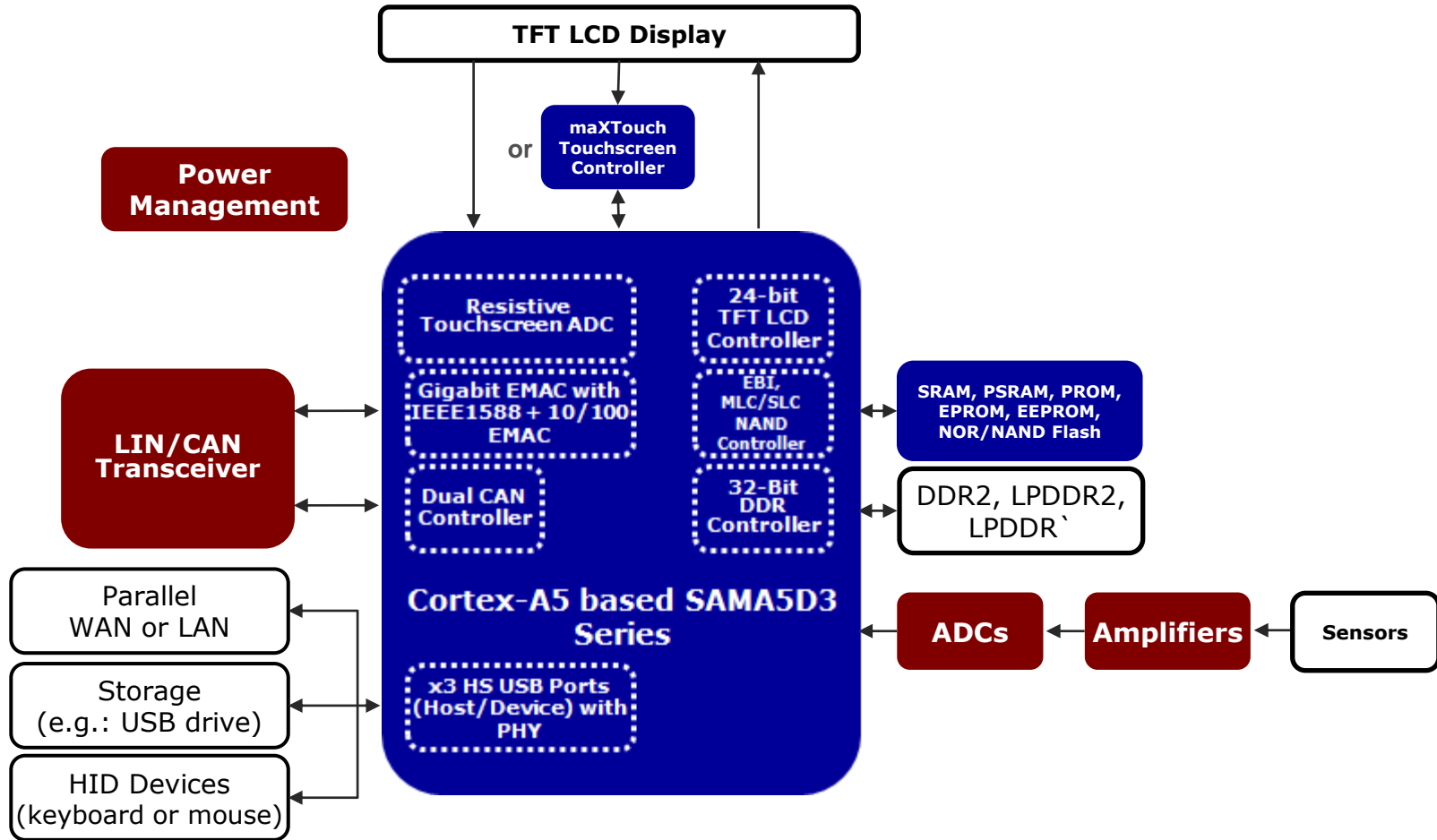
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	ATPL230A	ATPL250A	SAM4CP16B	SAM4CP16C
Standard	PRIME	G3	PRIME	G3
Band	< 500 kHz	< 500 kHz	< 500 kHz	< 500 kHz
Core	-	-	Dual Cortex-M4	Dual Cortex-M4
CPU Clock	-	-	120 MHz @core	120 MHz @core
Flash	-	-	1 MB	1 MB
SRAM	-	-	128+16+8 KB	128+16+8 KB
Package	LQFP80	LQFP80	LQFP176	LQFP176
Pin to Pin	YES		YES	
Availability	In production	In production	In production	In production



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# Industrial Control Panel



## □ Function: Adds touch input functionality

Popular Products	Description	Product Web Page
maxTouch® Touchscreen Controllers	The maXTouch touch controller family provides a leading projected capacitive technology for touchscreens and touch pads. It supports single-finger, multi-fingers and gloved-finger operation. Regardless of the operating environment—hot or cold, dry or wet, noisy power supply or strong radiating surrounding devices—maXTouch controllers are designed for robust and reliable operation without compromising touch performance.	<a href="#">Click Here</a>



# LIN/ CAN

	Suggested Products	Description	Product Web page
LIN	ATA663203	Stand-alone LIN LDO	<a href="#">LIN Design Center</a>
	ATA663211 ATA6662C/63/4	Globally automotive approved and qualified Stand-alone transceiver	
	ATA6670	Globally automotive approved and qualified Stand-alone Dual LIN transceiver	
	ATA663231/32/54/55 ATA6625, ATA6629/31 MCP2021A/2A/25	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator	
	MCP2050, ATA663431/54 ATA6628/30, ATA6622C/24C/26C	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + Window Watchdog Timer	
	ATA663331/54	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 2x Relay Driver	
	ATA664151	Globally automotive approved and qualified Stand-alone transceiver + 3.3V or 5V Voltage Regulator + 8x HV Switches	
	ATA6612C/13C/ 14Q/16C/17C ATSAMHA1G, PIC16F1829LIN	8-bit MCU with an integrated LIN transceiver + Voltage Regulator	
CAN, CAN FD	MCP2515	External CAN controller supports CAN V2.0B specification Can also interface with MCU with Standard SPI.	<a href="#">CAN Design Center</a>
	MCP25625	CAN 2.0 external Controller + Transceiver	
	MCP2561/2	Globally automotive approved and qualified, High Speed CAN Transceivers	
	MCP2561/2FD, ATA6560/61	Globally automotive approved and qualified CAN Flexible Data-rate (CAN FD) Transceivers	
	MCP25612FD	Dual CAN 2.0 or CAN FD Transceiver	

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# Memory

Popular Products	Description	Product Web Page
24AA256	<p>The 24AA256 is a 256Kb (32K x 8) Serial Electrically Erasable PROM (EEPROM), capable of operation across a broad voltage range (1.7V to 5.5V) and functional up to 125C. This ultra-reliable EEPROM has been developed for advanced, low-power applications and offers the benefit of over 1M Erase/Write cycles.</p>	<p><a href="#">Click Here</a></p>
23K256	<p>The 23K256 is a standalone Serial SRAM that offers designers an easy and inexpensive way to add more RAM to their application. These 8-pin low power, high performance SRAM devices have unlimited endurance and zero write times, making them ideal for applications involving continuous data transfer, buffering, data logging, audio, video, internet, graphics, and other math and data-intensive functions.</p>	<p><a href="#">Click Here</a></p>
SST26VF032B	<p>The SST26VF032B Serial Quad I/O (SQI) flash device utilizes a 4-bit multiplexed I/O serial interface to boost performance while maintaining the compact form factor of standard serial flash devices. Operating at frequencies reaching 104 MHz, the SST26VF032B enables minimum latency execute-in-place (XIP) capability without the need for code shadowing on an SRAM.</p>	<p><a href="#">Click Here</a></p>

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
SAMA5D	Operating at 850DMIPS at under 150mW, the Atmel SMART SAMA5D3 MPU is ideal for any high-performance, low-power and cost-sensitive industrial application.	<a href="#">Click Here</a>

# Analog-to-Digital Converter

- **Function: Convert analog signals from sensors to digital code**

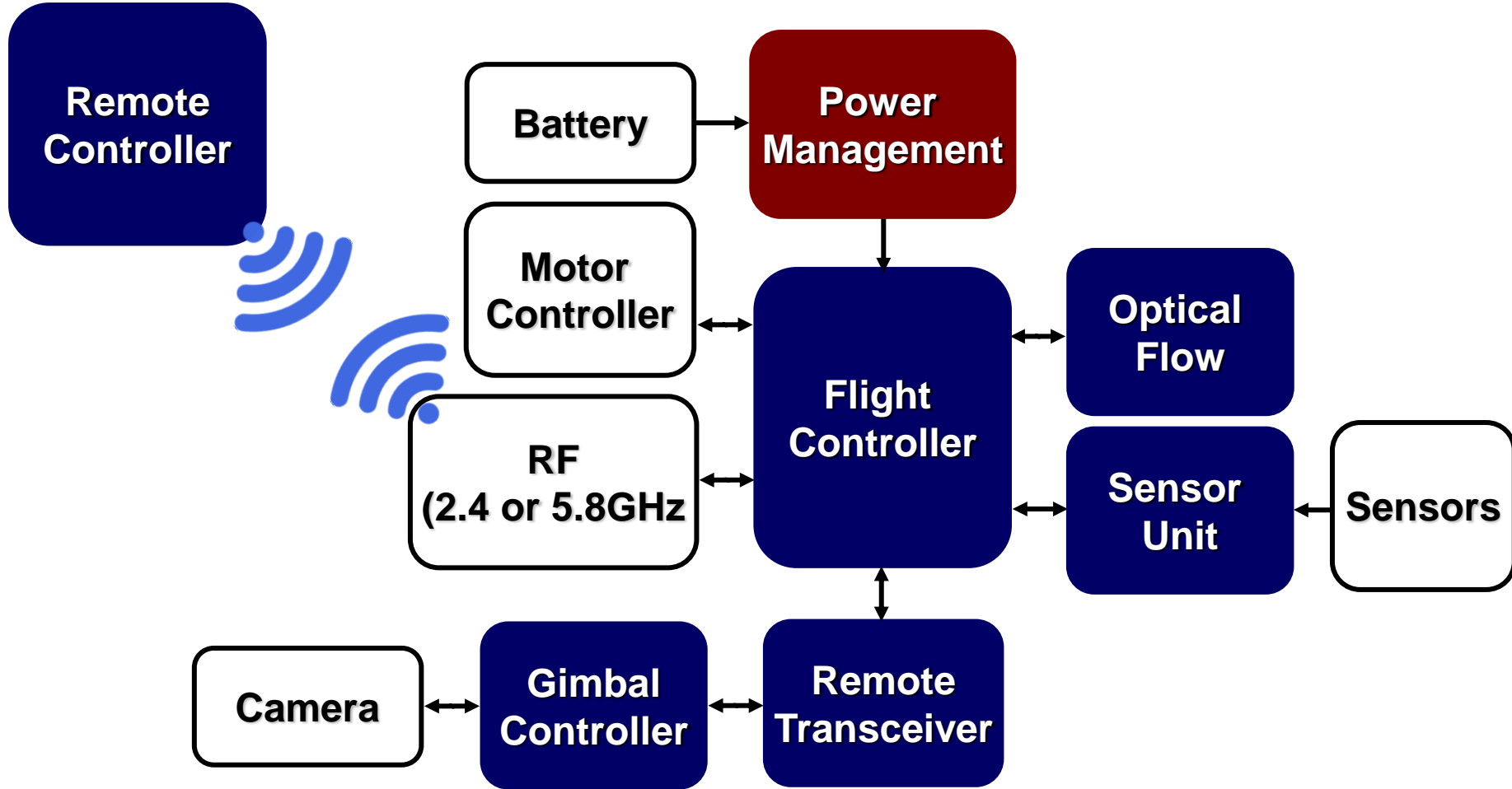
Popular Products	Description	Product Web Page
MCP3421	The MCP3421 is a single channel low-noise, high accuracy Delta-Sigma A/D converter with differential inputs and up to 18 bits of resolution in a small SOT-23-6 package. The device uses a two-wire I2C™ compatible serial interface and operates from a single power supply ranging from 2.7V to 5.5V.	<a href="#">Click Here</a>
MCP3551	MCP355X devices are 2.7V to 5.5V, 22-bit delta-sigma A/D converters. The family exhibit good linearity, high accuracy and low noise performance for applications where sensor measurements such as pressure are performed.	<a href="#">Click Here</a>



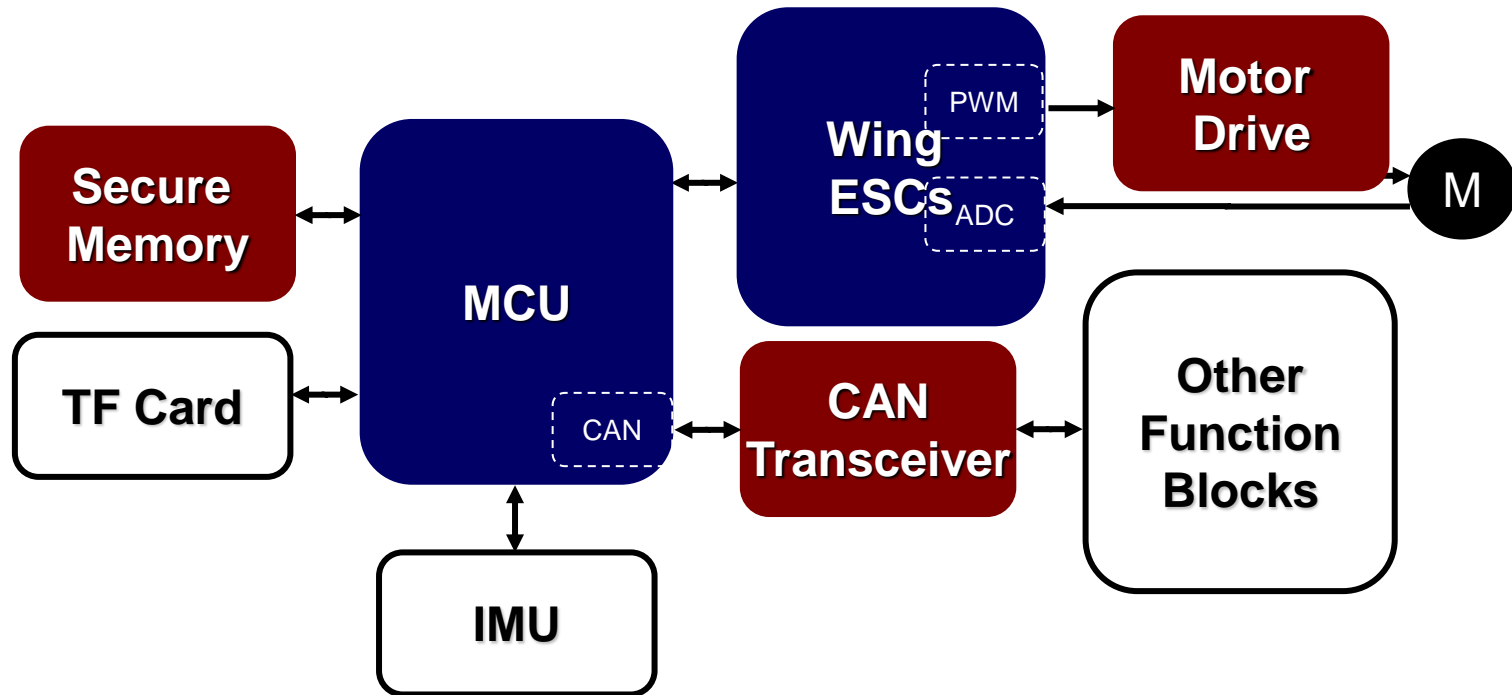
# Amplifiers

Popular Products	Description	Product Web Page
MCP603x	The MCP6031/2/3/4 op amps have a gain bandwidth of 10 kHz with a low typical operating current of 0.9 $\mu\text{A}$ and an offset voltage that is less than 150 $\mu\text{V}$ .	<a href="#">Click Here</a>
MCP6444	The MCP6444 is a quad general purpose op amp offering rail-to-rail input and output over the 1.8 to 6V operating range. This amplifier has a typical GBWP of 9 kHz with typ. quiescent current of 450 nA .	<a href="#">Click Here</a>
MCP60x	MCP601/2/3/4 (op amp) has a gain bandwidth product of 2.8 MHz with low typical operating current of 230 $\mu\text{A}$ and an offset voltage that is less than 2 mV.	<a href="#">Click Here</a>
MCP6Vxx Family of Zero-Drift Amplifiers	The MCP6Vxx provides high DC precision, including an offset voltage as low as 2 $\mu\text{V}$ and offset drift as low as 15nV/ $^{\circ}\text{C}$ maximum. They have low quiescent current, no 1/f noise and offer superior CMRR/PSRR performance. The family has an operating voltage as low as 1.6V and are available in small packages (SC-70 and DFN)	<a href="#">Click Here</a>
MCP6Nxx Family of Instrumentation Amplifiers	Microchip expanded its portfolio of amplifiers by first introducing the MCP6N11 the industry's first instrumentation amplifier featuring mCal technology and most recently introducing the MCP6N16 Zero-Drift instrumentation amplifier. <ul style="list-style-type: none"> <li>• Rail-to-Rail Input and Output</li> <li>• Gain Set by two (2) External Resistors</li> <li>• Enable/Vos Calibration Pin (MCP6N11)</li> <li>• Zero-Drift Architecture (MCP6N16)</li> <li>• Operating Voltage Range: 1.8V to 5.5V</li> </ul>	<a href="#">Click Here</a>

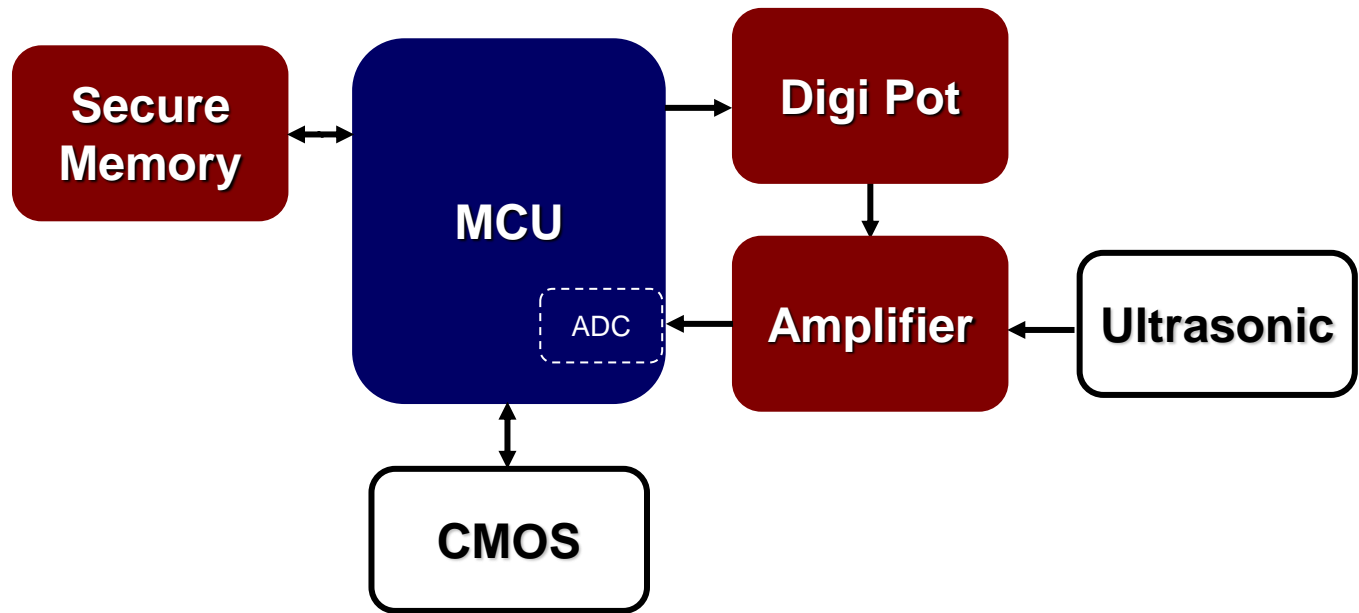
# Unmanned Aerial Vehicle (UAV)



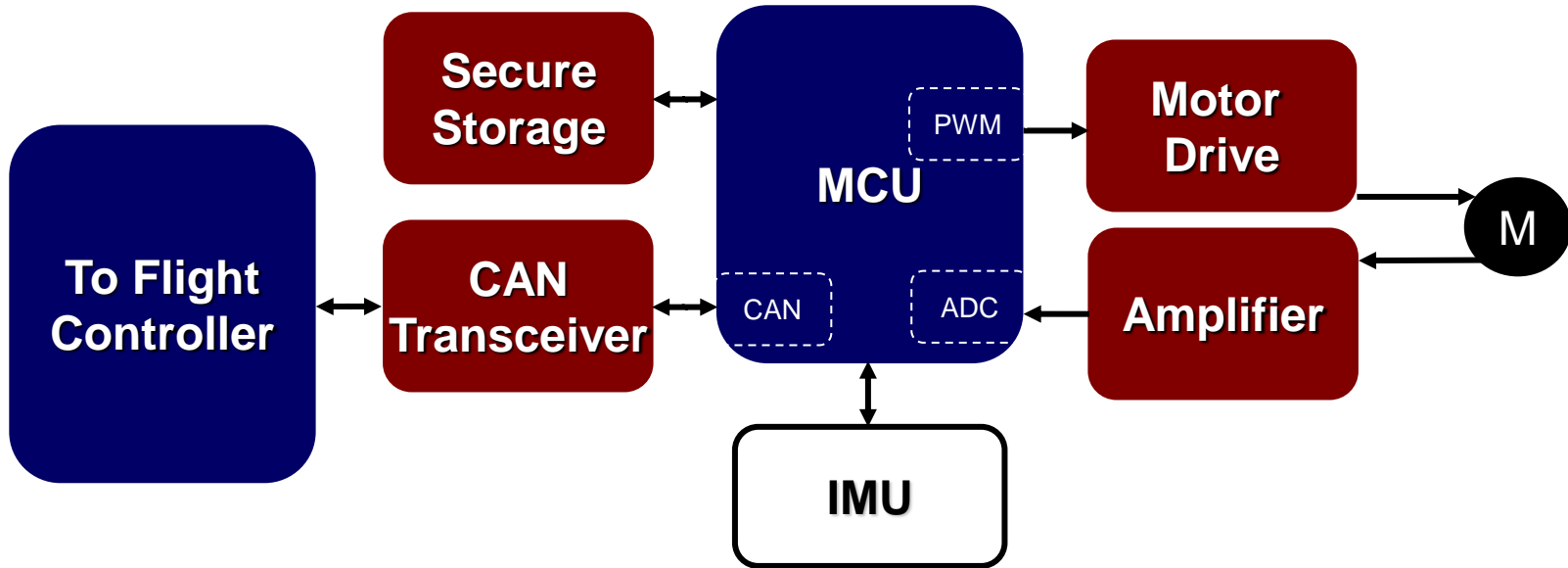
# UAV Flight Controller



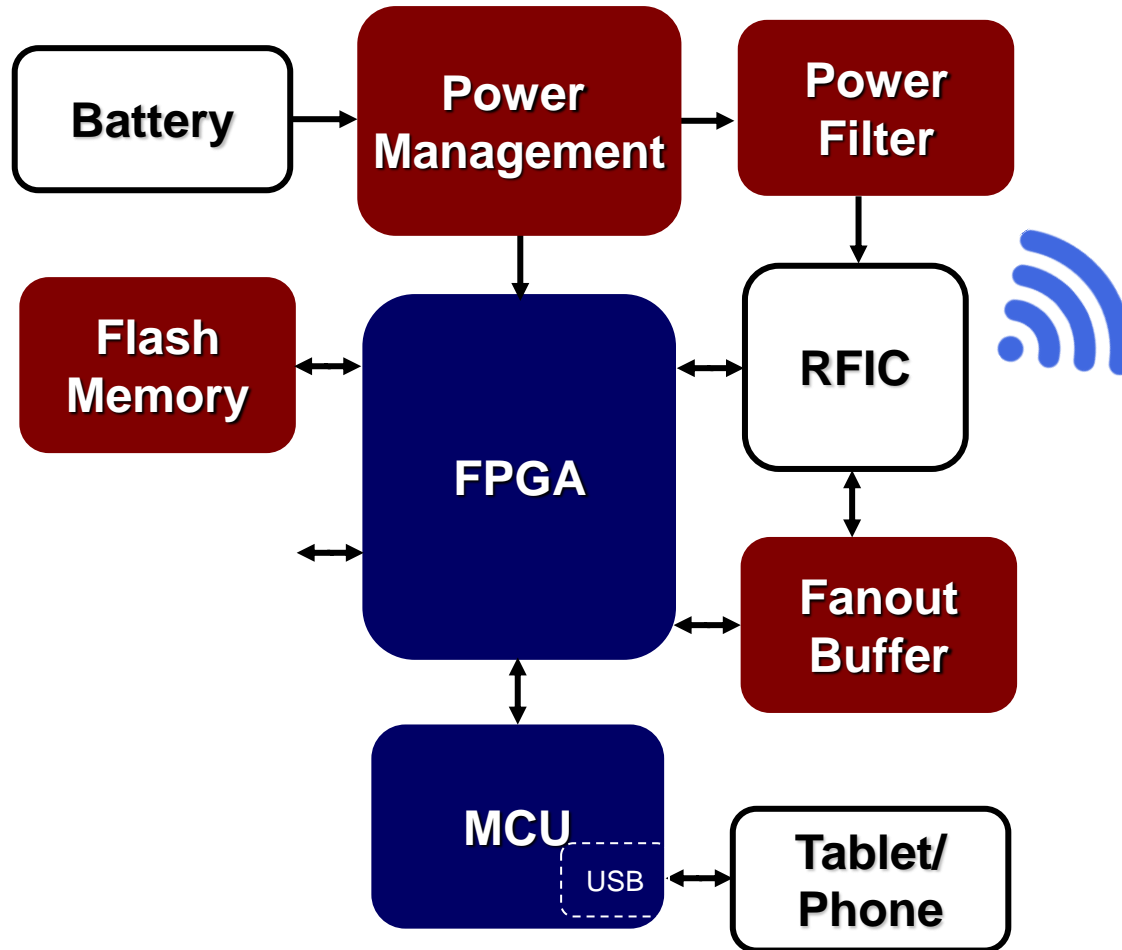
# UAV Optical Flow



# UAV Gimbal Controller



# UAV Remote Controller





# UAV Power Management

Popular Products	Description	Product Web Page
MIC26601	The MIC26601 is a 600kHz constant-frequency, synchronous buck regulator featuring a unique adaptive on-time control architecture. The MIC26601 operates over an input supply range of 4.5V to 28V and provides a regulated output of up to 6A of output current. The output voltage is adjustable down to 0.8V with a guaranteed accuracy of $\pm 1\%$ .	<a href="#">Click Here</a>
MIC26400	The MIC26400 is a 300kHz constant-frequency, synchronous buck regulator featuring a unique digitally modified adaptive ON-time control architecture. The MIC26400 operates over an input supply range of 4.5V to 26V and provides a regulated output at up to 5A of output current. The output voltage is adjustable down to 0.8V with a typical accuracy of $\pm 1\%$ .	<a href="#">Click Here</a>



# Secure Storage

Popular Products	Description	Product Web Page
ATAES132A	<p>The ATAES132A crypto element with hardware-based key storage is a very fast high-security serial 32K EEPROM device that enables authentication and confidential nonvolatile data storage. It is a direct drop-in for industry standard Serial EEPROMS, and supports the Advanced Encryption Standard (AES) cryptography standard.</p> <p>The AES-128 cryptographic engine operates in AES-CCM mode to provide authentication, stored data encryption/decryption, and Message Authentication Codes (MACs)</p>	<a href="#">Click Here</a>





# Flight Controller MCU

Popular Products	Description	Product Web Page
ATSAME70Q21A	<p>The Atmel   SMART SAME70Q21 devices are members of a flash microcontrollers family based on the high-performance 32-bit ARM Cortex-M7 processor with Floating Point Unit (FPU). These devices operate at up to 300MHz and feature up to 2048 Kbytes of Flash, up to 384 Kbytes of multi-port SRAM and configurable Instruction and Data Tightly Couple Memories to leverage the advanced DSP capabilities of the core. SAME70Q21 features multiple networking/connectivity peripherals, including CAN-FD interface and one 10/100Mbps Ethernet MAC with specific hardware support for Audio Video Bridging (AVB). Additional communication interfaces include a HS USB Host and Device, a HS SDCard/SDIO/MMC interface, USARTs, SPIs and multiple TWIs. Analog features include dual 2Msps 12-bit ADCs with analog front end offering offset and gain error correction, and 2Msps 12-bit DAC.</p>	<a href="#">Click Here</a>



# Wing ESCs MCU

Popular Products	Description	Product Web Page
ATMEGAxx8	Ideal for Sensorless BLDC, megaAVR 8-bit AVR microcontrollers offer substantial program and data memories with performance up to 20 MIPS. Meanwhile, innovative Atmel picoPower® technology minimizes power consumption.	<a href="#">Click Here</a>
dsPIC33EP32MC204	Ideal for Sensorless FOC/BLDC, Microchip's dsPIC33E family of digital signal controllers (DSCs) features a 70 MIPS dsPIC® DSC core with integrated DSP and enhanced on-chip peripherals. These DSCs enable the design of high-performance, precision motor control systems that are more energy efficient, quieter in operation, have a great range and extended life. They can be used to control brushless DC, permanent magnet synchronous, AC induction and stepper motors.	<a href="#">Click Here</a>

# Motor Drive

Popular Products	Description	Product Web Page
MIC4607	The MIC4607 is an 85V, three-phase MOSFET driver. The MIC4607 features a fast (35ns) propagation delay time and 20ns driver rise/fall times for a 1nF capacitive load. TTL inputs can be separate high- and low-side signals or a single PWM input with high and low drive generated internally. High- and low-side outputs are guaranteed to not overlap in either mode.	<a href="#">Click Here</a>
MCP87050	The MCP87000 family of high-speed MOSFETs have been designed to optimize the trade-off between ultra-low On-state resistance ( $R_{ds-on}$ ) and Gate Charge ( $Q_g$ ) to maximize power conversion efficiency in switched mode power supplies.	<a href="#">Click Here</a>



# CAN Transceiver

Popular Products	Description	Product Web Page
ATA6570	The ATA6570 is a standalone high speed CAN-FD transceiver that interfaces a Controller Area Network (CAN) protocol controller and the physical two wire CAN bus designed for high speed CAN applications in the automotive environment. It provides local and enhanced remote wake-up capabilities.	<a href="#">Click Here</a>



# Secure Storage

Popular Products	Description	Product Web Page
ATSHA204A	The ATSHA204A is a full turnkey security device. It includes a 4.5Kb EEPROM divided into 16 slots. This array can be used for storage of keys, miscellaneous read/write, read-only, password or secret data, and consumption tracking. Access to the various sections of memory can be restricted in a variety of ways and then the configuration locked to prevent changes.	<a href="#">Click Here</a>



# Digital Potentiometer

Popular Products	Description	Product Web Page
MCP4017	Used to adjust gain and trim, the MCP4017/8/9 devices are volatile, 7-bit (128 wiper steps) digital potentiometers with an I2C™ Compatible interface. This family offers 5kΩ, 10kΩ, 50kΩ and 100kΩ end-to-end resistance values and is available in miniature 5 or 6 lead SC-70 packaging with potentiometer or rheostat pinouts.	<a href="#">Click Here</a>



# Operational Amplifier

Popular Products	Description	Product Web Page
MCP607x	The MCP607x op amps have low input offset voltage ( $\pm 150 \mu\text{V}$ max) and rail-to-rail input and output operation. They are unity gain stable and with a gain bandwidth product of 1.2 MHz (typical). These devices operate with a single supply voltage as low as 1.8V, while drawing low quiescent current per amplifier (110 $\mu\text{A}$ typical).	<a href="#">Click Here</a>
MCP6V6x	The MCP6V6x family of operational amplifiers provides input offset voltage correction for very low offset ( $\pm 150 \mu\text{V}$ , max) and offset drift (15 nV/ $^{\circ}\text{C}$ ) with enhanced EMI rejection. These devices provide a gain bandwidth product of 1 MHz, are unity gain stable, have no 1/f noise, and provide superior CMRR and PSRR performance. These products operate with a single supply voltage as low as 1.8V with a quiescent current per amplifier of only 130 $\mu\text{A}$ max.	<a href="#">Click Here</a>



# Sensor Unit MCU & Op Amps

Popular Products	Description	Product Web Page
ATSAMD20	A rich set of peripherals, flexibility and ease-of-use combined with low power consumption define the SAM D20 ARM Cortex-M0+ based microcontroller series, which run up to 48MHz with up to 256KB Flash and 32KB SRAM.	<a href="#">Click Here</a>
MCP607x	The MCP607x op amps have low input offset voltage ( $\pm 150 \mu\text{V}$ max) and rail-to-rail input and output operation. They are unity gain stable and with a gain bandwidth product of 1.2 MHz (typical). These devices operate with a single supply voltage as low as 1.8V, while drawing low quiescent current per amplifier (110 $\mu\text{A}$ typical).	<a href="#">Click Here</a>
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# Remote Transceiver MCU

Popular Products	Description	Product Web Page
ATATSAMC21	A rich set of peripherals, flexibility and ease-of-use combined with 2.7V – 5.5V operating voltage define the SAM C21 ARM Cortex-M0+ based microcontroller series, which run up to 48MHz with up to 256KB Flash and 32KB SRAM.	<a href="#">Click Here</a>

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# Gimbal Controller MCU

Popular Products	Description	Product Web Page
ATSAME70N19A	<p>The SMART SAME70N19 devices are members of a flash microcontrollers family based on the high-performance 32-bit ARM Cortex-M7 processor with Floating Point Unit (FPU). These devices operate at up to 300MHz and feature up to 512 Kbytes of Flash, up to 256 Kbytes of multi-port SRAM and configurable Instruction and Data Tightly Couple Memories to leverage the advanced DSP capabilities of the core. SAME70N19 features multiple networking/connectivity peripherals, including CAN-FD interface and one 10/100Mbps Ethernet MAC with specific hardware support for Audio Video Bridging (AVB). Additional communication interfaces include a HS USB Host and Device, a HS SDCard/SDIO/MMC interface, USARTs, SPIs and multiple TWIs. Analog features include dual 2Msps 12-bit ADCs with analog front end offering offset and gain error correction, and 2Msps 12-bit DAC.</p>	<a href="#">Click Here</a>
dsPIC33EP32MC504/128MC504	<p>dsPIC33E family of digital signal controllers (DSCs) features a 70 MIPS dsPIC® DSC core with integrated DSP and enhanced on-chip peripherals. These DSCs enable the design of high-performance, precision motor control systems that are more energy efficient, quieter in operation, have a great range and extended life. They can be used to control brushless DC, permanent magnet synchronous, AC induction and stepper motors. These devices are also ideal for high-performance general purpose applications.</p>	<a href="#">Click Here</a>



# Secure Storage

Popular Products	Description	Product Web Page
ATSHA204A	The ATSHA204A is a full turnkey security device. It includes a 4.5Kb EEPROM divided into 16 slots. This array can be used for storage of keys, miscellaneous read/write, read-only, password or secret data, and consumption tracking. Access to the various sections of memory can be restricted in a variety of ways and then the configuration locked to prevent changes.	<a href="#">Click Here</a>



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# Motor Drive

<b>Popular Products</b>	<b>Description</b>	<b>Product Web Page</b>
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MCP87050	The MCP87000 family of high-speed MOSFETs have been designed to optimize the trade-off between ultra-low On-state resistance ( $R_{ds-on}$ ) and Gate Charge ( $Q_g$ ) to maximize power conversion efficiency in switched mode power supplies.	<a href="#">Click Here</a>



# CAN Transceiver

Popular Products	Description	Product Web Page
ATA6570	The ATA6570 is a standalone high speed CAN-FD transceiver that interfaces a Controller Area Network (CAN) protocol controller and the physical two wire CAN bus designed for high speed CAN applications in the automotive environment. It provides local and enhanced remote wake-up capabilities.	<a href="#">Click Here</a>



# Remote Controller Power Management

Popular Products	Description	Product Web Page
MIC45205	The MIC45205 is a synchronous step-down regulator module, featuring a unique adaptive ON-time control architecture. The module incorporates a DC-to-DC controller, power MOSFETs, bootstrap diode, bootstrap capacitor, and an inductor in a single package; simplifying the design and layout process for the end user.	<a href="#">Click Here</a>
MIC33153	The MIC33153 is a high-efficiency 4MHz 1.2A synchronous buck regulator with an internal inductor, HyperLight Load® mode, Power Good (PG) output indicator, and programmable soft start. HyperLight Load® provides very high efficiency at light loads and ultra-fast transient response which makes the MIC33153 perfectly suited for supplying processor core voltages.	<a href="#">Click Here</a>
MIC94305	The MIC94305 is an integrated load switch that incorporates Ripple Blocker™ active filter technology. The MIC94305 provides high-frequency ripple attenuation (switching noise rejection) for applications where switching noise cannot be tolerated by sensitive downstream circuits, such as RF applications.	<a href="#">Click Here</a>



# Remote Controller Power Filter

Popular Products	Description	Product Web Page
MIC94305	The MIC94305 is an integrated load switch that incorporates Ripple Blocker™ active filter technology. The MIC94305 provides high-frequency ripple attenuation (switching noise rejection) for applications where switching noise cannot be tolerated by sensitive downstream circuits, such as RF applications.	<a href="#">Click Here</a>

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# Remote Controller Flash Memory

Popular Products	Description	Product Web Page
SST26VF032B	The SST26VF032B 32 Mbit Serial Quad I/O (SQI) flash device utilizes a 4-bit multiplexed I/O serial interface to boost performance while maintaining the compact form factor of standard serial flash devices	<a href="#">Click Here</a>

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# Remote Controller MCU

Popular Products	Description	Product Web Page
ATSAMS70	<p>The SMART SAM S series of general-purpose Flash microcontrollers (MCUs) are based on the high-performance 32-bit ARM® Cortex®-M7 RISC processors with floating point unit (FPU). They operate at a maximum speed of 300MHz and feature up to 2048KB of Flash, dual 16KB of cache memory and up to 384KB of SRAM. An extensive peripheral set includes High Speed USB Host and Device plus phy, up to 8 UARTs, I2S, SD/MMC interface, a CMOS camera interface, system control and analog interfaces.</p>	<a href="#">Click Here</a>



# Remote Controller Fanout Buffer

Popular Products	Description	Product Web Page
PL133-XX	The PL133 are a family of an advanced fanout buffers designed for high performance, low-power, small form-factor applications. The PL133-XX accepts a reference clock input of 1MHz to 150MHz and produces multiple outputs of the same frequency. Reference clock inputs may be LVCMOS or sine-wave signals (the inputs are internally AC-coupled).	<a href="#">Click Here</a>

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## Key Features:

- Featuring PD69208T4, PD69210
- IEEE 802.3af/at/bt Type 3 standard compliant
- Eight 2-pair 30W ports
- LED stream
- UART / USB host interface
- Two gangs (each contains 4 RJ45 connectors)
- Switch domain isolated from PoE domain
- Switch domain USB interface
- PoE controller manual reset
- LED status indication for all ports (LED stream)
- Requires single power source only
- 0°C to 40°C working temperature
- RoHS compliant

## Kit content:

- PD-IM-7618T4 evaluation board
- Design files
  - Schematics
  - [User guide](#)
  - Featured IC datasheet
  - Layout and assembly files
- Software package
  - Communication protocol
  - Graphics user interface
  - API
  - S19

## Description:

The PD-IM-7618T4 evaluation board is developed based on PD69208T4 PSE manager and PD69210 controller, and demonstrates the operation of an eight 2-pair port system. The evaluation system provides designers with the required environment to evaluate the performance and implementation of PD69208T4 (eight 2-pair ports) PoE manager and PD69210 PoE controller. The included firmware demonstrates 2-pair operation. The evaluation board enables PoE designers to evaluate Microchip's PoE solution with flexibility and easy configuration.





# PD-IM-7618T4H PoE PSE EVB

Online  
Datasheet

## Key Features:

- Featuring 2xPD69208T4, PD69210
- IEEE 802.3af/at/bt Type 4 standard compliant
- Eight 4-pair 90W ports
- LED stream
- UART / USB host interface
- Two gangs (each contains 4 RJ45 connectors)
- Switch domain isolated from PoE domain
- Switch domain USB interface
- PoE controller manual reset
- LED status indication for all ports (LED stream)
- Requires single power source only
- 0°C to 40°C working temperature
- RoHS compliant

## Kit content:

- PD-IM-7618T4H evaluation board
- Design files
  - Schematics
  - [User guide](#)
  - Featured IC datasheet
  - Layout and assembly files
- Software package
  - Communication protocol
  - Graphics user interface
  - API
  - S19

## Description:

The PD-IM-7618T4H evaluation board is developed based on two PD69208T4 PSE managers and PD69210 controller, and demonstrates the operation of an eight 4-pair port system. The evaluation system provides designers with the required environment to evaluate the performance and implementation of two PD69208T4 (eight 4-pair ports) PoE managers and PD69210 PoE controller. The included firmware demonstrates 4-pair operation. The evaluation board enables PoE designers to evaluate Microchip's PoE solution with flexibility and easy configuration.



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The SAM R34 Xplained Pro is a hardware platform designed to evaluate the SAM R34 family of LoRa<sup>®</sup> devices.

This FCC, ISED and RED certified board is not only an evaluation platform but also an excellent reference design for developing SAMR34 based LoRa end-node applications.

This kit is supported by the Atmel Studio, an integrated development platform, which provides predefined application examples. The kit also provides easy access to various features of the ATSAMR34J18B device and offers additional peripherals to extend the features of the board and ease the development of custom designs.

### Reference links

- To get started with software development, download and install [Atmel Studio 7](#)
- For software examples, update to ASF 3.44 and above. For more information about ASF v3, click [here](#).
- To access SAM R34 Xplained Pro Design documentation, refer to SAM R34 Chip-down design package in the documents section on the [SAM R34/35 product pages](#)

SAM R34/35 SiP devices come in six device variants with different memory/interface options. For more information on specific SAM R34/35 device variants, refer to the product variant below.

[ATSAMR34J18](#)

[ATSAMR34J17](#)

[ATSAMR34J16](#)

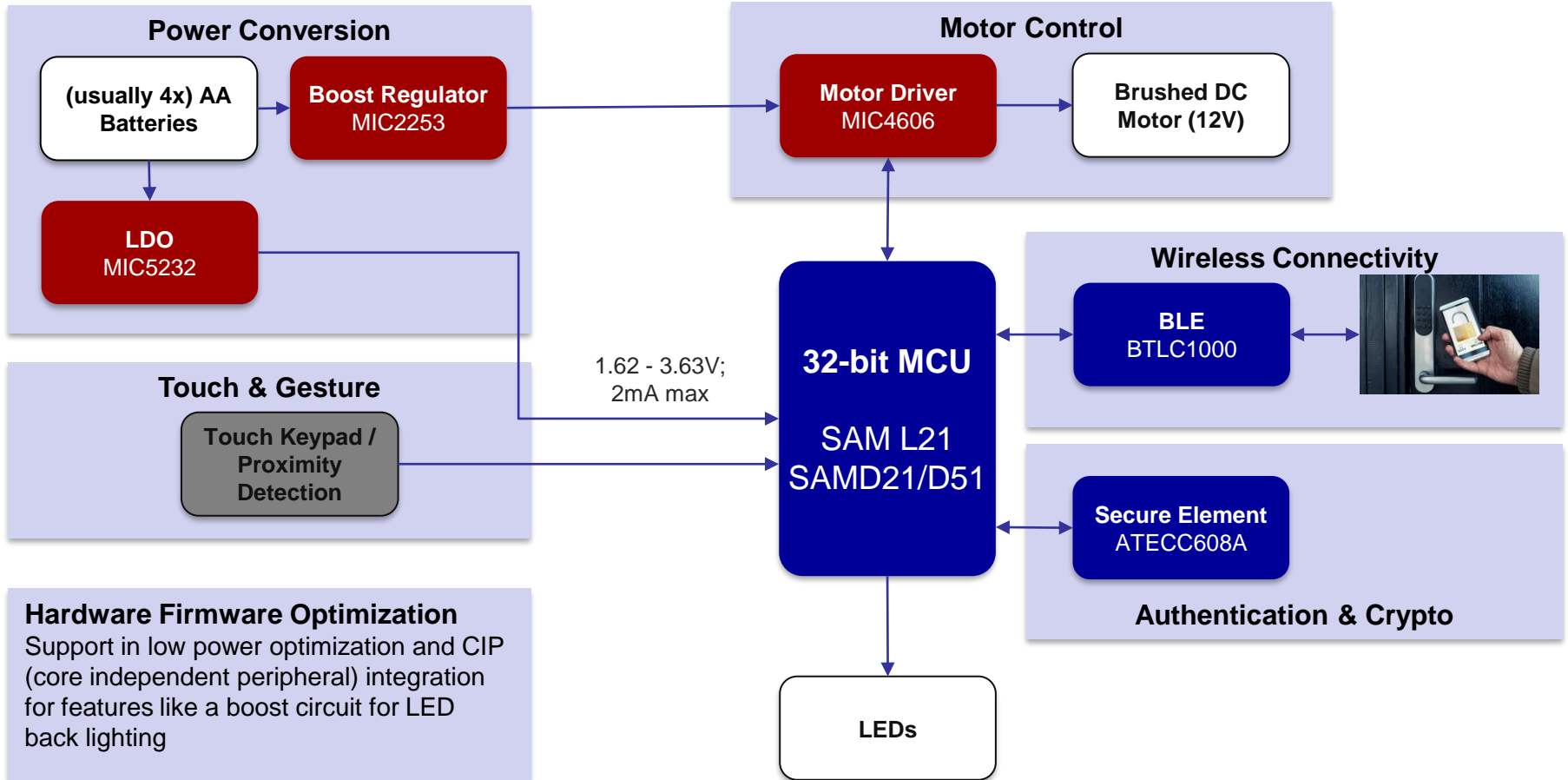
[ATSAMR35J18](#)

[ATSAMR35J17](#)

[ATSAMR35J16](#)



# Smart Home Lock



# 32-Bit MCU

Components	Product Family	Features
32-bit MCU	<u>SAM L21</u>	Ultra-low power: The <u>SAM L21</u> family of Arm Cortex-M0+ based MCUs can help extend the battery life of a smart lock design
	<u>SAM D21</u>	Low cost: The <u>SAM D21</u> family of Arm Cortex-M0+ based MCUs can significantly reduce the system's cost
	<u>SAM D51</u>	High performance: The <u>SAM D51</u> family of Arm Cortex-M4 based MCUs can quickly execute complex authentication algorithms to provide responsive and speedy unlocking of the door





# BLE Components

Components	Product Family	Features
Bluetooth® Low Energy (BLE)	<u>ATBTLC1000</u>	<ul style="list-style-type: none"><li>• The <u>ATBTLC1000</u> is an ultra-low-power Bluetooth Low Energy System on Chip (SoC) with an integrated Arm® Cortex®-M0 based 32-bit microcontroller, transceiver, modem, MAC, PA, TR switch and Power Management Unit (PMU).</li><li>• This module enables connectivity between the lock and your smartphone to unlock the door when the phone is in the immediate vicinity.</li></ul>



# Secure Element

Components	Product Family	Features
Secure Element	<u>ATECC608A</u>	<ul style="list-style-type: none"><li>• Secure Element JIL High rated with secure key storage</li><li>• Cryptographic co-processor with secure hardware-based key storage</li><li>• Protected storage for up to 16 Keys, certificates or data</li><li>• ECDH: FIPS SP800-56A Elliptic Curve Diffie-Hellman</li><li>• NIST standard P256 elliptic curve support</li><li>• SHA-256 and HMAC hash including off-chip context save/restore</li><li>• AES-128: encrypt/decrypt, galois field multiply for GCM</li></ul>

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# Boost Regulator

Components	Product Family	Features
Boost Regulator	<a href="#">MIC2253</a>	<ul style="list-style-type: none"><li>• 3.5A minimum switch current</li><li>• 1.245V <math>\pm</math>3% feedback voltage</li><li>• 2.5V to 10V input voltage</li><li>• Output over-voltage protection (OVP)</li><li>• Externally programmable soft-start</li><li>• Output voltage up to 30V (max)</li></ul>



# Motor Driver with Integrated FET

Components	Product Family	Features
Motor Driver with Integrated FET	<u>MIC4606</u>	<ul style="list-style-type: none"><li>• Dual <u>full-bridge motor drivers</u> offer a wide operating voltage range to drive bipolar stepper motors or provide bidirectional control of two DC motors</li><li>• 5.5V to 16V gate drive supply voltage range</li><li>• Advanced adaptive dead time</li><li>• Intelligent shoot-through protection</li><li>• MIC4606-1: 4 Independent TTL inputs</li><li>• MIC4606-2: 2 PWM inputs</li><li>• Enable input for on/off control</li></ul>

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# Low-Dropout Voltage Regulator/Buck Regulator

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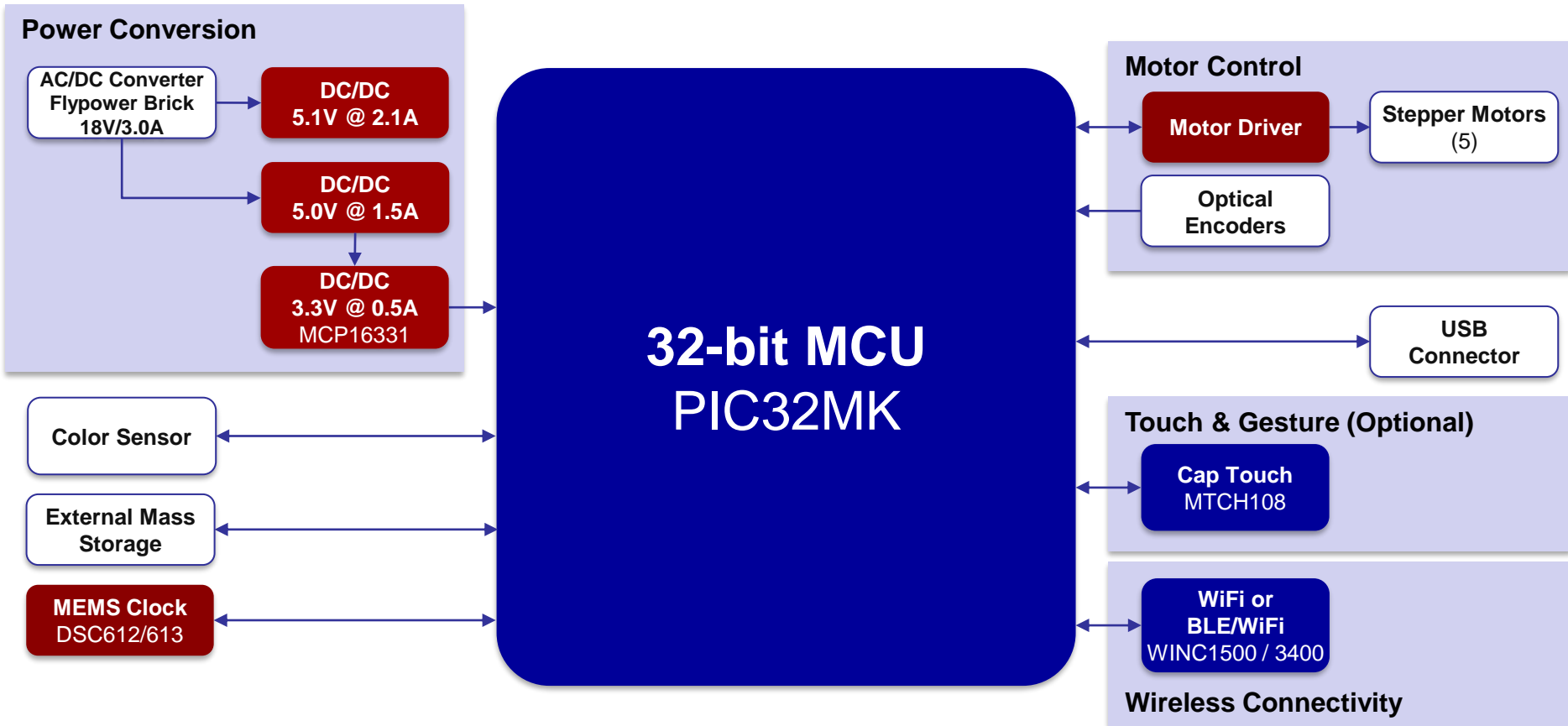
Components	Product Family	Features
LDO/Buck Regulator	<u>MIC5232</u>	<ul style="list-style-type: none"><li>• An ultra-low quiescent current, low-dropout linear regulator can operate from a single-cell lithium-ion battery</li><li>• It consumes only 1.8 <math>\mu</math>A of quiescent current while providing 10 mA of output current and low output noise, which makes it well suited for stand-by or keep-alive applications.</li></ul>

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# Die Cutting Machine



# 32-Bit MCU

Components	Product Family	Features
32-bit MCU	<u>PIC32MK</u>	<ul style="list-style-type: none"> <li>• Hardware QEI modules for up to six motors enables multi-axis precision cutting speed with 20% more MIPS compared to the original CPU speed</li> <li>• Increased number of PWMs, allowing hardware polarity switching (for motor control)</li> <li>• Double precision FPU providing high precision computational abilities.</li> <li>• Advanced Analog:               <ul style="list-style-type: none"> <li>○ 7x 12-bit 3.7 Msps ADC (up to 20 Msps in interleaved mode), up to 42ch</li> <li>○ Up to 3x 12-bit 1 Msps DAC</li> <li>○ 5x AC; 4x op amp</li> <li>○ Control Peripherals: motor control PWMs</li> </ul> </li> <li>• Connectivity: FS USB, CAN</li> <li>• Suited for industrial and <u>motor control</u> applications</li> </ul>

# Wi-Fi Components

Components	Product Family	Features
Wireless / Wi-Fi	<u>WINC3400</u> (BLE/WiFi)	<ul style="list-style-type: none"> <li>• IEEE 802.11 b/g/n 20MHz (1x1) Wi-Fi plus Bluetooth 5 Core Specification, Internet of Things (IoT) network controller module</li> <li>• It is an add-on to existing microcontroller (MCU) solutions, offering Wi-Fi® and Bluetooth® Low Energy (BLE) network capabilities through a SPI-to-Wi-Fi interface</li> <li>• Security protocols supported: WPA/WPA2 Personal, WPA/WPA2 Enterprise, TLS, SSL</li> <li>• Bluetooth 5 Certified</li> </ul>
	<u>WINC1500</u> (WiFi)	<ul style="list-style-type: none"> <li>• Single-band 2.4GHz b/g/n IoT Network Controller</li> <li>• Security protocols supported: WPA/WPA2 Personal and Enterprise, TLS, SSL</li> </ul>



# Motor Control Driver

Components	Product Family	Features
Motor Control Driver	<u>MTS2916A</u>	<ul style="list-style-type: none"> <li>• Dual full-bridge PWM motor driver IC; the two output bridges can sustain 40V and deliver up to 750mA of continuous current each</li> <li>• able to drive both windings of a bipolar stepper motor or bi-directionally control two DC motors</li> <li>• Internal fixed Toff time PWM current control</li> <li>• Built-in protection diodes</li> </ul>
	<u>MTS62C19A</u>	<ul style="list-style-type: none"> <li>• 3-Phase Brushless DC Sinusoidal Sensorless Fan Motor Driver</li> <li>• Able to drive both windings of a bipolar stepper motor or bi-directionally control two DC motors.</li> <li>• Load voltage supply range: 10V to 40V</li> <li>• Output current up to 750mA (each bridge)</li> </ul>

# Touch Controller

Components	Product Family	Features
Cap Touch (optional)	<u>MTCH108</u>	<ul style="list-style-type: none"><li>• An 8 channels Proximity/Touch controller with 8 simple digital outputs (proximity/key/slider).</li><li>• High Signal to Noise Ration (SNR)</li><li>• Moisture/ Water resistance</li><li>• High Signal to Noise Ration (SNR)</li><li>• Moisture/ Water resistance</li></ul>

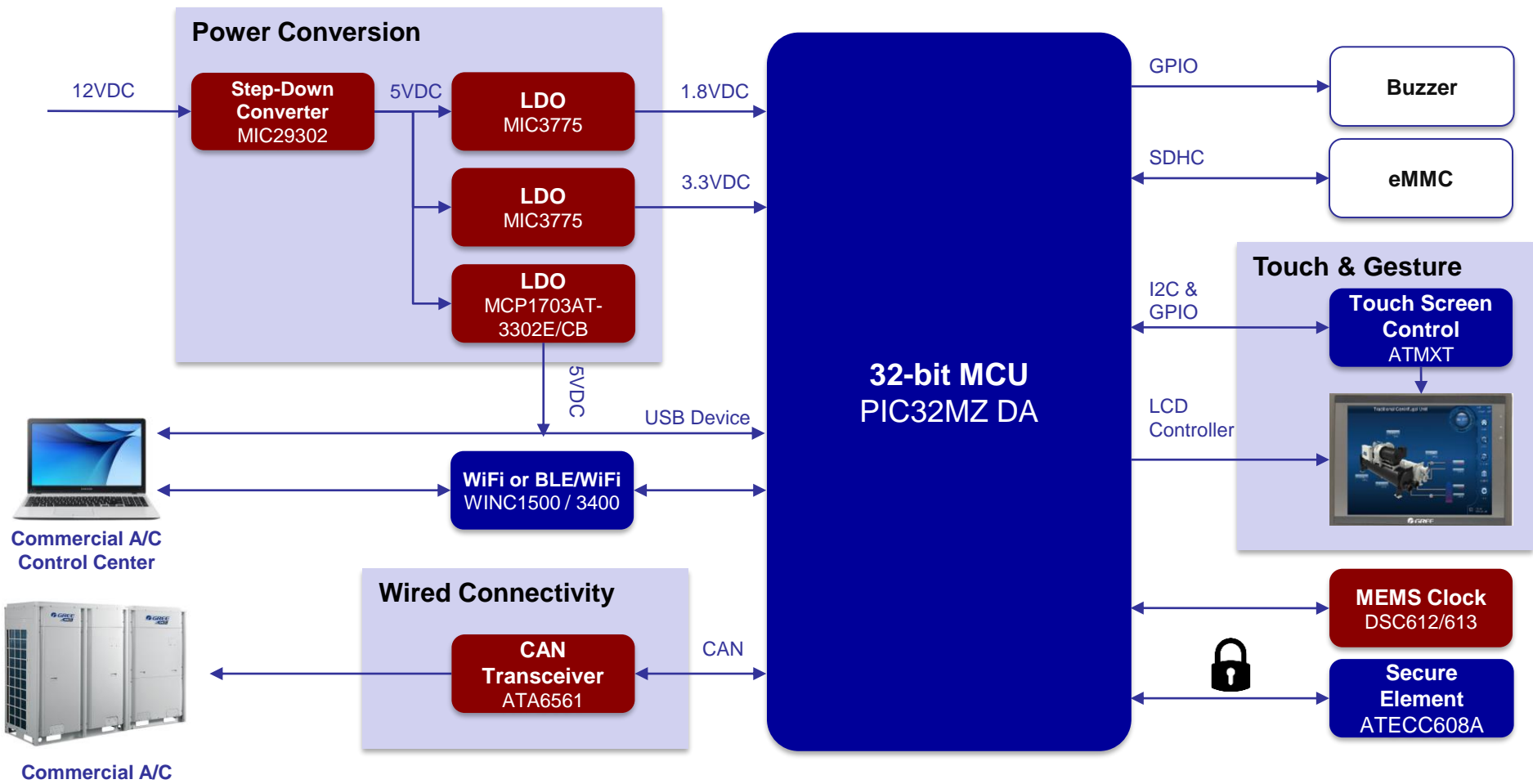
# DC- DC Converters

Components	Product Family	Features
DC-DC Converters	<u>MCP16331</u>	<ul style="list-style-type: none"> <li>• 50V/1A, Non-Synchronous Buck Regulator</li> <li>• Input Voltage Range: 4.4V to 50V</li> <li>• Output Voltage Range: 2.0V to 24V</li> <li>• 2% Output Voltage Accuracy</li> <li>• Minimum 500 mA Output Current</li> <li>• 500 kHz Fixed Frequency</li> </ul>
	<u>MIC24051</u>	<ul style="list-style-type: none"> <li>• 19V/6A DC-DC Buck Regulator</li> <li>• 4.5V to 19V input voltage</li> <li>• regulated output of up to 6A of output current</li> <li>• Adjustable output from 0.8V to 5.5V (<math>\pm 1\%</math> accuracy)</li> </ul>
	<u>MIC4684</u>	<ul style="list-style-type: none"> <li>• 200 KHz SuperSwitcher Buck Regulator</li> <li>• Wide input voltage range: 4V to 30V</li> <li>• Output voltage adjustable to 1.235V</li> </ul>

# MEMS Clock

Components	Product Family	Features
MEMS Clock (optional)	<u>DSC612</u>	<ul style="list-style-type: none"> <li>• 2-output any-rate MEMS clock generator</li> <li>• Supports 2 Any-Rate LVCMOS clock outputs from 2kHz to 100MHz</li> <li>• Integrated MEMS resonator eliminates the need for external crystal</li> <li>• Low power consumption: 5mA active 1 <math>\mu</math>A standby current</li> <li>• Wide supply voltage range: 1.71V -3.63V</li> </ul>
	<u>DSC613</u>	<ul style="list-style-type: none"> <li>• 3-output any-rate MEMS clock generator</li> <li>• Supports 3 LVCMOS clock outputs from 2kHz to 100MHz</li> <li>• Integrated MEMS resonator eliminates the need of external crystal</li> <li>• Low power consumption: 5.2mA active, 1 <math>\mu</math>A standby current</li> <li>• Wide supply voltage range: 1.71V -3.63V</li> </ul>

# HMI for Diagnostic (A/C) Tools



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# 32-Bit MCU

Components	Product Family	Features
32-bit MCU	<u>PIC32MZ DA</u>	<ul style="list-style-type: none"><li>• High-performing MCU (330 DMIPS) with integrated DRAM to drive larger LCD screens</li><li>• Advanced Graphics:<ul style="list-style-type: none"><li>• 3-layer graphics controller capable of driving 24-bit color WVGA</li><li>• High-performance 2D Graphics Processing Unit (GPU)</li></ul></li><li>• High Density of Memory:<ul style="list-style-type: none"><li>• 32 MB integrated DDR2 DRAM or 128 MB externally addressable</li><li>• Up to 2 MB Flash and 640 KB RAM</li></ul></li><li>• Suited for <u>embedded graphics and HMI</u> applications</li></ul>

# Wi-Fi Components

Components	Product Family	Features
Wireless / Wi-Fi	<u>WINC3400</u> (BLE/WiFi)	<ul style="list-style-type: none"> <li>• IEEE 802.11 b/g/n 20MHz (1x1) Wi-Fi plus Bluetooth 5 Core Specification, Internet of Things (IoT) network controller module</li> <li>• It is an add-on to existing microcontroller (MCU) solutions, offering Wi-Fi® and Bluetooth® Low Energy (BLE) network capabilities through a SPI-to-Wi-Fi interface</li> <li>• Security protocols supported: WPA/WPA2 Personal, WPA/WPA2 Enterprise, TLS, SSL</li> <li>• Bluetooth 5 Certified</li> </ul>
	<u>WINC1500</u> (WiFi)	<ul style="list-style-type: none"> <li>• Single-band 2.4GHz b/g/n IoT Network Controller</li> <li>• Security protocols supported: WPA/WPA2 Personal and Enterprise, TLS, SSL</li> </ul>

# CAN Transceiver

Components	Product Family	Features
CAN Transceiver	<u>ATA6561</u>	<ul style="list-style-type: none"><li>• High-speed CAN FD ready with standby mode and VIO pin that provides an interface between a controller area network (CAN) protocol controller and the physical two-wire CAN bus</li><li>• Communication speed up to 5Mbit/s</li><li>• Low electromagnetic emission (EME) and high electromagnetic immunity (EMI)</li><li>• Differential receiver with wide common mode range</li><li>• Direct interfacing to microcontrollers with supply voltages from 3V to 5V</li></ul>



# Touch Controller

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Components	Product Family	Features
Touch Screen Control	<u>ATMXT</u>	The maXTouch touch controller family provides a leading projected capacitive technology for touchscreens and touchpads, with a portfolio covering solutions for all touch surfaces and screens up to 24" diagonal size

# Step-Down Converters

Components	Product Family	Features
Step-Down Converters/ Low-Drop out Voltage Regulators	<u>MIC29302</u>	<ul style="list-style-type: none"> <li>• high-current, high-accuracy, low-dropout voltage regulators</li> <li>• Low dropout voltage</li> <li>• Low ground current</li> <li>• Accurate 1% guaranteed tolerance</li> <li>• Extremely fast transient response</li> </ul>
	<u>MIC3775</u>	<ul style="list-style-type: none"> <li>• 750mA low voltage uCap LDO</li> <li>• Fixed and adjustable output voltages to 1.24V</li> <li>• Ideal for 3.0V to 2.5V conversion</li> <li>• Ideal for 2.5V to 1.8V or 1.65V conversion</li> <li>• Stable with ceramic capacitor</li> <li>• 750mA minimum guaranteed output current</li> <li>• 1% initial accuracy</li> </ul>
	<u>MCP1703</u>	<ul style="list-style-type: none"> <li>• Low Iq 250mA LDO, Vin 16V max, Vout = 3.0V</li> <li>• Wide input operating voltage range: 2.7V to 16.0V</li> </ul>

# Secure Element

Components	Product Family	Features
Secure Element	<u>ATECC608A</u>	<ul style="list-style-type: none"><li>• Secure Element JIL High rated with secure key storage</li><li>• Cryptographic co-processor with secure hardware-based key storage</li><li>• Protected storage for up to 16 Keys, certificates or data</li><li>• ECDH: FIPS SP800-56A Elliptic Curve Diffie-Hellman</li><li>• NIST standard P256 elliptic curve support</li><li>• SHA-256 and HMAC hash including off-chip context save/restore</li><li>• AES-128: encrypt/decrypt, galois field multiply for GCM</li></ul>

# MEMS Clock

Components	Product Family	Features
MEMS Clock (optional)	<u>DSC612</u>	<ul style="list-style-type: none"> <li>• 2-output any-rate MEMS clock generator</li> <li>• Supports 2 Any-Rate LVCMOS clock outputs from 2kHz to 100MHz</li> <li>• Integrated MEMS resonator eliminates the need for external crystal</li> <li>• Low power consumption: 5mA active 1 <math>\mu</math>A standby current</li> <li>• Wide supply voltage range: 1.71V -3.63V</li> </ul>
	<u>DSC613</u>	<ul style="list-style-type: none"> <li>• 3-output any-rate MEMS clock generator</li> <li>• Supports 3 LVCMOS clock outputs from 2kHz to 100MHz</li> <li>• Integrated MEMS resonator eliminates the need of external crystal</li> <li>• Low power consumption: 5.2mA active, 1 <math>\mu</math>A standby current</li> <li>• Wide supply voltage range: 1.71V -3.63V</li> </ul>



# Embedded GUI Development Tool

Components	Product Family	Features
Embedded GUI Development Tool	<u>MPLAB Harmony Graphics Suite (MHGS)</u>	<ul style="list-style-type: none"><li>• Powerful Tools and Integration to Reduce Embedded Graphics Development Cost, Time and Risk</li><li>• Easy-to-Use “Display Manager” allows the engineer to visualize display timing and generate their own display controller driver, with minimal to no code written.</li><li>• Extensive graphics library for different color support, as well different text (strings, fonts, multi-lingual) support</li></ul>

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[<< BACK to 32-bit MCU](#)

[<< BACK to HMI Diagnostic Tools BLOCK DIAGRAM](#)

# Robotic Vacuum Cleaners

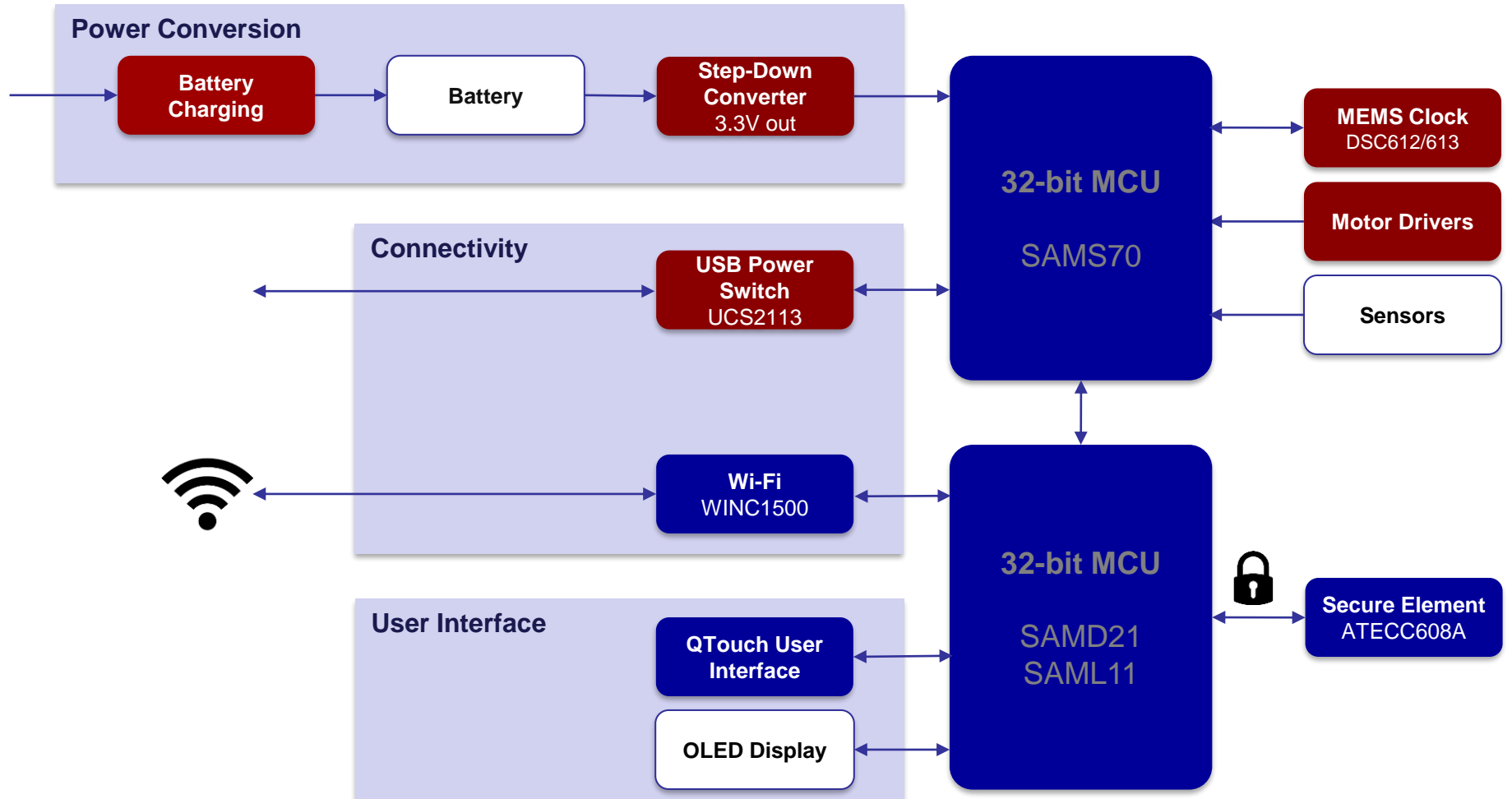
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**Robotic Vacuum MCU32**

**Robot Vacuum Other  
MCUs**



# Robotic Vacuum 32-bit MCU



# 32-Bit MCU

Components	Product Family	Features
32-bit MCU	<u>SAMS70</u>	<ul style="list-style-type: none"><li>• Arm® Cortex®-M7 based MCU</li><li>• Powerful Cortex-M7 core for image processing and mapping</li></ul>
	<u>SAMD21</u>	<ul style="list-style-type: none"><li>• Arm Cortex-M0+ based, low power, general purpose MCU</li></ul>
	<u>SAML11</u>	<ul style="list-style-type: none"><li>• Arm Cortex-M23 based, ultra-low power MCU which provides chip-level security with TrustZone and secure boot</li><li>• Enhanced hardware capacitive touch with water tolerance and parallel acquisition which is 4x times faster</li></ul>



# Wi-Fi Components

Components	Product Family	Features
Wireless / Wi-Fi	<u>WINC1500</u> (WiFi)	<ul style="list-style-type: none"><li>• Single-band 2.4GHz b/g/n IoT Network Controller</li><li>• Security protocols supported: WPA/WPA2 Personal and Enterprise, TLS, SSL</li></ul>

# Secure Element

Components	Product Family	Features
Secure Element	<u>ATECC608A</u>	<ul style="list-style-type: none"><li>• Secure Element JIL High rated with secure key storage</li><li>• Cryptographic co-processor with secure hardware-based key storage</li><li>• Protected storage for up to 16 Keys, certificates or data</li><li>• ECDH: FIPS SP800-56A Elliptic Curve Diffie-Hellman</li><li>• NIST standard P256 elliptic curve support</li><li>• SHA-256 and HMAC hash including off-chip context save/restore</li><li>• AES-128: encrypt/decrypt, galois field multiply for GCM</li></ul>

# Step-Down Converters

Components	Product Family	Features
DC-DC Converters	<u>MIC23030</u>	<ul style="list-style-type: none"><li>• High efficiency 8MHz 400mA synchronous buck regulator with HyperLight Load<sup>®</sup> mode</li><li>• Input voltage: 2.7V to 5.5V</li><li>• 400mA output current</li><li>• Up to 91% efficiency and 83% at 1mA</li><li>• 21 <math>\mu</math>A typical quiescent current</li><li>• 8MHz PWM operation in continuous mode</li><li>• Ultra fast transient response</li></ul>



# Battery Charging / Management

Components	Product Family	Features
Battery Charging / Management	<u>MCP738xx</u>	Depending on Battery Chemistry, Microchip offers a broad array of Battery Management Solutions which feature small package sizes, high-efficiency, low standby power, accuracy and versatility solutions to solve these portable power conversion challenges.

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# Motor Control Driver

Components	Product Family	Features
Motor Control Driver	<u>MTS2916A</u>	<ul style="list-style-type: none"> <li>• Dual full-bridge PWM motor driver IC; the two output bridges can sustain 40V and deliver up to 750mA of continuous current each</li> <li>• able to drive both windings of a bipolar stepper motor or bi-directionally control two DC motors</li> <li>• Internal fixed Toff time PWM current control</li> <li>• Built-in protection diodes</li> </ul>
	<u>MTS62C19A</u>	<ul style="list-style-type: none"> <li>• 3-Phase Brushless DC Sinusoidal Sensorless Fan Motor Driver</li> <li>• Able to drive both windings of a bipolar stepper motor or bi-directionally control two DC motors.</li> <li>• Load voltage supply range: 10V to 40V</li> <li>• Output current up to 750mA (each bridge)</li> </ul>

# USB Power Switch

Components	Product Family	Features
USB Power Switch	<u>UCS2113</u>	<ul style="list-style-type: none"><li>• Dual USB Power Switch with Integrated Current Sensor</li><li>• 2.9V to 5.5V source voltage range</li><li>• 3.0A continuous current per VBUS port with 40 mΩ On resistance per switch</li><li>• Independent port power switch enable pins</li><li>• Dual fault ALERT# active drain output pins</li><li>• Constant Current or Trip mode current limiting behaviors</li><li>• Undervoltage and overvoltage lockout</li></ul>

# CAN Transceiver

Components	Product Family	Features
CAN Transceiver	<u>ATA6561</u>	<ul style="list-style-type: none"><li>• High-speed CAN FD Transceiver with Standby Mode and VIO Pin</li><li>• Communication speed up to 5Mbit/s</li><li>• Low electromagnetic emission (EME) and high electromagnetic immunity (EMI)</li><li>• Differential receiver with wide common mode range</li><li>• Direct interfacing to microcontrollers with supply voltages from 3V to 5V</li></ul>



# Software

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Components	Product Family	Features
Software		<ul style="list-style-type: none"><li>• Software with drivers, middleware, Touch and ATECC608 CryptoAuthLib library</li><li>• Wireless (WiFi) Communication stacks</li><li>• Hardware and Software reference design enabling a prototype to be set up, utilizing the cloud demo</li><li>• QTouch composer to configure and calibrate the capacitive touch UI design</li></ul>

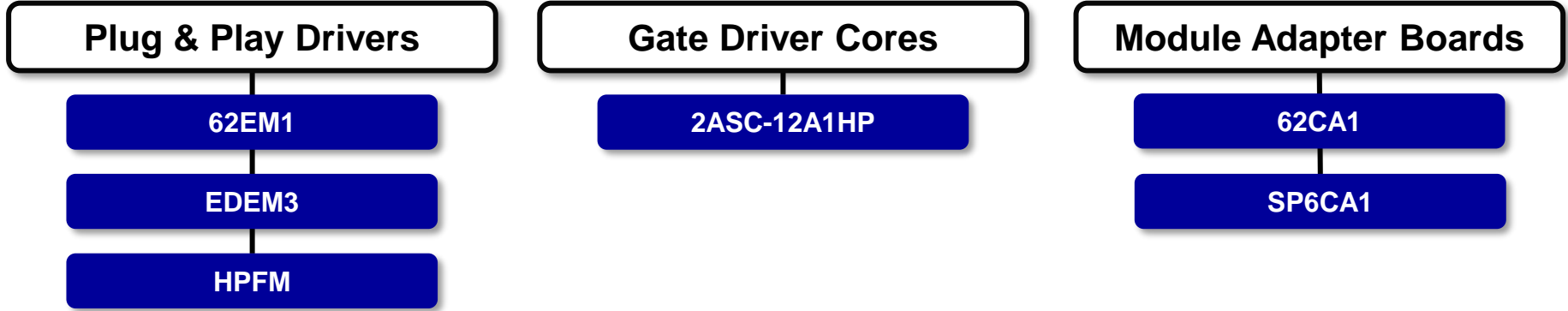
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# MEMS Clock

Components	Product Family	Features
MEMS Clock (optional)	<u>DSC612</u>	<ul style="list-style-type: none"><li>• 2-output any-rate MEMS clock generator</li><li>• Supports 2 Any-Rate LVCMOS clock outputs from 2kHz to 100MHz</li><li>• Integrated MEMS resonator eliminates the need for external crystal</li><li>• Low power consumption: 5mA active 1 <math>\mu</math>A standby current</li><li>• Wide supply voltage range: 1.71V -3.63V</li></ul>
	<u>DSC613</u>	<ul style="list-style-type: none"><li>• 3-output any-rate MEMS clock generator</li><li>• Supports 3 LVCMOS clock outputs from 2kHz to 100MHz</li><li>• Integrated MEMS resonator eliminates the need of external crystal</li><li>• Low power consumption: 5.2mA active, 1 <math>\mu</math>A standby current</li><li>• Wide supply voltage range: 1.71V -3.63V</li></ul>



## Key Gate Driver Features:

- 10W per Channel
- 20A Peak Gate Current
- Patented Augmented Switching
- Patented Robust Short Circuit Detection
- Temperature & DC Link Monitoring
- 7 Unique Fault conditions
- UVLO, OVLO
- Overcurrent Protection
- Master-Slave Compatible



## Key Gate Driver Features:

- 3W per Channel
- 15A Peak Gate Current
- Patented Augmented Switching
- Patented Robust Short Circuit Detection
- Temperature & DC Link Monitoring
- 7 Unique Fault conditions
- UVLO, OVLO
- Overcurrent Protection
- Master-Slave Compatible



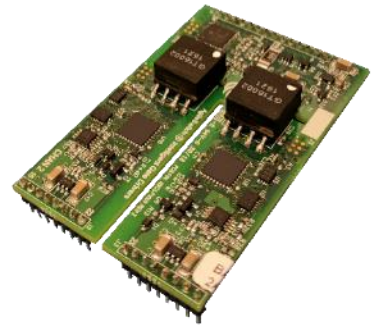
## Key Gate Driver Features:

- 7W per Channel
- 30A Peak Gate Current
- UVLO
- Overcurrent Protection
- Master-Slave Compatible



## Key Gate Driver Features:

- 3W per Channel
- 10A Peak Gate Current
- Patented Augmented Switching
- Patented Robust Short Circuit Detection
- Temperature & DC Link Monitoring
- 7 Unique Fault conditions
- UVLO, OVLO
- Overcurrent Protection



Programmable Vgs	Low Limit	High Limit
Gate Positive (V)	12	21
Gate Negative (V)	-5	0

## Key Features:

- Compatibility –
  - Gate Driver Core - 2ASC-12A1HP
  - SiC Module – 1200V Modules in 62mm Package
- 20 pin input connector
- Spade connectors for direct, low inductance connection to module
- Non-Isolated thermistor connector
- Master Slave capability



## Key Features:

- Compatibility –
  - Gate Driver Core - 2ASC-12A1HP
  - SiC Module – 1200V Modules in SP6LI Package
- 20 pin input connector
- direct, low inductance connection to module
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