SOLAR POWERED LIGHT WITH LORA COMMUNICATION

- EU2019-07.008

SOLAR POWERED LIGHT WITH LORA COMMUNICATION: OVERVIEW

Lighting is essential for safety and security, however it can be costly to run and maintain.

In todays “green” environment driven by government legislation, Smart LED lights that are self powered, efficient, environmentally friendly and can provide diagnostic data for easy maintenance, are essential.

The Renesas solution uses a combination of the Bidirectional Synchronous Buck-Boost controller ISL81601, RL78I1A Lighting ASSP microcontroller the FMLR-61-x-RSS3 High Performance LoRA WAN module and the ISL29122 Ambient Light Sensor to provide a Solar Powered Lighting solution that has LoRA communication.

The ISL81601 and the RL78I1A are used to implement an efficient solar powered battery charger with MPPT. The RL78I1A is also used to implement two PWM channels to drive LEDs. The LoRA module is used to communicate diagnostic and command information through a LoRA gateway and the Ambient Light Sensor is used to monitor daylight and switch the light ON when it is needed.

Key Features:

- Easy and fast to integrate
- Fast time to market due to utilization of existing infrastructure
- High Performance µC designed for lighting has all the functions required for an efficient LED driver.
- Fast comparators in µC allow detection of fault conditions and shutdown in 50ns preventing damage of system.
- Buck-boost architecture charges the battery even when the solar panel output is below the battery voltage
- Programmable charge rates to support various modes, such a fast charge and trickle charge.
- Up to 60V input and adjustable output voltage of 0.8V to 60V
- Monitors battery status and protects battery from damage caused by over charging.

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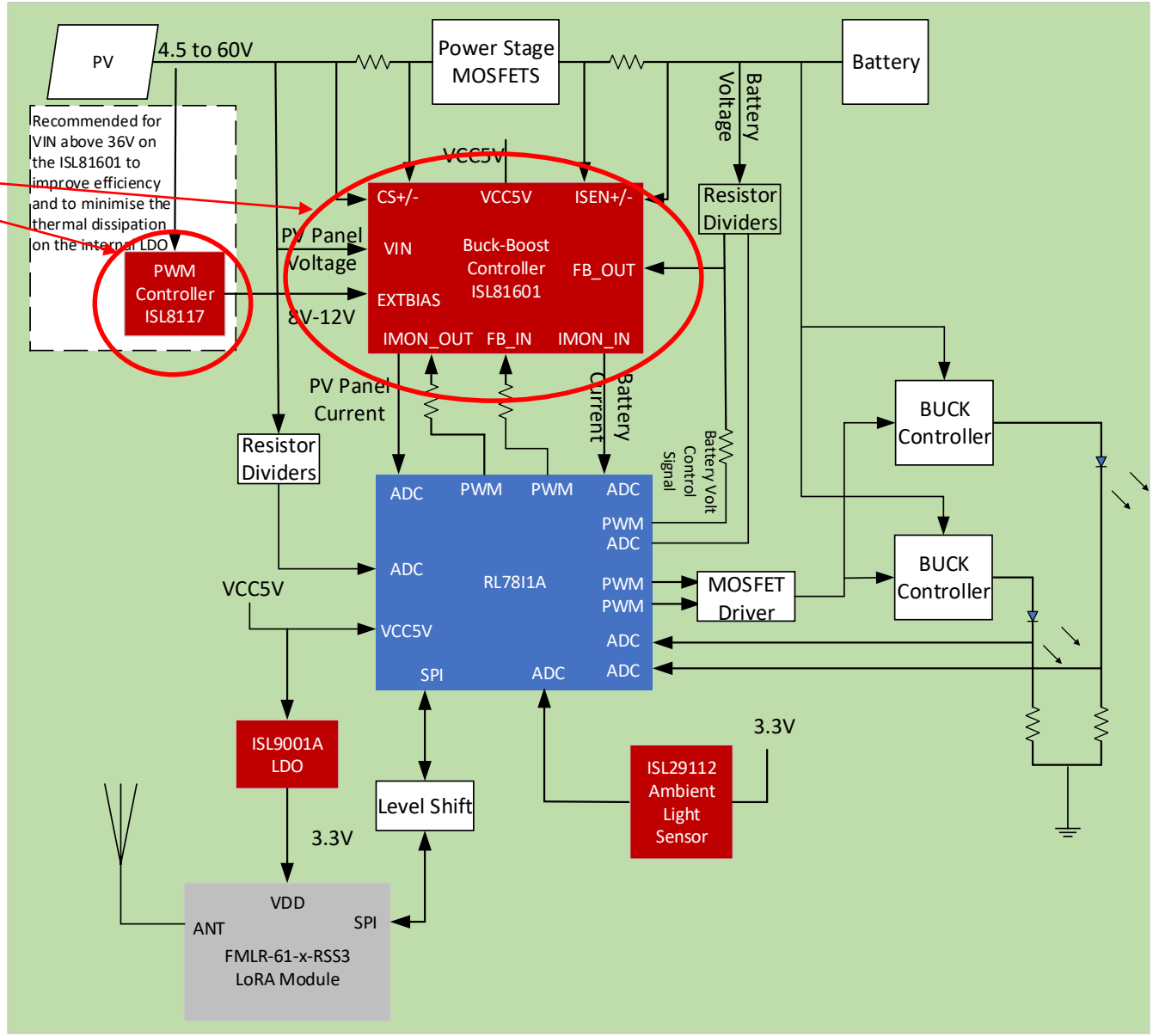
Used on Solar
Battery Charger
WC US011 – H12



RL78 / I1A: LOW POWER 16-BIT MCU

Lighting and Power Supply MCU series within the RL78 Family

Features

- 32MHz CPU Clock, 64MHz Timer clock
- Average resolution of 1ns @ 64MHz + dithering function
- 16bit Timers KB0 to KB2 for PWM outputs (3Ch x 2). Smooth Start, dithering, interleave function for PFC.
- 10bit ADC, 6 * Comparators (50ns prop. Dly.), PGA, DALI
- Broad Scalability w/ pin/FLASH/RAM options
- High Performance w/ 2.7V to 5.5V operation
- Comprehensive Tools and Support: AppliletEZ for HCD

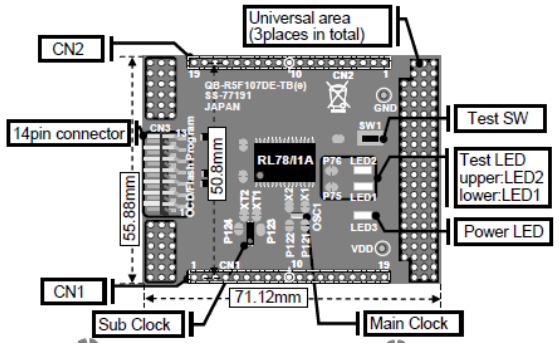
Benefits

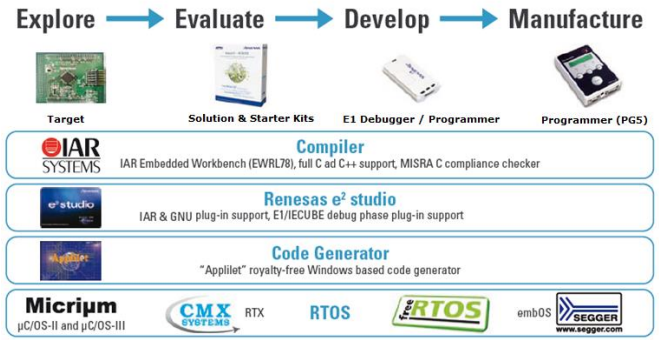
- RL78 provide many options in-order to scale power based on application requirements by using combination of the clock selection and advanced power modes
- RL78 offer scalability with wide pin count, packages, I/O peripheral mapping and large memory options
- Integrated timers and peripherals to implement efficient power supplies.

Applications

- Lighting with colour mixing and fine dimming
- AC/DC, DC/DC power supplies
- Industrial and home automation
- Electric/compact household appliances

RL78/L1X Low Power MCU





ISL9001A: HIGH ACCURACY HIGH PSRR LDO IN TINY PACKAGE

Low dropout regulator with low Iq and high PSRR

Features

- Excellent transient response to large current steps
- Excellent load regulation: <0.1% voltage change across full range of load current
- High PSRR: 90dB @ 1kHz
- Extremely low quiescent current: 25µA
- Low dropout voltage: typically 200mV @ 300mA
- Low output noise: typically 30µVRMS @ 100µA (1.5V)

Benefits

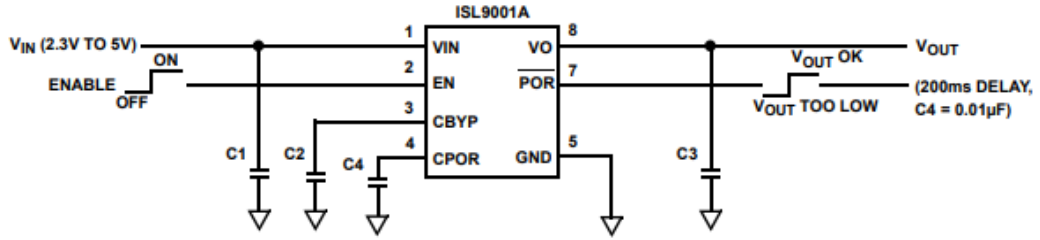
- When coupled with a no load quiescent current of 25µA (typical), and 0.1µA shutdown current, the ISL9001A is an ideal choice for low power consumption application.

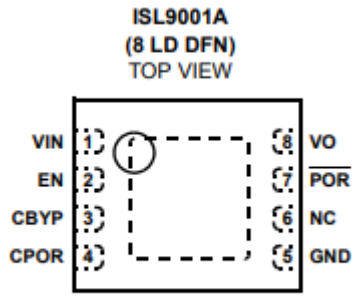
Applications

- PDAs, cell phones and smart phones
- Portable instruments, MP3 players
- Handheld devices, including medical handhelds

Typical application and key performances

Typical application circuit





FMLR-61-U-RSS3 – SYNERGY LORA MODULE

Synergy S3A6 ARM Cortex-M4 32bit MCU + Semtech SX1261 LoRA Module

Features

- Module consists of Synergy S3A6 ARM Cortex M4 32bit MCU + Semtech SX1261
- Txmt 14dBm and Receive sensitivity of -137dBm.
- 1.8V to 3.3V Power supply
- 25.5mA Tx mode (14.4 dBm), 4.6mA recv mode, 1.4µA sleep mode.
- Operating Temp. -40 ºC to +85 ºC
- Module Dimensions = 14mm x 19.5mm

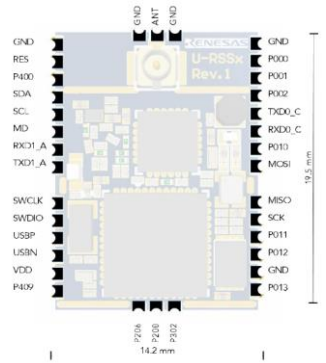
Benefits

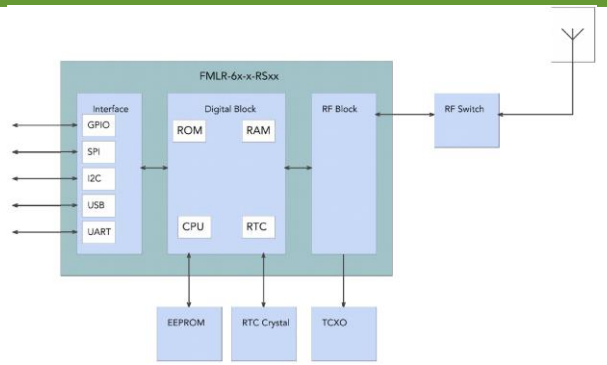
- Smallest certified LoRAWAN module family
- Module with optional integrated antenna
- Line-of-sight range of up to 100km
- Runs customer specific applications and proprietary radio stacks

Applications

- Low datarate IoT use cases
- Telemetry applications
- Smart metering
- Battery powered sensors
- Low power RF systems
- Wireless sensing
- Remote data logging
- Industrial and home automation
- UART / SPI / I2C / USB wireless bridging

FMLR-61-U-RSS3 - Synergy LoRAWAN module





ISL29112 ANALOG OUTPUT AMBIENT LIGHT SENSOR

Low Power, <100 Lux Optimized, Analog Output Ambient Light Sensor

Features

- Square root voltage output
- 0.01 lux to 100 lux range
- 1.8V to 3V supply range
- Close to human eye spectral response
- Fast response time
- Internal temperature compensation
- Good IR rejection
- Low supply current
- Operating temperature range -40°C to +85°C
- 6 Ld ODFN: 2mmx2.1mmx0.7mm
- Pb-free (RoHS compliant)

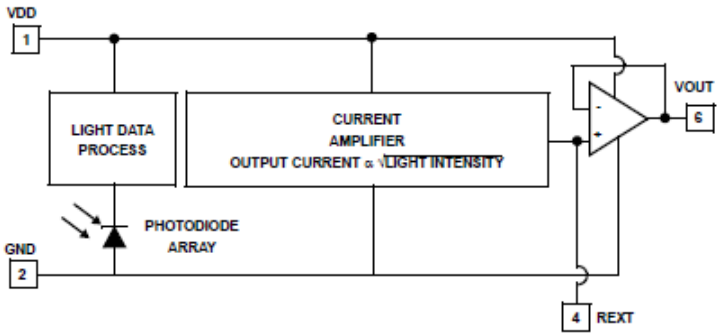
Benefits

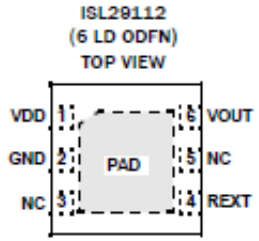
The ISL29112 is an ultra compact, low cost, light-to-voltage silicon optical sensor combining a photodiode array, a non-linear current amplifier, and a micropower op amp on a single monolithic IC. Similar to the human eye, the photodiode array has peak sensitivity at 550nm and spans the wavelength range 400nm to 600nm, rejecting UV and IR light. The input luminance range is from 0.01 lux to 100 lux.
The integrated non-linear current amplifier boosts and converts the photodiode signal into a square root output format, extending dynamic range while maintaining excellent sensitivity in dimly lit conditiont

Applications

- Ambient light sensing
- Mobile devices: wearables, smart phone, PDA, GPS
- Computing devices: notebook PC, MacBook, tablets
- Consumer devices: LCD-TV, digital camera
- Industrial, home automation and medical light sensing

ISL29112 analog output ambient light sensor





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