

EU021 Smoke Detector

EMEA System Solutions Team (SST)
09/2019

1v00

EU021 Smoke Detector

■ Overview

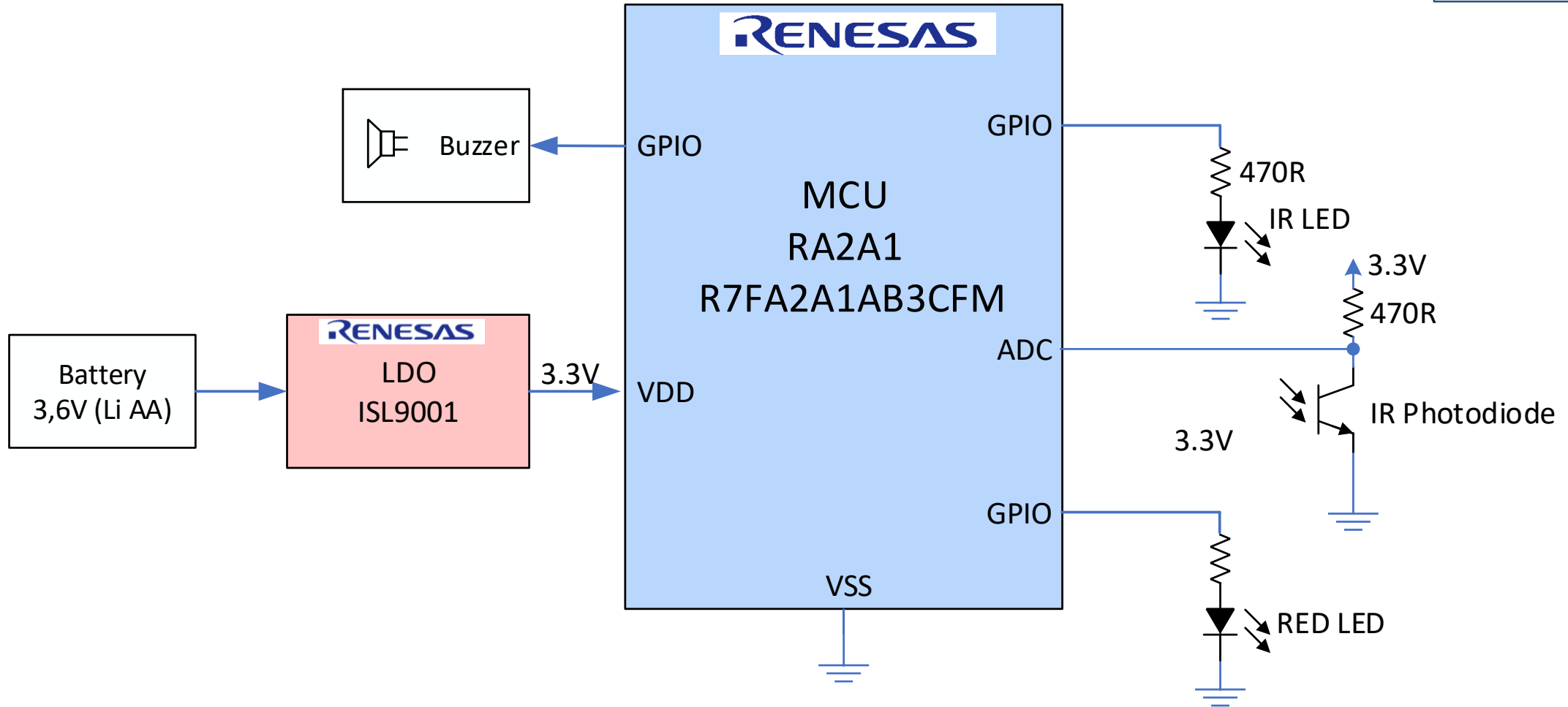
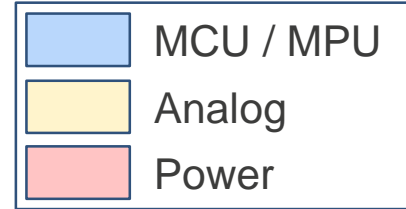
- The functional principle of this smoke detector is having an IR photo diode and photo transistor arranged inside a chamber where air, which may contain smoke from a nearby fire, flows. As both transmitter and receiver are positioned at an angle, the light is not directed at the sensor. If the air in the chamber contains particles (smoke or dust), the light is scattered and some of it reaches the sensor, triggering the alarm.
- According to the National Fire Protection Association (NFPA), "photoelectric smoke detection is generally more responsive to fires that begin with a long period of smoldering"; even though studies by Texas A&M and NFPA claim that photoelectric alarms react slower to rapidly growing fires than ionization alarms, however, laboratory and field tests have shown that photoelectric smoke alarms provide adequate warning for all types of fires and have been shown to be far less likely to be deactivated by occupants.

■ System benefits

- Using the new family of RA ARM™ based microcontrollers
- Microcontroller contains the required Amplifiers needed to level the input signals
- Very few external components needed

Block Diagram #EU021
September 2019

EU021 Smoke Detector



Block Diagram #EU021
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Smoke Detector

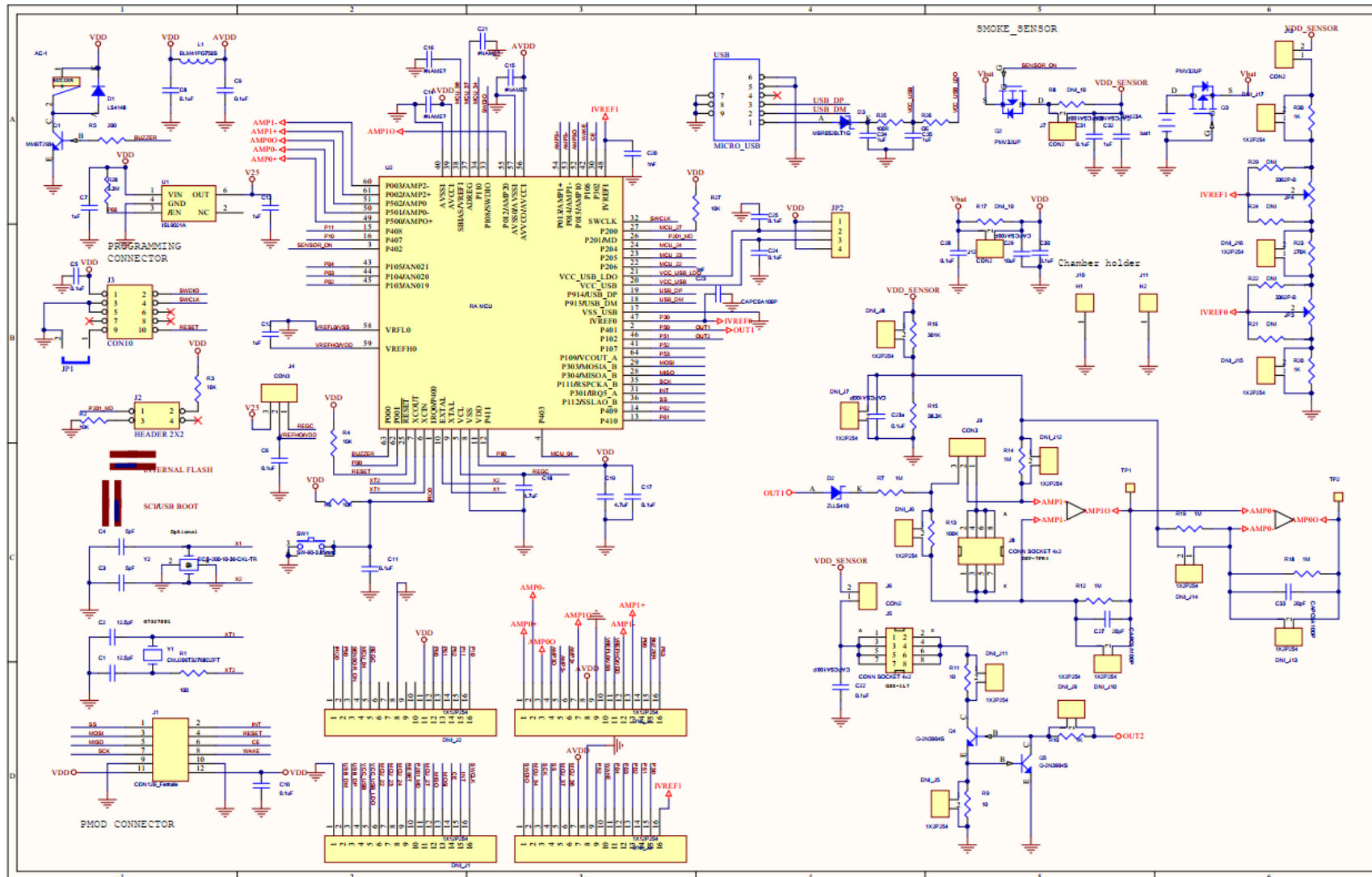
Device Category	P/N	Key Features
MCU	RA2A1 R7FA2A1AB3CFM	RA2 family of ARM™ based microcontrollers, including Analog amplifiers
Power	ISL9001AIRNZ-T	300mA LDO regulator 90dB PSSR 0.1-25µA Iq
Sensor	N/A	

Block Diagram #EU021
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[Renesas.com](https://www.renesas.com)

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Target design schematics



Renesas.com

RA6M1 – Ultra-Low Power 120-MHz Arm® Cortex®- M4 Core

For Control/ Security/Graphical and Capacitive Touch

High Performance

- 120MHz Arm® Cortex®-M4 CPU

Highly integrated capabilities

- Up to 512KB Flash Memory and 256KB SRAM
- 128-bit unique ID
- 12-Bit ADC x2
- 12-Bit DAC x2

Communication interfaces

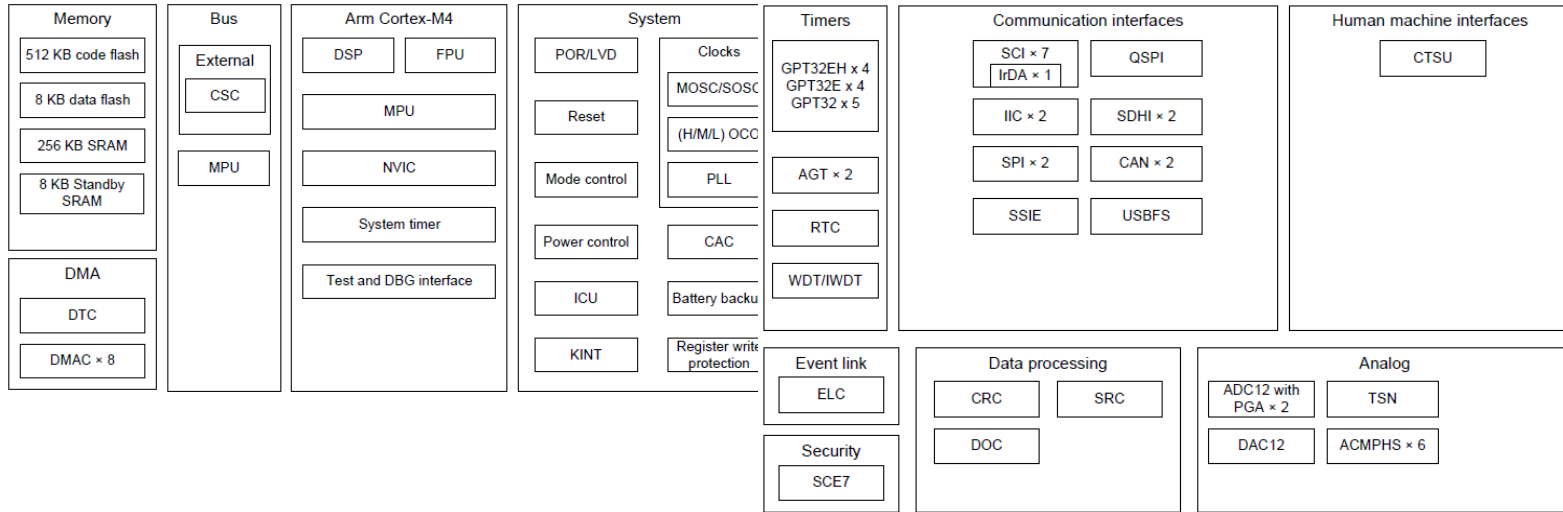
- USB 2.0(Full Speed/ High Speed)
- Ethernet Controller with DMA
- SCI x7/SPIx2/IICx2

HMI Interface

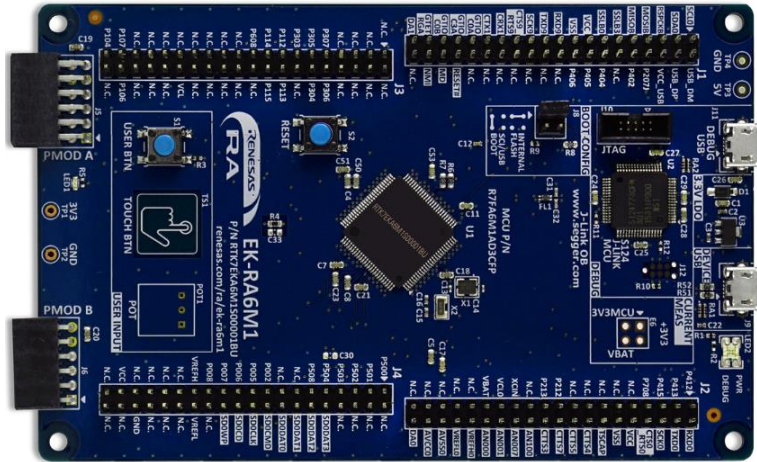
- Capacitive Touch Sensing Unit (12ch.)
- Graphics LCD Controller

Security and Encryption

- AES128/192/256, 3DES/ARC4, SHA1/SHA224/SHA256/MD5, GHASH, RSA/DSA/ECC
- True Random Number Generator (TRNG)



Part #	Flash Memory	RAM	Temp	Package
R7FA6M1AD3CFP	512KB	256KB	40~105°C	100 LQFP
R7FA6M1AD3CFM	512KB	256KB	40~105°C	64 LQFP



RTK7EKA6M1S00001BU

ISL9001A – V_{OUT} 1.5V to 3.3V/300mA LDO

LDO with Low I_{SUPPLY} and High PSSR

High Performance

- Excellent load regulation: <0.1% voltage change across full range of load current
- High PSRR: 90dB @ 1kHz

Stable Output Voltage

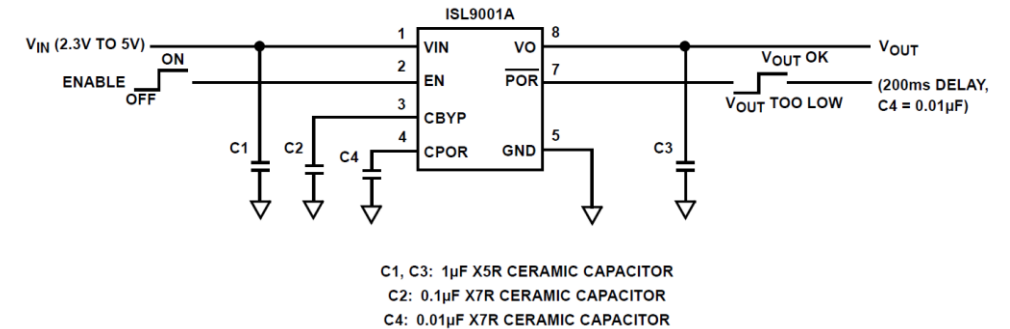
- $\pm 1.8\%$ V_{OUT} accuracy over all operating conditions
- Stable with 1 μ F to 10 μ F ceramic capacitor

High Efficiency

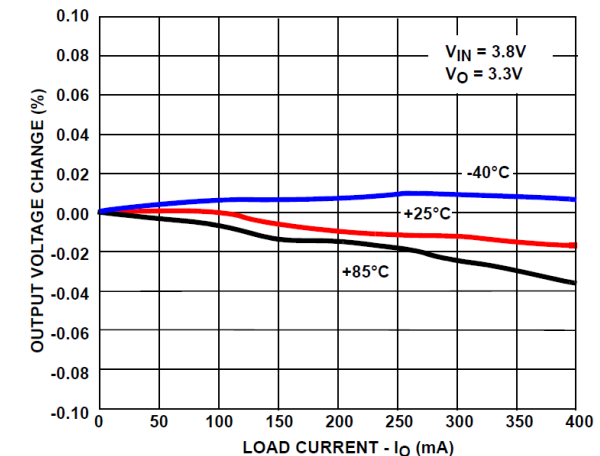
- Extremely low quiescent current: 25 μ A
- Low dropout voltage: typically 200mV @ 300mA

Excellent Safety

- Current limit and overheat protection



Typical Application Circuit



Output Voltage Change vs Load Current

Part #	Vout (V)	Temp.(°C)	Package
ISL9001AIRBZ-T	1.5	-40 to +85	8Ld 2x3 DFN
ISL9001AIRCZ-T	1.8	-40 to +85	8Ld 2x3 DFN
ISL9001AIRFZ-T	2.5	-40 to +85	8Ld 2x3 DFN
ISL9001AIRJZ-T	2.8	-40 to +85	8Ld 2x3 DFN
ISL9001AIRKZ-T	2.85	-40 to +85	8Ld 2x3 DFN
ISL9001AIRNZ-T	3.3	-40 to +85	8Ld 2x3 DFN