

CN155

Smart Industrial Weight Scale

October 2019

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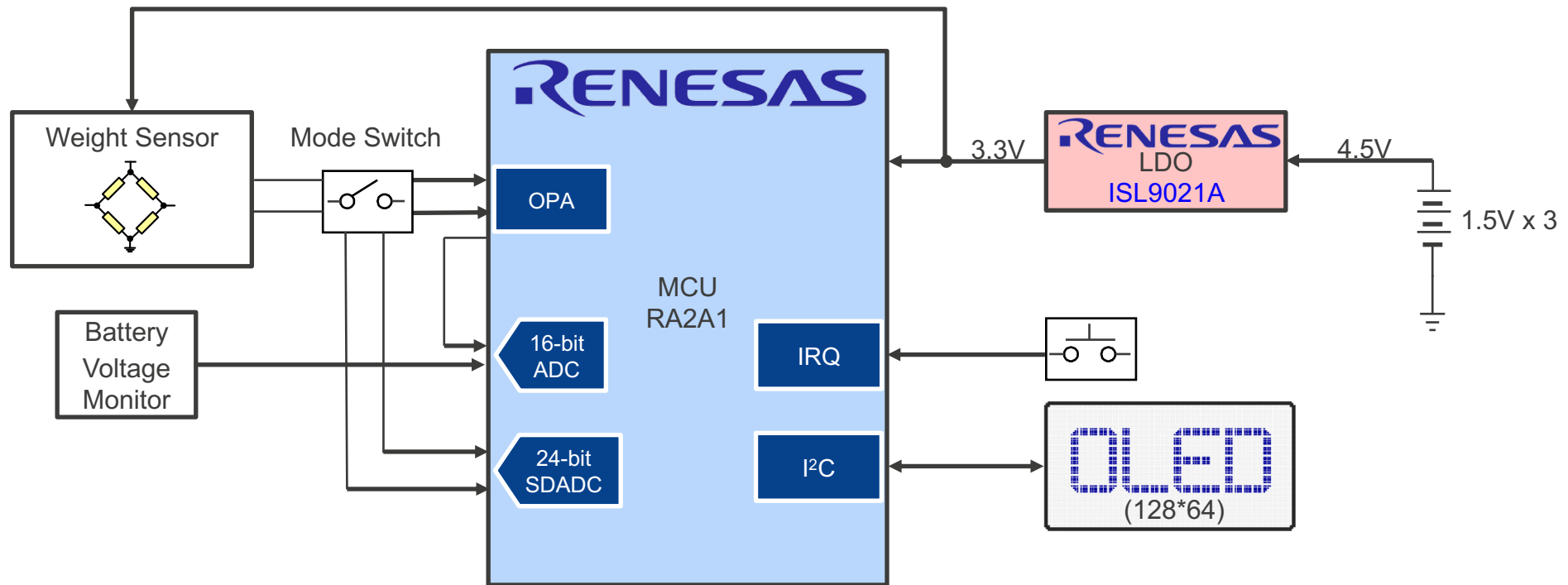
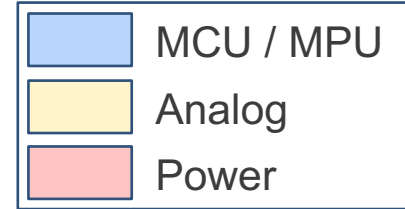
■ Overview

Most weight scales use bridge transducers for precise measurements. The challenge with this implementation is that the output differential signal from the transducer is very small and needs to be amplified prior to processing. For general MCU control systems, this typically involves using instrumentation amplifiers with high accuracy ADCs and voltage references. The advantage of the RA2A1 is that it integrates these high-precision analog functions, such as op amps, a 24-bit sigma-delta ADC, 16-bit ADCs, and DAC. This enables designers to simplify their design by eliminating external components. It also reduces overall system space and cost, while increasing system reliability. The integration of analog functions in a microcontroller offer interesting ways to create combined analog and digital functions that work together under full user control. This system solution provides an accurate method for sensing the transducer signal and measuring it with the RA2A1 MCU.

■ System Benefits

- The RA2A1 provides an integrated op amp configuration function
- The RA2A1 has an 24-bit sigma-delta A/D converter function

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Block Diagram #CN155
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Device Category	P/N	Key Features
MCU	RA2A1	Ultra-Low Power 48-MHz Arm® Cortex®-M23 Core with highly integrated, high-accuracy analog capabilities and offers complete analog solution for signal conditioning and measurement
Power	ISL9021A	250mA Single LDO Low IQ, Low Noise and High PSRR LDO

RA2A1 – Ultra-Low Power 48-MHz Arm® Cortex®-M23 Core

Complete Analog Solution for Signal Conditioning and Measurement

High Performance

- 48MHz Arm® Cortex®-M23 CPU

Highly Integrated, High-Accuracy Analog Capabilities

- OPAMP x3
- 24-Bit S/D ADC (10 ch.) /16-Bit SAR ADC (17 ch.)
- 12-Bit DAC (1 ch.)/8-Bit DAC (2 ch.)
- Temperature Sensor (TSN)
- High-Speed Comparator x2
- Low-Power Comparator x2

Communication Interfaces

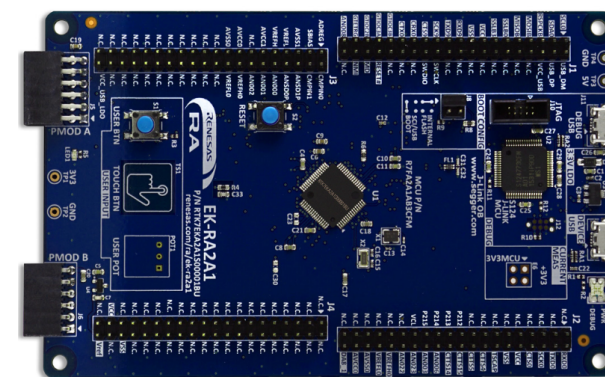
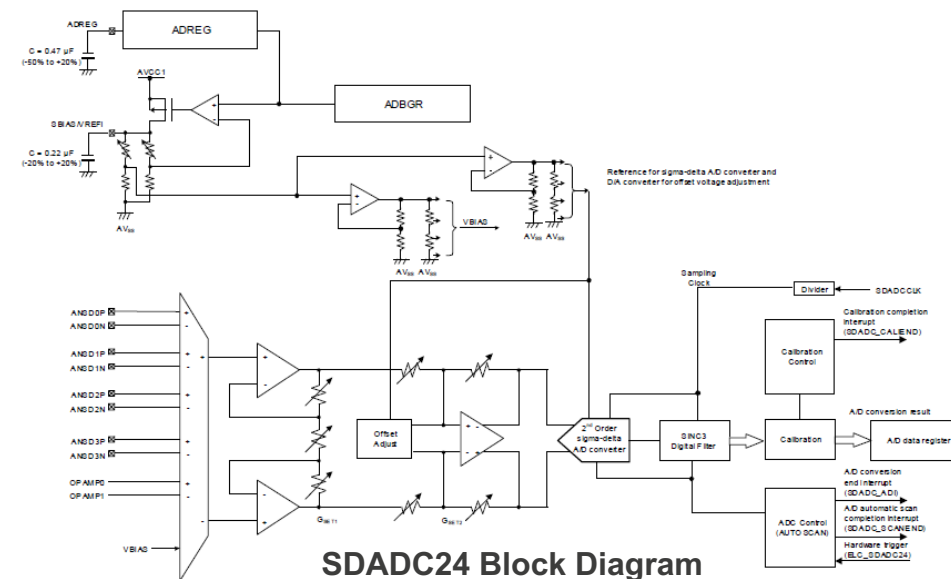
- USB 2.0 (Full Speed)
- CAN
- SCI x3/SPIx2/IICx2

HMI Interface

- Capacitive Touch Sensing Unit (26 ch.)

Wide Voltage and Low Power Consumption

- Wide operating voltage range of 1.6V to 5.5V
- Various Low Power Modes



RTK7EKA2A1S00001BU

Part #	Flash Memory	RAM	Temp	Package
R7FA2A1AB3CFJ	256KB	32KB	40 ~ 105°C	32 LQFP
R7FA2A1AB3CFM	256KB	32KB	40 ~ 105°C	64 LQFP

ISL9021/9021A – 250mA Single LDO

Low IQ, Low Noise and High PSRR LDO

Stable Output Voltage

- 250mA guaranteed continuous output current
- $\pm 1.8\%$ output accuracy over-temperature/load/line

High Efficiency

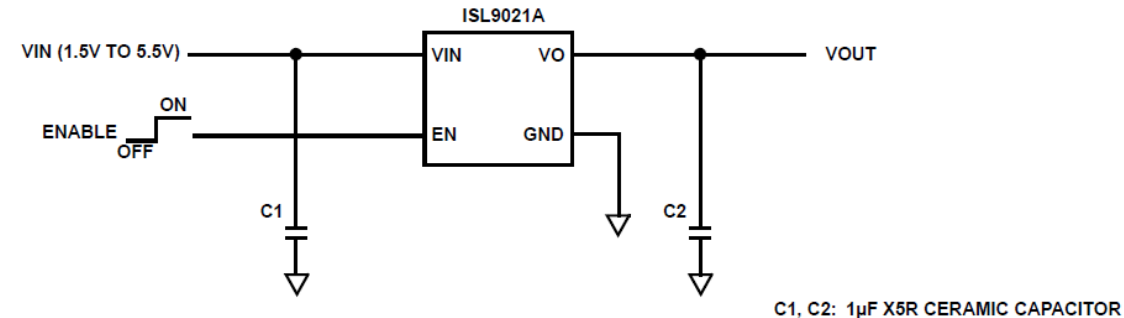
- Dropout voltage: $< 150\text{mV}$ @ 250mA
- Enable Control : typically $< 0.1\mu\text{A}$ (typ) when disable

High Performance

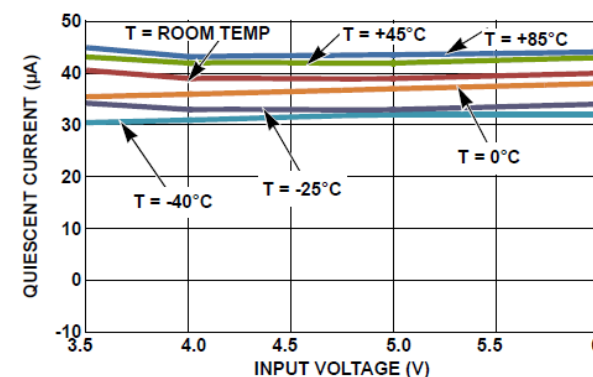
- High PSRR: 75dB @ 10kHz, 50dB @ 1MHz
- Low quiescent current: 35 μA

Excellent Safety

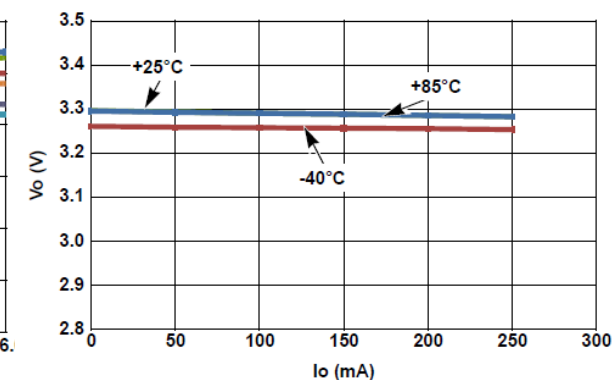
- Soft-start limits input current surge during enable
- Current limit and overheat protection



Typical Application Circuit



Quiescent Current vs Input Vvoltage



Load regulation vs Temperature

Part #	Vin (V)	Vout (V)	Iout (A)	Package
ISL9021	1.5V to 5.5V	1.2V to 3.3V	0.25	6 Ld μTDFN
ISL9021A	1.5V to 5.5V	1.2V to 3.3V	0.25	6 Ld μTDFN

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