

CN156

High Accuracy Distance Detector for Security Applications

October 2019

High Accuracy Distance Detector for Security Applications

■ Overview

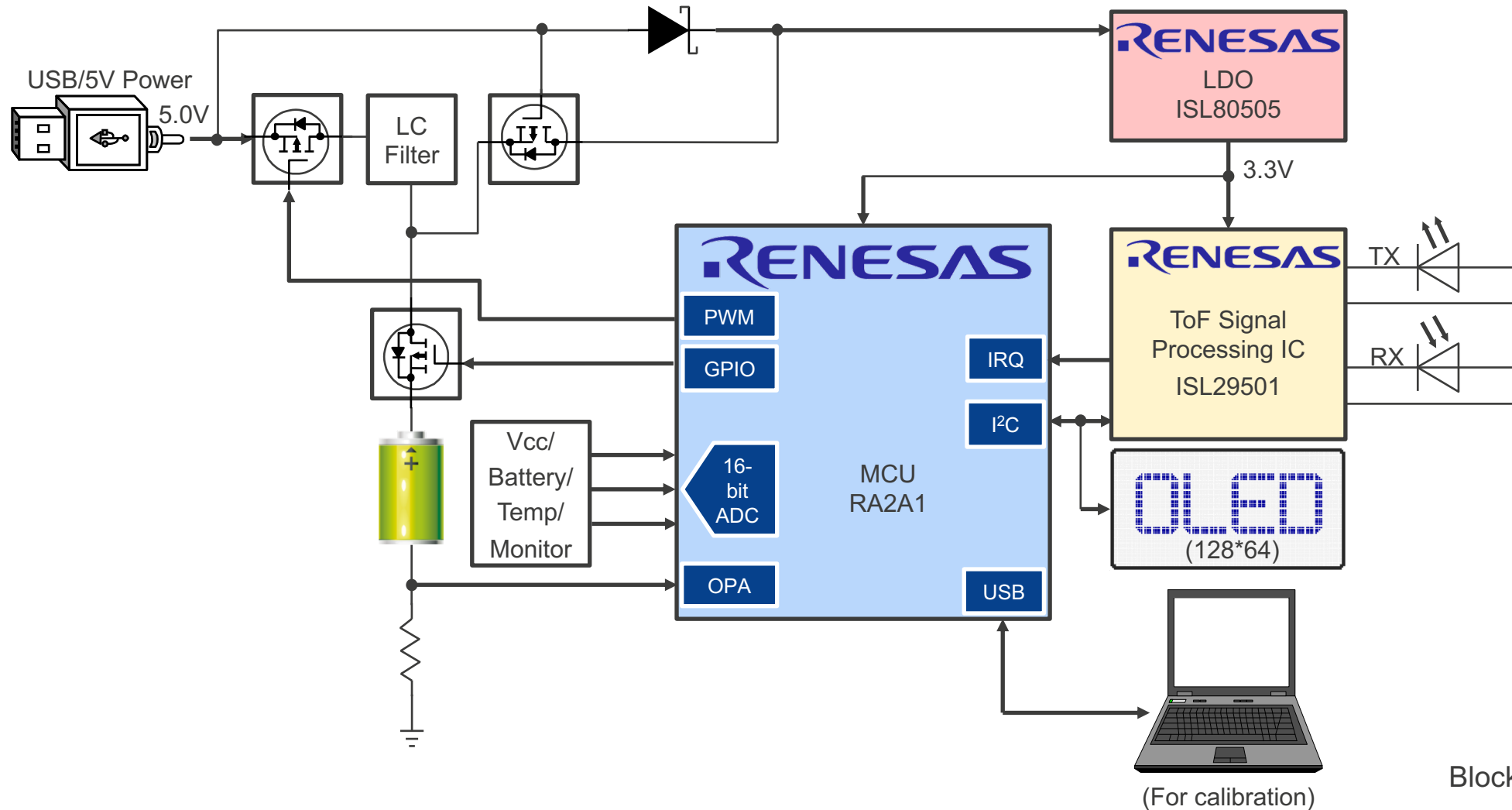
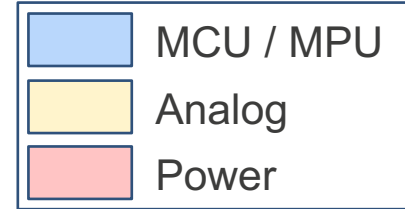
Time of Flight (ToF) technology has gained popularity and has been widely adopted for various applications. This system incorporates the ISL29501 ToF IC to provide a high-performance solution that is easy to design and control, while delivering accurate wide range distance measurements.

Optimized for handheld applications, this design includes the RA2A1 MCU. The MCU's analog support allows simple implementation of USB charging of a Li-ion battery. Voltage and current can also be monitored and controlled with real-time feedback, while charging mode can be adjusted as required.

■ System Benefits

- ToF with long range measurement distance (more than 10m)
- MCU-based lithium battery management. Includes pre-charging, constant current (CC), current voltage (CV) charging modes, overcurrent, overvoltage, overheating protection

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Block Diagram #CN156
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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
Analog	ISL29501	The ISL29501 is a Time of Flight (ToF) based signal processing integrated circuit
Power	ISL80505/510	Single output LDO capable of sourcing up to 500mA /1A output current

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

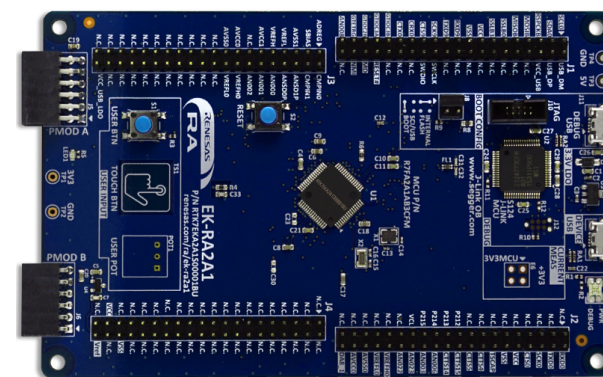
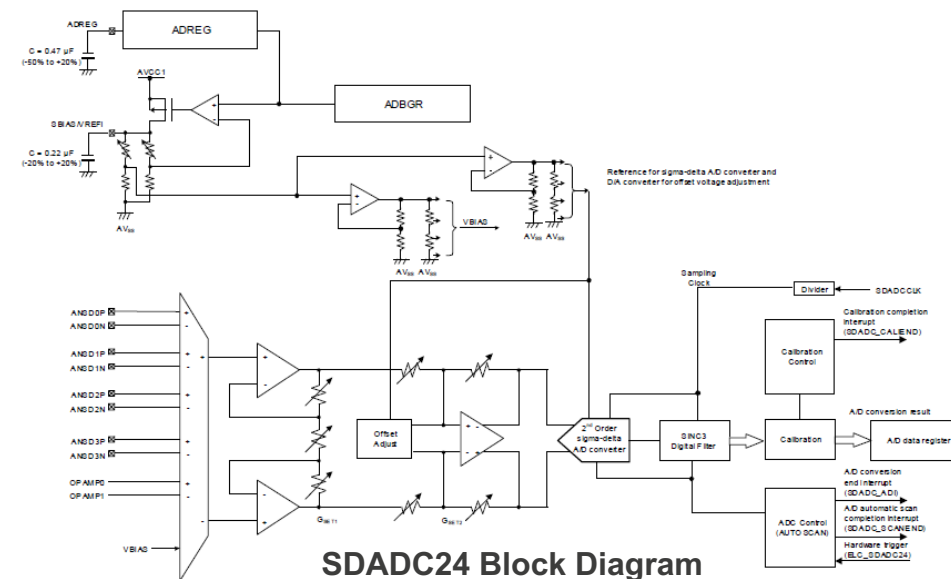
- USB 2.0 (Full Speed)
- CAN
- SCI x3/SPIx2/IICx2

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

ISL29501-Time of Flight (ToF) Signal Processing IC

Low Cost, Low Power, and Long Range Optical Distance Sensing

Application Level Integrated

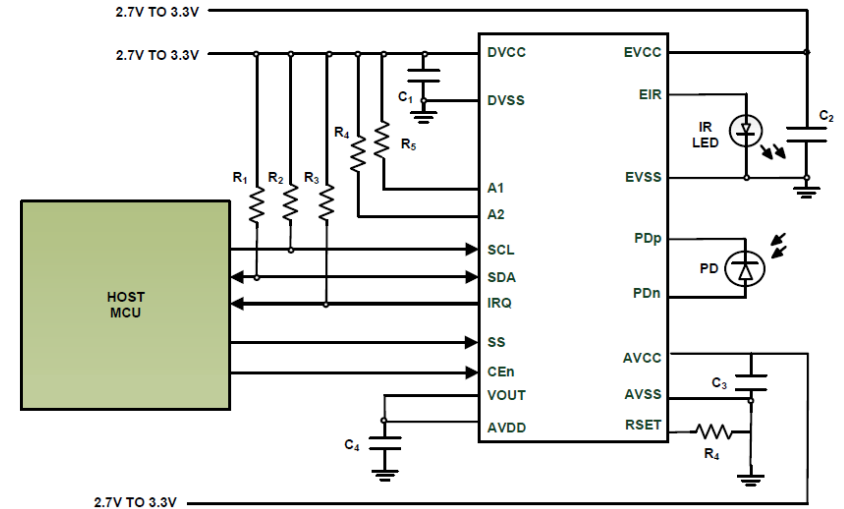
- On-chip Digital Signal Processor calculates the time of flight
- Built-in current DAC circuit that drives LED or laser
- On-chip active ambient light rejection

Easy Control

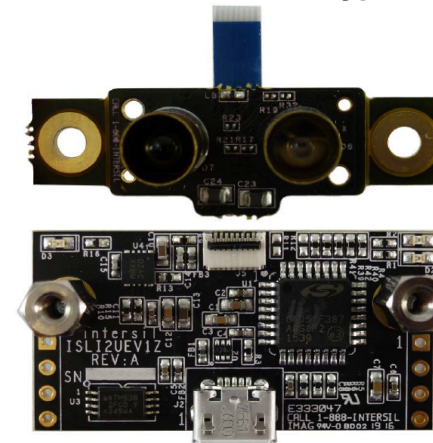
- I²C interface for configuration and control
- Operates in Continuous and Single Shot mode
- Auto gain control mechanism
- Interrupt controller
- Modulation frequency of 4.5MHz

Suitable for Different Designs

- Enables proximity detection and distance measurement
- Allows for optimization of performance/ power/ distance etc
- Wavelength agnostic
- Emitter DAC with programmable current up to 255mA
- I²C interface supporting 1.8V and 3.3V bus
- Low profile 24 Ld 4x5 QFN package



Typical Application Circuit



ISL29501-CS-EVKIT1Z Cat Shark



ISL29501-ST-EV1Z Sand Tiger

Part #	VDD RANGE (V)	TEMP RANGE (°C)	Package
ISL29501IRZ-T7	2.7V to 3.3V	-40 to +85	24 Ld QFN
ISL29501IRZ-T7A	2.7V to 3.3V	-40 to +85	24 Ld QFN

ISL80505/510 – High Performance 0.5A/1A LDO

High PSRR for Instrumentation, Industrial, and Medical Applications

Stable Output Voltage

- $\pm 1.8\%$ V_{OUT} accuracy guaranteed over line, load
- Stable with a $4.7\mu\text{F}$ output ceramic capacitor

High Efficiency

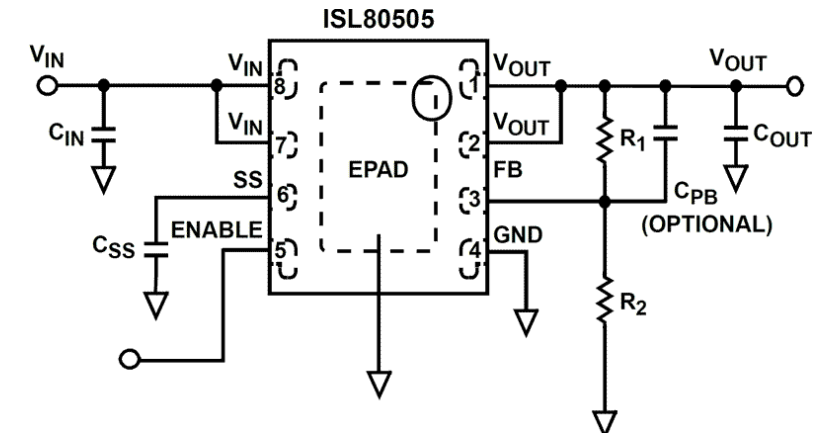
- Very low 45mV dropout voltage at $V_{OUT} = 2.5\text{V}$
- Very fast transient response

High Performance

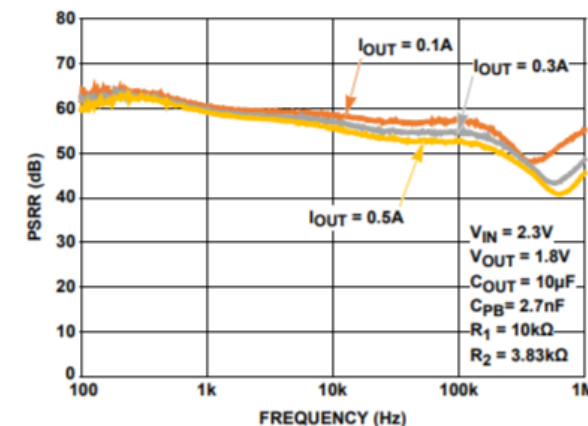
- Excellent PSRR over wide frequency range
- Programmable output soft-start time

Excellent Safety

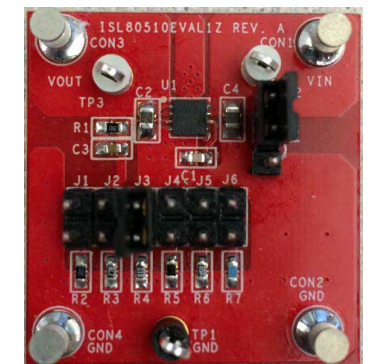
- Current limit protection
- Thermal shutdown function



Typical Application Circuit



PSRR (power supply rejection ratio)



ISL80510EVAL1Z 1A LDO Eval Board

Part #	Vin (V)	Iout (A)	Package
ISL80505IRAJZ	1.8V to 6V	0.5	3x3 DFN
ISL80510IRAJZ	2.2V to 6V	1	3x3 DFN

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