



# CN157 Digital Illuminometer

China System Solutions Team (SST)  
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# Digital Illuminometer

## ■ Overview

The digital illuminometer is composed of an integrated light sensor (ISL76683), OLED display and a cap-touch keypad. It can be used to monitor the lux value of a variety of lighting conditions. The OLED display method can be controlled with the touch key input, while the LED brightness also can be changed as a function of ambient light changes.

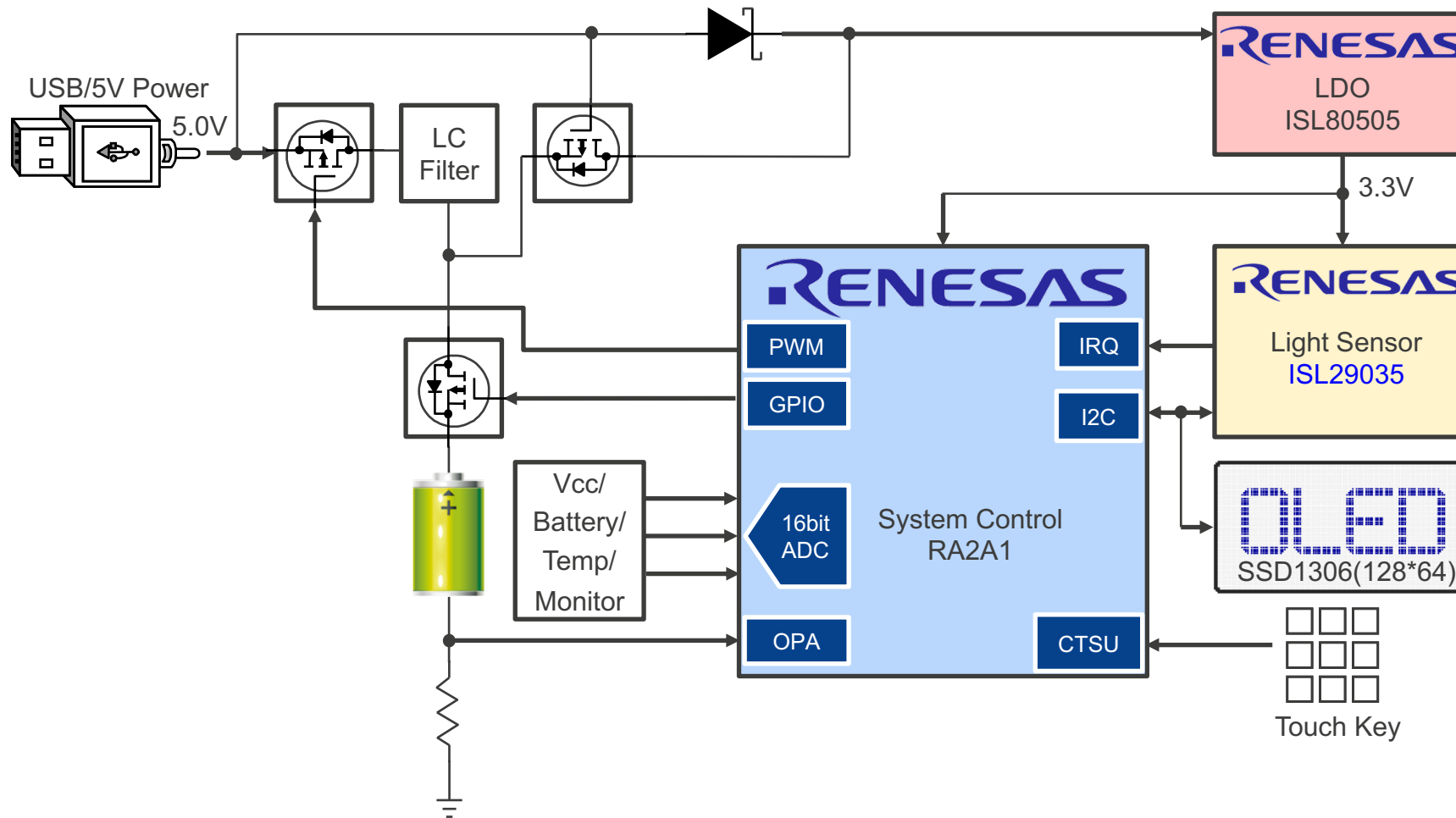
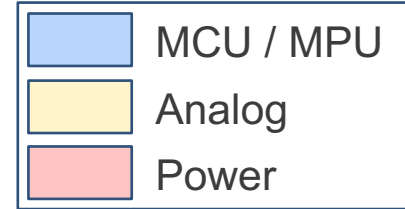
Optimized for handheld applications, this design incorporates the RA2A1 microcontroller, which with its analog support, can simply implement USB charging of a Li-ion battery. Voltage and current can be monitored and controlled with real-time feedback, while charging mode can be adjusted as required.

## ■ System Benefits

- Four lux sensitivity ranges provided automatically, LED brightness also can be changed
- MCU-based lithium battery management, which includes pre-charging, CC, CV charging mode, overcurrent, overvoltage, and overheating protection

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Block Diagram #CN157  
Dec, 2019

# Digital Illuminometer

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	ISL76683	Digital light sensor, ambient and infrared light-to-digital converter with I <sup>2</sup> C Interface
Power	ISL80505/510	Single output LDO capable of sourcing up to 500mA /1A output current

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# 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

- Op amp 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

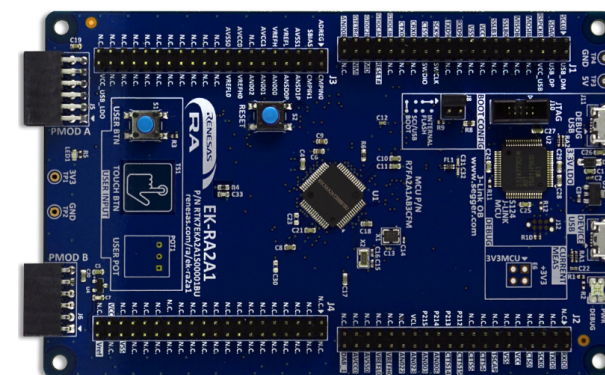
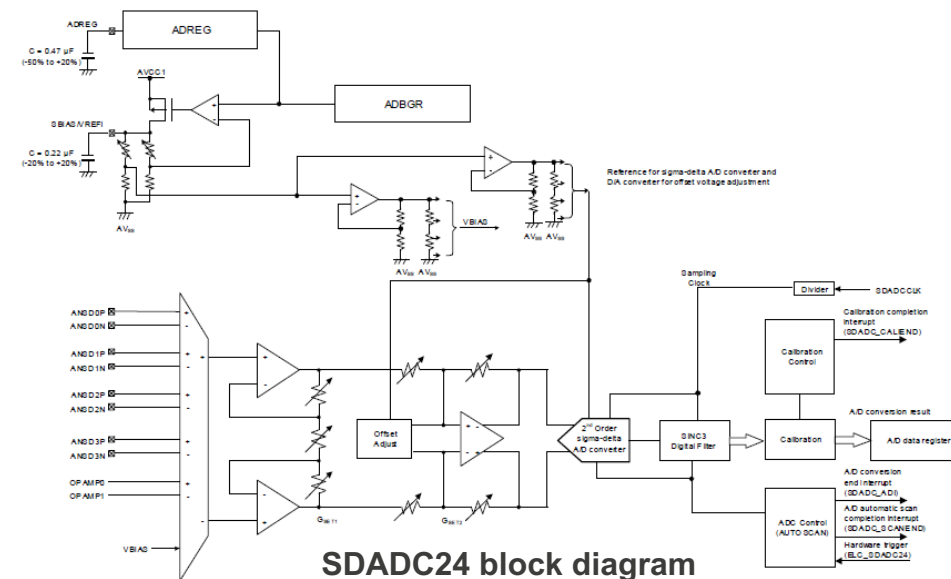
- USB 2.0(Full Speed)
- CAN
- SCI x3/SPIx2/IICx2

### 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#AA0	256KB	32KB	40~105°C	32 LQFP
R7FA2A1AB3CFM#AA0	256KB	32KB	40~105°C	64 LQFP

# ISL76683 - Digital Light Sensor with Interrupt

## Ambient and Infrared Light-to-digital Converter with I<sup>2</sup>C Interface

### Integrated Functions and Small Package

- 6 pin 2.1mm x 2mm ODFN
- On-chip 16-bit ADC
- I<sup>2</sup>C Interface
- Integrated noise rejection of 50Hz/60Hz

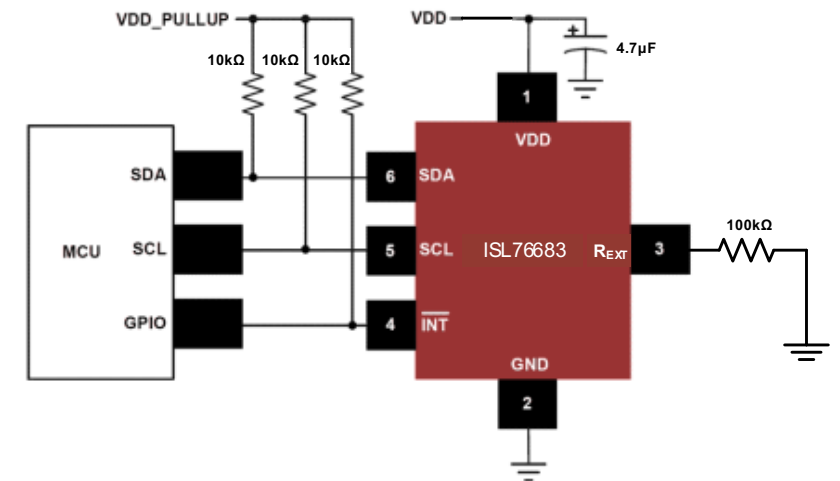
### High Performance

- Dynamic Range 1: 62,272
- 4 selectable measurement ranges: 1000, 4000, 16000, and 64000
- User-programmable upper and lower threshold interrupt
- Close to human eye response with excellent IR + UV rejection
- Temperature compensated
- Operation across -40°C to +105°C

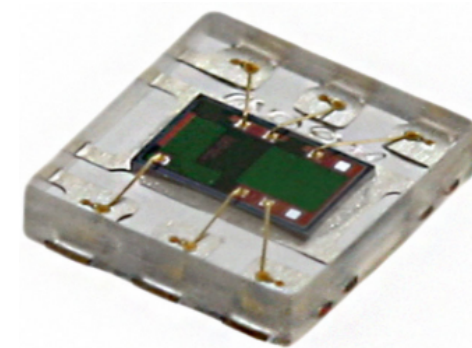
### Low Power Design

- Normal operation 300uA
- A software power-down mode reduces power consumption < 1uA

Part #	TEMP RANGE (°C)	Package
ISL76683AR0Z-T7	-40 to +105°C	6 pin 2.1mm x 2mm ODFN
ISL76683AR0Z-T7A	-40 to +105°C	6 pin 2.1mm x 2mm ODFN



Typical Application Circuit



ISL76683 encapsulation

# 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

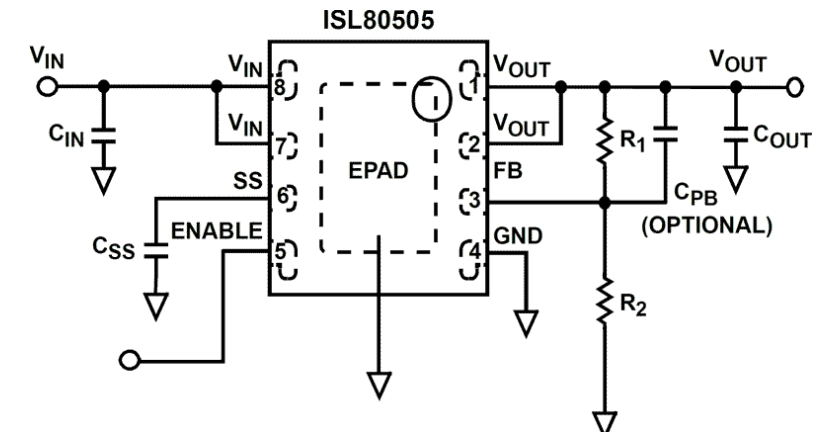
- Very low 45mV dropout voltage at  $V_{OUT} = 2.5\text{V}$
- Very fast transient response

## High Performance

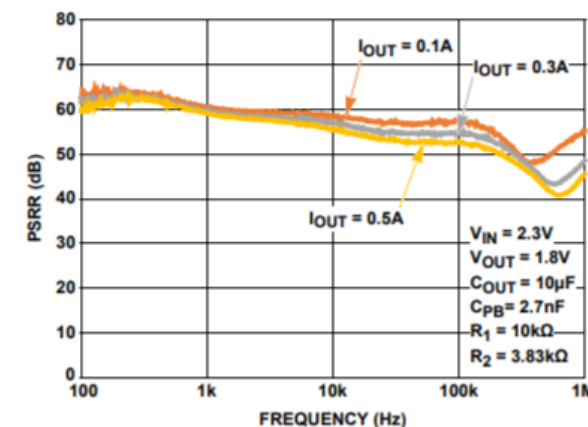
- Excellent PSRR over wide frequency range
- Programmable output soft-start time

## Excellent Safety

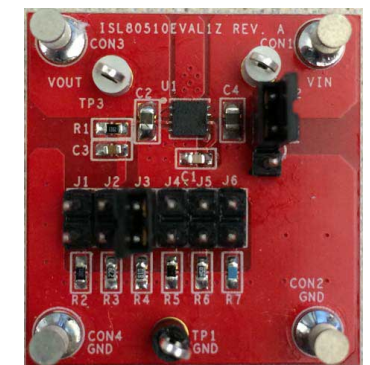
- Current limit protection
- Thermal shutdown function



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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[Renesas.com](https://www.renesas.com)