Integrated Digital Light Sensor with Interrupt

ISL29023

The ISL29023 is an integrated ambient and infrared light to digital converter with I²C (SMBus Compatible) Interface. Its advanced self-calibrated photodiode array emulates human eye response with excellent IR rejection. The on-chip ADC is capable of rejecting 50Hz and 60Hz flicker caused by artificial light sources. The lux range select feature allows users to program the lux range for optimized counts/lux.

For ambient light sensing, an internal 16-bit ADC has been designed based upon the charge-balancing technique. The ADC conversion time is nominally 90ms and is user adjustable from 11µs to 90ms, depending on oscillator frequency and ADC resolution. In normal operation, typical current consumption is 70µA. In order to further minimize power consumption, two power-down modes have been provided. If polling is chosen over continuous measurement of light, the auto-power-down function shuts down the whole chip after each ADC conversion for the measurement. The other power-down mode is controlled by software via the I²C interface. The power consumption can be reduced to less than 0.3µA when powered down.

The ISL29023 supports a software and hardware interrupt that remains asserted until the host clears it through I²C interface. Function of ADC conversion continues without stopping after interrupt is asserted.

Designed to operate on supplies from 2.25V to 3.63V with an I²C supply from 1.7V to 3.63V, the ISL29023 is specified for operation over the -40°C to +85°C ambient temperature range.

Features

- Resolution . . . . . .16-bits ADC
- Integrated Noise Reduction 50/60Hz
- Light Sensor Close to Human Eye Response
- Excellent Light Sensor IR and UV Rejection
- Range Selection via I²C
  - Range1 = 0.015 to 1,000 Lux
  - Range2 = 0.06 to 4,000 Lux
  - Range3 = 0.24 to 16,000 Lux
  - Range4 = 0.96 to 64,000 Lux
- Shutdown Modes . . . . . .Software & Automatic
- Supply Current (Max) 85µA
- Shutdown Current (Max) 0.3µA
- Control Interface . . . . . I²C and SMB Compatible
- I²C Power Supply . . . . . 1.7V to 3.63V
- Sensor Power Supply . . . . . .2.25V to 3.63V
- Operating Temperature Range . . . . . -40°C to +85°C
- Small Form Factor Package . . . . . .6 Ld 2.0x2.1x0.7 ODFN

Applications

- Mobile Devices: Smart Phone, PDA, GPS
- Computing Devices: Notebook PC, Webpad
- Consumer devices: LCD-TV, Digital Picture Frame, Digital Camera
- Industrial and Medical Light Sensing

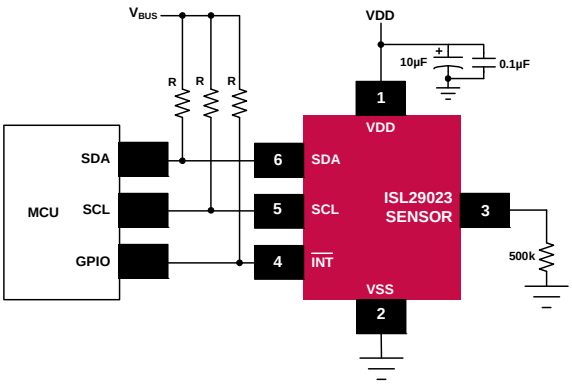


FIGURE 1. ISL29023 TYPICAL APPLICATION DIAGRAM

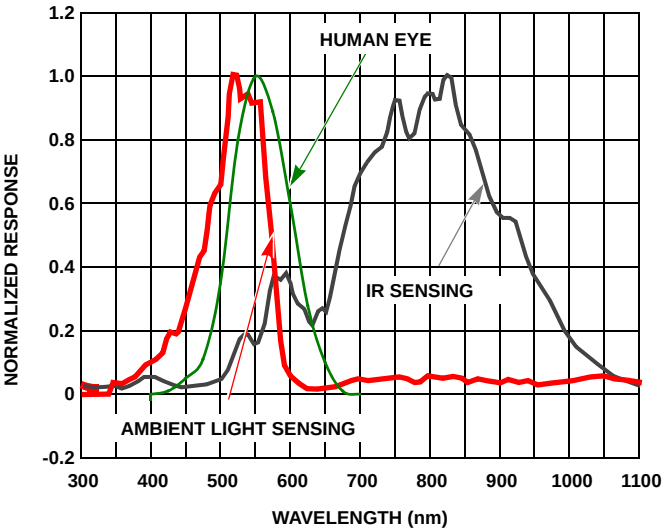
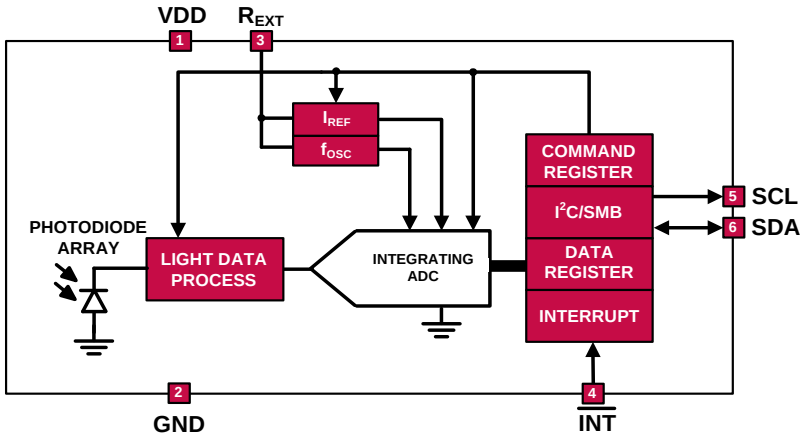


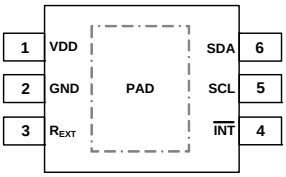
FIGURE 2. NORMALIZED SPECTRAL RESPONSE FOR AMBIENT LIGHT SENSING AND IR SENSING

Block Diagram



Pin Configuration

ISL29023
(6 LD ODFN)
TOP VIEW



*EXPOSED PAD CAN BE CONNECTED TO GND OR ELECTRICALLY ISOLATED

Pin Descriptions

PIN NUMBER	PIN NAME	DESCRIPTION
1	VDD	Positive supply; connect this pin to a 2.25V to 3.63V supply
2	GND	Ground pin
3	R_{EXT}	External resistor pin for ADC reference; connect this pin to ground through a (nominal) 499kΩ resistor.
4	$\overline{INT}$	Interrupt pin; low for interrupt alarming. $\overline{INT}$ pin is open drain. $\overline{INT}$ remains asserted until the interrupt flag status bit is reset.
5	SCL	I^2C serial clock. This line can be pulled from 1.7V to above V_{DD}, 3.63V max.
6	SDA	I^2C serial data. This line can be pulled from 1.7V to above V_{DD}, 3.63V max.
	PAD	Exposed pad connected to ground or electrically isolated