Low Power Ambient Light and Proximity Sensor with Intelligent Interrupt and Sleep Modes - Analog and Digital Out

ISL29030A

The ISL29030A is an integrated ambient and infrared light-to-digital converter with a built-in IR LED driver and I^2C Interface (SMBus Compatible). This device uses two independent ADCs for concurrently measuring ambient light and proximity in parallel. The flexible interrupt scheme is designed for minimal microcontroller utilization.

For ambient light sensor (ALS) data conversions, an ADC converts photodiode current (with a light sensitivity range of 2000 lux) in 100ms per sample. The ADC rejects 50Hz/60Hz flicker noise caused by artificial light sources. The I_{ALS} pin provides an analog output current proportional to the measured light (420µA FSR).

For proximity sensor (Prox) data conversions, the built-in driver turns on an external infrared LED, and the proximity sensor ADC converts the reflected IR intensity to digital. This ADC rejects ambient IR noise (such as sunlight) and has a 540µs conversion time.

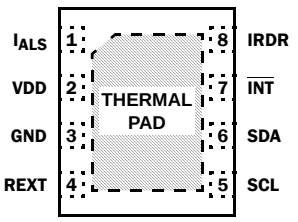
The ISL29030A provides low-power operation of the ALS and proximity sensing, with a typical 138µA normal operation current (110µA for sensors and internal circuitry; ~28µA for external LED, with 220mA current pulses for a net 100µs, repeating every 800ms or under).

The ISL29030A uses both a hardware pin and software bits to indicate an interrupt event has occurred. An ALS interrupt is defined as a measurement that is outside a set window. A proximity interrupt is defined as a measurement over a threshold limit. The user can configure the device so that ALS and proximity interrupts occur simultaneously, up to 16 times in a row, before the interrupt pin is activated.

The ISL29030A is designed to operate at 2.25V to 3.63V over the -40°C to +85°C ambient temperature range. It is packaged in a clear, lead-free 8 lead ODFN package.

Pin Configuration

ISL29030A
8 LD ODFN (2.0x2.1x0.7mm)
TOP VIEW



*THERMAL PAD CAN BE CONNECTED TO GND OR ELECTRICALLY ISOLATED

Features

- Works Under All Light Sources Including Sunlight
- Dual ADCs Measure ALS/Prox Concurrently
- Intelligent Interrupt Scheme Simplifies Microcontroller Code

Ambient Light Sensing

- Simple Output Code Directly Proportional to Lux
- 50Hz/60Hz Flicker Noise and IR Rejection
- Light Sensor Close to Human Eye Response
- Selectable 125/2000 Lux Range
- Analog 420µA Output Pin I_{ALS} Proportional to Lux

Proximity Sensing

- Proximity Sensor with Broad IR Spectrum
  - Can Use 850nm and 950nm External IR LEDs
- IR LED Driver with I^2C Programmable Sink Currents
  - Net 100µs Pulse with 110mA or 220mA Amplitudes
  - Periodic Sleep Time Up to 800ms Between Pulses
- Ambient IR Noise Cancelation (Including Sunlight)

Intelligent and Flexible Interrupts

- Independent ALS/Prox Interrupt Thresholds
- Adjustable Interrupt Persistency
  - 1/4/8/16 Consecutive Triggers Required Before Interrupt

Ultra Low Power

- 138µA DC Typical Supply Current for ALS/Prox Sensing
  - 110µA for Sensors and Internal Circuitry
  - 28µA Typical Current for External IR LED (Assuming 220mA for 100µs Every 800ms)
- <1.0µA Supply Current When Powered Down

Easy to Use

- Set Registers; Wait for Interrupt
- I^2C (SMBus Compatible) Output
- Temperature Compensated
- Tiny ODFN8 2.0x2.1x0.7 (mm) Package

Additional Features

- 1.7V to 3.63V Supply for I^2C Interface
- 2.25V to 3.63V Sensor Power Supply
- Pb-Free (RoHS compliant)

Applications

- Display and Keypad Dimming Adjustment and Proximity Sensing for:
  - Mobile Devices: Smart Phone, PDA, GPS
  - Computing Devices: Laptop PC, Netbook
  - Consumer Devices: LCD-TV, Digital Picture Frame, Digital Camera
- Industrial and Medical Light and Proximity Sensing

CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures.
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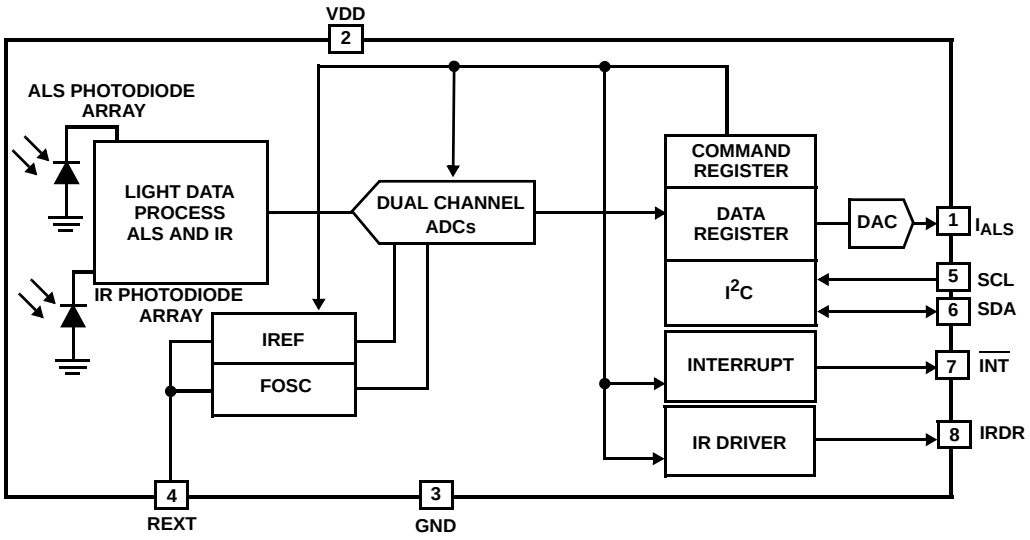
Pin Descriptions

PIN NUMBER	PIN NAME	DESCRIPTION	
0	T.PAD	Thermal pad (connect to GND or float)	
1	I_{ALS}	Analog current output (proportional to ALS/IR Data Count: 420µA FSR)	
2	VDD	Positive supply: 2.25V to 3.63V	
3	GND	Ground	
4	REXT	External resistor (499kΩ; 1%) connects this pin to ground	
5	SCL	I^2C clock line	The I^2C bus lines can be pulled from 1.7V to above V_{DD}; 3.63V max
6	SDA	I^2C data line	
7	$\overline{INT}$	$\overline{Interrupt}$ pin; logic output (open-drain) for interrupt	
8	IRDR	IR LED driver pin; current flows into ISL29030A from LED cathode	

Block Diagram



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