Low Power Ambient Light and Proximity Sensor with Intelligent Interrupt and Sleep Modes

ISL29028A

The ISL29028A 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 up to 2000 Lux) in 100ms per sample. The ADC rejects 50Hz/60Hz flicker noise caused by artificial light sources.

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 ISL29028A provides low power operation of 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 ISL29028A uses both a hardware pin and software bits to indicate an interrupt event has occurred. An ALS interrupt is defined as a measurement which is outside a set window. A proximity interrupt is defined as a measurement over a threshold limit. The user may also require that both ALS/prox interrupts occur at once, up to 16 times in a row before activating the interrupt pin.

The ISL29028A is designed to operate from 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.

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

Features

- Works Under All Light Sources Including Sunlight
- Dual ADCs Measure ALS/Prox Concurrently
- Intelligent Interrupt Scheme Simplifies µC Code
- 0.5% Typical Nonlinearity

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

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 Cancellation (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)
- I^2C Address Selection Pin

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