

- Converts Light Intensity to Digital Signal
- Infrared Compensation to Approximate Human Eye Response
- Companding A/D for Wide Dynamic Range
- Rejects 50 Hz/60 Hz Lighting Ripple
- Two-Wire SMBus Serial Interface
- Single Supply Operation (2.7 V to 5.5 V)
- Low Active Power (1 mW typ)
- Power Down Mode
- Low-Profile Surface-Mount Packages

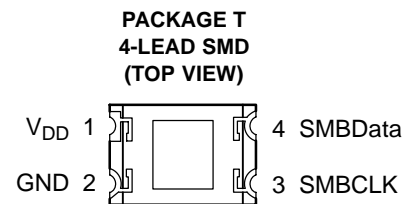
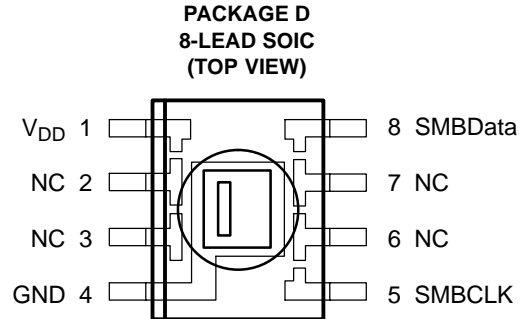
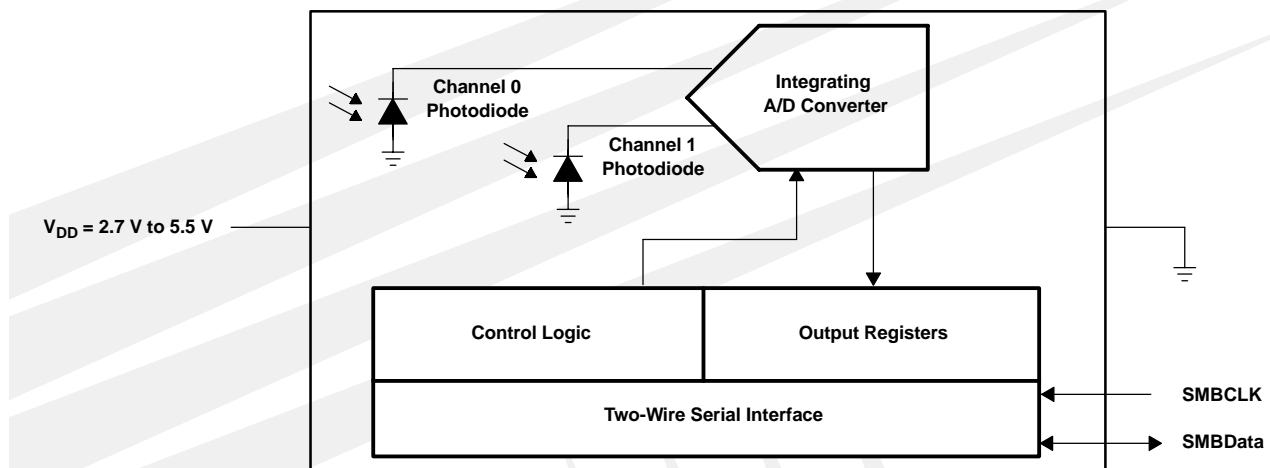
Description

The TSL2550 is a digital-output light sensor with a two-wire, SMBus serial interface. It combines two photodiodes and a companding analog-to-digital converter (ADC) on a single CMOS integrated circuit to provide light measurements over an effective 12-bit dynamic range with a response similar to that of the human eye.

The TSL2550 is designed for use with broad wavelength light sources. One of the photodiodes (channel 0) is sensitive to visible and infrared light, while the second photodiode (channel 1) is sensitive primarily to infrared light. An integrating ADC converts the photodiode currents to channel 0 and channel 1 digital outputs. Channel 1 digital output is used to compensate for the effect of the infrared component of ambient light on channel 0 digital output. The ADC digital outputs of the two channels are used to obtain a value that approximates the human eye response in the commonly used unit of Lux.

This device is intended primarily for use in applications in which measurement of ambient light is used to control display backlighting such as laptop computers, PDAs, camcorders, and GPS systems. Other applications include contrast control in LED signs and displays, camera exposure control, lighting controls, etc. The integrating conversion technique used by the TSL2550 effectively eliminates the effect of flicker from AC-powered lamps, increasing the stability of the measurement.

Functional Block Diagram



TSL2550 AMBIENT LIGHT SENSOR WITH SMBus INTERFACE

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Terminal Functions

| TERMINAL NAME | TERMINAL | | TYPE | DESCRIPTION |
|------------------|--------------|--------------|------|---|
| | D PKG NO. | T PKG NO. | | |
| GND | 4 | 2 | | Power supply ground. All voltages are referenced to GND. |
| SMBCLK | 5 | 3 | I | SMBus serial clock input terminal — clock signal for SMBus serial data. |
| SMBData | 8 | 4 | I/O | SMBus serial data I/O terminal — serial data I/O for SMBus. |
| V _{DD} | 1 | 1 | | Supply voltage. |

Available Options

| DEVICE | T _A | PACKAGE – LEADS | PACKAGE DESIGNATOR | ORDERING NUMBER |
|---------|----------------|-----------------|--------------------|-----------------|
| TSL2550 | –40°C to 85° | SOIC–8 | D | TSL2550D |
| TSL2550 | –40°C to 85° | T–4 | T | TSL2550T |

Absolute Maximum Ratings over operating free-air temperature range (unless otherwise noted)†

| | |
|--|----------------|
| Supply voltage, V _{DD} (see Note 1) | 6 V |
| Digital output voltage range, V _O | –0.3 V to +6 V |
| Digital output current, I _O | ±10 mA |
| SMBus input/output current, I _(SMBIN) | –1 mA to 20 mA |
| Operating free-air temperature range, T _A | –40°C to 85°C |
| Storage temperature range, T _{stg} | –40°C to 85°C |
| ESD tolerance, human body model | 2000 V |

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltages are with respect to GND.

Recommended Operating Conditions

| | MIN | MAX | UNIT |
|--|-----|-----|------|
| Supply voltage, V _{DD} | 2.7 | 5.5 | V |
| Operating free-air temperature, T _A | 0 | 70 | °C |
| SMBus input low voltage @ V _{DD} = 3.3 V ± 5%, V _{IL} | | 0.8 | V |
| SMBus input high voltage @ V _{DD} = 3.3 V ± 5%, V _{IH} | 2.1 | | V |
| SMBus operating frequency, f _(SMBCLK) | 10 | 100 | kHz |