

ISL29101

Small, Low Power, Voltage-Output Ambient Light Photo Detect IC

FN6510  
Rev 1.00  
November 5, 2012

The ISL29101 is a low power ambient Light-to-Voltage optical sensor combining a photodiode array, a current amplifier and a micropower operational amplifier on a single monolithic IC. Similar to the human eye, the photodiode array has a peak response at 550nm and spans from 400nm to 600nm, rejecting UV light and IR light. The output voltage is proportional to the visible light intensity from 0.5 lux up to 10,000 lux. However, the input luminance range can go up to 30,000 lux with some compromise in linearity.

A dark current compensation circuit aids the photodiode array to minimize temperature dependent leakage currents in the absence of light, improving the light sensity at low lux levels.

Housed in an ultra-compact surface mount 2mmx2.1mm ODFN clear plastic package, this device is excellent for power saving control functions in cell phones, PDAs, and other handheld applications.

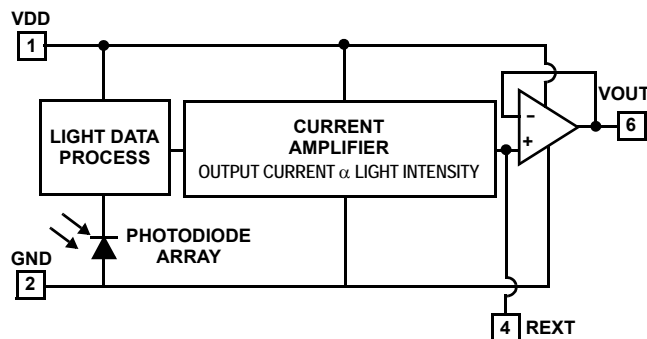
Ordering Information

PART NUMBER (Notes 2, 3)	TEMP. RANGE (°C)	PACKAGE (Pb-free)	PKG. DWG. #
ISL29101IROZ-T7 (Note 1)	-40 to +85	6 Ld ODFN	L6.2x2.1
ISL29101IROZ-T7A (Note 1)	-40 to +85	6 Ld ODFN	L6.2x2.1
ISL29101IROZ-EVALZ	Evaluation Board		

NOTES:

1. Please refer to [TB347](#) for details on reel specifications.
2. These Intersil Pb-free plastic packaged products employ special Pb-free material sets; molding compounds/die attach materials and NiPdAu plate - e4 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations. Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J STD-020.
3. For Moisture Sensitivity Level (MSL), please see device information page for [ISL29101](#). For more information on MSL please see tech brief [TB477](#).

Simplified Block Diagram



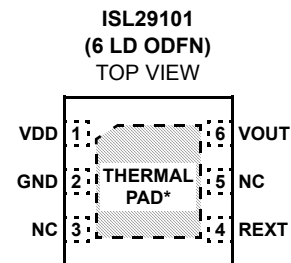
Features

- 0.5 lux to 10,000 lux range
- 1.8V to 3.3V supply range
- Low supply current
- Fast response time
- Excellent linearity of output voltage vs light intensity
- Close to human eye response
- Good IR rejection
- Internal temperature compensation
- Operating temperature range -40°C to +85°C
- Ultra-compact surface mount package
- Pb-free (RoHS compliant)

Applications

- Display and keypad dimming for:
  - Mobile devices: smart phone, PDA, GPS
  - Computing devices: notebook PC, webpod
  - Consumer devices: LCD-TV, digital picture frame, digital camera
- Industrial and medical light sensing

Pinout



\*THERMAL PAD CAN BE CONNECTED TO GND OR ELECTRICALLY ISOLATED

Pin Descriptions

PIN	NAME	DESCRIPTION
1	VDD	Supply. 1.8V to 3.3V
2	GND	Ground
3, 5	NC	No Connect
4	REXT	Connected to an external resistor to GND setting the light-to-voltage proportionality constant.
6	VOUT	Voltage Output

**Absolute Maximum Ratings** ( $T_A = +25^\circ\text{C}$ )

Supply Voltage between $V_{DD}$ and GND	3.6V
$R_{EXT}$	(-0.5V - GND) to (0.5V + $V_{DD}$ )
$V_{OUT}$	(-0.5V - GND) to (0.5V + $V_{DD}$ )
$V_{OUT}$ Short Circuit Current	<10mA
ESD Rating	
Human Body Model	3000V
Machine Model	300V

**Thermal Information**

Thermal Resistance	$\theta_{JA}$ ( $^\circ\text{C}/\text{W}$ )
6 Ld ODFN (Note 4)	88
Maximum Die Temperature	+90 $^\circ\text{C}$
Storage Temperature	-40 $^\circ\text{C}$ to +100 $^\circ\text{C}$
Operating Temperature	-40 $^\circ\text{C}$ to +85 $^\circ\text{C}$
Pb-Free Reflow Profile	see link below
	<a href="http://www.intersil.com/pbfree/Pb-FreeReflow.asp">http://www.intersil.com/pbfree/Pb-FreeReflow.asp</a>

CAUTION: Do not operate at or near the maximum ratings listed for extended periods of time. Exposure to such conditions may adversely impact product reliability and result in failures not covered by warranty.

## NOTE:

- $\theta_{JA}$  is measured in free air with the component mounted on a high effective thermal conductivity test board with "direct attach" features. See Tech Brief [TB379](#).

IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typical values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore:  $T_J = T_C = T_A$

**Electrical Specifications**  $V_{DD} = 3\text{V}$ ,  $T_A = +25^\circ\text{C}$ ,  $R_{EXT} = 100\text{k}\Omega$ , no load at  $V_{OUT}$ , green LED light, unless otherwise specified.

PARAMETER	DESCRIPTION	CONDITION	MIN (Note 6)	TYP	MAX (Note 6)	UNIT
E	Range of Input Light Intensity			0.5 to 10k		lux
VDD	Power Supply Range		1.8		3.3	V
I <sub>DD</sub>	Supply Current	E = 1000 lux		23	35	$\mu\text{A}$
		E = 100 lux		3.5		$\mu\text{A}$
		E = 0 lux		0.65		$\mu\text{A}$
V <sub>OUT0</sub>	Light-to-Voltage Accuracy	E = 100 lux		165		mV
V <sub>OUT1</sub>	Light-to-Voltage Accuracy	E = 1000 lux	1.15	1.65	2.13	V
V <sub>DARK</sub>	Voltage Output in the Absence of Light	E = 0 lux, $R_L = 10\text{M}\Omega$		1	25	mV
$\Delta V_{OUT}$	Output Voltage Variation Over Three Light Sources: Fluorescent, Incandescent and Halogen	E = 1000 lux		20		%
PSRR	Power Supply Rejection Ratio	E = 100 lux, $V_{DD} = 1.8\text{V}$ to 3.3V		2.5		mV/V
V <sub>O-MAX</sub>	Maximum Output Compliance Voltage at 95% of Nominal Output			$V_{DD} - 0.7\text{V}$		V
t <sub>R</sub>	ISRC and ISNK Rise Time (Note 5)	E = 300 lux from 0 lux		104		$\mu\text{s}$
		E = 1000 lux from 0 lux		27		$\mu\text{s}$
t <sub>F</sub>	ISRC and ISNK Fall Time (Note 5)	E = 300 lux to 0 lux		562		$\mu\text{s}$
		E = 1000 lux to 0 lux		233		$\mu\text{s}$
t <sub>D</sub>	ISRC and ISNK Delay Time for Rising Edge (Note 5)	E = 300 lux from 0 lux		504		$\mu\text{s}$
		E = 1000 lux from 0 lux		209		$\mu\text{s}$
t <sub>S</sub>	ISRC and ISNK Delay Time for Falling Edge (Note 5)	E = 300 lux to 0 lux		30		$\mu\text{s}$
		E = 1000 lux to 0 lux		18		$\mu\text{s}$
I <sub>SC</sub>	Short Circuit Current of Op Amp			$\pm 11$		mA
SR	Slew Rate of Op Amp			$\pm 10$		V/ms
V <sub>OS</sub>	Offset Voltage of Op Amp			$\pm 1.2$		mV

## NOTE:

- Switching time measurement is based on Figures 1 and 2.
- Compliance to datasheet limits is assured by one or more methods: production test, characterization and/or design.