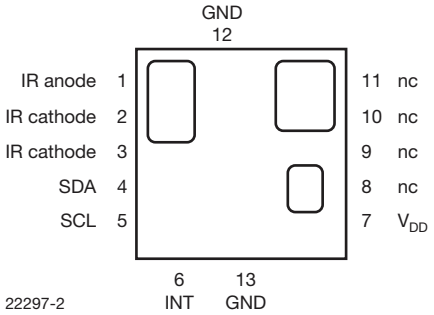
Fully Integrated Proximity and Ambient Light Sensor with Infrared Emitter, I²C Interface, and Interrupt Function



FEATURES

- Package type: surface mount
- Dimensions (L x W x H in mm): 3.95 x 3.95 x 0.75
- Integrated modules: infrared emitter (IRED), ambient light sensor (ALS-PD), proximity sensor (PD), and signal conditioning IC
- Interrupt function
- Supply voltage range V_{DD}: 2.5 V to 3.6 V
- Supply voltage range IR anode: 2.5 V to 5 V
- Communication via I²C interface
- I²C Bus H-level range: 1.7 V to 5 V
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Low stand by current consumption: 1.5 µA
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
e4
RoHS COMPLIANT
HALOGEN FREE
GREEN (5-2008)

DESCRIPTION

The VCNL4010 is a fully integrated proximity and ambient light sensor. Fully integrated means that the infrared emitter is included in the package. It has 16 bit resolution. It includes a signal processing IC and features standard I²C communication interface. It features an interrupt function.

APPLICATIONS

- Proximity sensor for mobile devices (e.g. smart phones, touch phones, PDA, GPS) for touch screen locking, power saving, etc.
- Integrated ambient light function for display/keypad contrast control and dimming of mobile devices
- Proximity/optical switch for consumer, computing and industrial devices and displays
- Dimming control for consumer, computing and industrial displays

PROXIMITY FUNCTION

- Built-in infrared emitter and photo-pin-diode for proximity function
- 16 bit effective resolution for proximity detection range ensures excellent cross talk immunity
- Programmable LED drive current from 10 mA to 200 mA in 10 mA steps
- Excellent ambient light suppression by modulating the infrared signal
- Proximity distance up to 200 mm

AMBIENT LIGHT FUNCTION

- Built-in ambient light photo-pin-diode with close-to-human-eye sensitivity
- 16 bit dynamic range from 0.25 lx to 16 klx
- 100 Hz and 120 Hz flicker noise rejection

PRODUCT SUMMARY

PART NUMBER	OPERATING RANGE (mm)	OPERATING VOLTAGE RANGE (V)	I²C BUS VOLTAGE RANGE (V)	LED PULSE CURRENT (1) (mA)	AMBIENT LIGHT RANGE (lx)	AMBIENT LIGHT RESOLUTION (lx)	OUTPUT CODE	ADC RESOLUTION PROXIMITY / AMBIENT LIGHT
VCNL4010	1 to 200	2.5 to 3.6	1.7 to 5	10 to 200	0.25 to 16 383	0.25	16 bit, I²C	16 bit / 16 bit

Note

(1) Adjustable through I²C interface

ORDERING INFORMATION			
ORDERING CODE	**PACKAGING**	**VOLUME (1)**	**REMARKS**
VCNL4010-GS08	Tape and reel	MOQ: 1800 pcs	3.95 mm x 3.95 mm x 0.75 mm
VCNL4010-GS18		MOQ: 7000 pcs	
Sensor starter kit (2)	-	MOQ: 1 pc	-

Notes

(1) MOQ: minimum order quantity

(2) A sensor starter kit is available, along with an add-on demo board for each of the sensors.
Please visit www.vishay.com/moreinfo/vcnldemokit/ for more information.
Contact any catalog distributor or a local Vishay sales representative to purchase the sensor starter kit and contact sensorstechsupport@vishay.com to receive an add-on sensor board.

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)					
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**MAX.**	**UNIT**
Supply voltage		V_{DD}	-0.3	5.5	V
Operation temperature range		T_{amb}	-25	+85	°C
Storage temperature range		T_{stg}	-40	+85	°C
Total power dissipation	$T_{amb} \leq 25$ °C	P_{tot}		50	mW
Junction temperature		T_j		100	°C

BASIC CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Supply voltage V_{DD}			2.5		3.6	V
Supply voltage IR anode			2.5		5	V
I²C Bus H-level range			1.7		5	V
INT H-level range			1.7		5	V
INT low voltage	3 mA sink current				0.4	V
Current consumption	Standby current, no IRED-operation			1.5	2	µA
Current consumption proximity mode incl. IRED (averaged)	2 measurements per second, IRED current 20 mA			5		µA
	250 measurements per second, IRED current 20 mA			520		µA
	2 measurements per second, IRED current 200 mA			35		µA
	250 measurements per second, IRED current 200 mA			4.0		mA
Current consumption ambient light mode	2 measurements per second averaging = 1			2.5		µA
	8 measurements per second averaging = 1			10		µA
	2 measurements per second averaging = 64			160		µA
	8 measurements per second averaging = 64			640		µA
Ambient light resolution	Digital resolution (LSB count)			0.25		lx
Ambient light output	E_V = 100 lx averaging = 64			400		counts
I²C clock rate range		f_{SCL}			3400	kHz