

High Sensitivity Long Distance Proximity and Ambient Light Sensor with I²C Interface

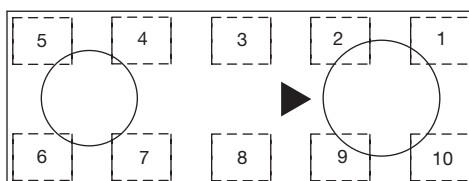


DESCRIPTION

VCNL4100 integrates a high sensitivity long distance proximity sensor (PS), ambient light sensor (ALS), and 940 nm IRED into one small package. It incorporates photodiodes, amplifiers, and analog to digital converting circuits into a single chip using a CMOS process. The 16-bit high resolution ALS offers excellent sensing capabilities with sufficient selections to fulfill most applications whether a dark or high transparency lens design. VCNL4100 offers individual programmable high and low threshold interrupt features for the best utilization of resources and power saving on the microcontroller. For the 8-bit proximity sensing function, VCNL4100 has a built-in intelligent cancellation scheme that eliminates background light issues. The persistence feature prevents false judgment of proximity sensing due to ambient light noise.

The adoption of the patented Filtron™ technology achieves the closest ambient light spectral sensitivity to real human eye responses. VCNL4100 provides excellent temperature compensation capability for keeping the output stable under changing temperature. ALS and PS functions are easily operated via the simple command format of I²C (SMBus compatible) interface protocol. Operating voltage ranges from 2.5 V to 3.6 V.

PIN DEFINITION



Top View

1	GND	6	LED+
2	LED_Cathode	7	NC
3	V _{DD}	8	INT
4	NC	9	SDAT
5	LED-	10	SCLK

FEATURES

- Package type: surface mount
- Dimensions (L x W x H in mm): 8.0 x 3.0 x 1.8
- Integrated modules: infrared emitter (IRED), ambient light sensor (ALS), proximity sensor (PS), and signal conditioning IC
- Operates ALS and PS in parallel structure
- Filtron™ technology adoption for robust background light cancellation
- Supports low transmittance (dark) lens design
- Temperature compensation: -40 °C to +85 °C
- Low power consumption I²C (SMBus compatible) interface
- Floor life: 168 h, MSL 3, according to J-STD-020
- Output type: I²C bus (ALS / PS)
- Operation voltage: 2.5 V to 3.6 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



PROXIMITY FUNCTION

- Immunity to red glow (940 nm IRED)
- Intelligent background light cancellation
- Smart persistence scheme to reduce PS response time
- Proximity distance up to 1 m

AMBIENT LIGHT FUNCTION

- Fluorescent light flicker immunity
- Spectrum close to real human eye responses
- Selectable maximum detection range (655 / 1311 / 2621 / 5243) lux with highest sensitivity 0.01 lux/step

INTERRUPT

- Programmable interrupt function for ALS and PS with upper and lower thresholds
- Adjustable persistence to prevent false triggers for ALS and PS

APPLICATIONS

- Presence detection to activate displays in printers, copiers, and home appliances
- Collision detection in robots and toys
- Proximity sensing and lighting control in offices, corridors and public buildings
- Vehicle occupancy detection in parking lots
- Proximity detection in lavatory appliances

**PRODUCT SUMMARY**

PART NUMBER	OPERATING RANGE (mm)	OPERATING VOLTAGE RANGE (V)	I ² C BUS VOLTAGE RANGE (V)	IRE D PULSE CURRENT (mA)	AMBIENT LIGHT RANGE (lx)	AMBIENT LIGHT RESOLUTION (lx)	OUTPUT CODE	ADC RESOLUTION PROXIMITY / AMBIENT LIGHT
VCNL4100	0 to 1000	2.5 to 3.6	1.8 to 3.6	800 ⁽¹⁾	0.011375 to 5964	0.011375	16 bit, I ² C	8 bit / 16 bit

Note

⁽¹⁾ Maximum allowed current for VCNL4100 internal IRED

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	PIN NUMBER	REMARKS
VCNL4100	Tape and reel	MOQ: 2500 pcs	10	8.0 mm x 3.0 mm x 1.8 mm

Note

⁽¹⁾ MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	MAX.	UNIT
Supply voltage		V_{DD}	-	5.0	V
Operation temperature range		T_{amb}	-40	+85	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	-40	+100	$^{\circ}\text{C}$

RECOMMENDED OPERATING CONDITIONS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	MAX.	UNIT
Supply voltage		V_{DD}	2.5	3.6	V
Operation temperature range		T_{amb}	-40	+85	$^{\circ}\text{C}$
I ² C bus operating frequency		$f_{(I2CCLK)}$	10	400	kHz

PIN DESCRIPTIONS

PIN ASSIGNMENT	SYMBOL	TYPE	FUNCTION
1	GND	I	Ground
2	LED_CATHODE	I	IRED cathode connection
3	V_{DD}	I	Power supply input
4	NC	-	No connection
5	LED-	O	IRED cathode
6	LED+	I	IRED anode
7	NC	-	No connection
8	INT	O	Interrupt pin
9	SDAT	I / O (open drain)	I ² C data bus data input / output
10	SCLK	I	I ² C digital bus clock input