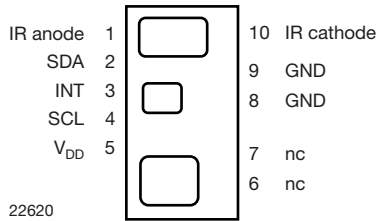
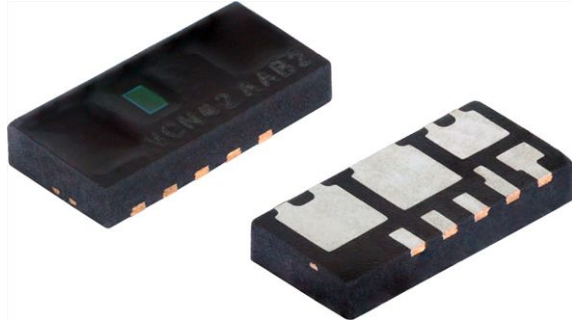


# Fully Integrated Proximity and Ambient Light Sensor with Infrared Emitter, I<sup>2</sup>C Interface, and Interrupt Function



## DESCRIPTION

The VCNL4020 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 I<sup>2</sup>C 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

## FEATURES

- Package type: surface mount
- Dimensions (L x W x H in mm): 4.90 x 2.40 x 0.83
- Integrated modules: infrared emitter (IRED), ambient light sensor (ALS-PD), proximity sensor (PD), and signal conditioning IC
- Interrupt function
- Supply voltage range V<sub>DD</sub>: 2.5 V to 3.6 V
- Supply voltage range IR anode: 2.5 V to 5 V
- Communication via I<sup>2</sup>C interface
- I<sup>2</sup>C bus H-level range: 1.7 V to 5 V
- Floor life: 72 h, MSL 4, 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](http://www.vishay.com/doc?99912)



## 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 signal modulation
- 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)	I <sup>2</sup> C BUS VOLTAGE RANGE (V)	LED PULSE CURRENT <sup>(1)</sup> (mA)	AMBIENT LIGHT RANGE (lx)	AMBIENT LIGHT RESOLUTION (lx)	OUTPUT CODE	ADC RESOLUTION PROXIMITY / AMBIENT LIGHT
VCNL4020	1 to 200	2.5 to 3.6	1.7 to 5	10 to 200	0.25 to 16 383	0.25	16 bit, I <sup>2</sup> C	16 bit / 16 bit

### Note

<sup>(1)</sup> Adjustable through I<sup>2</sup>C interface



ORDERING INFORMATION			
ORDERING CODE	PACKAGING	VOLUME <sup>(1)</sup>	REMARKS
VCNL4020-GS08	Tape and reel	MOQ: 3300 pcs	4.90 mm x 2.40 mm x 0.83 mm
VCNL4020-GS18		MOQ: 13 000 pcs	
Sensor starter kit <sup>(2)</sup>	-	MOQ: 1 pc	-

**Notes**

<sup>(1)</sup> MOQ: minimum order quantity

<sup>(2)</sup> 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/](http://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](mailto:sensorstechsupport@vishay.com) to receive an add-on sensor board.

ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	-25	+85	$^{\circ}\text{C}$
Total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	$P_{tot}$		50	mW
Junction temperature		$T_j$		100	$^{\circ}\text{C}$

BASIC CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , 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
I <sup>2</sup> C 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	$\mu\text{A}$
Current consumption proximity mode incl. IRED (averaged)	2 measurements per second, IRED current 20 mA			5		$\mu\text{A}$
	250 measurements per second, IRED current 20 mA			520		$\mu\text{A}$
	2 measurements per second, IRED current 200 mA			35		$\mu\text{A}$
	250 measurements per second, IRED current 200 mA			4		mA
Current consumption ambient light mode	2 measurements per second averaging = 1			2.5		$\mu\text{A}$
	8 measurements per second averaging = 1			10		$\mu\text{A}$
	2 measurements per second averaging = 64			160		$\mu\text{A}$
	8 measurements per second averaging = 64			640		$\mu\text{A}$
Ambient light resolution	Digital resolution (LSB count)			0.25		lx
Ambient light output	$E_v = 100\text{ lx}$ averaging = 64			400		counts
I <sup>2</sup> C clock rate range		$f_{SCL}$			3400	kHz