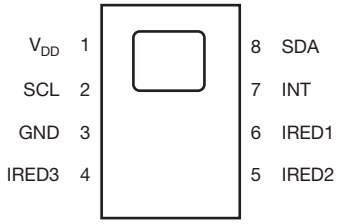
Fully Integrated Proximity and Ambient Light Sensor With I²C Interface and Interrupt Function for Gesture Applications



DESCRIPTION

VCNL4035X01 integrates a proximity sensor (PS), ambient light sensor (ALS), a muxx, and a driver for up to 3 external IREDs / LEDs into one small package. It incorporates photodiodes, amplifiers, and analog to digital converting circuits into a single chip by CMOS process. The 16-bit high resolution ALS offers excellent sensing capabilities with sufficient selections to fulfill most applications whether dark or high transparency lens design. Both ALS and PS programmable interrupt features of individual high and low thresholds offers the best utilization of resource and power saving on the microcontroller.

The proximity sensor features an intelligent cancellation scheme, so that cross talk phenomenon is eliminated effectively. To accelerate the PS response time, smart persistence prevents the misjudgment of proximity sensing but also keeps a fast response time. Active force mode, one time trigger by one instruction, is another good approach for more design flexibility to fulfill different kinds of applications with more power saving.

The adoption of patented Filtron™ technology achieves the closest ambient light spectral sensitivity to real human eye responses and offers the best background light cancellation capability (including sunlight) without utilizing the microcontrollers' resources. VCNL4035X01 provides an excellent temperature compensation capability for keeping output stable under various temperature configurations. 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. VCNL4035X01 is packaged in a lead-free 8-pin QFN package, which offers the best market-proven reliability quality.

FEATURES

AUTOMOTIVE GRADE

Pb-free

e4

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

- Package type: surface-mount
- Dimensions (L x W x H in mm): 4.0 x 2.36 x 0.75
- AEC-Q101 qualified
- Integrated modules: ambient light sensor (ALS), proximity sensor (PS), and signal conditioning ICL
- Operates ALS and PS in parallel structure
- Filtron™ technology adoption for robust background light cancellation
- Temperature compensation: -40 °C to +105 °C
- Low power consumption I²C (SMBus compatible) interface
- Output type: I²C bus (ALS / PS)
- Operation voltage: 2.5 V to 3.6 V
- Floor life: 168 h, MSL 3, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

PROXIMITY FUNCTION

- Immunity to red glow (≥ 890 nm IREDs)
- Programmable IRED sink current
- Intelligent cancellation to reduce cross talk phenomenon
- Smart persistence scheme to reduce PS response time
- Selectable for 12- / 16- bit PS output data

AMBIENT LIGHT FUNCTION

- High accuracy of ALS ± 10 %
- Fluorescent light flicker immunity
- Spectrum close to real human eye responses
- Selectable maximum detection range (262 / 524 / 1048 / 2096 / 4192) lux with highest sensitivity 0.004 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

- Handheld device
- Notebook, tablet PC
- Consumer device
- Industrial application

GESTURE APPLICATION

- 2D and 3D gesture function supported

PRODUCT SUMMARY

PART NUMBER	OPERATING RANGE (mm)	OPERATING VOLTAGE RANGE (V)	I²C BUS VOLTAGE RANGE (V)	IRED PULSE CURRENT (2) (mA)	AMBIENT LIGHT RANGE (lx)	AMBIENT LIGHT RESOLUTION (lx)	OUTPUT CODE	ADC RESOLUTION PROXIMITY / AMBIENT LIGHT
VCNL4035X01	0 to 500 (1)	2.5 to 3.6	1.8 to 5	200	0.004 to 4192	0.004	16 bit, I²C	16 bit / 16 bit

Notes

(1) Depending on external IRED

(2) Adjustable through I²C interface

ORDERING INFORMATION

ORDERING CODE	PACKAGING	VOLUME (1)	REMARKS
VCNL4035X01-GS08	Tape and reel	MOQ: 1800 pcs	4.0 mm x 2.36 mm x 0.75 mm
VCNL4035X01-GS18		MOQ: 7000 pcs	

Note

(1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °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	+105	°C
Storage temperature range		T_{stg}	-40	+110	°C

RECOMMENDED OPERATING CONDITIONS (T_{amb} = 25 °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	+105	°C
I²C bus operating frequency		$f_{(I2CCLK)}$	10	400	kHz

PIN DESCRIPTIONS

PIN ASSIGNMENT	SYMBOL	TYPE	FUNCTION
1	V_{DD}	I	Power supply input
2	SCL	I	I²C digital bus clock input
3	GND	I	Ground
4	IRED3	I	Cathode (IRED3) connection
5	IRED2	I	Cathode (IRED2) connection
6	IRED1	I	Cathode (IRED1) connection
7	INT	O	Interrupt pin
8	SDA	I / O (open drain)	I²C data bus data input / output