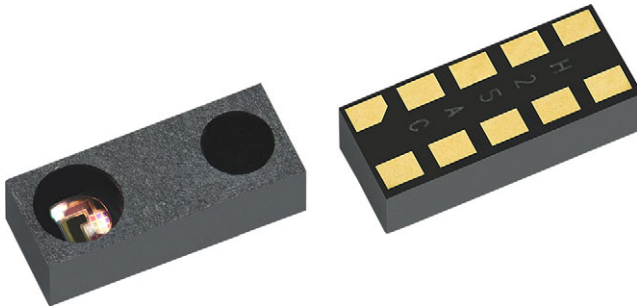




High Sensitivity Medium Distance Proximity Sensor With I²C Interface



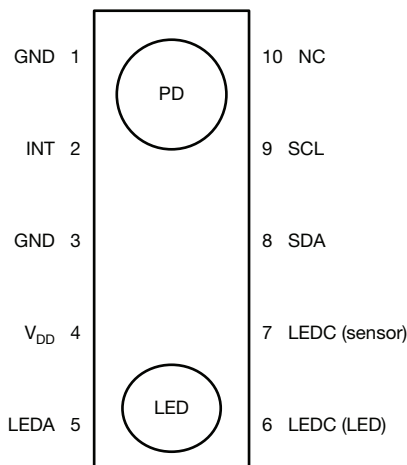
DESCRIPTION

VCNL36758 integrates a high sensitivity proximity sensor (PS) and an IR LED into one single package. It incorporates a photodiode, amplifiers, and analog / digital circuits into a single chip by the CMOS process. VCNL36758 offers individual programmable high and low threshold interrupt features for the best utilization of resources and power saving on the microcontroller.

The 12 bits proximity sensing function uses an intelligent cancellation scheme, so that crosstalk is eliminated effectively. To accelerate the PS response time, smart persistence prevents the misjudgment of proximity sensing but also allows for a fast response time. Active force mode, one time trigger by one instruction, is a feature offering more power saving.

VCNL36758 provides an excellent temperature compensation capability for keeping output stable under various temperature configurations. PS functions are easily operated via the simple command format of I²C (SMBus compatible) interface protocol. VCNL36758's operating voltage ranges from 1.7 V to 3.6 V. VCNL36758 is packaged in a lead (Pb)-free 10-pin molding package which offers the best market-proven reliability.

PIN DEFINITION



FEATURES

- Package type: surface-mount
- Dimensions (L x W x H in mm): 5.0 x 2.0 x 1.5
- Integrated modules: infrared emitter (IRLED) and a proximity sensor (PS)
- 1.8 V rated power supply and I²C bus
- Immunity to red glow (940 nm IRLED)
- Programmable ILED sink current
- Intelligent background light cancellation
- Proximity distance up to 60 cm
- Interrupt functionality
- Temperature compensation: -40 °C to +85 °C
- Adjustable persistence to prevent false triggers for PS
- Smart persistence scheme to reduce PS response time
- Output type: I²C bus
- Operation voltage: 1.7 V to 3.6 V
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



APPLICATIONS

- Presence detection to activate displays in printers, copiers, tablets, and home appliances
- Collision detection in robots and toys
- Proximity sensing and lighting control in offices, corridors and public buildings
- Parking space availability in lots and garages
- Proximity detection in lavatory appliances

**PRODUCT SUMMARY**

PART NUMBER	OPERATING RANGE (mm)	OPERATING VOLTAGE RANGE (V)	I ² C BUS VOLTAGE RANGE (V)	LED PULSE CURRENT (mA)	ADC RESOLUTION PROXIMITY / AMBIENT LIGHT
VCNL36758	600	1.7 to 3.6	1.7 to 3.6	240 ⁽¹⁾	12 bit / -

Note(1) Adjustable through I²C interface**ORDERING INFORMATION**

ORDERING CODE	PACKAGING	VOLUME ⁽¹⁾	PIN NUMBER	REMARKS
VCNL36758	Tape and reel	MOQ: 2500 pcs, 2500 pcs/reel	10	5.0 mm x 2.0 mm x 1.5 mm

Note

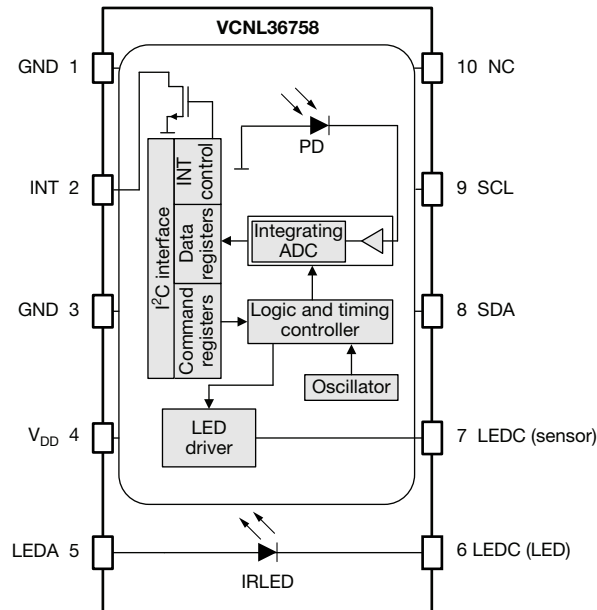
(1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	MAX.	UNIT
Supply voltage		V _{DD}	0	3.6	V
Operation temperature range		T _{amb}	-40	+85	°C
Storage temperature range		T _{stg}	-40	+100	°C

PIN DESCRIPTIONS

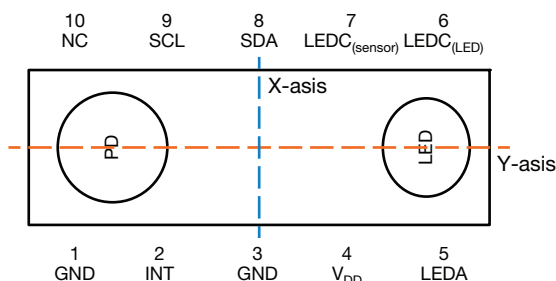
PIN NUMBER	PIN NAME	TYPE	DESCRIPTION
1	GND	I	Ground
2	INT	O (open drain)	Interrupt
3	GND	I	Ground
4	V _{DD}	I	Supply voltage
5	LEDA	I	LED anode
6	LEDC _(LED)	I	LED cathode
7	LEDC _(sensor)	I	Sensor cathode
8	SDA	I / O (open drain)	I ² C serial data
9	SCL	I / O (open drain)	I ² C serial clock
10	NC	-	No connection

BLOCK DIAGRAM


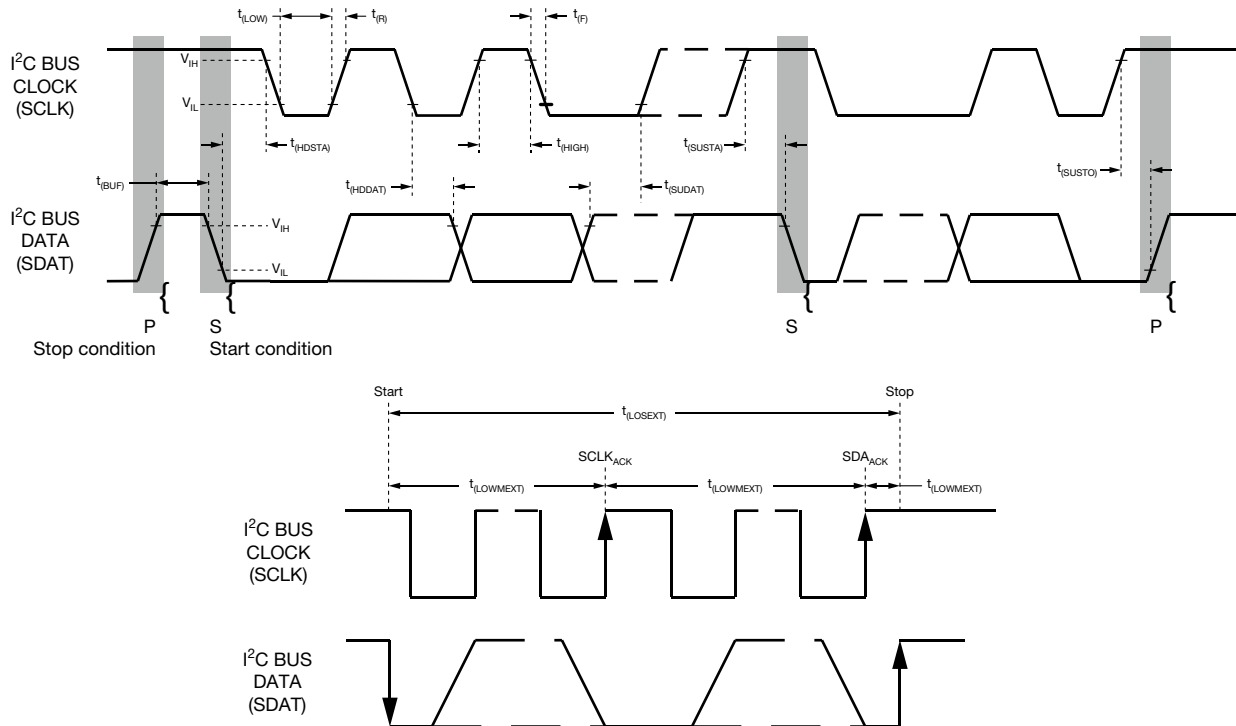
BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
ASIC						
Supply voltage		V_{DD}	1.7	-	3.6	V
Supply current	Shutdown current, $V_{DD} = 3.3\text{ V}$	I_{DD}	-	0.2	-	μA
	Excluded LED driving		-	200	-	
i2C supply voltage		$V_{PULL\ UP}$	1.65	-	-	V
i2C signal input	Logic high	$V_{DD} = 3.3\text{ V}$	V_{IH}	1.26	-	V
	Logic low		V_{IL}	-	-	
EMITTER						
Supply voltage of the LED		V_{LED}	2.9	-	4.8	V
Forward voltage	$I_F = 100\text{ mA}$	V_F	-	1.55	-	V
Forward current		I_F	70	-	240	mA
Angle of half intensity	$I_F = 100\text{ mA}$	ϕ	-	± 18	-	$^{\circ}$
Peak sensitivity wavelength		λ_p	925	940	955	nm
Spectral bandwidth	$I_F = 100\text{ mA}$	$\Delta\lambda$	-	48	-	nm
PHOTODIODE						
PS Angle of half sensitivity ⁽¹⁾	X-axis	ϕ	-	± 32	-	$^{\circ}$
	Y-axis		-	± 30	-	
Peak sensitivity wavelength		λ_p	-	850	-	nm

Note

⁽¹⁾ Cross section of the package



I²C BUS TIMING CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)						
PARAMETER	SYMBOL	STANDARD MODE		FAST MODE		UNIT
		MIN.	MAX.	MIN.	MAX.	
Clock frequency	$f_{(I2CCLK)}$	10	100	10	400	kHz
Bus free time between start and stop condition	$t_{(BUF)}$	4.7	-	1.3	-	μs
Hold time after (repeated) start condition; after this period, the first clock is generated	$t_{(HDSTA)}$	4.0	-	0.6	-	μs
Repeated start condition setup time	$t_{(SUSTA)}$	4.7	-	0.6	-	μs
Stop condition setup time	$t_{(SUSTO)}$	4.0	-	0.6	-	μs
Data hold time	$t_{(HDDAT)}$	0	3450	0	900	ns
Data setup time	$t_{(SUDAT)}$	250	-	100	-	ns
I ² C clock (SCK) low period	$t_{(LOW)}$	4.7	-	1.3	-	μs
I ² C clock (SCK) high period	$t_{(HIGH)}$	4.0	-	0.6	-	μs
Clock / data fall time	$t_{(F)}$	-	300	-	300	ns
Clock / data rise time	$t_{(R)}$	-	1000	-	300	ns


 Fig. 1 - I²C Bus Timing Diagram

PARAMETER TIMING INFORMATION

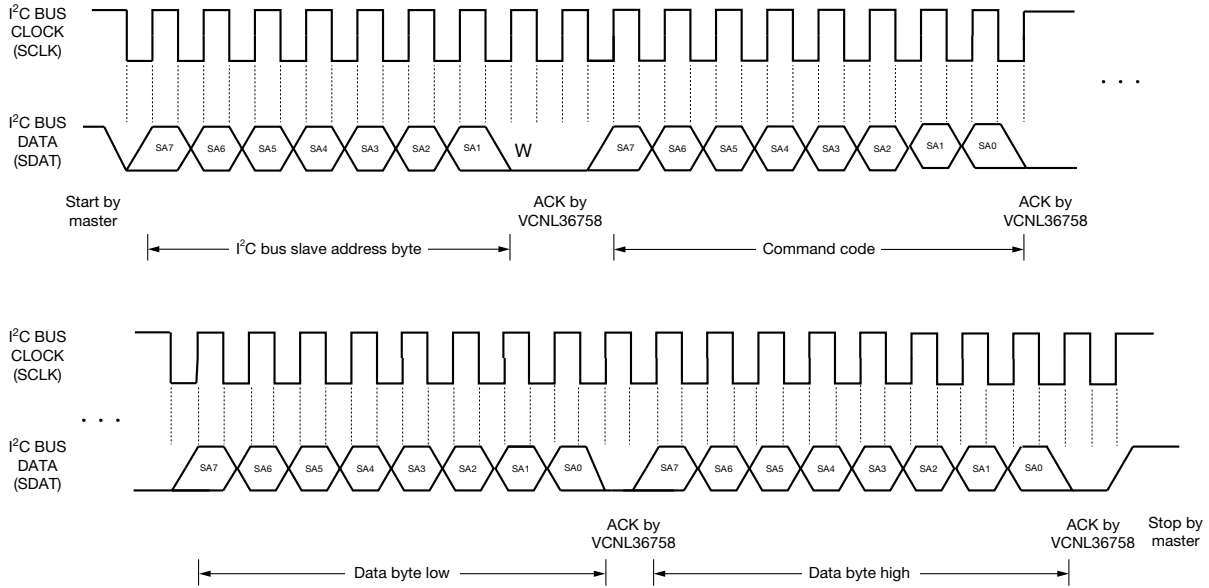


Fig. 2 - I²C Bus Timing for Sending Word Command Format

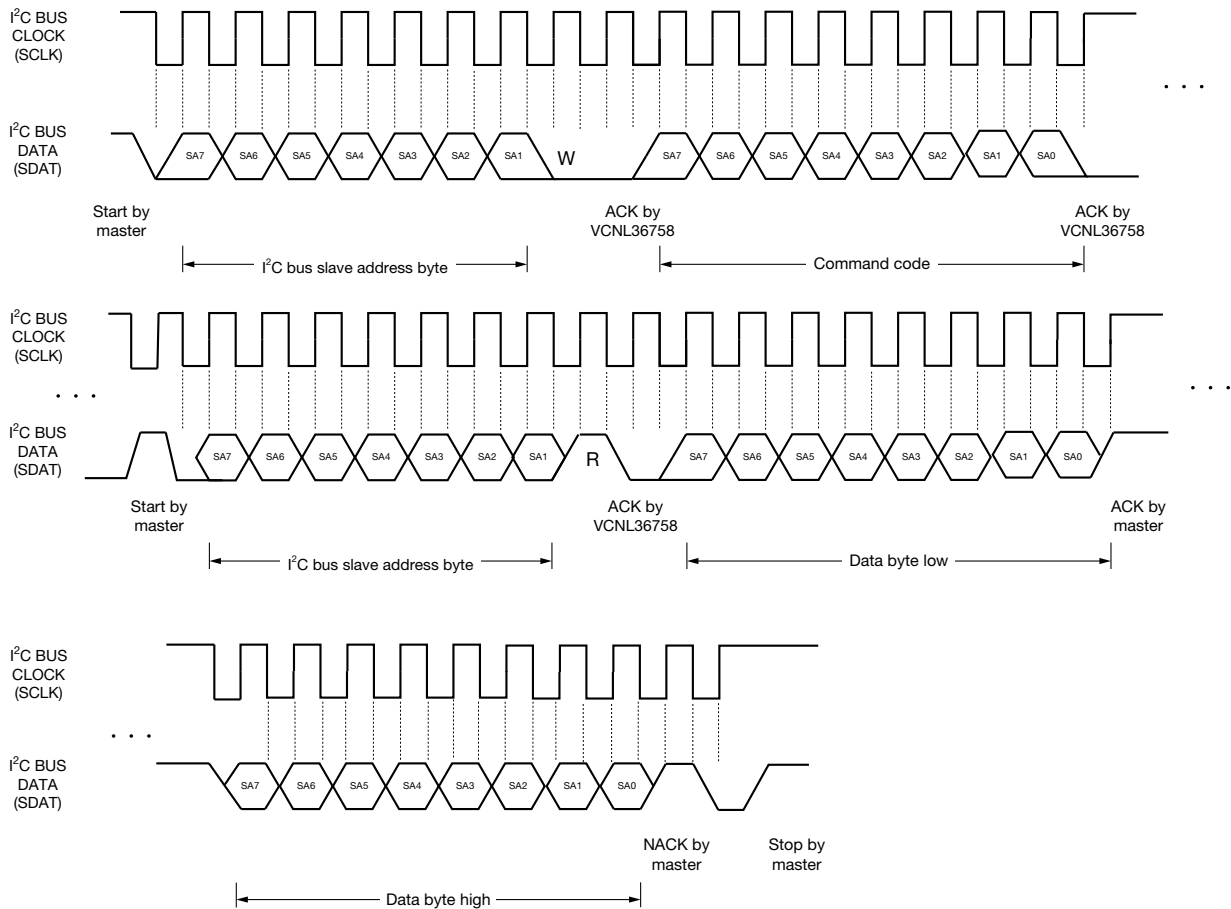


Fig. 3 - I²C Bus Timing for Receiving Word Command Format

TYPICAL PERFORMANCE CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

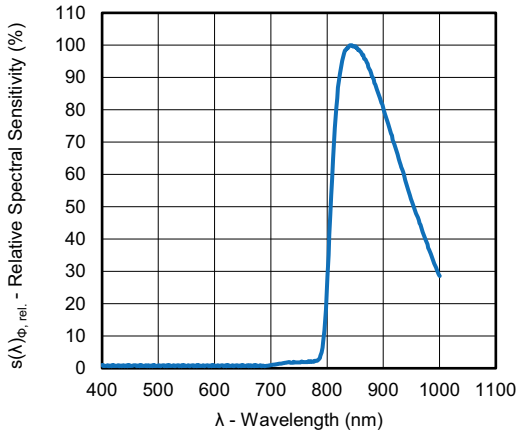


Fig. 4 - Relative Spectral Sensitivity vs. Wavelength of the Photodiode

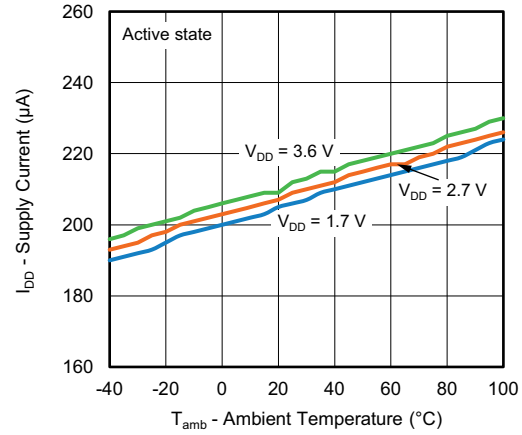


Fig. 7 - Supply Current vs. Ambient Temperature

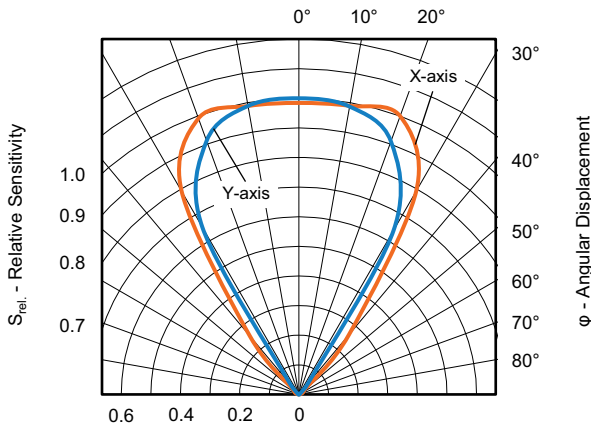


Fig. 5 - Relative Sensitivity vs. Angular Displacement of the Photodiode

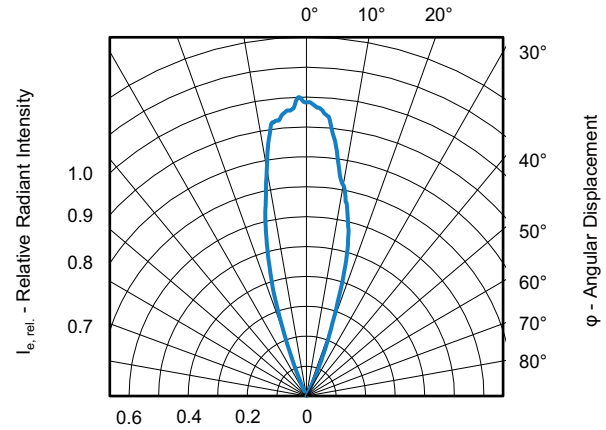


Fig. 8 - Relative Radiant Intensity vs. Angular Displacement of the IRLLED

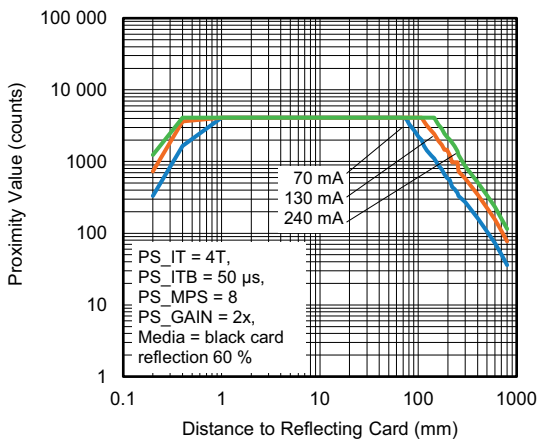


Fig. 6 - Proximity Value vs. Distance

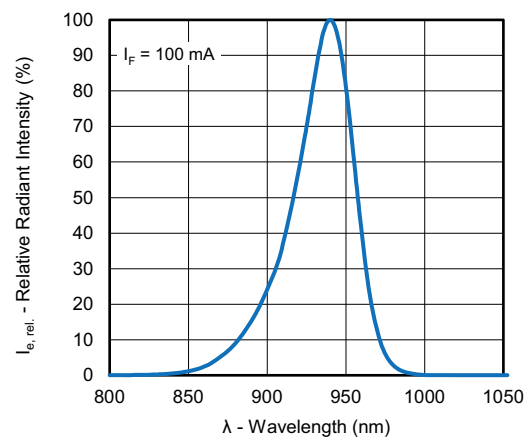


Fig. 9 - Relative Radiant Intensity vs. Wavelength of the IRLLED

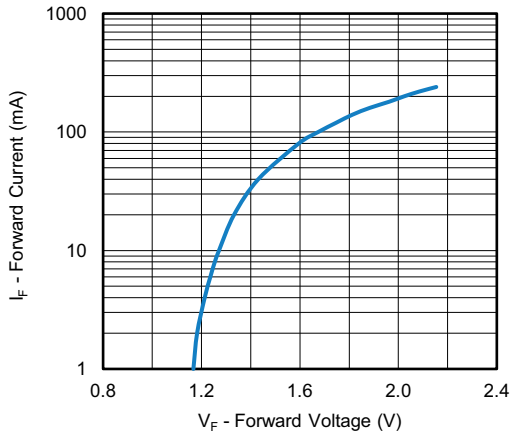


Fig. 10 - Forward Current vs. Forward Voltage of the IRLED

APPLICATION INFORMATION

Pin Connection With the Host

VCNL36758 integrates proximity sensor and IRLED all together with an I²C interface. It is easy for the baseband (CPU) to access PS output data via I²C interface without additional software algorithms. The hardware schematic is shown in the following diagram.

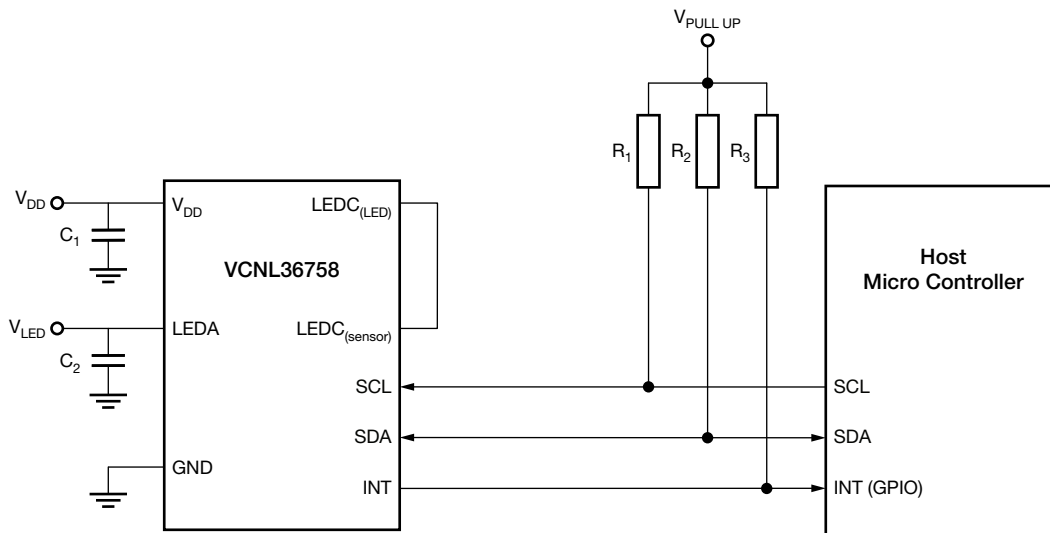


Fig. 11 - Application Diagram



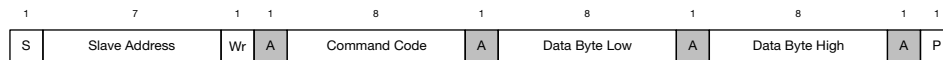
Table 1 shows the required values and the explanation for the individual application circuit parameters.

TABLE 1 - APPLICATION CIRCUIT PARAMETERS		
CIRCUIT PARAMETER	VALUE	DESCRIPTION
V _{DD}	1.7 V to 3.6 V	A stable power supply such as a low dropout regulator or a switching regulator is required. The power supply isolation can be further improved with a decoupling capacitor C ₁ .
V _{LED}	2.9 V to 4.8 V	A stable power supply such as a low dropout regulator or a switching regulator that can supply an adequate amount of power (max. IRLED pulse driving current of 240 mA) is required. The power supply isolation can be further improved with a decoupling capacitor C ₂ . The minimum voltage can support the selected driving current of the IR LED.
V _{PULL UP}	1.7 V to 3.6 V	A stable power supply such as a low dropout regulator or a switching regulator is required. A voltage level shifter is required if the I ² C bus voltage from the microcontroller is higher than 3.6 V.
C ₁ to C ₄	100 nF to 1 μF	Decoupling capacitors are recommended to reduce the noise in the supply voltage.
R ₁ to R ₂	2.2 kΩ to 4.7 kΩ	Pull-up resistors within the range of 2.2 kΩ to 4.7 kΩ are recommended. Any increase in bus capacitance or resistance will increase the logic-high transition time.
R ₃	4.7 kΩ to 22 kΩ	Pull-up resistor within the range of 4.7 kΩ to 22 kΩ is recommended.

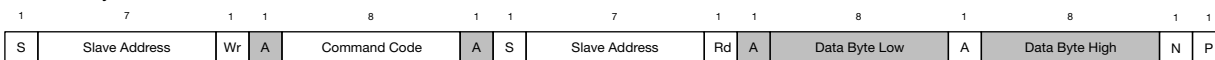
Digital Interface

VCNL36758 applies single 7-bit slave address 0x60 (HEX) following I²C protocol. All operations can be controlled by the command register. The simple command structure helps users easily program the operation setting and latch the light data from VCNL36758. As fig. 12 shows, VCNL36758's I²C command format is simple for read and write operations between VCNL36758 and the host. The white sections indicate host activity and the gray sections indicate VCNL36758's acknowledgement of the host access activity.

Send Byte → Write Command to VCNL36758



Receive Byte → Read Data from VCNL36758



S = start condition
P = stop condition
A = acknowledge
N = no acknowledge
Shaded area = VCNL36758 acknowledge

Fig. 12 - Command Protocol Format



Function Description

TABLE 2 - COMMAND CODE AND REGISTER DESCRIPTION					
COMMAND CODE	DATA BYTE LOW / HIGH	REGISTER NAME	DEFAULT VALUE	FUNCTION	ACCESS
0x00	L	PS_CONF1_L	0x01	Internal calibration setting	Write and read
	H	PS_CONF1_H	0x00	Switch the sensor on / off Reserved, bit 9 must be set to "1"	
0x03	L	PS_CONF2_L	0x01	Measurement period setting	
				Persistence setting	
				Interrupt setting	
				PS shutdown setting	
0x03	H	PS_CONF2_H	0x00	Signal strength setting (integration time and multi-pulse)	
				High gain setting	
				Trigger by each high / low threshold Interrupt setting	
				Bit 11 must be set to "1"	
0x04	L	PS_CONF3_L	0x00	Sensor mode setting	
				Active force mode trigger setting	
				Internal calibration setting	
				Sunlight protection interrupt enable setting	
0x04	H	PS_CONF3_H	0x00	Sunlight cancellation setting	
				LED driving current setting	
0x05	L	PS_THDL_L	0x00	PS low threshold interrupt value setting (low byte)	
	H	PS_THDL_H	0x00	PS low threshold interrupt value setting (high byte)	
0x06	L	PS_THDH_L	0x00	PS high threshold interrupt value setting (low byte)	
	H	PS_THDH_H	0x00	PS high threshold interrupt value setting (high byte)	
0x07	L	PS_CANC_L	0x00	PS offset count cancellation value setting (low byte)	
	H	PS_CANC_H	0x00	PS offset count cancellation value setting (high byte)	
0xF4	L	PS_DATA_L	0x00	Proximity output data (low byte)	
	H	PS_DATA_H	0x00	Proximity output data (high byte)	
0xF5	L	Reserved	0x00 to 0xFF	Reserved	
	H	INT_FLAG	0x00	Interrupt flag	
0xF6	L	VCNL36758_L	0x58	Device ID	
	H	VCNL36758_H	0x01	Device ID	

Note

- All of the reserved registers are used for internal test; these values must be kept constant



Command Register Format

TABLE 3 - REGISTER NAME: PS_CONF1_L							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PS_CAL	Reserved				Standby		Reserved
COMMAND CODE					0x00		
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
PS_CAL	Enable / disable the internal calibration		7	0x0 (0b0)	Disable (default)		
				0x1 (0b1)	Enable		
Reserved	Reserved		6 : 2	0x0 (0b00000)	Should be kept default		
PS_ON	Set this bit = "1" to enable bias circuit Note • Initialization process: step 1: set PS_ON bit = "1"; step 2: set PS_CAL = "1"; step 3: set PS_SD = 0 to enable PS		1	0x0 (0b0)	Disable (default)		
				0x1 (0b1)	Enable		
Reserved	Reserved		0	0x1 (0b1)	Should be kept default		

TABLE 4 - REGISTER NAME: PS_CONF1_H							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved							
COMMAND CODE					0x00		
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
Reserved	Reserved		15 : 10	0x0 (0b000000)	Should be kept default		
			9	0x0 (0b0)	(default)		
				0x1 (0b1)	Must be set to "1"		
		8	0x0 (0b0)	Should be kept default			

TABLE 5 - REGISTER NAME: PS_CONF2_L							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PS_PERIOD		PS_PERS		PS_INT		PS_SMART_PERS	PS_SD
COMMAND CODE					0x03		
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
PS_PERIOD	Set the measurement period		7 : 6	0x0 (0b00)	10 ms (default)		
				0x1 (0b01)	20 ms		
				0x2 (0b10)	40 ms		
				0x3 (0b11)	80 ms		
PS_PERS	Set the amount of consecutive threshold crossing events necessary to trigger interrupt		5 : 4	0x0 (0b00)	1 time (default)		
				0x1 (0b01)	2 times		
				0x2 (0b10)	3 times		
				0x3 (0b11)	4 times		
PS_INT	Set the interrupt mode setting		3 : 2	0x0 (0b00)	Interrupt disable (default)		
				0x1 (0b01)	Logic high / low mode		
				0x2 (0b10)	First high		
				0x3 (0b11)	Interrupt disable		
PS_SMART_PERS	Enable / disable the smart persistence setting when the interrupt event is triggered		1	0x0 (0b0)	Disable (default)		
PS_SD	PS shutdown setting		0	0x0 (0b0)	Power on		
				0x1 (0b1)	Shut down (default)		



TABLE 6 - REGISTER NAME: PS_CONF2_H							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
PS_IT		PS_MPS		Reserved	PS_HG	Reserved	PS_SSINT
COMMAND CODE					0x03		
BIT NAME	FUNCTION			BIT	VALUE	DESCRIPTION	
PS_IT	Set the integration time for one measurement; the pulse length "T" is 50 μ s			15 : 14	0x0 (0b00)	1T (default)	
					0x1 (0b01)	2T	
					0x2 (0b10)	4T	
					0x3 (0b11)	8T	
PS_MPS	Set the number of infrared signal pulses per measurement			13 : 12	0x0 (0b00)	1 pulse (default)	
					0x1 (0b01)	2 pulse	
					0x2 (0b10)	4 pulse	
					0x3 (0b11)	8 pulse	
Reserved	Reserved			11	0x0 (0b0)	Must be set to "1" (default)	
					0x1 (0b1)	Must be set to "1"	
PS_HG	Set the gain of the ADC			10	0x0 (0b0)	x 1 gain (default)	
					0x1 (0b1)	x 2 gain	
Reserved	Reserved			9	0x0 (0b0)	Should be kept default	
PS_SSINT	Trigger by each high / low threshold event			8	0x0 (0b0)	Disable (default)	
					0x1 (0b1)	Enable	

TABLE 7 - REGISTER NAME: PS_CONF3_L							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	PS_MODE	PS_TRIG	Reserved	PS_OFFSET	PS_SP_INT	Reserved	
COMMAND CODE					0x04		
BIT NAME	FUNCTION			BIT	VALUE	DESCRIPTION	
Reserved	Reserved			7	0x0 (0b0)	Should be kept default	
PS_MODE	Set the measurement mode of the sensor			6	0x0 (0b0)	Auto mode (default)	
					0x1 (0b1)	Active force mode	
PS_TRIG	Set the active force mode trigger; this bit will be reset to "0" after the measurement cycle			5	0x0 (0b0)	Off (default)	
					0x1 (0b1)	Trigger	
Reserved	Reserved			4	0x0 (0b0)	Should be kept default	
PS_OFFSET	Enable / disable the internal crosstalk cancellation			3	0x0 (0b0)	Disable (default)	
					0x1 (0b1)	Enable	
PS_SP_INT	Enable / disable the sunlight protection mode interrupt setting			2	0x0 (0b0)	Disable (default)	
					0x1 (0b1)	Enable	
Reserved	Reserved			1 : 0	0x0 (0b00)	Should be kept default	



TABLE 8 - REGISTER NAME: PS_CONF3_H							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
PS_SC_EN	PS_SC_LEVEL		Reserved		PS_CURRENT		
COMMAND CODE					0x04		
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
PS_SC_EN	Enable / disable the sunlight cancellation		15	0x0 (0b0)	Disable (default)		
				0x1 (0b1)	Enable		
PS_SC_LEVEL	Sunlight cancellation level setting		14 : 13	0x0 (0b00)	Level 1 (default)		
				0x1 (0b01)	Level 2		
				0x2 (0b10)	Level 3		
				0x3 (0b11)	Level 4		
Reserved	Reserved		12:11	0x0 (0b00)	Should be kept default		
PS_CURRENT	Set the LED driving current		10 : 8	0x0 (0b000)	70 mA (default)		
				0x1 (0b001)	95 mA		
				0x2 (0b010)	110 mA		
				0x3 (0b011)	130 mA		
				0x4 (0b100)	170 mA		
				0x5 (0b101)	200 mA		
				0x6 (0b110)	220 mA		
0x7 (0b111)	240 mA						

TABLE 9 - REGISTER NAME: PS_THDL							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PS_THDL_L							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved				PS_THDL_H			
COMMAND CODE					0x05		
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
PS_THDL_L	Set the low threshold interrupt value		7 : 0	0 to 4095	Low byte		
PS_THDL_H			11 : 8		High byte		
Reserved	Reserved		15 : 12	0x0 (0b0000)	Should be kept default		

TABLE 10 - REGISTER NAME: PS_THDH							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PS_THDH_L							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved				PS_THDH_H			
COMMAND CODE					0x06		
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
PS_THDH_L	Set the high threshold interrupt value		7 : 0	0 to 4095	Low byte		
PS_THDH_H			11 : 8		High byte		
Reserved	Reserved		15 : 12	0x0 (0b0000)	Should be kept default		

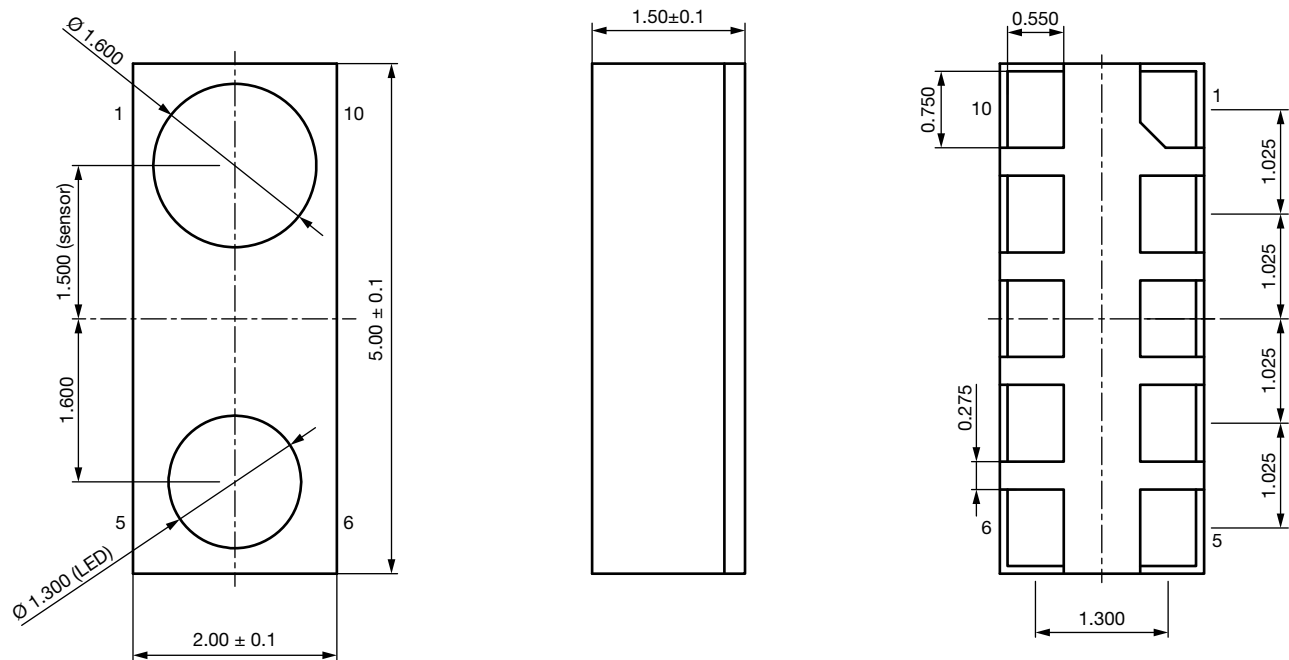


TABLE 11 - REGISTER NAME: PS_CANC							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PS_CANC_L							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved				PS_CANC_H			
COMMAND CODE				0x07			
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
PS_CANC_L	Set the offset count cancellation value		7 : 0	0 to 4095	Low byte		
PS_CANC_H			11 : 8		High byte		
Reserved	Reserved		15 : 12	0x0 (0b0000)	Should be kept default		

TABLE 12 - REGISTER NAME: PS_DATA							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PS_DATA_L							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved				PS_DATA_H			
COMMAND CODE				0xF4			
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
PS_DATA_L	Read the proximity output data		7 : 0	0 to 4095	Low byte		
PS_DATA_H			11 : 8		High byte		
Reserved	Reserved		15 : 12	0x0 (0b0000)	Should be kept default		

TABLE 13 - REGISTER NAME: INT_FLAG							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
Reserved			PS_SPFLAG	Reserved		PS_IF_CLOSE	PS_IF_AWAY
COMMAND CODE				0xF5			
BIT NAME	FUNCTION		BIT	VALUE	DESCRIPTION		
Reserved	Reserved		7 : 0	0x00 to 0xFF (0b00000000 to 0b11111111)	Should be kept default		
Reserved	Reserved		15 : 13	0x0 (0b000)	Should be kept default		
PS_SPFLAG	Read the sunlight protection mode interrupt event flag		12	0x0 (0b0)	No sunlight protection mode interrupt event flag		
				0x1 (0b1)	Sunlight protection mode interrupt event flag		
Reserved	Reserved		11 : 10	0x0 (0b00)	Should be kept default		
PS_IF_CLOSE	Read the high threshold crossing interrupt event flag		9	0x0 (0b0)	No high threshold crossing interrupt event flag		
				0x1 (0b1)	High threshold crossing interrupt event flag		
PS_IF_AWAY	Read the low threshold crossing interrupt event flag		8	0x0 (0b0)	No low threshold crossing interrupt event flag		
				0x1 (0b1)	Low threshold crossing interrupt event flag		

TABLE 14 - REGISTER NAME: VCNL36758_ID							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VCNL36758_ID_L							
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
VCNL36758_ID_H							
COMMAND CODE				0xF6			
BIT NAME	FUNCTION			BIT	VALUE	DESCRIPTION	
VCNL36758_ID_L	Read the device ID			7 : 0	0x58 (0b01011000)	Should be kept default	
VCNL36758_ID_H				15 : 8	0x01 (0b00000001)	Should be kept default	

PACKAGE INFORMATION in millimeters


1	GND	6	LEDC _(LED)
2	INT	7	LEDC _(sensor)
3	GND	8	SDA
4	V _{DD}	9	SCL
5	LEDA	10	NC

Fig. 13 - VCNL36758 Package Dimensions



RECOMMENDED INFRARED REFLOW

Soldering conditions which are based on J-STD-020 C.

IR REFLOW PROFILE CONDITION			
PARAMETER	CONDITIONS	TEMPERATURE	TIME
Peak temperature		255 °C + 0 °C / - 5 °C (max.: 260 °C)	10 s
Preheat temperature range and timing		150 °C to 200 °C	60 s to 180 s
Timing within 5 °C to peak temperature			10 s to 30 s
Timing maintained above temperature / time		217 °C	60 s to 150 s
Timing from 25 °C to peak temperature			8 min (max.)
Ramp-up rate		3 °C/s (max.)	
Ramp-down rate		6 °C/s (max.)	

Recommend Normal Solder Reflow is 235 °C to 255 °C.

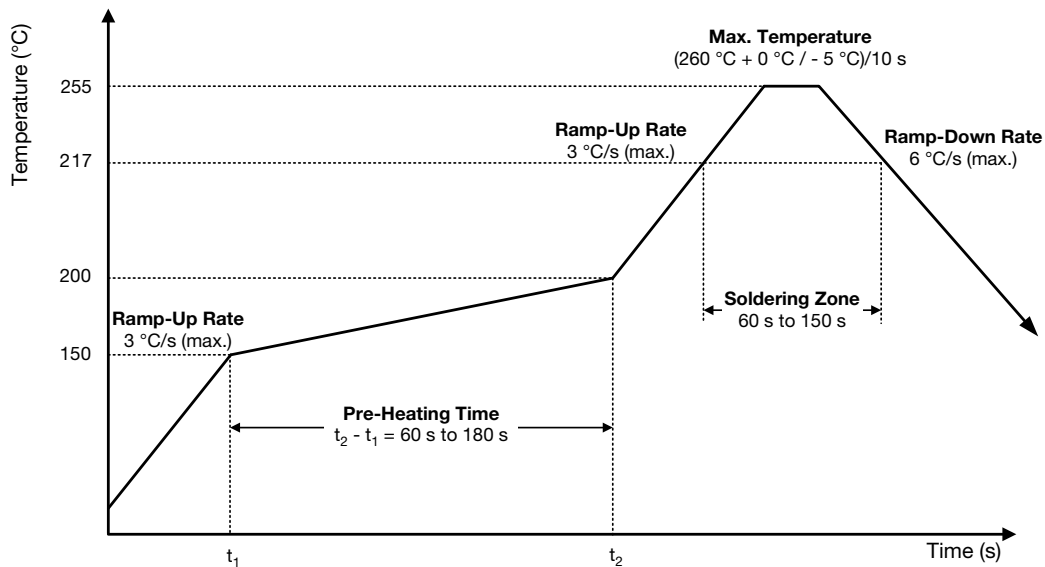


Fig. 14 - VCNL36758 Solder Reflow Profile Chart

TAPE PACKAGING INFORMATION in millimeters

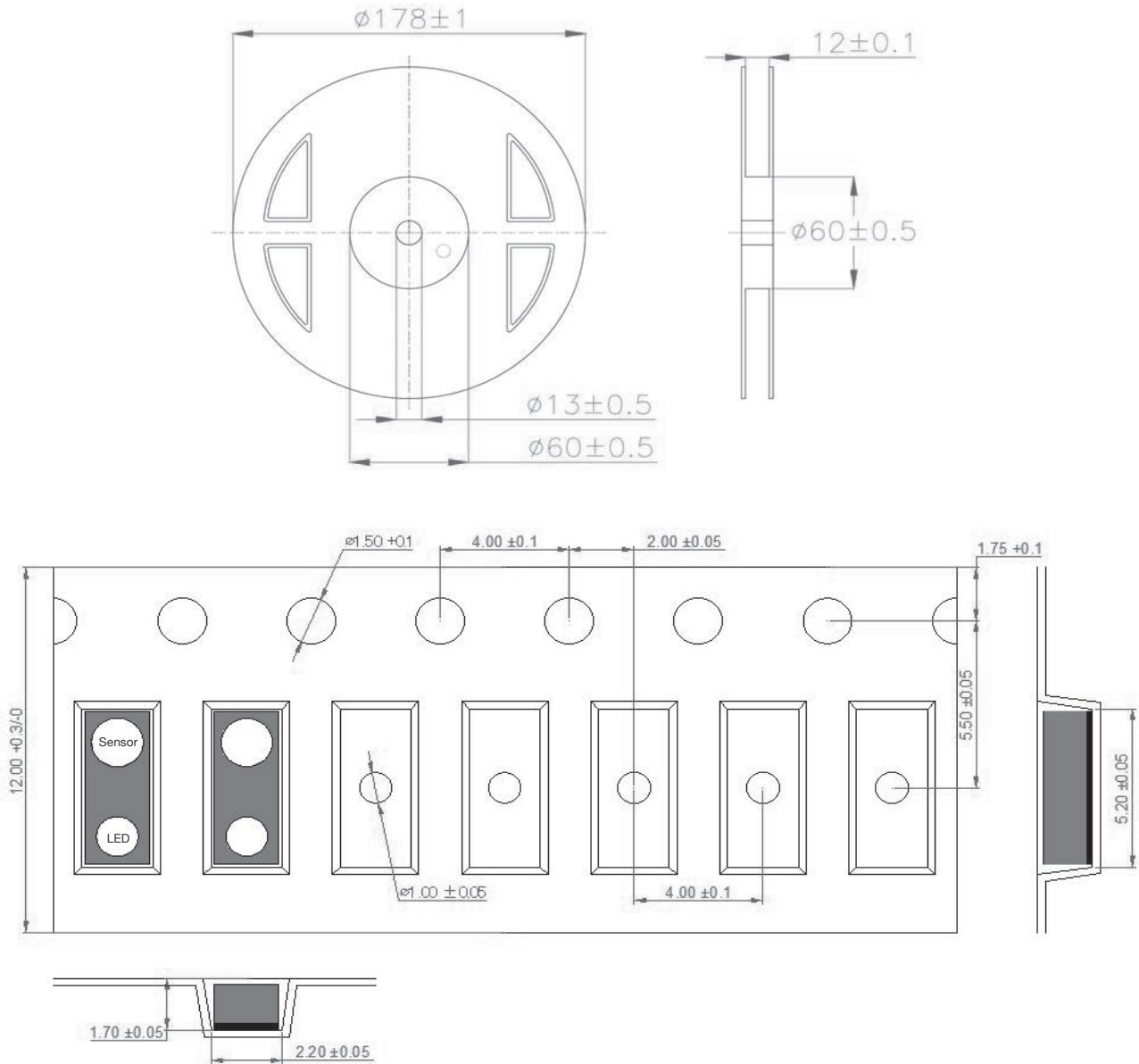


Fig. 15 - Package Carrier Tape



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