

Proximity Sensor With Interrupt, VCSEL, and I²C Interface



LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

VCNL36826S integrates a proximity sensor (PS), and a VCSEL into one small package. It incorporates photodiodes, amplifiers, and analog to digital converting circuits into a single chip by CMOS process. PS programmable interrupt features of individual high and low thresholds offers the best utilization of resource and power saving on the microcontroller.

APPLICATIONS

- Handheld device
- Consumer device
- Industrial application

FEATURES

- Package type: surface-mount
- Dimensions (L x W x H in mm): 2.55 x 2.05 x 1.0
- Integrated modules: vertical cavity surface emitting laser (VCSEL), proximity sensor (PS), and signal conditioning IC
- Interrupt function
- Smallest light hole opening design
- Supply voltage range V_{DD} : 2.62 V to 3.6 V
- Low power consumption I²C (SMBus compatible interface)
- Output type: I²C bus
- Temperature compensation: -40 °C to +85 °C
- Floor life: 168 h, MSL 3, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



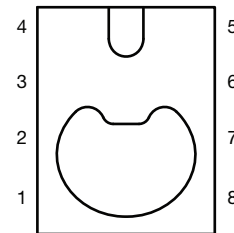
PROXIMITY FUNCTION

- Immunity to red glow (940 nm IRED)
- Programmable I_{VCSEL} sink current
- Intelligent cancellation to reduce cross talk phenomenon
- Smart persistence scheme to reduce PS response time
- Low power consumption mode
- Sunlight cancellation up to 100 klx

INTERRUPT

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

PIN DEFINITION



| | | | |
|---|-----------|---|----------|
| 1 | GND | 5 | V_{DD} |
| 2 | INT | 6 | V_{DD} |
| 3 | NC or GND | 7 | SDA |
| 4 | NC | 8 | SCL |

PRODUCT SUMMARY

| PART NUMBER | OPERATING RANGE (mm) | OPERATING VOLTAGE RANGE (V) | I ² C BUS VOLTAGE RANGE (V) | VCSEL DRIVING CURRENT (mA) | OUTPUT CODE | ADC RESOLUTION PROXIMITY / AMBIENT LIGHT |
|-------------|----------------------|-----------------------------|----------------------------------------|----------------------------|--------------------------|------------------------------------------|
| VCNL36826S | 200 | 2.62 to 3.6 | 1.7 to 3.6 | 20 | 12 bit, I ² C | 12 bit / - |



| ORDERING INFORMATION | | | |
|----------------------|---------------|------------------------------|----------------------------|
| ORDERING CODE | PACKAGING | VOLUME (1) | REMARKS |
| VCNL36826S | Tape and reel | MOQ: 3000 pcs, 3000 pcs/reel | 2.55 mm x 2.05 mm x 1.0 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 | 3.8 | V |
| Operation temperature range | | T _{amb} | -40 | +85 | °C |
| Storage temperature range | | T _{stg} | -40 | +100 | °C |

| BASIC CHARACTERISTICS (T _{amb} = 25 °C, unless otherwise specified) | | | | | | |
|------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------|------|------|------|------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Supply voltage (2) | | V _{DD} | 2.62 | - | 3.6 | V |
| Supply current | Excluding VCSEL driving | I _{DD} | 100 | 200 | 300 | μA |
| Shutdown current | Light condition = dark; V _{DD} = 3.3 V, T _{amb} = 25 °C | I _{DD} (SD) | - | 1 | - | μA |
| PS dark (1) | | | - | - | 2 | step |
| I ² C supply voltage | | V _{PULL UP} | 1.65 | - | - | V |
| I ² C signal input, logic high | V _{DD} = 3.3 V | V _{IH} | 1.26 | - | - | V |
| I ² C signal input, logic low | V _{DD} = 3.3 V | V _{IL} | - | - | 0.73 | V |
| Peak wavelength of VCSEL | I _F = 10 mA | λ _p (VCSEL) | - | 940 | - | nm |
| PS view angle (3) | | | - | 60 | - | ° |
| VCSEL driving current | | | - | - | 20 | mA |

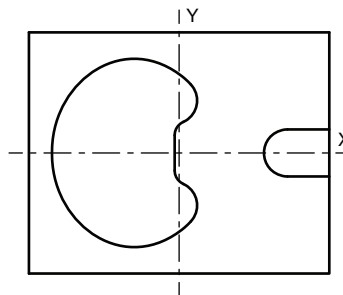
Notes

(1) PS_IT = 4T; I_{VCSEL} = 20 mA; PS_HG = 1

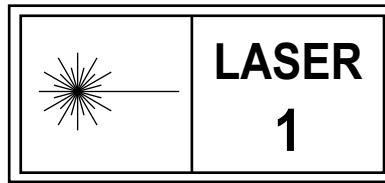
(2) Based on VCSEL current setting, V_{DD} min. voltage need adjust, example as below

| VCSEL current setting | 6 mA | 8 mA | 10 mA | 12 mA | 14 mA | 16 mA | 18 mA | 20 mA |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Min. V _{DD} | 2.62 V | 2.74 V | 2.84 V | 2.94 V | 3.03 V | 3.11 V | 3.19 V | 3.29 V |

(3) Shows total view angle of X axis (X axis: +10° to -50°; Y axis: ± 45°)



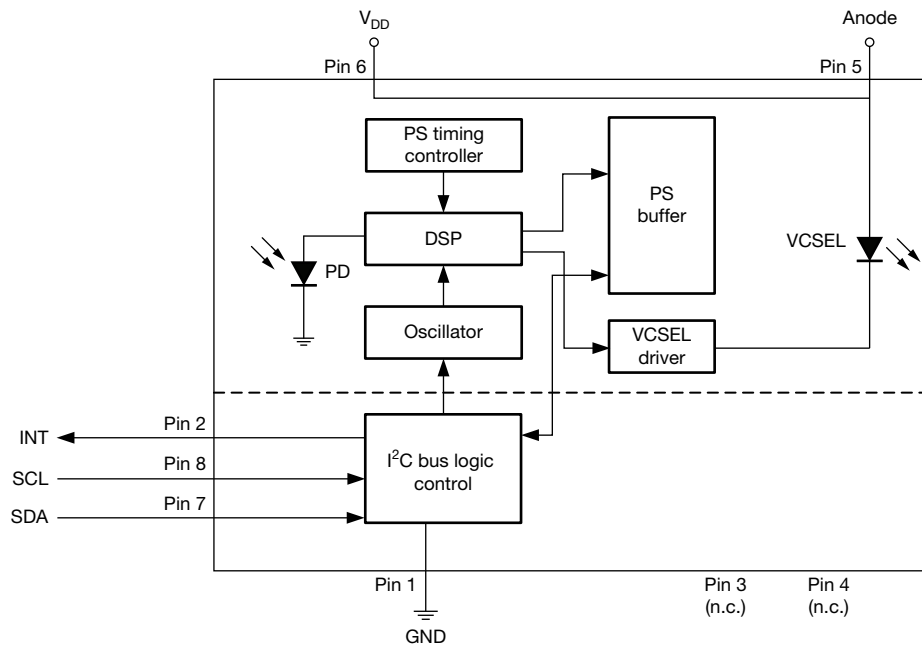
LABEL FOR LASER CLASS 1



Note

- Product specification with IEC / EN 60825-1:2014 compliance and above label

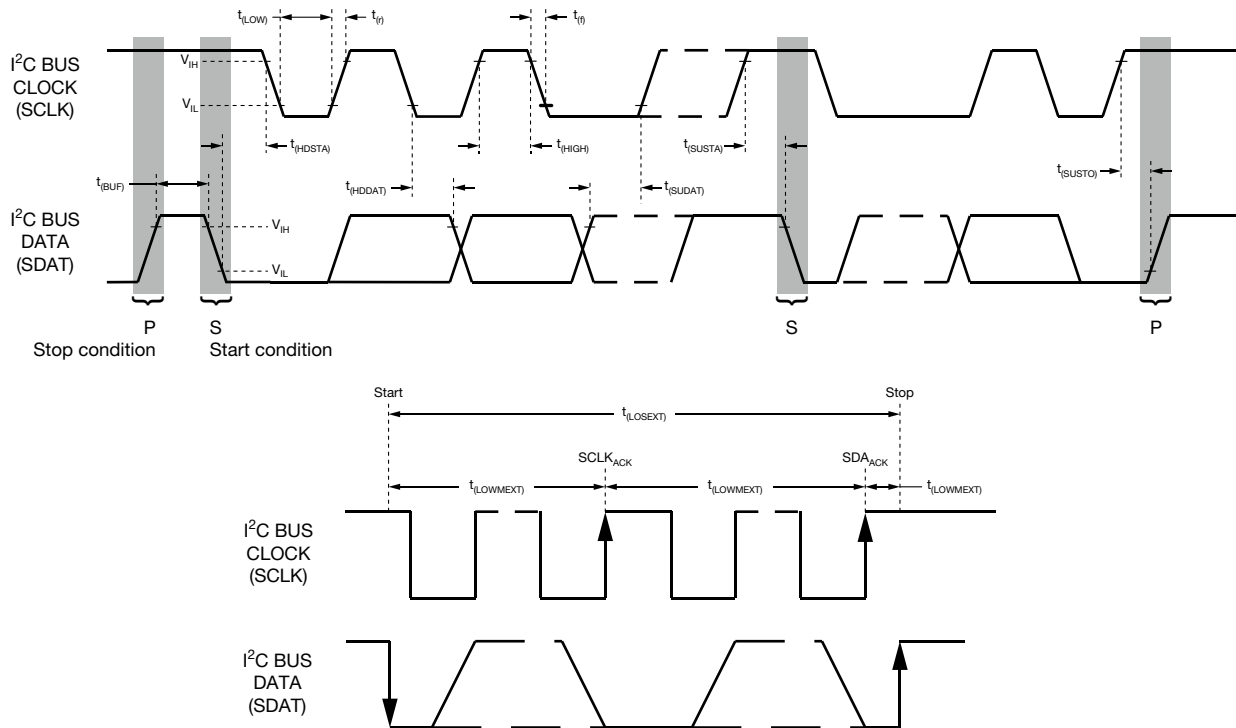
BLOCK DIAGRAM



| 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 |

Note

- Data based on standard I²C protocol requirement, not tested in production


 Fig. 1 - I²C Bus Timing Diagram

PARAMETER TIMING INFORMATION

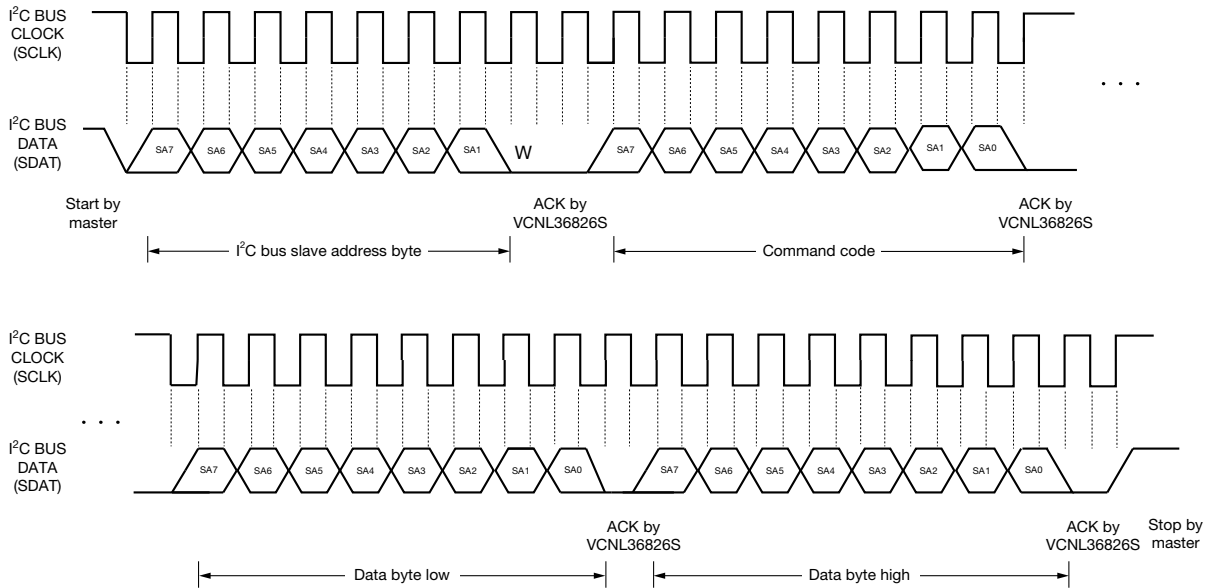


Fig. 2 - I²C Bus Timing for Sending Word Command Format

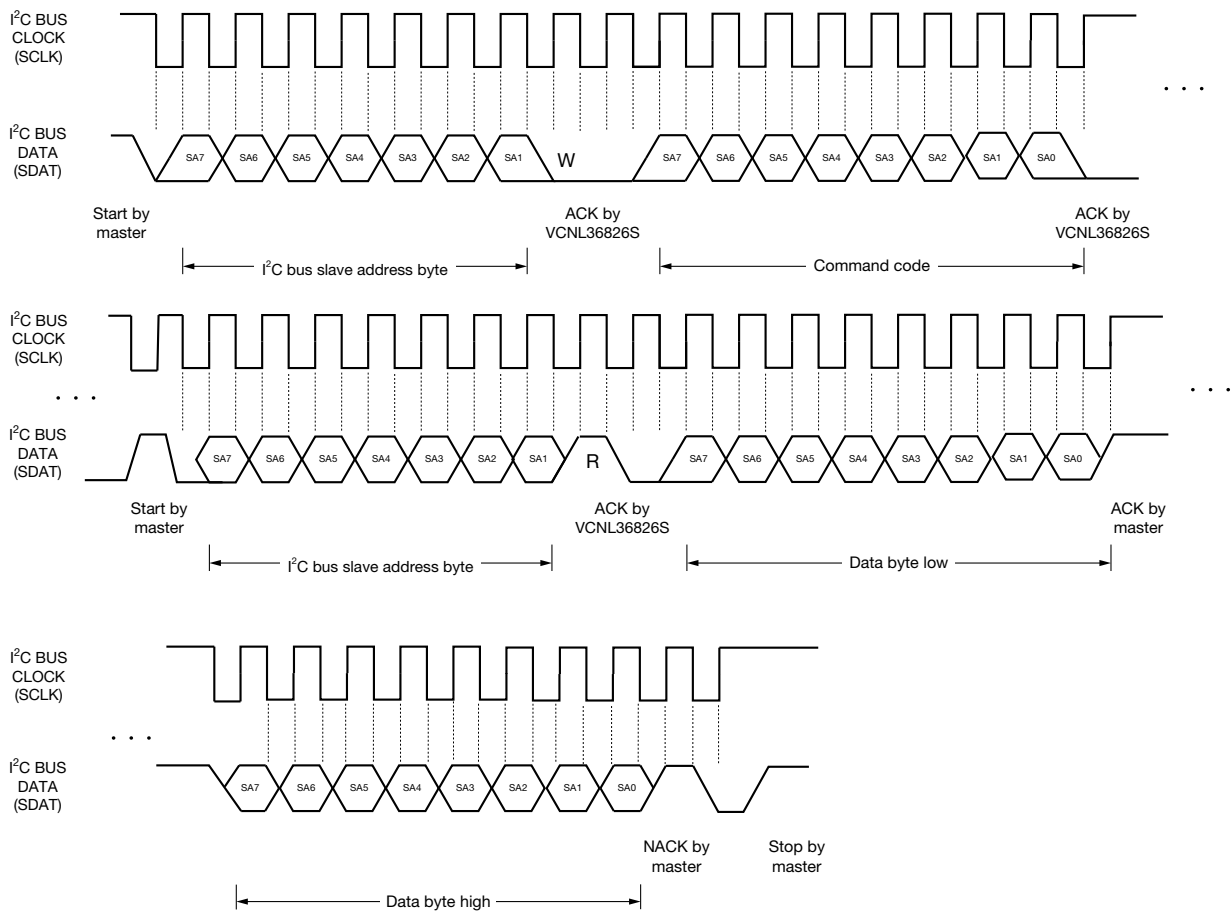


Fig. 3 - I²C Bus Timing for Receiving Word Command Format

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

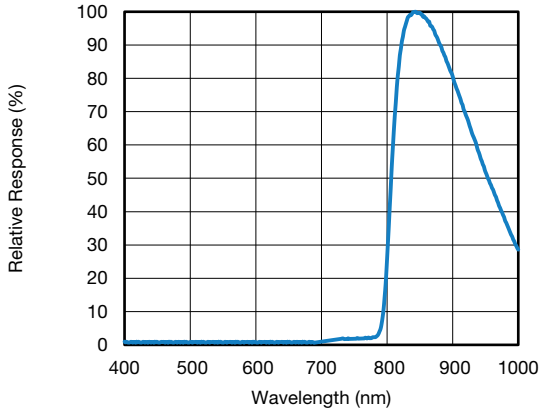


Fig. 4 - Normalized Spectral Response

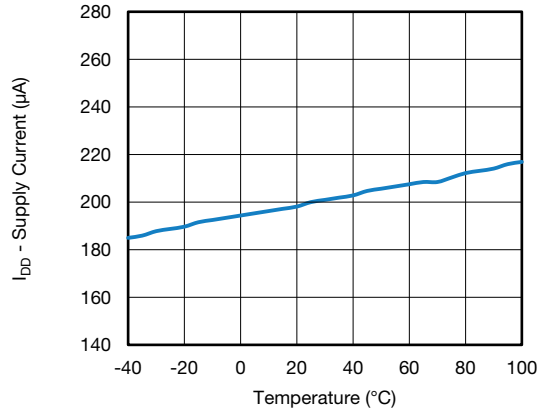


Fig. 7 - I_{DD} vs. Temperature

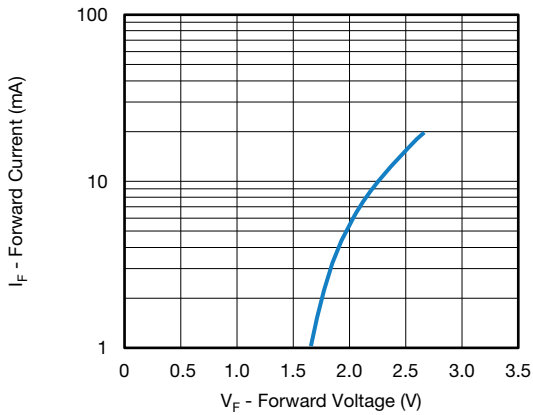


Fig. 5 - Forward Current vs. Forward Voltage

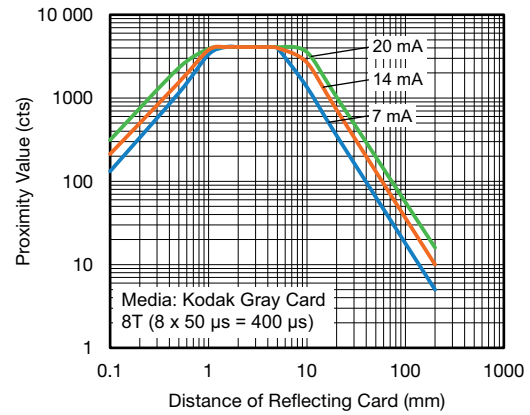


Fig. 8 - Proximity Value vs. Distance; PS_IT = 8T

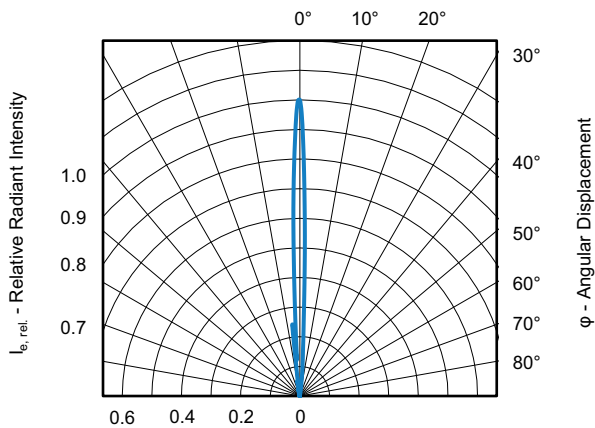


Fig. 6 - VCSEL Profile

For more information please study the application note “Designing the VCNL36826S Into an Application” (www.vishay.com/doc?8xxxx)

APPLICATION INFORMATION

Pin Connection with the Host

VCNL36826S integrates proximity sensor, and IR VCSEL all together with I²C interface. It is very easy for the baseband (CPU) to access PS output data via I²C interface without extra software algorithms. The hardware schematic is shown in the following diagram.

One additional 1 μF capacitor in the circuit is used for power supply noise rejection and 2.2 kΩ are proposed for the pull high resistor of I²C except 10 kΩ applied on INT pin.

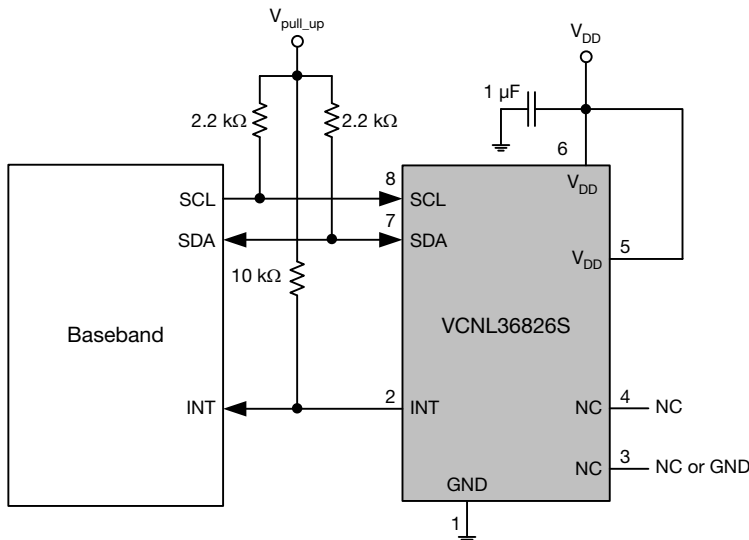
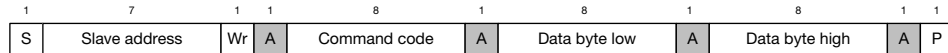


Fig. 9 - Hardware Pin Connection Diagram

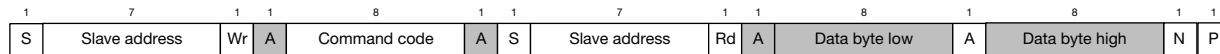
Digital Interface

VCNL36826S applies single slave address 0x60 (HEX) of 7-bit addressing 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 VCNL36826S. As Fig. 9 shows, VCNL36826S's I²C command format is simple for read and write operations between VCNL36826S and the host. The white sections indicate host activity and the gray sections indicate VCNL36826S's acknowledgement of the host access activity. Write word and read word protocol is suitable for accessing registers particularly for 12-bit PS data. Interrupt can be cleared by reading data out from register: INT_Flag. All command codes should follow read word and write word protocols.

Send word → write command to VCNL36826S



Receive word → read data from VCNL36826S



S = start condition
P = stop condition
A = acknowledge
N = not acknowledge

Host action
 VCNL36826S response

Fig. 10 - Write Word and Read Word Protocol



Function Description

VCNL36826S supports different kinds of mechanical designs to achieve the best proximity detection performance for any color of object with more flexibility. The basic PS function settings, such as duty ratio, integration time, interrupt, and PS enable / disable and persistence, are handled by the register: PS_CONF2_L. Duty ratio controls the PS response time. Integration time represents the duration of the energy being received. The Interrupt is asserted when the PS detection levels over the high threshold level setting (register: PS_THDH) or lower than low threshold (register: PS_THDL). If the Interrupt function is enabled, the host reads the PS output data from VCNL36826S that saves host loading from periodically reading PS data. More than that, INT flag (register: INT_Flag) indicates the behavior of INT triggered under different conditions. PS persistence (PS_PERS) sets up the PS INT asserted conditions as long as the PS output value continually exceeds the threshold level. The intelligent cancellation level can be set on register: PS_CANC to reduce the cross talk phenomenon.

A smart persistence (register: PS_SMART_PERS) is provided to get faster PS response time and prevent false trigger for PS.

| TABLE 1 - COMMAND CODE AND REGISTER DESCRIPTION | | | | | |
|-------------------------------------------------|----------------------|---------------|-------|---------------|--------------------------------------------------------------------------|
| COMMAND CODE | DATE BYTE LOW / HIGH | REGISTER NAME | R / W | DEFAULT VALUE | FUNCTION DESCRIPTION |
| 0x00 | L | PS_CONF1_L | R / W | 0x01 | Standby and on / off |
| | H | PS_CONF1_H | R / W | 0x00 | Standby and on / off |
| 0x03 | L | PS_CONF2_L | R / W | 0x01 | PS period, persistence, interrupt, smart persistence and PS start / stop |
| | H | PS_CONF2_H | R / W | 0x00 | PS integration time, multi pulse and interrupt function |
| 0x04 | L | PS_CONF3_L | R / W | 0x00 | PS force mode and sunlight light protect interrupt setting |
| | H | PS_CONF3_H | R / W | 0x00 | PS VCSEL current |
| 0x05 | L | PS_THDL_L | R / W | 0x00 | PS low interrupt threshold setting |
| | H | PS_THDL_H | R / W | 0x00 | PS low interrupt threshold setting |
| 0x06 | L | PS_THDH_L | R / W | 0x00 | PS high interrupt threshold setting |
| | H | PS_THDH_H | R / W | 0x00 | PS high interrupt threshold setting |
| 0x07 | L | PS_CANC_L | R / W | 0x00 | PS cancellation LSB setting |
| | H | PS_CANC_H | R / W | 0x00 | PS cancellation MSB setting |
| 0x08 | L | PS_CONF4_L | R / W | 0x00 | PS auto-calibration period, number, interrupt setting |
| | H | PS_CONF4_H | R / W | 0x00 | PS low power mode setting |
| 0xF8 | L | PS_Data_L | R | 0x00 | PS channel LSB output data |
| | H | PS_Data_H | R | 0x00 | PS channel MSB output data |
| 0xF9 | L | Reserved | R | 0x00 | Reserved |
| | H | INT_Flag | R | 0x00 | PS interrupt flag |
| 0xFA | L | ID_L | R | 0x26 | Device ID LSB |
| | H | ID_H | R | 0x00 | Device ID MSB |
| 0xFB | L | PS_AC_Data_L | R | 0x00 | PS auto-calibration LSB data |
| | H | PS_AC_Data_H | R | 0x00 | PS auto-calibration MSB data, busy and sunlight protect |

Note

- All of reserved register are used for internal test. Please keep as default setting

**Command Register Format**

VCNL36826S provides an 8-bit command register for PS controlling independently. The description of each command format is shown in the following tables.

TABLE 2 - REGISTER: PS_CONF1_L DESCRIPTION

| REGISTER NAME | | COMMAND CODE: 0x00_L (0x00 DATA BYTE LOW) |
|---------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Command | Bit | Description |
| PS_CAL | 7 | Must be set to "1" when power on ready |
| Reserved | 6 : 2 | Default = (0 : 0 : 0 : 0 : 0) |
| PS_ON | 1 | Set this bit = "1" to enable bias circuit Note • Initialization process: step 1: set PS_ON = "1"; step 2: set PS_CAL = "1" |
| Reserved | 0 | Default = 1, must always stay = 1 |

TABLE 3 - REGISTER: PS_CONF1_H DESCRIPTION

| REGISTER NAME | | COMMAND CODE: 0x00_H (0x00 DATA BYTE HIGH) |
|---------------|-------|--------------------------------------------|
| Command | Bit | Description |
| Reserved | 7 : 2 | Default = (0 : 0 : 0 : 0 : 0) |
| Reserved | 1 | Must be set to "1" when power on ready |
| Reserved | 0 | Default = 0 |

TABLE 4 - REGISTER: PS_CONF2_L DESCRIPTION

| REGISTER NAME | | COMMAND CODE: 0x03_L (0x03 DATA BYTE LOW) |
|---------------|-------|----------------------------------------------------------------------------------------------------------------|
| Command | Bit | Description |
| PS_Period | 7 : 6 | (0 : 0) = 10 ms, (0 : 1) = 20 ms, (1 : 0) = 40 ms, (1 : 1) = 80 ms PS sample period setting |
| PS_PERS | 5 : 4 | (0 : 0) = 1, (0 : 1) = 2, (1 : 0) = 3, (1 : 1) = 4 PS interrupt persistence setting |
| PS_INT | 3 : 2 | (0 : 0) = interrupt disable, (0 : 1) = logic high / low mode, (1 : 0) = first high, (1 : 1) = interrupt enable |
| PS_SMART_PERS | 1 | 0 = disable PS smart persistence, 1 = enable PS smart persistence |
| PS_ST | 0 | 0 = PS start, 1 = PS stop, default = 1; for active force mode set AF = 1 before setting PS_ST = 0 |

TABLE 5 - REGISTER: PS_CONF2_H DESCRIPTION

| REGISTER NAME | | COMMAND CODE: 0x03_H (0x03 DATA BYTE HIGH) |
|---------------|-------|-------------------------------------------------------------------------------|
| Command | Bit | Description |
| PS_IT | 7 : 6 | (0 : 0) = 1T, (0 : 1) = 2T, (1 : 0) = 4T, (1 : 1) = 8T |
| PS_MPS | 5 : 4 | (0 : 0) = 1, (0 : 1) = 2, (1 : 0) = 4, (1 : 1) = 8; PS multi-pulse setting |
| PS_ITB | 3 | 0: ITB = 25 μs, 1: ITB = 50 μs |
| PS_HG | 2 | 0 = disable, 1 = enable, PS high gain mode |
| Reserved | 1 : 0 | Default = (0 : 0) |

**TABLE 6 - REGISTER: PS_CONF3_L DESCRIPTION**

| COMMAND CODE: 0x04_L (0x04 DATA BYTE LOW) | | |
|-------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Register | Bit | Description |
| Reserved | 7 | 0 |
| PS_AF | 6 | 0 = auto mode; 1 = force mode |
| PS_FOR_Trig | 5 | 0 = no PS active force mode trigger, 1 = trigger one time cycle VCNL36826S output one cycle data every time host writes in "1" to sensor. The state returns to "0" automatically |
| PS_FORCENUM | 4 | 0 = one detect cycle after trigger, 1 = two detect cycle after trigger |
| Reserved | 3 | When use PS function, must write "1" |
| PS_SP_INT | 2 | 0 = disable, 1 = enable, PS sunlight light protect INT setting |
| Reserved | 1 : 0 | Reserved |

TABLE 7 - REGISTER: PS_CONF3_H DESCRIPTION

| COMMAND CODE: 0x04_H (0x04 DATA BYTE HIGH) | | |
|--------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Register | Bit | Description |
| PS_SC | 7 : 5 | Default = (0 : 0 : 0), with all 3 bit = "1", (1 : 1 : 1), sunlight cancellation is enabled |
| PS_HD | 4 | 0 = PS output is 12 bits, 1 = PS output is 16 bits |
| Reserved | 3 | Default = 0 |
| I_VCSEL | 2 : 0 | (0 : 0 : 0) = 6 mA, (0 : 0 : 1) = 8 mA, (0 : 1 : 0) = 10 mA,; (0 : 1 : 1) = 12 mA, (1 : 0 : 0) = 14 mA, (1 : 0 : 1) = 16 mA, (1 : 1 : 0) = 18 mA, (1 : 1 : 1) = 20 mA; VCSEL current selection setting |

TABLE 8 - REGISTER: PS_THDL DESCRIPTION

| COMMAND CODE: 0x05_L (0x05 DATA BYTE LOW) AND 0x05_H (0x05 DATA BYTE HIGH) | | |
|----------------------------------------------------------------------------|-------|------------------------------------------------------|
| Command | Bit | Description |
| PS_THDL_L | 7 : 0 | 0x00 to 0xFF, PS interrupt low threshold setting LSB |
| PS_THDL_H | 3 : 0 | 0x00 to 0x0F, PS interrupt low threshold setting MSB |

TABLE 9 - REGISTER: PS_THDH DESCRIPTION

| COMMAND CODE: 0x06_L (0x06 DATA BYTE LOW) AND 0x06_H (0x06 DATA BYTE HIGH) | | |
|----------------------------------------------------------------------------|-------|-----------------------------------------------------|
| Command | Bit | Description |
| PS_THDH_L | 7 : 0 | 00H to FFH, PS interrupt high threshold setting LSB |
| PS_THDH_H | 3 : 0 | 00H to 0FH, PS interrupt high threshold setting MSB |

TABLE 10 - REGISTER: PS_CANC DESCRIPTION

| COMMAND CODE: 0x07_L (0x07 DATA BYTE LOW) AND 0x07_H (0x07 DATA BYTE HIGH) | | |
|----------------------------------------------------------------------------|-------|-------------------------------------------------|
| Command | Bit | Description |
| PS_CANC_L | 7 : 0 | 0x00 to 0xFF, PS cancellation level setting LSB |
| PS_CANC_H | 3 : 0 | 0x00 to 0x0F, PS cancellation level setting MSB |

TABLE 11 - REGISTER: PS_CONF4_L DESCRIPTION

| COMMAND CODE: 0x08_L (0x08 DATA BYTE LOW) | | |
|-------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------|
| Register | Bit | Description |
| PS_AC_PERIOD | 7 : 6 | (0 : 0) = 3 ms, (0 : 1) = 6 ms, (1 : 0) = 12 ms, (1 : 1) = 24 ms; PS auto-calibration detect sample period setting |
| PS_AC_NUM | 5 : 4 | (0 : 0) = 1, (0 : 1) = 2, (1 : 0) = 4, (1 : 1) = 8; PS auto-calibration detect sample number setting |
| PS_AC | 3 | 0 = disable, 1 = enable; PS auto-calibration enable; need set PS_AF = 1 |
| PS_AC_TRIG | 2 | 0 = disable, 1 = enable; trigger one time auto-calibration |
| Reserved | 1 | Reserved |
| PS_AC_INT | 0 | 0 = disable, 1 = enable; PS auto-calibration INT setting |

**TABLE 12 - REGISTER: PS_CONF4_H DESCRIPTION**

| COMMAND CODE: 0x08_H (0x08 DATA BYTE HIGH) | | |
|--------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Register | Bit | Description |
| Reserved | 7 : 3 | Default = (0 : 0 : 0 : 0 : 0) |
| PS_LPPER | 2 : 1 | (0 : 0) = 40 ms, (0 : 1) = 80 ms, (1 : 0) = 160 ms, (1 : 1) = 320 ms; PS detection period setting at low power mode (PS_LPEN = 1) |
| PS_LPEN | 0 | 0 = disable, 1 = enable = starts proximity low power measurements; now PS_LPPER used as period, but I_VCSEL, PS_IT, PS_ITB, PS_MPS as defined within register 3 and register 4 |

TABLE 13 - READ OUT REGISTER DESCRIPTION

| Register | Command Code | Bit | Description |
|--------------|------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PS_Data_L | 0xF8_L (0xF8 data byte low) | 7 : 0 | 0x00 to 0xFF, PS output data |
| PS_Data_H | 0xF8_H (0xF8 data byte high) | 3 : 0 | 0x00 to 0x0F, PS output data |
| INT_Flag | 0xF9_H (0xF9 data byte high) | 7 : 6 5 4 3 2 1 0 | Reserved PS_ACFLAG, after PS finishing auto-calibration, INT raise PS_SPFLAG, PS entering protection mode Reserved Reserved PS_IF_CLOSE, PS rises above PS_THDH INT trigger event PS_IF_AWAY, PS drops below PS_THDL INT trigger event |
| ID_L | FAH_L (FAH data byte low) | 7 : 0 | Default = 0010 0110, device ID LSB byte |
| ID_H | FAH_H (FAH data byte high) | 7 : 6 5 : 4 3 : 0 | (0 : 0) (0 : 0) slave address = 0x60 Version code (0 : 0 : 0 : 0) device ID MSB byte |
| PS_AC_Data_L | 0xFB_L (0xFB data byte low) | 7 : 0 | 0x00 to 0xFF, PS auto-calibration data (LSB) |
| PS_AC_Data_H | 0xFB_H (0xFB data byte high) | 7 6 5 : 4 3 : 0 | AC_BUSY, when AC, the bit will be "1" AC_SUN, PS enters sunlight protect during auto-calibration Reserved 0x00 to 0xFF, PS auto-calibration data (MSB) |

Initialization

VCNL36826S includes default values for each register. As long as power is on, it is ready to be controlled by host via I²C bus.

Proximity Interrupt

There are three different Interrupt methods: "normal" interrupt mode, first high mode and so-called "logic high / low" mode.

The first high mode is selected by setting (0x03_L, bit 3:2 = 1:0) within register PS_CONF2_L. In this mode, the initial interrupt that is triggered needs to be with regard to the high threshold (PS_THDH). Passing underneath the low threshold will have no effect until the first high threshold event has occurred. In this mode, the interrupt event will remain set, until it is cleared, by reading the interrupt register.

The "normal" interrupt mode is selected with PS_INT = interrupt enabled (0x03_L, bit 3 : 2 = 1 : 1) within register PS_CONF2_L. Tests with ready-made application will show where to set the value for high threshold (PS_THDH) and low threshold (PS_THDL). For more information and explanation please study also the application note www.vishay.com/doc?80141.

The "logic high / low" mode is selected with PS_INT = trigger by logic high/low mode (0x03_L, bit 3 : 2 = 0 : 1) within register PS_CONF2_L. When this mode is selected, the interrupt pin is pulled low when the proximity counts reach the programmed high threshold (PS_THDH) and will return to high level when counts drop below the count value for low threshold (PS_THDL).

With help of the function PS persistence one may also improve a reliable detection that not just one short event directly triggers an interrupt, but only when 2 (or up to 4) consecutive proximity measurements are above the programmed threshold value the interrupt will be set; please see also within the application note www.vishay.com/doc?80141.

PROXIMITY LOW POWER CONSUMPTION MODE

With register PS_LPEN set to 1, proximity sensor operates in a special low power consumption mode offering significant lower power consumption of just 17.75 μA with response time of 320 ms for proximity detection. This is a remarkable feature for any application requiring lower power consumption and did not want to always request one proximity measurement with proximity force mode (PS_AF and PS_TRIG).

| PS period (ms) | 10 | 20 | 40 | 80 | 160 | 320 |
|----------------------------------|--------|--------|--------|--------|-------|-------|
| Normal mode (μA) | 600.00 | 400.00 | 300.00 | 250.00 | n/a | n/a |
| Low power mode (μA) | n/a | n/a | 107.00 | 56.00 | 30.50 | 17.75 |

Note

- $I_{\text{VCSEL}} = 10 \text{ mA}$; $\text{PS}_{\text{IT}} = 8\text{T}$

PROXIMITY DETECTION HYSTERESIS

A PS detection hysteresis is important that keeps PS state in a certain range of detection distance. For example, PS INT asserts when PS value over PS_{THDH} . Host switches off panel backlight and then clears INT. When PS value is less than PS_{THDL} , Host switches on panel backlight. Any PS value lower than PS_{THDH} or higher than PS_{THDL} , PS INT will not be asserted. Host does keep the same state.

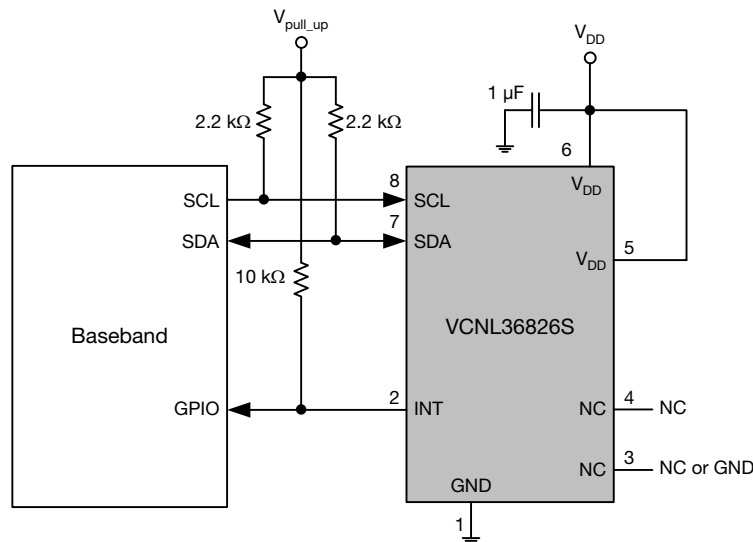


Fig. 11 - VCNL36826S Reference Circuit Connection With Host (proximity detection logic output mode)
(VCNL36826S INT pin connecting to BB GPIO instead of INT pin)

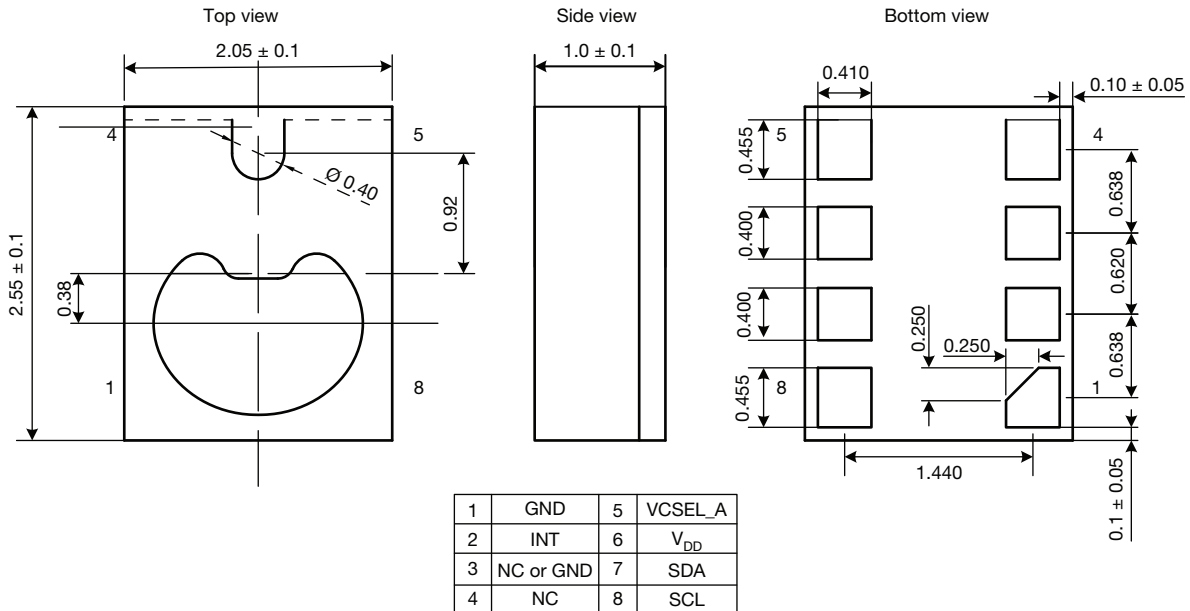
PACKAGE INFORMATION in millimeters


Fig. 12 - VCNL36826S Package Dimensions

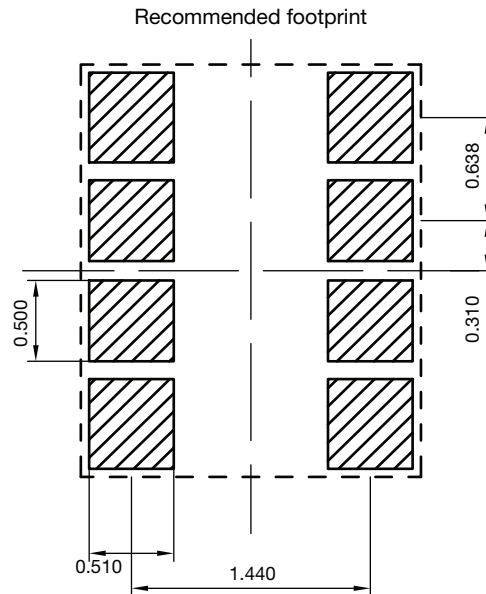
LAYOUT PAD INFORMATION in millimeters


Fig. 13 - VCNL36826S PCB Layout Footprint

| RECOMMENDED STORAGE AND REBAKING CONDITIONS | | | | |
|----------------------------------------------------|----------------------------------------------------------|-------------|-------------|-------------|
| PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
| Storage temperature | | -40 | 85 | °C |
| Relative humidity | | - | 60 | % |
| Open time | | - | 168 | h |
| Total time | From the date code on the aluminized envelope (unopened) | - | 12 | months |
| Rebaking | Tape and reel: 60 °C | - | 22 | h |
| | Tube: 60 °C | - | 22 | h |

RECOMMENDED INFRARED REFLOW

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

| IR REFLOW PROFILE CONDITION | | | |
|--------------------------------------------|------------|---------------------------------------|---------------|
| PARAMETER | CONDITIONS | TEMPERATURE | TIME |
| Peak temperature | | 260 °C + 5 °C / - 5 °C (max.: 265 °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 265 °C

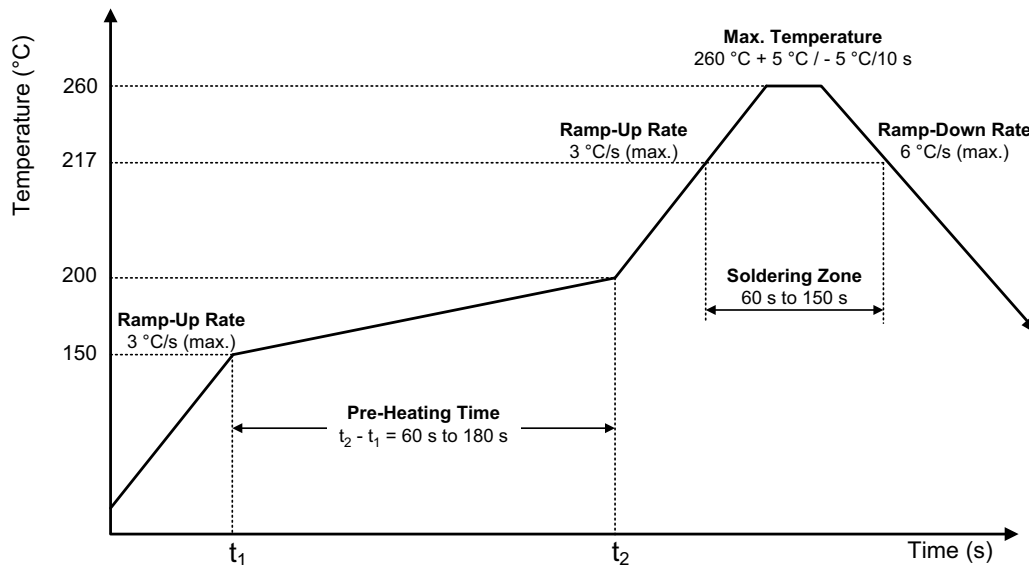


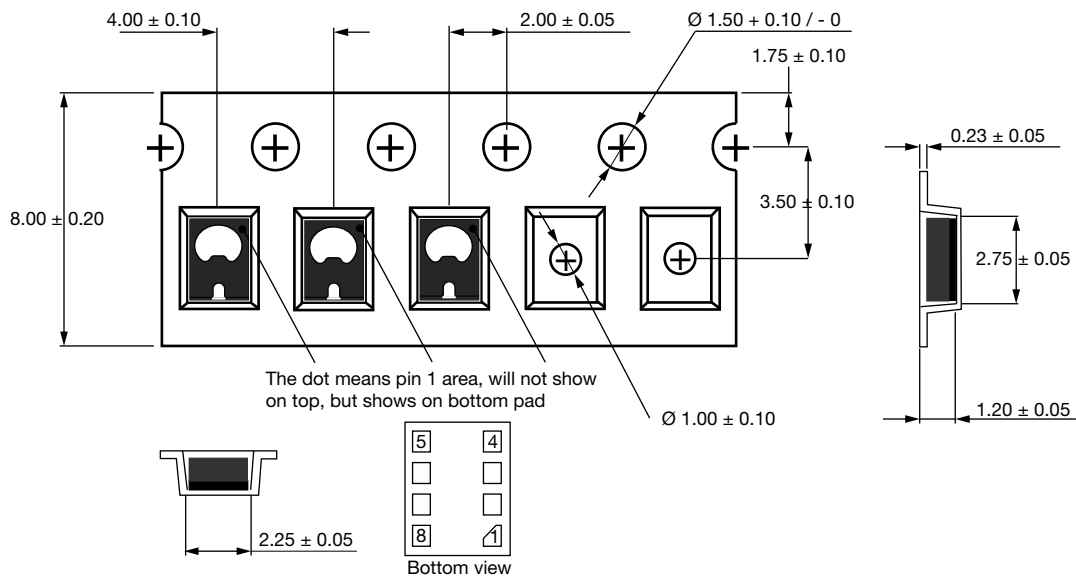
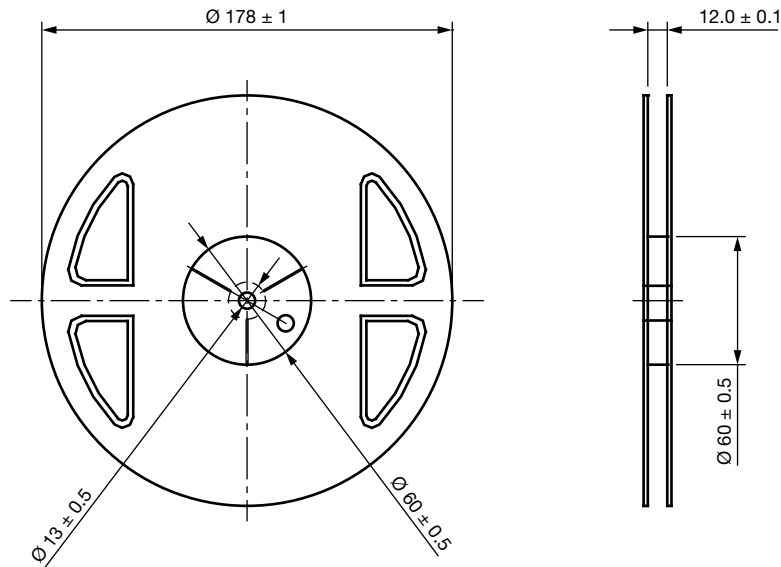
Fig. 14 - VCNL36826S Solder Reflow Profile Chart

RECOMMENDED IRON TIP SOLDERING CONDITION AND WARNING HANDLING

1. Solder the device with the following conditions:
 - 1.1. Soldering temperature: 400 °C (max.)
 - 1.2. Soldering time: 3 s (max.)
2. If the temperature of the method portion rises in addition to the residual stress between the leads, the possibility that an open or short circuit occurs due to the deformation or destruction of the resin increases
3. The following methods: VPS and wave soldering, have not been suggested for the component assembly
4. Cleaning method conditions:
 - 4.1. Solvent: methyl alcohol, ethyl alcohol, isopropyl alcohol
 - 4.2. Solvent temperature < 45 °C (max.)
 - 4.3. Time: 3 min (min.)



TAPE PACKAGING INFORMATION in millimeters





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