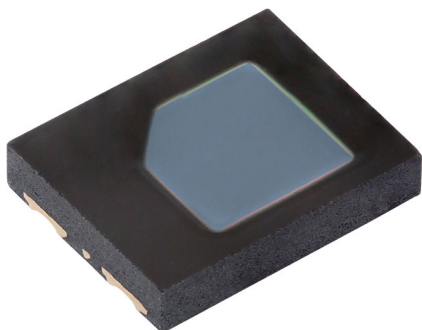




## Ambient Light Sensor



### DESCRIPTION

VEMD5510C is a high speed and high sensitive PIN photodiode. It is a low profile surface-mount device (SMD) including the chip with a 7.5 mm<sup>2</sup> sensitive area detecting visible light much like the human eye. The diode has its peak sensitivity at 550 nm and a low capacitance.

### FEATURES

- Package type: surface-mount
- Package form: top view
- Dimensions (L x W x H in mm): 5 x 4 x 0.9
- Radiant sensitive area (in mm<sup>2</sup>): 7.5
- High photo sensitivity
- Suppression filter for near infrared radiation
- Fast response times
- Angle of half sensitivity:  $\varphi = \pm 65^\circ$
- Floor life: 72 h, MSL 4, according to J-STD-020
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

### APPLICATIONS

- Wearables
- Optical heart rate monitoring
- Ambient light sensors

### PRODUCT SUMMARY

| COMPONENT | $I_{ra}$ (μA) | $\varphi$ (°) | $\lambda_{0.5}$ (nm) |
|-----------|---------------|---------------|----------------------|
| VEMD5510C | 0.6           | $\pm 65$      | 440 to 700           |

#### Note

- Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

| ORDERING CODE  | PACKAGING     | REMARKS                      | PACKAGE FORM |
|----------------|---------------|------------------------------|--------------|
| VEMD5510C      | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Top view     |
| VEMD5510C-GS15 | Tape and reel | MOQ: 5000 pcs, 5000 pcs/reel | Top view     |

#### Note

- MOQ: minimum order quantity

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

| PARAMETER                              | TEST CONDITION                            | SYMBOL      | VALUE       | UNIT             |
|----------------------------------------|-------------------------------------------|-------------|-------------|------------------|
| Reverse voltage                        |                                           | $V_R$       | 20          | V                |
| Power dissipation                      | $T_{amb} \leq 25^\circ\text{C}$           | $P_V$       | 215         | mW               |
| Junction temperature                   |                                           | $T_j$       | 110         | $^\circ\text{C}$ |
| Operating temperature range            |                                           | $T_{amb}$   | -40 to +100 | $^\circ\text{C}$ |
| Storage temperature range              |                                           | $T_{stg}$   | -40 to +100 | $^\circ\text{C}$ |
| Soldering temperature                  | According to reflow solder profile Fig. 8 | $T_{sd}$    | 260         | $^\circ\text{C}$ |
| Thermal resistance junction to ambient |                                           | $R_{thJA}$  | 350         | K/W              |
| ESD safety HBM                         | $\pm 2000$ V, 1.5 kΩ, 100 pF, 3 pulses    | $ESD_{HBM}$ | $\geq 2$    | kV               |



| BASIC CHARACTERISTICS ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |                                                                             |                 |      |            |      |               |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------|------|------------|------|---------------|
| PARAMETER                                                                                    | TEST CONDITION                                                              | SYMBOL          | MIN. | TYP.       | MAX. | UNIT          |
| Forward voltage                                                                              | $I_F = 50\text{ mA}$                                                        | $V_F$           | -    | 0.9        | 1.3  | V             |
| Breakdown voltage                                                                            | $I_R = 100\text{ }\mu\text{A}$ , $E = 0$                                    | $V_{(BR)}$      | 20   | -          | -    | V             |
| Reverse dark current                                                                         | $V_R = 10\text{ V}$ , $E = 0$                                               | $I_{r0}$        | -    | 0.2        | 10   | nA            |
| Diode capacitance                                                                            | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                           | $C_D$           | -    | 80         | -    | pF            |
|                                                                                              | $V_R = 3\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                           | $C_D$           | -    | 30         | 40   | pF            |
| Open circuit voltage                                                                         | $E_V = 100\text{ lx}$ , CIE illuminant A                                    | $V_o$           | -    | 240        | -    | mV            |
| Temperature coefficient of $V_o$                                                             | $E_V = 100\text{ lx}$ , CIE illuminant A                                    | $TK_{V_o}$      | -    | -2.5       | -    | mV/K          |
| Short circuit current                                                                        | $E_V = 100\text{ lx}$ , CIE illuminant A                                    | $I_k$           | -    | 0.6        | -    | $\mu\text{A}$ |
| Reverse light current                                                                        | $E_e = 0.2\text{ mW/cm}^2$ , $\lambda = 525\text{ nm}$ , $V_R = 5\text{ V}$ | $I_{ra}$        | 2.0  | 2.6        | -    | $\mu\text{A}$ |
|                                                                                              | $E_V = 100\text{ lx}$ , CIE illuminant A, $V_R = 5\text{ V}$                | $I_{ra}$        | 0.46 | 0.55       | -    | $\mu\text{A}$ |
| Angle of half sensitivity                                                                    |                                                                             | $\phi$          | -    | $\pm 65$   | -    | $^{\circ}$    |
| Wavelength of peak sensitivity                                                               |                                                                             | $\lambda_p$     | -    | 550        | -    | nm            |
| Range of spectral bandwidth                                                                  |                                                                             | $\lambda_{0.5}$ | -    | 440 to 700 | -    | nm            |
| Rise time                                                                                    | $V_R = 5\text{ V}$ , $R_L = 50\text{ }\Omega$ , $\lambda = 525\text{ nm}$   | $t_r$           | -    | 40         | -    | ns            |
| Fall time                                                                                    | $V_R = 5\text{ V}$ , $R_L = 50\text{ }\Omega$ , $\lambda = 525\text{ nm}$   | $t_f$           | -    | 30         | -    | ns            |

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

Basic characteristics graphs to be extended to  $110\text{ }^{\circ}\text{C}$  ambient temperatures where applicable.

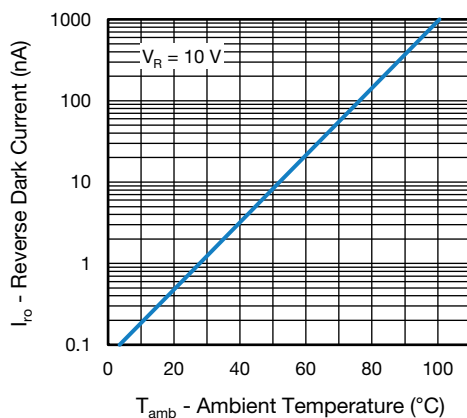


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

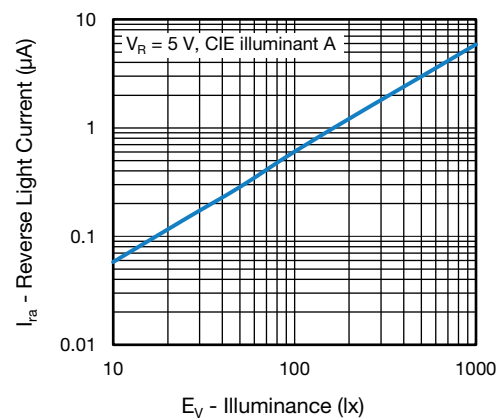


Fig. 2 - Reverse Light Current vs. Irradiance

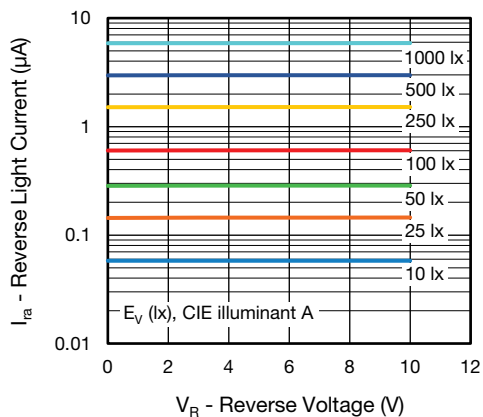


Fig. 3 - Reverse Light Current vs. Reverse Voltage

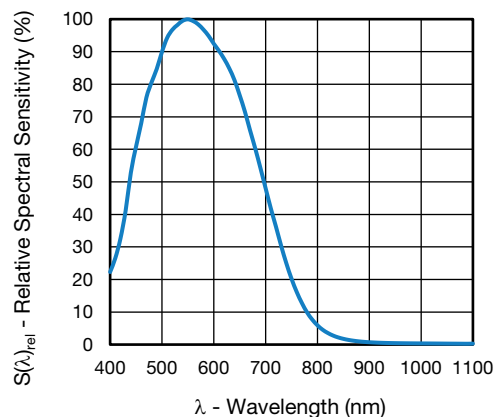


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

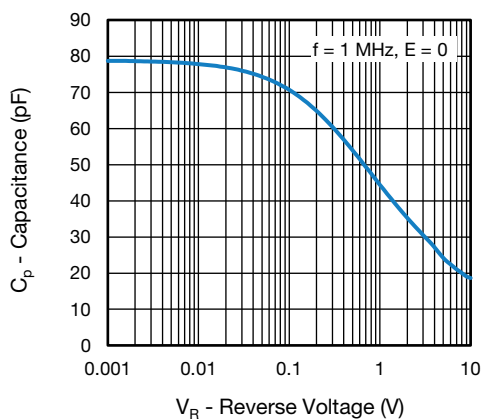


Fig. 4 - Diode Capacitance vs. Reverse Voltage

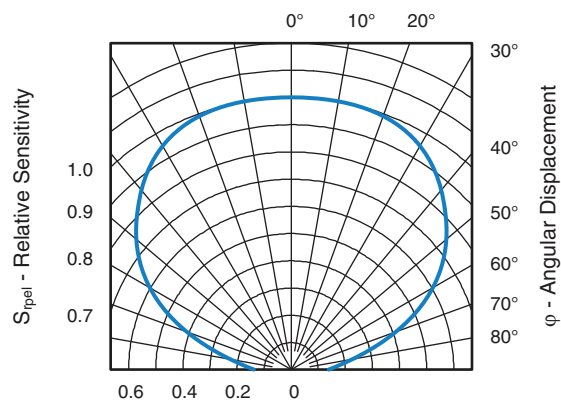


Fig. 6 - Relative Sensitivity vs. Angular Displacement

Technical drawing of the SMD package showing top, bottom, and side views with dimensions and labels.

**Top view:** Shows the overall dimensions of the package. The total width is 4.0 mm, and the total height is 5.0 mm. The central optical window has a width of 1.8 mm and a height of 3.0 mm. The distance from the center of the optical window to the bottom edge is 2.1 mm. The distance from the center of the optical window to the side edge is 3.0 mm. The distance from the center of the optical window to the top edge is 1.8 mm. The distance from the center of the optical window to the bottom edge is 1.8 mm. The distance from the center of the optical window to the side edge is 1.8 mm. The distance from the center of the optical window to the top edge is 1.8 mm.

**Bottom view:** Shows the underside of the package. The distance from the center of the optical window to the bottom edge is 2.1 mm. The distance from the center of the optical window to the side edge is 3.0 mm. The distance from the center of the optical window to the top edge is 1.8 mm. The distance from the center of the optical window to the bottom edge is 1.8 mm. The distance from the center of the optical window to the side edge is 1.8 mm. The distance from the center of the optical window to the top edge is 1.8 mm.

**Side view:** Shows the profile of the package. The total height is 5.0 mm. The distance from the center of the optical window to the bottom edge is 2.1 mm. The distance from the center of the optical window to the side edge is 3.0 mm. The distance from the center of the optical window to the top edge is 1.8 mm. The distance from the center of the optical window to the bottom edge is 1.8 mm. The distance from the center of the optical window to the side edge is 1.8 mm. The distance from the center of the optical window to the top edge is 1.8 mm.

**Detail X (20 : 1):** A magnified view of the package. The distance from the center of the optical window to the bottom edge is 2.1 mm. The distance from the center of the optical window to the side edge is 3.0 mm. The distance from the center of the optical window to the top edge is 1.8 mm. The distance from the center of the optical window to the bottom edge is 1.8 mm. The distance from the center of the optical window to the side edge is 1.8 mm. The distance from the center of the optical window to the top edge is 1.8 mm.

**Recommended footprint:** Shows the dimensions of the footprint. The total width is 4.1 mm, and the total height is 5.2 mm. The distance from the center of the device to the bottom edge is 1.0 mm. The distance from the center of the device to the side edge is 1.0 mm. The distance from the center of the device to the top edge is 1.0 mm. The distance from the center of the device to the bottom edge is 1.0 mm. The distance from the center of the device to the side edge is 1.0 mm. The distance from the center of the device to the top edge is 1.0 mm.

**Labels:** Optical center, Tie bar, electrically connected to cathode, Cathode, Exposed pad (cathode), Anode, NC, Center of device.

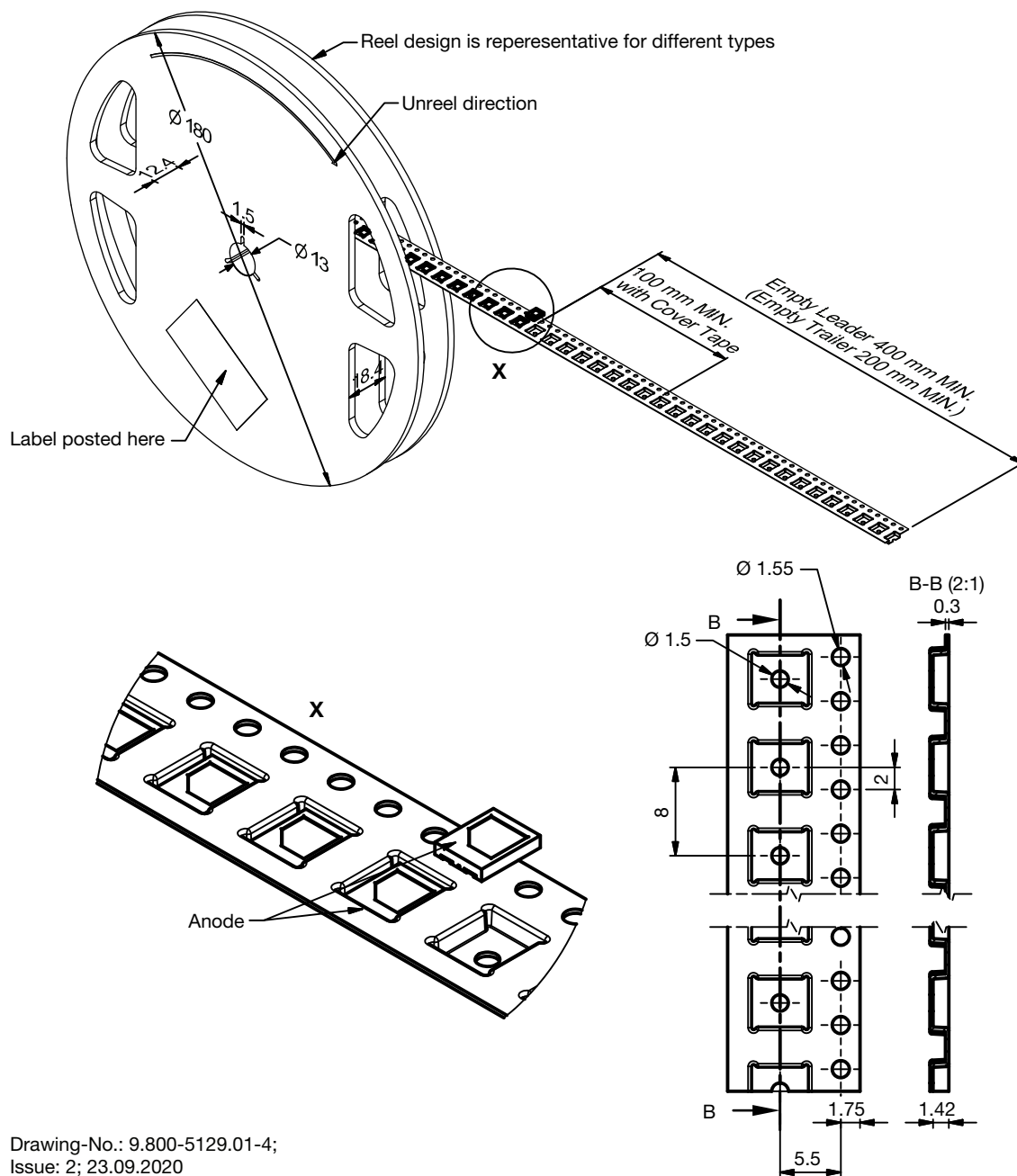
Not indicated tolerances  $\pm 0.1$



Technical drawings  
according to DIN  
specification



## TAPE AND REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5129.01-4;  
Issue: 2; 23.09.2020

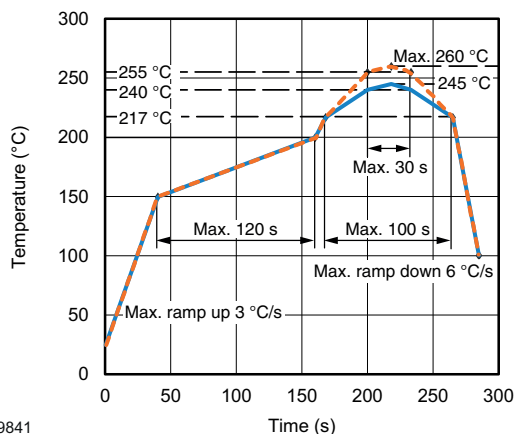
**SOLDER PROFILE**

Fig. 7 - Lead (Pb)-free Reflow Solder Profile  
According to J-STD-020D

**DRYPACK**

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

**FLOOR LIFE**

Time between soldering and removing from MBB must not exceed the time indicated in J-STD-020:

Moisture sensitivity: level 4

Floor life: 72 h

Conditions:  $T_{amb} < 30\text{ °C}$ ,  $RH < 60\%$

**DRYING**

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or recommended conditions:

192 h at 40 °C (+ 5 °C),  $RH < 5\%$

or

96 h at 60 °C (+ 5 °C),  $RH < 5\%$



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