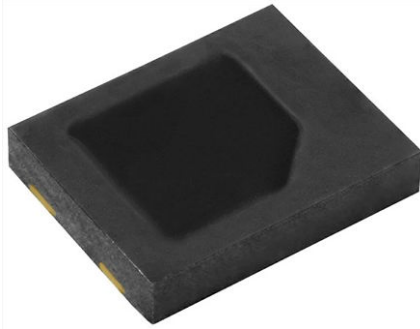


## Silicon PIN Photodiode



### DESCRIPTION

VEMD5110X01 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 and a daylight blocking filter matched with IR emitters operating at wavelength 870 nm or 950 nm.

### 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
- AEC-Q101 qualified
- High radiant sensitivity
- Daylight blocking filter matched with 870 nm to 950 nm emitters
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 65^\circ$
- 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)

 AUTOMOTIVE  
GRADE

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

### APPLICATIONS

- High speed detector for infrared radiation
- Infrared remote control and free air data transmissionsystems, e.g. road cash systems
- Photodiode for smoke detectors
- Photodiode for rain sensors

### PRODUCT SUMMARY

| COMPONENT   | I <sub>ra</sub> (μA) | φ (deg) | λ <sub>0.5</sub> (nm) |
|-------------|----------------------|---------|-----------------------|
| VEMD5110X01 | 48                   | ± 65    | 790 to 1050           |

#### Note

- Test conditions see table “Basic Characteristics”

### ORDERING INFORMATION

| ORDERING CODE    | PACKAGING     | REMARKS                      | PACKAGE FORM |
|------------------|---------------|------------------------------|--------------|
| VEMD5110X01      | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Top view     |
| VEMD5110X01-GS15 | Tape and reel | MOQ: 5000 pcs, 5000 pcs/reel | Top view     |

#### Note

- MOQ: minimum order quantity

### ABSOLUTE MAXIMUM RATINGS (T<sub>amb</sub> = 25 °C, unless otherwise specified)

| PARAMETER                           | TEST CONDITION                     | SYMBOL             | VALUE       | UNIT |
|-------------------------------------|------------------------------------|--------------------|-------------|------|
| Reverse voltage                     |                                    | V <sub>R</sub>     | 20          | V    |
| Power dissipation                   | T <sub>amb</sub> ≤ 25 °C           | P <sub>V</sub>     | 215         | mW   |
| Junction temperature                |                                    | T <sub>j</sub>     | 110         | °C   |
| Operating temperature range         |                                    | T <sub>amb</sub>   | -40 to +110 | °C   |
| Storage temperature range           |                                    | T <sub>stg</sub>   | -40 to +110 | °C   |
| Soldering temperature               | Acc. reflow solder profile fig. 8  | T <sub>sd</sub>    | 260         | °C   |
| Thermal resistance junction/ambient |                                    | R <sub>thJA</sub>  | 350         | K/W  |
| ESD safety HBM                      | ± 2000 V, 1.5 kΩ, 100 pF, 3 pulses | ESD <sub>HBM</sub> | ≥ 2         | kV   |

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |                 |      |                     |      |               |
|---|--|-----------------|------|---------------------|------|---------------|
| PARAMETER   | TEST CONDITION   | SYMBOL          | MIN. | TYP.                | MAX. | UNIT          |
| Forward voltage   | $I_F = 50\text{ mA}$   | $V_F$           |      | 1                   | 1.3  | V             |
| Breakdown voltage   | $I_R = 100\text{ }\mu\text{A}$ , $E = 0$                                     | $V_{(BR)}$      | 20   |                     |      | V             |
| Reverse dark current  | $V_R = 10\text{ V}$ , $E = 0$  | $I_{ro}$        |      | 2                   | 30   | nA            |
| Diode capacitance   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                            | $C_D$           |      | 70                  |      | pF            |
|   | $V_R = 3\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                            | $C_D$           |      | 25                  | 40   | pF            |
| Open circuit voltage  | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                         | $V_o$           |      | 350                 |      | mV            |
| Temperature coefficient of $V_o$  | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                         | $TK_{V_o}$      |      | -2.6                |      | mV/K          |
| Short circuit current   | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                         | $I_k$           |      | 45                  |      | $\mu\text{A}$ |
| Temperature coefficient of $I_k$  | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                         | $TK_{I_k}$      |      | 0.1                 |      | %/K           |
| Reverse light current   | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ ,<br>$V_R = 5\text{ V}$ | $I_{ra}$        | 40   | 48                  |      | $\mu\text{A}$ |
| Angle of half sensitivity   |  | $\phi$          |      | $\pm 65$            |      | deg           |
| Wavelength of peak sensitivity  |  | $\lambda_p$     |      | 940                 |      | nm            |
| Range of spectral bandwidth   |  | $\lambda_{0.5}$ |      | 790 to 1050         |      | nm            |
| Noise equivalent power  | $V_R = 10\text{ V}$ , $\lambda = 950\text{ nm}$                              | NEP             |      | $4 \times 10^{-14}$ |      | W//Hz         |
| Rise time   | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$   | $t_r$           |      | 100                 |      | ns            |
| Fall time   | $V_R = 10\text{ V}$ , $R_L = 1\text{ k}\Omega$ , $\lambda = 820\text{ nm}$   | $t_f$           |      | 100                 |      | ns            |

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

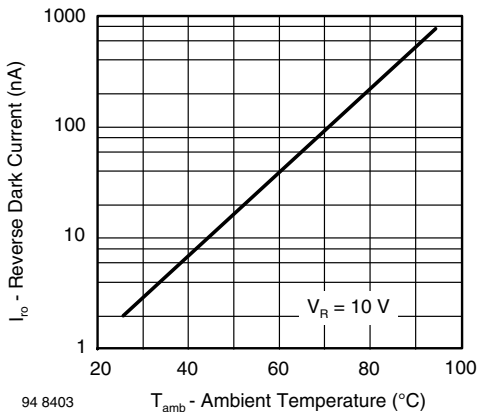
 Basic characteristics graphs to be extended to  $110\text{ }^{\circ}\text{C}$  ambient temperatures where applicable.


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

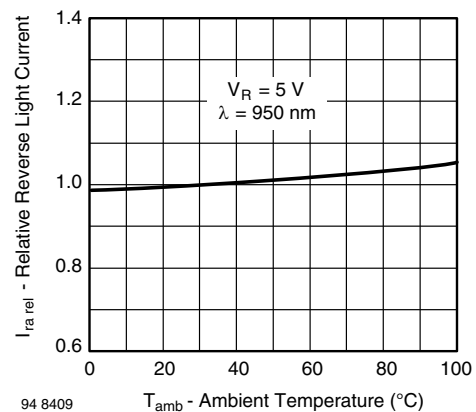


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

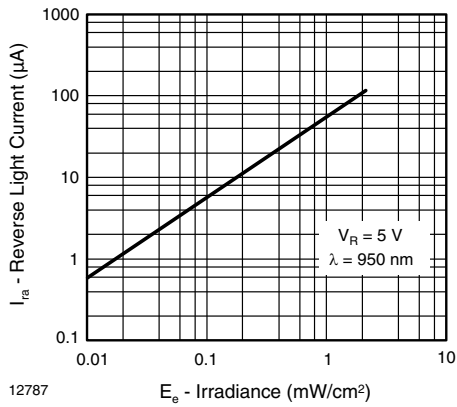


Fig. 3 - Reverse Light Current vs. Irradiance

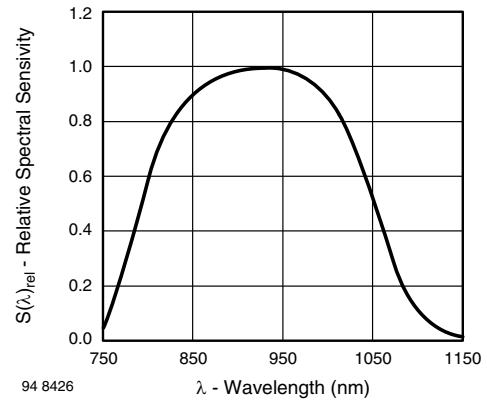


Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

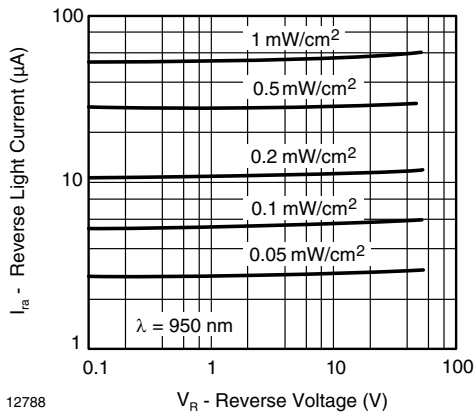


Fig. 4 - Reverse Light Current vs. Reverse Voltage

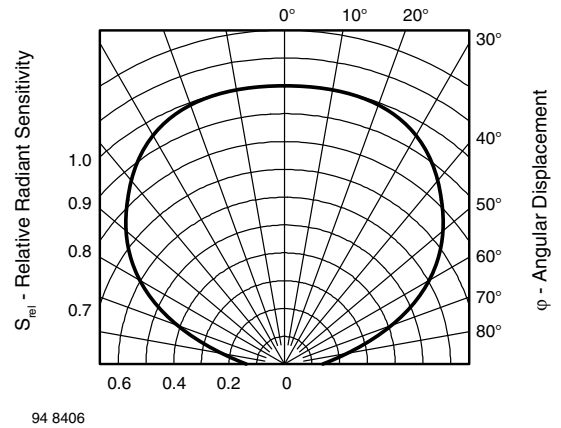


Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement

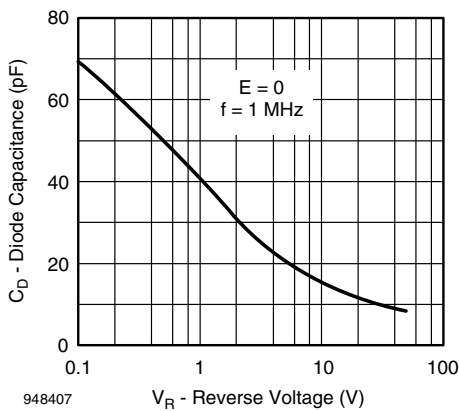


Fig. 5 - Diode Capacitance vs. Reverse Voltage

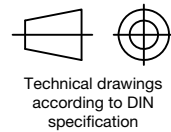


PACKAGE DIMENSIONS in millimeters



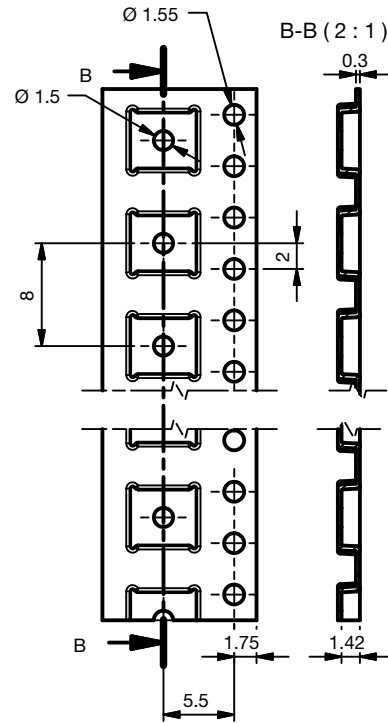
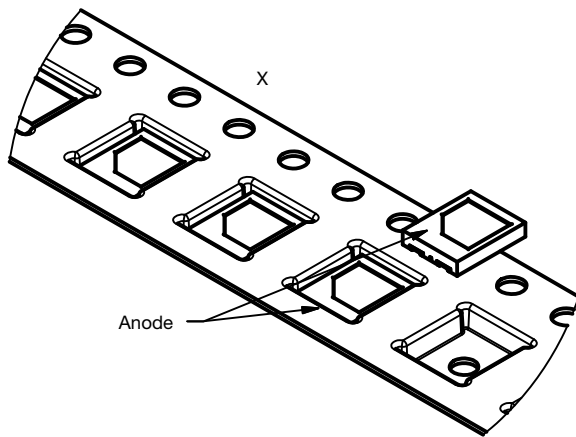
Drawing- No.: 6.550-5329.01-4  
Issue: 2; 03.03.2016

Not indicated tolerances ± 0.1





TAPE AND REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5129.01-4;  
Issue: 1; 20.07.2015

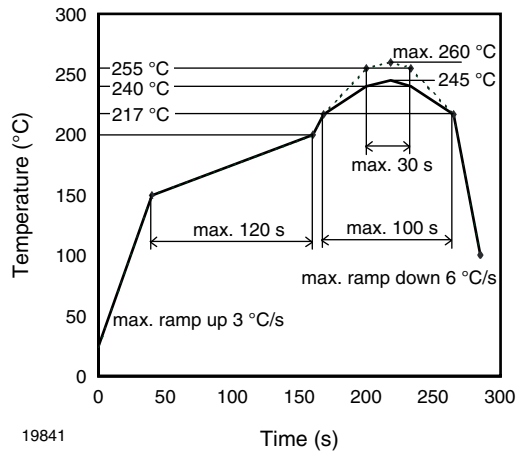
**SOLDER PROFILE**


Fig. 8 - Lead (Pb)-free Reflow Solder Profile  
acc. 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  $40\text{ °C} (+ 5\text{ °C})$ ,  $RH < 5\%$

or

96 h at  $60\text{ °C} (+ 5\text{ °C})$ ,  $RH < 5\%$ .



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