

## Silicon PIN Photodiode



### DESCRIPTION

VEMD1160X01 is a high speed and high sensitive PIN photodiode with a highly linear photoresponse. It is a low profile surface mount device (SMD) including the chip with a 0.23 mm<sup>2</sup> sensitive area and a daylight blocking filter.

### FEATURES

- Package type: surface mount
- Package form: 0805 top view
- Dimensions (L x W x H in mm): 2 x 1.25 x 0.85
- Radiant sensitive area (in mm<sup>2</sup>): 0.23
- Daylight blocking filter
- AEC-Q101 qualified
- High photo sensitivity
- High radiant sensitivity
- Excellent I<sub>ra</sub> linearity
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 70^\circ$
- 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 photo detector
- Small signal detection
- Proximity sensors

### PRODUCT SUMMARY

| COMPONENT   | I <sub>ra</sub> (μA) | φ (deg) | λ <sub>0.1</sub> (nm) |
|-------------|----------------------|---------|-----------------------|
| VEMD1160X01 | 1.8                  | ± 70    | 700 to 1070           |

#### Note

- Test conditions see table “Basic Characteristics”

### ORDERING INFORMATION

| ORDERING CODE | PACKAGING     | REMARKS                      | PACKAGE FORM  |
|---------------|---------------|------------------------------|---------------|
| VEMD1160X01   | Tape and reel | MOQ: 3000 pcs, 3000 pcs/reel | 0805 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                 | According to reflow solder profile Fig. 6 | T <sub>sd</sub>   | 260         | °C   |
| Thermal resistance junction / ambient | According to EIA / JESD 51                | R <sub>thJA</sub> | 270         | K/W  |

| <b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |                 |      |             |      |               |
|---|---|-----------------|------|-------------|------|---------------|
| PARAMETER   | TEST CONDITION  | SYMBOL          | MIN. | TYP.        | MAX. | UNIT          |
| Forward voltage   | $I_F = 50\text{ mA}$  | $V_F$           | -    | 0.9         | 1.1  | V             |
| Breakdown voltage   | $I_R = 100\text{ }\mu\text{A}$ , $E = 0$                                  | $V_{(BR)}$      | 20   | -           | -    | V             |
| Reverse dark current  | $V_R = 10\text{ V}$ , $E = 0$   | $I_{r0}$        | -    | 0.01        | 5    | nA            |
| Diode capacitance   | $V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                         | $C_D$           | -    | 3.8         | -    | pF            |
|   | $V_R = 3\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0$                         | $C_D$           | -    | 1.8         | -    | 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   | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$                      | $I_k$           | -    | 1.8         | -    | $\mu\text{A}$ |
| Temperature coefficient of $I_k$  | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 835\text{ nm}$                      | $TK_{I_k}$      | -    | 0.1         | -    | %/K           |
| Reverse light current   | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $V_R = 5\text{ V}$ | $I_{ra}$        | 1.4  | 1.8         | 3    | $\mu\text{A}$ |
|   | $E_e = 1\text{ mW/cm}^2$ , $\lambda = 890\text{ nm}$ , $V_R = 5\text{ V}$ | $I_{ra}$        | -    | 2.6         | -    | $\mu\text{A}$ |
| Angle of half sensitivity   |   | $\phi$          | -    | $\pm 70$    | -    | deg           |
| Wavelength of peak sensitivity  |   | $\lambda_p$     | -    | 840         | -    | nm            |
| Range of spectral bandwidth   |   | $\lambda_{0.1}$ | -    | 700 to 1070 | -    | nm            |
| Rise time   | $V_R = 5\text{ V}$ , $R_L = 50\text{ }\Omega$ , $\lambda = 820\text{ nm}$ | $t_r$           | -    | 60          | -    | ns            |
| Fall time   | $V_R = 5\text{ V}$ , $R_L = 50\text{ }\Omega$ , $\lambda = 820\text{ nm}$ | $t_f$           | -    | 80          | -    | ns            |

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

Basic characteristics graphs to be extended to 110 °C ambient temperatures where applicable.

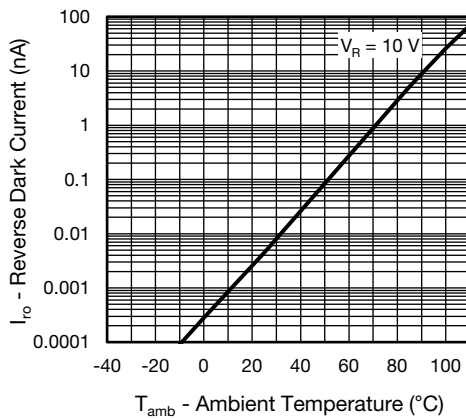


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

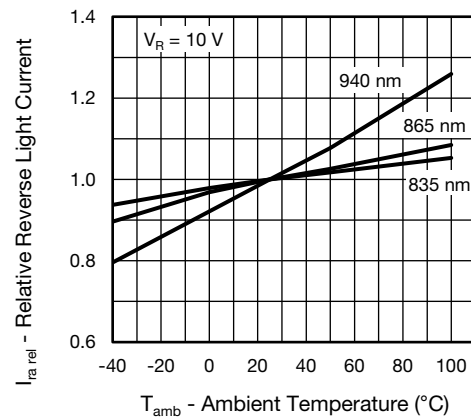


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

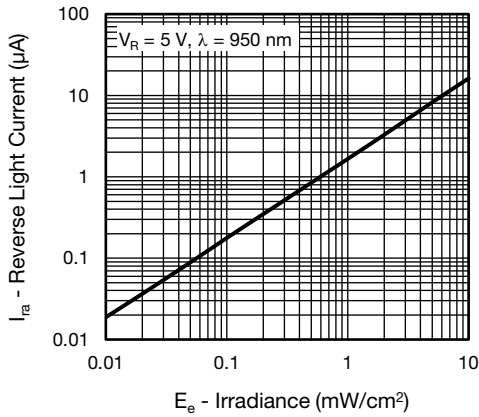


Fig. 3 - Reverse Light Current vs. Irradiance

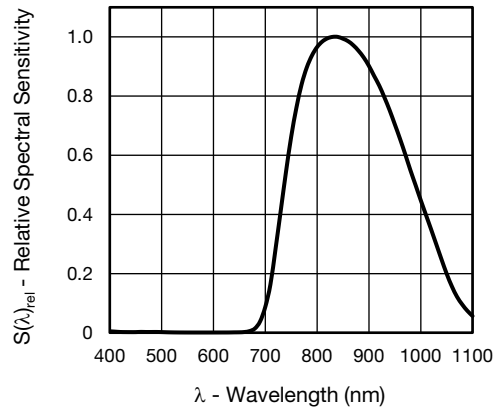


Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

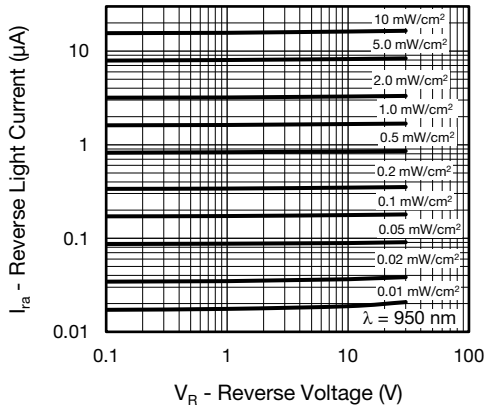


Fig. 4 - Reverse Light Current vs. Reverse Voltage

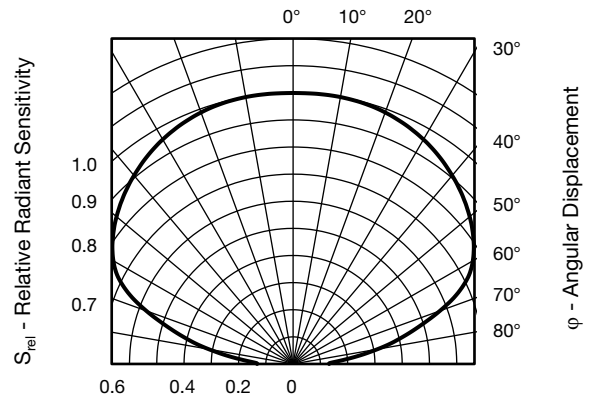


Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement

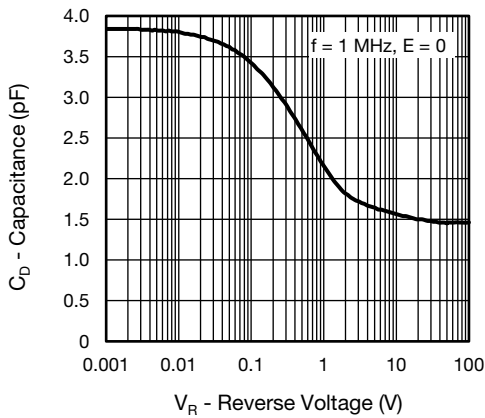


Fig. 5 - Diode Capacitance vs. Reverse Voltage

**REFLOW SOLDER PROFILE**

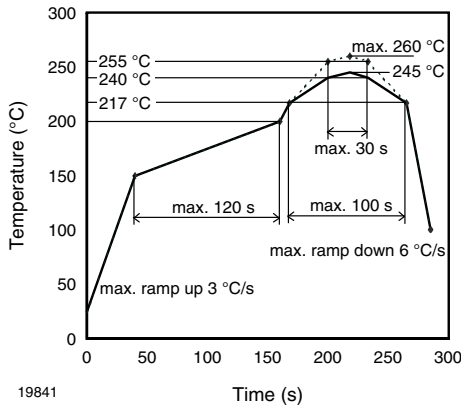


Fig. 8 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

**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**

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:

Floor life: 72 h

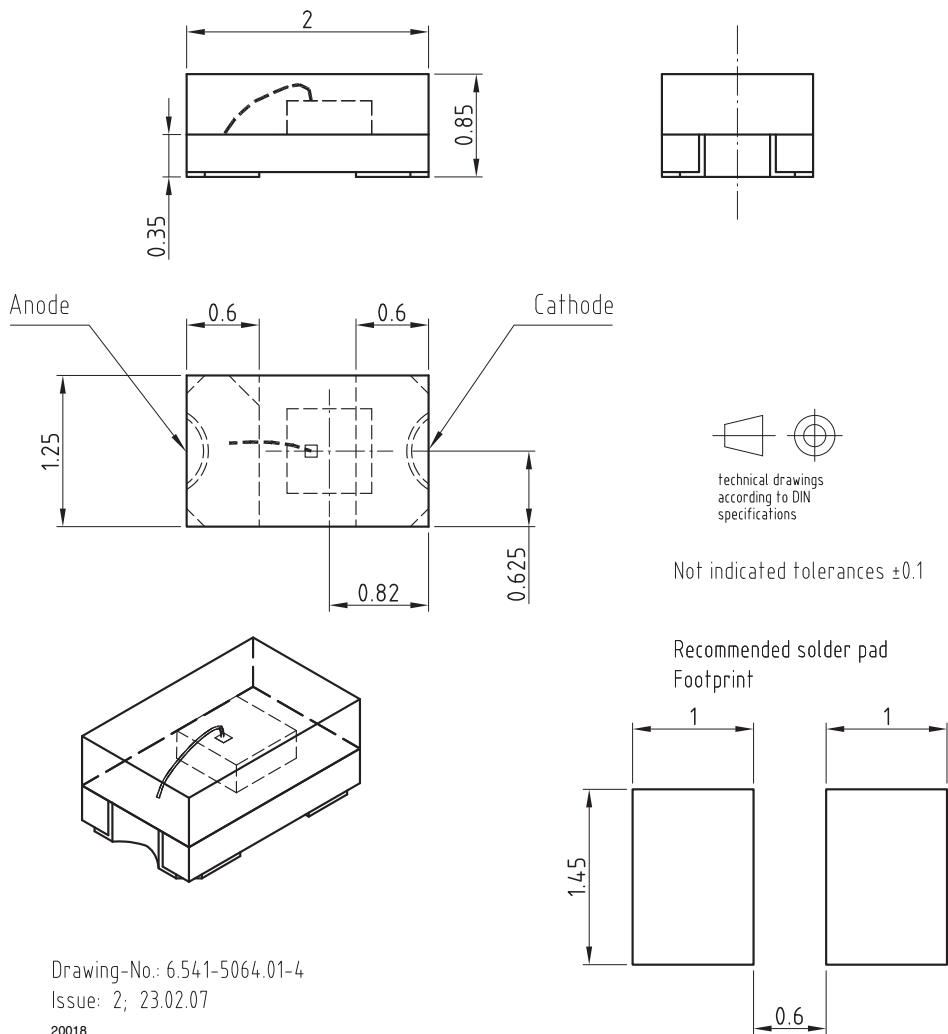
Conditions:  $T_{amb} < 30\text{ °C}$ ,  $RH < 60\%$

Moisture sensitivity level 4, according to J-STD-020.

**DRYING**

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label. Devices taped on reel dry using recommended conditions 192 h at 40 °C (+ 5 °C), RH < 5 %.

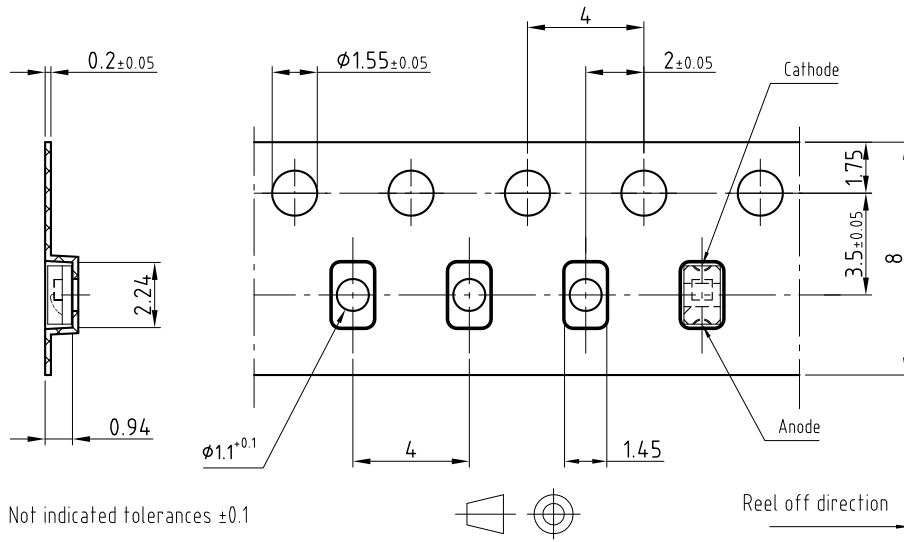
**PACKAGE DIMENSIONS** in millimeters



Drawing-No.: 6.541-5064.01-4  
Issue: 2; 23.02.07  
20018



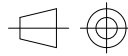
**BLISTER TAPE DIMENSIONS** in millimeters



Not indicated tolerances  $\pm 0.1$

Drawing-No.: 9.700-5311.01-4

Issue: 1; 23.02.07

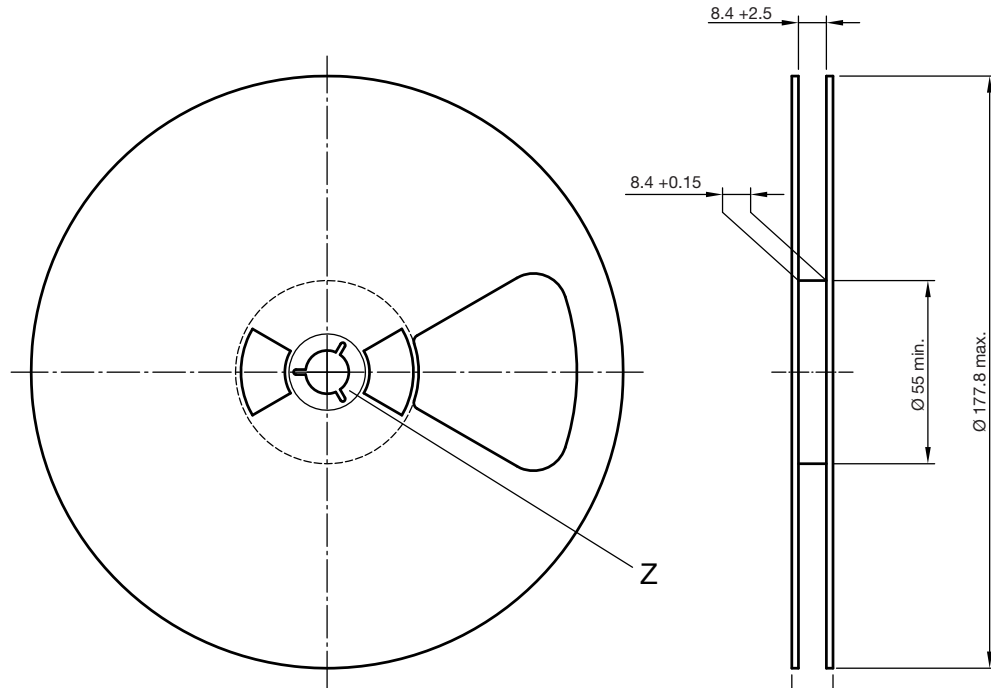


technical drawings according to DIN specifications

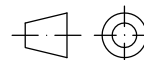
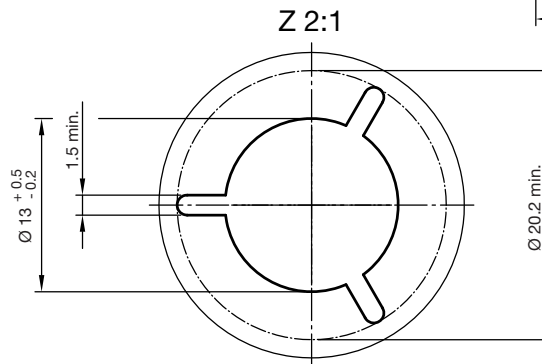
Reel off direction



**REEL DIMENSIONS** in millimeters



Form of the leave open of the wheel is supplier specific.



technical drawings according to DIN specifications

Drawing-No.: 9.800-5096.01-4  
Issue: 2; 26.04.10  
20875



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