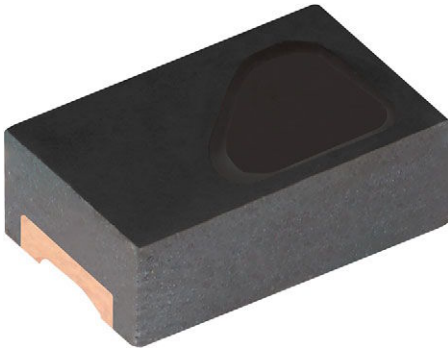


## Silicon PIN Photodiode



### FEATURES

- Package type: surface-mount
- Package form: 0805
- Dimensions (L x W x H in mm): 2 x 1.25 x 0.7
- Radiant sensitive area (in mm<sup>2</sup>): 0.375
- Ambient temperature range: T<sub>OP</sub> = -40 °C to +125 °C
- Angle of half sensitivity: φ = ± 56°
- Floor life: 4 weeks, MSL2a, according to J-STD-020
- Lead (Pb)-free reflow soldering
- AEC-Q102 qualified
- 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)

### LINKS TO ADDITIONAL RESOURCES



### DESCRIPTION

The VEMD4160X02 is a high speed and high sensitive PIN photodiode with a highly linear photoresponse. It is a low profile surface-mount device (SMD) with a 0.375 mm<sup>2</sup> sensitive area and a daylight blocking filter matched with IR emitters operating at wavelengths of 850 nm or 950 nm.

### APPLICATIONS

- High speed photo detector
- Photo interrupters
- Automotive sensors

### PRODUCT SUMMARY

COMPONENT	I <sub>ra</sub> (μA)	φ (°)	λ <sub>0.5</sub> (nm)
VEMD4160X02	1.4	± 56	730 to 960

#### Note

- Test conditions see table “Basic Characteristics”

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMD4160X02	Tape and reel	MOQ: 3000 pcs, 3000 pcs/reel	0805

#### 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
Ambient temperature range		T <sub>amb</sub>	-40 to +125	°C
Storage temperature range		T <sub>stg</sub>	-40 to +125	°C
Soldering temperature	According to reflow solder profile Fig. 8	T <sub>sd</sub>	260	°C

<b>BASIC CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 50\text{ mA}$	$V_F$	-	1.0	1.3	V
Breakdown voltage	$I_R = 100\text{ }\mu\text{A}$ , $E = 0\text{ mW/cm}^2$	$V_{(BR)}$	20	-	-	V
Reverse dark current	$V_R = 10\text{ V}$ , $E = 0$	$I_{ro}$	-	-	2	nA
Diode capacitance	$V_R = 0\text{ V}$ , $f = 1\text{ MHz}$ , $E = 0\text{ mW/cm}^2$	$C_D$	-	7.8	-	pF
Short circuit current	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 940\text{ nm}$	$I_k$	-	1.5	-	$\mu\text{A}$
Open circuit voltage	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 940\text{ nm}$	$V_O$	-	354	-	mV
Temperature coefficient of $I_k$	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 940\text{ nm}$	$TK_{I_k}$	-	0.37	-	%/K
Reverse light current	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 850\text{ nm}$ , $V_R = 5\text{ V}$	$I_{ra}$	1.6	2.2	2.8	$\mu\text{A}$
	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 940\text{ nm}$ , $V_R = 5\text{ V}$	$I_{ra}$	1.0	1.4	1.9	$\mu\text{A}$
Angle of half sensitivity		$\phi$	-	$\pm 56$	-	$^{\circ}$
Wavelength of peak sensitivity		$\lambda_p$	-	830	-	nm
Range of spectral bandwidth	$S_{rel} > 0.5$	$\lambda_{0.5}$	-	730 to 960	-	nm
Rise time	$V_R = 10\text{ V}$ , $R_L = 50\text{ }\Omega$ , $\lambda = 890\text{ nm}$	$t_r$	-	160	-	ns
Fall time	$V_R = 10\text{ V}$ , $R_L = 50\text{ }\Omega$ , $\lambda = 890\text{ nm}$	$t_f$	-	125	-	ns

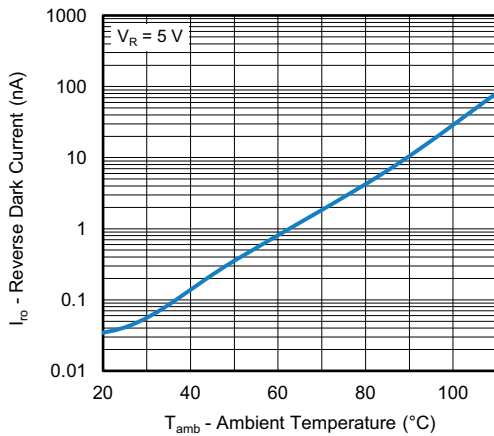
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

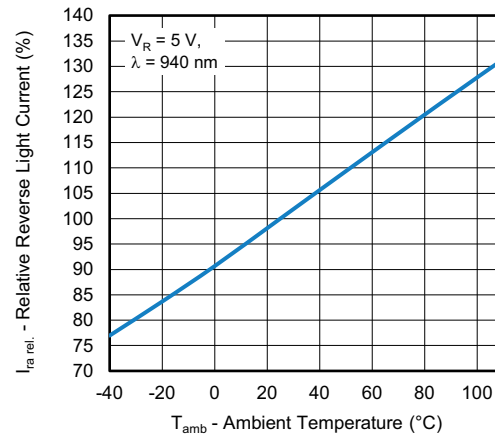


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

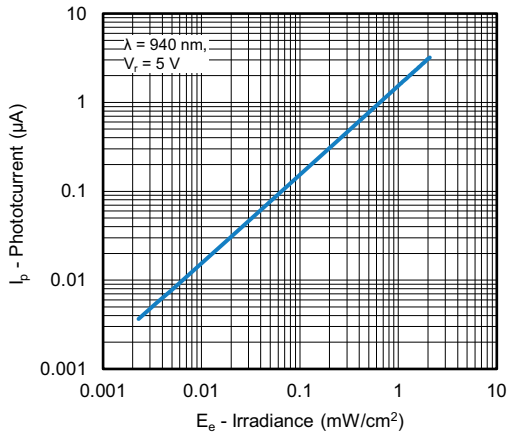


Fig. 3 - Reverse Light Current vs. Irradiance

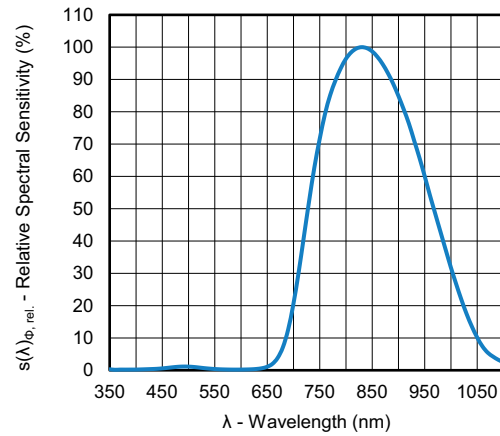


Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

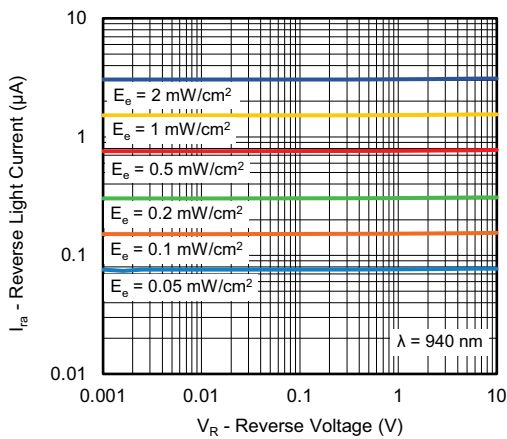


Fig. 4 - Reverse Light Current vs. Reverse Voltage

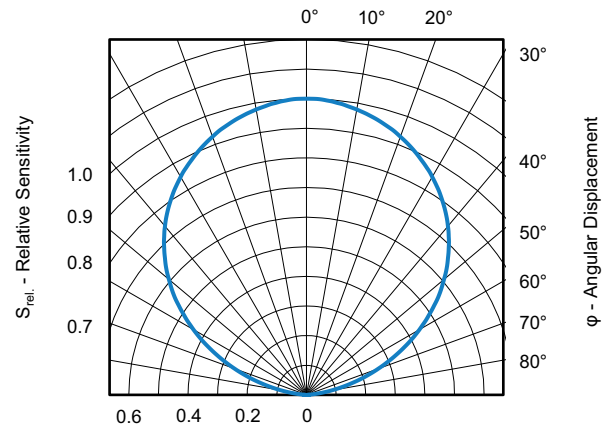


Fig. 7 - Relative Sensitivity vs. Angular Displacement

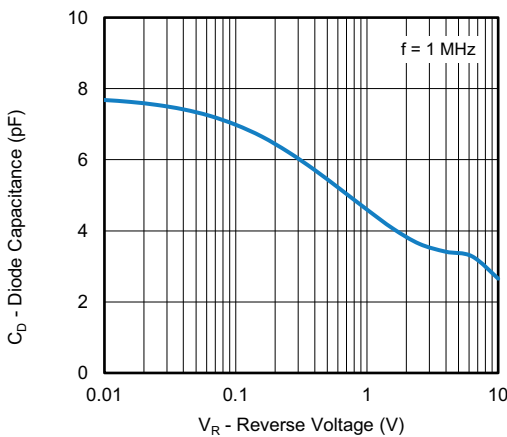
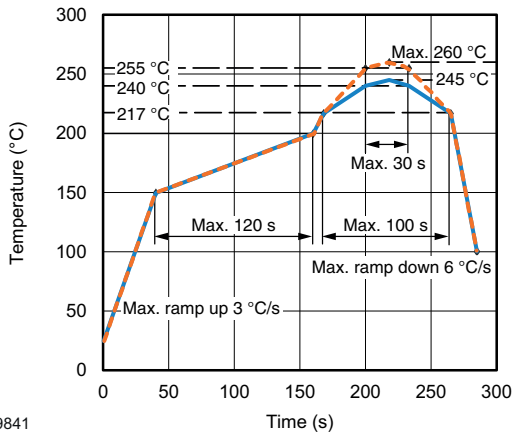


Fig. 5 - Diode Capacitance vs. Reverse Voltage

**REFLOW SOLDER PROFILE**



19841

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: 4 weeks

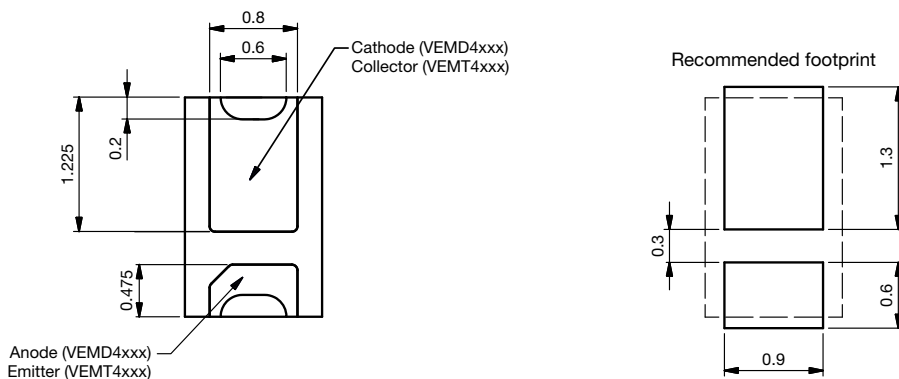
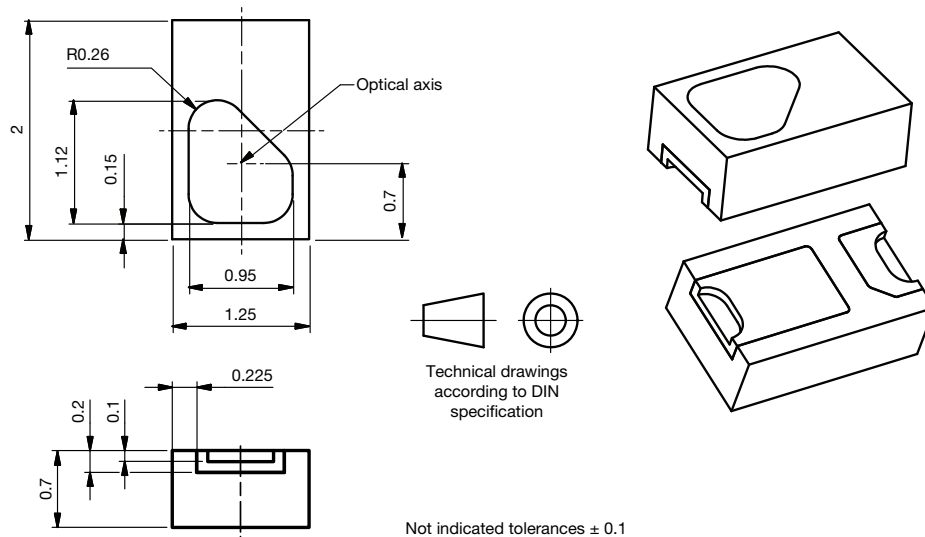
Conditions:  $T_{amb} < 30\text{ }^{\circ}\text{C}$ ,  $RH < 60\%$

Moisture sensitivity level 2a, according to J-STD-020.

**DRYING**

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-033D or label. Devices taped on reel dry using recommended conditions 192 h at  $40\text{ }^{\circ}\text{C}$  ( $+ 5\text{ }^{\circ}\text{C}$ ),  $RH < 5\%$ .

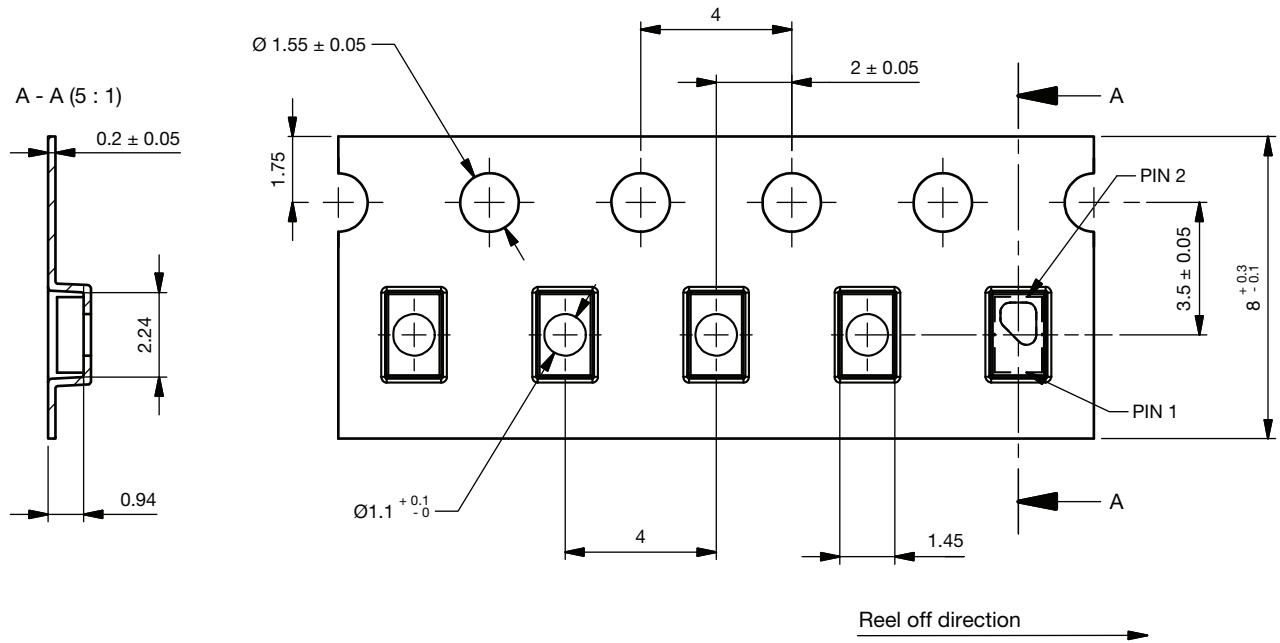
**PACKAGE DIMENSIONS** in millimeters



Drawing-No.: 6.550-5363.01-4  
Issue: 2; 01.07.2020



BLISTER TAPE DIMENSIONS in millimeters

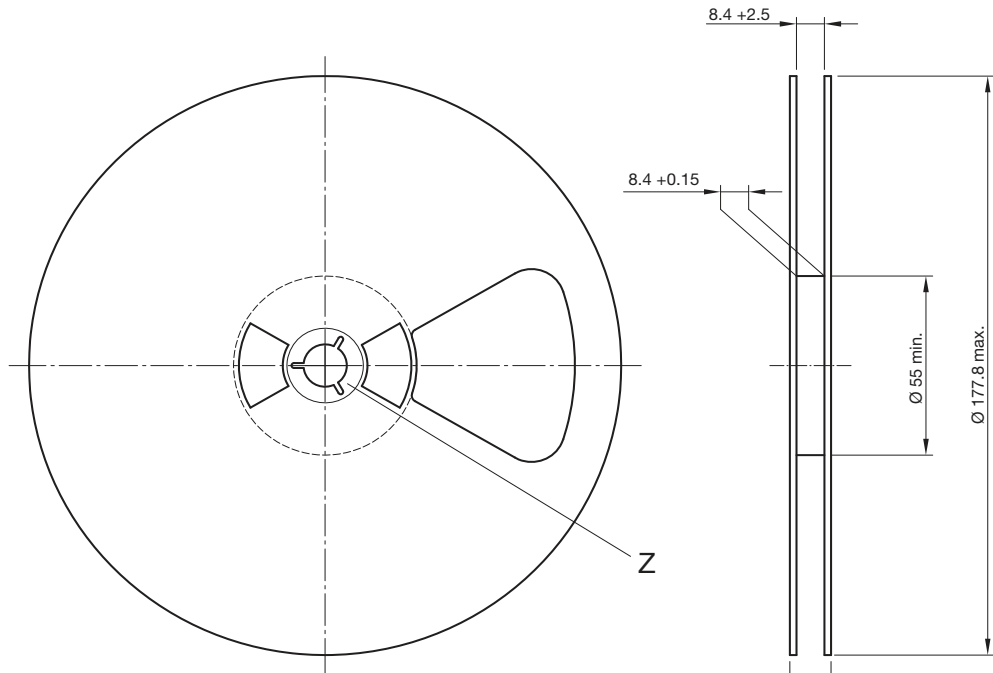


TYPE	PIN 1	PIN 2
VEMD4xxx	Anode	Cathode

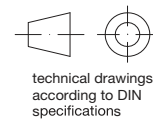
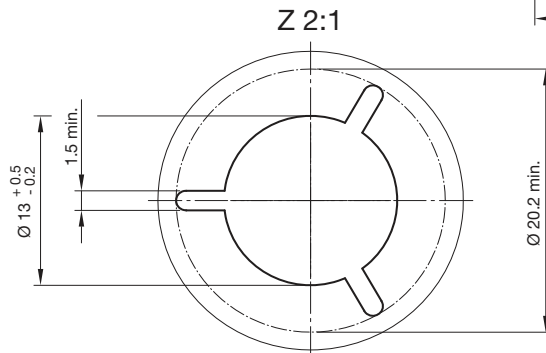
Drawing-No.: 9.700-5411.0-4  
Issue: 1\_A; 11.10.2022



REEL DIMENSIONS in millimeters



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



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



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