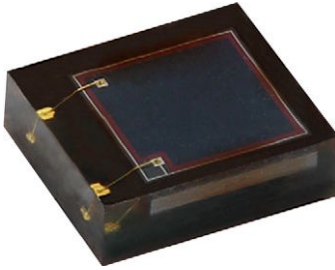


## Silicon PIN Photodiode



### DESCRIPTION

VEMD2704 is a high speed and high sensitive PIN photodiode with enhanced sensitivity for visible light. It is optimized for heart rate monitoring and pulse oximetry applications.

### FEATURES

- Package type: surface-mount
- Package form: top view
- Dimensions (L x W x H in mm): 2.0 x 1.8 x 0.6
- Radiant sensitive area (in mm<sup>2</sup>): 1.51
- Clear epoxy for maximum sensitivity
- Suitable for visible and near infrared radiation
- Angle of half sensitivity:  $\phi = \pm 67^\circ$
- Floor life: 168 h, MSL 3, according to J-STD-020
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



### APPLICATIONS

- Heart rate monitoring and pulse oximetry
- Wearables

PRODUCT SUMMARY			
COMPONENT	$I_{ra}$ ( $\mu A$ ) at $E_e = 0.1 \text{ mW/cm}^2$ , $\lambda = 530 \text{ nm}$ , $V_R = 5.0 \text{ V}$	$\phi$ ( $^\circ$ )	$\lambda_{0.1}$ (nm)
VEMD2704	0.48	$\pm 67$	350 to 1100

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMD2704	Tape and reel	MOQ: 4000	Top view

#### Note

- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		$V_R$	6	V
Ambient temperature range		$T_{amb}$	-40 to +85	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-40 to +85	$^\circ\text{C}$
Soldering temperature	According to reflow solder profile Fig. 7	$T_{sd}$	260	$^\circ\text{C}$
ESD safety HBM	$\pm 2000 \text{ V}$ , 1.5 k $\Omega$ , 100 pF, 3 pulses	ESD <sub>HBM</sub>	$\geq 2$	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	$I_F = 50\text{ mA}$	$V_F$	1.0	1.2	1.3	V
Reverse dark current	$V_R = 10\text{ V}, E = 0$	$I_{ro}$	-	0.03	40	nA
Diode capacitance	$V_R = 0\text{ V}, f = 1\text{ MHz}, E = 0$	$C_D$	-	17.6	-	pF
Reverse light current (1)	$E_e = 0.1\text{ mW/cm}^2, \lambda = 530\text{ nm}, V_R = 5\text{ V}$	$I_{ra}$	0.35	0.48	0.65	$\mu\text{A}$
	$E_e = 0.1\text{ mW/cm}^2, \lambda = 660\text{ nm}, V_R = 5\text{ V}$	$I_{ra}$	-	0.77	-	$\mu\text{A}$
	$E_e = 0.1\text{ mW/cm}^2, \lambda = 850\text{ nm}, V_R = 5\text{ V}$	$I_{ra}$	0.75	1.13	1.40	$\mu\text{A}$
	$E_e = 0.1\text{ mW/cm}^2, \lambda = 940\text{ nm}, V_R = 5\text{ V}$	$I_{ra}$	0.85	1.17	1.50	$\mu\text{A}$
Angle of half sensitivity		$\phi$	-	$\pm 67$	-	$^{\circ}$
Wavelength of peak sensitivity		$\lambda_p$	-	940	-	nm
Range of spectral bandwidth		$\lambda_{0.1}$	-	350 to 1100	-	nm
Rise time	$V_R = 5\text{ V}, R_L = 50\text{ }\Omega, \lambda = 530\text{ nm}$	$t_r$	-	70	-	ns
Fall time	$V_R = 5\text{ V}, R_L = 50\text{ }\Omega, \lambda = 530\text{ nm}$	$t_f$	-	70	-	ns

**Note**

(1) The reverse light current for other irradiances can be estimated by linear extrapolation

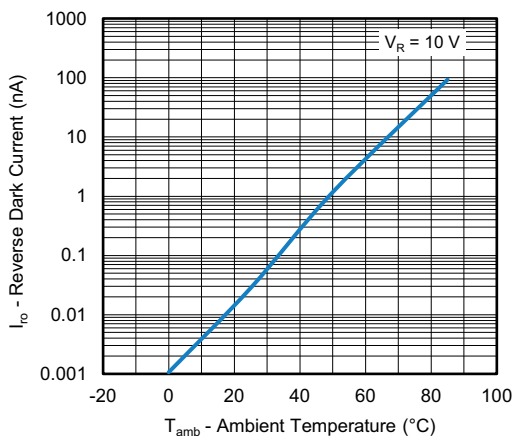
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

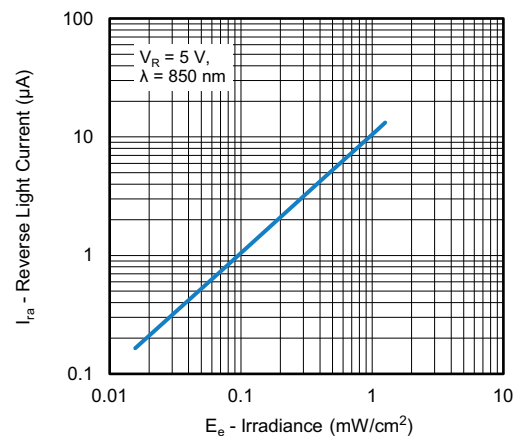


Fig. 3 - Reverse Light Current vs. Irradiance

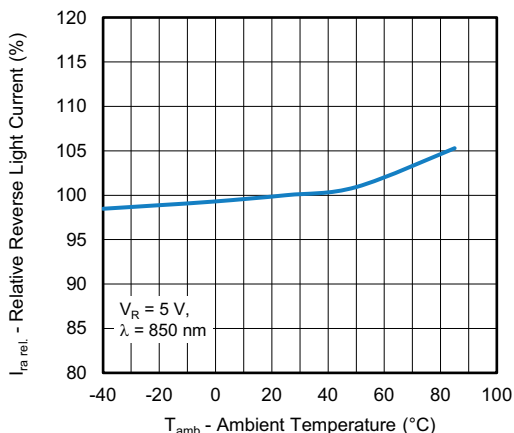


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

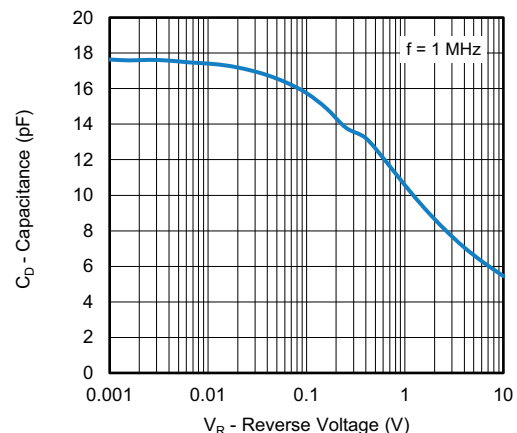


Fig. 4 - Diode Capacitance vs. Reverse Voltage

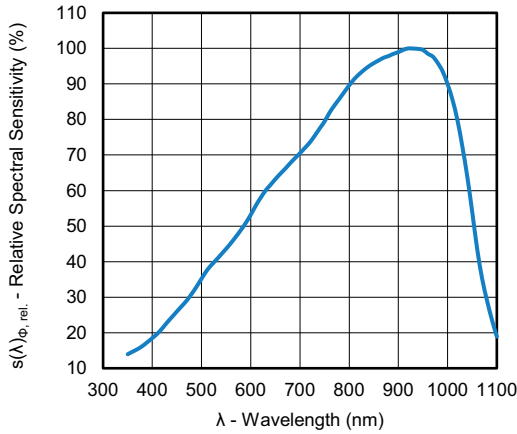


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

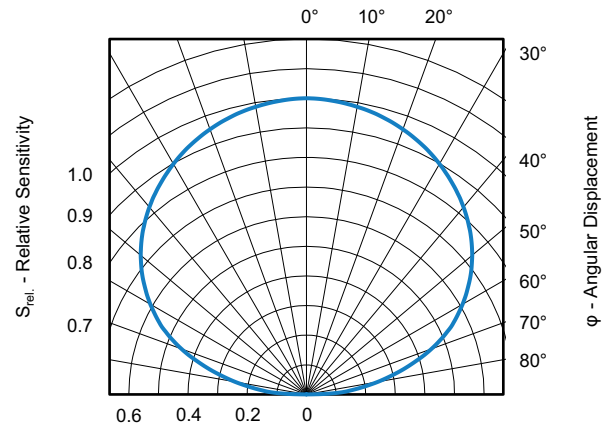
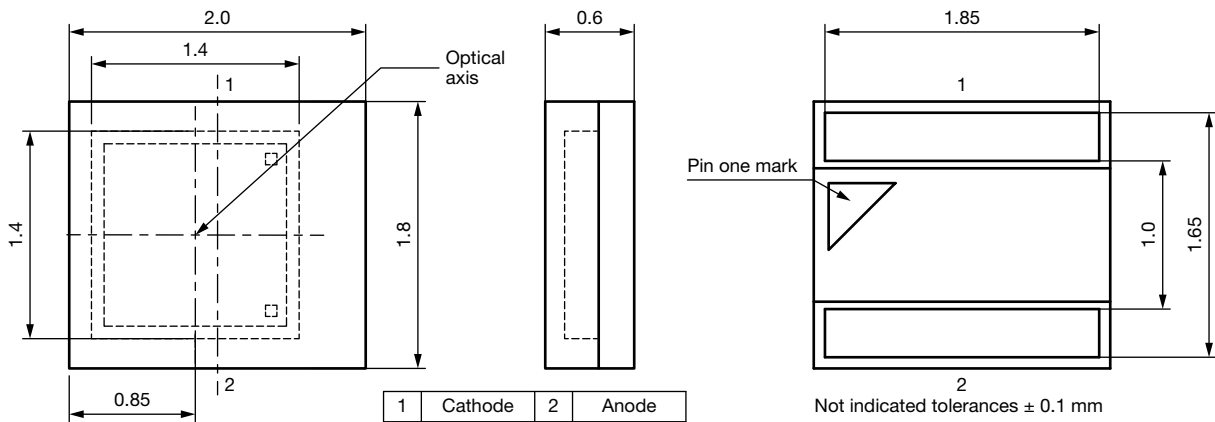
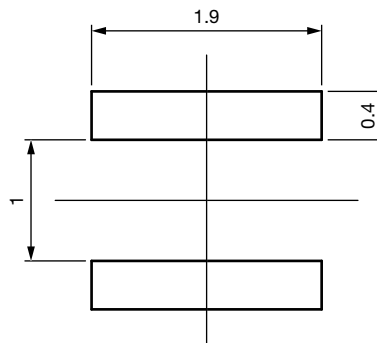


Fig. 6 - Relative Sensitivity vs. Angular Displacement

**PACKAGE DIMENSIONS** in millimeters

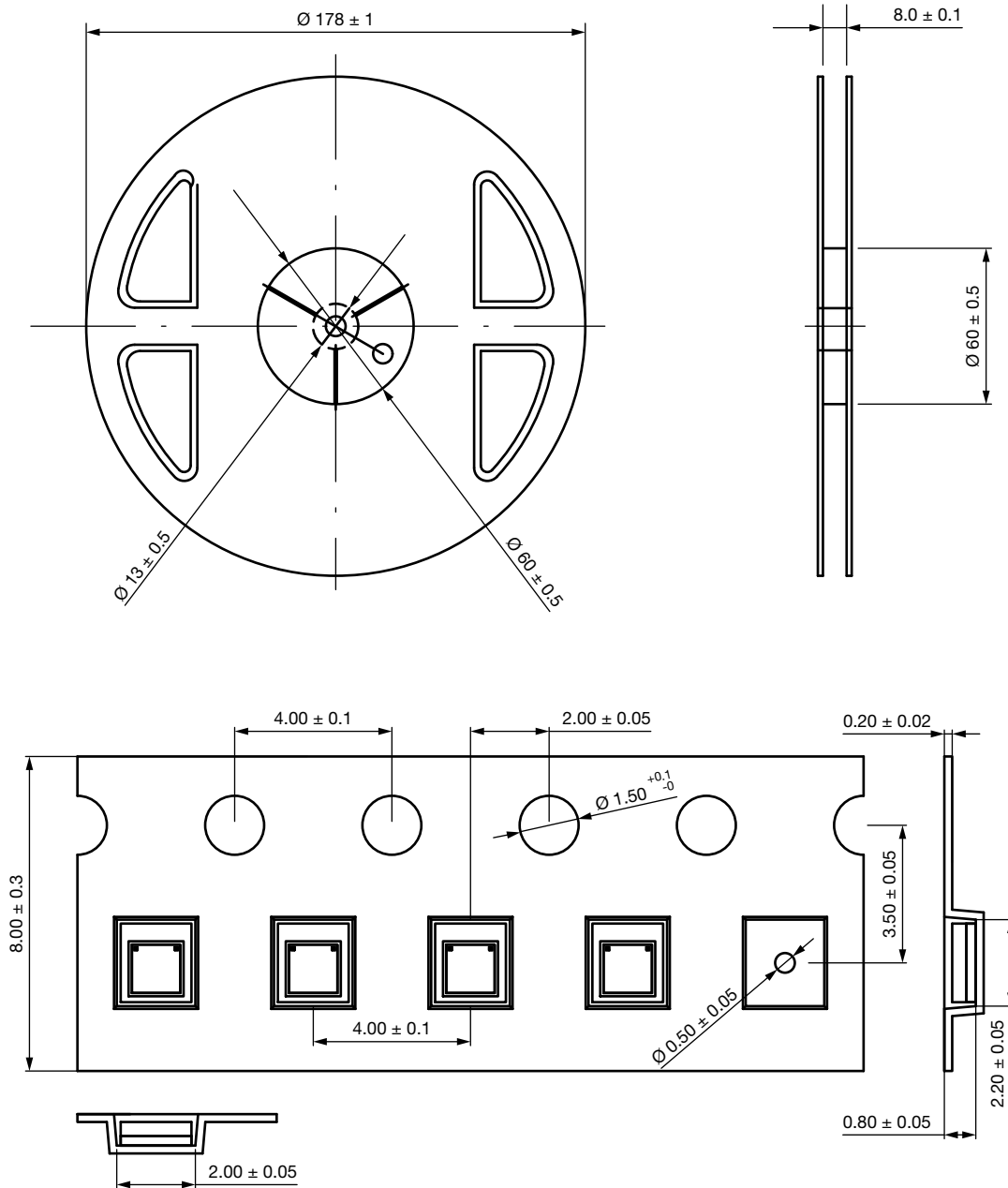


**RECOMMENDED FOOTPRINT** in millimeters





TAPE AND REEL DIMENSIONS in millimeters



**SOLDER PROFILE**

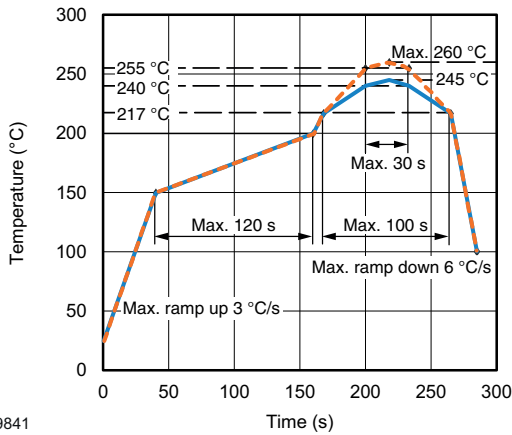


Fig. 7 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020D

**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 3

Floor life: 168 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-033D or recommended conditions:

192 h at 40 °C (+ 5 °C),  $RH < 5\%$

or

96 h at 60 °C (+ 5 °C),  $RH < 5\%$

19841



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