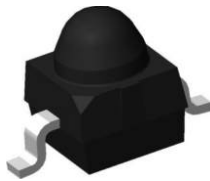


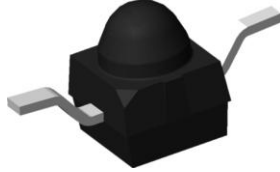


## Silicon PIN Photodiode, RoHS Compliant, Released for Lead (Pb)-free Soldering, AEC-Q101 Released



21568-1

VEMD2020X01



VEMD2000X01

### FEATURES

- Package type: surface mount
- Package form: GW, RGW
- Dimensions (L x W x H in mm): 2.3 x 2.3 x 2.8
- Product designed and qualified acc. AEC-Q101 for the automotive market
- High radiant sensitivity
- Daylight blocking filter matched with 830 nm to 950 nm IR emitters
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 15^\circ$
- Package matched with IR emitter series VSMB2000X01
- Floor life: 4 weeks, MSL 2a, acc. J-STD-020
- Lead (Pb)-free reflow soldering
- Lead (Pb)-free component in accordance with RoHS 2002/95/EC and WEEE 2002/96/EC



RoHS COMPLIANT

### DESCRIPTION

VEMD2000X01 and VEMD2020X01 are high speed and high sensitive PIN photodiodes in a miniature surface mount package (SMD) with dome lens and daylight blocking filter. Filter is matched with IR emitters operating at wavelength of 830 nm to 950 nm. The photo sensitive area of the chip is 0.23 mm<sup>2</sup>.

### APPLICATIONS

- High speed photo detector
- Infrared remote control
- Infrared data transmission
- Photo interrupters
- Shaft encoders

### PRODUCT SUMMARY

COMPONENT	I <sub>ra</sub> (μA)	φ (deg)	λ <sub>0.5</sub> (nm)
VEMD2000X01	12	± 15	750 to 1050
VEMD2020X01	12	± 15	750 to 1050

#### Note

Test conditions see table "Basic Characteristics"

### ORDERING INFORMATION

ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMD2000X01	Tape and reel	MOQ: 6000 pcs, 6000 pcs/reel	Reverse gullwing
VEMD2020X01	Tape and reel	MOQ: 6000 pcs, 6000 pcs/reel	Gullwing

#### Note

MOQ: minimum order quantity

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V <sub>R</sub>	60	V
Power dissipation	T <sub>amb</sub> ≤ 25 °C	P <sub>V</sub>	215	mW
Junction temperature		T <sub>j</sub>	100	°C
Operating temperature range		T <sub>amb</sub>	- 40 to + 100	°C
Storage temperature range		T <sub>stg</sub>	- 40 to + 100	°C
Soldering temperature	Acc. reflow solder profile fig. 7	T <sub>sd</sub>	260	°C
Thermal resistance junction/ambient	Acc. J-STD-051	R <sub>thJA</sub>	250	K/W

#### Note

T<sub>amb</sub> = 25 °C, unless otherwise specified

BASIC CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Forward voltage	$I_F = 50 \text{ mA}$	$V_F$		1		V
Breakdown voltage	$I_R = 100 \text{ }\mu\text{A}, E = 0$	$V_{(BR)}$	32			V
Reverse dark current	$V_R = 10 \text{ V}, E = 0$	$I_{ro}$		1	10	nA
Diode capacitance	$V_R = 0 \text{ V}, f = 1 \text{ MHz}, E = 0$	$C_D$		4		pF
	$V_R = 5 \text{ V}, f = 1 \text{ MHz}, E = 0$	$C_D$		1.3		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	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm}$	$I_k$		11		$\mu\text{A}$
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	$E_e = 1 \text{ mW/cm}^2, \lambda = 950 \text{ nm},$ $V_R = 5 \text{ V}$	$I_{ra}$	5	12		$\mu\text{A}$
Angle of half sensitivity		$\phi$		$\pm 15$		deg
Wavelength of peak sensitivity		$\lambda_p$		940		nm
Range of spectral bandwidth		$\lambda_{0.5}$		750 to 1050		nm
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

**Note**

$T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified

**BASIC CHARACTERISTICS**

$T_{amb} = 25 \text{ }^\circ\text{C}$ , unless otherwise specified

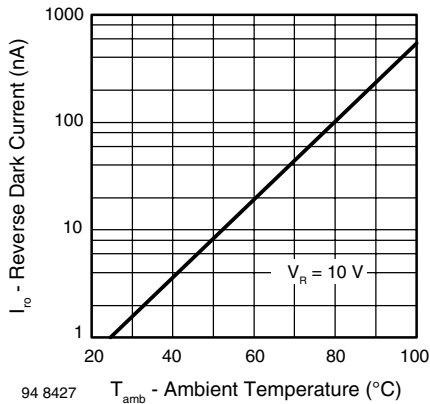


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

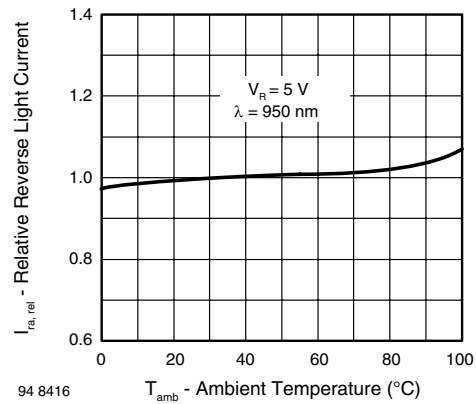


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature



# VEMD2000X01, VEMD2020X01

Silicon PIN Photodiode, RoHS Compliant, Vishay Semiconductors  
Released for Lead (Pb)-free Soldering,  
AEC-Q101 Released

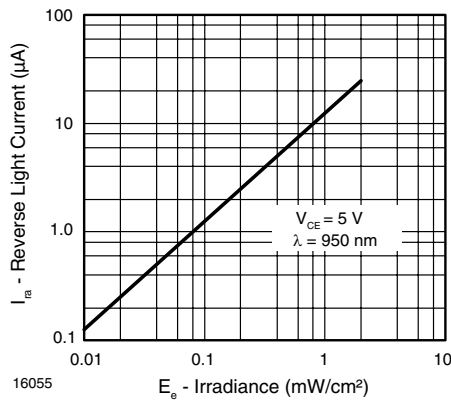


Fig. 3 - Reverse Light Current vs. Irradiance

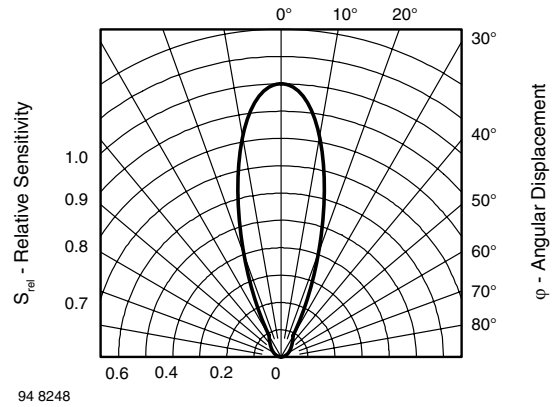


Fig. 6 - Relative Radiant Intensity vs. Angular Displacement

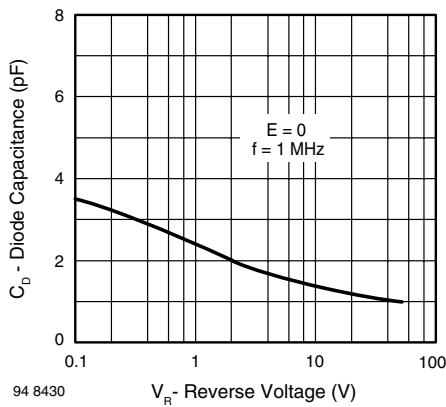


Fig. 4 - Diode Capacitance vs. Reverse Voltage

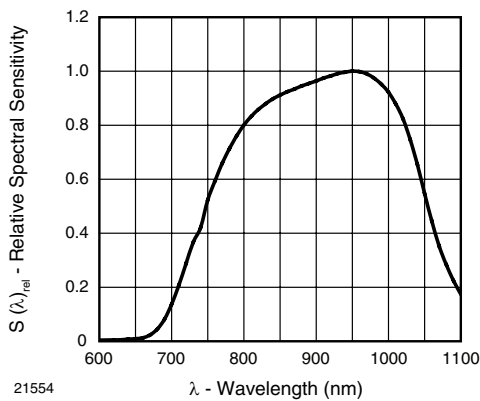


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

# VEMD2000X01, VEMD2020X01



Vishay Semiconductors Silicon PIN Photodiode, RoHS Compliant,  
Released for Lead (Pb)-free Soldering,  
AEC-Q101 Released

## REFLOW SOLDER PROFILE

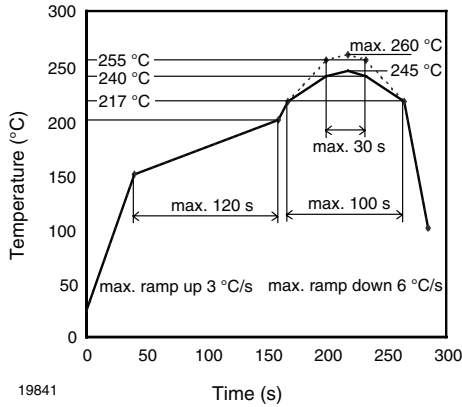


Fig. 7 - Lead (Pb)-free Reflow Solder Profile acc. J-STD-020D

## 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

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

Floor life: 4 weeks

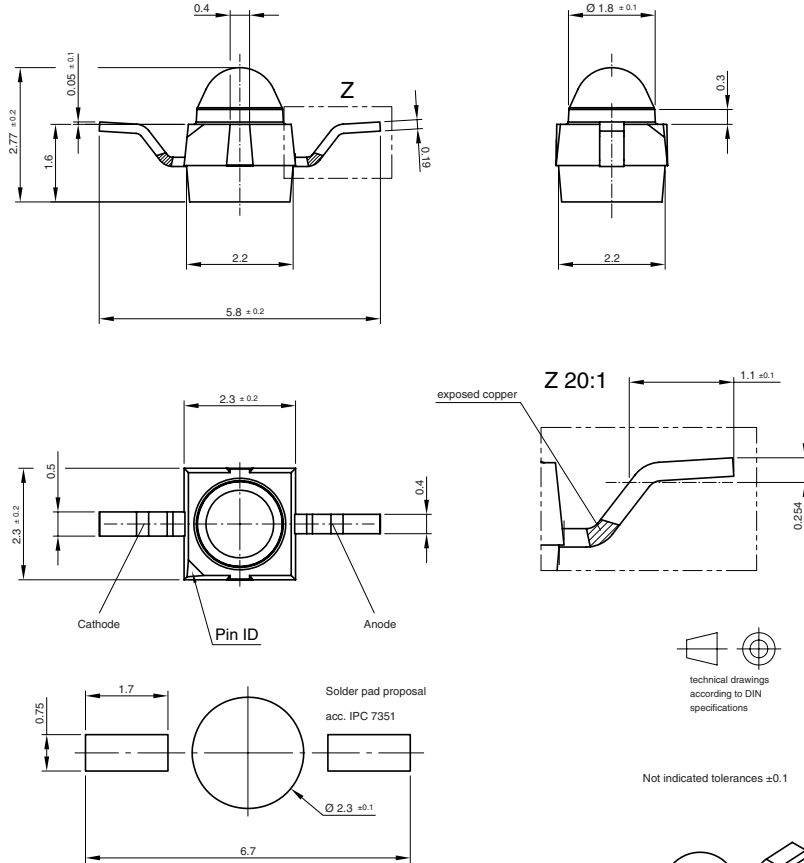
Conditions:  $T_{amb} < 30\text{ °C}$ ,  $RH < 60\%$

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

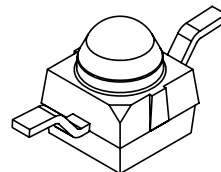
## DRYING

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  $40\text{ °C}$  (+  $5\text{ °C}$ ),  $RH < 5\%$ .

## PACKAGE DIMENSIONS in millimeters: VEMD2000



Drawing-No.: 6.544-5391.02-4  
Issue: 1; 26.09.08  
21517

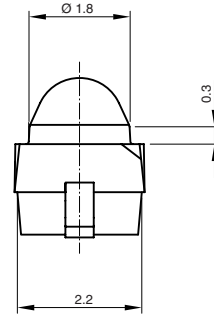
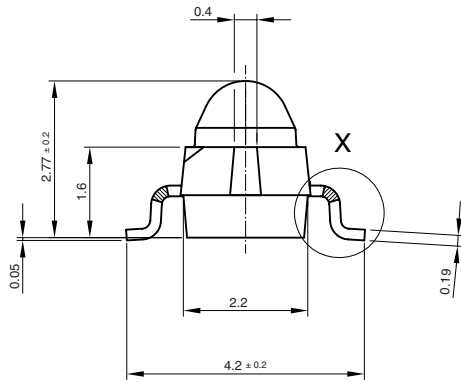




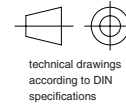
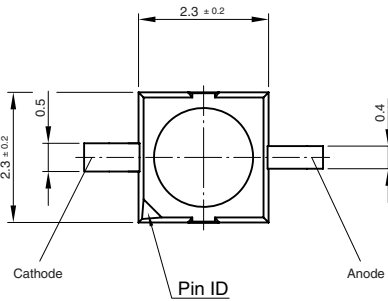
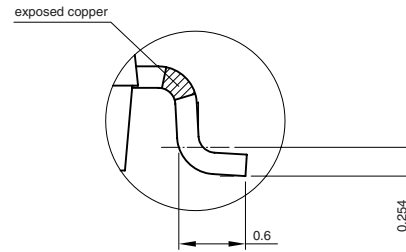
# VEMD2000X01, VEMD2020X01

Silicon PIN Photodiode, RoHS Compliant, Vishay Semiconductors  
Released for Lead (Pb)-free Soldering,  
AEC-Q101 Released

## PACKAGE DIMENSIONS in millimeters: VEMD2020

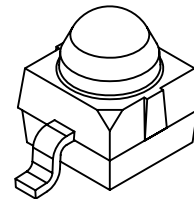
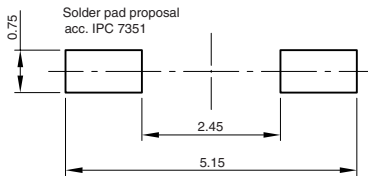


X 20:1



technical drawings  
according to DIN  
specifications

Not indicated tolerances ±0.1



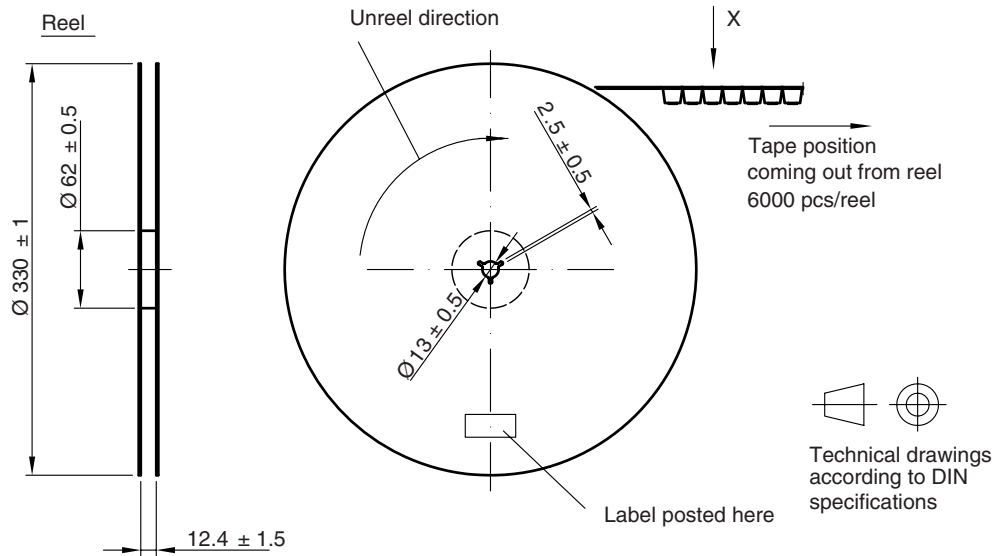
Drawing-No.: 6.544-5383.02-4  
Issue: 3; 26.09.08  
21488

# VEMD2000X01, VEMD2020X01

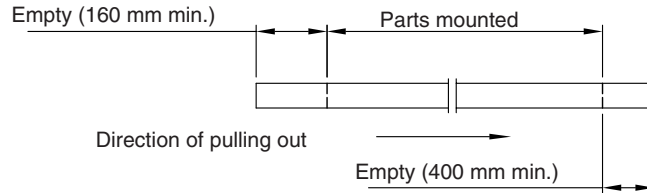


Vishay Semiconductors Silicon PIN Photodiode, RoHS Compliant,  
Released for Lead (Pb)-free Soldering,  
AEC-Q101 Released

## TAPING AND REEL DIMENSIONS in millimeters: VEMD2000

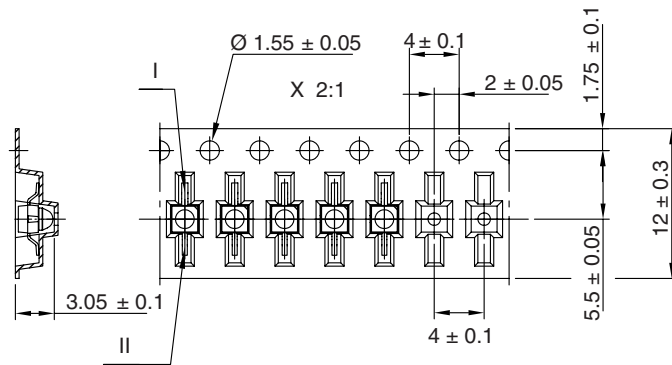


### Leader and trailer tape:



### Terminal position in tape

Device	Lead I	Lead II
VEMT 2000	Collector	Emitter
VEMD 2000	Cathode	Anode
VSMB 2000		



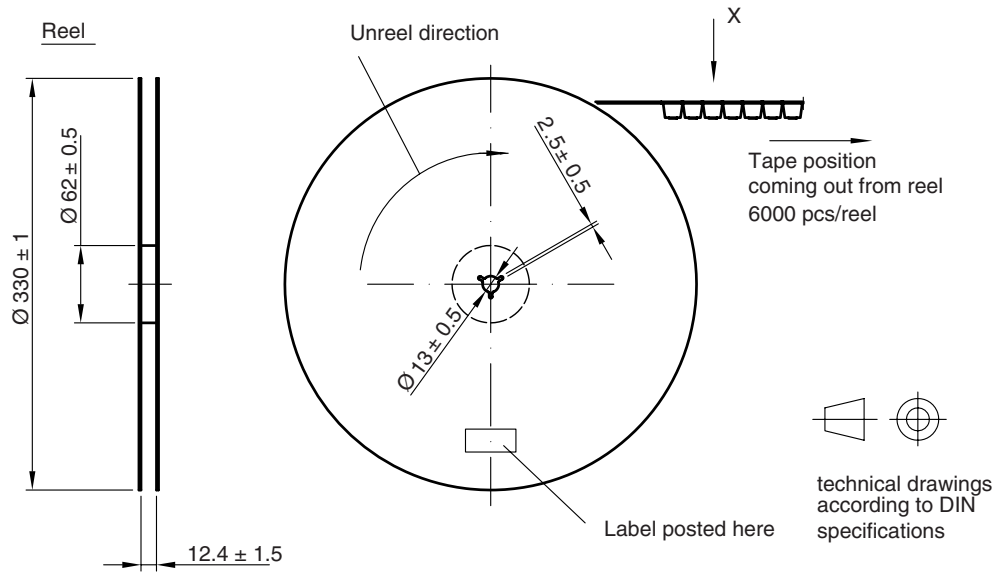
Drawing-No.: 9.800-5100.01-4  
Issue: 1; 26.09.08  
21572



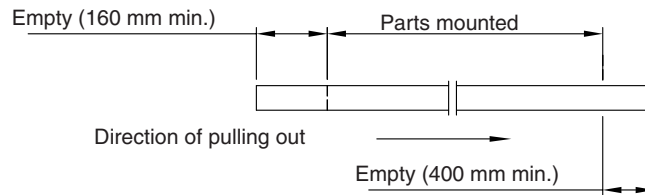
# VEMD2000X01, VEMD2020X01

Silicon PIN Photodiode, RoHS Compliant, Vishay Semiconductors  
Released for Lead (Pb)-free Soldering,  
AEC-Q101 Released

## TAPING AND REEL DIMENSIONS in millimeters: VEMD2020

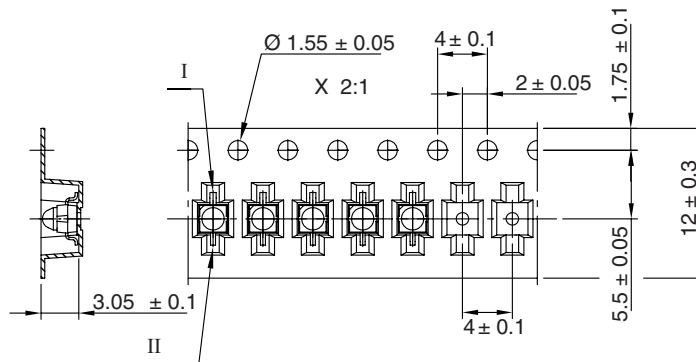


### Leader and trailer tape:



### Terminal position in tape

Device	Lead I	Lead II
VSMB2020	Cathode	Anode
VEMD2020	Collector	Emitter



Drawing-No.: 9.800-5091.01-4

Issue: 2; 26.09.08

21571



## Disclaimer

All product specifications and data are subject to change without notice.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

Vishay disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

Product names and markings noted herein may be trademarks of their respective owners.