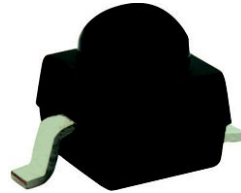


## Silicon PIN Photodiode

VEMD2003X01



VEMD2023X01



### DESCRIPTION

VEMD2003X01 and VEMD2023X01 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>.

### FEATURES

- Package type: surface mount
- Package form: GW, RGW
- Dimensions (L x W x H in mm): 2.3 x 2.3 x 2.55
- AEC-Q101 qualified
- High radiant sensitivity
- Daylight blocking filter matched with 830 nm to 950 nm IR emitters
- Fast response times
- Angle of half sensitivity:  $\phi = \pm 35^\circ$
- Package matched with IR emitter series VSMB2943X01
- Floor life: 4 weeks, MSL 2a, acc. J-STD-020
- Lead (Pb)-free reflow soldering
- 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
- Infrared remote control
- Infrared data transmission
- Photo interrupters
- IR touch panels

PRODUCT SUMMARY			
COMPONENT	$I_{ra}$ ( $\mu$ A)	$\phi$ (deg)	$\lambda_{0.5}$ (nm)
VEMD2003X01	10	$\pm 35$	750 to 1050
VEMD2023X01	10	$\pm 35$	750 to 1050

#### Note

- Test conditions see table “Basic Characteristics”

ORDERING INFORMATION			
ORDERING CODE	PACKAGING	REMARKS	PACKAGE FORM
VEMD2003X01	Tape and reel	MOQ: 6000 pcs, 6000 pcs/reel	Reverse gullwing
VEMD2023X01	Tape and reel	MOQ: 6000 pcs, 6000 pcs/reel	Gullwing

#### Note

- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25^\circ\text{C}$ , unless otherwise specified)				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		$V_R$	60	V
Power dissipation	$T_{amb} \leq 25^\circ\text{C}$	$P_V$	215	mW
Junction temperature		$T_j$	100	$^\circ\text{C}$
Operating temperature range		$T_{amb}$	- 40 to + 100	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	- 40 to + 100	$^\circ\text{C}$
Soldering temperature	Acc. reflow solder profile fig. 7	$T_{sd}$	260	$^\circ\text{C}$
Thermal resistance junction/ambient	Acc. J-STD-051	$R_{thJA}$	250	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	$I_F = 50\text{ mA}$	$V_F$		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	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$	$I_k$		10		$\mu\text{A}$
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	$E_e = 1\text{ mW/cm}^2$ , $\lambda = 950\text{ nm}$ , $V_R = 5\text{ V}$	$I_{ra}$	7	10	14	$\mu\text{A}$
Angle of half sensitivity		$\varphi$		$\pm 35$		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

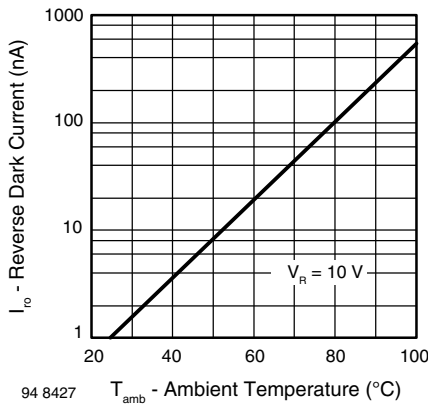
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

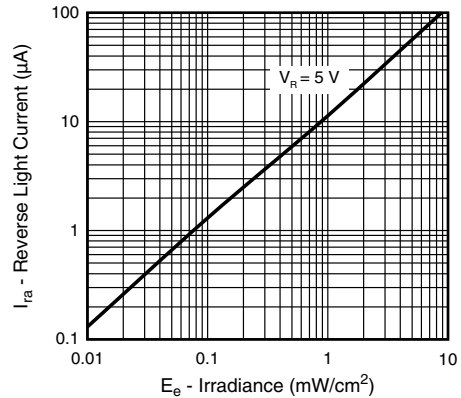


Fig. 3 - Reverse Light Current vs. Irradiance

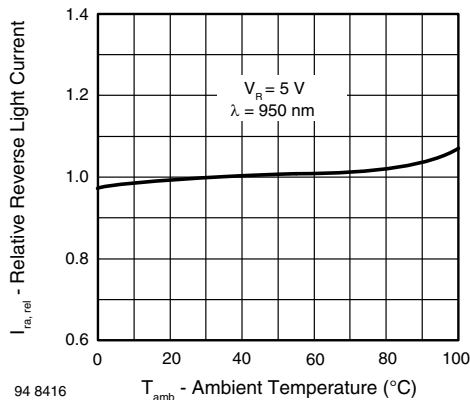


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

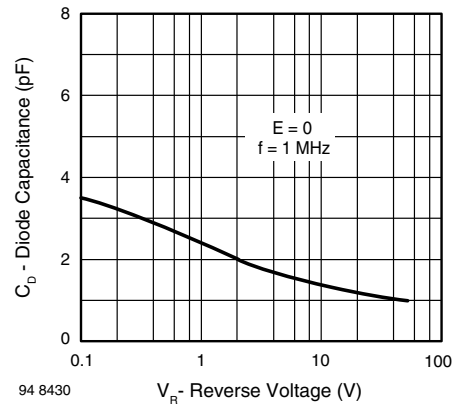


Fig. 4 - Diode Capacitance vs. Reverse Voltage

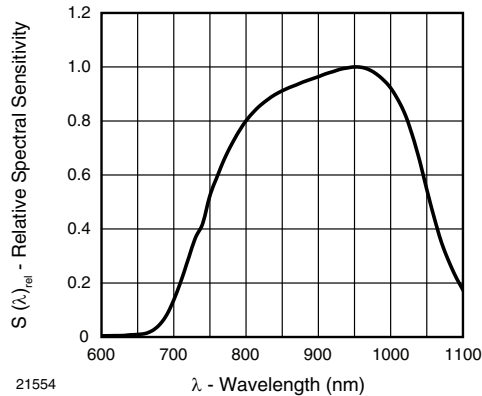


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength

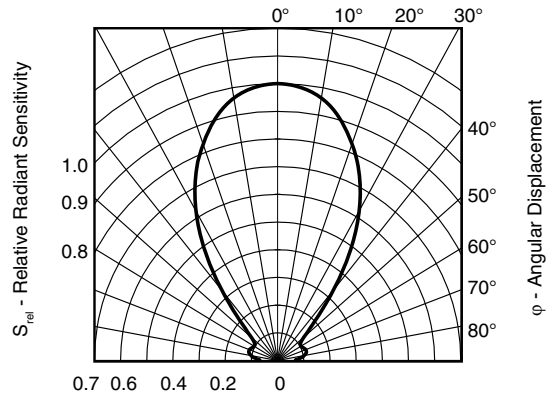


Fig. 6 - Relative Radiant Intensity vs. Angular Displacement

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

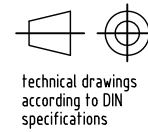
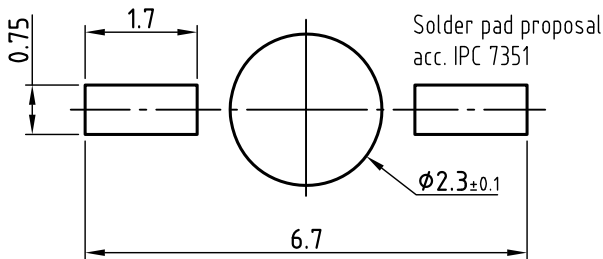
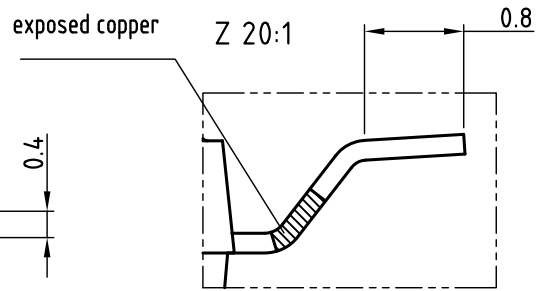
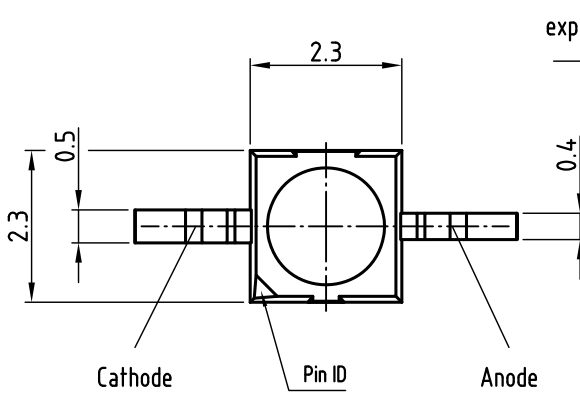
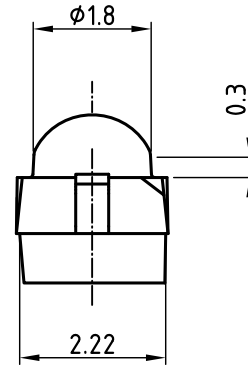
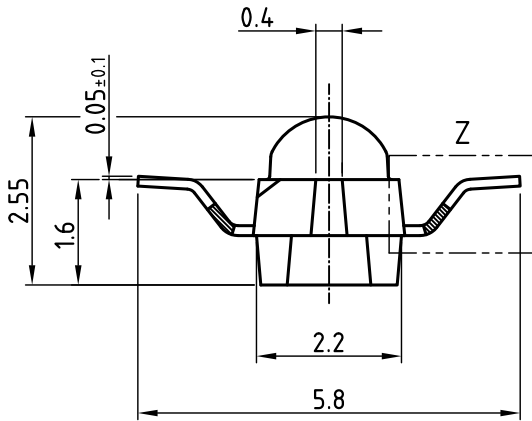
Moisture sensitivity level 2a, acc. to J-STD-020.

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



## PACKAGE DIMENSIONS in millimeters: VEMD2003

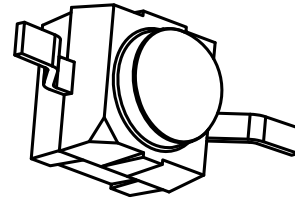


Dimensions in mm

Not indicated tolerances ±0.2

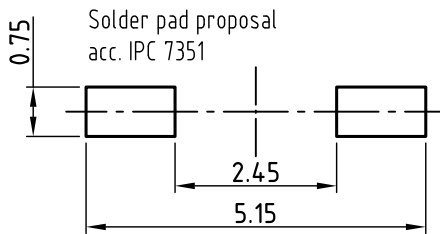
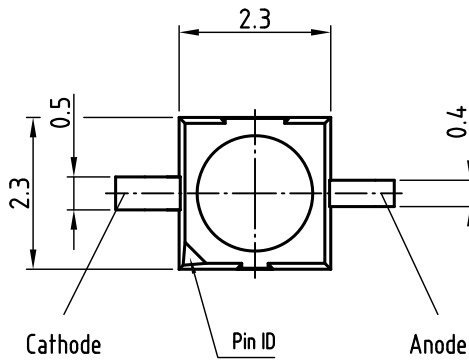
Drawing refers to following types: VSMB2943RGX01  
 VSMF2893RGX01  
 VEMD2x23X01

Drawing-No.: 6.544-5409.01-4  
 Issue: prel. 03.08.12





## PACKAGE DIMENSIONS in millimeters: VEMD2023



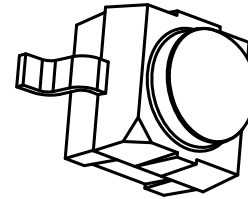
technical drawings according to DIN specifications

Dimensions in mm

Not indicated tolerances ±0.2

Drawing refers to following types: VSMB2943GX01  
 VSMF2893GX01  
 VEMD2x23X01

Drawing-No.: 6.544-5408.01-4  
 Issue: prel; 03.08.12



## TAPING AND REEL DIMENSIONS in millimeters: VEMD2003

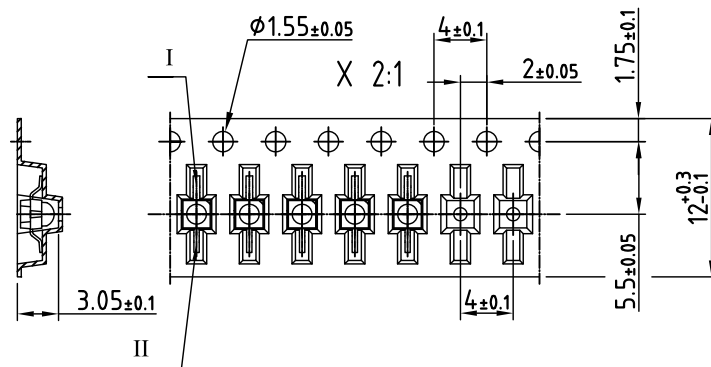


### Leader and trailer tape:



### Terminal position in tape

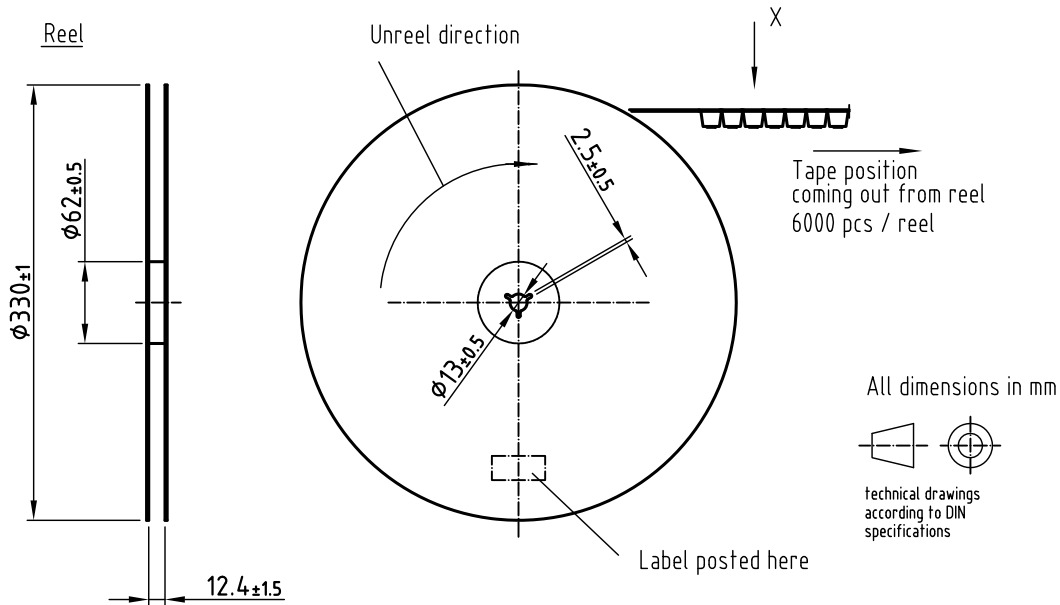
Device	Lead I	Lead II
V SMB294.3RGX01	Cathode	Anode
V SMF2893RGX01		
VEMD2x03X01		
VEMT2x03X01	Collector	Emitter
VSMY2853RG	Anode	Cathode



Drawing refers to following types: see table  
Reel dimensions and tape

Drawing-No.: 9.800-5100.02-4  
Issue: prel; 03.08.12

## TAPING AND REEL DIMENSIONS in millimeters: VEMD2023

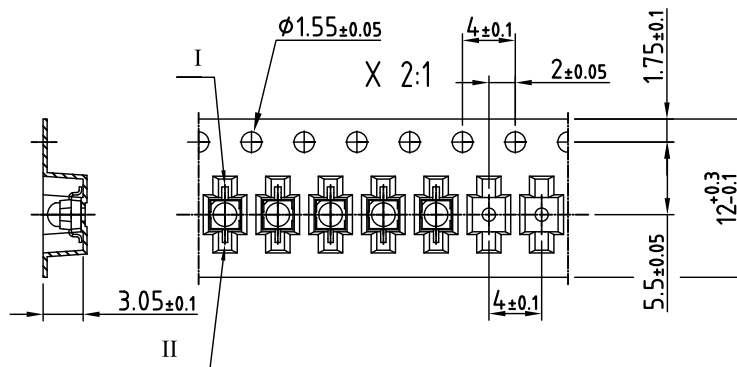


### Leader and trailer tape:



### Terminal position in tape

Device	Lead I	Lead II
VSMB2943GX01	Cathode	Anode
VSMF2893GX01		
VEMD2x23X01		
VEMT2x23X01	Collector	Emitter
VSMY2853G	Anode	Cathode



Drawing refers to following types: see table  
Reel dimensions and tape

Drawing-No.: 9.800-5091.21-4  
Issue: prel; 03.08.12



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