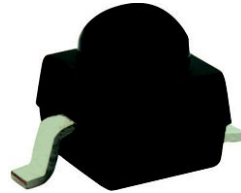


## Silicon PIN Photodiode

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            |

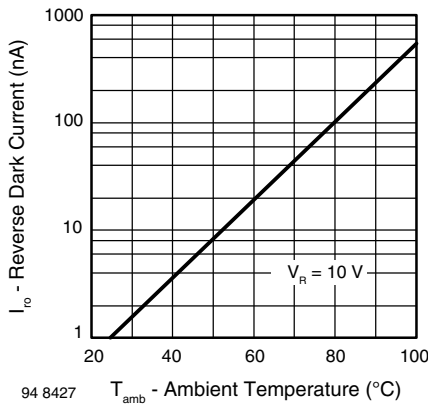
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

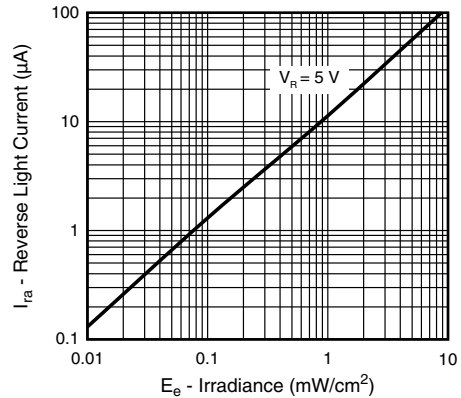


Fig. 3 - Reverse Light Current vs. Irradiance

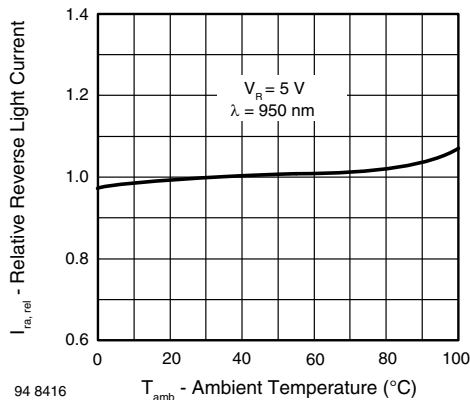


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

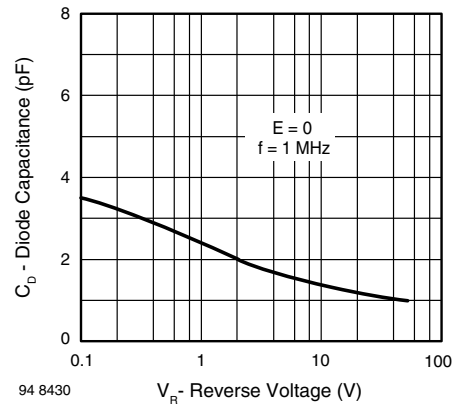


Fig. 4 - Diode Capacitance vs. Reverse Voltage

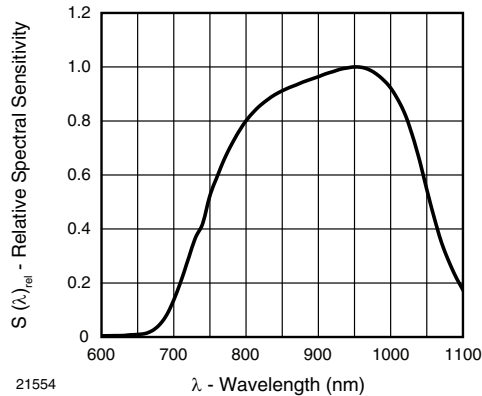


Fig. 5 - Relative Spectral Sensitivity vs. Wavelength



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

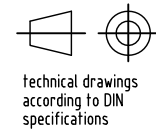
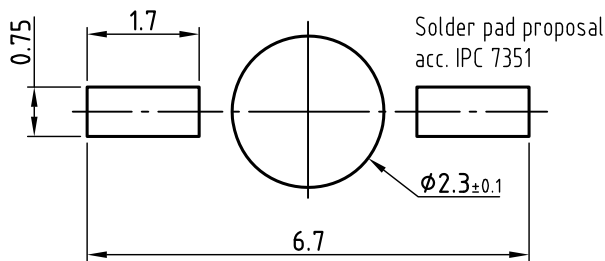
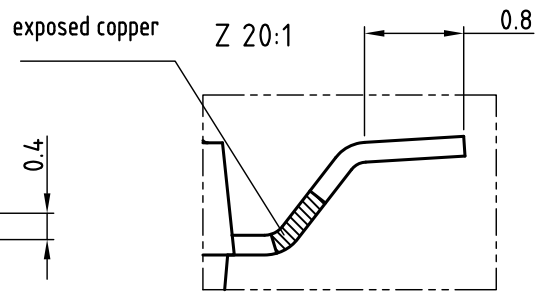
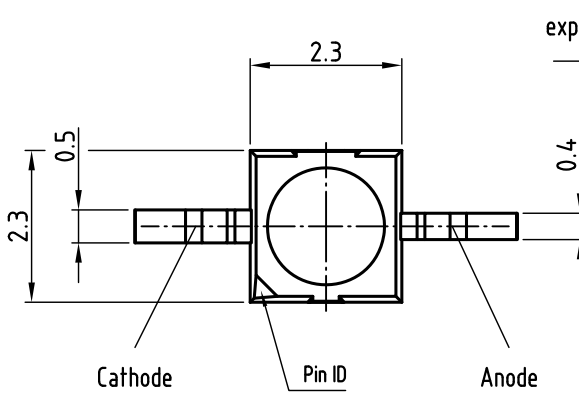
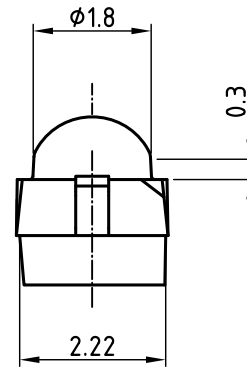
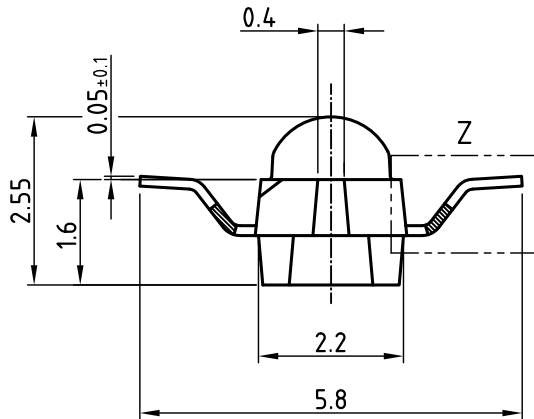
Moisture sensitivity level 2a, acc. to J-STD-020.

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



## PACKAGE DIMENSIONS in millimeters: VEMD2003



technical drawings according to DIN specifications

Dimensions in mm

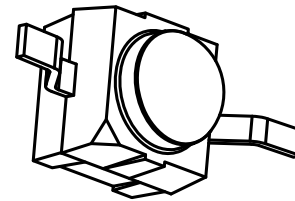
Not indicated tolerances  $\pm 0.2$

Drawing refers to following types:

VSMB2943RGX01  
VSMF2893RGX01  
VEMD2x23X01

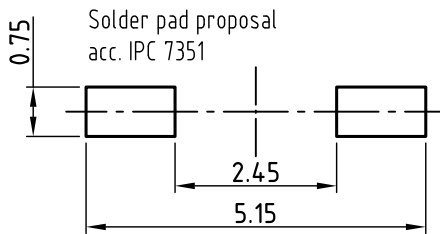
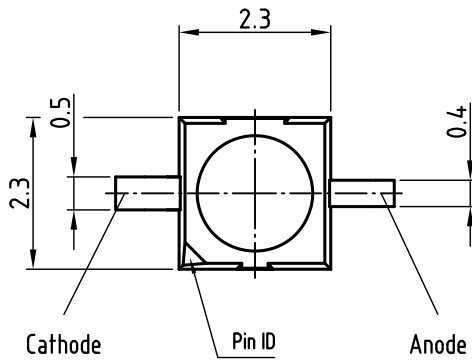
Drawing-No.: 6.544-5409.01-4

Issue: prel. 03.08.12





## PACKAGE DIMENSIONS in millimeters: VEMD2023



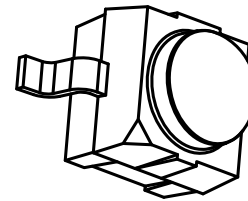
technical drawings according to DIN specifications

Dimensions in mm

Not indicated tolerances  $\pm 0.2$

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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