# Silicon PIN Photodiode



## FEATURES

- Package type: surface mount
- Package form: 0805 top view
- Dimensions (L x W x H in mm): 2 x 1.25 x 0.85
- Radiant sensitive area (in $mm^2$): 0.23
- Daylight blocking filter
- AEC-Q101 qualified
- High photo sensitivity
- High radiant sensitivity
- Excellent $I_{ra}$ linearity
- Fast response times
- Angle of half sensitivity: $\varphi = \pm 70°$
- Floor life: 72 h, MSL 4, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE GRADE

Pb-free

e4

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

## DESCRIPTION

VEMD1160X01 is a high speed and high sensitive PIN photodiode with a highly linear photoresponse. It is a low profile surface mount device (SMD) including the chip with a 0.23 $mm^2$ sensitive area and a daylight blocking filter.

## APPLICATIONS

- High speed photo detector
- Small signal detection
- Proximity sensors

| PRODUCT SUMMARY | | | |
|---|---|---|---|
| **COMPONENT** | **$I_{ra}$ (µA)** | **φ (deg)** | **$\lambda_{0.1}$ (nm)** |
| VEMD1160X01 | 1.8 | ± 70 | 700 to 1070 |

**Note**

- Test conditions see table “Basic Characteristics”

| ORDERING INFORMATION | | | |
|---|---|---|---|
| **ORDERING CODE** | **PACKAGING** | **REMARKS** | **PACKAGE FORM** |
| VEMD1160X01 | Tape and reel | MOQ: 3000 pcs, 3000 pcs/reel | 0805 top view |

**Note**

- MOQ: minimum order quantity

| ABSOLUTE MAXIMUM RATINGS ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| Reverse voltage | | $V_R$ | 20 | V |
| Power dissipation | $T_{amb} \leq 25$ °C | $P_V$ | 215 | mW |
| Junction temperature | | $T_j$ | 110 | °C |
| Operating temperature range | | $T_{amb}$ | -40 to +110 | °C |
| Storage temperature range | | $T_{stg}$ | -40 to +110 | °C |
| Soldering temperature | According to reflow solder profile Fig. 6 | $T_{sd}$ | 260 | °C |
| Thermal resistance junction / ambient | According to EIA / JESD 51 | $R_{thJA}$ | 270 | K/W |



For technical questions, contact: detectortechsupport@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

| **BASIC CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| Forward voltage | $I_F$ = 50 mA | $V_F$ | - | 0.9 | 1.1 | V |
| Breakdown voltage | $I_R$ = 100 µA, E = 0 | $V_{(BR)}$ | 20 | - | - | V |
| Reverse dark current | $V_R$ = 10 V, E = 0 | $I_{ro}$ | - | 0.01 | 5 | nA |
| Diode capacitance | $V_R$ = 0 V, f = 1 MHz, E = 0 | $C_D$ | - | 3.8 | - | pF |
| | $V_R$ = 3 V, f = 1 MHz, E = 0 | $C_D$ | - | 1.8 | - | pF |
| Open circuit voltage | $E_e$ = 1 mW/cm², λ = 950 nm | $V_o$ | - | 350 | - | mV |
| Temperature coefficient of $V_o$ | $E_e$ = 1 mW/cm², λ = 950 nm | $TK_{Vo}$ | - | -2.6 | - | mV/K |
| Short circuit current | $E_e$ = 1 mW/cm², λ = 950 nm | $I_k$ | - | 1.8 | - | µA |
| Temperature coefficient of $I_k$ | $E_e$ = 1 mW/cm², λ = 835 nm | $TK_{Ik}$ | - | 0.1 | - | %/K |
| Reverse light current | $E_e$ = 1 mW/cm², λ = 950 nm, $V_R$ = 5 V | $I_{ra}$ | 1.4 | 1.8 | 3 | µA |
| | $E_e$ = 1 mW/cm², λ = 890 nm, $V_R$ = 5 V | $I_{ra}$ | - | 2.6 | - | µA |
| Angle of half sensitivity | | φ | - | ± 70 | - | deg |
| Wavelength of peak sensitivity | | $\lambda_p$ | - | 840 | - | nm |
| Range of spectral bandwidth | | $\lambda_{0.1}$ | - | 700 to 1070 | - | nm |
| Rise time | $V_R$ = 5 V, $R_L$ = 50 Ω, λ = 820 nm | $t_r$ | - | 60 | - | ns |
| Fall time | $V_R$ = 5 V, $R_L$ = 50 Ω, λ = 820 nm | $t_f$ | - | 80 | - | ns |

## BASIC CHARACTERISTICS ($T_{amb}$ = 25 °C, unless otherwise specified)

*Basic characteristics graphs to be extended to 110 °C ambient temperatures where applicable.*

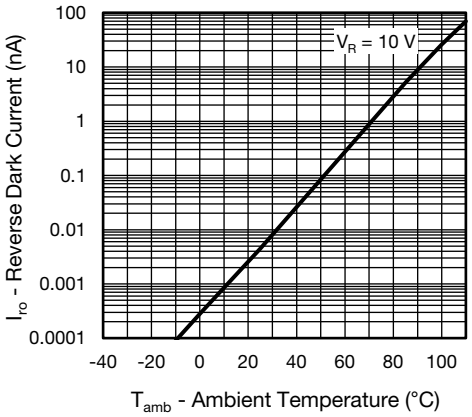



Fig. 1 - Reverse Dark Current vs. Ambient Temperature

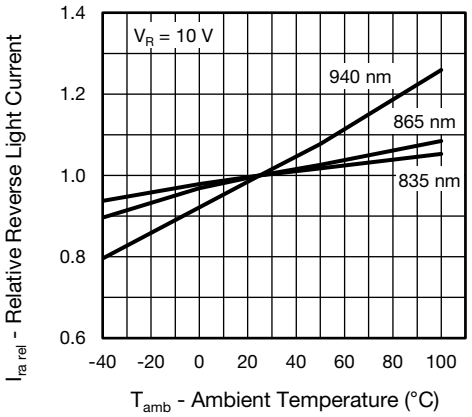



Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature



For technical questions, contact: detectortechsupport@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

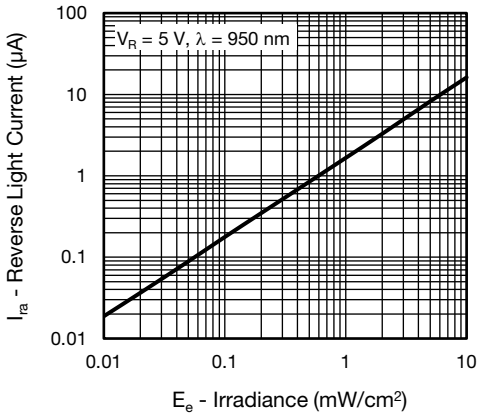



Fig. 3 - Reverse Light Current vs. Irradiance

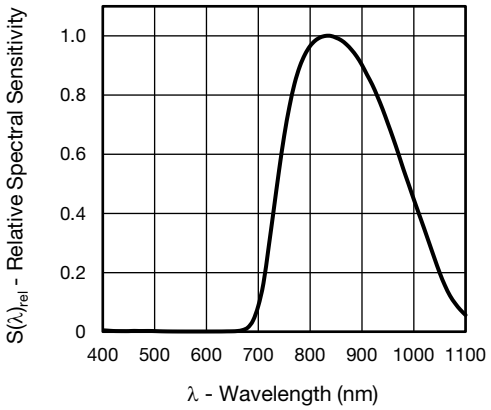



Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

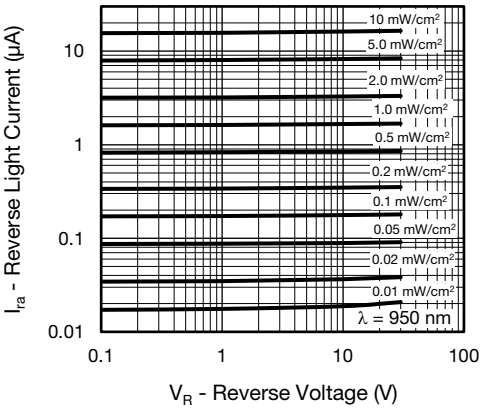



Fig. 4 - Reverse Light Current vs. Reverse Voltage

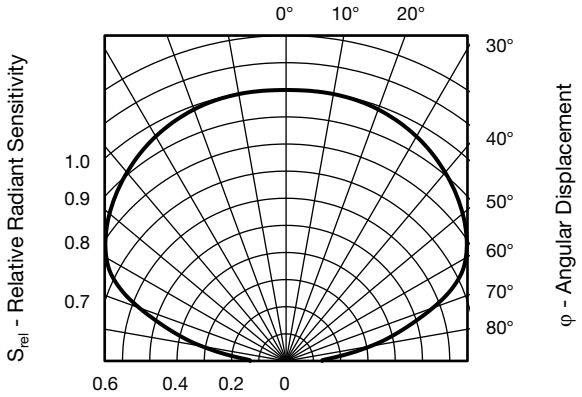



Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement

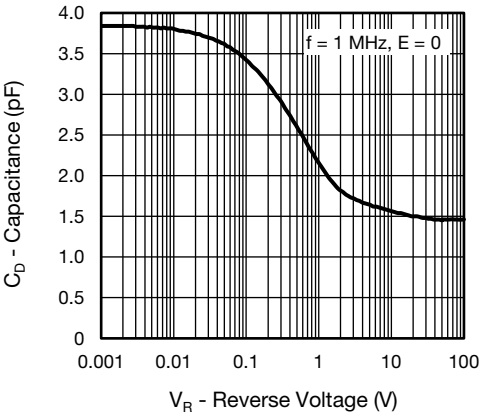



Fig. 5 - Diode Capacitance vs. Reverse Voltage


For technical questions, contact: detectortechsupport@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

## REFLOW SOLDER PROFILE

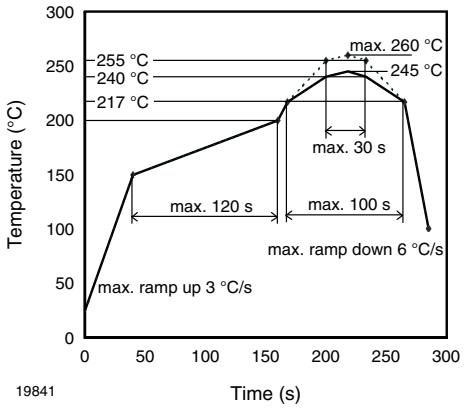



Fig. 8 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020

## 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: 72 h

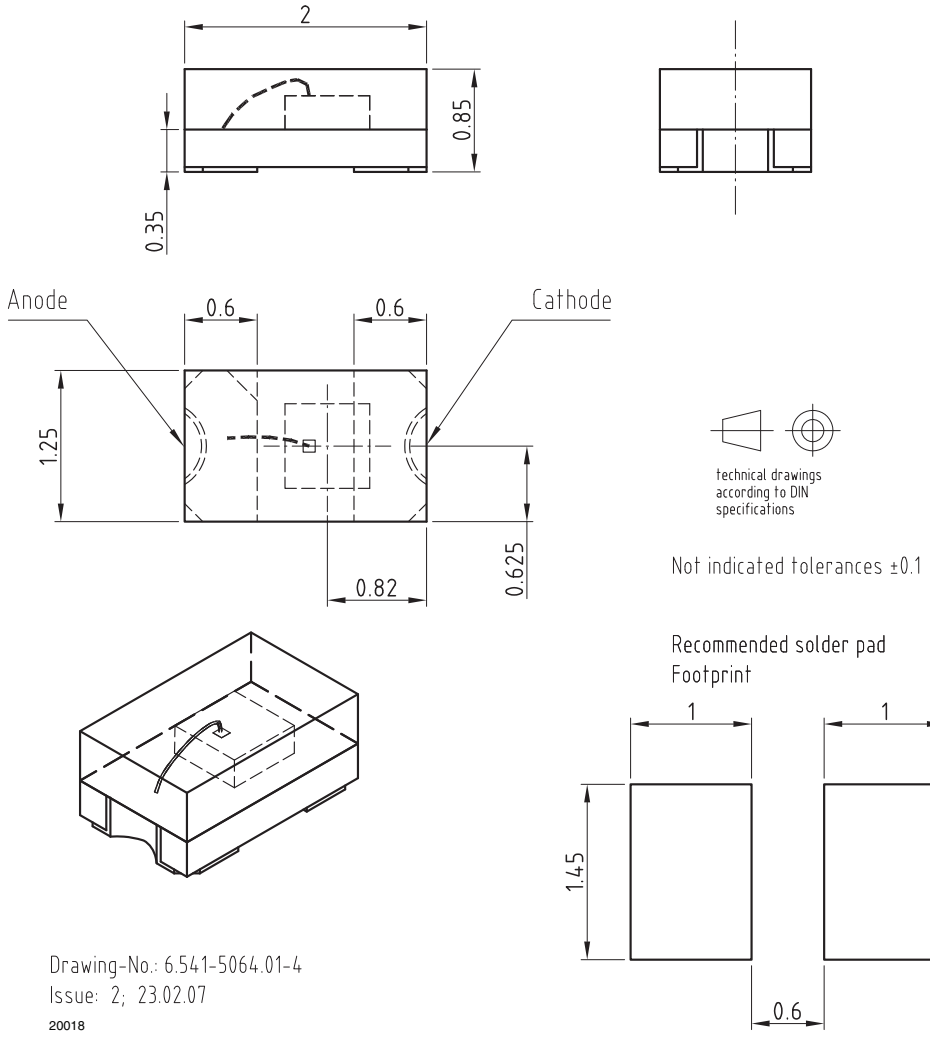
Conditions: $T_{amb}$ < 30 °C, RH < 60 %

Moisture sensitivity level 4, according 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 °C (+ 5 °C), RH < 5 %.

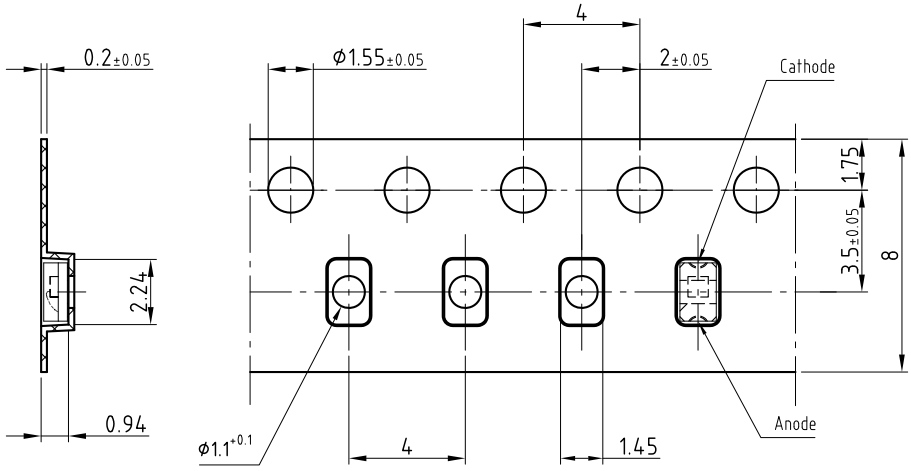
## PACKAGE DIMENSIONS in millimeters





For technical questions, contact: detectortechsupport@vishay.com
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

**BLISTER TAPE DIMENSIONS** in millimeters

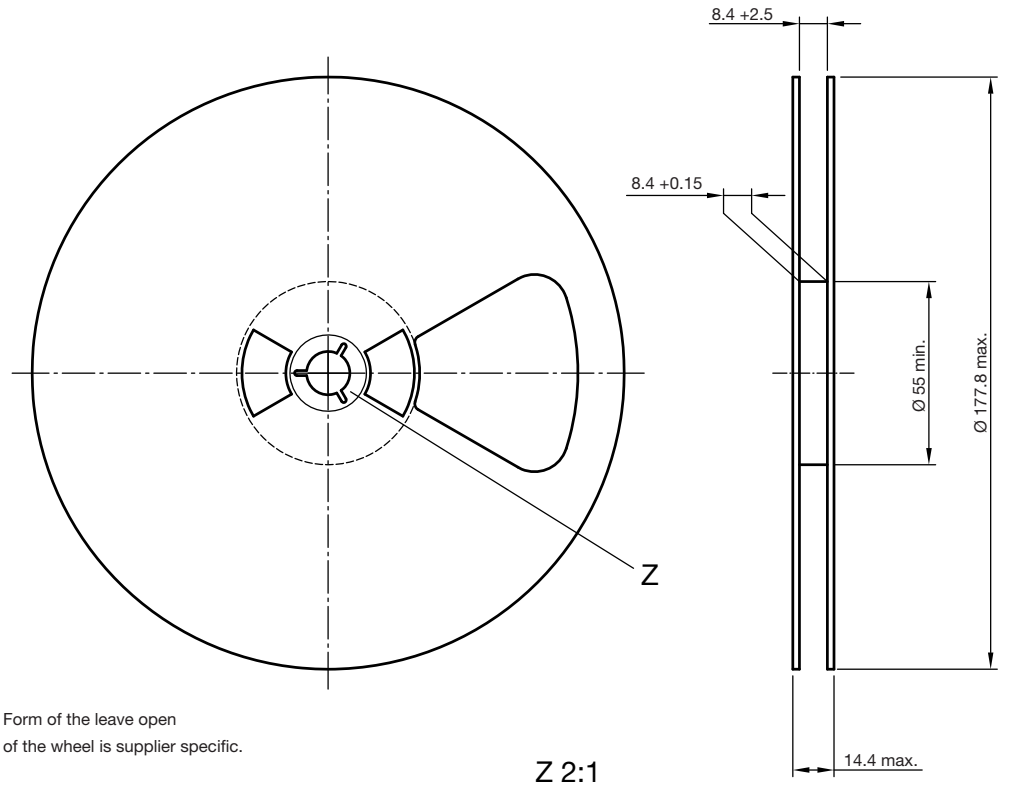




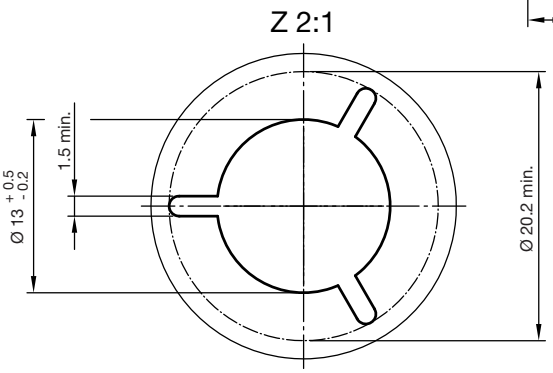

For technical questions, contact: detectortechsupport@vishay.com

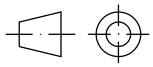
THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

**REEL DIMENSIONS** in millimeters




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



technical drawings
according to DIN
specifications

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



For technical questions, contact: detectortechsupport@vishay.com

THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishay.com/doc?91000

# Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

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 in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

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