

Silicon PIN Photodiode



DESCRIPTION

VEMD5010X01 is a high speed and high sensitive PIN photodiode. It is a low profile surface mount device (SMD) including the chip with a 7.5 mm² sensitive area detecting visible and near infrared radiation.

FEATURES

- Package type: surface mount
- Package form: top view
- Dimensions (L x W x H in mm): 5 x 4 x 0.9
- Radiant sensitive area (in mm²): 7.5
- AEC-Q101 qualified
- High photo sensitivity
- High radiant sensitivity
- Suitable for visible and near infrared radiation
- Fast response times
- Angle of half sensitivity: $\phi = \pm 65^\circ$
- 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

RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

APPLICATIONS

- High speed photo detector

PRODUCT SUMMARY

| COMPONENT | I_{ra} (μ A) | ϕ (deg) | $\lambda_{0.1}$ (nm) |
|-------------|---------------------|--------------|----------------------|
| VEMD5010X01 | 48 | ± 65 | 430 to 1100 |

Note

- Test conditions see table “Basic Characteristics”

ORDERING INFORMATION

| ORDERING CODE | PACKAGING | REMARKS | PACKAGE FORM |
|------------------|---------------|------------------------------|--------------|
| VEMD5010X01 | Tape and reel | MOQ: 1000 pcs, 1000 pcs/reel | Top view |
| VEMD5010X01-GS15 | Tape and reel | MOQ: 5000 pcs, 5000 pcs/reel | Top view |

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 | 20 | V |
| Power dissipation | $T_{amb} \leq 25^\circ\text{C}$ | P_V | 215 | mW |
| Junction temperature | | T_j | 110 | $^\circ\text{C}$ |
| Operating temperature range | | T_{amb} | -40 to +110 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | -40 to +110 | $^\circ\text{C}$ |
| Soldering temperature | Acc. reflow solder profile fig. 8 | T_{sd} | 260 | $^\circ\text{C}$ |
| Thermal resistance junction/ambient | | R_{thJA} | 350 | K/W |
| ESD safety HBM | ± 2000 V, 1.5 k Ω , 100 pF, 3 pulses | ESD_{HBM} | ≥ 2 | kV |

| BASIC CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified) | | | | | | |
|---|--|-----------------|------|---------------------|------|-----------------------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| Forward voltage | $I_F = 50\text{ mA}$ | V_F | | 1 | 1.3 | V |
| Breakdown voltage | $I_R = 100\text{ }\mu\text{A}$, $E = 0$ | $V_{(BR)}$ | 20 | | | V |
| Reverse dark current | $V_R = 10\text{ V}$, $E = 0$ | I_{ro} | | 2 | 30 | nA |
| Diode capacitance | $V_R = 0\text{ V}$, $f = 1\text{ MHz}$, $E = 0$ | C_D | | 70 | | pF |
| | $V_R = 3\text{ V}$, $f = 1\text{ MHz}$, $E = 0$ | C_D | | 25 | 40 | 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 | | 45 | | μA |
| 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} | 40 | 48 | | μA |
| Angle of half sensitivity | | ϕ | | ± 65 | | deg |
| Wavelength of peak sensitivity | | λ_p | | 940 | | nm |
| Range of spectral bandwidth | | $\lambda_{0.1}$ | | 430 to 1100 | | nm |
| Noise equivalent power | $V_R = 10\text{ V}$, $\lambda = 950\text{ nm}$ | NEP | | 4×10^{-14} | | W/ $\sqrt{\text{Hz}}$ |
| 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)

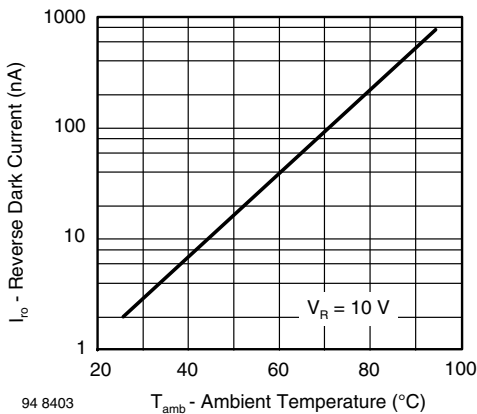
 Basic characteristics graphs to be extended to $110\text{ }^{\circ}\text{C}$ ambient temperatures where applicable.


Fig. 1 - Reverse Dark Current vs. Ambient Temperature

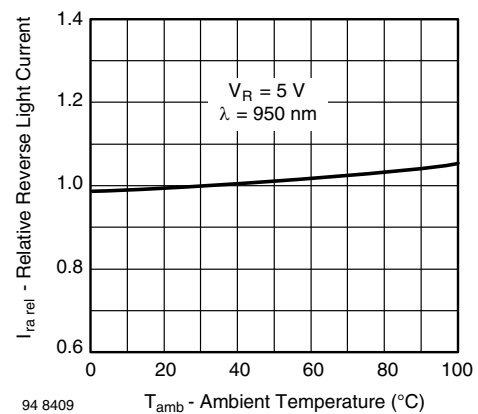


Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature

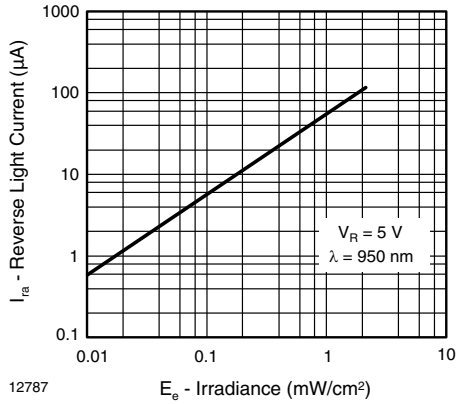


Fig. 3 - Reverse Light Current vs. Irradiance

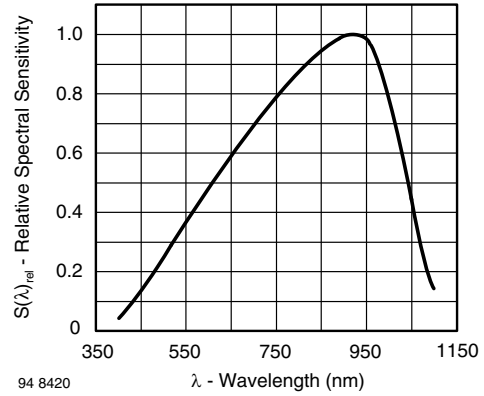


Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

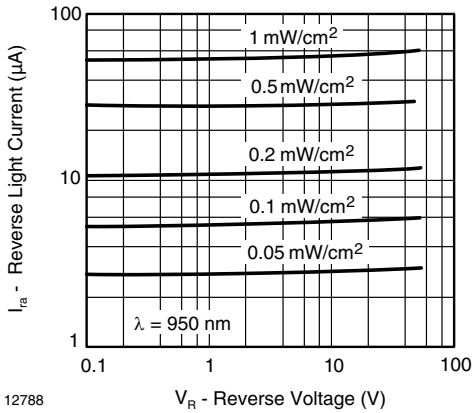


Fig. 4 - Reverse Light Current vs. Reverse Voltage

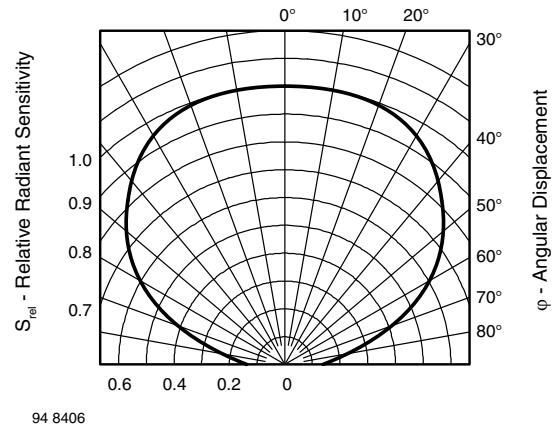


Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement

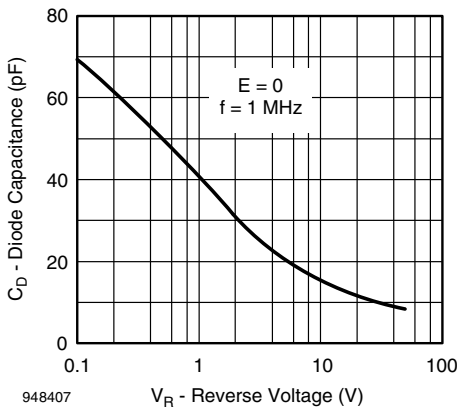
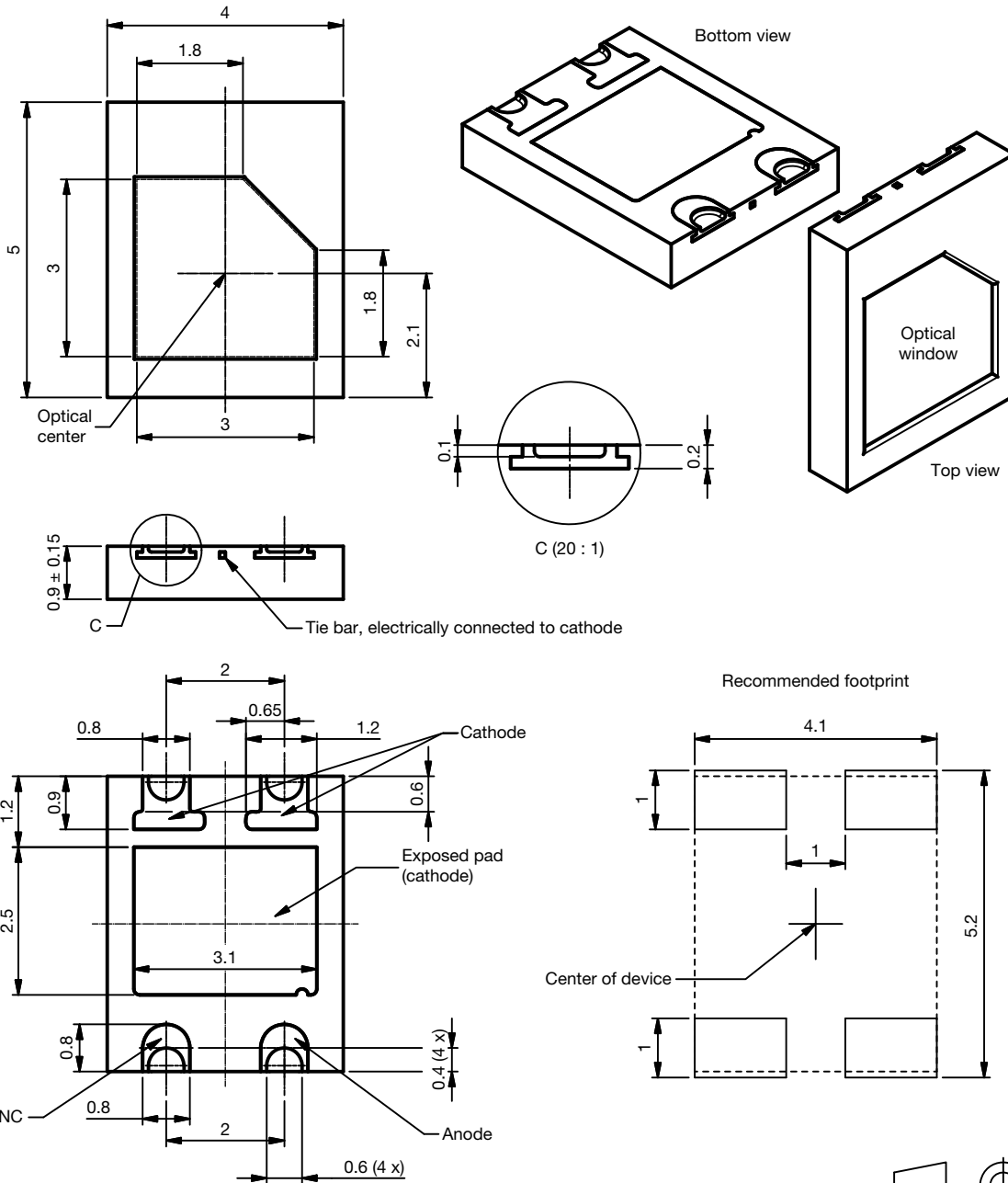


Fig. 5 - Diode Capacitance vs. Reverse Voltage

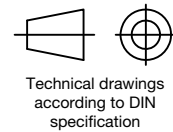


PACKAGE DIMENSIONS in millimeters



Drawing- No.: 6.550-5329.01-4
Issue: 2; 03.03.2016

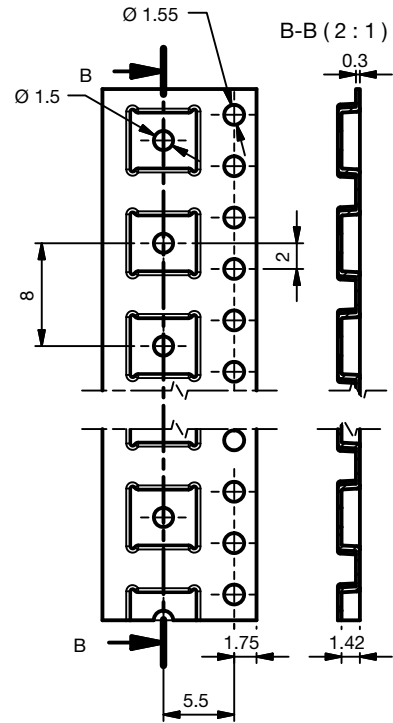
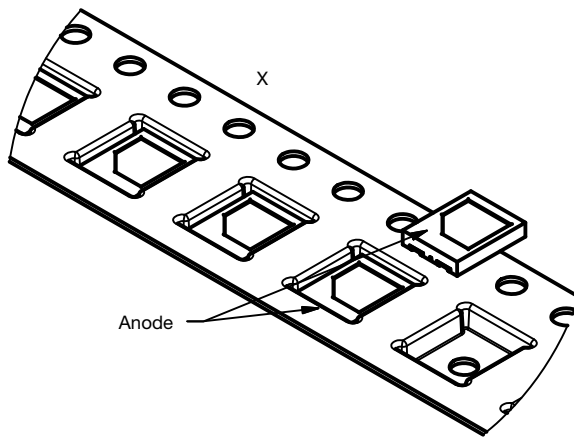
Not indicated tolerances ± 0.1



Technical drawings according to DIN specification



TAPE AND REEL DIMENSIONS in millimeters



Drawing-No.: 9.800-5129.01-4;
Issue: 1; 20.07.2015

SOLDER PROFILE



19841
 Fig. 8 - 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

Time between soldering and removing from MBB must not exceed the time indicated in J-STD-020:
 Moisture sensitivity: Level 4
 Floor life: 72 h
 Conditions: $T_{amb} < 30\text{ }^{\circ}\text{C}$, RH < 60 %

DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or recommended conditions:
 192 h at 40 °C (+ 5 °C), RH < 5 %
 or
 96 h at 60 °C (+ 5 °C), RH < 5 %.



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