Silicon PIN Photodiode

DESCRIPTION
VEMD8080 is a high speed and high sensitive PIN photodiode with enhanced sensitivity for visible light. It is a low profile surface-mount device (SMD) including the chip with a 4.5 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): 4.8 x 2.5 x 0.48
- Radiant sensitive area (in mm²): 4.5
- 0.48 mm low profile package
- Enhanced sensitivity for visible light
- Suitable for visible and near infrared radiation
- Fast response times
- Angle of half sensitivity: \( \varphi = \pm 65^\circ \)
- Floor life: 168 h, MSL 3, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS
- High speed photo detector
- Wearables

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>( I_{rd} ) (( \mu )A)</th>
<th>( \varphi ) (deg)</th>
<th>( \lambda_{\text{0.1}} ) (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEMD8080</td>
<td>28</td>
<td>± 65</td>
<td>350 to 1100</td>
</tr>
</tbody>
</table>

Note
- Test conditions see table “Basic Characteristics”

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>ORDERING CODE</th>
<th>PACKAGING</th>
<th>REMARKS</th>
<th>PACKAGE FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEMD8080</td>
<td>Tape and reel</td>
<td>MOQ: 5000 pcs, 5000 pcs/reel</td>
<td>Top view</td>
</tr>
</tbody>
</table>

Note
- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (\( T_{\text{amb}} = 25 \) °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>Vr</td>
<td>20</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Junction temperature</td>
<td>( T_{J} )</td>
<td>85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>( T_{\text{amb}} )</td>
<td>-40 to +85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>( T_{\text{stg}} )</td>
<td>-40 to +85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>According to reflow solder profile Fig. 8</td>
<td>( T_{sd} )</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance junction-to-ambient</td>
<td>( R_{\text{th,J}} )</td>
<td>350</td>
<td>K/W</td>
<td></td>
</tr>
<tr>
<td>ESD safety HBM</td>
<td>± 2000 V, 1.5 k( \Omega ), 100 pF, 3 pulses</td>
<td>( ESD_{\text{HBM}} )</td>
<td>( \geq 2 )</td>
<td>kV</td>
</tr>
</tbody>
</table>

For technical questions, contact: detectortechsupport@vishay.com

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

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward voltage</td>
<td>I_F = 50 mA</td>
<td>V_F</td>
<td>-</td>
<td>1.2</td>
<td>1.6</td>
<td>V</td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>I_R = 100 μA, E = 0</td>
<td>V_{BR}</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Reverse dark current</td>
<td>V_R = 10 V, E = 0</td>
<td>I_{ro}</td>
<td>-</td>
<td>0.2</td>
<td>10</td>
<td>nA</td>
</tr>
<tr>
<td>Diode capacitance</td>
<td>V_R = 0 V, f = 1 MHz, E = 0</td>
<td>C_D</td>
<td>-</td>
<td>47</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td>V_R = 3 V, f = 1 MHz, E = 0</td>
<td>C_D</td>
<td>-</td>
<td>17</td>
<td>40</td>
<td>pF</td>
</tr>
<tr>
<td>Open circuit voltage</td>
<td>E_e = 1 mW/cm², λ = 950 nm</td>
<td>V_o</td>
<td>-</td>
<td>320</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td>Temperature coefficient of V_o</td>
<td>E_e = 1 mW/cm², λ = 950 nm</td>
<td>T_{K_{V_o}}</td>
<td>-</td>
<td>-3.0</td>
<td>-</td>
<td>mV/K</td>
</tr>
<tr>
<td>Short circuit current</td>
<td>E_e = 1 mW/cm², λ = 950 nm</td>
<td>I_k</td>
<td>-</td>
<td>32</td>
<td>-</td>
<td>μA</td>
</tr>
<tr>
<td>Temperature coefficient of I_k</td>
<td>E_e = 1 mW/cm², λ = 950 nm</td>
<td>T_{K_{I_k}}</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>%/K</td>
</tr>
<tr>
<td>Reverse light current</td>
<td>E_e = 1 mW/cm², λ = 850 nm, V_R = 5 V</td>
<td>I_{ra}</td>
<td>23</td>
<td>28</td>
<td>33</td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td>E_e = 0.25 mW/cm², λ = 525 nm, V_R = 5 V</td>
<td>I_{ra}</td>
<td>3.4</td>
<td>4.4</td>
<td>5.3</td>
<td>μA</td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td>-</td>
<td>ϕ</td>
<td>-</td>
<td>± 65</td>
<td>-</td>
<td>deg</td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td>-</td>
<td>λ_p</td>
<td>-</td>
<td>850</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Range of spectral bandwidth</td>
<td>-</td>
<td>λ_{0,1}</td>
<td>-</td>
<td>350 to 1100</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Rise time</td>
<td>V_R = 10 V, R_L = 1 kΩ, λ = 830 nm</td>
<td>t_r</td>
<td>-</td>
<td>70</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>Fall time</td>
<td>V_R = 10 V, R_L = 1 kΩ, λ = 830 nm</td>
<td>t_f</td>
<td>-</td>
<td>70</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>

**Fig. 1 - Reverse Dark Current vs. Ambient Temperature**

**Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature**
**Fig. 3 - Reverse Light Current vs. Irradiance**

Reverse Light Current (μA) vs. Irradiance (mW/cm²)

- $V_R = 5$ V, $\lambda = 950$ nm

**Fig. 4 - Diode Capacitance vs. Reverse Voltage**

Diode Capacitance (pF) vs. Reverse Voltage (V)

- $f = 1$ MHz, $E = 0$

**Fig. 5 - Relative Spectral Sensitivity vs. Wavelength**

Relative Spectral Sensitivity vs. Wavelength (nm)

- $\lambda$ - Wavelength (nm)

**Fig. 6 - Relative Sensitivity vs. Angular Displacement**

Relative Sensitivity vs. Angular Displacement

- $\phi$ - Angular Displacement (°)
PACKAGE DIMENSIONS in millimeters

Footprint

Not indicated tolerances ± 0.1 mm

Pinning top view

Pinning bottom view

Technical drawings according to DIN specification.

Drawing number: 6.550-5354.01-4
Issue: 1; 20.04.2018

Optical center PD
Pin 1 marking

VEMD8080
www.vishay.com
Vishay Semiconductors

Rev. 1.0, 24-Apr-2018
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TAPE AND REEL DIMENSIONS in millimeters

Non tolerated dimensions ± 0.1 mm
Reel design is representative for different types

Unreel direction
Label posted here
Sensor orientation mark pin 1

Drawing-No.: 9.800-5146.01-4
Issue: 1; 20.04.2018
**DRY PACK**

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 3
- Floor life: 168 h
- Conditions: $T_{amb} < 30 \degree C$, 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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