Silicon PIN Photodiode

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 mm² sensitive area and a daylight blocking filter.

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 mm²): 0.23
- Daylight blocking filter
- AEC-Q101 qualified
- High photo sensitivity
- High radiant sensitivity
- Excellent Is lineararity
- Fast response times
- Angle of half sensitivity: $\phi = \pm 70^\circ$
- Floor life: 72 h, MSL 4, according to J-STD-020
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

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

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>$I_{th}$ (μA)</th>
<th>$\phi$ (deg)</th>
<th>$\lambda_{0.1}$ (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEMD1160X01</td>
<td>1.8</td>
<td>$\pm 70$</td>
<td>700 to 1070</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>VEMD1160X01</td>
<td>Tape and reel</td>
<td>MOQ: 3000 pcs, 3000 pcs/reel</td>
<td>0805 top view</td>
</tr>
</tbody>
</table>

Note
- MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (T_{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></td>
<td>$V_R$</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$T_{amb} \leq 25 ^\circ C$</td>
<td>$P_V$</td>
<td>215</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td></td>
<td>$T_J$</td>
<td>110</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>$T_{amb}$</td>
<td>$T_{op}$</td>
<td>-40 to +110</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>$T_{stg}$</td>
<td></td>
<td>-40 to +110</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>According to reflow solder profile Fig. 6</td>
<td>$T_{sd}$</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance junction / ambient</td>
<td>According to EIA / JESD 51</td>
<td>$R_{thJA}$</td>
<td>270</td>
<td>K/W</td>
</tr>
</tbody>
</table>
BASIC CHARACTERISTICS (T<sub>amb</sub> = 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&lt;sub&gt;F&lt;/sub&gt; = 50 mA</td>
<td>V&lt;sub&gt;F&lt;/sub&gt;</td>
<td>-</td>
<td>0.9</td>
<td>1.1</td>
<td>V</td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>I&lt;sub&gt;R&lt;/sub&gt; = 100 μA, E = 0</td>
<td>V&lt;sub&gt;(BR)&lt;/sub&gt;</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Reverse dark current</td>
<td>V&lt;sub&gt;R&lt;/sub&gt; = 10 V, E = 0</td>
<td>I&lt;sub&gt;ro&lt;/sub&gt;</td>
<td>-</td>
<td>0.01</td>
<td>5</td>
<td>nA</td>
</tr>
<tr>
<td>Diode capacitance</td>
<td>VR = 0 V, f = 1 MHz, E = 0</td>
<td>C&lt;sub&gt;D&lt;/sub&gt;</td>
<td>-</td>
<td>3.8</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td>VR = 3 V, f = 1 MHz, E = 0</td>
<td>C&lt;sub&gt;D&lt;/sub&gt;</td>
<td>-</td>
<td>1.8</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>Open circuit voltage</td>
<td>E&lt;sub&gt;e&lt;/sub&gt; = 1 mW/cm&lt;sup&gt;2&lt;/sup&gt;, λ = 950 nm</td>
<td>V&lt;sub&gt;o&lt;/sub&gt;</td>
<td>-</td>
<td>350</td>
<td>-</td>
<td>mV</td>
</tr>
<tr>
<td>Temperature coefficient of V&lt;sub&gt;o&lt;/sub&gt;</td>
<td>E&lt;sub&gt;e&lt;/sub&gt; = 1 mW/cm&lt;sup&gt;2&lt;/sup&gt;, λ = 950 nm</td>
<td>TK&lt;sub&gt;Vo&lt;/sub&gt;</td>
<td>-</td>
<td>-2.6</td>
<td>-</td>
<td>mV/K</td>
</tr>
<tr>
<td>Short circuit current</td>
<td>E&lt;sub&gt;e&lt;/sub&gt; = 1 mW/cm&lt;sup&gt;2&lt;/sup&gt;, λ = 950 nm</td>
<td>I&lt;sub&gt;k&lt;/sub&gt;</td>
<td>-</td>
<td>1.8</td>
<td>-</td>
<td>μA</td>
</tr>
<tr>
<td>Temperature coefficient of I&lt;sub&gt;k&lt;/sub&gt;</td>
<td>E&lt;sub&gt;e&lt;/sub&gt; = 1 mW/cm&lt;sup&gt;2&lt;/sup&gt;, λ = 835 nm</td>
<td>TK&lt;sub&gt;Ik&lt;/sub&gt;</td>
<td>-</td>
<td>0.1</td>
<td>-</td>
<td>%/K</td>
</tr>
<tr>
<td>Reverse light current</td>
<td>E&lt;sub&gt;e&lt;/sub&gt; = 1 mW/cm&lt;sup&gt;2&lt;/sup&gt;, λ = 950 nm, VR = 5 V</td>
<td>I&lt;sub&gt;ra&lt;/sub&gt;</td>
<td>1.4</td>
<td>1.8</td>
<td>3</td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td>E&lt;sub&gt;e&lt;/sub&gt; = 1 mW/cm&lt;sup&gt;2&lt;/sup&gt;, λ = 890 nm, VR = 5 V</td>
<td>I&lt;sub&gt;ra&lt;/sub&gt;</td>
<td>-</td>
<td>2.6</td>
<td>-</td>
<td>μA</td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td>-</td>
<td>ϕ</td>
<td>± 70</td>
<td>-</td>
<td>deg</td>
<td></td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td>-</td>
<td>λ&lt;sub&gt;p&lt;/sub&gt;</td>
<td>-</td>
<td>840</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Range of spectral bandwidth</td>
<td>-</td>
<td>λ&lt;sub&gt;0.1&lt;/sub&gt;</td>
<td>-</td>
<td>700 to 1070</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Rise time</td>
<td>VR = 5 V, RL = 50 Ω, λ = 820 nm</td>
<td>t&lt;sub&gt;r&lt;/sub&gt;</td>
<td>-</td>
<td>60</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>Fall time</td>
<td>VR = 5 V, RL = 50 Ω, λ = 820 nm</td>
<td>t&lt;sub&gt;f&lt;/sub&gt;</td>
<td>-</td>
<td>80</td>
<td>-</td>
<td>ns</td>
</tr>
</tbody>
</table>

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

![Fig. 1 - Reverse Dark Current vs. Ambient Temperature](image1)

![Fig. 2 - Relative Reverse Light Current vs. Ambient Temperature](image2)
Fig. 3 - Reverse Light Current vs. Irradiance

Fig. 4 - Reverse Light Current vs. Reverse Voltage

Fig. 5 - Diode Capacitance vs. Reverse Voltage

Fig. 6 - Relative Spectral Sensitivity vs. Wavelength

Fig. 7 - Relative Radiant Sensitivity vs. Angular Displacement
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: $T_{amb} < 30 \, ^\circ C$, $RH < 60 \, %$
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 %.
BLISTER TAPE DIMENSIONS in millimeters

Not indicated tolerances ±0.1

Drawing-no.: 9.700-5311.01-4
Issue: 1; 23.02.07

Technical drawings according to DIN 40840 specifications

Cathode
Anode
Reel off direction
Form of the leave open of the wheel is supplier specific.

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

Ø 177.8 max.
8.4 +2.5
8.4 +0.15
Ø 55 min.
14.4 max.
Ø 127.8 max.

ø 13 + 0.5 - 0.2
1.5 min.
Ø 20.2 min.

Z 2:1

technical drawings according to DIN specifications

For technical questions, contact: detectortechsupport@vishay.com
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