Silicon PIN Photodiode

**DESCRIPTION**

TEMD7000X01 is a high speed and high sensitive PIN photodiode. It is a miniature surface mount device (SMD) including the chip with a 0.23 mm² sensitive area detecting visible and near infrared radiation.

**FEATURES**

- Package type: surface mount
- Package form: 0805
- Dimensions (L x W x H in mm): 2 x 1.25 x 0.85
- Radiant sensitive area (in mm²): 0.23
- High photo sensitivity
- High radiant sensitivity
- Suitable for visible and near infrared radiation
- Fast response times
- Angle of half sensitivity: \( \phi = \pm 60° \)
- Floor life: 168 h, MSL 3, according to J-STD-020
- Lead (Pb)-free reflow soldering
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

**APPLICATIONS**

- High speed photo detector

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>( I_{IR} ) (( \mu )A)</th>
<th>( \phi ) (deg)</th>
<th>( \lambda_{o, 1} ) (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMD7000X01</td>
<td>3</td>
<td>( \pm 60 )</td>
<td>350 to 1120</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>ORDERING CODE</th>
<th>PACKAGING</th>
<th>REMARKS</th>
<th>PACKAGE FORM</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMD7000X01</td>
<td>Tape and reel</td>
<td>MOQ: 3000 pcs, 3000 pcs/reel</td>
<td>0805</td>
</tr>
</tbody>
</table>

**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>60</td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>( T_{amb} \leq 25 °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>100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td></td>
<td>( T_{amb} )</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td></td>
<td>( T_{stg} )</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>Acc. reflow solder profile fig. 8</td>
<td>( T_{sd} )</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Thermal resistance junction / ambient</td>
<td>Acc. J-STD-051</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>1</td>
<td></td>
<td></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>60</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>1</td>
<td>3</td>
<td>nA</td>
<td></td>
</tr>
<tr>
<td>Diode capacitance</td>
<td>V&lt;sub&gt;R&lt;/sub&gt; = 0 V, f = 1 MHz, E = 0</td>
<td>C&lt;sub&gt;D&lt;/sub&gt;</td>
<td>4</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td>V&lt;sub&gt;R&lt;/sub&gt; = 5 V, f = 1 MHz, E = 0</td>
<td>C&lt;sub&gt;D&lt;/sub&gt;</td>
<td>1.3</td>
<td></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;e&lt;/sub&gt;</td>
<td>350</td>
<td></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>-2.6</td>
<td></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;lk&lt;/sub&gt;</td>
<td>3</td>
<td></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 = 950 nm</td>
<td>TK&lt;sub&gt;lk&lt;/sub&gt;</td>
<td>0.1</td>
<td></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, V&lt;sub&gt;R&lt;/sub&gt; = 5 V</td>
<td>I&lt;sub&gt;la&lt;/sub&gt;</td>
<td>2.4</td>
<td>3</td>
<td>3.6</td>
<td>µA</td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td></td>
<td>φ</td>
<td>± 60</td>
<td></td>
<td></td>
<td>deg</td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td></td>
<td>λ&lt;sub&gt;p&lt;/sub&gt;</td>
<td>900</td>
<td></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>350 to 1120</td>
<td></td>
<td></td>
<td>nm</td>
</tr>
<tr>
<td>Rise time</td>
<td>V&lt;sub&gt;R&lt;/sub&gt; = 10 V, R&lt;sub&gt;L&lt;/sub&gt; = 1 kΩ, λ = 820 nm</td>
<td>t&lt;sub&gt;r&lt;/sub&gt;</td>
<td>100</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Fall time</td>
<td>V&lt;sub&gt;R&lt;/sub&gt; = 10 V, R&lt;sub&gt;L&lt;/sub&gt; = 1 kΩ, λ = 820 nm</td>
<td>t&lt;sub&gt;f&lt;/sub&gt;</td>
<td>100</td>
<td></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

**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

Fig. 8 - Lead (Pb)-free Reflow Solder Profile acc. 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: 168 h
Conditions: $T_{amb} < 30 \, ^\circ\text{C}$, RH < 60 %
Moisture sensitivity level 3, 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

Anode

Cathode

Not indicated tolerances ±0.1

Recommended solder pad Footprint

Drawing-No.: 6.541-5064.01-4
Issue: 2; 23.02.07
20018
BLISTER TAPE DIMENSIONS in millimeters

21501

0.2±0.05

0.94

0.1±0.01

1.55±0.05

2±0.05

3.5±0.05

1.75

4

4

1.45

Anode

Cathode

Reel off direction

techical drawings according to DIN specifications

Not indicated tolerances ±0.1

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

21501
REEL DIMENSIONS in millimeters

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

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