Silicon PIN Photodiode, RoHS Compliant

DESCRIPTION
TEM1000 series are PIN photodiodes with high speed and high radiant sensitivity in black, surface mount plastic packages with lens and daylight blocking filter. Filter bandwidth is matched with 870 nm to 950 nm IR emitters.

FEATURES
- Package type: surface mount
- Package form: GW, RGW, yoke, axial
- Dimensions (L x W x H in mm): 2.5 x 2 x 2.7
- Radiant sensitive area (in mm²): 0.23
- High radiant sensitivity
- Daylight blocking filter matched with 870 nm to 950 nm emitters
- Fast response times
- Angle of half sensitivity: \( \varphi = \pm 15° \)
- Package matches with IR emitter series TSMF1000
- Floor life: 168 h, MSL 3, acc. J-STD-020
- Compliant to RoHS Directive 2002/95/EC and in accordance with WEEE 2002/96/EC

APPLICATIONS
- High speed detector for infrared radiation
- Infrared remote control and free air data transmissions systems, e.g. in combination with TSFFxxxx series IR emitters

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>( I_{ra} ) (( \mu )A)</th>
<th>( \varphi ) (deg)</th>
<th>( \lambda_{0.5} ) (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMD1000</td>
<td>6.0 to 13.0</td>
<td>± 15</td>
<td>790 to 1050</td>
</tr>
<tr>
<td>TEMD1020</td>
<td>6.0 to 13.0</td>
<td>± 15</td>
<td>790 to 1050</td>
</tr>
<tr>
<td>TEMD1030</td>
<td>6.0 to 13.0</td>
<td>± 15</td>
<td>790 to 1050</td>
</tr>
<tr>
<td>TEMD1040</td>
<td>6.0 to 13.0</td>
<td>± 15</td>
<td>790 to 1050</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>TEMD1000</td>
<td>Tape and reel</td>
<td>MOQ: 1000 pcs, 1000 pcs/reel</td>
<td>Reverse gullwing</td>
</tr>
<tr>
<td>TEMD1020</td>
<td>Tape and reel</td>
<td>MOQ: 1000 pcs, 1000 pcs/reel</td>
<td>Gullwing</td>
</tr>
<tr>
<td>TEMD1030</td>
<td>Tape and reel</td>
<td>MOQ: 1000 pcs, 1000 pcs/reel</td>
<td>Yoke</td>
</tr>
<tr>
<td>TEMD1040</td>
<td>Bulk</td>
<td>MOQ: 1000 pcs, 1000 pcs/bulk</td>
<td>Axial leads</td>
</tr>
</tbody>
</table>

Note
- MOQ: minimum order quantity

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

<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 \degree C )</td>
<td>( P_V )</td>
<td>75</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 +85</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>( t \leq 5 \text{ s} )</td>
<td>( T_{sd} )</td>
<td>&lt; 260</td>
<td>°C</td>
</tr>
</tbody>
</table>

For technical questions, contact: detectortechsupport@vishay.com

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### BASIC CHARACTERISTICS (T_{\text{amb}} = 25 \, ^{\circ}\text{C}, \text{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 , \text{mA} )</td>
<td>( V_F )</td>
<td>1</td>
<td>1.3</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>( I_R = 100 , \mu\text{A}, E = 0 )</td>
<td>( V_{\text{BR}} )</td>
<td>60</td>
<td></td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Reverse dark current</td>
<td>( V_R = 10 , \text{V}, E = 0 )</td>
<td>( I_{\text{ro}} )</td>
<td>1</td>
<td>10</td>
<td>nA</td>
<td></td>
</tr>
<tr>
<td>Diode capacitance</td>
<td>( V_R = 5 , \text{V}, f = 1 , \text{MHz}, E = 0 )</td>
<td>( C_D )</td>
<td>1.8</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Reverse light current</td>
<td>( E_e = 1 , \text{mW/cm}^2, \lambda = 870 , \text{nm}, V_R = 5 , \text{V} )</td>
<td>( I_{\text{ra}} )</td>
<td>6.0</td>
<td>10</td>
<td>13.0</td>
<td>( \mu\text{A} )</td>
</tr>
<tr>
<td></td>
<td>( E_e = 1 , \text{mW/cm}^2, \lambda = 950 , \text{nm}, V_R = 5 , \text{V} )</td>
<td>( I_{\text{ra}} )</td>
<td>12</td>
<td></td>
<td></td>
<td>( \mu\text{A} )</td>
</tr>
<tr>
<td>Temperature coefficient of ( I_{\text{ra}} )</td>
<td>( V_R = 5 , \text{V}, \lambda = 870 , \text{nm} )</td>
<td>( T_{\text{K\text{ra}}} )</td>
<td>0.2</td>
<td></td>
<td>%/K</td>
<td></td>
</tr>
<tr>
<td>Absolute spectral sensitivity</td>
<td>( V_R = 5 , \text{V}, \lambda = 870 , \text{nm} )</td>
<td>( s(\lambda) )</td>
<td>0.60</td>
<td></td>
<td>A/W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( V_R = 5 , \text{V}, \lambda = 950 , \text{nm} )</td>
<td>( s(\lambda) )</td>
<td>0.55</td>
<td></td>
<td>A/W</td>
<td></td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td></td>
<td>( \varphi )</td>
<td>( \pm 15 )</td>
<td></td>
<td>deg</td>
<td></td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td></td>
<td>( \lambda_p )</td>
<td>940</td>
<td></td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>Range of spectral bandwidth</td>
<td></td>
<td>( \lambda_{0.5} )</td>
<td>790 to 1050</td>
<td></td>
<td>nm</td>
<td></td>
</tr>
<tr>
<td>Rise time</td>
<td>( V_R = 10 , \text{V}, R_L = 50 , \Omega, \lambda = 820 , \text{nm} )</td>
<td>( t_r )</td>
<td>4</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Fall time</td>
<td>( V_R = 10 , \text{V}, R_L = 50 , \Omega, \lambda = 820 , \text{nm} )</td>
<td>( t_f )</td>
<td>4</td>
<td></td>
<td>ns</td>
<td></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 - Diode Capacitance vs. Reverse Voltage**

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Rev. 2.4, 09-Aug-11

Document Number: 81564
**PRECAUTIONS FOR USE**

1. **Over-current-proof**
   Customer must apply resistors for protection, otherwise slight voltage shift will cause big current change (burn out will happen).

2. **Storage**
   - Storage temperature and rel. humidity conditions are: 5 °C to 35 °C, R.H. 60 %.
   - Floor life must not exceed 168 h, acc. to JEDEC level 3, J-STD-020.
   Once the package is opened, the products should be used within a week. Otherwise, they should be kept in a damp proof box with desiccant.
   Considering tape life, we suggest to use products within one year from production date.
   - If opened more than one week in an atmosphere 5 °C to 35 °C, R.H. 60 %, devices should be treated at 60 °C ± 5 °C for 15 h.
   - If humidity indicator in the package shows pink color (normal blue), then devices should be treated with the same conditions as 2.3.

**REFLOW SOLDER PROFILE**

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

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

**Fig. 7 - Lead Tin (SnPb) Reflow Solder Profile**

**Fig. 8 - Lead (Pb)-Free Reflow Solder Profile acc. J-STD-020**
**PACKAGE DIMENSIONS** in millimeters: **TEMD1000**

![TEMD1000 Package Dimensions Diagram]

**PACKAGE DIMENSIONS** in millimeters: **TEMD1020**

![TEMD1020 Package Dimensions Diagram]
PACKAGE DIMENSIONS in millimeters: TEMD1030

Drawing-No.: 6.544-5329.01-4
Issue: 4: 08.05.03

Solder pad proposal

TEMD1040

Drawing-No.: 6.544-5339.02-4
Issue: 3: 02.04.03
REEL DIMENSIONS in millimeters

Leader and trailer tape:

Parts mounted
Empty leader (400 mm, min.)

Direction of pulling out
Empty trailer (200 mm, min.)

Drawing-No.: 9.800-5080.01-4
Issue: 3; 11.06.08
18033

TAPING DIMENSIONS in millimeters: TEMD1000

Drawing-No.: 9.700-5268.01-4
Issue: 2; 22.11.02

Quantity per reel: 1000 pcs or 5000 pcs

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TAPING DIMENSIONS in millimeters: TEMD1020

Drawing-No: 9.700-5269.01-4
Issue: 2; 22.11.02

Quantity per reel: 1000 pcs or 5000 pcs

TAPING DIMENSIONS in millimeters: TEMD1030

Drawing-No: 9.700-5270.01-4
Issue: 2; 22.11.02

Quantity per reel: 1000 pcs or 5000 pcs
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