Silicon PIN Photodiode, RoHS-Compliant

DESCRIPTION
TEMD1000 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: $\phi = \pm 15^\circ$
- Package matches with IR emitter series TSML1000
- 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 detector for infrared radiation
- Infrared remote control and free air data transmission systems, e.g. in combination with TSMLxxxx series IR emitters

PRODUCT SUMMARY

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>$I_r$ (μA)</th>
<th>$\phi$ (°)</th>
<th>$\lambda_{0.5}$ (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEMD1000</td>
<td>10</td>
<td>$\pm 15$</td>
<td>790 to 1050</td>
</tr>
<tr>
<td>TEMD1020</td>
<td>10</td>
<td>$\pm 15$</td>
<td>790 to 1050</td>
</tr>
<tr>
<td>TEMD1030</td>
<td>10</td>
<td>$\pm 15$</td>
<td>790 to 1050</td>
</tr>
<tr>
<td>TEMD1040</td>
<td>10</td>
<td>$\pm 15$</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 ($T_{amb} = 25^\circ$ 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>$T_{amb} \leq 25^\circ$ C</td>
<td>$P_V$</td>
<td>75</td>
<td>mW</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>$T_J$</td>
<td></td>
<td>100</td>
<td>°C</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>$T_{amb}$</td>
<td>$T_{amb}$</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>$T_{stg}$</td>
<td>$T_{stg}$</td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperature</td>
<td>$t \leq 5$ 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 (\(T_{\text{amb}} = 25^\circ\text{C}\), 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>1</td>
<td>1.3</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>(I_R = 100) (\mu) A, (E = 0)</td>
<td>(V_{BR})</td>
<td>60</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_{RD})</td>
<td>-</td>
<td>1</td>
<td>10</td>
<td>nA</td>
</tr>
<tr>
<td>Diode capacitance</td>
<td>(V_R = 5) V, (f = 1) MHz, (E = 0)</td>
<td>(C_D)</td>
<td>-</td>
<td>1.8</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>Reverse light current</td>
<td>(E_e = 1) mW/cm(^2), (\lambda = 870) nm, (V_R = 5) V</td>
<td>(I_{RL})</td>
<td>6.0</td>
<td>10</td>
<td>13.0</td>
<td>(\mu) A</td>
</tr>
<tr>
<td></td>
<td>(E_e = 1) mW/cm(^2), (\lambda = 950) nm, (V_R = 5) V</td>
<td>(I_{RL})</td>
<td>-</td>
<td>12</td>
<td>-</td>
<td>(\mu) A</td>
</tr>
<tr>
<td>Temperature coefficient of (I_{RL})</td>
<td>(V_R = 5) V, (\lambda = 870) nm, (E = 0)</td>
<td>(T_{K_{I_{RL}}})</td>
<td>-</td>
<td>0.2</td>
<td>-</td>
<td>%/K</td>
</tr>
<tr>
<td>Absolute spectral sensitivity</td>
<td>(V_R = 5) V, (\lambda = 870) nm</td>
<td>(s(\lambda))</td>
<td>-</td>
<td>0.60</td>
<td>-</td>
<td>A/W</td>
</tr>
<tr>
<td></td>
<td>(V_R = 5) V, (\lambda = 950) nm</td>
<td>(s(\lambda))</td>
<td>-</td>
<td>0.55</td>
<td>-</td>
<td>A/W</td>
</tr>
<tr>
<td>Angle of half sensitivity</td>
<td></td>
<td>(\varphi)</td>
<td>-</td>
<td>±15</td>
<td>-</td>
<td>°</td>
</tr>
<tr>
<td>Wavelength of peak sensitivity</td>
<td></td>
<td>(\lambda_p)</td>
<td>-</td>
<td>940</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Range of spectral bandwidth</td>
<td></td>
<td>(\lambda_{0.5})</td>
<td>-</td>
<td>790 to 1050</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Rise time</td>
<td>(V_R = 10) V, (R_L = 50) (\Omega), (\lambda = 820) nm</td>
<td>(t_r)</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>ns</td>
</tr>
<tr>
<td>Fall time</td>
<td>(V_R = 10) V, (R_L = 50) (\Omega), (\lambda = 820) nm</td>
<td>(t_f)</td>
<td>-</td>
<td>4</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 - Diode Capacitance vs. Reverse Voltage
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, according 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

- Pre-heating
  180 °C to 200 °C
- 1 °C/s to 5 °C/s
- 60 s max.
- above 220 °C

- 1 °C/s to 5 °C/s
- 22566
- 260 °C max.
- 10 s max.

- 60 s to 120 s
- 5 s

- + 5 °C/s
- - 5 °C/s

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

According to J-STD-020
PACKAGE DIMENSIONS in millimeters: TEMD1030

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

PACKAGE DIMENSIONS in millimeters: TEMD1040

Drawing-No.: 6.544-5339.02-4
Issue: 02.04.03

technical drawings according to DIN specifications
**REEL DIMENSIONS** in millimeters

![Reel Dimensions Diagram]

**TAPING DIMENSIONS** in millimeters: **TEMD1000**

![Taping Dimensions Diagram]

**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

Top tape

- Push pin through hole

Quantity per reel: 1000 pcs or 5000 pcs

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**Taping Dimensions** in millimeters: TEMD1030

Top tape

- Push pin through hole

Quantity per reel: 1000 pcs or 5000 pcs
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