Si PIN photodiode

S7478

Large photosensitive area (5 × 5 mm) photosensor with high reliability

The S7478 is a PIN photodiode having a large photosensitive area (5 × 5 mm) and surface mount flat package with leads.

Features

- Surface mount plastic package: 9 × 9.6 × 1.5 mm
- Large photosensitive area: 5 × 5 mm
- Operating temperature range: -25 to +85 °C
  Storage temperature range: -40 to +100 °C
- High sensitivity: 0.72 A/W (λ=960 nm)

Applications

- Automobile sensor
  (Vehicle and traffic information system, laser radar, front window frost sensor, rain sensor)
- FSO (free space optics)

Structure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photosensitive area</td>
<td>5 × 5</td>
<td>mm</td>
</tr>
<tr>
<td>Package</td>
<td>Plastic</td>
<td></td>
</tr>
<tr>
<td>Window material</td>
<td>Silicone resin</td>
<td></td>
</tr>
</tbody>
</table>

Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Specification</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>Vr max.</td>
<td>Ta=25 °C</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td></td>
<td>-25 to +85 °C</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td></td>
<td>-40 to +100 °C</td>
<td>°C</td>
</tr>
<tr>
<td>Reflow soldering conditions</td>
<td>Tsol*1</td>
<td></td>
<td>Peak temperature 240 °C max., two times (see page 4)</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

*1: JEDEC level 5a

Electrical and optical characteristics (Ta=25 °C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral response range</td>
<td>λ</td>
<td></td>
<td>-</td>
<td>320 to 1100</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Peak sensitivity wavelength</td>
<td>λp</td>
<td></td>
<td>-</td>
<td>960</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Photosensitivity</td>
<td>S</td>
<td>λ=λp</td>
<td>0.6</td>
<td>0.72</td>
<td>-</td>
<td>A/W</td>
</tr>
<tr>
<td>Short circuit current</td>
<td>Isc</td>
<td>100 lx, 2856 K</td>
<td>26</td>
<td>-</td>
<td>-</td>
<td>μA</td>
</tr>
<tr>
<td>Dark current</td>
<td>Id</td>
<td>Vr=10 V</td>
<td>-</td>
<td>0.4</td>
<td>5</td>
<td>nA</td>
</tr>
<tr>
<td>Temperature coefficient of Io</td>
<td>Tcid</td>
<td></td>
<td>-</td>
<td>1.14</td>
<td>-</td>
<td>times/°C</td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>fc</td>
<td>Vr=10 V, RL=50 Ω-3 dB, λ=780 nm</td>
<td>10</td>
<td>20</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>Ct</td>
<td>Vr=10 V, f=1 MHz</td>
<td>-</td>
<td>40</td>
<td>60</td>
<td>pF</td>
</tr>
</tbody>
</table>
**Spectral response**

- Wavelength (nm)
  - 200, 400, 600, 800, 1000, 1200
- Photosensitivity (A/W)
  - 0.01, 0.1, 1, 10, 100

**Dark current vs. reverse voltage**

- Reverse voltage (V)
  - 0.01, 0.1, 1, 10, 100
- Dark current
  - 10 pA, 100 pA, 1 nA

**Terminal capacitance vs. reverse voltage**

- Reverse voltage (V)
  - 0.1, 1, 10, 100
- Terminal capacitance
  - 1 pF, 10 pF, 100 pF, 1 nF

**Dimensional outline (unit: mm)**

- Photosensitive surface
  - 5 x 5
- Photosensitive area
  - 9.0 ± 0.3

Tolerance unless otherwise noted: ±0.1
Chip position accuracy with respect to the package dimensions marked *:
X, Y ≤ 0.2, 0 ± 2°
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urdy land pattern (unit: mm)

![Recommended land pattern diagram]

**Standard packing specifications**

- **Reel (conforms to JEITA ET-7200)**

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Tape width</th>
<th>Material</th>
<th>Electrostatic characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>254 mm</td>
<td>24 mm</td>
<td>PS</td>
<td>Conductive</td>
</tr>
</tbody>
</table>

- **Enbossed tape (unit: mm, material: PS, conductive)**

![Enbossed tape diagram]

- **Packing quantity**
  1000 pcs/reel

- **Packing type**
  Reel and desiccant in moisture-proof packaging (vacuum-sealed)
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- Measured example of temperature profile with hot-air reflow oven for product testing

![Graph showing temperature profile with hot-air reflow oven](image)

- This product supports lead-free soldering. After unpacking, store it in an environment at a temperature of 30 °C or less and a humidity of 60% or less, and perform soldering within 24 hours.
- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. Before actual reflow soldering, check for any problems by testing out the reflow soldering methods in advance.

- Related information

## Precautions
- Disclaimer
- Metal, ceramic, Plastic Package products
- Surface mount type products

Information described in this material is current as of July 2016.

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