Si PIN photodiodes

S5980, S5981, S5870

Multi-element photodiodes for surface mounting

Features

- Large photosensitive area
  S5980: 5 × 5 mm
  S5981: 10 × 10 mm
  S5870: 10 × 10 mm
- Chip carrier package suitable for surface mounting
  Facilitates automated surface mounting by solder reflow
- Thin package: 1.26 mm
- Photosensitivity: 0.72 A/W (λ=960 nm)

Applications

- Laser beam axis alignment
- Level meters
- Pointing devices, etc.

Structure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>S5980</th>
<th>S5981</th>
<th>S5870</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window material</td>
<td>-</td>
<td>-</td>
<td>Resin coating</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gap between elements</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>-</td>
<td>μm</td>
</tr>
<tr>
<td>Photosensitive area</td>
<td>A</td>
<td>□5.0/4 elements</td>
<td>□10.0/4 elements</td>
<td>□10.0/2 elements</td>
<td>mm</td>
</tr>
</tbody>
</table>

Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>S5980</th>
<th>S5981</th>
<th>S5870</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>Vr, max</td>
<td>30</td>
<td>30</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>-40 to +100</td>
<td>-40 to +100</td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-40 to +125</td>
<td>-40 to +125</td>
<td>-40 to +125</td>
<td>°C</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.

Electrical and optical characteristics (Ta=25 °C, per one element)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>S5980</th>
<th>S5981</th>
<th>S5870</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral response range</td>
<td>A</td>
<td></td>
<td>320 to 1100</td>
<td>-</td>
<td>320 to 1100</td>
<td>-</td>
</tr>
<tr>
<td>Peak sensitivity wavelength</td>
<td>λp</td>
<td></td>
<td>960</td>
<td>960</td>
<td>960</td>
<td>-</td>
</tr>
<tr>
<td>Photosensitivity</td>
<td>S</td>
<td>λ=λp</td>
<td>0.72</td>
<td>0.72</td>
<td>0.72</td>
<td>-</td>
</tr>
<tr>
<td>Dark current</td>
<td>Id</td>
<td>VR=10 V</td>
<td>0.3</td>
<td>2</td>
<td>0.6</td>
<td>4</td>
</tr>
<tr>
<td>Temperature coefficient of Id</td>
<td>TCID</td>
<td>VR=10 V</td>
<td>1.15</td>
<td>25</td>
<td>1.15</td>
<td>20</td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>fc</td>
<td>VR=10 V, RL=50 Ω, -3 dB</td>
<td>25</td>
<td>-</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>Ct</td>
<td>VR=10 V, f=1 MHz</td>
<td>10</td>
<td>-</td>
<td>35</td>
<td>-</td>
</tr>
<tr>
<td>Noise equivalent power</td>
<td>NEP</td>
<td>VR=10 V, λ=λp</td>
<td>1.4 × 10^-14</td>
<td>-</td>
<td>1.9 × 10^-14</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: S5980: For mass production, order unit is 100 pieces.
S5981, S5870: For mass production, order unit is 50 pieces.
Precautions

- The light input window of this product uses soft silicone resin. Avoid touching the window to keep it from grime and damage that can decrease sensitivity. External force applied to the resin surface may deform or cut off the wires, so do not touch the window to prevent such troubles.
- Use rosin flux when soldering, to prevent the terminal lead corrosion. Reflow oven temperature should be at 260 °C maximum for 5 seconds maximum time under the conditions that no moisture absorption occurs. Reflow soldering conditions differ depending on the type of PCB board and reflow oven. Carefully check these conditions before use.
- Avoid unpacking until you actually use this product to prevent the terminals from oxidation and dust deposits or the coated resin from absorbing moisture. When the product is stored for 3 months while not unpacked or 24 hours have elapsed after unpacking, perform baking in nitrogen atmosphere at 150 °C for 3 to 5 hours or at 120 °C for 12 to 15 hours before use.

Spectral response

Photosensitivity vs. Wavelength (nm)

Photosensitivity temperature characteristics

Temperature coefficient (%/°C) vs. Wavelength (nm)

Dark current vs. reverse voltage

Dark current (pA) vs. Reverse voltage (V)

Terminal capacitance vs. reverse voltage

Terminal capacitance (pF) vs. Reverse voltage (V)
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### Dimensional outlines (unit: mm)

**S5980**

- Photosensitive area: (4 ×) R0.3
- Photosensitive surface: 8.8 ± 0.2
- Index mark: 0.6 ± 0.2
- Silicone resin: 1.26 ± 0.15
- Dimensional outlines (unit: mm):
  - A: 1.5
  - B: 1.27

**S5981**

- Photosensitive area: (4 ×) R0.3
- Photosensitive surface: 14.5 ± 0.2
- Details of photosensitive area: 0.03
- Silicone resin: 1.26 ± 0.15
- Dimensional outlines (unit: mm):
  - A: 1.5
  - B: 1.27

**S5870**

- Photosensitive area: (4 ×) R0.3
- Photosensitive surface: 14.5 ± 0.2
- Details of photosensitive area: 0.03
- Silicone resin: 1.26 ± 0.15
- Dimensional outlines (unit: mm):
  - A: 1.5
  - B: 1.27

*Burrs shall protrude no more than 0.3 mm on any side of package.*

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**KMPDA0036EC**

**KMPDA037EB**

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**Recommended land pattern (unit: mm)**

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<thead>
<tr>
<th>S5980</th>
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<tr>
<td><img src="image" alt="Recommended land pattern (unit: mm)" /></td>
<td></td>
</tr>
</tbody>
</table>

1. Solder all terminals.
2. Do not make the land area larger than necessary.
3. It is preferable that the land sizes be about equal.
4. Make land width \( x \) about the same as the terminal width.
5. Make land length \( y \) at least 1 mm longer than the terminal length, protruding outside the package.

**Related information**

www.hamamatsu.com/sp/ssd/doc_en.html

- Precautions
- Disclaimer
- Surface mount type products

- Technical information
  - Si photodiodes / Application circuit examples

Information described in this material is current as of May 2018. Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.

**Precautions**

- Using bandgap references and large currents may cause damage to the photodiode.
- Raising the operating temperature or frequency of the photodiode may cause damage.

**Disclaimer**

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