Si PIN photodiodes

High-speed photodiodes

(S5973 series: 1 GHz)

www.hamamatsu.com

The S5971, S5972 and S5973 series are high-speed Si PIN photodiodes designed for visible to near infrared light detection. These photodiodes provide wideband characteristics at a low bias, making them suitable for optical communications and other high-speed photometry. The S5973 series includes a mini-lens type (S5973-01) that can be efficiently coupled to an optical fiber and a violet sensitivity enhanced type (S5973-02) ideal for violet laser detection.

Features

- High-speed response
  - S5971: 100 MHz (VR=10 V)
  - S5972: 500 MHz (VR=10 V)
  - S5973 series: 1 GHz (VR=3.3 V)
- Low price
- High sensitivity
  - S5973-02: 0.3 A/W, QE=91 % (λ=410 nm)
- High reliability

Applications

- Optical fiber communications
- High-speed photometry
- Violet laser detection (S5973-02)

Structure / Absolute maximum ratings

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Package</th>
<th>Photosensitive area size</th>
<th>Effective photosensitive area</th>
<th>Absolute maximum ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(mm)</td>
<td>(mm)</td>
<td>(mm²)</td>
<td>Reverse voltage VR Max. (V)</td>
</tr>
<tr>
<td>S5971</td>
<td>TO-18</td>
<td>1.2</td>
<td>1.1</td>
<td>20</td>
</tr>
<tr>
<td>S5972</td>
<td></td>
<td>0.8</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>S5973</td>
<td></td>
<td>0.4</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>S5973-01</td>
<td></td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S5973-02</td>
<td></td>
<td>0.3</td>
<td></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.

Electrical and optical characteristics

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Spectral response range λ (nm)</th>
<th>Peak sensitivity wavelength λp (nm)</th>
<th>Photosensitivity S (A/W)</th>
<th>Short circuit current Isc (100 lx)</th>
<th>Dark current Id (µA)</th>
<th>Temp. coefficient of Id/IdT (times/°C)</th>
<th>Cutoff frequency fc (GHz)</th>
<th>Terminal capacitance Cf (pF)</th>
<th>Noise equivalent power NEP (W/Hz½)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5971</td>
<td>320 to 1060</td>
<td>920</td>
<td>0.64</td>
<td>0.44</td>
<td>0.55</td>
<td>0.55</td>
<td>0.07×3</td>
<td>1.0×3</td>
<td>7.4×10⁻¹⁵</td>
</tr>
<tr>
<td>S5972</td>
<td>320 to 1000</td>
<td>800</td>
<td>0.57</td>
<td>0.4</td>
<td>0.55</td>
<td>0.42</td>
<td>0.01×3</td>
<td>0.5×3</td>
<td>3.1×10⁻¹⁵</td>
</tr>
<tr>
<td>S5973</td>
<td>320 to 1000</td>
<td>760</td>
<td>0.52</td>
<td>0.48</td>
<td>0.51</td>
<td>0.42</td>
<td>0.001×4</td>
<td>0.1×4</td>
<td>1.1×10⁻¹⁵</td>
</tr>
<tr>
<td>S5973-01</td>
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<td></td>
<td></td>
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<tr>
<td>S5973-02</td>
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</tr>
</tbody>
</table>

*1: Window material K: borosilicate glass, L: lens type borosilicate glass
*2: λ=410 nm
*3: VR=10 V
*4: VR=3.3 V

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**Spectral response**

- Photosensitivity vs. Wavelength (nm)
- (Typ. Ta=25 °C)

**Photosensitivity temperature characteristics**

- Temperature coefficient (%/°C)

**Frequency response**

- Relative output (dB) vs. Frequency
- (Typ. Ta=25 °C, λ=830 nm, R_L=50 Ω)

**Cutoff frequency vs. reverse voltage**

- Cutoff frequency vs. Reverse voltage (V)
- (Typ. Ta=25 °C, λ=830 nm, R_L=50 Ω)
Si PIN photodiodes S5971, S5972, S5973 series

**Dark current vs. reverse voltage**

![Graph showing dark current vs. reverse voltage for S5971, S5972, S5973 series.](KPINB0162EA)

**Terminal capacitance vs. reverse voltage**

![Graph showing terminal capacitance vs. reverse voltage for S5971, S5972, S5973 series.](KPINB0162EA)

**Fiber coupling characteristics (S5973-01)**

- **X, Y direction**

![Graph showing fiber-coupled sensitivity for X, Y direction.](KPINB0161EA)

**Z direction**

![Graph showing fiber-coupled sensitivity for Z direction.](KPINB0161EA)
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- Dimensional outlines (unit: mm)

1. S5971, S5972, S5973

2. S5973-01

3. S5973-02
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Related information
www.hamamatsu.com/sp/ssd/doc_en.html

- Precautions
- Disclaimer
- Metal, ceramic, plastic package products

Technical information
- Si photodiode / Application circuit example

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