Si PIN photodiodes

High-speed photodiodes
(S5973 series: 1 GHz)

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>Dimensional outline/Window material</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></td>
<td>(mm)</td>
<td>(mm²)</td>
<td></td>
</tr>
<tr>
<td>S5971</td>
<td>(1)/K</td>
<td>TO-18</td>
<td>φ1.2</td>
<td>1.1</td>
<td>20</td>
</tr>
<tr>
<td>S5972</td>
<td></td>
<td></td>
<td>φ0.8</td>
<td>0.5</td>
<td>50</td>
</tr>
<tr>
<td>S5973</td>
<td></td>
<td></td>
<td>φ0.4</td>
<td>0.12</td>
<td>-40 to +100</td>
</tr>
<tr>
<td>S5973-01</td>
<td>(2)/L</td>
<td></td>
<td></td>
<td></td>
<td>-55 to +125</td>
</tr>
<tr>
<td>S5973-02</td>
<td>(3)/K</td>
<td></td>
<td></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 (nm)</th>
<th>Peak sensitivity wavelength (nm)</th>
<th>Photosensitivity S(A/W)</th>
<th>Short circuit current Isc 100/μA</th>
<th>Dark current Io</th>
<th>Temp. coefficient of Io T/co</th>
<th>Cutoff frequency fc f=1 MHz (GHz)</th>
<th>Temporal capacitance Ct f=1 MHz (pF)</th>
<th>Noise equivalent power NEP VR=10 V VR=3.3 V W/Hz^1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5971</td>
<td>320 to 1000</td>
<td>900</td>
<td>0.64</td>
<td>0.6</td>
<td>1.0</td>
<td>0.07⁺³</td>
<td>1.15</td>
<td>0.5⁺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>0.55</td>
<td>0.42</td>
<td>0.01⁺³</td>
<td>0.5⁻³</td>
<td>1⁺⁴</td>
<td>3.1 × 10⁻¹⁵</td>
</tr>
<tr>
<td>S5973</td>
<td>760</td>
<td>600</td>
<td>0.52</td>
<td>0.51</td>
<td>0.42</td>
<td>0.00¹⁻⁴</td>
<td>1⁺⁴</td>
<td>1.6⁺⁴</td>
<td>1.1 × 10⁻¹⁵⁺³</td>
</tr>
<tr>
<td>S5973-01</td>
<td>0.4</td>
<td>0.42</td>
<td>0.37</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.9 × 10⁻¹⁵⁺²</td>
</tr>
<tr>
<td>S5973-02</td>
<td>0.3²</td>
<td>0.42</td>
<td>0.37</td>
<td>0.07</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</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
Si PIN photodiodes | S5971, S5972, S5973 series

Spectral response

![Spectral response graph](Typ. Ta=25 °C)

Photosensitivity temperature characteristics

![Photosensitivity temperature characteristics graph](Typ.)

Frequency response

![Frequency response graph](Typ. Ta=25 °C, λ=830 nm, RL=50 Ω)

Cutoff frequency vs. reverse voltage

![Cutoff frequency vs. reverse voltage graph](Typ. Ta=25 °C, λ=830 nm, RL=50 Ω)
Si PIN photodiodes

**S5971, S5972, S5973 series**

### Dark current vs. reverse voltage

(Typ. Ta=25 °C)

![Graph](image1)

- Dark current vs. reverse voltage
- Terminal capacitance vs. reverse voltage

### Terminal capacitance vs. reverse voltage

(Typ. Ta=25 °C, f=1 MHz)

![Graph](image2)

### Fiber coupling characteristics (S5973-01)

**X, Y direction**

![Graph](image3)

- Fiber-coupled sensitivity (A/W)
- Distance between lens and fiber end Z (mm)

**Z direction**

![Graph](image4)

- Fiber-coupled sensitivity (A/W)
- Light source = 780 nm LD
- Optical fiber (core diameter: 50 µm)
- Shift from lens center X, Y (mm)
- Distance between lens and fiber end Z (mm)
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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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