Si PIN photodiodes

Large area, high-speed Si PIN photodiodes

The S3071, S3072, S3399 and S3883 are Si PIN photodiodes having a relatively large photosensitive area from $\phi 1.5$ to $\phi 5.0$ mm yet they offer excellent frequency response from 40 to 300 MHz. These photodiodes are suitable for FSO (free space optics) and high-speed pulsed light detection.

### Features

- Photosensitive area size
  - S3071: $\phi 5.0$ mm
  - S3072: $\phi 3.0$ mm
  - S3399: $\phi 3.0$ mm
  - S3883: $\phi 1.5$ mm
- Cutoff frequency
  - S3071: 40 MHz (VR=24 V)
  - S3072: 45 MHz (VR=24 V)
  - S3399: 100 MHz (VR=10 V)
  - S3883: 300 MHz (VR=20 V)
- High reliability: TO-5/8 metal package

### Applications

- FSO
- High-speed pulsed light detection

### Structure / Absolute maximum ratings

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Dimensional outline/ Window material*1</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></td>
<td></td>
<td>(mm)</td>
<td>(mm²)</td>
<td></td>
</tr>
<tr>
<td>S3071</td>
<td>(1)/K</td>
<td>TO-8</td>
<td>$\phi 5.0$</td>
<td>19.6</td>
<td>Reverse voltage VR max.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>S3072</td>
<td>(2)/K</td>
<td>TO-5</td>
<td>$\phi 3.0$</td>
<td>7.0</td>
<td>Power dissipation Pd</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>S3399</td>
<td>(3)/K</td>
<td></td>
<td>$\phi 3.0$</td>
<td>7.0</td>
<td>Operating temperature Topr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-40 to +100</td>
</tr>
<tr>
<td>S3883</td>
<td>(4)/K</td>
<td></td>
<td>$\phi 1.5$</td>
<td>1.7</td>
<td>Storage temperature Tstg</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-55 to +125</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: Window material K=borosilicate glass

### Electrical and optical characteristics (Typ. Ta=25 °C, unless otherwise noted)

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Spectral response range $\lambda$ (nm)</th>
<th>Peak sensitivity wavelength $\lambda_p$ (nm)</th>
<th>Photosensitivity $S$ (A/W)</th>
<th>Short circuit current $I_{sc}$ 100 $I_r$ (µA)</th>
<th>Dark current $I_D$ (nA)</th>
<th>Temp. coefficient of $I_D$ $T_C$ (times/°C)</th>
<th>Cutoff frequency $f_c$ RL=50 $\Omega$ (MHz)</th>
<th>Terminal capacitance $C_t$ $f=1$ MHz (pF)</th>
<th>Noize equivalent power $NEP$ $\lambda=\lambda_p$ (W/Hz$^{1/2}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3071</td>
<td>320 to 1060</td>
<td>920</td>
<td>0.6</td>
<td>0.5² $^{3}$ $^{4}$ 10² $^{4}$</td>
<td>17</td>
<td>1.15</td>
<td>40² $^{2}$ $^{4}$ 18² $^{2}$</td>
<td>2.1 $\times 10$-12² $^{2}$</td>
<td></td>
</tr>
<tr>
<td>S3072</td>
<td>320 to 1000</td>
<td>840</td>
<td>0.6</td>
<td>0.47 $^{4}$ 0.54 $^{4}$ 0.56 $^{4}$</td>
<td>6.5</td>
<td>1.12</td>
<td>45² $^{2}$ $^{4}$ 7² $^{2}$</td>
<td>1.6 $\times 10$-12² $^{2}$</td>
<td></td>
</tr>
<tr>
<td>S3399</td>
<td>320 to 1000</td>
<td>840</td>
<td>0.6</td>
<td>0.45 $^{4}$ 0.58 $^{4}$ 0.6 $^{4}$</td>
<td>5.6</td>
<td>1.12</td>
<td>100² $^{3}$ $^{3}$ 20² $^{3}$</td>
<td>9.4 $\times 10$-15² $^{3}$</td>
<td></td>
</tr>
<tr>
<td>S3883</td>
<td>320 to 1000</td>
<td>840</td>
<td>0.6</td>
<td>0.5² $^{4}$ 0.54 $^{4}$ 0.56 $^{4}$</td>
<td>1.4</td>
<td>1.12</td>
<td>300° $^{4}$ $^{4}$ 6° $^{4}$</td>
<td>6.7 $\times 10$-15² $^{4}$</td>
<td></td>
</tr>
</tbody>
</table>

*2: VR=24 V
*3: VR=10 V
*4: VR=20 V

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### Spectral response

(Typ. Ta=25 °C)

**Photosensitivity temperature characteristics**

(Typ.)

### Dark current vs. reverse voltage

(Typ. Ta=25 °C)

**Terminal capacitance vs. reverse voltage**

(Typ. Ta=25 °C, f=1 MHz)
### Dimensional outlines (unit: mm)

#### (1) S3071

- **Photosensitive area**: Ø5.0
- **Distance from photosensitive area center to cap center**: -0.3 ≤ X ≤ +0.3, -0.3 ≤ Y ≤ +0.3
- **The glass window may extend a maximum of 0.15 mm above the upper surface of the cap.**

#### (2) S3072

- **Photosensitive area**: Ø3.0
- **Distance from photosensitive area center to cap center**: -0.4 ≤ X ≤ +0.4, -0.4 ≤ Y ≤ +0.4
- **The glass window may extend a maximum of 0.2 mm above the upper surface of the cap.**
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(3) S3399

(4) S3883

Photosensitive area

Glass

Photosensitive surface

Distance from photosensitive area center to cap center

-0.3 ≤ X ≤ +0.3
-0.3 ≤ Y ≤ +0.3

The glass window may extend a maximum of 0.15 mm above the upper surface of the cap.

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.

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