Si PIN photodiodes

S3590 series

Large area Si PIN photodiodes

Features
- Sensitivity suitable for BGO and CsI(Tl) scintillators: S3590-08/-09
- Sensitivity suitable for blue scintillator (LSO, GSO, etc.): S3590-18/-19
- Bare chip type (unsealed): S3590-09/-19
- High quantum efficiency: S3590-09 (\(\lambda=540\) nm)
  S3590-19 (\(\lambda=400\) nm)
- Low capacitance
- High-speed response
- High stability
- Good energy resolution

Applications
- Scintillation detection
- Hodoscopes
- TOF counters
- Radiation detection
- X-ray detection

Structure / Absolute maximum ratings

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Window material</th>
<th>Photosensitive area</th>
<th>Depletion layer thickness</th>
<th>Reverse voltage VR max (V)</th>
<th>Power dissipation P (mW)</th>
<th>Operating temperature Topr (°C)</th>
<th>Storage temperature Tstg (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3590-08</td>
<td>Epoxy resin</td>
<td>10 × 10</td>
<td>0.3</td>
<td>100</td>
<td>100</td>
<td>-20 to +60</td>
<td>-20 to +80</td>
</tr>
<tr>
<td>S3590-09</td>
<td>Unsealed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3590-18</td>
<td>Epoxy resin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S3590-19</td>
<td>Unsealed</td>
<td></td>
<td></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 (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</th>
<th>Short circuit current (I_{sc}) ((\mu)A)</th>
<th>Dark current (I_0) (\lambda=540) nm (A/W)</th>
<th>Temp. coefficient of (I_0) (\lambda=540) nm (times/°C)</th>
<th>Cutoff Frequency (f_c) (MHz)</th>
<th>Terminal capacitance (C_t) (pF)</th>
<th>NEP (W/Hz(^{1/2}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3590-08</td>
<td>340 to 1100</td>
<td>960</td>
<td>0.66</td>
<td>0.20</td>
<td>0.30</td>
<td>0.36</td>
<td>100</td>
<td>2</td>
<td>1.12</td>
</tr>
<tr>
<td>S3590-09</td>
<td></td>
<td></td>
<td>0.58</td>
<td>0.33</td>
<td>0.37</td>
<td>0.4</td>
<td>86</td>
<td>4</td>
<td>7.6 × 10(^{-14})</td>
</tr>
<tr>
<td>S3590-18</td>
<td></td>
<td></td>
<td>0.65</td>
<td>0.28</td>
<td>0.34</td>
<td>0.38</td>
<td>100</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>S3590-19</td>
<td></td>
<td></td>
<td>0.58</td>
<td>0.33</td>
<td>0.37</td>
<td>0.4</td>
<td>86</td>
<td>4</td>
<td>3.8 × 10(^{-14})</td>
</tr>
</tbody>
</table>

www.hamamatsu.com
**Spectral response**

**S3590-08**

![Graph for S3590-08](image1)

**S3590-09 (Bare chip type)**

![Graph for S3590-09](image2)

**S3590-18**

![Graph for S3590-18](image3)

**S3590-19 (Bare chip type)**

![Graph for S3590-19](image4)
**Photosensitivity temperature characteristics**

![Graph showing photosensitivity temperature characteristics.](image)

**Terminal capacitance vs. reverse voltage**

![Graph showing terminal capacitance vs. reverse voltage.](image)

**Dark current vs. reverse voltage**

![Graph showing dark current vs. reverse voltage.](image)
### Dimensional outlines (unit: mm)

<table>
<thead>
<tr>
<th>S3590-08/-18</th>
<th>S3590-09/-19</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Dimensional outline S3590-08/-18" /></td>
<td><img src="image2" alt="Dimensional outline S3590-09/-19" /></td>
</tr>
</tbody>
</table>

The coating resin may extend a maximum of 0.1 mm beyond the upper surface of the package.

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### Related information


#### Precautions
- Disclaimer
- Metal, ceramic, plastic package products
- Surface mount type products

#### Technical information
- Si photodiode / Application circuit examples
For the visible to near infrared region, the S12452 is available, which incorporates the S3590-08 chip into a surface mount type package (window material: silicone resin).