The S12158-01CT is a Si PIN photodiode for visible to near infrared range and is compatible with lead-free solder reflow processes. The small and thin leadless package allows reducing the mount area on a printed circuit board.

### Features
- COB type, small and thin leadless package
- Applicable to lead-free solder reflow
- Photosensitive area: 2.77 × 2.77 mm
- High sensitivity: 0.7 A/W (λ=960 nm)

### Applications
- FSO (free space optics)
- Optical switches
- Laser radar, etc.

### Structure
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photosensitive area</td>
<td>2.77 × 2.77</td>
<td>mm</td>
</tr>
<tr>
<td>Package</td>
<td>Glass epoxy</td>
<td>-</td>
</tr>
<tr>
<td>Seal material</td>
<td>Epoxy resin</td>
<td>-</td>
</tr>
</tbody>
</table>

### Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>Vr max</td>
<td>Ta=25 °C</td>
<td>20</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td></td>
<td>-25 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td></td>
<td>-40 to +100</td>
<td>°C</td>
</tr>
<tr>
<td>Reflow soldering conditions*1</td>
<td>Tsol</td>
<td>Peak temperature 260 °C, 2 times (see page 4)</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.

*1: JEDEC level 4

### Electrical and optical characteristics (Ta=25 °C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral response range</td>
<td>λ</td>
<td></td>
<td>-</td>
<td>320 to 1100</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Peak sensitivity wavelength</td>
<td>λp</td>
<td></td>
<td>-</td>
<td>960</td>
<td>-</td>
<td>nm</td>
</tr>
<tr>
<td>Photosensitivity</td>
<td>S</td>
<td>λ=λp</td>
<td>0.6</td>
<td>0.7</td>
<td>-</td>
<td>A/W</td>
</tr>
<tr>
<td>Dark current</td>
<td>Id</td>
<td>Vr=12 V</td>
<td>-</td>
<td>0.1</td>
<td>10</td>
<td>nA</td>
</tr>
<tr>
<td>Temperature coefficient of Id</td>
<td>TCD</td>
<td>Vr=12 V</td>
<td>-</td>
<td>1.15</td>
<td>-</td>
<td>times/°C</td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>fc</td>
<td>Vr=12 V, RL=50 Ω, -3 dB</td>
<td>10</td>
<td>25</td>
<td>-</td>
<td>MHz</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>Ct</td>
<td>Vr=12 V, f=1 MHz</td>
<td>-</td>
<td>15</td>
<td>30</td>
<td>pF</td>
</tr>
</tbody>
</table>
Si PIN photodiode

**Spectral response**

(Typ. $T_a=25^\circ C$)

![Spectral response graph](image1)

- Photosensitivity (A/W)
- Wavelength (nm)
- QE=100%

**Dark current vs. reverse voltage**

(Typ. $T_a=25^\circ C$)

![Dark current vs. reverse voltage graph](image2)

- Dark current (fA - mA)
- Reverse voltage (V)

**Terminal capacitance vs. reverse voltage**

(Typ. $T_a=25^\circ C$)

![Terminal capacitance vs. reverse voltage graph](image3)

- Terminal capacitance (pF - nF)
- Reverse voltage (V)

**Dark current vs. ambient temperature**

(Typ. $T_a=25^\circ C$, $V_R=12$ V)

![Dark current vs. ambient temperature graph](image4)

- Dark current (pA - mA)
- Ambient temperature (°C)

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**Directivity**

(Typ. Ta=25 °C, light source: tungsten lamp)

![Directional sensitivity diagram](image)

**Dimensional outline (unit: mm)**

- Photosensitive area: (2.77 × 2.77)
- Index mark

![Dimensional outline diagram](image)

- Anode (common)
- Cathode (common)

Tolerance unless otherwise noted: ±0.1, ±2°

Chip position accuracy with respect to package dimensions marked

X, Y≤±0.2, θ≤±2°

Standard packing state: reel (2000 pcs/reel)

**Product orientation on reel**

![Product orientation diagram](image)
Si PIN photodiode  |  S12158-01CT

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

![Land Pattern Diagram]

**Recommended temperature profile of reflow soldering (typical example)**

![Temperature Profile Diagram]

- After unpacking, store this device in an environment at a temperature of 5 to 30 °C and a humidity below 70%, and perform reflow soldering on this device within 72 hours.

- The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. Before actual cleaning, check for any problems by testing out the cleaning methods in advance. A sudden temperature rise and cooling may be the cause of trouble, so make sure that the temperature change is within 4 °C per second.

Information described in this material is current as of October, 2012. Product specifications are subject to change without prior notice due to improvements or other reasons. Before assembly into final products, please contact us for the delivery specification sheet to check the latest information.

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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