Si PIN photodiodes

S10783   S10784

High-speed detectors with plastic package

The S10783 and S10784 are high-speed APC (auto power control) detectors developed for monitoring laser diodes with a peak wavelength of 660 nm or 780 nm. The S10783 is designed for surface mount and the S10784 is a plastic package with φ3 mm lens.

**Features**

- **High-speed response**
  - 300 MHz typ. (λ=650 nm, VR=2.5 V)
  - 250 MHz typ. (λ=780 nm, VR=2.5 V)
- **High sensitivity**
  - S10783: 0.46 A/W typ. (λ=650 nm)
  - S10784: 0.45 A/W typ. (λ=650 nm)

**Applications**

- Laser diode monitors of optical disk unit (high-speed APC)
- Sensors for red laser diode

**Structure**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>S10783</th>
<th>S10784</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photosensitive area size</td>
<td>-</td>
<td>φ0.8</td>
<td>φ3.0</td>
<td>mm</td>
</tr>
<tr>
<td>Effective photosensitive area</td>
<td>-</td>
<td>0.5</td>
<td>7.0</td>
<td>mm²</td>
</tr>
<tr>
<td>Package</td>
<td>-</td>
<td>Surface mount type plastic</td>
<td>Plastic with lens</td>
<td>-</td>
</tr>
</tbody>
</table>

**Absolute maximum ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>S10783</th>
<th>S10784</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse voltage</td>
<td>Vr max</td>
<td>20</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>P</td>
<td>50</td>
<td></td>
<td>mW</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>-25 to +85</td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-40 to +100</td>
<td></td>
<td>°C</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.

This product does not support lead-free soldering. For details on reflow soldering conditions for surface-mount components, please contact our sales office.

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Electrical and optical characteristics (Ta=25 °C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>S10783</th>
<th>S10784</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral response range</td>
<td>λ</td>
<td></td>
<td>330 to 1040</td>
<td>340 to 1040</td>
<td>nm</td>
</tr>
<tr>
<td>Peak sensitivity wavelength</td>
<td>λp</td>
<td></td>
<td>-</td>
<td>760</td>
<td>-</td>
</tr>
<tr>
<td>Photosensitivity</td>
<td>S</td>
<td>λ=660 nm</td>
<td>0.41</td>
<td>0.46</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>λ=780 nm</td>
<td>0.47</td>
<td>0.52</td>
<td>-</td>
</tr>
<tr>
<td>Dark current</td>
<td>Id</td>
<td>VR=2.5 V</td>
<td>-</td>
<td>0.01</td>
<td>1.0</td>
</tr>
<tr>
<td>Temperature coefficient of Id</td>
<td>Tcid</td>
<td></td>
<td>-</td>
<td>1.15</td>
<td>-</td>
</tr>
<tr>
<td>Cutoff frequency</td>
<td>fc</td>
<td>VR=2.5 V</td>
<td>150</td>
<td>300</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RL=50 Ω</td>
<td>125</td>
<td>250</td>
<td>-</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>Ct</td>
<td>VR=2.5 V, f=1 MHz</td>
<td>-</td>
<td>4.5</td>
<td>9</td>
</tr>
<tr>
<td>Noise equivalent power</td>
<td>NEP</td>
<td>VR=2.5 V</td>
<td>3.5 x 10^-15</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Spectral response

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

Linearity

![Linearity graph](Typ. Ta=25 °C, Vh=0 V, 2856 K)
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Dark current vs. reverse voltage

Photosensitivity temperature characteristics

Dark current vs. ambient temperature

Terminal capacitance vs. reverse voltage
- **Directivity**

<table>
<thead>
<tr>
<th>S10783</th>
<th>S10784</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Relative sensitivity" /></td>
<td><img src="image2" alt="Relative sensitivity" /></td>
</tr>
</tbody>
</table>

- **Frequency characteristics**

  \[
  \lambda = 660 \text{ nm} \\
  \lambda = 780 \text{ nm}
  \]

  | ![Relative output (dB)](image3) | ![Relative output (dB)](image4) |

(Typ. Ta=25 °C, V=2.5 V, RL=50 Ω)
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**Dimensional outlines (unit: mm)**

### S10783

- Photosensitive area (Ø 0.8)
- Dimensions:
  - 4.1 ± 0.2 mm (including burr)
  - 0.6 mm
  - 4.0 mm
  - 15 ± 0.4 mm
  - 2.54 mm

### S10784

- Dimensions:
  - 4.2 max. (including burr)
  - 0.7 ± 0.3 mm (including burr)
  - 10°
  - 5°
  - 0.1 ± 0.1 mm

**Tolerance unless otherwise noted:** ±0.1

- Position accuracy of photosensitive area center with respect to the package dimensions marked *
  - X, Y ≤ ±0.2
  - θ ≤ ±2°

- Lead surface finish: silver plating
- Standard packing: stick (50 pcs/stick)
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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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