Si photodiode

Photodiode with a filter for monochromatic light (220, 254, 275 nm) detection

The S12742 series uses an interference filter for its window and is sensitive only to monochromatic light. The series consists of three types with different center sensitively wavelengths: 220 nm, 254 nm, and 275 nm. The spectral response half width (FWHM) is extremely narrow at 10 nm (typ.), allowing accurate photometry with little stray light. The S12742 series can be customized to support other peak sensitivity wavelengths such as 340 nm and 560 nm.

**Features**

- With monochromatic light filter
- Narrow spectral response half width (FWHM): 10 nm typ.

**Applications**

- Water quality and atmosphere analysis
- UV monitors (mercury lamp, etc.)

**Structure**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>TO-5</td>
<td>-</td>
</tr>
<tr>
<td>Photosensitive area</td>
<td>3.61 × 3.61 mm</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>5 V</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>T_opr</td>
<td>No dew condensation*1</td>
<td>-20 to +60 °C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>T_stg</td>
<td>No dew condensation*1</td>
<td>-55 to +80 °C</td>
<td></td>
</tr>
</tbody>
</table>

*1: When there is a temperature difference between a product and the surrounding area in a high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability. 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 (Ta=25 °C)**

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Center wavelength CWL (nm)</th>
<th>Spectral response half width FWHM (nm)</th>
<th>Photosensitivity S (mA/W)</th>
<th>Dark current Id (at VR=10 mV) Max. (pA)</th>
<th>Dark current temperature coefficient TCD (times/°C)</th>
<th>Rise time tr (at VR=0 V, RL=1 kΩ) (µs)</th>
<th>Terminal capacitance (at VR=10 mV, f=10 kHz) (pF)</th>
<th>Shunt resistance Rsh (at VR=10 mV) (GΩ)</th>
<th>Noise equivalent power NEP (at VR=0 V, λ=λp) (W/Hz^{1/2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>S12742-220</td>
<td>216 220 224</td>
<td>6.5 10 13.5</td>
<td>3.8 6</td>
<td>25</td>
<td>1.12</td>
<td>1</td>
<td>500</td>
<td>0.4 5</td>
<td>3.3 × 10⁻¹³ 9.1 × 10⁻¹⁴ 2.0 × 10⁻¹³</td>
</tr>
<tr>
<td>S12742-254</td>
<td>252 254 256</td>
<td>8 10 12</td>
<td>12 18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S12742-275</td>
<td>271 275 279</td>
<td>6.5 10 13.5</td>
<td>6 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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**Spectral response**

![Spectral response diagram]

**Dark current vs. reverse voltage**

![Dark current vs. reverse voltage diagram]

**Terminal capacitance vs. reverse voltage**

![Terminal capacitance vs. reverse voltage diagram]
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Dimensional outline (unit: mm)

Photosensitive area: 3.61 x 3.61

Lead (20): 9.64 ± 0.2

ϕ0.45

ϕ5.08 ± 0.2

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 0.2 mm above the upper surface of the cap.
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**Precautions against UV light exposure**

- When UV light irradiation is applied, the product characteristics may degrade. Such examples include degradation of the product’s UV sensitivity and increase in dark current. This phenomenon varies depending on the irradiation level, irradiation intensity, operating time, and operating environment and also varies depending on the product model. Before employing the product, we recommend that you check the tolerance under the ultraviolet light environment that the product will be used in.
- Exposure to UV light may cause the characteristics to degrade due to gas released from the resin bonding the product’s component materials. As such, we recommend that you avoid applying UV light directly on the resin and apply it only on the inside of the photosensitive area by using an aperture or the like.

**Related information**

www.hamamatsu.com/sp/ssa/doc_en.html

- Precautions
- Disclaimer
- Metal, ceramic, plastic package products

**Technical information**

- Si photodiode / Application circuit examples

Information described in this material is current as of June 2020. Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

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