Si APD array

S8550-02

4 × 8 element APD array with low noise and enhanced short-wavelength sensitivity

The S8550-02 is an APD (avalanche photodiode) array designed for short wavelength detection, featuring low noise and low terminal capacitance. The S8550-02 also offers uniform gain and small crosstalk between each element.

Features

- High sensitivity and low noise in short wavelength region
- Low terminal capacitance
- Optimized for blue light detection
- Uniform gain and low crosstalk variation between each element
- Nonmagnetic

Applications

- Low-light-level photometry in the visible range
- Detector systems combined with scintillator

Structure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photosensitive area (per 1 element)</td>
<td>1.6 × 1.6</td>
</tr>
<tr>
<td>Element pitch</td>
<td>2.3</td>
</tr>
<tr>
<td>Number of elements</td>
<td>32</td>
</tr>
<tr>
<td>Package</td>
<td>Ceramic, nonmagnetic</td>
</tr>
<tr>
<td>Window material</td>
<td>Epoxy resin</td>
</tr>
</tbody>
</table>

Absolute maximum ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>Topr</td>
<td>-20 to +60</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-20 to +80</td>
<td>°C</td>
</tr>
<tr>
<td>Reverse current</td>
<td>Irmx</td>
<td>200</td>
<td>μA</td>
</tr>
<tr>
<td>Forward current</td>
<td>Ifmax</td>
<td>10</td>
<td>mA</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 (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>320</td>
<td>1000</td>
<td></td>
<td>nm</td>
</tr>
<tr>
<td>Peak sensitivity wavelength</td>
<td>λp</td>
<td>M=50</td>
<td>600</td>
<td></td>
<td></td>
<td>nm</td>
</tr>
<tr>
<td>Quantum efficiency</td>
<td>QE</td>
<td>λ=420 nm</td>
<td>70</td>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Breakdown voltage</td>
<td>VBR</td>
<td></td>
<td>400</td>
<td>500</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Dark current</td>
<td>I0</td>
<td>Per 1 element, M=50</td>
<td>1</td>
<td>10</td>
<td></td>
<td>nA</td>
</tr>
<tr>
<td>Terminal capacitance</td>
<td>Ct</td>
<td>Per 1 element, M=50, f=10 kHz</td>
<td>9</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td>Gain</td>
<td>M</td>
<td></td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gain variation</td>
<td>-</td>
<td>M=50</td>
<td>-</td>
<td>±15</td>
<td></td>
<td>%</td>
</tr>
<tr>
<td>Temperature coefficient of I0</td>
<td>TcI0</td>
<td>M=50</td>
<td>1.1</td>
<td></td>
<td></td>
<td>times/°C</td>
</tr>
<tr>
<td>Rise time</td>
<td>tr</td>
<td></td>
<td>1.5</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>Temperature coefficient of VBR</td>
<td>-</td>
<td></td>
<td>0.78</td>
<td></td>
<td></td>
<td>V/°C</td>
</tr>
<tr>
<td>Excess noise figure</td>
<td>x</td>
<td>λ=420 nm</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Quantum efficiency vs. wavelength**

(Typ. Ta=25 °C)

**Gain vs. reverse voltage**

(Typ. Ta=25 °C, λ=420 nm)

**Dark current vs. reverse voltage**

(Typ. Ta=25 °C, per 1 element)

**Terminal capacitance vs. reverse voltage**

(Typ. Ta=25 °C, per 1 element)
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**S8550-02**

### Crosstalk

**(S8550-02, element gap: 0.7 mm, typical example)**

![Crosstalk Graph](image)

### Uniformity of gain

**(Average gain = 50)**

![Uniformity Graph](image)

### Dimensional outline (unit: mm)

![Dimensional Outline](image)

### Photosensitive area

1.6 x 1.6 (anode)

### Photosensitive surface

Array 1

Array 2

Index mark

### Pin no. | Element no.
---|---
1a | Cathode 1
3a | B1
5a | C2
7a | D2
9a | E2
11a | G1
13a | H1
2b | A2
4b | C1

### Element no.

- D1
- 3d
- C3
- 1f
- A4
- 8b
- F1
- G2
- B2
- J1
- A1
- 3c
- B2
- 6e
- D4
- 8e
- E4
- 12e

**Cathode 1:** cathode of array 1

**Cathode 2:** cathode of array 2

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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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