InSb photoconductive detectors

P6606 series

Thermoelectrically cooled detectors capable of long-term measurements

Features
- Thermodlectric cooling ensures high speed and high sensitivity up to 6.5 \( \mu \)m.
- Photoconductive element that changes electrical resistance by input of IR radiation
- Easy-to-use detector/preamp modules are also available.

Applications
- Environment measurements (gas analysis, etc.)
- Radiation thermometers (5 \( \mu \)m band)
- FTIR
- IR laser detection

Related products (sold separately)
- Heatsink for one/two-stage TE-cooled type A3179-01
- Heatsink for three-stage TE-cooled type A3179-04
- Temperature controller C1103-05 (-75 to -25 \( ^\circ \)C)
- C1103-07 (-30 to +20 \( ^\circ \)C)
- Preamp C5185-02
- Infrared detector module with preamp P4631-03 (P6606-310)

Specifications / Absolute maximum ratings

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Dimensional outline/Window material*1</th>
<th>Package</th>
<th>Cooling</th>
<th>Photosensitive area (mm)</th>
<th>Absolute maximum ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Incident light level (mW)</td>
</tr>
<tr>
<td>P6606-110</td>
<td>1/S</td>
<td>TO-8</td>
<td>One-stage TE-cooled</td>
<td>1 x 1</td>
<td>400</td>
</tr>
<tr>
<td>P6606-210</td>
<td>1/S</td>
<td>TO-8</td>
<td>Two-stage TE-cooled</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>P6606-305</td>
<td>2/S</td>
<td>TO-3</td>
<td>Three-stage TE-cooled</td>
<td>0.5 x 0.5</td>
<td>10</td>
</tr>
<tr>
<td>P6606-310</td>
<td>2/S</td>
<td>TO-3</td>
<td>Three-stage TE-cooled</td>
<td>1 x 1</td>
<td>10</td>
</tr>
<tr>
<td>P6606-320</td>
<td>2/S</td>
<td>TO-3</td>
<td>Three-stage TE-cooled</td>
<td>2 x 2</td>
<td>10</td>
</tr>
</tbody>
</table>

*1: Window material S=Sapphire glass
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. unless otherwise noted)

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Measurement condition Element temperature ( T ) ((^\circ C))</th>
<th>Cutoff wavelength ( \lambda_c ) ((\mu m))</th>
<th>Peak sensitivity wavelength ( \lambda_p ) ((\mu m))</th>
<th>Photosensitivity ( S ) ( \lambda = \lambda_p )</th>
<th>( D^* ) ( (500, 1200, 1) )</th>
<th>( D^* ) ( (\lambda_p, 1200, 1) )</th>
<th>Rise time ( t_r ) ((0 \text{ to } 63%))</th>
<th>Dark resistance ( R_d ) ((\Omega))</th>
<th>Thermistor resistance ( R_T = 25 , ^\circ \text{C} ) ((\Omega))</th>
</tr>
</thead>
<tbody>
<tr>
<td>P6606-110</td>
<td>-10</td>
<td>6.7</td>
<td>10</td>
<td>7 x 10^3</td>
<td>2 x 10^6</td>
<td>1 x 10^9</td>
<td>0.4</td>
<td>20</td>
<td>1.3</td>
</tr>
<tr>
<td>P6606-210</td>
<td>-30</td>
<td>5.5</td>
<td>6.5</td>
<td>1.5 x 10^4</td>
<td>2 x 10^6</td>
<td>1 x 10^10</td>
<td>150</td>
<td>25</td>
<td>80</td>
</tr>
<tr>
<td>P6606-305</td>
<td>-60</td>
<td>6.3</td>
<td>2500</td>
<td>1 x 10^6</td>
<td>5 x 10^6</td>
<td>1 x 10^10</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>P6606-310</td>
<td>-60</td>
<td>6.3</td>
<td>650</td>
<td>1 x 10^6</td>
<td>2 x 10^6</td>
<td>1 x 10^10</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>P6606-320</td>
<td>-60</td>
<td>6.3</td>
<td>150</td>
<td>5 x 10^6</td>
<td>1 x 10^6</td>
<td>5 x 10^9</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

*2: Photosensitivity changes with the bias current. The values in the above table are measured with the optimum bias current.
InSb photoconductive detectors  |  P6606 series

**Spectral response**

- **D* vs. element temperature (P6606-310)**

**S/N vs. bias current (P6606-310)**

- Bias current must be in the range where D* is constant.

**S/N vs. chopping frequency**

- Increasing the chopping frequency reduces the 1/f noise and results in an S/N improvement. The S/N can also be improved by narrowing the noise bandwidth using a lock-in amplifier.
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**Linearity**

(Typ. Ta=25 °C, fully illuminated)

**Dark resistance, rise time vs. element temperature**

(Typ. Ta=25 °C)

**Thermistor temperature characteristic**

(Typ.)

**Cooling characteristics of TE-cooler**

[Typ. Ta=25 °C, thermal resistance of heatsink=3 °C/W (one and two-stage TE-cooler), 1.2 °C/W (three-stage TE-cooler)]
Current vs. voltage of TE-cooler

Voltage (V) vs. Current (A) graph showing different types of TE-cooled detectors:
- One-stage TE-cooled type
- Two-stage TE-cooled type
- Three-stage TE-cooled type

Typ. Ta=25 °C, thermal resistance of heatsink=1 °C/W (one and two-stage TE-cooler), 1.2 °C/W (three-stage TE-cooler)

Measurement circuit:
- Black body 500 K
- Chopper 1200 Hz
- Band-pass filter
- RMS meter
- Detector

fo=1200 Hz, f=120 Hz, Incident energy 2.64 µW/cm²
Information described in this material is current as of July, 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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