InAs photovoltaic detectors have high sensitivity in the infrared region around 3 µm as with PbS photoconductive detectors, and also feature low noise, high speed and high reliability. P10090 series is a new family of InAs photovoltaic detectors that deliver even lower noise than our conventional products (P8079 series). Various types are available, including non-cooled type, thermoelectrically cooled type (P10090 series), and liquid nitrogen cooled type (P7163) that delivers high performance.

**Features**

- Low noise
- High detectivity (D*)
- High reliability
- Available in multi-element arrays (custom product)

**Applications**

- Gas analysis
- Laser detection
- Infrared spectrophotometry
- Radiation thermometer

**Options (sold separately)**

- Heatsink for one/two-stage TE-cooled type A3179-01
- Temperature controller C1103-04
- Infrared detector module with preamp C12492-210
- Amplifiers for InAs photovoltaic detector (P10090 series: C4159-06, P7163: C4159-05)

### Structure/Absolute maximum ratings

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Dimensional outline/Window material</th>
<th>Package</th>
<th>Cooling</th>
<th>Nitrogen hold time (h)</th>
<th>Photosensitive area (mm)</th>
<th>Absolute maximum ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>P10090-01</td>
<td>Ø/S</td>
<td>TO-5</td>
<td>Non-cooled</td>
<td>-</td>
<td>ø1</td>
<td>-</td>
</tr>
<tr>
<td>P10090-11</td>
<td>Ø/S</td>
<td>TO-8</td>
<td>One-stage TE-cooled</td>
<td>-</td>
<td>ø1</td>
<td>1.5</td>
</tr>
<tr>
<td>P10090-21</td>
<td>Ø/S</td>
<td>TO-8</td>
<td>Two-stage TE-cooled</td>
<td>-</td>
<td>ø1</td>
<td>1.0</td>
</tr>
<tr>
<td>P7163</td>
<td>Ø/S</td>
<td>Metal dewer</td>
<td>LN2</td>
<td>12</td>
<td>ø1</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: S=Sapphire glass
*2: At the time of shipment
### Electrical and optical characteristics (Typ. unless otherwise noted)

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Measurement condition</th>
<th>Peak sensitivity wavelength λp (µm)</th>
<th>Cutoff wavelength λc (µm)</th>
<th>Photo sensitivity S λ=λp (A/W)</th>
<th>Shunt resistance Rsh (Ω)</th>
<th>D* (λp, 600, 1) (cm² Hz¹/²/W)</th>
<th>NEP λ=λp (W/Hz¹/²)</th>
<th>Rise time tr (µs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P10090-01</td>
<td>25</td>
<td>3.35</td>
<td>3.65</td>
<td>1.0</td>
<td>40</td>
<td>3.0 × 10⁸</td>
<td>4.5 × 10⁹</td>
<td>1.5 × 10⁻¹¹</td>
</tr>
<tr>
<td>P10090-11</td>
<td>-10</td>
<td>3.30</td>
<td>3.55</td>
<td>1.2</td>
<td>250</td>
<td>1.0 × 10¹⁰</td>
<td>1.6 × 10¹⁰</td>
<td>5.3 × 10⁻¹²</td>
</tr>
<tr>
<td>P10090-21</td>
<td>-30</td>
<td>3.25</td>
<td>3.45</td>
<td>1.3</td>
<td>1000</td>
<td>2.0 × 10¹⁰</td>
<td>3.2 × 10¹⁰</td>
<td>2.8 × 10⁻¹²</td>
</tr>
<tr>
<td>P7163</td>
<td>-196</td>
<td>3.00</td>
<td>3.1</td>
<td>1.3</td>
<td>1 × 10¹⁰</td>
<td>3.5 × 10⁻¹¹ x³</td>
<td>6.0 × 10⁻¹¹ x³</td>
<td>1.5 × 10⁻¹³</td>
</tr>
</tbody>
</table>

*3: D* (λp, 1200, 1)

### Spectral response (D*)

- **P10090-01 (Td=25 °C)**
- **P10090-11 (Td=-10 °C)**
- **P10090-21 (Td=-30 °C)**
- **P7163 (Td=-196 °C)**

### Spectral response

- **P10090-01 (Td=25 °C)**
- **P10090-11 (Td=-10 °C)**
- **P10090-21 (Td=-30 °C)**
InAs photovoltaic detectors  

**Dark current vs. reverse voltage**

![Graph showing dark current vs. reverse voltage](Typ.)

**Shunt resistance vs. element temperature (P10090 series)**

![Graph showing shunt resistance vs. element temperature](Typ.)

**Linearity**

![Graph showing linearity](Typ. Ta=25 °C, λ=1.3 µm)

**Sensitivity uniformity**

![Graph showing sensitivity uniformity](Typ. λ=1.55 µm)
InAs photovoltaic detectors

- **Current vs. voltage of TE-cooled type**

  (Typ. $T_a=25 \, ^\circ C$, Thermal resistance of heatsink=3 °C/W)

- **Cooling characteristics of TE-cooled type**

  (Typ. $T_a=25 \, ^\circ C$, Thermal resistance of heat sink=3 °C/W)

- **Thermistor temperature characteristic**

  (Typ.)

- **Thermal characteristics of TE-cooled type**

  (Typ. $T_a=25 \, ^\circ C$, Thermal resistance of heat sink=3 °C/W)
InAs photovoltaic detectors
P10090 series, P7163

Related information
www.hamamatsu.com/sp/ssp/doc_en.html

- Precautions
  - Notice
  - Metal, Ceramic, Plastic products
- Technical information
  - Infrared detector / technical information

Information described in this material is current as of May 2018.
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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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