PbS near-infrared detector
Single-Pixel double encapsulated in TO package

Features
• Double encapsulation (thin-film and TO package)
• High durability for rugged operation
• Very high sensitivity
• Room temperature operation
• Sapphire window

Applications
• Flame monitoring
• Flame and spark detection
• Gas detection and analysis
• Spectroscopy
• Temperature measurement
• Moisture measurement

Electrical and optical characteristics

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Active area [mm x mm]</th>
<th>Peak responsivity S [V/W]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Typ.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Min.</td>
</tr>
<tr>
<td>PbSO05005TO5</td>
<td>0.5 x 0.5</td>
<td>16 \cdot 10^5</td>
</tr>
<tr>
<td>PbSO10010TO5</td>
<td>1 x 1</td>
<td>8 \cdot 10^5</td>
</tr>
<tr>
<td>PbSO20020TO5</td>
<td>2 x 2</td>
<td>4 \cdot 10^5</td>
</tr>
<tr>
<td>PbSO30030TO5</td>
<td>3 x 3</td>
<td>3 \cdot 10^5</td>
</tr>
<tr>
<td>PbSO60060TO8</td>
<td>6 x 6</td>
<td>1.4 \cdot 10^5</td>
</tr>
<tr>
<td>PbSO10050TO5*</td>
<td>1 x 5</td>
<td>3.5 \cdot 10^5</td>
</tr>
</tbody>
</table>

* Dark resistance $R_D$ [MΩ] = 0.05 - 1

• Measured with 1550 nm LED, incident power 16 µW/cm²
• Measured in a voltage divider circuit with 50 V/mm
• Photo responsivity and detectivity are measured with constant load resistance ($R_L = 1$ MΩ) and calculated for matched resistance

<table>
<thead>
<tr>
<th>Element temperature [°C]</th>
<th>Peak wavelength $\lambda_P$ [µm]</th>
<th>20% cut-off wavelength $\lambda_C$ [µm]</th>
<th>Peak D* (620 Hz, 1 Hz) [cm-Hz⁰.⁵/W]</th>
<th>Time constant [µs]</th>
<th>Dark resistance $R_D$ [MΩ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>2.7</td>
<td>2.9</td>
<td>1.1 \cdot 10^{11}</td>
<td>0.8 \cdot 10^{11}</td>
<td>200</td>
</tr>
</tbody>
</table>
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Typical spectral response

![Typical Spectral Response](image1)

Typical frequency response

![Typical Frequency Response](image2)

Typical resistance change over temperature

![Typical Resistance Change](image3)

Storage

- Storage temperature: -55°C to +70°C
- Exposure to UV light results in permanent damage
- Prolonged exposure to visible light results in temporary low dark resistance

Handling

- Ensure dust-free environment for device handling
- Operating temperature: -30°C to +70°C

Options

- Custom windows and filters
- 1-stage or 2-stage Thermoelectric cooler (TEC) including thermistor
- Built-in internal LED for illumination and detection
- Custom packages upon request
- Evaluation Kit available
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TO5 exemplary package outlines (mm)

PbS020020TO5

Bottom view

Side view

Top view

Schematic

1. Electrode 1
2. GND
3. Electrode 2

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TO8 exemplary package outlines (mm)

PbS060060TO8

Bottom view

Side view

Top view

Schematic

1. Photoresistor $R_0$  
2. Electrode 1  
3. Electrode 2

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Exemplary circuit

![Exemplary circuit diagram](image)

- $V_B$: Bias voltage
- $V_O$: Output voltage
- $R_D$: Dark resistance of the detector
- $R_L$: Load resistor
- $C_F$: Filter capacitor
- $R_F$: Filter resistor
- $R_I$: Feedback resistor
- $R_G$: Gain resistor

Regulatory

For the use of Hertzstück™ PbS and PbSe infrared photodetectors in medical devices, monitoring and control instruments and consumer applications RoHS exemptions apply.

For automotive applications Hertzstück™ PbS and PbSe infrared photodetectors fall under ELV exemption.