PbS near-infrared detector
Single-Pixel thin-film encapsulated

Features

- Bondable electrode for COB mounting
- High durability for rugged operation
- Very high sensitivity
- Suitable for automated wire-bonding
- Room temperature operation

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>
<th>Peak D* (620 Hz, 1 Hz) [cm·Hz½/W]</th>
<th>Time constant [µs]</th>
<th>Dark resistance R\textsubscript{D} [MΩ]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PbS005005BC</td>
<td>0.5 x 0.5</td>
<td>16 · 10\textsuperscript{5}</td>
<td>10 · 10\textsuperscript{5}</td>
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<td></td>
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<tr>
<td>PbS010010BC</td>
<td>1 x 1</td>
<td>8 · 10\textsuperscript{5}</td>
<td>5.6 · 10\textsuperscript{5}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PbS020020BC</td>
<td>2 x 2</td>
<td>4 · 10\textsuperscript{5}</td>
<td>2.8 · 10\textsuperscript{5}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PbS030030BC</td>
<td>3 x 3</td>
<td>3 · 10\textsuperscript{5}</td>
<td>1.8 · 10\textsuperscript{5}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PbS060060BC</td>
<td>6 x 6</td>
<td>1.4 · 10\textsuperscript{5}</td>
<td>0.9 · 10\textsuperscript{5}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PbS100100BC</td>
<td>10 x 10</td>
<td>0.6 · 10\textsuperscript{5}</td>
<td>0.4 · 10\textsuperscript{5}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PbS010050BC*</td>
<td>1 x 5</td>
<td>3.5 · 10\textsuperscript{5}</td>
<td>2 · 10\textsuperscript{5}</td>
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<td></td>
</tr>
</tbody>
</table>

* Dark resistance R\textsubscript{D} [MΩ] = 0.05 - 1

- Measured with 1550 nm LED, incident power 16 µW/cm\textsuperscript{2}
- Measured in a voltage divider circuit with 50 V/mm
- Photo responsivity and detectivity are measured with constant load resistance (R\textsubscript{L} = 1 MΩ) and calculated for matched resistance

Die attach

- Use clean, soft rubber tip for pick and place handling
- UV-curing is not suitable due to permanent damage by UV light exposure
- Element temperature should never exceed +70°C

Wire-bonding

- Electrodes are optimized for room temperature Al-wire-bonding
- Element temperature should never exceed +70°C
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Typical spectral response
![Typical spectral response graph]

Typical frequency response
![Typical frequency response graph]

Typical resistance change over temperature
![Typical resistance change over temperature graph]

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
- Active area is scratch sensitive, protect top surface from any mechanical contact
- Ensure dust-free environment for device handling
- Operating temperature: -30°C to +70°C

Options
- Custom windows and filters
- Custom packages upon request
- Evaluation Kit available

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Exemplary mechanical outlines (mm)

PbS020020BC

Schematic

Bondable surface

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

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Exemplary circuit

![Exemplary circuit diagram]

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_B$</td>
<td>Bias voltage</td>
</tr>
<tr>
<td>$V_O$</td>
<td>Output voltage</td>
</tr>
<tr>
<td>$R_D$</td>
<td>Dark resistance of the detector</td>
</tr>
<tr>
<td>$R_L$</td>
<td>Load resistor</td>
</tr>
<tr>
<td>$C_F$</td>
<td>Filter capacitor</td>
</tr>
<tr>
<td>$R_F$</td>
<td>Filter resistor</td>
</tr>
<tr>
<td>$R_I$</td>
<td>Feedback resistor</td>
</tr>
<tr>
<td>$R_t$</td>
<td>Gain resistor</td>
</tr>
</tbody>
</table>

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.