

PbS near-infrared detector

Single-Pixel double encapsulated in TO package

trinamiX

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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

| Type No. | Active area [mm x mm] | Peak responsivity S [V/W] | |
|---------------|--------------------------|------------------------------|------------------|
| | | Typ. | Min. |
| PbS005005TO5 | 0.5 x 0.5 | $16 \cdot 10^5$ | $10 \cdot 10^5$ |
| PbS010010TO5 | 1 x 1 | $8 \cdot 10^5$ | $5.6 \cdot 10^5$ |
| PbS020020TO5 | 2 x 2 | $4 \cdot 10^5$ | $2.8 \cdot 10^5$ |
| PbS030030TO5 | 3 x 3 | $3 \cdot 10^5$ | $1.8 \cdot 10^5$ |
| PbS060060TO8 | 6 x 6 | $1.4 \cdot 10^5$ | $0.9 \cdot 10^5$ |
| PbS010050TO5* | 1 x 5 | $3.5 \cdot 10^5$ | $2 \cdot 10^5$ |

* Dark resistance R_D [M Ω] = 0.05 - 1



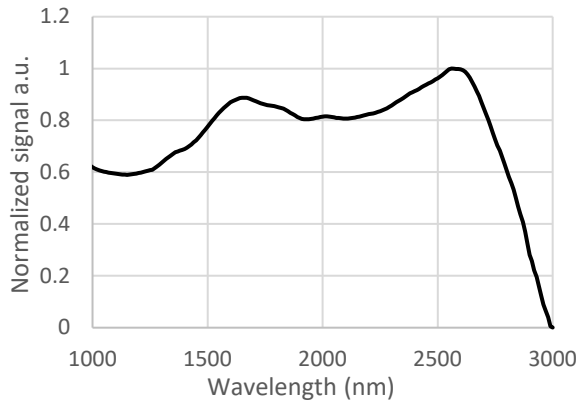
- Measured with 1550 nm LED, incident power 16 $\mu\text{W}/\text{cm}^2$
- Measured in a voltage divider circuit with 50 V/mm
- Photo responsivity and detectivity are measured with constant load resistance ($R_L = 1 \text{ M}\Omega$) and calculated for matched resistance

| Element temperature [°C] | Peak wave-length λ_p [μm] | 20% cut-off wavelength λ_c [μm] | Peak D* (620 Hz, 1 Hz) [$\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$] | | Time constant [μs] | Dark resistance R_D [M Ω] |
|-----------------------------|---|---|---|---------------------|------------------------------------|--|
| | Typ. | Typ. | Typ. | Min. | Typ. | |
| 22 | 2.7 | 2.9 | $1.1 \cdot 10^{11}$ | $0.8 \cdot 10^{11}$ | 200 | 0.3 - 3 |

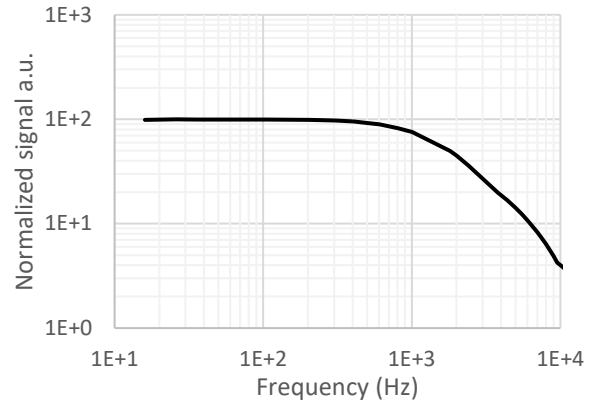
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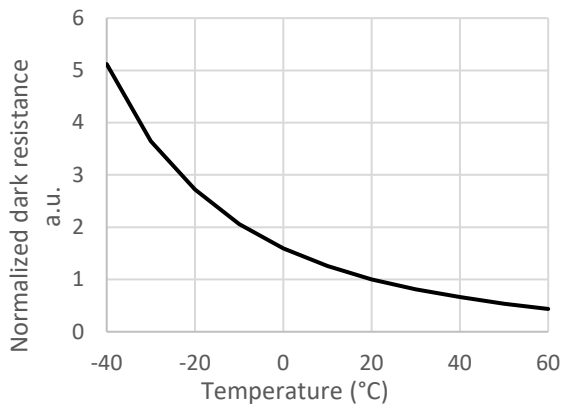
Typical spectral response



Typical frequency response



Typical resistance change over temperature



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

Options

- Custom windows and filters
- 1-stage or 2-stage Thermoelectric cooler (TEC) including thermistor
- Built-in internal LED for illumination and detection

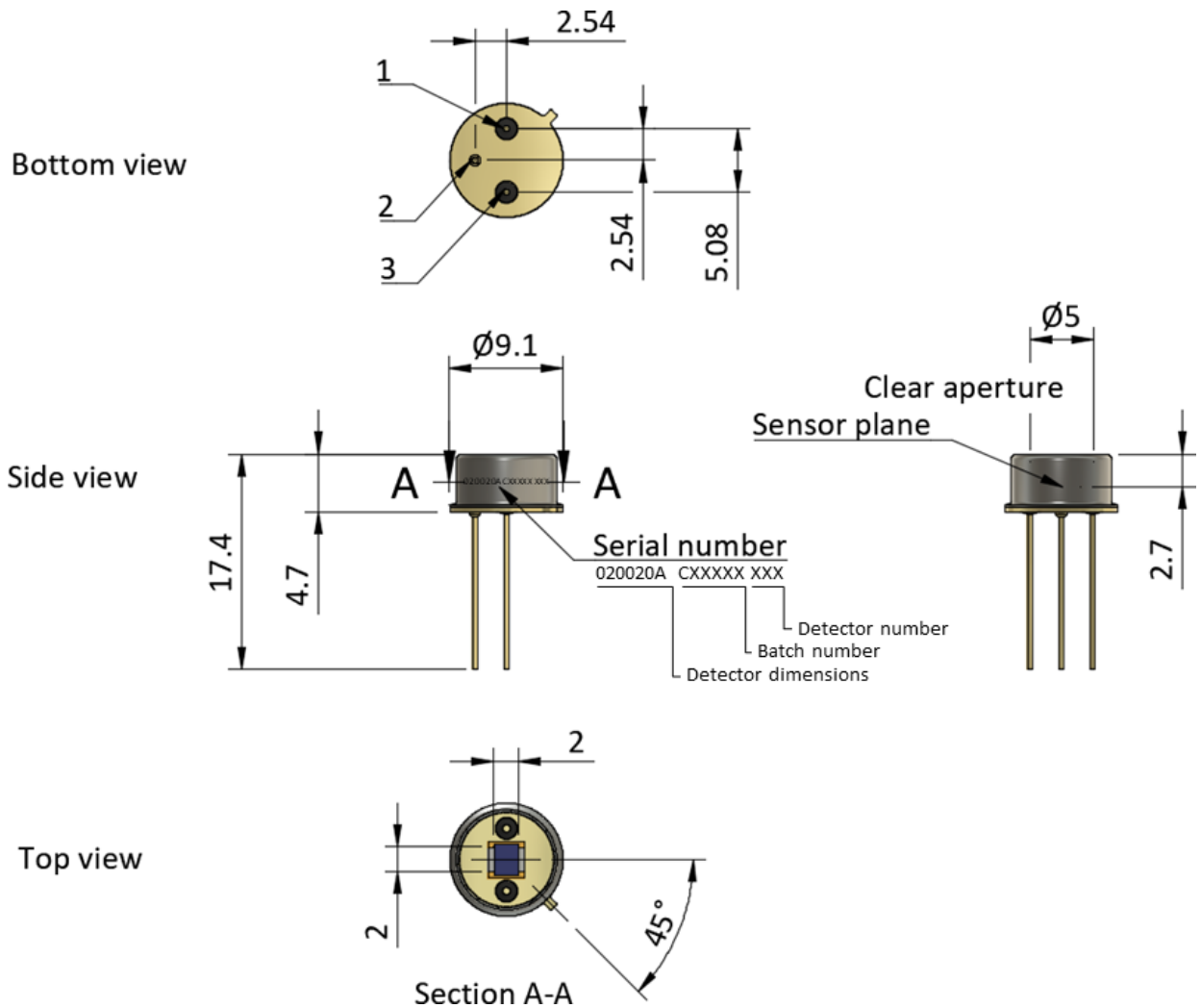
Handling

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

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TO5 exemplary package outlines (mm)

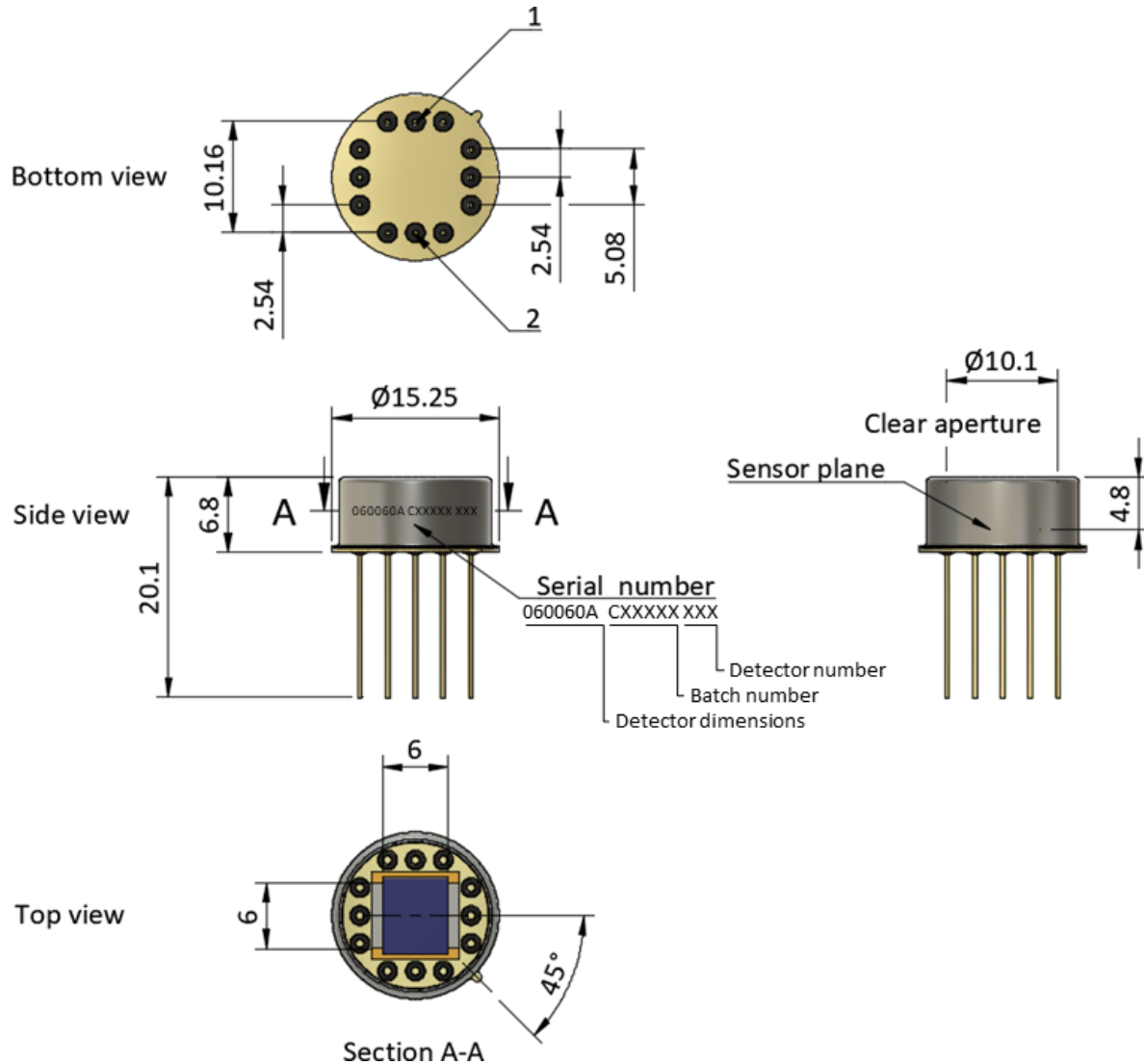
PbS020020TO5



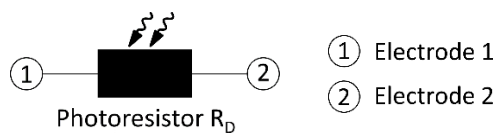
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TO8 exemplary package outlines (mm)

PbS060060TO8



Schematic



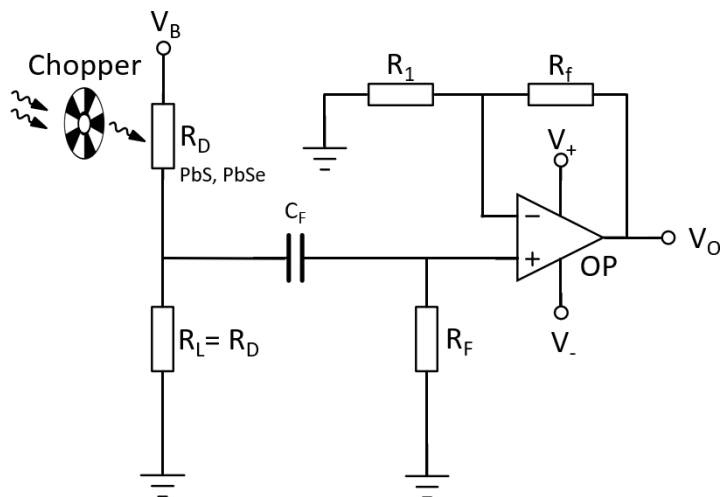
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Exemplary circuit



- 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_f : Feedback resistor
- R_1 : 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.