

## 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.
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 $\Omega$ ] = 0.05 - 1



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

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

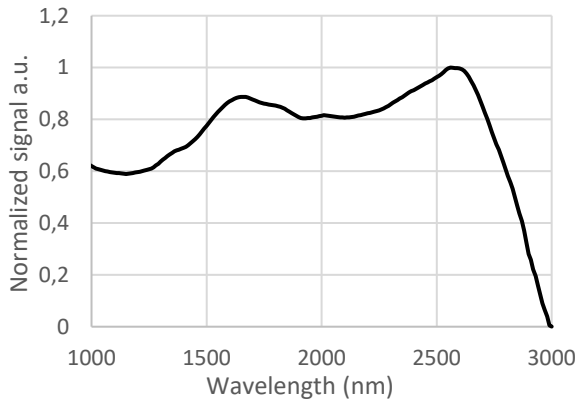
## PbS near-infrared detector

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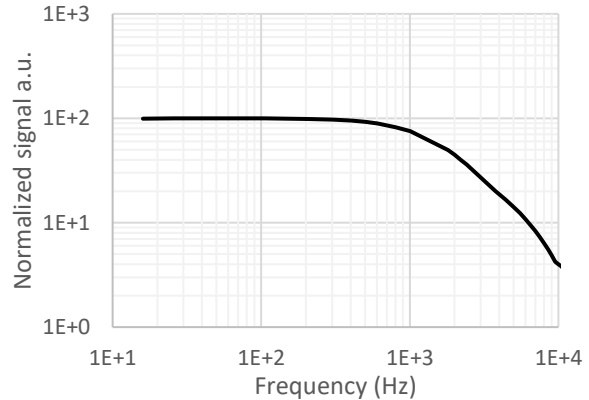
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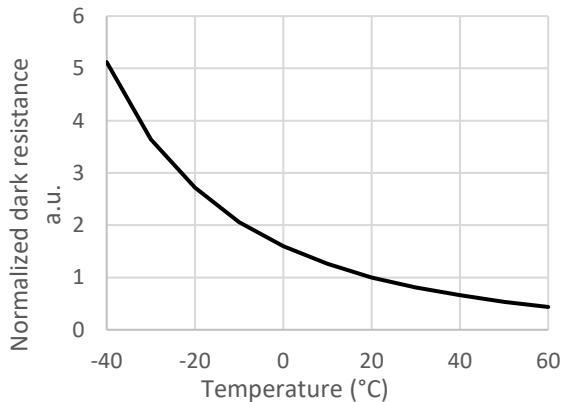
#### Typical spectral response



#### 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

#### Handling

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

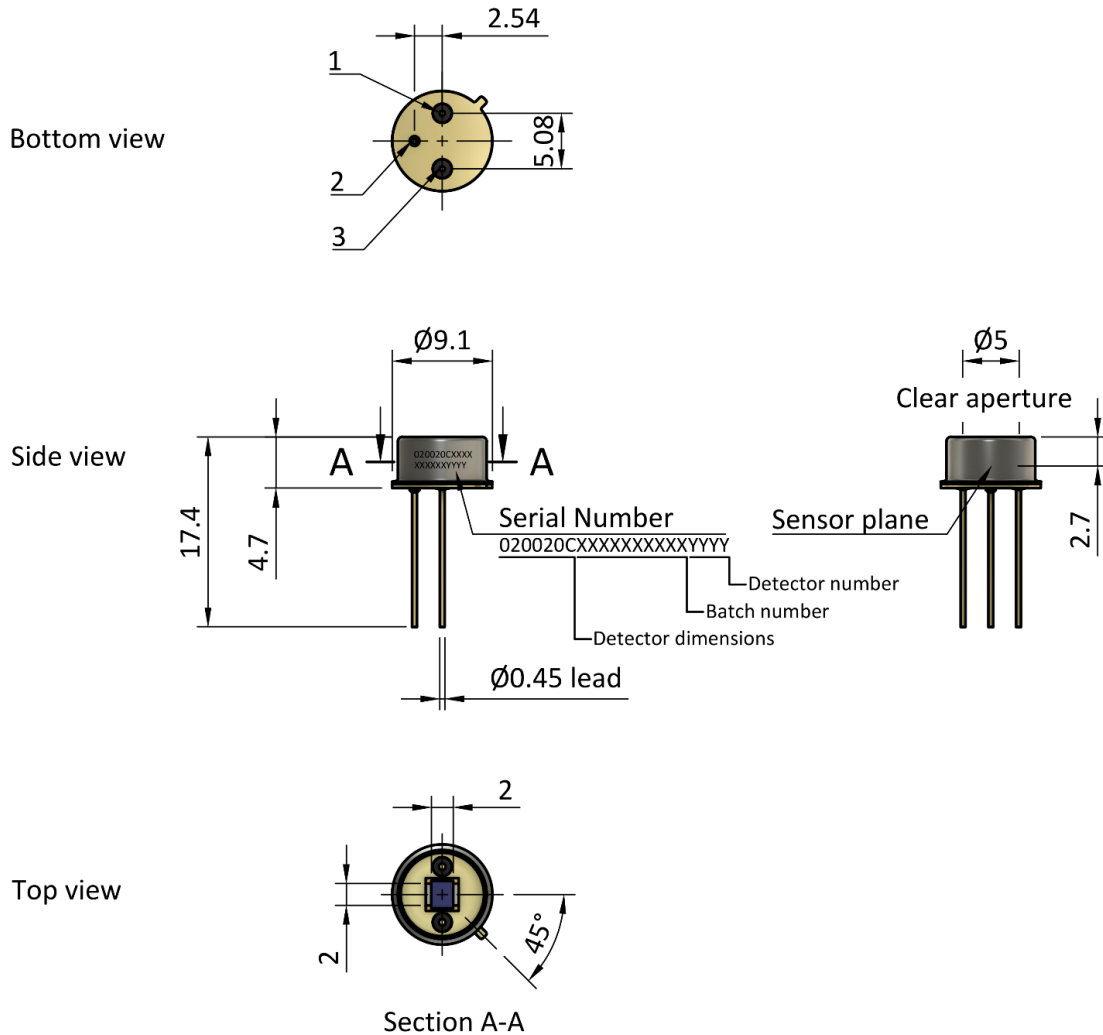
#### Options

- 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

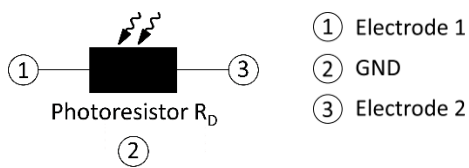
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### TO5 exemplary package outlines (dimensions in mm)

PbS020020TO5



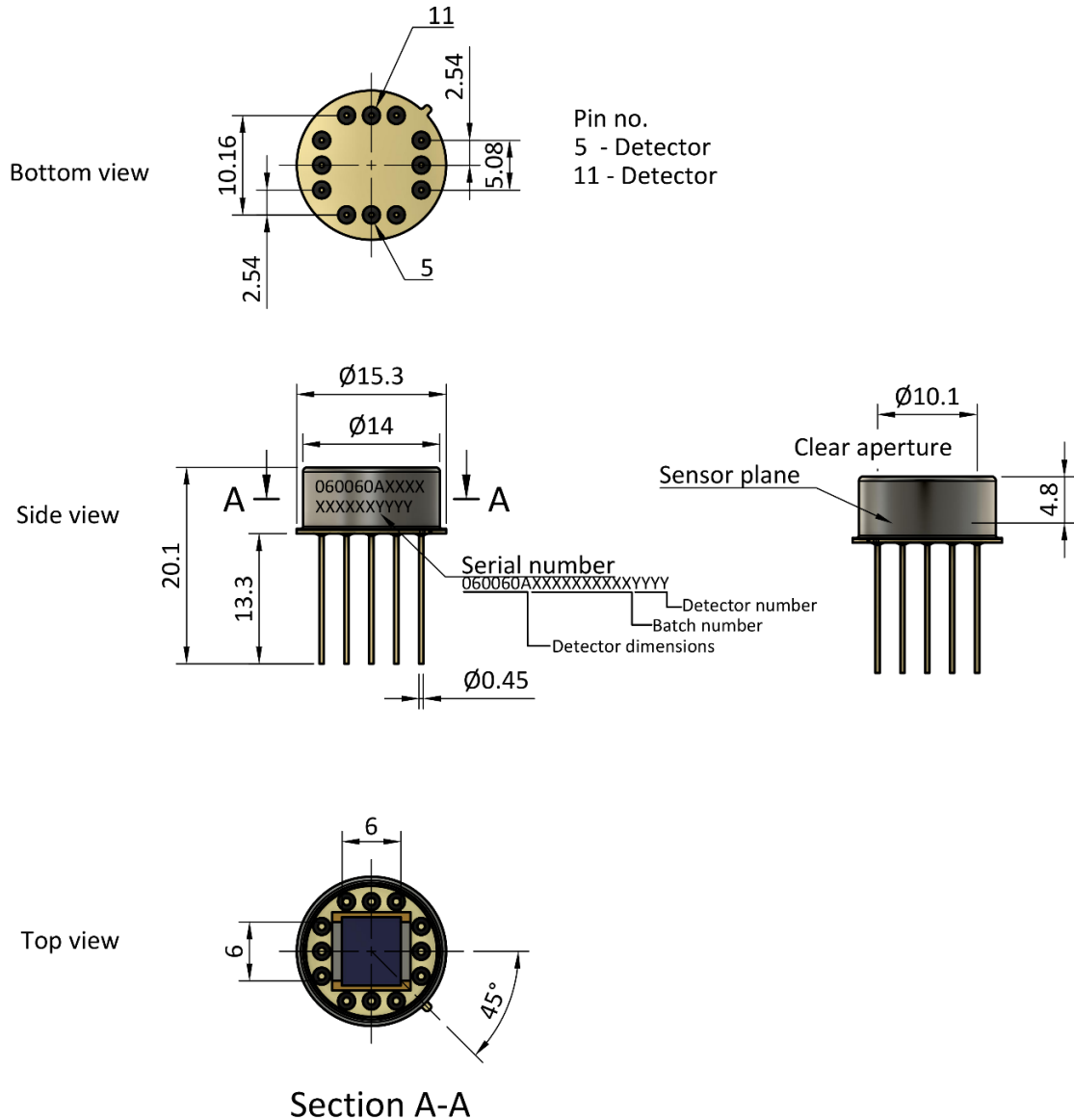
### Schematic



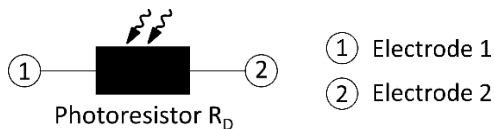
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TO8 exemplary package outlines (dimensions in mm)

PbS060060TO8



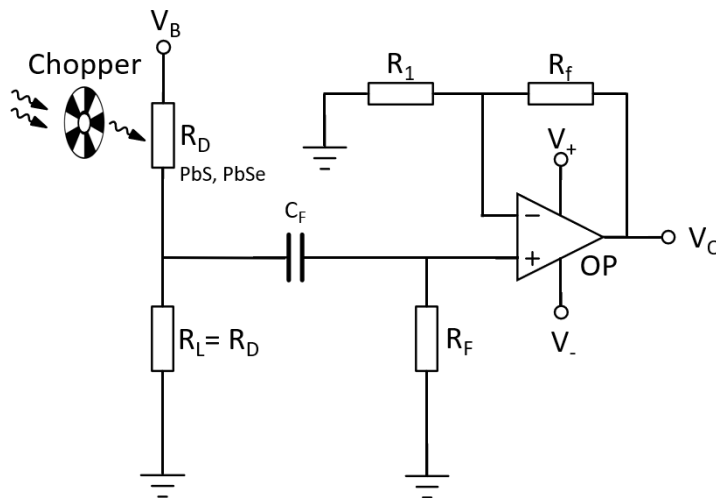
Schematic



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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 trinamiX PbS and PbSe infrared photodetectors in medical devices, monitoring and control instruments and consumer applications RoHS exemptions apply.

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