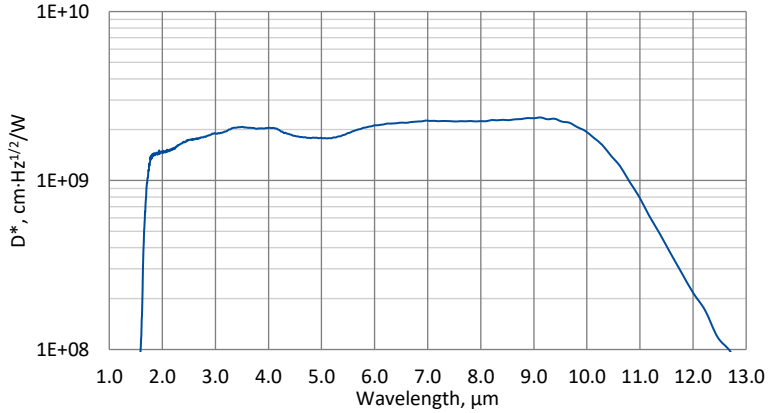
PCIAS-3TE-12-1×1-TO8-wZnSeAR-36 – ENGINEERING SAMPLE

Type II superlattice, three-stage thermoelectrically cooled, optically immersed photoconductive detector

PCIAS-3TE-12-1×1-TO8-wZnSeAR-36 is a Type II superlattice three-stage thermoelectrically cooled IR photoconductor, with excellent parameters. Detector element is monolithically integrated with hyperhemispherical GaAs microlens in order to improve performance of the device. Photoconductive detector should operate in optimum bias voltage and current readout mode. Performance at low frequencies is reduced due to 1/f noise. 3° wedged zinc selenide anti-reflection coated window (wZnSeAR) prevents unwanted interference effects. For detection of CW radiation, using of optical chopper system is recommended. This detector does not contain mercury or cadmium and is compliant with the RoHS Directive.

Spectral response (T_a = 20°C)



Exemplary spectral detectivity, the spectral response of delivered devices may differ.

Specification (T_a = 20°C)

Parameter	Detector type PCIAS-3TE-12-1×1-TO8-wZnSeAR-36
Active element material	epitaxial superlattice heterostructure
Cut-on wavelength $\lambda_{cut\text{-}on}$ (10%), µm	1.6±0.2
Peak wavelength λ_{peak}, µm	8.0±1.0
Cut-off wavelength $\lambda_{cut\text{-}off}$ (10%), µm	12.0±0.3
Detectivity D*(λ_{peak}, 20 kHz), cm·Hz$^{1/2}$/W	~2.0×10^9
Current responsivity $R_i(\lambda_{peak})$, A/W	~0.9
Time constant τ, ns	~4
Resistance R, Ω	~45
Bias voltage V_b, V	typ. 0.5
1/f noise corner frequency f_c, Hz	typ. 20k
Active element temperature T_{det}, K	~210
Optical area A_O, mm×mm	1×1
Package	TO8
Acceptance angle Φ	~36°
Window	wZnSeAR

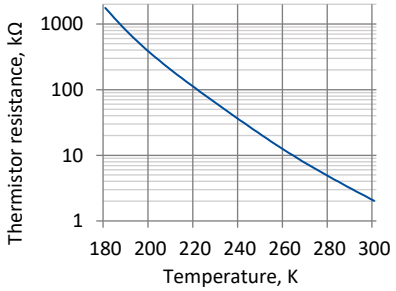
Features

- Optical immersion lens technology applied
- Very wide spectral range from 1.6 to 12.6 µm
- Very high responsivity
- Excellent linearity
- Environmentally friendly

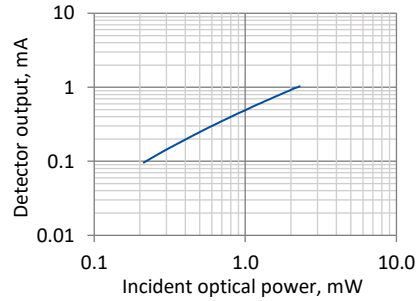
Three-stage thermoelectric cooler parameters

Parameter	Value
T_{det}, K	~210
V_{max}, V	3.6
I_{max}, A	0.45
Q_{max}, W	0.27

Thermistor characteristics

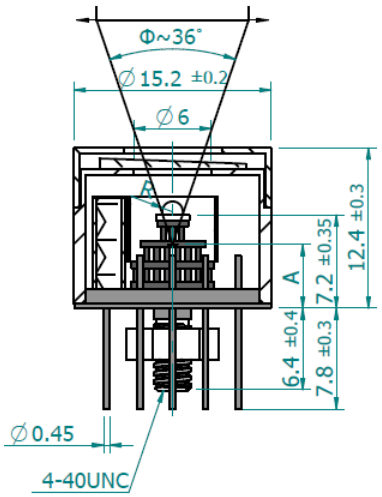


Linearity (typ., T_{BB} = 1273 K)



T_{BB} – black body temperature

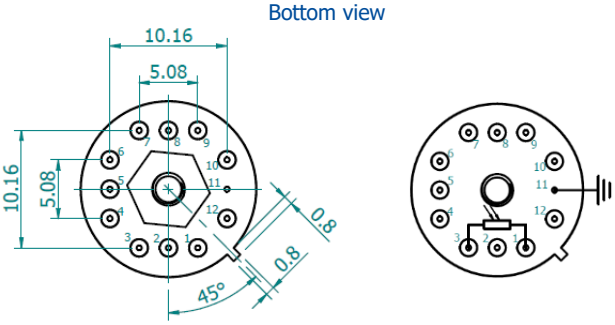
Mechanical layout, mm



Parameter	Value
Immersion microlens shape	hyperhemisphere
Optical area A_O, mm×mm	1×1
R, mm	0.8
A, mm	4.8±0.35

Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of the 3TE-TO8 header to the focal plane

Bottom view



Function	Pin number
Detector	1, 3
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

Dedicated preamplifiers

„all-in-one" AIP

programmable PIP

standard MIP

small SIP-TO8

Precautions for use and storage

- Heatsink with thermal resistance of ~2 K/W is necessary to dissipate heat generated by 3TE cooler.
- Operation in 10% to 80% humidity and -20°C to 30°C ambient temperature.
- Beam power limitations for optically immersed detector:
  - irradiance with CW or single pulse longer than 1 µs irradiance on the apparent optical active area must not exceed 2.5 W/cm^2,
  - irradiance of the pulse shorter than 1 µs must not exceed 10 kW/cm^2.
- Storage in dark place with 10% to 90% humidity and -20°C to 50°C ambient temperature.