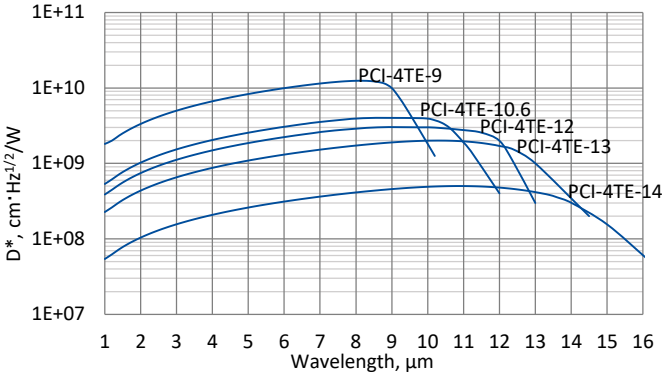
PCI-4TE series

1 – 16 µm HgCdTe four-stage thermoelectrically cooled, optically immersed photoconductive detectors

PCI-4TE series features four-stage thermoelectrically cooled IR photoconductive detectors based on sophisticated HgCdTe heterostructures for the best performance and stability, optically immersed in order to improve parameters of the devices. The detectors are optimized for the maximum performance at λ_{opt}. Cut-on wavelength is limited by GaAs transmittance (~0.9 µm). The devices should operate in optimum bias voltage and current readout mode. Performance at low frequencies is reduced due to 1/f noise. The 1/f noise corner frequency increases with the cut-off wavelength. 3° wedged zinc selenide anti-reflection coated (wZnSeAR) window prevents unwanted interference effects.

Spectral response (T_a = 20°C)



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

4TE-TO66 4TE-TO8

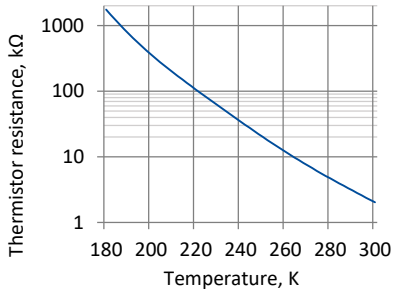
Specification (T_a = 20°C)

Parameter	Detector type				
	PCI-4TE-9	PCI-4TE-10.6	PCI-4TE-12	PCI-4TE-13	PCI-4TE-14
Active element material	epitaxial HgCdTe heterostructure				
Optimal wavelength λ_{opt}, µm	9.0	10.6	12.0	13.0	14.0
Detectivity D*(λ_{peak}, 20kHz), cm·Hz$^{1/2}$/W	≥1.25×10^{10}	≥4.0×10^{9}	≥3.0×10^{9}	≥2.0×10^{9}	≥5.0×10^{8}
Detectivity D*(λ_{opt}, 20kHz), cm·Hz$^{1/2}$/W	≥1.0×10^{10}	≥3.0×10^{9}	≥2.0×10^{9}	≥1.0×10^{9}	≥3.0×10^{8}
Current responsivity-optical area length product $R_i(\lambda_{opt})\cdot L_O$, A·mm/W	≥0.9	≥0.2	≥0.09	≥0.05	≥0.03
Time constant τ, ns	≤80	≤30	≤7	≤6	≤5
1/f noise corner frequency f_c, Hz	≤10k	≤20k			
Bias voltage-optical area length ratio V_b/L_O, V/mm	≤0.3	≤0.24			≤0.18
Resistance R, Ω	≤500	≤400			≤300
Active element temperature T_{det}, K	~195				
Optical area A_O, mm×mm	0.5×0.5, 1×1, 2×2				
Package	TO8, TO66				
Acceptance angle Φ	~36°				
Window	wZnSeAR				

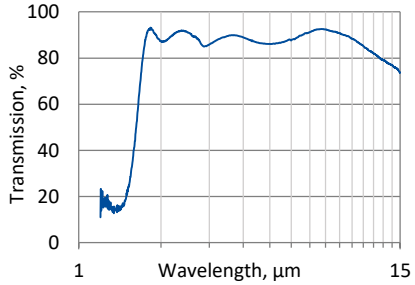
Four-stage thermoelectric cooler parameters

Parameter	Value
T_{det}, K	~195
V_{max}, V	8.3
I_{max}, A	0.4
Q_{max}, W	0.28

Thermistor characteristics

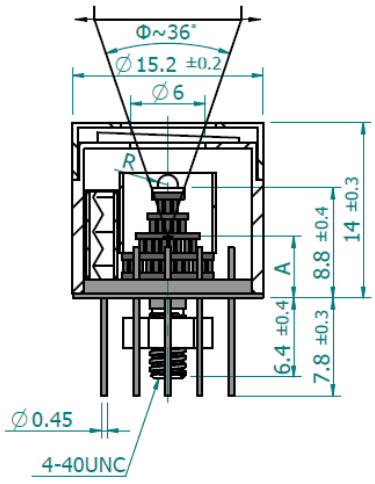


Spectral transmission of wZnSeAR window (typical example)



Mechanical layout, mm

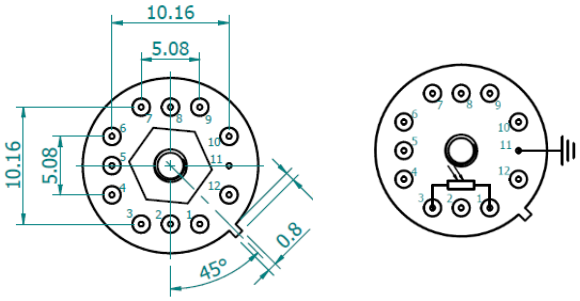
4TE-TO8 package



Parameter	Value		
Immersion microlens shape	hyperhemisphere		
Optical area A_O, mm×mm	0.5×0.5	1×1	2×2
R, mm	0.5	0.8	1.25
A, mm	7.3±0.4	6.4±0.4	5.0±0.4

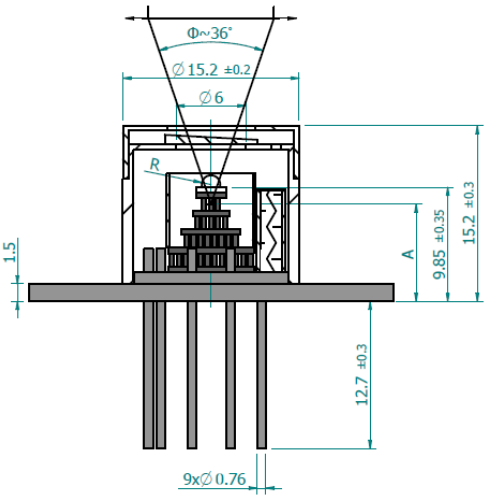
Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 4TE-TO8 header to the focal plane

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

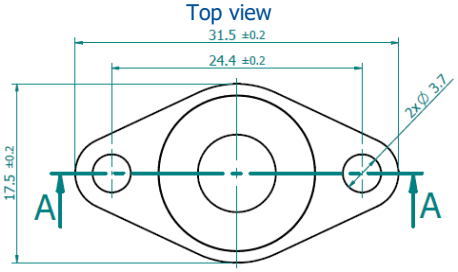
4TE-TO66 package



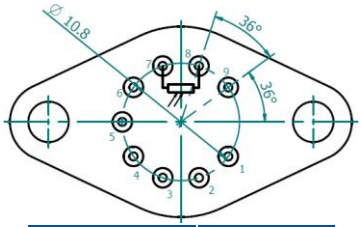
Parameter	Value		
Immersion microlens shape	hyperhemisphere		
Optical area A_O, mm×mm	0.5×0.5	1×1	2×2
R, mm	0.5	0.8	1.25
A, mm	8.35±0.40	7.45±0.40	6.1±0.4

Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 4TE-TO66 header to the focal plane

Top view



Bottom view



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

Dedicated preamplifiers


„all-in-one" AIP


programmable PIP


standard MIP


small SIP-TO8