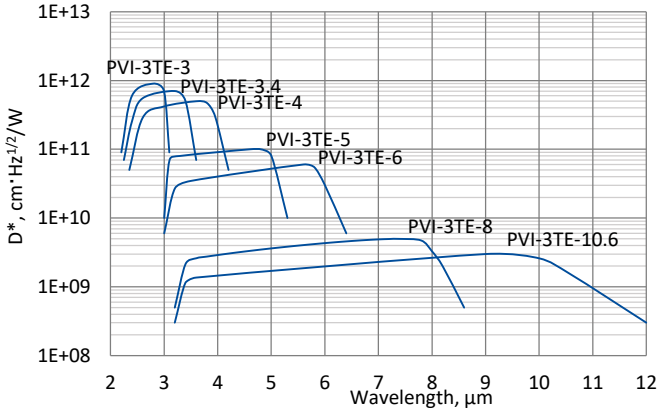
PVI-3TE series

2 – 12 µm HgCdTe three-stage thermoelectrically cooled, optically immersed photovoltaic detectors

PVI-3TE series features three-stage thermoelectrically cooled IR photovoltaic 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 can be optimized upon request. Reverse bias may significantly increase speed of response and dynamic range. It results also in improved performance at high frequencies, but 1/f noise that appears in biased devices may reduce performance at low frequencies. 3° wedged sapphire (wAl_2O_3) or zinc selenide anti-reflection coated (wZnSeAR) window prevents unwanted interference effects.

Spectral response (T_a = 20°C, V_b = 0 mV)



3TE-TO66

3TE-TO8

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

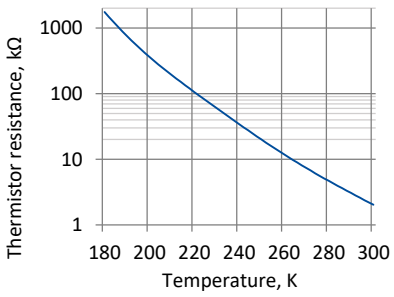
Specification (T_a = 20°C, V_b = 0 mV)

Parameter	Detector type						
	PVI-3TE-3	PVI-3TE-3.4	PVI-3TE-4	PVI-3TE-5	PVI-3TE-6	PVI-3TE-8	PVI-3TE-10.6
Active element material	epitaxial HgCdTe heterostructure						
Optimum wavelength λ_{opt}, µm	3.0	3.4	4.0	5.0	6.0	8.0	10.6
Detectivity D*(λ_{peak}), cm·Hz$^{1/2}$/W	≥9.0×10^{11}	≥7.0×10^{11}	≥5.0×10^{11}	≥1.0×10^{11}	≥6.0×10^{10}	≥5.0×10^{9}	≥3.0×10^{9}
Detectivity D*(λ_{opt}), cm·Hz$^{1/2}$/W	≥7.0×10^{11}	≥5.0×10^{11}	≥3.0×10^{11}	≥8.0×10^{10}	≥3.0×10^{10}	≥3.0×10^{9}	≥1.5×10^{9}
Current responsivity $R_I(\lambda_{opt})$, A/W	≥0.5	≥0.8	≥1.0	≥1.3	≥1.5	≥1.0	≥0.7
Time constant τ, ns	≤280	≤200	≤100	≤80	≤50	≤45	≤10
Resistance-optical area product R·A_O, Ω·cm^2	≥24000	≥1500	≥600	≥30	≥2.5	≥0.04	≥0.02
Active element temperature T_{det}, K	~210						
Optical area A_O, mm×mm	0.5×0.5, 1×1						0.5×0.5
Package	TO8, TO66						
Acceptance angle Φ	~36°						
Window	wAl_2O_3				wZnSeAR		

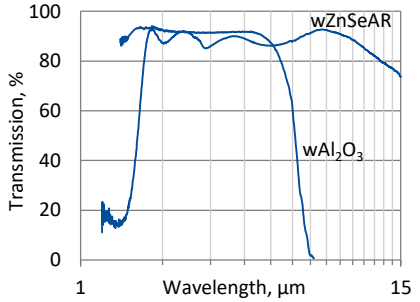
Three-stage thermoelectric cooler parameters

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

Thermistor characteristics

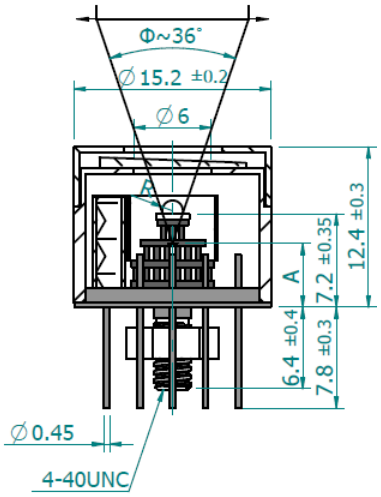


Spectral transmission of wAl_2O_3 and wZnSeAR windows (typical example)



Mechanical layout, mm

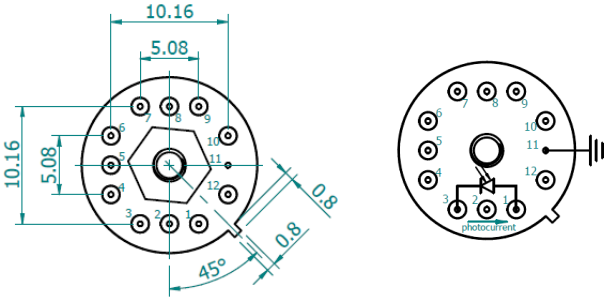
3TE-TO8 package



Parameter	Value	
Immersion microlens shape	hyperhemisphere	
Optical area A_O, mm×mm	0.5×0.5	1×1
R, mm	0.5	0.8
A, mm	5.7±0.35	4.8±0.35

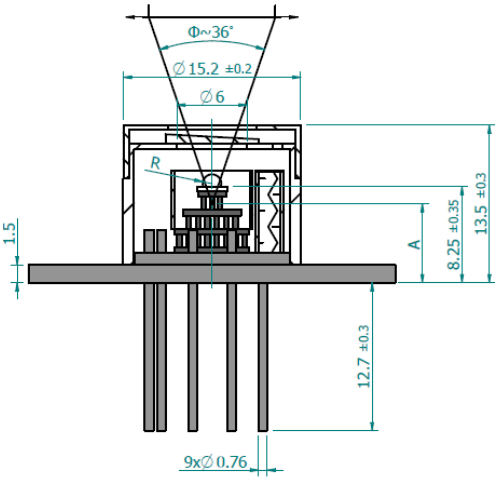
Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 3TE-TO8 header to the focal plane

Bottom view



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

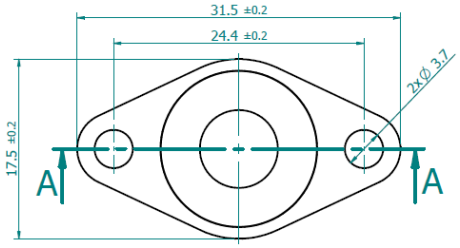
3TE-TO66 package



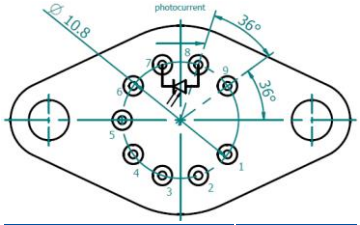
Parameter	Value	
Immersion microlens shape	hyperhemisphere	
Optical area A_O, mm×mm	0.5×0.5	1×1
R, mm	0.5	0.8
A, mm	6.75±0.35	5.85±0.35

Φ- acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 3TE-TO66 header to the focal plane

Top view



Bottom view



Function	Pin number
Detector	7, 8
Reverse bias (optional)	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


fast FIP