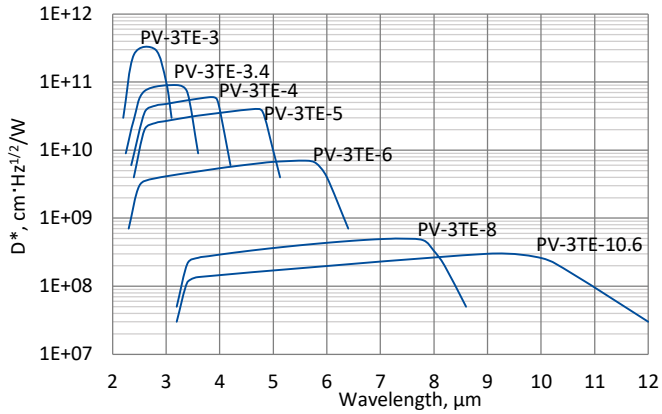
PV-3TE series

2.0 – 12.0 µm HgCdTe three-stage thermoelectrically cooled photovoltaic detectors

PV-3TE series features three-stage thermoelectrically cooled IR photovoltaic detectors based on sophisticated HgCdTe heterostructures for the best performance and stability. The devices are optimized for the maximum performance at λ_{opt}. Cut-on wavelength can be optimized upon request. Reverse bias may significantly increase response speed and dynamic range. It also results 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)



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

3TE-TO66 3TE-TO8

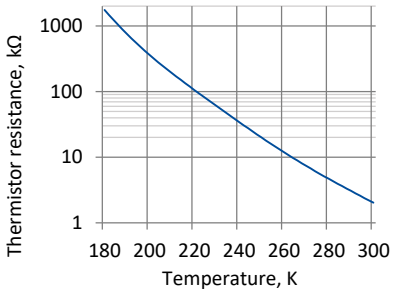
Specification (T_a = 20°C, V_b = 0V)

Parameter	Detector type						
	PV-3TE-3	PV-3TE-3.4	PV-3TE-4	PV-3TE-5	PV-3TE-6	PV-3TE-8	PV-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	≥3.0×10^{11}	≥9.0×10^{10}	≥6.0×10^{10}	≥4.0×10^{10}	≥7.0×10^{9}	≥5.0×10^{8}	≥3.0×10^{8}
Detectivity D*(λ_{opt}), cm·Hz$^{1/2}$/W	≥1.0×10^{11}	≥7.0×10^{10}	≥4.0×10^{10}	≥1.0×10^{10}	≥4.0×10^{9}	≥3.0×10^{8}	≥1.5×10^{8}
Current responsivity R_i(λ_{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-active area product R·A, Ω·cm^2	≥240	≥15	≥6	≥0.3	≥0.025	≥0.0004	≥0.0002
Active element temperature T_{det}, K	~210						
Active area A, mm×mm	0.05×0.05, 0.1×0.1						0.05×0.05
Package	TO8, TO66						
Acceptance angle Φ	~70°						
Window	wAl_2O_3				wZnSeAR		

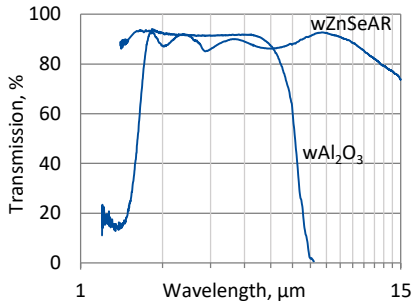
Three-stage thermoelectric cooler parameters

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

Thermistor characteristics

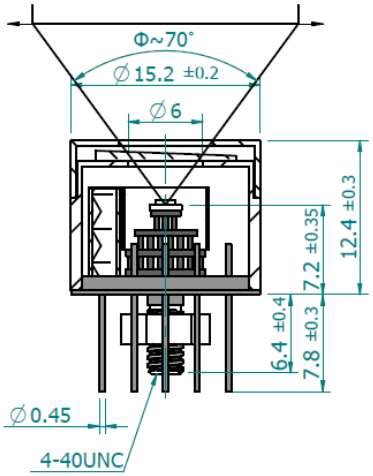


Spectral transmission of wAl_2O_3 and wZnSeAR windows (typical example)



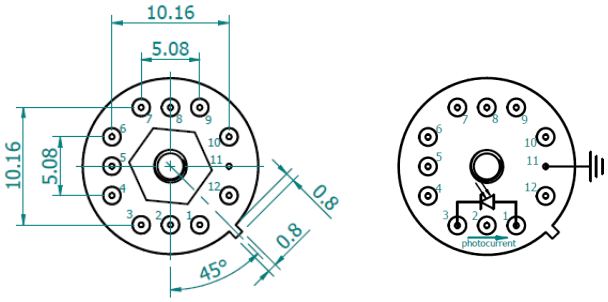
Mechanical layout, mm

3TE-TO8 package



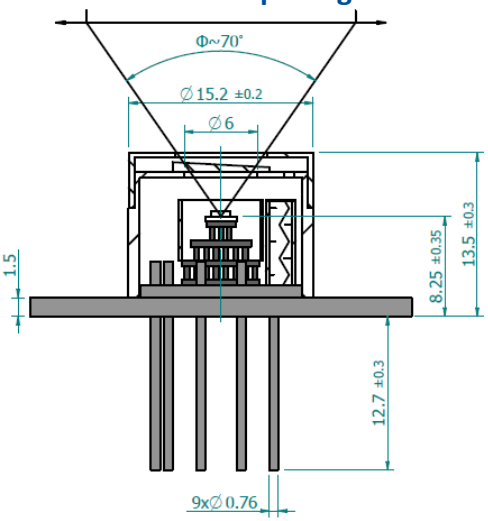
Φ – acceptance angle

Bottom view



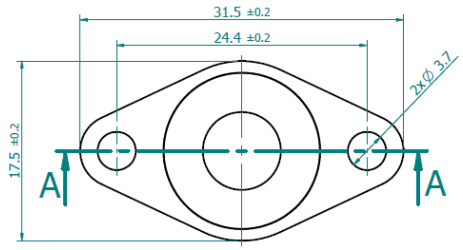
Function	Pin number
Detector	1, 3
Reverse bias (optional)	1(–), 3(+)
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

3TE-TO66 package

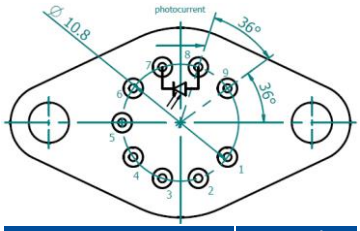


Φ – acceptance angle

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