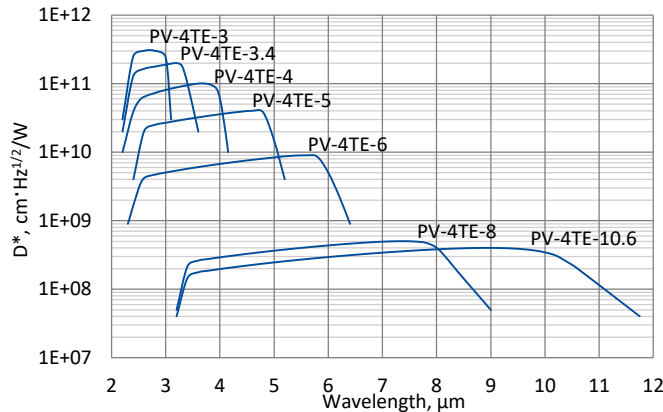


## PV-4TE series

### 2.0 – 12.0 μm HgCdTe four-stage thermoelectrically cooled photovoltaic detectors

**PV-4TE series** features four-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  $\lambda_{opt}$ . 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<sub>2</sub>O<sub>3</sub>) or zinc selenide anti-reflection coated (wZnSeAR) window prevents unwanted interference effects.

#### Spectral response ( $T_a = 20^\circ\text{C}$ , $V_b = 0\text{ mV}$ )



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

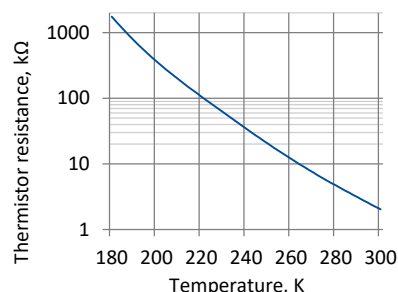
#### Specification ( $T_a = 20^\circ\text{C}$ , $V_b = 0\text{V}$ )

Parameter	Detector type						
	PV-4TE-3	PV-4TE-3.4	PV-4TE-4	PV-4TE-5	PV-4TE-6	PV-4TE-8	PV-4TE-10.6
Active element material	epitaxial HgCdTe heterostructure						
Optimum wavelength $\lambda_{opt}$ , $\mu\text{m}$	3.0	3.4	4.0	5.0	6.0	8.0	10.6
Detectivity $D^*(\lambda_{peak})$ , $\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$	$\geq 3.0 \times 10^{11}$	$\geq 2.0 \times 10^{11}$	$\geq 1.0 \times 10^{11}$	$\geq 4.0 \times 10^{10}$	$\geq 9.0 \times 10^9$	$\geq 5.0 \times 10^8$	$\geq 4.0 \times 10^8$
Detectivity $D^*(\lambda_{opt})$ , $\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$	$\geq 1.5 \times 10^{11}$	$\geq 1.0 \times 10^{11}$	$\geq 6.0 \times 10^{10}$	$\geq 1.5 \times 10^{10}$	$\geq 5.0 \times 10^9$	$\geq 4.0 \times 10^8$	$\geq 2.0 \times 10^8$
Current responsivity $R_i(\lambda_{opt})$ , $\text{A}/\text{W}$	$\geq 0.5$	$\geq 0.8$	$\geq 1.0$	$\geq 1.3$	$\geq 1.5$	$\geq 1.5$	$\geq 0.5$
Time constant $\tau$ , ns	$\leq 280$	$\leq 200$	$\leq 100$	$\leq 80$	$\leq 50$	$\leq 45$	$\leq 25$
Resistance-active area product $R \cdot A$ , $\Omega \cdot \text{cm}^2$	$\geq 300$	$\geq 20$	$\geq 8$	$\geq 0.4$	$\geq 0.03$	$\geq 0.0006$	$\geq 0.0005$
Active element temperature $T_{det}$ , K	$\sim 195$						
Active area $A$ , $\text{mm} \times \text{mm}$	$0.05 \times 0.05$ , $0.1 \times 0.1$						
Package	TO8, TO66						
Acceptance angle $\Phi$	$\sim 70^\circ$						
Window	wAl <sub>2</sub> O <sub>3</sub>			wZnSeAR			

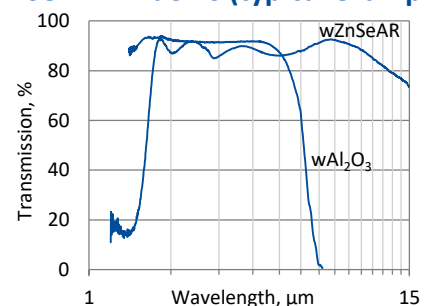
#### Four-stage thermoelectric cooler parameters

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

#### Thermistor characteristics

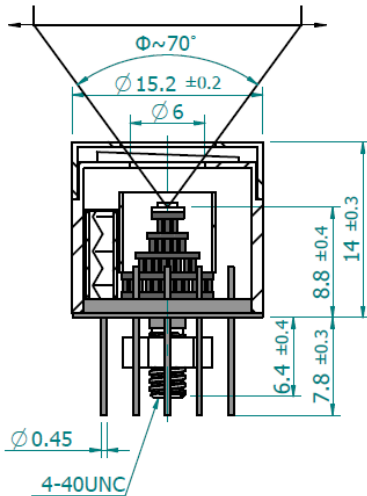


#### Spectral transmission of wAl<sub>2</sub>O<sub>3</sub> and wZnSeAR windows (typical example)



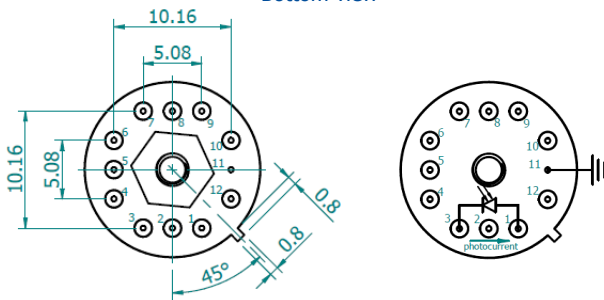
### Mechanical layout, mm

#### 4TE-TO8 package



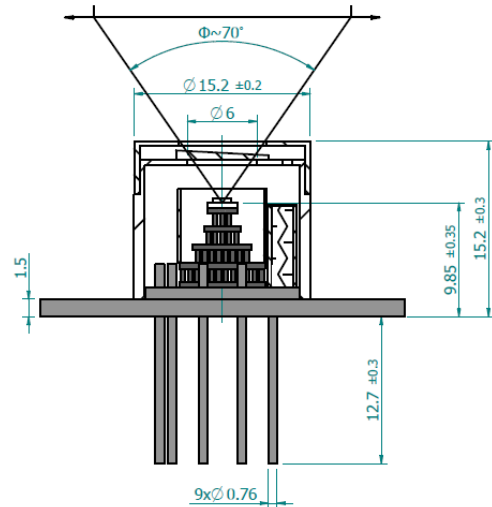
Φ – acceptance angle

Bottom view



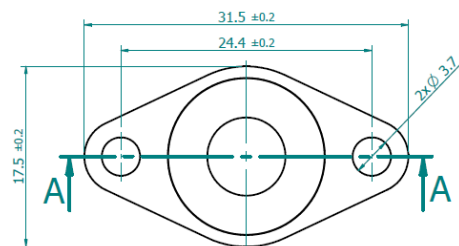
Function	Pin number
Detector	1, 3
Reverse bias (optional)	1(-), 3(+)
Thermistor	7, 9
TE cooler supply	2(+), 8(-)
Chassis ground	11
Not used	4, 5, 6, 10, 12

#### 4TE-TO66 package

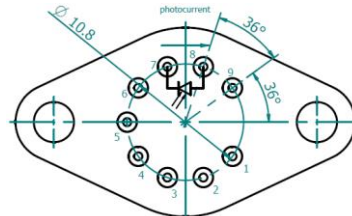


Φ – acceptance angle

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