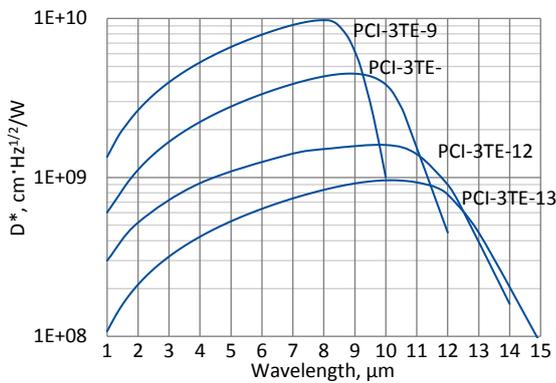


## 2.7 PCI-3TE series

### 2.7.1 1.0 – 15.0 μm HgCdTe three-stage thermoelectrically cooled, optically immersed photoconductive detectors

**PCI-3TE series** features three-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  $\lambda_{opt}$ . 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 ( $T_a = 20^\circ\text{C}$ )



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

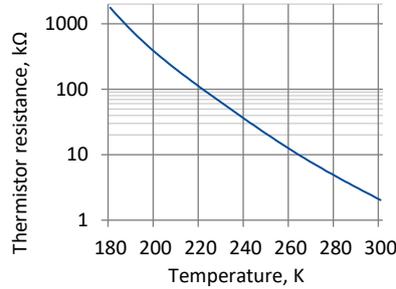
#### Specification ( $T_a = 20^\circ\text{C}$ )

Parameter	Detector type			
	PCI-3TE-9	PCI-3TE-10.6	PCI-3TE-12	PCI-3TE-13
Active element material	epitaxial HgCdTe heterostructure			
Optimal wavelength $\lambda_{opt}$ , μm	9.0	10.6	12.0	13.0
Detectivity $D^*(\lambda_{peak}, 20\text{kHz})$ , $\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$	$\geq 1.0 \times 10^{10}$	$\geq 4.5 \times 10^9$	$\geq 1.6 \times 10^9$	$\geq 9.0 \times 10^8$
Detectivity $D^*(\lambda_{opt}, 20\text{kHz})$ , $\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$	$\geq 6.2 \times 10^9$	$\geq 2.5 \times 10^9$	$\geq 9.0 \times 10^8$	$\geq 4.5 \times 10^8$
Current responsivity-optical area length product $R_i(\lambda_{opt}) \cdot L_{ov}$ , A·mm/W	$\geq 0.7$	$\geq 0.17$	$\geq 0.07$	$\geq 0.03$
Time constant $\tau$ , ns	$\leq 60$	$\leq 20$	$\leq 5$	$\leq 4$
1/f noise corner frequency $f_c$ , Hz	$\leq 10\text{k}$		$\leq 20\text{k}$	
Bias voltage-optical area length ratio $V_b/L_{ov}$ , V/mm	$\leq 0.2$		$\leq 0.15$	
Resistance $R$ , Ω	$\leq 400$		$\leq 300$	
Active element temperature $T_{det}$ , K	~210			
Optical area $A_{ov}$ , mm×mm	0.5×0.5, 1×1, 2×2			
Package	TO8, TO66			
Acceptance angle $\Phi$	~36°			
Window	wZnSeAR			

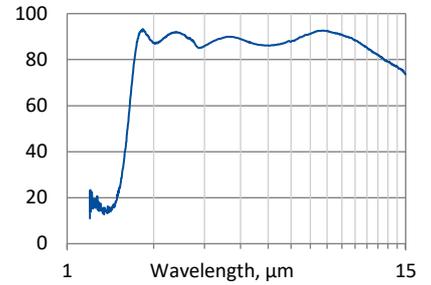
**Three-stage thermoelectric cooler parameters**

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

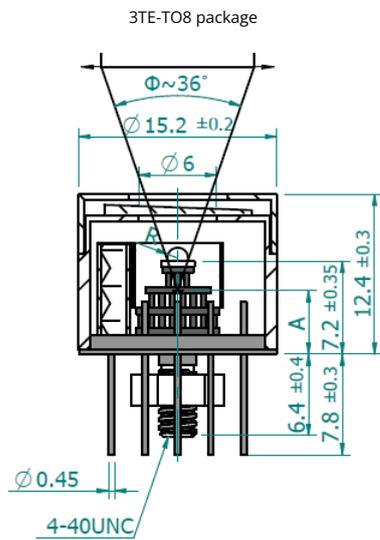
**Thermistor characteristics**



**Spectral transmission of wZnSeAR window (typical example)**

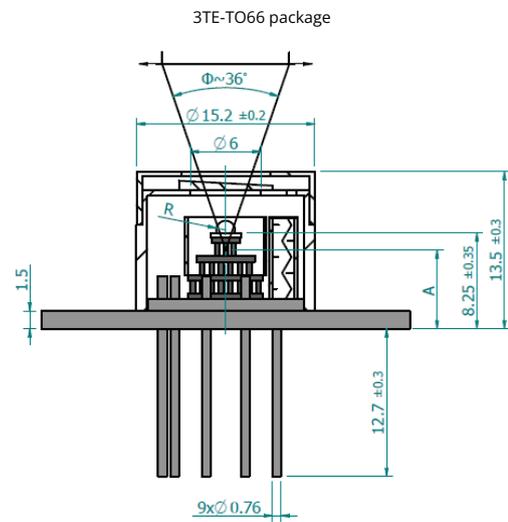


**Mechanical layout, mm**



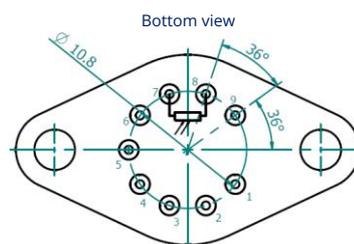
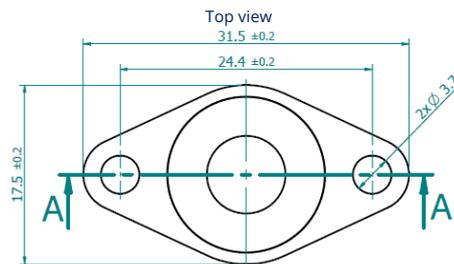
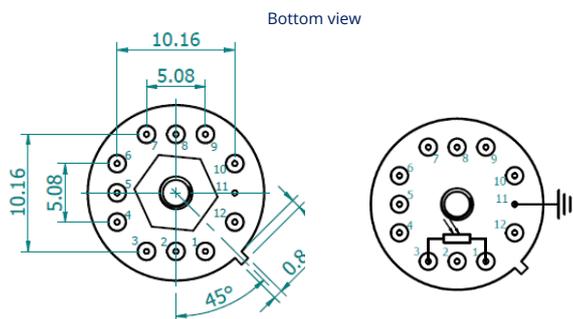
Parameter	Value		
Immersion microlens shape	hyperhemisphere		
Optical area $A_{opt}$ , mm×mm	0.5×0.5	1×1	2×2
$R$ , mm	0.5	0.8	1.25
$A$ , mm	5.7±0.35	4.8±0.35	3.45±0.35

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



Parameter	Value		
Immersion microlens shape	hyperhemisphere		
Optical area $A_{opt}$ , mm×mm	0.5×0.5	1×1	2×2
$R$ , mm	0.5	0.8	1.25
$A$ , mm	6.75±0.35	5.85±0.35	4.50±0.35

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



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

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

Dedicated preamplifier



„all-in-one“ AIP



programmable PIP



standard MIP



small SIP-T08