INFRARED DETECTORS AND MODULES – CONFIGURABLE LINE

VIGO offers various types of infrared detectors based on Mercury Cadmium Telluride, Indum Arsenide and Indium Arsenide Antimonide featuring different parameters.

Main features

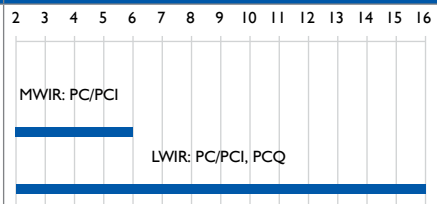
- Optimized at any wavelength from 2 – 14 μm spectral range
- With or without immersion technology
- Uncooled or thermoelectrically cooled
- Different sizes of active/optical area
- Different packages
- Different infrared windows
- Different acceptance angle
- Wide range of dedicated preamplifiers and accessories

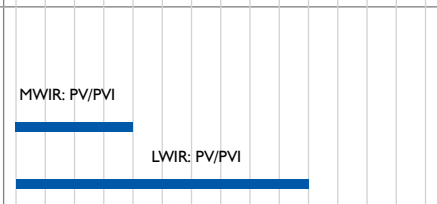
How to choose an infrared detector?

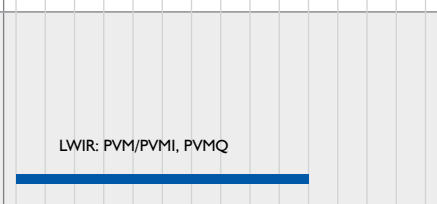
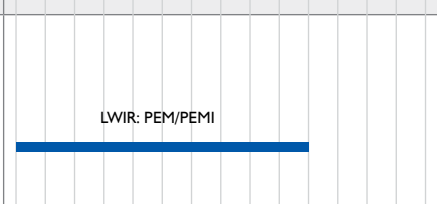
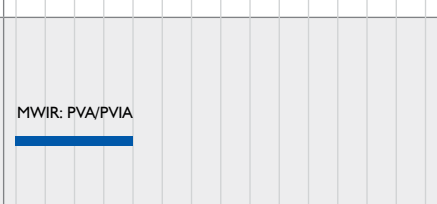
For making a detector selection, following points should be taken into consideration:

- wavelength or wavelength range,
- detectivity,
- speed of response.

VIGO detectors are optimized for various wavelengths. Depending on the required parameters a proper detector type should be selected.

Detector series	Spectral response range, μm	Features
HgCdTe (MCT) photoconductive detectors		› Broad 1 – 16 μm spectral range › Active area from 25×25 μm² to 4×4 mm² › High detectivity › Low speed › Long lifetime and MTBF › Stability and reliability › 1/f noise › Uncooled and TE cooled › Immersion microlens technology available

HgCdTe (MCT) photovoltaic detectors		› Near BLIP detection in 3 – 6 μm range
		› < 10x gap to BLIP for > 7 μm
		› No bias required
		› No 1/f noise
		› Bandwidth:
		  › tens of MHz (without reverse bias)
		  › ≥ 1GHz (with reverse bias)
		› LWIR devices limited to small areas
		› Uncooled and TE cooled
		› Immersion microlens technology available

HgCdTe (MCT) photovoltaic multiple junction detectors		› Wide 2 – 12 μm spectral range › Large active areas up to 4×4 mm² › No bias required › No 1/f noise › Short time constant ≤ 1.5 ns › Operation from DC to high frequency › Sensitive to IR radiation polarisation › Uncooled and TE cooled › Immersion microlens technology available
HgCdTe (MCT) photoelectromagnetic detectors		› Wide 2 – 12 μm spectral range › Room temperature operation › No bias required › No 1/f noise › Large active area up to 2×2 mm² › Short time constant ≤1.2 ns › Sensitive to IR radiation polarisation › Immersion microlens technology available
InAs and InAsSb photovoltaic detectors		› Spectral range 2 – 5.5 μm › Temperature stable up to 300°C › Mechanically durable › Complying with the RoHS Directive › No bias required › No 1/f noise › Sensitive to IR radiation polarisation › Uncooled and TE cooled › Immersion microlens technology available

Detector code

Different information such as detector type, optical immersion, number of stages thermoelectric cooler, the wavelength a detector is optimized for, size of active/optical area, package type, window type and acceptance angle combine to create VIGO System's detector code.

Detector type	Immersion	—	Cooling	—	Optimal wavelength	—	Active/optical area	—	Package	—	Window	—	Acceptance angle

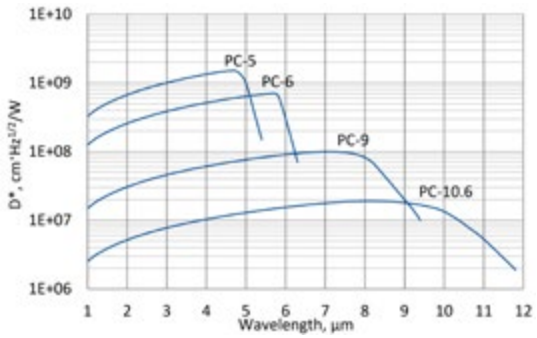
Please see particular detector series datasheets to get available options of each detector type.

PC series

1 – 12 μm HgCdTe ambient temperature photoconductive detectors

PC series features uncooled IR photoconductive detectors based on sophisticated HgCdTe heterostructures for the best performance and stability. The devices are optimized for the maximum performance at λ_{opt}. 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.

Spectral response (T_a = 20°C)



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

BNC **TO39**

Specification (T_a = 20°C)

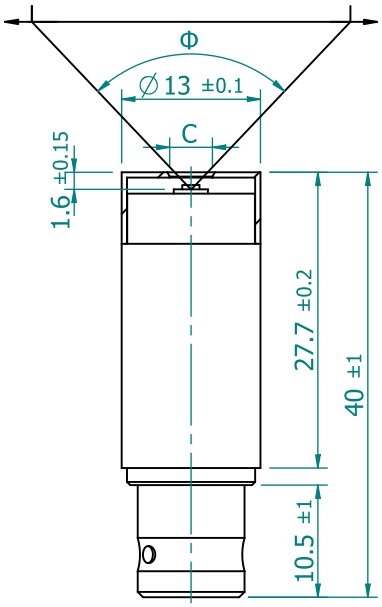
Parameter	Detector type							
	PC-5		PC-6		PC-9		PC-10.6	
Active element material	epitaxial HgCdTe heterostructure							
Optimal wavelength λ_{opt}, μm	5.0		6.0		9.0		10.6	
Detectivity D*(λ_{peak}, 20kHz), cm·Hz$^{1/2}$/W	≥1.5×10^9		≥7.0×10^8		≥1.0×10^8		≥1.9×10^7	
Detectivity D*(λ_{opt}, 20kHz), cm·Hz$^{1/2}$/W	≥1.0×10^9		≥3.0×10^8		≥2.0×10^7		≥9.0×10^6	
Current responsivity-active area length product $R_i(\lambda_{opt})$·L, A·mm/W	≥0.07		≥0.02		≥0.003		≥0.001	
Time constant τ, ns	≤5000		≤500		≤10		≤3	
1/f noise corner frequency f_c, Hz	≤10k						≤20k	
Bias voltage-active area length ratio V_b/L, V/mm	≤4.5		≤4.0		≤3.6		≤3.0	
Resistance R, Ω	≤1200		≤600		≤300		≤120	
Active area A, mm×mm	0.05×0.05, 0.1×0.1, 0.25×0.25, 0.5×0.5, 1×1, 2×2, 3×3, 4×4							
Package	TO39	BNC	TO39	BNC	TO39	BNC	TO39	BNC
Acceptance angle Φ	~90°	~102°*), ~124°**)	~90°	~102°*), ~124°**)	~90°	~102°*), ~124°**)	~90°	~102°*), ~124°**)
Window	none							

*) *Aperture C = Ø4 mm.*

**) *Aperture C = Ø6 mm.*

Mechanical layout, mm

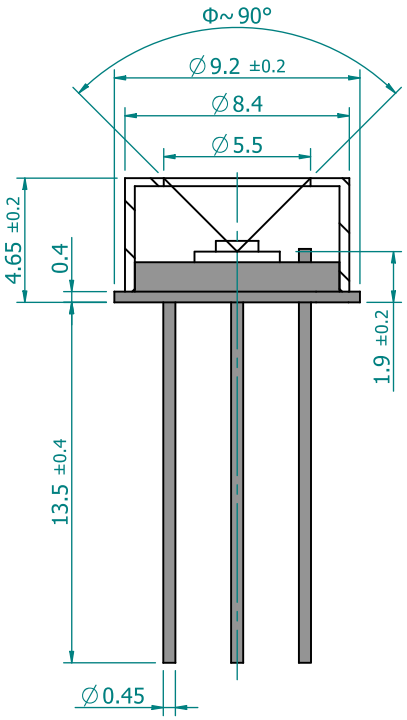
BNC package



Parameter	Value	
Active area, mm×mm	0.05×0.05 – 2×2	3×3 – 4×4
C, mm	Ø4	Ø6
Acceptance angle Φ	~102°	~124°

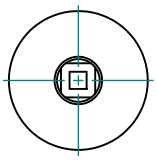
C – aperture

TO39 package

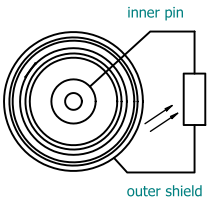


Φ – acceptance angle

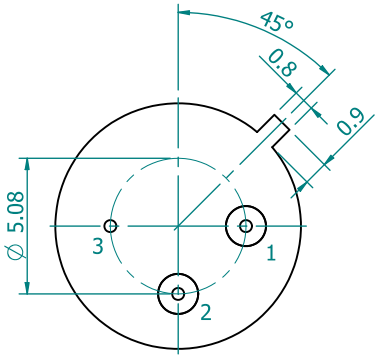
Top view



Bottom view

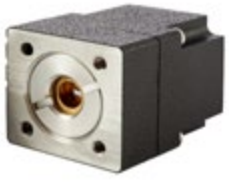


Bottom view



Function	Pin number
Detector	1, 2
Chassis ground	3

Dedicated preamplifier



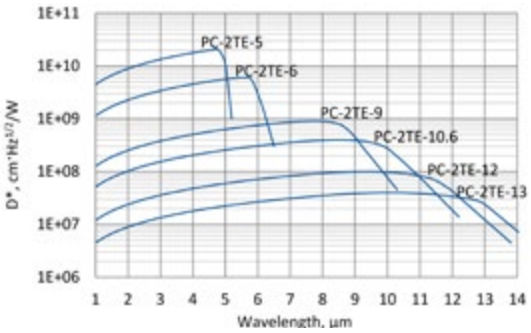
small SIP-TO39

PC-2TE series

1 – 14 μm HgCdTe two-stage thermoelectrically cooled photoconductive detectors

PC-2TE series features two-stage thermoelectrically cooled IR photoconductive detectors based on sophisticated HgCdTe heterostructures for the best performance and stability. The devices are optimized for the maximum performance at λ_{opt}. 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 sapphire (wAl_2O_3) or 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.

2TE-TO66

2TE-TO8

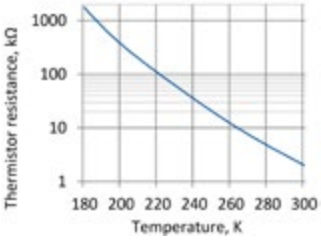
Specification (T_a = 20°C)

Parameter	Detector type					
	PC-2TE-5	PC-2TE-6	PC-2TE-9	PC-2TE-10.6	PC-2TE-12	PC-2TE-13
Active element material	epitaxial HgCdTe heterostructure					
Optimal wavelength λopt, μm	5.0	6.0	9.0	10.6	12.0	13.0
Detectivity D*(λ_{opt}, 20kHz), cm·Hz$^{1/2}$/W	≥1.0×10^{10}	≥3.0×10^{9}	≥4.5×10^{8}	≥1.4×10^{8}	≥4.5×10^{7}	≥2.3×10^{7}
Detectivity D*(λ_{peak}, 20kHz), cm·Hz$^{1/2}$/W	≥2.0×10^{10}	≥6.0×10^{9}	≥9.0×10^{8}	≥4.0×10^{8}	≥1.0×10^{8}	≥4.0×10^{7}
Current responsivity-active area length product $R_i(\lambda_{opt})$·L, A·mm/W	≥0.5	≥0.18	≥0.025	≥0.01	≥0.005	≥0.002
Time constant τ, ns	≤20000	≤4000	≤40	≤10	≤3	≤2
1/f noise corner frequency f_c, Hz	≤10k			≤20k		
Bias voltage-active area length ratio V_b/L, V/mm	≤2.0	≤3.2	≤2.0	≤2.25	≤1.5	≤1.8
Resistance R, Ω	≤1200	≤800	≤400	≤300	≤200	≤150
Active element temperature T_{det}, K	~230					
Active area A, mm×mm	0.05×0.05, 0.1×0.1, 0.25×0.25, 0.5×0.5, 1×1, 2×2					
Package	TO8, TO66					
Acceptance angle Φ	~70°					
Window	wAl_2O_3	wZnSeAR				

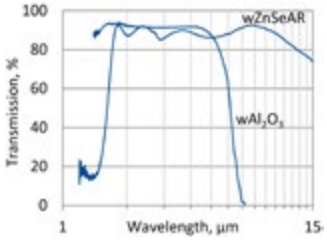
Four-stage thermoelectric cooler parameters

Parameter	Value
T_{det}, K	~230
V_{max}, V	1.3
I_{max}, A	1.2
Q_{max}, W	0.36

Thermistor characteristics



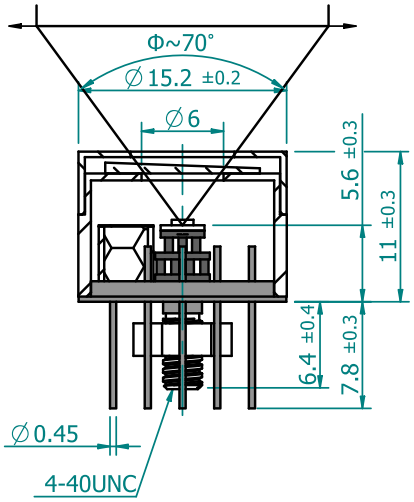
Spectral transmission of wZnSeAR window (typical example)



www.vigo.com.pl +48 22 733 54 10 info@vigo.com.pl

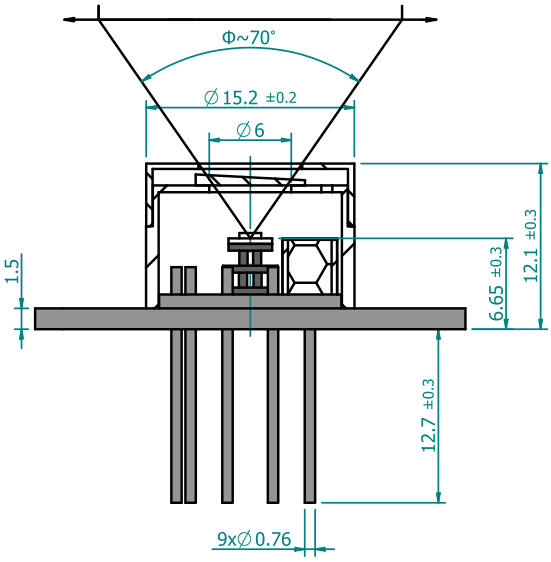
Mechanical layout, mm

2TE-TO8 package



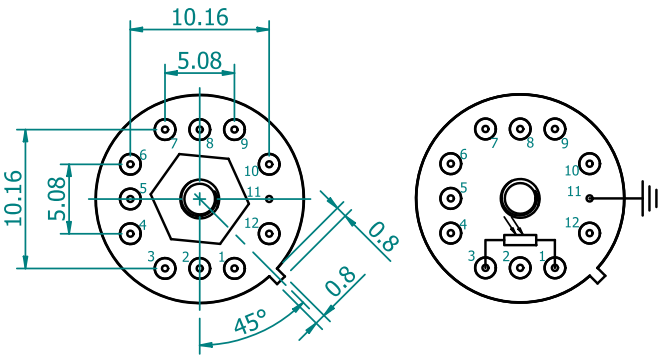
Φ – *acceptance angle*

2TE-TO66 package



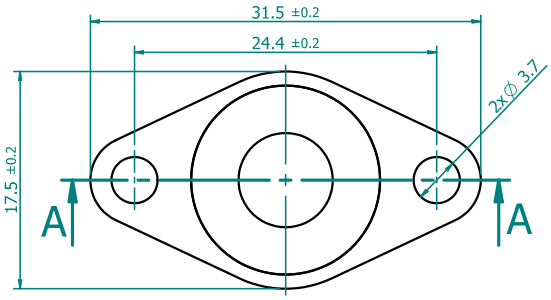
Φ – *acceptance angle*

Bottom view

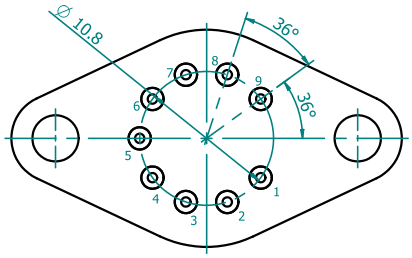


Function	Pin number
Detector	1, 3
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

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

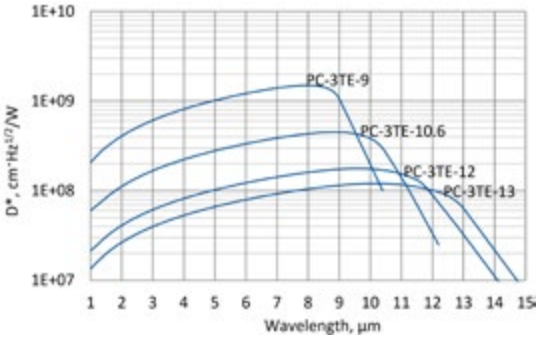
small SIP-TO8

PC-3TE series

1 – 15 μm HgCdTe three-stage thermoelectrically cooled photoconductive detectors

PC-3TE series features three-stage thermoelectrically cooled IR photoconductive detectors based on sophisticated HgCdTe heterostructures for the best performance and stability. The devices are optimized for the maximum performance at λ_{opt}. 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.

3TE-TO66

3TE-TO8

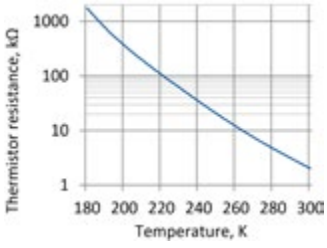
Specification (T_a = 20°C)

Parameter	Detector type			
	PC-3TE-9	PC-3TE-10.6	PC-3TE-12	PC-3TE-13
Active element material	epitaxial HgCdTe heterostructure			
Optimal wavelength λ_{opt}, μm	9.0	10.6	12.0	13.0
Detectivity D*(λ_{opt}, 20kHz), cm·Hz$^{1/2}$/W	≥1.0×10^9	≥2.5×10^8	≥9.0×10^7	≥6.0×10^7
Detectivity D*(λ_{peak}, 20kHz), cm·Hz$^{1/2}$/W	≥1.5×10^9	≥4.5×10^8	≥1.8×10^8	≥1.2×10^8
Current responsivity-active area length product $R_i(\lambda_{opt})$·L, A·mm/W	≥0.075	≥0.02	≥0.01	≥0.007
Time constant τ, ns	≤60	≤20	≤5	≤4
1/f noise corner frequency f_c, Hz	≤10k	≤20k		
Bias voltage-active area length ratio V_b/L, V/mm	≤2.0	≤1.5		
Resistance R, Ω	≤400	≤300		
Active element temperature T_{det}, K	~210			
Active area A, mm×mm	0.05×0.05, 0.1×0.1, 0.25×0.25, 0.5×0.5, 1×1, 2×2			
Package	TO8, TO66			
Acceptance angle Φ	~70°			
Window	wZnSeAR			

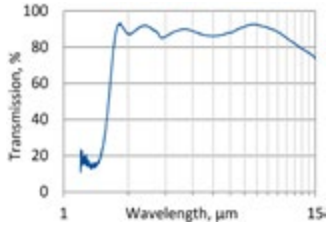
Three-stage thermoelectric cooler parameters

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

Thermistor characteristics

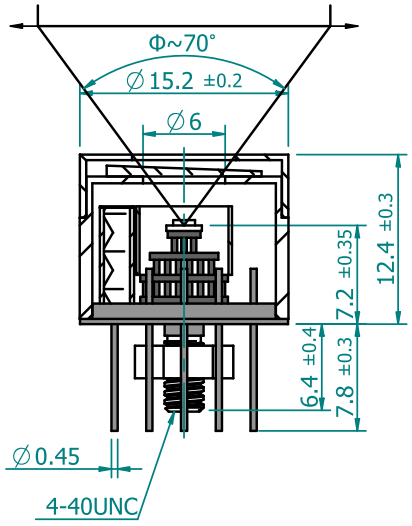


Spectral transmission of wZnSeAR window (typical example)



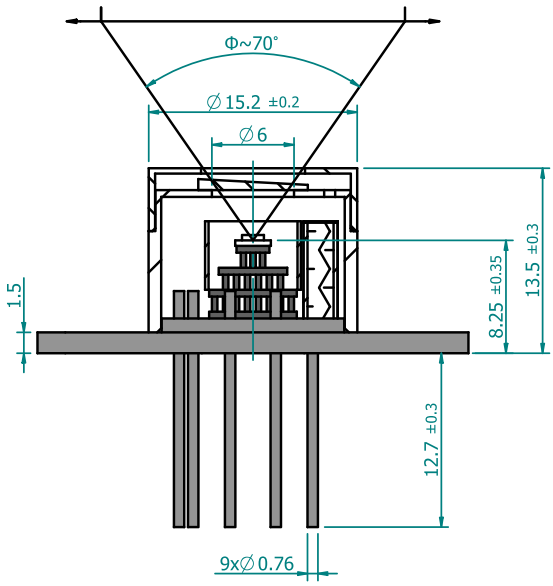
Mechanical layout, mm

3TE-TO8 package



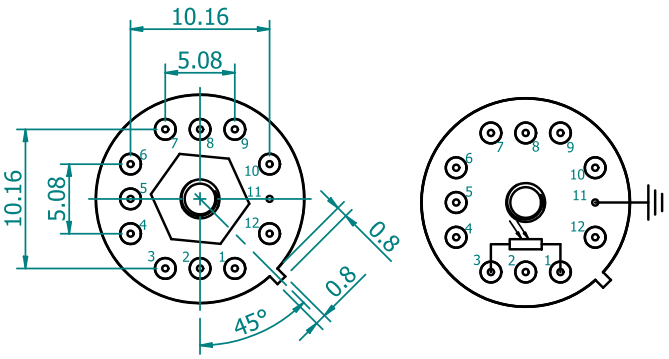
Φ – *acceptance angle*

3TE-TO66 package



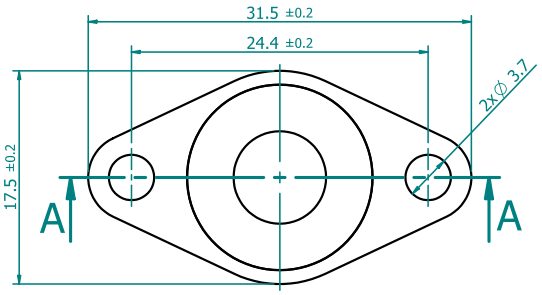
Φ – *acceptance angle*

Bottom view

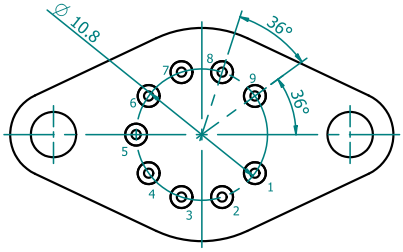


Function	Pin number
Detector	1, 3
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

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

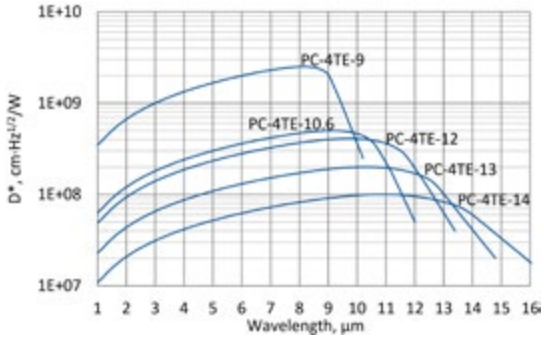
small SIP-TO8

PC-4TE series

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

PC-4TE series features four-stage thermoelectrically cooled IR photoconductive detectors based on sophisticated HgCdTe heterostructures for the best performance and stability. The devices are optimized for the maximum performance at λ_{opt}. 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

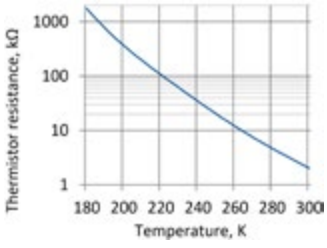
Specification (T_a = 20°C)

Parameter	Detector type				
	PC-4TE-9	PC-4TE-10.6	PC-4TE-12	PC-4TE-13	PC-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	≥2.5×10^9	≥5.0×10^8	≥4.0×10^8	≥2.0×10^8	≥1.0×10^8
Detectivity D*(λ_{opt}, 20kHz), cm·Hz$^{1/2}$/W	≥2.0×10^9	≥3.5×10^8	≥2.0×10^8	≥1.0×10^8	≥6.0×10^7
Current responsivity-active area length product $R_i(\lambda_{opt})$·L, A·mm/W	≥0.1	≥0.03	≥0.015	≥0.01	≥0.007
Time constant τ, ns	≤80	≤30	≤7	≤6	≤5
1/f noise corner frequency f_c, Hz	≤10k	≤20k			
Bias voltage-active area length ratio V_b/L, V/mm	≤3.8	≤3.0			≤2.25
Resistance R, Ω	≤500	≤400			≤300
Active element temperature T_{det}, K	~195				
Active area A, mm×mm	0.05×0.05, 0.1×0.1, 0.25×0.25, 0.5×0.5, 1×1, 2×2				
Package	TO8, TO66				
Acceptance angle Φ	~70°				
Window	wZnSeAR				

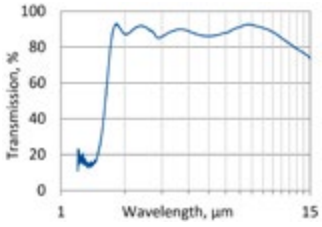
Four-stage thermoelectric cooler parameters

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)



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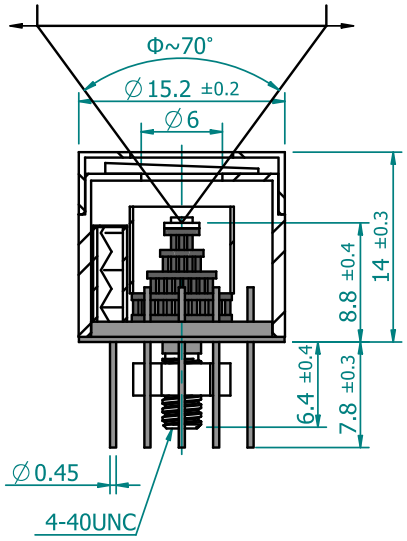
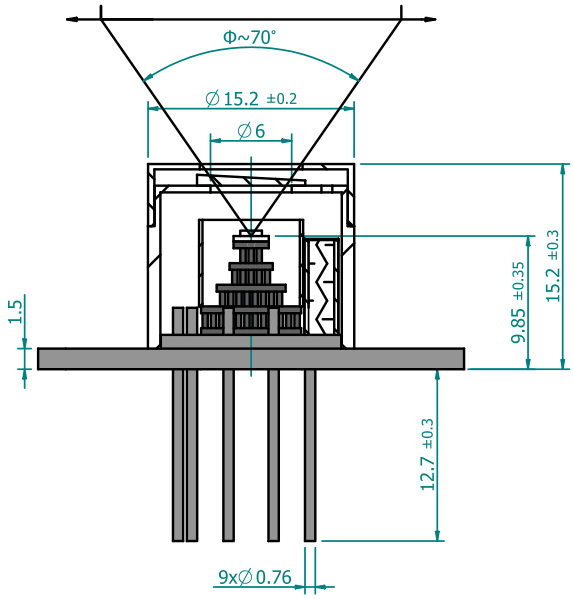
Mechanical layout, mm

4TE-TO8 package



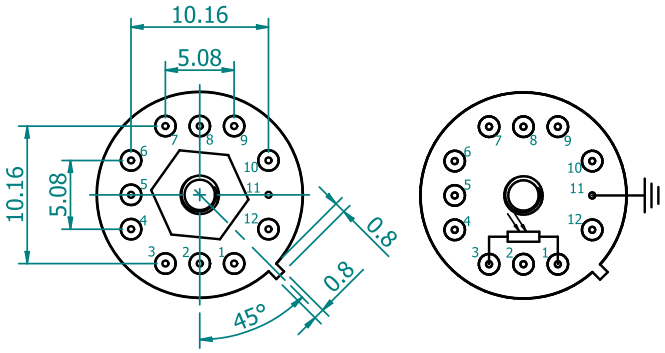
Φ – *acceptance angle*

4TE-TO66 package



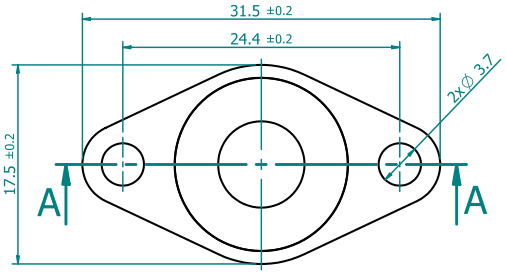
Φ – *acceptance angle*

Bottom view

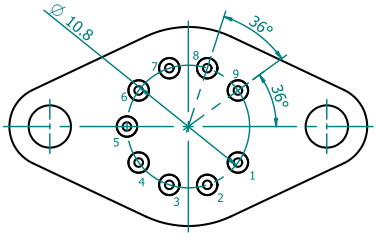


Function	Pin number
Detector	1, 3
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

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

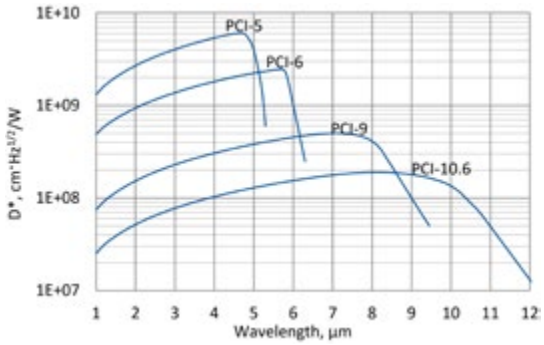
small SIP-TO8

PCI series

1 – 12 μm HgCdTe ambient temperature, optically immersed photoconductive detectors

PCI series features uncooled 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.

Spectral response (T_a = 20°C)



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

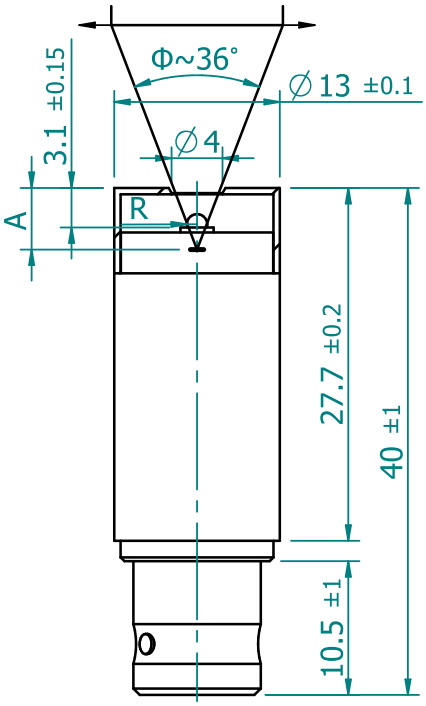
BNC **TO39**

Specification (T_a = 20°C)

Parameter	Detector type			
	PCI-5	PCI-6	PCI-9	PCI-10.6
Active element material	epitaxial HgCdTe heterostructure			
Optimal wavelength λ_{opt}, μm	5.0	6.0	9.0	10.6
Detectivity D*(λ_{peak}, 20kHz), cm·Hz$^{1/2}$/W	≥6.0×10^9	≥2.5×10^9	≥5.0×10^8	≥1.0×10^8
Detectivity D*(λ_{opt}, 20kHz), cm·Hz$^{1/2}$/W	≥4.0×10^9	≥1.0×10^9	≥1.0×10^8	≥8.0×10^7
Current responsivity-active area length product $R_i(\lambda_{opt})$·L, A·mm/W	≥0.5	≥0.2	≥0.02	≥0.008
Time constant τ, ns	≤5000	≤500	≤10	≤3
1/f noise corner frequency f_c, Hz	≤10k			≤20k
Bias voltage-active area length ratio V_b/L, V/mm	≤0.45	≤0.4	≤0.36	≤0.3
Resistance R, Ω	≤1200	≤600	≤300	≤120
Optical area A_O, mm×mm	0.5×0.5, 1×1, 2×2			
Package	TO39, BNC			
Acceptance angle Φ	~36°			
Window	none			

Mechanical layout, mm

BNC package



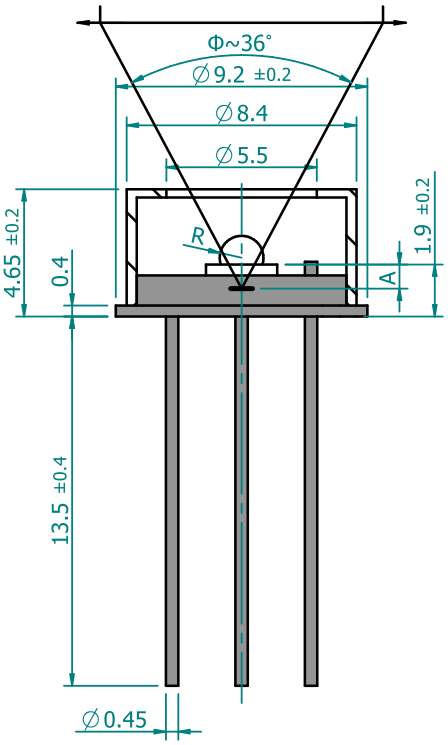
Parameter	Value		
Immersion microlens shape	hyperhemisphere		
Optical area A_o, mm×mm	0.5×0.5	1×1	2×2
R, mm	0.5	0.8	1.25
A, mm	4.6±0.3	5.5±0.3	6.85±0.30

Φ – *acceptance angle*

R – hyperhemisphere microlens radius

A – distance from the top of BNC package to the focal plane

TO39 package



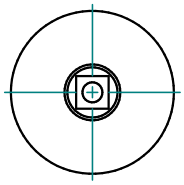
Parameter	Value		
Immersion microlens shape	hyperhemisphere		
Optical area A_o, mm×mm	0.5×0.5	1×1	2×2
R, mm	0.5	0.8	1.25
A, mm	1.5±0.2	2.4±0.2	3.75±0.20

Φ – *acceptance angle*

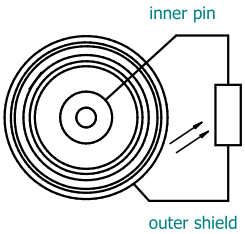
R – hyperhemisphere microlens radius

A – distance from the bottom of hyperhemisphere microlens to the focal plane

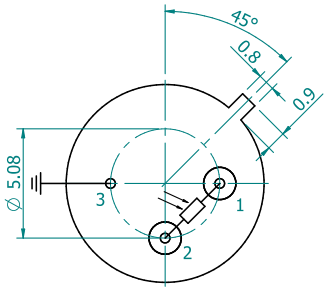
Top view



Bottom view

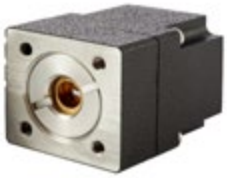


Bottom view



Function	Pin number
Detector	1, 2
Chassis ground	3

Dedicated preamplifiers



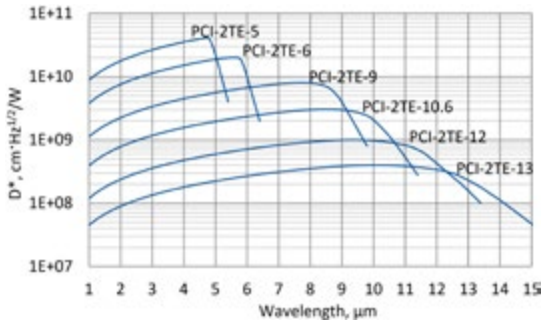
small SIP-TO39

PCI-2TE series

1 – 15 μm HgCdTe two-stage thermoelectrically cooled, optically immersed photoconductive detectors

PCI-2TE series features two-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 sapphire (wAl_2O_3) or 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.

2TE-TO66

2TE-TO8

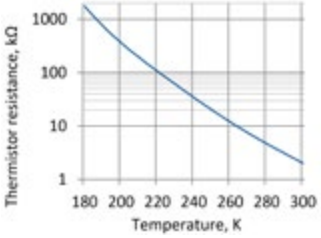
Specification (T_a = 20°C)

Parameter	Detector type					
	PCI-2TE-5	PCI-2TE-6	PCI-2TE-9	PCI-2TE-10.6	PCI-2TE-12	PCI-2TE-13
Active element material	epitaxial HgCdTe heterostructure					
Optimal wavelength λ_{opt}, μm	5.0	6.0	9.0	10.6	12.0	13.0
Detectivity D*(λ_{peak}, 20kHz), cm·Hz$^{1/2}$/W	≥4.0×10^{10}	≥2.0×10^{10}	≥8.0×10^{9}	≥2.8×10^{9}	≥1.0×10^{9}	≥4.0×10^{8}
Detectivity D*(λ_{opt}, 20kHz), cm·Hz$^{1/2}$/W	≥2.0×10^{10}	≥1.0×10^{10}	≥4.0×10^{9}	≥1.0×10^{9}	≥4.5×10^{8}	≥2.3×10^{8}
Current responsivity-active area length product $R_i(\lambda_{opt})$·L, A·mm/W	≥3.0	≥1.5	≥0.225	≥0.1	≥0.05	≥0.03
Time constant τ, ns	≤20000	≤4000	≤40	≤10	≤3	≤2
1/f noise corner frequency f_c, Hz	≤10k			≤20k		
Bias voltage-active area length ratio V_b/L, V/mm	≤0.2	≤0.32	≤0.2	≤0.225	≤0.15	≤0.18
Resistance R, Ω	≤1200	≤800	≤400	≤300	≤200	≤150
Active element temperature T_{det}, K	~230					
Optical area A_O, mm×mm	0.5×0.5, 1×1, 2×2					
Package	TO8, TO66					
Acceptance angle Φ	~36°					
Window	wAl_2O_3	wZnSeAR				

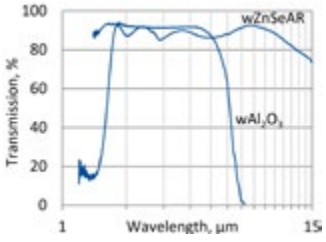
Three-stage thermoelectric cooler parameters

Parameter	Value
T_{det}, K	~230
V_{max}, V	1.3
I_{max}, A	1.2
Q_{max}, W	0.36

Thermistor characteristics

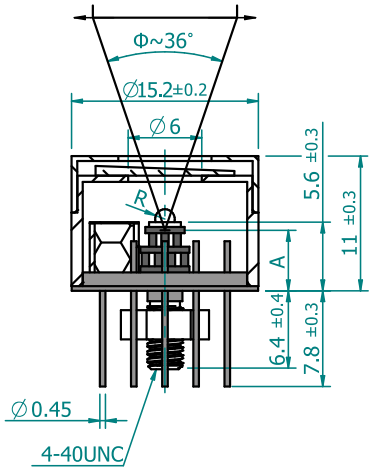


Spectral transmission of wAl_2O_3 and wZnSeAR windows (typical example)



Mechanical layout, mm

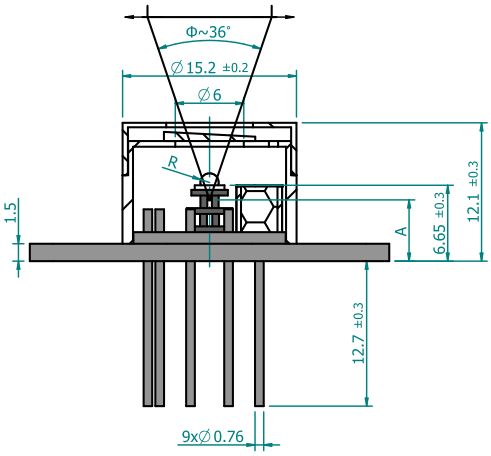
2TE-TO8 package



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	4.1±0.3	3.2±0.3	1.85±0.30

Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 2TE-TO8 header to the focal plane

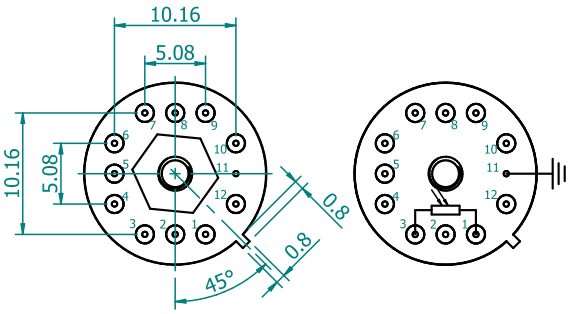
2TE-TO66 package



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	5.15±0.30	3.2±0.3	1.85±0.30

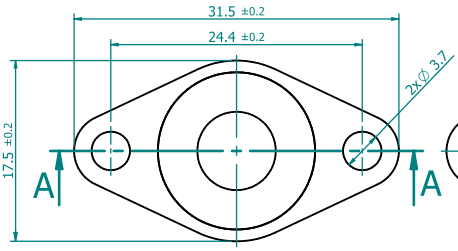
Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 2TE-TO66 header to the focal plane

Bottom view

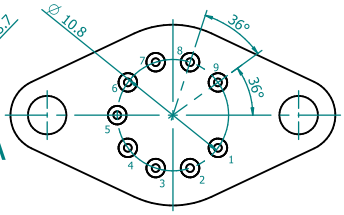


Function	Pin number
Detector	1, 3
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

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

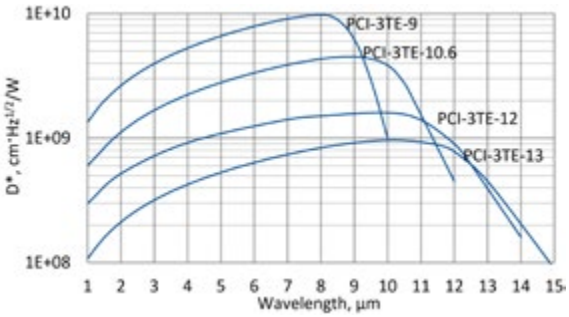
small SIP-TO8

PCI-3TE series

1 – 15 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 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.

3TE-TO66

3TE-TO8

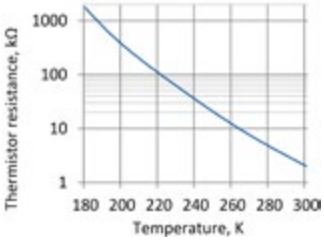
Specification (T_a = 20°C)

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

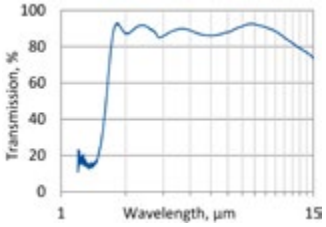
Two-stage thermoelectric cooler parameters

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)



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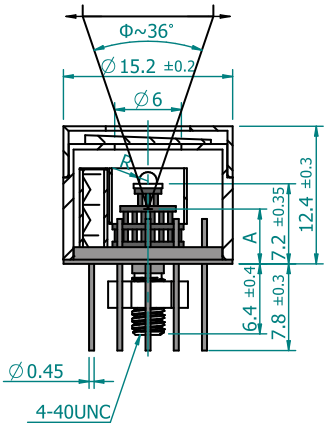
Mechanical layout, mm

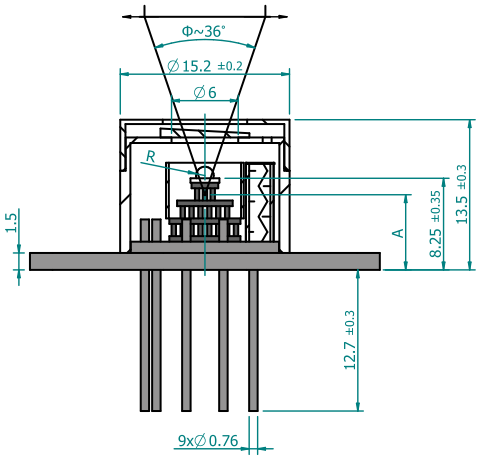
2TE-TO8 package



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	5.7±0.35	4.8±0.35	3.45±0.35

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

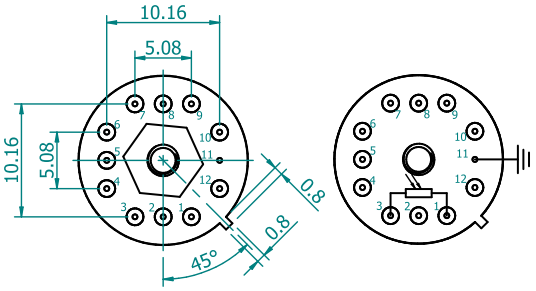
2TE-TO66 package



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	6.75±0.35	5.85±0.35	4.50±0.35

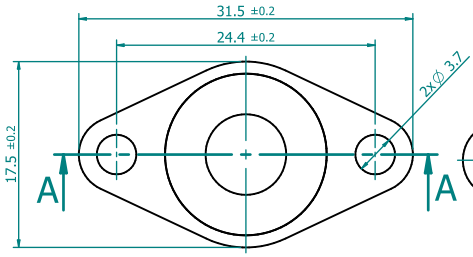
Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 3TE-TO66 header to the focal plane

Bottom view

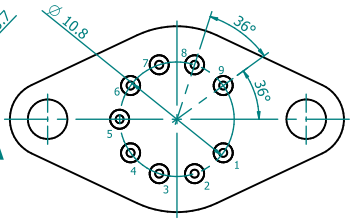


Function	Pin number
Detector	1, 3
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

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

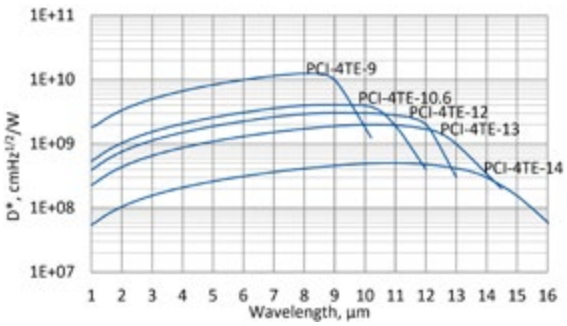
small SIP-TO8

PCI-4TE series

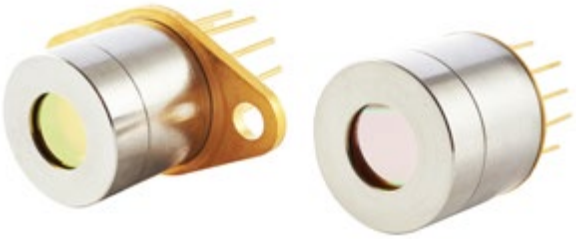
1 – 16 μm HgCdTe four-stage thermoelectrically cooled, optically immersed photoconductive detectors

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**

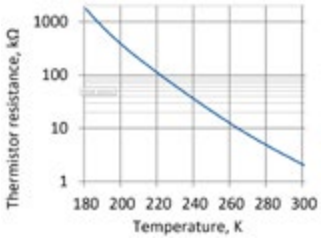
Specification (T_a = 20°C)

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-active area length product $R_i(\lambda_{opt})$·L, 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-active area length ratio V_b/L, 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				

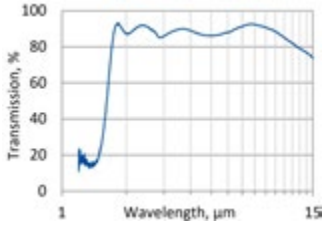
Two-stage thermoelectric cooler parameters

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)



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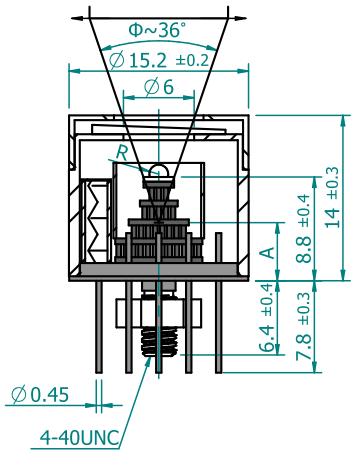
Mechanical layout, mm

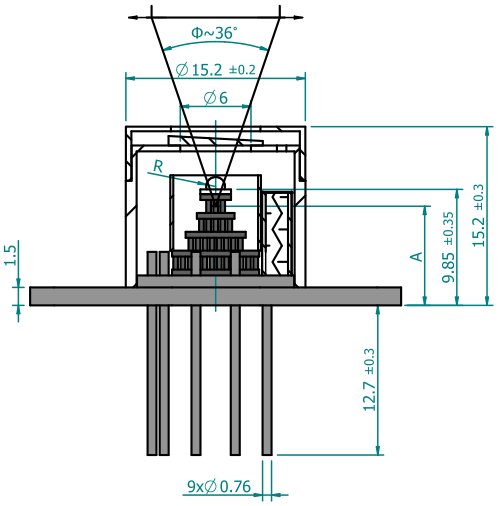
4TE-TO8 package



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

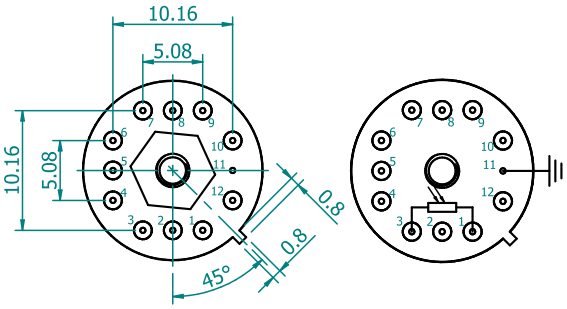
4TE-TO66 package



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

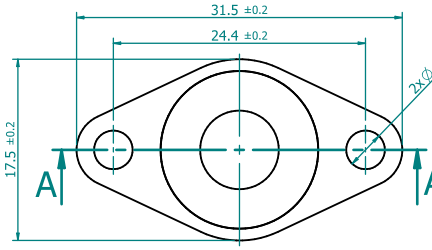
Φ – acceptance angle
R – hyperhemisphere microlens radius
A – distance from the bottom of 4TE-TO66 header to the focal plane

Bottom view

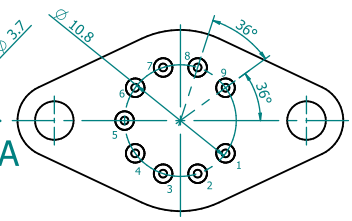


Function	Pin number
Detector	1, 3
Thermistor	7, 9
TE cooler supply	2(+), 8(–)
Chassis ground	11
Not used	4, 5, 6, 10, 12

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

INFRARED DETECTORS AND DETECTION MODULES – SELECTED LINE

We present VIGO most popular infrared detectors and integrated detection modules. These devices are suitable for both laboratory research as well as tests, prototyping, R&D stage and in a variety of MWIR and LWIR industrial applications.

Main features

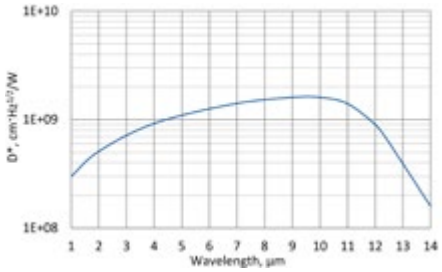
- High performance and reliability
- Very good repeatability in mass production
- Cost-effective sollutions
- Fast delivery

PCI-3TE-12-1×1-TO8-wZnSeAR-36

2 – 14 μm HgCdTe three-stage thermoelectrically cooled, optically immersed photoconductive detector

PCI-3TE-12-1×1-TO8-wZnSeAR-36 is a three-stage thermoelectrically cooled IR photoconductor, based on sophisticated HgCdTe heterostructure for the best performance and stability. The device is optimized for the maximum performance at 12 μm. Detector element is monolithically integrated with hyperhemispherical GaAs microlens in order to improve performance of the device. Photoconductive detector should operate in optimum bias voltage and current readout mode. Performance at low frequencies is reduced due to 1/f noise. 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.

Specification (T_a = 20°C)

Parameter	Detector type PCI-3TE-12-1×1-TO8-wZnSeAR-36
Active element material	epitaxial HgCdTe heterostructure
Cut-on wavelength λ_{cut-on} (10%), μm	≤2.0
Peak wavelength λ_{peak}, μm	10.0±0.2
Optimum wavelength λ_{opt}, μm	12.0
Cut-off wavelength $\lambda_{cut-off}$ (10%), μm	14.0±0.2
Detectivity D*(λ_{peak}), cm·Hz$^{1/2}$/W	≥1.6×10^9
Detectivity D*(λ_{opt}), cm·Hz$^{1/2}$/W	≥9.0×10^8
Current responsivity R_i(λ_{peak}), A/W	≥0.11
Current responsivity R_i(λ_{opt}), A/W	≥0.07
Time constant τ, ns	≤5
Resistance R, Ω	≤300
Bias voltage Vb, V	≤1.8
1/f noise corner frequency f_c, kHz	≤20
Active element temperature T_{det}, K	~210
Optical area A_O, mm×mm	1×1
Package	TO8
Acceptance angle Φ	~36°
Window	wZnSeAR

Features

- Wide spectral range from 1 to 14 μm
- High responsivity
- Large dynamic range
- Excellent long term stability and reliability
- Quantity discounted price
- Fast delivery

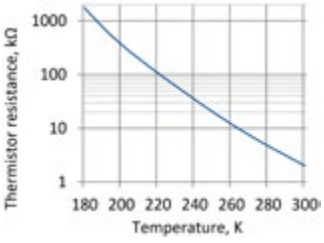
Applications

- FTIR spectroscopy and spectrometry

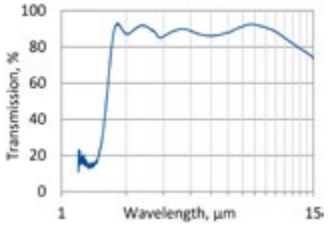
Four-stage thermoelectric cooler parameters

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

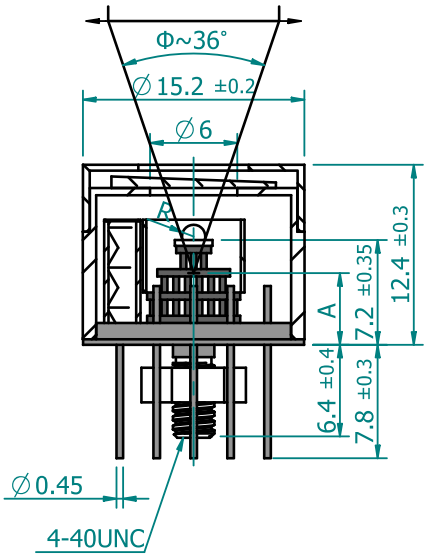
Thermistor characteristics



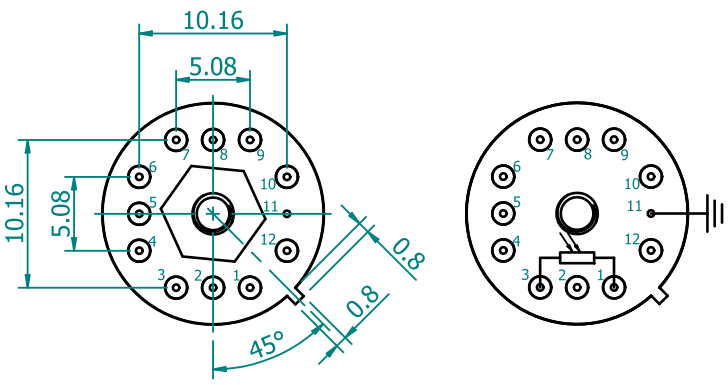
Spectral transmission of wZnSeAR window (typical example)



Mechanical layout, mm



Bottom view



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

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

Φ – *acceptance angle*

R – hyperhemisphere microlens radius

A – distance from the bottom of the 3TE-TO8 header to the focal plane

Precautions for use and storage

- Heatsink with thermal resistance of ~2 K/W is necessary to dissipate heat generated by 3TE cooler.
- Operation in 10% to 80% humidity and -20°C to 30°C ambient temperature.
- Beam power limitations for optically immersed detector:
  - irradiance with CW or single pulse longer than 1 μs irradiance on the apparent optical active area must not exceed 2.5 W/cm^2,
  - irradiance of the pulse shorter than 1 μs must not exceed 10 kW/cm^2.
- Storage in dark place with 10% to 90% humidity and -20°C to 50°C ambient temperature.