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

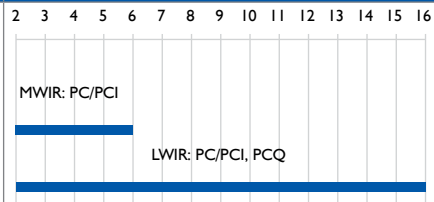
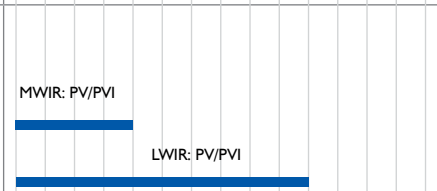
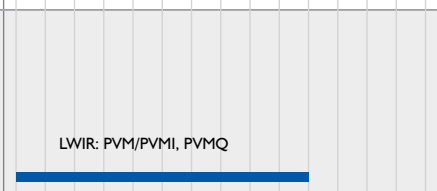
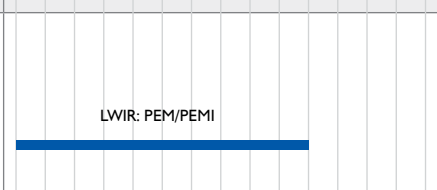
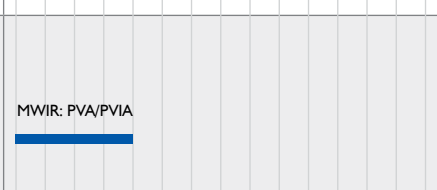
- Optimized at any wavelength from 2 – 14 μm spectral range
- With or without immersion technology
- Uncooled or thermoelectrically cooled
- Different sizes of active/optical area
- Different packages
- Different infrared windows
- Different acceptance angle
- Wide range of dedicated preamplifiers and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

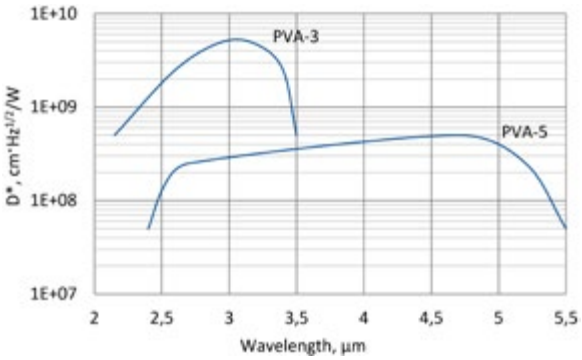
Please see particular detector series datasheets to get available options of each detector type.

PVA series

2.0 – 5.5 μm InAs and InAsSb ambient temperature photovoltaic detectors

PVA series features uncooled IR photovoltaic detectors based on $InAs_{1-x}Sb_x$ alloys. The devices are temperature stable up to 300°C and mechanically durable. They do not contain mercury or cadmium and are complying with the RoHS Directive.

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



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

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

Parameter	Detector type	
	PVA-3	PVA-5
Active element material	epitaxial InAs heterostructure	epitaxial InAsSb heterostructure
Cut-on wavelength $\lambda_{cut\text{-}on}$ (10%), µm	2.15±0.20	2.3±0.2
Peak wavelength λ_{peak}, µm	2.95±0.30	4.7±0.3
Cut-off wavelength $\lambda_{cut\text{-}off}$ (10%), µm	3.5±0.2	5.5±0.2
Detectivity $D^*(\lambda_{peak})$, cm·Hz$^{1/2}$/W	≥5.0×10^9	≥5.0×10^8
Current responsivity $R_i(\lambda_{peak})$, A/W	≥1.3	≥1.3
Time constant τ, ns	≤20	≤60
Resistance R, Ω	≥2k	≥70
Active area A, mm×mm	0.1×0.1	
Package	TO39	
Acceptance angle Φ	~90°	
Window	none	

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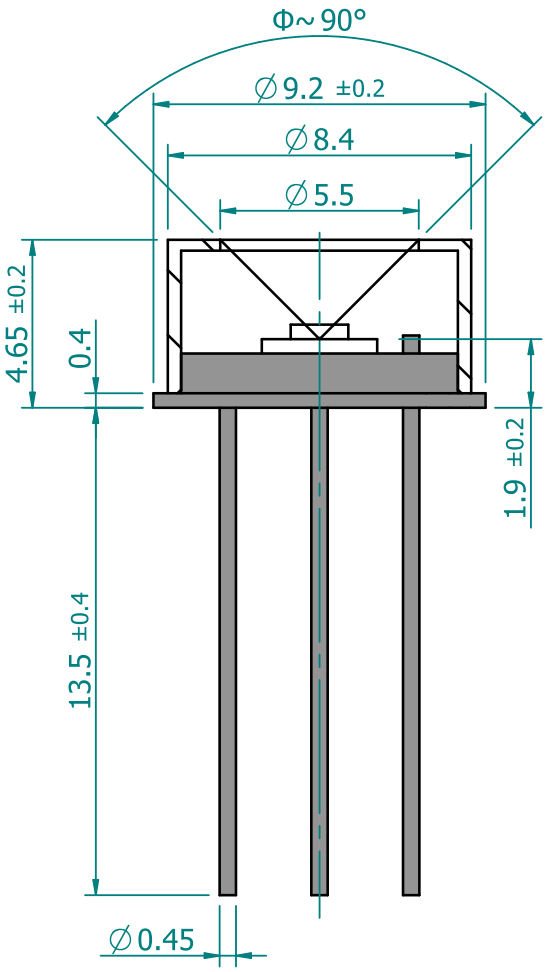
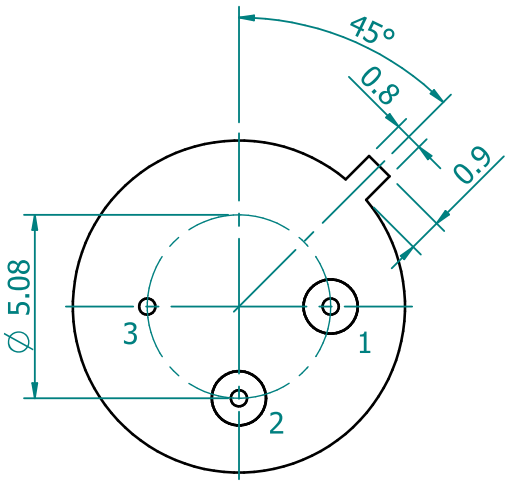
Mechanical layout, mm



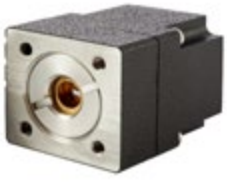
Φ – *acceptance angle*

Bottom view



Function	Pin number
Detector	1, 2
Chassis ground	3

Dedicated preamplifiers



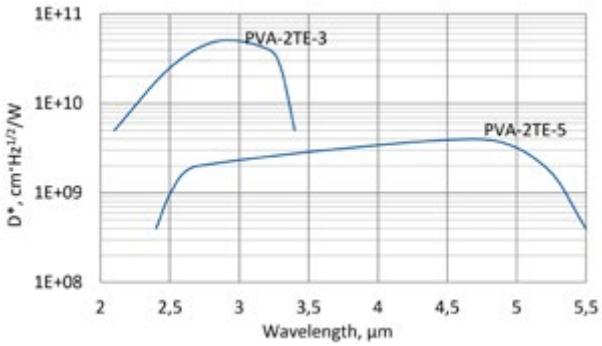
small SIP-TO39

PVA-2TE series

2.0 – 5.5 μm InAs and InAsSb two-stage thermoelectrically cooled photovoltaic detectors

PVA-2TE series features two-stage thermoelectrically cooled IR photovoltaic detectors based on InAsSb alloys. The devices are temperature stable up to 300°C and mechanically durable. They do not contain mercury or cadmium and are complying with the RoHS Directive. 3° wedged sapphire (wAl_2O_3) 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.

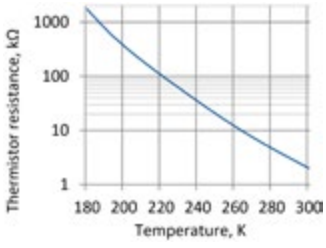
Specification (T_a = 20°C, V_b = 0 mV)

Parameter	Detector type	
	PVA-2TE-3	PVA-2TE-5
Active element material	epitaxial InAs heterostructure	epitaxial InAsSb heterostructure
Cut-on wavelength $\lambda_{cut\text{-}on}$ (10%), μm	2.1±0.2	2.4±0.2
Peak wavelength λ_{peak}, μm	2.9±0.3	4.7±0.3
Cut-off wavelength $\lambda_{cut\text{-}off}$ (10%), μm	3.4±0.2	5.5±0.2
Detectivity D*(λ_{peak}), cm·Hz$^{1/2}$/W	≥5.0×10^{10}	≥4.0×10^{9}
Current responsivity $R_i(\lambda_{peak})$, A/W	≥1.3	≥1.5
Time constant τ, ns	≤15	≤20
Resistance R, Ω	≥200k	≥1.0k
Active element temperature T_{det}, K	~230	
Active area A, mm×mm	0.1×0.1	
Package	TO8	
Acceptance angle Φ	~70°	
Window	wAl_2O_3	

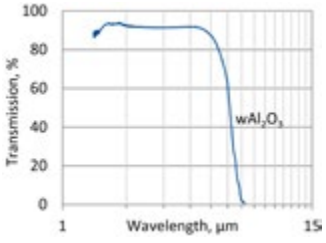
Two-stage thermoelectric cooler parameters

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

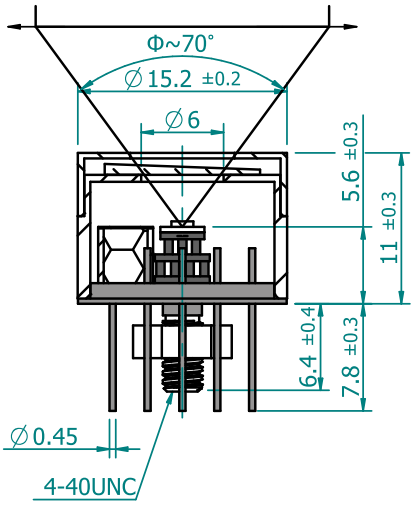
Thermistor characteristics



Spectral transmission of wAl_2O_3 window (typical example)

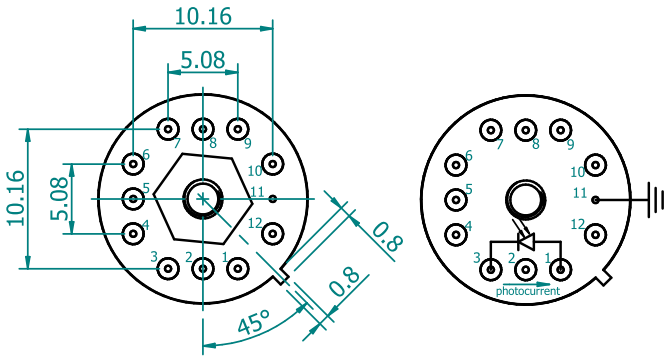


Mechanical layout, mm



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

Dedicated preamplifiers

„all-in-one" AIP

programmable PIP

standard MIP

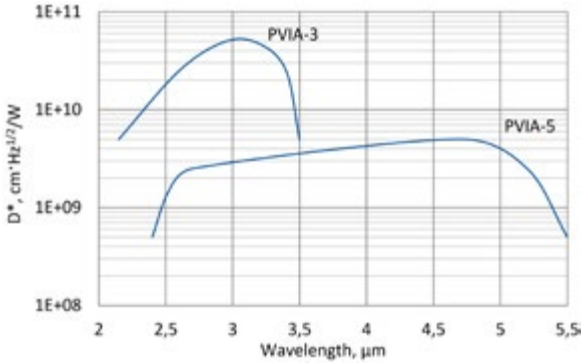
small SIP-TO8

PVIA series

2.0 – 5.5 μm InAs and InAsSb ambient temperature, optically immersed photovoltaic detectors

PVIA series features uncooled IR photovoltaic detectors based on InAsSb alloys, optically immersed in order to improve performance of the devices. The detectors are temperature stable up to 300°C and mechanically durable. They do not contain mercury or cadmium and are complying with the RoHS Directive.

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

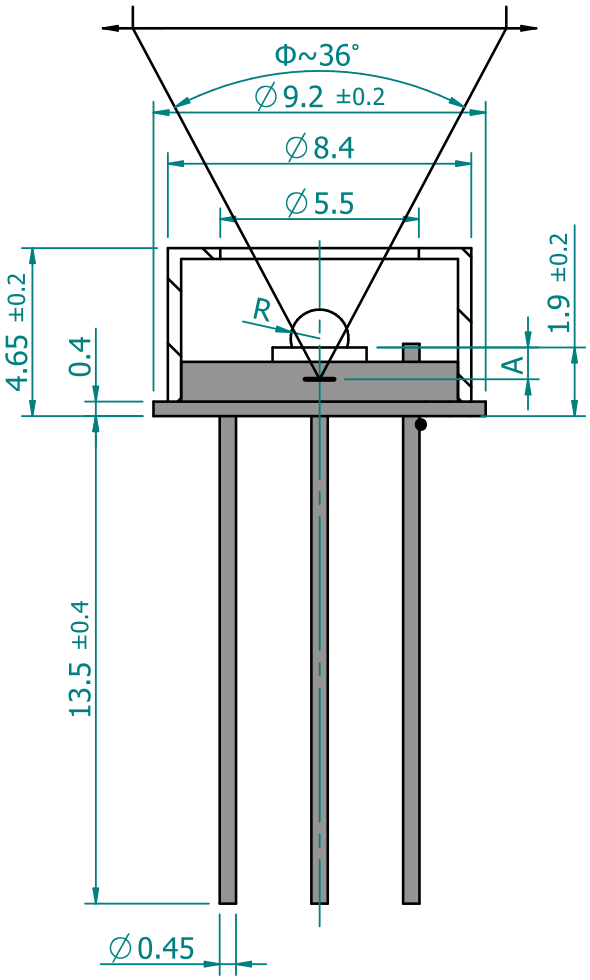


Exemplary spectral detectivity, the spectral response of delivered devices may differ.

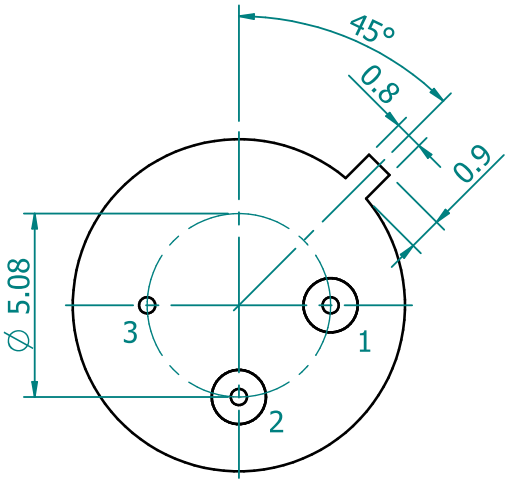
Specification (T_a = 20°C, V_b = 0 mV)

Parameter	Detector type	
	PVIA-3	PVIA-5
Active element material	epitaxial InAs heterostructure	epitaxial InAsSb heterostructure
Cut-on wavelength $\lambda_{cut\text{-}on}$ (10%), μm	2.15±0.20	2.3±0.2
Peak wavelength λ_{peak}, μm	2.95±0.30	4.7±0.3
Cut-off wavelength $\lambda_{cut\text{-}off}$ (10%), μm	3.5±0.2	5.5±0.2
Detectivity $D^*(\lambda_{peak})$, cm·Hz$^{1/2}$/W	≥1.3	≥1.3
Current responsivity $R_i(\lambda_{peak})$, A/W	≥5.0×10^{10}	≥5.0×10^{9}
Time constant τ, ns	≤20	≤15
Resistance R, Ω	≥2k	≥70
Optical area A_O, mm×mm	1×1	
Package	TO39	
Acceptance angle Φ	~36°	
Window	none	

Mechanical layout, mm



Bottom view

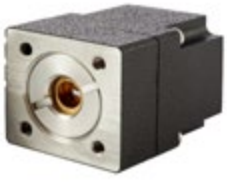


Function	Pin number
Detector	1, 2
Chassis ground	3

Parameter	Value
Immersion microlens shape	hyperhemisphere
Optical area A_o, mm×mm	1×1
R, mm	0.8
A, mm	2.4±0.2

Φ – *acceptance angle*
R – hyperhemisphere microlens radius
A – distance from the bottom of hyperhemisphere microlens to the focal

Dedicated preamplifiers



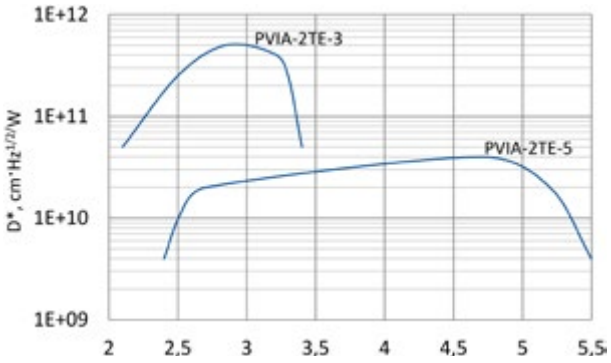
small SIP-TO39

PVIA-2TE series

2.0 – 5.5 μm InAs and InAsSb two-stage thermoelectrically cooled, optically immersed photovoltaic detectors

PVIA-2TE series features two-stage thermoelectrically cooled IR photovoltaic detectors based on InAsSb alloys, optically immersed in order to improve performance of the devices. The detectors are temperature stable up to 300°C and mechanically durable. They do not contain mercury or cadmium and are complying with the RoHS Directive. 3° wedged sapphire (wAl_2O_3) 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.

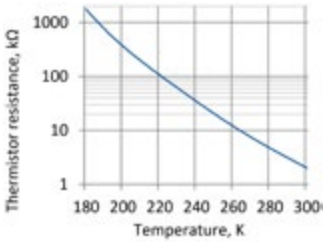
Specification (T_a = 20°C, V_b = 0 mV)

Parameter	Detector type	
	PVIA-2TE-3	PVIA-2TE-5
Active element material	epitaxial InAs heterostructure	epitaxial InAsSb heterostructure
Cut-on wavelength $\lambda_{cut\text{-}on}$ (10%), μm	2.1±0.2	2.4±0.2
Peak wavelength λ_{peak}, μm	2.9±0.3	4.7±0.3
Cut-off wavelength $\lambda_{cut\text{-}off}$ (10%), μm	3.4±0.2	5.5±0.2
Detectivity D*(λ_{peak}), cm·Hz$^{1/2}$/W	≥5.0×10^{11}	≥4.0×10^{10}
Current responsivity $R_i(\lambda_{peak})$, A/W	≥1.3	≥1.5
Time constant τ, ns	≤15	≤5
Resistance R, Ω	≥200k	≥1.0k
Active element temperature T_{det}, K	~230	
Optical area A_O, mm×mm	1×1	
Package	TO8	
Acceptance angle Φ	~36°	
Window	wAl_2O_3	

Two-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 window (typical example)