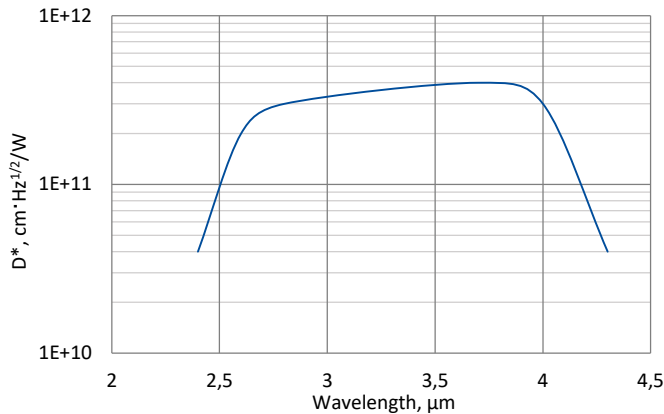


## PVI-2TE-4-1x1-TO8-wAl<sub>2</sub>O<sub>3</sub>-36

### 2.4 – 4.3 μm HgCdTe two-stage thermoelectrically cooled, optically immersed photovoltaic detector

**PVI-2TE-4-1x1-TO8-wAl<sub>2</sub>O<sub>3</sub>-36** is two-stage thermoelectrically cooled IR photovoltaic detector based on sophisticated HgCdTe heterostructure for the best performance and stability. The device is optimized for the maximum performance at 4 μm. Detector element is monolithically integrated with hyperhemispherical GaAs microlens in order to improve performance of the device. 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>) 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 ( $T_a = 20^\circ\text{C}$ , $V_b = 0\text{ mV}$ )

Parameter	Detector type
	PVI-2TE-4-1x1-TO8-wAl <sub>2</sub> O <sub>3</sub> -36
Active element material	epitaxial HgCdTe heterostructure
Cut-on wavelength $\lambda_{\text{cut-on}}$ (10%), μm	2.4±0.5
Peak wavelength $\lambda_{\text{peak}}$ , μm	3.5±0.5
Optimum wavelength $\lambda_{\text{opt}}$ , μm	4.0
Cut-off wavelength $\lambda_{\text{cut-off}}$ (10%), μm	4.3±0.3
Detectivity $D^*(\lambda_{\text{peak}})$ , cm·Hz <sup>1/2</sup> /W	≥4.0×10 <sup>11</sup>
Detectivity $D^*(\lambda_{\text{opt}})$ , cm·Hz <sup>1/2</sup> /W	≥3.0×10 <sup>11</sup>
Current responsivity $R_i(\lambda_{\text{peak}})$ , A/W	≥2.0
Current responsivity $R_i(\lambda_{\text{opt}})$ , A/W	≥1.3
Time constant $\tau$ , ns	≤100
Resistance $R$ , Ω	≥20000
Active element temperature $T_{\text{det}}$ , K	~230
Optical area $A_o$ , mm×mm	1×1
Package	TO8
Acceptance angle $\Phi$	~36°
Window	wAl <sub>2</sub> O <sub>3</sub>

#### Features

- High performance
- D\* better by one order of magnitude compared with the same type uncooled detector
- Wide dynamic range
- Quantity discounted price
- Fast delivery

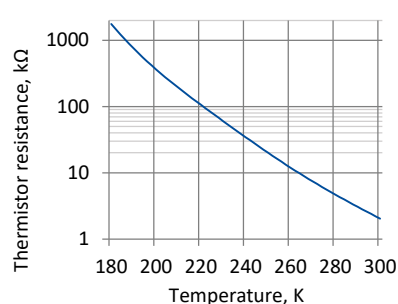
#### Applications

- Gas detection, monitoring and analysis (CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, CH<sub>2</sub>O, HCl, NH<sub>3</sub>, SO<sub>2</sub>, C<sub>2</sub>H<sub>6</sub>)
- Breath analysis
- Explosion prevention
- Flue gas denitrification
- Emission control (exhaust fumes, greenhouse gases)

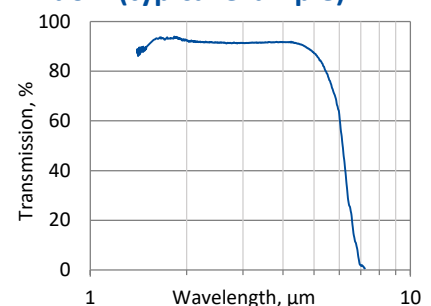
#### Two-stage thermoelectric cooler parameters

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

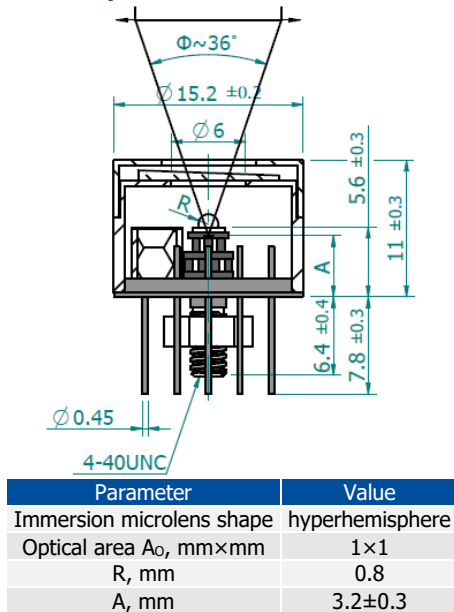
#### Thermistor characteristics



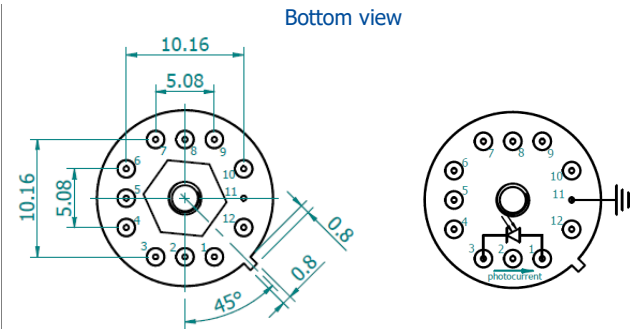
#### Spectral transmission of wAl<sub>2</sub>O<sub>3</sub> window (typical example)



### Mechanical layout, mm



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



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

### Precautions for use and storage

- Standard ohmmeter may overbias and damage the detector. Bias of 10 mV can be used for resistance measurements.
- Heatsink with thermal resistance of ~2 K/W is necessary to dissipate heat generated by 2TE 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<sup>2</sup>,
  - irradiance of the pulse shorter than 1 μs must not exceed 10 kW/cm<sup>2</sup>.
- Storage in dark place with 10% to 90% humidity and -20°C to 50°C ambient temperature.