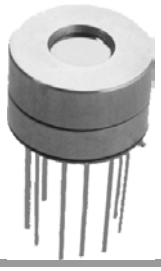
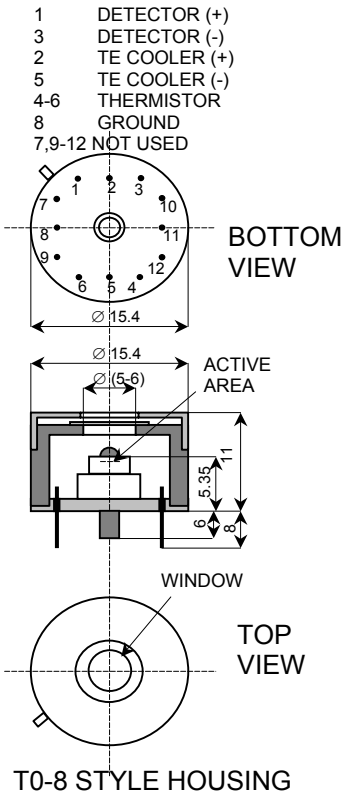
2-12 µm IR
PHOTOVOLTAIC DETECTORS
THERMOELECTRICALLY COOLED
OPTICALLY IMMERSED
SERIES PDI-2TE

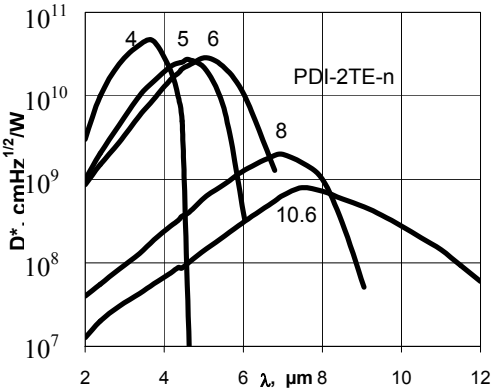


FEATURES

- **High performance in the 2-11 µm range withoutLN_2-cooling!**
- **Fast response**
- **No flicker (*1/f*) noise**
- **Convenient to use**
- **Wide dynamic range**
- **Compact, rugged and reliable**



SPECTRAL RESPONSE



Typical spectral detectivities of PDI-2TE photovoltaic detectors (with BaF_2 windows)

PDI-2TE photodetectors are typically mounted on two-stage low-power thermoelectric coolers and packaged in modified T0-8-style cans. Standard devices are delivered with BaF_2 windows. Packages with ZnSe, CdTe, CaF_2, sapphire, AR-coated Si and Ge windows and with variety of connectors are available upon request. For proper operation, the units must be mounted on an appropriate heat sink to dissipate the heat generated by TE cooler.

APPLICATIONS

Detection of low and high frequency modulated 2-12 µm IR radiation ✹ IR spectroscopy ✹ fourier transform spectroscopy ✹ fast and multicolor pyrometry ✹ thermal imagers and scanners ✹ remote sensing ✹ gas analysis ✹ fire and flame detection ✹ human body detection ✹ laser beam diagnostics ✹ laser warning receivers ✹ laser radar, range finders and communications.

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DESCRIPTION

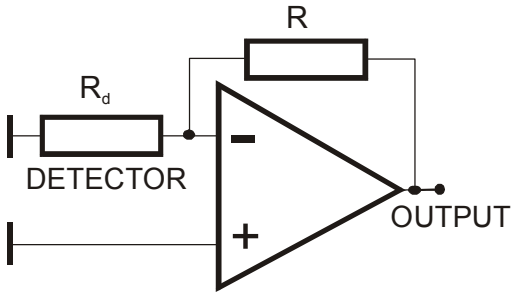
The PDI-2TE-n series detectors (where n is wavelength λ_{op}, in micrometers, for which the detector is optimized) are two-stage TE-cooled IR photovoltaic detectors, which have been optically immersed to high refractive index CdZnTe hemispherical or hyperhemispherical lenses. These devices can be optimized for the maximum performance anywhere from 2 to 12 μm. High performance and stability were achieved by using variable gap semiconductors (Hg-Cd-Zn-Te) as well as graded composition and doping level profiles and optimized surface processing. Custom devices such as quadrant cells, multi-element arrays, specialized packages, connectors, windows and optical filters are available on request.

SPECIFICATION @ 20

CHARACTERISTICS	UNITS	PDI-2TE-4	PDI-2TE-5	PDI-2TE-6	PDI-2TE-8	PDI-2TE-10.6
λ_{op}	μm	4	5	6	8	10.6
Detectivity: **at λ_p** **at λ_{op}**	$cmHz^{1/2}/W$	$\geq 1\cdot10^{11}$ $>4\cdot10^{10}$	$\geq 5\cdot10^{10}$ $>2\cdot10^{10}$	$\geq 3\cdot10^{10}$ $\geq 1\cdot10^{10}$	$\geq 3\cdot10^{9}$ $\geq 1\cdot10^{9}$	$\geq 6\cdot10^{8}$ $\geq 2\cdot10^{8}$
Responsivity ($1\times1mm^2$)	V/W	≥900	≥290	≥50	≥7	≥1
Response Time	ns	≤20	≤20	≤10	≤7	≤3
Resistance ($1\times1mm^2$)	Ω	500- 9000	200-1500	40-400	40-300	30-200
Area (optical)	mm × mm	0.25×0.25; 0.5×0.5; 1×1; 2×2;				
Field of View*	deg	42 (60)*				
Operating Temperature* **	K	220–240				

* 60^{O} FOV available only for hemispherically immersed devices with D* reduced by a factor ≈2.7
** Recommended cooler current is specified with each detector.
*** TE-cooled devices require heat sinks with thermal resistances ≤3K/W

OPERATING CIRCUIT



Typical circuitry

CAUTION!

- **CW OPTICAL POWER MUST NOT EXCEED 20 W/cm²!**
- **PULSES SHORTER THAN 1 μs MUST NOT EXCEED 10 kW/cm²!**
- **AVOID STEADY-STATE OR TRANSIENT OVERBIASING OF DETECTOR!**
- **AVOID OVERBIASING AND REVERSING POLARITY OF TE-COOLER!**

We offer optimized preamplifiers and cooler controllers for these detectors

The PDI-2TE photodetectors are low resistance devices, compatible with a wide range of low noise preamplifiers and power supplies. Requiring no bias, they can be DC coupled to the electronics. For best performance they should be used with specialized electronics, in dependence on the frequency band. Resistor R should have resistance of at least 5 times greater than that of detector R_d.

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