

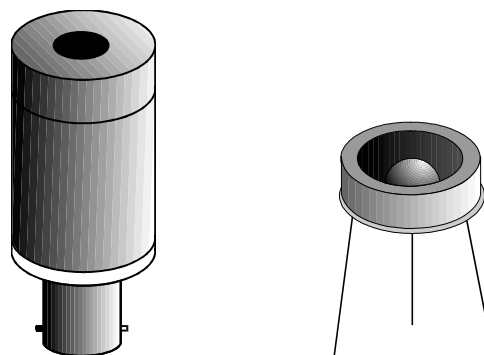


## PD-10.6 Series Photovoltaic CO<sub>2</sub> Laser Detectors

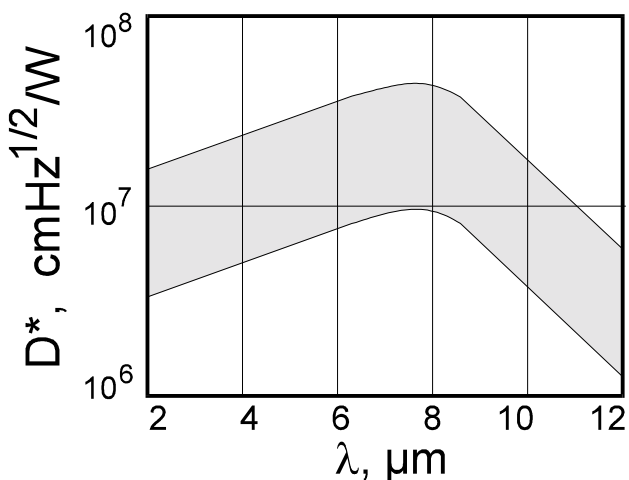
### PHOTOVOLTAIC CO<sub>2</sub> Laser Detectors 2-12 $\mu\text{m}$ IR PHOTODETECTORS ROOM TEMPERATURE

#### FEATURES

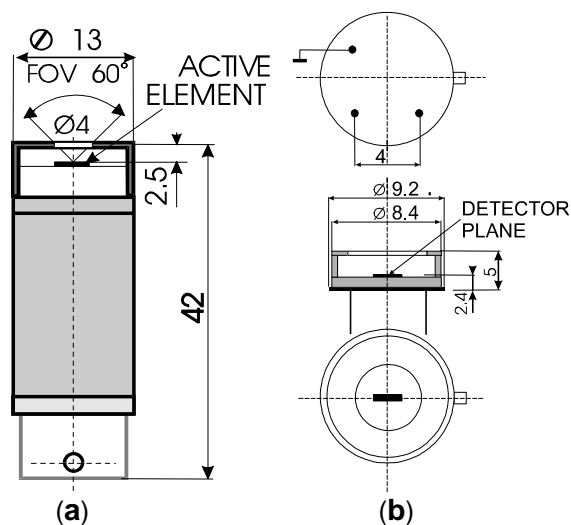
- Room temperature operation
- No bias required
- Wide spectral range (2-12  $\mu\text{m}$ )
- $D^*(10.6 \mu\text{m}) > 2 \cdot 10^6 \text{ cmHz}^{1/2}/\text{W}$
- Time constant  $\tau < 1 \text{ nsec}$
- No  $1/f$  (flicker) noise
- Operation DC to  $> 800 \text{ MHz}$
- Lightweight and rugged
- Convenient and reliable



#### SPECTRAL RESPONSE



Typical spectral detectivity of PD detectors as a function of wavelength.



Devices are packaged in specialized packages with BNC connectors (a) for broadband applications and in inexpensive modified TO-5-style packages (b) for low frequency operation (0-20 MHz). The devices are usually mounted with no windows. Packages with customer specified connectors and windows are also available.



## DESCRIPTION

PD series detectors operate by the photodiffusion effect, producing photovoltage in the semiconductor. The devices are optimized for 10.6  $\mu\text{m}$  and are useful at all shorter wavelengths. Recent improvements include use of the newly developed quaternary semiconductor (Hg-Cd-Zn-Te) with selected composition and profiled doping. PD series detectors offer improved performance and speed. They are housed in small, lightweight, rugged packages. Measured performance data are provided with each detector.

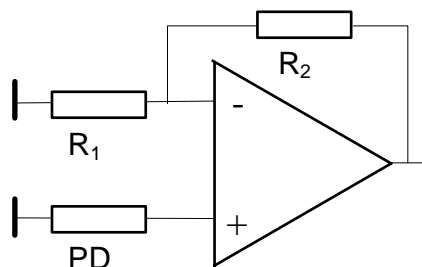
PD series detectors are exceptionally well suited for high frequency and heterodyne detection of 10.6  $\mu\text{m}$  radiation due to their very short response time. Exhibiting no  $1/f$  (flicker) noise, they can also be used for detection of CW and low frequency modulated radiation anywhere in the 2-12  $\mu\text{m}$  spectral range.

## SPECIFICATIONS

Specifications are subject to change without notice. Specifications measured @20°C, 1x1 active area.

Characteristics	Units	PD-10.6-3	PD-10.6-5	PD-10.6-8
Spectral range	$\mu\text{m}$	2 – 12		
Response time	nsec	<1		
Detectivity (peak)	$\text{cmHz}^{1/2}/\text{W}$	$>8 \cdot 10^6$	$>2 \cdot 10^7$	$>3.2 \cdot 10^7$
Detectivity (10.6 $\mu\text{m}$ )	$\text{cmHz}^{1/2}/\text{W}$	$>3 \cdot 10^6$	$>5 \cdot 10^6$	$>8 \cdot 10^6$
Responsivity-Width product (10.6 $\mu\text{m}$ )	$\text{V} \cdot \text{mm}/\text{W}$	$>0.03$	$>0.05$	$>0.08$
Area	$\text{mm}^2$	0.1x0.1; 0.2x0.2, 0.5x0.5; 1x1, 2x2, 3x3; 4x4		
Field of view	deg	$>60$		
Sheet Resistivity	$\Omega$	50 – 120		
Max. signal per mm of element length, Single Pulses <1 $\mu\text{sec}$ ..... CW.....	$\text{V}/\text{mm}$	$>0.60$ $>0.01$	$>1.0$ $>0.015$	$>1.6$ $>0.024$

## TYPICAL OPERATING CIRCUIT



## CAUTION

- CW optical power must not exceed  $100\text{W}/\text{cm}^2$ !
- Pulses shorter than must not exceed  $1\text{MW}/\text{cm}^2$ !

More Information: see J. Piotrowski et al., "New generation of near-room temperature photodetectors", Optical Engineering, May 1994, Vol. 33 No. 5, pages 1413-1421

We supply compatible low-noise preamplifiers with bandwidths from DC to 200 MHz or, AC-coupled, to  $500^+$  MHz. These detectors require no bias voltage and exhibit no  $1/f$  (flicker) noise and thus have optimum performance from DC to very high frequencies.

