



70777 HgCdZnTe Detector.

- n Broad spectral response 2 to 12  $\mu\text{m}$  and beyond
- n DC to subnanosecond operation
- n No flicker noise down to 0 Hz in photovoltaic mode
- n Monolithic optical immersion
- n Room temperature and TE cooled operation

Our Mercury Cadmium Zinc Telluride Detectors (HgCdZnTe) cover a broad spectral range, 2 to 12  $\mu\text{m}$ , and have excellent detectivity. Fig. 1 shows typical curves. They are excellent for infrared laser characterization and stabilization, for heterodyne detection, FT-IR, fast pyrometry, and radiometry.

Optical immersion is a classical way to make a physically small detector (lower noise, lower bias requirements, lower bias current heating, etc.) look optically larger for more sensitivity. It is particularly easy to do with the monolithic manufacturing technique of our detectors, see Fig. 2. Our proprietary technique ensures a perfect optical match between lens and detector. We have removed the transmission limits normally set by bonding adhesives.

## PHOTOVOLTAIC OPERATION

Photovoltaic operation is preferred for lower frequency applications, to avoid the bias current created  $1/f$  noise. It also allows highest frequency operation, down to the 100 ps level. Response time in the photovoltaic mode is only limited by the carrier diffusion time through the very thin HgCdTe layer. Two forms of photovoltaic products are available: the magnetically (PEM) assisted ones and the photodiffusion (PD) effect assisted ones.

The PD variety is now available even in TE cooled versions for optimum performance throughout the frequency spectrum.

## TECH NOTE

*PD type detectors offer high speed response, ideal for applications involving short pulse lasers. Occasionally these detectors exhibit responsivity curves with both positive and negative wavelength response regions. We can select spectrally well balanced units for you, if you let us know that your application covers more than a single laser wavelength.*

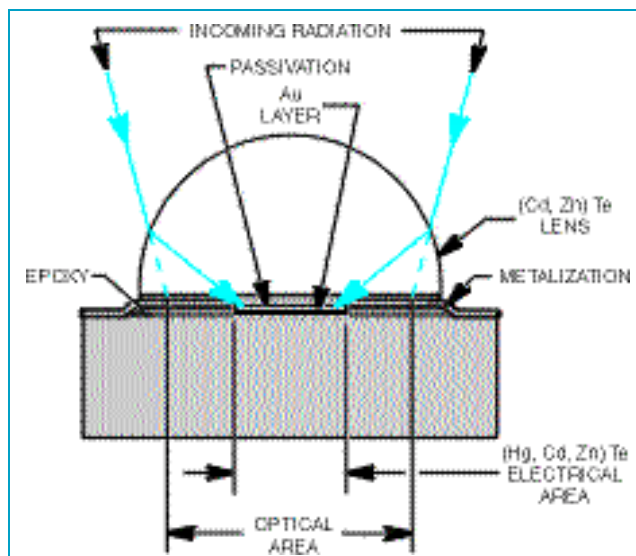


Fig. 2 Schematic of optically immersed HgCdZnTe Detectors.

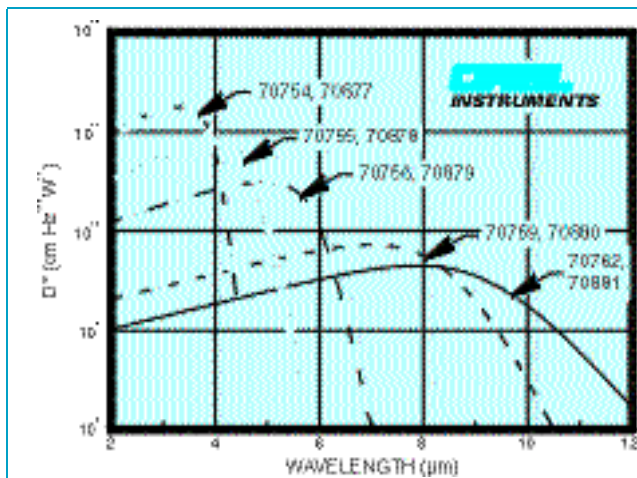
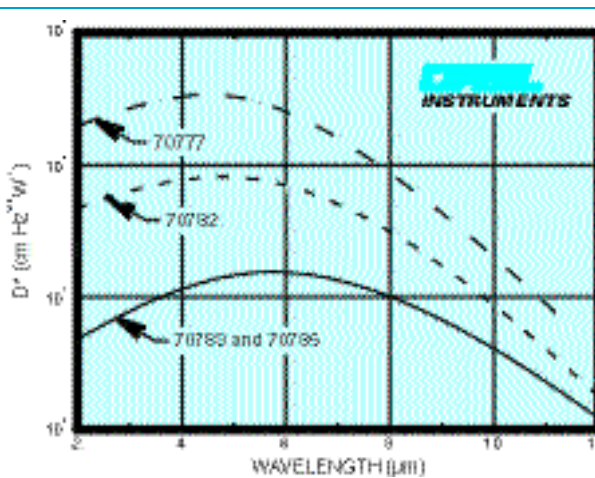


Fig. 1 Typical detectivities of HgCdZnTe Detectors.



## GENERAL LIMITS AND PRECAUTIONS

1. CW irradiance must not exceed  $20 \text{ W cm}^{-2}$  for the optically immersed detectors and  $100 \text{ W cm}^{-2}$  for the non-immersed detectors.
2. Pulses shorter than  $1 \mu\text{s}$  must not exceed  $10 \text{ kW cm}^{-2}$  for the optically immersed detectors and  $1 \text{ MW cm}^{-2}$  for non-immersed detectors.
3. Avoid overbiasing of the detectors.
4. Avoid overdriving and reversing voltage connections on the TE coolers.

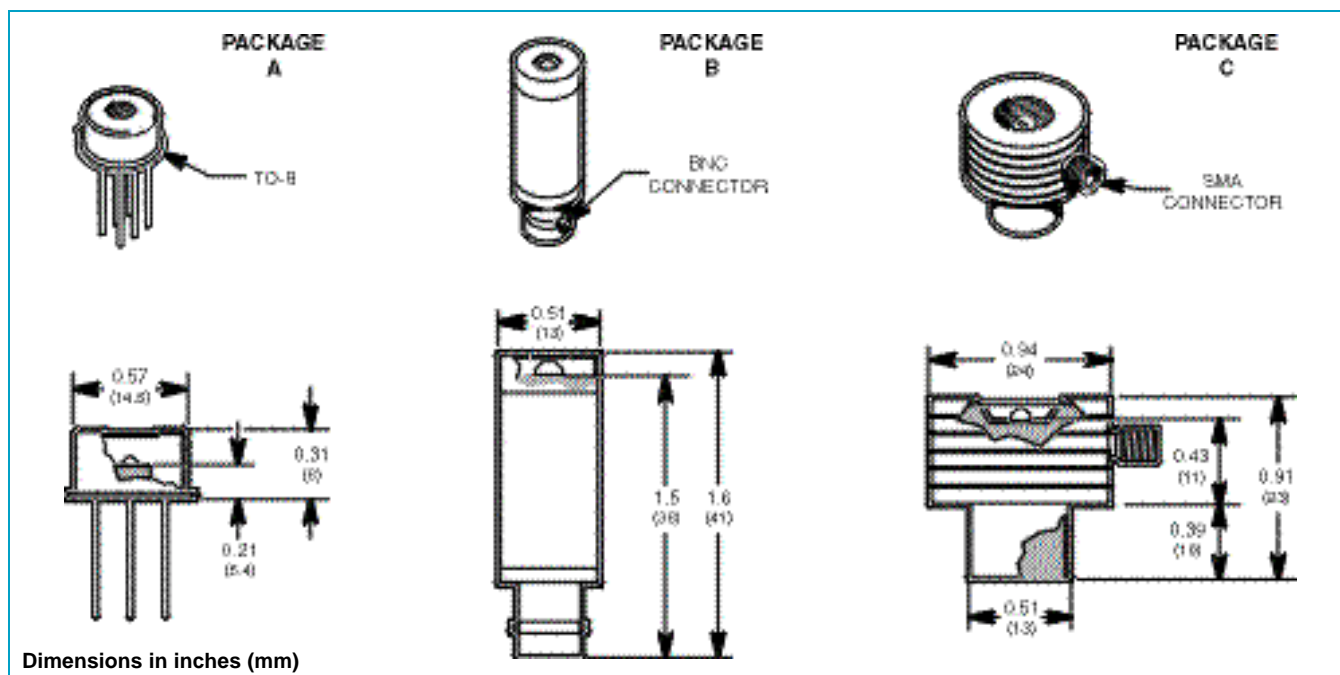


Fig. 3 Dimensional diagram of HgCdZnTe Detectors and their mounts.

## SPECIFICATIONS AND ORDERING INFORMATION

### Room Temperature Detectors

Useful Wavelength Range ( $\mu\text{m}$ )	Window Material	Optimization Wavelength ( $\mu\text{m}$ )	Typical Responsivity (V/W)		Typical $D^*$ ( $\text{cm H}_2^{1/2} \text{ W}^{-1}$ )		Max. Signal (V)	
			@ Peak $\lambda$	@ $10.6 \mu\text{m}$	@ Peak $\lambda$	@ $10.6 \mu\text{m}$	<1 $\mu\text{s}$	CW
2 - 4	BaF <sub>2</sub>	4	>1000	NA	>1 x 10 <sup>11</sup>	NA	0.05	0.05
2 - 5	BaF <sub>2</sub>	5	> 900	NA	>5 x 10 <sup>10</sup>	NA	0.05	0.05
2 - 6	BaF <sub>2</sub>	6	> 500	NA	>3 x 10 <sup>10</sup>	NA	0.05	0.05
2 - 9	BaF <sub>2</sub>	9	> 50	>3	>2 x 10 <sup>9</sup>	>4 x 10 <sup>7</sup>	0.05	0.05
2 - 12	BaF <sub>2</sub>	12	> 10	>5	>1 x 10 <sup>9</sup>	>2 x 10 <sup>8</sup>	0.05	0.05
2 - 12	No Window	10.6	> 2	>0.3	>2 x 10 <sup>8</sup>	>3 x 10 <sup>7</sup>	>0.1	>0.1
2 - 12	Ge, AR coated @ $10.6 \mu\text{m}$	10.6	> 0.5	>0.1	>5 x 10 <sup>7</sup>	>1 x 10 <sup>7</sup>	>0.1	>0.03
2 - 12	Ge, AR coated @ $10.6 \mu\text{m}$	10.6	> 0.1	>0.02	>1 x 10 <sup>7</sup>	>2 x 10 <sup>6</sup>	>0.4	>0.006
2 - 12	No Window	10.6	> 0.1	>0.02	>1 x 10 <sup>7</sup>	>2 x 10 <sup>6</sup>	>1	>0.015

### Optically Immersed TE Cooled Photovoltaic Detectors\*

Useful Wavelength Range ( $\mu\text{m}$ )	Window Material	Optimization Wavelength ( $\mu\text{m}$ )	$D^*$ @ Peak $\lambda$	Risetime (ns)	Model No.	Price (\$)
2 - 4	BaF <sub>2</sub>	4	>1 x 10 <sup>11</sup>	<250	70877	\$ 1,831.00
2 - 5	BaF <sub>2</sub>	5	>5 x 10 <sup>10</sup>	<200	70878	\$ 1,831.00
2 - 6	BaF <sub>2</sub>	6	>3 x 10 <sup>10</sup>	< 80	70879	\$ 2,192.00
2 - 8	BaF <sub>2</sub>	8	>2 x 10 <sup>9</sup>	< 10	70880	\$ 3,109.00
2 - 12	BaF <sub>2</sub>	10.6	>2 x 10 <sup>9</sup>	< 3	70881	\$ 3,180.00

\* Common specifications: Field of View is 40°, Detector Type is PD, Package Type is A, Operating temperature is 240 K, typical.

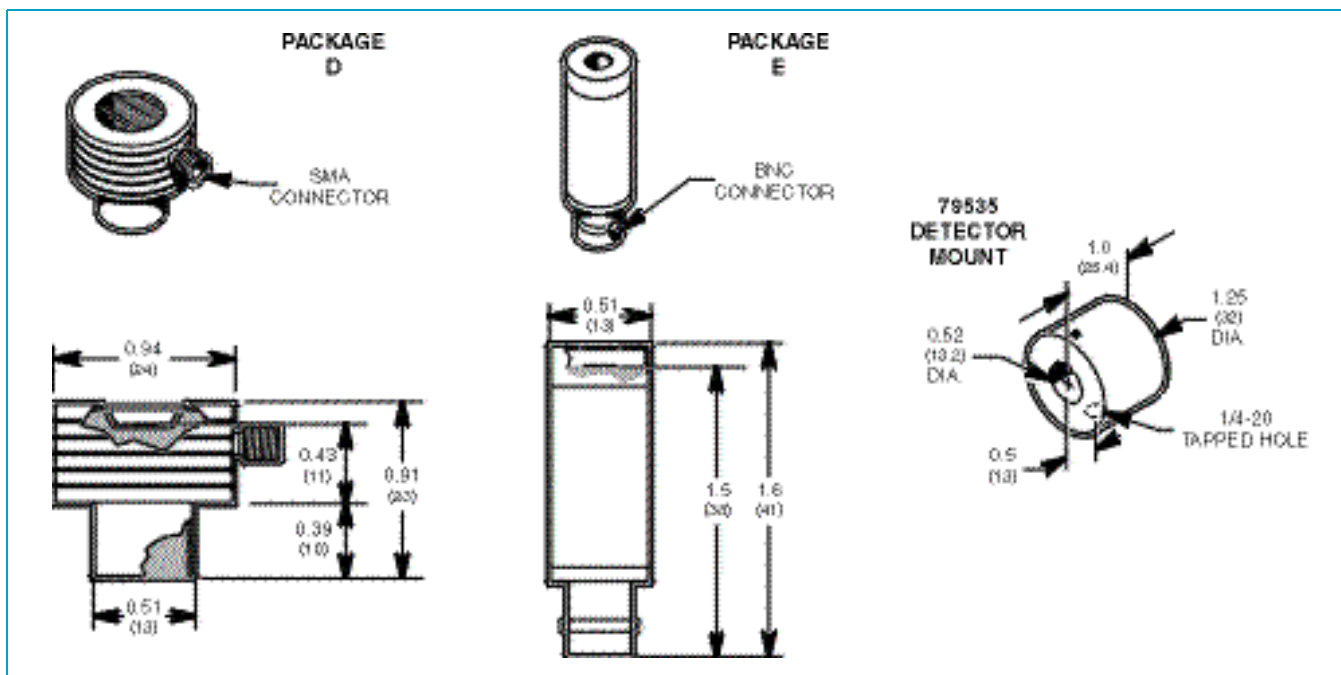
## COMMON SPECIFICATIONS

Active area:	1 x 1 mm*
Bias (mA):	1-25 for TE cooled detectors; 20-100 for 70785. Optimum bias level supplied with each detector shipped
Impedance ( $\Omega$ ):	30-400, data supplied with each detector; longer wavelength detectors are typically characterized by lower impedance
TE cooler current:	1 A typical

\* Detector sizes from 0.05 x 0.05 mm to 4 x 4 mm can also be provided. Contact Oriel for pricing and other details.

## FOR OEM BUYERS...

Significant price discounts and custom requirement accommodations for OEM or multiple unit customers is offered. Call us for information and a quotation for different packaging, element sizes, wavelength optimization, higher detectivities, faster response times, as well as extra cooling stages, small arrays, and custom electronics.



Risetime (ns)	Cooling (Typical Operating Temp.)	Field of View (degrees)	Detector Type*	Optically Immersed	Package Type (See Figs. above)	Output Connection	Model No.	Price (\$)
<3000	TE (240 K)	>40	PC	Yes	A	TO-8	70754	\$ 1,468.00
<1000	TE (240 K)	>40	PC	Yes	A	TO-8	70755	\$ 1,661.00
<100	TE (240 K)	>40	PC	Yes	A	TO-8	70756	\$ 1,995.00
<30	TE (240 K)	>40	PC	Yes	A	TO-8	70759	\$ 2,801.00
<10	TE (240 K)	>40	PC	Yes	A	TO-8	70762	\$ 3,087.00
<1	Room Temp.	>40	PD	Yes	B	BNC	70777	\$ 2,080.00
<1	Room Temp.	>40	PEM	Yes	C	SMA	70782	\$ 2,295.00
0.2, typical	Room Temp.	>60	PEM	No	D	SMA	70783	\$ 2,067.00
<1	Room Temp.	>60	PC	No	E	BNC	70785	\$ 823.00

\* PC = Photoconductive

PD = Photovoltaic (Photo diffusion effect assisted)

PEM = Photovoltaic (Magnetically assisted)

## Accessories

79535	Detector Mount for Packages.....	\$ 89.00	70716	High Gain Voltage Amplifier .....	\$ 565.00
	B, C, D and E		70717	High Gain Voltage Amplifier .....	\$ 662.00
70016	6 ft. (1.8 m) Long BNC to BNC Cable .....	\$ 28.00		with bias option	
70032	6 ft. (1.8 m) Long SMA to BNC Cable .....	\$ 50.00	77057	TE Cooler Controller, 110 V .....	\$ 1,125.00
70041	6 ft. (1.8 m) Long SMA to SMA Cable .....	\$ 50.00	77058	TE Cooler Controller, 220 V .....	\$ 1,125.00
70703	±15 VDC Power Supply, 110 V .....	\$ 297.00			
70709	±15 VDC Power Supply, 220 V .....	\$ 297.00			