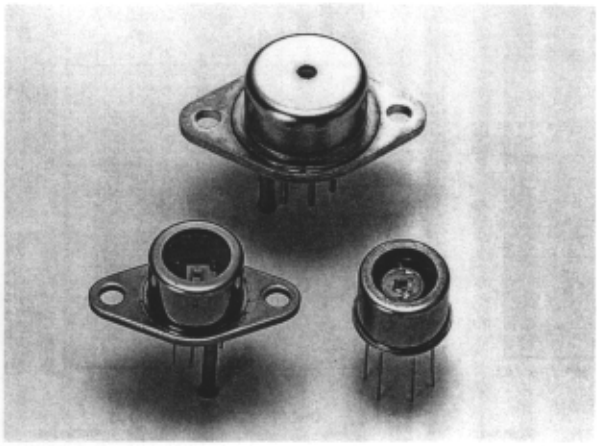
MCT (HgCdTe) Photoconductive Detectors (TE-cooled Types)

Spectral Response Range: 2 to 5 μm

Thermoelectric cooling assures stable operation over extended time periods



■Various options of spectral response

The band-gap of HgCdTe can be modified by controlling the composition ratio of HgTe and CdTe. Utilizing this fact, various types are available in different spectral responses.

■Photoconductive mode operation

These devices operate in the photoconductive mode in which electrical resistance decreases with input of infrared radiation.

■Custom devices available

In addition to standard items listed in this catalog, custom-designed devices are available with different active areas and numbers of elements on request.

■ACCESSORIES (Optional)

Heatsink for two-stage TE-cooled types	A3179-01
Temperature controller for TE-cooled types	C1103-05
Preamplifier for MCT detectors (TE-cooled)	C5185-01

■SPECIFICATIONS (Common)

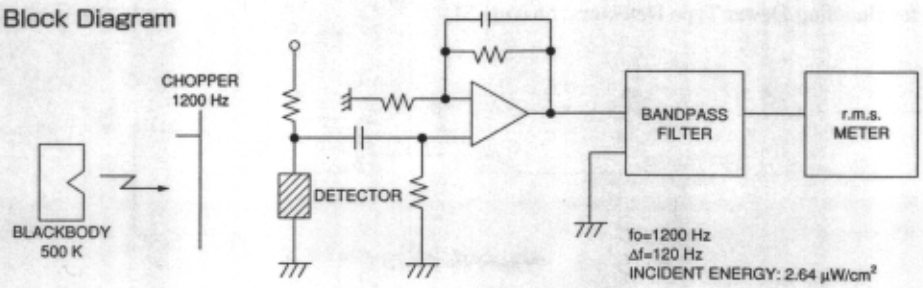
Window Material	Sapphire glass
Thermistor Allowable Dissipation	0.2 mW
Pelter Element Allowable Dissipation	1.0 A
Operating Temperature	-40 to +60 °C
Storage Temperature	-55 to +60 °C

(Unless otherwise noted, Typ.)

Type No.	Outline No.	Package	Active Area	Elemnt Temperature	Peak Wavelength λp	Cutoff Wavelength λc	*1 Photo Sensitivity S λ=λp	D* (500, 1200, 1) Min.	D* (500, 1200, 1) Typ.	D* (λp,1200,1)	NEP λ=λp	Rise Time tr 0 to 63%	Dark Resistance Rd	Maximum Allowable Current
	(P.34,36)		(mm)	(°C)	(μm)	(μm)	(V/W)	(cm•Hz$^{1/2}$/W)	(cm•Hz$^{1/2}$/W)	(cm•Hz$^{1/2}$/W)	(W/Hz$^{1/2}$)	(μs)	(Ω)	(mA)
■Two-stage TE-cooled Types														
P3981	⑤	TO-8	1×1	-30	3.6	3.7	1×10^{4}	2×10^{8}	2×10^{9}	5×10^{10}	2×10^{-12}	10	600	2
P3981-01	⑳	TO-66	1×1	-30	3.6	3.7	1×10^{4}	2×10^{8}	2×10^{9}	5×10^{10}	2×10^{-12}	10	600	2
P3982	⑤	TO-8	1×1	-30	2.9	3.1	4×10^{4}	1×10^{8}	1×10^{9}	1×10^{11}	1×10^{-12}	30	2000	0.5
P3982-01	⑳	TO-66	1×1	-30	2.9	3.1	4×10^{4}	1×10^{8}	1×10^{9}	1×10^{11}	1×10^{-12}	30	2000	0.5
■Three-stage TE-cooled Types														
P2750	㉑	TO-3	1×1	-60	4.8	5.5	2×10^{3}	5×10^{8}	3×10^{9}	2×10^{10}	5×10^{-12}	5	200	3
P2750-04			0.1×0.1	-60	4.8	5.5	2×10^{4}	5×10^{8}	3×10^{9}	2×10^{10}	5×10^{-13}	5	200	3

*1: Photo sensitivity depends on the bias current. The value listed is measured with the optimum bias current.

■Measuring Block Diagram



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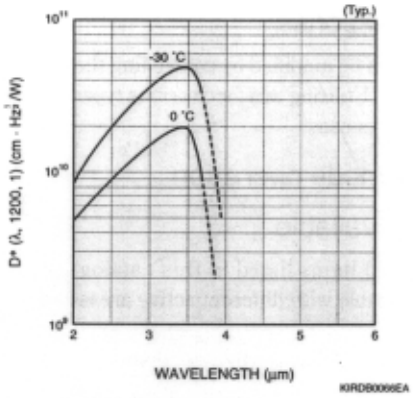
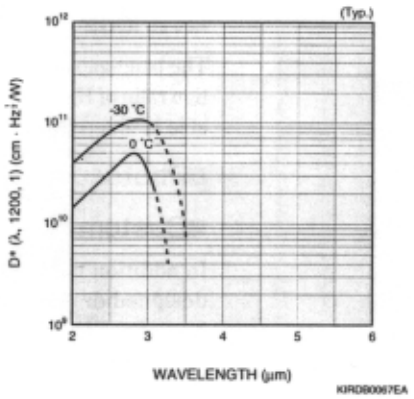
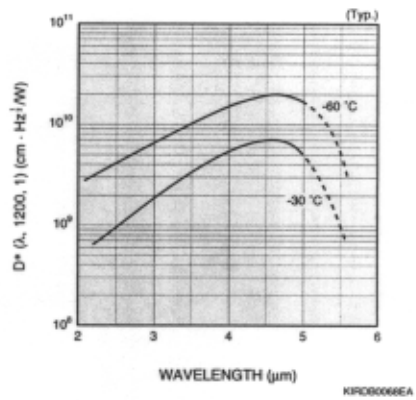
■Spectral Response (P3981/-01)



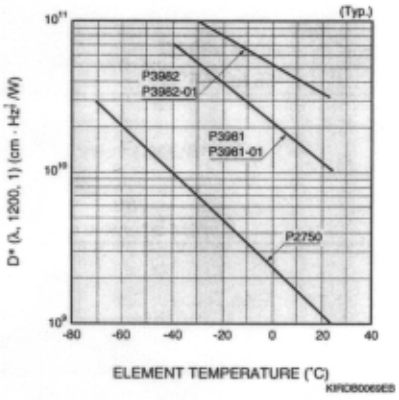
■Spectral Response (P3982/-01)



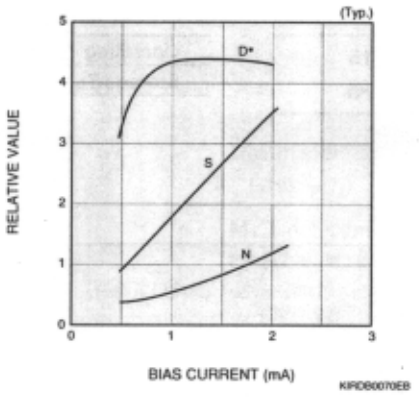
■Spectral Response (P2750/-04)



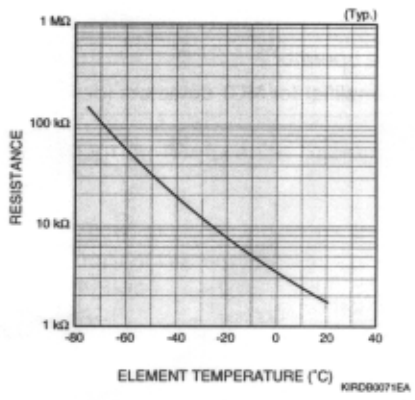
■D* vs. Element Temperature



■S/N vs. Bias Current (P2750)

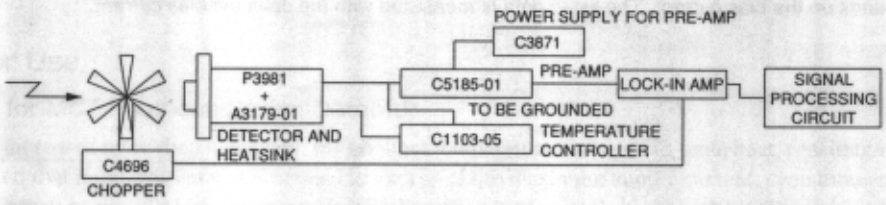


■Temperature Characteristic for Thermistor



The detector must be operated in a range where the D* becomes max.

■Connection Example



Precautions for Use

(1) Bias Current for MCT Photoconductive Detector

If the bias current is increased more than necessary, the element temperature rises due to Joule heat, resulting in degradation in the D*. It should also be noted that if the bias current is applied in excess of the maximum supply current, even momentarily, then the element could be damaged. Therefore, use of a bias power supply with low ripple and careful choice of the optimum bias current is recommended.

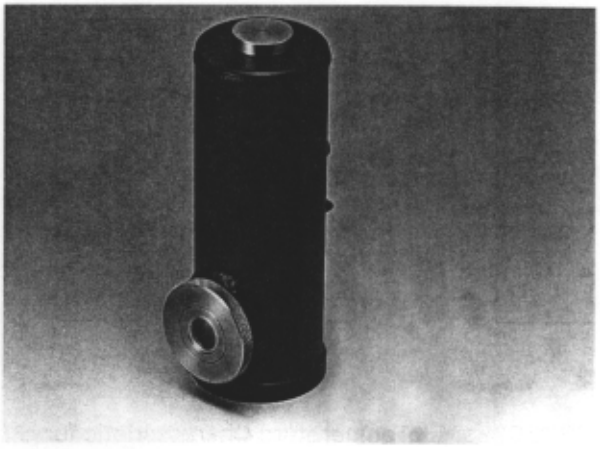
(2) Handling

Refer to "Precautions for Handling TE-cooled Detectors" on page 51.

MCT (HgCdTe) Photoconductive Detectors (Dewar Types)

Spectral Response Range: 2 to 16 μm

High sensitivity in the long wavelength range and high-speed response



■Various options response

The band-gap of HgCdTe can be modified by controlling the composition ratio of HgTe and CdTe. Utilizing this fact, various types are available in different spectral responses.

■Photoconductive mode operation

■Custom devices available

In addition to the standard items listed in this catalog, custom-designed devices are available with different active areas and numbers of elements on request.
Metal dewar types can be re-evacuated when necessary.

■ACCESSORIES (Optional)

Valve operator	A3515
Preamplifier for MCT detectors (dewar types)	C5185

■SPECIFICATIONS (Common)

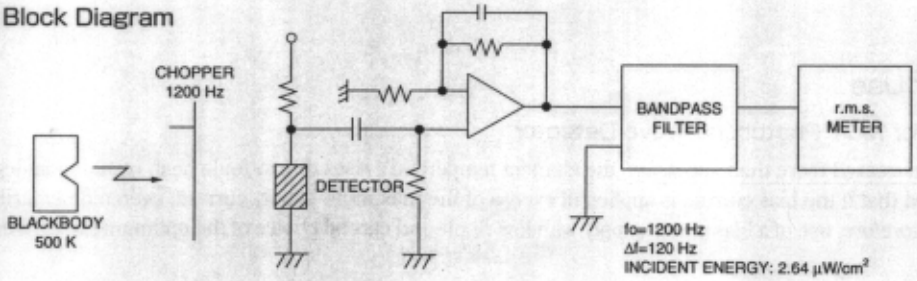
Operating Temperature	-40 to +60 °C
Storage Temperature	-55 to +60 °C

(Unless otherwise noted, Typ.)

Type No.	Outline No. (P. 35)	Package	Active Area (mm)	Element Temperature (°C)	Photo Sensitivity S λ=λp (V/W) *1	D* (500, 1200, 1) Min. (cm・Hz$^{1/2}$/W)	D* (500, 1200, 1) Typ. (cm・Hz$^{1/2}$/W)	D* (λp,1200,1) (cm・Hz$^{1/2}$/W)	NEP λ=λp (W/Hz$^{1/2}$)	Rise Time tr 0 to 63 % (μs)	Dark Resistance Rd (Ω)	Maximum Allowable Current (mA)
■Dewar Types (FOV=60 degrees)												
P3257-01	⓭	Metal dewar	0.1×0.1	-196	3×10^{4}	1×10^{10}	2×10^{10}	4×10^{10}	2.5×10^{-13}	1	40	10
P3257-02			0.25×0.25	-196	1×10^{4}	1×10^{10}	2×10^{10}	4×10^{10}	6.3×10^{-13}	1	40	20
P3257-10			1×1	-196	1×10^{3}	5×10^{9}	2×10^{10}	4×10^{10}	2.5×10^{-12}	1	40	40
P5274			1×1	-196	5×10^{2}	1×10^{9}	5×10^{9}	7.5×10^{9}	1.3×10^{-11}	1	40	40

*1: Photo sensitivity depends on the bias current. The listed data is measured with the optimum bias current.

■Measuring Block Diagram



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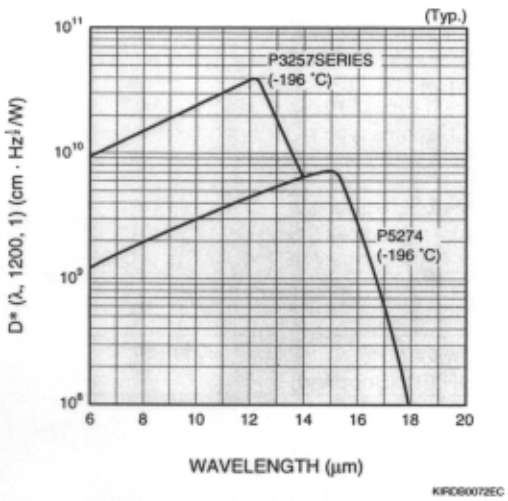
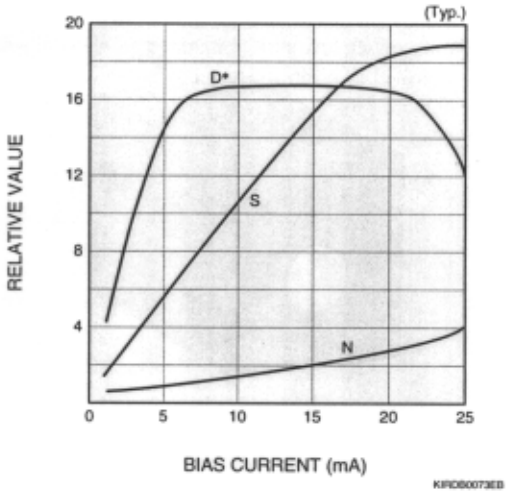
■Spectral Response



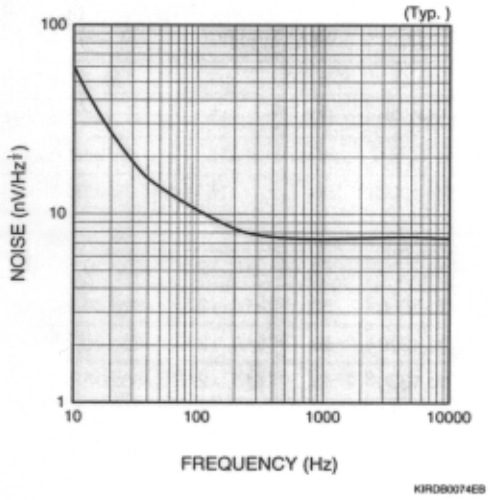
Spectral response can be shifted upon request

■S/N vs. Bias Current (P3257-10)



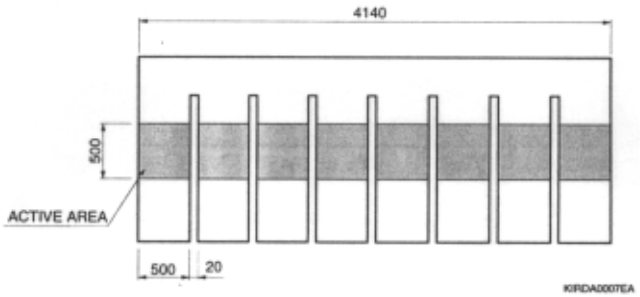
The detector must be operated in a range where the D* becomes max.

■Noise vs. Frequency



■Multielement Detector Option (Reference Example; Unit: μm)

MCT detectors of custom-designed multielement arrays are also available on request. For the number of elements, element size and packaging, please consult us with your specific needs.



Precautions for Use

(1) Bias Current for MCT Photoconductive Detector

If the bias current is increased more than necessary, the element temperature rises due to Joule heat, resulting in degradation in the D*. It should also be noted that if the bias current is applied in excess of the maximum supply current, even momentarily, then the element could be damaged. Therefore, use of a bias power supply with low ripple and careful choice of the optimum bias current is recommended.

(2) Pouring Liquid Nitrogen

When filling the dewar with liquid nitrogen, use the following procedure: First pour 20 to 30 cc into the dewar, and wait for a while until the whitish vapor (made by the ebullient liquid nitrogen) settles.
Then pour another 20 to 30 cc into the dewar and wait for a while again.
The remainder of filling may be done in one step. (Sudden filling from the beginning can cause the liquid nitrogen to overflow or splash.

(3) Handling

Refer to "Precautions for Handling Dewar Type Devices" on page 51.