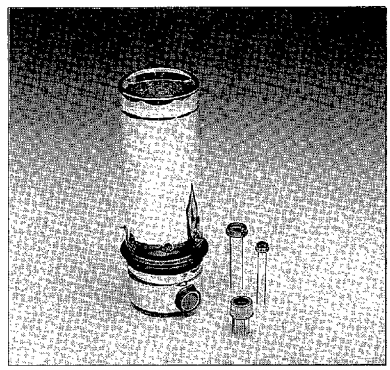
PbS Photoconductive Cells

Easy-to-Use Photoconductive Detectors with High Responsivity Over 3 μm

PbS cells make use of the photoconductive effect by which the electrical resistance decreases with application of infrared radiation



Operates at Room Temperature

Since PbS cells operate stably at room temperature, they are used in a wide range of applications such as radiation thermometers and flame monitors. (Cooled types are also available for precision photometry.)

High Responsivity

Lower Temperature Detection Limit: Approx. 100℃

Noncooled Types

These devices can stably operate at room temperature, making them easy to use in diverse fields.

Multielement Types

Multielement types are provided as standard items.

Cooled Types

Thermoelectrically-cooled devices and glass dewar devices are available. Cooling a PbS cells enhances the responsivity and improves the S/N ratio, thus cooled types are widely used in precision photometry for applications such as in analytical instruments.

● SPECIFICATIONS (Common)

Peak wavelength	2.2 μm (element temperature 25℃)
Cutoff Wavelength	2.9 μm (element temperature 25℃)
Window Material	Borosilicate glass
	Sapphire glass (P2682 series, P5168)
Thermistor Allowable Dissipation	0.2 mW
Peltier Element Allowable Current	1.5 A (one-stage TE-cooled types)
	1.0 A (two-stage TE-cooled types)
Maximum Supply Voltage	100 V

Operating Temperature	−30 to +50℃
Storage Temperature	−55 to +50℃

● ACCESSORIES (Optional)

Heatsink for one-stage TE-cooled types : A3179
Heatsink for two-stage TE-cooled types : A3179-01
Temperature controller for TE-cooled types : C1103-04
Preamplifier for PbS/PbSe cells : C3757-02
Housing for glass dewar devices : A3262-02
(Dewar devices are available potted in the housing upon request.)

(Typical data unless otherwise specified)

Type No.	Outline No. (P.34–36)	Package	Active Area (mm)	Element Temperature (℃)	Photo Sensitivity S at λp Vs=15V (V/W)	Signal Ⓐ Min. (μV)	Signal Ⓐ Typ. (μV)	Noise Ⓑ N Typ. (μV)	Noise Ⓑ N Max. (μV)	D*(500, 600, 1) Min. (cm•Hz$^{1/2}$/W)	D*(500, 600, 1) Typ. (cm•Hz$^{1/2}$/W)	D* (λp,600,1) (cm•Hz$^{1/2}$/W)	Rise Time tr 0 to 63% (μs)	Dark Resistance Rd (MΩ)
Noncooled Types														
P394	⑮	2-pin TO-5	1×5	25	1×10^5	100	250	2	4	5×10^8	1×10^9	1×10^{11}	50 to 200	0.1 to 1
P394A	⑯	2-pin TO-5	2×5	25	5×10^4	100	250	2	4	5×10^8	1×10^9	1×10^{11}	50 to 200	0.1 to 1.5
P3258-02		2-pin TO-5	2×2	25	1×10^5	100	250	2	4	5×10^8	1×10^9	1×10^{11}	50 to 200	0.5 to 2.5
P3258-03		2-pin TO-5	3×3	25	5×10^4	100	250	2	4	5×10^8	1×10^9	1×10^{11}	50 to 200	0.5 to 2.5
P3226-02	⑰	2-pin TO-5	1.5×1.5Ⓒ	25	1.5×10^5	1500	2000	2	4	5×10^8	1×10^9	1×10^{11}	50 to 200	0.3 to 2
P397	⑱	2-pin TO-8	4×5	25	3×10^4	100	250	2	4	2×10^8	5×10^8	5×10^{10}	50 to 200	0.3 to 2
Multielement Types														
P3210-16	⑲	40-pin DIP	1×1 (16 element)	25	4×10^5	100	200	4	8	5×10^8	1×10^9	1×10^{11}	50 to 200	0.5 to 2.5
One-stage Thermoelectrically-cooled Types														
P2532	④	6-pin TO-8	1×3	−10	6×10^5	300	750	4	8	1×10^9	2×10^9	2×10^{11}	200 to 600	0.3 to 5
P2532-01		6-pin TO-8	4×5	−10	9×10^4	300	750	4	8	5×10^8	1×10^9	1×10^{11}	200 to 600	0.5 to 10
Two-stage Thermoelectrically-cooled Types														
P2682	⑤	6-pin TO-8	1×3	−20	1×10^6	600	1500	5	10	2×10^9	4×10^9	4×10^{11}	200 to 600	1 to 10
P2682-01		6-pin TO-8	4×5	−20	2×10^5	600	1500	5	10	8×10^8	2×10^9	2×10^{11}	200 to 600	1 to 10
Glass Dewar Types														
P5168Ⓓ	⑭	Glass dewar	2×10	−77	1×10^6	10000	20000	3	6	1×10^{10}	2×10^{10}	1×10^{12}	2 to 10(ms)	0.5 to 10

Ⓐ Light source : 500 K blackbody
Chopping frequency : 600 Hz
Supply Voltage : 15 V
Load resistance : Nearly equal to the element dark resistance.
Incident energy : 4.8 μW/cm²

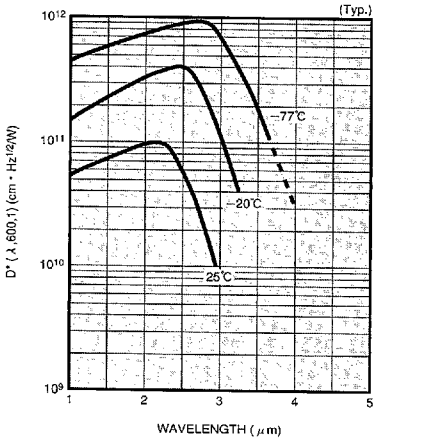
Ⓑ Chopping frequency : 600 Hz
Noise bandwidth : 60 Hz
Load resistance : Nearly equal to the element dark resistance.

Ⓒ Lens window

Ⓓ Chopping frequency : 100 Hz
Noise bandwidth : 10 Hz

Spectral Response 1.0 to 3.6 μm

● Spectral Response



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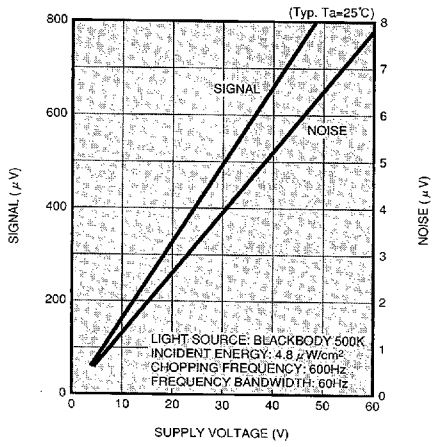
● S/N Ratio vs. Supply Voltage



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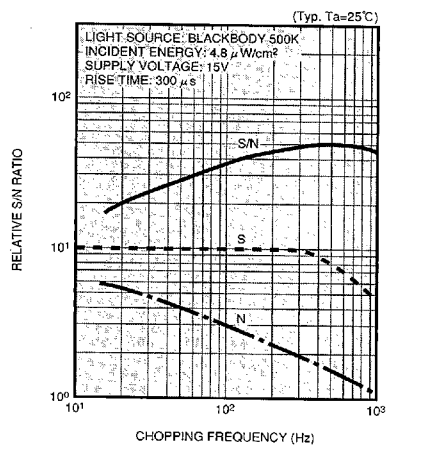
If a voltage higher than 60V is applied, the noise increases exponentially, degrading the S/N ratio. The device should be operated at 60V or less.

● S/N Ratio vs. Chopping Frequency



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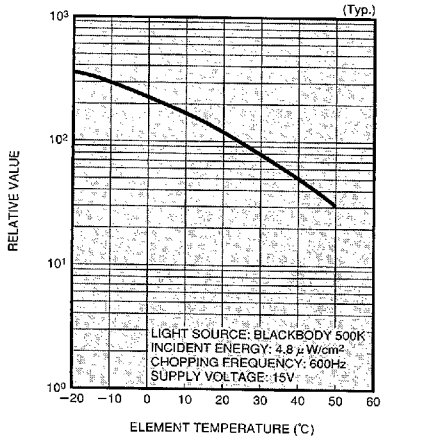
Increasing the chopping frequency reduces the 1/f noise and results in an improved S/N ratio. The S/N ratio can also be improved by narrowing the noise bandwidth using a lock-in amplifier.

● Responsivity vs. Temperature



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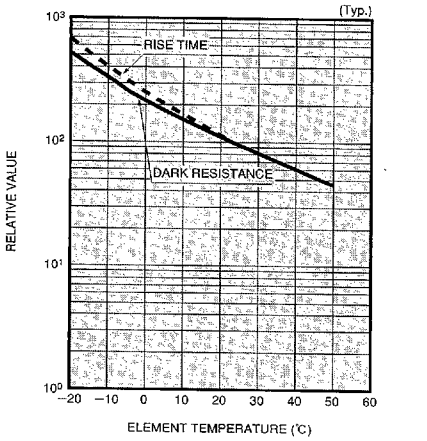
Cooling the device enhances its responsivity. But the responsivity also depends on the load resistance in the circuit.

● Dark Resistance, Rise Time vs. Temperature



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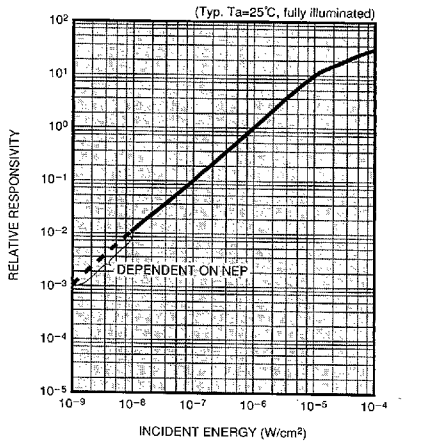
● Linearity



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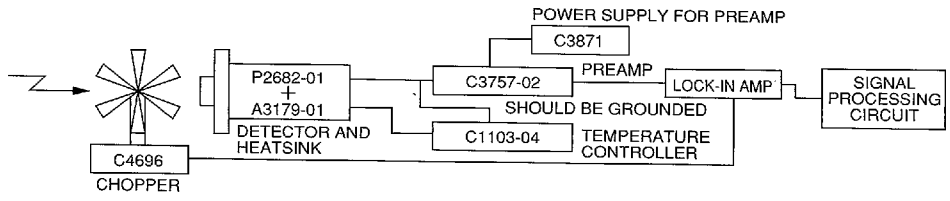
When making the incident light spot is smaller than the active area, the upper limit of the linearity becomes lower.

● Connection Example



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