

PbS Photoconductive Detectors

Easy-to-use photoconductive detectors with high responsivity over 3 μm

● 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 °C

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

Noncooled Types

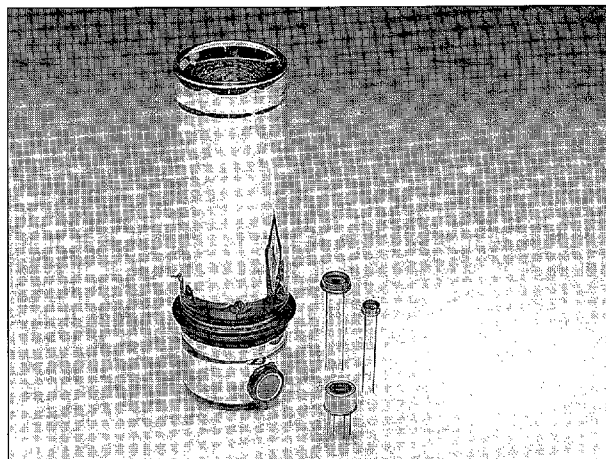
These devices can stably operate at room temperature, making them easy to use in diverse fields.

Multielement Types

Multielement types are provided as standard items.

● SPECIFICATIONS (Common)

Peak wavelength	2.2 μm (element temperature 25 °C)
Cutoff Wavelength	2.9 μm (element temperature 25 °C)
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



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.

Operating Temperature	-30 to +50 °C
Storage Temperature	-55 to +50 °C

● 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 (°C)	Photo Sensitivity S $\lambda = \lambda_p$ $V_s = 15 \text{ V}$ (V/W)	Signal A		Noise B N D* (500, 600, 1)				D* ($\lambda_p, 600, 1$) ($\text{cm} \cdot \text{Hz}^{1/2} / \text{W}$)	Rise Time t_r 0 to 63 % (μs)	Dark Resistance R_d (M Ω)
						Min.	Typ.	Typ.	Max.	Min.	Typ.			
						(μV)	(μV)	(μV)	(μV)	($\text{cm} \cdot \text{Hz}^{1/2} / \text{W}$)	($\text{cm} \cdot \text{Hz}^{1/2} / \text{W}$)			

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		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	16	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

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
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Ⓐ 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 $\mu\text{W}/\text{cm}^2$

Ⓑ Chopping frequency : 600 Hz

Noise bandwidth : 60 Hz

Load resistance : Nearly equal to the element dark resistance.

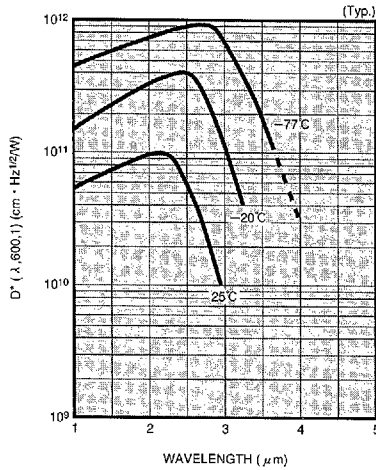
Ⓒ Lens window

Ⓓ Chopping frequency : 100 Hz

Noise bandwidth : 10 Hz

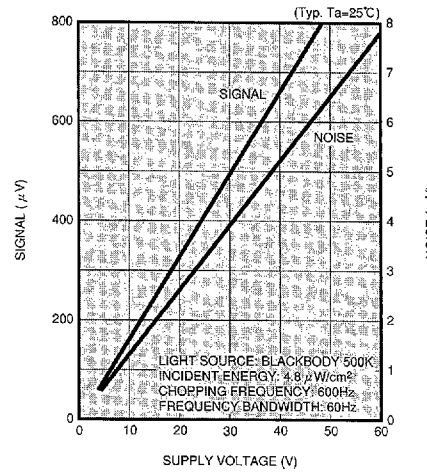
Spectral Response 1.0 to 3.6 μm

• Spectral Response



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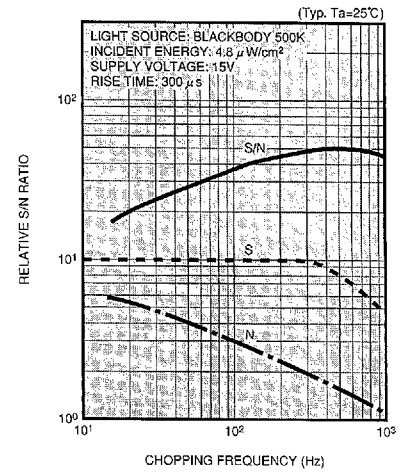
• S/N Ratio vs. Supply Voltage



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

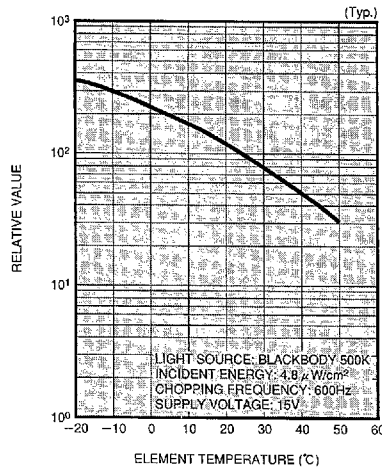
• S/N Ratio vs. Chopping Frequency



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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.

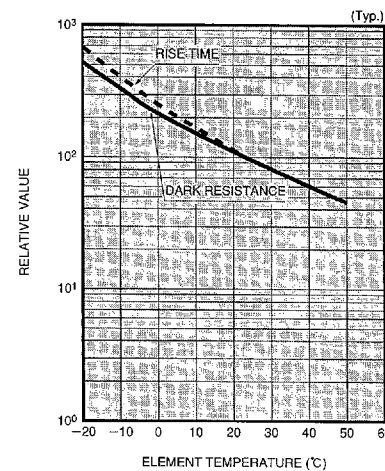
• Responsivity vs. Temperature



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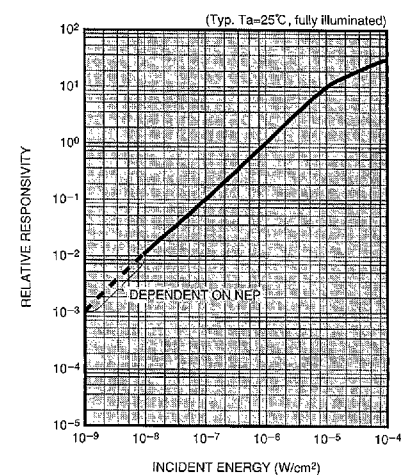
Cooling the device enhances its responsivity. But the responsivity also depends on the load resistance in the circuit.

• Dark Resistance, Rise Time vs. Temperature



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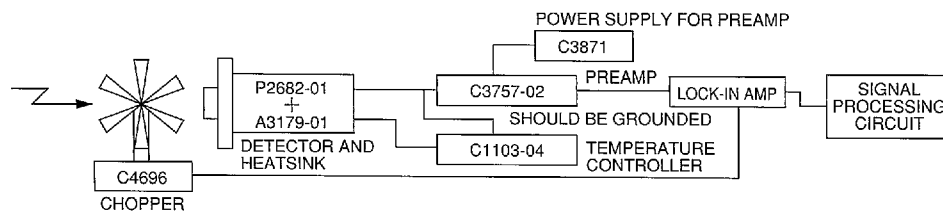
• Linearity



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

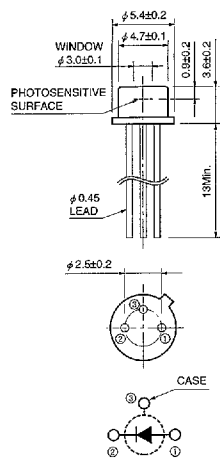
• Connection Example



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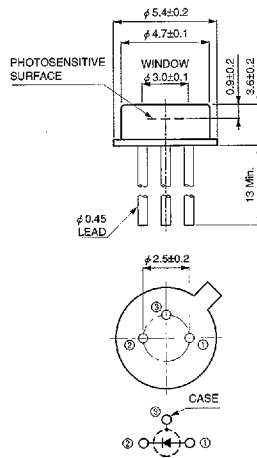
Dimensional Outlines (Unit: mm)

① G3476-01, etc.



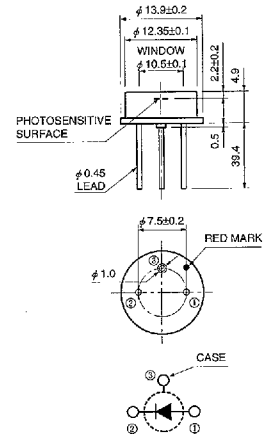
KIRDA0034EA

② G5832-02, -03



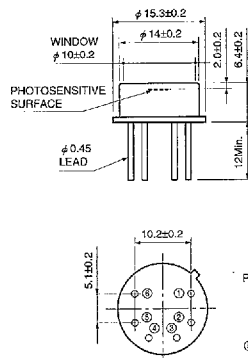
KIRDA0002EB

③ G5832-05, etc.



KIRDA0005EA

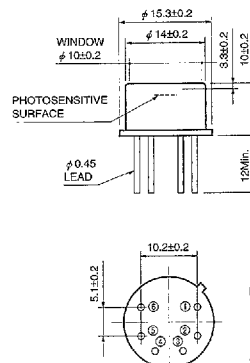
④ G5832-11, etc.



PIN No.
① DETECTOR (ANODE)
② DETECTOR (CATHODE)
③ COOLER (-)
④ COOLER (+)
⑤ THERMISTOR

KIRDA0028EB

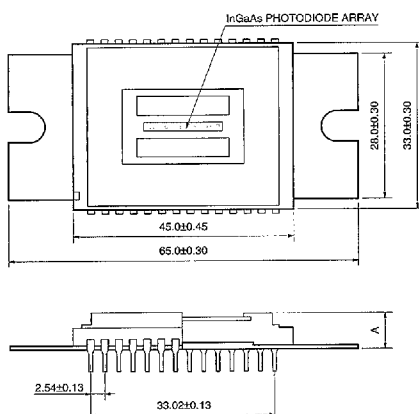
⑤ G5832-21, etc.



PIN No.
① DETECTOR (ANODE)
② DETECTOR (CATHODE)
③ COOLER (-)
④ COOLER (+)
⑤ THERMISTOR

KIRDA0031EB

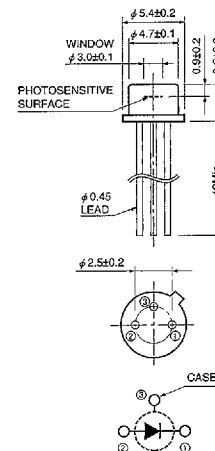
⑥ G6890-128, etc.



G6890 SERIES A=7.06±0.70
G6891 SERIES A=11.05±1.10 (2-stage TE-cooled)
G6893 SERIES A=11.05±1.10 (2-stage TE-cooled)
A=17.15±1.70 (3-stage TE-cooled)

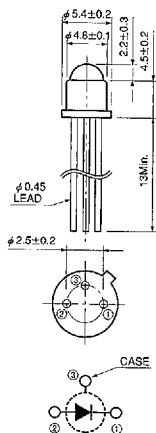
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⑦ B1720-02, etc.



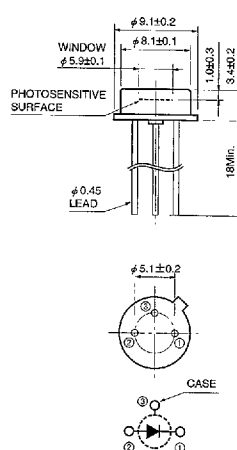
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8 B1720-05



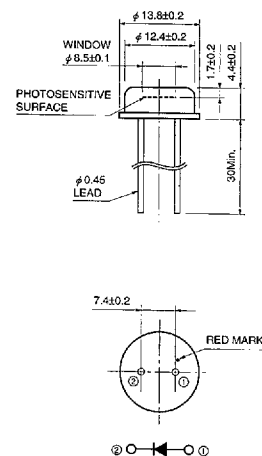
KIRDA0024EA

9 B2144-01, etc.



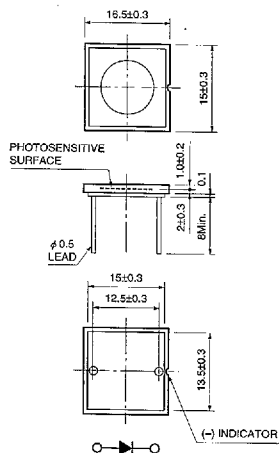
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10 B1919-01



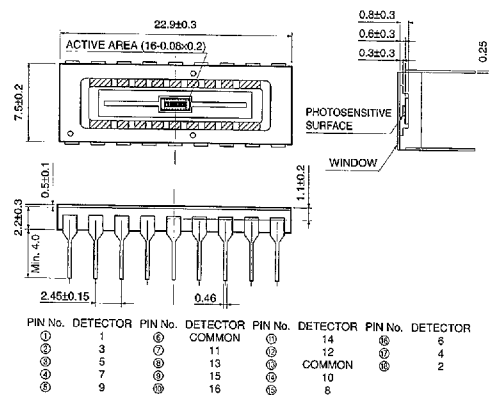
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11 B1920-01



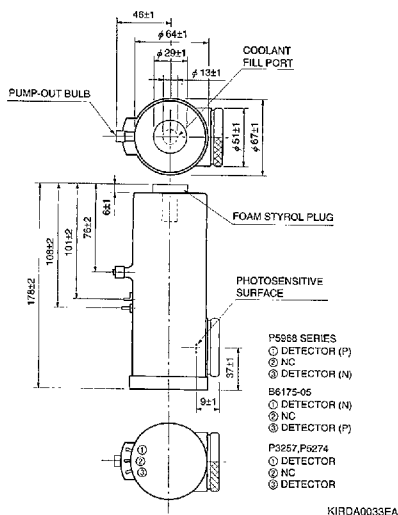
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12 G7151-16



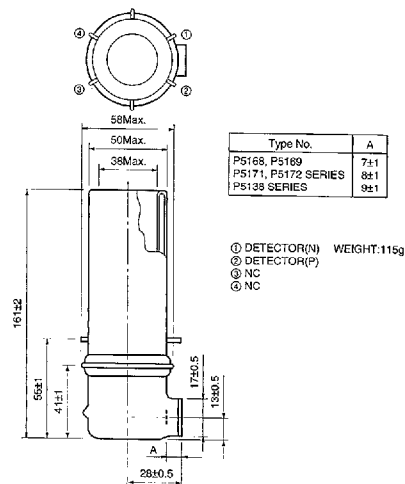
KIRDA0030EB

13 P5968 series, P7163, B6175-05, etc.



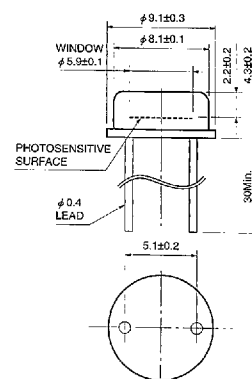
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14 P5138, etc.



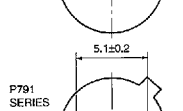
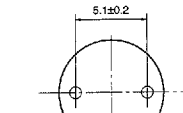
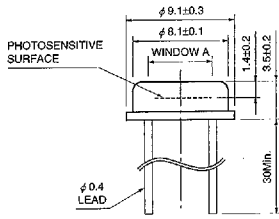
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15 P394



KIRDA0055EA

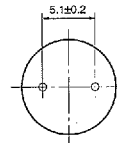
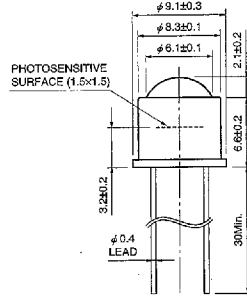
16 P394A, etc.



	P791 SERIES	OTHERS
A	5.5±0.1	5.9±0.1

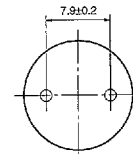
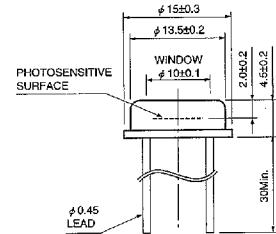
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17 P3226-02



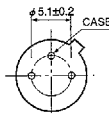
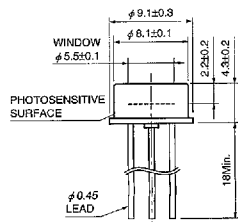
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18 P397



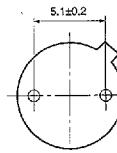
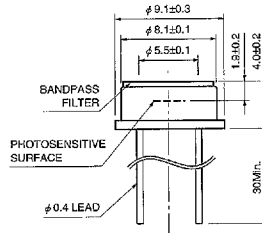
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19 P791-11



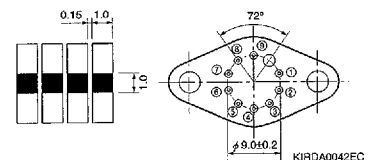
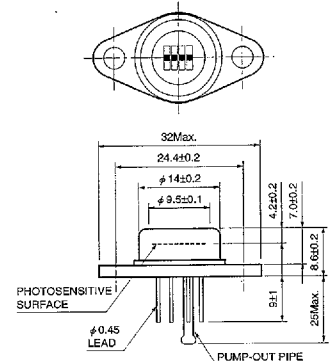
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20 P3207-04



KIRDA0054EA

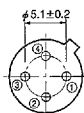
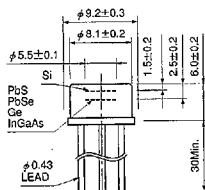
21 P4115



PIN No.
① THERMISTOR
② 1
③ 2
④ 3
⑤ 4
⑥ COMMON
⑦ COOLER (-)
⑧ COOLER (+)

KIRDA0042EC

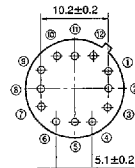
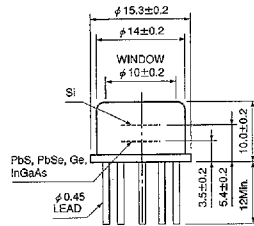
22 K1713-01, etc.



PIN No.
① Si (N)
② Si (P)
③ PbS, PbSe, Ge, InGaAs (N)
④ PbS, PbSe, Ge, InGaAs (P)

KIRDA0041EA

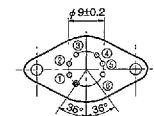
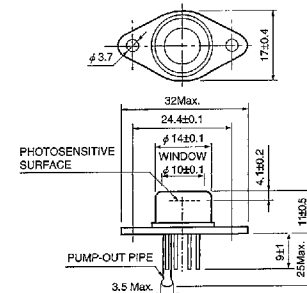
23 K3413-01, etc.



PIN No.
① PbS, PbSe, Ge, InGaAs (P)
② PbS, PbSe, Ge, InGaAs (N)
③ COOLER (-)
④ COOLER (+)
⑤ THERMISTOR
⑥ Si (N)
⑦ Si (P)

KIRDA0043EA

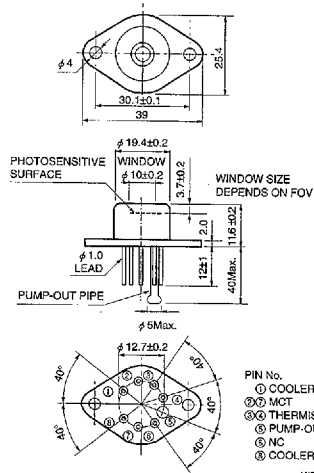
24 P3981-01, etc.



PIN No.
① THERMISTOR
② THERMISTOR
③ DETECTOR
④ DETECTOR
⑤ COOLER (-)
⑥ COOLER (+)

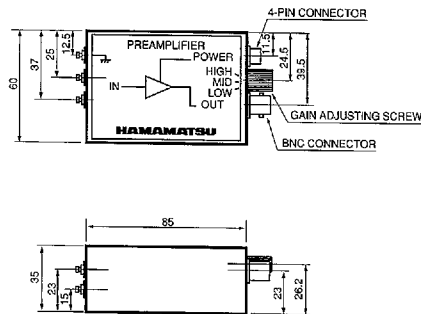
KIRDA0044EB

25 P2750, etc.



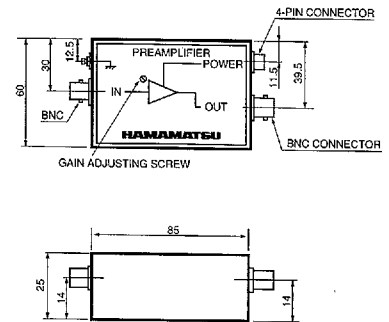
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26 C4159, -01, -03



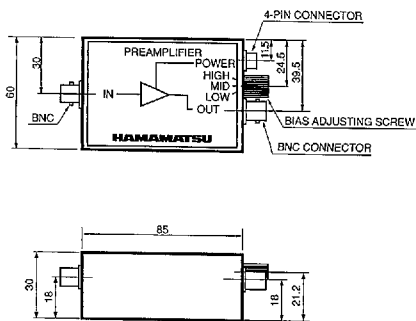
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27 C4159-02



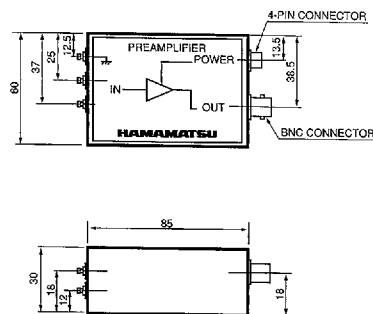
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28 C5185, -01



KIRDA0048EB

29 C3757-02



KIRDA0049EA