

PbSe Photoconductive Detectors

Capable of detecting to 5 μm range (TE-cooled types)

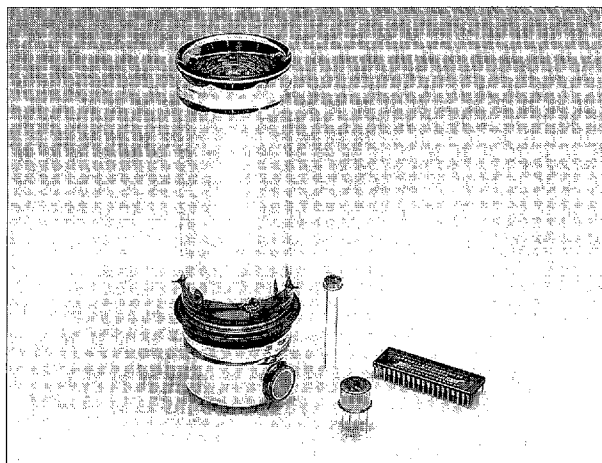
- High-speed response

- Operates at room temperature

Compared to other types of detectors used in the same wavelength range, PbSe cells have higher response speed and can also operate at room temperature, making them useful in a wide range of applications such as gas analyzers. (Cooled types are provided for higher precision photometry.)

- Lower temperature detection limit: Approx. 50 $^{\circ}\text{C}$

PbSe cells operate on the same principle as in PbS cells, but can be used to detect longer wavelengths up to or over 5 μm . In particular, TE-cooled types ensure stable and reliable measurement over extended time periods.



Noncooled Types

These devices operate at room temperature, making them easy to use in a variety of applications.

Multielement Types

Multielement types include 4-element and 16-element linear arrays as standard items.

Cooled Types

Thermoelectrically-cooled devices and glass dewar devices are available. Cooling a PbSe cell 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	3.8 μm (element temperature 25 $^{\circ}\text{C}$)
Cutoff Wavelength	4.8 μm (element temperature 25 $^{\circ}\text{C}$)
Window Material	Bandpass filter (P3207 series)
	Sapphire glass (other than P3207 series)
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 $^{\circ}\text{C}$
Storage Temperature	-55 to +60 $^{\circ}\text{C}$

- 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. (P34-36)	Package	Active Area (mm)	Element Temperature ($^{\circ}\text{C}$)	Photo Sensitivity S $\lambda = \lambda_p$ $V_s = 15\text{V}$ (V/W)	Signal Δ		Noise \ominus N		D [*] (500, 600, 1)		D [*] (λ_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. (μV)	Typ. (μV)	Typ. (μV)	Max. (μV)	Min. ($\text{cm} \cdot \text{Hz}^{1/2}$)	Typ. ($\text{cm} \cdot \text{Hz}^{1/2}$)			

Non-cooled Types

P791	15	2-pin TO-5	1x5	25	8×10^2	50	70	1.5	3	5×10^7	1×10^8	1×10^9	1 to 3	0.1 to 0.6
P791-01		2-pin TO-5	1x3	25	1×10^3	50	70	1.5	3	5×10^7	1×10^8	1×10^9	1 to 3	0.2 to 1
P791-02		2-pin TO-5	3x3	25	5×10^2	50	70	1.5	3	5×10^7	1×10^8	1×10^9	1 to 3	0.35 to 2
P791-03		2-pin TO-5	2x5	25	4×10^2	50	70	1.5	3	5×10^7	1×10^8	1×10^9	1 to 3	0.2 to 0.8
P791-11	19	3-pin TO-5	2x2	25	1×10^3	50	70	1.5	3	5×10^7	1×10^8	1×10^9	1 to 3	0.7 to 1.6
P3207-04	20	2-pin TO-5	1x2	25	5×10^2	-	-	1.5	3	-	-	-	1 to 3	0.3 to 1

Multi-element Types

P4115	21	Cooled TO-66	1x1 (4 element)	-10	1×10^4	150	200	2.5	5	1×10^8	3×10^8	3×10^9	2 to 5	1.5 to 7
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One-stage TE-cooled Types

P2038-01	4	6-pin TO-8	1x3	-10	4×10^3	150	200	2	4	1×10^8	3×10^8	3×10^9	2 to 5	0.5 to 5
P2038-03		6-pin TO-8	3x3	-10	1×10^3	150	200	2	4	1×10^8	3×10^8	3×10^9	2 to 5	1.7 to 7

Two-stage TE-cooled Types

P2680	5	6-pin TO-8	1x3	-20	5×10^3	180	280	2	4	2×10^8	4×10^8	4×10^9	2 to 5	0.5 to 5
P2680-01		6-pin TO-8	3x3	-20	2×10^3	180	280	2	4	2×10^8	4×10^8	4×10^9	2 to 5	1.8 to 8

Glass Dewar Types

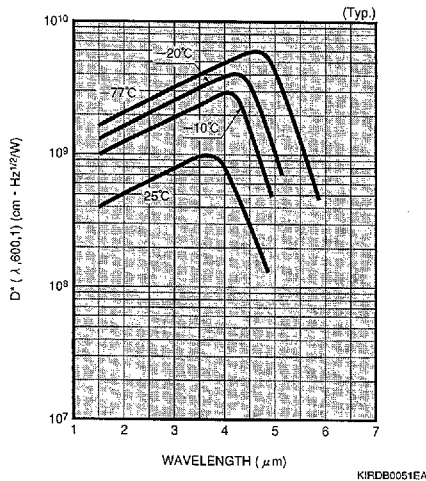
P5169	14	Glass dewar	1x5	-77	5×10^3	400	500	2	4	4×10^8	7×10^8	6×10^9	40 to 100	0.1 to 10
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Ⓐ Light source : 500 K blackbody
Chopping frequency : 600 Hz
Supply Voltage : 15 V
Load resistance : Nearly equal to the element dark resistance.
Incident energy : 16.7 $\mu\text{W}/\text{cm}^2$

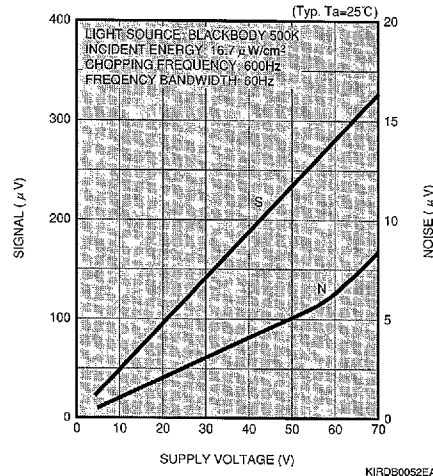
Ⓑ Chopping frequency : 600 Hz
Noise bandwidth : 60 Hz
Supply Voltage : 15 V
Load resistance : Nearly equal to the element dark resistance.

Spectral Response 1.5 to 5.8 μm

• Spectral Response

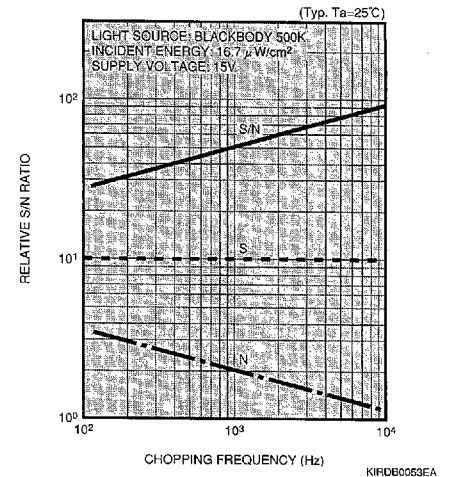


• S/N Ratio vs. Supply Voltage



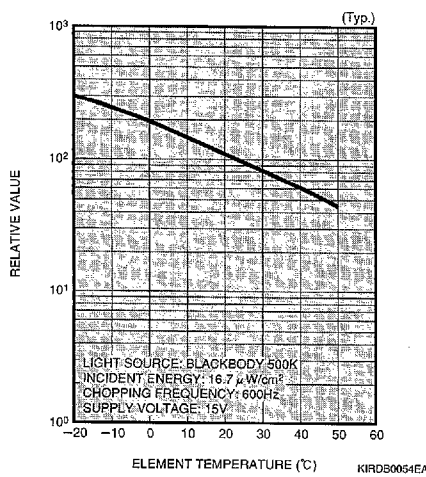
If a voltage higher than 60 V is applied, the noise increases exponentially, degrading the S/N ratio. The device should be operated at 60 V or less.

• S/N Ratio vs. Chopping Frequency



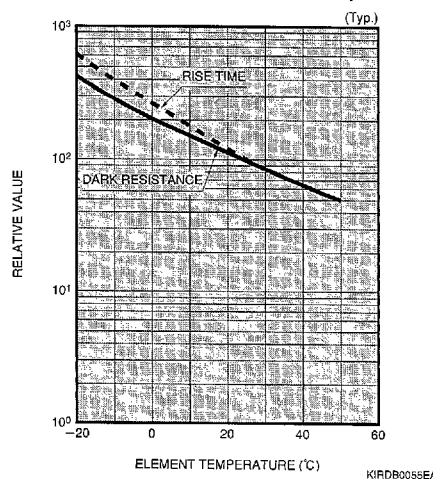
Increasing the chopping frequency reduces the 1/f noise and results in an improved S/N ratio. The S/N ratio can also be improved by narrowing the noise bandwidth using a lock-in amplifier.

• Responsivity vs. Temperature

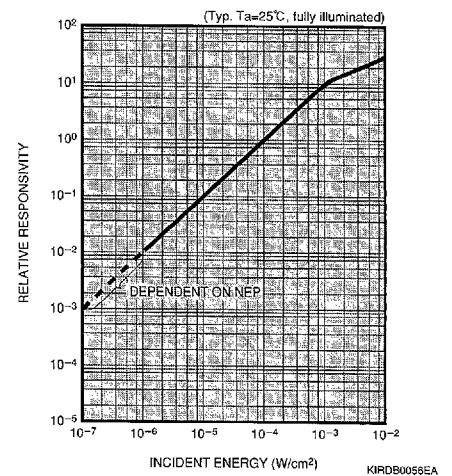


Cooling the device enhances its responsivity. But the responsivity also depends on the load resistance in the circuit.

• Dark Resistance, Rise Time vs. Temperature

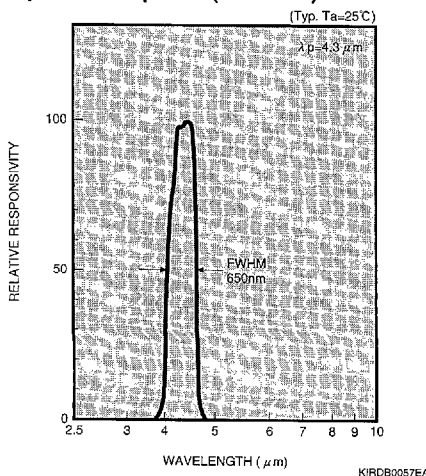


• Linearity



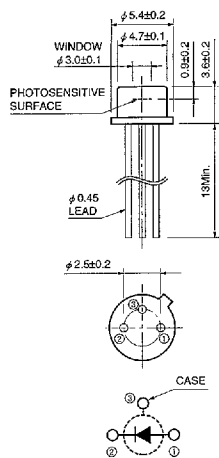
When the incident light spot is smaller than the active area, the upper limit of the linearity becomes lower.

• Spectral Response (P3207-04)



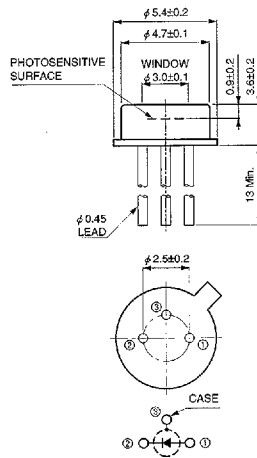
Dimensional Outlines (Unit: mm)

① G3476-01, etc.



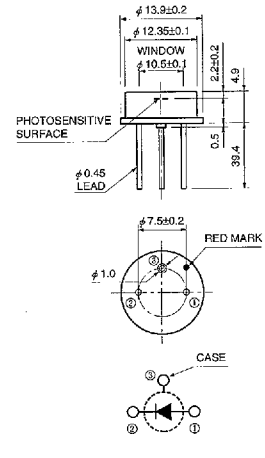
KIRDA0034EA

② G5832-02, -03



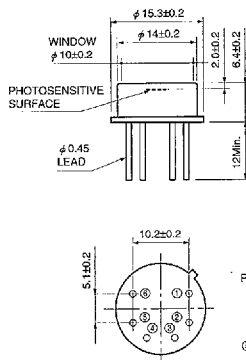
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③ G5832-05, etc.



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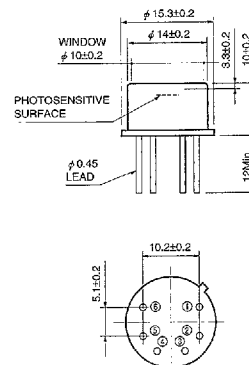
④ G5832-11, etc.



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

KIRDA0028EB

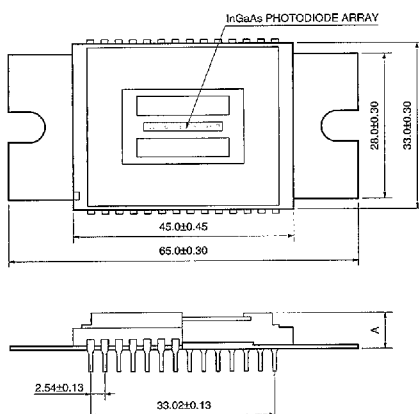
⑤ G5832-21, etc.



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

KIRDA00031EB

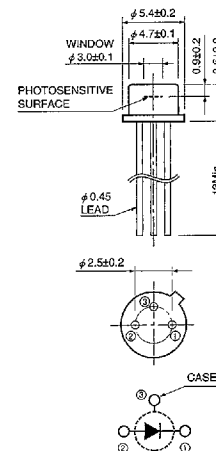
⑥ G6890-128, etc.



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)

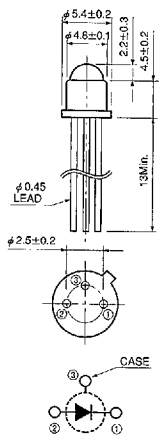
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⑦ B1720-02, etc.



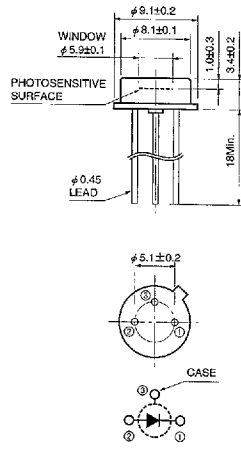
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8 B1720-05



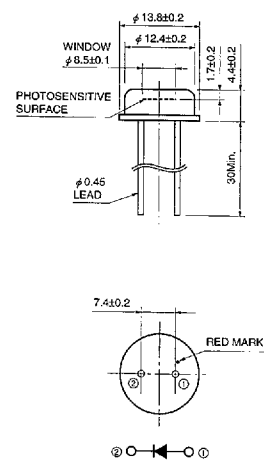
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9 B2144-01, etc.



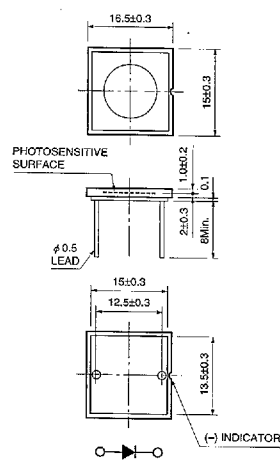
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10 B1919-01



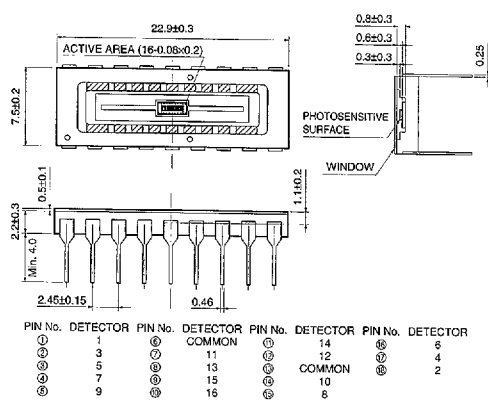
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11 B1920-01



KIRDA0027EB

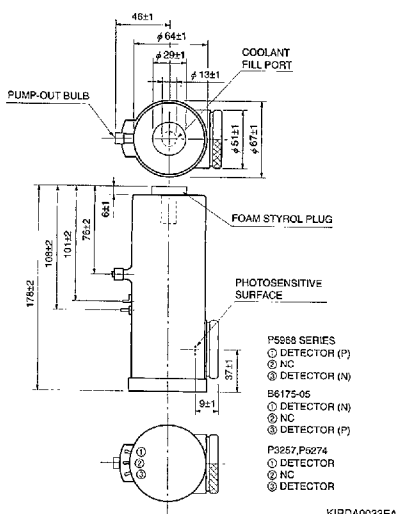
12 G7151-16



PIN No.	DETECTOR	PIN No.	DETECTOR	PIN No.	DETECTOR	PIN No.	DETECTOR
①	1	⑦	COMMON	⑬	14	⑲	4
②	3	⑧	11	⑭	12	⑳	5
③	5	⑨	13	⑮	COMMON	㉑	2
④	7	⑩	15	⑯	10	㉒	8
⑤	9	⑪	16	⑰	8		

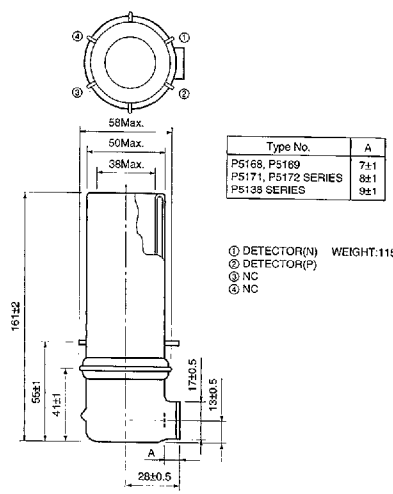
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13 P5968 series, P7163, B6175-05, etc.



KIRDA0033EA

14 P5138, etc.

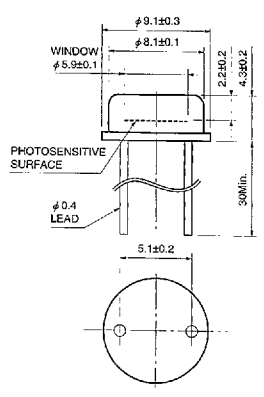


Type No.	A
P5168, P5169	71.1
P5171, P5172 SERIES	84.1
P5138 SERIES	94.1

- ① DETECTOR(N) WEIGHT:115g
- ② DETECTOR(P)
- ③ NC
- ④ NC

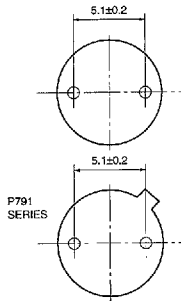
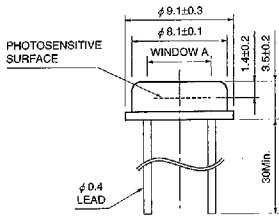
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15 P394



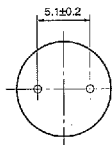
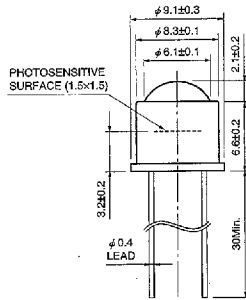
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16 P394A, etc.



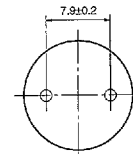
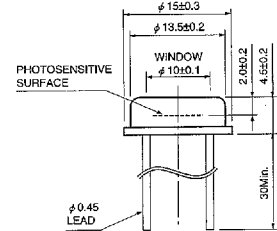
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17 P3226-02



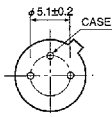
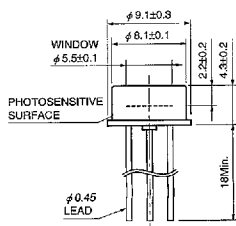
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18 P397



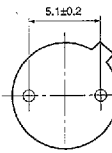
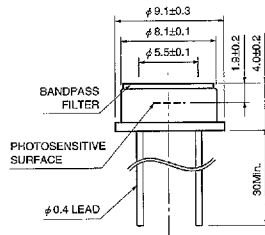
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19 P791-11



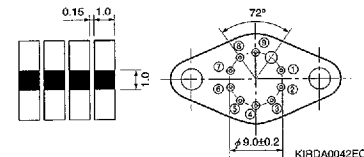
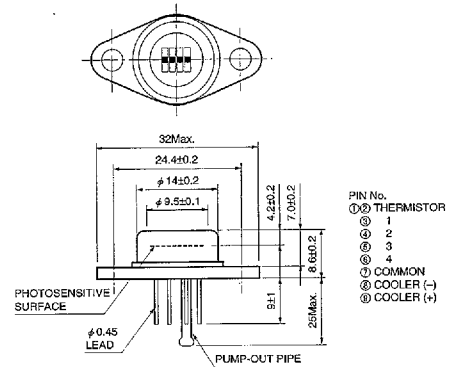
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20 P3207-04



KIRDA0054EA

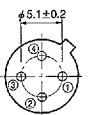
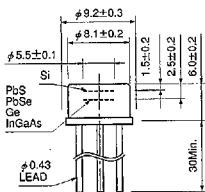
21 P4115



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

KIRDA0042EC

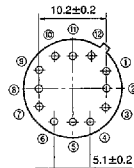
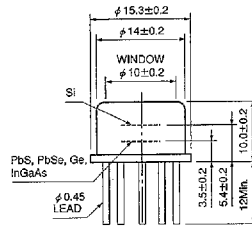
22 K1713-01, etc.



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

KIRDA0041EA

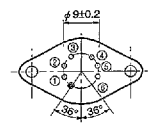
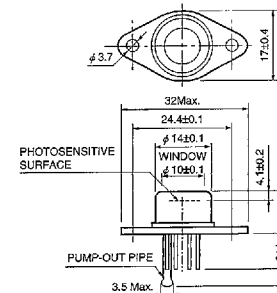
23 K3413-01, etc.



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

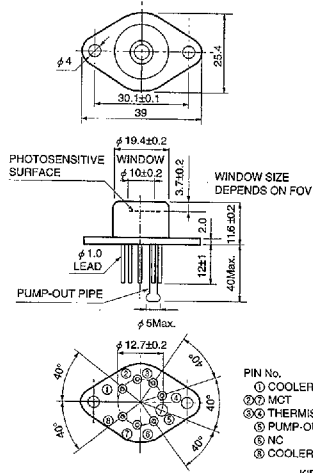
24 P3981-01, etc.



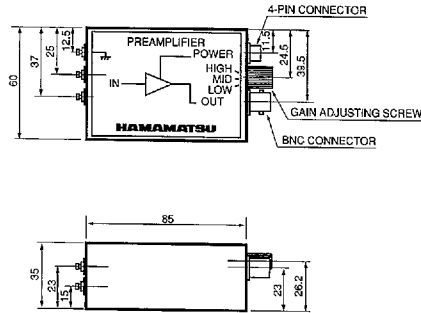
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 ② THERMISTOR
 ③ DETECTOR
 ④ DETECTOR
 ⑤ COOLER (-)
 ⑥ COOLER (+)

KIRDA0044EB

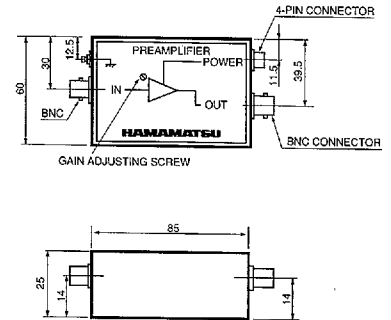
25 P2750, etc.



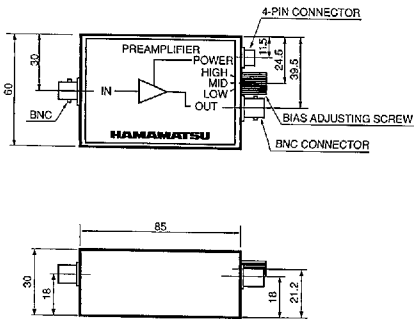
26 C4159, -01, -03



27 C4159-02



28 C5185, -01



29 C3757-02

