HAMAMATSU
PHOTON IS OUR BUSINESS

PbSe photoconductive detectors

NEW

P9696 series P3207-08

Infrared detectors with fast response and high sensitivity in 5 µm wavelength band

Compared to other detectors used in the same wavelength regions, PbSe photoconductive detectors have faster response and can operate at room temperature, making them widely used in gas analyzers, etc. Cooling these detectors increases the sensitivity and improves the S/N. So cooled type PbSe photoconductive detectors are widely used in high-precision photometry such as for analytical instruments.

Features

- **High-speed response**
- **Room temperature type and TE-cooled type available**
- **Lower temperature detection limit: approx. 50 °C**
- **With bandpass filter: P3207-08**

Applications

- **Gas analyzer (CH_4, CO, CO_2)**
- **Radiation thermometer**
- **Flame detector**
- **Film thickness gauge**

Accessories (options)

- **Heatsink for one-stage TE-cooled type A3179**
- **Heatsink for two-stage TE-cooled type A3179-01**
- **Temperature controller for TE-cooled type C1103-04**
- **Amplifier for PbS/PbSe photoconductive detector C3757-02**
- **Infrared detector module with preamp Non-cooled type P4245**
  Cooled type P4639

Specifications / Absolute maximum ratings

Type no.	Dimensional outline*1	Package	Cooling	Photosensitive area (mm)	Absolute maximum ratings: Thermistor power dissipation*2 (mW)	TE-cooler voltage consumption (V)	TE-cooler current consumption (A)	Incident light level Pin (W/cm^2)	Supply*3 voltage Vs (V)	Operating temperature Topr (°C)	Storage temperature Tstg (°C)	Soldering conditions
P9696-02	(1)/S	TO-5	Non-cooled	2 × 2	-	-	-	1×10^{-3}	100	-30 to +50	-55 to +60	260 °C or less, within 10 seconds
P9696-03				3 × 3								
P3207-08	(2)/S	TO-5*4 (with filter)		2 × 2								
P9696-102	(3)/S	TO-8	One-stage TE-cooled	2 × 2	0.2	0.85	1.5					
P9696-103				3 × 3								
P9696-202	(4)/S		Two-stage TE-cooled	2 × 2		0.95	1.0					
P9696-203				3 × 3								

*1: S=Sapphire glass
*2: Thermistor recommended power dissipation=0.03 mW max.
*3: Voltage applied to a PbSe detector through a load resistor
*4: Half width=140 nm
Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

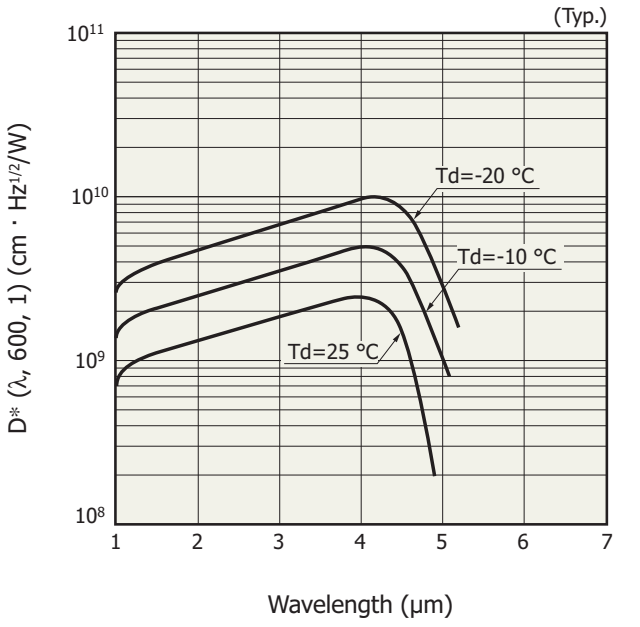
Electrical and optical characteristics (Typ., unless otherwise noted)

Type no.	Measurement condition Element temperature Td (°C)	Peak sensitivity wavelength λp (μm)	Cut-off wavelength λc (μm)	Photosensitivity*4 S λ=λp Vs=15 V Min. (V/W)	Photosensitivity*4 S λ=λp Vs=15 V Typ. (V/W)	Detectivity D* (500, 600, 1) Min. (cm · Hz$^{1/2}$/W)	Detectivity D* (500, 600, 1) Typ. (cm · Hz$^{1/2}$/W)	Detectivity D* (λp, 600, 1) Typ. (cm · Hz$^{1/2}$/W)	Rise time tr 0 to 63% Typ. (μs)	Rise time tr 0 to 63% Max. (μs)	Thermistor resistance T=25 °C (kΩ)	Thermistor B constant T=-10 to 25 °C	Dark resistance Rd (MΩ)
P9696-02	25	4.0	4.8	1.5×10^3	3×10^3	1×10^8	2.5×10^8	2.5×10^9	8	10	-	3300	0.1 to 3
P9696-03				6.7×10^2	1.3×10^3								
P3207-08*5		4.25	4.35	7.8×10^2	1.5×10^3	-	-	1.3×10^9					
P9696-102	-10	4.1	5.1	5.6×10^3	7.5×10^3	2.5×10^8	5×10^8	5×10^9	10	20	9.0		0.5 to 10
P9696-103				2.5×10^3	3.3×10^3								
P9696-202	-20	4.2	5.2	6.7×10^3	1×10^4	5×10^8	1×10^9	1×10^{10}					
P9696-203				3×10^3	4.7×10^3								

*4: Chopping frequency=600 Hz, load resistance=nearly equal to detector dark resistance
*5: Half width=140 nm

Spectral response

P9696 series



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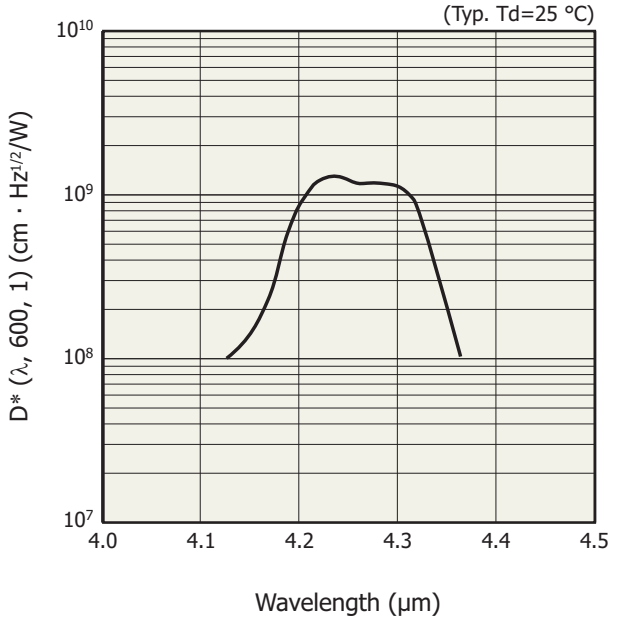
P3207-08



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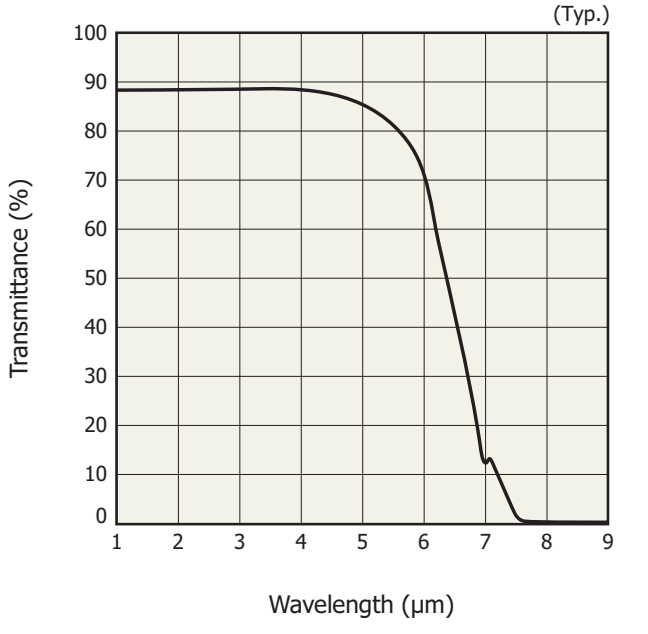
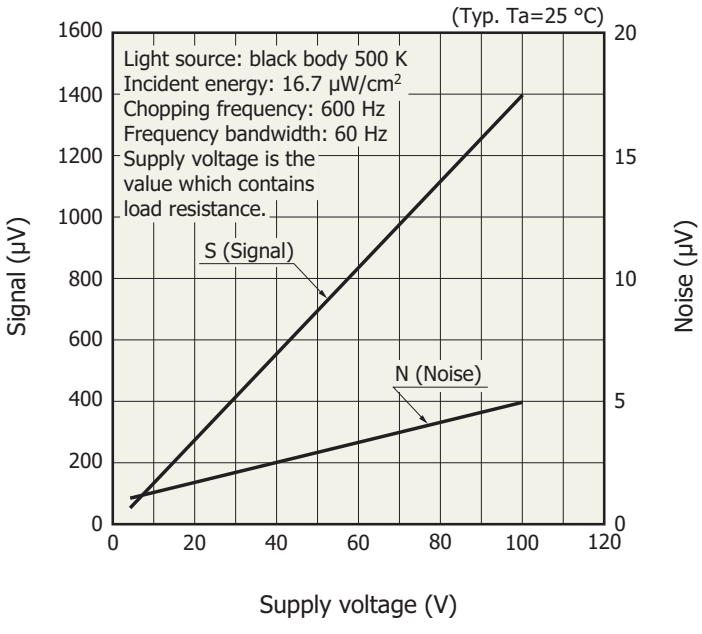
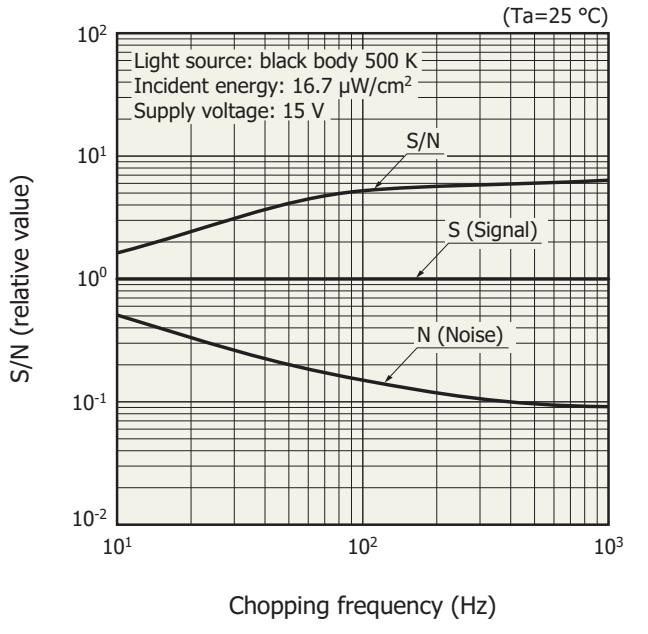
Spectral transmittance of window material



S/N vs. supply voltage (P9696-02)

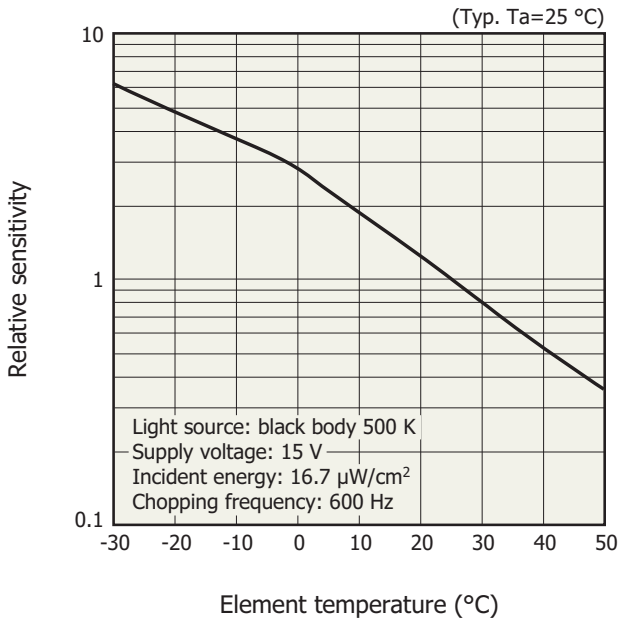


S/N vs. chopping frequency



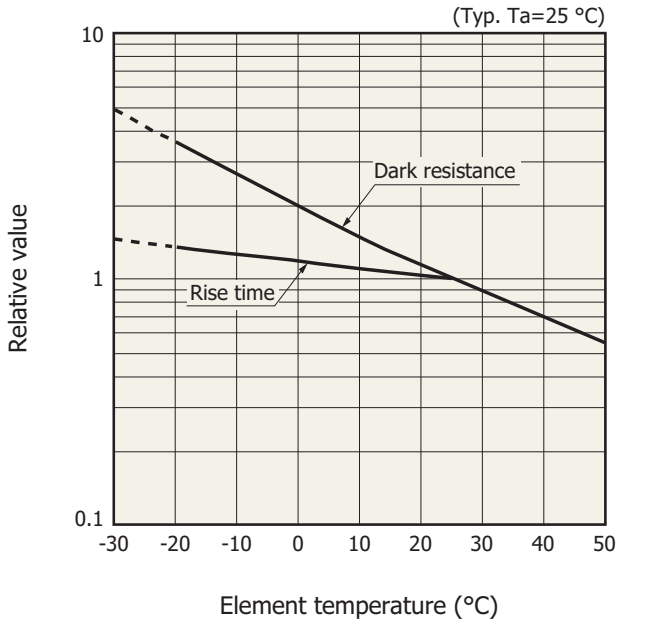
Increasing the chopping frequency reduces the 1/f noise and results in an S/N improvement. The S/N can also be improved by narrowing the noise bandwidth using a lock-in amplifier.

Photosensitivity vs. element temperature



Cooling the device enhances its sensitivity, but the sensitivity also depends on the load resistance in the circuit.

Dark resistance, rise time vs. element temperature



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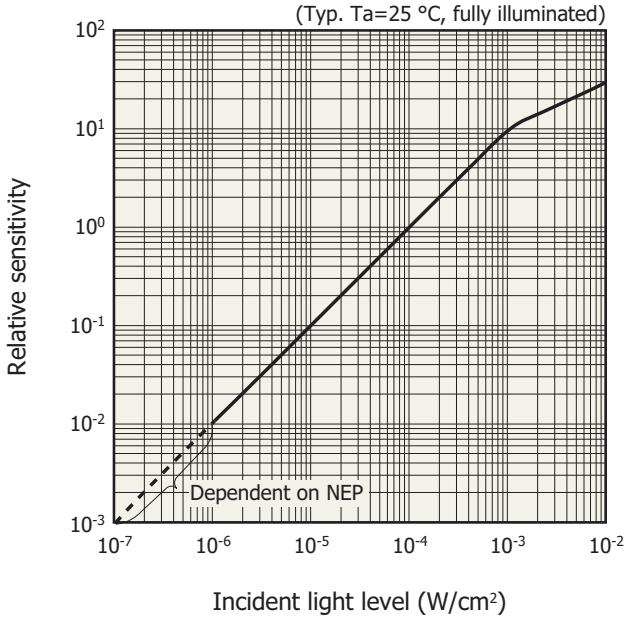
Linearity



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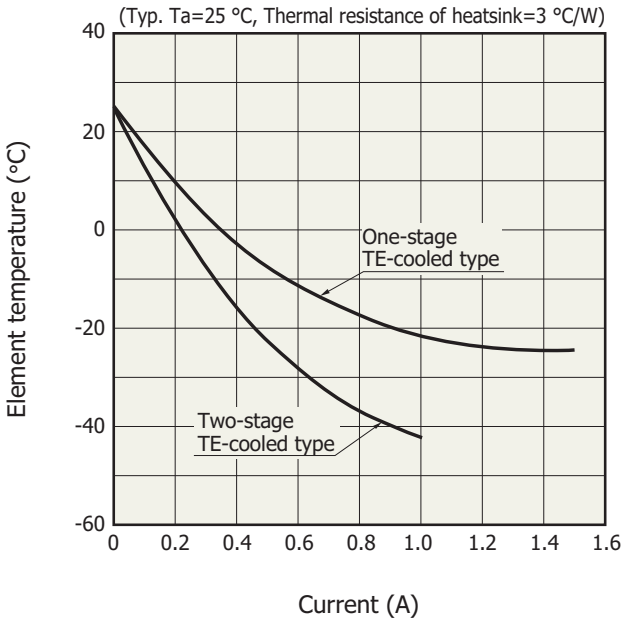
By making the incident light spot smaller than the photosensitive area, the upper limit of the linearity becomes lower.

Cooling characteristics of TE-cooler



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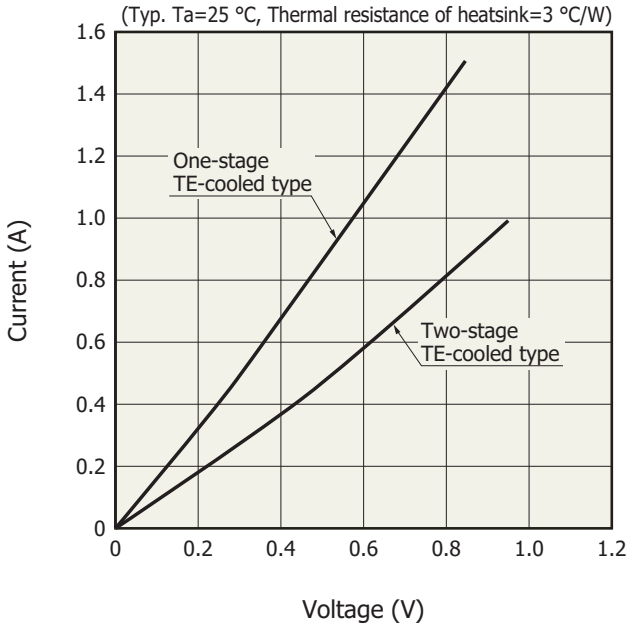
Current vs. voltage characteristics of TE-cooler



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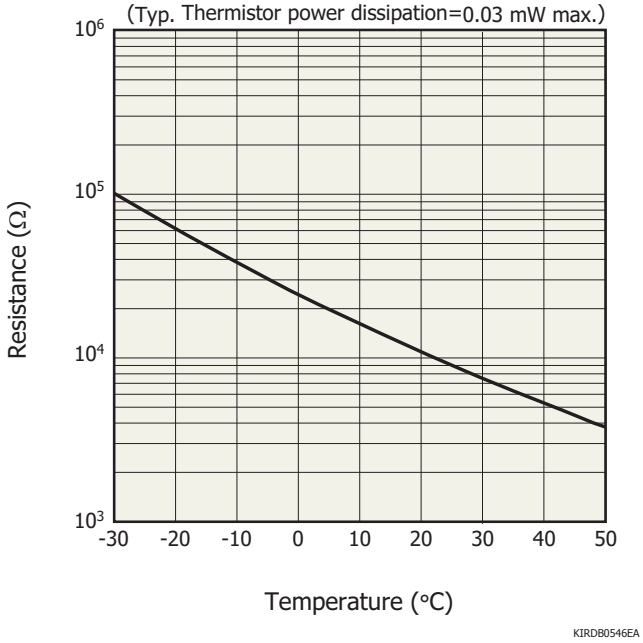
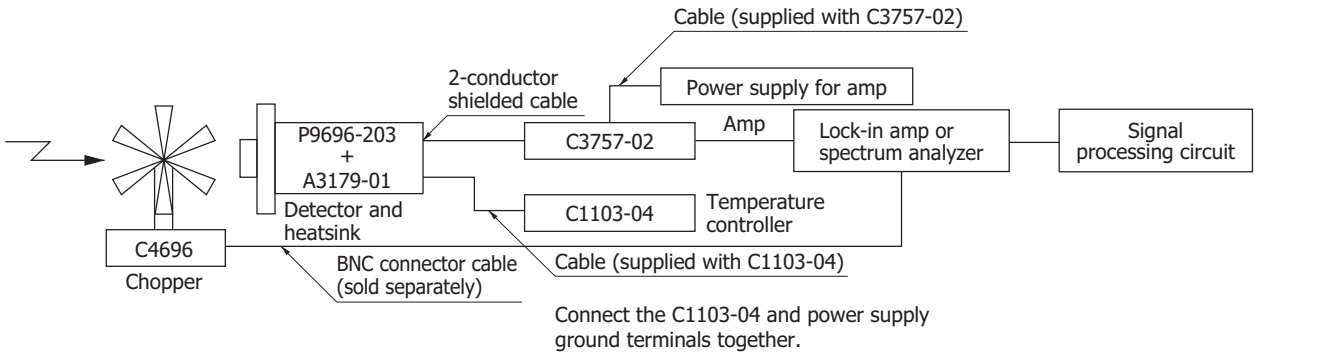
Thermistor temperature characteristics

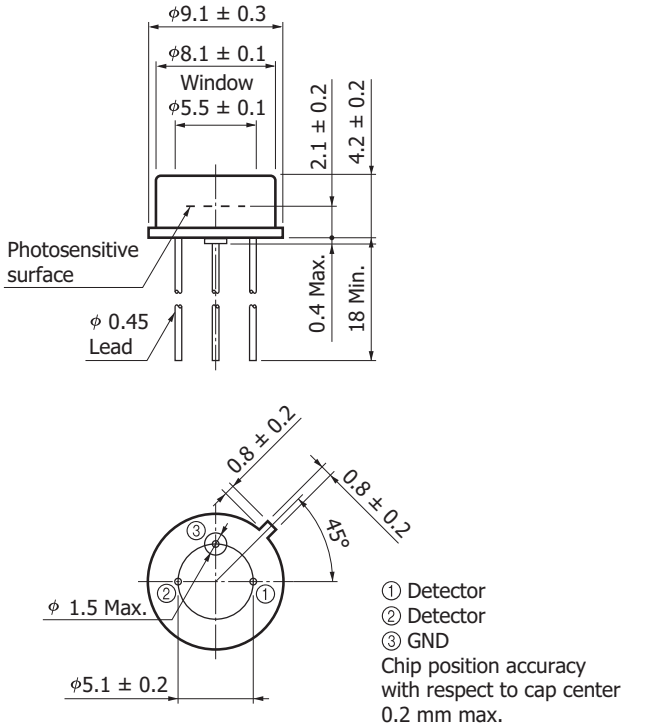


Connection example (P9696-203)



Dimensional outlines (unit: mm)

(1) P9696-02/-03



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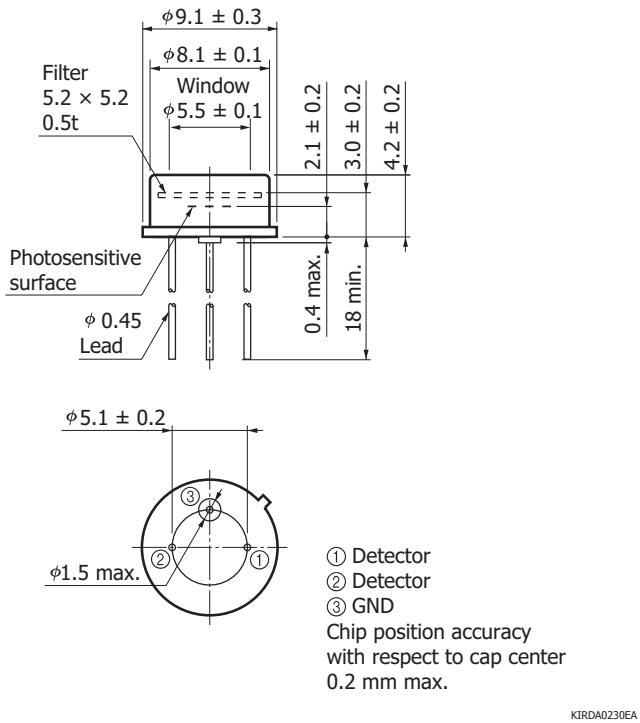

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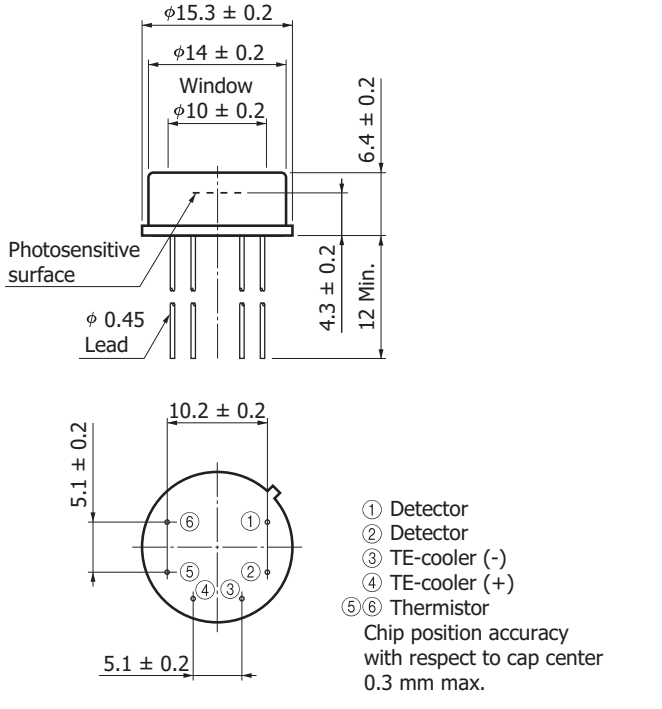
(3) P9696-102/-103



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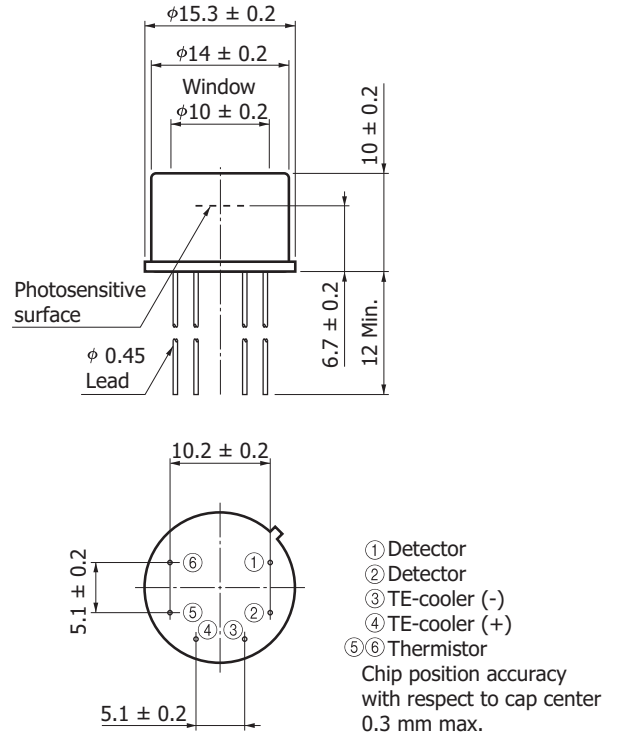
(4) P9696-202/-203



KIRDA0125EB

Related information

www.hamamatsu.com/sp/ssd/doc_en.html

■ Precautions
- Notice
- Metal, ceramic, Plastic products/Precautions

■ Technical information
- infrared detector/technical information

HAMAMATSU www.hamamatsu.com

HAMAMATSU PHOTONICS K.K., Solid State Division
1126-1 Ichino-cho, Higashi-ku, Hamamatsu City, 435-8558 Japan, Telephone: (81) 53-434-3311, Fax: (81) 53-434-5184
U.S.A.: Hamamatsu Corporation: 360 Foothill Road, P.O.Box 6910, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1) 908-231-0960, Fax: (1) 908-231-1218
Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49) 8152-375-0, Fax: (49) 8152-265-8
France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: 33-(1) 69 53 71 00, Fax: 33-(1) 69 53 71 10
United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, United Kingdom, Telephone: (44) 1707-294888, Fax: (44) 1707-325777
North Europe: Hamamatsu Photonics Norden AB: Thorshamnsgatan 35 16440 Kista, Sweden, Telephone: (46) 8-509-031-00, Fax: (46) 8-509-031-01
Italy: Hamamatsu Photonics Italia S.R.L.: Strada della Moia, 1 int. 6, 20020 Arese, (Milano), Italy, Telephone: (39) 02-935-81-733, Fax: (39) 02-935-81-741
China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaming Center, No.27 Dongsanhuan Beilu, Chaoyang District, Beijing 100020, China, Telephone: (86) 10-6586-6006, Fax: (86) 10-6586-2866

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