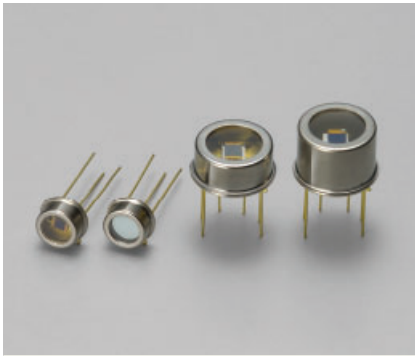


PbSe photoconductive detectors



P791/P2038/P2680 series
P3207-07

Detection capability up to 5 μm range (TE-cooled type)

HAMAMATSU provides various types of PbSe photoconductive detectors including room temperature operation types and thermoelectrically cooled types. Cooled type PbSe photoconductive detectors offer higher sensitivity and improved S/N, and are widely used in precision photometry such as in analytical instruments.

Features

- **High-speed response**
- **Room temperature operation**
Compared to other types of detectors used in the same wavelength range, PbSe detectors have higher response speed and can also operate at room temperature, making them useful in a wide range of applications such as gas analyzers, etc.
- **Lower temperature detection limit: 50 °C approx.**

Applications

- **Radiation thermometer**
- **Flame detector**
- **Gas analyzer (CH₄, CO, CO₂)**
- **Film thickness gauge**

Accessories (Optional)

- **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	Package	Cooling	Active area (mm)	Thermistor resistance Ta=25 °C Typ. (kΩ)	Absolute maximum ratings				
						Thermistor power dissipation (mW)	TE-cooler current dissipation (A)	Supply voltage Vs (V) *1	Operating temperature Topr (°C)	Storage temperature Tstg (°C)
P791-11	①	TO-5	Non-cooled	2 × 2	-	-	-	100	-30 to +50	-55 to +60
P791-13				3 × 3						
P3207-07	②	TO-5 (With filter)		2 × 2						
P2038-02	③	TO-8	One-stage TE-cooled	2 × 2	9	0.2	1.5	100	-30 to +50	-55 to +60
P2038-03			3 × 3							
P2680-02	④	TO-8	Two-stage TE-cooled	2 × 2	9	0.2	1.0	100	-30 to +50	-55 to +60
P2680-03			3 × 3							

*1: Voltage applied to a PbSe detector through a load resistor

Electrical and optical characteristics (Typ. unless otherwise noted)

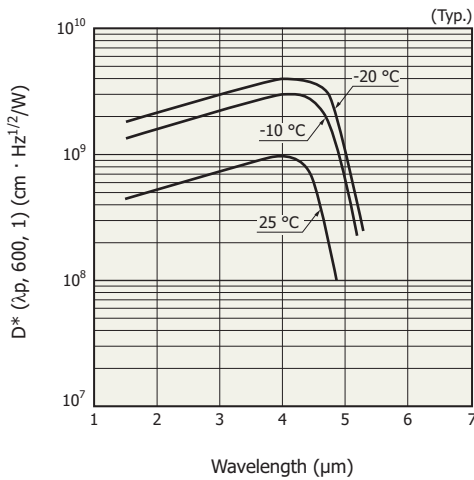
Type No.	Measurement-condition	Peak sensitivity wavelength λ_p	Cut-off wavelength λ_c	Photo sensitivity S^{*3} $\lambda = \lambda_p$ $V_s = 15 V$		D^* (500, 600, 1)		D^* (λ_p , 600, 1)	Rise time t_r 0 to 63 %	Dark resistance R_d
	Element temperature T			(μm)	(μm)	Min. (V/W)	Typ. (V/W)		Min. ($cm \cdot Hz^{1/2}/W$)	
	($^{\circ}C$)	(μm)	(μm)						($M\Omega$)	
P791-11	25	4.0	4.8	7×10^2	1×10^3	5×10^7	1×10^8	1×10^9	3	0.3 to 1.5
P791-13				3×10^2	5×10^2					
P3207-07 *2		4.3			1.4×10^3	1.8×10^3	-	-	2×10^9	10
P2038-02	-10	4.1	5.1	2.2×10^3	3×10^3	1×10^8	3×10^8	3×10^9	5	1.7 to 7.0
P2038-03				1×10^3	1.3×10^3					
P2680-02	-20	4.2	5.2	2.7×10^3	4×10^3	2×10^8	4×10^8	4×10^9		1.8 to 8.0
P2680-03				1.2×10^3	2×10^3					

*2: Half width 400 nm

*3: Chopping frequency=600 Hz, load resistance=nearly equal to detector element dark resistance

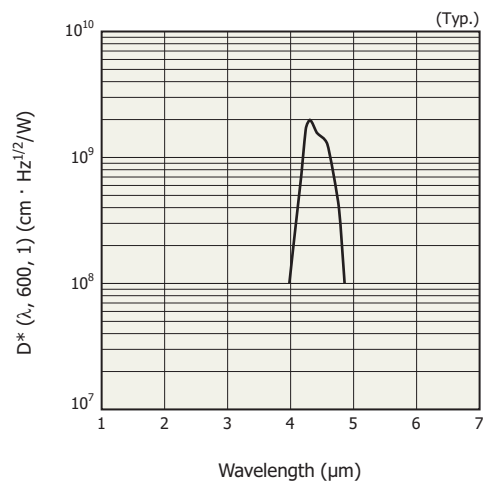
Spectral response

P791/P2038/P2680 series



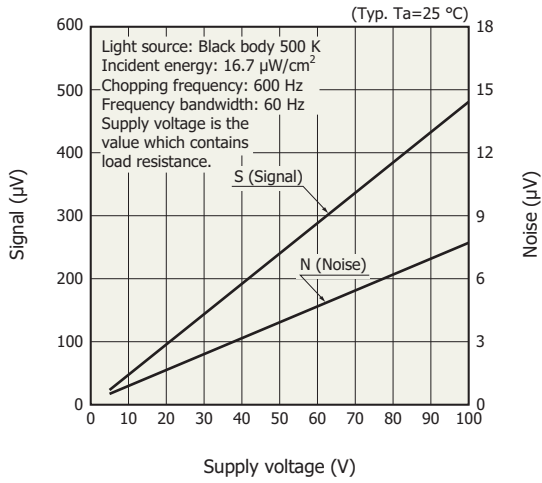
KIRD80392EA

P3207-07



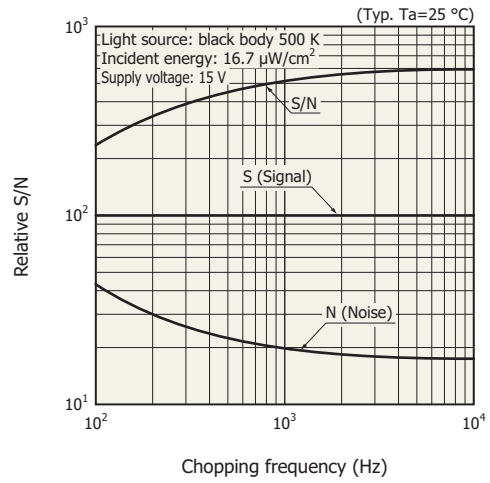
KIRD80391EA

S/N vs. supply voltage



KIRDB0052EC

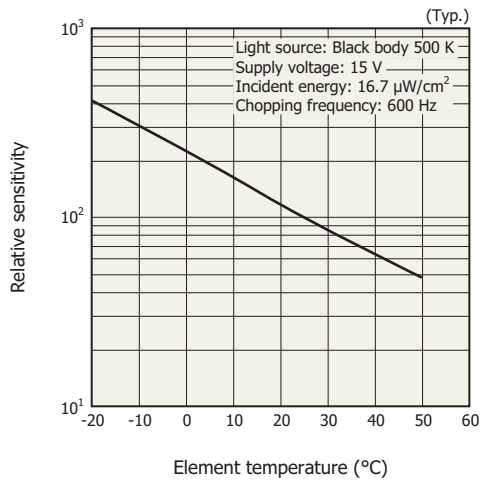
S/N vs. chopping frequency



KIRDB0053EB

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.

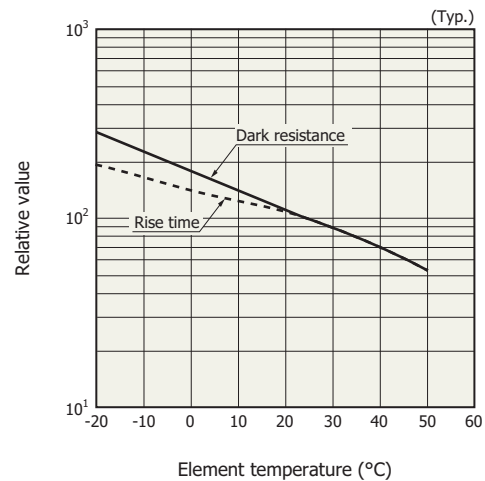
Photo sensitivity temperature characteristic



KIRDB0054EB

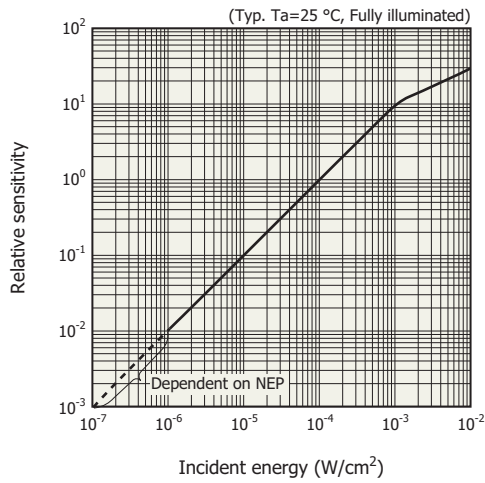
Cooling the device enhances its sensitivity, but the sensitivity also depends on the load resistance in the circuit.

Dark resistance, rise time temperature characteristics



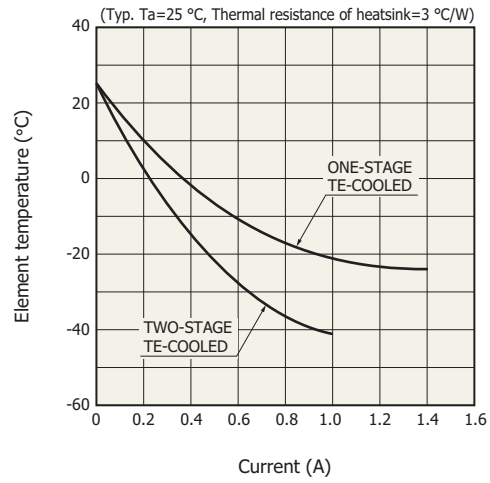
KIRDB0055EB

Photo sensitivity linearity

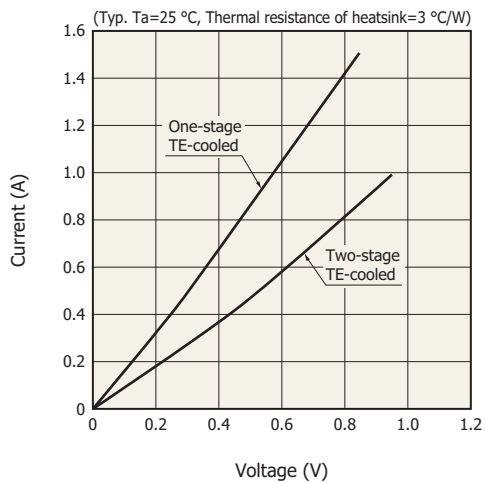


By making the incident light spot smaller than the active area, the upper limit of the linearity becomes lower.

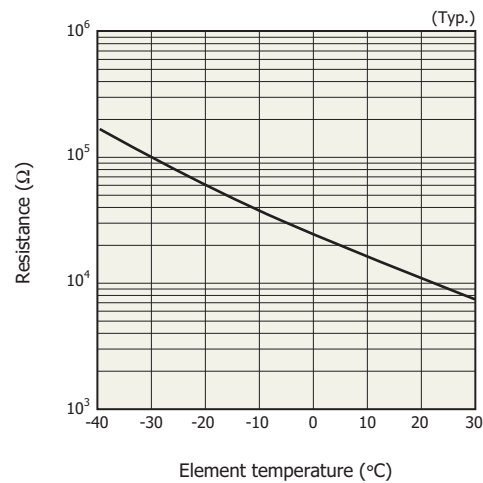
Cooling characteristics of TE-cooler



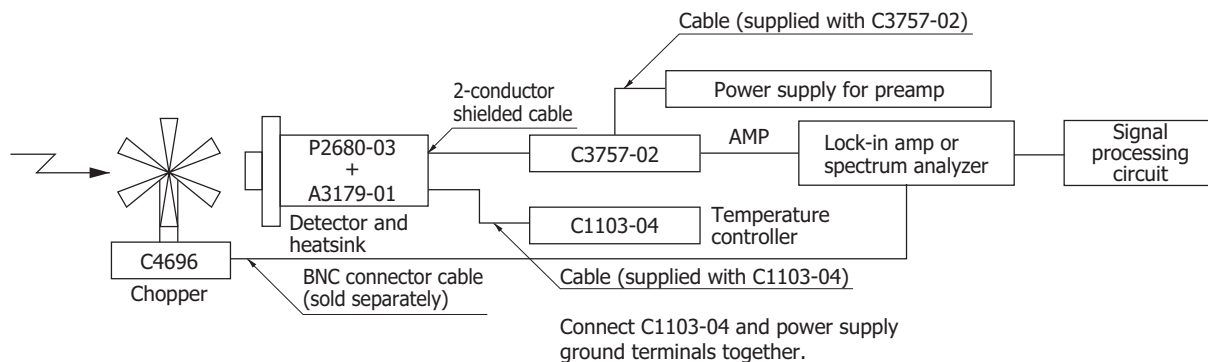
Current vs. voltage characteristics of TE-cooler



Thermistor temperature characteristic



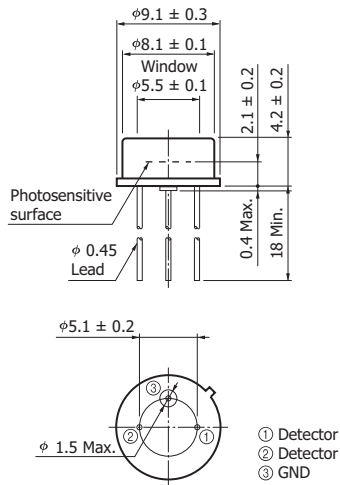
Connection example (P2680-03)



KIRDC0045EB

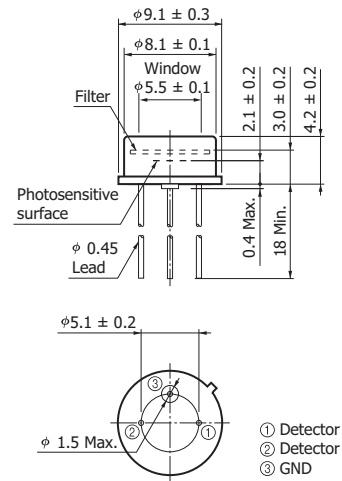
Dimensional outlines (unit: mm)

① P791-11/-13



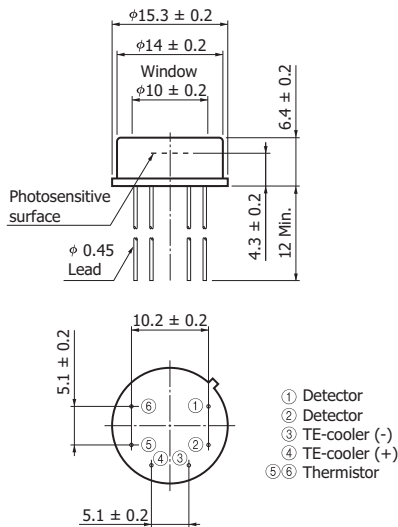
KIRDA0056EC

② P3207-07



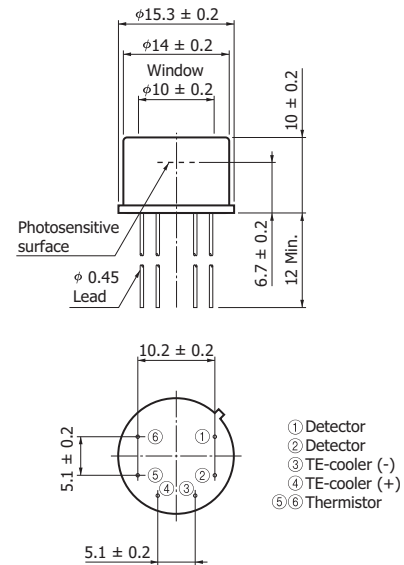
KIRDA0118EA

③ P2038-02/-03



KIRDA0128EA

④ P2680-02/-03



KIRDA0125EA

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