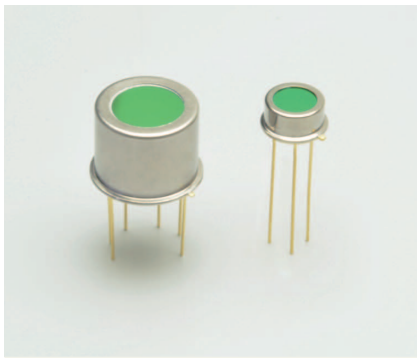


InAsSb photovoltaic detectors



P13894 series

High-speed response and high sensitivity in the spectral band up to 11 μm Infrared detectors

The P13894 series are photovoltaic type infrared detectors that have achieved high sensitivity in the spectral band up to 11 μm using Hamamatsu unique crystal growth technology and process technology. They are compact and easy to handle.

Features

- High sensitivity
- High-speed response
- High shunt resistance
- Non-cooled (P13894-011NA/-011MA), compact package

Applications

- Gas detection (CH₄, CO₂, CO, NH₃, O₃, etc.)
- Radiation thermometers

Options (sold separately)

- Amplifier for infrared detector **C4159-01**

Structure

Parameter	P13894-011NA	P13894-011MA	P13894-211MA	Unit
Window material	None	Ge with AR coating	Ge with AR coating	-
Package	TO-5		TO-8	-
Cooling	Non-cooled		Two-stage TE-cooled type	-
Photosensitive area	1 × 1			mm
Field of view (FOV)	97		113	degrees

Absolute maximum ratings

Parameter	Symbol	Condition	P13894-011NA	P13894-011MA	P13894-211MA	Unit
Reverse voltage	V _R		1			V
Operating temperature	T _{opr}	No dew condensation*1	-40 to +85	-40 to +60		°C
Storage temperature	T _{stg}	No dew condensation*1	-40 to +85	-40 to +60		°C
Soldering conditions			260 °C or less, within 10 s			-

*1: When there is a temperature difference between a product and the surrounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

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.

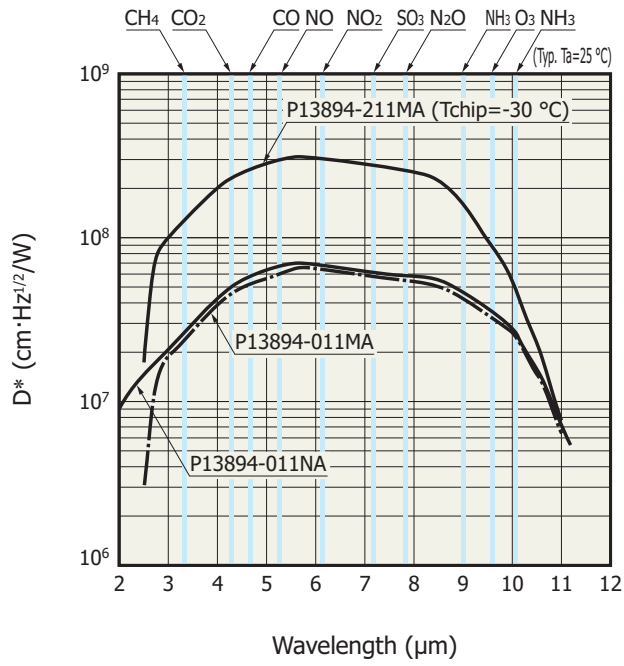
Electrical and optical characteristics (T_a=25 °C)

Parameter	Symbol	Condition	P13894-011NA			P13894-011MA			P13894-211MA			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Chip temperature	T _{chip}		25			25			-30			°C
Peak sensitivity wavelength	λ_p		-	5.6	-	-	5.6	-	-	5.6	-	μm
Cutoff wavelength	λ_c		9.7	11.0	-	9.7	11.0	-	8.9	10.2	-	μm
Photosensitivity	S	$\lambda = \lambda_p^{*2}$	1.4	2.0	-	1.3	1.9	-	2.8	3.8	-	mA/W
Shunt resistance	R _{sh}	V _R =10 mV	1.5	2.0	-	1.5	2.0	-	7.5	10.0	-	k Ω
Detectivity	D*	(λ_p , 1200, 1)	4.0×10^7	7.0×10^7	-	3.8×10^7	6.5×10^7	-	1.8×10^8	3.2×10^8	-	cm ² ·Hz ^{1/2} /W
Noise equivalent power	NEP	$\lambda = \lambda_p$	-	1.4×10^{-9}	2.5×10^{-9}	-	1.5×10^{-9}	2.6×10^{-9}	-	3.1×10^{-10}	5.6×10^{-10}	W/Hz ^{1/2}
Terminal capacitance	C _t	V _R =0 V, f=1 MHz	-	0.6	-	-	0.6	-	-	0.6	-	pF
Rise time	t _r	10 to 90%, no window, $\lambda=1.55 \mu\text{m}$	-	3	10	-	3	10	-	3	10	ns

*2: Uniform irradiation on the entire photosensitive area

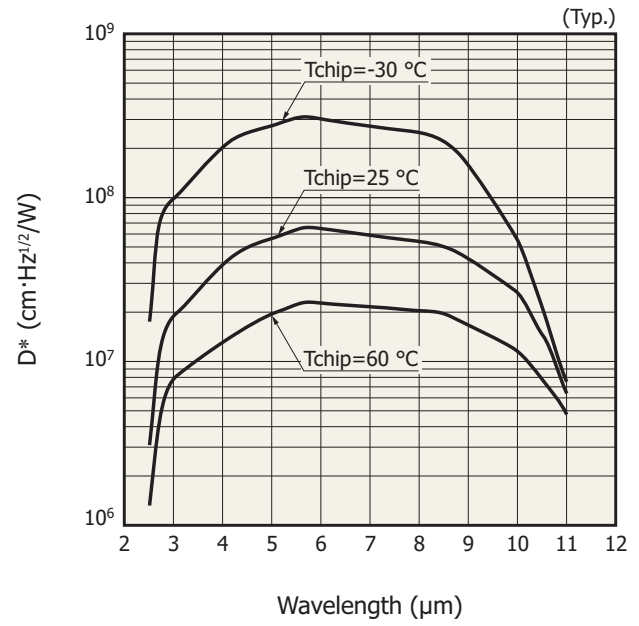
Note: Uniform irradiation must be applied to the entire photosensitive area during use.

Spectral response (D^*)



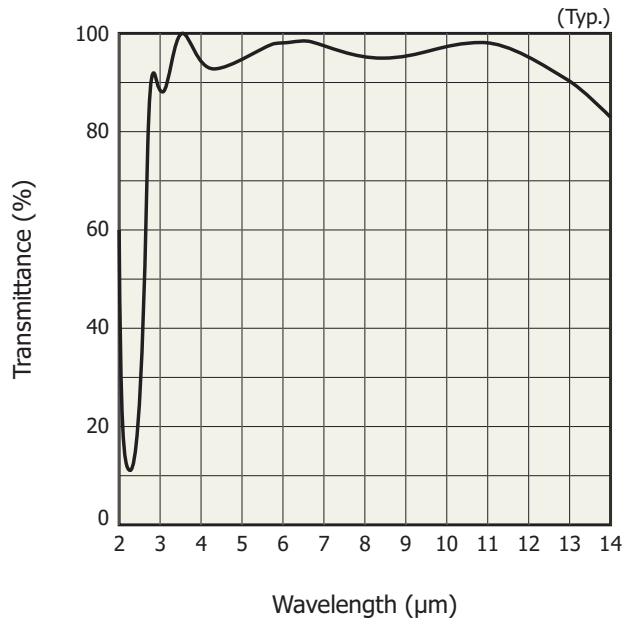
KIRD0632EA

Photosensitivity temperature characteristics (P13894-011MA/-211MA)



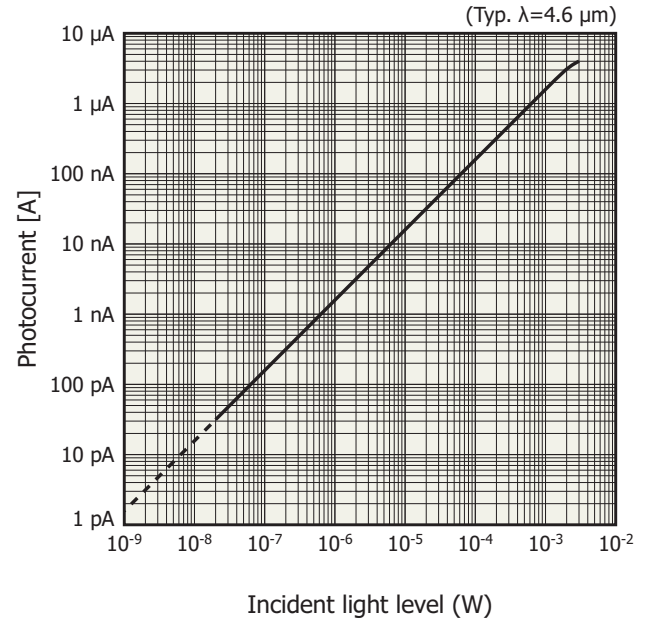
KIRD0633EA

Spectral transmittance characteristics of window material



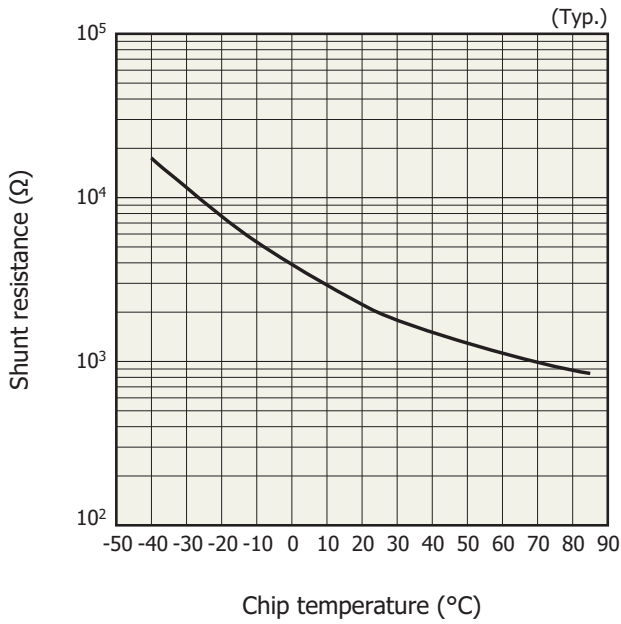
KIRD0629EA

Linearity (P13894-011NA)



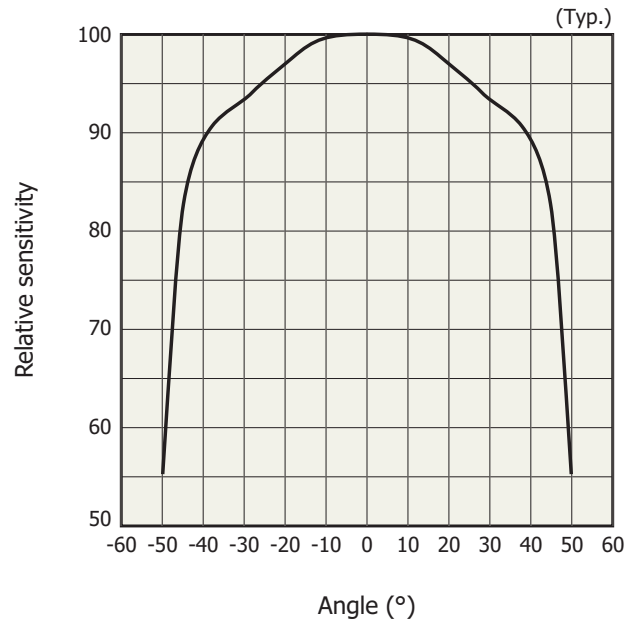
KIRD0630EA

Shunt resistance vs. chip temperature



KIRDB0628EA

Directivity (P13894-011NA)

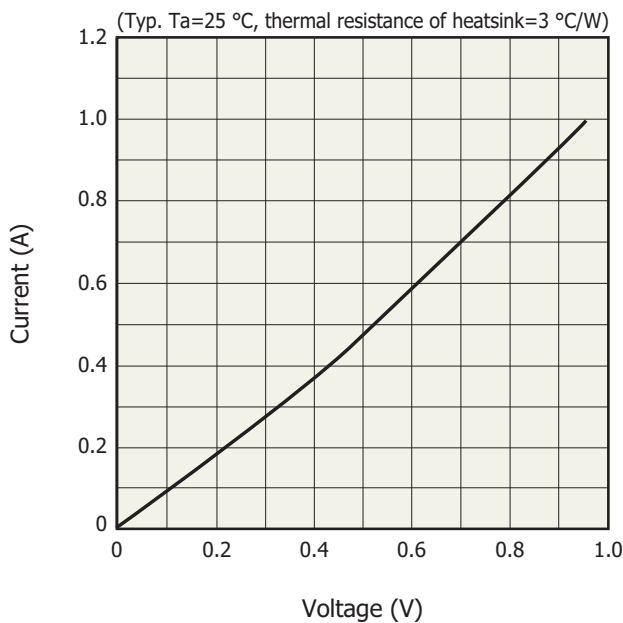


KIRDB0631EA

Specifications of two-stage TE-cooler (Ta=25 °C)

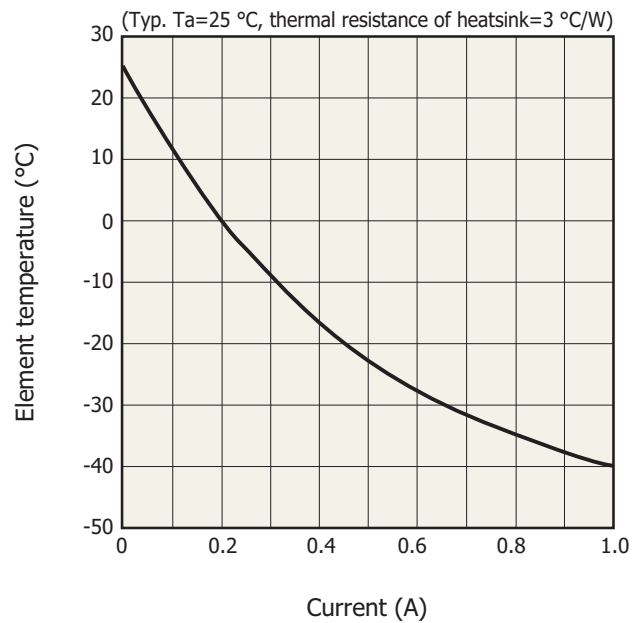
Parameter	Symbol	Min.	Typ.	Max.	Unit
Allowable current	Ic	-	-	1.0	A
Allowable voltage	Vc	-	-	0.95	V
Thermistor resistance	Rth	8.1	9.0	9.9	KΩ
Thermistor allowable dissipation	Pth	-	-	0.2	mW

Current vs. voltage characteristics of TE-cooler



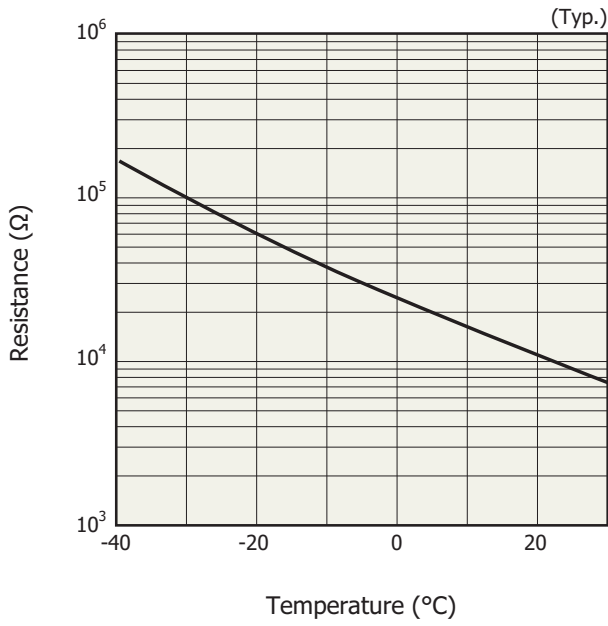
KIRDB0459EA

Cooling characteristics of TE-cooler



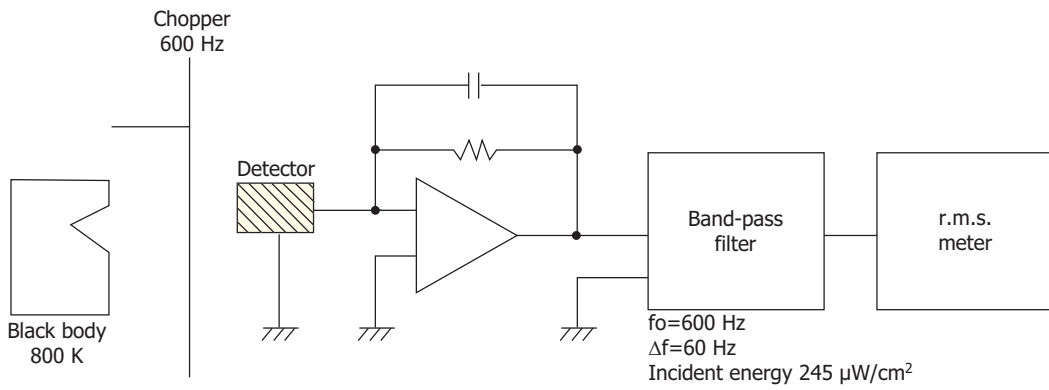
KIRDB0464EA

Thermistor temperature characteristics



KIRDB0116EB

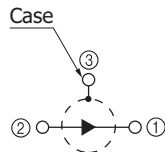
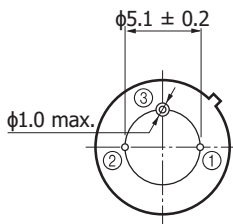
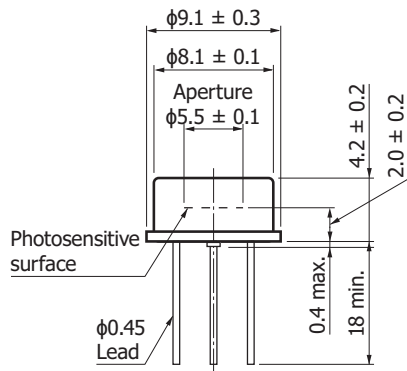
Measurement circuit example



KIRDC0094EA

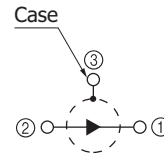
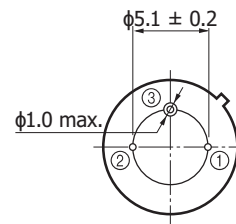
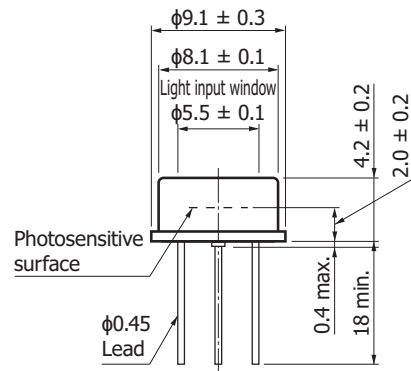
Dimensional outline (unit: mm)

P13894-011NA



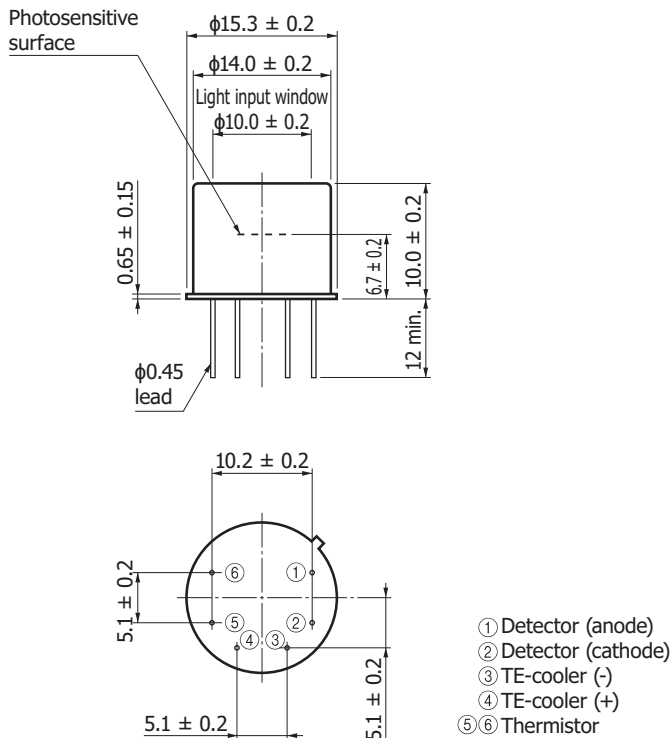
KIRDA0256EA

P13894-011MA



KIRDA0257EA

P13894-211MA



KIRDA0258EA

Related information

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

Precautions

- Disclaimer
- Compound semiconductor photosensors

Technical information

- Infrared detectors

Information described in this material is current as of January 2017.

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