

InAsSb photovoltaic detector



P11120-201

High-speed response and high sensitivity in the 5 μm spectral band
Thermoelectrically cooled infrared detector with no liquid nitrogen required

The P11120-201 is an infrared detector that provides high sensitivity in the 5 μm spectral band due to our unique crystal growth technology. The InAsSb photovoltaic detector has a PN junction that ensures high-speed response and high reliability. Typical applications include gas analysis such as CO₂, SO_x, CO and NO_x. The P11120-201 is environmentally friendly infrared detector and do not use lead, mercury or cadmium, which are substances restricted by the RoHS Directive. They are replacements for previous products that contain these substances.

Features

- High-speed response
- High sensitivity
- High reliability
- RoHS compliant

Applications

- Gas analysis
- Radiation thermometers
- Thermal imaging
- Remote sensing
- FTIR
- Spectrophotometry

Options (sold separately)

- Heatsink for two-stage TE-cooled type **A3179-01**
- Temperature controller **C1103-04**
- Amplifier for infrared detector **C4159-07**
- Infrared detector module with preamp **C12494-210S**

Structure

Parameter	Specification	Unit
Window material	Sapphire	-
Package	TO-8	-
Cooling	Two-stage TE-cooled	-
Photosensitive area	$\phi 1.0$	mm

Absolute maximum ratings

Parameter	Symbol	Value	Unit
Thermistor power dissipation	-	0.2	mW
Reverse voltage	V _R	0.1	V
Operating temperature*1 *2	T _{opr}	-40 to +60	°C
Storage temperature*1	T _{stg}	-55 to +60	°C

*1: No dew condensation

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.

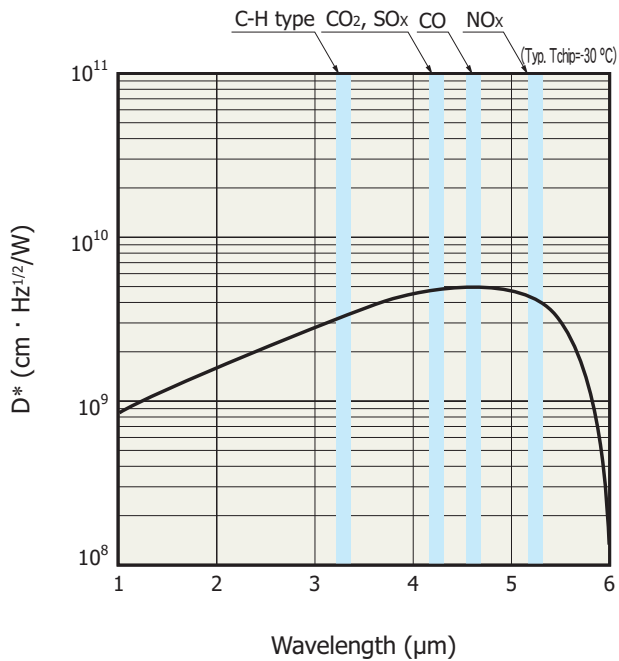
*2: Chip temperature and package temperature

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.

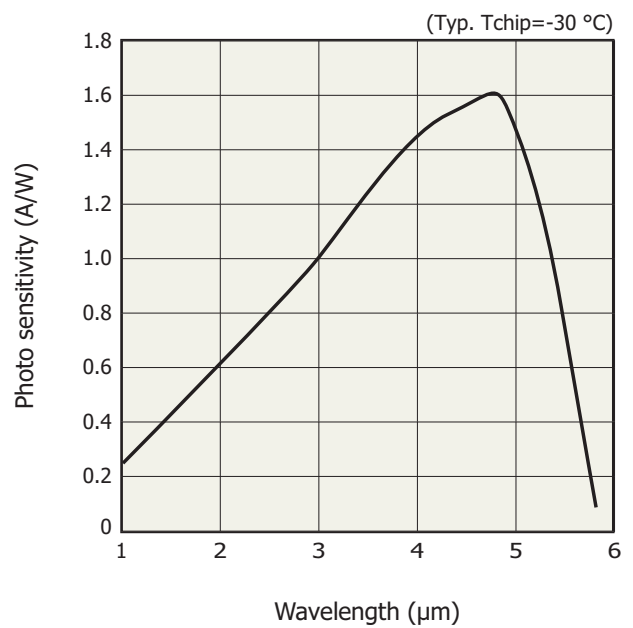
Electrical and optical characteristics (Tchip=-30 °C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Peak sensitivity wavelength	λ_p		4.0	4.9	-	μm
Cutoff wavelength	λ_c		5.6	5.9	-	μm
Photo sensitivity	S	$\lambda = \lambda_p$	0.8	1.6	-	A/W
Shunt resistance	Rsh	$V_R = 10 \text{ mV}$	10	13	-	Ω
Detectivity	D^*	$(\lambda_p, 1200, 1)$	3.5×10^9	5.0×10^9	-	$\text{cm} \cdot \text{Hz}^{1/2} / \text{W}$
Noise equivalent power	NEP	$\lambda = \lambda_p$	-	1.8×10^{-11}	2.5×10^{-11}	$\text{W} / \text{Hz}^{1/2}$
Rise time	tr	$V_R = 0 \text{ V}, R_L = 50 \Omega$ 0 to 63%	-	0.4	-	μs

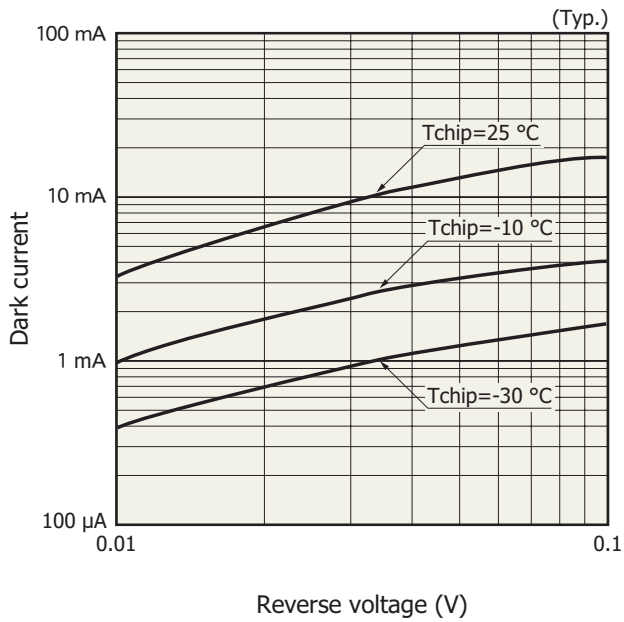
Spectral response (D^*)



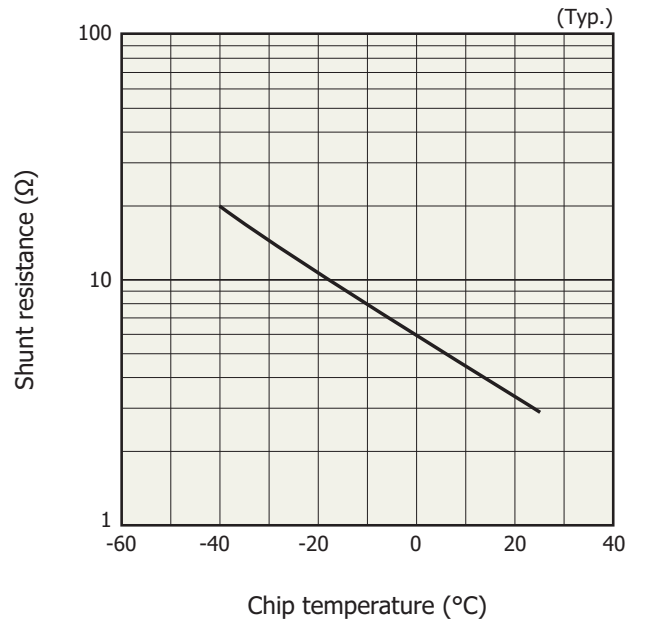
Spectral response



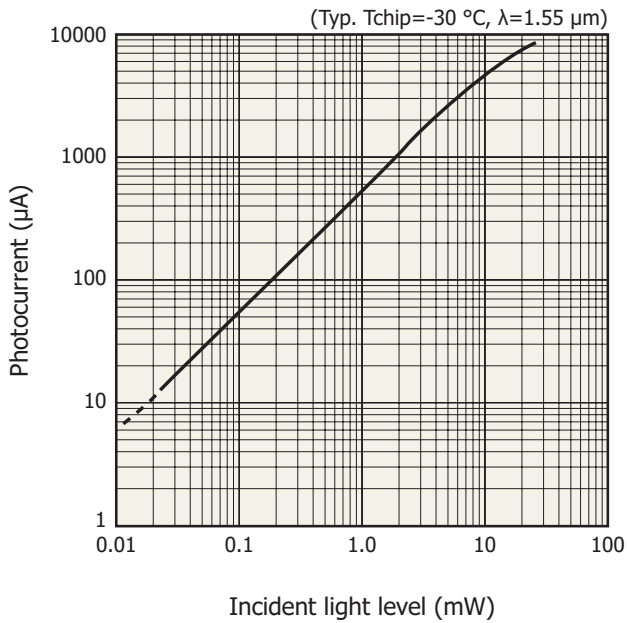
Dark current vs. reverse voltage



Shunt resistance vs. chip temperature



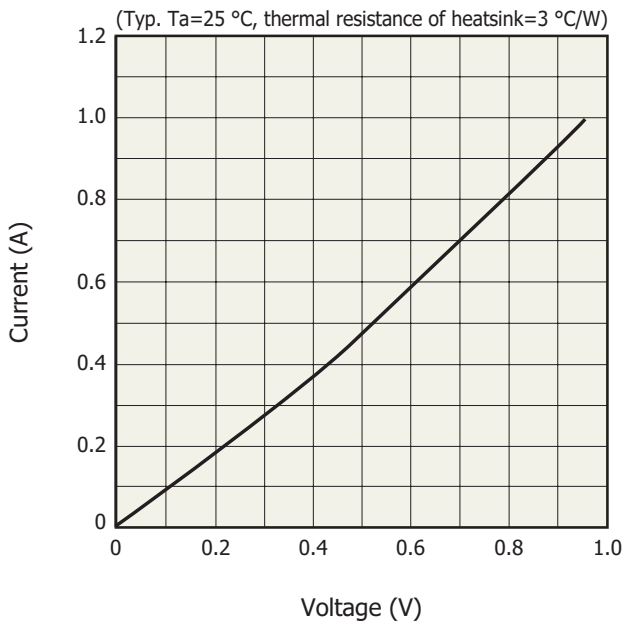
Linearity



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

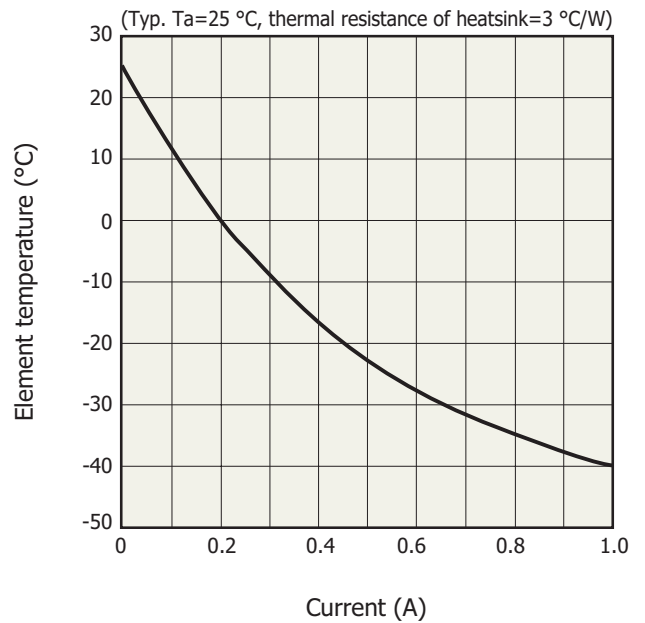
Parameter	Symbol	Min.	Typ.	Max.	Unit
Allowable current	Ic	-	-	1.0	A
Allowable voltage	Vc	-	-	0.95	V
Thermistor resistance	Rth	8.1	9.0	9.9	kΩ
Thermistor power dissipation	Pth	-	-	0.2	mW

▣ Current vs. voltage of TE-cooled type



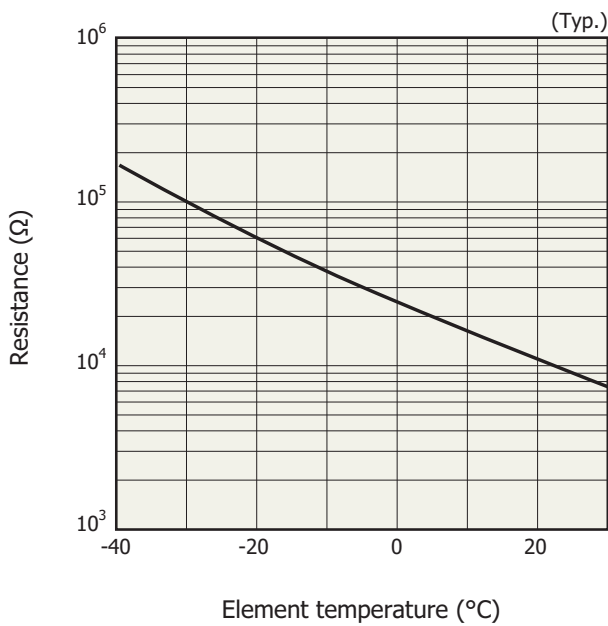
KIRDB0459EA

▣ Cooling characteristics of TE-cooled type



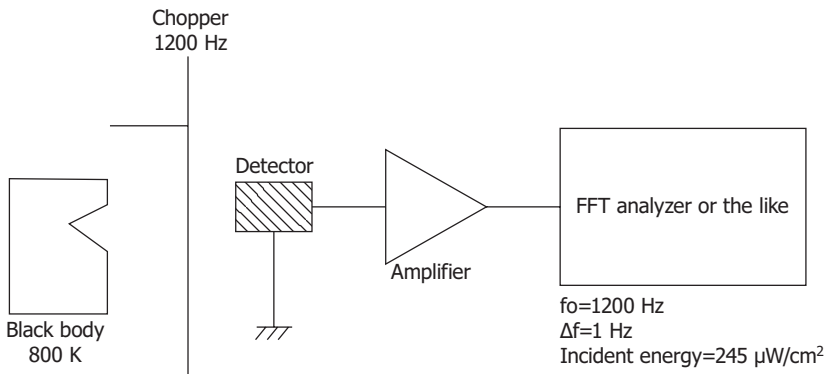
KIRDB0464EA

▣ Thermistor temperature characteristic



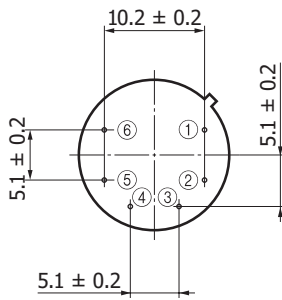
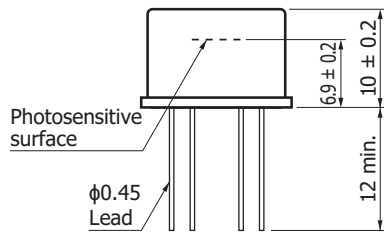
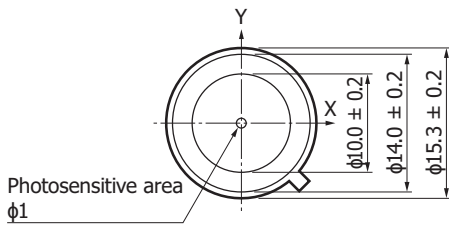
KIRDB0116EA

Measurement circuit example



KIRDC0127EA

Dimensional outline (unit: mm)



Distance from
photosensitive area
center to cap center
 $-0.3 \leq X \leq +0.3$
 $-0.3 \leq Y \leq +0.3$

- ① Detector (anode)
- ② Detector (cathode)
- ③ TE-cooler (-)
- ④ TE-cooler (+)
- ⑤⑥ Thermistor

KIRDA0212EA

Recommended soldering conditions

· Solder temperature: 260 °C (10 s or less, once)

Note: When you set soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

Related information

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

■ Precautions

- Disclaimer
- Compound opto-semiconductors

■ Technical note

- Compound semiconductor photosensors

Information described in this material is current as of October 2023.

Product specifications are subject to change without prior notice due to improvements or other reasons. This document has been carefully prepared and the information contained is believed to be accurate. In rare cases, however, there may be inaccuracies such as text errors. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

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