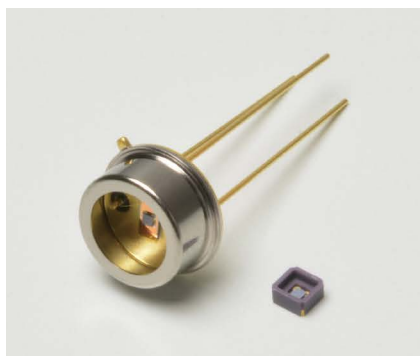


# InAsSb photovoltaic detectors



P16113-011MN P16613-011CN

## Infrared detector capable of room temperature operation (up to 8 μm band)

The P16113-011MN and P16613-011CN are infrared detectors that have high sensitivity in the spectral band up to 8 μm. This high sensitivity has been achieved due to Hamamatsu unique crystal growth technology and process technology. By using a back-illuminated structure, we achieved excellent sensitivity temperature characteristics. These products are an environmentally friendly infrared detector and do not use lead, mercury, or cadmium, which are substances restricted by the RoHS directive. These products replace conventional products containing these substances.

### Features

- High sensitivity
- High-speed response
- High shunt resistance
- Compact, surface mount type ceramic package (P16613-011CN)
- Compatible with lead-free solder reflow (P16613-011CN)
- RoHS compliant (lead, mercury, cadmium free)

### Applications

- Gas detection (SO<sub>x</sub>, NO<sub>x</sub>, etc.)
- Radiation thermometers
- Mid infrared spectroscopy

### Option (sold separately)

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

### Structure

Parameter	P16113-011MN	P16613-011CN	Unit
Window material	None		-
Package	TO-5	Ceramic	-
Photosensitive area	0.7 × 0.7		mm
Field of view	101	86	degrees

### Absolute maximum ratings (Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Value	Unit
Reverse voltage	V <sub>R</sub>	1	V
Operating temperature*1	T <sub>opr</sub>	-40 to +85	°C
Storage temperature*1	T <sub>stg</sub>	-40 to +85	°C
Incident light level	P <sub>in</sub>	1	W/mm <sup>2</sup>
Soldering temperature	T <sub>sol</sub>	240 (once)*2	°C

\*1: No dew condensation

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

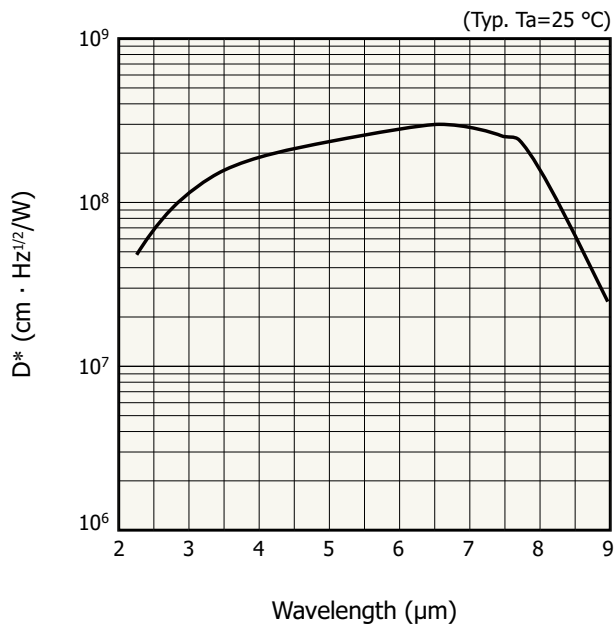
\*2: P16613-011CN Reflow soldering, JEDEC J-STD-020 MLS 2, see P.6

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 (Ta=25 °C)**

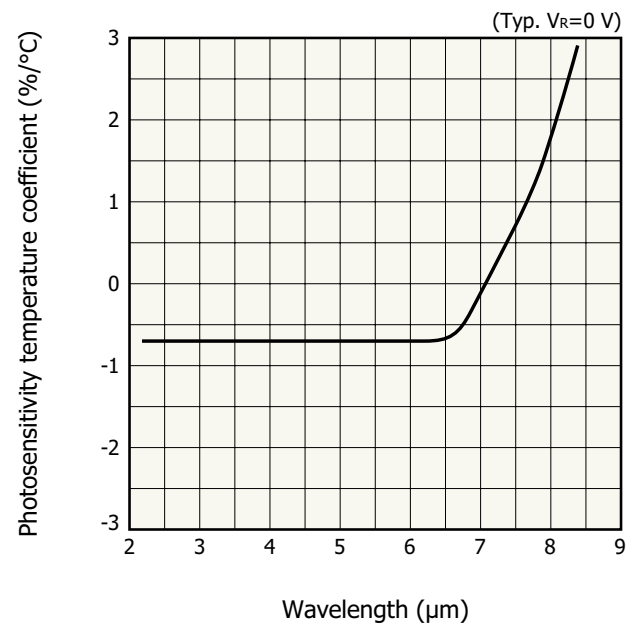
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Peak sensitivity wavelength	$\lambda_p$		-	6.5	-	$\mu\text{m}$
Cutoff wavelength	$\lambda_c$		8.0	8.3	-	$\mu\text{m}$
Photosensitivity	S	$\lambda=\lambda_p$	5.3	6.1	-	$\text{mA/W}$
Shunt resistance	Rsh	$V_R=10\text{ mV}$	4.9	8.3	-	$\text{k}\Omega$
Terminal capacitance	Ct	$V_R=0\text{ V}, f=1\text{ MHz}$	-	0.8	-	$\text{pF}$
Detectivity	$D^*$	$(\lambda_p, 1200, 1)$	$2.0 \times 10^8$	$3.0 \times 10^8$	-	$\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$
Noise equivalent power	NEP	$\lambda=\lambda_p$	-	$2.0 \times 10^{-10}$	$2.7 \times 10^{-10}$	$\text{W}/\text{Hz}^{1/2}$
Rise time	tr	$V_R=0\text{ V}, R_L=50\ \Omega,$ 10 to 90%	-	3	10	ns

**Spectral response ( $D^*$ )**



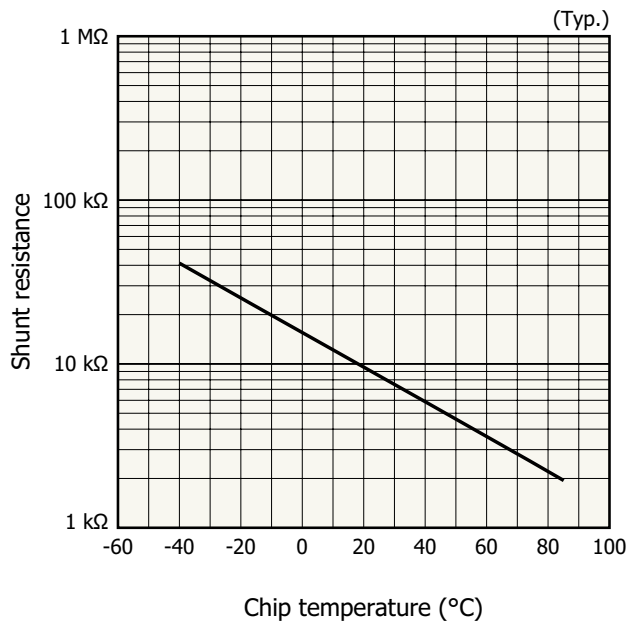
KIRD80720EA

**Photosensitivity temperature characteristics**



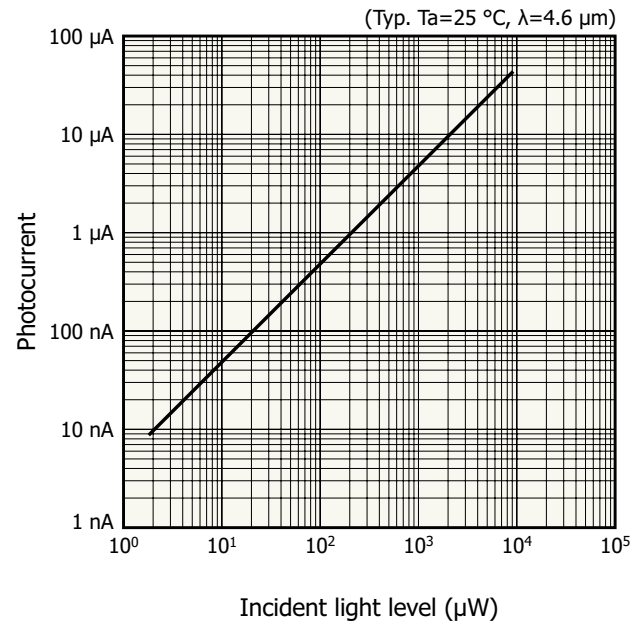
KIRD80721EA

**Shunt resistance vs. chip temperature**



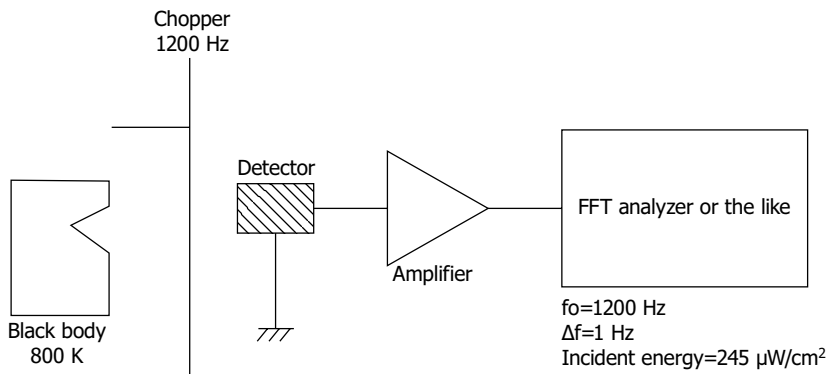
KIRD80722EA

**Linearity**



KIRD80723EA

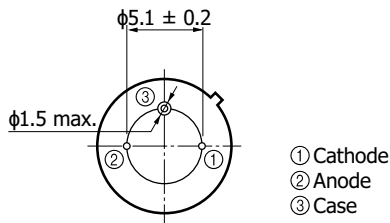
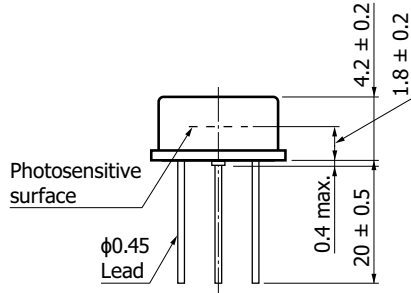
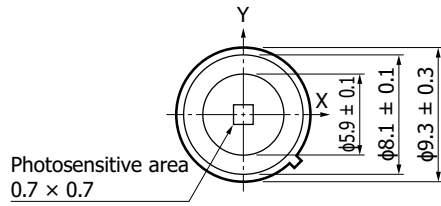
**Block diagram for characteristic measurement**



KIRD00125EA

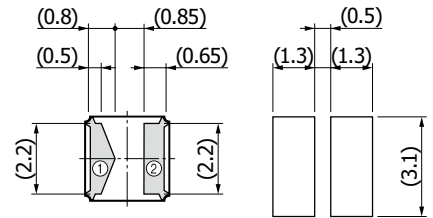
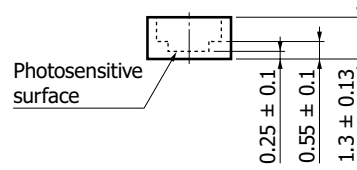
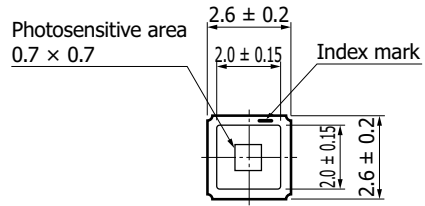
**Dimensional outline (unit: mm)**

P16113-011MN



KIRDA0290EA

P16613-011CN



Recommended land pattern  
Values in parentheses  
indicate reference values.

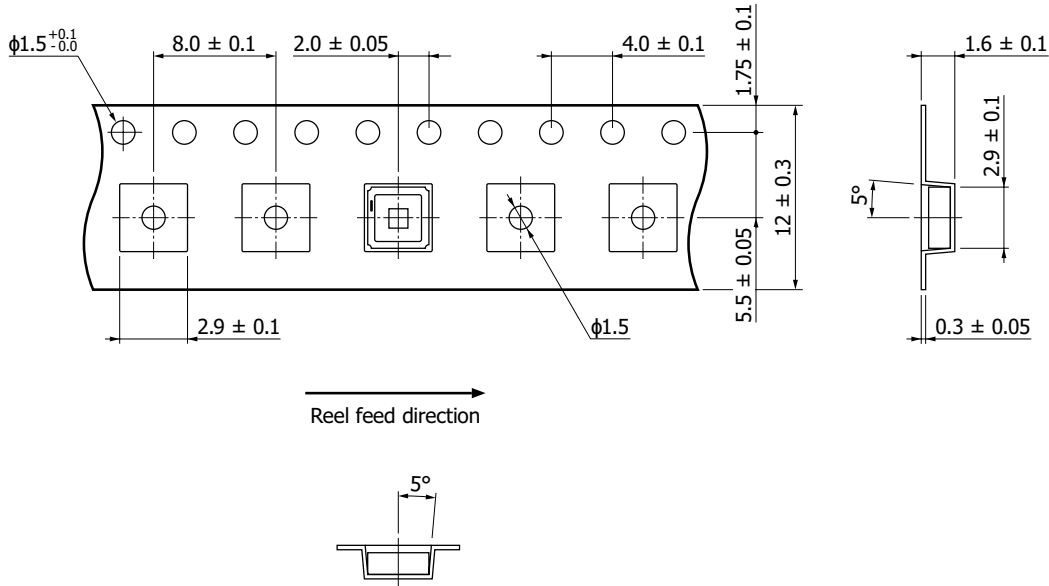
KIRDA0285EB

**Standard packing specifications (P16613-011CN)**

■ Reel (conforms to JEITA ET-7200)

Outer diameter	Hub diameter	Tape width	Material	Electrostatic characteristics
φ180 mm	φ60 mm	12 mm	PS	Conductive

■ Embossed tape (unit: mm, material: PS, conductive)



KLEDC0143EA

■ Packing quantity

100 pcs/reel

■ Packing state

Reel and desiccant in moisture-proof packaging (vacuum-sealed)

## Recommended soldering conditions

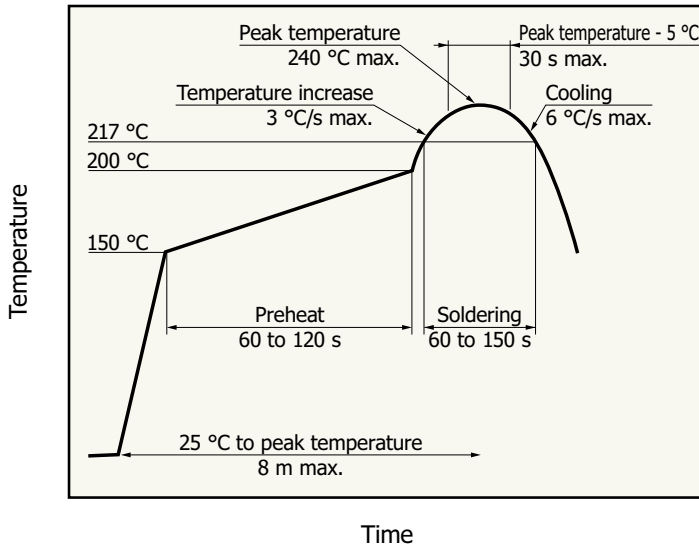
### P16113-011MN

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

Solder the leads at a point at least 1 mm away from the package body.

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

### P16613-011CN



· After unpacking, keep it in an environment at 5 to 30 °C and a humidity of 60% or less, and perform reflow soldering within 1 year.

· The effect that the product receives during reflow soldering varies depending on the circuit board and reflow oven that are used. When you set reflow soldering conditions, check that problems do not occur in the product by testing out the conditions in advance.

KSPD80418EA

## Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

### ■ Precautions

- Disclaimer
- Safety consideration
- Surface mount type products
- Unsealed products
- Compound opto-semiconductors (photosensors, light emitters)

### ■ Technical note

- Compound semiconductor photosensors

The content of this document is current as of May 2024.

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