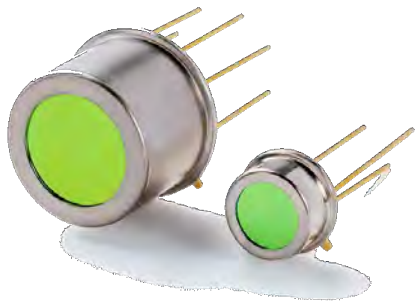
Boston Electronics

Infrared Detectors & Modules



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shop.boselec.com | 617-566-3821

Line Up

Product name	Spectral response range (μm) 0 5 10 15 20 25	Features	Main applications
InAs photovoltaic detector	1 to 3.8 μm	· Covers a spectral response range close to PbS but offers higher response speed	· Gas measurement · Infrared measurement · FTIR
InSb photovoltaic detector	1 to 5.5 μm	· High sensitivity in the 3 to 5 μm band makes it suitable for analysis of gases such as CO_2, SOx.	· FTIR · Gas measurement · Radiation thermometers · Flame detection
InAsSb photovoltaic detector	1 to 11 μm	· High-speed response, high sensitivity, and high reliability infrared detectors in the 5 μm, 8 μm, or 10 μm band · Covers a spectral response range (5 μm band) close to PbSe but offers higher response speed	· Gas measurement · FTIR · Radiation thermometers · Laser monitors
Type II superlattice infrared detector	1 to 14.5 μm	· This sensor has expanded sensitivity up to the 14 μm band without using mercury or cadmium restricted by RoHS directive.	· FTIR · Gas measurement · Radiation thermometers

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Prices valid as of **1/1/2026** and subject to change without notice

Infrared Detector Modules with integrated preamps

Model #	Wavelength Range	Peak wavelength (µm)	active area	NEP (MAX) at peak wavelength ($W/Hz^{1/2}$)	Frequency response	Price, US$, FOB Brookline MA USA	Notes
C12492-210	1.5 to 3.45	3.25	1 mm dia	6.00E-12	5 Hz to > 50 kHz	$4,728	**1**
C12494-210S (HS-4)	1.5 to 5.9	4.9	1 mm dia	3.00E-10	5 Hz to > 80 kHz	$4,728	**1**
C12494-222S (HS-5)	1.5 to 5.1	4.1	2x2 mm	8.00E-10	DC to 1 MHz	$3,930	**1**
C17212-011	2 to 5.3	4.1	0.7x0.7 mm	4.00E-09	DC to 10 MHz	$1,487	**2**
C17213-011	2 to 8.3	6.5	0.7x0.7 mm	6.00E-09	DC to 10 MHz	$2,142	**2**
C17214-011	2 to 11	7.4	0.7x0.7 mm	6.00E-09	DC to 10 MHz	$2,213	**2**
P16702-01MN TO-5 Hybrid	**1.5 to 11**	**5.6**	**1x1 mm**	**2.50E-09**	**DC to > 100 MHz**	**$1,771**	**New!**

Note 1 > **Device contains TE cooler and preamp. Delivered with 6 conductor cable A4372 for power. Requires customer supplied regulated power supply +15V, - 15V and +2.5V. Power should be < 5 mV ripple. Signal on customer supplied BNC cable.**

Note 2 > **Recommended DC power supply (analog power supply): PW18-1.3ATS (TEXIO Technology), E3630A (Keysight Tech.)**

Please consult detailed data sheets for complete specifications

Infrared detector modules with preamp

C17212-011, C17213-011, C17214-011

Easy-to-use detector modules with built-in preamps

These are room-temperature modules with an integrated amplifier that can detect infrared light simply by connecting to a DC power supply. Using back-illuminated type InAsSb photodetectors, modules with wavelengths in the 5 µm, 8 µm, and 10 µm bands are available. We welcome requests for custom devices that suit your application.

Features

- **High-speed response: 10 MHz typ.**
- **Compact size**
- **Easy to use**
  Operates just by connecting to DC power supply
- **Circuit design optimized for detector characteristics**

Applications

- **High-speed gas analysis (combined with QCL)**
- **CO_2 laser monitor (C17214-011)**

Accessories

- **4-conductor cable (for DC power supply):**
  2 m (with one side connector) A4372-02
- **Instruction manual**

Structure

Type no.	Detector element	Window material	Photosensitive area (mm)	Supply voltage Vcc*1 (V)
C17212-011	InAsSb (P16112-011MA)	AR coated Si	0.7 × 0.7	±15 ± 0.5
C17213-011	InAsSb (P16113-011MN)	None		
C17214-011	InAsSb (P16114-011MN)			

*1: Vcc=power supply for circuit

Absolute maximum ratings

Type no.	Incident light level*2 (W)	Supply voltage Vcc (V)	Operating temperature Topr*3 (°C)	Storage temperature Tstg*3 (°C)
C17212-011	0.2	±18	0 to +40	-20 to +50
C17213-011	0.17			
C17214-011	0.2			

*2: The value at which the output voltage of each module is maximized when light with the maximum sensitivity wavelength λp enters the device. This value does not cause immediate failure.
However, if light that destroys the device (1 W/cm^2 for all elements) enters the device, it may cause a drop in product quality.
*3: 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 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.

Optical characteristics (Typ. Ta=25 °C, unless otherwise noted)

Type no.	Peak sensitivity wavelength λp (μm)	Cutoff wavelength λc (μm)	Photosensitivity*4 λ=λp		Noise equivalent power NEP λ=λp	
			Min. (V/W)	Typ. (V/W)	Typ. ($W/Hz^{1/2}$)	Max. ($W/Hz^{1/2}$)
C17212-011	4.1	5.3	35	50	1.5×10^{-9}	4.0×10^{-9}
C17213-011	6.5	8.3	45	60	2.0×10^{-9}	6.0×10^{-9}
C17214-011	7.4	11	35	50	2.0×10^{-9}	6.0×10^{-9}

*4: f=600 Hz

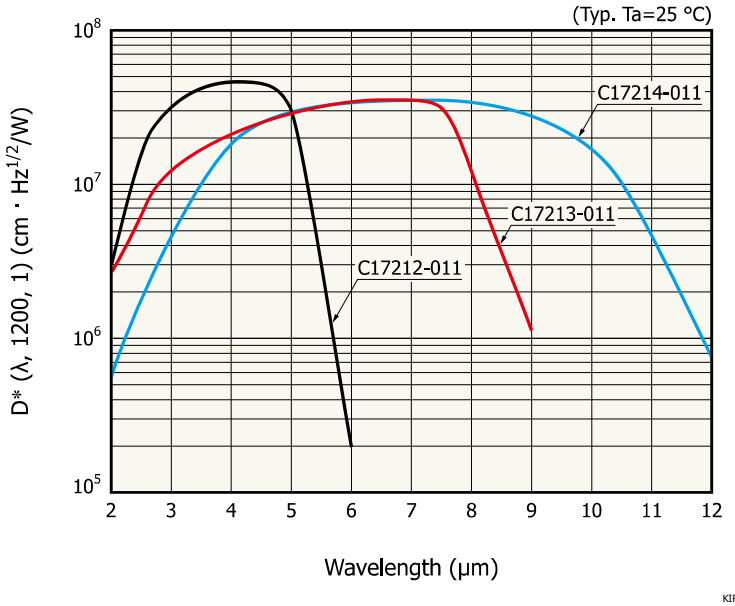
Electrical characteristics (Typ. Ta=25 °C, unless otherwise noted)

Type no.	Frequency response -3 dB		Output impedance (Ω)	Maximum output voltage RL=1 MΩ (V)	Current consumption*5 Vcc	
	FcL Typ. (Hz)	FcH Typ. (MHz)			Typ. (mA)	Max. (mA)
C17212-011	DC	10	50	10	±12	±18
C17213-011						
C17214-011						

*5: Vcc=±15 V
Recommended DC power supply (analog power supply): PW18-1.3ATS (TEXIO Technology), E3630A (Keysight Technologies)
Current capacity: More than 1.5 times the maximum current consumption
Ripple noise: 5 mVp-p or less (±15 V power supply)

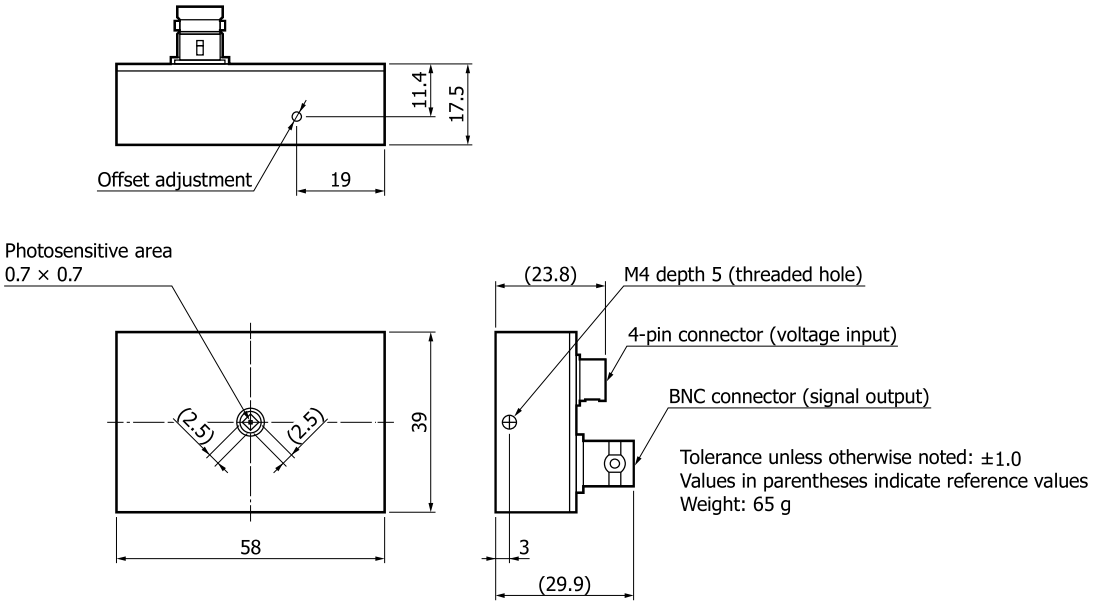
Current consumption (min.)	Voltage
+30 mA	+15 V
-30 mA	-15 V

Spectral response



Dimensional outlines (unit: mm)

C17212-011



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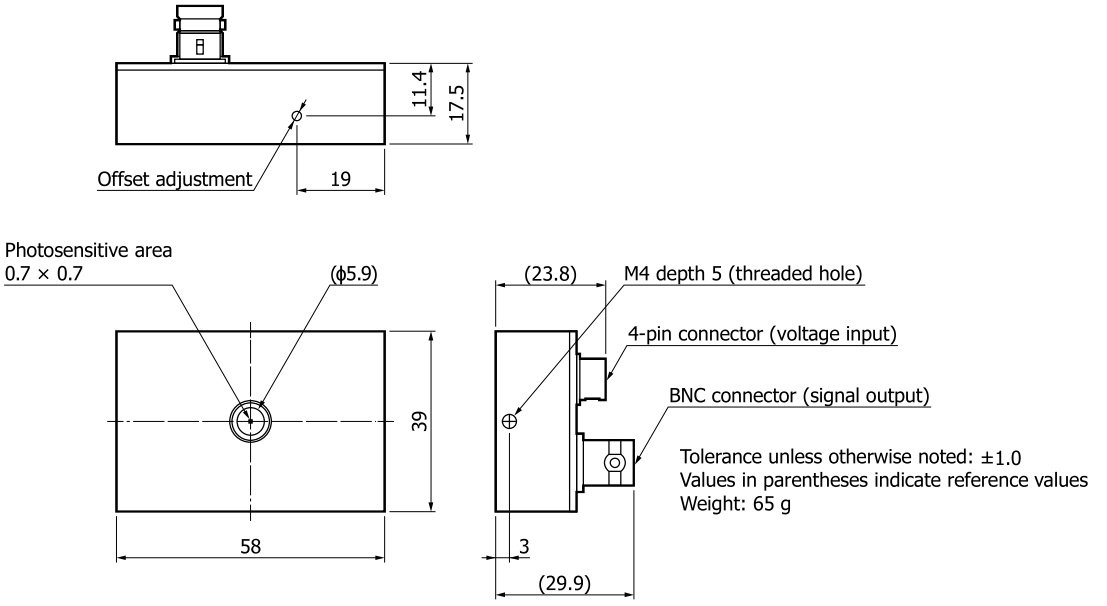
C17213-011, C17214-011



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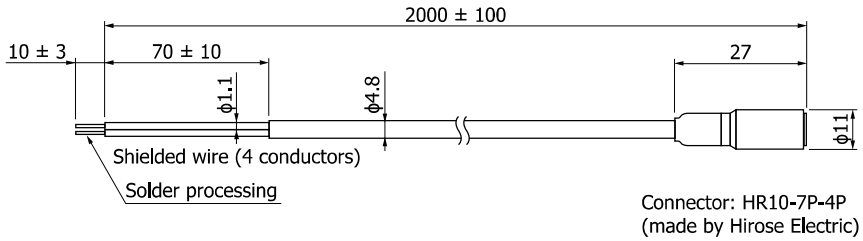
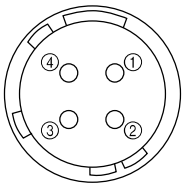
4-conductor cable (for DC power supply) A4372-02



Connector: HR10-7P-4P
(made by Hirose Electric)



As viewed from connector side

Pin no.	Pin connection	Lead color
①	-Vs	Blue
②	GND	Black/white/blue stranded wire
③	GND	
④	+Vs	White

Tolerance unless otherwise noted: ±1

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Precautions

- Always use a dual-polarity ±15 V power supply to operate this detector. Never use a single-polarity power supply. Using a single-polarity power supply may cause the amplifier in the detector module to break down.
- The detection elements of C17213-011 and C17214-011 do not have the chip part protected by a window material, etc. Please refer to "Precautions / Unsealed Products" and handle with care.
- Do not drop this product or do not apply excessive shock to it.

Related information

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

■ Precautions
- Disclaimer
- Safety consideration
- Precautions / Unsealed products
- Precautions / Compound opto-semiconductors (photosensors, light emitters)

■ Catalogs
- Selection guide / Infrared detectors
- Technical note / Compound semiconductor photosensors

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Infrared detector modules with preamp

Thermoelectrically cooled types

Easy-to-use detector modules with built-in preamps

Infrared detector modules operate just by connecting to DC power supplies. Low noise thermoelectric cooled types using InGaAs, InAs or InAsSb elements are available. We welcome requests for custom devices that suit your application.

Features

- **High S/N**
- **Compact size**
- **Easy to use**
  Operates just by connecting to DC power supply
- **Circuit design optimized for detector characteristics**
- **Built-in temperature control circuit (TE-cooled type)**

Applications

- **Infrared detection**

Accessories

- **6-conductor cable for TE-cooled type (for DC power supply): 2 m (with one side connector) A4372-07**
- **Instruction manual**

Structure

Type no.	Detector element	Cooling	Window material	Photosensitive area (mm)	Supply voltage	
					Vcc*1 (V)	Vp*1 (V)
C12483-250	InGaAs (G12180-250A)	Two-stage TE-cooled	AR coated (1.55 µm peak) borosilicate glass	ϕ5	±15 ± 0.5	$+2.5^{+0.5}_{-0.1}$
C12485-210	InGaAs (G12182-210K)		Borosilicate glass	ϕ1		
C12486-210	InGaAs (G12183-210K)					
C12492-210	InAs (P10090-21)		Sapphire glass			
C12494-222S	InAsSb (P13243-222MS)			2 × 2		
C12494-210S	InAsSb (P11120-201)			ϕ1		

*1: Vcc=power supply for circuit, Vp=power supply for cooling

Absolute maximum ratings

Type no.	Incident light level*2 (μW)	Supply voltage		Operating temperature*3 Topr (°C)	Storage temperature*3 Tstg (°C)
		Vcc (V)	Vp (V)		
C12483-250	0.2	±18	+5	0 to +40	-20 to +50
C12485-210	0.06				
C12486-210	0.07				
C12492-210	2.6				
C12494-222S	14 mW				
C12494-210S	26				

*2: The value at which the output voltage of each module is maximized when light with the maximum sensitivity wavelength λp enters the device. This value does not cause immediate failure.
However, if light that destroys the device (1 W/mm^2 for all elements) enters the device, it may cause a drop in product quality.
*3: 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.
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.

Optical characteristics (Typ. Ta=25 °C, unless otherwise noted)

Type no.	Chip temperature at rated supply voltage Tchip (°C)	Peak sensitivity wavelength λp (μm)	Cutoff wavelength λc (μm)	Photosensitivity*4 S λ=λp		Noise equivalent power NEP λ=λp	
				Min. (V/W)	Typ. (V/W)	Typ. (W/Hz$^{1/2}$)	Max. (W/Hz$^{1/2}$)
C12483-250	-15	1.55	1.66	3.3×10^7	5.8×10^7	5.2×10^{-14}	7×10^{-13}
C12485-210		1.95	2.05	1.1×10^8	1.8×10^8	1×10^{-13}	3×10^{-12}
C12486-210		2.3	2.56	1×10^8	2×10^8	4×10^{-13}	6×10^{-12}
C12492-210	-28	3.25	3.45	0.8×10^7	1×10^7	6×10^{-12}	1×10^{-11}
C12494-222S		4.1	5.1	5×10^2	7×10^2	8×10^{-10}	1.2×10^{-9}
C12494-210S		4.9	5.9	5×10^5	7.5×10^5	1×10^{-10}	3×10^{-10}

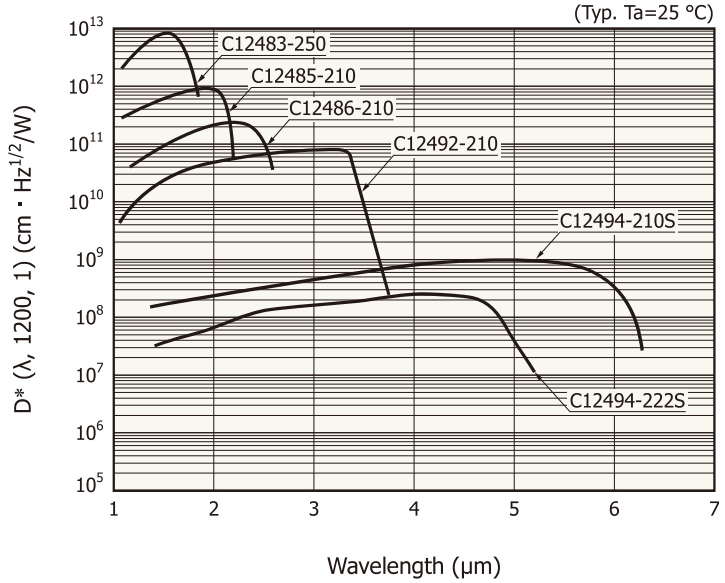
*4: f=100 Hz (C12483-250, C12485-210, C12486-210), f=1.2 kHz (C12492-210, C12494-210S), f=600 Hz (C12494-222S)

Electrical characteristics (Typ. Ta=25 °C, unless otherwise noted)

Type no.	Frequency response -3 dB (Hz)			Output impedance (Ω)	Maximum output voltage RL=1 kΩ (V)	Current consumption*5			
	FcL	FcH				Vcc		Vp	
	Typ.	Min.	Typ.			Typ. (mA)	Max. (mA)	Typ. (mA)	Max. (mA)
C12483-250	DC	900	1.1 k	50	+10	+30, -22	+50, -30	+500	+1100
C12485-210	DC	1.5 k	2.2 k			+30, -13	+60, -30		
C12486-210	DC	2.1 k	3 k			+30, -14			
C12492-210	5	40 k	50 k		±13	+30, -14	+80, -30	+600	
C12494-222S	DC	750 k	1 M		+10	+30, -20			
C12494-210S	5	80 k	100 k		±13				

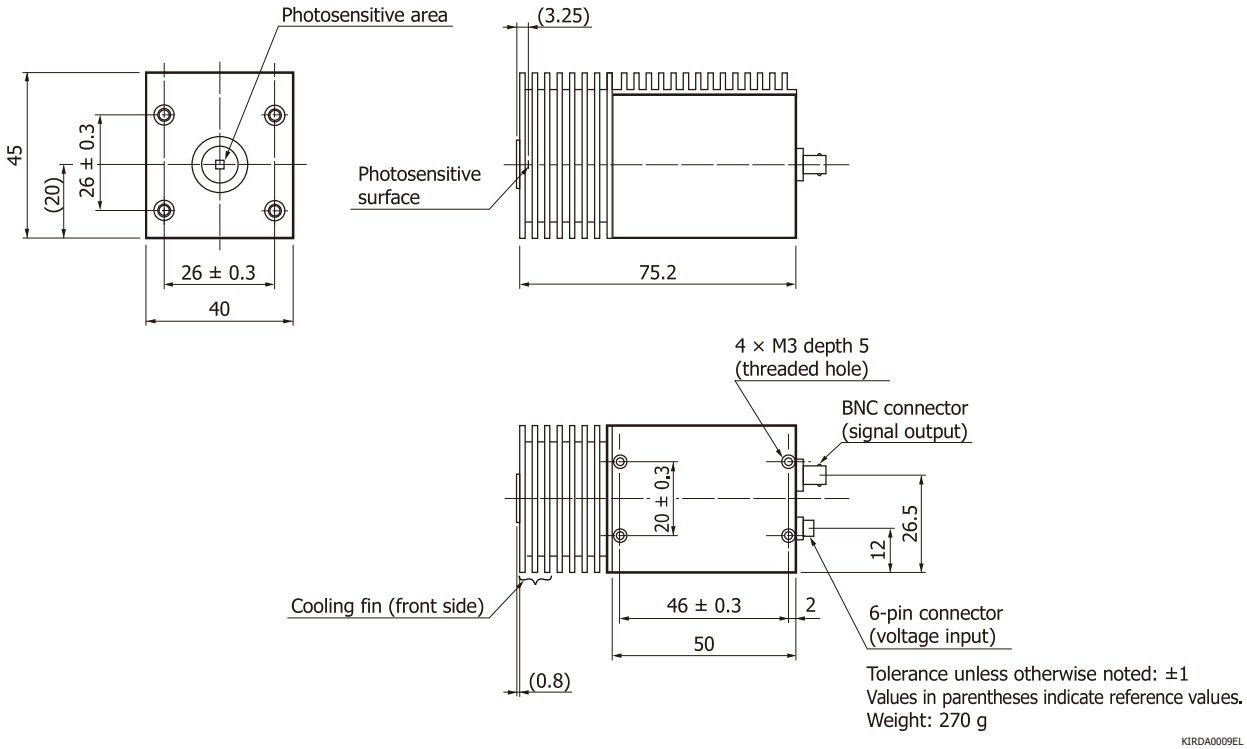
*5: Vcc=±15 V, Vp=2.5 V (C12485-210, C12486-210, C12483-250, C12492-210, C12494-210S/-222S)
Recommended DC power supply (analog power supply): PW18-1.3ATS (TEXIO Technology), E3630A (Keysight Technologies)
Current capacity: More than 1.5 times the maximum current consumption
Ripple noise: 5 mVp-p or less (±15 V, +2.5 V power supply)

Spectral response

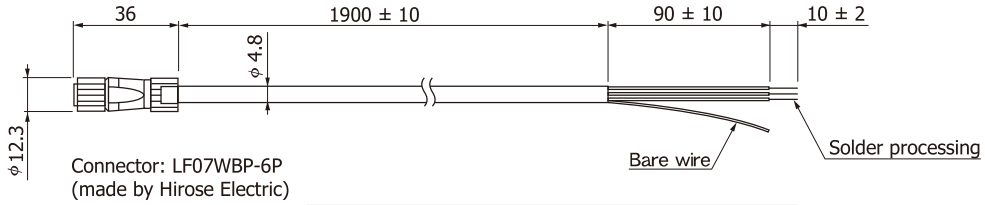


Dimensional outlines (unit: mm)

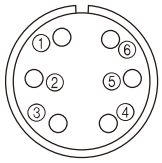
C12485-210, C12486-210, C12483-250, C12492-210, C12494-210S/-222S



6-conductor cable (for DC power supply) A4372-07



Connector: LF07WBP-6P
(made by Hirose Electric)



Connector

Pin no.	Pin connection	Lead color
①	+2.5 V Power supply for cooling controller	Red
②	GND Power supply for cooling controller	Blue
③	Output for temperature monitor	Light green
④	+15 V	Yellow
⑤	-15 V	White
⑥	GND	Black

Note: The bare wire is for GND of the case.

Tolerance unless otherwise noted: ±1

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Precautions

- Always use a dual-polarity ±15 V or ±2.5 V power supply to operate this detector. Never use a single-polarity power supply. Using a single-polarity power supply may cause the amplifier in the detector module to break down.
- Regarding TE-cooled type, always supply +2.5 V to cool the detector element.
- Be careful not to apply excessive force to the detector surface. Applying excessive force may damage the light input window. Do not directly touch the light input window with bare hands. If dust or dirt gets on the window, wipe it gently using ethyl alcohol.
- Do not drop this product or do not apply excessive shock to it.

Related information

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

■ Precautions
- Disclaimer
- Safety consideration / Opto-semiconductors
- Precautions / Compound opto-semiconductors (photosensors, light emitters)

■ Catalogs
- Selection guide / Infrared detectors
- Technical note / Compound semiconductor photosensors

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NEW

InAsSb photovoltaic detector with preamp

P16702-011MN

Infrared detector with preamp offering high sensitivity in the mid-infrared region (up to 11 µm)

It is a compact infrared detector that integrates an InAsSb photovoltaic detector (up to 11 µm) and a preamp. It is approximately 1/200 th the size of previous module products, and achieves a response speed of 100 MHz, which is twice as fast. This product is an environmentally friendly infrared detector and do not use lead, mercury, or cadmium, which are substances restricted by the RoHS directive.

Features

- **Compact (TO-5)**
- **High-speed response (DC to 100 MHz)**
- **RoHS compliant (lead, mercury, cadmium free)**

Applications

- **Gas analysis (combined with QCL)**
- **CO_2 laser monitor**
- **Non-invasive blood analysis**

Structure

Parameter	Specification	Unit
Photosensitive area	0.7 × 0.7	mm
Package	TO-5	-
Window material	No	-
Field of view (FOV)	97	degrees

Absolute maximum ratings (Ta=25 °C)

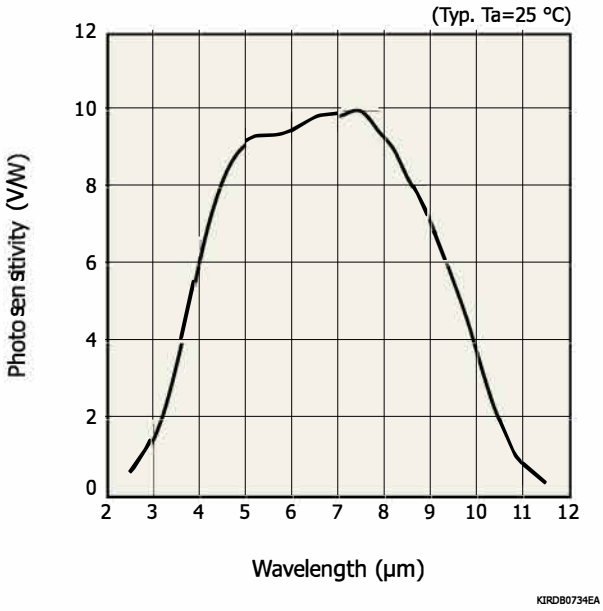
Parameter	Symbol	Value	Unit
Supply voltage (for preamp)	Vcc	+4	V
Reverse voltage (for element)	V_R	+1	V
Operating temperature*1	Topr	-30 to +60	°C
Storage temperature*1	Tstg	-30 to +60	°C
Incident light level	Pin	1	W/mm²

*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.
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.

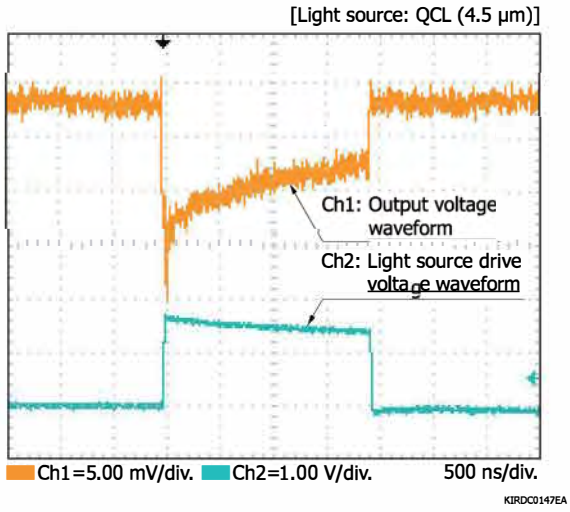
Electrical and optical characteristics (Typ. Ta=25 °C, Vcc=+3.3 V, 50 Ω system, unless otherwise noted)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Peak sensitivity wavelength	λp		-	7.4	-	µm
Cutoff wavelength	λc		9.7	11	-	µm
Photosensitivity	S	λ=λp	-	10	-	V/W
Reverse voltage (for element)	V_R		-	0.7	-	V
Noise equivalent power	NEP	λ=λp, f=50 kHz	-	8.0×10^{-9}	5.0×10^{-8}	W/Hz$^{1/2}$
Frequency characteristics	f_{CL}	-3 dB	-	DC	-	-
	f_{CH}	-3 dB	80	100	-	MHz
Output voltage level	-		0.6	0.9	1.2	V
Maximum output voltage amplitude	Vp-p max		-	-0.5	-	V
Supply voltage (for preamp)	Vcc		3.2	3.3	3.4	V
Current consumption	Ic		20	26	35	mA

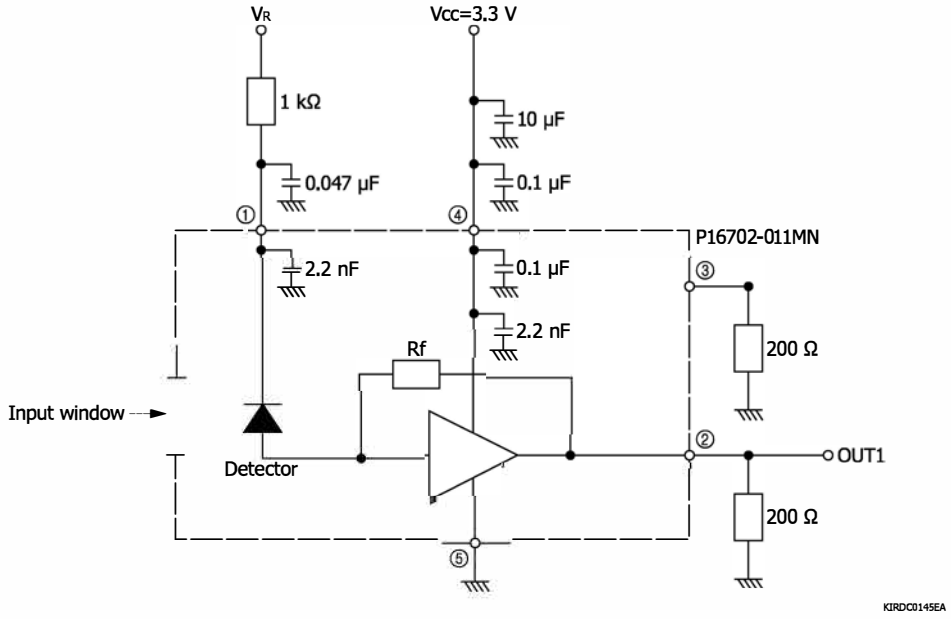
Spectral response



Output waveform example

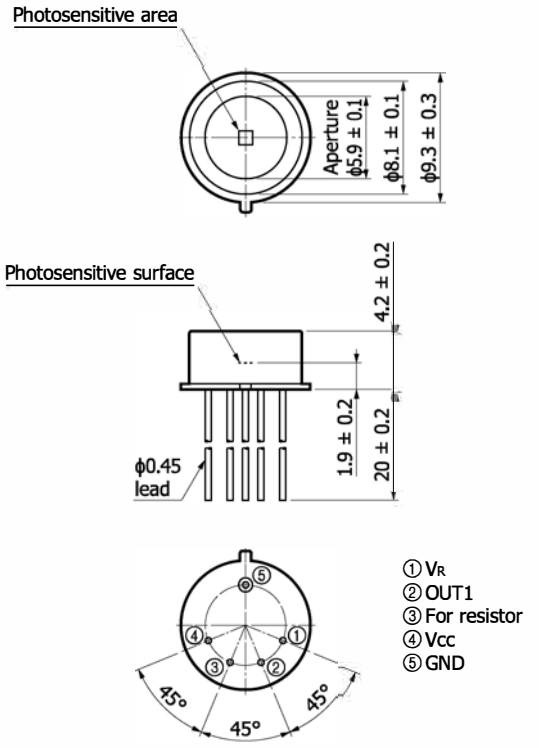


Connection example



Note: Please connect the same resistance to the terminal ②③.
Make sure to connect a bypass capacitor (0.1 to 10 µF) to the supply voltage ④ to prevent oscillation.

Dimensional outline (unit: mm)



Note: Please connect the same resistance to the terminal ②③.
Make sure to connect a bypass capacitor (0.1 to 10 μF)
to the supply voltage ④ to prevent oscillation.

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Precautions

■ Electrostatic breakdown

The P16702-011MN may be damaged or deteriorated by static electricity. Please refer to precautions of "compound opto-semiconductors (photosensors, light emitters)" for use.

■ Wiring

Applying voltage or current with the wrong polarity to electronic parts such as a preamp may degrade the characteristics or destroy the elements. Please refer to the dimensional outline to do wiring correctly.

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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 CO_2, SOx, CO and NOx. 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	ϕ1.0	mm

Absolute maximum ratings

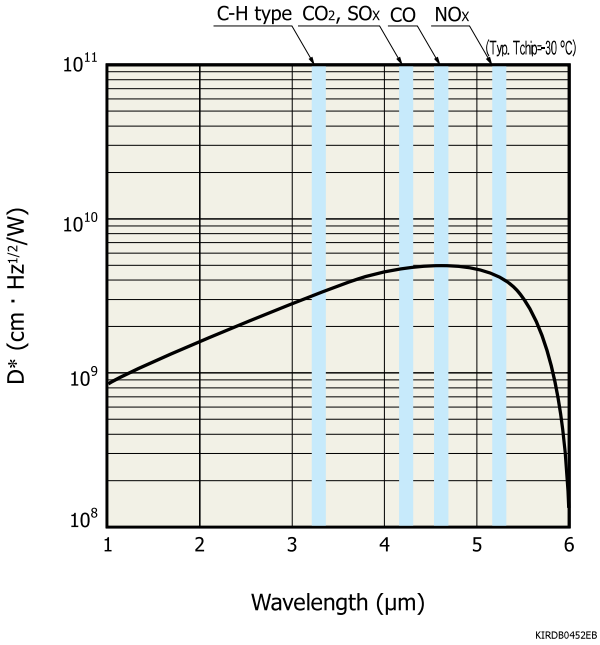
Parameter	Symbol	Value	Unit
Thermistor power dissipation	-	0.2	mW
Reverse voltage	V_R	0.1	V
Operating temperature*1 *2	Topr	-40 to +60	°C
Storage temperature*1	Tstg	-55 to +60	°C

*1: No dew condensation
When there is a temperature difference between a product and the surounding area in high humidity environment, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in charactaristics and relaiablity.
*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.

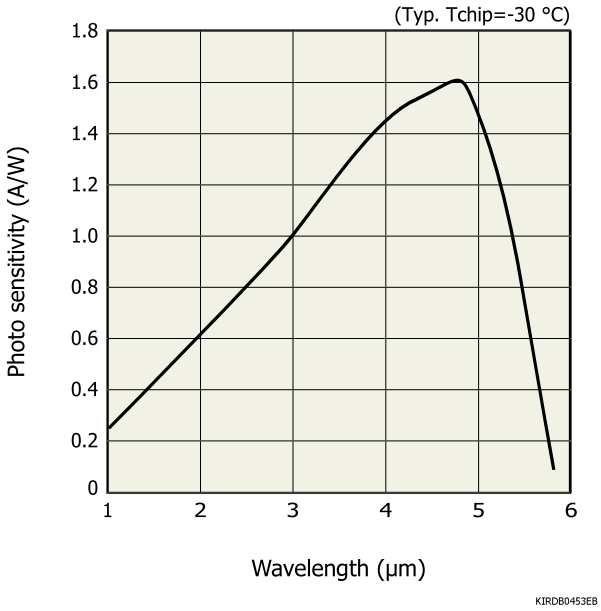
Electrical and optical characteristics (Tchip=-30 °C)

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

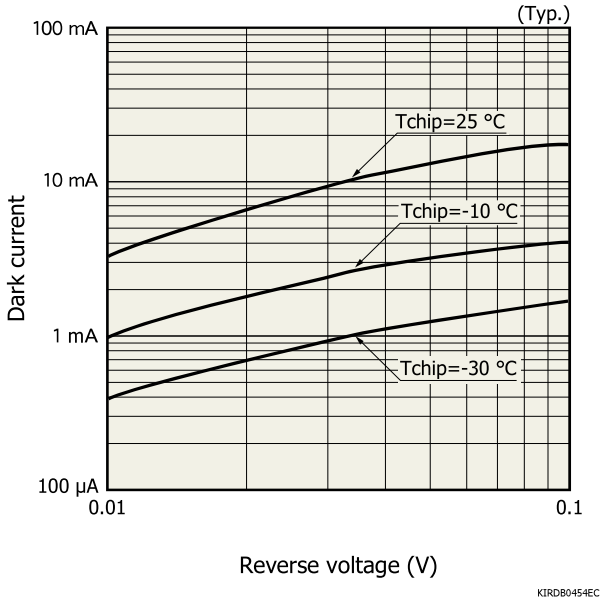
Spectral response (D*)



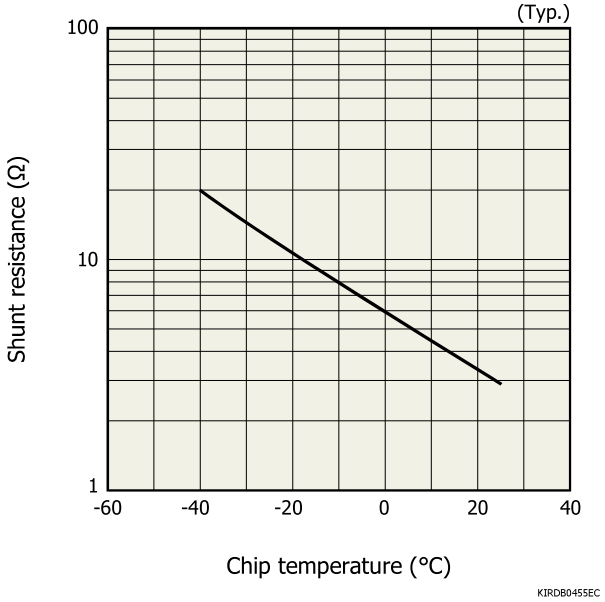
Spectral response



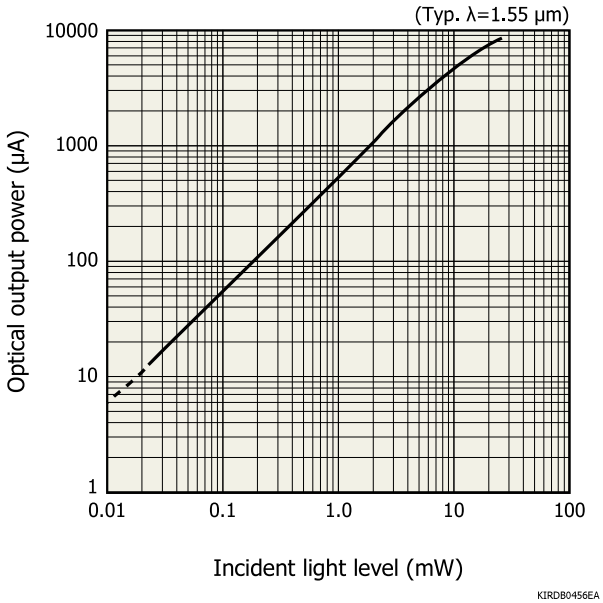
Dark current vs. reverse voltage



Shunt resistance vs. chip temperature



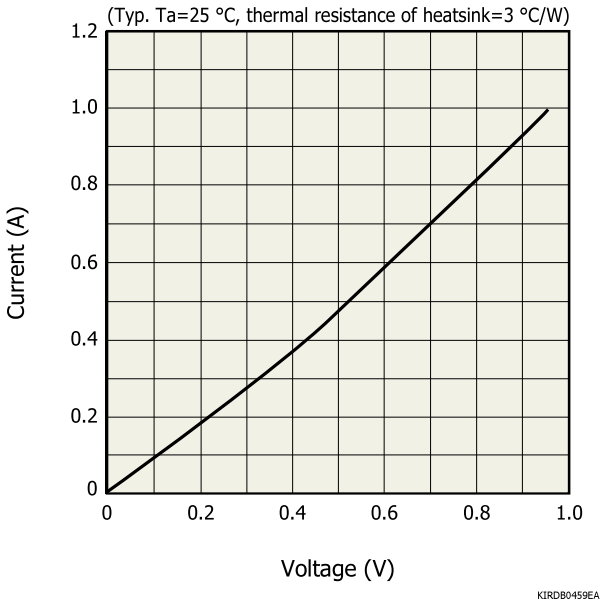
Linearity



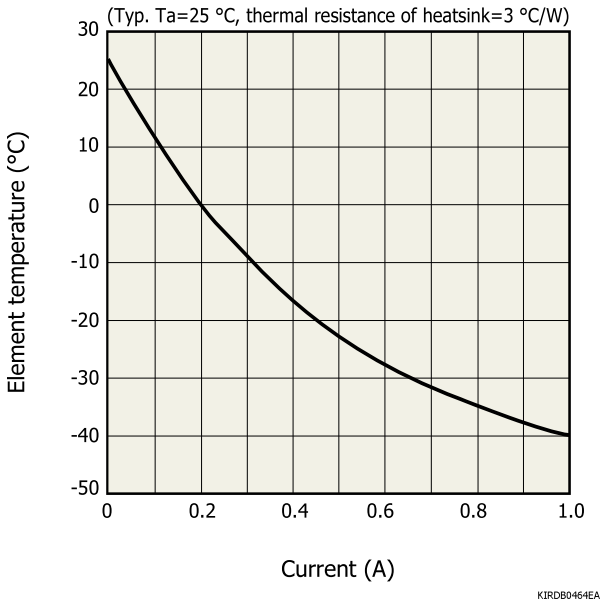
Specifications of two-stage TE-cooler (Ta=25 °C)

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

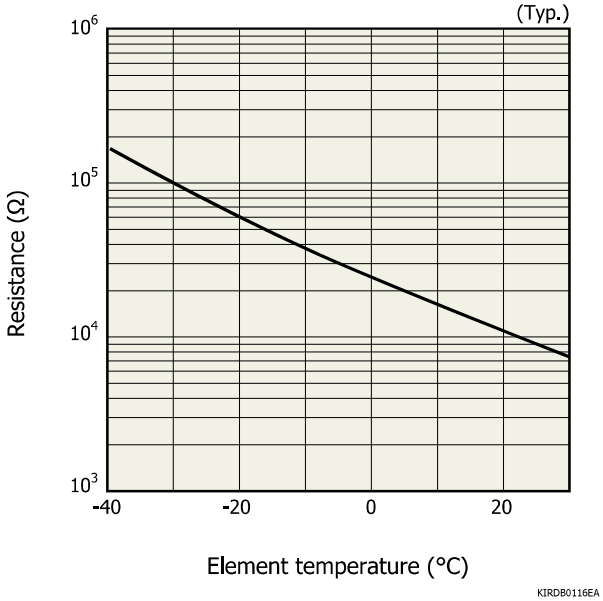
Current vs. voltage of TE-cooled type



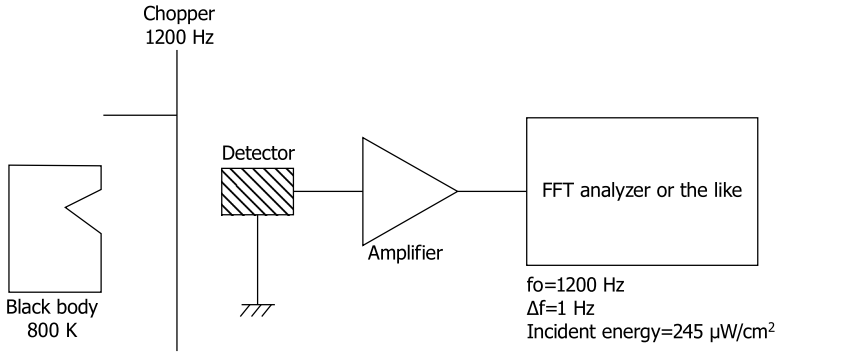
Cooling characteristics of TE-cooled type



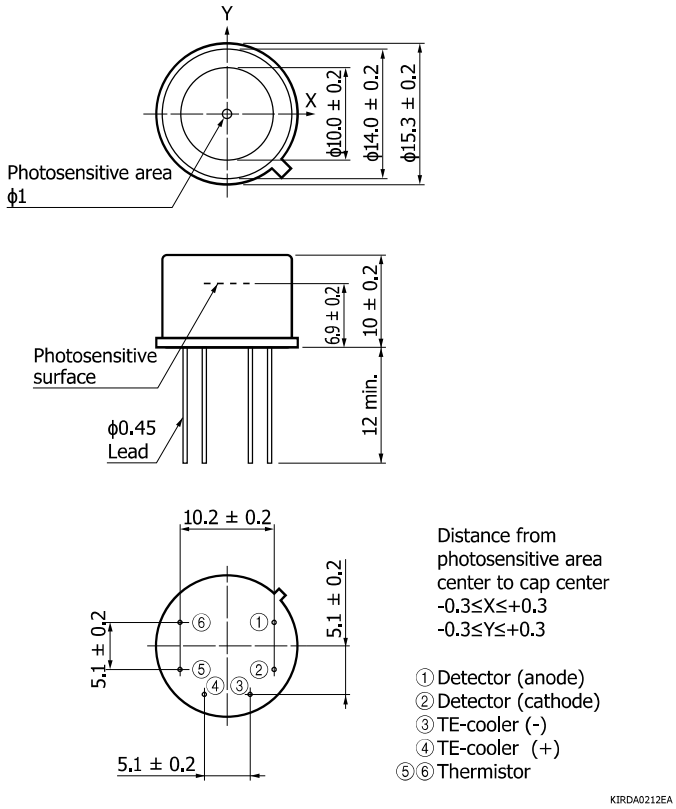
Thermistor temperature characteristic



Measurement circuit example



Dimensional outline (unit: mm)



Recommended soldering conditions

· Solder temperature: 260 ℃ (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.

InAsSb photovoltaic detectors

P13243 series

High sensitivity, high-speed response infrared detectors with large photosensitive area (up to 5 µm band)

The P13424 series are photovoltaic type detectors that have high sensitivity in the spectral band up to 5 µm band. These products are environmentally friendly as they do not use lead, mercury, or cadmium which are substances restricted by the RoHS Directive. Therefore, they are replacements for previous products that contain these substances. The easily handled non-cooled type and the TE-cooled type capable of stable high S/N measurement are available.

Features

- **High sensitivity**
- **High-speed response**
- **High shunt resistance**
- **RoHS compliant (lead, mercury, cadmium free)**

Applications

- **Gas detection (CH_4, CO_2, CO, etc.)**
- **Radiation thermometers**
- **Flame detection (CO_2 resonance radiation)**

Options (sold separately)

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 infrared detector	**C4159-01**

Structure

Type no.	Photosensitive area (mm)	Package	Window material	Cooling	Field of view FOV (degrees)
P13243-022MS	2 × 2	TO-5	Sapphire	Non-cooled	97
P13243-122MS		TO-8		One-stage TE-cooled	134
P13243-222MS				Two-stage TE-cooled	113

Absolute maximum ratings

Type no.	TE-cooler allowable current (A)	Thermistor power dissipation (mW)	Reverse voltage V_R (V)	Operating temperature Topr*1 (°C)	Storage temperature Tstg*1 (°C)	Incident light level Pin (W/mm^2)
P13243-022MS	-	-	1	-40 to +85	-40 to +85	1
P13243-122MS	1.5	0.2		-40 to +60	-40 to +60	
P13243-222MS	1.0					

*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.

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.

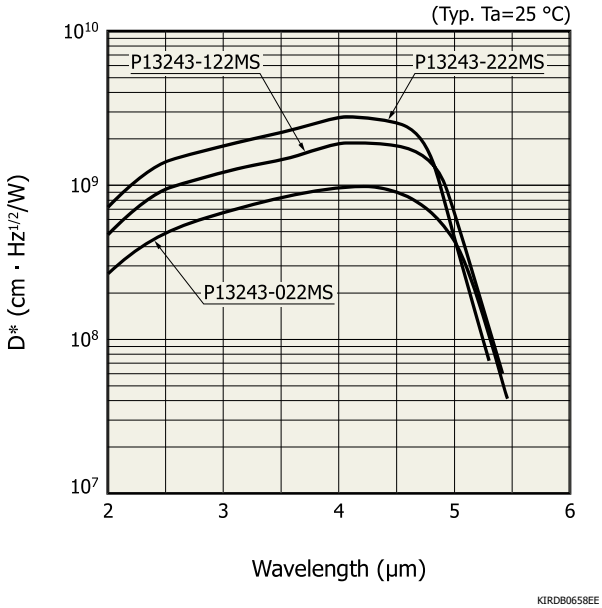
Electrical and optical characteristics (Typ. Ta=25 °C, unless otherwise noted)

Type no.	Chip temperature Tchip (°C)	Peak sensitivity wavelength λp (μm)	Cutoff wavelength λc (μm)	Photosensitivity S*2 λ=λp (mA/W)	Shunt resistance Rsh VR=10mV (kΩ)	Detectivity D* (λp, 1200, 1) Min. (cm·Hz$^{1/2}$/W)	Detectivity D* (λp, 1200, 1) Typ. (cm·Hz$^{1/2}$/W)	Noise equivalent power NEP λ=λp Typ. (W/Hz$^{1/2}$)	Noise equivalent power NEP λ=λp Max. (W/Hz$^{1/2}$)	Rise time tr*3 (ns)	Terminal capacitance Ct*4 (pF)
P13243-022MS	25	4.1	5.3	8.0	7	8.0 × 10^{8}	1.0 × 10^{9}	2.0 × 10^{-10}	2.5 × 10^{-10}	100	20
P13243-122MS	-10		5.2	8.6	19	1.0 × 10^{9}	1.9 × 10^{9}	1.0 × 10^{-10}	2.0 × 10^{-10}		
P13243-222MS	-30		5.1	8.8	33	1.6 × 10^{9}	2.8 × 10^{9}	0.7 × 10^{-10}	1.3 × 10^{-10}		

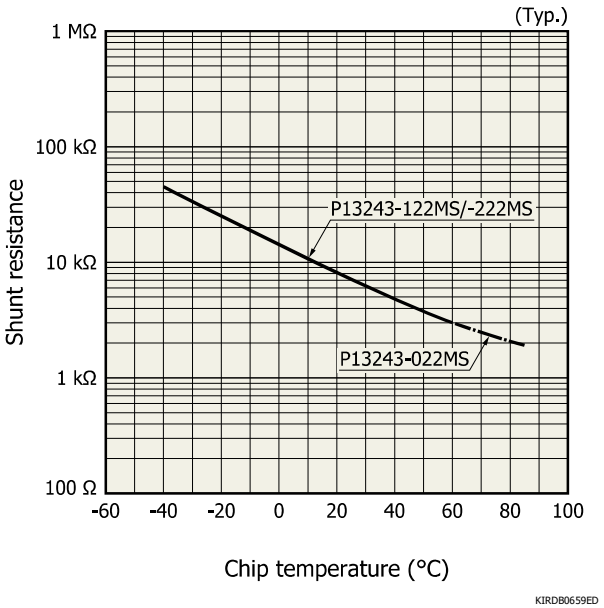
*2: Uniform irradiation on the entire photosensitive area
*3: VR=0 V, RL=50 Ω, 10 to 90%, λ=1.55 μm
*4: VR=0 V, f=1 MHz

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

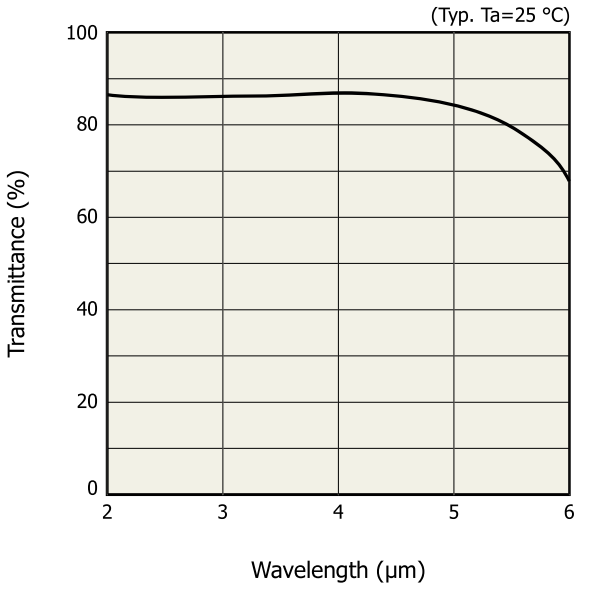
Spectral response (D*)



Shunt resistance vs. chip temperature

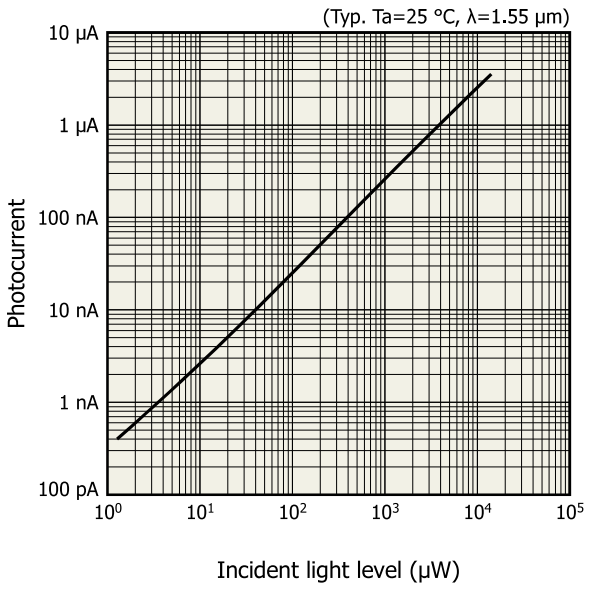


Spectral transmittance of window materials



KIRDB0660EC

Linearity

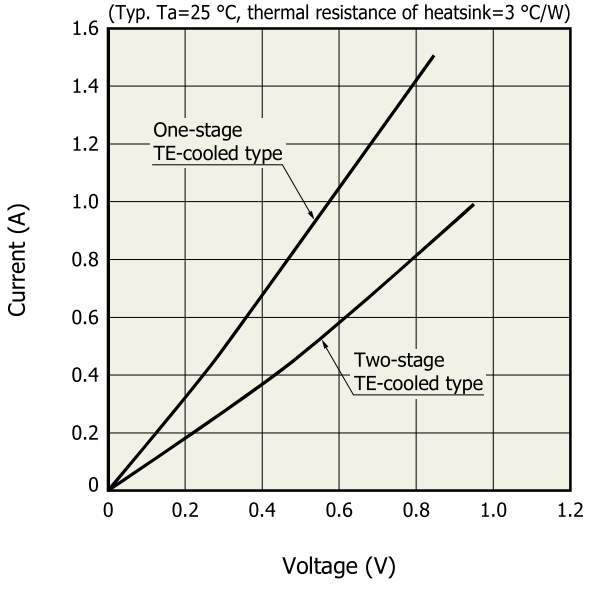


KIRDB0615EB

TE-cooler specifications (Ta=25 °C, unless otherwise noted)

Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
TE-cooler allowable current	One-stage TE-cooled	Ic max	-	-	1.5	A
	Two-stage TE-cooled		-	-	1.0	
TE-cooler allowable voltage	One-stage TE-cooled	Vc max	-	-	1.0	V
	Two-stage TE-cooled		-	-	1.2	
Thermistor resistance		Rth	8.1	9.0	9.9	kΩ
Thermistor B constant	T1=25 °C, T2=-30 °C	B	-	3298	-	K
Thermistor power dissipation		Pth	-	-	0.2	mW

Current vs. voltage characteristics of TE-cooler



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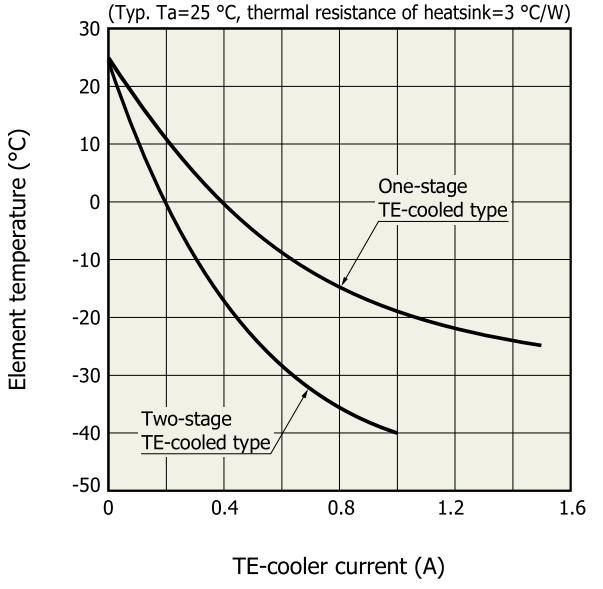
Cooling characteristics of TE-cooler



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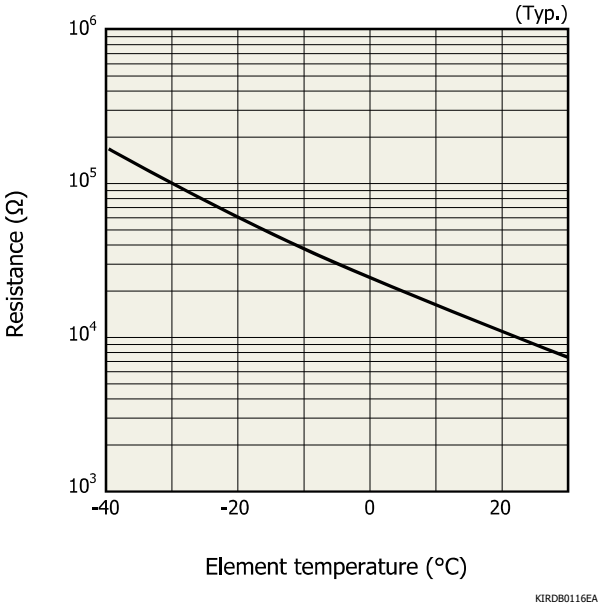
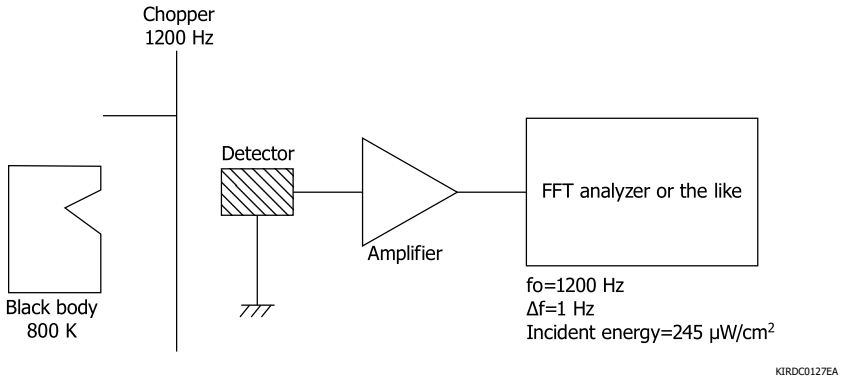
Thermistor temperature characteristics

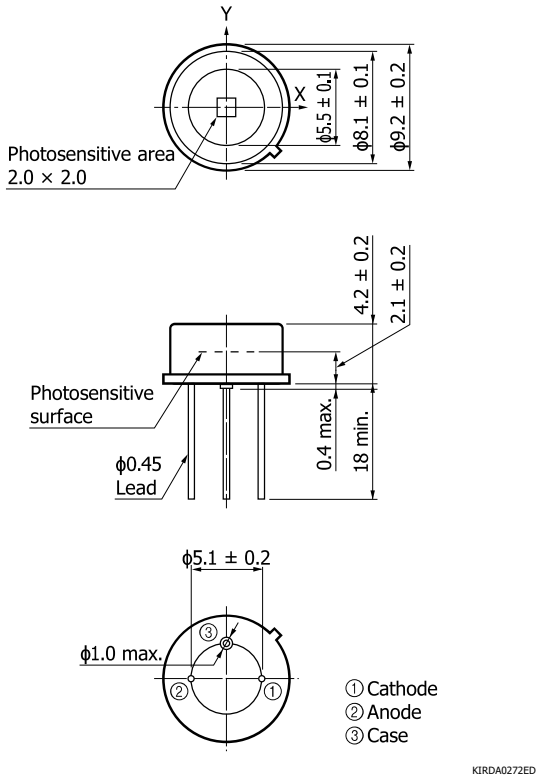


Block diagram for characteristic measurement

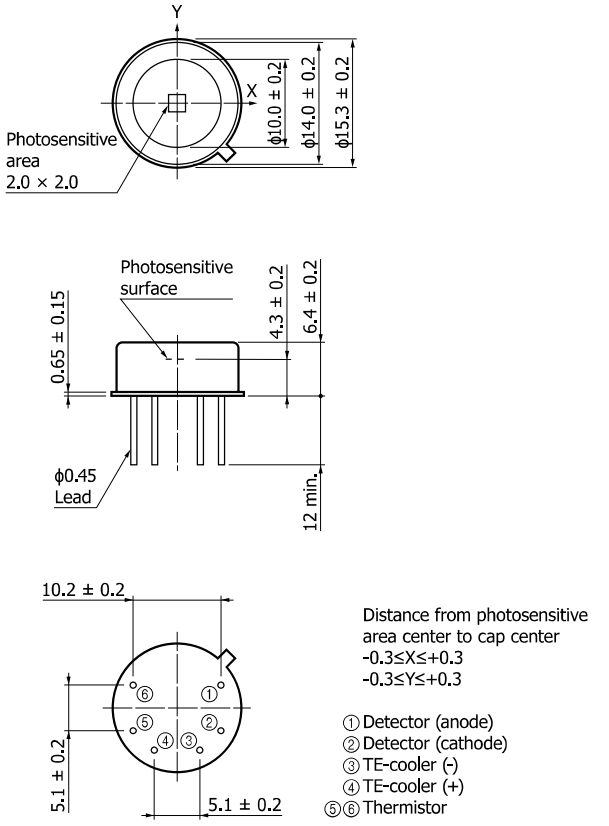


Dimensional outlines (unit: mm)

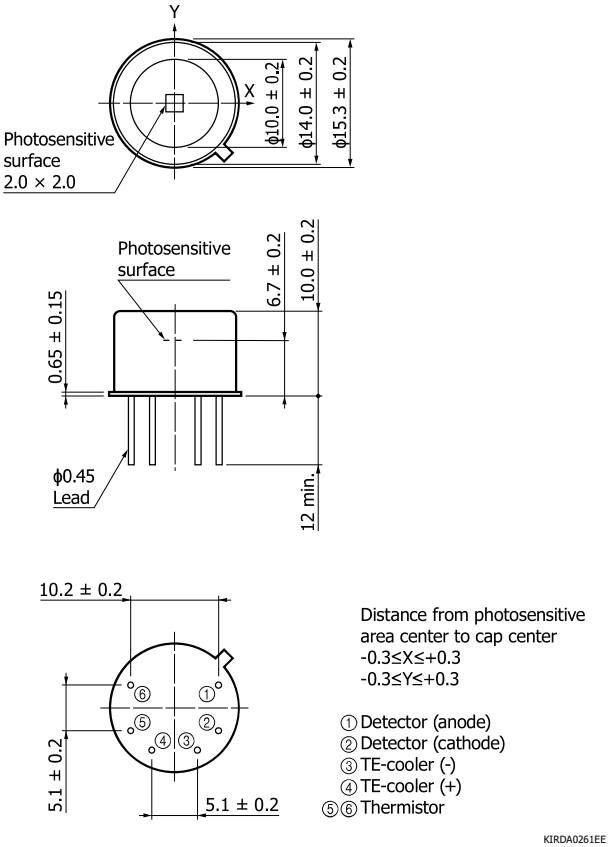
P13243-022MS



P13243-122MS



P13243-222MS

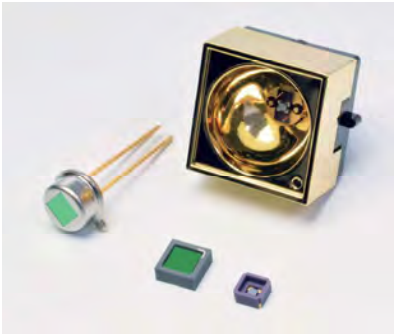


Recommended soldering conditions

· 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.

Related products

Mid infrared LED L15893/L15894/L15895 series



Hamamatsu's unique crystal growth and process technologies enable mid infrared LEDs with peak emission wavelengths of 3.3 µm, 3.9 µm, and 4.3 µm.

Type no.	Package
L15893-0330C/CN, L15894-0390C/CN, L15895-0430C/CN	Ceramic
L15893-0330MA, L15894-0390MA, L15895-0430MA	TO-46
L15893-0330ML, L15894-0390ML, L15895-0430ML	TO-46 with reflector

Related information

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

■ Precautions
· Disclaimer
· Safety consideration
· Compound opto-semiconductors (photosensors, light emitters)

■ Technical note
· Compound semiconductor photosensors

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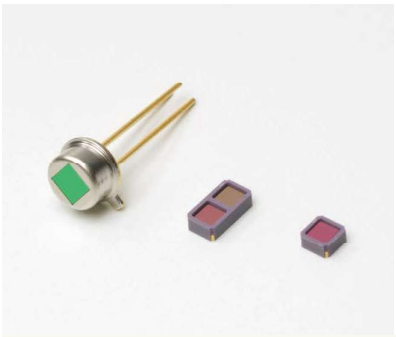
Taiwan: HAMAMATSU PHOTONICS TAIWAN CO., LTD.: 13F-1, No.101, Section 2, Gongdao 5th Road, East Dist., Hsinchu City, 300046, Taiwan(R.O.C) Telephone: (886)3-659-0080, Fax: (886)3-659-0081 E-mail: info@hamamatsu.com.tw

InAsSb photovoltaic detectors



P16112/P16612/P16849 series (with band-pass filter)

Back-illuminated type infrared detectors with band-pass filter (3.3 µm, 3.9 µm, 4.26 µm, 4.45 µm)

These are InAsSb photovoltaic detectors that use a band-pass filter for the window material. By using a back-illuminated structure, we greatly improved the sensitivity temperature coefficient compared to the front-illuminated type. Types using a band-pass filter with a center wavelength of 3.3 µm, 3.9 µm, or 4.26 µm are suitable for gas measurement, and a type using a band-pass filter of 4.45 µm is suitable for flame monitoring. These are environmentally friendly infrared detectors and do not use lead, mercury, or cadmium, which are substances restricted by the RoHS directive. A two-element type that can detect two wavelength is also available.

Features

- **High sensitivity**
- **High-speed response**
- **High shunt resistance**
- **Compact, surface mount ceramic package**
- **Compatible with lead-free solder reflow (ceramic package)**

Applications

- **Gas measurement (CH_4, CO_2)**
- **Flame monitors (CO_2 resonance radiation)**

Option (sold separately)

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

Structure

Type no.	Number of elements	Photosensitive area (mm)	Window material*1	Package	Cooling	Field of view FOV (degrees)
P16112-033MF	1	0.7 × 0.7	BPF (3.3 µm)	TO-46	Non-cooled	87
P16112-039MF			BPF (3.9 µm)			
P16112-043MF			BPF (4.26 µm)			
P16112-045MF			BPF (4.45 µm)			
P16612-033CF			BPF (3.3 µm)	Ceramic		86
P16612-039CF			BPF (3.9 µm)			
P16612-043CF			BPF (4.26 µm)			
P16612-045CF			BPF (4.45 µm)			
P16849-011CF	2		BPF (3.3 µm)			
			BPF (3.9 µm)			
P16849-012CF			BPF (4.26 µm)			
			BPF (3.9 µm)			

*1: BPF: Band-pass filter. For windowless and AR coating types, refer to the P16612-011CN datasheet.

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

Type no.	Reverse voltage V_R (V)	Operating temperature*2 Topr (°C)	Storage temperature*2 Tstg (°C)	Incident light level (W/mm²)	Soldering temperature Tsol (°C)
P16112-033MF	1	-40 to +85	-40 to +85	1	-
P16112-039MF					
P16112-043MF					
P16112-045MF					
P16612-033CF					240 (twice)*3
P16612-039CF					
P16612-043CF					
P16612-045CF					
P16849-011CF					
P16849-012CF					

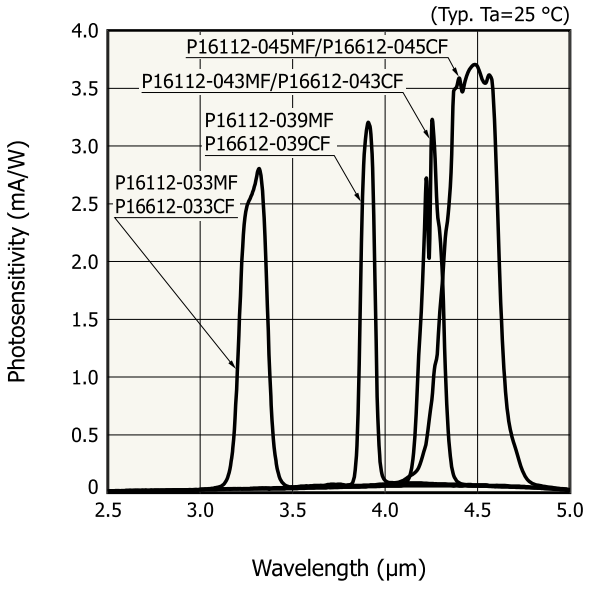
*2: No dew condensation
When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation may cause deterioration in characteristics and reliability.
*3: Reflow soldering, JEDEC J-STD-020 MSL 2, see P.8
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. Ta=25 °C, unless otherwise noted)

Type no.	Center wavelength CWL			Spectral response half width FWHM		Photosensitivity S λ=CWL	Shunt resistance Rsh V_R=10 mV	Detectivity D* (CWL, 1200, 1)		Noise equivalent power NEP λ=λp		Rise time tr*4	Terminal capacitance Ct*5
	Min. (nm)	Typ. (nm)	Max. (nm)	Typ. (nm)	Max. (nm)	(mA/W)	(kΩ)	Min. (cm·Hz$^{1/2}$/W)	Typ. (cm·Hz$^{1/2}$/W)	Typ. (W/Hz$^{1/2}$)	Max. (W/Hz$^{1/2}$)	(ns)	(pF)
P16112-033MF	3270	3300	3330	160	180	2.8	180	3.2×10^{8}	6.5×10^{8}	1.1×10^{-10}	2.2×10^{-10}	15	0.5
P16112-039MF	3820	3900	3980	90	110	3.2		3.7×10^{8}	7.4×10^{8}	9.5×10^{-11}	1.9×10^{-10}		
P16112-043MF	4217	4260	4303	140	160	3.2		3.7×10^{8}	7.4×10^{8}	9.5×10^{-11}	1.9×10^{-10}		
P16112-045MF	4400	4450	4500	350	400	3.7		4.3×10^{8}	8.6×10^{8}	8.2×10^{-11}	1.6×10^{-10}		
P16612-033CF	3270	3300	3330	160	180	2.8		3.2×10^{8}	6.5×10^{8}	1.1×10^{-10}	2.2×10^{-10}		
P16612-039CF	3820	3900	3980	90	110	3.2		3.7×10^{8}	7.4×10^{8}	9.5×10^{-11}	1.9×10^{-10}		
P16612-043CF	4217	4260	4303	140	160	3.2		3.7×10^{8}	7.4×10^{8}	9.5×10^{-11}	1.9×10^{-10}		
P16612-045CF	4400	4450	4500	350	400	3.7		4.3×10^{8}	8.6×10^{8}	8.2×10^{-11}	1.6×10^{-10}		
P16849-011CF	3270	3300	3330	160	180	2.8		3.2×10^{8}	6.5×10^{8}	1.1×10^{-10}	2.2×10^{-10}		
	3820	3900	3980	90	110	3.2		3.7×10^{8}	7.4×10^{8}	9.5×10^{-11}	1.9×10^{-10}		
P16849-012CF	4217	4260	4303	140	160	3.2		3.7×10^{8}	7.4×10^{8}	9.5×10^{-11}	1.9×10^{-10}		
	3820	3900	3980	90	110	3.2		3.7×10^{8}	7.4×10^{8}	9.5×10^{-11}	1.9×10^{-10}		

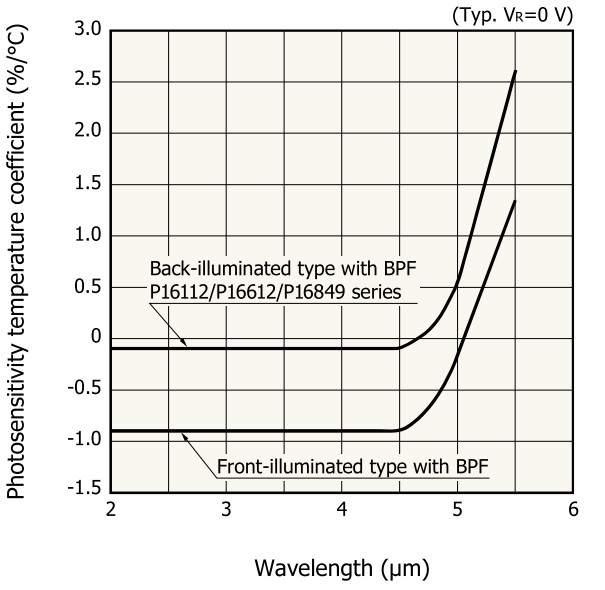
*4: V_R=0 V, R_L=50 Ω, 10 to 90%
*5: V_R=0 V, f=1 MHz

Spectral response



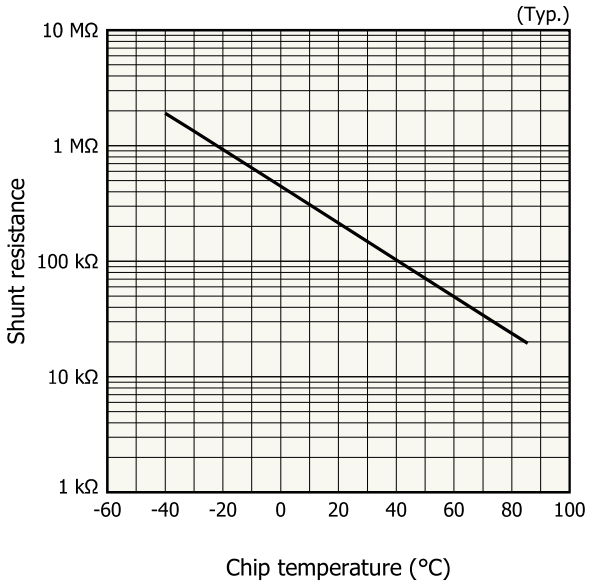
KIRDB0732EC

Photosensitivity temperature characteristics



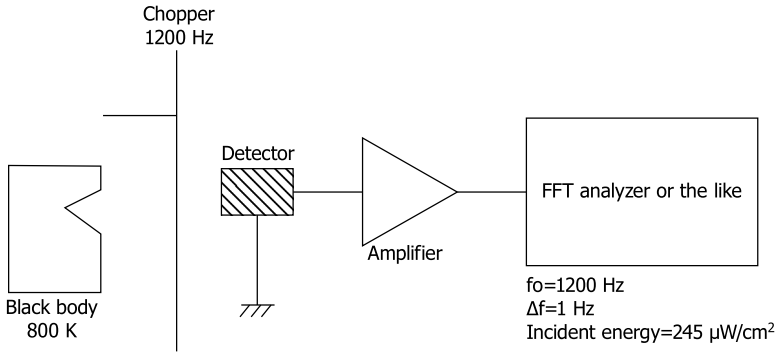
KIRDB0729EB

Shunt resistance vs. chip temperature



KIRDB0717EB

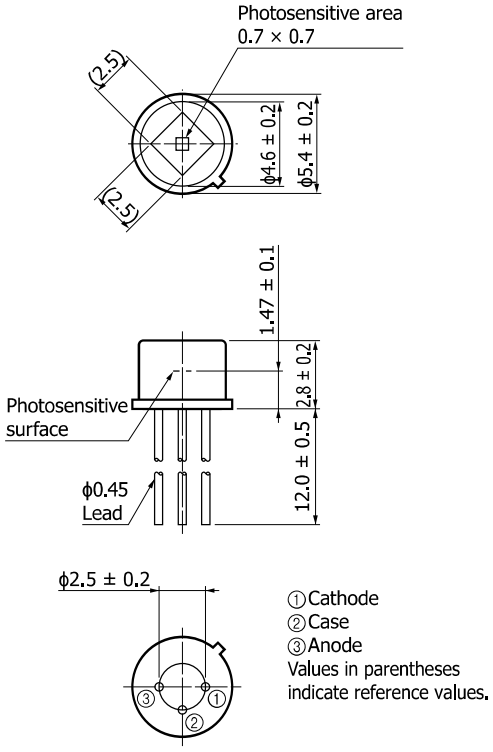
Measurement circuit example



KIRDC0127EA

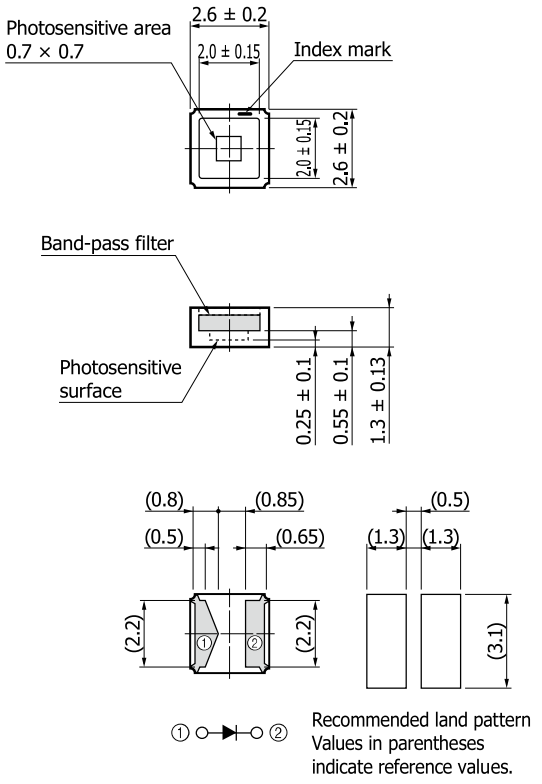
Dimensional outlines (unit: mm)

P16112-033MF/-039MF/-043MF/-045MF



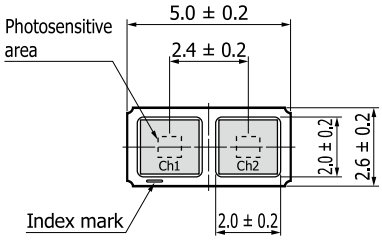
KIRDA0284EA

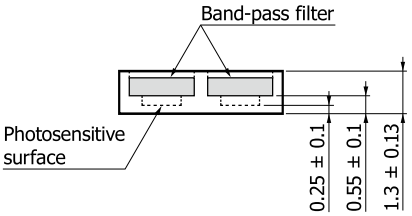
P16612-033CF/-039CF/-043CF/-045CF

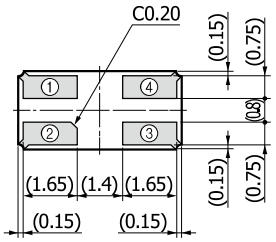


KIRDA0288EA

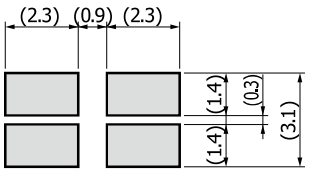
P16849-011CF/-012CF







① Cathode (Ch1)
② Anode (Ch1)
③ Anode (Ch2)
④ Cathode (Ch2)
Values in parentheses are not guaranteed, but for reference.



Recommended land pattern

Type no.	Ch1	Ch2
P16849-011CF	3.3 µm	3.9 µm
P16849-012CF	4.26 µm	3.9 µm

KIRDA0287EA

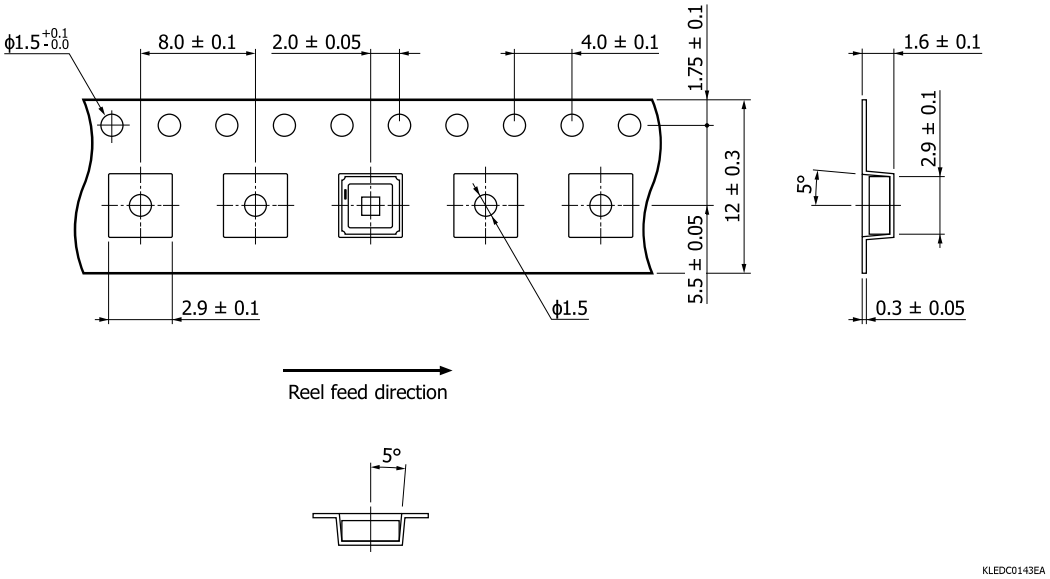
Standard packing specifications

P16612-033CF/-039CF/-043CF/-045CF

■ 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)



■ Packing quantity
500 pcs/reel

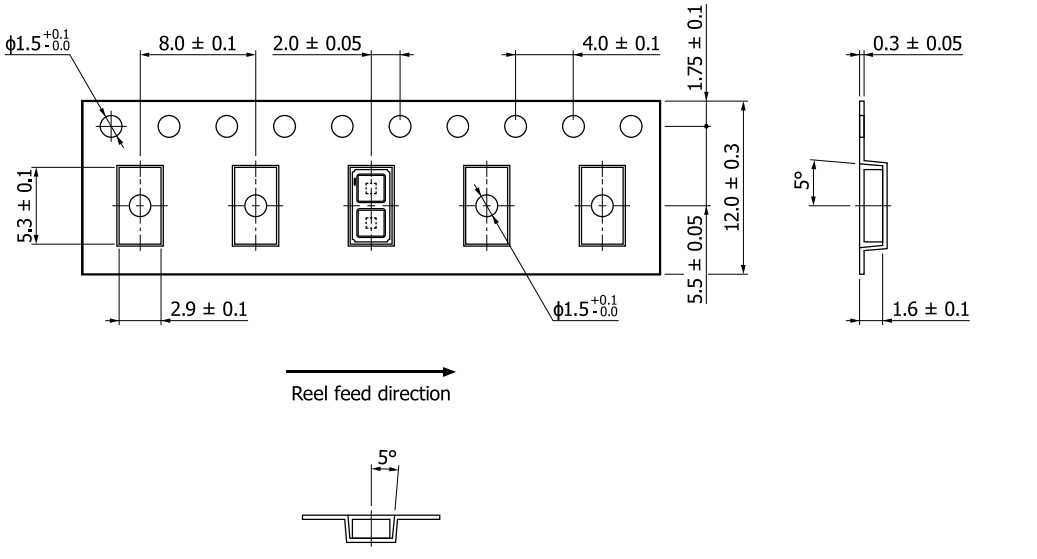
■ Packing state
Reel and desiccant in moisture-proof packaging (vacuum-sealed)

P16849-011CF/-012CF

■ 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)



■ Packing quantity
100 pcs/reel

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

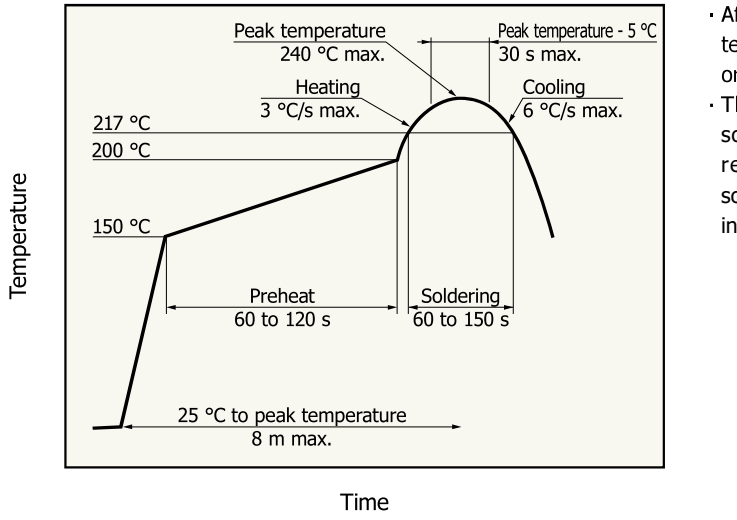
Recommended soldering conditions

P16112-033MF/-039MF/-043MF/-045MF

- 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 conditions in advance.

P16612-033CF/-039CF/-043CF/-045CF, P16849-011CF/-012CF



- After unpacking, store the device in an environment at a temperature range of 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.

Related products

Evaluation kit M16953 for InAsSb photovoltaic detector

The M16953 is an evaluation amplifier for gas measurement used in combination with Hamamatsu's InAsSb photovoltaic devices with band-pass filters (TO-46 package). These can detect infrared light transmitted through a band-pass filter simply by connecting a power supply ±2.5 V.

Specifications

- **Applicable devices: InAsSb photovoltaic detectors with band-pass filter*6**
- **Gain: 10^7 V/A**
- **Frequency characteristics: DC to 80 kHz**
- **Recommended drive voltage: ±2.5 V**

*6: InAsSb photovoltaic devices with band-pass filter sold separately

Evaluation kit M16615 for mid infrared LED

The M16615 is a driver for mid infrared LED (TO-46 package). The LED can be pulse-driven simply by connecting a power supply (+15 V). This is used in combination with the evaluation kit M16953 series for InAsSb photovoltaic detector.

Specifications

- **Applicable devices: Mid infrared LED*7**
- **Output current: 400 mA**
- **Output pulse: 10 µs**
- **Output cycle: 1000 µs**
- **Recommended drive voltage: +15 V**

*7: Mid infrared LED sold separately

Related information

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

■ Precautions
- Disclaimer
- Safety consideration / Opto-semiconductor products
- Precautions / Surface mount type products
- Precautions / Compound opto-semiconductors (photosensors, light emitters)

■ Catalogs
- Selection guide / Infrared detectors
- Technical note / Compound semiconductor photosensors

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North Europe: HAMAMATSU PHOTONICS NORDEN AB: Torshamnsgatan 35, 16440 Kista, Sweden, Telephone: (46)8 509 031 00, Fax: (46)8 509 031 01 E mail: info@hamamatsu.se
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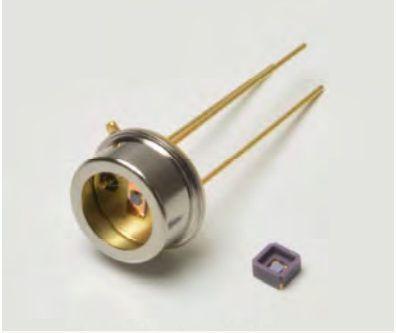
Taiwan: HAMAMATSU PHOTONICS TAIWAN CO., LTD.: 13F 1, No.101, Section 2, Gongdao 5th Road, East Dist., Hsinchu City, 300046, Taiwan(R.O.C) Telephone: (886)3 659 0080, Fax: (886)3 659 0081 E mail: info@hamamatsu.com.tw

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 (SOx, NOx, 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)

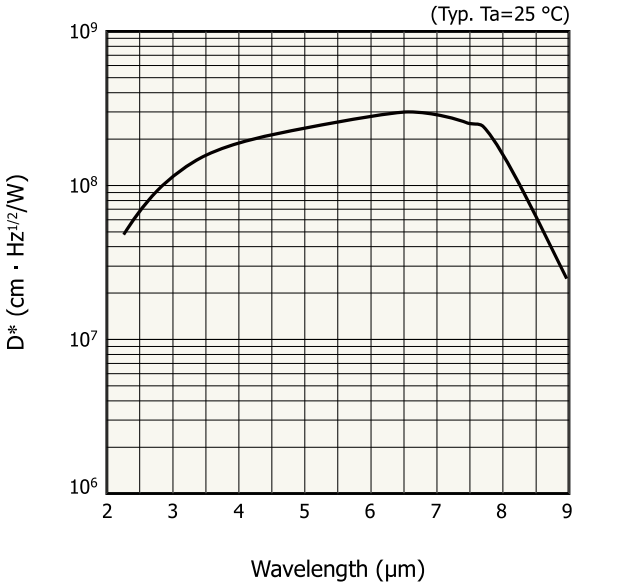
Parameter	Symbol	Value	Unit
Reverse voltage	V_R	1	V
Operating temperature*1	Topr	-40 to +85	°C
Storage temperature*1	Tstg	-40 to +85	°C
Incident light level	Pin	1	W/mm^2
Soldering temperature	Tsol	240 (once)*2	°C

*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)

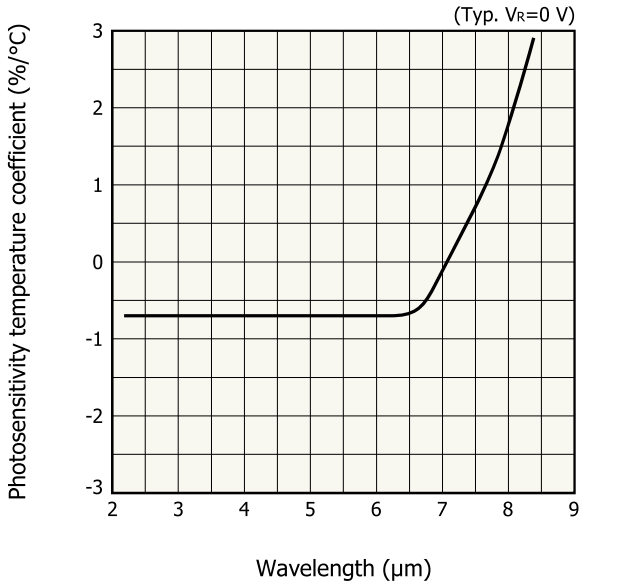
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Peak sensitivity wavelength	λp		-	6.5	-	µm
Cutoff wavelength	λc		8.0	8.3	-	µm
Photosensitivity	S	λ=λp	5.3	6.1	-	mA/W
Shunt resistance	Rsh	V_R=10 mV	4.9	8.3	-	kΩ
Terminal capacitance	Ct	V_R=0 V, f=1 MHz	-	0.8	-	pF
Detectivity	D*	(λp, 1200, 1)	2.0×10^{8}	3.0×10^{8}	-	cm·$Hz^{1/2}$/W
Noise equivalent power	NEP	λ=λp	-	2.0×10^{-10}	2.7×10^{-10}	W/$Hz^{1/2}$
Rise time	tr	V_R=0 V, R_L=50 Ω, 10 to 90%	-	3	10	ns

Spectral response (D*)



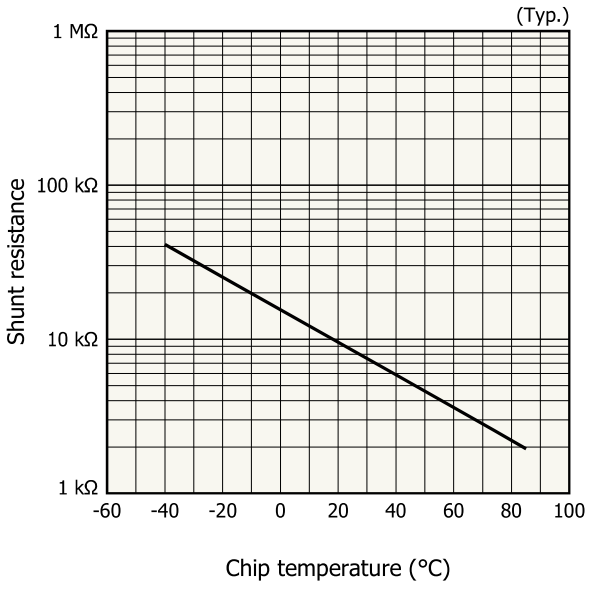
KIRDB0720EA

Photosensitivity temperature characteristics



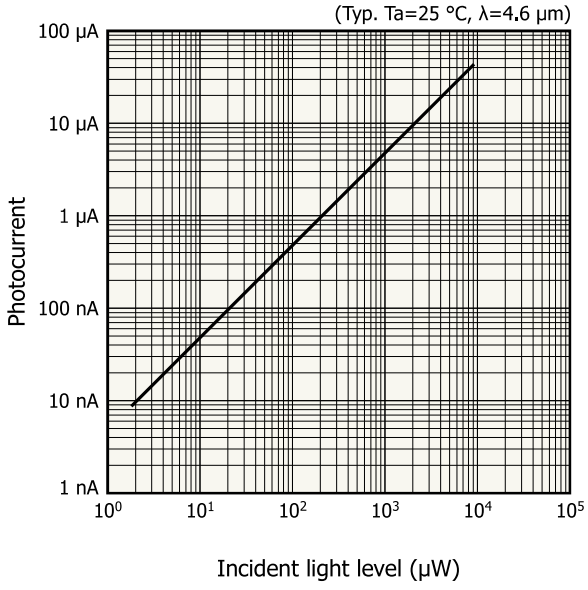
KIRDB0721EA

Shunt resistance vs. chip temperature



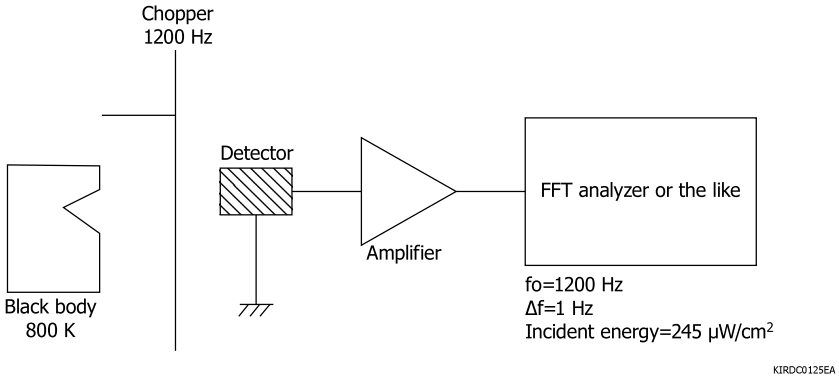
KIRDB0722EA

Linearity



KIRDB0723EA

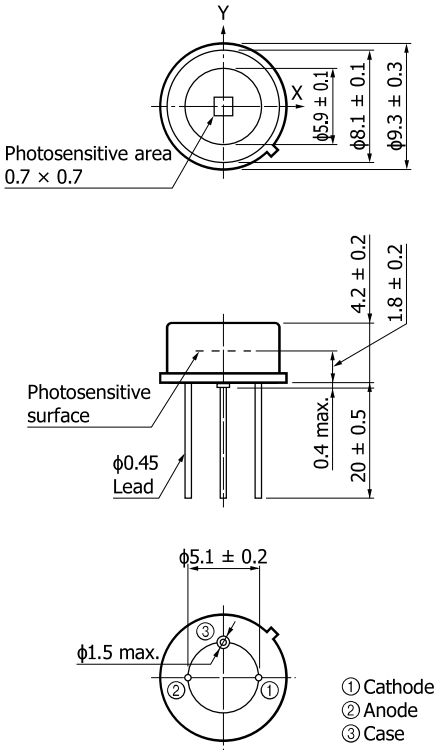
Block diagram for characteristic measurement



KIRDC0125EA

Dimensional outline (unit: mm)

P16113-011MN



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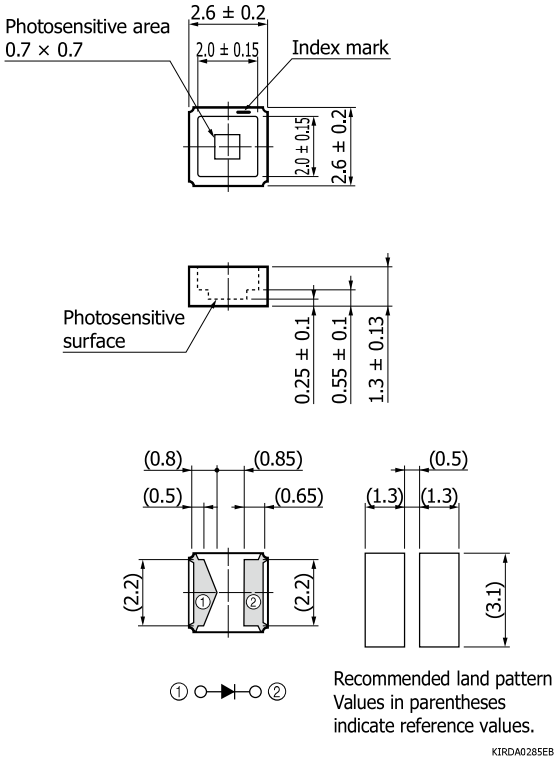
P16613-011CN



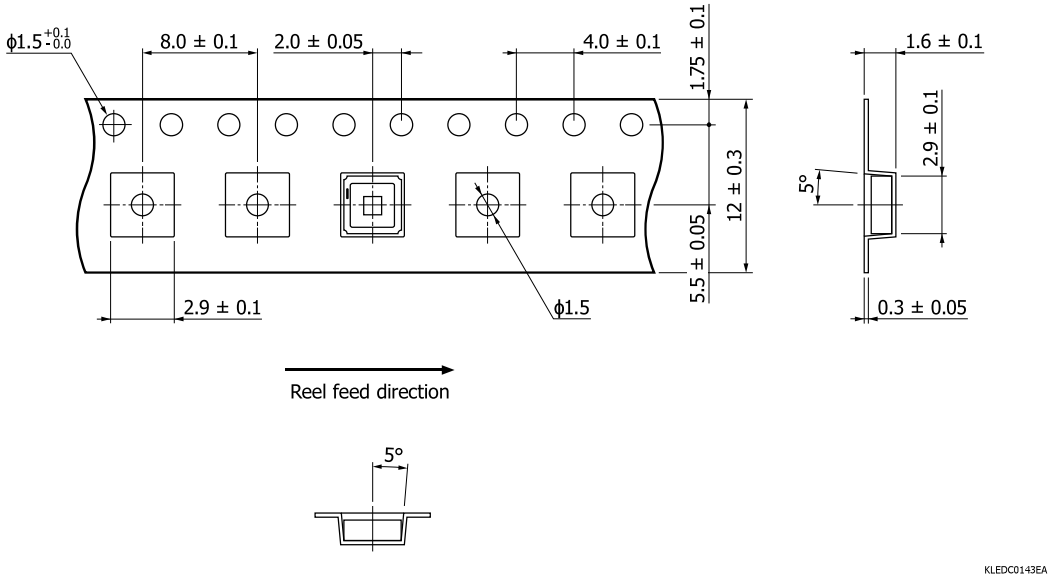
KIRDA0285EB

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)



■ Packing quantity
100 pcs/reel

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

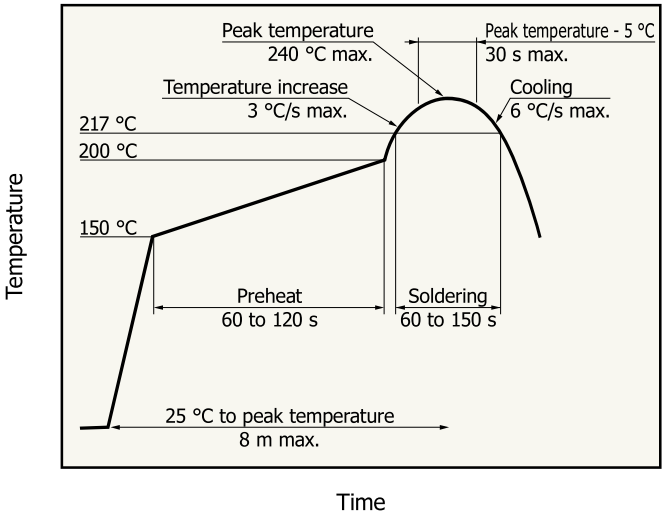
Recommended soldering conditions

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.

Related information

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

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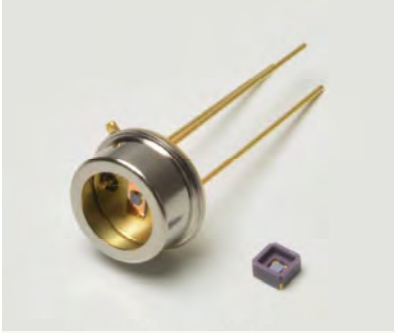
InAsSb photovoltaic detectors



P16114-011MN P16614-011CN

Infrared detector with high photosensitivity (up to 10 µm band)

The P16114-011MN and P16614-011CN are an infrared detector that have high sensitivity in the spectral band up to 10 µm. This high sensitivity has been achieved due to Hamamatsu unique crystal growth technology and process technology. By using a back-illuminated structure, the photosensitivity has been improved compared to the front-illuminated type. 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 (P16614-011CN)**
- **Compatible with lead-free solder reflow (P16614-011CN)**
- **RoHS compliant (lead, mercury, cadmium free)**

Applications

- **Gas detection (SOx, NOx, NH_3, O_3, etc.)**
- **Radiation thermometers**
- **CO_2 laser monitor**
- **Mid infrared spectroscopy**

Option (sold separately)

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

Structure

Parameter	P16114-011MN	P16614-011CN	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)

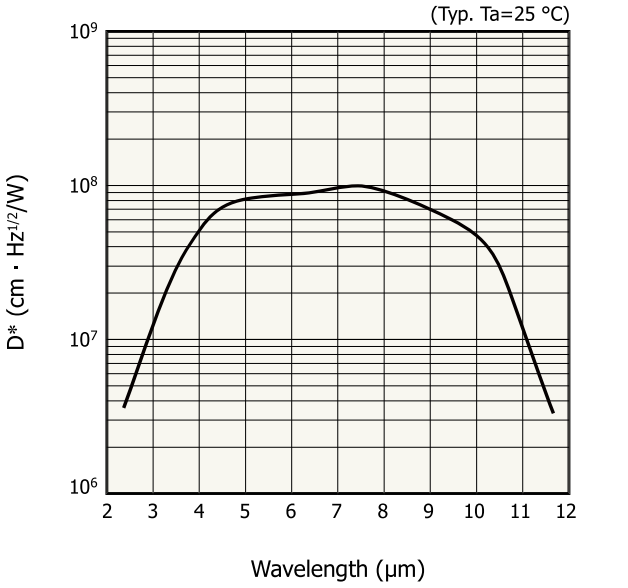
Parameter	Symbol	Value	Unit
Reverse voltage	V_R	1	V
Operating temperature*1	Topr	-40 to +85	°C
Storage temperature*1	Tstg	-40 to +85	°C
Incident light level	Pin	1	W/mm^2
Soldering temperature	Tsol	240 (once)*2	°C

*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: P16614-011CN 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	λp		-	7.4	-	µm
Cutoff wavelength	λc		9.7	11.0	-	µm
Photosensitivity	S	λ=λp	3.4	5.0	-	mA/W
Shunt resistance	Rsh	V_R=10 mV	0.65	1.3	-	kΩ
Terminal capacitance	Ct	V_R=0 V, f=1 MHz	-	1.2	-	pF
Detectivity	D*	(λp, 1200, 1)	4.7×10^7	1.0×10^8	-	cm·Hz$^{1/2}$/W
Noise equivalent power	NEP	λ=λp	-	7.1×10^{-10}	9.0×10^{-10}	W/Hz$^{1/2}$
Rise time	tr	V_R=0 V, R_L=50 Ω, 10 to 90%	-	3	10	ns

Spectral response (D*)



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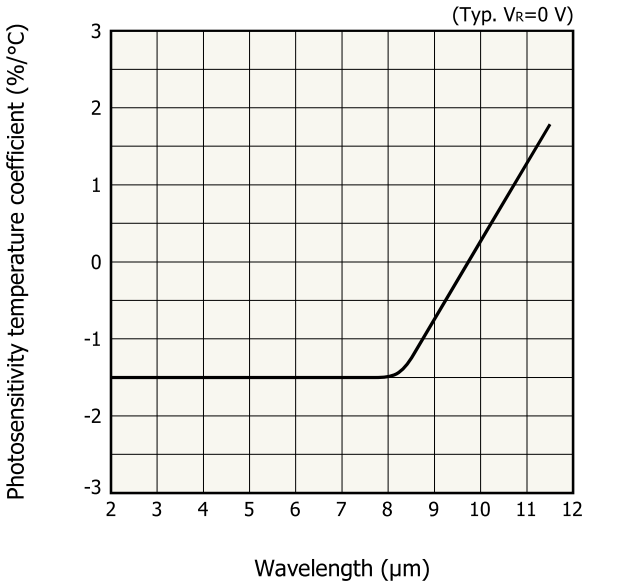
Photosensitivity temperature characteristics



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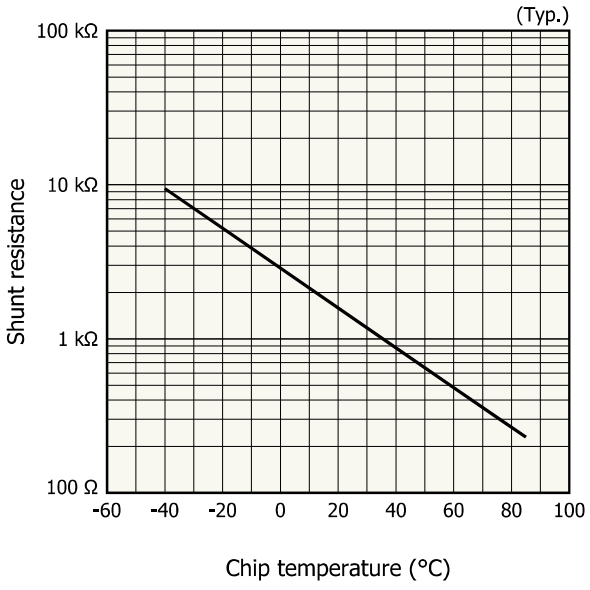
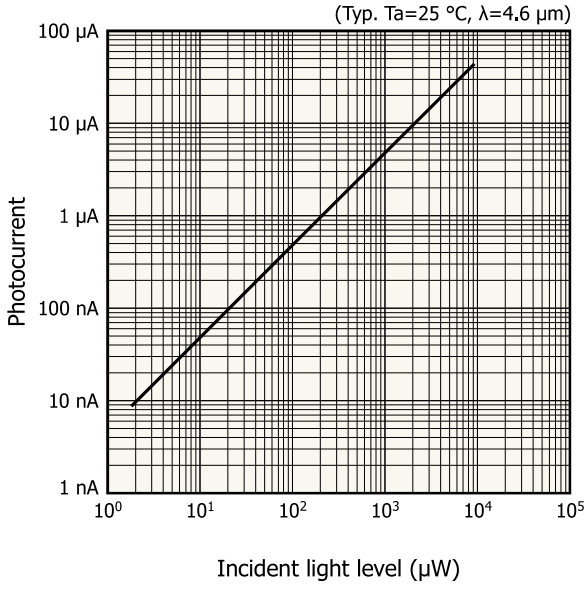
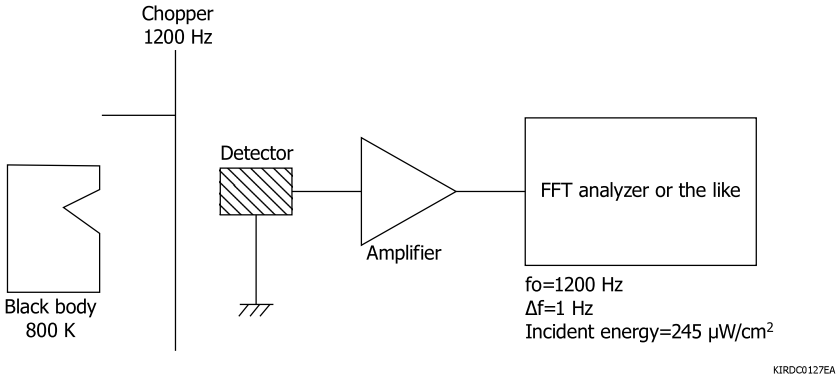
Shunt resistance vs. chip temperature



Linearity



Block diagram for characteristic measurement



Dimensional outline (unit: mm)

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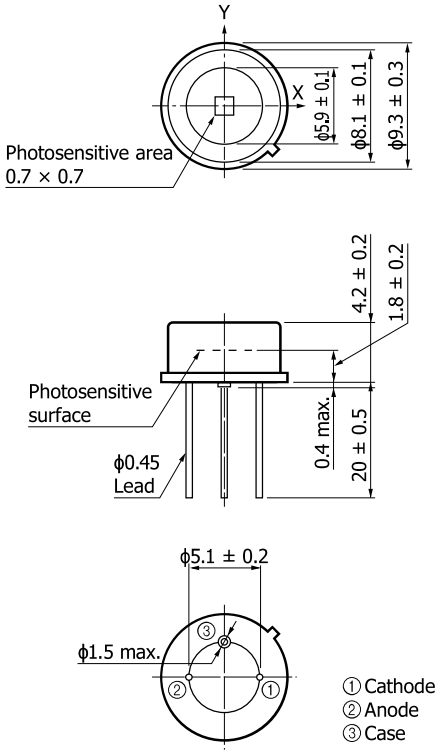

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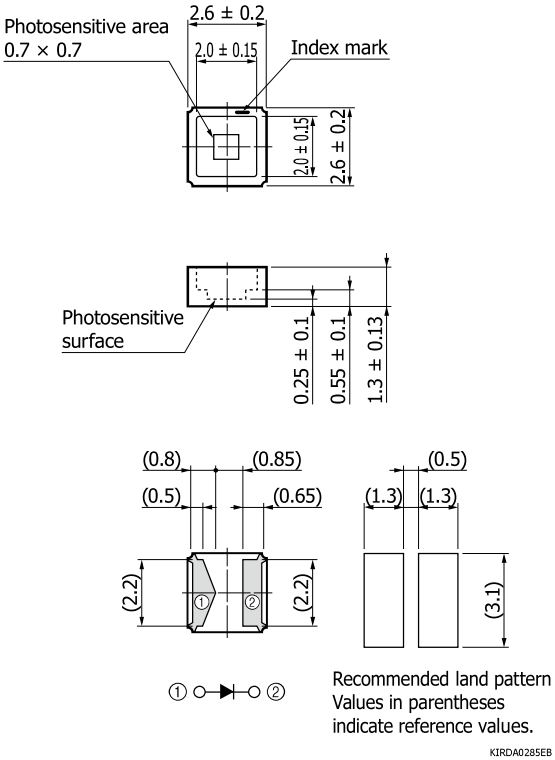

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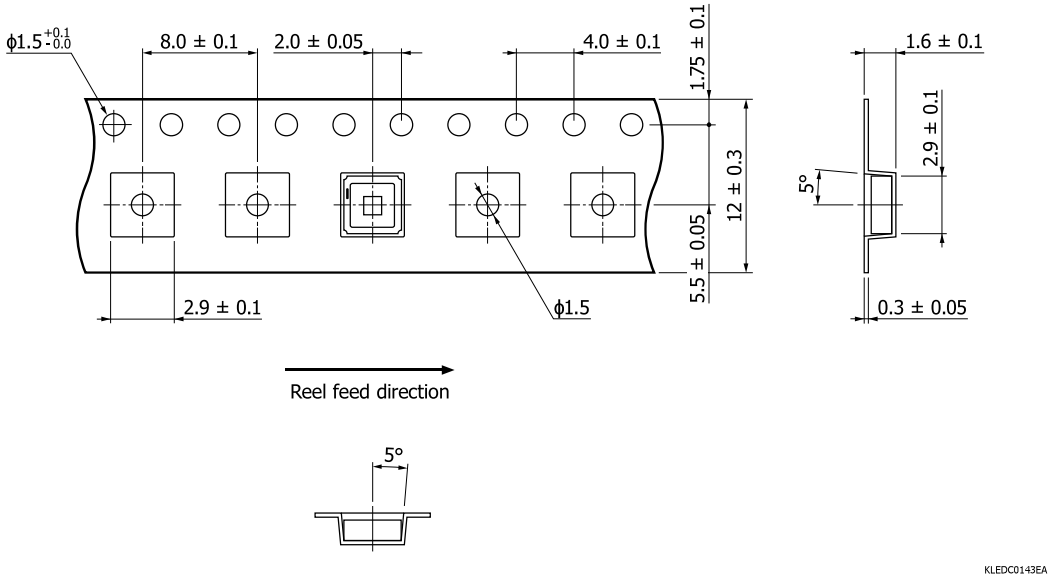
Standard packing specifications (P16614-011CN)

■ 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)



■ Packing quantity
100 pcs/reel

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

Recommended soldering conditions

P16114-011MN

- 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.

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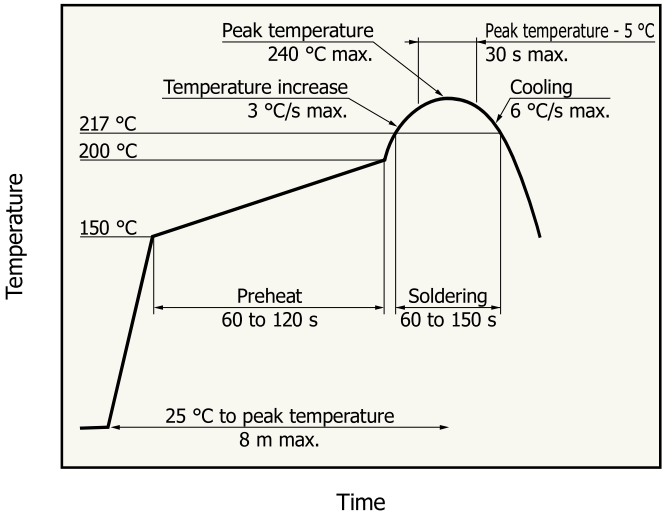

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- After unpacking, store it in an environment at a temperature of 5 to 30 °C and a humidity of 60% or less, and perform reflow soldering within 1 year.
- The effect that the product receives during reflow soldering varies depending on the circuit board 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.

Related information

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

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