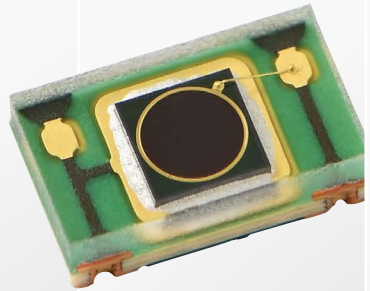
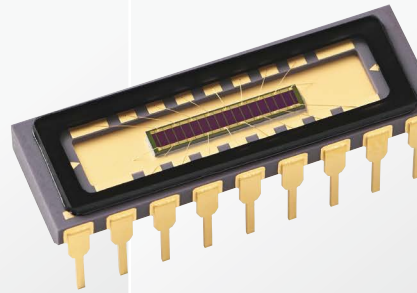
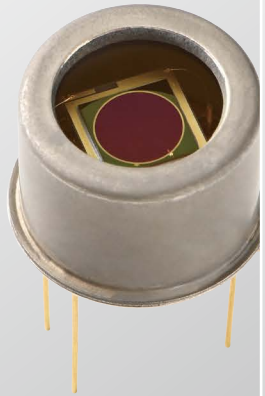
Supports various spectral response ranges in the infrared region

Infrared detectors








Infrared detectors

Supports various spectral response ranges in the infrared region

Infrared detectors are widely used in fields including measurement, analysis, industry, communications, agriculture, medicine, physical-and-chemical science, astronomy, and aerospace. Based on its long experience in optical technology, Hamamatsu provides a wide lineup of products for the infrared region.

When using infrared detectors, the following points should be taken into consideration for making a device selection.

Spectral response

We offer detectors with various spectral responses (P.5). By cooling the element, the spectral response of InGaAs, InAs, InSb, and InAsSb shifts to the short-wavelength side.

Response speed

Various detectors are available with different response speeds.

Photosensitive area, number of elements

Various types are available, ranging from small to large photosensitive area sizes. We also offer multi-element types suitable for high-speed multi-channel spectrophotometry.

Cooling

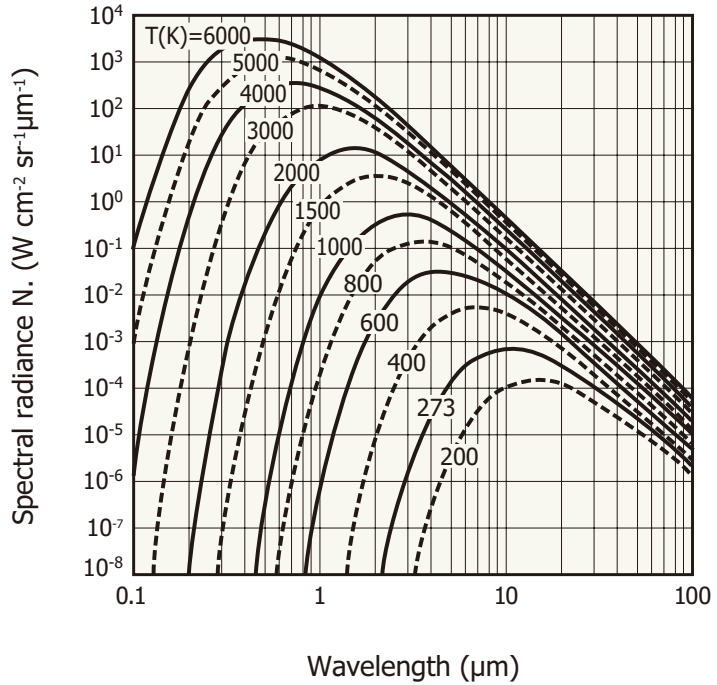
Besides the easy-to-use non-cooled type, we offer a TE-cooled type that does not require coolant, as well as a dewar type (cooled with liquid nitrogen) that realizes low noise.

Object temperature

When selecting a detector based on the temperature of the object, it is necessary to consider the energy distribution (wavelength dependence of energy) radiated from the object. When the temperature of the object changes, its radiant energy distribution changes according to the law of black body radiation (Planck's law of radiation). (See the figure on the right.) The following relationship exists between the peak sensitivity wavelength λp (μm) and the object temperature T (K).

$\lambda p \cdot T = 2897.9$

● Law of black body radiation (Planck's law)

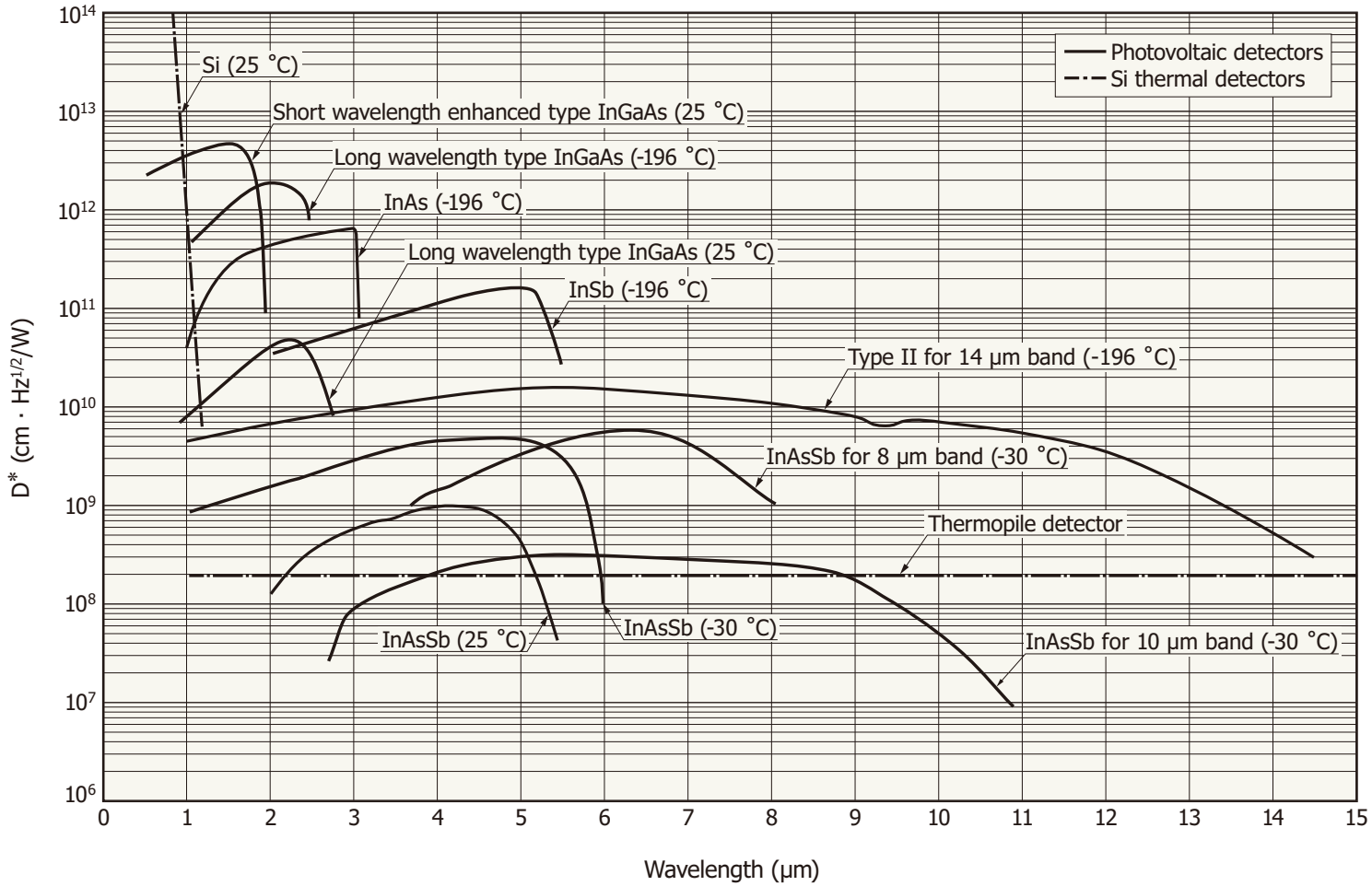


KIRDB0014EB

Product name	Spectral response range (μm) 0 1 2 3	Features	Main applications
InGaAs PIN photodiode	0.5 to 1.7 μm 0.9 to 1.7 μm 0.9 to 1.9 μm 0.9 to 2.1 μm 0.9 to 2.6 μm	· High-speed response · Various types of photosensitive areas, arrays, and packages available · TE-cooled type available	· Optical fiber communications · Power meters · Gas analysis · Moisture meters · NIR (near infrared) photometry
InGaAs APD	0.95 to 1.7 μm	· Low dark current · Low capacitance · High sensitivity	· Distance measurement · LiDAR · OTDR

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
Thermopile detector		3 to 5 μm	· Sensors that generate thermoelectromotive force in proportion to the incident infrared light energy	· Gas measurement · CO_2density measurement
Two-color detector	Si + InGaAs	0.32 to 2.55 μm	· Wide spectral response range from UV to infrared · Sensor with transmitting Si photodiode and InGaAs placed on top and bottom	· Spectrophotometers · Laser monitors · Flame monitors · Radiation thermometers
	Si + InAsSb	0.32 to 5.3 μm	· Wide spectral response range from UV to infrared · Sensor with transmitting Si photodiode and InAsSb placed on top and bottom	
	InGaAs + InGaAs	0.9 to 2.55 μm	· Sensor with two InGaAs PIN photodiodes with different spectral ranges placed on top and bottom	

Spectral response (typical example)



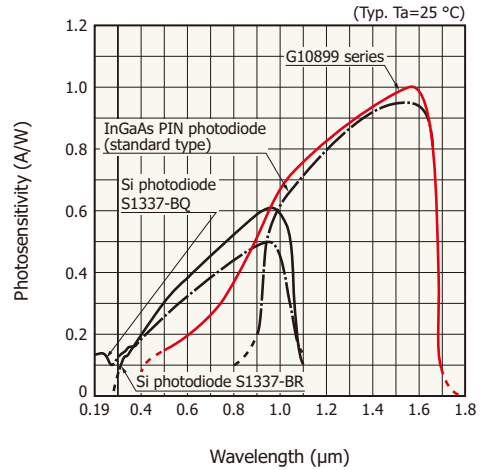
KIRDB0259EU

Short wavelength enhanced type

(Typ. Ta=25 °C)

Type no.	Cooling	Photosensitive area (mm)	Spectral response range λ (μm)	Peak sensitivity wavelength λp (μm)	Cutoff frequency fc V_R=1 V (MHz)	Package	Photo	Dedicated amplifier (sold separately)
G10899-003K	Non-cooled	ϕ0.3	0.5 to 1.7	1.55	300	TO-18		C4159-03
G10899-005K		ϕ0.5			150			
G10899-01K		ϕ1			45			
G10899-02K		ϕ2			10	TO-5		
G10899-03K		ϕ3			5			

● Spectral response



KIRDB0408EC

Standard type

Metal package

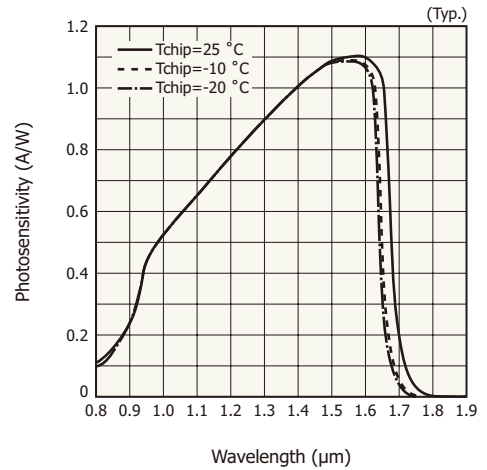
Various sizes of photosensitive areas are available.

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

Type no.	Cooling	Photosensitive area (mm)	Spectral response range λ (μm)	Peak sensitivity wavelength λp (μm)	Cutoff frequency fc (MHz)	Package	Photo	Options (sold separately)
G12180-003A	Non-cooled	ϕ0.3	0.9 to 1.7	1.55	600 (VR=5 V)	TO-18		C4159-03
G12180-005A		ϕ0.5			200 (VR=5 V)			
G12180-010A		ϕ1			60 (VR=5 V)			
G12180-020A		ϕ2			13 (VR=1 V)	TO-5		
G12180-030A		ϕ3			7 (VR=1 V)			
G12180-050A		ϕ5			3 (VR=1 V)	TO-8		
G8370-81*		ϕ1			35 (VR=1 V)	TO-18		
G8370-82*		ϕ2			4 (VR=1 V)	TO-5		
G8370-83*		ϕ3			2 (VR=1 V)			
G8370-85*		ϕ5			0.6 (VR=1 V)	TO-8		
G12180-110A	One-stage TE-cooled (Tchip=-10 °C)	ϕ1	0.9 to 1.67		40 (VR=1 V)	TO-8		C4159-03 A3179 C1103-04
G12180-120A		ϕ2			13 (VR=1 V)			
G12180-130A		ϕ3			7 (VR=1 V)			
G12180-150A		ϕ5			3 (VR=1 V)			
G12180-210A	Two-stage TE-cooled (Tchip=-20 °C)	ϕ1	0.9 to 1.65		40 (VR=1 V)			C4159-03 A3179-01 C1103-04
G12180-220A		ϕ2			13 (VR=1 V)			
G12180-230A		ϕ3			7 (VR=1 V)			
G12180-250A		ϕ5			3 (VR=1 V)			
G6854-01	Non-cooled	ϕ0.08	0.9 to 1.7		2000 (VR=5 V)	With CD lens TO-18		–

* Low PDL type

Spectral response

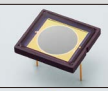
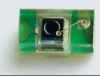


KIRDB0672EB

Standard type

Ceramic package, plastic package

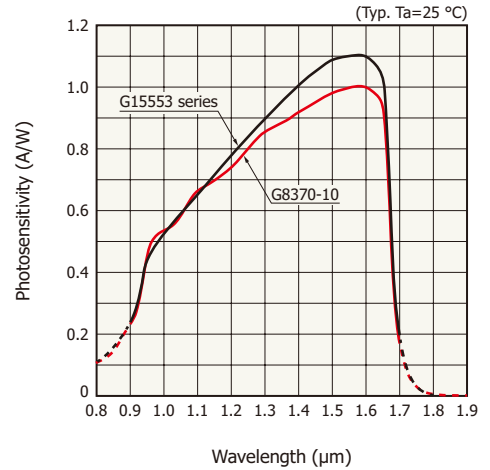
(Typ. Ta=25 °C)

Type no.	Photosensitive area (mm)	Spectral response range λ (μm)	Peak sensitivity wavelength λp (μm)	Cutoff frequency fc VR=5 V (MHz)	Package	Photo
G8370-10	φ10	0.9 to 1.7	1.55	0.1*	Ceramic	
G15553-003C	φ0.3			600	Ceramic (unsealed, surface mount type)	
G15553-005C	φ0.5			200		
G15553-010C	φ1			60		
G11193-02R	φ0.2			1000	Ceramic (surface mount type)	
G11193-03R	φ0.3			500		
G11193-10R	φ1			60		
G13176-003P	φ0.3			600	Plastic COB (surface mount type)	
G13176-010P	φ1			60		
G14448-003L	φ0.3			600	Plastic COB with lens (surface mount type)	

* VR=0 V

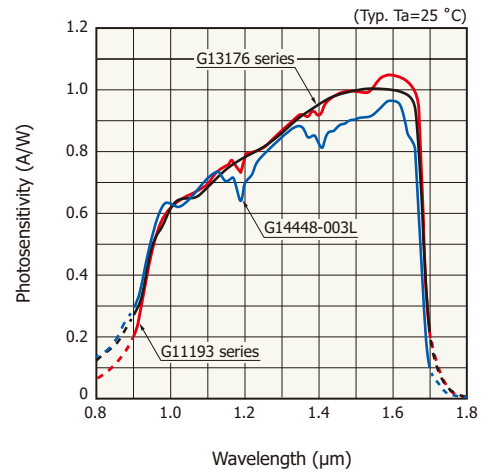
Spectral response

[G8370-10, G15553 series]



KIRDB0719EA

[G11193, G13176 series, G14448-003L]



KIRDB0646EC

Long wavelength type

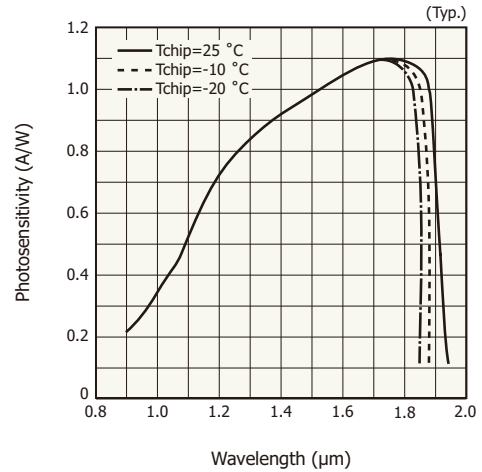
Peak sensitivity wavelength: 1.75 µm

These are suitable for light measurement around 1.7 µm.

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

Type no.	Cooling	Photosensitive area (mm)	Spectral response range λ (µm)	Peak sensitivity wavelength λp (µm)	Cutoff frequency fc V_R=0 V (MHz)	Package	Photo	Options (sold separately)
G12181-003K	Non-cooled	φ0.3	0.9 to 1.9	1.75	90	TO-18		C4159-03
G12181-005K		φ0.5			35			
G12181-010K		φ1			10			
G12181-020K		φ2			2.5	TO-5		
G12181-030K		φ3			1.5			
G12181-103K	One-stage TE-cooled (Tchip=-10 °C)	φ0.3	0.9 to 1.87		140	TO-8		C4159-03 A3179 C1103-04
G12181-105K		φ0.5			50			
G12181-110K		φ1			16			
G12181-120K		φ2			3.5			
G12181-130K		φ3			1.8			
G12181-203K	Two-stage TE-cooled (Tchip=-20 °C)	φ0.3	0.9 to 1.85		150	TO-8		C4159-03 A3179-01 C1103-04
G12181-205K		φ0.5			53			
G12181-210K		φ1			17			
G12181-220K		φ2			3.7			
G12181-230K		φ3			1.9			

Spectral response



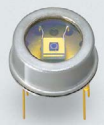
KIRDB0483ED

Long wavelength type

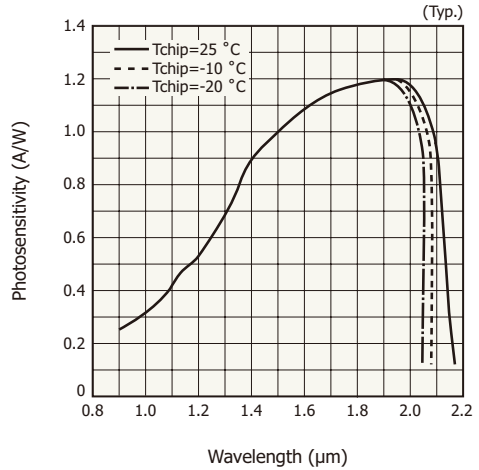
Peak sensitivity wavelength: 1.95 µm

These are suitable for optical measurement in the moisture absorption wavelength band in the 1.9 µm band.

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

Type no.	Cooling	Photosensitive area (mm)	Spectral response range λ (µm)	Peak sensitivity wavelength λp (µm)	Cutoff frequency fc V_R=0 V (MHz)	Package	Photo	Options (sold separately)
G12182-003K	Non-cooled	φ0.3	0.9 to 2.1	1.95	90	TO-18		C4159-03
G12182-005K		φ0.5			35			
G12182-010K		φ1			10			
G12182-020K		φ2			2.5	TO-5		
G12182-030K		φ3			1.5			
G12182-103K	One-stage TE-cooled (Tchip=-10 °C)	φ0.3	0.9 to 2.07		140	TO-8		C4159-03 A3179 C1103-04
G12182-105K		φ0.5			50			
G12182-110K		φ1			16			
G12182-120K		φ2			3.5			
G12182-130K		φ3			1.8			
G12182-203K	Two-stage TE-cooled (Tchip=-20 °C)	φ0.3	0.9 to 2.05		150	TO-8		C4159-03 A3179-01 C1103-04
G12182-205K		φ0.5			53			
G12182-210K		φ1			17			
G12182-220K		φ2			3.7			
G12182-230K		φ3			1.9			

Spectral response



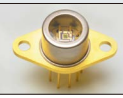
KIRDB0487ED

Long wavelength type

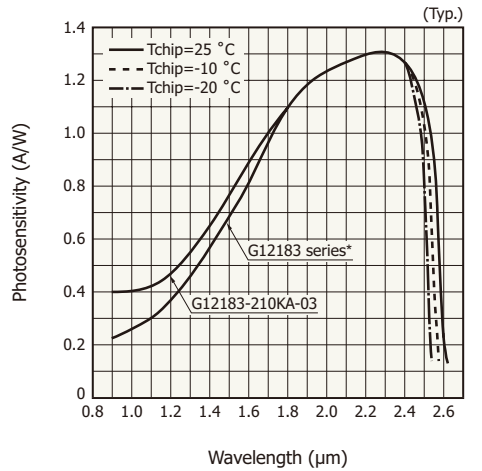
Peak sensitivity wavelength: 2.3 µm

These are suitable for NIR (near infrared) spectrometers.

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

Type no.	Cooling	Photosensitive area (mm)	Spectral response range λ (µm)	Peak sensitivity wavelength λp (µm)	Cutoff frequency fc V_R=0 V (MHz)	Package	Photo	Options (sold separately)
G12183-003K	Non-cooled	φ0.3	0.9 to 2.6	2.3	50	TO-18		C4159-03
G12183-005K		φ0.5			20			
G12183-010K		φ1			6			
G12183-020K		φ2			1.5	TO-5		
G12183-030K		φ3			0.8			
G12183-103K	One-stage TE-cooled (Tchip=-10 °C)	φ0.3	0.9 to 2.57		70	TO-8		C4159-03 A3179 C1103-04
G12183-105K		φ0.5			25			
G12183-110K		φ1			7			
G12183-120K		φ2			2			
G12183-130K		φ3			0.9			
G12183-203K	Two-stage TE-cooled (Tchip=-20 °C)	φ0.3	0.9 to 2.55		75	TO-8		C4159-03 A3179-01 C1103-04
G12183-205K		φ0.5			28			
G12183-210K		φ1			8			
G12183-220K		φ2			2.3			
G12183-230K		φ3			1			
G12183-210KA-03		φ1			4	TO-66		

Spectral response



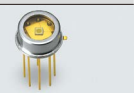
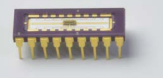
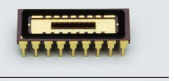
* Excluding G12183-210KA-03

KIRDB0491EF

InGaAs PIN photodiode arrays

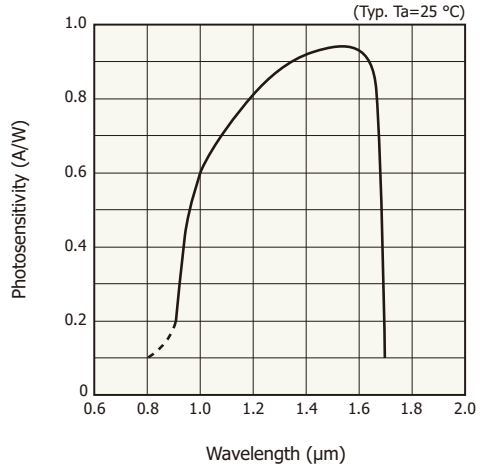
4-segmented type and 16, 32, 40, 46-element arrays are available.

(Typ. Ta=25 °C)

Type no.	Photosensitive area (mm)	Number of elements	Spectral response range λ (μm)	Peak sensitivity wavelength λp (μm)	Package	Photo
G6849-01	ϕ1	4-segment	0.9 to 1.7	1.55	TO-5	
G6849	ϕ2	4-segment				
G7151-16	0.08 × 0.2	16 elements			Ceramic	
G12430-016D	0.45 × 1.0	16 elements				
G12430-032D	0.2 × 1.0	32 elements				
G12430-046D	0.2 × 1.0	46 elements				
G8909-01	ϕ0.08	40 elements			Ceramic (unsealed)	

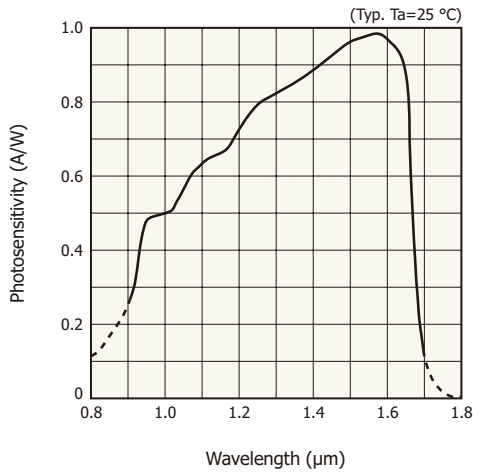
Spectral response

[G6849 series, G7151-16, G8909-01]



KIRDB0002EB

[G12430 series]



KIRDB0565EA

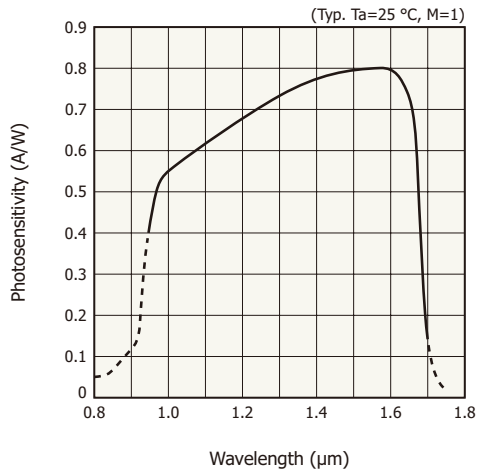
InGaAs APD

The G14858-0020AA is used for distance measurement, low-light-level detection, and so on.

(Typ. Ta=25 °C)

Type no.	Photosensitive area (mm)	Spectral response range (μm)	Breakdown voltage max. ID=100 μA (V)	Cutoff frequency RL=50 Ω (MHz)	Terminal capacitance (pF)	Gain λ=1.55 μm	Package	Photo
G14858-0020AA	ϕ0.2	0.95 to 1.7	80	900	2.0	30	TO-18	

Spectral response



KAPDB0417EA

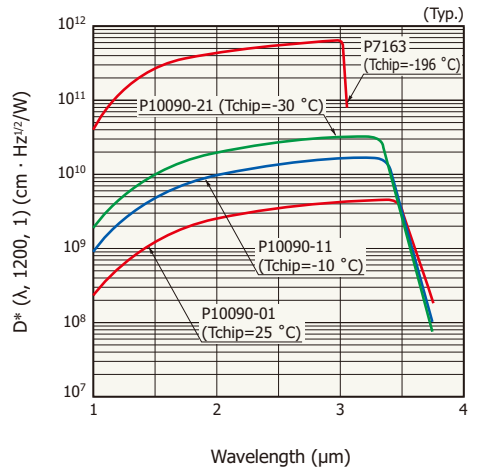
InAs photovoltaic detectors

The InAs photovoltaic detectors are low-noise, high-speed response infrared detectors that can detect up to around 3.5 µm.

(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Cutoff wavelength λc (µm)	Peak sensitivity wavelength λp (µm)	Package	Photo	Options (sold separately)
P10090-01	Non-cooled	ϕ1	3.65	3.35	TO-5		C4159-07
P10090-11	One-stage TE-cooled (Tchip=-10 °C)		3.55	3.30	TO-8		A3179-01 C1103-04 C4159-06
P10090-21	Two-stage TE-cooled (Tchip=-30 °C)		3.45	3.25			A3179-01 C1103-04 C4159-06
P7163	Liquid nitrogen (Tchip=-196 °C)		3.10	3.00	Metal dewar		C4159-05

● Spectral response



KIRDB0356EE

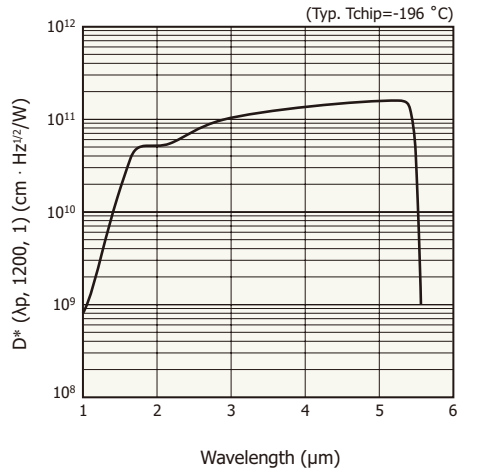
InSb photovoltaic detectors

These are the most sensitive and fastest response detectors among our products in 5 µm band.

(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Cutoff wavelength λc (µm)	Peak sensitivity wavelength λp (µm)	Package	Photo	Dedicated amplifier (sold separately)
P5968-060	Liquid nitrogen (Tchip=-196 °C)	ϕ0.6	5.5	5.3	Metal dewar		C4159-01
P5968-100		ϕ1					
P5968-200		ϕ2					C4159-04
P5968-300		ϕ3					Custom product

● Spectral response



KIRDB0063EG

Front-illuminated type

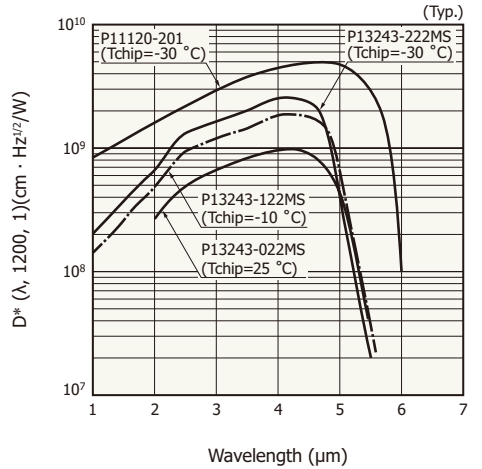
These are InAsSb photovoltaic detectors with cutoff wavelengths of 5 µm band or 10 µm band. The TE-cooled type capable of stable S/N measurement are available.

(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Cutoff wavelength λc (µm)	Peak sensitivity wavelength λp (µm)	Package	Photo	Options (sold separately)
P11120-201	Two-stage TE-cooled (Tchip=-30 °C)	ϕ1	5.9	4.9	TO-8		A3179-01 C1103-04 C4159-07
P13243-022MS	Non-cooled	2 × 2	5.3	4.1	TO-5		C4159-01
P13243-122MS	One-stage TE-cooled (Tchip=-10 °C)		5.2		TO-8		A3179 C1103-04 C4159-01
P13243-222MS	Two-stage TE-cooled (Tchip=-30 °C)		5.1				A3179-01 C1103-04 C4159-01
P13894-011MA	Non-cooled	1 × 1	11.0	5.6	TO-5		C4159-01
P13894-211MA	Two-stage TE-cooled (Tchip=-30 °C)		10.2		TO-8		A3179-01 C1103-04 C4159-01

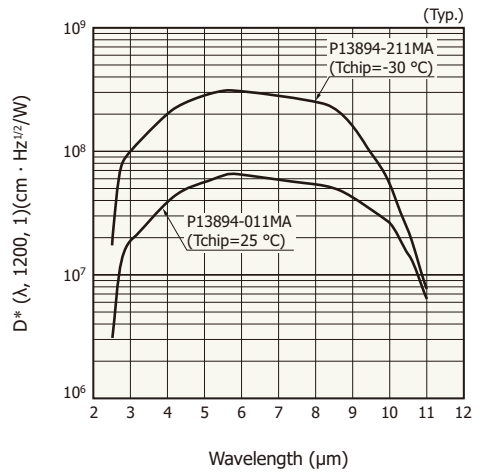
Spectral response

[P11120-201, P13243 series]



KIRDB0430EM

[P13894 series]

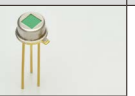
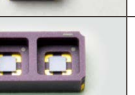


KIRDB0626ED

Back-illuminated type

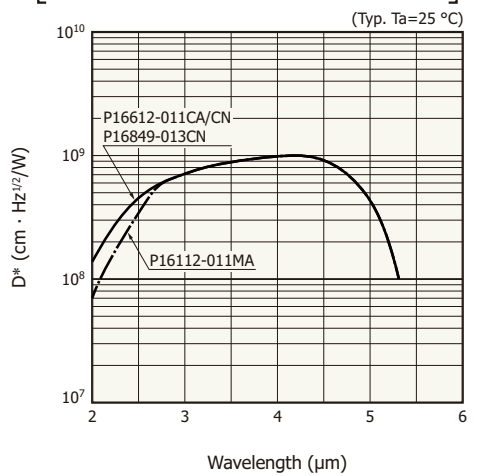
The back-illuminated type InAsSb photovoltaic detectors achieve cutoff wavelength of 5 µm, 8 µm, or 10 µm using Hamamatsu's unique crystal growth technology. Compared to the front-illuminated type, they achieve high sensitivity and improve the temperature characteristics of sensitivity.

(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Cutoff wavelength λc (µm)	Peak sensitivity wavelength λp (µm)	Package	Photo	Dedicated amplifier (sold separately)
P16112-011MA	Non-cooled	0.7 × 0.7	5.3	4.1	TO-46		C4159-01
P16612-011CA					Ceramic (Surface mount type)		
P16612-011CN							
P16113-011MN			8.3	6.5	TO-5		
P16613-011CN					Ceramic (Surface mount type)		
P16114-011MN			11	7.4	TO-5		
P16614-011CN					Ceramic (Surface mount type)		
P16849-013CN		0.7 × 0.7 (two-element)	5.3	4.1			—

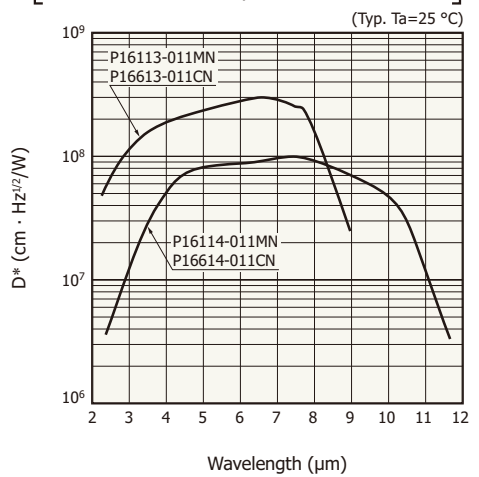
● Spectral response

[P16112-011MA, P16612 series, P16849-013CN]



KIRDB0715ED

[P16113-011MN, P16613-011CN, P16114-011MN, P16614-011CN]

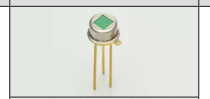
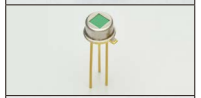
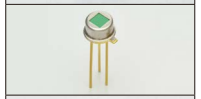
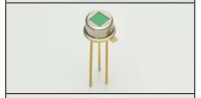


KIRDB0733EB

With band-pass filter

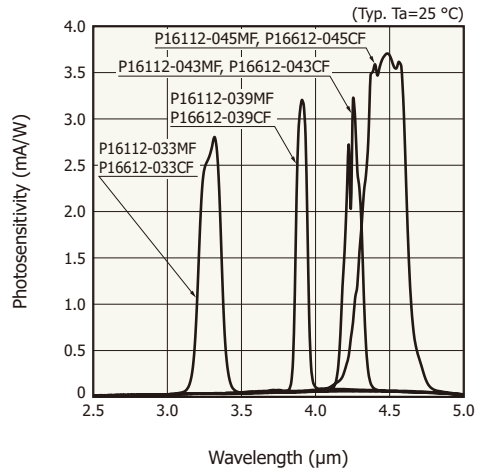
These are back-illuminated type InAsSb photovoltaic detectors that use a band-pass filter (center wavelength: 3.3 µm, 3.9 µm, 4.26 µm, 4.45 µm) for the window material. They are suitable for gas measurement (CH_4, CO_2) and flame detection.

(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Window material*	Package	Photo	Dedicated amplifier (sold separately)
P16112-033MF	Non-cooled	0.7 × 0.7	BPF (3.3 µm)	Ceramic (Surface mount type)		C4159-01
P16612-033CF						
P16112-039MF			BPF (3.9 µm)			
P16612-039CF						
P16112-043MF			BPF (4.26 µm)			
P16612-043CF						
P16112-045MF			BPF (4.45 µm)			
P16612-045CF						
P16849-011CF		0.7 × 0.7 (two-element)	BPF (3.3 µm)			—
			BPF (3.9 µm)			
P16849-012CF			BPF (3.9 µm)			
			BPF (4.26 µm)			

* BPF: band-pass filter

Spectral response

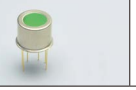


KIRDB0732EC

With lens

This is an InAsSb photovoltaic detector that achieves high sensitivity by mounting a lens on a chip with a back-illuminated structure. It is an electronically cooled type that provides a stable S/N.

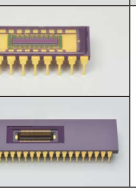
(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Cutoff wavelength λc (μm)	Peak sensitivity wavelength λp (μm)	Package	Photo	Options (sold separately)
P12691-201G	Two-stage TE-cooled (Tchip=-30 °C)	ϕ1	8.3	6.7	TO-8		A3179-01 C1103-04 C4159-07

Arrays

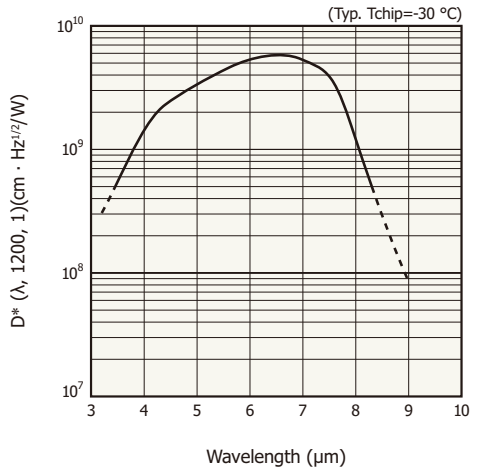
These are InAsSb arrays in DIP ceramic packages. Simultaneous measurement and wide range measurement are possible.

(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Cutoff wavelength λc (μm)	Peak sensitivity wavelength λp (μm)	Package	Photo	Dedicated amplifier (sold separately)
P15742-016DS	Non-cooled	0.45 × 0.7 (16 elements)	5.3	4.1	Ceramic		—
P15742-046DS		0.2 × 0.7 (46 elements)					

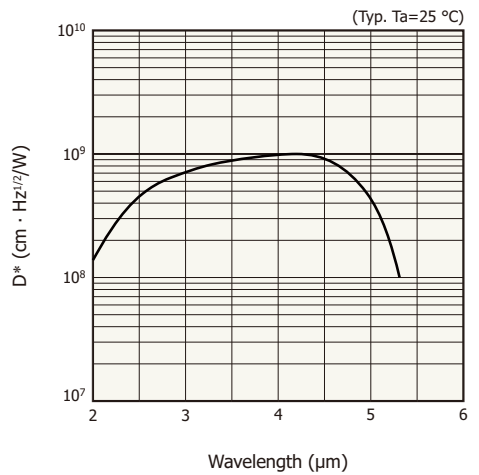
● Spectral response

[P12691-201G]



KIRDB0592EA

[P15742 series]



KIRDB0687EB

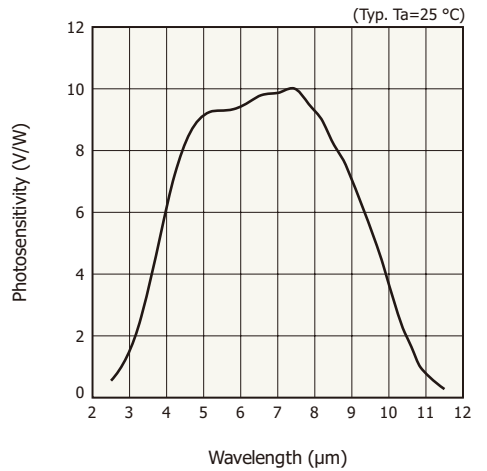
InAsSb photovoltaic detector with preamp

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.

(Typ.)

Type no.	Photosensitive area (mm)	Cutoff wavelength λc (µm)	Peak sensitivity wavelength λp (µm)	Frequency characteristics FcL	Frequency characteristics FcH (MHz)	Package	Photo
P16702-011MN	0.7 × 0.7	11	7.4	DC	100	TO-5	

● Spectral response



KIRDB0734EA

Type Ⅱ superlattice infrared detectors

Type Ⅱ superlattice infrared detector

The P15409-901 is a type Ⅱ superlattice infrared detector with sensitivity expanded to the 14 μm band using Hamamatsu's unique crystal growth technology and process technology. This product is an environmentally friendly infrared detector and does not use mercury or cadmium, which are substances restricted by the RoHS directive. It is a replacement for conventional products that contain these substances.

(Typ.)

Type no.	Cooling	Photosensitive area (mm)	Cutoff wavelength* λc (μm)	Peak sensitivity wavelength λp (μm)	Package	Photo	Dedicated amplifier (sold separately)
P15409-901	Liquid nitrogen (Tchip=-196 °C)	ϕ0.1	14.5	5.4	Metal dewar		C4159-01

* Wavelength at which signal/noise = 1

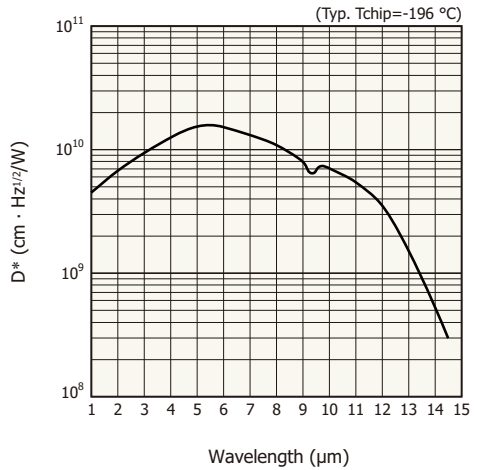
Infrared detector module with preamp

This is an amplifier-integrated module that can detect infrared light simply by connecting a DC power supply.

(Typ.)

Type no.	Detector	Photosensitive area (mm)	Cooling	Measurement condition: Chip temperature (°C)	Cutoff wavelength λc (μm)	Peak sensitivity wavelength λp (μm)	Photo
C15780-401	Type Ⅱ superlattice (P15409-901)	ϕ0.1	Liquid nitrogen	-196	14.5	5.4	

● Spectral response



KIRDB0673EB

Thermopile detectors (thermal detectors)

Single element

These are high-sensitivity Si thermopile detectors suitable for gas density measurement or the like. By attaching a band-pass filter to the thermopile detector, it is possible to measure the concentration of various gases. The T15570 is suitable for flame detection.

(Typ.)

Type no.	Number of elements	Photosensitive area (mm)	Window material	Spectral response range (μm)	Package	Photo
T11361-01*	1	1.2 × 1.2	Si with AR coating	3 to 5	TO-18	
T15770			With band-pass filter	4.45		

* Built-in thermistor

Dual element

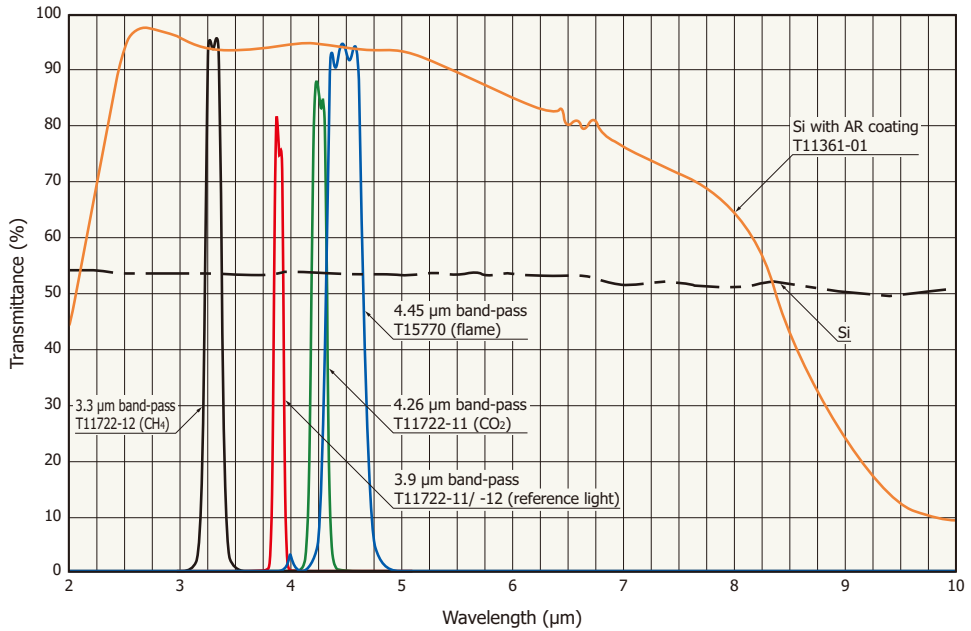
These dual type thermopile detectors were developed to measure concentration of carbon dioxide (CO_2) and methane (CH_4) with high accuracy. They consist of two high-sensitivity Si thermopile chips and two band-pass filters so that two wavelengths can be detected simultaneously.

(Typ.)

Type no.	Number of elements	Photosensitive area (mm)	Window material	Spectral response range (μm)	Package	Photo
T11722-11	2	1.2 × 1.2 (per element)	With band-pass filter	Reference light: 3.9 CO_2: 4.26	TO-5	
T11722-12				Reference light: 3.9 CH_4: 3.3		

● Spectral response (typical example)

Since thermopile detectors have no wavelength dependence, their spectral response is determined by the transmittance characteristics of window materials. Spectral transmittance characteristics of typical window materials are shown below. Please contact our sales office if you wish to replace a window material with the one shown below for thermopile detectors.



KIRDB0671EE

Two-color detectors

These sensors have two photosensors with different spectral response ranges arranged on the top and bottom of the same optical axis. They realize a wide spectral response range. The TE-cooled types improve the S/N and enable high accuracy measurement by cooling the element and keeping the temperature constant.

(Typ.)

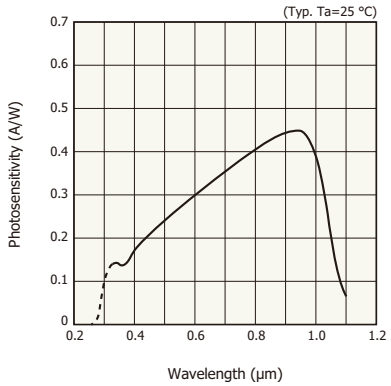
Type no.	Cooling	Detector	Photosensitive area (mm)	Spectral response range λ (μm)	Peak sensitivity wavelength λp (μm)	Photosensitivity S λ=λp (A/W)	Package	Photo	Options (sold separately)
K1713-003	Non-cooled	Si	2.4 × 2.4	0.32 to 5.3	0.94	0.45	TO-5		C9329-01 C4159-01
		InAsSb	0.7 × 0.7		4.0	0.0039			
K1713-05		Si	2.4 × 2.4	0.32 to 1.7	0.94	0.45			C9329-01 C4159-03
		InGaAs	ϕ0.5		1.55	0.55			
K1713-08		Si	2.4 × 2.4	0.32 to 2.6	0.94	0.45			
		InGaAs	ϕ1		2.3	0.60			
K1713-09		Si	2.4 × 2.4	0.32 to 1.7	0.94	0.45			
		InGaAs	ϕ1		1.55	0.55			
K11908-010K		InGaAs	2.4 × 2.4	0.9 to 2.55	1.55	0.95			C4159-03
		InGaAs	ϕ1		2.1	1.0			
K13085-010K		InGaAs	2.4 × 2.4	0.9 to 1.85	1.55	0.95			
		InGaAs	ϕ1		1.75	0.8			
K3413-05	One-stage TE-cooled (Tchip=-10 °C)	Si	2.4 × 2.4	0.32 to 1.67	0.94	0.45	TO-8		C9329-01 C4159-03 A3179-03 C1103-04
		InGaAs	ϕ0.5		1.55	0.55			
K3413-08		Si	2.4 × 2.4	0.32 to 2.57	0.94	0.45			
		InGaAs	ϕ1		2.3	0.60			
K3413-09		Si	2.4 × 2.4	0.32 to 1.67	0.94	0.45			
		InGaAs	ϕ1		1.55	0.55			
K12728-010K	Non-cooled	Si	2.4 × 2.4	0.32 to 1.7	0.96	0.45	Ceramic (surface mount type)		–
		InGaAs	ϕ1		1.55	0.55			
K12729-010K		InGaAs	2.4 × 2.4	0.9 to 2.55	1.55	0.95			
		InGaAs	ϕ1		2.1	1.0			

Two-color detectors

Spectral response

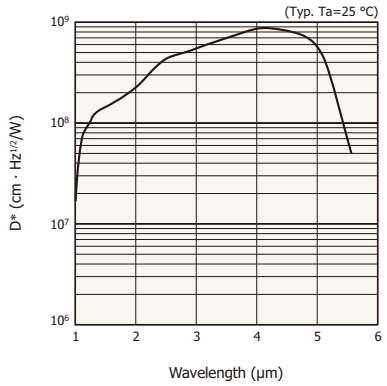
[K1713-003]

Si photodiode



KIRDB0199EB

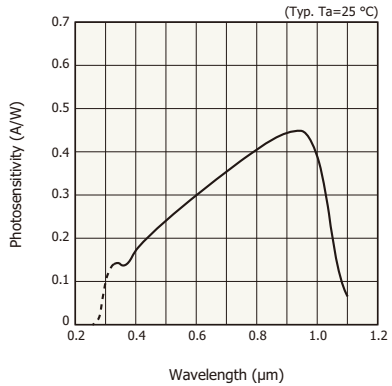
InAsSb photovoltaic detector



KIRDB0623EB

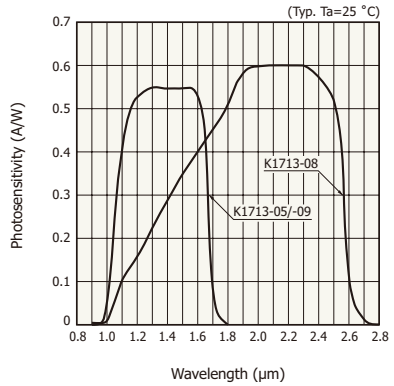
[K1713-05/-08/-09]

Si photodiode



KIRDB0199EB

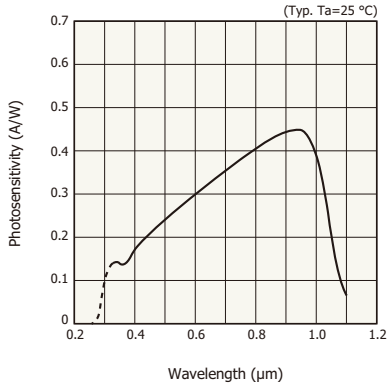
InGaAs PIN photodiode



KIRDB0211EB

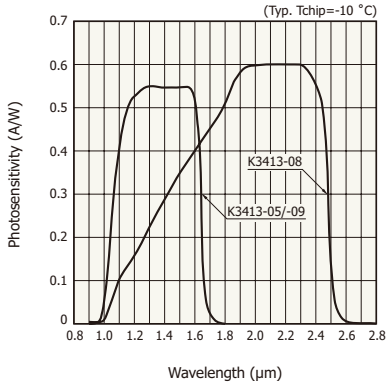
[K3413-05/-08/-09]

Si photodiode



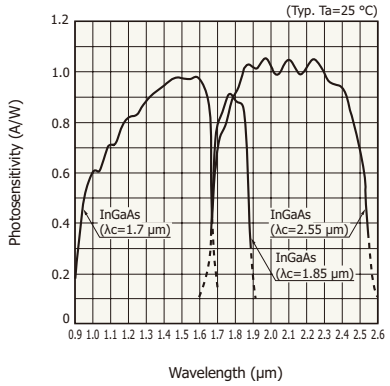
KIRDB0199EB

InGaAs PIN photodiode



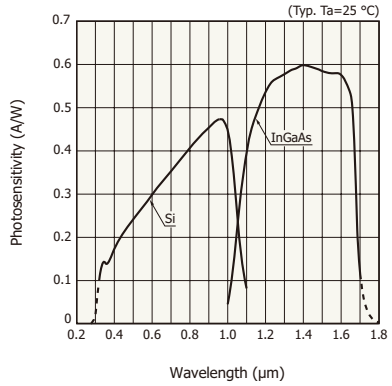
KIRDB0212EB

[K11908-010K, K13085-010K, K12729-010K]



KIRDB0661EA

[K12728-010K]



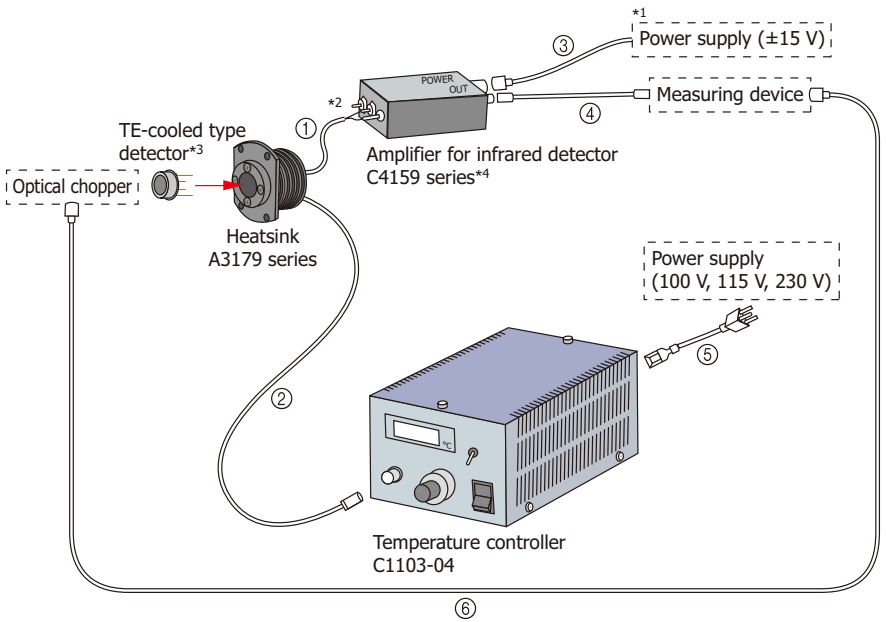
KIRDB0598EC

Accessories for infrared detectors

Hamamatsu provides the following accessories for infrared detectors.

Product name	Type no.	Overview
Temperature controller	C1103-04	The temperature of the TE-cooler inside the detector can be set. Compatible with one-stage and two-stage TE-cooled InAsSb/InAs photovoltaic detectors and InGaAs/Si photodiodes
Valve operator for metal dewar	A3515	The valve operator can be used to re-evacuate the metal dewar. Please be aware of that the detector performance is not guaranteed after re-evacuation at the customer side.
Heatsink (for TE-cooled detector TO-8/TO-3 package)	A3179 series	This heatsink is designed for TE-cooled detectors in 6-pin TO-8 packages and TO-3 packages.

Connection example



KACCC0321EE

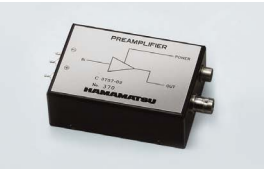
Cable

Cable no.	Cable	Approx. length	Note
①	Coaxial cable (for signals)	2 m	Supplied with heatsink A3179 series. Make the cable as short as possible. (approx. 10 cm is desirable)
②	4-conductor cable (with a connector) A4372-05	3 m	Supplied with temperature controller C1103 series. It is also sold separately.
③	4-conductor cable (with a connector) A4372-02	2 m	Supplied with C4159 series amplifiers for infrared detectors and infrared detector modules with preamp (room temperature type). It is also sold separately.
④	BNC connector cable E2573	1 m	Sold separately
⑤	Power cable (for temperature controller)	1.9 m	Supplied with temperature controller C1103 series
⑥	Cable	-	It needs to be prepared by user side.

*1: Attach the unterminated wire to a 3-4 pin connector or banana plug, then connect it to the power supply.
*2: Soldering is required.
*3: No dedicated socket is available. Soldering is required.
*4: Refer to amplifiers for infrared detectors (P.24) for details.

Amplifiers for infrared detectors

These are low noise amplifiers for InSb, InAs, InAsSb, and InGaAs detectors.



Product name	Type no.	Conversion impedance 3 range switchable (V/A)	Frequency characteristics Amplifier only, -3 dB	Equivalent input noise current f=1 kHz (pA/Hz$^{1/2}$)	External power supply (V)	Applicable detectors
Amplifier for photovoltaic detector	C4159-01	10^8, 10^7, 10^6	DC to 100 kHz	0.15 (10^8, 10^7 range) 0.65 (10^6 range)	±15	Dewar type InSb (P5968-060/-100), non-cooled type InAsSb (P13243-022MS, P13894-011MA, P16112-011MA/-033MF/-039MF/-043MF/-045MF, P16612-011CA/-011CN/-033CF/-039CF/-043CF/-045CF, P16113-011MN, P16613-011CN, P16114-011MN, P16614-011CN), TE-cooled type InAsSb (P13243-122MS/-222MS, P13894-211MA), dewar Type Ⅱ (P15409-901)
	C4159-04	2×10^7, 2×10^6, 2×10^5	DC to 45 kHz	0.55	±15	Dewar type InSb (P5968-200)
	C4159-05	10^8, 10^7, 10^6	DC to 15 kHz	0.15 (10^8, 10^7 range) 0.65 (10^6 range)	±15	Dewar type InAs (P7163)
	C4159-06	10^6, 10^5, 10^4	DC to 100 kHz	6	±15	TE-cooled type InAs (P10090-11/-21)
	C4159-07	10^6, 10^5, 10^4	DC to 100 kHz	10	±15	Non-cooled type InAs (P10090-01), TE-cooled type InAsSb (P11120-201, P12691-201G)
Amplifier for InGaAs PIN photodiode	C4159-03	10^7, 10^6, 10^5	DC to 15 kHz	2.5	±15	Non-cooled/TE-cooled type InGaAs (G12180/G12181/G12182/G12183 series)

Accessories

· Instruction manual
· Power cable A4372-02
(with 4-pin connector for amplifier connection, the othe side: unterminated wire, 2 m)

Required power supply specifications

· C4159 series: ±15 V ± 0.5
· Current capacity: 1.5 times or more of amplifier's maximum current consumption
· Ripple noise: 5 mVp-p or less
· Analog power supply only
Recommended DC power supply (example): PW18-3AD [TEXIO], E3630A [Keysight Technologies]

Absolute maximum ratings (Ta= 25 °C)

Parameter	Value	Unit
Supply voltage	±18.0 max.	V
Operating temperature*	0 to +40	°C
Storage temperature*	-20 to +70	°C

* 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.

Infrared detector modules with preamp

These modules integrate a preamp with an infrared detector of various types. They can detect infrared light simply by connecting a DC power supply.

(Typ.)

Type	Type no.	Detector (type no.)	Photosensitive area (mm)	Cooling	Measurement condition Chip temperature (°C)	Cutoff wavelength (μm)	Peak sensitivity wavelength (μm)	Photo
TE-cooled type	C17212-011 NEW	InAsSb (P16112-011MA)	0.7 × 0.7	Non-cooled	+25	5.3	4.1	
	C17213-011 NEW	InAsSb (P16113-011MN)				8.3	6.5	
	C17214-011 NEW	InAsSb (P16114-011MN)				11	7.4	
	C12483-250	InGaAs (G12180-250A)	ϕ5	TE-cooled	-15	1.66	1.55	
	C12485-210	InGaAs (G12182-210K)	ϕ1			2.05	1.95	
	C12486-210	InGaAs (G12183-210K)				2.56	2.3	
	C12492-210	InAs (P10090-21)	ϕ1		-28	3.45	3.25	
	C12494-222S	InAsSb (P13243-222MS)	2 × 2		-28	4.1	5.1	
	C12494-210S	InAsSb (P11120-201)	ϕ1			5.9	4.9	
	C12494-210M	InAsSb (P12691-201G)				8.3	6.7	
	C12494-211L	InAsSb (P13894-211MA)	1 × 1			10.2	5.6	

Infrared detector modules with preamp

These modules integrate a preamp with an infrared detector of various types. They can detect infrared light simply by connecting a DC power supply. High sensitivity is achieved by cooling the chip to -196 °C using a metal dewar.

(Typ.)

Type	Type no.	Detector (type no.)	Photosensitive area (mm)	Cooling	Measurement condition Chip temperature (°C)	Cutoff wavelength (μm)	Peak sensitivity wavelength (μm)	Photo
Metal dewar type	G7754-01	InGaAs (G12183-010)*1	ϕ1	Liquid nitrogen	-196	2.4	2.0	
	G7754-03	InGaAs (G12183-030)*1	ϕ3					
	P7751-01*2	InSb (P5968-060)	ϕ0.6			5.5	5.3	
	P7751-02*2	InSb (P5968-200)	ϕ2					

*1: Chip
*2: FOV=60°

Photodiode modules

These high accuracy photodetectors have a high/low 2-range switching function.

Type no.	Spectral response range (μm)	Peak sensitivity wavelength (μm)	Detector	Photosensitive area (mm)	Cooling	Photo
C10439-10	0.5 to 1.7	1.55	InGaAs	ϕ1	Non-cooled	
C10439-11	0.5 to 1.7	1.55	InGaAs	ϕ3		
C10439-15	0.32 to 2.6	0.94	Si	2.4 × 2.4		
		2.3	InGaAs	ϕ1		

Signal processing unit for photodiode module C10475-01

The C10475-01 is a signal processing unit specifically designed to convert the output of a photodiode module (C10439 series) into digital signals. Digital output (16-bit) can be obtained through serial connection (RS-232C) to a PC.

Technical notes

Compound semiconductor photosensors
Thermopile detectors

Precautions

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

Inquiries from online

www.hamamatsu.com

- Information described in this material is current as of August 2024.
- Product specifications are subject to change without prior notice due to improvements or other reasons. Before using these products, always contact us for the delivery specification sheet to check the latest specifications.

HAMAMATSU PHOTONICS K.K.

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HAMAMATSU PHOTONICS K.K., Solid State Division
1126-1 Ichino-cho, Chuo-ku, Hamamatsu City, 435-8558 Japan, Telephone: (81)53-434-3311, Fax: (81)53-434-5184

U.S.A.: HAMAMATSU CORPORATION: 360 Foothill Road, Bridgewater, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218
Germany: HAMAMATSU PHOTONICS DEUTSCHLAND GMBH: Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de
France: HAMAMATSU PHOTONICS FRANCE S.A.R.L.: 19 Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr
United Kingdom: HAMAMATSU PHOTONICS UK LIMITED: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk
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
Italy: HAMAMATSU PHOTONICS ITALIA S.R.L.: Strada della Moia, 1 int. 6 20044 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: info@hamamatsu.it
China: HAMAMATSU PHOTONICS (CHINA) CO., LTD.: 1201, Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, P.R. China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn
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