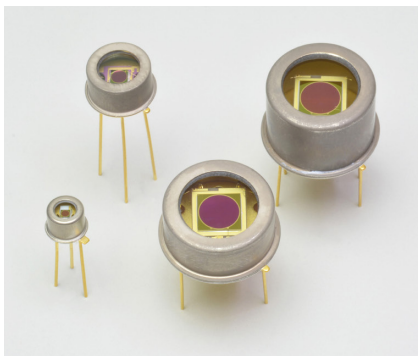


InGaAs PIN photodiodes

G12180 series



Photosensitive area from $\phi 0.3$ mm to $\phi 5$ mm

InGaAs PIN photodiodes have large shunt resistance and feature very low noise. Hamamatsu provides various types of InGaAs PIN photodiodes with photosensitive area from $\phi 0.3$ mm to $\phi 5$ mm.

Features

- Low noise, low dark current
- Low terminal capacitance
- Large photosensitive area
- Various photosensitive area sizes available

Applications

- Laser monitors
- Optical power meters
- Laser diode life test
- NIR (near infrared) photometry
- Optical communications

Options

- Amplifier for InGaAs PIN photodiode **C4159-03**
- Heatsink for one-stage TE-cooled type **A3179**
- Heatsink for two-stage TE-cooled type **A3179-01**
- Temperature controller for TE-cooler type **C1103-04**

Structure

Type no.	Dimensional outline/ Window material*1	Package	Cooling	Photosensitive area (mm)
G12180-003A	(1)/A	TO-18	Non-cooled	$\phi 0.3$
G12180-005A				$\phi 0.5$
G12180-010A				$\phi 1$
G12180-020A	(2)/A	TO-5		$\phi 2$
G12180-030A				$\phi 3$
G12180-050A				$\phi 5$
G12180-110A	(4)/A	TO-8	One-stage TE-cooled	$\phi 1$
G12180-120A				$\phi 2$
G12180-130A				$\phi 3$
G12180-150A				$\phi 5$
G12180-210A	(5)/A	TO-8	Two-stage TE-cooled	$\phi 1$
G12180-220A				$\phi 2$
G12180-230A				$\phi 3$
G12180-250A				$\phi 5$

*1: A=Borosilicate glass with anti-reflective coating (optimized for 1.55 μm peak)

The G12180 series may be damaged by electrostatic discharge, etc. Be careful when using the G12180 series.

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

Type no.	Thermistor power dissipation Pd_th (mW)	TE-cooler allowable current ITE max (A)	TE-cooler allowable voltage VTE max (V)	Reverse voltage VR max (V)	Operating temperature Topr (°C)	Storage temperature Tstg (°C)			
G12180-003A	-	-	-	20	-40 to +100	-55 to +125			
G12180-005A				10					
G12180-010A				5					
G12180-020A				5					
G12180-030A				2					
G12180-050A	0.2	1.5	1	5	-40 to +70*3	-55 to +85			
G12180-110A				2					
G12180-120A				1			1.2	5	
G12180-130A								2	
G12180-150A		1	1.2	5					
G12180-210A				2					
G12180-220A				5					
G12180-230A				2					
G12180-250A							2		

*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 on the product may cause deterioration in characteristics and reliability.

*3: 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 (Typ. unless otherwise noted)

Type no.	Measurement condition	Thermistor resistance (+25 °C) Rth (kΩ)	Thermistor B constant (-20/+25 °C) B (K)	Spectral response range λ (μm)	Peak sensitivity wavelength λp (μm)	Photosensitivity S				Dark current ID VR=1 V		Temp. coefficient of dark current ΔTID VR=1 V (times/°C)
	Element temperature (°C)					1.3 μm		λ=λp		Typ. (nA)	Max. (nA)	
						Min. (A/W)	Typ. (A/W)	Min. (A/W)	Typ. (A/W)			
G12180-003A	25	-	-	0.9 to 1.7	1.55	0.8	0.9	0.9	1.1	0.1*4	0.5*4	1.09
G12180-005A										0.15*4	0.75*4	
G12180-010A										0.8*4	4*4	
G12180-020A										1.5	7.5	
G12180-030A										2.5	12.5	
G12180-050A	5	25										
G12180-110A	-10	9.0	3300	0.9 to 1.67	1.55	0.8	0.9	0.9	1.1	0.02	0.1	1.09
G12180-120A										0.1	0.5	
G12180-130A										0.15	0.8	
G12180-150A										0.33	1.67	
G12180-210A	-20	9.0	3300	0.9 to 1.65	1.55	0.8	0.9	0.9	1.1	0.01	0.06	1.09
G12180-220A										0.04	0.2	
G12180-230A										0.07	0.35	
G12180-250A										0.15	0.75	

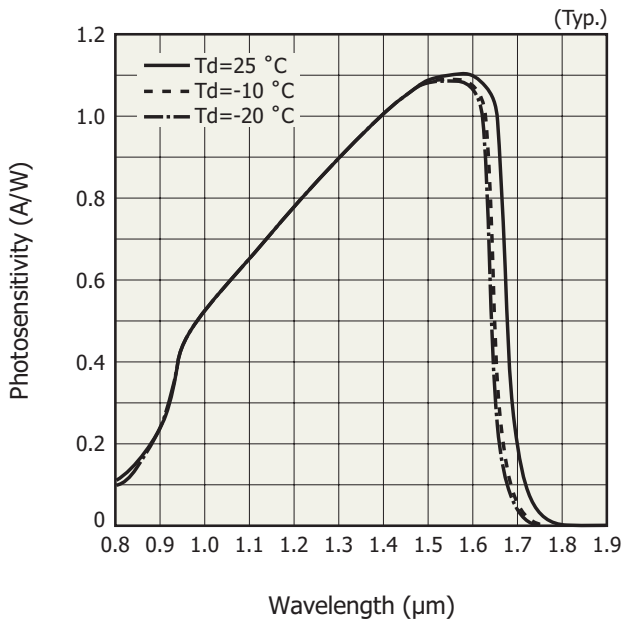
*4: VR=5 V

Type no.	Measurement condition	Cutoff frequency fc		Terminal capacitance Ct		Shunt resistance Rsh		Detectivity D*		Noise equivalent power NEP	
	Element temperature (°C)	VR=1 V, RL=50 Ω		VR=1 V, f=1 MHz		VR=10 mV		λ=λp		λ=λp	
		Min. (MHz)	Typ. (MHz)	Typ. (pF)	Max. (pF)	Min. (MΩ)	Typ. (MΩ)	Min. (cm·Hz ^{1/2} /W)	Typ. (cm·Hz ^{1/2} /W)	Typ. (W/Hz ^{1/2})	Max. (W/Hz ^{1/2})
G12180-003A	25	450*5	600*5	5*6	7.5*6	200	1000	2.4 × 10 ¹²	6.3 × 10 ¹²	4.2 × 10 ⁻¹⁵	1.2 × 10 ⁻¹⁴
G12180-005A		160*5	200*5	15*6	20*6	80	400			7.0 × 10 ⁻¹⁵	1.9 × 10 ⁻¹⁴
G12180-010A		25*5	60*5	55*6	120*6	25	125			1.4 × 10 ⁻¹⁴	3.8 × 10 ⁻¹⁴
G12180-020A		4	13	250	800	6.5	30			2.8 × 10 ⁻¹⁴	7.5 × 10 ⁻¹⁴
G12180-030A		2.5	7	450	1500	4	20			4.4 × 10 ⁻¹⁴	1.1 × 10 ⁻¹³
G12180-050A		0.5	3	1000	7000	1.3	6.5			7.0 × 10 ⁻¹⁴	1.9 × 10 ⁻¹³
G12180-110A	-10	20	40	75	140	750	3750	1.6 × 10 ¹³	4.4 × 10 ¹³	2.0 × 10 ⁻¹⁵	5.4 × 10 ⁻¹⁵
G12180-120A		4	13	250	800	200	900			4.0 × 10 ⁻¹⁵	1.1 × 10 ⁻¹⁴
G12180-130A		2.5	7	450	1500	120	600			4.9 × 10 ⁻¹⁵	1.4 × 10 ⁻¹⁴
G12180-150A		0.5	3	1000	7000	40	200			8.6 × 10 ⁻¹⁵	2.3 × 10 ⁻¹⁴
G12180-210A	-20	20	40	75	140	1750	8750	2.6 × 10 ¹³	6.7 × 10 ¹³	1.3 × 10 ⁻¹⁵	3.5 × 10 ⁻¹⁵
G12180-220A		4	13	250	800	500	2000			2.7 × 10 ⁻¹⁵	6.5 × 10 ⁻¹⁵
G12180-230A		2.5	7	450	1500	280	1400			3.2 × 10 ⁻¹⁵	8.7 × 10 ⁻¹⁵
G12180-250A		0.5	3	1000	7000	90	500			5.3 × 10 ⁻¹⁵	1.5 × 10 ⁻¹⁴

*5: VR=5 V, RL=50 Ω, -3 dB

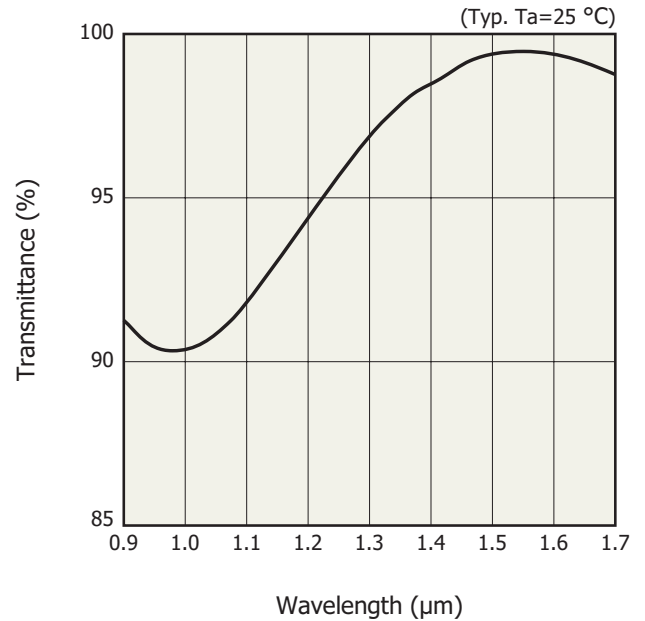
*6: VR=5 V, f=1 MHz

Spectral response



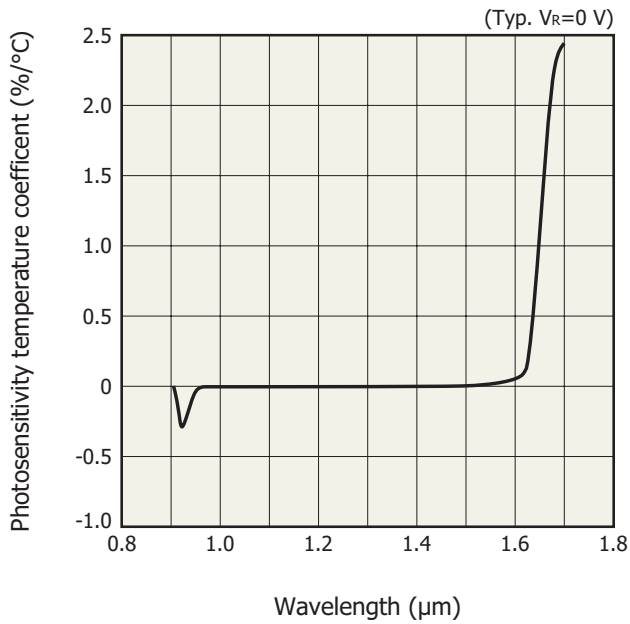
KIRD0672EA

Spectral transmittance characteristics of window material



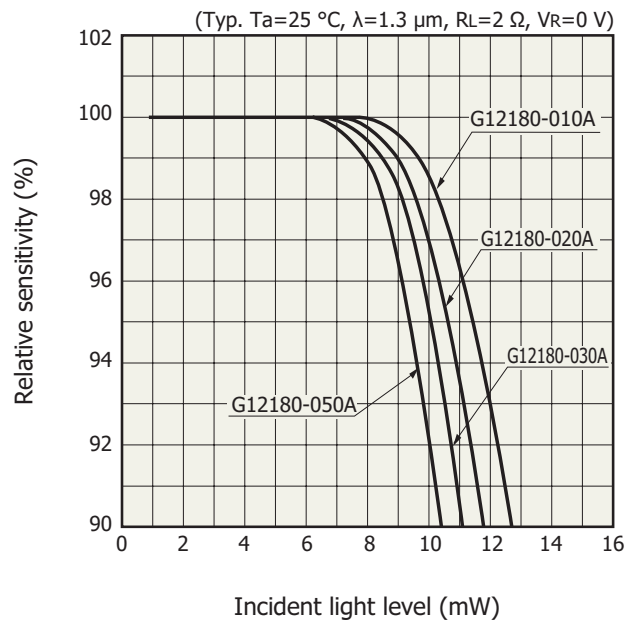
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Photosensitivity temperature characteristics



KIRDB0636EA

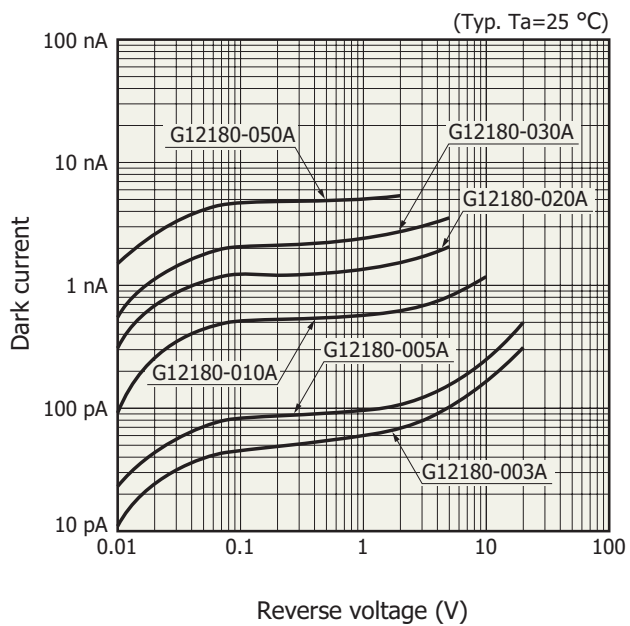
Linearity



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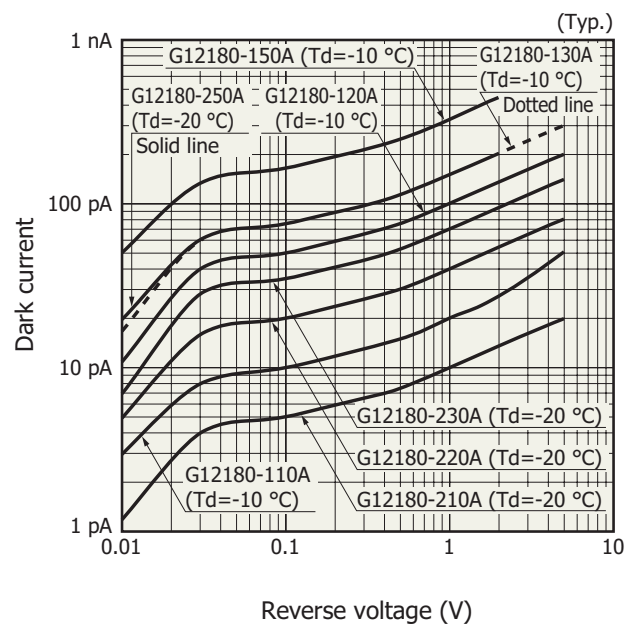
Dark current vs. reverse voltage

Non-cooled type



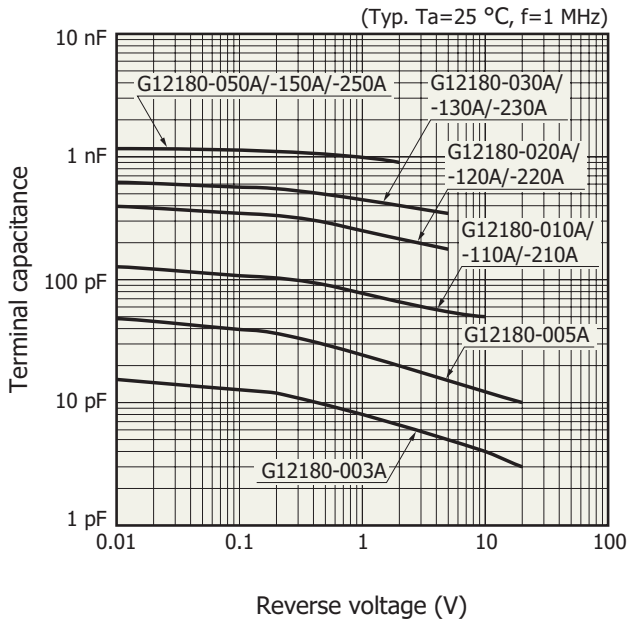
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TE-cooled type



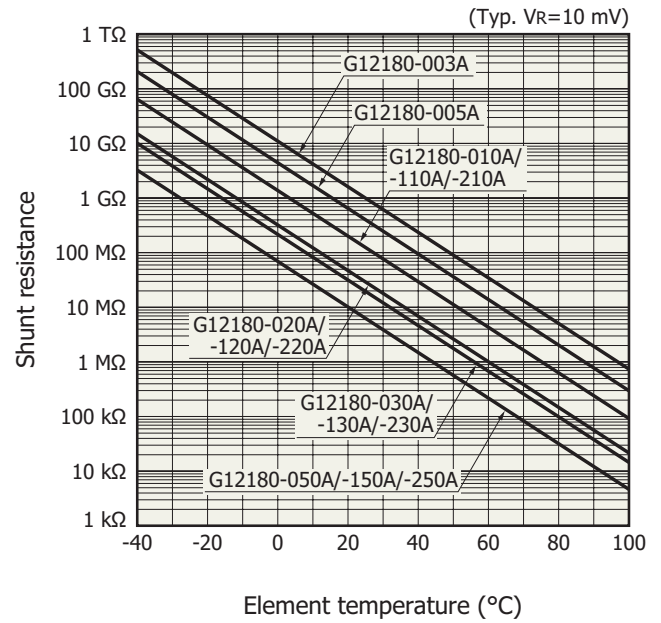
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Terminal capacitance vs. reverse voltage



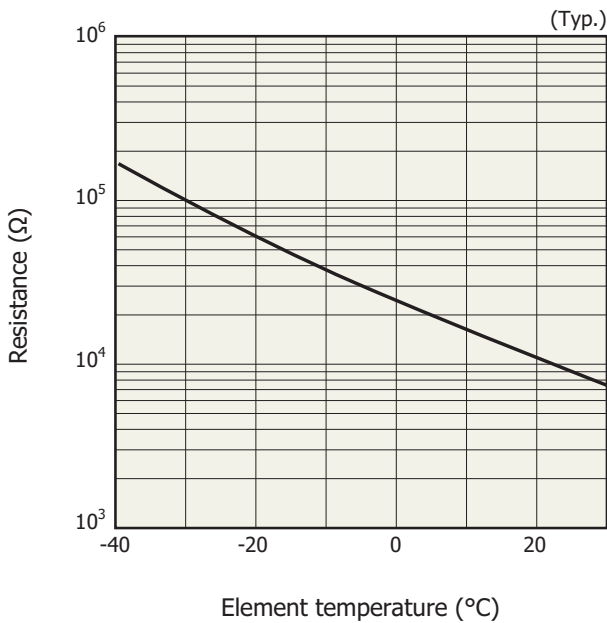
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Shunt resistance vs. element temperature



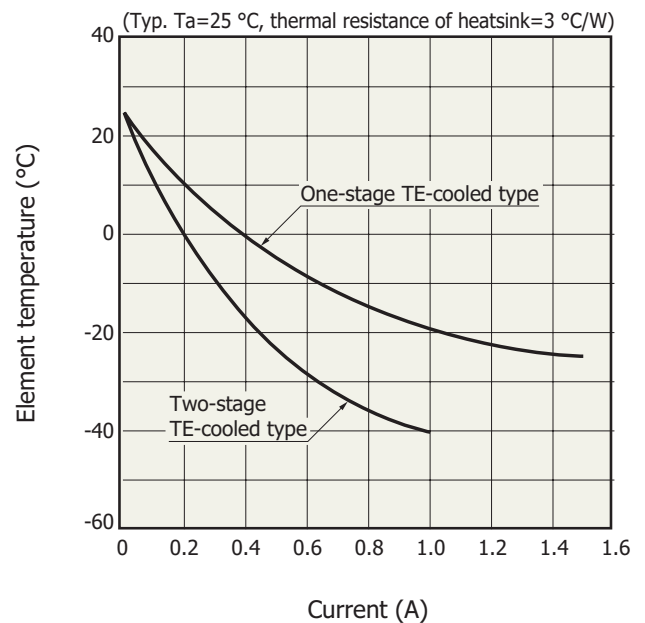
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Thermistor temperature characteristics



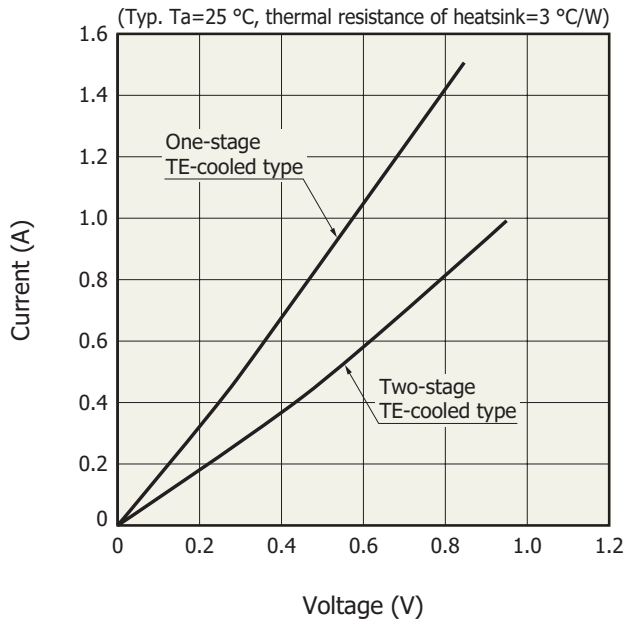
KIRDB0116EA

Cooling characteristics of TE-cooler



KIRDB0231EA

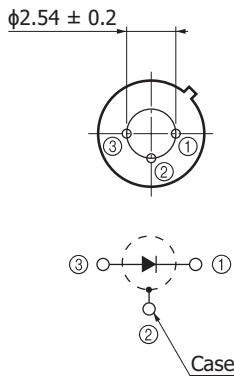
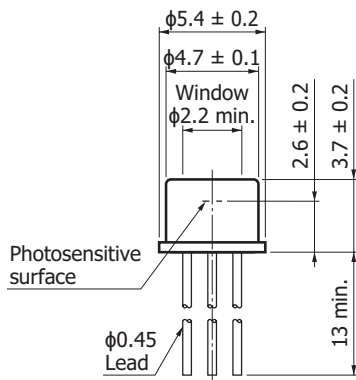
Current vs. voltage (TE-cooler)



KIRDB0115EB

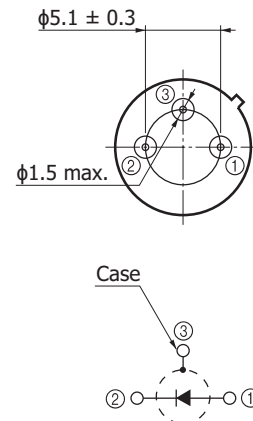
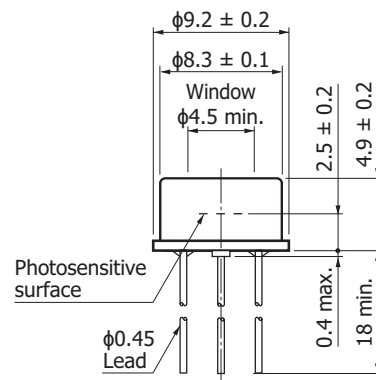
Dimensional outlines (unit: mm)

(1) G12180-003A/-005A/-010A



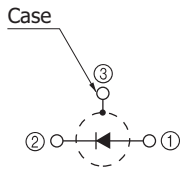
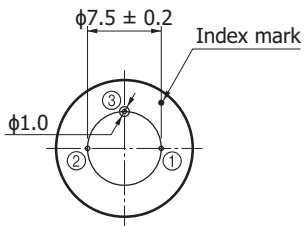
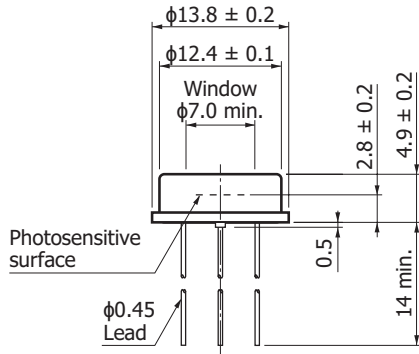
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(2) G12180-020A/-030A

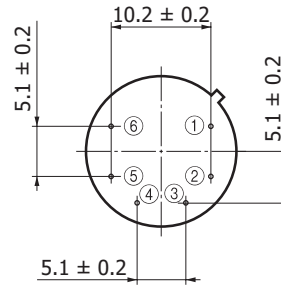
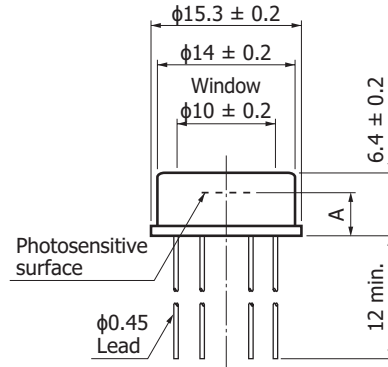


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(3) G12180-050A



(4) G12180-110A/-120A/-130A/-150A



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

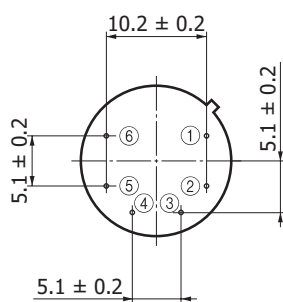
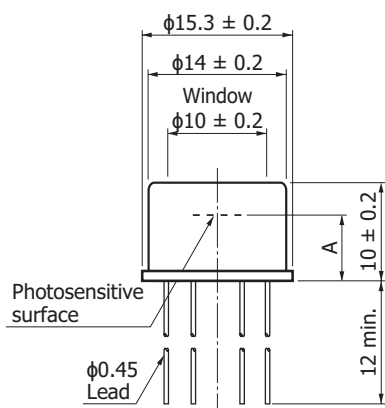
Distance from photosensitive area center to cap center
 $-0.3 \leq X \leq +0.3$
 $-0.3 \leq Y \leq +0.3$

	G12180-110A	G12180-120A /-130A/-150A
A	4.3 ± 0.2	4.4 ± 0.2

KIRDA0052EC

KIRDA0246EA

(5) G12180-210A/-220A/-230A/-250A



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

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

	G12180-210A	G12180-220A /-230A/-250A
A	6.6 ± 0.2	6.7 ± 0.2

KIRD40247EA

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 conditions in advance.

Related information

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

■ Precautions

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

Information described in this material is current as of January 2021.

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

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