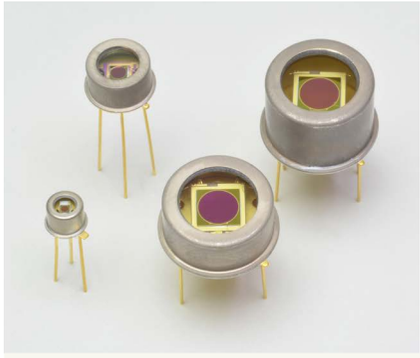
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InGaAs PIN photodiodes

G12180 series

Photosensitive area from ϕ0.3 mm to ϕ5 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 ϕ0.3 mm to ϕ5 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	ϕ0.3
G12180-005A				ϕ0.5
G12180-010A				ϕ1
G12180-020A	(2)/A	TO-5		ϕ2
G12180-030A				ϕ3
G12180-050A	(3)/A	TO-8		ϕ5
G12180-110A	(4)/A		One-stage TE-cooled	ϕ1
G12180-120A				ϕ2
G12180-130A				ϕ3
G12180-150A				ϕ5
G12180-210A	(5)/A		Two-stage TE-cooled	ϕ1
G12180-220A				ϕ2
G12180-230A				ϕ3
G12180-250A				ϕ5

*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.

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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*2 Topr (°C)	Storage temperature*2 Tstg (°C)
G12180-003A	-	-	-	20	-40 to +100	-55 to +125
G12180-005A						
G12180-010A				10		
G12180-020A				5		
G12180-030A						
G12180-050A				2		
G12180-110A	0.2	1.5	1	5	-40 to +70*3	-55 to +85
G12180-120A						
G12180-130A						
G12180-150A				2		
G12180-210A		1	1.2	5		
G12180-220A						
G12180-230A						
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 Element temperature (°C)	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 1.3 μm Min. (A/W)	Photosensitivity S 1.3 μm Typ. (A/W)	Photosensitivity S λ=λp Min. (A/W)	Photosensitivity S λ=λp Typ. (A/W)	Dark current ID VR=1 V Typ. (nA)	Dark current ID VR=1 V Max. (nA)	Temp. coefficient of dark current ΔTID VR=1 V (times/°C)
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						0.02	0.1	
G12180-120A										0.1	0.5	
G12180-130A										0.15	0.8	
G12180-150A										0.33	1.67	
G12180-210A	-20			0.9 to 1.65						0.01	0.06	
G12180-220A										0.04	0.2	
G12180-230A										0.07	0.35	
G12180-250A										0.15	0.75	

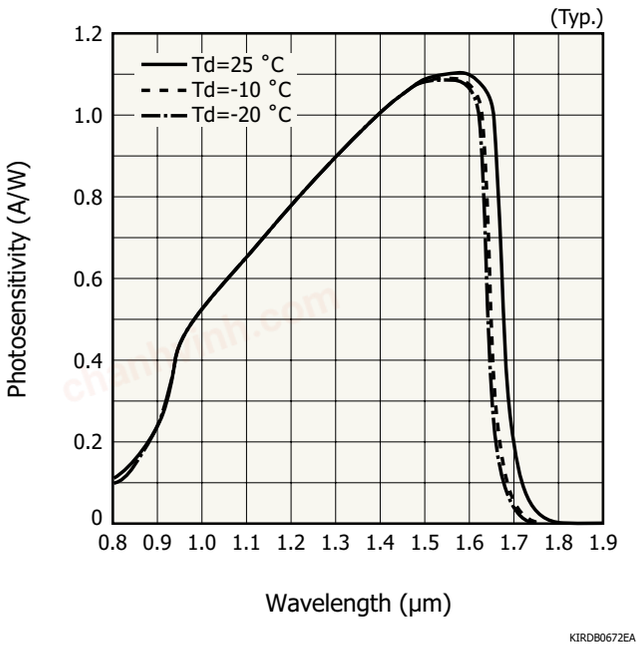
*4: VR=5 V

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Type no.	Measurement condition: Element temperature (°C)	Cutoff frequency fc VR=1 V RL=50 Ω: Min. (MHz)	Cutoff frequency fc VR=1 V RL=50 Ω: Typ. (MHz)	Terminal capacitance Ct VR=1 V f=1 MHz: Typ. (pF)	Terminal capacitance Ct VR=1 V f=1 MHz: Max. (pF)	Shunt resistance Rsh VR=10 mV: Min. (MΩ)	Shunt resistance Rsh VR=10 mV: Typ. (MΩ)	Detectivity D* λ=λp: Min. (cm·Hz$^{1/2}$/W)	Detectivity D* λ=λp: 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$^{1/2}$)
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}

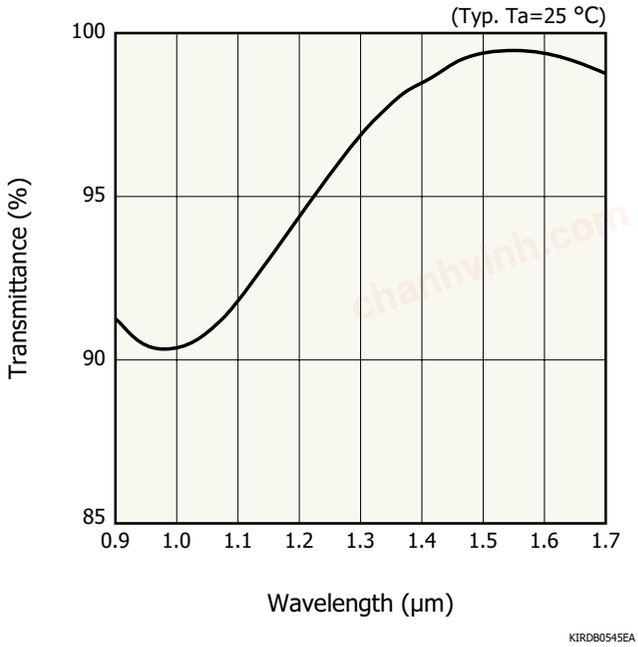
*5: VR=5 V, RL=50 Ω, -3 dB
*6: VR=5 V, f=1 MHz

Spectral response



KIRDB0672EA

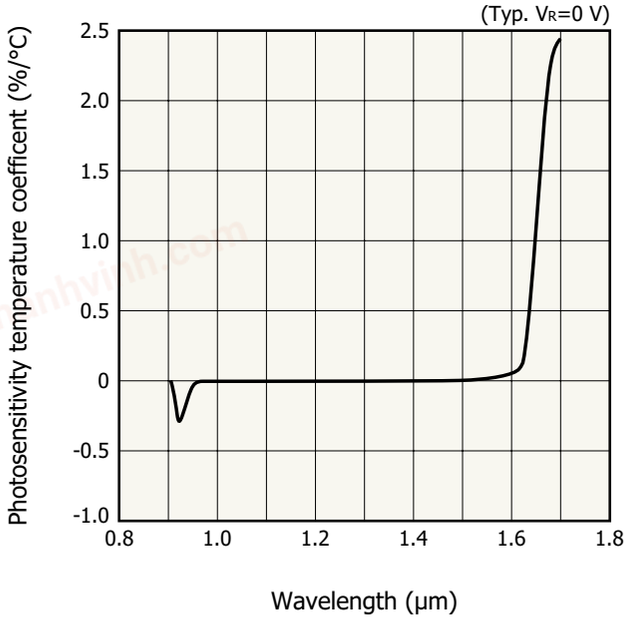
Spectral transmittance characteristics of window material



KIRDB0545EA

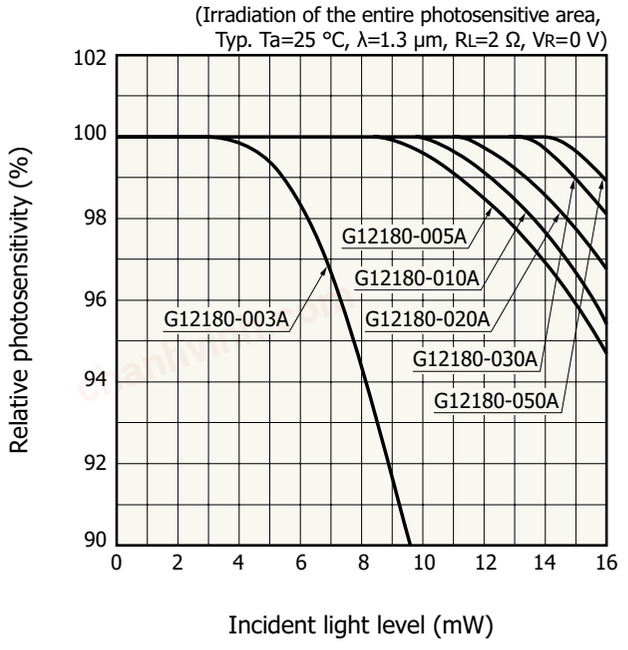
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Photosensitivity temperature characteristics



KIRDB0636EA

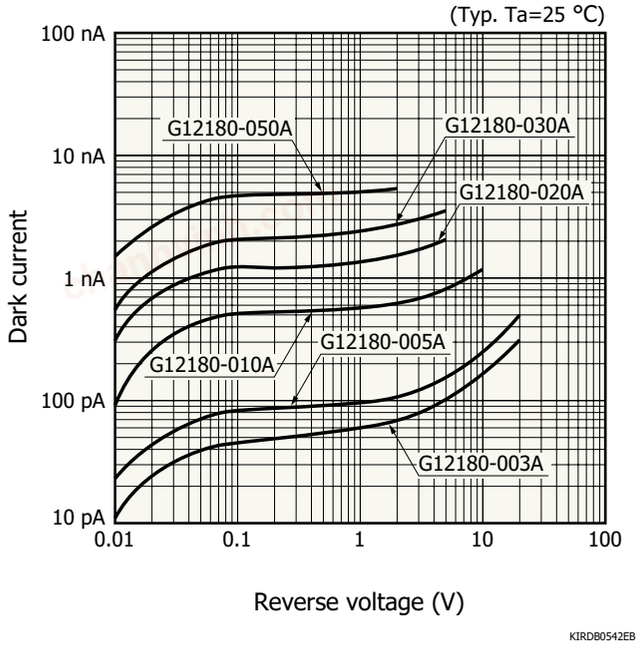
Linearity



KIRDB0541EB

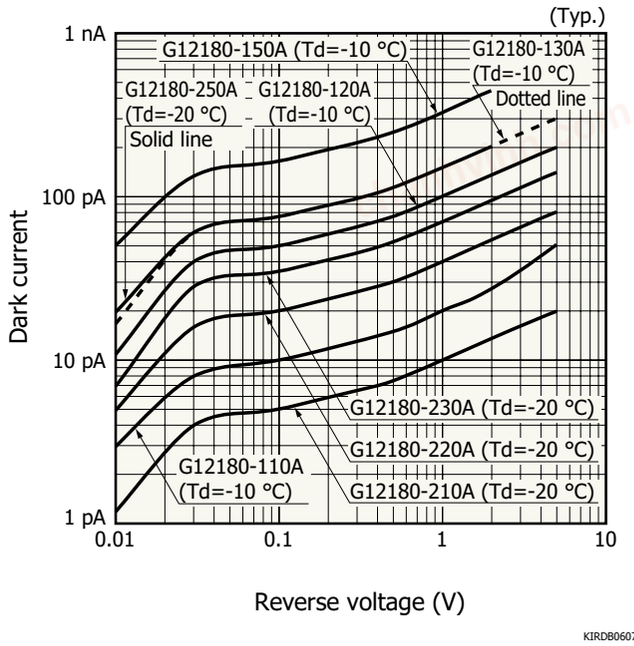
Dark current vs. reverse voltage

Non-cooled type



KIRDB0542EB

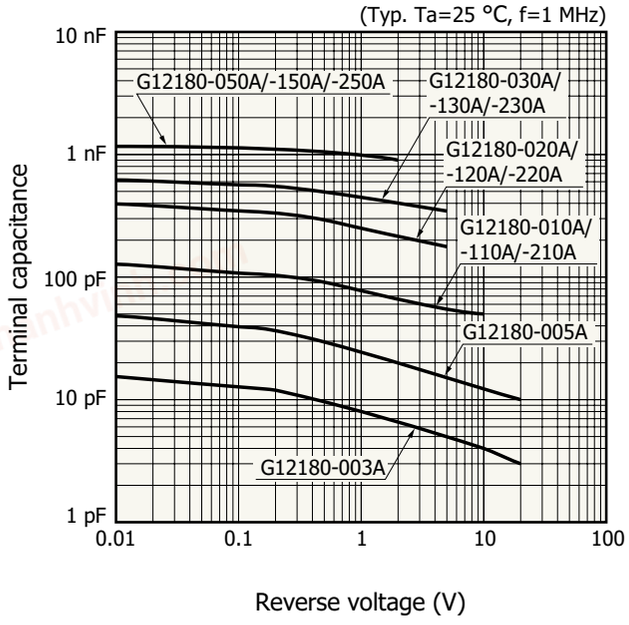
TE-cooled type



KIRDB0607EA

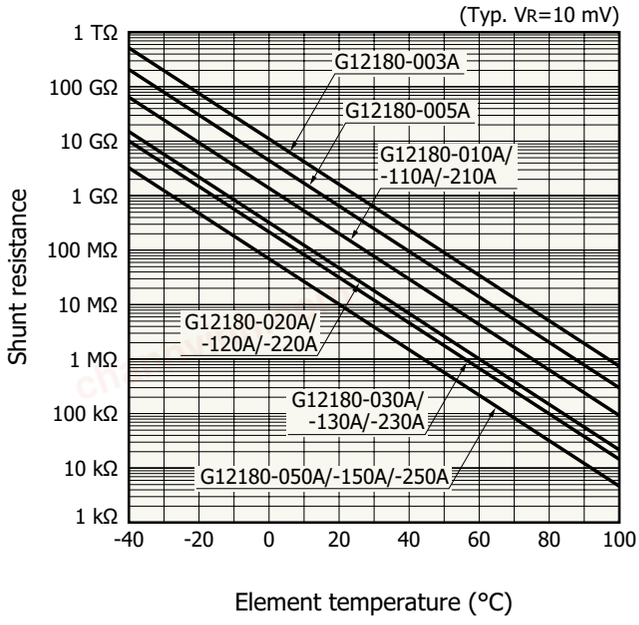
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Terminal capacitance vs. reverse voltage



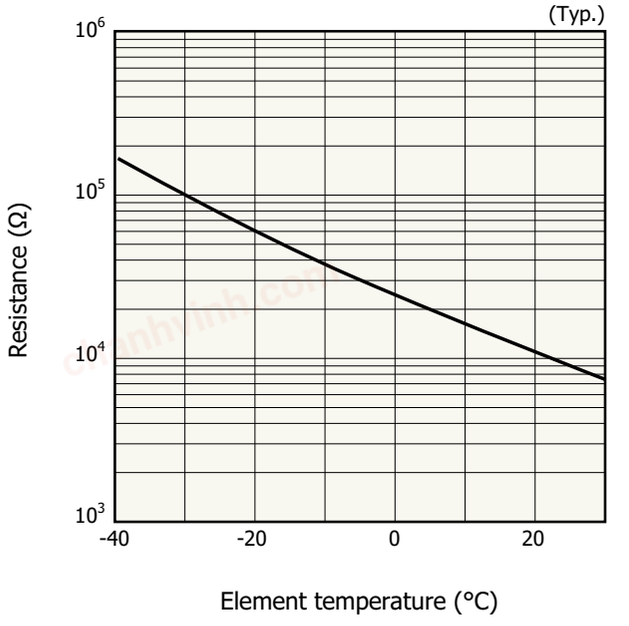
KIRDB0543EB

Shunt resistance vs. element temperature



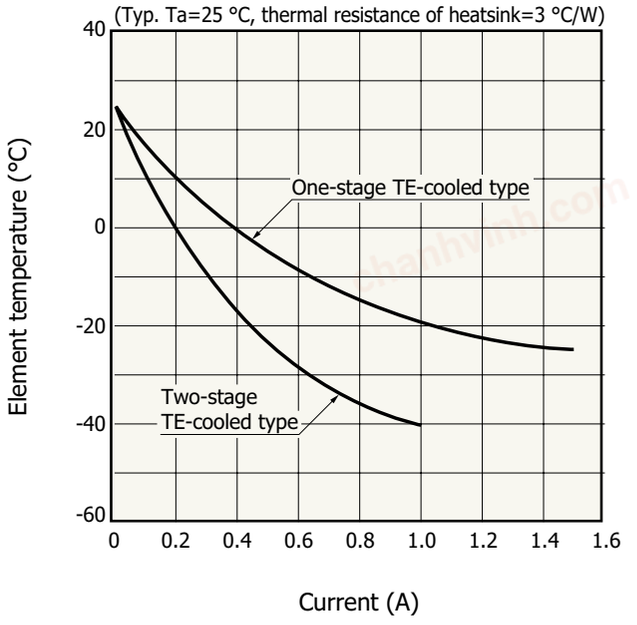
KIRDB0544EB

Thermistor temperature characteristics



KIRDB0116EA

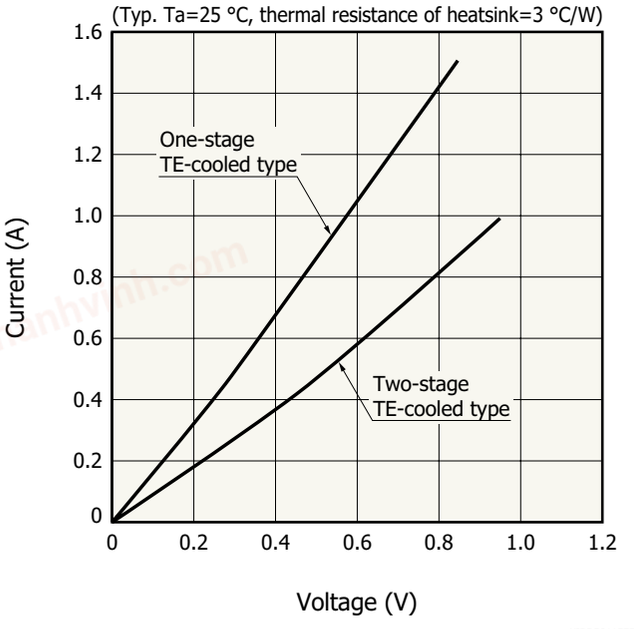
Cooling characteristics of TE-cooler



KIRDB0231EA

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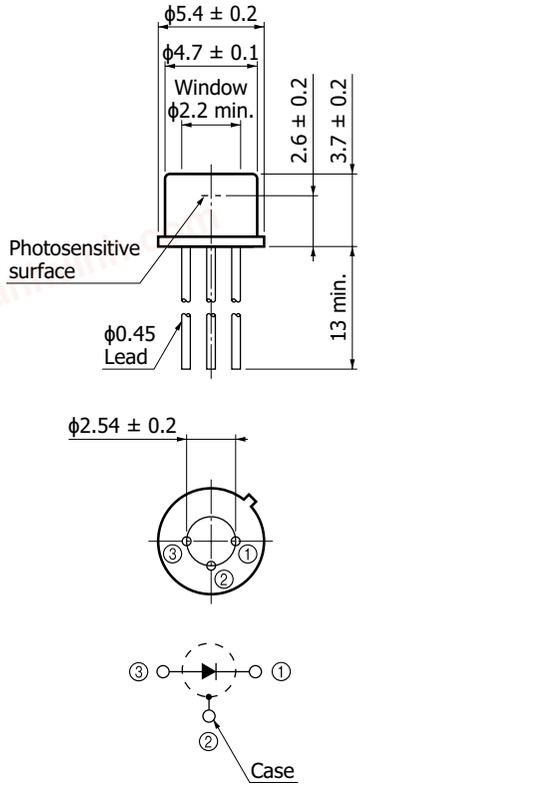
Current vs. voltage (TE-cooler)



KIRDB0115EB

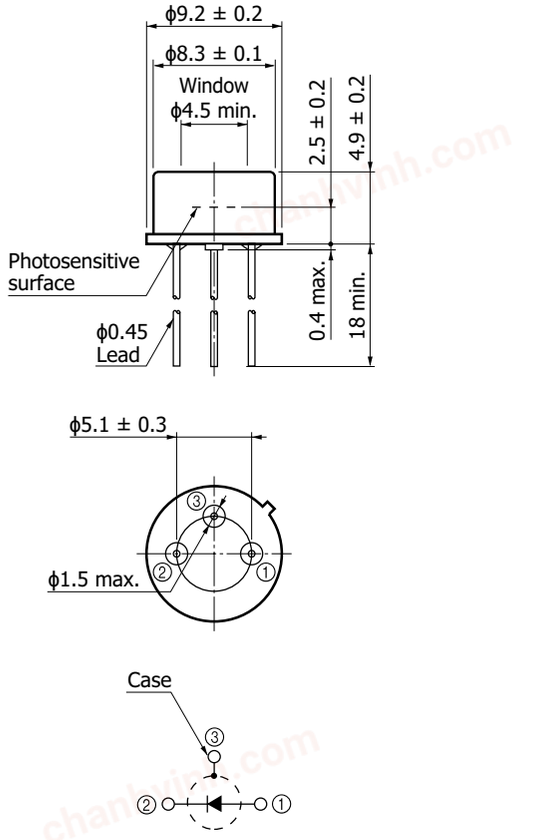
Dimensional outlines (unit: mm)

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



KIRDA0150ED

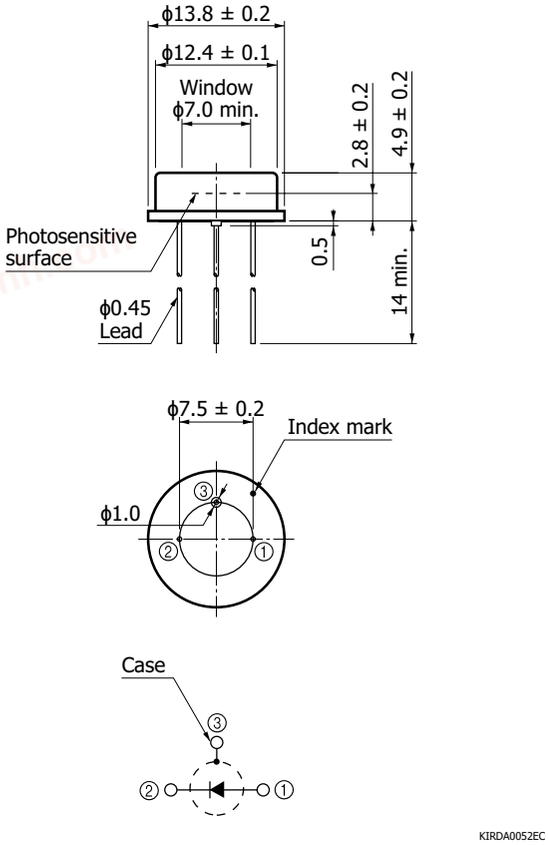
(2) G12180-020A/-030A



KIRDA0155EB

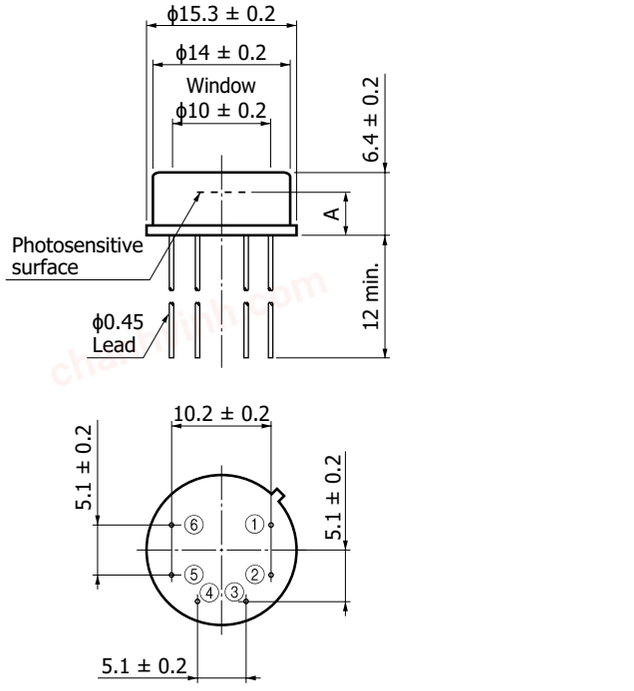
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(3) G12180-050A



KIRDA0052EC

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



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

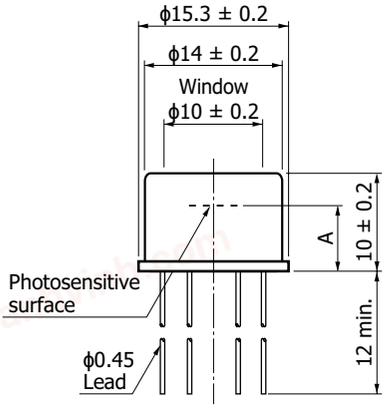
Distance from photosensitive area center to cap center
-0.3≤X≤+0.3
-0.3≤Y≤+0.3

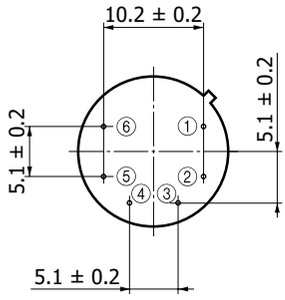
	G12180-110A	G12180-120A /-130A/-150A
A	4.3 ± 0.2	4.4 ± 0.2

KIRDA0246EA

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(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≤X≤+0.3
-0.3≤Y≤+0.3

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

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Recommended soldering conditions

Solder temperature: 260 °C (10 s or less, once)
Solder the leads at a point at leat 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)

■ Technical information
· Infrared detectors

Information described in this material is current as of February 2024.
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.
The product warranty is valid for one year after delivery and is limited to product repair or replacement for defects discovered and reported to us within that one year period. However, even if within the warranty period we accept absolutely no liability for any loss caused by natural disasters or improper product use.
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