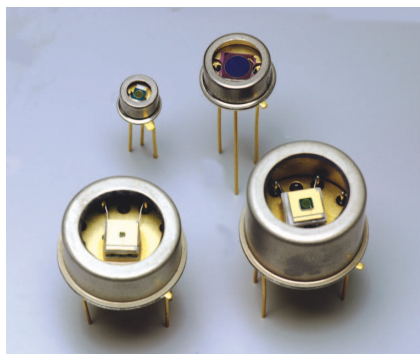


InGaAs PIN photodiodes



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**

Specifications/Absolute maximum ratings

Type no.	Dimensional outline/ Window material*1	Package	Cooling	Photosensitive area (mm)	Absolute maximum ratings								
					Thermistor power dissipation (mW)	TE-cooler allowable current (A)	TE-cooler allowable voltage (V)	Reverse voltage (V)	Operating temperature*2 (°C)	Storage temperature*2 (°C)	Soldering conditions		
G12180-003A	(1)/K	TO-18	Non-cooled	$\phi 0.3$	-	-	-	20	-40 to +100	-55 to +125	260 °C or less, within 10 s		
G12180-005A				$\phi 0.5$									
G12180-010A	(2)/K	TO-5		$\phi 1$				10					
G12180-020A				$\phi 2$				5					
G12180-030A				$\phi 3$				2					
G12180-050A	(3)/K	TO-8	$\phi 5$	0.2	1.5	1	5	-40 to +70	-55 to +85				
G12180-110A	(4)/K		One-stage TE-cooled				$\phi 1$			2			
G12180-120A							$\phi 2$			5			
G12180-130A							$\phi 3$			2			
G12180-150A							$\phi 5$			5			
G12180-210A	(5)/K		Two-stage TE-cooled				$\phi 1$			1		1.2	5
G12180-220A							$\phi 2$						2
G12180-230A							$\phi 3$						5
G12180-250A		$\phi 5$		2									

*1: K: borosilicate glass with anti-reflective coating (optimized for 1.55 μ m peak)

*2: No dew condensation

When there is a temperature difference between a product and the surrounding area in high humidity environment, 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.

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

Electrical and optical characteristics (Typ. unless otherwise noted)

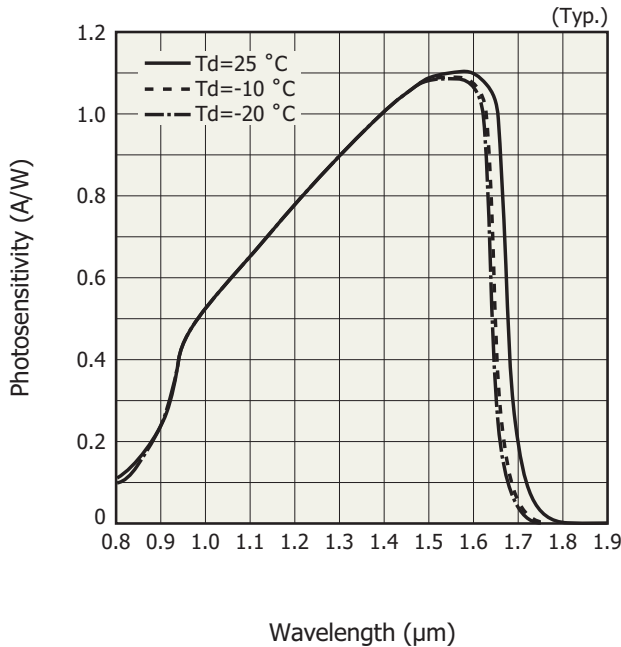
Type no.	Measurement condition		Spectral response range λ (μm)	Peak sensitivity wavelength λ_p (μm)	Photosensitivity S				Dark current I_D $V_R=1\text{ V}$		Temperature coefficient of dark current ΔI_D $V_R=1\text{ V}$	Cutoff frequency f_c $V_R=1\text{ V}$ $R_L=50\ \Omega$		Terminal capacitance C_t $V_R=1\text{ V}$ $f=1\text{ MHz}$		Shunt resistance R_{sh} $V_R=10\text{ mV}$		Detectivity D^* $\lambda=\lambda_p$		Noise equivalent power NEP $\lambda=\lambda_p$	
	Element temperature ($^\circ\text{C}$)				1.3 μm		$\lambda=\lambda_p$		Typ. (nA)	Max. (nA)		Min. (MHz)	Typ. (MHz)	Typ. (pF)	Max. (pF)	Min. (M Ω)	Typ. (M Ω)	Min. ($\text{cm}^2\cdot\text{Hz}^{1/2}/\text{W}$)	Typ. ($\text{cm}^2\cdot\text{Hz}^{1/2}/\text{W}$)	Typ. ($\text{W}/\text{Hz}^{1/2}$)	Max. ($\text{W}/\text{Hz}^{1/2}$)
					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	1.09	0.1* ³	0.5* ³	450* ⁴	600* ⁴	5* ⁵	7.5* ⁵	200	1000	2.4×10^{12}	6.3×10^{12}	4.2 $\times 10^{-15}$	1.2 $\times 10^{-14}$	
G12180-005A									0.15* ³	0.75* ³	160* ⁴	200* ⁴	15* ⁵	20* ⁵	80	400			7.0 $\times 10^{-15}$	1.9 $\times 10^{-14}$	
G12180-010A									0.8* ³	4* ³	25* ⁴	60* ⁴	55* ⁵	120* ⁵	25	125			1.4 $\times 10^{-14}$	3.8 $\times 10^{-14}$	
G12180-020A									1.5	7.5	4	13	250	800	6.5	30			2.8 $\times 10^{-14}$	7.5 $\times 10^{-14}$	
G12180-030A									2.5	12.5	2.5	7	450	1500	4	20			4.4 $\times 10^{-14}$	1.1 $\times 10^{-13}$	
G12180-050A									5	25	0.5	3	1000	7000	1.3	6.5			7.0 $\times 10^{-14}$	1.9 $\times 10^{-13}$	
G12180-110A	-10	0.9 to 1.67	1.55	0.8	0.9	0.9	1.1	1.09	0.02	0.1	20	40	75	140	750	3750	1.6×10^{13}	4.4×10^{13}	2.0 $\times 10^{-15}$	5.4 $\times 10^{-15}$	
G12180-120A									0.1	0.5	4	13	250	800	200	900			4.0 $\times 10^{-15}$	1.1 $\times 10^{-14}$	
G12180-130A									0.15	0.8	2.5	7	450	1500	120	600			4.9 $\times 10^{-15}$	1.4 $\times 10^{-14}$	
G12180-150A									0.33	1.67	0.5	3	1000	7000	40	200			8.6 $\times 10^{-15}$	2.3 $\times 10^{-14}$	
G12180-210A	-20	0.9 to 1.65	1.55	0.8	0.9	0.9	1.1	1.09	0.01	0.06	20	40	75	140	1750	8750	2.6×10^{13}	6.7×10^{13}	1.3 $\times 10^{-15}$	3.5 $\times 10^{-15}$	
G12180-220A									0.04	0.2	4	13	250	800	500	2000			2.7 $\times 10^{-15}$	6.5 $\times 10^{-15}$	
G12180-230A									0.07	0.35	2.5	7	450	1500	280	1400			3.2 $\times 10^{-15}$	8.7 $\times 10^{-15}$	
G12180-250A									0.15	0.75	0.5	3	1000	7000	90	500			5.3 $\times 10^{-15}$	1.5 $\times 10^{-14}$	

*3: $V_R=5\text{ V}$

*4: $V_R=5\text{ V}$, $R_L=50\ \Omega$, -3 dB

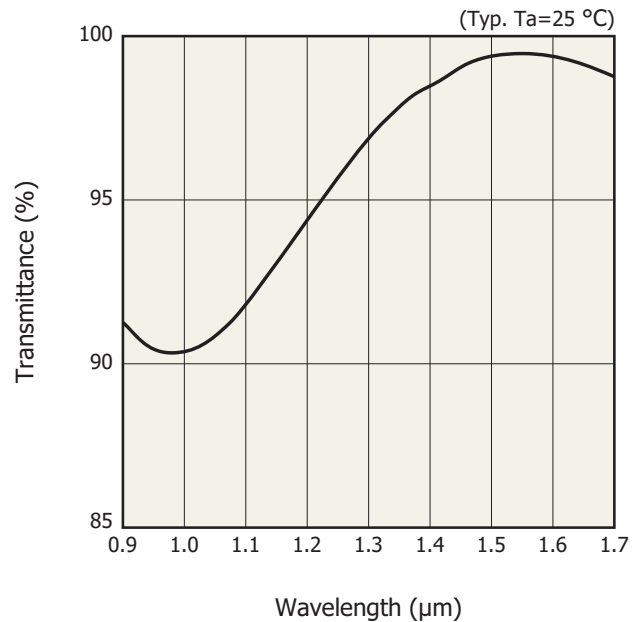
*5: $V_R=5\text{ V}$, $f=1\text{ MHz}$

Spectral response



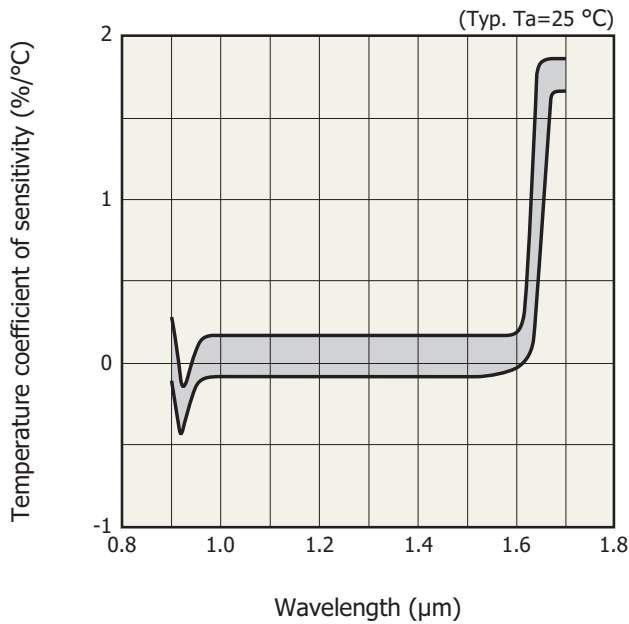
KIRD0374EB

Spectral transmittance characteristics of window material



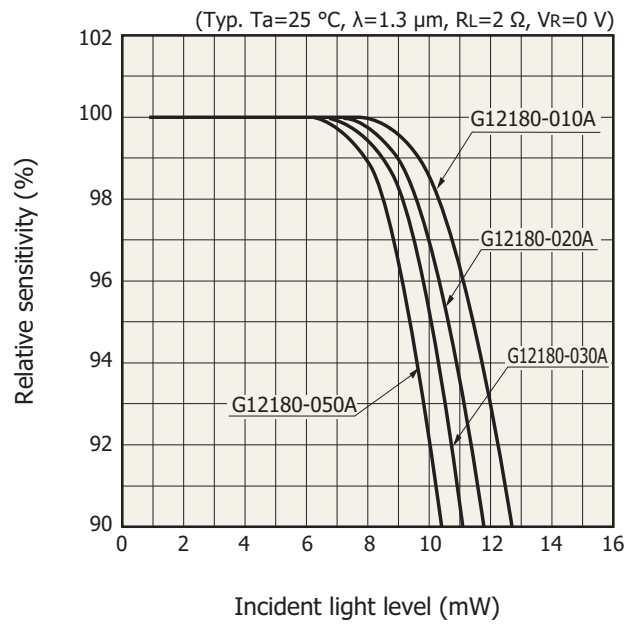
KIRD0545EA

Photosensitivity temperature characteristics



KIRDB0042EB

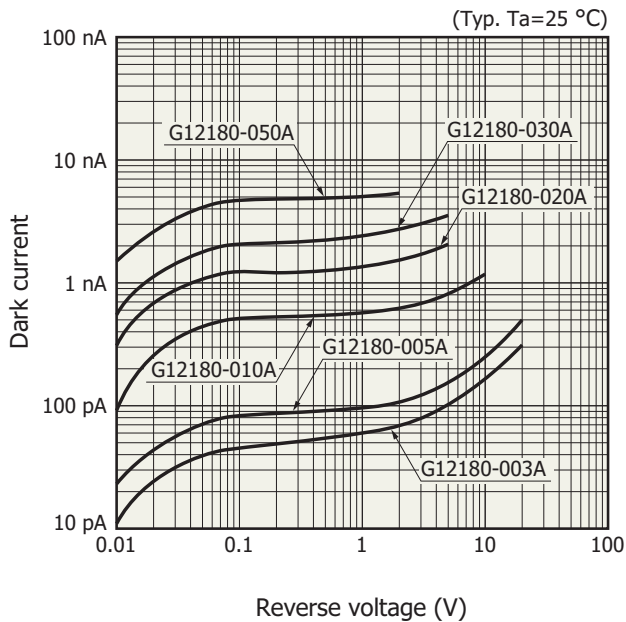
Linearity



KIRDB0541EA

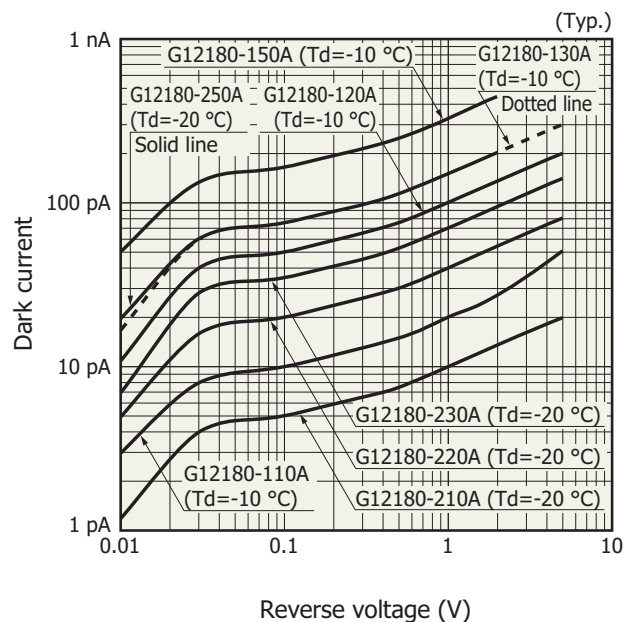
Dark current vs. reverse voltage

Non-cooled type



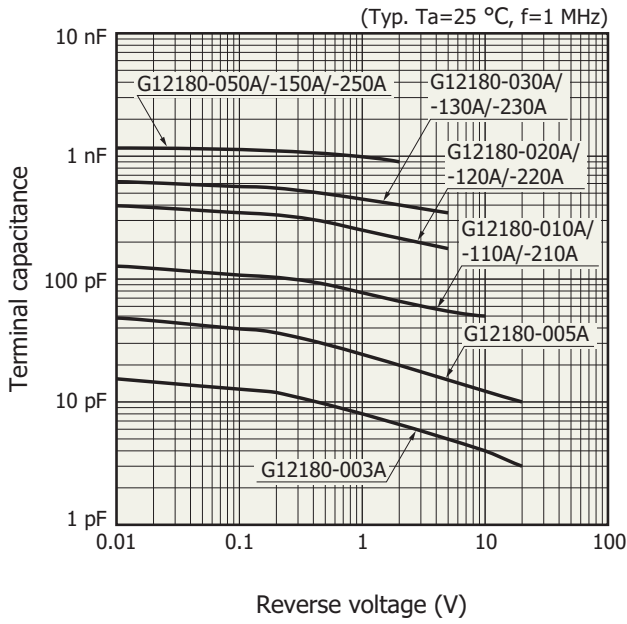
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TE-cooled type



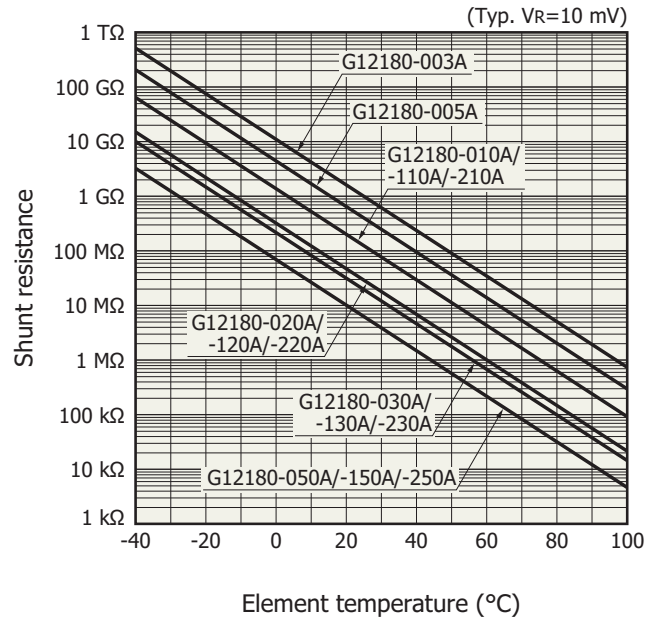
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Terminal capacitance vs. reverse voltage



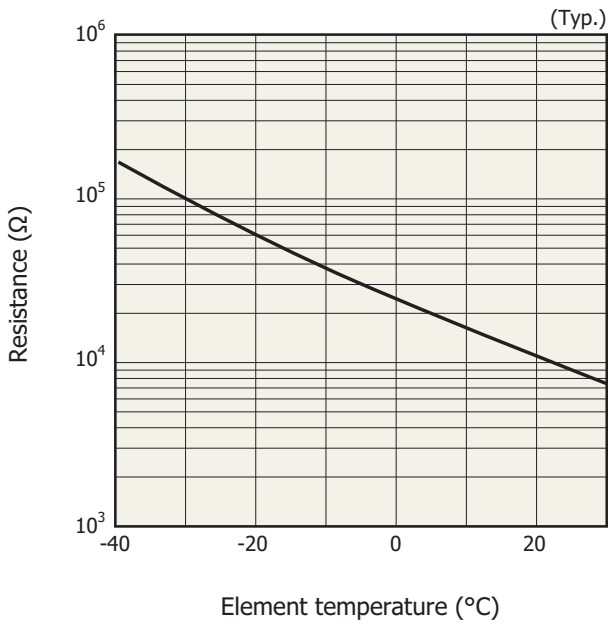
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Shunt resistance vs. element temperature



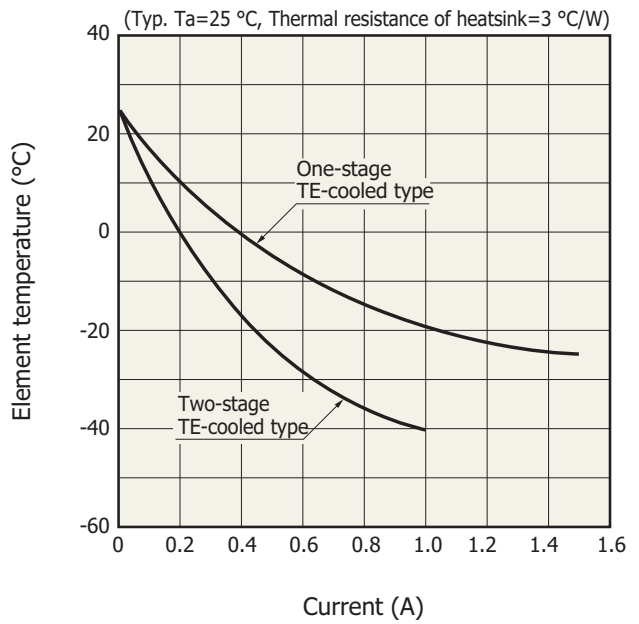
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Thermistor temperature characteristics



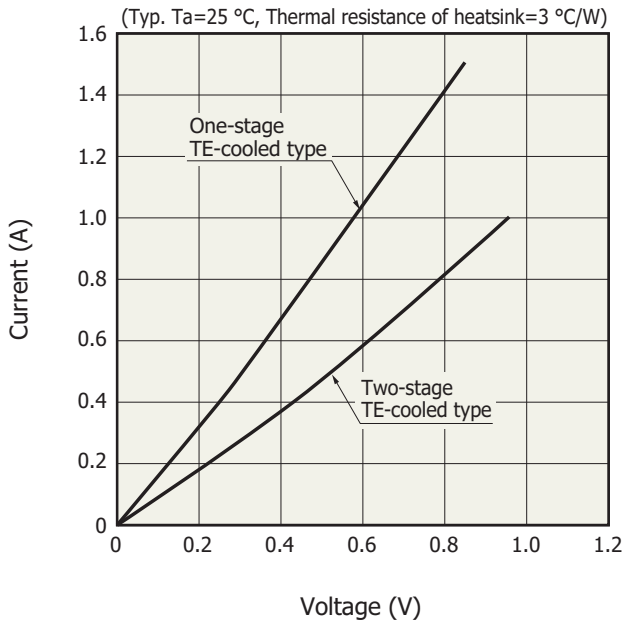
KIRDB0116EA

Cooling characteristics of TE-cooler



KIRDB0231EA

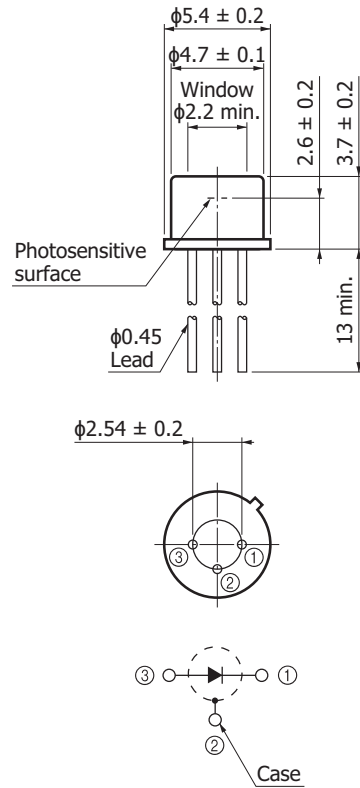
Current vs. voltage (TE-cooler)



KIRDB0115EB

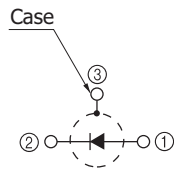
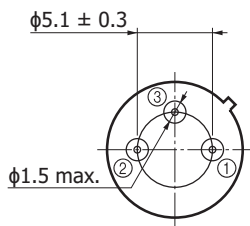
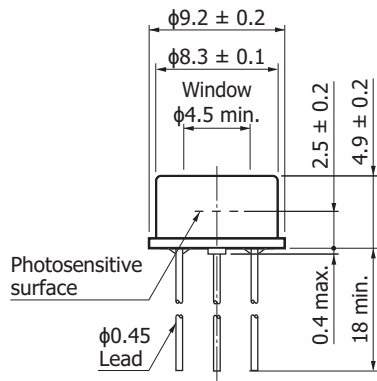
Dimensional outlines (unit: mm)

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



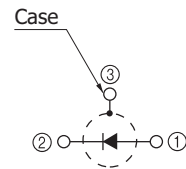
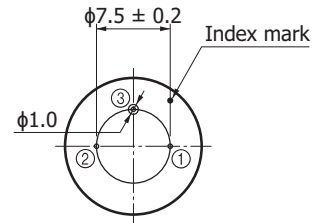
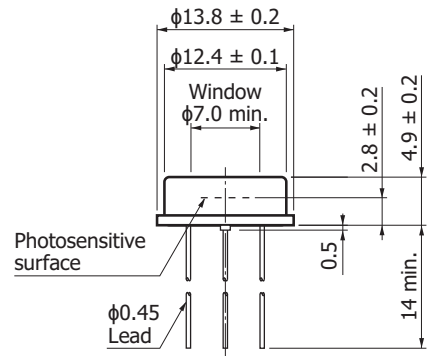
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(2) G12180-020A/-030A



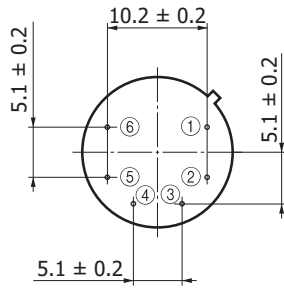
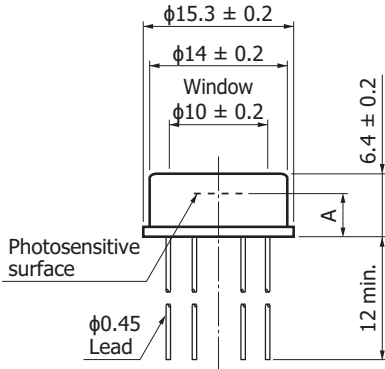
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(3) G12180-050A



KIRDA0052EC

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



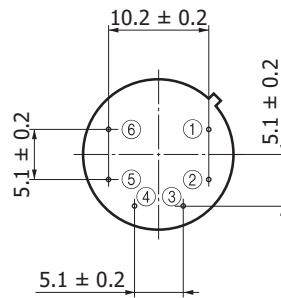
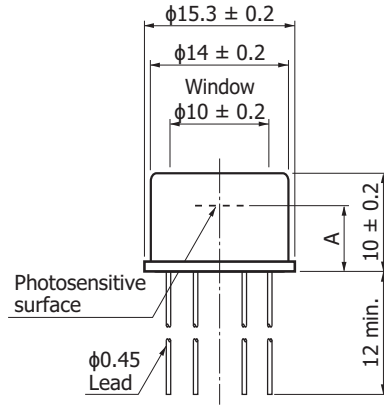
- ① Detector (anode)
- ② Detector (cathode)
- ③ TE-cooler (-)
- ④ TE-cooler (+)
- ⑤⑥ Thermistor

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

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

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

KIRDA0247EA

Related information

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

■ Precautions

- Disclaimer
- Metal, ceramic, plastic package products

■ Technical information

- Infrared detectors

Information described in this material is current as of December, 2015.

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