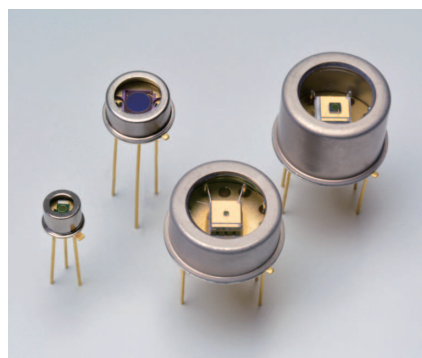




# InGaAs PIN photodiodes

G12183 series

**Long wavelength type**  
**(cutoff wavelength: 2.55 to 2.6  $\mu\text{m}$ )**

## Features

- Cutoff wavelength: 2.55 to 2.6  $\mu\text{m}$
- Low cost
- Photosensitive area:  $\phi 0.3$  to  $\phi 3$  mm
- Low noise
- High sensitivity
- High reliability
- High-speed response

## Applications

- Optical power meters
- Gas analyzers
- Moisture meters
- NIR (near infrared) photometry

## 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-cooled type **C1103-04**

## Structure

| Type no.    | Dimensional outline<br>/Window material*1 | Package | Cooling                | Photosensitive area<br>(mm) |
|-------------|-------------------------------------------|---------|------------------------|-----------------------------|
| G12183-003K | (1)/B                                     | TO-18   | Non-cooled             | φ0.3                        |
| G12183-005K |                                           |         |                        | φ0.5                        |
| G12183-010K |                                           |         |                        | φ1                          |
| G12183-020K | (2)/B                                     | TO-5    |                        | φ2                          |
| G12183-030K |                                           |         |                        | φ3                          |
| G12183-103K | (3)/B                                     | TO-8    | One-stage<br>TE-cooled | φ0.3                        |
| G12183-105K |                                           |         |                        | φ0.5                        |
| G12183-110K |                                           |         |                        | φ1                          |
| G12183-120K |                                           |         |                        | φ2                          |
| G12183-130K |                                           |         |                        | φ3                          |
| G12183-203K | (4)/B                                     | TO-8    | Two-stage<br>TE-cooled | φ0.3                        |
| G12183-205K |                                           |         |                        | φ0.5                        |
| G12183-210K |                                           |         |                        | φ1                          |
| G12183-220K |                                           |         |                        | φ2                          |
| G12183-230K |                                           |         |                        | φ3                          |

\*1: B=Borosilicate glass

### ➤ Absolute maximum ratings

| Type no.    | Thermister power<br>dissipation<br>Pd_th<br>(mW) | TE-cooler<br>allowable current<br>ITE max<br>(A) | TE-cooler<br>allowable voltage<br>VTE max<br>(V) | Reverse voltage<br>VR max<br>(V) | Operating<br>temperature<br>Topr<br>(°C) | Storage<br>temperature<br>Tstg<br>(°C) | Soldering<br>conditions        |
|-------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|----------------------------------|------------------------------------------|----------------------------------------|--------------------------------|
| G12183-003K | -                                                | -                                                | -                                                | 1                                | -40 to +85*2                             | -55 to +125*2                          | 260 °C or less,<br>within 10 s |
| G12183-005K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-010K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-020K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-030K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-103K | 0.2                                              | 1.5                                              | 1.0                                              |                                  | -40 to +70*2                             | -55 to +85*2                           |                                |
| G12183-105K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-110K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-120K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-130K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-203K |                                                  | 1.0                                              | 1.2                                              |                                  |                                          |                                        |                                |
| G12183-205K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-210K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-220K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |
| G12183-230K |                                                  |                                                  |                                                  |                                  |                                          |                                        |                                |

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.

\*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.

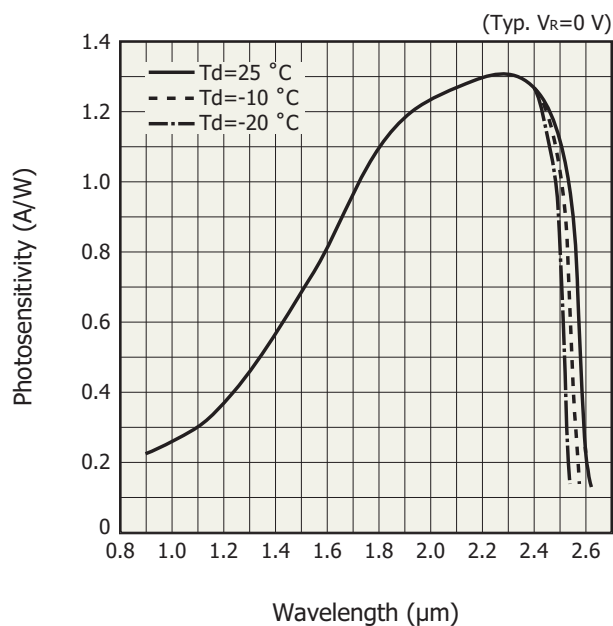
The G12183 series may be destroyed or deteriorated by electrostatic discharge, etc. Be carefull when using the G12183 series.

### ➤ Electrical and optical characteristics (Typ., unless otherwise noted)

| Type no.    | Measurement Condition             | Thermistor resistance Rth<br>(kΩ) | Thermistor B constant B<br>(K) | Spectral response range λ<br>(μm) | Peak sensitivity wavelength λp<br>(μm) | Photo sensitivity S<br>λ=λp |               | Dark current ID<br>VR=0.5 V |              | Temp. coefficient of ID<br>VR=0.5 V<br>(times/°C) |
|-------------|-----------------------------------|-----------------------------------|--------------------------------|-----------------------------------|----------------------------------------|-----------------------------|---------------|-----------------------------|--------------|---------------------------------------------------|
|             | Element temperature Tchip<br>(°C) |                                   |                                |                                   |                                        | Min.<br>(A/W)               | Typ.<br>(A/W) | Typ.<br>(μA)                | Max.<br>(μA) |                                                   |
|             |                                   |                                   |                                |                                   |                                        |                             |               |                             |              |                                                   |
| G12183-003K | 25                                | -                                 | -                              | 0.9 to 2.6                        | 2.3                                    | 1                           | 1.3           | 0.4                         | 4            | 1.035                                             |
| G12183-005K |                                   |                                   |                                |                                   |                                        |                             |               | 1                           | 10           |                                                   |
| G12183-010K |                                   |                                   |                                |                                   |                                        |                             |               | 3                           | 30           |                                                   |
| G12183-020K |                                   |                                   |                                |                                   |                                        |                             |               | 10                          | 100          |                                                   |
| G12183-030K |                                   |                                   |                                |                                   |                                        |                             |               | 30                          | 300          |                                                   |
| G12183-103K | -10                               | 9.0                               | 3.3                            | 0.9 to 2.57                       |                                        |                             |               | 0.12                        | 1.2          |                                                   |
| G12183-105K |                                   |                                   |                                |                                   |                                        |                             |               | 0.3                         | 3            |                                                   |
| G12183-110K |                                   |                                   |                                |                                   |                                        |                             |               | 0.9                         | 9            |                                                   |
| G12183-120K |                                   |                                   |                                |                                   |                                        |                             |               | 3                           | 30           |                                                   |
| G12183-130K |                                   |                                   |                                |                                   |                                        |                             |               | 9                           | 90           |                                                   |
| G12183-203K | -20                               |                                   |                                | 0.9 to 2.55                       |                                        |                             |               | 0.085                       | 0.85         |                                                   |
| G12183-205K |                                   |                                   |                                |                                   |                                        |                             |               | 0.21                        | 2.1          |                                                   |
| G12183-210K |                                   |                                   |                                |                                   |                                        |                             |               | 0.65                        | 6.5          |                                                   |
| G12183-220K |                                   |                                   |                                |                                   |                                        |                             |               | 2.1                         | 21           |                                                   |
| G12183-230K |                                   |                                   |                                |                                   |                                        |                             |               | 6                           | 60           |                                                   |

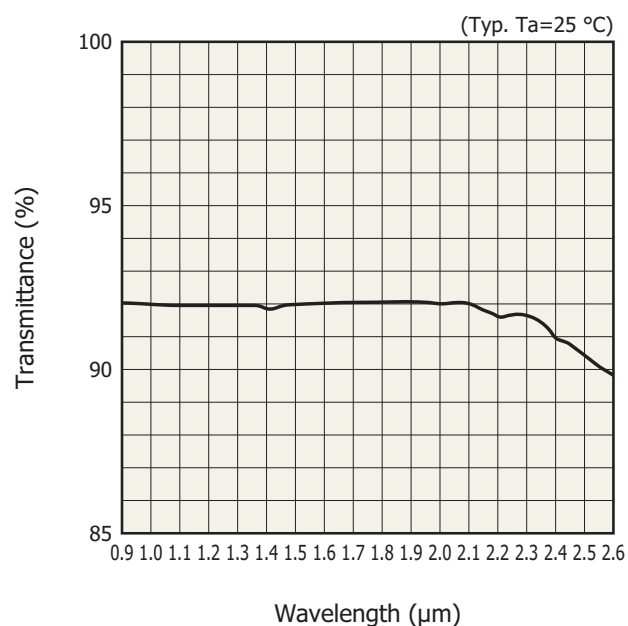
| Type no.    | Measurement Condition | Cutoff frequency<br>fc |            | Terminal capacitance<br>Ct |           | Shunt resistance<br>Rsh |           | Detectivity<br>D*              |                                | Noise equivalent power<br>NEP |                             |
|-------------|-----------------------|------------------------|------------|----------------------------|-----------|-------------------------|-----------|--------------------------------|--------------------------------|-------------------------------|-----------------------------|
|             | Element temperature   | VR=0 V<br>RL=50 Ω      |            | VR=0 V<br>f=1 MHz          |           | VR=10 mV                |           | $\lambda=\lambda_p$            |                                | $\lambda=\lambda_p$           |                             |
|             | Tchip (°C)            | Min. (MHz)             | Typ. (MHz) | Typ. (pF)                  | Max. (pF) | Min. (kΩ)               | Typ. (kΩ) | Min. (cm·Hz <sup>1/2</sup> /W) | Typ. (cm·Hz <sup>1/2</sup> /W) | Typ. (W/Hz <sup>1/2</sup> )   | Max. (W/Hz <sup>1/2</sup> ) |
| G12183-003K | 25                    | 20                     | 50         | 50                         | 100       | 20                      | 100       | $3 \times 10^{10}$             | $9 \times 10^{10}$             | $4 \times 10^{-13}$           | $9 \times 10^{-13}$         |
| G12183-005K |                       | 5                      | 20         | 140                        | 300       | 10                      | 50        |                                |                                | $5 \times 10^{-13}$           | $1.5 \times 10^{-12}$       |
| G12183-010K |                       | 2                      | 6          | 500                        | 1000      | 2.8                     | 14        |                                |                                | $1 \times 10^{-12}$           | $3 \times 10^{-12}$         |
| G12183-020K |                       | 1                      | 1.5        | 1800                       | 3000      | 0.65                    | 3         |                                |                                | $2 \times 10^{-12}$           | $5 \times 10^{-12}$         |
| G12183-030K |                       | 0.5                    | 0.8        | 4000                       | 5000      | 0.25                    | 1.4       |                                |                                | $3 \times 10^{-12}$           | $8 \times 10^{-12}$         |
| G12183-103K | -10                   | 20                     | 70         | 44                         | 100       | 200                     | 1000      | $1 \times 10^{11}$             | $3 \times 10^{11}$             | $1 \times 10^{-13}$           | $3 \times 10^{-13}$         |
| G12183-105K |                       | 5                      | 25         | 120                        | 300       | 100                     | 500       |                                |                                | $1.5 \times 10^{-13}$         | $4.5 \times 10^{-13}$       |
| G12183-110K |                       | 2                      | 7          | 440                        | 1000      | 28                      | 140       |                                |                                | $2.5 \times 10^{-13}$         | $8 \times 10^{-13}$         |
| G12183-120K |                       | 1                      | 2          | 1500                       | 3000      | 6.5                     | 30        |                                |                                | $5.5 \times 10^{-13}$         | $2 \times 10^{-12}$         |
| G12183-130K |                       | 0.5                    | 0.9        | 3400                       | 5000      | 2.8                     | 14        |                                |                                | $8.5 \times 10^{-13}$         | $2.5 \times 10^{-12}$       |
| G12183-203K | -20                   | 20                     | 75         | 40                         | 100       | 400                     | 2000      | $1.5 \times 10^{11}$           | $4.5 \times 10^{11}$           | $7 \times 10^{-14}$           | $2 \times 10^{-13}$         |
| G12183-205K |                       | 5                      | 28         | 110                        | 300       | 200                     | 1000      |                                |                                | $1 \times 10^{-13}$           | $3 \times 10^{-13}$         |
| G12183-210K |                       | 2                      | 8          | 400                        | 1000      | 55                      | 280       |                                |                                | $2 \times 10^{-13}$           | $5.5 \times 10^{-13}$       |
| G12183-220K |                       | 1                      | 2.3        | 1400                       | 3000      | 13                      | 60        |                                |                                | $4 \times 10^{-13}$           | $1 \times 10^{-12}$         |
| G12183-230K |                       | 0.5                    | 1          | 3200                       | 5000      | 5.5                     | 28        |                                |                                | $6 \times 10^{-13}$           | $2 \times 10^{-12}$         |

## Spectral response



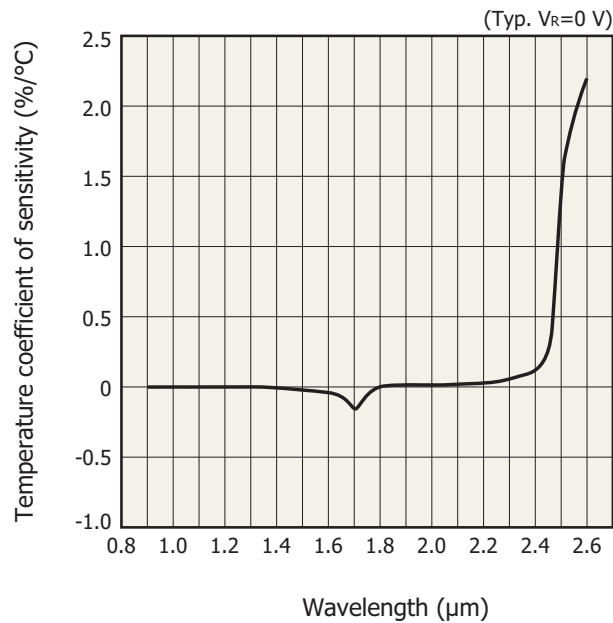
KIRD80491EC

## Spectral transmittance of window material

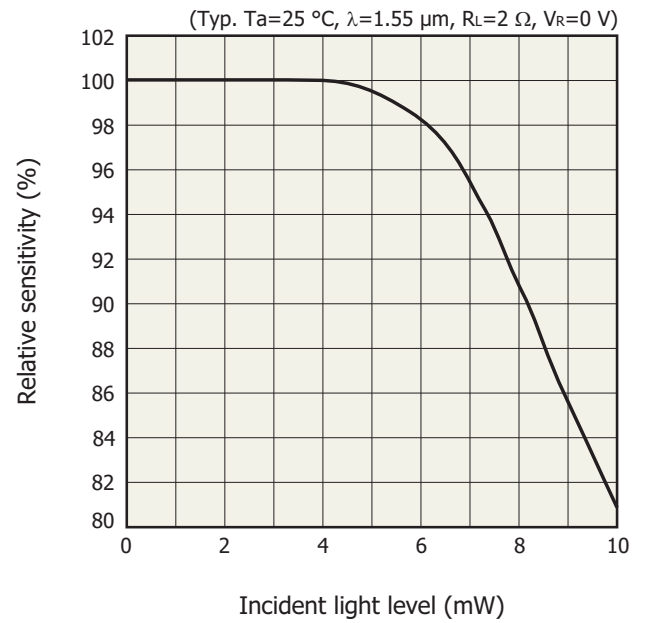


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### Photosensitivity temperature characteristics

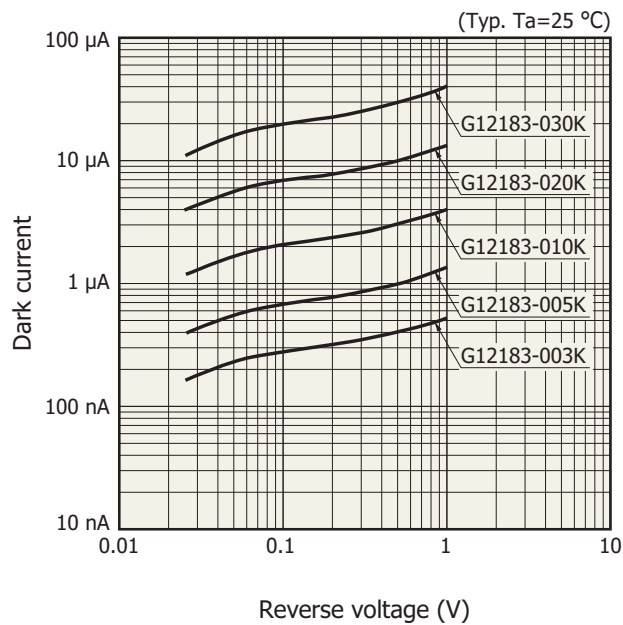


### Linearity (G12183-010K)

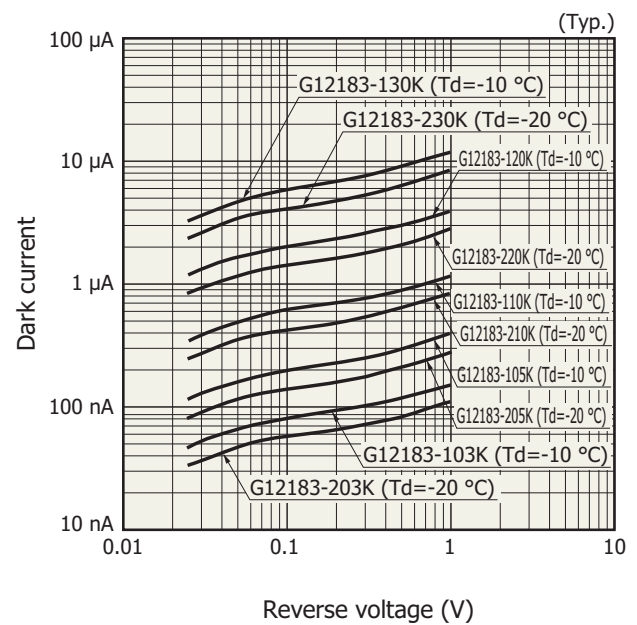


### Dark current vs. reverse voltage

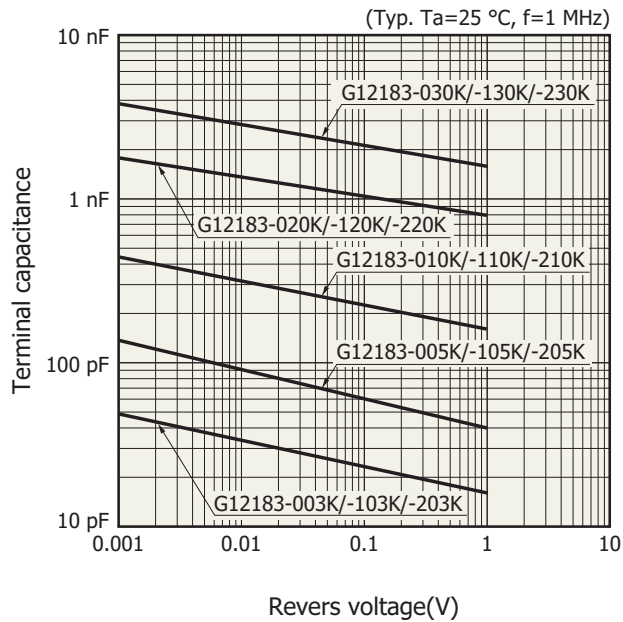
Non-cooled type



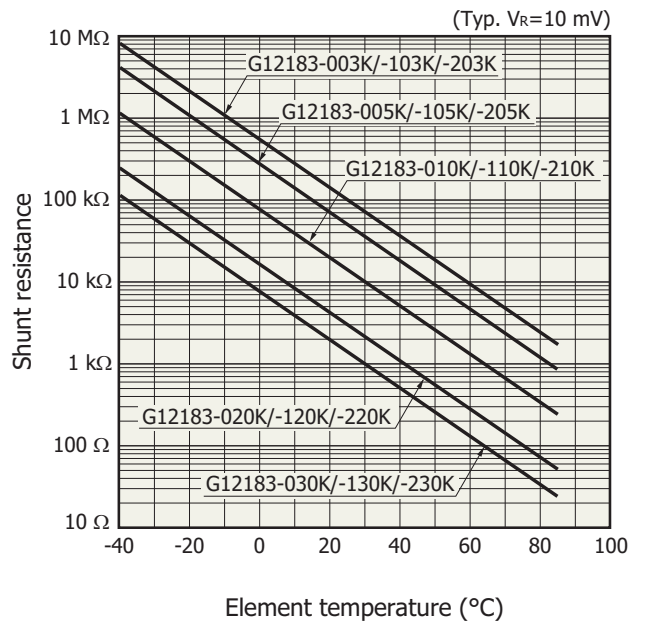
TE-cooled type



### Terminal capacitance vs. reverse voltage

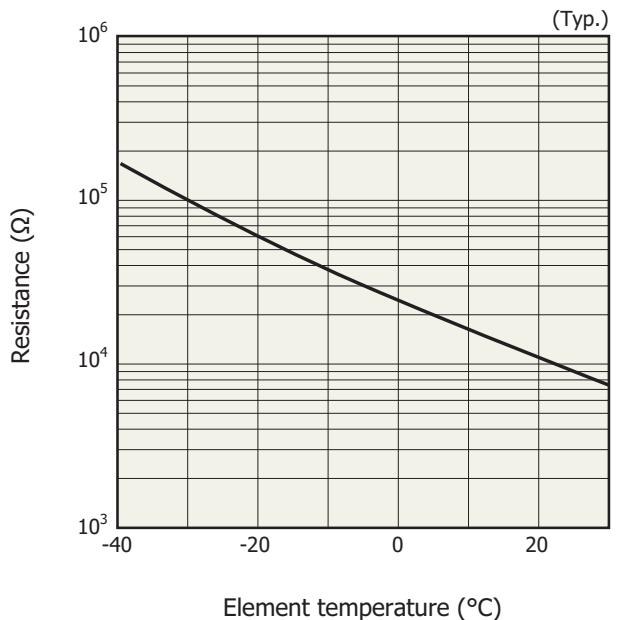


### Shunt resistance vs. element temperature

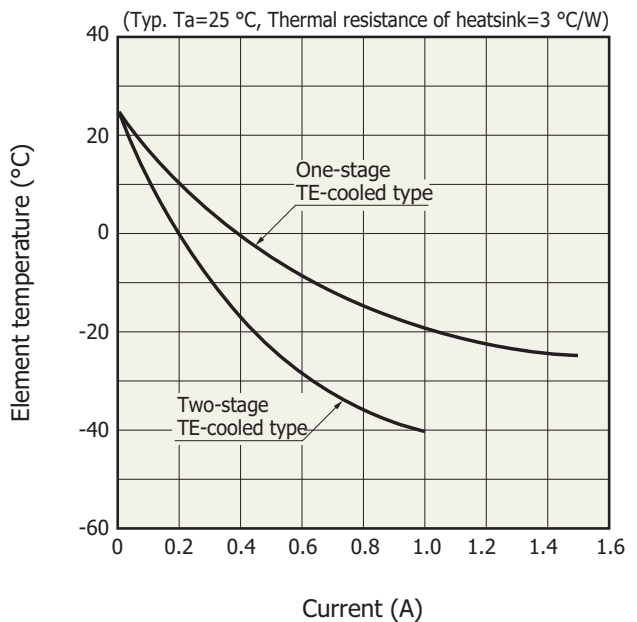


The operating temperature for one-stage and two-stage TE-cooled types is up to  $70\text{ }^{\circ}\text{C}$ .

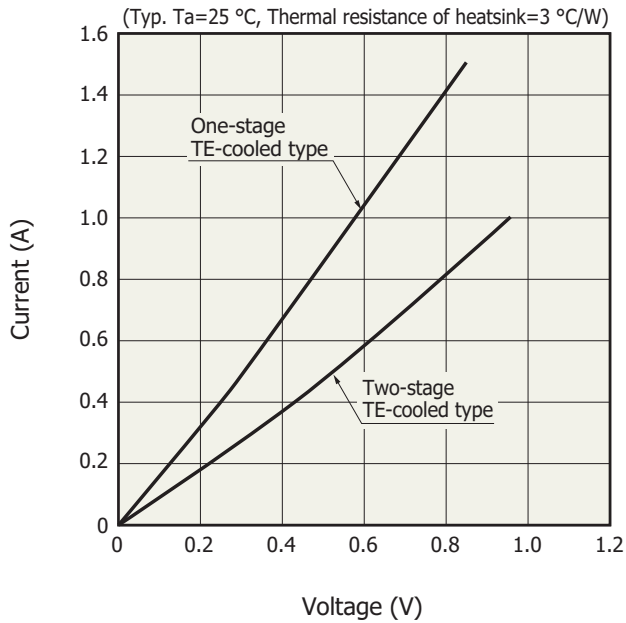
### Thermistor temperature characteristics



### Cooling characteristics of TE-cooler



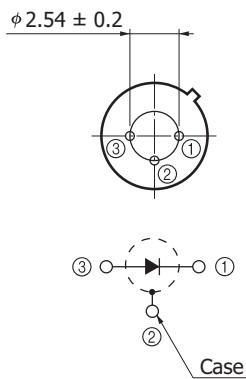
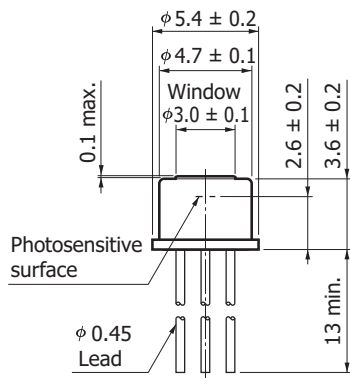
### Current vs. voltage (TE-cooler)



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### Dimensional outlines (unit: mm)

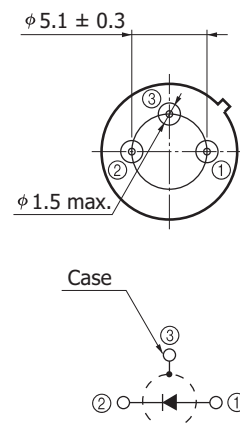
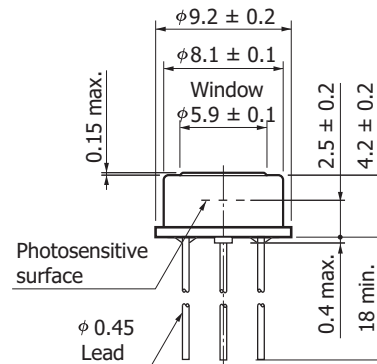
(1) G12183-003K/-005K/-010K



Distance from photosensitive area center to cap center  
 $-0.2 \leq X \leq +0.2$   
 $-0.2 \leq Y \leq +0.2$

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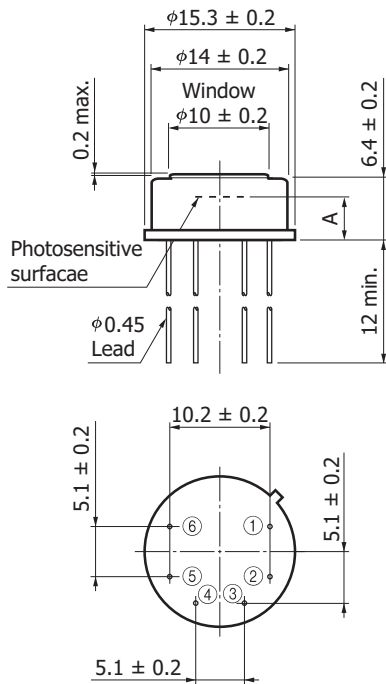
(2) G12183-020K/-030K



Distance from photosensitive area center to cap center  
 $-0.2 \leq X \leq +0.2$   
 $-0.2 \leq Y \leq +0.2$

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(3) G12183-103K/-105K/-110K/-120K/-130K



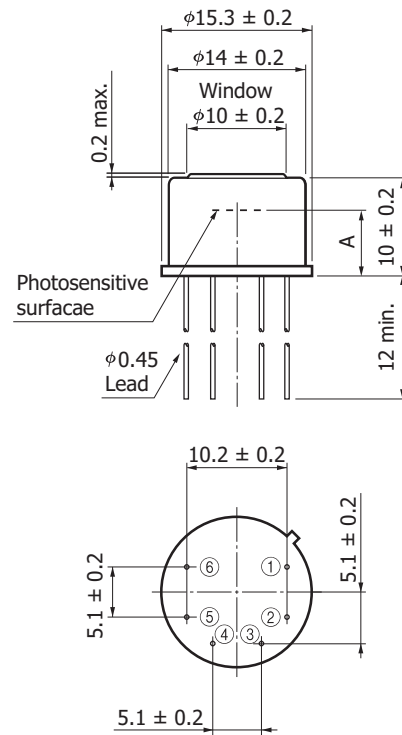
- ① Detector (anode)
- ② Detector (cathode)
- ③ TE-cooler (-)
- ④ Te-cooler (+)
- ⑤⑥ Thermistor

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

|   | G12183-103K<br>/-105K/110K | G12183-120K<br>/-130K |
|---|----------------------------|-----------------------|
| A | 4.3 ± 0.2                  | 4.4 ± 0.2             |

KIRDA0228EA

(4) G12183-203K/-205K/-210K/-220K/-230K



- 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

|   | G12183-203K<br>/-205K/-210K | G12183-220K<br>/-230K |
|---|-----------------------------|-----------------------|
| A | 6.6 ± 0.2                   | 6.7 ± 0.2             |

KIRDA0229EA

## Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

### ■ Precautions

- Disclaimer
- Safety consideration
- Metal, ceramic, plastic package products

### ■ Technical information

- Infrared detectors

Information described in this material is current as of October 2017.

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. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.

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