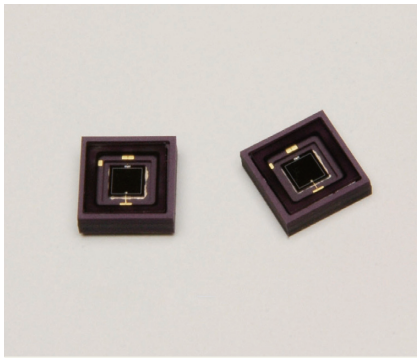


# Two-color detector



K12728-010K

**Wide spectral response range: 0.32 to 1.65  $\mu\text{m}$ ,  
Compact ceramic package**

The K12728-010K is a two-color detector in a compact ceramic package, covering a wide spectral response range. Like the current K1713-09, it incorporates an infrared-transmitting Si photodiode mounted over an InGaAs PIN photodiode, along the same optical axis. It features low noise and low dark current and supports reflow soldering.

## Features

- Wide spectral response range
- Compact, low noise, low dark current
- Supports reflow soldering

## Applications

- Spectrophotometers
- Radiation thermometers

## Structure

Parameter	Symbol	Condition	Specification	Unit
Window material	-		Borosilicate glass	-
Package	-		Ceramic	-
Photosensitive area	-	Si	2.4 × 2.4	mm
		InGaAs	$\phi 1.0$	

## Absolute maximum ratings

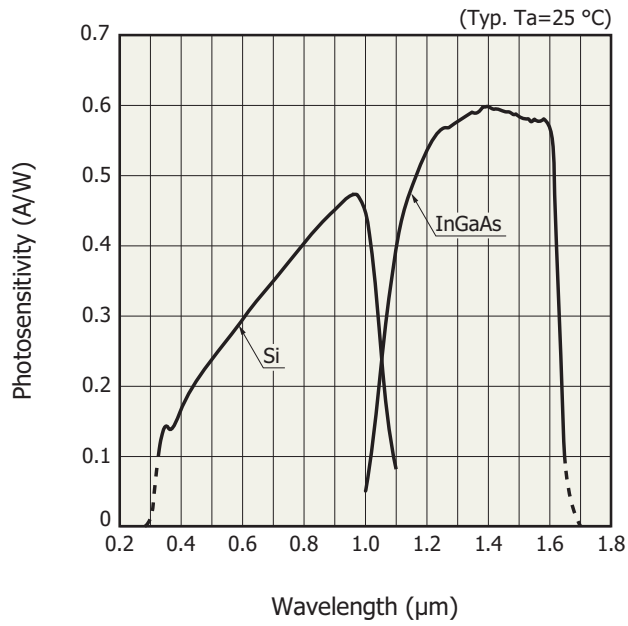
Parameter	Symbol	Condition	Value	Unit
Reverse voltage	$V_R$ max	Si, $T_a=25\text{ }^\circ\text{C}$	5	V
		InGaAs, $T_a=25\text{ }^\circ\text{C}$	10	
Operating temperature	$T_{opr}$	No condensation	-20 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$	No condensation	-20 to +85	$^\circ\text{C}$

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.

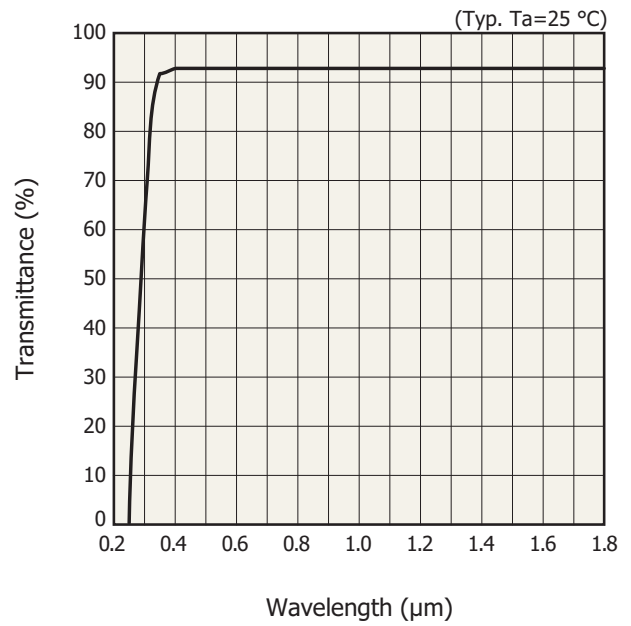
## Electrical and optical characteristics ( $T_a=25\text{ }^\circ\text{C}$ )

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Spectral response range	$\lambda$	Si	-	0.32 to 1.1	-	$\mu\text{m}$
		InGaAs	-	1.1 to 1.65	-	
Peak sensitivity wavelength	$\lambda_p$	Si	-	0.96	-	$\mu\text{m}$
		InGaAs	-	1.55	-	
Photosensitivity	S	Si, $\lambda=\lambda_p$	0.3	0.45	-	A/W
		InGaAs, $\lambda=\lambda_p$	0.3	0.55	-	
Dark current	$I_D$	Si, $V_R=10\text{ mV}$	-	30	100	$\mu\text{A}$
		InGaAs, $V_R=10\text{ mV}$	-	80	400	
Cutoff frequency	$f_c$	Si, -3 dB, $V_R=0\text{ V}$ , $R_L=50\ \Omega$	1	2	-	MHz
		InGaAs, -3 dB, $V_R=0\text{ V}$ , $R_L=50\ \Omega$	5	10	-	
Terminal capacitance	$C_t$	Si, $V_R=0\text{ V}$ , $f=10\text{ kHz}$	-	60	110	pF
		InGaAs, $V_R=0\text{ V}$ , $f=1\text{ MHz}$	-	130	200	
Shunt resistance	$R_{sh}$	Si, $V_R=10\text{ mV}$	100	300	-	$\text{M}\Omega$
		InGaAs, $V_R=10\text{ mV}$	25	125	-	
Detectivity	$D^*$	Si, $\lambda=\lambda_p$	$5 \times 10^{12}$	$1.4 \times 10^{13}$	-	$\text{cm}\cdot\text{Hz}^{1/2}/\text{W}$
		InGaAs, $\lambda=\lambda_p$	$5 \times 10^{11}$	$3.5 \times 10^{12}$	-	

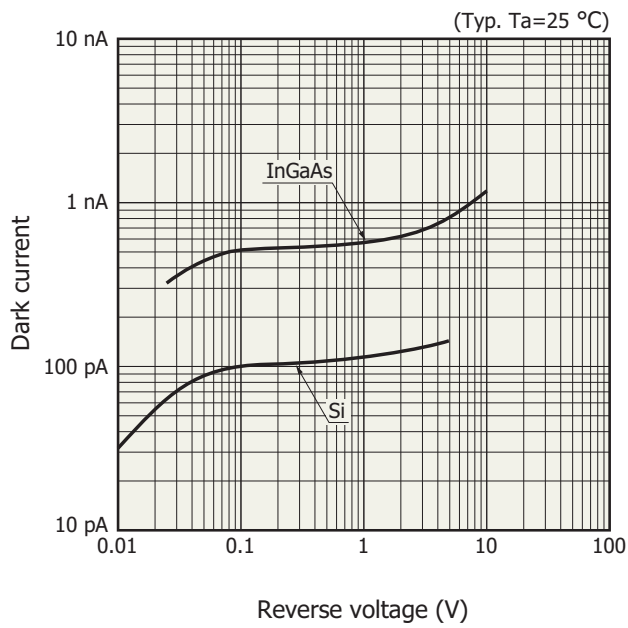
**Spectral response**



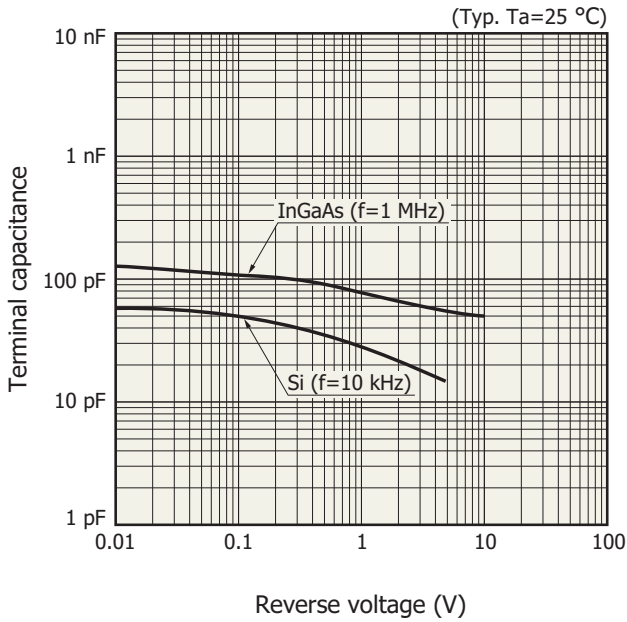
**Spectral transmittance of window material**



**Dark current vs. reverse voltage**

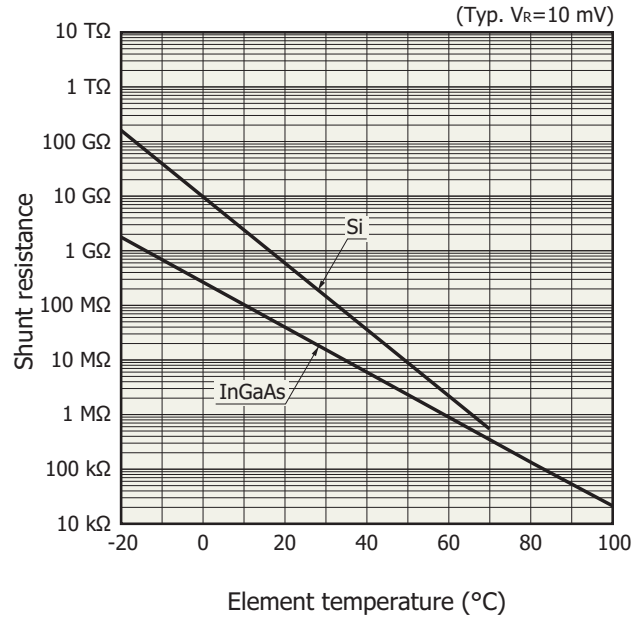


Terminal capacitance vs. reverse voltage



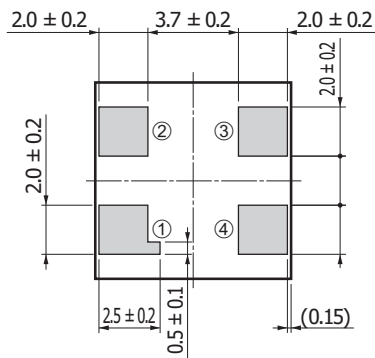
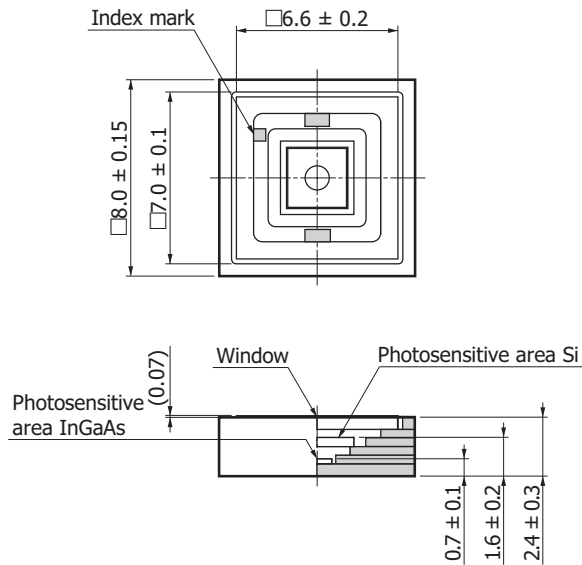
KIRD0601EA

Shunt resistance vs. element temperature



KIRD0602EA

Dimensional outline (unit: mm)

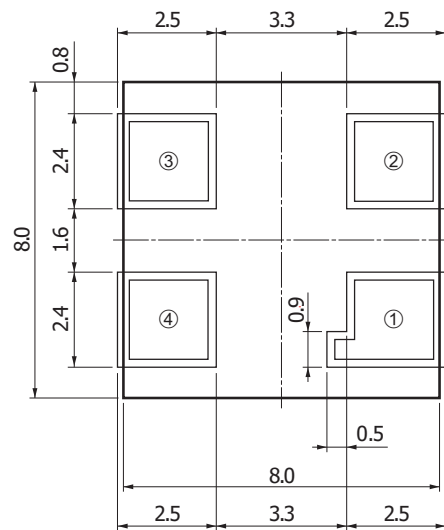


- ① Cathode (Si)
- ② Anode (Si)
- ③ Cathode (InGaAs)
- ④ Anode (InGaAs)

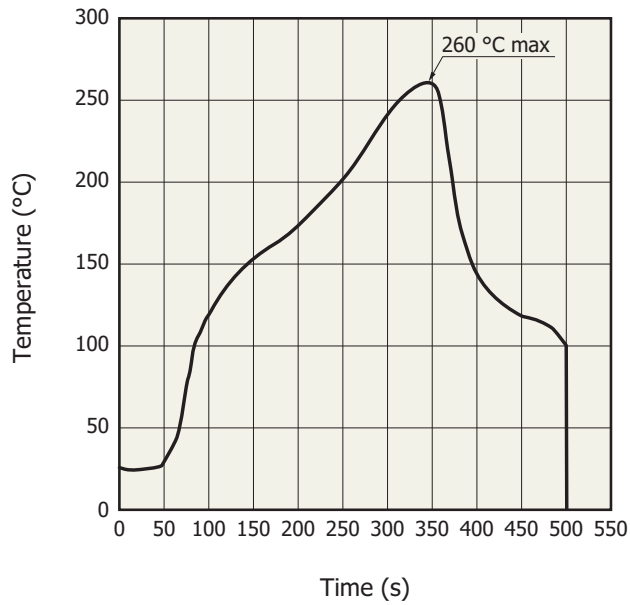
Center position accuracy of photosensitive area  
 $-0.3 \leq X \leq +0.3$   
 $-0.3 \leq Y \leq +0.3$

KIRDA0243EA

Recommended land mark pattern (unit: mm)



KIRDC0119EA

**Measured example of temperature profile with our hot-air reflow oven for product testing**

K1RDC0120EA

- After unpacking, store the device in an environment at a temperature range of 5 to 30 °C and a humidity of 60% or less, and perform reflow soldering within 4 weeks.
- The thermal stress applied to the device during reflow soldering varies depending on the circuit board and the reflow oven that is used.
- When setting the reflow conditions, verify that the reliability of the device is not compromised by the reflow soldering process.

## Related information

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

### ■ Precautions

- Notice
- Metal, ceramic, plastic packages

### ■ Technical information

- Infrared detector / Technical information

Information described in this material is current as of August, 2014.

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.

# HAMAMATSU

[www.hamamatsu.com](http://www.hamamatsu.com)

HAMAMATSU PHOTONICS K.K., Solid State Division

1126-1 Ichino-cho, Higashi-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, N.J. 08807, U.S.A., Telephone: (1) 908-231-0960, Fax: (1) 908-231-1218

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49) 8152-375-0, Fax: (49) 8152-265-8

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

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, United Kingdom, Telephone: (44) 1707-294888, Fax: (44) 1707-325777

North Europe: Hamamatsu Photonics Norden AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46) 8-509-031-00, Fax: (46) 8-509-031-01

Italy: Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20020 Arese (Milano), Italy, Telephone: (39) 02-93581733, Fax: (39) 02-93581741

China: Hamamatsu Photonics (China) Co., Ltd.: B1201, Jiaming Center, No.27 Dongsanhuan Beilu, Chaoyang District, Beijing 100020, China, Telephone: (86) 10-6586-6006, Fax: (86) 10-6586-2866