

# InAs photovoltaic detectors



P10090 series  
P7163

## Low noise, high reliability infrared detectors (for 3 $\mu\text{m}$ band)

InAs photovoltaic detectors have high sensitivity in the infrared region around 3  $\mu\text{m}$  as with PbS photoconductive detectors, and also feature low noise, high speed and high reliability. P10090 series is a new family of InAs photovoltaic detectors that deliver even lower noise than our conventional products (P8079 series).

Various types are available, including non-cooled type, thermoelectrically cooled type (P10090 series), and liquid nitrogen cooled type (P7163) that delivers high performance.

### Features

- Low noise
- High detectivity ( $D^*$ )
- High reliability
- Available in multi-element arrays (custom product)

### Applications

- Gas analysis
- Laser detection
- Infrared spectrophotometry
- Radiation thermometer

### Options (sold separately)

- Heatsink for one/two-stage TE-cooled type A3179-01
- Temperature controller C1103-04
- Infrared detector module with preamp C12492-210
- Amplifiers for InAs photovoltaic detector  
(P10090 series: C4159-06, P7163: C4159-05)

### Structure/Absolute maximum ratings

Type No.	Dimensional outline/ Window material *1	Package	Cooling	Nitrogen hold time (h)	Photosensitive area (mm)	Absolute maximum ratings					
						Thermoelectric cooler allowable current (A)	Thermistor power dissipation (mW)	Reverse voltage $V_R$ (V)	Operating temperature $T_{opr}$ ( $^{\circ}\text{C}$ )	Storage temperature $T_{stg}$ ( $^{\circ}\text{C}$ )	Maximum incident light level (W)
P10090-01	①/S	TO-5	Non-cooled	-	$\phi 1$	-	-	0.5	-40 to +60	-40 to +80	0.6
P10090-11	②/S	TO-8	One-stage TE-cooled			1.5	0.2				
P10090-21			Two-stage TE-cooled			1.0					
P7163	③/S	Metal dewar	LN <sub>2</sub>	12 *2	$\phi 1$	-	-			-55 to +60	

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.

\*1: S=Sapphire glass

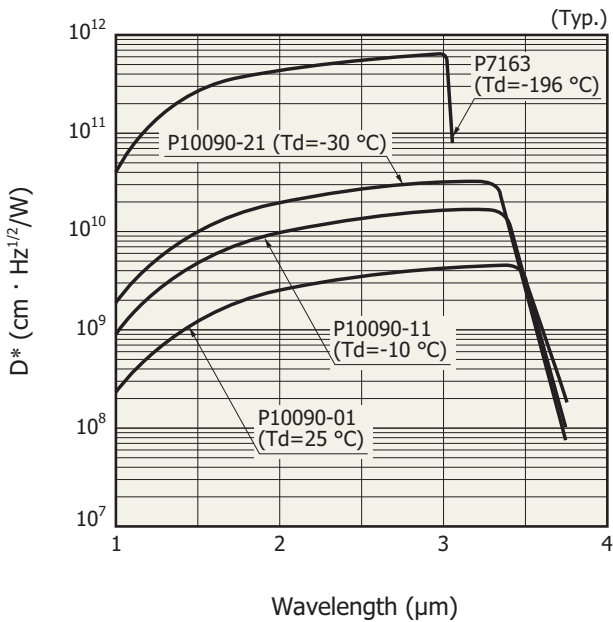
\*2: At the time of shipment

Electrical and optical characteristics (Typ. unless otherwise noted)

Type no.	Measurement condition	Peak sensitivity wavelength $\lambda_p$ ( $\mu\text{m}$ )	Cutoff wavelength $\lambda_c$ ( $\mu\text{m}$ )	Photo sensitivity $S_{\lambda=\lambda_p}$ (A/W)	Shunt resistance $R_{sh}$		$D^*$ ( $\lambda_p, 600, 1$ )		NEP $\lambda=\lambda_p$ ( $\text{W}/\text{Hz}^{1/2}$ )	Rise time $t_r$ $V_R=0\text{ V}$ $R_L=50\ \Omega$ 0 to 63% ( $\mu\text{s}$ )
	Element temperature $T_d$				Min. ( $\Omega$ )	Typ. ( $\Omega$ )	Min. ( $\text{cm} \cdot \text{Hz}^{1/2}/\text{W}$ )	Typ. ( $\text{cm} \cdot \text{Hz}^{1/2}/\text{W}$ )		
	( $^{\circ}\text{C}$ )									
P10090-01	25	3.35	3.65	1.0	40	70	$3.0 \times 10^9$	$4.5 \times 10^9$	$1.5 \times 10^{-11}$	0.70
P10090-11	-10	3.30	3.55	1.2	250	400	$1.0 \times 10^{10}$	$1.6 \times 10^{10}$	$5.3 \times 10^{-12}$	0.45
P10090-21	-30	3.25	3.45		1000	1300	$2.0 \times 10^{10}$	$3.2 \times 10^{10}$	$2.8 \times 10^{-12}$	0.30
P7163	-196	3.00	3.1	1.3	$1 \times 10^5$	$1 \times 10^6$	$3.5 \times 10^{11} *3$	$6.0 \times 10^{11} *3$	$1.5 \times 10^{-13}$	0.10

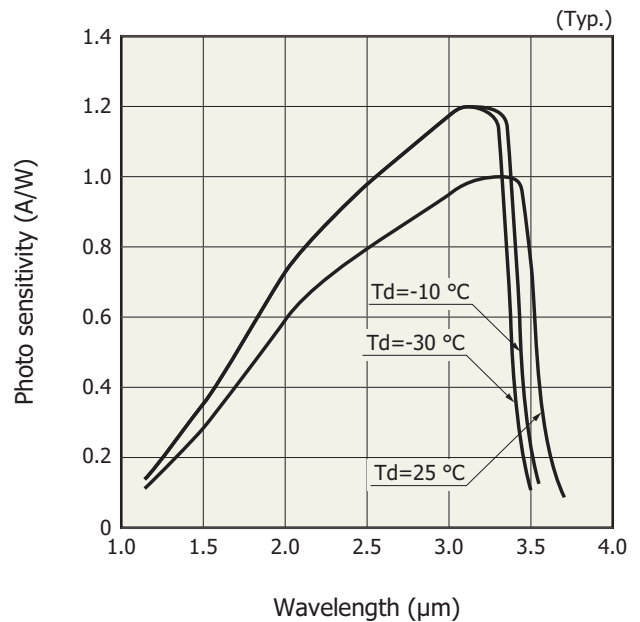
\*3:  $D^*$  ( $\lambda_p, 1200, 1$ )

Spectral response ( $D^*$ )



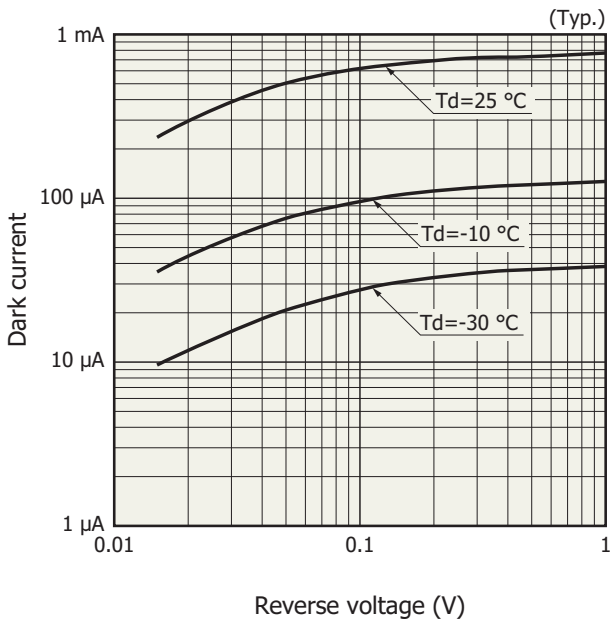
KIRD80356ED

Spectral response

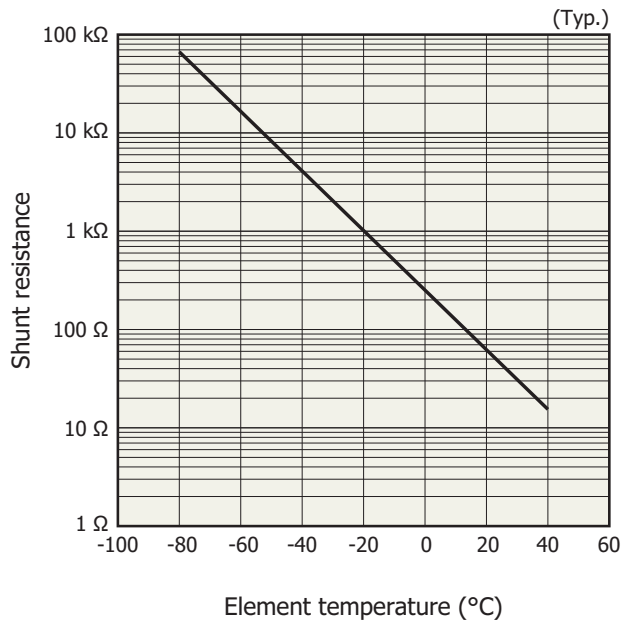


KIRD80381EB

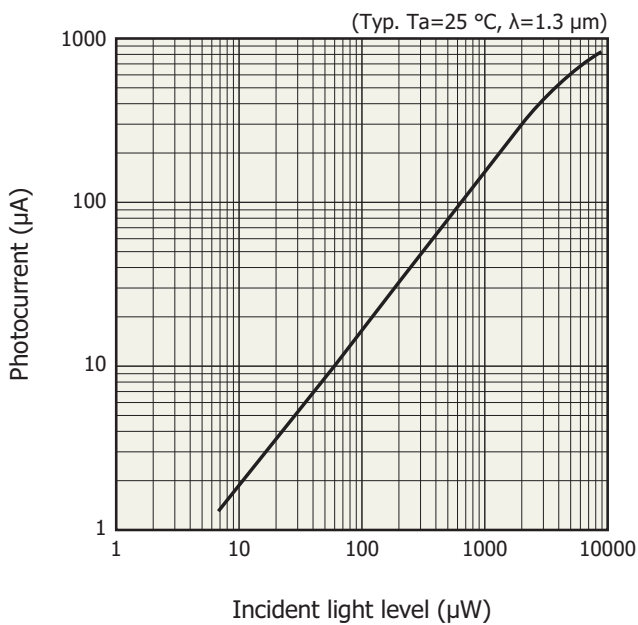
**Dark current vs. reverse voltage**



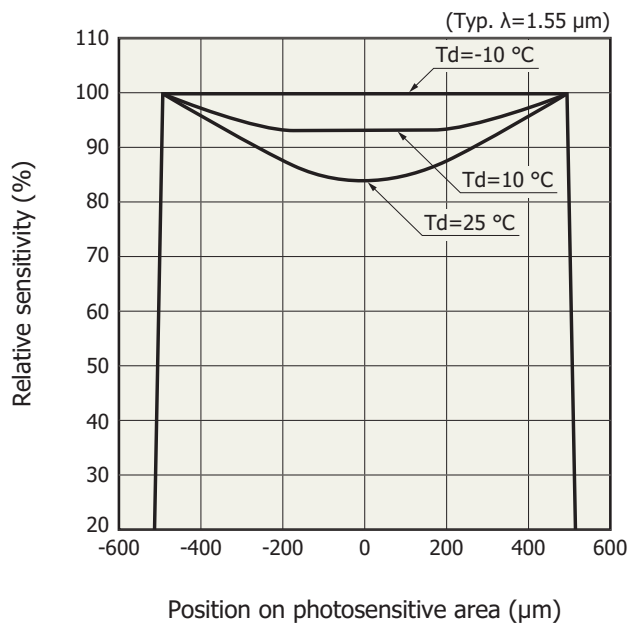
**Shunt resistance vs. element temperature (P10090 series)**



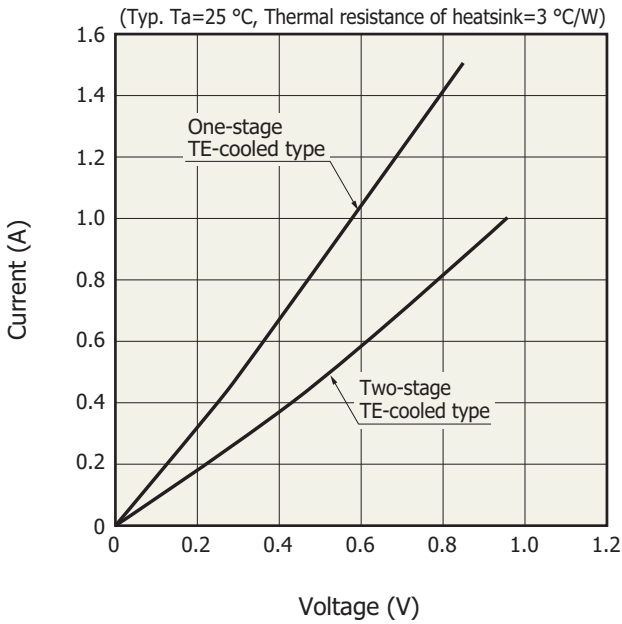
**Linearity**



**Sensitivity uniformity**

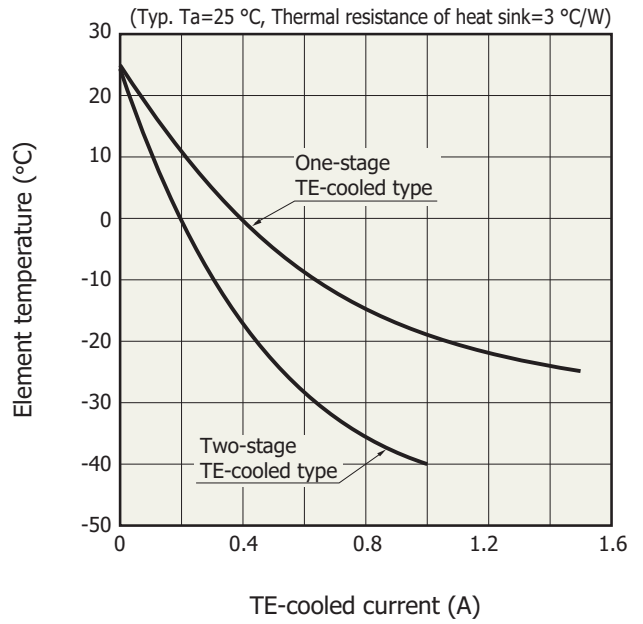


**Current vs. voltage of TE-cooled type**



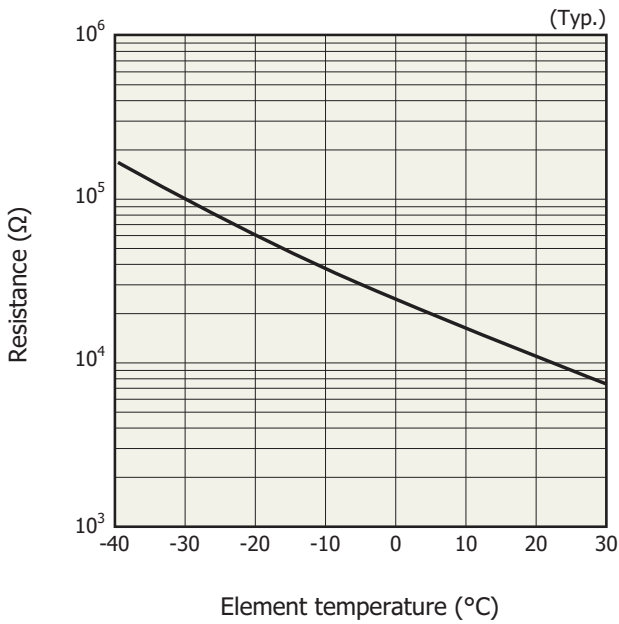
KIRDB0115EB

**Cooling characteristics of TE-cooled type**



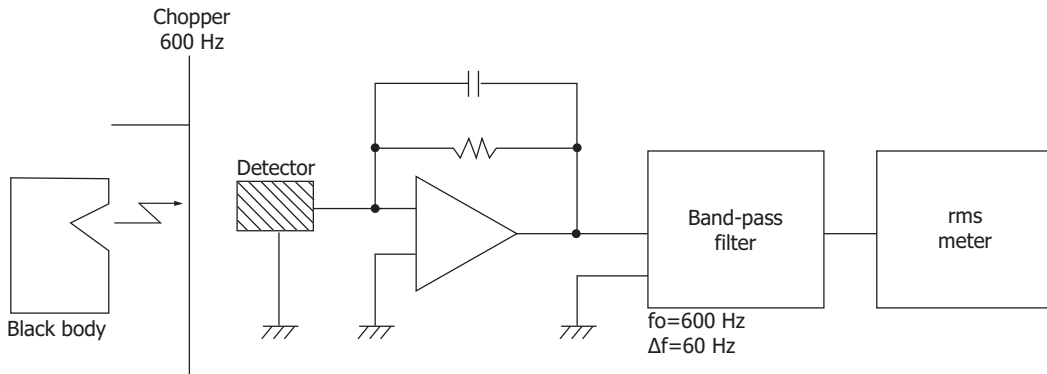
KIRDB0181EA

**Thermistor temperature characteristic**



KIRDB0116EA

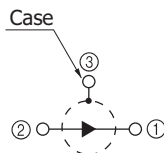
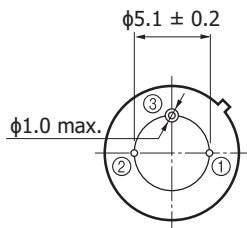
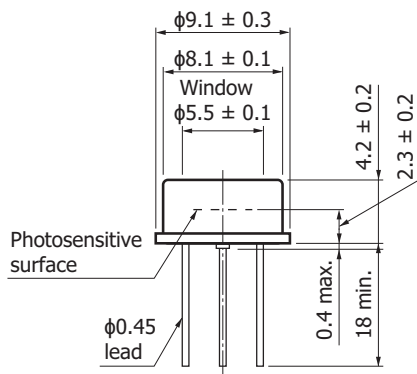
Measurement circuit



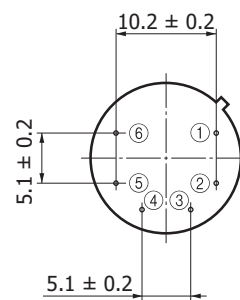
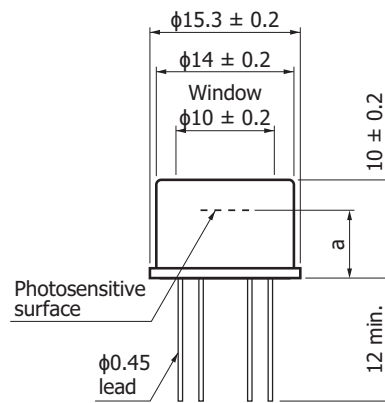
KIRDC0075EA

Dimensional outline (unit: mm)

① P10090-01



② P10090-11/-21



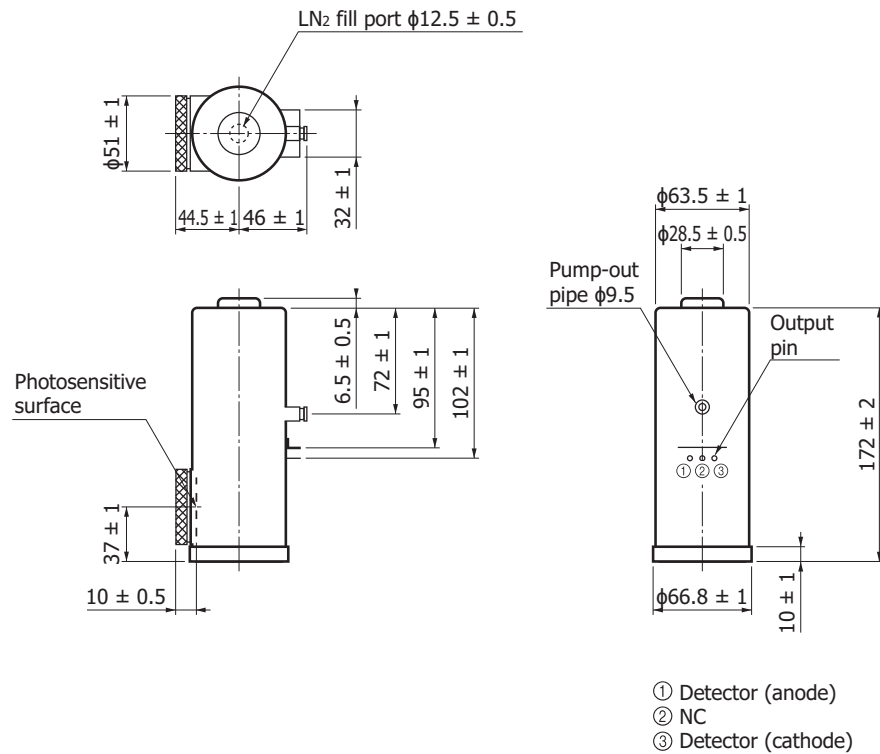
- ① Detector (anode)
- ② Detector (cathode)
- ③ TE-cooler (-)
- ④ TE-cooler (+)
- ⑤ ⑥ Thermistor

	P10090-11	P10090-21
a	$4.5 \pm 0.2$	$6.9 \pm 0.2$

KIRDA0191EA

KIRDA0219EA

## ③ P7163



KIRDA0033EE

## Related information

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

### Precautions

- Notice
- Metal, Ceramic, Plastic products

### 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.

Type numbers of products listed in the delivery specification sheets or supplied as samples may have a suffix "(X)" which means preliminary specifications or a suffix "(Z)" which means developmental 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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