

S2592 series

Thermoelectrically cooled photodiodes for low-light-level detection in UV to near IR

The S2592 series sensors combine a UV to near infrared Si photodiode with a thermoelectric cooler. A thermistor is also included in the same package to sense the Si photodiode chip temperature. This allows stable operation over long periods of time, making these sensors suitable for low-light-level detection where a high S/N is required. A dedicated temperature controller (C1103-04) and heatsink (A3179 series) are also available as options (sold separately).

Features

- High S/N
- High UV sensitivity
- Built-in thermistor allows stable operation.

Applications

- Low-light-level detection

Structure

Parameter	S2592-03	S2592-04	Unit
Built-in photodiode	S1336 series		-
Photosensitive area	2.4 × 2.4	5.8 × 5.8	mm
Window material	Sapphire glass		-
Cooling	One-stage TE-cooled		-
Package	TO-8		

Absolute maximum ratings

Parameter	Symbol	Value	Unit
Reverse voltage	V_R	5	V
Operating temperature*1	T_{opr}	-40 to +70	°C
Storage temperature*1	T_{stg}	-55 to +85	°C

*1: No dew condensation

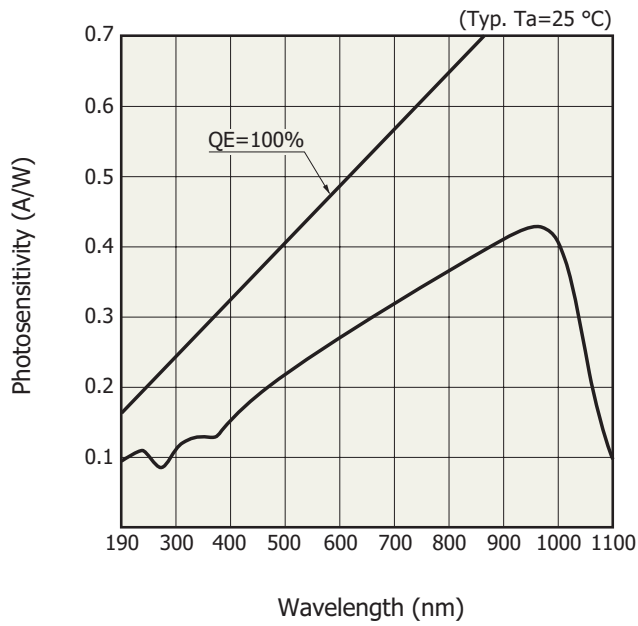
When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

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. $T_a=25\text{ °C}$)

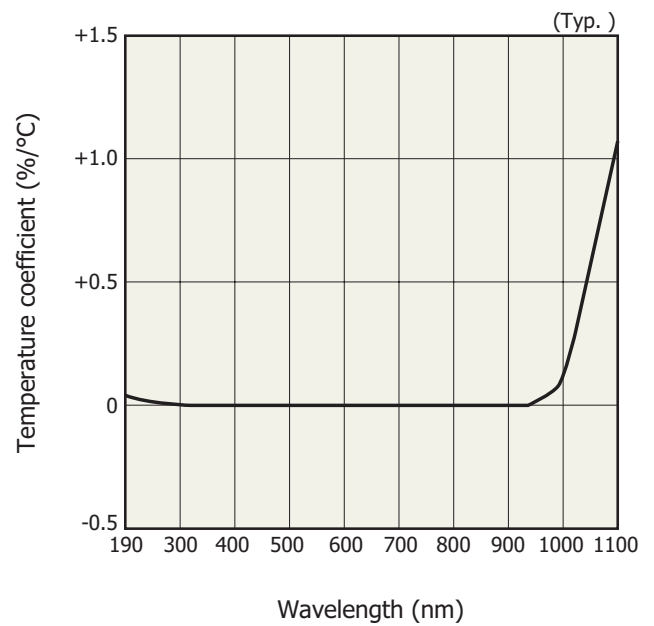
Parameter	Symbol	Condition	S2592-03	S2592-04	Unit
Spectral response range	λ		190 to 1100		nm
Peak sensitivity wavelength	λ_p		960		nm
Photosensitivity	S	$\lambda=\lambda_p$	0.42		A/W
Short circuit current	I_{sc}	100 lx, 2856 K	5	28	μA
Dark current	I_D	$V_R=10\text{ mV}$	10	25	pA
Temperature coefficient of dark current	$TCID$		1.15		times/°C
Rise time	t_r	$V_R=0\text{ V}, R_L=1\text{ k}\Omega$	0.2	1	μs
Terminal capacitance	C_t	$V_R=0\text{ V}$	65	380	pF
Shunt resistance	R_{sh}	$V_R=10\text{ mV}$	1	0.4	G Ω
Noise equivalent power	NEP	$V_R=0\text{ V}, \lambda=\lambda_p$	8.1×10^{-15}	1.3×10^{-14}	W/Hz ^{1/2}
Cooling temperature	ΔT		35		°C

Spectral response



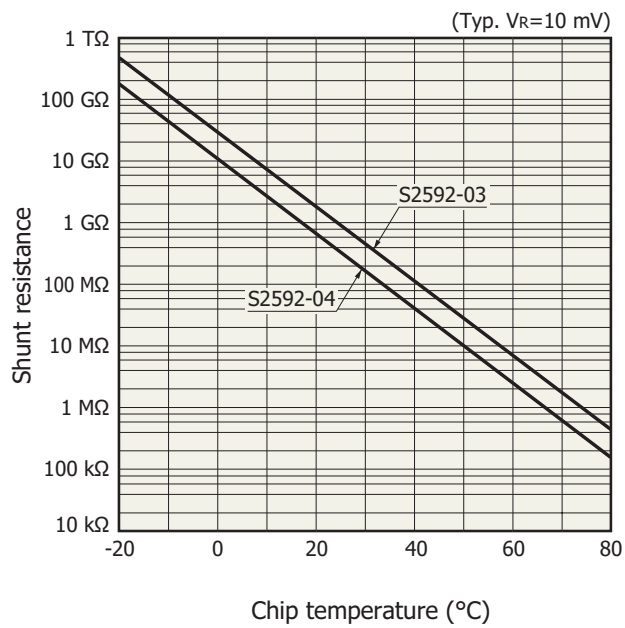
KSPDB0182EC

Photosensitivity temperature characteristics



KSPDB0053EC

Shunt resistance vs. chip temperature

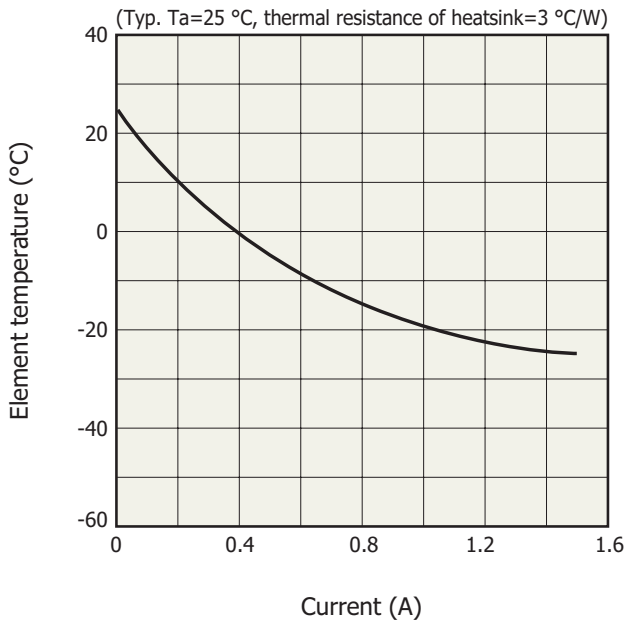


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TE-cooler specifications (Ta=25 °C, unless otherwise noted)

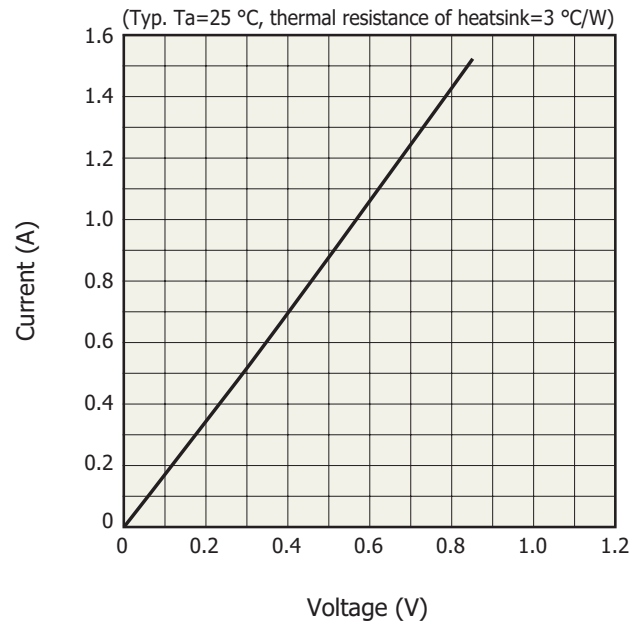
Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
TE-cooler allowable current		ITE max	-	-	1.5	A
TE-cooler allowable voltage		VTE max	-	-	1.0	V
Thermistor resistance		Rth	8.1	9.0	9.9	kΩ
Thermistor B constant	T1=25 °C, T2=-20 °C	B	-	3.3	-	K
Thermistor power dissipation		Pth	-	-	0.2	mW

Cooling characteristics of TE-cooler



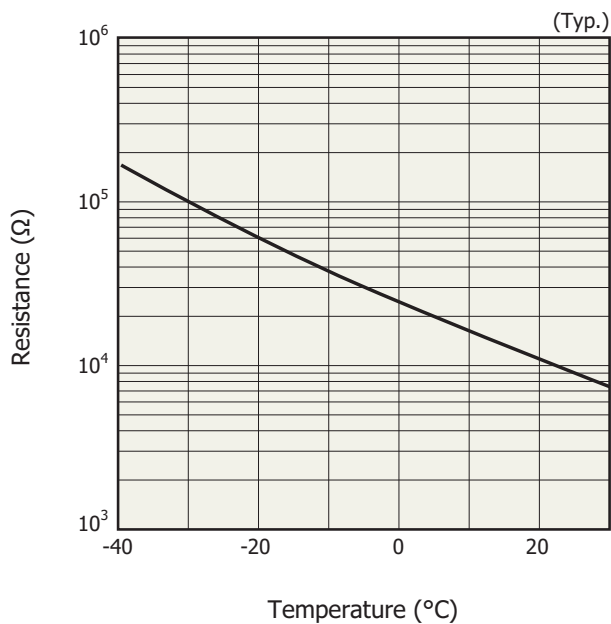
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Current vs. voltage characteristics of TE-cooler



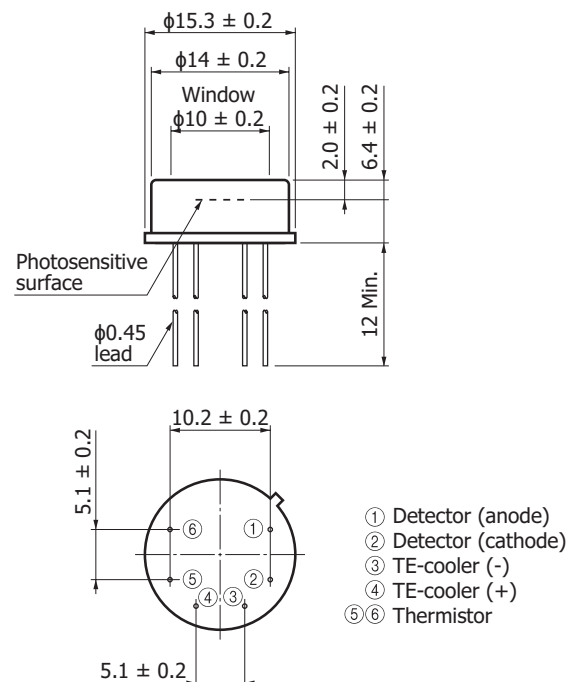
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Thermistor temperature characteristics



KIRDB0116EB

Dimensional outline (unit: mm)



KSPDA0133EB

Related products

Temperature controller for TE-cooled detector C1103-04



By adjusting the current flowing through the thermoelectric cooler in a one-stage or two-stage thermoelectrically cooled detector, the C1103-04 maintains the detector element at a constant temperature. The cooling temperature can be easily set by using the control knob on the front panel.

Accessories

➔ **Instruction manual**

➔ **4-conductor cable (with a connector, 3 m)**

A4372-05^{*2}

➔ **Power supply cable**

Setting element temperature	-30 to +20 °C
Applicable detectors ^{*3}	One-stage or two-stage thermoelectrically cooled detectors
Temperature stability	Within ±0.1 °C
Temperature control output current	1.1 A min., 1.2 A typ., 1.3 A max.
Power supply	100 V ± 10% · 50/60 Hz ^{*4}
Power consumption	30 W
Dimensions and weight	107 (W) × 84 (H) × 190 (D) mm/approx. 1.9 kg
Operating temperature	+10 to +40 °C
Operating humidity	Equal to or less than 90% ^{*5}
Storage temperature	+20 to +40 °C

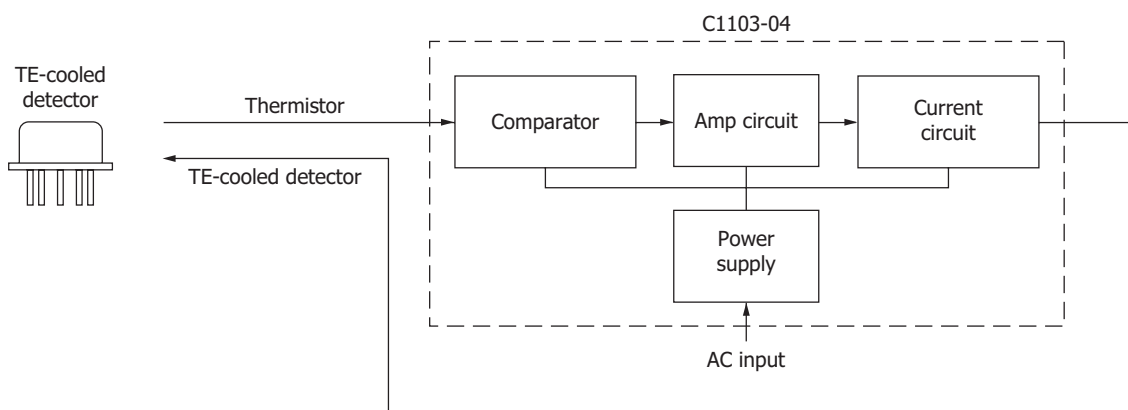
*2: When used in combination with the A3179 series heatsink, do not use the 4-conductor cable supplied with the A3179 series, but use the A4372-05 instead.

*3: It doesn't correspond to TE-cooled type infrared detector module with preamp.

*4: Power requirement (AC line voltage) can be selected from among 100 V, 115 V and 230 V at the factory prior to shipping.

*5: No dew condensation

Block diagram

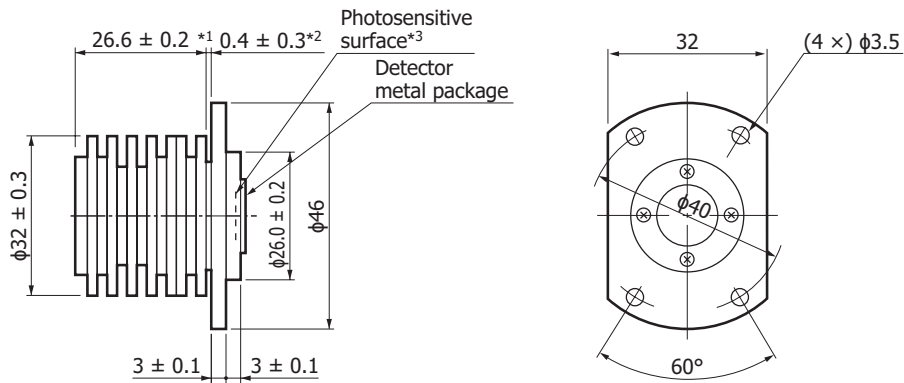


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Heatsink for TE-cooled detector (TO-8 package) A3179

The A3179 heatsink is designed for thermoelectrically cooled detectors having a 6-pin TO-8 package. Heat dissipation capacity for the A3179 is about 35 °C versus the ambient temperature 25 °C.

■ Dimensional outline (unit: mm)



Weight: 50 g approx.

Tolerance unless otherwise noted: ± 0.3

*1: Bottom surface (reference surface) of detector metal package

*2: When detector is installed

*3: The position of the photosensitive surface differs according to the detector used.

Refer to the dimensional outline for the detector.

KIRDA0018EE

⚠ Precautions against UV light exposure

- When UV light irradiation is applied, the product characteristics may degrade. Such examples include degradation of the product's UV sensitivity and increase in dark current. This phenomenon varies depending on the irradiation level, irradiation intensity, usage time, and ambient environment and also varies depending on the product model. Before employing the product, we recommend that you check the tolerance under the ultraviolet light environment that the product will be used in.
- Exposure to UV light may cause the characteristics to degrade due to gas released from the resin bonding the product's component materials. As such, we recommend that you avoid applying UV light directly on the resin and apply it on only the inside of the photosensitive area by using an aperture or the like.

⚠ Related information

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

■ Precautions

- Disclaimer
- Metal, ceramic, plastic package products

■ Technical note

- Si photodiodes

Information described in this material is current as of February 2023.

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.

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HAMAMATSU

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, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218

Germany: HAMAMATSU PHOTONICS DEUTSCHLAND GMBH: Arzbergerstr. 10, 82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de

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 E-mail: infos@hamamatsu.fr

United Kingdom: HAMAMATSU PHOTONICS UK LIMITED: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk

North Europe: HAMAMATSU PHOTONICS NORDEN AB: Torshamnsgatan 35, 16440 Kista, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01 E-mail: info@hamamatsu.se

Italy: HAMAMATSU PHOTONICS ITALIA S.R.L.: Strada della Moia, 1 int. 6 20044 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: info@hamamatsu.it

China: HAMAMATSU PHOTONICS (CHINA) CO., LTD.: 1201, Tower B, Jiaming Center, 27 Dongsanhuan Bellu, Chaoyang District, 100020 Beijing, P.R. China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn

Taiwan: HAMAMATSU PHOTONICS TAIWAN CO., LTD.: 8F-3, No.158, Section 2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)3-659-0080, Fax: (886)3-659-0081 E-mail: info@hamamatsu.com.tw