

Two-dimensional PSD

S5990-01, S5991-01

Improved tetra-lateral type for surface mounting

Features

- **Large photosensitive area**
S5990-01: 4 × 4 mm
S5991-01: 9 × 9 mm
- **Chip carrier package for surface mounting**
(automatic mounting with solder reflow)
Thin package: 1.26 mm
- **Improved tetra-lateral type (pin-cushion type) delivers superior position detection.**
- **Evaluation circuit board provided (sold separately)**
C4674-01 (DC signal processing circuit)

Applications

- **Light spot detection**
- **Pointing device (computer mouse, track-ball)**
- **Position measurement**

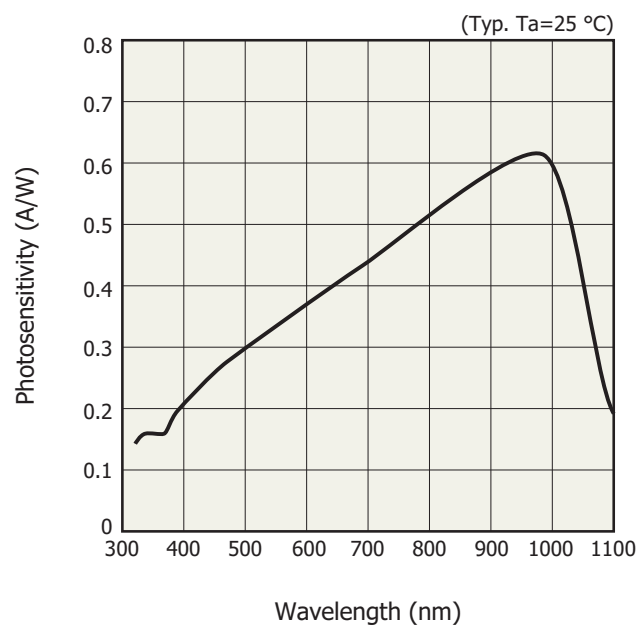
Absolute maximum ratings (Ta=25 °C)

| Parameter | Symbol | Value | Unit |
|-----------------------|--------------------|------------|------|
| Reverse voltage | V _R max | 20 | V |
| Operating temperature | T _{opr} | -20 to +60 | °C |
| Storage temperature | T _{stg} | -20 to +80 | °C |

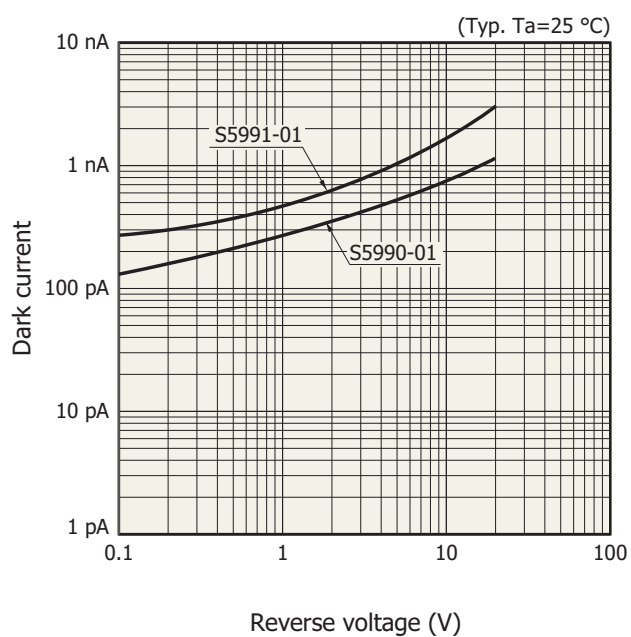
Electrical and optical characteristics (Ta=25 °C)

| Parameter | Symbol | Condition | S5990-01 | | | S5991-01 | | | Unit |
|-----------------------------|-----------------|--|----------|-------------|------|----------|-------------|------|------------|
| | | | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| Spectral response range | λ | | - | 320 to 1100 | - | - | 320 to 1100 | - | nm |
| Peak sensitivity wavelength | λ_p | | - | 960 | - | - | 960 | - | nm |
| Photosensitivity | S | $\lambda = \lambda_p$ | - | 0.6 | - | - | 0.6 | - | A/W |
| Interelectrode resistance | R _{ie} | V _b =0.1 V | 5 | 7 | 15 | 5 | 7 | 15 | k Ω |
| Position detection error | E | $\lambda = 900$ nm, V _R =5 V light spot size: $\phi 0.2$ mm * | - | ±70 | ±150 | - | ±150 | ±250 | μ m |
| Saturation photocurrent | I _{st} | $\lambda = 900$ nm, V _R =5 V R _L =1 k Ω | - | 500 | - | - | 500 | - | μ A |
| Dark current | I _D | V _R =5 V | - | 0.5 | 10 | - | 1 | 50 | nA |
| Rise time | t _r | V _R =5 V, R _L =1 k Ω $\lambda = 900$ nm | - | 1 | - | - | 2 | - | μ s |
| Terminal capacitance | C _t | V _R =5 V, f=10 kHz | - | 150 | 300 | - | 500 | 1000 | pF |
| Position resolution | ΔR | I _o =1 μ A, B=1 kHz * | - | 0.7 | - | - | 1.5 | - | μ m |

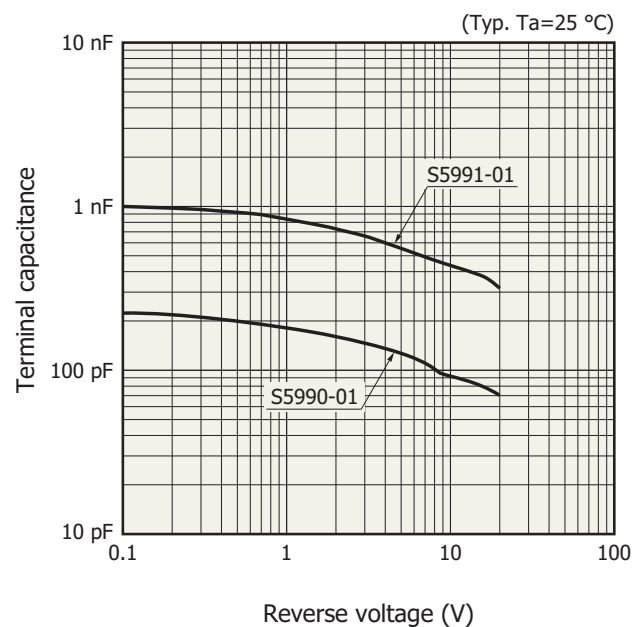
* In the range that is 80% from the center to the edge. Recommended light spot size is larger than $\phi 0.2$ mm.

Spectral response

KPSDB0026EA

Dark current vs. reverse voltage

KPSDB0068EA

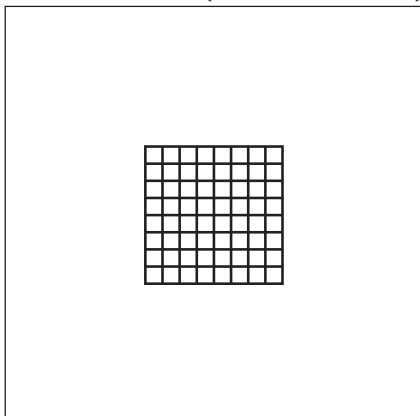
Terminal capacitance vs. reverse voltage

KPSDB0073EA

Example of position detectability ($T_a = 25\text{ }^{\circ}\text{C}$, $\lambda = 830\text{ nm}$, light spot size: $\phi 0.2\text{ mm}$)

S5990-01

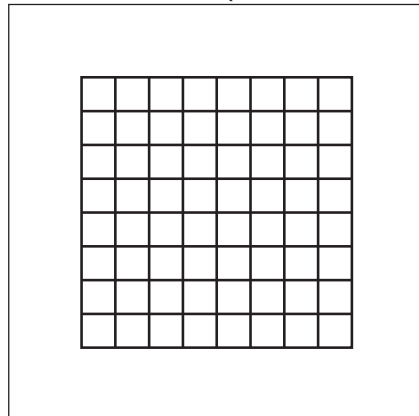
(Scan interval: 0.4 mm)



KPSDC0064EA

S5991-01

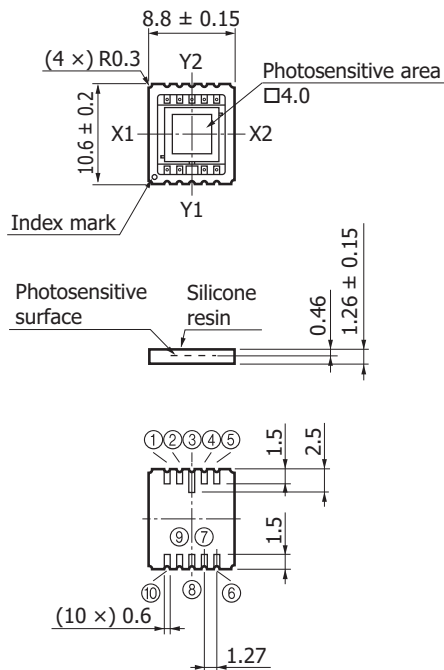
(Scan interval: 1 mm)



KPSDC0065EA

Dimensional outlines (unit: mm)

S5990-01



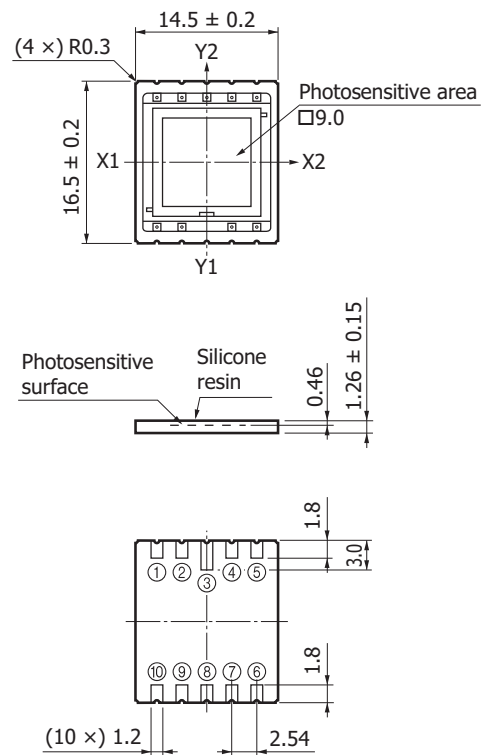
Burrs shall protrude no more than 0.3 mm on any side of package.

- ① Anode X1 (I1)
- ② NC
- ③ NC
- ④ NC
- ⑤ Anode Y1 (I3)
- ⑥ Anode X2 (I2)
- ⑦ NC
- ⑧ Cathode
- ⑨ NC
- ⑩ Anode Y2 (I4)

③ pin should be open-circuited

KPSDA0044EB

S5991-01



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- ③ NC
- ④ NC
- ⑤ Anode Y1 (I3)
- ⑥ Anode X2 (I2)
- ⑦ NC
- ⑧ Cathode
- ⑨ NC
- ⑩ Anode Y2 (I4)

③ pin should be open-circuited

KPSDA0045EA

Conversion formula

$$\frac{(l_2 + l_3) - (l_1 + l_4)}{l_1 + l_2 + l_3 + l_4} = \frac{2x}{L}$$

$$\frac{(l_2 + l_4) - (l_1 + l_3)}{l_1 + l_2 + l_3 + l_4} = \frac{2y}{L}$$

x, y: position coordinate of light spot

S5990-01: L=4.5 mm

S5991-01: L=10 mm

■ Precautions

- The light input window of this product uses soft silicone resin. Avoid touching the window to keep it from grime and damage that can decrease sensitivity. External force applied to the resin surface may deform or cut off the wires, so do not touch the window to prevent such troubles.
 - Use rosin flux when soldering, to prevent the terminal lead corrosion. Reflow oven temperature should be at 260 °C maximum for 5 seconds maximum time under the conditions that no moisture absorption occurs.
Reflow soldering conditions differ depending on the type of PC board and reflow oven. Carefully check these conditions before use.
 - Silicone resin swells when it absorbs organic solvent, so do not use any solvent other than alcohol.
 - Avoid unpacking until you actually use this product to prevent the terminals from oxidation and dust deposits or the coated resin from absorbing moisture.
- When the product is stored for 3 months while not unpacked or 24 hours have elapsed after unpacking, perform baking in nitrogen atmosphere at 150 °C for 3 to 5 hours or at 120 °C for 12 to 15 hours before use.

Information described in this material is current as of May, 2013.

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.

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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, P.O.Box 6910, Bridgewater, N.J. 08807-0910, 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 Trappu, 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: Thorshamnsgatan 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) 02-935-81-733, Fax: (39) 02-935-81-741

China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaming Center, No.27 Dongsanhuan Beilu, Chaoyang District, Beijing 100020, China, Telephone: (86) 10-6586-6006, Fax: (86) 10-6586-2866