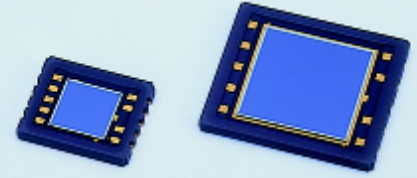


Two-dimensional PSD

S5990-01, S5991-01

Improved tetra-lateral type for surface mounting



Features

- Large active 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 boards provided
C4674 (DC signal processing circuit)
C7563 (AC signal processing circuit)

Applications

- Spot light detection
- Pointing device (computer mouse, track-ball)
- Position measurement

■ Absolute maximum ratings (Ta=25 °C)

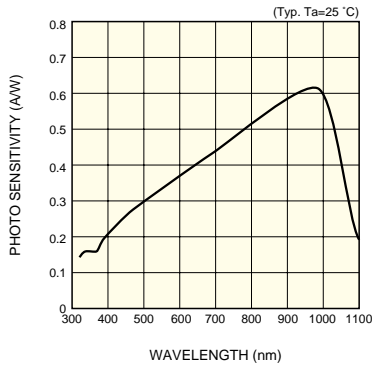
Parameter	Symbol	Value	Unit
Reverse voltage	VR Max.	20	V
Operating temperature	Topr	-20 to +60	°C
Storage temperature	Tstg	-20 to +80	°C

■ Electrical and optical characteristics (Ta=25 °C)

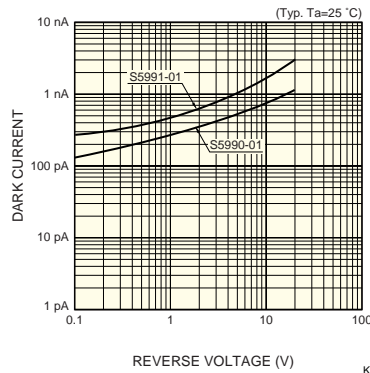
Parameter	Symbol	Condition	S5990-01			S5991-01			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Spectral response range	λ		-	320 to 1100	-	-	320 to 1100	-	nm
Peak sensitivity wavelength	λ_p		-	960	-	-	960	-	nm
Photo sensitivity	S	$\lambda = \lambda_p$	-	0.6	-	-	0.6	-	A/W
Interelectrode resistance	Rie	Vb=0.1 V	5	7	15	5	7	15	k Ω
Position detection error	E	$\lambda = 900$ nm VR=5 V, spot light size: $\phi 0.2$ mm *	-	± 70	± 150	-	± 150	± 250	μ m
Saturation photocurrent	Ist	$\lambda = 900$ nm, VR=5 V RL=1 k Ω	-	500	-	-	500	-	μ A
Dark current	ID	VR=5 V	-	0.5	10	-	1	50	nA
Rise time	tr	VR=5 V, RL=1 k Ω $\lambda = 900$ nm	-	1	-	-	2	-	μ s
Terminal capacitance	Ct	VR=5 V, f=10 kHz	-	150	300	-	500	1000	pF
Position resolution	ΔR	Io=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 spot light size is larger than $\phi 0.2$ mm.

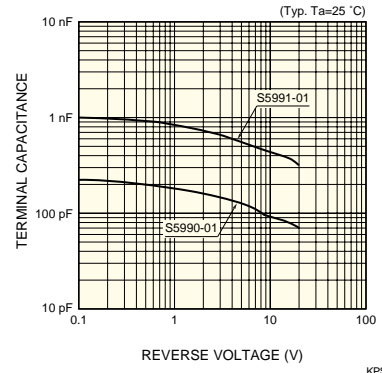
Spectral response



Dark current vs. reverse voltage

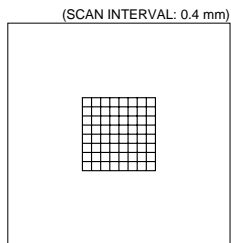


Terminal capacitance vs. reverse voltage

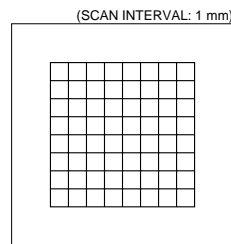


Example of position detectability (Ta=25 °C, λ=830 nm, Spot light size: φ0.2 mm)

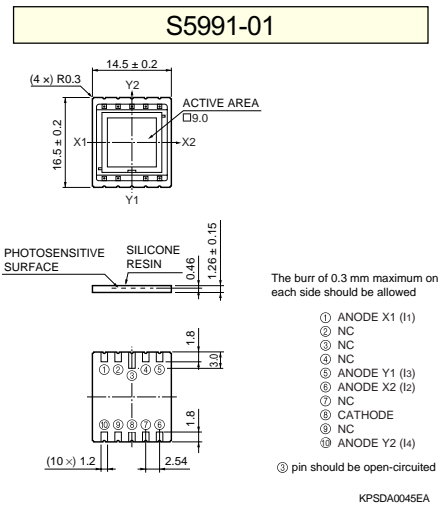
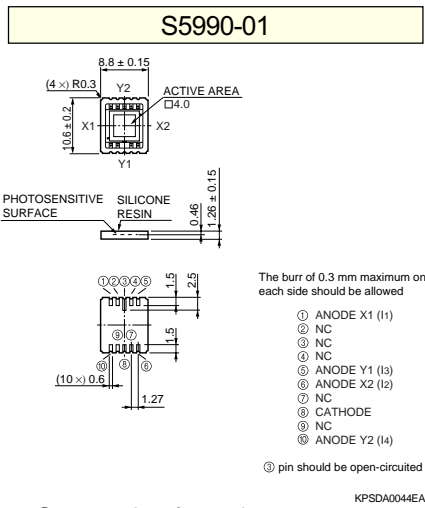
S5990-01



S5991-01



Dimensional outlines (unit: mm)



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 spot light
 S5990-01: L=4.5 mm
 S5991-01: L=10 mm

Precautions for use

- 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.