

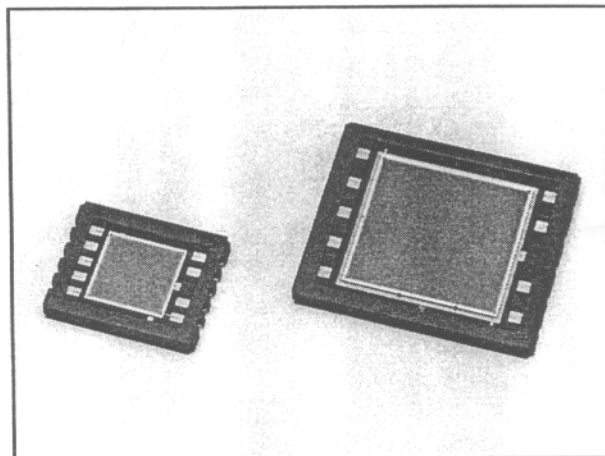
### Surface mount type PSDs (tetra-lateral types)

#### FEATURES

- Large active area  
S5990: 5 × 5 mm  
S5991: 10 × 10 mm
- Chip carrier package for surface mounting (automatic mounting with solder reflow) thin package: 1.26 mm
- Tetra-lateral types

#### APPLICATIONS

- Spot light detection
- Pointing device, etc. (computer mouse, track-ball)



#### ■ ABSOLUTE MAXIMUM RATINGS

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			S5991			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Spectral Response Range	$\lambda$		320 to 1100			320 to 1100			nm
Peak Sensitivity Wavelength	$\lambda_p$		-	960	-	-	960	-	nm
Photo Sensitivity	S	$\lambda = \lambda_p$	-	0.6	-	-	0.6	-	A/W
Interelectrode Resistance	Rie	Vb=0.1 V	5	10	15	5	10	15	k $\Omega$
Position Detection Error	E	$\lambda=900$ nm, VR=5 V illuminated spot size: $\phi 0.2$ mm *	-	$\pm 500$	$\pm 750$	-	$\pm 1000$	$\pm 1500$	$\mu$ m
Maximum Photocurrent	Ist	$\lambda=900$ nm VR=5 V, RL=1 k $\Omega$	-	1000	-	-	1000	-	$\mu$ A
Dark Current	ID	VR=5V	-	0.2	10.0	-	1.0	50.0	nA
Rise Time	tr	$\lambda=900$ nm VR=5 $\mu$ V, RL=1k $\Omega$	-	1.0	-	-	2.0	-	$\mu$ s
Position Resolution	$\Delta R$	Io=1 $\mu$ A, B=1 kHz *	-	0.5	-	-	1.1	-	$\mu$ m
Terminal Capacitance	Ct	VR=5 V, f=10 kHz	-	150	500	-	500	1000	pF

\* In the range that is 80 % from the center to the edge. Recommended light spot size is larger than 200  $\mu$ m dia.

HAMAMATSU provides one-element Si PIN photodiodes (S5106 and S5107) and 4-element Si PIN photodiodes (S5980 and S5981) with the same packages as S5990 and S5991, too.

# TWO-DIMENSIONAL PSDs S5990, S5991

Figure 1: Spectral Response

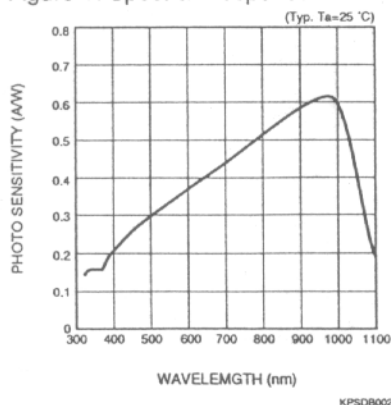


Figure 2: Dark Current vs. Reverse Voltage

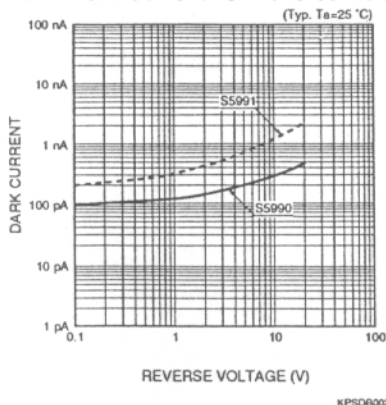


Figure 3: Terminal Capacitance vs. Reverse Voltage

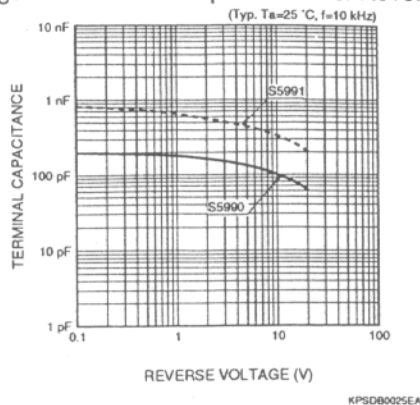
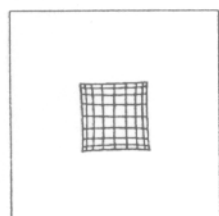


Figure 4: Example of Position Detectability

(Ta=25 °C,  $\lambda=830$  nm,  
Spot light size:  $\phi 0.2$  mm)  
● S5990  
(Scan Interval: 0.5 mm)



● S5991  
(Scan Interval: 1 mm)

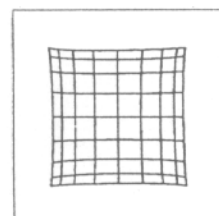
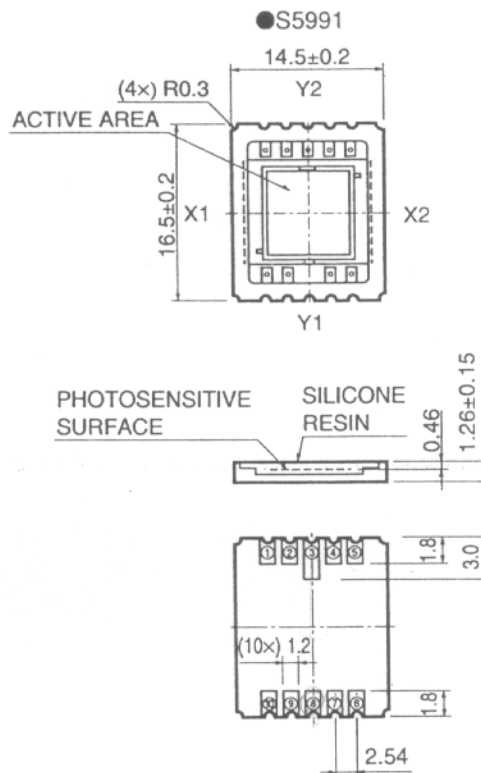
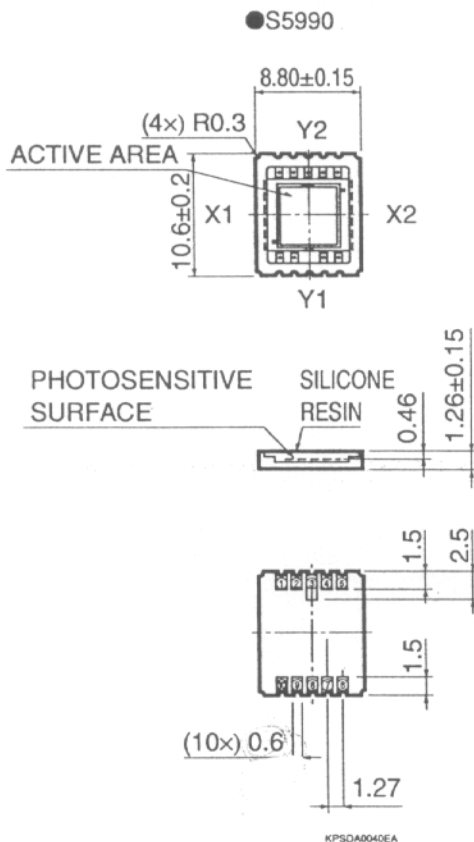


Figure 5: Dimensional Outlines (Unit:mm)



With respect to the outer dimensions, the 0.3 mm Max. on one side.

③ terminal should be open during use.

- ① ANODE X1
- ② NC
- ③ NC
- ④ NC
- ⑤ ANODE Y1
- ⑥ ANODE X2
- ⑦ NC
- ⑧ CATHODE
- ⑨ NC
- ⑩ ANODE Y2

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# PRECAUTIONS FOR HANDLING PHOTODIODES POTTED WITH SILICONE RESIN FOR LCC (Leadless Chip Carrier) PACKAGE SERIES

(Including baking and aluminum laminate-film packing)

## 1. Silicone resin used for potting photodiodes;

The silicone resin used for potting photodiodes is mainly selected for optimum light transmission. It differs greatly from package materials used for general-purpose ICs and shows the following characteristics:

- ① Flexibility (elasticity like rubber)
- ② A high degree of moisture permeability
- ③ A tendency to expand when exposed to organic solvents (swelling)

Therefore, sufficient care should be taken when handling the devices.

## 2. Precautions for storage;

To protect the terminal leads from oxidation and stains, and to prevent the package from absorbing moisture, avoid unpacking the devices until they are actually in use. Since these devices are packed with a moisture-proof conductive film, they can be stored for long periods (about 3 months) if they are left in air-conditioned environment at normal room temperatures and moistures (5 to 30°C, 70% RH or below).

After removing the moisture-proof film, store the devices in dehumidified atmosphere (5 to 25°C, 60% RH or below) and use them within 24 hours.

If the devices are stored for more than 3 months, or, if after unpacking, they are left for more than 24 hours, they should be rebaked in nitrogen flow at 150°C for 3 to 5 hours or at 120°C for about 12 hours.

Even when the devices are packed with the moisture-proof film, avoid exposing them to water leakage, harmful gases, direct sunlight, or temperature rises (e.g., turning off the air conditioner at night).

## 3. Precautions for handling or soldering the devices;

### (1) Handling the devices

The silicone resin is flexible and soft. Applying external pressure may damage the potted silicon resin and cause the bonding wires inside the device to become deformed and possibly severed, therefore the handling should be taken care of.

### (2) Soldering

Solder the leads at 260°C or less, within 10 seconds. Do not use any fluxes which are highly acid, alkaline, or inorganic because they may cause the leads to be eroded. Use a flux made of rosin.

## 4. Cleaning;

### (1) Solvent.

Use alcohol for cleaning.

If the devices are cleaned with organic solvents other than alcohol, the solvents may soak into the silicone resin, causing it to expand, thus generating a "swelling" phenomenon. This phenomenon progresses more rapidly in the liquid phase and may cause cracks in the resin and sever the bonding wires within several minutes.

### (2) Cleaning methods

When removing stains and dirt from the resin surface, use a cotton swab moistened with alcohol and wipe gently, being careful not to cause any damage.

If the devices are cleaned by running water, do not expose them to the water for more than one minute. Do not use ultrasonic cleaning methods on these devices.