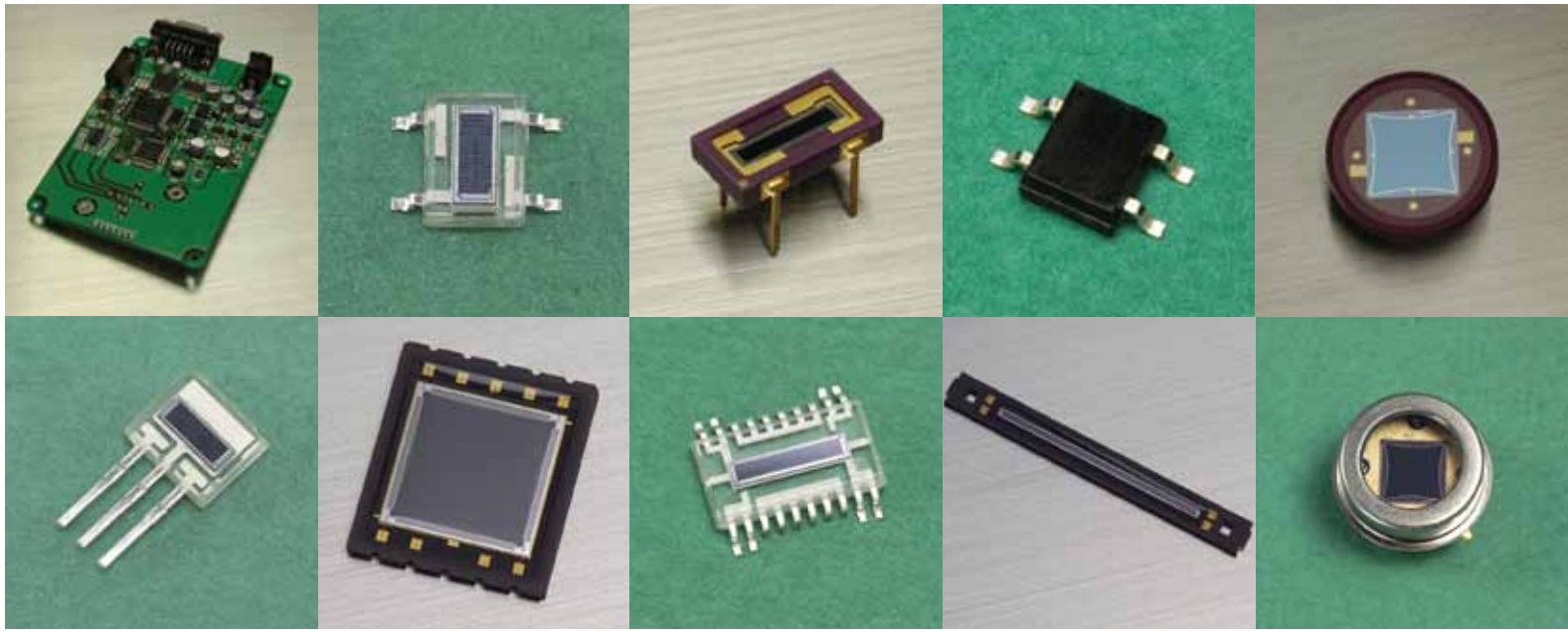


PSD (Position Sensitive Detectors)



Excellent position resolution in a fast, highly reliable sensor

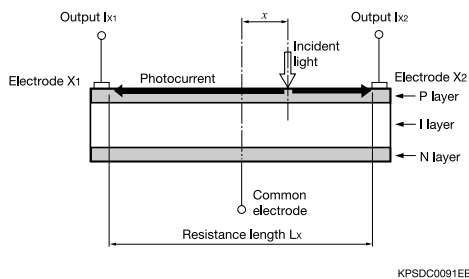
PSDs detect position data of incident spot light. Monolithic, PSDs can track very small positional changes over the photosensitive area. In contrast, discrete devices (CCDs) resolve distances limited by their pixel size and can lose microscopic spot information. PSDs provide higher position resolution with high-speed response and reliability. Hamamatsu PSDs are fabricated using our own cutting-edge semiconductor process technology and have the following features:

- Excellent position resolution
- Wide spectral response range
- High-speed response
- Simultaneously detects light level and center-of-gravity position of light spot
- High reliability

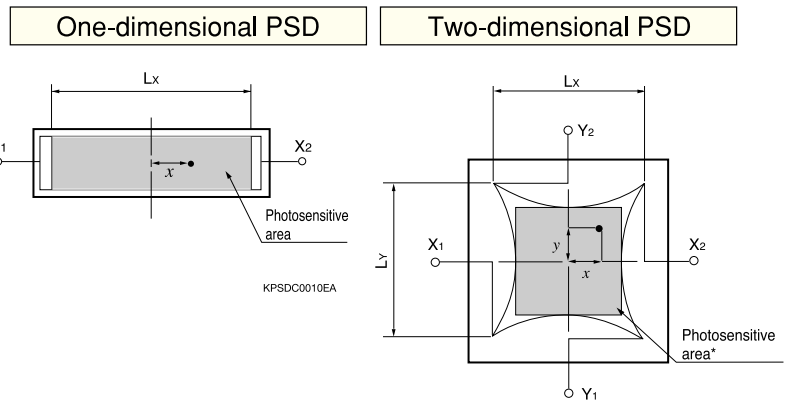
PSDs measure position, angles, distortion, vibration, and lens refraction/reflection. Some product examples are laser displacement meters, optical remote control devices, distance sensors, optical switches, and camera shake correctors.

One-dimensional PSDs operate simply, comparing two output currents, which determine the position. Two-dimensional PSDs compare four output currents. Hamamatsu sells operating circuit boards for most PSDs.

PSD sectional view



Photosensitive area chart, position conversion formula



* Photosensitive area is specified at the inscribed square.

KPSDC0012EA

$$\frac{Ix2 - Ix1}{Ix1 + Ix2} = \frac{2x}{Lx}$$

$$\frac{(Ix2 + Iy1) - (Ix1 + Iy2)}{Ix1 + Ix2 + Iy1 + Iy2} = \frac{2x}{Lx}$$

$$\frac{(Ix2 + Iy2) - (Ix1 + Iy1)}{Ix1 + Ix2 + Iy1 + Iy2} = \frac{2y}{Ly}$$

Hamamatsu PSDs

Type	Feature / Line-up
One-dimensional PSD	Visible light cut-off type suitable for detection of infrared light
	High IR sensitivity
	Ideal for detection of microscopic spot light such as from laser diode
	Long, narrow type with active area length of 30 mm or more
Two-dimensional PSD	High-speed response, low dark current, high position resolution

For detailed information and data on the products listed in this catalog, see their datasheets that are available from our website www.hamamatsu.com

One-dimensional PSD

PSD with a belt-like photosensitive area for position detection along the longer direction.

Type no.	Photosensitive area (mm)	Resistance length (mm)	Interelectrode resistance $V_b=0.1\text{ V}$ (k Ω)	Spectral response range (nm)	Package*1		Photo
S4581-04	1 × 2	2	140	760 to 1060	Plastic	①	
S4583-04	1 × 3	3	140	760 to 1100	Plastic	①	
S8673				320 to 1100	Plastic SIP		
S4584-04	1 × 3.5	3.5	140	760 to 1100	Plastic	①	
S4584-06				320 to 1100			
S3274-05			400	760 to 1100			
S7105-04	1 × 4.2	4.2	140	760 to 1100	Plastic	②	
S7105-06				320 to 1100			
S7105-05			400	760 to 1100			
S5629	1 × 6	6	50	760 to 1100	Plastic	③	
S5629-01				320 to 1100			
S5629-02			300	760 to 1100			
S3931	1 × 6	6	50	320 to 1100	Ceramic		
S3932	1 × 12	12					
S8543	0.7 × 24	24	140	320 to 1100	Surface-mount type ceramic		
S3270 *2	1 × 37	37	15	700 to 1100	Ceramic		




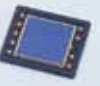
*1: Plastic package size (unit: mm)

① 4.0 × 4.8 × 1.8[†] ② 4.5 × 5.5 × 2.0[†] ③ 5.2 × 9.5 × 1.7[†]

*2: Works with microscopic spot light detection

Two-dimensional PSD

These PSDs detect two-dimensional positions.

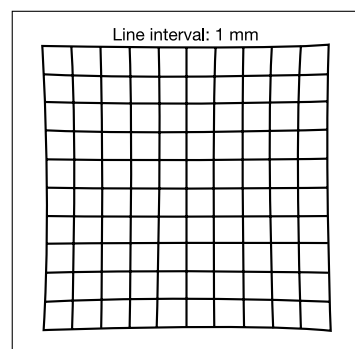
Type no.	Photosensitive area (mm)	Resistance length (mm)	Interelectrode resistance $V_b=0.1\text{ V}$ (k Ω)	Spectral response range (nm)	Package	Photo
S1880*3	12 × 12	14 × 14	10	320 to 1060	Ceramic	
S2044*3	4.7 × 4.7	5.7 × 5.7	10	320 to 1060	Metal	
S5990-01	4 × 4	4.5 × 4.5	7	320 to 1100	Ceramic chip carrier	
S5991-01	9 × 9	10 × 10	7			

*3: Works with microscopic spot light detection

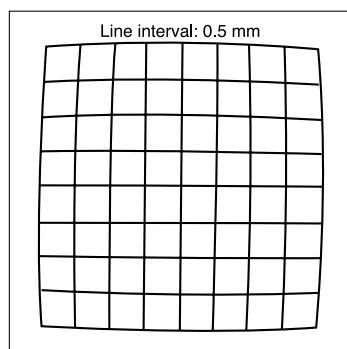
Examples of position detectability

[$T_a=25\text{ }^\circ\text{C}$, $\lambda=900\text{ nm}$ (S1880, S2044), $\lambda=830\text{ nm}$ (S5990-01, S5991-01), light spot size: $\phi 0.2\text{ mm}$]

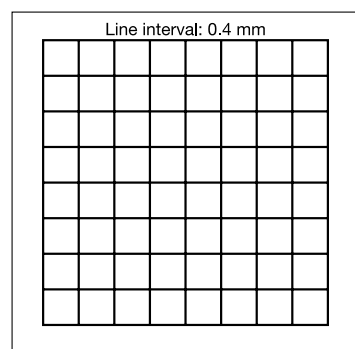
●S1880



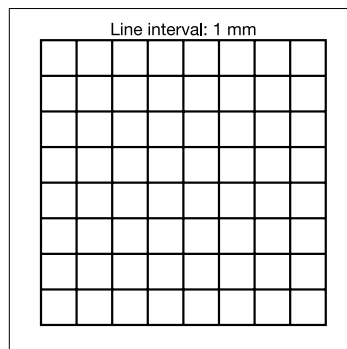
●S2044



●S5990-01







●S5991-01



PSD signal processing circuit




DC type

These are designed specifically for DC signal detection

Type no.	Compatible PSD	Output	Dimensions (mm)	Photo
C3683-02	One-dimensional PSD	Analog	66 × 56 × 15	
C9068		Digital (RS-232C)	110 × 75 × 15	
C4674-01	Two-dimensional PSD	Analog	90 × 65 × 15	
C9069		Digital (RS-232C)	110 × 75 × 15	

PSD module


These modules contain a high-precision PSD and a low-noise amplifier, and are able to perform accurate distance measurement.

Type no.	Built-in PSD	Photosensitive area (mm)	Peak sensitivity wavelength (nm)	Photosensitivity*4 (mV/μW)	Output	Dimensions (mm)	Photo
C10443-01	Two-dimensional PSD	4 × 4	960	-60	Analog	34 × 44 × 40	
C10443-02		9 × 9					
C10443-03		12 × 12	920				

*4: $\lambda = \lambda_p$

Signal processing unit for PSD module

The C10460 is a signal processing unit specifically designed to convert the output from a PSD module into position signals.

Type no.	Compatible PSD module	Analog output (V)	Digital output	Minimum measurement time interval (ms)	Dimensions (mm)	Photo
C10460	C10443-01/-02/-03	-10 to +10	Conforms to RS-232C (16-bit)	2	150 x 30 x 100	

HAMAMATSU

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PSD
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Hamamatsu also supplies:

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Imaging and processing systems

Information in this catalogue is believed to be reliable. However, no responsibility is assumed for possible inaccuracies or omissions. Specifications are subject to change without notice. No patent rights are granted to any of the circuits described herein.

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Quality, technology, and service are part of every product.

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