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 position-
al 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 prod-
uct 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 posi-
tion. Two-dimensional PSDs compare four output currents. Hamamatsu sells operating circuit 
boards for most PSDs.

### Hamamatsu PSDs

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

For detailed information and data on the products listed in this catalog, see their datasheets that are available from our website [www.hamamatsu.com](http://www.hamamatsu.com)
One-dimensional PSD

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

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Photosensitive area (mm)</th>
<th>Resistance length (mm)</th>
<th>Interelectrode resistance $V_b=0.1\ \text{V}$ (kΩ)</th>
<th>Spectral response range (nm)</th>
<th>Package*1</th>
<th>Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4581-04</td>
<td>1 x 2</td>
<td>2</td>
<td>140</td>
<td>760 to 1060</td>
<td>Plastic</td>
<td><img src="image1" alt="Image" /></td>
</tr>
<tr>
<td>S4583-04</td>
<td>1 x 3</td>
<td>3</td>
<td>140</td>
<td>760 to 1100</td>
<td>Plastic</td>
<td><img src="image2" alt="Image" /></td>
</tr>
<tr>
<td>S8673</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Plastic SIP</td>
<td><img src="image3" alt="Image" /></td>
</tr>
<tr>
<td>S4584-04</td>
<td>1 x 3.5</td>
<td>3.5</td>
<td>140</td>
<td>760 to 1100</td>
<td>Plastic</td>
<td><img src="image4" alt="Image" /></td>
</tr>
<tr>
<td>S4584-06</td>
<td>1 x 3.5</td>
<td>3.5</td>
<td></td>
<td>320 to 1100</td>
<td>Plastic</td>
<td><img src="image5" alt="Image" /></td>
</tr>
<tr>
<td>S3274-05</td>
<td></td>
<td></td>
<td></td>
<td>760 to 1100</td>
<td>Plastic</td>
<td><img src="image6" alt="Image" /></td>
</tr>
<tr>
<td>S7105-04</td>
<td></td>
<td></td>
<td></td>
<td>760 to 1100</td>
<td>Plastic</td>
<td><img src="image7" alt="Image" /></td>
</tr>
<tr>
<td>S7105-06</td>
<td>1 x 4.2</td>
<td>4.2</td>
<td>140</td>
<td>320 to 1100</td>
<td>Plastic</td>
<td><img src="image8" alt="Image" /></td>
</tr>
<tr>
<td>S7105-05</td>
<td></td>
<td></td>
<td></td>
<td>760 to 1100</td>
<td>Plastic</td>
<td><img src="image9" alt="Image" /></td>
</tr>
<tr>
<td>S5629</td>
<td></td>
<td></td>
<td></td>
<td>760 to 1100</td>
<td>Plastic</td>
<td><img src="image10" alt="Image" /></td>
</tr>
<tr>
<td>S5629-01</td>
<td>1 x 6</td>
<td>6</td>
<td>50</td>
<td>320 to 1100</td>
<td>Plastic</td>
<td><img src="image11" alt="Image" /></td>
</tr>
<tr>
<td>S5629-02</td>
<td></td>
<td></td>
<td></td>
<td>760 to 1100</td>
<td>Plastic</td>
<td><img src="image12" alt="Image" /></td>
</tr>
<tr>
<td>S3931</td>
<td>1 x 6</td>
<td>6</td>
<td>50</td>
<td>320 to 1100</td>
<td>Ceramic</td>
<td><img src="image13" alt="Image" /></td>
</tr>
<tr>
<td>S3932</td>
<td>1 x 12</td>
<td>12</td>
<td></td>
<td>320 to 1100</td>
<td>Ceramic</td>
<td><img src="image14" alt="Image" /></td>
</tr>
<tr>
<td>S8543</td>
<td>0.7 x 24</td>
<td>24</td>
<td>140</td>
<td>320 to 1100</td>
<td>Surface-mount type ceramic</td>
<td><img src="image15" alt="Image" /></td>
</tr>
<tr>
<td>S3270 ‡</td>
<td>1 x 37</td>
<td>37</td>
<td>15</td>
<td>700 to 1100</td>
<td>Ceramic</td>
<td><img src="image16" alt="Image" /></td>
</tr>
</tbody>
</table>

*1: Plastic package size (unit: mm)  
*2: 4.0 x 4.8 x 1.8  
  4.5 x 5.5 x 2.0  
  5.2 x 9.5 x 1.7  
*2: Works with microscopic spot light detection
Two-dimensional PSD

These PSDs detect two-dimensional positions.

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Photosensitive area (mm)</th>
<th>Resistance length (mm)</th>
<th>Interelectrode resistance Vb=0.1 V (kΩ)</th>
<th>Spectral response range (nm)</th>
<th>Package</th>
<th>Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1880**3</td>
<td>12 x 12</td>
<td>14 x 14</td>
<td>10</td>
<td>320 to 1060</td>
<td>Ceramic</td>
<td></td>
</tr>
<tr>
<td>S2044**3</td>
<td>4.7 x 4.7</td>
<td>5.7 x 5.7</td>
<td>10</td>
<td>320 to 1060</td>
<td>Metal</td>
<td></td>
</tr>
<tr>
<td>S5990-01</td>
<td>4 x 4</td>
<td>4.5 x 4.5</td>
<td>7</td>
<td>320 to 1100</td>
<td>Ceramic chip carrier</td>
<td></td>
</tr>
<tr>
<td>S5991-01</td>
<td>9 x 9</td>
<td>10 x 10</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*3: Works with microscopic spot light detection

** Examples of position detectability
[Ta=25 °C, λ=900 nm (S1880, S2044), λ=830 nm (S5990-01, S5991-01), light spot size: φ0.2 mm]

●S1880

![Line interval: 1 mm](image1)

●S2044

![Line interval: 0.5 mm](image2)

●S5990-01

![Line interval: 0.4 mm](image3)

●S5991-01

![Line interval: 1 mm](image4)
## PSD signal processing circuit

**DC type**

These are designed specifically for DC signal detection.

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Compatible PSD</th>
<th>Output</th>
<th>Dimensions (mm)</th>
<th>Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3683-02</td>
<td>One-dimensional PSD</td>
<td>Analog</td>
<td>66 x 56 x 15</td>
<td></td>
</tr>
<tr>
<td>C9068</td>
<td></td>
<td>Digital (RS-232C)</td>
<td>110 x 75 x 15</td>
<td></td>
</tr>
<tr>
<td>C4074-01</td>
<td>Two-dimensional PSD</td>
<td>Analog</td>
<td>90 x 65 x 15</td>
<td></td>
</tr>
<tr>
<td>C9069</td>
<td></td>
<td>Digital (RS-232C)</td>
<td>110 x 75 x 15</td>
<td></td>
</tr>
</tbody>
</table>

## PSD module

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

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Built-in PSD</th>
<th>Photosensitive area (mm)</th>
<th>Peak sensitivity wavelength (nm)</th>
<th>Photosensitivity&lt;sup&gt;4&lt;/sup&gt; (mV/μW)</th>
<th>Output</th>
<th>Dimensions (mm)</th>
<th>Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10443-01</td>
<td>Two-dimensional PSD</td>
<td>4 x 4</td>
<td>960</td>
<td>-80</td>
<td>Analog</td>
<td>34 x 44 x 40</td>
<td></td>
</tr>
<tr>
<td>C10443-02</td>
<td>Two-dimensional PSD</td>
<td>9 x 9</td>
<td></td>
<td>-80</td>
<td>Analog</td>
<td>34 x 44 x 40</td>
<td></td>
</tr>
<tr>
<td>C10443-03</td>
<td>Two-dimensional PSD</td>
<td>12 x 12</td>
<td>920</td>
<td></td>
<td>Analog</td>
<td>34 x 44 x 40</td>
<td></td>
</tr>
</tbody>
</table>

<sup>4</sup>: λ = λ<sub>0</sub>
The C10460 is a signal processing unit specifically designed to convert the output from a PSD module into position signals.

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Compatible PSD module</th>
<th>Analog output (V)</th>
<th>Digital output</th>
<th>Minimum measurement time interval (ms)</th>
<th>Dimensions (mm)</th>
<th>Photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10460</td>
<td>C10443-01/-02/-03</td>
<td>±10 to +10</td>
<td>Conforms to RS-232C (16-bit)</td>
<td>2</td>
<td>150 x 30 x 100</td>
<td></td>
</tr>
</tbody>
</table>
Main Products
Si photodiodes
APD
MPPC
Photo IC
Image sensors
X-ray flat panel sensors
PSD
Infrared detectors
LED
Optical communication devices
Automotive devices
Mini-spectrometers
High energy particle/X-ray detectors
Opto-semiconductor modules

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