PSD modules

C10443 series

Integrates a 2-PSD for precision photometry or a 4-segment Si photodiode with low-noise amp in a compact case

PSD modules contain a high-precision two-dimensional PSD (position sensitive detector) or a 4-segment Si photodiode and a low-noise amplifier, and are able to perform accurate distance measurement. Using a PSD module (excluding the C10443-06) with a dedicated signal processing unit C10460-01 allows obtaining distance information easily.

**Features**

- Easy handling
- High precision analog voltage output
- Only half size of a business card: 34 (W) × 40 (D) × 44 (H) mm

**Applications**

- Optical axis alignment
- Distance sensors
- Two-dimensional measurement
- Three-dimensional measurement
- Length measurement
- Liquid level sensors
- Distortion measurement
- Displacement sensor

**Selection guide**

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Detector type</th>
<th>Photosensitive area (mm)</th>
<th>Peak sensitivity wavelength λp (nm)</th>
<th>Dimensions (mm)</th>
<th>Cutoff frequency fc -3 dB (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10443-01</td>
<td>Two-dimensional PSD</td>
<td>4 × 4</td>
<td>960</td>
<td>34 × 40 × 44</td>
<td>DC</td>
</tr>
<tr>
<td>C10443-02</td>
<td></td>
<td>9 × 9</td>
<td></td>
<td></td>
<td>16 k</td>
</tr>
<tr>
<td>C10443-06</td>
<td>4-segment photodiode</td>
<td>10 × 10</td>
<td>960</td>
<td></td>
<td>160 k</td>
</tr>
</tbody>
</table>

**Recommended conditions/Absolute maximum ratings (Ta=25 °C unless otherwise noted)**

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Supply voltage Vs (V)</th>
<th>Current consumption Is Max. Dark state (mA)</th>
<th>Absolute maximum ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
<td>Supply voltage Vs max (V)</td>
</tr>
<tr>
<td>C10443-01</td>
<td>±5</td>
<td>±12</td>
<td>±2</td>
</tr>
<tr>
<td>C10443-02</td>
<td></td>
<td></td>
<td>±5</td>
</tr>
<tr>
<td>C10443-06</td>
<td></td>
<td>±15</td>
<td>±13</td>
</tr>
</tbody>
</table>

*1: No dew condensation

When there is a temperature difference between a product and the surrounding area in high humidity environments, dew condensation may occur on the product surface. Dew condensation on the product may cause deterioration in characteristics and reliability.

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.
Electrical and optical characteristics (Typ. Ta=25 °C, Vs=±12 V, unless otherwise noted)

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Spectral response range λ (nm)</th>
<th>Peak sensitivity wavelength λp (nm)</th>
<th>Saturation incident light level*2 Past (µW)</th>
<th>Photosensitivity*2 S (mV/µW)</th>
<th>Position detection error*3 E (µm)</th>
<th>Position resolution*4 ΔR (µm)</th>
<th>Σ=10 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10443-01</td>
<td>320 to 1100</td>
<td>960</td>
<td>167</td>
<td>-60</td>
<td>±70</td>
<td>±0.5</td>
<td></td>
</tr>
<tr>
<td>C10443-02</td>
<td>320 to 1100</td>
<td>960</td>
<td>139</td>
<td>-72</td>
<td>±150</td>
<td>±1.0</td>
<td></td>
</tr>
<tr>
<td>C10443-06</td>
<td>320 to 1100</td>
<td>960</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*2: λ=λp
*3: Reference value. Values may vary depending on operating environment. Position detection error is specified within a circular range of 80% from the center of the photosensitive area to the edge. Recommended light spot size: Ø0.2 mm or more.
*4: Reference value. Values may vary depending on operating environment. Σ is the sum of each output voltage and calculated as follows.
Σ = Vx1 + Vx2 + Vy1 + Vy2

<table>
<thead>
<tr>
<th>Type no.</th>
<th>Maximum output amplitude voltage Vfs (V)</th>
<th>Offset voltage Vos Dark state (mV)</th>
<th>Output noise voltage*5 Vn Dark state (mVp-p)</th>
<th>Cutoff frequency fc -3 dB (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>Max.</td>
<td>Min.</td>
<td>Max.</td>
</tr>
<tr>
<td>C10443-01</td>
<td>-</td>
<td>-Vs + 1.1</td>
<td>-5</td>
<td>+5</td>
</tr>
<tr>
<td>C10443-02</td>
<td>-</td>
<td>-Vs + 2.5</td>
<td>-10</td>
<td>+10</td>
</tr>
<tr>
<td>C10443-06</td>
<td>-</td>
<td>-Vs + 2.5</td>
<td>-10</td>
<td>+10</td>
</tr>
</tbody>
</table>

*5: 0 V in dark state. A negative voltage output appears when light is input.

Spectral response

![Spectral response graph for C10443-01/02](Typ_Ta25%C)  
![Spectral response graph for C10443-06](Typ_Ta25%C)
**Example of position detectability (Ta=25 °C, λ=900 nm, light spot size: φ0.2 mm)**

<table>
<thead>
<tr>
<th>C10443-01</th>
<th>C10443-02</th>
</tr>
</thead>
</table>

**Block diagram**

**Conversion formula**

\[
x = \frac{(V_{X2} + V_{Y1}) - (V_{X1} + V_{Y2})}{V_{X1} + V_{X2} + V_{Y1} + V_{Y2}} \times \frac{L}{2}
\]

\[
y = \frac{(V_{X2} + V_{Y2}) - (V_{X1} + V_{Y1})}{V_{X1} + V_{X2} + V_{Y1} + V_{Y2}} \times \frac{L}{2}
\]

- \(x, y\): Position (mm) of light spot relative to center of PSD photosensitive area
- \(L\): 4.5 mm (C10443-01)
  10 mm (C10443-02)
**PSD modules | C10443 series**

#### Dimensional outline (unit: mm)

- **Connector**
  - HR-10A-10R-10PB (71)
  - Hirose Electric, 10-pin, male

- **Photosensitive area**
  - C10443-01: 4 × 4
  - C10443-02: 9 × 9
  - C10443-06: 10 × 10

- **Photosensitive surface**

- **Tolerance:** ±0.2

#### Connection example

- **PSD module**
- **Cable (accessory)**
- **Stabilized DC power supply (±5 to ±12 V)**
- Be sure to use a dual power supply with positive and negative output.
- **Readout device (voltmeter, etc.)**

#### Accessories (unit: mm)

- Instruction manual
- Cable (One end of cable is cut off.)

- **Connector** HR10A-10P-10S
  - Hirose Electric, 10-pin, female
**Options (sold separately)**

| Signal processing unit for PSD module C10460-01 |

This unit converts PSD module output into position signals. The position signals are output as both analog and digital signals. With the analog signal, simply connect a voltmeter to the connector, and the readout voltage will display the position information [output voltage (V) = position relative to the PSD center (mm), excluding the C10443-06]. With the digital signal, use a serial connection (RS-232C) to connect with a PC. Use the supplied sample software to easily retrieve position information into a PC. For the specifications, refer to the C10443-06 datasheet.

- Dimensions: 150 × 100 × 30 mm

- Applicable PSD modules
  - C10443-01
  - C10443-02

Note: The C10443-06 is not supported.

**Related information**

www.hamamatsu.com/sp/ssd/doc_en.html

- Precautions
- Disclaimer

- Technical notes
  - PSD
  - PSD processing circuits, PSD modules

Information described in this material is current as of March 2023. 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. Copying or reprinting the contents described in this material in whole or in part is prohibited without our prior permission.

HAMAMATSU PHOTOONICS 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

United Kingdom: HAMAMATSU PHOTONICS UK LIMITED: 2 Howard Court, Tewin Road, Welwyn Garden City, Hertfordshire, AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk

Information described in this material is current as of March 2023.