PHOTOSENSOR MODULES
H11900/H11901 SERIES

OVERVIEW
The H11900 and H11901 series are photosensor modules containing a metal package PMT and a high-voltage power supply circuit. The built-in PMT uses a metal package with the same diameter as a TO-8 metal package used for semiconductor photodetectors. Despite the small size nearly equal to photodiodes, this PMT delivers high gain, wide dynamic range, and high-speed response. Six types of products are available with different sensitivity characteristics such as spectral response ranges. Hamamatsu also provides "P" type with low dark count selected for photon counting measurement. The H11900 series are pin output type, while the H11901 are flexible cable output type.

PRODUCT VARIATIONS

○ Pin output type (On-board type)

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Spectral response</th>
<th>Photocathode</th>
<th>Window material</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>H11900-110 / H11900P-110</td>
<td>230 nm to 700 nm</td>
<td>Super bialkali</td>
<td>Borosilicate glass</td>
<td></td>
</tr>
<tr>
<td>H11900-113 / H11900P-113</td>
<td>185 nm to 700 nm</td>
<td>Super bialkali</td>
<td>Borosilicate glass</td>
<td></td>
</tr>
<tr>
<td>H11900-210 / H11900P-210</td>
<td>230 nm to 700 nm</td>
<td>Ultra bialkali</td>
<td>Borosilicate glass</td>
<td></td>
</tr>
<tr>
<td>H11900-01 / H11900P-01</td>
<td>230 nm to 870 nm</td>
<td>Multialkali</td>
<td>Borosilicate glass</td>
<td></td>
</tr>
<tr>
<td>H11900-04 / H11900P-04</td>
<td>185 nm to 870 nm</td>
<td>Multialkali</td>
<td>UV glass</td>
<td></td>
</tr>
<tr>
<td>H11900-20</td>
<td>230 nm to 920 nm</td>
<td>Exteded red multialkali</td>
<td>Borosilicate glass</td>
<td>P Type: For photon counting</td>
</tr>
</tbody>
</table>

○ Cable output type

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<th>Window material</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>H11901-110 / H11901P-110</td>
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This product can’t be used at vacuum environment or reduced pressure environment.

Figure 1: Typical spectral response
### PHOTOSENSOR MODULES H11900/H11901 SERIES

**SPECIFICATIONS**

(at +25 °C)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>H11900 / H11901 Series</th>
<th>Unit</th>
</tr>
</thead>
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<tr>
<td>Suffix</td>
<td>-110, -113</td>
<td></td>
</tr>
<tr>
<td>-120</td>
<td>-01, -04</td>
<td></td>
</tr>
<tr>
<td>-20</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

- **Input voltage**
  - Max. input voltage: +11.5 to +15.5 V
  - Max. input current: +18 mA

- **Max. average output signal current**
  - +1.0 V control voltage: 12 µA

- **Max. control voltage**
  - +1.1 (Input Impedance 30 kΩ) V

- **Recommended control voltage adjustment range**
  - +0.5 to +1.1 (Input Impedance 30 kΩ) V

- **Effective area**
  - 8 mm

- **Luminous sensitivity**
  - Min. 400 nm
  - Typ. 400 nm
  - Typ. 400 nm
  - Typ. 630 nm

- **Blue sensitivity index (CS 5-58)**
  - Min. 80
  - Typ. 105
  - Typ. 135
  - Typ. 200
  - Typ. 500

- **Red / White ratio**
  - Min. 80
  - Typ. 105
  - Typ. 135
  - Typ. 200
  - Typ. 350

- **Radiant sensitivity**
  - Min. 2.2 × 10^5 A/lm
  - Typ. 2.6 × 10^5 A/lm
  - Typ. 1.5 × 10^6 A/W
  - Typ. 1.5 × 10^6 A/W

- **Dark current**
  - Min. 100
  - Typ. 100
  - Typ. 100
  - Typ. 100

- **Rise time**
  - Min. 600 s
  - Typ. 1 NS

- **Ripple noise**
  - Min. 0.6 mV
  - Typ. 0.2 mV

- **Settling time**
  - Min. 100 ks

- **Operating ambient temperature**
  - Min. -20 to +50 ºC

- **Storage temperature**
  - Min. -20 to +50 ºC

- **Weight**
  - Min. 45 (H11900 Series), 60 (H11901 Series) g

*1: At +15 V input voltage, +1.0 V control voltage, and output current equal to dark current
*2: Control voltage = +1.0 V
*3: Measured at the peak sensitivity wavelength
*4: After 30 minutes storage in darkness.
*5: Cable RG-174/U, Cable length 450 mm, Load resistance = 1 MΩ, Load capacitance = 22 pF
*6: The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.
*7: No condensation

**Figure 2: Schematic diagram**

**Figure 3: Sensitivity adjustment method**

- **PHOTOSSENSOR MODULE**
  - SIGNAL OUTPUT
  - LOW VOLTAGE INPUT (RED)
  - GND (BLACK)
  - GND (WHITE)
  - Vref OUTPUT (BLUE)
  - Vcont INPUT (WHITE)

- **POWER SUPPLY**
  - +15 V
  - GND

- **PHOTOSSENSOR MODULE**
  - SIGNAL OUTPUT
  - LOW VOLTAGE INPUT (RED)
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  - Vcont INPUT (WHITE)

- **POWER SUPPLY**
  - +15 V
  - GND

* When using a potentiometer, adjust sensitivity while monitoring the control voltage so it does not exceed +1.1 V.

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**Footnotes:**
- 1: Adjust the control voltage to adjust the sensitivity.
- 2: Electrically insulate the reference voltage output.

Figure 4: Typical gain

Figure 5: Typical output current v.s. input current

Figure 6: Typical ripple noise

Figure 7: Typical DC linearity

Figure 8: Typical pulse linearity
PHOTOSENSOR MODULES H11900/H11901 SERIES

Figure 10: Dimensional outlines (Unit: mm)

H11900 Series

- Effective Area (ø 8 mm)
- Threaded Hole for Option *
- Bottom View

H11901 Series

- Effective Area (ø 8 mm)
- Threaded Hole for Option *
- Bottom View

Figure 11: Cross-sectional diagram

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OPTION

OPTICAL FIBER ADAPTER E5776 / E5776-51

- E5776 (FC Type)
- E5776-51 (SMA Type)

C-MOUNT ADAPTER A9865

- Supplied with M2 screws (4 pcs) for fixing to module

Note: Optical blocks are available for these photosensor modules to make compact optical systems without light leakage.

RELATED PRODUCT

POWER SUPPLY FOR PHOTOMULTIPLIER TUBE MODULES C7169

The C7169 is the power supply for photomultiplier tube modules which has 15 V input voltage. This unit can provide both the driving voltage and the control voltage. This feature enables users to operate the modules easily.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description / Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Voltage</td>
<td>±15</td>
<td>V</td>
</tr>
<tr>
<td>Output Current</td>
<td>Max. 0.3 (+15 V), 0.2 (-15 V)</td>
<td>A</td>
</tr>
<tr>
<td>Control Voltage</td>
<td>+0.25 to +1.8 V</td>
<td>V</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>AC 100 to AC 240 V</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Adjust within the recommended control voltage range for the photomultiplier tube module being used.

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