

OVERVIEW

The H11900 and H11901 series are photomultiplier tube 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 provides high gain, wide dynamic range, and high-speed response. Seven types of products are available with different sensitivity characteristics such as spectral response ranges. "P" type with low dark count selected for photon counting measurement is also available. The H11900 series are pin output type, while the H11901 series are flexible cable output type.



Left: H11900, Right: H11901

PRODUCT VARIATIONS

●Pin output type (On-board type)

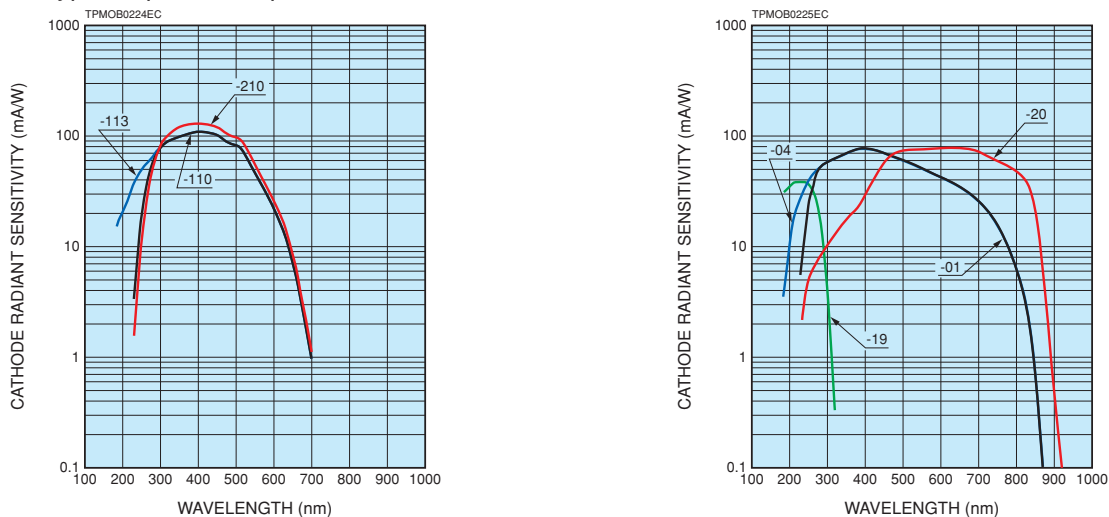
| Type No. | Spectral response | Photocathode | Window material | Notes |
|--------------------------|-------------------|--------------------------|--------------------|-----------------------------|
| H11900-110 / H11900P-110 | 230 nm to 700 nm | Super bialkali | Borosilicate glass | P Type: For photon counting |
| H11900-113 / H11900P-113 | 185 nm to 700 nm | Super bialkali | UV glass | |
| H11900-210 / H11900P-210 | 230 nm to 700 nm | Ultra bialkali | Borosilicate glass | |
| H11900-01 / H11900P-01 | 230 nm to 870 nm | Multialkali | Borosilicate glass | |
| H11900-04 / H11900P-04 | 185 nm to 870 nm | Multialkali | UV glass | — |
| H11900-20 | 230 nm to 920 nm | Extended red multialkali | Borosilicate glass | |
| H11900-19 | 185 nm to 320 nm | Cs-Te | Quartz glass | |

●Cable output type

| Type No. | Spectral response | Photocathode | Window material | Notes |
|--------------------------|-------------------|--------------------------|--------------------|-----------------------------|
| H11901-110 / H11901P-110 | 230 nm to 700 nm | Super bialkali | Borosilicate glass | P Type: For photon counting |
| H11901-113 / H11901P-113 | 185 nm to 700 nm | Super bialkali | UV glass | |
| H11901-210 / H11901P-210 | 230 nm to 700 nm | Ultra bialkali | Borosilicate glass | |
| H11901-01 / H11901P-01 | 230 nm to 870 nm | Multialkali | Borosilicate glass | |
| H11901-04 / H11901P-04 | 185 nm to 870 nm | Multialkali | UV glass | — |
| H11901-20 | 230 nm to 920 nm | Extended red multialkali | Borosilicate glass | |
| H11901-19 | 185 nm to 320 nm | Cs-Te | Quartz glass | |

This product can't be used at vacuum environment or reduced pressure environment.

Figure 1: Typical spectral response



PHOTOMULTIPLIER TUBE MODULES

H11900/H11901 SERIES

SPECIFICATIONS

(at +25 °C)

| Parameter | | H11900 / H11901 series | | | | | Unit | | |
|--|--------------------------------------|--------------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|--|-----------------|------|
| Suffix | | -110, -113 | -210 | -01, -04 | -20 | -19 | — | | |
| Input voltage | | +11.5 to +15.5 | | | | | V | | |
| Max. input voltage | | +18 | | | | | V | | |
| Max. input current *1 | | 12 | | | | | mA | | |
| Max. average output signal current *2 | | 100 | | | 10 | | 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 | | φ8 | | | | | mm | | |
| Peak sensitivity wavelength | | 400 | 400 | 400 | 630 | 240 | nm | | |
| Cathode | Luminous sensitivity | Min. | 80 | 100 | 100 | 350 | — | μA/lm | |
| | | Typ. | 105 | 135 | 200 | 500 | — | | |
| | Blue sensitivity index (Blue filter) | Typ. | 13.5 | 15.5 | — | — | — | — | |
| | Red / White ratio | Typ. | — | — | 0.2 | 0.45 | — | — | |
| Radiant sensitivity *3 | | Typ. | 110 | 130 | 77 | 78 | 35 | mA/W | |
| Anode | Standard type | Luminous sensitivity *2 | Min. | 80 | 100 | 100 | 350 | — | A/lm |
| | | | Typ. | 210 | 270 | 400 | 1000 | — | |
| | Radiant sensitivity *2 *3 | Typ. | 2.2 × 10 ⁵ | 2.6 × 10 ⁵ | 1.5 × 10 ⁵ | 1.5 × 10 ⁵ | 7.0 × 10 ⁴ | A/W | |
| | | Dark current *2 *4 | Typ. | 1 | 1 | 1 | 10 | 0.1 | nA |
| | Max. | | 10 | 10 | 10 | 100 | 1 | | |
| | P type dark count *2 *4 | Typ. | 50 | 50 | 600 | — | — | s ⁻¹ | |
| Max. | | 100 | 100 | 1000 | — | — | | | |
| Rise time *2 | | 0.57 | | | | | ns | | |
| Ripple noise *2 *5 (peak to peak) | | Max. | | 0.6 | | | mV | | |
| Settling time *6 | | Max. | | 0.2 | | | s | | |
| Operating ambient temperature *7 | | +5 to +50 | | | | | °C | | |
| Storage temperature *7 | | -20 to +50 | | | | | °C | | |
| Weight | | Typ. | | | | | 42 (H11900 series), 74 (H11900-19), 76.5 (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 min storage in darkness.

*5: Cable RG-174/U, Cable length 450 mm, Load resistance = 1 MΩ, Load capacitance = 14 pF

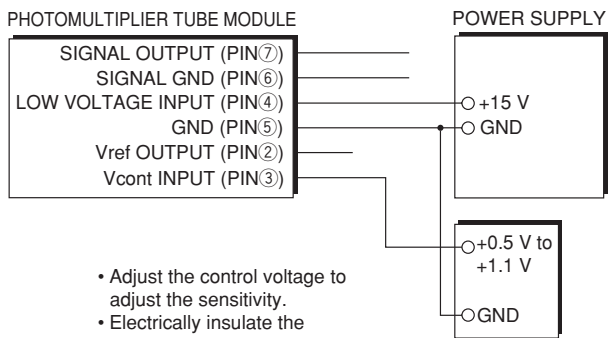
*6: The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

*7: No condensation

Figure 2: Sensitivity adjustment method

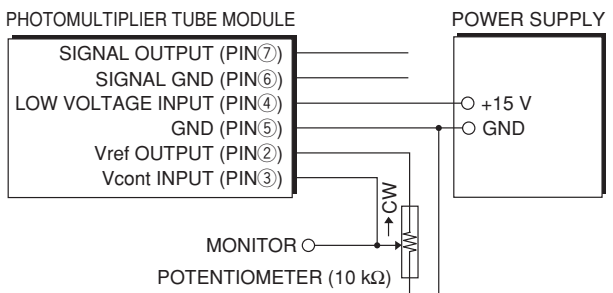
●H11900 series

VOLTAGE PROGRAMMING



- Adjust the control voltage to adjust the sensitivity.
- Electrically insulate the reference voltage output.

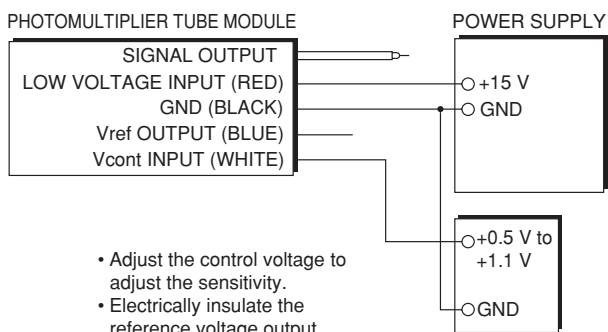
RESISTANCE PROGRAMMING



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

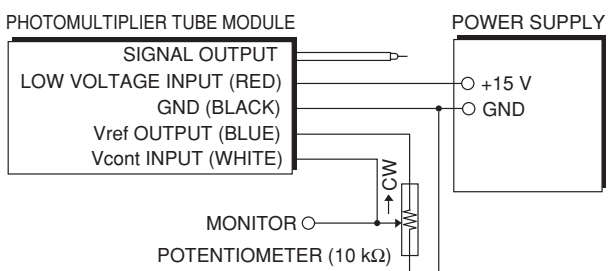
●H11901 series

VOLTAGE PROGRAMMING



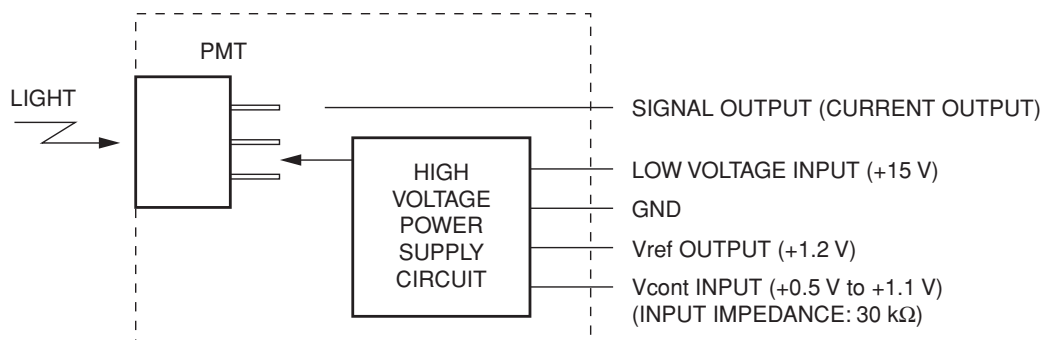
- Adjust the control voltage to adjust the sensitivity.
- Electrically insulate the reference voltage output.

RESISTANCE PROGRAMMING



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

Figure 3: Schematic diagram



PHOTOMULTIPLIER TUBE MODULES H11900/H11901 SERIES

Figure 4: Typical gain

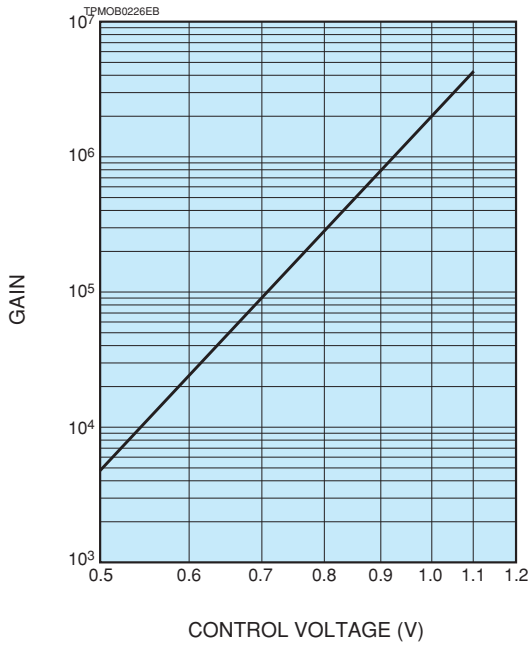


Figure 5: Typical output current v.s. input current

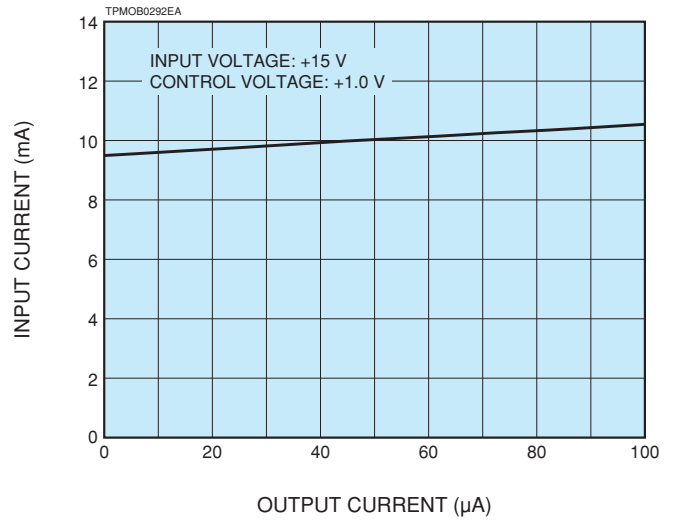


Figure 6: Typical ripple noise

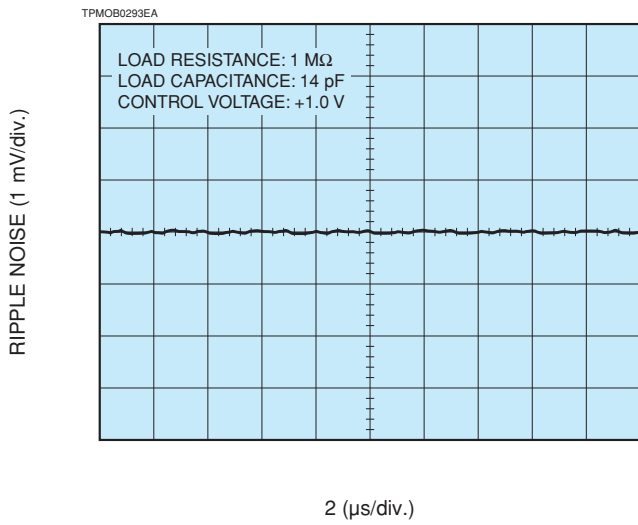


Figure 7: Typical pulse linearity

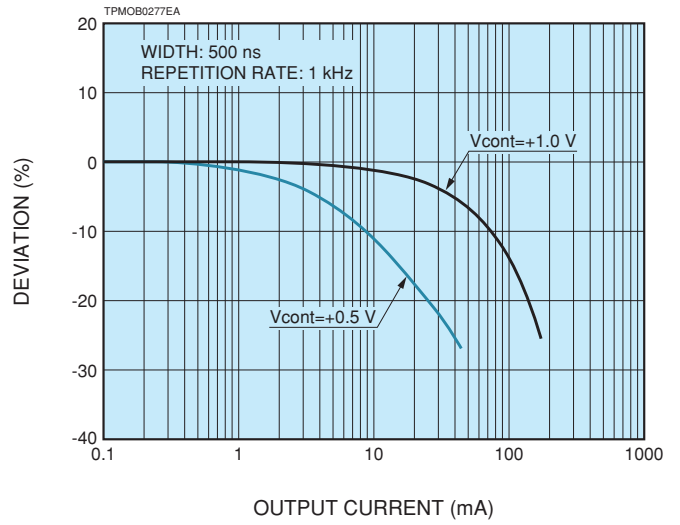
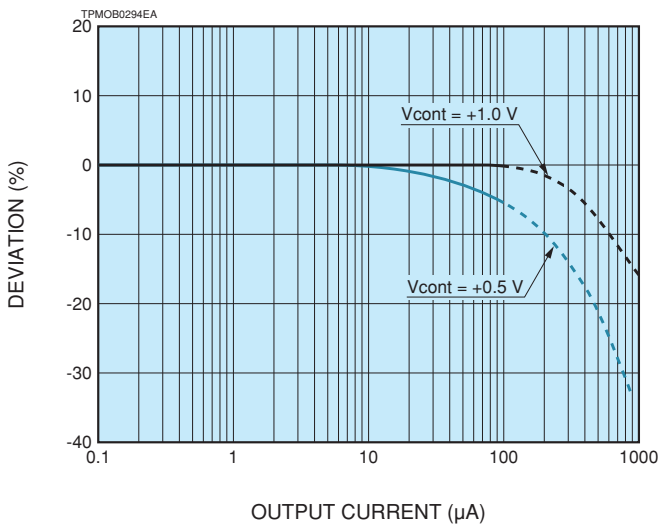


Figure 8: Typical DC linearity

● H1190x-110/H1190x-210/H1190x-113



● H1190x-01/H1190x-20/H1190x-04

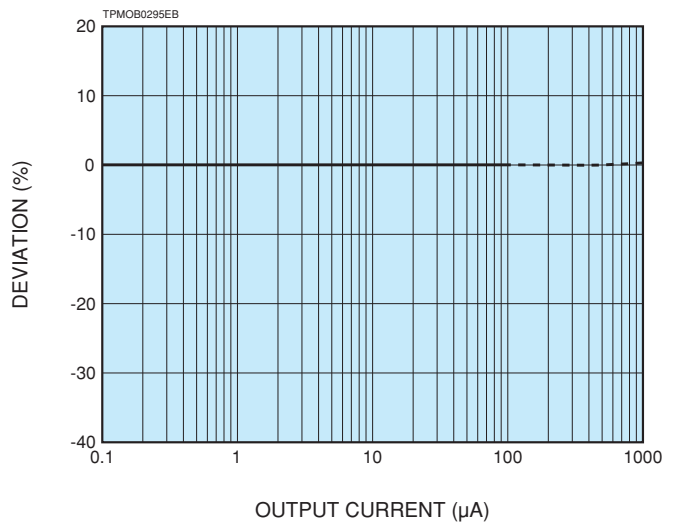
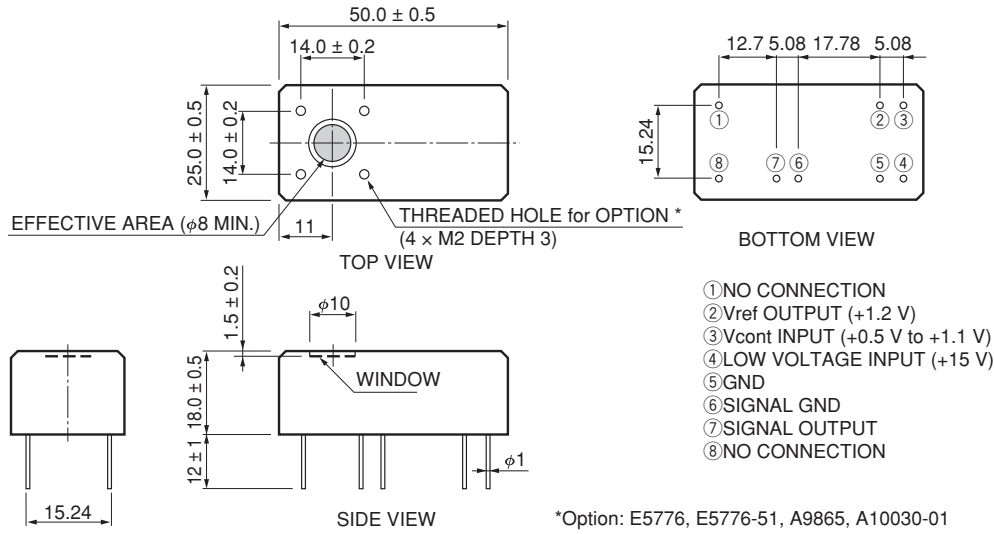


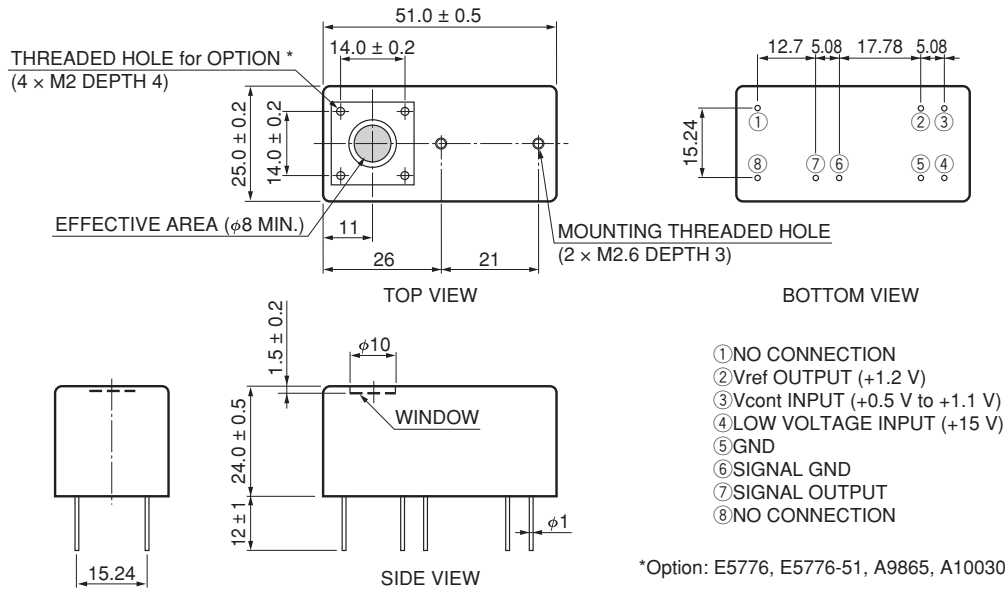
Figure 9: Dimensional outlines (Unit: mm)

H11900 series

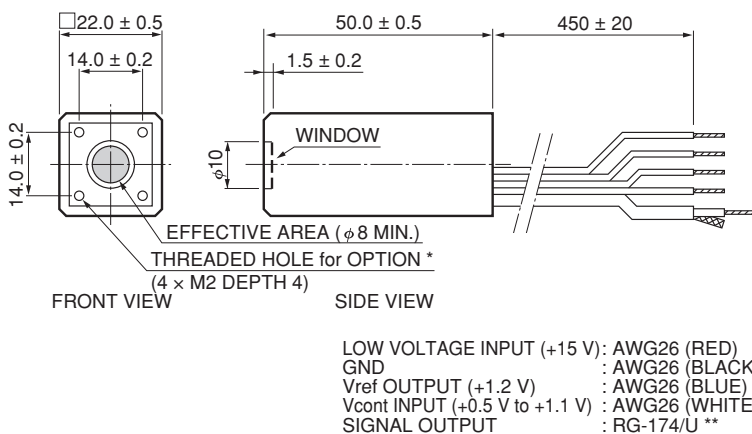


TPMOA0094EB

H11900-19



H11901 series



* Option: E5776, E5776-51, A9865, A10030-01

** Option: Available with BNC/SMA connector.

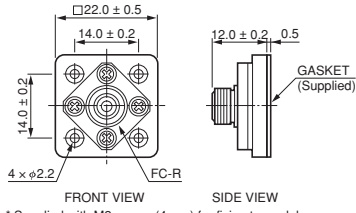
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PHOTOMULTIPLIER TUBE MODULES H11900/H11901 SERIES

OPTION

OPTICAL FIBER ADAPTER E5776 / E5776-51

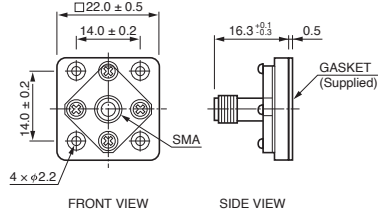
E5776 (FC Type)



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

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E5776-51 (SMA Type)

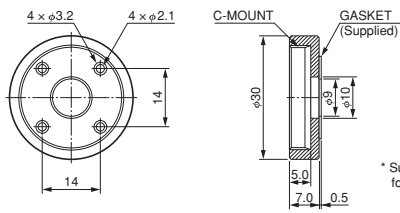


* Supplied with M2 screws(4 pcs) for fixing to module

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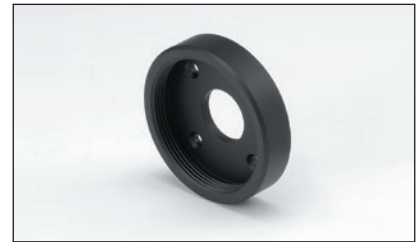


C-MOUNT ADAPTER A9865



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

TPMQA0056EB



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

RELATED PRODUCT

POWER SUPPLY FOR PHOTOMULTIPLIER TUBE MODULES C7169 SERIES

The C7169 series are 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.

| Parameter | Description / Value | Unit |
|---|-------------------------------|------|
| Output voltage | ±15 | V |
| Output current | Max. 0.3 (+15 V), 0.2 (-15 V) | A |
| Control voltage ^(A) (variable voltage range) | +0.25 to +1.8 | V |
| Input voltage | AC 100 to AC 240 | V |

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



PHOTOMULTIPLIER TUBE MODULES H11900/H11901 SERIES

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