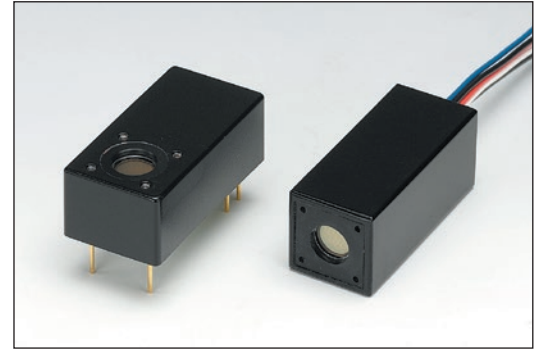


## OVERVIEW

The H10720 and H10721 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. The H10720 and H10721 series are also included "P" type with low dark count selected for photon counting measurement.

The H10720 series are pin output type, while the H10721 series are flexible cable output type.



Left: H10720, Right: H10721

## PRODUCT VARIATIONS

### ● Pin output type (On-board type)

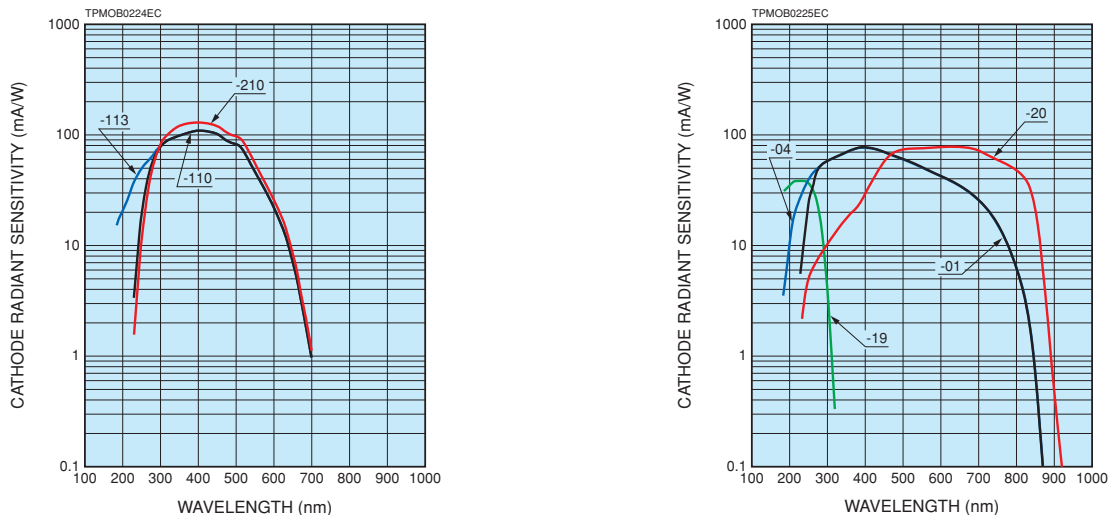
Type No.	Spectral response	Photocathode	Window material	Notes
H10720-110 / H10720P-110	230 nm to 700 nm	Super bialkali	Borosilicate glass	P Type: For photon counting
H10720-113 / H10720P-113	185 nm to 700 nm	Super bialkali	UV glass	
H10720-210 / H10720P-210	230 nm to 700 nm	Ultra bialkali	Borosilicate glass	
H10720-01 / H10720P-01	230 nm to 870 nm	Multialkali	Borosilicate glass	
H10720-04 / H10720P-04	185 nm to 870 nm	Multialkali	UV glass	—
H10720-20	230 nm to 920 nm	Extended red multialkali	Borosilicate glass	
H10720-19	185 nm to 320 nm	Cs-Te	Quartz glass	

### ● Cable output type

Type No.	Spectral response	Photocathode	Window material	Notes
H10721-110 / H10721P-110	230 nm to 700 nm	Super bialkali	Borosilicate glass	P Type: For photon counting
H10721-113 / H10721P-113	185 nm to 700 nm	Super bialkali	UV glass	
H10721-210 / H10721P-210	230 nm to 700 nm	Ultra bialkali	Borosilicate glass	
H10721-01 / H10721P-01	230 nm to 870 nm	Multialkali	Borosilicate glass	
H10721-04 / H10721P-04	185 nm to 870 nm	Multialkali	UV glass	—
H10721-20	230 nm to 920 nm	Extended red multialkali	Borosilicate glass	
H10721-19	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

## H10720/H10721 SERIES

### SPECIFICATIONS

(at +25 °C)

Parameter		H10720 / H10721 series					Unit		
Suffix		-110, -113	-210	-01, -04	-20	-19	—		
Input voltage		+2.8 to +5.5					V		
Max. input voltage		+5.5					V		
Max. input current *1		2.7					mA		
Max. average output signal current *2		100			10		μA		
Max. control voltage		+1.1 (Input impedance 1 MΩ)					V		
Recommended control voltage adjustment range		+0.5 to +1.1 (Input impedance 1 MΩ)					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 <sup>5</sup>	2.6 × 10 <sup>5</sup>	1.5 × 10 <sup>5</sup>	1.5 × 10 <sup>5</sup>	7.0 × 10 <sup>4</sup>	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 <sup>-1</sup>	
Max.		100	100	1000	—	—			
Rise time *2		0.57					ns		
Ripple noise *2 *5 (peak to peak)		Max.		0.1			mV		
Settling time *6		Max.		10			s		
Operating ambient temperature *7		+5 to +50					°C		
Storage temperature *7		-20 to +50					°C		
Weight		Typ.					42 (H10720 series), 74 (H10720-19), 76.5 (H10721 series)	g	

\*1: At +5 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

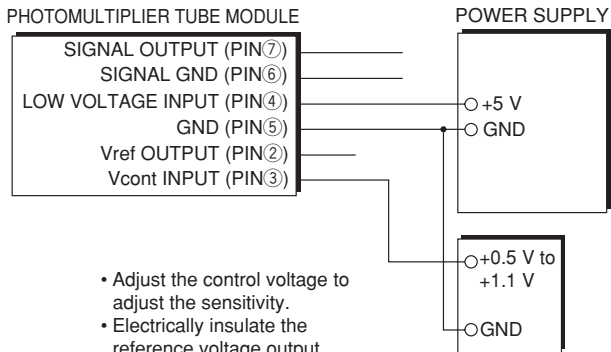
\*6: The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

\*7: No condensation

Figure 2: Sensitivity adjustment method

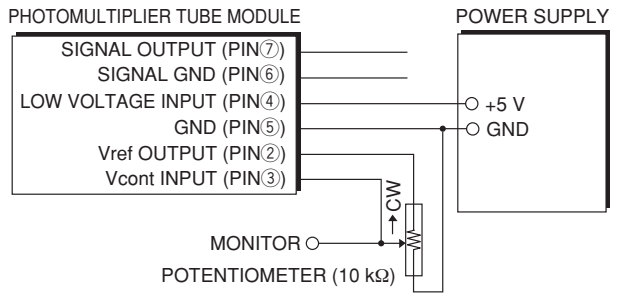
●H10720 series

VOLTAGE PROGRAMMING



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

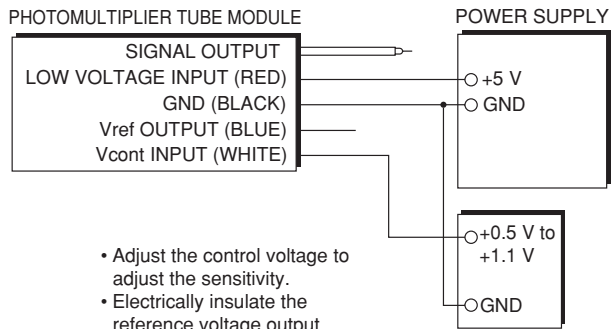
RESISTANCE PROGRAMMING



- \* When using a potentiometer, adjust sensitivity while monitoring the control voltage so it does not exceed +1.1 V.
- \*\* When input voltage is +4 V or less, please set resistance of potentiometer to 100 kΩ.

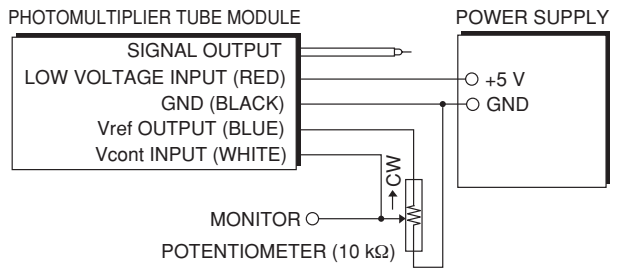
●H10721 series

VOLTAGE PROGRAMMING



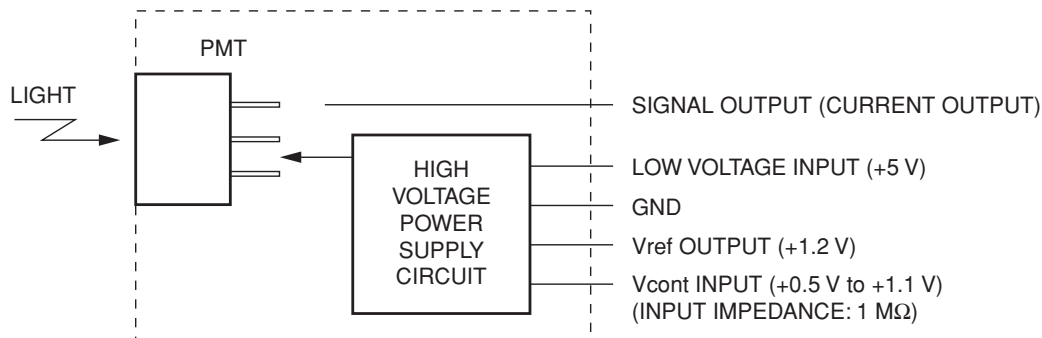
- Adjust the control voltage to adjust the sensitivity.
- Electrically insulate the reference voltage output.

RESISTANCE PROGRAMMING



- \* When using a potentiometer, adjust sensitivity while monitoring the control voltage so it does not exceed +1.1 V.
- \*\* When input voltage is +4 V or less, please set resistance of potentiometer to 100 kΩ.

Figure 3: Schematic diagram



# PHOTOMULTIPLIER TUBE MODULES H10720/H10721 SERIES

Figure 4: Typical gain

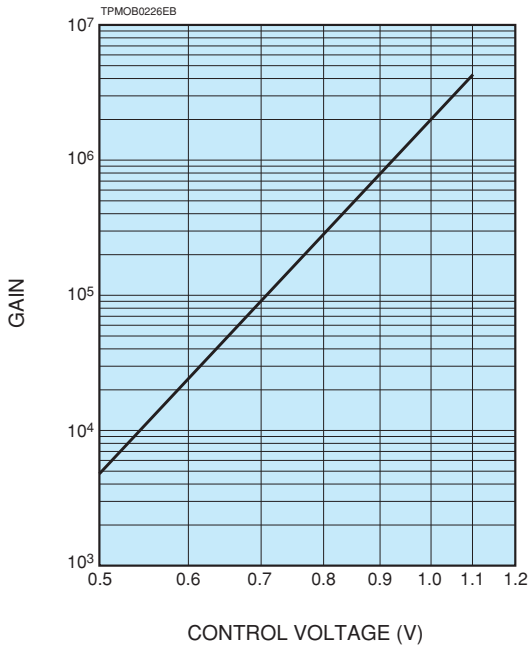


Figure 5: Typical output current v.s. input current

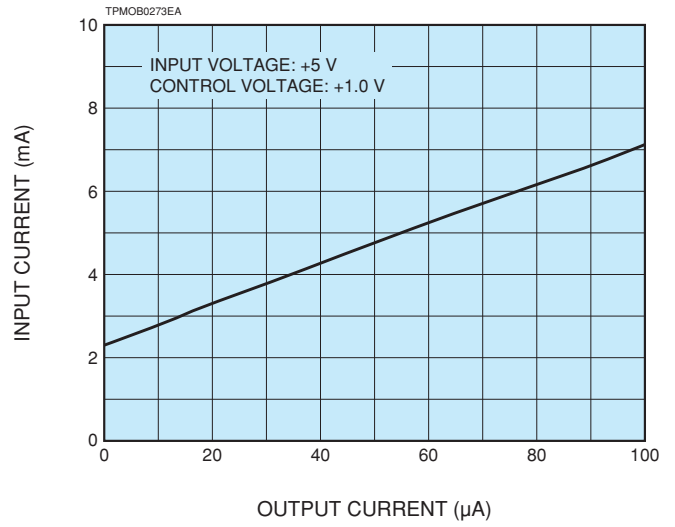


Figure 6: Typical ripple noise

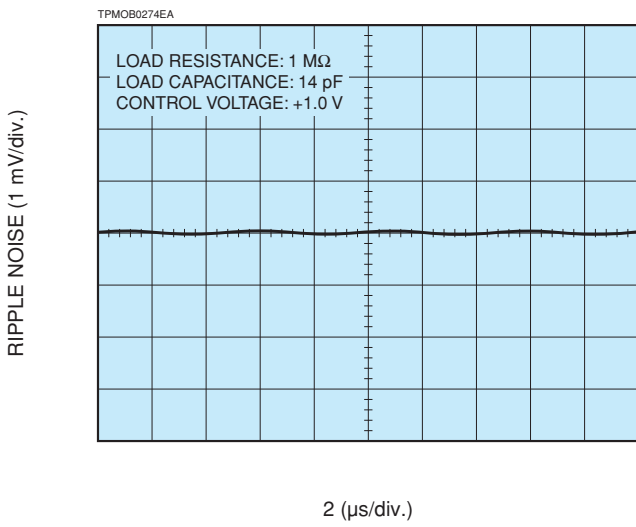


Figure 7: Typical pulse linearity

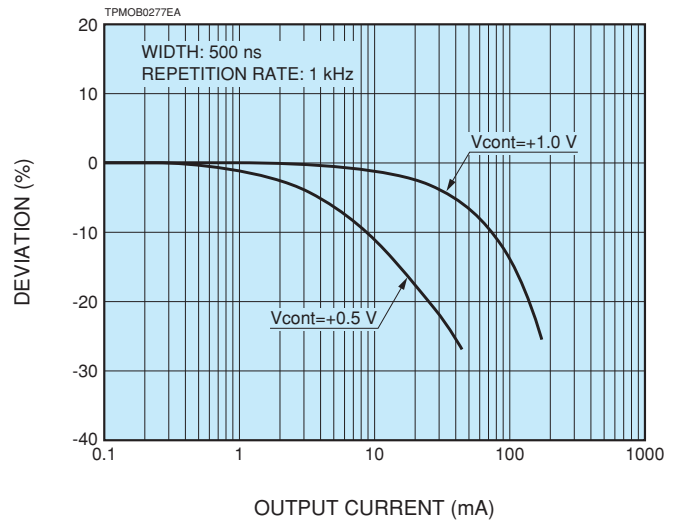
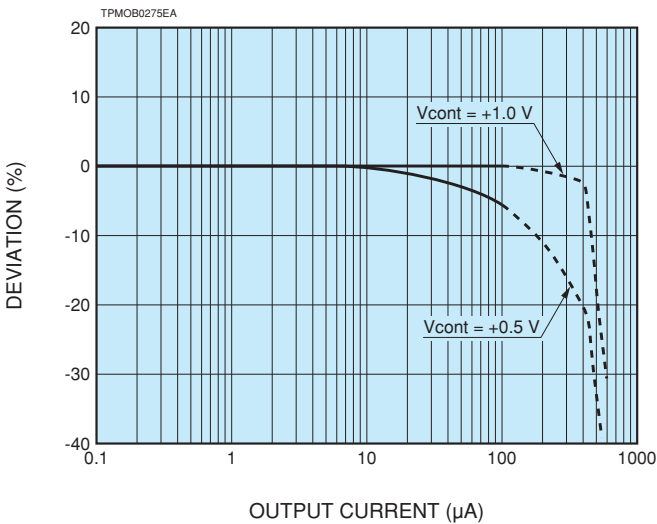


Figure 8: Typical DC linearity

● H1072x-110/H1072x-210/H1072x-113



● H1072x-01/H1072x-20/H1072x-04

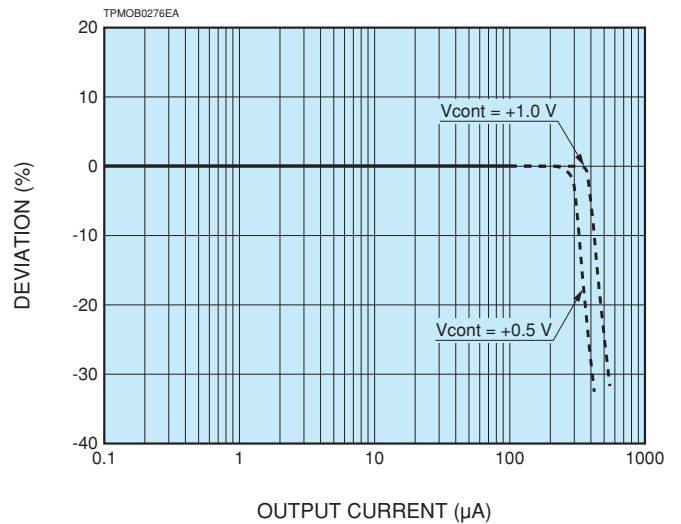
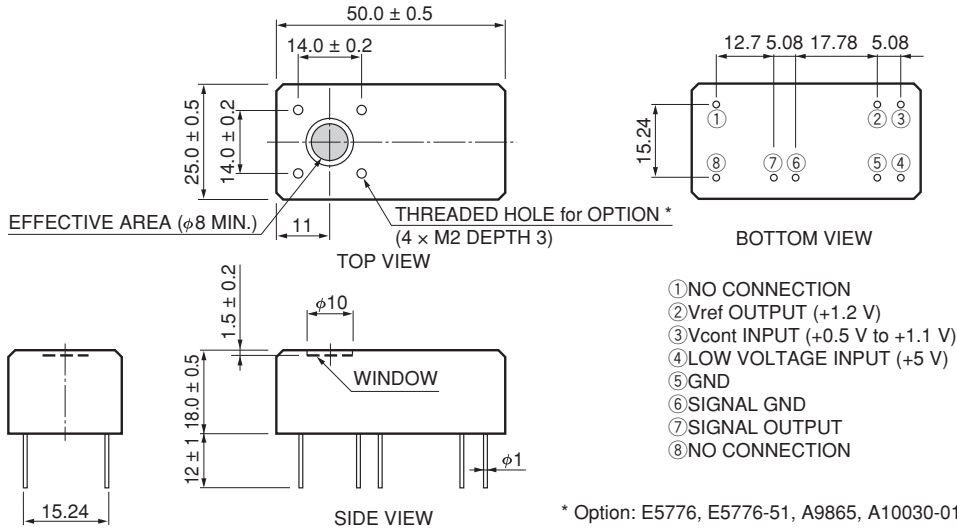


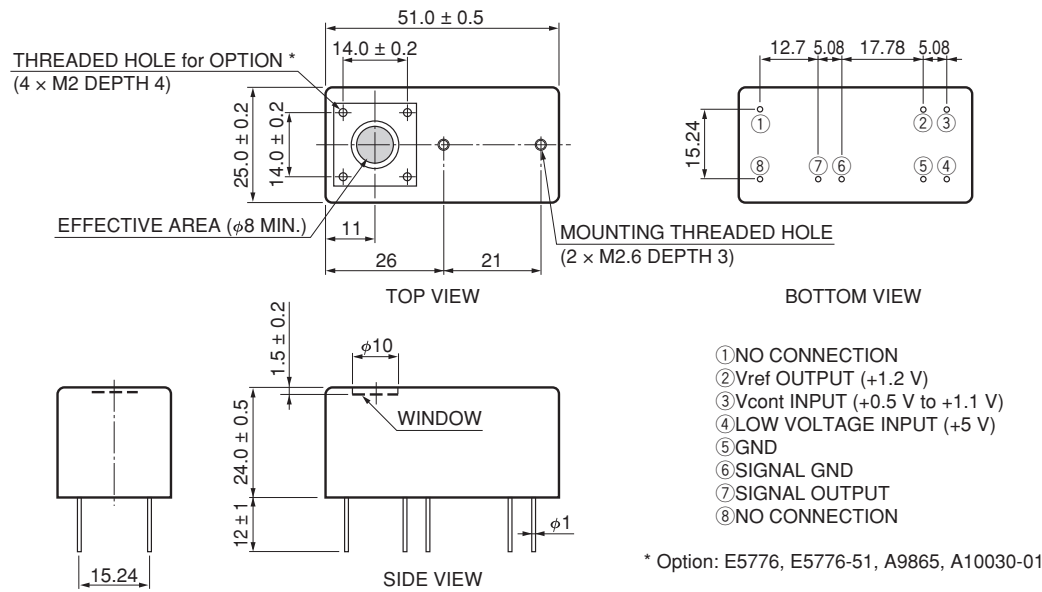
Figure 9: Dimensional outlines (Unit: mm)

**H10720 series**

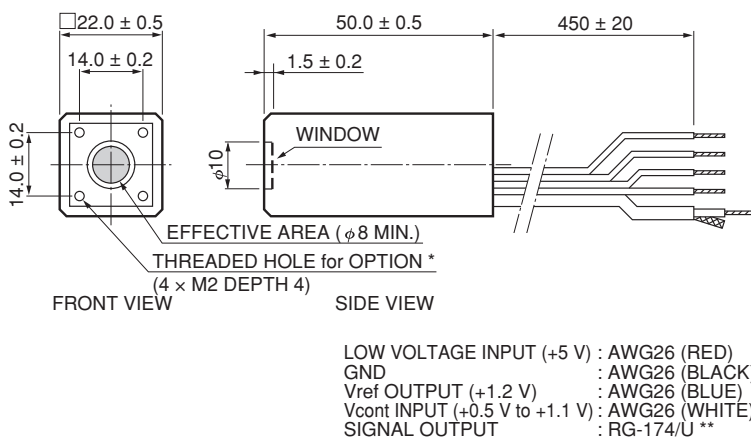


TPMOA0061EB

**H10720-19**



**H10721 series**



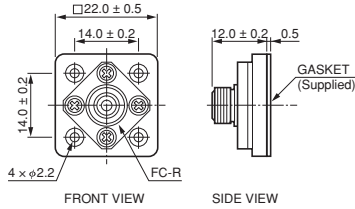
\* Option: E5776, E5776-51, A9865, A10030-01  
\*\* Option: Available with BNC/SMA connector.

# PHOTOMULTIPLIER TUBE MODULES H10720/H10721 SERIES

## OPTION

### OPTICAL FIBER ADAPTER E5776 / E5776-51

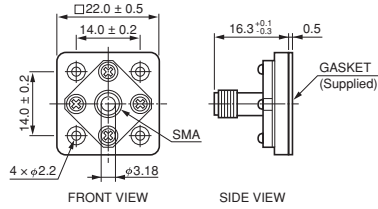
#### E5776 (FC Type)



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

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#### E5776-51 (SMA Type)

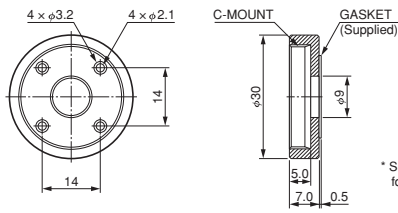


\* Supplied with M2 screws(4 pcs) for fixing to module

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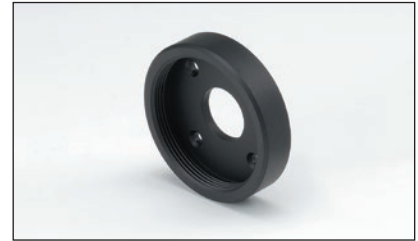


### C-MOUNT ADAPTER A9865



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

TPMOA0056EB



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 C10709 SERIES

The C10709 series are the power supply for photomultiplier tube modules which has 5 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	±5	V
Output current	Max. 2.0 (+5 V), 0.2 (-5 V)	A
Control voltage <sup>Ⓐ</sup> (variable voltage range)	+0.25 to +1.8	V
Input voltage	AC100 to AC240	V

**NOTE:** <sup>Ⓐ</sup>Adjust within the recommended control voltage range for the photomultiplier tube module being used.





# PHOTOMULTIPLIER TUBE MODULES H10720/H10721 SERIES

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