

# Metal Package PMT with Cooler

## Photosensor Modules H7422 Series



Heatsink with fan (A7423) sold separately

The H7422 series are PMT modules with an internal high-voltage power supply and a cooler installed to the metal package photomultiplier tube. Efficient cooling was achieved by placing the cooler near the photomultiplier tube to reduce thermal noise emitted from the photocathode and a high S/N ratio can be obtained even at extremely low light levels.

The H7422-40 has high sensitivity in the 300 nm to 720 nm wavelength. The H7422-50 is sensitive along a wide spectral range from 380 nm to 890 nm. The H7422-01 and H7422-02 have a maximum rated current value of 100  $\mu\text{A}$  and so are extremely effective when measurements are needed over a wide dynamic range. The photomultiplier tube is maintained at a constant temperature by monitoring the output from a thermistor installed near the photomultiplier and then regulating the current to the cooler.

## Product Variations

Type No.	Spectral Response	Max. Rated Output	Features
H7422-40	300 nm to 720 nm	2 $\mu\text{A}$	GaAsP photocathode, QE 40 % at peak wavelength, high gain (P type)
H7422P-40			
H7422-50	380 nm to 890 nm	100 $\mu\text{A}$	GaAs photocathode, QE 12 % at 800 nm, high gain (P type)
H7422P-50			
H7422-01	300 nm to 850 nm	100 $\mu\text{A}$	Multialkali photocathode
H7422-02	300 nm to 880 nm		Infrared-extended multialkali photocathode

## Specifications

Parameter		H7422 Series				Unit		
		-40	-50	-01	-02			
Suffix						—		
Input Voltage		+11.5 to +15.5				V		
Max. Input Voltage for Main Unit		+18				V		
Max. Input Current for Main Unit		30				mA		
Max. Input Voltage for Peltier Element		2.6				V		
Max. Input Current for Peltier Element		2.2				A		
Max. Output Signal Current *1		2		100		$\mu\text{A}$		
Max. Control Voltage		+0.9 (Input impedance 100 k $\Omega$ )				V		
Recommended Control Voltage Adjustment Range		+0.50 to +0.80		+0.25 to +0.80		V		
Effective Photocathode Size		$\phi 5$		$\phi 7$		mm		
Sensitivity Adjustment Range		1: 10 <sup>4</sup> (H7422-01/-02)				—		
Peak Sensitivity Wavelength		550	800	400	500	nm		
Cathode	Radiant Sensitivity	420 nm	108	15	56	mA/W		
		550 nm	176	50	36			
		800 nm	—	90	1.2		6.4	
Anode	Standard Type	Radiant Sensitivity *1 *4	550 nm	8.8 × 10 <sup>4</sup>	2.5 × 10 <sup>4</sup>	1.8 × 10 <sup>4</sup>	2.8 × 10 <sup>4</sup>	A/W
		Dark Current *1 *4	Typ.	0.4	0.5	0.03	0.08	nA
	Max.		1.0	1.3	0.08	0.2		
	P Type	Radiant Sensitivity *1 *4	550 nm	1.8 × 10 <sup>5</sup>	5.0 × 10 <sup>4</sup>	—	—	A/W
Dark Count *1 *4		Typ.	100	125	—	—	s <sup>-1</sup>	
	Max.	300	375	—	—			
Rise Time *1 *4		1.00		0.78		ns		
Ripple Noise (Max.) *2		0.6				mV		
Settling Time *3		0.2				s		
Operating Temperature Range		+5 to +35				°C		
Storage Temperature Range		-20 to +50				°C		
Weight		Approx. 400				g		

\*1: Control voltage = +0.8 V \*2: load resistance = 1 M $\Omega$ , load capacitance = 22 pF

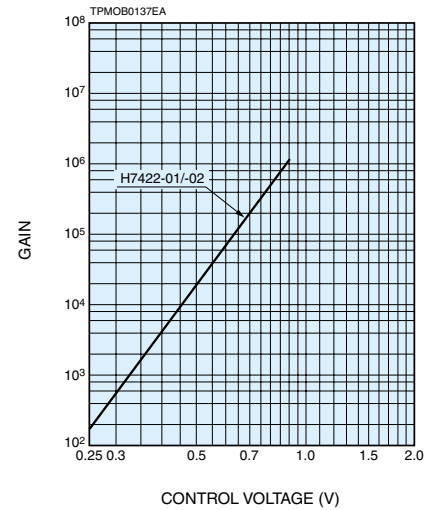
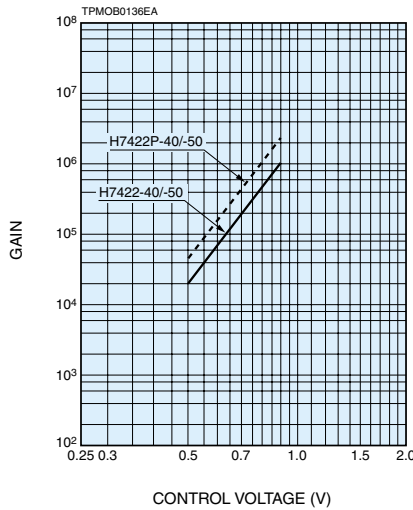
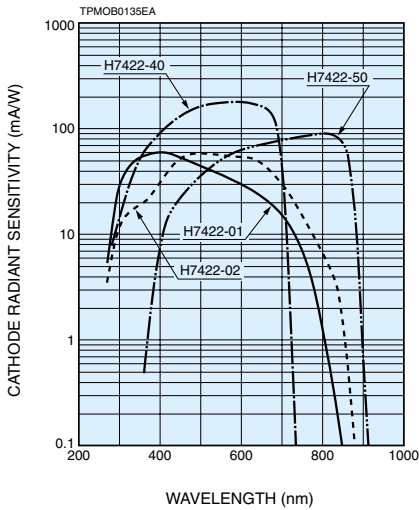
\*3: The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.

\*4: When used with C8137-02 and A7423 Plateau voltage: PMT temperature setting value 0 °C

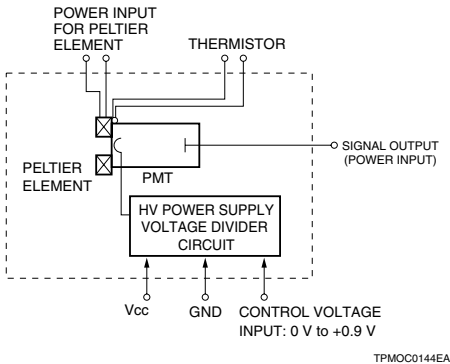
# Cooling Specifications

Parameter	H7422/H7422P	Unit
Cooling Method	Thermoelectric cooling	—
Max. Cooling Temperature ( $\Delta T$ )	35	$^{\circ}\text{C}$
Cooling Time	Approx. 5	min.
Peltier Element Input Current	2.0	A

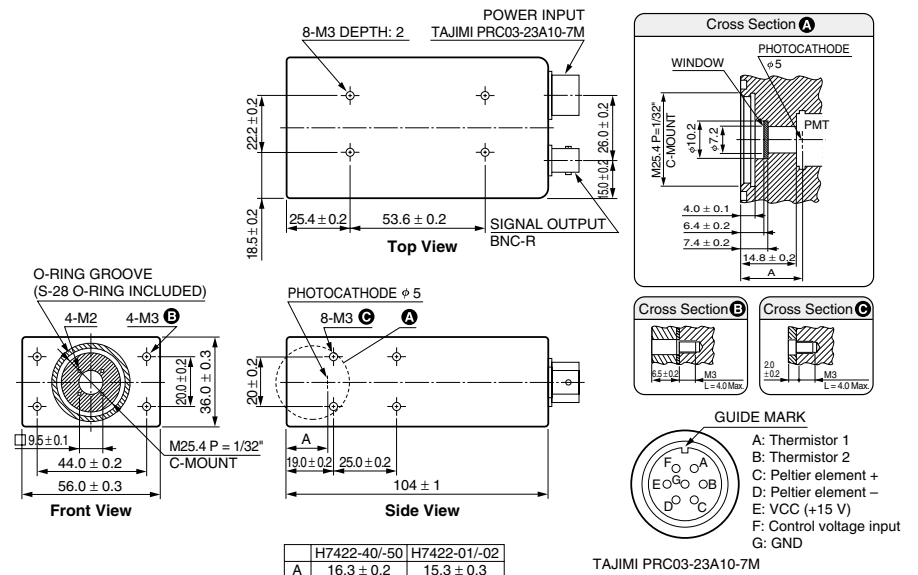
# Characteristics (Cathode radiant sensitivity, Gain)



# Block Diagram

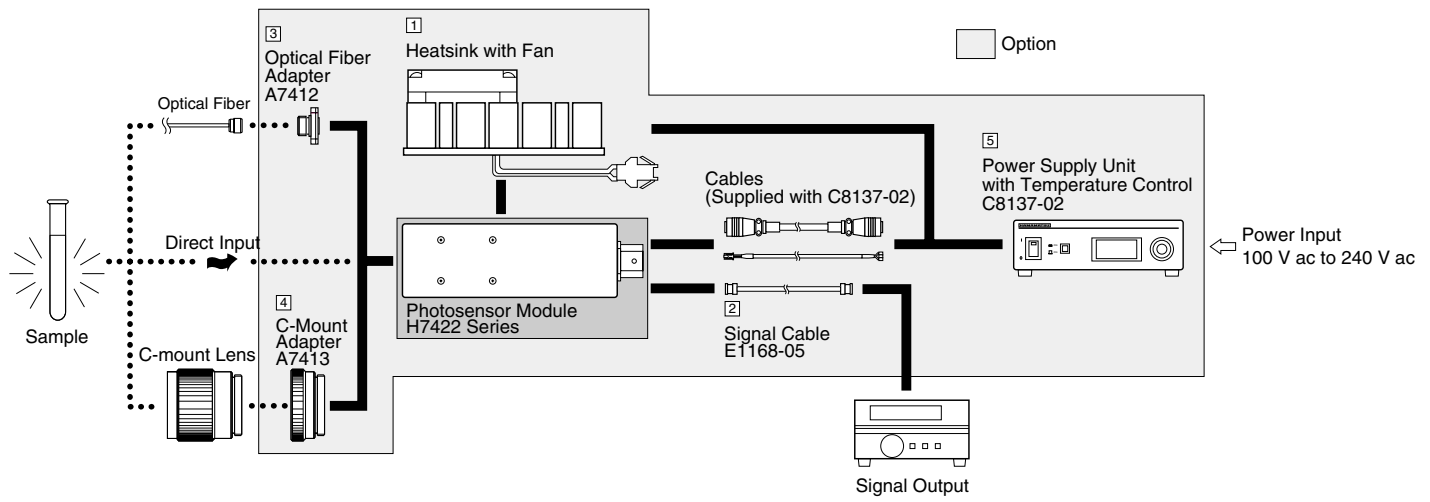


# Dimensional Outlines (Unit: mm)



# Metal Package PMT with Cooler

## H7422 Series option



TPMOC0145EA

### ● Heatsink with Fan A7423

The temperature of the H7422 outer case rises due to the Peltier element housed in the case. The A7423 heatsink efficiently radiates away this heat to maintain the case temperature within 40 °C. The A7423 can be easily installed onto the H7422 with four M3 screws. Apply a coat of heat conductive grease onto the joint surface shared by the H7422 and A7423.

Parameter	Value	Unit
Input Voltage	12	V
Input Current	during lock	140
	during operation	90
Operating Voltage	10.2 to 13.8	V
Weight	120	g

### ● Signal Cable E1168-05

This signal cable is terminated with a BNC connector for easily connecting the H7422 to external equipment.

### ● Optical Fiber Adapter (FC type) A7412

The A7412 is an FC type optical fiber connector that attaches to the light input window of the H7422. The A7412 can easily be secured in place with four M2 screws.

### ● C-Mount Adapter A7413

The A7413 mount adapter is used when a C-mount lens protruding 4 mm or more from the flange-back must be installed onto the H7422.

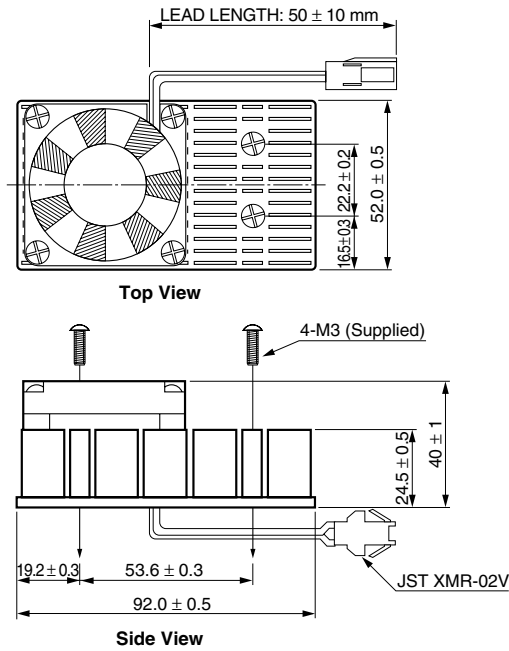
### ● Power Supply Unit with Temperature Control C8137-02

The C8137-02 is a power supply unit with a temperature control function. Just connecting to an AC source of 100 to 240 V generates the output voltages for the Peltier element and the A7423 fan, needed for operating the H7422. The photomultiplier tube temperature can be maintained to 0 °C by monitoring the thermistor and regulating the output current from the Peltier element. Control voltage can be varied by a knob on the front panel.

Parameter	Value	Unit
Max. Cooling Temperature	35	°C
Setting Cooling Temperature (preset at factory)	0	°C
Input Voltage	100 to 240	V
Input Voltage Frequency	50/60	Hz
Power Consumption	30	VA
Main Circuit Output Voltage	+15	V
Max. Peltier Element Current	2.2	A
Output Voltage for Fan	12	V
Control Voltage Adjustment Range	0 to +0.9	V
Weight	1.1	kg

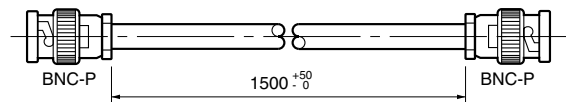
## Options (Unit: mm)

### 1 Heatsink with fan A7423



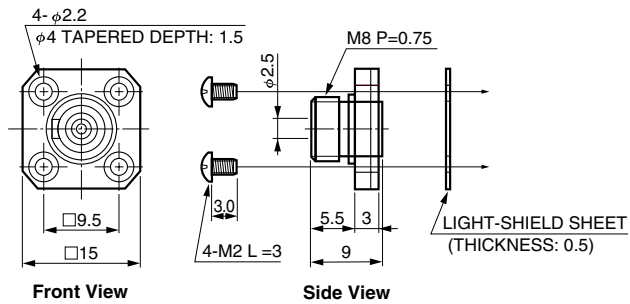
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### 2 Signal cable E1168-05



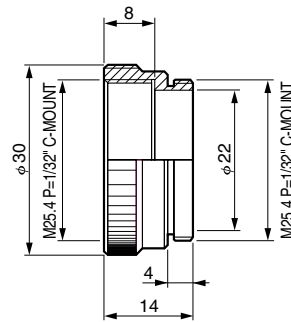
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### 3 Optical fiber adapter (FC type) A7412



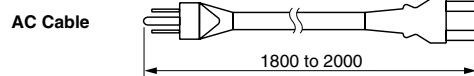
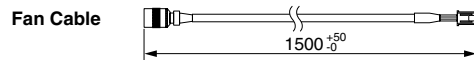
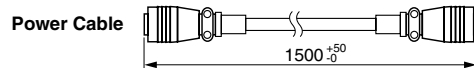
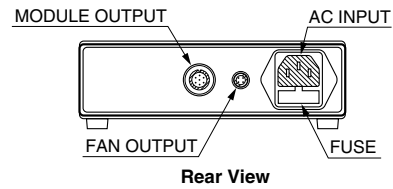
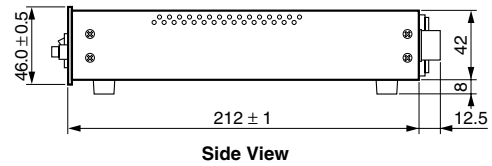
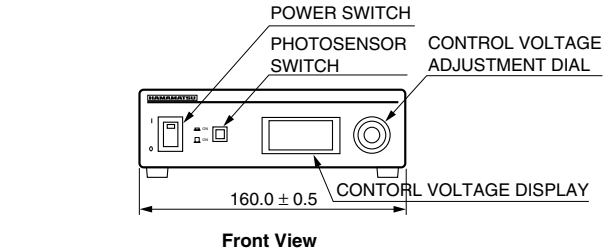
TACCA0190EA

### 4 C-mount adapter A7413



TACCA0191EA

### 5 Power Supply Unit with Temperature Control C8137-02



TACCA0238EA