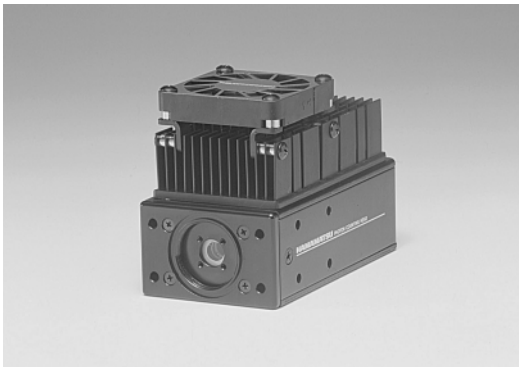
Metal package PMT with Cooler

Photon Counting Head H7421 Series



Heatsink with fan (A7423) sold separately

The H7421 series are photon counting head devices containing a metal package photomultiplier tube having a GaAsP/GaAs photocathode and a thermoelectric cooler. The thermoelectric cooler reduces thermal noise generated from the photocathode which also offers a high quantum efficiency, allowing measurement to be made with a good S/N ratio even at very low light levels.
The H7421-40 has high sensitivity on wavelength from 300 nm to 720 nm. The H7421-50 is sensitive over a wide spectral range from 380 nm to 890 nm. The photomultiplier tube is maintained at a constant temperature by monitoring the output from a thermistor installed near the photomultiplier tube and regulating the current to the thermoelectric cooler.

Product Variations

Type No.	Spectral Response	Features
H7421-40	300 nm to 720 nm	GaAsP photocathode, QE 40 % at peak wavelength
H7421-50	380 nm to 890 nm	GaAs photocathode, QE 12 % at peak wavelength

Specifications

Parameter		H7421-40	H7421-50	Unit
Input Voltage		+4.5 to +5.5		V
Max. Input Voltage for Main Unit		+6		V
Max. Input Current for Main Unit		50		mA
Max. Input Voltage for Thermoelectric Cooler		2.6		V
Max. Input Current for Thermoelectric Cooler		2.2		A
Effective Area		ϕ5		mm
Peak Sensitivity Wavelength		580	800	nm
Count Sensitivity		7.8×10^5	3.9×10^5	$s^{-1} \cdot pW^{-1}$
Count Linearity *1		1.5×10^6	1.5×10^6	s^{-1}
Dark Count *2 *3	Typ.	100	125	s^{-1}
	Max.	300	375	
Pulse-pair Resolution		70		ns
Output Pulse Width		30		ns
Output Pulse Height *4	Typ.	3.6		V
	Min.	3.0		
Recommended Load Resistance		50		Ω
Signal Output Logic		Positive logic		—
Operating Ambient Temperature		+5 to +35		°C
Storage Temperature		-20 to +50		°C
Weight		340		g

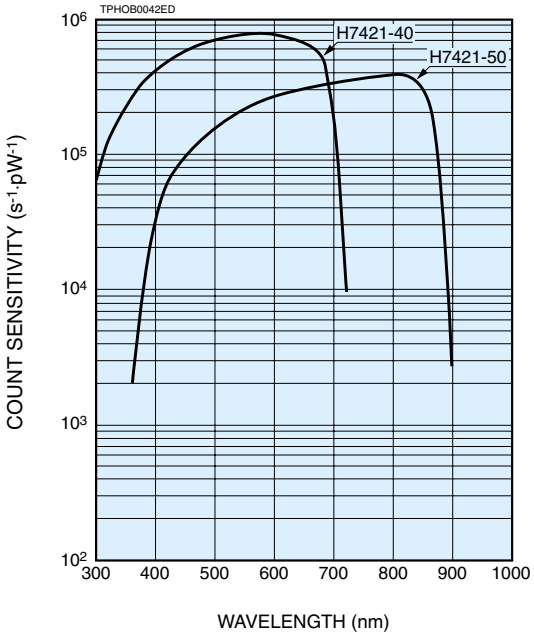
*1: Random pulse, at 10 % count loss
*2: PMT setting temperature 0 °C, used with C8137, M9011 and A7432
*3: After 30 minute storage in darkness
*4: With input voltage +5 V, Load resistance 50 Ω and Coaxial cable RG-174/U (450 mm)

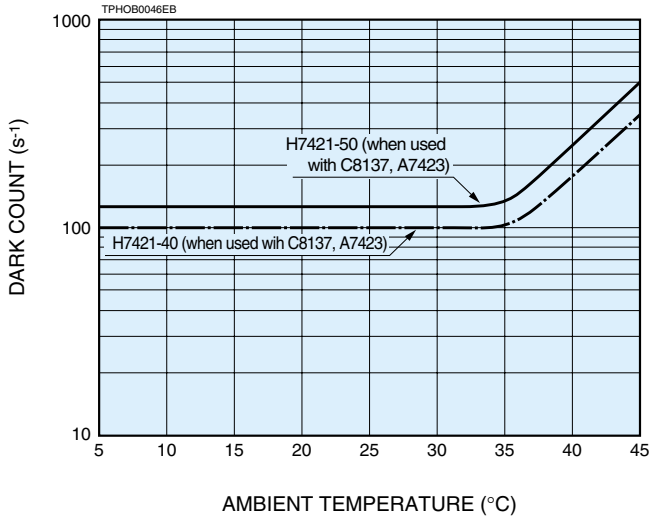
Cooling Specifications

Parameter	H7421-40/H7421-50	Unit
Cooling Method	Thermoelectric cooling	—
Max. Cooling Temperature (ΔT) *5	35	°C
Cooling Time *5	Approx. 5	min

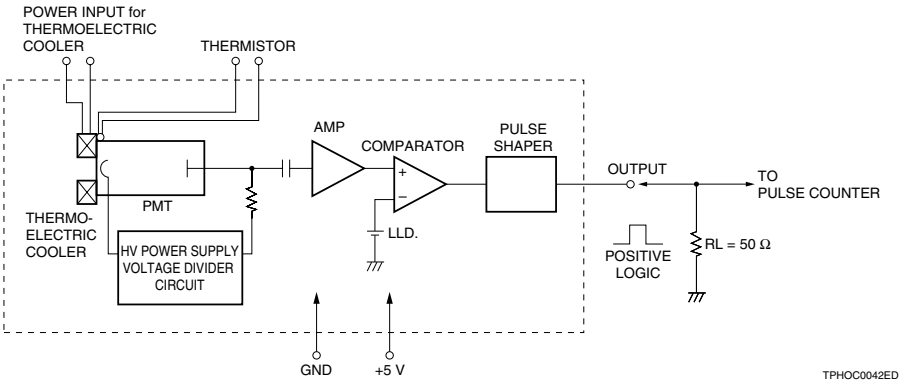
*5: Input current to thermoelectric cooler = 2.0 A

Characteristics (Count sensitivity, Dark count)

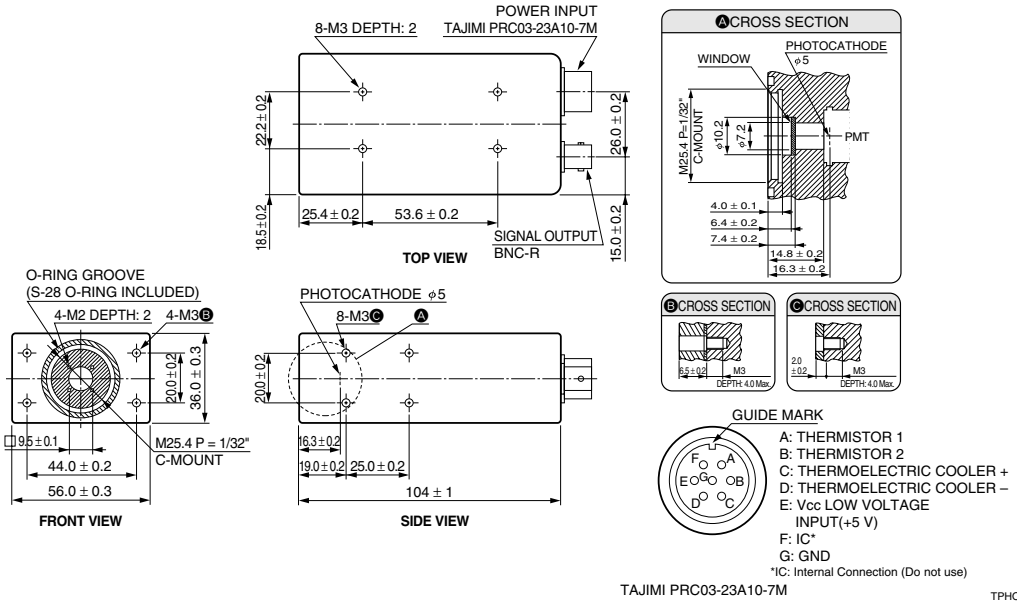




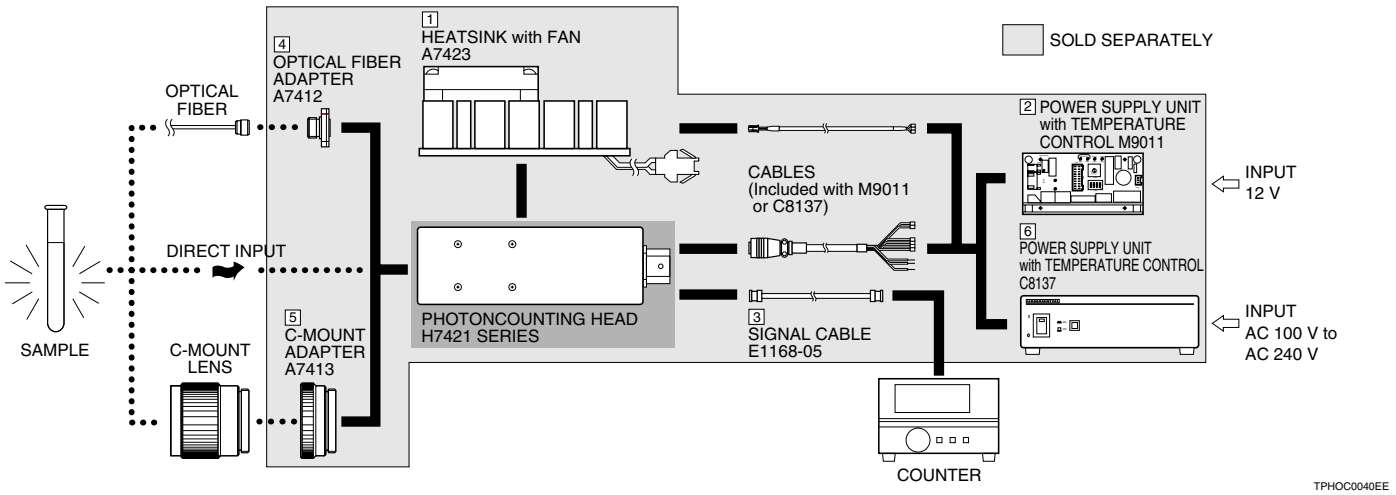
Block Diagram



Dimensional Outlines (Unit: mm)



Options for H7421 Series



● Heatsink with Fan A7423

The temperature of the H7421 outer case rises due to the thermoelectric cooler housed in the case. The A7423 heatsink efficiently radiates away this heat to prevent a temperature rise in the H7421. The A7423 can be easily installed onto the H7421 with four M3 screws. Apply a coat of heat conductive grease onto the joint surface shared by the H7421 and A7423.

Parameter		Value	Unit
Input Voltage		12	V
Input Current	During Lock	140	mA
	During Operation	90	mA
Operating Voltage		10.2 to 13.8	V
Weight		120	g

● Power Supply Unit with Temperature Control M9011

The M9011 is an on-board type power supply unit.
By just connecting to 12 V supply, the M9011 provides power necessary to operate the H7421 series. The M9011 also controls the thermoelectric cooler in the H7421 series so that the output and noise can be maintained at constant levels even when the ambient temperature changes. The thermoelectric cooler and PMT operation can be controlled from an external device by connecting it to the I/O connector on the M9011.

Parameter		Value	Unit
Max. Cooling Temperature (ΔT)		35	°C
Input Voltage		12	V
Max. Input Current		1.2	A
Max. Power Consumption		15.8	V·A
Main Circuit Output Voltage		5	V
Max. Output Current for Thermoelectric Cooler		2.2	A
Output Voltage for Fan		12	V
Control Signal Input Voltage	Thermoelectric Cooler	Non-insulated TTL level input	—
	PMT	Non-insulated TTL level input	
	Fan	Non-insulated TTL level input	
Error Signal Output Voltage	Thermoelectric Cooler	Non-insulated TTL level output	—
LED Output	PMT	5	V
	Error	5	
Setting Cooling Temperature		0	°C
Weight (excluding cables)		120	g

● Signal Cable E1168-05

This signal cable comes attached to a BNC connector for easily connecting the H7421 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 H7421. 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 H7421.

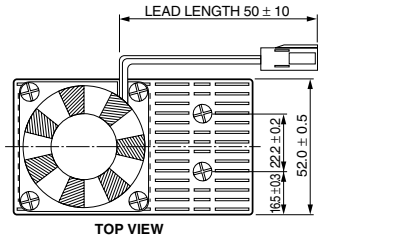
● Power Supply Unit with Temperature Control C8137

The C8137 is a power supply unit with a temperature control function. Just connecting to an AC source of 100 V to 240 V generates the output voltages for the thermoelectric cooler and the A7423 fan, needed for operating the H7421. The photomultiplier tube temperature can be maintained to 0 °C by monitoring the thermistor and regulating the output current for the thermoelectric cooler.

Parameter	Value	Unit
Max. Cooling Temperature (ΔT)	35	°C
Setting Cooling Temperature (preset at factory)	0	°C
Input Voltage	AC 100 to AC 240	V
Input Voltage Frequency	50/60	Hz
Power Consumption	30	V·A
Main Circuit Output Voltage	+5	V
Max. Current for Thermoelectric Cooler	2.2	A
Output Voltage for Fan	12	V
Weight	1	kg

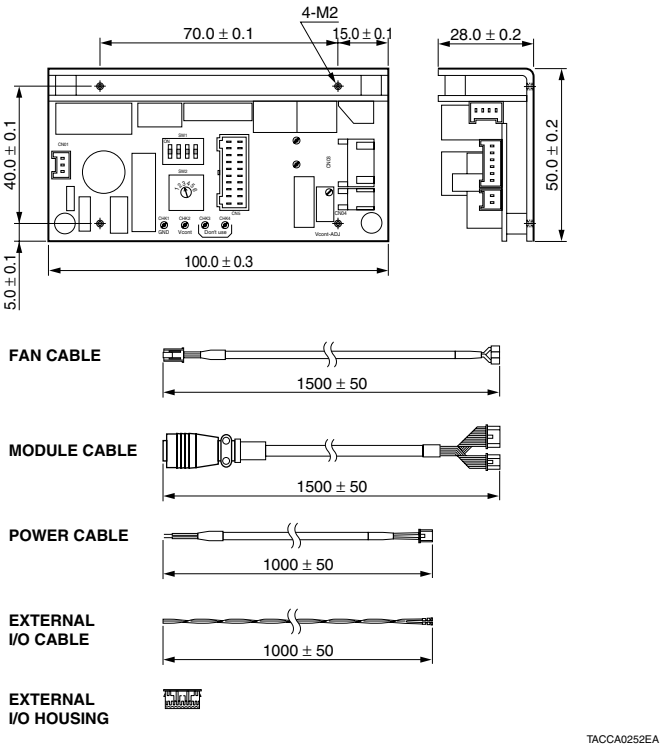
Options (Unit: mm)

1 Heatsink with Fan A7423



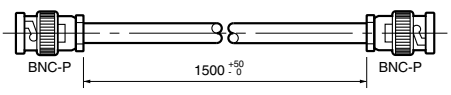
TACCA0188ED

2 Power Supply Unit with Temperature Control M9011



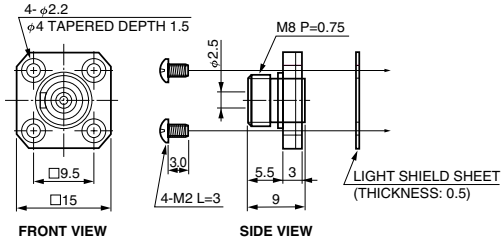
TACCA0252EA

3 Signal Cable E1168-05



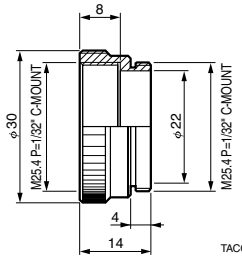
TACCA0148EA

4 Optical Fiber Adapter (FC Type) A7412



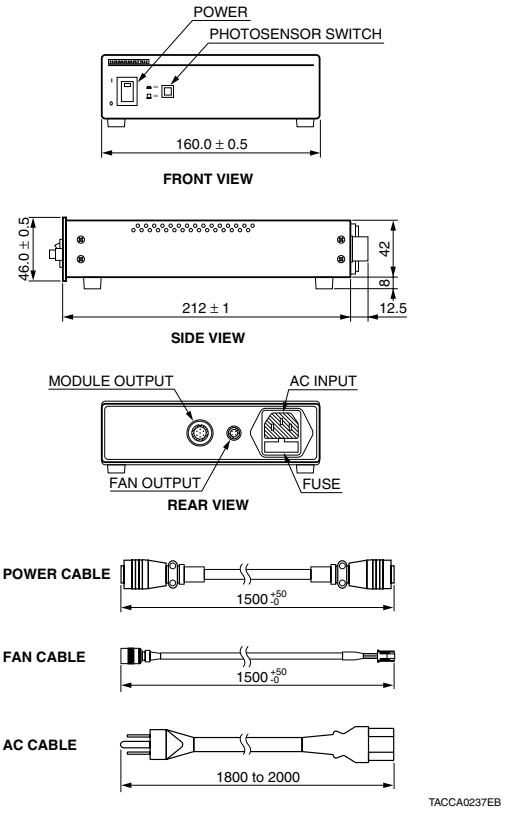
TACCA0190EB

5 C-Mount Adapter A7413



TACCA0191EA

6 Power Supply Unit with Temperature Control C8137



TACCA0237EB