

# Metal Package PMT

## Photosensor Modules H11706 Series



The H11706 series is an optical sensor module containing a metal package photomultiplier tube, a high-voltage power supply circuit, and a shutter circuit. The shutter circuit electrically protects the photomultiplier tube from excessive light such as excitation light that illuminates samples.

The H11706 series offers a choice of photomultiplier tubes with different photocathodes: multialkali photocathodes with sensitivity extending to the near infrared region or enhanced red sensitivity and GaAsP photocathodes with high sensitivity in the visible region. The H11706 series also includes “P type” with high gain and low dark count specifically selected for photon counting applications.

### Product Variations

Parameter	Spectral Response	Features
H11706-01	230 nm to 870 nm	For visible to near IR range
H11706-20	230 nm to 920 nm	Infrared-extended multialkali photocathode with enhanced sensitivity
H11706-40	300 nm to 720 nm	GaAsP photocathode, QE 40 % at peak wavelength
H11706P-01	230 nm to 870 nm	For visible to near IR range, For photon counting
H11706P-40	300 nm to 720 nm	GaAsP photocathode, For photon counting

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

### Specifications

(at +25 °C)

Parameter		H11706-01	H11706-20	H11706-40	Unit		
Input Voltage		+14.5 to +15.5			V		
Max. Input Voltage		+16			V		
Max. Input Current *1*2		10			mA		
Max. Average Output Signal Current*2		100		2	μA		
Max. Control Voltage		+1.1		+0.9	V		
Recommended Control Voltage Adjustment Range		+0.5 to +1.1		+0.5 to +0.8	V		
Control Voltage Input Impedance		30			kΩ		
Effective Area		φ8			mm		
Peak Sensitivity Wavelength		400	630	580	nm		
Cathode	Luminous Sensitivity	Min.	100	350	μA/lm		
		Typ.	200	500			
	Red / White Ratio	Typ.	0.2	0.45	—		
	Radiant Sensitivity	Typ.	77 (400 nm)	78 (630 nm)	176 (550 nm)	mA/W	
Anode	Standard Type	Luminous Sensitivity *2	Min.	100	350	A/lm	
			Typ.	400	1000		
	P Type	Radiant Sensitivity *2	Typ.	1.5 × 10 <sup>5</sup> (400 nm)	1.5 × 10 <sup>5</sup> (630 nm)	8.8 × 10 <sup>4</sup> (550 nm)	A/W
			Dark Current *2*3	Typ.	1	10	5
	Max.	10		100	—		
	P Type	Dark Count *2*3	Typ.	1.5 × 10 <sup>5</sup> (400 nm)	—	17.6 × 10 <sup>4</sup> (550 nm)	A/W
Max.			600	—	6000	s <sup>-1</sup>	
Rise Time *2		0.57			ns		
Ripple Noise *2*4 (peak to peak)		Max.	0.8		mV		
Settling Time		Max.	0.2 *5	0.2 *6	s		
Operating Ambient Temperature *7		+5 to +50		+5 to +35	°C		
Storage Temperature *7		-20 to +50			°C		
Weight		125		135	g		

\*1: At +15 V input voltage, output current equal to dark current, and without shutter signal input

\*2: H11706-01/-20: Control voltage = +1.0 V, H11706-40: Control voltage = +0.8 V

\*3: After 30 minutes storage in darkness, output of dark current.

\*4: Cable RG-174/U, Cable length 450 mm, Load resistance = 1 MΩ, Load capacitance = 22 pF

\*5: 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.

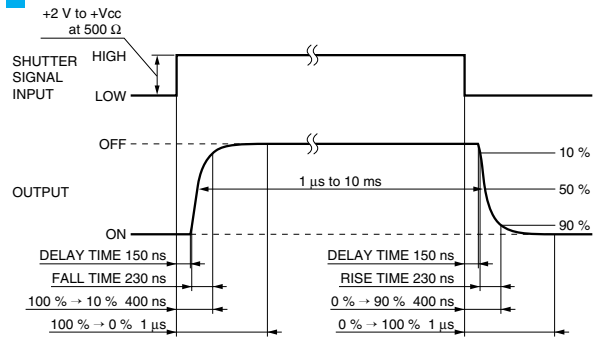
\*6: The time required for the output to reach a stable level following a change in the control voltage from +0.9 V to +0.5 V.

\*7: No condensation

(at +25 °C)

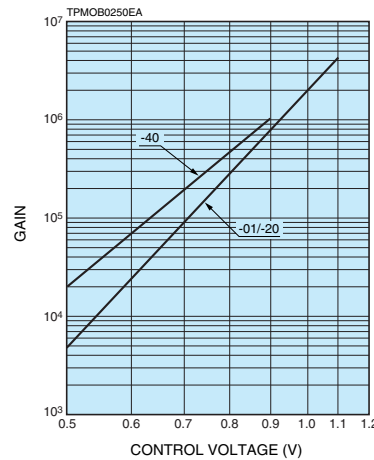
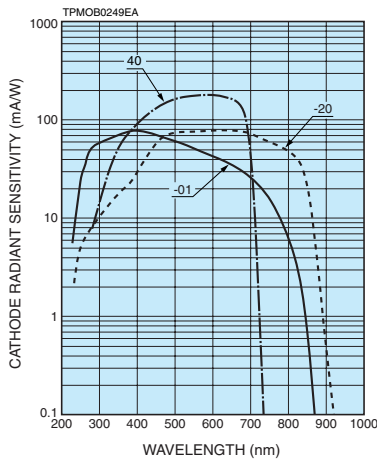
Parameter		Description / Value	Unit
Shutter Mode	Mode	Nomally ON	—
	Shutter Width (FWHM)	1 μs to 10 ms	—
	Rise Time	Typ.	230 ns
	Fall Time	Typ.	230 ns
	Repetition Rate	Max.	10 kHz
	Switching Ratio	Typ.	10 <sup>3</sup>
	Delay Time	Typ.	150 ns
Shutter Signal	Input LOW Level	Min.	0 V
		Max.	+0.4 V
	Input HIGH Level	Min.	+2.0 V
		Max.	V <sub>cc</sub>
Input Impedance		500 Ω	

### Shutter Characteristics

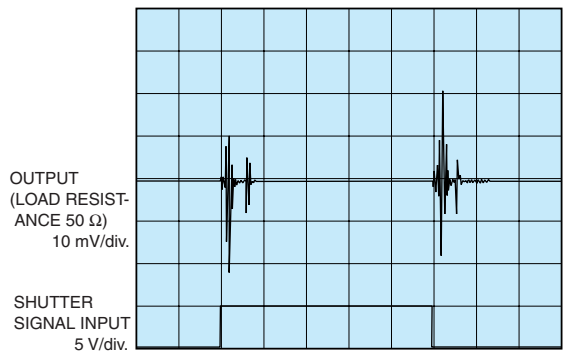


TPMOC0254EA

### Characteristics (Cathode radiant sensitivity, Gain)



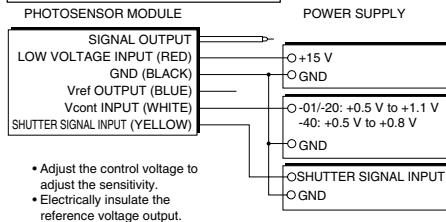
### Switching Noise



400 ns/div.

### Sensitivity Adjustment Method

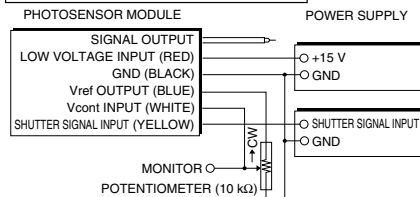
#### VOLTAGE PROGRAMMING



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

TPMOC0252EA

#### RESISTANCE PROGRAMMING

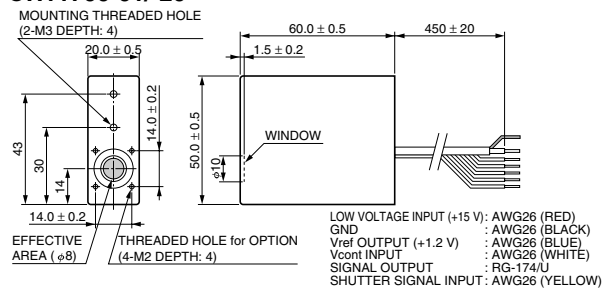


\* When using a potentiometer to adjust sensitivity, monitor the control voltage so it does not exceed +1.1 V (-0.1/-20) / +0.9 V (-40).

TPMOC0253EA

### Dimensional Outlines (Unit: mm)

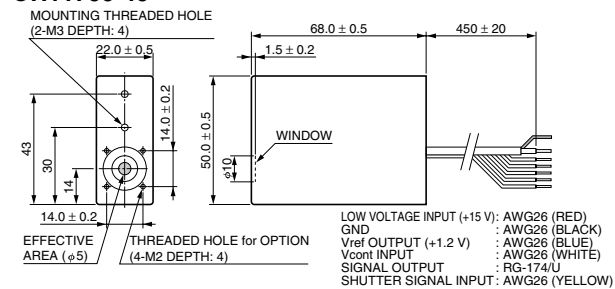
#### ●H11706-01/-20



LOW VOLTAGE INPUT (+1.5 V): AWG26 (RED)  
 GND : AWG28 (BLACK)  
 Vref OUTPUT (+1.2 V) : AWG28 (BLUE)  
 Vcont INPUT : AWG26 (WHITE)  
 SIGNAL OUTPUT : RG-174/U  
 SHUTTER SIGNAL INPUT: AWG26 (YELLOW)

TPMOA0081JA

#### ●H11706-40



LOW VOLTAGE INPUT (+1.5 V): AWG26 (RED)  
 GND : AWG28 (BLACK)  
 Vref OUTPUT (+1.2 V) : AWG26 (BLUE)  
 Vcont INPUT : AWG26 (WHITE)  
 SIGNAL OUTPUT : RG-174/U  
 SHUTTER SIGNAL INPUT: AWG26 (YELLOW)

TPMOA0082JA

## HAMAMATSU PHOTONICS K.K. www.hamamatsu.com

### HAMAMATSU PHOTONICS K.K., Electron Tube Division

314-5, Shimokanzo, Iwata City, Shizuoka Pref., 438-0193, Japan, Telephone: (81)539/62-5248, Fax: (81)539/62-2205

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, P. O. Box 6910, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218 E-mail: usa@hamamatsu.com

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658 E-mail: info@hamamatsu.de

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trappu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 00 E-mail: info@hamamatsu.fr

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tevin Road Welwyn Garden City Hertfordshire AL7 1BW, United Kingdom, Telephone: 44-(0)1707-294886, Fax: 44-(0)1707-325777 E-mail: info@hamamatsu.co.uk

North Europe: Hamamatsu Photonics Norden AB: Thorshamnsgatan 35 SE-164 40 Kista, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01 E-mail: info@hamamatsu.se

Italy: Hamamatsu Photonics Italia: S.R.L.: Strada della Moia, 1/E, 20020 Arese, (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741 E-mail: info@hamamatsu.it

China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Road North, Chaoyang District, Beijing 100020, China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn

TPMO1059E01

JUL. 2013 IP