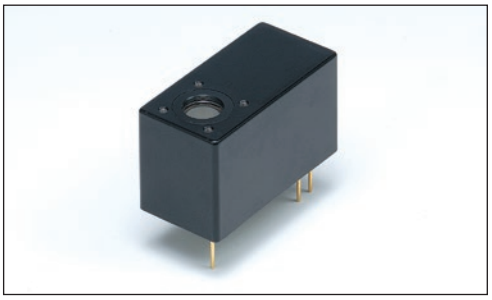
HAMAMATSU

PHOTON IS OUR BUSINESS

PHOTOMULTIPLIER TUBE MODULE
H12056 SERIES

The H12056 series is a photomultiplier tube module containing a metal package PMT, gate circuit and a high-voltage power supply circuit.
This module has gate function to avert the PMT from excessive light without switching OFF the PMT voltage completely like the case of opening / closing machine to change the measurement samples.
Also, provides "P" type with gain and low dark count selected for photon counting measurement.



PRODUCT VARIATIONS

Type No.	Spectral response	Features
H12056-110	230 nm to 700 nm	Super bialkali photocathode, high sensitivity in visible range
H12056-210	230 nm to 700 nm	Ultra bialkali photocathode, high sensitivity in visible range
H12056-01	230 nm to 870 nm	Multialkali photocathode, for visible to near IR range
H12056-20	230 nm to 920 nm	Infrared-extended multialkali photocathode, for visible to near IR range
H12056-40	300 nm to 740 nm	GaAsP photocathode, very high quantum efficiency in the visible range (approx. 40 %)
H12056P-110	230 nm to 700 nm	Super bialkali photocathode, for photon counting
H12056P-210	230 nm to 700 nm	Ultra bialkali photocathode, for photon counting
H12056P-01	230 nm to 870 nm	Muktialkali photocathode, for visible to near IR range, for photon counting
H12056P-40	300 nm to 740 nm	GaAsP photocathode, for photon counting

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

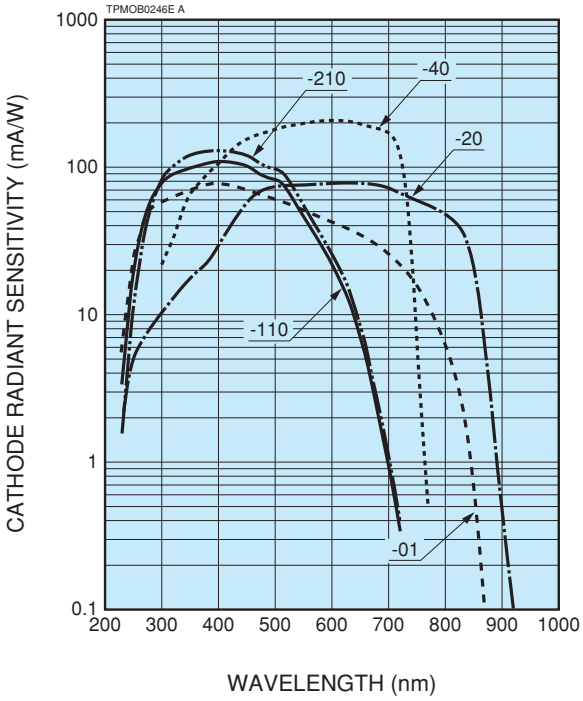
SPECIFICATIONS

(at +25 °C)

Parameter			H12056-110 H12056P-110	H12056-210 H12056P-210	H12056-01 H12056P-01	H12056-20	H12056-40	H12056P-40	Unit
Input voltage			+4.5 to +5.5						V
Max. input voltage			5.5						V
Max. input current ①			10						mA
Max. average input current ②			100				40		μA
Max. control voltage			+1.1 (Input impedance 1 MΩ)				+0.9 (Input impedance 1 MΩ)		V
Recommended control voltage adjustment range			+0.5 to +1.1 (Input impedance 1 MΩ)				+0.5 to +0.8 (Input impedance 1 MΩ)		V
Effective area			φ8				φ5		mm
Peak sensitivity wavelength			400	400	400	630	520		nm
Cathode	Quantum efficiency ③	Min.	—	—	—	—	40		%
		Typ.	—	—	—	—	45		
	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	Min.	—	—	—	—	168		mA/W
		Typ.	110	130	77	78	189		
Anode	Luminous sensitivity ②	Min.	80	100	100	350	—		A/lm
		Typ.	210	270	400	1000	—		
	Radiant sensitivity ②③	Min.	—	—	—	—	1.0×10^5	1.7×10^5	A/W
		Typ.	2.2×10^5	2.6×10^5	1.5×10^5	1.5×10^5	1.9×10^5	3.8×10^5	
	Dark current ②④	Typ.	1	1	1	10	3		nA
		Max.	10	10	10	100	10		
	Dark count (P type) ②④	Typ.	50	50	600	—	—	6000	s^{-1}
		Max.	100	100	1000	—	—	18 000	
Rise time *2			0.57				1.0		ns
Ripple noise ②⑤ (peak to peak)		Max.	0.6						mV
Settling time ⑥		Max.	10						s
Operating ambient temperature ⑦			+5 to +50				+5 to +35		°C
Storage temperature ⑦			-20 to +50						°C
Weight		Typ.	56				85		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, -40, P-40: Control voltage = +0.8 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. -40, P-40: The time required for the output to reach a stable level following a change in the control voltage from +0.8 V to +0.5 V. ⑦ No condensation

Figure 1: Characteristics



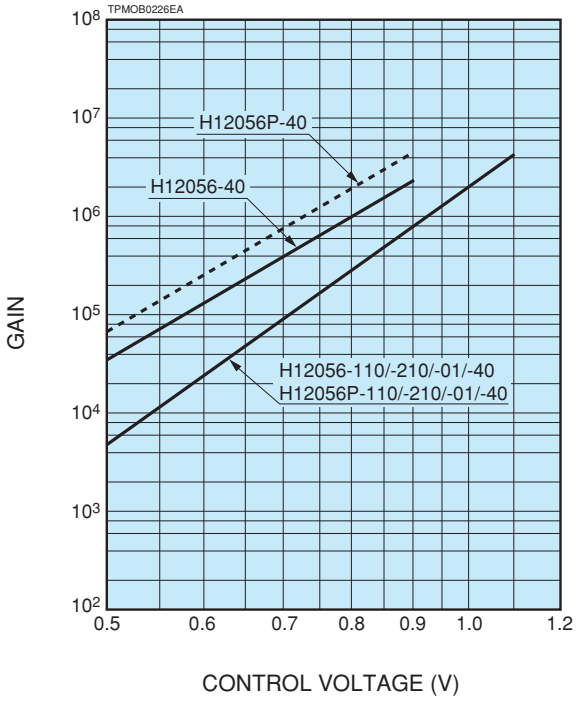


Figure 2: Sensitivity adjustment method

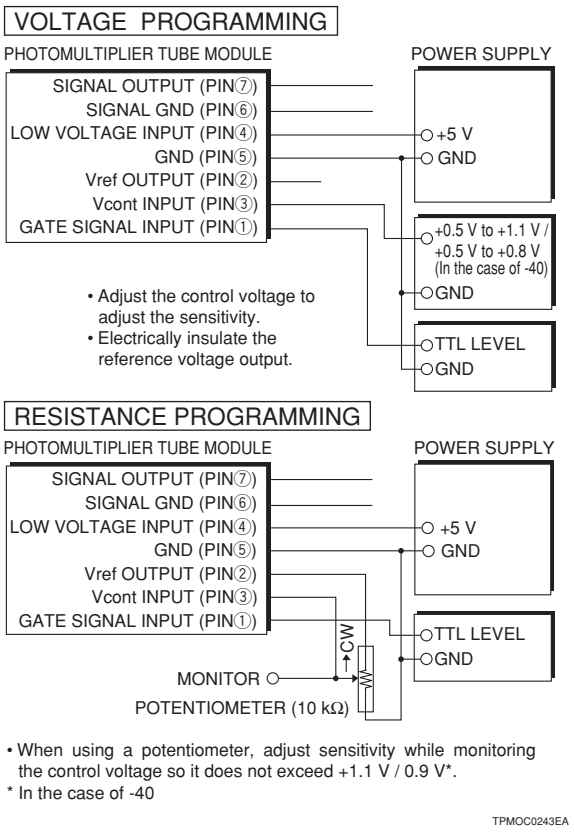


Figure 3: Gate characteristic

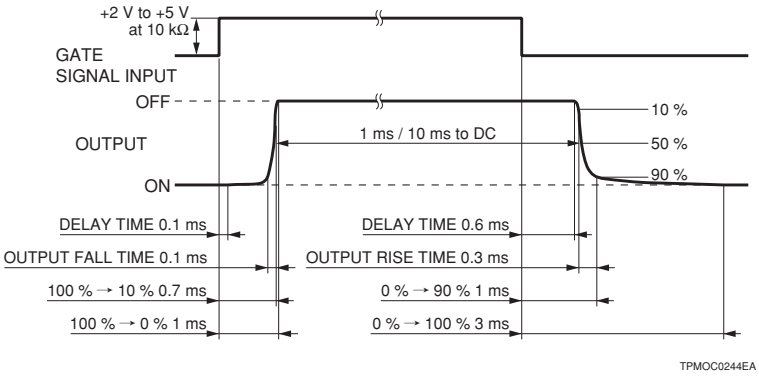
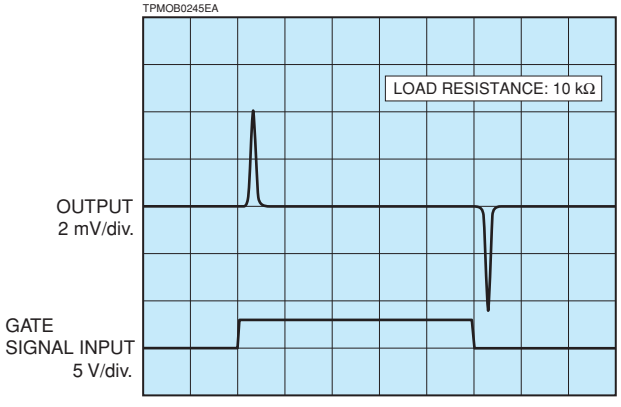


Figure 4: Switching noise characteristic

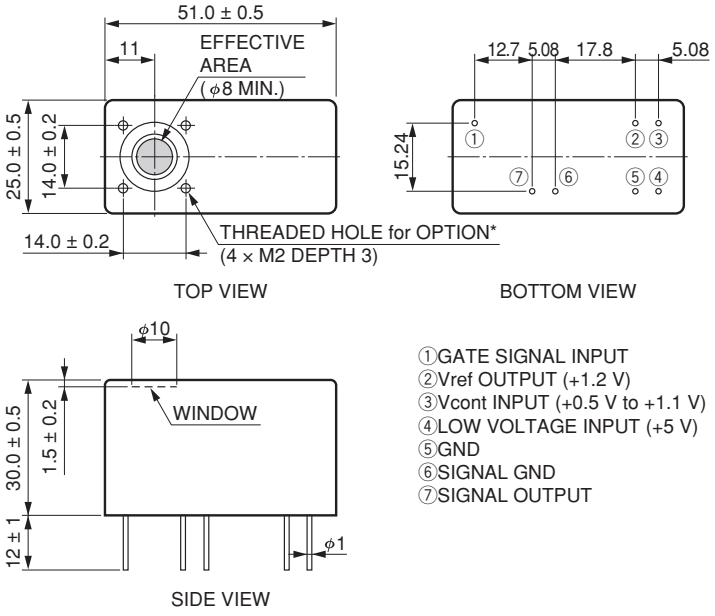


GATE SPECIFICATIONS

Parameter			H12056-110/-210 H12056P-110/-210	H12056-01/-20/-40 H12056P-01/-40	Unit
Gate mode	Mode		Normally ON		—
	Gate width (FWHM)		10 ms to DC	1 ms to DC	—
	Rise time	Typ.	0.3		ms
	Fall time	Typ.	0.1		ms
	Repetition rate	Max.	70 Hz (Gate width 10 ms) 9 Hz (Gate width 100 ms)	300 Hz (Gate width 1 ms)	—
	Switching ratio	Typ.	10^3		—
	Delay time	Typ.	0.6 (At rise), 0.1 (At fall)		ms
Gate signal input	Level		High level: +2 V to +5 V		—
	Input impedance		10		kΩ

Figure 5: Dimensional outline (Unit: mm)

●H12056-110/-210/-01/-20, H12056P-110/-210/-01



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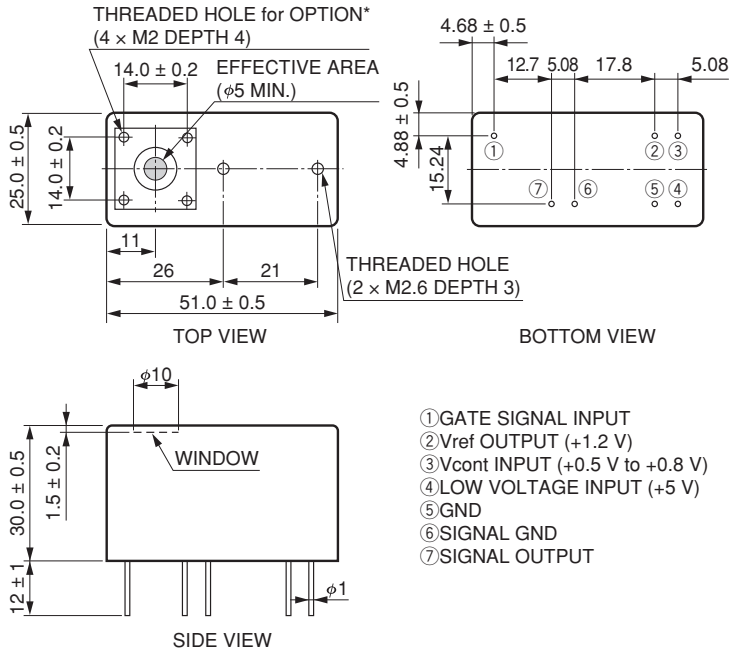
●H12056-40, H12056P-40



*OPTION: Optical fiber adapter (E5776 / E5776-51), C-mount adapter(A9865)

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