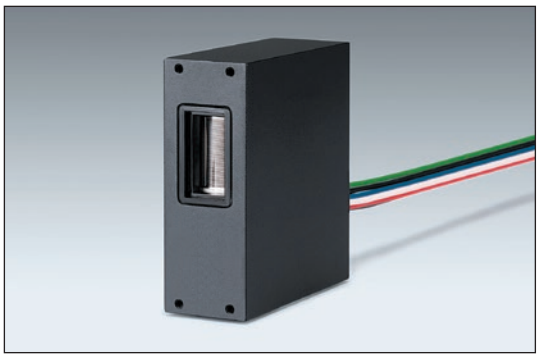
HAMAMATSU

PHOTON IS OUR BUSINESS

PHOTOMULTIPLIER TUBE MODULES
H9306 SERIES / H9307 SERIES

OVERVIEW

The H9306 series / H9307 series voltage output type photomultiplier tube modules contain a high-voltage power supply circuit, low noise amplifier and 13-mm(1/2") diameter side-on photomultiplier tube. The amplifier contained in H9306 series has 1 V/µA of current to voltage conversion factor and 20 kHz of frequency bandwidth. The amplifier contained in H9307 series has 0.1V/µA of current to voltage conversion factor and 200 kHz of frequency bandwidth.
The H9306 series / H9307 series uses a Cockcroft-Walton circuit with low power consumption. Flexible cables are used for easy installation in equipment.



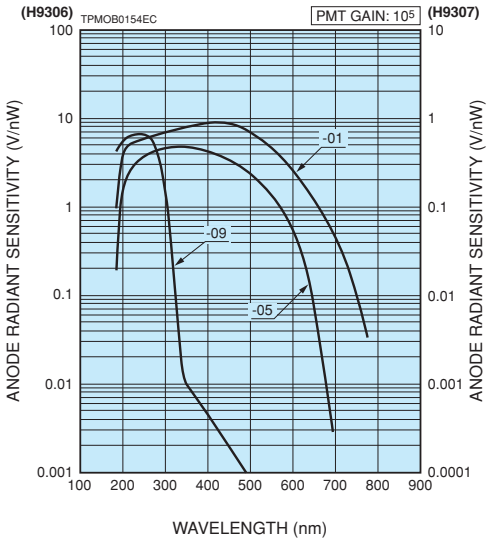
PRODUCT VARIATIONS

Type No.	Spectral response	Photocathode	Window material	Current-to-voltage conversion factor	Frequency bandwidth
H9306-01	185 nm to 750 nm	Bialkali	UV glass	1 V/µA	DC to 20 kHz
H9306-02	185 nm to 900 nm	Multialkali	UV glass		
H9306-03	185 nm to 900 nm	Multialkali	UV glass		
H9306-13	185 nm to 900 nm	Multialkali	UV glass		
H9306-04	185 nm to 830 nm	Multialkali	UV glass		
H9306-05	185 nm to 650 nm	Bialkali	UV glass		
H9306-09	185 nm to 320 nm	Cs-Te	Quartz		

Type No.	Spectral response	Photocathode	Window material	Current-to-voltage conversion factor	Frequency bandwidth
H9307-01	185 nm to 750 nm	Bialkali	UV glass	0.1 V/µA	DC to 200 kHz
H9307-02	185 nm to 900 nm	Multialkali	UV glass		
H9307-03	185 nm to 900 nm	Multialkali	UV glass		
H9307-13	185 nm to 900 nm	Multialkali	UV glass		
H9307-04	185 nm to 830 nm	Multialkali	UV glass		
H9307-05	185 nm to 650 nm	Bialkali	UV glass		
H9307-09	185 nm to 320 nm	Cs-Te	Quartz		

This product can't be used at vacuum environment or reduced pressure environment. Please pay attention when the H9306/H9307 series is used for measuring the light below 190 nm.

Figure 1: Typical spectral response



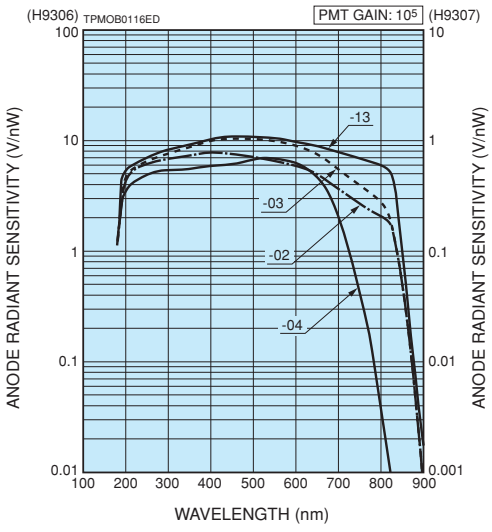
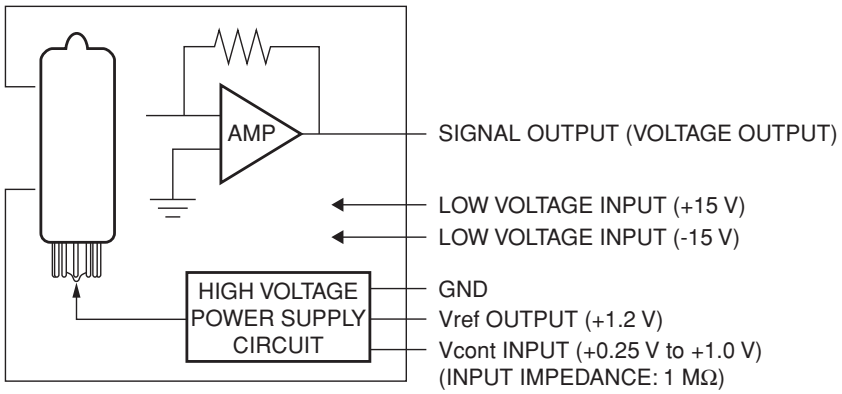


Figure 2: Schematic diagram



SPECIFICATIONS

(at +25 °C)

Parameter			H9306 series / H9307 series							Unit
Suffix			-01	-02	-03	-13	-04	-05	-09	—
Input voltage			±11.5 to ±15.5							V
Max. input voltage			±18							V
Max. input current *1			+9/-1 (H9306), +15/-8 (H9307)							mA
Max. control voltage			+1.2 (Input impedance: 1 MΩ)							V
Recommended control voltage adjustment range			+0.25 to +1.0 (Input impedance: 1 MΩ)							V
Effective area			3.7 × 13.0							mm
Peak sensitivity wavelength			420	400	450	450	530	340	230	nm
Cathode	Luminous sensitivity	Min.	80	200	350	620	140	20	—	μA/lm
		Typ.	120	300	500	650	200	40	—	
	Blue sensitivity index (CS 5-58)	Typ.	10	—	—	15	—	5	—	—
	Red/White ratio	Typ.	—	0.3	0.4	0.43	0.15	—	—	—
	Radiant sensitivity *2	Typ.	90	77	105	109	70	48	50 *3	mA/W
Offset voltage		Typ.	±3							mV
Ripple noise *4 *5 (peak to peak)		Max.	0.8							mV
Settling time *6		Max.	10							s
Operating ambient temperature *7			+5 to +50							°C
Storage temperature *7			-20 to +50							°C
Weight			110						115	g

Parameter			H9306 series (with internal 20 kHz amp)							Unit
Suffix			-01	-02	-03	-13	-04	-05	-09	—
Anode	Luminous sensitivity *4	Min.	1.0×10^8	4.0×10^8	1.0×10^9	4.0×10^8	3.0×10^8	5.0×10^7	—	V/lm
		Typ.	7.0×10^8	1.2×10^9	2.0×10^9	1.5×10^9	7.0×10^8	3.0×10^8	—	
	Radiant sensitivity *2 *4	Typ.	520	310	420	250	250	360	200 *3	V/nW
	Voltage output due to PMT dark current *4 *8	Typ.	1	1	2	3	0.1	0.5	0.5	mV
		Max.	10	10	10	10	1	5	5	
Max. output signal voltage *9			+10 (Load resistance 10 kΩ)							V
Current-to-voltage conversion factor			1							V/μA

Parameter			H9307 series (with internal 200 kHz amp)							Unit
Suffix			-01	-02	-03	-13	-04	-05	-09	—
Anode	Luminous sensitivity *4	Min.	1.0×10^7	4.0×10^7	1.0×10^8	4.0×10^7	3.0×10^7	5.0×10^6	—	V/lm
		Typ.	7.0×10^7	1.2×10^8	2.0×10^8	1.5×10^8	7.0×10^7	3.0×10^7	—	
	Radiant sensitivity *2 *4	Typ.	52	31	42	25	25	36	20 *3	V/nW
	Voltage output due to PMT dark current *4 *8	Typ.	0.1	0.1	0.2	0.3	0.01	0.05	0.05	mV
		Max.	1	1	1	1	0.1	0.5	0.5	
Max. output signal voltage *9			+1 (Load resistance 10 kΩ)							V
Current-to-voltage conversion factor			0.1							V/μA

*1: Input voltage = ±15 V, Control voltage = +1.0 V, Dark current output
*2: Measured at the peak sensitivity wavelength
*3: Measured at 254 nm
*4: Control voltage = +1.0 V
*5: Cable RG-174/U, Cable length 450 mm, Load resistance = 1 MΩ, Load capacitance = 22 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 *8: After 30 min storage in darkness *9: At ±15 V input voltage

Figure 3: Sensitivity adjustment method

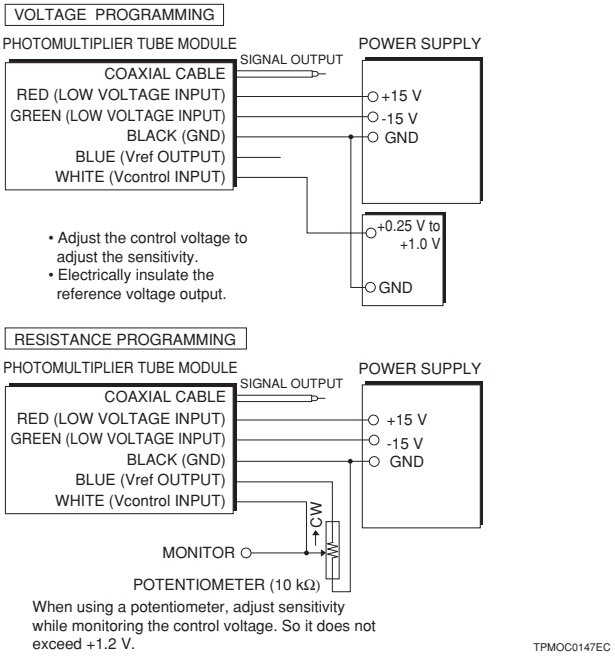


Figure 4: Gain

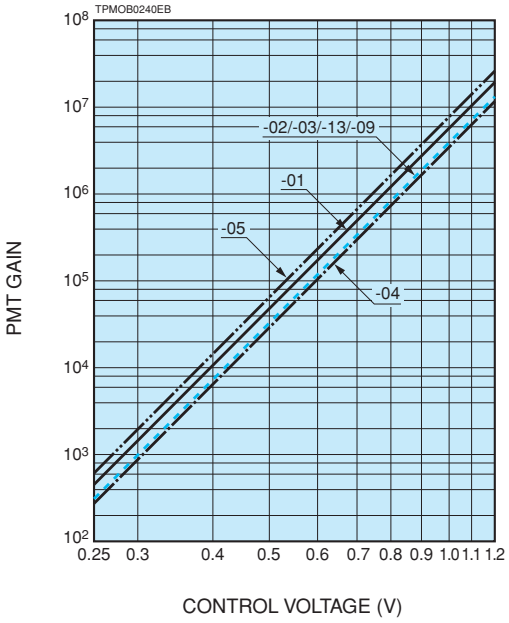


Figure 5: Frequency characteristics

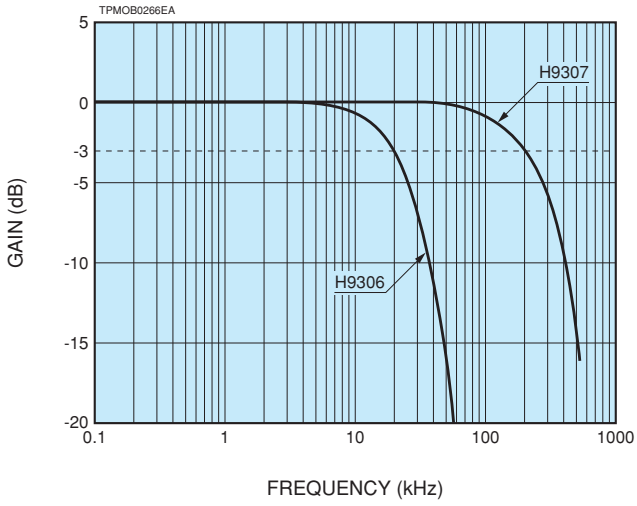


Figure 6: Ripple noise

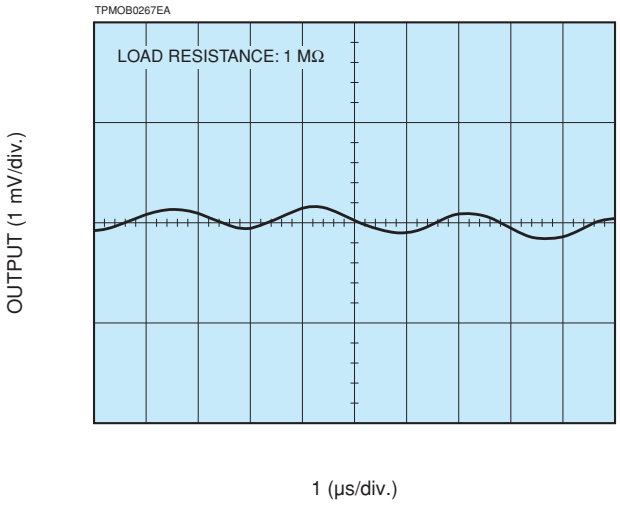
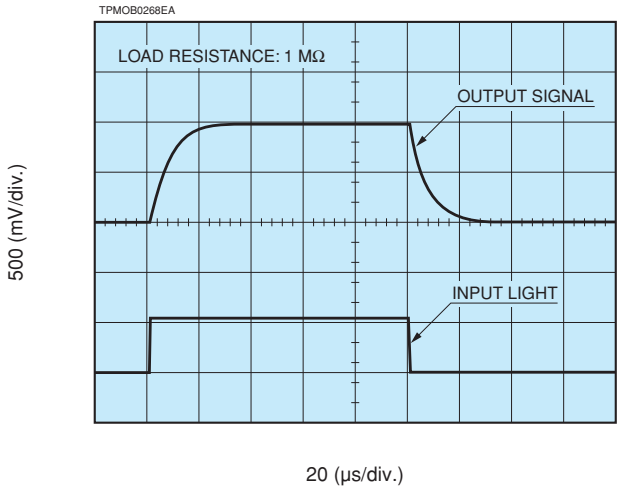


Figure 7: Output characteristics

●H9306



●H9307

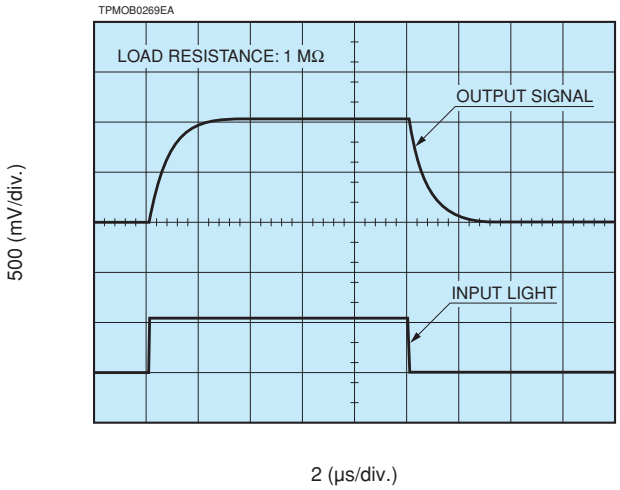
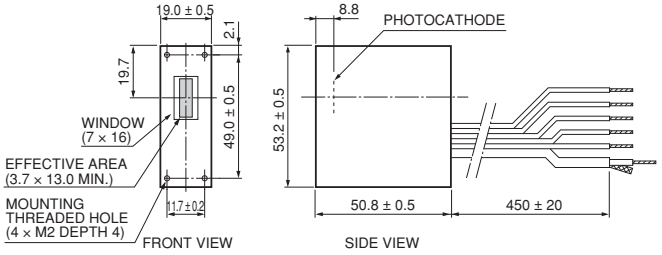


Figure 8: Dimensional outlines (Unit: mm)

●H9306-01/-02/-03/-13/-04/-05
H9307-01/-02/-03/-13/-04/-05

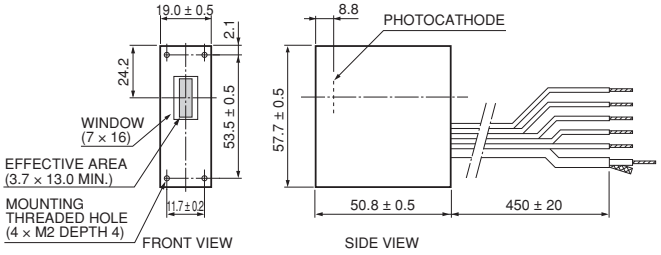


LOW VOLTAGE INPUT (+15 V) : UL1430 AWG26 (RED)
LOW VOLTAGE INPUT (-15 V) : UL1430 AWG26 (GREEN)
GND : UL1430 AWG26 (BLACK)
Vref OUTPUT (+1.2 V) : UL1430 AWG26 (BLUE)
Vcont INPUT (+0.25 V to +1.0 V): UL1430 AWG26 (WHITE)
SIGNAL OUTPUT : RG-174/U*

* Option: Available with BNC / SMA connector

TPMOA0013EI

●H9306-09
H9307-09

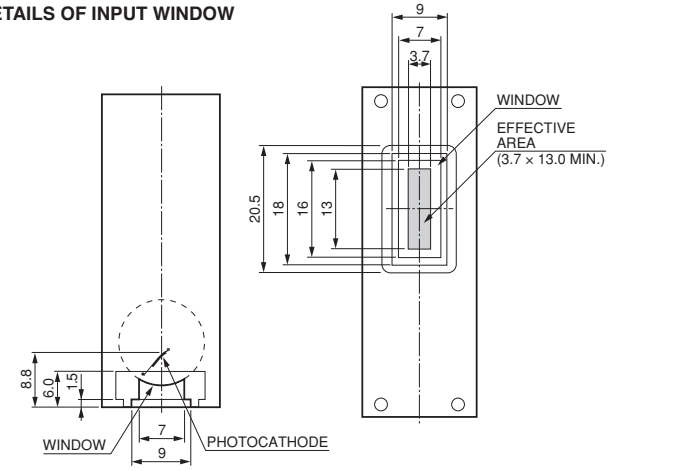


LOW VOLTAGE INPUT (+15 V) : UL1430 AWG26 (RED)
LOW VOLTAGE INPUT (-15 V) : UL1430 AWG26 (GREEN)
GND : UL1430 AWG26 (BLACK)
Vref OUTPUT (+1.2 V) : UL1430 AWG26 (BLUE)
Vcont INPUT (+0.25 V to +1.0 V): UL1430 AWG26 (WHITE)
SIGNAL OUTPUT : RG-174/U*

* Option: Available with BNC / SMA connector

TPMOA0113EA

DETAILS OF INPUT WINDOW



TPMOA0018EE

RELATED PRODUCT

POWER SUPPLY FOR PHOTOMULTIPLIER TUBE MODULES C7169

The C7169 is the power supply for photomultiplier tube modules with 15 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		±15	V
Output current	Max.	0.3 (+15 V), 0.2 (-15 V)	A
Control voltage Ⓐ (variable voltage range)		+0.25 to +1.8	V
Terminal connection method		Binding post	—
Input voltage		AC100 to AC240	V
Operating ambient temperature		+5 to +50	°C
Dimensions (W × H × D) Ⓑ		147 × 61 × 200	mm
Weight		Approx. 1.3	kg

NOTE: ⒶAdjust within the recommended control voltage range for the photomultiplier tube module being used. ⒷExcluding protuberance

HAMAMATSU PHOTONICS K.K. **www.hamamatsu.com**

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, Bridgewater, NJ 08807, 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, 82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de
France: HAMAMATSU PHOTONICS FRANCE S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr
United Kingdom: HAMAMATSU PHOTONICS UK LIMITED: 2 Howard Court,10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk
North Europe: HAMAMATSU PHOTONICS NORDEN AB: Torshamnsgatan 35 16440 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 int. 6, 20044 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: info@hamamatsu.it
China: HAMAMATSU PHOTONICS (CHINA) CO., LTD.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, P.R. China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn
Taiwan: HAMAMATSU PHOTONICS TAIWAN CO., LTD.: 8F-3, No.158, Section 2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)3-659-0080, Fax: (886)3-659-0081 E-mail: info@hamamatsu.com.tw

TPMO1069E04
JUL. 2022 IP