

FEATURES

- High-speed response
- High time resolution
- High sensitivity
- Direct connection to the HPD power supply
(R10467U-xx-01, R11322U-40-01, R14713U-07-01, H13223-40)

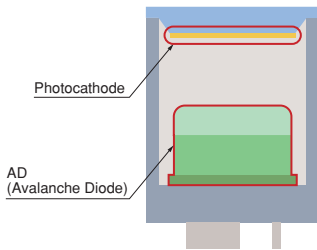
APPLICATIONS

- Laser scanning microscope (Confocal / Two-photon)
- FCS (Fluorescence Correlation Spectroscopy)
- LIDAR (Light Detection and Ranging)
- TCSPC (Time-correlated Single Photon Counting)

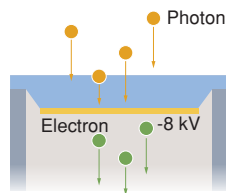


PRINCIPLE

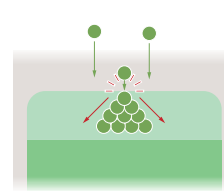
● Structure image



① Photon-to-electron conversion

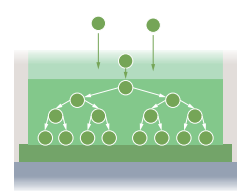


② Electron bombardment multiplication



Gain: 1500 times

③ Avalanche multiplication



Gain: 80 times

CHARACTERISTICS

Figure 1: Quantum efficiency

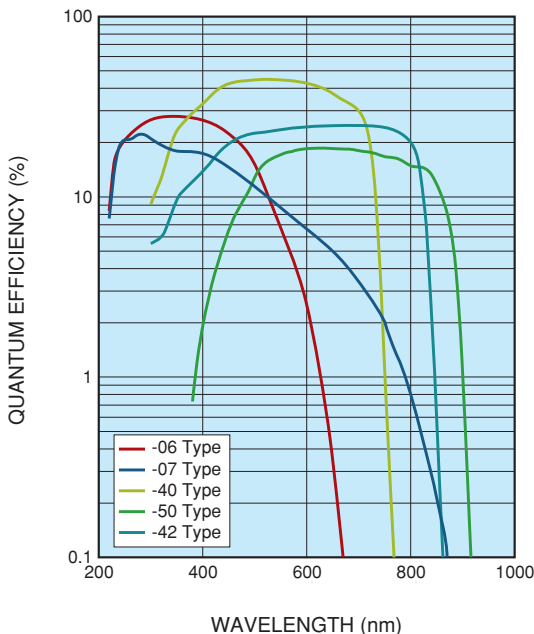
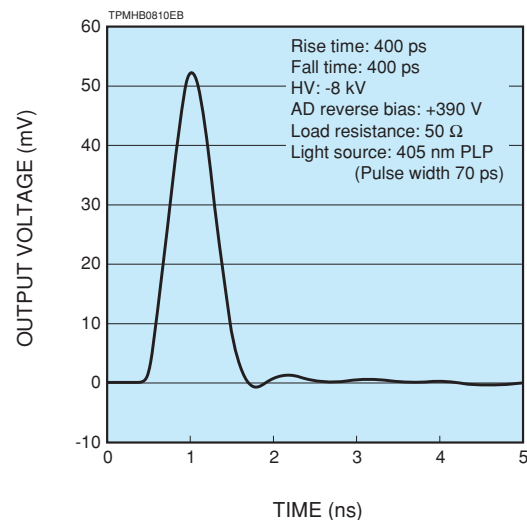


Figure 2: Output waveform (multi-photoelectron state)



HPD SERIES (Hybrid Photo Detector)

Figure 3: Gain

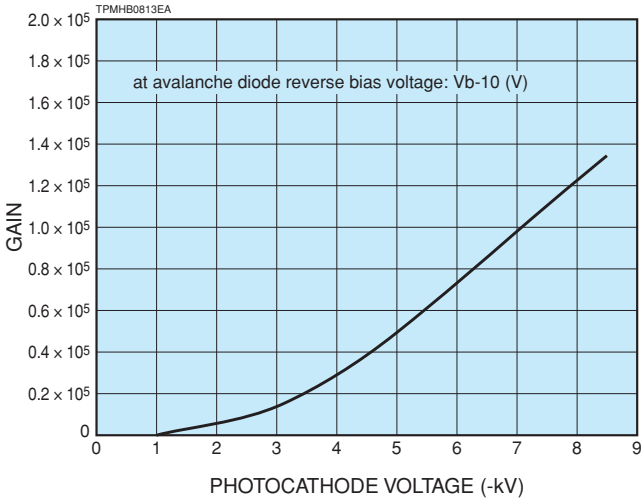
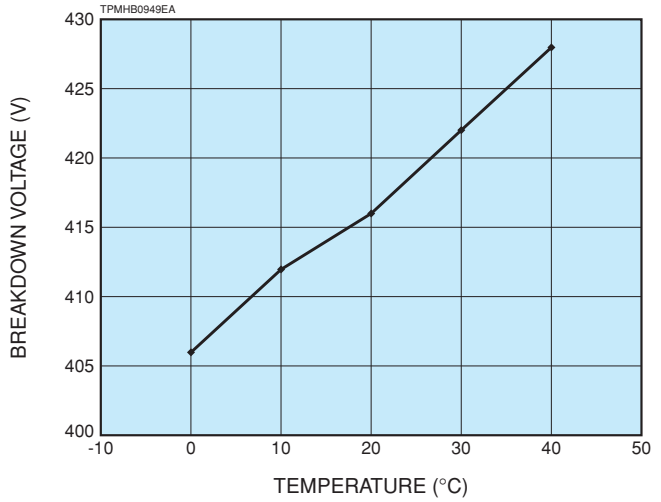


Figure 4: Breakdown voltage vs. temperature



PRODUCT VARIATIONS

●R10467U Series

Type No.	Spectral response	Photocathode	Window material	Window type	Effective area	T.T.S.(Transit Time Spread) *1 (FWHM)
R10467U-06	220 nm to 650 nm	Bialkali	Synthetic silica	Plano-concave	φ6 mm	50 ps
R10467U-07	220 nm to 870 nm	Multialkali	Synthetic silica	Plano-concave	φ6 mm	30 ps
R10467U-40	300 nm to 740 nm	GaAsP	Borosilicate glass	Flat	φ3 mm	90 ps
R10467U-42	300 nm to 840 nm	Extended red-GaAsP	Borosilicate glass	Flat	φ3 mm	130 ps
R10467U-50	380 nm to 900 nm	GaAs	Borosilicate glass	Flat	φ3 mm	130 ps

●R11322U-40

Type No.	Spectral response	Photocathode	Window material	Window type	Effective area	T.T.S. (Transit Time Spread) *1 (FWHM)
R11322U-40	300 nm to 740 nm	GaAsP	Borosilicate glass	Flat	φ5 mm	170 ps

●R14713U-07

Type No.	Spectral response	Photocathode	Window material	Window type	Effective area	T.T.S. (Transit Time Spread) *1 (FWHM)
R14713U-07	220 nm to 870 nm	Multialkali	Synthetic silica	Plano-concave	φ3 mm	20 ps

●H13223-40

Type No.	Spectral response	Photocathode	Window material	Window type	Effective area	T.T.S. (Transit Time Spread) *1 (FWHM)
H13223-40	300 nm to 740 nm	GaAsP	Borosilicate glass	Flat	φ3 mm	90 ps

*1: At the single photon state and the full illumination on photocathode, specified as FWHM (Full Width at Half Maximum). These Values include the jitter of the electronics about 30 ps.

SPECIFICATIONS

(at +25 °C)

Parameter			HPD series					Unit
			-06	-07	-40	-42	-50	
Suffix	Photocathode voltage	Max.	-8500					V
	Avalanche diode (AD) reverse bias voltage	Max.	Vb -10 *2					V
	Average photocathode current	Max.	200					pA
Quantum efficiency	Typ.	28 *5	16 *6	45 *7	25 *8	15 *9	%	
AD leakage current *3	Typ.	150					pA	
Gain *4	Typ.	1.2 × 10 ⁵					—	
Time response	Rise time	Typ.	400					ps
	Fall time	Typ.	400					ps
	Width	Typ.	600					ps
Operating ambient temperature		+15 to +35					°C	
Storage temperature		0 to +40					°C	

*1: Never operate the product more than the stated value.

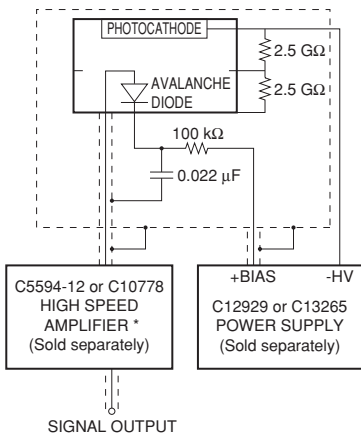
*2: Vb is the AD bias voltage at the leakage current 1 μA. The voltage of Vb is from 300 V to 500 V.

*3: At Vb -10 V *4: At the photocathode voltage of -8 kV and the AD bias voltage of Vb (breakdown voltage) -10 V.

*5: At 350 nm *6: At 400 nm *7: At 520 nm *8: At 660 nm *9: At 800 nm

BLOCK DIAGRAM

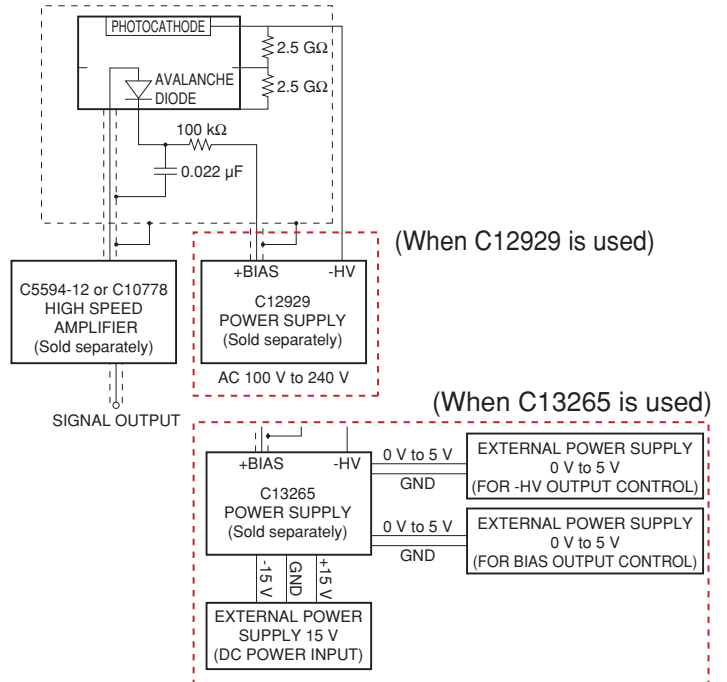
Figure 5: R10467U series, R11322U-40, R14713U-07



* HV and bias plug connectors (AMP P/N 830611, LEMO FFA.00.250.CTAC29) fitting each female connector on C12929 can be attached to the R10467U series /R11322U-40 /R14713U-07 on request as an option.
The R10467U-xx-01, R11322U-40-01 and R14713U-07-01 are equipped with these connectors.

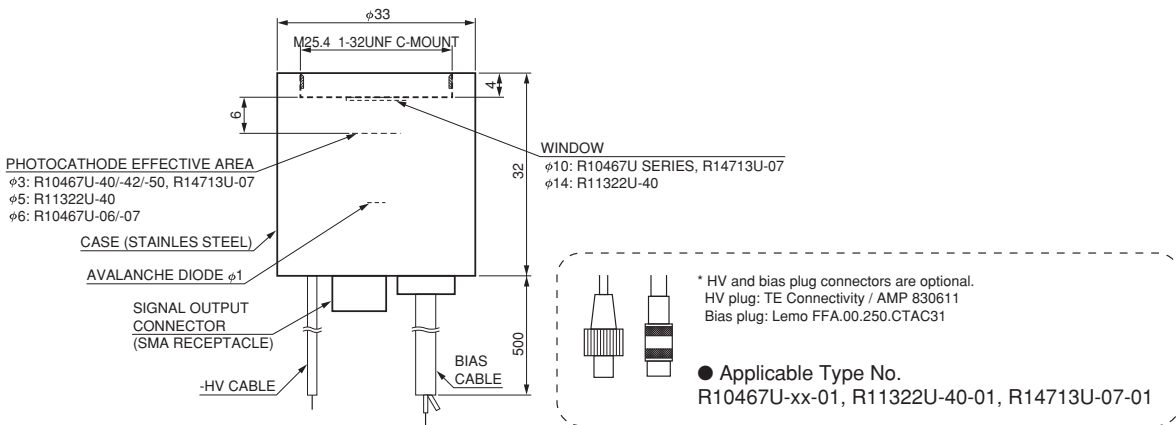
TPMHC0236EC

Figure 6: H13223-40



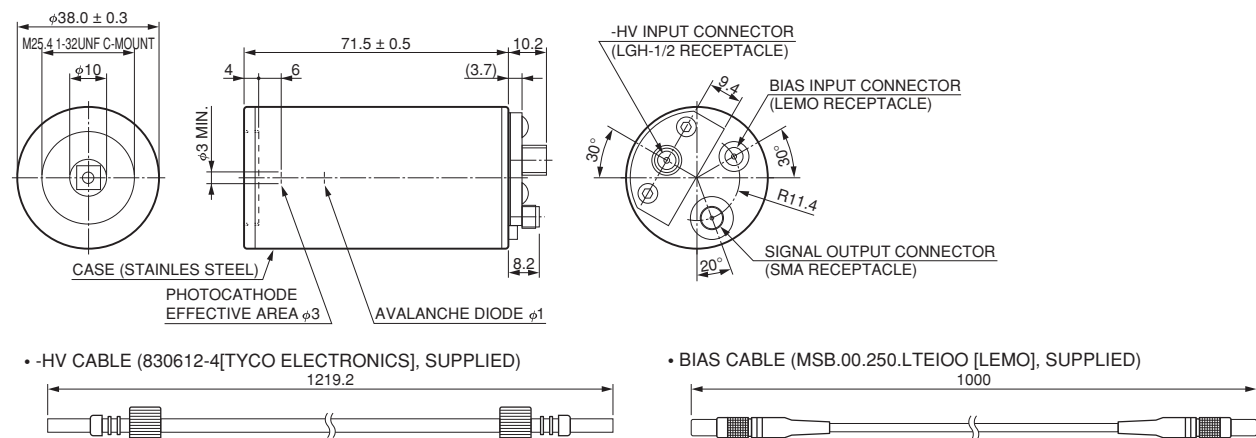
DIMENSIONAL OUTLINE

Figure 7: R10467U series, R11322U-40, R14713U-07 (Unit: mm)



TPMHA0561EB

Figure 8: H13223-40 (Unit: mm)



TPMHA0618EA

HPD SERIES (Hybrid Photo Detector)

RELATED PRODUCTS

HIGH SPEED INVERTING AMPLIFIER C10778 HIGH SPEED AMPLIFIER C5594-12



Left: C10778, Right: C5594-12

Parameter		C10778	C5594-12	Unit
Polarity		Inverting	Non-inverting	—
Frequency		350 kHz to 1.5 GHz*1	50 kHz to 1.5 GHz*2	—
Gain	Min.	34*3	34*4	dB
	Typ.	37*3	36*4	dB
Input / Output impedance		50	50	Ω
Supply voltage		+7 to +12	+12 to +16	V dc

*1: The upper and lower cutoff frequencies are defined as the points 3 dB below the average gain over the frequency range 350 kHz to 1.5 GHz.

*2: The upper and lower cutoff frequencies are defined as the points 3 dB below the gain at 0.1 GHz.

*3: Frequency range of 350 kHz to 1.5 GHz *4: Frequency = 0.1 GHz

High voltage power supply for HPD assembly C12929, C13265

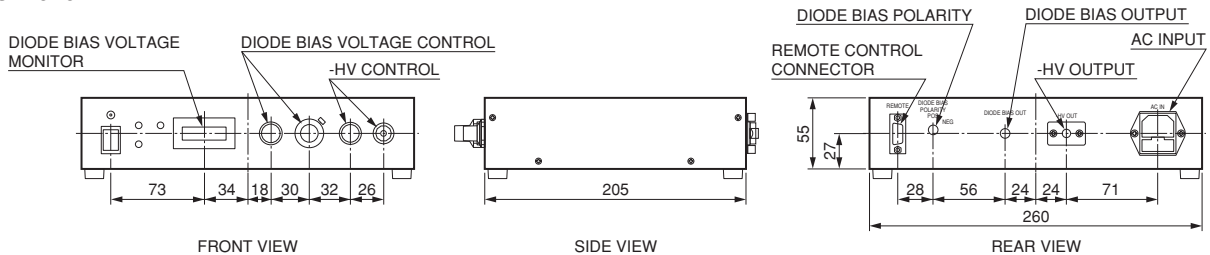


Left: C12929, Right: C13265

Parameter		C12929	C13265	Unit
Input voltage		100 V AC to 240 V AC	± 15 V dc	—
Output	Bias	voltage range	0 to ± 500	V
		Maximum output current	500	μ A
H.V.	voltage range	0 to -8.5		kV
	Maximum output current	16	2	μ A

Dimensional outline (Unit: mm)

●C12929



TYPE NO. GUIDE

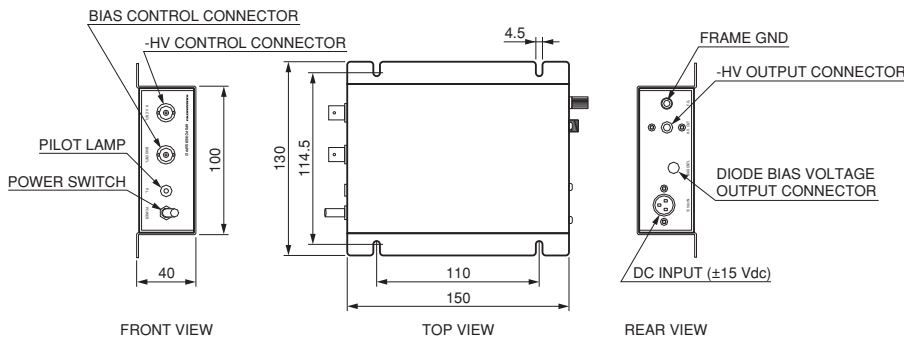
C12929-C□

Number in □ indicates power cable specifications

2: For Japan / For North America 3: For EU 4: For China 5: For UK 6: For Australia

Please contact us for use in other countries and regions.

●C13265



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 Bellu, 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

TPMH1361E03
MAR. 2022 IP