

## FEATURES

- Large effective area: 48.5 mm × 48.5 mm
- Packing density: 87 %
- 8 × 8 multianode,  
Pixel size: 6 mm × 6 mm / anode
- High quantum efficiency: 33 % Typ.
- Small dead space
- Fast time response
- Two types are available for HV input  
H12700A series: Cable input type  
H12700B series: Pin input type
- With tapered divider (-10 type)

## APPLICATIONS

- Academic research  
(RICH, Gamma ray telescope, etc.)
- Nuclear medicine equipment  
(PET, Gamma camera, etc.)
- 2D radiation imaging



Left: H12700A, Right: H12700B

Figure 1: Typical spectral response

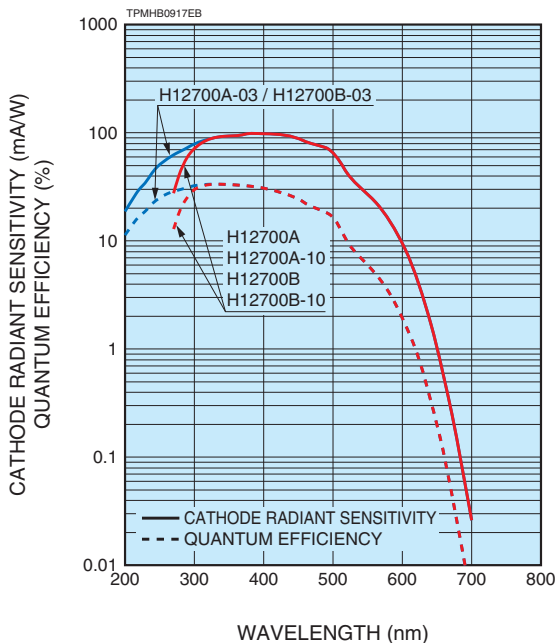
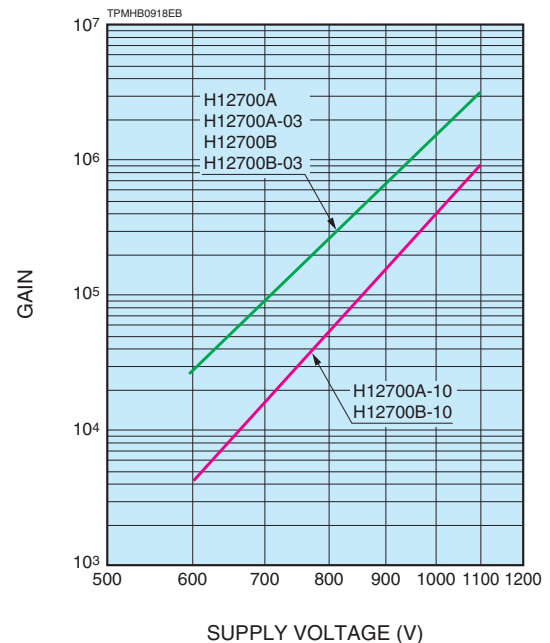


Figure 2: Typical gain



# FLAT PANEL TYPE MULTIANODE PMT ASSEMBLY H12700 SERIES

## SPECIFICATIONS

Type No.	Spectral response		Photo-cathode material <sup>(A)</sup>	Window material <sup>(B)</sup>	Dynode structure / Stages <sup>(C)</sup>	Maximum ratings			Cathode characteristics		Anode to cathode supply voltage (V)	
	Range (nm)	Peak wavelength (nm)				Supply voltage between anode and cathode (V)	Average anode output current in total (μA)	Divider current at -1100 V (μA)	Luminous <sup>(D)</sup>			Blue sensitivity index (CS 5-58) Typ.
									Min. (μA/lm)	Typ. (μA/lm)		
H12700A	300 to 650	380	BA	K	MC/10	-1100	100	225	60	95	12	-1000
H12700B	300 to 650	380	BA	K	MC/10	-1100	100	225	60	95	12	-1000
H12700A-03	185 to 650	380	BA	U	MC/10	-1100	100	225	60	95	12	-1000
H12700B-03	185 to 650	380	BA	U	MC/10	-1100	100	225	60	95	12	-1000
H12700A-10	300 to 650	380	BA	K	MC/10	-1100	100	225	60	95	12	-1000
H12700B-10	300 to 650	380	BA	K	MC/10	-1100	100	225	60	95	12	-1000

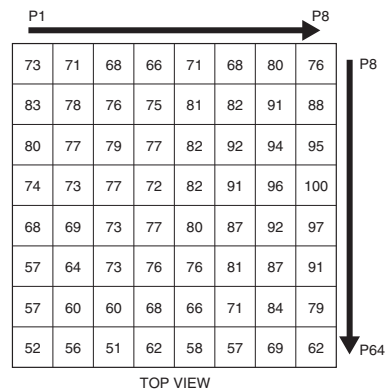
- NOTE:**
- (A) BA: Bialkali
  - (B) K: Borosilicate glass, U: UV glass
  - (C) MC: Metal channel
  - (D) The light source is a tungsten filament lamp operated at a distribution temperature of 2856 K. Supply voltage is 150 volts between the cathode and all other electrodes connected together as anode.
  - (E) The value is cathode output current when a blue filter (corning CS 5-58 polished to 1/2 stock thickness) is interposed between the light source and the tube under the same condition as Note (D).
  - (F) Measured with the same light source as Note (D) and with the anode-to-cathode supply voltage and voltage distribution ratio shown in Table 1 below.
  - (G) Measured with the same supply voltage and voltage distribution ratio as Note (F) after 30 minute storage in darkness.
  - (H) Those are test data when a signal from a central channel (P28) of 64 anodes is used, while all photocathode are illuminated by pulsed light source.
  - (J) The rise time is the time for the output pulse to rise from 10 % to 90 % of the peak amplitude when the whole photocathode is illuminated by a delta function light pulse.
  - (K) The electron transit time is the interval between the arrival of delta function light pulse at the entrance window of the tube and the time when the anode output reaches the peak amplitude. In measurement, the whole photocathode is illuminated.
  - (L) Also called transit time jitter. This is the fluctuation in electron transit time between individual pulses in the single photoelectron event, and defined as the FWHM of the frequency distribution of electron transit time.

**Table 1: Voltage distribution ratio and supply voltage**

Electrodes	K	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8	Dy9	Dy10	GR	P
Standard divider type	2	1	1	1	1	1	1	1	1	1	1	1	0.5
Tapered divider type	2.4	1.2	1	1	1	1	1	1	1	1	1.1	3.5	0.5

Supply voltage: -1000 V, K: Cathode, Dy: Dynode, GR: Guard ring P: Anode

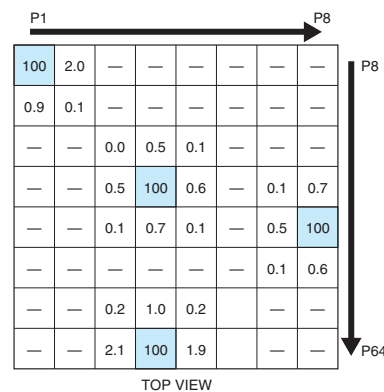
**Figure 3: Anode uniformity (Example)**



SUPPLY VOLTAGE: -1000 V  
LIGHT SOURCE: TUNGSTEN LAMP with BLUE FILTER (DC LIGHT)  
SPOT ILLUMINATION (APERTURE SIZE): 6 mm square on each channel

TPMHB0919EA

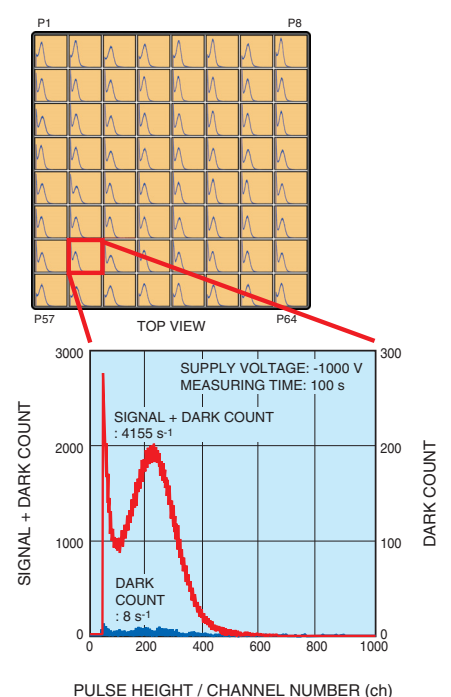
**Figure 4: Anode cross-talk (Example)**



SUPPLY VOLTAGE: -1000 V  
LIGHT SOURCE: TUNGSTEN LAMP with BLUE FILTER (DC LIGHT)  
FIBER SIZE: φ1.0 mm (Kuraray: Clear Fiber NA=0.72)

TPMHB0920EA

**Figure 5: Single photon counting (Example)**



TPMHB0921EA

Anode characteristics											Pulse linearity per channel [2% deviation]		Uniformity between each anode		Type No.
Luminous <sup>F</sup>		Gain <sup>F</sup> Typ.	Dark current per channel <sup>G</sup>		Dark current in total <sup>G</sup>		Time response <sup>H</sup>			Typ.	Max.				
Min. (A/lm)	Typ. (A/lm)		Typ. (nA)	Max. (nA)	Typ. (nA)	Max. (nA)	Rise time Typ. (ns)	Transit time Typ. (ns)	Transit time spread Typ. (ns)						
—	140	$1.5 \times 10^6$	0.1	—	6	50	0.52	4.9	0.35	0.8	1: 2	1: 3	H12700A		
—	140	$1.5 \times 10^6$	0.1	—	6	50	0.52	4.9	0.35	0.8	1: 2	1: 3	H12700B		
—	140	$1.5 \times 10^6$	0.1	—	6	50	0.52	4.9	0.35	0.8	1: 2	1: 3	H12700A-03		
—	140	$1.5 \times 10^6$	0.1	—	6	50	0.52	4.9	0.35	0.8	1: 2	1: 3	H12700B-03		
—	(38)	$(0.4 \times 10^6)$	(0.1)	—	(6)	(50)	(0.52)	(4.9)	(0.35)	(3)	1: 2	1: 3	H12700A-10		
—	(38)	$(0.4 \times 10^6)$	(0.1)	—	(6)	(50)	(0.52)	(4.9)	(0.35)	(3)	1: 2	1: 3	H12700B-10		

( ): Measured with the special voltage distribution ratio (Tapered divider) shown in Table 1 below.

Figure 6: Dimensional outlines and basing diagram (Unit: mm)

●HV cable input type (H12700A / H12700A-03 / H12700A-10)

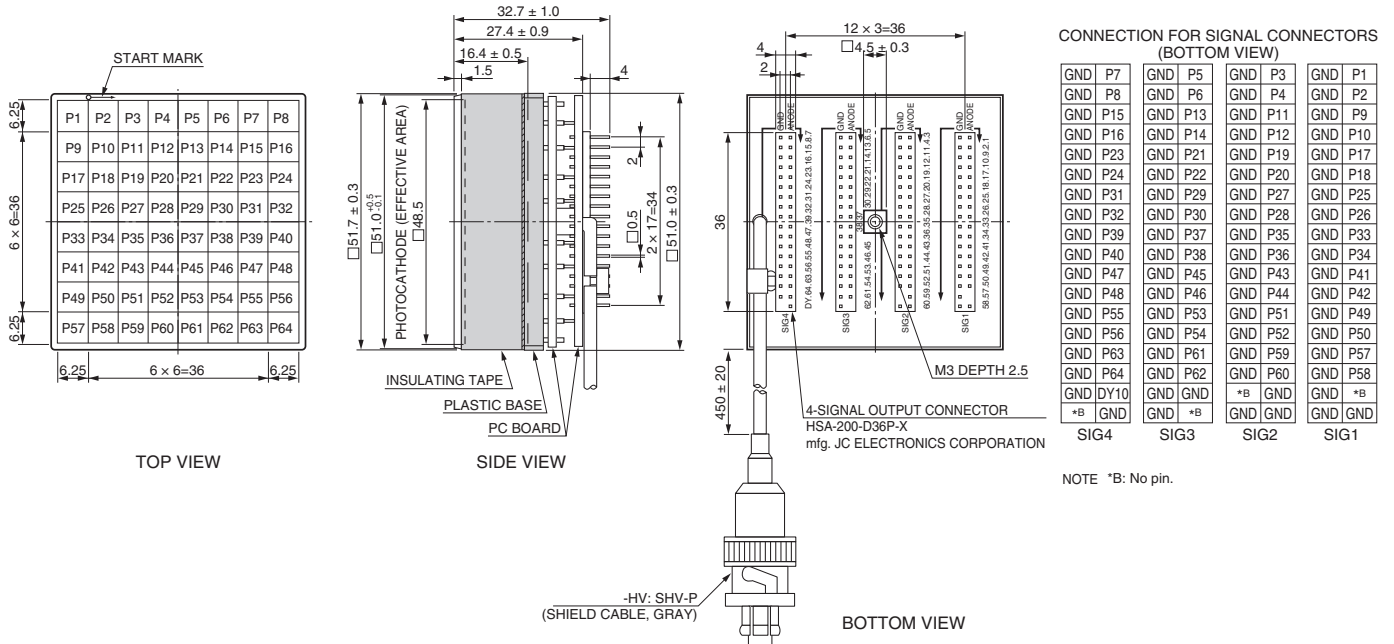
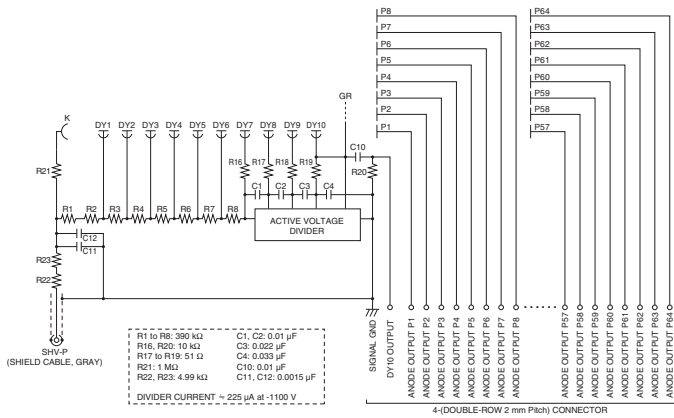
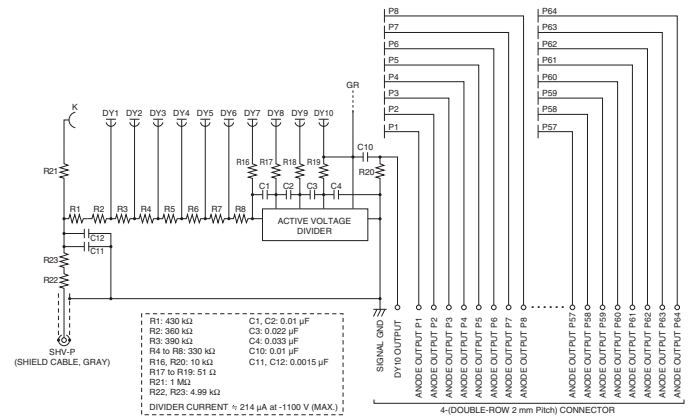


Figure 7: Internal circuit

H12700A / H12700A-03



H12700A-10



# FLAT PANEL TYPE MULTIANODE PMT ASSEMBLY H12700 SERIES

Figure 8: Dimensional outlines and basing diagram (Unit: mm)

●HV cable input type (H12700B / H12700B-03 / H12700B-10)

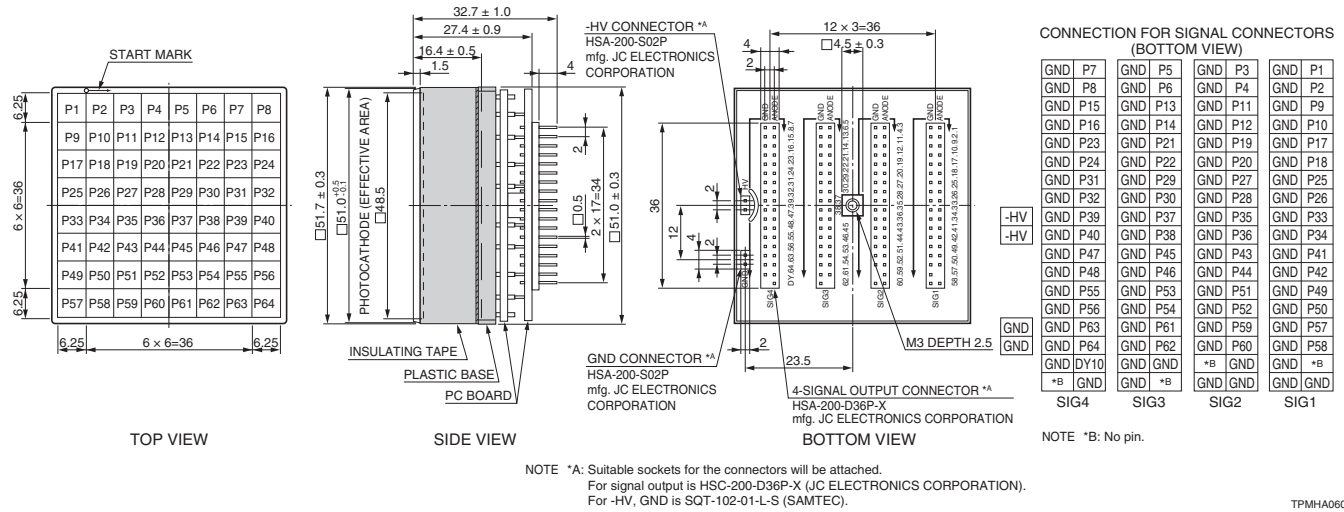


Figure 9: Internal circuit

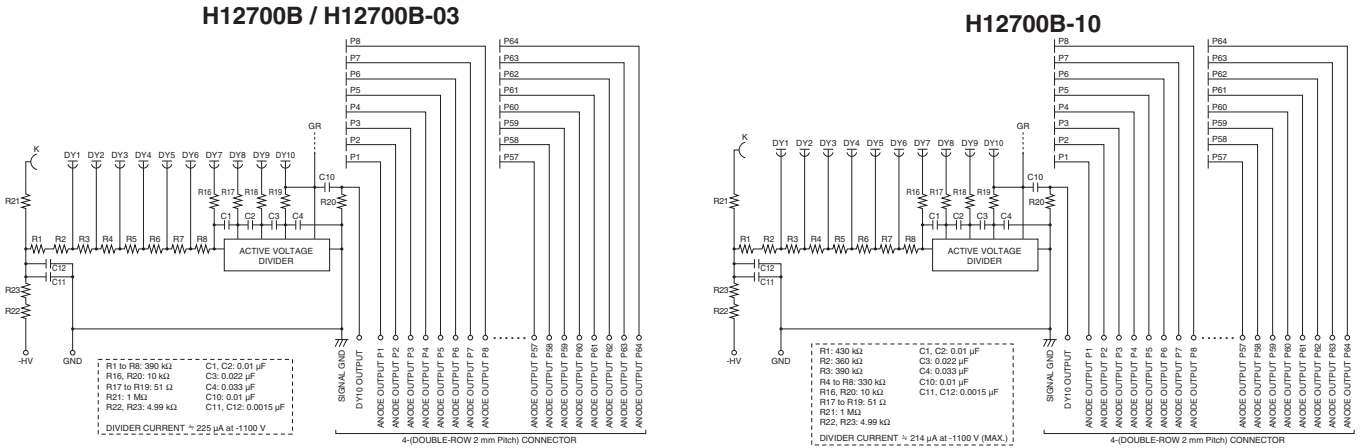
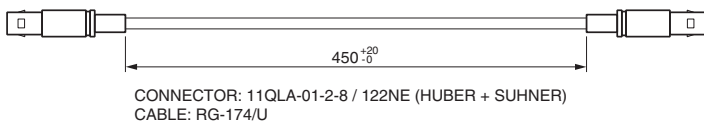
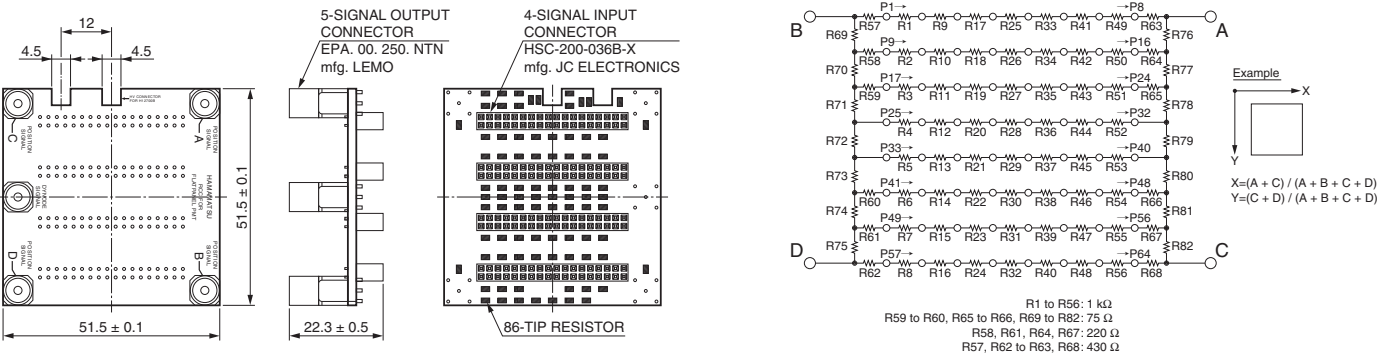


Figure 10: Accessories (Unit: mm) **Sold separately**

●Signal cable A13976



●Signal read-out board E14340 (for position imaging with center of gravity method)



## 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, 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, D-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, 20020 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 Beltu, Chaoyang District, 100020 Beijing, 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, Section2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)03-659-0080, Fax: (886)03-659-0081 E-mail: info@hamamatsu.com.tw