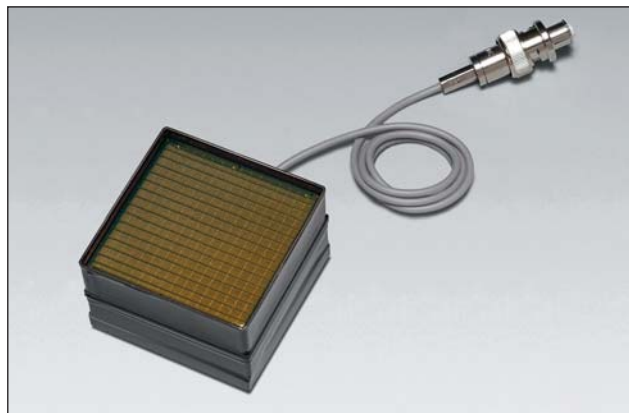


## FEATURES

- Large effective area: 49 mm × 49 mm
- 16 × 16 multianode,  
Anode pixel size: 2.8 mm × 2.8 mm / anode
- Small dead space
- Fast time response

## APPLICATIONS

- Nuclear medicine equipment  
(PET, Gamma camera, etc.)
- High energy physics
- Radiation measurement



## SPECIFICATIONS

### GENERAL

Parameter		H9500	H9500-03	Unit
Spectral response		300 to 650	185 to 650	nm
Peak wavelength		400		nm
Photocathode material		Bialkali		—
Window	Material	Borosilicate glass	UV glass	—
	Thickness	1.5		mm
Dynode	Structure	Metal channel dynode		—
	Number of stages	12		—
Number of anode pixels		256 (16 × 16 matrix)		—
Pixel size / Pitch at center		2.8 × 2.8 / 3.04		mm
Effective area		49 × 49		mm
Dimensional outline (W × H × D)		52 × 52 × 33.3		mm
Packing density (Effective area / External size)		89		%
Weight		177		g
Operating ambient temperature		0 to +50		°C
Storage temperature		-15 to +50		°C

### MAXIMUM RATINGS (Absolute maximum values)

Parameter	H9500	H9500-03	Unit
Supply voltage (Between anode to cathode)	-1100		V
Average anode output current in total	100		μA
Divider current at -1100 V	180		μA

# FLAT PANEL TYPE

## MULTIANODE PHOTOMULTIPLIER TUBE ASSEMBLY H9500, H9500-03

### CHARACTERISTICS (at 25 °C)

Parameter		Min.	Typ.	Max.	Unit
Cathode sensitivity	Luminous <sup>Ⓐ</sup>	50	75	—	μA/lm
	Blue sensitivity index <sup>Ⓑ</sup>	8.0	10.5	—	—
	Radiant	—	90	—	mA/W
Quantum efficiency at 420 nm		—	25	—	%
Anode sensitivity	Luminous <sup>Ⓒ</sup>	—	110	—	A/lm
Gain <sup>Ⓒ</sup>		$0.5 \times 10^6$	$1.5 \times 10^6$	—	—
Anode dark current per channel <sup>Ⓓ</sup>		—	0.02	—	nA
Anode dark current in total <sup>Ⓓ</sup>		—	5	30	nA
Time response <sup>Ⓔ</sup>	Rise time <sup>Ⓕ</sup>	—	0.8	—	ns
	Transit time <sup>Ⓖ</sup>	—	6	—	ns
	Transit time spread (FWHM) <sup>Ⓖ</sup>	—	0.4	—	ns
Pulse linearity per channel (2 % deviation)		—	0.2	—	mA
Anode uniformity (Condition Figure 3)		—	1: 3	1: 5	—
Cross-talk <sup>Ⓙ</sup>		—	5	—	%

Ⓐ: 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.

Ⓑ: The value is cathode output current when a blue filter is interposed between the light source and the tube under the same condition as Note Ⓐ.

Ⓒ: Measured with the same light source as Note Ⓐ and with the anode-to-cathode supply voltage and voltage distribution ratio shown in Table 1 below.

Ⓓ: Measured with the same supply voltage and voltage distribution ratio as Note Ⓒ after 30 minutes storage in darkness.

Ⓔ: Those are test data when a signal from a central channel of 256 anodes is used, while all photocathode are illuminated by pulsed light source.

Ⓕ: 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.

Ⓖ: 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.

Ⓖ: 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.

Ⓙ: Supply Voltage: -1000 V Light Source: Tungsten filament lamp + blue filter

Aperture Size: Approx. 2 mm × 2 mm

One anode is illuminated through the aperture and the output of the adjacent anodes are calculated as relative value, with 100 % being equal to the output of the illuminated anode. The cross-talk is the relative value of the adjacent anodes expressed in %.

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

Electrodes	K	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8	Dy9	Dy10	Dy11	Dy12	GR	P
Distribution ratio	1	1	1	1	1	1	1	1	1	1	1	1	1	0.9	0.1

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

Figure 1: Typical spectral response

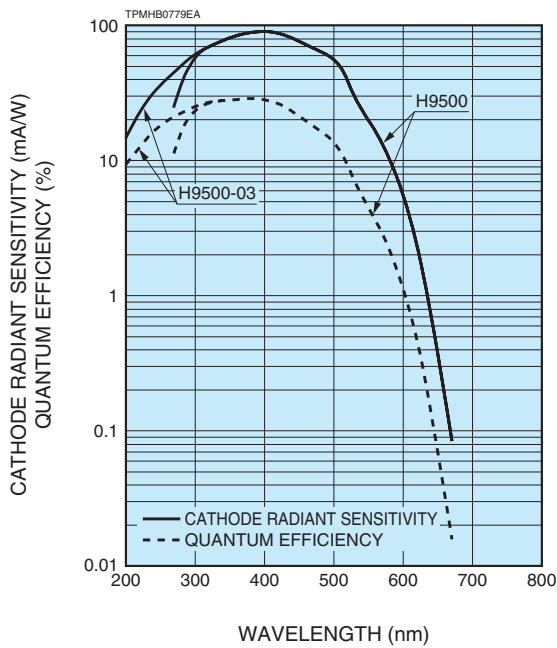


Figure 2: Typical gain characteristics

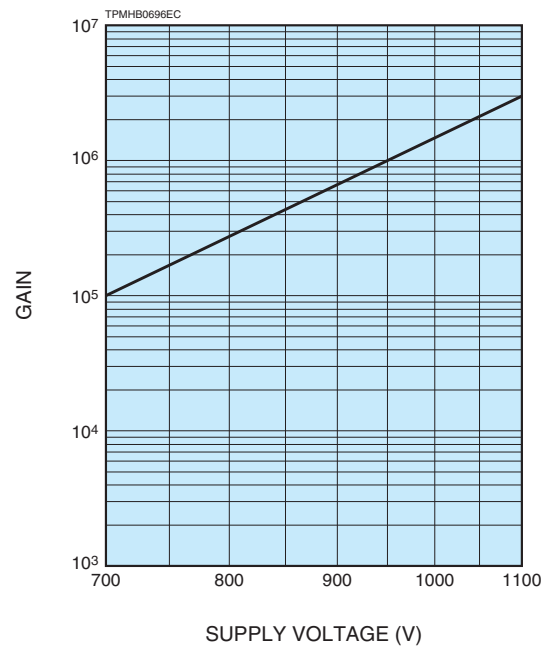
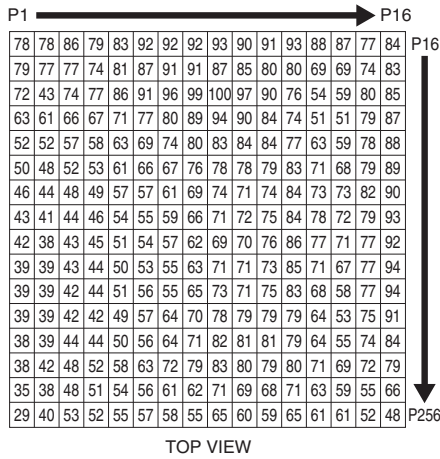


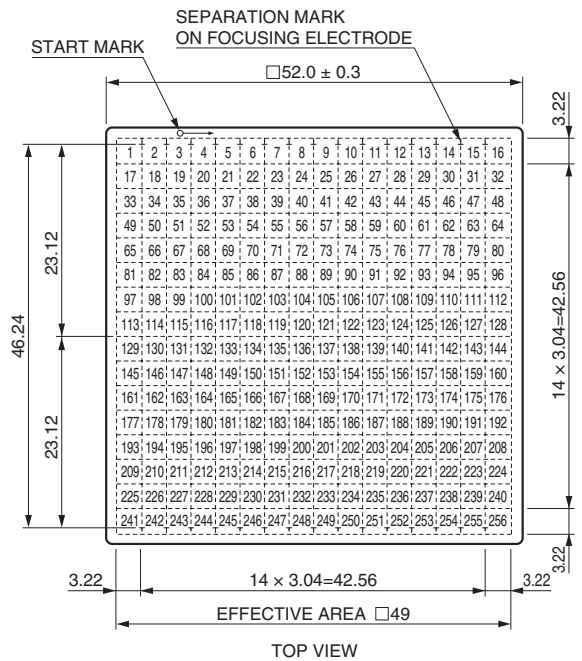
Figure 3: Anode uniformity (Example)



SUPPLY VOLTAGE: -1000 V  
LIGHT SOURCE: TUNGSTEN LAMP with BLUE FILTER (DC LIGHT)  
SPOT ILLUMINATION (APERTURE SIZE): 3 mm square on each channel

TPMHB0730EB

Figure 4: Anode matrix and separation mark



The start mark and the separation marks are put on an electrode plate inside.

TPMHB0731EA

