HAMAMATSU

FLAT PANEL TYPE MULTIANODE PHOTOMULTIPLIER TUBE ASSEMBLY
H8500, H8500B

52 mm Square, Bialkali Photocathode, 12-stage, 8 × 8 Multianode, Small Dead Space, Fast Time Response

APPLICATIONS

- Small Animal Imaging
- Compact Gamma Camera
- Scinti-mammography
- 2D Radiation Monitor

Left: H8500, Right: H8500B

SPECIFICATIONS

GENERAL

Parameter		Description / Value	Unit
Spectral Response		300 to 650	nm
Peak Wavelength		420	nm
Photocathode Material		Bialkali	—
Window	Material	Borosilicate glass	—
	Thickness	1.5	mm
Dynode	Structure	Metal channel dynode	—
	Number of Stages	12	—
Number of Anode Pixels		64 (8 × 8 matrix)	—
Pixel Size / Pitch at Center		5.8 × 5.8 / 6.08	mm
Effective Area		49 × 49	mm
Dimensional Outline (W × H × D)		52 × 52 × 28	mm
Packing Density (Effective Area / External Size)		89	%
Weight		140 (H8500), 117 (H8500B)	g
Operating Ambient Temperature		0 to +50	°C
Storage Temperature		-15 to +50	°C

MAXIMUM RATINGS (Absolute Maximum Values)

Parameter	Value	Unit
Supply Voltage (Between Anode to Cathode)	-1100	V
Average Anode Output Current in Total	100	µA
Divider Current at -1100 V	180	µA

CHARACTERISTICS (at 25 °C)

Parameter		Min.	Typ.	Max.	Unit
Cathode Sensitivity	Luminous Ⓐ	50	60	—	μA/lm
	Blue Sensitivity Index (CS 5-58) Ⓑ	8.0	9.5	—	—
	Quantum Efficiency at 420 nm	—	24	—	%
Anode Sensitivity	Luminous Ⓒ	—	90	—	A/lm
Gain Ⓒ		0.5×10^6	1.5×10^6	—	—
Anode Dark Current per Channel Ⓓ		—	0.1	—	nA
Anode Dark Current in Total Ⓓ		—	6	50	nA
Time Response Ⓔ	Rise Time Ⓕ	—	0.8	—	ns
	Transit Time Ⓖ	—	6	—	ns
	Transit Time Spread (FWHM) Ⓗ	—	0.4	—	ns
Pulse Linearity per Channel (±2 % deviation)		—	1	—	mA
Uniformity (Condition Figure 3)		—	1: 2	1: 4	—
Cross-talk		—	3	—	%

NOTES

Ⓐ: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(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 Ⓐ.
Ⓒ: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 minute storage in darkness.
Ⓔ:Those are test data when a signal from a central channel of 64 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.

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

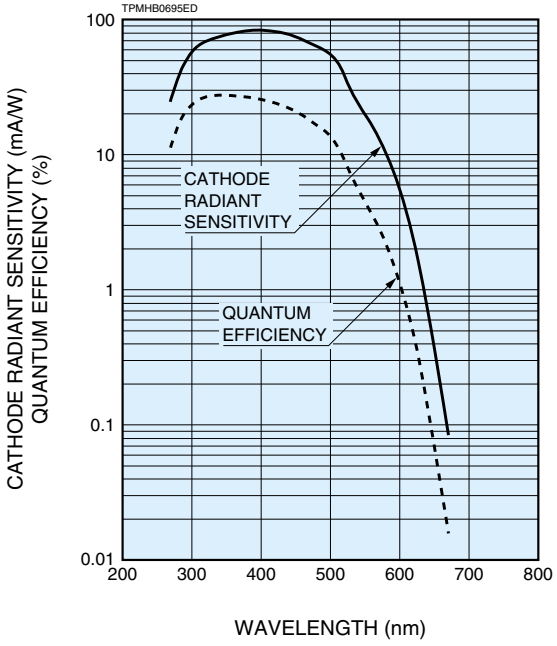


Figure 2: Typical Gain Characteristics

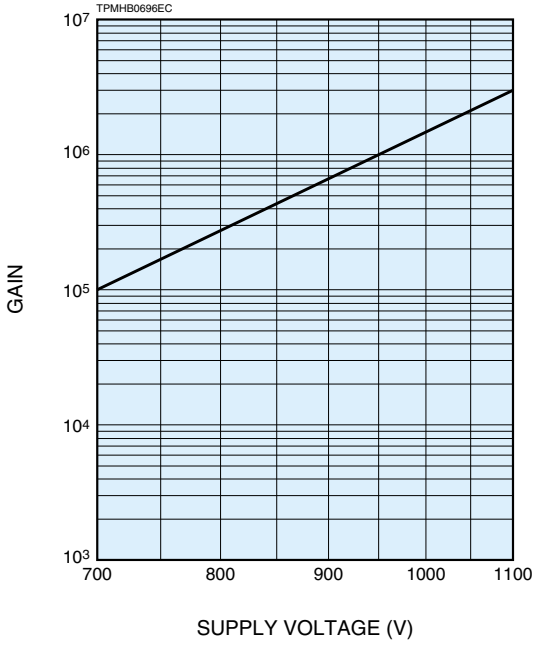
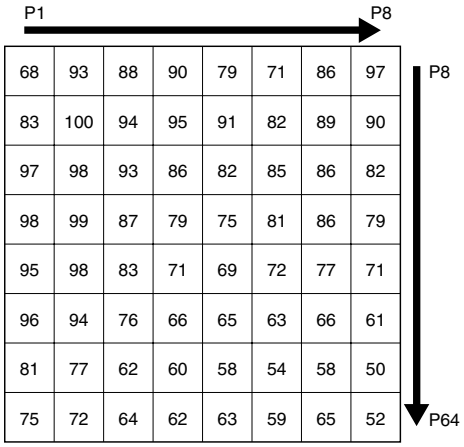


Figure 3: Anode Uniformity (Example)



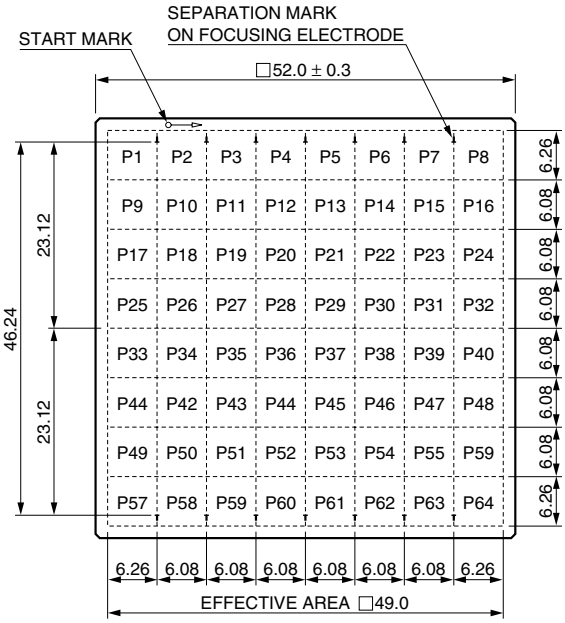
68	93	88	90	79	71	86	97
83	100	94	95	91	82	89	90
97	98	93	86	82	85	86	82
98	99	87	79	75	81	86	79
95	98	83	71	69	72	77	71
96	94	76	66	65	63	66	61
81	77	62	60	58	54	58	50
75	72	64	62	63	59	65	52

TOP VIEW

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

TPMHB0697EC

Figure 4: Anode Matrix and Separation Mark



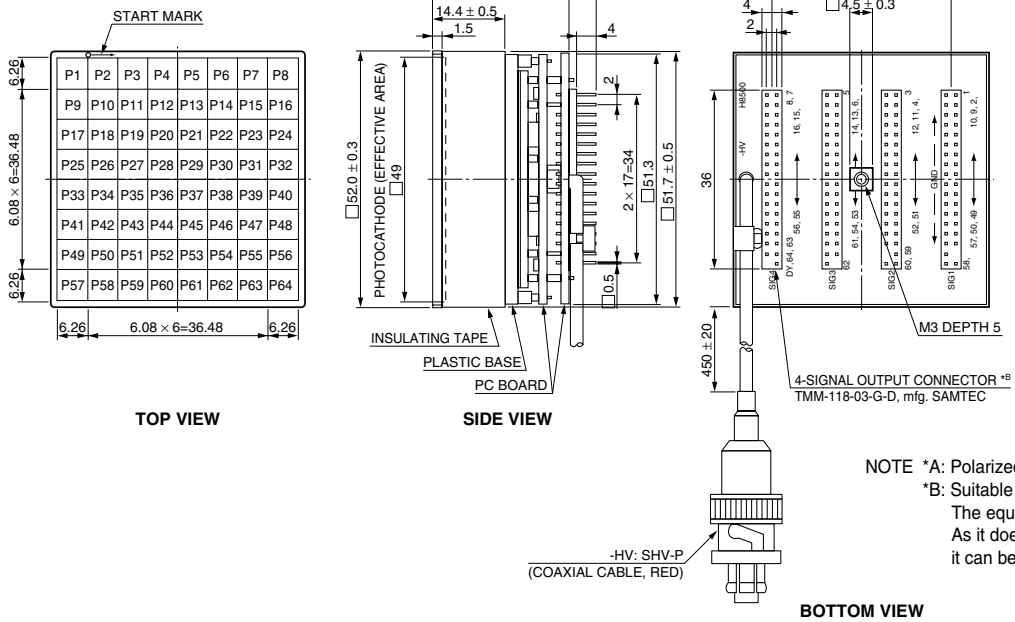
TOP VIEW

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

TPMHB0708EB

Figure 5: Dimensional Outline (Unit: mm)

H8500

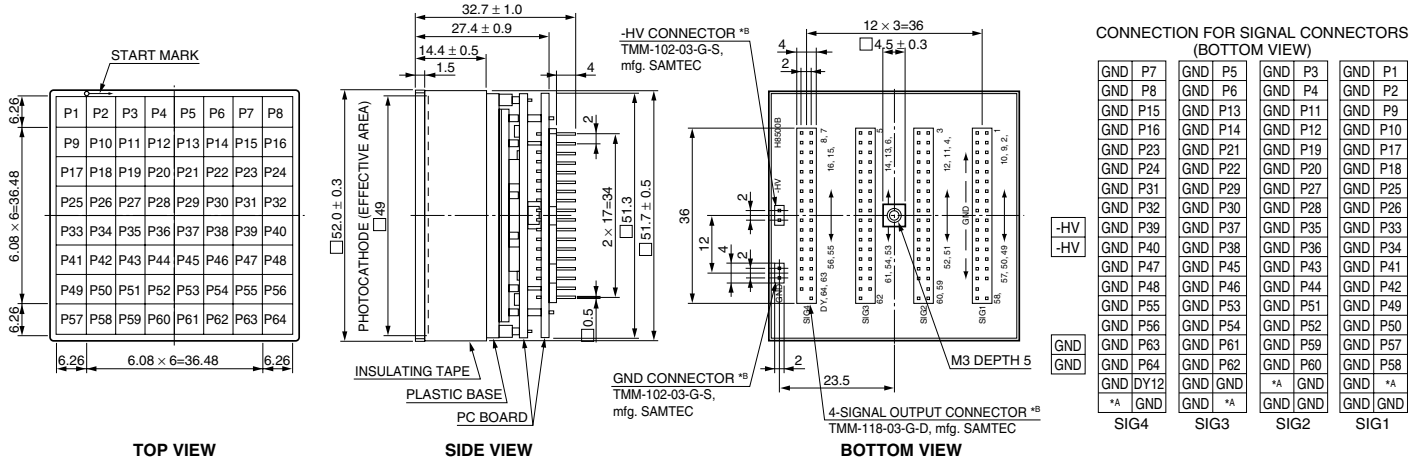


SIG4		SIG3		SIG2		SIG1	
GND	P7	GND	P5	GND	P3	GND	P1
GND	P8	GND	P6	GND	P4	GND	P2
GND	P15	GND	P13	GND	P11	GND	P9
GND	P16	GND	P14	GND	P12	GND	P10
GND	P23	GND	P21	GND	P19	GND	P17
GND	P24	GND	P22	GND	P20	GND	P18
GND	P31	GND	P29	GND	P27	GND	P25
GND	P32	GND	P30	GND	P28	GND	P26
GND	P39	GND	P37	GND	P35	GND	P33
GND	P40	GND	P38	GND	P36	GND	P34
GND	P47	GND	P45	GND	P43	GND	P41
GND	P48	GND	P46	GND	P44	GND	P42
GND	P55	GND	P53	GND	P51	GND	P49
GND	P56	GND	P54	GND	P52	GND	P50
GND	P63	GND	P61	GND	P59	GND	P57
GND	P64	GND	P62	GND	P60	GND	P58
GND	DY12	GND	GND	*A	GND	GND	*A
*A	GND	GND	*A	GND	GND	GND	GND

NOTE *A: Polarized position of omitted pin
*B: Suitable sockets for the signal connectors will be attached.
The equivalent socket is SQT-118-01-L-D (SAMTEC).
As it doesn't have a polarized position marker,
it can be used at any positions.

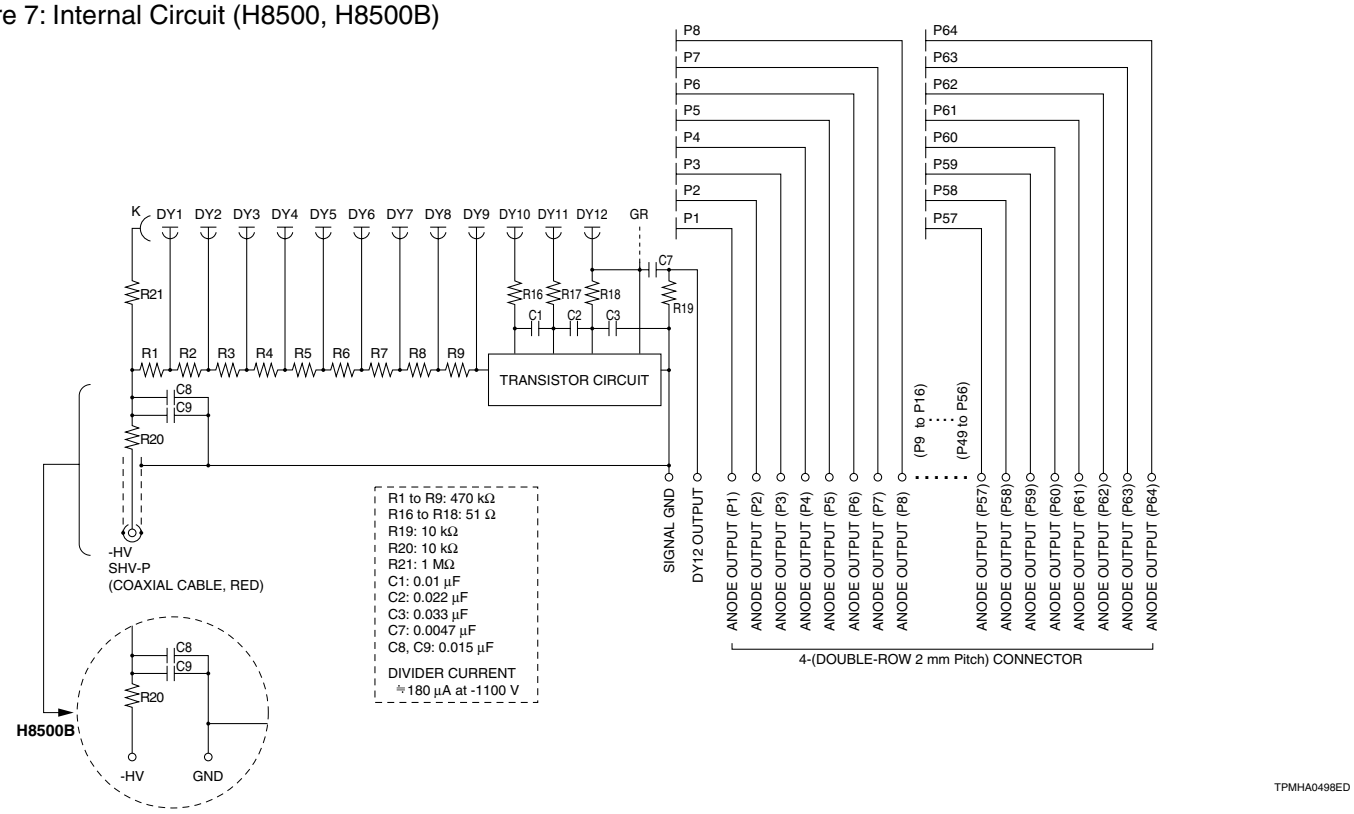
Figure 6: Dimensional Outline (Unit: mm)

H8500B



NOTE *A: Polarized position of omitted pin
*B: Suitable sockets for the signal connectors will be attached.
The equivalent socket for signal output is SQT-118-01-L-D (SAMTEC).
The equivalent socket for -HV, GND is SQT-102-01-L-S (SAMTEC).
As it doesn't have a polarized position marker,
it can be used at any positions.

Figure 7: Internal Circuit (H8500, H8500B)



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