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HAMAMATSU

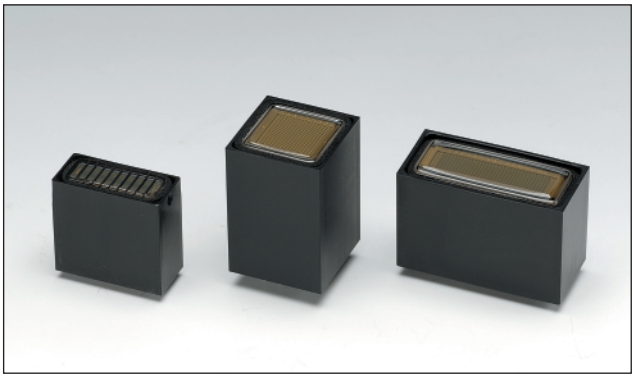
PHOTON IS OUR BUSINESS

LINEAR ARRAY MULTIANODE PMT ASSEMBLY AND MODULE

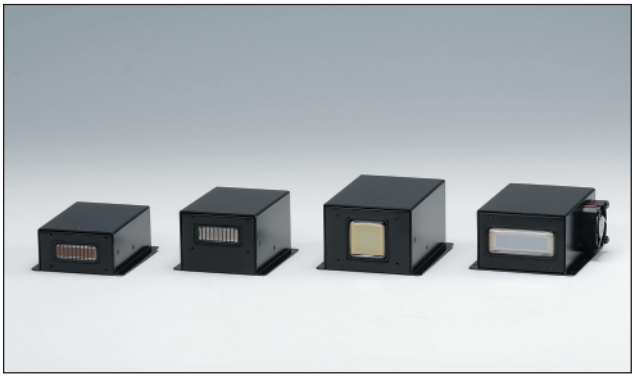
Photomultiplier Tube with Active Divider Circuit
Linear Array Multianode PMT Assembly, 8-Channel(H9530 series) / 16-Channel(H10515B series) / 32-Channel(H7260 series)

FEATURES

- **High Cathode Sensitivity**
  Luminous 500 μA/lm Typ. (-20 Type)
- **Effective Area per Channel**
  H9530 Series ..... 2.0 mm × 2.5 mm × 8 Anodes
  H10515B Series ..... 0.8 mm × 16 mm × 16 Anodes
  H7260 Series ..... 0.8 mm × 7 mm × 32 Anodes
- **High Speed Response:**
  H9530 Series Rise Time 0.7 ns Typ.
  H10515B Series, H7260 Series Rise Time 0.6 ns Typ.
- **Good Anode Uniformity (H9530 Series)**
  1:1.1 Typ. (at -1000 V and peak wavelength)
- **Low Cross-talk (H9530 Series)**
  0.1 % Typ. (each channel)
  Black slit faceplate used
- **Built In Preamplifier and High Voltage Power Supply Circuit (Module Types)**



Assembly Types: H9530 Series, H10515B Series, H7260 Series



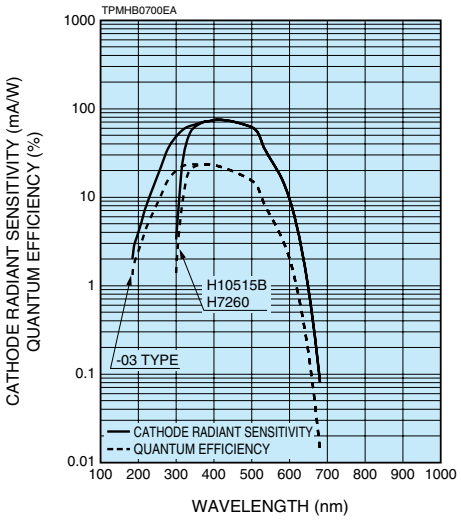
Module Types: H11451, H11452, H11459, H11460

APPLICATIONS

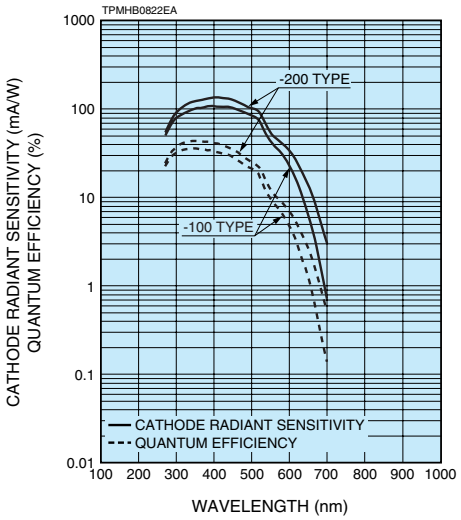
- **Biomedical Fluorescence Detection**
- **Laser Scanning Detection**
- **Spectroscopy**
- **Environmental Monitoring**

Figure 1: Typical Spectral Response

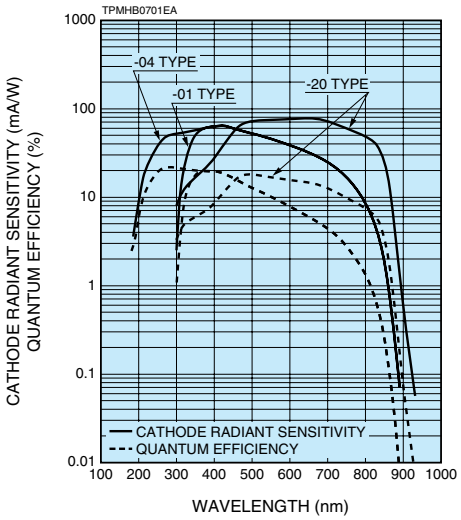
-03 and None Suffix Types



-100 and -200 Types



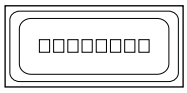
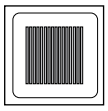
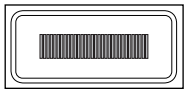
-01, -04 and -20 Types



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SPECIFICATIONS OF ASSEMBLY TYPES

Type No.	Anode Type		Dimensional Outline	Effective Area per Channel (mm)	Channel Pitch (mm)	Ⓐ Dynode Structure / No. of Stages	Weight (g)	Ⓑ Insulation Cover Material
H9530 SERIES	8-Channel Linear Array		See Fig.6	2.0 × 2.5	2.8	MC/12	25.5	P.O.M.
H10515B SERIES	16-Channel Linear Array		See Fig.7	0.8 × 16	1	MC/10	49.0	P.O.M.
H7260 SERIES	32-Channel Linear Array		See Fig.8	0.8 × 7	1	MC/10	62.0	P.O.M.

Notes: Ⓐ MC: Metal Channel
Ⓑ P.O.M.: Polyoxymethylene
* Operating ambient temperature: 0 °C to +50 °C
Storage temperature: -15 °C to +50 °C

Type No.	Spectral Response		Ⓖ Photocathode Material	Ⓗ Window Material	Cathode Characteristics					Supply Voltage (V dc)
					Luminous		Blue Sensitivity Index (CS 5-58) Typ.	Red /White Ratio (R-68) Typ.	Ⓘ Radiant	
	Range (nm)	Peak Wavelength (nm)			Min. (μA/lm)	Typ. (μA/lm)			Typ. (mA/W)	
H9530-01	300 to 880	420	MA	B	150	250	—	0.3	65	-1000
H9530-20	300 to 920	630	MA	B	350	500	—	0.45	78	-1000
H10515B	300 to 650	420	BA	B	50	70	8.5	—	72	-800
H10515B-01	300 to 880	420	MA	B	150	250	—	0.3	65	-800
H10515B-03	185 to 650	420	BA	U	50	70	8.5	—	72	-800
H10515B-04	185 to 880	420	MA	U	150	250	—	0.3	65	-800
H10515B-20	300 to 920	630	MA	B	350	500	—	0.45	78	-800
H10515B-100	300 to 650	400	SBA	B	90	105	13.5	—	110	-800
H10515B-200	300 to 650	400	UBA	B	110	135	15.5	—	130	-800
H7260	300 to 650	420	BA	B	50	70	8.5	—	72	-800
H7260-01	300 to 880	420	MA	B	150	250	—	0.3	65	-800
H7260-03	185 to 650	420	BA	U	50	70	8.5	—	72	-800
H7260-04	185 to 880	420	MA	U	150	250	—	0.3	65	-800
H7260-20	300 to 920	630	MA	B	350	500	—	0.45	78	-800
H7260-100	300 to 650	400	SBA	B	90	105	13.5	—	110	-800
H7260-200	300 to 650	400	UBA	B	110	135	15.5	—	130	-800

Notes: Ⓖ BA: Bialkali MA: Multialkali SBA: Super Bialkali UBA: Ultra Bialkal
Ⓗ B: Borosilicate glass U: UV glass
Ⓘ Measured at the peak wavelength

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(at 25 °C)

Ⓒ Socket	Maximum Ratings Ⓓ				Type No.
	Supply Voltage (V dc)	Ⓔ Total Average Anode Current (μA)	Ⓔ Average Anode Current per Channel (μA)	Voltage Divider Current (mA)	
SD-106-T-22	-1200	80	10	0.42 Ⓕ	H9530 SERIES
SD-108-T-22 ASP24307-02	-900	100	10	0.37 Ⓕ	H10515B SERIES
SD-108-T-22 × 2 pcs	-900	100	6	0.37 Ⓕ	H7260 SERIES

Notes: Ⓒ Supplied
Ⓓ The maximum ambient temperature range
Ⓔ Averaged over any interval of 30 seconds maximum.
Ⓕ Measured with the maximum supply voltage.

(at 25 °C)

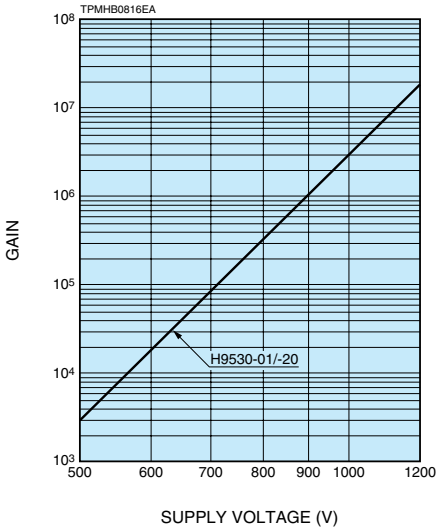
Anode Characteristics Ⓙ							Pulse Linearity per Channel (±2 % deviation) (mA)	Cross-talk	Uniformity Between Each Anode		Type No.
Luminous		Gain	Dark Current per Channel (After 30 min.)		Time Response						
					Rise Time	Transit Time Spread (FWHM)					
Min. (A/lm)	Typ. (A/lm)	Typ.	Typ. (nA)	Max. (nA)	Typ. (ns)	Typ. (ns)		Typ. (%)	Typ.	Max.	
75	750	3×10^6	0.5	5	0.7	0.25	0.9	0.1	—	1: 1.1	H9530-01
175	1500	3×10^6	1	10	0.7	0.25	0.9	0.1	—	1: 1.1	H9530-20
50	280	4×10^6	0.2	2	0.6	0.18	0.8	3	1: 1.5	1: 2	H10515B
75	250	1×10^6	0.5	5	0.6	0.18	0.8	3	1: 1.7	1: 2.5	H10515B-01
50	280	4×10^6	0.2	2	0.6	0.18	0.8	3	1: 1.5	1: 2	H10515B-03
75	250	1×10^6	0.5	5	0.6	0.18	0.8	3	1: 1.7	1: 2.5	H10515B-04
175	500	1×10^6	1	10	0.6	0.18	0.8	3	1: 1.7	1: 2.5	H10515B-20
90	315	3×10^6	0.2	2	0.6	0.18	0.8	3	1: 1.5	1: 2	H10515B-100
110	405	3×10^6	0.2	2	0.6	0.18	0.8	3	1: 1.5	1: 2	H10515B-200
50	140	2×10^6	0.2	2	0.6	0.18	0.6	3	1: 1.5	1: 2	H7260
75	250	1×10^6	0.5	5	0.6	0.18	0.6	3	1: 1.7	1: 2.5	H7260-01
50	140	2×10^6	0.2	2	0.6	0.18	0.6	3	1: 1.5	1: 2	H7260-03
75	250	1×10^6	0.5	5	0.6	0.18	0.6	3	1: 1.7	1: 2.5	H7260-04
175	500	1×10^6	1	10	0.6	0.18	0.6	3	1: 1.7	1: 2.5	H7260-20
90	210	2×10^6	0.2	2	0.6	0.18	0.6	3	1: 1.5	1: 2	H7260-100
110	270	2×10^6	0.2	2	0.6	0.18	0.6	3	1: 1.5	1: 2	H7260-200

Notes: Ⓙ Anode characteristics are measured with the supply voltage.

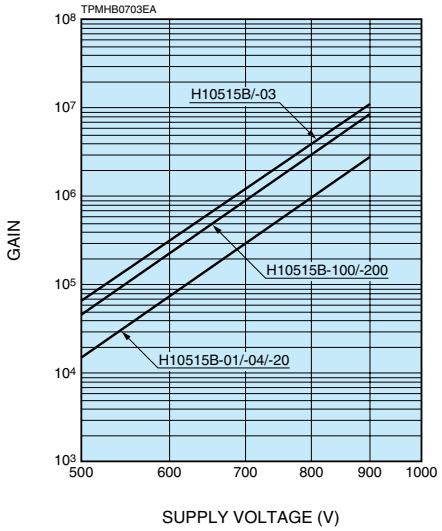
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Figure 2: Typical Gain Characteristics

H9530 Series



H10515B Series



H7260 Series

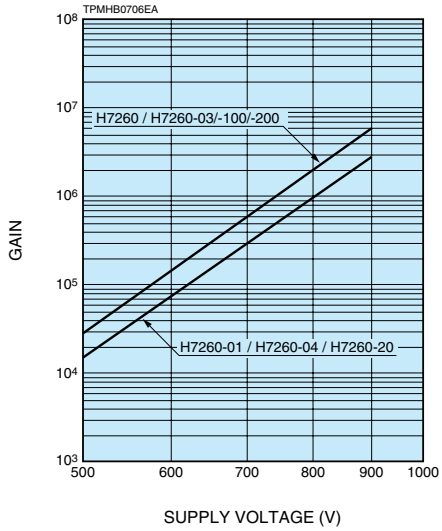
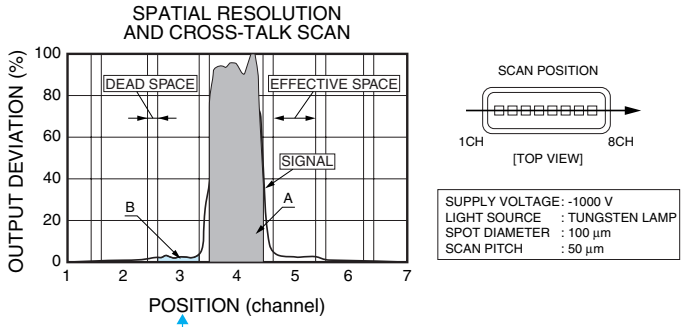


Figure 3: Cross-Talk (Example)

H9530 Series

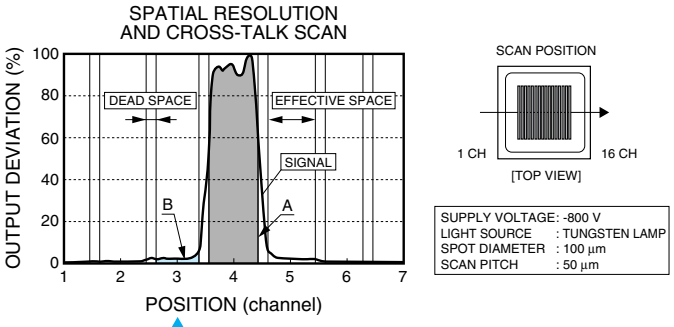


CH	CROSS-TALK RATIO (%)							
	1	2	3	4	5	6	7	8
1	100	0.04	0.01					
2	0.08	100	0.05	0.01				
3	0.01	0.07	100	0.04	0.01			
4		0.01	0.10	100	0.04	0.01		
5			0.01	0.11	100	0.08	0.01	
6				0.01	0.11	100	0.05	0.01
7					0.01	0.08	100	0.06
8						0.01	0.07	100

CROSS-TALK
AREA B / AREA A × 100

TPMHB0817EA

H10515B Series



CH	CROSS-TALK RATIO (%)															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	100	2.9	0.6	0.2	0.1	—	—	—	—	—	—	—	—	—	—	—
2	2.9	100	3.1	0.5	0.2	0.1	—	—	—	—	—	—	—	—	—	—
3	0.8	2.8	100	2.8	0.6	0.2	0.1	—	—	—	—	—	—	—	—	—
4	0.3	0.8	2.7	100	3.2	0.6	0.2	0.1	—	—	—	—	—	—	—	—
5	0.1	0.3	0.8	2.9	100	3.1	0.6	0.2	0.1	—	—	—	—	—	—	—
6	—	0.1	0.3	0.8	2.7	100	3.0	0.6	0.2	0.1	—	—	—	—	—	—
7	—	—	0.1	0.3	0.8	2.7	100	3.0	0.6	0.2	0.1	—	—	—	—	—
8	—	—	—	0.1	0.3	0.8	2.9	100	2.9	0.6	0.2	0.1	—	—	—	—
9	—	—	—	—	0.1	0.3	0.8	2.9	100	2.9	0.6	0.2	0.1	—	—	—
10	—	—	—	—	—	0.1	0.3	0.8	3.1	100	2.7	0.6	0.2	0.1	—	—
11	—	—	—	—	—	—	0.1	0.4	0.8	3.3	100	3.8	0.6	0.2	0.1	—
12	—	—	—	—	—	—	—	0.1	0.4	0.9	3.2	100	2.8	0.6	0.2	0.1
13	—	—	—	—	—	—	—	—	0.1	0.4	0.8	3.1	100	2.8	0.6	0.3
14	—	—	—	—	—	—	—	—	—	0.1	0.4	0.8	3.1	100	2.7	0.6
15	—	—	—	—	—	—	—	—	—	—	0.1	0.4	0.9	3.2	100	2.9
16	—	—	—	—	—	—	—	—	—	—	—	0.1	0.4	0.9	3.1	100

CROSS-TALK
AREA B / AREA A × 100

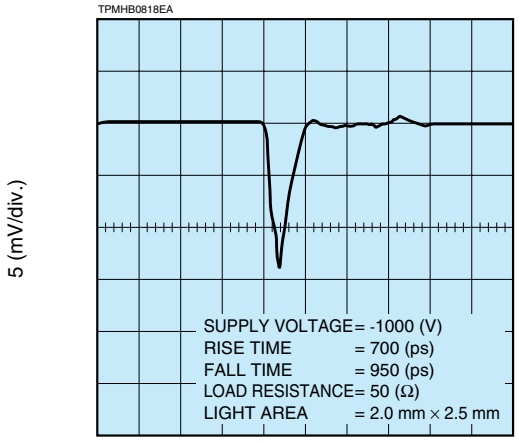
TPMHB0705EA

* H7260 series is equivalent to H10515B series.

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Figure 4: Typical Time Response

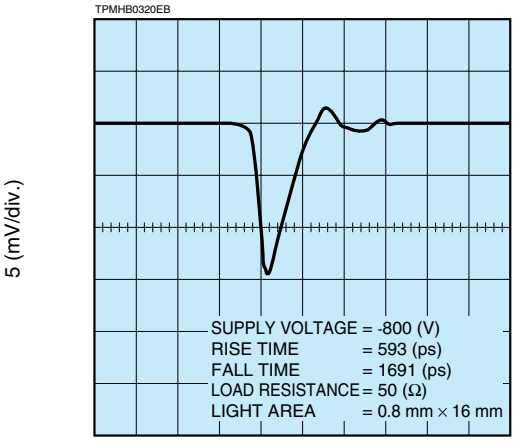
H9530 Series



2 (ns/div.)

Light is irradiated to only one channel at this measurement.

H10515B Series



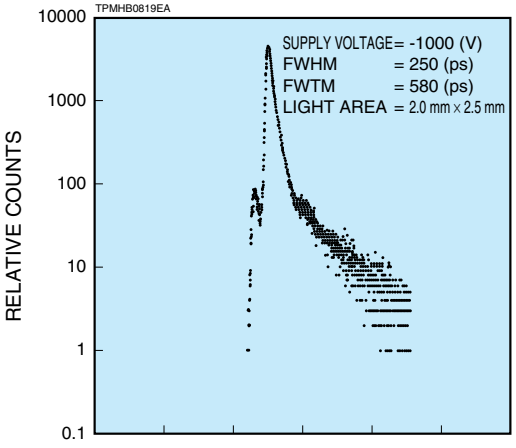
2 (ns/div.)

Light is irradiated to only one channel at this measurement.

* H7260 series is equivalent to H10515B series.

Figure 5: Typical Transit Time Spread Characteristics

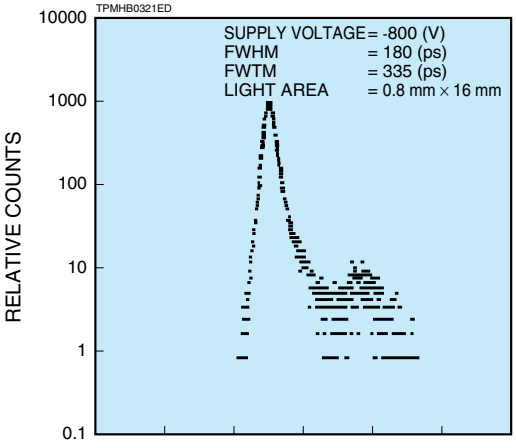
H9530 Series



0.5 (ns/div.)

Light is irradiated to only one channel at this measurement.

H10515B Series



0.5 (ns/div.)

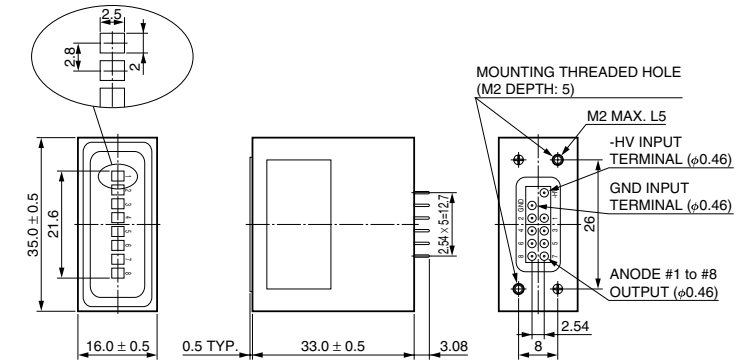
Light is irradiated to only one channel at this measurement.

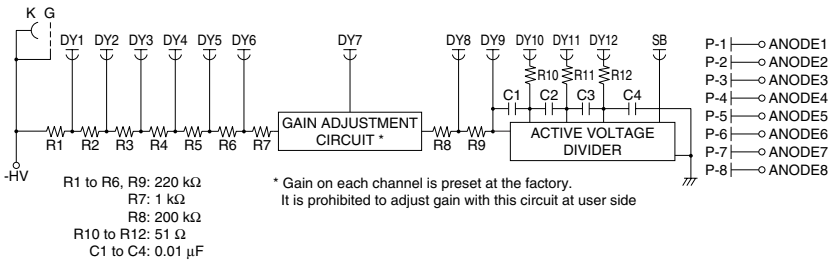
* H7260 series is equivalent to H10515B series.

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Figure 6: Dimensional Outline (Unit: mm)

H9530 Series



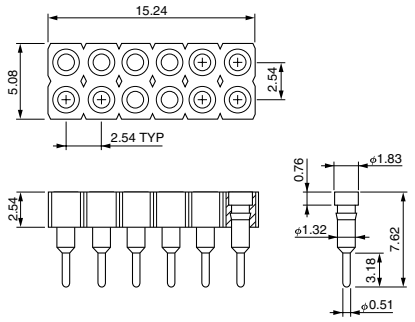


R1 to R6, R9: 220 kΩ
R7: 1 kΩ
R8: 200 kΩ
R10 to R12: 51 Ω
C1 to C4: 0.01 μF

* Gain on each channel is preset at the factory.
It is prohibited to adjust gain with this circuit at user side

TPMHA0508EC

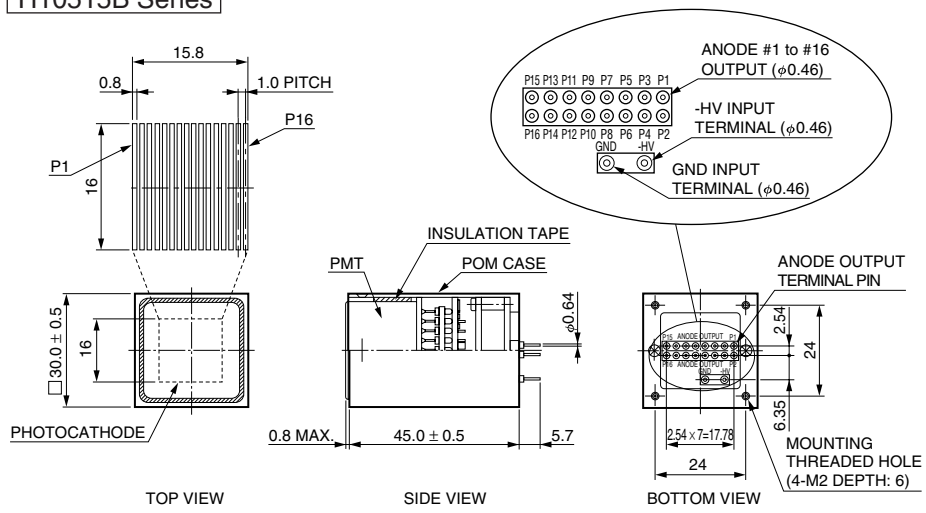
SOCKET: SD-106-T-22 (Supplied)

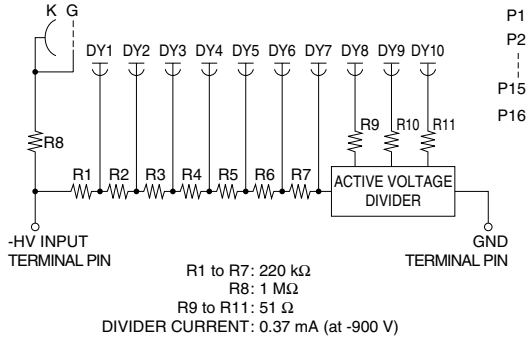


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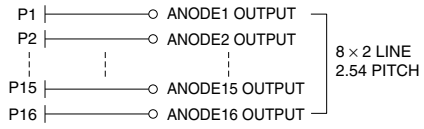
Figure 7: Dimensional Outline (Unit: mm)

H10515B Series



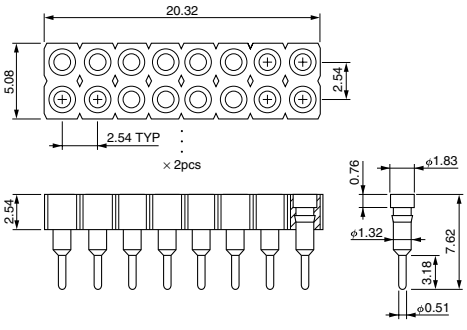


R1 to R7: 220 kΩ
R8: 1 MΩ
R9 to R11: 51 Ω
DIVIDER CURRENT: 0.37 mA (at -900 V)



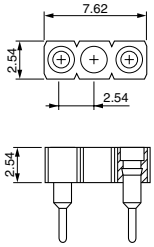
TPMHA0534EB

SOCKET: SD-108-T-22 (Supplied)



TACCA0204EA

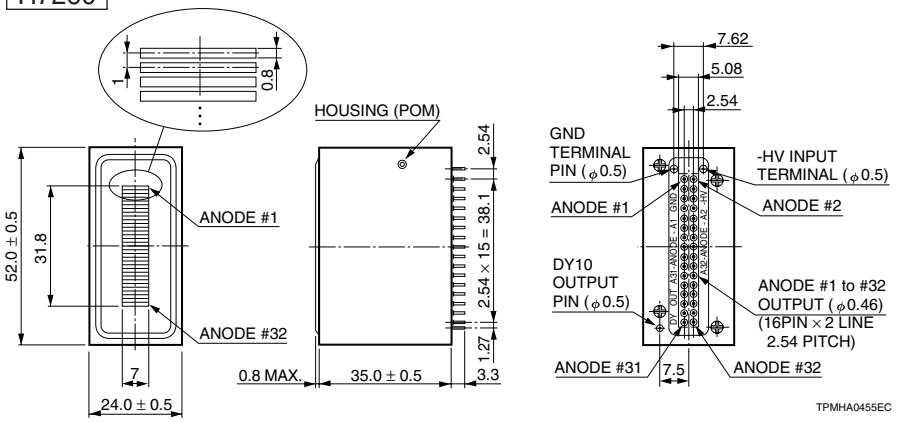
SOCKET: ASP24307-02 (Supplied)



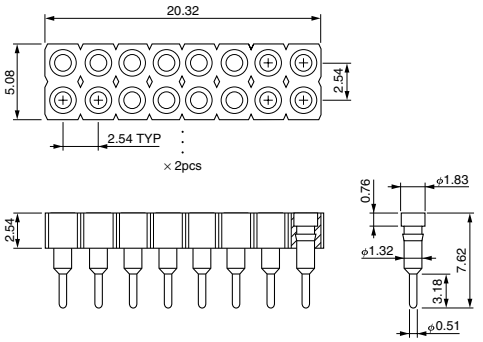
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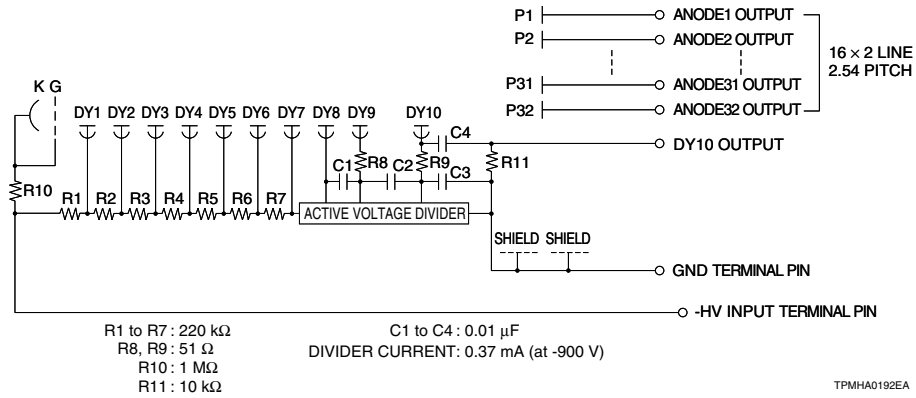
Figure 8: Dimensional Outline and Circuit Diagram (Unit: mm)

H7260

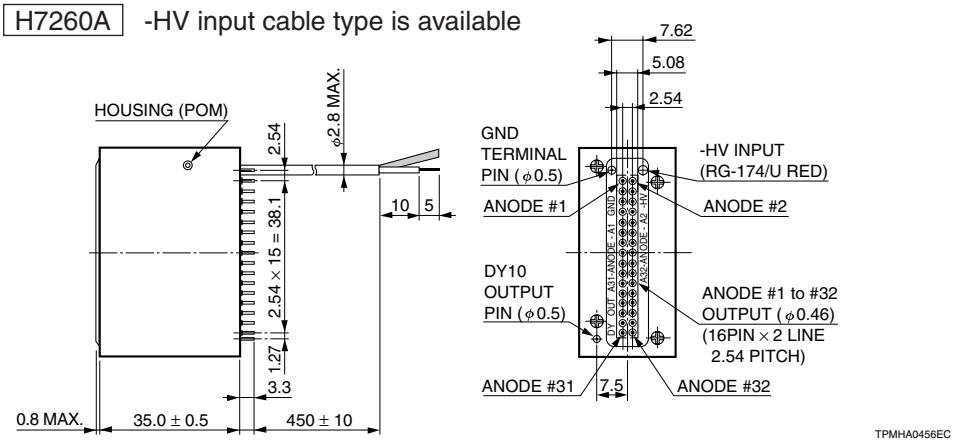


SOCKET: SD-108-T-22 (Supplied)





H7260A -HV input cable type is available



RELATED PRODUCTS for H9530 / H10515B / H7260 SERIES



C4900, C4900-01



C10673, C10673-01

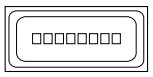
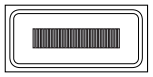
HIGH VOLTAGE POWER SUPPLY UNIT

Type No.	Max. Output Voltage (V)	Output Current (mA)	Input Voltage (mA)	Dimensions (mm)	Weight (g)
C4900	-1250	0.6	+15	46 × 24 × 12	31
C4900-01		0.5	+12		
C10673		0.6	+15		
C10673-01		0.5	+12		

* C10673, C10673-01: UL recognized

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SPECIFICATIONS OF MODULE TYPES

Type No.	Anode Type		Dimensional Outline	Effective Area per Channel (mm)	Channel Pitch (mm)	Maximum Ratings			
						Input Voltage (V)	Ⓐ Control Voltage (V)	Output Signal Voltage Ⓑ DC Output per Channel (V)	Output Signal Voltage ⒷⒸ Pulse Output per Channel (V)
H11451 SERIES	8-Channel Linear Array		See Fig.10	2.0 × 2.5	2.8	±16	+4.8	+1	+10
H11452 SERIES	8-Channel Linear Array		See Fig.11	2.0 × 2.5	2.8	±16	+4.8	+1	+10
H11459 SERIES	16-Channel Linear Array		See Fig.12	0.8 × 16	1	±16	+3.6	+1	+10
H11460 SERIES	32-Channel Linear Array		See Fig.13	0.8 × 7	1	±16	+3.6	+1	+10

Notes: Ⓐ Input impedance = 400 kΩ
Ⓑ Load resistance = 10 kΩ
Ⓒ Pulse width = 10 μs, Duty ratio = 1/100
* Operating ambient temperature: +5 °C to +45 °C
Storage temperature: -15 °C to +45 °C

Type No.	Spectral Response		Ⓔ Photocathode Material	Ⓕ Window Material	Cathode Characteristics				
	Range (nm)	Peak Wavelength (nm)			Luminous Min. (μA/lm)	Luminous Typ. (μA/lm)	Blue Sensitivity Index (CS 5-58) Typ.	Red /White Ratio (R-68) Typ.	Ⓖ Radiant Typ. (mA/W)
H11451-01	300 to 880	420	MA	B	150	250	—	0.3	65
H11451-20	300 to 920	630	MA	B	350	500	—	0.45	78
H11452-01	300 to 880	420	MA	B	150	250	—	0.3	65
H11452-20	300 to 920	630	MA	B	350	500	—	0.45	78
H11459	300 to 650	420	BA	B	50	70	8.5	—	72
H11459-01	300 to 880	420	MA	B	150	250	—	0.3	65
H11459-03	185 to 650	420	BA	U	50	70	8.5	—	72
H11459-04	185 to 880	420	MA	U	150	250	—	0.3	65
H11459-20	300 to 920	630	MA	B	350	500	—	0.45	78
H11459-100	300 to 650	400	SBA	B	90	105	13.5	—	110
H11459-200	300 to 650	400	UBA	B	110	135	15.5	—	130
H11460	300 to 650	420	BA	B	50	70	8.5	—	72
H11460-01	300 to 880	420	MA	B	150	250	—	0.3	65
H11460-03	185 to 650	420	BA	U	50	70	8.5	—	72
H11460-04	185 to 880	420	MA	U	150	250	—	0.3	65
H11460-20	300 to 920	630	MA	B	350	500	—	0.45	78
H11460-100	300 to 650	400	SBA	B	90	105	13.5	—	110
H11460-200	300 to 650	400	UBA	B	110	135	15.5	—	130

Notes: Ⓔ BA: Bialkali MA: Multialkali SBA: Super Bialkali UBA: Ultra Bialkal
Ⓕ B: Borosilicate glass U: UV glass
Ⓖ Measured at the peak wavelength

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(at 25 °C)

Current-to-Voltage Conversuon Factory (V/μA)	Frequency Bandwith	Input Voltage (V)	Ⓓ Input Current Typ. (mA)	Ⓐ Recommended Control Voltage Adjustment Range (V)	Weight (g)	Features	Type No.
0.1	DC to 1 MHz	±11.5 to ±15.5	+26 / -18	+0.5 to +4.6	101	H9530 with preamplifier and high voltage power supply	H11451 SERIES
0.1	DC to 1 MHz	±11.5 to ±15.5	+32 / -18	+0.5 to +4.6	155	H11451 with gain control function	H11452 SERIES
0.1	DC to 1 MHz	±11.5 to ±15.5	+46 / -42	+0.5 to +3.4	154	H10515B with preamplifier and high voltage power supply	H11459 SERIES
0.1	DC to 1 MHz	±11.5 to ±15.5	+127 / -83	+0.5 to +3.4	154	H7260 with preamplifier and high voltage power supply	H11460 SERIES

Notes: Ⓓ At ±15 V input voltage

(at 25 °C)

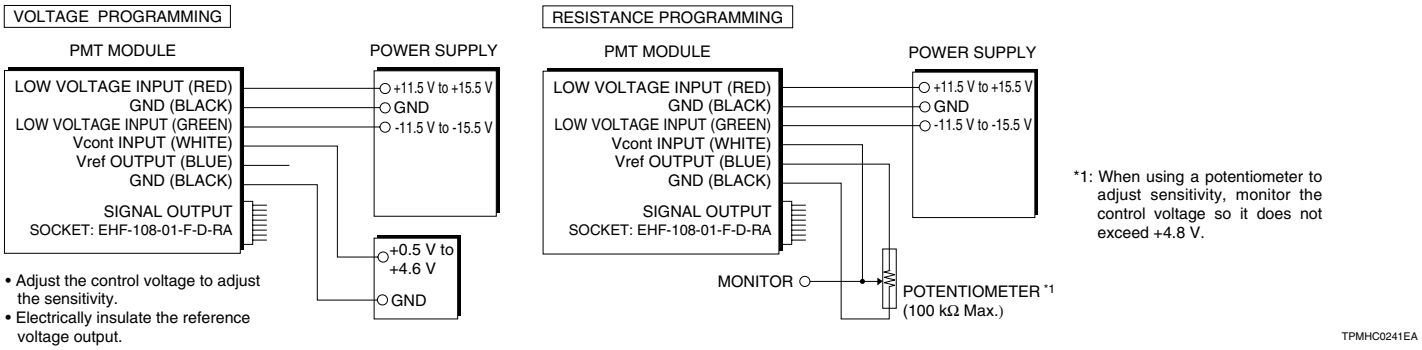
Anode Characteristics Ⓗ				Offset Voltage	Ripple Noise (peak to peak)	Cross-talk	Uniformity Between Each Anode		Type No.
Luminous		Voltage Output Ⓘ Depending on PMT Dark Current per Channel							
Min. (V/lm)	Typ. (V/lm)	Typ. (mV)	Max. (mV)	Max. (mV)	Typ. (mV)	Typ. (%)	Typ.	Max.	
7.5×10^6	7.5×10^7	0.05	0.5	±2	1	0.2	—	1: 1.1	H11451-01
1.75×10^7	1.5×10^8	0.1	1	±2	1	0.2	—	1: 1.1	H11451-20
7.5×10^6	7.5×10^7	0.05	0.5	±2	1	0.2	1: 1.7	1: 2.5	H11452-01
1.75×10^7	1.5×10^8	0.1	1	±2	1	0.2	1: 1.7	1: 2.5	H11452-20
5.0×10^6	2.8×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11459
7.5×10^6	2.5×10^7	0.05	0.5	±2	1	3	1: 1.7	1: 2.5	H11459-01
5.0×10^6	2.8×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11459-03
7.5×10^6	2.5×10^7	0.05	0.5	±2	1	3	1: 1.7	1: 2.5	H11459-04
1.75×10^7	5.0×10^7	0.1	1	±2	1	3	1: 1.7	1: 2.5	H11459-20
9.0×10^6	3.15×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11459-100
1.1×10^7	4.05×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11459-200
5.0×10^6	1.4×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11460
7.5×10^6	2.5×10^7	0.05	0.5	±2	1	3	1: 1.7	1: 2.5	H11460-01
5.0×10^6	1.4×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11460-03
7.5×10^6	2.5×10^7	0.05	0.5	±2	1	3	1: 1.7	1: 2.5	H11460-04
1.75×10^7	5.0×10^7	0.1	1	±2	1	3	1: 1.7	1: 2.5	H11460-20
9.0×10^6	2.1×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11460-100
1.1×10^7	2.7×10^7	0.02	0.2	±2	1	3	1: 1.5	1: 2	H11460-200

Notes: Ⓗ Control Voltage = H11451 Series / H11452 Series: +4 V
H11459 Series / H11460 Series: +3.2 V
Ⓘ After 30 minutes storage in darkness

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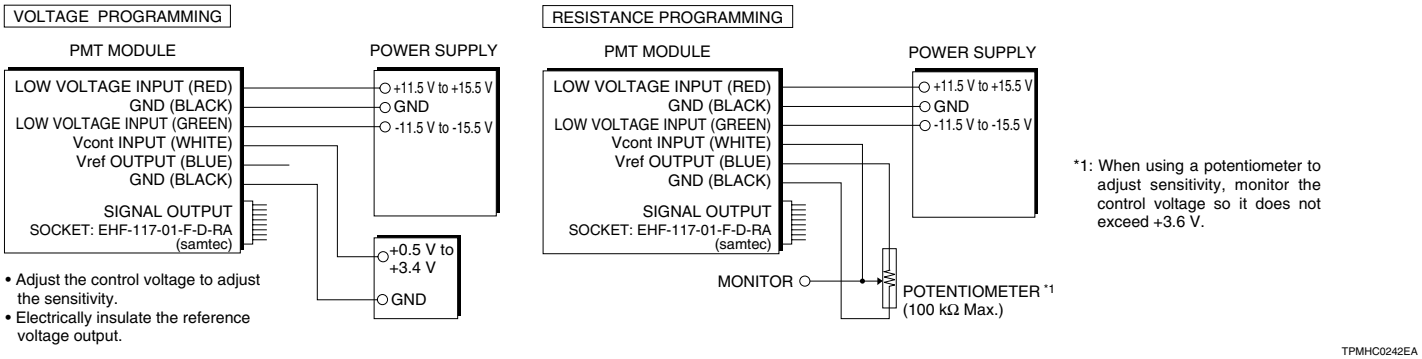
Figure 9: Sensitivity Adjustment Method

H11451 / H11452



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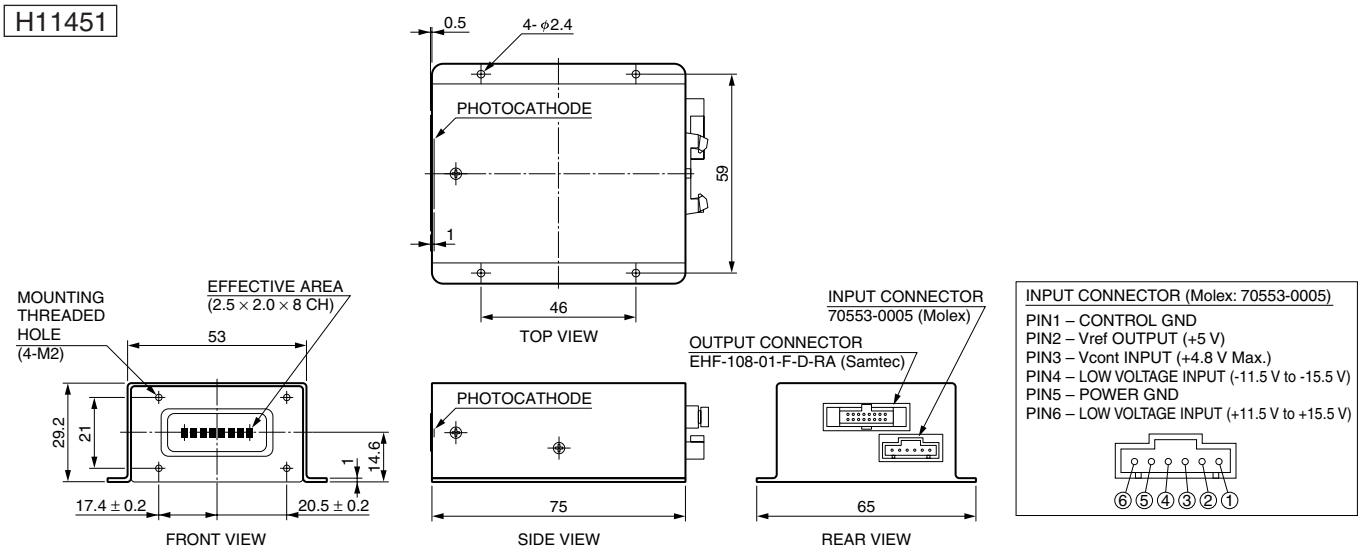
H11459 / H11460



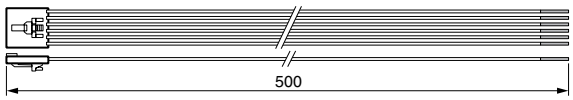
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Figure 10: Dimensional Outline (Unit: mm)

H11451

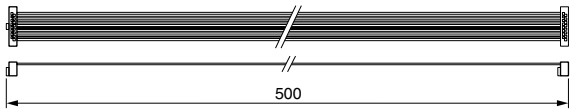


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(Molex: 50-57-9406)

RIBBON CABLE (SUPPLIED)



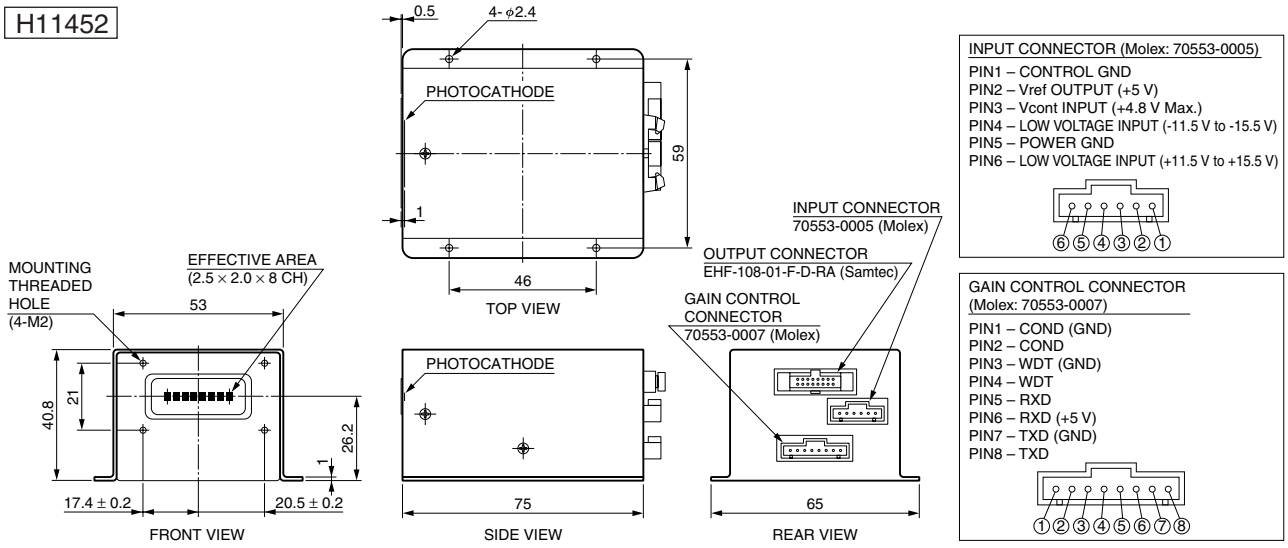
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TPMHA0567EA

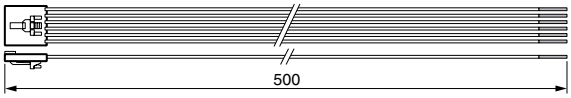
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Figure 11: Dimensional Outline (Unit: mm)

H11452

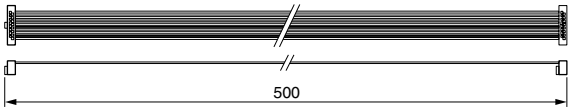


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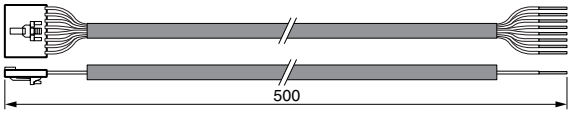
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GAIN CONTROL CABLE (SUPPLIED)

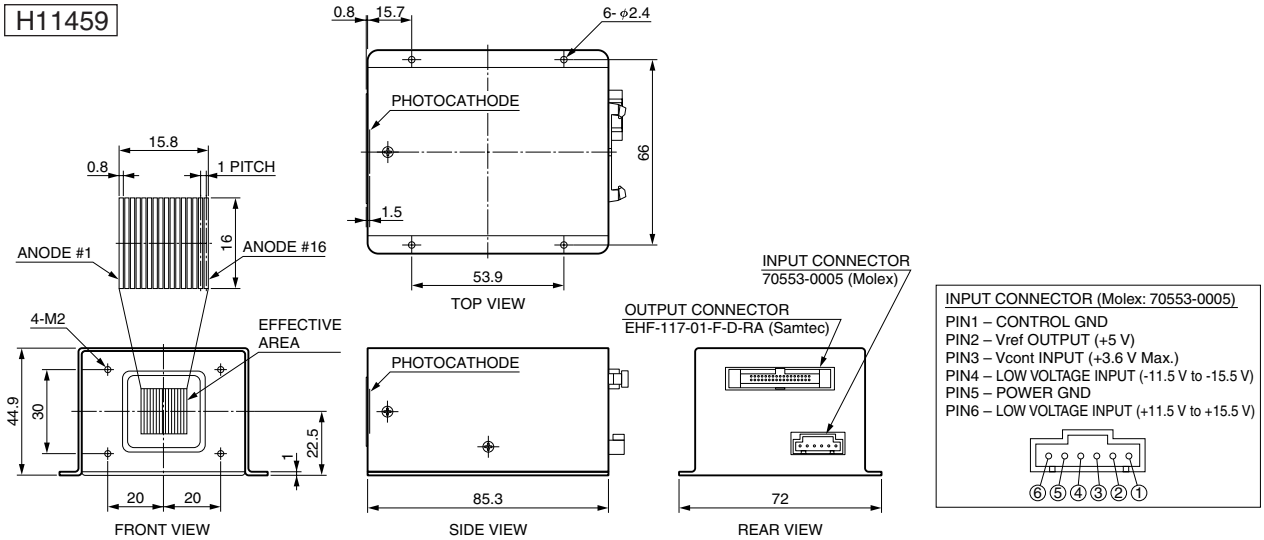


(Molex: 50-57-9408)

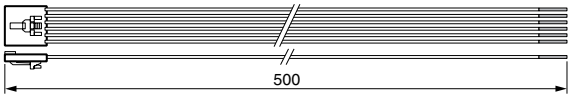
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Figure 12: Dimensional Outline (Unit: mm)

H11459

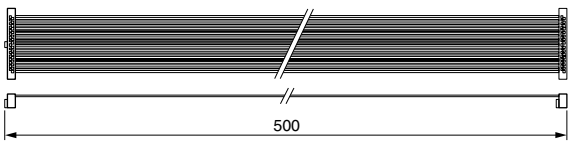


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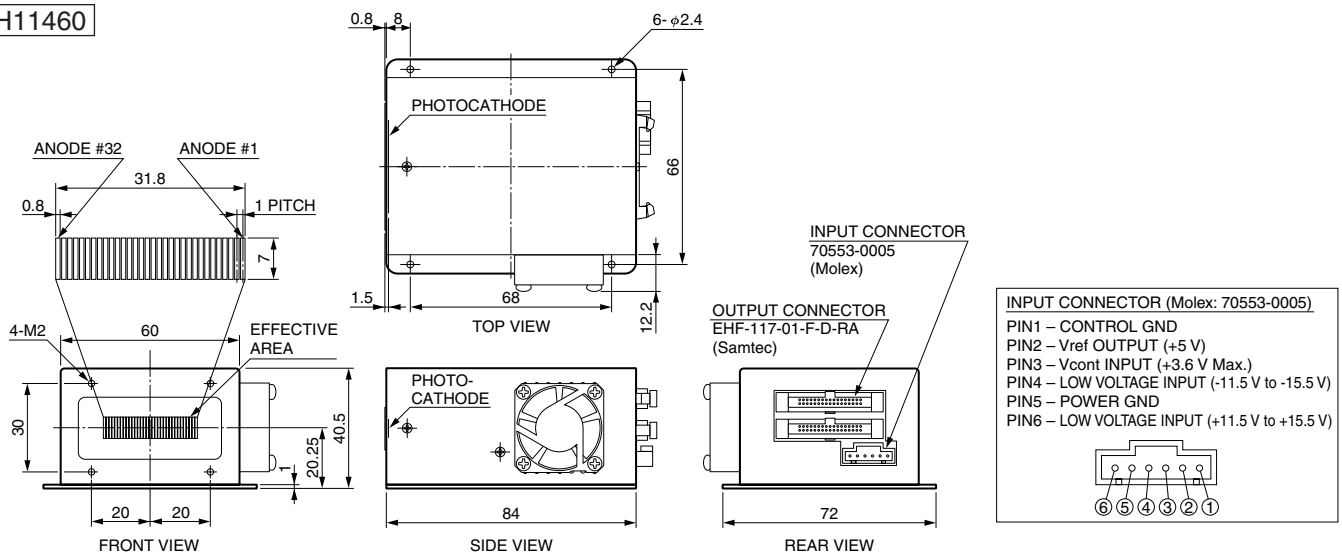
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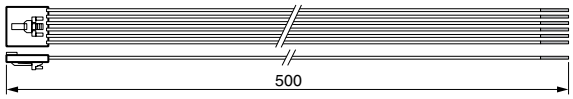
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Figure 13: Dimensional Outline (Unit: mm)

H11460

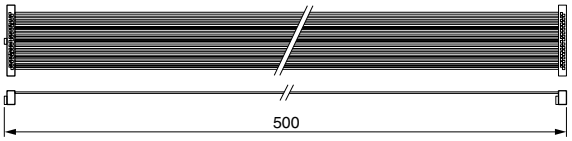


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TPMHA0570EA

⚠ WARNING ~ High Voltage ~

The product is operated at high voltage potential. Further, the metal housing of the product is connected to the photocathode (potential) so that it becomes a high voltage potential when the product is operated at a negative high voltage (anode grounded). Accordingly, extreme safety care must be taken for the electrical shock hazard to the operator or the damage to the other instruments.

* PATENT: USA Pat. No. 5410211 PATENT PENDING: JAPAN 12, USA 8, EUROPE 9

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