

**Photomultiplier tube with active divider circuit
Linear multianode PMT assembly, 8-channel (H9530 series) /
16-channel (H10515B series) / 32-channel (H7260 series)**

FEATURES

- High cathode sensitivity
Luminous 500 $\mu\text{A/lm}$ Typ. (-20 type)
- Effective area per channel
H9530 / H11451 / H11452 series ... 2.0 mm \times 2.5 mm \times 8 channels
H10515B / H11459 series ... 0.8 mm \times 16 mm \times 16 channels
H7260 / H11460 series 0.8 mm \times 7 mm \times 32 channels
- 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 Max. (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



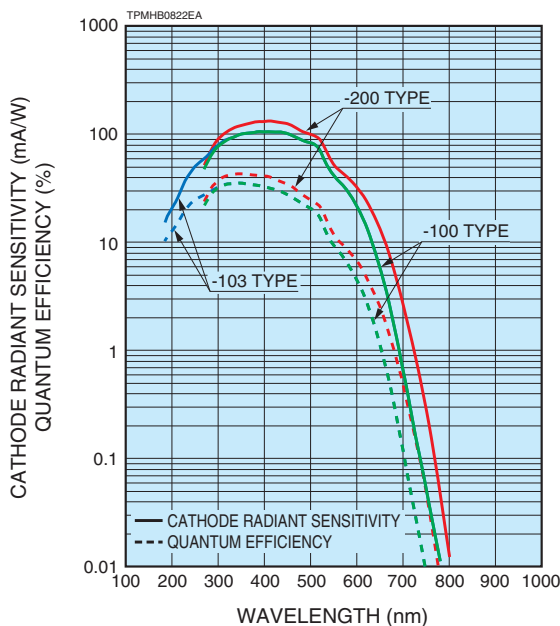
Module types: H11451, H11452, H11459, H11460

APPLICATIONS

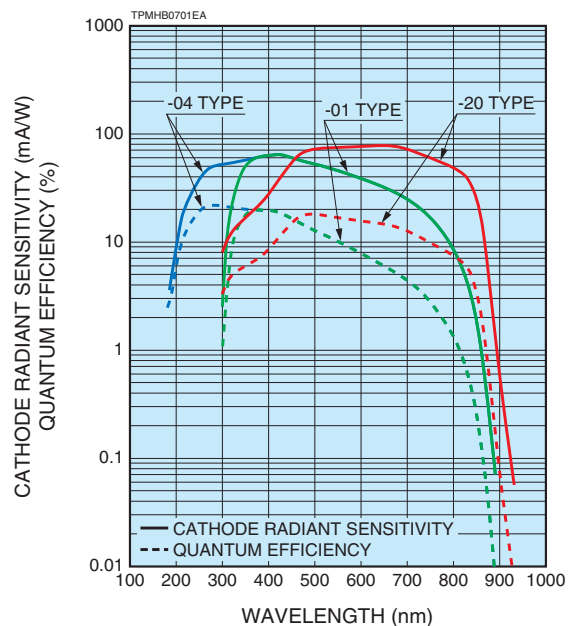
- Biomedical fluorescence detection
- Laser scanning detection
- Spectroscopy
- Environmental monitoring

Figure 1: Typical spectral response

-100, -103 and -200 types

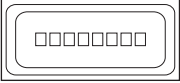




-01, -04 and -20 types



LINEAR MULTIANODE PMT ASSEMBLIES AND MODULES

SPECIFICATIONS OF ASSEMBLY TYPES

Type No.	Channel pattern		Dimensional outline	Effective area per channel (mm)	Channel pitch (mm)	Dynode structure / No. of stages ^(A)	Weight (g)	Insulation cover material ^(B)
H9530 SERIES	8-channel		See Fig.6	2.0 × 2.5	2.8	MC/12	25.5	P.O.M.
H10515B SERIES	16-channel		See Fig.7	0.8 × 16	1	MC/10	49.0	P.O.M.
H7260 SERIES	32-channel		See Fig.8	0.8 × 7	1	MC/10	62.0	P.O.M.

Notes: ^(A) MC: Metal channel

^(B) P.O.M.: Polyoxymethylene

* Operating ambient temperature: 0 °C to +50 °C (No condensation)

Storage temperature: -15 °C to +50 °C (No condensation)

Type No.	Spectral response		Photocathode material ^(F)	Window material ^(G)	Cathode characteristics					Supply voltage (V dc)
	Range (nm)	Peak wavelength (nm)			Luminous		Blue sensitivity index (CS 5-58) Typ.	Red /White ratio (R-68) Typ.	Radiant ^(H) Typ. (mA/W)	
					Min. (μ A/lm)	Typ. (μ A/lm)				
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-01	300 to 880	420	MA	B	150	250	—	0.3	65	-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-103	185 to 650	400	SBA	U	90	105	13.5	—	110	-800
H10515B-200	300 to 650	400	UBA	B	110	135	15.5	—	130	-800
H7260-01	300 to 880	420	MA	B	150	250	—	0.3	65	-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
H7260-103	185 to 650	400	SBA	U	90	105	13.5	—	110	-800
H7260-200	300 to 650	400	UBA	B	110	135	15.5	—	130	-800

Notes: ^(F) MA: Multialkali SBA: Super bialkali UBA: Ultra bialkal

^(G) B: Borosilicate glass U: UV glass

^(H) Measured at the peak sensitivity wavelength

(at 25 °C)

Socket	Maximum ratings				Type No.
	Maximum 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:** ③ Supplied
 ④ Averaged over any interval of 30 seconds maximum.
 ⑤ Measured with the maximum supply voltage.

(at 25 °C)

Anode characteristics ①											Type No.
Luminous		Gain	Dark current per channel (After 30 min.)		Time response		Pulse linearity per channel (2% deviation) (mA)	Cross-talk	Uniformity between each anode		
Min. (A/lm)	Typ. (A/lm)		Typ.	Typ. (nA)	Max. (nA)	Rise time			Transit time spread (FWHM) Typ. (ns)	Typ. (%)	
75	750	3 × 10 ⁶	0.5	5	0.7	0.25	0.9	0.1	—	1: 1.1 ⑥	H9530-01
175	1500	3 × 10 ⁶	1	10	0.7	0.25	0.9	0.1	—	1: 1.1 ⑥	H9530-20
75	250	1 × 10 ⁶	0.5	5	0.6	0.18	0.8	3	1: 1.7	1: 2.5	H10515B-01
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
90	315	3 × 10 ⁶	0.2	2	0.6	0.18	0.8	3	1: 1.5	1: 2	H10515B-103
110	405	3 × 10 ⁶	0.2	2	0.6	0.18	0.8	3	1: 1.5	1: 2	H10515B-200
75	250	1 × 10 ⁶	0.5	5	0.6	0.18	0.6	3	1: 1.7	1: 2.5	H7260-01
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
90	210	2 × 10 ⁶	0.2	2	0.6	0.18	0.6	3	1: 1.5	1: 2	H7260-103
110	270	2 × 10 ⁶	0.2	2	0.6	0.18	0.6	3	1: 1.5	1: 2	H7260-200

- Notes:** ① Anode characteristics are measured with the supply voltage.
 ② The pulse width is 50 ns and the repetition rate is 1 kHz.
 ③ Uniformity is adjusted at HAMAMATSU

LINEAR MULTIANODE PMT ASSEMBLIES AND MODULES

Figure 2: Typical gain characteristics

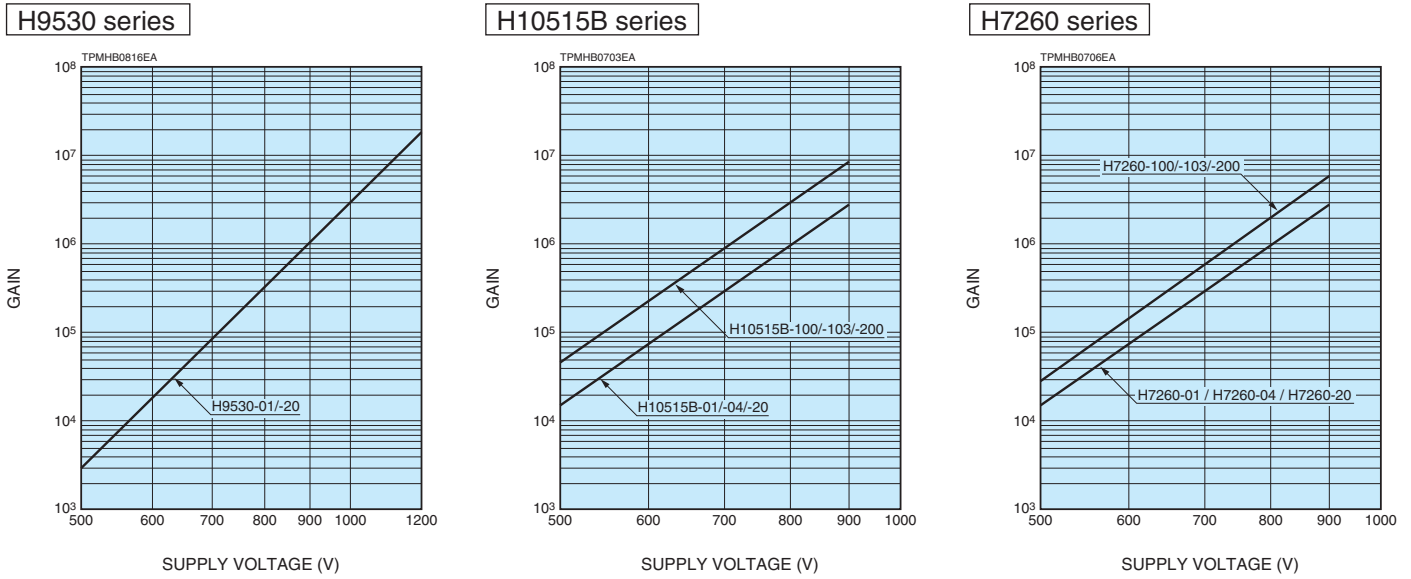
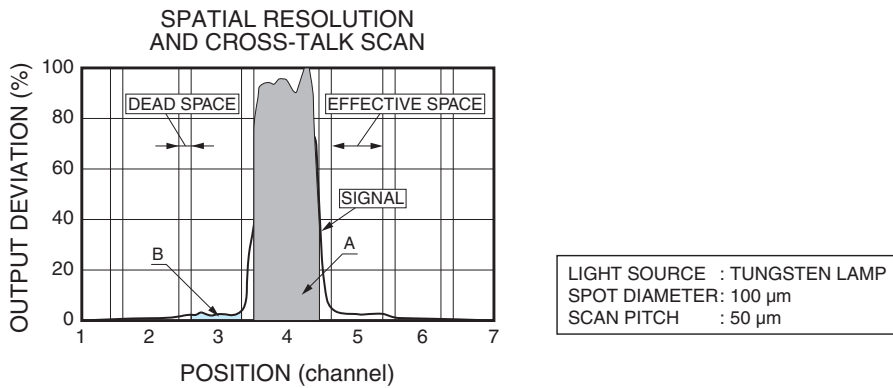
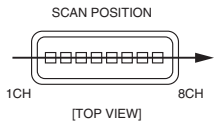


Figure 3: Cross-talk (Example)



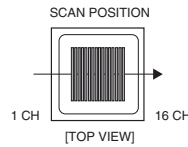
H9530 series



CH	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

SUPPLY VOLTAGE -1000 V
 CROSS-TALK
 AREA B / AREA A × 100

H10515B series



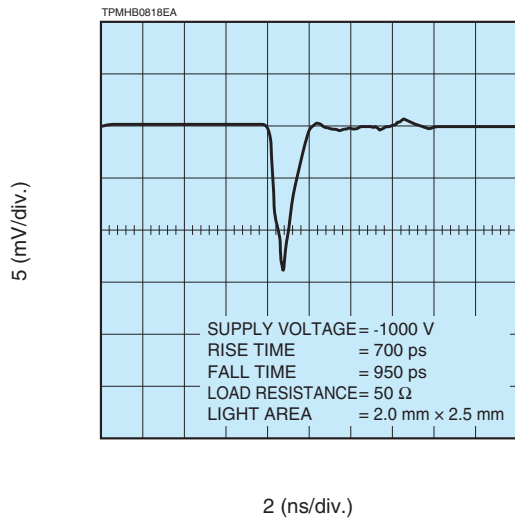
CH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	100	2.9	0.6	0.2	0.1	—	—	—	—	—	—	—	—	—	—	—
2	2.9	100	3.1	0.5	0.2	0.1	—	—	—	—	—	—	—	—	—	—
3	0.8	2.8	100	2.8	0.6	0.2	0.1	—	—	—	—	—	—	—	—	—
4	0.3	0.8	2.7	100	3.2	0.6	0.2	0.1	—	—	—	—	—	—	—	—
5	0.1	0.3	0.8	2.9	100	3.1	0.6	0.2	0.1	—	—	—	—	—	—	—
6	—	0.1	0.3	0.8	2.7	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

SUPPLY VOLTAGE -800 V
 CROSS-TALK
 AREA B / AREA A × 100

* H7260 series is equivalent to H10515B series.

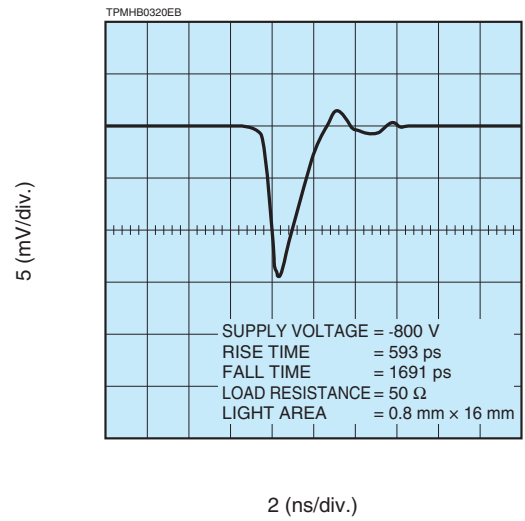
Figure 4: Typical time response

H9530 series



Light is irradiated to only one channel at this measurement.

H10515B series

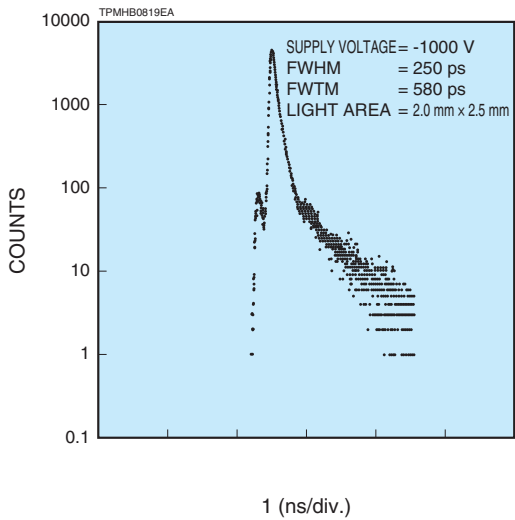


Light is irradiated to only one channel at this measurement.

* H7260 series is equivalent to H10515B series.

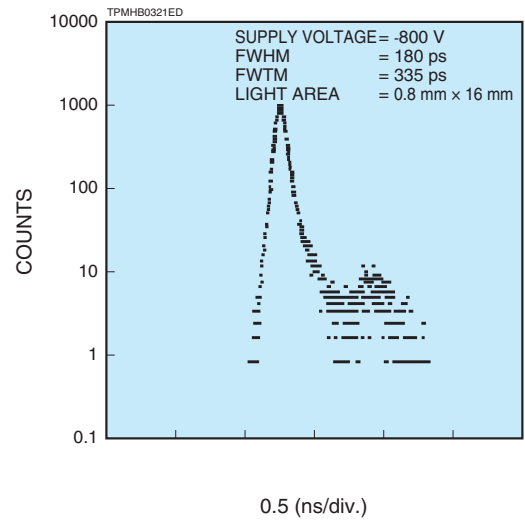
Figure 5: Typical transit time spread characteristics

H9530 series



Light is irradiated to only one channel at this measurement.

H10515B series



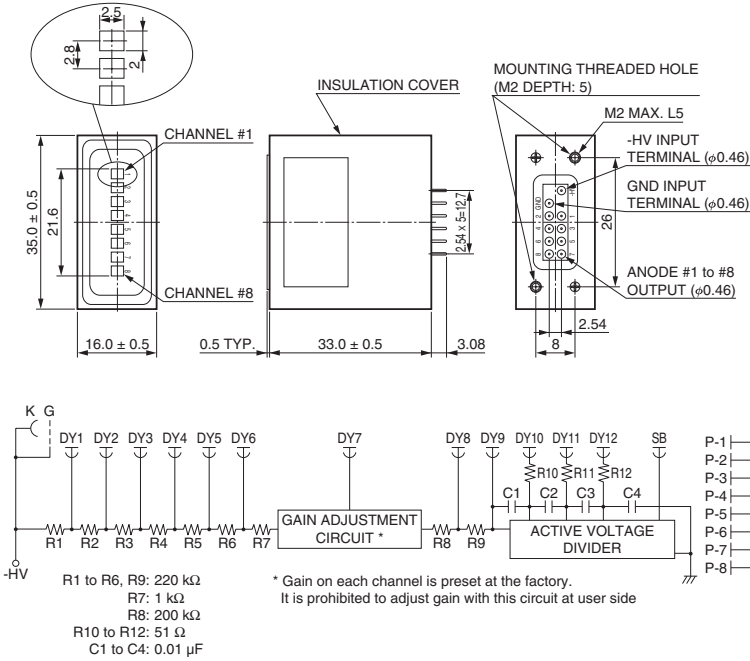
Light is irradiated to only one channel at this measurement.

* H7260 series is equivalent to H10515B series.

LINEAR MULTIANODE PMT ASSEMBLIES AND MODULES

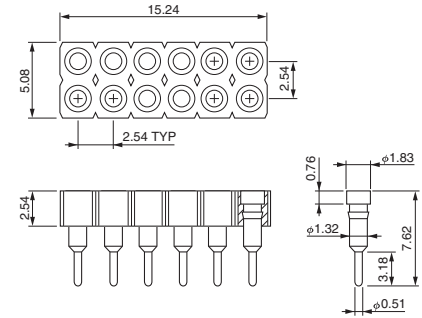
Figure 6: Dimensional outline (Unit: mm)

H9530 series



TPMHA0508EC

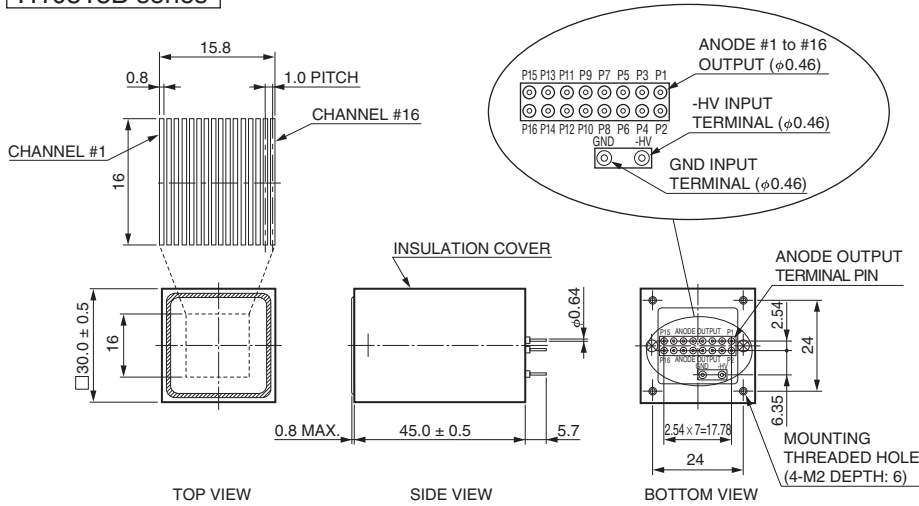
SOCKET: SD-106-T-22 (Supplied)



TACCA0257EA

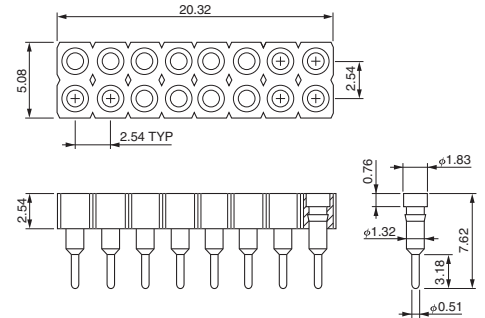
Figure 7: Dimensional outline (Unit: mm)

H10515B series



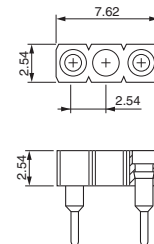
TPMHA0534EB

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



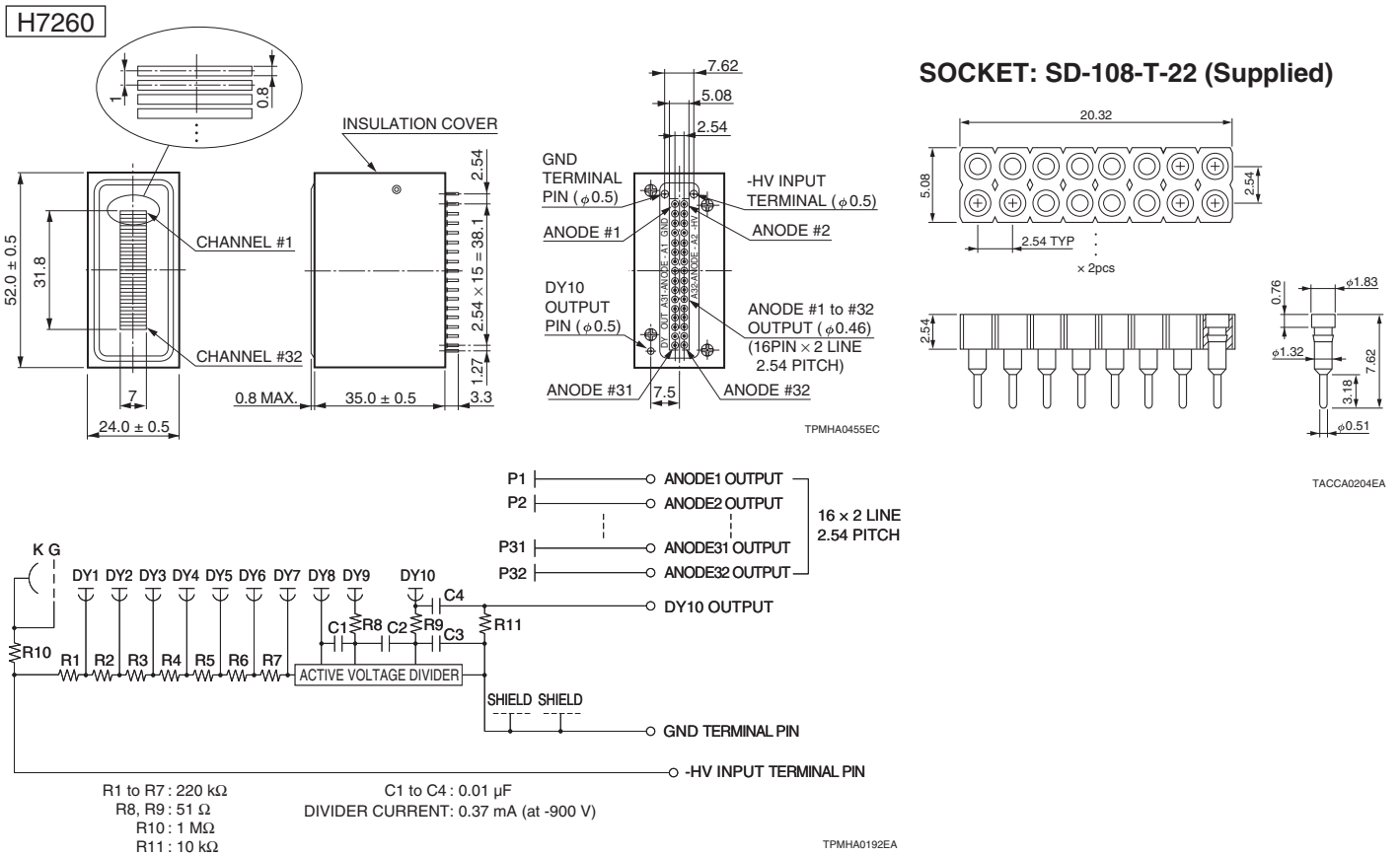
TACCA0204EA

SOCKET: ASP24307-02 (Supplied)

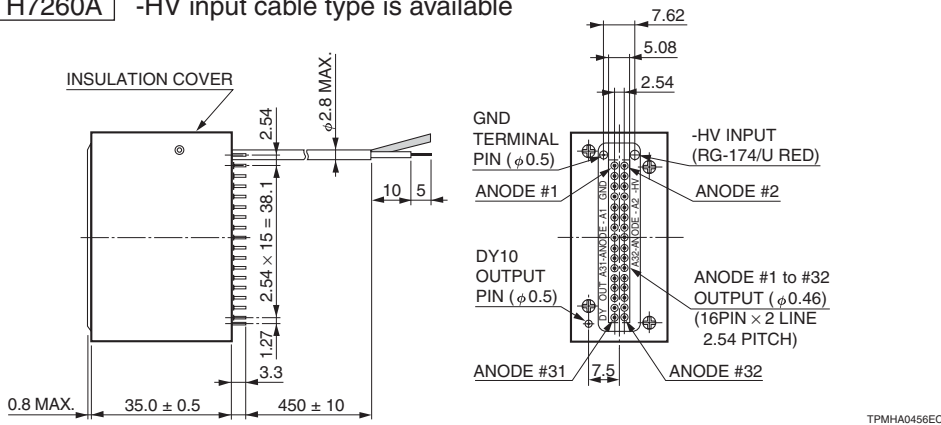


TACCA0307EA

Figure 8: Dimensional outline and circuit diagram (Unit: mm)



H7260A -HV input cable type is available



RELATED PRODUCTS for H9530 / H10515B / H7260 SERIES



C10940-03



C13890-15





HIGH VOLTAGE POWER SUPPLY UNIT

Type No.	Max. output voltage (V)	Output current (mA)	Input voltage (mA)	Dimensions (mm)	Weight (g)
C10940-03	-1200	0.6	15	15 × 18 × 15	7.7
C13890-15	-1250	0.6	11 to 16	46 × 24 × 12	29

* C10673, C10673-01: UL recognized

LINEAR MULTIANODE PMT ASSEMBLIES AND MODULES

SPECIFICATIONS OF MODULE TYPES

Type No.	Channel pattern	Dimensional outline	Effective area per channel (mm)	Channel pitch (mm)	Maximum ratings			
					Input voltage (V)	Control voltage ^(A) (V)	Output signal voltage /ch ^(B) (V)	
H11451 SERIES	8-channel		See Fig.10	2.0 × 2.5	2.8	16	+4.8	+1 ^(C)
H11452 SERIES	8-channel		See Fig.11	2.0 × 2.5	2.8	16	+4.8	+1 ^(C)
H11459 SERIES	16-channel		See Fig.12	0.8 × 16	1	16	+3.6	+1 ^(C)
H11460 SERIES	32-channel		See Fig.13	0.8 × 7	1	16	+3.6	+1 ^(C)

Notes: ^(A) Input impedance = 400 kΩ

^(B) Load resistance = 10 kΩ, Average over any interval of 30 seconds maximum.

^(C) Maximum pulse output signal voltage=+10 V, The pulse width is 10 μs and the repetition rate is 1 kHz.

* Operating ambient temperature: +5 °C to +45 °C

Storage temperature: -20 °C to +50 °C

Type No.	Spectral response		Photocathode material ^(E)	Window material ^(F)	Cathode Characteristics				
	Range (nm)	Peak wavelength (nm)			Luminous	Blue sensitivity index (CS 5-58) Typ.	Red /White ratio (R-68) Typ.	Radiant ^(G)	
									Min. (μA/lm)
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
H11459-01	300 to 880	420	MA	B	150	250	—	0.3	65
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
H11459-103	185 to 650	400	SBA	U	90	105	13.5	—	110
H11459-200	300 to 650	400	UBA	B	110	135	15.5	—	130
H11460-01	300 to 880	420	MA	B	150	250	—	0.3	65
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
H11460-103	185 to 650	400	SBA	U	90	105	13.5	—	110
H11460-200	300 to 650	400	UBA	B	110	135	15.5	—	130

Notes: ^(E) MA: Multialkali SBA: Super bialkali UBA: Ultra bialkal

^(F) B: Borosilicate glass U: UV glass

^(G) Measured at the peak sensitivity wavelength

(at 25 °C)

Current-to-voltage conversion Factor (V/μA)	Frequency bandwidth	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	+2.0 to +4.0	129	H9530 with preamplifier and high voltage power supply	H11451 SERIES
0.1	DC to 1 MHz	11.5 to 15.5	+32 / -18	+2.0 to +4.0	155	H11451 with individual gain control function	H11452 SERIES
0.1	DC to 1 MHz	11.5 to 15.5	+46 / -42	+2.0 to +3.2	185	H10515B with preamplifier and high voltage power supply	H11459 SERIES
0.1	DC to 1 MHz	11.5 to 15.5	+127 / -83	+2.0 to +3.2	246	H7260 with preamplifier, high voltage power supply and cooling fan	H11460 SERIES

Notes: [Ⓓ] At 15 V input voltage in darkness

(at 25 °C)

Anode characteristics [Ⓗ]							Offset voltage Max. (mV)	Ripple noise (peak to peak) Typ. (mV)	Type No.
Luminous		Voltage output depending on PMT dark current per channel [Ⓘ]		Cross-talk Typ. (%)	Uniformity between each anode				
Min. (V/lm)	Typ. (V/lm)	Typ. (mV)	Max. (mV)		Typ.	Max.			
7.5×10^6	7.5×10^7	0.05	0.5	0.2	—	1: 1.1 ^⓵	2	1	H11451-01
1.75×10^7	1.5×10^8	0.1	1	0.2	—	1: 1.1 ^⓵	2	1	H11451-20
7.5×10^6	7.5×10^7	0.05	0.5	0.2	1: 1.7	1: 2.5	2	1	H11452-01
1.75×10^7	1.5×10^8	0.1	1	0.2	1: 1.7	1: 2.5	2	1	H11452-20
7.5×10^6	2.5×10^7	0.05	0.5	3	1: 1.7	1: 2.5	2	1	H11459-01
7.5×10^6	2.5×10^7	0.05	0.5	3	1: 1.7	1: 2.5	2	1	H11459-04
1.75×10^7	5.0×10^7	0.1	1	3	1: 1.7	1: 2.5	2	1	H11459-20
9.0×10^6	3.15×10^7	0.02	0.2	3	1: 1.5	1: 2	2	1	H11459-100
9.0×10^6	3.15×10^7	0.02	0.2	3	1: 1.5	1: 2	2	1	H11459-103
1.1×10^7	4.05×10^7	0.02	0.2	3	1: 1.5	1: 2	2	1	H11459-200
7.5×10^6	2.5×10^7	0.05	0.5	3	1: 1.7	1: 2.5	2	1	H11460-01
7.5×10^6	2.5×10^7	0.05	0.5	3	1: 1.7	1: 2.5	2	1	H11460-04
1.75×10^7	5.0×10^7	0.1	1	3	1: 1.7	1: 2.5	2	1	H11460-20
9.0×10^6	2.1×10^7	0.02	0.2	3	1: 1.5	1: 2	2	1	H11460-100
9.0×10^6	2.1×10^7	0.02	0.2	3	1: 1.5	1: 2	2	1	H11460-103
1.1×10^7	2.7×10^7	0.02	0.2	3	1: 1.5	1: 2	2	1	H11460-200

Notes: [Ⓗ] Control voltage = H11451 series / H11452 series: +4 V
H11459 series / H11460 series: +3.2 V

[Ⓘ] After 30 minutes storage in darkness. The actual output value in darkness is the sum of dark current and offset voltage.

^⓵ Uniformity is adjusted at HAMAMATSU

LINEAR MULTIANODE PMT ASSEMBLIES AND MODULES

Figure 9: Typical gain characteristics

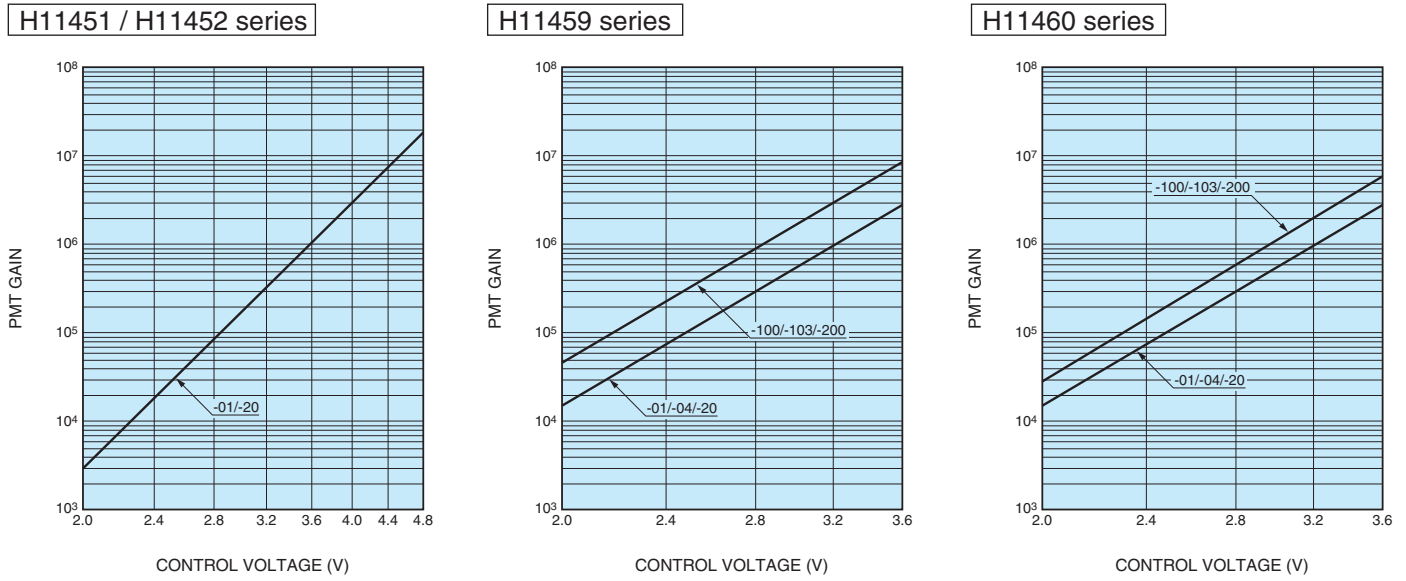


Figure 10: Typical frequency response

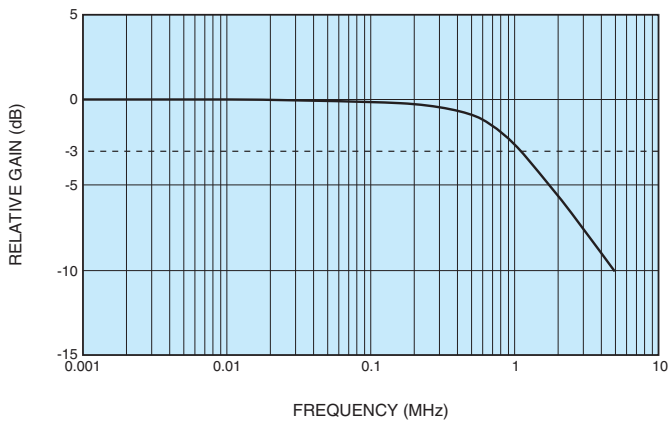
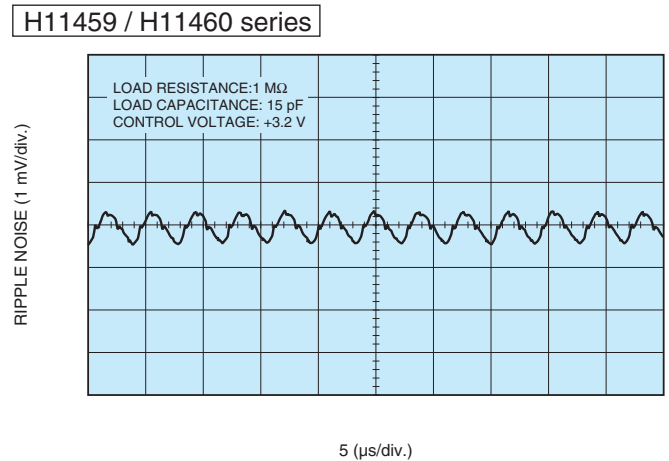
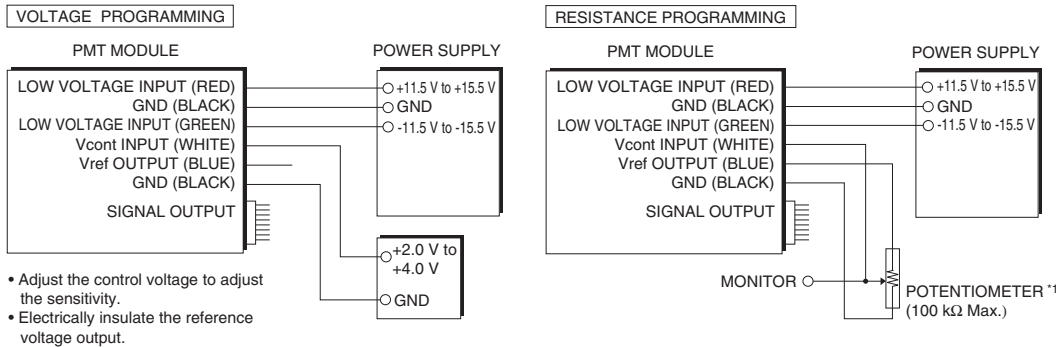


Figure 11: Typical ripple noise



* H11451 / H11452 series is equivalent to H11459 / H11460 series.

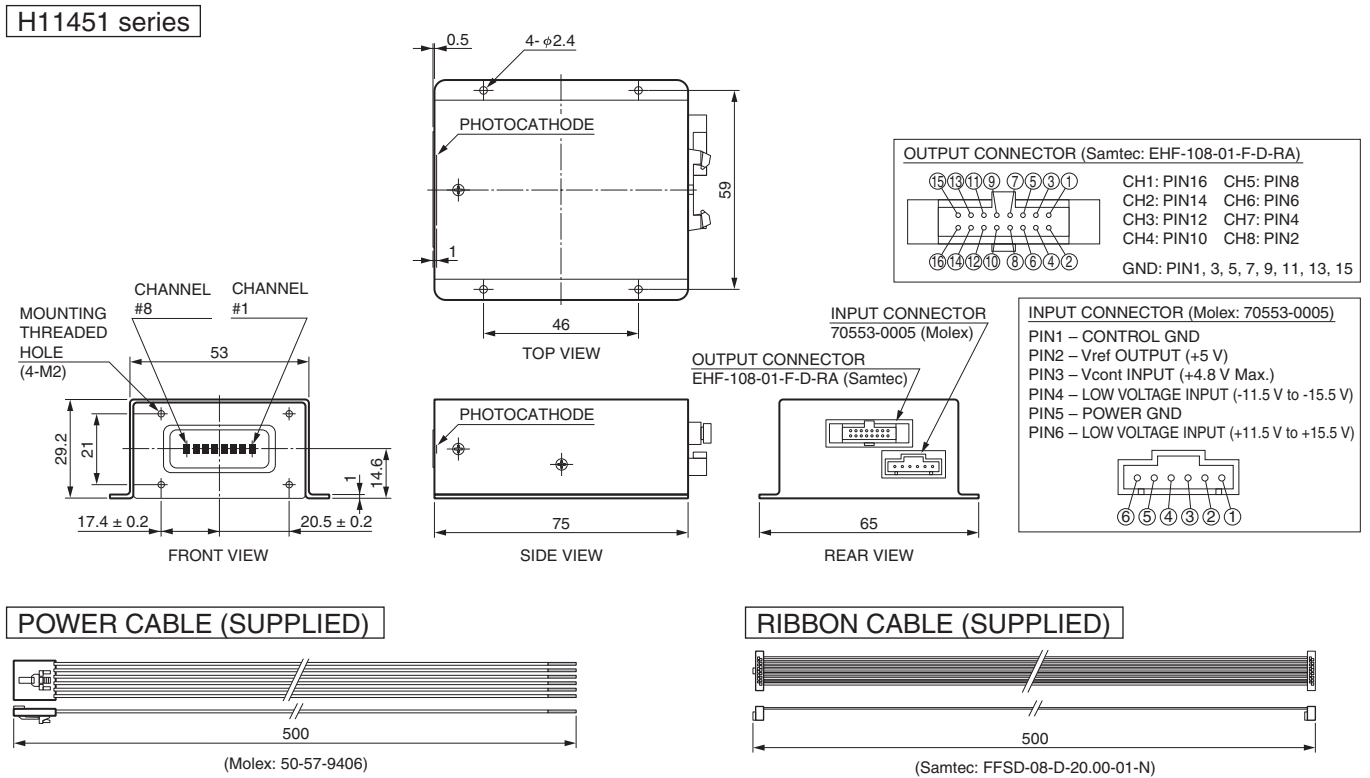
Figure 12: Sensitivity adjustment method



- Adjust the control voltage to adjust the sensitivity.
- Electrically insulate the reference voltage output.

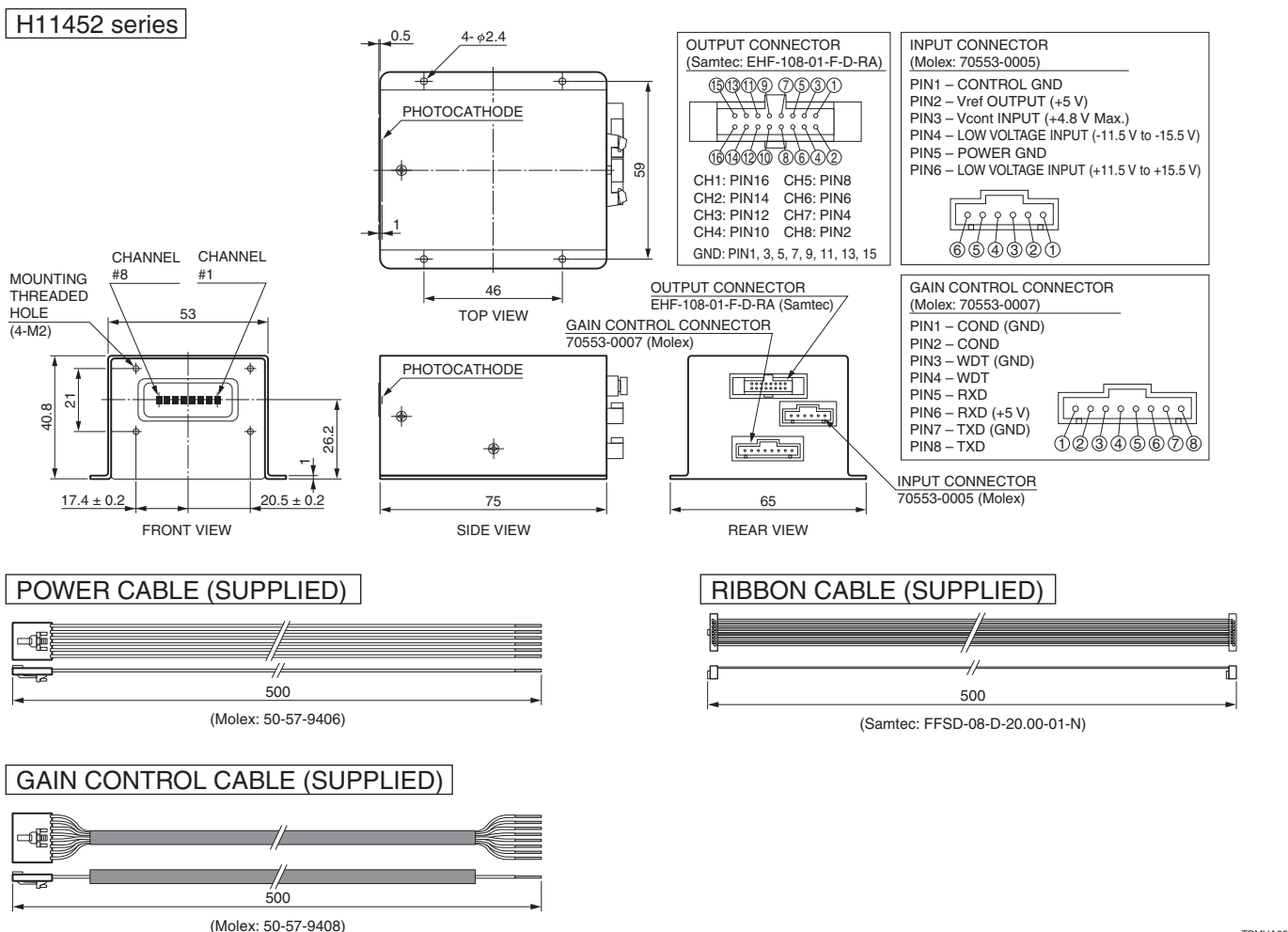
*1: When using a potentiometer to adjust sensitivity, monitor the control voltage so that it does not exceed +4.8 V (H11451 / H11452), +3.6 V (H11459 / H11460).

Figure 13: Dimensional outline (Unit: mm)



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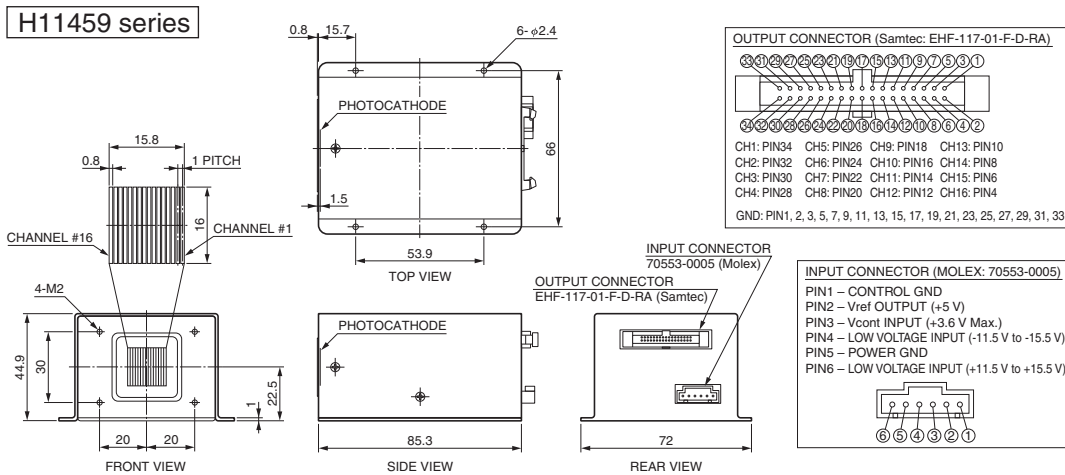
Figure 14: Dimensional outline (Unit: mm)



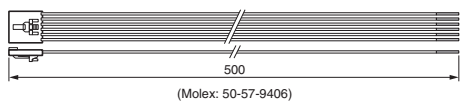
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LINEAR MULTIANODE PMT ASSEMBLIES AND MODULES

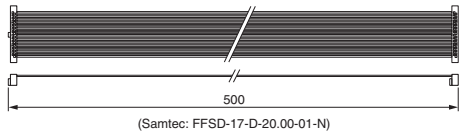
Figure 15: Dimensional Outline (Unit: mm)



POWER CABLE (SUPPLIED)

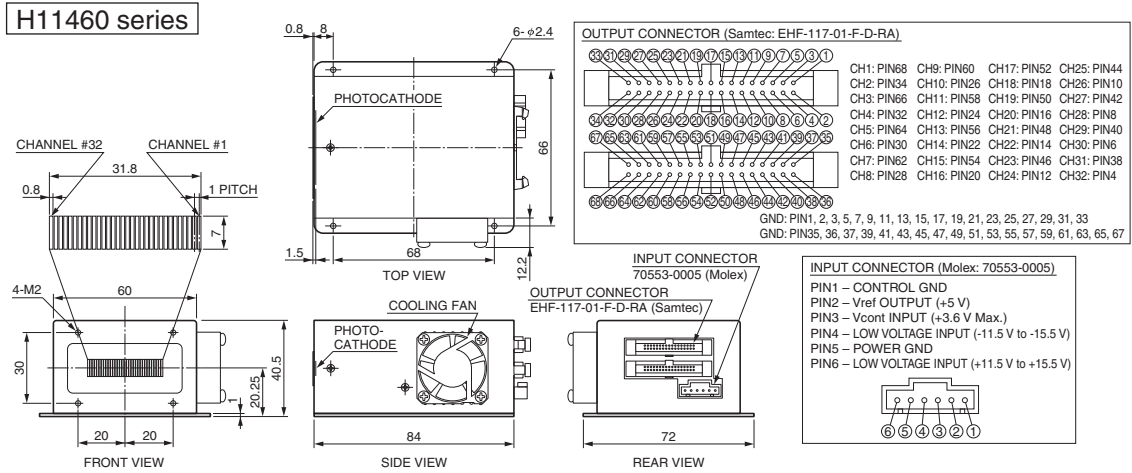


RIBBON CABLE (SUPPLIED)

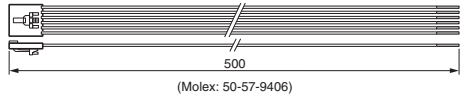


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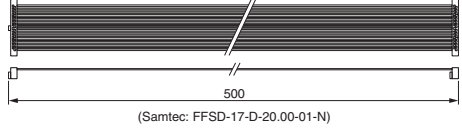
Figure 16: Dimensional outline (Unit: mm)



POWER CABLE (SUPPLIED)



RIBBON CABLE (SUPPLIED)



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⚠ 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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