HAMAMATSU

PHOTON IS OUR BUSINESS

PHOTOMULTIPLIER TUBE
R16571

FEATURES

- ●High QE in near IR region ..... QE 0.13 % at 1000 nm
- ●Wide wavelength range ..... 185 nm to 1010 nm
- ●Low dark current ..... 4 nA at 1250 V (Typ.)
- ●Wide effective area ..... 6 mm × 12 mm

APPLICATIONS

- ●Spectroscopy

SPECIFICATIONS

GENERAL

Parameter		Description / Value	Unit
Spectral response		185 to 1010	nm
Wavelength of maximum response		400	nm
Photocathode	Material	InGaAs	—
	Minimum effective area	6 × 12	mm
Window material		UV glass	—
Dynode	Secondary emitting surface	Cu-BeO	—
	Structure	Circular-cage	—
	Number of stages	9	—
Direct interelectrode capacitances	Anode to last dynode	Approx. 4	pF
	Anode to all other electrode	Approx. 6	pF
Base		11-pin base JEDEC No. B11-88	—
Weight		Approx. 45	g
Operating ambient temperature		-30 to +50	°C
Storage temperature		-30 to +50	°C
Suitable socket (Sold separately)		E678-11A	—
Suitable socket assembly (Sold separately)		E717-63	—

Figure 1: Uniformity area

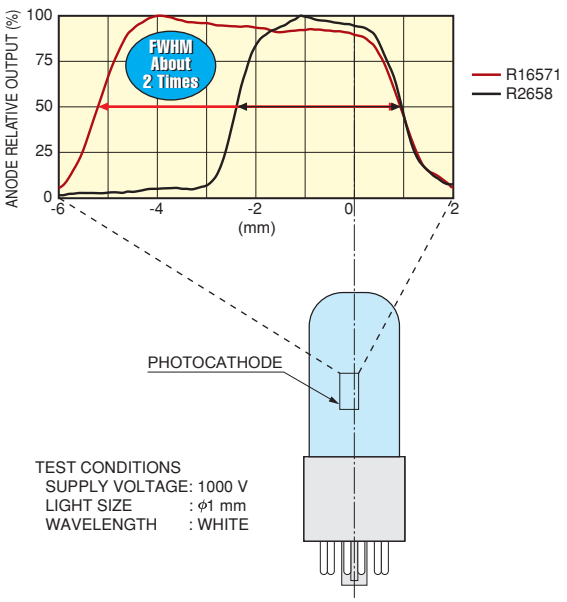
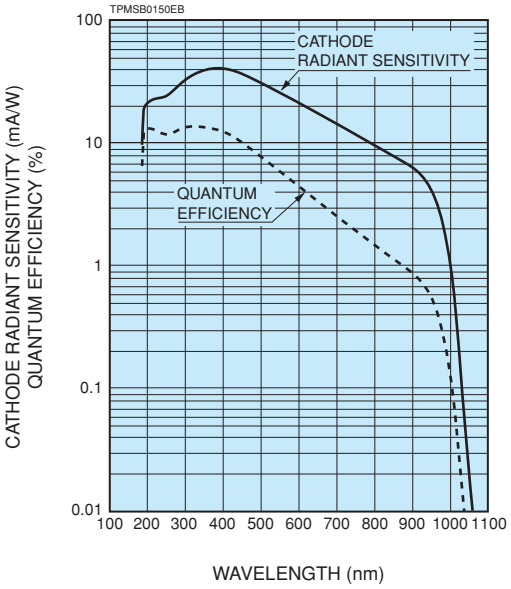


Figure 2: Typical spectral response



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MAXIMUM RATINGS (Absolute maximum values)

Parameter		Value	Unit
Supply Voltage	Between anode and cathode	1500	V
	Between anode and last dynode	250	V
Average anode current Ⓐ		0.001	mA

CHARACTERISTICS (at 25 °C)

Parameter			Min.	Typ.	Max.	Unit
Cathode sensitivity	Quantum efficiency	at 330 nm	—	14	—	%
		at 1000 nm	0.02	0.13	—	%
	Luminous Ⓑ		50	100	—	μA/lm
	Radiant	at 194 nm	—	20	—	mA/W
		at 254 nm	—	23	—	mA/W
		at 400 nm	—	40	—	mA/W
		at 633 nm	—	19	—	mA/W
		at 852 nm	—	7.6	—	mA/W
		at 1000 nm	0.16	1	—	mA/W
	Red / White ratio Ⓒ		0.25	0.4	—	—
Anode sensitivity	Luminous Ⓓ		10	30	—	A/lm
	Radiant	at 194 nm	—	6.0×10^3	—	A/W
		at 254 nm	—	6.9×10^3	—	A/W
		at 400 nm	—	1.2×10^4	—	A/W
		at 633 nm	—	5.7×10^3	—	A/W
		at 852 nm	—	2.3×10^3	—	A/W
		at 1000 nm	—	3.0×10^2	—	A/W
Gain Ⓓ			—	3.0×10^5	—	—
Anode dark current Ⓔ			—	4	40	nA
ENI (Equivalent noise input) Ⓕ			—	1.6×10^{-15}	—	W
Time response Ⓓ	Anode pulse rise time Ⓖ		—	3.3	—	ns
	Electron transit time Ⓗ		—	21	—	ns
Anode current stability Ⓙ	Current hysteresis		—	2	—	%
	Voltage hysteresis		—	2	—	%

NOTES

Ⓐ: Averaged over any interval of 30 seconds maximum.

Ⓑ: The light source is a tungsten filament lamp operated at a distribution temperature of 2856 kelvin. Supply voltage is 100 volts between the cathode and all other electrodes connected together as anode.

Ⓒ: Red / white ratio is the quotient of the cathode current measured using a red filter interposed between the light source and the tube by the cathode current measured with the filter removed under the same condition as Note Ⓑ.

Ⓓ: Measured with the same light source as Note Ⓑ and with the voltage distribution ratio shown in Table 1 below.

Table 1: Voltage distribution ratio

Electrodes	K	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8	Dy9	P
Distribution ratio	1	1	1	1	1	1	1	1	1	1	

Supply voltage= 1250 V, K: Cathode, Dy: Dynode, P: Anode

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

Ⓕ: ENI is an indication of the photo-limited signal-to-noise ratio. It refers to the amount of light in watts to produce a signal-to-noise ratio of unity in the output of a photomultiplier tube.

$$\text{ENI} = \frac{\sqrt{2q \cdot Idb \cdot G \cdot \Delta f}}{S}$$

where q = Electronic charge (1.60×10^{-19} coulomb)
Idb = Anode dark current (after 30 minute storage) in amperes
G = Gain
Δf = Bandwidth of the system in hertz. 1 hertz is used.
S = Anode radiant sensitivity in amperes per watt at the wavelength of peak response.

Ⓖ: The rise time is the time for the output pulse to rise from 10 % to 90 % of the peak amplitude when the entire 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.

Ⓙ: Hysteresis is temporary instability in anode current after light and voltage are applied.

Figure 3: Anode luminous sensitivity and gain characteristics

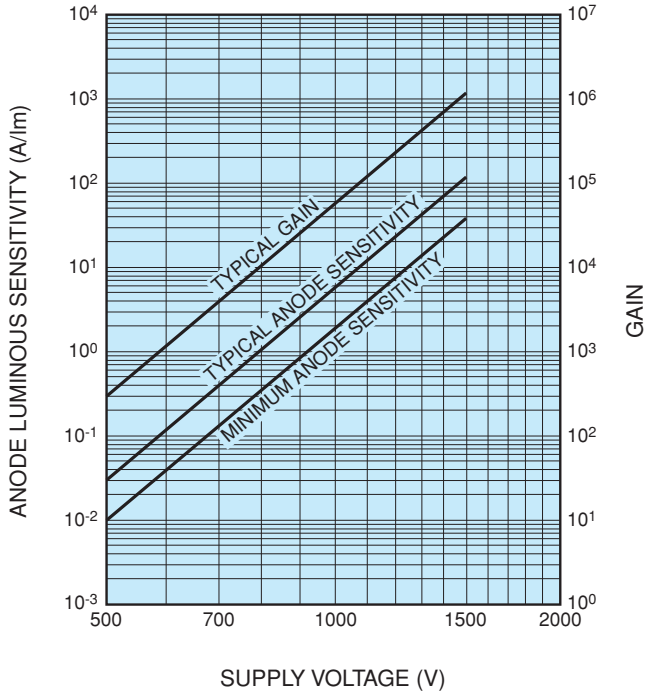


Figure 4: Typical time response

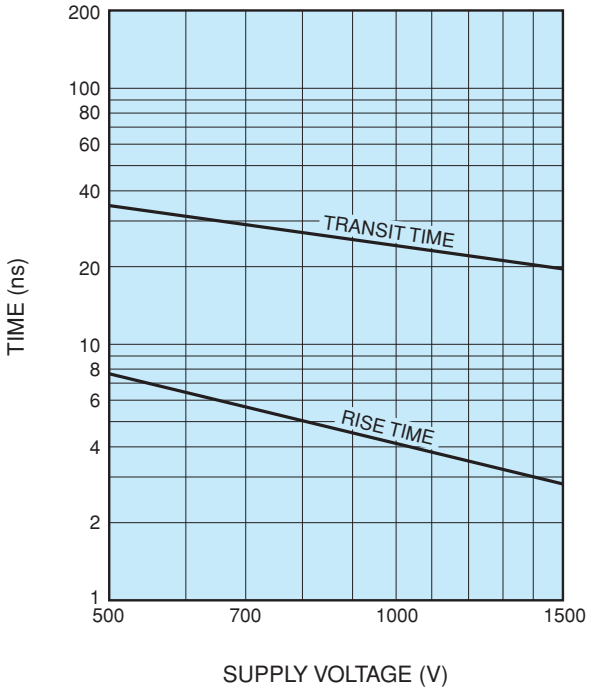


Figure 5: Temperature coefficient

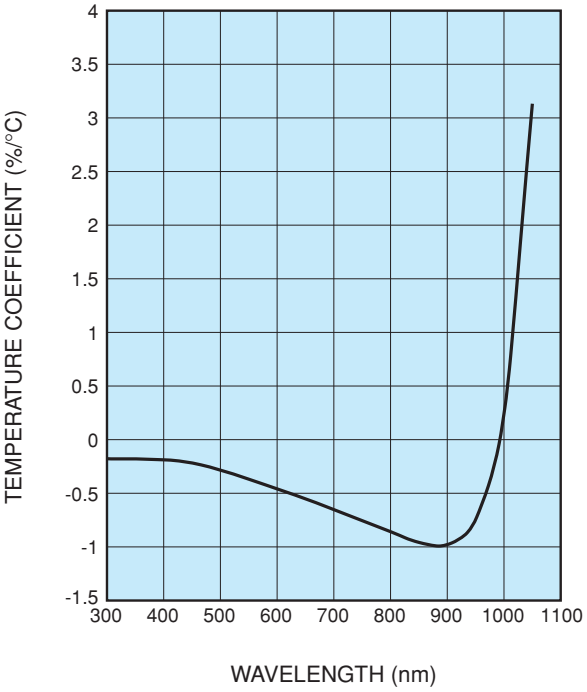


Figure 6: Typical temperature characteristic of dark current

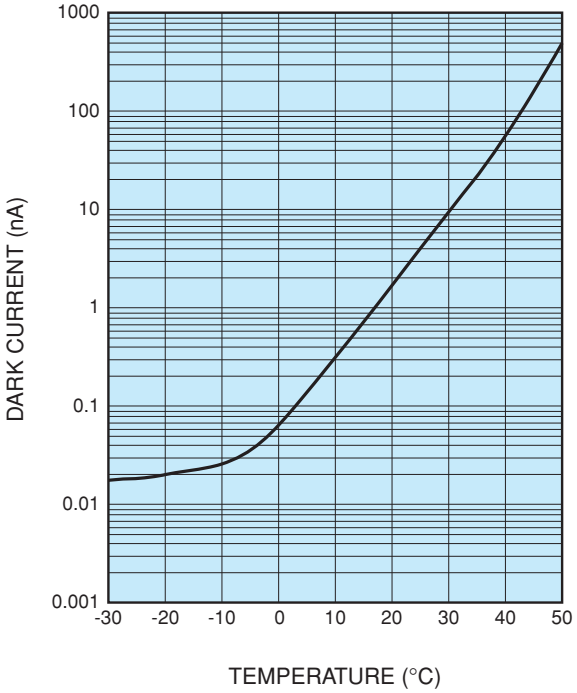


Figure 7: Dimensional outline and basing diagram (Unit: mm)

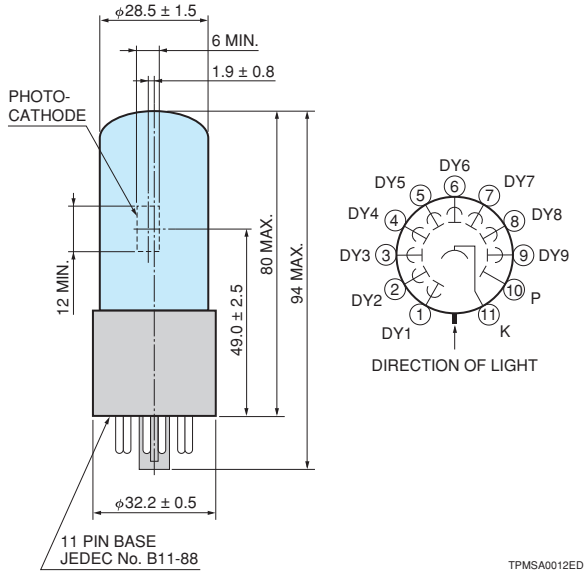
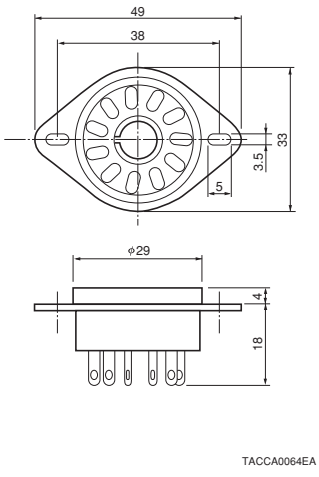
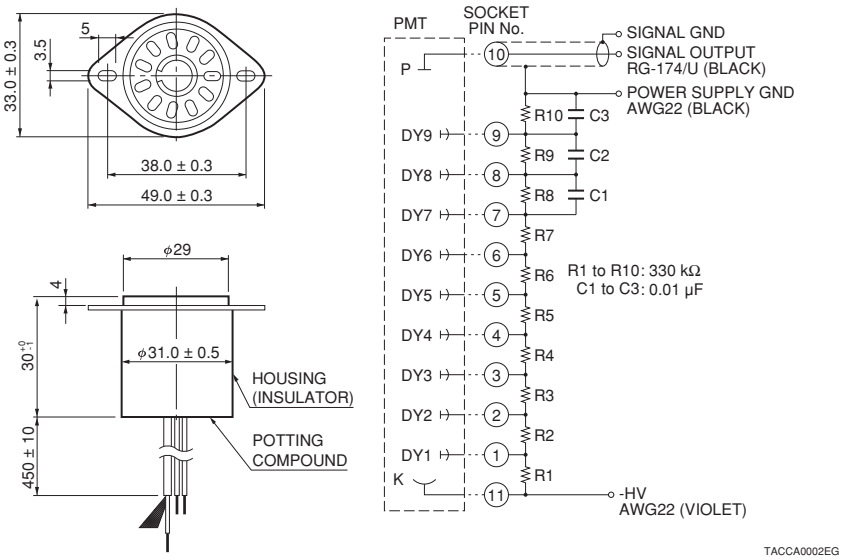


Figure 7: Accessories (Unit: mm) Sold separately

Socket E678-11A



D-type socket assembly E717-63



Warning – Personal Safety Hazards

Electrical Shock – Operating voltages applied to this device present a shock hazard.

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JUL. 2024 IP