

## High Anode Sensitivity at Low Supply Voltage, 13mm (1/2 Inch) Diameter, 10 Stage, Head-On Type, Multialkali Photocathode, (185nm to 850nm)

The Hamamatsu R1463 is a 13mm (1/2") diameter, head-on type photomultiplier tube having a multialkali photocathode designed for use in UV to near IR spectrophotometers and other analysis equipments where wide range response and high gain are of importance. The R1463 exhibits a high anode sensitivity at relatively low supply voltage by virtue of improvement in secondary emitting surface. The R1463P is for photon counting with low dark counts. It has an HA coating with a magnetic shield for decreasing glass scintillations.

### FEATURES

- High Anode Sensitivity
  - Radiant (420nm) .....  $5.1 \times 10^4$  A/W at 1000V
  - Luminous ..... 120 A/lm at 1000V
- High Quantum Efficiency (290nm) ..... 19%
- Wide Spectral Response ..... 185 to 850nm
- Low Anode Dark Current ..... 4 nA at 1000V

### APPLICATIONS

- UV to Near IR Spectrophotometers
- Laser Detection Systems
- Photon Counting Systems

### GENERAL

Parameter		R1463	R1463P	Unit
Spectral Response		185 to 850		nm
Wavelength of Maximum Response		420		nm
Photocathode	Material	Multialkali		—
	Minimum Useful Area	10		mm dia.
Window Material	Material	UV glass		—
	Shape	Plano-plano		—
Dynode	Secondary Emitting Surface	Multialkali		—
	Structure	Linear focused		—
	Number of Stages	10		—
Direct Interelectrode	Anode to Last Dynode	1.2		pF
Capacitances (Approx.)	Anode to All Other Electrodes	2.0		pF
Base		13-pin glass base		—
Weight		8	14	g
Suitable Socket		E678-13A (Supplied)		—
Suitable Socket Assembly		E849 series (option)		—

### MAXIMUM RATINGS (Absolute Maximum Values)

Parameter		Value	Unit
Supply Voltage	Between Anode and Cathode	1250	Vdc
	Between Anode and Last Dynode	250	Vdc
Average Anode Current <sup>A</sup>		0.03	mA
Average Cathode Current <sup>A</sup>		100	nA/cm <sup>2</sup>
Ambient Temperature		-80 to +50	°C

# PHOTOMULTIPLIER TUBES R1463, R1463P

## CHARACTERISTICS (at 25°C)

Parameter		Min.	Typ.	Max.	Unit
Cathode Sensitivity	Luminous <sup>B</sup>	80	120	—	μA/lm
	Radiant at 420nm	—	51	—	mA/W
	at 633nm	—	19	—	mA/W
	Quantum Efficiency at 290nm	—	19	—	%
	Red/White Ratio <sup>C</sup>	0.15	0.2	—	—
Anode Sensitivity <sup>D</sup>	Luminous <sup>E</sup>	30	120	—	A/lm
	Radiant at 420nm	—	$5.1 \times 10^4$	—	A/W
	at 633nm	—	$1.9 \times 10^4$	—	A/W
Gain <sup>D</sup>	—	$1 \times 10^6$	—	—	
Anode Dark Current <sup>D</sup> (After 30 minute storage in the darkness)		—	4	20	nA
Anode Dark Count <sup>D</sup> (After 3 hour storage in the darkness) (for R1463P)		—	900	1000	cps
Time Response	Anode Pulse Rise Time <sup>D, F</sup>	—	2.5	—	ns
	Electron Transit Time <sup>D, G</sup>	—	24	—	ns

### NOTES

- A: Averaged over any interval of 30 seconds maximum.
- B: The light source is a tungsten filament lamp operated at a distribution temperature of 2856K. The light input is  $10^{-3}$  lumen. Supply voltage is 150 volts between the cathode and all other electrodes connected together as anode.
- C: Red/White Ratio is the quotient of the cathode current measured using a red filter (Toshiba R-68) interposed between the light source and the tube by the cathode current measured with the filter removed under the same conditions as Note B.
- D: Measured with the anode-to-cathode supply voltage and voltage distribution ratio shown in Table 1.
- E: The light input is  $10^{-8}$  lumens with the same light source as Note B.
- F: 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.
- G: The electron transit time is the interval between the arrival of a delta function light pulse at the entrance window of the tube and the time the output pulse reaches the peak amplitude. In measurement the entire photocathode is illuminated.

**Table 1: VOLTAGE DISTRIBUTION RATIO**

Electrodes	K	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8	Dy9	Dy10	P
Distribution Ratio	1	1	1	1	1	1	1	1	1	1	1	1

Supply Voltage: 1000Vdc, K: Cathode, Dy: Dynode, P: Anode

Figure 1: Typical Spectral Response

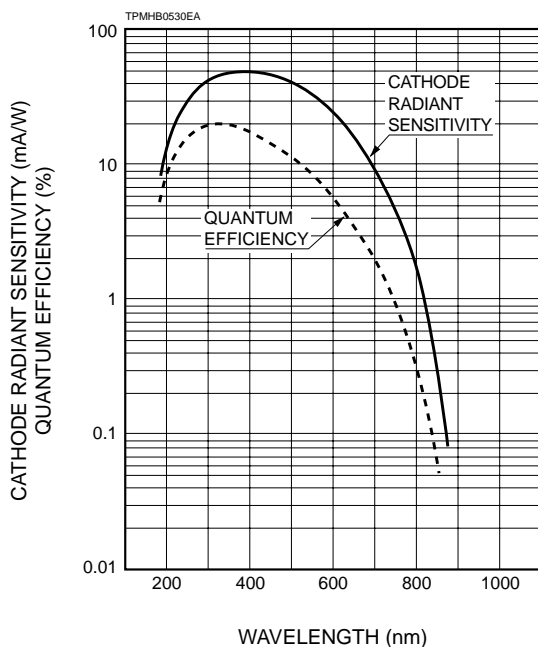


Figure 2: Anode Sensitivity and Gain Characteristics

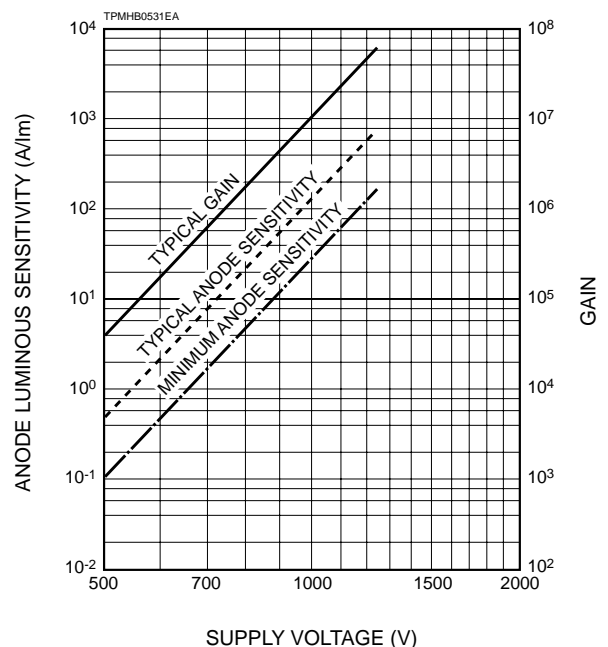


Figure 3: Typical Time Response

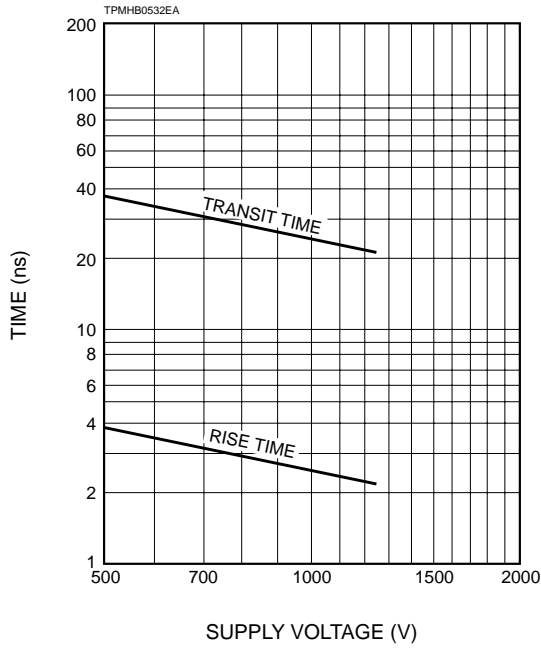


Figure 4: Typical Temperature Coefficient of Anode Sensitivity

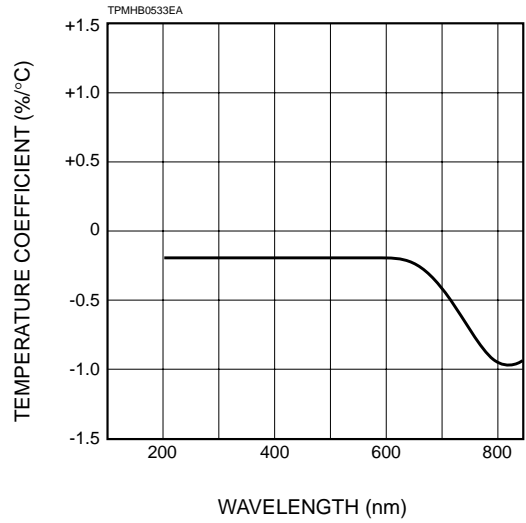


Figure 5: Typical Temperature Characteristic of Dark Current and Dark Counts (R1463P)

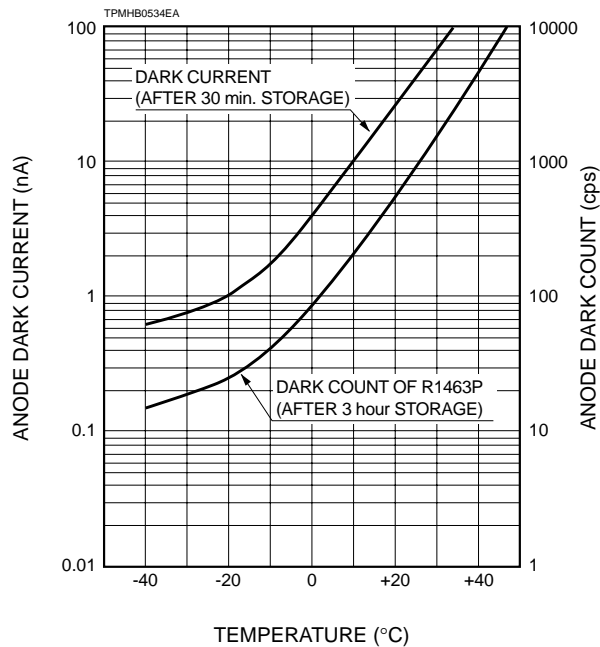
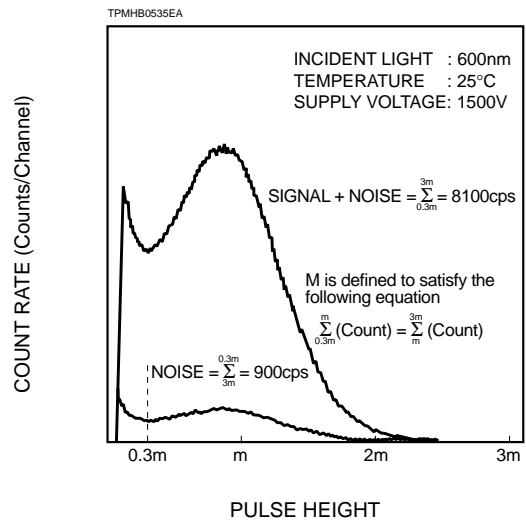


Figure 6: Typical Single Photoelectron Pulse Height Distribution (R1463P)



# PHOTOMULTIPLIER TUBES R1463, R1463P

Figure 7: Dimensional Outline and Basing Diagram (Unit: mm)

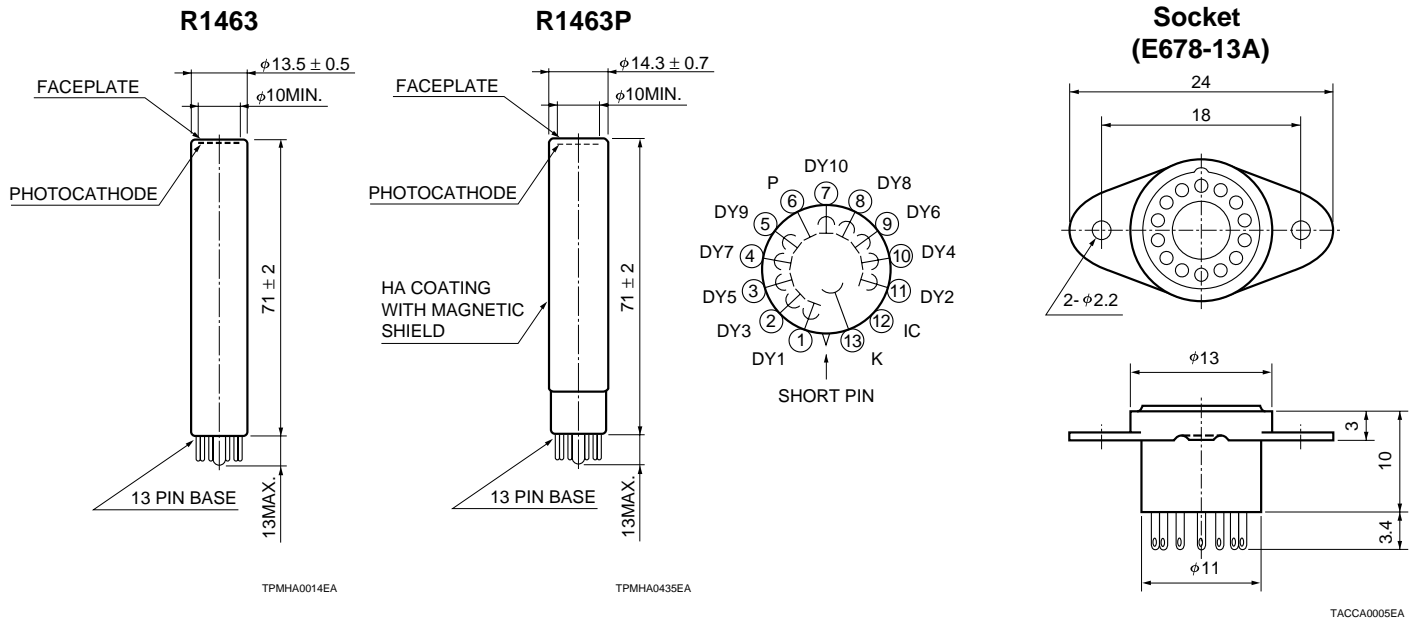
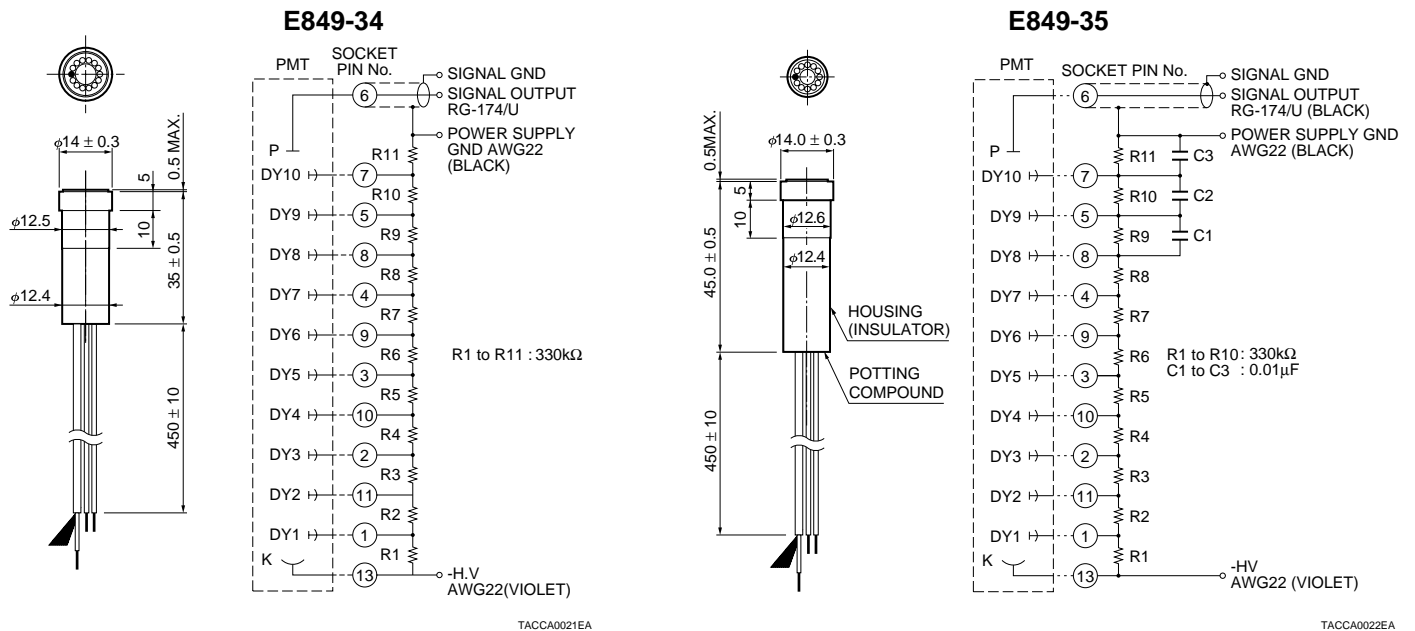


Figure 8: Optional Socket Assembly E849-34 and E849-35 (Unit: mm)

The E849-34 and E849-35 are socket assemblies specifically designed for 1/2 inch diameter, 10 stage, head-on type photomultiplier tubes having a 13-pin glass base. It contains a voltage-divider network potted with silicone rubber, thus eliminating troublesome soldering for making up the divider network.



**Warning - Personal Safety Hazards**  
Electrical Shock — Operating voltage applied to this device presents shock hazard.

# HAMAMATSU

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