

For Scintillation Counting, Photon Counting, Ruggedized, Low Profile, 25mm (1 Inch) Diameter, Bialkali Photocathode (300nm to 650nm), 10 Stages, Head-on Type

The R1924 and R1924-01 are 1" diameter series photomultiplier tubes. They feature a low-profile configuration and a rugged construction suited for radiation detecting instruments. They provide high quantum efficiency, fast time response and excellent energy resolution, so they are well suited to scintillation counting application and photon counting application.

FEATURES

- Rugged Construction
- Low Profile Configuration
- High Quantum Efficiency at 420nm 26%
- Excellent Pulse Height Resolution
with ¹³⁷Cs and NaI (TI) 7.8%
- Fast Time Response 2ns at 1000V

APPLICATIONS

Scintillation Counting

γ-ray survey meter, Door monitor, Hand monitor, etc.

Photon Counting

Fluorescence spectrophotometer, Chemiluminescence spectrophotometer, etc.

GENERAL

Parameter		Description/Value	Unit
Spectral Response		300 to 650	nm
Wavelength of Maximum Response		420	nm
Photocathode	Material	Bialkali	—
	Minimum Useful Size	21	mm dia.
Window Material	Material	Borosilicate glass	—
	Index of Refraction at 420nm	1.500 ± 0.001	—
	Faceplate Flatness	Less than ± 50	μm
	Shape	Plano-concave	—
Dynode	Structure	Circular-cage	—
	Number of Stages	10	—
Base	R1924	14-pin glass base	—
	R1924-01	12-pin base JEDEC No. B12-43	—
Socket (Supplied)	R1924	E678-14C (supplied)	—
	R1924-01	E678-12A (supplied)	—

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 ^A		0.1	mA
Ambient Temperature		-80 to +50	°C

CHARACTERISTICS (at 25°C)

Parameter		Min.	Typ.	Max.	Unit
Cathode Sensitivity	Quantum Efficiency at 420nm	—	26	—	%
	Luminous ^B	60	90	—	μA/lm
	Radiant at 420nm	—	85	—	mA/W
	Blue ^C	—	10.5	—	μA/lm-b
Anode Sensitivity	Luminous ^D	20	100	—	A/lm
Gain ^D		—	1.1 × 10 ⁶	—	—
Anode Dark Current ^E		—	3	20	nA
Time Response	Anode Pulse Rise Time ^F	—	2.0	—	ns
	Electron Transit Time ^G	—	19	—	ns
	Transit Time Spread ^H	—	1.1	—	ns
Pulse Height Resolution ^J		—	7.8	—	%

Table 1: VOLTAGE DISTRIBUTION RATIO

Electrodes	K	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8	Dy9	Dy10	P
Distribution Ratio	3	1	1	1	1	1	1	1	1	1	1	1

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

PHOTOMULTIPLIER TUBES R1924, R1924-01

NOTES

- A: Averaged over any interval of 30 seconds maximum and the whole photocathode is illuminated.
- B: The light source is a tungsten filament lamp operated at a distribution temperature of 2856K. The light input is 0.01 lm and 150 volts are applied between the cathode and all other electrodes connected together as anode.
- C: 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 B.
- D: Measured with the same light source as Note B and the light input is 0.1 μ lm. The anode-to-cathode supply voltage and voltage distribution ratio are shown in Table 1.
- E: Measured with the same supply voltage and voltage distribution ratio as Note D after 30-minute storage in darkness.
- 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 (410nm). The anode-to-cathode supply voltage and voltage distribution ratio are shown in Table 1.
- G: The electron transit time is the interval between the arrival of a delta function light pulse (410nm) at the entrance window of the tube and the time the output pulse reaches the peak amplitude. In measurement the entire photocathode is illuminated. The anode-to-cathode supply voltage and voltage distribution ratio are shown in Table 1.
- H: Also called transit time jitter. This is the fluctuation in electron transit time between individual pulses in the single photoelectron state, and may be defined as the FWHM of the frequency distribution of the transit times. The anode-to-cathode supply voltage and voltage distribution ratio are shown in Table 1 and wavelength of light pulse is 410nm.
- J: The pulse height resolution is measured with ^{137}Cs and NaI(Tl) scintillator (3/4" diameter \times 3/4" thickness). The anode-to-cathode supply voltage and voltage distribution ratio are shown in Table 1.

Figure 1: Typical Spectral Response

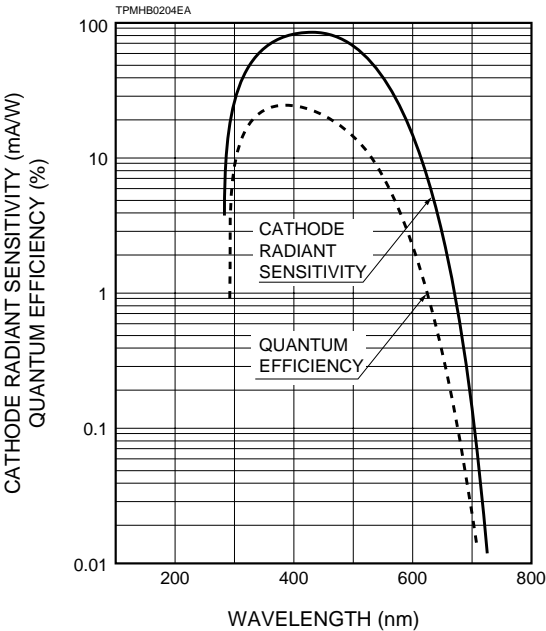


Figure 2: Typical Gain and Dark Current Characteristics

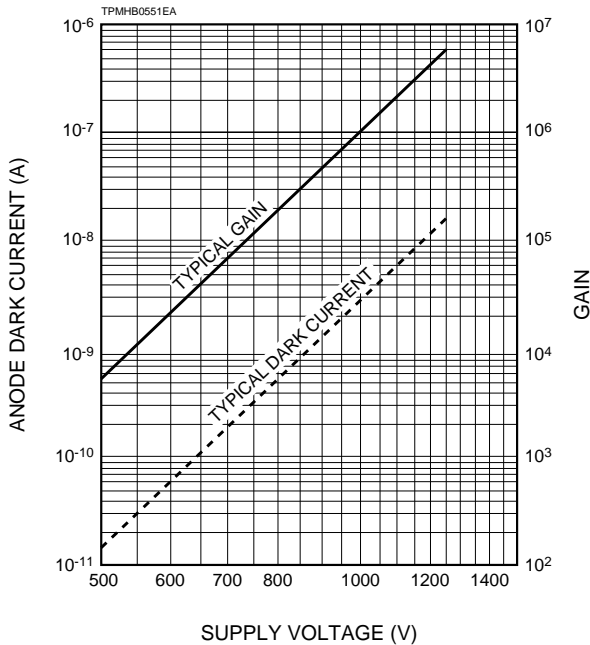


Figure 3: Typical Time Response

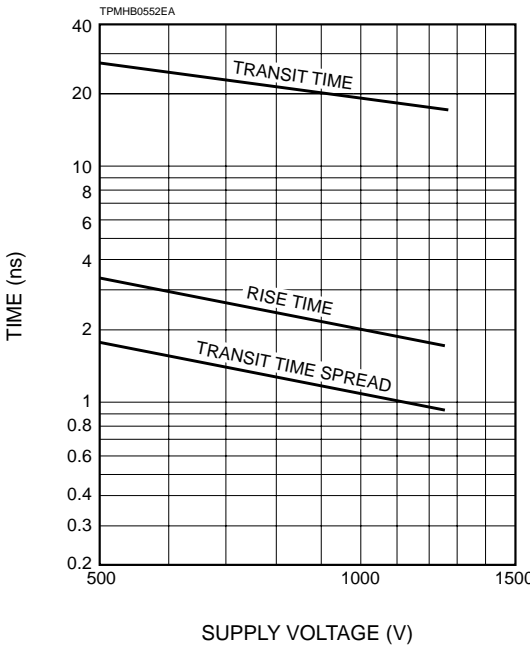


Figure 4: Typical Pulse Height Distribution with ^{137}Cs & NaI(Tl)

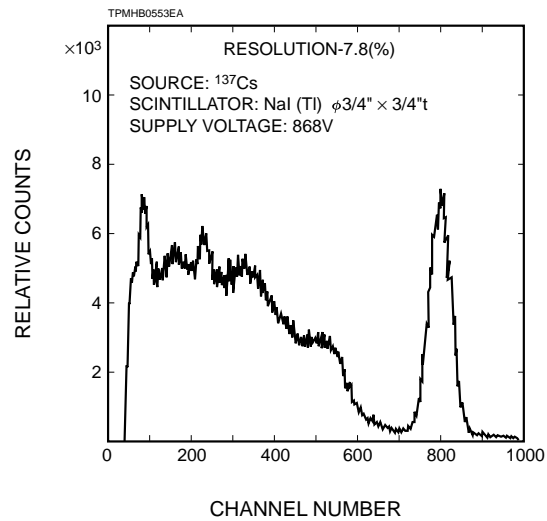


Figure 5: Typical Single Photoelectron Pulse Height Distribution

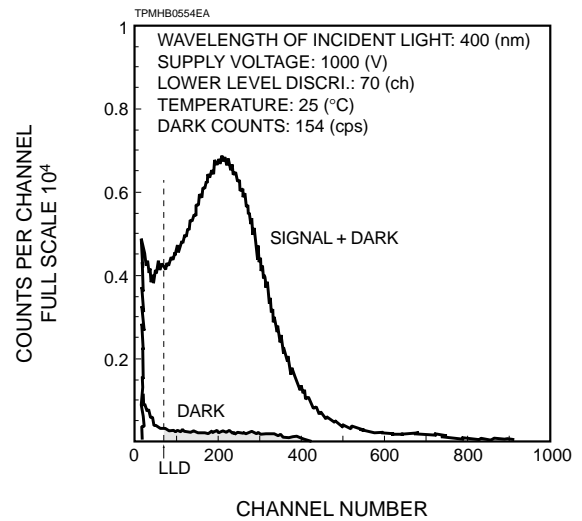


Figure 6: Typical Temperature Coefficient of Anode Sensitivity

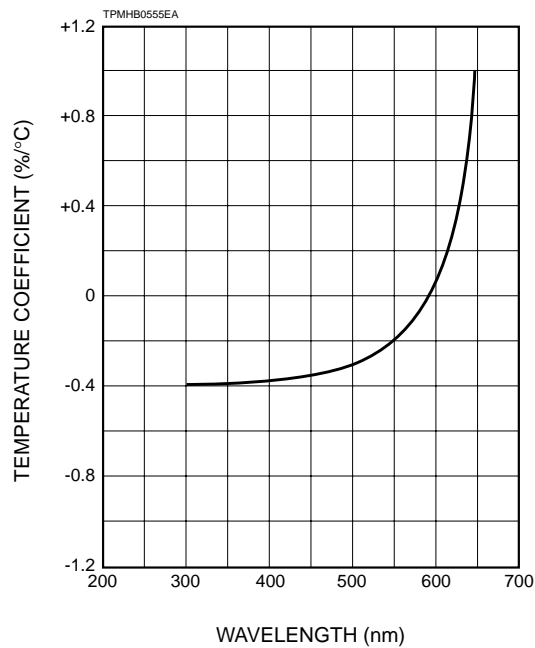
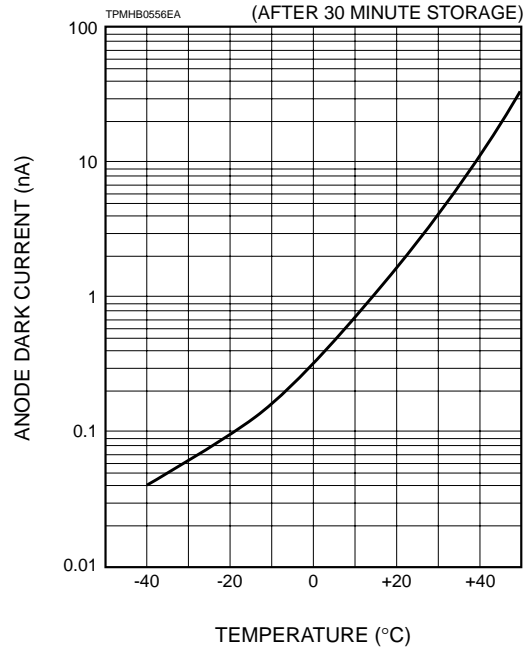


Figure 7: Typical Temperature Characteristics of Dark Current



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

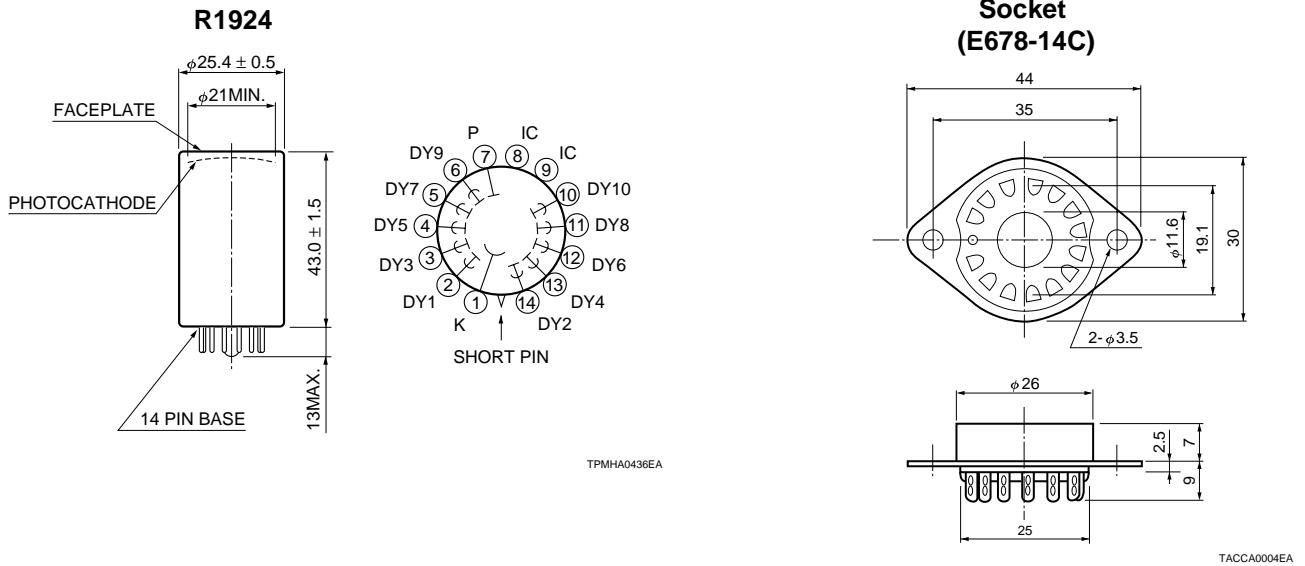
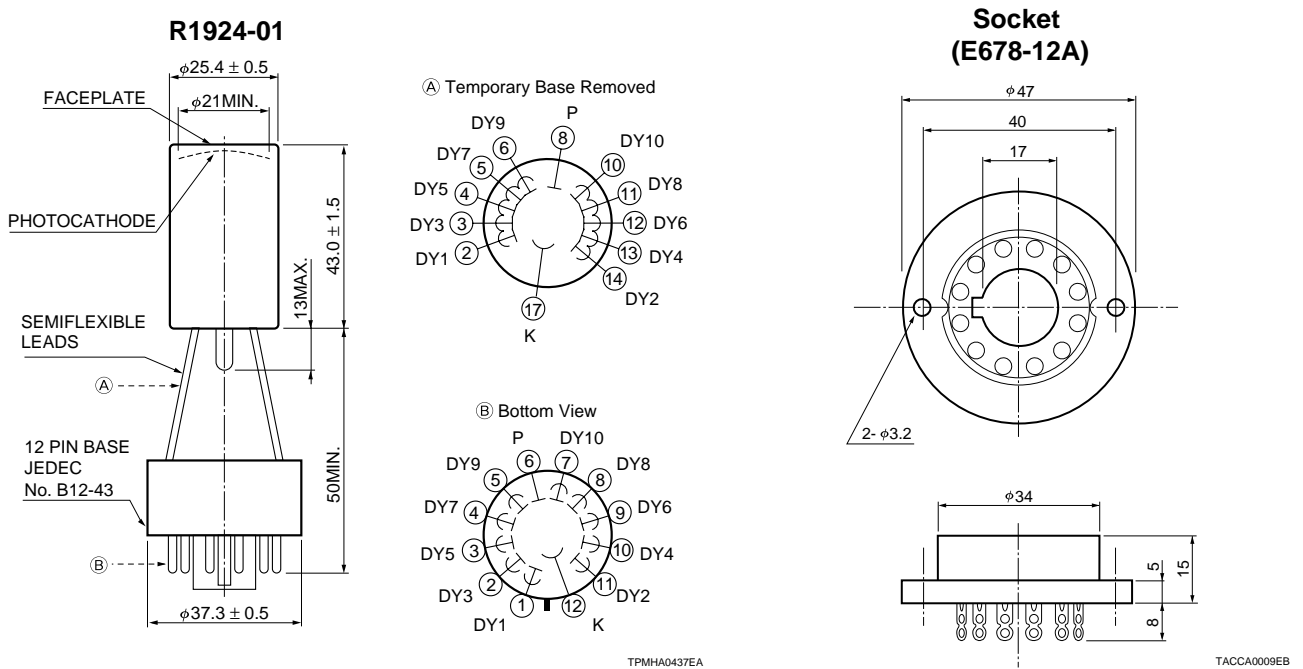


Figure 9: Dimensional Outline and Basing Diagram (Unit: mm)



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

HAMAMATSU

HAMAMATSU PHOTONICS K.K., Electron Tube Center

314-5, Shimokanzo, Toyooka-village, Iwata-gun, Shizuoka-ken, 438-0193, Japan, Telephone: (81)539/62-5248, Fax: (81)539/62-2205

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, P. O. Box 6910, Bridgewater, N.J. 08807-0910, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658

France: Hamamatsu Photonics France S.A.R.L.: 8, Rue du Saule Trappu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10

United Kingdom: Hamamatsu Photonics UK Limited: Lough Point, 2 Gladbeck Way, Windmill Hill, Enfield, Middlesex EN2 7JA, United Kingdom, Telephone: (44)181-367-3560, Fax: (44)181-367-6384

North Europe: Hamamatsu Photonics Norden AB: Färögatan 7, S-164-40 Kista Sweden, Telephone: (46)8-703-29-50, Fax: (46)8-750-58-95

Italy: Hamamatsu Photonics Italia: S.R.L.: Strada della Moia, 1/E, 20020 Arese, (Milano), Italy, Telephone: (39)02-935 81 733, Fax: (39)02-935 81 741

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