

## FLAT PANEL TYPE MULTIANODE PHOTOMULTIPLIER TUBE R12699-406-M4

### FEATURES

- For low temperature operation down to  $-110\text{ }^{\circ}\text{C}$
- Large effective area:  $48.5\text{ mm} \times 48.5\text{ mm}$
- $2 \times 2$  multianode, pixel size:  $24.25\text{ mm} \times 24.25\text{ mm}$  / anode
- High UV sensitivity
- Low profile
- Low radioactivity

### APPLICATIONS

- Academic research (Dark matter detection)
- Nuclear medicine equipment (PET)

### SPECIFICATIONS

#### GENERAL

Parameter		Description	Unit
Spectral response		160 to 650	nm
Peak wavelength		400	nm
Photocathode material		Bialkali	—
Window	Material	Silica glass	—
	Thickness	2.5	mm
Dynode	Structure	Metal channel dynode	—
	Number of stages	10	—
Anode	Number of pixels	4 ( $2 \times 2$ matrix)	—
	Pixel size / pitch at center	$24.25 \times 24.25$	mm
Effective area		$48.5 \times 48.5$	mm
Dimensional outline (W × H × D)		$56 \times 56 \times 14.8$	mm
Packing density (Effective area / External size)		75	%
Weight		104	g
Operating ambient temperature		$-110$ to $+50$	$^{\circ}\text{C}$
Storage temperature		$-110$ to $+50$	$^{\circ}\text{C}$

#### MAXIMUM RATINGS (ABSOLUTE MAXIMUM VALUES)

Parameter		Value	Unit
Supply voltage	Between anode and cathode	1100	V
Average anode output current in total		0.1	mA

#### CHARACTERISTICS at $25\text{ }^{\circ}\text{C}$

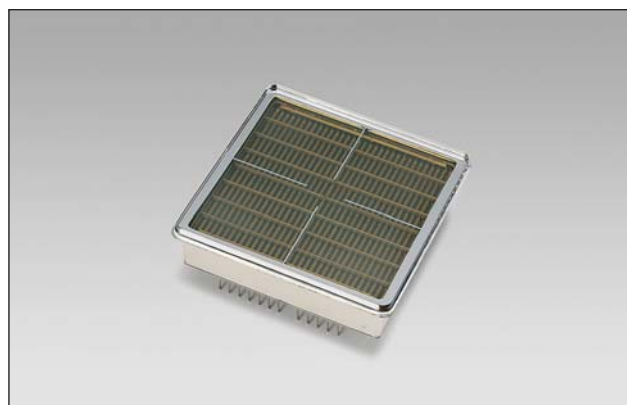
Parameter		Min.	Typ.	Max.	Unit
Cathode sensitivity	Luminous (2856 K)	70	95	—	$\mu\text{A}/\text{lm}$
	Blue sensitivity index	—	10	—	—
	Quantum efficiency at 175 nm	—	33	—	%
Anode sensitivity	Luminous (2856 K)	—	140	—	$\text{A}/\text{lm}$
Gain		—	$1.5 \times 10^6$	—	—
Anode dark current	per channel	—	1.5	—	nA
	in total	—	6	50	nA
Time response	Rise time	—	1.2	—	ns
	Transit time	—	5.9	—	ns
	Transit time spread (FWHM)	—	0.41	—	ns
Pulse linearity per channel (2 % deviation)		—	8	—	mA
Pulse linearity per channel (5 % deviation)		—	20	—	mA
Uniformity ratio between anodes		—	1: 1.5	1: 2	—

NOTE: Anode characteristics are measured with a voltage distribution ratio shown below.

#### VOLTAGE DISTRIBUTION RATIO AND SUPPLY VOLTAGE

Electrodes	K	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8	Dy9	Dy10	GR	P
Distribution ratio	2	1	1	1	1	1	1	1	1	1	1	1	0.5

Supply voltage: 1000 V, K: Cathode, Dy: Dynode, GR: Guard ring, P: Anode



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Figure 1: Typical spectral response

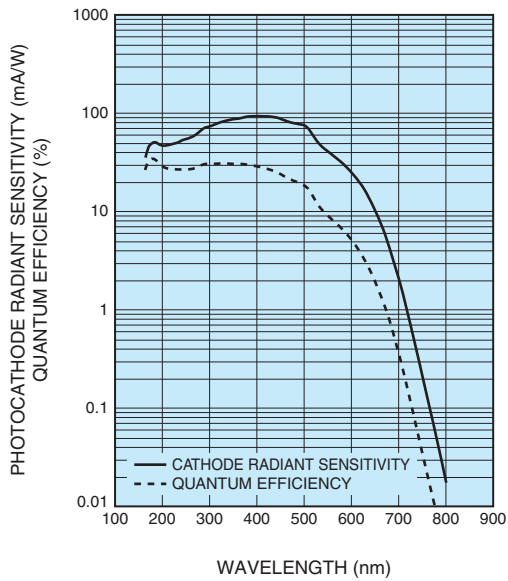


Figure 2: Typical gain

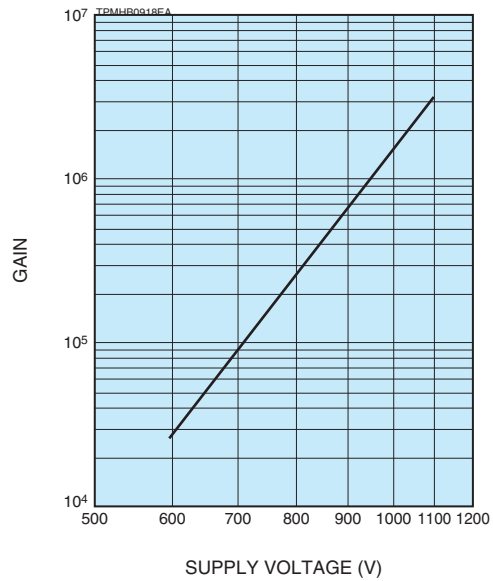
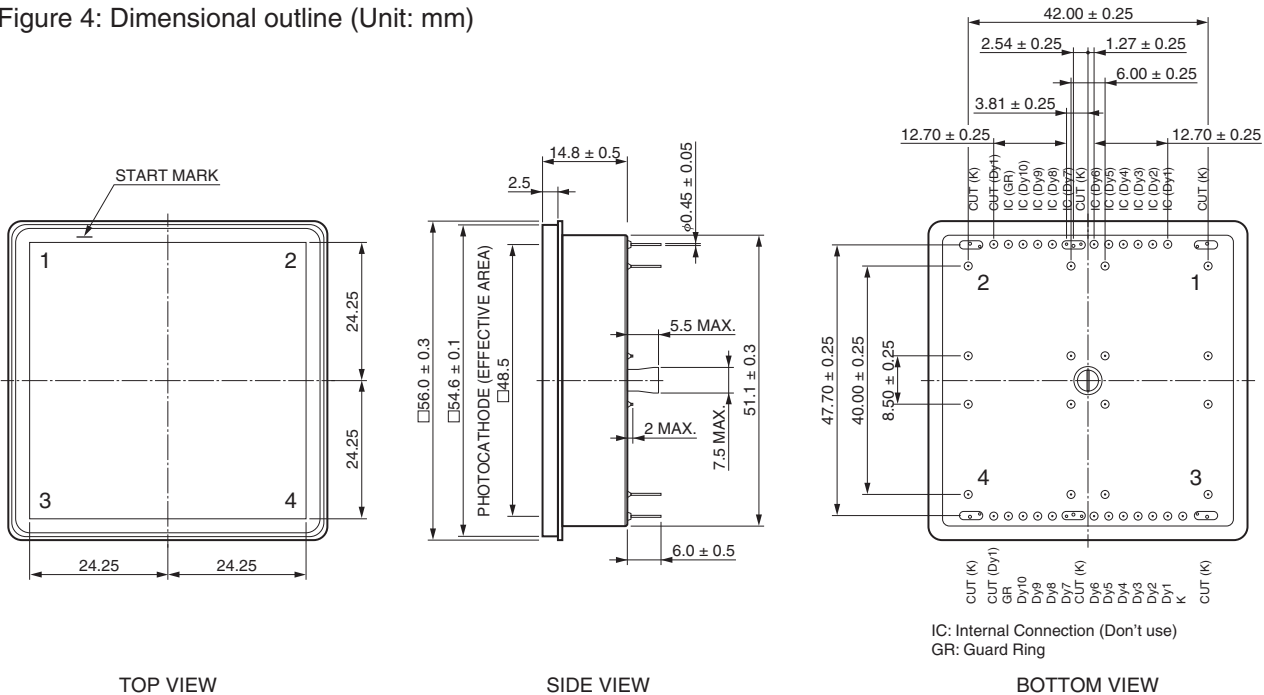


Figure 3: Anode cross-talk (Example)

P1	P2	P1	P2
100 %	0.61 %	0.02 %	0.07 %
0.22 %	0.02 %	0.14 %	100 %
P3	P4	P3	P4

SUPPLY VOLTAGE: 1000 V  
LIGHT SOURCE: TUNGSTEN LAMP (DC LIGHT)  
SPOT ILLUMINATION: 24.25 mm x 24.25 mm

Figure 4: Dimensional outline (Unit: mm)



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TPMH1368E03

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DEC. 2020 IP