

## FEATURES

- Fast time response
- Suitable for mass production

## APPLICATIONS

- TOF-PET in nuclear medicine
- TOF counter in HEP experiment
- Radiation monitor in security instrument



From left: R13478, R13449, R13408, R13089

Figure 1: Typical spectral response

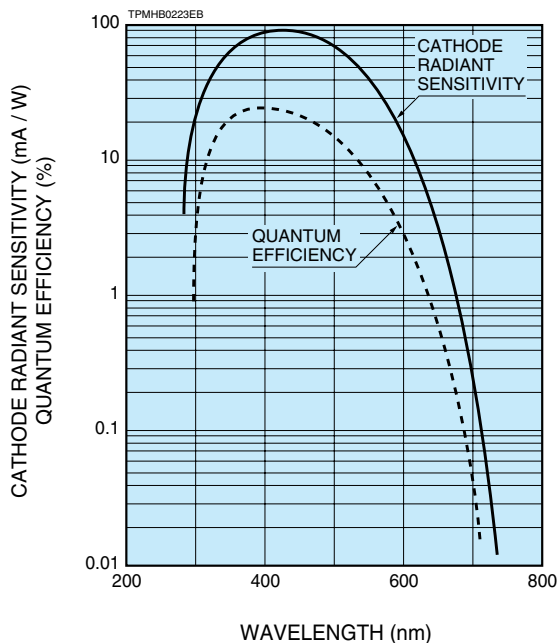
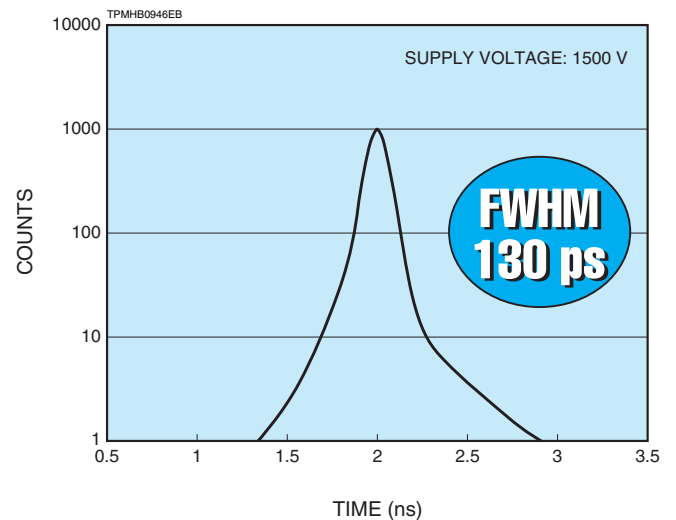


Figure 2: T.T.S. (R13478)



# PHOTOMULTIPLIER TUBES

## R13478, R13449, R13408, R13089

Type No.	Spectral response		Photo-cathode material	Window material	Dynode structure / Stages	Maximum ratings		Anode to cathode supply voltage (V)	Cathode characteristics			
	Range (nm)	Peak wavelength (nm)				Supply voltage between anode and cathode (V)	Average anode current (mA)		Luminous		Blue sensitivity index (CS 5-58) Typ.	Radiant Typ. (mA/W)
									Min. ( $\mu\text{A/lm}$ )	Typ. ( $\mu\text{A/lm}$ )		
R13478	300 to 650	420	BA	K	L/8	1750	0.1	1500	70	95	10.0	80
R13449	300 to 650	420	BA	K	L/8	1750	0.1	1500	70	95	10.0	80
R13408	300 to 650	420	BA	K	L/8	1750	0.1	1500	70	95	10.0	80
R13089	300 to 650	420	BA	K	L/8	1750	0.1	1500	70	95	10.0	80

**NOTE:** (A) BA: Bialkali (B) K: Borosilicate glass (C) L: Linear-focused  
 (D) Measured at the peak sensitivity wavelength.

### VOLTAGE DISTRIBUTION RATIO AND SUPPLY VOLTAGE

Electrodes	K	G	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8(Acc)	P
Ratio		1.3	4.8	1.5	1.5	1	1	1	1	1	1

Supply voltage: 1500 V, K: Cathode, Dy: Dynode, P: Anode, G: Grid, Acc: Accelerating electrode  
 Acc to be connected to Dy8 with a protection resistor in series. (recommended resistance: 10 M $\Omega$ )

Figure 3: Typical gain characteristics

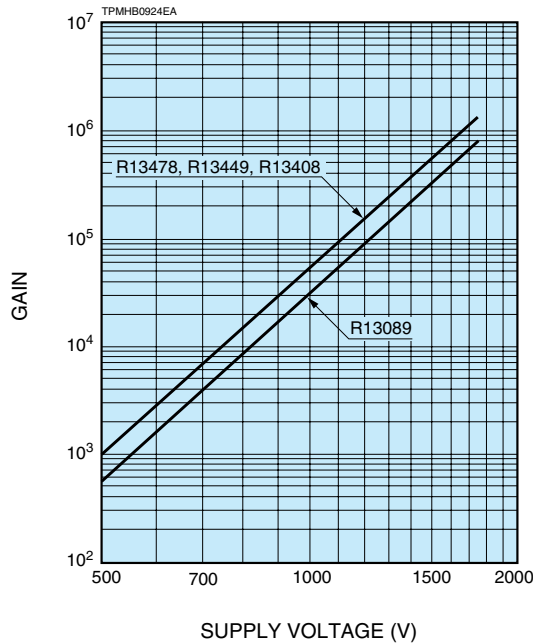
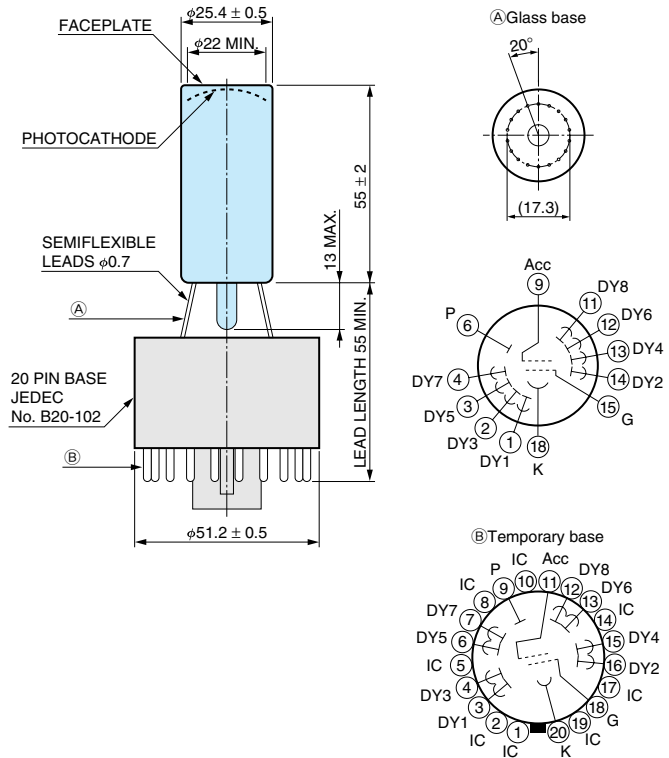


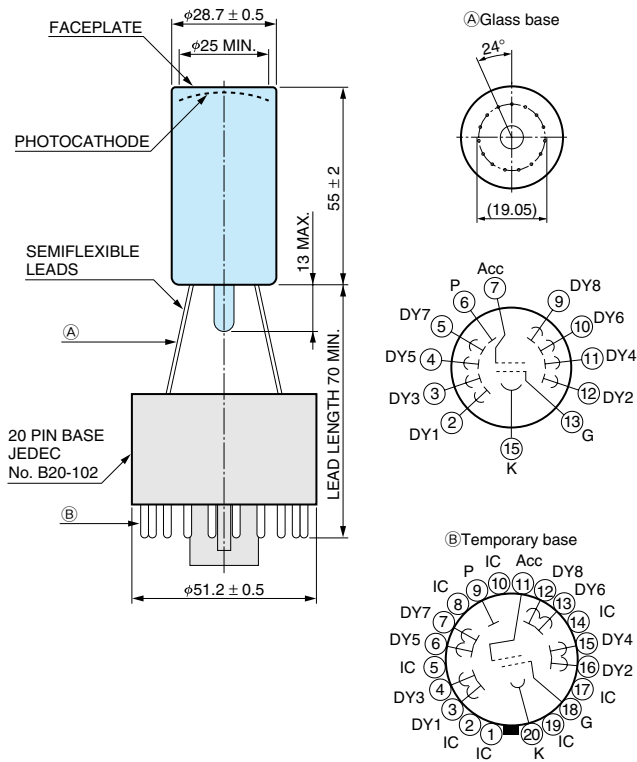
Figure 4: Dimensional outline and basing diagram (Unit: mm)

#### ● R13478

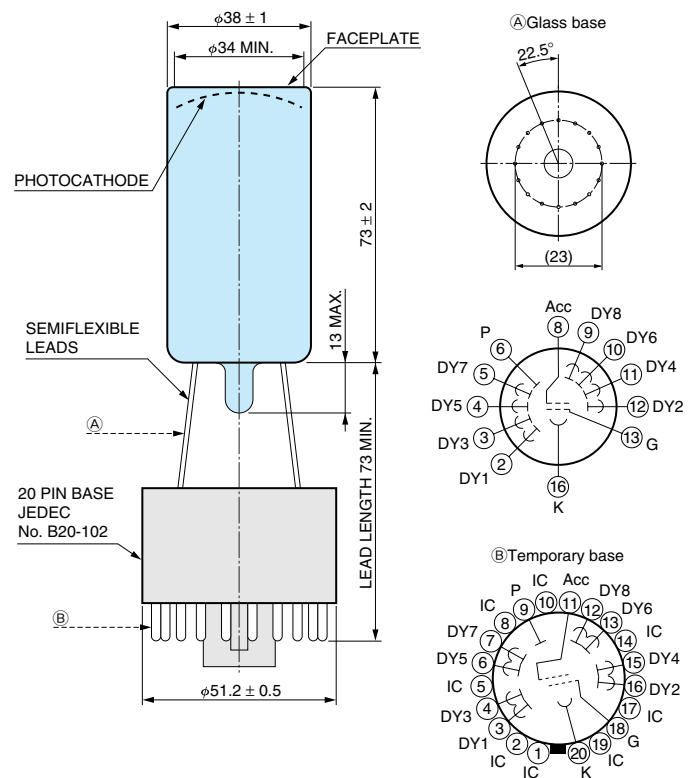


Anode characteristics								Pulse linearity		Storage temperature (°C)	Operating ambient temperature (°C)	Type No.
Luminous Typ. (A/lm)	Radiant Typ. (A/W)	Gain Typ.	Dark current (After 30 min)		Time response			±2 % deviation (mA)	±5 % deviation (mA)			
			Typ. (nA)	Max. (nA)	Rise time Typ. (ns)	Transit time Typ. (ns)	T.T.S. (Transit Time Spread) (FWHM) (ps)					
50	$4.2 \times 10^4$	$5.3 \times 10^5$	3	30	0.9	9.1	130	10	25	-80 to +50	-30 to +50	R13478
50	$4.2 \times 10^4$	$5.3 \times 10^5$	3	30	0.9	10	170	10	30	-80 to +50	-30 to +50	R13449
50	$4.2 \times 10^4$	$5.3 \times 10^5$	3	30	1.2	13	190	20	50	-80 to +50	-30 to +50	R13408
30	$2.5 \times 10^4$	$3.2 \times 10^5$	10	50	2.0	20	230	30	60	-80 to +50	-30 to +50	R13089

## ● R13449



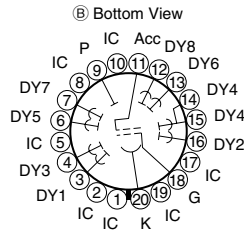
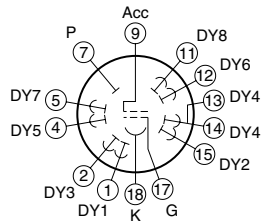
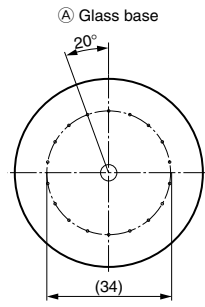
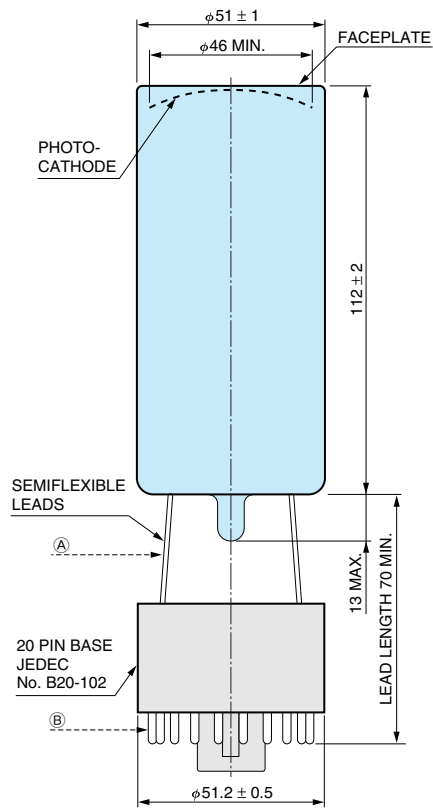
## ● R13408



# PHOTOMULTIPLIER TUBES

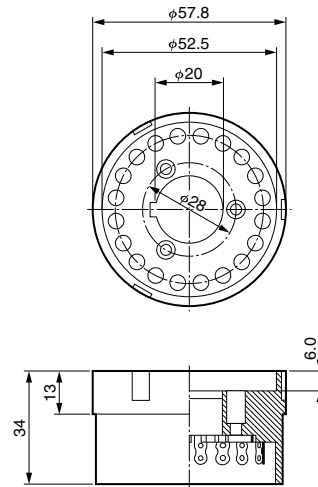
## R13478, R13449, R13408, R13089

### ● R13089



TPMHA0606EA

### ● Socket E678-20B (Supplied)



TACCA0309EA

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