

preliminary product specification

High gain, high resolution, 10-stage, low profile, 39 mm (1.5") round tube

Applications :	All photometry and scintillation applications where a good energy resolution is required and a limited supply voltage and space are available.		
Description :	Window :	Material :	lime glass
		Photocathode :	bi-alkali
		Refr. index at 420 nm :	1.54
	Multiplier :	Structure :	linear focused
		Nb of stages :	10
	Mass :		50 g

Photocathode characteristics

Spectral range :	290-650	nm
Maximum sensitivity at :	420	nm
Sensitivity ① :		
† Luminous :	90	μA/Im
† Blue :	min : 10	typ : 11.5
† Radiant, at 420 nm :		typ : 90
		μA/ImF
		mA/W

Characteristics with voltage divider A

Gain slope (vs supp. volt., log/log)	7.5	
For an anode blue sensitivity of :	7.5	A/ImF
† Supply voltage :	max: 950	typ: 800
	min : 700	V
Gain	6.5 x 10 ⁵	
† Anode dark current ②:	max: 10	typ : 2
		nA
† Pulse height resolution for ¹³⁷ Cs ③ :		7.5
		%
† Pulse height resolution for ⁵⁵ Fe ③ :	max. 40	typ. 38
		%
Peak to valley ratio for ⁵⁵ Fe :		40
Mean anode sensitivity deviation ④ :		
long term (16 h) :		0.6
after change of count rate :		1
vs temperature between 0 and +40°C at 420 nm :		- 0.3
		%/K
Gain halved for a magnetic field		
perpendicular to axis "n" of :		0.12
parallel to axis "n":		0.3
parallel to tube axis :		0.5
		mT

Characteristics with voltage divider ⑤ :

	B	A	
For a supply voltage of	1000	800	V
Gain	1.0 x 10 ⁶	6.5 x 10 ⁵	
Linearity (2%) of an. current up to :	80	30	mA
Anode pulse ⑥ :			
Rise time :	3	3	ns
Duration at half height :	6	7	ns
Transit Time :	34	36	ns
Capacitance anode to all :	5	5	pF

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Recommended voltage divider

Type A for maximum gain

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	A	
2	2	1	1	1	1	1	1	1	1	1	1	(total :12)

Type B for best timing / linearity compromise

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	A	
2	2	1	1	1.25	1.25	1.5	2.25	2.5	3	2.75		(total :20.5)
K : photocathode				Dn : dynode			A : anode					

Limiting values

Anode luminous sensitivity :		max:	75	A/lmF
Supply voltage :		max:	1400	V
Continuous anode current :		max:	0.2	mA
Voltage between				
	D1 and photocathode :	min :	100	max: 400
	consecutive dynodes :			max: 300
	anode and D10 :	min :	30	max: 300
Ambient temperature				
	short operation (< 30 mn) :	min :	-30	max: +80
	continuous operation & storage :	min :	-30	max: +50

Notes

Characteristic measured and mentioned on the test ticket of each tube.

① Luminous sensitivity is measured with a tungsten filament lamp with a colour temperature of 2856 ± 5 K. The blue sensitivity, expressed in A/lmF ("F" as in Filtered) is measured with a tungsten filament lamp with a color temperature of 2856 ± 5 K. Light is transmitted through a blue filter Corning CS no.5-58, polished to half stock thickness. The radiant sensitivity is measured with a tungsten filament lamp with a colour temperature of 2856 ± 5K. Light is transmitted through an interference filter. Radiant sensitivity at 420 nm, expressed in mA/W, can be estimated by multiplying the blue sensitivity, expressed in µA/lmF, by 7.5 for this type of tube.

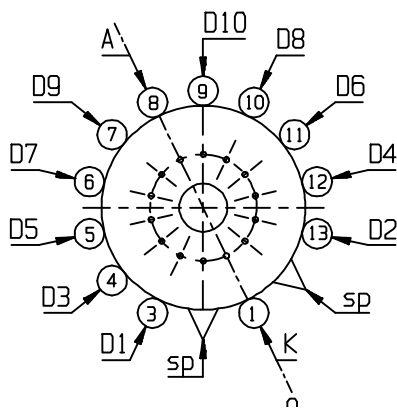
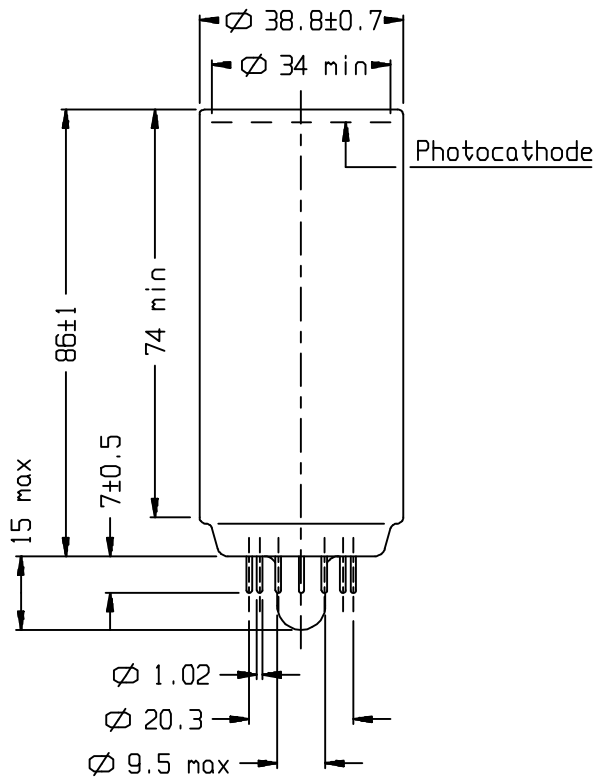
② Dark current is measured at ambient temperature, after the tube has been in darkness for approximately 1 min. Lower value can be obtained after a longer stabilisation period in darkness (approx. 30 min.).

③ Pulse amplitude resolution for ¹³⁷Cs and ⁵⁷Co is measured with NaI(Tl) cylindrical scintillator with a diameter of 32 mm and a height of 25 mm. The count rate used is ~ 1.0 x 10⁴ c/s. The pulse amplitude for ⁵⁵Fe is measured with a NaI(Tl) cylindrical scintillator with a diameter of 25 mm and a height of 1 mm provided with a beryllium window. The count rate used is~ 1.0 x 10⁴ c/s.

④ The mean pulse amplitude deviation is measured by coupling a NaI(Tl) scintillator to the window of the tube. Long term (16h) deviation is measured by placing a ¹³⁷Cs source at a distance from the scintillator such that the count rate is ~1.E+04 c/s, corresponding to an anode current of ~ 300 nA. The mean pulse amplitude deviation after change of count rate is measured with a ¹³⁷Cs source at a distance from the scintillator such that the count rate can be changed from 1.E+04 to 1.E+03 c/s, corresponding to an anode current of ~1 µA and 0.1 µA respectively. Both tests are carried out according to ANSI-N42-9-1972 of IEEE recommendations.

⑤ To obtain a peak pulse current greater than that obtainable with divider A, it is necessary to increase the inter-dynode voltage progressively. Divider circuit C is an example of a progressive divider, giving a compromise between gain, speed and linearity. other dividers can be conceived to achieve other compromises. It is generally recommended that the voltage ratio between two successive stages is less than 2.

⑥ Measured with a pulse light source, with a pulse duration (FWHM) of approximately 1 ns., the cathode being completely illuminated. The rise time is determined between 10 % and 90 % of the anode pulse amplitude. The signal transit time is measured between the instant at which the illuminating pulse of the cathode becomes maximum, and the instant at which the anode pulse reaches its maximum. Rise time, pulse duration and transit time vary with respect to high tension supply voltage Vht as (Vht)^{-1/2}.

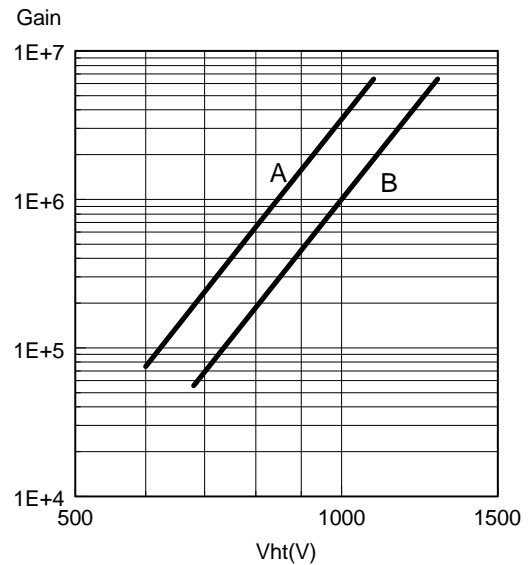


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sp : short pin
nc : not connected
ic : internal connection
n : plane of symmetry of the multiplier

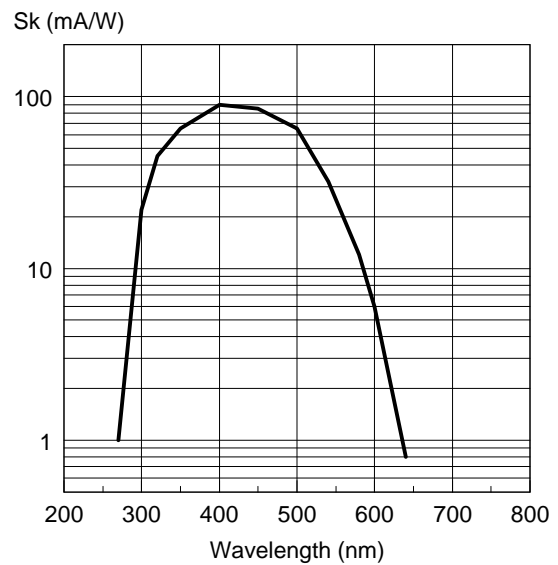
K : cathode Dn : dynode
A : anode

Typical gain curve



XP2042

Typical spectral characteristics



XP2042

Accessories

Socket for wires : FE1112
Mu-metal shield : MS170