

A standard, fast, 10-stage, 29mm (1 1/8") tube

Applications :	For high energy physics and scintillation counting where good timing characteristics are required e.g. coincidence measurements and Cerenkov light detection.		
Description :	Window :	Material :	lime glass
		Photocathode :	bi-alkali
		Refr. index at 420 nm :	1.54
	Multiplier :	Structure :	linear focused
		Nb of stages :	10
	Mass :		34 g

Photocathode characteristics

Spectral range : 290-650 nm
Maximum sensitivity at : 420 nm

Sensitivity ① :
 Luminous : min.: 9 typ.: 90 $\mu\text{A}/\text{lm}$
 Blue : min.: 9 typ.: 11 $\mu\text{A}/\text{lmF}$
 Radiant, at 420 nm : min.: 9 typ.: 85 mA/W

Characteristics with voltage divider A

Gain slope (vs supp. volt., log/log) : 7.5
 For an anode sensitivity of : 10 A/lmF
 Gain : 9.3x10⁵
 Supply voltage : max.: 1500 typ.: 1300 V
 min.: 1000
 Anode dark current ② : max.: 20 typ.: 5 nA
 Pulse height resolution ¹³⁷Cs ③ : typ.: 7.7 %
 Mean anode sensitivity deviation ④ :
 long term (16 h) : typ.: 1.5 %
 after change of count rate : typ.: 1 %
 vs temperature between 0 and +40°C at 400 nm : typ.: -0.2 %/K
 Gain halved for a magnetic field of :
 perpendicular to axis "n" : 0.4 mT
 parallel to axis "n" : 0.2 mT

Characteristics with voltage divider ⑤ :

	B	A	
For a supply voltage of :	1800	1500	V
Gain :	3x10 ⁶	2.7x10 ⁶	
Linearity (2%) of anode current up to :	80	30	mA
Anode pulse ⑥ :			
Rise time :	1.9	2.1	ns
Duration at half height :	3	3.5	ns
Transit Time :	23	23	ns
Transit Time Difference :			
between center of PK and 11mm from it :	0.8		ns
Capacitance anode to all dynodes :		5	pF

product specification

Recommended voltage divider

Type A for maximum gain

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	A	
2	1	1.5	1	1	1	1	1	1	1	1	1	(total : 12.5)

Type B for best timing / linearity compromise

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	A	
2	1	1.5	1	1.25	1.25	1.5	2.25	2.25	2.5	3		(total : 19.5)

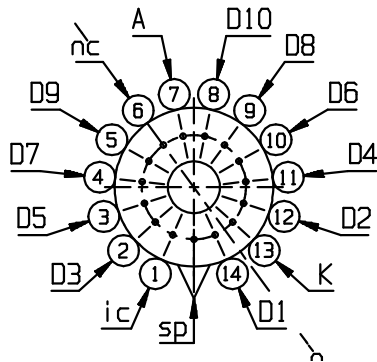
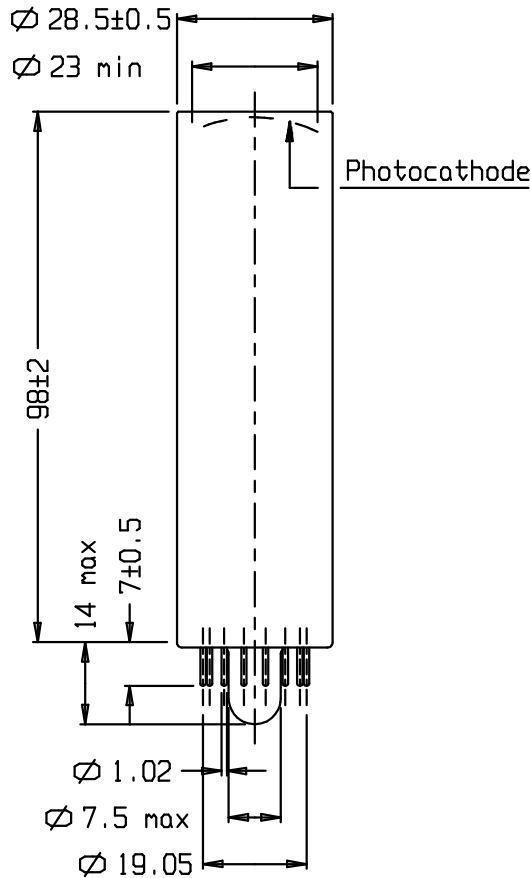
K: photocathode Dn: dynode A: anode

Limiting values

Anode luminous sensitivity :		max.:	100	A/lmF		
Supply voltage :		max.:	1800	V		
Continuous anode current :		max.:	0.2	mA		
Voltage between :						
	D1 and photocathode :	min.:	120	max.:	350	V
	consecutive dynodes :			max.:	250	V
	anode and D10 :	min.:	30	max.:	300	V
Ambient temperature :						
	short operation (< 30 mn) :	min.:	-30	max.:	+80	°C
	continuous operation & storage :	min.:	-30	max.:	+50	°C

Notes

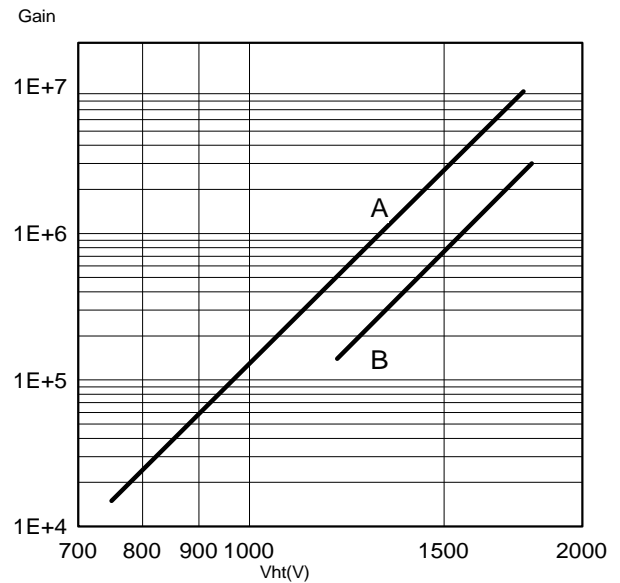
- Characteristic measured and mentioned on the test ticket of each tube.
- ① Luminous sensitivity is measured with a tungsten filament lamp with a colour temperature of 2856 ± 5 K. The blue radiant blue sensitivity expressed in A/lmF ("F" as filtered) is measured with a tungsten filament lamp with a colour of 2856 ± 5 K transmitted through a blue filter Corning Cs N°5-58, polished to half stock thickness.
- 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 for ^{137}Cs is measured with NaI(Tl) cylindrical scintillator with a diameter of 25 mm and a height of 25 mm. The count rate used is $\sim 10^4$ cps.
- 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 ^{137}Cs source at a distance from the scintillator so that the count rate is $\sim 10^4$ cps, corresponding to an anode current of ~ 300 nA. The mean pulse amplitude deviation after change of count rate is measured with a ^{137}Cs source at a distance from the scintillator so that the count rate can be changed from 10^4 to 10^3 cps 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 greater than that obtainable with voltage divider A, it is necessary to increase the inter-dynode voltage progressively. Divider circuit B is an example of a progressive voltage divider, giving a compromise between gain, speed and linearity.
- ⑥ Measured with a pulse light source, with a pulse duration (FWHM) of approximately 1ns., 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 V_{ht} as $(V_{ht})^{-1/2}$.



ref.: 95700001
 sp: short pin
 nc: not connected
 ic: internal connection
 n: plane of symmetry of the multiplier

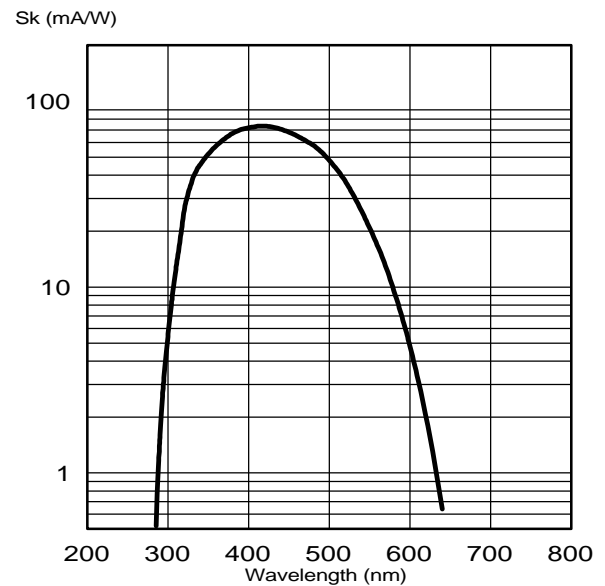
K: cathode Dn : dynode
 A: anode

Typical gain curve



XP2972

Typical spectral characteristics



XP2972

Accessories

Socket for wires: FE1114
 Socket for PCB: FE3114
 Mu-metal shield: MS179
 Voltage divider: VD109