

**A low voltage, low noise, 10-stage, 19mm (3/4") tube**

<b>Applications :</b>	For high energy physics and scintillation counting.		
<b>Description :</b>	Window :	Material :	low K borosilicate glass [ <sup>40</sup> K 1 cpm; <sup>137</sup> Cs, <sup>238</sup> U, <sup>226</sup> Ra, <sup>228</sup> Ra, <sup>228</sup> Th < 0.1 cpm ]
		Photocathode :	bi-alkali
		Refr. index at 420 nm :	1.48
	Multiplier :	Structure :	linear focused
		Nb of stages :	10
	Mass :		25 g

**Photocathode characteristics**

Spectral range : 270-650 nm  
 Maximum sensitivity at : 420 nm

Sensitivity ① :

<input checked="" type="checkbox"/>	Luminous :	min.:	9	typ.:	80	μA/lm
	Blue :			typ.:	10.5	μA/lmF
	Radiant, at 400 nm :			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 : 9.5x10<sup>5</sup>

<input checked="" type="checkbox"/>	Supply voltage :	max.:	1100	typ.:	900	V
		min.:	700			

<input checked="" type="checkbox"/>	Anode dark current ② :	max.:	3	typ.:	0.3	nA
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<input checked="" type="checkbox"/>	Background noise ③ :	max.:	200	typ.:	50	cps
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Pulse height resolution <sup>137</sup>Cs ④ : typ.:

Single electron peak to valley ratio ⑤ : typ.:

Mean anode sensitivity deviation ⑥ :

DC drift : typ.:

long term (16 h) : typ.:

after change of count rate : typ.:

vs temperature between 0 and +40°C at 400 nm : typ.:

Gain halved for a magnetic field of :

perpendicular to axis "n" : 0.3 mT

parallel to axis "n" : 0.2 mT

Anode pulse ⑦ at 1500 V :

Rise time : 2.2 ns

Transit Time : 21.0 ns

Duration at half height : 4.5 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	1	1	1	1	1	1	1	1	1	(total : 12)

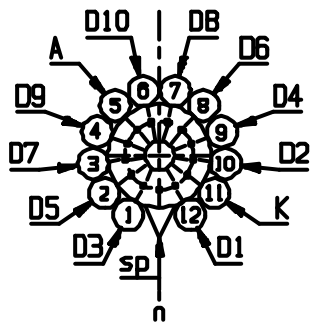
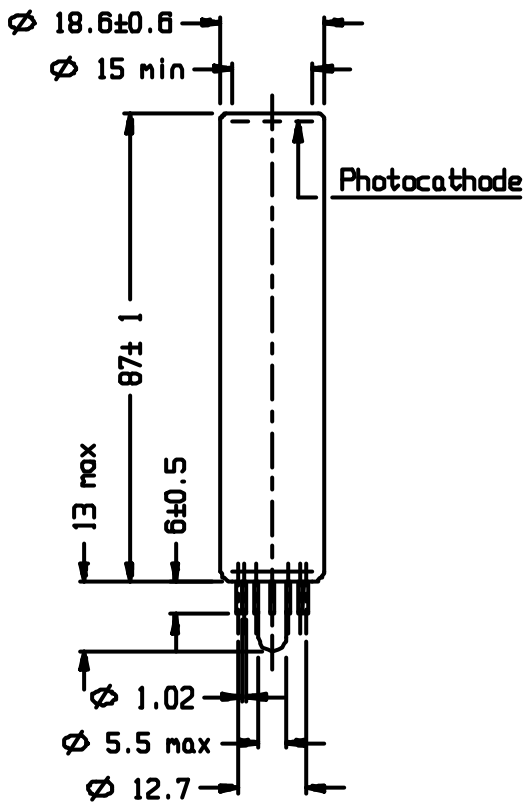
K: photocathode      Dn: dynode      A: anode

Limiting values

Anode luminous sensitivity :		max.:	100	A/lmF		
Supply voltage :		max.:	1700	V		
Continuous anode current :		max.:	0.2	mA		
Voltage between :						
	D1 and photocathode :	min.:	80	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

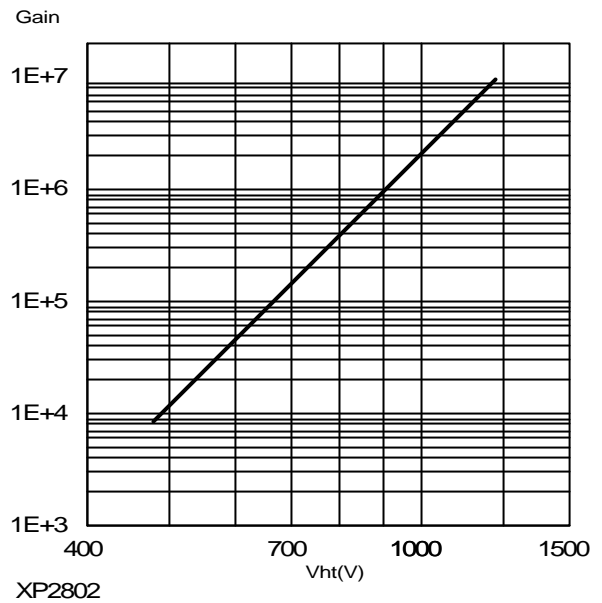
Notes

- ☑ 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  $2856 \pm 5$  K. The blue radiant blue sensitivity expressed in A/lmF ("F" as filtered) is measured with a tungsten filament lamp with a colour of  $2856 \pm 5$  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 The background noise is measured with an output circuit and electronics with a bandwidth of 3 MHz above a threshold of 0.2 photoelectron.
- ④ Pulse amplitude for  $^{137}\text{Cs}$  is measured with NaI(Tl) cylindrical scintillator with a diameter of 12 mm and a height of 25mm. The count rate used is  $\sim 10^4$  cps.
- ⑤ The peak to valley ratio is calculated by dividing the single electron by the minimum vale to the left of the peak.
- ⑥ 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  $^{137}\text{Cs}$  source at a distance from the scintillator so that the count rate is  $\sim 10^4$  cps, corresponding to an anode current of  $\sim 300$  nA. The mean pulse amplitude deviation after change of count rate is measured with a  $^{137}\text{Cs}$  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  $\sim 1 \mu\text{A}$  and  $0.1 \mu\text{A}$  respectively. Both tests are carried out according to ANSI-N42-9-1972 of IEEE recommendations.
- ⑦ 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  $(Vht)^{-1/2}$ .

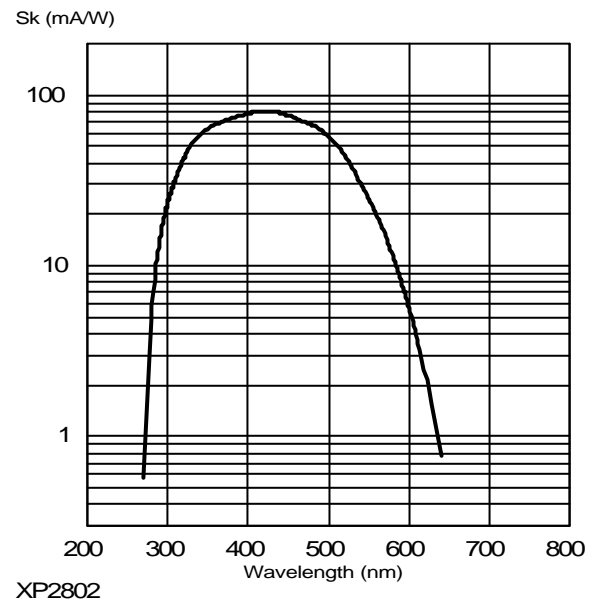


ref.: 23300014  
 sp: short pin  
 n: plane of symmetry of the multiplier  
 K: cathode      Dn: dynode  
 A: anode

Typical gain curve



Typical spectral characteristics



**Accessories**

Socket : FE1004  
 Socket for PCB: FE3112  
 Mu-metal shield: MS178  
 Voltage divider assembly:  
   + HV: VD3A8  
   - HV: VD1A8