Two-channel, square, 25 mm (1") tube

Applications :	This two-channel tube behaves like two separate photomultipliers. It will be used in cases where a number of tubes have to be stacked together in order to more efficiently cover a large surface of detection.		
Description :	Window :	Material :	lime glass
		Photocathode :	bi-alkali
		Refr. index at 420 nm :	1.54
	Multiplier :	Structure :	foil multiplier
		Nb of stages :	11
	Mass :	30 g	

Photocathode characteristics

	Spectral range :					290-650	nm
		Maximum sensitivity at :				420	nm
	Sensitivity ① :						
☑		Luminous :	min.:	80	typ.:	100	µA/lm
☑		Blue :	min.:	10	typ.:	11	µA/lmF
		Radiant, at 420 nm :			typ.:	100	mA/W

Characteristics with voltage divider A

	Gain slope (vs supp. volt., log/log) :					8	
	For an anode blue sensitivity of :					16	A/lmF
	Supply voltage :		max.:	1450	typ.:	1150	V
			min.:	990			
	Gain :				typ.:	1.5×10^6	
☑	Anode dark current ② :		max.:	40	typ.:	5	nA
☑	Gain ration between channels ③ :		max.:	2	typ.:	1.3	
	Cross talk between channels ③ :				typ.:	15	%
☑	Pulse height resolution per channel for 511 keV Gama Ray with BGO ④ :		max.:	20.0	typ.:	17	%
	Mean anode sensitivity deviation ⑤ :						
		long term (16 h) :				1	%
		after change of count rate :				1	%
	Anode sensitivity change for magnetic field of 0.3 mT :						
		perpendicular to axis "n" :				15	%
		parallel to axis "n" :				2	%
		parallel to tube axis :				1	%
	For a supply voltage of :					1250	V
		Anode pulse rise time ⑥ :				4	ns
		Anode pulse duration at half height :				6	ns
		Signal transit time :				23.5 (± 1)	ns
	Capacitance	anode to all :				4	pF

Recommended voltage divider

Type A for maximum gain

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	A1-A2
3	1	1	1	1	1	1	1	1	1	1	2.5	(total : 15.5)

K: photo cathode Dn: dynode A1 & A2: anodes

Limiting values

Anode blue sensitivity :				max.:	200	A/lmF
Supply voltage :				max.:	1550	V
Continuous anode current :				max.:	100	µA
Voltage between:	D1 and photo cathode :	min.:	150	max.:	350	V
	consecutive dynodes :			max.:	250	V
	anode and last dynode :	min.:	125	max.:	250	V
Ambient temperature :						
	short operation (< 30 mn) :	min.:	-30	max.:	+80	°C
	continuous operation :	min.:	-20	max.:	+50	°C
	continuous storage :	min.:	-35	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 sensitivity, expressed in A/lmF ("F" as in Filtered) is measured with a tungsten filament lamp with a colour 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.

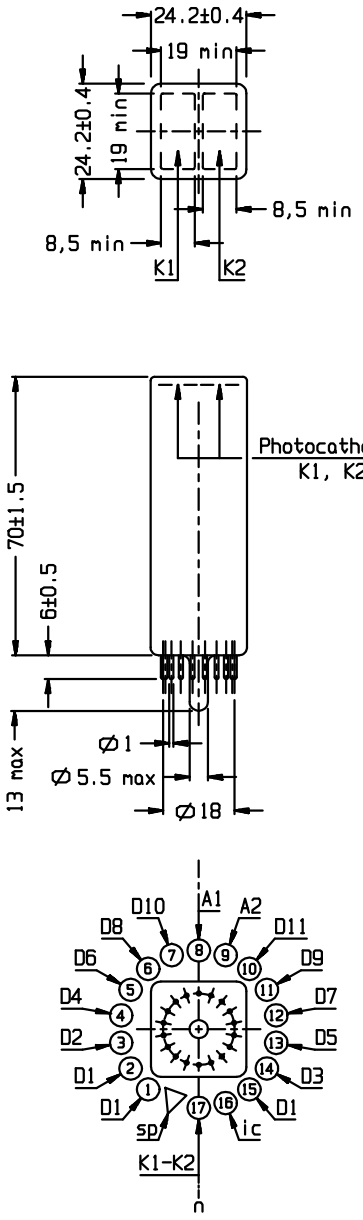
② Dark current is measured with A1 and A2 connected, at ambient temperature, after the tube has been in darkness for approximately 30 minutes.

③ The gain ratio and cross talk are measured as follows: a parallel light beam illuminates only the area of the photo cathode related to A1. This results in a current IA1 at A1 and IoA2 at A2. In a similar way, the other half of the photo cathode is illuminated, which results in a current IA2 at A2 and IoA1 at A1. The gain ratio between both anodes is A1/A2. The cross talk ratio between channels A1 and A2 is (IoA1+IoA2)/(IA1+IA2).

④ The pulse height resolution is measured with a DUAL BGO CRYSTAL ASSEMBLY (the size of each crystal is 13 x 24.5 x 30) and a ^{22}Na Gamma Ray source (511 keV) centred on the DUAL BGO.

⑤ 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 such that the count rate is ~ 10^4 c/s, 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 such that the count rate can be changed from 10^4 to 10^3 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.

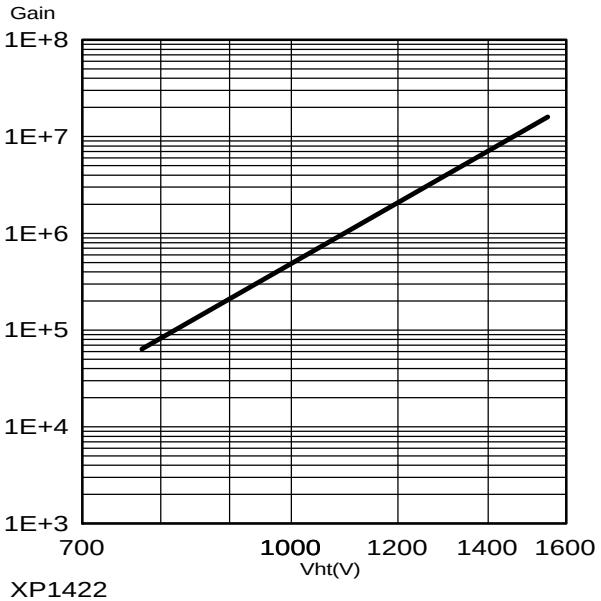
⑥ Measured with a pulse light source, with a pulse duration (FWHM) of approximately 1 ns., the cathode being completely illuminated. The rise time is determined between 10 % and 90 % of the anode pulse amplitude. The signal transit time is measured between the instant at which the illuminating pulse 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)-½.



ref. 2750003
sp: short pin
ic: internal connection
n: plane of symmetry of the multiplier

K: cathode Dn: dynode
A1, A2: anodes

Typical gain curve



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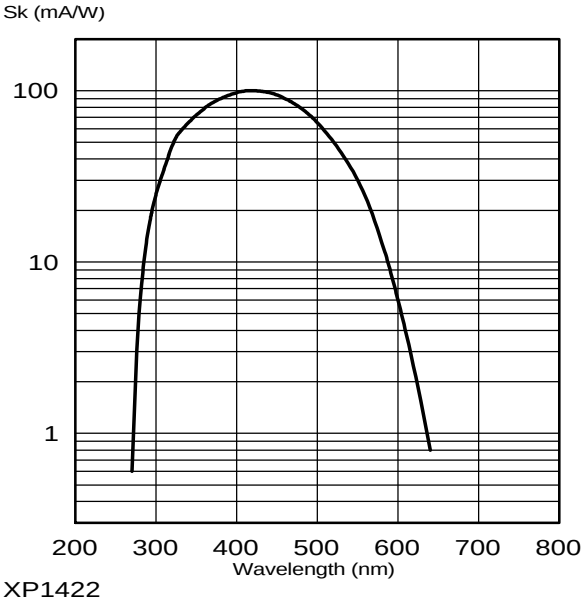
Typical spectral characteristics



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Accessories

Socket:	FE3117
Voltage divider:	VD314

PHOTONIS imaging sensors