Fast, red extended sensitive, 12-stage, 51 mm (2") round tube

Applications :	Low light level physics experiments and applications in the red part and the far red part of the light spectrum.		
Description :	Window :	Material :	borosilicate glass
		Photocathode :	red extended multialkali
		Refr. index at 420 nm :	1.48
	Multiplier :	Structure :	linear focused
		Nb of stages :	12
	Mass :	170 g	

Photocathode characteristics

	Spectral range :					270-900	nm
		Maximum sensitivity at :				550	nm
	Sensitivity ① :	Luminous :				160	µA/lm
		Radiant sensitivity at 800 nm :			typ.:	15	mA/W
☑		Radiant sensitivity at 853 nm :	min.:	3	typ.:	8	mA/W

Characteristics with voltage divider A

	Gain slope (vs supp. volt., log/log) :					9	
	For a gain of :					$3x10^7$	
☑	Supply voltage :		max.:	2500	typ.:	2050	V
			min.:	1600			
☑	Anode dark current ② :		max.:	5000	typ.:	500	nA
	Background noise ③ :		max.:	10^6	typ.:	10^5	cps
	Single electron spectrum resolution ④ :				typ.:	70	%
		peak to valley ration ⑤ :			typ.:	2.5	
	Mean anode sensitivity deviation long term :				typ.:	1	%
		after change of count rate :			typ.:	1	%
		vs temperature between :					
		0 and +40°C at 550nm :			typ.:	- 0.2	%/K
	Gain halved for a magnetic field of :						
		perpendicular to axis "n" :				0.2	mT
		parallel with axis "n" :				0.1	mT

Characteristics with voltage divider ⑥ :

		C	**B**	**A**	
For a supply voltage of :		2200	2400	2050	V
Gain :		$3x10^7$	$2x10^7$	$3x10^7$	
Linearity (2%) of anode current up to :		150	250	100	mA
Anode pulse ⑦ :					
	Rise time :	2	2	2.2	ns
	Duration at half height :	3.2	3.2	3.6	ns
	Transit Time :	30	30	30	ns
	Transit Time between centre of PK and 18mm from it :		0.7		ns
Capacitance	anode to all dynodes :		5		pF

PHOTONIS imaging sensors

Recommended voltage divider

Two non-inductive resistors of 51Ω are wired in series with D11 and D12 in the plastic base.

Type A for maximum gain

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	A	
3	0.9	1.1	1	1	1	1	1	1	1	1	1	1		(total :15)

Type B for best timing / linearity compromise

K	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	A	
4	0.9	1.1	1	1	1	1.25	1.25	1.5	2.25	1.75	2.75	2.5		(total :22.25)

Type C for best timing / linearity / gain compromise

K	D2	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	A	
3	0.9	1.1	1	1	1	1	1	1	1	1.25	1.75	1.25		(total :16.25)

K: photocathode Dn: dynode A: anode

Limiting values

Gain :				max.:	$2x10^8$	
Supply voltage :				max.:	2500	V
Continuous anode current :				max.:	0.2	mA
Voltage between :	photocathode and D1 :	min.:	300	max.:	800	V
	consecutive dynodes :			max.:	400	V
	anode and last dynode :	min.:	80	max.:	600	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 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 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 Noise is measured at ambient temperature. After having been stored with its protection hood, the tube is placed in darkness with vd set to a value giving a gain of $3x10^7$. After a 30mn stabilisation period, noise pulses with a threshold of 1 pC (corresponding to 0.2 photoelectron) are recorded.

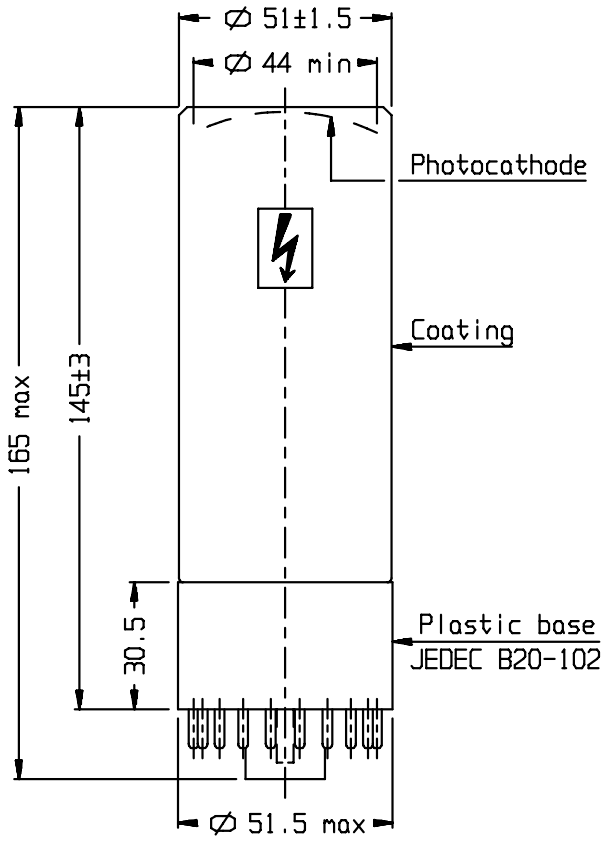
④ The single electron spectrum resolution will be optimised by adjusting the D2 voltage.

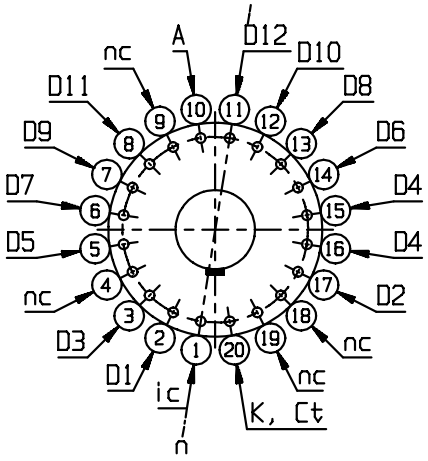
⑤ The peak to valley ratio is defined as the single electron peak value divided by the minimum value at the left of the peak.

⑥ 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 B is an example of a progressive divider, optimising 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.

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)-½.

Note : The envelope of the tube is covered with a conductive coating connected to the photocathode on top of which a black paint is applied. This paint is neither guaranteed to be light-tight nor electrically insulating. Care should be taken to avoid electrical shock.

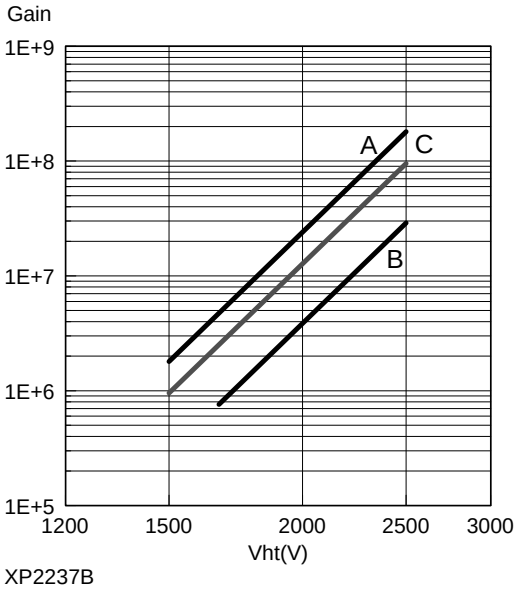




ref.: 21200082
nc: not connected
ic: internal connection
n: plane of symmetry of the multiplier

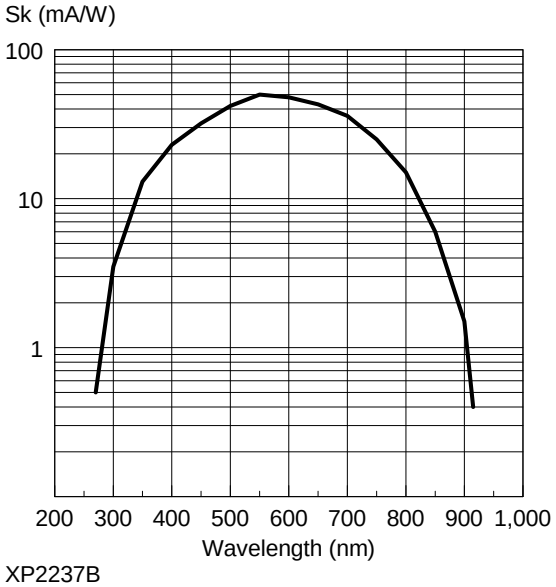
K: cathode Dn: dynode
A: anode Ct: coating

Typical gain curve



XP2237B

Typical spectral characteristics



XP2237B

Accessories

Socket:	FE1120
Mu-metal shield:	MS172
Voltage divider:	VD122K

PHOTONIS imaging sensors