25 mm (1") photomultiplier
9111B series data sheet

ET Enterprises electron tubes

1 description

The 9111B is a compact 25 mm (1″) diameter, end window photomultiplier with plano-concave window, blue-green sensitive biakali photocathode and 10 high gain, high stability, SbCs dynodes of circular focused design for fast timing. The 9111WB is a variant for applications requiring UV sensitivity.

2 applications

- wide range of applications
- X-ray & gamma-ray spectroscopy
- photon counting of bio- and chemi-luminescent samples
- high energy physics studies

3 features

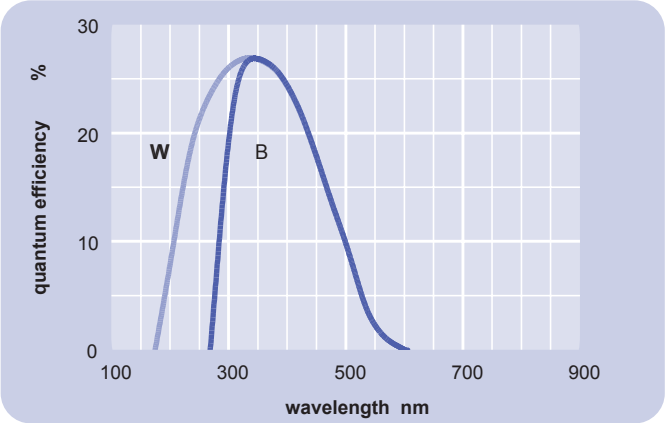
- compact
- fast time response
- low operating voltage

4 window characteristics

	borosilicate	UV glass
spectral range*(nm)	280 - 630	170 - 630
refractive index (n_d)	1.49	1.48
K (ppm)	300	8500
Th (ppb)	250	30
U (ppb)	100	30

* wavelength range over which quantum efficiency exceeds 1 % of peak

5 typical spectral response curves

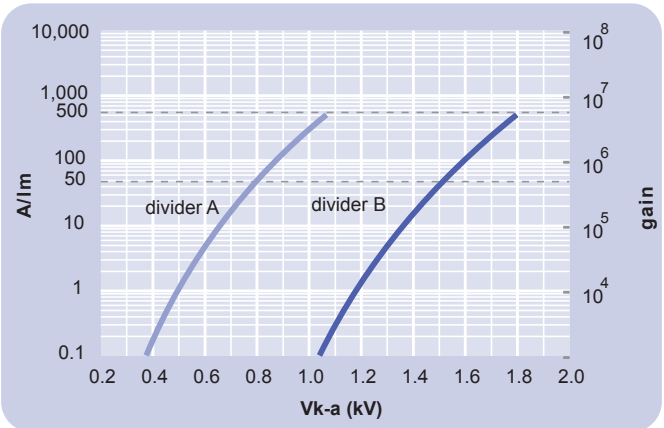


11 ordering information

	unit	min	typ	max
photocathode: bialkali				
active diameter	mm		22	
quantum efficiency at peak	%		28	
luminous sensitivity	µA/lm		70	
with CB filter		7	11	
with CR filter			2	
dynodes: 10CFSbCs				
anode sensitivity in divider A:				
nominal anode sensitivity	A/lm		50	
max. rated anode sensitivity	A/lm		500	
overall V for nominal A/lm	V		800	1300
overall V for max. rated A/lm	V		1050	
gain at nominal A/lm	x 10^6		0.7	
dark current at 20 °C:				
dc at nominal A/lm	nA		0.3	1
dc at max. rated A/lm	nA		3	
dark count rate	s^{-1}		100	
afterpulse rate:	**%**		5	
afterpulse time window	µs	0.1		6.4
pulsed linearity (-5% deviation):				
divider A	mA		2	
divider B	mA		20	
pulse height resolution:				
single electron peak to valley	ratio		1.5	
^{137}Cs with 0.75" x 0.75" NaI(T1)	%		7.5	
^{57}Co with 0.75" x 0.75" NaI(T1)	%		11	
rate effect (I_a for Δ g/g=1%):	µA		20	
magnetic field sensitivity: the field for which the output decreases by 50 %				
most sensitive direction	T x 10^{-4}		2.5	
temperature coefficient:	% $°C^{-1}$		± 0.5	
timing:				
single electron rise time	ns		1.8	
single electron fwhm	ns		3.1	
single electron jitter fwhm	ns		1.2	
transit time delay	ns		15	
weight:	g		20	
maximum ratings:				
anode current	µA			100
cathode current	nA			20
gain	x 10^6			7.1
sensitivity	A/lm			500
temperature	°C	-30		60
V (k-a)(1)				1900
V (k-d1)	V			450
V (d-d)(2)	V			200
ambient pressure (absolute):	kPa			202

(1) subject to not exceeding max. rated sensitivity (2) subject to not exceeding max rated V(k-a)

7 typical voltage gain characteristics



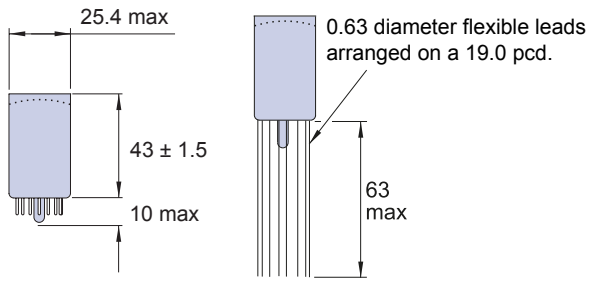
8 voltage divider distribution

	k	d_1	d_2	.....	d_7	d_8	d_9	d_{10}	a	
A	3R	R	.....		R	R	R	R	R	Standard
B	3R	R	.....		R	R	R	2R	4R	High Pulsed Linearity

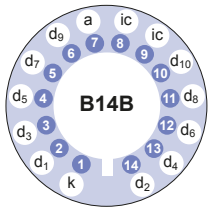
Characteristics contained in this data sheet refer to divider A unless stated otherwise.

9 external dimensions mm

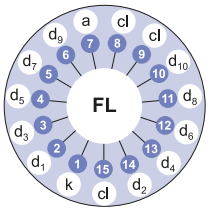
The drawings below show the 9111B in hardpin format and the 9111FLB in flying lead format.



10 base configurations (viewed from below)



'ic' indicates an internal connection



flying lead base
(for 9111FLB)
after removal of temporary cap
'cl' indicates cut lead

Our range of B14B sockets is available to suit the B14B hardpin base. The socket range includes versions with or without a mounting flange, and with contacts for mounting directly onto printed circuit boards.

11 ordering information

The 9111B meets the specification given in this data sheet. You may order **variants** by adding a suffix to the type number. You may also order **options** by adding a suffix to the type number. You may order product with **specification options** by discussing your requirements with us. If your selection option is for one-off order, then the product will be referred to as 9111A. For a repeat order, **ET Enterprises** will give the product a two digit suffix after the letter B, for example B21. This identifies your specific requirement.

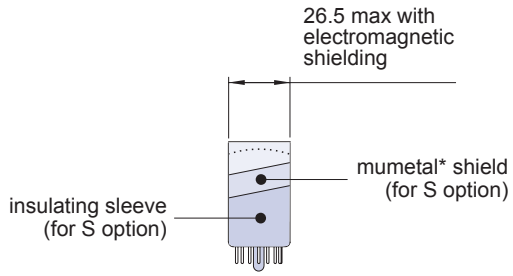
9111 □ □ □ □

window variant
W UV glass

shielding option
S electromagnetic shielding see drawing below

selection option
M supplied with spectral response calibration

specification
B as data sheet
A customer specific selection(s) single order
Bnn customer specific selection(s) repeat order



12 voltage dividers

The standard voltage dividers available for this pmt are tabulated below:

9111B	9111FLB	k	d_1	d_2	.....	d_6	d_7	d_8	d_9	d_{10}	a
C673A	C651A	3R	R	.....		R	R	R	R	R	
C673B	C651B	3R	R	.....		R	R	R	2R	4R	
	C651C	150 V	R	.....		R	R	R	R	R	
	C651D	150 V	R	.....		R	R	R	2R	4R	

R = 330 kΩ

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