38 mm (1.5") photomultiplier
9902B series data sheet

ET Enterprises electron tubes

1 description

The 9902B is a 38 mm (1.5″) diameter, end window photomultiplier with enhanced green sensitive bialkali photocathode and 10 high gain, high stability, SbCs dynodes of linear focused design for good linearity and timing.

2 applications

- wide range of applications
- high energy physics studies

3 features

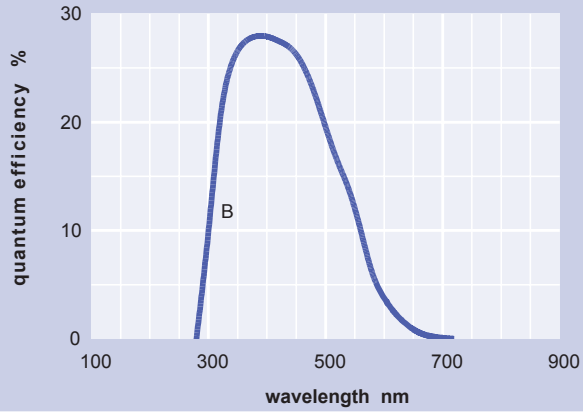
- good SER
- good pulse height resolution
- good stability

4 window characteristics

	9902B borosilicate
spectral range *(nm)	290 - 680
refractive index (n_d)	1.49
K (ppm)	300
Th (ppb)	250
U (ppb)	100

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

5 typical spectral response curves

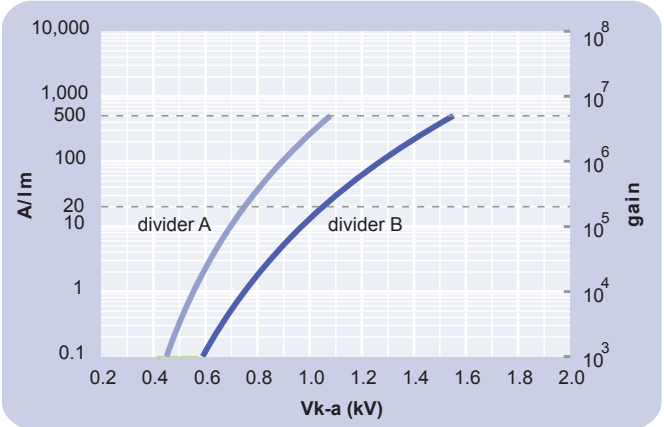


6 characteristics

	unit	min	typ	max
photocathode: bialkali				
active diameter	mm		32	
quantum efficiency at peak	%		28	
luminous sensitivity	µA/lm		100	
with CB filter		8	12	
with CR filter			9	
dynodes: 10LFSbCs				
anode sensitivity in divider A:				
nominal anode sensitivity	A/lm		20	
max. rated anode sensitivity	A/lm		500	
overall V for nominal A/lm	V		750	900
overall V for max. rated A/lm	V		1100	
gain at nominal A/lm	x 10^6		0.2	
dark current at 20 ºC:				
dc at nominal A/lm	nA		0.1	3
dc at max. rated A/lm	nA		2.5	
dark count rate	s^{-1}		300	
pulsed linearity (-5% deviation):				
divider A	mA		25	
divider B	mA		100	
pulse height resolution:				
single electron peak to valley	ratio		2	
^{137}Cs with 1.13″ x 1.13″ NaI (Tl)	%		7.5	
^{57}Co with 1.13″ x 1.13″ NaI(Tl)	%		11	
rate effect (I_a for Äg/g=1%):	µA		20	
magnetic field sensitivity: the field for which the output decreases by 50 %				
most sensitive direction	T x 10^{-4}		1.3	
temperature coefficient:	% $ºC^{-1}$		± 0.5	
timing:				
multi electron rise time	ns		3.5	
multi electron fwhm	ns		6	
single electron rise time	ns		3	
single electron (fwhm)	ns		4	
single electron jitter (fwhm)	ns		4.5	
transit time	ns		35	
weight:	g		60	
maximum ratings:				
anode current	µA			100
cathode current	nA			150
gain	x 10^6			5
sensitivity	A/lm			500
temperature	°C	-30		60
V (k-a)[1]	V			1800
V (k-d1)	V			300
V (d-d)[2]	V			300
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



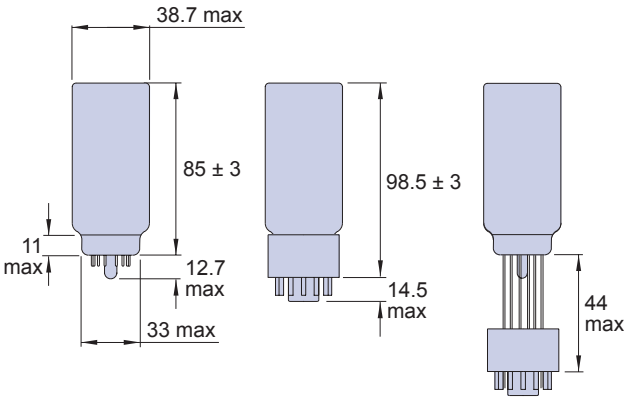
8 voltage divider distribution

	k	d_1	d_2	d_7	d_8	d_9	d_{10}	a	
A	150V	R	. . . . .	R	R	R	R	R	Standard
B	150V	R	. . . . .	R	2R	3R	4R	3R	High Pulsed Linearity

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

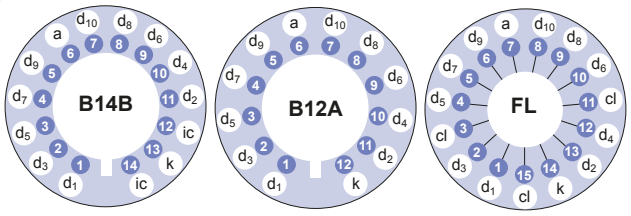
9 external dimensions mm

The drawings below show the 9902B in hardpin format and the 9902KB with the B12A cap fitted. The 9902KFLB is shown in flying lead format with a temporary cap fitted. This temporary cap is attached as agreed with the customer.



flying lead length 54 max when the temporary B12A cap is removed

10 base configuration (viewed from below)



B14B hardpin base (for 9902B)
'ic' indicates an internal connection

B12A cap (for 9902KB)

flying lead base (for 9902FLB) after removal of temporary cap
'cl' indicates cut lead

Our range of B14B sockets is available to suit the hardpin base. Our range of B12A sockets is available to suit the B12A cap. Both socket ranges include versions with or without a mounting flange, and versions with contacts for mounting directly onto printed circuit boards.

11 ordering information

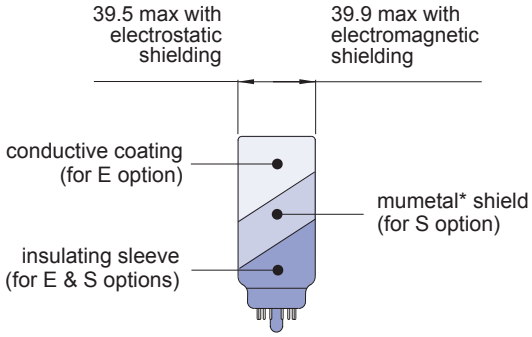
The 9902B meets the specification given in this data sheet. You may order **variants** by adding a suffix to the type number. You may also order **options** by adding a suffix to the type number. You may order product with **specification options** by discussing your requirements with us. If your selection option is for one-off order, then the product will be referred to as 9902A. 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.

9902 □ □ □

base options
- **K** capped
- **KFL** flying lead base with temporary B12A cap

options
- **E** electrostatic shielding see drawing below
- **S** electromagnetic shielding see drawing below
- **M** supplied with spectral response calibration

specification options
- **B** as given in data sheet
- **A** single order to selected specification
- **Bnn** repeat order to selected specification



12 voltage dividers

The standard voltage dividers available for these pmts are tabulated below:

B/XB	9902 KB	FLB	k	d_1	d_2	d_6	d_7	d_8	d_9	d_{10}	a
C646A	C674A	C653A	2R	R	. . . .	R	R	R	R	R	
C646B	C674B	C653B	2R	R	. . . .	R	2R	3R	4R	3R	
C646C	C674C	C653C	150 V	R	. . . .	R	R	R	R	R	
C646D	C674D	C653D	150 V	R	. . . .	R	2R	3R	4R	3R	

R = 330 kΩ

*mumetal is a registered trademark of Magnetic Shield Corporation

ET Enterprises Limited
45 Riverside Way
Uxbridge UB8 2YF
United Kingdom
tel: +44 (0) 1895 200880
fax: +44 (0) 1895 270873
e-mail: sales@et-enterprises.com
web site: www.et-enterprises.com

ADIT Electron Tubes
300 Crane Street
Sweetwater TX 79556 USA
tel: (325) 235 1418
toll free: (800) 521 8382
fax: (325) 235 2872
e-mail: sales@electrontubes.com
web site: www.electrontubes.com

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