

# 38 mm (1.5") photomultiplier

## 9903B series data sheet

### 1 description

The 9903B is a 38 mm (1.5") diameter, end window photomultiplier with enhanced green sensitive bialkali photocathode and 10 BeCu dynodes of linear focused design for good linearity and timing.

### 2 applications

- radiation monitoring
- scintillation spectroscopy

### 3 features

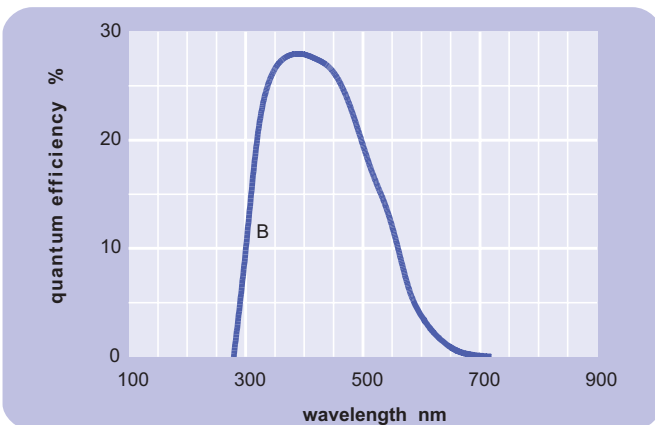
- good pulse height resolution
- high pulsed linearity

### 4 window characteristics

9903B 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

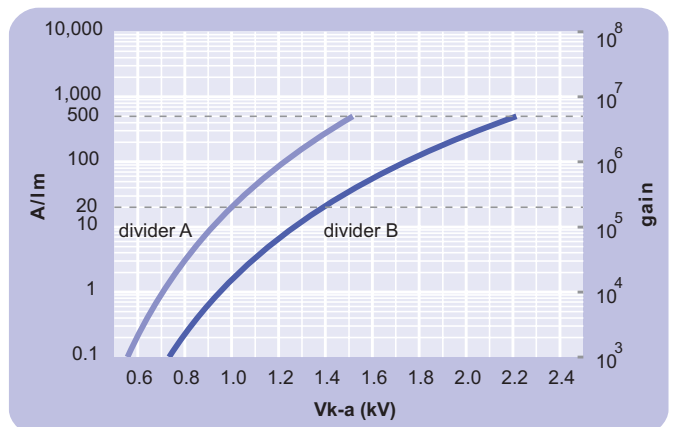


### 6 characteristics

	unit	min	typ	max
<b>photocathode: bialkali</b>				
active diameter	mm		32	
quantum efficiency at peak	%		28	
luminous sensitivity	$\mu\text{A}/\text{lm}$	8	100	
with CB filter			12	
with CR filter			9	
<b>dynodes: 10LFBBeCu</b>				
<b>anode sensitivity in divider A:</b>				
nominal anode sensitivity	$\text{A}/\text{lm}$		20	
max. rated anode sensitivity	$\text{A}/\text{lm}$		500	
overall V for nominal $\text{A}/\text{lm}$	V		1000	1100
overall V for max. rated $\text{A}/\text{lm}$	V		1500	
gain at nominal $\text{A}/\text{lm}$	$\times 10^6$		0.2	
<b>dark current at 20 °C:</b>				
dc at nominal $\text{A}/\text{lm}$	nA		0.1	3
dc at max. rated $\text{A}/\text{lm}$	nA		2.5	
dark count rate	$\text{s}^{-1}$		300	
<b>pulsed linearity (-5% deviation):</b>				
divider A	mA		50	
divider B	mA		150	
<b>pulse height resolution:</b>				
single electron peak to valley	ratio		2	
<sup>137</sup> Cs with 1.13" x 1.13" NaI(Tl)	%		7.5	
<sup>57</sup> Co with 1.13" x 1.13" NaI(Tl)	%		11	
<b>rate effect (<math>I_a</math> for <math>\dot{A}g/g=1\%</math>):</b>	$\mu\text{A}$		1	
<b>magnetic field sensitivity:</b>				
the field for which the output decreases by 50 %				
most sensitive direction	$\text{T} \times 10^{-4}$		1.3	
<b>temperature coefficient:</b>	$\% \text{ } ^\circ\text{C}^{-1}$		$\pm 0.5$	
<b>timing:</b>				
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		30	
<b>weight:</b>	g		60	
<b>maximum ratings:</b>				
anode current	$\mu\text{A}$			100
cathode current	nA			150
gain	$\times 10^6$			5
sensitivity	$\text{A}/\text{lm}$			500
temperature	$^\circ\text{C}$	-30		60
V (k-a) <sup>(1)</sup>	V			2200
V (k-d1)	V			300
V (d-d) <sup>(2)</sup>	V			300
ambient pressure (absolute)	kPa			202

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

### 7 typical voltage gain characteristics



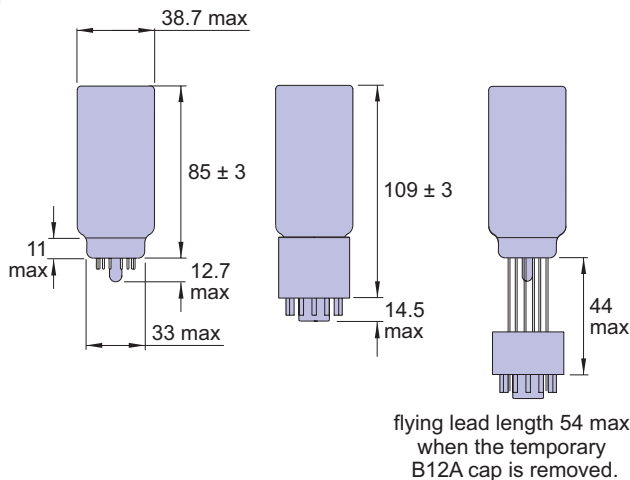
## 8 voltage divider distribution

	k	d <sub>1</sub>	d <sub>2</sub>	.....	d <sub>7</sub>	d <sub>8</sub>	d <sub>9</sub>	d <sub>10</sub>	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.

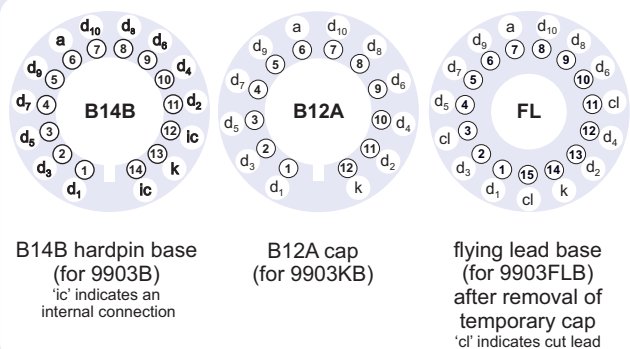
## 9 external dimensions mm

The drawings below show the 9903B in hardpin format and the 9903KB with the B12A cap fitted. The 9903KFLB 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 9903B)  
'ic' indicates an internal connection

B12A cap (for 9903KB)

flying lead base (for 9903FLB) 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 9903B 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 9903A. 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.

### base options

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

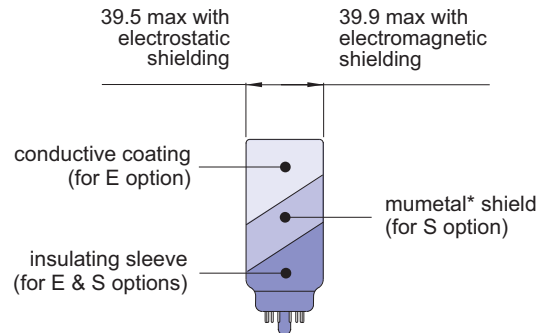
### options

- 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

9903



## 12 voltage dividers

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

	k	d <sub>1</sub>	d <sub>2</sub>	.....	d <sub>6</sub>	d <sub>7</sub>	d <sub>8</sub>	d <sub>9</sub>	d <sub>10</sub>	a
C646A	2R	R	.....		R	R	R	R	R	
C646B	2R	R	.....		R	2R	3R	4R	3R	

R = 330 kΩ

\*mumetal is a registered trademark of Magnetic Shield Corporation

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DS\_ 9903B Issue 4 (JUN/09)