90 mm (3.5") photomultiplier
9276B series data sheet

ET Enterprises electron tubes

1 description

A 90 mm (3.5") diameter, ruggedised, end window photomultiplier with blue-green sensitive bialkali photocathode and ten high gain linear focussed dynodes. Intended for scintillation spectroscopy, this is a rugged version of the 9306, constructed to withstand shock and vibration levels above those normally experienced in industrial applications.

2 applications

- scintillation spectroscopy

3 features

- rugged
- high quantum efficiency (QE)
- good single electron response (SER)
- good linearity
- low rate effect

4 window characteristics

	9276B
spectral range*	295 - 630
K (ppm)	300
Th (ppb)	250
U (ppb)	100

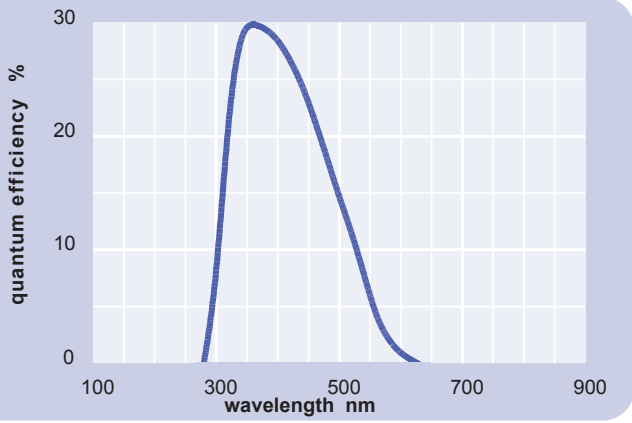
* nm (1 % of peak)

6 characteristics

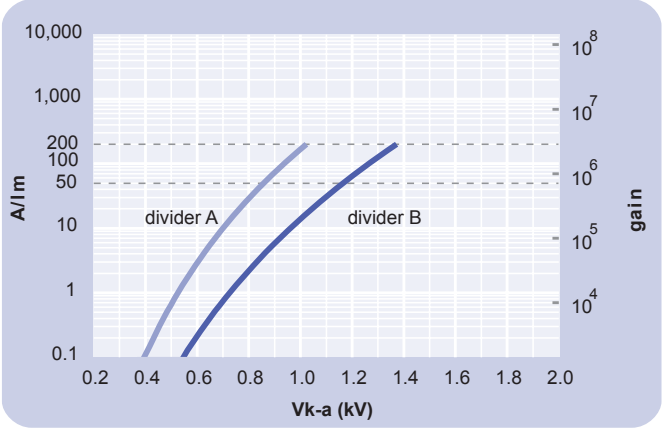
	unit	min	typ	max
photocathode: bialkali				
active diameter	mm		80	
quantum efficiency at peak	%		30	
luminous sensitivity	µA/lm		75	
with CB filter		8	12	
with CR filter			2	
dynodes: 10LFSbCs				
anode sensitivity in divider A:				
overall voltage for 50 A/lm	V		850	1700
gain at 50 A/lm	x 10^6		0.6	
overall voltage for 500 A/lm	V		1200	
dark current at 20 ºC:				
DC at 50 A/lm	nA		0.5	10
dark rate	cps		500	
pulsed linearity (-5 % deviation):				
divider A	mA		30	
divider B	mA		100	
rate effect:				
<1 % change in gain for Ia (µA):			10	
resolution:				
single electron peak to valley			2	
^{137}Cs with 3 " x 3 " NaI(Tl)	%		7.5	
^{57}Co with 3 " x 3 " NaI(Tl)	%		10.5	
temperature coefficient:	% $ºC^{-1}$		± 0.5	
timing: multi-electron				
rise time	ns		7.5	
pulse width (fwhm)	ns		15	
transit time delay	ns		42	
weight :	g		150	
maximum ratings:				
anode current	µA			100
cathode current	nA			100
gain	x 10^6			7
sensitivity	A/lm			500
V (k-a)(1)				2000
V (k-d1)	V			300
V (d-d)(2)	V			300

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

5 typical spectral response curves



7 typical voltage gain characteristics



8 voltage divider distribution

	k	d_1	d_2	.....	d_6	d_7	d_8	d_9	d_{10}	a	
A	3R	R		.....	R	R	R	R	R		Standard
B	3R	R		.....	R	2R	3R	4R	3R		High Pulsed Linearity

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

9 environmental specifications

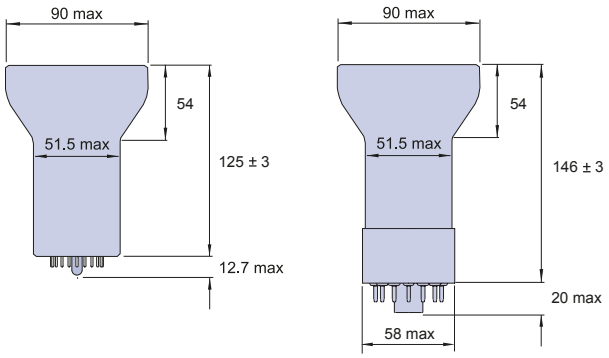
shock & vibration profile	qualification levels		acceptance levels	
(all 3 axis tested)				
sine vibration:				
frequency (Hz)	20 - 2000			
amplitude (ĝ)	20			
sweep rate (octave/min.)	2			
single sweep				
random vibration:				
freq. band (Hz)	**PSD (g^2/Hz)**	**overall g rms.**	**PSD (g^2/Hz)**	**overall g rms.**
20	0.045		0.0187	
20 - 60 roll on	+6 db/oct		+6 db/oct	
60 - 400	0.4024	20	0.1686	13
400 - 2000 roll off	-3 db/oct		-3 db/oct	
2000	0.0805		0.0337	
1 min. duration in each axis				
impact shock (½ sine):				
peak acceleration (ĝ)	250			
duration (ms)	1			
3 shocks per axis (18 shocks total)				

thermal range: operating - -30 °C to +60 °C
non-operating - -30 °C to +90 °C

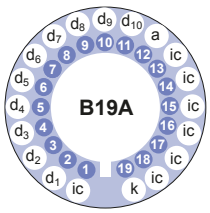
pressure: 0 - 1.3 atmospheres absolute

10 external dimensions mm

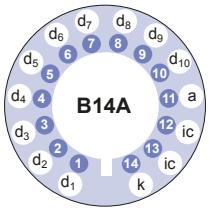
The drawings below show the 9276B in hardpin format and the 9276KB with the B14A cap fitted.



11 base configurations (viewed from below)



B19A glass base
(for 9276B)
'ic' denotes an internal connection



B14A cap
(for 9276KB)
'ic' denotes an internal connection

12 sockets

Our range of B14A and B19A sockets is available to suit the above base configurations. The range includes versions with contacts for mounting directly onto printed circuit boards.

13 ordering information

The 9276B is the standard product but selection of electrical parameters to customers' specification can be agreed.

14 voltage dividers

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

9276B	9276KB	k	d_1	d_2	.....	d_6	d_7	d_8	d_9	d_{10}	a
C647P	C636P	3R	R		.....	R	R	R	R	R	
C647R	C636R	3R	R		.....	R	2R	3R	4R	3R	
C647S	C636S	200 V	R		.....	R	R	R	R	R	
C647T	C636T	200 V	R		.....	R	2R	3R	4R	3R	

R = 330k Ω

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) 399 4557
fax: (325) 235 2872
e-mail: sales@electrontubes.com
web site: www.electrontubes.com

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