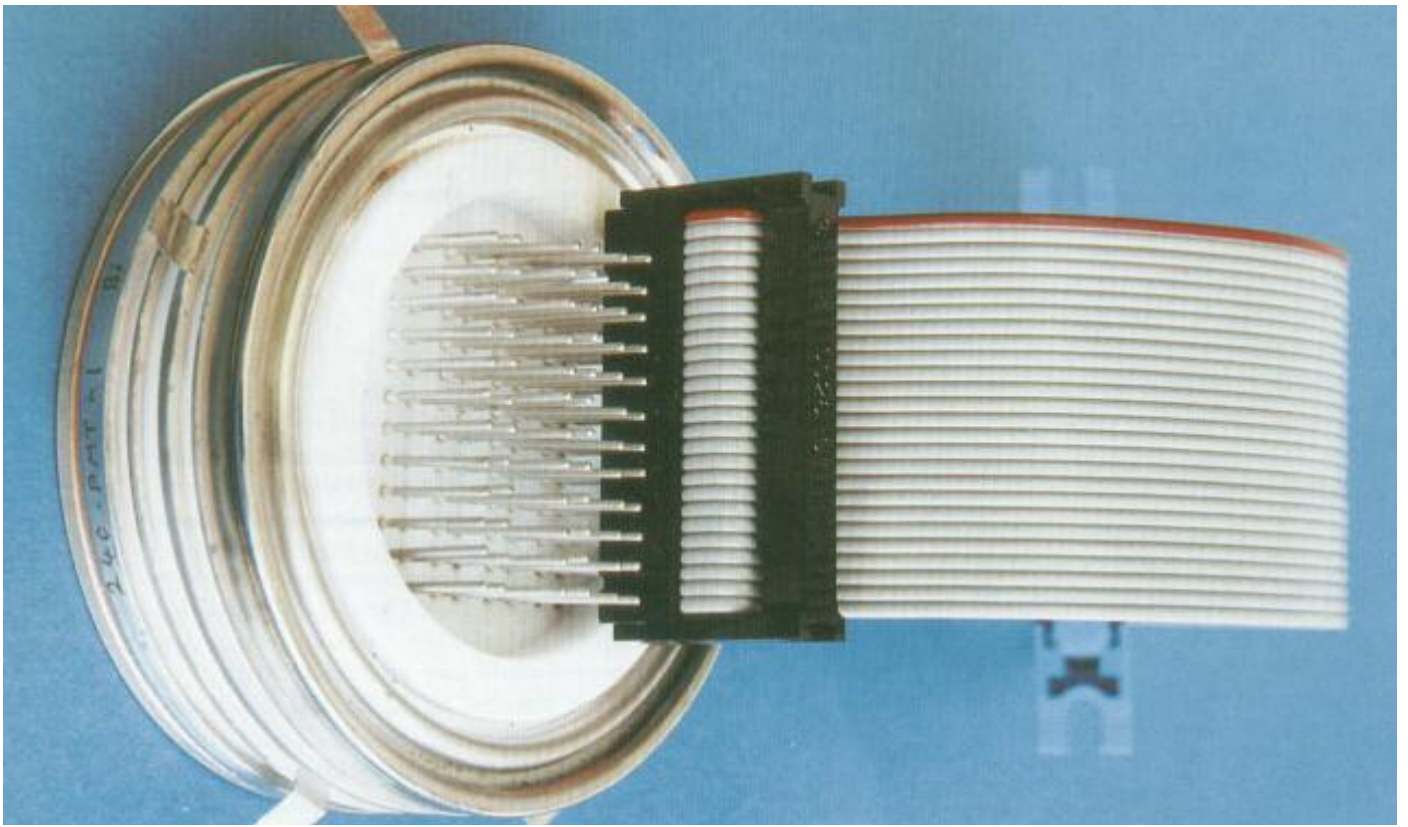


MULTI-ANODE PHOTOMULTIPLIERS



FEATURES

- ❑ Compact size
- ❑ Standard or UV fibre optic input window
- ❑ Good gain & spectral uniformity
- ❑ Single electron counting
- ❑ 96 Discrete anodes in one envelope
- ❑ Compatible with standard ribbon cable connectors
- ❑ Less than 1ns rise time and transit time
Relatively immune to high magnetic fields up to 1K gauss

APPLICATIONS

- ❑ Multi fibre scintillation counting
- ❑ Parallel multichannel read-out from spectrometers, micro titre trays etc.
Fluorescence spectroscopy
- ❑ Time resolved photon counting

If you count photons.....count on

Photek

Photek Ltd
26 Castleham Road,
St Leonards on Sea,
East Sussex, TN38 9NS,
United Kingdom

Tel (+44) 1424 850555
Fax (+44) 1424 850051
sales@photek.co.uk
www.photek.co.uk

Photek Inc.,
PO Box 51748
Phoenix,
AZ 85076-1748,
USA

Tel (480) 759 7871
Fax (480) 759 6785
sales@photek.com
www.photek.com

MULTI-ANODE PHOTOMULTIPLIERS

General Description

The PMT240-96 is part of the PMT40-96 range, it is a compact size single enveloped photomultiplier tube using microchannel plates (MCP) for electron gain and having 96 discrete output anodes. This tube incorporates proximity focusing in the photocathode to MCP gap and from the MCP to the anode array, which ensures good response with minimal cross talk even in strong magnetic fields. The photocathode is remotely processed to ensure excellent uniformity. The tube is available with a variety of input window and photocathode spectral responses. Fibre optic windows allow accurate coupling of the tube to arrays of optical fibres for scintillation counting. The 8x12 anode array features discrete output from each of the individual anodes. The performance is equivalent to 96 closely matched pulse-counting photomultiplier tubes.

Spectral Response

For most applications of multi-anode photomultiplier, a fibre optic window is most appropriate to couple to scintillating fibre arrays or light guides to microtitre trays.

Figure 1 shows typical response with standard (NA 1.0) and UV (NA 0.6) fibre optic face plates.

For lens coupled applications, tubes are available with other input windows from MgF2 for the UV to fused silica and plain glass with a wide variety of standard photocathodes which have sensitivity peaked from the UV to the IR

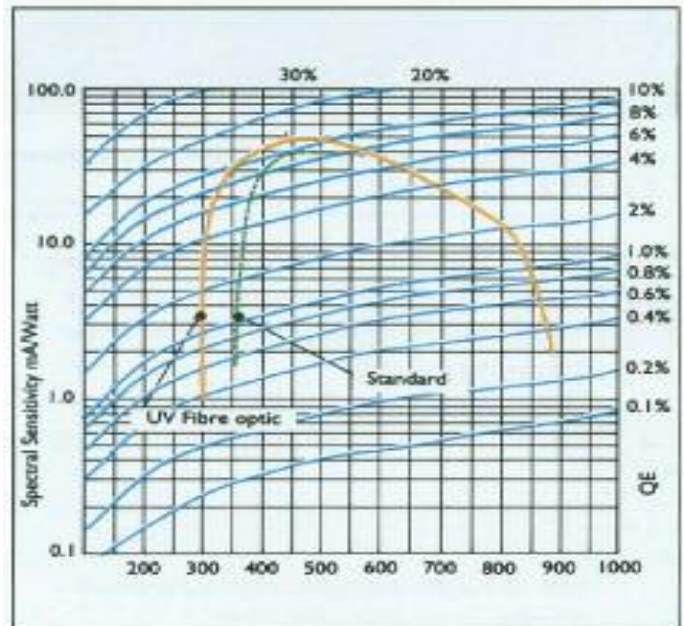


FIGURE 1 - SPECTRAL RESPONSE SHOWING TWO TYPES OF GLASS FIBRE OPTIC INPUT WINDOW WITH AN S20 PHOTOCATHODE

If you count photons.....count on

Photek

Photek Ltd

26 Castleham Road,
St Leonards on Sea,
East Sussex, TN38 9NS,
United Kingdom

Tel (+44) 1424 850555
Fax (+44) 1424 850051
sales@photek.co.uk
www.photek.co.uk

Photek Inc.,

PO Box 51748
Phoenix,
AZ 85076-1748,
USA

Tel (480) 759 7871
Fax (480) 759 6785
sales@photek.com
www.photek.com

MULTI-ANODE PHOTOMULTIPLIERS

Pulse Height Distribution, Gain and Time Response

Tubes with more channel plates have higher gain and improved pulse height distribution, but inferior time response.

Figure 2 shows pulse height distribution as a function of channel plate (MCP) configuration. Three MCPs (PMT 340 -96) will achieve a FWHM/Gain ratio of 100% or less, with a gain of over 106, and is ideal for most single photon counting applications. The transit time is calculated to be 900 ps, while for PMT240-96 transit time is about 600 ps. Jitter and rise time are proportionally reduced, but maximum gain is reduced to around 250,000 with a broader pulse height distribution.

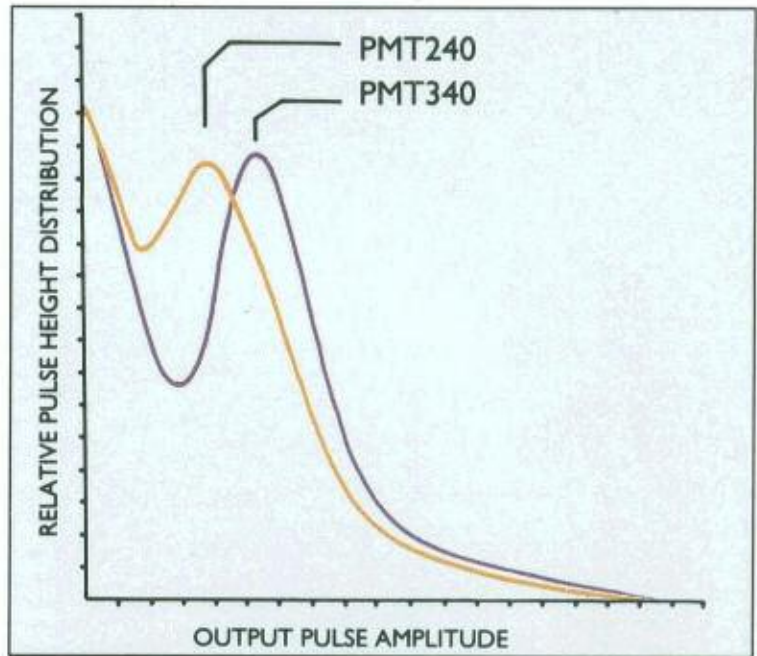


FIGURE 2 - PULSE HEIGHT DISTRIBUTION

Cross Talk/Pixel Density

The electron shower is closely confined by the 10um diameter pores of the microchannel plate and proximity focus.

For a point source of light, the electron shower will be largely confined to one microchannel (10um) in a single MCP device, 3 channels (30um) in a 2 MCP device, and 5 channels (50um) in a 3 MCP device. At low levels of signal, cross talk is influenced by stray light which is not absorbed by the photocathode, scattered electrons and other scattering phenomena. As the construction is identical to an image intensifier, the background with a point source illumination would fall to less than 1% at a distance of 1mm from an adjacent anode.

The PMT240-96 is designed with rather coarse resolution parameters (2.5mm a nodes with 0.1mm separation) and has inherently low cross talk; much higher pixel densities are attainable, but present difficulties in making external connection. The PMT40 -96 range is compatible with standard ribbon cable connectors.

If you count photons.....count on

Photek

Photek Ltd

26 Castleham Road,
St Leonards on Sea,
East Sussex, TN38 9NS,
United Kingdom

Tel (+44) 1424 850555
Fax (+44) 1424 850051
sales@photek.co.uk
www.photek.co.uk

Photek Inc.,

PO Box 51748
Phoenix,
AZ 85076-1748,
USA

Tel (480) 759 7871
Fax (480) 759 6785
sales@photek.com
www.photek.com

MULTI-ANODE PHOTOMULTIPLIERS

	PMT240-96	PMT340-96
Transit time	600 ps	900ps
Rise time	~200ps	~300ps
Jitter	~100ps	~100ps
Electron optical spread	60um FWHM	100um FWHM
Peak/valley ratio of pulse height		
Distribution		1.5:1
FWHM width/amplitude ratio		2:1
Gain	250,000	5,000,000 (See Note 5)
MCP gain uniformity	+/- 15%	+/- 15%
Cathode response uniformity	+/- 5%	+/- 5%
Overall uniformity	+/- 20%	+/- 20%
Average anode current	10nA maximum (See Note 3)	
Temperature	40 degrees C maximum 0 degrees C minimum (See Note 4)	
Maximum linear output pulse	30mA in 1ns at a maximum repetition frequency of 250 per second (See Note 3)	
Dark count	1 cps per anode (See Note 1)	

Notes

- 1 The measured dark count rate depends upon the type of photocathode, the operating temperature and the selected bias discriminator level of the external pulse counting circuits. It is recommended that this level be set at a pproximately 50% of the most probable output photo -electron-generated pulse amplitude (the peak of the pulse height distribution) for best results. Thus the bias discriminator level should be matched to the particular operating gain selected.
- 2 The user is expected to make electrical connections to these anode pins without thermal or mechanical shock to the tube header plate.
- 3 The average current should not exceed this rating to avoid permanent damage to the device. Higher peak currents are permissible for s hort pulses, and are self protecting in terms of peak amplitude.
- 4 Contact Photek for other operating temperatures. Thermal shock during heating and cooling must be avoided.
- 5 The gain of the 2-plate MCP is limited by internal charge saturation in the MCP. No attempt should be made to achieve a higher gain by increasing the MCP input -output voltage. For a PMT240 -96 variant the maximum gain will be typically 250,000.

If you count photons.....count on

Photek

Photek Ltd

26 Castleham Road,
St Leonards on Sea,
East Sussex, TN38 9NS,
United Kingdom

Tel (+44) 1424 850555
Fax (+44) 1424 850051
sales@photek.co.uk
www.photek.co.uk

Photek Inc.,

PO Box 51748
Phoenix,
AZ 85076-1748,
USA

Tel (480) 759 7871
Fax (480) 759 6785
sales@photek.com
www.photek.com

MULTI-ANODE PHOTOMULTIPLIERS

Input

Window material Fibre optic, UV fibre optic, UV grade fused silica, MgF2

Window configuration Plano-plano

Photocathode diameter 40mm

Output

Anode configuration (See Fig 3) 8x12 multiple anode array, on 0.1 inch centres to match 26 way ribbon connector.

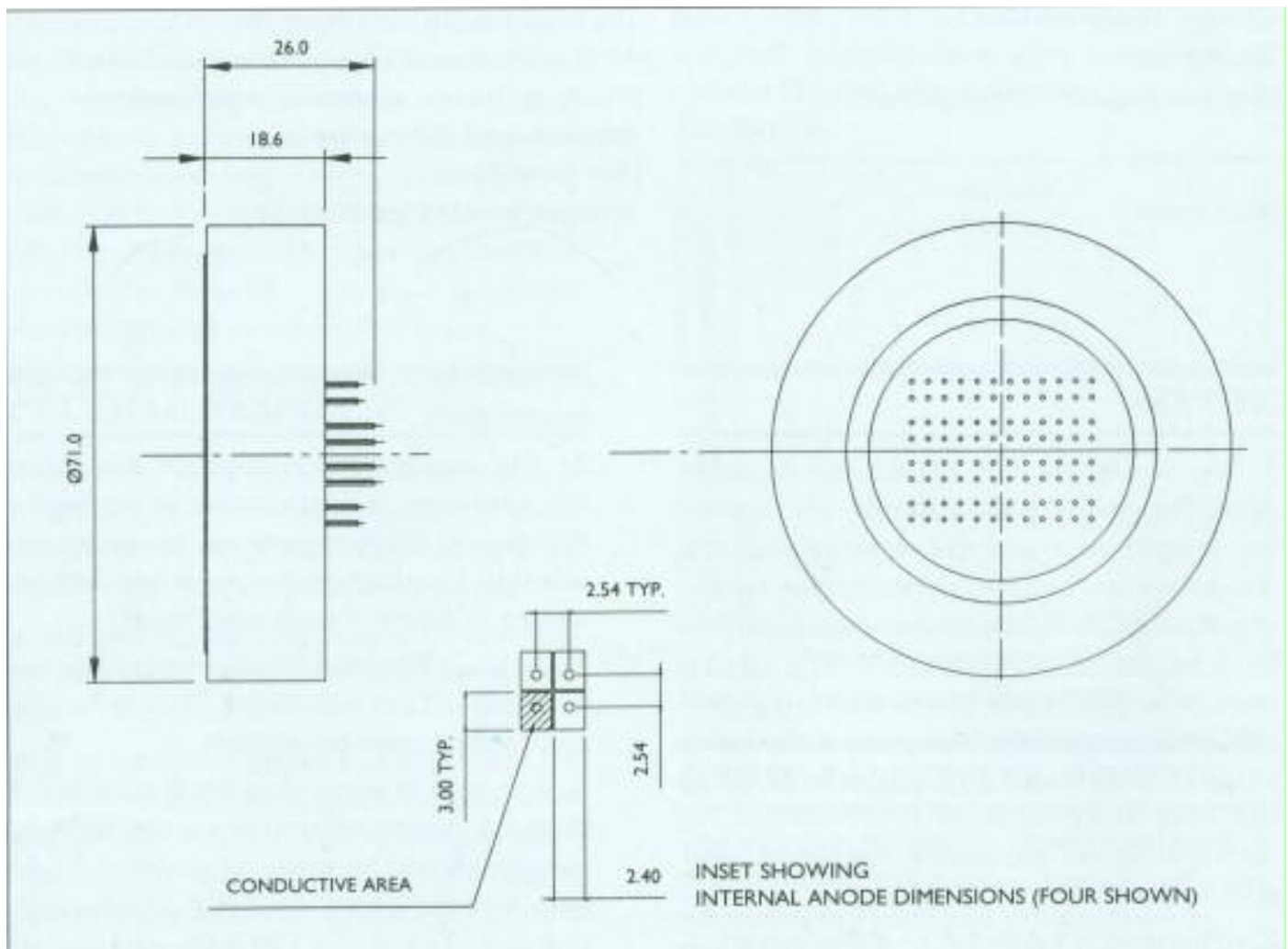


FIGURE 3 : MECHANICAL OUTLINE OF SHOWING ANODE CONNECTOR PINS

If you count photons.....count on

Photek

Photek Ltd

26 Castleham Road,
St Leonards on Sea,
East Sussex, TN38 9NS,
United Kingdom

Tel (+44) 1424 850555
Fax (+44) 1424 850051
sales@photek.co.uk
www.photek.co.uk

Photek Inc.,

PO Box 51748
Phoenix,
AZ 85076-1748,
USA

Tel (480) 759 7871
Fax (480) 759 6785
sales@photek.com
www.photek.com