photodetector module
PDM9107-CP-TTL data sheet

ET Enterprises electron tubes

1 description

The PDM9107-CP-TTL is a photon counting module incorporating a high sensitivity, low noise, 29mm diameter photomultiplier, a fast amplifier-discriminator, and a low power high-voltage supply. The combination of high-speed electronics and fast photomultiplier with low dark counts enables a wide dynamic range to be achieved. A positive polarity high-voltage supply is used for maximum count rate stability at very low light levels and a mumetal* cylindrical housing provides a high level of immunity to external magnetic fields.

The spectral range of the PDM9107-CP-TTL is 280-630nm. Other versions are available with a wider range, for example the PDM9107Q-CP-TTL, which extends the UV sensitivity to 160nm. The effective photosensitive diameter of 25mm makes efficient collection of incident light relatively easy and combining this with a typical dark count of only 100 cps at 20 deg C results in a unique detection capability.

The photomultiplier high-voltage and discriminator threshold level are pre-set for optimum performance, enabling photon counting operation simply by connecting to a +5V supply. The fixed pulse-width TTL output is fully compatible with the ET Enterprises MCS-CT3 multi-channel scaler/counter-timer. When used together, these units can be controlled and powered from a pc USB port, subject to the USB port current limitations.

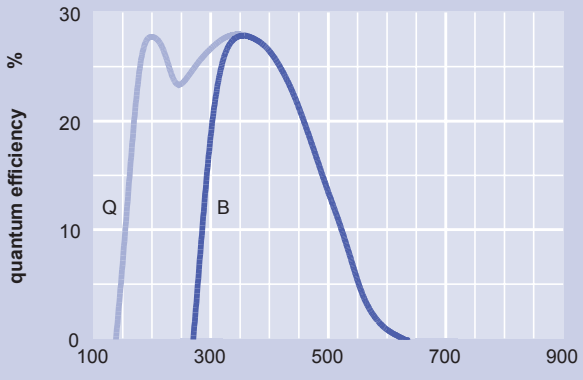
2 applications

- fluorescence spectroscopy
- luminometry
- hygiene monitoring
- portable photon counting equipment

3 features

- pre-configured for optimum performance and ease of use
- wide dynamic range (up to 150Mcps)
- operation from a single +5V supply
- magnetic and electrostatic shielding
- only 500mW power dissipation (typical)
- spectral range options
- 25mm diameter photosensitive input area

4 photocathode spectral response



5 characteristics

	unit	min	typ	max
photocathode: biakali				
active diameter	mm		25	
quantum efficiency at peak	%		28	
spectral range	nm	280		630
output pulse:				
TTL high level (terminated)	V	3.3		
rise and fall time	ns		1.2	
pulse-pair resolution	ns		25	
dead-time	ns		25	
signal count rate:				
without dead time correction	cps			30M
with dead time correction	cps			150M
output impedance	Ω		50	
discriminator level	mV		-2	
dark counts (@ 20°C)	cps		100	200
supply voltage	V	4.5		15
supply current (@ 5V, no signal)	mA		40	
supply current (@ 5V, signal = 150Mcps)	mA		120	
warm-up time	s		1	
temperature (operating)	°C	5		55
temperature (storage)	°C	-40		60
humidity (non-condensing)	%			93
weight	g		210	

*mumetal is a registered trademark of Magnetic Shield Corporation

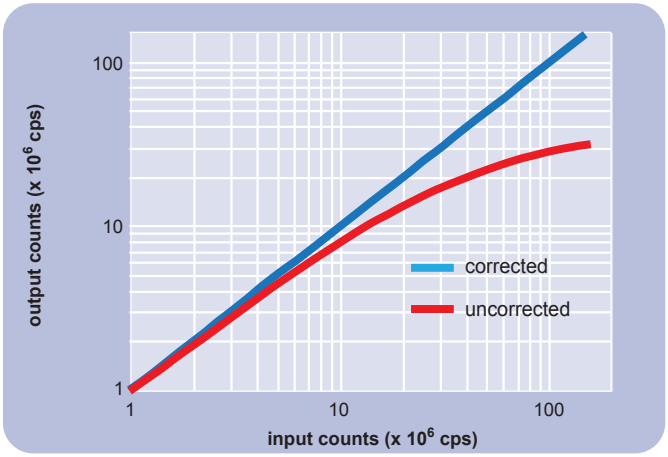
6 dynamic range

Extended dynamic range can be obtained by dead time correction to compensate for departure from linearity at high count rates due to pulse pile-up. Dead time may be corrected for, as follows:

$$N = n/(1-nT)$$

where: N is the true count rate (cps),
n is the measured count rate (cps),
T is the count rate correction factor (25 x 10^{-9}s),

Using this correction, deviation from linearity is typically within ±5% at 120Mcps.



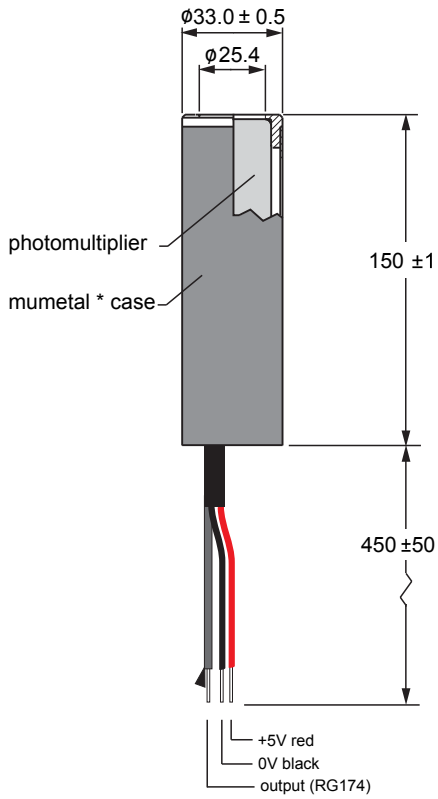
7 installation and operation

Each module is supplied with test data. Wherever possible, installation should be carried out in subdued light. Exposure to strong lights, particularly those containing a high UV content, can result in a temporary increase in dark counts during subsequent operation.

Remove the protective cap from the package. If necessary, the photomultiplier window can be cleaned using a lens tissue moistened with alcohol. Do not use any other solvent.

Mount the module and make power input and signal output connections. The signal lead should be terminated into 50Ω. Do not expose the photomultiplier photocathode to strong light while the module is energised.

8 outline drawing mm



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9 ordering information

PDM9107-CP-TTL	visible range (280-630nm)
PDM9107Q-CP-TTL	extended UV (160-630nm)

10 warning

No attempt must be made to repair or dismantle this product. High voltage used within the module may present an electric shock hazard.

Operation beyond the maximum ratings, or reversal of the input voltage may result in loss of performance or permanent damage to the product.

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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