

photodetector module

PDM9111-CP-USB data sheet

1 description

The PDM9111-CP-USB is a plug-and-play photon counting module incorporating a high sensitivity, low noise, 25mm diameter photomultiplier, fast counting electronics and a low-power high voltage supply. The counting electronics consist of an amplifier/discriminator with an adjustable threshold and a multi-channel scaler/counter timer which records and stores data as a function of time. There is a choice of three software configurable counting modes: pre-set number of channels, pre-set total measurement period, or continuous. HV level and data retrieval are controlled by dedicated application software.

The spectral range of the PDM9111-CP-USB is 280-630nm. Other versions are available with a wider range, for example the PDM9111W-CP-USB, which extends the UV sensitivity, or the PDM9113-CP-USB for applications requiring red/ir response.

The combination of an effective photosensitive diameter of 22mm, and a dark count of typically 100cps at 20°C, results in a unique detection capability. The module is also very easy to use, the only additional requirement being a PC or laptop with a free USB port.

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 degree of immunity to external magnetic fields.

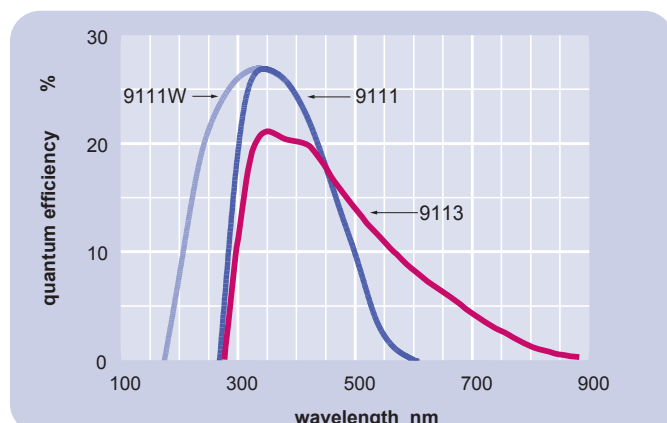
2 applications

The PDM9111-CP-USB is suitable for all applications involving photon-counting mode light detection down to single photons. Typical uses are time-resolved fluorescence, luminescence and similar investigations.

3 features

- easy plug-and-play operation
- wide dynamic range
- no external power supply required
- magnetic and electrostatic shielding
- spectral range options
- 22mm diameter detection area
- low noise

4 photocathode spectral response



5 characteristics

	unit	min	typ	max
photocathode: biakali				
active diameter	mm		22	
spectral response range	nm	280		630
quantum efficiency (peak)			28	
output:				
Interface type				USB 2.0 or higher
Connector type				USB type A
signal:				
pulse width	ns		17	
rise and fall time	ns		1.2	
pulse-pair resolution	ns		25	
dead time	ns		25	
count rate:				
without dead-time correction	cps		30M	
with dead-time correction	cps		100M	
channel width		0.2ms		999hrs
channel width jitter	µs		200	
dead-time between channels:			none	
number of channels		1		65535
counts per channel				10 ⁸
discriminator level (adjustable)	mV	2		8
dark count rate at 20°C	cps		100	200
supply (from USB connection)				
voltage	V	4.5		5.5
current:				
no signal	mA		40	
signal = 100Mcps	mA		120	
control voltage (1:1000)	V	0.1		2.0*
warm-up time	s		1	
temperature (operating)	°C	5		55
temperature (storage)	°C	-40		60
weight	g		220	

*subject to not exceeding maximum rated gain of the pmt

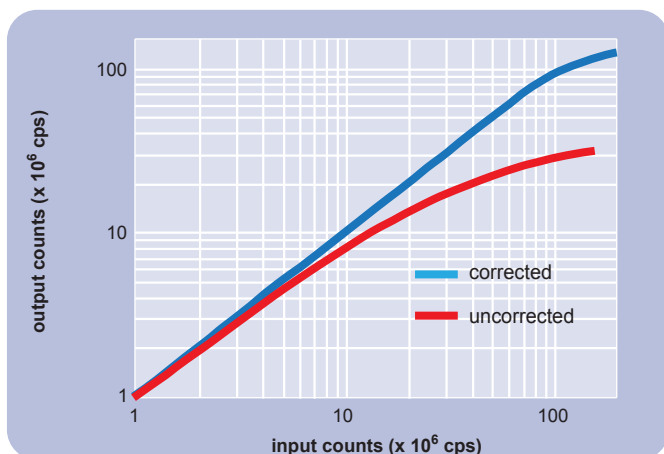
6 dynamic range

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:

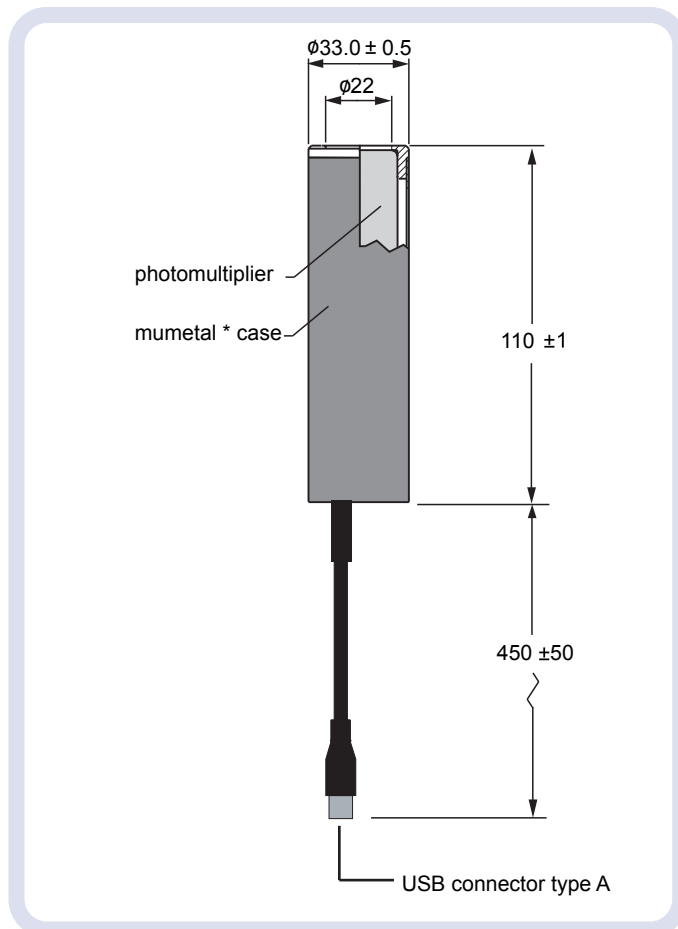
$$N = n/(1-nT)$$

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

Using this correction, deviation from linearity is typically within $\pm 5\%$ at 100Mcps.



8 outline drawing mm



*mumetal is a registered trademark of Magnetic Shield Corporation

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 or cover 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 in a light-tight enclosure with the light source to be measured and install the application software by downloading from the ET Enterprises Limited website (www.et-enterprises.com). Connect the USB cable to the PC or laptop and run the application. Further details are given in the user manual which can also be downloaded from the ET Enterprises website.

9 ordering information

PDM9111-CP-USB	visible range (280-630nm)
PDM9111W-CP-USB	extended UV (170-630nm)
PDM9113-CP-USB	extended red/ir (280-850nm)

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.

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