

ADVANCED SINGLE PHOTON COUNTING

Fast-timing MCP-PMT detectors

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MCP-PMT JANZO



Fast-timing MCP-PMT

Photonis fast-timing MCP-PMTs is a new product line, making state-of-the-art photocathode and MCP technology available for fast photon counting applications. Built in a modular way, this new MCP-PMT series allows customers to choose the best options for each application.



Unique Features

- Excellent timing
- Hi-QE photocathode technology
- Great PHD characteristics
- Hi-CE MCP technology
- High linearity MCP
- Fast gating

Customization Options

Photocathode

A broad range of photocathodes can be used with the new series of fast-timing MCP-PMT. The Hi-QE UV, Blue and Green are very attractive with a high QE above 30% and a very low dark rate (down to 50 Hz/cm²). For applications requiring longer wavelength response, the Hi-QE Red, S25 or Hot S20 photocathodes are recommended, however they have a much higher dark rate (typically 50 kHz/cm²).

MCP Technology

The fast-timing MCP-PMTs make use of Photonis' optimised MCP technology resulting in excellent shape of pulse height distribution (PHD) and a collection efficiency almost equal to 100% to provide DQE close to the QE value. The dynamic range can be extended with the high linearity MCP for GHz counting rate.

Gating Option

Gating will improve the signal to noise ratio significantly, especially when a high dark rate photocathode is selected or when a high background signal is present. Gating unit down to 3 ns is available as an option.

Power Supply

A resistive bleeder chain is integrated in the MCP-PMT housing. Only a single high voltage needs to be applied. An optional miniature USB power supply will help you get your experiment under way quickly.



Fast-timing MCP-PMT
Dimensions 38/45 x 60 mm.
Anodized aluminum housing.
High voltage connector and SMA signal output.

Configurations

Detection area, timing, dynamic range, and collection efficiency are properties that can be optimised independently or in combination with each other. In order to serve your application in a most optimal way, Photonis offers fast MCP-PMTs in 3 configurations: FT-8, FT-16 and FT-18/LIDAR, all with different options and related key properties.

FT-8

8 mm detection area, fastest timing properties, lowest total dark rate

With a photocathode diameter of 8 mm, this MCP-PMT shows the best temporal characteristics. The rise slope (leading edge) is about 130 ps, FWHM < 250 ps, and TTS (for single photon illumination) 15 ps. For multiphoton excitation the time resolution improves further.

FT-16

16 mm detection area, higher dynamic range

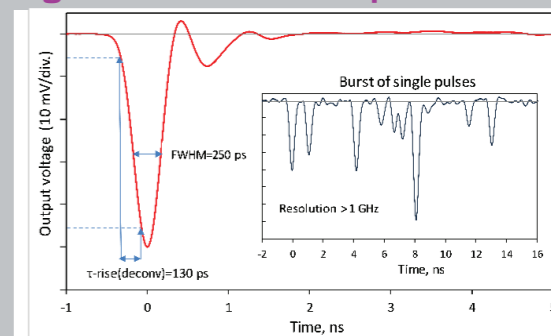
With a photocathode diameter of 16 mm, the FT-16 MCP-PMT is the best choice when temporal characteristics and high dynamic range are equally important. With a 4 times higher dynamic range (ref. FT-8) and still good temporal resolution, this can be your detector of choice.

FT-18/LIDAR

Full 18 mm detection area, highest dynamic range

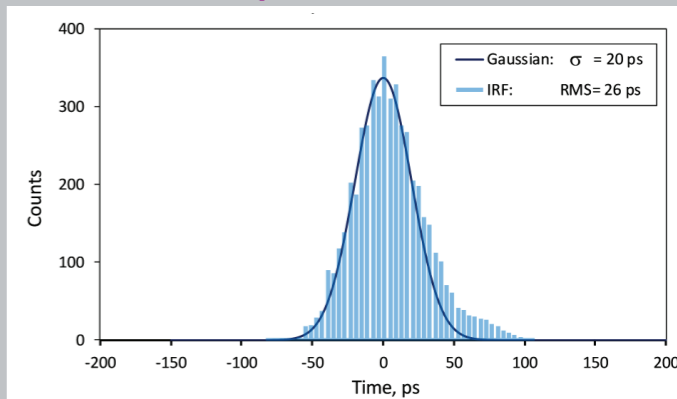
The FT-18/LIDAR makes use of the full 18 mm diameter useful area, which demonstrates the highest dynamic range of this series, up to 500 MHz counting rate. This property is required in particular for LIDAR applications, with high load of background illumination and high flux from the ground-echo. With its specific timing properties, this configuration is optimal for applications where ns laser illumination is typically used.

Single Photon Pulse-Response Waveform



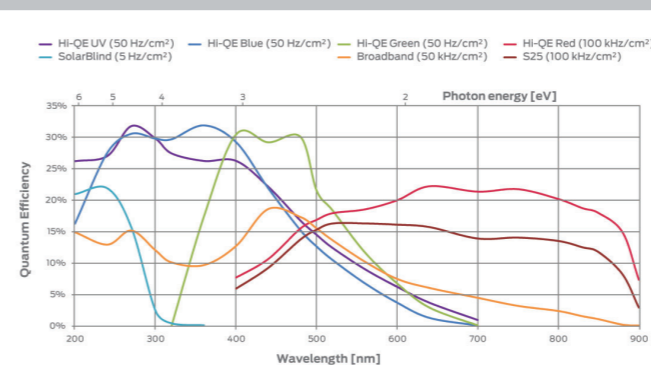
Response waveform for a single pulse and for a burst of single pulses for FT-8 configuration. The deconvoluted values of FWHM and rise time are found to be 250 ps and 130 ps, respectively. The burst mode shows >1 GHz detection capability.

Temporal Resolution



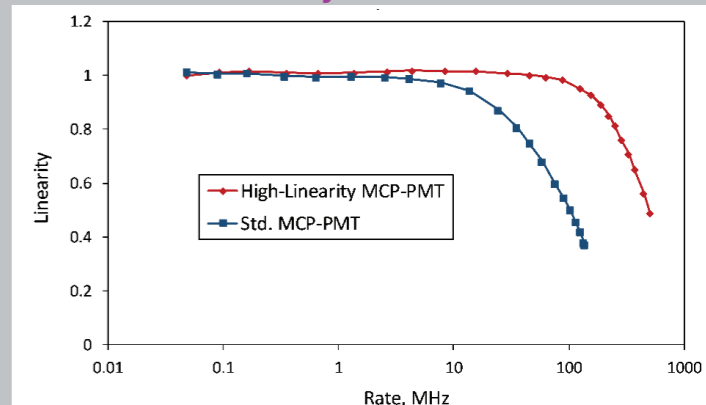
IRF (instrument response function) measurement with FT-8 Hi-CE configuration. Time resolution RMS = 25 ps and Transit Time Spread (TTS) = 15 ps (sigma), deconvoluted.

Photocathodes Quantum Efficiency



Typical performance at 20°C. Cooling the photocathode reduces the dark count rate by about a factor of 2, every 5°C.

Linearity FT-18/LIDAR



Linearity output of the high-linearity MCP-PMT vs counting rate. Detection of average rates up to about 500 MHz, corresponding to an income photon flux above 1.5 GHz (for FT-18/LIDAR with 30% QE).