PMA Hybrid

PicoQuant

Hybrid Photomultiplier Detector Assembly new

- Detection efficiency up to 45 % at 500 nm (cathode dependent)
- Instrument response down to 50 ps (FWHM, cathode dependent)
- Negligible afterpulsing
- Internal HV power supply and pre-amplifier
- Active temperature stabilization
- Shutter and overload protection
- Active sensor area: 3 mm, 5 mm or 6 mm (cathode dependent)

Applications

- Fluorescence lifetime measurements
- Fluorescence Lifetime Imaging (FLIM)
- Fluorescence Correlation Spectroscopy (FCS, FCCS, FLCS, FLCCS, 2-focus FCS)
- Ranging (LIDAR, OTDR)
- Laser scanning microscopy (confocal / two-photon)

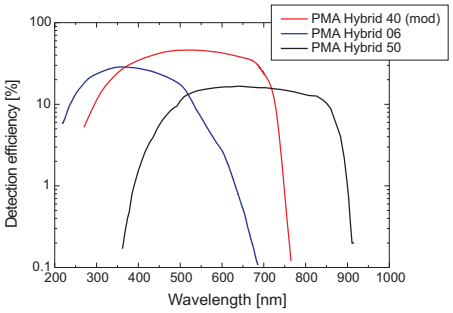
The PMA Hybrid is a compact single photon sensitive detector based on a fast hybrid photomultiplier tube with peltier cooler to reduce the dark count rate. The detector includes a high voltage power supply and pre-amplifier with overload protection and emergency shut down procedure if the detector count rate reaches a critical limit. Overload protection, high voltage set-up and temperature regulation are calibrated at PicoQuant and do not require any adjustment. The detector is prepared for PicoQuant system integration via CAN interface.

Three different photocathodes can be incorporated into the PMA Hybrid to meet the user's needs. A blue sensitive, low dark count version covers the spectral range from 220 nm to 650 nm. The standard unit is sensitive in the range from 300 nm to 720 nm and features a very high photon detection efficiency up to 45 % at 500 nm. A third cathode covers the red spectral range between 380 nm and 900 nm. The PMA Hybrid is built in a nickel coated aluminum housing to achieve high level of RF shielding and protection against the interference with other devices. The built-in pre-amplifier is specially targeted at timing sensitive applications such as Time-Correlated Single Photon Counting (TCSPC).

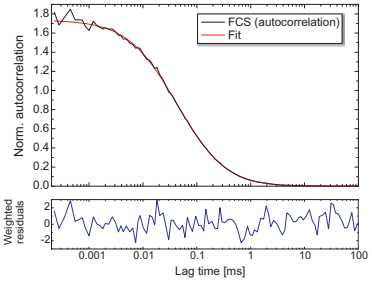
All PMA Hybrids have very good timing resolution that can even reach values down to 50 ps FWHM for the blue sensitive version. In contrast to other detector types, the afterpulsing is neglibile. This special feature makes the PMA Hybrid especially suited for e.g. Fluorescence Correlation Spectroscopy (FCS), where the afterpulsing peak at early lag times often makes analysis of the autocorrelation function problematic.

The PMA Hybrid interfaces directly to all PicoQuant TCSPC products such as the PicoHarp 300 or HydraHarp 400. Due to its large active area, the detector can be connected to spectrometers such as the FluoTime 200 or FluoTime 300 from PicoQuant. It can also be attached to Laser Scanning Microscopes in Non-Descanned Detection (NDD) set-ups via the C-mount adapter. Integration in descanned detection mode or other systems, such as the confocal time-resolved microscope MicroTime 200 from PicoQuant is of course also possible. Signal output for the PMA Hybrid is a standard 50 Ohms SMA connector. The module only needs a 12 V DC supply line, which is delivered already with the PMA Hybrid unit.

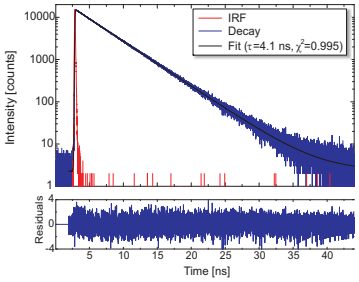
Spectral response



Measurement examples



FCS curve (autocorrelation) of a 1 nm ATTO 488 solution. No afterpulsing peak visible.



Fluorescence decay of a Anthracen solution in EtOH shows clean response of the detector.

Specifications

Electrical parameters

Cathode type	-06	-40	-40 mod	-50
Wavelength range	220 to 650 nm	300 to 720 nm	300 to 720 nm	380 to 890 nm
Dark counts (cooled, typ. value)	< 100 cps	< 700 cps	< 4000 cps	< 1000 cps
Transit time spread (FWHM, typ. value)	< 50 ps	< 120 ps	< 120 ps	< 160 ps
Recommended max. count rate	10 MHz			
Overload shutdown at	typ. 9 MHz - 15 MHz (determined by detector current)			
Single electron response width (typ. value)	600 ps			
Pulse rise / fall time (typ. value)	400 ps			

Signal output

Connector	SMA female
Impedance	50 Ohms
Polarity	negative

Power supply

Input	12 V DC

Dimensions

Detector area diameter	6 mm	3 mm	5 mm	3 mm
Housing (w × d × h)	80 × 170 × 60 mm			
Optical adapters	C-mount, mounting holes for FluoTime 200 / FluoTime 300 spectrometers			

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