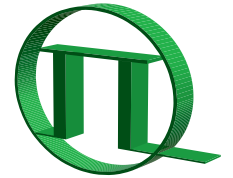
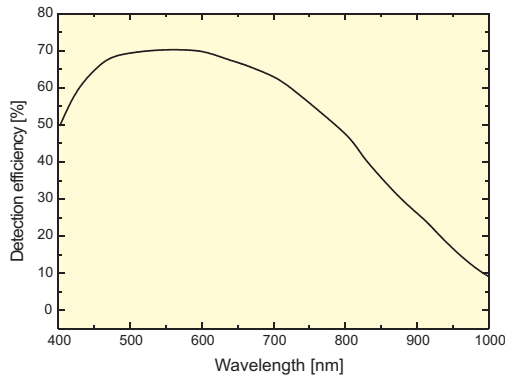


# -SPAD-FAST



PICOQUANT

## Single Photon Counting Module



- Detection efficiency up to 70 %
- Dark count rate < 500 cps
- Active area 500  $\mu\text{m}$
- Timing resolution down to 150 ps (FWHM)
- NIM and TTL signal output
- Optional fiber connector



## Applications

- Time-resolved fluorescence spectroscopy
- Single molecule spectroscopy
- Fluorescence Lifetime Imaging (FLIM)
- Fluorescence Correlation Spectroscopy (FCS)
- LIDAR, Ranging
- Quantum optics
- Single photon source characterization

# Single Photon Counting Module

The -SPAD-FAST photon counting module combines a large active area APD with specially developed quenching electronics from PicoQuant (covered by patent DE 10 2010 060 527). The fast timing resolution, large active area and high photon detection efficiency make it an ideal detector for many time-resolved applications in the life sciences such as Fluorescence Correlation Spectroscopy (FCS) or Fluorescence Lifetime Imaging (FLIM) as well as applications in quantum optics or other related fields of research.

The -SPAD-FAST features an extremely high photon detection efficiency of typically 70 % at 470 nm and can be used to detect single photons over the 400 nm to 1100 nm wavelength range. It can be supplied with an easy to use FC/PC connection for optical fibers or as a free-beam module.

The -SPAD generates a NIM and a TTL output pulse per detected photon and can therefore be directly interfaced with different data acquisition systems such as TCSPC electronics. The photon timing response can be as short as 150 ps (FWHM, depending on module, wavelength and signal rate).

It should be noted that due to the large active area, the afterglow of the -SPAD-FAST is noticeably higher than, e.g., of the -SPAD. The afterglow is usually not problematic in single detector set-ups, but might be difficult to suppress completely in multi-detector set-ups.

## Specifications (@ 25 °C)

Spectral range	400 nm - 1100 nm
Active area diameter	500 µm
Photon timing resolution*	150 ps - 400 ps (FWHM, depending on module, wavelength and signal rate)
Dark count rate	< 500 cps
Afterpulsing probability (0 to 500 ns)*	< 5 % (typical)
Dead time	< 70 ns (typical)
Fiber connector type (optional)	FC/PC

### Photon Detection Efficiency\* (typical values, without fiber connector)

@ 405 nm	50 ± 5 %
@ 470 nm	70 ± 5 %
@ 670 nm	65 ± 5 %
@ 890 nm	20 ± 5 %

Losses due to fiber connector: approx. 10 % absolute

### Input/Output

#### NIM output

Pulse width	15 - 25 ns
Pulse amplitude	-0.8 V to -1 V (into 50 Ohms)
Connector type	SMA

#### TTL output

Pulse width	15 - 25 ns
Pulse amplitude	> 2.4 V (into 50 Ohms)
Connector type	Lemo, type EPS.00.250

#### Gating input

Input voltage	TTL control, TTL high (> 2.4 V) enables counting
Response time	disable: < 40 ns (typ. 20 ns); enable: < 100 ns (typ. 85 ns)
Connector type	SMA

### Operating Conditions

Supply voltage	12 V
Supply current	1.5 A (at turn on), 0.3 A (at 1 Mcps)
Operating temperature	10 °C - 40 °C

\* measured by illuminating < 30 µm in the center of the active area

Further available are Fluorescence Lifetime Spectrometers; Time-resolved Fluorescence Microscopes; Upgrade kit for Laser Scanning Microscopes; Picosecond / Nanosecond Pulsed, Modulated and Fast Switched Diode Lasers; PC Modules for TCSPC. Please call for detailed information and data sheets. **Please check our website for updated information.**

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PicoQuant GmbH, October 2013



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