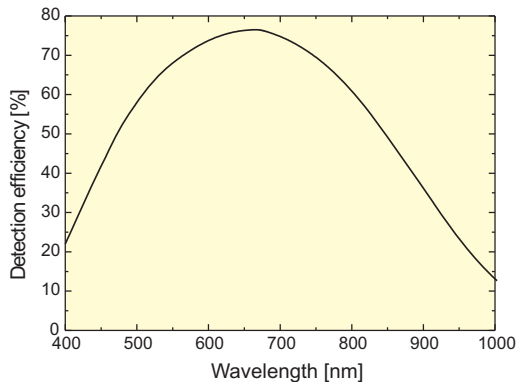


# $\tau$ -SPAD



## Single Photon Counting Module



- Extremely high detection efficiency
- Very low dark counts
- Active area 150  $\mu$ m
- Timing resolution down to 350 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  $\tau$ -SPAD detector module combines Laser Components' ultra-low noise VLoK silicon avalanche photodiode with specially developed quenching electronics from PicoQuant (patent pending). It features an extremely high photon detection efficiency of 75 % at 670 nm and can be used to detect single photons over the 400 nm to 1100 nm wavelength range. The  $\tau$ -SPAD generates a NIM and a TTL output pulse per detected photon and can therefore be directly interfaced with e.g. TCSPC electronics such as the PicoHarp 300 or HydraHarp 400. The photon timing response can be as short as 350 ps (FWHM, depending on module, wavelength and signal rate). The  $\tau$ -SPAD can be supplied with an easy to use FC/PC connection for optical fibers or as a free-beam module. The low dark counts and high quantum efficiency make it an ideal detector for single molecule applications, like Fluorescence Correlation Spectroscopy (FCS) or Fluorescence Lifetime Imaging (FLIM).

## Specifications (@ 25 °C)

Spectral range	400 nm - 1100 nm
Active area diameter	150 $\mu$ m
Photon timing resolution*	350 ps - 800 ps (FWHM, depending on module, wavelength and signal rate)
Afterpulsing probability (0 to 500 ns)*	< 1 % (typical)
Dead time	< 60 ns (typical)
Fiber connector type (optional)	FC/PC

### Dark Count Rate

$\tau$ -SPAD-20	< 20 cps (available upon request)
$\tau$ -SPAD-50	< 50 cps
$\tau$ -SPAD-100	< 100 cps

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

@ 405 nm	20 %
@ 470 nm	45 %
@ 670 nm	75 %
@ 890 nm	35 %

Losses due to fiber connector: approx. 10 %

### 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  $\mu$ m 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  
Rudower Chaussee 29 (IGZ)  
12489 Berlin  
Germany

Phone +49-(0)30-6392-6929  
Telefax +49-(0)30-6392-6561  
Email [info@picoquant.com](mailto:info@picoquant.com)  
WWW <http://www.picoquant.com>