



SPAD Alpha

A high-performance single-photon camera

DESCRIPTION

SPAD Alpha is a photon-counting camera for high-speed imaging. The core of the camera is a SPAD image sensor with 1024×1024 pixels. Photon counting with up to 57'000 frames per second and zero readout noise is achieved. The global shutter enables nanosecond exposures with exposure shifts of 17 ps. The image sensor is optimized for low noise, with a typical dark count rate of less than 100 cps.

KEY BENEFITS



Widefield camera

Released in 2025, SPAD Alpha is the successor of the first commercially available SPAD camera in the world, SPAD 512. It is suitable for photon-counting and photon-time gating applications.



Wide detection spectra and low noise

Our single-photon detectors are fabricated in a state-of-the-art CMOS process and offer an ultra-low dark count rate of less than 100 cps. Microlenses enhance the sensor's detection efficiency.



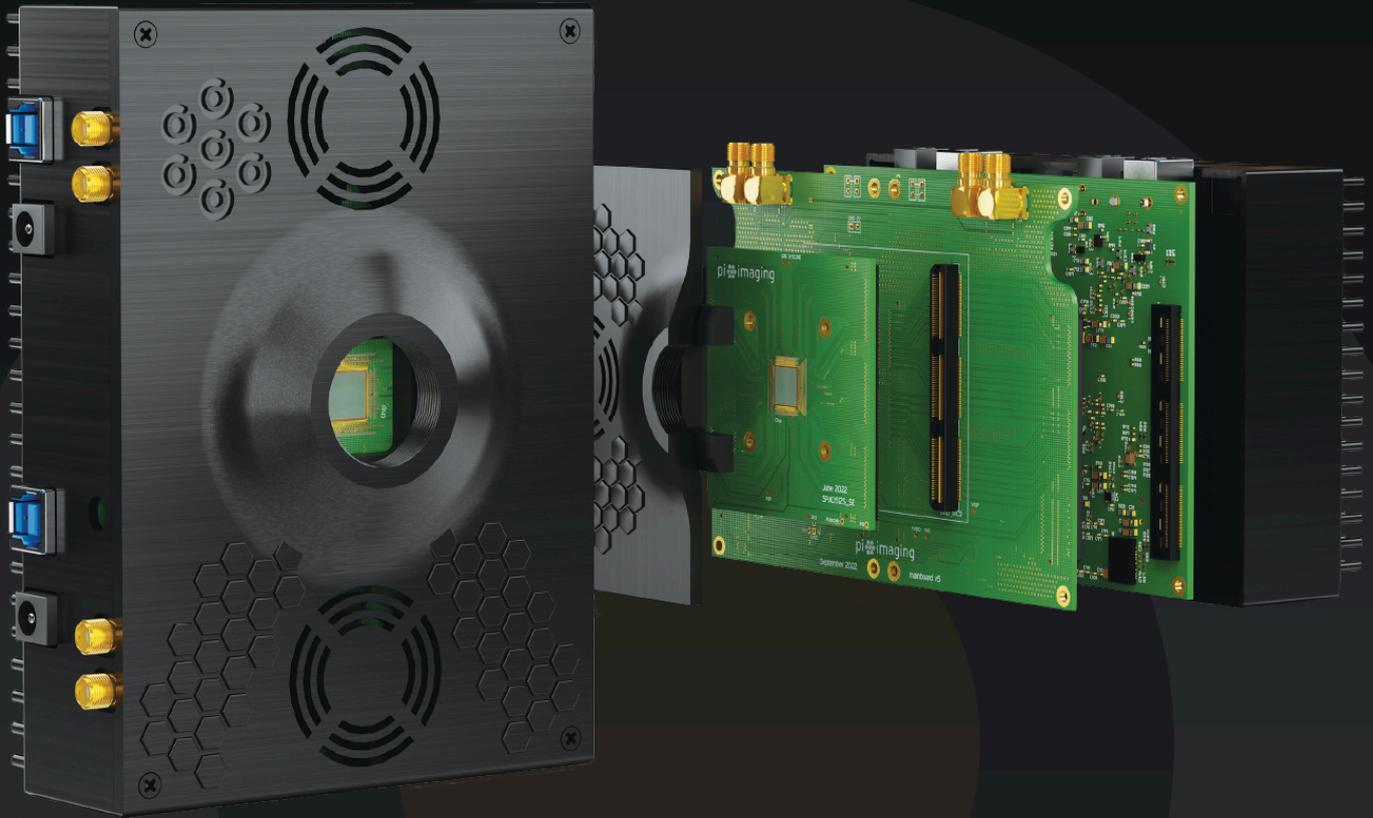
Time gating

The sensor features time gating to study time varying signals of interest, such as FLIM. This makes it a perfect addition to any widefield FLIM microscopy setup.



Plug and play

The system requires just a 5V power adapter and two USB3 cables to run. For full flexibility, 2 additional control lines can be connected to the SMA connectors.



APPLICATIONS

Widefield fluorescence lifetime imaging (FLIM)

SPAD cameras increase the overall photon throughput compared to scanned detection systems from the typical 10 Mcounts per second to 60 Gcounts per second.

Why SPAD Alpha?



- Simplify FLIM setup
- Increase FLIM frame rate

High-speed imaging

SPAD cameras enable high frame rates with global shutter at zero readout noise.

Why SPAD Alpha?



- Image fast phenomena in low light conditions
- Image light-in-flight

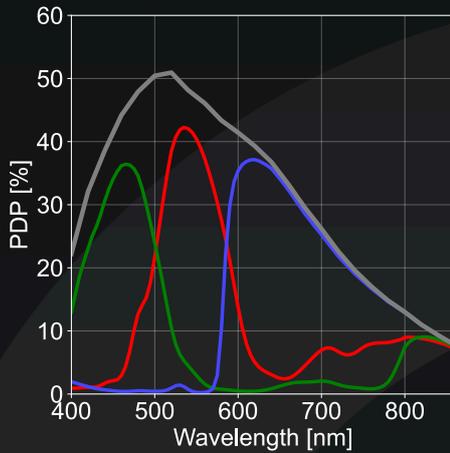
TECHNICAL SPECIFICATIONS

SPAD Alpha	
Array dimensions	1024 x 1024 pixels
Pixel pitch	16 μm
Wavelength range	400 to 900 nm
Detection options	RGB / monochrome
Readout noise	0 e ⁻
Frame rate (max.)	<ul style="list-style-type: none"> • 57'000 fps at 1-bit for 1s (buffered) • 3'600 fps at 4-bit semi-continuous • 920 fps at 6-bit continuous • 230 fps at 8-bit continuous
Minimum gate width	6 ns
Minimum gate shift	17 ps
Optical mount	TFL-mount / F-mount with optional adapter

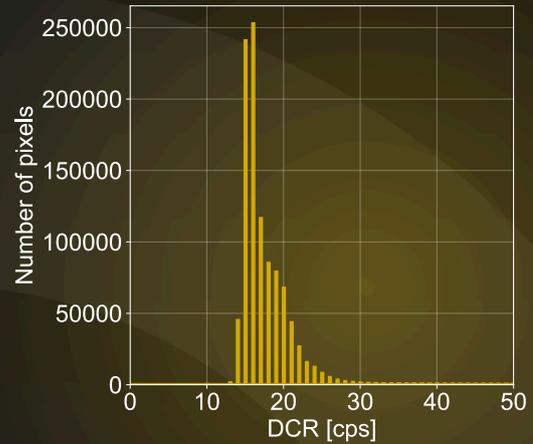
PARAMETER AT ROOM TEMPERATURE	MIN.	TYP.	MAX.
Median DCR	-	50 cps	100 cps
Percentage of pixels with >1 kcps	-	1.5%	2.5%
Fill factor with microlenses for collimated light	40%	50%	100%
Exposure rise / fall time (20 / 80%)	-	170 ps / 370 ps	200 ps / 400 ps

TYPICAL SPECIFICATIONS

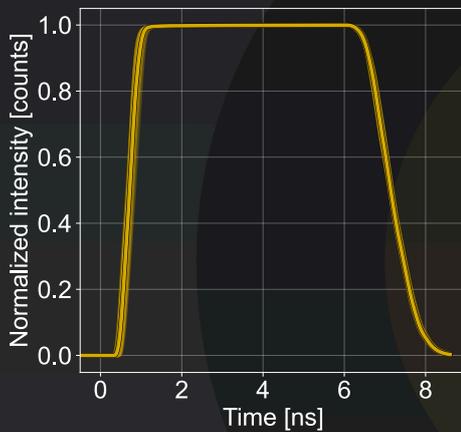
Photon detection probability



Dark count rate histogram



Gate profile



SYSTEM INTEGRATION

For operation, a 5 V power supply and two USB3 connections are required. The system software provides functionalities for photon-counting and time-gating. It enables 1-bit, 4-bit and 6 to 12-bit (time-gated) imaging modes and phasor FLIM processing. It can be accessed through TCP/IP for easy integration into LabVIEW, MATLAB or Python.

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