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 73'000 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.
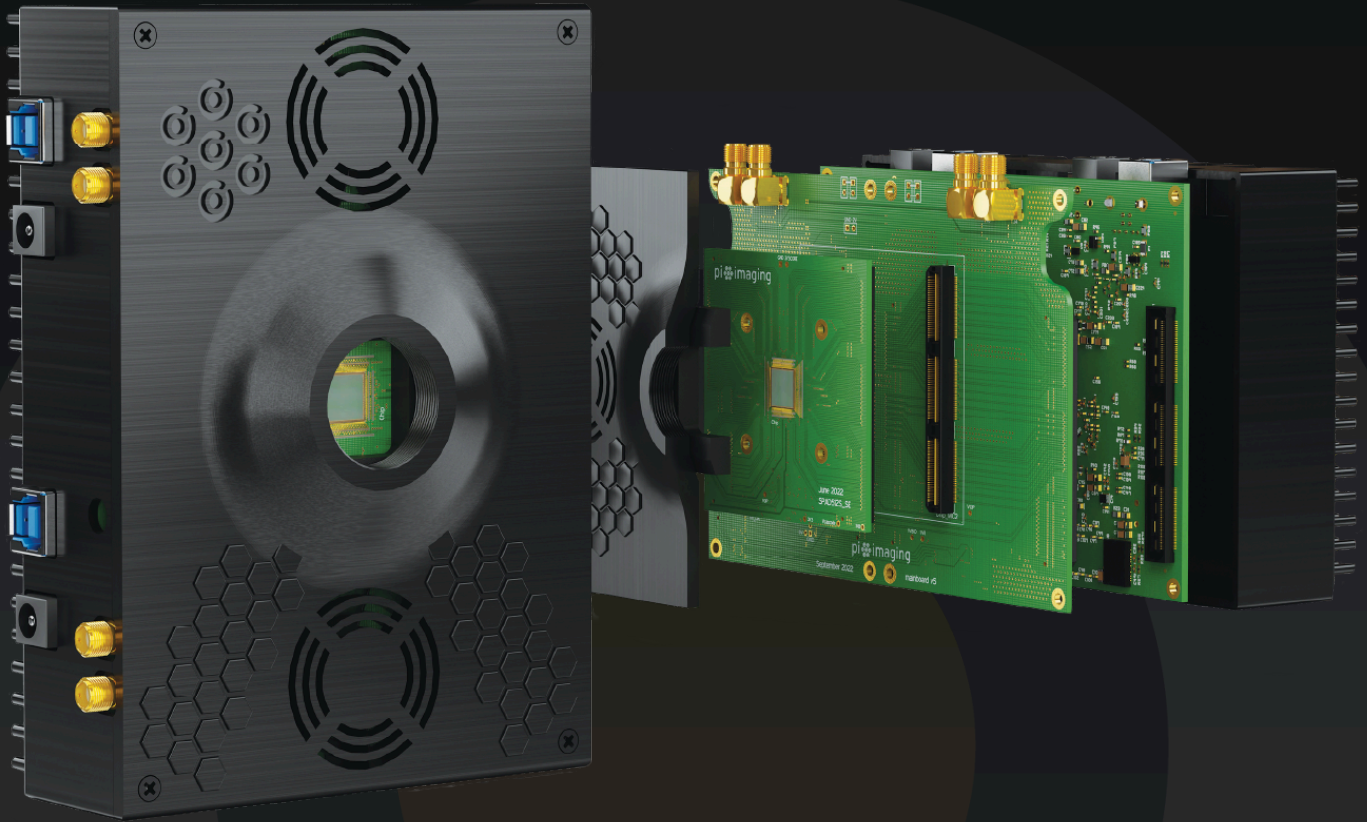
Time gating
The sensor features time gating to study time varying signals of interest, such as FLIM. This makes it a perfect addition to any widefield FLIM microscopy setup.

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.

Widefield fluorescence lifetime imaging

SPAD cameras increase the overall photon throughput compared to scanned detection systems from the typical 10 Mcounts per second to 77 Gcounts per second.

High-speed imaging

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

Why SPAD cameras?

• Simplify FLIM setup
• Increase FLIM frame rate

Why SPAD arrays?

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

TYPICAL TECHNICAL SPECIFICATIONS

SENSOR	SPAD IMAGER WITH IN-PIXAL GATE
Resolution	1024 x 1024
Pixel pitch	16 μm
Sensor wavelength range	400 to 900 nm
Sensor type	RGB / monochrome
Shutter type	Global
Median dark count rate at room temperature	<100 cps
Readout noise	0 e-
Frame rate (max.)	73'000 fps @ 1-bit 4'883 fps @ 4-bit 580 fps @ 7-bit 287 fps @ 8-bit
Minimum gate width	6 ns
Minimum gate shift	17 ps
Exposure rise / fall time (20/80%)	170 ps / 370 ps
Lens type	TFL-mount

TFL-mount
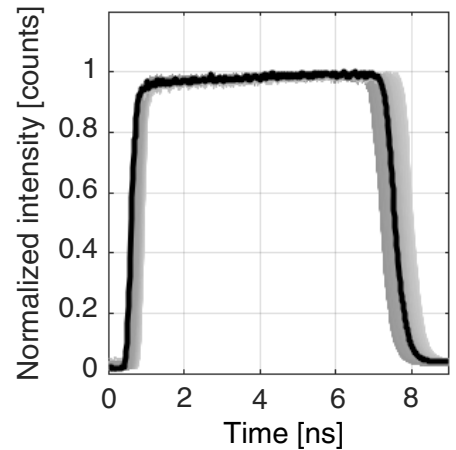
105 mm

147 mm

50 mm

Laser

Frame
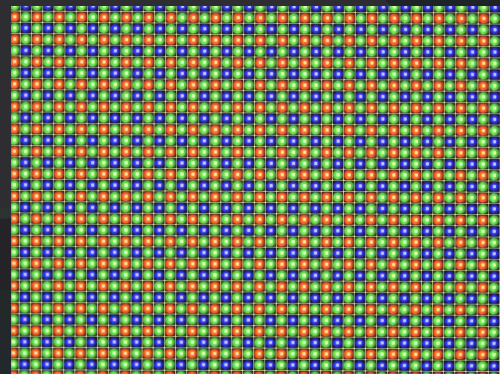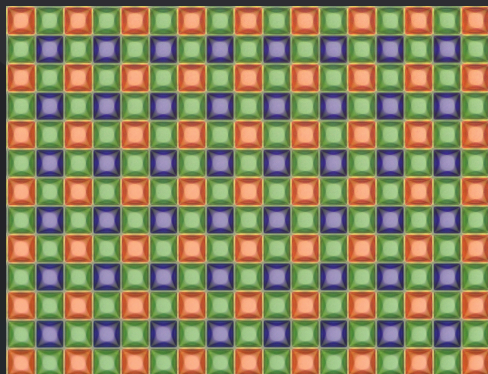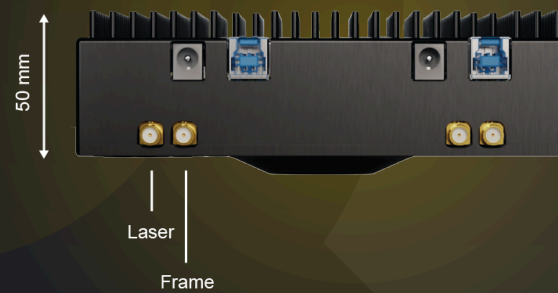
TYPICAL SPECIFICATIONS
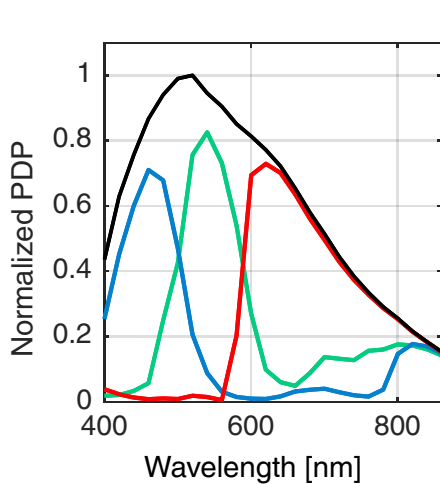
Photon detection probability.
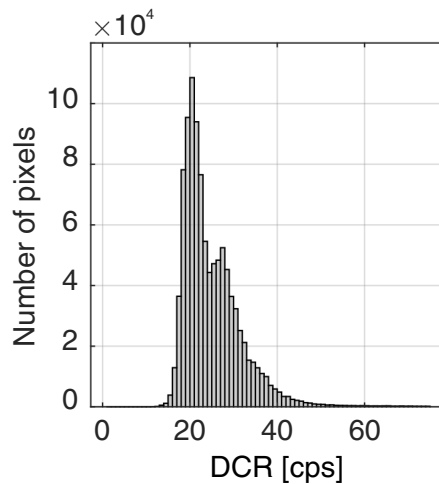
Distribution of dark count rate over the image sensor.

Time gating with 170 ps rise time and 370 ps fall time.

SYSTEM INTEGRATION

For operation, only three plugs are required, a 5 V power supply and two USB3 connections. The system software provides functionalities for photon-counting, time-gating and fluorescence lifetime imaging.

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.
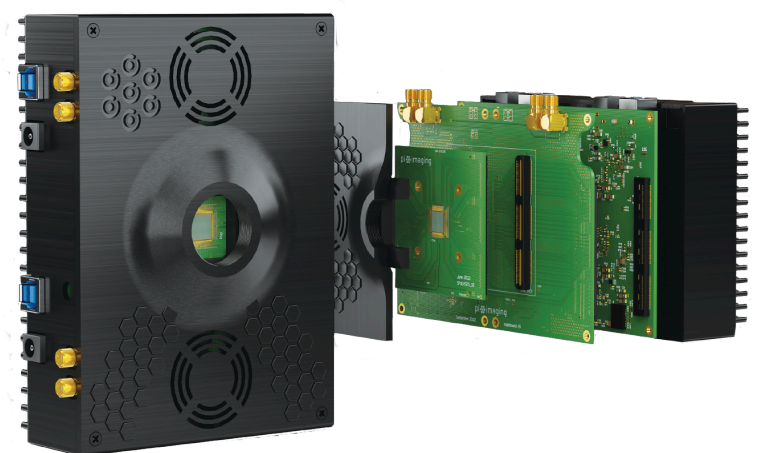
Pi Imaging Technology SA
EPFL Innovation Park 1015
Lausanne, Switzerland

info@piimaging.com
www.piimaging.com
+41 76 5733 314