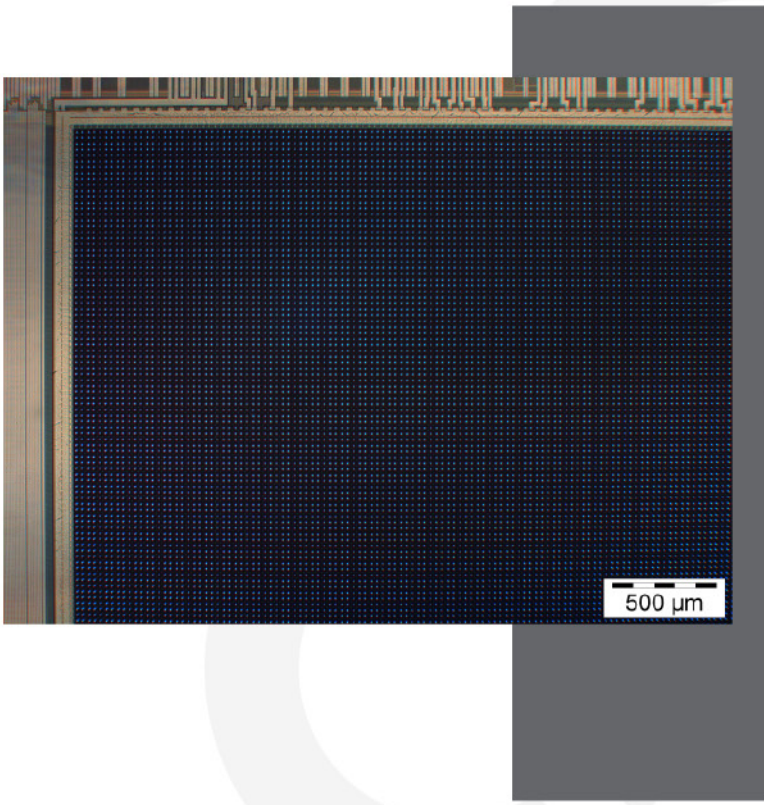
pi imaging

ENABLING INNOVATION

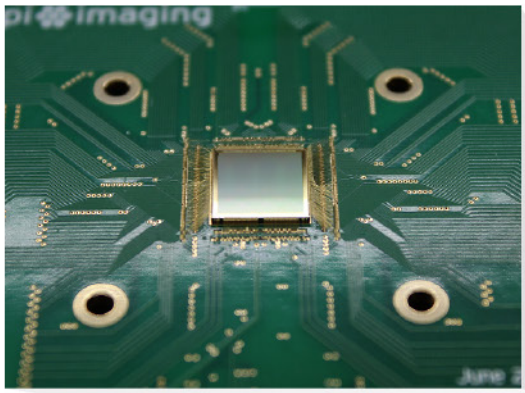
SPAD512S



Description

SPAD512S is a photon-counting camera for high-speed imaging. The core of the camera is a SPAD image sensor with 512×512 pixels. Photon counting with up to 100'000 frames per second and zero readout noise is achieved.

The global shutter enables nanosecond exposures with exposure shifts of 17 ps. The array is optimized for low noise, with a typical dark count rate of less than 25 cps.



Applications

Widefield fluorescence lifetime imaging

SPAD cameras increase the overall photon throughput compared to scanned detection systems from the typical 10 Mcounts per second to 26 Gcounts per second.

Why SPAD cameras?

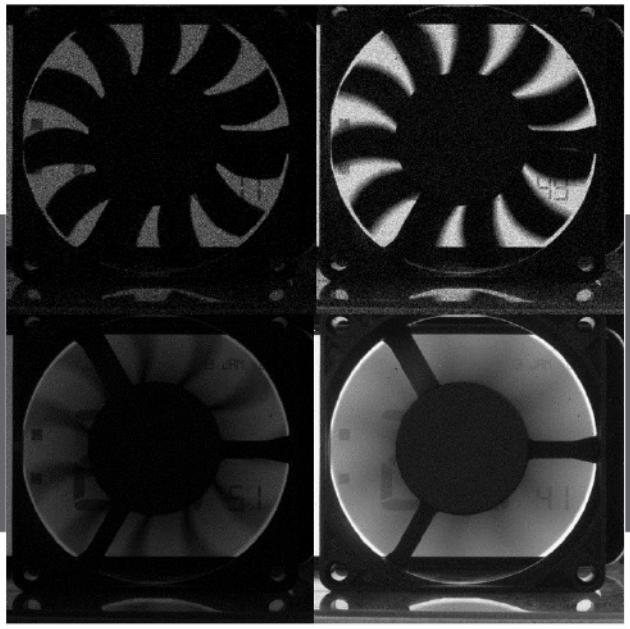
- Simplify FLIM setup
- Increase FLIM frame rate

High-speed imaging

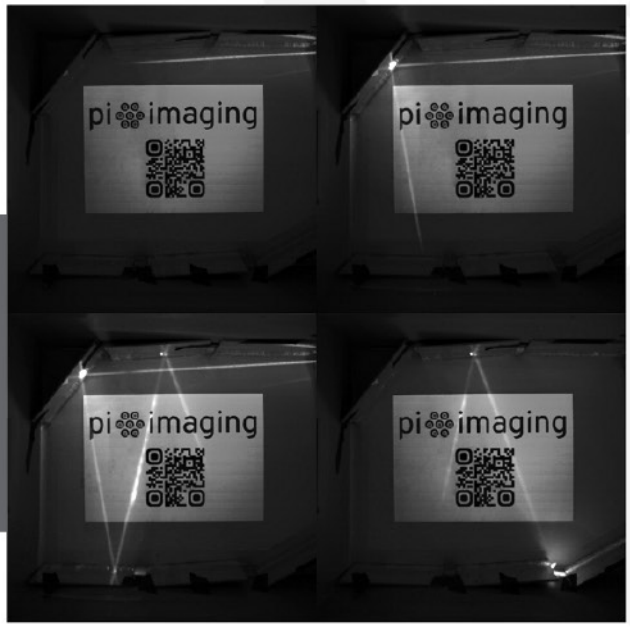
SPAD cameras enable high frame rates with global shutter at zero readout noise.

Why SPAD arrays?

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



Change the frame rate from 400 fps to 100’000 fps to capture fast moving objects.

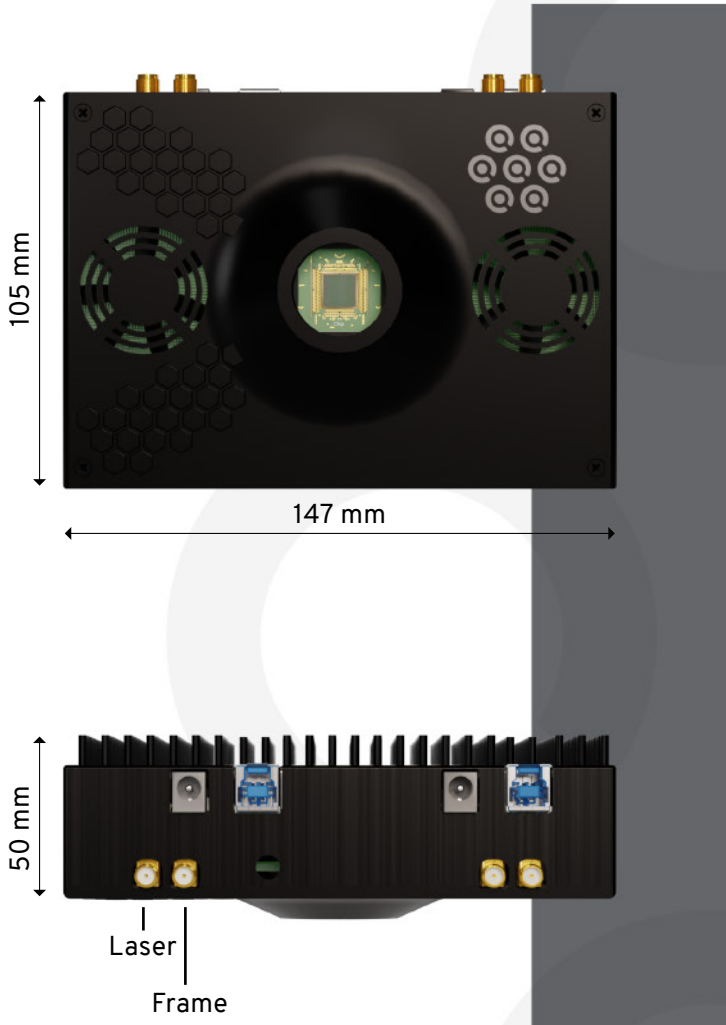


Track short burst of light scattering in water, traveling at 225 million m/s and imaged with 17 ps time resolution.

Technical specifications

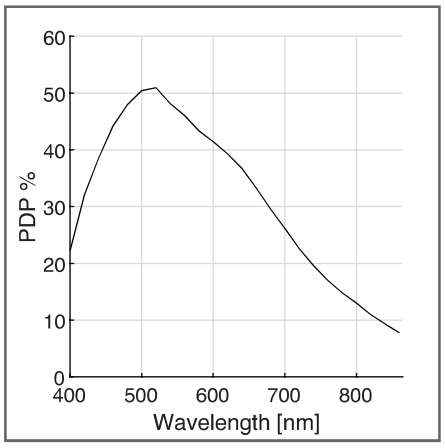
Typical technical specifications

SENSOR	SPAD IMAGES SENSOR WITH IN-PIXEL GATE
Image array	512 × 512
Pixel pitch	16.38 µm
Sensor wavelength range	400 to 900 nm
Peak photon detection probability	50% @ 520 nm
Fill factor with microlenses	>50 % for collimated light
Median dark count rate at room temperature	<25 cps
Percentage of pixels with >1 kcps	1.5%
Frame rate (max.)	100,000 fps @ 1-bit for 1 s 2,500 fps @ 4-bit continuous 400 fps @ 8-bit continuous
Maximal pixel count rate with exposure modulation	167 Mcps (400 Mcps with response linearization)
Maximal pixel count rate without exposure modulation	100 kcps (240 kcps with response linearization)
Minimum exposure/gate width	6 ns
Minimum exposure/gate shift	17 ps
Exposure rise / fall time (20/80%)	350 ps / 150 ps
Connection type	C-mount

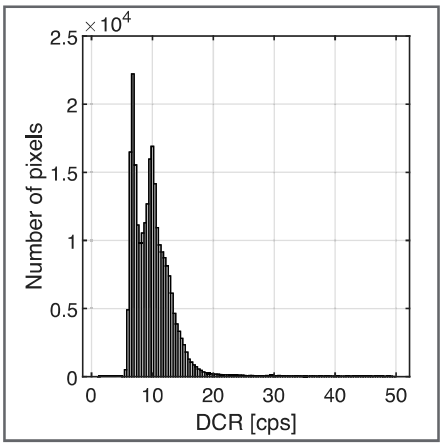


pi imaging

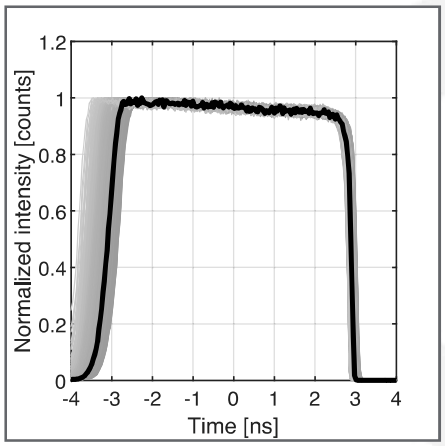
Typical performance characteristics



Photon detection probability.



Distribution of dark count rate over the image sensor.

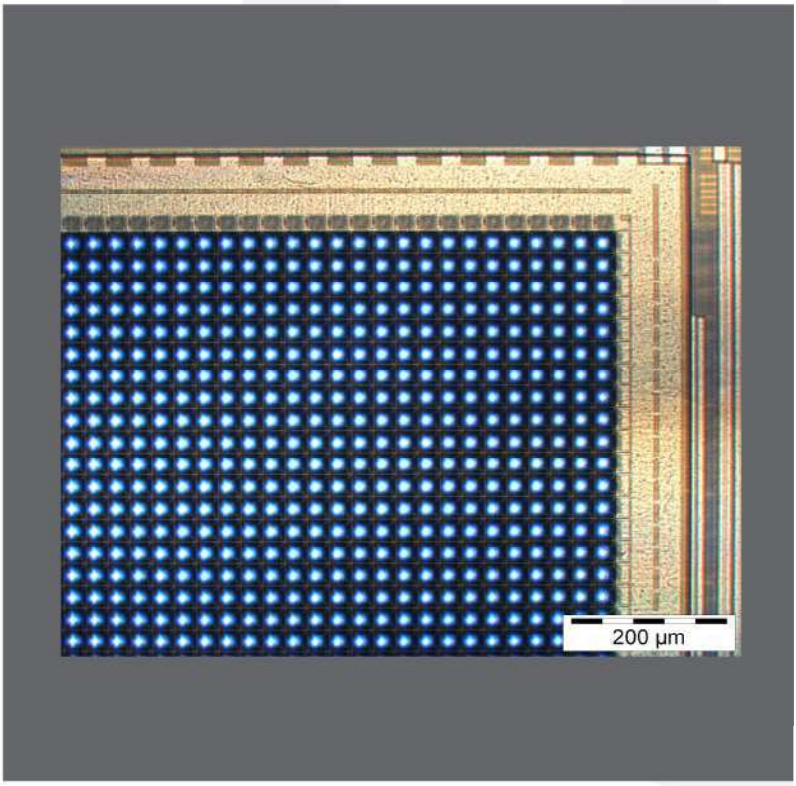


Time gating with typical 6 ns width, 350 ps rise time and 150 ps fall time. The figure shows all the gate shapes over the image sensor.

System integration

The image sensor pixels are shown on the right. For operation, only three plugs are required, a 5 V power supply and two USB3 connections. It provides functionalities for photon-counting, time-gating and fluorescence lifetime imaging modes.

The system software enables 1-bit, 4-bit and 8-bit (time-gated) imaging and phasor FLIM processing. It can be accessed through TCP/IP for easy integration into LabVIEW, MATLAB or Python.



MSHシステムズ株式会社
MSH Systems, Inc.

■ 東京本社
〒104-0032　東京都中央区八丁堀3-25-10　JR八丁堀ビル6階
TEL:03-6659-7540　　FAX:03-6659-7541
■ 神戸オフィス
〒650-0011　神戸市中央区下山手通5-12-4-301
TEL:078-335-5531　　FAX:078-335-5532
https://www.msh-systems.com　E-mail:sales@msh-

Pi Imaging Technology SA
EPFL Innovation Park
1015 Lausanne, Switzerland

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