PHOTON DETECTION / SPAD IMAGING

PHOTONICS

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SPAD CAMERA

PHOTONICS

NovoViz redefines what’s possible in photon detection. Just as OLED transformed displays, SPAD sensors are redefining vision—detecting single photons for unmatched speed and sensitivity. But with great data comes great complexity.

Product offering

Asynchronous Single-Photon Camera (NV04ASC-HW)

Asynchronous Single-Photon Camera (NV04ASC-HW)

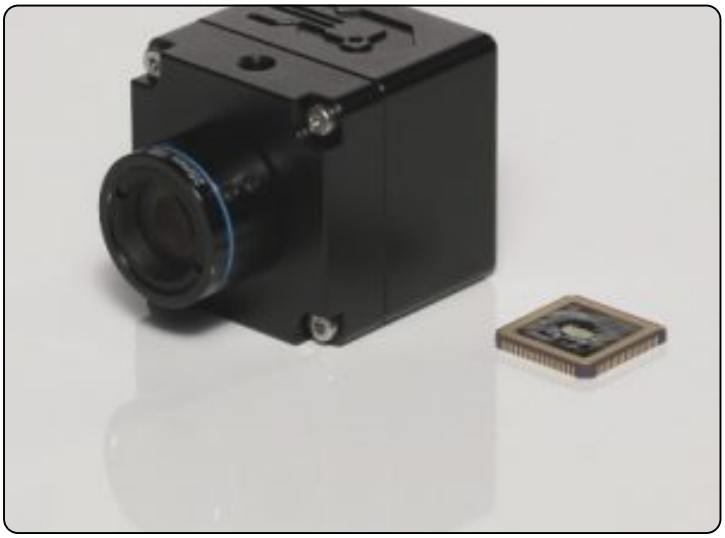
The NovoViz NV04ASC-HW Asynchronous photon-driven camera was developed for applications requiring high sensitivity and/or frame rate but with reduced output bandwidth.

The camera combines the benefits of a single-photon avalanche diode (SPAD) camera, namely the single-photon resolution and fast operating speeds, with the benefits of an event camera – low output data rates.

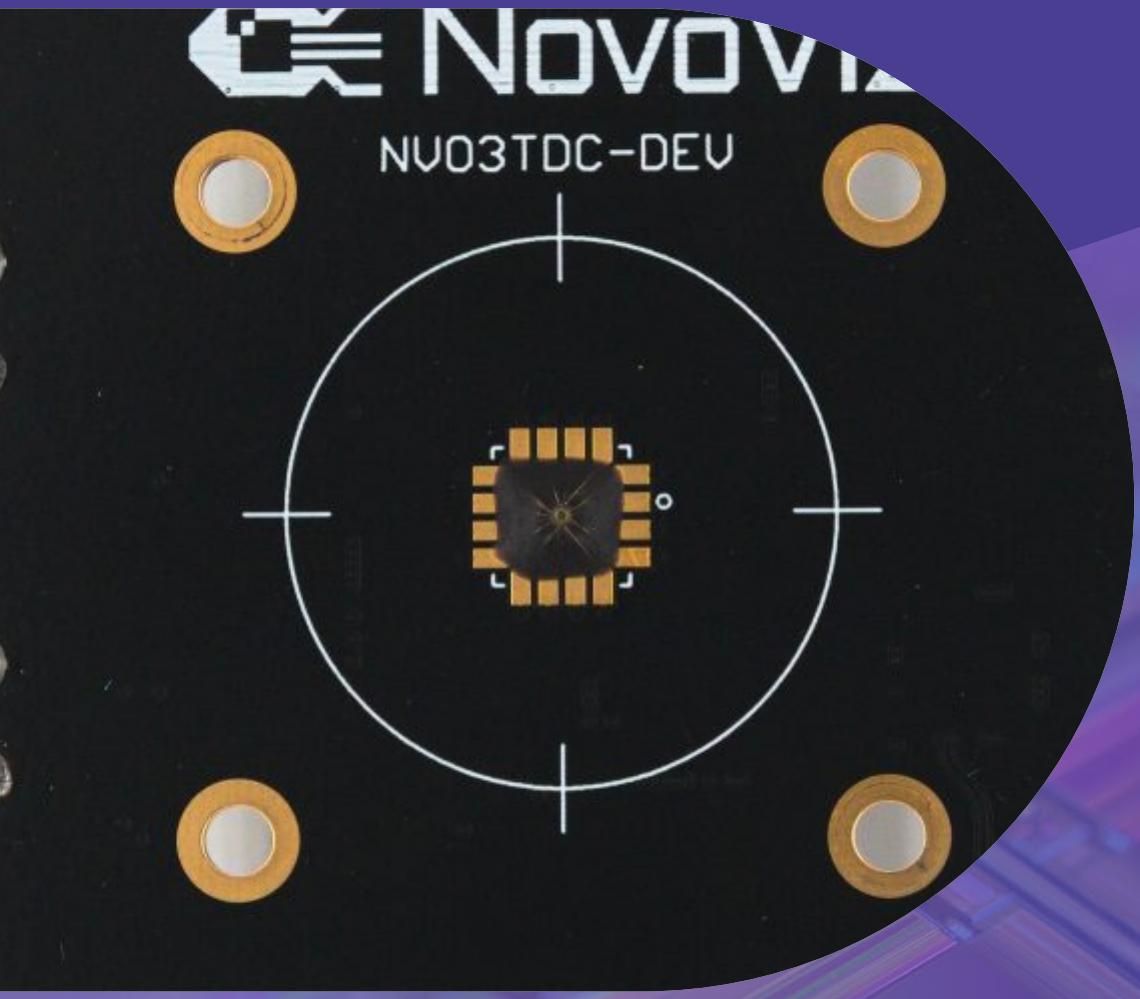
Our innovative sensor architecture streams photon events with nanosecond timestamp resolution and latency over a conventional, low cost USB interface. The camera is well suited for high dynamic range imaging, low light imaging, depth sensing, obstacle detection and visual odometry, among others. Due to the advanced architecture, the camera can operate at an equivalent frame rate of 100 million single-photon frames per second which comes with significant advantages over current solutions.

Key Specifications:

- 64 x 48 SPAD pixels
- 100M fps
- 10ns resolution
- Event-driven output
- USB 3.0



DEVELOPMENT MODULES



PHOTONICS

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Product offering

Small line sensor development module (NV07SLN-DEV)

Two-pixel correlator development module (NV02TPX-DEV)

Photon number resolver development module (NV01PNR-DEV)

Photon burst detector development module (NV03TDC-DEV)

Small line sensor development module (NV07SLN-DEV)

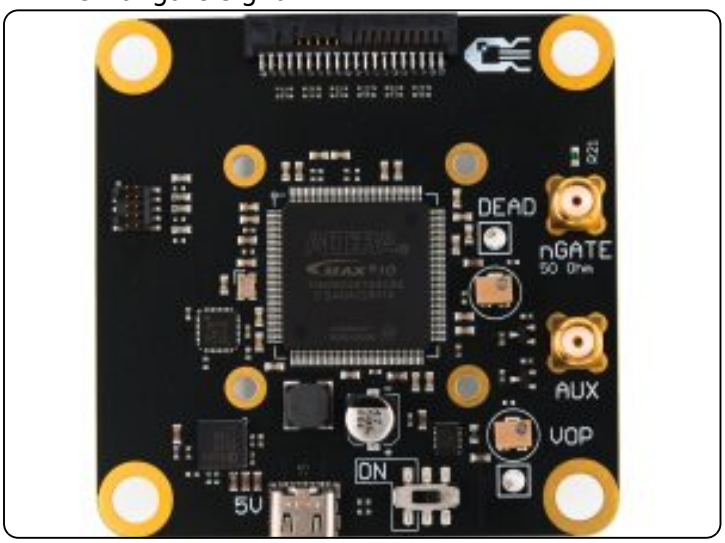
The NovoViz NV07SLN-DEV requiring single photon line detectors with low timing jitter. The device does not require any external threshold circuitry and provides an asynchronous digital output for every pixel. Accumulated counts are read over the single USB connection that also provides power.

The sensor combines the benefits of a single-photon avalanche diode (SPAD) pixel, namely the single-photon resolution and fast operating speeds, with the benefits of on chip recharge and threshold circuitry – high event rates and reduced noise.

The array can be reshaped instantaneously from one to two lines with a digital signal. In addition, the two lines can be combined through AND gates to provide coincidence detection capabilities. The two line pixel pitch was designed to match with off the shelf optical fiber bundles. The sensor is well suited for interferometry, spectroscopy, high dynamic range imaging and low light imaging, among others.

Key Specifications:

- 2×12 or 1×24 SPAD array
- 125 µm two-line pitch for coupling with a fiber bundle
- 25 µm single-line pitch
- On-chip coincidence
- External gate signal



Two-pixel correlator development module (NV02TPX-DEV)

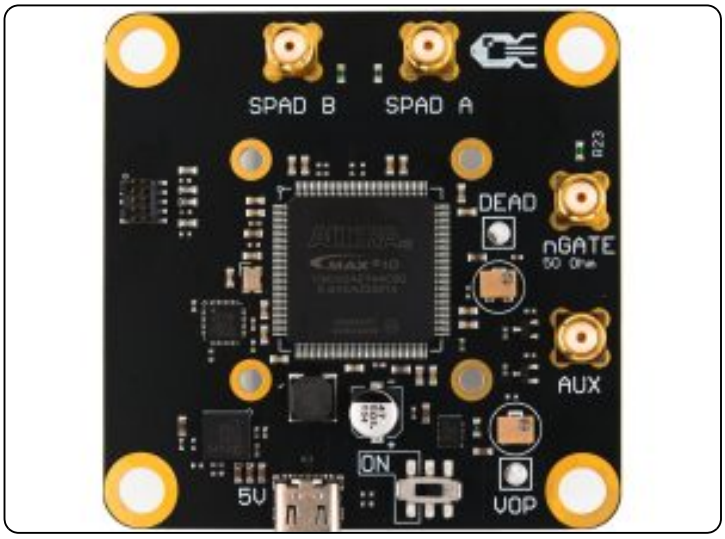
The NovoViz NV02TPX-DEV was developed for applications requiring fast correlation times and single photon sensitivity. The device does not require any external threshold circuitry, provides direct access to SPAD outputs and uses a single USB connection for both power and data.

The sensor combines the benefits of a single-photon avalanche diode (SPAD) pixel, namely the single-photon resolution and fast operating speeds, with the benefits of on chip digital processing – reduced output data rates.

Our innovative sensor architecture performs all the correlation computations simultaneously for every acquisition step and stores the results in internal memory. At the end of the user-defined exposure period, the data can be retrieved, after which the process can be repeated. The sensor is well suited for applications such as diffuse correlation spectroscopy and quantum optics, among others.

Key Specifications:

- 2 SPAD pixels
- On-chip g(2) or cross-correlation
- 64 bins of up to 5 ns width
- External gate signal



Photon number resolver development module (NV01PNR-DEV)

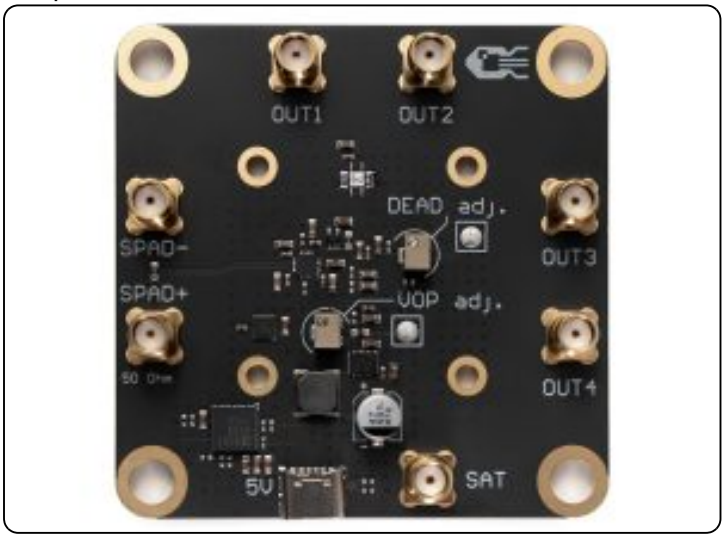
The NovoViz NV01PNR-DEV was developed for applications requiring single photon point detectors with low timing jitter. The device does not require any external threshold circuitry and provides a fully digital output, compatible with standard CMOS electronics.

The sensor combines the benefits of a single-photon avalanche diode (SPAD) pixel, namely the single-photon resolution and fast operating speeds, with the benefits of on chip recharge and threshold circuitry – high event rates and reduced noise.

Our innovative sensor architecture has dedicated outputs for single, two, three and four photon thresholds as well as a separate output that connects to a single SPAD in order to optimize the timing jitter. The sensor is well suited for high dynamic range imaging, low light imaging, depth sensing and obstacle detection, among others.

Key Specifications:

- 4 x 4 SPAD cluster
- One, two, three and four photon threshold
- Digital output
- Up to 300M events/s



Photon burst detector development module (NV03TDC-DEV)

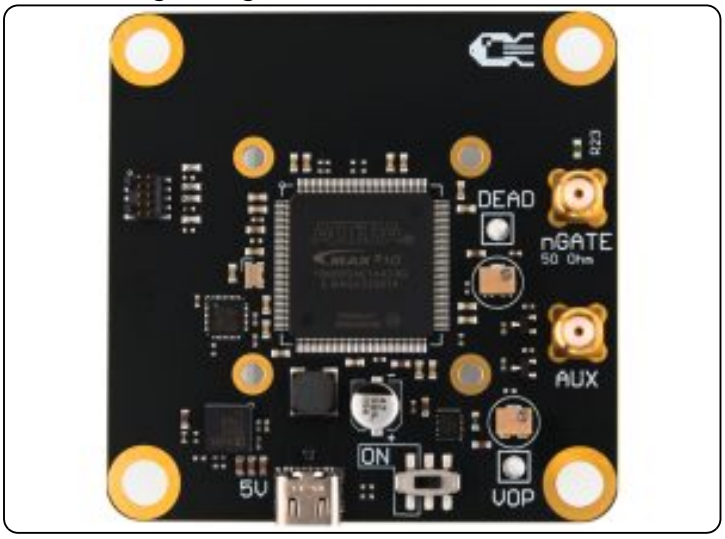
The NovoViz NV03TDC-DEV was developed for applications requiring single-photon sensitivity point detectors and burst timestamping capabilities. The device does not require any external threshold circuitry and uses a single USB connection for both power and data.

The sensor combines the benefits of a single-photon avalanche diode (SPAD) pixel, namely the single-photon resolution and fast operating speeds, with the benefits of on chip timestamping and memory – high event rates and reduced output data rates.

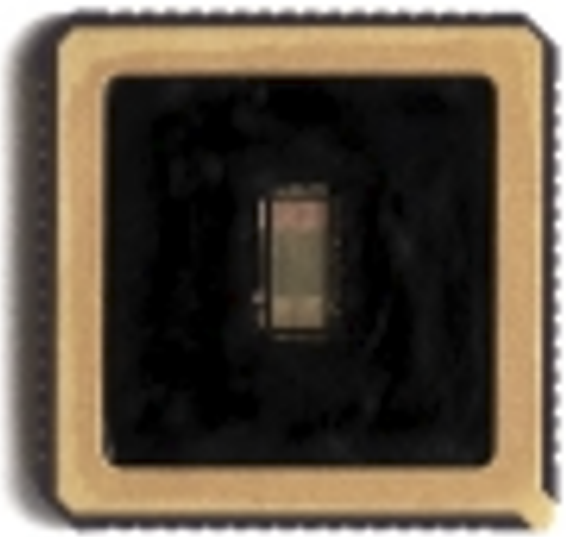
Our innovative sensor architecture has a multi-shot time to digital converter connected to a free running gated SPAD pixel. The timing resolution is defined by an externally provided clock signal. The events are stored in the on-chip FIFO and can be read at any time by the user. The sensor is well suited for lifetime measurements, high dynamic range imaging, low light imaging and depth sensing, among others.

Key Specifications:

- Single SPAD pixel
- On-chip memory for 255 events
- 2 ns timestamping resolution
- External gate signal



SENSOR CHIP



PEO PHOTONICS

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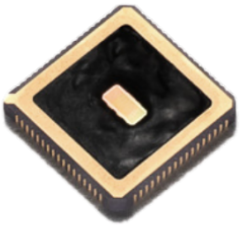
Product offering

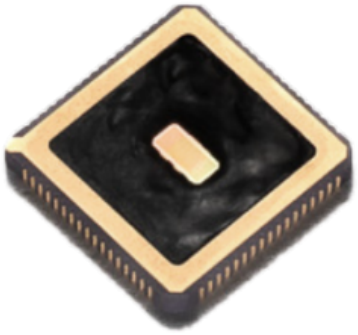
Asynchronous photon-driven sensor (NV04ASC)



Asynchronous photon-driven sensor (NV04ASC)

The NovoViz NV04ASC asynchronous photon-driven sensor chip is engineered to meet the demands of applications that require both high sensitivity and elevated frame rates, while maintaining a reduced output bandwidth.

This advanced sensor integrates the advantages of single-photon avalanche diode (SPAD) technology—delivering true single-photon resolution and rapid response times—with the efficiency of event-based sensing, resulting in significantly lower data output rates.



Leveraging an innovative sensor architecture, the NV04ASC streams photon events with nanosecond-level timestamp resolution and minimal latency, all over a standard, cost-effective interface. Its design makes it exceptionally well-suited for high dynamic range imaging, low-light environments, depth sensing, obstacle detection, and visual odometry, among other applications. Owing to its novel architecture, the sensor achieves an effective frame rate of up to 100 million single-photon frames per second, offering substantial performance and efficiency advantages over existing solutions in the market. This combination of high speed, sensitivity, and data efficiency positions the NV04ASC as a versatile solution for next-generation imaging challenges across various industries.

Key Specifications:

- 64 x 48 SPAD pixels
- 100M fps
- 10ns resolution
- Event-driven output