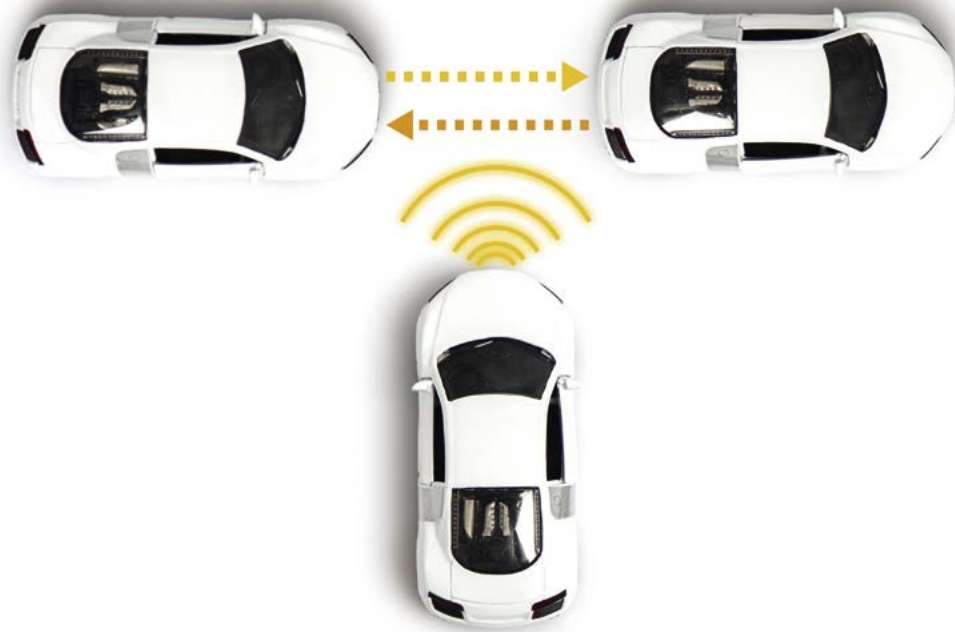


Emitters
and Receivers

Components
made for 3D LiDAR



Products

Made by LASER COMPONENTS

LASER COMPONENTS manufactures sensors for ranging and detection in high volume and in ISO-certified manufacturing facilities. The high power, short pulse laser diodes improve the distance resolution with matching high sensitivity avalanche photodiodes that detect even the smallest signal.

Pulsed Laser Diodes - Emitters

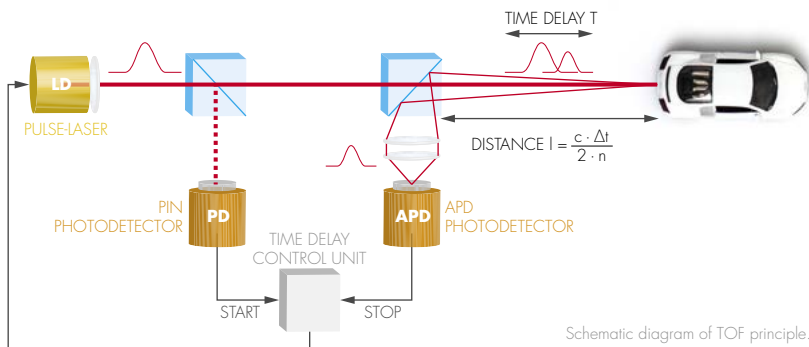
In order to achieve the distance resolution managed by modern time-of-flight ranging systems, shorter and shorter pulses need to be generated. The wavelength of choice for the majority of safety scanning applications is 905 nm. For superior transmission through atmospheric aerosols and in eye-safe applications, 1550 nm is recommended

Avalanche Photodiodes - Receivers

Silicon Avalanche Photodiodes (APDs), are meeting high sensitivity, low noise, and cost. They amplify very weak signals coming from the targets. In that way making detectors very highly sensitive to weak signals, at the same time keeping the noise low.



Challenge	Solution
Higher precision	Short pulse lasers at 1.5 ns pulse width and rise time from 500 ps, photodiodes with <500 ps response time, hybrid devices
Reliability	Proven technology with hermetically sealed packages, arrays, temperature stable
Compact design	Die packaging, surface mount devices (SMD), arrays
Cost	Affordable 905 nm pulsed lasers, Si avalanche photodiodes



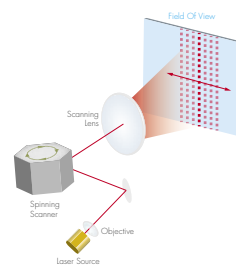
Applications

3D LiDAR

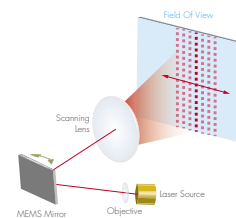
Optoelectronic equipment and laser measurement manufacturers are constantly challenged to design more complex LiDAR systems and demand reliable, small, and low-cost devices. Their solutions have to detect and discern objects and measure distance and speed at high precision and under variable environmental conditions. Frequently, the measurement principle is based on the optical Time-of-Flight (ToF) measurement by illuminating with a laser and analyzing the reflected light with a detector.

Applications

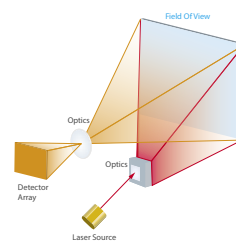
- 3D mapping
- Adaptive Cruise Control (ACC)
- Advanced Driver-Assistance System (ADAS)
- Agriculture
- Autonomous Driving
- Drones
- Robotics
- Safety & security scanning



Scanning LiDAR illuminates a small part of the FOV at a time. The pulsed laser is scanned across the FOV (field of view) by using i.e. a rotating mirror. A rotating spin of 360° is doable. As little as a single photodetector (1 pixel or small array) captures the return.



Solid-state LiDAR is a broad name to describe LiDAR which are not using conventional motors but semiconductor solutions to scan or steer light through a scene. The pulsed laser is scanned across the FOV (field of view) by using MEMS. As little as a single photodetector (1 pixel or small array) captures the return.



Flash LiDAR – Illuminates the entire field of view at once and a photodetector array captures the return of the entire field of view at once. Flash is mechanically/optically simple and potentially cheaper as there is no need for a beam steering mechanism. A powerful emitter and very sensitive photodetector array is needed.

Automotive Qualified



905DxxUA Series Pulsed Laser Diodes

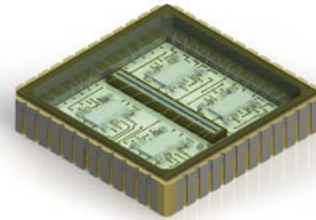
Highly Reliable Pulsed Laser Diodes

- AEC-Q101 automotive qualified with excellent temperature stability
- Up to 110W laser output power
- 905nm

As a single element design, the 905DxxUA series are available at 905nm wavelength. They are highly reliable, possess excellent overdrive capabilities, and optimal thermal stability. Additionally, the design features very precise chip alignment inside the hermetic housing.

AEC-
Q101
Qualified

Custom Arrays



Si APD Arrays

Simplify Time-of-Flight Sensor Development

- 8-, 12- or 16-element arrays, 190 x 650µm, custom versions
- 14-pin DIL or SMD package
- Responsivity between 440nm–1000nm

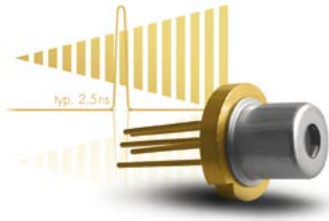
Our arrays are characterized by a very narrow gap of just 40µm between the elements; and feature very low cross talk and temperature coefficient. The components are based on fast, low-noise avalanche diodes in a monolithic array.

Upon request, we also design and build linear arrays according to customer specifications. The number and size of the individual elements are driven by the customers design. The array can be along 1 or 2 axes.

Additional options include integrated electronics and bandpass filter.

We strive to produce high quality products with flexible designs.

Fast Hybrids



QuickSwitch Pulsed Laser Diodes

Fastest Hybrid Pulsed Laser Diode

- 1.5 to 5 ns pulse duration, up to 90 W in TO-56 package
- Pulse frequencies at up to 200 kHz
- 905 nm

The shorter the laser pulse, the more accurate the measurement. The short pulse duration also allows for higher pulse repetition rates, which can create a higher density point cloud.

This new hybrid pulsed laser diode features the shortest pulse duration in the world. In one second, the QuickSwitch PLD generates up to 200,000 laser pulses with a typical duration of 2.5 ns. Depending on the operating voltage, it achieves an optical peak power of up to 90 watts.

The laser chip and switching electronics are integrated in a compact TO-56 housing. The hybrid design enables the shortest bond wires: a current path with low inductance can be achieved which is necessary for ultra-short pulse lengths.

Additional options are more powerful open carriers and arrays.

High Sensitivity



APD Receivers

Best Possible Signal-to-Noise Ratio

- Low Noise Equivalent Power
- Various gain / bandwidth configurations
- Responsivity between 400 nm – 1100 nm (Si);
or 900 nm – 1700 nm (InGaAs)

The ultra-low-noise H1-series is supplied in a 12-pin hermetically sealed TO-8 package and features a built-in temperature sensor to allow temperature compensation. The maximum bandwidth is 1 MHz to 25 MHz depending on the version.

We also offer high speed receiver designs up to 700 MHz. Packaged in a TO-46 housing, the low noise amplifiers allow for compact design and a differential output.

We are ready to meet your present and future market needs.

High Volume Low-Cost

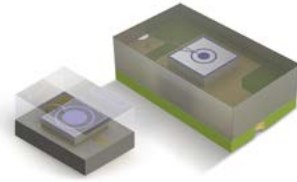


Pulsed Laser Diodes

Miniature SMD, Bare Die or Ceramic Submount

- Miniature Surface Mount SMD or die packaging
- 6W up to 110W laser output power
- 905 nm

High Volume Low-Cost



Avalanche Photodiodes

SMD Housings

- Miniature Surface Mount (SMD) package down to 2 x 1.4 mm
- Optimize high gain and low gain
- Responsivity between 400 nm–1000 nm
- \varnothing detector area: 230 μ m, 500 μ m
- Integrated bandpass filter available

Similar to the components in the M2 and M2F (with integrated bandpass filter) package, the noise is lower and the response time particularly fast.

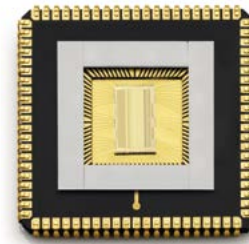
Those inexpensive components are specially designed for distance measurements in which, due to lack of space, larger emitters and detectors cannot be installed. Consumer products are commonly fitted with this version. ■



Accessories

Evaluation Board

Evaluation boards have been designed for the QuickSwitch PLD and APD arrays. The boards have either an internal pulse generator or transimpedance amplifier. The socket allows easy installation of the diodes.



CMOS-SPADs

- 192x2 pixel solid-state CMOS sensor
- High sensitive single-photon avalanche diodes
- TDC with 312.5ps resolution in each pixel
- Adjustable background light rejection
- Timing and counting mode

The SPAD2L192 is a 192x2 pixel solid-state CMOS sensor for flash LiDAR applications. The distance measurement is based on the first-photon direct time-of-flight principle. The single-photon detectors offer very high sensitivity and high timing resolution.

Custom versions are available on request.

We offer accessories that
simplify your design-in cycles.



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