

LIDAR FOR AUTOMOTIVE APPLICATIONS



First Sensor

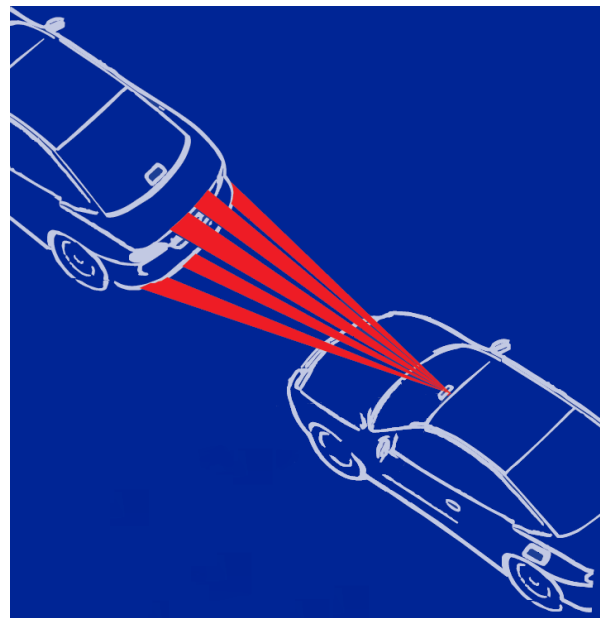
LIDAR technology is gaining in importance for advanced driver assistance systems because it offers a high resolution combined with a long range. First Sensor provides specific detector solutions.

Advanced driver assistance systems such as adaptive cruise control (ACC) or collision avoidance systems do not only provide a more comfortable driving experience but are also able to reduce the severity of accidents or even prevent crashes entirely.

While some of these systems are already well established in higher vehicle classes, even better assistance systems are introduced to deal with more and more complex traffic situations. There is a trend towards a use of assistance systems also in cheaper vehicles which are sold in higher quantities and require affordable sensors.

LIDAR (light detection and ranging) is an optical remote sensing technology. An emitter sends out infrared laser pulses and the reflected light is detected by a photodiode. The distance and relative speed of other objects can be determined from the runtime of the signal (time of flight) and the speed of light.

This measurement method is similar to radar, which today is often used as the sensor system for ACC applications. Both technologies offer a range up to 200 m for this usage but LIDAR has the significant advantage of a much higher angular resolution, especially when it comes to more complex automotive applications. This makes it possible to identify the horizontal or vertical position of a car or pedestrian more precisely, and to distinguish different objects that are located in same distance and moving with the same speed. Unlike radar, LIDAR sensors are also able to recognize the size and thereby draw conclusions about the type of the object. In addition, LIDAR systems can usually be produced at lower costs because of the less expensive components and a single system can cover short and long ranges.



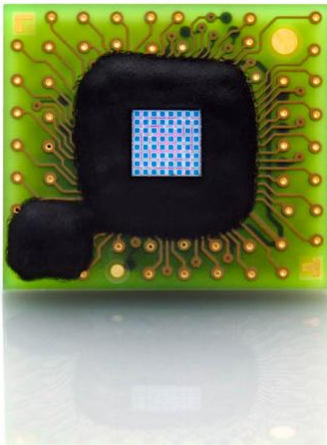


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LIDAR technology sometimes still has the reputation of losing performance at bad weather conditions, but new generations of LIDAR systems insure a high functionality even with rain or fog by receiving multiple echoes from a single laser beam.

Preferentially, avalanche photodiodes (APD) are used for applications with very low optical signal strength or with high modulation frequencies, as it is the case with LIDAR.

APDs are photodiodes with an internal gain mechanism. The photons generate electron-hole pairs which are accelerated by an applied voltage. Thereby further electrons are raised into the conduction band by impact ionization. These electrons can again absorb enough energy to raise further electrons into the conduction band. That way a multiplication factor of several hundred can be achieved



First Sensor AG manufactures and improves silicon APDs for over 20 years for demanding sensor solutions and offers a wide selection of APDs for range finding and distance measurement applications.

First Sensor's series -9 APDs is optimized for 905 nm laser radiation, has a high quantum efficiency, fast rise time, low noise and slow slope gain curve and is therefore particularly suited for LIDAR applications. The product line includes single element APDs as well as arrays in 5 x 5 (25 APD-pixel) and 8 x 8 (64 APD-pixel) matrix geometries and in linear configuration with up to 16 elements to serve specific needs.

The available high reliability packages include standard TOs and ceramic carriers as well as cost efficient organic carrier SMD packages.

All packages can be built with specific band pass filters matching the laser wavelength to improve signal-to-noise performance.

For detailed information please contact us at sales.us@first-sensor.com or visit us at the Photonics West Show booth 4933 (north hall).

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