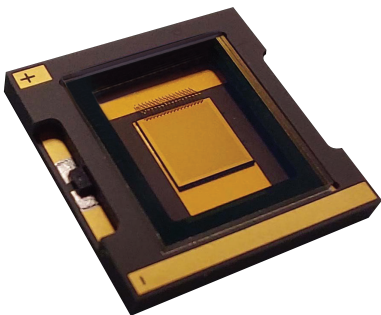


# Automotive Lidar Illumination Sources

Leonardo systems have proven reliability and robust operation in extremely harsh defense environments. The latest advancements in Advanced Driver Assist Systems (ADAS) and autonomous vehicle sensors require high-performance illumination sources that can be custom designed to fit particular sensor architectures and maintain performance over extreme automotive conditions.

VCSEL and edge emitter arrays can be supplied as bare die, chip on sub-mounts, or fully packaged units. Leonardo also offers integration with optics, short pulse drivers and thermally managed housings. Our team of experts works with customers to provide the best illumination solution for short, mid and long range lidar systems. Whether using a flash, scanning or a hybrid approach to lidar, Leonardo can help provide a cost effective source from concept and initial product demonstration through to high volume production.

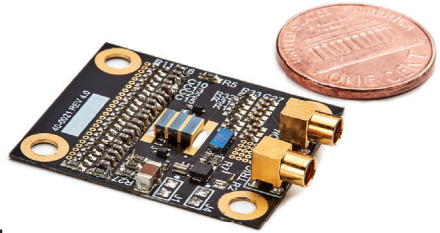


## VCSEL ARRAYS

VCSEL arrays are offered from 800 nm to 980 nm with customizable emitter geometries. Arrays can be combined to provide the desired power and size. They can be individually addressed or sections within an array can be addressed individually. Operation modes are from ns pulses to CW with intensities of  $>10 \text{ kW/cm}^2$  in 10 ns pulses.

## EDGE EMITTER ARRAYS

Edge emitter arrays are offered from 760 nm to 1.6 microns with customizable geometries.



## PACKAGING

Leonardo offers custom packaging options that can be AEC Q102 qualified.

## TYPICAL VCSEL SPECIFICATIONS

760 nm - 980 nm		
Typical Parameters (at 25°C)	Units	Typical Value
Pulse Width	ns	<5
Output Intensity	kW/cm <sup>2</sup>	10
Wavelength	nm	800 to 980
Operating Voltage	V	<3
Beam Divergence (1/e <sup>2</sup> )	°	<30 (circular)
Spectral Width	nm	<3
Power Conversion Efficiency	%	35

## ACCESSORIES

Leonardo's VCSEL and edge emitting arrays can be fully integrated with drive electronics, power boards and housings.

## AUTOMOTIVE QUALITY SOLUTIONS

### AEC-Q102

Leonardo offers stress-tested products for automotive applications.

### IATF 16949 Certified

Leonardo uses automotive-approved, process oriented, quality systems.

## ABOUT US

Leonardo Electronics US enables next-gen technologies in defense, security, medical, automotive and industrial segments. For over 20 years, the Tucson, AZ based facility has driven robust laser design and innovation resulting in enabling technology to support market leaders worldwide.

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### Patent Numbers:

US 7,660,335 | US 7,864,825  
US 6,352,873 | US 6,295,307

### Certifications:

AS9100D including ISO 9001:2015  
ISO 13485:2016 Medical  
IATF 16949:2016 Automotive  
ISO14001:2016 Environmental Management System

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