

LeddarSteer™

Digital Beam Steering

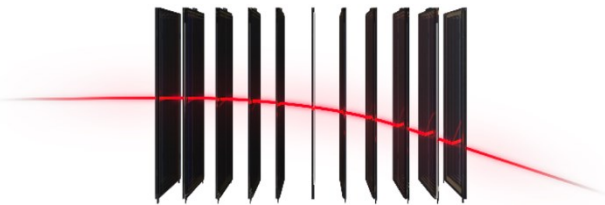


Overview

LeddarSteer™ is a digital beam steering (DBS) technology based on liquid crystal and polarization gratings which steers light to the desired angles rapidly, accurately and reliably, enabling a field of view up to 120° x 60°.

LeddarSteer represents the ideal solution for LiDAR manufacturers aiming to build their next generation of sensors with true, reliable solid-state beam steering and field of view agile re-configuration capability.

LeddarSteer digital beam steering divides the FoV into discrete tiles that can be assembled to create the complete frame, with or without a specific region of interest. These FoV configurations can be changed on-the-fly, based on the vehicle's speed or environment, to fulfill multiple ADAS and AD use cases from a single LiDAR design.



Higher Range

- Reduction of ambient noise by steering receiver to a sub-segment of the FoV
- Emitter steering enables higher collimation and peak power while maintaining eye safety and acceptable power consumption and thermal dissipation

Higher Resolution

- Emitter beam steering and/or receiver detector / detector array steering to sub-segments of the FoV with repeatable sub-milliradian precision
- Reduced size and complexity, smaller FoV of the receiver and/or emitter optical sub-system
- Reduces the number of laser and detector elements needed

Scalable

- DBS component can be designed into next generations of existing LiDAR designs
- Compatible with a broad range of wavelengths (NIR, SWIR, MWIR, LWIR)
- Up to 120° x 60° addressable steering
- Fast transition time down to 50 microseconds, can support high frame rates

Adaptable

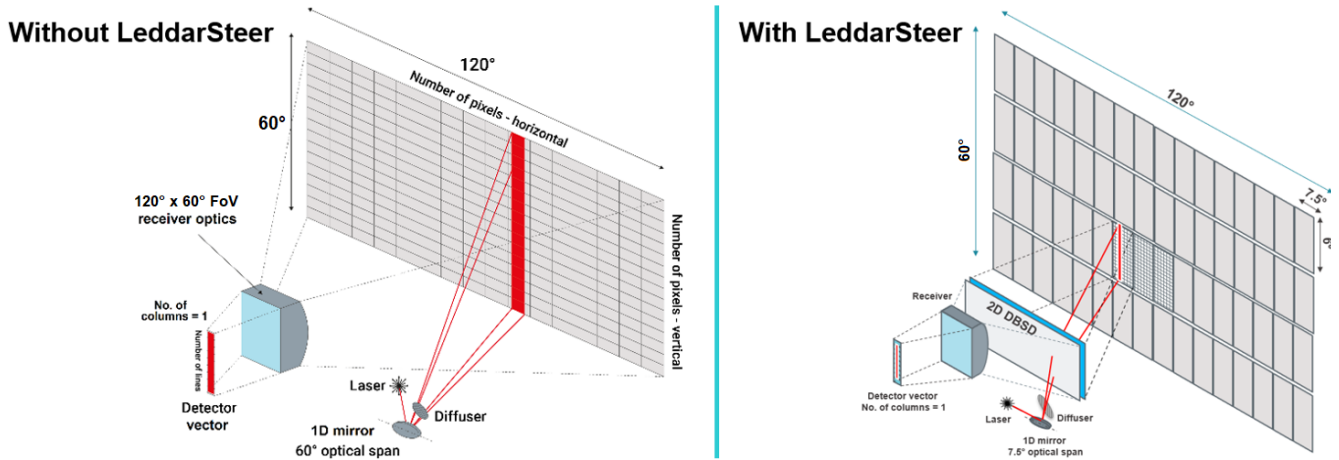
- Compatible with a variety of LiDAR architectures

Reliable

- 100% true solid-state technology (no moving parts)

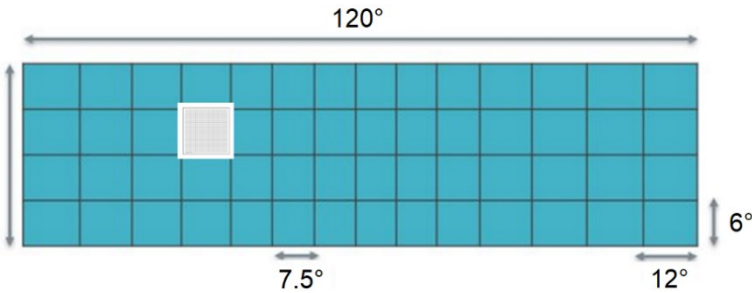
LeddarSteer DBS can be fully customized for volume production (number of layers, steering angles, aperture and more) with up to 7 cm clear aperture.

LeddarSteer DBS for LiDAR: Overview



LeddarSteer can be seamlessly integrated into an existing LiDAR and expand the field of view while maintaining high resolution. In the example above, using the Evaluation Kit, a resonant micromirror semi-flash architecture is used. Simply adding LeddarSteer DBS in front of the emitting and receiving optics significantly enhances LiDAR performance and FoV. The scanning pattern can be in any desired order on any tiles.

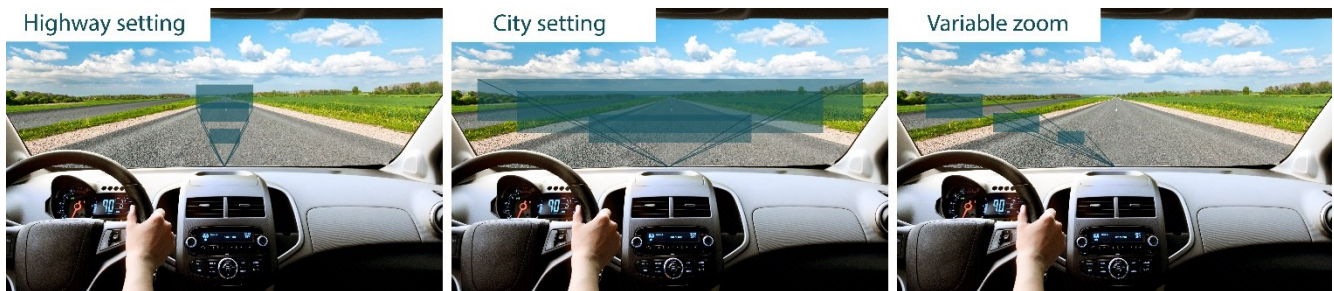
LeddarSteer Field of View



The field of view of a tile is finer in the center and is linearly extended towards the edges. There are two types of transitions (accelerated and natural, of $50 \mu s$ and $<750 \mu s$ respectively). Non-sequential scanning optimizes the number of accelerated transitions and the frame rate.

Flex View: On-the-Fly Field-of-View Adjustments

The Flex View feature enables modifying the FoV, the resolution and the number of acquisitions on a specific tile during operation and as fast as from frame to frame. This provides a valuable advantage when dealing with hazardous objects or adverse conditions such as fog, rain or snow. It is also perfect for switching between a highway and city setting.



Long-range FoV

Front LiDAR covers large FoV and high frame rate (vs. 2-corner LiDAR design)

On-the-fly SNR and resolution adjustment in adverse weather conditions

Specifications

Parameter	Standard Part	Evaluation Kit ¹	Limits ²	Units
Full field of view (azimuthal x elevation)	120 x 30	120 x 24	Up to 120 x 60 or 60 x 120	Degrees (°)
Single tile optical minimum FoV (azimuthal x elevation)	8.3 x 8.3	7.1 x 6.0	Customer-specific	Degrees (°)
Number of tiles (H x V)	12 x 4	14 x 4		Segments
Horizontal steering angles	Base steering ±4.15	Base steering ±3.56		Degrees (°)
Vertical steering angles		Base steering ±3.0		Degrees (°)
Form factor (H x V)	30 x 30	65 x 75		mm

¹ Typical.

² LeddarSteer DBS can be fully customized for volume production (number of layers, steering angles, aperture and more).

Transition Time

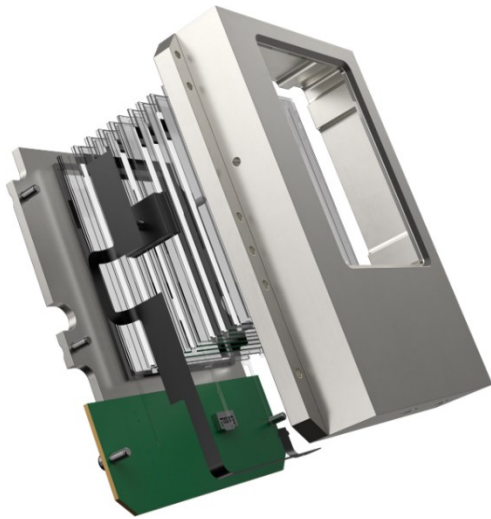
Transition Type	Transition Time
Accelerated (low voltage to high voltage)	50 µs to 100 µs
Natural (high voltage to low voltage)	≤750 µs @ 55°C



LeddarSteer Evaluation Kit

The LeddarSteer Evaluation Kit allows you to test DBS features on a stand-alone platform and experiment the integration of the DBS technology within your own LiDAR design. The Evaluation Kit's DBS contains 7 liquid crystal layers with 7.5° x 6° FoV and >5 cm clear aperture.

- Easy interface and control through SPI, USB and hardware trigger
- Compact and well adapted for characterization of the different modes
- Configuration and settings can be fine-tuned
- Programmable tile switching sequences
- Interface with other products such as the LCA3 Evaluation Board



Ask about LeddarSteer DBS for your LiDAR development project today.



Integrates seamlessly into LiDAR system designs



Drastically reduces optical design requirements, hence cost, size and complexity



On-the-fly field of view and resolution adjustment, providing tools to assess adverse conditions such as rain, fog, snow and objects of interest



Drastically mitigates ambient light noise, extending the range

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