

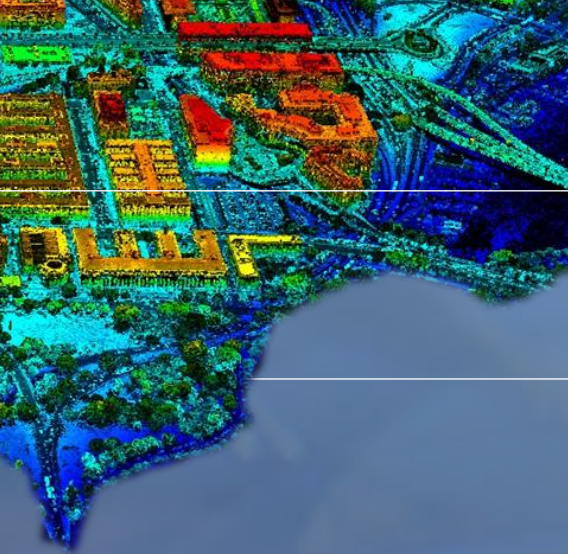
# Sunex

Excellence in Optical Design and Manufacturing

## LiDAR and ToF Lenses

25+ year track record of success in taking customer concepts from design through mass production.

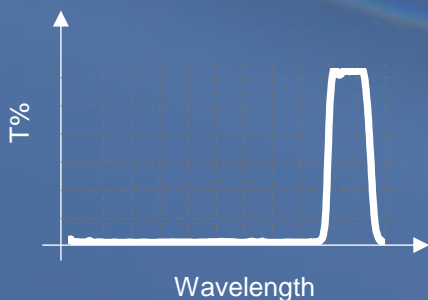
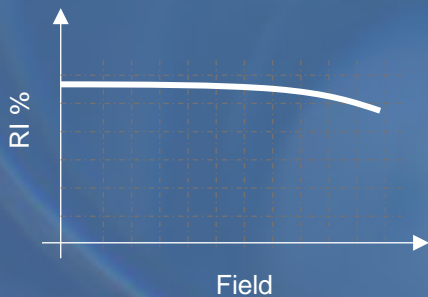
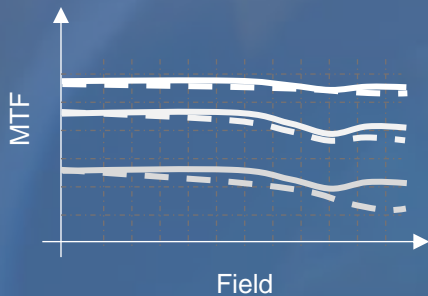




# Sunex LiDAR and ToF lenses

## Time-of-Flight

ToF or Time-of-Flight refers to a measurement principle based on a signal leaving a source and a detector measuring the time it takes for a detector to receive the same signal back. The distance to any given object can be determined by factoring in the speed of the signal itself. Optical systems play a critical role when the signal is based on light, and the most common systems are referred to as ToF-cameras and LiDARs. ToF-cameras illuminate a scene with a modulated signal, and the phase shift between the send and receive signal determines the depth ranging. LiDAR stands for Light-Detection-and-Ranging and uses the delay between send and receive of a single laser pulse to determine depth. Sunex is offering solutions for both types.



## Applications

Many industries and applications have leveraged these technologies for decades, from topology and meteorology to medical and industrial robotics applications. In recent years ToF-cameras and LiDARs have also entered high-volume consumer and automotive markets. Especially for LiDAR applications, we see many established and new companies pushing the boundaries to reduce costs and advance performance for long- and short-range LiDAR systems.

## Designed for Mass Production

Often it is not the challenge to create a design “that works” but to find a solution that can scale to mass production, meeting price targets, optical performance, mechanical constraints, and quality requirements. Sunex has decades of design and manufacturing expertise, and all of our ToF- or LiDAR lenses are designed within the context of high-volume manufacturability.

All graphs are for illustration purpose only. The individual lens performance can be different.

Type	Format	EFL	FOV	F/#	TTL	Features
DSL146	1/2.8"	3.3	123	1.4	28	All Glass, Wide FOV, 4k High Resolution
DSL147	1/2.8"	2.5	156	1.4	28	All Glass, Wide FOV, 4k High Resolution
DSL148	1/3"	2.2	122	1.4	20	Hybrid Design, Wide FOV, Short TTL
DSL115	1/3"	4.5	68	1.5	27	Hybrid Design, Short TTL
DSL947	1/3"	6.1	56	1.6	14	All Glass, Small Form Factor
LiDAR Receiver	1.5"	41	35	1.4	57	Long range, narrow FOV, low straylight
LiDAR Receiver	1"	8	≥120	1.3	50	Hybrid Design, Short range, wide FOV

Table only shows a selection. Additional ToF and LiDAR lens options are available.

## Miniaturized SuperFisheye™




With the recent advancements to expand the LiDAR technology to non-spinning short-range or near-field, LiDARs the requirements shifted to an increase in horizontal (HFOV) and vertical field of views (VFOV), smaller F/#, and a decrease of the overall form-factor.

Sunex pioneered and coined the term Miniaturized SuperFisheye™ lenses in the automotive industry. We are now applying the same design concepts and experiences to support our customers in advancing their LiDAR product range.

## Automotive Qualified

With almost two decades as a qualified automotive supplier to our global customer base, we know what is required to design and manufacture a lens that has stable performance over a wide temperature range and passes automotive reliability and environmental testing. Whether we improve existing work through Design for Manufacturing (DFM) and Design to Cost (DTC) cycles or start with a blank sheet design to meet all requirements, the end goal is always to deliver on time with consistent quality.



-  ToF Camera
-  Short Range LiDAR
-  Long Range LiDAR

Create 3D depth perception with

LiDAR lenses



Consulting – Design – Manufacturing - Support



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