

# Sunex

Excellence in Optical Design and Manufacturing

## HD Projection Lenses

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





# Sunex $\mu$ LIGHT™ lenses

## Automotive Headlamp Solutions

Lighting functions in and around the car play an ever-increasing role in an OEM's brand recognition and are a signature piece for corporate design consideration.

From a purely technical perspective, modern high definition (HD) headlamps are designed for two main applications: Advanced Lighting Functions and Road Projections.

Even with the underlying technologies advancing far beyond what the early trailblazers of automotive headlamps could have envisioned, we still try to optimize for the same goals:

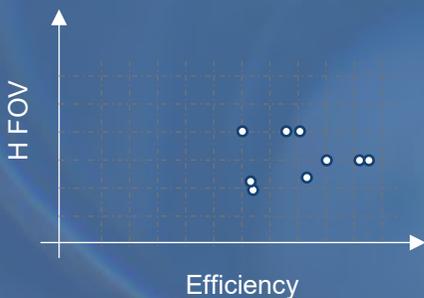
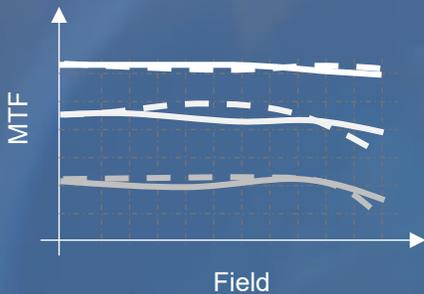
- reduce glare
- increase efficiency and range
- make driving safer

Sunex's design, engineering, and manufacturing know-how are well known in the automotive industry. Our consistent quality and on-time delivery made us a preferred supplier for imaging optics for leading Tier1s and OEMs for over a decade. Building on that history and reputation, we successfully advance the new high-resolution automotive headlamps segment with our customers and partners.

## Expanding the Solution Space

The requirements for high-resolution automotive projector lenses are changing as the adoption of this technology rapidly increases. Besides mechanical constraints and the need to meet OEM styling guidelines, we typically see MTF, Emax, efficiency, and color aberrations as crucial performance differentiators.

Sunex has developed an extensive design expertise, engineering capabilities, and manufacturing process know-how that addresses the expanding solution space.



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

Lens	HFOV	F/#	Efficiency	TTL	Source	Notes
A	48	0.66	46	31	16/26k	All glass, wide HFOV, compact design
B	24	0.7	42	70	16k	Hybrid, narrow HFOV, good efficiency
C	20	0.75	40	70	16k	All glass, narrow HFOV, OEM production
D	40	0.7	49	57	16k	All glass, wide HFOV, OEM production
E	24	0.65	43	63	16/26k	Hybrid, high resolution, OEM production
F	30	0.7	50	59	+3k	Hybrid, wider HFOV, high efficiency

Data does not constitute specifications. Additional  $\mu$ LIGHT™ lens options are available.

## Fast Prototyping

We provide prototyping services for complete lens assemblies, often as the first step after a new custom design.

In automotive headlamps, the series-production barrel design is a crucial part of the prototyping process. It defines the headlamp module's critical interface to the vehicle, making it as important as the optical system itself.

Sunex can produce prototypes with short lead times to verify the design before advancing to OEM series production, using state-of-the-art fabrication processes for glass and plastic optical elements and all mechanical components.

## Test & Measurement Capabilities

Sunex has expanded the existing design, test, and measurement capabilities to account for the specific needs of projection optics and our automotive headlamp customers.

In-house equipment includes test systems for the characterization of large-format projection optics, a goniophotometer lab with industry-standard analysis software, and VDA19.1 test equipment.



See the road ahead with  $\mu$ LIGHT™ lenses

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Consulting – Design – Manufacturing - Support

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