

OrionTM
by metalenz

Orion 18K Meta-optic (ML1DP18MS)

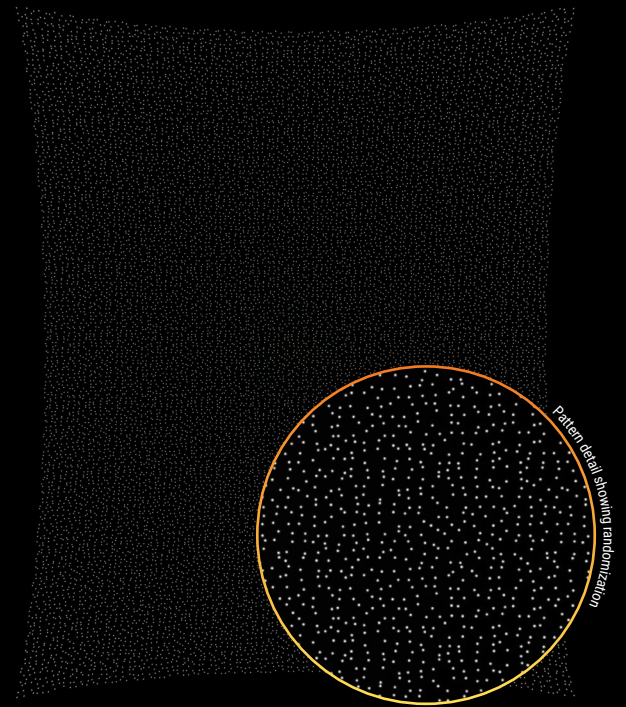
Pseudorandom Dot Pattern Meta-optic for Structured Light 3D Sensing

Metalenz's revolutionary technology simplifies 3D sensing optical systems by providing collimation and dot projection functions with a single optical metasurface element (meta-optic) while exceeding the performance of traditional multi-element designs.

Applications

face authentication for smartphones, (contactless) access control, security • gesture recognition • obstacle avoidance • automotive in-cabin monitoring

The Orion 18K infrared dot pattern projector meta-optic demonstrates the benefits of Metalenz's revolutionary technology for 3D sensing applications. Dot projector modules consist of a VCSEL array light source and pattern projecting optics. Conventionally, the optics consist of multiple elements: refractive lenses for collimation and diffractive optical elements for the patterning. Metalenz produces the dot pattern directly from the VCSEL array with a single meta-optic (one metalens with a single metasurface layer).



Key Features

- high-contrast, high intensity dots for better performance in daylight
- large field of illumination (FOI)
- superior dot to dot power uniformity
- extreme temp stability
- multifunction
- reflowable

Typical Optical Characteristics¹

Metric	Typ. Value	Note
Wavelength of Operation	940nm +/-10nm	2nm bandwidth
Number of Dots	~18,000	For VCSEL with ~400 emitters
Dots Pattern	Pseudorandom	For VCSEL with randomized pattern
Average Dot FW1/e ²	0.19°	For VCSEL with 8µm Optical Aperture and M ² =1
Tiling	5x9	Seamless for VCSEL with 0.602mm x 0.393mm active area
Minimum Working Distance	20cm	Minimum distance for seamless pattern. For shorter distances, seams between the tiles are present
Full FOI (H)	62.5°	For VCSEL with 0.602 x 0.393mm active area FOI (D) includes distortion effects
Full FOI (V)	75.5°	
Full FOI (D)	106°	
Mean Contrast	40:1	Average signal in the dot over the average signal residing outside of dot in a square around the centroid of dot with twice the dot size, for no ambient light conditions
Geometric Distortion	+37%	Pincushion, relative to f.tan(theta) in real space
Dot Power Efficiency	60%	Total power in the dots over incident VCSEL power
Power per Dot	50 µW	For VCSEL with 1.50W peak power and 391 emitters
Dot Power Uniformity Error	<5%	(Pmax-Pmin)/(Pmax+Pmin) with max and min powers are integrated irradiance over dots FW
Lens Dimensions	2.7 x 2.5 x 0.775mm	Active area size is 2.1 x 1.9mm ²
TTL	3.135mm	Optical total track length, metasurface facing world (see drawing for orientation)
BFL	2.36mm	Top of VCSEL to bottom of substrate, metasurface facing world (see drawing for orientation)
Number of Meta-optic Surfaces	1	Orientation: facing world
Number of Fiducials	3	
AR Coating	2 surfaces	Top and bottom

1. Opto-mechanical performance for VCSEL of 0.602x0.393mm active area, 8µm OA (optical aperture), 20° D86 beam full divergence and 1.5W peak power.

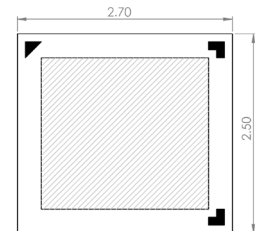
VCSEL Compatibility

Compatible with Vertilite “Dolphin” 940nm VCSEL array P/N CSC940F002. Other compatibility options upon request.

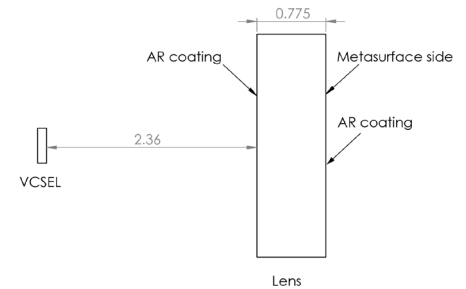
Safe Handling Note

- Avoid any contact with lens surface
- Cleaning: follow best practices for AR coated lenses. Do not use tweezers, compressed air, swabs, or other means to rub the optical surfaces.

Metalens- Top View



Metalens- Side View



Metalens- Isometric View

