



Orion™
by metalenz

+ VERTILITE
纵慧芯光

STARLIGHT Dot Projector (MT1DP18MSVD)

Infrared Dot Pattern Projector for Structured Light 3D Sensing

The Starlight projector is the most compact, high performance, low cost structured light solution available for 3D sensing systems. Based on "Orion 18K" pseudorandom dot pattern meta-optic from Metalenz paired with Vertilite's proven single-junction "Dolphin" VCSEL.

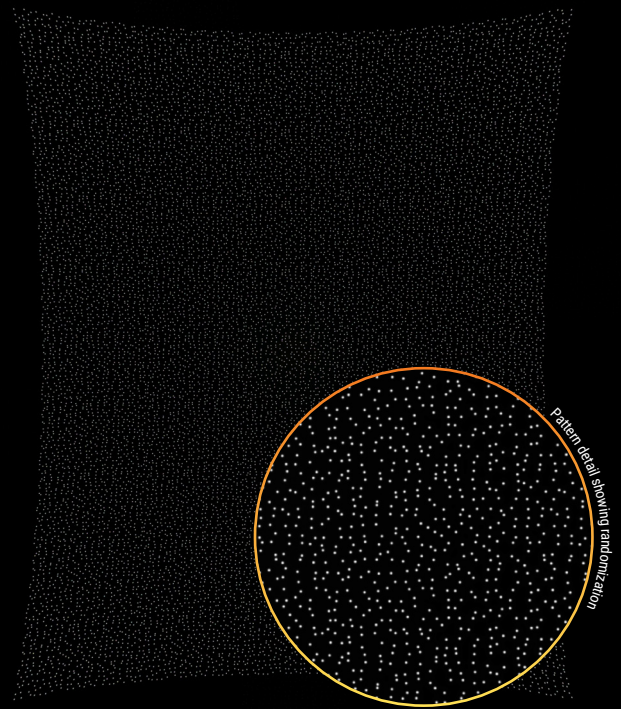
Applications

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

The Starlight projector generates ~18,000 dots in a pseudorandom pattern using the Orion 18K meta-optic to collimate and diffract the light coming from VCSEL emitters arranged in a pseudorandom array. The dot pattern is produced directly for the VCSEL array with a single meta-optic (one metalens with a single metasurface layer).

Using metasurface technology, Starlight delivers class leading power per dot with high contrast, making it suitable for use under any indoor/outdoor lighting conditions. Additionally, the Orion 18K meta-optic provides superior pattern precision, a very large field of illumination and is reflowable and stable at extended operating temperatures.

Vertilite's Dolphin, a 1.5 watt 940nm pseudorandom pattern VCSEL array, is an ideal solution for structured light applications.



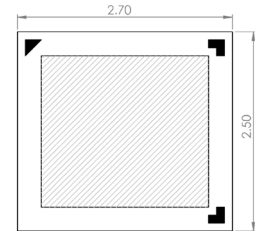
Key Features

- 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

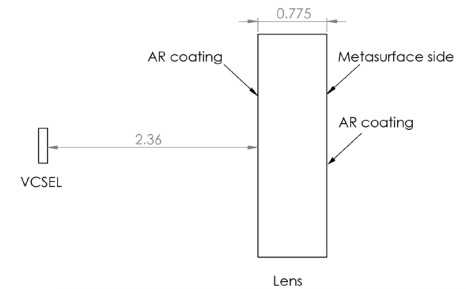
Typical Optical Characteristics

Metric	Typ. Value	Note
Wavelength of Operation	940nm +/-6nm	2nm bandwidth, 0.07nm/°C dλ/dT
Number of Dots	17,595	Pseudorandom dot pattern
Average Dot FW1/e ²	0.19°	
Full FOI (H)	62.5°	5x9 seamless tiling
Full FOI (V)	75.5°	
Minimum Working Distance	20cm	Minimum distance for seamless pattern. For shorter distances, seams between the tiles are present
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 Optical Efficiency	60%	Total power in the dots over incident VCSEL optical power
Power per Dot	50 μW	Pulse 2A, 1000Hz, 10%D.C., 50°C
Dot Power Uniformity Error	<10%	(Pmax-Pmin)/(Pmax+Pmin) where 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
Optical TTL	3.135mm	Top of VCSEL to top of meta-optic
BFL	2.36mm	Top of VCSEL to bottom of meta-optic
Number of Meta-optic Surfaces	1	Orientation: facing world

Metalens (Orion 18K) Top View



Side View

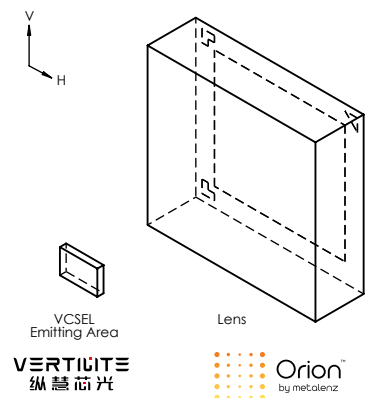


VCSEL Characteristics¹

Metric	Typ. Value	Note
Wavelength	940nm +/- 10nm	
Optical Output Power	1.5W	Pulse 2A, 1000Hz, 10%D.C., 50°C
Operating Peak Current	2.0A	
Operating Voltage	2.1V	
Power Conversion Efficiency	38%	
Number of Emitters	391	Pseudorandom arrangement
Chip Dimensions (LxWxH)	940μm x 575μm x 100μm	Active area is 602μm x 393μm

¹ Pulse condition 1000Hz, 10%D.C., 50°C

Isometric View



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.



WARNING This product includes a laser emitting device. Use appropriate protective eyewear when possible.

STARLIGHT - Components	
Meta-optic	Metalenz "Orion 18K" P/N ML1DP18MS
VCSEL	Vertilite "Dolphin" P/N CSC940F002