

Record performance of Tx metalens

A SINGLE-SURFACE METALENS DOT PROJECTOR

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Technical specifications of the record performing single-surface metalens that combines collimation function and fan-out function into a single nanostructured metalens surface, so-called 2-in-1 optics, to create a dot projector. The single-surface metalens dot projector is characterized using a VCSEL light source.

Dot Projector Specifications

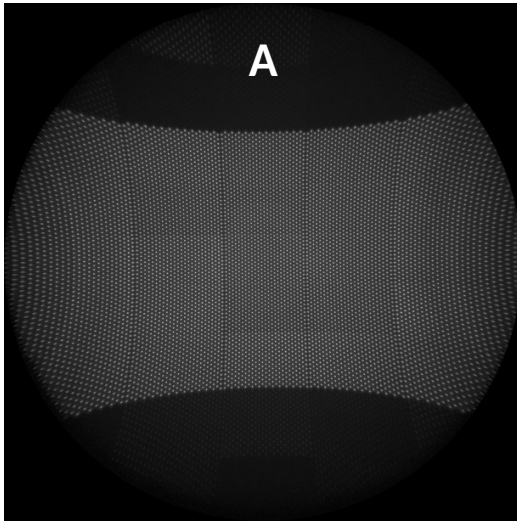
Dot projector	λ [nm]	FOI (X*Y) [$^{\circ}$]	Tiling	Number of spots	Efficiency [%]	Dot uniformity error [%]
A	940	144 x 70	5 x 5	8,125	>65	<15 *
B	940	70 x 70	5 x 3	4,875	>70	<15 *
C	940	70 x 40	3 x 3	2,925	>70	<10

VCSEL divergence angle [$^{\circ}$]	Number of emitters	VCSEL emitter area (X*Y dimensions) [mm]
29	325 in hexagonal arrangement	0.81 x 0.51

* +/- 5% Current uncertainty with planned improvements in the near future

Projected VCSEL illuminated profile of dot projectors

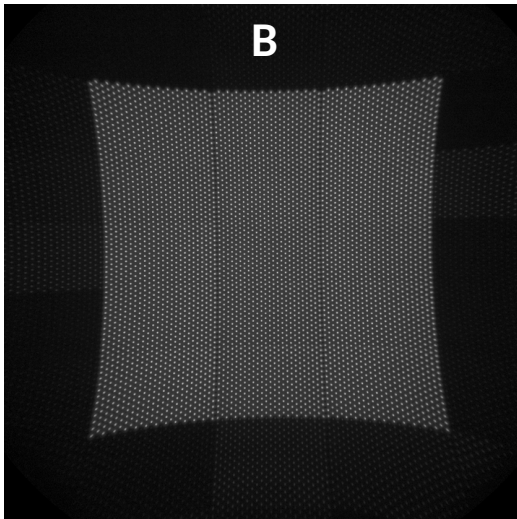
With these dot projectors, NILT has demonstrated designs for any field of illumination (FOI), including extreme FOI, while maintaining a dot-uniformity error of less than 15% and efficiency above 65% for the extreme FOI. Lower FOI dot projectors exhibit efficiencies above 70% and dot-uniformity errors less than 10%. These demonstrations signal that NILT's dot projectors can be designed into a diverse range of 3D sensing applications. NILT can customize the field of illumination and the tiling to the applications' specific needs while delivering excellent performance.



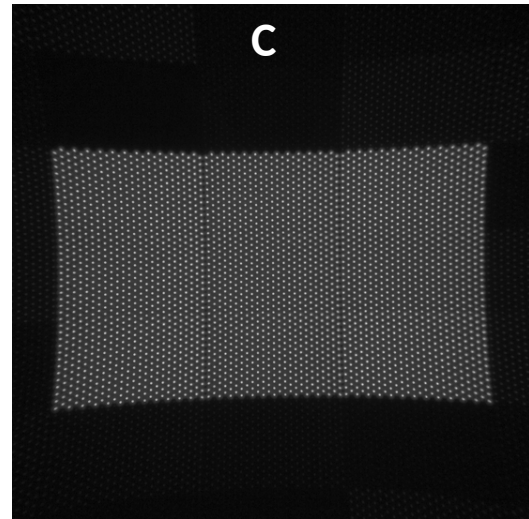
Dot projector 'A' has a FOI of $144^\circ \times 70^\circ$, yet maintains a dot-uniformity-error below 15% which is highly advantageous for applications such as in-cabin monitoring.



Illustration of a schematic module geometry that shows the simplicity of using a single optical surface to produce the dot pattern.



Dot projector 'B' has a FOI of $70^\circ \times 70^\circ$ and like design 'C' demonstrates a record efficiency above 70% even with its comparably larger FOI.



Dot projector 'C' has a FOI of $70^\circ \times 40^\circ$, record efficiency above 70%, and dot-uniformity-error $<10\%$, making it an ideal platform for most 3D sensing applications where low power consumption is critical.

For inquiries, contact Brian Orr, VP Sales or Dr. Ulrich Quaade, Head of Optics at contact@nilt.com

About NILT

NIL Technology ApS (NILT), founded in 2006, is an advanced optical solutions company designing, developing, and manufacturing optical elements and components using high-precision nanoscale features. The company is backed by several industry-independent investors: Jolt Capital, NGP Capital, Swisscanto, Vækstfonden, and the European Innovation Council (EIC).

NILT creates competitive advantages with flat optics in optical applications for 3D sensing, consumer electronics, machine vision, autonomous vehicles, telecommunication, and AR/VR/MR displays. NILT is based in Denmark and has offices in Switzerland, Sweden, Malaysia, and the US. Visit us at www.nilt.com.