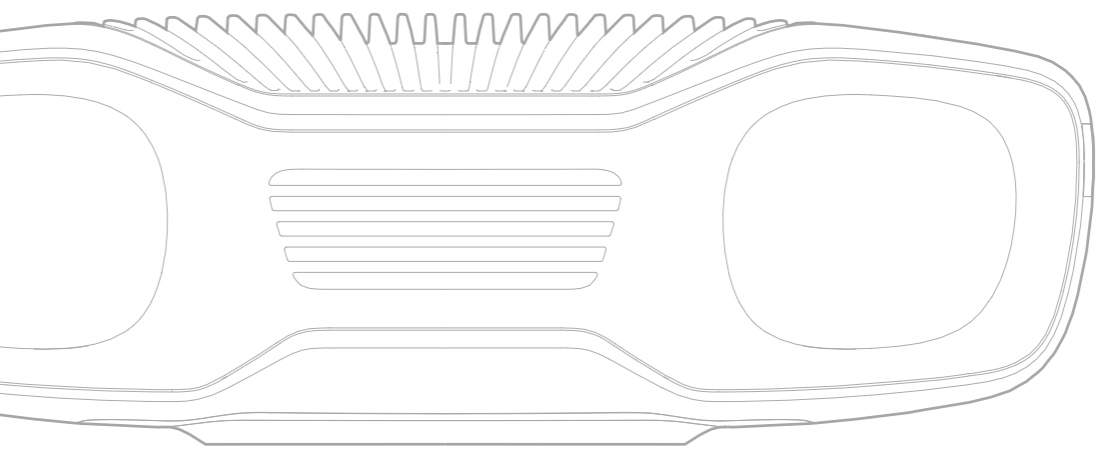
Zivid Two

L100

Technical Specification



Introduction

Zivid Two is a product family of structured-light 3D cameras designed for machine vision applications. These cameras produce 2D color images and colored 3D point clouds with high resolution, fidelity and quality at high speeds ranging from 10's of milliseconds to seconds, depending on the application and required point cloud quality.

Zivid Two cameras are designed to be ruggedized and small, making them ideal for robot-mounted applications where the camera is fixed to the end-effector of a fast-moving robot. They are available in different variants with different field-of-view tailored to the volumes-of-interest of specific applications.

The Zivid Two cameras are designed for use in industrial environments and provide state-of-the-art performance and reliability. They are particularly suited to machine vision applications that require high-performance 3D imaging.

Overall, Zivid Two is an excellent choice for machine vision professionals who demand high-quality, flexible, and reliable 3D imaging.

Table of Contents

General specifications

Product	Zivid Two L100
Model Number [1]	Z2 L100
Revision [2]	Rev B
Order code (SKU)	ZVD2-L100
3D technology	Structured-light
Imaging	1944 x 1200 (2.3 MP) Native 3D Color
Point cloud output	3D (XYZ) + Color (RGB) + SNR
Exposure time (minimum per pattern projection)	1.677 ms
Aperture (A)	f/1.8 to f/32
Gain (G)	1x to 16x
Projector Brightness (B)	0.25x to 1.8x 1x = 360 lumens 1.8x = 648 lumens (max)
Calibration	Factory calibrated
Safety and EMC	CE CB EN62368 FCC Class B KC
Typical capture time [3]	100 ms to 1 s

[1] The model number is found on the physical label on the product (marked M/N).
[2] The product's major revision of hardware for which this datasheet is valid. The revision can be found together with the model number (M/N) on the physical label of the product.
[3] From capture initialized until point cloud is ready to copy. Includes processing. Acquisition time can be shorter.

Operating distance and field of view

Focus distance (mm)	1000
Optimal working distance (mm)	800 to 1400
Recommended working distance (mm)	600 to 1600
Field of view (mm)	1147 x 680 at 1000
Spatial resolution (mm)	0.56 at 1000 5.6×10^{-4} per distance (z) in mm

FIGURE 1 – FIELD OF VIEW

All values in degrees or mm.

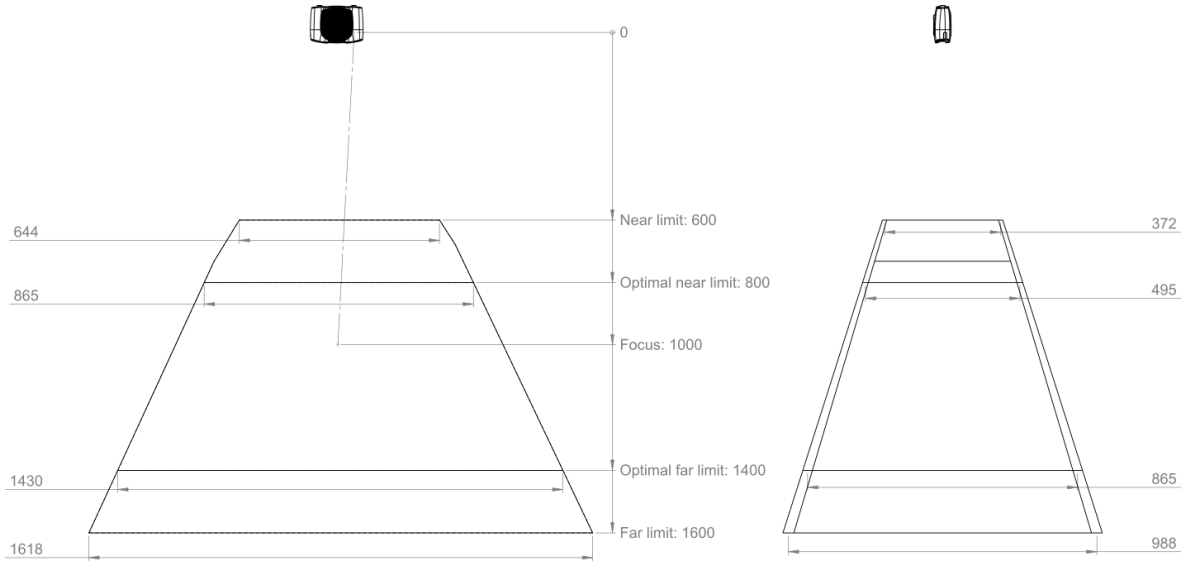


Figure 2 – Field of View vs. Distance

All values in degrees or mm.

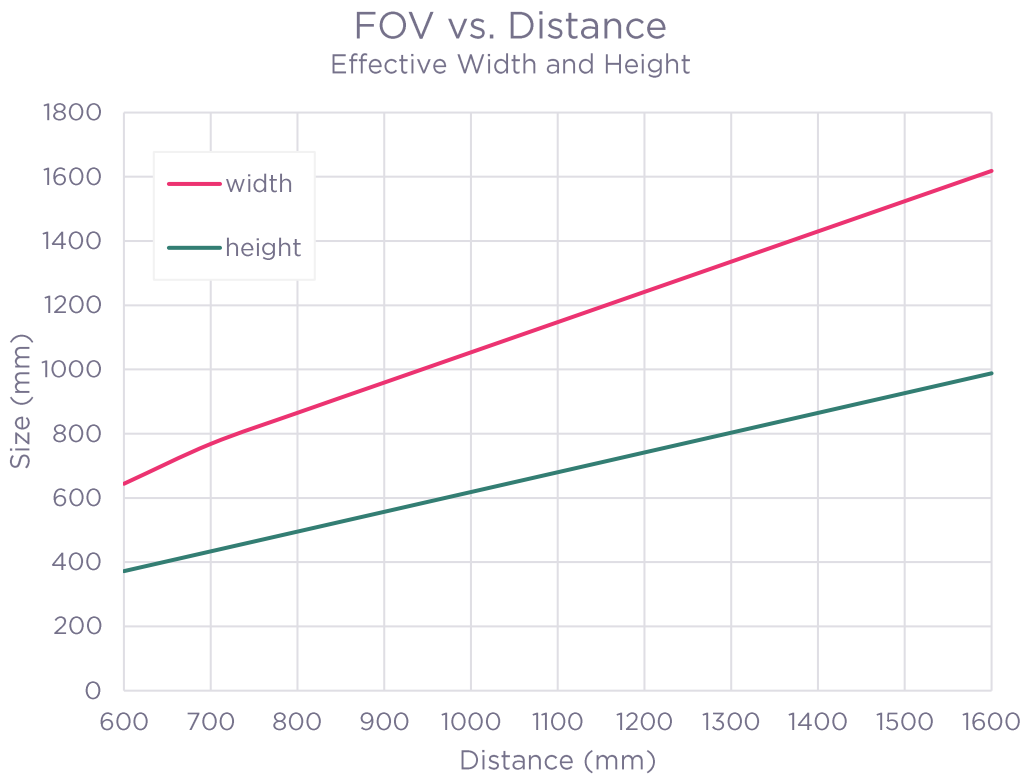


Figure 3 – Spatial Resolution

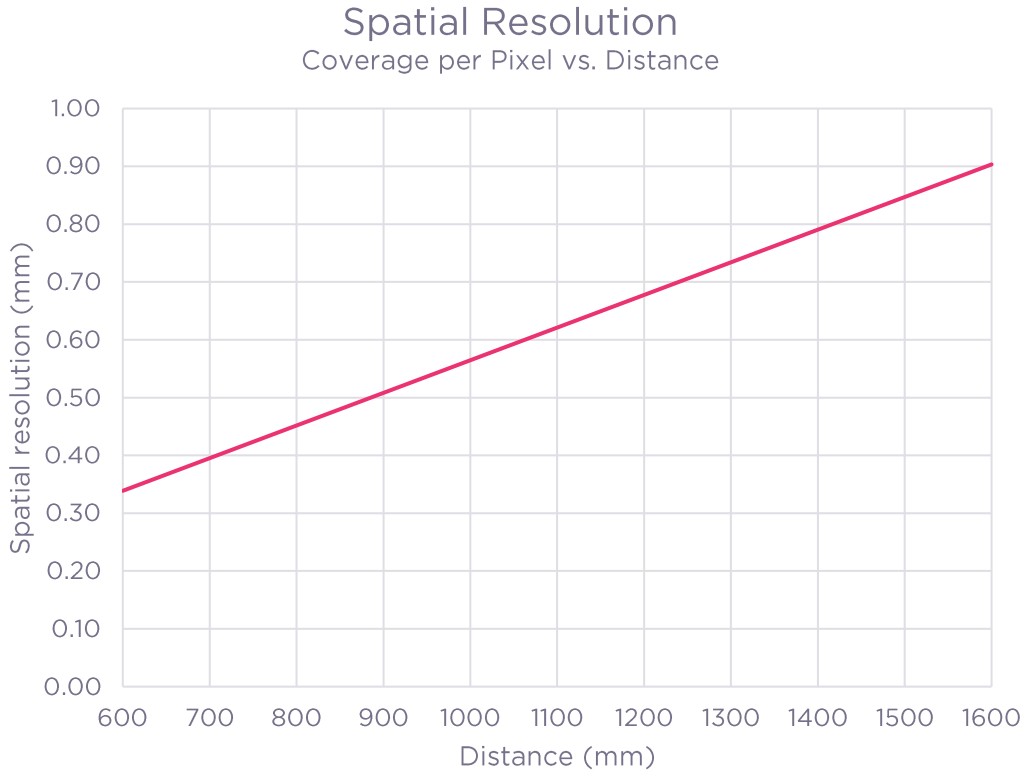


FIGURE 4 – PROJECTOR BRIGHTNESS

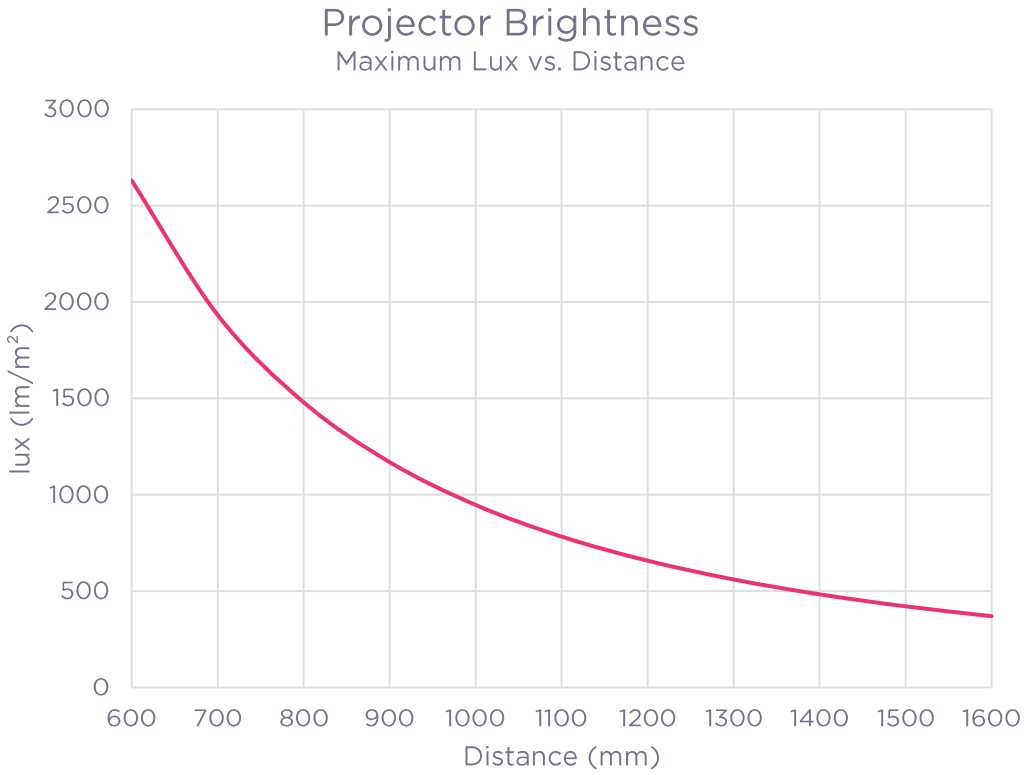


FIGURE 5 – OPTICAL ANGLES AND BASELINE

All values in degrees or mm.

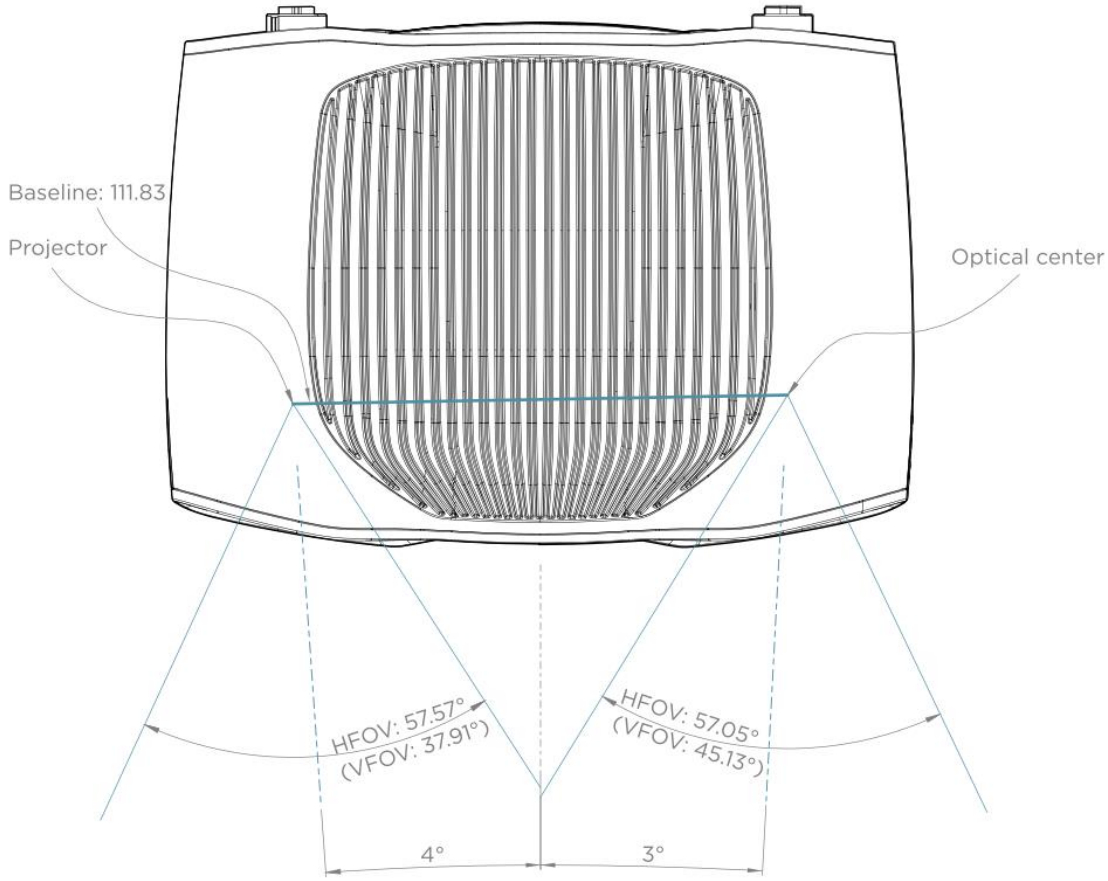


Figure 6 – Optical Center Position Relative to Mounting Holes

All values in degrees or mm.

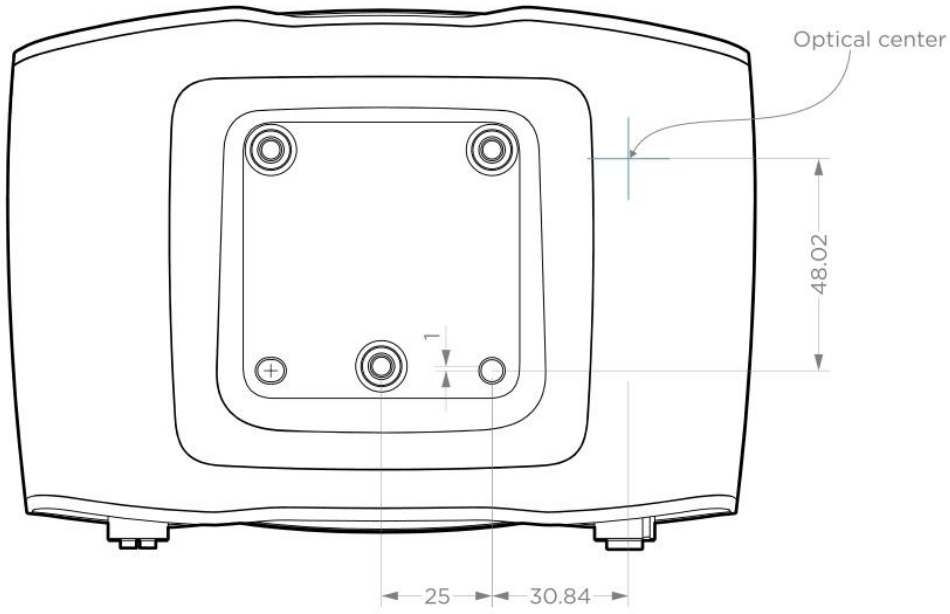
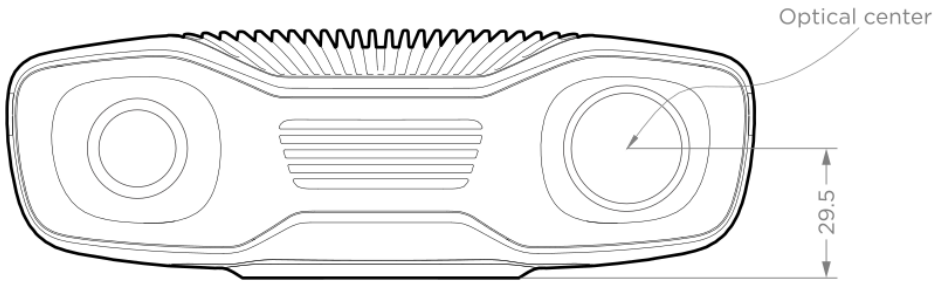


Figure 7 – Optical Center Position Relative to Base Plate

All values in degrees or mm.



Accuracy specifications

Common conditions

The following table outlines the conditions applied under test and to all specifications unless stated otherwise.

Parameter	Description	Typical
Working distance (D)	Focus distance	1000 mm
	Optimal working distance	800 – 1400 mm
Ambient temperature (Ta)	Typical temperature	15 - 30 °C
	Full temperature range	0 – 40 °C
Ambient light (La)		0 lux
Aperture (A)		f/8.0 – f/2.0
Gain (G)		1.0x
Projector Brightness (B)		1 – 1.8 x
Capture time	Acquisition time used during measurement	> 60 ms
	Capture time used during measurement	> 100 ms
Duty Cycle	Capture-to-Idle time ratio	5 - 30 %
Other		81% center crop (90% × 90%) HDR = off 10 min warm-up Applied in-field correction

Typical specifications

Typical numbers are given at common conditions unless otherwise specified.

Property	Description	Typical
Warm-up time	The minimum recommended time needed for camera to stabilize from an idle state assuming capturing at a constant rate. [4]	10 minutes
Dynamic Range	Maximum for 1-frame acquisition	60 dB
	Maximum for HDR acquisition	120 dB
Point precision	1σ Euclidian distance variation for a point between consecutive measurements at focus distance, D. [5]	100 µm
Local Planarity Precision	1σ Euclidian distance variation from a plane for a set of points within a smaller local region at focus distance, D. [6] [8]	130 µm
Global Planarity Trueness Error	Average deviation from a plane in field of view at focus distance, D. [7] [8]	< 0.20 mm
Dimension Trueness Error	70-percentile dimension error in field of view at focus distance, D, and typical temperature range. [9]	< 0.20 %
	70-percentile dimension error in field of view within optimal working distance and typical temperature range. [9]	< 0.30 %
	70-percentile dimension error in field of view within optimal working distance and full temperature range. [9]	< 0.60 %

Note: The term “accuracy” is composed of a precision component and a trueness component as described in ISO 5725.

[4] Some trueness changes may be experienced during warm-up phase.
[5] Point precision is found by measuring an individual point’s capture-to-capture variation in space for all points in the point cloud over multiple consecutive measurements.
[6] Local planarity precision is defined as the average standard deviation of all individual local standard deviations across the entire field-of-view. An individual local standard deviation is found by measuring the orthogonal distance from a fitted plane of all individual points within a small local region, e.g., 50 by 50 pixels.
[7] Global planarity trueness error is found by measuring the distance of all individual points in the point cloud from a flat reference surface. Can also be interpreted as flatness.
[8] Measured using the unfiltered, raw output of a single-acquisition 3D capture on a Lambertian surface. Enabling post processing filters, such as Gaussian filter, can further suppress noise to great effect.
[9] Dimension trueness error is found by measuring the error of multiple calibrated reference distances in the point cloud. A reference distance can be 5 to 50 cm. The calibrated reference object is measured repeatedly across the entire field of view and operating distance, and during exposure of thermal and mechanical stress, such as temperature change, vibration, and shock.

FIGURE 8 - POINT PRECISION VS. DISTANCE AND AMBIENT LIGHT

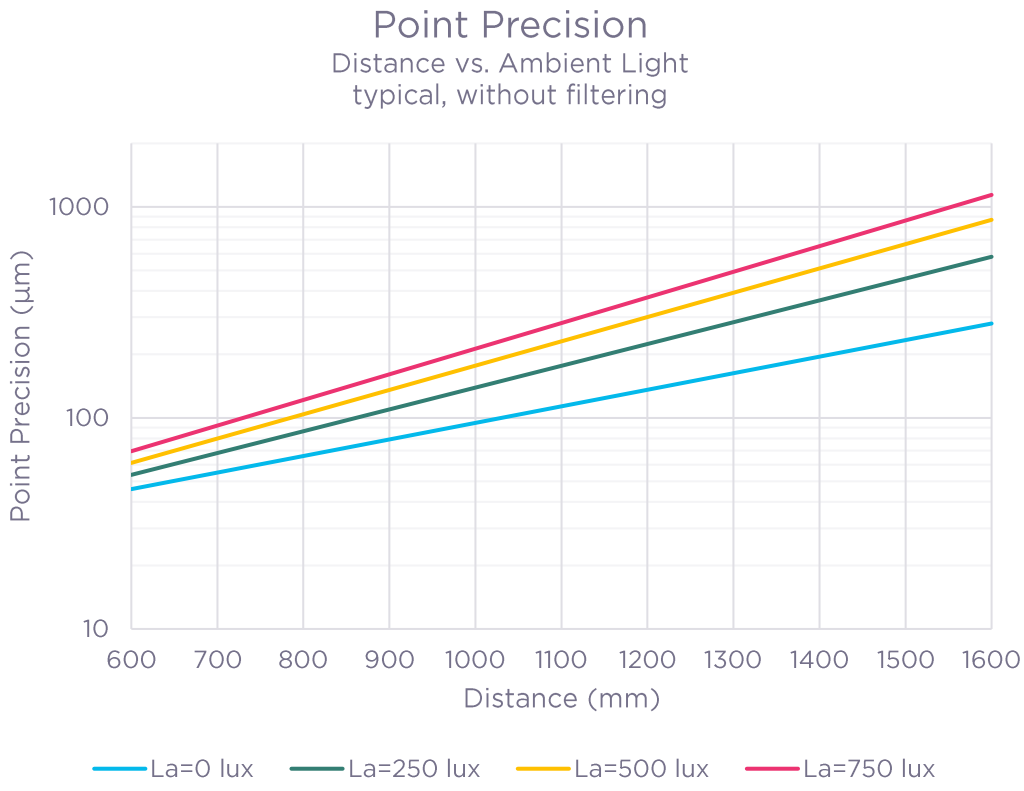


FIGURE 9 - LOCAL PLANARITY PRECISION VS. DISTANCE

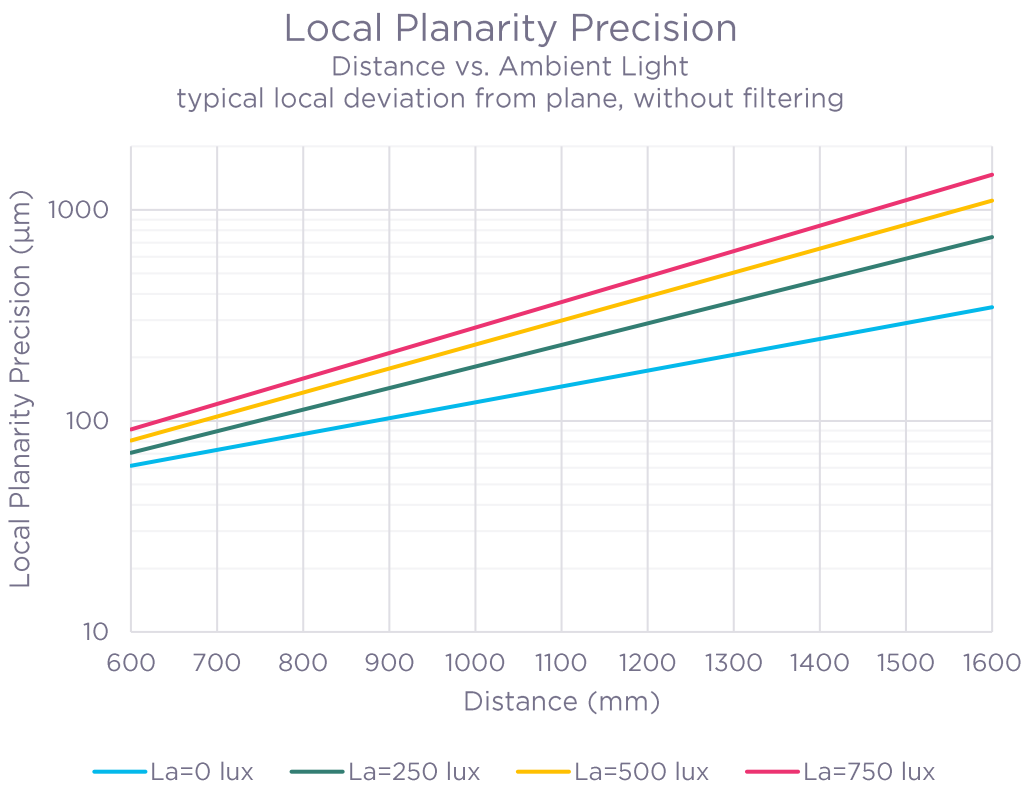


FIGURE 10 - GLOBAL PLANARITY TRUENESS VS. DISTANCE

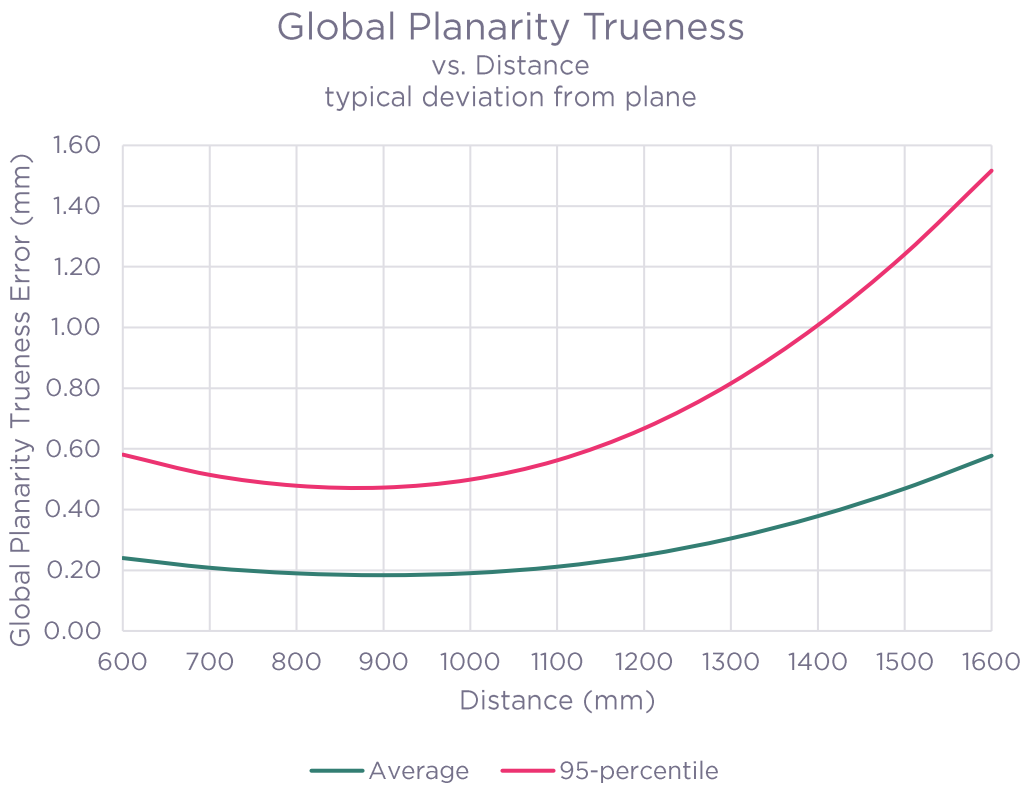
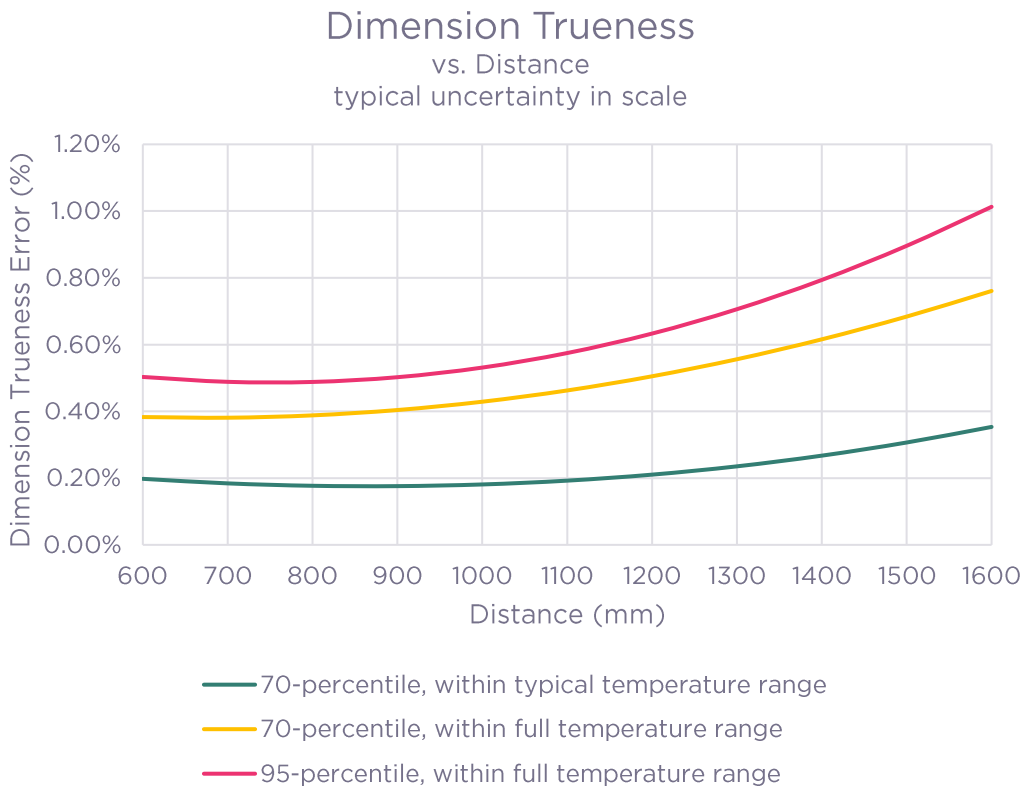


FIGURE 11 - DIMENSION TRUENESS VS. DISTANCE



Physical specifications

Size	169 mm x 122 mm x 56 mm
Weight	945 g
Flatness tolerance of mounting surface [10]	±0.05 mm
Cable strain limit	125 N
Environmental	IP65 5 g sinusoidal [11] 15 g shock [12]
Operating temperature	0° to 40° C
Storage temperature	-20° to 60° C
Humidity [13]	10 – 90 % non-condensing
Safety [14]	Risk Group 2
Noise, typical at 1 m distance	< 28 dB, typical use 67 dB, at maximum fan speed
Data connection	10 GigE [15] M12-X, 8-pin connector, X-coded CAT6A, SF-UTP or better
Power connection	M12-5
Power adapter	24 V ⎓ 5A, DC EU, US, and UK power plug options
Power consumption, typical	15 W, Idle 45 W, TDP [16] 120 W, Peak

[10] The surface which the camera is mounted to should meet this specification.
[11] IEC 60068-2-6, 10-150 Hz, 5 g, in X, Y and Z direction, 2 hour per axis. Sweep rate 1 octave per minute sweep rate.
[12] IEC 60068-2-27, 15 g / 11 ms half sine shock pulses. 3 shocks per direction, 18 shocks in total.
[13] Relative humidity during operation and storage.
[14] IEC 62471, photobiological (eye) safety of LED. EN 62471:2008. IEC/TR 62471-2.
[15] Slower gigabit ethernet connections, such as 1 GigE, also supported, but can reduce capture speed.
[16] Thermal Design Power is the maximum power consumed while capturing 3D images in a continuous stream.

Mechanical drawings

FIGURE 12 – DIMENSIONS

All values in degrees or mm.

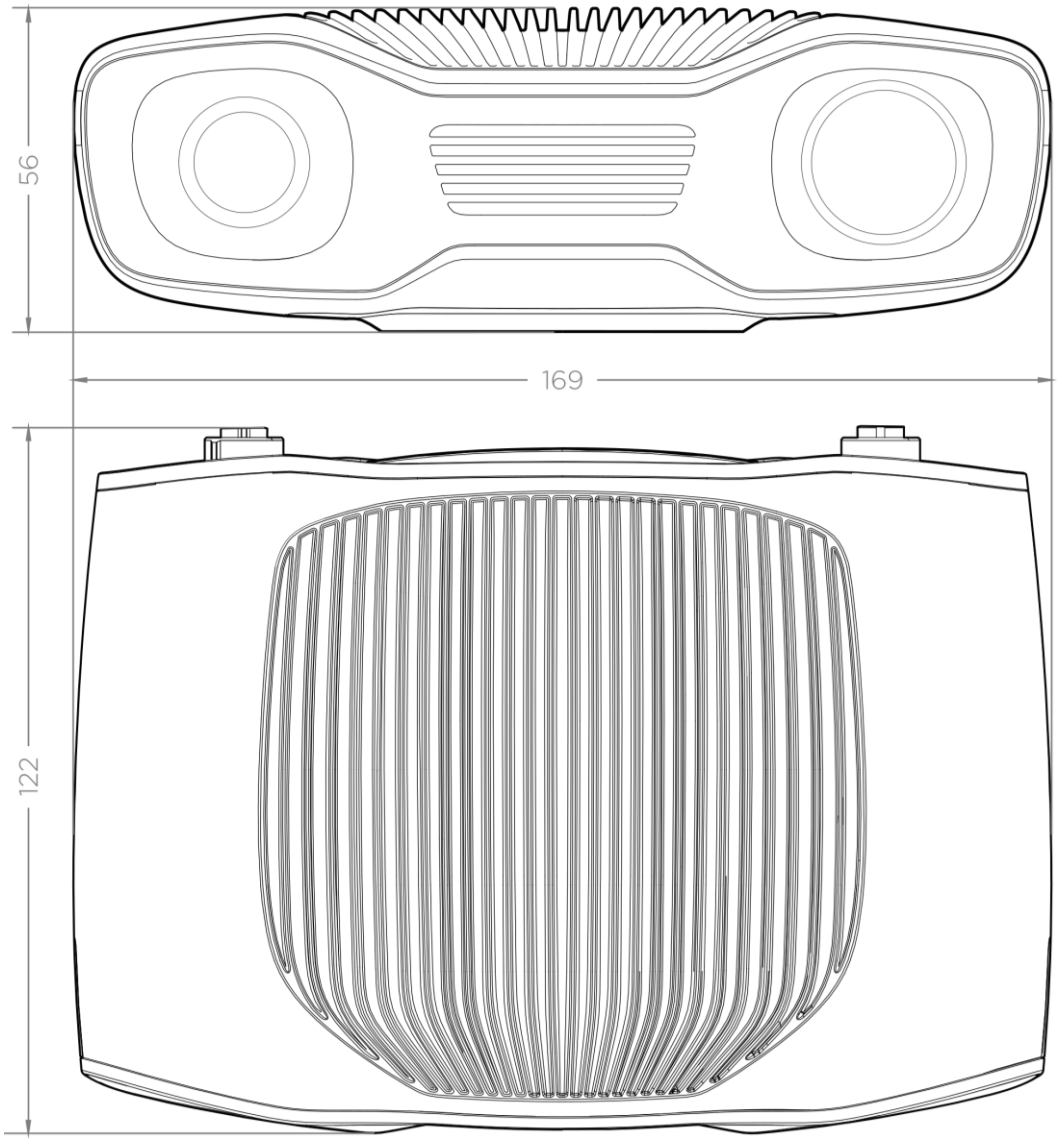
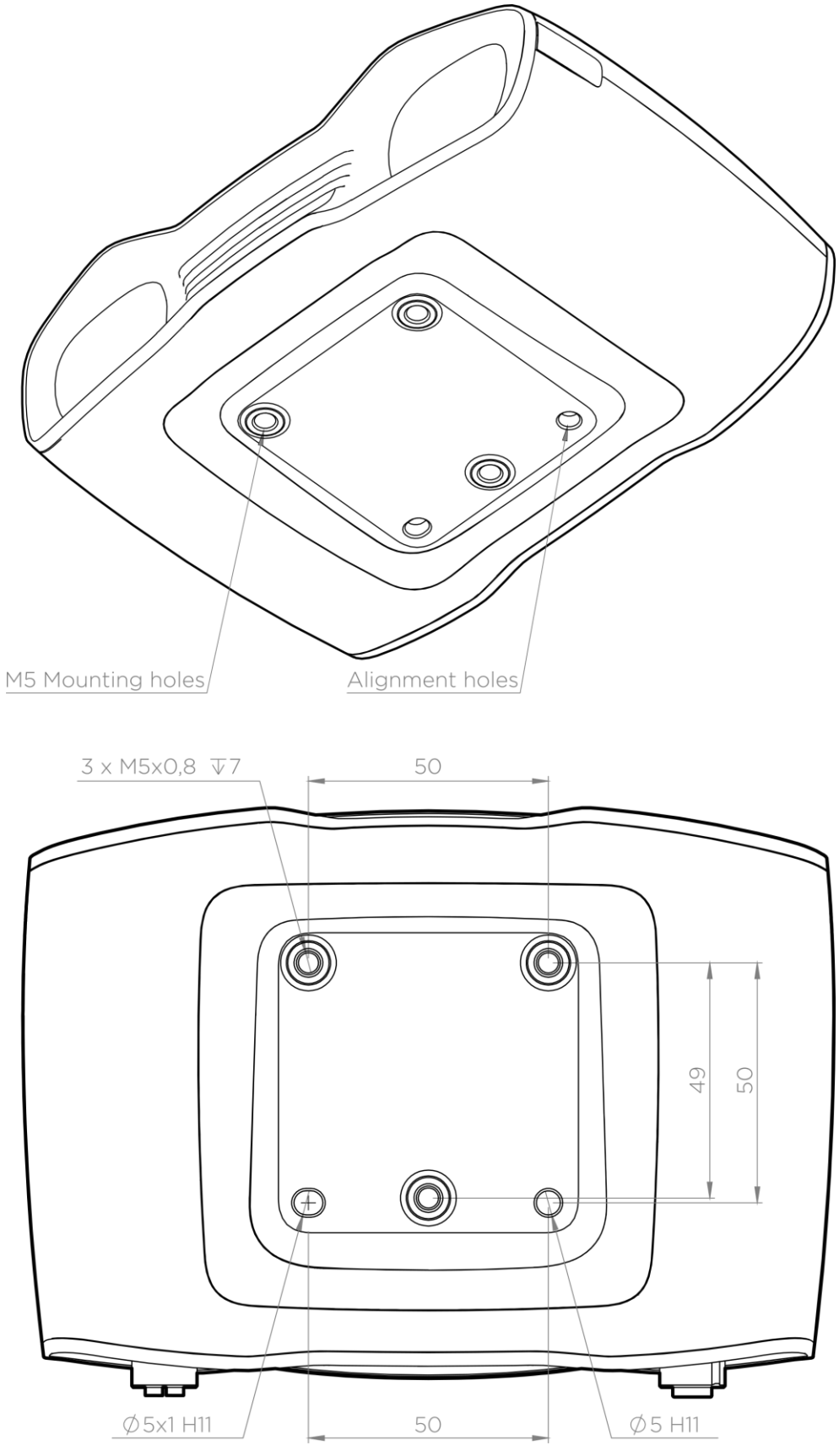


Figure 13 – Mounting options

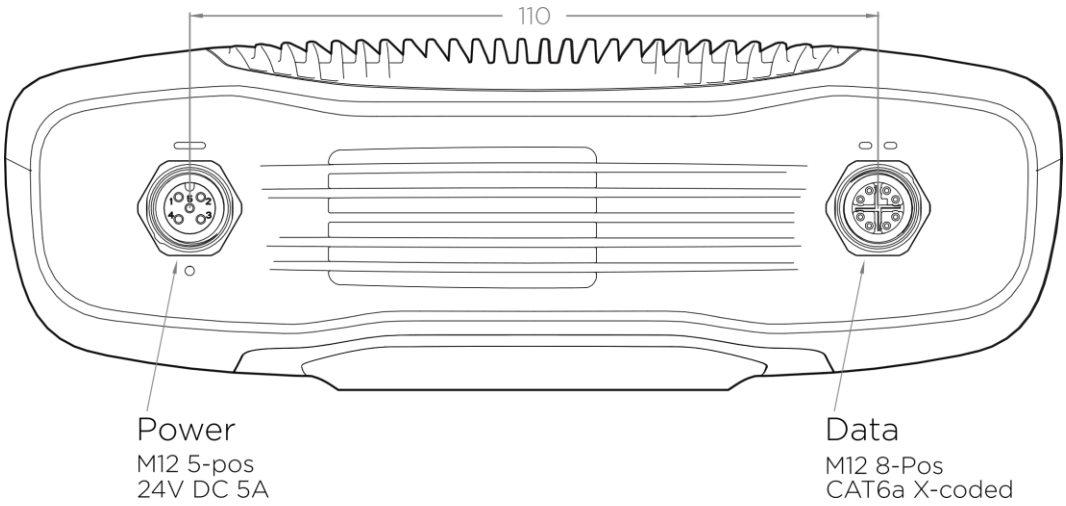
All values in degrees or mm.

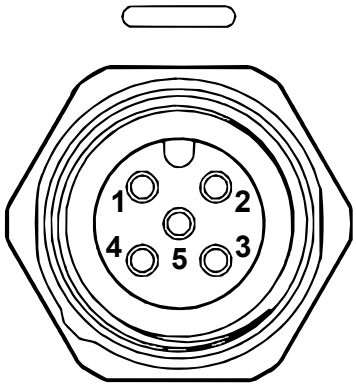


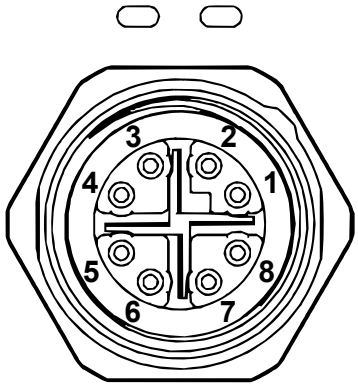
Connectors

FIGURE 14 – CONNECTORS

All values in degrees or mm.







Pin #	M12-5
1	24V DC ± 4.8V (Max 5A)
2	24V DC ± 4.8V (Max 5A)
3	GND
4	GND
5	NC [17]

M12-X	RJ45	Color
1	1	WH/OG
2	2	OG
3	3	WH/GN
4	6	GN
5	7	WH/BN
6	8	BN
7	5	WH/BU
8	4	BU

[17] Not connected. Do not connect.

Revision history

Ver.	Date	Notes
1.0	4/23	Official version. Added Introduction section, pin-out model, FOV and optical center figures, humidity spec, dynamic range spec, and supporting footnotes.
0.9	3/22	Updated with full characterization and qualification results.
0.1	9/22	Initial version.

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