ALTOS PoE Datasheet

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Date: April 4th, 2025
Revision: v1.4

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1. Abbreviations

Abbreviations	Description
ALTOS	Advanced LiDAR Technology Opsys Sensors
CDRH	Center for Devices and Radiological Health
CPU	Central Processing Unit
FDA	Food and Drug Administration
FOV	Field of View
FPS	Frames per Second
Hz	Hertz
LiDAR	Light Detection and Ranging
MFT	Micro-Flash Technology
OEM	Original Equipment Manufacturer
POD	Probability of Detection
PoE	Power over Ethernet
ROI	Region of Interest
SNR	Signal to Noise Ratio
SPAD	Single-Photon Avalanche Diode
TRX	Opsys' opto-electronic base module
UDP	User Datagram Protocol - connectionless communication protocol for transporting packets across networks
VCSEL	Vertical-Cavity Surface-Emitting Laser - a type of semiconductor laser diode with laser beam emission perpendicular from the top surface

Table 1: Abbreviations

2. Executive Summary

Opsys' Industrial LiDAR sensor, ALTOS, is a pure solid-state LiDAR without any moving parts based on fully addressable 2D VCSELs and a SPAD detector. The ALTOS (Advanced LiDAR Technology Opsys Sensors) is based on electrical scanning of the VCEL, which allows the sensor to work 24/7 without limitations. The VCEL and SPAD cells are individually controlled at each scan for a very short period of time. The field of view (FOV) and angular resolution of the sensor is defined only by the optics. This modular approach makes the system very scalable and cost-effective. The ALTOS can therefore be supplied with different FOVs and angular resolutions to match each use case, while keeping the system cost low.

ALTOS PoE adds the simplicity of a single ethernet connection for data communication and supplying power to the device. ALTOS has the option of integration perception for ITS, security and other applications. This smart sensor approach allows for easy integration and minimal design in effort.

Opsys' LiDAR sensors are based on Micro Flash Technology (MFT), which allows for very fast point-by-point scanning of the FOV (as opposed to flash or row-/ column-scanning techniques) without any scanning degradation across the entire FOV. This technology enables the LiDAR to scan the entire FOV at a very high rate to improve the SNR of each point in the point cloud and achieve a very high POD (probability of detection), even for low reflectivity targets at longer distances. The entire FOV is scanned 1000 times per second.

3. Ordering Information

3.1. ALTOS

IMUXSP3**FW**L4-**XZY**

F: Angular Resolution

- H: 0.1°x0.1° / 22.5° x 6.6°
- L: 0.2°x0.2° / 45° x 13°
- A: 0.4°x0.4° / 80° x 22°

W: Wavelength

- S: 905nm
- F: 940nm

XZ: Customer Code *

0. LiDAR point cloud output
1. Integrated perception, ITS MQTT output
2. Integrated perception, Perimeter Security MQTT output
3. Integrated perception, Healthcare MQTT output
4. Integrated perception for ITS with integrated analytics

* Customer specific customer code available upon request. Please consult with your Opsys representative or contact info@opsys-tech.com

Y: Option Code

3. Plastic window

Glass window is available upon request for applications that require additional durability. Please contact your Opsys representative or **info@opys-tech.com**.

Example:

- **IMUXSP3LFL4-003**
- **IMUXSP3ASL4-023**

3.2. Accessories

Ordering code	Description
1287636	Power connector for cable assembly
1287056	Ethernet connector for cable assembly *

Table 2: Accessories ordering codes

* One ethernet connector for cable assembly is supplied with each ALTOS

4. Specifications

4.1. Typical Operating Conditions

Parameter	Minimum	Typical	Maximum	Unit
Supply voltage*	9	12	20	V
Power consumption 12V		8.5	9	W
Power consumption PoE		9	10	
Operating temperature	-30		65	°C
Storage temperature	-40		75	°C
MTBF		160 000		Hr

Table 3: Typical operating conditions

* According to LV124 standard

4.2. Performance Specifications

Parameter	ALTOS 300	ALTOS 150	ALTOS 70
Field of view (horizontal x vertical)	22.5° x 6.5°	45° x 13°	80° x 22°
Typical range, 10% reflective Lambertian target, 90klux	200m	100m	55m
Typical range, 70% reflective Lambertian target, 90klux	300m	150m	100m
Maximum observable range	300m	150m	150m
Minimum range	0.4m*	0.4m*	0.4m*
Range measurement accuracy	±0.1m <100m	±0.075m <100m	±0.05m <100m
Range measurement precision	±0.1m	±0.075m	±0.05m
Horizontal angular resolution	0.1°	0.2°	0.4°
Vertical angular resolution	0.1°	0.2°	0.4°
Number of returns per pixel	Up to 2	Up to 2	Up to 2
Frame rate	Up to 25Hz	Up to 25Hz	Up to 25Hz

Table 4: Performance specifications

* The accuracy will be higher in the close range, objects can still be detected in this range (close range: ALTOS 70: 0.4m to 0.8m, ALTOS 150: 0.4 to 1.2m, ALTOS 300: 0.4 to 2m)

Illumination Specifications	
Wavelength	905nm, 940nm
Laser safety	Class 1 Eye-safe per IEC/EN 60825-1: 2014

Table 5: Illumination specifications

Mechanical Specifications	
Dimensions	109 x 68 x 100 mm
Weight	750g
Ingress protection	IP67
Physical interfaces	1000Base-T
Supported PoE versions	PoE, PoE+, PoE++ (IEEE802.3af/at/bt)

Table 6: Mechanical specifications

Data Specifications	
LiDAR data	• Data per echo for all pixels: distance, position, intensity • Data per pixel: Ambient illumination (passive grayscale IR image) • Timestamp per scan step
Time synchronization protocol	PTP, NTP

Table 7: Sensor output

5. Mechanical Specifications

5.1. Dimensions

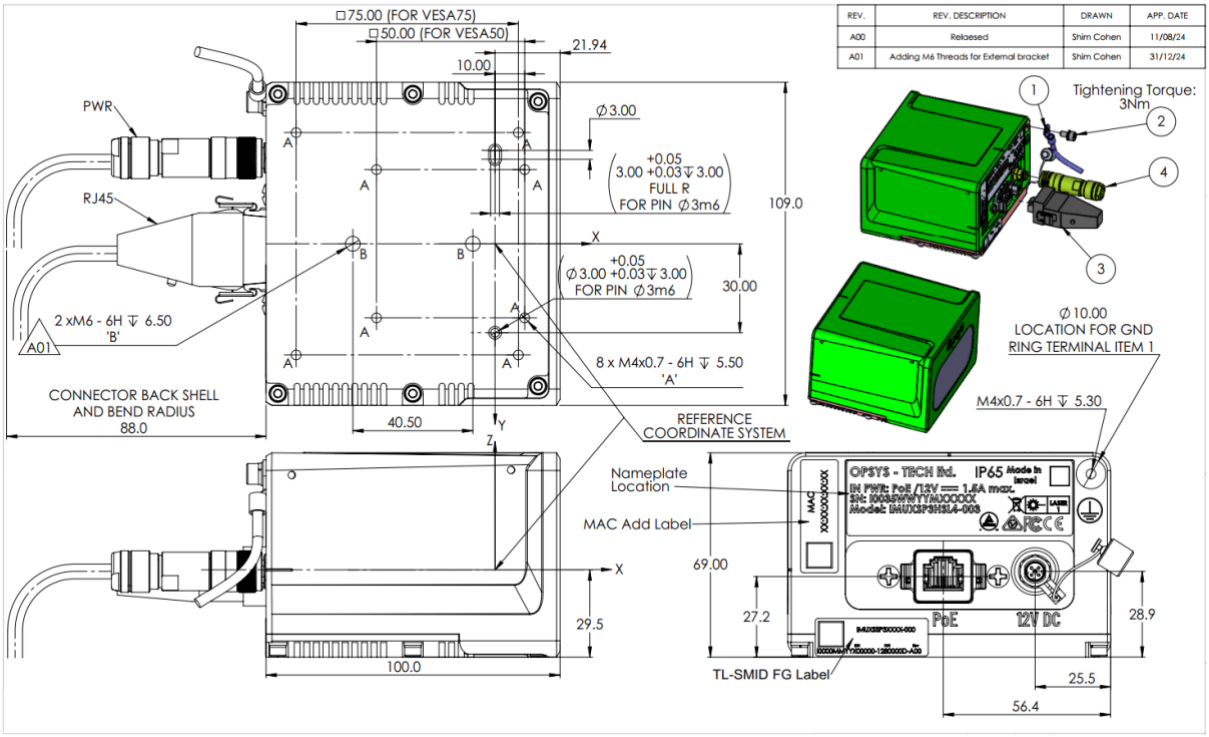

Figure 1: ALTOS PoE dimensions

ALTOS PoE has 3 mounting options: VESA 50 M4 holes, VESA 75 M4 holes and 2 M6 holes in the middle. All the mounting holes are located at the bottom of the unit.

The backside of the unit holds the ethernet connector, power connector, nameplate and the location for the ground terminal.

5.2. Connector Specifications

5.2.1. Ethernet Connector

The ethernet connector on the ALTOS PoE is used for data communication, as well as supplying power to the device when using PoE. For installations for which PoE is not available there is also the option to supply power to the device using a dedicated power connector. When not using the power connector it must be sealed using the attached cap to keep the specified IP rating.

Opsys supplies the mating connector for the cable assembly with each ALTOS unit. Depending on the ethernet cable thickness two parts of Samtec are available with only difference the sealing rubber. Table 8 below shows the details of the ethernet connector and the mating options. Opsys supplies the connector with sealing rubber for both ethernet cable thickness ranges. It is required to use a Cat 5e or Cat 6 ethernet cable with a temperature rating between -30°C and 65°C. The maximum cable length depends on the combination of the ethernet cable and PoE type. For most combinations for PoE versions supported by ALTOS, it is 100m.For correct operation and sealing of the ethernet cable connector, please refer to the assembly instructions of the ethernet cable connector which can be found in the documentation package. Please contact your Opsys representative or **info@opys-tech.com** for any questions.

Location	Manufacturer	Type	Angle	Cable Assembly	Ethernet Cable Thickness
ALTOS PoE part	Samtec	RPBE-01-01-E	N/A	N/A	
Mating	Opsys	1287056	Right	Crimp	5.00mm to 6.50mm
Mating	Samtec	RCEF-G-01	Right	Crimp	5.00mm to 5.75mm
Mating	Samtec	RCEF-G-02	Right	Crimp	5.75mm to 6.50mm

Table 8: Ethernet connector details

5.2.2. Power Connector

Power to the ALTOS PoE can also be supplied via a dedicated power connection when PoE is not available in the environment in which the ALTOS will be installed. In this case the data communication still happens via the ethernet connector while the power is supplied through the dedicated power connector.

Table 9 below shows the details of the power connector as well as the mating options. Table 9 below shows the details of the power connector as well as the mating options. A maximum cable length of 12m is supported by ALTOS. If a larger distance to the power supply is needed, please contact your Opsys representative or **info@opys-tech.com.**

Location	Manufacturer	Type	Angle	Cable Assembly	Wire
ALTOS PoE part	Binder	86 6321 1121 00404	N/A	N/A	N/A
Mating	Binder	99 3368 100 04	Right	Screw	20AWG
Mating	Binder	99 3368 600 04	Right	Screw	20AWG

Table 9: Power connector details

Pin #	Function
1	GND
2	+12V DC
3	Not connected
4	Not connected

Table 10: Power connector pinout

6. System Description

6.1. Sampling

The ALTOS PoE can be operated at framerates up to 25FPS. The high point-by-point scan rate enables the use of additional averaging for each pixel to improve the detection range and the probability of detection. Lower framerates allow for higher averaging in each pixel.

6.2. Functions

Integrated perception (Optional)

The ALTOS PoE can be ordered with integrated perception. The perception engine is tuned for ITS and security applications but is not limited to these. The perception engine outputs its data as MQTT and can be integrated into many 3rd party analytic software packages.

Occlusion and dirt detection

The ALTOS PoE includes the function to detect dirt and occlusion. The occlusion detection will report when there are objects close to the sensor obstructing the field of view of the sensor.

For this purpose, the sensor field of view is divided into 12 segments. A blockage value will be provided for each of the 12 segments with every frame. Additional information will be provided periodically. This additional information consists of the percentage of the area blocked in each of the 12 segments.

The occlusion functionality is currently under development and will be available in a later algorithm release. The dirt detection function needs customization for each different system and is only available upon request.

6.3. Communication Interface

The ALTOS PoE provides its data over a 1000 Base-T interface in UDP packets using IPv4. The UDP payload has a little-endian format and is using the ISO 23150 protocol for its data structure. Each packet consists of a header and pixel data. Additional health information is available in a dedicated package.

The specifications of the data structure of the different packets can be found in a dedicated application note. Please contact your Opsys representative for more information or info@opys-tech.com.

7. Certifications

Certificate	Certificate number	Certificate Provider
Laser Class 1 Safety	7412304482	The Standards Institution of Israel
CDRH Laser Certification	2510633-000	FDA (U.S Food & Drug Administration

Table 11: Certifications

8. About Opsys Tech Ltd.

Opsys has developed the world's most advanced solid-state scanning LiDAR sensor. Opsys technology uses fully addressable VCSEL arrays, combined with a single chip addressable CMOS SPAD array. No moving parts allows for 24/7 operation. This gives the benefit of ensuring there are no mechanical failures over time, which increases the LiDAR's lifetime expectancy well beyond any other solution on the market today.

The patented technology provides a 5D point cloud in real time. Opsys sensors provide major cost savings as they are semiconductor-based, and the solution is scalable. The high-performance sensor is already in mass production.

Opsys technology is designed as a Lego brick system to enable complete customization at an affordable price. The ALTOS provides a fully integrated solution to meet the myriad of demands of industry across numerous different sectors, such as Smart Cities, Intelligent Traffic Systems (ITS), Robotics, Smart Factories, AGV and Security (for example in Perimeter Security, Public Safety, Healthcare and Education).

Founded in 2016, the company has major investment, is headquartered in Israel, with offices in USA, APAC, and Europe.

For more info: www.opsys-tech.com

9. Revision History

Date	Version	Description
01/10/2024	1.0	Initial version
08/10/2024	1.1	Added power connector pinout and watermark
09/01/2025	1.2	Removed watermark, corrected endianness, updated pictures to match ALTOS PoE
19/01/2025	1.3	Updated ordering codes, mechanical drawing and ethernet cable assembly information
04/04/2025	1.4	Updated IP rating to IP67 and added supported PoE standards

Table 12: Revision history