



OS1 - ITS Datasheet

Mid-Range High-Resolution Imaging Lidar

FIRMWARE VERSION: 3.1.x

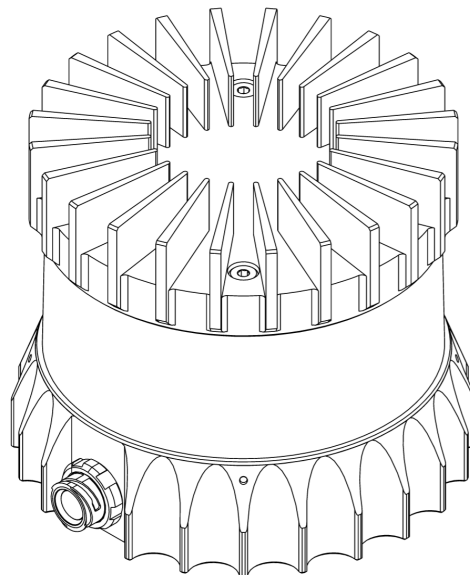
HARDWARE VERSION: REV7

SUMMARY

The mid-range OS1 lidar sensor features 90 m range on a dark 10% target, a 42.4° vertical field of view, and high reliability for the most rugged conditions. The OS1 is designed for all-weather environments and use in industrial automation, autonomous vehicles, mapping, smart infrastructure, and robotics.

HIGHLIGHTS

- Configurable Minimum Range and Return Ordering
- Low Data Rate Profile now available with Dual Returns
- Camera-grade near-infrared and signal data
- Multi-sensor crosstalk suppression



OPTICAL PERFORMANCE

Range (80% Lambertian reflectivity, 1024 @ 10 Hz mode)	170 m @ >90% detection probability, 100 klx sunlight
Range (10% Lambertian reflectivity, 1024 @ 10 Hz mode)	90 m @ >90% detection probability, 100 klx sunlight
Minimum Range	0.0 m (0.3 m optional, and 0.5 m default)
Vertical Resolution	32, 64, or 128 channels
Horizontal Resolution	512, 1024, or 2048 (configurable)
Rotation Rate	10 or 20 Hz (configurable)
Field of View	Vertical: 42.4° ± 1.0° (+21.2° to -21.2°) Horizontal: 360°
Angular Sampling Accuracy	Vertical: ±0.01° / Horizontal: ±0.01°
Range Resolution	0.1 cm Note: For <i>Low Data Rate Profile</i> the Range Resolution = 0.8 cm
# of Returns	up to 2
Return Order	Strongest to Weakest, Farthest to Nearest, and Nearest to Farthest

LASER

Laser Product Class	Class 1 eye-safe per IEC/EN 60825-1: 2014
Laser Wavelength	865 nm
Beam Diameter Exiting Sensor	9.5 mm
Beam Divergence	0.18° (FWHM)

LIDAR OUTPUT

Connection	UDP over gigabit Ethernet
Points Per Second	5,242,880 (128 channel)
Data Rate (megabits per second) (Low Data Rate Profile, 1 return, 1024 @ 10 Hz mode)	up to 43.29 Mbps (128 channel)
Data Rate (megabits per second) (Low Data Rate Profile, 2 returns, 1024 @ 10 Hz mode)	up to 85.24 Mbps (128 channel)
Data Rate (megabits per second) (Single Return Profile, 1024 @ 10 Hz mode)	up to 32.81 Mbps (32 channel) up to 64.26 Mbps (64 channel) up to 127.18 Mbps (128 channel)
Data Rate (megabits per second) (Dual Return Profile, 1024 @ 10 Hz mode)	up to 43.29 Mbps (32 channel) up to 85.24 Mbps (64 channel) up to 169.12 Mbps (128 channel)
Data Per Point	Range, Signal, Reflectivity, Near-infrared, Channel, Azimuth angle, and Timestamp
Timestamp Resolution	< 1 μ s
Data Latency	< 10 ms

IMU OUTPUT

Connection	UDP over 1000Base-T or 1000Base-T1
Samples Per Second	100
Data Per Sample	3 axis gyro, 3 axis accelerometer

CONTROL INTERFACE

Connection	HTTP API	
Time Synchronization	Input sources: • IEEE1588 Precision Time Protocol (PTP); Accuracy: <1 ms error • gPTP; Accuracy: <1 ms error • NMEA \$GPRMC UART message support • External PPS; Accuracy: <1 ms error • Internal 10 ppm drift clock; Accuracy: <20 ppm error Output sources: • Configurable 1 - 60 Hz output pulse	
Lidar Operating Modes	• x 512 @ 10 Hz or 20 Hz • x 1024 @ 10 Hz or 20 Hz • x 2048 @ 10 Hz	
Additional Programmability	• Multi-sensor phase lock • Queryable intrinsic calibration information: • Beam angles • IMU pose correction matrix	• Return ordering • Minimum range • Azimuth masking • Low-power standby mode

MECHANICAL/ELECTRICAL

Power Consumption	14 - 20 W • 16 W nominal • 28 W peak at startup if operating at -40 °C
Connector	Standard 1000BASE-T or Automotive Standard 1000BASE-T1

Operating Voltage	9.5 V - 51 V • Suitable for 12 VDC to 24 VDC nominal systems • Not suitable for 48 V nominal battery based systems • Under-voltage WARNING level alert occurs at 9.5 VDC at the connector • Under-voltage ERROR level alert occurs at 9.0 VDC at the connector • Below 9.0 VDC at connector, sensor may shutdown • Over-voltage conditions/alarms occur at 51 VDC at the connector • Over-voltage lockout onset at 58 VDC (± 1 V) at the connector • Over-voltage lockout release at 55 VDC (± 1 V) at the connector
Dimensions	Diameter: 87 mm (3.42 in) Height: • Without cap: 58.35 mm (2.3 in) • With thermal cap: 74.2 mm (2.9 in)
Weight	Without cap: 410 g (14.5 oz) With radial cap: 482 g (17.0 oz) With halo cap: 502 g (17.7 oz)
Mounting	Bottom: 4x M3 screws, 2x locating 2 mm pin holes Top: 4x M3 screws, 4x locating 2 mm pin holes, 1x M6 screw

OPERATIONAL

Operating Temperature	-40 °C to +74 °C (including standby mode) -40 °C to +60 °C full range operation at detection range (200ft) At temperatures above 60°C, the Lidar may enter standby mode depending on sun load and other factors. In such case the system enters failsafe mode operation automatically and places calls on all active channels. While in standby mode, the Lidar will respond to inquiries, including providing its status and temperature. The system continuously monitors the status and temperature of Lidar, deactivating failsafe mode once the point cloud quality returns to normal.
Storage Temperature	-40 °C to +105 °C
Ingress Protection	IP68 (1 m submersion for 1 hour, with I/O cable attached) IP69K (with I/O cable attached)
Shock	IEC 60068-2-27 (Amplitude: 100 g, Shape: 11 ms half-sine, 3 shocks x 6 directions)
Vibration	IEC 60068-2-64 (Amplitude: 3 G-rms, Shape: 10 - 1000 Hz, Mounting: sprung masses, 3 axes w/ 8 hr duration each)

Compliance

Note: Ouster UK (Ltd): 125 Princes Street, Edinburgh EH2 4AD, Scotland, United Kingdom
Contact: Neil Calder, Phone Number: +44(0).131.563.9078

For US

Laser Safety:

- EN/IEC 60825-1:2014 Class 1 eye safe
- FDA US 21CFR1040 Notice 56 Class 1

Product Safety:

- UL 62368-1
- UL 60950-22 (outdoor use)
- CSA-C22.2 No. 62368-1-19
- CSA-C22.2 No. 60950-22-07 (outdoor use)

EMC: FCC 47CFR Part 15, Subpart B, Class A

For EU

Laser Safety: EN/IEC 60825-1:2014 Class 1 eye safe

Product Safety: EN/IEC 62368-1

EMC:

- EN 55032:2012/AC 2013; CISPR 32:2015
- EN 55024:2010; CISPR 24:2010
- EN 61000-3-2:2014
- EN 61000-3-3:2013



EXTERIOR DIMENSIONS

