# OS3D-DTS

MINIATURE IMU
& DIGITAL TILT SENSORS DTS

The **Inertial Labs OS3D-DTS** is an ultra high accuracy, miniature MEMS Inertial Measurement Units (IMU) and dual axis MEMS Digital Tilt Sensors, designed for test & measurement, industrial, manufacturing, R&D, aerospace static and dynamic applications.

OS3D-DTS includes tri-axial MEMS Gyroscopes and tri-axial high precision MEMS Accelerometers. The **OS3D-DTS** also comes equipped with an onboard processor and embedded inclination and tilt algorithms allowing for direct integration into systems without interfacing a PC.

Applications

➢ High-precision Geotech
➢ Precision Tilt Measuring
➢ Pavement Profiling Rigs
➢ Vehicle Wheel Alignment
➢ Oil & Gas, Riser Tilt Monitoring
➢ Platform Leveling and Positioning
➢ Industrial Automation and Control
➢ Robotics and Electro Optical Systems
➢ Construction & Agricultural Equipment
➢ Railway Track Alignment & Maintenance
➢ Solar Tracking, Mobile Cranes and Radars
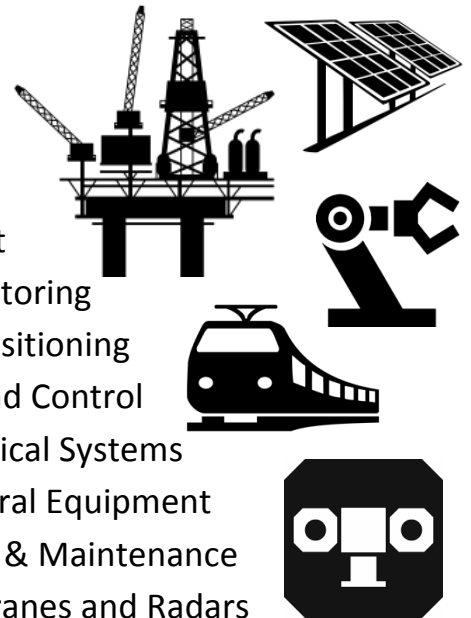
KEY FEATURES AND FUNCTIONALITY

- Export classification: EAR99 (No License Required)
- Advanced MEMS Gyroscopes and Accelerometers
- 0.01 deg Pitch & Roll resolution
- 0.05 deg Pitch & Roll accuracy
- -40degC…+85degC operational temperature range
- Robust and Rugged Enclosure
- High Shock and Vibration Tolerance
- Affordable price
- Fully calibrated in operational temperature range
- Real-time Pitch and Roll orientation information
- Small size, lightweight and low power consumption
- Environmentally sealed (IP67)

Inertial Labs, Inc. Address: 39959 Catoctin Ridge Street, Paeonian Springs, VA 20129 U.S.A.
Tel: +1 (703) 880-4222, Website: www.inertiallabs.com

2

OS3D-DTS Specifications

Parameter	Units	Value		
Output signals		Pitch, Roll, Accelerations, Angular rates		
Start-up time	sec	<1		
Pitch & Roll				
Range: Pitch	deg	±90		
Range: Roll	deg	±180		
Angular Resolution	deg	0.01		
Static Accuracy, RMS	deg	0.05		
Dynamic Accuracy, RMS	deg	0.08		
Sensors		**Gyroscopes**	**Accelerometers**	
Measurement range		±1864 deg/s	±15 g	±40 g
Bandwidth		up to 200 Hz	up to 200 Hz	up to 200 Hz
Bias in-run Stability (Allan Variance)		<8 deg/hr	0.03 mg	0.05 mg
Bias instability (in temp. range, RMS)		0.2 deg/sec	1.1 mg	1.5 mg
Bias one-year repeatability		0.5 deg/sec	2.0 mg	2.5 mg
Scale Factor Accuracy		500 ppm	700 ppm	850 ppm
SF one-year repeatability		1000 ppm	1400 ppm	1700 ppm
Random Walk		0.36 deg/√hr	0.045 m/sec/√hr	0.06 m/sec/√hr
Power Spectral Density		0.006 deg/√Hz	0.08 mg/√Hz	0.1 mg/√Hz
Non-linearity		0.05 %	0.05 %	0.05 %
Axis misalignment		0.15 mrad	0.15 mrad	0.15 mrad
Environment				
Operating temperature range	deg C	-40 to +85		
Storage temperature range	deg C	-45 to +90		
MTBF (G_M +65degC)	hours	100,000		
Environmentally sealed		IP65 (version C11, 12, 21, 22) / IP67 (version C5)		
Electrical		**Version C11, C12, C21, C22**	**Version C5**	
Supply voltage	V DC	5V to 25V	9V to 36V	
Current consumption	mA, V	24 mA @ 5V / 5 mA @ 25V	75 mA @ 12 V	
Power Consumption	W	0.125 W (typical)	0.9 W (typical)	
Connector type	-	G125-MV11005L1P by HARWIN	Binder Series 723	
Output Interface	-	RS-232 or RS-422	RS-232, Ethernet	
Baud Rate	bps	Up to 3M (RS-422) Up to 1M (RS-232)	Up to 1M (RS232)	
Update rate	Hz	500	500	
Physical		**Version C11, C12, C21, C22**	**Version C5**	
Size	mm	26.5 × 19.5 × 8.4	120 x 50 x 53	
Weight	gram	9	220	

Inertial Labs, Inc. Address: 39959 Catoctin Ridge Street, Paeonian Springs, VA 20129 U.S.A.
Tel: +1 (703) 880-4222, Website: www.inertiallabs.com

3

OS3D-DTS part number structure: OS3D-DTS-GXXXX-AXX-TGA-CXX-VXX.X

Model	Gyroscopes range	Accelerometers range	Temperature calibration	Type of enclosure	Version	Type of interface
OS3D-DTS	G1864	A15 / A40	TGA	C11 / C12 / C21 / C22 / C5	V10 / V11	VX.1 / VX.2
Digital Tilt Sensor	±1864 deg/s	±15 g / ±40 g	Gyroscopes & Accelerometers are calibrated over operational temperature range	C0: OEM C11: Aluminum case, mounting option #1 mating option #1 C12: Aluminum case, mounting option #1 mating option #2 C21: Aluminum case, mounting option #2 mating option #1 C22: Aluminum case, mounting option #2 mating option #2 C5: IP-67 sealed enclosure	V10: filters-on V11: filters-off	VX.1: RS-232 VX.2: RS-422 For C5 models: VX.3: Ethernet VX.13: RS-232 & Ethernet

OS3D-DTS mechanical interface drawing (version C11, C12, C21, C22)
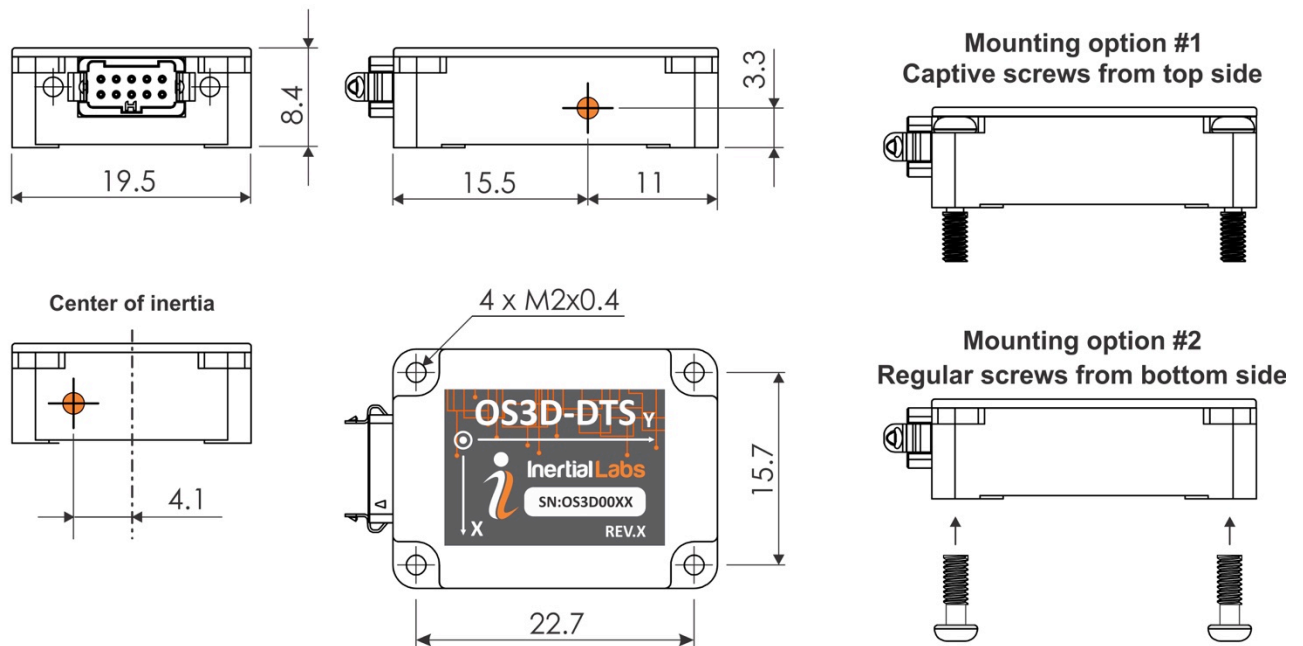
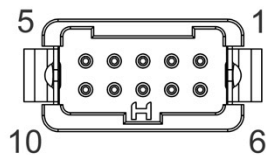
Note 1: All dimensions are in millimeters.
Note 2: All dimensions within this drawing are subject to change without notice. Customers should obtain final drawings before designing any interface hardware.

Inertial Labs, Inc. Address: 39959 Catoctin Ridge Street, Paeonian Springs, VA 20129 U.S.A.
Tel: +1 (703) 880-4222, Website: www.inertiallabs.com

4

Mounting option #1
Captive screws from top side

Mounting option #2
Regular screws from bottom side

Mating option #1 - connector with latches - G125-FC11005L0-0150L (Note 1)

Mating option #2 - screw-lock connector - G125-2241096F1 (Note 2)

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SSBA-M2-12-A2	M2 x 12mm Button Head Captive Screw (ISO 7380) - A2 Stainless Steel	4
2	90145A413	18-8 Stainless Steel Dowel Pin 1/16" Diameter, 1/8" Long	2
3	G125-FC11005L0-0150L	connector with latches	1
4	G125-2241096F1	screw-lock connector	1

Note 1: Connector with latches is available with L=0mm screw overhanging length.
Note 2: Screw-lock connector is available only with L=4mm screw overhanging length .

OS3D-DTS
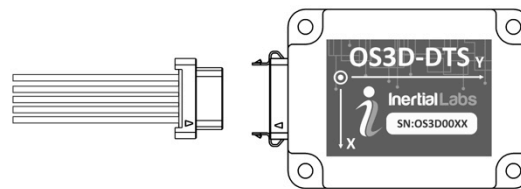mounting options

OS3D-DTS

OS3D-DTS electrical interface description (version C11, C12, C21, C22)

G125-MV11005L1P by HARWIN
G125-MV11005L0P by HARWIN

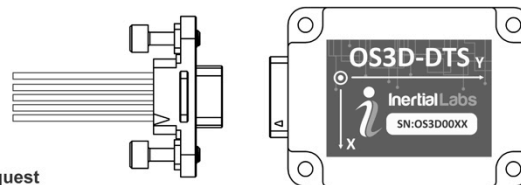Mating option #1 - connector with latches - G125-FC11005L0-0150L

Mating option #2 - screw-lock connector - G125-2241096F1 (Note 1)

1	POWER	Power Supply Input 4V-15V
2	RS232-Tx	RS232 Transmitter Output (Note 2)
3	RS232-Rx	RS232 Receiver Input (Note 2)
4	RS422-A	RS-422 Non-Inverting Input
5	RS422-B	RS-422 Inverting Input
6	GROUND	Power Supply Return
7	TOV	3V3 TTL Time of validity output
8	EXTRIG	3V3 TTL External trigger input
9	RS442-Y	RS-422 Non-Inverting Output
10	RS422-Z	RS-422 Inverting Output

Note 1: Screw-lock is available upon customer request
Note 2: 3V3 TTL UART is available upon customer request

Inertial Labs, Inc. Address: 39959 Catoctin Ridge Street, Paeonian Springs, VA 20129 U.S.A.
Tel: +1 (703) 880-4222, Website: www.inertiallabs.com

5

OS3D-DTS mechanical interface drawing (version C5)

Inertial Labs, Inc. Address: 39959 Catoctin Ridge Street, Paeonian Springs, VA 20129 U.S.A.
Tel: +1 (703) 880-4222, Website: www.inertiallabs.com

6
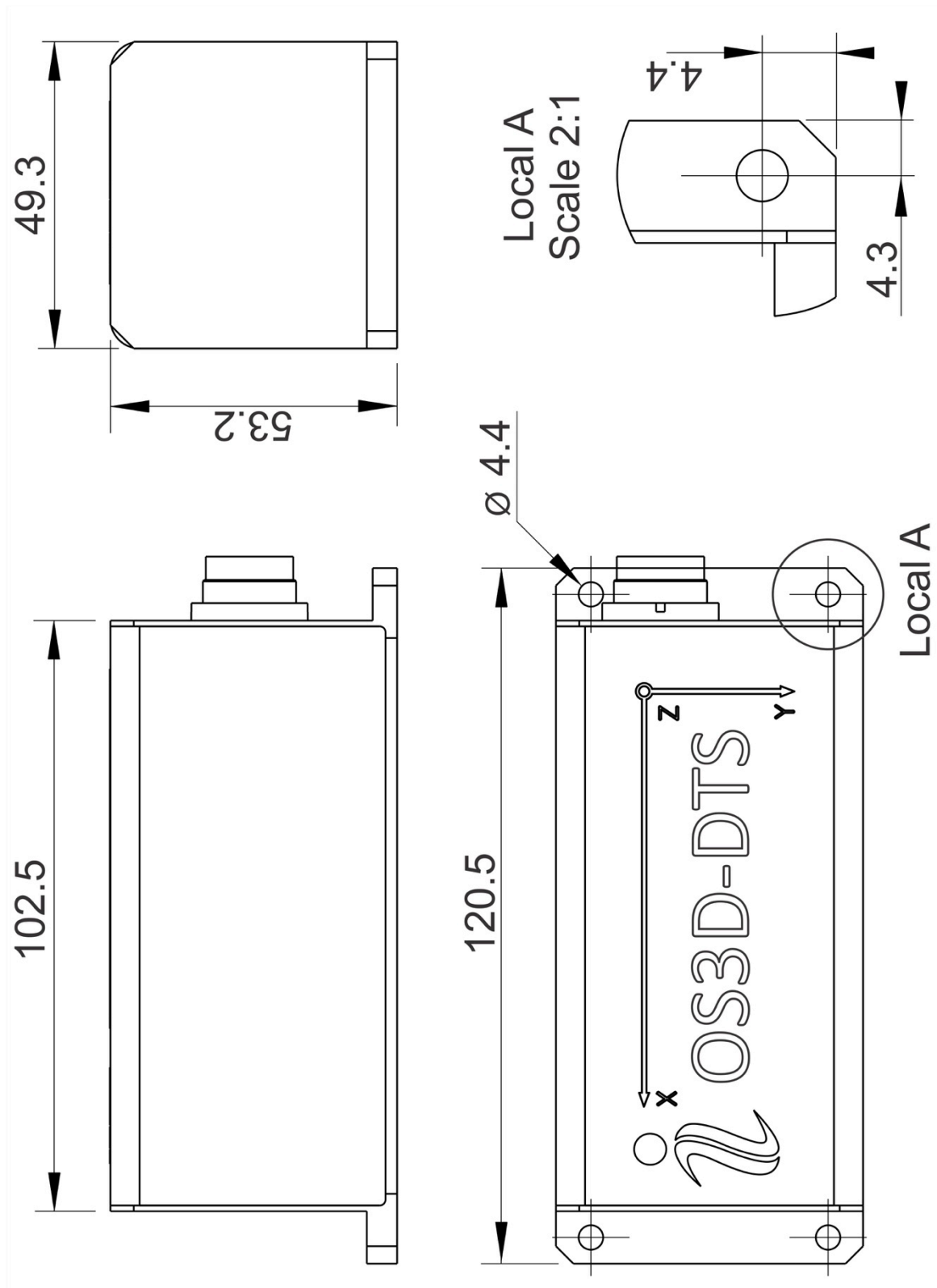
OS3D-DTS electrical interface description (for version C5 only)

CAS-DTS-CA.07-2M-C1.01-C2.11-V0.1
(Power Over Ethernet)

X1: 99 5896 15 24 by Binder-USA
Soldering side view

X1: device side		X2: RJ45 side		
POWER	1	4		BLUE
POWER	1	5		BLUE
GROUND	2	7		BRWN
GROUND	3	8		BRWN
ETHX+	21	3		GREEN
ETHX-	22	6		GREEN
ERHX+	23	1		ORNG
ERHX-	24	2		ORNG

Cable: 4 pair 24 AWG stranded TC5208 by L-COM
Total length: 2M

X2: A-MO 8/8 F50 by Assmann

TITLE:	CAS-DTS-CA.07-2M-C1.01-C2.11-V0.1		
VERSION: V0.1	RELEASE DATE: OCT-2018	TECHNICAL DRAWING	SHEET 1 OF 1	DOCUMENT:

CAS-DTS-CA.01-2M-C1.01-C2.01-V0.1

TITLE:	CAS-DTS-CA.01-2M-C1.01-C2.01-V0.1		
VERSION: V0.1	RELEASE DATE: OCT-2018	TECHNICAL DRAWING	SHEET 1 OF 3	DOCUMENT:

Inertial Labs, Inc. Address: 39959 Catoctin Ridge Street, Paeonian Springs, VA 20129 U.S.A.
Tel: +1 (703) 880-4222, Website: www.inertiallabs.com

7