Digital Tilt Sensors OS3D-DTS

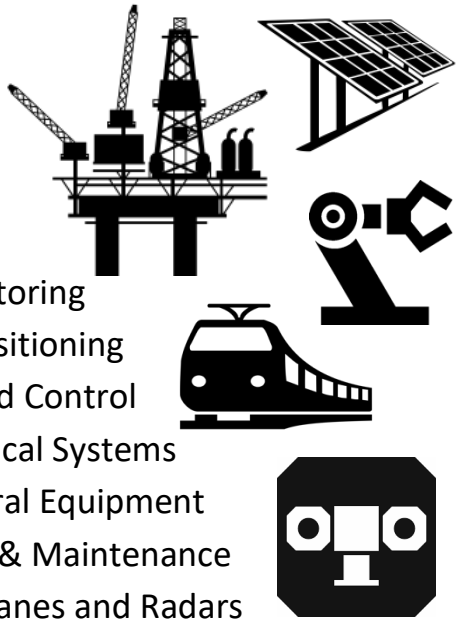
InertialLabs
Attitude is Everything

Datasheet
Rev. 3.8

The **Inertial Labs OS3D-DTS** is an ultra high accuracy, miniature 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)

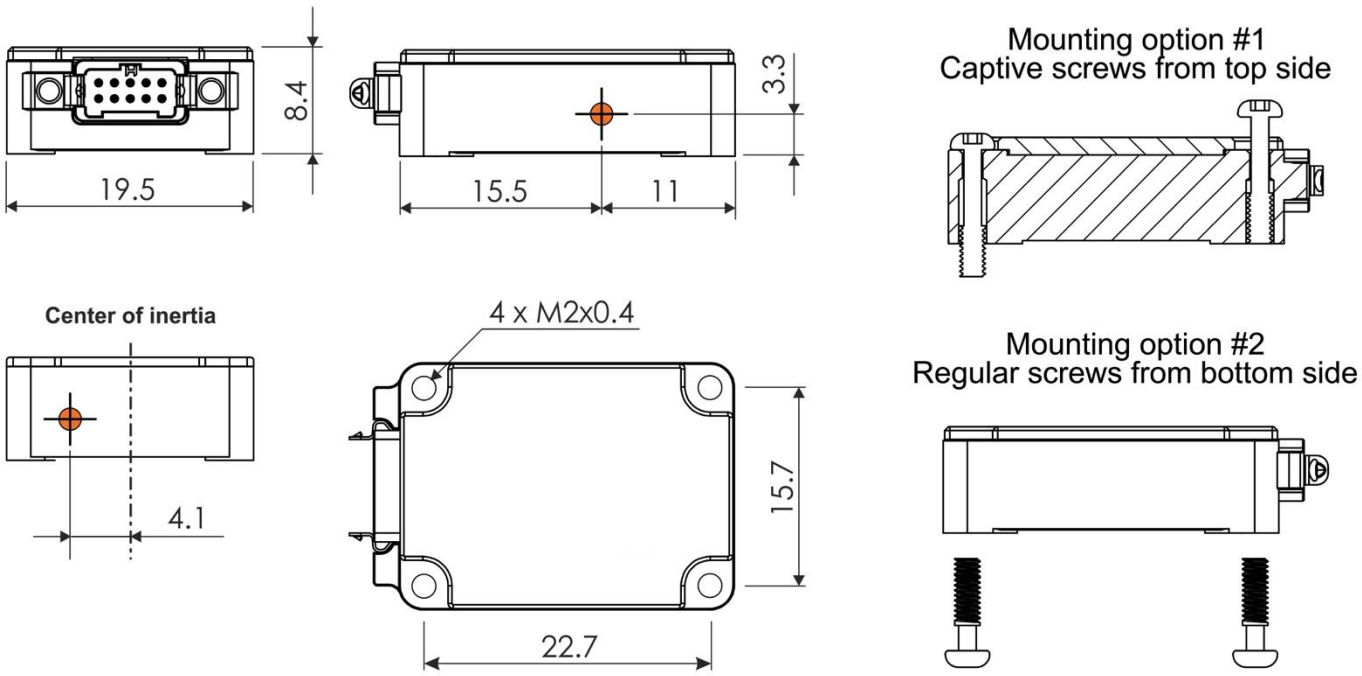
OS3D-DTS Specifications

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)		720 deg/hr	1.1 mg	1.5 mg
Bias one-year repeatability		1800 deg/hr	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		500 ppm	500 ppm	500 ppm
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	

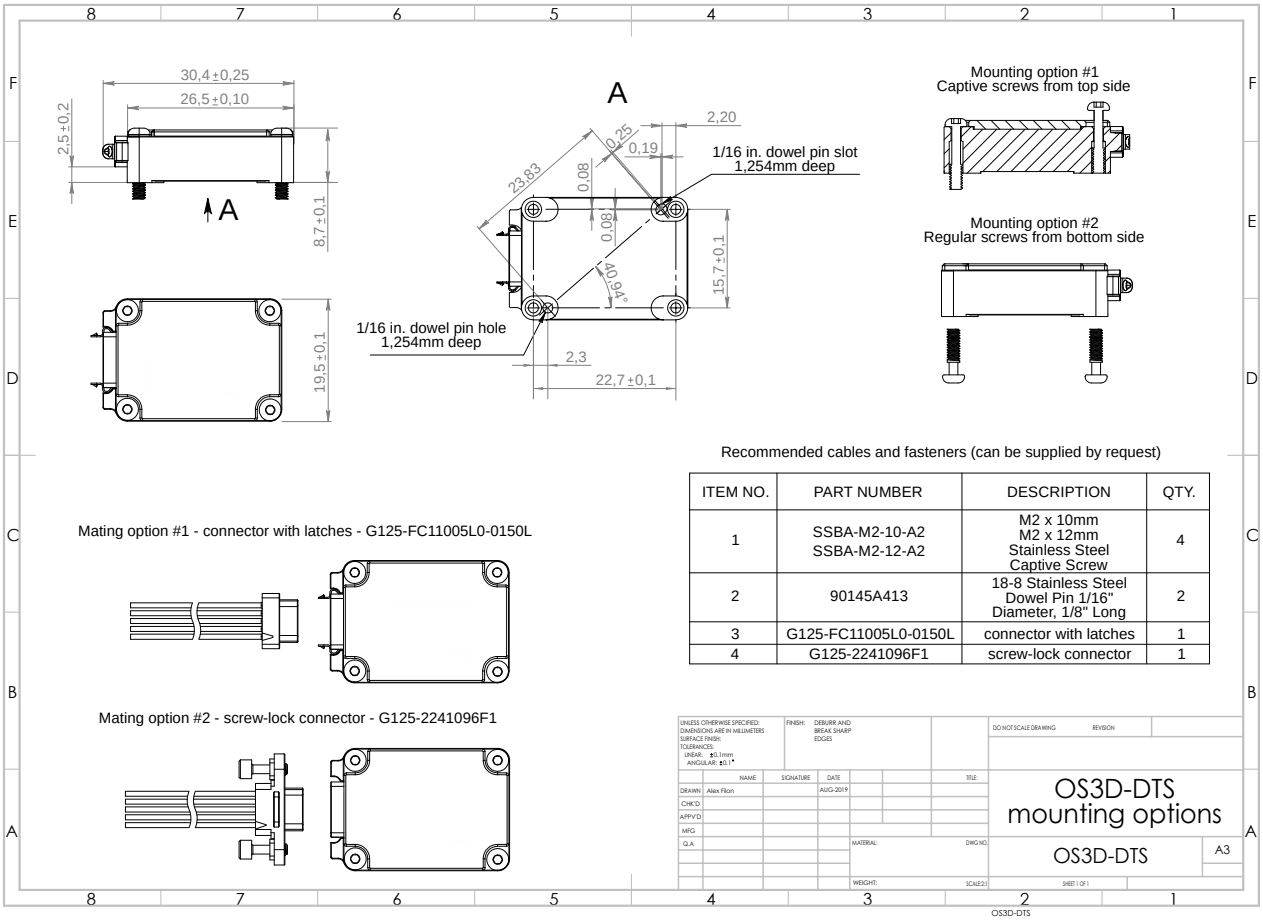
OS3D-DTS part number structure: OS3D-DTS-GXXXX-AXX-TGA-CXX-VXX.X

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 (case 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.

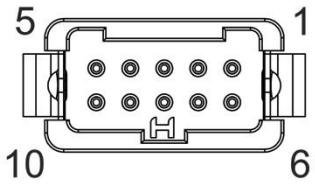


Recommended cables and fasteners (can be supplied by request)

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	SSBA-M2-10-A2 SSBA-M2-12-A2	M2 x 10mm M2 x 12mm Stainless Steel Captive Screw	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

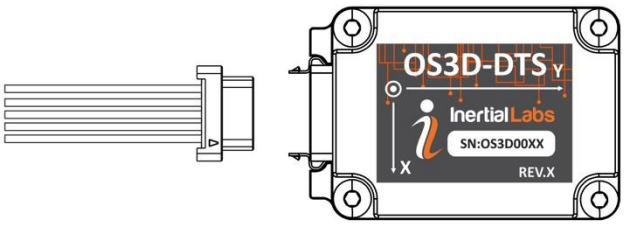
OS3D-DTS electrical interface description (version C11, C12, C21, C22)

G125-MV11005L1P by HARWIN
G125-MV11005L0P by HARWIN

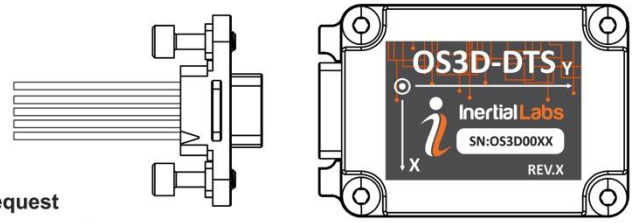


1	POWER	Power Supply Input (Note 3)
2	RS232-Tx	RS232 Transmitter Output (Note 2)
3	RS232-Rx	RS232 Receiver Input (Note 2)
4	RS422-A	RS-422 Non-Inverting Input
5	RS422-B	RS-422 Inverting Input
6	GROUND	Power Supply Return
7	TOV	3V3 TTL Time of validity output
8	EXTRIG	3V3 TTL External trigger input
9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

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

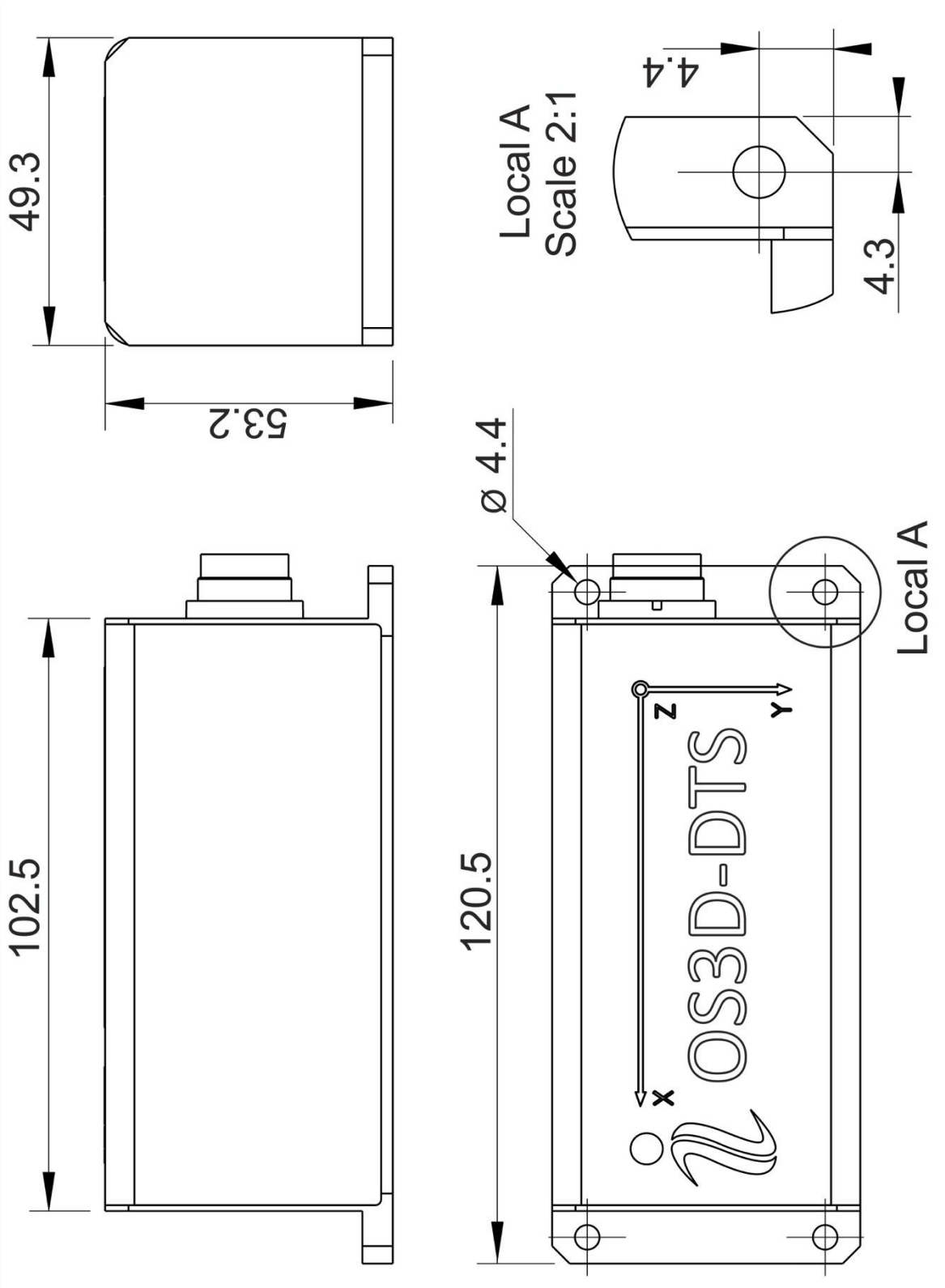


Mating option #2 - screw-lock connector - G125-2241096F1 (Note 1)



Note 1: Screw-lock is available upon customer request
Note 2: 3V3 TTL UART is available upon customer request
Note 3: The supply voltage range is 5V-25V.

OS3D-DTS mechanical interface drawing (version C5)



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