

# INS-T-306

Tersus GNSS-Aided Inertial Navigation Systems



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## Tersus GNSS-Aided Inertial Navigation Systems

The Tersus GNSS-Aided Inertial Navigation System (INS-T-306) is OEM version of new generation, fully-integrated, combined L1 & L2 GPS, GLONASS and BeiDou navigation and high-performance strapdown system, that determines position, velocity and absolute orientation (Heading, Pitch and Roll) for any device on which it is mounted. Horizontal and Vertical Position, Velocity and Orientation are determined with high accuracy for both motionless and dynamic applications.



State-of-the-art algorithms for different dynamic motions of Vessels, Ships, Helicopters, UAV, UUV, UGV, AGV, ROV, Gimbals and Land Vehicles.

# INS-T-306

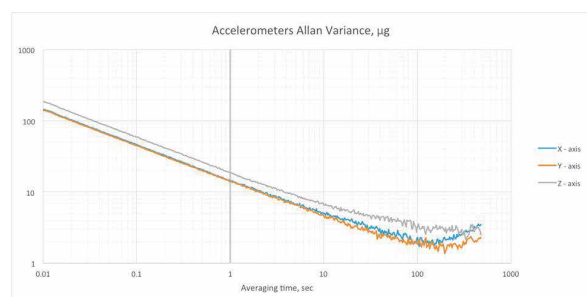
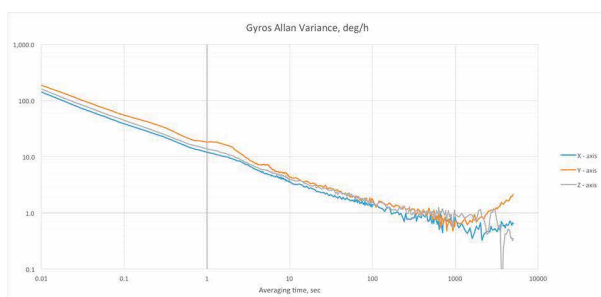
## Key Features



- 🌀 Commercially exportable GNSS-Aided Inertial Navigation System
- 🌀 73 x 47 x 33 mm size and 145 gram weight
- 🌀 High precision IMU (1 deg/hr gyroscopes and 5 micro g accelerometers Bias in-run stability)
- 🌀 GPS L1/L2, GLONASS, BeiDou, DGPS, SBAS, RTK supported signals
- 🌀 Compatibility with LiDARs (Velodyne, RIEGL, FARO)
- 🌀 Up to 200 Hz IMU, 50Hz GNSS positions and 20 Hz GNSS measurements data rate
- 🌀 Advanced, extendable, embedded Kalman Filter based sensor fusion algorithms
- 🌀 State-of-the-art algorithms for different dynamic motions of Vessels, Ships, Helicopters, UAV, UUV, UGV, AGV, ROV, Gimbals and Land Vehicles
- 🌀 Implemented ZUPT, GNSS tracking angle features
- 🌀 Full temperature calibration of all sensing elements, Environmentally sealed (IP67)

## INS-T-306 Performance during GNSS outages

Outage duration	Positioning mode	Position accuracy (meters, RMS)		Velocity accuracy (meters/sec, RMS)		Attitude accuracy (degree, RMS)	
		Horizontal	Vertical	Horizontal	Vertical	Pitch, Roll	Heading
0 sec	RTK	0.01 + 1ppm	0.02 + 1ppm	0.02	0.01	0.015	0.08
	SP	1.2	1.0	0.03	0.02	0.1	0.1
	PP	0.02	0.03	0.02	0.01	0.006	0.03
60 sec	RTK	7	2	0.3	0.1	0.05	0.15
	SP	8	3	0.3	0.1	0.05	0.5
	PP	0.3	0.2	0.03	0.05	0.01	0.1



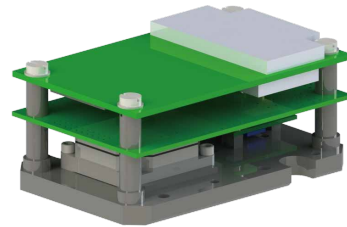
# Electrical and Mechanical interface drawing

## Power and interface harness

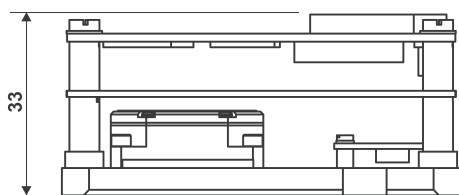
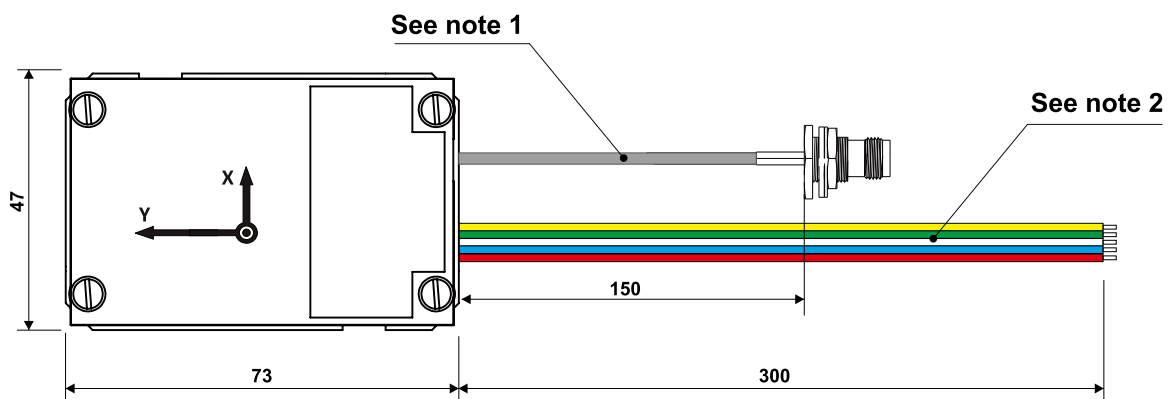
POWER IN	RED	
GROUND	BLACK	
Rs232 – Rx1	PINK	
Rs232 – Tx1	ORANGE	
Rs232 – Rx2	WHITE	
Rs232 – Tx2	GREEN	
Rs232 – Rx3	YELLOW	
Rs232 – Tx3	BROWN	
PPS	PURPLE	
UPDATE 1	GREY	
UPDATE 2 (G)	TAN	

## Indication harness

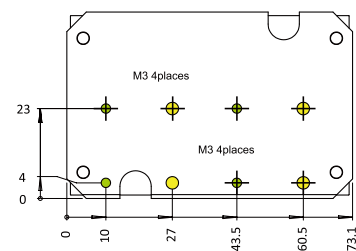
POWER (3.3V)	RED	
GROUND	BLACK	
SDA	WT/BROWN	
SCL	WT/BLACK	
INS GRN LED	WT/GREEN	
INS RED LED	WT/ORNG	
GNSS PV LED	BLUE	



The names of the signals are given relative to the device.  
I.e. the Rx pin is the input pin of the INS, Tx is the output one.



## Mounting holes



## Main electrical parameters

Supply voltage	9 to 36 VDC
Power consumption	3.0 W
Output Interface	RS-232/RS-422
Output data format	Binary, TSS-1, NMEA 0183 ASCII characters

Note 1: 26AWG stranded wires - by Alpha Wire for main harness;  
28AWG stranded wires - by Alpha Wire for indication harness;  
300mm length, stripped and tinned

Note 2: TNC Female Bulkhead to MCX Plug Right Angle Cable  
150mm length RG174 Coax

Note 3: Weight 145g

TITLE:

INS-T-306 assembly drawings

VERSION:

REV1.0

RELEASEDATE:

04/30/2017

TECHNICAL DRAWING

SHEET:

1 OF 1

DOCUMENT:

# Technical Specifications – INS-T-306

## Performance

Output Signals: Positions, Heading, Pitch & Roll, Velocity, Accelerations, Angular rates, Barometric data, Pulse Per Second

IMU update rate: 1...200 Hz

Start-up time: < 1s

## GNSS:

Supported Navigation Signals:  
GPS L1/L2, GLONASS, BeiDou, DGPS, SBAS, RTK

Number of Antennas: Single

Channel Configuration <sup>(3)</sup> : 120 channels

GNSS Positions data rate <sup>(4)</sup> : 50 Hz

GNSS Measurements (raw) data rate: 20 Hz

Velocity accuracy, RMS: < 0.03 m/s

Initialization time: <50s (cold start), <30s (hot start)

Time accuracy (clock drift) <sup>(6)</sup> : 20 ns

## Navigation:

Horizontal position accuracy (GPS L1/L2), RMS: 1.2m

Horizontal position accuracy (DGPS), RMS: 0.4m

Horizontal position accuracy (post processing)<sup>(1)</sup> :  
0.02m

Horizontal position accuracy (RTK), RMS:  
0.01m+1 ppm

Vertical position accuracy, RMS: <1m

Velocity accuracy, RMS: 0.03 m/s

PPS timestamps accuracy: 20 ns

## Electrical

Supply Voltage: 9V~36V DC

Power Consumption: 3.0W

Output Interface (options): RS-232/RS-422

Output data format:  
Binary, TSS-1, NMEA 0183 ASCII characters

## Physical

Size: 73x47x33mm

Weight: 145g

## Environmental

Operating Temperature: -40°C ~ +70°C

Operating Temperature: -50°C ~ +85°C

MTBF: 55,500 hours

## Orientation:

### Heading

Range: 0 to 360 deg

Static Accuracy <sup>(2)</sup> : 1 deg

Dynamic accuracy (GNSS) <sup>(5)</sup> : 0.1 deg RMS

Post processing accuracy <sup>(1)</sup> : 0.03 deg RMS

### Pitch and Roll

Range: Pitch, Roll: ±90, ±180 deg

Angular Resolution: 0.01 deg

Static Accuracy in whole Temperature Range:  
0.05 deg

Dynamic Accuracy <sup>(5)</sup> : 0.1 deg RMS

Post processing accuracy <sup>(1)</sup> : 0.006 deg RMS

## Sensors:

### Gyroscopes

Measurement range: ±450 deg /sec

Bias in-run stability (RMS, Allan Variance): 1 deg/hr

Noise density: 0.004 deg/secVHz

### Accelerometers

Measurement range: ±8 g

Bias in-run stability (RMS, Allan Variance): 0.005mg

Noise density: 0.025 mgVHz

### Magnetometers

Measurement range: ±2 Gauss

Bias in-run stability, RMS: 4 nT

Noise density, PSD: 10 nTVHz

### Pressure

Measurement range: 300 – 1100 hPa

Bias in-run stability (RMS, Allan Variance): 2 Pa

Noise density: 0.8 Pa/VHz

## Notes:

(1) RMS, post-processing results use third party software

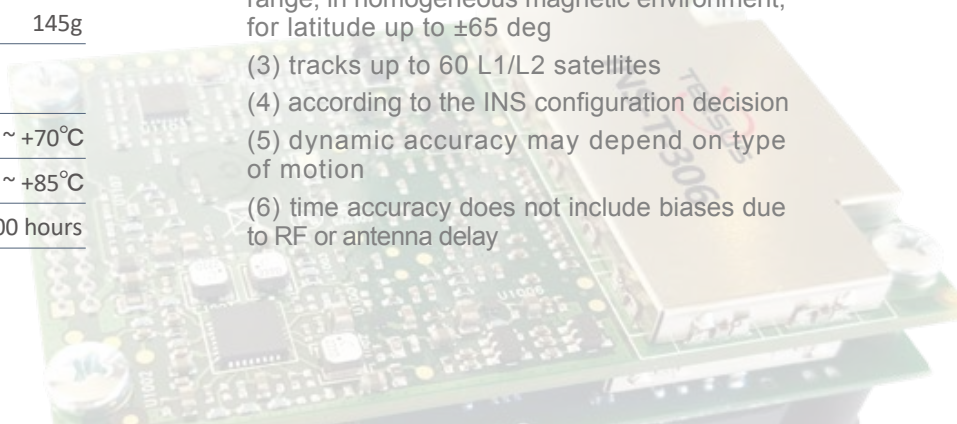
(2) calibrated in whole operational temperature range, in homogeneous magnetic environment, for latitude up to ±65 deg

(3) tracks up to 60 L1/L2 satellites

(4) according to the INS configuration decision

(5) dynamic accuracy may depend on type of motion

(6) time accuracy does not include biases due to RF or antenna delay



# Tersus GNSS Inc.

## Global Accuracy Easier

Tersus is a leading GNSS RTK solution provider. Our engineers have been pioneers in the design of GNSS products to support high-precision positioning applications.

Our products include GNSS RTK & PPK OEM boards and receivers, as well as integrated solutions such as the David GNSS Receiver, Oscar GNSS Receiver, MatrixRTK, and GNSS-aided Inertial Navigation System.

Designed for easy and rapid integration, our GNSS solutions offer centimeter-level positioning accuracy and flexible interfaces for a variety of applications including: unmanned aerial vehicle (UAVs), surveying, mapping, construction engineering, and precision agriculture.

To learn more, visit: [www.tersus-gnss.com](http://www.tersus-gnss.com)

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Technical support: [support@tersus-gnss.com](mailto:support@tersus-gnss.com)

Descriptions, specifications and related materials are subject to change.

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