

VBOX 3iS – 100 Hz GNSS/INS System (RLVB3iS / RLVB3iSR)



The VBOX 3iS is a compact GNSS-aided inertial navigation system (INS) with a built-in OLED display.

Combining wheel speed and survey-grade 100 Hz GNSS measurements with an Inertial Measurement Unit, the VBOX 3iS offers accurate position, speed, acceleration, attitude and angular rate data.

The VBOX 3iS is available with RTK & DGNSS for even greater positional accuracy when used in conjunction with a VBOX Base Station or other RTCMv3 service like NTRIP. This allows it to be used for robot guidance and as a moving target, as part of a VBOX ADAS setup.

In GNSS denied environments, such as tunnels and deep urban canyons, combining wheel speed information with GNSS and inertial data in a Kalman filter yields a significant improvement in the accuracy of the estimated speed and position.

Only 13cm in length, the sensor is easy to mount and transport, making it ideal for automotive, motorsport, marine, and telematics testing and development.



Features

- High Performance 100Hz GPS and GLONASS receiver
- Integrated Inertial Measurement Unit
- Built in display for easy configuration and diagnostics
- CAN bus output includes: speed, body heading, pitch and roll angles, brake stop distance, radius of turn, accelerometer and gyro data
- Serial output of NMEA and attitude channels
- User configurable digital output
- Virtual lap beacon output
- Compatible with DGPS Base Station
- Rugged Deutsch ASDD Autosport connector
- High quality aluminium enclosure
- IP67 rated: water + dust proof
- Wide 6.5 V – 30 V operating range and low current consumption
- Oversampled event marker to precisely capture the start of tests such as braking



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GNSS Specifications

Velocity		Absolute Positioning	
Accuracy	0.1 km/h (averaged over 4 samples)	Accuracy	3 m 95 % CEP*
Update rate	100 Hz	Accuracy with SBAS DGPS	<1.8 m 95 % CEP*
Maximum velocity	655 knots (1200 km/h)	Accuracy with RTCM DGNSS Base Station	0.4 m 95 % CEP*
Minimum velocity	0.1 km/h	Accuracy with RTK Base Station	0.02 m 95 % CEP*
Resolution	0.01 knots (0.0185 km/h)	Update rate	100 Hz
Latency	15.5 ms (fixed)	Height accuracy	6 m 95 % CEP*
		Height accuracy with DGNSS	2 m 95 % CEP*

Distance		Acceleration	
Accuracy	0.05 % (<50 cm per km)	Accuracy	0.50 %
Update rate	100 Hz	Maximum	20 g
Resolution	0.078 mm	Resolution	0.01 g
		Update rate	100 Hz

Heading		Time	
Resolution	0.01°	Resolution	0.01 s
Update rate	100 Hz	Accuracy	30 ns

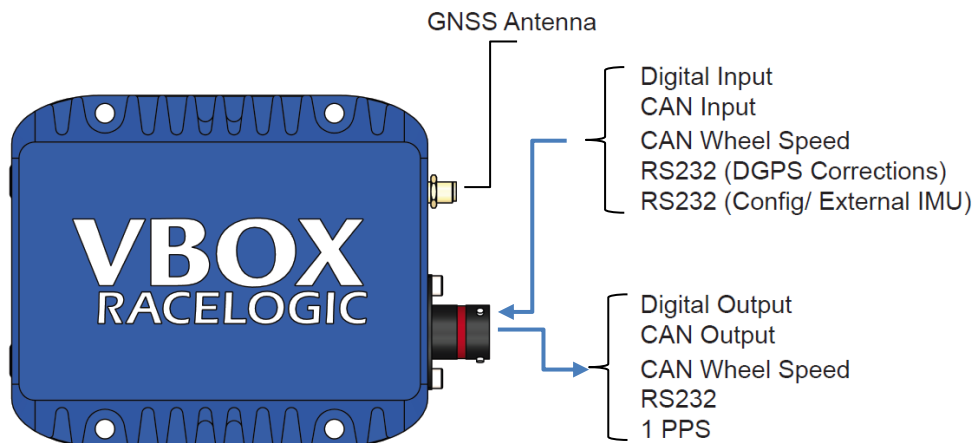
Brake Stop Accuracy (Trigger Activated)			
Accuracy	±1.8 cm**		

Definitions

*Circle of Error Probable: 95 % of the time the position readings will fall within a circle of the stated radius.

** Based on <50 m brake stop distance.

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Inputs

Unit Power	
Input Voltage Range	6.5 – 30 V DC
Power Consumption	7.5 W max
Digital Input	
Input Function	Brake event trigger / track marker

Outputs

CAN Bus	
Output Data Rate	125 kbit/s, 250 kbit/s, 500 kbit/s & 1 Mbit/s selectable baud rate. Software controlled CAN termination.
Data available	Outputs: Satellite count, time, position, speed, heading, body heading, height, vertical velocity, longitudinal acceleration, lateral acceleration, distance, IMU heading*, IMU roll angle*, IMU pitch angle*, X acceleration, Y acceleration, Z acceleration, pitch rate, roll rate, yaw rate, Robot heading *with IMU enabled Results: Trigger event time, trigger speed, start speed, end speed, deceleration test time, lap time, split time, radius of turn.
RS232	
Output Data Rate	Up to 100 Hz
Digital Output	
Signal Levels	Low = 0 V, High = 5 V, Max. frequency 4.4 kHz
Output Type	Speed, 1 PPS or Lap Beacon
GNSS Antenna Supply	
Supply Voltage	5 V DC

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IMU Specifications

	Gyroscopes (Angular rate sensors)	Accelerometers
Dynamic range	± 450 °/s	± 20 g
Nonlinearity	0.01 % of full scale	0.1 % of full scale
Resolution	16-bit ADC (0.014 °/s)	16-bit ADC (0.15 mg)
Bandwidth	50 Hz	50 Hz
Noise density	0.01 °/s/√Hz	60 µg/√Hz
Bias stability	0.003 °/s	15 µg
Bias repeatability (1 year)	0.2 °/s	0.005 g

Roll and Pitch Angle Accuracy

Attitude	Accuracy (RMS)
Pitch Angle	0.06°
Roll Angle	0.06°

Environmental and Physical

Environmental and physical			
Weight	Approx. 480 g	Operating temperature	-20°C to +70°C
Size	133.2 mm x 98 mm x 37.5 mm	Storage temperature	-40°C to +85°C
IP rating	IP 67		

Package Contents

Description	Product Code
1x VBOX 3iS 100 Hz GNSS & INS Unit <u>or</u> 1x VBOX3iS 100 Hz GNSS & INS Unit with RTK	VB3iS-V1 / VB3iSR-V1
1x GPS/GLONASS L1 antenna with detachable RG 174 SMA-SMA cable (4 m)	RLACS156
1x Carry Case	RLACS106
Supplied separately	
VBOX 3iS Speed Only Interface Cable (1.2 m)	RLCAB128
VBOX 3iS Brake Testing Interface Cable (1.2 m)	RLCAB129
VBOX 3iS ADAS Interface Cable (1.2 m)	RLCAB130
VBOX 3iS External IMU Interface Cable (3 m)	RLCAB131

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Hardware & Software Support

Support	
Lifetime Support Contract	Valid for a minimum of 5 years from the date of purchase and limited to the original purchaser. Contract includes: telephone/ email technical support provided by local VBOX distributor and firmware/ software upgrades (where applicable).

Unit Dimensions

