

# VBOX3i – Dual Antenna

## Measures Slip and Pitch/Roll (RLVB3iSL)



VBOX3i dual antenna (VB3iSL) is Racelogic's most powerful GPS data logging system. By utilising two GPS engines configured in a 'Fixed Baseline RTK setup', the VB3iSL combines high level accuracy and test repeatability with the ability to measure slip and pitch/roll angles at 100Hz.

Enabling users to intuitively measure set parameters during acceleration, deceleration, braking, ABS and ESP testing, handling and many other types of high dynamic tests, VB3iSL combines a system renowned for accuracy with the ability to record data via additional parameters to a single unit.



As with previous VBOX models, VB3iSL is compatible with all existing peripherals; including Multifunction Display, 16bit Analogue Input, 4 Channel Frequency and Pulse Counter Input Module, 8 Channel Thermocouple Interface and Yaw rate sensor.

Included within the VBOX3iSL package is VBOX Manager. A device enabling you to change the dynamic modes and filter settings, show real time graphs of speed against time, setup slip angle data and calculate antenna locations.



## Features

- Non-contact 100Hz speed and distance measurement using GPS + GLONASS
- Simultaneous measurement of Slip Angle, Pitch/Roll Angle, Yaw rate, True Heading, Lateral Velocity and Longitudinal Velocity
- Very low latency: 6.75ms
- 4 x 24bit differential analogue input channels with  $\pm 50V$  input range and synchronous capture
- Brake/Event Trigger input at 10ns resolution.
- 2 x CAN Bus interface for data input & output
- RS-232 serial interface
- Bluetooth Interface
- Audio voice tagging
- Microphone headset included
- Data logged to Compact Flash memory card
- 2 x 16bit User configurable analogue outputs
- 2 x Digital outputs
- User configurable logging conditions
- Logging rate selectable to 100Hz, 50Hz, 20Hz, 10Hz, 5Hz, 1Hz
- Wide 7V to 30V operating range
- Low current consumption
- USB Interface

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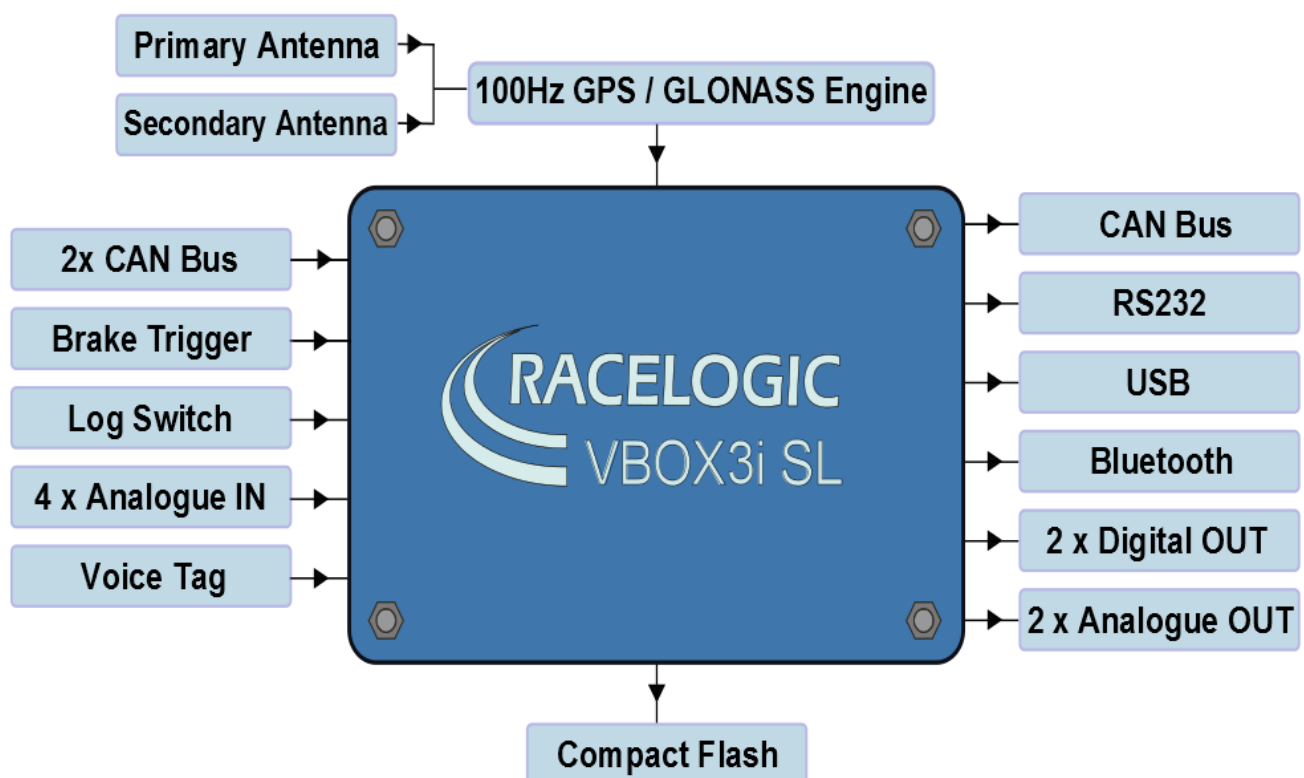
## System

### 100Hz GPS Engine

VB3iSL features a powerful GPS engine embracing twin antennas capable of providing 100Hz signal update rate for all GPS / GLONASS parameters (i.e. velocity, heading & position). Velocity and heading are calculated via Doppler Shift in the GPS carrier signal, providing you with unparalleled data accuracy.

### Dual Antenna

Utilising two GPS antennas additional parameters can be measured. Slip and pitch/roll angles can now be more accurately defined, making this system ideal for vehicle dynamics testing.



### Compact Flash

VB3iSL can accept Type I compact flash cards to log data. Data is stored in a standard PC format allowing fast transfer of data to a PC equipped with a compact flash card reader. The file format is an ASCII text file that can be loaded directly into VBOX Tools software, or imported into Excel and other third party software.

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### Inputs / Outputs

Inputs	Outputs
<b>CAN Bus</b>  Two CAN Bus interfaces are available on VBOX3i SL. By utilising separate CAN Bus connections it allows data to be logged from external modules (e.g. TC8, FIM02). Up to 16 CAN signals can also be logged from a different CAN source (e.g. Vehicle CAN Bus). When logging data from another source, VBOX Tools can load signal data from an industry standard CAN database file (.DBC).	<b>CAN Bus</b>  One of the two VBOX CAN ports can be used to output VBOX GPS parameters plus any 12 channels from connected input modules or internal AD channels. The baud rate and CAN id's for these outputs are user configurable.
<b>Brake Trigger</b>  By using a physical pressure switch on the brake pedal, a precise 'start of braking event' can be captured.	<b>RS232</b>  RS232 connector is used for VBOX configuration and output of real-time GPS data. Serial data sent to the software is limited by the bandwidth of the PC serial port - 20Hz (Full 100hz serial is available via USB / Bluetooth).
<b>Log Switch</b>  A start/stop logging switch allows users to manually choose when they wish to record data.	<b>USB</b>  VB3iSL USB connector can be used for VBOX Configuration to output real-time data at 100Hz.
<b>4x Analogue Input</b>  Each of the four Analogue Input channels on a VB3iSL has a dedicated 24bit analogue converter. Data is recorded from each channel simultaneously to avoid latency between analogue channel data. The name, scale and offset of each Analogue Input channel can be adjusted using VBOX Tools software to allow sensor calibration and therefore logging of data in standard SI units.  The Analogue Input connector also provides two power outputs that may be used for driving sensors. These are in the form of a 5v DC isolated supply and an output equal to the VBOX power supply voltage.	<b>2x Analogue Outputs</b>  2x 16bit analogue outputs can be configured to output velocity (or other GPS parameters) for use by additional data logging equipment. The voltage output range is from 0 to 5v DC with a resolution of 76 $\mu$ V per bit.
	<b>2x Digital Outputs</b>  Two digital outputs are available on VBOX3i SL. One Digital output is assigned to Speed/Distance – configurable via Pulses per Meter. While the second is a level switch output enabling users to select any one of the logged channels and assign it a threshold value.
<b>Voice Tagging</b>  VB3iSL can record a GPS synchronised WAV audio tag up to 30 seconds long to a time accuracy of 0.5 sec. The recorded WAV file is then logged to the CF card.	<b>Bluetooth</b>  VB3iSL comes equipped with an internal Bluetooth Radio allowing remote configuration and remote output of real-time GPS data to any Bluetooth capable PC or Data logger. The Bluetooth connection is capable of sending data at the full 100Hz rate.
<b>Power Supply</b>  VB3iSL can accept a supply voltage between 7 to 30V DC. Low current consumption results in extended battery life.	

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## GPS Specifications

Velocity		Distance	
Accuracy	0.1 Km/h (averaged over 4 samples)	Accuracy	0.05 % (<50cm per Km)
Units	Km/h or Mph	Units	Metres / Feet
Update rate	100 Hz	Update rate	100 Hz
Maximum velocity	1000 Mph	Resolution	1 cm
Minimum velocity	0.1 Km/h	Height accuracy	6 Metres 95% CEP*
Resolution	0.01 Km/h	Height accuracy with DGPS	2 metres 95% CEP*
Latency	6.75 ms		

Absolute Positioning		Time	
Accuracy	3m 95% CEP*	<b>Accel/Brake Test (MFD/VBOX Tools)</b>	
Accuracy with SBAS DGPS	>1m * 95% CEP*	Resolution	0.01 s
Accuracy with RTCM DGPS	40cm* 95% CEP*	Accuracy	0.01 s
Accuracy with RTK DGPS	2cm* 95% CEP* (optional)	<b>Lap Timing (OLED/VBOX Tools)</b>	
Update rate	100 Hz	Resolution	0.01 s
Resolution	1.8 mm	Accuracy	0.05 s**

\* To be confirmed

Acceleration		Environmental and physical	
Accuracy	0.50%	Weight	Approx. 900 grams
Maximum	20 G	Size	170 x 121 x 41mm
Resolution	0.01 G	Operating temperature	-20°C to +70°C
Update rate	100 Hz	Storage temperature	-30°C to +80°C

Heading		Brake stop accuracy	
Resolution	0.01°	Accuracy	+/- 2cm
Accuracy	0.1°		

### Definitions

\* CEP = Circle of Error Probable. 95% CEP means 95% of the time the position readings will fall within a circle of the stated diameter. 2cm accuracy requires an RTK option and RTK enabled Base Station

\*\* Not using DGPS and crossing the start/finish line at 100km/h



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## Slip Angle

<b>Accuracy</b>	<0.2° rms at 0.5m antenna separation
	<0.04° rms at 2.5m antenna separation

## Pitch / Roll Angle

<b>Accuracy</b>	<0.14° rms at 0.5m antenna separation
	<0.028° rms at 2.5m antenna separation

## Memory

<b>Compact Flash</b>	Type I
<b>Recording time</b>	Dependent on flash card capacity*

## Power

<b>Input Voltage Range</b>	7 – 30V DC
<b>Power</b>	Max. 5.5 Watts

\* Approximately 29Mb per hour used when logging GPS data at 100Hz; Approx. 182Mb per hour total logging capacity



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## Outputs

### CAN Bus

<b>Bit rate</b>	125Kbits, 250Kbits ,500Kbits & 1Mbit selectable baud rate
<b>Identifier type</b>	Standard 11bit 2.0A
<b>Data available</b>	Satellites in View, Latitude, Longitude, Velocity, Heading, Altitude, Vertical Velocity, Distance, Longitudinal Acceleration & Lateral Acceleration, Distance from Trigger, Trigger Time, Trigger Velocity

Analogue		Digital	
<b>Voltage range</b>	0 to 5Volts DC	<b>Frequency range</b>	DC to 44.4Khz
<b>Default setting *</b>	Velocity 0.0125Volts per Km/h (0 - 400Km/h)	<b>Default setting *</b>	Velocity 25Hz per Km/h (0 - 400Km/h) 90 pulses per metre
<b>Accuracy</b>	0.1 Km/h	<b>Accuracy</b>	0.1Km/h
<b>Update rate</b>	100Hz	<b>Update rate</b>	100Hz

### Definitions

\* The range settings can be adjusted by the user in VBOX Tools Software

## Inputs

### CAN Bus

<b>Racelogic modules</b>	Up to 32 channels from any combination of ADC02, ADC03, FIM02, TC8, Yaw sensor or CAN01
<b>External CAN Bus</b>	16 Channels of user definable CAN signal from external bus, e.g. Vehicle CAN bus Can load signal data from industry standard DBC database file

Analogue		Digital	
<b>Number of channels</b>	4	<b>Brake event trigger</b>	10ns resolution
<b>Input range</b>	±50v	<b>On/Off logging control</b>	Remote log control from hand-held switch
<b>Channel sample order</b>	Synchronous		
<b>Resolution</b>	24 bit		
<b>DC accuracy</b>	400 µV		

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## Hardware & Software Support

Support	
Hardware	One Year Support Contract
Software	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).

## Package Contents

Description	Product Code
1x VBOX3i dual antenna unit	RLVB3i SL
1x VBOX Manager	RLVBFMAN
1x VBOX mains charger	RLVBACS020
2x GPS/GLONASS ground plane antenna with 4m removable cable	RLACS156
1x 4GB Compact Flash Card	RLACS098
1x VBOX Serial PC cable (5-way LEMO to 9-way D-type serial cable - 2m)	RLCAB001
1x VBOX3i Bluetooth antenna	RLACS119
1x VBOX3i Audio Headset	RLACS120
1x 25-way D-type connector	ADC25IPCON
1x USB A – Mini B Lead 2m	RLCAB066-2
1x 2-way LEMO power lead to 12V cigar lighter – 2m	RLCAB010L
2x spare fuse 3.15A 250V	416-610
1x USB multi card reader	RLACS163
1x VBOX Padded carry case	RLACS013V4
1x VBOX User Manual	VB3iMAN
1x VBOX Tools Software Manual	VBTOOLSMANA5
1x VBOX Tools Software CD	RLVBACS030
1x VBOX Tape Measure	RLACS091
1x Spare Antenna Cable	RLCAB071-4



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