

Ellipse AHRS & INS

High Performance, Miniature Inertial Sensors

OEM Integration Manual



Document
Revision

ELLIPSEOEMIM.1
1 - Oct 21, 2014

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Revision history

Rev.	Date	Author	Information
1	Oct 21, 2014	Alexis Guinamard	First version of this document

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1. Introduction

This documentation aims to merge all information, specifications and recommendations that are specific to Ellipse Devices OEM integration.

This documentation has to be considered as a complement to the Ellipse User Manual which includes most installation and operating guidelines.

OEM devices are more sensitive to their direct environment than box devices. That's why, in addition to the User Manual, OEM integrator is advised to carefully follow the next instructions.

2. OEM Guidelines

2.1. Mechanical mounting

During calibration, SBG Systems takes care to avoid stressing the Ellipse sensor PCB as it could affect sensor performance.

The Ellipse OEM enclosure is significantly lighter than the standard box enclosure. As it is made of plastic, it's possible to bend the enclosure if it is not properly mounted. Care should be taken to avoid such bending by installing the sensor on a flat surface

2.1.1. Device coordinate frame

The following pictures shows how the sensor coordinate frame is oriented with respect to the module:



Figure 2.1: Ellipse L coordinate frame

2.2. Recommended accessories

The following accessories are recommended to connect and mount and connect the Ellipse device on your system.

Ordering reference	Item	Comments
DK-ELI-L	Ellipse development Kit	Includes a USB cable and software development suite.
CA-ELI-L-KIT-10CM	Cable kit including: A mating plug 10x 10cm wire with contact	1 kit provided with each sensor
ANT-TAL-TW-33-2710-03-3000	GPS + GLONASS + BEIDOU + GALILEO L1 Antenna with 3M cable, MMCX connector, no magnet	Check ellipse User manual for antenna specifications. This product shares the same specs as ANT-TAL-TW-33-2710-00-3000.
-	M2 Screw – 20 mm long	Brass or A4 stainless steel

2.3. Vibrations considerations

Standard box devices don't include any mechanical anti-vibration system so both boxed and OEM devices have roughly the same requirements.

However, the OEM version is lighter than the boxed device. Most of the time, it's more difficult to efficiently isolate a lightweight part from vibrations than a heavier system.


If it's too hard to isolate the Ellipse sensor alone from vibrations, then it's probably much easier to fix rigidly the IMU to its host system, and then isolate the whole system from vibrations.

Sensors embedded in the Ellipse series are sampled at a very high rate (10kHz), and are able to filter out a lot of vibrations. However, the sensors themselves suffer from an error called VRE (Vibration Rectification Error). This error comes from the sensor intrinsic asymmetry and cannot be compensated for.

It is therefore really important to isolate the sensor from vibrations as much as possible because large vibrations can compromise overall accuracy. Very large vibration levels can lead to the sensor instability due to large sensors errors.

3. OEM Specifications

3.1. Mechanical specifications

All dimensions are in mm. The center of measurement for acceleration, velocity and position is represented on the mechanical outlines by the  symbol. It is referenced to the base plate.

Mechanical Specifications	
Size	33.5 x 34 x 13 mm
Weight	A: 15 g / 0.035lb N: 16 g / 0.035 lb E: 16 g / 0.035 lb

3.1.1. Front view

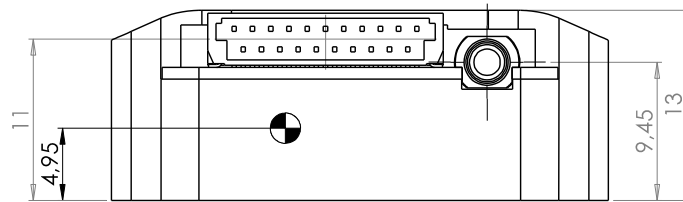


Figure 3.1: Ellipse OEM front view

3.1.2. Top view

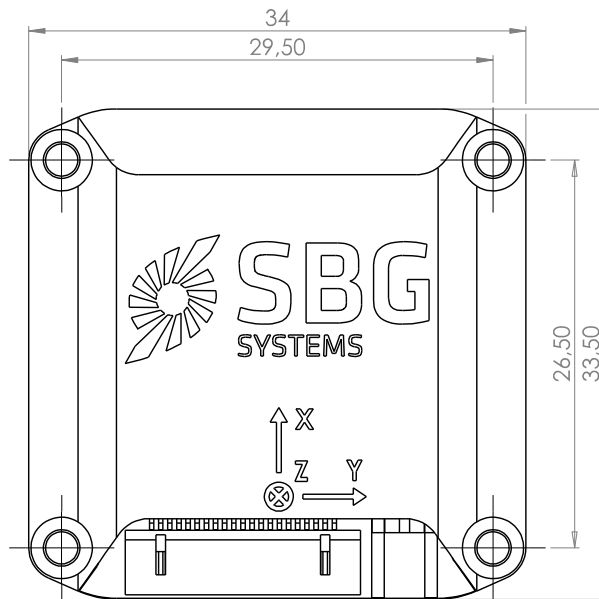


Figure 3.2: Ellipse OEM top view

3.1.3. Bottom view

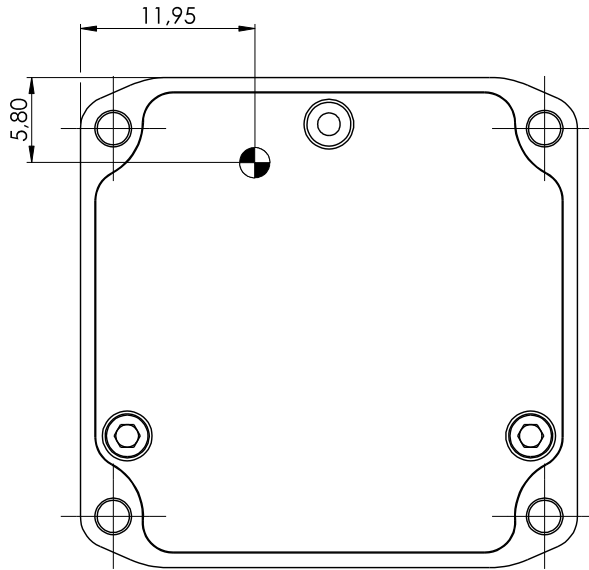


Figure 3.3: Ellipse OEM bottom view

3.2. Electrical specifications

Ellipse L1 and L2 share the same 21 ways board to wire connector, which is a JAE FI-W21P-HFE-E1500. It mates with a FI-W21S plug, which uses FI-C3-A1-15000 contacts.

The connector pin numbering is as follows. Pins 1, 2, 20 and 21 are also marked on the plug.

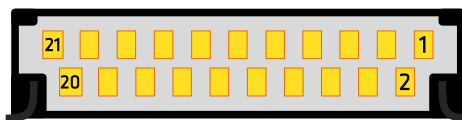


Figure 3.4: FI-W21P-HFE-E1500 pin numbering (front view)

3.2.1. L1 versions (TTL)

The Ellipse L1 versions share most of the boxed versions electrical characteristics. However, due to the TTL interfaces, the following specification apply on serial ports:

Item	Conditions	Min	Typical	Max	Unit
TTL inputs (Rx pins)					
Input range		-0.3	3.3	3.6	V
Low level threshold		TBD			V
High level threshold				TBD	V
TTL outputs (Tx pins)					
Low level output				TBD	V
High level output		TBD			V

3.2.1.1. Connector Pinout

Pin #	Name	Description
1	GND	Ground return
2	VIN	Power supply input
3	VDDL	3.3 regulated power supply output. May be used for voltage translation if required.
4	PORT A TTL/RS232	PORT A type selection. Tie to VDDL to enable RS-232 communication on PORT A. Leave unconnected for TTL communications
5	RESERVED	Reserved pin for future use
6	PORT A TX RS232	Port A RS-232 Tx - Not used in TTL mode
7	PORT A RX RS232	Port A RS-232 Rx - Not used in TTL mode
8	RESERVED	Reserved pin for future use
9	PORT A TX TTL	PORT A Tx in TTL mode - Not used in RS-232 mode
10	PORT C TTL TX	Port C Tx line
11	PORT C TTL RX	Port C Rx line
12	PORT A RX TTL	PORT A Rx in TTL mode - Not used in RS-232 mode
13	PORT D TTL Rx	TTL input for miscellaneous applications
14	SYNC IN A	May be used as clock/event input
15	SYNC IN B	May be used as clock/event input
16	SYNC IN C	May be used as clock/event input
17	SYNC IN D	May be used as clock/event input
18	SYNC OUT A	Synchronization output signal.
19	SYNC OUT B	Synchronization output signal.
20	CAN L	Can Low signal
21	CAN H	Can High signal

3.2.2. L2 versions (RS-232 / RS-422 + CAN)

The L2 models share the same electrical specifications as boxed versions B1 and B2. See Ellipse User Manual for more information about L2 electrical specifications.

3.2.2.1. Connector Pin out

Pin #	Name	Description
1	GND	Ground return
2	VIN	Power supply input
3	NC	Leave unconnected.
4	PORT A RS232/RS422	Port A RS-232 or RS-422 selector. Tie to GND to select RS-422
5	PORT A RS422 TX+	Port A RS-422 Tx+. Not used in RS-232 connection.
6	PORT A RS232 TX - PORT A RS422 TX-	Port A RS-422 Tx- or RS-232 Tx line
7	PORT A RS232 RX - PORT A RS422 RX+	Port A RS-422 Rx+ or RS-232 Rx line
8	PORT A RS422 RX-	Port A RS-422 Rx-. Not used in RS-232 connection.
9	PORT C RS422 TX+	Port C RS-422 Tx+. Not used in RS-232 connection.
10	PORT C RS232 TX - PORT C RS422 TX-	Port C RS-422 Tx- or RS-232 Tx line
11	PORT C RS232 RX - PORT C RS422 RX+	Port C RS-422 Rx+ or RS-232 Rx line
12	PORT C RS422 RX-	Port C RS-422 Rx-. Not used in RS-232 connection.
13	PORT D Rx	RS-232 input for miscellaneous applications
14	SYNC IN A	May be used as clock/event input
15	SYNC IN B	May be used as clock/event input
16	SYNC IN C	May be used as clock/event input
17	SYNC IN D	May be used as clock/event input
18	SYNC OUT A	Synchronization output signal.
19	SYNC OUT B	Synchronization output signal.
20	CAN L	Can Low signal
21	CAN H	Can High signal

3.2.3. GPS connector (Ellipse N models)

GPS connector in OEM version is a MMCX connector. The active antenna can be directly plugged into this MMCX connector, or can be connected to a SMA to MMCX cable.



Figure 3.5: MMCX connector

4. Support

If you still have some questions after reading this document, we would be glad to help you, so please feel free to contact us. Please do not forget to mention the device id of your product that can be located on the top tag.

You can contact us by:

- Email : support@sbg-systems.com
- Phone : +33 1 80 88 45 00