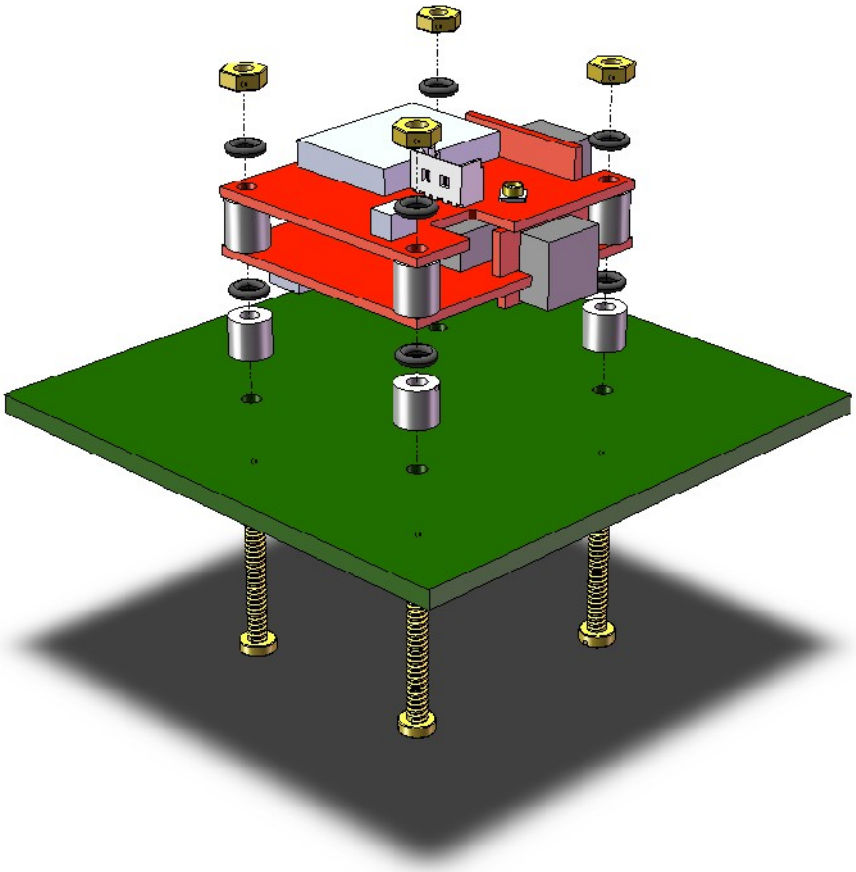
IG-Devices
OEM Integration manual



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Revision history

Rev.	Date	Author	Information
1	9. May. 2012	Alexis GUINAMARD	First version of this document

Index

1. Introduction

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

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

OEM devices are much 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.

A proper handling leads to a very tight integration into customer system, with the same level of performance as box devices. However, an incorrect integration could compromise overall accuracy.

2. OEM Guidelines

These recommendations are extremely important to enable high performance and reliability. A great care should be taken to follow them.

2.1. ESD Considerations

As any electronic device, an OEM IG-Devices is sensitive to Electrostatic Discharges.

A human body can accumulate several thousand volts and can discharge itself into anything it touches.

Irreversible injuries can be caused to electronic devices due to those ESD issues. Therefore, care should be taken to keep OEM devices away from ESD, especially during mounting, with proper protections (with ESD straps, conductive rubber tiles, foot grounders, ...).

2.2. Thermal consideration

IG-Devices are calibrated over the full -40°C to 85°C temperature range. The calibration model assumes the temperature is more or less constant. In case of large temperature variations, a sensor hysteresis effect can be observed. This effect is partially masked by the aluminum box of standard devices.

As there is no box in OEM devices, and in order to maintain the best level of performance, OEM IG-Devices should be kept away from high speed temperature changes and air flows.

2.3. Mechanical mounting

During calibration, SBG Systems takes care to avoid stressing the IG-Devices PCB.

The PCB is rather thin (1.0mm) and can easily be bent or stressed. This would cause sensor errors, and could eventually break the sensor. It is therefore highly recommended to use appropriate spacers between boards in order to avoid any stress.

In addition, a proper PCB mounting will ensure proper resistance against manipulations and shocks.

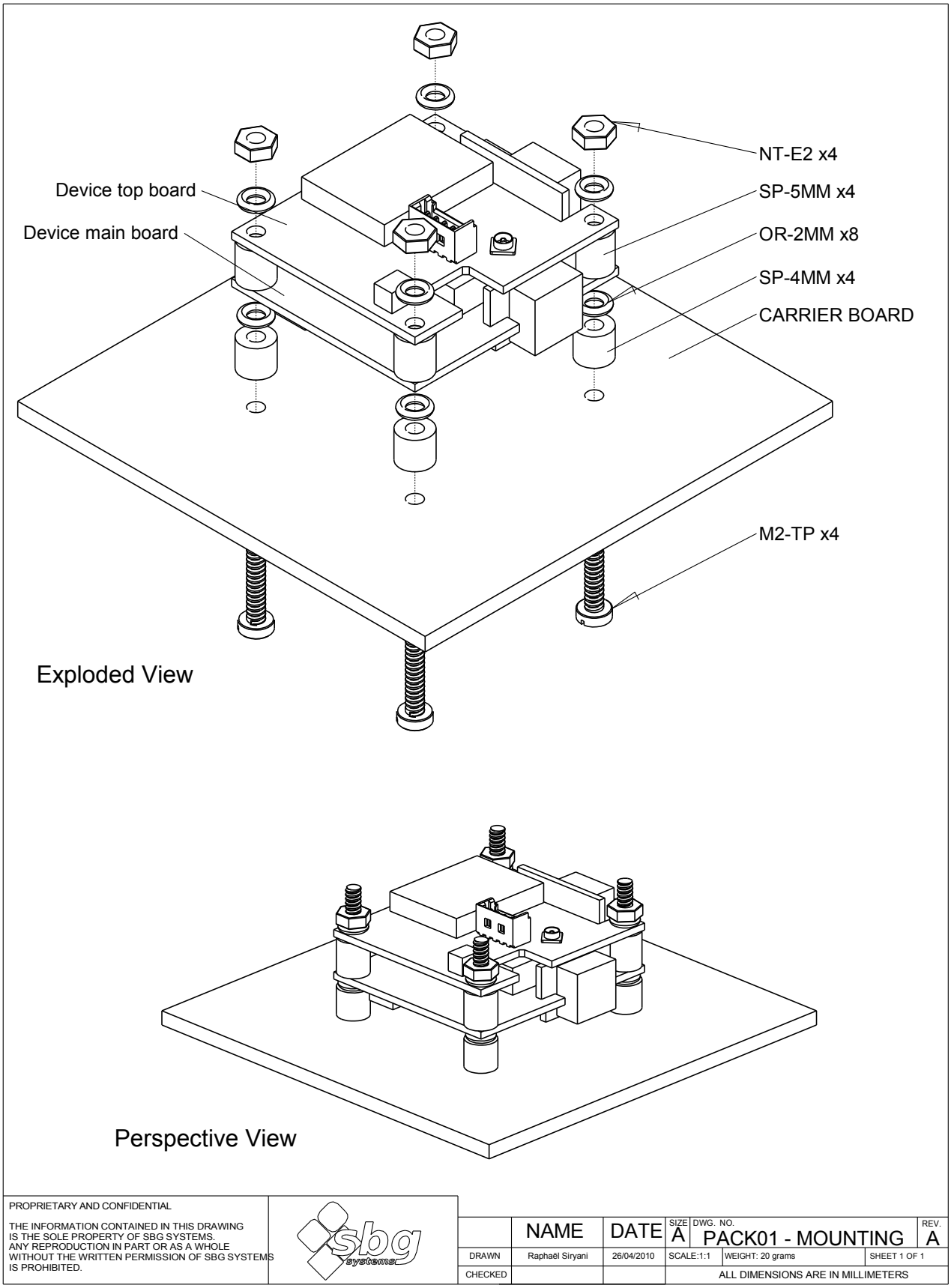
Note: *For best performance, a gyro bias reset should be performed and saved to flash memory after mounting in the final system.*

2.3.1. Recommended accessories

The OEM Development kit already includes mounting accessories (screws, nuts). When OEM devices are bought without DK, user has to provide mounting accessories. The following list shows the recommended accessories for proper mounting.

Reference	Item	Quantity	Material	Comments
SW-M2	M2 Screw – 20 mm long	4	Brass (avoid Nickel finish)	
NT-M2	M2 Nut	4	Brass (avoid Nickel finish)	
SP-4MM	2.2 x 4 x 4 mm spacer	4	Plastic	
SP-5MM	2.2 x 4 x 5 mm spacer	4	Plastic	Provided with each device
OR-2MM	2 x 1 mm O-Ring	8	NBR	

2.3.2. Mounting example



2.4. Vibrations considerations

Boxed 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 IG-Device 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 IG-Devices are sampled at a very high rate (10kHz on IG-500, 1kHz on IG-20/30), 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. Coordinate frames definition

3.1.1. Device coordinate system

Below is defined the inertial coordinate frame for both OEM devices:

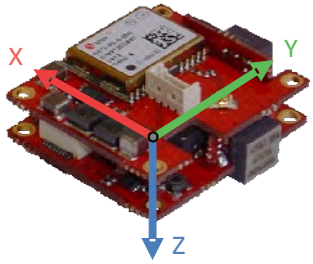


Figure 1: Inertial coordinate frame of the OEM version

3.1.2. Origin of the device coordinate system

If highest precision are needed for velocity and position measurements, it may be useful to know the real center of accelerations as measured by the device. The diagram below describes the position of the 3D accelerometer. Note that this information is in general negligible if only accurate orientation is needed.

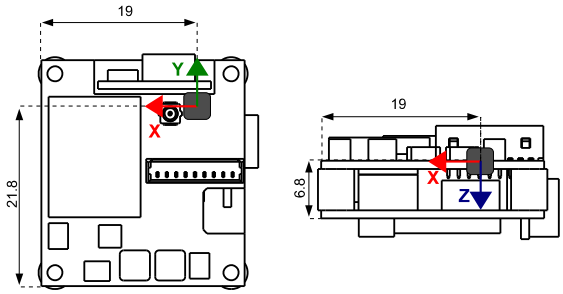
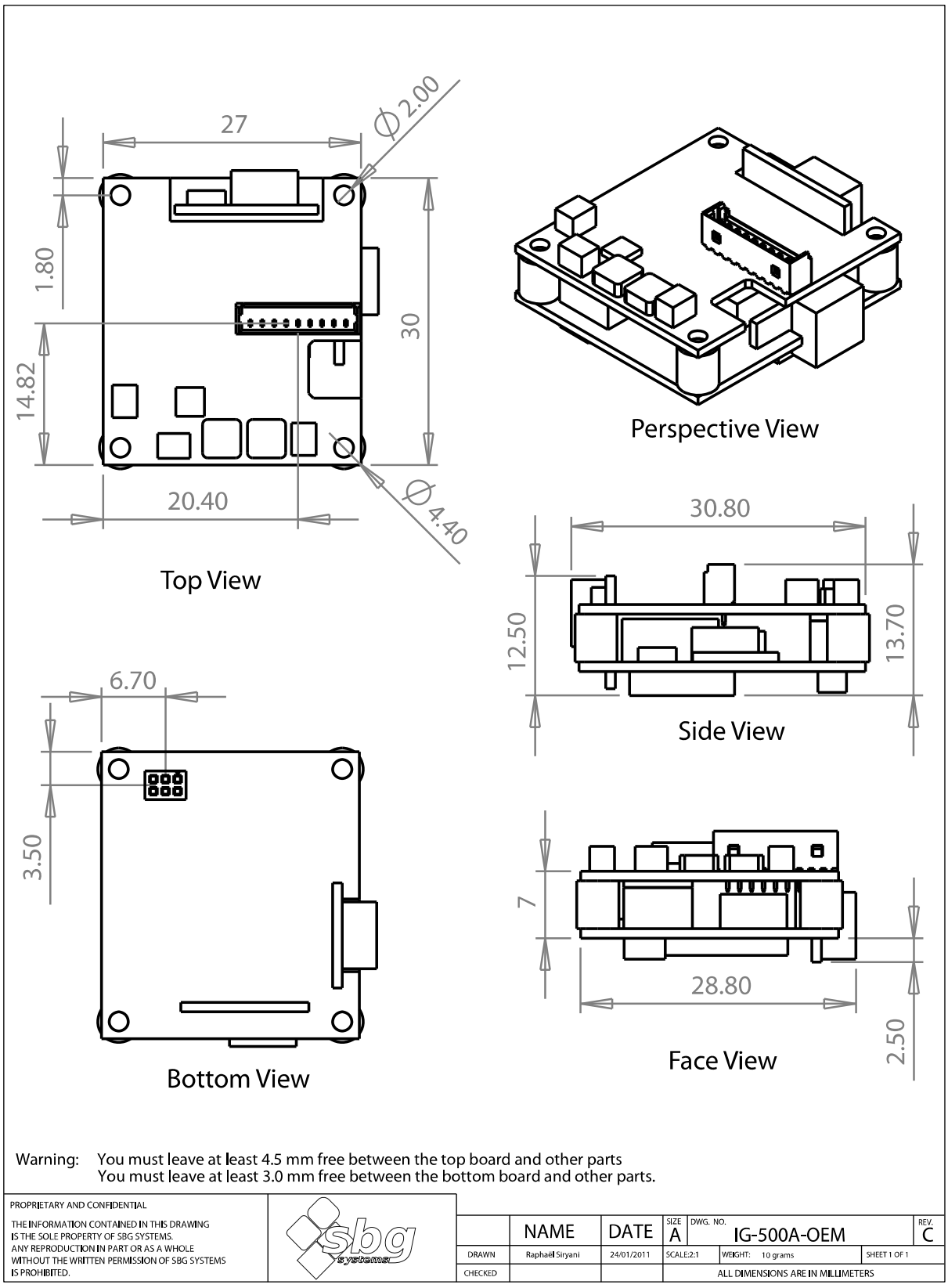


Figure 2: 3D Accelerometer physical location in box and OEM versions.

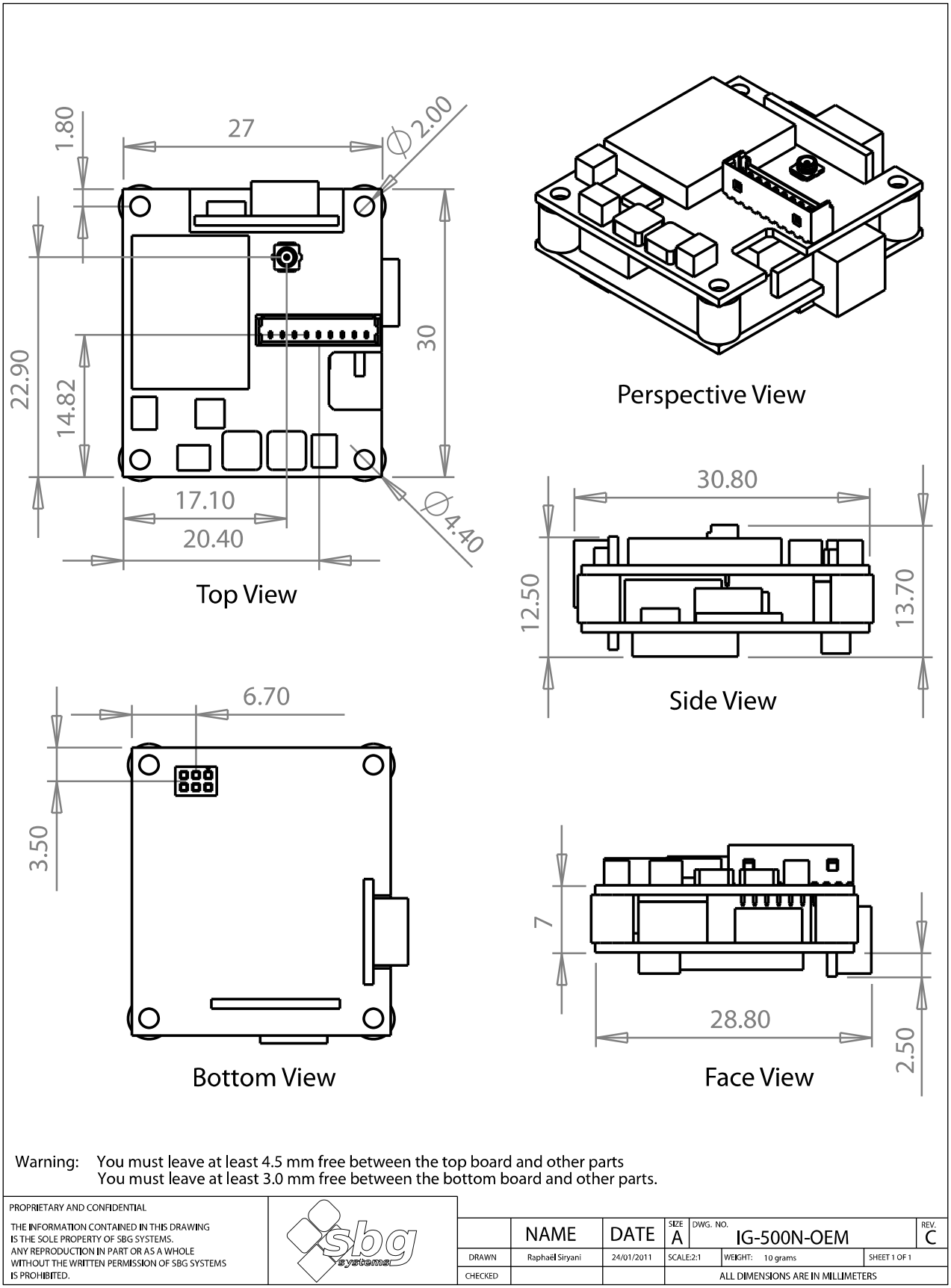
Dimensions are in mm.

3.2. Mechanical specifications

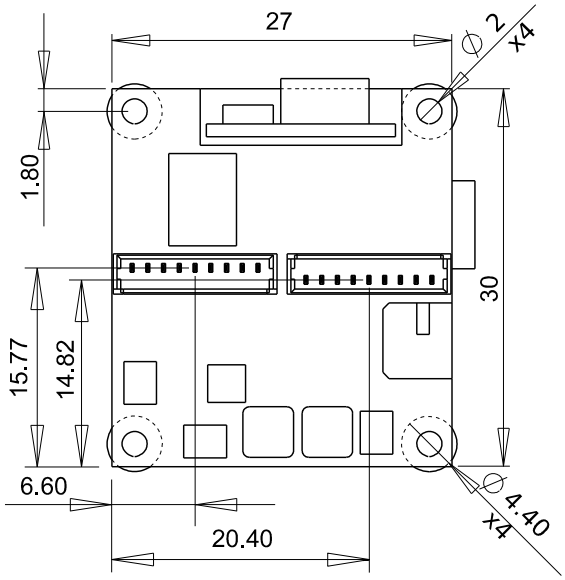
3.2.1. IG-500A – IG-30A – IG-20 OEM outline



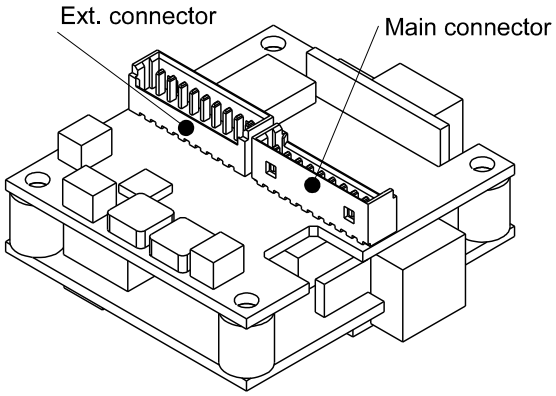
3.2.2. IG-500N – IG-30G Mechanical outline



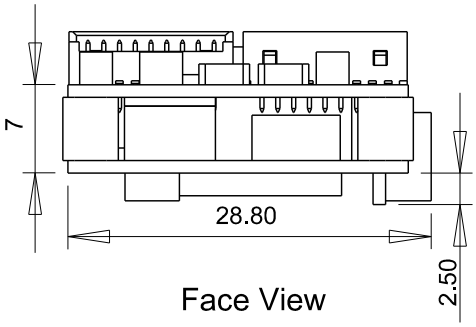
3.2.3. IG-500E OEM mechanical outline



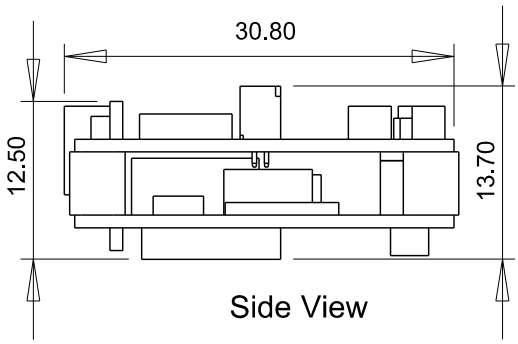
Top View



Perspective View

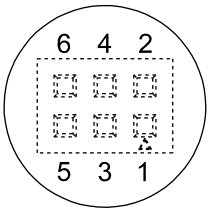


Face View



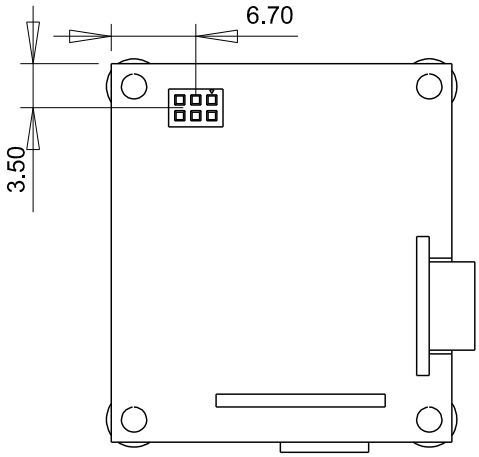
Side View

OEM Connector
1.27 mm Pitch
Top Viewed



Vendor: E-Tec
Ref: BS2-006-TB22

OEM Connector	
Pin	Function
1	VDD
2	GND
3	EN
4	VREG
5	TX
6	RX



Bottom View

Warning: You must leave at least 4.5 mm free between the top board and other parts.
You must leave at least 3.0 mm free between the bottom board and other parts.

	NAME	DATE	SIZE	DWG. NO.	REV.
			A	IG-500E OEM	A
DRAWN	Raphaël Siryani	10/12/2010	SCALE:2:1	WEIGHT: 10 grams	SHEET 1 OF 1
CHECKED			DIMENSIONS ARE IN MILLIMETERS		TOLERANCES: ± 0,1

3.3. IG-Devices OEM Connectors

All signal lines are expressed from IG-Device side. For example, Tx line is IG-Device Tx so it's an output.

3.3.1. OEM Board to Board connector

OEM integration of the IG-Device is made easy by the the OEM Board to Board Connector. It is used to power the device and communicate in serial TTL format. The connector is a 2*3 ways 1.27mm pitch from E-Tec, ref BS2-006-TB22 which is compatible with Samtec CLP-103-02-G-D. This connector mates with E-Tec SS2-006-H70/0 (or Samtec FTS-103-03-L-DV).

Pin	Name	Description	Type
1	**VDD**	Supply voltage [3.3V -> 30V]	SUPPLY
2	**GND**	Ground	SUPPLY
3	**RES**	Reserved. Do not Connect	–
4	**VREG**	3.3 V internal regulator output.	OUTPUT
5	**TX**	Serial output; 3.3V TTL format.	OUTPUT
6	**RX**	Serial input ; 3.3V TTL format	INPUT

Table 1: OEM board to board connector pinout

Note 1: *VREG can be used to achieve a 3.3V to 5V signal conversion with a MAX3378E for example.*

Warning: *Pins 5 and 6 can only be used with the 3.3V TTL serial format (P2 version). Please order a TTL version of the device if you wish to use this connector.*

For other protocols, pins 5 and 6 cannot be used and you should use the OEM Board connector as described in section 3.3.3.

3.3.2. GPS connector (IG-500N and IG-30G only)

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

Figure 3: U.F.L connector

3.3.3. OEM Board to Wire connectors

To connect the IG-Device OEM version to your application, you will probably use the two OEM board to wire connectors located on the top of the device.

3.3.3.1. Main OEM Connector

The main connector (indicated with a “M” on the PCB) contains all required signals to communicate directly with the IG-Device. This connector mates with a 9 ways 1.25mm pitch female, Molex connector, reference 51021-0900. This connector uses the crimp terminal Molex ref 50058 or 50079.

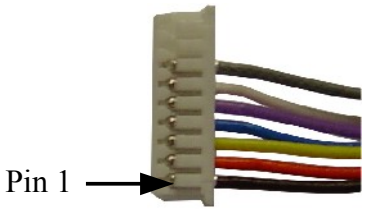


Figure 4: 9 Ways lemo plug

Pin	Signals version P1/P2, RS-232 / TTL	Signals Version P3 : CAN 2.0	Signals Version P4: Rs 422
1	GND	GND	GND
2	VCC	VCC	VCC
3	Tx	-	Tx-
4	Rx	-	Rx+
5	Sync In[1]	Sync In[1]	Rx-
6	Sync Out	Sync Out	Sync Out
7	-	-	Tx+
8	-	CANH	-
9	-	CANL	-

Table 2: Main OEM connector pinout depending on protocol version

***Note [1]:** Sync In Signal is not available on IG-500N and IG-30G*

3.3.3.2. Extended OEM Connector (On IG-500E Only)

The Extended connector (indicated with an “E” on the PCB) includes the pins used for the external device.

Pin	Signals RS-232 configuration	Signals RS-422 configuration
1	GND	GND
2	ODO In	ODO In
3	EXT_Tx	EXT_Tx-
4	EXT_Rx	EXT_Rx+
5	-	EXT_Rx-
6	Sync In	Sync In
7	-	EXT_Tx+
8	-	-
9	-	-

Table 3: Extended OEM Connector pinout

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