

NanoUtil

Interstage GSSB A, B and C

Datasheet

Interstage unit with communication busses from OBC to I²C devices

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2 Overview

The primary function of the GomSpace NanoUtil Interstages GSSB (GomSpace Sensor Bus) is to tie the external part of the satellite to the internal, e.g. solar panels to EPS or sensors to the CPU.

The Interstage is a PCB's placed in between the solar panels on the surface of a 2U or larger satellite.

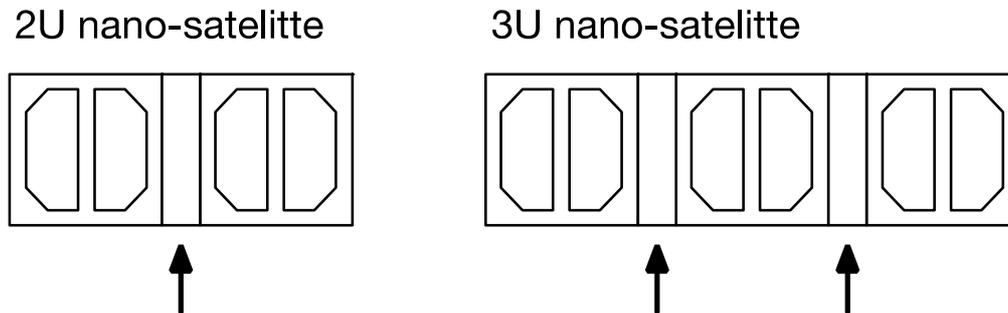


Figure 1 Examples of Interstages positions in a 2U and a 3U satellite

The inside of the PCB contains all the electronics and connectors. The outside has space for a GomSpace Fine Sun Sensor (FSS), an antenna release mechanism or other custom sensors.

The Interstage GSSB comes in 3 versions, labeled A, B and C. The C version is used inside the satellite usually in support of devices in the top or bottom.

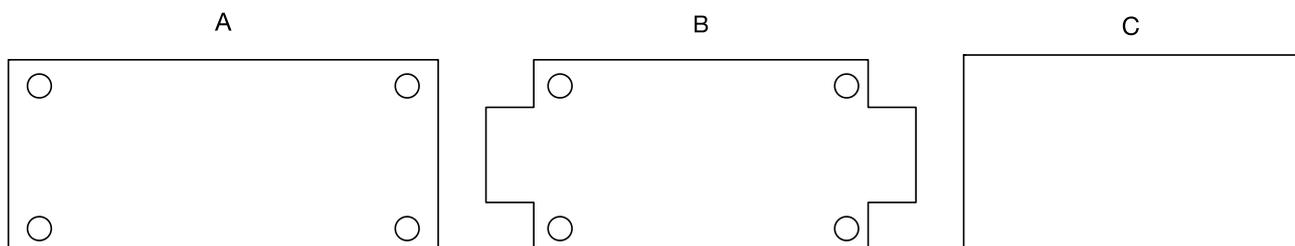


Figure 2 Sketches of the 3 types of interstages

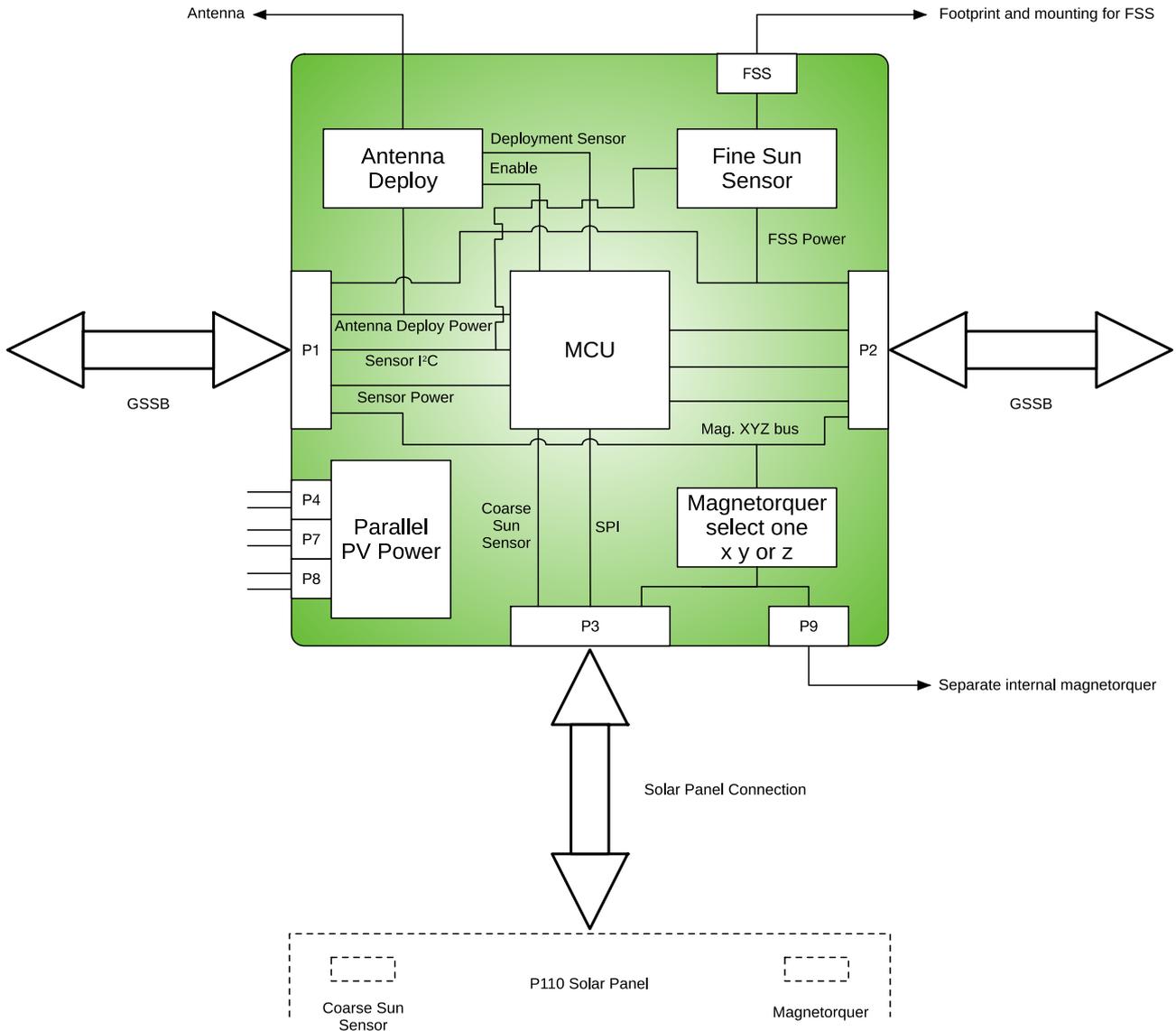
The A and B version are mounted with straight angle connectors and the C version is mounted with right angle connectors.

2.1 Highlighted Features

- Sensor bus (GSSB)
- Connector to a Fine Sun Sensor
- Connector to a external magnetorquer
- Parallel PV power
- Optional antenna release
- Dimensions and mass
 - A: 82.5 mm x 29.0 mm x (device dependent), ~11 g
 - B: 82.5 mm x 29.0 mm x (device dependent), ~10 g
 - C: 63.5 mm x 29.0 mm x (device dependent), ~9 g
- Operational temperature: -40 °C to +85 °C
- PCB material: Glass/polyimide
- IPC-A-610 Class 3 assembly

2.2 Block Diagram

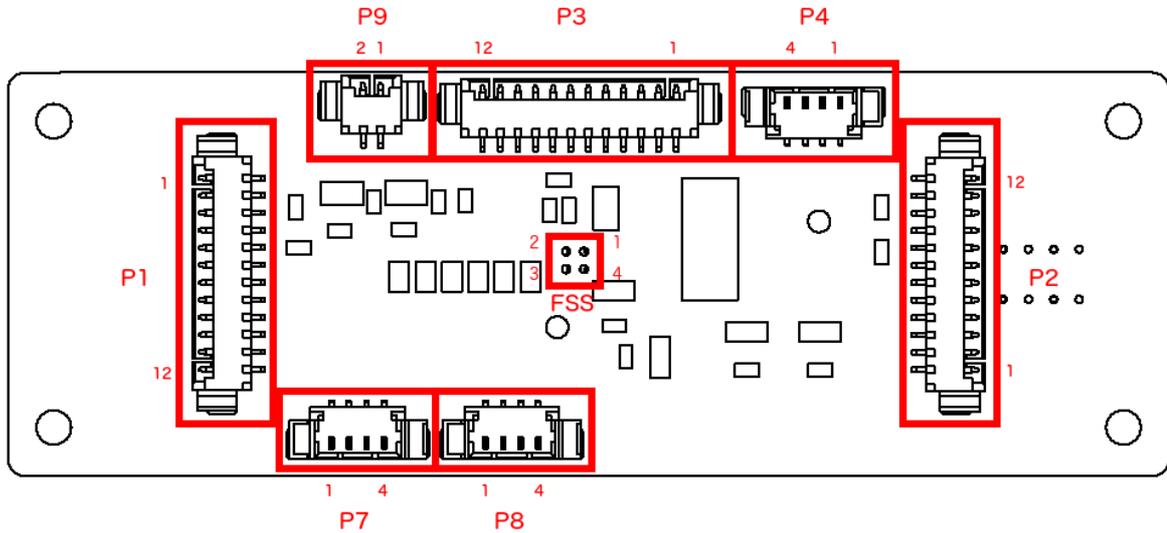
The Interstage GomSpace Sensor Bus (GSSB) is used for connecting I²C devices (magnetorquers, sun sensors etc.) to the OBC, or solar panels to the EPS. The bus also carries the power supply for the connected sensors in form of GND and 3.3 V and SDA and SCL signals are used for communication. The maximum I²C bus speed is 100 kHz and this applies to all communication on the bus.



3 Hardware Layout

The connector positions are the same on the three versions.

3.1 Connector Location Bottom



3.2 P1 – GSSB

Version A and B:

Picoblade 12 pin
 Molex 53398-1271

Version C:

Picoblade 12 pin RA
 Molex 53261-1271

3.3 P2 – GSSB

Version A and B:

Picoblade 12 pin
 Molex 53398-1271

Version C:

Picoblade 12 pin RA
 Molex 53261-1271

Pin	Description
1	SDA
2	SCL
3	VCC
4	GND
5	VCC2
6	VAUX *
7	MT X NEG
8	MT X POS
9	MT Y NEG
10	MT Y POS
11	MT Z NEG
12	MT Z POS

Pin	Description
1	MT Z POS
2	MT Z NEG
3	MT Y POS
4	MT Y NEG
5	MT X POS
6	MT X NEG
7	VAUX *
8	VCC2
9	GND
10	VCC
11	SCL
12	SDA

* 8 or 16 V depending on option sheet choice

3.4 P3 – Solar Power Connector

Version A and B:

Picoblade 12 pin
Molex 53398-1271

Version C:

Picoblade 12 pin RA
Molex 53261-1271

Pin	Description
1	SPI CS
2	GSSB VCC
3	SPI MISO
4	SPI SCK
5	SUN CATHODE
6	GSSB GND
7	Not connected
8	Not connected
9	Not connected
10	GSSB GND
11	MT XYZ NEG*
12	MT XYZ POS*

*Option sheet dependable, X, Y or Z

3.5 P4 – PV parallel connection

Used for adding two solar panel outputs together.

Version A and B:

Picoblade 4 pin
Molex 53398-0471

Version C:

Picoblade 4 pin RA
Molex 53261-0471

Pin	Description
1	PV
2	PV
3	PV GND
4	PV GND

3.6 P7 – PV parallel connection

Used for adding two solar panel outputs together.

Version A and B:

Picoblade 4 pin
Molex 53398-0471

Version C:

Picoblade 4 pin RA
Molex 53261-0471

Pin	Description
1	PV
2	PV
3	PV GND
4	PV GND

3.7 P8 – PV parallel connection

Used for adding two solar panel outputs together.

Version A and B:

Picoblade 4 pin
Molex 53398-0471

Version C:

Picoblade 4 pin RA
Molex 53261-0471

Pin	Description
1	PV
2	PV
3	PV GND
4	PV GND

3.8 P9 – External Magnetorquer

If an external magnetorquer is fitted in your satellite.

See chapter 4.3

Version A and B:

Picoblade 2 pin
Molex 53398-0271

Version C:

Picoblade 2 pin RA
Molex 53261-0271

Pin	Description
1	MT XYZ NEG*
2	MT XYZ POS*

*Option sheet dependable, X, Y or Z

3.9 FSS – connectors for the Fine Sun Sensor

If a NanoSense Fine Sun Sensor is mounted.

Pin	Description
1	GSSB VCC2
2	GSSB GND
3	SUN SDA
4	SUN SCL

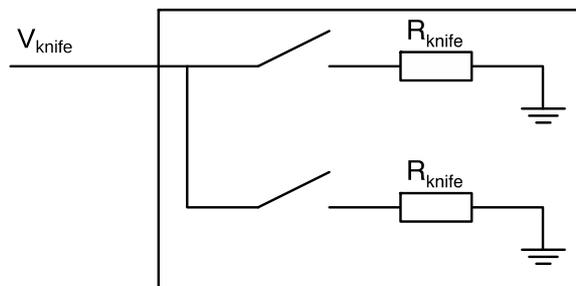
4 Interstage GSSB Top Side Components

4.1 Antenna Release

The antenna release system is an optional purchase for the Interstage GSSB. Below is shown a mounted release system on the outside of the Interstage GSSB A. The antenna is tied down into the top U shape. An activated current will burn through the wire and release the antenna. A deployment sensor tells if the antenna has been released.



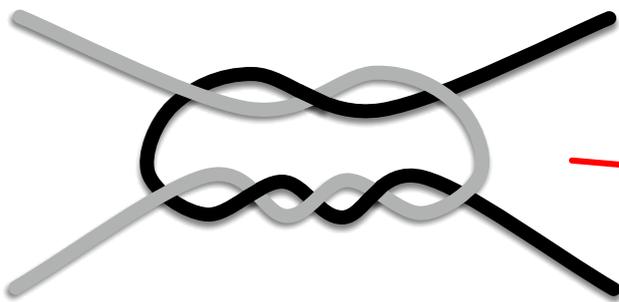
Below is illustrated how each knife has its own switch, and that they can be activated separately.



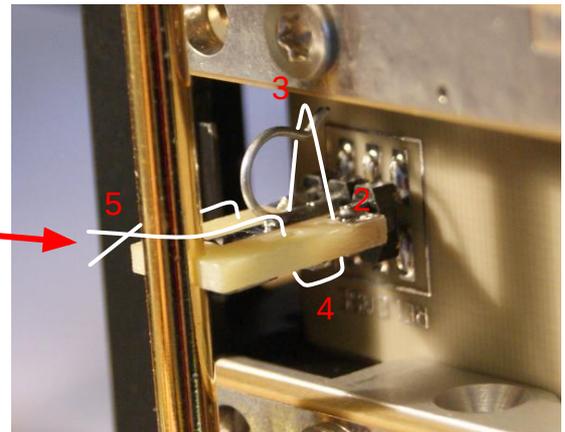
4.1.1 Antenna Stowing Procedure

Procedure to tie up the antenna to the release mechanism:

1. Use 40 cm burn wire.
2. Insert both ends of wire through the inner holes of the release PCB from the side with the spring.
3. Place loop of wire around hook on spring.
4. Pull both ends over the burn resistors and through the outer two holes.
5. Tie the ends around antenna using two surgeon's knots, one on top of the other.
6. Use a knife or scissor to remove the remaining wire after the knot

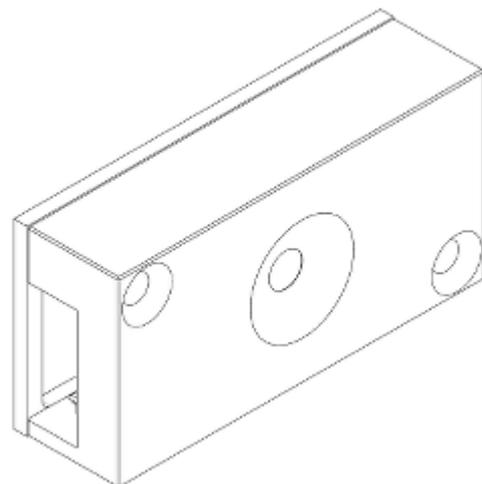
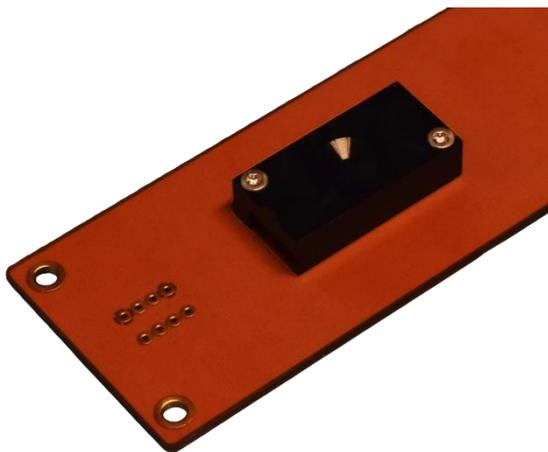


Surgeons Knot



4.2 Fine Sun Sensor

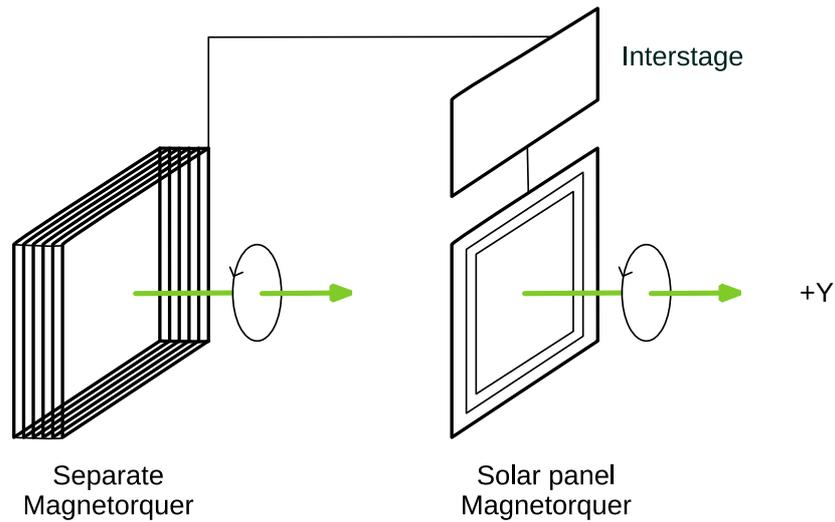
Below left is shown a mounted Fine Sun Sensor on the outside of the Interstage GSSB A. To the right is a drawing of the FSS itself. See the GomSpace Fine Sun Sensor datasheet for more information



4.3 Magnetorquer

If the satellite is fitted with magnetorquer it can be connected to the internal bus through the Interstage GSSB connector P9.

Only connect a separate magnetorquer to an interstage if they share direction with a solar panel magnetorquer, so if the solar panel magnetorquer is pointing in the +Y direction, only connect the separate magnetorquer to the interstage if it also points in the +Y direction. Make sure the correct choice is made in the option sheet.



If the solar panels do not have magnetorquer, connect as you will.

5 Absolute maximum ratings

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the Interstage GSSB. Exposure to absolute maximum rating conditions for extended periods may affect the reliability.

Symbol	Description	Min.	Max.	Unit
VCC	Supply voltage		3.4	V
T _{amb}	Operating Temperature	-40	85	° C

6 Electrical characteristics

Symbol	Description	Min.	Typ.	Max.	Unit
VCC	Supply voltage		3.3		V
I _{rx}	Supply current		4.0		mA
V _{knife8}	Knife activation voltage, 8 V*	6.0	VAUX	8.4	V
I _{knife8}	Knife activation current, 8 V*	0.3		0.42	A
R _{knife8}	Knife resistor		20		Ω
V _{knife16}	Knife activation voltage, 16 V*	12.0	VAUX	16.8	V
I _{knife16}	Knife activation current, 16 V*	0.15		0.21	A
R _{knife16}	Knife resistor		80		Ω

* Voltage for the antenna release, option sheet choice

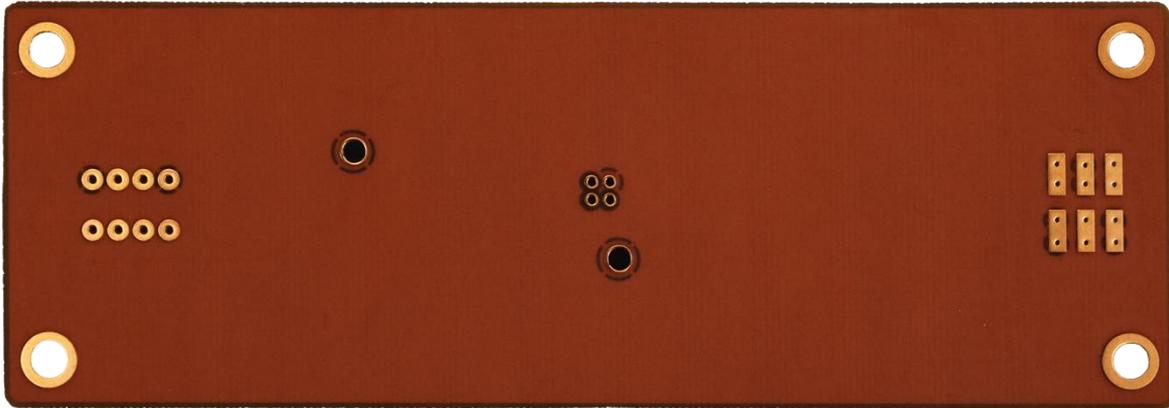
7 Environment Testing

To simulate the harsh conditions of launch and space, the GSSB's has been exposed to a number of environment tests. For detailed information about the tests please contact GomSpace.

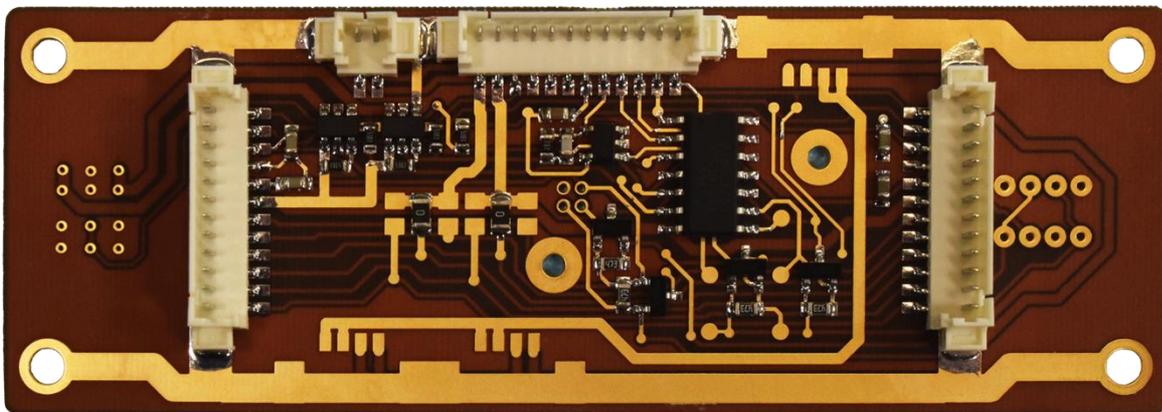
The GSSB's has flown on several satellites and performed perfectly.

8 Physical Layout

On the GSSB top can be seen various preparations for optional choices. The four small holes in the middle are for the Fine Sun Sensor data connectors. Around those are two holes that can be used to fasten the Fine Sun Sensor to the PCB. To the right are preparations for an antenna release.



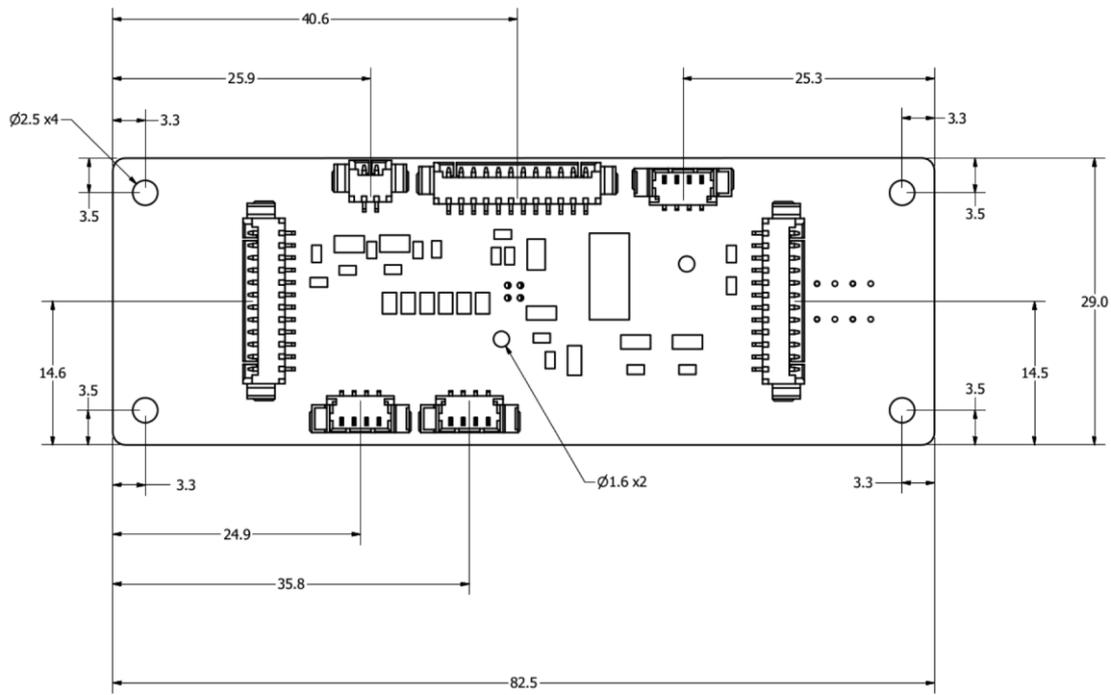
The bottom side contains the electronic components and the connectors.



9 Mechanical Drawing

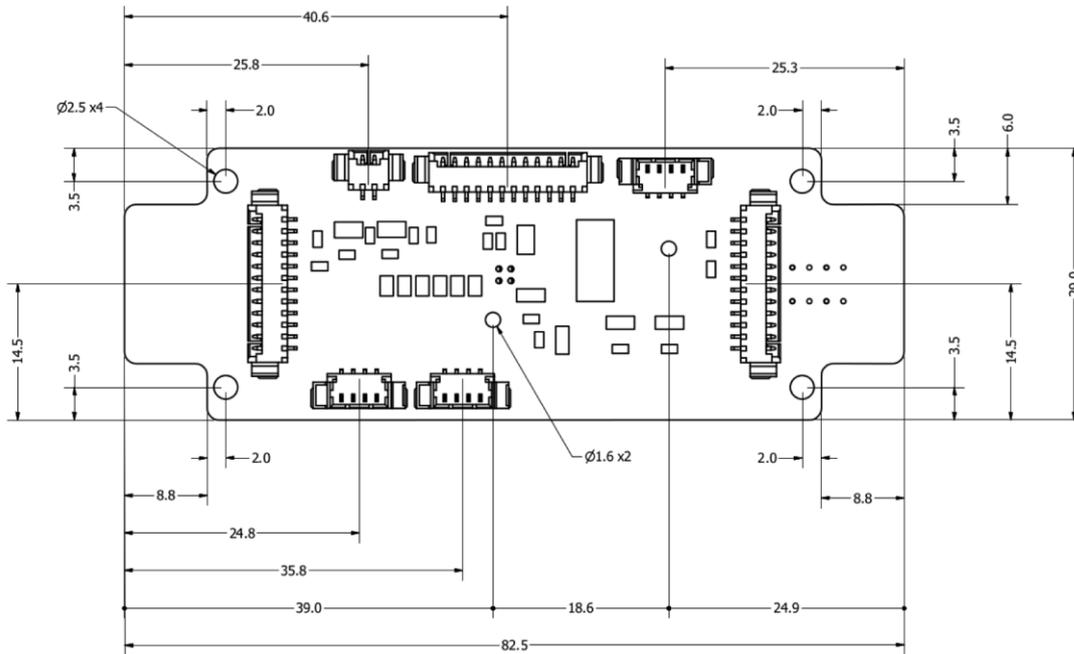
9.1 Interstage GSSB A

All dimensions in mm.



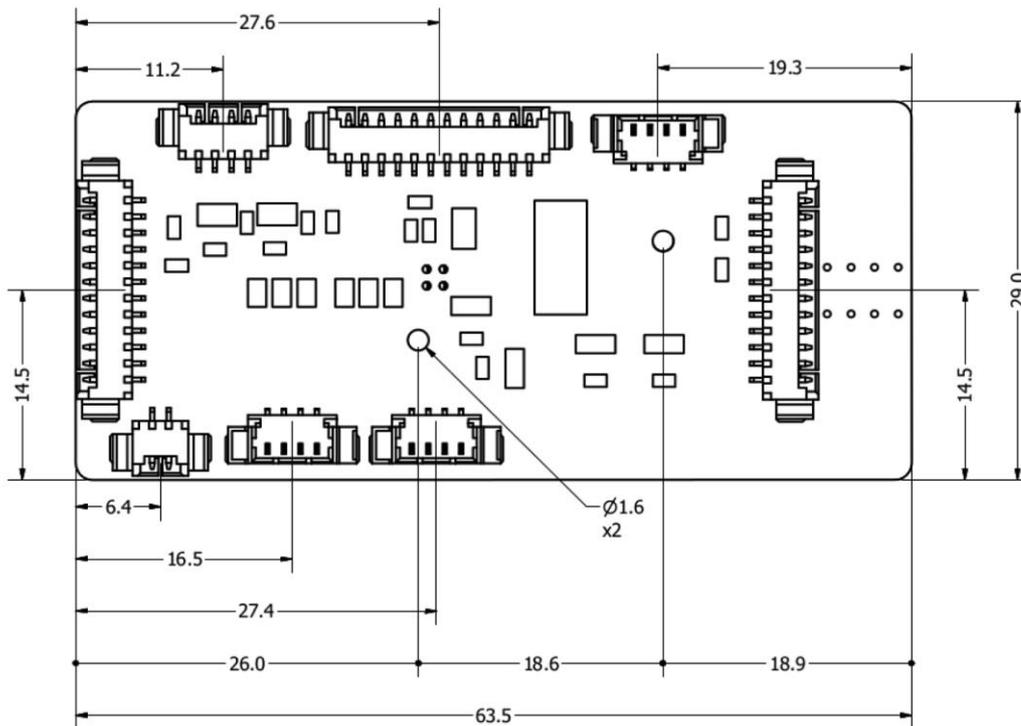
9.2 Interstage GSSB B

All dimensions in mm.



9.3 Interstage GSSB C

All dimensions in mm.



10 Disclaimer

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11 GomSpace Example

Below is shown a CAD drawing of a 2U satellite with other GomSpace products to illustrate some of the uses of the Interstage GSSB.



P110UC-SUN
Interstage GSSB Version C with Fine Sun Sensor
(below the P110UC-SUN)
ANT430 with antenna rods stowed down the side
(below the P110UC-SUN)

P110AS (seen from behind)
P110UBS (seen from behind)

2x Interstage GSSB version A with Fine Sun Sensor
and antenna release system
2x Interstage GSSB version B with Fine Sun Sensor
and antenna release system

P110AS (seen from behind)
P110UBS (seen from behind)

Interstage GSSB Version C
P110UC-SUN