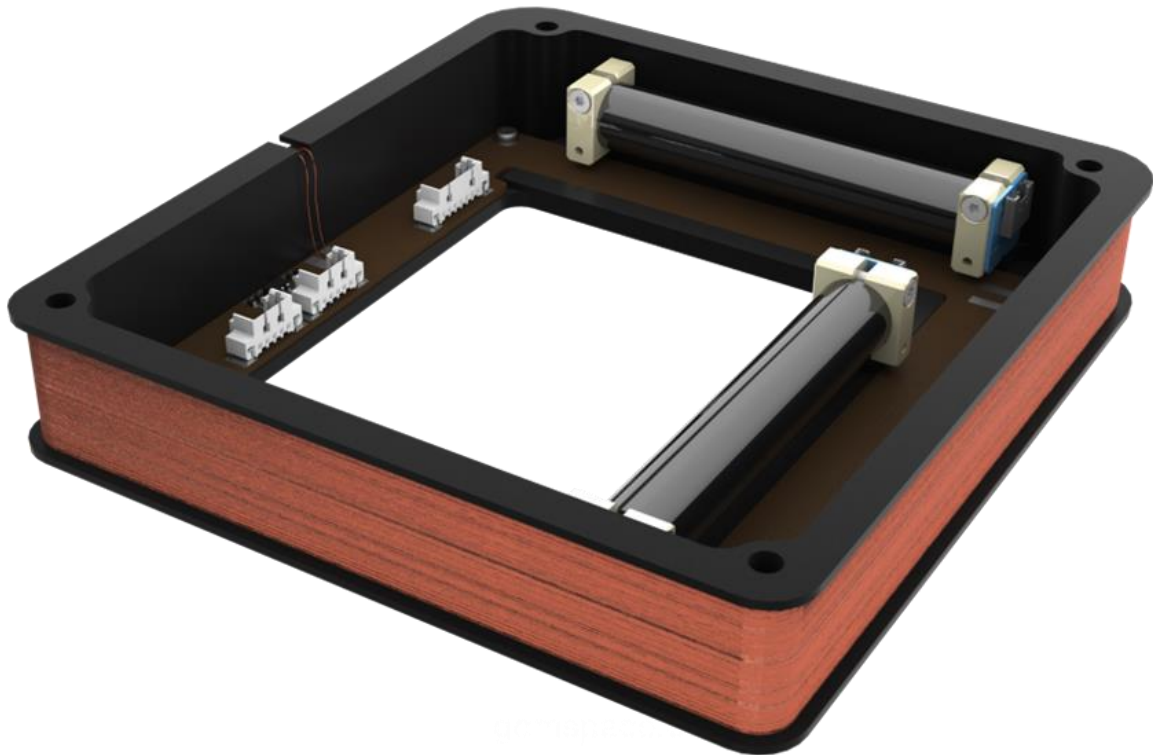




NanoTorque GST-600 MK2

Datasheet

Three axis magnetorquer for CubeSats

Product name: NanoTorque GST-600 Mk2

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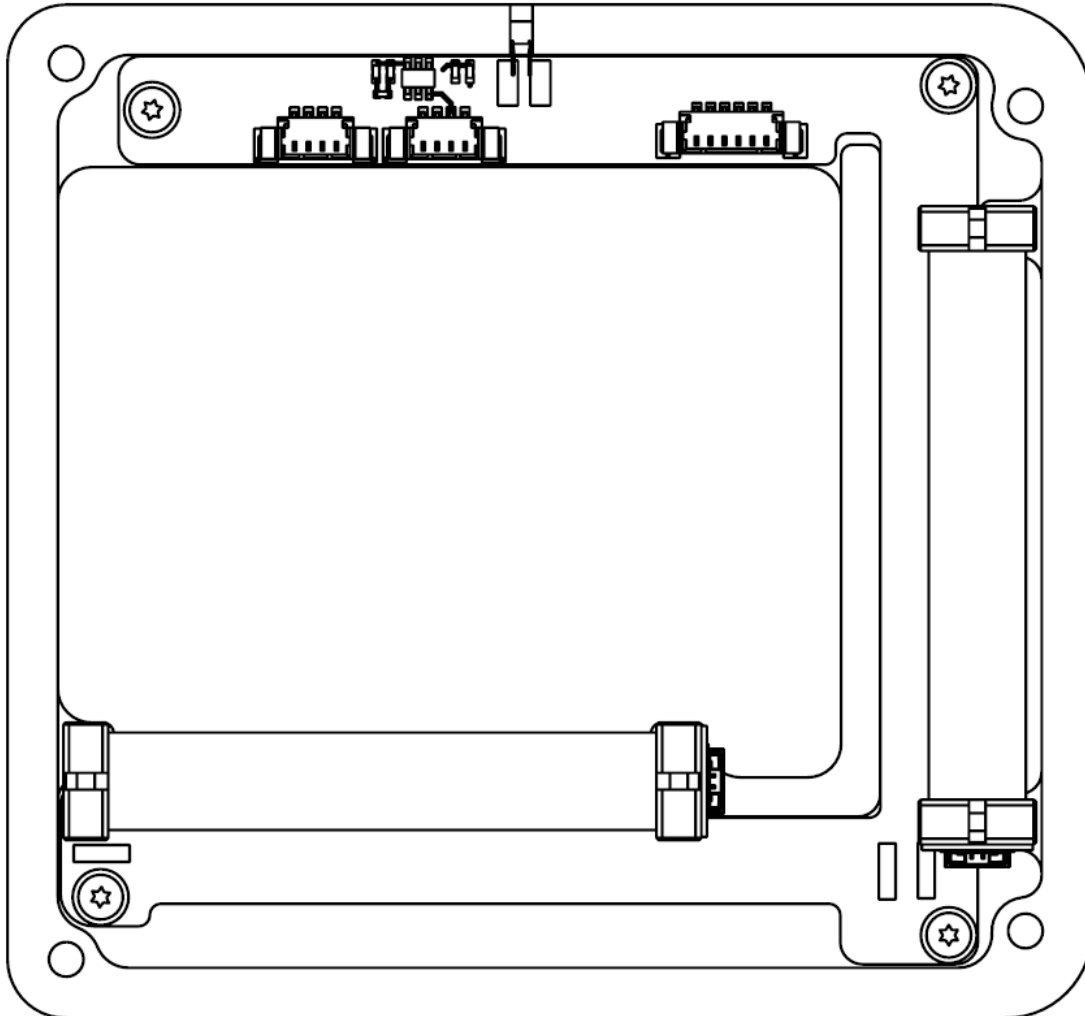
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3 Overview

The GomSpace NanoTorque GST-600 Mk2 is a compact three axis magnetorquer that is designed for 6U CubeSats but can be used in both smaller and larger satellites. The system consists of a single air-torquer and two magnetorquer-rods.



3.1 Highlighted Features

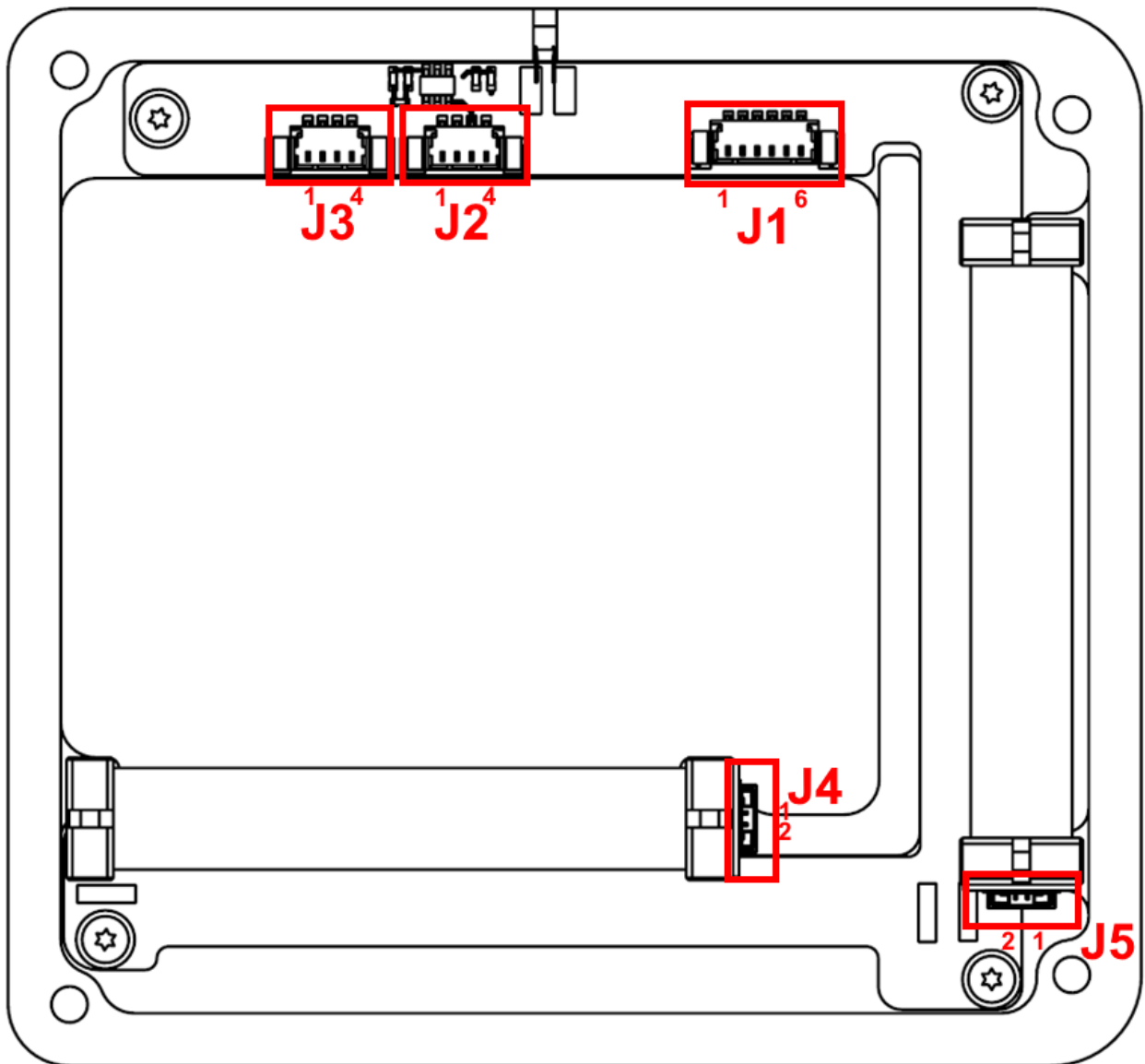
- 3-axis magnetorquer
- Build-in temperature sensor
- High torque and low residual dipole

3.2 Temperature sensor

The temperature sensor is a TMP100 sensor with an I²C address of 0x4e. There is not internal I²C pull-ups or isolation.

4 Connector Pinout

4.1 Connector Locations



4.2 J1 - Magnetorquer Z-Axis

Molex PicoBlade 53398-0671

Pin	Description
1	n.c.
2	n.c.
3	n.c.
4	n.c.
5	Magnetorquer Z Neg
6	Magnetorquer Z Pos

4.3 J2 - Communication

Molex PicoBlade 53398-0471

Pin	Description
1	VCC
2	GND
3	SDA
4	SCL

4.4 J3 - Communication

Molex PicoBlade 53398-0471

Pin	Description
1	VCC
2	GND
3	SDA
4	SCL

4.5 J4 - Magnetorquer X-Axis

Molex PicoLock 503763-0291

Pin	Description
1	Magnetorque X Pos
2	Magnetorque X Neg

4.6 J5 - Magnetorquer Y-Axis

Molex PicoLock 503763-0291

Pin	Description
1	Magnetorque Y Pos
2	Magnetorque Y Neg

5 Absolute Maximum Ratings

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

Parameter	Description	Min	Typ.	Max	Unit
V _{cc}	Maximum supply voltage and logic voltage for TMP100 temperature sensor	-0.3		3.6	V
T _{op}	Operational temperature range	-35		70	°C
T _{st}	Storage temperature range	-35		70	°C

6 Magnetorquer Characteristics

Parameter	Condition	Min	Typ.	Max	Unit
V _{pwm}	Recommended PWM voltage amplitude	±3.3	±5.0	±5.5	V
m _z	Dipole moment (Z-axis) at 20 °C	0.34	0.50		Am ²
m _{xy}	Dipole moment (X- and Y-axis) at 20 °C	0.23	0.40		Am ²
R _z	Resistance (Z-axis) at 20 °C		25.5		Ω
R _{xy}	Resistance (X- and Y-axis) at 20 °C		39.5		Ω
ρ _z	Temperature coefficient (Z-axis)		0.104		Ω/°C
ρ _{xy}	Temperature coefficient (X- and Y-axis) between		0.155		Ω/°C

The power consumptions listed below are measured while the NanoTorque GST600 Mk2 is connected and commanded by the NanomMind A3200-ADCS using a NanoDock ADCS-8.

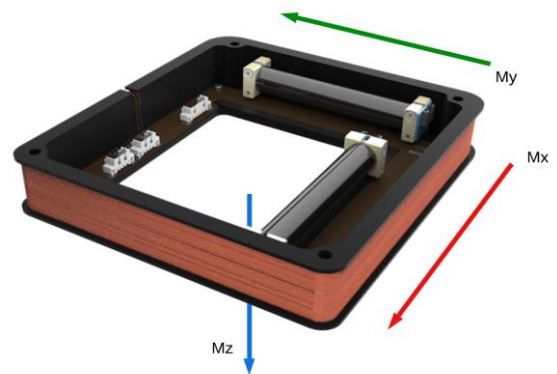
Parameter	Condition	Standby ¹	Avg.	Max.	Unit
P _z	Power consumption (Z-axis) at 20 °C ²	3	720	900	mW
P _{xy}	Power consumption (X- and Y-axis) at 20 °C ²	3	500	625	mW

¹ The standby power consumption is measured for the GST600 incl. torquer rods X, Y, and the Z coil connected to the Nanomind A3200-ADCS through an ADCS-8 board and supplied with 5 V.

² Power consumption measured for a single coil with a 5 V supply voltage and an 80 % duty cycle at a 1 Hz system loop time.

The directions of the magnetic fields are shown on the right.

Notice it is a right-handed coordinate system³.



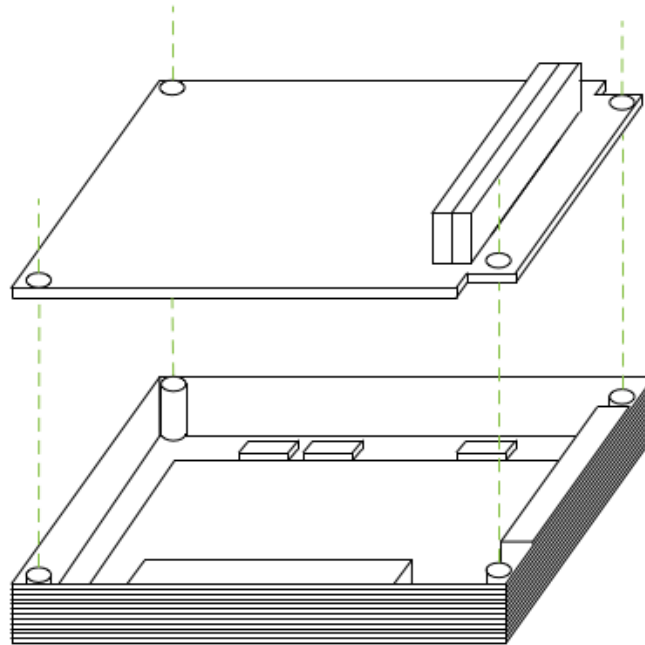
7 Physical Characteristics

Description	Value	Unit
Mass	180	g
Size	90.5 x 96.9 x 17.2	mm

³ Note that the previous GST600 version was a left-handed coordinate system

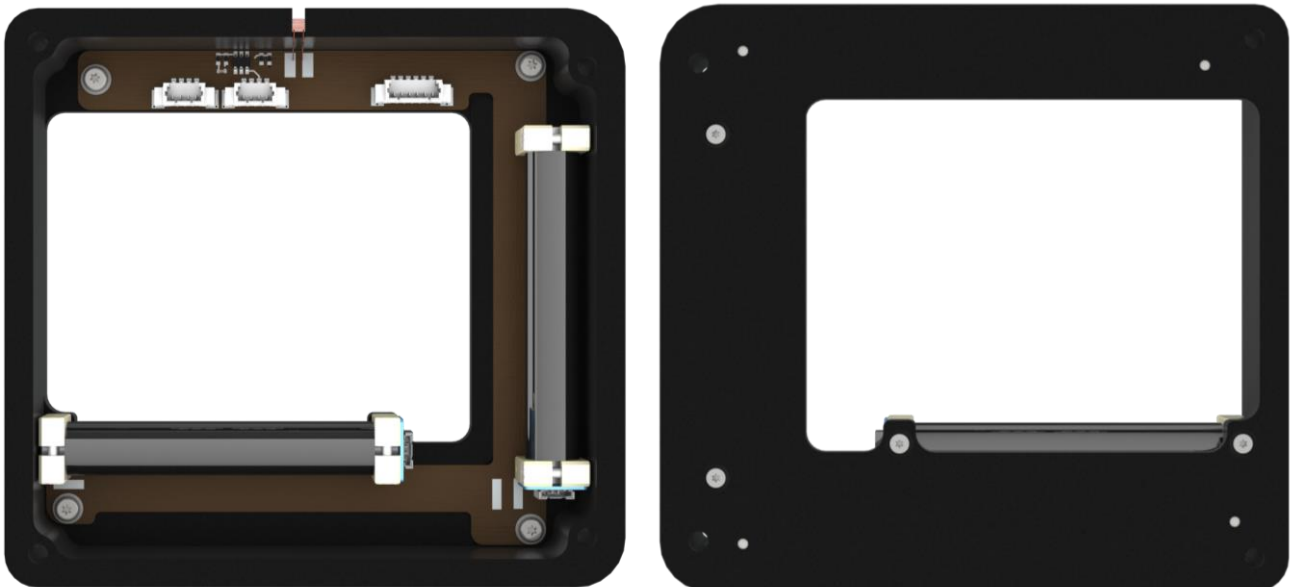
8 Connecting with other PCB's

To place the GST-600 correctly within a PC104 stack, place the stack connector on top the Y magnetorquer rod. View the drawing below.



9 Physical Layout

Below is shown a picture of the top and bottom of the GST-600.



The top view shows the three connectors and the two magnetorquer-rods. Temperature sensor is located just behind connector J2.

10 Mechanical Drawing

All dimensions in mm.

