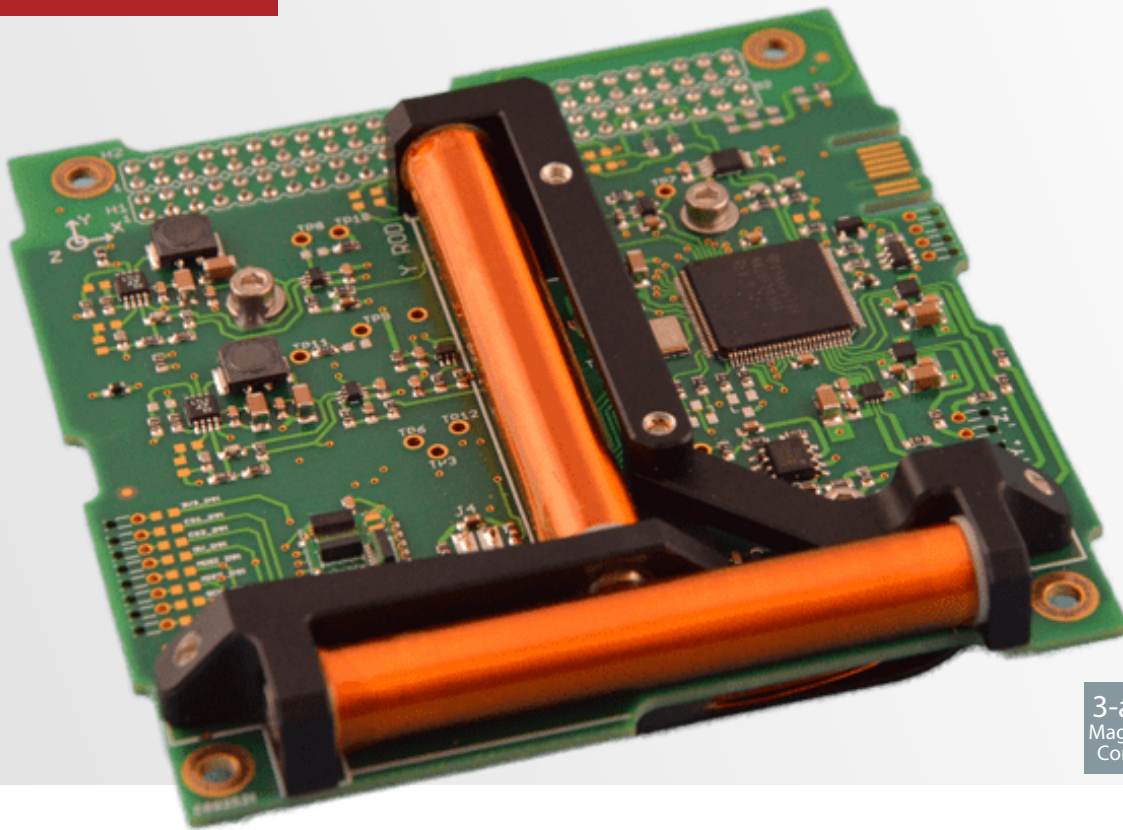# Magnetorquer Board (iMTQ)

Flight heritage since 2013

3-axis Magnetic Control

BDOT controller

DESCRIPTION

The ISIS MagneTorQuer board (iMTQ) is a PCB based 3-axis magnetic actuation and control system for Cubesats. It is designed as a standalone detumbling system and can also be used with more advanced ADCS hardware providing actuation of 0.2Am^2. In every axis, the system can be used to detumble cubesats up to a 12-unit sized system. The system can be placed in a cubesat electronics stack or in between stacks in ISIS cubesat structures. It can be controlled over digital or analog interface, and provides telemetry over I^{2}C.

FEATURES

- Three axis magnetometer (onboard + interface for external MTM)
- Three actuators; two torque rods and one air core torquer.
- Current sensors for each torquers
- Temperature telemetry of actuators
- Including detumbling algorithm
- Suitable to detumble up to 12U (~24kg) CubeSats
- Can be used to desaturate reaction wheels

PERFORMANCE

- Actuation level in all 3-axis
  - Nominal: 0.2 Am2 (@ 20°C, 5V)
- Maximum actuation envelope error: <5%
- Magnetometer accuracy: <3μT
- Detumbling algorithm frequency: selectable from 1Hz to 8Hz

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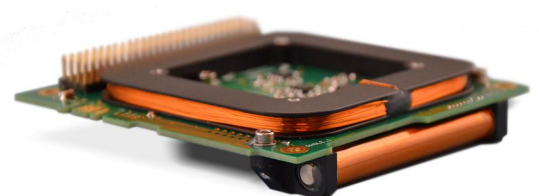
PRODUCT PROPERTIES

- Mass: 196g
- Qualified operational temperature range:-40°C to +70°C
- Dimensions (l x w x h): 95.9 x 90.1 x 17 mm³
- Supply voltage: 5V
- Power consumption (@ 20°C)
  - No actuation: 175 mW
  - Full actuation (3-Axis): <1.2W

Magnetorquer coil

CONFIGURATION AND OPTIONS

- External magnetometer
- I2C control level command, with automatic current sensing and temperature correction
- Direct analog control of actuators with direct PWM signal
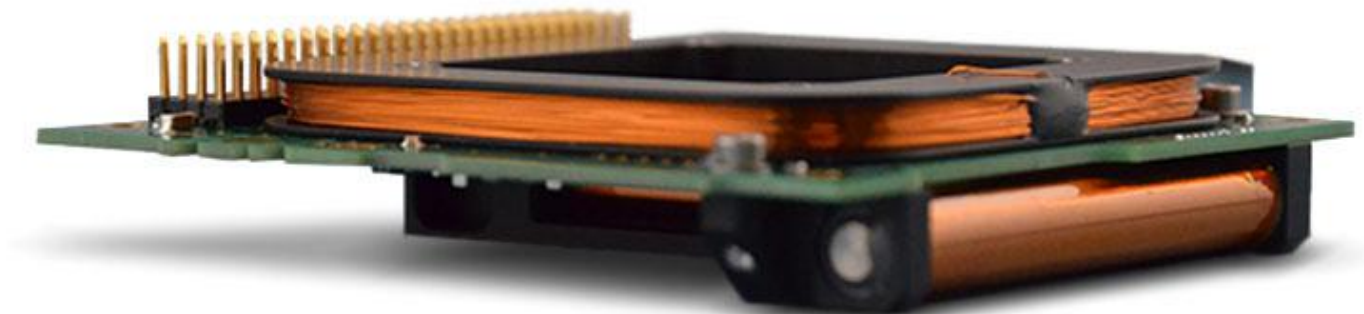- CSKB connector type and location
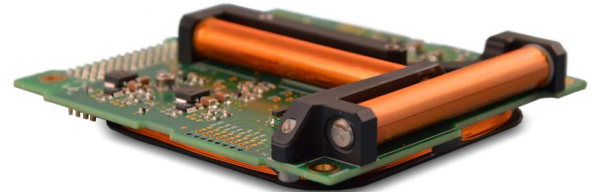
ISIS Magnetorquer Board

QUALIFICATION AND ACCEPTANCE TESTING

Test	QT	AT
Functional	✓	✓
Vibration	✓	-
Mechanical Shock	✓	-
Thermal Cycling	✓	✓
Thermal Vacuum	✓	-

*QT is performed on the design/qualification model

*AT is performed on the unit to be shipped