

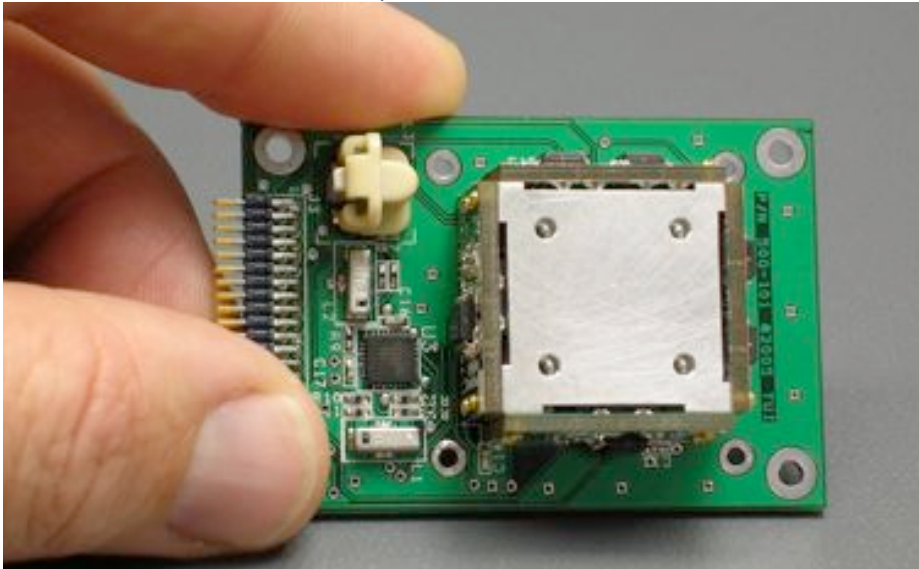
nanosat IMU

Inertial Measurement Unit for Nanosatellites

The nanosat IMU is a device that offers full six degrees-of-freedom motion sensing in an extremely compact package. Utilizing micro-machined electromechanical system (MEMS) devices, it achieves high performance at a low cost. The nanosat IMU provides analog outputs from 3-axis MEMS rate gyros, dual range 3-axis MEMS accelerometers, and digital outputs from 3-axis magnetometers.

Concept of Operations:

- The nanosat IMU integrates low-cost MEMS accelerometers and rate gyros (with on-chip temperature sensors) to achieve high performance in a compact package. The MEMS sensors have high vibration rejection over a wide frequency, and a high power shock survivability rating.
- The bandwidth of the rate gyro and accelerometer sensors come preconfigured, but can be readily tuned through the replacement of on-board passive components.
- To enable the system to measure acceleration with good resolution and dynamic range, each axis is sensed with independent sensors: both a ± 1.2 accelerometer and a $\pm 10g$ accelerometer.
- All of the onboard inertial sensors have built-in self-test functions that actuate the sensing MEMS structures and readout electronics as if subjected to angular rate or linear acceleration.
- To maximize performance, the inertial sensors are in thermal contact with the aluminum mounting block which acts as a thermal mass. To improve sensor performance, a heater can be attached to the aluminum block and the sensors insulated. Additional mounting holes for an insulating enclosure are provided.
- Integrated ASIC can sample the magnetic field measured by three magneto-inductive sensors in the ± 10 Gauss range with 16-bit resolution at a rate of 2000 samples/second. The ASIC communicates with a host processor via a standard SPI interface.



Other Affordable Nanosatellite Products from TUI:

- **nanoTerminator™**: a compact device that uses a passive electrodynamic tether to rapidly deorbit a small spacecraft at the end of its mission
- **nanosat Release Mechanism**: low-cost, low-mass device for activating spring-based separation of nanosatellites or ejection of the nanoTerminator™

Specifications

- Inertial Sensor Ranges:
Rate: ± 300 °/sec
Acceleration: $\pm 10g$, and $\pm 1.2g$
- Magnetometer Range:
 $\pm 1000\mu T$, 2000 samples/second
- Operating Temperature:
 $-40^{\circ}C$ to $+85^{\circ}C$
- Shock Survival: 1000g powered
- Power Requirements:
40mA (typical) at 5V
- Electrical Interface:
40-pin Samtec straight or right angle connector

Physical Characteristics

Mass:

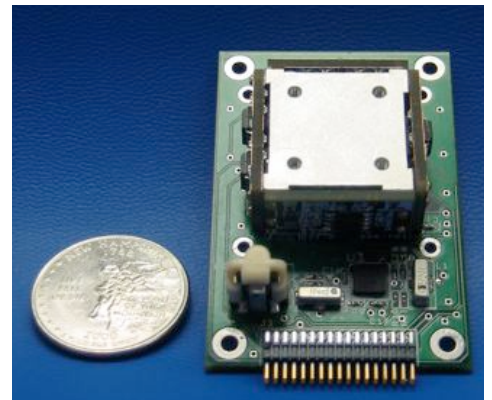
34 grams

Dimensions:

Width: 38.1 mm (1.5")

Length: 50.8 mm (2.0")

Height: 15.2 mm (0.6")



Tethers Unlimited, Inc.

11711 N. Creek Pkwy S., Suite B102

Bothell, WA 98011

Phone: (425) 486-0100

Fax: (425) 482-9670

Email: info@tethers.com

Web: www.tethers.com