



MICRO AEROSPACE SOLUTIONS, INC .

- ▲ **Propulsion System Engineering**
- ▲ **Small Spacecraft Engineering**
- ▲ **Computer Data Systems**
- ▲ **Aerospace Software**

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Micro Aerospace Solutions' Attitude Detection Systems

Micro Aerospace Solutions (MAS) has developed MEMS-based inertial sensor technology into inertial measurement units (IMUs) for small satellite attitude detection systems. These sensors can be combined with sun sensors from our partner, Optical Energy Technologies Inc and MAS' thruster systems to provide a complete small satellite attitude detection and control system (ADCS).

MAS offers three levels of attitude detection inertial measurement units. The MASIMU01 is a low-cost, small unit which will fly on the University of Texas' FASTRAC microsatellite for the Air Force Research Lab (AFRL). The second unit improves on the drift rate while only having a slightly larger footprint. The MASIMU03 offers an innovative use of MEMS inertial sensors in a platform which is competitive with much larger conventional inertial measurement units.

MAS Inertial Sensors Summary

Specification	MASIMU01	MASIMU02	MASIMU03
Power	0.6 Watts	0.6 Watts	1.3 Watts
Mass (without enclosure)	40 grams	20 grams	100 grams
Mass (with enclosure)	80 grams	60 grams	150 grams
Voltage	5 to 12 volts	5 to 12 volts	5 to 12 volts
Dimensions (with enclosure)	2.5 x 2.2 x 1.4"	2 x 2 x 1.5"	4 x 3 x 1.5"
Interface	RS 485 Serial	RS 485 Serial	RS485/232
Drift (deg/min)	1.0	0.2	<0.013

Each system board will provides gyro sensors as well as MEMS-based accelerometers (not required for some applications) and an I2C A/D converter which allows each individual sensor board to be addressable. The accelerometers are configurable for outputs from 0-2 to 0-50 G's. A microcontroller board provides complete IMU output by high-speed serial data on an I2C or RS485 data bus.

The boards can also be customized per customer requirements. This system allows a working device as simple as a single axis gyro and accelerometer or as complex as a three axis gyro and accelerometer IMU with multiple sensors in each axis for redundancy and to matrix together the system output for higher accuracy measurements.

The image below shows a complete MASIMU01 system.

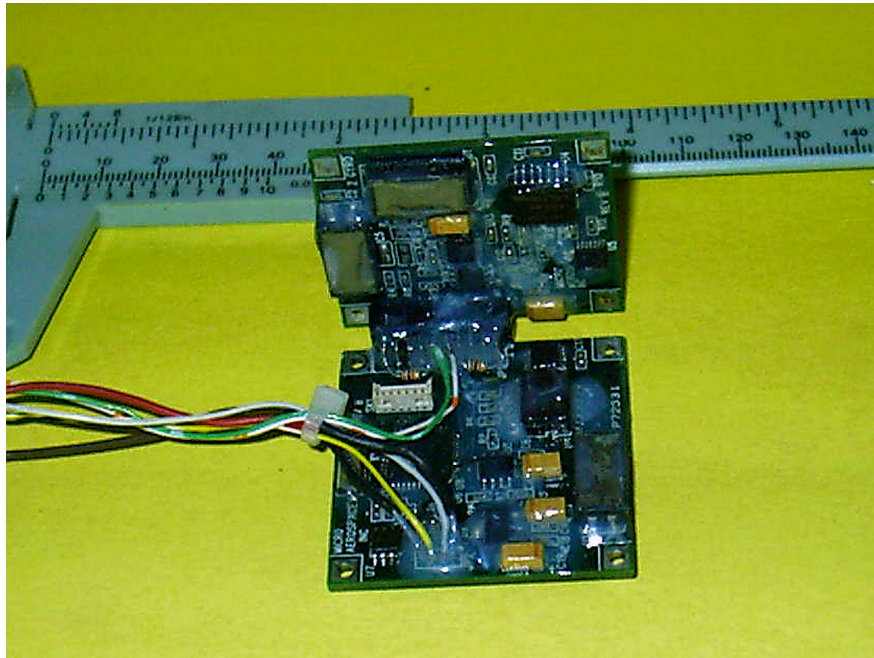


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The MASIMU01 Inertial Measurement Unit Complete with Three Gyros and Accelerometers

The systems can output angular rates in units of degrees/second and linear accelerations in units of G's or the output can be set to A/D units. Output rate is configurable with rates up to 100 Hz.