

Testing MEMS-based Accelerometers Used in GPS Navigation System with a Custom 2-Axis Gimbal

Markets: RES, MICRO, IND

Application: Testing

Territory: Korea

A Newport customer manufactures and provides the GPS navigation module for various end products such as robots, automobiles and aircraft. An inertial navigation system is a device that includes a computer, accelerometers and gyroscopes. As we are all familiar from everyday use of GPS navigation devices from automobiles or the iPhone, it continuously calculates the orientation and velocity of a moving object and provides data to a computer. Since the velocity calculation needs to be done without an external reference, it is necessary to calibrate and test the accelerometer sensor in various orientations about two rotational axes during production.

Newport's 2-axis [Elevation Roll gimbal](#) provides the ideal platform to test and calibrate the MEMS-based accelerometer. The system consists of two high precision [RV series rotary stages](#), the inner stage providing roll motion & outer stage assembly providing elevation. The gimbal allows orienting the accelerometer in various positions relative to the direction of earth's gravity.

The UUT is inside a 10lb environmental chamber (not provided by Newport).

Description of the solution:

The UUT is required to rotate about its axis (or the environmental chamber) and then rotated relative to gravity. Only point-to-point motion is necessary in this application, and the required accuracy/repeatability can vary depending on the characteristics of sensors. This set up was being used as part of the R&D characterization process and not their production batch testing.

Key Specifications:

Elevation Stage: [RV240HAHLT](#) with error mapping

Roll Stage: [RV160HAHLT-F](#) with error mapping

Controller: [XPS-C2](#) with (2) [XPS-DRV03](#)

- Axis Accuracy: 5 arcsec (0.00139°)
- Axis Min Incremental Motion: 0.0001°
- Axis Repeatability: 0.00011° typical, 0.0002° guaranteed
- Axis Resolution: 0.00005°[rY], 0.000075°
- Axis Velocity: 16°/s
- Axis Travel Range(s): ±170°
- System Orthogonality: 100 μrad

Pricing and Leadtime:

Contact your Regional Sales Manager for pricing and leadtime.

