



MEMS EGI

COMPACT INERTIAL NAVIGATION SYSTEM

MEMS EGI, designed and manufactured by TÜBİTAK SAGE, is a compact inertial navigation system to be used with land, naval and airborne platforms and munitions. Including multi constellation GNSS receiver(s), MEMS EGI can be used both as primary and/or secondary navigation system.

Inertial Measurement Unit (IMU), GNSS receivers, a three axis magnetometer and related electronics are all included in the MEMS EGI which is enclosed in a tough-environment-proof structure. Besides these, external total and static pressure sensors can be connected to MEMS EGI when necessary. Electronic hardware designs, mechanical designs, software and algorithms are all developed by TÜBİTAK SAGE.

The precise accuracy of GNSS solutions and stability of IMU sensor measurements are tightly coupled and aided with a three axis magnetometer and pressure sensors. Under the favor of outstanding sensor fusion algorithms (extended Kalman Filter) developed by TÜBİTAK SAGE, stable and continuous navigation solutions are available even though during periods when GNSS signals are jammed or blocked. The system is capable of performing initialization methods such as manual, autonomous or transfer alignment.

MEMS EGI-D which is a version of the family that contains two GNSS receivers is designed for use in cases where sensitive initialization and tracking of heading information is necessary.

Electrical interfaces used with MEMS EGI are designed to meet requirements of both civil and military platforms.

IMU Performance

Accelerometer Performance	
• Operating range	• ± 30 g
• Bias repeatability	• 0.5 mg, 1 σ
• Bias (in run stability)	• 0.02 mg, 1 σ
• Velocity random walk	• 0.3 (ft/s)/ $\sqrt{\text{hr}}$ (rms)

Gyroscope Performance	
• Input range	• ± 1000 $^{\circ}/\text{s}$
• Bias repeatability (typical)	• 7 $^{\circ}/\text{hr}$, 1 σ
• Bias (in run stability)	• 0.25 $^{\circ}/\text{hr}$, 1 σ
• Velocity random walk	• 0.06 $^{\circ}/\sqrt{\text{hr}}$

GNSS Performance

GNSS Performance	
• Receiver type	• GPS L1C/A L2C, GLO L1OF L2OF,
• GAL E1B/C E5b, BDS B1I B2I, QZSS L1C/A L2C	• 0.5 mg, 1 σ
• Position accuracy	• 0.01 m + 1 ppm
• Cold starts	• 24 s
• Aided starts	• 2 s
• Tracking sensitivity	• -167 dBm
• Max velocity	• 515 m/s

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COMPACT INERTIAL NAVIGATION SYSTEM

1. Environmental Conditions

- Altitude: 50,000 feet

2. Temperature

- Operating: -40 °C / +71 °C (MIL-STD-810G)
- Storage: -40 °C / +80 °C (MIL-STD-810G)

3. Vibration (In each axes)

- 20 – 2000 Hz, 6.5 g rms, 60 min
- 20 – 2000 Hz, 7.5 g rms, 20 min
- MIL-STD-810G, METHOD 514, Procedure I

4. Shock (In each direction)

- 18g, 26 ms
- MIL-STD-810G, METHOD 516, Procedure I

5. Dimensions and Weight

- 76 mm x 81 mm x 82 mm
- 0,65 kg

6. Interface

- 14- 34 VDC Supply Voltage
- 100 Mbps Ethernet Interface
- RS-422/RS-485 Serial Interface
- 9600 - 115200 Baud Rate
- SDLC/UART Interface
- Active and Passive RF Antenna Interface
- 1 PPS Interface
- Total Pressure Sensor Interface
- Static Pressure Sensor Interface

