emcore®

DATA SHEET

SDI-170

Quartz MEMS Tactical Inertial Measurement Unit (IMU)

NON ITAR

Suitable for wide variety of high-precision commercial, industrial, marine and defense applications

The SDI-170 IMU is designed as a performance-compatible inertial system that is form, fit, and functional with a legacy RLG-based IMU product. The MEMS-based Inertial Measurement Unit (IMU) delivers 1°/hr gyro bias and 1 mg accelerometer bias stability and very low 0.02°/√hr angle random walk over wide -55 °C to +85 °C temperatures and rugged vibration environments. The tactical performance of the SDI-170 IMU is based on EMCORE's proven, dependable, accurate quartz MEMS inertial sensor technology. EMCORE's quartz technology enables repeatable high-volume production of precisely machined sensor structures combined with the inherent large signal output and thermal stability of quartz materials.

The SDI-170 IMU is constructed with EMCORE's latest generation quartz gyros, quartz accelerometers, and high-speed signal processing to achieve outstanding precision performance. The SDI-170 IMU is designed for demanding, mission-critical, rugged environments. It is ideal for continuous use applications with no wear-out components, highly linear accelerometer performance and longer life compared to competing alternatives. The solid-state quartz sensors and hermetically sealed IMU construction provide reliable MTBF and a 20- year operating and storage life. Continuous Built-in Test (BIT), configurable communications protocols, electromagnetic interference (EMI) protection and flexible input power compatibility make the SDI-170 IMU easy to use in a wide range of higher-order integrated commercial and defense system applications.

APPLICATIONS

- Precision Aircraft Attitude Heading Reference Systems
- GPS-Aided Navigation Systems
- Autonomous Vehicles
- Remotely Operated Vehicles
- Tactical Weapons & Torpedoes
- Aerial and Marine Geomapping / Surveying
- Targeting & Pointing Systems
- Robotics

KEY FEATURES

- 1°/hr Gyro & 1mg Accel Bias Over Wide Temperature Range
- 0.02°/√hr Angle Random Walk - 5X Better Than RLG-based IMU
- <1.0 Seconds Valid Data Start Up
- Industry Standard RS-422 Serial Interface
- <33 in.3 Rugged Size
- Stable Performance, Superior Quality & Reliability
- Greater Than 100,000 hr MTBF
- Designed as a Form, Fit & Functional
- Performance Alternative to Legacy RLG based IMU

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SDI-170 Quartz MEMS Tactical IMU

PERFORMANCE HIGHLIGHTS

GRYO PERFORMANCE	SDI-170-AA00	SDI-170-BA00	SDI-170-CA00
Bias (over temperature) 1σ	1.0°/hr	2.0°/hr	3.0°/hr
Bias In-Run Stability 1σ	1.0°/hr	1.0°/hr	1.5°/hr
Angle Random Walk (max)	0.02°/√hr	0.02°/√hr	0.02°/√hr
Bandwidth, Phase Shift (-90° Phase) * (min)	90 Hz	90 Hz	90 Hz
ACCELEROMETER PERFORMANCE			
Bias (over temperature) 1σ	1.0 milli-g	1.0 milli-g	2.0 milli-g
Bias In-Run Stability 1σ	100 µg	200 µg	200 µg
Velocity Random Walk 1σ	100 µg/√Hz	100 µg/√Hz	100 µg/√Hz

PERFORMANCE SPECIFICATIONS

SYSTEM PERFORMANCE	SDI-50X-AF00	SDI-50X-BF00	SDI-50X-CF00
Start Up Time for Valid Data Output	<1.0 secs		
Bandwidth, Phase (-90o Phase Shift) *	90 Hz		
GYRO CHANNELS			
Bias (over temperature) 1σ	1.0°/hr	2.0°/hr	3.0°/hr
Bias In-Run Stability 1σ	1.0°/hr	1.0°/hr	1.5°/hr
Scale Factor Error 1σ	200 ppm	200 ppm	200 ppm
Angle Random Walk (max)	0.02°/√hr	0.02°/√hr	0.02°/√hr
Angular Rate – Dynamic Range (min)	±1074°/sec	±1074°/sec	±1074°/sec
ACCELEROMETER CHANNELS			
Bias (over temperature) 1σ	1.0 milli-g	1.0 milli-g	2.0 milli-g
Bias In-Run Stability 1σ	100 µg	200 µg	200 µg
Scale Factor Error 1σ	200 ppm	200 ppm	200 ppm
Velocity Random Walk 1σ	100 µg/√Hz	100 µg/√Hz	120 µg/√Hz
Acceleration - Calibrated Range (min)	±50g (±70 optional)	±50g (±70 optional)	±50g (±70 optional)
PHYSICAL & ENVIRONMENTAL			
Input Voltage	+15 and +5 Vdc		
Power	<5.0 watts		
I/O	RS422, SDLC		
Data Rate	100 Hz (Guidance) and 600 Hz (Control) – Other rates available		
Dimensions (height x diameter)	2.9” x 3.5”		
Volume	<33 cu in		
Weight	<1.95 lbs		
Temperature	-55 to +85 °C		
Vibration (Operating)	10 g, rms		
Shock	150, 11 g, ms		
Operating Life	20 yrs		
Reliability @ 35°C (MTBF)	100,000 hrs ground benign: 15,000 hrs air inhabited cargo		
Dormancy	20 yrs		

NOTES:

* @ 600 Hz Flight Control Data Rate

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