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SDI500/SDI505

Quartz MEMS Tactical Inertial Measurement Unit

emcore®



DATASHEET | DECEMBER 2023

A New Era in Navigation



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 Performance Features

- 1°/hr Gyro Bias Over Wide Temperature Range
- 0.02°/√hr Angle Random Walk - 5X Better Than Competition
- <1.0 seconds Valid Data Start Up
- 19 in.^{3} Compact Size
- Stable Performance, Superior Quality & Reliability
- Greater Than 100,000 hr MTBF
- Data Time of Validity (TOV) Input & Output Synchronization, SDI505 only

NON ITAR

Suitable for Wide Variety of High-Precision Commercial, Industrial, Marine and Defense Applications

SYSTRON DONNER QUARTZ MEMS

The SDI500 is the highest performance MEMS-based Inertial Measurement Unit (IMU) and is the only MEMS-based IMU to demonstrate 1°/hr gyro bias and 1 mg accelerometer bias stability and very low 0.02°/√hr angle random walk over wide temperature ranges. The breakthrough performance of the SDI500 IMU is based on a EMCORE's proven 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 SDI500 is a compact IMU constructed with EMCORE's latest generation quartz gyros, quartz accelerometers, and high-speed signal processing to achieve outstanding precision performance. The SDI500 IMU is designed for demanding, mission-critical, rugged environments. 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 SDI500 IMU easy to use in a wide range of higher order integrated system applications.

The SDI505 supports four data message synchronization methods with either input synchronization pulse capability or an output time of validity capability. The user can choose whether the synchronization pulse is internally generated and output as a Time of Validity (TOV) of the output data or whether the SDI505 software will identify the synchronization pulse input and synchronize the output data to the input pulse.

Performance Highlights

Parameter	SDI50x-AF00	SDI50x-BF00	SDI50x-CF00
Gyro Performance			
Bias (Over Temperature) (1σ)	1.0°/hr	3.0°/hr	10.0°/hr
Bias In-Run Stability (1σ)	1.0°/hr	1.5°/hr	2.0°/hr
Angle Random Walk (ARW) (Max)	0.02°/√hr	0.02°/√hr	0.02°/√hr
Bandwidth (Min)		100 Hz	
Accelerometer Performance			
Bias (over temperature)	1.0 mg	1.5 mg	2.0 mg
Bias In-Run Stability	100 µg	200 µg	200 µg
Velocity Random Walk	100 µg/√Hz	100 µg/√Hz	100 µg/√Hz

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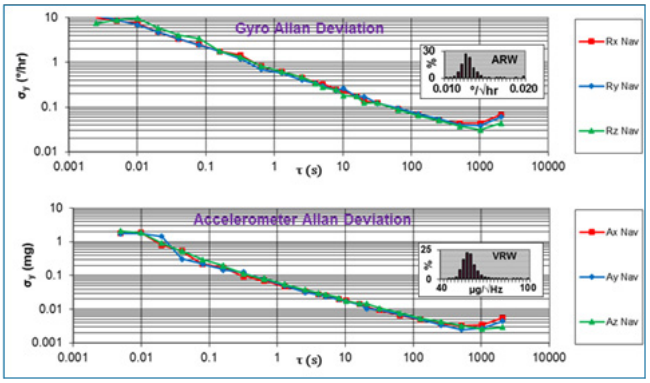
SDI500/SDI505

Quartz MEMS Tactical Inertial Measurement Unit

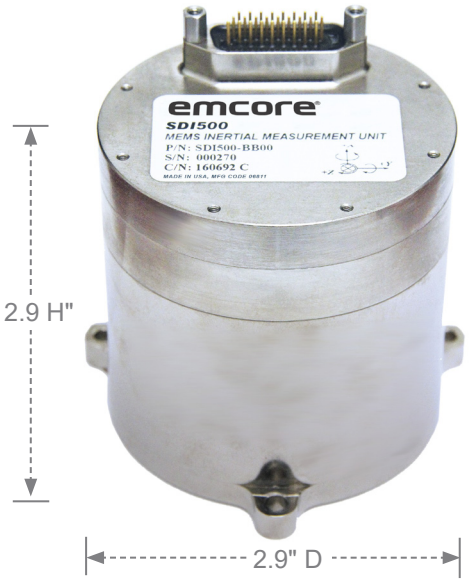
A New Era in Navigation

Performance Specifications

Parameter	SDI50x-AF00	SDI50x-BF00	SDI50x-CF00
System Performance			
Start Up Time for Valid Data Output	1.0 secs max (SDI500) 1.5 secs max (SDI505)		
Bandwidth, Phase (-90° Phase Shift) *	100 Hz		
Gyro Channels			
Bias (Over Temperature) (1σ)	1.0°/hr	3.0°/hr	10.0°/hr
Bias In-Run Stability (1σ)	1.0°/hr	1.5°/hr	2.0°/hr
Scale Factor Accuracy (1σ)	200 ppm	200 ppm	200 ppm
Angle Random Walk (ARW) (Max)	0.02°/√Hr	0.02°/√Hr	0.02°/√Hr
Angular Rate – Dynamic Range (Min)	±1000°/sec	±1000°/sec	±1000°/sec
Accelerometer Channels			
Bias (over temperature) (1σ)	1.0 mg	1.5 mg	2.0 mg
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)	±50 g	±50 g	±50 g
Physical & Environmental			
Input Voltage	12 to 42 Vdc		
Power	SDI500 max power 5.2 watts SDI505 max power 5.6 Watts		
I/O	RS232/422, SDLC		
Data Synchronization Pulse**	(Input: 600, 1200, 2400) Hz (Output: 100, 200, 400, 600, 1200, 2400) Hz		
Dimensions (height x diameter)	2.9" x 2.9"		
Volume	19 cu in		
Weight	1.3 lbs		
Temperature (Operating)	-55°C to +85°C		
Vibration (Operating)	16 g, rms		
Shock (Survival)	150 g, 11 ms		
Operating Life	20 yrs		
Reliability @ 35°C (MTBF)	100,000 hrs ground benign: 15,000 hrs air inhabited cargo		
Dormancy	20 yrs		



Dimensions/Scale



Notes

Specifications are based on 100 Hz Inertial Data (ΔV/Δθ)

* @ 600 Hz Flight Control Data Rate

** SDI505-xF00 only

EMCORE P/N 965755 Rev AB1

For More Information

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MADE IN USA

Released 12.12.2023

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