

# SDI500/SDI505

## MEMS Quartz Tactical Inertial Measurement Unit

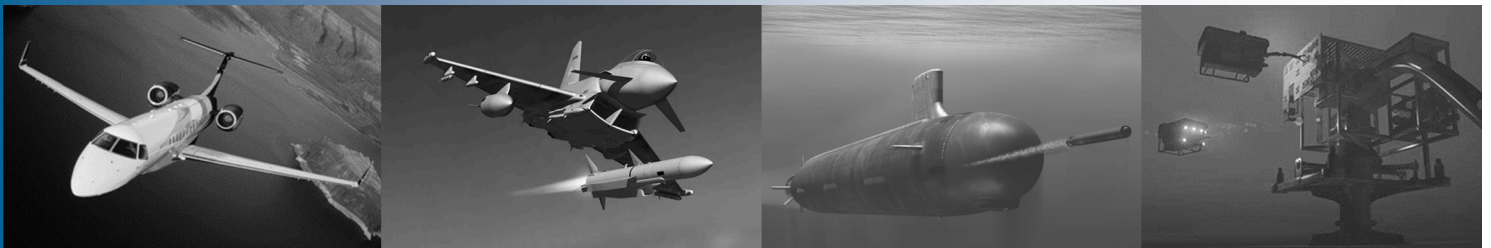
Suitable for Wide Variety of High-Precision Commercial, Industrial, Marine and Defense Applications:

- 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.<sup>3</sup> Compact Size**
- **Stable Performance, Superior Quality & Reliability**
  - **20 Year Lifetime without Calibration**
  - **Greater Than 100,000 hr MTBF**
- **Data Time of Validity (TOV) Input & Output Synchronization, SDI505 only**



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.

[www.emcore.com/nav](http://www.emcore.com/nav)

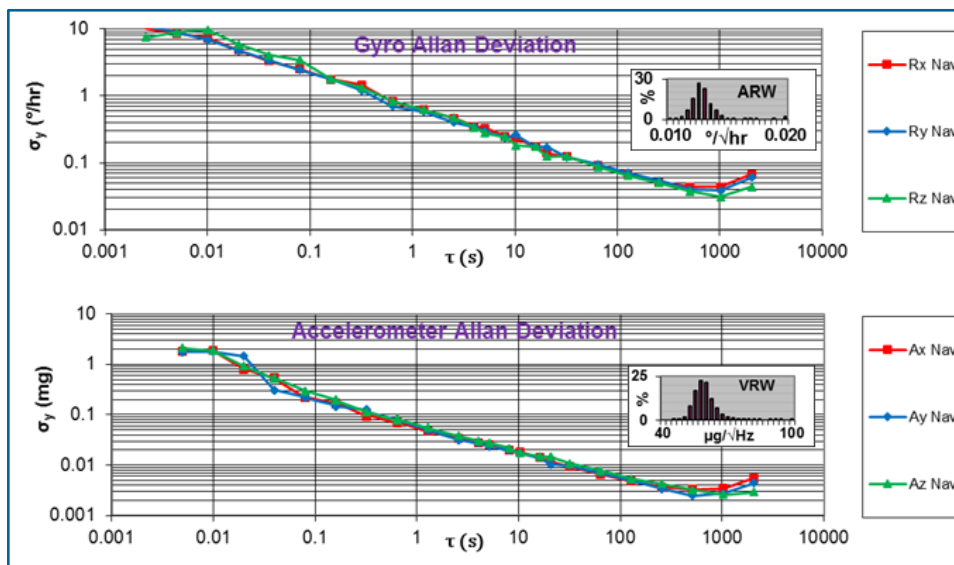
# SDI500/SDI505

## MEMS Quartz Tactical Inertial Measurement Unit

Specifications are based on 100 Hz Inertial Data ( $\Delta V/\Delta \theta$ )

|  | Units                          | Measure    | SDI50x-AF00              | SDI50x-BF00                                       | SDI50x-CF00 |
|--|--------------------------------|------------|--------------------------|---|-------------|
| <b>System Performance</b>                  |                                |            |                          |   |             |
| Start Up Time for Valid Data               | secs                           | max        |                          | 1.0   |             |
| Bandwidth, Phase (-90° Phase Shift) *      | Hz                             | min        |                          | 100   |             |
| <b>Gyro Channels</b>                       |                                |            |                          |   |             |
| Bias (over temperature)                    | deg/hr                         | 1 $\sigma$ | 1.0                      | 3.0   | 10.0        |
| Bias In-Run Stability                      | deg/hr                         | 1 $\sigma$ | 1.0                      | 1.5   | 2.0         |
| Scale Factor Error                         | ppm                            | 1 $\sigma$ | 200                      | 200   | 200         |
| Angle Random Walk                          | deg/ $\sqrt{\text{hr}}$        | max        | 0.02                     | 0.02  | 0.02        |
| Angular Rate – Dynamic Range               | deg/sec                        | min        | $\pm 1000$               | $\pm 1000$  | $\pm 1000$  |
| <b>Accelerometer Channels</b>              |                                |            |                          |   |             |
| Bias (over temperature)                    | milli-g                        | 1 $\sigma$ | 1.0                      | 1.5   | 2.0         |
| Bias In-Run Stability                      | $\mu\text{g}$                  | 1 $\sigma$ | 100                      | 200   | 200         |
| Scale Factor Error                         | ppm                            | 1 $\sigma$ | 200                      | 200   | 200         |
| Velocity Random Walk                       | $\mu\text{g}/\sqrt{\text{Hz}}$ | 1 $\sigma$ | 100                      | 100   | 120         |
| Acceleration - Calibrated Range            | g                              | min        | $\pm 50$                 | $\pm 50$  | $\pm 50$    |
| <b>System Physical &amp; Environmental</b> |                                |            |                          |   |             |
| Input Voltage                              | Vdc                            |            |                          | 10 to 42  |             |
| Power                                      | watts                          |            |                          | <5.0  |             |
| I/O  |                                |            |                          | RS232/422, SDLC                                   |             |
| Data Synchronization Pulse**               | Hz                             |            | (Input: 600, 1200, 2400) | (Output: 100, 200, 400, 600, 1200, 2400)          |             |
| Dimensions (height x diameter)             | in                             |            |                          | 2.9 x 2.9   |             |
| Volume                                     | cu in                          |            |                          | 19  |             |
| Weight                                     | lbs                            |            |                          | 1.3   |             |
| Temperature                                | °C                             |            |                          | -55 to +85  |             |
| Vibration (Operating)                      | g, rms                         |            |                          | 19  |             |
| Shock                                      | g, ms                          |            |                          | 150, 11   |             |
| Operating Life                             | yrs                            |            |                          | 20  |             |
| Reliability @ 35°C (MTBF)                  | hrs                            |            |                          | 100,000 ground benign: 15,000 air inhabited cargo |             |
| Dormancy                                   | yrs                            |            |                          | 20  |             |

Note: \* @ 600 Hz Flight Control Data Rate, \*\* SDI505-xF00 only



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