SYSTRON DONNER INERTIAL

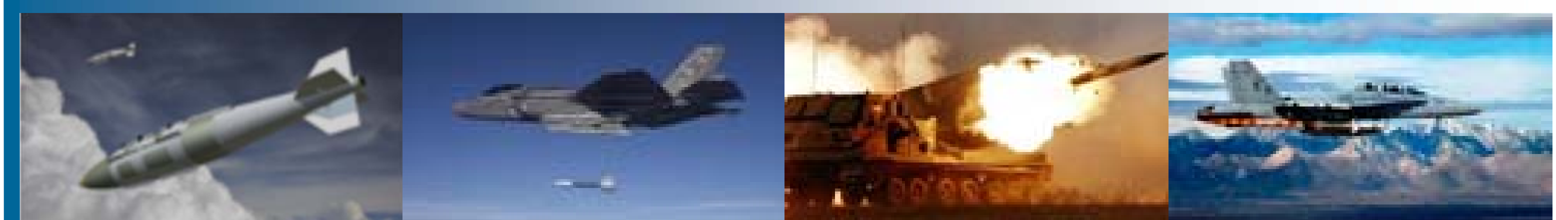
SDI600

MEMS Quartz Tactical Inertial Measurement Unit

Ideal for High-Precision Captive Carry Weapons Systems with high shock and vibration requirements:

- Precision Guided Munitions
- Tactical Missiles
- Guided Multiple Launch Rocket Systems
- Interceptors
- Torpedoes
- GPS-Aided Navigation Systems

- **1°/hr Gyro & 1 mg Accel Bias *All-Causes***
- **2°/hr stability under >25Grms Captive Carry Environments**
- **1.0 second Full Performance Start Up**
- **0.04°/√hr Angle Random Walk**
- **20 in.^{3} Compact Size**
- **95% Built-in Test (BIT) Coverage**
- **Internal/External T.O.V. data sync**
- **20,000 hours MTBF Airborne Uninhabited Fighter (AUF) for Captive Carriage at 42°C.**
- **20 Year Lifetime without Calibration**



Air, ground and sea missile and munitions designers are challenged to meet demanding accuracy requirements under extraordinarily difficult operating conditions and do it with size, weight and cost constraints. SDI has developed the SDI600 to uniquely meet those challenges. Designed specifically for missile and munition applications, the SDI600 delivers the SWAP benefits of Quartz MEMs sensors and sets a new standard for >25Grms captive carry environments for shock and vibration performance.

With a breakthrough High Bandwidth (HBW) Gyro and advanced packaging design, SDI delivers true “all causes” 1 °/hr / 1 mg performance in a uniquely small, light package. Needing no periodic recalibration and having no moving parts or consumables, the SDI600 will help your program meet tough life requirements, too. SDI600 is rated at >20K hours MTBF Airborne Uninhabited Fighter (AUF) for captive carriage at 42°C. With 1 sec full performance start-up, industry standard serial communication, TOV sync, and 95% BIT coverage, your system integration will be fast & easy.

SDI provides high volume production of precisely micro-machined sensor structures in our quartz technology. Quartz’s piezoelectric properties deliver inherently large signal output and thermal stability. The SDI600 is the better alternative to older generation optical RLG/FOG technologies.

SDI600

MEMS Quartz Tactical Inertial Measurement Unit

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

	Units	Measure	SDI600-AA00	SDI600-BA00
System Performance				
Start Up Time for Full Performance	secs	max	1.0	
Bandwidth, Phase (-90º Phase Shift) *	Hz	min	170	
Gyro Channels				
Bias (over temperature)	°/hr	1σ	1.0	5.0
Bias (in-run)	°/hr	1σ	1.0	1.0
Scale Factor Error	ppm	1σ	200	200
Angle Random Walk	°/√hr	max	0.04	0.04
Angular Rate – Dynamic Range	°/sec	min	±1000	±1000
Accelerometer Channels				
Bias (over temperature)	milli-g	1σ	1.0	1.0
Bias (in-run)	milli-g	1σ	0.1	0.1
Scale Factor Error	ppm	1σ	200	200
Velocity Random Walk	μg/√Hz	1σ	100	100
Acceleration - Calibrated Range	G	min	±70	±70
System Physical & Environmental				
Input Voltage	Vdc		10 to 42	
Power	watts		<5.0	
I/O			RS232/422, SDLC	
Data Latency	msec		1.4 Flight Control, 5.2 Inertial 1, 20 Inertial 2	
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 / Weight	cu in, lbs		20, 1.3	
Temperature	°C		-55 to +85	
Vibration (Operating)	g, rms		25	
Vibe Rec Captive Flight (max)	°/hr, milli-g		10, 30	
Shock	g, ms		150, 11	
Operating Life	yrs		20	
Reliability @ AUF 42°C (MTBF)	hrs		6,500 standard-reliability: 20,000 high-reliability	
Dormancy	yrs		20	

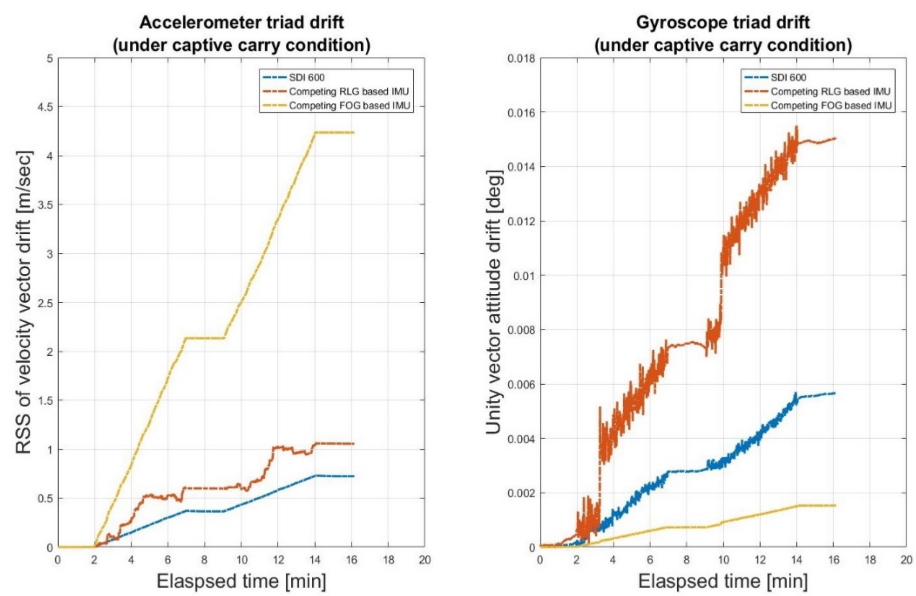
Note: * @ 600 Hz Flight Control

SDI600 compared to the incumbent RLG & FOG based product under captive flight vibe conditions to expose the impact of vibe on integrated error of the accelerometer and gyroscope triads respectively.

For Accelerometers, SDI used the 45deg unity acceleration vector (1,1,1) and computed the root sum square (RSS) of the velocity vector drift.

For Gyroscopes, SDI computed the attitude drift of the same 45deg unity vector as an absolute angle between unity vectors before and after drift.

The effect of vibration on drift is made clear by alternating between 2 min of quiet environment and 5 min of captive flight vibration.



Accelerometer and gyroscope triads sensitivity to vibration. Velocity and attitude drifts are compared for SDI600 and legacy RLG & FOG tactical grade IMUs through vibration on/off cycle (2min/5min)

For more information, contact:

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