SYSTRON DONNER INERTIAL

Miniature MEMS Quartz GPS/INS

MMQ™G

Applications

The MMQ™G has a wide variety of applications.

- **Targets and Drones**
- **Position and Orientation System Stabilization**
- **UAVs and other Unmanned Vehicles**
- **Range Instrumentation**
- **Commercial Aviation**
- **Navigation**
- **Railroads**
- **Helicopters**

Description

The MMQ™G offers a unique combination of the Systron Donner Inertial solid-state Inertial Measurement Unit (IMU) and the Jupiter PICO™ commercial Global Positioning System (GPS) receiver. The MMQG's MEMS quartz rate sensors and MEMS accelerometers make up an IMU system that is tightly coupled with the Jupiter's 12-channel Coarse/Acquisition (C/A) Code GPS engine to provide a highly accurate navigation solution. The MMQG also accepts 3-axis magnetometer data, which it uses as a heading reference in order to improve heading stability. This also allows for alignment during low dynamic motion, as experienced in ocean applications. A "heading hold" feature allows delayed takeoffs after alignment is complete.

The MMQG combines tremendous performance and versatility with an extremely compact size and low weight at a very low price. Leveraging the C-MIGITS® III user-friendly message based navigation outputs, the MMQG provides a powerful solution for Guidance, Navigation & Control.

Key Performance Features

- **Extremely Small Size**
- **Integrated INS/GPS**
- **Optimized 28-State Kalman Filtered Navigation Solution**
- **RS-232 Digital Interface**
- **Low Power Consumption (<5W)**
- **Accepts External Magnetometer Data for Heading Reference**
- **In-Air Dynamic Alignment Capability** (1)

(1) In-Air dynamic alignment without magnetometer reference requires system velocity below 95 kts

Miniature MEMS Quartz GPS/INS

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Physical Characteristics	
Part Number	MMQG-100-102
Size (Vol.)	9.0 in^3
Weight	<0.50 lbs (<0.227 kg)
Power	+ and - 12 Vdc at <5 watts total
I/O	RS-232, output protocol similar to GPS-153
Navigation Performance	
	C/A Configuration
Position (SEP)	5 m
Random Walk	Angle: 0.3 deg/√hr, 1σ; Velocity: 0.5 mg/√Hz, 1σ
Velocity (1 sigma)	0.2 m/s
Attitude (1 sigma) (1)	5 mrad
Heading (1 sigma) (1)	5 mrad
Time (1 sigma)	1 µs
Rate Channels	
Range	±200°/ sec
Bias Turn-on to turn-on Stability (fixed temp)	≤100°/hr, 1σ
Bias In-run Stability (at any temperature)	100°/hr, 1σ
Bias Instability	<4-15°/hr
Angle Random Walk	0.3 °/rt-hr (0.005 °sec/rt-Hz)
Scale Factor error	≤5000 ppm (0.5%)
Alignment	≤5 mrad
Bandwidth (-90 degrees)	50 Hz, nominal
Acceleration Channels	
Range	±10g
Bias Turn-on to turn-on Stability (fixed temp)	≤2.5 mg, 1σ
Bias In-run Stability (at any temperature)	≤3 mg, 1σ
Velocity Random Walk	0.5 mg/rt-Hz
Scale Factor Error	≤5000 ppm (0.5%)
Alignment	≤5 mrad
Bandwidth (-90 degrees)	50 Hz, nominal
Environmental	
Temperature Range	-40 to +71°C (operating)
Vibration	6 g rms (performance) 20 – 2000 Hz
Shock	250g (survival)
Operating Range	Up to 60,000’ and 500 m/s Velocity

(1) In dynamic motion

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