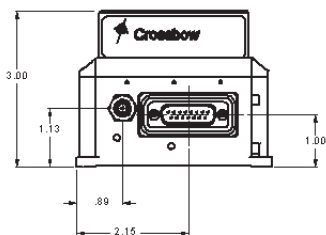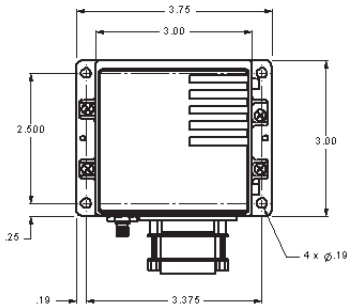# NAV420

GPS-AIDED MEMS INERTIAL SYSTEM

- Real-Time GPS X, Y, Z Position and Velocity Outputs

- AHRS Pitch, Roll, and Heading Output at 100Hz

- Built-In GPS Receiver with RTCM and WAAS Compatibility

- High Stability MEMS Sensors

- Enhanced Performance Kalman Filter Algorithm

- EMI & Vibration Resistant

- Environmentally Sealed

Applications

- Unmanned Vehicle Control

- Land Vehicle Guidance

- Avionics Systems

- Platform Stabilization

Package Dimensions

NAV420CA

The MEMSIC NAV420 is a combined GPS Navigation and GPS-Aided Attitude & Heading Reference system (AHRS) that utilizes both MEMS-based inertial sensors and GPS technology to provide an unmatched value in terms of both price and performance. Developed in response to years of extensive application experience in a wide variety of airborne, marine and land applications, the NAV420 also incorporates many new and enhanced design features including:

- Built-in GPS receiver for position and velocity measurement

- GPS data synchronization clock

- High performance Kalman Filter algorithms

- Water resistant, vibration resistant, light-weight design

- EMI protection for trouble-free operation

- Continuous Built-in-Test

The NAV420 provides consistent performance over a wide temperature range in challenging EMI environments across a broad range of input power conditions. It is designed for use in a number of different applications including unmanned vehicle control, land vehicle guidance, uncertified avionics and platform stabilization.

This high reliability, strapdown inertial system provides attitude and heading measurement with static and dynamic accuracies that exceed traditional spinning mass vertical and directional gyros. With GPS integration, the NAV420 system also provides GPS-aided velocity data at up to 100 Hz. Velocity data derived from the inertial instruments improves stability and reduces the latency associated with stand-alone GPS measurements.

Each NAV420 system comes with a GPS antenna and User's Manual. MEMSIC's NAV-VIEW software is also included to assist users with system development, evaluation, and data acquisition.

NAV420 Block Diagram
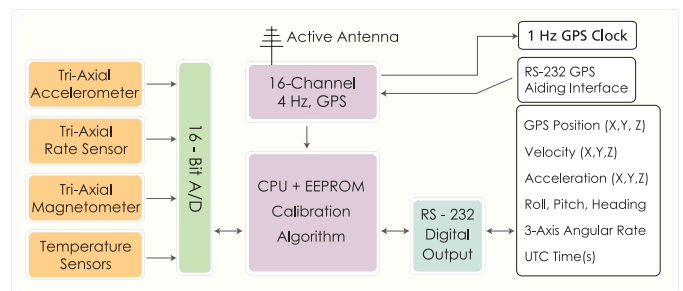
Specifications	NAV420CA-100	Remarks
Performance		
Update Rate[1] (Hz)	2-100	Programmable
Start-up Time Valid Data (sec)	< 1	
Fully Stabilized Data (sec)	< 60	Under static conditions
Position/Velocity		
Position Accuracy[2] (m CEP)	3	Internal GPS, not augmented
X,Y Velocity Accuracy (m/s rms)	< 0.4	GPS available
Z Velocity Accuracy (m/s rms)	< 0.5	GPS available
1PPS Accuracy (ns)	± 50	GPS available
Attitude		
Range: Roll, Pitch (°)	± 180, ± 90	
Accuracy[3] (° rms)	< 0.75	GPS available
(° rms)	< 2.5	GPS unavailable
Resolution (°)	< 0.1	
Heading		
Range (°)	± 180	
Accuracy[3] (° rms)	< 3.0	
Resolution (°)	< 0.1	
Angular Rate		
Range: Roll, Pitch, Yaw (°/sec)	± 200	
Bias: Roll, Pitch, Yaw (°/sec)	< ± 0.1	Kalman filter stabilized
Bias: Roll, Pitch, Yaw (°/sec)	< ± 0.75	Kalman filter off
Scale Factor Accuracy (%)	< 1	
Non-Linearity (% FS)	< 0.5	
Resolution (°/sec)	< 0.06	
Bandwidth (Hz)	25	-3 dB point nominal
Random Walk (°/hr$^{1/2}$)	< 4.5	
Acceleration		
Input Range: X/Y/Z (g)	± 4	
Bias: X/Y/Z (mg)	< ± 15	
Scale Factor Accuracy (%)	< 1	
Non-Linearity (% FS)	< 1	
Resolution (mg)	< 0.6	
Bandwidth (Hz)	25	-3 dB point nominal
Random Walk (m/s/hr$^{1/2}$)	< 1.0	
Environment		
Operating Temperature (°C)	-40 to +71	
Non-Operating Temperature (°C)	-55 to +85	
Non-Operating Vibration (g rms)	6	20 Hz - 2 KHz random
Non-Operating Shock (g)	200	1 ms half sine wave
Enclosure[4]	IP66 compliant	
Electrical		
Input Voltage (VDC)	9 to 42	
Input Current (mA)	< 350	at 12 VDC nominal
Power Consumption (W)	< 5	
Digital Output Format	RS-232	
Physical		
Size (in)	3.0 x 3.75 x 3.0	including mounting flanges
(cm)	7.62 x 9.53 x 7.62	including mounting flanges
Weight (lbs)	< 1.3	
(kg)	< 0.58	
Connector	15 pin "D" male	
GPS Antenna Connector	SMA Jack	

15 Pin "D" Connector Male Pinout

Pin	Signal
1	RS-232 Transmit Data
2	RS-232 Receive Data
3	Positive Power Input (+Vcc)
4	Power Ground
5	Chassis Ground
6	NC – Factory use only
7	RS-232 GPS Tx
8	RS-232 GPS Rx
9	Signal Ground
10	1PPS OUT
11	NC – Factory use only
12	NC – Factory use only
13	NC – Factory use only
14	NC – Factory use only
15	NC – Factory use only

NAV420 Pin Diagram

Specifications subject to change without notice

Notes:

[1] See User's Manual for additional information

[2] Internal GPS accuracy can be further improved with Radio Technical Commission for Maritime (RTCM) or Satellite Based Augmentation System (SBAS) messages such as the Wide Area Augmentation System (WAAS).

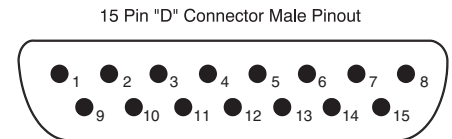[3] Dynamic conditions, aggressive MEMSIC flight profile.

[4] IP66 Compliant without EMI filter attached.

Ordering Information

Model	Description	Gyro (°/sec)	Accel (g)
NAV420CA-100	GPS-Aided MEMS Inertial System	± 200	± 4

CALL FACTORY FOR OTHER CONFIGURATIONS