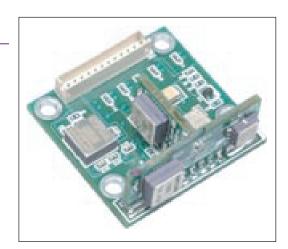




#### STANDARD FEATURES

- High Performance MEMS Inertial Sensors
- Solid State Reliability
- Versatile Analog Interface
- On-Board Temperature Monitor
- Low Cost
- Ultra Compact Package
- Low Power Consumption (Single 5V Supply)



#### PRODUCT DESCRIPTION

The Gyrocube3A is a complete three axis silicon MEMS inertial measurement module with analog outputs. The Gyrocube3A integrates three MEMS angular rate gyros and three MEMS accelerometers in a triaxial orthogonal configuration. Featuring low bias drift and excellent scale factor stability, these rugged inertial sensor modules are rated for 500g operating and 1000g non-operating shock survival. The Gyrocube3A is packaged in just under one cubic inch of volume. The module requires a single 5V supply and consumes only 135mW.

Angular rate outputs are available in three ranges of ±100°/s, ±200°/s and ±400°/s, with optional gain, output sensitivities can be configured to ±25°/s full scale. Acceleration outputs are available in two ranges ±2g or ±10g, with optional gain, output sensitivities to ±0.5g full scale are available. Self test inputs are provided to verify proper operation.

Rate and acceleration outputs are buffered to drive up to 30mA. An unbuffered temperature output is also provided for thermal compensation, if desired. Outputs are terminated on a detent-locking header for reliable contact in dynamic environments. The wire-to-board connection allows mounting the module in any orientation. Preassembled cable sets are available for easy system integration.

An evaluation kit is available with everything needed to power and test a Gyrocube3A on a desktop or in your application. The evaluation kit includes a Gyrocube3A, connecting cables, AC power supply and a user manual. An optional digitizer unit is available for serial (RS-232) interfacing to a PC or users system. An optional milled aluminum enclosure is available for installations in rugged environments.

#### **APPLICATIONS**

- Platform Stabilization
- Motion Control Systems
- Inertial Guidance & Navigation
- Vehicle Stabilization & Control
- Antenna Tracking

- Attitude Reference Systems
- Seismic Event Sensing
- Motion Instrumentation
- Virtual Reality Input Sensing
- Vehicle Failsafe Systems

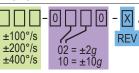


Optional Digitizer/MX A/D Converter Module

# ORDERING INFORMATION

## STANDARD CONFIGURATIONS

GYROCUBE 3A 23503-



### **CUSTOM CONFIGURATIONS**

Custom Bandwidth 1-40Hz (Rate) 1-100Hz (Accel.) Custom rate sensitivity to ±25°/s Custom Acelerometer sensitivity to ±0.5g Mixed sensitivities Custom I/O Header (Removed or Reversed) Machined aluminum enclosures

#### **DISCLAIMER**

Data contained herein is believed to be reliable and accurate. O-Navi LLC assumes no liability for the use of any information contained herein, nor for any infringements of patents or other rights of third parties that may result from its use. No license is granted for any patent rights of O-Navi LLC.



# Triaxial Analog MEMS IMU Module

Example 23503-200-0020-CA for ±200 ±2g Rev C Version (Other ranges available)

ANGULAR RATE         Dynamic Range         ±200         "/s         Full Scale (F.S.) Range @25°C           Sensitivity (Over Temp)         11.25         13.75         mV/"/s         4.75V <vcc<5.25< td="">           Noise Density         0         0.05         "/s/√Hz         4.75V<vcc<5.25< td="">           Bias Temp Drift         0.10         "/s/√Hz         0.25°C           Non-Linearity         0.10         "/s/√Hz         0.25°C           Bandwidth         40         Hz         -3db           Self Resonant Freq         14         KHz         -3db           Linear Acceleration Effect         0.2         "/s/g         Any Axis           Voltage Sensitivity         1         "/s/g         Any Axis           Start-up Time         35         mS         To within ±0.5°/s of final           ACCELERATION           Dynamic Range         ±2         g         Full Scale (F.S.) Range           Sensitivity         0.2         "/s/g         Any Axis           Noise Density         0.2         (375)         mV/g         0.25°C           Sensor Die Align Error         0.2         "/s/s         WF.S.         Best Fit Straight Line           Sensor Die Align Error         1         "/s/s&lt;</vcc<5.25<></vcc<5.25<>	PARAMETER	MIN	TYP	MAX	UNITS	CONDITIONS / REMARKS
Sensitivity (Over Temp)	ANGULAR RATE					
Sensitivity (Over Temp)	Dynamic Range		±200		°/s	Full Scale (F.S.) Range
Noise   Noise Density   Noise Density   Noise Density   Sias   Sensitivity   Sensor Die Align Error   Cross Axis Sensitivity   Cross Axis Sensitivity   Self-Test Deviation   Start-up Time   Self-Test Deviation	Sensitivity	11.25	12.5	13.75	mV/°/s	@25°C
Noise Density Bias Bias Temp Drift Non-Linearity Cross Axis Sensitivity Bandwidth Self Resonant Freq Linear Acceleration Effect Voltage Sensitivity Start-up Time  ACCELERATION Dynamic Range Sensitivity Drift over Temp Non-Linearity Non-Linearity Non-Linearity Sensitivity Drift over Temp Non-Linearity Nose Density Bias Offset Drift Sensor Die Align Error Cross Axis Sensitivity Senstivity Senstivity Sensonant Freq Linear Acceleration Effect Voltage Sensitivity Sensitivity Drift over Temp Non-Linearity Noise Density Bias Offset Drift Sensor Die Align Error Cross Axis Sensitivity Bandwidth So Resonant Freq (Sensor) Supply Voltage Sensitivity Self-Test Deviation Start-up Time  TEMP SENSOR Temperature Output Temperature Scale Temp. Output Drive LECTRICAL Inertial Signal Output Inertial Output Drive Supply Voltage Supply Current  O.00  O.00  A.75  V F.S. Best Fit Straight Line Wey5°C Full Scale (F.S.) Range @25°C Ratiometric (V <sub>20</sub> 25°C Ratiometric (V <sub>20</sub> 72)  Fixed (Not ratiometric) Fixed (Not ationetric) Fixed (Not Arabic Not Any Axis Fixed (Not Arabic Not Any Axis Fixed (Not Arisy) Fixed (Not Arabic Not Any Axis Full Cale (Not Arabic Not Any Axis Full Cale (Not Arabic Not Any Axis Full Cale (Not Arabic N	Sensitivity (Over Temp)	11.25		13.75	mV/°/s	4.75V <vcc<5.25< td=""></vcc<5.25<>
Bias Temp Drift Non-Linearity Cross Axis Sensitivity         0.10 www. F.S. which is part of the properties of the propert	Noise		0		°/s	
Bias Temp Drift   Non-Linearity   Cross Axis Sensitivity   Bandwidth   40	Noise Density		0.05		°/s/√Hz	@25°C
Non-Linearity         0.10         % F.S.         Best Fit Straight Line           Cross Axis Sensitivity         40         Hz         -3db           Self Resonant Freq         14         KHz         -3db           Linear Acceleration Effect         0.2         "s/s/y         Any Axis           Voltage Sensitivity         1         "s/s/v         Ar,75v-VCC<-5.25V	Bias		2.5		V	Fixed (Not ratiometric)
Cross Axis Sensitivity         2         % F.S.           Bandwidth         40         Hz         -3db           Self Resonant Freq         14         KHz         -3db           Linear Acceleration Effect         0.2         % s/g         Any Axis           Voltage Sensitivity         1         % s/g         Any Axis           Voltage Sensitivity         35         mS         To within ±0.5°/s of final           ACCELERATION           Dynamic Range         ±2         g         Full Scale (F.S.) Range           Sensitivity Drift over Temp         ±0.5         %         Delta from 25°C           Non-Linearity         0.2         % F.S.         Best Fit Straight Line           Noise Density         200         1000         μg/y Hz         @25°C           Bias         2.5         V         mg/°C         Ratiometric (V <sub>20</sub> / 2)           Offset Drift         2.0         mg/°C         Ratiometric (V <sub>20</sub> / 2)         W           Sensor Die Align Error         1         %         Hz         -3db           Cross Axis Sensitivity         ±2         %         Hz         -3db           Bandwidth         50         Hz         V         W/V         W/V	Bias Temp Drift			±300	mV	
Bandwidth   Self Resonant Freq   14	Non-Linearity		0.10		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Best Fit Straight Line
Self Resonant Freq	Cross Axis Sensitivity		_		% F.S.	
Linear Acceleration Effect Voltage Sensitivity Start-up Time         0.2 1 2 35 ms         "/s/g 4.75V         Any Axis 4.75V <vcc<5.25v< td="">           ACCELERATION Dynamic Range Sensitivity Start-up Time         ±2 (250)         (312)         (375)         mS         To within ±0.5°/s of final           ACCELERATION Dynamic Range Sensitivity Drift over Temp Non-Linearity Noise Density Pond-Linearity Noise Density Pond-Linearity P</vcc<5.25v<>						-3db
Voltage Sensitivity Start-up Time         1 35         "/s/V 4.75V<0CC<5.25V	'					
Start-up Time   35						
ACCELERATION  Dynamic Range Sensitivity Sensitivity Sensitivity Drift over Temp Non-Linearity Noise Density Bias Offset Drift Cross Axis Sensitivity Bandwidth Resonant Freq (Sensor) Supply Voltage Sensitivity Self-Test Deviation Start-up Time  TEMP SENSOR Temperature Output Temperature Scale Temp. Output Drive LetteCTRICAL Inertial Signal Output Inertial Signal Output Inertial Supply Voltage Supply Current   4.25 Supply Voltage Supply Current  4.75 Supply Voltage Supply Current  5.50 Supply Voltage Supply Current  5.50 Supply Voltage Supply Current  5.75 Supply Voltage Supply Current  5.75 Supply Voltage Supply Current  6.75 Supply Voltage Supply Current  5.75 Supply Voltage Supply Current  6.75 Supply Voltage Supply Current  6.75 Supply Voltage Supply Current  7.75 Supply Voltage Supply Current  8.40 Supply Supply Current  9.75 Supply Voltage Supply Current  9.75 Supply Supply Current  9.75 Supply Voltage Supply Current  9.75 Supply Supply Current  9.75 Supply Supply Supply Supply Current  9.75 Supply Suppl					°/s/V	
Dynamic Range   ±2   (250)   (312)   (375)   mV/g   (25°C   (250)   (25°C   (250)   (25°C   (250)   (25°C   (250)   (25°C	Start-up Time		35		mS	To within ±0.5°/s of final
Sensitivity   Sensitivity   Sensitivity   Sensitivity   Drift over Temp   ±0.5   ±0.5   %   Delta from 25°C	ACCELERATION					
Sensitivity Drift over Temp   Mon-Linearity   Noise Density   200   1000   μg√ Hz   @25°C   Best Fit Straight Line   @25°C   Ratiometric (V <sub>DO</sub> / 2)   W F.S.   Best Fit Straight Line   @25°C   Ratiometric (V <sub>DO</sub> / 2)   W F.S.   Best Fit Straight Line   @25°C   Ratiometric (V <sub>DO</sub> / 2)   W F.S.   Best Fit Straight Line   @25°C   Ratiometric (V <sub>DO</sub> / 2)   W F.S.   W F.S.   W F.S.   Best Fit Straight Line   @25°C   Ratiometric (V <sub>DO</sub> / 2)   W F.S.   Best Fit Straight Line   @25°C   Ratiometric (V <sub>DO</sub> / 2)   W F.S.   W F.	Dynamic Range	±2			g	Full Scale (F.S.) Range
Non-Linearity       0.2       w F.S.       Best Fit Straight Line $ω25^{\circ}$ C         Noise Density       200       1000 $μg_V$ Hz $ω25^{\circ}$ C       Ratiometric $(V_{DD} / 2)$ Offset Drift       2.0       mg/° C       Ratiometric $(V_{DD} / 2)$ Sensor Die Align Error       1 $ω$ $ω$ Cross Axis Sensitivity $±2$ $‰$ Bandwidth       50       Hz       -3db         Resonant Freq (Sensor)       10 $4.0$ kHz       -3db         Supply Voltage Sensitivity       1.0 $‰$ / $𝑉$ $𝑉$ $𝑉$ $𝑉$ Suprive Self-Test Deviation       10 $𝑉$ <t< td=""><td>Sensitivity</td><td>(250)</td><td>(312)</td><td>(375)</td><td>mV/g</td><td>@25°C</td></t<>	Sensitivity	(250)	(312)	(375)	mV/g	@25°C
Noise Density   200   1000   μg√ Hz   @25°C   Ratiometric (V <sub>DO</sub> / 2)	Sensitivty Drift over Temp		±0.5		%	Delta from 25°C
Bias         2.5         V         Ratiometric (V <sub>20</sub> / 2)           Offset Drift         2.0         mg/° C           Sensor Die Align Error         1         °           Cross Axis Sensitivity         ±2         %           Bandwidth         50         Hz         -3db           Resonant Freq (Sensor)         10         4.0         kHz         -3db           Supply Voltage Sensitivity         1.0         % / V         W         BW: 50Hz           TEMP SENSOR           Temperature Output         2.5         V         mS         BW: 50Hz           TEMP SENSOR           Temperature Scale         8.4         mV/°C         @25°C           Temperature Scale         8.4         mV/°C         Rev. C Only (50 μA Rev B)           ELECTRICAL           Inertial Signal Output         0.25         4.75         V           Inertial Output Drive         30         mA         Indefinite S.C.           Supply Voltage         4.75         5.00         5.25         V           Supply Current         27         mA         Vcc=5V	Non-Linearity		0.2		% F.S.	Best Fit Straight Line
Offset Drift         2.0         mg/°C           Sensor Die Align Error         1         °           Cross Axis Sensitivity         ±2         %           Bandwidth         50         Hz         -3db           Resonant Freq (Sensor)         10         4.0         kHz         -3db           Supply Voltage Sensitivity         1.0         % / V         Self-Test Deviation         9% / V           Start-up Time         <20	Noise Density		200	1000	µg√ Hz	@25°C
Sensor Die Align Error   1	Bias		2.5		V	Ratiometric (V <sub>DD</sub> / 2)
Cross Axis Sensitivity         ±2         %         Hz         -3db           Bandwidth         50         Hz         -3db           Resonant Freq (Sensor)         10         4.0         kHz           Supply Voltage Sensitivity         1.0         % / V           Self-Test Deviation         10         %           Start-up Time         <20	Offset Drift		2.0		mg/°C	
Bandwidth   So   Hz   -3db	Sensor Die Align Error		1		۰	
Resonant Freq (Sensor)   10   4.0   kHz   % / V   Supply Voltage Sensitivity   1.0   %   W / V   Self-Test Deviation   10   %   mS   BW: 50Hz	Cross Axis Sensitivity		±2		%	
Supply Voltage Sensitivity   Self-Test Deviation   Start-up Time   Supply Voltage   Sensitivity   Self-Test Deviation   Start-up Time   Supply Voltage   Sup						-3db
Self-Test Deviation   10				4.0		
Start-up Time   <20	117 0 ,				, , , ,	
TEMP SENSOR  Temperature Output Temperature Scale Temp. Output Drive  ELECTRICAL Inertial Signal Output Inertial Output Drive Supply Voltage Supply Current  TEMP SENSOR  2.5 V mV/°C mA Rev. C Only (50 μA Rev B)  4.75 V NA Indefinite S.C.  MA Vcc=5V						
Temperature Output Temperature Scale Temp. Output Drive	Start-up Time		<20		mS	BW: 50Hz
Temperature Scale Temp. Output Drive  ELECTRICAL Inertial Signal Output Inertial Output Drive Supply Voltage Supply Current  N.25 Supply Current  N.25 Supply Current  N.25 Supply Current  N.25 Supply Current  N.26 Supply Current  N.27 Supply Current  N.27 Supply Current  N.28 Supply Current  N.29 Supply Current  N.20 Supp	TEMP SENSOR					
Temp. Output Drive 10 mA Rev. C Only (50 μA Rev B)  ELECTRICAL Inertial Signal Output 0.25 4.75 V Inertial Output Drive 30 mA Indefinite S.C. Supply Voltage 4.75 5.00 5.25 V Supply Current 27 mA Vcc=5V	Temperature Output		2.5		V	@25°C
ELECTRICAL         0.25         4.75         V           Inertial Signal Output Inertial Output Drive         30         mA         Indefinite S.C.           Supply Voltage         4.75         5.00         5.25         V           Supply Current         27         mA         Vcc=5V	Temperature Scale		8.4		mV/°C	
Inertial Signal Output	Temp. Output Drive			10	mA	Rev. C Only (50 µA Rev B)
Inertial Signal Output	FI FCTRICAL					
Inertial Output Drive		0.25		4.75	V	
Supply Voltage         4.75         5.00         5.25         V           Supply Current         27         mA         Vcc=5V	• '	0.20				Indefinite S.C.
Supply Current 27 mA Vcc=5V	•	4 75	5 00			
,	117	•		0.20	mA	Vcc=5V
	''''		135		mW	
PHYSICAL	PHYSICAL					
Temp Range (OP) -40 +85 °C Absol Max: -55 to +125°C		-40		+85	°C	Absol Max: -55 to +125°C
Temp Range (NOP) -65 +125 °C						, 15501 HIGH. 50 (0 1 120 0
Shock (OP) 500 g Any Axis 0.5mS	, , ,	-03			•	Any Axis 0.5mS
Shock (NOP) 1000 g Any Axis 0.5mS	, ,					
Humidity 0 90 % R.H. Non-Condensing	, ,	0			"	
Mass 7.0 gram	•		7.0			Saluationing

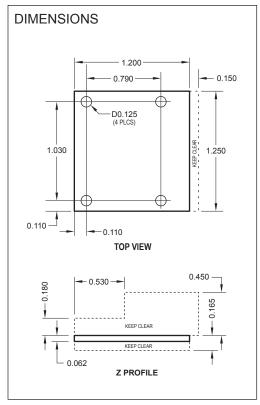
Dimensions: 30.5 X 31.75 X 15.62MM

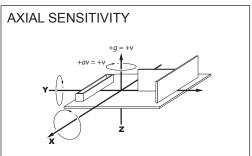
Mounting Hole: Diameter 3.175mm (M3 or SAE 4-40)

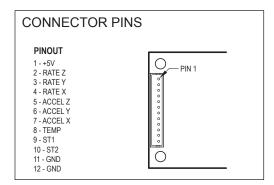
Interface Connector: JST - B12B-ZR
Mating Connector: JST - ZHR-12

#### OPTIONS

I/O Cable (Flying Leads)	305-1206A
I/O Cable (Power Connector)	305-1235A
Digitizer Bridge Cable	305-1212A
AC Power Supply	310-0502A
Digitizer/MX ADC Module	DMX-23501
Stand-Off Kit (1/2" X 4-40) [w/Screws]	810-7440







SPECIFICATION SUBJECT TO CHANGE WITHOUT NOTICE

