

**ПРОСТЫЕ  
РЕШЕНИЯ  
СЛОЖНЫХ  
ЗАДАЧ**

**МЭМС  
ДАТЧИКИ**

**2025**



# **MEMS Inertial Devices and Systems**

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# MEMS Inertial Devices and Systems

**AC101**

## Advantages

- Extra Small Size, LCC20 packaging
- Low Noise
- Harsh Environment (Shock, Vibration, Temperature)
- $\pm 5$ - $\pm 200$  Range
- Excellent Long-term Stability

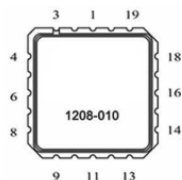
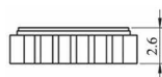
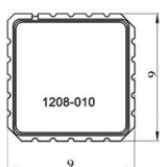


## Applications

- IMU/AHRS for Aerospace
- Land & Sea Inertial Navigation
- Directional Drilling
- Tilt & Inclination

Accelerometer	-5	-10	-15	-30	-50	-100	-200	
Range	$\pm 5$	$\pm 10$	$\pm 15$	$\pm 30$	$\pm 50$	$\pm 100$	$\pm 200$	g
Bias	<50	<50	<100	<150	<250	<500	<1000	mg
Bias Stability	<0.5	<0.5	<0.75	<1	<2	<5	<10	mg
Bias Repeatability	<0.75	<0.75	<0.75	<1.5	<2.5	<5.0	<10	mg
Bias Temp. Coefficient	<0.75	<0.75	<0.75	<1.2	<2.5	<5.0	<10	mg/°C
Scale Factor	400 $\pm$ 5	200 $\pm$ 2	133.3 $\pm$ 1	66.6 $\pm$ 1	40 $\pm$ 1	20 $\pm$ 1	10 $\pm$ 1	mV/g
Scale Factor Temp. Coefficient	100	100	100	100	100	100	100	PPm
Sensitive Axis Misalignment	<10	<10	<10	<10	<10	<10	<10	ppm/°C
	<2	<1	<1	<1	<1	<1	<1	mrad (max)
Resolution	0.3	0.3	0.5	1.0	2.5	5.0	10	% (max)
Non-linearity	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.5	mg
Bandwidth	0-250	0-500	0-500	0-500	0-500	0-500	0-500	% of FS
Resonant Frequency	1.7	2.7	3.8	5.5	5.5	9.8	9.8	Hz
Operating Temp.	-40°C+85°C (default); -55°C+125°C (as request, but the performance have to be updated in this case)							
Shock	Up to 20, 000g(half-sine, 3 time shocks in each direction)							
Recovery Time	Dms (1000g, 1ms half-sine shock)							
Vibration	20g rms, 20~2000Hz (random noise, 30 minutes in each direction)							
Packaging	Hermetic							
ESD Sensitivity	Class 2 (requirements MIL-STD-833-G, 1 Method 3015.7) HBM 2kV							
Supply Voltage	3.0~7.0Vdc. (Typ. 5.0Vdc)							

## Structure (unit: mm)



2	VCC	+PWR
3	GND	Ground
15	SST	Self Test
16	Vour	Sensor Output
17	ORG-OUT	Filter Output (adjustable bandwidth)
18	ECAP	Voltage Reference(V2Vcc)
20	GND	Ground

# High Accuracy MEMS Accelerometer

**AC102**

## Advantages

- Bias stability (Allan Curve) 5  $\mu\text{g}$
- Bias stability (1s Standard Deviation)(1 $\sigma$ )<20 $\mu\text{g}$
- Bias month repeatability 200 $\mu\text{g}$



## Applications

- Inertial measurement: inertial guidance, overload measurement, combined navigation
- Tilt measurement: antenna attitude, platform measurement, dip test
- Vibration measurement: mechanical equipment, bridge dam, safety test

Accelerometer	-(2-10)	-(30-50)	-(70-100)	-(150-200)	
Range	$\pm 2\text{-}\pm 10$	$\pm 30\text{-}\pm 50$	$\pm 70\text{-}\pm 100$	$\pm 150\text{-}\pm 200$	g
Bandwidth	100	100	100	100	Hz
Bias Stability (Allan Curve)	<5	<10	<20	<30	$\mu\text{g}$
Bias Stability (1s Standard Deviation) (1 $\sigma$ )	<20	<50	<100	<150	$\mu\text{g}$
Bias Month Repeatability	100-300	300-500	1000	1000	$\mu\text{g}$
Bias Temp Coefficient	<10	<50	<100	<200	$\mu\text{g}/^\circ\text{C}$
Bias Temp Hysteresis	<0.5	<1	<3	<5	mg
Factor Scale Non-linearity	<500	<1000(2000@50g)	<1000	<2000(3000@50g)	ppm
Scale Factor Month Repeatability	<300	<300	<300	<300	ppm
Scale Factor Temp Coefficient	10	10	10	10	ppm/ $^\circ\text{C}$
Class II Non-linearity Coefficient	<100	<100	<100	<100	$\mu\text{g}/\text{g}^2$
Scale Factor	4000000-800000	200000-150000	100000-80000	50000-40000	Lsb/g
Resolution	5	10	25	50	$\mu\text{g}$
Start Time	<1	<1	<1	<1	s
Sampling Rate	1500	1500	1500	1500	Hz
Shock(charged)	10000	10000	10000	10000	g
Shock(uncharged)	10000	10000	10000	10000	g
Vibration Rectification Error (6grms)	/	<0.4	<0.15	<0.05	mg/grms
Operation Temp	-40 $^\circ\text{C}$ +80 $^\circ\text{C}$				
Voltage	5 $\pm$ 0.25	5 $\pm$ 0.25	5 $\pm$ 0.25	5 $\pm$ 0.25	V
Current	<15	<15	<15	<15	mA
Interface	SPI	SPI	SPI	SPI	SPI

# MEMS Test and Measurement Sensors

## AC103

### Advantages

- Extra Small Size, LCC20 Packaging
- Low Noise
- Excellent Long-term Stability
- $\pm 5\text{--}\pm 10\ 000\text{g}$  Range
- Large Bandwidth(DC~5000Hz@5%)
- Harsh Environment(Shock, Vibration, Temperature)



### Applications

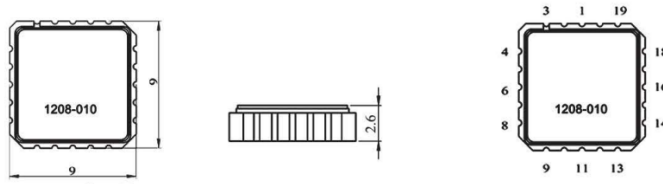
- Aviation & Aerospace
- Civil Engineering Structures
- Helicopter & Aircraft Testing
- Railway Technology
- Automotive Testing & Crash Testing
- Industrial Testing

Accelerometer	-5	-10	-30	-50	-100	-200	-500	-1000	-2000	-10000	
Range	$\pm 5$	$\pm 10$	$\pm 30$	$\pm 50$	$\pm 100$	$\pm 200$	$\pm 500$	$\pm 1000$	$\pm 2000$	$\pm 10000$	g
Bandwidth	0-250	0-1000	0-1500	0-1500	0-3000	0-3000	0-5000	0-5000	0-7000	0-7000	Hz
	( $\pm 5\%$ )	( $\pm 5\%$ )	( $\pm 5\%$ )	( $\pm 5\%$ )	( $\pm 1\text{dB}$ )	( $\pm 1\text{dB}$ )	( $\pm 1\text{dB}$ )	( $\pm 1\text{dB}$ )	( $\pm 3\text{dB}$ )	( $\pm 3\text{dB}$ )	
Resonant Frequency	1.7	2.7	5.5	5.5	9.8	9.8	18.0	25.8	25.8	50.0	kHz
Noise Density	10	10	10	10	10	10	10	10	10	10	pV/v-Hz
Bias	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	$2.5\pm 0.05$	V
One Year Bias Stability Typ. (Max.)	4(<25)	7.5(<25)	22(<75)	37.5(<125)	75(<250)	150(<500)	375(<1250)	750(<500)	1000(000)	7500(<25000)	mg
Switch On/Off Repeatability	<0.4	<0.75	<3.0	<4.0	<10	<15	<30	<75	<100	<500	mg
Bias Temp. Coefficient	<0.75	<0.8	<2.0	<4.0	<10	<20	<30	<75	<100	<500	mg/°C
Sensitivity	400 $\pm$ 5	200 $\pm$ 2	66.6 $\pm$ 1	40 $\pm$ 1	20 $\pm$ 1	10 $\pm$ 1	4 $\pm$ 0.3	2 $\pm$ 0.3	1 $\pm$ 0.2	2 $\pm$ 0.03	mV/g
1 year Scale Factor Stability Typ. (Max.)	300	300	300	300	300	300	1500	3000	4000	5000	PPm
	(1000)	(1000)	(1000)	(1000)	(1000)	(1000)	(5000)	(5000)	(6000)	(8000)	
Sensitivity Temp. Coefficient	200	200	200	200	200	200	200	200	200	200	ppm/°C
Input Axis Misalignment	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mrad (Max)
Cross Axis Sensitivity	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	% (Max)
Resolution/Threshold (@1 Hz)	0.3	0.3	1	2.5	5	10	20	30	60	200	mg
Non-linearity	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<2	<4	% of FS
Operating Temp	-55°C+125°C										
Shock	10, 000g (2ms half-sine, 3 time shocks in each direction)										
Recovery Time	< 1ms (1000g, 1ms half-sine shock)										
Vibration	20g rms, 20-2000Hz (random noise, 30 minutes in each direction)										
Packaging	Hermetic										
ESD Sensitivity	Class 2 (requirements MIL-STD-883-G, 1 Method 3015.7),HBM 2kV										
Supply Voltage	3.0-7.0Vdc.(Typ. 5.0Vdc)										
Output Range	0.5-4.5Vdc@5.0Vdc Supply Voltage(2.5V $\pm$ 1 0mV@0g)										

Supply Current	< 6mA @5.0Vdc
Output Impedance/Load Drive	Max 50pF, Min 10KO
Weight	< 1 grams
Size	9mm x 9mm x 2.6mm

All values are typical at +25°C, +5Vdc unless otherwise statement

## Structure (unit: mm)



# MEMS Inertial Devices and Systems

**AC301**

## Advantages

- Extra Small Size, 3-axis integration
- Low Noise
- Excellent Temperature Performance
- Excellent Long-term Stability
- Seal Design



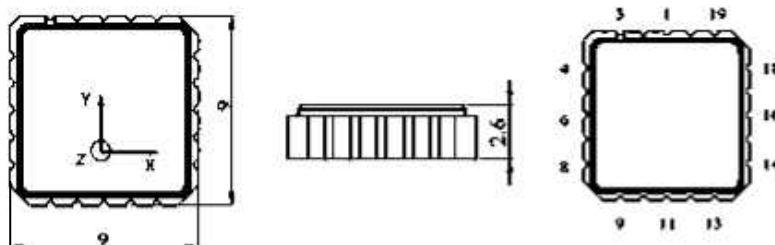
## Applications

- IMU/AHRS for Milaerospace
- Land & Sea Inertial Navigation
- Directional Drilling
- Tilt & Inclination

Accelerometer	-5	-15	-50	-100	-200	
Range	±5	±15	±50	±100	±200	g
Bias	<±20	<±75	<±250	<±500	<±1000	mg
Bias Stability	<1.5	<2	<3	<7	<15	mg
Bias Repeatability	<1.5	<2	<3	<7	<15	mg
Bias Temp. Coefficient	<1	<1.5	<1	<7.0	<15	mg/°C
Scale Factor	400±2	133.3±1	40±1	20±1	10±0.5	mV/g
Scale Factor Stability	700	1000	1500	2000	3500	PPm
Scale Factor Temp. Coefficient	300	500	600	1000	2000	ppm/°C
Sensitive Axis Misalignment	<10	<10	<10	<10	<10	mrad (max)
	<1	<1	<1	<1	<1	% (max)
Resolution	0.3	0.5	2.5	3.0	6.0	mg
Non-linearity	<0.3	<0.3	<0.3	<0.5	<0.7	% of FS
Bandwidth	0-500	0-800	0-1000	0-1000	0-1000	Hz
Operating Temp.	-55°C+125°C					
Shock	Up to 10,000 g (0.15ms half-sine, 3 time shocks in each direction)					
Vibration	20g rms, 20~2000 Hz (random noise, 30 minutes in each direction)					
ESD Sensitivity	Class 2 (requirements MIL-STD-883-G, 1 Method 3015.7) HBM 2kV					
Supply Voltage	5 ± 0.1					
Weight	<1 grams					
Size	9mm x 9mm x 2.7mm					

All values are typical at +25°C, +5 ± 0.1 Vdc unless otherwise statement

## Structure (unit: mm)



# MEMS Inertial Devices and Systems

**AC302**



## Advantages

- Extra Small Size, 3-axis integration
- Low Noise
- Wide Frequency Response, Ultra-low Frequency
- Excellent Temperature Performance
- Excellent Long-term Stability
- Seal Design

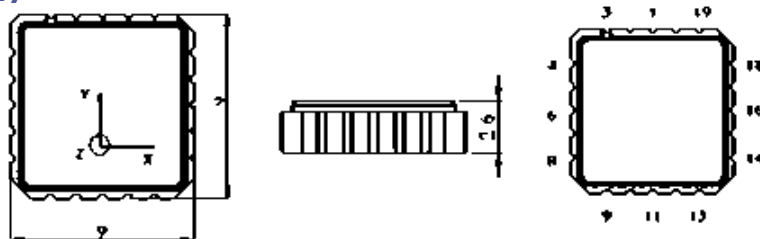
## Applications

- Aviation & Aerospace
- Civil Engineering Structures
- Modal Analysis
- Helicopter & Aircraft Testing
- Railway Technology
- Health Monitoring
- Automotive Testing
- Industrial Testing

Accelerometer	-5	-15	-50	-100	-200	
Range	±5	±15	±50	±100	±200	g
Bandwidth (-3dB)	0-1200	0-2500	0-3000	0-5000	0-5000	Hz
Bandwidth (±5%)	0-550	0-550	0-1500	0-2000	0-2000	Hz
Noise Density	<10	<10	<10	<10	<10	pV/√Hz
Bias	2.5±0.05	2.5±0.05	2.5 ±0.05	2.5±0.05	2.5±0.05	V
Bias Repeatability	<1	<1	<3	<5	<10	mg
Bias Temp. Coefficient	<0.5	<1	<3	<5	<10	mg/°C
Scale Factor	<400±5	<133.33±5	<40±1	<20±1	<10±1	mV/g
Scale Factor Temp. Coefficient	0-300	0-300	0-300	0-300	0-300	ppm/°C
Sensitive Axis Misalignment	<10					mrad (max)
						< 1
Non-linearity	<0.5					% of FS
Operating Temp.	-55°C+125°C					
Recovery Time	< 1ms (1000g, 1ms half-sine shock)					
Shock	Up to 10, 000g (0.15ms half-sine, 3 time shocks in each direction)					
Vibration	20g rms, 20~2000Hz (random noise, 30 minutes in each direction)					
BSD Sensitivity	Class 2 (requirements MIL-STD-833-G, 1 Method 3015.7) HBM 2kV					
Supply Voltage	5 ±0.1					
Weight	<1 grams					
Size	9mm x 9mm x 2.7mm					

All values are typical at +25°C, +5 ± 0.1 Vdc unless otherwise statement

## Structure (unit: mm)





# MEMS Inertial Devices and Systems

**AC303**



## Advantages

- Based on MEMS Process
- $\pm 15 \sim \pm 150g$  Full Scale
- 10,000g Shock Resistance
- LCC20 Package
- Integrated Signal Conditioning
- SPI Output

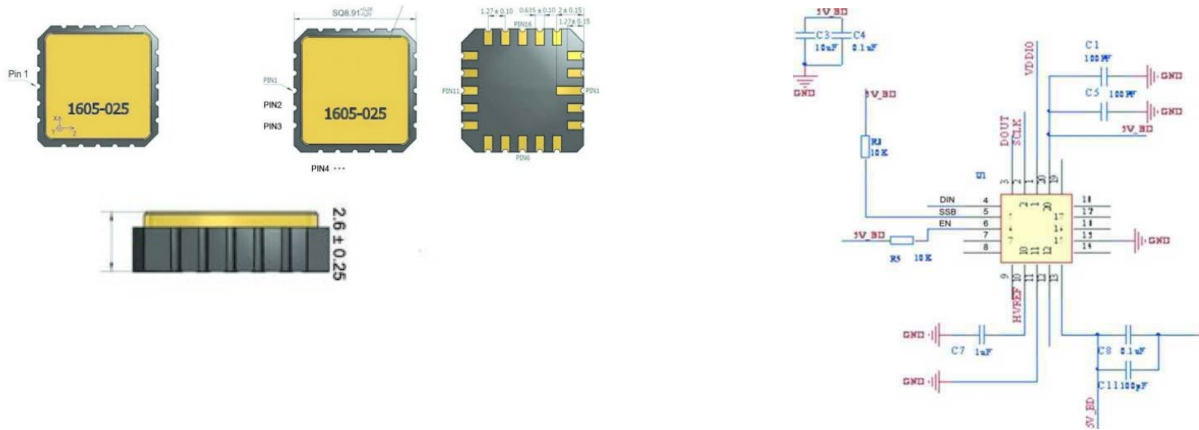
## Applications

- Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization ~ C:4 Short-term
- Navigation: Flight Control , Ballistic Correction, Telemetry T~a~Ta.i.ir
- Posture Control: UAV(Unmanned Aerial Vehicle), Antenna Orientation, North Finde1\_t---J
- Automotive: ESP, Balance Measurement

Accelerometer	-15	-50	-100	-150	
Full Scale	$\pm 15$	$\pm 50$	$\pm 100$	$\pm 150$	g
Bias	$\pm 15$	$\pm 50$	$\pm 50$	$\pm 50$	mg
Bias Stability	<0.3	<0.5	<1	<1.5	mg
Bias Repeatability	<0.3	<0.5	<1	<1.5	mg
Bias Temp. Coefficient	<0.5	<0.5	<1	<1.5	mg/°C
Scale Factor Stability	<300	<300	<600	<600	PPm
Scale Factor Repeatability	<300	<300	<600	<600	PPm
Scale Factor Temp.Coefficient	<100	<300	<600	<600	ppm/°C
Resolution	0.5	0.8	1	1.5	mg
Bandwidth	0-500	0-500	0-500	0-500	Hz
Input axis Mis-alignment	<10	<10	<10	<10	mrad
	<1	<1	<1	<1	%
Non Linearity	$\leq \pm 0.3$	$\leq \pm 0.3$	$\leq \pm 0.3$	$\leq \pm 0.3$	%FS(max)
Resonant Frequency	X,Y: 4.8 Z:3.5	X,Y: 8.1Z:6.2	X,Y: 13.9 Z: 10	X,Y: 13.9 Z: 10	kHz
Start Up Time	1	1	1	1	s
Power Consumption		125			mW
Size	9mm x 9mm x 2.6 $\pm$ 0,25mm				
Package	Ceramic LCC20				
Interface	SPI				
Operating Temp.	-40°C+85°C				
Storaging Temp.	-55°C+125°C				
Shock	Up to 10,000g (0.15ms half-since, 3 time shocks in each direction)				
Vibration	20g rms, 20-2000 Hz(random noise, 30 minutes in each direction)				
ESD Sensitivity	Class 2 (requirements MIL-STD-833-G, 1 Method 3015.7) HBM 2kV				

All values are typical at +25°C, +5Vdc unless otherwise stated

## Structure (unit: mm)

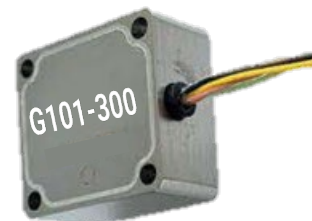


# MEMS Inertial Devices and Systems

**G101-300**

## Advantages

- Based on MEMS Process
- 2000g Shock Resistance
- SPI Interface
- Angular Rate & Temp. Output
- Integrate Signal Conditioning
- Self Test



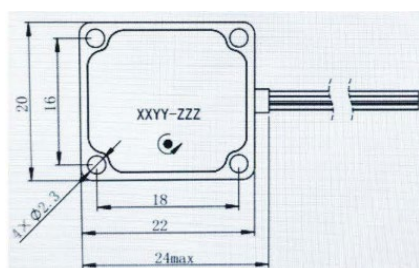
## Applications

- Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization
- Short-term Navigation: Flight Control, Ballistic Correction, Telemetry
- Posture Control: UAV(Unmanned Aerial vehicle), Antenna Orientation, North Finder
- Automotive: Balance Measurement

Gyroscope		
Range	±300	°/s
Scale Factor	10 000±500	LSB/(°/s)
Scale Factor Nonlinearity	<0.1	%FS
Bias	-0.5-0.5	°/s
Short-term Bias Stability (1σ)	10	°/h
Threshold	0.005	°/s
Resolution	0.005	°/s
Random Walk	<0.2	°/√h
Start up time	1	s
Shock Resistance	2000	g
Bandwidth	120	Hz
Power Consumption	<150	mW
Interface	SPI	
Packaging	Stainless Steel	
Operating Temp	-40°C+85°C	
Storing Temp	-55°C+100°C	

All values are typical at +25°C, +5Vdc unless otherwise statement

## Structure (unit: mm)



Red	VCC	Power
Black	GND	GND
Yellow	MISO	Master InpuV Slave Output
Green	MOSI	Master OutpuV Slave Input
Brown	SCLK	Clock
White	SSB	Chip Select

# MEMS Inertial Devices and Systems

**G301**

## Advantages

- Based on MEMS process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low power, Small Size
- High Tolerance

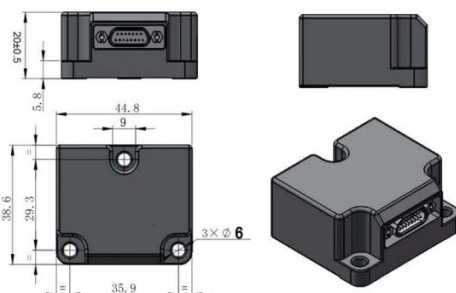


## Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±450	°/s
Bias in Full temperature	<100	°/h
Bias Stability	<8	°/h
Bias Repeatability(1 σ)	<5	°/h
Scale Factor Non-linearity	<20	ppm
Data Rate	1000	Hz
Sensitive Axis Misalignment	10	'
Threshold/Resolution	0.005	°/s
-3 dB Bandwidth	150 (10-250 Adjustable)	Hz
G-Sensitivity	0.005	°/s/g
Weight	80	g
Size	44.8mm x 38.6mm x 20 ± 0.5mm	mm
Supply Voltage	5±0.3	V
Power Consumption	<1.5	W
Interface / Connector	RS422/J30J-15ZKP	
Shock Resistance	>2000	g
Vibration Level	>20	g rms
Operating Temp	-45°C+85°C	
Storing Temp	-55°C+105°C	

## Structure (unit: mm)



ID	Definition	Note
1	Tx-	GND
2	Rx-	RS422 Transmit Negative
3~5	NC	RS422 Receive Negative
6~7	Reserved	Blank
8	VCC(+5V)	Reserved
9	Tx+	Power
10	Rx+	RS422 Transmit Positive
11	NC	RS422 Receive Positive
12~13	GND	Power Ground
14	NC	Blank
15	GND	RS422 Ground

# MEMS Inertial Devices and Systems

**G302**

## Advantages

- Based on MEMS process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low power, Small Size
- High Tolerance

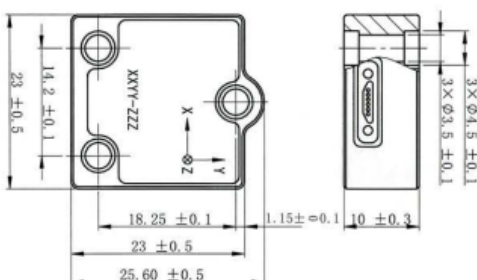


## Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±450 (Extendable to ±3600)	°/s
Bias in Full temperature	< 100	°/h
Bias Stability	<10	°/h
Bias Repeatability (1 $\sigma$ )	<10	°/h
Scale Factor Non-linearity	<50	ppm
Sensitive Axis Misalignment	<10	'
Threshold/Resolution	0.005	°/s
G-Sensitivity	0.01	°/s/g
-3 dB Bandwidth	150 (10~250 Adjustable)	Hz
Refresh Rate	1000	Hz
Weight	≤30	g
Size	23mm x 25.6mm x 10mm	mm
Supply Voltage	5±0.3	V
Interface	RS422	
Connector	JMC-1284Z2-JH	
Vibration Level	>20	g rms
Shock Resistance	>2000	g
Operating Temp	-45°C+85°C	
Storing Temp	-55°C+105°C	

## Structure (unit: mm)



ID	Definition	Note
1	VCC(+5V)	Power Positive
2	GND	Power Ground
3	Rx+	RS422 Receive Positive
4	Rx-	RS422 Receive Negative
5	Tx-	RS422 Transmit Negative
6	Tx+	RS422 Transmit Positive

# MEMS Inertial Devices and Systems

**G303**

## Advantages

- Based on MEMS Process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low Power, Extra-small Size
- Robust for Vibration & Shock



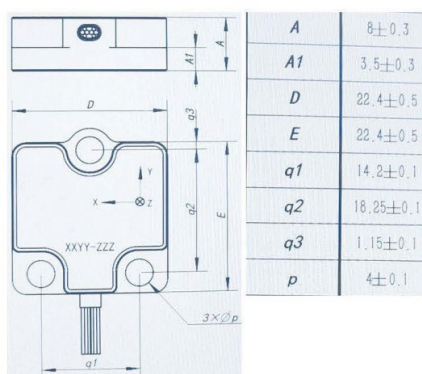
## Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±450	°/s
Bias (Full Temp. )	<150	°/h
Bias Stability(1σ, 10s on average)	<20	°/h
Bias Repeatability	<15	°/h
Nonlinearity	<50	ppm
Misalignment Error Axis to Axis, 1a	15	'
Linear Acceleration Effect Any direction, 1σ	0.01	°/s/g
-3 dB Bandwidth	150 (10-250 Adjustable)	Hz
Output Data Rate	1000 Hz	Hz
Weight	≤30 g	g
Size	22.4mm x 22.4mm x 8mm	mm
Supply Voltage	5±0.3 V	V
Power Consumption	0.5 W	W
Shock Resistance	>2000 g	g
Vibration Level	>20 g rms	g rms
Operating Temp	-45°C+85°C	
Storing Temp	-55°C+105°C	

All values are typical at +23°C±2°C, -40°C,+85°C measured, unless otherwise statement

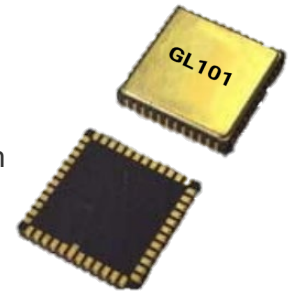
## Structure (unit: mm)



Color	Definition	Note
Red	VCC(+5V)	Power
Black	VGND	Power Ground
White	Rx+	Receive Positive
Brown	Rx-	Receive Negative
Green	Tx-	Transmit Negative
Yellow	Tx+	Transmit Positive

# High Performance North Seeking MEMS Gyroscope

**GL101**



## Advantages

- 0.01-0.02°/hr bias instability
- 0.0025-0.005°/√hr angular random walk
- Size: 11mm x 11mm x 2mm

## Applications

- North seeking in logging tools/gyro tools
- Pointing, steering and guiding in advanced mining/drilling equipment
- Initial alignment in weapon/UAV launch systems
- Direction pointing and tracking in satellite antenna, target tracking system
- Guidance and navigation in navigation grade MEMS weapon system
- Orientating and positioning in railway train system
- Precision platform attitude measuring and controls
- Precision attitude, position measuring in navigation grade MEMS IMU/INS
- North finding and positioning in land surveying/land mobile mapping system
- Petroleum exploration
- Bridge, tall building, tower, dam monitoring
- Rock and soil monitoring
- Mining

Gyroscope	GL101-50	GL101-100	
Range	50	100	deg/s
Resolution	24	24	bits
Data rate	2k	2k	Hz
Group delay	50	20	ms
Bandwidth (-3dB)	12	12	Hz
Scale factor at 25°C	160000	80000	lsb/deg/s
Scale factor repeatability (1σ)	<50	<50	ppm
Scale factor vs temperature (1σ)	300	300	ppm
Scale factor non-linearity (1σ)	<200	<200	ppm
Bias instability	<0.01	<0.02	deg/hr
Bias stability (1σ 10s)	<0.05	<0.1	deg/hr
Bias stability (1σ 1s)	<0.15	<0.3	deg/hr
Bias repeatability (1σ)	<0.1	<0.1	deg/hr
Angular random walk	<0.0025	<0.005	°/√h
Bias error over temperature (1σ)	3	3	deg/hr
Bias temperature variations, calibrated (1σ)	<0.1	<0.3	deg/hr
Noise peak to peak	±0.002	±0.003	deg/s
G-sensitivity	<0.5	<1	°/hr/g
Vibration rectification error	<0.5	<1	°/hr/g (rms)
Startup time	1	1	s
Sensor resonant frequency	11~13		K

Shock (charged)	1000g, 1ms, half sine wave
Shock (uncharged)	10000g, 1.0ms, half sine wave
Vibration (operating)	12grms, 20Hz to 2KHz random vibration
Operating temperature	-40°C+85°C
Max storage (survival) temperature	-55°C+125°C
Supply voltage	5±0.25V
Current consumption	40mA



# High Precision Navigation MEMS Gyroscope

## GL102



### Advantages

- Up to  $\pm 400^\circ/\text{s}$  measurement range
- 0.01-0.025 $^\circ/\sqrt{\text{hr}}$  angular random walk
- 0.03-0.05 $^\circ/\text{hr}$  bias instability

### Applications

- Precision attitude & azimuth keeping, positioning, navigation in navigation grade IMU/INS/AHRS
- Heading, navigation, positioning in high performance GNSS-aided INS
- Orientation, navigation, positioning in aerial/marine/land mapping/survey system
- Attitude and motion control in medium and large UAV, AUV
- Pointing and tracking in satellite antenna, target tracking system
- Guidance and navigation in medium-low navigation grade MEMS weapon system
- Azimuth, position, heaving/swaying/surging of gyrocompass in surface and submarine carriers, AUV
- Antenna and line of Sight Stabilization Systems
- Integrated Navigation Systems & Inertial Guidance System
- Flight Control & Guidance System
- Attitude Heading Reference Systems (AHRS)
- Stabilization of antennas, cameras & platforms
- Aerial and marine geo-mapping / surveying

Gyroscope	GL102-300	GL102-400	
Range	300	400	deg/s
Resolution	24	24	Bits
Data rate	12K	12K	Hz
Group delay	<5	<3	Ms
Bandwidth (-3dB)	50	100	Hz
Scale factor at 25°C	28000	20000	lsb/deg/s
Scale factor repeatability (1 $\sigma$ )	<50	<20	Ppm
Scale factor vs temperature (1 $\sigma$ )	300	100	Ppm
Scale factor non-linearity (1 $\sigma$ )	<300	100	Ppm
Bias instability	0.03	0.05	deg/hr
Bias stability (1 $\sigma$ 10s)	0.15	<0.5	deg/hr
Bias stability (1 $\sigma$ 1s)	0.5	<1.5	deg/hr
Angular random walk	<0.01	<0.025	$^\circ/\sqrt{\text{h}}$
Bias error over temperature (1 $\sigma$ )	10	3	deg/hr
Bias temperature variations, calibrated (1 $\sigma$ )	<1	<0.5	deg/hr
Bias repeatability (1 $\sigma$ )	<0.3	<0.3	deg/hr
Noise peak to peak	$\pm 0.01$	$\pm 0.05$	deg/s
G-sensitivity	<1	<1	$^\circ/\text{hr/g}$
Vibration rectification error	<1	<1	$^\circ/\text{hr/g}$ (rms)
Startup time	1		1
Sensor resonant frequency	11K~13K		

Shock (charged)	1000g,1 ms, half sine wave
Shock (uncharged)	10000g,1.0ms, half sine wave
Vibration (operating)	12grms, 20Hz to 2KHz random vibration
Operating temperature	-40°C+85°C
Max storage (survival) temperature	-55°C+125°C
Supply voltage	5±0.25V
Current consumption	40mA

# High-temperature North Seeking MEMS Gyro For Gyro Tools(125°C)

**GL103**

## Advantages

- <0.02°/hr bias instability
- <0.025°/√h angular random walk
- <0.1°/hr bias stability



## Applications

- North seeking in logging tools/gyro tools
- Pointing, steering and guiding in advanced mining/drilling equipment
- Precision attitude, position measuring in navigation grade MEMS IMU/ INS
- Petroleum exploration

Gyroscope		
High Temperature MEMS Gyro Range	100	deg/s
Bandwidth (BW@3DB Customizable)	12.5	Hz
Output Accuracy (Digital SPI)	24	Bits
Data Output Rate (ODR)(Customizable)	2K	Hz
Delay (Customizable)	<3	Ms
Bias Stability (Allan Curve @Room Temp)	<0.02	deg/hr (1σ)
Bias Stability (10s standard deviation @Room Temp)	<0.1	deg/hr (1σ)
Bias Stability (1s standard deviation @Room Temp)	<0.3	deg/hr (1σ)
Bias Drift	<0.25	deg/hr/°C
Bias Drift (After Temp Compensation)	<0.05	deg/hr/°C
Bias Repeatability (Room Temp)	0.1	deg/hr (1σ)
Scale Factor Repeatability (Room Temp)	<100	ppm (1σ)
Scale Factor Temp Drift (1 sigma)	±500	ppm (1σ)
Scale Factor Nonlinearity (Full Temp)	<300	Ppm
Random Walk (ARW)	<0.025	°/√h
Resolution	0.05	°/hr
Bandwidth Noise (Peak to Peak)	±0.1	deg/s
G-value Sensitivity	<1	°/hr/g
Vibration Rectification Error (12gRMS, 20-2000)	<1	°/hr/g (rms)
Power-on Time (Valid Data)	1	S
Shock (charged)	200g (1ms, 1/2 sine)	
Shock Resistance (uncharged)	1.8wg 3ms	
Vibration (charged)	12g rms (20Hz to 2kHz)	
Operation Temp	-40°C+125°C	
Storage Temp	-55°C+125°C	
Size	11mm x 11mm x 2mm	
Package	LCC	

# Economical MEMS Gyroscope

**GL104**

## Advantages

- 1°/hr bias instability
- 0.25°/√hr angular random walk
- 5°/hr bias stability



## Applications

- Azimuth, attitude, position measuring and keeping in GNSS-assisted INS
- Heading, pitch, roll measuring in AHRS for UAV
- Motion survey and keeping in MRU
- Attitude & azimuth keeping, positioning in IMU
- Guidance, navigation, control in tactical MEMS weapon system
- Stabilizing & Pointing in satellite antenna, target tracking system
- Robotic Control & Orientation in
- Autonomous machines, Unmanned vehicles

Gyroscope		
Input range	400	dps
Bandwidth	200	Hz
Data output rate	2K	Hz
Latency	2	ms
Scale factor	20000	LSB/°/s
Scale factor non-linearity	200	ppm
Scale factor temp drift (1σ)	500	ppm
Scale factor repeatability (1σ)	<10	ppm
Bias temp drift (16)	50	dph
Bias temp drift (16) (After temp compensation)	20	dph
Bias instability	1	dph
Bias stability (16 10s)	5	dph
Bias stability (16 1s)	15	dph
Run to run repeatability	5	dph
RMS noise (1-200Hz)	0.1	dps
Random walk (ARW)	0.25	°/√h
Start up time	0.8	s
G-sensitivity	5	dph/g
VRC	0.5	°/h/g²rms
Shock	12g	rms
Vibration	1000g 5ms 1/2 sine	/
Operation temperature	-40°C+85°C	

# MEMS Inertial Devices and Systems

## GL301

### Advantages

- Single chip 3-axis integration
- $\pm 300 \sim \pm 3600$  Full Scale
- High reliability
- LCC16 Package
- Small profile
- Full Temperature Compensated



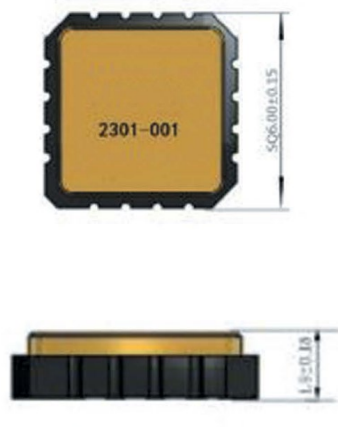
### Applications

- Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization
- Short-term Navigation: Flight Control, Ballistic Correction, Telemetry
- Posture Control: UAV(Unmanned Aerial Vehicle), Antenna Orientation, North Finder
- Automotive: ESP, Balance Measurement

Gyroscope		
Full Scale	$\pm 300$ ( $\pm 300 \sim \pm 3600$ adjustable)	$^{\circ}/s$
Scale Factor Nonlinearity	<0.01	%FS
Scale Factor Repeatability	<100	ppm
Scale Factor Temp.Coefficient	<40	ppm/ $^{\circ}C$
Bias Stability	<20	$^{\circ}/h$
Bias Repeatability	<20	$^{\circ}/h$
Bias Instability	<10	$^{\circ}/h$
Random Angular Walk	<0.6	$^{\circ}/\text{root}(h)$
Resolution	<0.015	$^{\circ}/s$
Bias Temp. Coefficient	0.002	$^{\circ}/s/^{\circ}C$
Start Up Time	<1	s
Bandwidth	150	Hz
Power Voltage	3.3	
Operating Voltage	<5	mA
Shock Resistance	6000	G
Operating Temp.	$-40^{\circ}C+85^{\circ}C$	
Storaging Temp.	$-55^{\circ}C+105^{\circ}C$	
Interface	SPI	
Package	Ceramic LCC16	
Size	6mm x 6mm x 1.9 $\pm$ 0.18mm	

All values are typical at +25°C, +5Vdc unless otherwise statement. The product may be changed at any time without prior notice

## Structure (unit: mm)



Pin No.	Name	Description
1	GND	Ground
2	VDD_OTP	OTP Supply, Connect to Pin 16
3	VDD	Chip Digital Supply
4	NC	No Connection
5	MOSI	SPI MOSI
6	MISO	SPI MISO
7	SCLK	SPI Clock
8	SSB	SPI Slave Select
9	VDDIO	Chip Digital I/O Supply (3.3V)
10	DGND	Chip Digital Ground
11	NC	No Connection
12	NC	No Connection
13	NC	No Connection
14	VDD	Chip Digital Supply
15	DIG 1P8	Internal Digital Module Supply, Connect to Pin 16
16	ANA 1P8	1.8V Output

# MEMS Inertial Devices and Systems

## MINS101

### Advantages

- Based on MEMS Process
- Compensated for over temperature
- Fully calibrated for parameters of each axis of sensor
- High accuracy gyros 10°/h
- Low power, small size
- Robust for vibration & shock

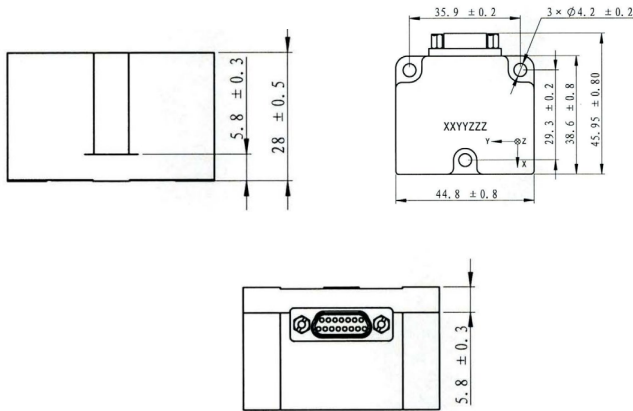


### Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Flight Control & Guidance Systems
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range: X,Y,Z	±450	°/s
Angular Random Walk	<0.2	°/√h
Bias Stability (1s smoothing)	<15	°/h
Bias Repeatability	<15	°/h
Scale Factor Non-linearity	<50	ppm
Accelerometer		
Range: X,Y,Z	±10	g
Bias	<5	mg
Bias Stability (1 σ)	< 0.2	mg
Bias Repeatability	< 0.2	mg
Scale Factor Non-linearity(in ± 1g)	<150	ppm
System		
Accuracy	<0.2	
Range: Roll, Pitch	-180° ~ + 180 °, -75 ° ~ + 75 °	
Dynamic Accuracy	<0.3°; <0.08 "(Static Accuracy)	
Range: X,Y,Z	±450°/s	
Input Voltage	5±0.2V	
Power consumption	<2W	
Interface	RS422	
Data Rate	200 Hz (Extendable to 500 Hz)	
Baud Rate	115200 Default Value	
Size	44.8±0.8mm x 45.95±0.8mm x 28±0.5mm	
Weight	<75 g	
Operating Temp	-45°C+ 85°C	
Storing Temp	-50°C + 85 °C	

## Structure (unit: mm)



1	+5V	Power
2	GND	Power ground
3	RS422 TX P	RS422 Transmit Positive
4	RS422 TX N	RS422 Transmit Neaative
5	RS422 RX P	RS422 Receive Positive
6	RS422 RX N	RS422 Receive Neqative
7	AUX RS232 TXA	Extened serial port output A
8	AUX RS232 RXA	Extened serial port input A
9	SGND	Signal ground
10-15	N/A	Reserved



# MEMS Inertial Devices and Systems

## MINS102

### Advantages

- Based on MEMS Process
- Compensated for over temperature
- Fully calibrated for parameters of each axis of sensor
- High accuracy gyros 5°/h (Allan variance)
- Low power, small size
- Robust for vibration & shock



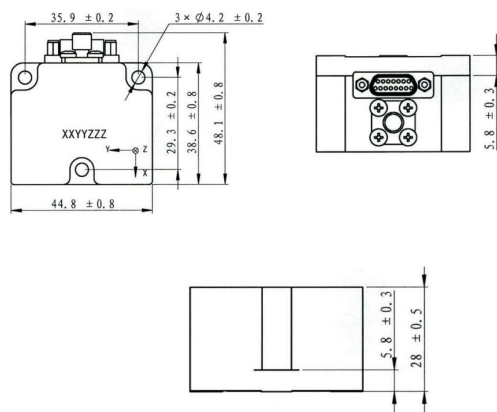
### Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Flight Control & Guidance Systems
- Stabilization of Antennas, Cameras & Platforms

GPS Outage		
Position Drift (1 min)	<3 (with odometer)	m
Heading Drift (1 min)	<0.2	<0.2°
Gyroscope		
Range: X,Y,Z	±450	°/s
Angular Random Walk	<0.2	°/√h
Bias Stability (1s smoothing)	<15	°/h
Scale Factor Non-linearity	<50	ppm
Sensitive Axis Misalignment	10	'
Accelerometer		
Range: X,Y,Z	±10	g
Bias	<5	mg
Bias Stability (1σ)	<0.2	mg
Bias Repeatability	<0.2	mg
Scale Factor Non-linearity (in ±1g)	<150	ppm
Sensitive Axis Misalignment	10	'
GNSS Receiver		
Horizontal Position Accuracy	<1.5	m
Vertical Position Accuracy	<2	m
Velocity (1σ)	<0.05	m/s
Heading (1σ)	<0.3	°
Frequency	GPS LI, GLONASS LI, Beidou LI	
System		
Range: Roll, Pitch	-180° ~ + 180 °, -75 ° ~ + 75 °	
Dynamic Accuracy	<0.2°	
Input Voltage	5±0.2 V	
Power consumption	<2 W	

Interface	RS422
Baud Rate	115200 default value
Size	44.8±0.8mm x 48.1±0.8mm x 28±0.5mm
Operating Temperature	-45°C+85°C
Storing Temperature	-50°C+85°C

## Structure (unit: mm)



1	+5V	Power
2	GND	Power ground
3	RS422 TX P	RS422 Transmit Positive
4	RS422 TX N	RS422 Transmit Negative
5	RS422 RX P	RS422 Receive Positive
6	RS422 RX N	RS422 Receive Negative
7	AUX RS232 TX	A Extended serial port output A
8	AUX RS232 R>	A Extended serial port input A
9	SGND	Signal ground
10-15N/A		Reserved

### Advantages

- Equipped with MEMS gyroscope and accelerometer and mapping multi-mode multi-frequency GNSS receiver
- It can achieve a single antenna dynamic alignment or dual antenna-assisted fast high-precision orientation
- The directional accuracy can reach up to 0.1 deg



### Applications

	UAV	High dynamic measurement range
Space fields	Aerial surveying	Small dimension, light weight
	Aircraft black box	Supports real-time RTK mobile stations
		Hold IE data post-processing
	INS/GNSS combination design	
Land-based domain	Street view cart	Dual antenna assisted rapid orientation 0.1°
	Electric inspection	Multiple interface outputs
	Unmanned car	Support NMEA standard protocol
		IP67 degree of protection

System real-time accuracy	
Heading	0.1° (dual antenna mode, baseline length >2m) 0.5° (single antenna mode)
Attitude	0.5° (1σ)
Position	single point positioning <2m (CEP) RTK 50px+1 ppm (CEP)
Speed accuracy	0.1 m/s
Data update rate	200Hz (configurable)
Start time	<10s
Alignment time	1 ~2min (depending on the form of dynamic maneuver) dual antenna assisted directional time <1 min
Reprocessing accuracy	
Heading	0.25° (1 σ)
Attitude	0.15° (1 σ)
Position accuracy	lockout time: 0 s accuracy: 0.02 m
Position accuracy	lockout time: 10 s accuracy: 0.2 m
Position accuracy	lockout time: 60 s accuracy: 10 m
Key components parameters	
Gyroscope	range: ±450° /s zero partial stability: <20° /h
Accelerometer	range: ±5g zero partial stability: <1 mg
User model	
Car model (the default model)	airborne models ship model
Data Interface	
Interface mode	1 path RS232; 1 path RS422; 1 path differential signal. 2 path single-ended; support PPS; EVENTMARK input/output.
Baud rate	9600-115200 bps (configurable)
System	
Supply voltage	24VDC rated (10-32VDC), power consumption <7W
Operating temperature	-40°C+80°C
Waterproof level	IP65
Size	102mm x 56mm x 38mm
Weight	<250g

# MEMS Inertial Devices and Systems

## MIMU301\*



### Advantages

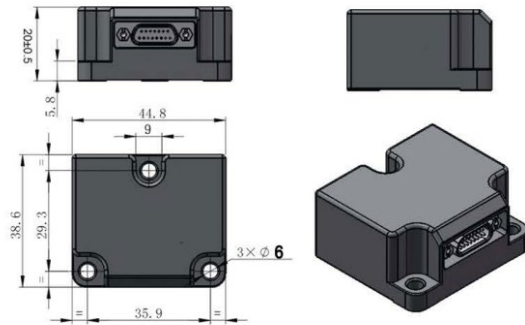
- Based on MEMS process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low power, Small Size
- High Tolerance

### Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±450	°/s
Bias in Full temperature	<100	°/h
Bias Stability	<8	°/h
Bias Repeatability (1σ)	<5	°/h
Scale Factor Non-linearity	<20	ppm
Sensitive Axis Misalignment	10	'
Threshold/Resolution	0.005	°/s
-3 dB Bandwidth	150 (10-250 Adjustable)	Hz
G-Sensitivity	0.005	°/s/g
Accelerometer		
Range	±15	g
Bias in Full temperature	<2	mg
Bias Stability(1 σ, 10son average)	< 0.2	mg
Bias Repeatability	< 0.2	mg
Scale Factor Non-linearity(±1g)	<100	ppm
Threshold/Resolution	1	mg
Sensitive Axis Misalignment	10	'
-3 dB Bandwidth	150 (10-250 Adjustable)	Hz
System		
Data Rate	1000 Hz	
Weight	≤80 g	
Size	44.8mm x 38.6mm x 20±0.5mm	
Supply Voltage	5±0.3 V	
Power Consumption	<1.5 W	
Interface / Connector	RS422/J30J-15ZKP	
Shock Resistance	>2000 g	
Vibration Level	>20 g rms	
Operating Temp	-45°C+85°C	
Storing Temp	-55°C+105°C	

## Structure (unit: mm)



ID	Definition	Note
1	Tx-	GND
2	Rx-	RS422 Transmit Negative
3~5	NC	RS422 Receive Negative
6~7	Reserved	Blank
8	VCC(+5V)	Reserved
9	Tx+	Power
10	Rx+	RS422 Transmit Positive
11	NC	RS422 Receive Positive
12~13	GND	Power Ground
14	NC	Blank
15	GND	RS422 Ground

# MEMS Inertial Devices and Systems

**MIMU302\***

## Advantages

- Based on MEMS process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low power, Small Size
- High Tolerance

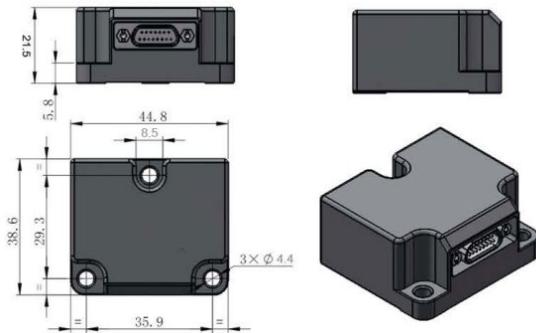


## Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±450 (can be extended to ±4000)	°/s
Bias in Full temperature(1σ,10s on average)	<100	°/h
Bias Stability(Full Temp., 1σ,10s on average)	<10	°/h
Bias Repeatability(Full Temp., 1σ)	<10	°/h
Scale Factor Non-linearity	<50	ppm
Sensitive Axis Misalignment	10	'
Threshold/Resolution	0.005	°/s
-3 dB Bandwidth	150 (10-250 Adjustable)	Hz
G-Sensitivity	0.005	°/s/g
Accelerometer		
Range	±50 (Extendable to 150)	g
Bias in Full temperature	<10	mg
Bias Stability(Full Temp., 1σ, 10s on average)	< 1	mg
Bias Repeatability(Full Temp.,1 σ)	< 1	mg
Scale Factor Non-linearity(±1g)	< 3000	ppm
Threshold/Resolution	1	mg
Sensitive Axis Misalignment	10	'
-3 dB Bandwidth	150 (10-250 Adjustable)	Hz
System		
Data Rate	1000 Hz	
Weight	≤80 g	
Size	44.8mm x 38.6mm x 21.5 ± 0.5mm	
Supply Voltage	5±0.3 V	
Power Consumption	<1.5 W	
Interface / Connector	RS422/J30J-15ZKP	
Shock Resistance	>2000 g	
Vibration Level	>20 g rms	
Operating Temp	-45°C+85°C	
Storing Temp	-55°C+105°C	

## Structure (unit: mm)



ID	Definition	Note
1	Tx-	GND
2	Rx-	RS422 Transmit Negative
3~5	NC	RS422 Receive Negative
6~7	Reserved	Blank
8	VCC(+5V)	Reserved
9	Tx+	Power
10	Rx+	RS422 Transmit Positive
11	NC	RS422 Receive Positive
12~13	GND	Power Ground
14	NC	Blank
15	GND	RS422 Ground

Definition

# MEMS Inertial Devices and Systems

## MIMU303



### Advantages

- Based on MEMS process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low power, Small Size
- High Tolerance

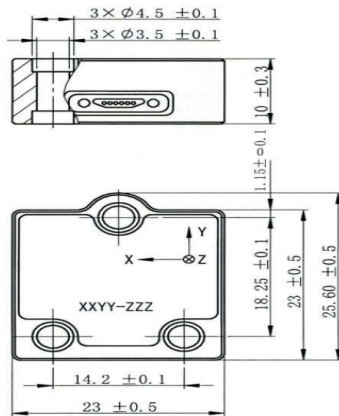
### Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±450	°/s
Bias in Full temperature	< 100	°/h
Bias Stability	<10	°/h
Bias Repeatability(1σ)	<10	°/h
Scale Factor Non-linearity	<50	ppm
Sensitive Axis Misalignment	<10	'
Threshold/Resolution	0.005	°/s
G-Sensitivity	0.01	°/s/g
-3 dB Bandwidth	150 (10~250 Adjustable)	Hz
Accelerometer		
Range	±15	g
Bias in Full temperature	<2	mg
Bias Stability (1σ, 10s on average)	<0.2	mg
Bias Repeatability (1σ)	<0.2	mg
Scale Factor Non-linearity(<1g)	<200	ppm
Threshold/Resolution	<0.1	mg
Sensitive Axis Misalignment	10	'
-3 dB Bandwidth	150 (Extendable, 10~250)	Hz
System		
Refresh Rate	1000 Hz	
Weight	≤30 g	
Size	23± 0.5mm x 25.6± 0.5mm x 10mm	
Supply Voltage	5±0.3 V	
Interface	RS422	
Connector	JMC-1284Z2-JH	
Vibration Level	>20 g rms	
Shock Resistance	>2000 g	
Operating Temp	-45°C+85°C	
Storing Temp	-55°C+105°C	



## Structure (unit: mm)



ID	Definition	Note
1	VCC(+5V)	Power Positive
2	GND	Power Ground
3	Rx+	RS422 Receive Positive
4	Rx-	RS422 Receive Negative
5	Tx-	RS422 Transmit Negative
6	Tx+	RS422 Transmit Positive

# MEMS Inertial Devices and Systems

## MIMU304

### Advantages

- Based on MEMS Process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low Power, Extra-small Size
- Robust for Vibration & Shock



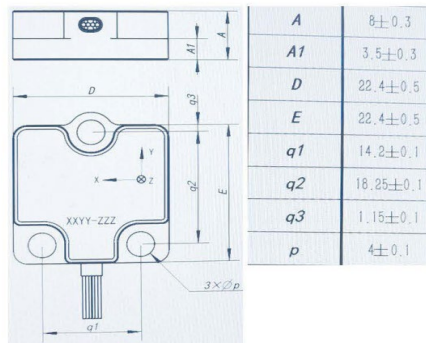
### Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±450 (can be extended to ±3600)	°/s
Bias (Full Temp.)	<150	°/h
Bias Stability (1σ, 10s on average)	<20	°/h
Bias Repeatability	<15	°/h
Nonlinearity	<50	ppm
Sensitive Axis Misalignment	10	'
Linear Acceleration Effect Any direction, 1 σ	0.005	°/s/g
Accelerometer		
Dynamic Range	±10	g
Bias (Full Temp.)	<5	mg
Bias Stability (1σ, 10s on average)	<0.3	mg
Bias Repeatability	<0.3	mg
Nonlinearity	<200	ppm
System		
-3 dB Bandwidth	150 Hz	
Output Data Rate	1000 Hz	
Weight	≤30 g	
Size	22.4mm x 22.4mm x 8mm	
Supply Voltage	5±0.3 V	
Power Consumption	0.5 W	
Shock Resistance	>2000 g	
Vibration Level	>20 g rms	
Operating Temp	-45°C+85°C	
Storing Temp	-55°C+105°C	

All values are typical at +23°C ± 2° C, -40°C ,+85°C measured unless otherwise statement

## Structure (unit: mm)



Color	Definition	Note
Red	VCC(+5V)	Power
Black	VGND	Power Ground
White	Rx+	Receive Positive
Brown	Rx-	Receive Negative
Green	Tx-	Transmit Negative
Yellow	Tx+	Transmit Positive

# MEMS Inertial Devices and Systems

## MIMU305



### Advantages

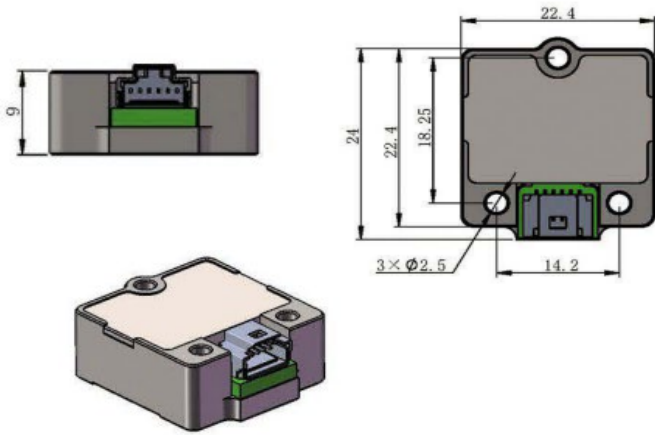
- Based on MEMS process
- Digital Gyros & Accelerometers
- High Speed Processor Embedded
- Compensation & Calibration
- Low power, Small Size
- High Tolerance

### Applications

- Integrated Navigation Systems & Inertial Guidance Systems
- Flight Control & Guidance Systems
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms

Gyroscope		
Range	±250	°/s
Bias in Full temperature (1σ,10s on average)	<0.1	°/s
Bias Stability (1σ,10s on average)	<15	°/h
Bias Repeatability(1σ)	<15	°/h
Angular Random Walk	<0.3	°/√Hr
Scale Factor Non-linearity	<100	ppm
Installation Error	<0.7	°
Bandwidth	>100	Hz
Accelerometer		
Range	±4	g
Bias in Full temperature (1 σ, 10s on average)	<2.5	mg
Bias Stability(1σ, 10s on average)	<0.3	mg
Bias Repeatability (1 σ)	<0.3	mg
Scale Factor Non-linearity(±1g)	<300	ppm
Installation Error	<0.7	°
Bandwidth	>100	Hz
System		
Refresh Rate	200 Hz	
Weight	<25 g	
Size	24mm x 22.4mm x 9mm	
Supply Voltage	5±0.3 V	
Power Consumption	<0.25 W	
Interface	UART	
Connector	Molex	
Operating Temp	-40°C+85°C	
Storing Temp	-40°C+95°C	

## Structure (unit: mm)



Symbol	Note
VCC(+5V)	Power Positive
GND	Power Ground
TXD	Transmit
RXD	Receive

# MEMS Inertial Devices and Systems

## MIMU306

### Advantages

- Single chip 3-axis integration
- $\pm 500$  Full Scale
- High reliability
- SPI Output
- Small profile
- Full Temperature Compensated



### Applications

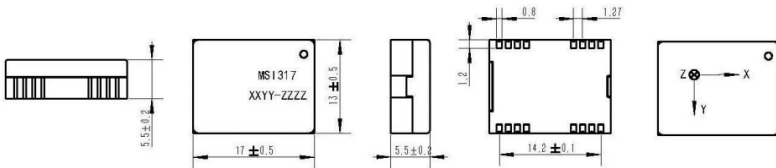
- Inertial Navigation: Inertial Guidance, Integrated Navigation, Platform Stabilization Short-term
- Navigation: Flight Control , Ballistic Correction, Telemetry
- Posture Control: UAV(Unmanned Aerial Vehicle), Antenna Orientation, North Finder
- Automotive: ESP, Balance Measurement

Gyroscope		
Full Scale	$\pm 500$	$^{\circ}/s$
Bias	0.05	$^{\circ}/s$
Scale Factor Nonlinearity	< 150	Ppm
Scale Factor Repeatability	< 100	Ppm
Scale Factor Temp. coefficient	< 40	ppm/ $^{\circ}C$
Bias Stability	< 10	$^{\circ}/h$
Bias Repeatability	< 15	$^{\circ}/h$
Bias Instability	<3	$^{\circ}/h$
Random Angular Walk	<0.35	$^{\circ}/\text{root}(h)$
Bandwidth	>150	Hz
Accelerometer		
Full Scale	$\pm 8$	G
Bias	<2.5	Mm
Random Velocity Walk	<0.05	m/s/root (h)
Bias Stability	<0.3	mg
Bias Repeatability	0.3	grms
Bias Instability	0.1	mg
Scale Factor Nonlinearity	<300	ppm
Bandwidth	>150	Hz
System		
Power Voltage	3.3 $\pm$ 0.3 V	
Shock Resistance	>2000 g	
Vibration	>20 g rms	
Weight	<3 g	
Operating Temp	-45 $^{\circ}C$ +85 $^{\circ}C$	

Storing Temp	-55°C+100°C
Interface	SPI
Size	17±0.5mm x 13±0.5mm x 5.5mm

All values are typical at +25±2°C unless otherwise statement. The product may be changed at any time without prior notice

## Structure (unit: mm)



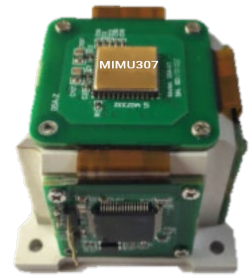
ID	Def.	Description
1	VDD	Power supply
2	DGND	Power ground
3	DGND	Power ground
4	NC	-
5	MOSI	SPI MOSI
6	CS	SPI Chip Select
7	SCLK	SPI Clock
8	MISO	SPI MISO
9	NC	-
10	NC	-
11	NC	-
12	DGND	Power ground
13	RXD	Uart Rx
14	TXD	Uart Tx
15	DGND	Power ground
16	NC	--

# North-Seeking MEMS IMU

MIMU307

## Advantages

- 3 axis gyroscope & 3-axis accelerometer
- Gyro bias instability:<0.02 deg/hr
- Gyro bias stability (10s 1 $\sigma$ ): <0.1 deg/hr
- Gyro angular random walk:<0.005  $^{\circ}/\sqrt{h}$



## Applications

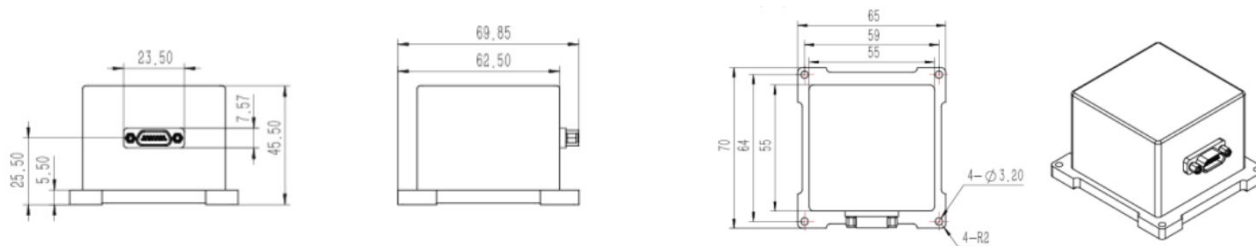
- North seeking in logging tools/gyro tools
- Pointing, steering and guiding in advanced mining/drilling equipment
- Initial alignment in weapon/UAV launch systems
- Direction pointing and tracking in satellite antenna, target tracking system
- Guidance and navigation in navigation grade MEMS weapon system
- Orientating and positioning in railway train system
- Precision platform attitude measuring and controls
- Precision attitude, position measuring in navigation grade MEMS IMU/INS
- North finding and positioning in land surveying/land mobile mapping system
- Petroleum exploration
- Bridge, tall building, tower, dam monitoring
- Rock and soil monitoring
- Mining

Gyroscope		
Range	100	deg/s
Bandwidth (-3dB)	12	Hz
Scale Factor at 25°C	80000	LSB/(deg/s)
Scale Factor Repeatability (1 $\sigma$ )	<50	ppm
Scale Factor VS Temperature (1 $\sigma$ )	300	ppm
Scale Factor Non-Linearity (1 $\sigma$ )	<200	ppm
Bias Instability	<0.02	deg/hr
Bias stability (10s 1 $\sigma$ )	<0.1	deg/hr
Angular Random Walk	<0.005	$^{\circ}/\sqrt{h}$
Bias error over temperature (1 $\sigma$ )	3	deg/hr
Bias temperature variations, calibrated (1 $\sigma$ )	<0.3	deg/hr
Bias Run-Run (1 $\sigma$ )	<0.1	deg/hr
Accelerometer		
Range	30	g
Bandwidth	100	Hz
Bias Stability (1s)(1 $\sigma$ )	<30	ug
Bias Repeatability	200-500	ug
Bias Temp Coefficient	<20	ug/ $^{\circ}C$
Bias Temp Hysteresis	<0.5	mg
Factor Scale Non-linearity	<500	ppm
Factor Scale Repeatability	<300	ppm
Factor Scale Temp Coefficient	10	ppm/ $^{\circ}C$



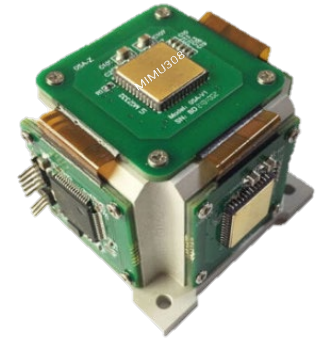
Class II Non-linearity Coefficient	<100 ug/g2
Factor Scale	400000-800000 µg/LSB
Supply Voltage	6~12 V
Supply Consumption	2 V
Interface	RS422
Vibration	6.06g (10~2000Hz)
Shock	5000g, 0.1 ms
Operate Temp	-40°C+80°C
Storage Temp	-55°C+105°C
Weight	≤100g (without shell)≤220g (with shell)
Size	43.2mm x 43.2mm x 35.5mm (without shell) 65mm x 70mm x 45.5mm (with shell)

## Structure (unit: mm)



# High Performance Navigation MEMS IMU

**MIMU308**



## Advantages

- 3 axis gyroscope & 3-axis accelerometer
- Gyro bias instability: 0.05 deg/hr
- Gyro angular random walk: <math><0.025^\circ / \sqrt{h}</math>
- Gyro bias stability (10s 1 $\sigma$ ): <math><0.5\text{deg/hr}</math>

### High Performance Navigation MEMS IMU

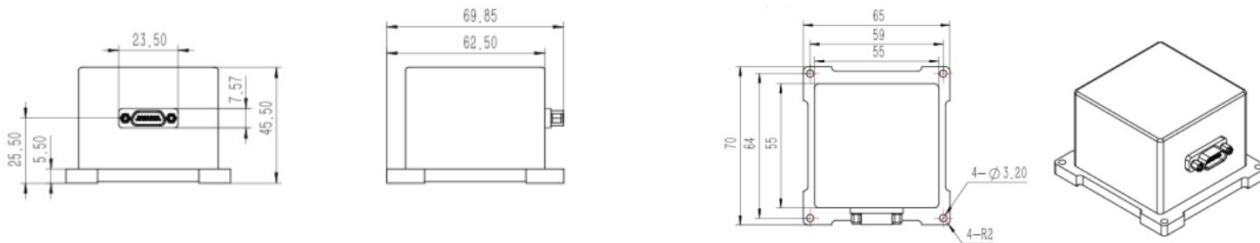
## Applications

- Antenna and Line of Sight Stabilization Systems
- Integrated Navigation Systems & Inertial Guidance System
- Flight Control & Guidance System
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms
- Aerial and Marine Geo-mapping / Surveying

Gyroscope		
Range	400	deg/s
Bandwidth (-3dB)	100	Hz
Scale Factor at 25°C	20000	LSB/deg/s
Scale Factor Repeatability (1 $\sigma$ )	<math><20</math>	Ppm
Scale Factor VS Temperature (1 $\sigma$ )	100	Ppm
Scale Factor Non-Linearity (1 $\sigma$ )	100	Ppm
Bias Instability	0.05	deg/hr
Bias stability (10s 1 $\sigma$ )	<math><0.5</math>	deg/hr
Angular Random Walk	<math><0.025</math>	$^\circ / \sqrt{h}$
Bias error over temperature (1 $\sigma$ )	3	deg/hr
Bias temperature variations, calibrated (1 $\sigma$ )	<math><0.5</math>	deg/hr
Bias Run-Run (1 $\sigma$ )	<math><0.3</math>	deg/hr
Accelerometer		
Range	30	g
Bandwidth	100	Hz
Bias Stability (1s) (1 $\sigma$ )	<math><30</math>	Ug
Bias Repeatability	200-500	Ug
Bias Temp Coefficient	<math><20</math>	ug/°C
Bias Temp Hysteresis	<math><0.5</math>	mg
Factor Scale Non-linearity	<math><500</math>	ppm
Factor Scale Repeatability	<math><300</math>	ppm
Factor Scale Temp Coefficient	10	ppm/°C
Class II Non-linearity Coefficient	<math><100</math>	ug/g <sup>2</sup>
Factor Scale	400000-800000	μg/LSB

Supply Voltage	6~12V
Supply Consumption	2W
Interface	RS422
Vibration	6.06g (10~2000Hz)
Shock	5000g, 0.1ms
Operate Temp	-40°C+80°C
Storage Temp	-55°C+105°C
Weight	≤100g (without shell)≤220g (with shell)
Size	43.2mm x 43.2mm x 35.5mm (without shell) 65mm x 70mm x 45.5mm (with shell)

## Structure (unit: mm)



# High Accuracy North-Seeking MEMS IMU

**MIMU309**

## Advantages

- Measuring range :100deg/s
- Gyro bias stability (10s 1σ):<0.1deg/hr
- Gyro bias instability:<0.02deg/hr
- Gyro angular random walk:<0.005°/√h



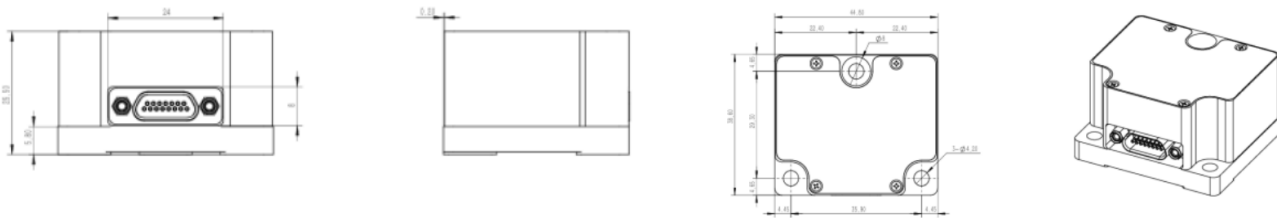
## Applications

- North seeking in logging tools/gyro tools
- Precision platform attitude measuring and controls
- Pointing, steering and guiding in advanced mining/drilling equipment
- Precision attitude, position measuring in navigation grade MEMS IMU/INS
- Initial alignment in weapon/UAV launch systems
- North finding and positioning in land surveying/land mobile mapping system
- Direction pointing and tracking in satellite antenna, target tracking system
- Petroleum exploration
- Guidance and navigation in navigation grade MEMS weapon system
- Bridge, tall building, tower, dam monitoring
- Orientating and positioning in railway train system
- Rock and soil monitoring
- Mining

Gyroscope		
Range	100	deg/s
Bandwidth (-3dB)	12	Hz
Scale Factor at 25°C	80000	LSB/deg/s
Scale Factor Repeatability (1σ)	<50	ppm
Scale Factor VS Temperature (1σ)	300	ppm
Scale Factor Non-Linearity (1σ)	<200	ppm
Bias Instability	<0.02	deg/hr
Bias stability (10s 1σ)	<0.1	deg/hr
Angular Random Walk	<0.005	°/√h
Bias error over temperature (1σ)	3	deg/hr
Bias temperature variations, calibrated (1σ)	<0.3	deg/hr
Bias Repeatability (1σ)	<0.1	deg/hr
Accelerometer		
Range	30	g
Bandwidth	100	Hz
Bias Stability (1s)(1σ)	<30	ug
Bias Repeatability	200-500	ug
Bias Temp Coefficient	<20	ug/°C
Bias Temp Hysteresis	<0.5	mg
Factor Scale Non-linearity	<500	ppm
Factor Scale Repeatability	<300	ppm

Factor Scale Temp Coefficient	10 ppm/°C
Class II Non-linearity Coefficient	<100 ug/g <sup>2</sup>
Factor Scale	400000-800000 µg/LSB
Supply Voltage	6~12 V
Supply Consumption	2 W
Interface	RS422
Vibration	6.06g (10~2000Hz)
Shock	5000g, 0.1ms
Operate Temp	-40°C+80°C
Storage Temp	-55°C+105°C
Weight	≤70g
Size	38.6mm x 44.8mm x25.5mm

## Structure (unit: mm)



# High Precision Navigation MEMS IMU

## MIMU310

### Advantages

- Measuring range : $\pm 400^\circ/\text{s}$
- Gyro bias instability: 0.05 deg/hr
- Gyro angular random walk: $<0.025^\circ/\sqrt{\text{h}}$
- Gyro bias stability (10s  $1\sigma$ ):  $<0.5\text{deg/hr}$



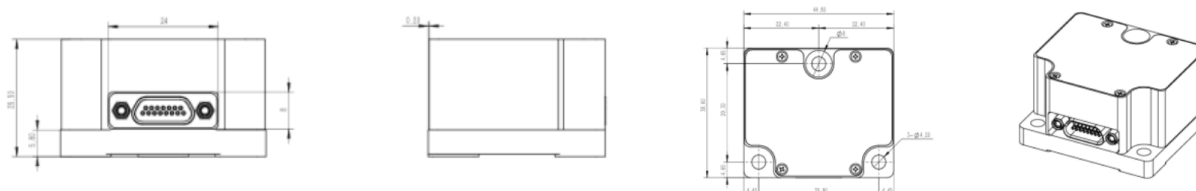
### Applications

- Antenna and Line of Sight Stabilization Systems
- Integrated Navigation Systems & Inertial Guidance System
- Flight Control & Guidance System
- Flight Control & Guidance System
- Attitude Heading Reference Systems (AHRS)
- Stabilization of Antennas, Cameras & Platforms
- Aerial and Marine Geo-mapping / Surveying

Gyroscope		
Range	400	deg/s
Bandwidth (-3dB)	100	Hz
Scale Factor at 25°C	20000	LSB/deg/s
Scale Factor Repeatability (1 $\sigma$ )	<20	ppm
Scale Factor VS Temperature (1 $\sigma$ )	100	ppm
Scale Factor Non-Linearity (1 $\sigma$ )	100	ppm
Bias Instability	0.05	deg/hr
Bias stability (10s 1 $\sigma$ )	<0.5	deg/hr
Angular Random Walk	<0.025	$^\circ/\sqrt{\text{h}}$
Bias error over temperature (1 $\sigma$ )	3	deg/hr
Bias temperature variations, calibrated (1 $\sigma$ )	<0.5	deg/hr
Bias Run-Run (1 $\sigma$ )	<0.3	deg/hr
Accelerometer		
Range	30	g
Bandwidth	100	Hz
Bias Stability (1s) (1 $\sigma$ )	<30	ug
Bias Repeatability	200-500	ug
Bias Temp Coefficient	<20	ug/°C
Bias Temp Hysteresis	<0.5	mg
Factor Scale Non-linearity	<500	ppm
Factor Scale Repeatability	<300	ppm
Factor Scale Temp Coefficient	10	ppm/°C
Class II Non-linearity Coefficient	<100	ug/g <sup>2</sup>
Factor Scale	400000-800000	ug/LSB
Supply Voltage	6~12	V
Supply Consumption	2	W

Interface	RS422
Vibration	6.06g (10~2000Hz)
Shock	5000g, 0.1ms
Operate Temp	-40°C+80°C
Storage Temp	-55°C+105°C
Weight	≤70g
Size	38.6mm x 44.8mm x 25.5mm

## Structure (unit: mm)



# North-Seeking MEMS IMU for Gyro Tools

## MIMU311

### Advantages

- 3 axis gyroscope & 3-axis accelerometer
- Size: 120mm x  $\Phi$ 30mm
- Gyro bias instability: 0.02 deg/hr
- Gyro bias stability (10s 1 $\sigma$ ): <0.1deg/hr



### Applications

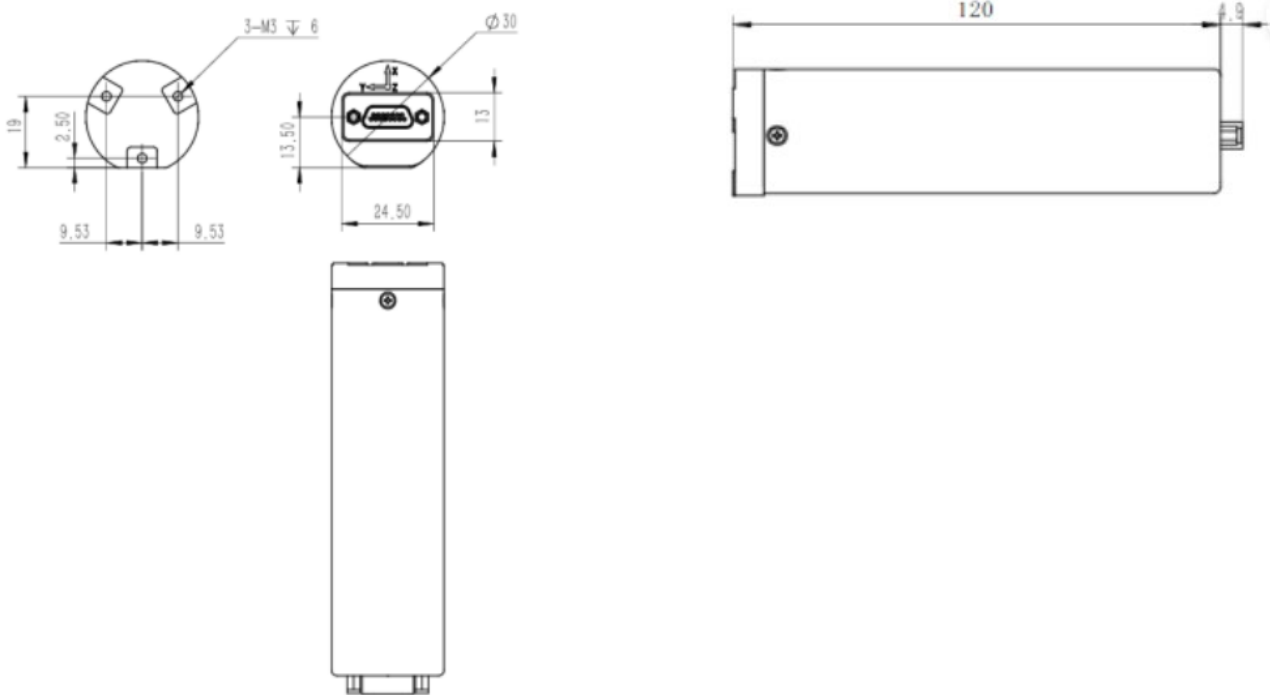
- North seeking in logging tools/gyro tools
- Pointing, steering and guiding in advanced mining/drilling equipment
- Initial alignment in weapon/UAV launch systems
- Direction pointing and tracking in satellite antenna, target tracking system
- Guidance and navigation in navigation grade MEMS weapon system
- Orientating and positioning in railway train system
- Precision platform attitude measuring and controls
- Precision attitude, position measuring in navigation grade MEMS IMU/INS
- North finding and positioning in land surveying/land mobile mapping system

Gyroscope		
Range	100deg/s	100deg/s
Bandwidth (-3dB)	12Hz	12Hz
Scale Factor at 25°C	80000LSB/(deg/s)	80000LSB/(deg/s)
Scale Factor Repeatability (1 $\sigma$ )	<50ppm	<100ppm
Scale Factor VS Temperature (1 $\sigma$ )	300ppm	500ppm
Scale Factor Non-Linearity (1 $\sigma$ )	<200ppm	<300ppm
Bias Instability	<0.02deg/hr	<0.02deg/hr
Bias stability (10s 1 $\sigma$ )	<0.1deg/hr	<0.1deg/hr
Angular Random Walk	<0.005°/√h	<0.025°/√h
Bias error over temperature (1 $\sigma$ )	3deg/hr	3deg/hr
Bias temperature variations, calibrated (1 $\sigma$ )	<0.3deg/hr	<0.3deg/hr
Bias Run-Run (1 $\sigma$ )	<0.1deg/hr	<0.1deg/hr
Accelerometer performance		
Range	10-30g	
Bandwidth	100Hz	
Bias Stability (1s)(1 $\sigma$ )	≤0.05mg	
Bias Repeatability	≤0.1mg	
Bias Temp Coefficient	<10ug/°C	
Bias Temp Hysteresis	<0.5mg	
Factor Scale Non-linearity	<500ppm	
Factor Scale Repeatability	≤30ppm	
Factor Scale Temp Coefficient	10ppm/°C	
Class II Non-linearity Coefficient	<100ug/g <sup>2</sup>	
Factor Scale	400000-800000μg/LSB	



System Performance		
Supply Voltage	6V~12V	
Supply Consumption	2W	
Interface	RS422	
Vibration	6.06g (10~2000Hz)	
Shock	5000g, 0.1ms	
Operate Temp	-40°C+80°C	-40°C+125°C
Storage Temp	-55°C+105°C	-55°C+125°C
Weight	≤70g	
Size	120mm x Φ30mm	

## Structure (unit: mm)



# North-Seeking MEMS IMU for Gyro Tools

## MIMU312A

### Advantages

- Miniaturized IMU
- Low power consumption
- High cost performance
- Total temperature compensation



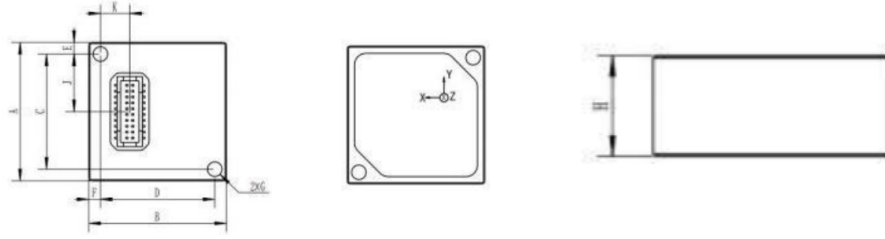
### Applications

- Inertial navigation: inertial guidance, integrated navigation, platform stability
- Short-term navigation: flight control, ballistic correction, telemetry and remote control
- Attitude control: UAV, antenna orientation

Gyroscope		
Measuring range	±450	°/s
Full temperature bias	≤36	°/h
Angle random walk	≤0.15	°/√h
Bias instability	≤2	°/h
Bias stability (1σ)	≤8	°/h
Bias repeatability (1σ)	≤8	°/h
Scale factor non-linearity	≤50	ppm
Bandwidth (10~250Hz adjustable)	472	Hz
Accelerometer		
Measuring range	±16	g
Full temperature bias	≤3	mg
Rate random walk	≤0.02	m/s/√h
Bias instability	≤0.025	mg
Bias stability (1σ)	≤0.2	mg
Bias repeatability (1σ)	≤0.2	mg
Scale factor non-linearity (±1g)	0.1%	FS
Bandwidth (10~250Hz adjustable)	333	Hz
System		
Supply voltage	3.3 V ± 0.15 V	
Operating temperature range	-45°C+85°C	
Shock resistance	≥2000 g	
Vibration	≥20 g rms	
Size	23.7mm × 23.7mm × 9.9mm	
Weight	≤25 g	
Interface type (-)	UART	
Connector (-)	FTMH-110-02-L-DV-ES	

## Structure (unit: mm)

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# High Performance Inertial Measurement Unit

## MIMU315

### Advantages

- Measuring range: 400°/s
- Gyro bias instability: 3°/h
- High precision 6DoF mini IMU with full calibration
- Fully similar as ADIS16460, better performance



### Applications

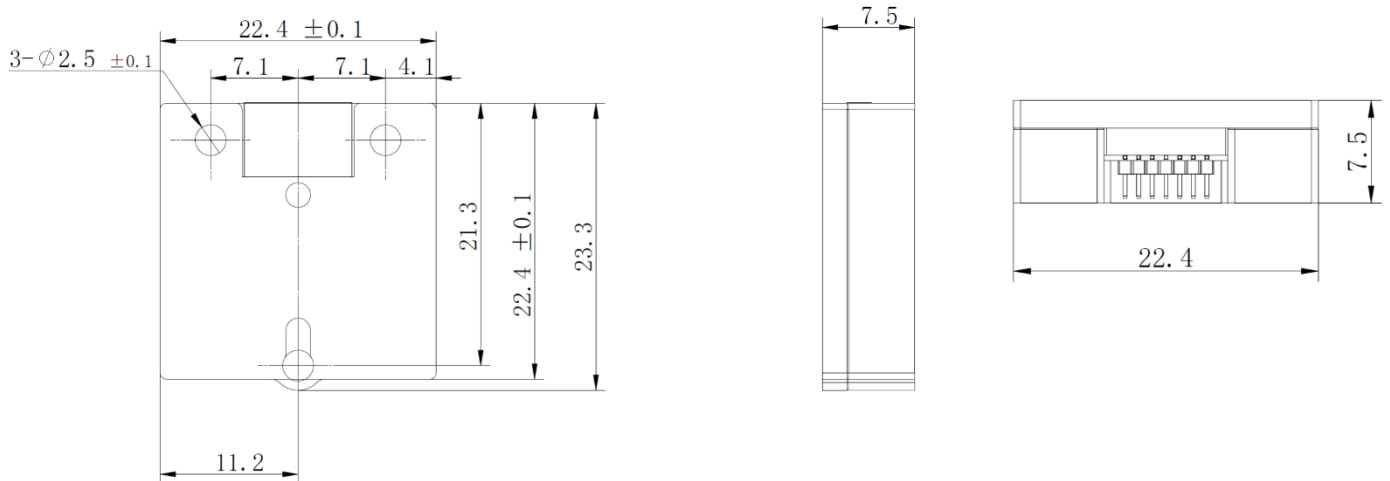
- AGV
- Smart agriculture
- Unmanned aircraft
- ROVs
- Robotics
- Machine control
- Platform stabilization
- Precision platform attitude measuring and controls

Gyroscopes		
Range*	400	°/s
Bandwidth	50	Hz
Scale factor accuracy	0.1	%
Bias Instability (Allan variance)	min 2 max 4	°/h
Initial bias error	min 0.05 max 0.1	°/s
Random walk	min 0.1 max 0.3	°/√h
Non-linearity (Full scale (FS))	0.01	%FS
Resolution	0.01	°/s
Accelerometers		
Range*	30	g
Bandwidth	50	Hz
Scale factor accuracy	0.1	%
Bias instability (Allan variance)	min 40 max 60	ug
Initial bias error	min 3 max 5	mg
Random walk	min 0.03 max 0.07	m/s/√h
Non-linearity (Full scale (FS))	0.01	%FS
Resolution	0.1	mg
System		
Supply Voltage	3.3V	
Power Consumption	<0.1W	
Interface	UART, SPI	
Operate Temp	-40°C+85°C	
Storage Temp	-55°C+100°C	
Housing material	aluminum	
Weight	≤15g	

\* The range of Gyroscopes and Accelerometers can be configured in our factory

Size	23.3mm x 22.4mm x 7.5mm
Connector	7 x 2 pins (matching Samtec CLM-107-02 socket)

## Structure (unit: mm)



# High Performance Inertial Measurement Unit **MIMU316**

## Advantages

- Measuring range: 500°/s
- Gyro bias instability: 1.5°/h
- High precision 6DoF mini IMU with full calibration



## Applications

- AGV
- Smart agriculture
- Unmanned aircraft
- ROVs
- Robotics
- Machine control
- Platform stabilization
- Precision platform attitude measuring and controls

Gyroscopes		
Range*	500	°/s
Bandwidth	150	Hz
Scale factor accuracy	0.1	%
Bias Instability (Allan variance)	min 1 max 2	°/h
Initial bias error	min 0.01 max 0.1	°/s
Random walk	min 0.1 max 0.15	°/√h
Non-linearity (Full scale (FS))	0.01	%FS
Resolution	0.005	°/s
Accelerometers		
Range*	16	g
Bandwidth	150	Hz
Scale factor accuracy	0.1	%
Bias instability (Allan variance)	min 25 max 45	ug
Initial bias error	min 3 max 5	mg
Random walk	min 0.01 max 0.04	m/s/√h
Non-linearity (Full scale (FS))	0.01	%FS
Resolution	0.05	mg
System		
Supply Voltage	3.3V	
Power Consumption	<0.15W	
Interface**	UART***, SPI	
Operate Temp	-40°C+85°C	
Storage Temp	-55°C+100°C	

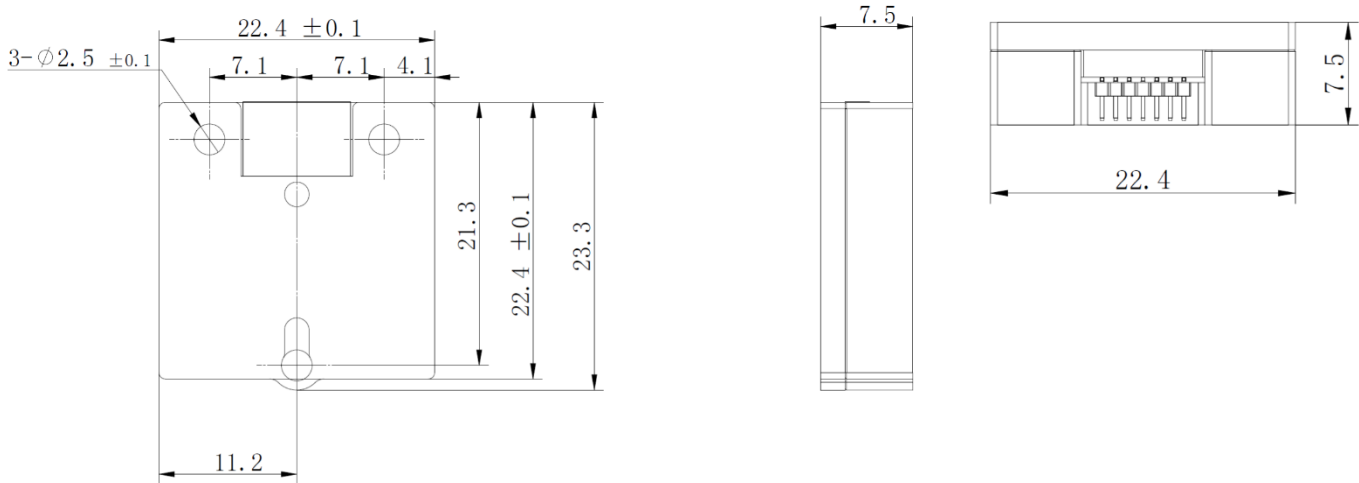
\* The range of Gyroscopes and Accelerometers can be configured in our factory

\*\* SPI or CAN communication can be selected in our factory

\*\*\* ODR=500Hz (baud rate=230400bps) or ODR=1000Hz (baud rate=460800bps) can be configured via UART command

Housing material	aluminum
Weight	≤15g
Size	23.3mm x 22.4mm x 7.5mm
Connector	7 x 2 pins

## Structure (unit: mm)



# High Performance Inertial Measurement Unit

## MIMU317

### Advantages

- Measuring range: 450°/s
- Gyro bias instability: 1.2°/h
- High precision 6DoF mini IMU with high G capable to 10000g



### Applications

- Gimbal stabilization
- Rain-seeding rockets
- Target drones

Gyroscopes		
Range*	450	°/s
Bandwidth	200	Hz
Axial coupling coefficient	1	%
Bias Instability (Allan variance)	1.2	°/h
Linear acceleration effect on bias	0.002	°/s/g
Random walk	0.2	°/√h
Non-linearity	100	ppm
Bias repeatability	3	°/h
Accelerometers		
Range*	16	g
Bandwidth	150	Hz
Scale factor accuracy	0.1	%
Bias instability (Allan variance)	min 25 max 75	ug
Initial bias error	min 3 max 5	mg
Random walk	min 0.01 max 0.02	m/s/√h
Non-linearity (Full scale (FS))	0.01	%FS
Resolution	0.01	mg
Reliability		
MTBF	20000	h
Continuous Working Time	120	h
System		
Supply Voltage	5V	
Power Consumption	<0.2W	
Interface**	RS422	
Operate Temp	-40°C+85°C	
Storage Temp	-55°C+105°C	
Vibration resistance	20-2000Hz, 6.06g	

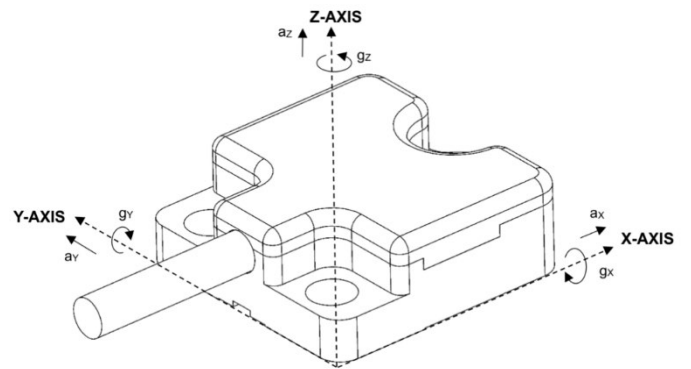
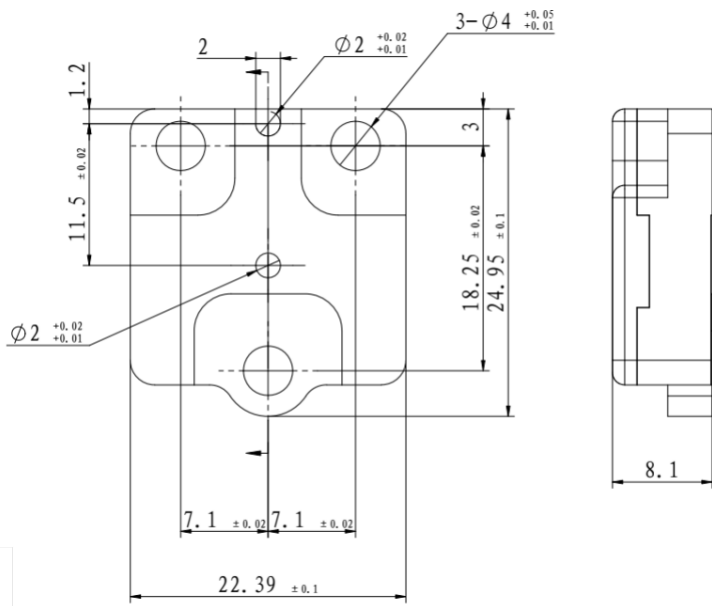
\* The range of Gyroscopes and Accelerometers can be configured in our factory

\*\* The baud rate and output rate can be configured in our factory



Shock Resistance	half sine, 10000g, 0.5ms
Weight	22g (with wire)
Size	24.95mm x 22.39mm x 8.1mm
Connector	pigtail

## Structure (unit: mm)



# High Performance Inertial Measurement Unit

## MIMU318

### Advantages

- Measuring range: 450°/s
- Gyro bias instability: 1.2°/h
- Automotive grade 6DoF imu sensor, easy to integrate
- Strictly factory calibrated at full temperature



### Applications

- AGV
- Smart agriculture
- Unmanned aircraft
- USV
- Platform stabilization
- Unmanned vehicle

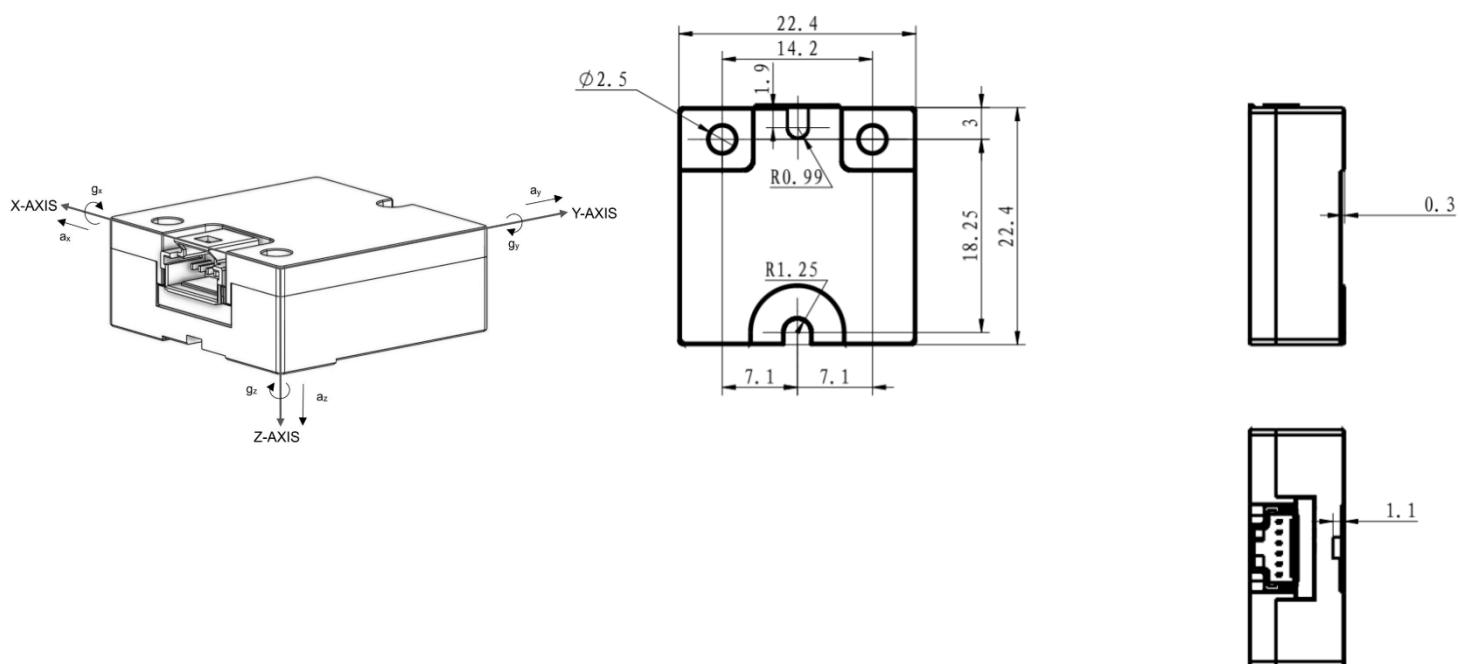
Gyroscopes		
Range*	450	°/s
Bandwidth	200	Hz
Axial coupling coefficient	1	%
Bias Instability (Allan variance)	1.2	°/h
Linear acceleration effect on bias	0.002	°/s/g
Random walk	0.2	°/√h
Non-linearity	100	ppm
Bias repeatability	3	°/h
Accelerometers		
Range*	16	g
Bandwidth	150	Hz
Scale factor accuracy	0.1	%
Bias instability (Allan variance)	min 25 max 75	ug
Initial bias error	min 3 max 5	mg
Random walk	min 0.01 max 0.02	m/s/√h
Non-linearity (Full scale (FS))	0.01	%FS
Resolution	0.01	mg
Reliability		
MTBF	20000h	
Continuous Working Time	120h	
System		
Supply Voltage	3.2-6V	
Power Consumption	<0.5W	
Interface**	UART	
Operate Temp	-40°C+85°C	
Storage Temp	-55°C+105°C	

\* The range of Gyroscopes and Accelerometers can be configured in our factory

\*\* The baud rate and output rate can be configured in our factory

Vibration resistance	20-2000Hz, 20grms
Shock Resistance	2000g, 0.5ms
Weight	20g
Size	22.4mm x 22.4mm x 9mm
Connector	molex connector, model: 5015680607

## Structure (unit: mm)

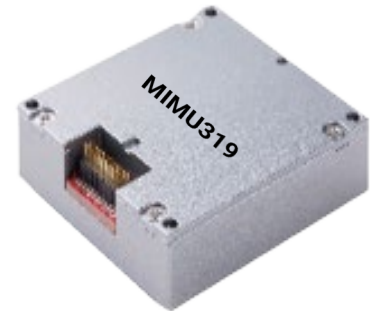


# High Performance Inertial Measurement Unit

## MIMU319

### Advantages

- Measuring range: 450°/s
- Gyro bias instability: 2°/h
- Precision 10DoF imu, Pin-to-pin replace ADIS16485



### Applications

- Surface vehicle
- Unmanned aircraft
- Platform stabilization
- Industrial robotics

Gyroscopes		
Range*	450	°/s
Bandwidth	200	Hz
Bias Instability (Allan variance)	2	°/h
Bias repeatability	3	°/h
Random walk	0.2	°/√h
Non-linearity	100	ppm
Bias change at full temp. range**	0.04	°/s
Bias change in vibration conditions***	6	°/h
Accelerometers		
Range*	16                      40*****	g
Bandwidth	200	Hz
Bias repeatability	0,1	mg
Bias instability (Allan variance)	50	ug
Random walk	0,015	m/s/√h
Non-linearity	100	ppm
Magnetometer		
Dynamic Range	±2	Gauss
Resolution	120	uGauss
Noise RMS	10Hz; 50 uGauss	Hz, uGauss
Bandwidth	200	Hz
Barometer		
Pressure Range	450, 1100	mbar
Resolution	0.1	mbar
Absolute Accuracy	1.5	mbar
Angle Outputs		
Euler Dynamic Range	Yaw and roll (Euler) ±180 Pitch (Euler) ±90 Rotation matrix, quaternion ±180	
Static Accuracy	Pitch and roll 0.05 Yaw 0.2	
Dynamic Accuracy	Pitch and roll 0.2 Yaw 0.3	

System	
Supply Voltage	3.3V
Power Consumption	<0.2W
MTBF	20000 h
Continuous Working Time	120 h
Interface**	UART****, SPI
Operate Temp	-40°C+85°C
Storage Temp	-55°C+105°C
Vibration resistance	20-2000Hz, 6.06g
Shock Resistance	1000g, 0.5ms
Weight	50g
Size	47mm x 44mm x 14mm
Connector	2 x 12 pins

\* The range of Gyroscopes and Accelerometers can be configured in our factory

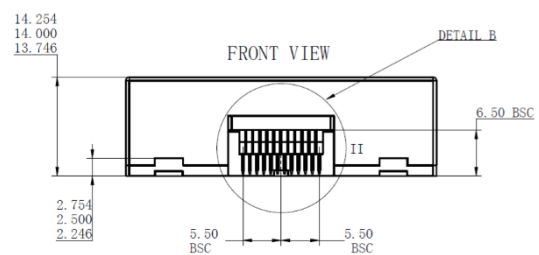
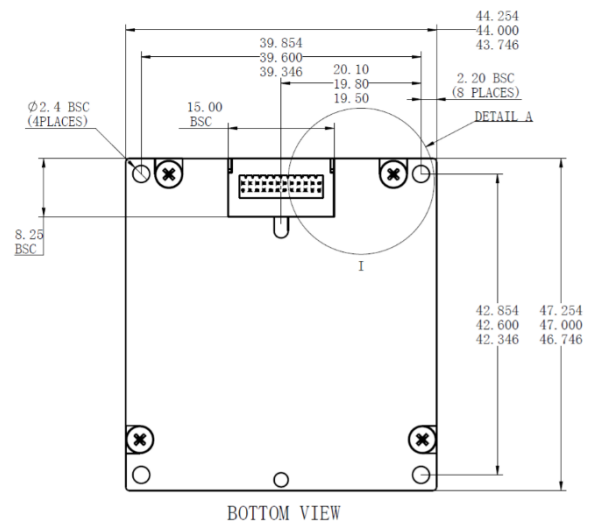
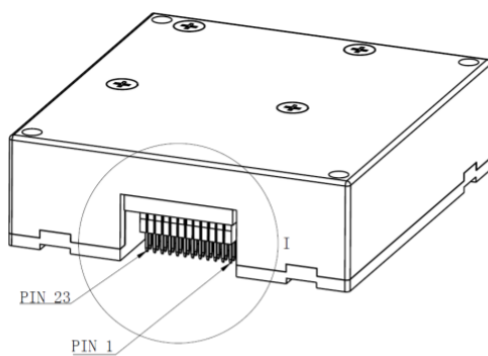
\*\* The bias value is calculated based on the whole temperature change period, the temperature changing rate  $\leq 2^\circ\text{C}/\text{minute}$ , temperature range:  $-40\dots+85^\circ\text{C}$

\*\*\* Before vibration average value + after vibration value / 2 - during vibration average value, the vibration conditions are 6,06g, 20-2000Hz

\*\*\*\* The baud rate and output rate can be configured in our factory

\*\*\*\*\*  $\pm 40\text{g}$  can be customized

## Structure (unit: mm)



# High Performance Inertial Measurement Unit

## MIMU320

### Advantages

- Measuring range: 450°/s
- Gyro bias instability: 1°/h
- Precision 10DoF imu, Pin-to-pin replace ADIS16488



### Applications

- Surface vehicle
- Unmanned aircraft
- Platform stabilization
- Industrial robotics

Gyroscopes		
Range*	450	°/s
Bandwidth	200	Hz
Bias Instability (Allan variance)	1	°/h
Bias repeatability	2	°/h
Random walk	0.1	°/√h
Non-linearity	100	ppm
Bias change at full temp. range**	0.04	°/s
Bias change in vibration conditions***	6	°/h
Accelerometers		
Range*	16	g
Bandwidth	200	Hz
Bias repeatability	60	ug
Bias instability (Allan variance)	30...45	ug
Random walk	0,01	m/s/√h
Non-linearity	100	ppm
Magnetometer		
Dynamic Range	±2	Gauss
Resolution	120	uGauss
Noise RMS	10 Hz, 50 uGauss	Hz, uGauss
Bandwidth	200	Hz
Barometer		
Pressure Range	450, 1100	mbar
Resolution	0.1	mbar
Absolute Accuracy	1.5	mbar
System		
Supply Voltage	3.3V	
Power Consumption	<0.15W	
MTBF	20000 h	
Continuous Working Time	120 h	

Supply Voltage	3.3V
Power Consumption	<0.15W
Interface**	UART****, SPI
Operate Temp	-40°C+85°C
Storage Temp	-55°C+105°C
Vibration resistance	20-2000Hz, 6.06g
Shock Resistance	1000g, 0.5ms
Weight	50g
Size	47mm x 44mm x 14mm
Connector	2 x 12 pins

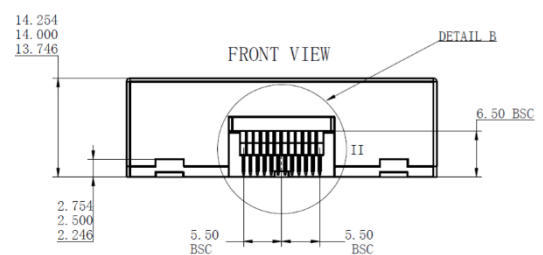
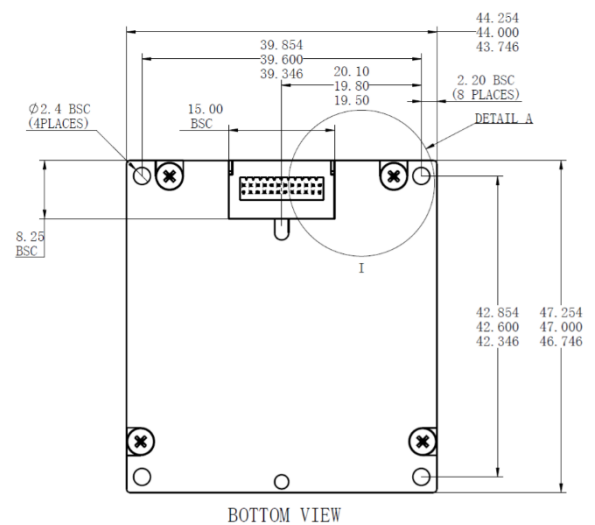
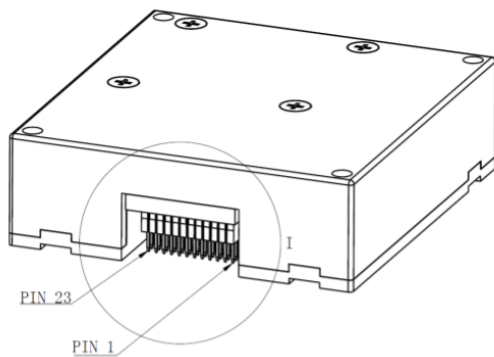
\* The range of Gyroscopes and Accelerometers can be configured in our factory

\*\* The bias value is calculated based on the whole temperature change period, the temperature changing rate  $\leq 2^\circ\text{C}/\text{minute}$ , temperature range:  $-40\dots+85^\circ\text{C}$

\*\*\* Before vibration average value + after vibration value/2-during vibration average value, the vibration conditions are 6,06g, 20-2000Hz

\*\*\*\* The baud rate and output rate can be configured in our factory

## Structure (unit: mm)



# Cost-Efficient Triaxial MEMS North Seeker

## MNS101

### Advantages

- Triaxial MEMS North Seeker
- Full temperature compensation
- Mini size and high performance

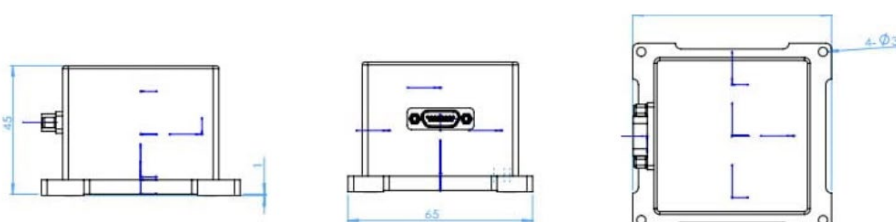


### Applications

- North seeking in logging tools/gyro tools
- Precision attitude, position measuring in navigation grade MEMS IMU/INS
- Pointing, steering and guiding in advanced mining/drilling equipment
- North finding and positioning in land surveying/land mobile mapping system
- Initial alignment in weapon/UAV launch systems
- Petroleum exploration
- Direction pointing and tracking in satellite antenna, target tracking system
- Bridge, tall building, tower, dam monitoring
- Guidance and navigation in navigation grade MEMS weapon system
- Rock and soil monitoring
- Mining
- Orientating and positioning in railway train system
- Precision platform attitude measuring and controls

	MINS101-A	MINS101-B	MINS101-C
Power supply (V)	5±0.25V		
Power (W)	2		
Run-up time (s)	2		
Communication interface	RS-422		
Update Rate (Hz)	200		
North seeking accuracy (°, 5min)	1°secϕ	0.5°secϕ	0.25°secϕ
Size	70mm × 65mm × 45mm		
Weight (g)	≤220		
Environmental conditions			
Operating temperature	+5°C+55°C		
Storage temperature	0°C+65°C		
Reliability			
Mean Time Between Failures (h)	200000		

### Structure (unit: mm)



Connect Type	Pin	Definition
J30J-15ZKP	1	+5V
	2	
	3	GND
	4	
	6	Tx+
	7	Tx-
	8	Rx+
	9	Rx-
	10	GND



# Smallest Size Triaxial MEMS North Seeker

**MNS102**

## Advantages

- Smallest Size MEMS north seeker in the world
- Resistant to harsh mechanical environment
- Light weight, low power consumption



## Applications

- North seeking in logging tools/gyro tools
- Pointing, steering and guiding in advanced mining/drilling equipment
- Initial alignment in weapon/UAV launch systems
- Direction pointing and tracking in satellite antenna, target tracking system
- Guidance and navigation in navigation grade MEMS weapon system
- Orientating and positioning in railway train system
- Precision platform attitude measuring and controls
- Precision attitude, position measuring in navigation grade MEMS IMU/INS
- North finding and positioning in land surveying/land mobile mapping system
- Petroleum exploration
- Bridge, tall building, tower, dam monitoring
- Rock and soil monitoring
- Mining

	MINS102-A	MINS102-B	MINS102-C
Power supply (V)	5±0.25V		
Power (W)	2		
Run-up time (s)	2		
Communication interface	RS-422		
Update Rate (Hz)	200		
North seeking accuracy (°, 5min)	1°sec $\varphi$	0.5°sec $\varphi$	0.25°sec $\varphi$
Size (mm×mm×mm)	38.6mm × 44.8mm × 25.5mm		
Weight (g)	≤70g		
Environmental conditions			
Operating temperature	+5°C+55°C		
Storage temperature	0°C+65°C		
Reliability			
Mean Time Between Failures (h)	200000		

Connect Type	Pin	Definition
J30J-15ZKP	1	+5V
	2	
	3	GND
	4	
	6	Tx+
	7	Tx-
	8	Rx+
	9	Rx-
	10	GND

# MEMS Triaxial North Seeker for Mining

## MNS103

### Advantages

- Angular rate and acceleration measurement function
- Self-alignment function
- Attitude tracking function

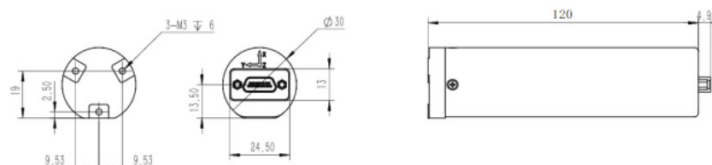


### Applications

- North seeking in logging tools/gyro tools
- Pointing, steering and guiding of advanced mining/drilling equipment
- Initial alignment of weapon/drone launch system
- Satellite antenna direction indication and target tracking system
- Guidance and navigation of navigation-level MEMS weapon systems
- Orientating and positioning in railway train system
- Precision platform attitude measurement and control
- Navigation-grade MEMS INS high-precision attitude and position measurement
- North seeking positioning in land surveying/land mobile surveying and mapping systems

North seeking time	5	min
Continuous working time	≥60	min
Output update rate	200	Hz
Weight	≤150	g
Size	120 x 30	mm
Communication Interface	RS422 serial port	
Operating temperature	+5 ~ +55	°C
Storage temperature	-40 ~ +80	°C
North seeking method	static base	
Azimuth holding time	20	min
Azimuth measurement range	0~360	°
Inclination angle measurement range	-90~90	°
Pitch/roll angle (1σ)	≤0.2	°
Course Angle (1σ)	≤0.5	°
Attitude maintenance accuracy		
Pitch/roll angle (20min)	≤0.2	°
Heading angle (20min)	≤0.5	°
Power requirements		
Voltage	6~12	V

### Structure (unit: mm)



# Low Cost 3 Axis FOG North Seeker

**FNS101**

## Advantages

- Low cost FOG north seeking solution
- Specially suitable for mining application
- 3-axis FOG & 3-axis accelerometer



## Applications

- North seeking in logging tools/gyro tools
- Pointing, steering and guiding in advanced mining/drilling equipment
- Initial alignment in weapon/UAV launch systems
- Direction pointing and tracking in satellite antenna, target tracking system
- Guidance and navigation in navigation grade MEMS weapon system
- Orientating and positioning in railway train system
- Precision platform attitude measuring and controls
- Precision attitude, position measuring in navigation grade MEMS IMU/INS
- North finding and positioning in land surveying/land mobile mapping system
- Petroleum exploration
- Bridge, tall building, tower, dam monitoring
- Rock and soil monitoring
- Mining

	FNS101-A	FNS101-B	FNS101-C
Dimension (mm)	200mm × 100mm × 90mm/210mm × 125mm × 105mm		
Sensor	3-Axis FOG		
Weight (Kg)	2.0Kg		
Power Supply	12V		
Current	1A		
Power Consumption	≤12W		
Start-up Time	5min		
Working Latitude	-65°~+65°		
North Seeking Precision	1°secϕ	0.5°secϕ	0.25°secϕ
North Seeking Time	5min		
Heading Measurement Range	0°~360°		
Pitch Measurement Range	-65°C+65°C		
Output Method	RS422		
Operating Temperature	5°C+55°C		
Vibration Environment	10Hz~1000Hz, 5g		
Impact Environment	8ms~11ms, 20g, half-sine wave		

## Structure (unit: mm)

