FORSENSE
原极科技

Tactical-grade MEMS 6-DOF inertial sensor

IMU16460-S

Product manual



Forsense (Shanghai) Technology Co., Ltd

Please read this user manual carefully before using this product.

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Tactical-grade MEMS 6-DOF inertial sensor

FSS-IMU16460-S-Product Manual(en)

Features

100% Domestically Produced

Tactical-Grade MEMS Gyroscope

- 2.5°/hr Bias instability
- 0.3°/√hr Angle Random Walk

Tactical-Grade MEMS Accelerometer

- 20μg Bias instability
- 0.04 m/s/√hr Velocity Random Walk

independent rotary table calibration

- Independent Calibration of Each Module: Sensitivity, Bias, Misalignment
- -40°C to 85°C Temperature Compensation

High-Intensity Operating Condition Tolerance

- Extreme Shock Resistance: 2000g (0.5ms, Half-Sine, 3-Axis)
- Extreme Vibration Resistance: 10g (10~2KHz, 3-Axis)
- Stable Operation Across Full Temperature Range: -40°C ~ 85°C
- 100% Magnetic Shielding

Real-time and flexible digital interface, compact size

- Configurable output sampling rate up to 1kHz
- SupportedRS422
- 24.05*22.4*9mm, weight only 8g

Product Overview

IMU16460-S is a 6 degrees of freedom (DOF) MEMS inertial sensor module developed by Forsense Technology, featuring standard output of three-axis Gyroscope and acceleration data. This IMU adopts**a fully domestic solution**. Whether for sensors, processors, or software algorithms, it uses**domestic solutions**.

High precision and high resolution to capture subtle vibrations and tilts. All modules undergo turntable calibration before shipment, ensuring stable performance under various extreme operating conditions while maintaining high consistency across all products.

Application Fields

Yes**Domestication Requirements**IMU application scenarios, for example:

- Attitude and Heading Reference System (AHRS) and Attitude and Heading Reference System (AHRS)
- Platform Stabilization System
- Industrial Robots

Based on standard performance and output Parameter, Forsense also provides for your special needs**Customized software and LOGO customization services**, to assist you with the product!

Table of Contents

1. Performance Parameter **3**
1.1 Gyroscope Key Metrics 3
1.2 Accelerometer Key Metrics 4
2. Physical Dimensions **6**
3. Electrical Characteristics **8**
3.1 Maximum Ratings 8
3.2 Operating Conditions 8
4. Pin Definition **9**
5. Communication Protocol **10**
6. Coordinate System Definition **11**
7. Update History **12**

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1. Performance Parameter

1.1 Gyroscope Key Metrics

Table 1 Gyroscope Key Metrics

Parameter	Test Conditions/Remarks	Min.	Typ.	Max.	Unit
Measurement Range			±500		°/s
Bias instability[1]	@25℃, Allan Variance, 1σ		2.5		°/hr
Bias stability	GJB, 10s Smoothing		7		°/hr
Bias Repeatability	GJB		50		°/hr
Resolution			0.0076		°/s
Misalignment between axes			0.02		deg
Internal low-pass cutoff frequency	Software Adjustable		96		Hz
ODR			100	1000	Hz
measure delay			7.8		ms
Bias over temperature	-40℃ ~ 85℃, ≤1℃/min @1σ		0.06		°/s
Random Walk	@25℃, Allan Variance, 1σ		0.3		°/√hr
scale coefficient error			XY: 4 Z: 5.5		‰
scale factor nonlinear	@25℃		100		ppm

Note 1: IEEE standard, provided by the Allan variance curve in a static environment at 25°C

1.2 Accelerometer Key Metrics

Table 2 Accelerometer Key Metrics

Parameter	Test Conditions / Remarks	Min	Typ	Max	Unit
Measurement Range			±8		g
Bias instability[1]	@25℃, Allan Variance, 1σ		20		μg
Bias stability	GJB, 10s smoothing		55		μg
Bias Repeatability	GJB		2		mg
Resolution			0.122		mg
Misalignment between axes			0.04		deg
Internal low-pass cutoff frequency	Software Adjustable		34		Hz
ODR			100	1000	Hz
measure delay			7.8		ms
Bias over temperature	-40℃ ~ 85℃, ≤1℃/min @1σ		xy:1 z:2.5		mg
Random Walk	@25℃, Allan Variance, 1σ		0.04		m/s/√hr
scale coefficient error			0.5		‰
scale factor nonlinear	@25℃		200		ppm

Note 1: IEEE standard, given by the Allan Variance curve at a static environment of 25°C

Figure 1 Gyroscope Allan Variance Typical Curve

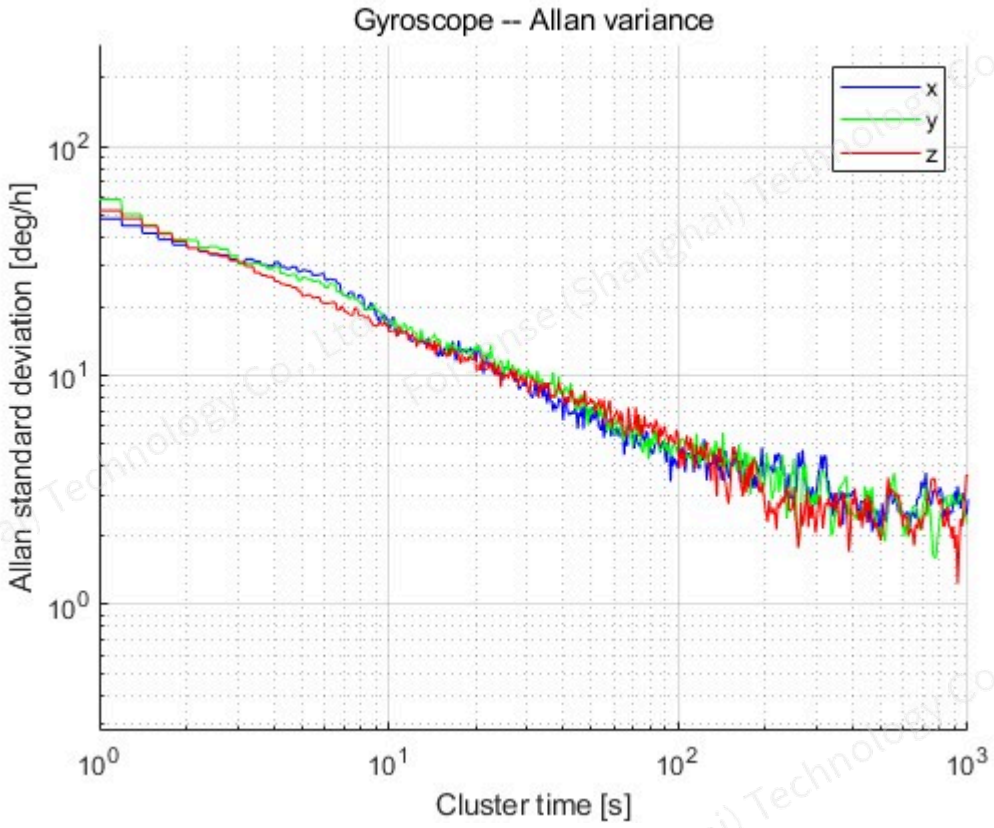
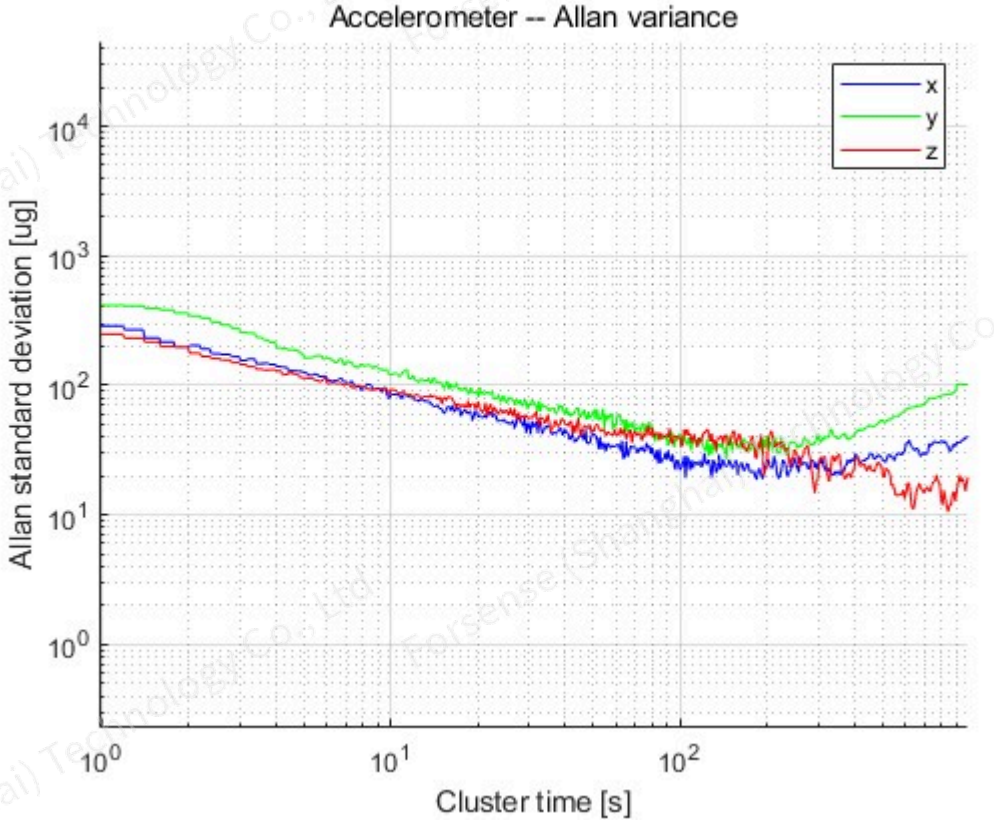


Figure 2 Accelerometer Allan Variance Typical Curve



2. Physical Dimensions

Figure 3 Outline Structure and Dimensions (Unit: mm)

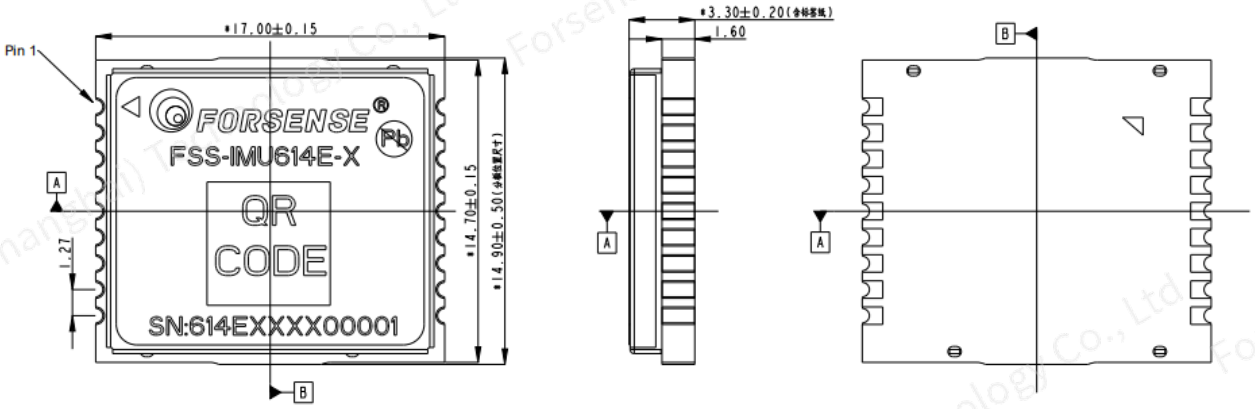
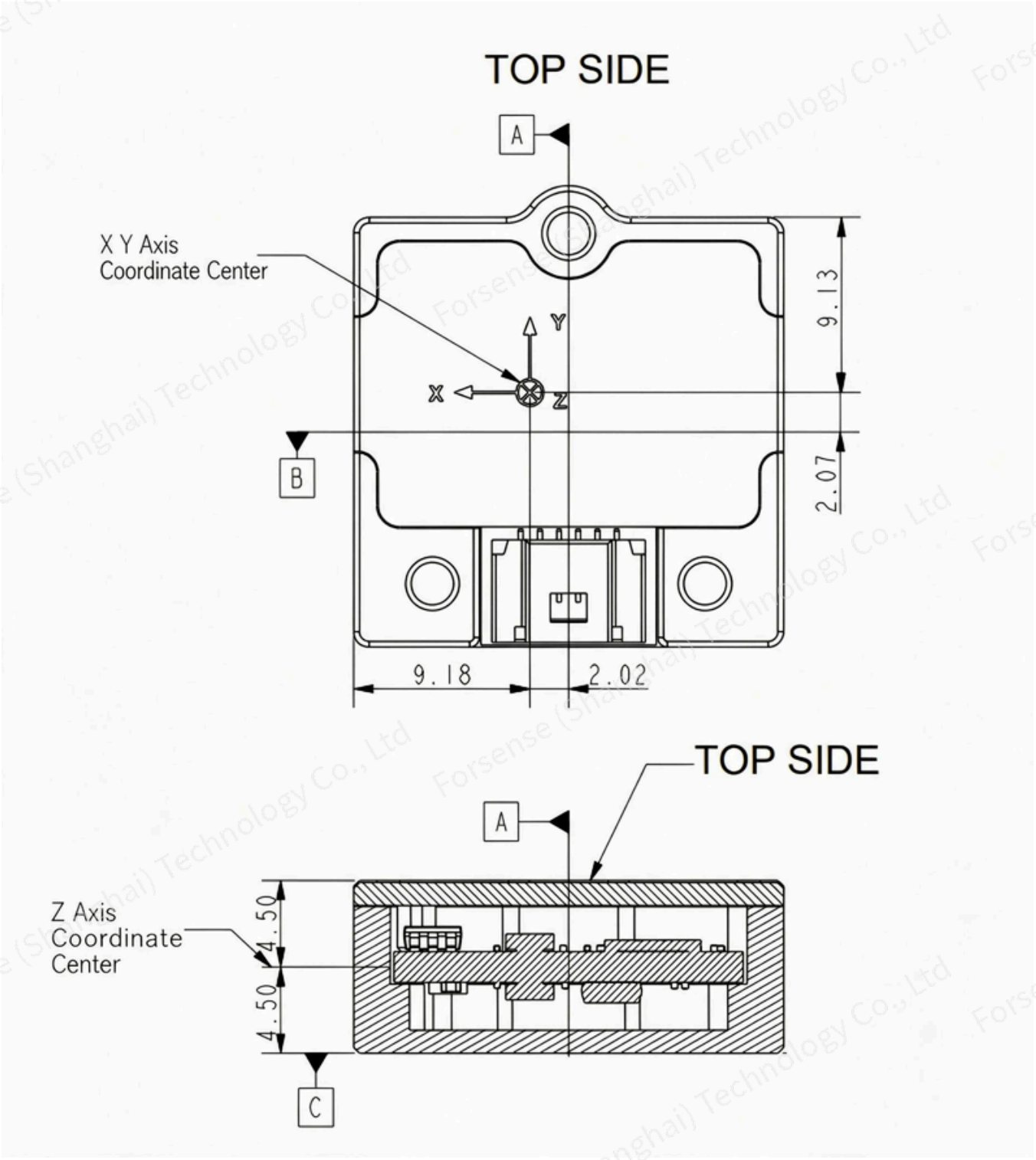


Figure 4 IMU Coordinate Center (Unit: mm)


TOP SIDE
A
X Y Axis
Coordinate Center
Y
X
Z
B
9.13
2.07
9.18
2.02
TOP SIDE
A
Z Axis
Coordinate
Center
4.50
4.50
C

3. Electrical Characteristics

3.1 Maximum Ratings

Table 3 Absolute Maximum Ratings

Parameter	Symbol	Range	Unit
supply voltage	VCC	-0.3 to 6.5	V
Ground (GND)	GND	-	-
Input Pin Voltage (Vin)	Vin	-0.3 to 5.8	V
Operating Temperature (Tot)	Tot	-40 to 85	℃
Storage Temperature (Tstg)	Tstg	-55 to 105	℃

3.2 Operating Conditions

Table 4 Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum Value	Unit
supply voltage	VIN	4.5	5	5.5	V
Max VIN Ripple	Vrpp		±40		mV
Power Consumption	P		0.12		W
Operating Temperature (Tot)	Tot	-40		85	℃
Storage Temperature (Tstg)	Tstg	-40		85	℃

Note: When the supply voltage exceeds 6V, the internal voltage protection circuit will cut off power and put the device into a reset state until the voltage returns to operating conditions, after which normal operation resumes.

4. Pin Definition

Docking Connector Model: MOLEX: 5013300600

Figure 5 Pin Schematic

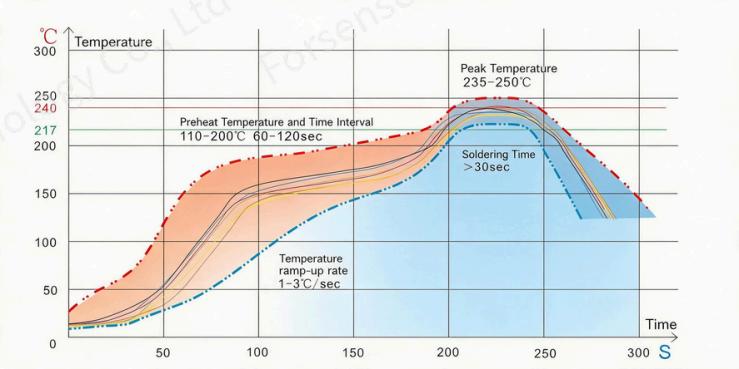


Table 5 Pin Definition

Pin No.	Pin Name	Pin Description	Wire Harness Color
1	VIN	+5V Power Input	Red
2	GND	Ground (GND)	Black
3	RX+	RS-422 Receive Positive	White
4	RX-	RS-422 Receive Negative	Brown
5	TX-	RS-422 TX Negative	Green
6	TX+	RS-422 TX Positive	Yellow

5. Communication Protocol

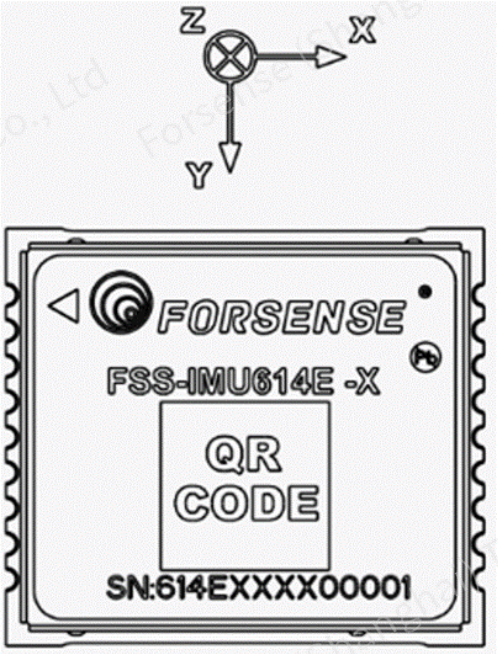
Reference Document Forsense IMU Communication Protocols（en）

Includes serial communication protocols, Coordinate System Settings, Filter Settings, Parameter Settings, OTA Update Method, Time Synchronization, etc.

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6. Coordinate System Definition

Figure6 Coordinate System Diagram



This product uses the Front-Right-Down (FRD) coordinate system. The Euler angle ranges are as follows:

Rotation about the Z-axis: Yaw angle Yaw range: 0° ~ 360°;

Rotation about the X-axis: Roll angle Roll range: -180° ~ 180°;

Rotation about the Y-axis: Pitch angle Pitch range: -90° ~ 90°.

7. Update History

Latest Manual Version: IMU16460-S_Datasheet_产品手册

Version	Date	Status/Notes
Version 1.0	2024.08.28	Initial Release
Version 1.1	2025.01.22	Revised figure and table numbering definitions
Version 1.2	2025.08.01	Simplified communication protocol
Version 1.3	2026.05.13	Update cutoff frequency and measure delay