

Super precision tactical MEMS

FSS-NS1_PRO Product Manual

MEMS IMU North-finder

- Up to 1.5 ° north finding accuracy (1σ) (dual rotation, 0-50 degree deviation)

Ultra high precision gyroscope - comparable to foreign high-end

- 0.25 °/h Bias instability

Super high low noise

- Low noise beyond fiber optic gyroscopes

Full temperature range stable operation

- -40 ~ 85℃ stable fine temperature compensation

Real-time and flexible digital interface, small size

- Ultra-small size: R28.8 x 330.5mm

Field of application

- Tunnel exploration and measurement
- Mapping of underground pipe network
- Tunnel/underground North-finder

On the basis of standard performance and output Parameter, FORSENSE also provides **customized software and LOGO customization** services for your special needs, to help you in the product!

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1. Performance parameters

1.1 Key indicators of gyroscope

Table 1 Key indicators of gyroscope

Parameters	Test conditions/Remarks	Minimum value	Typical value	Maximum value	Units
Measuring range			+ 500		°/s
Bias instability X axis ¹	@25 ° C, ALLAN variance 1 σ		0.35		°/hr
Bias instability Y-axis (North-finder axis)			0.25		°/hr
Z-axis of zero-bias instability (north-seeking axis)			0.25		°/hr
Non-orthogonal between axes			0.05		deg
Internal low-pass cutoff frequency	Software adjustable		47		Hz
ODR			100		Hz
Measuring delay				7.0	ms
Random Walk X axis ¹	@25 ° C, ALLAN variance 1 σ		0.04		°/√hr
Random walk Y axis			0.02		°/√hr
Random Walk Z-axis			0.02		°/√hr
scale coefficient error			1.0		‰

Note 1: IEEE standard, Allan variance curve given at static 25°C environment

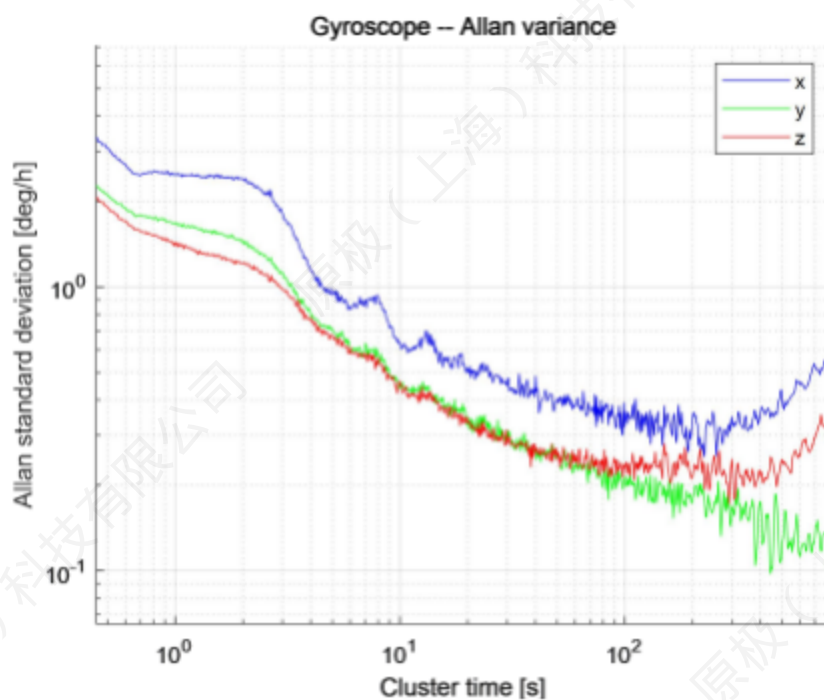
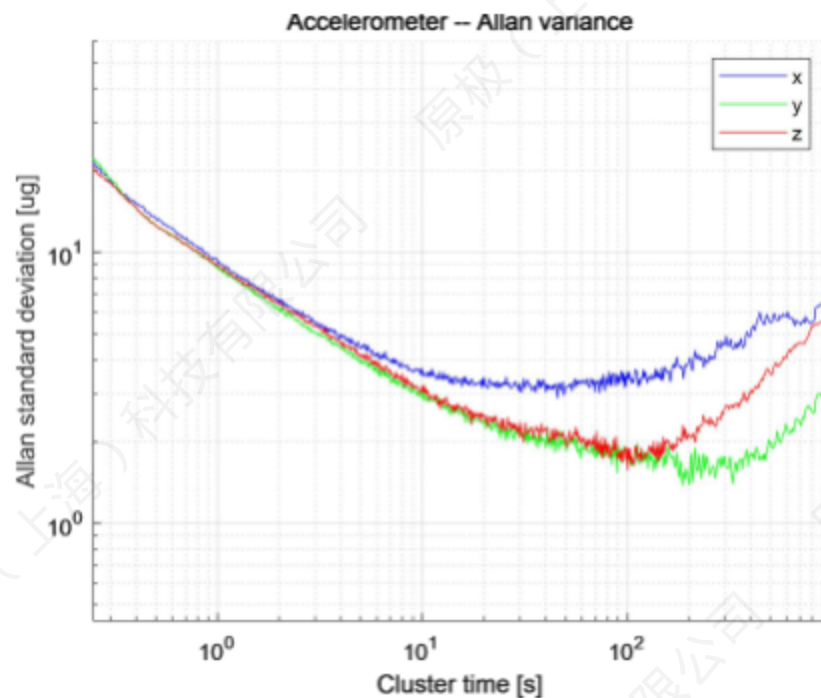
1.2 Key indicators of Accelerometer

Table 2 Key indicators of Accelerometer

Parameter	Test conditions/Remarks	Minimum value	Typical value	Maximum value	Units
Measurement Range			Plus or minus 6		g
Zero bias instability ¹	@25 ° C, ALLAN variance 1 σ		10		μg
Non-orthogonal between axes			0.05		deg
Internal low-pass cutoff frequency	Software adjustable		47		Hz
ODR			100		Hz
Measuring delay				7.0	ms
Random Walk X axis ¹	@25 ° C, ALLAN variance 1 σ		0.01		m/s/√hr
Random walk Y axis			0.01		m/s/√hr
Random walk Z axis			0.01		m/s/√hr

Note 1: IEEE standard, Allan variance curve given at static 25 ° C environment

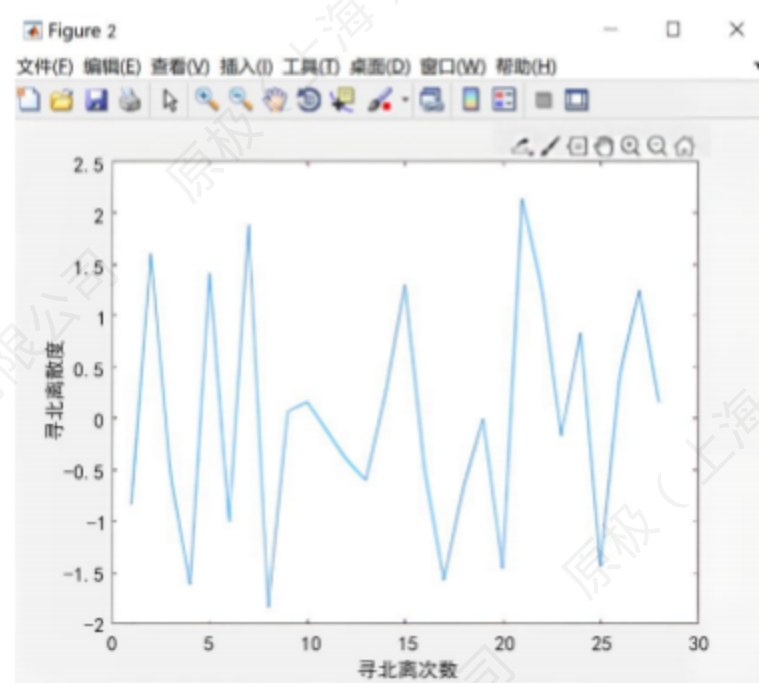
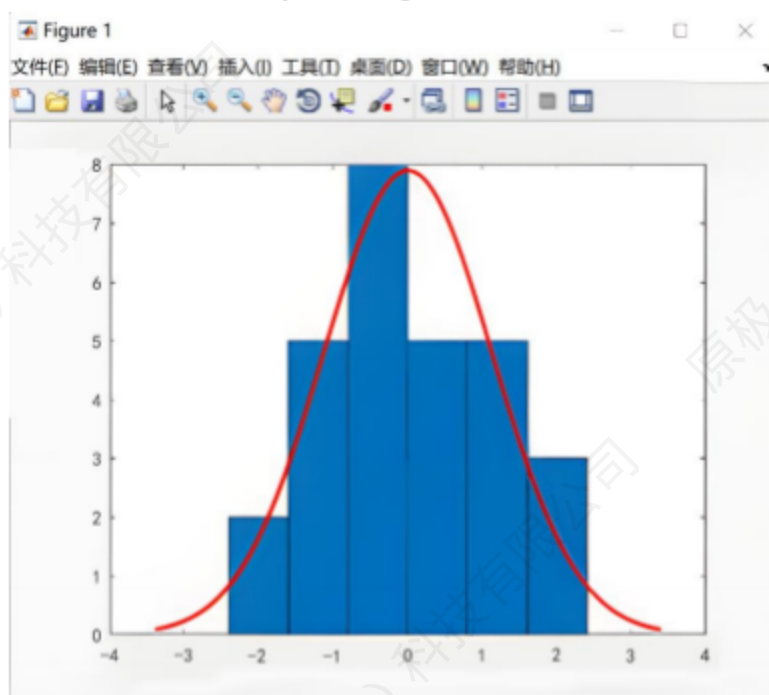
1.3 ALLAN Variance Typical Curve



2 Find north parameters

2.1 Repeated north finding test

Dual position counter rotation method, well inclination 30 degrees, each position static acquisition 30s 1σ accuracy =1.1 degrees



3 Electrical characteristics

3.1 Maximum tolerance value

Table 3 Maximum absolute rating

Parameters	Symbols	Radius	Units
Supply voltage	V _{IN}	-0.3 to 24	V
Power source	GND	-	-
Temperature for use	T _{ot}	-40 to 85	°C
Storage temperature	T _{stg}	-40 to 85	°C

3.2 Working Conditions

Table 4 Working conditions

argument	Symbols	Minimum value	Typical value	Maximum value	Units
Supply voltage	V _{IN}	9	12	24	V
Vin ripple	V _{rpp}		+ 40		mV
High Power	P		7.2		W
Low power consumption	P		2.0		W
Use temperature	T _{ot}	-40		85	°C
Storage temperature	T _{stg}	-40		85	°C

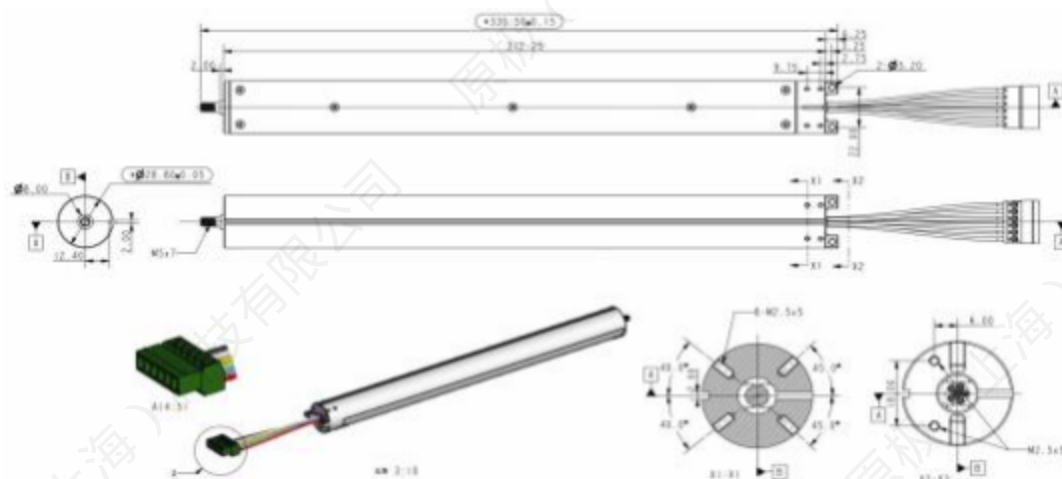
3.3 IO Threshold Characteristics

Table 5 I/O Threshold Characteristics

Parameters	Symbols	Minimum value	Typical value	Maximum value	Units
Input pin low	V _{in_low}	0		3.3 V * 0.2	V
Input pin high	V _{in_high}	3.3 V * 0.7		3.3 V to + 0.2	V
Output pin low	V _{out_low}	0		0.45	V
Output pin high	V _{out_high}	3.3 V - 0.45		3.3	V

4. Shape and structure

Figure 1 Outline structure and dimensions (unit: mm)

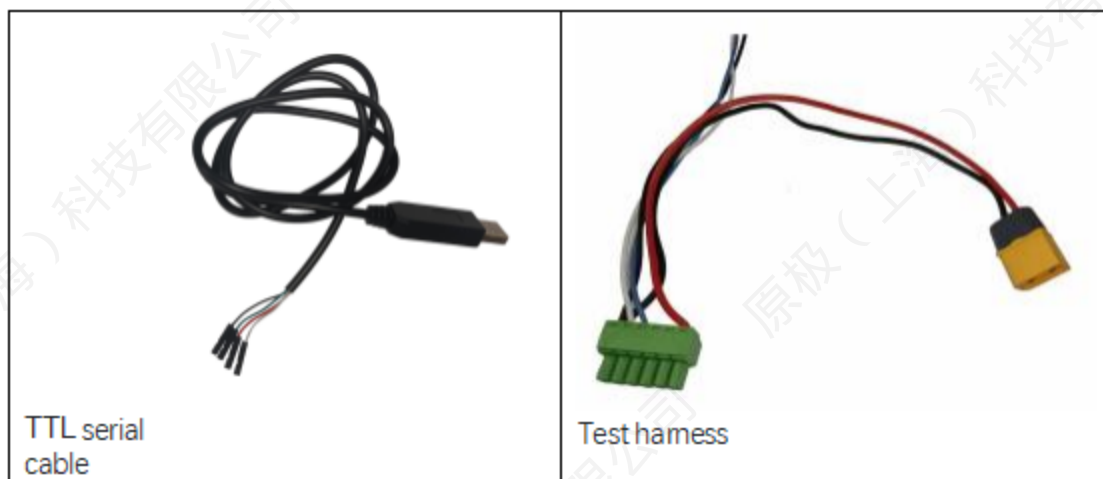


Note 1: Connector: Terminal block - male head, 3.81mm spacing, 6pin.

Table 6 Wiring harness definitions

Colors	Definition	Description	Remarks
red	V IN	Power input, 9-24V input	
blue	TX2	Serial 2 Output (LVTTTL)	
green	RX2	Serial port 2 Input (LVTTTL)	
yellow	TX1	Serial 1 Output (LVTTTL)	
white	RX1	Serial port 1 Input (LVTTTL)	
black	GND	Power ground	

5 Accessories



6 Update your records

Versions	Dates	Status/Comments
Version 1.0	2023.07.25	Initial issue
Version 1.1	2023.12.14	Add attachments
Version 1.2	2024.08.19	Modifying dimensional drawing