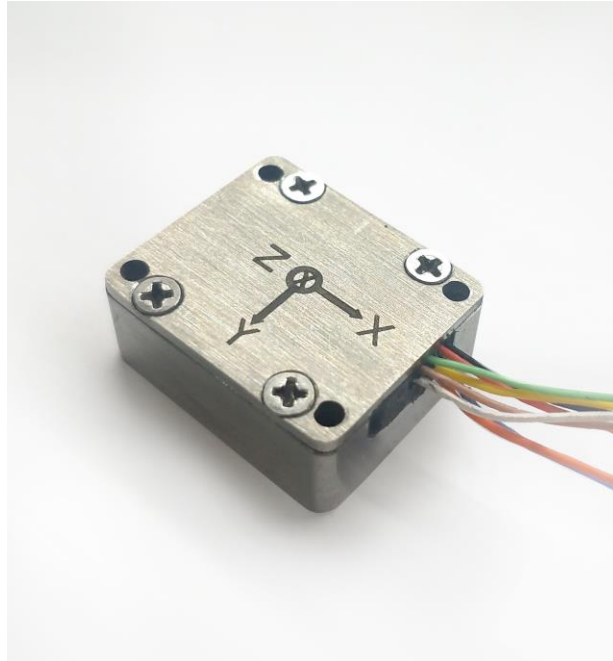# BS-GU30B-5-D3EW MEMS Three-Axis Gyro Operating Instructions

1. Product overview

BS-GU30B-5-D3EW is a three-axis gyroscope based on MEMS technology, which has built-in high-performance MEMS gyroscope and outputs three angular velocities.

BS-GU30B-5-D3EW features high reliability and strong environmental adaptability. By matching different software, the product can be widely used in seeker, tactical and industrial UAV, intelligent ammunition and other fields.

2. Product features

Three-axis digital gyroscope:

1) $\pm$ 500º/s dynamic measuring range;
2) Zero bias stability: 8 °/H (GJB, 10s), 1.9 °/H (ALLAN);
3) High reliability: MTBF > 20000h;
4) Guaranteed accuracy within the full temperature range (-40 ℃ ~ 80 ℃): built-in high-performance temperature calibration and compensation algorithm;
5) Suitable for working under strong vibration conditions;
6) Interface 1-way RS422

3. Field of application

1) Seeker
2) Tactical and Industrial UAV
3) Smart Munitions

4. Product indicators

Table 1 Technical Index

| Parameter			Test conditions	Typical value	Unit
Angular velocity	Range		Turntable	500	° /s
	Peak-to-peak value		Static test	0.15	° /s
	Zero bias	Stability	10 s average, + 70 ℃, + 20 ℃, -40 ℃	8	° /h
			Allan variance, + 20 ℃	1.9	° /h
		Start repeatability	+70℃、+20℃、-40℃	15	° /h
		Zero-bias total temperature variation	-40 ℃ ~ + 70 ℃, 1 ℃ /min, 10 s average, 1 σ	0.02	° /s
		Zero bias	Life-cycle change, accelerated testing	0.1	° /s
	Scale factor	Repeatability of successive starts	+70℃、+20℃、-40℃	100	ppm
		Daily start repeatability	+70℃、+20℃、-40℃	200	ppm
		Monthly Start Repeatability	+70℃、+20℃、-40℃	400	ppm
		Non-linearity	+20℃	200	ppm
		Full temperature change	1℃/min、1 σ	400	ppm
		Scale factor	Life-cycle change, accelerated testing	2000	ppm
	Acceleration sensitive term			5	° /h/g
	Random walk			0.12	° / √ hr
	Noise density			0.002	° /s/ √ Hz
	Bandwidth		3dB	200	Hz
	Data delay		Excluding transmission time	5ms	ms
Start time			Time from power-on to output valid data	500	ms
Reset time			Time from reset to output valid data (hard reset)	500	ms
			Time from reset to output valid data (soft reset)	300	ms
The degree of nonorthogonality between any two ax			+70℃、+20℃、-40℃	0.05	°
Power supply				5±0.1	V
Power consumption				0.8	W
Communication update rate			1-way RS422	200 (default) 2000 (Max)	Hz
Communication baud rate			1-way RS422	230.4 (default) 921.6 (Max)	kbps

5. Electrical interface

BS-GU30B-5-D3EW adopts 6PIN domestic connector with locking function for interconnection. The schematic diagram of interface definition is shown in the figure below, and the pin definition and specific functions are shown in the table below.
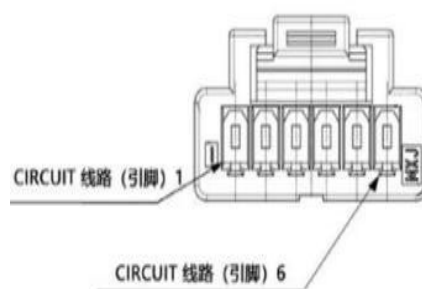
No.	Name	Function	IO	Color
1	+5V	Power supply input +5V±0 .5V，peak current≤ 100mA，	Input	Red
2	GND	GND	GND	Black
3	UART-TX	Communication serial port output, LVTTL3.3	Output	Green
4	UART-RX	Communication serial port input, LVTTL3.3	Input	White
5	SYNC	1PPS synchronous signal input, rising edge valid, pulse width ≥ 10 ms, LVTTL 3.3	Input	Purple
6	MCLR	Reset signal input, active low level, duration ≥ 20ms, LVTTL3.3	Input	Blue

6. Structure

size 22.4mm x 24mm x 9mm(±0.2mm) , weight 10g±2g。
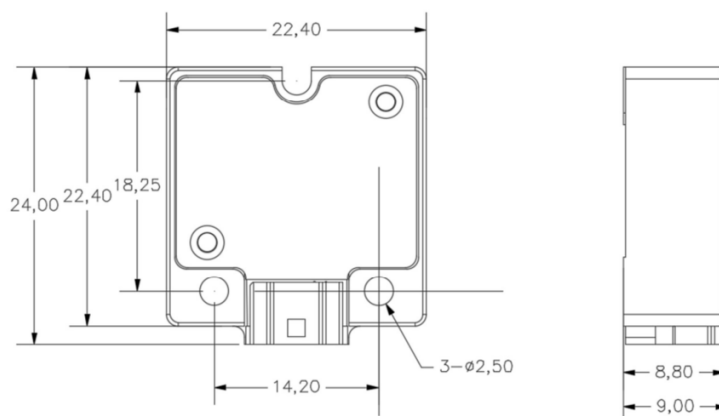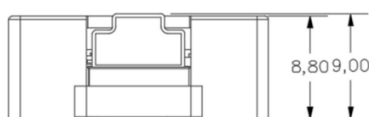
7.Instructions for use

7.1　UART reads and writes data

7.1.1 Interface

Default configuration: 230400bps, 8 data bits, 1stop bit, no parity;

7.1.2　Configuration commands

1) $GPENB

   Enable UART power-on automatic output
2) $GPDIS

   Close UART power-on automatic output
3) $GPSER

   View the serial number
4) $GPINF

   View configuration information

7.1.3　Protocol format

A protocol head, a protocol body and a protocol tail; 200Hz; The coordinate axis is defined as front right down.

Table 3 Software protocol table

Agreement	Byte sequence number	Data	Unit	Data type	Remark
Protocol header	0	0x5a			
	1	0x5a			
Protocol body	2~5	X-axis gyro	°/s	float	
	6~9	Y-axis gyro	°/s	float	
	10~13	Z-axis gyro	°/s	float	
	14~17	Spare			
	18~21	Spare			
	22~25	Spare			
	26~29	Spare			
	30~33	Spare			
	34~37	Spare			
	38~41	Spare			
	42~45	Spare			
	46~49	Temperature	℃	float	
	50~53	Spare			
	54~57	Spare			
End of agreement	58	Checksum			Accumulate and sum 2 to 57 bytes, take the low byte