

## BS-GU30B-5-D3EC MEMS Three-Axis Gyro Operating Instructions



### Product overview

BS-GU30B-5-D3EC 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-D3EC has 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.

### 1. Product features

Three-axis digital gyroscope:

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

### 2. Field of application

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

### 3. Product indicators

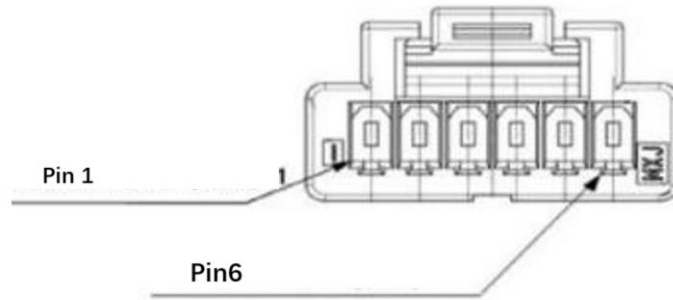
Table 1 Technical Index

Parameter		Test conditions	Typical value	Unit	
Angular velocity	Range	Turntable	500	$^\circ/\text{s}$	
	Peak-to-peak value		Static test	0.15	$^\circ/\text{s}$
	Zero bias	Stability	10 s average, $+70^\circ\text{C}$ , $+20^\circ\text{C}$ , $-40^\circ\text{C}$	8	$^\circ/\text{h}$
			Allan variance, $+20^\circ\text{C}$	1.9	$^\circ/\text{h}$
		Start repeatability	$+70^\circ\text{C}$ 、 $+20^\circ\text{C}$ 、 $-40^\circ\text{C}$	15	$^\circ/\text{h}$
		Zero-bias total temperature variation	$-40^\circ\text{C} \sim +70^\circ\text{C}$ , $1^\circ\text{C}/\text{min}$ , 10 s average, $1\sigma$	0.02	$^\circ/\text{s}$
		Zero bias	Life-cycle change, accelerated testing	0.1	$^\circ/\text{s}$
Scale	Repeatability of	$+70^\circ\text{C}$ 、 $+20^\circ\text{C}$ 、 $-40^\circ\text{C}$	100	ppm	

Parameter		Test conditions	Typical value	Unit
factor	successive starts			
	Daily start repeatability	+70°C、+20°C、-40°C	200	ppm
	Monthly Start Repeatability	+70°C、+20°C、-40°C	400	ppm
	Non-linearity	+20°C	200	ppm
	Full temperature change	1°C/min、1σ	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 up 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°C、+20°C、-40°C	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-D3EC 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.



Serial number	Name	Functional description	IO attribute
1	+5V	Power input + 5V $\pm$ 0.5V, peak current $\leq$ 100 mA,	Input
2	GND	Power ground	Ground
3	UART-TX	Communication serial port output, LVTTTL3.3	Output
4	UART-RX	Communication serial port input, LVTTTL3.3	Input

#### 4. Fabric interface

The BS-GU30B-5-D3EC has overall dimensions of 22.4mm X 24mm X 9mm ( $\pm$  0.2mm) and a weight of 10g  $\pm$  2g.

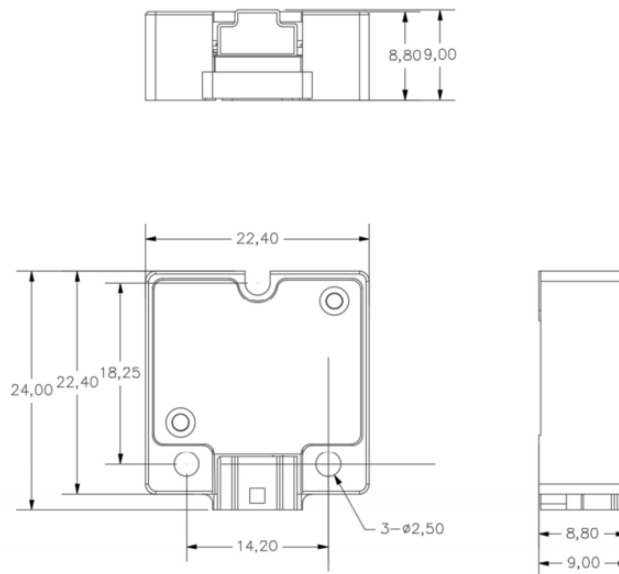


Fig. 2 Schematic Diagram of Structure Appearance

#### 5. Instructions for use

##### 5.1. UART reads and writes data

###### 5.1.1. Interface

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

###### 5.1.2. Configuration commands

- 1) \$GPENB  
Enable UART power-on automatic output
- 2) \$GPDIS  
Close UART power-on automatic output

3) \$GPSEER

View the serial number

4) \$GPINF

View configuration information

### 5.1.3. Protocol format

It is divided into protocol head, protocol body and protocol tail; 200 Hz; the coordinate axis is defined as front right bottom.

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	°C	float	
	50~53	Spare			
	54~57	Spare			
End of agreement	58	Checksum			Accumulate and sum 2 to 57 bytes, take the low byte