

BS-IC305-M-D6EC
High-precision inertial
measurement unit

Specifications
V1.01

I. Product Introduction

The BS-IC305-M-D6EC High Precision Inertial Measurement Unit is a compact, general-purpose 6-axis inertial measurement unit with angular velocity and acceleration measurement capabilities in three directions. Calibrated over the full temperature range and housed in stainless steel, the product delivers reliable inertial measurement performance for demanding applications. The product has the characteristics of ultra-small size, strong environmental adaptability, low power consumption, time synchronization and the like, and is suitable for the fields of automatic driving, unmanned aerial vehicle navigation control, satellite integrated navigation and the like.

二、 Specification parameters

1) Technical index

Table 1 Parameter table

| Gyroscopic index | | |
|--|-------------|---------------------|
| Range | ± 500 | $^{\circ}/s$ |
| Zero-bias stability (10 s smoothing, 1σ) | < 4 | $^{\circ}/h$ |
| Zero-bias instability (Allan variance) | ≤ 2 | $^{\circ}/h$ |
| Full temperature zero bias (10 s smoothing), 1σ | ≤ 0.01 | $^{\circ}/s$ |
| Scale error | ≤ 0.3 | $\%$ |
| Non-linearity | ≤ 30 | ppm |
| Cross coupling | ≤ 0.05 | $^{\circ}$ |
| Angular random walk | ≤ 0.2 | $^{\circ}/\sqrt{h}$ |
| -3db bandwidth | > 80 | Hz |

| | | |
|--|---|---------|
| Operating frequency | 200 | Hz |
| Accelerometer index | | |
| Range | ±16 | g |
| Zero-bias stability (10 s smoothing, 1 σ) | ≤0.05 | mg |
| Zero-bias instability (Allan variance) | ≤0.03 | mg |
| Full temperature zero bias (10 s smoothing, 1 σ) | ≤0.60 | mg |
| Scale error | ≤0.1 | % |
| Speed random walk | ≤0.02 | m/s/√hr |
| -3db bandwidth | >80 | Hz |
| Operating frequency | 200 | Hz |
| Electrical interface | | |
| Input voltage | DC: 5±0.5 | V |
| Operating current | ≤0.1 | A |
| External data interface | PPS *1, UART *1, CAN0 *1, CAN1 *1 | |
| Interface type | 10pin TTL serial communication, signal level 3.3 3V | |
| Structural dimensions | | |
| Weight | 26.2±1 | g |
| Overall dimensions | 30x30x10 | mm |
| Operating temperature | -40 ~ +85 | °C |
| Storage temperature | -40 ~ +95 | °C |

2) Product size and axial direction

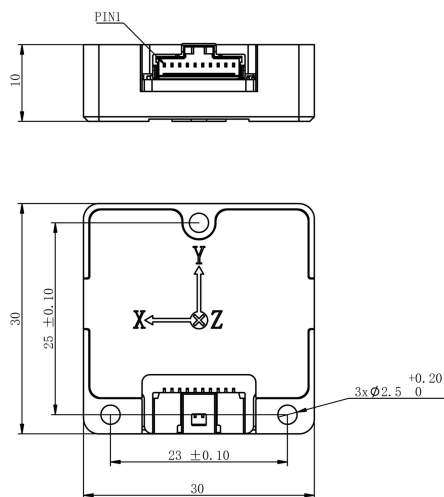


Fig. 1 Specification ruler and axial direction

3) Interface definition

The interface of the equipment adopts Molex-5015681007 connector. See Table 2 for specific definition. See Figure 1 for PIN1 of the connector.

Table 2 Interface Definition

| Pin | Definition | Explain | Remark |
|-----|------------|------------------------|----------------------------|
| 1 | POWER_5V | Power supply positive | DC 5V (4-6V) |
| 2 | PGND | Power ground | Power ground |
| 3 | Uart_Tx | Serial port sending | 3.3 V TTL level |
| 4 | Uart_Rx | Serial port receiving | 3.3 V TTL level |
| 5 | PPS | Pulse per second input | 3.3 V TTL level, rising ed |
| 6 | NC | - | Hanging in the air |
| 7 | CAN0_Tx | CAN0 transmit | 3.3 V TTL level |
| 8 | CAN0_Rx | CAN0 receive | 3.3 V TTL level |
| 9 | CAN1_Tx | CAN1 transmit | 3.3 V TTL level |
| 10 | CAN1_Rx | CAN1 receive | 3.3 V TTL level |

4) Communication protocol you

The communication interface is a UART serial port, the baud rate is 115200,1 the start bit, 1stop bit, no check bit, the output message frequency is 200Hz, and the data frame definition is as shown in Table 3.

Table 3 Frame Message

| Offset | Definition | Format | Length | Unit | Byte order | Explain |
|--------|------------|--------|--------|------------------|-------------|---------------------------------------|
| 0 | 0xAB | UChar | 1 | - | - | Header (fixed value) |
| 1 | 0x54 | UChar | 1 | - | - | Header (fixed value) |
| 2 | 0x8B | UChar | 1 | - | - | Function code (output data frame) |
| 3 | 0xXX | UChar | 1 | - | - | MEMS number, default 0x00 |
| 4-5 | 0xXX | UShort | 2 | | (LSB_first) | Length of data part |
| 6-9 | 0xXX | Ulong | 4 | | (LSB_first) | Timestamp in milliseconds |
| 10 | 0x00~FF | UChar | 1 | | | Incremental sequence number (0 ~ 255) |
| 11-14 | GyroX | Float | 4 | deg/s | (LSB_first) | Data section |
| 15-18 | GyroY | Float | 4 | deg/s | (LSB_first) | Data section |
| 19-22 | GyroZ | Float | 4 | deg/s | (LSB_first) | Data section |
| 23-26 | AcceX | Float | 4 | m/s ² | (LSB_first) | Data section |

| | | | | | | |
|-------|-------------|--------|---|------------------|-------------|---|
| 27-30 | AcceY | Float | 4 | m/s ² | (LSB_first) | Data section |
| 31-34 | AcceZ | Float | 4 | m/s ² | (LSB_first) | Data section |
| 35-36 | Temperature | Signed | 2 | °C | (LSB_first) | The data portion, Multiply by 200.0/327 68.0 |
| 37-38 | 0xXX | UShort | 2 | - | - | |
| 39-40 | 0xXX | UShort | 2 | - | (LSB_first) | CRC16 (0-38 bytes) |

CRC verification includes the verification of the entire message header and data segment. The protocol uses 16-bit CRC verification. The standard parameters for verification calculation are shown in Table 4.

Table 4 Standard Parameters for CRC Check Calculation

| | |
|-----------------------|---------|
| CRC result width | 16 bits |
| Polynomial | 1021h |
| Initial value | FFFFh |
| Input data reflected | No |
| Result data reflected | No |
| XOR value | 0000h |
| Check | 29B1h |
| Magic check | 0000h |