	Format	
Diskette	Fare Phase s S	
CAD	Mark	
	BS-IU30-M-D6EC	
	MEMS Inertial Measurement Unit Instruction	
	Manual	
Countersig	R2.900.006SM	
	编写	
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This instruction manual is the main reference document for the operation of BS-IU30-M-D6EC inertial measurement unit.

This manual is prepared in accordance with BS-IU30-M-D6EC Technical Conditions, BS-IU30-M-D6EC MEMS Inertial Measurement Unit Protocol and RJT-001 Technical Conditions for Inertial Measurement Unit and Triaxial Gyro Combination.

BS-IU30-M-D6EC inertial measurement unit can change the measurement accuracy and measurement range of the inertial sensor according to the user's requirements.

# 1 Product features and technical parameters

### 1.1 Composition and function

The MEMS Inertial Measurement Unit (IMU) consists of three-axis gyroscope, three-axis accelerometer, temperature sensor, signal processing board, structure and necessary software, and is used to measure the three-axis angular rate, three-axis acceleration and three-axis inclination of the carrier. And output that data of the gyroscope and the loading table aft error compensation (including temperature compensation, installation misalignment angle compensation, nonlinear compensation and the like) through an RS-422 serial port according to an agreed communication protocol.

1.2 Main technical parameters

# 1.2.1 Gyroscope specifications

Parameter	Unit	BS-IU30-M-D6EC
Measuring range (customizable)	°/s	±200
Bias stability (@ Allan variance)	°/h	0.2
Bias stability (10 s smoothing, $1\sigma$ , room	°/h	0.5
temperature)		
Bias error over full temperature range	°/h	2.5
Random walk	°/√h	0.02
Bias repeatability	°/h	1
Zero bias acceleration sensitivity	°/h/g	1

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Diskette			<del></del>	1
		Resolution	°/h	2
CAD		Scale factor nonlinearity	ppm	100
		Scale factor repeatability	ppm	100
		Cross coupling	%	0.2
		Bandwidth	Hz	100
	1.2.2	Add table technical indicator	rs	·
		Parameter	Unit	BS-IU30-M-D6EC
		Measuring range (customizable)	g	±30
		Bias stability (Allan Variance @ 25 °C)	ug	30
		Bias stability (1s smoothing)	ug	700
	Í	Bias error over full temperature range	mg	1.5
	Í	Random walk	m/s/√h	0.01
		Bias repeatability	mg	2
		Scale factor repeatability	ppm	200
		Scale factor nonlinearity	ppm	200
		Cross coupling	%	0.2
		Bandwidth	Hz	100
	1.2.3	Electrical characteristics		

Parameter	Unit	BS-IU30-M-D6EC
Voltage	V	5
Power consumption	W	1.5
Ripple	mV	100

# 1.2.4 Environmental adaptability

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Parameter	Unit	BS-IU30-M-D6EC
Operating temperature	°C	-45~85
Storage temperature	°C	-60~105
Vibration		10~2000Hz, 6.06g

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Base	map				BS-IU30-M-D6EC	R2.900.006SM
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Diskette				
		Impact		15000g,4ms
CAD	1.2.5	Other		
		Parameter	Unit	BS-IU30-M-D6EC
		Weight	g	120
		1		

# 2.1 Right Hand Rule Principle 1

The MEMS IMU contains three axial spatial coordinate systems, namely X, Y and Z. The X axis points to the top surface of the IMU, the Y axis points to the direction of the electrical connection interface, and the Z axis refers to the right side of the IMU, as shown in Figure 2-1.



Figure 2-1 Space Coordinate System of Inertial Measurement Unit

The installation of the inertial measurement unit should match the axial direction of the coordinate system, otherwise the measured angular velocity data is not accurate. The axis of the coordinate system can be quickly assigned and determined by following the "right-hand rule principle 1". Stretch out the right hand and spread out the thumb, index finger and middle finger respectively. The direction of the thumb is the X axis, the direction of the index finger is the Y axis, and the direction of the middle finger is the Z

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Diskette axis, as shown in Figure 2-2. CAD Figure 2-2 Right Hand Rule Principle 1 2.2 Right hand rule principle two The three-degree-of-freedom gyroscope in the inertial measurement unit can measure the angular velocity in three directions. The direction of the angular velocity of the axial rotation of the coordinate axis can be quickly determined by following the'righthand rule principle 2'. Stretch out the right hand and spread out the thumb. The direction of the thumb is the axial direction, and the direction of the other four fingers is the angular velocity of the axial rotation of the thumb, as shown in Figure 2-3. Figure 2-3 Right Hand Rule Principle 2 Structural installation 3 Refer to Figure 3-1 for outline drawing of BS-IU30-M-D6EC inertial measurement unit. Tracing Trace Old base map Base map BS-IU30-M-D6EC R2.900.006SM Page 19 No. 5 Page Mark Change order Signature,



3	Rx+	The product receives RS422	
4	Rx-		
5	GND	Power ground	
6	+5V	Power supply positive	
7	EXT	External trigger, 3.3 V TTL level, falling edge active	
8,9	NC	Hanging in the air	



Figure 4-1 J30J-9ZK Node Distribution Diagram

### Communication interface 5

Diskette

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# 5.1 Configurable parameters

The product communication protocol can be configured through the upper computer software, and the configurable parameters are shown in Table 5-1 below.

		Parameter		Configuration va	alue	Explain
Data frame		'Gyro 'G 'Gyro + 'Gyro + 'Gyro + plus n 'Gyro + ti 'Gyro + plus n	Gyro data frame (ID = 0x90) 'Gyro + Add Table 'data frame (ID = 0x91) 'Gyro + Tilt 'data frame (ID = 0x92) 'Gyro + Add Table + Tilt 'data frame (ID = 0x93) 'Gyro + Temperature 'data frame (ID = 0x94) 'Gyro + plus meter + temperature 'data frame (ID = 0 xA5) 'Gyro + tilt + temperature 'data frame (ID = 0 xA6) 'Gyro + plus meter + tilt + temperature 'data frame (ID = 0 xA7)		See Section 5.3 for the specific data frame format, and you can choose one of them to send. See Table 5-2 for the relationship between data frame, baud rate and update rate.	
		RS422 baud rate		460800bps 921600bps		Refer to Table 5-2 for baud rate limit conditions.
		RS422 check digit		NONE (no check) ODD (odd parity) EVEN (even parity)		
		RS422 stop bit		1 bit 2 bits		
			-3dB	frequency	Group Delay (ms)	)
Tracing				16Hz	23.4	independent of the data
IIacing		Low-pass filter bandwidth		33Hz 66Hz	11.7	update rate.
		oundernam	1	131Hz	5.9	The low-pass filter is a
Trace			2	262Hz	1.6	second-order IIK.
		Data update rate		125Hz 250Hz		Refer to Table 5-2 for data update rate
l base map						
use map				BS-IU30-	M-D6EC	R2.900.006SM
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Table 5-1 Product Configurable Parameters

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	500Hz	restrictions.
	1000Hz	
Restore factory	Restore factory settings	
settings	Restore factory settings and save	

# 5.2 Communication interface

It communicates with the processing circuit unit through the serial communication interface and adopts the RS-422 standard. Both the transmission baud rate and the data update rate can be configured by software. Table 5-2 shows the maximum data update rate corresponding to the transmission baud rate.

In the default state of the product, the communication protocol is: baud rate 921 600bps, 8 data bits, 1stop bit, no check bit, 0xA5 data frame, update rate 1000Hz.

Table 3-2 Maximum Data Optiate Kate				
Baud rate Data frame format	460800 bit/s	921600 bit/s		
Gyro data frame (0x90)	1000Hz	1000 Hz		
'Gyro + Add Table 'data frame (0 x91)	1000 Hz	1000 Hz		
'Gyro + Tilt 'data frame (0x92)	1000 Hz	1000 Hz		
'Gyro + plus meter + tilt 'data frame (0x93)	1000 Hz	1000 Hz		
'Gyro + Temperature 'data frame (0x94)	1000 Hz	1000 Hz		
'Gyro + plus meter + temperature 'data frame (0 xA5)	500 Hz	1000 Hz		
'Gyro + tilt + temperature 'data frame (0 xA6)	500 Hz	1000 Hz		
'Gyro + plus meter + tilt + temperature 'data frame (0 xA7)	500 Hz	1000 Hz		

# 5.3 Data frame format

The inertial measurement unit sends data frames in each cycle. The data format can be configured by referring to the corresponding data frame format in the operating instructions of the supporting upper computer. All formats are shown in the following table.

Table 5-2 Data Frame Format of Gyro

		Seri al num ber	Parameter n	ame	Effective range	Ву	yte	Scale		Remark
		1	Frame hea	der	0x90	1	1			Packet header
Tracing		2							Unit: (/s	s, from high to low, the most
			X-axis ang	ular	[-200, 200	0] 3	3	2 <sup>-14</sup>	significan	t bit of the first byte is the sign
Trace			velocity	T					bit. See No	ote 1 for the specific algorithm.
01d base map										
Base map						E	3S-2	IU30-M-D	6EC	R2.900.006SM
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3	Y-axis angular velocity	[-200, 200]	3	2 <sup>-14</sup>	Unit: (/s, from high to low, the most significant bit of the first byte is the sign bit. See Note 1 for the specific algorithm.
4	Z-axis angular velocity	[-200, 200]	3	2 <sup>-14</sup>	Unit: (/s, from high to low, the most significant bit of the first byte is the sign bit. See Note 1 for the specific algorithm.
5	Gyro status		1		All zeros are normal. See Table 5-10 for specific definitions.
6	Frame counter	[0, 255]	1	1	0-255 continuous count
7	Delay		2		Unit: us, first high and then low, the most significant bit of the first byte is the sign bit. See Note 5 for the specific algorithm.
8	CRC32		4		CRC32 verification, see instruction 6

Table 5-3 Data Frame Format of "Gyro + Add Table"

	Seri al num ber	Parameter name	Effective range	Byte	Scale		Remark
	1	Frame header	0x91	1			Packet header
	2	X-axis angular velocity	[-200, 200]	] 3	2 <sup>-14</sup>	Unit: (/ significan bit. See N	s, from high to low, the most t bit of the first byte is the sign ote 1 for the specific algorithm.
	3	Y-axis angular velocity	[-200, 200]	] 3	2 <sup>-14</sup>	Unit: (/ significan bit. See N	s, from high to low, the most t bit of the first byte is the sign ote 1 for the specific algorithm.
	4	Z-axis angular velocity	[-200, 200]	] 3	2 <sup>-14</sup>	Unit: (/ significan bit. See N	s, from high to low, the most t bit of the first byte is the sign ote 1 for the specific algorithm.
	5	Gyro status		1		All zeros	are normal. See Table 5-10 for specific definitions.
	6	X-axis acceleration	[-10, 10]	3	$2^{-19}$ $2^{-18}$	Unit: G, f significan	irst high and then low, the most t bit of the first byte is the sign
Tracing			[-50, 50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
	7		[-10, 10]		2 <sup>-19</sup>	Unit: G, f	irst high and then low, the most
Trace		Y-axis acceleration	[-30, 30]	3	2 <sup>-18</sup>	significan	t bit of the first byte is the sign
			[-50, 50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
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Base map				BS	S-IU30-M-	D6EC	R2.900.006SM

Page 19 No. 9 Page

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8		[-10, 10]		2 <sup>-19</sup>	Unit: G, first high and then low, the most
	Z-axis acceleration	[-30, 30]	3	2 <sup>-18</sup>	significant bit of the first byte is the sign
		[-50, 50]		2 <sup>-17</sup>	bit. See Note 2 for the specific algorithm.
9	Add table status		1		All zeros are normal. See Table 5-10 for specific definitions.
10	Frame counter	[0, 255]	1	1	0-255 continuous count
11	Delay		2		Unit: us, first high and then low, the most significant bit of the first byte is the sign bit. See Note 5 for the specific algorithm.
12	CRC32		4		CRC32 verification, see instruction 6

# Table 5-4 Format of 'Gyro + Tilt' Data Frame

Seri al num ber	Parameter name	Effective range	Byte	Scale	Remark
1	Frame header	0x92	1		Packet header
2	X-axis angular velocity	[-200, 200]	3	2 <sup>-14</sup>	Unit: (/s, from high to low, the most significant bit of the first byte is the sign bit. See Note 1 for the specific algorithm.
3	Y-axis angular velocity	[-200, 200]	3	2 <sup>-14</sup>	Unit: (/s, from high to low, the most significant bit of the first byte is the sign bit. See Note 1 for the specific algorithm.
4	Z-axis angular velocity	[-200, 200]	3	2 <sup>-14</sup>	Unit: (/s, from high to low, the most significant bit of the first byte is the sign bit. See Note 1 for the specific algorithm.
5	Gyro status		1		All zeros are normal. See Table 5-10 for specific definitions.
6	X-axis inclination	[-1.7, 1.7]	3	2 <sup>-22</sup>	Unit: G, first high and then low, the most significant bit of the first byte is the sign bit. See Note 3 for the specific algorithm.
7	Y-axis inclination	[-1.7, 1.7]	3	2-22	Unit: G, first high and then low, the most significant bit of the first byte is the sign bit. See Note 3 for the specific algorithm.
8	Z-axis inclination	[-1.7, 1.7]	3	2 <sup>-22</sup>	Unit: G, first high and then low, the most significant bit of the first byte is the sign bit. See Note 3 for the specific algorithm.

Tracing

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Old base map

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Mark

Change order

Signature,

Base

BS-IU30-M-D6EC

R2.900.006SM

Page 19 No. 10 Page

	1	9					All zeros	are normal. See Table 5-10 for
CAD			Inclination state		1			specific definitions.
on		10	Frame counter	[0, 255]	1	1	0	0-255 continuous count
	1	11					Unit: us, f	first high and then low, the most
			Delay		2		significar	nt bit of the first byte is the sign
							bit. See N	ote 5 for the specific algorithm.
		12	CRC32		4		CRC32	verification, see instruction 6
			Table	5-5 Data Fram	e Format o	of 'Gyro + Ad	ld Table + I	Dip Angle'
		Seri						
		al	Deremator name	Effective	Duto	Saala		Domork
		num	I arameter name	range	Byte	Scale		Kennark
		ber						
		1	Frame header	0x93	1			Packet header
		2	V avia an1-				Unit: (/	/s, from high to low, the most
				[-200, 200]	3	2 <sup>-14</sup>	significar	nt bit of the first byte is the sign
			velocity				bit. See N	ote 1 for the specific algorithm.
		3	X7 · 1				Unit: (/	/s, from high to low, the most
			Y-axis angular	[-200, 200]	3	$2^{-14}$	significar	nt bit of the first byte is the sign
			velocity				bit. See N	ote 1 for the specific algorithm.
		4					Unit: (/	/s, from high to low, the most
			Z-axis angular	[-200, 200]	3	2 <sup>-14</sup>	significar	nt bit of the first byte is the sign
			velocity				bit. See N	ote 1 for the specific algorithm.
		5	_				All zeros	are normal. See Table 5-10 for
			Gyro status		1			specific definitions.
		6		[-10, 10]		2-19	Unit: G, f	irst high and then low, the most
			X-axis acceleration	[-30, 30]	3	2 <sup>-18</sup>	significar	nt bit of the first byte is the sign
				[-50, 50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
		7		[-10, 10]		2-19	Unit: G, f	irst high and then low, the most
			Y-axis acceleration	[-30, 30]	3	2-18	significar	nt bit of the first byte is the sign
				[-50, 50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
		8		[-10, 10]		2 <sup>-19</sup>	Unit: G. f	irst high and then low the most
			Z-axis acceleration	[-30, 30]	3	2-18	significar	nt bit of the first byte is the sign
				[-50, 50]		2 <sup>-17</sup>	bit. See N	lote 2 for the specific algorithm.
Tracing	1	9			1		All zeros	are normal. See Table 5-10 for
			Auu table status		1			specific definitions.
Trace								
1 1 1								
ld base map			1	I				
Base man	┫──┤				Da	11120 1 4 1		D2 000 0065M
Jase map					R2-	1U3U-M-I	DOEC	K2.900.0005M
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	I TTTTTT	Shang	0~ ~ ~ ~ ~   UIB				-	1

Diskette		10					Unit <sup>.</sup> G f	irst high and then low the most
		10	X-avis inclinatio	n [_17 17]	3	2-22	significar	at bit of the first byte is the sign
CAD			X-axis inclinatio		5	2	bit See N	late 3 for the specific algorithm
		11						
		11	Vi. in alimatia		2	2-22	Unit: G, I	itst nign and then low, the most
			Y-axis inclination	n [-1./, 1./]	3	Ζ 22	significar	It bit of the first byte is the sign
							bit. See N	ote 3 for the specific algorithm.
		12					Unit: G, f	irst high and then low, the most
			Z-axis inclination	n [-1.7, 1.7]	3	2 <sup>-22</sup>	significar	nt bit of the first byte is the sign
							bit. See N	ote 3 for the specific algorithm.
		13	Inclination state		1		All zeros	are normal. See Table 5-10 for
								specific definitions.
		14	Frame counter	[0, 255]	1	1	(	0-255 continuous count
		15					Unit: us, t	first high and then low, the most
			Delay		2		significar	nt bit of the first byte is the sign
							bit. See N	ote 5 for the specific algorithm.
		16	CRC32		4		CRC32	verification, see instruction 6
			Γ	Table 5-6 Forr	nat of 'Gyr	o + Temperat	ure' Data Fi	ame
		Seri						
		al	Parameter name	Effective	Byte	Scale		Remark
		num		range	Byte	Source		roman
		ber						
		1	Frame header	0x94	1			Packet header
		2	V				Unit: (/	/s, from high to low, the most
				[-200, 200]	] 3	2 <sup>-14</sup>	significar	nt bit of the first byte is the sign
			velocity				bit. See N	ote 1 for the specific algorithm.
		3	V 1				Unit: (/	/s, from high to low, the most
			Y-axis angular	[-200, 200]	] 3	2 <sup>-14</sup>	significant bit of the first byte is the sign	
			velocity				bit. See N	ote 1 for the specific algorithm.
		4					Unit: (/	/s, from high to low, the most
			Z-axis angular	[-200, 200]	] 3	2 <sup>-14</sup>	significar	nt bit of the first byte is the sign
			velocity				bit. See N	ote 1 for the specific algorithm.
		5					All zeros	are normal. See Table 5-10 for
			Gyro status		1			specific definitions.
Tracing		6					Unit: °	C, from high to low, the most
~			X-axis gyro	[-128, 128]	] 2	2 <sup>-8</sup>	significar	nt bit of the first byte is the sign
Traco			temperature				bit. See N	ote 4 for the specific algorithm.
Trace			<u> </u>	I	I		1	
1								1
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	1	7	V-avis our	20				Unit: °	C, from high to low, the most
CAD	1		temperatur	0 	[-128, 128]	2	2 <sup>-8</sup>	significan	t bit of the first byte is the sign
ChD	1		temperatur	e				bit. See N	ote 4 for the specific algorithm.
	-	8	T (	67				Unit: °	C, from high to low, the most
			i emperature o	51 Z-	[-128, 128]	2	2 <sup>-8</sup>	significan	t bit of the first byte is the sign
			axis gyrosco	ope				bit. See N	ote 4 for the specific algorithm.
		9	Gyro Thermor	neter				All zeros	are normal. See Table 5-10 for
			Status			1			specific definitions.
		10	Frame coun	ter	[0, 255]	1	1	0	-255 continuous count
		11						Unit: us, f	irst high and then low, the most
			Delay			2		significan	t bit of the first byte is the sign
								bit. See N	ote 5 for the specific algorithm.
		12	CRC32			4		CRC32	verification, see instruction 6
			011002					011002	
			Та	ıble 5-	7 Data Frame	e Format o	f 'Gyro + Ado	l Table + Te	mperature'
		Seri							
		al	Parameter na	ame	Effective	Byte	Scale		Remark
		num			range				
		ber							
		1	Frame head	ler	0xA5	1			Packet header
		2	V avia an au	100				Unit: (/	s, from high to low, the most
			A-axis angu	llar	[-200, 200]	3	2 <sup>-14</sup>	significan	t bit of the first byte is the sign
			velocity					bit. See N	ote 1 for the specific algorithm.
		3		1				Unit: (/	s, from high to low, the most
			Y-axis angu	lar	[-200, 200]	3	2 <sup>-14</sup>	significan	t bit of the first byte is the sign
			velocity					bit. See N	ote 1 for the specific algorithm.
		4		1				Unit: (/	s, from high to low, the most
			Z-axis angu	lar	[-200, 200]	3	2 <sup>-14</sup>	significan	t bit of the first byte is the sign
			velocity					bit. See N	ote 1 for the specific algorithm.
		5						All zeros	are normal. See Table 5-10 for
			Gyro statu	IS		1			specific definitions.
		6			[-10, 10]		2 <sup>-19</sup>	Unit: G, f	irst high and then low, the most
			X-axis acceler	ration	[-30, 30]	3	2 <sup>-18</sup>	significan	t bit of the first byte is the sign
					[-50, 50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
Tracing		7			[-10, 10]		2 <sup>-19</sup>	Unit: G. f	irst high and then low, the most
11001115	-		Y-axis acceler	ation	[-30, 30]	3	2 <sup>-18</sup>	significan	t bit of the first byte is the sign
<b>T</b>	-				[-50, 50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
Trace	-	8	Z-axis acceler	ation	[-10. 10]	3	2-19	Unit: G f	irst high and then low. the most
						5	-	5 0,1	
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CAD				[-30, 30]	_	2 <sup>-18</sup>	significar	nt bit of the first byte is the sign
	1			[-50, 50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
		9	Add table stat	us	1		All zeros	are normal. See Table 5-10 for specific definitions.
		10	X-axis gyro temperature	[-128, 128	] 2	2 <sup>-8</sup>	Unit: ° significar bit. See N	C, from high to low, the most nt bit of the first byte is the sign lote 4 for the specific algorithm.
		11	Y-axis gyro temperature	[-128, 128	] 2	2 <sup>-8</sup>	Unit: ° significar bit. See N	C, from high to low, the most at bit of the first byte is the sign lote 4 for the specific algorithm.
		12	Temperature of axis gyroscop	f Z- [-128, 128]	] 2	2 <sup>-8</sup>	Unit: ° significar bit. See N	C, from high to low, the most nt bit of the first byte is the sign lote 4 for the specific algorithm.
		13	Gyro Thermom Status	eter	1		All zeros	are normal. See Table 5-10 for specific definitions.
		14	X-axis plus surf temperature	face [-128, 128	] 2	2 <sup>-8</sup>	Unit: ° significar bit. See N	C, from high to low, the most at bit of the first byte is the sign lote 4 for the specific algorithm.
		15	Y-axis plus surf temperature	face [-128, 128]	] 2	2 <sup>-8</sup>	Unit: ° significar bit. See N	C, from high to low, the most nt bit of the first byte is the sign lote 4 for the specific algorithm.
		16	Z-axis plus surf temperature	face [-128, 128	] 2	2 <sup>-8</sup>	Unit: ° significar bit. See N	C, from high to low, the most nt bit of the first byte is the sign lote 4 for the specific algorithm.
		17	Add thermome status	eter	1		All zeros	are normal. See Table 5-10 for specific definitions.
		18	Frame counte	er [0, 255]	1	1	(	0-255 continuous count
		19	Delay		2		Unit: us, t significar bit. See N	first high and then low, the most nt bit of the first byte is the sign lote 5 for the specific algorithm.
		20	CRC32		4		CRC32	verification, see instruction 6
				Table 5-8 Format	t of 'Gyro +	Tilt + Tempe	erature' Data	a Frame
Tracing	-	Seri al num ber	Parameter nan	ne Effective range	Byte	Scale		Remark
		1	Frame heade	er 0xA6	1			Packet header
Trace	-			L	I			
Trace base map								
Trace 1 base map								
Trace 1 base map 1se map					BS	-IU30-M-	D6EC	R2.900.006SM

DISKette		2					Unit: (/	/s, from high to low, the most
			X-axis angular	[-200, 200]	3	$2^{-14}$	significar	nt bit of the first byte is the sign
CAD			velocity	[ , ]		-	bit. See N	ote 1 for the specific algorithm.
		3					Unit: ()	/s. from high to low, the most
		5	Y-axis angular	[-200, 200]	3	$2^{-14}$	significar	the first byte is the sign
			velocity	[ 200, 200]	U U	-	bit See N	lote 1 for the specific algorithm
		4					Unit: ()	/s. from high to low the most
		-	Z-axis angular	[-200 200]	3	2-14	significar	at hit of the first byte is the sign
			velocity	[-200; 200]	5	2	bit See N	late 1 for the specific algorithm
		5						ore normal. See Table 5.10 for
		5	Gyroscope status		1		All Zeros	are normal. See Table 3-10 for
		-						specific definitions.
		6				- 22	Unit: G, f	first high and then low, the most
			X-axis inclination	[-1.7, 1.7]	3	2-22	significar	nt bit of the first byte is the sign
							bit. See N	ote 3 for the specific algorithm.
		7					Unit: G, f	first high and then low, the most
			Y-axis inclination	[-1.7, 1.7]	3	2 <sup>-22</sup>	significar	nt bit of the first byte is the sign
							bit. See N	ote 3 for the specific algorithm.
		8					Unit: G, f	irst high and then low, the most
			Z-axis inclination	[-1.7, 1.7]	3	2-22	significar	nt bit of the first byte is the sign
							bit. See N	ote 3 for the specific algorithm.
		9	Inclination state		1		All zeros	are normal. See Table 5-10 for
			mennation state		1			specific definitions.
			V ·				Unit: °	C, from high to low, the most
		10	A-axis gyro	[-128, 128]	2	2 <sup>-8</sup>	significar	nt bit of the first byte is the sign
			temperature				bit. See N	ote 4 for the specific algorithm.
		11					Unit: °	C, from high to low, the most
			Y-axis gyro	[-128, 128]	2	2 <sup>-8</sup>	significar	nt bit of the first byte is the sign
			temperature				bit. See N	ote 4 for the specific algorithm.
		12					Unit: °	C, from high to low, the most
			Temperature of Z-	[-128, 128]	2	2-8	significar	nt bit of the first byte is the sign
			axis gyroscope				bit. See N	ote 4 for the specific algorithm.
		13	Gyro Thermometer				All zeros	are normal. See Table 5-10 for
			Status		1			specific definitions.
		14					Unit: °	C, from high to low. the most
Tracing			X-axis tilt	[-128, 128]	2	2-8	significar	nt bit of the first byte is the sign
0			temperature			_	bit. See N	lote 4 for the specific algorithm
Trace			1	1		L		1 8
Trace								
1								
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	.			1	DC	TTOONE	DCEC	
se map					B2-	-IU30-M-	DOEC	R2.900.006SM

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15	Y-axis tilt	[-128 128]	2	2-8	Unit: °C, from high to low, the most
	temperature	[-120, 120]	2	2	bit. See Note 4 for the specific algorith
16	Z-axis tilt temperature	[-128, 128]	2	2 <sup>-8</sup>	Unit: °C, from high to low, the most significant bit of the first byte is the sig bit. See Note 4 for the specific algorith
17	Dip Thermometer Status		1		All zeros are normal. See Table 5-10 f specific definitions.
18	Frame counter	[0, 255]	1	1	0-255 continuous count
19	Delay		2		Unit: us, first high and then low, the me significant bit of the first byte is the significant bit of the specific algorith
20	CRC32		4		CRC32 verification, see instruction 6

## Table 5-9 Data Frame Format of 'Gyro + Add Table + Inclination + Temperature'

		Seri al num ber	Parameter nam	Effect te rang	tive ge	Byte	Scale		Remark	
		1	Frame header	· 0xA	.7	1			Packet header	
		2	X-axis angula velocity	r [-200,	200]	3	2 <sup>-14</sup>	Unit: (/ significan bit. See N	s, from high to low, the most t bit of the first byte is the sign ote 1 for the specific algorithm.	
		3	Y-axis angula velocity	r [-200,	200]	3	2 <sup>-14</sup>	Unit: (/ significan bit. See N	s, from high to low, the most It bit of the first byte is the sign ote 1 for the specific algorithm.	
		4	Z-axis angula velocity	r [-200,	200]	3	2 <sup>-14</sup>	Unit: (/ significan bit. See N	s, from high to low, the most t bit of the first byte is the sign ote 1 for the specific algorithm.	
		5	Gyroscope stat	us				All zeros are normal. See Table 5-10 specific definitions.		
		6		[-10,	10]		2 <sup>-19</sup>	Unit: G, f	irst high and then low, the most	
			X-axis accelerat	ion [-30,	30]	3	2 <sup>-18</sup>	significant bit of the first byte is the sign		
				[-50,	[-50, 50]		2 <sup>-17</sup>	bit. See Note 2 for the specific algorithm.		
Tracing		7		[-10,	10]		2 <sup>-19</sup>	Unit: G, f	irst high and then low, the most	
			Y-axis accelerat	ion [-30,	30]	3	2 <sup>-18</sup>	significan	t bit of the first byte is the sign	
Trace				[-50,	50]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.	
		8	Z-axis accelerat	ion [-10,	10]	3	2 <sup>-19</sup>	Unit: G, f	irst high and then low, the most	
Old base map										
Base map					_	BS	-IU30-M-	D6EC	R2.900.006SM	
	Mark	Chan	ge order 🛛	Signature,		rag	e 19 No. 16 P	age		

Diskette									1
				[-30, 30	]		2 <sup>-18</sup>	significar	at bit of the first byte is the sign
CAD				[-50, 50	]		2 <sup>-17</sup>	bit. See N	ote 2 for the specific algorithm.
CILD		9	Add table status			1		All zeros	are normal. See Table 5-10 for specific definitions.
		10						Unit: G, f	irst high and then low, the most
			X-axis inclinatio	n [-1.7, 1.7	71	3	2 <sup>-22</sup>	significar	at bit of the first byte is the sign
					-			bit. See N	ote 3 for the specific algorithm.
		11						Unit: G, f	irst high and then low, the most
			Y-axis inclination	n [-1.7, 1.7	71	3	2 <sup>-22</sup>	significar	at bit of the first byte is the sign
					-			bit. See N	ote 3 for the specific algorithm.
		12						Unit: G, f	irst high and then low, the most
			Z-axis inclination	n [-1.7, 1.7	71	3	2 <sup>-22</sup>	significar	at bit of the first byte is the sign
								bit. See N	ote 3 for the specific algorithm.
		13						All zeros	are normal. See Table 5-10 for
		_	Inclination state			1			specific definitions.
		14						Unit: °	C. from high to low, the most
			X-axis gyro	[-128, 12	81	2	2-8	significar	t hit of the first byte is the sign
			temperature	[ 120, 12		_	-	bit. See N	ote 4 for the specific algorithm.
		15						Unit: °	from high to low the most
		10	Y-axis gyro	[-128, 12	81	2	2-8	significar	t bit of the first byte is the sign
			temperature	[,	~]	-		bit. See N	ote 4 for the specific algorithm.
		16						Unit: °	C. from high to low the most
		10	Temperature of Z	Z-	81	2	2-8	significar	t bit of the first byte is the sign
			axis gyroscope	[ 120, 12	-	_		bit. See N	ote 4 for the specific algorithm.
		17	Gvro Thermomet	er				All zeros	are normal. See Table 5-10 for
		17	Status			1		specific definitions.	
		18	V minutes much					Unit: °	C, from high to low, the most
			A-axis plus surfac	[-128, 12	8]	2	2 <sup>-8</sup>	significar	nt bit of the first byte is the sign
			temperature					bit. See N	ote 4 for the specific algorithm.
		19	V avia stress					Unit: °	C, from high to low, the most
			1-axis pius surfac	[-128, 12	8]	2	2 <sup>-8</sup>	significar	nt bit of the first byte is the sign
			temperature					bit. See Note 4 for the specific algorithm.	
		20	7 ovic plus					Unit: °	C, from high to low, the most
				[-128, 12	8]	2	2 <sup>-8</sup>	significar	nt bit of the first byte is the sign
Tracing			temperature					bit. See N	ote 4 for the specific algorithm.
		21	Add thermomete	er		1		All zeros	are normal. See Table 5-10 for
Trace			status			1 specific def		specific definitions.	
)ld base map	,								
Deee						ספ		DEC	
base map						D2-	-1030-101-1	DUEU	K2.900.006SM
	M 1	C1		•		Page 10 No. 17 Page			
	mark	Unan	ge order S	ıgnature,		1 ug	- 17 110. 17 1		

Diskette	4	22					I Inite of	from high to low the most	
		22	X-axis tilt	F 100 1001	2	2-8		, from high to low, the most	
CAD			temperature	[-128, 128]	Z	2 °	significant	t bit of the irrst byte is the sign	
		22						ble 4 for the specific algorithm.	
	1	23	Y-axis tilt	F 100 1001	2	2-8	Unit: (	t, from high to low, the most	
			temperature	[-128, 128]	2	2 °	significant	t bit of the first byte is the sign	
		24					bit. See No	bie 4 for the specific algorithm.	
		24	Z-axis tilt	F 100 1001	2	2	Unit: (	, from high to low, the most	
			temperature	[-128, 128]	Z	2 0	significant	t bit of the first byte is the sign	
		25					bit. See No	the 4 for the specific algorithm.	
		25	Dip Thermometer		1		All zeros	are normal. See Table 5-10 for	
			Status					specific definitions.	
		26	Frame counter	[0, 255]	1	1	0-	-255 continuous count	
		27					Unit: us, fi	irst high and then low, the most	
			Delay		2		significant	t bit of the first byte is the sign	
							bit. See No	ote 5 for the specific algorithm.	
		28	CRC32		4		CRC32	verification, see instruction 6	
	data bit format; Among $AR_1$ Outputting the high eight bits of the three bytes for the angular velocity of each axis of the gyroscope; $AR_2$ Outputting the middle eight bits of the three bytes for the angular velocity of each axis of the gyroscope; $AR_3$ Outputs the lower eight bits of the three bytes for the angular velocity								
		data of e velo	h bit format; Among $AR_1$ Ou ach axis of the g $AR_2$ Ou ocity of each axis $AR_3$ Ou ach axis of the g	tputting the hi yroscope; tputting the r of the gyrosc tputs the lowe yro.	gh eight niddle e ope; r eight b	bits of the	2 <sup>14</sup> hree bytes f the three uree bytes	for the angular velocity e bytes for the angular for the angular velocity	
		data of e velo	a bit format; Among $AR_1$ Ou ach axis of the g $AR_2$ Ou botty of each axis $AR_3$ Ou ach axis of the g ach axis of the g $AR_1$ — $R_2^2$ BH22 BH21 BH 20 BH19 $2^9$ $2^8$ $2^7$ $2^9$ $2^5$	tputting the high yroscope; tputting the model of the gyroscope tputs the lowe yro. $\frac{1}{2^4} 2^3 2^2 2^1$	gh eight niddle e ope; r eight b $\mu_{11} = \mu_{13} = \mu_{14}$	bits of the	$2^{14}$ hree bytes f the three uree bytes BR8 BH7 BH6 $2^{4}$ $2^{7}$ $2^{8}$	for the angular velocity e bytes for the angular for the angular velocity $AR_3 \longrightarrow AR_3 \longrightarrow AR_$	
Tracing		data of e velo	a bit format; Among $AR_1$ Ou ach axis of the g $AR_2$ Ou botty of each axis $AR_3$ Ou ach axis of the g $AR_1$ — BI(22) BI(22) BI(21) BI(20) BI(19) $2^9$ $2^8$ $2^7$ $2^8$ $2^5$ Figure	tputting the hi, yroscope; tputting the m of the gyrosc tputs the lowe yro. BIT 18 BIT 17 BIT 16 BIT 15 E $2^4$ $2^3$ $2^2$ $2^1$ e 5-1 Converting	gh eight niddle e ope; r eight t $\frac{14}{2^0}$ $\frac{1}{2^1}$ $\frac{1}{2^2}$ g the Gyr	bits of the	$2^{14}$ hree bytes f the three uree bytes BH 8 BH 7 BH 6 $2^{8}$ $2^{7}$ $2^{8}$ locity Output	for the angular velocity e bytes for the angular for the angular velocity $AR_3 \longrightarrow AR_3 \longrightarrow AR_$	
Tracing		data of e velo	a bit format; Among $AR_1$ Ou ach axis of the g $AR_2$ Ou ocity of each axis $AR_3$ Ou ach axis of the g $AR_1$ — $R_1$ — $R_2^2$ BH22 BH21 BH20 BH19 $2^9$ $2^8$ $2^7$ $2^6$ $2^5$ Figure 2) Acceleration	tputting the hi, yroscope; tputting the m of the gyrosc tputs the lowe yro. BR18 BR 17 BR 16 BR 15 F $2^4$ $2^3$ $2^2$ $2^1$ e 5-1 Converting speed output	gh eight niddle e ope; r eight b $\frac{14}{2^0}$ $\frac{2^1}{2^1}$ $\frac{2^1}{2^2}$ g the Gyr [G] = <u>AR</u> ;	bits of the the eight bits of bits of the the $R_2 - \frac{12}{2^3} \frac{BI11}{2^4} \frac{BI10}{2^5}$ o Angular Vel $\frac{1\cdot 2^{16} + AR_2 \cdot 2^8 + \frac{12}{2^5}}{2^8}$	$2^{14}$ hree bytes f the three hree bytes $\frac{1}{2^{4}}$ $2^{4}$ $2^{7}$ $2^{8}$ locity Output $\frac{AR_{3}}{3}$ ;	for the angular velocity e bytes for the angular for the angular velocity ${2^{4} 2^{10} 2^{11} 2^{12} 2^{13} 2^{14}}$	
Tracing		data of e velo	a bit format; Among $AR_1$ Ou ach axis of the gy $AR_2$ Ou ocity of each axis $AR_3$ Ou ach axis of the gy $AR_1$ $R_{12} = BH22 = BH21 = BH20 = BH19$ $2^9 = 2^8 = 2^7 = 2^8 = 2^5$ Figure 2) Acceleration Among $AR_1$	tputting the hi, yroscope; tputting the m of the gyrosc tputs the lowe yro. BR18 BR17 BR16 BR15 F $2^4$ $2^3$ $2^2$ $2^1$ e 5-1 Converting speed output Outputs the m	gh eight niddle e ope; r eight b $\frac{14}{2^0}$ $\frac{2^1}{2^1}$ $\frac{2^1}{2^2}$ g the Gyr [G] = <u>AR</u>	bits of the the eight bits of bits of the the $R_2 - \frac{R_2}{2^3 2^4 2^5}$ o Angular Vel $\frac{1 \cdot 2^{16} + AR_2 \cdot 2^8 + 2^8}{2^8}$ ight bits of	$2^{14}$ hree bytes E the three hree bytes $\frac{1}{2^{4}}$ $2^{7}$ $2^{8}$ hocity Output $\frac{AR_{3}}{2^{7}}$ ; the three	for the angular velocity e bytes for the angular for the angular velocity $AR_3 \rightarrow AR_3 \rightarrow AR_$	
Tracing Trace		data of e velo	a bit format; Among $AR_1$ Ou ach axis of the gy $AR_2$ Ou ocity of each axis $AR_3$ Ou ach axis of the gy ach axis of the gy $AR_1 - R_1 - R_1 - R_1 - R_1 - R_1$ $2^8 2^8 2^7 2^8 2^5$ Figure 2) Acceleration Among $AR_1$	tputting the hi, yroscope; tputting the m of the gyrosc tputs the lowe yro. BR18 BR17 BR 16 BR15 F $2^4$ $2^3$ $2^2$ $2^1$ e 5-1 Converting speed output Outputs the m	gh eight niddle e ope; r eight b $\frac{14}{2^0}$ $\frac{2^1}{2^1}$ $\frac{2^1}{2^2}$ g the Gyr [G] = <u>AR</u> upper ei	bits of the the eight bits of bits of the the $R_2 - \frac{R_2}{2^3 2^4 2^5}$ o Angular Vel $\frac{1 \cdot 2^{16} + AR_2 \cdot 2^8 + 2^X}{2^X}$ ight bits of	$2^{14}$ hree bytes E the three hree bytes $\frac{1}{2^{4}}$ $2^{7}$ $2^{8}$ locity Output $\frac{AR_{3}}{2^{7}}$ ; E the three	for the angular velocity e bytes for the angular for the angular velocity for the angular velocity $\frac{AR_3}{2^4 2^{10} 2^{11} 2^{12} 2^{13} 2^{14}}$ at to [°/s]	
Tracing Trace 1d base map		data of e velo	a bit format; Among $AR_1$ Ou ach axis of the gy $AR_2$ Ou ocity of each axis $AR_3$ Ou ach axis of the gy ach axis of the gy $AR_1 - $ $R_1 - $ $R_2 = R_1 - $ $R_2 = R_2 = R_2 = R_2 = R_1 = $ $2^9 = 2^8 = 2^7 = 2^8 = 2^5 = $ Figure 2) Acceleration Among $AR_1$	tputting the hi, yroscope; tputting the m of the gyrosc tputs the lowe yro. BR18 BR17 BR16 BR15 F $2^4$ $2^3$ $2^2$ $2^1$ e 5-1 Converting speed output Outputs the m	gh eight niddle e ope; r eight b $\frac{R}{2^0}$ $\frac{2^1}{2^1}$ $\frac{2^2}{2^1}$ g the Gyr $[G] = \frac{AR}{2^1}$	bits of the the bits of the the bits of the the bits of the the $R_2 - \frac{1}{2^3 2^4 2^5}$ o Angular Vel $\frac{1 \cdot 2^{16} + AR_2 \cdot 2^8 + 2^8}{2^8}$ ight bits of	$2^{14}$ hree bytes the three the three $2^{4}$ $2^{7}$ $2^{8}$ locity Outpute $AR_{3}$ ; the three	for the angular velocity e bytes for the angular for the angular velocity $\frac{AR_3}{2^4 2^{10} 2^{11} 2^{12} 2^{13} 2^{14}}$ at to [°/s]	
Tracing Trace Id base map Base map		data of e velo	a bit format; Among $AR_1$ Ou ach axis of the gy $AR_2$ Ou ocity of each axis $AR_3$ Ou ach axis of the gy ach axis of the gy $AR_1$ $R_{12} = R_{12} =$	tputting the hi, yroscope; tputting the m of the gyrosc tputs the lowe yro. $2^{4} 2^{3} 2^{2} 2^{1}$ e 5-1 Converting speed output Outputs the m	gh eight niddle e ope; r eight b $\frac{1}{2^0}$ $\frac{2^1}{2^1}$ $\frac{2^1}{2^2}$ g the Gyrt [G] = <u>AR</u> upper ef BS-	bits of the the eight bits of bits of the the $R_2 - \frac{R_2}{2^3 2^4 2^5}$ o Angular Vel $\frac{1 \cdot 2^{16} + AR_2 \cdot 2^8 + 2^3}{2^3}$ ight bits of	$2^{14}$ hree bytes E the three hree bytes $\frac{1}{2^{4}}$ $2^{7}$ $2^{8}$ locity Output $\frac{AR_{3}}{2^{7}}$ ; T the three D6EC	for the angular velocity e bytes for the angular for the angular velocity $\frac{AR_3}{2^{4} 2^{10} 2^{11} 2^{12} 2^{13} 2^{14}}$ at to [°/s] e bytes for the angular R2.900.006SM	
Tracing Trace 1d base map 3ase map	Mark	data of e velo	a bit format; Among $AR_1$ Ou ach axis of the gy $AR_2$ Ou ocity of each axis $AR_3$ Ou ach axis of the gy $AR_3$ Ou ach axis of the gy $PR_{23} \ BR_{22} \ BR_{21} \ BR_{20} \ BR_{10} \ BR_{20} \ BR_{10} \$	tputting the hi, yroscope; tputting the m of the gyrosc tputs the lowe yro. $\boxed{2^4 \ 2^3 \ 2^2 \ 2^1}$ e 5-1 Converting speed output Outputs the m	gh eight niddle e ope; r eight t $\frac{14}{2^0}$ $\frac{2^1}{2^1}$ $\frac{2^1}{2^2}$ g the Gyrt [G] = <u>AR</u> upper ef BS- BS-	bits of the the eight bits of bits of the the $R_2$ $\frac{R_2}{2^3}$ $\frac{2^4}{2^5}$ o Angular Vel $\frac{1\cdot 2^{16} + AR_2 \cdot 2^8 + 2^8}{2^8}$ ight bits of -IU30-M-I e 19 No. 18 P	$2^{14}$ hree bytes f the three aree bytes $2^{4}$ $2^{7}$ $2^{8}$ locity Outpute $AR_{3}$ ; f the three D6EC	for the angular velocity e bytes for the angular for the angular velocity $AR_3 \rightarrow AR_3 \rightarrow AR_$	

CAD

Tracing

Trace

01d base map

velocity of each axis of the accelerometer;

 $AR_2$  Outputs the middle eight bits of the three bytes for the angular velocity of each axis of the accelerometer;

 $AR_3$  Outputs the lower eight bits of the three bytes for the angular velocity of each axis of the accelerometer.

X is the tabulated scale index, and 10g, 30g, and 50g are tabulated for X = 19, 18, and 17.

3) Tilt speed output [G] =  $\frac{AR_1 \cdot 2^{16} + AR_2 \cdot 2^8 + AR_3}{2^{22}}$ ;

Among  $AR_1$  Outputs the upper eight bits of the three bytes for the angular velocity of each axis of the tilt angle;

 $AR_2$  The middle eight bit of that three bytes are output for the angular velocity of each axis of the tilt angle;

 $AR_3$  The lower eight bits of the three bytes are output for the angular velocity of each axis of the tilt angle.

4) Temperature output [°C] =  $\frac{T_1 \cdot 2^8 + T_2}{2^8}$ ? See Figure 5-2 for data bit format.

Among  $T_1$  Outputs the upper eight bits of the two bytes for each axis temperature;

 $T_2$  Outputs the lower eight bits of the two bytes for each axis temperature.

•			– T <sub>1</sub>					•			- T <sub>2</sub>				
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
27	2 <sup>6</sup>	2 <sup>5</sup>	24	2 <sup>3</sup>	2 <sup>2</sup>	2 <sup>1</sup>	2º	21	2 <sup>-2</sup>	2.3	24	2°5	2.6	2.7	2 <sup>8</sup>

Figure 5-2 Converting Temperature Output to [°C]

5) Delay time output [us] =  $T_1 \cdot 2^8 + T_2$ 

Where: T<sub>1</sub> is the high eight bits in the two bytes of the delay time output;

T<sub>2</sub>outputs the lower eight bits of the two bytes for the delay time.

6) CRC check method

The CRC uses the standard CRC-32 polynomial:

 $x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$ seed = 0xFFFFFFF

See Appendix B for a list of table and table lookup function codes generated

Base	map				BS-IU30-M-D6EC	R2.900.006SM
		Mark	Change order	Signature,	Page 19 No. 19 Page	

CAD

Tracing

Trace

from this polynomial.

# 5.4 Self-check function and real-time output function of working status

The product has the functions of self-checking and real-time output of working status. The data frame contains a byte indicating the status, and the real-time output of product working status information is started after the power-on start is completed. The status bits are defined in Table 5-10.

Bit	Definition
7	0 = normal, $1 = $ system-wide abnormal
6	0 = normal, $1 = $ starting
5	0 = normal, $1 = $ abnormal external environment
4	0 = normal, $1 =$ three axes out of service condition
3	0 = normal, $1 = $ error in three-axis output
2	0 = OK, $1 = Z$ axis out of use condition or error
1	0 = OK, $1 = Y$ axis out of use condition or error
0	0 = OK, $1 = X$ axis out of use condition or error

Table 5-10 Product Status Bit Definitions

# 6 Functional testing

# 6.1 Test equipment and instrumentation required

The equipment and instruments required in the test include: DC regulated power supply, computer, turntable, test tooling and test cable.

# 6.2 Functional testing

The product is in a static state, and the DC regulated power supply is used to supply power to the product. The power supply requirements meet the requirements of 1.2.2. The specific connection mode of the product is shown in Figure 6-1. Data is received according to the communication protocol, and the angular velocity output of the product is received and displayed by the upper computer receiving software.

Rotate the gyroscope assembly in the positive direction around X, Y and Z respectively (if conditions permit, the turntable can be used for input, and if conditions

Old base map					
Base map				BS-IU30-M-D6EC	R2.900.006SM
	Mark	Change order	Signature,	Page 19 No. 20 Page	

CAD

Tracing

Trace

01d base map

do not permit, it can be rotated by hand), and the angular velocity output of the corresponding axis can be monitored as the positive angular rate. Rotate the product reversely around X, Y and Z respectively, and the angular velocity output of the corresponding axis can be monitored to be a negative angular velocity. It indicates that the angular velocity output polarity of the product is correct. The three angular rate values at the output of the product shall be in the vicinity of 0 deg/s under stationary conditions.

The acceleration output of the corresponding axis can be monitored to be 1G when X, Y and Z are respectively in the forward direction. Under static conditions, the acceleration at the output of two axes of the product is about 0 G, and the acceleration at the output of the third axis is about 1 G.



Figure 6-1 Inertial Measurement Unit Test Connection Diagram

### 7 Use and maintenance requirements

Before use, the installation position of the system must be checked to ensure correct installation. Carefully check the connection of each signal line to ensure that the connection is correct.

Before power-on, check the cable network contact and power supply value, and the power supply polarity shall not be reversed.

In use, the mechanical grounding of the system shall be well grounded.

This product contains precision instruments. Knocking and falling are prohibited.

This product should be stored in a well-ventilated warehouse with a temperature of  $(15 \sim 35)$  °C, a relative humidity of not more than 75%, and free of acid, alkali and corrosive gases.

# **Appendix A Packing List**

Base	map				BS-IU30-M-D6EC	R2.900.006SM
		Mark	Change order	Signature,	Page 19 No. 21 Page	

CAD

BS-IU30-M-D6EC Inertial Measurement Unit Product Matching Table										
Serial number	Name	Quantity	Unit	Remark						
1	BS-IU30-M-D6EC product	1	Taiwan							
2	Product certificate	1	Share							
3	Instructions for use	1	Share							
4	Packing list	1	Share							
5	Product packing box	1	А							

# **Appendix B CRC Lookup Table and Lookup Function**

Lookup table for B1 CRC32

static Uint32 crc\_table[256]={

0x0000000, 0x04c11db7, 0x09823b6e, 0x0d4326d9, 0x130476dc, 0x17c56b6b, 0x1a864db2, 0x1e475005, 0x2608edb8, 0x22c9f00f, 0x2f8ad6d6, 0x2b4bcb61, 0x350c9b64, 0x31cd86d3, 0x3c8ea00a, 0x384fbdbd,0x4c11db70, 0x48d0c6c7, 0x4593e01e, 0x4152fda9, 0x5f15adac, 0x5bd4b01b, 0x569796c2, 0x52568b75, 0x6a1936c8, 0x6ed82b7f, 0x639b0da6, 0x675a1011, 0x791d4014, 0x7ddc5da3, 0x709f7b7a, 0x745e66cd,0x9823b6e0, 0x9ce2ab57, 0x91a18d8e, 0x95609039, 0x8b27c03c, 0x8fe6dd8b, 0x82a5fb52, 0x8664e6e5, 0xbe2b5b58, 0xbaea46ef, 0xb7a96036, 0xb3687d81, 0xad2f2d84, 0xa9ee3033, 0xa4ad16ea, 0xa06c0b5d,0xd4326d90, 0xd0f37027, 0xddb056fe, 0xd9714b49, 0xc7361b4c, 0xc3f706fb, 0xceb42022, 0xca753d95, 0xf23a8028, 0xf6fb9d9f, 0xfbb8bb46, 0xff79a6f1, 0xe13ef6f4, 0xe5ffeb43, 0xe8bccd9a, 0xec7dd02d,0x34867077, 0x30476dc0, 0x3d044b19, 0x39c556ae, 0x278206ab, 0x23431b1c, 0x2e003dc5, 0x2ac12072, 0x128e9dcf, 0x164f8078, 0x1b0ca6a1, 0x1fcdbb16, 0x018aeb13,

Tracing

Trace

01d base man

Ulu bas	e map					
Base	map				BS-IU30-M-D6EC	R2.900.006SM
		Mark	Change order	Signature,	Page 19 No. 22 Page	

Diskette											
DISKette	0x054bf6a4, 0x0808d07d, 0x0cc9cdca,0x7897ab07, 0x7c56b6b0, 0x71159069, 0x75d48dde,										
		0x6b93dddb 0x6	of52c06c_0x6211e6	6b5 0x66d0fb02 0x5e9f46bf 0x5a5e	e5b08_0x571d7dd1						
CAD		0x53dc6066_0x4	d9b3063_0v495a2	dd4  0x44190b0d  0x40d816ba  0xacs	$a_{5c697} 0_{x_{2}864} db_{20}$						
		$0x_05000000, 0x_1$	$a = \frac{1}{2} $	$\frac{1}{2} \frac{1}{2} \frac{1}$	20602 $0x8aad2h2f$						
		$0.8 \le 2.000$	22(1041 + 0.87 + 0.1)	100, 0000000000, 0000238023, 0002020	1,9092, 000000000000000000000000000000000						
		0x8e6c3698, 0x8	3211041, 0x8/ee0c	116, 0X99a95d13, 0X9d684044, 0X902	bbb9d, 0x94ea/b2a,						
		0xe0b41de7, 0xe	4750050, 0xe93620	689, 0xedf73b3e, 0xf3b06b3b, 0xf77	1768c, 0xfa325055,						
		0xfef34de2, 0xc6	bcf05f, 0xc27dede	8, 0xcf3ecb31, 0xcbffd686, 0xd5b88	683, 0xd1799b34,						
		0xdc3abded, 0xd	8fba05a,0x690ce0e	ee, 0x6dcdfd59, 0x608edb80, 0x644f	c637, 0x7a089632,						
		0x7ec98b85, 0x738aad5c, 0x774bb0eb, 0x4f040d56, 0x4bc510e1, 0x46863638, 0x42472b8f,									
		0x5c007b8a, 0x58c1663d, 0x558240e4, 0x51435d53,0x251d3b9e, 0x21dc2629, 0x2c9f00f0,									
		0x285e1d47, 0x3	6194d42, 0x32d85	0f5, 0x3f9b762c, 0x3b5a6b9b, 0x031	15d626, 0x07d4cb91,						
		0x0a97ed48, 0x0	e56f0ff, 0x1011a0f	fa, 0x14d0bd4d, 0x19939b94, 0x1d52	28623,0xf12f560e,						
		0xf5ee4bb9, 0xf8	ad6d60, 0xfc6c70d	17. 0xe22b20d2. 0xe6ea3d65. 0xeba9	01bbc, 0xef68060b.						
		0xd727bbb6 $0xd$	3e6a601_0xdea580	$d_{2}$ $d_{2$	$2d0dd_0xcda1f604$						
		0xc060ebb3 0xbc	13-8d7- 0xb0ff00	$\sim 0.0 \text{ where}$	$f_{12} = 0$						
		0xc700c003,0x00	270447b 0x0b2666	25, 0.00+0.00010, 0.000700000, 0.000700000, 0.00070000000000	$5461f_{0y}$ 9922161						
			3/9 dd 70, 0x 903000	20.512 - 0.512 - 0.000 - 0.5041 - 0.540	34011, 0x8832101a,						
			10020/4, 0x85/130		8ab1/, 0x50c9b640,						
		0x4e8ee645, 0x4	a4ffbf2, 0x4/0cdd2	2b, 0x43cdc09c, 0x/b82/d21, 0x/t43	6096, 0x7200464t,						
		0x76c15bf8, 0x68	8860bfd, 0x6c4716	4a, 0x61043093, 0x65c52d24,0x119	b4be9, 0x155a565e,						
		0x18197087, 0x1	cd86d30, 0x029f30	d35, 0x065e2082, 0x0b1d065b, 0x0fo	dc1bec, 0x3793a651,						
		0x3352bbe6, 0x3	e119d3f, 0x3ad080	088, 0x2497d08d, 0x2056cd3a, 0x2d	15ebe3,						
		0x29d4f654,0xc5	a92679, 0xc1683b	ce, 0xcc2b1d17, 0xc8ea00a0, 0xd6ad	150a5, 0xd26c4d12,						
		0xdf2f6bcb, 0xdb	bee767c, 0xe3a1cbo	c1, 0xe760d676, 0xea23f0af, 0xeee2e	ed18, 0xf0a5bd1d,						
		0xf464a0aa, 0xf9	278673, 0xfde69bo	c4,0x89b8fd09, 0x8d79e0be, 0x803a	c667, 0x84fbdbd0,						
		0x9abc8bd5, 0x9	e7d9662, 0x933eb0	0bb, 0x97ffad0c, 0xafb010b1, 0xab7	10d06, 0xa6322bdf,						
		0xa2f33668, 0xb	cb4666d, 0xb8757t	oda, 0xb5365d03, 0xb1f740b4							
		};									
		, ,									
		B2 Table loo	kup function								
		uoid CBC22(Uin	+16 *nch int lon)								
		void CRC32(Um	(16 <sup>s</sup> pcn,int len)								
		l I IInt27 roa -		nitial value							
			JAFTTTTTTT,//II								
		int i;	1 0/ 4								
		int res = $4 - 1$	ien % 4;								
		tor( $1 = 0; i < 0$	< len; 1++)								
		{									
		reg = (r	reg<<8) ^ crc_table	e32[(((reg>>24)&0xFF) ^ pch[i])];							
Tracing		}									
		for (i = 0; i <	< res; i++)								
		{									
Trace		reg = (r	$reg \ll 8) \land crc_tab$	$le32[(((reg >> 24) & 0xFF) ^ 0x00)];$							
		}									
Old hase man											
oru base map			,								
Base map				BS-III30-M-D6FC	R2 900 006SM						
<b>F</b> *					112.700.0005101						
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Γ

Diskette		1 503			
	$\operatorname{crc}_{data}[0] = (byte)((\operatorname{reg} >>24) \& 0xFF);$				
	$\operatorname{crc}_{data}[1] = (byte)((reg \gg 16) \& 0xFF);$				
CAD	$\operatorname{crc}_{\operatorname{data}[2]} = (byte)((reg >>8) \& 0xFF);$				
	$\operatorname{crc}_{\operatorname{data}[3]} = (byte)(\operatorname{reg} \& 0xFF);$				
	return;				
		<u>،</u>			
		)			
	Where the CDC state [4] is the estimilated CDC22 scalar				
	where, the CRC data [4] is the calculated CRC32 value.				
Tracator	1				
iracing					
Traco	1				
ITace	4				
Old base map	1				
P					
Base map	]			BS-IU30-M-D6FC	R2 900 006SM
					112.700.0000111
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	THE T		Signature,		