General Description

GRM-5550DR-UB8X4P500 is consist of the Swiss ublox M8 series GNSS chip, and six axis acceleration sensor. It is a multiple function communication module which has integrated the advanced online adaptive integrated navigation algorithm and GNSS location engine, it can provide real-time,high-precision vehicle location, speed measurement and direction measurement information in any environment (such as indoor, tunnel, underground garage, etc). When the signal accuracy is reduced and even satellite signals are lost in GNSS system, without using the odometer information, GRM-5550DR-UB8X4P500 Can use only inertial navigation technology to locate, measure the vehicle carrier accurately for a long time.

GRM-5550DR-UB8X4P500 is a concurrent receiver module with built-in multiple positioning systems that support simultaneous reception of GPS, GLONASS, Galileo, Beidou, and QZSS L1 bands. It has 33 tracking channels, 72 capture channels and 210 PRN channels, enable it to capture and track any multiple satellite signals. Compared with single GPS system, the multiple positioning system (GPS&GLONASS& Galileo, Beidou &QZSS) of GRM-5550DR-UB8X4P500 makes a great increase in the number of visible and available satellites, at the same time, the first positioning time is greatly reduced, even in complex urban environment, it can achieve higher positioning precision and accuracy.

Applications

- Vehicle High Precision Navigation
- ITS (Intelligent Traffic System)
- Vehicle Remote Monitoring

Figure：GRM-5550DR-UB8X4P500

Features

- Build on high performance,low-power GNSS U-blox UBX-M8030-KT chip set
- Support satellite systems: GPS, Glonass Galileo, Beidou
- Ultra high track sensitivity: -167dBm
- Baud rate:115200
- Protocol compliant NMEA-0183, UBX, RTCM2.3
- The built-in six-axis acceleration sensor can be used to define various gravity algorithms
- Automatically inertial navigation positioning without GNSS signal
- Built-in high gain LNA to improve receiving sensitivity
- Automatically save GNSS log information
- Operating voltage: 3.0V~5.5V
- Power consumption: 140mA~150mA
- Operating temperature range: -40to85℃
- Patch Antenna Size:35x35x4mm
- Small form factor: 55x50x18.4mm
- Communication type: RS232
- Wire interface type: Molex 4PIN , L=500CM
- Waterproofing grade: IP41
- RoHS compliant (Lead-free)

1. Performance Description

1.1 Features

item	Features	item	Features
Gyroscopic drift	High precision attitude heading information is obtained by eliminating gyro driftwo	Component selection	High performance three axis gyroscope and three axis accelerometer
Acceleration noise	Eliminate vibration acceleration and obtain high accurate velocity information	Error compensation	Complete quadrature error / temperature drift and other error compensation
zero-velocity correct	Zero speed correction algorithm prevents navigation data drift	Preventing pirate	Each product calibration code is inconsistent for preventing pirate
Software algorithm	Adaptive extended Calman filtering algorithm	Physical Dimensions	Compact modular design saves user product space
Intelligent identification	Identify and isolate GNSS data with large errors	Communication protocol	Plug and use standard communication protocol NEMA-0183
Independent to odometer	High precision positioning by using inertial navigation	Engineering installation	No installation angle, convenient for users to install on board
Navigation technology	Switch between integrated navigation and inertial navigation technology	Sub - meter	Support RTCM2.3 protocol / sub-meter level navigation in complex environment

1.2 Technical Parameter

Parameter	Specification
Receiver Type	• Code 72 (search channel)/Code 33(tracking channel)/ 210(PRN) GPS&QZSS L1 1575.42MHz C/A, Beidou B1 1561.098MHz, GALILEO E1B/C[1], GLONASS L1OF 1602MHz, • SBAS: WAAS, EGNOS, MSAS, GAGAN
GNSS Sensitivity	• Tracking: -167dBm • Re-acquisition: -161dBm • Acquisition: -149dBm
TTFF (Autonomous)	• Cold start(Autonomous): 35s AVG @-130dBm • Warm start (Autonomous): 30s AVG @-130dBm • Hot start (Autonomous): 1s AVG @-130dBm
Horizontal Locating Accuracy	• GNSS inertial navigation : <2.5m CEP @-130 dBm • Without aid : Sub-mete (1% ~3% distance tolerance)
Acceleration Accuracy	• Without aid: 0.1m/s²
Accuracy of 1PPS Signal	• Typical accuracy: ±30ns, Time pulse width: 100ms
Acceleration Accuracy	• Without aid: 0.1m/s²
GNSS Dynamic Performance	• Maximum altitude: 18,000m • Maximum velocity: 515m/s • Acceleration: 4G

2.Application

2.1 Block Diagram

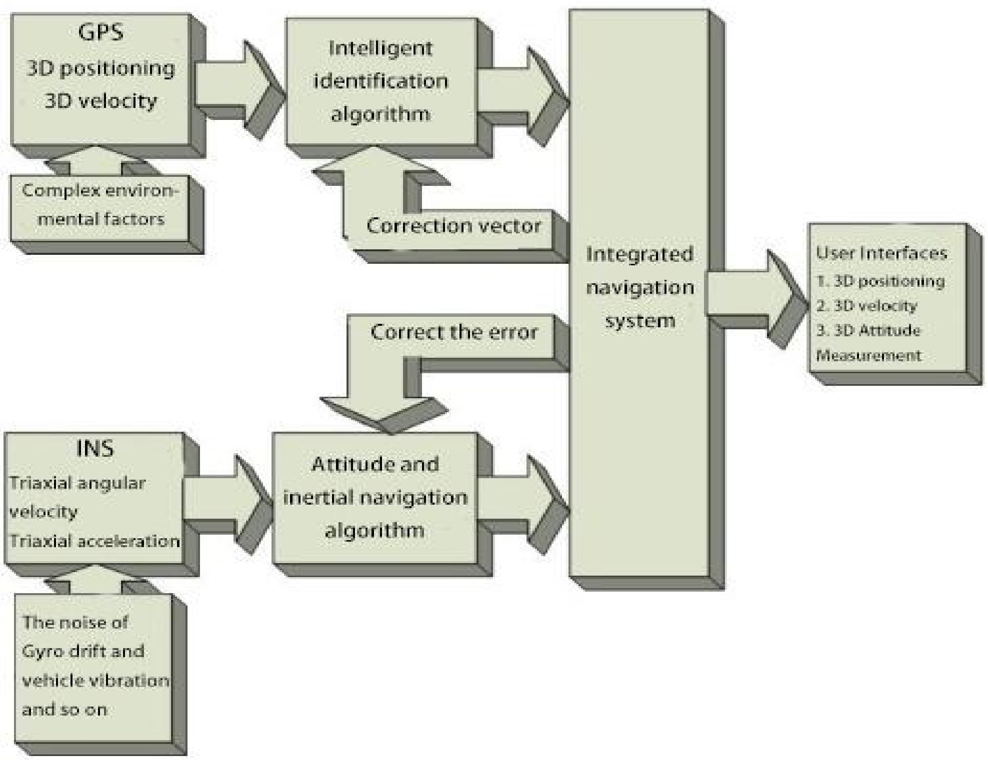

Figure 1: Block Diagram

2.2 System Introduction

2.2.1 Satellite navigation system:

Satellite navigation system has the advantages of global application, all-weather extension and high precision navigation; But satellite navigation systems are vulnerable to environmental influences, such as trees, buildings and so on, resulting in multi path effect to cause the accuracy of positioning result reduced or even lost, especially in the indoor environment, such as tunnels, satellite navigation system cannot be used.

In addition, even in an open environment, when the carrier speed is very low, the satellite navigation system will also be unable to get precise carrier azimuth information (heading angle).

2.2.2 Inertial navigation system:

The inertial navigation is based on Newton's laws of mechanics to conduct integrating to time and change it into navigation coordinates by measuring the acceleration of the carrier in the inertial reference frame, thus, it can get information about speed, yaw angle, and position in navigation coordinates, as well as the carrier information. However, due to the serious drift of gyro and the shock of vehicle, the inertial navigation system can not obtain high precise azimuth and velocity information by directly integrating acceleration, that means, existing micro inertial navigation systems are difficult to work independently for a long time.

2.2.3 Integrated navigation system：

Satellite / inertial integrated navigation takes full advantage of inertial navigation to obtain optimal navigation results based on the integration of optimal estimation algorithm and the Kalman filtering algorithm ; Especially when the satellite navigation system cannot work, the inertial navigation system is used to make the navigation system continue to work, to ensure the normal operation of the navigation system, and to improve the stability and reliability of the system.

2.2.4 Independent to odometer

Conventional vehicle navigation systems often rely on GRM-5550DR-UB8X4P500 schemes of odometer and gyroscopes to realize high precision navigation and positioning in complex environment of vehicle, for many automotive aftermarket, the connection of odometer signal is extreme complex, and it involves auto safety. After years of research and development, when the signal accuracy in GNSS system is reduced and even satellite signals are lost, only by using inertial navigation technology, the vehicle carrier can be accurately positioned, measured in a long time. Compared with the existing products on the market, the performance has been greatly improved.

Of course, the GRM-5550DR-UB8X4P500 system can also connect with odometer signals and will achieve better performance indicators.

2.2.5 Vehicle attitude angle

GRM-5550DR-UB8X4P500 navigation system achieves filtering of gyro drift and acceleration vibration signals using research experience in MEMS inertial devices for many years by adaptive filtering algorithm, and furthermore, it can get high precision attitude information, so as to meet various needs of vehicle monitoring and navigation applications in ramp detection.

2.2.6 GGM navigation system

GRM-5550DR-UB8X4P500 navigation system provides intelligent recognition algorithm for satellite navigation accuracy to identify the positioning accuracy of satellite navigation based on the high precision navigation information provided by integrated navigation, if the satellite navigation accuracy is better, integrated navigation will be carried out, once satellite navigation signals are found to be very bad and even lost, inertial navigation is carried out, in a word, GRM-5550DR-UB8X4P500 navigation system realizes autonomous switching between integrated navigation and inertial navigation.

2.3 Product feature

2.3.1 Maximum parameter

Parameter	Index	Unit
Power Supply		
Voltage Supply	5.0	V
Temperature Range		
Operation Temp	-30 to + 85	℃
Storage Temp	-40 to + 125	℃

2.3.2 Electrical feature

Parameter	Index	Unit
Power Supply		
Input voltage	3.3-5.0	V
Current	55 [1]	mA
Consumption	300	mW
Time		
The time required for the first valid data	<30	S

2.4 Performance Index

2.4.1 Mileage timing

GNSS signal loss time	Receiver positioning mode	Horizontal position[1]	Horizontal velocity[1]	Pitch roll Angle	Heading angle1
5 s	Standard	1.0-2.0m	0.05m/s	0.3deg	1.0
	Standard	1.5-5.5m	N/A	N/A	N/A
	Standard	3.0m	N/A	N/A	N/A
	Standard	5.0m	0.30m/s	0.4deg	1.0deg

2.4.2 No Mileage Timing

GNSS signal loss time	Receiver positioning mode	Horizontal position[1]	Horizontal velocity[1]	Pitch roll Angle	Heading angle1
5 S	Standard	2.0-3.5m	0.05m/s	0.5deg	1.0
10 S	Standard	10.0m	N/A	N/A	N/A
60 S	Standard	25.0m	N/A	N/A	N/A
120 S	Standard	60.0m	0.5m/s	1.0deg	2.0deg

3. Mechanical Dimensions and Pin Assignment

3.1 Dimensions

This chapter describes the mechanical dimensions of the module.

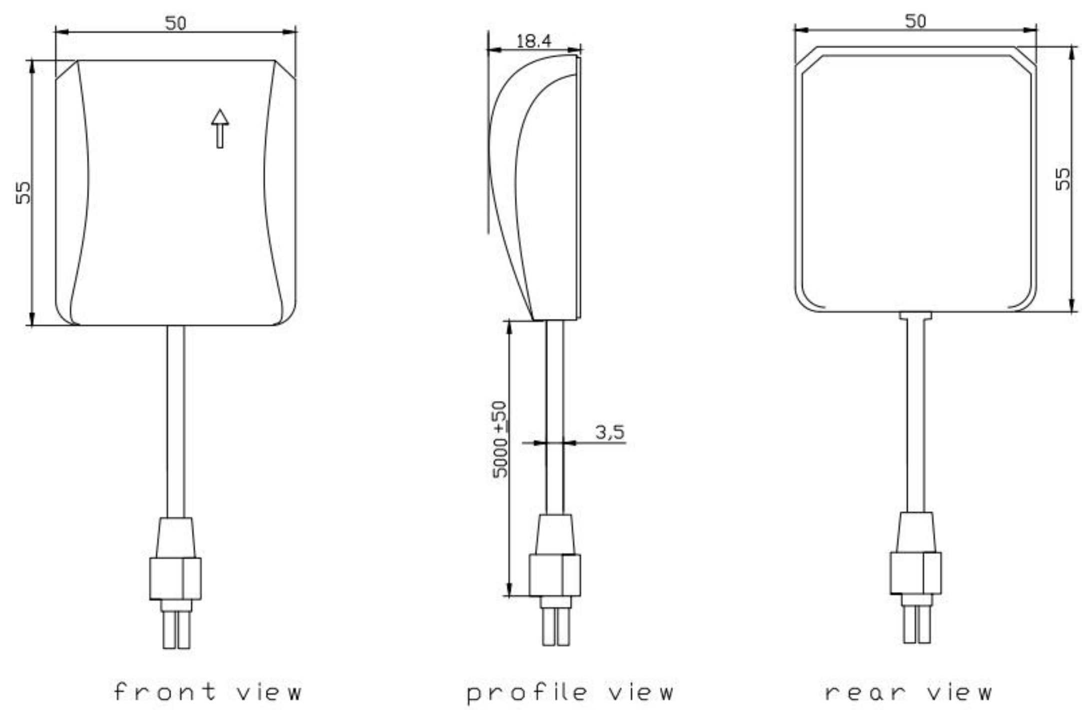

Figure2：Mechanical Dimensions (Unit：mm)

3.2 Pin Definition

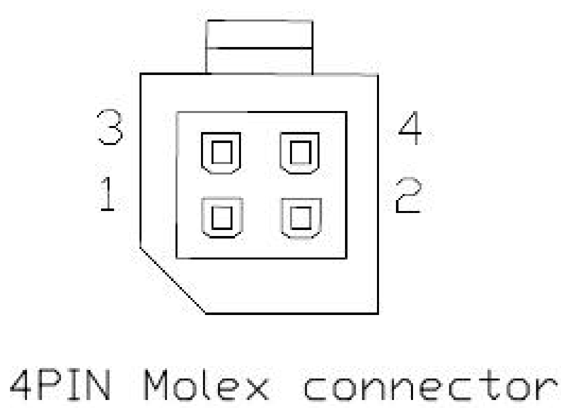

Figure3：Pin Assignment

Table: CON Pin Description

Pin No.	I/O	Description	Remark
1	RS232_RX	I	RS232 Serial Data input
2	GND	G	Ground
3	RE232_TX	O	RS232 Serial Data Output
4	VCC	I	Module Power Supply

4. Installation Direction

Please refer to the product arrow label direction in figure 4 for the installation direction. The arrow direction is the forward heading.

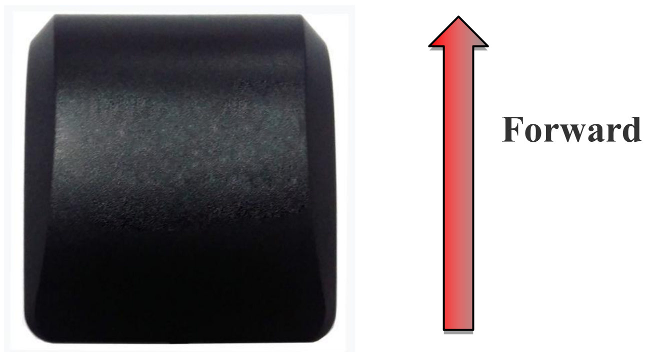

Figure4： GRM-5550DR-UB8X4P500 coordinate system

5.Instructions

5.1 Sensor Calibration

Because the chip manufacturing process, each sensor element of GRM-5550DR-UB8X4P500 (three axis gyroscope, three axis accelerometer), sensitivity and zero temperature drift parameters are not the same, in order to make each GRM-5550DR-UB8X4P500 reach the same performance, before leaving the factory, various error compensation has been made for each sensor element of GRM-5550DR-UB8X4P500.

The calibration parameters of sensor components are different for each product, if using the same parameters, it will lead to greater navigation error. This uniqueness can be used to prevent system piracy, therefore improving the reliability of the products.

5.2 Communication interface

The GRM-5550DR-UB8X4P500 system provides two serial ports, where in the serial port 1 is used for transmitting satellite information and receiving differential information, and the serial port 2 is used for receiving the odometer information.

Both serial ports do not provide a hardware handshake, and the use of 8 bit data bits, 0 bit parity bit, 1 bit stop bit (8-N-1) mode, baud rate default is 9600bps, and according to user requirements, it can be modified to 115200bps.

5.3 Communication frequency

The system supports the output of 1HZ and 5HZ data refresh frequency, the default frequency is 1HZ.

5.4 Communication protocol

At present, the GRM-5550DR-UB8X4P500 system outputs common NMEA0183 protocols, such as GPGGA, GPRMC, GPGSV, GPGSA; in addition, in order to output vehicle attitude information, the GRM-5550DR-UB8X4P500 system also defines a set of communication protocols called GPATT.

5.5 Control command

GRM-5550DR-UB8X4P500 system supports users to send control command via serial ports to achieve following functions, but GRM-5550DR-UB8X4P500 cannot save the setting. That means, every time the GRM-5550DR-UB8X4P500 is powered on, it is output by default.

Table 1 : Inertial navigation enabling

type	attribute	communication protocol	default value	Remarks
1	log gpins	Open inertial navigation	Default	For results, please see protocol GPATT
2	unlog gpins	Close inertial navigation		For results, please see protocol GPATT

Table 2: Output frequency setting

type	attribute	communication protocol	default value	Remarks
1	log ghigh	Achieve 5HZ output		For results, please see output protocol
2	unlog ghigh	Achieve 1HZ output	Default	For results, please see output protocol

Table 3: ATT protocol

type	attribute	communication protocol	default value	Remarks
4	log gpatt	Open GPATT	Default	For results, please see output protocol
8	unlog gpatt	Close GPATT		For results, please see output protocol

Table 4: ZDA protocol

type	attribute	communication protocol	default value	Remarks
1	log gpzda	Open GNZDA		For results, please see output protocol
2	unlog gpzda	Close GNZDA	Default	For results, please see output protocol

Table 5: GSV protocol

type	attribute	communication protocol	default value	Remarks
1	log gpgsv	Open GPGSV,GPGSA		For results, please see output protocol
2	unlog gpgsv	Close GPGSV,GPGSA	Default	For results, please see output protocol

Table 6: BD/GLONS Option

type	attribute	communication protocol	default value	Remarks
1	log gpgbd	Choose GPS+BD		For results, please see protocol GPATT
2	unlog gpgbd	Choose GPS+Glonass	Default	For results, please see protocol GPATT

Table 7: Baud rate setting

type	attribute	communication protocol	default value	Remarks
4	log g4800	Set as 4800		For results, please see output protocol
5	log g9600	Set as 9600	Default 1	For results, please see output protocol
6	log g1920	Set as 19200		For results, please see output protocol
7	log g3840	Set as 38400		For results, please see output protocol
8	log g115200	Set as 115200	Default 2	For results, please see output protocol

Remarks:

(1) All instructions are lowercase letters;

(2) There is a space key behind Log and unlog;

(3) GPATT protocol contains a lot of product information, it is recommended that users retain the output of the protocol to facilitate query problems;

(4) GPGSV, GPGSA take serial port resources, and, it is recommended that users to close two groups of protocols when using the inertial navigation function;

(5) GRM-5550DR-UB8X4P500 has two default baud rates 9600bps/115200bps. Please specify the baud rate required when make ordering.

(6) The specific details of required execution time for GRM-5550DR-UB8X4P500 to execute various user commands are shown in following table. If the user sends a command, please make sure that the command is executed.

No	Command type	required time
1	Inertial navigation enabling	20ms
2	Output frequency setting	20ms
3	ATT protocol enabling	20ms
4	ZDA protocol enabling	20ms
5	GSV protocol enabling	500ms
6	Choose BD/GLONASS	500ms
7	Baud rate setting	20ms

6. Attentions

As a high-performance vehicle integrated navigation system, GRM-5550DR-UB8X4P500 system also requires users to pay attention to some matters during application.

No	Initialization process of integrated navigation	Importance
1	Before power on, it can be installed roughly according to figure 4, without specific installation Angle requirements.	Required
2	Before power on，Fixed connected GRM-5550DR-UB8X4P500 and vehicle	Required
3	After power on，shouldn't move GRM-5550DR-UB8X4P500；	Required
4	Before the vehicle moves，please make sure the GPS/BD system output the correct protocol	Required

No	Initialization process of integrated navigation	Importance
1	After power on, make static at least 5-10 seconds to complete the attitude initialization of the navigation system;	Required
2	In the course of the vehicle, it is necessary to keep the GRM-5550DR-UB8X4P500 navigation system moves in an open area for some time, for the algorithm convergence of integrated navigation system, and then test it in complex environments such as tunnels.	

Further Explain：

In integrated navigation system initialization, it is suggested that the vehicle drive under unobstructed environment fo r about a few minutes,then go into obstructed environment, the positioning effect will be better.

7. NMEA Data Analysis

The communication statements specified in the NMEA protocol are based on ASCII coding, the data format of the NMEA-0183 protocol statement is as follows: "$" is the statement start symbol; "," is the domain delimiter; "*" is the checksum identifier, the two digits behind it are checksum, which represent the bitwise XOR value of all characters between ($) and * (excluding these two characters); "/" is the terminator, all statements must end using it, that is, the ASCII character "return" (hexadecimal 0D) and "line feed" (hexadecimal 0A).

The default output NMEA data of GRM-5550DR-UB8X4P500 is $GNRMC, $GNGGA, $GNZDA,$GPATT, users can also specify the output data according to personal needs.

7.1 GGA Data Format

For Example ：$GNGGA,062938.00,3110.4700719,N,12123.2657056,E,1,25,0.6,58.9666,M,0.000,M,99,AAAA*50

No	Name	Description	Code	Example
1	$GNGGA	Log header		$GNGGA
2	utc	UTC time (H/M/S)	hhmmss.ss	202134.00
3	lat	Latitude: -90~90 degrees	llll.lllllll	3110.4693903
4	latdir	Latitude direction: N: North; S: South	a	N
5	lon	Longitude: -180~180 degrees	yyyyy.yyyyyyy	12123.2621695
6	londir	Longitude direction: E:east; W:west	b	W
7	QF	Solution State 0: invalid solution; 1: single point positioning solution; 2: pseudo range difference;	q	4
8	sat No.	Satellite Number	n	14
9	hdop	Horizontal DOP value	x.x	1.0
10	alt	Altitude	h.h	50.22
11	a-units	Altitude unit	M	M
14	age	Differential delay	dd	1
15	stn ID	Base station number: 0000-1023, In single: AAAA	xxxx	1
16	*xx	Checksum	*hh	
17	[CR][LF]	Sentence terminator		[CR][LF]

7.2 RMC Data Format

For Example ： $GNRMC,064401.65,A,3110.4706987,N,12123.2653375,E,0.604,243.2,300713,0.0,W,A*3E

No	Name	Description	code	Example
1	$GNRMC	Log header		$GNRMC
2	utc	UTC time (H/M/S)	hhmmss.ss	143550.00
3	Pos status	Solution state: A= effective positioning V= invalid positioning	A	A
4	lat	Latitude: -90~90 degrees	llll.lllllll	3110.4854911
5	latdir	Latitude direction: N: North; S: South	a	N
6	lon	Longitude: -180~180 degrees	yyyyy.yyyyyyy	12123.9129278
7	londir	Longitude direction: E:east; W:west	b	E
8	SPEED IN	Ground speed	q	0.29
9	Track Ture	Ground course angle	n	108.5
10	Date	UTC date	ddmmyy	010909
11	Mag var	Magnetic declination (000.0~180.0 degrees, adding o if lack of leading digit)	0.0	0.0
12	Vardir	Declination direction, E (East) or W (West)	M	M
13	Mode ind	Mode indication (only NMEA0183 3 version output, A= self localization, D= difference, E= estimation, N= data invalid)	a	A
14	*xx	Checksum	*hh	*57
15	[CR][LF]	Sentence terminator		[CR][LF]

7.3 ATT Data Format

Fro Example：$GPATT,0.000,p,0.000,r,y,20190621,5,0024004A5113353434303038,ID,1,INS,405,02,00,5,G,A,0,6,00,1,F,1,1,0,0.002,0,1,0,220,11*03

No	Name	Description	code	Example
1	$GPATT	Log header		$GPATT
2	Pitch	pitching angle	ddd.mm	1.34
3	Angle Channel	P: pitch, r: roll, y: yaw	P	P
4	Roll	Roll angle	ddd.mm	2.56

5	Angle Channel	P: pitch, r: roll, y: yaw	A	R
6	Yaw	Yaw angle	ddd.mm	132.45
7	Angle Channel	P: pitch, r: roll, y: yaw		Y
8	Soft Version	software version number	xxxxxxxx	20161105
9	Version Channel	S: software version number		S
10	Product ID	96 bit unique ID		D226FF343839503157147637
11	ID Channel	ID: product ID	ID	ID
12	INS	Default open inertial navigation	X	1：open，0：close
13	INS Channel	INS: whether inertial navigation open	INS	INS
14	Hardware version	Named after the master chip	411	
15	State_Flag	Algorithm status flag	d	Please refer to table A below for details
16	Mis_Angel_Num	number of Installation Angle identification	d	9
17	IMU_Kind	Coordinate system number	d	5：frontward，7：backward
18	Beidou flag	Choose GPS+BD/GPS+Glonass	B	B:GPS+BD,G:GPS+Glonass

Remarks 1: The Bit 17 in GPATT protocol is the coordinate system number of the sensor,If shown 5, the Gmosue direction should be forward, and if shown 7, the Gmouse direction should be backward.It is recommended to read this flag bit and display it on the controller screen, so that the user can know whether the current installation mode is consistent with the sensor coordinate system setting.

Table A: Physical meaning description of State_Flags

Flag	description	Required conditions
0	Prepare initialization	System power on
1	Attitude initialization completed	Vehicle still for 5-10S
2	Position speed initialization completed	Speed exceeding 2m/s
3	Direction angle initialization completed	Speed exceeding 5m/s

Remarks 2: the conditions for inertial navigation to work normally:

(1)GPATT protocol 12 field INS is 1
(2)GPATT protocol 15 field State Flag is 03

7.4 GSA Data Format

For Example：$GNGSA,A,3,07,08,09,11,01,23,27,,,,,,3.01,1.25,2.74*1A

No	Name	Description	code	Example
1	$GNGSA	Log header		$GNGSA
2	Positioning mode	Positioning mode flag		Please refer to table B below for details
3	Positioning type	Positioning type flag		Please refer to table C below for details
4	Satellite used	First channel	SV	07
5	Satellite used	Second channel	SV	08
6	…	…	…	…
7	PDOP	Position Dilution Of Precision		3.01
8	HDOP	Horizontal Dilution of Precision		1.25
9	VDOP	Vertical Dilution of Precision		2.74
10	*xx	Checksum	*hh	*1A
11	[CR][LF]	End of message termination		[CR][LF]

Table B: Physical meaning description of State_Flags

Flag	description
M	Manual-forced to operate in 2D or 3D mode
A	Auto switch 2D/3D mode

Table C： Physical meaning description of State_Flags

Flag	description
1	No positioning
2	2D positioning
3	3D positioning

7.5 GSV Data Format

For Example ：$GPGSV,4,2,13,09,36,259,48,11,51,187,45,16,,,33,22,02,168,40*46

No	Name	Description	code	Example
1	$GPGSV	Log header		$GPGSV
2	Number of Message	Number of GSV statements		4

3	Message Number	Number of GSV statements digits		2
4	Satellites in View	Active satellites		13
5	Satellite ID	Pseudo random noise code(01-32)		09
6	Elevation	Satellite elevation (00-90 degrees)	degrees	36
7	Azinmuth	Satellite azimuth (00-359 degrees)	degrees	259
8	SNR(C/NO)	Signal to noise ratio (00-99) dbHz	dbHz	48
9	…	…	…	…
10	Satellite ID	Pseudo random noise code(01-32)		22
11	Elevation	Satellite elevation (00-90 degrees)	degrees	02
12	Azinmuth	Satellite azimuth (00-359 degrees)	degrees	168
13	SNR(C/NO)	Signal to noise ratio (00-99) dbHz	dbHz	40
14	*xx	Checksum	*hh	*46
15	[CR][LF]	Sentence terminator		[CR][LF]

7.6 GLL Data Format

For Example ：$GNGLL,2240.69163,N,11402.71942,E,051756.00,A,A*77

No	Name	Description	code	Example
1	$GNGLL	Log header		$GNGLL
2	Latitude	Latitude	ddmm.mmmmm	2240.69163
3	N/S Indicator	Latitude N (north) or S (south)		N
4	Longitude	Longitude	ddmm.mmmmm	11402.71942
5	E/WIndicator	Longitude E (east) or W (west)		E
6	UTC Position	UTC time	hhmmss.sss	051756.00
7	Status	A=data valid or V=data not valid		A
8	*xx	Checksum	*hh	*77
9	[CR][LF]	Sentence terminator		[CR][LF]

7.7 VTG Data Format

For Example：$GNVTG,309.62, T,227.10,M, 0.13, N, 0.2, K*6E

No	Name	Description	code	Example
1	$GNVTG	Log header		$GNVTG

2	Measured heading	Movement angle (000 - 359 degrees)	Degrees	309.62
3	Reference	Due north reference system		T
4	Measured heading	Movement angle (000 - 359 degrees)	Degrees	227.10
5	Reference	Magnetic north reference system		M
6	Speed	Horizontal velocity	Knots	0.13
7	Units	unit	Section	N
8	Speed		Km/h	0.2
9	Units	unit	Km/h	K
10	*xx	Checksum	*hh	*6E
11	[CR][LF]	Sentence terminator		[CR][LF]

7.8 VTG Data Format

For Example：$GNVTG,309.62, T,227.10,M, 0.13, N, 0.2, K*6E

No	Name	Description	code	Example
1	$GNVTG	Log header		$GNVTG
2	Measured heading	Movement angle (000 - 359 degrees)	Degrees	309.62
3	Reference	Due north reference system		T
4	Measured heading	Movement angle (000 - 359 degrees)	Degrees	227.10
5	Reference	Magnetic north reference system		M
6	Speed	Horizontal velocity	Knots	0.13
7	Units	unit	Section	N
8	Speed		Km/h	0.2
9	Units	unit	Km/h	K
10	*xx	Checksum	*hh	*6E
11	[CR][LF]	Sentence terminator		[CR][LF]

Gotop Technology Co. ，LTD

Add:AreaC,4th layer,A1 building,QingHu Silicon Valley Power,LongHua district ,Shenzhen ,China
Phone: 86-755-23804156
fax: 86-755-23804155
N 22° 32' 17", E 114° 07' 07“
http://www.gotop-zzu.com