CASIC multimode satellite navigation receiver

Protocol Specification

V3.6

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Document Summary

Detailed Description of the multimode satellite navigation receiver CASIC protocol specification, including NMEA0183 common standard protocol, and custom binary protocol.

date	version	Author	Explanation
2017.04.24	3.6		CASIC protocol, the payload 'predetermined size increased from 1kB 2KB

1 NMEA protocol

1.1 NMEA protocol characteristics

CASIC receiver is compatible with international standards NMEA0183 protocol by default supports NMEA0183 4.0 version, compatible with V2.3 and V3.X version supports NMEA0183 V4.1 standard by sending a command, and the previous standard V2.3.

Data is transferred in serial asynchronous manner. Bit 1 start bit, followed by data bits. Data bits following the least significant bit first rule.

number according to Transfer methods

	Start bit D0		D1	D2	D3	D4	D5	D6	D7 Stop		

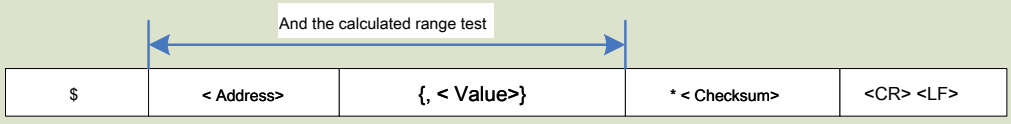
The data transfer parameter

Baud Rate (bps) Support 4800,9600,19200,38400,57600,115200 data bits	
	8
Stop bits	1 person
Check Digit	no

1.2 NMEA protocol framework

NMEA message is sent by the GNSS receiver, NMEA0183 protocol support. Data protocol frame format

NMEA Framework agreement



Start character	Addresses	Data segment	Checksum segment	End sequence
Each statement is to '$' Start	It divided into two parts: a sender identifier and statement type	With " Start, the value is variable length behind, there is a fixed length	Of the '$' and the data (not including the two characters) between the '*' XOR result byte, hexadecimal value represented by	Each statement is to <CR> <CF> End

Detail of the NMEA protocol standard reference http://www.nmea.org/

This receiver Protocol Specification NMEA protocol framework on the basis of the increase of customized statements, for controlling the operating mode of the receiver, and product information inquiry receiver. Custom statement identifier ' P ' .

1.3 NMEA identifier field type

1.3.1 transmitter identifier

NMEA sentences to distinguish different transmitter identifier by G NSS mode, transmitter identifier is defined as follows: Transmitter

	Identifier
Beidou Navigation Satellite System (BDS)	BD
Global Positioning System (GPS, SBAS, QZSS)	GP
Global Navigation Satellite System (GLONASS)	GL
Global Navigation Satellite System (GNSS)	GN
Custom information	P

1.3.2 Satellite Number Identifier

Satellite System	NMEA satellite ID identifier Satellite PRN number	Satellite PRN number and its corresponding relationship	
GPS	1 to 32	1 to 32	0 + PRN
SBAS	33 ~ 51	120 to 138	87 + PRN
GLONASS	65 to 88	1 to 24	64 + PRN
BDS	1 to 37	1 to 37	0 + PRN
QZSS	193 to 197	193 to 197	0 + PRN

1.3.3 System Identifier

CASIC receiver supports multiple data protocols NMEA format, the difference is reflected in a different protocol identifier indicates the above system, with

When a new version of the agreement increases Some fields.

	NMEA4.0 and below	NMEA4.1
GGA	[1] identified	[1] identified
ZDA	[1] identified	[1] identified
GLL	[1] identified	[1] identified
RMC	[1] identified	[1] identified
VTG	[1] identified	[1] identified
GSA	[2] identified	[1] identified, additional fields add different sorting system
GSV	[2] identified	[2] identified

[1] Identification: position solution if only BD, GPS, GLONASS, Galileo satellites for transmitting an identifier for the BD, GP, GL, GA, etc. If a plurality of systems on satellite positioning solution, transferred identifiers GN.

[2] identified: GP (GPS satellites), BD (BDS satellite), GL (GLONASS satellites)

About Section 1.1, CASIC receiver supports three versions of the standard NMEA0183 protocol. To name is different between the following three criteria.

And the difference between NMEA2.2 2.3 / 4.0 are:

1) In the GLL, RMC, and VTG statement positioning mode (Mode) not an output. 2) is positioned in the mass GGA statement (FS) a, dead reckoning positioning and normal use 1 (2.3 to 6 in the dead reckoning)

NMEA 4.1 added some protocol fields on the basis of 4.0: 1) GSA The statement added systemId A. 2) In GSV The statement added signalId A. 3) In RMC The statement added navStatus A. For details, refer 1.5 NMEA sentences subsequent introduction portion.

1.3.4 Field Type

Field Type	symbol	definition
Specific format status		
field	A	Single-character field: A = is the data valid flag is cleared alarm; V = NO, invalid data, the alarm flag is set.
latitude	ddmm.mmmm	Fixed / variable length field dd for a fixed length of 2 degrees, before the decimal point in mm of a fixed length of 2 minutes, the mmmm after the decimal point represents the fractional variable length.
longitude	dddmm.mmmm Fixed / variable length field	ddd represents a fixed length of 3 degrees, before the decimal point in mm of a fixed length of 2 minutes, the mmmm after the decimal point represents the fractional variable length.
time	hhmmss.sss	Fixed length field hh is a fixed length of 2 hours, mm is the fixed length of 2 minutes, ss before the decimal point indicates a fixed length of 2 seconds, sss after the decimal point represents a small fixed length of 3 seconds.
Determine the field		Some field specifies the predefined constants.
Variable digital		
numeric field	xx	Floating point number or a variable length field
Fixed hex field hh___		Fixed length hexadecimal numbers, the most significant bit to the left
Variable Hex field h - h		Variable length hexadecimal numbers, the most significant bit to the left
Fixed letter field		
information field	aa___	Fixed length character field uppercase or lowercase letters
Fixed numeric field	xx___	Fixed-length bit character field
Variable text	c - c	Effective variable length character field

1.4 NMEA messages Overview

page	Message name	Class / ID	description
NMEA standard messages			**Standard message**
	GGA	0x4E 0x00	Positioning data receiver
	GLL	0x4E 0x01	Location - latitude / longitude
	GSA	0X4E 0x02	Dilution of precision (DOP) and the active satellite
	GSV	0x4E 0x03	Visible Satellite
	RMC	0x4E 0x04	Recommended Minimum dedicated navigation data
	VTG	0x4E 0x05	Ground speed and heading
	ZDA	0x4E 0x08	Time and Date
	txt	0x4E 0x11	Text Transfer
NMEA custom message			**Custom Message**
	CAS00	-	Save the configuration information
	CAS01	-	And serial communication protocol configuration information
	CAS02	-	Set positioning update rate
	CAS03	-	Enabling or disabling its output frequency
	CAS04	-	Initializing the system and the number of channels provided
	CAS05	-	Setting the transmitter identifier NMEA sentences
	CAS06	-	Query module software and hardware information
	CAS10	-	Start mode configuration and auxiliary information
	CAS20	-	Upgrade instructions online

1.5 NMEA standard messages

1.5.1 GGA

information	GGA
description Receiver time, location and type of location-related data Output Format	
	$ - GGA, UTCtime, Lat, uLat, Lon, uLon, FS, numSv, HDOP, Msl, uMsl, Sep, uSep, DiffA ge, DiffSta * CS <CR> <LF>
Examples	$ GPGGA, 235316.000,2959.9925, S, 12000.0090, E, 1,06,1.21,62.77, M, 0.00, M ,, * 7B

Parameters say Ming

Field Name		format	Parameter Description
1	$ - GGA	String	Message ID, GGA sentence head, '-' Identification system
2	UTCtime	hhmmss.sss	The current positioning of UTC time
3	Lat	ddmm.mmmm Latitude, it represents the first two characters of the back of the character representing minutes	
4	uLat	character	Latitude Direction: N- north, S- south
5	Lon	dddmm.mmm m	Longitude, represent the first three characters of the back of the character representing minutes
6	uLon	character	Longitude Direction: E- East, W- West
7	FS	Numerical	Mass indicates the current position (Notes [1]), this field should be empty
8	numSv	Numerical	The number of satellites for positioning, 00 ~ 24
9	HDOP	Numerical	Horizontal dilution of precision (the HDOP)
10	Msl	Numerical	Altitude, i.e., receiver antenna height with respect to the geoid
11	uMsl	character	Height units, meters, fixed character M
12	Sep	Numerical	The distance between the reference geoid and ellipsoid,, - 'denotes lower than the reference geoid ellipsoid
13	uSep	character	Height units, meters, fixed character M
14	DiffAge	Numerical	The age of differential correction data, DGPS is not used when the field is empty
15	DiffSta	Numerical	ID differential reference station
16	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
17	<CR> <LF> character		Carriage return and line breaks

NOTE [1] Positioning Quality Mark

Positioning Quality Mark	description
0	Positioning is unavailable or invalid
1	SPS positioning mode, positioning effective
6	Estimation Model (dead reckoning) *Only valid NMEA 2.3 or later*

1.5.2 GLL

information	GLL
description Latitude, longitude, positioning time and location status. Types of Output Format	
	$ - GLL, Lat, uLat, Lon, uLon, UTCtime, valid, Mode * CS <CR> <LF>
Examples	$ GPGLL, 2959.9925, S, 12000.0090, E, 235316.000, A, A * 4E

Parameters say Ming

Field Name		format	Parameter Description
1	$ - GLL	String	Message ID, GLL sentence head, '-' Identification system
2	Lat	ddmm.mmmm Latitude, it represents the first two characters of the back of the character representing minutes	
3	uLat	character	Latitude Direction: N- north, S- south
4	Lon	dddmm.mmm m	Longitude, represent the first three characters of the back of the character representing minutes
5	uLon	character	Longitude Direction: E- East, W- West
6	UTCtime	hhmmss.sss	The current positioning of UTC time
7	Valid	character	Data validity (Notes [1])
8	Mode	character	Positioning mode (Note [2]), *Only valid NMEA 2.3 or later*
9	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
10	<CR> <LF> character		Carriage return and line breaks

Notes [1] Data Validation Standard Chi

Positioning Quality Mark	description
A	Effective data
V	The data is invalid

Note [2] positioning mode flag

Positioning mode flag	description
A	Autonomous mode
E	Estimation Model (dead reckoning)
N	The data is invalid
D	Differential mode

1.5.3 GSA

information	GSA
description DOP information for satellite number and location. Whether or not or whether there is available satellite positioning, both output GSA Statement; when the receiver is in a multi-joint working systems, each system can be used corresponding to a satellite GSA statement, each statement GSA PDOP composition comprising the satellite system obtained, and the HDOP VDOP.	
Types of Output Format	
	$ - GSA, Smode, FS {, SVID}, PDOP, HDOP, VDOP * CS <CR> <LF>
Examples	$ GPGSA, A, 3,05,21,31,12,18,29 ,,,,,,, 2.56,1.21,2.25 * 01

Parameters say Ming

Field Name		format	Parameter Description
1	$ - GSA	String	Message ID, GSA head statement, '-' Identification system
2	Smode	character	Mode switching manner indicates (Notes [1])
3	FS	digital	Positioning state flag (Note [2])
4	{, SVID}	Numerical	For positioning the satellite number, the field 12 displays a total number of available satellites, only the output 12 before more than 12, less than 12 less than the area fill empty time
5	PDOP	Numerical	Position dilution of precision (the PDOP)
6	HDOP	Numerical	Horizontal dilution of precision (the HDOP)
7	VDOP	Numerical	Vertical Dilution of Precision (VDOP)
8	systemId value		GNSS system ID number as defined NMEA (Note [3]) *Only valid NMEA 4.1 or later*
9	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
10	<CR> <LF> character		Carriage return and line breaks

Notes [1] The mode switching manner Indicating an

indication mode switching manner Description M	
	Manual switching. Forced to work as 2D or 3D mode
A	Automatic switching. Receiver automatically switching 2D / 3D mode of operation

Note [2] Location state flag

Positioning status	description
1	Positioning invalid
2	2D Locate
3	3D Locate

Remarks [3] GNSS system ID

system ID	description
1	GPS system
2	GLONASS system
4	BDS system

1.5.4 GSV

information	GSV
description Number of visible satellites and satellite elevation, azimuth, and other information carrier to noise ratio. Each satellite GSV compiled statement {	Number, elevation, azimuth, CNR} variable number of parameters, up to 4 groups, minimum of 0 group.
Types of Output Format	
	$ - GSV, NumMsg, MsgNo, NumSv {, SVID, ele, az, cn0} * CS <CR> <LF>
Examples	$ GPGSV, 3,1,10,25,68,053,47,21,59,306,49,29,56,161,49,31,36,265,49 * 79 $ GPGSV, 3,2,10,12,29,048,49,05 , 22,123,49,18,13,000,49,01,00,000,49 * 72 $ GPGSV, 3,3,10,14,00,000,03,16,00,000,27 * 7C

Parameters say Ming

Field Name		format	Parameter Description
1	$ - GSA	String	Message ID, GSA head statement, '-' Identification system
2	NumMsg character		The total number of statements. Each output statement GSV up to four satellites visible information, so when the system is more than four satellites, would require multiple GSV statement.
3	MsgNo	digital	Current statement number
4	NumSv	Numerical	The total number of visible satellites
5	{, SVID, ele, az, cn0}	Numerical	As follows: the satellite number; Elevation angle range of 0 to 90, in degrees; azimuthal angle in the range from 0 to 359, in degrees; carrier to noise ratio in the range from 0 to 99, in units of dB-Hz, if no tracking the current satellite, fill empty (Note [3])
6	signalId	Numerical	ID NMEA GNSS signals defined by (0 represent all signal) *Only valid NMEA 4.1 or later*
7	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
8	<CR> <LF> character		Carriage return and line breaks

1.5.5 RMC

information	RMC
description Recommended minimum type location	
information Output Format	
	$ - RMC, UTCtime, status, Lat, uLat, Lon, uLon, Spd, Cog, Date, mv, mvE, mode * CS <CR> <LF>
Examples	$ GPRMC, 235316.000, A, 2959.9925, S, 12000.0090, E, 0.009,75.020,020711 ,,, A * 45

Parameters say Ming

Field Name		format	Parameter Description
1	$ - RMC	String	Message ID, RMC sentence head, '-' Identification system
2	UTCtime	hhmmss.sss	The current positioning of UTC time
3	status	String	Position valid flag. V = Warning receiver, the data is invalid A = Effective data
4	Lat	ddmm.mmmm Latitude, it represents the first two characters of the back of the character representing minutes	
5	uLat	character	Latitude Direction: N- north, S- south
6	Lon	dddmm.mmm m	Longitude, represent the first three characters of the back of the character representing minutes
7	uLon	character	Longitude Direction: E- East, W- West
8	Spd	Numerical	Ground speed in knots
9	Cog	Numerical	True Heading ground in degrees
10	Date	ddmmyy	Date (dd for the day, mm for the month, yy for the year)
11	mv	Numerical	Magnetic declination in degrees. Fixed empty
12	mvE	character	Declination direction: E- East, W- West. Fixed empty
13	mode	character	Positioning mode flag (Notes [1]) *only NMEA 2.3 And above effective*
14	navStatus character		Navigation status identifier (V represents the navigation system does not output state information) *Only valid NMEA 4.1 or later*
15	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
16	<CR> <LF> character		Carriage return and line breaks

Notes [1] Positioning mode flag

Positioning mode flag	description
A	Autonomous mode
E	Estimation Model (dead reckoning)
N	The data is invalid
D	Differential mode

1.5.6 VTG

information	VTG
description Ground speed and heading information to ground. Types of Output	
Format	
	$ - VTG, Cogt, T, Cogm, M, Sog, N, kph, K, mode * CS <CR> <LF>
Examples	$ GPVTG, 75.20, T ,, M, 0.009, N, 0.017, K, A * 02

Parameters say Ming

Field Name		format	Parameter Description
1	$ - VTG	String	Message ID, VTG sentence head, '-' Identification system
2	Cogt	Numerical	True north heading in degrees on the ground
3	T	character	True North instructions, fixed at T
4	Cogm	Numerical	Geomagnetic north heading in degrees
5	M	character	Magnetic north indicated, fixed to M
6	Sog	Numerical	Ground speed in knots
7	N	character	Speed unit section, fixed to N
8	kph	Numerical	Ground speed, in units of kilometers per hour
9	K	character	Speed unit, kilometers per hour, is fixed to K
10	mode	character	Positioning mode flag (Notes [1]) *only NMEA 2.3 And above effective*
11	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
12	<CR> <LF> character		Carriage return and line breaks

Notes [1] Positioning mode flag

Positioning mode flag	description
A	Autonomous mode
E	Estimation Model (dead reckoning)
N	The data is invalid
D	Differential mode

1.5.7 ZDA

information	ZDA		
description Time and date information. Types of Output			
Format			
	$ - ZDA, UTCtime, Day, Month, Year, Ltzh, Ltzn * CS <CR> <LF>		
Examples	$ GPZDA, 235316.000,02,07,2011,00,00 * 51		
Parameters say Ming			
Field Name		format	Parameter Description
1	$ - ZDA	String	Message ID, ZDA sentence head, '-' Identification system
2	UTCtime	hhmmss.sss	UTC time for positioning
3	Day	Numerical	Day, fixed two digits, ranging from 01 to 31
4	Month	Numerical	Month, fixed two digits, ranging from 01 to 12
5	Year	Numerical	In fixed four digits
6	Ltzh	Numerical	This time zone hours, does not support, fixed at 00
7	Ltzn	Numerical	This time zone minute, do not support, fixed at 00
8	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
9	<CR> <LF> character		Carriage return and line breaks

1.5.8 TXT

1) Product Information

	txt
description Product Types Output, the output format boot	
time	
	$ GPTXT, xx, yy, zz, info * hh <CR> <LF>
Examples	$ GPTXT, 01,01,02, MA = CASIC * 27 represents a manufacturer name (CASIC) $ GPTXT, 01,01,02, IC = ATGB03 + ATGR201 * 71 Represents a type of chip or chipset (baseband chip model ATGB03, RF chip type ATGR201) $ GPTXT, 01,01,02, SW = URANUS2, V2.2.1.0 * 1D represent software name and version number (software name URANUS2, version No. V2.2.1.0) $ GPTXT, 01,01,02, TB = 2013-06-20,13: 02: 49 * 43 represents the code compile time (June 20, 2013, 13:02:49) $ GPTXT, 01,01,02, MO = GB * 77 The launch represents the receiver operating mode (GB GPS + BDS represents the dual-mode mode) $ GPTXT, 01,01,02, CI = 00000000 * 7A represents the customer number (customer number is 00000000)

Parameters say Ming

Field Name		format	Parameter Description
1	$ GPTXT	String	Message ID, TXT statement head
2	xx	Numerical	The current total sentence of 01 to 99 messages if a message is too long and needs to be divided into multiple pieces of information display
3	yy	Numerical	Statement No. 01 to 99
4	zz	Numerical	Text identifier. 00 = error message; 01 = warning messages; 02 = notification information; 07 = user information.
5	info		Text information
6	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
7	<CR> <LF> character		Carriage return and line breaks

2) antenna status

information	txt
description Antenna status types Output	
Format	
	$ GPTXT, xx, yy, zz, info * hh <CR> <LF>
Examples	$ GPTXT, 01,01,01, ANTENNA OPEN * 25 denotes an antenna state (open) $ GPTXT, 01,01,01, ANTENNA OK * 35 denotes an antenna state (good) $ GPTXT, 01,01,01, ANTENNA SHORT * 63 represents an antenna state (short circuit)

Parameters say Ming

Field Name		format	Parameter Description
1	$ GPTXT	String	Message ID, TXT statement head
2	xx	Numerical	The current total sentence of 01 to 99 messages if a message is too long and needs to be divided into a number of information display, fixed at 01.
3	yy	Numerical	Statement No. 01 to 99, fixed at 01.
4	zz	Numerical	Text identifier. Fixed at 01.
5	info		Text information ANTENNA OPEN = open good antenna ANTENNA SHORT = Antenna short antenna ANTENNA OK =
6	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
7	<CR> <LF> character		Carriage return and line breaks

3) leap seconds Information

	txt
description Leap second type Output	
Format	
	$ GPTXT, xx, yy, zz, system, valid, utcLS, utcLSF, utcTOW, utcWNT, utcDN, utcWNF, utcA0, utcA1, leapDt * hh <CR> <LF>
Examples	$ GPZDA, 090748.000,29,09,2013,00,00 * 56 current UTC time for the September 29, 2013, 09 hours 07 minutes 48 seconds $ GPTXT, 01,01,02, LS = 0,3,16 , 16,57,224,7,158,0, -5, -39344868 * 5B GPS leap second information is valid and used for timing, the current leap second leap second event and the same is 16 seconds, indicating that the leap second event is already in force, leap second event occurs before 39,344,868 (that is, ending June 30, 2012 of) $ GPTXT, 01,01,02, LS = 1,1,2,2,0,148,7,82,4,0, -39344868 * 5B Compass leap second is not valid for the timing, the current leap second leap second event and the same, are two seconds, indicating that the leap second event is already in force, the leap second event occurs before 39,344,868 (that is, June 30, 2012 of end), Note: GPS and Compass leap second is not the same, because they are a starting reference point of time is not the same

Parameters say Ming

Field Name		format	Parameter Description
1	$ GPTXT	String	Message ID, TXT statement head
2	xx	Numerical	The current total sentence of 01 to 99 messages if a message is too long and needs to be divided into a number of information display, fixed at 01.
3	yy	Numerical	Statement No. 01 to 99, fixed at 01.
4	zz	Numerical	Text identifier. Fixed at 02.
5	system	character	Leap second information corresponding to system. 0 = GPS 1 = BDS (Compass)
6	LS =	String	Leap second message identifier, a fixed character.
7	valid	character	The leap second information is valid flag. When a plurality of satellite positioning systems combined, only one system is used for timing (1PPS calibration and UTC time) = 0 leap second information is invalid 1 = leap second information is valid, but the system is not used 2 = leap second timing information is invalid, but the timing 3 = the leap second information systems have been used effectively, and the system has been used for timing
8	utcLS	Numerical	Current leap second, seconds, positive number indicates the satellite time ahead of UTC time
9	utcLSF	Numerical	(After the leap second event) forecast of leap seconds, seconds, positive number indicates the satellite time ahead of UTC time
10	utcTOW value		UTC reference time correction parameter, when the week, seconds
11	utcWNT	Numerical	UTC reference time correction parameters, weeks, peripheral units, mold 256
12	utcDN	Numerical	Leap second occurrence time, weeks, days of the end of the range of 1 to 7,1 represents the end of Sunday, Monday = 2, and so on, 7 represents the end of Saturday
13	utcWNF	Numerical	Leap second time occurs, weeks, peripheral units, mold 256
14	utcA0	Numerical	UTC time and the satellite time error time (scale factor of 2 ^ -30),

			Seconds
15	utcA1	Numerical	UTC time rate of change of the time error and the satellite time (scale factor of 2 ^ -50) seconds / sec
16	leapDt	Numerical	Time leap second event of the current UTC time from the time interval, a positive number represents a leap second event in the future
17	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
18	<CR> <LF> character		Carriage return and line breaks

1.6 NMEA custom message

1.6.1 CAS00

information	CAS00		
description Save the current configuration to FLASH, even if the receiver is completely powered off, FLASH information is not lost. Types of Input Format			
	$ PCAS00 * CS <CR> <LF>		
Examples	$ PCAS00 * 01		
Parameters say Ming			
Field Name		format	Parameter Description
1	$ PCAS00 string		Message ID, sentence head
2	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
3	<CR> <LF> character		Carriage return and line breaks

1.6.2 CAS01

information	CAS01		
description Set the serial communication baud rate. Types of Input			
Format			
	$ PCAS01, br * CS <CR> <LF>		
Examples	$ PCAS01,1 * 1D		
Parameters say Ming			
Field Name		format	Parameter Description
1	$ PCAS01 string		Message ID, sentence head
2	br	digital	Baud rate configurations. 0 = 4800bps 1 = 9600bps 2 = 19200bps 3 = 38400bps 4 = 57600bps 5 = 115200bps
3	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
4	<CR> <LF> character		Carriage return and line breaks

1.6.3 CAS02

information	CAS02		
description Set positioning update rate. Types of Input			
Format			
	$ PCAS02, fixInt * CS <CR> <LF>		
Examples	$ PCAS02,1000 * 2E		
Parameters say Ming			
Field Name		format	Parameter Description
1	$ PCAS02 string		Message ID, sentence head
2	fixInt	Numerical	Positioning update interval, in units of ms. 1000 update rate = 1Hz Output per second 1 Positioning points update rate = 500 2Hz Output per second 2 Positioning points update rate = 250 4Hz Output per second 4 Positioning points update rate = 200 5Hz Output per second 5 Positioning points update rate = 100 10Hz Output per second 10 Positioning points
3	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
4	<CR> <LF> character		Carriage return and line breaks

1.6.4 CAS03

information	CAS03		
description Set the required output or stop output NMEA sentences. Types of Input Format			
	$ PCAS03, nGGA, nGLL, nGSA, nGSV, nRMC, nVTG, nZDA, nTXT * CS <CR> <LF>		
Examples	$ PCAS03,1,1,1,1,1,1,0,1 * 03		
Parameters say Ming			
Field Name		format	Parameter Description
1	$ PCAS03 string		Message ID, sentence head
2	nGGA	Numerical	GGA output frequency, the output frequency is positioned statements reference update rate, n (0 ~ 9) denotes output once every n positioned, 0 indicates that the statement is not output, maintaining the original configuration of the blank.
3	nGLL	Numerical	GLL output frequency, with nGGA
4	nGSA	Numerical	GSA output frequency, with nGGA
5	nGSV	Numerical	GSV output frequency, with nGGA
6	nRMC	Numerical	RMC output frequency, with nGGA
7	nVTG	Numerical	VTG output frequency, with nGGA
8	nZDA	Numerical	ZDA output frequency, with nGGA
9	nTXT	Numerical	TXT output frequency, with nGGA
10	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
11	<CR> <LF> character		Carriage return and line breaks

1.6.5 CAS04

information	CAS04		
description Configuring the system work. Types of Input			
Format			
	$ PCAS04, mode * hh <CR> <LF>		
Examples	$ PCAS04,3 * 1A and Beidou dual mode GPS $ PCAS04,1 * 18 single GPS mode $ PCAS04,2 * 1B single operation mode Compass		
Parameter Description			
Field Name		format	Parameter Description
1	$ PCAS04 string		Message ID, sentence head
2	mode	digital	Work system configuration. For the characteristics of the product model, configuration supports the following section. 1 = GPS 2 = BDS 3 = GPS + BDS 4 = GLONASS 5 = GPS + GLONASS 6 = BDS + GLONASS 7 = GPS + BDS + GLONASS
3	CS	Hexadecimal value between 16	and checksum, and $ * (and not including the $ *) XOR of all characters junction fruit
4	<CR> <LF> character		Carriage return and line breaks

1.6.6 CAS05

information	CAS05		
description NMEA protocol type is provided. Protocol type multi-mode navigation receiver wide comparison, the Data Protocol Standard also More, this receiver products can support multiple protocols *(Optional)* .			
Types of Input Format			
	$ PCAS05, ver * CS <CR> <LF>		
Examples	$ PCAS05,1 * 19		
Parameter Description			
Field Name		format	Parameter Description
1	$ PCAS05 string		Message ID, sentence head
2	mode	digital	NMEA protocol type (Notes [1])
3	CS	Hexadecimal value between 16 and checksum, and $ * (and not including the $ *) XOR of all characters junction fruit	
4	<CR> <LF> character		Carriage return and line breaks
Notes [1] N MEA protocol type 2			
	Compatible NMEA 4.1 or later		
5	Compatible BDS China Transportation Information Center / GPS dual-mode protocol, compatible NMEA 2.3 or later, compatible NMEA4.0 agreement, The default protocol		
9	Single-compatible GPS NMEA0183 protocol, NMEA 2.2 compatible version		

1.6.7 CAS06

information	CAS06
description Product type query Input	
Format	
	$ PCAS06, info * CS <CR> <LF>
Examples	$ PCAS06,0 * 1B

Parameters say Ming

Field Name		format	Parameter Description
1	$ PCAS06 string		Message ID, sentence head
2	info	digital	Query information type of product. Information content reference 1.5.8. 0 = 1 = Query firmware version number to query the hardware model and serial number 2 = query mode of the multimode receiver queries 3 = 5 = number of products customers upgrade code information query
3	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
4	<CR> <LF> character		Carriage return and line breaks

1.6.8 CAS10

information	CAS10
description Reset type receiver Input	
Format	
	$ PCAS10, rs * CS <CR> <LF>
Examples	$ PCAS10,0 * 1C * 1D hot start Warm start PCAS10,1 $ $ PCAS10,2 * 1E cold start $ PCAS10,8 * 14 factory default start $ PCAS10,9 * 15 Start

Parameters say Ming

Field Name		format	Parameter Description
1	$ PCAS10 string		Message ID, sentence head
2	rs	digital	Start mode configuration. 0 = restart. Initialization information is not used, all the effective data backup store. 1 = warm start. Do not use initialization information, clear ephemeris. 2 = cold start. Initialization information is not used, to clear all the data except the backup storage arranged outside. 3 = factory started. Clear all the data memory, and the receiver is reset to factory default configuration. = 8 and RF section off the serial output, the serial configuration response. = 9 and the start serial output RF section. 8 corresponds.
3	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
4	<CR> <LF> character		Carriage return and line breaks

1.6.9 CAS20

information	CAS20
description Upgrade online instruction type Input	
Format	
	$ PCAS20 * CS <CR> <LF>
Examples	$ PCAS20 * 03

Parameters say Ming

Field Name		format	Parameter Description
1	$ PCAS20 string		Message ID, sentence head
2	CS	Hexadecimal value	Between checksum, and $ * (and not including the $ *) XOR result of all characters
3	<CR> <LF> character		Carriage return and line breaks

2 CASIC agreement

2.1 CASIC protocol characteristics

CASIC receiver using a custom standard interface protocols (CSIP, CASIC Standard Interface Protocol) to send data to the host, asynchronous serial data transfer mode.

2.2 CASIC framework agreement

CSIP packet structure

Field 1	*Field 2*	*Field 3*	*Field 4*	*Field 5*	Field 6
Header	*Payload length payload message type of message number* Checksum				
0xBA, 0xCE	*Unsigned short 2 bytes*	*1 byte 1 byte*		*<2k bytes* Unsigned int	4 bytes

Field 1: a header (0xBA, 0xCE)

Four hexadecimal characters as a starting delimiter character message (message header), occupies two bytes.

Field 2: Payload length (len)

Message length (two bytes) indicates the number of bytes of the payload (field 5) occupied, Do not It includes a message header, message type, number, length, and checksum field.

Field 3: message type (class)

One byte, represents a basic subset of the current message belongs.

4 fields: message number (id)

After the message type byte is a message number.

Field 5: Payload (payload)

Payload is the specific contents of the packet transfer, and the length (number of bytes) of the variable, and an integer multiple of 4.

Field 6: check value (ckSum)

The checksum is on word (a word comprising 4 bytes) from accumulating between the field 5 to field 2 (including 2 fields and fields 5) and of all data, 4 bytes.

Calculating a checksum value may follow the following algorithm:

ckSum = (class << 24) + (id << 16) + len; for (i = 0; i <(len / 4); i ++) {

ckSum = ckSum + payload [i];} In the formula, payload It contains all the information field 5. In the calculation process, the first part of the field 2 is assembled to the field 4 (a word 4 bytes), then the field data 5 by a group of four bytes of the sequence (received at the first low) accumulated .

2.3 CASIC type and number

Each type of message interaction CASIC receiver for a collection of related messages.

Name Type		description
NAV	0x01	Navigation Results: position, velocity, time
TIM	0x02	Message Timing: pulse output time, the time stamp results
RXM 0x03		The measurement information output by the receiver (pseudoranges, carrier phase, etc.)
ACK	0x05	ACK / NAK message: the reply message to the message CFG
CFG 0x06		Input Configuration message: configure the navigation mode, baud rate, etc.
MEAS 0x07		Channel measurement information output by the receiver (pseudorange)
MSG 0x08		Message information to the satellite receiver output
MON 0x0A		Monitoring messages: a communication status, the CPU load, the stack utilization
AID	0x0B	Auxiliary message: ephemeris, almanac and other data A-GPS

2.4 CASIC payload definition rule

2.4.1 Data encapsulation

In order to more easily achieve the structure of the data package, a data payload portion are arranged in a particular manner: for each type of closely spaced data message, 2-byte values in a multiple of 2 offset address, 4-byte value of the discharge 4 is a multiple of an offset address.

2.4.2 Message name

Shaped like the name of the message, the message type name + message apos structures. For example: Configure PPS configuration message name: CFG-PPS.

2.4.3 Data Types

Unless otherwise defined, all values of a plurality of characters arranged in little endian format. All floating-point values are in accordance with the IEEE754 Intracytoplasmic Sperm And the double of standard transmission.

abbreviation	Types of	Byte count	Remark
U1	unsigned char	1	
I1	Signed char	1	Complement
U2	unsigned short	2	
I2	Signed short	2	Complement
U4	unsigned long integer	4	
I4	Signed long integer	4	Complement
R4	IEEE754 single precision	4	
R8	IEEE754 double-precision	8	

2.5 CASIC message interaction

Mechanism for defining the receiver input and output messages. When a receiver receives CFG type messages, message needs to correctly process according to the configuration, a reply ACK-ACK message or ACK-NACK. Before the receiver CFG reply to a received message, the sender shall not send a second message CFG. Other message received by the receiver does not need to reply.

2.6 CASIC news overview

page	Message name	Class / ID	length	Types of	description
Class NAV				**NAV navigation results**	
	NAV-STATUS	0x01 0x00	80	cycle	Navigation receiver status
	NAV-DOP	0x01 0x01	28	cycle	GDOP
	NAV-SOL	0x01 0x02	72	cycle	PVT streamlined navigation information
	NAV-PV	0x01 0x03	80	cycle	Position and velocity information
	NAV-TIMEUTC	0x01 0x10	twenty four	cycle	UTC time information
	NAV-CLOCK	0x01 0x11	64	cycle	Clock solver information
	NAV-GPSINFO	0x01 0x20	8 + 12 * N cycles		GPS satellite information
	NAV-BDSINFO	0x01 0x21	8 + 12 * N cycles		BDS satellite information
	NAV-GLNINFO	0x01 0x22	8 + 12 * N cycles		GLONASS satellite information
Class TIM				**Elimination time TIM interest**	
	TIM-TP	0x02 0x00	twenty four	cycle	Timing pulse information
Class RXM				**RXM reception Machine measured value**	
	RXM-MEASX	0x03 0x00	16 + 32 * N cycle		Pseudoranges, carrier phase measurement information of the original
	RXM-SVPOS	0x03 0x01	16 + 48 * N cycle		Satellite position information
Class ACK				**ACK / NAC K news**	
	ACK-NACK	0x05 0x00	4	Reply message	Reply indicates that the message has not been received correctly
	ACK-ACK	0x05 0x01	4	Reply message	It represents a reply message is correctly received
Class CFG				**CFG input Configuration message**	
	CFG-PRT	0x06 0x00	0/8	Query / Set message	Query / work mode configuration of UART
	CFG-MSG	0x06 0x01	0/4	Query / Set message	Query / transmit frequency configuration information
	CFG-RST	0x06 0x02	4	Setting message	Restart receiver / Clear saved data structure
	CFG-TP	0x06 0x03	0/16	Query / Set message	Query / receiver configuration parameters related to PPS
	CFG-RATE	0x06 0x04	0/4	Query / Set message	Query navigation rate / receiver configuration
	CFG-CFG	0x06 0x05	4	Setting message	Clear, save and load configuration information
	CFG-TMODE	0x06 0x06	0/28	Query / Set message	Query / configuration of the receiver of the PPS timing mode
	CFG-NAVX	0x06 0x07	0/44	Query / Set message	Query / professional navigation engine configuration parameters
	CFG-GROUP	0x06 0x08	0/56	Query / Set message	Query / GLONASS configuration parameters of group delay
	CFG-POLLMSG	0x06 0x10	4	Inquire	Query statements receiver output frequency of the periodic output
Class MEAS				**MEAS message channel measurement receiver**	
	MEAS	0x07 0x00	16 + 32 * 32 cycle		A receiver output channel measurement information
Class MSG				**MSG reception Satellite information message**	
	MSG-BDSUTC	0x08 0x00	20	cycle	UTC BDS receiver output system information.
	MSG-BDSION	0x08 0x01	16	cycle	ION BDS receiver output system information.
	MSG-BDSEPH	0x08 0x02	92	cycle	BDS receiver output system ephemeris information.
	MSG-GPSUTC	0x08 0x05	20	cycle	UTC BDS receiver output system information.
	MSG-GPSION	0x08 0x06	16	cycle	ION BDS receiver output system information.
	MSG-GPSEPH	0x08 0x07	72	cycle	GPS receiver output system ephemeris information.
	MSG-GLNEPH	0x08 0x08	68	cycle	GLN receiver output system ephemeris information.
Class MON				**MON monitoring news**	
	MON-VER	0x0A 0x04	64	Respond to queries	Output version information

	MON-HW	0x0A 0x09	56	Cycle / Query Various hardware configuration status
Class AID				**AID Dissipation interest**
	AID-INI	0x0B 0x01	56	Query / auxiliary input location, time, frequency, the clock frequency offset information
	AID-HUI	0x0B 0x03	60	Query / auxiliary input health information, UTC parameters, ionospheric parameters

2.7 NAV (0x01)

Navigation Results: position, velocity, time, accuracy, heading, and the number of GDOP satellites. NAV message is divided into several types, each containing different information.

2.7.1NAV-STATUS (0x01 0x00)

information	NAV-STATUS Status				
Type cycle described navigation receiver /					
query message structure Notes					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	80	0x01 0x00	The table below	4 Bytes

Payload contents

character Offset	type of data	proportion Scaling	first name	Unit	Description
0	U4	-	runTime	ms	Distance Power / reset runtime
4	U2	-	fixInterval	ms	Positioning time interval
6	U1	-	posValid	-	Registration marks (Notes [1])
7	U1	-	velValid	-	Speed flag (Note [2])
8	U1 * 32	-	gpsMsgFlag	-	32 GPS satellites almanac and ephemeris message validity flag (Note [3])
40	U1 * 24	-	glnMsgFlag	-	24 GLONASS satellites almanac and ephemeris message validity flag (Note [3])
64	U1 * 14	-	bdsMsgFlag	-	14 BDS satellite almanac and ephemeris message validity flag (Note [3])
78	U1		gpsUtcionFlag	-	Message validity flag UTC and ionospheric information on GPS (Note [4])
79	U1	-	bdsUtcionFlag	-	BDS validity flag of message information, ionosphere and UTC (Note [4])

Notes [1]: Location Value of the flag

	description
0	Positioning invalid
1	External input position
2	A rough estimate of the position
3	Keeping the last position location
4	Dead Reckoning
5	Fast positioning mode
6	2D positioning
7	3D positioning
8	GNSS + DR integrated navigation

Note [2]: Speed Value of the flag

	description
0	Speed invalid
1	Speed external input

2	A rough estimate of the speed
3	To maintain the last speed
4	Rate projections
5	Fast speed mode
6	2D speed
7	3D speed
8	GNSS + DR integrated navigation speed
Note [3]: message validity flag Message validity flag high 4 represents almanac, ephemeris low 4 represents the value of the message validity flag	
	description
0	Missing
1	Unhealthy
2	Expired
3	effective
Note [4]: message validity flag 4 represents a high UTC parameter message validity flag, the message indicates the lower 4 bits of the ionosphere parameter value validity flags	
	description
0	Missing
1	Unhealthy
2	Expired
3	effective

2.7.2NAV-DOP (0x01 0x01)

Information NAV-DOP factor type positioning					
accuracy described cycle / query Note DOP					
values are dimensionless message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	28	0x01 0x01	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling first name		Unit Description	
0	U4	-	runtime	ms	Distance Power / reset runtime
4	R4	-	pDop	-	Location DOP
8	R4	-	hDop	-	DOP level
12	R4	-	vDop	-	Vertical DOP
16	R4	-	nDop	-	North DOP
20	R4	-	eDop	-	East DOP
twenty four	R4	-	tDop	-	Time DOP

2.7.3NAV-SOL (0x01 0x02)

Information	NAV-SOL				
PVT navigation information described in the type of cycle ECEF coordinate					
system / query message structure Notes					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	72	0x01 0x02	The table below	4 Bytes

Payload Lotus content

Character Offset	data Types of	Scaling name		unit	description
0	U4	-	runTime	ms	Distance Power / reset runtime
4	U1	-	posValid	-	Registration marks (Notes [1])
5	U1		velValid	-	Speed flag (Note [2])
6	U1	-	timeSrc	-	Time source (Note [3])
7	U1	-	system	-	Multimode receiver receiving mode mask (Note [4])
8	U1	-	numSV	-	The total number of satellites involved in solving
9	U1	-	numSVGPS	-	The number of GPS satellites involved in solving the
10	U1	-	numSVBDS	-	The number of satellites involved in solving the BDS
11	U1	-	numSVGLO NASS	-	The number of GLONASS satellites involved in solving the
12	U2	-	res	-	Retention
14	U2	-	week	-	Weeks
16	R8	-	tow	s	When the week
twenty four	R8	-	ecefX	m	X coordinate in the ECEF coordinate system
32	R8	-	ecefY	m	Y coordinate in the ECEF coordinate system
40	R8	-	ecefZ	m	Z coordinate in the ECEF coordinate system
48	R4	-	pAcc	M ^ 2	Estimation accuracy 3D position
52	R4	-	ecefVX	m / s	X speed ECEF coordinate system
56	R4	-	ecefVY	m / s	Y coordinate system ECEF velocity
60	R4	-	ecefVZ	m / s	Z coordinate system ECEF velocity
64	R4	-	sAcc	(M / s) ^ 2	3D velocity estimation accuracy
68	R4	-	pDop	-	Location DOP

Notes [1]: Location Value of the flag

	description
0	Positioning invalid
1	External input position
2	A rough estimate of the position
3	Keeping the last position location
4	Dead Reckoning
5	Fast positioning mode
6	2D positioning
7	3D positioning
8	GNSS + DR integrated navigation

Note [2]: Speed Value of the flag

	description

0	Speed invalid
1	Speed external input
2	A rough estimate of the speed
3	To maintain the last speed
4	Rate projections
5	Fast speed mode
6	2D speed
7	3D speed
8	GNSS + DR integrated navigation speed
Note [3]: Time Source Time	
Source	description
0	GPS timing, that is, the number of weeks and weeks of time is obtained from the GPS satellite receiver local time
1	BDS
2	GLONASS
3	RTC
Note [4]: Multimode Receiving mode bits	
	description
B0	1 = GPS satellites for positioning
B1	1 = BDS satellites for positioning
B2	1 = GLONASS satellites for positioning

2.7.4 NAV-PV (0x01 0x03)

Information	NAV-PV				
Position and speed information of the type described in the cycle Geodetic					
System / query message structure Notes					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	80	0x01 0x03	The table below	4 Bytes

Payload Lotus content

Character Offset	data Types of	Scaling name		unit	description
0	U4	-	runTime	ms	Distance Power / reset runtime
4	U1	-	posValid	-	Registration marks (Notes [1])
5	U1		velValid	-	Speed flag (Note [2])
6	U1	-	system	-	Multimode receiver receiving mode mask (Note [4])
7	U1	-	numSV	-	The total number of satellites involved in solving
8	U1	-	numSVGPS	-	The number of GPS satellites involved in solving the
9	U1	-	NumSVBDS	-	The number of satellites involved in solving the BDS
10	U1	-	numSVGLO NASS	-	The number of GLONASS satellites involved in solving the
11	U1	-	res	-	Retention
12	R4	-	pDop	-	Location DOP
16	R8	-	lon	°	longitude
twenty four	R8	-	lat	°	latitude
32	R4	-	height	m	Geodetic height (in reference ellipsoid)
36	R4	-	sepGeoid m		Abnormal height (height difference between the earth and altitude)
40	R4	-	hAcc	m ^ 2	Horizontal position accuracy
44	R4	-	vAcc	m ^ 2	Vertical positional accuracy
48	R4	-	velN	m / s	North to speed ENU coordinate system
52	R4	-	velE	m / s	East to speed ENU coordinate system
56	R4	-	velU	m / s	ENU coordinate system velocity days
60	R4	-	speed3D m / s		3D speed
64	R4	-	speed2D m / s		2D ground speed
68	R4	-	heading	°	course
72	R4	-	sAcc	(M / s) ^ 2	Accuracy of ground speed
76	R4	-	cAcc	° ^ 2	Accuracy heading

2.7.5NAV-TIMEUTC (0x01 0x10)

information NAV-TIMEUTC					
description UTC time information					
Types of Cycle / Query					
Note					
Message	head	Length (bytes)	Identifier	Checksum Payload	
Structure	0xBA 0xCE	twenty four	0x01 0x10	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling first name		Unit Description	
0	U4	-	runTime ms		Distance Power / reset runtime
4	R4	-	tAcc	s ^ 2	Time estimation accuracy
8	R4	-	msErr	ms	Ms residual error after taking the whole
12	U2	-	ms	ms	Millisecond portion of UTC time in the range from 0 to 999
14	U2	-	year	year	UTC years (1999 to 2099)
16	U1	-	month	Month	UTC month (1 to 12)
17	U1	-	day	Day	UTC within days of the month (1 to 31)
18	U1	-	hour	Hour	UTC within hours (0 to 23)
19	U1	-	min	min	The UTC time division (0 to 59)
20	U1	-	sec	s	UTC seconds since the beginning (0 to 59)
twenty one	U1	-	valid	-	Time valid flag (Notes [1])
twenty two	U1	-	timeSrc	-	Timing system flag (Note [2])
twenty three	U1	-	res	-	Retention

Notes [1]: Time The effective value of the

flag	description
0	Time is invalid
1	RTC time
2	According to a rough estimate of the time the satellite launch time
3	Undefined
4	Estimated time
5	Time to get the fast mode
6	Undefined
7	Obtained accurate time

Note [2]: Timing System flag values

	description
0	GPS time
1	BDS Timing
2	GLONASS Timing

2.7.6NAV-CLOCK (0x01 0x11)

information NAV-CLOCK					
description Clock solver information					
Types of Cycle / Query					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	64	0x01 0x11	The table below	4 Bytes

The active load Yung

character offsets	data Types of	Scaling name		Unit Description	
0	U4	-	runTime ms		Distance Power / reset runtime
4	R4	1 / c	freqBias	s / s	Clock drift (clock frequency deviation)
8	R4	-	tAcc	s ^ 2	Time Accuracy
12	R4	1 / c ^ 2	fAcc	-	Frequency accuracy
Repeating section starts (N = 0 Represents GP S, 1 represents BDS, 2 denotes GLONASS)					
16 + 16 * N R8		-	tow	ms	TOW
24 + 16 * N R4		-	dtUtc	s	UTC time difference between the satellite time and a small portion seconds
28 + 16 * N U2		-	wn	- Weeks	
30 + 16 * N	I1	-	leapS	-	UTC leap second, the time difference between the satellite time and UTC integer second portion
31 + 16 * N U1		-	valid	-	Time validity flag
Repeat portion end, N is the maximum value (SYSTEM_ALL-1), which is the current version 2					

2.7.7NAV-GPSINFO (0x01 0x20)

information NAV-GPSINFO					
description GPS satellite information					
Types of Cycle / Query					
Each statement contains only comment with A satellite system of satellite information for more than More System, the statement It outputs a plurality of message					
structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	8 + 12 * N	0x01 0x20	The table below	4 Bytes

The active load Yung					
character offsets	data Types of	proportion Scaling first name		Unit Description	
0	U4	-	runTime	-	Distance Power / reset runtime
4	U1	-	numViewSv	-	Number of visible satellites, the effective range of 0 to 32
5	U1	-	numFixSv	-	The number of satellites for positioning
6	U1		system	-	System type (Notes [1])
7	U1	-	res		Retention
Repeat part open beginning (N = n u mVie wSv, the effective range of 0 ~ 32) 8 + 12 * N					
	U1	-	chn	- Channel number	
9 + 12 * N	U1	-	svid	-	Satellite No.
10 + 12 * N	U1	-	flags	-	Satellite status mask (Note [2])
11 + 12 * N	U1	-	quality	-	Measured signal quality indicator (Note [3])
12 + 12 * N	U1	-	CN0	dB-Hz Signal carrier to noise ratio	
13 + 12 * N	I1	-	elev	°	Satellite elevation angle (-90 to 90)
14 + 12 * N	I2	-	azim	°	Satellite azimuth (0 to 360)
16 + 12 * N	R4	-	prRes	m	Pseudorange residuals
Repeat section End					

Notes [1]: System Type	
Numerical	description
0	GPS
1	BDS
2	GLONASS

Note [2]: satellite states	
Bit	description
B0	1 = satellite operator involved in understanding
B1	1 = satellite differential correction data is available
B2	1 = satellite orbit information available (ephemeris or almanac)
B3	1 = satellite orbit information from the ephemeris
B4	1 = unhealthy satellites
B5	1 = satellite orbit information from the enhanced almanac
B7: B6	00 = 01 = no predictive information capture is prohibited 10 = prediction information obtained from the estimated position 11 = prediction information obtained from the exact position

Comments [3]: measured signal The quality indicator	
value	description
0	Satellite idle channel is not allocated

1	The capture process
2	capture
3	Signal is detected, but not by
4	Code phase locking
5,6	Retention
7	Code phase and carrier phase locking

2.7.8NAV-BDSINFO (0x01 0x21)

information NAV-BDSINFO					
description BDS satellite information					
Types of Cycle / Query					
Each statement contains only comment with A satellite system of satellite information for more than More System, the statement It outputs a plurality of message					
structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	8 + 12 * N	0x01 0x21	The table below	4 Bytes

The active load Yung					
character offsets	data Types of	proportion Scaling first name		Unit Description	
0	U4	-	runTime	-	Distance Power / reset runtime
4	U1	-	numViewSv	-	Number of visible satellites, the effective range of 0 to 32
5	U1	-	numFixSv	-	The number of satellites for positioning
6	U1	-	system	-	System type (see 2.7.7 Notes [1])
7	U1	-	res		Retention
Repeat part open beginning (N = n u mVie wSv, the effective range of 0 ~ 32) 8 + 12 * N					
	U1	-	chn	- Channel number	
9 + 12 * N	U1	-	svid	-	Satellite No.
10 + 12 * N	U1	-	flags	-	Satellite status mask (refer to 2.7.7 Note [2])
11 + 12 * N	U1	-	quality	-	Measuring a signal quality indication (see 2.7.7 Remarks [3])
12 + 12 * N	U1	-	CN0	dB-Hz Signal carrier to noise ratio	
13 + 12 * N	I1	-	elev	°	Satellite elevation angle (-90 to 90)
14 + 12 * N	I2	-	azim	°	Satellite azimuth (0 to 360)
16 + 12 * N	R4	-	prRes	m	Pseudorange residuals
Repeat section End					

2.7.9NAV-GLNINFO (0x01 0x22)

information	NAV-GLNINFO				
description	GLONASS satellite information				
Types of	Cycle / Query				
Each statement contains only comment with	A satellite system of satellite information for more than More System, the statement It outputs a plurality of message				
structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	8 + 12 * N	0x01 0x22	The table below	4 Bytes

The active load	Yung				
character offsets	data Types of	proportion Scaling first	name	Unit	Description
0	U4	-	runTime	-	Distance Power / reset runtime
4	U1	-	numViewSv	-	Number of visible satellites, the effective range of 0 to 32
5	U1	-	numFixSv	-	The number of satellites for positioning
6	U1	-	system	-	System type (see 2.7.7 Notes [1])
7	U1	-	res		Retention
Repeat part open beginning (N = n u mVie wSv, the effective range of 0 ~ 32) 8 + 12 * N					
	U1	-	chn	-	Channel number
9 + 12 * N	U1	-	svid	-	Satellite No.
10 + 12 * N	U1	-	flags	-	Satellite status mask (refer to 2.7.7 Note [2])
11 + 12 * N	U1	-	quality	-	Measuring a signal quality indication (see 2.7.7 Remarks [3])
12 + 12 * N	U1	-	CN0	dB-Hz	Signal carrier to noise ratio
13 + 12 * N	I1	-	elev	°	Satellite elevation angle (-90 to 90)
14 + 12 * N	I2	-	azim	°	Satellite azimuth (0 to 360)
16 + 12 * N	R4	-	prRes	m	Pseudorange residuals
Repeat section End					

2.8 TIM (0x02)

2.8.1 TIM-TP (0x02 0x00)

Message name	TIM-TP type described				
timing pulse period information / annotation					
query message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	twenty four	0x02 0x00	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	Scaling name		Unit Description	
0	U4	-	runTime	ms	Distance Power / reset runtime
4	R4	-	qErr	s	The next time the time corresponding to the pulse quantization error
8	R8	-	tow	s	The next time the time corresponding to the pulse weeks
16	U2	-	Wn	-	Weeks next time corresponding to the pulse
18	U1	-	refTime	-	Reference time (Notes [1])
19	U1	-	utcValid	-	Valid flag (Note [2])
20	U4	-	Res	- Reserved	

Notes [1]: Timing Pulse reference time value

	description
0	UTC time
1	Satellite time

Note [2]: UTC The parameters are valid flag is set

	description
0	Missing
1	Retention
2	Expired
3	effective

2.9 RXM (0x03)

Measurement message.

2.9.1 RXM-MEASX (0x03 0x10)

information RXM-MEASX					
description Pseudoranges, carrier phase measurement information of the original					
Types of Cycle / Query					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	16 + 32 * N	0x03 0x10	The table below	4 Bytes
The active load Content:					
Character Offset	data Types of	Scaling name		Unit Description	
0	R8	-	tow	s	Receiver time during week
8	I2	-	wn	week Receiver time, weeks	
10	I1	-	leapS	- leap second value	
11	U1	-	numMeas	-	The number of measured values, the effective range of 0 to 32
12	U1	-	recStat	-	Receiver Status [Note 1]
13	U1	-	timeSource		Receiver time source, 0 = GPS, 1 = BDS
14	U1	-	rcvrid	-	Receiver number. A first receiver 0 = 1 = second receiver. . .
15	U1	-	res1	- Reserved	
Repeat part open beginning (N = n u mMeas , The effective range of 0 ~ 32) 16 + 32 * N					
	R8	-	prMes	m	Pseudo range measurements
24 + 32 * N	R8	-	cpMes	cycles Carrier phase	
32 + 32 * N	R4	-	doMes	Hz	Doppler measurements
36 + 32 * N	U1	-	gnssid	-	System type. 0 = GPS, 1 = BDS, 2 = GLONASS
37 + 32 * N	U1	-	svid	-	Satellite No.
38 + 32 * N	U1	-	res2	- Reserved	
39 + 32 * N	U1	-	glnFreqid	-	Frequency number (offset 8), effective for GLONASS
40 + 32 * N	U2	-	lockTime	s	Time code locking ring
42 + 32 * N	U1	-	cn0	dB-Hz CNR	
43 + 32 * N	U1	-	res3	- Reserved	
44 + 32 * N	U1	-	res4	- Reserved	
45 + 32 * N	U1	-	res5	- Reserved	
46 + 32 * N	U1	-	trkStat	-	Satellite tracking state [Note 2]
47 + 32 * N	U1	-	res6	- Reserved	
Repeat portion end Notes [1]: a					
receiver state					

recStat	Explanation
BIT0	= 1, Show leapS effective(UTC Correction parameters are valid)
BIT1	= 1, Show GPS Receiver clock reset
BIT2	= 1, Show BDS Receiver clock reset
Note [2]: with satellite Track state	
recStat	Explanation
BIT0	= 1, It represents a pseudo range measurements prMes effective
BIT1	= 1, Denotes carrier phase measurements cpMes effective
BIT2	= 1, It represents the effective half-cycle ambiguity (down PI Corrected effective)
BIT3	= 1, It represents a half cycle ambiguity is subtracted from the carrier phase measurements

2.9.2 RXM-SVPOS (0x03 0x11)

information RXM- SVPOS					
description Satellite position information					
Types of Cycle / Query					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	16 + 48 * N	0x03 0x11	The table below	4 Bytes

The active load Content:

Character Offset	data Types of	Scaling name		Unit Description	
0	R8	-	tow	s	Receiver time during week
8	I2	-	wn	week Receiver time, weeks	
10	U1	-	numMeas	-	The number of measured values, the effective range of 0 to 32
11	U1	-	rcvrid	-	Receiver number. A first receiver 0 = 1 = second receiver. . .
12	I4	-	res2	- Reserved	
Repeat part open beginning (N = n u mMeas , The effective range of 0 ~ 32) 16 + 48 * N					
	R8	-	x	m	Satellite coordinates
24 + 48 * N	R8	- y		m	Satellite coordinates
32 + 48 * N	R8	-	z	m	Satellite coordinates
40 + 48 * N	R4	-	svdt	m	Satellite clock error
44 + 48 * N	R4	-	svdf	m / s	Satellite frequency deviation
48 + 48 * N	R4	-	tropDelay	m	Tropospheric delay
52 + 48 * N	R4	-	ionoDelay	m	Ionospheric delay
56 + 48 * N	U1	-	svid	-	Satellite No.
57 + 48 * N	U1	-	glnFreqid	-	Frequency number (offset 8), effective for GLONASS
58 + 48 * N	U1	-	gnssid	-	System Type, 0 = GPS, 1 = BDS, 2 = GLONASS
59 + 48 * N	U1	-	res3	- Reserved	
60 + 48 * N	U4	-	res4	- Reserved	
Repeat section End					

2.10 ACK (0x05)

CFG reply ACK and NACK for a received message.

2.10.1 ACK-NACK (0x05 0x00)

information ACK-NACK						
description Not properly respond to information received						
Types of Reply						
Note						
Message Structure	head		Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE		4	0x05 0x00	The table below	4 Bytes
Payload Dutch character						
content Offset	type of data	proportion Scaling first	name	Unit	Description	
0	U1	-	clsID	-	Type information is not received correctly	
1	U1	-	msgID	-	No messages received correctly numbered	
2	U2	-	res	- Reserved		

2.10.2 ACK-ACK (0x05 0x01)

information ACK-ACK						
description Respond correctly received information						
Types of Reply						
Note						
Message Structure	head		Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE		4	0x05 0x01	The table below	4 Bytes
Payload Dutch character						
content Offset	type of data	proportion Scaling first	name	Unit	Description	
0	U1	-	clsID	-	The right to receive the type of information	
1	U1	-	msgID	-	Number of correctly received information	
2	U2	-	res	- Reserved		

2.11 CFG (0x06)

Configuration information, such as the dynamic setting mode, baud rate. When the effective length of 0, representative for the configuration information, the system outputs the data of the same identifier.

2.11.1 CFG-PRT (0x06 0x00)

news CFG-PRT					
description Query the operating mode of UART					
Types of Inquire					
Note					
news	head	Length (bytes)	Identifier	Checksum Payload	
structure	0xBA 0xCE	0	0x06 0x00	0	4 Bytes

news CFG-PRT					
description Set the operating mode of UART					
Types of Set / query response					
Note					
news	head	Length (bytes)	Identifier	Checksum Payload	
structure	0xBA 0xCE	8	0x06 0x00	The table below	4 Bytes

Payload contents

character Offset	data Types of	Scaling name		Unit Description	
0	U1	-	portID	-	Port identification symbol (corresponding to 0 and 1 UART0 and UART1)
1	U1	-	protoMask	-	Protocol control mask, each port can support several protocols simultaneously. Is equal to 1 the corresponding bit is enabled Protocol (Notes [1])
2	U2	-	mode	-	UART operation mode bit mask (Note [2])
4	U4	-	baudRate	bps Baud Rate	

Notes [1]: Protocol Controlling mask bit

	description
B0	1 = input binary protocol
B1	1 = Protocol Text Input
B4	1 = output binary protocol
B5	Protocol Text Output 1 =

Note [2]: UAR T Mode of operation than Mask bits Laid

	The value	description
[7: 6]	00	5bits
	01	6bits
	10	7bits
	11	8bits
[11: 9]	10x	No parity
	001	Odd parity
	000	Even parity
	x1x	Retention

[13:12]	00	One stop bit
	01	1.5 stop bits
	10	Two stop bits
	11	Retention

2.11.2 CFG-MSG (0x06 0x01)

Information	CFG-MSG				
Description	Read / type of the transmission frequency setting				
information read / comment	provided message structure				
	head	Length (bytes)	Identifier	Checksum	Payload
	0xBA 0xCE	4	0x06 0x01	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling	first name	Unit	Description
0	U1	-	clsID	-	Information Type
1	U1	-	msgID	-	Number Information
2	U2	-	rate	-	Transmission frequency information (Notes [1])

Notes [1]: Information Transmission

frequency value	description
0	No output
1	Every position, output once
2	Positioning twice, once output
N	Positioning N times, once output
0xFFFF	Output immediately once, and only once, equivalent to the query output

2.11.3 CFG-RST (0x06 0x02)

Message name CFG-RST					
Description boot the receiver / Clear saved annotation data structure types					
provided message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	4	0x06 0x02	The table below	4 Bytes

effective Load Dutch content					
character Offset	data Types of	proportion Scaling first	name	Unit	Description
0	U2	-	navBbrMask	-	Clear battery of RAM. If the mask a bit is set to 1, then clear the data indicated on the bit (Note [1])
2	U1	-	resetMode	-	Reset (Note [2])
3	U1	-	startMode	-	Starting method (Note [3])

Notes [1]: Clear Field bits	
	description
B0	Ephemeris
B1	Almanac
B2	Health Information
B3	Ionospheric parameters
B4	Receiver location information
B5	Clock drift (clock offset)
B6	Crystal parameters
B7	UTC correction parameters
B8	RTC
B9	Configuration information

Note [2]: Reset The numerical	
values	description
0	Immediate hardware reset (achieved through WATCHDOG)
1	Software controlled reset
2	Software controlled reset (GPS only)
4	Hardware reset after shutdown (through WATCHDOG)
8	GPS controlled stop
9	GPS controlled start

Note [3]: Start The numerical values	
	description
0	Hot Start
1	Warm start
2	Cold start
3	The factory started
8	Close serial output and the radio frequency part, serial command response
9	Open the serial output and the radio frequency part

2.11.4 CFG-TP (0x06 0x03)

information CFG-TP					
description Query time pulse parameters					
Types of Inquire					
Note					
Message	head	Length (bytes)	Identifier	Checksum Payload	
Structure	0xBA 0xCE	0	0x06 0x03	0	4 Bytes

information CFG-TP					
description Read / Set time pulse parameters					
Types of Read / Set					
Note					
Message	head	Length (bytes)	Identifier	Checksum Payload	
Structure	0xBA 0xCE	16	0x06 0x03	The table below	4 Bytes

effective Load contents of

the character Offset	type of data	proportion Scaling first name		Unit Description	
0	U4	-	interval	us	Time interval (pulse period) between the pulses
4	U4	-	width	us	Pulse Width
8	U1	-	enable	-	Enable flag (Notes [1])
9	U1	-	polar	-	Configuration pulse polarity (Note [2)
10	U1	-	timeRef	-	Reference time (Note [3)
11	U1	-	timeSource	-	Time source (Note [4)
12	R4	-	userDelay	s	User Time Delay

Notes [1]: pulses The value can sign

	description
0	Close Pulse
1	Enable pulse
2	Pulse enable, and continuous output. When you can not locate a normal, automatic updates to maintain the pulse rate
3	Positioning in a normal output pulses when the receiver is not positioned properly, no output pulse

Note [2]: pulse electrode Configuration 0

	Rising edge
1	Falling edge

Comments [3]: Reference time Inter

0	UTC time
1	Satellite time

When the satellite: Remarks [4] Numerical-source

	description
0	Force Single GPS time
1	Force Single BDS Timing
2	Force Single GLN Timing
3	Retention
4	BDS primary, when the BDS is unavailable and automatically switches to the other system timing
5	Primary GPS, when GPS is not automatically switch to the other system timing

6	Primary GLN, GLN is unavailable when automatically switches to the other system timing
7	Retention
other	Automatic selection Time System

2.11.5 CFG-RATE (0x06 0x04)

Message name CFG-RATE The query					
type targeting query interval					
Comment receiver supports different navigation rate (default rate of once per second update). Navigation will directly affect the rate of power consumption, The faster rate, CPU And communication burden more Big					
Message	head	Length (bytes)	Identifier	Checksum Payload	
Structure	0xBA 0xCE	0	0x06 0x04	0	4 Bytes

Message name CFG-RATE described type					
is provided a positioning interval					
Comment receiver supports different navigation rate (default rate of once per second update). Navigation will directly affect the rate of power consumption, The faster rate, CPU And communication burden more Big					
Message	head	Length (bytes)	Identifier	Checksum Payload	
Structure	0xBA 0xCE	4	0x06 0x04	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling first name		unit	description
0	U2	-	interval	ms	The time interval between two positioning
2	U2	-	res	-	Retention

2.11.6 CFG-CFG (0x06 0x05)

information	CFG- CFG					
Clear description, save and load configuration command						
annotation message type structure						
	head		Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE		4	0x06 0x05	The table below	4 Bytes
Payload Content						
character offsets	type of data	proportion Scaling first	name	Unit Description		
0	U2	-	mask	-	Mask configuration information (Notes [1])	
2	U1	-	mode	-	An operation mode of configuration information (Note [2])	
3	U1	-	res	- Reserved		

Notes [1]: configuration information Mask bits	
	description
B0	IO port configuration information (CFG-PRT)
B1	Message configuration (CFG-MSG)
B2	INF message configuration (CFG-INF)
B3	Navigation configuration (CFG-RATE, CFG-TMODE)
B4	Time pulse configuration (CFG-TP)
B5	Group delay (CFG-GROUP)

Note [2]: Operation mode	
Numerical	description
0	Clear permanent configuration
1	Save the current configuration to the permanent configuration
2	Permanent configuration is loaded to the current configuration

2.11.7 CFG-TMODE (0x06 0x06)

information CFG-TMODE					
description Query time service mode					
Types of Inquire					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	0	0x06 0x06	0	4 Bytes

information CFG-TMODE					
description Read / Set Mode Timing					
Types of Read / Set					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	40	0x06 0x06	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling	first name	Unit	Description
0	U4	-	mode	-	Timing Mode (Note [1])
4	R8	-	fixedPosX	m	ECEF coordinate system where the X coordinate
12	R8	-	fixedPosY	m	ECEF coordinate system Y-coordinate
20	R8	-	fixedPosZ	m	ECEF coordinate system Z coordinate
28	R4	-	fixedPosVar	m ^ 2	3D position variance
32	U4	-	svinMinDur	s	When the timing when the mode is 1, the minimum measurement time interval
36	R4		svinVarLimit	m ^ 2	when the mode is the timing 1, the positioning error limit

Notes [1]: Timing Numerical model

	description
0	Self-positioning, while granted
1	After a period of time to obtain the autonomous positioning have sufficient accuracy the position of the user, all available satellites calculated using only the user clock timing parameters. In this mode the user when the fixing position can be achieved when a single satellite timing
2	User to enter the current position is calculated using only the user all available satellite clock parameters for timing, in this mode allows a single satellite timing

2.11.8 CFG-NAVX (0x06 0x07)

Message name CFG-NAVX The query navigation engine					
specialized type of configuration queries Comment Query					
navigation-related parameters Number of message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	0	0x06 0x07	0	4 Bytes

Message name CFG-NAVX described configuration					
type navigation engine professional settings					
Comment Configuration parameters related to					
navigation Number of message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	44	0x06 0x07	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	Scaling name		Unit Description	
0	U4	-	mask	-	Parameter mask, only the corresponding mask bit set to 1, only the application parameters (Notes [1])
4	U1	-	dyModel	-	Dynamic Mode (Note [2])
5	U1	-	fixMode	-	Positioning mode (Note [3])
6	U1	-	minSVs	-	The minimum number of satellites for positioning
7	U1	-	maxSVs	-	The maximum number of satellites for positioning
8	U1	-	minCNO	dB-Hz	The minimum for the positioning satellite signal carrier to noise ratio
9	U1	-	res1	-	Reserved
10	U1		iniFix3D		Positioning must be initialized 3D positioning mark (0/1)
11	I1	-	minElev	°	The minimum elevation angle for positioning GNSS satellites
12	U1	-	drLimit	s	No satellite signal DR maximum time
13	U1	-	navSystem	-	The navigation system enable flag (Note [4])
14	U2	-	wnRollOver	-	GPS week number rollover
16	R4	-	fixedAlt	m	2D is positioned at a fixed height
20	R4	-	fixedAltVar	m ^ 2	Fixed height error in positioning 2D
twenty four	R4	-	pDop	-	DOP maximum position
28	R4	-	tDop	-	DOP maximum time
32	R4	-	pAcc	m ^ 2	maximum position accuracy
36	R4	-	tAcc	m ^ 2	times the maximum precision
40	R4	-	staticHoldTh	m / s	Remains stationary threshold

Notes [1]: Parameter Mask bits

	description
B0	Dynamic mode settings
B1	Application positioning mode settings
B2	Application of the maximum / minimum number of satellite navigation settings
B3	Application set minimum signal to noise ratio
B4	Retention
B5	Applications initial positioning 3D Set up

B6	Application of the minimum angle of elevation settings
B7	DR application restriction settings
B8	Applications enabled navigation system
B9	Application of GPS week rollover settings
B10	Application height of the auxiliary
B11	Application position DOP limit
B12	Application time limit DOP
B13	APPLICATION OF STATIC remains set
Note [2]: Dynamic Mode Mode	
	description
0	Portable mode
1	Stationary mode
2	Walking Mode
3	Car Mode
4	Navigation mode
5	Flight mode acceleration <1g
6	Flight mode acceleration <2g
7	Flight mode acceleration <4g
Comments [3]: Location Mode Mode	
	description
0	Retention
1	2D positioning
2	3D positioning
3	2D / 3D switching automatically positioned
Note [4]: Navigation System enable bits	
	description
B0	1 = GPS
B1	1 = BDS
B2	1 = GLONASS

2.11.9 CFG-GROUP (0x06 0x08)

Message name CFG-GROUP					
The query GLONASS group delay type of query					
message structure Comment					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	0	0x06 0x08	0	4 Bytes

Message name CFG-GROUP					
GLONASS configuration described group delay type setting					
configuration message annotations					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	56	0x06 0x08	The table below	4 Bytes
effective Load contents of					
the character Offset	type of data	Scaling name		Unit Description	
0	R4 [14]	-	groupDealy	m	GLONASS frequencies corresponding to the respective group delay characterized by the distance (the group delay time by the speed of light to obtain distance)

2.11.10 CFG-POLLMSG (0x06 0x10)

Query access Receiver outputs transmission frequency

information. Information CFG-POLLMSG					
The query receiver frequency transmission cycle of the output type information read /					
comment provided message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	4	0x06 0x10	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling first	name	Unit	Description
0	U1	-	clsID	-	Information Type
1	U1	-	msgID	-	Number Information
2	U2	-	Res	- Reserved	

Information	CFG-POLLMSG				
Description Returns the receiver output cycle type transmission frequency read /					
set annotation message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	4	0x06 0x10	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling first	name	Unit	Description
0	U1	-	clsID	-	Information Type
1	U1	-	msgID	-	Number Information
2	U2	-	rate	-	Statement transmission frequency

2.12 MEAS (0x07)

Raw measurement data receiver, message type is 0x07.

2.12.1 MEAS (0x07 0x00)

information MEAS					
description Raw measurement data					
Types of Cycle / Query					
Note					
Message	head	Length (bytes)	Identifier	Checksum Payload	
Structure	0xBA 0xCE	16 + 32 * 32	0x07 0x00	The table below	4 Bytes

The active load Yung					
character offsets	data Types of	Scaling name		Unit Description	
0	R8	-	tow	s	Receiver time during week
8	I4	-	wn	week Receiver time, weeks	
12	U1	-	numFixBds	-	BDS number of available satellites
13	U1	-	numFixGps	-	The number of available GPS satellites
14	U1	-	numFixGln	-	The number of available GLONASS satellites
15	U1	-	res3	- Reserved	
Repeat part open beginning (N = 0 ... 31) 16 + 32					
* N	R8	-	pr	m	Pseudorange
24 + 32 * N	R8	-	prRate	m / s	Pseudo-range rate of change
32 + 32 * N	R8	-	tdcp	a differential carrier phase cycle time (time of the current carrier Subtracting the phase of the carrier phase at the previous time)	
40 + 32 * N	U1	-	valid	-	Measure the effective value of the flag (Notes [1])
41 + 32 * N	U1	-	cn0	dB-Hz CNR	
42 + 32 * N	U1	-	svid	-	Satellite No.
43 + 32 * N	U1	-	system	-	System type. 0 = GPS, 1 = BDS, 2 = GLONASS
44 + 32 * N	U1	-	chn	-	Measured values corresponding tracking channel number
44 + 32 * N	U1	-	res1	- Reserved	
44 + 32 * N	I2	-	res2	- Reserved	
Repeat section End					

Notes [1]: measured The magnitude of the effective	
value of the flag	Explanation
<3	Measurement value is invalid
3	Code phase lock, but there is no synchronization
5	Code phase lock, and sync
> 8	Available measurements

2.13 MSG (0x08)

A navigation message receiver, the message type is 0x08.

2.13.1 MSG-BDSUTC (0x08 0x00)

information MSG-BDSUTC						
description BDS point UTC data (synchronization parameters and UTC time)						
Types of cycle						
Note						
Message Structure	head		Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE		20	0x08 0x00	The table below	4 Bytes
Payload Lotus content						
character Offset	data Types of	proportion Scaling first name		Unit Description		
0	U4	-	Res1	- Reserved		
4	I4	2^{-30}	A0UTC	s	BDT to UTC clock error	
8	I4	2^{-50}	A1UTC	s / s	BDT to UTC clock speed	
12	I1	-	dtls	s	The new leap seconds before the entry into force, BDT relative to the cumulative leap seconds UTC corrections	
13	I1	-	dtlsf	s	After the entry into force of the new leap second, BDT relative to the cumulative leap seconds UTC corrections	
14	U1	-	Res2	- Reserved		
15	U1	-	Res3	- Reserved		
16	U1	-	wnlsf	wee k	The new count of the entry into force of the leap second week	
17	U1	-	dn	day	The new leap second week of the date of entry into force of the count	
18	U1	-	valid	-	Flag information is available (Note [1])	
19	U1	-	Res4	- Reserved		

Notes [1]: Information Available flags value	
	Explanation
0	invalid
1	Unhealthy
2	Expired
3	effective

2.13.2 MSG-BDSION (0x08 0x01)

information	MSG-BDSION				
description	Ionospheric data point parameter BDS8				
Types of cycle					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	16	0x08 0x01	The table below	4 Bytes

Payload Lotus content

character Offset	data Types of	proportion Scaling	first name	Unit	Description
0	U4	-	Res1	- Reserved	
4	I1	2^{-30}	alpha0	s	Ionospheric parameters
5	I1	2^{-27}	alpha1	s / π	Ionospheric parameters
6	I1	2^{-24}	alpha2	s / π 2	Ionospheric parameters
7	I1	2^{-24}	alpha3	s / π 3	Ionospheric parameters
8	I1	2^{11}	beta0	s	Ionospheric parameters
9	I1	2^{14}	beta1	s / π	Ionospheric parameters
10	I1	2^{16}	beta2	s / π 2	Ionospheric parameters
11	I1	2^{16}	beta3	s / π 3	Ionospheric parameters
12	U1	-	valid	-	Flag information is available (Note [1])
13	U1	-	Res2	- Reserved	
14	U2	-	Res3	- Reserved	

Notes [1]: Information Available flags value

	Explanation
0	invalid
1	Unhealthy
2	Expired
3	effective

2.13.3 MSG-BDSEPH (0x08 0x02)

information	MSG-BDSEPH				
description	BDS ephemeris				
Types of cycle					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	92	0x08 0x02	The table below	4 Bytes

Payload contents

character Offset	data Types of	Scaling	first name	Unit	Description
0	U4	-	Res1	-	Reserved
4	U4	2^{-19}	sqra	$m^{1/2}$	Satellite orbit semi-major axis of the square root
8	U4	2^{-33}	es	-	Satellite orbital eccentricity
12	I4	2^{-31}	ω	π	Perigee
16	I4	2^{-31}	M_0	π	Mean anomaly reference time
20	I4	2^{-31}	i_0	π	Orbital inclination reference time
twenty four	I4	2^{-31}	Ω_0	π	The reference time calculated by ascension
28	I4	2^{-43}	Ω	π / s	Ascension rate of change
32	I2	2^{-43}	Δn	π / s	The average difference between the rate of movement of the satellite and the calculated values
34	I2	2^{-43}	IDOT	π / s	Orbital inclination of the rate of change
36	I4	2^{-31}	cuc	rad	Argument of latitude cosine harmonic correction to the amplitude
40	I4	2^{-31}	cus	rad	Sine argument of latitude correction to the amplitude of the harmonic
44	I4	2^{-6}	crc	m	Orbit radius amplitude cosine harmonic correction term
48	I4	2^{-6}	crs	m	Sine harmonic correction term orbit radius amplitude
52	I4	2^{-31}	cic	rad	Orbital inclination of the cosine harmonic correction to the amplitude
56	I4	2^{-31}	cis	rad	Orbital inclination of the sine amplitude harmonic correction term
60	U4	2^{3}	toe	s	Ephemeris reference time
64	U2	-	wne	-	The number of the entire circumference of the reference time
66	U2	-	Res2	-	Retention
68	U4	2^{3}	toc	s	This time clock reference time difference parameters
72	I4	2^{-33}	af0	s	Satellite ranging code phase time offset factor
76	I4	2^{-50}	af1	s / s	Satellite ranging code phase time offset factor
80	I2	2^{-66}	af2	s / s^2	Satellite ranging code phase time offset factor
82	I2	0.1	tgd	ns	Equipment on the satellite delay difference
84	U1	-	iodc	-	The age of the data clock
85	U1	-	iode	-	Ephemeris data age
86	U1	-	ura	-	User Range Accuracy
87	U1	-	health	-	Satellite Autonomous Health logo
88	U1	-	svid	-	Satellite No.
89	U1	-	valid	-	Flag information is available (Note [1])
90	U2	-	Res3	-	Retention

Notes [1]: Information available flags

Numerical	Description
0	
1 is	
invalid	Unhealthy

2	Expired 3
	effective

2.13.4 MSG-GPSUTC (0x08 0x05)

information	MSG-GPSUTC				
description	GPS UTC data point (synchronization parameters and UTC time)				
Types of cycle					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	20	0x08 0x05	The table below	4 Bytes

Payload Lotus content					
character Offset	data Types of	Scaling name		Unit Description	
0	U4	-	Res1	-	Retention
4	I4	2^{-30}	A0UTC	s	GPST clock error relative to UTC
8	I4	2^{-50}	A1UTC	s / s	GPST to UTC clock speed
12	I1	-	dtls	s	The new leap seconds before the entry into force, BDT relative to the cumulative leap seconds UTC corrections
13	I1	-	dtlsf	s	After the entry into force of the new leap second, BDT relative to the cumulative leap seconds UTC corrections
14	U1	2^{12}	tot	s	UTC reference time data
15	U1	-	wnt	week	UTC reference week number
16	U1	-	wnlsf	week	The new count of the entry into force of the leap second week
17	U1	-	dn	day	The new leap second week of the date of entry into force of the count
18	U1	-	valid	-	Flag information is available (Note [1])
19	U1	-	Res2	-	Retention

Notes [1]: Information Available flags value	
	Explanation
0	invalid
1	Unhealthy
2	Expired
3	effective

2.13.5 MSG-GPSION (0x08 0x06)

information	MSG-GPSION				
description	Ionospheric data point parameter GPS8				
Types of cycle					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	16	0x08 0x06	The table below	4 Bytes

Payload Lotus content

character Offset	data Types of	Scaling name		unit	description
0	U4	-	Res1	-	Retention
4	I1	2^{-30}	alpha0	s	Ionospheric parameters
5	I1	2^{-27}	alpha1	s / π	Ionospheric parameters
6	I1	2^{-24}	alpha2	s / π^2	Ionospheric parameters
7	I1	2^{-24}	alpha3	s / π^3	Ionospheric parameters
8	I1	2^{11}	beta0	s	Ionospheric parameters
9	I1	2^{14}	beta1	s / π	Ionospheric parameters
10	I1	2^{16}	beta2	s / π^2	Ionospheric parameters
11	I1	2^{16}	beta3	s / π^3	Ionospheric parameters
12	U1	-	valid	-	Flag information is available (Note [1])
13	U1	-	Res2	-	Retention
14	U2	-	Res3	-	Retention

Notes [1]: Information Available flags value

	Explanation
0	invalid
1	Unhealthy
2	Expired
3	effective

2.13.6 MSG-GPSEPH (0x08 0x07)

information RXM-GPSEPH						
description GPS ephemeris						
Types of cycle						
Note						
Message Structure	head		Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE		72	0x08 0x07	The table below	4 Bytes
Payload Lotus content						
character Offset	data Types of	proportion Scaling	name	Unit	Description	
0	U4	-	Res1	-	Retention	
4	U4	2^{-19}	sqra m	$m^{1/2}$	Satellite orbit semi-major axis of the square root	
8	U4	2^{-33}	es	-	Satellite orbital eccentricity	
12	I4	2^{-31}	ω	π	Perigee	
16	I4	2^{-31}	M_0	π	Mean anomaly reference time	
20	I4	2^{-31}	i_0	π	Orbital inclination reference time	
twenty four	I4	2^{-31}	Ω_0	π	The reference time calculated by ascension	
28	I4	2^{-43}	Ω	π / s	Ascension rate of change	
32	I2	2^{-43}	Δn	π / s	The average difference between the rate of movement of the satellite and the calculated values	
34	I2	2^{-43}	IDOT	π / s	Orbital inclination of the rate of change	
36	I2	2^{-29}	cuc	rad	Argument of latitude cosine harmonic correction to the amplitude	
38	I2	2^{-29}	cus	rad	Sine argument of latitude correction to the amplitude of the harmonic	
40	I2	2^{-5}	crc	m	Orbit radius amplitude cosine harmonic correction term	
42	I2	2^{-5}	crs	m	Sine harmonic correction term orbit radius amplitude	
44	I2	2^{-29}	cic	rad	Orbital inclination of the cosine harmonic correction to the amplitude	
46	I2	2^{-29}	cis	rad	Orbital inclination of the sine amplitude harmonic correction term	
48	U2	2^4	toe	s	Ephemeris reference time	
50	U2	-	wne	-	The number of the entire circumference of the reference time	
52	U4	2^4	toc	s	This time clock reference time difference parameters	
56	I4	2^{-31}	af0	s	Satellite ranging code phase time offset factor	
60	I2	2^{-43}	af1	s / s	Satellite ranging code phase time offset factor	
62	I1	2^{-55}	af2	s / s^2	Satellite ranging code phase time offset factor	
63	I1	2^{-31}	tgd	s	Equipment on the satellite delay difference	
64	U2	-	iodc	-	The age of the data clock	
66	U1	-	ura	-	User Range Accuracy	
67	U1	-	health	-	Satellite Autonomous Health logo	
68	U1	-	svid	-	Satellite No.	
69	U1	-	valid	-	Flag information is available (Note [1])	
70	U2	-	Res2	-	Retention	

Notes [1]: Letter Value of the flag information

available	Explanation
0	invalid
1	Unhealthy
2	Expired
3	effective

2.13.7 MSG-GLNEPH (0x08 0x08)

information	RXM-GLNEPH				
description	GLONASS ephemeris				
Types of cycle					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	68	0x08 0x08	The table below	4 Bytes
Payload Lotus content					
character Offset	data Types of	Scaling name		Unit Description	
0	U4	-	res1	- Reserved	
4	I4	2^{-30}	Taon	s	The correction value of the n GLONASS satellite relative time
8	I4	2^{-11}	x	km	Satellite position coordinates of the coordinate system PZ-90
12	I4	2^{-11}	y	km	Satellite position coordinates of the coordinate system PZ-90
16	I4	2^{-11}	z	km	Satellite position coordinates of the coordinate system PZ-90
20	I4	2^{-20}	dx	km / s	PZ-90 coordinate system satellite velocity
twenty four	I4	2^{-20}	dy	km / s	PZ-90 coordinate system satellite velocity
28	I4	2^{-20}	dz	km / s	PZ-90 coordinate system satellite velocity
32	I4	2^{-31}	taoc	s	UTC time is relatively GLONASS time scale correction amount
36	I4	2^{-30}	taoGPS	day	GLONASS correction amount from time to GPS time
40	I2	2^{-40}	gamman -		Satellite predicted carrier frequency relative deviation
42	U2	-	tk	-	When the days of the current frame, a total of 12bit
44	U2	-	nt	day	From a leap year in January clocking the current date
46	I1	2^{-30}	ddx	km / s 2	PZ-90 coordinate system of the satellite acceleration
47	I1	2^{-30}	ddy	km / s 2	PZ-90 coordinate system of the satellite acceleration
48	I1	2^{-30}	ddz	km / s 2	PZ-90 coordinate system of the satellite acceleration
49	I1	2^{-30}	dtaon	s	N-th satellite L2 signal and the L1 signal propagation time differences
50	U1	-	bn	-	Health logo
51	U1	900	tb	s	When the current time (UTC + 3 in order to prevail) intraday
52	U1	-	M	-	GLONASS satellites category
53	U1	-	P	-	The control part of the technical parameters
54	U1	-	ft	-	Satellite prediction accuracy pseudorange
55	U1	-	en	day	Satellite ephemeris age
56	U1	-	p1	-	Ephemeris information update flag
57	U1	-	p2	-	tb parity flag
58	U1	-	p3	-	Passing a current frame comprising a number of satellite almanac
59	U1	-	p4	-	Ephemeris data update flags: 1 Updated
60	U1	-	ln	-	Satellite healthy sign (GLONASS-M type satellites)
61	U1	-	n4	-	Time count (from the beginning of 1996, the four-year period)
62	U1	-	svid	-	Satellite No.
63	U1	-	nl	-	Frequency No.

64	U1	-	valid	-	Flag information is available (Note [1])
65	U1	-	res2	- Reserved	
66	U2	-	res3	- Reserved	

Notes [1]: Letter Value of the flag information

available	Explanation
0	invalid
1	Unhealthy
2	Expired
3	effective

2.14 MON (0x0A)

Monitoring information, such as configuration status, task status.

2.14.1 MON-VER (0x0A 0x04)

information MON-VER					
description Version Information					
Types of Respond to queries					
Note					
Message Structure	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	64	0x0A 0x04	The table below	4 Bytes

effective Load Netherlands Content:

character Offset	type of data	proportion Scaling first name		Unit Description	
0	CH [32]	-	swVersion	-	Software version string
32	CH [32]	-	hwVersion	-	Hardware version string

2.14.2 MON-HW (0x0A 0x09)

information MON-HW					
description Hardware Status					
Types of Cycle / Query					
Notes Hardware configuration of various shape state Including an antenna state , IO port status, noise Sound level, AG C information message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	56	0x0A 0x09	The table below	4 Bytes

effective Load Netherlands Content:

character Offset	type of data	Scaling name		Unit Description	
0	U4	-	noisePerMs0	-	IF data noise power DIF0
4	U4	-	noisePerMs1	-	IF data noise power DIF1
8	U4	-	noisePerMs2	-	IF data noise power DIF2
12	U2	-	agcData0	-	IF the number of amplitude data bits DIF0 1
14	U2	-	agcData1	-	IF the number of amplitude data bits DIF1 1
16	U2	-	agcData2	-	IF the number of amplitude data bits DIF2 1
18	U2	-	res	- Reserved	
20	U1	-	antStatus	-	The antenna status (Notes [1])
twenty one	U1	-	res	- Reserved	
twenty two	U1	-	res	- Reserved	
twenty three	U1	-	res	- Reserved	
twenty four	U4 [8]	2 ^ 24	jamming	-	The center frequency of the interference signal (normalized)

Notes [1]: Antennae State value

	description
0	Initialization process
1	Unknown state
2	normal
3	Short circuit
4	open circuit

2.15 AID (0x0B)

The auxiliary information, such as the initial position of the receiver, the time and the like.

2.15.1 AID-INI (0x0B 0x01)

Information AID-INI					
Description auxiliary position, time, frequency, clock offset information type query /					
comment input Configuration parameters related to navigation Number of message					
structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	56	0x0B 0x01	The table below	4 Bytes

effective Load Dutch content					
character Offset	data Types of	proportion Scaling first name		unit	description
0	R8	-	ecefXOrLat	m or 1 °	ECEF coordinate system, the X coordinate or latitude
8	R8	-	ecefYOrLon m or 1 °		Y coordinate or longitude coordinates in ECEF
16	R8	-	ecefZOrAlt	m or 1 °	Y coordinate or height ECEF coordinate system
twenty four	R8	-	tow	s	GPS time of week
32	R4	-	freaBias	m / s or ppm	Clock frequency drift
36	R4	-	pAcc	m	Estimation accuracy 3D position
40	R4	-	tAcc	s	The estimation accuracy of time
44	R4	-	fAcc	m / s or ppm	The accuracy of the clock frequency drift
48	U4	-	res	-	Retention
52	U2	-	wn	-	GPS week number
54	U1	-	timeSource	-	Time Source
55	U1	-	flags	-	Flag masks (Note [1])

Notes [1]: Logo Mask bits	
	description
B0	1 = valid position
B1	1 = effective time
B2	1 = data valid clock frequency drift
B3	Retention
B4	1 = data valid clock frequency
B5	LLA format 1 = position
B6	1 = highly ineffective
B7	Retention

2.15.2 AID-HUI (0x0B 0x03)

Information AID-HUI					
Description assist health information, UTC parameters, ionospheric parameters of the type					
of query / input Comment Configuration parameters related to navigation Number of					
message structure					
	head	Length (bytes)	Identifier	Checksum Payload	
	0xBA 0xCE	60	0x0B 0x03	The table below	4 Bytes

effective Load Dutch content

character Offset	data Types of	proportion Scaling first name		Unit Description	
4	U4	-	HeaGps	-	GPS satellite health information (Note [1])
8	U4	-	HeaBds	-	BDS satellite health information (Note [1])
12	U4	-	HeaGln	-	Health Information GLONASS satellites (Note [1])
16	I4	2^{-30}	utcGpsA0	s	UTC parameters A0, when the GPS clock error relative to UTC
20	I4	2^{-50}	utcGpsA1	s / s	UTC parameters A1, with respect to the UTC clock speed when GPS
twenty four	I1	-	utcGpsLS	s	The new relative to the second jump UTC GPS time hopping seconds ago
25	I1	-	utcGpsLSF	s	With respect to the second jump UTC when the new hop seconds after GPS
26	U1	-	utcGpsTow s		UTC time reference week of the parameters of GPS
27	U1	-	utcGpsWNT week	UTC parameters of GPS reference week number	
28	U1	-	utcGpsWNF week	GPS new leap second weekday in force	
29	U1	-	utcGpsDN day		The new GPS hop seconds into effect within a few weeks of days
30	I2	-	Res	- Reserved	
32	I4	2^{-30}	utcBdsA0	s	UTC parameters A0, BDS time difference to UTC clock
36	I4	2^{-50}	utcBdsA1	s / s	UTC parameters A1, with respect to the UTC clock speed when the BDS
40	I1	-	utcBdsLS	s	With respect to the second jump UTC when the new jumping seconds ago BDS
41	I1	-	utcBdsLSF	s	With respect to the second jump UTC when the new hop seconds after BDS
42	U1	-	utcBdsTow	s	UTC time parameters of the reference week of BDS
43	U1	-	utcBdsWNT week		UTC parameters BDS reference week number
44	U1	-	utcBdsWNF week		BDS new leap second weekday in force
45	U1	-	utcBdsDN	day	The new BDS jump into effect within a few weeks of days seconds
46	I2	-	Res	- Reserved	
48	I1	2^{-30}	klobA0	s / π	Klobuchar model parameters alpha0
49	I1	2^{-27}	klobA1	s / π_1	Klobuchar model parameters alpha1
50	I1	$2^{-\text{twenty four}}$	klobA2	s / π_2	Klobuchar model parameter alpha2
51	I1	$2^{-\text{twenty four}}$	klobA3	s / π_3	Klobuchar model parameters alpha3
52	I1	2^{11}	klobB0	s / π	Klobuchar model parameters beta0
53	I1	2^{14}	klobB1	s / π_1	Klobuchar model parameters beta1
54	I1	2^{16}	klobB2	s / π_2	Klobuchar model parameters beta2
55	I1	2^{16}	klobB3	s / π_3	Klobuchar model parameters beta3
56	U4	-	flags	-	Valid flag Mask (Note [2])

Notes [1]: B0 represents a satellite No. 1, and so on, the corresponding bit is equal to 0, represents the satellite health.

Note [2]: effective Sign bit

	description
B0	Health information is valid
B1	UTC parameters are valid

B2	Ionospheric parameters are valid