EC200U Series&EG912U-GL
GNSS Application Note

LTE Standard Module Series

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About the Document

Revision History

Version	Date	Author	Description
-	2020-12-17	Lambert ZHAO	Creation of the document
1.0	2021-05-13	Lambert ZHAO	First official release
1.1	2022-08-23	Tyler LI	1. Deleted applicable modules EC600U series, EG500U-CN and EG700U-CN, and added EC200U-AU and EG912U-GL. 2. Added the maximum response time for each AT command. 3. Updated the prefixes of BDS NMEA sentences (Chapter 1.3). 4. Updated the NMEA sentence types corresponding to the values and default value for <BeiDou_NMEA_type> in AT+QGPSCFG="beidounmeatype" (Chapter 2.3.1.6). 5. Updated the supported GNSS constellations (Chapter 2.3.1.8). 6. Added AT+QGPSCFG="beidounmeaformat" (Chapter 2.3.1.10). 7. Added AT+QGPSCFG="apflash" (Chapter 2.3.1.11). 8. Updated AT+QAGPSCFG to configure IP type and APN (Chapter 2.3.8).

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1 Introduction

Quectel EC200U series and EG912U-GL modules integrate the GNSS engine and support GPS, BDS, Galileo and GLONASS systems for multi-constellation positioning (See ***Chapter 2.3.1.8***), providing a high-performance positioning solution that is quick and accurate. With GNSS function, the modules are widely applied in fields such as turn-by-turn navigation, asset tracking, wearable devices, personnel and vehicle tracking.

1.1. Applicable Modules

Table 1: Applicable Modules

Module Series	Module
EC200U	EC200U-AU
	EC200U-CN
	EC200U-EU
EG912U	EG912U-GL

NOTE

GNSS function is optional for EC200U series and EG912U-GL modules, and please consult Quectel Technical Support for details.

1.2. GNSS Turning on/off Procedures

The module's GNSS engine supports location calculation without any network assistance. GNSS turning on/off procedures are shown below:

Step 1: Configure GNSS parameters via **AT+QGPSCFG**.
Step 2: Turn on GNSS via **AT+QGPS**.

Step 3: Obtain the positioning information in either of the following three ways after turning on GNSS and fixing position successfully:

1) NMEA sentences are output to USB NMEA port by default and can be obtained by reading the port.
2) Obtain positioning information such as latitude, longitude, height, GNSS positioning mode, time, number of satellites, and so on directly via **AT+QGPSLOC**.
3) Set **AT+QGPSCFG="nmeasrc",1** to enable acquisition of specified NMEA sentences via **AT+QGPSGNMEA**, and set **AT+QGPSCFG="nmeasrc",0** to disable acquisition of specified NMEA sentences via **AT+QGPSGNMEA**.

Step 4: Turn off GNSS via **AT+QGPSEND**.

1.3. Supported NMEA Sentence Types

The default NMEA sentences of the module are compatible with NMEA 0183 protocol, and five kinds of prefixes are available to differentiate NMEA sentences of different satellite systems, as illustrated below.

GPS NMEA sentences have the prefix "GP":

- GPGGA - Global positioning system fix data, such as time and position
- GPRMC - Recommended minimum specific GNSS data
- GPGSV - GNSS satellites in view, such as number of satellites in view and satellite ID numbers
- GPGSA - GNSS DOP and active satellites
- GPVTG - Course over ground and ground speed

BDS NMEA sentences have the prefixes "PQ", or "GB", or "BD". You can configure the prefixes by **AT+QGPSCFG="beidounmeaformat"**. Taking "PQ" as an example:

- PQGSV - GNSS satellites in view, such as number of satellites in view and satellite ID numbers
- PQGSA - GNSS DOP and active satellites
- PQGGA - Global positioning system fix data, such as time and position
- PQRMC - Recommended minimum specific GNSS data
- PQVTG - Course over ground and ground speed

Multi-constellation NMEA sentences have the prefix "GN":

- GNGSV - GNSS satellites in view, such as number of satellites in view and satellite ID numbers
- GNGGA - Global positioning system fix data, such as time and position
- GNRMC - Recommended minimum specific GNSS data
- GNVTG - Course over ground and ground speed

GLONASS NMEA sentence has the prefix "GL":

- GLGSV - GNSS satellites in view, such as number of satellites in view and satellite ID numbers.

Galileo NMEA sentence has the prefix "GA":

- GAGSV - GNSS satellites in view, such as number of satellites in view and satellite ID numbers.

2 Description of GNSS AT Commands

2.1. AT Command Introduction

2.1.1. Definitions

- **<CR>** Carriage return character.
- **<LF>** Line feed character.
- **<...>** Parameter name. Angle brackets do not appear on the command line.
- **[...]** Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on the command line. When an optional parameter is not given in a command, the new value equals to its previous value or the default settings, unless otherwise specified.
- **Underline** Default setting of a parameter.

2.1.2. AT Command Syntax

All command lines must start with **AT** or **at** and end with **<CR>**. Information responses and result codes always start and end with a carriage return character and a line feed character: **<CR><LF><response><CR><LF>**. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and **<CR>** and **<LF>** are deliberately omitted.

Table 2: Type of AT Commands

Command Type	Syntax	Description
Test Command	**AT+<cmd>=?**	Test the existence of the corresponding command and return information about the type, value, or range of its parameter.
Read Command	**AT+<cmd>?**	Check the current parameter value of the corresponding command.
Write Command	**AT+<cmd>=<p1>[,<p2>[,<p3>[...]]]**	Set user-definable parameter value.
Execution Command	**AT+<cmd>**	Return a specific information parameter or perform a specific action.

2.2. Declaration of AT Command Examples

The AT command examples in this document are provided to help you familiarize with AT commands and learn how to use them. The examples, however, should not be taken as Quectel's recommendation or suggestions about how to design a program flow or what status to set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there is a correlation among these examples and that they should be executed in a given sequence.

2.3. AT Command Description

2.3.1. AT+QGPSCFG Configure GNSS

This command queries and configures various GNSS settings, including the output port and output types of NMEA sentences.

AT+QGPSCFG Configure GNSS	
Test Command **AT+QGPSCFG=?**	Response **+QGPSCFG: "outport",(**list of supported **<out_port>**s**)** **+QGPSCFG: "nmeasrc",(**list of supported **<NMEA_src>**s**)** **+QGPSCFG: "gpsnmeatype",(**list of supported **<GPS_NMEA_type>**s**)** **+QGPSCFG: "glonassnmeatype",(**list of supported **<GLONASS_NMEA_type>**s**)** **+QGPSCFG: "galileonmeatype",(**list of supported **<Galileo_NMEA_type>**s**)** **+QGPSCFG: "beidounmeatype",(**list of supported **<BeiDou_NMEA_type>**s**)** **+QGPSCFG: "gnssnmeatype",(**list of supported **<GNSS_NMEA_type>**s**)** **+QGPSCFG: "gnssconfig",(**list of supported **<GNSS_config>**s**)** **+QGPSCFG: "autogps",(**list of supported **<autoGPS>**s**)** **+QGPSCFG: "beidounmeaformat",(**range of supported **<BeiDou_NMEA_format>**s**)** **+QGPSCFG: "apflash",(**list of supported **<AP_flash_mode>**s**)** **OK**
Maximum Response Time	300 ms
Characteristics	/

2.3.1.1. AT+QGPSCFG="outport" Configure Output Port of NMEA Sentences

This command configures the output port of NMEA sentences.

AT+QGPSCFG="outport" Configure Output Port of NMEA Sentences	
Write Command **AT+QGPSCFG="outport"[,<out_port>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "outport",<out_port>** **OK** If the optional parameter is specified, configure the output port of NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately; The configuration is saved automatically.

Parameter

<out_port>	String type. Configure the output port of NMEA sentences.	
	"none"	Close NMEA sentence output
	"uart1"	Output via UART1 port
	"uart2"	Output via UART2 port
	"usbat"	Output via USB AT port
	"usbmodem"	Output via USB Modem port
	"usbnmea"	Output via USB NMEA port
<errcode>	The error code of operation. See ***Chapter 4*** for details.	

2.3.1.2. AT+QGPSCFG="nmeasrc" Enable/Disable Acquisition of NMEA Sentences via AT+QGPSGNMEA

This command enables/disables acquisition of NMEA sentences via **AT+QGPSGNMEA**.

AT+QGPSCFG="nmeasrc" Enable/Disable Acquisition of NMEA Sentences via AT+QGPSGNMEA	
Write Command **AT+QGPSCFG="nmeasrc"[,<NMEA_src>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "nmeasrc",<NMEA_src>** **OK** If the optional parameter is specified, configure whether to enable acquisition of NMEA sentences via **AT+QGPSGNMEA**: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately; The configuration is saved automatically.

Parameter

<NMEA_src>	Integer type. If enabled, NMEA sentences can be acquired via **AT+QGPSGNMEA**. Meanwhile, NMEA sentences are output via the AT port as a return value. 0 Disable 1 Enable
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.3. AT+QGPSCFG="gpsnmeatype" Configure Output Type of GPS NMEA Sentences

This command configures the type of GPS NMEA sentences that will be output.

AT+QGPSCFG="gpsnmeatype" Configure Output Type of GPS NMEA Sentences	
Write Command **AT+QGPSCFG="gpsnmeatype"[,**	Response If the optional parameter is omitted, query the current configuration:

<GPS_NMEA_type>]	**+QGPSCFG: "gpsnmeatype",<GPS_NMEA_type>** **OK** If the optional parameter is specified, configure the output type of GPS NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<GPS_NMEA_type>	Integer type. Output type of GPS NMEA sentences in XOR format. 0 Disable 1 GPGGA 2 GPRMC 4 GPGSV 8 GPGSA 16 GPVTG 31 All the five types of sentences
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.4. AT+QGPSCFG="glonassnmeatype" Configure Output Type of GLONASS NMEA Sentences

This command configures the type of the GLONASS NMEA sentences that will be output.

AT+QGPSCFG="glonassnmeatype" Configure Output Type of GLONASS NMEA Sentences	
Write Command **AT+QGPSCFG="glonassnmeatype"[,<GLONASS_NMEA_type>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "glonassnmeatype",<GLONASS_NMEA_type>** **OK**

	If the optional parameter is specified, configure the output type of GLONASS NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<GLONASS_NMEA_type>	Integer type. Configure output type of GLONASS NMEA sentences in XOR format. 0 Disable 1 GLGSV
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.5. AT+QGPSCFG="galileonmeatype" Configure Output Type of Galileo NMEA Sentences

This command configures the type of Galileo NMEA sentences that will be output.

AT+QGPSCFG="galileonmeatype" Configure Output Type of Galileo NMEA Sentences	
Write Command **AT+QGPSCFG="galileonmeatype"[,<Galileo_NMEA_type>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "galileonmeatype",<Galileo_NMEA_type>** **OK** If the optional parameter is specified, configure the output type of Galileo NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**

Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<Galileo_NMEA_type>	Integer type. Configure output type of Galileo NMEA sentences in XOR format. 0 Disable 1 GAGSV
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.6. AT+QGPSCFG="beidounmeatype" Configure Output Type of BDS NMEA Sentences

This command configures the type of BDS NMEA sentences that will be output.

AT+QGPSCFG="beidounmeatype" Configure Output Type of BDS NMEA Sentences	
Write Command **AT+QGPSCFG="beidounmeatype"[,<BeiDou_NMEA_type>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "beidounmeatype",<BeiDou_NMEA_type>** **OK** If the optional parameter is specified, configure the output type of BDS NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<BeiDou_NMEA_type>	Integer type. Configure output type of BDS NMEA sentences in XOR format. 0 Disable 1 PQGSA

	2 PQGSV 4 PQGGA 8 PQRMC 16 PQVTG 31 All the five types of sentences
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.7. AT+QGPSCFG="gnssnmeatype" Configure Output Type of Multi-constellation NMEA sentences

This command configures the type of multi-constellation NMEA sentences that will be output.

AT+QGPSCFG="gnssnmeatype" Configure Output Type of Multi-constellation NMEA sentences	
Write Command **AT+QGPSCFG="gnssnmeatype"[,<GNSS_NMEA_type>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "gnssnmeatype",<GNSS_NMEA_type>** **OK** If the optional parameter is specified, configure the output type of multi-constellation NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<GNSS_NMEA_type>	Integer type. Configure output type of multi-constellation NMEA sentences in XOR format. 0 Disable 1 GNGGA 2 GNRMC 4 GNGSA 8 GNVTG

	15 All the four types of sentences
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.8. AT+QGPSCFG="gnssconfig" Configure Supported GNSS Constellations

This command configures the supported GNSS constellations of the module.

AT+QGPSCFG="gnssconfig"	**Configure Supported GNSS Constellations**
Write Command **AT+QGPSCFG="gnssconfig"[,<GNSS_config>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "gnssconfig",<GNSS_config>** **OK** If the optional parameter is specified, configure the supported GNSS constellations: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<GNSS_config>	Integer type. Supported GNSS constellations. 0 GPS only 3 GPS + GLONASS + Galileo 4 GPS + GLONASS 5 GPS + BDS (When the module is EC200U-CN) GPS + BeiDou + Galileo (When the module is EC200U-AU, EC200U-EU or EG912U-GL) 6 GPS + Galileo 7 BDS only
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.9. AT+QGPSCFG="autogps" Enable/Disable GNSS to Run Automatically

This command configures whether to enable GNSS when the module starts up.

AT+QGPSCFG="autogps" Enable/Disable GNSS to Run Automatically	
Write Command **AT+QGPSCFG="autogps"[,<autoGPS>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "autogps",<autoGPS>** **OK** If the optional parameter is specified, configure whether to enable GNSS to run automatically: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<autoGPS>	Integer type. Enable/disable GNSS to run automatically. 0 Disable 1 Enable
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.1.10. AT+QGPSCFG="beidounmeaformat" Configure Prefix of BDS NMEA Sentences

This command configures prefix of BDS NMEA sentences.

AT+QGPSCFG="beidounmeaformat" Configure Prefix of BDS NMEA Sentences	
Write Command **AT+QGPSCFG="beidounmeaformat"[,<BeiDou_NMEA_format>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "beidounmeaformat",<BeiDou_NMEA_format>** **OK**

	If the optional parameter is specified, configure the prefix of BDS NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect after rebooting; The configuration is saved automatically.

Parameter

<BeiDou_NMEA_format>	Integer type. Prefix of BDS NMEA sentences. 0 PQ 1 GB 2 BD
<errcode>	The error code of operation. See ***Chapter 4*** for details.

NOTE

If **<BeiDou_NMEA_format>**=0, the output PQGSV sentence contains system ID (GNSS system ID defined by NMEA protocol) at the end of the sentence.

2.3.1.11. AT+QGPSCFG="apflash" Enable/Disable AP Flash Quick Hot Start

This command enables or disables AP Flash quick hot start.

AT+QGPSCFG="apflash" Enable/Disable AP Flash Quick Hot Start	
Write Command **AT+QGPSCFG="apflash"[,<AP_flash_mode>]**	Response If the optional parameter is omitted, query the current configuration: **+QGPSCFG: "apflash",<AP_flash_mode>** **OK** If the optional parameter is specified, configure whether to enable AP Flash quick hot start: **OK** Or **ERROR**

	If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately; The configuration is not saved.

Parameter

<AP_flash_mode>	Integer type. Enable or disable AP Flash quick hot start. 0 Disable 1 Enable
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.2. AT+QGPSDEL Delete Assistance Data

The command deletes assistance data so as to perform cold start, hot start and warm start of GNSS. The command can only be executed when GNSS is turned on.

AT+QGPSDEL Delete Assistance Data	
Test Command **AT+QGPSDEL=?**	Response **+QGPSDEL: (**range of supported **<delete_type>**s**)** **OK**
Write Command **AT+QGPSDEL=<delete_type>**	Response **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<delete_type>	Integer type. The type of GNSS assistance data to be deleted. 0 Delete all assistance data. Enforce cold start after starting GNSS. 1 Do not delete any data. Perform hot start if conditions permit after starting GNSS. 2 Delete some related data. Perform warm start if conditions permit after starting GNSS.

<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.3. AT+QGPS Turn on GNSS

This command turns on or wakes up GNSS function. When **<fix_count>** is 0, GNSS engine continues to locate and can be turned off via **AT+QGPSEND**. When **<fix_count>** is non-zero and the actual positioning times reach the specified value, GNSS engine turns off automatically; when **<fix_count>** is non-zero but the actual positioning times don't reach the specified value, GNSS also can be turned off via **AT+QGPSEND**.

AT+QGPS Turn on GNSS	
Test Command **AT+QGPS=?**	Response **+QGPS: (**list of supported **<GNSS_mode>**s**),(**range of supported **<fix_maxtime>**s**),(**range of supported **<fix_maxdist>**s**),(**range of supported **<fix_count>**s**),(**range of supported **<fix_rate>**s**)** **OK**
Read Command Read current GNSS state **AT+QGPS?**	Response **+QGPS: <GNSS_state>** **OK**
Write Command **AT+QGPS=<GNSS_mode>[,<fix_maxtime>[,<fix_maxdist>[,<fix_count>[,<fix_rate>]]]]**	Response **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<GNSS_state>	Integer type. GNSS state. 0 Off 1 On
<GNSS_mode>	Integer type. GNSS working mode. 1 Stand-alone
<fix_maxtime>	Integer type. The maximum positioning time, which indicates the response time of GNSS receiver while measuring the GNSS pseudo range and the upper time limit of GNSS satellite searching. It also includes the time for demodulating the ephemeris

	data and calculating the position. Range: 1–255. Default value: 30. Unit: second.
<fix_maxdist>	Integer type. Accuracy threshold of positioning. Range: 0–1000. Default value: 50. Unit: meter.
<fix_count>	Integer type. Positioning times. Range: 0–1000. 0 Continuous positioning Other values Actual positioning times
<fix_rate>	Integer type. The interval between the first and the second positioning. Range: 1–65535. Default value: 1. Unit: second.
<errcode>	The error code of operation. See ***Chapter 4*** for details.

NOTE

Only after GNSS is turned on successfully by **AT+QGPS=1** and **GNSS Open Success** is output from AP log, you can perform other GNSS related actions.

2.3.4. AT+QGPSEND Turn off GNSS

This command turns off GNSS. When GNSS is turned on by **AT+QGPS=1** and **<fix_count>** is 0, GNSS fixes position continuously. GNSS stops positioning when it is turned off via **AT+QGPSEND**. You can execute **AT+QGPS=1** within 2 hours if AP Flash is enabled and effective to turn on the GNSS and wake up the GNSS engine, and then the GNSS engine will perform a hot start by default.

AT+QGPSEND Turn off GNSS	
Test Command **AT+QGPSEND=?**	Response **OK** Or **ERROR**
Read command **AT+QGPSEND?**	Response **OK** Or **ERROR**
Execution Command Turn off GNSS **AT+QGPSEND**	Response **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.5. AT+QGPSLOC Acquire Positioning Information

This command acquires positioning information. Before executing this command, GNSS should be turned on via **AT+QGPS**. If GNSS fails in position fix, **+CME ERROR: <errcode>** is returned to indicate the corresponding situation.

AT+QGPSLOC Acquire Positioning Information	
Test Command **AT+QGPSLOC=?**	Response **+QGPSLOC: <UTC>,<latitude>,<longitude>,<HDOP>,<altitude>,<fix>,<COG>,<spkm>,<spkn>,<date>,<nsat>** **OK**
Write Command **AT+QGPSLOC=<mode>**	Response **+QGPSLOC: <UTC>,<latitude>,<longitude>,<HDOP>,<altitude>,<fix>,<COG>,<spkm>,<spkn>,<date>,<nsat>** **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<mode>	Integer type. Latitude and longitude display format. 0 **<latitude>,<longitude>** format: ddmm.mmmmN/S,dddmm.mmmmE/W 1 **<latitude>,<longitude>** format: ddmm.mmmmmm,N/S,dddmm.mmmmmm,E/W 2 **<latitude>,<longitude>** format: (-)dd.ddddd,(-)ddd.ddddd
<UTC>	String type. UTC time. Format: hhmmss.sss (Quoted from GPGGA sentence).
<latitude>	String type. Latitude. If **<mode>** is 0: Format: ddmm.mmmmN/S (Quoted from GPGGA sentence) dd Degree. Range: 00–89 mm.mmmm Minute. Range: 00.0000–59.9999 N/S North/South

	If **<mode>** is 1: Format: ddmm.mmmmmm,N/S (Quoted from GPGGA sentence) dd Degree. Range: 00–89 mm.mmmmmm Minute. Range: 00.000000–59.999999 N/S North/South If **<mode>** is 2: Format: (-)dd.ddddd (Quoted from GPGGA sentence) dd.ddddd Degree. Range: -89.9999–89.9999 - South
<longitude>	String type. Longitude. If **<mode>** is 0: Format: dddmm.mmmmE/W (Quoted from GPGGA sentence) ddd Degree. Range: 000–179. mm.mmmm Minute. Range: 00.0000–59.9999. E/W East/West If **<mode>** is 1: Format: dddmm.mmmmmm,E/W (Quoted from GPGGA sentence) ddd Degree. Range: 000–179. mm.mmmmmm Minute. Range: 00.000000–59.999999 E/W East/West If **<mode>** is 2: Format: (-)ddd.ddddd (Quoted from GPGGA sentence) ddd.ddddd Degree. Range: -179.99999–179.99999 - West
<HDOP>	Horizontal dilution of precision. Range: 0.5–99.9 (Quoted from GPGGA sentence).
<altitude>	The altitude of the antenna away from the sea level, and is accurate to one decimal place. Unit: meter (Quoted from GPGGA sentence).
<fix>	Integer type. GNSS positioning mode (Quoted from GPGSA sentence). 2 2D positioning 3 3D positioning
<COG>	String type. Course Over Ground based on true north. Format: ddd.mm (Quoted from GPVTG sentence). ddd Degree. Range: 000–359 mm Minute. Range: 00–59
<spkm>	Speed over ground. Accurate to one decimal place. Unit: km/h (Quoted from GPVTG sentence).
<spkn>	Speed over ground. Accurate to one decimal place. Unit: knots (Quoted from GPVTG sentence).
<date>	UTC date. Format: ddmmyy (Quoted from GPRMC sentence). dd Day mm Month

	yy Year
<nsat>	Number of satellites. The value should be kept two digits, and add 0 If the leading digit is insufficient (Quoted from GPGGA sentence).
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.6. AT+QGPSGNMEA Acquire Specified NMEA Sentences

This command acquires specified NMEA sentences. Before using this command, turn on GNSS via **AT+QGPS**, and set **<NMEA_src>** to 1 to enable acquisition of NMEA sentences via **AT+QGPSGNMEA**.

The sentence output can be disabled via **AT+QGPSCFG="gpsnmeatype",0**, **AT+QGPSCFG="glonassnmeatype",0**, **AT+QGPSCFG="galileonmeatype",0**, **AT+QGPSCFG="beidounmeatype",0** or **AT+QGPSCFG="gnssnmeatype",0**. If sentence output is disabled, the updated sentence is no longer output, and the NMEA sentence acquired before sentence output is disabled and after the GNSS is activated is saved. If the saved NMEA sentence contains the sentence type specified by **AT+QGPSGNMEA**, the specified NMEA sentence can still be acquired through **AT+QGPSGNMEA**.

AT+QGPSGNMEA Acquire Specified NMEA Sentences	
Test Command **AT+QGPSGNMEA=?**	Response **+QGPSGNMEA: (**list of supported **<NMEA_type>**s**)** **OK**
Write Command Query GGA sentence **AT+QGPSGNMEA="GGA"**	Response **[+QGPSGNMEA: <GGA_sentence>]** **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Write Command Query RMC sentence **AT+QGPSGNMEA="RMC"**	Response **[+QGPSGNMEA: <RMC_sentence>]** **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Write Command Query GSV sentence **AT+QGPSGNMEA="GSV"**	Response **[+QGPSGNMEA: <GSV_sentence>]** **OK** If there is any error related to ME functionality:

	+CME ERROR: <errcode>
Write Command Query GSA sentence **AT+QGPSGNMEA="GSA"**	Response **[+QGPSGNMEA: <GSA_sentence>]** **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Write Command Query VTG sentence **AT+QGPSGNMEA="VTG"**	Response **[+QGPSGNMEA: <VTG_sentence>]** **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<NMEA_type>	String type. NMEA sentence type. "GGA" GGA sentence "RMC" RMC sentence "GSV" GSV sentence "GSA" GSA sentence "VTG" VTG sentence
<GGA_sentence>	String type. GGA sentences.
<RMC_sentence>	String type. RMC sentences.
<GSV_sentence>	String type. GSV sentences.
<GSA_sentence>	String type. GSA sentences.
<VTG_sentence>	String type. VTG sentences.
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.7. AT+QAGPS Enable/Disable AGPS

This command enables or disables AGPS feature of GNSS.

AT+QAGPS Enable/Disable AGPS	
Test Command **AT+QAGPS=?**	Response **+QAGPS: (**list of supported **<AGPS_mode>**s**)**

	OK
Read Command Query whether AGPS is enabled **AT+QAGPS?**	Response **+QAGPS: <AGPS_mode>** **OK**
Write Command Enable or disable AGPS **AT+QAGPS=<AGPS_mode>**	Response **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately; The configuration is saved automatically.

Parameter

<AGPS_mode>	Integer type. Enable or disable AGPS feature of GNSS. 0 Disable 1 Enable
<errcode>	The error code of operation. See ***Chapter 4*** for details.

2.3.8. AT+QAGPSCFG Configure AGPS

This command configures AGPS related parameters.

AT+QAGPSCFG Configure AGPS	
Test Command **AT+QAGPSCFG=?**	Response **+QAGPSCFG: (**range of supported **<profile>**s**),<URL>,<vendorID>,<modelID>,<password>,(**range of supported **<IP_ver>**s**),<APN>** **OK**
Read Command **AT+QAGPSCFG?**	Response **+QAGPSCFG: <profile>,<URL>,<vendorID>,<modelID>,<password>,<IP_ver>,<APN>** **OK**
Write Command **AT+QAGPSCFG=<profile>[,<URL>[,<vendorID>[,<modelID>[,<password>[,<IP_ver>>[,<APN>]]]]]]**	Response **OK** If there is any error related to ME functionality:

	+CME ERROR: <errcode>
Maximum Response Time	300 ms
Characteristics	The command takes effect immediately; The configuration is saved automatically.

Parameter

<profile>	Integer type. PDP index. Range: 1–7. Default value: 1.
<URL>	String type. AGPS server address. Default value: "http://quectel-api1.rx-networks.cn/rxn-api/locationApi/rtcm".
<vendorID>	String type. User name. Default value: "wLgWwv6JQt". The maximum length: 30 bytes.
<modelID>	String type. Client ID. Default value: "Quectel".
<password>	String type. Password. Default value: "aFltUERDZzZxeTY5cEp2eA==". The maximum length: 30 bytes.
<IP_ver>	Integer type. IP type. 0 The IP type configured when the specified PDP context was activated last time 1 IPv4 2 IPv6 3 IPv4v6 Note: If the specified PDP context has never been activated, the default value is 1.
<APN>	String type. Access point name. Default value: "NULL". Maximum length: 99 bytes.
<errcode>	The error code of operation. See ***Chapter 4*** for details.

NOTE

After AGPS feature is enabled, the PDP context specified by **<profile>** may be de-activated. So, do not use the same PDP context with other applications at the same time, preventing the application from abnormal network disconnection and restarting a data call.

2.3.9. AT+QGPSINFO Query GNSS Version

This command queries GNSS version information.

AT+QGPSINFO Query GNSS Version	
Test Command **AT+QGPSINFO=?**	Response **OK**
Read Command **AT+QGPSINFO?**	Response **OK**
Execution Command **AT+QGPSINFO**	Response **+QGPSINFO: <GNSS_info>**

	OK If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Maximum Response Time	300 ms
Characteristics	/

Parameter

<GNSS_info>	String type. GNSS version information.
<errcode>	The error code of operation. See ***Chapter 4*** for details.

Example

```
AT+QGPSINFO                                    //Query GNSS version.
+QGPSINFO: UC6226,G1B1,V1.0,R3.0.0Build1500,080101800600

OK
```

3 Examples

3.1. Turn On/Off the GNSS

Default parameters are used in this example to turn on GNSS. After turning on GNSS, NMEA sentences will be output from "usbnmea" port by default; and GNSS can be turned off via **AT+QGPSEND**.

```
AT+QGPS=1                       //Turn on GNSS.
OK
//After turning on GNSS, NMEA sentences will be output from "usbnmea" port by default.
AT+QGPSLOC=0                    //Obtain positioning information.
+QGPSLOC: 061951.000,3150.7223N,11711.9293E,0.7,62.2,2,000.00,0.0,0.0,110513,09

OK
AT+QGPSEND                      //Turn off GNSS.
OK
```

3.2. Application of <NMEA_src>

When GNSS is turned on and **<NMEA_src>** is set to 1, NMEA sentences can be acquired directly via **AT+QGPSGNMEA**.

```
AT+QGPSCFG="nmeasrc",1          //Set <NMEA_src> to 1 to enable acquisition of NMEA
                                  sentences via AT+QGPSGNMEA.
OK
AT+QGPSGNMEA="GGA"              //Obtain GGA sentence.
+QGPSGNMEA: $GNGGA,074113.00,3148.57843,N,11718.02170,E,1,18,1.17,22.3,M,,M,,*68

OK
AT+QGPSCFG="nmeasrc",0          //Set <NMEA_src> to 0 to disable acquisition of NMEA
                                  sentences via AT+QGPSGNMEA.
OK
AT+QGPSGNMEA="GGA"              //Obtain GGA sentence.
+CME ERROR: 507                 //Acquisition of NMEA sentences via AT+QGPSGNMEA
                                  was disabled, and thus GGA sentences cannot be obtained.
```

3.3. GNSS Hibernation Mode

After the module is powered on and GNSS is turned on, executing **AT+QGPSEND** without powering down or rebooting the module can turn off the GNSS engine and stop positioning to lower down power consumption. If **AT+QGPS=1** is executed within 2 hours after AP Flash is enabled and effective to wake up the GNSS engine, GNSS hot start is performed to achieve a quick positioning.

```
AT+QGPS=1                        //Turn on GNSS.
OK
AT+QGPSEND
OK
//Turn off GNSS without powering down or rebooting the module. Then the GNSS engine is powered off
and stops positioning, but the ephemeris data is saved.
AT+QGPSLOC=0                     //Acquire positioning information.
+CMS ERROR: 505                  //GNSS feature is unavailable.
AT+QGPS=1                        //Turns on GNSS within 2 hours after AP Flash is enabled and effective,
                                 then GNSS performs a hot start.
OK
AT+QGPSLOC=0                 //Acquire positioning information.
+QGPSLOC: 121251.000,2301.4623N,11314.4612E,0.8,141.6,3,000.00,0.5,0.3,020321,20

OK
```

3.4. Application of AGPS Feature

AT+QAGPSCFG configures AGPS related parameters. **AT+QAGPS=1** enables AGPS feature. Ephemeris data can be acquired automatically every time when the module is powered on and the GNSS is turned on under the premise that the network is normal and the AGPS related parameters are configured correctly, achieving a quick positioning.

```
AT+QAGPSCFG=1,"http://quectel-api1.rx-networks.cn/rxn-api/locationApi/rtcm","wLgWwv6JQt","
Quectel","aFltUERDZzZxeTY5cEp2eA==",1,"ctnet"      //Configure  AGPS.
OK
AT+QAGPS=1                                          //Enable AGPS feature.
OK
AT+QGPS=1                                           //Turn on GNSS.
OK
AT+QFLST="*"                                        //See document [1] for details.
+QFLST: "UFS:agps.txt",5020      //The downloaded ephemeris data is valid for 2 hours, and you need
                                  to reconnect server to download new ephemeris data after 2 hours.

OK
```

4 Summary of Error Codes

The **<errcode>** indicates an error related to GNSS operation. The details about **<errcode>** are described in the following table.

Table 3: Summary of Error Codes

<errcode>	Meaning
501	Invalid parameter(s)
502	Operation not supported
503	GNSS subsystem busy
504	Session is ongoing
505	Session not active
506	Operation timeout
507	Function not enabled
508	Time information error
512	Validity time is out of range
513	Internal resource error
514	GNSS locked
515	End by E911
516	Not fixed now
517	CMUX port is not opened
549	Unknown error

5 Appendix References

Table 4: Related Document

Document Name
[1] Quectel_EC200U&EG91xU_Series_FILE_Application_Note

Table 5: Terms and Abbreviations

Abbreviation	Description
AGPS	Assisted GPS (Global Positioning System)
APN	Access Point Name
BDS	BeiDou Navigation Satellite System
CMUX	Connection Multiplexing
DOP	Dilution of Precision
Galileo	Galileo Satellite Navigation System
GGA	Global Positioning System Fix Data
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	GPS DOP and Active Satellites
GSV	GNSS Satellites in View
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6

ME	Mobile Equipment
NMEA	NMEA (National Marine Electronics Association) 0183 Interface Standard
NVRAM	Non-Volatile Random Access Memory
RMC	Recommended Minimum Specific GNSS Data
UART	Universal Asynchronous Receiver & Transmitter
URL	Uniform Resource Locator
USB	Universal Serial Bus
UTC	Coordinated Universal Time
VTG	Course Over Ground and Ground Speed