ECx00U&EGx00U Series
GNSS Application Note

LTE Standard Module Series

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About the Document

Revision History

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-	2020-12-17	Lambert ZHAO	Creation of the document
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1 Introduction

Quectel EC200U series module integrates the GNSS engine, and EC600U series, EG500U-CN and EG700U-CN modules support external GNSS engine. The modules support GPS and BeiDou systems, but only EC200U-EU and EC600U-EU modules support Galileo and GLONASS systems for multi-constellations positioning (See ***Chapter 2.3.1.8***), providing a high-performance positioning solution that is quick and accurate. This makes EC200U series, EC600U series, EG500U-CN and EG700U-CN 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	Variant
ECx00U	EC200U Series	EC200U-CN
		EC200U-EU
	EC600U Series	EC600U-CN
		EC600U-EU
EGx00U	EG500U-CN	EG500U-CN
	EG700U-CN	EG700U-CN

1.2. GNSS Turning on/off Procedures

The GNSS of ECx00U and EGx00U series modules support 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 outputted to "usbnmea" 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 **<NMEA_src>** to 1 to enable acquisition of specified NMEA sentences via **AT+QGPSGNMEA**, and set **<NMEA_src>** to 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 modules 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, position, etc.
- GPRMC - Recommended minimum specific GNSS data
- GPGSV - GNSS satellites in view, such as number of satellites in view, satellite ID numbers, etc.
- GPGSA - GNSS DOP and active satellites
- GPVTG - Course over ground and ground speed

BeiDou NMEA sentences have the prefixes "PQ":

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

Multi-constellations NMEA sentences have the prefixes “GN”:

- GNGSV - GNSS satellites in view, such as number of satellites in view, satellite ID numbers, etc.
- GNGGA - Global positioning system fix data, such as time, position, etc.

- GNRMC - Recommended minimum specific GNSS data
- GNVTG - Course over ground and ground speed

GLONASS NMEA sentences have the prefixes "GL" and "GN":

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

Galileo NMEA sentences have the prefixes "GA":

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

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 corresponding Write Command and return information about the type, value, or range of its parameter.
Read Command	**AT+<cmd>?**	Check the current parameter value of a corresponding Write 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 you should design a program flow or what status you should set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there exists a correlation among these examples and that they should be executed in a given sequence.

2.3. AT Commands 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",(**range 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",(**range of supported **<BeiDou_NMEA_type>**s**)** **+QGPSCFG: "gnssnmeatype",(**range of supported **<GNSS_NMEA_type>)** **+QGPSCFG: "gnssconfig",(**list of supported **<GNSS_config>**s**)** **+QGPSCFG: "autogps",(**list of supported **<autoGPS>**s**)** **OK**

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>**
Characteristics	The command takes effect immediately; The configuration will be saved to NVRAM 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>**
Characteristics	The command takes effect immediately; The configuration will be saved to NVRAM automatically.

Parameter

<NMEA_src>	Integer type. If enabled, NMEA sentences can be acquired via **AT+QGPSGNMEA**. Meanwhile, NMEA sentences are outputted 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 outputted.

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

	+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>**
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

<GPS_NMEA_type>	Integer type. Output type of GPS NMEA sentences in ORed. 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 sentence that will be outputted.

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>**
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

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

NOTE

AT+QGPSCFG="glonassnmeatype" is only applicable to EC200U-EU and EC600U-EU.

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

This command configures the type of Galileo NMEA sentence that will be outputted.

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>**
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

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

NOTE

AT+QGPSCFG="galileonmeatype" is only applicable to EC200U-EU and EC600U-EU.

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

This command configures the type of BeiDou NMEA sentence that will be outputted.

AT+QGPSCFG="beidounmeatype" Configure Output Type of BeiDou 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 BeiDou NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality:

	+CME ERROR: <errcode>
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

<BeiDou_NMEA_type>	Integer type. Configure output type of BeiDou NMEA sentences in ORed. 0 Disable 1 PQGGA 2 PQRMC 4 PQGSV 8 PQGSA 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-constellations NMEA sentences

This command configures the type of multi-constellations NMEA sentence that will be outputted.

AT+QGPSCFG="gnssnmeatype" Configure Output Type of Multi-constellations 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-constellations NMEA sentences: **OK** Or **ERROR** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

<GNSS_NMEA_type>	Integer type. Configure output type of multi-constellations NMEA sentences in ORed. 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>**
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

<GNSS_config>	Integer type. Supported GNSS constellations. 0 GPS only 3 GPS + GLONASS + Galileo (Only supported by EC200U-EU and EC600U-EU) 5 GPS + BeiDou (When the module is not EC200U-EU or EC600U-EU) GPS + BeiDou + Galileo (When the module is EC200U-EU or EC600U-EU) 7 BeiDou 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>**
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

<autoGPS>	Integer type. Enable/disable GNSS to run automatically. 0 Disable GNSS to run automatically 1 Enable GNSS to run automatically
<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>**
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 the conditions are permitted after starting GNSS. 2 Delete some related data. Perform warm start if the conditions are permitted 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 reaches the specified value, GNSS 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>**
Characteristics	/

Parameter

<GNSS_state>	Integer type. GNSS state. 0 GNSS OFF 1 GNSS 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 and can be turned off via **AT+QGPSEND**. Then, the GNSS engine enters into hibernation mode. If you execute **AT+QGPS=1** within 2 hours to turn on the GNSS and wake up the GNSS engine, 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 error is related to ME functionality: **+CME ERROR: <errcode>**
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>**
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.mmm Minute. Range: 00.0000–59.9999 N/S North latitude/South latitude 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 latitude/South latitude If **<mode>** is 2: Format: (-)dd.ddddd (Quoted from GPGGA sentence) dd.ddddd Degree. Range: -89.9999–89.9999 - South latitude
<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 longitude/West longitude 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 longitude/West longitude
	If **<mode>** is 2:	
	Format: (-)ddd.ddddd (Quoted from GPGGA sentence)	
	ddd.ddddd	Degree. Range: -179.99999-179.99999
	-	West longitude
<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 GAGSA/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 the sentence output is disabled 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 information **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>**
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>**
Characteristics	The command takes effect immediately; The configuration will be saved to NVRAM 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 APGS related parameters.

AT+QAGPSCFG Configure AGPS	
Test Command **AT+QAGPSCFG=?**	Response **+QAGPSCFG: (**range of supported **<profile>**s**),<URL>,<vendorID>,<modelID>,<password>** **OK**
Read Command **AT+QAGPSCFG?**	Response **+QAGPSCFG: <profile>,<URL>,<vendorID>,<modelID>,<password>** **OK**
Write Command **AT+QAGPSCFG=<profile>[,<URL>[,<vendorID>[,<modelID>[,<password>]]]]**	Response **OK** If there is any error related to ME functionality: **+CME ERROR: <errcode>**
Characteristics	The command takes effect immediately; The configuration will be saved to NVRAM 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.
<errcode>	The error code of operation. See ***Chapter 4*** for details.

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>**
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 outputted 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 outputted 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: $GPGGA,103647.000,3150.721154,N,11711.925873,E,1,02,4.7,59.8,M,-2.0,M,,*77

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 make the GNSS engine enter into hibernation mode, stop positioning to lower down power consumption, and save ephemeris data. If **AT+QGPS=1** is executed within 2 hours 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 enters into hibernation mode 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 and 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=="      //Configure  AGPS.
OK
AT+QAGPS=1                               //Enable AGPS feature.
OK
AT+QGPS=1                                //Turn on GNSS.
OK
AT+QFLST="*"                             //See document [1] for details of this command.
+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

SN	Document Name	Description
[1]	Quectel_ECx00U&EGx00U_Series_FILE_Application_Note	File application note applicable for EC200U series, EC600U series, EG500U-CN and EG700U-CN modules.

Table 5: Terms and Abbreviations

Abbreviation	Description
AGPS	Assisted GPS (Global Positioning System)
BeiDou	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
GNS	New GGA Message For GNSS
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	GPS DOP and Active Satellites
GSV	GNSS Satellites in View
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