

EC2x&EG9x&EG2x-G&EM05 Series

GNSS Application Note

LTE Standard Module Series

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About the Document

Revision History

Version	Date	Author	Description
1.0	2016-09-02	Sundy WANG	Initial
1.1	2017-02-13	Sundy WANG	<ol style="list-style-type: none"> Added the introduction, AT commands and an operation procedure example of gpsOneXTRA Assistance function (Chapter 1.3, 2.7, 2.8, 2.9 and 3.3) Modified the parameter description of AT+QGPSCFG="outport"[,<outport>] (Chapter 2.1.1) Modified the parameter description of AT+QGPSDEL (Chapter 2.2)
1.2	2019-10-23	Tery SHI	<ol style="list-style-type: none"> Added applicable modules of this document (Chapter 1). Added following commands (Chapter 2.1) AT+QGPSCFG="odpcontrol" AT+QGPSCFG="dpoenable" AT+QGPSCFG="plane" AT+QGPSCFG="autgps" AT+QGPSCFG="suplver" AT+QGPSCFG="agpsposmode" AT+QGPSCFG="agnssprotocol" AT+QGPSCFG="fixfreq" Added command AT+QGPSSUPLURL(Chapter 2.6) and AT+QGPSSUPLCA (Chapter 2.7)
1.3	2020-09-04	Tery SHI	<ol style="list-style-type: none"> Updated downloading URL of gpsOneXTRA binary files (Chapter 1.4). Modified AT+QGPSCFG="dpoenable" to take effective immediately without saving to NVRAM, the configurations will be restored to default values after rebooting (Chapter 2.2.9). Updated the description of parameter <AGPS_posmode> for AT+QGPSCFG="agpsposmode" (Chapter 2.2.14). Updated the description of AT+QGPS (Chapter 2.4).

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5. Updated the description of AT+QGPSGNMEA (Chapter 2.9).
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Contents

About the Document	1
Contents	3
Table Index	5
1 Introduction	6
1.1. Applicable Modules	6
1.2. GNSS Turning on/off Procedures	7
1.3. Supported NMEA Sentence Types	7
1.4. gpsOneXTRA Assistance Introduction.....	8
2 Description of GNSS AT Commands	10
2.1. AT Command Syntax	10
2.1.1. Definitions.....	10
2.1.2. AT Command Syntax	10
2.2. AT+QGPSCFG Configure GNSS.....	11
2.2.1. AT+QGPSCFG="outport" Configure Output Port of NMEA Sentences	11
2.2.2. AT+QGPSCFG="nmeasrc" Enable/Disable Acquisition of NMEA Sentences via AT+QGPSSGNMEA.....	12
2.2.3. AT+QGPSCFG="gpsnmeatype" Configure Output Type of GPS NMEA Sentences.	13
2.2.4. AT+QGPSCFG="glonassnmeatype" Configure Output Type of GLONASS NMEA Sentences.....	14
2.2.5. AT+QGPSCFG="galileonmeatype" Configure Output Type of Galileo NMEA Sentences.....	15
2.2.6. AT+QGPSCFG="beidoumeatype" Configure Output Type of BeiDou NMEA Sentences.....	16
2.2.7. AT+QGPSCFG="gnssconfig" Configure Supported GNSS Constellations	16
2.2.8. AT+QGPSCFG="odpcontrol" Configure ODP Mode.....	17
2.2.9. AT+QGPSCFG="dpoenable" Enable/Disable DPO Mode.....	18
2.2.10. AT+QGPSCFG="gsvextnmeatype" Enable/Disable GNSS Extended GGSV	19
2.2.11. AT+QGPSCFG="plane" Configure Plane Mode Used by MO AGPS Session	19
2.2.12. AT+QGPSCFG="autogps" Enable/Disable GNSS to Run Automatically	20
2.2.13. AT+QGPSCFG="suplver" Configure SUPL Protocol Version.....	21
2.2.14. AT+QGPSCFG="agpsposmode" Configure AGPS Positioning Mode	22
2.2.15. AT+QGPSCFG="agnssprotocol" Configure A-GNSS Positioning Protocols	23
2.2.16. AT+QGPSCFG="fixfreq" Configure NMEA Output Frequency	23
2.3. AT+QGPSDEL Delete Assistance Data	24
2.4. AT+QGPS Turn on GNSS	25
2.5. AT+QGPSEND Turn off GNSS	27
2.6. AT+QGPSLOC Acquire Positioning Information.....	27
2.7. AT+QGPSSUPLURL Configure SUPL Server URL.....	29
2.8. AT+QGPSSUPLCA Inject SUPL Certificate.....	30
2.9. AT+QGPSSGNMEA Acquire NMEA Sentences.....	31
2.10. AT+QGPSXTRA Enable/Disable gpsOneXTRA Assistance Function.....	33

2.11.	AT+QGPSXTRATIME	Inject gpsOneXTRA Time.....	34
2.12.	AT+QGPSXTRADATA	Inject gpsOneXTRA Data File	35
3	Examples	36
3.1.	Turn on/off the GNSS.....		36
3.2.	Application of GNSS <NMEA_src>.....		36
3.3.	Operation Procedures of gpsOneXTRA Assistance Function		37
4	Summary of Error Codes	38
5	Appendix A References		39

Table Index

Table 1: Applicable Modules.....	6
Table 2: Type of AT Commands and Responses.....	10
Table 3: Summary of Error Codes.....	38
Table 4: Related Documents.....	39
Table 5: Terms and Abbreviations.....	39

1 Introduction

Quectel EC2x series, EG9x series, EG2x-G and EM05 series modules integrate the multi-GNSS engine which supports GPS, BeiDou, Galileo and GLONASS systems, with the gpsOneXTRA Assistance. The high-performance GNSS engine is suitable for various applications where the accurate positioning at the lowest cost is needed, or position tracking without network assistance. This makes EC2x series, EG9x series, EG2x-G and EM05 series modules widely used in application fields such as turn-by-turn navigation, asset tracking, personnel tracking, location-aware games, as well as home and fleet management.

1.1. Applicable Modules

Table 1: Applicable Modules

Module Series	Module
EC2x Series	EC21 Series
	EC25 Series
	EC20 R2.1
EG9x Series	EG91 Series
	EG95 Series
EG2x-G	EG21-G
	EG25-G
EM05 Series	EM05 Series

1.2. GNSS Turning on/off Procedures

The GNSS of EC2x series, EG9x series, EG2x-G and EM05 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 "usbhnmca" 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) After enabling **<NMEA_src>** via **AT+QGPSCFG="nmeasrc",1**, the specified NMEA sentence can be acquired via **AT+QGPSGNMEA**. If **<NMEA_src>** is disabled, this command cannot be used.

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 four 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

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.
- GNGSA - GNSS DOP and active satellites
- GNGNS - GNSS fix data

Galileo NMEA sentences have the prefixes "GA":

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

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

1.4. gpsOneXTRA Assistance Introduction

gpsOneXTRA Assistance technology enhances the performance of GNSS and provides simplified GNSS assistance delivery, including ephemeris, almanac, ionosphere, UTC, health and coarse time assistance for GNSS engine. After activating gpsOneXTRA Assistance, the TTFF (Time to First Fix) can be reduced by 18~30 s (or more in harsh environments with weak signals). The assistance data which is obtained from one of the gpsOneXTRA Assistance web servers needs to be updated before expired.

Before using this function, please make sure the valid gpsOneXTRA assistance data is available first. It is necessary to download a new gpsOneXTRA binary file which contains the data from one of the gpsOneXTRA Assistance web servers via URLs listed below.

- **The files named with suffix "xtra2.bin" are for GPS+GLONASS.**

<http://xtrapath4.izatcloud.net/xtra2.bin>

<http://xtrapath5.izatcloud.net/xtra2.bin>

<http://xtrapath6.izatcloud.net/xtra2.bin>

- **The files named with suffix "xtra3grc.bin" are for GPS+GLONASS+BeiDou.**

<http://xtrapath4.izatcloud.net/xtra3grc.bin>

<http://xtrapath5.izatcloud.net/xtra3grc.bin>

<http://xtrapath6.izatcloud.net/xtra3grc.bin>

- **The files named with suffix "xtra3grcej.bin" are for GPS+GLONASS+BeiDou+Galileo.**

<http://xtrapath4.izatcloud.net/xtra3grcej.bin>

<http://xtrapath5.izatcloud.net/xtra3grcej.bin>

<http://xtrapath6.izatcloud.net/xtra3grcej.bin>

NOTE

Not all applicable modules of this document support GPS+GLONASS+BeiDou+Galileo system data files with the suffix "xtra3grcej.bin". Please contact Quectel Technical Support for details.

gpsOneXTRA assistance data needs to be updated regularly. The status of gpsOneXTRA data files can be queried via **AT+QGPSXTRADATA?** before updating.

The operation procedures of gpsOneXTRA Assistance function are shown as follows:

Step 1: gpsOneXTRA Assistance function is disabled by default, and can be enabled via **AT+QGPSXTRA=1**.

Step 2: Query and confirm the current validity of gpsOneXTRA data file via **AT+QGPSXTRADATA?**. If the data is invalid, perform **Step 3~6**; if the data is valid, turn on GNSS engine according to the procedures described in **Chapter 1.2** directly.

Step 3: Download files with suffix “xtra2.bin” or “xtra3grc.bin” to the module via URLs listed above.

Step 4: Inject the correct gpsOneXTRA time to GNSS engine via **AT+QGPSXTRATIME**.

Step 5: Inject the valid gpsOneXTRA data file to GNSS engine via **AT+QGPSXTRADATA**.

Step 6: Turn on GNSS engine according to the procedures described in **Chapter 1.1**.

NOTE

Before **Step 1**, ensure that the GNSS engine has been turned off.

For more detailed information of the AT commands mentioned above, see **Chapter 2.9, 2.10** and **2.11**.

2 Description of GNSS AT Commands

2.1. AT Command Syntax

2.1.1. Definitions

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

2.1.2. AT Command Syntax

The **AT** or **at** prefix must be added at the beginning of each command line. Entering **<CR>** will terminate a command line. Commands are usually followed by a response that includes **<CR><LF><response><CR><LF>**. Throughout this document, only the response **<response>** will be presented, **<CR><LF>** are omitted intentionally.

Table 2: Type of AT Commands and Responses

Test Command	AT+<cmd>=?	This command returns the list of parameters and value ranges set by the corresponding Write Command or internal processes.
Read Command	AT+<cmd>?	This command returns the currently set value of the parameter or parameters.
Write Command	AT+<cmd>=<p1> [,<p2>[,<p3>[...]]]	This command sets the user-definable parameter values.
Execution Command	AT+<cmd>	This command reads non-variable parameters affected by internal processes in the module.

2.2. 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	Response
AT+QGPSCFG=?	<p>+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", (range of supported <GLONASS_NMEA_type>s) +QGPSCFG: "galileonmeatype", (list of supported <Galileo_NMEA_type>s) +QGPSCFG: "beidoumeatype", (range of supported <BeiDou_NMEA_type>s) +QGPSCFG: "gnssconfig", (range of supported <GNSS_config>s) +QGPSCFG: "odpcontrol", (range of supported <ODP_control>s) +QGPSCFG: "dpoenable", (list of supported <DPO_enable>s) +QGPSCFG: "gsvextnmeatype", (list of supported <gsvext_NMEA_type>s) +QGPSCFG: "plane", (range of supported <plane>s) +QGPSCFG: "autogps", (list of supported <autoGPS>s) +QGPSCFG: "suplver", (list of supported <SUPL_version>s) +QGPSCFG: "agpsposmode", (range of supported <AGPS_posmode>s) +QGPSCFG: "agnssprotocol", (range of supported <AGPS_ip> bytes), (range of supported <AGLONASS_ip> bytes) +QGPSCDF: "fixfreq", (list of supported <freq>s)</p> <p>OK</p>

2.2.1. 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	Response
AT+QGPSCFG="outport"[,<out_port>]]	<p>If the optional parameter is omitted, query the current configuration: +QGPSCFG: "outport",<out_port></p>

	<p>OK</p> <p>If the optional parameter is specified, configure the output port of NMEA sentences:</p> <p>OK</p> <p>Or</p> <p>ERROR</p> <p>If there is any error related to ME functionality:</p> <p>+CME ERROR: <errcode></p>
Characteristics	<p>The command takes effect immediately;</p> <p>The configuration will be saved to NVRAM automatically.</p>

Parameter

<out_port>	String type. Configure the output port of NMEA sentences.
"none"	Close NMEA sentence output
"usbnmea"	Output via USB NMEA port
"uartdebug"	Output via debug UART port
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.2. 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	Response
AT+QGPSCFG="nmeasrc" [<NMEA_src>]	<p>If the optional parameter is omitted, query the current configuration:</p> <p>+QGPSCFG: "nmeasrc",<NMEA_src></p> <p>OK</p> <p>If the optional parameter is specified, configure whether to enable acquisition of NMEA sentences via AT+QGPSGNMEA:</p> <p>OK</p> <p>Or</p> <p>ERROR</p>

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

2.2.3. 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 <u>31</u> All the five types of sentences
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.4. 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. <u>0</u> Disable 1 GLGSV 2 GNGSA 4 GNGNS
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.5. 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. <u>0</u> Disable 1 GAGSV
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.6. AT+QGPSCFG="beidoumeatype" Configure Output Type of BeiDou NMEA Sentences

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

AT+QGPSCFG="beidoumeatype" Configure Output Type of BeiDou NMEA Sentences	
Write Command AT+QGPSCFG="beidoumeatype"[,<BeiDou_NMEA_type>]	Response If the optional parameter is omitted, query the current configuration: +QGPSCFG: "beidoumeatype",<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 PQGSA 2 PQGSV
<errcode>	Integer type. The error code of operation. See Chapter 4 for details

2.2.7. 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>

	<p>OK</p> <p>If the optional parameter is specified, configure the supported GNSS constellations:</p> <p>OK</p> <p>Or</p> <p>ERROR</p> <p>If there is any error related to ME functionality:</p> <p>+CME ERROR: <errcode></p>
Characteristics	<p>The command takes effect after rebooting;</p> <p>The configuration will be saved to NVRAM automatically.</p>

Parameter

<GNSS_config>	<p>Integer type. Supported GNSS constellations. GPS is always ON</p> <p>0 GLONASS OFF/BeiDou OFF/Galileo OFF</p> <p><u>1</u> GLONASS ON/BeiDou ON/Galileo ON</p> <p>2 GLONASS ON/BeiDou ON/Galileo OFF</p> <p>3 GLONASS ON/BeiDou OFF/Galileo ON</p> <p>4 GLONASS ON/BeiDou OFF/Galileo OFF</p> <p>5 GLONASS OFF/BeiDou ON/Galileo ON</p> <p>6 GLONASS OFF/BeiDou OFF/Galileo ON</p> <p>7 GLONASS OFF/BeiDou ON/Galileo OFF</p>
<errcode>	<p>Integer type. The error code of operation. See Chapter 4 for details.</p>

2.2.8. AT+QGPSCFG="odpcontrol" Configure ODP Mode

This command configures the OPD mode.

AT+QGPSCFG="odpcontrol" Configure ODP Mode	
Write Command	Response
AT+QGPSCFG="odpcontrol" [<ODP_control>]	<p>If the optional parameter is omitted, query the current configuraion:</p> <p>+QGPSCFG: "odpcontrol",<ODP_control></p> <p>OK</p> <p>If the optional parameter is specified, configure ODP mode:</p> <p>OK</p> <p>Or</p> <p>ERROR</p>

	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

<ODP_control>	Integer type. Set ODP mode. 0 Disable ODP 1 Low power mode 2 Ready mode
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.9. AT+QGPSCFG="dpoenable" Enable/Disable DPO Mode

This command enables/disables the DPO mode for GNSS.

AT+QGPSCFG="dpoenable" Enable/Disable DPO Mode	
Write Command AT+QGPSCFG="dpoenable" [<DPO_enable>]	Response If the optional parameter is omitted, query the current configuration: +QGPSCFG: "dpoenable", <DPO_enable> OK If the optional parameter is specified, enable/disable the DPO mode: OK Or ERROR If there is any error related to ME functionality: +CME ERROR: <errcode>
Characteristics	The command takes effect immediately; The configuration will not be saved.

Parameter

<DPO_enable>	Integer type. Enable/Disable DPO. 0 Disable DPO 1 Enable the DPO with dynamic duty cycle
---------------------------	--

- 2 Enable the DPO only if the module is not connected to an external power supply (not running on battery)

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

2.2.10. AT+QGPSCFG="gsvextnmeatype" Enable/Disable GNSS Extended GGSV

This command enables/disables GNSS extended GGSV.

AT+QGPSCFG="gsvextnmeatype" Enable/Disable GNSS Extended GGSV	
Write Command AT+QGPSCFG="gsvextnmeatype"[,<gsvext_NMEA_type>]	Response If the optional parameter is omitted, , query the current configuration: +QGPSCFG: "gsvextnmeatype",<gsvext_NMEA_type> OK If the optional parameter is specified, configure the GNSS extended GGSV: 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

<gsvext_NMEA_type>	Integer type. Enable/disable extended GGSV 0 Disable extended GGSV 1 Enable extended GGSV
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.11. AT+QGPSCFG="plane" Configure Plane Mode Used by MO AGPS Session

This command configures the plane mode (control plane or user plane) to be used by the Mobile-Originated (MO) AGPS session.

AT+QGPSCFG="plane" Configure AGPS Plane Mode	
Write Command AT+QGPSCFG="plane"[,<plane>]	Response If the optional parameter is omitted, query the current

	<p>configuration: +QGPSCFG: "plane",<plane></p> <p>OK</p> <p>If the optional parameter is specified, configure the plane mode used by MO GPS session: OK</p> <p>Or ERROR</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
Characteristics	<p>The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.</p>

Parameter

<plane>	Integer type. The plane mode used by MO AGPS session. 0 User plane without SSL 1 User plane with SSL 2 Control plane
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

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

This command configures whether to enable GNSS when the module restarts.

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

<p>Write Command AT+QGPSCFG="autogps" [<autoGPS>]</p>	<p>Response</p> <p>If the optional parameter is omitted, query the current configuration: +QGPSCFG: "autogps",<autoGPS></p> <p>OK</p> <p>If the optional parameter is specified, configure whether to enable GNSS to run automatically: OK</p> <p>Or ERROR</p> <p>If there is any error related to ME functionality:</p>
--	--

	+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 after the module is powered on. <u>0</u> Disable GNSS to run automatically 1 Enable GNSS to run automatically
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.13. AT+QGPSCFG="suplver" Configure SUPL Protocol Version

This command configures the SUPL version in an SI session, and the most likely used SUPL major version in a NI session.

AT+QGPSCFG="suplver" Configure SUPL Protocol Version	
Write Command AT+QGPSCFG="suplver"[,<SUPL_version>]	Response If the optional parameter is omitted, query the current configuration: +QGPSCFG: "suplver",<SUPL_version> OK If the optional parameter is specified, configure the SUPL protocol version: 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

<SUPL_version>	Integer type. SUPL protocol version. 1 SUPL version 1.0 <u>2</u> SUPL version 2.0
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.14. AT+QGPSCFG="agpsposmode" Configure AGPS Positioning Mode

This command configures the AGPS positioning mode.

AT+QGPSCFG="agpsposmode" Configure the AGPS mode	
Write Command AT+QGPSCFG="agpsposmode"[,<AGPS_posmode>]	Response If the optional parameter is omitted, query the current configuration: +QGPSCFG: "agpsposmode",<AGPS_posmode> OK If the optional parameter is specified, configure the AGPS mode: 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

<AGPS_posmode> Integer type. AGPS positioning mode. Each bit indicates a specified mode and see following figure for details. Set bit to 1 can enable the corresponding mode. Range: 0–33554431. Default: 33488767.

Bit value	Description
Bit 0	Standalone
Bit 1	UP MS-based
Bit 2	UP MS-assisted
Bit 3	CP MS-based (2G)
Bit 4	CP MS-assisted (2G)
Bit 5	CP UE-based (3G)
Bit 6	CP UE-assisted (3G)
Bit 7	UP network measurement report (2G)
Bit 8	UP MS-based (4G)
Bit 9	UP MS-assisted (4G)
Bit 10	CP MS-based (4G)
Bit 11	CP MS-assisted (4G)
Bit 16	Enabling of autonomous fallback for SUPL-MSB
Bit 17	A-GLONASS UP MS-based for 3G
Bit 18	A-GLONASS UP MS-assisted for 3G
Bit 19	A-GLONASS CP MS-based for 3G
Bit 20	A-GLONASS CP MS-assisted for 3G
Bit 21	A-GLONASS UP MS-based for 4G
Bit 22	A-GLONASS UP MS-assisted for 4G
Bit 23	A-GLONASS CP MS-based for 4G
Bit 24	A-GLONASS CP MS-assisted for 4G

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

2.2.15. AT+QGPSCFG="agnssprotocol" Configure A-GNSS Positioning Protocols

This command configures A-GPS LPP positioning protocol and A-GLONASS positioning protocol.

AT+QGPSCFG="agnssprotocol" Configure A-GNSS Positioning Protocols	
Write Command AT+QGPSCFG="agnssprotocol"[,<AGPS Ip>,<AGLONASS Ip>]	<p>Response</p> <p>If the optional parameters are omitted, query the current configuration: +QGPSCFG: "agnssprotocol",<AGPS Ip>,<AGLONASS Ip></p> <p>OK</p> <p>If the optional parameters are specified, configure the LPP protocol: OK Or ERROR</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
Characteristics	The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.

Parameter

<AGPS Ip>	Integer type. A-GPS LPP positioning protocol in ORed. Default: 3. 1 User plane LPP 2 Control plane LPP
<AGLONASS Ip>	Integer type. A-GLONASS positioning protocol in ORed. Default: 1287. 1 Control plane RRLP 2 Control plane RRC 4 Control plane LPP 256 User plane RRLP 1024 User plane LPP
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.2.16. AT+QGPSCFG="fixfreq" Configure NMEA Output Frequency

This command configures the NMEA sentence output frequency. It can only be executed when the GNSS engine is turned off. When the output frequency of NMEA is set higher than 1 Hz, the output of GGA, RMC, VTG and GSA sentences are outputted at the set frequency, and the output frequency of GSV sentence always be 1 Hz.

AT+QGPSCFG="fixfreq" Configure NMEA Output Frequency

Write Command AT+QGPSCFG="fixfreq"[,<freq>]	<p>Response</p> <p>If the optional parameter is omitted, query the current configuration: +QGPSCFG: "fixfreq",<freq></p> <p>OK</p> <p>If the optional parameter is specified, configure the NMEA output frequency: OK</p> <p>Or ERROR</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
Characteristics	<p>The command takes effect after rebooting; The configuration will be saved to NVRAM automatically.</p>

Parameter

<freq>	Integer type. NMEA sentence output frequency. <table style="margin-left: 20px;"> <tr><td>1</td><td>1 Hz</td></tr> <tr><td>2</td><td>2 Hz</td></tr> <tr><td>5</td><td>5 Hz</td></tr> <tr><td>10</td><td>10 Hz</td></tr> </table>	1	1 Hz	2	2 Hz	5	5 Hz	10	10 Hz
1	1 Hz								
2	2 Hz								
5	5 Hz								
10	10 Hz								
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.								

NOTE

Not all modules and software baselines support this function. For more details, contact Quectel Technical Supports.

2.3. AT+QGPSDEL Delete Assistance Data

The command deletes assistance data so as to operate cold start, hot start and warm start of GNSS. The command can only be executed when GNSS is turned off. After the assistance data is deleted via this command, the cold start of GNSS can be enforced via **AT+QGPS**. Hot/warm start can also be performed if the corresponding conditions are satisfied.

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	The command takes effect immediately.

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. 3 Delete the gpsOneXTRA assistance data injected into GNSS engine.
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.4. AT+QGPS Turn on GNSS

This command turns on 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 reaches the value specified by customers, GNSS turns off automatically.

AT+QGPS Turn on GNSS	
Test Command AT+QGPS=?	Response +QGPS: (range 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	The command takes effect immediately; The configurations will not be saved.

Parameter

<GNSS_state>	Integer type. GNSS state. 0 GNSS OFF 1 GNSS ON
<GNSS_mode>	Integer type. GNSS working mode. 1 Stand-alone 2 MS-based 3 MS-assisted 4 Speed-optimal
<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: 255. Unit: second.
<fix_maxdist>	Integer type. Accuracy threshold of positioning. Range: 0–1000. Default: 50. Unit: meter.
<fix_count>	Integer type. Positioning times. Range: 0–1000. Default: 0 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>	Integer type. The error code of operation. See Chapter 4 for details.

2.5. AT+QGPSEND Turn off GNSS

When GNSS is turned on and `<fix_count>` is 0, GNSS fixes position continuously and can be turned off via `AT+QGPSEND`. When `<fix_count>` is non-zero and reaches the value specified, GNSS is turned off automatically.

AT+QGPSEND Turn off GNSS	
Test Command <code>AT+QGPSEND=?</code>	Response OK Or ERROR
Read command <code>AT+QGPSEND?</code>	Response OK Or ERROR
Execution Command <code>AT+QGPSEND</code>	Response OK Or ERROR If error is related to ME functionality: +CME ERROR: <errcode>
Characteristics	The command takes effect immediately.

Parameter

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

2.6. AT+QGPSLOC Acquire Positioning Information

This command acquires positioning information. Before executing the command, turns on GNSS 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 <code>AT+QGPSLOC=?</code>	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	The command takes effect immediately; The configurations will not be saved.

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 GPGLL sentence).
<latitude>	String type. Latitude. If <mode> is 0: Format: ddmm.mmmmN/S (Quoted from GPGLL 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 GPGLL 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 GPGLL sentence) dd.ddddd Degree. Range: -89.9999–89.9999 - South latitude
<longitude>	Longitude If <mode> is 0: Format: dddmm.mmmmE/W (Quoted from GPGLL sentence) ddd Degree. Range: 000–179. mm.mmmmm 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: (-)dd.ddddd (Quoted from GPGGA sentence) dd.ddddd Degree. Range: -179.99999-179.99999 - West longitude
<HDOP>	Horizontal 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. Format: xxxx.x. Unit: km/h. Accurate to one decimal place (Quoted from GPVTG sentence).
<spkn>	Speed over ground. Format: xxxx.x. Unit: knots. Accurate to one decimal place (Quoted from GPVTG sentence).
<date>	UTC time when fixing position. Format: ddmmyy (Quoted from GPRMC sentence). dd Day mm Month yy Year
<nsat>	Number of satellites. Range: 00–12 (the first 0 should be retained) (Quoted from GPGGA sentence).
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.7. AT+QGPSSUPLURL Configure SUPL Server URL

This command configures the SUPL server URL.

AT+QGPSSUPLURL Configure SUPL Server URL	
Test command	Response
AT+QGPSSUPLSURL=?	+QGPSSUPLURL: <SUPL_URL>
	OK

Read Command AT+QGPSSUPLURL?	Response +QGPSSUPLURL: <SUPL_URL> OK
Write Command Configure SUPL server URL AT+QGPSSUPLURL=<SUPL_URL>	Response OK Or ERROR If there is any error related to ME functionality: +CME ERROR: <errcode>
Characteristics	The command takes effect immediately; The configurations will be saved to NVRAM automatically.

Parameter

<SUPL_URL>	String type. SUPL server address. The address format is "URL:port_number" where the "port_number" can be omitted, for example "supl.server.com", "123.123.123.123", and "supl.server.com:7275". When the "port number" is omitted, the default value (7275) will be used.
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.8. AT+QGPSSUPLCA Inject SUPL Certificate

This command injects SUPL certificate. The certificate file should be inputted into the file system via **AT+QFUPL**, details of which are provided in *Quectel_LTE_Standard_FILE_Application_Note*. The certificate should be obtained from the operator or the server provider.

AT+QGPSSUPLCA Inject SUPL Certificate	
Test command AT+QGPSSUPLCA=?	Response +QGPSSUPLCA: <CA_file_name> OK
Read Command AT+QGPSSUPLCA?	Response OK Or ERROR
Write Command AT+QGPSSUPLCA=<CA_file_name>	Response OK Or

	<p>ERROR</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
Characteristics	The command takes effect immediately.

Parameter

<CA_file_name>	String type. SUPL certificate name.
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.9. AT+QGPSGNMEA Acquire NMEA Sentences

This command acquires 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"**, **AT+QGPSCFG="glonassnmeatype"**, **AT+QGPSCFG="galileonmeatype"** or **AT+QGPSCFG="beidoumeatype",0**. If sentence output is disabled, **AT+QGPSGNMEA** can still be used to acquire NMEA sentences on condition that the GNSS has already acquired sentences via this command after its activation. And the sentences acquired via the command will be the last ones that have ever been acquired.

AT+QGPSGNMEA Acquire 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] [...]

	<p>OK</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
<p>Write Command Query GSV information AT+QGPSGNMEA="GSV"</p>	<p>Response [+QGPSGNMEA: GSV sentence] [...]</p> <p>OK</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
<p>Write Command Query GSA sentence AT+QGPSGNMEA="GSA"</p>	<p>Response [+QGPSGNMEA: GSA sentence] [...]</p> <p>OK</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
<p>Write Command Query VTG sentence AT+QGPSGNMEA="VTG"</p>	<p>Response [+QGPSGNMEA: VTG sentence] [...]</p> <p>OK</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
<p>Write Command Query GNS sentence AT+QGPSGNMEA="GNS"</p>	<p>Response [+QGPSGNMEA: GNS sentence] [...]</p> <p>OK</p> <p>If there is any error related to ME functionality: +CME ERROR: <errcode></p>
<p>Characteristics</p>	<p>The command takes effect immediately.</p>

Parameter

<NMEA_type>	String type. NMEA sentence type. "GGA" GGA sentence "RMC" RMC sentence
--------------------------	--

"GSV"	GSV sentence
"GSA"	GSA sentence
"VTG"	VTG sentence
"GNS"	GNS sentence
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.10. AT+QGPSXTRA Enable/Disable gpsOneXTRA Assistance

Function

This command enables/disables gpsOneXTRA Assistance function.

AT+QGPSXTRA Enable/Disable gpsOneXTRA Assistance Function	
Test Command AT+QGPSXTRA=?	Response +QGPSXTRA: (list of supported <XTRA_enable>s) OK
Read Command AT+QGPSXTRA?	Response +QGPSXTRA: <XTRA_enable> OK
Write Command AT+QGPSXTRA=<XTRA_enable>	Response OK Or ERROR If there is any error related to ME functionality: +CME ERROR: <errcode>
Characteristics	The command takes effect immediately; The configurations will be saved to NVRAM automatically.

Parameter

<XTRA_enable>	Integer type. Enable/disable gpsOneXTRA Assistance function. 0 Disable gpsOneXTRA Assistance 1 Enable gpsOneXTRA Assistance
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.11. AT+QGPSXTRATIME Inject gpsOneXTRA Time

This command injects gpsOneXTRA time to GNSS engine. Before using this command, enable gpsOneXTRA Assistance function via **AT+QGPSXTRA=1**. After the function is activated, the GNSS engine asks for gpsOneXTRA time and assistance data file. Before injecting gpsOneXTRA data file, inject gpsOneXTRA time first via this command.

AT+QGPSXTRATIME Inject gpsOneXTRA Time	
Test Command AT+QGPSXTRATIME=?	Response +QGPSXTRATIME: 0,<xtratime>,(list of supported <UTC>s),(list of supported <force>s),<uncrtn> OK
Write Command Inject gpsOneXTRA time AT+QGPSXTRATIME=<type>,<xtratime>,<UTC>,<force>,<uncrtn>	Response OK Or ERROR If there is any error related to ME functionality: +CME ERROR: <errcode>
Characteristics	The command takes effect immediately; The configurations will not be saved

Parameter

<type>	Integer type. Type of injecting time. <u>0</u> Inject XTRA time manually
<xtratime>	String type. Current UTC time. Format: "YYYY/MM/DD,hh:mm:ss". e.g. "2019/01/05,08:30:30".
<UTC>	Integer type. UTC or GPS time that gpsOneXTRA time refers to. <u>0</u> GPS time <u>1</u> UTC time (Recommended).
<force>	Integer type. Whether to force GNSS to accept the data. <u>0</u> Not force GNSS to accept the data <u>1</u> Force acceptance of data (Recommended).
<uncrtn>	Integer type. Uncertainty of time. It indicates the time difference between sending a request to the SNTP server and receiving a response from the SNTP server. Default: 3500. Unit: millisecond.
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

2.12. AT+QGPSXTRADATA Inject gpsOneXTRA Data File

This command injects a gpsOneXTRA assistance data file to the GNSS engine. Before operating this command, enable gpsOneXTRA first, store valid gpsOneXTRA data file into RAM or UFS (UFS is recommended) of the module and inject gpsOneXTRA time to GNSS engine. After operating this command successfully, gpsOneXTRA data file can be deleted from RAM or UFS, and whether the gpsOneXTRA data is injected successfully can be queried via **AT+QGPSXTRADATA?**.

AT+QGPSXTRADATA Inject gpsOneXTRA Data File	
Test Command AT+QGPSXTRADATA=?	Response +QGPSXTRADATA: <xtradatafilename> OK
Read Command Query the status of gpsOneXTRA data files AT+QGPSXTRADATA?	Response +QGPSXTRADATA: <xtra_data_durtime>,<injected_data_time> OK If there is any error related to ME functionality: +CME ERROR: <errcode>
Write Command Inject gpsOneXTRA data files AT+QGPSXTRADATA=<xtradatafilename>	Response OK Or ERROR If there is any error related to ME functionality: +CME ERROR: <errcode>
Characteristics	The command takes effect immediately; The configurations will be saved to NVRAM automatically.

Parameter

<xtradatafilename>	String type. Filename of the gpsOneXTRA data file, e.g. "RAM:xtra2.bin" or "RAM:xtra3grc.bin", in which, RAM indicates the actual file storage area.
<xtra_data_durtime>	Integer type. Valid time of injected gpsOneXTRA data file. Unit: minute. 0 No gpsOneXTRA file or the file is overdue 1-10080 Valid time of gpsOneXTRA file
<injected_data_time>	String type. Start time of the valid time of gpsOneXTRA data file. Format: "YYYY/MM/DD,hh:mm:ss", e.g. "2016/01/03,15:34:50".
<errcode>	Integer type. The error code of operation. See Chapter 4 for details.

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 "usbntmea" port by default; and GNSS can be turned off via **AT+QGSEND**.

```
AT+QGPS=1 //Turn on GNSS.
OK
//After turning on GNSS, NMEA sentences will be outputted from "usbntmea" port by default.
AT+QGPSLOC=0 //Obtain positioning information.
+QGPSLOC: 063416.400,3143.2951N,11713.0655E,0.6,224.9,2,162.57,17.6,9.5,110620,07

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

3.2. Application of GNSS <NMEA_src>

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

```
AT+QPSCFG="nmeasrc",1 //Set <NMEA_src> to 1 to enable acquisition of NMEA
//sentences via AT+QPSGNMEA.
OK
AT+QPSGNMEA="GGA" //Obtain GGA sentence.
+QPSGNMEA: $GPGGA,103647.0,3150.721154,N,11711.925873,E,1,02,4.7,59.8,M,-2.0,M,,*77

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

3.3. Operation Procedures of gpsOneXTRA Assistance Function

This example shows the operation procedures of gpsOneXTRA Assistance function.

```
AT+QGPSXTRA=1 //If gpsOneXTRA Assistance is disabled,
                enable it first and then perform the following
                procedures.

OK
//Activate gpsOneXTRA Assistance function immediately.
//If gpsOneXTRA data file is valid (query via AT+QGPSXTRADATA?), turn on GNSS engine directly.
//If gpsOneXTRA data file is invalid (query via AT+QGPSXTRADATA?), then perform the following
procedures.
//gpsOneXTRA data file can be downloaded to PC (or MCU) from URL
http://xtrath1.izatcloud.net/xtra2.bin or other URLs listed in Chapter 1.3.
AT+QFUPL="RAM:xtra2.bin",59748,60 //Select a gpsOneXTRA file and upload it to
                                   module via QCOM. For more details about this
                                   command and QCOM tool usage and
                                   configuration, see document [1] and [2]
                                   respectively.

OK
AT+QGPSXTRATIME=0,"2019/01/05,08:30:30",1,1,3500 //Inject gpsOneXTRA time to GNSS engine.
OK
AT+QGPSXTRADATA="RAM:xtra2.bin"
OK //The gpsOneXTRA data file is injected to
    GNSS engine successfully.
AT+QFDEL="RAM:xtra2.bin" //Delete gpsOneXTRA data file from UFS.
OK
AT+QGPS=1 //Turn on GNSS engine.
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 A References

Table 4: Related Documents

SN	Document Name	Remark
[1]	Quectel_LTE_Standard_FILE_Application_Note	FILE application note applicable for EC2x series, EG9x series, EG2x-G and EM05 series modules
[2]	Quectel_QCOM_User_Guide	QCOM user guide

Table 5: Terms and Abbreviations

Abbreviation	Description
AGPS	Assisted GPS (Global Positioning System)
APN	Access Point Name
BeiDou	BeiDou Navigation Satellite System
DOP	Dilution of Precision
DPO	Dynamic Power Optimization
Galileo	Galileo Satellite Navigation System
GGA	Global Positioning System Fix Data
GLONASS	Global Navigation Satellite System
GNS	Global Network Service
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
gpsOneXTRA	An Auxiliary Positioning Technology Provided by Qualcomm
GSA	GPS DOP and Active Satellites

GSV	Satellites in View
LPP	LTE Positioning Protocol
MCU	Micro Control Unit
ME	Mobile Equipment
MS	Mobile Station
NI	Network Initiated
NMEA	NMEA (National Marine Electronics Association) 0183 Interface Standard
NVRAM	Non-Volatile Random Access Memory
ODP	On-Demand Positioning
PC	Private Computer
RAM	Random Access Memory
RMC	Recommended Minimum Specific GNSS Data
SI	SET Initiated
SNR	Signal Noise Ratio
SNTP	Simple Network Time Protocol
SSL	Secure Sockets Layer
SUPL	Secure User Plane Location
TTFF	Time to First Fix
UART	Universal Asynchronous Receiver & Transmitter
UFS	User File System
URL	Uniform Resource Locator
USB	Universal Serial Bus
UTC	Universal Time Code
VTG	Course Over Ground and Ground Speed
