

EC20 GNSS

AT Commands Manual

LTE Module Series

Rev. EC20_GNSS_AT_Commands_Manual_V1.1

Date: 2015-06-09



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About the Document

History

Revision	Date	Author	Description
1.0	2015-02-28	Tommy ZHANG	Initial
1.1	2015-06-09	Tommy ZHANG	<ol style="list-style-type: none">1. Added <uartdebug> and <plane> parameters in AT+QGPSCFG command.2. Deleted AT+QGPSXTRAUPL command.

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1 Introduction

EC20 integrates a GNSS engine, which supports GPS and GLONASS double system and provides gpsOneXTRA assistance. EC20 GNSS engine is high-performance and suitable for various applications which lowest-cost and accurate positioning are needed. Meanwhile, it can also support position tracking without network assistance, and GNSS capabilities when GSM/WCDMA is out of network coverage areas. EC20 GNSS can be applied in the following occasions: turn-by-turn navigation applications, asset tracking, buddy tracking, location-aware games, homing and fleet management.

1.1. How to Use GNSS

EC20 GNSS engine allows calculating location without any assistance from the network. The procedure of turning on GNSS is shown as below:

Step 1: Configure corresponding demands by **AT+QGPSCFG**.

Step 2: Active GNSS engine by **AT+QGPS**.

Step 3: After GNSS session is started successfully and GNSS has fixed, positioning information can be obtained by three ways:

- 1) NMEA sentences output to "usbntmea" port by default, you can read the port to obtain NMEA sentences.
- 2) You can use **AT+QGPSLOC** to obtain some positioning information directly, such as latitude, longitude, height, time and positioning type and so on .
- 3) After enabling **<nmeasrc>** by **AT+QGPSCFG**, you can acquire the specified NMEA sentence by **AT+QGPSGNMEA**. If **<nmeasrc>** is disabled, this command cannot be used.

Step 4: You can terminate GNSS by two ways:

- 1) If the parameter **<fixcount>** of the **AT+QGPS** is set to 0 in Step 2, GNSS engine will get position continuously, and it can be ended by **AT+QGPSEND**.
- 2) If the actual fix times reach to the specified **<fixcount>** value, the engine will stop automatically; in this process you can use the command **AT+QGPSEND** to end the session.

1.2. NMEA Sentences Type

The NMEA sentences are compatible with NMEA-0183 protocol, and all of the standard NMEA sentences have two kinds of prefix.

For GPS sentences, the prefix is "GP", as below:

- GPGGA - Global Positioning System Fix Data, Time, Position and related fix data
- GPRMC - Recommended minimum data
- GPGSV - Detailed satellite data
- GPGSA - Overall satellite data
- GPVTG - Vector track and speed over the ground

And for GLONASS sentences, the prefixes are "GL" and "GN", as below:

- GLGSV - Detailed satellite data
- GNGSA - Overall satellite data
- GNGNS - Positioning System

1.3. Introduction of gpsOneXTRA

gpsOneXTRA assistance enhances standalone performance, and simplifies GNSS assistance delivery to GNSS engine, including ephemeris, almanac, ionosphere, UTC, health and coarse time assistance. After booting gpsOneXTRA, TTFF (Time to First Fix) can be reduced by 18 to 30 sec (or more in harsh signal environments). And the gpsOneXTRA data needs to be updated once per day (or every a couple of days) which is obtained from an XTRA server on the network.

In order to use gpsOneXTRA feature, you should ensure that valid gpsOneXTRA assistance data is available. Firstly download a new gpsOneXTRA binary file from one of the gpsOneXTRA assistance web servers via HTTP. The files are named as xtra.bin for GPS only and xtra2.bin for GPS+GLONASS. The exact file size should be less than 50kB:

<http://xtra1.gpsonextra.net/xtra.bin>
<http://xtra2.gpsonextra.net/xtra.bin>
<http://xtra3.gpsonextra.net/xtra.bin>
<http://xtra1.gpsonextra.net/xtra2.bin>
<http://xtra2.gpsonextra.net/xtra2.bin>
<http://xtra3.gpsonextra.net/xtra2.bin>

gpsOneXTRA data needs to be updated regularly. You can query the gpsOneXTRA data status by **AT+QGSPXTRADATA?** to update gpsOneXTRA data properly.

The working procedure of gpsOneXTRA is shown as follows:

Step 1: If gpsOneXTRA is disabled, enable it by **AT+QGPSXTRA** and restart the module.

Step 2: Confirm the current validity of gpsOneXTRA data by **AT+QGPSXTRADATA?**.

Step 3: Download xtra.bin or xtra2.bin to the module via HTTP AT command.

Step 4: Inject the correct time by **AT+QGPSXTRATIME**.

Step 5: Inject the downloaded xtra.bin or xtra2.bin file by **AT+QGPSXTRADATA**.

Step 6: Others steps see Chapter 1.1.

1.4. GNSS Power Saving Management

EC20 GNSS engine provides power saving solutions by DPO and ODP, thus extending battery life, maximizing talk and standby time, and enhancing accuracy and TTFF.

1.4.1. DPO (Dynamic Power Optimization)

DPO (Dynamic Power Optimization) is a power-saving solution which attempts to turn off GNSS RF and other unneeded components. DPO takes effect after configuring **<dpoenable>** via **AT+QGPSCFG**. There are several preconditions to turn on the DPO, shown as below:

- All SVs>26dB-Hz must have ephemeris or recent (<3.5 days) XTRA almanac corrections for those SVs.
- Health or UTC information is not transmitted over-the-air.
- Valid position and HEPE should be less than 50m and within users' specified value in QoS.
- 6 SVs>37dB-Hz or 4 SVs>26dB-Hz and have almanac and health for all SVs.

Benefits and impacts of DPO:

- When the DPO feature is on and the SV or navigational data cannot be decoded, the GPS receiver will not be continuous.
- During the DPO, the SBAS feature is effectively disabled. The receiver cannot demodulate the SBAS messages. DPO always takes precedence over SBAS.
- TTFF and yield will not be impacted.

1.4.2. ODP (On-Demand Positioning)

When On-Demand Positioning (ODP) is enabled, standalone GNSS positioning will be triggered in the background. The positions calculated as a result of ODP are not presented to the application, NMEA, or the network. However, when the on-demand session is operating and the users or network request a GNSS session, the on-demand session is immediately terminated and the incoming request is implemented.

ODP system requirements: (1) ODP requires valid gpsOneXTRA assistance data. (2) ODP requires that EC20 is in service. If these two requirements are not fulfilled ODP will be turned off automatically. And ODP will be suspended if a regular GNSS fix is running.

In the enabled low power mode, the GNSS engine is turned on to consume low power. Requests to determine the GNSS position are returned with a reduced time-to-fix while this mode is active. In the enabled Ready mode, the GNSS engine is kept active and is available to perform fixed position. Requests to determine the GNSS position are immediately returned while this mode is active. The battery will be greatly impacted in this mode. Maintenance of position and time uncertainty also improves the performance of E911 on UMTS.

Configure **<odpcontrol>** to set two different modes by **AT+QGPSCFG**:

Low power mode:

- Low-frequency background GNSS tracking session.
- In good signal condition, use shorter interval with frequent ODP session (i.e., per 5 min).
- In weak signal condition, use longer interval, but less frequent ODP session (i.e., twice per hour).

Ready mode:

- GNSS engine will start 1 Hz positioning session.
- Main goal is to keep GNSS engine ready so that when the application demands a position from the GNSS engine, position can be reported quickly.

2 Description of AT Command

2.1. AT+QGPSCFG Configure GNSS

This command can be used to configure the using of GLONASS, switchover of NMEA sentences output port and setting of power saving and so on.

AT+QGPSCFG Configure GNSS	
Test command AT+QGPSCFG=?	Response +QGPSCFG: "outport",("none","usbntmea","uartdebug") +QGPSCFG: "nmeasrc",(0,1) +QGPSCFG: "gpsnmeatype",(0-31) +QGPSCFG: "glonassnmeatype",(0-7) +QGPSCFG: "glonassenable",(0,1) +QGPSCFG: "odpcontrol",(0-2) +QGPSCFG: "dpoenable",(0,1) +QGPSCFG: "plane",(0-2) OK
Configure NMEA sentences out port AT+QGPSCFG="outport"[,<outport>]	Response When there are two parameters: OK If error is related to ME functionality: +CME ERROR: <errcode> When the second parameter is omitted, query the current setting: +QGPSCFG: "outport",<outport> OK
Enable nmeasrc, obtain NMEA sentences by AT+QGPSCGNMEA AT+QGPSCFG="nmeasrc"[,<nmeasrc>]	Response When there are two parameters: OK If error is related to ME functionality:

	<p>+CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "nmeasrc",<nmeasrc></p> <p>OK</p>
<p>Configure output type of GPS NMEA sentences AT+QGPSCFG="gpsnmeatype"[,<gpsnmeatype>]</p>	<p>Response</p> <p>When there are two parameters: OK</p> <p>If error is related to ME functionality: +CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "gpsnmeatype",<gpsnmeatype></p> <p>OK</p>
<p>Configure output type of GLONASS NMEA sentences AT+QGPSCFG="glonassnmeatype"[,<glonassnmeatype>]</p>	<p>Response</p> <p>When there are two parameters: OK</p> <p>If error is related to ME functionality: +CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "glonassnmeatype",<glonassnmeatype></p> <p>OK</p>
<p>Configure GLONASS AT+QGPSCFG="glonassenable"[,<glonassenable>]</p>	<p>Response</p> <p>When there are two parameters: OK</p> <p>If error is related to ME functionality: +CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "glonassenable",<glonassenable></p> <p>OK</p>

<p>Configure ODP mode AT+QGPSCFG="odpcontrol",<odpcontrol>]</p>	<p>Response When there are two parameters: OK</p> <p>If error is related to ME functionality: +CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "odpcontrol",<odpcontrol></p> <p>OK</p>
<p>Configure DPO AT+QGPSCFG="dpoenable",<dpoenable>]</p>	<p>Response When there are two parameters: OK</p> <p>If error is related to ME functionality: +CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "dpoenable",<dpoenable></p> <p>OK</p>
<p>Configure GPS plane AT+QGPSCFG="plane",<plane>]</p>	<p>Response When there are two parameters: OK</p> <p>If error is related to ME functionality: +CME ERROR: <errcode></p> <p>When the second parameter is omitted, query the current setting: +QGPSCFG: "plane",<plane></p> <p>OK</p>
<p>Reference</p>	

Parameter

<p><outport></p>	<p>Configure the output port of NMEA sentences, and the setting will be auto saved to NVRAM.</p> <p>"none" Close NMEA sentence outputting</p>
-------------------------------	--

	"usbhmea"	Output through USB NMEA port
	"uartdebug"	Output through UART DEBUG port
<nmeasrc>		After enabled, original NMEA sentences can be acquired by AT+QGPGSNMEA , and the setting will be auto saved to NVRAM. Meanwhile, sentences are output through NMEA port as before
	0	Disable
	1	Enable
<gpsnmeatype>		Configure output type of GPS NMEA sentences by ORed, the setting will be auto saved to NVRAM. The default value is 31.
	1	GGA
	2	RMC
	4	GSV
	8	GSA
	16	VTG
<glonassnmeatype>		Configure output type of GLONASS NMEA sentences by ORed, the setting will be auto saved to NVRAM. The default value is 0.
	1	GSV
	2	GSA
	4	GNS
<glonassenable>		Enable/Disable GLONASS, the setting will be auto saved to NVRAM. Parameter takes effect after module reset. If GLONASS is disabled and <glonassnmeatype> is not zero, the GLONASS NMEA sentences will be output.
	0	Disable GLONASS
	1	Enable GLONASS
<odpcontrol>		Set ODP mode, the setting will be auto saved to NVRAM.
	0	Disable ODP
	1	Low power mode
	2	Ready mode
<dpoenable>		Enable/Disable DPO, the setting will be auto saved to NVRAM.
	0	Disable DPO
	1	Enable DPO
<plane>		Set user plane and control plane.
	0	User plane without SSL
	1	User plane with SSL
	2	Control plane
<errcode>		Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.2. AT+QGPSDEL Delete Assistance Data

Delete assistance data to operate cold start, hot start and warm start. This command can only be executed when GPS engine is turned off. After deleting the assistance data by this command, cold start will be enforced by **AT+QGPS**, or perform hot/warm start when the hot/warm start condition is permitted.

AT+QGPSDEL Delete Assistance Data

Test Command
AT+QGPSDEL=?

Response
+QGPSDEL: (0-3)

OK

Write Command
AT+QGPSDEL=<deletetype>

Response
OK

If error is related to ME functionality:
+CME ERROR: <errcode>

Reference

Parameter

<deletetype>	Delete data type. 0 Delete all assistance data, not include XTRA 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 related data. Perform warm start if the conditions are permitted after starting GNSS. 3 Delete gpsOneXTRA data.
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.3. AT+QGPS Operate GPS Session

Turn on GNSS engine, current **<gnssmode>** only supports Standalone GNSS. When **<fixcount>** is 0, GNSS engine will position continuously, you can terminate the session by **AT+QGPSEND**. When **<fixcount>** is not 0, and the actual fix times reach to the specified value, GNSS engine will terminate automatically.

AT+QGPS Operate GPS Session

Test Command AT+QGPS=?	Response +QGPS: (1-4),(1-255),(0-1000),(0-1000),(1-65535) OK
Read current GNSS session state AT+QGPS?	Response +QGPS: <gnssstate> OK
Write Command AT+QGPS=<gnssmode>[,<fixmaxtime>[,<fixmaxdist>[,<fixcount>[,<fixrate>]]]]	Response OK If error is related to ME functionality: +CME ERROR: <errcode>
Reference	

Parameter

<gnssstate>	GNSS state 0 GNSS off 1 GNSS on
<gnssmode>	GNSS start mode 1 Standalone 2 MS-based 3 MS-assisted 4 Speed optimal
<fixmaxtime>	The max positioning time, unit: s, indicates the response time during the measurement of the GNSS pseudo range, the upper time limit of the GPS satellite searching, include the time for demodulating the ephemeris data and calculating the position. 1-30-255 Max positioning time
<fixmaxdist>	Accuracy threshold of positioning, unit: m. 0-50-1000
<fixcount>	Fix times 0-1000 0 indicates continuous fix. Non 0 indicates the actual fix times.
<fixrate>	The intervals between the first and second positioning, unit: s. 1-65535
<errcode>	Integer type, indicates the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.4. AT+QGPSEND Terminate GNSS Session

Turn on GNSS engine by **AT+QGPS**, when **<fixcount>** is 0, GNSS engine will fix continuously, you can force to terminate it by **AT+QGPSEND**. When **<fixcount>** is not 0, and the actual fix times reach to the specified value, it will terminate automatically.

AT+QGPSEND Terminate GNSS Session

Test Command AT+QGPSEND=?	Response OK
Read command AT+QGPSEND?	Response OK
Execution Command, terminate GNSS session AT+QGPSEND	Response OK If error is related to ME functionality: +CME ERROR: <errcode>
Reference	

Parameter

<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).
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2.5. AT+QGPSLOC Obtain Position

Before using this command, GNSS engine must be turned on by **AT+QGPS**. If it does not position successfully, **+CME ERROR: <errcode>** will be returned to indicate the corresponding situation. Please note that the response appears on current AT port.

AT+QGPSLOC Obtain Position

Test Command AT+QGPSLOC=?	Response +QGPSLOC: <UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cong>,<spkm>,<spkn>,<date>,<nsat> OK
-------------------------------------	---

Read Command AT+QGPSLOC=<mode>	Response +QGPSLOC: <UTC>,<latitude>,<longitude>,<hdop>,<altitude>,<fix>,<cog>,<spkm>,<spkn>,<date>,<nsat> OK If error is related to ME functionality: +CME ERROR: <errcode>
Reference	

Parameter

<mode>	Control the 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.dddd,(-)ddd.dddd
<UTC>	UTC time. Format: hhmmss.sss (Quoted from GPGLA sentence).
<latitude>	Latitude. Format: ddmm.mmmm N/S (Quoted from GPGLA sentence). dd 00-89 (degree) mm.mmmm 00.0000-59.9999 (minute) N/S North latitude/South latitude
<longitude>	Longitude. Format: dddmm.mmmm E/W (Quoted from GPGLA sentence). ddd 000-179 (degree) mm.mmmm 00.0000-59.9999 (minute) E/W East longitude/West longitude
<hdop>	Horizontal Precision, 0.5-99.9 (quoted from GPGLA sentence)
<altitude>	The altitude of the antenna away from the sea level (unit: m), accurate to one decimal place (Quoted from GPGLA sentence).
<fix>	GNSS positioning mode (quoted from GNGSA/GPGSA) 2 2D positioning 3 3D positioning
<cog>	Ground heading based on true north. Format: ddd.mm (quoted from GPVTG sentence) ddd 000-359 (degree) mm 00-59 (minute)
<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 positioning. Format: ddmmyy (Quoted from GPRMC sentence).
<nsat>	Number of satellites, from 00 to 12 (The first 0 will also be transferred, quoted from GPGLA sentence).

<errcode> Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.6. AT+QGPSGNMEA Obtain NMEA Sentences

Before using this command, GNSS engine must be turned on by **AT+QGPS**, and enable **<nmeasrc>** by **AT+QGPPCFG**. This command can be used to obtain NMEA sentences.

If **<gpsnmeatype>** and **<glonassnmeatype>** is 0, this command cannot obtain NMEA sentences. If it has already obtained sentences after the engine is activated, you close the output by **AT+QGPPCFG="gpsnmeatype"/"glonassnmeatype"**, then the sentence obtained by this command is the last sentences. Please note that the response appears on current AT port.

AT+QGPSGNMEA Obtain NMEA Sentences

Test Command AT+QGPSGNMEA=?	Response +QGPSGNMEA: ("GGA","RMC","GSV","GSA","VTG","GNS") OK
Read Command AT+QGPSGNMEA?	Response OK
Query GGA information AT+QGPSGNMEA="GGA"	Response +QGPSGNMEA: GGA sentence OK If error is related to ME functionality: +CME ERROR: <errcode>
Query RMC information AT+QGPSGNMEA="RMC"	Response +QGPSGNMEA: RMC sentence OK If error is related to ME functionality: +CME ERROR: <errcode>
Query GSV information AT+QGPSGNMEA="GSV"	Response +QGPSGNMEA: GSV sentence OK If error is related to ME functionality:

	+CME ERROR: <errcode>
Query GSA information AT+QGPSGNMEA="GSA"	Response +QGPSGNMEA: GSA sentence OK If error is related to ME functionality: +CME ERROR: <errcode>
Query VTG information AT+QGPSGNMEA="VTG"	Response +QGPSGNMEA: VTG sentence OK If error is related to ME functionality: +CME ERROR: <errcode>
Query GNS information AT+QGPSGNMEA="GNS"	Response +QGPSGNMEA: GNS sentence OK If error is related to ME functionality: +CME ERROR: <errcode>
Reference	

Parameter

<errcode> Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.7. AT+QGPSXTRA Enable gpsOneXTRA Functionality

This command can be used to enable gpsOneXTRA functionality after restarting GNSS engine.

AT+QGPSXTRA Enable gpsOneXTRA Functionality

Test Command AT+QGPSXTRA=?	Response +QGPSXTRA: (0-2),(0-10),(1-120),(24-168) OK
Read Command AT+QGPSXTRA?	Response +QGPSXTRA: <xtraenable>

	OK
Write Command AT+QGPSXTRA=<xtraenable>[,<retries>,<retryInt>,<dloadInt>]	Response OK If error is related to ME functionality: +CME ERROR: <errcode>
Reference	

Parameter

<xtraenable>	Enable gpsOneXTRA functionality, the setting will be auto saved to NVRAM. 0 Disable gpsOneXTRA 1 Enable gpsOneXTRA and inject data by manual 2 Enable gpsOneXTRA and automatically inject data
<retries>	Automatically download retry count. It is effective when <xtraenable> is set to 2. 0-3-10
<retryInt>	Automatically download retry interval. It is effective when <xtraenable> is set to 2. 1-10-120
<dloadInt>	Automatically download time interval. It is effective when <xtraenable> is set to 2. 24-48-168
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.8. AT+QGPSXTRATIME Inject gpsOneXTRA Time

This command can be used to inject time to GNSS engine. Before using it, you must turn off the GNSS engine and configure **<xtraenable>** by **AT+QGPSXTRA**. After activating gpsOneXTRA functionality, GNSS engine will ask for gpsOneXTRA time and gpsOneXTRA data. Meanwhile, before injecting gpsOneXTRA data, gpsOneXTRA time must be injected first by this command.

AT+QGPSXTRATIME Inject gpsOneXTRA Time

Test Command AT+QGPSXTRATIME=?	Response +QGPSXTRATIME: 0,<xtratime>,(0,1),(0,1),<uncrtn> OK
Read Command AT+QGPSXTRATIME?	Response OK

Inject XTRA time manually AT+QGPSXTRATIME=<op>,<xtratime>[,<utc>[,<force>,<uncrtn>]]	Response OK If error is related to ME functionality: +CME ERROR: <errcode>
Reference	

Parameter

<op>	Operation type 0 Inject gpsOneXTRA time
<xtratime>	Current UTC/GPS time, the format of time: YYYY/MM/DD, hh:mm:ss, e.g.2015/01/03,15:34:50.
<utc>	The type of time 0 GPS time 1 UTC time
<force>	Force or allow GPS subsystem to accept the time entered. 0 Allow acceptances 1 Force acceptances
<uncrtn>	Uncertainty of time. Unit: ms, default value: 3500ms. It indicates the time difference between sending a request to the SNTP server and receiving a response from the SNTP server. If the set time is less than 3.5s, it will be counted as 3.5s.
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.9. AT+QGPSXTRADATA Inject gpsOneXTRA Data Manually

This command can be used to inject gpsOneXTRA data to GNSS engine. Before using it, you must turn off the GNSS engine and enable XTRA by **AT+QGPSXTRA**. Meanwhile, before injecting gpsOneXTRA data, gpsOneXTRA time must be injected first by **AT+QGPSXTRATIME**.

Before operating **AT+QGPSXTRADATA** command, you should store the valid gpsOneXTRA data into RAM or UFS of the module (recommended to save it to RAM). After operating this command successfully, gpsOneXTRA data can be deleted. At this moment, you can query the validity of gpsOneXTRA data by **AT+QGPSXTRADATA?**.

AT+QGPSXTRADATA Inject gpsOneXTRA Data Manually

Test Command AT+QGPSXTRADATA=?	Response +QGPSXTRADATA: <xtradatafilename>
--	--

	OK
Query the validity of the current gpsOneXTRA data AT+QGPSXTRADATA?	Response +QGPSXTRADATA: <xtradataendtime>,<injecteddatatime>
	OK
	If error is related to ME functionality: +CME ERROR: <errcode>
Inject gpsOneXTRA data manually AT+QGPSXTRADATA=<xtradatafilename>	Response OK
	If error is related to ME functionality: +CME ERROR: <errcode>
Reference	

Parameter

<xtradatafilename>	Filename of gpsOneXTRA data file, e.g. "xtra.bin" or "xtra2.bin".
<xtradataendtime>	Valid time of injected gpsOneXTRA data, unit: minute. 0 No gpsOneXTRA file or gpsOneXTRA file is overdue 1-10080 Valid time of gpsOneXTRA file
<injecteddatatime>	Starting time of the valid time of XTRA data, format: "YYYY/MM/DD,hh:mm:ss", e.g. "2015/01/03,15:34:50".
<errcode>	Integer type, indicate the error code of the operation. If it is not 0, it is the type of error (Please refer to the Chapter 5).

2.10. Introduction of URC

EC20 GNSS engine will inform some information via URC.

2.10.1. Expired XTRA Data

When XTRA data is expired, it will be informed by URC.

Expired XTRA Data

+QGPSURC: "xtradataexpire",<xtradataendtime>,<injecteddatatime>	XTRA data is expired, and need to be updated.
---	---

Parameter

<xtradataurtime>	Valid time of injected XTRA data, unit: minute. 0 No XTRA file or XTRA file is expired
<injecteddatatime>	Starting time of the valid time of XTRA data, format: “YYYY/MM/DD,hh:mm:ss”, e.g.“2015/01/03,15:34:50”

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3 Example

3.1. Turn On and Off the GNSS Engine

The example uses default arguments to start GNSS engine, after turning on GNSS engine, NMEA sentences will be outputted from “usbnmea” port by default.

```
AT+QGPS=1 //Turn on GNSS engine.
OK
//After turning on GNSS engine, NMEA sentences will be outputted from “usbnmea” port by default.
AT+QGPSLOC? //Obtain position information.
+QGPSLOC: 061951.0,3150.7223N,11711.9293E,0.7,62.2,2,0.0,0.0,110513,09
OK
AT+QGPSEND //Turn off GNSS engine.
OK
```

3.2. Application of GNSS nmeasrc

When GNSS was started, you can turn on **<nmeasrc>** feature, and obtain NMEA sentences by **AT+QGPSGNMEA** directly.

```
AT+QGPSCFG="nmeasrc",1 //Enable nmeasrc functionality.
OK
AT+QGPSGNMEA="GGA" //Obtain GGA sentence.
+QGPSGNMEA: $GPGGA,103647.0,3150.721154,N,11711.925873,E,1,02,4.7,59.8,M,-2.0,M,,*77
OK
AT+QGPSCFG="nmeasrc",0 //Disable nmeasrc functionality.
OK
AT+QGPSGNMEA="GGA" //Disable nmeasrc functionality, GGA sentence can't be obtained.
+CME ERROR: 507
```


3.3. Example of Injecting gpsOneXTRA

You must enable gpsOneXTRA before injecting gpsOneXTRA time and data to GNSS engine. In this example we manually download the XTRA file, then upload to UFS via **AT+QGPSXTRAUPL**.

//If gpsOneXTRA is disabled, enable it by **AT+QGPSXTRA** and reset EC20, then perform the following procedures.

AT+QGPSXTRA=1 //Enable XTRA.

OK

//Restart EC20, enable gpsOneXTRA of GNSS engine.

//If gpsOneXTRA data is invalid (query by **AT+QGPSXTRADATA?**), then perform the following procedures.

//You can download XTRA file to PC from this URL <http://xtra1.gpsonextra.net/xtra2.bin> or other URL (Refer to the Chapter 1.3).

AT+QFUPL="RAM:xtra2.bin",59748,60

<Select file & send it in QCOM>

OK

//<utc> format is YYYY/MM/DD,hh:mm:ss, e.g. 2015/01/03,15:30:30.

AT+QGPSXTRATIME=0,"2015/01/03,15:30:30",1,1,5 //Inject gpsOneXTRA time to GNSS engine.

OK

AT+QGPSXTRADATA="RAM:xtra2.bin" //Inject gpsOneXTRA data to GNSS engine successfully.

OK

AT+QFDEL="RAM:xtra2.bin" //Delete XTRA data file from RAM file

OK

AT+QGPS=1 //Turn on GNSS engine

OK

4 Appendix A Reference

Table 1: Related Documents

SN	Document name	Remark
[1]	Quectel_EC20_AT_Commands_Manual	EC20 AT commands sets

Table 2: Terms and Abbreviations

Abbreviation	Description
GNSS	Global Navigation Satellite Systems
GPS	Global Positioning System provides by USA
GLONASS	Global Navigation Satellite System provides by Russia
NMEA	National Marine Electronics Association
gpsOneXTRA	An auxiliary positioning technology provides by Qualcomm
DPO	Dynamic Power Optimization
ODP	On-Demand Positioning

5 Appendix B Summary of Error Codes

The error code **<errcode>** indicates an error related to GNSS operations. The detail about **<errcode>** is 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 activity
506	Operation timeout
507	Function not enabled
508	Time information error
509	XTRA not enabled
510	XTRA file open failed
511	Bad CRC for XTRA data file
512	Validity time is out of range
513	Internal resource error
514	GNSS locked
515	End by E911
516	Not fixed now
549	Unknown error