# EM12&EG12&EG18
# GNSS Application Note

**LTE-A Module Series**

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# About the Document

## History

| Revision | Date | Author | Description |
|----------|------|--------|-------------|
| 1.0 | 2019-10-12 | Amos ZHANG/ Leonard LI | Initial |

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# 1 Introduction

Quectel EM12, EG12 and EG18 modules integrate a GNSS engine which supports GPS, BeiDou, Galileo and GLONASS systems and also gpsOneXTRA Assistance technology. The high performance GNSS engine is suitable for various applications where the lowest-cost and accurate positioning is needed, and it supports position tracking without any network assistance. The high-performance GNSS makes EM12, EG12 and EG18 popular 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. GNSS Turning on/off Procedures

The GNSS of EM12/EG12/EG18 supports location calculation without any assistance from the network. 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:** After GNSS is turned on and position is fixed successfully, the positioning information can be obtained in either of the following three ways:
   1) NMEA sentences are outputted to "usbnmea" port by default. Customers can read the port to obtain NMEA sentences.
   2) **AT+QGPSLOC** can be used to obtain positioning information directly, such as latitude, longitude, height, GNSS positioning mode, time, number of satellites, and so on.
   3) After enabling **<NMEA_src>** via **AT+QGPSCFG="nmeasrc",1**, customers can acquire the specified NMEA sentence via **AT+QGPSGNMEA**. If **<NMEA_src>** is disabled, this command cannot be used.

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

## 1.2. NMEA Sentence Types

The NMEA sentences are compatible with NMEA-0183 protocol, and four kinds of prefixes are available to differentiate NMEA sentences of different satellite systems, as illustrated below.

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

● 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

For GLONASS NMEA sentences, the prefixes are "GL" and "GN", as below:

● 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

For Galileo NMEA sentences, the prefixes are "GA", as below:

● GAGGA - Global positioning system fix data, such as time, position, etc.
● GARMC - Recommended minimum specific GNSS data
● GAGSV - GNSS satellites in view, such as number of satellites in view, satellite ID numbers, etc.
● GAGSA - GNSS DOP and active satellites
● GAVTG - Course over ground and ground speed

For BeiDou NMEA sentences, the prefix is "PQ", as below:

● PQGSV - GNSS satellites in view, such as number of satellites in view, satellite ID numbers, etc.
● PQGSA - GNSS DOP and active satellites

## 1.3. Introduction of gpsOneXTRA Assistance

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 18s~30s (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 once a day (or every couple of days).

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 as *xtra2.bin* are for GPS+GLONASS.**

*http://xtrapath1.izatcloud.net/xtra2.bin*
*http://xtrapath2.izatcloud.net/xtra2.bin*
*http://xtrapath3.izatcloud.net/xtra2.bin*

● **The files named as *xtra3grc.bin* are for GPS+GLONASS+BeiDou.**

*http://xtrapath1.izatcloud.net/xtra3grc.bin*
*http://xtrapath2.izatcloud.net/xtra3grc.bin*
*http://xtrapath3.izatcloud.net/xtra3grc.bin*
*http://xtrapath3.izatcloud.net/xtra3grc.bin*

● **The files named as xtra3grcej.bin are for GPS+GLONASS+BeiDou+Galileo.**

*http://xtrapath1.izatcloud.net/xtra3grcej.bin*
*http://xtrapath2.izatcloud.net/xtra3grcej.bin*
*http://xtrapath3.izatcloud.net/xtra3grcej.bin*

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 enabled by default. If it is disabled, enable it first 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** then; if the data is valid, turn on GNSS engine according to the procedures described in *Chapter 1.1* directly.

**Step 3:** Download file *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*.

For more detailed information of the AT commands mentioned above, please refer to *Chapters 2.7*, *2.8* and *2.9*.

# 2 Description of GNSS AT Commands

## 2.1. AT+QGPSCFG    GNSS Configurations

The command is used to query and configure various GNSS settings, including NMEA sentences output port, output type of NMEA sentences, and more.

| AT+QGPSCFG    GNSS Configurations | |
| --- | --- |
| Test Command<br>**AT+QGPSCFG=?** | Response<br>**+QGPSCFG: "outport",("none","usbnmea","uartdebug")**<br>**+QGPSCFG: "nmeasrc",(0,1)**<br>**+QGPSCFG: "gpsnmeatype",(0-31)**<br>**+QGPSCFG: "glonassnmeatype",(0-7)**<br>**+QGPSCFG: "galileonmeatype",(0,31)**<br>**+QGPSCFG: "beidounmeatype",(0-3)**<br>**+QGPSCFG: "gnssconfig",(0-7)**<br>**+QGPSCFG: "autogps",(0,1)**<br>**+QGPSCFG: "dpoenable",(0,1)**<br>**+QGPSCFG: "plane",(0-2)**<br>**+QGPSCFG: "suplver",(1-3)**<br>**+QGPSCFG: "lbsapn",(1-31),(1-4),<APN>**<br>**+QGPSCFG: "agpsposmode",(0-4294967295)**<br>**+QGPSCFG: "agnssprotocol",(1-3),(0-65535)**<br>**+QGPSCFG: "appidname",<ID>,<password>**<br><br>**OK** |
| Reference | |

### 2.1.1. AT+QGPSCFG="outport"    Configure NMEA Sentences Output Port

This command is used to configure NMEA sentences output port. It will take effect immediately.

| AT+QGPSCFG="outport"    Configure NMEA Sentences Output Port | |
| --- | --- |
| Write Command<br>AT+QGPSCFG="outport"[,<out_port>] | Response<br>When there are two parameters, configure the output port of NMEA sentences:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "outport",<out_port>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| <out_port> | String type. Configure the output port of NMEA sentences, and the configuration parameter will be automatically saved to NVRAM. | |
| --- | --- | --- |
| | "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. Please refer to *Chapter 4* for details. | |

### 2.1.2. AT+QGPSCFG="nmeasrc"    Enable/Disable Acquisition of NMEA Sentences via

   **AT+QGPSGNMEA**

The command enables/disables acquisition of NMEA sentences via **AT+QGPSGNMEA**. It will take effect immediately.

| AT+QGPSCFG="nmeasrc"    Enable/Disable Acquisition of NMEA Sentences via AT+QGPSGNMEA | |
| --- | --- |
| Write Command<br>AT+QGPSCFG="nmeasrc"[,<NMEA_src>] | Response<br>When there are two parameters, configure whether to enable acquisition of NMEA sentences via **AT+QGPSGNMEA**:<br>**OK** |

| | When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "nmeasrc",<NMEA_src>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
|---|---|
| Reference | |

### Parameter

| | |
|---|---|
| **<NMEA_src>** | Integer type. If enabled, original NMEA sentences can be acquired via **AT+QGPSGNMEA**, and the configuration parameter will be automatically saved to NVRAM. Meanwhile, sentences are outputted via the same NMEA ports as before.<br>0　　　　Disable<br>1　　　　Enable |
| **<errcode>** | Integer type. The error code of operation. Please refer to **Chapter 4** for details. |

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

This command is used to configure which type of GPS NMEA sentence will be output. It will take effect immediately.

| AT+QGPSCFG="gpsnmeatype"　Configure Output Type of GPS NMEA Sentences | |
|---|---|
| Write Command<br>**AT+QGPSCFG="gpsnmeatype"[,<GPS_NMEA_type>]** | Response<br>When there are two parameters, configure the output type of GPS NMEA sentences:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "gpsnmeatype",<GPS_NMEA_type>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |

| Reference | |
|---|---|

**Parameter**

| | |
|---|---|
| **<GPS_NMEA_type>** | Integer type. Output type of GPS NMEA sentences by ORed, and the configuration parameter will be automatically saved to NVRAM. The default value is 31 which means that all the five types of sentences will be outputted. |
| | 0        Disable |
| | 1        GPGGA |
| | 2        GPRMC |
| | 4        GPGSV |
| | 8        GPGSA |
| | 16      GPVTG |
| **<errcode>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

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

This command is used to configure which type of GLONASS NMEA sentence will be output. It will take effect immediately.

| AT+QGPSCFG="glonassnmeatype"　Configure Output Type of GLONASS NMEA Sentences | |
|---|---|
| Write Command<br>**AT+QGPSCFG="glonassnmeatype"[,<br><GLONASS_NMEA_type>]** | Response<br>When there are two parameters, configure output type of GLONASS NMEA sentences:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "glonassnmeatype",<GLONASS_NMEA_type>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<GLONASS_NMEA_type>** | Integer type. Configure output type of GLONASS NMEA sentences by ORed, and the configuration parameter will be automatically saved to NVRAM. The default value is 0. |
| | <u>0</u>          Disable |
| | 1           GLGSV |
| | 2           GNGSA |
| | 4           GNGNS |
| **<errcode>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

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

This command is used to configure which type of Galileo NMEA sentence will be output. It will take effect immediately.

| AT+QGPSCFG="galileonmeatype"　Configure Output Type of Galileo NMEA Sentences | |
|---|---|
| Write Command<br>**AT+QGPSCFG="galileonmeatype"[,<Galileo_NMEA_type>]** | Response<br>When there are two parameters, configure output type of Galileo NMEA sentences:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "galileonmeatype",<Galileo_NMEA_type>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<Galileo_NMEA_type>** | Integer type. Configure output type of Galileo NMEA sentences by ORed, and the configuration parameter will be automatically saved to NVRAM. The default value is 0. |
| | <u>0</u>          Disable |
| | 1           GAGGA |

| | |
|---|---|
| 2 | GARMC |
| 4 | GAGSV |
| 8 | GAGSA |
| 16 | GAVTG |
| **\<errcode\>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

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

This command is used to configure which type of BeiDou NMEA sentence will be output. It will take effect immediately.

| AT+QGPSCFG="beidounmeatype"　Configure Output Type of BeiDou NMEA Sentences | |
|---|---|
| Write Command<br>**AT+QGPSCFG="beidounmeatype"[,\<BeiDou_NMEA_type\>]** | Response<br>When there are two parameters, configure output type of BeiDou NMEA sentences:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "beidounmeatype",\<BeiDou_NMEA_type\>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: \<errcode\>** |
| Reference | |

### Parameter

| | |
|---|---|
| **\<BeiDou_NMEA_type\>** | Integer type. Configure output type of BeiDou NMEA sentences via ORed, and the configuration parameter will be automatically saved to NVRAM. The default value is 0.<br>0　　　Disable<br>1　　　PQGSA<br>2　　　PQGSV |
| **\<errcode\>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

### 2.1.7. AT+QGPSCFG="gnssconfig"   Configure Supported GNSS Constellations

This command is used to configure the supported GNSS constellations of the module. It will take effect after the module is rebooted.

| AT+QGPSCFG="gnssconfig"   Configure Supported GNSS Constellations | |
| --- | --- |
| Write Command<br>**AT+QGPSCFG="gnssconfig"[,<GNSS_config>]** | Response<br>When there are two parameters, configure supported GNSS constellations:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "gnssconfig",<GNSS_config>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

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

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

This command is used to configure whether to enable GNSS when the module restarts. It will take effect after the module is rebooted.

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

| Write Command<br>AT+QGPSCFG="autogps"[,<autoGPS>] | Response<br>When there are two parameters, configure whether to enable GNSS to run automatically:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "autogps",<autoGPS>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
|---|---|
| Reference | |

**Parameter**

| <autoGPS> | Integer type. Enable/disable GNSS to run automatically after the module is powered on, and the configuration parameter will be automatically saved to NVRAM.<br>0          Disable GNSS to run automatically<br>1          Enable GNSS to run automatically |
|---|---|
| <errcode> | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

---

**NOTE**

The command is only valid when the GNSS works in **stand-alone** mode.

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

This command is used to enable/disable the DPO mode for GNSS. It will take effect after the module is rebooted.

## AT+QGPSCFG="dpoenable"    Enable/Disable DPO Mode

| Write Command<br>AT+QGPSCFG="dpoenable"[,<DPO_enable>] | Response<br>When there are two parameters, enable/disable the DPO mode:<br>**OK** |
|---|---|

| | When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "dpoenable",<DPO_enable>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
|---|---|
| Reference | |

**Parameter**

| <DPO_enable> | Integer type. Enable/disable DPO. The setting will be automatically saved to NVRAM.<br>0        Disable DPO<br>1        Enable DPO |
|---|---|
| <errcode> | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

## 2.1.10. AT+QGPSCFG="plane"　Configure Plane Mode Used by MO GPS Session

This command is used to configure the plane mode (control plane or user plane) to be used by the Mobile-Originated (MO) GPS session. This command will take effect after the module is rebooted.

| AT+QGPSCFG="plane"　Configure Plane Mode Used by MO GPS Session | |
|---|---|
| Write Command<br>**AT+QGPSCFG="plane"[,<plane>]** | Response<br>When there are two parameters, the plane mode used by MO GPS session can be configured:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "plane",<plane>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **\<plane>** | Integer type. The plane mode used by MO GPS session. |
| | 0        User plane without SSL |
| | 1        User plane with SSL |
| | 2        Control plane |
| **\<errcode>** | Integer type. The error code of the operation. Please refer to *Chapter 4* for details. |

### 2.1.11. AT+QGPSCFG="suplver"　Configure the SUPL Protocol Version

This command is used to configure the SUPL version in an SI session, and the highest possible SUPL major version used in an NI session. This command will take effect after the module is rebooted.

| AT+QGPSCFG="suplver"　Configure the SUPL Protocol Version | |
|---|---|
| Write Command<br>**AT+QGPSCFG="suplver"[,\<SUPL_ver>]** | Response<br>When there are two parameters, configure the SUPL protocol version:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "suplver",\<SUPL_ver>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: \<errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **\<SUPL_ver>** | Integer type. SUPL version. The range is 1-3. |
| | 1    SUPL Version 1.0 |
| | 2    SUPL Version 2.0 |
| | 3    SUPL Version 2.0.2 |
| **\<errcode>** | Integer type. The error code of the operation. Please refer to *Chapter 4* for details. |

### 2.1.12. AT+QGPSCFG="lbsapn" Configure LBS APN Profile

This command is used to configure LBS APN profile. This command will take effect after the module is rebooted.

| AT+QGPSCFG="lbsapn" Configure LBS APN Profile | |
|---|---|
| Write Command<br>**AT+QGPSCFG="lbsapn"[,<srvsystem>,<PDP>,<APN>]** | Response<br>When all parameters are present, configure LBS APN profile:<br>**OK**<br><br>When **<srvsystem>**, **<PDP>** and **<APN>** are omitted, query the current setting:<br>**+QGPSCFG: "lbsapn",<srvsystem>,<PDP>,<APN>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<srvsystem>** | Integer type. Serving system on which this APN should be used. The range is 1-31. |
| | 1    CDMA |
| | 2    HDR |
| | 4    GSM |
| | 8    WCDMA |
| | 16  LTE |
| **<PDP>** | Integer type. PDP type of the APN profile. |
| | 1     IPv4 |
| | 2     IPv6 |
| | 3     IPv4v6 |
| | 4     PPP |
| **<APN>** | String type. Access point name. |
| **<errcode>** | Integer type. The error code of the operation. Please refer to *Chapter 4* for details. |

### 2.1.13. AT+QGPSCFG="agpsposmode" Configure AGPS Positioning Mode

This command is used to configure the AGPS positioning mode. This command will take effect after the module is rebooted.

| AT+QGPSCFG="agpsposmode" | Configure AGPS Positioning Mode |
|---|---|
| Write Command<br>**AT+QGPSCFG="agpsposmode"[,<AGPS_posmode>]** | Response<br>When there are two parameters, configure the AGPS positioning mode:<br>**OK**<br><br>When the second parameter is omitted, query the current setting:<br>**+QGPSCFG: "agpsposmode",<AGPS_posmode>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<AGPS_posmode>** | Integer type. Configure AGPS positioning mode, and the configuration parameter will be automatically saved to NVRAM. Only bit 16 is relevant to enabling of autonomous fallback for SUPL-MSB. The range is 0-4294967295. |
| **<errcode>** | Integer type. The error code of the operation. Please refer to **Chapter 4** for details. |

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

This command is used to configure A-GPS LPP positioning protocol and A-GLONASS positioning protocol. This command will take effect after the module is rebooted.

| AT+QGPSCFG="agnssprotocol" | Configure A-GNSS Positioning Protocols |
|---|---|
| Write Command<br>**AT+QGPSCFG="agnssprotocol"[,<AGPS_LPP_pos>,<AGLONASS_LPP_pos>]** | Response<br>When there are three parameters, configure A-GNSS positioning protocols:<br>**OK**<br><br>When the second and the third parameters are omitted, query the current setting:<br>**+QGPSCFG: "agnssprotocol",<AGPS_LPP_pos>,<AGLONASS_LPP_pos>** |

| | **OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
|---|---|
| Reference | |

**Parameter**

| | |
|---|---|
| **<AGPS_LPP_pos>** | Integer type. A-GPS LPP positioning protocol. |
| | 1       User Plane LPP |
| | 2       Control Plane LPP |
| | 3       User Plane LPP and Control Plane LPP |
| **<AGLONASS_LPP_pos>** | Integer type. A-GLONASS positioning protocol. |
| | 1       Control Plane RRLP |
| | 2       Control Plane RRC |
| | 4       Control Plane LPP |
| | 256     User Plane RRLP |
| | 1280    User Plane LPP |
| **<errcode>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

### 2.1.15. AT+QGPSCFG="appidname" Configure AGPS Username and Password

This command is used to configure AGPS username and password for Verizon. It is valid only under Verizon network.

| **AT+QGPSCFG="appidname" Configure AGPS Username and Password** | |
|---|---|
| Write Command<br>**AT+QGPSCFG="appidname"[,<ID>,<password>]** | Response<br>When all parameters are present, configure AGPS username and password:<br>**OK**<br><br>When **<ID>** and **<password>** are omitted, query the current setting:<br>**+QGPSCFG: "appidname",<ID>,<password>**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<ID>** | Username. |
| | String type and the maximum length is 15 bytes. |
| | The default value is "20000018". |
| **<password>** | Password. |
| | String type and the maximum length is 15 bytes. |
| | The default value is "vlalite". |
| **<errcode>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

## 2.2. AT+QGPSDEL    Delete Assistance Data

The command is used to delete 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 deleting the assistance data via this command, 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<br>**AT+QGPSDEL=?** | Response<br>**+QGPSDEL: (0-3)**<br><br>**OK** |
| Write Command<br>**AT+QGPSDEL=<delete_type>** | Response<br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**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. Please refer to *Chapter 4* for details. |

## 2.3. AT+QGPS   Turn on GNSS

The command is used to turn on GNSS function. Currently it only supports turning on GNSS in **Stand-alone** mode (that is, **<GNSS_mode>**=1).

| AT+QGPS   Turn on GNSS | |
|---|---|
| Test Command<br>**AT+QGPS=?** | Response<br>**+QGPS: (1-4),(1-255),(1-3),(100-65535)**<br><br>**OK** |
| Read Command<br>Read current GNSS state<br>**AT+QGPS?** | Response<br>**+QGPS: <GNSS_state>**<br><br>**OK** |
| Write Command<br>**AT+QGPS=<GNSS_mode>[,<fix_maxtime>[,<accuracy>[,<fix_rate>]]]** | Response<br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<GNSS_state>** | Integer type. GNSS state |
| | <u>0</u>          GNSS OFF |
| | 1          GNSS ON |
| **<GNSS_mode>** | Integer type. GNSS working mode |
| | <u>1</u>          Stand-alone |
| | 2          MS-based |
| | 3          MS-assisted |
| | 4          Speed-optimal |
| **<fix_maxtime>** | Integer type. The maximum positioning time (unit: s), 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. |
| | 1-<u>30</u>-255    Maximum positioning time |
| **<accuracy>** | Integer type. Horizontal accuracy level |
| | 1          Low accuracy |
| | 2          Medium accuracy |
| | <u>3</u>          High accuracy |
| **<fix_rate>** | Integer type. The interval time between the first and second time positioning. Unit: ms. |

|  | 1000–65535 |
|---|---|
| **\<errcode\>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

## 2.4. AT+QGPSEND   Turn off GNSS

The command is used to turn off GNSS function.

| **AT+QGPSEND   Turn off GNSS** | |
|---|---|
| Test Command<br>**AT+QGPSEND=?** | Response<br>**OK** |
| Execution Command<br>**AT+QGPSEND** | Response<br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: \<errcode\>** |
| Reference | |

**Parameter**

| **\<errcode\>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |
|---|---|

## 2.5. AT+QGPSLOC   Acquire Positioning Information

Before executing the command, GNSS must be turned on via **AT+QGPS**. If it fails in position fix, **+CME ERROR: \<errcode\>** will be returned to indicate the corresponding situation.

| **AT+QGPSLOC   Acquire Positioning Information** | |
|---|---|
| Test  Command<br>**AT+QGPSLOC=?** | Response<br>**+QGPSLOC: \<UTC\>,\<latitude\>,\<longitude\>,\<HDOP\>,\<altitude\>,\<fix\>,\<COG\>,\<spkm\>,\<spkn\>,\<date\>,\<satnumber\>**<br><br>**OK** |
| Write  Command<br>**AT+QGPSLOC=\<mode\>** | Response<br>**+QGPSLOC: \<UTC\>,\<latitude\>,\<longitude\>,\<HDOP\>,\<altitude\>,\<fix\>,\<COG\>,\<spkm\>,\<spkn\>,\<date\>,\<satnumber\>** |

| | OK<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
|---|---|
| Reference | |

**Parameter**

| | |
|---|---|
| **<mode>** | Integer type. Latitude and longitude display format |
| | 0    **<latitude>,<longitude>** format: ddmm.mmmm N/S,dddmm.mmmm E/W |
| | 1    **<latitude>,<longitude>** format: ddmm.mmmmmm N/S,dddmm.mmmmmm E/W |
| | 2    **<latitude>,<longitude>** format: (-)dd.ddddd,(-)ddd.ddddd |
| **<UTC>** | UTC time |
| | Format: hhmmss.sss (Quoted from GPGGA sentence). |
| **<latitude>** | Latitude |
| | If **<mode>** is 0: |
| | Format: ddmm.mmmm N/S (Quoted from GPGGA sentence) |
| | dd          00-89 (degree) |
| | mm.mmmm    00.0000-59.9999 (minute) |
| | N/S         North latitude/South latitude |
| | If **<mode>** is 1: |
| | Format: ddmm.mmmmmm N/S (Quoted from GPGGA sentence) |
| | dd          00-89 (degree) |
| | mm.mmmmmm   00.000000-59.999999 (minute) |
| | N/S         North latitude/South latitude |
| | If **<mode>** is 2: |
| | Format: (-)dd.ddddd (Quoted from GPGGA sentence) |
| | dd.ddddd     -89.99999-89.99999 (degree) |
| | -          South latitude |
| **<longitude>** | Longitude |
| | If **<mode>** is 0: |
| | Format: dddmm.mmmm E/W (Quoted from GPGGA sentence) |
| | ddd        000-179 (degree) |
| | mm.mmmm    00.0000-59.9999 (minute) |
| | E/W        East longitude/West longitude |
| | If **<mode>** is 1: |
| | Format: dddmm.mmmmmm E/W (Quoted from GPGGA sentence) |
| | ddd        000-179 (degree) |
| | mm.mmmmmm   00.000000-59.999999 (minute) |
| | E/W        East longitude/West longitude |
| | If **<mode>** is 2: |
| | Format: (-)dd.ddddd Quoted from GPGGA sentence) |

| | |
|---|---|
| | dd.ddddd      -179.99999-179.99999 (degree) |
| | -          West longitude |
| **\<HDOP\>** | Horizontal precision: 0.5-99.9 (Quoted from GPGGA sentence). |
| **\<altitude\>** | The altitude of the antenna away from the sea level (unit: m), accurate to one decimal place (Quoted from GPGGA sentence). |
| **\<fix\>** | GNSS positioning mode (Quoted from GAGSA/GPGSA sentence). |
| | 2             2D positioning |
| | 3             3D positioning |
| **\<COG\>** | Course Over Ground 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 fixing position. |
| | Format: ddmmyy (Quoted from GPRMC sentence). |
| **\<satnumber\>** | Number of satellites, from 00 (the first 0 should be retained) to 12 (Quoted from GPGGA sentence). |
| **\<errcode\>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

## 2.6. AT+QGPSGNMEA    Acquire NMEA Sentences

Before using this command, GNSS must be turned on via **AT+QGPS**, and set **\<NMEA_src\>** into 1 to enable acquisition of NMEA sentences via **AT+QGPSGNMEA**.

Customers can disable sentences output via **AT+QGPSCFG="gpsnmeatype"**/"**glonassnmeatype**"/ "**galileonmeatype**"/"**beidounmeatype**",0. If sentences 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<br>**AT+QGPSGNMEA=?** | Response<br>**+QGPSGNMEA: ("GGA","RMC","GSV","GSA","VTG","GNS")**<br><br>**OK** |

| Write Command<br>Query GGA sentence<br>**AT+QGPSGNMEA="GGA"** | Response<br>**+QGPSGNMEA: GGA sentence**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
|---|---|
| Write Command<br>Query RMC sentence<br>**AT+QGPSGNMEA="RMC"** | Response<br>**+QGPSGNMEA: RMC sentence**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Write Command<br>Query GSV information<br>**AT+QGPSGNMEA="GSV"** | Response<br>**+QGPSGNMEA: GSV sentence**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Write Command<br>Query GSA sentence<br>**AT+QGPSGNMEA="GSA"** | Response<br>**+QGPSGNMEA: GSA sentence**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Write Command<br>Query VTG sentence<br>**AT+QGPSGNMEA="VTG"** | Response<br>**+QGPSGNMEA: VTG sentence**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Write Command<br>Query GNS sentence<br>**AT+QGPSGNMEA="GNS"** | Response<br>**+QGPSGNMEA: GNS sentence**<br><br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **\<errcode\>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

## 2.7. AT+QGPSXTRA   Enable/Disable gpsOneXTRA Assistance Function

This command can be used to enable/disable gpsOneXTRA Assistance function, and it will take effect after the module is rebooted.

| AT+QGPSXTRA   Enable/Disable gpsOneXTRA Assistance Function | |
|---|---|
| Test Command<br>**AT+QGPSXTRA=?** | Response<br>**+QGPSXTRA: (0,1)**<br><br>**OK** |
| Read Command<br>**AT+QGPSXTRA?** | Response<br>**+QGPSXTRA: \<xtraenable\>**<br><br>**OK** |
| Write Command<br>**AT+QGPSXTRA=\<xtraenable\>** | Response<br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: \<errcode\>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **\<xtraenable\>** | Integer type. Enable/disable gpsOneXTRA Assistance function, and the configuration parameter will be automatically saved to NVRAM. |
| | 0        Disable gpsOneXTRA Assistance |
| | 1        Enable gpsOneXTRA Assistance |
| **\<errcode\>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

## 2.8. AT+QGPSXTRATIME   Inject gpsOneXTRA Time

This command can be used to inject gpsOneXTRA time to GNSS engine. Before using it, gpsOneXTRA Assistance function must be enabled via **AT+QGPSXTRA=1** command. After activating the function, the GNSS engine will ask for gpsOneXTRA time and assistance data file. Before injecting gpsOneXTRA data

file, gpsOneXTRA time must be injected first via this command.

| AT+QGPSXTRATIME    Inject gpsOneXTRA Time | |
|---|---|
| Test Command<br>**AT+QGPSXTRATIME=?** | Response<br>**+QGPSXTRATIME: <xtratime>,<uncrtn>**<br><br>**OK** |
| Write Command<br>Inject gpsOneXTRA time<br>**AT+QGPSXTRATIME=<xtratime>,<un crtn>** | Response<br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| <xtratime> | String type. Current UTC time<br>Format: YYYY/MM/DD,hh:mm:ss. e.g. 2019/01/05,08:30:30. |
|---|---|
| <uncrtn> | Integer type. 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. |
| <errcode> | Integer type. The error code of operation. Please refer to **Chapter 4** for details. |

## 2.9. AT+QGPSXTRADATA    Inject gpsOneXTRA Data File

This command can be used to inject a gpsOneXTRA assistance data file to GNSS engine. Before operating this command, customers must enable gpsOneXTRA, store the valid gpsOneXTRA data file into UFS of the module and inject gpsOneXTRA time to GNSS engine. After operating this command successfully, gpsOneXTRA data file can be deleted from UFS, and customers can query whether the gpsOneXTRA data is injected successfully via **AT+QGPSXTRADATA?**.

| AT+QGPSXTRADATA    Inject gpsOneXTRA Data File | |
|---|---|
| Test Command<br>**AT+QGPSXTRADATA=?** | Response<br>**+QGPSXTRADATA: <xtradata_file_name>**<br><br>**OK** |
| Read Command<br>Query the status of gpsOneXTRA data files<br>**AT+QGPSXTRADATA?** | Response<br>**+QGPSXTRADATA: <xtradata_durtime>,<injected_data_t ime>**<br><br>**OK** |

| | If there is any error related to ME functionality: <br> **+CME ERROR: <errcode>** |
|---|---|
| Write Command <br> Inject gpsOneXTRA data files <br> **AT+QGPSXTRADATA=<xtradatafilename>** | Response <br> **OK** <br><br> If there is any error related to ME functionality: <br> **+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<xtradata_file_name>** | String type. Filename of the gpsOneXTRA data file, e.g. *xtra2.bin* or *xtra3grc.bin*. |
| **<xtradata_durtime>** | Integer type. Valid time of injected gpsOneXTRA data file. Unit: min. <br> 0      No gpsOneXTRA file or the file is overdue <br> 1-10080    Valid time of gpsOneXTRA file |
| **<injected_data_time>** | String type. Starting time of the valid time of gpsOneXTRA data file <br> Format: YYYY/MM/DD,hh:mm:ss, e.g. 2016/01/03,15:34:50. |
| **<errcode>** | Integer type. The error code of operation. Please refer to *Chapter 4* for details. |

## 2.10. AT+QGPSSUPLURL  Configure SUPL Server URL

This command is used to configure the SUPL server URL. The parameter configurations will be saved to NVRAM automatically. This command takes effect immediately.

| **AT+QGPSSUPLURL  Configure SUPL Server URL** | |
|---|---|
| Test Command <br> **AT+QGPSSUPLURL=?** | Response <br> **+QGPSSUPLURL: <SUPL_URL>** <br><br> **OK** |
| Read Command <br> **AT+QGPSSUPLURL?** | Response <br> **+QGPSSUPLURL: <SUPL_URL>** <br><br> **OK** |
| Write Command <br> Configure SUPL Server URL <br> **AT+QGPSSUPLURL=<suplurl>** | Response <br> **OK** <br><br> If there is any error related to ME functionality: |

| | +CME ERROR: <errcode> |
|---|---|
| Reference | |

**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. Please refer to **Chapter 4** for details. |

## 2.11. AT+QGPSSUPLCA   Inject SUPL Certificate

This command can be used to inject SUPL certificate. The certificate file should be input into file system with **AT+QFUPL**, details of which are provided in *Quectel_EM12&EG12&EG18_FILE_Application_Note*. The certificate should be obtained from the operator or the server provider. This command takes effect immediately.

| AT+QGPSSUPLCA   Inject SUPL Certificate | |
|---|---|
| Test Command<br>**AT+QGPSSUPLCA=?** | Response<br>**+QGPSSUPLCA: <CA>,<certID>**<br><br>**OK** |
| Read Command<br>**AT+QGPSSUPLCA?** | Response<br>**OK** |
| Write Command<br>Inject SUPL certificate<br>**AT+QGPSSUPLCA=<CA>[,<certID>]** | Response<br>**OK**<br><br>If there is any error related to ME functionality:<br>**+CME ERROR: <errcode>** |
| Reference | |

**Parameter**

| | |
|---|---|
| **<CA>** | String type. Name of the SUPL certificate. |
| **<certID>** | Integer type. SUPL certificate ID. |
| **<errcode>** | Integer type. The error code of operation. Please refer to **Chapter 4** for details. |

# 3 Examples

## 3.1. Turn on and off the GNSS

Default arguments 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?                      //Obtain positioning information.
+QGPSLOC: 061951.0,3150.7223N,11711.9293E,0.7,62.2,2,0.0,0.0,0.0,110513,09


OK


AT+QGPSEND                       //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+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,103647.0,3150.721154,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"**
**+CME ERROR: 507**                     //Acquisition of NMEA sentences via **AT+QGPSGNMEA** 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**

//The gpsOneXTRA Assistance function is activated 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.
//Customers can download the gpsOneXTRA data file to PC (or MCU) from URL
  *http://xtrapath1.izatcloud.net/xtra2.bin* or other URLs listed in **Chapter 1.3**.

**AT+QFUPL="UFS: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, please refer to **document [2]**.
**OK**

**AT+QGPSXTRATIME="2019/01/05,08:30:30",3500**   //Inject gpsOneXTRA time to GNSS engine.
**OK**

**AT+QGPSXTRADATA="UFS:xtra2.bin"**
**OK**                                              //The gpsOneXTRA data file is injected to
                                                    GNSS engine successfully.

**AT+QFDEL="UFS: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 1: 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 2: Related Documents**

| SN | Document Name | Remark |
|---|---|---|
| [1] | Quectel_EM12&EG12&EG18_AT_Commands _Manual | EM12&EG12&EG18 AT commands manual |
| [2] | Quectel_EM12&EG12&EG18_FILE_ Application_Note | EM12&EG12&EG18 FILE application note |

**Table 3: Terms and Abbreviations**

| Abbreviation | Description |
|---|---|
| AGPS | Assisted 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 | National Marine Electronics Association |
| NVRAM | Non-Volatile Random Access Memory |
| PC | Private Computer |
| RAM | Random Access Memory |
| RMC | Recommended Minimum Navigation Information |
| 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 | Track Made Good and Ground Speed |