



# **BG95&BG77 GNSS**

## Application Note

**LPWA Module Series**

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**Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:**

**Quectel Wireless Solutions Co., Ltd.**

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

Tel: +86 21 5108 6236

Email: [info@quectel.com](mailto:info@quectel.com)

**Or our local office. For more information, please visit:**

<http://www.quectel.com/support/sales.htm>

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# About the Document

## Revision History

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# 1 Introduction

Quectel BG95 and BG77 modules integrate a GNSS engine which supports GPS, BeiDou, Galileo, GLONASS and QZSS systems and gpsOneXTRA\* Assistance technology. GPS is always on and maximum two constellations are supported synchronously. 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 network assistance.

**NOTE**

“\*” means under development.

## 1.1. GNSS Turning on/off Procedures

BG95/BG77 GNSS 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 output to "usbnmea" port by default. NMEA sentences can be obtained through reading the port.
- 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**, the specified NMEA sentence can be acquired via **AT+QGPSGNMEA**. If **<NMEA\_src>** is disabled, this command cannot be used.

**Step 4:** GNSS can be turned off in two ways:

- 1) If the parameter **<fix\_count>** of **AT+QGPS** is set to 0 in **Step 2**, GNSS will get the position continuously, and it can be turned off via **AT+QGPSEND**.
- 2) If **<fix\_count>** reaches the specified value, the GNSS will stop automatically.

## 1.2. NMEA Sentence Types

The default NMEA sentences of BG95 and BG77 are compliant with NMEA 0183 version 4.10 standard except talker ID, and five kinds of prefixes are available to differentiate NMEA sentences of different satellite systems, as illustrated below.

For GPS 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 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

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

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

For BeiDou 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

## 2 Description of GNSS AT Commands

Table 1: Types of AT Commands and Responses

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

### NOTES

1. <..>: Parameter name. Angle brackets do not appear on the command line. The parameter value indicated by “\_” is the default one.
2. [..]: Optional parameter. Square brackets do not appear on the command line. When an optional parameter is omitted, the default value will be used unless otherwise specified.
3. The AT commands take effect immediately unless otherwise specified.

### 2.1. AT+QGPSCFG Configure GNSS

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

#### AT+QGPSCFG Configure GNSS

Test Command

**AT+QGPSCFG=?**

Response

+QGPSCFG: "outport",(list of supported <outport>s),(list of supported <bud\_rate>s)  
+QGPSCFG: "gnssconfig",(range of supported <GNSS\_config>s)  
+QGPSCFG: "nmeafmt",(list of supported <NMEA\_fmt\_config>s)

+QGPSCFG: "gpsnmeatype",(list 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: "beidounmeatype",(range of supported <BeiDou\_NMEA\_type>s)  
+QGPSCFG: "nmeasrc",(list of supported <NMEA\_src>s)  
+QGPSCFG: "autogps",(list of supported <autoGPS>s)  
+QGPSCFG: "priority",(list of supported <priority\_type>s)

OK

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

This command is used to configure the NMEA sentences output port.

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

Write Command

**AT+QGPSCFG="outport"[,<outport>[,<bud\_rate>]]**

Response

When <outport> and <bud\_rate> are specified, configure the NMEA sentences output port:

OK

When <outport> and <bud\_rate> are omitted, query the current configuration:

If <outport> is configured as "uartnmea" or "auxnmea":  
**+QGPSCFG: "outport",<outport>,<bud\_rate>**

If <outport> is configured as "usbnmea" or "none":  
**+QGPSCFG: "outport",<outport>**

OK

If there is any error related to ME functionality:

**+CME ERROR: <errcode>**

Maximum Response Time

300ms

Validity

Remain valid after powering down.

## Parameter

<b>&lt;outport&gt;</b>	String type. Configure the output port of NMEA sentences. "none" Close NMEA sentence output <u>"usbnmea"</u> Output via USB NMEA port <u>"uartnmea"</u> Output via GNSS UART port <u>"auxnmea"</u> Output via debug UART port
<b>&lt;baud_rate&gt;</b>	Integer type. Baud rate of GNSS UART and debug UART port. <b>&lt;baud_rate&gt;</b> is available only when <b>&lt;outport&gt;</b> is "uartnmea" or "auxnmea". Unit: bps. 4800 9600 19200 38400 57600 <u>115200</u>
<b>&lt;errcode&gt;</b>	Integer type. The error code of operation. Please refer to <b>Chapter 4</b> for details.

**NOTE**

When **<baud\_rate>** is 4800, data loss may occur if a large amount of NMEA sentences are output.

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

This command is used to configure the supported GNSS constellations of the module.

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

Write Command <b>AT+QGPSCFG="gnssconfig"[,&lt;GNSS_config&gt;]</b>	Response When <b>&lt;GNSS_config&gt;</b> is present, configure the supported GNSS constellations: <b>OK</b>  When <b>&lt;GNSS_config&gt;</b> is omitted, query the current configuration: <b>+QGPSCFG: "gnssconfig",&lt;GNSS_config&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

## Parameter

<GNSS_config>	Integer type. Supported GNSS constellation. 1 GPS ON/GLONASS ON/BeiDou OFF/Galileo OFF/QZSS OFF 2 GPS ON/GLONASS OFF/BeiDou ON/Galileo OFF/QZSS OFF 3 GPS ON/GLONASS OFF/BeiDou OFF/Galileo ON/QZSS OFF 4 GPS ON/GLONASS OFF/BeiDou OFF/Galileo OFF/QZSS ON 5 The constellation is selected based on MCC of camped network
<errcode>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.

**NOTE**

The command takes effect after rebooting.

### 2.1.3. AT+QGPSCFG="nmeafmt" Configure NMEA Sentence Protocol Standard

This command is used to configure the protocol standard of NMEA sentences.

AT+QGPSCFG="nmeafmt" Configure NMEA Sentence Protocol Standard	
Write Command	Response
<b>AT+QGPSCFG="nmeafmt"[,&lt;NMEA_fmt_config&gt;]</b>	When <NMEA_fmt_config> is specified, configure the NMEA sentence protocol standard: <b>OK</b>
	When <NMEA_fmt_config> is omitted, query the current configuration: <b>+QGPSCFG: "nmeafmt",&lt;NMEA_fmt_config&gt;</b>
	<b>OK</b>
	If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

## Parameter

<NMEA_fmt_config>	Integer type. NMEA sentences protocol standards 0 The output NMEA sentences conforms to Qualcomm's standards 1 The output NMEA sentences conforms to NMEA 0183 version 4.10.
-------------------	--

<b>&lt;errcode&gt;</b>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.
------------------------	--

**NOTE**

For details of NMEA sentences in Qualcomm standards, please refer to **Chapter 1.2**. NMEA sentences in Qualcomm standards and that in NMEA 0183 version 4.10 standard differ from each other only in the talker ID of RMC, GGA and VTG sentences.

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

##### Sentences

This command is used to configure the output type of GPS NMEA sentences.

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

Write Command <b>AT+QGPSCFG="gpsnmeatype"[,&lt;GPS_NMEA_type&gt;]</b>	Response When <GPS_NMEA_type> is specified, configure the output type of GPS NMEA sentences: <b>OK</b>  When <GPS_NMEA_type> is omitted, query the current configuration: <b>+QGPSCFG: "gpsnmeatype",&lt;GPS_NMEA_type&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

##### Parameter

<b>&lt;GPS_NMEA_type&gt;</b>	Integer type. Output type of GPS NMEA sentences by ORed. 0 Disable 1 GGA 2 RMC 4 GSV 8 GSA 16 VTG
------------------------------	---

	<u>31</u> All the five types above
<errcode>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.

## 2.1.5. AT+QGPSCFG="glonassnmeatype" Configure Output Type of GLONASS

### NMEA Sentences

This command is used to configure the output type of GLONASS NMEA sentences.

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

Write Command	Response
<b>AT+QGPSCFG="glonassnmeatype"[,&lt;GLONASS_NMEA_type&gt;]</b>	When <GLONASS_NMEA_type> is specified, configure the output type of GLONASS NMEA sentences: <b>OK</b>
	When <GLONASS_NMEA_type> is omitted, query the current configuration: <b>+QGPSCFG: "glonassnmeatype",&lt;GLONASS_NMEA_type&gt;</b>
	<b>OK</b>
	If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

### Parameter

<GLONASS_NMEA_type>	Integer type. Output type of GLONASS NMEA sentences by ORed. <u>0</u> Disable 1 GSV 2 GSA
<errcode>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.

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

### Sentences

This command is used to configure the output type of Galileo NMEA sentences.

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

Write Command	Response
<b>AT+QGPSCFG="galileonmeatype"[,&lt; Galileo_NMEA_type&gt;]</b>	When <Galileo_NMEA_type> is specified, configure the output type of Galileo NMEA sentences: <b>OK</b>
	When <Galileo_NMEA_type> is omitted, query the current configuration: <b>+QGPSCFG: "galileonmeatype",&lt;Galileo_NMEA_type&gt;</b>
	<b>OK</b>
	If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

### Parameter

<b>&lt;Galileo_NMEA_type&gt;</b>	Integer type. Output type of Galileo NMEA sentences by ORed. 0 Disable 1 GSV
<b>&lt;errcode&gt;</b>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.

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

### Sentences

This command is used to configure the output type of BeiDou NMEA sentences.

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

Write Command	Response
<b>AT+QGPSCFG="beidounmeatype"[,&lt; BeiDou_NMEA_type&gt;]</b>	When <BeiDou_NMEA_type> is specified, configure output type of BeiDou NMEA sentences:

	<p><b>OK</b></p> <p>When &lt;BeiDou_NMEA_type&gt; is omitted, query the current configuration:  <b>+QGPSCFG: "beidounmeatype",&lt;BeiDou_NMEA_type&gt;</b></p>
	<p><b>OK</b></p> <p>If there is any error related to ME functionality:  <b>+CME ERROR: &lt;errcode&gt;</b></p>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

## Parameter

<BeiDou_NMEA_type>	Integer type. Output type of BeiDou NMEA sentences by ORed.
0	Disable
1	GSA
2	GSV
<errcode>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.

### 2.1.8. 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
<b>AT+QGPSCFG="nmeasrc"[,&lt;NMEA_src&gt;]</b>	When <NMEA_src> is specified, configure whether to enable acquisition of NMEA sentences via <b>AT+QGPSGNMEA</b> : <b>OK</b>
	When <NMEA_src> is omitted, query the current setting: <b>+QGPSCFG: "nmeasrc",&lt;NMEA_src&gt;</b>
	<b>OK</b>
	If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>

Maximum Response Time	300ms
Validity	Remain valid after powering down.

## Parameter

<b>&lt;NMEA_src&gt;</b>	Integer type. If enabled, original NMEA sentences can be acquired via <b>AT+QGPSCFG</b> . 0 Disable 1 Enable
<b>&lt;errcode&gt;</b>	Integer type. The error code of operation. Please refer to <b>Chapter 4</b> for details.

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

This command is used to configure whether to enable automatic running of GNSS after the module is powered on.

<b>AT+QGPSCFG="autogps" Enable/Disable GNSS to Run Automatically</b>	
Write Command	Response
<b>AT+QGPSCFG="autogps"[,&lt;autogps&gt;]</b>	When <b>&lt;autoGPS&gt;</b> is specified, configure whether to enable automatic running of GNSS: <b>OK</b>  When <b>&lt;autoGPS&gt;</b> is omitted, query the current setting: <b>+QGPSCFG: "autogps",&lt;autoGPS&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

## Parameter

<b>&lt;autoGPS&gt;</b>	Integer type. Enable/disable GNSS to run automatically after the module is powered on. 0 Disable GNSS to run automatically 1 Enable GNSS to run automatically
<b>&lt;errcode&gt;</b>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.

**NOTE**

The command takes effect after rebooting.

### 2.1.10. AT+QGPSCFG="priority" Set GNSS and LTE Priority

This command is used to configure GNSS and LTE priority.

#### AT+QGPSCFG="priority" Set GNSS and LTE Priority

Write Command

**AT+QGPSCFG="priority"[,<priority\_type>]**

Response

When <priority\_type> is specified, configure the GNSS and LTE priority:

**OK**

When <priority\_type> is omitted, query the current setting:  
**+QGPSCFG: "priority",<priority\_type>**

**OK**

If there is any error related to ME functionality:

**+CME ERROR: <errcode>**

Maximum Response Time

300ms

Validity

Remain valid after powering down.

#### Parameter

**<priority\_type>** Integer type. Switch GNSS and LTE priority.

0 GNSS is in high priority

1 LTE is in high priority

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

**NOTES**

1. The LTE and GNSS Rx chains of BG95 and BG77 share some hardware blocks, therefore concurrent WWAN and GNSS operations are not supported.
2. The command takes effect after rebooting.

## 2.2. AT+QGPS Turn on GNSS

This command is used to turn on GNSS function. When **<fix\_count>** is non-zero, GNSS will be turned off automatically when **<fix\_count>** reaches the value specified. When **<fix\_count>** is 0, GNSS will fix position continuously, and it can be turned off via **AT+QGPSEND**.

AT+QGPS Turn on GNSS	
Test Command <b>AT+QGPS=?</b>	Response <b>+QGPS: (list of supported &lt;GNSS_mode&gt;)[],(range of supported &lt;accuracy&gt;s)[],(range of supported &lt;fix_count&gt;s)[],(range of supported &lt;fix_rate&gt;s)]]</b>
	<b>OK</b>
Read Command <b>AT+QGPS?</b>	Response <b>+QGPS: &lt;GNSS_state&gt;</b>
	<b>OK</b>
Write Command <b>AT+QGPS=&lt;GNSS_mode&gt;[,&lt;accuracy&gt;[,&lt;fix_count&gt;[,&lt;fix_rate&gt;]]]</b>	Response <b>OK</b> If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

### Parameter

<b>&lt;GNSS_state&gt;</b>	Integer type. GNSS state 0 GNSS OFF 1 GNSS ON
<b>&lt;GNSS_mode&gt;</b>	Integer type. GNSS working mode 1 Stand-alone mode
<b>&lt;accuracy&gt;</b>	Integer type. Flags to indicate the desired level of accuracy for fix computation. 1 Low Accuracy for location is acceptable. 2 Medium Accuracy for location is acceptable. 3 Only High Accuracy for location is acceptable
<b>&lt;fix_count&gt;</b>	Integer type. Number of attempts for positioning. 0–1000 0 indicates continuous positioning. Other values indicate the number of attempts for positioning.
<b>&lt;fix_rate&gt;</b>	Integer type. The interval time between the first and second time positioning. Unit: s. 1–65535

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

## 2.3. AT+QGPSEND Turn off GNSS

When GNSS is turned on and <fix\_count> is 0, GNSS fixes position continuously. In such a case, GNSS can be turned off compulsorily via **AT+QGPSEND**. When <fix\_count> is non-zero, GNSS will be turned off automatically when <fix\_count> reaches the value specified, and thus this command can be ignored in such a case.

AT+QGPSEND Turn off GNSS	
Test Command <b>AT+QGPSEND=?</b>	Response <b>OK</b>
Execution Command <b>AT+QGPSEND</b>	Response <b>OK</b>
	If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

### Parameter

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

## 2.4. AT+QGPSLOC Acquire Positioning Information

This command is used to 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 <b>AT+QGPSLOC=?</b>	Response <b>+QGPSLOC: (range of supported &lt;mode&gt;s)[,(range of supported &lt;time&gt;s)]</b> <b>OK</b>

Write Command <b>AT+QGPSLOC=&lt;mode&gt;[,&lt;time&gt;]</b>	Response <b>+QGPSLOC: &lt;UTC&gt;,&lt;latitude&gt;,&lt;longitude&gt;,&lt;HDOP&gt;,&lt;altitude&gt;,&lt;fix&gt;,&lt;COG&gt;,&lt;spkm&gt;,&lt;spkn&gt;,&lt;date&gt;,&lt;nSAT&gt;</b>
	<b>OK</b> If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms
Validity	Remain valid after powering down.

## Parameter

<b>&lt;mode&gt;</b>	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.mmmmmmm E/W 2      <latitude>,<longitude> format: (-)dd.ddddd,(-)ddd.ddddd
<b>&lt;time&gt;</b>	Integer type. The time when the queried results are reported periodically. Unit: s. 0–3600      0 indicates turn off this feature. If the parameter is omitted, the default value 0 will be used.
<b>&lt;UTC&gt;</b>	String type. UTC time. Format: hhmmss.sss (Quoted from GPGGA sentence).
<b>&lt;latitude&gt;</b>	Float type. Latitude. If <b>&lt;mode&gt;</b> 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 <b>&lt;mode&gt;</b> 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 <b>&lt;mode&gt;</b> is 2: Format: (-)dd.ddddd (Quoted from GPGGA sentence) dd.ddddd      -89.99999-89.99999 (degree) -                South latitude
<b>&lt;longitude&gt;</b>	Float type. Longitude. If <b>&lt;mode&gt;</b> is 0: Format: dddmm.mmmm E/W (Quoted from GPGGA sentence) dd            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> Float type. Horizontal precision: 0.5-99.9 (Quoted from GPGGA sentence).

<altitude> Float type. The altitude of the antenna away from the sea level (unit: m), accurate to one decimal place (Quoted from GPGGA sentence)

<fix> Integer type. GNSS positioning mode (Quoted from GNGSA/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 000-359 (degree)

mm 00-59 (minute)

<spkm> Float type. Speed over ground.

Format: xxxx.x. Unit: Km/h. Accurate to one decimal place (Quoted from GPVTG sentence).

<spkn> Float type. Speed over ground.

Format: xxxx.x. Unit: knots. Accurate to one decimal place (Quoted from GPVTG sentence).

<date> String type. UTC time when fixing position.

Format: ddmmyy (Quoted from GPRMC sentence).

<nSAT> Integer type. Number of satellites, from 00 (the first 0 should be retained) to 12 (Quoted from GPGGA sentence).

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

## 2.5. AT+QGPSGNMEA Acquire NMEA Sentences

This command is used to 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**.

The sentence output can be disabled via **AT+QGPSCFG="gpsnmeatype",0**, **AT+QGPSCFG="glonassnmeatype",0**, **AT+QGPSCFG="galileonmeatype",0** and **AT+QGPSCFG="beidounmeatype",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 <b>AT+QGPSGNMEA=?</b>	Response <b>+QGPSGNMEA: ("GGA","RMC","GSV","GSA","VTG")</b>  <b>OK</b>
Write Command Acquire GGA sentence <b>AT+QGPSGNMEA="GGA"</b>	Response <b>+QGPSGNMEA: &lt;GGA_sentence&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Write Command Acquire RMC sentence <b>AT+QGPSGNMEA="RMC"</b>	Response <b>+QGPSGNMEA: &lt;RMC_sentence&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Write Command Acquire GSV sentence <b>AT+QGPSGNMEA="GSV"</b>	Response <b>+QGPSGNMEA: &lt;GSV_sentence&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Write Command Acquire GSA sentence <b>AT+QGPSGNMEA="GSA"</b>	Response <b>+QGPSGNMEA: &lt;GSA_sentence&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Write Command Acquire VTG sentence <b>AT+QGPSGNMEA="VTG"</b>	Response <b>+QGPSGNMEA: &lt;VTG_sentence&gt;</b>  <b>OK</b>  If there is any error related to ME functionality: <b>+CME ERROR: &lt;errcode&gt;</b>
Maximum Response Time	300ms

Validity	Remain valid after powering down.
----------	-----------------------------------

## Parameter

<GGA_sentence>	String type. GGA sentence.
<RMC_sentence>	String type. RMC sentence.
<GSV_sentence>	String type. GSV sentence.
<GSA_sentence>	String type. GSA sentence.
<VTG_sentence>	String type. VTG sentence.
<errcode>	Integer type. The error code of the operation. Please refer to <b>Chapter 4</b> for details.

# 3 Examples

## 3.1. Turn on/off the GNSS

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

```
AT+QGPS=1          //Turn on GNSS.  
OK  
  
//After turning on GNSS, NMEA sentences will be output from "usbnmea" port by default.  
AT+QGPSLOC?      //Obtain positioning information.  
+QGPSLOC: 130618.0,3150.8076N,11711.9039E,0.8,89.5,2,0.00,0.0,0.0,110919,12  
  
OK  
  
AT+QGPSEND        //Turn off GNSS.  
OK
```

## 3.2. Acquire Positioning Information

When GNSS is turned on and after it is fixed, the positioning information can be acquired via **AT+QGPSLOC**.

```
AT+QGPSLOC?      //Obtain positioning information.  
+QGPSLOC: 130618.0,3150.8076N,11711.9039E,0.8,89.5,2,0.00,0.0,0.0,110919,12  
  
OK  
  
AT+QGPSLOC=0  
+QGPSLOC: 131050.0,3150.8069N,11711.9032E,1.2,90.7,3,0.00,0.0,0.0,110919,08  
  
OK
```

**AT+QGPSLOC=1****+QGPSLOC: 131117.0,3150.806972,N,11711.903278,E,1.3,90.6,3,0.00,0.0,0.0,0.0,110919,07**

OK

**AT+QGPSLOC=2****+QGPSLOC: 131140.0,31.84678,117.19838,1.3,90.5,3,0.00,0.0,0.0,0.0,110919,07**

OK

**AT+QGPSLOC=2,1**

//Obtain positioning information and enable periodical location report.

**+QGPSLOC: 131305.0,31.84678,117.19838,1.8,89.9,3,0.00,0.0,0.0,0.0,110919,07**

OK

**+QGPSLOC: 131306.0,31.84678,117.19838,1.0,89.9,3,0.00,0.0,0.0,0.0,110919,08****+QGPSLOC: 131307.0,31.84678,117.19838,1.0,89.9,3,0.00,0.0,0.0,0.0,110919,08****+QGPSLOC: 131308.0,31.84678,117.19838,0.9,89.9,3,0.00,0.0,0.0,0.0,110919,08****AT+QGPSLOC=2,0**

//Obtain positioning information and disable periodical location report.

**+QGPSLOC: 131431.0,31.84678,117.19838,0.9,89.7,3,0.00,0.0,0.0,0.0,110919,09**

OK

### 3.3. Query Satellite System

**AT+QGPSCFG="gnssconfig"**

//Query enabled satellite systems

**+QGPSCFG: "gnssconfig",1**

//GPS and GLONASS are enabled.

OK

**AT+QGPS=1**

//Turn on GNSS.

OK

**AT+QGPSGNMEA="GSV"****\$GPGSV,4,1,14,02,68,055,16,04,00,000,31,05,64,314,26,07,08,070,18,1\*6D** //GPS GSV sentence.**\$GPGSV,4,2,14,09,04,037,30,12,11,228,36,15,16,207,20,19,11,155,14,1\*6B****\$GPGSV,4,3,14,25,09,269,20,29,27,316,32,06,26,101,,13,41,177,,1\*68****\$GPGSV,4,4,14,17,00,000,,30,10,091,,1\*6D**

```
$GLGSV,2,1,05,22,32,332,26,20,25,136,13,21,78,073,18,07,57,243,21,1*78      //GLONASS GSV  
sentence  
$GLGSV,2,2,05,08,10,224,,1*40
```

OK

```
AT+QGPSCFG="gnssconfig",2      //Enable GPS and BeiDou.
```

OK

/\*Restart module\*/

RDY

APP RDY

```
AT+QGPSCFG="gnssconfig"      //Query enabled satellite systems.  
+QGPSCFG: "gnssconfig",2      //GPS and BeiDou are enabled.
```

OK

```
AT+QGPS=1
```

OK

```
AT+QGPSGNMEA="GSV"
```

```
$GPGSV,3,1,11,02,64,089,36,04,00,000,39,05,63,346,45,06,21,113,27,1*6F      //GPS GSV sentence
```

```
$GPGSV,3,2,11,07,09,059,45,12,02,218,33,15,29,211,30,25,04,257,27,1*64
```

```
$GPGSV,3,3,11,29,37,307,41,30,16,090,29,13,57,173,,1*59
```

```
$PQGSV,1,1,03,13,65,343,34,14,72,329,26,21,08,052,42,1*45      //BeiDou GSV sentence
```

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 2: Summary of Error Codes

<errcode>	Meaning
501	Invalid parameter
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
509	XTRA not enabled
512	Validity time is out of range
513	Internal resource error
514	GNSS locked
515	End by E911
516	Not fixed now
517	Geo-fence ID is not existed
549	Unknown error

# 5 Appendix A References

**Table 3: Related Documents**

SN	Document Name	Remark
[1]	Quectel_BG95&BG77_AT_Commands_Manual	BG95&BG77 AT Commands Manual
[2]	Quectel_BG95&BG77_FILE_Application_Note	BG95&BG77 FILE Application Note

**Table 4: Terms and Abbreviations**

Abbreviation	Description
BeiDou	BeiDou Navigation Satellite System
DOP	Dilution of Precision
Galileo	Galileo Satellite Navigation System (EU)
GGA	Global Positioning System Fix Data
GLONASS	Global Navigation Satellite System (Russian)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
gpsOneXTRA	An Auxiliary Positioning Technology Provided by Qualcomm
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
HDOP	Horizontal Dilution of Precision
MCC	Mobile Country Code
ME	Mobile Equipment
NMEA	National Marine Electronics Association

RMC	Recommended Minimum Specific GNSS Data
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
UTC	Universal Time Coordinated
VTG	Course over Ground and Ground Speed