GL502MG @Track Air Interface Protocol

EGPRS/LTE Cat-M1/LTE Cat-NB2/GNSS Tracker

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Contents

0. Revision History

Version	Date	Author	Description of Change
1.00	2020-03-31	Sean Guo	Initial
1.01	2020-08-25	Devin Xie	1. Add Range/Format for parameter LET APN and GPRS APN of GTBSI. 2. Delete the Sub Command Parameter 2 of sub command RESET (4) of GTRTO. 3. Add parameter Device Type for GTVER.
1.02	2020-08-28	Devin Xie	1. Modify the Report Item Mask of GTCFG. 2. Modify the Range/Format of GEO ID of +ACK:GTGEO. 3. Modify the Range/Format of Report ID of +ACK:GTGEO. 4. Modify the description of AT. Command/Configuration Mask/ATI Mask of AT+GTRTO. 5. Delete the AT+GTFRI and +ACK:GTFRI in Appendix. 6. Add AT+GTGLM AND +ACK:GTGLM in Appendix.
1.03	2020-10-20	Leyfi Wang	1. Add <Wifi Report> in AT+GTCFG.
2.01	2021-01-07	Leyfi Wang	1. Modified <Accessory Type> in AT+GTBAS. 2. Added AT+GTBID, AT+GTIEX, and AT+GTAEX commands. 3. Added Reports +RESP:GTBID, +RESP:GTDIS, +RESP:GTAIS, and +RESP:GTBAA. 4. Modified <LTE Mode> in GTBSI. 5. Modified ATI Mask Table and +RESP:GTATI.
2.02	2021-08-12	Leyfi Wang	1. Modified the hex format of **+RESP:GTAIS**. 2. Add Sub Command "**PWROFF**" in **GTRTO**.
3.00	2022-05-10	Leyfi Wang	1. Modified field <Start Mode> in AT+GTCFG. 2. Modified field <Reboot Interval > in AT+GTDOG 3. Modified <+INF Mask> in AT+GTHRM. 4. Modified the hex format of +RESP:GTINF. 5. Added +RESP:GTGSM hex report in +INF.
3.01	2022-06-13	Leyfi Wang	1. Added <GPS Timeout> and <GNSS Mode> in AT+GTCFG.
3.02	2022-08-01	Leyfi Wang	1. Add command AT+GTNTS.
3.03	2022-08-14	Leyfi Wang	1. Added Physical Web Beacon (WID300) in AT+GTBAS.
3.04	2022-10-08	Leyfi Wang	1. Added Physical Web Beacon (WID310) in AT+GTBAS.
3.05	2022-11-01	Leyfi Wang	1. Added Physical Web Beacon (WID310) in AT+GTBID.

			2. Moved Physical Web Beacon (WID300) to AT+GTBID. 1. Added <Number of Satellites> in AT+GTCFG. 2. Added <Number of Satellites> in <+RSP Mask> 3. Added <Number of Satellites> in <+EVt Mask>
3.06	2022-12-12	Leyfi Wang	1. Added WMS301 in AT+GTBAS.
4.01	2023-03-02	Leyfi Wang	1. Deleted <Number of Satellites> in <+RSP Mask> and <+EVT Mask>. 2. Deleted <Number of Satellites> in AT+GTCFG. 3. Modified the range of <Duration> in AT+GTLTA.
4.02	2023-05-09	Leyfi Wang	1. Added temperature and humidity sensor (WTH301) in AT+GTBAS.
4.03	2023-08-31	Leyfi Wang	1. Added commands AT+GTCMD and AT+GTUDF.

1. Overview

1.1. Scope

The @Track Air Interface Protocol, a digital communication interface based on printable ASCII characters over SMS or wireless network, is used for all communications between the backend server and the terminal. The backend server sends a command to the terminal and then the terminal confirms with an acknowledgement message. If configured, the terminal also sends messages to the backend server.

The purpose of this document is to describe how to build the backend server based on the @Track Air Interface Protocol.

1.2. Terms and Abbreviations

Table 1 Terms and Abbreviations

Abbreviation	Description
APN	Access Point Name
ASCII	American National Standard Code for Information Interchange
LTE	Long Term Evolution
HDOP	Horizontal Dilution of Precision
ICCID	Integrated Circuit Card Identity
IP	Internet Protocol
SMS	Short Message Service
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UTC	Coordinated Universal Time

2. System Architecture

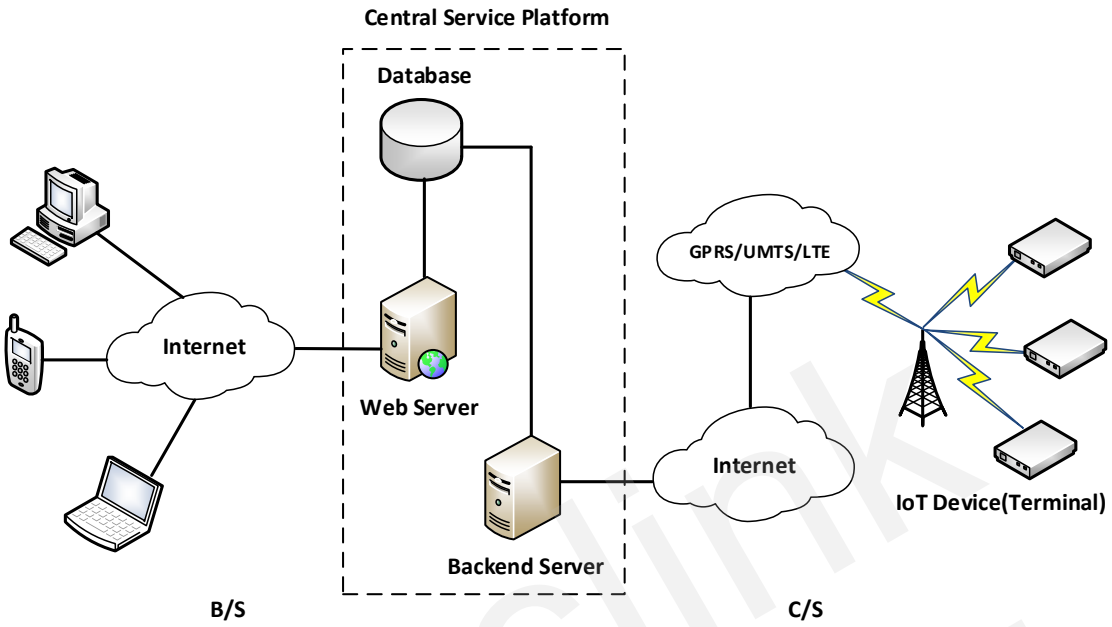

Figure 1 System Architecture

The backend server needs to be accessed by multiple terminals and should have the following abilities:

- The backend server should be able to access the internet and listen for the connection originating from the terminals.
- The backend server should be able to support TCP or UDP connection with the terminal. It should be able to receive data from the terminal and send data to the terminal.
- The backend server should be able to receive and send SMS.

3. Message Description

3.1. Message Format

All the @Track Air Interface Protocol messages are composed of printable ASCII characters. Message formats are shown in the table below:

Message Format	Message Type
AT+GTXXX=<parameter1>,<parameter2>,… $	Command
+ACK:GTXXX, <parameter1>,<parameter2>,… $	Acknowledgement
+RESP:GTXXX,<parameter1>,<parameter2>,…$	Report

The entire message string ends with the character '$'.

The characters 'XXX' allow the identification of the difference between messages.

The "<parameter1>,<parameter2>,…" carries the message's parameters. The number of parameters is different in different messages. The ASCII character "," is used to separate the neighbouring parameter characters. The parameter string may contain the following ASCII characters: '0'–'9', 'a'–'z', and 'A'–'Z'.

Detailed descriptions of each message format are available in the corresponding message sections.

By sending Commands to the terminal, the backend server can either configure and query the parameters of the terminal or control the terminal to perform specific actions. When the terminal receives Commands over the air, it will reply with a corresponding Acknowledgement message.

The device can send other Reports to the server by configuring related parameters. Please see the following figure:

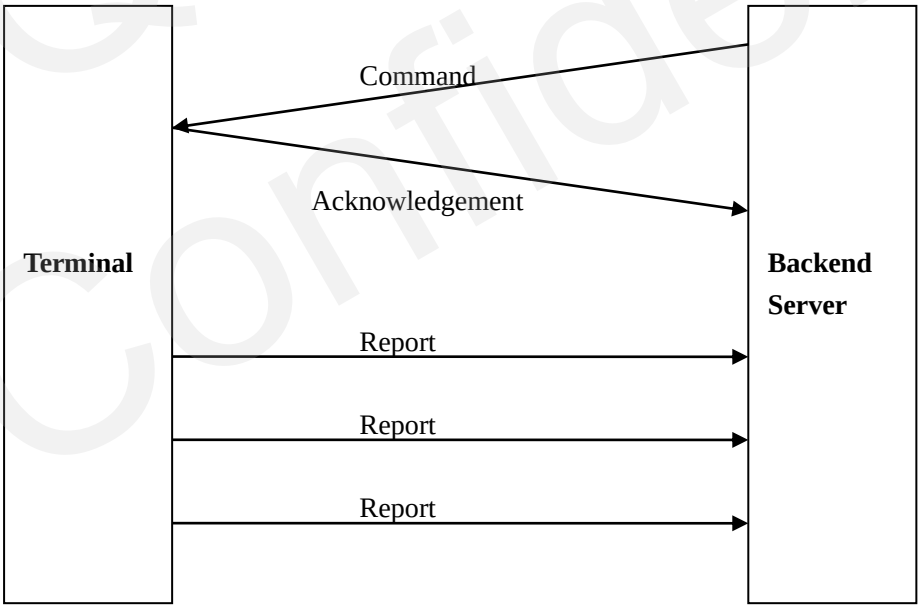

Figure 2 @Track Protocol Message Flow

When the device receives commands over the air, it supports several commands in one SMS or network packet without separation symbol between adjacent commands. Make sure the total

size of the several commands is no longer than 160 bytes if the commands are sent via SMS. Here is an example of sending two commands in one SMS.

AT+GTBSI=gl502m,,,,,,,0,0,FFFF$AT+GTGEO=gl502m,0,3,101.412248,21.187891,1000,600,,,,,,,,0008$

There are two commands (**AT+GTBSI**, **AT+GTGEO**) in the message above. And the terminal will handle the two commands one by one and it will send the following two acknowledgement messages to the backend server one by one.

+ACK:GTBSI,D50201,352948070074301,,0002,20161005172830,11F0$
+ACK:GTGEO, D50201,352948070074301,,0,0008,20161005074623,11F1$

3.2. Command and Acknowledgement

3.2.1. Device Configuration

3.2.1.1. Global Configuration

The **AT+GTCFG** command is used to configure the global parameters.

- **AT+GTCFG=**

Example:
AT+GTCFG=gl502m,,GL502M,,0000,0000,0,5,000000000000000,0,,0,1,24,1,1,5,0,0000,0000,,10,,,,2,FFFF$

SN	Parameter	Length	Range/Format	Default
1	Password	4 – 20	‘0’ – ‘9’, ‘a’ – ‘z’, ‘A’ – ‘Z’	gl502m
2	New Password	4 – 20	‘0’ – ‘9’, ‘a’ – ‘z’, ‘A’ – ‘Z’	
3	Device Name	<=20	‘0’ – ‘9’, ‘a’ – ‘z’, ‘A’ – ‘Z’, ‘-’, ‘_’	gl502m
4	GPS Timeout	3	120 – 600(sec)	300
5	Event Mask	4	0000 – 0FFF	0823
6	Report Item Mask	<=4	0000 – 003F	002F
7	Mode Selection	1	0|1	
8	Continuous Send Interval	<=4	0|1-1440(min)	5
9	Week Report Selection	14	00000000000000-11111111111111	10101010101010
10	Start Mode	1	0-3	0
11	Specified time of day	4	HHMM	1200
12	Adjustment Enable	1	0-1	0
13	Initial Wakeup Interval	<=2	1 – 4|6|8|12|24	1
14	Final Wakeup Interval	<=2	1 – 4|6|8|12|24	24
15	Hold Days	<=2	1 – 99	1
16	Report frequency	<=3	1 – 100	1
17	GPS Fix Delay	2	5 – 60(sec)	5
18	AGPS Mode	1	0|1	0
19	GSM Report	4	0000 -FFFF	0
20	Wifi Report	4	0000 -FFFF	0

21	Reserved	0		
22	Battery Low Percentage	<=2	0 - 30	10
23	Reserved	0		
24	GNSS Mode	4	0000 - FFFF	0003
25	Reserved	0		
26	*Location Request Mask*	1	0|2	2
27	Serial Number	4	(HEX)	
28	Tail Character	1	$	$

- <*New Password*>: It is used to change the current password.
- <*Device Name*>: The name of the device. It appears in each message.
- <*GPS Timeout*>: The GPS will use <GPS Timeout> as the longest working time.
- <*Event Mask*>: A Hex value to configure which event report can be sent to the backend server. Each bit corresponds to a message. If the bit is set to 1, the corresponding message can be sent to the backend server. Otherwise, the corresponding message cannot be sent to the backend server. Here is the matching between each bit and message.

  Bit 0 (0001): **+RESP:GTPNA**
  Bit 1 (0002): **+RESP:GTPFA**
  Bit 2 (0004): Reserved.
  Bit 3 (0008): Reserved.
  Bit 4 (0010): Reserved
  Bit 5 (0020): **+RESP:GTBPL**
  Bit 6 (0040): Reserved
  Bit 7 (0080): Reserved
  Bit 8 (0100): Reserved
  Bit 9 (0200): Reserved
  Bit 10 (0400): Reserved
  Bit 11 (0800): **+RESP:GTPNL**
  Bit 12 (1000): Reserved
  Bit 13 (2000): Reserved
- <*Report Item Mask*>: Bitwise report mask to configure the composition of all the messages. Each bit represents a field in the message. If a bit is set to 1, the corresponding field will be filled if it is included in the message. Otherwise, the field will be empty.

  Bit 0 (0001): <*Speed*>
  Bit 1 (0002): <*Azimuth*>
  Bit 2 (0004): <*Altitude*>
  Bit 3 (0008): Cell information, including <*MCC*>, <*MNC*>, <*LAC*>, and <*Cell ID*>
  Bit 4 (0010): Reserved
  Bit 5 (0020): <*Send Time*>
  Bit 6 (0040): <*Device Name*>
- <*Mode Selection*>: It configures the working mode of the terminal.
  - 0: Power saving mode (PSM). The terminal is in power saving status and report the message **+RESP:GTFRI** periodically according to power saving mode parameters. The connection between the terminal and the server will be maintained for a

period of time according to the setting of *<Network Hold Time>* in **AT+GTSRI**, and then go into deep sleep.

Note: Power saving mode (PSM) at here is not the PSM mode defined by 3GPP.

- 1: Continuous mode. The terminal is always active when report mode of **AT+GTSRI** is set to 3 or 4 (TCP long-connection mode or UDP mode). This allows the control of the terminal at any time and immediate receipt of ACK information form the terminal. The terminal performs GPS fix and reports the message **+RESP:GTFRI** periodically according to *<Continuous Send interval>*.

Note that if any sensor (GTNMD, GTTEM) is used to switch over the mode of the device, the working mode of the device will be determined by the sensor status and *<Mode Selection>* will become invalid in such circumstance.

✧ *<Continuous Send Interval>*: The send interval of message **+RESP: GTFRI** when *<Mode Selection>* is set to 1. The value range is 1-1440 and the unit is minute. If the value is set to 0, the device will not report the message.

✧ *<Week Report Selection>*: It configures the report mode for each day in one week. There is a total of seven 2-character combinations. The seven combinations represent seven days of one week respectively. The first two characters represent Sunday, and last two characters represent Saturday.

The first character of each combination defines whether the terminal will report messages to the server on this day of week, and the second character defines whether the message should contain GPS information when the first character is set to 1.

The 14-digit format can be configured as follows.

Example: 11000000101011. It means the messages on Sunday and Saturday will contain GPS information, no message will be reported Monday, Tuesday and Wednesday, and messages for Thursday and Friday will not contain GPS information.

✧ *<Start Mode>:* It configures how to determine the first wakeup time. The time of next wakeup will be calculated based on the *<Wakeup Hour Interval>*.

- 0: First wakeup at the time defined by *<Specified Time of Day>*.
- 1: To get the first wakeup time, add the current time and *<Wakeup Hour Interval>*.
- 2: The terminal will first wake up at the wake-up time point (calculated by *<Specified Time of Day>* and *<Wakeup Hour Interval>*) nearest to the current time. Wake-up time points are the time that the terminal should wake up at each day. For example, if *<Specified Time of Day>* is 0300 and *<Wakeup Hour Interval>* is 4 hours, then the wake-up time points are 03:00, 07:00, 11:00, 15:00, 19:00, 23:00. If the current time is 15:30, then the nearest wake-up time is 19:00.
- 3: Device will report at <Specified Time of Day> + random time between 0-60mins.

✧ *<Specified Time of Day>*: It configures the start time for the terminal to wake up (also referred to as first wakeup time herein). The value range of "HH" is "00"-"23". The value range of "MM" is '00"-"59".

✧ *<Adjustment Enable>*: Enable/disable the interval adjustment of the wakeup interval.

- 0: Disable interval adjustment.
- 1: Enable interval adjustment.

✧ *<Initial Wakeup Interval>*: A numeral to specify the initial hour interval for waking up the terminal. The value 24 means the terminal wakes up once per 24 hours. If *<Adjustment*

Enable> is disabled, the device will always use this value as its waking up interval.

- <*Final Wakeup Interval*>: A numeral to specify the final hour interval for waking up the terminal. The value 24 means the terminal wakes up once per 24 hours. If the <*Adjustment Enable*> is enabled, after the specified time of <Hold Days>, the device's waking up interval switches from <*Initial Wakeup Interval*> to <*Final Wakeup Interval*>. And the device's report interval will remain at this value.

  Note: If Bit 0 (0001):**+RESP:GTPNA** is not selected in <Event Mask>**,** the terminal won't wake up at <*Initial Wakeup Interval*> *or* <*Final Wakeup Interval*>.
- <*Hold Days*>: The number of days to hold <*Initial Wakeup Interval*> before switching to <*Final Wakeup Interval*>.
- <*Report Frequency*>: This parameter value multiplied by <*Initial Wakeup Interval*> or <*Final Wakeup Interval*> equals the report frequency (Unit: hour) for the message **+RESP:GTFRI**.

  Note: If <*Report Frequency*> is set to 2 and <*Initial Wakeup Interval*> or <*Final Wakeup Interval*> is set to 2, the terminal will wake up every 2 hours and report the **+RESP:GTFRI** every 4 hours.
- <*GPS Fix Delay*>: This value indicates the waiting time after GPS fix succeeds. After GPS fix succeeds, the device will wait for a period of time (specified by <*GPS Fix Delay*>) and then get the result of GPS fix because the position obtained immediately after the GPS fix may not be accurate. (e.g. If <*GPS Fix Delay*> is set to 7, the device will wait 7 seconds after GPS fix and then get the fix result). The range of the parameter value is 5 – 60, and the default value is 5. Unit: second.
- <*AGPS Mode*>: A numeral to indicate whether to enable AGPS. AGPS is helpful to improve the chance to get GPS position successfully and reduce the time to get GPS position.
  - 0: Disable the AGPS function.
  - 1: Enable the AGPS function.

  Note: The AGPS uses a URL to download the ephemeris data. Some SIM card operators do not support parsing URL to get the data. Contact with the SIM card provider to see whether URL parsing is supported or not. If not, disable this function. Otherwise, the power consumption of the device will increase. AGPS only increases the speed to get GPS fix. It will not affect the function of GPS.
- <*GSM Report*>: It controls how or when to report cell information.

  The 2 high bits, Bit 14 – 15, represent the GSM report mode.
  - 0: Do not allow the cell information report.
  - 1: Allow the cell information report after failing to get GPS position if cell information is available.
  - 2: Report the message **+RESP:GTGSM** after each successful GPS fix if cell information is available.
  - 3: Report the message **+RESP:GTGSM** regardless of getting GPS position is successful or not if cell information is available.

  The 2 low bits, bit0 and bit2 are used to configure **+RESP:GTGSM** will be sent after which message.
  - Bit 0 for **+RESP:GTRTL**
  - Bit 2 for **+RESP:GTFRI**
- <*Wifi Report*>: It controls how or when to report Wifi information. The message

+RESP:GTWIFI is only sent via TCP short connection even if the report mode is Force on SMS.

The 2 high bits, bit 14 – 15, represent the Wifi report mode.

- 0: Do not allow the Wifi information report.
- 1: Allow the Wifi information report after failing to get GPS position if cell information is available.
- 2: Report the message **+RESP:GTWFI** after each successful GPS fix if cell information is available.
- 3: Report the message **+RESP:GTWFI** regardless of getting GPS position is successful or not if cell information is available.

The 2 low bits, bit0 and bit2 are used to configure **+RESP:GTWIFI** will be sent after which message.

- Bit 0 for **+RESP:GTRTL**
- Bit 2 for **+RESP:GTFRI**

✧ *<Battery Low Percentage>*: If the battery percentage is lower than the value specified by this parameter, the terminal will report the message **+RESP:GTBPL**.

✧ *<GNSS Mode>*: At most 2 modes can be selected (enabled) at the same time. But GPS and GALILEO can be considered as the same, in this case, it is allowed to select GPS+GALILEO+another positioning system. For other combinations, only at most two can be selected.

- Bit 0: GNSS_GPS
- Bit 1: GNSS_GLONASS
- Bit 2: GNSS_GALILEO
- Bit 3: GNSS_BEIDOU

✧ *<Location Request Mask>*: Mask to control the location request

- Bit 0: Reserved.
- Bit 1: SMS location request.

Note: If the device is in power saving mode, the module is turned off also. So it cannot receive and process the "get position" message at this time. It will process the message after the device wakes up.

The acknowledgement message of the **AT+GTCFG** command:

➢ **+ACK:GTCFG,**

Example: **+ACK:GTCFG,D50201,352948070074301,,0004,20161005172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.1.2. Auto Unlock PIN

The **AT+GTPIN** command is used to unlock the USIM automatically.

➢ **AT+GTPIN=**

Example: **AT+GTPIN=gl502m,0,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Auto Unlock PIN	1	0|1	0
3	PIN	4 - 8	'0' – '9'	
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Serial Number	4	(HEX)	
10	Tail Character	1	$	$

✧ <*Auto Unlock PIN*>: A numeral to indicate whether to unlock the USIM-PIN for the device.

- 0: Do not unlock USIM-PIN automatically.
- 1: Each time the device powers on, it will detect whether the USIM card is locked with a PIN. If it is locked, the device will auto-unlock the PIN.

✧ <*PIN*>: The PIN code which is used for unlocking PIN automatically. If it is empty, the PIN code saved in the device will be cleared.

The acknowledgment message of the **AT+GTPIN** command:

➢ **+ACK:GTPIN,**

Example: **+ACK:GTPIN,D50201,352948070074301,,000E,20161005085505,0027$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.1.3. Software Protocol Watchdog

The **AT+GTDOG** command is used to reboot the device in a time-based manner. This helps the device avoid working in an abnormal status for a long time.

➢ **AT+GTDOG=**

Example: **AT+GTDOG=gl502m,0,,30,0200,,1,,0,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Mode	1	0|1	1
3	Reserved	0		
4	Reboot Interval	<=2	1 - 30	7
5	Reboot Time	4	HHMM	0200
6	Reserved	0		
7	Report Before Reboot	1	0|1	1
8	Reserved	0		
9	Unit	1	0|1	0
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
13	Serial Number	4	(HEX)	
14	Tail Character	1	$	$

✧ <*Mode*>: The working mode of the watchdog function.
- 0: Disable this function.
- 1: Reboot periodically according to the <*Interval*> and <*Time*> settings.

✧ <*Reboot Interval*>: The interval to reboot the device per days or hours, and a random time, 1-60min, will be added. That is, a random time between 1 to 60mins is added to the <*Reboot Interval*>. For example, if the <Reboot Interval> is set to 1 hour, the actual reboot interval will be 1 hour + 1-60min, if the <Reboot Interval> is set to 1 day, the actual reboot interval will be 1 day + 1-60min.

✧ <*Reboot Time*>: The time to perform the reboot operation when the <*Interval*> condition is met.

✧ <*Report Before Reboot*>: Whether to report the **+RESP:GTDOG** message before reboot. 0 means "Do not report the **+RESP:GTDOG** message before reboot", and 1 means "Report the **+RESP:GTDOG** message before reboot". If this parameter is enabled, the device will obtain a real-time location and send it to the server.

✧ <*Unit*>: The unit of the <*Interval*> value.
- 0: Day.
- 1: Hour.

The acknowledgment message of the **AT+GTDOG** command:

➢ **+ACK:GTDOG,**

Example: **+ACK:GTDOG,D50201,352948070074301,,0011,20161005085505,0028$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	

Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.1.4. Time Adjustment

The command **AT+GTTMA** is used to adjust local time.

➢ **AT+GTTMA=**

Example: **AT+GTTMA=gl502m,+,0,0,0,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Sign	1	+|-	+
3	Hour Offset	<=2	0 - 12	00
4	Minute Offset	<=2	0 - 59	00
5	Daylight Saving	1	0|1	0
6	UTC Time	14	YYYYMMDDHHMMSS	
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Serial Number	4	(HEX)	
12	Tail Character	1	$	$

✧ <*Sign*>: It indicates the positive or negative offset of the local time from UTC time.
✧ <*Hour Offset*>: The UTC offset in hours.
✧ <*Minute Offset*>: The UTC offset in minutes.
✧ <*Daylight Saving*>: Enable/disable daylight saving time.
- 0: Disable daylight saving time.
- 1: Enable daylight saving time.

✧ <*UTC Time*>: UTC time used to adjust the local time.

The acknowledgement message of the **AT+GTTMA** command:

➢ **+ACK:GTTMA,**

Example: **+ACK:GTTMA,D50201,352948070074301,,0007,20161005172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	

Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.1.5. Non-movement Detection

The **AT+GTNMD** command is used to configure the parameters for non-movement detection.

➢ **AT+GTNMD=**

Example: **AT+GTNMD=gl502m,0,0,3,3,2,1440,1,,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Sensor Enable	1	0 - 1	0
3	Mode	1	0 - F	0
4	Non-movement Duration	<=3	1 – 200(*15sec)	3
5	Movement Duration	<=2	3 – 50(*100ms)	3
6	Movement Threshold	1	2 – 9	2
7	Rest Send Interval	<=4	5 - 1440(min)	1440
8	Report Mode	1	1 - 3	2
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
13	Reserved	0		
14	Reserved	0		
15	Reserved	0		
16	Serial Number	4	(HEX)	
17	Tail Character	1	$	$

✧ *<Sensor Enable>:* Enable/disable the sensor function. If the sensor is enabled, and movement is detected, the terminal will enter continuous mode to preform GPS fix and report message.

✧ <*Mode*>: A hex numeral to determine how the function works. Each bit of the hex numeral indicates different actions the device can perform. If a bit is 1, the device will perform the corresponding action as described below.

Bit 0 (1): When it detects non-movement, then enter power saving mode.

Bit 1 (2): Report the message **+RESP:GTNMR** to the backend server when it detects non-movement.

Bit 2 (4): Report the message **+RESP:GTNMR** to the backend server when it detects movement.

Bit3 (8): Change the GPS fix interval and the +RESP:GTFRI report interval to <Rest Send

Interval> when non-movement is detected.

Note: If Bit3 is enabled, Bit0 will become invalid. And the device maintains in continuous mode. If <*Report Mode*> of **AT+GTSRI** is set to 3: TCP Long-connection Mode or 4: UDP Mode, the device will never go to sleep.

- <*Non-movement Duration*>: A time parameter to determine whether the device enters non-movement status. If the motion sensor detects that the device stays in non-movement status for a period of time specified by <*Non-movement Duration*>, the device will be considered to be in non-movement status.
- <*Movement Duration*>: A time parameter to determine whether the device enters movement status. If the motion sensor detects that the device stays in movement for a period of time specified by <*Movement Duration*>, the device will be considered to be in movement status.
- <*Movement Threshold*>: The threshold for the motion sensor to determine whether the device is in movement state. The smaller the value is, the easier it will be for the device to be considered to enter the state of movement.
- <*Rest Send Interval*>: The send interval for the **+RESP:GTFRI** message when the device is in rest state and bit 3 of <*Mode*> is set to 1.
- <*Report mode*>*:* A numeral to configure how to report **+RESP:GTNMR** when motion sensor status changes.
  - 1: Report the last fixed position.
  - 2: Report the current position.
  - 3: Report the last fixed position immediately, and then turn on GPS to get the current position and report position information again.

The acknowledgement message of the **AT+GTNMD** command:

➢ **+ACK:GTNMD,**

Example: **+ACK:GTNMD,D50201,352948070074301,,0005,20161005172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.1.6. Network Selection

The **AT+GTNTS** command is used to set network selection.

➢ **AT+ GTNTS=**

Example: **AT+GTNTS=gl520m,1,,,46000,4556,7777,,46000,578621,36254,,FFFF$**

SN	Parameter	Length (Byte)	Range/Format	Default
1	Password	4 - 20	'0' - '9', 'a' - 'z', 'A' - 'Z'	gl520m
2	Enable	1	0|1	0
3	Reserved	0		
4	Reserved	0		
5	Allowed Oper1	10		
6	Allowed Oper2	10		
7	Allowed Oper3	10		
8	Reserved	0		
9	Blocked Oper1	10		
10	Blocked Oper2	10		
11	Blocked Oper3	10		
12	Reserved			
13	Serial number	4	(HEX)	
14	Tail character	1	$	$

- ✧ <*Enable*>: Enable or disable "NTS" based functionality.
  - 0: Disable
  - 1: Enable
- ✧ <*Allowed Oper1*>: The first network to select.
- ✧ <*Allowed Oper2*>: The second network to select.
- ✧ <*Allowed Oper3*>: The third network to select.
- ✧ <*Blocked Oper1*>: The network that is refused to be selected.
- ✧ <*Blocked Oper2*>: The network that is refused to be selected.
- ✧ <*Blocked Oper3*>: The network that is refused to be selected.

The acknowledgment message of AT+ GTNTS command:

➢ **+ACK:GTNTS**

Example: **+ACK:GTNTS,D50201,015181001707687,,004F,20200806071850,006E$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol version	6	(HEX)	
Unique ID	15	(IMEI)	
Device name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Serial number	4	(HEX)	
Send time	14	YYYYMMDDHHMMSS	
Count number	4	(HEX)	
Tail character	1	$	$

3.2.1.7. Preserve Device Special Logical State

The command **AT+GTPDS** is used to preserve special logic state of the terminal. Enable the function according to the working mode, and save the logic state according to the value of the

<*Mask*>.

➢ **AT+GTPDS=**

Example: **AT+GTPDS=gl502m,1,00000011,,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gl502m
2	Mode	1	0 - 2	1
3	Mask	8	00000000-FFFFFFFF	00000019
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Serial Number	4	(HEX)	
11	Tail Character	1	$	$

✧ <*Mode*>: The working mode of the **AT+GTPDS** command.

- 0: Disable this function.
- 1: Preserve special logic state of the device according to the value of the <*Mask*>.
- 2: Reset all the special logical states listed in the <*Mask*> after receiving the command, and then preserve special logic state of the device according to the value of the <*Mask*>.

✧ <*Mask*>: Bitwise mask to configure which device states will be preserved.

Each bit represents a state.

- Bit 0: States of GEO
- Bit 1: Reserved
- Bit2: Reserved
- Bit 3: Information of last known position
- Bit 4: Current device state, including motion state

The acknowledgment message of the **AT+GTPDS** command:

➢ **+ACK:GTPDS,**

Example: **+ACK:GTPDS,D50201,352948070074301,,000D,20161005093254,FFFF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

Protocol Version	6	(HEX)	
Unique ID	15	MEID	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.2. Server Connection

3.2.2.1. Bearer Setting Information

The command **AT+GTBSI** is used to set the network parameters.

➢ **AT+GTBSI=**

Example: **AT+GTBSI=gl502m,,,,,,,00,0,FFFF$**				
SN	**Parameter**	**Length**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	**gl502m**
2	LTE APN	<=40	'0' – '9', 'a' – 'z', 'A' – 'Z', '.', '-'	
3	LTE APN User Name	<=30		
4	LTE APN Password	<=30		
5	GPRS APN	<=40	'0' – '9', 'a' – 'z', 'A' – 'Z', '.', '-'	
6	GPRS APN User Name	<=30		
7	GPRS APN Password	<=30		
8	Network Mode/APN Authentication Methods	1	00-33	00
9	LTE Mode	1	0 – 3	2
10	Serial Number	4	(HEX)	
11	Tail Character	1	$	$

✧ <*Password*>: The valid characters for the password include '0' – '9', 'a' – 'z', and 'A' – 'Z'. The default value is "**gl502m**".

✧ <*LTE APN*>: Access point name (APN).

✧ <*LTE APN User Name*>: The APN user name. If the parameter field is empty, the current value of this parameter will be cleared.

✧ <*LTE APN Password*>: The APN Password. If the parameter field is empty, the current value of this parameter will be cleared.

✧ <*GPRS APN*>: GPRS access point name (APN). If the <LTE APN> does not work, the <GPRS APN> will be used.

✧ <*GPRS APN User Name*>: The GPRS APN user name. If the parameter field is empty, the

current value of this parameter will be cleared.

✧ <*GPRS APN Password*>: The GPRS APN Password. If the parameter field is empty, the current value of this parameter will be cleared.

Note:

If there is only one APN, please use it as LTE APN.

✧ <*Network Mode*/APN Authentication Methods>: This field is in hex format. 4 high bits mean APN Authentication Methods and 4 low bits mean network mode.

Mobile network modes of the device:

- 0: Auto. (LTE &GSM)
- 1: GSM only.
- 2: LTE only.
- 3: GSM First. (LTE & GSM)

Mobile APN authentication methods of the device:

- 0: No authentication
- 1: PAP authentication
- 2: CHAP authentication
- 3: PAP or CHAP authentication

✧ <*LTE Mode*>: Select LTE network mode.

- 0: Cat-M1 & Cat-NB2 (Cat-M1 first)
- 1: Cat-NB2 & Cat-M1 (Cat-NB2 first)
- 2: Cat-M1
- 3: Cat-NB2
- 4: Cat-NB2 first (network search sequence: NB2, 2G, M1). It is valid when <*Network Mode*> is set to 0: Auto. (LTE &GSM).
- 5: Cat-NB2 only (network search sequence: NB2, 2G). It is valid when <*Network Mode*> is set to 0: Auto. (LTE &GSM).

Note: When <Network Mode> is 1, <LTE Mode> is invalid.

The network search sequence list is shown as below:

Network Mode		**LTE Mode**		**Search Order**		
Mode	Detail	Mode	Detail	1	2	3
0	Auto	0	Cat-M1&Cat-NB2 (Cat-M1 first)	M1	2G	NB2
		1	Cat-M1&Cat-NB2 (Cat-NB2 first)	2G	NB2	M1
		2	Cat-M1	M1	2G	N/A
		3	Cat-NB2	2G	NB2	N/A
		4	Cat-NB2 first	NB2	2G	M1
		5	Cat-NB2 only	NB2	2G	N/A
1	GSM Only	N/A	N/A	2G	N/A	N/A
2	LTE Only	0	Cat-M1&Cat-NB2(Cat-M1 first)	M1	NB2	N/A
		1	Cat-M1&Cat-NB2(Cat-NB2 first)	NB2	M1	N/A
		2	Cat-M1	M1	N/A	N/A
		3	Cat-NB2	NB2	N/A	N/A
3	GSM First	0	Cat-M1&Cat-NB2(Cat-M1 first)	2G	M1	NB2
		1	Cat-M1&Cat-NB2(Cat-NB2 first)	2G	NB2	M1
		2	Cat-M1	2G	M1	N/A

		3	Cat-NB2	2G	NB2	N/A

- ✧ <*Serial Number*>: The serial number of the command. It will be included in the ACK message of the command.
- ✧ <*Tail Character*>: A character which indicates the end of the command. And it must be '$'.

Note: If there is only one APN, please use it as LTE APN.

The acknowledgement message of the **AT+GTBSI** command:

- ➢ **+ACK:GTBSI,**

Example: **+ACK:GTBSI,D50201,352948070074301,,0002,20161005172830,11F0$**			
Parameter	**Length**	**Range/Format**	**Default**
Protocol Version	6	XX0000 - XXFFFF, X∈{'A' - 'Z', '0' - '9'}	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- ✧ <*Protocol Version*>: The protocol version that the terminal conforms to. The first two characters represent the device type. As shown in the example, "**D5**" means GL502M. The middle two characters represent the major version number of the protocol and the last two characters represent the minor version number of the protocol. And all the version numbers are hex digits. For example, "**0101**" means version 1.01.
- ✧ <*Unique ID*>: The IMEI of the terminal.
- ✧ <*Device Name*>: The specified name of the device.
- ✧ <*Serial Number*>: A serial number which is included in the corresponding command and is used to distinguish which command the ACK message is for.
- ✧ <*Send Time*>: The local time to send the ACK message.
- ✧ <*Count Number*>: A self-increasing count number in each acknowledgment message and other messages. It begins from "0000" and increases by 1 for each message. And it rolls back after "FFFF".
- ✧ <*Tail Character*>: A character which indicates the end of the command. It must be '$'.

Note: Only after both the commands **AT+GTBSI** and **AT+GTSRI** are properly set can the ACK messages and other messages be received by the backend server.

3.2.2.2. Backend Server Registration Information

The command **AT+GTSRI** is used to configure the backend server that the terminal reports to and the report mode that defines the communication method between the backend server and the terminal.

➢ **AT+GTSRI=**

Example: **AT+GTSRI=gl502m,0,1,0,,0,,0,,0,0,0,0,0,,FFFF$**				
SN	**Parameter**	**Length**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Report Mode	1	0 – 5	0
3	Reserved	0		
4	Buffer Mode	1	0 – 2	1
5	Main Server IP/ Domain Name	<=60		
6	Main Server Port	<=5	0 – 65535	0
7	Backup Server IP/ Domain Name	<=60		
8	Backup Server Port	<=5	0 – 65535	0
9	SMS Gateway	<=20		
10	Heartbeat Interval	<=3	0|5 – 360(min)	0
11	SACK Enable	1	0 – 2	0
12	SMS ACK Enable	1	0|1	0
13	PSM Network Hold Time	<=5	0 - 86400 (sec)	0
14	Protocol Format	1	0|1	
15	Reserved	0		
16	Serial Number	4	(HEX)	
17	Tail Character	1	$	$

✧ <*Report Mode*>: Supported report modes are as follows:

- 0: Stop mode.
- 1: TCP short-connection preferred mode. The connection is based on TCP protocol. The terminal connects to the backend server every time it needs to send data and will cut off the connection when the terminal finishes sending data. And if the terminal fails to establish TCP connection with the backend server (including main server and backup server), it will try to send data via SMS.
- 2: TCP short-connection forced mode. The connection is based on TCP protocol. The terminal connects to the backend server every time it needs to send data and will cut off the connection when the terminal finishes sending data. And if the terminal fails to establish TCP connection with the backend server (including main server and backup server), the data will be stored in the BUFFER (if BUFFER function is enabled, please refer to <*Enable Buffer*>) or discarded (if the BUFFER function is disabled).
- 3: TCP long-connection mode. The connection is based on TCP protocol. The terminal connects to the backend server and maintains the connection by using the heartbeat data. Please note that in this mode the backend server should respond to the heartbeat data from the terminals.
- 4: UDP mode. The terminal will send data to the backend server through the UDP protocol. It supports receiving protocol command via UDP. Make sure the IP address

and UDP port of the device can be visited over the internet, which is generally realized by heartbeat package.

- 5: Force on SMS mode. Only SMS is used for data transmission.
- 6: UDP with fixed local port mode. Like the UDP mode, the terminal will send data by using UDP protocol. The difference is the terminal will use a fixed local port rather than a random port to communicate with the server in this mode. Thus, the backend server could use the identical port to communicate with all terminals if the backend server and the terminals are all in the same VPN network. The port number the device uses is the same as the port number of the main server.
- 7: Backup server supported TCP long-connection mode. The connection is based on TCP protocol. The terminal connects to the backend server and maintains the connection by using the heartbeat data. The backend server should respond to the heartbeat data from the terminals. If the main server is lost, it will try to connect the backup server. And if the backup server is also lost, it will try to connect the main server again.

✧ <*Reserved*>: Not used at present. Please keep it empty.

✧ <*Buffer Mode*>: Enable or disable the BUFFER function. Please refer to Chapter 3.3.5 or details of the BUFFER function.

- 0: Disable the BUFFER function.
- 1: Enable the BUFFER function.
- 2: High priority—Enable the buffer report function. Under this working mode, the device will send all the buffered messages before sending real-time messages.

✧ <*Main Server IP/Domain Name*>: The IP address or the domain name of the main server.

✧ <*Main Server Port*>: The port of the main server.

✧ <*Backup Server IP/Domain Name*>: The IP address or the domain name of the backup backend server.

✧ <*Backup Server Port*>: The port of the backup server.

✧ <*SMS Gateway*>: Maximum 20 characters (including the optional national code starting with "+"). Short code (for example, 10086) is also supported.

✧ <*Heartbeat Interval*>: The interval for the terminal to send the heartbeat message to the backend server. If it is set to 0, no heartbeat message will be sent.

✧ <*SACK Enable*>: A numeral to indicate whether the backend server should reply with a SACK message to the device.

- 0: The backend server does not reply with a SACK message after receiving a message from the device.
- 1: The backend server should reply with a SACK message after receiving a message from the device.
- 2: The backend server replies with a SACK message when receiving a message from the terminal, but the terminal does not check the serial number of the SACK message.

✧ <*SMS ACK Enable*>: This defines whether the ACK confirmation should be replied via SMS when the command is sent via SMS.

- 0: The device will send the ACK confirmation according to the configuration of <*Report Mode*>.

- 1: The device will send the ACK confirmation via SMS to the phone which sends the command by SMS.

✧ <*PSM Network Hold Time*>: This parameter is used in power saving mode when the <*Report Mode*> is TCP long-connection mode, UDP mode or Force on SMS. The network of the device will maintain <*PSM Network Hold Time*> after the message is sent and then the modem will be shut off.

✧ <*Protocol Format*>: This defines the format of the message sent from the device to the backend server. 0 means using the ASCII format, 1 means the HEX format.

✧ <*Reserved*>: Not used at present. Please keep it empty.

✧ <*Serial Number*>: The serial number of the command. It will be included in the ACK message of the command.

✧ <*Tail Character*>: A character to indicate the end of the command. And it must be '$'.

Note: If <*Report Mode*> is set to 4 (UDP mode), it is recommended to enable SACK or heartbeat mechanism (in this case, <*Heartbeat Interval*> should not be set to 0). Otherwise the backend server may not be able to send commands to the terminal.

The acknowledgement message of the **AT+GTSRI** command:

➢ **+ACK:GTSRI,**

Example: **+ACK:GTSRI,D50201,352948070074301,,0003,20161005172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

Note: Only after both the commands **AT+GTBSI** and **AT+GTSRI** are properly set can the ACK messages and other messages be received by the backend server.

3.2.2.3. Quick Start Setting

The command **AT+GTQSS** is used to set the network parameters and backend server information if the length of all its settings is within 160 bytes. Otherwise, use two commands **AT+GTBSI** and **AT+GTSRI** to configure the settings.

➢ **AT+GTQSS=**

Example: **AT+GTQSS=gl502m,,,,0,0,0,,0,,0,,0,0,0,0,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**

1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	LTE APN	<=40		
3	LTE APN User Name	<=30		
4	LTE APN Password	<=30		
5	Report Mode	1	0 – 5	0
6	Protocol Format	1	0|1	
7	Buffer Mode	1	0 – 2	1
8	Main Server IP/ Domain Name	<=60		
9	Main Server Port	<=5	0 – 65535	0
10	Backup Server IP/ Domain Name	<=60		
11	Backup Server Port	<=5	0 – 65535	0
12	SMS Gateway	<=20		
13	Heartbeat Interval	<=3	0|5 – 360(min)	0
14	SACK Enable	1	0 – 2	0
15	SMS ACK Enable	1	0|1	0
16	Network Hold Time	<=5	0 – 86400(sec)	300
17	Serial Number	4	(HEX)	
18	Tail Character	1	$	$

The acknowledgement message of the **AT+GTQSS** command:

- **+ACK:GTQSS,**

Example: **+ACK:GTQSS,D50201,352948070074301,,0001,20100310172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.3. Alarm Settings

3.2.3.1. Geo-fence Information

The command **AT+GTGEO** is used to configure the parameters of Geo-fence. Geo-fence is a virtual perimeter around a geographic area using a location-based service. When the terminal enters or exits the area, a notification is generated. The notification contains information about the location of the terminal and will be sent to the backend server.

- **AT+GTGEO=**

Example: **AT+GTGEO=gl502m,0,3,101.412248,21.187891,1000,600,,,,,,,,0008$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	GEO ID	1	0 – 19	
3	Mode	1	0 – 3	0
4	Longitude	<=11	(-)XXX.XXXXXX	
5	Latitude	<=10	(-)XX.XXXXXX	
6	Radius	<=7	50 – 6000000(min)	50
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
13	Reserved	0		
14	Reserved	0		
15	Reserved	0		
16	Serial Number	4	(HEX)	
17	Tail Character	1	$	$

- <*GEO ID*>: A numeral to identify the Geo-fence.
- <*Mode*>: A numeral which indicates when to report the notification to the backend server:
  - 0: Disable the Geo-fence on the specified GEO ID.
  - 1: Reports when entering the Geo-fence.
  - 2: Reports when leaving the Geo-fence.
  - 3: Reports when entering or leaving the Geo-fence.
- <*Longitude*>: The longitude of a point which is defined as the centre of the circular Geo-fence region. The format is "(-)xxx.xxxxxx" and the value range is from "-180.000000" to "180.000000". The unit is degree. West longitude is represented as a negative value starting with the minus sign "-" and east longitude is represented as a positive value without "+".
- <*Latitude*>: The latitude of a point which is defined as the centre of the circular Geo-fence region. The format is "(-)xx.xxxxxx" and the value range is from "-90.000000" to "90.000000". The unit is degree. South latitude is represented as a negative value starting with the minus sign "-" and north latitude is represented as a positive value without "+".
- <*Radius*>: The radius of the circular Geo-fence region. The value range is (50-6000000) and the unit is meter.

The acknowledgement message of the **AT+GTGEO** command:

- **+ACK:GTGEO,**

Example: **+ACK:GTGEO,D50201,352948070074301,,0,0008,20161005172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
GEO ID	1	0 – 19	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.3.2. Temperature Alarm

The **AT+GTTEM** command is used to configure the temperature alarm function of the device. Based on the working mode, the device will report temperature alarm when its temperature is outside or inside a predefined range.

➢ **AT+GTTEM=**

Example:
AT+GTTEM=gl502m,0,0,0,0,60,300,0,,,,,FFFF$

SN	Parameter	Length (Byte)	Range/Format	Default
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Temperature Enable	1	0|1	0
3	Mode	1	0 – 4	0
4	Min. Temperature	<=3	-20 – +60	0
5	Max. Temperature	<=3	-20 – +60	0
6	Duration	<=4	10 – 3600(sec)	60
7	Send Interval	<=4	0|10 – 3600(sec)	300
8	Enable Continuous Mode	0	0|1	0
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
13	Serial Number	4	(HEX)	
14	Tail Character	1	$	$

✧ <*Temperature Enable*>: Enable/Disable the temperature function. If disabled, the temperature value will be empty in the report.

✧ <*Mode*>: A numeral to indicate the working mode of the temperature alarm function.

- 0: Disable this function.
- 1: Report the alarm message **+RESP:GTTEM** when the current temperature is lower than the temperature specified by <*Min. Temperature*>.
- 2: Report the alarm message **+RESP:GTTEM** when the current temperature is higher than the temperature specified by <*Max. Temperature*>.
- 3: Report the alarm message **+RESP:GTTEM** when the current temperature is

inside the temperature range.

- 4：Report the alarm message **+RESP:GTTEM** when the current temperature is outside the temperature range.

✧ <*Min. Temperature*>: The lower limit of the temperature range.

✧ <*Max. Temperature*>: The upper limit of the temperature range.

✧ <*Duration*>: If the temperature is in the specified temperature range and is maintained for a period of time specified by <*Duration*>, the temperature alarm will be triggered.

✧ <*Send Interval*>: If the temperature alarm is triggered, the temperature alarm message will be sent periodically according to <*Send Interval*>. If the <*Send Interval*> is set to 0, the temperature alarm message will be sent only once.

✧ <*Enable Continuous Mode*>: If it is enabled and the temperature alarm is triggered, the device enters continuous mode, otherwise enters power saving mode.

The acknowledgment message of the **AT+GTTEM** command:

➢ **+ACK:GTTEM,**

Example: **+ACK:GTTEM,D50201,352948070074301,,000E,20161005093254, 000E$**			
Parameter	**Length**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.3.3. Light Tamper Alarm

The **AT+GTLTA** command is used to configure the light tamper alarm function.

➢ **AT+GTLTA=**

Example: **AT+GTLTA=gl502m,0,,3,0,0,2,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Mode	1	0|1	0
3	Reserved	0		
4	Duration	<= 2	1 – 30	3
5	Send Interval	<= 3	0|10 – 300 (sec)	0
6	End Report	1	0|1	0
7	Report Mode	1	1 – 3	2
8	Reserved	0		
9	Reserved	0		

10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
13	Serial Number	4	(HEX)	
14	Tail Character	1	$	$

- <*Mode*>: A numeral to indicate the working mode of light sensor tamper alarm
  - 0: Disable light tamper alarm.
  - 1: Enable light tamper alarm. The device will send the **+RESP:GTLTA** message when light sensor tamper detected.
- <*Duration*>: If <*Mode*> is not 0 and the light intensity maintains a period of time specified by <*Duration*>, the light sensor alarm event will be triggered.
- <*Send interval*>: The send interval for the light sensor alarm report when the device enters into light sensor alarm status. 0 means "The light sensor alarm will only be reported once.
- <*End Report*>: The device reports the **+RESP:GTLTA** message when it exits the light sensor alarm status. 1 means "Enable this parameter", and 0 means "Disable this parameter".
- <*Report mode*>: A numeral to configure how to report **+RESP:GTLTA** when light sensor status changes.
  - 1: Report the last fixed position.
  - 2: Report the current position.
  - 3: Report the last fixed position immediately, and then turn on GPS to get the current position and report position information again.

The acknowledgment message of the **AT+GTLTA** command:

- **+ACK:GTLTA,**

Example: **+ACK:GTLTA,D50201,135790246811220,,0010,20090214093254,11F0$**			
Parameter	**Length**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9', 'a' – 'z', 'A' – 'Z','-','_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.4. Bluetooth Setting

3.2.4.1. Bluetooth Setting

The command **AT+GTBTS** is used to enable Bluetooth or not.

- **AT+GTBTS=**

Example: **AT+GTBTS=gl502m,0,,GL502M_BT,,,,,,,0,0,0,1000,0,0,,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 - 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gl502m
2	Mode	1	0|1|2	0
3	Reserved	0		
4	Bluetooth Name	<=20	'0' – '9', 'a' – 'z', 'A' – 'Z', '-', '_'	GL502M_BT
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Advertising Type	1	0-2	0
13	Power Mode	1	0|1	1
14	PA Level	1	0 - 7	4
15	Advertising Interval	<=5	100 – 10000(ms)	1000
16	Advertising Data Type	1	0-1	0
17	Reserved (optional)	0	0	0
18	Reserved (optional)	0		
19	Reserved (optional)	0		
20	Reserved (optional)	0		
21	Reserved	0		
22	Reserved	0		
23	Reserved	0		

24	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ *<Mode>:* The working mode of the Bluetooth.
- 0: Disable the Bluetooth.
- 1: Enable Bluetooth as Master.
- 2: Enable Bluetooth as Beacon function.

✧ *<Advertising Type>:* The type of advertising.
- 0: ADV_IND (Connectable undirected advertising).
- 1: Reserved.
- 2: ADV_SCAN_IND (Scannable undirected advertising).

✧ *<Power Mode>:* Enable/disable high power mode.
- 0: Standard Power.
- 1: High Power.

✧ *<PA Level>:* Power amplifier output level. Output power is indicative and it depends on Bluetooth working mode and external Bluetooth devices. Its default value is 4.
- 0: -18 dBm (standard power), -14 dBm (high power)
- 1: -15 dBm (standard power), -11 dBm (high power)
- 2: -12 dBm (standard power), -8 dBm (high power)
- 3: -9 dBm (standard power), -5 dBm (high power)
- 4: -6 dBm (standard power), -2 dBm (high power)
- 5: -2 dBm (standard power), 2 dBm (high power)
- 6: 0 dBm (standard power), 4 dBm (high power)
- 7: 5 dBm (standard power), 8 dBm (high power)

✧ *<Advertising Interval>:* The Interval of the advertising.

✧ *<Advertising Data Type>:* The type of advertising data.
- 0: Bluetooth Name.

	Ad Flags	Len	Type	Data
Bluetooth Name	02 01 06	length	09	Bluetooth Name

◆ <Len>: Including type length + data length.
- 1: Eddystone-UID.

Beacon ID Type	1	0-1	0
Beacon ID	12	0-F	
Reserved (optional)	0		
Reserved (optional)	0		

✧ <Beacon ID Type>: The type of the Beacon ID.
- 0: Use the BLE MAC as the Beacon ID.
- 1: The custom Beacon ID.

✧ <Beacon ID>: The custom Beacon ID.

The format of the Eddystone-UID.

	Ad Flags	Eddystone ID	Len	Type	UUID	Frame	Frame Specific Format			
Eddystone -UID	02 01 06	03 03 AA FE	17	16	AA FE	00	RD	NID [10]	BID[6]	00 00

- <RD>: Ranging data, calibrated TX power at 0 m.
- <NID>: The device name. Note: If the length of the device name does not exceed 10 bytes, complete with 0x00. If the length of device name exceeds 10 bytes, take the first 10 bytes.
- <BID>: Beacon ID.

3.2.4.2. Bluetooth Accessory Setting

The command **AT+GTBAS** is used to scan or connect the device with Bluetooth accessories which contain some effective data such as temperature/humidity. The parameter *<Mode>* in the command **AT+GTBTS** must be 1 to use the function.

➢ **AT+GTBAS=**

Example: **AT+GTBAS=gl500m,0,2,0,,B84BA4C0B801,001E,30,2400,,0,0,10,2,300,,0,0,0,0,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	**gl500m**
2	Index	1	0 – 9	0
3	Accessory Type	1	0 - 8	0
4	Accessory Model	1	0 - 5	0
5	Accessory Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' ' _'	
6	Accessory MAC	12	000000000000 - FFFFFFFFFFFF	
7	Append Mask	<=4	0000- FFFF	3F
8	Read Interval	<=5	10 – 86400(sec)	30
9	Low Voltage Threshold	<=4	0 – 5000(mv)	2400
10	Extended Common Parameter Number	1	1	
11	Accessory Available Report	1	0 - 1	0
12	Reserved (optional)	0		
13	Reserved (optional)	0		
14	Reserved (optional)	0		

15	Reserved (optional)	0		
16	Reserved (optional)	0		
17	Reserved	0		
18	Reserved			
19	Reserved	0		
20	Reserved	0		
21	Reserved	0		
22	Reserved	0		
23	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

- <*Index*>: The index of the Bluetooth accessory. Total 10 groups can be used for Bluetooth beacon accessories.
- <*Accessory Type*>: The type of the Bluetooth accessory which is defined in the <*Index*>. The following is supported now:
  - 0: No Bluetooth accessory.
  - 1: Reserved.
  - 2: Reserved
  - 3: Reserved
  - 4: Reserved
  - 5: Reserved
  - 6: Beacon temperature/humidity sensor. Five reserved parameters are used as follows:

Temp Mode | Hum Mode	3	0-3 & 0-3	0|0
Low Temperature | Humidity	<=7	-40 – 80℃ | 0 - 100	0|20
High Temperature | Humidity	<=7	-40 - 80℃ | 0 - 100	10|80
Validity	<=2	1 – 10sec	2
Send Interval	2-5	30 - 43200	300

The device will report **+RESP:GTBAA** message to the backend server when the temperature/humidity outside or inside the range is detected.

- <*Temp Mode | Hum Mode*>: "Temp Mode" indicates the working mode of temperature alarm, and "Hum Mode" indicates the working mode of humidity alarm. The two modes are separated by '|'.
  - 0: Disable alarm.
  - 1: Report alarm if the current temperature/humidity is within the range defined by <Low Temperature | Humidity> and <High Temperature |

Humidity>.

- 2: Report alarm if the current temperature/humidity is outside the temperature range defined by <Low Temperature | Humidity> and <High Temperature | Humidity>.
- 3: Report alarm only once if the current temperature/humidity enters/exits the range defined by <Low Temperature | Humidity> and <High Temperature | Humidity>. In this mode, <*Send Interval*> will be ignored.

✧ <*Low Temperature | Humidity*>: Specify the lower limit temperature/humidity. When the temperature/humidity of the sensor is below this value, the device will report message **+RESP:GTBAA** to back server.

✧ <*High Temperature | Humidity*>: Specify the upper limit temperature/humidity. When the temperature/humidity of the sensor is above this value, the device will report message **+RESP:GTBAA** to back server.

✧ <*Validity*>: If the sensor detects the environment temperature/humidity meets the alarm condition, it will continuously check the temperature/humidity based on the timer set by <*Read Interval*>. If the temperature/humidity keeps meeting the alarm condition for <*Validity*>, the temperature/humidity alarm will be triggered.

✧ <*Send Interval*>: The interval between two messages.

- 8: External input/output Bluetooth accessory.

✧ <*Accessory Model*>: The model of the Bluetooth accessory defined in <*Accessory Type*>. The following is supported now:

- The model for <Accessory Type> 6 (Beacon Temperature/humidity Sensor):
  0: WTH300.
  4: WMS301.
  5: WTH301.
- The external input/output Bluetooth accessory (<Accessory Type> is 8):
  0: WBC300.
  Note: The current version supports only one WBC300 configuration.

✧ <*Accessory Name*>: The name of the Bluetooth accessory.

✧ <*Accessory MAC*>: The MAC address of the Bluetooth accessory.

✧ <*Append Mask*>: Bitwise mask to configure the composition of Bluetooth accessary info. In **+RESP:GTBAA** message, the Bluetooth accessories data will be included according to the mask set by this field.

- Bit 0: Bluetooth accessory name.
- Bit 1: Bluetooth accessory MAC.
- Bit 2: Bluetooth accessory connection status. 1 means the beacon is connected and 0 means the beacon not connected.
- Bit 3: Bluetooth accessory battery voltage.
- Bit 4: Bluetooth accessory temperature.
- Bit 5: Bluetooth accessory humidity.

✧ <*Read Interval*>: The interval for reading data from the Bluetooth accessory.

✧ <*Low Voltage Threshold*>: Specify the lower limit voltage. When the voltage of Bluetooth accessary is below this value, the device will report message **+RESP:GTBAA** to backend

server. 0 means disable low voltage detection.

✧ <Extended Common Parameter Number>: This parameter defines the extended common parameter number for BLE accessories in following fields.

✧ <Accessory Available Report>: This field controls whether to report **+RESP:GTBAA** event to backend server when accessory availability status changes.

- 0: Do not report **+RESP:GTBAA** event to backend server.
- 1: Report **+RESP:GTBAA** event to backend server to indicate that BLE accessories are available or not available.

3.2.4.3. Bluetooth Beacon ID Setting

The command **AT+GTBID** is used to scan Bluetooth beacon ID accessories. The parameter <Mode> in the command **AT+GTBTS** must be 1 to use the function.

➢ **AT+GTBID=**

Example: **AT+GTBID=gl502m,,1,0,001F,2400,,1,15,B80EA1003C06,,B80EA100A00A,,B80EA11067E8,,,,,,B80EA1104007,,,,B80EA10017F2,1,1,31,,,,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gl502m
2	Reserved	0		
3	Enable	1	0|1	
4	Beacon ID Accessory Model	1	0 - 9	0
5	Append Mask	<=4	0 - FFFF	1F
6	Low Voltage Threshold	<=4	0 – 5000(mv)	2400
7	Reserved	0		
8	Start Index	<=3	1 – 30	1
9	End Index	<=3	1– 30	30
10	MAC List	<=12*30		
11	Reserved (optional)	0		
12	Reserved (optional)	0		
13	Reserved (optional)	0		
14	Reserved (optional)	0		
15	Reserved (optional)	0		
16	Reserved	0		
17	Reserved	0		

18	Reserved	0		
19	Reserved	0		
20	Reserved	0		
21	Reserved	0		
22	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ *<Enable>:* Whether to support the Bluetooth beacon ID accessories.

- 0: Not support.
- 1: Support.

✧ *<Accessory Model>:* The model of the Bluetooth accessory. The following is supported now:

- 0: WKF300 (Keyfob). Two reserved parameters are used as follows:

Reserved	0		0
Reserved	0		0
Read Interval	<=3	1 -1440 (min)	60
Reserved	0		
Reserved	0		

✧ <Read Interval>: It specifies the interval of detecting Keyfob.

- After <Enable> is set to 1, the device will scan Keyfobs according to <Read Interval>, and then it will send the **+RESP:GTBID** message to report information of Keyfob(s). If more than 3 Keyfobs are detected, the **+RESP:GTBID** message contains information of top 3 Keyfobs with the strongest signal.

- 3: WID300. Five reserved parameters are used as follows:

Reserved	0	0	0
Detection Mode	1	0|2	0
Detection Interval	<=3	30 - 600(s)	30
Reserved	0		
Reserved	0		

✧ <WID300 Detection Mode>: The parameter which specifies the mode of detecting WID300.

- 0: Disable detection.
- 2: Enable detection: The device will keep scanning WID300 continuously. If the device detects WID300 or change of available WID300, it will send the +RESP:GTBID messages to report information of WID300. the

+RESP:GTBID message contains information of top 3 WID300 with the strongest signal.

- 4: WID310. Five reserved parameters are used as follows:

Reserved	0	0	0
Detection Mode	1	0|2	0
Detection Interval	<=3	30 - 600(s)	30
Reserved	0		
Reserved	0		

✧ <Detection Mode>: The parameter which specifies the mode of detecting WID310.

- 0: Disable detection.
- 2: Enable detection: The device will keep scanning WID310 continuously. If the device detects WID310 or change of available WID310, it will send the **+RESP:GTBID** messages to report information of WID310. the **+RESP:GTBID** message contains information of top 3 WID310 with the strongest signal.

✧ *<Append Mask>:* Bitwise mask to configure the composition of Bluetooth accessary info. In **+RESP:GTBAA** message, the Bluetooth accessories data items will be reported according to the mask set by this field.

- Bit 0: Reserved.
- Bit 1: Bluetooth accessory MAC.
- Bit 2: Reserved.
- Bit 3: Bluetooth accessory battery voltage.
- Bit 4: Reserved.

✧ *<Low Voltage Threshold>:* Specify the lower limit voltage. When the voltage of Bluetooth accessary is below this value, the device will report message **+RESP:GTBAA** to back server. 0 means to disable low voltage detection.

✧ *<Start Index>, <End Index>:* The index range of the MAC list into which the MAC addresses are to be updated. For example, if <Start Index> is set to 1 and <End Index> is set to 2, then the first two MAC addresses in the MAC list will be updated by the MAC addresses provided in the parameter <MAC List>. <Start Index> and<End Index> determine the total amount of MAC addresses that will be updated. If either one is empty, there should be no <MAC List> following the empty value. A maximum of 75 MAC addresses can be updated each time.

✧ *<MAC List>:* A list of comma-separated MAC addresses to be updated to the MAC list. The quantity of the MAC addresses is determined by <Start Index>and <End Index>.

Note: If more accessories are needed, please adjust <Start Index> and <End Index> for appropriate setup. If some MAC addresses in <MAC List> are empty, then the corresponding MAC address will be deleted. For example, to delete the 4th, 5th and 6th MAC addresses of the <MAC List>, please set <Start Index> to 4 and set <End Index>to 6 and keep the three MAC addresses of <MAC List> empty.

The acknowledgment message of the **AT+GTBID** command:

➢ **+ACK:GTBID,**

Example: +ACK:GTBID,600100,135790246811220,,0005,20090214093254,11F0$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.5. Other Settings

3.2.5.1. Real Time Operation

The **AT+GTRTO** command is used to retrieve information from the terminal or control the terminal.

➢ **AT+GTRTO=**

Example: AT+GTRTO=gl502m,2,BSI,,,,,FFFF$				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Sub Command	<=2	1 – D	
3	AT Command | Configuration Mask | ATI Mask	3|16|8	"SRI"|0000000000000000 – FFFFFFFFFFFFFFFF|00000000 – FFFFFFFF	
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Sub Command Parameter	<=1		
8	Serial Number	4	(HEX)	
9	Tail Character	1	$	$

✧ <*Sub Command*>: A numeral to indicate the sub command to be executed.

1: **(RTL)**: Request the device to report its current position.

2: **(READ)**: Get the current configuration of the terminal via message **+RESP: GTALM or +RESP: GTALS** or **+RESP: GTALC** or **+RESP: GTALL**.

3: **(REBOOT)**: Reboot the device remotely.

4: **(RESET)**: Reset the parameters to factory settings (or default settings) and clear all

buffered messages.

5: **(PWROFF)**: Power off the device remotely.

6: **(CID)**: Request the device to report the ICCID of the installed SIM card.

7: **(CSQ)**: Request the device to report the current network signal level.

8: **(VER)**: Request the device to report version information including the device type, the firmware version, and the hardware version.

B: **(TMZ)**: Get the time zone settings via report **+RESP:GTTMZ**.

C: **(GIR)**: Get cell information via message **+RESP:GTGSM**.

D: **(AIF)**: Get APN, ICCID, base station ID, RSSI, cell ID, and IP via **+RESP:GTAIF.**

E: **(GSV)**: Request the device to report the GPS fix level. The corresponding information will be reported via the message **+RESP:GTGSV.**

F: **(INF)**: Request the device information report. The corresponding information will be reported via the message **+RESP:GTINF**.

10: **(CLM)**: Reset the coulometer. This command needs to be sent when the user replaces the battery with a new one.

11-13: Reserved

14: **(DELBUF)**: Delete all the buffered reports.

1C: **(ATI)**: Get device basic information via the message **+RESP:GTATI**.

✧ *<AT Command/Configuration Mask/ATI Mask>*:

- *<AT Command>*: To get a single AT command's configuration when <Sub Command> is set to 2, follow the format in the following example. For example, to get the configuration of AT+GTBSI, please set AT+GTRTO=gl502m,2,BSI,,,,,0015$, and get it via **+RESP:GTALS**.
- *<Configuration Mask>*: If *<Sub Command>* is set to 2, the configuration information of the specified *<Configuration Mask>* can be obtained via the message **+RESP:GTALC**. The Configuration Mask must be 16 bytes. If it's less than 16 bytes, '0' will be added in the high bytes of the Configuration Mask.

Configuration Mask Table:

Bit	Item to Mask
Bit60	CMD
Bit49 ~ Bit 59	Reserved
Bit48	UDF
Bit28 ~ Bit 47	Reserved
Bit27	NTS
Bit25 ~ Bit 26	Reserved
Bit24	AEX
Bit23	IEX
Bit22	BID
Bit21	Reserved
Bit20	BTS
Bit19	BAS
Bit18	HRM
Bit17	UPC
Bit16	GLM

Bit15	WLT
Bit14	Reserved
Bit 13	Reserved
Bit12	LTA
Bit11	Reserved
Bit10	TEM
Bit9	GEO
Bit8	PDS
Bit7	NMD
Bit6	TMA
Bit5	DOG
Bit4	PIN
Bit 3	CFG
Bit 2	Reserved
Bit 1	SRI
Bit 0	BSI

- ATI Mask: If <Sub Command> is set to 0x1C, the basic information will be reported via the message **+RESP:GTATI** according to chosen <ATI Mask>. ATI Mask Table:

Mask Bit	Item
Bit 0	Firmware Version
…	…
Bit 7	Modem Firmware Version
Bit 12	Hardware Version
Bit 13	Modem Hardware Version
Bit 16	Bootloader Version
Bit 17 ~ Bit 31	Reserved

➢ If <*Sub Command*> is set to 2, and this parameter field **is left empty**, the device will report all the configurations via **+RESP:GTALL**.

✧ <*Sub Command Parameter*>: This parameter is used for part of the sub commands. This field cannot be empty for the sub-commands listed below.

For the sub command RESET (4):

- 0: Light. Reset all configuration parameters, except:
  (1) Network-related configuration (APN, server IP, server port, network mode, etc.).
  (2) Device password.
  (3) Local time calibration (AT+GTTMA).
- 1: Heavy. Reset all configuration parameters.

Note: The AT+GTPIN will not be reset.

The acknowledgement message of the **AT+GTRTO** command:

➢ **+ACK:GTRTO,**

Example: **+ACK:GTRTO,D50201,352948070074301,,GPS,000B,20161005172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	

Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Sub Command	<=6	Sub command string	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.5.2. White Number List Configuration

The **AT+GTWLT** command is used to set up the white number list.

➢ **AT+GTWLT=**

Example: **AT+GTWLT=gl502m,1,1,2,13813888888,13913999999,,,,,000C$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	gl502m
2	Number Filter	1	0|1	0
3	Phone Number Start	<=2	1 - 10	
4	Phone Number End	<=2	1 - 10	
5	White Number List	<=20*10		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Serial Number	4	(HEX)	
11	Tail Character	1	$	$

<*Number Filter*>: A numeral to indicate whether to filter the original number according to <*White Number List*> before implementation of SMS commands.

- 0: SMS commands will be implemented no matter whether the original number is in the <*White Number List*>.
- 1: SMS commands will be implemented only when the original number is in the <*White Number List*>.

✧ <*Phone Number Start*>: A numeral to indicate the first index of the White Number List numbers to be input. For example, if it is **1**, the device will update the White Number List from the **1**st number. If it is empty, there should be no <*White Number List*>.

✧ <*Phone Number End*>: A numeral to indicate the last index of the White Number List numbers to be input. For example, if it is **2**, the device will update the whitelist numbers until the **2**nd one. If it is empty, there should be no <*White Number List*>.

✧ <*White Number List*>: A White Number List of phone numbers. Two adjacent phone numbers are separated with ",". The number of the phone numbers in the list is determined by the parameters <*Phone Number Start*> and <*Phone Number End*>. For example, if <*Phone Number Start*> is **1** and <*Phone Number End*> is **2**, the <*White Number List*> should include **2**

phone numbers and the two numbers are separated by",".

The acknowledgment message of the **AT+GTWLT** command:

➢ **+ACK:GTWLT**

Example: **+ACK:GTWLT,D50201,352948070074301,,000C,20161005085505,0025$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

Note: Make sure the size of the command is not greater than 160 bytes if it is sent via SMS.

3.2.4.3 Settings for SMS with Google Maps Link

The **AT+GTGLM** command is used to configure whether to send an SMS with a Google Maps link for LBC.

➢ **AT+GTGLM=**

Example: **AT+GTGLM=gl502m,1,1,1,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 - 20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	gl502m
2	Google Mode	1	0|1|2	0
3	Phone Number Start	1	1 - 3	
4	Phone Number End	1	1 - 3	
5	Direct Number List	<=20*3		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Serial Number	4	(HEX)	
11	Tail Character	1	$	$

✧ <*Google Mode*>: A numeral to indicate whether to send an SMS with a Google Maps link to the number in <*Direct Number List*> for LBC event.

- 0: Do not send an SMS with a Google Maps link to the number in the <*Direct Number List*> for LBC event.
- 1: Send an SMS with a Google Maps link including the terminal name to the number

in the <*Direct Number List*> for LBC event.

- 2: Send an SMS with a Google Maps link not including the terminal name to the number in the <*Direct Number List*> for LBC event.

✧ <*Phone Number Start*>: A numeral to indicate the first index of the direct numbers to be input. For example, if it is **1**, the device will update the direct number list from the **1**st number. If it is empty, there should be no <*Direct Number List*>.

✧ <*Phone Number End*>: A numeral to indicate the last index of the direct numbers to be input. For example, if it is **2**, the device will update the direct number list until the **2**nd one. If it is empty, there should be no <*Direct Number List*>.

✧ <*Direct Number List*>: A list of phone numbers. Two adjacent phone numbers are separated with "**,**". The number of the phone numbers in the list is determined by the parameters <*Phone Number Start*> and <*Phone Number End*>. For example, if <*Phone Number Start*> is **1** and <*Phone Number End*> is **2**, the <*Direct Number List*> should include **2** phone numbers and the two numbers are separated by ",".

The acknowledgment message of the **AT+GTGLM** command:

➢ **+ACK:GTGLM,**

Example: **+ACK:GTGLM,F50601,015181001707687,,0073,20190906073241,00AB$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.4.4. Over-the-Air Configuration Update

The **AT+GTUPC** command is used to download configuration file over the air for the update of the local configuration.

➢ **AT+GTUPC=**

Example: **AT+GTUPC=gl502m,0,10,0,0,0,0,http://www.queclink.com/configure.ini,0,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' - '9', 'a' - 'z', 'A' - 'Z'	gl502m
2	Max Download Retries	1	0 – 3	0
3	Download Timeout	<=2	5 – 30(min)	10
4	Download Protocol	1	0	0
5	Enable Report	1	0|1	0
6	Update Interval	1	0 – 8760	0
7	Download URL	<=100	URL	

8	Mode	1	0|1	0
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Serial Number	4	(HEX)	
13	Tail Character	1	$	$

- <*Password*>: The valid characters for the password include '0'–'9', 'a'–'z', and 'A'–'Z'. The default value is "gl502m".
- <*Max Download Retries*>: It specifies the maximum number of retries to download the configuration file upon downloading failure.
- <*Download Timeout*>: If downloading is not finished within this time, it will be regarded that the downloading failed.
- <*Download Protocol*>: The protocol used to download the file. Only HTTP is supported now. It is set to 0.
- <*Enable Report*>: A numeral to indicate whether to send the message **+RESP:GTUPC** to indicate the configuration is updated over the air.
  - 0: Do not report the message **+RESP:GTUPC**.
  - 1: Report the message **+RESP:GTUPC**.
- <*Update Interval*>: The time interval in hours for updating the configuration over the air.
- <*Download URL*>: It specifies the URL to download the configuration file. If the URL ends with "/", it means it is a path without any file name. <imei>.ini will be added as the file name at the end of URL.
- <*Mode*>: A numeral to indicate the working mode of downloading configuration over the air.
  - 0: Disable this function.
  - 1: Enable this function.

The acknowledgement message of the **AT+GTUPC** command:

➢ **+ACK:GTUPC**

Example: **+ACK:GTUPC,D50201,352948070074301,,0005,20161005172830,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	MEID	
Device Name	20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

Note:

(1) If the <*Download URL*> ends with "/", it means it is a path without any file name. <imei>.ini

will be added as the file name at the end of URL. If it is larger than 100, an error will be reported.

(2) The maximum size of configuration file is 32*200 bytes. If the size of configuration file is larger than 32*200 bytes, configuration file cannot be downloaded.

(3) The length of a command should not exceed 200 bytes in the configuration file.

(4) Make sure there's only one command per line in the configuration file and there should be a "\r\n" between each command.

3.2.4.5 SMS Position Request

This command can only be sent via SMS, and will enable the device to send SMS message with a Google Maps hyperlink of the current position immediately. Please refer to the Chapter 3.3.6 for details of the position report.

Command Format	**get position**
Example	get position

get position: It's a command string to request the current position.

3.2.5.3. Input Expansion

The command **AT+GTIEX** is used to configure the external Bluetooth input accessories. All these inputs are customizable. If the logic status is changed on one of Bluetooth input accessories, the device will report the message **+RESP:GTDIS** to the backend server.

- **AT+GTIEX=**

Example: AT+GTIEX=gl502m,0,0,1,,,,,,,,FFFF$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Password	4 – 6	'0' – '9' 'a' – 'z' 'A' – 'Z'	gl500m
Input Expansion Type	1	0	0
Bind BAS Index	1	0 – 9	0
Input Number	1	1 - 4	1
Input ID	1	5	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

- *<Input Expansion Type>:* It's used to indicate which extended device the following parameters are used for.

  0: Bluetooth accessory input setting.

  Note: Due to the limitation of the detection mechanism, changing the input state within a short time may not be detected.
- *<Bind BAS Index>:* It is used to bind the specific configuration in **AT+GTBAS**.
- *<Input Number>:* It is used to indicate how many of the following special parameters. If the *<Input Expansion Type>* is 0, it indicates the number of configured Bluetooth input setting. In one configuration, <Input ID> is included and others are reserved.
- *<Input ID>:* The ID of 5 is Bluetooth accessory input and the parameters *<Accessory Type>* and *<Accessory Model>* should be set in **AT+GTBAS**.

  Note: If *<Input Number>* is set to 5 and the index in **AT+GTBAS** is set to the relevant configuration, and *<Bind BAS Index>* is also set to the same index, this means that the Bluetooth accessory input port is enabled.

The acknowledgment message of the **AT+GTIEX** command:

➢ **+ACK:GTIEX,**

Example: **+ACK:GTIEX,D50201,867995030082104,,0054,20190415085637,0261$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.4. Analog Input Expansion

The command **AT+GTAEX** is used to configure the parameters of external Bluetooth analog input accessories. All these inputs are customizable.

➢ **AT+GTAEX=**

Example: **AT+GTAEX=gl502m,0,0,1,5,0,8000,8000,,,,,FFFF$**

Parameter	Length (Byte)	Range/Format	Default
Password	4 – 6	'0' – '9' 'a' – 'z' 'A' – 'Z'	gl500m
Analog Input Expansion Type	1	0	
Bind BAS Index	1	0 – 9	0
Analog Input Number	1	1	
Analog Input ID	1	5	
Mode	1	0|1|2	0
Min Threshold	<=5	8000 – 32000(mv)	
Max Threshold	<=5	8000 – 32000(mv)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

- *<Analog Expansion Type>:* It's used to indicate which extended device the following parameters are used for.

  0: Bluetooth analog input accessory setting.
- *<Bind BAS Index>:* It is used to bind the specific configuration in **AT+GTBAS**.
- *<Analog Input Number>:* The total number of configured Bluetooth Analog Input Setting. In one configuration, *<Analog Input ID>, <Mode>, <Min Threshold>* and *<Max Threshold>* are included and others are reserved.
- *<Analog Input ID>:* The ID of 5 is Bluetooth analog input ID, the parameters <Accessory Type> and <Accessory Model> should be set in **AT+GTBAS**.
- *<Mode>:* The working mode of the analog input alarm (**+RESP:GTAIS**).
  - 0: Disable analog input alarm.
  - 1: Enable analog input alarm: If the current input voltage is within the range of (<Min. Threshold>, <Max. Threshold>), the alarm will be triggered.
  - 2: Enable analog input alarm: If the current input voltage is outside the range of (<Min. Threshold>, <Max. Threshold>), the alarm will be triggered.
- *<Min Threshold>:* This parameter specifies the lower voltage limit for the analog input port to trigger the alarm when the <Mode> is set to 1 or 2.
- *<Max Threshold>:* This parameter specifies the upper voltage limit for the analog input port to trigger the alarm when the <Mode> is set to 1 or 2.

The acknowledgment message of the **AT+GTAEX** command:

➢ **+ACK:GTAEX,**

Example: **+ACK:GTAEX,D50201,867995030082104,,0054,20190415085637,0261$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.5. Command String Storage

The **AT+GTCMD** command is used to store the commands which will be used by the command AT+GTUDF.

➢ **AT+GTCMD=**

Example: **AT+GTCMD=gl521m,1,0,AT+CFUN=4,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	gl521m
2	Mode	1	0 - 1	0
3	Stored cmd ID	3	0 - 31	
4	Command String	200	AT command	
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Serial Number	4	(HEX)	
10	Tail Character	1	$	$

- ✧ <Mode>: The treating method of the command string.
  - 0: Delete the stored command.
  - 1: Add the stored command.
- ✧ <Stored cmd ID>: A numeral to identify the stored command.
- ✧ <Command String>: The whole content of the stored command. The command should end with '$'.

➢ **+ACK:GTCMD,**

Example: **+ACK:GTCMD, C50205,015181001707687,,0079,20200806073622,00B8$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	IMEI	
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.5.6. User Defined Function

The **AT+GTUDF** command is used to bind input events and the stored commands. The input events will trigger the corresponding stored commands.

➢ **AT+GTUDF=**

Example: **AT+GTUDF=gl521m,1,0,1000000000,0,0,0,1,0,460,,,,,,,,,,,,FFFF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Password	4 - 20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	Gl521m
Mode	1	0 - 2	0
Group ID	2	0 - 31	
Input ID Mask	16	0 - FFFFFFFFFFFFFFFF	
Debounce Time	5	0 - 86400(s)	0
Inzizo Mask	5	0 - FFFFF	0
Outzizo Mask	5	0 - FFFFF	0
Stocmd ID Mask	16	0 - FFFFFFFFFFFFFFFF	
Stocmd Ack	1	0|1	0
MCC List	<=3*10		
Reserved			
Reserved			
Reserved			
Serial Number	4	(HEX)	

Tail Character	1	$	$

✧ <Mode>: The working mode of the user defined function.
- 0: Disable the group.
- 1: Enable the group.
- 2: Delete the group.

✧ <Group ID>: A numeral to identify the group of input events and stored commands to be executed.

✧ <Input ID Mask>: The bitwise mask to indicate the input events that included in the group.

Bit 0 (00000001): Select ID1
Bit 1 (00000002): Select ID2
Bit 2 (00000004): Select ID3
Bit 3 (00000008): Select ID4
For example:
Bit (00000003): Select ID1, and ID2
Bit (00000017): Select ID1, ID2, ID3, and ID5

ID	Mask Bit	Item
1	**Bit 0**	Power on finished
2	**Bit 1**	Reserved
3	**Bit 2**	Reserved
4	**Bit 3**	The PDP connection is attached
5	**Bit 4**	The PDP connection is not attached
6	**Bit 5**	The network is registered
7	**Bit 6**	The network is not registered
8	**Bit 7**	Network roaming
9	**Bit 8**	Network non-roaming
10	**Bit 9**	SIM card is locked
11	**Bit 10**	GPS is turned on
12	**Bit 11**	GPS is turned off
13	**Bit 12**	The device is stationary
14	**Bit 13**	The device is moving
15	**Bit 14**	Reserved
16	**Bit 15**	Reserved
17	**Bit 16**	Reserved
18	**Bit 17**	Reserved
19	**Bit 18**	Reserved
20	**Bit 19**	Reserved
21	**Bit 20**	Reserved
22	**Bit 21**	Reserved
23	**Bit 22**	SIM card is inserted
24	**Bit 23**	SIM card is not inserted
25	**Bit 24**	Reserved

26	**Bit 25**	Reserved
27	**Bit 26**	Reserved
28	**Bit 27**	Reserved
29	**Bit 28**	Reserved
30	**Bit 29**	Reserved
31	**Bit 30**	Reserved
32	**Bit 31**	Reserved
33	**Bit 32**	Reserved
34	**Bit 33**	Reserved
35	**Bit 34**	Reserved
36	**Bit 35**	Reserved
37	**Bit 36**	Reserved
38	**Bit 37**	Reserved
39	**Bit 38**	Messages need to be sent
40	**Bit 39**	No messages need to be sent
41	**Bit 40**	SOS event
42	**Bit 41**	Reserved
43	**Bit 42**	Reserved
44	**Bit 43**	Reserved

✧ <Debounce Time>: The debounce time for input events before the specified stored commands are executed.

✧ <Inzizo Mask>: The bitwise masks to indicate the input events within the Geo-fence.

ID	Mask Bit	Item
1	**Bit 0**	Inside the Geo 0
2	**Bit 1**	Inside the Geo 1
3	**Bit 2**	Inside the Geo 2
4	**Bit 3**	Inside the Geo 3
5	**Bit 4**	Inside the Geo 4
6	**Bit 5**	Inside the Geo 5
7	**Bit 6**	Inside the Geo 6
8	**Bit 7**	Inside the Geo 7
9	**Bit 8**	Inside the Geo 8
10	**Bit 9**	Inside the Geo 9
11	**Bit 10**	Inside the Geo 10
12	**Bit 11**	Inside the Geo 11
13	**Bit 12**	Inside the Geo 12
14	**Bit 13**	Inside the Geo 13
15	**Bit 14**	Inside the Geo 14
16	**Bit 15**	Inside the Geo 15
17	**Bit 16**	Inside the Geo 16
18	**Bit 17**	Inside the Geo 17

19	**Bit 18**	Inside the Geo 18
20	**Bit 19**	Inside the Geo 19

✧ <*Outzizo Mask*>: The bitwise masks to indicate the input events outside the Geo-fence.

ID	Mask Bit	Item
1	**Bit 0**	Outside the Geo 0
2	**Bit 1**	Outside the Geo 1
3	**Bit 2**	Outside the Geo 2
4	**Bit 3**	Outside the Geo 3
5	**Bit 4**	Outside the Geo 4
6	**Bit 5**	Outside the Geo 5
7	**Bit 6**	Outside the Geo 6
8	**Bit 7**	Outside the Geo 7
9	**Bit 8**	Outside the Geo 8
10	**Bit 9**	Outside the Geo 9
11	**Bit 10**	Outside the Geo 10
12	**Bit 11**	Outside the Geo 11
13	**Bit 12**	Outside the Geo 12
14	**Bit 13**	Outside the Geo 13
15	**Bit 14**	Outside the Geo 14
16	**Bit 15**	Outside the Geo 15
17	**Bit 16**	Outside the Geo 16
18	**Bit 17**	Outside the Geo 17
19	**Bit 18**	Outside the Geo 18
20	**Bit 19**	Outside the Geo 19

Note: If the <*Inzizo Mask*> *or* <*Outzizo Mask*> is set to 0, please check Bit 26 - Bit 35 in <*Input ID Mask*>.

✧ <*Stocmd ID Mask*>: The bitwise masks of the stored command which will be executed after the state of the group becomes true (i.e. input events included in the group occur).

✧ <*Stocmd Ack*>: A numeral to indicate whether to send an acknowledgement message when a stored command is executed.

- 0: Do not send an acknowledgement message after a stored command is executed.
- 1: Send an acknowledgement message after a stored command is executed.

Note: Maximum 5 stored commands in a group will be executed.

✧ <*MCC List*>: The list of MCCs that can be used as a condition to trigger the logic.

The acknowledgement message of the **AT+GTUDF** command:

➢ **+ACK:GTUDF**

Example: **+ACK:GTUDF,C50205,015181001707687,,007E,20200806073729,00BD$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	

Unique ID	15	IMEI	
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.3. Report

3.3.1. Position Related Report

3.3.1.1. General Position Report

- **+RESP:GTGEO**: The message for **AT+GTGEO**
- **+RESP:GTRTL**: The message for **AT+GTRTO-RTL**
- **+RESP:GTPNL**: The first location message after the device powers on
- **+RESP:GTNMR:** Non-movement is detected by motion sensor according to the setting of **AT+GTNMD**
- **+RESP:GTDOG:** The watchdog rebooting message
- **+RESP:GTFRI:** The timed message
- **+RESP:GTDIS:** If the status change of digital inputs is detected, the device will send the message **+RESP:GTDIS** to the backend server.

Example:

+RESP:GTGEO,D50201,015425000020117,gl502m,2,0,1,4,0.0,0,419.4,114.015800,22.538521,20191011065126,0460,0001,253D,AEC3,19,0,,92,0,0,27.6,20191011145127,0044$

+RESP:GTRTL,D50201,015425000020117,gl502m,0,0,1,3,0.0,0,116.8,114.015631,22.537277,20191011081006,0460,0001,253D,AEC3,10,0,,92,1,1,28.3,20191011161007,0089$

+RESP:GTNMR,D50201,015425000020117,gl502m,0,1,1,0,0.0,0,326.5,114.019362,22.537809,20191011075205,0460,0001,253D,AEC3,21,0,,92,1,1,27.6,20191011160517,0083$

+RESP:GTDOG,D50201,015425000020117,gl502m,0,1,1,0,0.0,0,326.5,114.019362,22.537809,20191011075305,0460,0001,253D,AEC3,21,0,,92,1,1,27.6,20191011160617,0082$

+RESP:GTFRI,D50201,015425000020117,gl502m,0,0,1,2,0.0,0,326.5,114.019362,22.537809,20191011075126,0460,0001,253D,AEC3,21,0,,92,0,0,28.8,20191011155127,0079$

+RESP:GTDIS,D50201,015425000020257,gl502m,0,0,1,2,0.0,0,326.5,114.019362,22.537809,20191011075126,0460,0001,253D,AEC3,21,0,,92,0,0,28.8,20191011155127,0079$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	(HEX)	

Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Report ID	1	0 – 5	
Report Type	1	0 – 1	
Number	<=1	1	
GPS Accuracy	1	0|1 – 50	
Speed	<=5	0.0 – 999.9(km/h)	
Azimuth	<=3	0 – 359	
Altitude	<=8	(-)XXXXX.X (min)	
Longitude	<=11	(-)XXX.XXXXXX	
Latitude	<=10	(-)XX.XXXXXX	
GPS UTC Time	14	YYYYMMDDHHMMSS	
MCC	0|4	0XXX	
MNC	0|4	0XXX	
LAC	0|4	XXXX	
Cell ID	<=8	XXXX	
CSQ RSSI	<=2	0 - 31|99	
CSQ BER	<=2	0 - 7|99	
Battery Voltage	<=5	0-10000(mV)	
Battery Percentage	<=3	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	<=5	+/-XX.X	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Report ID*>:

- The ID of Geo-fence in **+RESP:GTGEO**.
- The ID of digital input port which triggers the report **+RESP:GTDIS**. It is 5.

For the ID of other reports, it is 0.

✧ <*Report Type*>: The type of the messages **+RESP:GTGEO, +RESP:GTDOG** and **+RESP:GTNMR**. For other reports, it is 0.

- For **+RESP:GTGEO**

  0: Exit the corresponding Geo-fence

  1: Enter the corresponding Geo-fence
- For **+RESP:GTNMR**

  0: The state of the device changed from motion to rest

  1: The state of the device changed from rest to motion
- For **+RESP:GTDOG**

  0: Reboot periodically according to the <*Interval*> and <*Time*> settings
- For **+RESP:GTDIS**

  0: The current logical state of the input port is disabled state.

1: The current logical state of the input is enabled state.

- <*Number*>: The number of points in one message. This parameter value is always 1.
- <*GPS Accuracy*>: A numeral to indicate the GPS fix status and HDOP of the GPS position. 0 indicates the current GPS fix fails and the last known GPS position is used. A non-zero value (1 - 50) indicates the current GPS fix is successful and represents the HDOP of the current GPS position.
- <*Speed*>: The speed read from GPS.
- <*Azimuth*> The azimuth from GPS.
- <*Altitude*>: The height above sea level from GPS.
- <*Longitude*>: The longitude of the current position. The format is "(-)xxx.xxxxxx" and the value range is from "-180.000000" to "180.000000". The unit is degree. West longitude is represented as a negative value starting with the minus sign "-" and east longitude is represented as a positive value without "+".
- <*Latitude*>: The latitude of the current position. The format is "(-)xx.xxxxxx" and the value range is from "-90.000000" to "90.000000". The unit is degree. South latitude is represented as a negative value starting with the minus sign "-" and north latitude is represented as a positive value without "+".
- <*GPS UTC Time*>: UTC time from GPS.
- <*MCC*>: Mobile country code. It is 3-digit in length and ranges from 000–999. If Bit 3 of the field <*Report Composition Mask*> in **AT+GTCFG** is not set to 1, the length of this field is 0 in ASCII format message.
- <*MNC*>: Mobile network code. It is 3-digit in length and ranges from 000–999. If Bit 3 of the field <*Report Composition Mask*> in **AT+GTCFG** is not set to 1, the length of this field is 0 in ASCII format message.
- <*Cell ID*>: Cell ID in hex format.
- <*CSQ RSSI*>: The signal strength level.
- <*CSQ BER*>: The quality of the signal. The range is 0-7, and 99 is for unknown signal strength.
- <*Battery Percentage*>: Current volume of the battery in percentage.
- <*Mode Selection*>: Current mode of the device.
  - 0: Power saving mode (PSM)
  - 1: Continuous mode
- <*Movement Status*>: The movement status of the device. It must be noted that the sensor function must be enabled in the **AT+GTNMD** command, otherwise this field is empty.
  - 0: Stillness
  - 1: Motion
- <*Temperature>:* The real time temperature value of the terminal. It must be noted that the temperature function must be enabled in the in the **AT+GTTEM** command, otherwise this field is empty.

3.3.1.2 Location Request Report

- **+RESP:GTLBC,**

Example:
+RESP:GTLBC,D50201,015425000021222,GL502M,15889570956,3,0.3,0,146.0,114.016352,22.537313,20200109022915,0460,0001,253D,AEC3,21,0,,91,1,,25.7,20200109102917,0B13$

Parameter	Length	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Original Number	<=20	phone number	
GPS Accuracy	1	0|1 – 50	
Speed	<=5	0.0 – 999.9(km/h)	
Azimuth	<=3	0 – 359	
Altitude	<=8	(-)XXXXX.X (min)	
Longitude	<=11	(-)XXX.XXXXXX	
Latitude	<=10	(-)XX.XXXXXX	
GPS UTC Time	14	YYYYMMDDHHMMSS	
MCC	0|4	0XXX	
MNC	0|4	0XXX	
LAC	0|4	XXXX	
Cell ID	<=8	XXXX	
CSQ RSSI	<=2	0 - 31|99	
CSQ BER	<=2	0 - 7|99	
Battery Voltage	<=5	0-10000(mV)	
Battery Percentage	<=3	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	<=5	+/-XX.X	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Original Number*>: The phone number which initiates this report.

➢ **+RESP:GTAIS**

If the analog input alarm is enabled by the command **AT+GTAEX**, the device will send the report **+RESP:GTAIS** to the server when analog input voltage enters the alarm range.

Example:
+RESP:GTAIS,F1030A,868446036599153,gl501m,13393,5,1,1,1,0.0,0,131.3,114.014838,22.538404,20190823061047,0460,0001,253D,AEC3,,0.0,20190823141049,1254$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Analog Input VCC	<=5	0 – 32000 mV	

Report ID	1	5	
Report Type	1	0 – 1	
Number	1	0 – 1	
GPS Accuracy	<=2	0/1 – 50	
Speed	<=5	0.0 – 999.9 km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	(–)xxxxx.x m	
Longitude	<=11	(–)xxx.xxxxxx	
Latitude	<=10	(–)xx.xxxxxx	
GPS UTC Time	14	YYYYMMDDHHMMSS	
MCC	0/4	0XXX	
MNC	0/4	0XXX	
LAC	0/4	XXXX	
Cell ID	0/4/8	XXXXXXXX	
Reserved	0	Reserved	
Send Time	0/14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Analog Input VCC*>: The Bluetooth accessory analog input voltage. When the voltage of the analog input meets the alarm condition as set by the command **AT+GTAEX,** the device will send the current analog input voltage with the **+RESP:GTAIS** message to the backend server.
- <*Report ID*>: The ID of analog input port which triggers report **+RESP:GTAIS**. The ID is 5.
  <*Report type*>: It has two meanings as below:
  - 0: Outside of the predefined range.
  - 1: Inside of the predefined range.
- <*Number*>: The number of the GPS positions included in the report. Generally, it equals to 1.

3.3.2. Device Information Report

➢ **+RESP:GTINF:**

Example: **+RESP:GTINF,D50201,015425000020117,gl502m,89860117851023145136,21,0,,0,,92,29.1,20191011075205,0,,,,,,,20191011155208,0081$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
ICCID	20		
CSQ RSSI	<=2	0 – 31|99	
CSQ BER	<=2	0 – 7|99	
Reserved	0		
Mode Selection	1	0|1	
Reserved	0		
Battery Percentage	3	0 - 100	
Temperature	<=5	(-)XX.X	
Last GPS Fix UTC Time	14	YYYYMMDDHHMMSS	
Movement Status	1	0|1	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*ICCID*>: The ICCID of the installed SIM card.
- <*CSQ RSSI*>: The network signal strength level.
- <*CSQ BER*>: The quality of the network signal.
- <*Last GPS Fix UTC Time*>: The UTC time of the latest successful GPS fix.
- *<Temperature>:* The real time temperature value of the terminal. It must be noted that the temperature function must be enabled in the in the **AT+GTTEM** command, otherwise this field is empty.

3.3.3. Report for Querying

The reports for real time querying via the command **AT+GTRTO** are as follows.

3.3.3.1 +RESP:GTALM

After the device receives the command **AT+GTRTO** to read all the configurations, it will send all configurations to the backend server by the message **+RESP:GTALL.** This message is only sent via GPRS/LTE even if the report mode is Force on SMS. If the message's length is too long, then it will be sub-packaged into several **+RESP:GTALM** messages. The **+RESP:GTALM** does not support HEX format report. When the protocol format is hex format, **+RESP:GTALM** will still be reported in ASCII format.

- **+RESP:GTALM,**

Example:
+RESP:GTALM,D50201,015425000021222,GL502M,2,1,BSI,2gnet,,,iot.aer.net,,,1,2,SRI,3,,0,218.17.46.11,65535,218.17.46.11,65534,15889570956,0,0,0,10,0,,CFG,gl502m,GL502M,,0823,003F,1,5,11111111111111,1,1200,0,24,24,1,1,5,0,0000,1,1,10,2,,1,2,PIN,0,,,,,,DOG,0,,7,0200,,1,,0,,,,TMA,+,08,00,0,,,,,,NMD,0,0,3,3,2,1440,2,,,,,,,,PDS,0,00000019,,,,,,GEO,0,0,114.016144,22.537659,50,,,,,,,,,1,0,114.016144,22.537659,50,,,,,,,,,2,0,114.016144,22.537659,50,,,,,,,,,3,0,114.016144,22.537659,50,,,,,,,,,4,0,-180.000000,22.537659,50,,,,,,,,,5,0,22.537659,22.537659,50,,,,,,,,,6,0,22.537659,22.537659,50,,,,,,,,,7,0,22.537659,22.537659,50,,,,,,,,,8,0,22.537659,22.537659,50,,,,,,,,,9,0,22.537659,22.537659,50,,,,,,,,,10,0,22.537659,22.537659,50,,,,,,,,,11,0,22.537659,22.537659,50,,,,,,,,,12,0,22.537659,22.537659,50,,,,,,,,,13,0,22.537659,22.537659,50,,,,,,,,,14,0,22.537659,22.537659,50,,,,,,,,,15,0,22.537659,22.537659,50,,,,,,,,,16,0,22.537659,22.537659,50,,,,,,,,,17,0,22.537659,22.537659,50,,,,,,,,,18,0,22.537659,22.537659,50,,,,,,,,,19,0,22.537659,22.537659,50,,,,,,,,,TEM,1,0,0,0,60,300,0,,,,LSA,0,5,3,0,0,2,0,,,,LTA,0,,3,0,0,2,,,,,DMS,0,queclinkDM,1,queclink.3322.org,8020,,,1,779F,,0,,0,100,,WLT,0,1,10,15889570956,15889570956,15889570956,15889570956,15889570956,15889570956,15889570956,15889570956,15889570956,15889570956,,,,20200103150303,018C$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Total Packets	<=2	1 – 10	
Current Packet	<=2	1 – 10	
Configurations	< 1500		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Total Packets*>: The total number of **+RESP:GTALM.**
- <*Current Packet*>: The sequence number of current packet.
- <*Configurations*>: The current configuration of the device.

Note: The length of every **+RESP:GTALM** message (including header and tail) should be no more than 1500 characters.

3.3.3.2 +RESP:GTALC

After the device receives the command **AT+GTRTO** to read the configurations, it will send corresponding configuration information to the backend server via the message **+RESP:GTALC** according to the configuration mask. The **+RESP:GTALC** does not support HEX format report. When the protocol format is hex format, **+RESP:GTALC** will still be reported in ASCII format.

➢ **+RESP:GTALC**,

Example: **+RESP:GTALC,D50201,015425000021222,gl502m,0000000000000403,BSI,4gnet,,,2gnet,,,3,0,SRI,1,,1,218.17.46.11,65535,218.17.46.11,65533,18565713530,0,0,0,20,0,,TEM,1,0,0,0,60,300,0,,,,,20200117173015,0199$**			
Parameter	**Length**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Configuration Mask	16	0000000000000000 - FFFFFFFFFFFFFFFF	
BSI	3	BSI	BSI
LTE APN	<=40		
LTE APN User Name	<=30		
LTE APN Password	<=30		
GPRS APN	<=40		
GPRS APN User Name	<=30		
GPRS APN Password	<=30		
Network Mode/APN Authentication Methods	1	00 - 33	0
LTE Mode	1	0 - 3	0
SRI	3	SRI	SRI
Report Mode	1	0 – 5	0
Reserved	0		
Enable Buffer	1	0 - 2	1
Main Server IP/ Domain Name	<=60		
Main Server Port	<=5	0 – 65535	0
Backup Server IP/Domain Name	<=60		
Backup Server Port	<=5	0 – 65535	0
SMS Gateway	<=20		
Heartbeat Interval	<=3	0|10 – 360(min)	0
Enable SACK	1	0-2	0
Enable SMS ACK	1	0|1	0
Network hold time	<=5	0 - 86400(sec)	300
Protocol Format	1	0|1	
Reserved	0		
CFG	3	CFG	CFG
New Password	4 – 20	'0' – '9', 'a' – 'z', 'A' – 'Z'	
Device Name	<=20	'0' – '9', 'a' – 'z', 'A' – 'Z', '-', '_'	gl502m
Reserved	0		

Event Mask	4	0000 – 0FFF	0823
Report Item Mask	<=4	0000 – 003F	001F
Mode Selection	1	0|1	
Continuous Send Interval	<=4	0|1-1440(min)	5
Week Report Selection	14	00000000000000- 11111111111111	1010101010 1010
Start Mode	1	0-2	0
Specified time of day	4	HHMM	1200
Adjustment Enable	1	0-1	0
Initial Wakeup Interval	<=2	1 – 4|6|8|12|24	1
Final Wakeup Interval	<=2	1 – 4|6|8|12|24	24
Hold Days	<=2	1 – 99	1
Report frequency	<=3	1 – 100	1
GPS Fix Delay	2	5 – 60(sec)	5
AGPS Mode	1	0|1	0
GSM Report	4	0000 -FFFF	0
Motor Vibration Time	1	0 - 9 (*100ms)	0
Battery Type	1	0 - 1	0
Battery Low Percentage	<=2	0 - 30	10
Reserved	1	0-2	0
Reserved	0		
Reserved	1	0-2	1
Location Request Mask	1	0|2	2
PIN	3	PIN	PIN
Auto Unlock PIN	1	0|1	0
PIN	4-8	‘0’ - ‘9’	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
DOG	3	DOG	DOG
Mode	1	0 - 2	1
Reserved	0		
Interval	<=2	1 - 30(days)	7
Time	4	HHMM	0200
Reserved	0		
Report Before Reboot	1	0|1	1
Reserved	0		
Unit	1	0|1	0
Reserved	0		
Reserved	0		

Reserved	0		
TMA	3	TMA	TMA
Sign	1	+|-	+
Hour Offset	<=2	0 - 12	00
Minute Offset	<=2	0 - 59	00
Daylight Saving	1	0|1	0
UTC Time	14	YYYYMMDDHHMMSS	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
NMD	3	NMD	NMD
Sensor Enable	1	0-1	0
Mode	1	0-F	0
Non-movement Duration	<=3	1 – 200(*15sec)	3
Movement Duration	<=2	3 – 50(*100ms)	3
Movement Threshold	1	2 – 9	2
Rest Send Interval	<=4	5 - 1440 (min)	
Report Mode	1	1 - 3	2
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
PDS	3	PDS	PDS
Mode	1	0 - 2	1
Mask	8	00000000-FFFFFFFF	00000019
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
GEO	3	GEO	GEO
GEO ID0	<=2	1	1
Mode	1	0 – 3	0
Longitude	<=11	(-)XXX.XXXXXX	
Latitude	<=10	(-)XX.XXXXXX	
Radius	<=7	50 – 6000000(min)	50
Reserved	0		

Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
GEO ID1	<=2	1	1
Mode	1	0 – 3	0
Longitude	<=11	(-)XXX.XXXXXX	
Latitude	<=10	(-)XX.XXXXXX	
Radius	<=7	50 – 6000000(min)	50
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
⋮	⋮	⋮	⋮
GEO ID19	<=2	19	19
Mode	1	0 – 3	0
Longitude	<=11	(-)XXX.XXXXXX	
Latitude	<=10	(-)XX.XXXXXX	
Radius	<=7	50 – 6000000(min)	50
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
TEM	3	TEM	TEM
Temperature Enable	1	0|1	0
Mode	1	0 - 3	0
Min. Temperature	3	-20 – +60	0
Max. Temperature	3	-20 – +60	0

Duration	<=4	10 – 3600(sec)	60
Send Interval	<=4	0|10 – 3600(sec)	300
Enable Continuous Mode	0	0|1	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
LSA	3	LSA	LSA
Mode	1	0 - 2	0
Sensitivity Threshold	1	1 - 9	5
Duration	<= 2	3 – 30	3
Send Interval	<= 3	0|10 – 300 (sec)	0
End Report	1	0|1	0
Report Mode	1	1 - 3	2
Enable Continuous Mode	0	0|1	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
LTA	3	LTA	LTA
Mode	1	0|1	0
Reserved	0		
Duration	<= 2	3 – 30	3
Send Interval	<= 3	0|10 – 300 (sec)	0
End Report	1	0|1	0
Report Mode	1	1 - 3	2
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
WLT	3	WLT	WLT
Call Filter	1	0|1	0
Phone Number Start	<=2	1 - 10	0
Phone Number End	<=2	1 - 10	
White Number List Number	<=20		
White Number List Number	<=20		
White Number List Number	<=20		

White Number List Number	<=20		
White Number List Number	<=20		
White Number List Number	<=20		
White Number List Number	<=20		
White Number List Number	<=20		
White Number List Number	<=20		
White Number List Number	<=20		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
GLM	3	GLM	GLM
Google Mode	1	0|1|2	0
Direct Number	<=20		
Direct Number	<=20		
Direct Number	<=20		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
UPC	3	UPC	UPC
Max. Download Retries	1	0 – 3	0
Download Timeout	<=2	5 – 30(min)	10
Download Protocol	1	0	0
Enable Report	1	0|1	0
Update Interval	1	0 – 8760	0
Download URL	<=100	URL	
Mode	1	0|1	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
HRM	3	HRM	HRM
Reserved	0		
Reserved	0		

+ACK Mask	4	(HEX)	7F
+RSP Mask	6	(HEX)	00FF7F
+EVT Mask	6	(HEX)	00FF7F
+INF Mask	4	(HEX)	F77F
+HBD Mask	4	(HEX)	7F
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
BAS	3	BAS	BAS
Index ID0	1	0	0
Accessory Type	1	0 - 8	0
Accessory Model	1	0 - 5	0
Accessory Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Accessory MAC	12	000000000000 - FFFFFFFFFFFF	
Append Mask	<=4	0 - FFFF	3F
Read Interval	<=5	10 – 86400sec	30
Low Voltage Threshold	<=4	0 – 5000mV	2400
Extended Common Parameter Number	1	1	
Accessory Available Report	1	0-1	0
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved	0		
Reserved			
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
⋮	⋮	⋮	⋮
Index ID9	1	9	9
Accessory Type	1	0 - 8	0
Accessory Model	1	0	0
Accessory Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Accessory MAC	12	000000000000 - FFFFFFFFFFFF	
Append Mask	<=4	0 - FFFF	3F

Read Interval	<=5	10 – 86400sec	30
Low Voltage Threshold	<=4	0 – 5000mV	2400
Extended Common Parameter Number	1	1	
Accessory Available Report	1	0-1	0
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved	0		
Reserved			
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
BTS	3	BTS	BTS
Mode	1	0|1|2	0
Reserved	0		
Bluetooth Name	<=20	'0' – '9', 'a' – 'z', 'A' – 'Z', '-', '_'	GL502M_BT
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Advertising Type	1	0-2	0
Power Mode	1	0|1	1
PA Level	1	0-7	4
Advertising Interval	<=5	100 – 10000 (ms)	1000
Advertising Data Type	1	0-1	0
Reserved (optional)	0	0	0
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

BID	3	BID	BID
Reserved	0		
Enable	1	0|1	
Beacon ID Accessory Model	1	0 - 9	0
Append Mask	<=4	0 - FFFF	1F
Low Voltage Threshold	<=4	0 – 5000mV	2400
Reserved	0		
Start Index	<=3	1 – 30	1
End Index	<=3	1– 30	30
MAC List	<=12*75		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved (optional)	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
IEX	3	IEX	IEX
Input Expansion Type	1	0	0
Bind BAS Index ID0	1	0	0
Input Number	1	1 - 4	1
Input ID	1	5	
⋮	⋮	⋮	⋮
Bind BAS Index ID9	1	9	9
Input Number	1	1 - 4	1
Input ID	1	5	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

AEX	3	AEX	AEX
Analog Input Expansion Type	1	0	
Bind BAS Index ID0	1	0	0
Analog Input Number	1	1	
Analog Input ID	1	5	
Mode	1	0|1|2	0
Min Threshold	<=5	8000mv~32000mv	
Max Threshold	<=5	8000mv~32000mv	
⋮	⋮	⋮	⋮
Bind BAS Index ID9	1	9	9
Analog Input Number	1	1	
Analog Input ID	1	5	
Mode	1	0|1|2	0
Min Threshold	<=5	8000mv~32000mv	
Max Threshold	<=5	8000mv~32000mv	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
NTS	3	NTS	NTS
Enable	1	0|1	0
Reserved	0		
Reserved	0		
Allowed Oper1	10		
Allowed Oper2	10		
Allowed Oper3	10		
Reserved	0		
Blocked Oper1	10		
Blocked Oper2	10		
Blocked Oper3	10		
Reserved			
UDF	3	UDF	UDF
Mode	1	0 - 2	0
Group ID	2	0 - 31	
Input ID Mask	16	0 - FFFFFFFFFFFFFFFF	
Debounce Time	5	0 - 86400(s)	0
Inzizo Mask	5	0 - FFFFF	0

Outzizo Mask	5	0 - FFFFF	0
Stocmd ID Mask	16	0 - FFFFFFFFFFFFFFFF	
Stocmd Ack	1	0|1	0
MCC List	<=3*10		
Reserved			
Reserved			
Reserved			
⋮	⋮	⋮	⋮
Mode	1	0 - 2	0
Group ID 31	2	0 - 31	
Input ID Mask	16	0 - FFFFFFFFFFFFFFFF	
Debounce Time	5	0 - 86400(s)	0
Inzizo Mask	5	0 - FFFFF	0
Outzizo Mask	5	0 - FFFFF	0
Stocmd ID Mask	16	0 - FFFFFFFFFFFFFFFF	
Stocmd Ack	1	0|1	0
MCC List	<=3*10		
Reserved			
Reserved			
Reserved			
CMD	3	CMD	CMD
Mode	1	0 - 1	0
Stored cmd ID 0	3	0 - 31	
Command String	200	AT command	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
⋮	⋮	⋮	⋮
Mode	1	0 - 1	0
Stored cmd ID 31	3	0 - 31	
Command String	200	AT command	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

Note: Regardless the report mode setting in **AT+GTSRI**, **+RESP:GTALC** is only reported through TCP/UDP. If current report mode is Force on SMS, **+RESP:GTALC** will still be reported via TCP/UDP.

3.3.3.3 +RESP:GTCID

After the device receives the command **AT+GTRTO** to read the ICCID of the SIM card, it will send the ICCID to the server by the report **+RESP:GTCID**.

➢ **+RESP:GTCID,**

Example: **+RESP:GTCID,D50201,015425000020117,gl502m,89860117851023145136,20191011163149,00BD$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
ICCID	20		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.3.3.4 +RESP:GTCSQ

After the device receives the command **AT+GTRTO** to read the GPRS/LTE signal level, it will send the GPRS/LTE signal level to the backend server by the message **+RESP:GTCSQ**.

➢ **+RESP:GTCSQ:**

Example: **+RESP:GTCSQ,D50201,015425000020117,gl502m,18,99,20191011163153,00BF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
CSQ RSSI	<=2	0 – 31 | 99	
CSQ BER	<=2	0 – 7 | 99	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*CSQ RSSI*>: The signal strength level.

CSQ RSSI	**Signal Strength (dBm)**
0	<-133
1	-111
2 – 30	-109 – -53

31	>-51

✧ <*CSQ BER*>: The quality of the GPRS/LTE signal. The range is 0-7 and 99 means unknown.

3.3.3.5 +RESP:GTVER

After the device receives the command **AT+GTRTO** to get the versions (including firmware version, hardware version and module version), it will send the version information to the backend server by the message **+RESP:GTVER**.

➢ **+RESP:GTVER:**

Example: **+RESP:GTVER,D50201,015425000020117,gl502m,0902,0106,,BG96,BG96MAR02A07M1G,201 91011161008,008B$**			
Parameter	**Length**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Device Type	<=10	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Firmware Version	4	(HEX)	
Hardware Version	4	(HEX)	
Reserved	4	0000	0000
Modem Hardware Version	<=20		
Modem Software Version	<=50		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Firmware Version*>: The firmware version of the device. The first two characters indicate the major version and the last two characters indicate the minor version. For example, 010A means version 1.10.

✧ <*Hardware Version*>: The hardware version of the device. The first two characters indicate the major version and the last two characters indicate the minor version. For example, 010A means version 1.10.

✧ <*Modem Hardware Version*>: It gives the modem hardware information of this device.

✧ <*Modem Software Version*>: It gives the modem software version information of this device.

3.3.3.6 +RESP:GTTMZ

After the device receives the command **AT+GTRTO** to get the time zone settings, it will send the time zone information by the message **+RESP:GTTMZ** to the backend server.

➢ **+RESP:GTTMZ,**

Example: **+RESP:GTTMZ,D50201,015425000020257,,+0000,0,20191226074345,000C$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Time Zone Offset	5	±HHMM	
Daylight Saving	1	0|1	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.3.3.7 +RESP:GTAIF

After the device receives the command **AT+GTRTO** to get the **AIF**, it will send the information by the report **+RESP:GTAIF** to the server. The **+RESP:GTAIF** does not support the HEX report. When the protocol format is hex format, **+RESP:GTAIF** will still be reported in ASCII format.

- **+RESP:GTAIF,**

Example:
+RESP:GTAIF,D50201,868446036599153,gl502m,,,,,,,89860117851023145722,16,0,AEC3,10.100.13.247,,,,,1,20190823114121,116A$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
LTE APN	<=47		
LTE APN User Name	<=30		
LTE APN Password	<=30		
GPRS APN	<=47		
GPRS APN User Name	<=30		
GPRS APN Password	<=30		
ICCID	20		
CSQ RSSI	<=2	0 – 31	
CSQ BER	<=2	0 – 7/99	

Cell ID	<=8	XXXXXXXX	
IP Address	7	0.0.0.0	
Main DNS	7	0.0.0.0	
Backup DNS	7	0.0.0.0	
Reserved			
Reserved			
Reserved			
Network Type	1	0,1,2	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <CSQ RSSI>: The signal strength level.

CSQ RSSI	Signal Strength (dBm)
0	<-133
1	-111
2 – 30	-109 – -53
31	>-51

- <CSQ BER>: The strength of the signal. The range is 0-7 and 99 means unknown.
- <Cell ID>: Cell ID in hex format.
- <IP Address>: The IP address of the device.
- <Main DNS>: The main DNS server.
- <Backup DNS>: The backup DNS server.
- <Network Type>: Current network type.
  - 0: Unregistered.
  - 1: 2G
  - 2: 4G

3.3.3.8 +RESP:GTALS

After the device receives the command **AT+GTRTO** to get sub AT command configuration information, it will send the configuration information to the backend server by the message **+RESP:GTALS**. Different AT Command gets different configuration information. The **+RESP:GTALS** does not support HEX report. When the protocol format is hex format, **+RESP:GTALS** will still be reported in ASCII format. For example, to get FRI configuration:

AT+GTRTO=gl502m,2,BSI,0,,,,FFFF$

- **+RESP:GTALS,**

Example:
+RESP:GTALS,D50201,866425030719696,,BSI,cmnet,,,,,,1,2, 20180921161511,005B$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
BSI	3	BSI	
APN	<=64		
APN User Name	<=30		
APN Password	<=30		
Backup APN	<=40		
Backup APN User Name	<=30		
Backup APN Password	<=30		
Network Mode	1	0 - 2	
LTE Mode	1	0 - 3	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- **+RESP:GTAIF:** After the device receives the command **AT+GTRTO** to get the **AIF**, it will send the information by the report **+RESP:GTAIF** to the server. The **+RESP:GTAIF** does not support the HEX report.

Example:
RESP:GTAIF,F10310,868446036599153,gv350m,,,,,,,89860117851023145722,16,0,AEC3,10.100.13.247,,,,,,1,20190823114121,116A$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
LTE APN	<=47		
LTE APN User Name	<=30		
LTE APN Password	<=30		
GPRS APN	<=47		
GPRS APN User Name	<=30		
GPRS APN Password	<=30		
ICCID	20		
CSQ RSSI	<=2	0 – 31	

CSQ BER	<=2	0 – 7/99	
Cell ID	<=8	XXXXXXXX	
IP Address	<=15	0.0.0.0	
Reserved			
Reserved			
Reserved			
Reserved			
Reserved			
Network Type	1	0,1,2	
Send Time	0/14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <CSQ RSSI>: The signal strength level.

CSQ RSSI	Signal Strength (dBm)
0	<-133
1	-111
2 – 30	-109 – -53
31	>-51

- <CSQ BER>: The strength of the signal. The range is 0-7 and 99 means unknown.
- <Cell ID>: Cell ID in hex format.
- <IP Address>: The IP address of the device.
- <Network Type>: Current network type.
  - 0: Unregistered.
  - 1: 2G
  - 2: 4G

3.3.3.9 +RESP:GTGSV

After the device receives the command to get satellite information, it will send the satellite information via the message **+RESP:GTGSV** to the backend server. The **+RESP:GTGSV** does not support the HEX report.

- **+RESP:GTGSV,**

Example: **+RESP:GTGSV,D50201,015425000020117,gl502m,11,2,42,5,27,6,35,7,0,9,33,12,33,17,32,19,35,25,25,29,46,30,18,20191011110234,0008$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

Protocol Version	6	XX0000 – XXFFFF, X ∈ {'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
SV Count	2	0-24	
SV ID	2	>= 0	
SV Power	2	>= 0	
… … …			
SV ID	2		
SV Power	2		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- ✧ <*SV Count*>: The count of satellites the GPS finds.
- ✧ <*SV ID*>: The satellite ID. In case of no satellite, the field is filled with zero.
- ✧ <*SV Power*>: Satellite power. In case of no satellite, the field is filled with zero.

3.3.3.10 +RESP:GTATI

After the device receives the command **AT+GTRTO** to get the basic device information, it will send the information to the backend server via the message **+RESP:GTATI**.

Example:
+RESP:GTATI,D50201,866833040175736,,13091,140202,0106,0202,BG95-M5,BG95M5LAR02A03,GL502M_BT_R20A01V03,20210811141701,0287$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X ∈ {'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
ATI Mask	<=8	'0' – '9' 'a' – 'z' 'A' – 'Z	
Firmware Version	6	'0' – '9' 'a' – 'z' 'A' – 'Z	
Hardware Version	4	'0' – '9' 'a' – 'z' 'A' – 'Z	
Bootloader Version	4	0' – '9' 'a' – 'z' 'A' – 'Z	

Modem Hardware Version	<=20		
Modem Firmware Version	<=50		
Bluetooth Firmware Version	<=50		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*ATI Mask*>: This mask is set by **AT+GTRTO** command and used to control parameter fields in the **+RESP:GTATI** message.
- <*Firmware Version*>: The firmware version of the device. The first two characters indicate the branch number, the middle two characters indicate the major version and the last two characters indicate the minor version. For example, 010A means version 1.10.
- <*Hardware Version*>: The hardware version of the device. The first two characters indicate the major version and the last two characters indicate the minor version. For example, 010A means version 1.10.
- <*Modem Hardware Version*>: It gives the modem hardware information of this device.
- <*Modem Firmware Version*>: It gives the modem software version information of this device.
- <*Bluetooth Firmware Version*>: It gives the Bluetooth firmware information of this device.

3.3.4. Event Report

The following event reports are triggered when certain events occur.

+RESP:GTPNA: Power on report

+RESP:GTPFA: Power off report

+RESP:GTBPL: Battery low report

+RESP:GTTEM: Temperature alarm report

+RESP:GTUPC: Configuration updated report

+RESP:GTGSM: The report for the information of the serving cell and the neighbor cells, this report does not support the HEX format. When the protocol format is hex format, **+RESP:GTGSM** will still be reported in ASCII format.

+RESP:GTLTA: Light sensor tamper alarm report.

+RESP:GTWFI: The report for the information of the Wifi points. this report does not support the HEX format. When the protocol format is hex format, **+RESP:GTWFI** will still be reported in ASCII format.

+RESP: GTBAA: Bluetooth alarm report.

+RESP: GTBID: The number of Beacon ID accessories detected by device.

- **+RESP:GTPNA,**

Example:
+RESP:GTPNA,D50201,015425000020117,gl502m,2,20191011160545,0084$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Power On Type		1 - 9	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <Power On Type>: A numeral to indicate how the terminal is activated.

- 1: Movement detected by the terminal.
- 2: Specified time reached.
- 3: Reserved.
- 4: Manual powering on for the first time.
- 5: RTO command or watchdog reboot.
- 6: Abnormal power on.
- 7: RTC error.
- 8: FOTA process.
- 9: Temperature sensor alarm event.

➢ **+RESP:GTPFA**

Example: **+RESP:GTPFA,D50201,015425000020117,gl502m,20191011161520,0092$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

➢ **+RESP:GTBPL,**

➢ **+RESP:GTTEM,**

➢ **+RESP:GTLTA,**

Example: **+RESP:GTBPL,D50201,015425000020117,gl502m,0,0,1,3,0.0,0,86.5,114.015376,22.537105,20191011081251,0460,0001,253D,AEC3,17,0,,9,0,0,28.8,20191011161253,0090$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Event State1	<=4		
Event State2	<=4		
Number	<=1	1	

GPS Accuracy	1	0|1 – 50	
Speed	<=5	0.0 – 999.9(km/h)	
Azimuth	<=3	0 – 359	
Altitude	<=8	+/-XXXXX.X (min)	
Longitude	<=11	+/-XXX.XXXXXX	
Latitude	<=10	+/-XX.XXXXXX	
GPS UTC Time	14	YYYYMMDDHHMMSS	
MCC	0|4	0XXX	
MNC	0|4	0XXX	
LAC	0|4	XXXX	
Cell ID	<=8	XXXX	
CSQ RSSI	<=2	0 - 31|99	
CSQ BER	<=2	0 - 7|99	
Reserved	0		
Battery Percentage	<=3	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	<=5	+/-XX.X	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

For **+RESP:GTBPL**

- *<Event State1>*: 0
- *<Event State2>*: 0

For **+RESP:GTTEM**

- *<Event State1>*: The temperature alarm state
  - 1: The current temperature is lower than the low temperature threshold specified by *<Min. Temperature>*.
  - 2: The current temperature is higher than the high temperature threshold specified by *<Max. Temperature>*.
  - 3: The current temperature is within the temperature threshold range.
  - 4: The current temperature is outside the temperature threshold range.
- *<Event State2>*: 0

For **+RESP:GTLTA**

- *<Event State1>*: The light sensor tamper state.
  - 0: Normal state
  - 1: Tamper alarm state
- *<Event State2>*: 0

- **+RESP:GTGSM,**

Example:
+RESP:GTGSM,D50201,015425000020117,gl502m,RTL,0460,0001,253D,AEC3,21,,,,,,,,,,,,,,,,,,,,,,,,,,,,,0460,0001,253D,AEC3,21,,20191011155127,007C$

Parameter	Length	Range/Format	Default
Protocol version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Fix Type	3	FRI|RTL|GIR	
MCC1	4	0XXX	
MNC1	4	0XXX	
LAC1	4	XXXX	
Cell ID1	<=8	XXXX	
RX level1	2	0 - 63	
Reserved	0		
MCC2	4	0XXX	
MNC2	4	0XXX	
LAC2	4	XXXX	
Cell ID2	<=8	XXXXXXXX	
RX level2	2	0 - 63	
Reserved	0		
MCC3	4	0XXX	
MNC3	4	0XXX	
LAC3	4	XXXX	
Cell ID3	<=8	XXXXXXXX	
RX level3	2	0 - 63	
Reserved	0		
MCC4	4	0XXX	
MNC4	4	0XXX	
LAC4	4	XXXX	
Cell ID4	<=8	XXXXXXXX	
RX level4	2	0 - 63	
Reserved	0		
MCC5	4	0XXX	

MNC5	4	0XXX	
LAC5	4	XXXX	
Cell ID5	<=8	XXXXXXXX	
RX level5	2	0 - 63	
Reserved	0		
MCC6	4	0XXX	
MNC6	4	0XXX	
LAC6	4	XXXX	
Cell ID6	<=8	XXXXXXXX	
RX level6	2	0 - 63	
Reserved	0		
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	<=8	XXXXXXXX	
RX Level	2	0 - 63	
Reserved	0		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	(HEX)	
Tail character	1	$	$

- <*Fix Type*>: A string which indicates the type of GPS fix this cell information is for.
  "FRI": This cell information is for FRI request.
  "RTL": This cell information is for RTL request.
  "GIR": This cell information is for GIR request.
- <*MCC (i)*>: MCC of the neighbor cell *i* (*i* is the index of the neighbor cell).
- <*MNC (i)*>: MNC of the neighbor cell *i*.
- <*LAC (i)*>: LAC in hex format of the neighbor cell *i*.
- <*Cell ID (i)*>: Cell ID in hex format of the neighbor cell *i*.
- <*RX level (i)*>: The signal strength of the neighbor cell *i*. This parameter specifies a 6-bit value coded in 1. The dBm steps:
  0: -110 dBm
  1 to 62: -109 to -48 dBm
  63: -47 dBm
- <*MCC*>: MCC of the serving cell.

- <*MNC*>: MNC of the serving cell.
- <*LAC*>: LAC (in hex format) of the serving cell.
- <*Cell ID*>: Cell ID (in hex format) of the serving cell.
- <*RX level*>: The signal strength of the serving cell.

Note:

1. It may include information of several neighbor cells. If no neighbor cell is found, all the fields of the neighbor cell will be empty.
2. "ffff" in the fields of <*LAC(i)*> and <*Cell ID(i)*> means the terminal does not know the value.

➢ **+RESP:GTUPC,**

Example: **+RESP:GTUPC,D50201,015425000020117,gl502m,000,100,http://szqueclink.f3322.net:9129/GL502M/deltabin/test.ini,20191011151222,005A$**			
Parameter	**Length**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Command ID	<=3		
Result	3	100 - 103|200 - 202|300 - 302	
Download URL	<=100	Complete URL	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Command ID*>: The command ID in the update configuration file. It is always 0 before the device starts to update the configuration. It indicates the total number of the commands when the response result code is 301. It indicates wrong format of command ID when the response result code is 302.
- <*Result*>: A numeral to indicate whether the configuration is updated successfully.
  - 100: The update command is starting.
  - 101: The update command is confirmed by the device.
  - 102: The update command is refused by the device.
  - 103: The update process is refused because the battery is low.
  - 200: The device starts to download the package.
  - 201: The device finishes downloading the package successfully.
  - 202: The device fails to download the package.
  - 300: The device starts to update the device configuration.
  - 301: The device finishes updating the device configuration successfully.
  - 302: The device fails to update the device configuration.
- <*Download URL*>: The complete URL to download the configuration. It includes the file name.

➢ **+RESP:GTWFI**

Example: **+RESP:GTWFI,** **D50201,860112043699794,scm3200,FRI,7,TP-LINK_6F5C,0c-82-68-bb-6f-5c,-55,test123,12-02-b5-42-7f-39,-56,queclink,08-9b-4b-99-44-32,-63,queclink,08-9b-4b-99-43-72,-63,queclink,08-9b-4b-99-44-1a,-65,queclink,08-9b-4b-99-43-b2,-70,Shenzhen Bros,48-0e-ec-b4-30-d1,-79,20200819162934,075B$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Fix Type	3	RTL/FRI	
Point Number	<=2	0 - 10	
SSID(i)	<=32	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
MAC(i)	<=64	'0' – '9' 'a' – 'f' '-'	
RSSI(i)	<=8	-100 - 100	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- ✧ <Fix Type>: A string to indicate the type of GPS positioning of the current Wifi information.

  "RTL": This Wifi information is for RTL requirement.
  "FRI": This Wifi information is for FRI requirement.
- ✧ <Point Number>: The number of the Wifi points. The information of a Wifi point consists of SSID, MAC and RSSI.
- ✧ <SSID(i)>: The SSID of a Wifi point.
- ✧ <MAC(i)>: The MAC of a Wifi point. For instance, 08-9b-4b-99-44-12.
- ✧ <RSSI(i)>: Received Signal Strength Indication.

+RESP:GTBAA:

Example: **+RESP:GTBAA,DE0114,865284041222989,gl501m,2,2,0,2,003f,WTH300,78054101E5C1,1,3200,25.5,,0,0.0,0,433.2,114.017002,22.538826,20200116155812,0460,0000,2493,16F9,,20200117000028,021B$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15/12	IMEI/MUID	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Index	2	0 – 9|FF	
Accessory Type	1	0 – 8	

Accessory Model/Beacon ID Accessory Model	1	0-2	
Alarm Type	2	00 – FF	
Append Mask	4	0000 – FFFF	
Accessory Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Accessory MAC	12	'0' – '9' 'A' – 'F'	
Accessory Connection Status	1	0 - 1	
Accessory Voltage	<=4	0 – 5000mV	
Accessory Temperature	<=4	-40.0 – 80.0℃	
Accessory Humidity	<=3	1-100	
GPS Accuracy	1	0-6	0, Last known
Speed	<=5	0.0 – 999.9 km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	(–)xxxxx.x m	
Longitude	<=11	(–)xxx.xxxxxx	
Latitude	<=10	(–)xx.xxxxxx	
GPS UTC Time	14	YYYYMMDDHHMMSS	
MCC	0|4	0XXX	
MNC	0|4	0XXX	
LAC	0|4	XXXX	
Cell ID	0|4|8	XXXXXXXX	
Reserved	0|2	00	00
Send Time	0|14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ *<Index>:* There are two meaning for <Index>.

- The index of Bluetooth accessory defined in **AT+GTBAS** which triggers the **+RESP:GTBAA** message.
- 0xFF for WKF300.

✧ *<Accessory Type>:* The type of the Bluetooth accessory. The following is supported now:

- 3: Bluetooth Beacon ID accessory.
- 6: Beacon multi-functional sensor.

- *<Accessory Model/Beacon ID Accessory Model>:* The model of the Bluetooth accessory which is defined in **AT+GTBAS** or the model of the Bluetooth Beacon ID accessory which is defined in **AT+GTBID**. The following is supported now:
  - The model of Bluetooth Beacon ID accessory (<Accessory Type> is 3):
    0: WKF300 (Keyfob).
  - The model of Beacon multi-functional sensor (<Accessory Type> is 6):
    0: WTH300.
    4: WMS301.
  - The model of External input/output sensor (<Accessory Type> is 8):
    0: WBC300.
    Note: The current version supports only one WBC300 configuration.
- *<Alarm Type>:* The alarm type of the **+RESP:GTBAA**.
  - 0: The voltage of the Bluetooth accessory is low.
  - 1: The temperature alarm: current temperature value is below low temperature limit set in **AT+GTBAS** command.
  - 2: The temperature alarm: current temperature value is upper high temperature limit set in **AT+GTBAS** command.
  - 3. The temperature alarm: current temperature value is within the range defined by temperature limits set in **AT+GTBAS** command.
  - 4. Reserved.
  - 5. Reserved.
  - 6. Reserved.
  - 7. The humidity alarm: current humidity value is below low humidity limit set in **AT+GTBAS** command.
  - 8: The humidity alarm: current humidity value is upper high humidity limit set in **AT+GTBAS** command.
  - 9: The humidity alarm: current humidity value is within the range defined by humidity limits set in **AT+GTBAS** command.
  - A: The availability alarm: The connection status of Bluetooth accessory has changed.
  - 13: Door opened.
  - 14: Door closed.
- *<Append Mask>:* Bitwise mask defined in **AT+GTBAS** and **AT+GTBID** commands to configure which data item is reported.
  - Bit 0: <Accessory Name>.
  - Bit 1: <Accessory MAC>.
  - Bit 2: <Accessory Connection Status>.
  - Bit 3: <Accessory Voltage>.
  - Bit 4: <Accessory Temperature>.
  - Bit 5: <Accessory Humidity>.
- *<Accessory Name>:* Bluetooth accessory name ended with '\0'(0x00). If the accessory name is empty, this filed will be filled with one byte: 0x00.
- *<Accessory MAC>:* Bluetooth accessory MAC address.
- *<Accessory Connection Status>:* It indicates the connection status of Bluetooth accessory.

- 0: Disconnected.
- 1: Connected.

✧ *<Accessory Voltage>:* The voltage of Bluetooth accessory. It is controlled by the <Append Mask>.If *<Alarm Type>* is A, this filed must be 0.

✧ *<Accessory Temperature>:* Temperature data of Bluetooth accessory. It is controlled by the <Append Mask>. If *<Alarm Type>* is A, this filed must be 0.

✧ *<Accessory Humidity>:* Humidity data of Bluetooth accessory. It is controlled by the <Append Mask>. If *<Alarm Type>* is A, this filed must be 0.

➢ **+RESP: GTBID**

Example: **+RESP:GTBID,F10400,867995030131778,,1,0,000A,78054101F478,2935,0,,,,,,,0460,0000,550B,B96A,00,20200710010818,009E$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Number	1	0 – 3	
Beacon ID Accessory Model	1	0	
Append Mask	4	000 – FFFF	
Accessory MAC	12	'0' – '9' 'A' – 'F'	
Accessory Voltage	<=4	0 – 5000mV	
GNSS Accuracy	<=2	0	0, Last known
Speed	<=5	0.0 – 999.9 km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	(–)xxxxx.x m	
Longitude	<=11	(–)xxx.xxxxxx	
Latitude	<=10	(–)xx.xxxxxx	
GPS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	4	XXXX	

Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- *<Number>:* The number of Bluetooth Beacon ID accessory.
- *<Accessory Model>:* The model of the Bluetooth accessory.
- *<Append Mask>:* Bitwise mask defined in the **AT+GTBID** command to configure which data item is reported.
  - Bit 0: Reserved.
  - Bit 1: <Accessory MAC>.
  - Bit 2: Reserved.
  - Bit 3: <Accessory Voltage>.
  - Bit 4: Reserved.
- *<Accessory MAC>:* Bluetooth accessory MAC address.
- *<Accessory Voltage>:* The voltage of Bluetooth accessory.

3.3.5. Buffer Report

If the buffer function is enabled, the terminal will save the messages into the buffer in the following circumstances.

- No network signal.
- Failed to activate network context for the TCP or UDP connection.
- Failed to establish TCP connection with the backend server.

The buffered messages will be sent to the backend server when connection to the server recovers. The buffer reports are saved to the built-in non-volatile memory in case the device is reset. The device can save 10000 messages at most.

- Only **+RESP** messages except **+RESP:GTALC** can be buffered.
- In the buffer report, the original header string "**+RESP**" is replaced by "**+BUFF**". Other contents such as the original sending time and count number remains unchanged.
- Buffered messages will be sent only via Network by TCP or UDP protocol. They cannot be sent via SMS.
- The buffered messages will be sent after the real-time messages if <*Buffer Mode*> in **AT+GTSRI** is set to 1.
- The buffered messages will be sent before the real-time messages if <*Buffer Mode*> in **AT+GTSRI** is set to 2.

Example:

The following is an example of the buffered message:

+BUFF:GTFRI,D50201,015425000020117,gl502m,0,0,1,2,0.0,0,326.5,114.019362,22.537809,20191011075126,0460,0001,253D,AEC3,21,0,,92,0,0,28.8,20191011155127,0079$

3.3.6. Report with Google Maps Hyperlink

According to the settings of the command **AT+GTGLM** or upon receiving **SMS Position Request** message via SMS, the device can send an SMS with a Google Maps hyperlink to a mobile phone.

If the device receives **SMS Position Request** message via SMS, GL502MG will send its current position to the original number via SMS with a Google Maps hyperlink if the original number is a direct number (please refer to <*Direct Number List*> in the Chapter 3.2.4.3) or a number in the White Number List (please refer to <*White Number List*> in the Chapter 3.2.4.2).

If the <*Google Link Mode*> in the command **AT+GTGLM** is set to 1, GL502MG will send an SMS with a Google Maps hyperlink to the direct phone numbers after the messages **+RESP:GTLBC**.

➢ **Google Maps Hyperlink**

Example: **LBC:** **http://maps.google.com/maps?q=22.538503,114.017054+%28gl502m %29** **F1 D2019/09/11T14:33:05 B100%**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
SMS Header	<=30		
Google Maps Hyperlink	<=77		
GPS Fix	2	F1|F0	
GPS UTC Time	20	DYYYY/MM/DDTHH:MM:SS	
Battery Level	<=5	B1 - 100(%)	

✧ <*SMS Header*>: A string that includes the terminal name and GPS fix type ("**LBC**").
✧ <*Google Maps Hyperlink*>: A string which represents a Google Maps hyperlink.

3.4. Heartbeat

Heartbeat is used to maintain the contact between the device and the backend server via network communication. The heartbeat package is sent to the backend server at the interval specified by <*Heartbeat Interval*> in the **AT+GTQSS** or **AT+GTSRI** command.

➢ **+ACK:GTHBD,**

Example: **+ACK:GTHBD,D50201,352948070074301,,20191011155127,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

Whenever the backend server receives a heartbeat package, it should reply with an acknowledgement message to the device.

➢ **+SACK:GTHBD,**

Example: +SACK:GTHBD,D50201,11F0$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Count Number*>: The backend server uses the <*Count Number*> extracted from the heartbeat package from the device as the <*Count Number*> in the server acknowledgement of the heartbeat package.

3.5. Sever Acknowledgement

If server acknowledgement is enabled by the **AT+GTQSS** or **AT+GTSRI** command, the backend server should reply to the device whenever it receives a message from the device.

➢ **+SACK:**

Example: +SACK:11F0$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Count Number*>: The backend server uses the <*Count Number*> extracted from the received message as the <*Count Number*> in the server acknowledgement.

4. HEX Format Message

From this version, the @Tracker protocol supports messages in HEX format. For all the commands, they still use the ASCII format as described above. By default, the device uses ASCII format messages. Use **AT+GTQSS** or **AT+GTSRI** (set the <*Protocol Format*> to 1) to enable the HEX format messages.

All the messages are sorted into 5 categories (acknowledgement to command (**+ACK**), location report (**+RSP**), event report (**+EVT**), information report (**+INF**) and the heartbeat data (**+HBD**)). Messages of the same category have the same header string.

The composition of the HEX message could be customized by **AT+GTHRM** command. The actual length of each HEX report depends on the setting of the masks in **AT+GTHRM**.

The device uses CRC-CCITT (0xFFFF) method to calculate the checksum of the report data and appends the checksum to the end of the data. The backend server could use this checksum to verify the integrity of the received data.

At the end of each HEX message, the device uses 0x0D and 0x0A as the end.

The HEX messages are transmitted in network byte order (big-endian).

4.1. Hex Report Mask

AT+GTHRM command uses <*+ACK Mask*>, <*+RSP Mask*>, <*+EVT Mask*>, <*+INF Mask*> and <*+HBD Mask*> to control the composition of the corresponding HEX message. In each HEX message, the corresponding mask for the report is included to indicate which part is reported.

- **AT+GTHRM=**

Example: **AT+GTHRM=gl502m,,,7F,FF7F,FF7F,FF7F,7F,,,,,0018$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	gl502m
Reserved	0		
Reserved	0		
+ACK Mask	4	(HEX)	7F
+RSP Mask	6	(HEX)	00FF7F
+EVT Mask	6	(HEX)	00FF7F
+INF Mask	4	(HEX)	F77F

+HBD Mask	4	(HEX)	7F
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	(HEX)	
Tail Character	1	$	$

✧ <*+ACK Mask*>: Component mask of the acknowledgement received.

Bit	Item to Mask
Bit 7	Reserved
Bit 6	<*Count Number*>
Bit 5	<*Send Time*>
Bit 4	<*Device Name*>
Bit 3	<*Firmware Version*>
Bit 2	<*Protocol Version*>
Bit 1	<*Device Type*>
Bit 0	<*Length*>

✧ <*+RSP Mask*>: Component mask of the location message.

Bit	Item to Mask
Bit 15	<Temperature>
Bit 14	<*Motion Status*>
Bit 13	<Mode Selection>
Bit 12	<*Battery Percentage*>
Bit 11	<*Network Data*>
Bit 10	<*Altitude*>
Bit 9	<*Azimuth*>
Bit 8	<*Speed*>
Bit 7	<*Battery Voltage*>

Bit 6	*<Count Number>*
Bit 5	*<Send Time>*
Bit 4	*<Device Name>*
Bit 3	*<Firmware Version>*
Bit 2	*<Protocol Version>*
Bit 1	*<Device Type>*
Bit 0	*<Length>*

✧ *<+EVT Mask>*: Component mask of the event message.

Bit	**Item to Mask**
Bit 15	<Temperature>
Bit 14	*<Motion Status>*
Bit 13	<Mode Selection>
Bit 12	*<Battery Percentage>*
Bit 11	*<Network Data>*
Bit 10	*<Altitude>*
Bit 9	*<Azimuth>*
Bit 8	*<Speed>*
Bit 7	Reserved
Bit 6	*<Count Number>*
Bit 5	*<Send Time>*
Bit 4	*<Device Name>*
Bit 3	*<Firmware Version>*
Bit 2	*<Protocol Version>*
Bit 1	*<Device Type>*
Bit 0	*<Length>*

✧ *<+INF Mask>*: Component mask of the information message.

Bit	**Item to Mask**
Bit 15	*<GTGSM>*

Bit 14	*<Temperature>*
Bit 13	*<Motion Status>*
Bit 12	*<Mode Selection>*
Bit 11	*<Battery Percentage>*
Bit 10	*<Hardware Version>*
Bit 9	*<CSQ RSSI> & <CSQ BER>*
Bit 8	*<ICCID>*
Bit 7	Reserved
Bit 6	*<Count Number>*
Bit 5	*<Send Time>*
Bit 4	*<Device Name>*
Bit 3	*<Firmware Version>*
Bit 2	*<Protocol Version>*
Bit 1	*<Device Type>*
Bit 0	*<Length>*

✧ <*+HBD Mask*>: Component mask of the heartbeat data.

Bit	Item to Mask
Bit 7	Reserved
Bit 6	*<Count Number>*
Bit 5	*<Send Time>*
Bit 4	*<Device Name>*
Bit 3	*<Firmware Version>*
Bit 2	*<Protocol Version>*
Bit 1	*<Device Type>*
Bit 0	*<Length>*

The acknowledgment message of **AT+GTHRM** command:

➢ **+ACK:GTHRM,**

Example:

+ACK:GTHRM,FE1001,862170019025640,,0019,20140511093254,11F0$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

4.2. Acknowledgement +ACK

➢ **+ACK,**

Example: 2B 41 43 4B 00 00 7F 25 D5 01 10 08 03 67 6C 35 30 30 6D 00 00 7F 00 01 07 E3 08 06 11 29 34 00 59 03 09 0D 0A			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+ACK	+ACK
Message Type	1		
Report Mask	2	(HEX)	
Length	1		
Device Type	1	D5	D5
Protocol Version	2	(HEX)	010F
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
ID	1		
Serial Number	2	(HEX)	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ <*Message Type*>: The ID of the command that the device received.

Command	ID
AT+GTBSI	0
AT+GTSRI	1
AT+GTQSS	2
Reserved	3
AT+GTCFG	4
AT+GTPIN	5
AT+GTDOG	6
AT+GTTMA	7
AT+GTNMD	8
AT+GTPDS	9
AT+GTGEO	10
AT+GTTEM	11
Reserved	12
AT+GTLTA	13
Reserved	14
AT+GTRTO	15
AT+GTUPC	16
AT+GTWLT	17
AT+GTUPD	18
AT+GTHRM	19
AT+GTBTS	20
AT+GTBAS	21
AT+GTGLM	22
AT+GTBID	23
AT+GTIEX	24
AT+GTAEX	25
AT+GTNTS	26

- <*Report Mask*>: It refer to the <+*ACK Mask*> in **AT+GTHRM.**
- <*Length*>: The length of the acknowledgement message (total characters from header to the tail).

✧ <*Unique ID*>: If Bit 4 of <*+ACK Mask*> is 0, IMEI of the device will be used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, every 2 digits are encoded into one byte as an integer.

IMEI	13	57	90	24	68	11	22	0
HEX	0D	39	5A	18	44	0B	16	00

If the Bit 4 of <*+ACK Mask*> is 1, the device name is used as the unique ID of the device. Refer to the <*Device Name*> in **AT+GTCFG** for the device name. Device name is an 8-bytes string. If the length of the <*Device Name*> is more than 8 bytes, only the first 8 bytes will be acquired. In the Hex format message, each byte is encoded into one byte as an integer. If the device name is less than 8 bytes, the empty bytes will be set to 0.

Device Name	g	v	5	0	l	t	m	
HEX	67	76	35	30	6C	74	6D	00

✧ <*ID*>: Sub-command ID of **AT+GTRTO** or **AT+GTGEO**. Set it to 0 for other reports.

✧ <*Send Time*>: The local time to send the acknowledgement message. Total 7 bytes. The first 2 bytes are for year, the rest 5 bytes for month, day, hour, minute and second respectively.

Send Time	2011		01	31	06	29	11
HEX	07	DB	01	1F	06	1D	0B

✧ <*Checksum*>: The CRC16 checksum for data from <*Message Type*> to <*Count Number*>.

4.3. Location Report +RSP

Location messages (including **+RESP:GTGEO**, **+RESP:GTFRI**, **+RESP:GTRTL**, **+RESP:GTNMR, +RESP:GTDOG, +RESP:GTDIS**) use this format.

➢ **+RSP,**

Example:
2B 52 53 50 08 FF 3F 4C D5 01 13 12 BE 67 6C 35 30 30 6D 00 00 00 00 01 00 00 00 00 00 01 51 06 CB BF 27 01 57 EA 66 07 E4 01 08 06 0E 02 01 CC 00 01 25 3D 00 00 AE C3 13 00 00 0B 01 00 00 1B 07 07 E4 01 08 0E 0E 04 F6 8E 0D 0A

Parameter	Length (Byte)	Range/Format	Default
Message Header	4	+RSP	+RSP
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	D5	D5
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	

Unique ID	8	(IMEI)	
Report Id	1	0 – 19	
Report Type	1		
GPS Accuracy	1	0|1 – 50	
Speed	3	0.0 – 999.9(km/h)	
Azimuth	2	0 – 359	
Altitude	2		
Longitude	4		
Latitude	4		
GPS UTC Time	7	YYYYMMDDHHMMSS	
MCC	2	0000-FFFF	
MNC	2	0000-FFFF	
LAC	2	0000-FFFF	
Cell ID	4	00000000-FFFFFFFF	
CSQ RSSI	1	0 - 31|99	
CSQ BER	1	0 - 7|99	
Battery Voltage	2	0-10000(mV)	
Battery Percentage	1	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	3	+/-XX.X	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ <*Message Type*>: The ID of location message.

Command	**ID**
+RESP:GTGEO	0
+RESP:GTFRI	1
+RESP:GTPNL	2

+RESP:GTNMR	3
+RESP:GTRTL	4
+RESP:GTDOG	5
Reserved	6
+RESP:GTLBC	7
Reserved	8
+RESP:GTDIS	9
+RESP:GTAIS	10

- <*Report Mask*>: It refer to the <*+RSP Mask*> in **AT+GTHRM.**
- <*Unique ID*>: If the Bit 4 of <*+RSP Mask*> is 0, IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, every 2 digits are encoded into one byte as an integer.

IMEI	**13**	**57**	**90**	**24**	**68**	**11**	**22**	**0**
HEX	**0D**	**39**	**5A**	**18**	**44**	**0B**	**16**	**00**

If the Bit 6 of <*+RSP Mask*> is 1, the device name is used as the unique ID of the device. Refer to the <*Device Name*> in **AT+GTCFG** for the device name. Device name is an 8-byte string. If the length of the <*Device Name*> is more than 8 bytes, only the first 8 bytes will be acquired. In the Hex format message, each byte is encoded into one byte as an integer. If the device name is less than 8 bytes, the empty bytes will be set to 0.

Device Name	**g**	**v**	**5**	**0**	**l**	**t**	**m**	
HEX	**67**	**76**	**35**	**30**	**6C**	**74**	**6D**	**00**

- <*Report ID*>:
  - The ID of Geo-fence in **+RESP:GTGEO**. For the ID of other reports, it is 0.
  - 5: The ID of **+RESP:GTDIS**.
- <*Report Type*>: The type of the messages **+RESP:GTGEO, +RESP:GTDOG** and **+RESP:GTNMR**. For other reports, it is 0.
  - For **+RESP:GTGEO**
    0: Exit the corresponding Geo-fence
    1: Enter the corresponding Geo-fence
  - For **+RESP:GTNMR**
    0: The state of the device changed from motion to rest
    1: The state of the device changed from rest to motion
  - For **+RESP:GTDOG**
    0: Reboot periodically according to the <*Interval*> and <*Time*> settings
  - For **+RESP:GTDIS**
    0: The current logical state of the input port is disabled state.
    1: The current logical state of the input is enabled state.
- <*Speed*>: Total 3 bytes. The first two bytes are for the integer part of the speed and the last byte is for the fraction part. The fraction part has only 1 digit.

✧ <*Longitude*>: The longitude of the current position. Total 4 bytes. The longitude is converted to an integer with 6 implicit decimals and this integer is reported in HEX format. If the value of the longitude is negative, it is represented in 2's complement format.

Longitude 121.390847	**121390847**			
HEX	**07**	**3C**	**46**	**FF**

✧ <*Latitude*>: The latitude of the current position. Total 4 bytes. The latitude is converted to an integer with 6 implicit decimals and this integer is reported in HEX format. If the value of the latitude is negative, it is represented in 2's complement format.

Latitude 31.164503	**31164503**			
HEX	**01**	**DB**	**88**	**57**

✧ <*GPS UTC Time*>: The UTC time from the GPS chip. Total 7 bytes. The first 2 bytes are for year, the rest 5 bytes for month, day, hour, minute and second respectively.

GPS UTC Time	**2011**		**07**	**14**	**08**	**24**	**13**
HEX	**07**	**DB**	**07**	**0E**	**08**	**18**	**0D**

✧ <*Mode Selection*>: Current mode of the device. Total 1 byte.

- 0: Power saving mode (PSM)
- 1: Continuous mode

✧ <*Movement Status*>: The movement status of the device. Total 1 byte. It must be noted that the sensor function must be enabled in the **AT+GTNMD** command, otherwise it's always 0.

- 0: Stillness
- 1: Motion

✧ <*Temperature*>: Total 3 bytes. The first two bytes are for the integer part of the temperature and the last byte is for the fraction part. The fraction part has only 1 digit. It must be noted that the temperature function must be enabled in the in the **AT+GTTEM** command, otherwise it's always 0.

Location message for **+RESP:GTLBC** uses below format.

Example:
2B 52 53 50 07 FF 3F 51 D5 01 13 10 02 67 6C 35 30 30 6D 00 00 60 15 88 95 70 95 6F 01 00 00 00 00 00 01 05 06 CB BB 2F 01 57 E3 68 07 E4 01 06 09 07 21 01 CC 00 01 25 3D 00 00 AE C3 13 00 00 49 01 00 00 19 02 07 E4 01 06 11 07 22 50 A3 0D 0A

Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+RSP	+RSP
Message Type	1		
Report Mask	4	(HEX)	

Length	1		
Device Type	1	D5	D5
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Number Length/Number Type	1		
Phone Number	<=10		
GPS Accuracy	1	0|1 – 50	
Speed	3	0.0 – 999.9(km/h)	
Azimuth	2	0 – 359	
Altitude	2		
Longitude	4		
Latitude	4		
GPS UTC Time	7	YYYYMMDDHHMMSS	
MCC	2	0000-FFFF	
MNC	2	0000-FFFF	
LAC	2	0000-FFFF	
Cell ID	4	00000000-FFFFFFFF	
CSQ RSSI	1	0 - 31|99	
CSQ BER	1	0 - 7|99	
Battery Voltage	2	0-10000(mV)	
Battery Percentage	1	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	3	+/-XX.X	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ <*Number Length/Number Type*>: The high nibble is for <*Number Length*> and the low nibble

is for <*Number Type*>. <*Number Length*> is the number of bytes used to represent the phone number. <*Number Type*> indicates if there is a '+' sign before the phone number. 1 means there is the sign and 0 means no such a sign.

	Number Length	Number Type
HEX	7	0

✧ <*Phone Number*>: No more than 10 bytes. Each byte uses the high nibble and low nibble to represent one digit of the phone number respectively. If the last low nibble has no digit to represent, fill in 0xF.

Phone Number 02154450293	02	15	44	50	29	3
HEX	02	15	44	50	29	3F

➢ Location message for **+RESP:GTAIS** uses below format.

Example:
2B 42 53 50 0A FF 7F 50 DE 02 02 07 01 67 6C 35 30 30 6D 00 00 05 01 2F 5A 00 00 00 00 00 00 00 C1 06 CB BC 73 01 57 E3 4A 07 E5 08 0C 02 24 2F 01 CC 00 00 27 BD 00 00 0D FC 00 00 00 59 01 00 00 00 00 07 E5 08 0D 0A 11 11 0C 46 87 E2 0D 0A

Parameter	Length (Byte)	Range/Format	Default
Message Header	4	+RSP	+RSP
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	D5	D5
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Report ID	1	0 – 19	
Report Type	1		
Analog Input VCC	2	0 – 32000(mv)	
GPS Accuracy	1	0|1 – 50	
Speed	3	0.0 – 999.9(km/h)	
Azimuth	2	0 – 359	
Altitude	2		
Longitude	4		

Latitude	4		
GPS UTC Time	7	YYYYMMDDHHMMSS	
MCC	2	0000-FFFF	
MNC	2	0000-FFFF	
LAC	2	0000-FFFF	
Cell ID	4	00000000-FFFFFFFF	
CSQ RSSI	1	0 - 31|99	
CSQ BER	1	0 - 7|99	
Reserved	1		
Battery Percentage	1	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	3	+/-XX.X	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ *<Report ID>*:

- 5: The ID of **+RESP:GTAIS**.

✧ *<Report Type>*: For **+RESP:GTAIS:**

0: Outside of the predefined range.

1: Inside of the predefined range.

✧ *< Analog Input VCC>:* The Bluetooth accessory analog input voltage.

4.4. Information Report +INF

Information messages include **+RESP:GTINF**. The message uses the format as below.

➢ **+INF,**

Example: 2B 49 4E 46 00 F7 7F 32 DE 01 13 02 03 67 6C 35 30 30 6D 00 00 01 03 89 86 01 17 85 10 23 14 51 36 16 00 00 00 07 E3 0C 13 0D 2B 10 03 6E E4 62 0D 0A			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+INF	+INF
Message Type	1		

Report Mask	2	(HEX)	
Length	1		
Device Type	1	DE	DE
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Hardware Version	2	(HEX)	
ICCID	10	ICCID	
CSQ RSSI	1	0 – 31 | 99	
CSQ BER	1	0 – 7 | 99	
Reserved	2	0000	
Battery Percentage	1	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	3	(-)XX.X	
GIR Trigger Type	1		+RESP:GTGSM
Cell Number	1		
MCC	2		
MNC	2		
LAC	2		
Cell ID	2		
Reserved	1		
RX Level	1		
…	2		
MCC	2		
MNC	2		
LAC	2		
Cell ID	4		
Reserved	1		
RX Level	1		

Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ <Message Type>: The ID for specific information reports.

Message	ID
+RESP:GTINF	1
+RESP:GTGSM	10

✧ <Report Mask>: It refers to the <+INF Mask> in AT+GTHRM.

✧ <Unique ID>: If the Bit 4 of <+INF Mask> is 0, IMEI of the device is used as the unique ID. IMEI has 14 bytes in hexadecimal format. In the Hex format message, every two bytes are encoded into one byte as an integer. The 8th byte is reserved and its value is 0x00.

IMEI	13	57	90	24	68	11	22	0
HEX	0D	39	5A	18	44	0B	16	00

If the Bit 1 of <+INF Mask> is 1, the device name is used as the unique ID of the device. Refer to the <Device Name> in AT+GTCFG for the device name. Device name is an 8-byte string. If the length of the <Device Name> is more than 8 bytes, only the first 8 bytes will be acquired. In the Hex format report, each byte is encoded into one byte as an integer. If the device name is less than 8 bytes, the empty bytes will be set to 0.

Device Name	g	v	5	0	l	t	m	
HEX	67	76	35	30	6C	74	6D	00

✧ <ICCID>: ICCID is a 20-digit string. In the HEX format message, every 4 bits are used to represent one digit of the ICCID.

ICCID	89	86	00	00	09	09	17	21	49	53
HEX	89	86	00	00	09	09	17	21	49	53

✧ <Cell Number>: It represents the number of the IMSI. The IMSI consists of MCC, MNC, LAC, and Cell ID.

✧ <GIR Trigger Type>: A string to indicate what kind of GNSS fix this cell information is for.

"RTL": This cell information is for RTL request.

"FRI": This cell information is for FRI request.

"GIR": This cell information is for sub command "**C**" in the **AT+GTRTO** command.

"ERI": This cell information is for ERI request.

Fix Type	ID
INF	0
Reserved	1
RTL	2

Reserved	3
Reserved	4
FRI	5
GIR	6
ERI	7

4.5. Event Report +EVT

Event message (**+RESP:GTPNA**) uses this format.

➢ **+EVT,**

Example: **2B 45 56 54 00 FF 7F 23 D5 01 10 08 04 67 6C 35 30 30 6D 00 00 02 07 E3 08 0F 0B 12 26 00 A1 B0 9F 0D 0A**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+EVT	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	D5	D5
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Power On Type	1	1 - 9	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ <*Message Type*>: The ID of event message.

Command	**ID**
+RESP:GTPNA	0
+RESP:GTPFA	1
+RESP:GTBPL	2

+RESP:GTTEM	3
Reserved	4
+RESP:GTUPC	5
Reserved	6
+RESP:GTLTA	7
+RESP:GTUPD	8
Reserved	9
Reserved	10
+RESP:GTBAA	11
+RESP:GTBID	12

✧ <*Report Mask*>: It refers to the <*+EVT Mask*> in **AT+GTHRM.**

✧ <*Unique ID*>: If the Bit 4 of <*+EVT Mask*> is 0, IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, every 2 digits are encoded into one byte as an integer.

IMEI	**13**	**57**	**90**	**24**	**68**	**11**	**22**	**0**
HEX	**0D**	**39**	**5A**	**18**	**44**	**0B**	**16**	**00**

If the Bit 6 of <*+EVT Mask*> is 1, the device name is used as the unique ID of the device. Refer to the <*Device Name*> in **AT+GTCFG** for the device name. Device name is an 8-byte string. If the length of the <*Device Name*> is more than 8 bytes, only the first 8 bytes will be acquired. In the Hex format report, each byte is encoded into one byte as an integer. If the device name is less than 8 bytes, the empty bytes will be set to 0.

Device Name	**g**	**v**	**5**	**0**	**l**	**t**	**m**	
HEX	**67**	**76**	**35**	**30**	**6C**	**74**	**6D**	**00**

✧ <*Power On Type*>: A numeral to indicate how the terminal is activated.

- 1: Movement detected by the terminal.
- 2: Specified time reached.
- 3: Light sensor alarm event.
- 4: Manual powering on for the first time.
- 5: RTO command or dog reboot.
- 6: Reserved
- 7: RTC error.
- 8: FOTA process.
- 9: Temperature sensor alarm event.

Event message **+RESP:GTPFA** uses this format.

➢ **+EVT,**

Example: **2B 45 56 54 01 FF 7F 22 D5 01 10 08 03 67 6C 35 30 30 6D 00 00 07 E3 08 07 09 14 28 00 E3 1F 02 0D 0A**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+EVT	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	FE	FE
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

Event messages (**+RESP:GTBPL**, **+RESP:GTTEM**, **+RESP:GTLTA**) use this format.

- **+EVT,**

Example: **2B 45 56 54 02 FF 7F 4E D5 01 10 08 03 67 6C 35 30 30 6D 00 00 00 00 02 00 00 00 00 00 00 5F 06 CB BC D8 01 57 E3 99 07 E3 08 07 02 23 17 01 CC 00 01 25 3D 00 00 AE C3 0F 00 00 09 00 00 00 00 00 07 E3 08 07 0A 23 18 01 05 D3 07 0D 0A**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+EVT	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	FE	FE
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Event State1	1	1 - 4	

Event State2	1	0	
GPS Accuracy	1	0|1 – 50	0
Speed	3	0.0 – 999.9(km/h)	
Azimuth	2	0 – 359	
Altitude	2		
Longitude	4		
Latitude	4		
GPS UTC Time	7	YYYYMMDDHHMMSS	
MCC	2	0000-FFFF	
MNC	2	0000-FFFF	
LAC	2	0000-FFFF	
Cell ID	4	00000000-FFFFFFFF	
CSQ RSSI	1	0 - 31|99	
CSQ BER	1	0 - 7|99	
Reserved	1		
Battery Percentage	1	0 - 100	
Mode Selection	1	0|1	
Movement Status	1	0|1	
Temperature	3	+/-XX.X	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

For **+RESP:GTBPL**

✧ <*Event State1*>: 0

✧ <*Event State2*>: 0

For **+RESP:GTTEM**

✧ <*Event State1*>: The temperature alarm state

- 1: The current temperature is lower than the low temperature threshold specified by <*Min. Temperature*>.
- 2: The current temperature is higher than the high temperature threshold specified by <*Max. Temperature*>.
- 3: The current temperature is within the temperature threshold range.
- 4: The current temperature is outside the temperature threshold range.

✧ *<Event State2>*: 0

For **+RESP:GTLTA**

✧ *<Event State1>*: The light sensor tamper state.

- 0: Normal state
- 1: Tamper alarm state

✧ *<Event State2>*: 0

Event message **+RESP:GTUPC** uses this format.

Example: **2B 45 56 54 05 FF 7F 5F D5 01 10 08 04 67 6C 35 30 30 6D 00 00 00 00 64 39 68 74 74 70 3A 2F 2F 73 7A 71 75 65 63 6C 69 6E 6B 2E 66 33 33 32 32 2E 6E 65 74 3A 39 31 32 39 2F 47 4C 35 30 30 4D 2F 64 65 6C 74 61 62 69 6E 2F 74 65 73 74 2E 69 6E 69 07 E3 08 0F 0B 0B 0E 00 94 B5 95 0D 0A**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+EVT	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	FE	FE
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Command ID	1		
Result	2	100 - 103|200 - 202|300 - 302	
URL Length	1		
Download URL	<=60	Complete URL	1
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ *<Command ID>*: The command ID in the update configuration file. It is always 0 before the device starts to update the configuration. It indicates the total number of the successfully

executed commands when the result code is 301. And it is the number of the commands which have failed to execute when the result code is 302.

✧ <*Result*>: A numeral to indicate whether the configuration is updated successfully.

- 100: The update command is starting.
- 101: The update command is confirmed by the device.
- 102: The update command is refused by the device.
- 103: The update process is refused because the battery is low.
- 200: The device starts to download the package.
- 201: The device finishes downloading the package successfully.
- 202: The device fails to download the package.
- 300: The device starts to update the device configuration.
- 301: The device finishes updating the device configuration successfully.
- 302: The device fails to update the device configuration.

✧ <*URL Length*>*:* The length of complete URL.

✧ <*Download URL*>: The complete URL to download the configuration. It includes the file name.

Event message **+RESP:GTUPD** uses this format.

➢ **+EVT,**

Example: **2B 45 56 54 08 FF 7F 25 D5 01 10 08 04 67 6C 35 30 30 6D 00 00 00 64 00 07 E3 08 0F 09 12 0D 00 A5 0F 55 0D 0A**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+EVT	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	FE	FE
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Code	2		
Retry	1		
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

The event report message **+RESP:GTBAA** uses the format below.

- **+EVT,**

Example: **2B 45 56 54 0B FF 7F 5E DE 01 13 02 03 67 6C 35 30 30 6D 00 00 03 02 00 02 00 3F 57 54 53 33 30 30 2D 32 00 78 05 41 CF B8 01 01 08 E6 19 00 00 00 00 00 00 00 00 8A 06 CB BD 40 01 57 E4 94 07 E3 0C 13 06 03 1B 01 CC 00 01 25 3D 00 00 AE C3 00 07 E3 0C 13 0E 03 39 03 A3 A3 D1 0D 0A**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+EVT	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	DE	DE
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Index	1	0 – 9|FF	
Accessory Type	1	0 –8	
Accessory Model/Beacon ID Accessory Model	1	0	
Alarm Type	1	00 – FF	
Append Mask	2	0000– FFFF	
Accessory Name	<=21	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' ' _'	
Accessory MAC	6	'0' – '9' 'A' – 'F'	
Accessory Connection Status	1	0 - 1	
Accessory Voltage	2	0 – 5000mV	
Accessory Temperature	1	-40 – 80℃	
Accessory Humidity	1	1-100	
GPS Accuracy	1	0 – 6	0
Speed	3	0.0 – 999.9(km/h)	

Azimuth	2	0 – 359	
Altitude	2		
Longitude	4		
Latitude	4		
GPS UTC Time	7	YYYYMMDDHHMMSS	
MCC	2	0000-FFFF	
MNC	2	0000-FFFF	
LAC	2	0000-FFFF	
Cell ID	4	00000000-FFFFFFFF	
Reserved	1		
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	0000 – FFFF	
Checksum	2	0000 – FFFF	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ <*Index*>: There are two meanings for <Index>.
- The index of Bluetooth accessory defined in **AT+GTBAS** which triggers the **+RESP:GTBAA** message.
- 0xFF for WKF300.

✧ <*Accessory Type*>: The type of the Bluetooth accessory which is defined in the <Index>. The following is supported now:
- 0: No Bluetooth accessory.
- 1: Reserved.
- 2: Beacon temperature sensor.
- 3: Bluetooth Beacon ID accessory (WKF300).
- 5: Reserved.
- 6: Beacon Temperature & humidity sensor.
- 7: Reserved.
- 8: External Input Output Bluetooth Accessory.

✧ <*Accessory Model*>: The model of the Bluetooth accessory which is defined in **AT+GTBAS**.

✧ <*Alarm Type*>: The alarm type of the **+RESP:GTBAA**.
- 0: The voltage of the Bluetooth accessory is low.
- 1: The temperature alarm: current temperature value is below low temperature limit set in **AT+GTBAS** command.
- 2: The temperature alarm: current temperature value is upper high temperature limit set in **AT+GTBAS** command.
- 3. The temperature alarm: current temperature value is within the range defined by temperature limits set in **AT+GTBAS** command.

- 4. Reserved.
- 5. Reserved.
- 6. Reserved.
- 7. The humidity alarm: current humidity value is below low humidity limit set in **AT+GTBAS** command.
- 8: The humidity alarm: current humidity value is upper high humidity limit set in **AT+GTBAS** command.
- 9: The humidity alarm: current humidity value is within the range defined by humidity limits set in **AT+GTBAS** command.

✧ *<Append Mask>:* Bitwise mask defined in **AT+GTBAS** to configure which data item is reported.

- Bit 0: <Accessory Name>.
- Bit 1: <Accessory MAC>.
- Bit 2: <Accessory Connection Status>.
- Bit 3: <Accessory Voltage>.
- Bit 4: <Accessory Temperature>.
- Bit 5: <Accessory Humidity>.

✧ *<Accessory Name>:* Bluetooth accessory name ended with '\0'(0x00). If the Accessory name is empty, this filed will be filled with one byte: 0x00.

✧ *<Accessory MAC>:* Bluetooth accessory MAC address.

✧ *<Accessory Connection Status>:* It indicates the connection status of Bluetooth accessory.

- 0: Disconnected.
- 1: Connected.

✧ *<Accessory Voltage>:* The voltage of Bluetooth accessory.

✧ *<Accessory Temperature>:* Temperature data of Bluetooth accessory.

✧ *<Accessory Humidity>:* Humidity data of Bluetooth accessory.

The event report message **+RESP:GTBID** uses the format below.

➢ **+EVT,**

Example:
2B 45 56 54 43 00 FC 1F FF 00 6A D7 01 02 01 0E 67 62 31 30 30 63 61 75 64 00 00 22 08 01 00 00 0A 78 05 41 01 F4 F7 0A B8 01 01 00 00 00 00 40 00 72 06 CB BD 2A 01 57 E3 F1 07 E4 07 16 03 38 32 01 CC 00 00 27 BD 02 C3 8D 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 07 E4 07 16 03 38 33 04 A7 56 48 0D 0A

Parameter	Length (Byte)	Range/Format	Default
Message Header	4	+EVT	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	1		
Device Type	1	DE	DE
Protocol Version	2	(HEX)	

Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Reserved	1		
Reserved	1		
Reserved	1		
Number	1	0 – 3	
Beacon ID Accessory Model	1	0	
Accessory Append Mask	2	0000 – FFFF	
Accessory MAC	6	'0' – '9' 'A' – 'F'	
Accessory Voltage	2	0 – 5000mV	
GNSS Accuracy	1	0|1 – 50	
Speed	3	0.0 – 999.9km/h	
Azimuth	2	0 – 359	
Altitude	2		
Longitude	4		
Latitude	4		
GNSS UTC Time	7	YYYYMMDDHHMMSS	
MCC	2	0000 – FFFF	
MNC	2	0000 – FFFF	
LAC	2	0000 – FFFF	
Cell ID	4	00000000 – FFFFFFFF	
Reserved	1		
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	0000 – FFFF	
Checksum	2	0000 – FFFF	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

- *<Number>:* The number of Bluetooth beacon ID.
- *<Accessory Model>:* The model of the Bluetooth accessory which is defined in **AT+GTBID**.
- *<Append Mask>:* Bitwise mask defined in the **AT+GTBID** command to configure which data item is reported.
  - Bit 0: reserved.
  - Bit 1: *<Accessory MAC>.*
  - Bit 2: reserved.

- Bit 3: *<Accessory Voltage>*.
- Bit 4: reserved.

✧ *<Accessory MAC>:* Bluetooth accessory MAC address.

✧ *<Accessory Voltage>:* The voltage of Bluetooth accessory.

4.6. Heartbeat Data +HBD

➢ **+HBD,**

Example: **2B 48 42 44 00 00 FF 22 D5 01 11 08 05 67 6C 35 30 30 6D 00 00 07 E3 09 1B 10 2F 19 05 D3 F0 B8 0D 0A**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Message Header	4	+HBD	+HBD
Reserved	1	0	
Report Mask	2	(HEX)	
Length	1		
Device Type	1	FE	FE
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI)	
Send Time	7	YYYYMMDDHHMMSS	
Count Number	2	(HEX)	
Checksum	2	(HEX)	
Tail Characters	2	0x0D 0x0A	0x0D 0x0A

✧ *<Report Mask>*: It refers to the *<+HBD Mask>* in **AT+GTHRM.**

✧ *<Unique ID>*: If Bit 4 of *<+HBD Mask>* is 0, IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, every 2 digits are encoded into one byte as an integer.

IMEI	**13**	**57**	**90**	**24**	**68**	**11**	**22**	**0**
HEX	**0D**	**39**	**5A**	**18**	**44**	**0B**	**16**	**00**

If the Bit 4 of *<+HBD Mask>* is 1, the device name is used as the unique ID of the device. Refer to the *<Device Name>* in **AT+GTCFG** for the device name. Device name is an 8-byte string. If the length of the *<Device Name>* is more than 8 bytes, only the first 8 bytes will be acquired. In the Hex format report, each byte is encoded into one byte as an integer. If the device name is less than 8 bytes, the empty bytes will be set to 0.

Device Name	**g**	**v**	**5**	**0**	**l**	**t**	**m**	

HEX	**67**	**76**	**35**	**30**	**6C**	**74**	**6D**	**00**

If the mask of <*UID*> is set to 0 in the <*+HBD Mask*> of **AT+GTHRM**, the heartbeat message will not include device name or IMEI information. If the mask of <*UID*> is set to 1, the heartbeat message will report device name or IMEI according to the mask of <*Device Name*>.

4.7. Buffer Report in HEX Format

When HEX format messages go into the local buffer, the device will replace the second byte of the messages with 'B'. Thus, **+BSP** is buffered report for **+RSP**, **+BNF** is buffered report for **+INF** and **+BVT** is buffered report for **+EVT**. The rest part of the messages is the same.

5. Appendix: Message Index

✧ **Command and ACK**

AT+GTBSI
+ACK:GTBSI
AT+GTSRI
+ACK:GTSRI
AT+GTQSS
+ACK:GTQSS
AT+GTCFG
+ACK:GTCFG
AT+GTPIN
+ACK:GTPIN
AT+GTDOG
+ACK:GTDOG
AT+GTTMA
+ACK:GTTMA
AT+GTNMD
+ACK:GTNMD
AT+GTGLM
+ACK:GTGLM
AT+GTGEO
+ACK:GTGEO
AT+GTTEM
+ACK:GTTEM
AT+GTRTO
+ACK:GTRTO
AT+GTWLT
+ACK:GTWLT
AT+GTUPC
+ACK:GTUPC
AT+GTPDS
+ACK:GTPDS
AT+GTLTA
+ACK:GTLTA
AT+GTBID
+ACK:GTBID
AT+GTIEX
+ACK:GTIEX
AT+GTAEX
+ACK:GTAEX
AT+GTNTS
+ACK:GTNTS
AT+GTCMD

+ACK:GTCMD
AT+GTUDF
+ACK:GTUDF

✧ **Position Related Report**

+RESP:GTFRI
+RESP:GTGEO
+RESP:GTRTL
+RESP:GTPNL
+RESP:GTNMR
+RESP:GTDOG
+RESP:GTDIS
+RESP:GTAIS

✧ **Device Power Report**

+RESP:GTPWR

✧ **Device Information Report**

+RESP:GTINF

✧ **Report for Querying**

+RESP:GTALC
+RESP:GTCID
+RESP:GTCSQ
+RESP:GTVER
+RESP:GTALS

✧ **Event Report**

+RESP:GTPNA
+RESP:GTPFA
+RESP:GTBPL
+RESP:GTTEM
+RESP:GTUPC
+RESP:GTLTA
+RESP:GTBAA
+RESP:GTBID

✧ **Heartbeat**

+ACK:GTHBD
+SACK:GTHBD

✧ **Server Acknowledgement**

+SACK