GV500MA @Track Air Interface Protocol

EGPRS/LTE Cat-M1/LTE Cat-NB1/GNSS Tracker

TRACGV500MAAN001

Version: 2.00

International Telematics Solutions Innovator

www. queclink .com

Document Title	GV500MA @Track Air Interface Protocol
Version	2.00
Date	2019-07-18
Status	Release
Document Control ID	TRACGV500MAAN001

General Notes

Queclink offers this information as a service to its customers, to support application and engineering efforts that use the products designed by Queclink. The information provided is based upon requirements specifically provided to Queclink by the customers. Queclink has not undertaken any independent search for additional relevant information, including any information that may be in the customer's possession. Furthermore, system validation of this product designed by Queclink within a larger electronic system remains the responsibility of the customer or the customer's system integrator. All specifications supplied herein are subject to change.

Copyright

Contents

0. Revision History

Version	Date	Author	Description of Change
1.00	2018-11-09	Wokky Lin	Initial.
2.00	2019-06-10	Wokky Lin	Changed the value ranges of <*Virtual Ignition On Mask*> and <*Virtual Ignition Off Mask*> to 01-03.
	2019-06-10	Wokky Lin	Added Mode 4 to <*LED On*> in **AT+GTCFG**.
	2019-06-11	Eden Zhang	Added the command **AT+GTCRA** for crash detection.
	2019-06-11	Eden Zhang	Added the command **AT+GTASC** for the calibration of the accelerometer directions.
	2019-07-08	Wokky Lin	Added Mode 2 and Mode 3 to <*Mode*> in **AT+GTHBM**.
	2019-07-18	Wokky Lin	Removed <*Flash ID*> related information from the protocol.

1. Overview

1.1. Scope of This Document

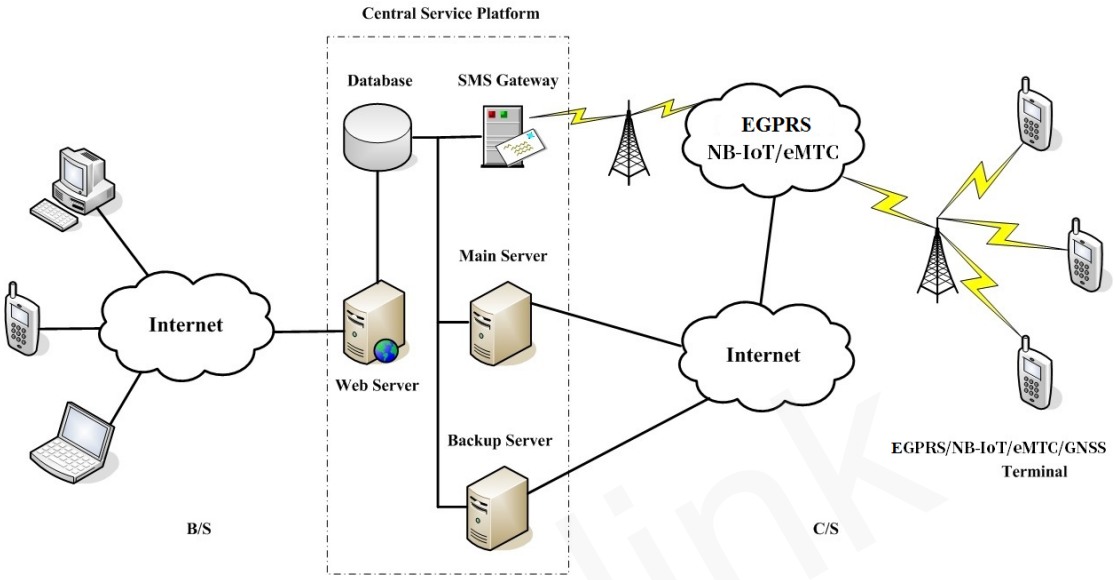
The @Track Air Interface Protocol is a digital communication interface based on printable ASCII characters over SMS, LTE or EGPRS, which is used for all communication between the backend server and the terminal. The backend server sends a command to the terminal and then the terminal confirms the receipt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

Abbreviation	Description
APN	Access Point Network
ASCII	American National Standard Code for Information Interchange
LTE	Long Term Evolution
EGPRS	Enhanced General Packet Radio Service
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
GNSS	Global Navigation Satellite System

2. System Architecture



The backend server needs to be accessible by many 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 terminal.
- ✧ 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 of the @Track Air Interface Protocol messages are composed of printable ASCII characters. Message format which varies with message type is 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>,…" carry 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 when it performs specific actions. When the terminal receives Commands over the air, it will reply with a corresponding Acknowledgement message.

According to the configuration of the parameters, the terminal can send Report messages to the backend server. Please see the following figure:

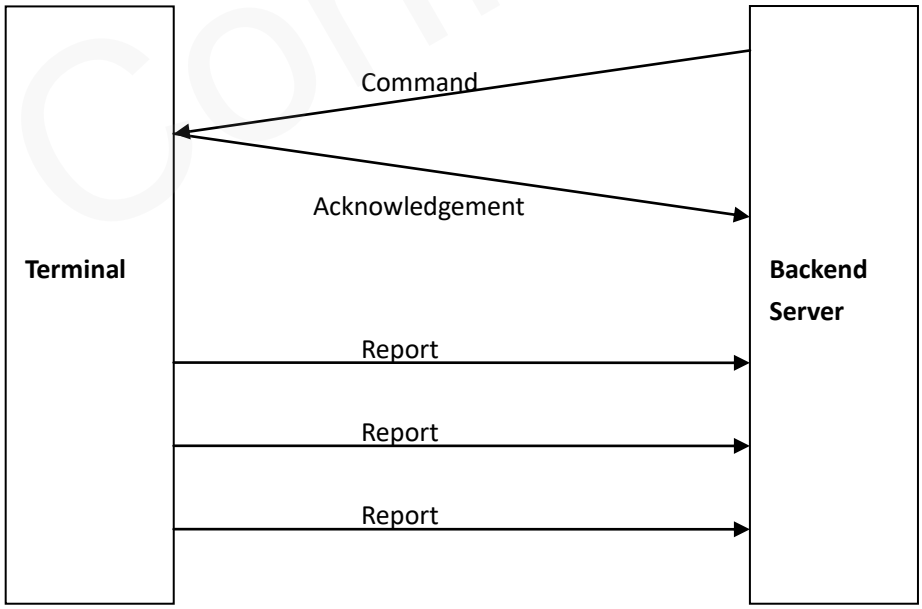


Figure 1: @Track Protocol Message Flow

3.2. Command and Acknowledgement

3.2.1. Server Connection

3.2.1.1. Bearer Setting Information

The command **AT+GTBSI** is used to configure the EGPRS/LTE parameters.

➢ **AT+GTBSI=**

Example: **AT+GTBSI=gv500,cmnet,,,,,,,,0000$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
APN	<=40		
APN User Name	<=30		
APN Password	<=30		
Reserved	0		
Reserved	0		
Reserved	0		
Network Mode	1	0-2	
LTE Mode	1	0-3	
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Password*>: The valid characters for the password include '0' – '9', 'a' – 'z', and 'A' – 'Z'. The default value is "gv500".

✧ <*APN*>: Access point name (APN).

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

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

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

✧ <*Network Mode*>: Mobile network mode of the device.

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

✧ <*LTE Mode*>: The LTE network mode.

- 0: Cat-M1 & Cat-NB1 (Cat-M1 First).
- 1: Cat-NB1 & Cat-M1 (Cat-NB1 First).
- 2: Cat-M1.
- 3: Cat-NB1.

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

✧ <*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. It must be '$'.

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

➢ **+ACK:GTBSI,**

Example: **+ACK:GTBSI,560200,135790246811220,,0000,20090214093254,11F0$**			
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	$	$

✧ <*Protocol Version*>: The protocol version that the device conforms to. The first two characters indicate the device type. As shown in the example, "**56**" means GV500MA. The middle two characters indicate the major version number of the protocol and the last two characters indicate the minor version number of the protocol. Both version numbers are hex digits. For example, "**010A**" means version 2.10.

✧ <*Unique ID*>: The IMEI of the device.

✧ <*Device Name*>: The specified name of the device.

✧ <*Serial Number*>: A serial number which is the same as the <*Serial Number*> in the corresponding command. It distinguishes 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 report message. It begins from 0000 and increases by 1 for each message. It rolls back after "FFFF".

✧ <*Tail Character*>: A character to indicate 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 report messages be sent to the backend server.

3.2.1.2. Backend Server Registration Information

The command **AT+GTSRI** is used to configure where and how to report all the messages, including the server information and the method of communication between the backend server and the device. When the device is configured correctly, it should be able to report data to the backend server.

➢ **AT+GTSRI=**

Example: **AT+GTSRI=gv500,3,,1,116.226.44.17,7011,116.226.45.229,7012,+8613812341234,15,1,,,,,0001$** **AT+GTSRI=gv500,3,,1,some.host.name,7011,116.226.45.229,7012,+8613812341234,15,1,,,,,0001$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Report Mode	1	0 – 7	0
Reserved	0		
Buffer Mode	1	0 – 2|5	1
Main Server IP / Domain Name	<=60	(ASCII)	
Main Server Port	<=5	0 – 65535	
Backup Server IP / Domain Name	<=60	(ASCII)	
Backup Server Port	<=5	0 – 65535	
SMS Gateway	<=20	(Call Number)	
Heartbeat Interval	<=3	0|5 – 360 min	0
SACK Enable	1	0|1	0
Protocol Format	1	0|1	0
Enable SMS ACK	1	0|1	0
High Priority Report Mask	<=2	0 – FF	0
Reserved	0		
Serial Number	4	0000 – FFFF	

Tail Character	1	$	$

✧ <*Report Mode*>: This parameter defines the method of communication between the backend server and the terminal. 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 shut down the connection when it finishes sending data. If the terminal fails to establish TCP connection to the backend server (both Main Server and Backup Server), it will try to send data via SMS to the SMS gateway.
- 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 shut down the connection when the terminal finishes sending data. If the terminal fails to establish TCP connection to the backend server (both Main Server and Backup Server), it will store the data in the memory buffer if the buffer report function is enabled. Otherwise, the data is dropped.
- 3: TCP long-connection mode. The connection is based on TCP protocol. The terminal connects to the backend server and maintains the connection using the heartbeat data. The backend server should respond to the heartbeat data from the terminals.
- 4: UDP mode. The terminal will send data to the backend server by UDP protocol. Receiving protocol commands via UDP is supported if the EGPRS/LTE network allows it. It is recommended to enable heartbeat sending and the **+RESP:GTPDP** report in the case of receiving command via UDP.
- 5: Forced 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 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-connection supported TCP long-connection mode. The connection is based on TCP protocol. The terminal connects to the backend server and maintains the connection using the heartbeat data. The backend server should respond to the heartbeat data from the terminals. If the main server connection is lost, the terminal will try to connect to the backup server. If the backup server connection is also lost, the terminal will try to connect to the main server again.

✧ <*Buffer Mode*>: The working mode of the buffer report function. If the buffer report function is enabled and the device goes into areas without EGPRS/LTE network coverage, the device will store all reports locally. If the device goes back to areas with EGPRS/LTE network coverage, it will then send all the buffered reports through EGPRS/LTE.

- 0: Disable the buffer report function.
- 1: Low priority – Enable the buffer report function: In this mode, the device will send the buffered messages after sending real time messages.
- 2: High priority – Enable the buffer report function: In this mode, the device will

send all the buffered messages before sending real time messages.

- 3: Reserved
- 4: Reserved
- 5: Timestamp priority. In this mode, all messages will be saved and sent in the order they are generated, but the messages which are configured in <*High Priority Report Mask*> will be reported first. In this mode, the message header will not be changed to the string "+BUFF:".

✧ <*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*>: The IP address of the backup server.

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

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

✧ <*Heartbeat Interval*>: The interval for sending heartbeat message (**+ACK:GTHBD**) when report mode is TCP long-connection mode or UDP mode. If it is set to 0, no heartbeat package message will be sent.

✧ <*SACK Enable*>: This parameter defines whether the backend server should respond to the device with a SACK message when it receives a message from the device.

- 0: The backend server does not reply with a SACK message when receiving a message from the device.
- 1: The backend server replies with a SACK message when receiving a message from the device.

✧ <*Protocol Format*>: This parameter defines the format of the report messages sent from the device to the backend server. 0 means "ASCII format", and 1 means "HEX format".

✧ <*Enable SMS ACK*>: This parameter defines whether to reply with the ACK confirmation via SMS when the command is sent via SMS.

- 0: The device will send the ACK confirmation using the mode specified by <*Report Mode*>.
- 1: The device will send the ACK confirmation via SMS to the phone number from which the command is sent via SMS.

✧ <*High Priority Report Mask*>: Bitwise mask to configure the messages which should be sent at high priority when the <*Buffer Mode*> is 5.

- Bit 0 for **+RESP:GTPDP**
- Bit 1 for **+ACK:GTHBD**
- Bit 2 for **+RESP:GTUPD**

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

➢ **+ACK:GTSRI,**

Example: **+ACK:GTSRI,560200,135790246811220,,0001,20090214093254,11F0$**			
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	$	$

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

3.2.1.3. Quick Start Setting

The command **AT+GTQSS** is used to configure the EGPRS/LTE parameters and backend server information if the length of all these settings is less than 160 bytes. Otherwise, the two commands **AT+GTBSI** and **AT+GTSRI** are used to configure those settings.

- **AT+GTQSS=**

Example: **AT+GTQSS=gv500,cmnet,,,3,,1,116.226.44.17,7011,116.226.45.229,7012,+8613812341234,15,1,,,0002$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
APN	<=40		
APN User Name	<=30		
APN Password	<=30		
Report Mode	1	0 – 7	0
Reserved	0		
Buffer Mode	1	0 – 2 | 5	1
Main Server IP / Domain Name	<=60	(ASCII)	
Main Server Port	<=5	0 – 65535	
Backup Server IP / Domain Name	<=60	(ASCII)	
Backup Server Port	<=5	0 – 65535	

SMS Gateway	<=20	(Call Number)	
Heartbeat Interval	<=3	0|5 – 360 min	0
SACK Enable	1	0|1	0
Protocol Format	1	0|1	0
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

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

➢ **+ACK:GTQSS,**

Example: **+ACK:GTQSS,560200,135790246811220,,0002,20090214093254,11F0$**			
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	$	$

3.2.2. Device Configuration

3.2.2.1. Global Configuration

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

➢ **AT+GTCFG=**

Example: **AT+GTCFG=gv500,123456,gv500,,,,,,,,,,,,,,,,,0,0003$** **AT+GTCFG=gv500,,,1,123.4,0,,0,1,,2FF,,1,1,300,0,0,1,,,0,0003$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
New Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	

Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	gv500
ODO Enable	1	0|1	0
ODO Initial Mileage	<=9	0.0 – 4294967.0 (km)	0.0
Reserved	0		
Reserved	0		
Report Composition Mask	<=4	0000 – FFFF	003F
Power Saving Mode	1	0 – 2	1
Sleep Mode	1	0 – 1	1
Event Mask	<=4	0000 – FFFF	3FFF
Reserved	0		
LED On	1	0|1|2|3|4	2
Info Report Enable	1	0|1	0
Info Report Interval	<=5	30 – 86400 sec	300
Reserved	0		
Backup Battery Supply	1	0|1	0
Backup Battery Charge Mode	1	0|1	0
AGPS Mode	1	0|1|2	0
GSM Report	4	0000 – FFFF	000F
GNSS Lost Time	<=2	0 – 30 min	0
GNSS Antenna Mode	1	0|1|2	0
GNSS Antenna Timeout	<=4	0 – 1440 min	30
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*New Password*>: It is set to change the current password.
- <*Device Name*>: An ASCII string to represent the name of the device.
- <*ODO Enable*>: Enable/disable the odograph function to calculate the total mileage. The current mileage is included in every position report message.
- <*ODO Initial Mileage*>: The initial value for calculating the total mileage.
- <*Report Composition Mask*>: Bitwise mask to configure the composition of report messages, especially the composition of GNSS information.
  - Bit 0 for <*Speed*>
  - Bit 1 for <*Azimuth*>

- Bit 2 for <*Altitude*>
- Bit 3 for network data, including <*MCC*>, <*MNC*>, <*LAC*>, <*Cell ID*> and the <*Reserved*> parameter value "00"
- Bit 4 for <*Mileage*>
- Bit 5 for <*Send Time*>
- Bit 6 for <*Device Name*>
- Bit 7 Reserved

For each bit, set it to 1 to enable the corresponding component in the report, and 0 to disable the corresponding component in the report. This mask is valid for all report messages.

✧ <*Power Saving Mode*>: The mode of the power saving function. If <*Power Saving Mode*> is set to 0, the GNSS chipset will be always on. If <*Power Saving Mode*> is set to 1, the fixed report, geo-fence and speed alarm report functions are suspended when the device is at a standstill or the engine is turned off. If <*Power Saving Mode*> is set to 2, it is mostly like mode 1 and the difference is that the fixed report will not be suspended and the fix and send interval of it will be set to <*IGF Report Interval*> in **AT+GTFRI** when the engine is off.

- 0: Disable the power saving function.
- 1: Mode 1 of the power saving function.
- 2: Mode 2 of the power saving function.

✧ <*Sleep Mode*>: It configures the mode of the sleep function. If <*Sleep Mode*> is set to 0, it means "Disable the sleep function". If <*Sleep Mode*> is set to 1, it means "Enable the sleep function and stop all the GNSS position fixing and report when the voltage of the external power supply is lower than 11.5V".

- 0: Disable the sleep function. This mode is not recommended because it may cause high current consumption for the vehicle battery in ignition off state.
- 1: Mode 1 of the sleep function.

✧ <*Event Mask*>: Bitwise mask to configure which event report should be sent to the backend server.

- Bit 0 for **+RESP:GTPNA**
- Bit 1 for **+RESP:GTPFA**
- Bit 2 for **+RESP:GTMPN**
- Bit 3 for **+RESP:GTMPF**
- Bit 4 Reserved
- Bit 5 for **+RESP:GTBPL**
- Bit 6 for **+RESP:GTBTC**
- Bit 7 for **+RESP:GTSTC**
- Bit 8 for **+RESP:GTSTT**
- Bit 9 Reserved
- Bit 10 for **+RESP:GTPDP**
- Bit 11 for the power on **+RESP:GTRTL**
- Bit 12 for the virtual ignition on/off report **+RESP:GTVGN** and **+RESP:GTVGF**
- Bit 13 for the virtual ignition on/off location report **+RESP:GTVGL**

For each bit, set it to 1 to enable the corresponding event report, and 0 to disable the corresponding event report.

- <*LED On*>: It configures the working mode of CELL LED and GNSS LED.
  - 0: Each time the device powers on, GNSS LED will work for 30 minutes and then turn off.
  - 1: GNSS LED turns on as configured.
  - 2: Default working mode. Each time the device connects to or disconnects from the vehicle or the engine ignition status has changed, both LEDs (GNSS LED and CELL LED) will work for 5 minutes and then turn off.
  - 3: Each time the device connects to the vehicle, both LEDs will work for 5 minutes only and then turn off.
  - 4: Both LEDs will stay off all the time.
- <*Info Report Enable*>: Enable/disable the device information report (**+RESP:GTINF**). The device information includes state of the device, ICCID, signal strength, voltage of external power supply, battery voltage, charging status and GNSS LED working mode, the last known time of GNSS fix, output status, time zone information and daylight saving setting.
  - 0: Disable the device information report.
  - 1: Enable the device information report.
- <*Info Report Interval*>: The interval for reporting the device information.
- <*Backup Battery Supply*>: It configures the working mode of the backup battery supply.
  - 0: Disable the backup battery power supply.
  - 1: Enable the backup battery power supply.
- <*Backup Battery Charge Mode*>: It controls the charging mode of the backup battery.
  - 0: When the main power supply is connected, the backup battery is charged as needed.
  - 1: When the main power supply is connected, the backup battery is charged only when ignition on is detected. The charge process will begin 3 minutes after the ignition is turned on. The charge process is stopped when the ignition is turned off.
- <*AGPS Mode*>: A numeral to indicate the AGPS mode. AGPS helps increase the chances of getting a GNSS position successfully and reduce the time needed to get a GNSS position.
  - 0: Disable the AGPS function.
  - 1: AGPS Offline mode
  - 2: AGPS Online mode
- <*GSM Report*>: It controls how or when to report cell information.

  The 2 high bits Bit 14 – 15 indicate GSM report mode:
  - 0: Do not allow the cell information report.
  - 1: Allow the cell information report after failing to get a GNSS position if cell information is available.
  - 2: Report the message **+RESP:GTGSM** after getting a GNSS position successfully every time if cell information is available.
  - 3: Report the message **+RESP:GTGSM** no matter what the result of getting a GNSS position every time if cell information is available.

  Bitwise mask to configure which event report should be sent to the backend server.
  - Bit 0 for **+RESP:GTRTL**
  - Bit 1 Reserved
  - Bit 2 for **+RESP:GTFRI**

- Bit 3 Reserved
- Bit 4 for **+RESP:GTTOW**
- Bit 5 – 13 Reserved

For each bit, set it to 1 to enable the corresponding event report, and 0 to disable the corresponding event report.

✧ <*GNSS Lost Time*>: A time parameter to monitor the GNSS signal. If there is no GNSS signal or no successful GNSS fix for <*GNSS Lost Time*> consecutively, the device will send the event report **+RESP:GTGSS** to indicate "GNSS signal lost". When the GNSS signal is recovered or a successful fix is obtained again, the device will send the event report **+RESP:GTGSS** to indicate the recovery. 0 means "Disable this feature".

Note: If the device is rebooted, it will not report **+RESP:GTGSS** to indicate GNSS signal recovery even if it has reported **+RESP:GTGSS** to indicate "GNSS signal lost" before reboot.

✧ <*GNSS Antenna Mode*>: A numeral to indicate how to select a GNSS antenna.

- 0: Select the better-performing GNSS antenna automatically.
- 1: Use the main GNSS antenna.
- 2: Use the GNSS antenna on the same side as the USB interface.

✧ <*GNSS Antenna Timeout*>: The time in minutes before starting GNSS antenna selection algorithm when the device fails to get a GNSS position in ignition on state. This parameter works only if <*GNSS Antenna Mode*> is 0. 0 means "The device will start GNSS antenna selection algorithm for only one time (till it gets a better-performing antenna) after it is inserted into OBD interface and it will never start GNSS antenna selection algorithm no matter how long it is unable to get a GNSS position".

Note: When the device works only on backup battery, the GNSS will be forced to turn off in order to save power. When the main power supply is reconnected, the GNSS will resume working normally as configured.

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

➢ **+ACK:GTCFG,**

Example: **+ACK:GTCFG,560200,135790246811220,,0003,20090214093254,11F0$**			
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	$	$

3.2.2.2. Time Adjustment

The command **AT+GTTMA** is used to adjust the local time of the device remotely. Upon receiving this command, the device will set the time zone and daylight saving accordingly. Then it will use the given UTC time to adjust the local time based on the time zone and daylight saving setting. This command will also be a trigger for the device to start GNSS. After a successful GNSS fix, the device will update the local time with the GNSS UTC time again.

➢ **AT+GTTMA=**

Example: **AT+GTTMA=gv500,-,3,30,0,20090917203500,,,,,0011$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Sign	1	+|–	+
Hour Offset	<=2	0 – 23	0
Minute Offset	<=2	0 – 59	0
Daylight Saving	1	0|1	0
UTC Time	14	YYYYMMDDHHMMSS	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character			

✧ <*Sign*>: It indicates the positive or negative offset of the local time from UTC time.
✧ <*Hour Offset*>: UTC offset in hours.
✧ <*Minute Offset*>: 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 acknowledgment message of the **AT+GTTMA** command:

➢ **+ACK:GTTMA,**

Example: **+ACK:GTTMA,560200,135790246811220,,0011,20090214093254,11F0$**

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	$	$

3.2.2.3. Outside Working Hours

To protect the privacy of the driver when he is off duty, the device could be configured to report empty location information outside working hours. The command **AT+GTOWH** is used to define the working hours and the working mode to protect the privacy. If this function is enabled and it is outside of working hours, in all ASCII format reports, the fields Latitude, Longitude, MCC, MNC, LAC, Cell ID and the reserved field after Cell ID will be empty. Meanwhile, in HEX format reports where location should be hidden, the fields Latitude and Longitude will be filled with 0x054C5638, and the fields MCC, MNC, LAC Cell ID and the reserved field after Cell ID will be filled with 0. This function will not hide any information if the device is in emergency report mode.

- **AT+GTOWH=**

Example: **AT+GTOWH=gv500,3,1F,0900,1200,1300,1730,,,,,,,,,,,0012$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|3	0
Day of Work	<=2	0 – 7F	1F
Working Hours Start1	4	HHMM	0900
Working Hours End1	4	HHMM	1200
Working Hours Start2	4	HHMM	1300
Working Hours End2	4	HHMM	1800
Reserved	0		
Reserved	0		
Reserved	0		

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

- ✧ <*Mode*>: The working mode of this function.
  - 0: Disable this function.
  - 3: Automatic mode. The device will automatically check the current time against the working hours range. If it is outside working hours, the device will hide the location information in the ASCII format report message and replace the location information with a fixed value in the hex format report message. If it is during working hours, the location information will be reported normally.
- ✧ <*Day of Work*>: It specifies the working days in a week in a bitwise manner.
  - Bit 0 for Monday
  - Bit 1 for Tuesday
  - Bit 2 for Wednesday
  - Bit 3 for Thursday
  - Bit 4 for Friday
  - Bit 5 for Saturday
  - Bit 6 for Sunday

  For each bit, 0 means “off day”, and 1 means “working day”.
- ✧ <*Working Hours Start1*>, <*Working Hours End1*>: The first period of the working hours in a day.
- ✧ <*Working Hours Start2*>, <*Working Hours End2*>: The second period of the working hours in a day.

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

- ➢ **+ACK:GTOWH,**

Example: **+ACK:GTOWH,560200,135790246811220,,0012,20090214093254,11F0$**			
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	$	$

3.2.2.4. Protocol Watchdog

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

➢ **AT+GTDOG=**

Example:
AT+GTDOG=gv500,1,,1,0130,,1,,,60,60,0,0013$
AT+GTDOG=gv500,2,30,,,,1,,,60,60,0,0013$

Parameter	Length (byte)	Range/Format	Default
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1|2	0
Ignition Frequency	<=3	10 – 120 min	60
Interval	<=2	1 – 30 day	30
Time	4	HHMM	0200
Reserved	0		
Report Before Reboot	1	0|1	1
Reserved	0		
Reserved	0		
No Network Interval	<=4	0 | 5-1440 min	60
No Activation Interval	<=4	0 | 5-1440 min	60
Send Failure Timeout	<=4	0 | 5-1440 min	0
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Mode*>: The working mode of this function.

- 0: Disable this function.

- 1: Reboot periodically according to the <*Interval*> and <*Time*> settings.
- 2: Reboot when the ignition is turned on.

✧ <*Ignition Frequency*>: If the working mode is 2, and the time interval between two adjacent ignitions is greater than the values specified by this parameter, the device will automatically reboot upon ignition on.

✧ <*Interval*>: The time interval (in days) for rebooting the device.

✧ <*Time*>: It specifies the time at which the reboot operation is performed when the <*Interval*> condition is met.

✧ <*Report Before Reboot*>: It defines whether to report the **+RESP:GTDOG** message before reboot. 0 means "Do not report the message before reboot", and 1 means "Report the message before reboot". If this parameter is enabled, the device will initiate a real-time location fix before sending the message with the current location information.

✧ <*No Network Interval*>: The interval for rebooting the device when there is no network signal. 0 means "Do not reboot the device".

✧ <*No Activation Interval*>: The interval for rebooting the device when the device is unable to be registered to the EGPRS/LTE network. 0 means "Do not reboot the device."

✧ <*Send Failure Timeout*>: The length of time (in minutes) before rebooting the device when the device fails to send a message. 0 means "Do not reboot the device".

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

➢ **+ACK:GTDOG,**

Example: **+ACK:GTDOG,560200,135790246811220,,0013,20090214093254,11F0$**			
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	$	$

3.2.2.5. Settings for Preserving Device's Specified Logic States

The command **AT+GTPDS** is used to preserve specified logic states of the device. The logic states specified by <*Mask*> will be preserved or reset according to the <*Mode*> setting.

➢ **AT+GTPDS=**

Example:

AT+GTPDS=gv500,1,1F,,,,,,FFFF$			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1|2	0
Mask	4	0000 – FFFF	0
Reserved			
Reserved			
Reserved			
Reserved			
Reserved			
Reserved			
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Mode*>: It controls the mode of preserving specified logic states of the device.

- 0: Disable this function.
- 1: Preserve specified logic states of the device according to the value of the <*Mask*>.
- 2: Reset all the specified logic states of the device listed in the <*Mask*> after receiving the command, and then preserve specified logic states 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: State of GEO
- Bit 1: Reserved
- Bit 2: Reserved
- Bit 3: Information of last known position
- Bit 4: State of ignition
- Bit 5: Reserved
- Bit 6: Reserved
- Bit 7: State of SPD

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

➢ **+ACK:GTPDS,**

Example: **+ACK:GTPDS, 560200,135790246811220,,000D,20090214093254,FFFF$**			
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	$	$

3.2.2.6. 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=gv500,0,5,0,1,,http://180.169.235.202:21022/U21023_at.ini,1,,1,FFFFFFFF,,F,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-20	'0'-'9', 'a'-'z', 'A'-'Z'	gv500
Max Download Retry	1	0 – 3	0
Download Timeout	<=2	5 – 30 min	10
Download Protocol	1	0	0
Enable Report	1	0|1	0
Update Interval	<=4	0 – 8760 hour	0
Download URL	<=100	URL	
Mode	1	0|1	0
Reserved	0		
Extended Status Report	1	0|1	0
Identifier Number	8	00000000-FFFFFFFF	0
Reserved			
Update Status Mask	1	0 - F	3
Serial Number	4	0000-FFFF	
Tail Character	1	$	$

✧ <*Max Download Retry*>: It specifies the maximum number of retries to download the configuration file upon download failure.

✧ <*Download Timeout*>: It specifies the expiration timeout of a single download. If the download expires, it is considered to be failure.

✧ <*Download Protocol*>: The protocol used to download the file. Only HTTP is supported now.

It is set to 0.

- <*Enable Report*>: A numeral which indicates whether to report the message **+RESP:GTUPC** or **+RESP:GTEUC** when the configuration is updated over the air.
  - 0: Do not report the message **+RESP:GTUPC** or **+RESP:GTEUC**.
  - 1: Report the message **+RESP:GTUPC** or **+RESP:GTEUC**.
- <*Update Interval*>: The time interval measured in hours for updating the configuration over the air.
- <*Download URL*>: It specifies the URL to download the configuration file. If the <*Download URL*> ends with "/" which means the URL is just a path without file name, the device will add <imei>.ini as the file name to complete the URL. If it is greater than 100 bytes in length, error will be returned.
- <*Mode*>: A numeral which indicates the working mode of downloading configuration over the air.
  - 0: Disable this function.
  - 1: Enable this function.
- <*Extended Status Report*>: A numeral to indicate the message to report for the configuration update status when <*Enable Report*> is 1.
  - 0: Report the message **+RESP:GTUPC**.
  - 1: Report the message **+RESP:GTEUC** to include more information.
- <*Identifier Number*>: A numeral to identify the update configuration request. This number will be included in the message **+RESP:GTEUC** to indicate the request it is related to.
- <*Update Status Mask*>: Bitwise mask to configure the status in which the device can update the configuration.
  - Bit 0 for ignition off
  - Bit 1 for ignition on

Note:

1. The maximum number of commands in configuration file is 255. If there are more than 255 commands in the configuration file, the device will fail to download the configuration file.
2. Make sure there is only one command per line in the configuration file and there is a "\r\n" between two commands.
3. There should be no space before each command.
4. The configuration file should be a plain text file.
5. **+RESP:GTEUC** in hex format has the same message format as **+RESP:GTUPC**.

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

- **+ACK:GTUPC,**

Example: **+ACK:GTUPC,560200,135790246811220,,0005,20100310172830,11F0$**			
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. Position Related Report

3.2.3.1. Fixed Report Information

The command **AT+GTFRI** is used to configure the parameters of fixed report (**+RESP:GTFRI**).

➢ **AT+GTFRI=**

Example: **AT+GTFRI=gv500,1,0,,1,0000,0000,,5,1000,1000,,45,5,,,,,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0 – 5|8	0
Discard No Fix	1	0|1	1
Reserved	0		
Period Enable	1	0|1	1
Start Time	4	HHMM	0000
End Time	4	HHMM	0000
Reserved	0		
Send Interval	<=5	1 – 86400 sec	30
Distance	<=5	50 – 65535m	1000
Mileage	<=5	50 – 65535m	1000
Reserved	0		
Corner Report	<=3	0 – 180	0
IGF Report Interval	<=5	0|1 – 86400 sec	600
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	

Tail Character	1	$	$

✧ <*Mode*>: The working mode of the fixed report function.

- 0: Disable this function.
- 1: Fixed Time Report. The position report message is sent to the backend server periodically according to the parameter <*Send Interval*>.
- 2: Fixed Distance Report. The position report message is sent to the backend server when the straight-line distance between the current GNSS position and the last sent GNSS position is greater than or equal to the distance specified by the parameter <*Distance*>.
- 3: Fixed Mileage Report. The position report message is sent to the backend server when the path length between the current GNSS position and the last sent GNSS position is greater than or equal to the mileage specified by the parameter <*Mileage*>.
- 4: Optimum Report. The device simultaneously checks both time interval and path length between two adjacent position reports. Device position will be reported if the calculated time interval between the current time and the time of last report is greater than <*Send Interval*>, and the length of the path between the current position and the last position is greater than <*Mileage*>.

  Note: If the device gets a valid GNSS fix and finds that it moves more than <*Mileage*>, it will store this position. After some time, if the time interval is greater than <*Send Interval*> while the device fails to get a valid GNSS fix, the last position stored will be reported.
- 5: Fixed Time or Mileage Report. The device checks either time interval or path length between two adjacent position reports. Device position will be reported if the calculated time interval between the current time and the time of last report is greater than <*Send Interval*>, or the length of the path between the current position and the last position is greater than <*Mileage*>.
- 8: Fixed Time or Mileage or Corner Report. It is mostly like the Fixed Time or Mileage Report, and the difference is that the Fixed Time and Mileage will be reset to 0 if a corner report occurs.

✧ <*Discard No Fix*>: Enable/disable report when there is no GNSS fix.

- 0: Enable report.
- 1: Disable report.

✧ <*Period Enable*>: Enable/disable the time range specified by <*Start Time*> and <*End Time*>. If the time range is enabled, the position reporting is limited within the time range.

✧ <*Start Time*>: The start time of the scheduled report. The valid format is “HHMM”. The value range of “HH” is “00”–“23”. The value range of “MM” is “00”–“59”.

✧ <*End Time*>: The end time of the scheduled report. The valid format and range are the same as those of <*Start Time*>.

✧ <*Send Interval*>: The time interval for sending the position information. The value range is 1 – 86400. Unit: second. If <*Report Mode*> in **AT+GTSRI** is set to forced SMS mode, this parameter should not be less than 15 seconds; otherwise the position information will be sent via TCP short connection.

- <*Distance*>: The specified distance for sending the position information when <*Mode*> is 2. Unit: meter.
- <*Mileage*>: The specified length for sending the position information when <*Mode*> is 3, 4, 5 or 8. Unit: meter.
- <*Corner Report*>: The threshold to determine whether the device is turning around a corner. 0 means "Disable the corner report". For other values, the device will compare the current azimuth with that of the last known corner. If the difference is greater than or equal to the specific value, the device will send the corner report with **+RESP:GTFRI**.
- <*IGF Report Interval*>: The time period for fixing and sending the position information via the **+RESP:GTFRI** message periodically when <*Mode*> is not 0, <*Power Saving Mode*> in **AT+GTCFG** is set to 0|2 and the engine is off. Its value range is 0|1 – 86400 and the unit is second.

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

➢ **+ACK:GTFRI,**

Example: **+ACK:GTFRI,560200,135790246811220,,0009,20090214093254,11F0$**			
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	$	$

3.2.3.2. Emergency Report Mode

The command **AT+GTEMG** is used to initiate emergency mode which works for a predefined period of time. When the device receives the command via LTE, EGPRS or SMS, the device will change the location sending interval of fixed time report during the emergency period. When the emergency period is over, the device will switch to the original location sending interval automatically. In emergency mode, the value of report ID is 6 in the fixed time report message **+RESP:GTFRI**.

➢ **AT+GTEMG=**

Example: **AT+GTEMG=gv500,1,600,10,,,,,,010A$**

Parameter	Length (byte)	Range/Format	Default
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1|2	0
Emergency Period	<=5	5 – 86400 sec	600
Emergency Report Interval	<=5	5 – 86400 sec	10
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Mode*>: A numeral to indicate the mode for the command.
  - 0: Disable the current emergency mode if the device is in emergency mode.
  - 1: Initiate emergency mode immediately.
  - 2: Do not initiate emergency mode. The device will just update the settings of <*Emergency Period*> and <*Emergency Report Interval*>.
- <*Emergency Period*>: The period of time the emergency mode works since it is initiated. After the time period has elapsed, the device will exit from the emergency mode. Unit: second.
- <*Emergency Report Interval*>: The interval for sending the fixed time report **+RESP:GTFRI** in emergency mode. Unit: second.

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

- **+ACK:GTEMG,**

Example: **+ACK:GTEMG,560200,135790246811220,,FFFF,20140605140622,001F$**			
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. Alarm Settings

3.2.4.1. Tow Alarm Configuration

The **AT+GTTOW** command is used to configure the tow alarm parameters.

➢ **AT+GTTOW=**

Example: **AT+GTTOW=gv500,1,5,0,120,,,,,4,10,4,,,,,,,,,000B$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Tow Enable	1	0|1	0
Engine Off to Tow	<=2	5 – 15 min	10
Fake Tow Delay	<=2	0 – 10 min	1
Tow Interval	<=5	30 – 86400 sec	300
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Rest Duration	<=3	1 – 255 (×15sec)	2
Motion Duration	<=2	1 – 10 (×100ms)	3
Motion Threshold	1	2 – 4	2
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Tow Enable*>: Enable/disable tow alarm (**+RESP:GTTOW**).
  - 0: Disable the tow alarm.
  - 1: Enable the tow alarm.
- <*Engine Off to Tow*>: A time parameter to measure whether the device is considered being towed after the engine is turned off. If the motion sensor does not detect rest within the specified time after the engine is turned off, the device is being towed.
- <*Fake Tow Delay*>: If the motion sensor detects motion again after engine off and rest are detected, the device turns into a state called fake tow. If the device stays in fake tow after a period of time defined by the parameter <*Fake Tow Delay*>, it is considered being towed.
- <*Tow Interval*>: The interval for sending tow alarm messages.
- <*Rest Duration*>: A time parameter to measure whether the device enters stationary state. The status of the device will be changed to rest if the motion sensor detects rest and the stationary state is maintained for a period of time defined by the parameter <*Rest Duration*>.
- <*Motion Duration*>: A time parameter to measure whether the device enters moving state. The status of the device will be changed to motion if the motion sensor detects motion and the moving state is maintained for a period of time defined by the parameter <*Motion Duration*>.
- <*Motion Threshold*>: The threshold for the motion sensor to measure whether the device is moving.

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

➢ **+ACK:GTTOW,**

Example: **+ACK:GTTOW,560200,135790246811220,,000B,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	$	$

3.2.4.2. 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 location-based service. When the geofencing device enters or exits the area, a notification is generated. The notification contains information about the location of the device and can be sent to the backend server.)

➢ **AT+GTGEO=**

Example: **AT+GTGEO=gv500,0,0,121.315424,31.254617,50,0,,,,,0,0,0,,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
GEO ID	1	0 – 4	
Mode	1	0 – 3	0
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
Radius	<=7	50 – 6000000m	50
Check Interval	<=5	0|5 – 86400sec	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Trigger Mode	<=2	0|21|22	0
Trigger Report	1	0|1	0
State Mode	1	0|1	0
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*GEO ID*>: The ID of the Geo-Fence. A total of five (0 to 4) zones are supported.

✧ <*Mode*>: The working mode of the device reporting the Geo-Fence message **+RESP:GTGEO** to the backend server.

- 0: Disable the zone's Geo-Fence function.
- 1: Entering the zone. The report will be generated only when the device enters the Geo-Fence.
- 2: Exiting the zone. The report will be generated only when the device exits from the

Geo-Fence.

- 3: Both entering and exiting the zone.

✧ <*Longitude*>: The longitude of a point which is defined as the center of the circular Geo-Fence region. The unit is degree, and accuracy is 6 decimal places. West longitude is defined as negative starting with the minus sign "–" and east longitude is defined as positive without "+".

✧ <*Latitude*>: The latitude of a point which is defined as the centre of the circular Geo-Fence region. The unit is degree, and accuracy is 6 decimal places. South latitude is defined as negative starting with the minus sign "–" and north latitude is defined as positive without "+".

✧ <*Radius*>: The radius of the circular Geo-Fence region. The value range is 50 – 6000000 and the unit is meter.

✧ <*Check Interval*>: The interval for GNSS checking position information against the Geo-Fence alarm.

✧ <*State Mode*>: The mode of state reporting.

- 0: Report upon getting the state for the first time.
- 1: Do not report until the state changes.

✧ <*Trigger Mode*>: The trigger mode of the Geo-Fence function.

- 0: Disable auto trigger mode.
- 21: Automatically set up Geo Fence after the ignition is turned off. In this mode, the device will automatically set up a Geo-Fence with the current location as the center point of the Geo-Fence when the ignition is off. The device will only report alarm upon exiting the Geo-Fence. The Geo-Fence will be canceled after the device exits the Geo-Fence.
- 22: Manually enable Geo-Fence after the ignition is turned off. In this mode, the device will automatically set up a Geo-Fence with the current location as the center point of the Geo-Fence when the ignition is off. The device will only report alarm upon exiting the Geo-Fence. When the device exits the Geo-Fence, it will cancel the Geo-Fence and disable the trigger mode at the same time. If the driver wants to use this trigger mode again, he has to manually set the trigger mode again.

✧ <*Trigger Report*>: Whether to report the **+RESP:GTGES** message when the specified trigger mode is triggered and when the Geo-Fence is canceled.

- 0: Disable the **+RESP:GTGES** report.
- 1: Enable the **+RESP:GTGES** report.

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

➢ **+ACK:GTGEO,**

Example: **+ACK:GTGEO,560200,135790246811220,,0,000A,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', '-', '_'	
GEO ID	1	0 - 4	
Serial Number	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.2.4.3. Roaming Detection Configuration

The command **AT+GTRMD** is used to configure the parameters for network roaming detection.

➢ **AT+GTRMD=**

Example: **AT+GTRMD=gv500,1,,,,,1,3,46000,46002,46003,,,2,2,46007,,,1,1,46001,,,3fff,,,2ff,,,,,,,,,,0002$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Home Operator Start	1	1-10	
Home Operator End	1	1-10	
Home Operator List	<=6*10	(ASCII)	
Reserved	0		
Reserved	0		
Roaming Operator Start	1	1-100	
Roaming Operator End	1	1-100	
Roaming Operator List	<=6*100	(ASCII)	
Reserved	0		
Reserved	0		
Blacklist Operator Start	1	1-20	

Blacklist Operator End	1	1-20	
Black List Operator	<=6*20	(ASCII)	
Reserved	0		
Reserved	0		
Known Roaming Event Mask	<=6	000000 – FFFFFF	3DEF
Reserved	0		
Reserved	0		
Unknown Roaming Event Mask	<=6	000000 – FFFFFF	3DEF
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Mode*>: The working mode of the roaming detection function.
  - 0: Disable this function.
  - 1: Enable this function.
- <*Operator Start*>: A numeral to indicate the first index of the whitelist operator numbers to be input. For example, if it is 1, the device will update the whitelist operators from the 1st one. If it is empty, there should be no whitelist number following the empty value.
- <*Operator End*>: A numeral to indicate the last index of the whitelist operator numbers to be input. For example, if it is 2, the device will update the whitelist operators until the 2nd one. If it is empty, there should be no whitelist number following the empty value.
- <*Home Operator List*>: A white list of PLMN codes for network operators. The numbers are composed of MCC and MNC, both of which consist of 3 digits. The last digit of MNC can be omitted (e.g. both “46001F” and “46001” are the PLMN of CHINA UNICOM). The operators in this list will be considered as in “Home” state. Two adjacent operator numbers are

separated with ‘,’. The number of the operators in the list is determined by the parameters <*Operator Start*> and <*Operator End*>. For example, if <*Operator Start*> is 1 and <*Operator End*> is 2, the operator list should include 2 operator numbers (empty value acceptable) and the two numbers are separated by with ‘,’. “MCCFF” type code is used to identify operators across a whole country. For example, “460FF” covers mobile network operators all across China.

- <*Roaming Operator List*>: It is almost the same as the <*Home Operator List*>, and the difference is that the operators in this list will be considered as in “Known Roaming” state.
- <*Black List Operator*>: It is almost the same as the <*Home Operator List*>, and the difference is that the operators in this list will be considered as in “Blocking Report” state. In this state, the device works normally but all reports will be buffered instead of being sent. Operators that are not in <*Home Operator List*>, <*Roaming Operator List*> or <*Black List Operator*> will be considered as in “Unknown Roaming” state.
- <*Known Roaming Event Mask*>: Bitwise mask to configure which event report should be sent to the backend server when network roaming state is detected. If the roaming state is “Known Roaming”, the <*Known Roaming Event Mask*> will be valid; if the roaming state is “Unknown Roaming”, the <*Unknown Roaming Event Mask*> will be valid.
  - Bit 0 for **+RESP:GTPNA**
  - Bit 1 for **+RESP:GTPFA**
  - Bit 2 for **+RESP:GTMPN**
  - Bit 3 for **+RESP:GTMPF**
  - Bit 4 Reserved
  - Bit 5 for **+RESP:GTBPL**
  - Bit 6 for **+RESP:GTBTC**
  - Bit 7 for **+RESP:GTSTC**
  - Bit 8 for **+RESP:GTSTT**
  - Bit 9 Reserved
  - Bit 10 for **+RESP:GTPDP**
  - Bit 11 for the power on **+RESP:GTRTL**
  - Bit 12 for the virtual ignition on/off report **+RESP:GTVGN** and **+RESP:GTVGF**
  - Bit 13 for the virtual ignition on/off location report **+RESP:GTVGL**
  - Others Reserved

  For each bit, set it to 1 to enable the corresponding event report, and 0 to disable the corresponding event report.
- <*Unknown Roaming Event Mask*>: It is mostly like the <*Known Roaming Event Mask*>.

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

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

- **+ACK:GTRMD,**

Example: +ACK:GTRMD,560200,135790246811220,,0000,20090214093254,11F0$			
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	$	$

Note: Only an AT command string of no more than 180 bytes could be accepted by the device in the case of sending the command string via Manage Tool (There is no such limit for sending the command via EGPRS/LTE). As **AT+GTRMD** contains a large amount of configuration information in PLMN code list, make sure the command length does not exceed 180 bytes through proper <*Operator Start*> and <*Operator End*> settings. A color alert will occur on Command Text Box which turns yellow if there is a command of over 180 bytes to be sent via Manage Tool.

3.2.4.4. Speed Alarm

This command is used to set a speed range for the alarm function of the device. According to the working mode, the device will report the message **+RESP:GTSPD** to the backend server when its moving speed is outside or inside the range.

➢ **AT+GTSPD=**

Example: AT+GTSPD=gv500,1,80,120,60,300,,,,,,,,,,,,,,000C$ AT+GTSPD=gv500,2,80,120,60,300,,,,,,,,,,,,,,000C$			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1|2|3	0
Min Speed	<=3	0 – 400 km/h	0
Max Speed	<=3	0 – 400 km/h	0
Validity	<=4	0 – 3600 sec	60
Send Interval	<=4	30 – 3600 sec	300

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

- ✧ <*Mode*>: The working mode of the speed alarm function.
  - 0: Disable the speed alarm function.
  - 1: Report speed alarm if the current speed is within the speed range defined by <*Min Speed*> and <*Max Speed*>.
  - 2: Report speed alarm if the current speed is outside the speed range defined by <*Min Speed*> and <*Max Speed*>.
  - 3: Report speed alarm only one time if the current speed is within or outside the speed range defined by <*Min Speed*> and <*Max Speed*>. In this mode, <*Send Interval*> will be ignored.
- ✧ <*Min Speed*>: The lower speed limit.
- ✧ <*Max Speed*>: The upper speed limit.
- ✧ <*Validity*>: If the speed meets the alarm condition and is maintained for a period of time defined by <*Validity*>, the speed alarm will be triggered.
- ✧ <*Send Interval*>: The time interval for sending the speed alarm message.

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

- ➢ **+ACK:GTSPD,**

Example:

+ACK:GTSPD,560200,135790246811220,,000C,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	$	$

3.2.4.5. Excessive Idling Detection

The command **AT+GTIDL** is used to detect the engine excessive idling (the vehicle stays stationary while the ignition is on). To use this command, virtual ignition detection must be enabled. When the device detects that the vehicle is entering into the idle status, it can report the event message **+RESP:GTIDN** to the backend server. When the vehicle leaves the idle status, the device can report the event message **+RESP:GTIDF** to the backend server.

➢ **AT+GTIDL=**

Example: **AT+GTIDL=gv500,1,2,1,,,,,,,,,,,000F$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1	0
Time to Idling	<=2	1 – 30 min	2
Time to Movement	1	1 – 5 min	1
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

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

✧ <*Mode*>: The working mode of the excessive idling detection function.
- 0: Disable this function.
- 1: Enable this function.

✧ <*Time to Idling*>: If it is detected that the vehicle is stationary with ignition on for the length of time specified by this parameter, the vehicle is considered to be in idling status.

✧ <*Time to Movement*>: If the vehicle moves again and the moving state is maintained for the length of time specified by this parameter after the vehicle enters into idling status, it is considered to leave idling status. If ignition off is detected, the vehicle is considered to leave idling status regardless of the <*Time to Movement*> setting.

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

➢ **+ACK:GTIDL,**

Example: **+ACK:GTIDL,560200,135790246811220,,000F,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	$	$

3.2.4.6. Start/Stop Report

The command **AT+GTSSR** is used to detect the status of vehicle (Start or Stop status). When the device detects that the vehicle is entering into Start status, it can report the event message **+RESP:GTSTR** to the backend server. When the vehicle leaves the Start status, and then enters

into Stop status, the device can report the event message **+RESP:GTSTP** to the backend server.

➢ **AT+GTSSR=**

Example: **AT+GTSSR=gv500,1,2,1,5,,,,,000F$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1	0
Time to Stop	<=4	(0– 30 min)| (0 – 1800 Sec)	2min
Time to Start	<=3	(0 – 5 min) | (0 – 300 Sec)	1min
Start Speed	<=2	1 – 10 Km/h	5
Long Stop	<=5	0 – 43200 min	0
Time Unit	1	0|1	0
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Mode*>: The working mode of the Start/Stop report function.
- 0: Disable this function.
- 1: Enable this function.

✧ <*Time to Stop*>: If the vehicle rests again and stays in that status for the length of time specified by this parameter after it enters into Start status, it is considered to leave Start status.

✧ <*Time to Start*>: If it is detected that the vehicle is moving with ignition on for the length of time specified by this parameter, the vehicle is considered to be in Start status.

✧ <*Start Speed*>: The Start speed threshold to determine whether the vehicle is started or not. If the built-in motion sensor detects that the device is moving with ignition on, the device will start to check the speed from GNSS. If the device speed stays greater than <*Start Speed*> for a period of time longer than <*Time to Start*>, the vehicle is considered to be in Start status, and the event message **+RESP:GTSTR** will be reported. If the device speed stays lower than or equal with <*Start Speed*> for a period of time longer than <*Time to Stop*>, the vehicle is considered to quit Start status, and the event message **+RESP:GTSTP** will be reported. If GNSS fix is abnormal for more than 1 minute, the device will only use the built-in motion sensor to detect the Start/Stop status and does not check the speed.

✧ <*Long Stop*>: After the vehicle enters into Stop status and stays in Stop state for the period of time specified by this parameter, the **+RESP:GTLSP** message will be sent. 0 means

"Disable this feature".

✧ <*Time Unit*>: It controls the time unit of <*Time to Stop*> and <*Time to Start*> parameters.

- 0: Unit: minute
- 1: Unit: second

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

➢ **+ACK:GTSSR,**

Example: **+ACK:GTSSR,560200,135790246811220,,000F,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	$	$

3.2.4.7. Harsh Behavior Monitoring

The command **AT+GTHBM** is used to monitor the harsh driving behavior based on GNSS.

➢ **AT+GTHBM=**

Example: **AT+GTHBM=gv500,1,,0,100,21,6,,60,21,6,,,21,15,,,,,,,,,0010$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1|2|3	0
Reserved	0		
Discard Unknown Event	1	0|1	0
High Speed	3	100 – 400 km/h	100
ΔVhb	<=3	0 – 100 km/h	0
ΔVha	<=3	0 – 100 km/h	0
Reserved	0		

Medium Speed	<=3	60 – 100 km/h	60
ΔVmb	<=3	0 – 100 km/h	0
ΔVma	<=3	0 – 100 km/h	0
Reserved	0		
Reserved	0		
ΔVlb	<=3	0 – 100 km/h	0
ΔVla	<=3	0 – 100 km/h	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Cornering and Braking Threshold	2	30 – 70	30
Cornering and Braking Duration	<=3	40-100(*8ms)	50
Acceleration Threshold	2	15 – 50	20
Acceleration Duration	<=3	50 – 250(*8ms)	65
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Mode*>: The working mode of the harsh behavior monitoring function.

- 0: Disable this function.
- 1: Enable this function: Detection by GNSS only. In this mode, two harsh behaviors are monitored, i.e. harsh braking and harsh acceleration. According to the speed read from GNSS, 3 levels of speed are defined including high speed, medium speed and low speed. For each speed level, 2 thresholds of speed change are defined to determine harsh braking and harsh acceleration. If the change of speed within 5 seconds is greater than the corresponding threshold, the device will report the **+RESP:GTHBM** message to the backend server to indicate the harsh behavior. The same harsh behavior within 30 seconds will only be reported once if only GNSS is used to judge harsh driving behavior.
- 2: Enable this function: Detection by motion sensor only. In this mode, three types of harsh behavior can be detected, i.e. harsh braking, harsh acceleration and harsh cornering. The device needs GNSS information to get the harsh behavior direction, so it is necessary to keep GNSS always on to collect all the information needed.

- 3: Enable this function: Detection by motion sensor or GNSS. This mode works in the way both Mode 1 and Mode 2 are enabled.

✧ <*Discard Unknown Event*>: It configures whether to discard the unknown harsh behavior message.

- 0: Do not discard unknown harsh behavior message.
- 1: Discard unknown harsh behavior message.

✧ <*High Speed*>, <*Medium Speed*>: If the last known speed of the device read from GNSS is greater than or equal to <*High Speed*>, the vehicle that the device is attached to is considered to be at high speed. If the last known speed is less than <*High Speed*> but greater than or equal to <*Medium Speed*>, the vehicle is considered to be at medium speed. If the last known speed is less than <*Medium Speed*>, the vehicle is considered to be at low speed.

✧ <*ΔVhb*>: The threshold for harsh braking at high speed level. If the current speed is less than the last known speed and the change of the speed is greater than or equal to this value within 5 seconds, harsh braking is detected at high speed level. If it is set to 0, it means "Do not monitor harsh braking behavior at high speed level".

✧ <*ΔVha*>: The threshold for harsh acceleration at high speed level. If the current speed is greater than the last known speed and the change of the speed is greater than or equal to this value within 5 seconds, harsh acceleration is detected at high speed level. If it is set to 0, it means "Do not monitor harsh acceleration behavior at high speed level".

✧ <*ΔVmb*>: The threshold for harsh braking at medium speed level. If the current speed is less than the last known speed and the change of the speed is greater than or equal to this value within 5 seconds, harsh braking is detected at medium speed level. If it is set to 0, it means "Do not monitor harsh braking behavior at medium speed level".

✧ <*ΔVma*>: The threshold for harsh acceleration at medium speed level. If the current speed is greater than the last known speed and the change of the speed is greater than or equal to this value within 5 seconds, harsh acceleration is detected at medium speed level. If it is set to 0, it means "Do not monitor harsh acceleration behavior at medium speed level".

✧ <*ΔVlb*>: The threshold for harsh braking at low speed level. If the current speed is less than the last known speed and the change of the speed is greater than or equal to this value within 5 seconds, harsh braking is detected at low speed level. If it is set to 0, it means "Do not monitor harsh braking behavior at low speed level".

✧ <*ΔVla*>: The threshold for harsh acceleration at low speed level. If the current speed is greater than the last known speed and the change of the speed is greater than or equal to this value within 5 seconds, harsh acceleration is detected at low speed level. If it is set to 0, it means "Do not monitor harsh acceleration behavior at low speed level".

✧ <*Cornering and Braking Threshold*>: The threshold for the motion sensor to measure whether the device is in harsh cornering or harsh braking status.

✧ <*Cornering and Braking Duration*>: A time parameter to measure whether the device enters harsh cornering or harsh braking status. If the driving behaviors are maintained for a period of time longer than the time defined by <*Cornering and Braking Duration*>, harsh cornering or harsh braking event will be triggered.

✧ <*Acceleration Threshold*>: The threshold for the motion sensor to measure whether the device is in harsh acceleration status.

✧ <*Acceleration Duration*>: A time parameter to measure whether the device enters harsh

acceleration status. If the driving behavior is maintained for a period of time longer than the time defined by <*Acceleration Duration*>, harsh acceleration event will be triggered.

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

➢ **+ACK:GTHBM,**

Example: **+ACK:GTHBM,560200,135790246811220,,0010,20090214093254,11F0$**			
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	$	$

3.2.4.8. Crash Detection

The command **AT+GTCRA** is used to configure the parameters for crash detection. If the detection condition is matched (i.e., the current acceleration in a direction is beyond the configured threshold), the device will report the **+RESP:GTCRA** event message and **+RESP:GTCRD** data packets to the backend server.

➢ **AT+GTCRA=**

Example: **AT+GTCRA=gv500,1,50,50,50,0,500,500, , , , ,,0019$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0-2	0
Threshold_X	<=3	0 - 160	50
Threshold_Y	<=3	0 – 160	50
Threshold_Z	<=3	0 – 160	50
Sampling Start	1	0|1	0
Samples Before Crash	<=4	1-1500	500
Samples After Crash	<=4	1-1500	500

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

✧ <*Mode*>: The working mode of the crash detection function.

- 0: Disable this function.
- 1: Enable this function. In this mode, three-axis self-calibration is not needed.
- 2: Enable this function. In this mode, the acceleration sensor data will be converted in accordance with three-axis self-calibration. In the new coordinate system, the positive X-axis points in the direction in which the vehicle travels, the positive Y-axis, which is perpendicular to X axis, points in such a way that the positive X-axis is right handed, and positive Z-axis is the opposite direction of gravity.

Note: The device will keep moitoring crash event based on the original three-axis data from sensor until it detects the first **+RESP:GTASC** event.

✧ <*Threshold_X*>: The acceleration threshold for crash in X direction. The smaller the parameter value is, the more easily a crash event will be detected. If <*Threshold_X*> is 0, the device will not monitor crash event in X axis. Unit: 0.1g.

✧ <*Threshold_Y*>: The acceleration threshold for crash in Y direction. The smaller the parameter is, the more easily a crash event will be detected. If <*Threshold_Y*> is 0, the device will not monitor crash event in Y axis. Unit: 0.1g.

✧ <*Threshold_Z*>: The acceleration threshold for crash in Z direction. The smaller the parameter is, the more easily a crash event will be detected. If <*Threshold_Z*> is 0, the device will not monitor crash event in Z axis. Unit: 0.1g.

✧ <*Sampling Start*>: A numeral to indicate when to start acceleration sampling.

- 0: Start acceleration sampling after the device is power on. The device will always collect acceleration information as long as it is powered on.
- 1: Start acceleration sampling after ignition on is detected. The device will collect acceleration information only in ignition on state.

✧ <*Samples Before Crash*>: The number of recorded XYZ-axis acceleration samples before crash.

✧ <*Samples After Crash*>: The number of recorded XYZ-axis acceleration samples after crash.

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

➢ **+ACK:GTCRA,**

Example:
+ACK:GTCRA,560200,135790246811220,,0019,20090214093254,11F0$

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	$	$

3.2.4.9. Three-Axis Self-Calibration

The command **AT+GTASC** is used to define the condition for the calibration of the accelerometer directions. When the condition is matched and the accelerometer is calibrated successfully, the device will report the event message **+RESP:GTASC** which includes the calibration result to the backend server. The pre-condition for the calibration is that the device is in moving state while the ignition is on and the parameter <*Mode*> in the command **AT+GTCRA** is 2.

➢ **AT+GTASC=**

Example: **AT+GTASC=gv500,50,10,5,,,,, , , , ,,0019$**				
SN	**Parameter**	**Length (byte)**	**Range/Format**	**Default**
1	Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
2	Brake Speed Threshold	<=3	30 – 400km/h	50
3	Delta Speed Threshold	<=2	5 – 72km/h	10
4	Delta Heading Threshold	1	0-5	2
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
13	Reserved	0		

	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

- ✧ <*Brake Speed Threshold*>: The lower threshold of the speed before braking. If the speed is beyond the threshold before braking, the braking event can trigger the accelerometer calibration.
- ✧ <*Delta Speed Threshold*>: The lower threshold of the delta speed in one second during braking. If the delta speed is beyond the threshold, the braking event can trigger the accelerometer calibration.
- ✧ <*Delta Heading Threshold*>: The upper threshold of the delta heading during braking. If the delta heading is smaller than the threshold, the braking event can trigger the accelerometer calibration.

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

➢ **+ACK:GTASC,**

Example: **+ACK:GTASC,560200,135790246811220,,0019,20090214093254,11F0$**			
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. IO Application

3.2.5.1. External Power Supply Monitoring

The command **AT+GTEPS** is used to configure the parameters for external power supply monitoring. The device will measure and monitor the voltage of the external power supply. If the voltage of the external power supply matches the predefined alarm condition, the device will report the alarm message **+RESP:GTEPS** to the backend server to indicate the status of the external power supply.

To make sure this function works in all situations, it is strongly recommended to switch on the backup battery in case the voltage of the external power may drop to a very low level.

➢ **AT+GTEPS=**

Example: **AT+GTEPS=gv500,2,250,12000,3,2,,,,,1,0,0,,0007$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1|2	0
Min Threshold	<=5	250 – 28000 mV	250
Max Threshold	<=5	250 – 28000 mV	250
Sample Period	<=2	0|1 – 12 (×2s)	0
Debounce Time	1	0 – 5 (×1s)	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Sync with FRI	1	0|1	0
Voltage Margin Error	<=3	0 – 100 (×10mv)	0
Debounce Voltage Threshold	<=3	0 – 100 (×100mv)	0
MPN/MPF Validity Time	1	0 – 5 (×1s)	0
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Mode*>: The working mode of the external power supply monitoring function.

- 0: Disable the external power supply monitoring function.
- 1: Enable the external power supply monitoring function. If the current voltage is within the range of (<*Min Threshold*>, <*Max Threshold*>), the **+RESP:GTEPS** alarm will be triggered.
- 2: Enable the external power supply monitoring function. If the current voltage is outside the range of (<*Min Threshold*>, <*Max Threshold*>), the **+RESP:GTEPS** alarm will be triggered.

✧ <*Min Threshold*>: The lower limit to the voltage of the external power supply to trigger the alarm.

✧ <*Max Threshold*>: The upper limit to the voltage of the external power supply to trigger the alarm.

✧ <*Sample Period*>: The sampling period for measuring the external power supply.

- <*Debounce Time*>: The time for debouncing used to avoid false reporting due to excessive voltage drop of the external power supply within a short time.
- <*Sync with FRI*>: Besides the **+RESP:GTEPS** alarm report, the device can also send the voltage of external power supply periodically along with the fixed report message.
  - 0: Do not report external power supply voltage along with the fixed report message.
  - 1: Report external power supply voltage along with the fixed report message.
- <*Voltage Margin Error*>: This parameter will be used together with <*Min Threshold*> and <*Max Threshold*>, which indicates the voltage margin error of the <*Min Threshold*> and <*Max Threshold*> parameters. If the current value of voltage detection falls between the voltage margin error range of the <*Min Threshold*> and that of the <*Max Threshold*>, then this voltage value will not be processed. For example, if the <*Min Threshold*> is set to 6000mv, the <*Max Threshold*> is set to 12000mv, and the <*Voltage Margin Error*> is set to ±100mv, the current voltage will not be processed when the current voltage meets the condition (5900mv < the current voltage < 6100mv) or (11900mv < the current voltage < 12100mv). The <*Voltage Margin Error*> parameter improves the performance of the **+RESP:GTEPS** report.
- <*Debounce Voltage Threshold*>: This parameter will be used together with <*Debounce Time*>. If the voltage drops or bursts dramatically greater than <*Debounce Voltage Threshold*>, the device will start to debounce voltage for the period of time specified by <*Debounce Time*>.
- <*MPN/MPF Validity Time*>: The validity time for detecting the device connecting or disconnecting main power supply. 0 means "Do not check the validity time". If <*MPN/MPF Validity Time*> is not 0, and the device remains connected or disconnected with main power supply for the period of time specified by this parameter, the device will report **+RESP:GTMPN** or **+RESP:GTMPF** to the backend server. If it is detected that the device connects or disconnects the main power supply when <*MPN/MPF Validity Time*> is 0, the device will report **+RESP:GTMPN** or **+RESP:GTMPF** immediately to the backend server.

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

- **+ACK:GTEPS,**

Example: **+ACK:GTEPS,560200,135790246811220,,0007,20090214093254,11F0$**			
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	$	$

3.2.6. Virtual Ignition Settings

3.2.6.1. Voltage Virtual Ignition Setting

The command **AT+GTVVS** is used to configure parameters for detecting virtual ignition status by monitoring voltage. It is enabled if <*Virtual Ignition Mode*> of **AT+GTVMS** is set to 2.

➢ **AT+GTVVS=**

Example: **AT+GTVVS=gv500,13400,600,1,1,10,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Ignition On Voltage	<=5	8000 – 28000 mV	13500
Voltage Offset	<=4	200 – 2000 mV	600
Ignition On Debounce	<=3	5 – 255 (× 2 sec)	10
Smart Voltage Adjustment	1	0|1	1
Ignition Off Debounce	<=3	5 – 255 (× 2 sec)	10
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Ignition On Voltage*>: The external power voltage in ignition on state. Different vehicles have different voltages in ignition on state. This parameter should be set to a value very close to the original voltage of the external power supply, so that the device can detect ignition on event more accurately.

✧ <*Voltage Offset*>: The offset from <*Ignition On Voltage*> used to determine ignition on or ignition off state. If the voltage of the external power is higher than <*Ignition On Voltage*> - <*Voltage Offset*> and is maintained for <*Ignition On Debounce*> seconds, the device will consider it as virtual ignition on state. If the voltage of the external power is lower than <*Ignition On Voltage*> - <*Voltage Offset*> and is maintained for <*Ignition Off Debounce*> seconds, the device will consider it as virtual ignition off state.

✧ <*Ignition On Debounce*>: The debounce time to wait before updating the virtual ignition state according to the external power voltage.

✧ <*Smart Voltage Adjustment*>: Enable/disable the smart voltage adjustment algorithm.

- 0: Disable the smart voltage adjustment algorithm. The values of <*Ignition On Voltage*> and <*Voltage Offset*> will keep static.
- 1: Enable the smart voltage adjustment algorithm. The values of <*Ignition On Voltage*> and <*Voltage Offset*> will dynamically change according to actual igniton on and off voltage.

✧ <*Ignition Off Debounce*>: The debounce time to wait before updating the virtual ignition off

state according to the external power voltage.

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

➢ **+ACK:GTVVS,**

Example: **+ACK:GTVVS,560200,135790246811220,,0072,20170605110225,00FF$**			
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	$	$

3.2.6.2. Accelerometer Virtual Ignition Setting

The command **AT+GTAVS** is used to configure parameters for detecting virtual ignition status based on motion status. It is enabled if <*Virtual Ignition Mode*> of **AT+GTVMS** is set to 4.

➢ **AT+GTAVS=**

Example: **AT+GTAVS=gv500,30,30,,,,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Rest Validity	<=3	1 – 255 sec	30
Movement Validity	<=3	1 – 255 sec	60
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Rest Validity*>: A time parameter to determine whether the device enters virtual ignition off state. The device will be considered in virtual ignition off state after the motion sensor

detects rest and the stationary state is maintained for a period of time specified by the parameter <*Rest Validity*>.

✧ <*Movement Validity*>: A time parameter to determine whether the device enters virtual ignition on state. The device will be considered in virtual ignition on state after the motion sensor detects movement and the moving state is maintained for a period of time specified by the parameter <*Movement Validity*>.

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

➢ **+ACK:GTAVS,**

Example: **+ACK:GTAVS,560200,135790246811220,,0073,20170605110226,0100$**			
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	$	$

3.2.6.3. Virtual Ignition Mode Selection

The command **AT+GTVMS** is used to configure the mode of detecting virtual ignition state. If virtual ignition mode is not disabled, the virtual ignition on/off events will be triggered according to the detection mode.

➢ **AT+GTVMS=**

Example: **AT+GTVMS=gv500,2,,,,,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Virtual Ignition Mode	1	0 | 2 | 4 | 7	0
Virtual Ignition On Mask	2	01-03	03
Virtual Ignition Off Mask	2	01-03	03
Virtual Ignition On Logic	1	0-1	1
Reserved	0		

Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Virtual Ignition Mode*>: A numeral to define the working mode of detecting virtual ignition state.

- 0: Disable the virtual ignition detection function.
- 2: Voltage virtual ignition detection mode. The ignition status is related to the voltage of the external power supply. Please use the command **AT+GTVVS** to configure the ignition on/off voltage parameters.
- 4: Accelerometer virtual ignition detection mode. Ignition status can be indicated by the motion status determined by <*Rest Validity*> and <*Movement Validity*> defined in the **AT+GTAVS** command. Stationary state indicates ignition off and moving state indicates ignition on.
- 7: Combined detection mode. In this mode, ignition on/off trigger conditions can be selected using <*Virtual Ignition On Mask*> and <*Virtual Ignition Off Mask*> parameters.

  Note: <*Virtual Ignition off Mask*> must contain <*Virtual Ignition On Mask*> to prevent logic errors.

✧ <*Virtual Ignition On Mask*>: Bitwise mask to detect the ignition on event. The logic of each bit is controlled by the <*Virtual Ignition On Mask Logic*> parameter.

Bit0 (01): Voltage virtual ignition detection

Bit1 (02): Motion status virtual ignition detection

✧ <*Virtual Ignition Off Mask*>: Bitwise mask to detect ignition off event. All bits matched are considered as ignition off event.

Bit0 (01): Voltage virtual ignition detection

Bit1 (02): Motion status virtual ignition detection

For example:

Bit (00000003): Voltage virtual ignition detection and motion status virtual ignition detection combined mode. Only when ignition off is detected by both Mode 2 and Mode 4, the device is considered in ignition off state.

✧ <*Virtual Ignition On Logic*>: The logic of each bit in <*Virtual Ignition On Mask*>.

- 0: AND logic. All bits matched are considered as ignition on event.
- 1: OR logic. Any one bit matched is considered as ignition on event.

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

➢ **+ACK:GTVMS,**

Example: **+ACK:GTVMS,560200,865084030004210,,FFFF,20170609080955,097C$**			
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: If the virtual ignition detection function is enabled, **+RESP:GTVGN**, **+RESP:GTVGF** and **+RESP:GTVGL** can be reported to the backend server when the corresponding bit in <*Event Mask*> of the command **AT+GTCFG** is set to 1.

3.2.7. Other Settings

3.2.7.1. Real Time Operation

The command **AT+GTRTO** is used to retrieve information from the device or control the device when it executes certain actions.

➢ **AT+GTRTO=**

Example: **AT+GTRTO=gv500,9,,,,,,0015$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Sub Command	<=2	0 – E|13|1C	
Sub AT Command / ATI Mask	3|8	"SRI" | 00000000 – FFFFFFFF	
Output Direction	1	0|1|3	
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Sub Command*>: Valid values are 0–E, 13, and 1C.

- 0: ***GPS***. Get the GNSS related information via the message **+RESP:GTGPS**.
- 1: ***RTL***. Request the device to report its current position immediately via the message **+RESP:GTRTL**.
- 2: ***READ***. Get the current configuration of the device via the message **+RESP:GTALL**.

- 3: ***REBOOT***. Reboot the device.
- 4: ***RESET***. Reset all parameters to factory settings and clear all buffered messages. Parameters configured by **AT+GTBSI**, **AT+GTSRI**, **AT+GTCFG** and **AT+GTTMA** will not be reset.
- 5: ***PWROFF***. Power off the device.
- 6: ***CID***. Get the ICCID of the SIM card being used by the device via the message **+RESP:GTCID**.
- 7: ***CSQ***. Get the current signal level of the device via the message **+RESP:GTCSQ**.
- 8: ***VER***. Get the version information of the device via the message **+RESP:GTVER**.
- 9: ***BAT***. Get the battery voltage and adapter status of the device via the message **+RESP:GTBAT**.
- A: Reserved.
- B: ***TMZ***. Get the time zone settings via the message **+RESP:GTTMZ**.
- C: ***GIR***. Get cell information via the message **+RESP:GTGSM**.
- D: ***DELBUF***. Delete all of buffered messages.
- E: ***GSV*****.** Request the device to report the satellite information via the message **+RESP:GTGSV**.
- 13: ***GPSANT***. Start to select GNSS antenna.
- 1C: ***ATI***. Get the basic device information via the message **+RESP:GTATI**.

✧ <*Sub AT Command / ATI Mask*>:

- Sub AT Command: For example, to get the configuration of **AT+GTFRI**, please set **AT+GTRTO=gv500,2,FRI,,,,,0015$,** and get it via **+RESP:GTALS**. **Note:** To get local time information, please use **TMZ**.
- ATI Mask: If <*Sub Command*> is set to 1C, the basic device information will be reported via the message **+RESP:GTATI** according to the <*ATI Mask*> setting.

ATI Mask Table:

Mask Bit	Item
Bit 0	Firmware Version
Bit 1	MCU Firmware Version
Bit 2	Reserved
Bit 3	Reserved
Bit 4	Reserved
Bit 5	Reserved
Bit 6	Reserved
Bit 7	Modem Firmware Version
Bit 8 – Bit 11	Reserved for Firmware Version
Bit 12	Hardware Version
Bit 13	Modem Hardware Version

Bit 14 – Bit 15	Reserved for Hardware Version
Bit 16 – Bit 17	Reserved
Bit 18	Sensor ID
Bit 19	Reserved
Bit 20 – Bit 30	Reserved
Bit 31	Reserved

✧ <*Output Direction*>: This parameter determines the destination that the response message of the RTO command will be reported to. This field is invalid for <*Sub Command*> 2(READ), 3(REBOOT), 4(RESET), and 5(PWROFF).

- 0: The message will be output to the backend server.
- 1: The message will be output to the main serial port.
- 2: Reserved
- 3: If the command is received via SMS, the message will be output to the original SMS number; otherwise the message will be output to the backend server.

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

➢ **+ACK:GTRTO,**

Example: **+ACK:GTRTO,560200,135790246811220,,VER,0015,20090214093254,11F1$**			
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	$	$

✧ <*Sub Command*>: A string to indicate the sub command of **AT+GTRTO**.

3.2.7.2. Hour Meter Count

The command **AT+GTHMC** is used to measure the accumulated time of use with each actuation of the ignition on. To use this command, virtual ignition detection must be enabled. When the device sends the **+RESP:GTFRI**, **+RESP:GTVGN** or **+RESP:GTVGF** message, <*Hour Meter Count*>

will be included in these reports.

➢ **AT+GTHMC=**

Example: **AT+GTHMC=gv500,1,22222:22:22,,,,,,,,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Hour Meter Enable	1	0|1	0
Initial Hour Meter Count	11	HHHHH:MM:SS	00000:00:00
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Hour Meter Enable*>: Enable/disable the hour meter count function. If the hour meter count function is enabled, the hour meter count will be increased when the device detects the vehicle ignition is turned on.

- 0: Disable the hour meter count function.
- 1: Enable the hour meter count function.

✧ <*Initial Hour Meter Count*>: It is formatted with 5 hour digits, 2 minute digits and 2 second digits, and the range is 00000:00:00 – 99999:00:00. When the ignition is turned on for the first time, the <*Hour Meter Count*> which is reported in **+RESP:GTFRI**, **+RESP:GTVGN** or **+RESP:GTVGF** will be increased based on this value.

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

➢ **+ACK:GTHMC,**

Example: **+ACK:GTHMC,560200,135790246811220,,0018,20090214093254,11F0$**			
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	$	$

3.2.7.3. White List

The command **AT+GTWLT** is used to configure a list of authorized phone numbers which are allowed to perform the SMS function.

➢ **AT+GTWLT=**

Example: **AT+GTWLT=gv500,1,1,2,13813888888,13913999999,,,,,0018$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Call Filter	1	0 – 5	0
Start Index	<=2	1 – 10	
End Index	<=2	1 – 10	
Phone Number List	<=20*10	(Call Number)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Call Filter*>: The working mode of the White List function.

- Bit 0: Reserved
- Bit 1: Reserved
- Bit 2: White list for SMS. As a receiver number, Gateway Number will ignore the white list function.

For each bit, set it to 1 to enable its corresponding function, and 0 to disable its corresponding function. If Bit 2 is set to 0, it means "Disable the White List function and

allow any phone number to perform the SMS function".

- ✧ <*Start Index*>, <*End Index*>: The index range of the white list to which the phone numbers are to be updated. For example, if <*Start Index*> is set to 1 and <*End Index*> is set to 2, then the first two phone numbers in the white list will be updated by the numbers provided in the parameter <*Phone Number List*>. The parameters <*Start Index*> and <*End Index*> determine the total number of phone numbers that will be updated. If either one is empty, there should be no <*Phone Number List*>.
- ✧ <*Phone Number List*>: A list of comma-separated phone numbers to be updated to the white list. The number of the phone numbers is determined by <*Start Index*> and <*End Index*>.

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

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

➢ **+ACK:GTWLT,**

Example: **+ACK:GTWLT,560200,135790246811220,,0018,20090214093254,11F0$**			
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	$	$

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

3.2.7.4. GNSS-Assisted Motion Measurement

The command **AT+GTGAM** is used for assisting in measuring moving or stationary state with GNSS if the sensor detects stationary state while the vehicle ignition is turned on.

➢ **AT+GTGAM=**

Example:

AT+GTGAM=gv500,1,1,10,10,10,5,,,,,0006$			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Mode	1	0|1	1
Speed Mode	1	0|1	1
Motion Speed Threshold	<=2	5-50 km/h	25
Motion Cumulative Time	<=3	10-100s	10
Motionless Cumulative Time	<=3	10-250s	60
GNSS Fix Failure Timeout	<=4	5-1800s	60
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Mode*>: The working mode of the GNSS-assited motion measurement function.
  - 0: Disable this function.
  - 1: Enable this function.
- <*Speed Mode*>: Enable/disable the use of GNSS speed to assist with motion measurement based on motion sensor status.
  - 0: Disable this feature.
  - 1: Enable this feature.
- <*Motion Speed Threshold*>: The speed threshold which is combined with GNSS speed to measure the status of movement.
- <*Motion Cumulative Time*>: If the average speed is higher than <*Motion Speed Threshold*> for <*Motion Cumulative Time*>, the device is considered to be in moving state.
- <*Motionless Cumulative Time*>: If the average speed is lower than <*Motion Speed Threshold*> for <*Motionless Cumulative Time*>, the device is considered to be in stationary state.
- <*GNSS Fix Failure Timeout*>: If GNSS takes longer than <*GNSS Fix Failure Timeout*> before it gets a fix, the device will update the motion status from the motion sensor.

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

- **+ACK:GTGAM,**

Example:
+ACK:GTGAM,560200,135790246811220,,0006,20090214093254,11F0$

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	$	$

3.2.7.5. Configuration File Version

The command **AT+GTFVR** is used to record configuration information from the configuration file (generated by Manage Tool) to be downloaded by the device during update via **AT+GTUPC**.

➢ **AT+GTFVR=**

Example: **AT+GTFVR=gv500,1,0000,,,,,,,,,,0010$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	
Configuration Name	<=40	'0' – '9', 'a' – 'z', 'A' – 'Z', '-', '_'	
Configuration Version	4	0000 – 9999	
Command Mask	<=32	00000000000000000000000000000000 – FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF	
GEO ID Mask	<=16	0000000000000000 – FFFFFFFFFFFFFFFF	
Reserved	0		
Reserved	0		
Digital Signature	32	'0'-'9' 'a'-'z' 'A'-'Z'	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Generation Time	14	YYYYMMDDHHMMSS	
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Configuration Name*>: The name of the configuration file.

✧ <*Configuration Version*>: The version number of the configuration file. The first two

characters indicate the major version number, and the last two characters indicate the minor version number.

✧ <*Command Mask*>: A hex value to indicate which AT command is included in this configuration file. Each bit corresponds to an AT command.

Mask Bit	Item
Bit 0	BSI
Bit 1	SRI
Bit 2	QSS
Bit 3	CFG
Bit 4	Reserved
Bit 5	TMA
Bit 6	FRI
Bit 7	GEO
Bit 8	SPD
Bit 9	Reserved
Bit 10	OWH
Bit 11	DOG
Bit 12	WLT
Bit 13	PDS
Bit 14	Reserved
Bit 15	Reserved
Bit 16	Reserved
Bit 17	Reserved
Bit 18	Reserved
Bit 19	Reserved
Bit 20	FVR
Bit 21	TOW
Bit 22	EPS
Bit 23	IDL
Bit 24	HMC
Bit 25	HBM
Bit 26	HRM

Bit 27	CRA
Bit 28	SSR
Bit 29	Reserved
Bit 30	Reserved
Bit 31	EMG
Bit 32	Reserved
Bit 33	Reserved
Bit34	Reserved
Bit 35	Reserved
Bit 36	Reserved
Bit 37	Reserved
Bit 38	RMD
Bit 39	Reserved
Bit 40	Reserved
Bit 41	Reserved
Bit 42	Reserved
Bit 43	Reserved
⋮	Reserved
Bit 50	VVS
Bit 51	AVS
Bit 52	VMS
Bit 53	ASC
Bit 54	Reserved
Bit 55	GAM
Bit 56	Reserved
Bit 57	Reserved
Bit 58	Reserved
Bit 59	Reserved
Bit 60	Reserved
Bit 61	Reserved

Bit 62	Reserved
Bit 63	Reserved
Bit 64	Reserved
Bit 65	Reserved
Bit 66	Reserved
Bit 67	Reserved
Bit 68	Reserved
Bit 69	Reserved
Bit 70	Reserved
Bit 71	Reserved
Bit 72	Reserved
Bit 73	Reserved
Bit 74	Reserved
Bit 75	Reserved
Bit 76	Reserved
Bit 77	Reserved
Bit 78	Reserved
Bit 79	Reserved
Bit 80	Reserved
Bit 81	Reserved
Bit 82	Reserved
⋮	Reserved
Bit 113	Reserved
⋮	Reserved

✧ <*GEO ID Mask*>: Bitwise mask to indicate the GEO-fence.

ID	Mask Bit	Item
1	**Bit 0**	Indicate the Geo 0
2	**Bit 1**	Indicate the Geo 1
3	**Bit 2**	Indicate the Geo 2
4	**Bit 3**	Indicate the Geo 3
5	**Bit 4**	Indicate the Geo 4
6	**Bit 5**	Reserved

7	**Bit 6**	Reserved
8	**Bit 7**	Reserved
9	**Bit 8**	Reserved
10	**Bit 9**	Reserved
11	**Bit 10**	Reserved
12	**Bit 11**	Reserved
13	**Bit 12**	Reserved
14	**Bit 13**	Reserved
15	**Bit 14**	Reserved
16	**Bit 15**	Reserved
17	**Bit 16**	Reserved
18	**Bit 17**	Reserved
19	**Bit 18**	Reserved
20	**Bit 19**	Reserved
⋮	⋮	Reserved
64	**Bit 63**	Reserved

- ✧ <*Digital Signature*>: The parameter is used to confirm the validity of subsequent commands.
- ✧ <*Generation Time*>: The time when the configuration file is generated.

Note: The **AT+GTFVR** command must be the first command in the configuration file.

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

- ➢ **+ACK:GTFVR,**

Example: **+ACK:GTFVR,560200,135790246811220,,0012,20090214093254,11F0$**			
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	$	$

3.3. Report

This section defines the formats of the report messages. Due to the max length limit of an SMS message (160 bytes), it is recommended to carefully set the <*Report Composition Mask*> in **AT+GTCFG** to limit the length of the report which contains GNSS position information in case of

SMS transmission. Otherwise, the report will be truncated to fit the length of an SMS message.

3.3.1 Position Related Report

- **+RESP:GTTOW,**

If the tow alarm is enabled by the command **AT+GTTOW**, the device will send the message **+RESP:GTTOW** to the backend server when the motion sensor detects tow.

- **+RESP:GTGEO,**

If Geo-Fence is configured and enabled, the device will send the message **+RESP:GTGEO** to the backend server according to settings when the device enters or exits the Geo-Fence.

- **+RESP:GTSPD,**

If the speed alarm is enabled, the device will send the message **+RESP:GTSPD** to the backend server when the device speed within the alarm range is detected.

- **+RESP:GTRTL,**

After the device receives the command **AT+GTRTO**, it will start GNSS to get the current position and then send the message **+RESP:GTRTL** to the backend server.

- **+RESP:GTDOG,**

The protocol watchdog reboot message.

- **+RESP:GTVGL,**

The virtual ignition on/off location message.

- **+RESP:GTHBM,**

If harsh behavior is detected, this message will be sent to the backend server.

All of the above report messages have the same format as shown below.

Example:

+RESP:GTTOW,560200,866425037438217,,,,00,1,1,0.0,0,25.6,121.410162,31.175400,20190808020004,0460,0000,1877,8790,00,114.5,20190808100008,6BE1$

+RESP:GTGEO,560200,866425037534650,,,,10,1,1,0.0,0,-3.6,121.409446,31.175402,20190805033721,0460,0000,1877,8790,00,100.0,20190805123724,04CF$

+RESP:GTSPD,560200,866425035142365,,,,00,1,1,0.0,156,64.3,121.409989,31.175306,20190604062818,0460,0000,1877,8790,00,100.0,20190806064335,005E

+RESP:GTRTL,560200,866425035142365,,,,00,1,1,0.0,0,19.9,121.409784,31.175441,20190803041640,0460,0000,5B5D,183991B,00,100.0,20190803041641,006F$

+RESP:GTDOG,560200,866425035142365,,,,02,1,1,0.0,0,19.5,121.409866,31.175350,20190802023907,0460,0001,144B,6AF7,00,100.0,20190802113908,00A1$

+RESP:GTVGL,560200,866425037438217,,,,71,1,1,0.0,0,14.0,121.320734,31.151815,20190805100155,0460,0001,088A,5602,00,113.0,20190805180156,5093$

+RESP:GTHBM,560200,866425037536275,,,,11,1,1,20.6,69,16.6,121.377548,31.173945,20190805100709,0460,0000,5B65,188951B,00,121.6,20190805180710,4853$

Parameter	Length (byte)	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Reserved	0		
Report ID / Report Type	2	XY(X∈{0 - 4|7}, Y∈{0 - 6})	
Number	1	0|1	
GNSS Accuracy	<=2	0 - 50	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Mileage	<=9	0.0 - 4294967.0(km)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Report ID / Report Type*>: It is a one-byte hexadecimal value represented by two ASCII bytes. The first byte (4 higher bits of the hexadecimal value) indicates Report ID and the second byte (4 lower bits of the hexadecimal value) indicates Report Type.

Report ID has different meanings in different messages below.

- The ID of Geo-Fence in the report message **+RESP:GTGEO**. The range is 0 – 4.
- The speed level at which the harsh behavior is detected in the message **+RESP:GTHBM**. 3 indicates high speed, 2 indicates medium speed and 1 indicates low speed. If the <*Mode*> of the command **AT+GTHBM** is set to 2, the value is always 0 which indicates unknown speed.
- The value of <*Virtual Ignition Mode*> which indicates the trigger source of the message **+RESP:GTVGL**.

For other messages, it will always be 0.

Report Type has different meanings in different messages below.

- In the Geo-Fence report message **+RESP:GTGEO**
  0: Exit from the Geo-Fence
  1: Enter the Geo-Fence
- In the speed alarm message **+RESP:GTSPD**
  0: Outside the predefined speed range
  1: Inside the predefined speed range
- In the protocol watchdog reboot message **+RESP:GTDOG**
  1: Reboot message for time based working mode
  2: Reboot message for ignition on working mode
  3: Reserved
  4: Reboot message for no network watchdog
  5: Reboot message for no activation watchdog
  6: Reboot message for sending failure timeout watchdog
- In the harsh behavior monitoring message **+RESP:GTHBM**
  0: Harsh braking behavior
  1: Harsh acceleration behavior
  2: Harsh cornering behavior
  3: Harsh braking and cornering behavior
  4: Harsh acceleration and cornering behavior
  5: Unknown harsh behavior
- In the virtual ignition on/off location message **+RESP:GTVGL**
  0: (Virtual) Ignition off
  1: (Virtual) Ignition on

For the other messages, it will always be 0.

✧ <*Number*>: The number of the GNSS position(s) included in the report message. Generally, it is 1.

✧ <*GNSS Accuracy*>: A numeral to indicate the GNSS fix status and HDOP of the GNSS position. 0 indicates the current GNSS fix fails and the last known GNSS position is used. A non-zero value (1 - 50) indicates the current GNSS fix is successful and represents the HDOP of the current GNSS position.

- ✧ <*Speed*>: The current speed. Unit: km/h.
- ✧ <*Azimuth*>: The azimuth of the GNSS fix.
- ✧ <*Altitude*>: The height above the sea level.
- ✧ <*Longitude*>: The longitude of the current position.
- ✧ <*Latitude*>: The latitude of the current position.
- ✧ <*GNSS UTC Time*>: The UTC time obtained from the GNSS chip.
- ✧ <*MCC*>: Mobile country code. It is 3 digits in length and the range is 000 – 999.
- ✧ <*MNC*>: Mobile network code. It is 3 digits in length and the range is 000 – 999.
- ✧ <*LAC*>: Location area code in hex format.
- ✧ <*Cell ID*>: Cell ID in hex format.
- ✧ <*Mileage*>: The current total mileage.

➢ **+RESP:GTFRI,**

If fixed report is enabled, the device will send the message **+RESP:GTFRI** to the backend server according to the working mode.

Example: **+RESP:GTFRI,560200,866425037557739,,,13636,10,1,0,0.0,167,9.9,121.357001,31.172397,20190805095555,0460,0000,5B65,188951B,00,115.8,,,,,220000,,,,20190805180654,4875$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
External Power Voltage	<=5	0 - 99999(mV)	
Report ID / Report Type	2	XY(X∈{1 - 8}, Y∈{0|1})	
Number	<=2	0|1	
GNSS Accuracy	<=2	0 - 50	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	

Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Mileage	<=9	0.0 - 4294967.0(km)	
Hour Meter Count	11	HHHHH:MM:SS	
Reserved	0		
Reserved	0		
Reserved	0		
Device Status	6	000000 - FF0000	
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*External Power Voltage*>: The voltage of the external power supply. If the command **AT+GTEPS** is used to configure the device to report the external power supply voltage periodically with fixed report, the device will send the current voltage along with the **+RESP:GTFRI** message to the backend server. If the device is not configured to do so, this field will be empty.
- <*Report ID / Report Type*>: It is a one-byte hexadecimal value represented by two ASCII bytes. The first byte (4 higher bits of the hexadecimal value) indicates Report ID and the second byte (4 lower bits of the hexadecimal value) indicates Report Type.

  Report ID has different meanings below.
  - 1: Fixed time report
  - 2: Fixed distance report
  - 3: Fixed mileage report
  - 4: Fixed time and mileage report
  - 5: Fixed time or mileage report
  - 6: Fixed time report in emergency mode
  - 7: Reserved
  - 8: Fixed time or mileage or corner report

  Report Type has several meanings below.
  - 0: Normal fixed report
  - 1: Corner report which indicates the device just turns a corner
  - 2: Reserved
  - 3: Reserved
  - 4: Mileage report when fixed report works in Mode 5 and Mode 8

- ✧ <*Number*>: The number of the GNSS position(s) included in the report message. Generally, it is 1.
- ✧ <*Hour Meter Count*>: If the hour meter count function is enabled by the command **AT+GTHMC**, total hours the meter has counted when the engine is on will be reported in this field. It is formatted with 5 hour digits, 2 minute digits and 2 second digits, and the range is 00000:00:00 – 99999:00:00. If the function is disabled, this field will be empty.
- ✧ <*Device Status*>: The state of the device. From left to right, the first two bytes indicate the current motion status of the device, and the other four bytes are always 0.

  The current motion status of the device:
  - 16 (Tow): The device attached vehicle is ignition off and it is towed.
  - 1A (Fake Tow): The device attached vehicle is ignition off and it might be towed.
  - 11 (Ignition Off Rest): The device attached vehicle is ignition off and it is motionless.
  - 12 (Ignition Off Motion): The device attached vehicle is ignition off and it is moving before it is considered as being towed.
  - 21 (Ignition On Rest): The device attached vehicle is ignition on and it is motionless.
  - 22 (Ignition On Motion): The device attached vehicle is ignition on and it is moving.
  - 41 (Sensor Rest): The device attached vehicle is motionless without ignition signal detected.
  - 42 (Sensor Motion): The device attached vehicle is moving without ignition signal detected.

➢ **+RESP:GTEPS,**

If the external power supply monitoring is enabled by the command **AT+GTEPS**, the device will send the message **+RESP:GTEPS** to the backend server when the voltage of the external power supply enters the alarm range.

All of the above report messages have the same format as shown below.

Example: **+RESP:GTEPS,560200,866425035142365,,,12425,00,1,3,0.0,0,16.3,121.409752,31.175341,20190802022326,0460,0001,144B,6AF7,00,100.0,20190802112327,0062$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
External Power Voltage	<=5	0 - 99999(mV)	
Report ID / Report Type	2	XY(X∈{0 - 2}, Y∈{0|1})	

Number	<=2	0|1	
GNSS Accuracy	<=2	0 - 50	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Mileage	<=9	0.0 - 4294967.0(km)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*External Power Voltage*>: The value of the external power voltage. If the voltage of the external input meets the alarm condition as set by the command **AT+GTEPS**, the device will send the current external input voltage with **+RESP:GTEPS** to the backend server.
- <*Report ID* / *Report Type*>: It is a one-byte hexadecimal value represented by two ASCII bytes. The first byte (4 higher bits of the hexadecimal value) indicates Report ID and the second byte (4 lower bits of the hexadecimal value) indicates Report Type.
  Report ID is always 0.
  Report Type has meanings below.
  - 0: Outside the predefined range
  - 1: Inside the predefined range
- <*Number*>: The number of the GNSS position(s) included in the report message. Generally, it is 1.

➢ **+RESP:GTGES,**

The device reports **+RESP:GTGES** according to <*Trigger Mode*> and <*Trigger Report*> settings in **AT+GTGEO** after the ignition is turned off.

Example:
+RESP:GTGES,560200,866425037438217,,,,01,21,50,5,1,1,0.0,0,25.6,121.409911,31.175369,20

190808020612,0460,0000,1877,8790,00,114.5,20190808100613,6BEC$			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Reserved	0		
Report ID / Report Type	2	XY(X∈{0 - 4}, Y∈{0|1})	
Trigger Mode	<=2	0|21|22	
Radius	<=7	50 - 6000000(m)	
Check Interval	<=5	0|5 - 86400(sec)	
Number	<=2	1	
GNSS Accuracy	<=2	0 - 50	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Mileage	<=9	0.0 - 4294967.0(km)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ *<Report Type>*: The current Parking-Fence is active or inactive.

- 0: The current Parking-Fence is inactive.
- 1: The current Parking-Fence is active.

3.3.2 Device Information Report

If the device information report is enabled by the command **AT+GTCFG**, the device will send the device information via the message **+RESP:GTINF** to the backend server periodically.

➢ **+RESP:GTINF,**

Example:
+RESP:GTINF,560200,866425037534650,,GV500MA,21,898600200918F2000727,26,99,1,12386,,4.16,0,1,,,20190805033736,,,,,,+0800,1,20190805123739,04E4$

Parameter	Length (byte)	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Motion Status	2	11|12|16|1A|21|22|41|42	
ICCID	20		
CSQ RSSI	<=2	0 - 31|99	
CSQ BER	<=2	0 - 7|99	
External Power Supply	1	0|1	
External Power Voltage	<=5	0 - 99999(mV)	
Reserved	0		
Backup Battery Voltage	<=4	0.00 - 4.20(V)	
Charging	1	0|1	
LED On	1	0 - 4	
Reserved	0		
Reserved	0		
Last Fix UTC Time	14	YYYYMMDDHHMMSS	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

Time Zone Offset	5	+/- HHMM	
Daylight Saving	1	0|1	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Motion Status*>: The current motion status of the device.
  - 16 (Tow): The device attached vehicle is ignition off and it is towed.
  - 1A (Fake Tow): The device attached vehicle is ignition off and it might be towed.
  - 11 (Ignition Off Rest): The device attached vehicle is ignition off and it is motionless.
  - 12 (Ignition Off Motion): The device attached vehicle is ignition off and it is moving before it is considered as being towed.
  - 21 (Ignition On Rest): The device attached vehicle is ignition on and it is motionless.
  - 22 (Ignition On Motion): The device attached vehicle is ignition on and it is moving.
  - 41 (Sensor Rest): The device attached vehicle is motionless without ignition signal detected.
  - 42 (Sensor Motion): The device attached vehicle is moving without ignition signal detected.
- <*ICCID*>: The ICCID of the SIM card.
- <*CSQ RSSI*>: The signal strength level.

CSQ RSSI	Signal Strength (dBm)
0	<-113
1	-111
2 – 30	-109 – -53
31	>-51
99	Unknown

- <*CSQ BER*>: The quality of the signal. The range is 0–7, and 99 is for unknown signal strength.
- <*External Power Supply*>: It indicates whether the external power supply is connected or not.
  - 0: Not connected
  - 1: Connected
- <*External Power Voltage*>: The voltage of the external power supply.
- <*Backup Battery Voltage*>: The voltage of the backup battery. The value of this field is only valid when the external power is not connected.
- <*Charging*>: It indicates whether the backup battery is charging when the main power supply is connected.
  - 0: Not charging
  - 1: Charging

- ✧ <*Last Fix UTC Time*>: The UTC time of the latest successful GNSS fix.
- ✧ <*Time Zone Offset*>: The offset of the local time zone from UTC.
- ✧ <*Daylight Saving*>: The current daylight saving time setting.
  - 0: Daylight saving time is disabled.
  - 1: Daylight saving time is enabled.

3.3.3 Report for Real Time Querying

3.3.3.1 +RESP:GTGPS

After the device receives the command **AT+GTRTO** to read the GNSS information, it will send the GNSS information to the backend server via the message **+RESP:GTGPS**.

➢ **+RESP:GTGPS,**

Example: **+RESP:GTGPS,560200,135790246811220,,,,,,0000,,,20090214013254,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Reserved	0		
Reserved	0		
Reserved	0		
Report Composition Mask	4	(HEX)	
Current GNSS Antenna	1	1|2	
Reserved	0		
Last Fix UTC Time	14	YYYYMMDDHHMMSS	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- ✧ <*Report Composition Mask*>: Please refer to <*Report Composition Mask*> of the **AT+GTCFG** command.
- ✧ <*Current GNSS Antenna*>: The index of the GNSS antenna being used.
  - 1: Main GNSS antenna

- 2: The GNSS antenna on the same side as the USB interface

3.3.3.2 +RESP:GTALM

After the device receives the command **AT+GTRTO** to read all the configurations, it will send all configurations to the backend server via the message **+RESP:GTALL**. This message is only sent via EGPRS/LTE even if the report mode is forced SMS mode. If the message is too long, then it will be subpackaged into several **+RESP:GTALM** messages. The **+RESP:GTALM** message does not support the HEX report.

Note: The length of every **+RESP:GTALM** message (including header and tail) should be less than or equal to 1500 characters.

- **+RESP:GTALM,**

Example:

+RESP:GTALM,560200,866425037534699,,,7,1,BSI,cmnet,,,,,,1,0,SRI,3,,1,180.169.235.202,9031,,0,,120,1,0,0,00,,CFG,gv500,V21,1,100.0,,,007F,2,0,3FFF,,1,0,300,,1,0,0,000F,1,0,30,TOW,0,10,1,300,,,,,2,3,2,,,,,,,,,EPS,0,250,250,0,0,,,,,0,0,0,0,TMZ,+0000,0,,,,,FRI,0,1,,1,0000,0000,,30,1000,1000,,0,600,,,,,20190805055130,003A$

+RESP:GTALM,560200,866425037534699,,,7,2,GEO,0,0,,,50,0,,,,,0,0,0,,1,0,,,50,0,,,,,0,0,0,,2,0,,,50,0,,,,,0,0,0,,3,0,,,50,0,,,,,0,0,0,,4,0,,,50,0,,,,,0,0,0,,SPD,0,0,0,60,300,,,,,,,,,,,,,,OWH,0,1F,0900,1200,1300,1800,,,,,,,,,,,DOG,0,60,30,0200,,1,,,60,60,0,20190805055130,003B$

+RESP:GTALM,560200,866425037534699,,,7,3,IDL,0,2,1,,,,,,,,,,,,HMC,0,00000:00:00,,,,,,,,,HBM,0,,0,100,0,0,,60,0,0,,,0,0,,,,,,30,50,20,65,WLT,0,,,,,,,,,,,,,,HRM,,,6F,FC17BF,FC17BF,FD7D,EF,7D,,,,CRA,0,50,50,50,0,500,500,,,,,,PDS,0,0000,,,,,,,20190805055130,003C$

+RESP:GTALM,560200,866425037534699,,,7,4,SSR,0,2,1,5,0,0,,,EMG,0,600,10,,,,,,20190805055130,003D$

+RESP:GTALM,560200,866425037534699,,,7,5,RMD,0,,003DEF,,,003DEF,,,,,,,,,,20190805055130,003E$

+RESP:GTALM,560200,866425037534699,,,7,6,UPC,0,10,0,0,0,,0,00,0,00000000,00000380,3,GAM,1,1,25,10,60,60,,,,,20190805055130,003F$

+RESP:GTALM,560200,866425037534699,,,7,7,VVS,13500,600,10,1,10,AVS,30,60,,,,VMS,0,03,03,1,,ASC,50,10,2,,,,,,,,,,FVR,,0000,00000000000000000000000000000000,00000000000000000000000000000000,,,,,,,,,20190805055130,0040$

Parameter	Length (byte)	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Total Packets	<=2	1 - 25	

Current Packet	<=2	1 - 25	
Configurations	<1500		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Total Packets*>: The total number of **+RESP:GTALM** messages.
- <*Current Packet*>: The sequence number of the current **+RESP:GTALM** message.
- <*Configurations*>: The current configurations of the device. The 1st message contains configurations for the commands from **BSI** to **SRI**, the 2nd is for the commands from **GEO** to **DOG**, and the last message is for the command **FVR**.

The configuration parameters of all commands are as follows:

Parameter	Length (byte)	Range/Format	Default
BSI	3	BSI	BSI
APN	<=40		
APN User Name	<=30		
APN Password	<=30		
Reserved	0		
Reserved	0		
Reserved	0		
Network Mode	1	0 - 2	
LTE Mode	1	0 - 3	
SRI	3	SRI	SRI
Report Mode	1	0 - 7	
Reserved	0		
Buffer Mode	1	0 - 2|5	
Main Server IP / Domain Name	<=60	(ASCII)	
Main Server Port	<=5	0 - 65535	
Backup Server IP / Domain Name	<=60	(ASCII)	
Backup Server Port	<=5	0 - 65535	

SMS Gateway	<=20	(Call Number)	
Heartbeat Interval	<=3	0|5 – 360(min)	
SACK Enable	1	0|1	
Protocol Format	1	0|1	0
Enable SMS ACK	1	0|1	0
High Priority Report Mask	2	(HEX)	0
Reserved	0		
CFG	3	CFG	CFG
Password	4 - 20	'0' - '9', 'a' - 'z', 'A' - 'Z'	
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
ODO Enable	1	0|1	
ODO Initial Mileage	<=9	0.0 - 4294967.0(km)	
Reserved	0		
Reserved	0		
Report Composition Mask	4	(HEX)	
Power Saving Mode	1	0 - 2	
Sleep Mode	1	0 - 1	1
Event Mask	4	(HEX)	
Reserved	0		
LED On	1	0 - 4	
Info Report Enable	1	0|1	
Info Report Interval	<=5	30 - 86400(sec)	
Reserved	0		
Backup Battery Supply	1	0|1	
Backup Battery Charge Mode	1	0|1	
AGPS Mode	1	0 - 2	
GSM Report	4	(HEX)	
GNSS Lost Time	<=2	0 - 30(min)	0
GNSS Antenna Mode	1	0 - 2	0

GNSS Antenna Timeout	<=4	0 - 1440(min)	30
TOW	3	TOW	TOW
Tow Enable	1	0|1	
Engine off to Tow	<=2	5 - 15(min)	
Fake Tow Delay	<=2	0 - 10(min)	
Tow Interval	<=5	30 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Rest Duration	<=3	1 - 255(*15sec)	
Motion Duration	<=2	1 - 10(*100ms)	
Motion Threshold	1	2 - 4	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
EPS	3	EPS	EPS
Mode	1	0 - 2	
Min Threshold	<=5	250 - 28000(mV)	
Max Threshold	<=5	250 - 28000(mV)	
Sample Period	<=2	0 - 12(*2sec)	
Debounce Time	1	0 - 5(sec)	
Reserved	0		
Reserved	0		
Reserved	0		

Reserved	0		
Sync with FRI	1	0|1	
Voltage Margin Error	<=3	0 - 100(*10mV)	0
Debounce Voltage Threshold	<=3	0 - 100(*100mV)	0
MPN/MPF Validity Time	1	0 - 5(sec)	0
TMZ	3	TMZ	TMZ
Time Zone	5	+/- HHMM	
Daylight Saving	1	0|1	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
FRI	3	FRI	FRI
Mode	1	0 - 5|8	
Discard No Fix	1	0|1	
Reserved	0		
Period Enable	1	0|1	
Begin Time	4	HHMM	
End Time	4	HHMM	
Reserved	0		
Send Interval	<=5	1 - 86400(sec)	
Distance	<=5	50 - 65535(m)	1000
Mileage	<=5	50 - 65535(m)	1000
Reserved	0		
Corner Report	<=3	0 - 180	40
IGF Report Interval	<=5	0 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

GEO	3	GEO	GEO
GEO ID0	1	0	0
Mode	1	0 - 3	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
Radius	<=7	50 - 6000000(m)	
Check Interval	<=5	0|5 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Trigger Mode	<=2	0|21|22	0
Trigger Report	1	0|1	0
State Mode	1	0|1	0
Reserved	0		
GEO ID1	1	1	1
Mode	1	0 - 3	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
Radius	<=7	50 - 6000000(m)	
Check Interval	<=5	0|5 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Trigger Mode	<=2	0|21|22	0
Trigger Report	1	0|1	0
State Mode	1	0|1	0
Reserved	0		
GEO ID2	1	2	2

Mode	1	0 - 3	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
Radius	<=7	50 - 6000000(m)	
Check Interval	<=5	0|5 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Trigger Mode	<=2	0|21|22	0
Trigger Report	1	0|1	0
State Mode	1	0|1	0
Reserved	0		
GEO ID3	1	3	3
Mode	1	0 - 3	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
Radius	<=7	50 - 6000000(m)	
Check Interval	<=5	0|5 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Trigger Mode	<=2	0|21|22	0
Trigger Report	1	0|1	0
State Mode	1	0|1	0
Reserved	0		
GEO ID4	1	4	4
Mode	1	0 - 3	
Longitude	<=11	-180 - 180	

Latitude	<=10	-90 - 90	
Radius	<=7	50 - 6000000(m)	
Check Interval	<=5	0|5 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Trigger Mode	<=2	0|21|22	0
Trigger Report	1	0|1	0
State Mode	1	0|1	0
Reserved	0		
SPD	3	SPD	SPD
Mode	1	0 - 3	0
Min Speed	<=3	0 - 400(km/h)	
Max Speed	<=3	0 - 400(km/h)	
Validity	<=4	0 - 3600(sec)	
Send Interval	<=4	30 - 3600(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

Reserved	0		
Reserved	0		
OWH	3	OWH	OWH
Mode	1	0|3	
Day of Work	<=2	0 - 7F	
Working Hours Start1	4	HHMM	
Working Hours End1	4	HHMM	
Working Hours Start2	4	HHMM	
Working Hours End2	4	HHMM	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
DOG	3	DOG	DOG
Mode	1	0 - 2	
Ignition Frequency	<=3	10 - 120(min)	
Interval	<=2	1 - 30	
Time	4	HHMM	
Reserved	0		
Report Before Reboot	1	0|1	
Reserved	0		
Reserved	0		
No Network Interval	<=4	0|5 - 1440(min)	60

No Activation Interval	<=4	0|5 - 1440(min)	60
Send Failure Timeout	<=4	0|5 - 1440(min)	60
IDL	3	IDL	IDL
Mode	1	0|1	
Time to Idling	<=2	1 - 30(min)	
Time to Movement	1	1 - 5(min)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
HMC	3	HMC	HMC
Hour Meter Enable	1	0|1	
Initial Hour Meter Count	11	HHHHH:MM:SS	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
HBM	3	HBM	HBM

HBM Enable	1	0 - 3	
Reserved	0		
Discard Unknown Event	1	0|1	
High Speed	3	100 - 400(km/h)	
ΔVhb	<=3	0 - 100(km/h)	
ΔVha	<=3	0 - 100(km/h)	
Reserved	0		
Medium Speed	<=3	60 - 100(km/h)	60
ΔVmb	<=3	0 - 100(km/h)	
ΔVma	<=3	0 - 100(km/h)	
Reserved	0		
Reserved	0		
ΔVlb	<=3	0 - 100(km/h)	
ΔVla	<=3	0 - 100(km/h)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Cornering and Braking Threshold	2	30 - 70	30
Cornering and Braking Duration	<=3	40 - 100(*8ms)	50
Acceleration Threshold	2	15 - 50	20
Acceleration Duration	<=3	50 - 250(*8ms)	65
WLT	3	WLT	WLT
Call Filter	1	0 - 5	
Phone Number List	<=20*10	(Call Number)	
Reserved	0		
Reserved	0		
Reserved	0		

Reserved	0		
HRM	3	HRM	HRM
Reserved	0		
Reserved	0		
+ACK Mask	<=2	(HEX)	FF
+RSP Mask	<=8	(HEX)	FFFFFFFF
+EVT Mask	<=8	(HEX)	FFFFFFFF
+INF Mask	<=8	(HEX)	FFFFFFFF
+HBD Mask	<=2	(HEX)	FF
+CRD Mask	<=4	(HEX)	FFFF
Reserved	0		
Reserved	0		
Reserved	0		
CRA	3	CRA	CRA
Mode	1	0 - 2	0
Threshold_X	<=3	0 - 160	50
Threshold_Y	<=3	0 - 160	50
Threshold_Z	<=3	0 - 160	50
Sampling Start	1	0|1	0
Samples Before Crash	<=4	1 - 1500	500
Samples After Crash	<=4	1 - 1500	500
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
PDS	3	PDS	PDS
Mode	1	0 - 2	0
Mask	4	(HEX)	0
Reserved	0		

Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
SSR	3	SSR	SSR
Mode	1	0|1	0
Time to Stop	<=4	0 - 30(min)|0 - 1800(sec)	2min
Time to Start	<=3	0 - 5(min)|0 - 300(sec)	1min
Start Speed	<=2	1 – 10(km/h)	5
Long Stop	<=5	0 – 43200(min)	0
Time Unit	1	0|1	0
Reserved	0		
Reserved	0		
EMG	3	EMG	EMG
Mode	1	0 - 2	0
Emergency Period	<=5	5 - 86400(sec)	600
Emergency Report Interval	<=5	5 - 86400(sec)	10
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
RMD	3	RMD	RMD
Mode	1	0|1	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Home Operator List	<=6*10	(ASCII)	

Reserved	0		
Reserved	0		
Roaming Operator List	<=6*100	(ASCII)	
Reserved	0		
Reserved	0		
Black List Operator	<=6*20	(ASCII)	
Reserved	0		
Reserved	0		
Known Roaming Event Mask	6	(HEX)	003DEF
Reserved	0		
Reserved	0		
Unknown Roaming Event Mask	6	(HEX)	003DEF
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
UPC	3	UPC	UPC
Max. Download Retry	1	0 - 3	0
Download Timeout	<=2	5 - 30(min)	10
Download Protocol	1	0	0
Enable Report	1	0|1	0
Update Interval	<=4	0 - 8760(h)	0
Download URL	<=100	(URL)	

Mode	1	0|1	0
Reserved	0		
Extended Status Report	1	0|1	0
Identifier Number	8	(HEX)	0
Reserved	0		
Update Status Mask	1	(HEX)	3
GAM	3	GAM	GAM
Mode	1	0|1	1
Speed Mode	1	0|1	1
Motion Speed Threshold	<=2	5 - 50(km/h)	10
Motion Cumulative Time	<=3	10 - 100(sec)	10
Motionless Cumulative Time	<=3	10 - 250(sec)	60
GNSS Fix Failure Timeout	<=4	5 - 1800(sec)	60
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
VVS	3	VVS	VVS
Ignition On Voltage	<=5	8000 - 28000(mV)	13500
Voltage Offset	<=4	200 - 2000(mV)	600
Ignition On Debounce	<=3	5 - 255 (*2sec)	5
Smart Voltage Adjustment	1	0|1	1
Ignition Off Debounce	<=3	5 - 255 (*2sec)	10
AVS	3	AVS	AVS
Rest Validity	<=3	1 - 255(sec)	30
Movement Validity	<=3	1 - 255(sec)	60
Reserved	0		
Reserved	0		
Reserved	0		
VMS	3	VMS	VMS

Virtual Ignition Mode	1	0|2|4|7	2
Virtual Ignition On Mask	2	01 - 03	03
Virtual Ignition Off Mask	2	01 - 03	03
Virtual Ignition On Logic	1	0|1	1
Reserved	0		
ASC	3	ASC	ASC
Brake Speed Threshold	<=3	30 - 400(km/h)	50
Delta Speed Threshold	<=2	5 - 72(km/h)	10
Delta Heading Threshold	1	0 - 5	2
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
FVR	3	FVR	FVR
Configuration Name	<=40	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Configuration Version	4	0000 - 9999	
Command Mask	32	(HEX)	
GEO ID Mask	32	(HEX)	
Reserved	0		
Reserved	0		
Digital Signature	32	'0' - '9', 'a' - 'z', 'A' - 'Z'	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

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

3.3.3.3 +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 via the message **+RESP:GTALS**. Configuration information varies with different AT commands. For example, to get FRI configuration, set **AT+GTRTO=gv500,2,FRI,,,,,0015$**.

- **+RESP:GTALS,**

Example: **+RESP:GTALS,560200,135790246811220,,gv500,FRI,1,0,,1,0000,0000,,60,1000,100,,0,60,,,,,20130809081544,4FBC$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Sub AT Command	3	'0' - '9', 'A' - 'Z'	
Mode	1	0 - 5|8	
Discard No Fix	<=2	0|1	
Reserved	0		
Period Enable	1	0|1	
Start Time	4	HHMM	
End Time	4	HHMM	
Reserved	0		
Send Interval	<=5	1 - 86400(sec)	
Distance	<=5	50 - 65535(m)	
Mileage	<=5	50 - 65535(m)	
Reserved	0		

Corner Report	<=3	0 - 180	
IGF Report Interval	<=5	1 - 86400(sec)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.3.3.4 +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 backend server via the message **+RESP:GTCID**.

- **+RESP:GTCID,**

Example: **+RESP:GTCID,560200,866425037438217,,,898600200917F2005221,20190808105110,6D1A$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
ICCID	20		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

3.3.3.5 +RESP:GTCSQ

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

- **+RESP:GTCSQ,**

Example: **+RESP:GTCSQ,560200,135790246811220,,,16,0,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
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	<-113
1	-111
2 – 30	-109 – -53
31	>-51
99	Unknown

✧ <*CSQ BER*>: The quality of the signal. The range is 0-7, and 99 is for unknown signal strength.

3.3.3.6 +RESP:GTVER

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

➢ **+RESP:GTVER,**

Example: **+RESP:GTVER,560200,866425037438217,,,GV500MA,0215,0102,20190808105245,6D21$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	

Device Type	<=10	'0' - '9', 'a' - 'z', 'A' - 'Z'	
Software Version	4	(HEX)	
Hardware Version	4	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Device Type*>: The type of the device.
- <*Software Version*>: The software 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 the 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 the version **1.10**.

3.3.3.7 +RESP:GTBAT

After the device receives the command **AT+GTRTO** to read the power supply information, it will send the power supply information to the backend server via the message **+RESP:GTBAT**.

➢ **+RESP:GTBAT,**

Example: **+RESP:GTBAT,560200,866425037438217,,,1,12396,,4.17,0,1,20190808105316,6D23$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
External Power Supply	1	0|1	
External Power Voltage	<=5	0 - 99999(mV)	
Reserved	0		
Backup Battery Voltage	4	0.00 - 4.20(V)	
Charging	1	0|1	
LED On	1	0 - 4	
Send Time	14	YYYYMMDDHHMMSS	

Count Number	4	(HEX)	
Tail Character	1	$	$

3.3.3.8 +RESP:GTTMZ

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

➢ **+RESP:GTTMZ,**

Example: **+RESP:GTTMZ,560200,135790246811220,,,+0800,0,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
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	(HEX)	
Tail Character	1	$	$

3.3.3.9 +RESP:GTGSV

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

➢ **+RESP:GTGSV,**

Example: **+RESP:GTGSV,560200,866425037438217,,,13,1,45,3,41,6,0,8,25,9,0,11,34,17,29,18,19,19,25,22,48,23,22,28,0,30,34,20190808105618,6D2D$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		

Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
SV Count	<=2	0 - 24	
SV ID	<=2	0 - 99	
SV Power	<=2	0 - 51	
…			
SV ID	<=2	0 - 99	
SV Power	<=2	0 - 51	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*SV Count*>: The number of satellites the GNSS finds.
- <*SV ID*>: Satellite ID.
- <*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 versions (including firmware, MCU, and hardware version information), it will send the version information to the backend server via the message **+RESP:GTATI**.

➢ **+RESP:GTATI,**

Example: **+RESP:GTATI,560200,862785041632111,,,GV500MA,00043083,021D,0400,0106,0102,0101,FA,20200414071635,0022$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Device Type	<=10	'0' - '9', 'a' - 'z', 'A' - 'Z'	
ATI Mask	8	(HEX)	
Firmware Version	4	(HEX)	
MCU Firmware Version	4	(HEX)	

Modem Firmware Version	4	(HEX)	
Hardware Version	4	(HEX)	
Modem Hardware Version	5	(HEX)	
Sensor ID	2	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Device Type*>: The type of the device.
- <*ATI Mask*>: Please refer to <*Sub AT Command / ATI Mask*> in the command **AT+GTRTO**.
- <*Firmware Version*>: The firmware version of the device. The first two characters represent the major version and the last two characters represent the minor version. For example, **010A** means the version **1.10**.
- <*MCU Firmware Version*>: The MCU firmware version. The first two characters represent the major version and the last two characters represent the minor version. For example, **010A** means the version **1.10**.
- <*Modem Firmware Version*>: The modem firmware version. The first two characters represent the major version and the last two characters represent the minor version. For example, **0106** means the version **1.6**.
- <*Hardware Version*>: The hardware version of the device. The first two characters represent the major version and the last two characters represent the minor version. For example, **010A** means the version **1.10**.
- <*Modem Hardware Version*>: The modem hardware version. The first two characters represent the major version and the last two characters represent the minor version. For example, **0101** means the version **1.1**.
- <*Sensor ID*>: It indicates the type of the sensor currently used by the 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:GTMPN: The report for connecting main power supply

+RESP:GTMPF: The report for disconnecting main power supply

+RESP:GTBTC: Backup-battery-starts-charging report

+RESP:GTSTC: Backup-battery-stops-charging report

+RESP:GTBPL: Backup battery low (reported 4 times before power off)

+RESP:GTSTT: Device status indication when the device status changes

+RESP:GTPDP: EGPRS connection establishment report

+RESP:GTVGN: Virtual ignition on report

+RESP:GTVGF: Virtual ignition off report
+RESP:GTIDN: Enter into idling status
+RESP:GTIDF: Leave idling status
+RESP:GTGSM: The report for the information of the serving cell and the neighbor cells
+RESP:GTGSS: GNSS signal status
+RESP:GTCRA: Crash report
+RESP:GTASC: The report for the calibration result
+RESP:GTSTR: Vehicle entering Start status
+RESP:GTSTP: Vehicle entering Stop status
+RESP:GTLSP: Vehicle entering Long Stop status
+RESP:GTRMD: The report for entering or leaving network roaming state
+RESP:GTUPC: The report for over-the-air configuration update

In **+RESP:GTMPN**, **+RESP:GTMPF**, **+RESP:GTBTC**, **+RESP:GTSTC**, **+RESP:GTBPL**, **+RESP:GTSTT**, **+RESP:GTVGN**, **+RESP:GTVGF**, **+RESP:GTIDN**, **+RESP:GTIDF**, **+RESP:GTSTR**, **+RESP:GTSTP**, **+RESP:GTLSP** and **+RESP:GTGSS** event reports, the last known GNSS information and the current network information are included.

- **+RESP:GTPNA,**
- **+RESP:GTPFA,**
- **+RESP:GTPDP,**

Example:
+RESP:GTPNA,560200,135790246811220,,,20090214093254,11F0$
+RESP:GTPFA,560200,135790246811220,,,20090214093254,11F0$
+RESP:GTPDP,560200,135790246811220,,,20090214093254,11F0$

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

- **+RESP:GTMPN,**
- **+RESP:GTMPF,**
- **+RESP:GTBTC,**

Example:
+RESP:GTMPN,560200,866425037534699,,,0,,,,,,,0460,0000,1877,8790,00,20190805073619,0093$

+RESP:GTMPF,560200,866425037534699,,,0,0.0,0,7.2,121.409857,31.175376,20190805073821,0460,0000,1877,8790,00,20190805073823,0099$ +RESP:GTBTC,560200,866425035142365,,,0,0.0,156,20.3,121.408137,31.175069,20190604063146,0460,0000,1877,8790,00,20190806064704,00C4$			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

➢ **+RESP:GTSTC,**

Example: +RESP:GTSTC,560200,866425035142365,,,,0,0.0,156,20.3,121.408137,31.175069,20190604063151,0460,0000,1877,8790,00,20190806064709,00C7$			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	

Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Reserved	0		
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

➢ **+RESP:GTBPL,**

Example: **+RESP:GTBPL,560200,866425037557739,,,3.86,0,17.9,71,-1.9,121.408763,31.174587,20190803064405,0460,0000,5B5D,183991B,00,20190803150645,1E0D$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Backup Battery Voltage	4	0.00 - 4.20(V)	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	

Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

➢ **+RESP:GTSTT,**

Example:
+RESP:GTSTT,560200,866425035142365,,,21,0,0.0,156,20.3,121.408137,31.175069,20190604063203,0460,0000,1877,8790,00,20190806064721,00CE$

Parameter	Length (byte)	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Motion Status	2	11|12|16|21|22|41|42	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	

LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Motion Status*>: The current motion status of the device.

- 16 (Tow): The device attached vehicle is ignition off and it is towed.
- 11 (Ignition Off Rest): The device attached vehicle is ignition off and it is motionless.
- 12 (Ignition Off Motion): The device attached vehicle is ignition off and it is moving before it is considered as being towed.
- 21 (Ignition On Rest): The device attached vehicle is ignition on and it is motionless.
- 22 (Ignition On Motion): The device attached vehicle is ignition on and it is moving.
- 41 (Sensor Rest): The device attached vehicle is motionless without ignition signal detected.
- 42 (Sensor Motion): The device attached vehicle is moving without ignition signal detected.

➢ **+RESP:GTVGN,**

Example: **+RESP:GTVGN,560200,135790246811220,,,00,2,382,0,0.0,0,1.0,117.201933,31.833132,20171207092206,0460,0000,5678,2D7E,00,,0.0,20171207092209,0117$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Reserved	2	00	
Report Type	1	2|4|7	
Duration of Ignition Off	<=6	0 - 999999(sec)	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	

Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Hour Meter Count	11	HHHHH:MM:SS	
Mileage	<=9	0.0 - 4294967.0(km)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Report Type*>: This parameter indicates in which mode the virtual ignition event is triggered.
  - 2: Voltage virtual ignition detection mode
  - 4: Accelerometer virtual ignition detection mode
  - 7: Combined detection mode
- <*Duration of Ignition On*>: Duration since last time the ignition is turned on. If the duration is greater than 999999 seconds, it will be reported as 999999 seconds.
- <*Hour Meter Count*>: If the hour meter count function is enabled by the command **AT+GTHMC**, total hours the meter has counted when the engine is on will be reported in this field. If the function is disabled, this field will be empty. It is formatted with 5 hour digits, 2 minute digits and 2 second digits, and the range is 00000:00:00 – 99999:00:00.

➢ **+RESP:GTVGF,**

Example: **+RESP:GTVGF,560200,135790246811220,,,00,2,444,0,0.0,0,24.3,117.201856,31.833027,20171207092337,0460,0000,5678,2D7E,00,,0.0,20171207092340,011C$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	

Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Reserved	2	00	
Report Type	1	2|4|7	
Duration of Ignition On	<=6	0 - 999999(sec)	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Hour Meter Count	11	HHHHH:MM:SS	
Mileage	<=9	0.0 - 4294967.0(km)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Duration of Ignition Off*>: Duration since last time the ignition is turned off. If the duration is greater than 999999 seconds, it will be reported as 999999 seconds.
- <*Hour Meter Count*>: If the hour meter count function is enabled by the command **AT+GTHMC**, total hours the meter has counted when the engine is on will be reported in this field. If the function is disabled, this field will be empty. It is formatted with 5 hour digits, 2 minute digits and 2 second digits, and the range is 00000:00:00 – 99999:00:00.

- **+RESP:GTIDN,**
- **+RESP:GTSTR,**
- **+RESP:GTSTP,**
- **+RESP:GTLSP,**

Example:
+RESP:GTIDN,560200,866425035142365,,,,,0,0.0,0,16.3,121.409752,31.175341,20190802023122,0460,0001,144B,6AF7,00,100.0,20190802113126,007E$
+RESP:GTSTR,560200,866425037534699,,,,,0,,,,,,,0460,0000,1877,8790,00,100.0,20190805075604,00D4$
+RESP:GTSTP,560200,866425037534699,,,,,0,,,,,,,0460,0000,1877,8790,00,100.0,20190805075632,00D6$
+RESP:GTLSP,560200,866425037534699,,,,,0,,,,,,,0460,0000,1877,8790,00,100.0,20190805075732,00D9$

Parameter	Length (byte)	Range/Format	Default
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Reserved	0		
Reserved	0		
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Mileage	<=9	0.0 - 4294967.0(km)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

➢ **+RESP:GTIDF,**

Example: **+RESP:GTIDF,560200,135790246811220,,,22,300,0,4.3,92,70.0,121.354335,31.222073,20090214013254,0460,0000,18D8,6141,00,2000.0,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Motion Status	2	11|12|16|1A|22	
Duration of Idling Status	<=6	0 - 999999(sec)	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Mileage	<=9	0.0 - 4294967.0(km)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Motion Status*>: The current motion status when the vehicle leaves idling status.

✧ <*Duration of Idling Status*>: The period of time the vehicle has been in idling status. If the duration is greater than 999999 seconds, it will be reported as 999999 seconds.

➢ **+RESP:GTGSM,**

Example: **+RESP:GTGSM,560200,135790246811220,,,FRI,0460,0000,1878,0871,20,,0460,0000,1878,0152,16,,,,,,,,,,,,,,,,,,,,,,0460,0000,1878, 805497B,57,00,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Fix Type	3	FRI|GIR|RTL	
MCC1	4	0XXX	
MNC1	4	0XXX	
LAC1	4	(HEX)	
Cell ID1	4 - 8	(HEX)	
RX Level1	<=2	0 - 63	
Reserved	2	00	
MCC2	4	0XXX	
MNC2	4	0XXX	
LAC2	4	(HEX)	
Cell ID2	4 - 8	(HEX)	
RX Level2	<=2	0 - 63	
Reserved	2	00	
MCC3	4	0XXX	
MNC3	4	0XXX	
LAC3	4	(HEX)	
Cell ID3	4 - 8	(HEX)	
RX Level3	<=2	0 - 63	
Reserved	2	00	
MCC4	4	0XXX	
MNC4	4	0XXX	
LAC4	4	(HEX)	
Cell ID4	4 - 8	(HEX)	

RX Level4	<=2	0 - 63	
Reserved	2	00	
MCC5	4	0XXX	
MNC5	4	0XXX	
LAC5	4	(HEX)	
Cell ID5	4 - 8	(HEX)	
RX Level5	<=2	0 - 63	
Reserved	2	00	
MCC6	4	0XXX	
MNC6	4	0XXX	
LAC6	4	(HEX)	
Cell ID6	4 - 8	(HEX)	
RX Level6	<=2	0 - 63	
Reserved	2	00	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
RX Level	<=2	0 - 63	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Fix 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 the sub command "**C**" in the **AT+GTRTO** command.
- <*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 is a 6-bit value coded in 1 dB 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 only several neighbor cells (or even no neighbor cell). 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 device does not know the value.
3. This message cannot be sent via SMS.

➢ **+RESP:GTCRA,**

Example: **+RESP:GTCRA,560200,135790246811220,,0,4.3,92,70.0,121.354335,31.222073,20090214013254,0460,0000,18D8,6141,00,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Crash Counter	2	(HEX)	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	

Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Crash Counter*>: A hexadecimal value to indicate the crash sequence. The report messages **+RESP:GTCRA** and **+RESP:GTCRD** are combined into one crash event. It rolls from 0x00 to 0xFF.

➢ **+RESP:GTASC,**

Example: **+RESP:GTASC,560200,135790246811220,,,-0.11,-0.13,0.99,0.98,-0.18,0.08,0.17,0.97,0.15,0,4.3,92,70.0,121.354335,31.222073,20090214013254,0460,0000,18D8,6141,00,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
X_Forward	<=5	-1.00 - 1.00	
Y_Forward	<=5	-1.00 - 1.00	
Z_Forward	<=5	-1.00 - 1.00	
X_Side	<=5	-1.00 - 1.00	
Y_Side	<=5	-1.00 - 1.00	
Z_Side	<=5	-1.00 - 1.00	
X_Vertical	<=5	-1.00 - 1.00	
Y_Vertical	<=5	-1.00 - 1.00	
Z_Vertical	<=5	-1.00 - 1.00	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Heading	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	

Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- ✧ <*X_Forward*>, <*Y_Forward*>, <*Z_Forward*>: The factors to calculate the new acceleration in forward direction. The formula to calculate the acceleration in Forward direction Xnew is Xnew = <*X_Forward*> * X + <*Y_Forward*> * Y + <*Z_Forward*> * Z.
- ✧ <*X_Side*>, <*Y_Side*>, <*Z_Side*>: The factors to calculate the new acceleration in side direction. The formula to calculate the acceleration in Side direction Ynew is Ynew = <*X_Side*> * X + <*Y_Side*> * Y + <*Z_Side*> * Z.
- ✧ <*X_Vertical*>, <*Y_Vertical*>, <*Z_Vertical*>: The factors to calculate the new acceleration in vertical direction. The formula to calculate the acceleration in Vertical direction Znew is Znew = <*X_Vertical*> * X + <*Y_Vertical*> * Y + <*Z_Vertical*> * Z.

➢ **+RESP:GTGSS,**

Example: **+RESP:GTGSS,560200,135790246811220,,,1,9,11,,0,4.3,92,70.0,121.354335,31.222073,20090214013254,0460,0000,18D8,6141,00,20090214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
GNSS Signal Status	1	0|1	
Satellite Number	<=2	0 - 24	
Motion Status	2	11|12|16|1A|21|22|41|42	
Reserved	0		
GNSS Accuracy	<=2	0	

Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*GNSS Signal Status*>: 0 means "GNSS signal lost or no successful GNSS fix", and 1 means "GNSS signal recovered and successful GNSS fix".
- <*Satellite Number*>: The number of the visible satellites when fix is successful. If fix fails, this field is empty.
- <*Motion Status*>: The motion status of the device.
  - 16 (Tow): The device attached vehicle is ignition off and it is towed.
  - 11 (Ignition Off Rest): The device attached vehicle is ignition off and it is motionless.
  - 12 (Ignition Off Motion): The device attached vehicle is ignition off and it is moving before it is considered as being towed.
  - 21 (Ignition On Rest): The device attached vehicle is ignition on and it is motionless.
  - 22 (Ignition On Motion): The device attached vehicle is ignition on and it is moving.
  - 41 (Sensor Rest): The device attached vehicle is motionless without ignition signal detected.
  - 42 (Sensor Motion): The device attached vehicle is moving without ignition signal detected.

If the network roaming state changes, the current roaming state will be reported in the **+RESP:GTRMD** message. The message is defined as an event message.

- **+RESP:GTRMD,**

Example: **+RESP:GTRMD,560200,135790246811220,,,1,0,0.0,0,83.9,117.201281,31.833017,20130917071326,0460,0000,5678,2079,00,20130917071330,00A4$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol **Version**	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Roaming State	1	0 - 3	
GNSS Accuracy	<=2	0	
Speed	<=5	0.0 - 999.9(km/h)	
Azimuth	<=3	0 - 359	
Altitude	<=8	(-)XXXXX.X(m)	
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	(HEX)	
Cell ID	4 - 8	(HEX)	
Reserved	2	00	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Roaming State*>: A numeral to indicate the roaming state.

- 0: Home
- 1: Known Roaming
- 2: Unknow Roaming
- 3: Blocking Report

➢ **+RESP:GTUPC,**

Example: **+RESP:GTUPC,560200,135790246811220,,gv500,0,100,http://180.169.235.202:21022/U21023**

_at.ini,20190402061037,0C88$			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Command ID	<=3	0 - 999	
Result	3	100 - 103|200 - 202|300 - 302|304 - 306	
Download URL	<=100	(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 code is 301. It indicates the ID of the command in wrong format when the response code is 302. It is empty when the response code is 304, 305 or 306.
- <*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.
  - 303: Reserved
  - 304: <*Command Mask*> or <*GEO ID Mask*> check fails.
  - 305: The update process is interrupted by abnormal reboot.
  - 306: The update process is interrupted by MD5 verification error.
- <*Download URL*>: The complete URL to download the configuration. It includes the file name.

➢ **+RESP:GTEUC,**

Example: **+RESP:GTEUC,560200,135790246811220,,,0,101,http://180.169.235.202:9034/866425037536481.ini,FFFFFFFF,,,,,20190415014708,004E$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	
Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	

Command ID	<=3	0 - 999	
Result	3	100 - 103|200 - 202|300 - 302|304 - 306	
Download URL	<=100	(URL)	
Identifier Number	8	(HEX)	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
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 code is 301. It indicates the ID of the command in wrong format when the response code is 302. It is empty when the response code is 304, 305 or 306.
- <*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.
  - 303: Reserved
  - 304: <*Command Mask*> or <*GEO ID Mask*> check fails.
  - 305: The update process is interrupted by abnormal reboot.
  - 306: The update process is interrupted by MD5 verification error.
- <*Download URL*>: The complete URL to download the configuration. It includes the file name.
- <*Identifier Number*>: Please refer to the parameter <*Identifier Number*> in the command **AT+GTUPC**.

3.3.5 Buffer Report

If the buffer report function is enabled by the command **AT+GTSRI**, the device will save the report messages in a local buffer when the following occurs.

- The network is not available.
- EGPRS/LTE PDP context activation for the TCP or UDP connection fails.
- Establishment of the TCP connection with the backend server fails.

Those buffered messages will be sent to the backend server when the connection to the server is recovered again. The buffered reports are saved to the built-in non-volatile memory in case the device is reset. The device can buffer up to 10,000 messages (160 bytes per message).

Detailed information about buffer report is listed below.

- ✧ Only **+RESP** messages except **+RESP:GTALL** and **+RESP:GTPDP** are buffered.
- ✧ In the buffer report, the original header string "**+RESP**" is replaced by "**+BUFF**" while the other content including the original sending time and count number is kept unchanged.
- ✧ Buffered messages will be sent only via EGPRS/LTE by TCP or UDP protocol. They cannot be sent via SMS. If the current report is forced SMS mode, the buffered message will not be sent until the report mode is changed to TCP or UDP.
- ✧ The buffered messages will be sent after real time messages if <*Buffer Mode*> in **AT+GTSRI** is set to 1.
- ✧ The buffered messages will be sent before 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,560200,868034001000579,,gv500,,10,1,1,0.4,60,56.6,117.201309,31.833082,20130107182151,0460,0000,5678,2079,00,21188.6,,,,,21,,,,20130107182154,01B8$

3.3.6 Crash Data Packet

The message contains 15s tri-axial acceleration data before and after crash at most. When a crash accident is detected, tri-axial acceleration data before crash will be reported to the backend server packed in several frames. And the device will continue to record tri-axial data after crash and report it to backend server packed with several frames.

➢ **+RESP:GTCRD,**

Example:

+RESP:GTCRD,560200,866425035142365,,,00,02,1,1,004B00030024004D00040023004D00030021004E00010020004FFFFC0020004EFFFC001F004FFFFC001E0050FFFD001E004D0001001E004FFFFF001B004C0000001A0056000000110054FFFE00110050000500140056000000120052FFFE00180050FFFB00170053FFF100180058FFED00170056FFEA00140049FFF100120058FFF400160055FFEC0012004AFFF400110052FFFC00160051FFF80016004BFFF70018003DFFFA001B0040FFFE001C00440008001E00480016001B005600140011004C0017000A004A00120001003F000FFFFC005B0018FFE2005F0010FFE30051000FFFE90058000BFFEA004B0000FFF30025FFFD000BFFFA0001001E0070FFF7000B0050FFFE0014002CFFF2001200490000000F00A2001700110011FFF400010014FFEFFFF902180060FEFF,20190806070221,0138$

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

Unique ID	15	(IMEI)	
Reserved	0		
Device Name	<=20	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '_'	
Crash Counter	2	(HEX)	
Data Type	2	00 - 7F	
Total Frame	<=2	1-15	
Frame Number	<=2	1 -15	
Data	<=1200	(HEX)	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	(HEX)	
Tail Character	1	$	$

- <*Crash Counter*>: A hexadecimal value to indicate the crash sequence. The report messages **+RESP:GTCRA** and **+RESP:GTCRD** are combined into one crash event. It rolls from 0x00 to 0xFF.
- <*Data Type*>: A hexadecimal parameter to indicate the time of the data (before crash or after crash) and crash direction (+X, -X, +Y, -Y, +Z, -Z or several of them). Please refer to the following table for the detailed syntax.

Bits	Description		Range
Bit 0	0: before crash	1: after crash	0-1
Bit 1	0: X-axis crash not detected	1: X-axis crash detected	0-1
Bit 2	0: X-axis positive direction	1: X-axis negative direction	0-1
Bit 3	0: Y-axis crash not detected	1: Y-axis crash detected	0-1
Bit 4	0: Y-axis positive direction	1: Y-axis negative direction	0-1
Bit 5	0: Z-axis crash not detected	1: Z-axis crash detected	0-1
Bit 6	0: Z-axis positive direction	1: Z-axis negative direction	0-1
Bit 7	Fixed value		0

- <*Total Frame*>: The total number of data frames reported to the server.
- <*Frame Number*>: The sequence number of the current data frame.
- <*Data*>: There are a maximum of 1200 ASCII characters in one message which includes acceleration samples in 1 second at most. There are 12 characters in a group. The first 4 characters of these 12 characters represent X axis acceleration data, the middle 4 characters represent Y axis acceleration data and the last 4 characters respresent Z axis acceleration data. The ASCII “0001” is equal to 0x0001 in hex format, and the ASCII “afff” is equal to 0xAFFF in hex format. They are two’s complement.

Example:

+RESP:GTCRD,560200,359231038715676,,,0,3,1,000100010055… ,20120330120443,005C$

This is the oldest XYZ-axis acceleration data:
Conversion to hex format: X (axis acceleration data) = 0x0001; Y = 0x0001; Z = 0x0055;
Decimal format: X (axis acceleration data) = 1; Y = 1; Z = 85;

+RESP:GTCRD,560200,359231038715676,,,1,3,3,...ffffff10052,20120330115736,005A$
This is the latest XYZ-axis acceleration data:
Conversion to hex format: X (axis acceleration data) = 0xFFFF; Y = 0xFFF1; Z = 0x0052;
Decimal format: X (axis acceleration data) = -1; Y = -15; Z = 82;

Note: Acceleration of gravity (+g) is 82 in decimal format and –g is −82. The linearized acceleration data 1312 represents +16g and −1312 represents −16g.

3.4 Heartbeat

Heartbeat is used to maintain the connection between the device and the backend server in the case of EGPRS/LTE communication. The heartbeat package is sent to the backend server at the interval defined by <*Heartbeat Interval*> in the **AT+GTSRI** command.

- **+ACK:GTHBD,**

Example: **+ACK:GTHBD,560200,135790246811220,,20100214093254,11F0$**			
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 to the device.

- **+SACK:GTHBD,**

Example: **+SACK:GTHBD,560200,11F0$** **+SACK:GTHBD,,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol Version	6	(HEX)	

Count Number	4	(HEX)	
Tail Character	1	$	$

✧ <*Protocol Version*>: The device type and the protocol version that the backend server supports. This field is optional. The backend server could just send an empty field to decrease the length of the heartbeat data acknowledgement.

✧ <*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.

3.5 Server Acknowledgement

If server acknowledgement is enabled by the **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 Report Message

From this version, the @Track protocol starts to support report messages in HEX format. For all the commands, they are still using the ASCII format as described above. By default the device uses ASCII format report messages. The backend server could use the **AT+GTQSS** or **AT+GTSRI** command to enable the HEX format report messages by setting the <*Protocol Format*> to 1.

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

The composition of the HEX report message could be customized by the **AT+GTHRM** command. The actual length of each HEX report message varies depending on the mask settings in **AT+GTHRM**.

The device uses CRC16 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 report message, the device uses 0x0D and 0x0A to mark the end.

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

4.1 Hex Report Mask

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

- **AT+GTHRM=**

Example: **AT+GTHRM=gv500,,,6F,FC17BF,FC17BF,FDFD,EF,7D,,,,FFFF$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4 – 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv500
Reserved	0		
Reserved	0		

+ACK Mask	<=2	00– FF	6F
+RSP Mask	<=8	00000000 – FFFFFFFF	FC1FBF
+EVT Mask	<=8	00000000 – FFFFFFFF	FC1FBF
+INF Mask	<=8	00000000 – FFFFFFFF	FD7D
+HBD Mask	<=2	00 – FF	EF
+CRD Mask	<=4	0000–FFFF	7D
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

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

Mask Bit	Item
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 report message.

Mask Bit	Item
Bit 31	Reserved
Bit 30	Reserved
Bit 29	Reserved
Bit 28	Reserved
Bit 27	Reserved
Bit 26	Reserved

Bit 25	Reserved
Bit 24	Reserved
Bit 23	*<Total Hour Meter Count>*
Bit 22	*<Current Hour Meter Count>*
Bit 21	*<Total Mileage>*
Bit 20	*<Current Mileage>*
Bit 19	*<Satellites in View>*
Bit 18	*<Motion Status>*
Bit 17	Reserved
Bit 16	Reserved
Bit 15	Reserved
Bit 14	Reserved
Bit 13	Reserved
Bit 12	*<External Power Voltage>*
Bit 11	Reserved
Bit 10	*<Firmware Version>*
Bit 9	*<Protocol Version>*
Bit 8	*<Device Type>*
Bit 7	*<Length>*
Bit 6	*<Device Name>*
Bit 5	*<Count Number>*
Bit 4	*<Send Time>*
Bit 3	*<MCC / MNC / LAC / Cell ID / Reserved>*
Bit 2	*<Altitude>*
Bit 1	*<Azimuth>*
Bit 0	*<Speed>*

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

Mask Bit	Item
Bit 31	Reserved
Bit 30	Reserved

Bit 29	Reserved
Bit 28	Reserved
Bit 27	Reserved
Bit 26	Reserved
Bit 25	Reserved
Bit 24	Reserved
Bit 23	*<Total Hour Meter Count>*
Bit 22	*<Current Hour Meter Count>*
Bit 21	*<Total Mileage>*
Bit 20	*<Current Mileage>*
Bit 19	*<Satellites in View>*
Bit 18	*<Motion Status>*
Bit 17	Reserved
Bit 16	Reserved
Bit 15	Reserved
Bit 14	Reserved
Bit 13	Reserved
Bit 12	*<External Power Voltage>*
Bit 11	Reserved
Bit 10	*<Firmware Version>*
Bit 9	*<Protocol Version>*
Bit 8	*<Device Type>*
Bit 7	*<Length>*
Bit 6	*<Device Name>*
Bit 5	*<Count Number>*
Bit 4	*<Send Time>*
Bit 3	*<MCC / MNC / LAC / Cell ID / Reserved>*
Bit 2	*<Altitude>*
Bit 1	*<Azimuth>*
Bit 0	*<Speed>*

✧ <*+INF Mask*>: Component mask of the information report message. Bit 8 – Bit 15 indicate which groups of items are included when the device reports the message **+RESP:GTINF**.

Mask Bit	Item
Bit 15	**+RESP:GTGIR**
Bit 14	**+RESP:GTTMZ**
Bit 13	**+RESP:GTCSQ**
Bit 12	**+RESP:GTCID**
Bit 11	**+RESP:GTBAT**
Bit 10	**+RESP:GTGPS**
Bit 9	Reserved
Bit 8	**+RESP:GTVER**
Bit 7	<*INF Expansion Mask*>
Bit 6	<*Count Number*>
Bit 5	<*Send Time*>
Bit 4	<*Firmware Version*>
Bit 3	<*Protocol Version*>
Bit 2	<*Device Type*>
Bit 1	<*Device Name*>
Bit 0	<*Length*>

✧ <*INF Expansion Mask*>: Component mask of the information report message. Please refer to Bit 7 in the parameter <*+INF Mask*>.

Mask Bit	Item
Bit 15	Reserved
Bit 14	Reserved
Bit 13	Reserved
Bit 12	Reserved
Bit 11	Reserved
Bit 10	Reserved
Bit 9	Reserved
Bit 8	Reserved
Bit 7	Reserved

Bit 6	Reserved
Bit 5	Reserved
Bit 4	Reserved
Bit 3	Reserved
Bit 2	Reserved
Bit 1	**+RESP:GTGSV**
Bit 0	Reserved

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

Mask Bit	Item
Bit 7	*<UID>*
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>*

✧ *<+CRD Mask>*: Component mask of the crash data packet.

Mask Bit	Item
Bit 15	Reserved
Bit 14	Reserved
Bit 13	Reserved
Bit 12	Reserved
Bit 11	Reserved
Bit 10	Reserved
Bit 9	Reserved
Bit 8	Reserved
Bit 7	Reserved
Bit 6	*<Count Number>*

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

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

- **+ACK:GTHRM,**

Example: **+ACK:GTHRM,560200,135790246811220,,0019,20090214093254,11F0$**			
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	$	$

4.2 Acknowledgement +ACK

- **+ACK,**

Example: **2B 41 43 4B 01 6F 24 56 01 00 01 29 56 40 19 03 33 23 5C 02 00 00 1A 07 E3 03 0D 09 00 26 16 C7 CE 21 0D 0A**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Message Header	4	(+ACK)	+ACK
Message Type	1		
Report Mask	1	(HEX)	
Length	1	(Length)	
Device Type	1	56	56

Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
ID	1		
Serial Number	2	(HEX)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

✧ <*Message Type*>: It indicates the ID of the command that the device receives.

Command	ID
AT+GTBSI	0
AT+GTSRI	1
AT+GTQSS	2
Reserved	3
AT+GTCFG	4
AT+GTTOW	5
AT+GTEPS	6
Reserved	7
Reserved	8
Reserved	9
AT+GTTMA	10
AT+GTFRI	11
AT+GTGEO	12
AT+GTSPD	13
Reserved	14
Reserved	15
AT+GTRTO	16
Reserved	17
Reserved	18

Reserved	19
Reserved	20
AT+GTUPD	21
Reserved	22
Reserved	23
AT+GTOWH	24
AT+GTDOG	25
Reserved	26
Reserved	27
AT+GTIDL	28
AT+GTHBM	29
AT+GTHMC	30
Reserved	31
Reserved	32
Reserved	33
AT+GTWLT	34
AT+GTHRM	35
AT+GTCRA	36
Reserved	37
AT+GTPDS	38
Reserved	39
Reserved	40
AT+GTSSR	41
Reserved	42
Reserved	43
Reserved	44
Reserved	45
Reserved	46
Reserved	47
AT+GTEMG	48

Reserved	49
Reserved	50
Reserved	51
Reserved	52
AT+GTRMD	53
AT+GTGAM	54
Reserved	55
Reserved	56
AT+GTGVVS	57
AT+GTGAVS	58
AT+GTGVMS	59
Reserved	⋮
AT+GTUPC	70
Reserved	⋮
AT+GTASC	79
AT+GTFVR	80

- <*Report Mask*>: Please refer to the <*+ACK Mask*> in **AT+GTHRM**.
- <*Length*>: The length of the whole acknowledgement message from header to the tail characters.
- <*Unique ID*>: If Bit 4 of <*+ACK Mask*> is 0, the IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, each 2 digits are encoded into one byte as an integer.

IMEI	**86**	**80**	**34**	**00**	**10**	**00**	**39**	**7**
HEX	**56**	**50**	**22**	**00**	**0A**	**00**	**27**	**07**

If Bit 4 of <*+ACK Mask*> is 1, the device name is used as the unique ID of the device. For the device name, please refer to the <*Device Name*> in **AT+GTCFG**. 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 remaining bytes are 0.

Device Name	**g**	**V**	**5**	**0**	**0**			
HEX	**67**	**76**	**35**	**30**	**30**	**00**	**00**	**00**

- <*ID*>: The ID of the sub-command of **AT+GTRTO**, or the ID of **AT+GTGEO**. For others, it is 0.
- <*Send Time*>: The local time to send the acknowledgement message. 7 bytes in total. The first 2 bytes are for year, and the other 5 bytes are 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 report messages including **+RESP:GTTOW**, **+RESP:GTEPS**, **+RESP:GTGEO**, **+RESP:GTSPD**, **+RESP:GTRTL**, **+RESP:GTDOG**, **+RESP:GTVGL**, **+RESP:GTFRI** and **+RESP:GTHBM** use the format below. For the message **+RESP:GTEPS**, the <*External Power Voltage*> field will always be present regardless of the <*+RSP Mask*> setting. For the message **+RESP:GTSPD**, the <*Speed*> field will always be present regardless of the <*+RSP Mask*> setting. For the message **+RESP:GTHBM**, the <*Speed*> and <*Azimuth*> fields will always be present regardless of the <*+RSP Mask*> setting.

➢ **+RSP,**

Example:
2B 52 53 50 0B 00 FC 17 BF 00 5E 56 01 00 01 29 56 40 19 03 33 23 5C 02 30 68 41 08 00 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 41 89 37 00 00 00 00 00 00 00 00 00 00 07 E3 03 0D 07 20 30 15 26 60 64 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+RSP)	+RSP
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Report ID / Report Type	1	(HEX)	
Number	1	1 - 15	

GNSS Accuracy	1	0 - 50	
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

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

Message	**ID**
Reserved	0
+RESP:GTTOW	1
Reserved	2
Reserved	3
+RESP:GTEPS	4
Reserved	5
Reserved	6
+RESP:GTFRI	7

+RESP:GTGEO	8
+RESP:GTSPD	9
Reserved	10
+RESP:GTRTL	11
+RESP:GTDOG	12
Reserved	13
Reserved	14
+RESP:GTHBM	15
Reserved	16
+RESP:GTVGL	17

- <*Report Mask*>: Please refer to the <*+RSP Mask*> in **AT+GTHRM**.
- <*Unique ID*>: If Bit 6 of <*+RSP Mask*> is 0, the IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, each 2 digits are encoded into one byte as an integer.

IMEI	**86**	**80**	**34**	**00**	**10**	**00**	**39**	**7**
HEX	**56**	**50**	**22**	**00**	**0A**	**00**	**27**	**07**

If Bit 6 of <*+RSP Mask*> is 1, the device name is used as the unique ID of the device. For the device name, please refer to the <*Device Name*> in **AT+GTCFG**. 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 remaining bytes are 0.

IMEI	**G**	**V**	**5**	**0**	**0**			
HEX	**47**	**56**	**35**	**30**	**30**	**00**	**00**	**00**

- <*Motion Status*>: 0x1A is a status which is before 0x16 status.
- <*Satellites in View*>: The low nibble is for <*Satellites in View*>.
- <*Report ID / Report Type*>: The high nibble is for <*Report ID*> and the low nibble is for <*Report Type*>.
- <*Speed*>: 3 bytes in total. The first 2 bytes are for the integer part of the speed and the last byte is for the fractional part. The fractional part has 1 digit.
- <*Longitude*>: The longitude of the current position. 4 bytes in total. The device converts the longitude to an integer with 6 implicit decimals and reports this integer 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. 4 bytes in total. The device converts the latitude to an integer with 6 implicit decimals and reports this integer 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

✧ <*Altitude*>: The altitude from GNSS. If the altitude is negative, it is represented in 2's complement format. Unit: meter.

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

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

✧ <*Current Mileage*>: 3 bytes in total. The first 2 bytes are for the integer part of the current mileage and the last byte is for the fractional part. The fractional part has 1 digit.

Current Mileage	0		0
HEX	00	00	00

✧ <*Total Mileage*>: 5 bytes in total. The first 4 bytes are for the integer part of the total mileage and the last byte is for the fractional part. The fractional part has 1 digit.

Total Mileage	0				0
HEX	00	00	00	00	00

✧ <*Total Hour Meter Count*>: 6 bytes in total. The first 4 bytes are the hour part, the fifth byte is the minute part, and the sixth byte is the second part.

Total Hour Meter Count	0				0	0
HEX	00	00	00	00	00	00

4.4 Information Report +INF

Information report messages include **+RESP:GTGSV**, **+RESP:GTINF**, **+RESP:GTGPS**, **+RESP:GTCID**, **+RESP:GTCSQ**, **+RESP:GTVER**, **+RESP:GTBAT**, **+RESP:GTTMZ** and **+RESP:GTGIR**. These messages use the same format as shown below. However, only **+RESP:GTINF** includes all the items while others include only the information items related to themselves.

➢ **+INF,**

Example: **2B 49 4E 46 01 FD 7D 00 94 56 40 19 03 33 23 5C 02 56 01 00 01 29 01 02 01 06 00 00 41 00 01 01 00 00 00 00 00 00 00 02 00 00 3F 00 00 1E 00 00 1E 00 00 00 D0 30 6F 00 00 00 89 86 07 22 09 17 00 53 10 86 1A 03 00 00 00 00 05 04 60 00 00 18 77 00 00 87 93 00 18 04 60 00 00 18 77 00 00 87 93 00 18 04 60 00 00 18 77 00 00 87 5B 00 0C 04 60 00 00 18 77 00 00 87 CA 00 09 04 60 00 00 18 77 00 00 87 90 00 C2 07 E3 03 0D 07 23 30 15 33 56 BE 0D 0A**			
Parameter	**Length (byte)**	**Range/Format**	**Default**

Message Header	4	(+INF)	+INF
Message Type	1		
Report Mask	2	(HEX)	
INF Expansion Mask	2	(HEX)	
Length	2	(Length)	
Unique ID	8	(IMEI|Device Name)	
Device Type	1	56	
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Hardware Version	2	(HEX)	**+RESP:GTVER**
MCU Version	2	(HEX)	
Reserved	2	0000	
Motion Status	1	11|12|21|22|41|42|16|1A	**+RESP:GTGPS**
Reserved	1	00	
Satellites in View	1		
Power Saving Enable / OWH Mode / Outside Working Hours / AGPS	1	(HEX)	
Last Fix UTC Time	7	(YYYYMMDDHHMMSS)	
Current GNSS Antenna	1	1|2	
Discard No Fix	1	0|1	
Report Composition Mask	2	(HEX)	
Send Interval	3		
IGF Report Interval	3		
Reserved	2	0000	
Reserved	1	00	
External Power Supply / Backup Battery On / Charging / LED State / Backup Battery Charge Mode	1	(HEX)	**+RESP:GTBAT**
External Power Voltage	2		
Backup Battery Voltage	2	0 - 4200(mV)	

Reserved	1	00	
ICCID	10	(ICCID)	**+RESP:GTCID**
CSQ RSSI	1	0 - 31|99	**+RESP:GTCSQ**
CSQ BER	1	0 - 7|99	
Time Zone Offset Sign / Daylight Saving Enable	1	(HEX)	**+RESP:GTTMZ**
Time Zone Offset	2	(HHMM)	
GIR Trigger Type	1		**+RESP:GTGIR**
Cell Number	1		
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
TA	1	(HEX)	
RX Level	1		
SV Count	1		**+RESP:GTGSV**
SV ID	1		
SV Power	1		
…			
SV ID	1		
SV Power	1		
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

✧ <*Message Type*>: The ID of a specific information report message.

Message	ID
+RESP:GTINF	1
+RESP:GTGPS	2
+RESP:GTCID	4

+RESP:GTCSQ	5
+RESP:GTVER	6
+RESP:GTBAT	7
Reserved	8
+RESP:GTTMZ	9
+RESP:GTGIR	10
+RESP:GTGSV	11

- <*Report Mask*>: Please refer to the <*+INF Mask*> in **AT+GTHRM**.
- <*Unique ID*>: If Bit 1 of <*+INF Mask*> is 0, the IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, each 2 digits are encoded into one byte as an integer.

IMEI	**86**	**80**	**34**	**00**	**10**	**00**	**39**	**7**
HEX	**56**	**50**	**22**	**00**	**0A**	**00**	**27**	**07**

If Bit 1 of <*+INF Mask*> is 1, the device name is used as the unique ID of the device. For the device name, please refer to the <*Device Name*> in **AT+GTCFG**. 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 remaining bytes are 0.

IMEI	**G**	**V**	**5**	**0**	**0**			
HEX	**47**	**56**	**35**	**30**	**30**	**00**	**00**	**00**

- <*Device Type*>: If <*Message Type*> is 6 (**+RESP:GTVER**) in the message, Bit 2 (<*Device Type*>) in <*+INF Mask*> will be forced to 1, and thus the field will always be present in the hex report of **+RESP:GTVER**.
- <*Protocol Version*>: If <*Message Type*> is 6 (**+RESP:GTVER**) in the message, Bit 3 (<*Protocol Version*>) in <*+INF Mask*> will be forced to 1, and thus the field will always be present in the hex report of **+RESP:GTVER**.
- <*Firmware Version*>: If <*Message Type*> is 6 (**+RESP:GTVER**) in the message, Bit 4 (<*Firmware Version*>) in <*+INF Mask*> will be forced to 1, and thus the field will always be present in the hex report of **+RESP:GTVER**.
- <*Power Saving Enable / OWH Mode / Outside Working Hours / AGPS*>: The highest bit, Bit 7 is reserved, Bit 5 and Bit 6 are for <*Power Saving Enable*>, Bit 3 and Bit 4 are for <*OWH Mode*>, and Bit 2 is for <*Outside Working Hours*>. Bit 0 is for <*AGPS*>. <*Outside Working Hours*> is used to indicate whether the device is currently outside working hours. 1 means "outside working hours".
- <*External Power Supply / Backup Battery On / Charging / LED On / Backup Battery Charge Mode*>: The highest bit, or Bit 7, is for <*External Power Supply*> which indicates whether the external power supply is connected to the device. Bit 6, which is for <*Backup Battery On*>,

indicates whether the backup battery is working. Bit 5 is for <*Charging*>, indicating whether the backup battery is currently charging. Bit 4 is for <*LED State*>, indicating at least one LED indicator is either flashing or steady on when it is 1 and both LED indicators are off when it is 0. Bit 0 is for <*Backup Battery Charge Mode*>.

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

✧ <*Time Zone Offset Sign / Daylight Saving Enable*>: Bit 1 is for <*Daylight Saving Enable*>, indicating whether the daylight saving function is currently enabled. Bit 0 is for <*Time Zone Offset Sign*> which indicates the positive or negative offset of the local time from UTC. 1 means “negative offset”.

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

“INF”: This cell information is for INF request.

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

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

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

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

Fix Type	**ID**
INF	0
Reserved	1
RTL	2
Reserved	3
TOW	4
FRI	5
GIR	6

✧ <*Cell Number*>: The number of cells. It also indicates the number of cell information groups. One cell information group consists of MCC, MNC, LAC, and Cell ID.

4.5 Event Report +EVT

Event report messages including **+RESP:GTPNA**, **+RESP:GTPFA**, **+RESP:GTMPN**, **+RESP:GTMPF**, **+RESP:GTBTC**, **+RESP:GTSTC**, **+RESP:GTSTT**, **+RESP:GTPDP**, **+RESP:GTIDN**, **+RESP:GTSTR**, **+RESP:GTSTP** and **+RESP:GTLSP** use the format below. For the message **+RESP:GTSTT**, the <*Motion Status*> field will always be present.

➢ **+EVT,**

Example:
2B 45 56 54 09 00 FC 17 BF 00 5D 56 01 00 01 29 56 40 19 03 33 23 5C 02 30 6C 42 04 01 00 00 00 00 00 00 FF F9 07 3C 8F E5 01 DB B2 00 07 E3 03 0D 07 2D 18 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 41 89 37 00 00 00 00 00 00 00 00 00 00 07 E3 03 0D 07 2D 1B 15 5B C9 99 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	

Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

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

Message	ID
+RESP:GTPNA	1
+RESP:GTPFA	2
+RESP:GTMPN	3
+RESP:GTMPF	4
Reserved	5
+RESP:GTBPL	6
+RESP:GTBTC	7
+RESP:GTSTC	8
+RESP:GTSTT	9
Reserved	10
Reserved	11
+RESP:GTPDP	12
Reserved	13
Reserved	14
+RESP:GTUPD	15
+RESP:GTIDN	16
+RESP:GTIDF	17
Reserved	18
Reserved	19
Reserved	20
+RESP:GTGSS	21

Reserved	22
+RESP:GTCRA	23
Reserved	25
+RESP:GTGES	26
+RESP:GTSTR	28
+RESP:GTSTP	29
+RESP:GTLSP	30
Reserved	32
+RESP:GTRMD	33
Reserved	34
+RESP:GTVGN	35
+RESP:GTVGF	36
…	…
+RESP:GTUPC	40
…	…
+RESP:GTASC	47

- <*Report Mask*>: Please refer to the <*+EVT Mask*> in **AT+GTHRM**.
- <*Unique ID*>: If Bit 6 of <*+EVT Mask*> is 0, the IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, each 2 digits are encoded into one byte as an integer.

IMEI	**86**	**80**	**34**	**00**	**10**	**00**	**39**	**7**
HEX	**56**	**50**	**22**	**00**	**0A**	**00**	**27**	**07**

If Bit 6 of <*+EVT Mask*> is 1, the device name is used as the unique ID of the device. For the device name, please refer to the <*Device Name*> in **AT+GTCFG**. 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 remaining bytes are 0.

IMEI	**G**	**V**	**5**	**0**	**0**			
HEX	**47**	**56**	**35**	**30**	**30**	**00**	**00**	**00**

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

- **+EVT,**

Example:
2B 45 56 54 06 00 FC 17 BF 00 5F 56 01 00 01 2A 56 40 19 03 33 23 5C 02 04 13 41 00 28 88 01 00

00 00 00 00 00 00 22 07 3C 92 14 01 DB B2 E4 07 E3 03 12 08 11 08 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00 00 07 E3 03 12 08 19 0B 2A 09 9B EF 0D 0A			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Backup Battery Voltage	2	0 - 4200(mV)	
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter	3	(HHMMSS)	

Count			
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

The event report messages **+RESP:GTVGN** and **+RESP:GTVGF** use the format below. For these two messages, the <*Current Mileage*> and <*Total Mileage*> fields will always be present regardless of the <*+EVT Mask*> setting.

- **+EVT,**

Example:
2B 45 56 54 23 00 FC 17 BF 00 63 56 01 00 01 29 56 40 19 03 33 23 5C 02 30 6A 22 0D 00 04 00 00 01 E4 01 00 00 00 00 00 00 00 4B 07 3C 90 8E 01 DB B3 57 07 E3 03 0D 08 2E 0C 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 41 89 37 00 00 00 00 00 00 00 00 00 00 07 E3 03 0D 08 2E 0D 16 7F 0F BF 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Reserved	1	00	
Report Type	1	2|4|7	
Duration of Ignition On or Ignition Off	4	0 - 999999(sec)	
Number	1	1	

GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

The event report message **+RESP:GTUPD** uses the format below. For this message, the <*Protocol Version*> and <*Firmware Version*> will always be present regardless of the <*+EVT Mask*> setting.

- **+EVT,**

Example:
2B 45 56 54 0F 00 FC 17 BF 00 60 56 01 00 01 2A 56 40 19 03 33 23 5C 02 30 5E 11 00 00 64 00 01 00 00 00 00 00 00 00 15 07 3C 91 09 01 DB B2 72 07 E3 03 12 08 05 2F 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00 00 07 E3 03 12 08 05 30 28 E5 21 85 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	

Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Code	2	100 - 103|110 - 114|170 - 173|200 - 203|210 - 212|270 - 272|300 - 303|310 - 313|370 - 373	
Retry	1		
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	

Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

The event report message **+RESP:GTIDF** uses the format below. For this message, the <*Motion Status*> field will always be present regardless of the <*+EVTMask*> setting.

- **+EVT,**

Example:
2B 45 56 54 11 00 FC 17 BF 00 61 56 01 00 01 29 56 40 19 03 33 23 5C 02 30 46 11 0A 00 00 00 78 01 00 00 00 00 00 00 00 4B 07 3C 90 8E 01 DB B3 57 07 E3 03 0D 08 27 08 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 41 89 37 00 00 00 00 00 00 00 00 00 00 07 E3 03 0D 08 27 09 16 5E 7E DA 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Duration of Idling	4	0 - 999999(sec)	
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	

GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

The event report message **+RESP:GTGSS** uses the format below. For this message, the <*Satellites in View*> field will always be present regardless of the <*+EVTMask*> setting.

- **+EVT,**

Example:
2B 45 56 54 15 00 FC 17 BF 00 62 56 01 00 01 29 56 40 19 03 33 23 5C 02 30 6F 11 04 00 00 00 00 00 01 00 00 00 00 00 00 00 3A 07 3C 93 73 01 DB B2 58 07 E3 03 0D 08 33 2B 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 41 89 37 00 00 00 00 00 00 00 00 00 00 07 E3 03 0D 08 34 28 16 A1 A8 5D 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		

Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
GNSS Signal Status	1	0|1	
Reserved	4	00000000	00000000
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

✧ <*GNSS Signal Status*>: 0 means “GNSS signal lost or no successful GNSS fix”, and 1 means “GNSS signal recovered and successful GNSS fix”.

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

➢ **+EVT,**

Example:
2B 45 56 54 1A 00 FC 17 BF 00 67 56 01 00 01 29 56 40 19 03 33 23 5C 02 30 66 11 0A 01 15 00 00 03 E8 00 00 00 0A 01 00 00 00 00 00 00 00 3A 07 3C 93 73 01 DB B2 58 07 E3 03 0D 08 37 00 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 41 89 37 00 00 00 00 00 00 00 00 00 00 07 E3 03 0D 08 37 01 16 AD 90 D3 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Supply Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Trigger GEO ID / Trigger GEO Enable	1		
Trigger Mode	1	0|21|22	
Radius	4	50 - 6000000(m)	
Check Interval	4	0|5 - 86400(sec)	
Number	1	1	
GNSS Accuracy	1	0	
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	

MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

✧ <*Trigger GEO ID* / *Trigger GEO Enable*>: <*Trigger GEO ID*> and <*Trigger GEO Enable*> are in hex format. The high bit indicates <*Trigger GEO ID*> and the low bit indicates <*Trigger GEO Enable*>.

- ➢ *Trigger GEO ID*: The ID of Geo-Fence. The range is 0 – 4.
- ➢ *Trigger GEO Enable*: It indicates whether the zone's Geo-Fence function is enabled or disabled.
  - 0: The zone's Geo-Fence function is disabled.
  - 1: The zone's Geo-Fence function is enabled.

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

- ➢ **+EVT,**

Example:
2B 45 56 54 21 00 FC 17 BF 00 5E 56 01 00 01 29 56 40 19 03 33 23 5C 02 30 60 11 05 02 01 00 00 00 00 00 00 00 3A 07 3C 93 73 01 DB B2 58 07 E3 03 0D 08 39 14 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 41 89 37 00 00 00 00 00 00 00 00 00 00 07 E3 03 0D 08 39 16 16 BA CE 22 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	

Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Supply Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Roaming State	1	0 - 3	
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

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

- **+EVT,**

Example:
2B 45 56 54 28 00 FC 17 BF 00 9E 56 01 00 01 2A 56 40 19 03 33 23 5C 02 30 49 11 00 00 00 C8 68 74 74 70 3A 2F 2F 31 38 30 2E 31 36 39 2E 32 33 35 2E 32 30 32 3A 39 30 35 31 2F 47 56 35 30 30 4D 41 52 30 30 41 30 31 56 33 38 4D 31 30 32 34 5F 66 6F 74 61 2E 62 69 6E 2E 69 6E 69 01 00 00 00 00 00 00 00 15 07 3C 91 09 01 DB B2 72 07 E3 03 12 07 2C 06 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00 00 07 E3 03 12 07 2C 07 28 B0 C8 5B 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	25
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Supply Voltage	2		
Motion Status	1	11|12|21|22|41|42|16|1A	
External GNSS Antenna Status | Satellites in View	1		
Command ID	1		
Result	2	100 - 103|200 - 202|300 - 302|304 - 306	
Download URL	<=100		
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	

MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
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 commands when the response code is 301. It indicates the ID of the command in wrong format when the response code is 302. It is 0 when the response code is 304, 305 or 306.
- <*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.
  - 303: Reserved
  - 304: <*Command Mask*> or <*GEO ID Mask*> check fails.
  - 305: The update process is interrupted by abnormal reboot.
  - 306: The update process is interrupted by MD5 verification error.
- <*Download URL*>: The complete URL to download the configuration. It includes the file name and ends by 0x00.

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

- **+EVT,**

Example:
2B 45 56 54 06 00 FC 17 BF 00 5F 5E 01 00 01 2A 56 40 19 03 33 23 5C 02 04 13 41 00 28 88 01 00 00 00 00 00 00 00 22 07 3C 92 14 01 DB B2 E4 07 E3 03 12 08 11 08 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00 00 07 E3 03 12 08 19 0B 2A 09 9B EF 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	5E
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Device Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
Crash Counter	1		
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	

Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

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

- **+EVT,**

Example: **2B 45 56 54 06 00 FC 17 BF 00 5F 5E 01 00 01 2A 56 40 19 03 33 23 5C 02 04 13 41 00 28 88 01 00 00 00 00 00 00 00 22 07 3C 92 14 01 DB B2 E4 07 E3 03 12 08 11 08 04 60 00 00 18 77 00 00 87 90 00 00 00 00 00 00 00 00 00 02 00 00 00 00 00 00 00 00 00 07 E3 03 12 08 19 0B 2A 09 9B EF 0D 0A**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Message Header	4	(+EVT)	+EVT
Message Type	1		
Report Mask	4	(HEX)	
Length	2	(Length)	
Device Type	1	56	5E
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
External Power Voltage	2		
Device Status	1	11|12|21|22|41|42|16|1A	
Satellites in View	1		
X_Forward	1	-100 - 100	
Y_Forward	1	-100 - 100	
Z_Forward	1	-100 - 100	
X_Side	1	-100 - 100	
Y_Side	1	-100 - 100	

Z_Side	1	-100 - 100	
X_Vertical	1	-100 - 100	
Y_Vertical	1	-100 - 100	
Z_Vertical	1	-100 - 100	
Number	1	1	
GNSS Accuracy	1	0	0
Speed	3	0.0 - 999.9(km/h)	
Azimuth	2	0 - 359	
Altitude	2		
Longitude	4	(-180 - 180)	
Latitude	4	(-90 - 90)	
GNSS UTC Time	7	(YYYYMMDDHHMMSS)	
MCC	2	0000 - 0FFF	
MNC	2	0000 - 0FFF	
LAC	2	(HEX)	
Cell ID	4	(HEX)	
Reserved	1	00	00
Current Mileage	3	0.0 - 65535.0(km)	
Total Mileage	5	0.0 - 4294967.0(km)	
Current Hour Meter Count	3	(HHMMSS)	
Total Hour Meter Count	6	(HHHHHHHHMMSS)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

- ✧ *<X_Forward>,<Y_Forward>,<Z_Forward>*: The factors to calculate the new acceleration in forward direction. The formula to calculate the acceleration in Forward direction Xnew is Xnew = *<X_Forward>* * X + *<Y_Forward>* * Y + *<Z_Forward>* * Z. To get the actual factor, this value needs to be divided by 100.
- ✧ *<X_Side>,<Y_Side>,<Z_Side>*: The factors to calculate the new acceleration in side direction. The formula to calculate the acceleration in Side direction Ynew is Ynew = *<X_Side>* * X +

<*Y_Side*> * Y + <*Z_Side*> * Z. To get the actual factor, this value needs to be divided by 100.

✧ <*X_Vertical*>,<*Y_Vertical*>,<*Z_Vertical*>: The factors to calculate the new acceleration in vertical direction. The formula to calculate the acceleration in Vertical direction Znew is Znew = <*X_Vertical*> * X + <*Y_Vertical*> * Y + <*Z_Vertical*> * Z. To get the actual factor, this value needs to be divided by 100.

4.6 Heartbeat Data +HBD

➢ **+HBD,**

Example: **2B 48 42 44 EF 20 56 01 00 01 29 56 40 19 03 33 23 5C 02 07 E3 03 0D 08 37 2C 16 B0 86 B8 0D 0A**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Message Header	4	(+HBD)	+HBD
Report Mask	1	(HEX)	
Length	1	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

✧ <*Report Mask*>: Please refer to the <*+HBD Mask*> in **AT+GTHRM**.

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

IMEI	**86**	**80**	**34**	**00**	**10**	**00**	**39**	**7**
HEX	**56**	**50**	**22**	**00**	**0A**	**00**	**27**	**07**

If Bit 4 of <*+HBD Mask*> is 1, the device name is used as the unique ID of the device. For the device name, please refer to the <*Device Name*> in **AT+GTCFG**. 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 remaining bytes are 0.

IMEI	G	V	5	0	0			
HEX	47	56	35	30	30	00	00	00

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

4.7 Crash Data Packet +CRD

➢ **+CRD,**

Example:

2B 43 52 44 00 7D 02 19 5E 01 00 01 02 0D 39 5A 18 44 0B 16 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 03 03 00 5A FF FE FF FC 00 58 FF FD FF FD 00 55 FF FE FF FE 00 56 FF FF FF FF 00 57 FF FC FF FC 00 54 FF FC FF FF 00 57 FF FD FF FF 00 57 FF FD FF FF 00 55 FF FC FF FE 00 58 FF FE FF FE 00 57 FF FD FF FE 00 56 FF FB 00 00 00 57 FF FB FF FD 00 57 FF FD 00 00 00 57 FF FF 00 00 00 58 FF FE FF FF 00 57 FF FC FF FE 00 57 FF FD 00 01 00 58 FF FD FF FD 00 5A FF FC FF FE 00 53 FF FE FF FF 00 57 FF FD FF FF 00 54 FF FD FF FD 00 53 FF FB FF FF 00 55 FF FE FF FE 00 56 FF FC FF FD 00 58 FF FD FF FF 00 57 FF FD FF FD 00 56 FF FF FF FF 00 57 FF FD 00 00 00 56 FF FD FF FF 00 56 FF FD 00 00 00 56 FF FE FF FE 00 58 FF FD FF FD 00 58 FF FC 00 00 00 57 FF FE FF FD 00 55 FF FE FF FE 00 56 FF FD 00 00 00 5A FF FC FF FE 00 58 FF FC FF FF 00 58 FF FC FF FE 00 56 FF FF 00 00 00 57 FF FD 00 01 00 55 FF FD FF FF 00 58 FF FD FF FD 00 56 FF FC FF FF 00 57 FF FC FF FD 00 57 FF FE FF FE 00 57 FF FD FF FF 00 57 FF FB FF FE 00 56 FF FB FF FE 00 56 FF FF FF FD 00 54 00 00 FF FF 00 56 FF FC FF FF 00 56 FF FD FF FE 00 59 FF FC 00 00 00 57 FF FC FF FD 00 57 FF FD FF FE 00 59 FF FC FF FE 00 5C FF FB FF FD 00 57 FF FB 00 00 00 58 FF FF FF FD 00 55 FF FD FF FF 00 58 FF FB FF FE 00 56 00 00 FF FD 00 58 FF FD FF FF 00 56 FF FB FF FD 00 55 FF FC FF FF 00 57 FF FB FF FF 00 58 FF FC FF FF 00 55 FF FD FF FE 00 58 FF FC FF FE 00 56 FF FC FF FF 00 54 FF FC FF FD 00 59 FF FE 00 00 00 58 FF FF FF FF 00 55 FF FE FF FF 00 57 FF FA FF FE 00 55 FF FD FF FE 00 58 FF FD FF FE 00 5A FF FC FF FD 00 57 FF FF FF FD 00 58 FF FD 00 00 00 55 07 DB 01 01 14 10 24 00 D8 14 37 0D 0A

Parameter	Length (byte)	Range/Format	Default
Message Header	4	(+CRD)	+CRD
Report Mask	2	(HEX)	
Length	2	(Length)	
Device Type	1	56	5E
Protocol Version	2	(HEX)	

Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
Crash Counter	1	(HEX)	
Data Type	1	00 - 7F	
Total Frame	1	1 - 8	
Frame Number	1	1 - 8	
Data Length	2	0 - 1200	
Data	<=1200	(HEX)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

- <*Report Mask*>: Please refer to the <*+CRD Mask*> in **AT+GTHRM**.
- <*Unique ID*>: If Bit 1 of <*+CRD Mask*> is 0, the IMEI of the device is used as the unique ID of the device. IMEI is a 15-digit string. In the HEX format message, each 2 digits are encoded into one byte as an integer.

IMEI	**86**	**80**	**34**	**00**	**10**	**00**	**39**	**7**
HEX	**56**	**50**	**22**	**00**	**0A**	**00**	**27**	**07**

If Bit 1 of <*+CRD Mask*> is 1, the device name is used as the unique ID of the device. For the device name, please refer to the <*Device Name*> in **AT+GTCFG**. 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 remaining bytes are set to 0.

Device Name	**G**	**V**	**5**	**0**	**0**			
HEX	**67**	**76**	**35**	**30**	**30**	**00**	**00**	**00**

- <*Data Type*>: A hexadecimal parameter to indicate the time of the data (before crash or after crash) and crash direction (+X, -X, +Y, -Y, +Z, -Z or several of them). Please refer to the following table for the detailed syntax.

Bits	Description		Range
Bit 0	0: before crash	1: after crash	0-1
Bit 1	0: X-axis crash not detected	1: X-axis crash detected	0-1
Bit 2	0: X-axis positive direction	1: X-axis negative direction	0-1
Bit 3	0: Y-axis crash not detected	1: Y-axis crash detected	0-1
Bit 4	0: Y-axis positive direction	1: Y-axis negative direction	0-1

Bit 5	0: Z-axis crash not detected	1: Z-axis crash detected	0-1
Bit 6	0: Z-axis positive direction	1: Z-axis negative direction	0-1
Bit 7	Fixed value		0

- <*Total Frame*>: The total number of the messages that are sent to the backend server for the crash event.
- <*Frame Number*>: A numeral to indicate the sequence of the current message.
- <*Data*>: There are 1200 bytes in one frame at most which includes acceleration samples in 2 seconds at most. 6 bytes are as a group. The first 2 bytes of these 6 bytes represent X axis acceleration data, the middle 2 bytes represent Y axis acceleration data and the last 2 bytes are for Z axis acceleration data. And they are two's complement.

4.8 Advanced Version Information +ATI

Advanced version information includes information of the fields such as <*Firmware Version*>, <*Hardware Version*>, <*MCU Version*>, <*MCU Boot Version*>, etc. as shown in the blue part of the following table.

➢ **+ATI,**

Example: **2B 41 54 49 00 24 56 01 00 01 29 56 40 19 03 33 23 5C 02 00 00 00 00 07 E3 03 0D 09 02 26 16 D2 8A 00 0D 0A**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Message Header	4	(+ATI)	+ATI
Length	2	(Length)	
Device Type	1	56	56
Protocol Version	2	(HEX)	
Firmware Version	2	(HEX)	
Unique ID	8	(IMEI|Device Name)	
ATI Mask	4	(HEX)	
Firmware Version	2	(HEX)	
MCU Firmware Version	2	(HEX)	
Modem Firmware Version	2	(HEX)	
Hardware Version	2	(HEX)	
Modem Hardware Version	2	(HEX)	

Sensor ID	1	(HEX)	
Send Time	7	(YYYYMMDDHHMMSS)	
Count Number	2	(HEX)	
Checksum	2	(Checksum)	
Tail Characters	2	(0x0D 0x0A)	0x0D 0x0A

✧ <*ATI Mask*>: This mask is set by the **AT+GTRTO** command. It is used to control the parameter fields in the **+ATI** message.

4.9 Buffer Report in HEX Format

When HEX format messages go into the local buffer, the device will replace the 2nd byte of the report messages with 'B'. Thus, **+BSP** is buffered report for **+RSP**, **+BNF** is buffered report for **+INF** and **+BVT** is buffered report for **+EVT**. The remaining part of the report messages is kept unchanged.

Appendix: Message Index

- **Command and ACK**

+ACK:GTEPS
AT+GTRTO
+ACK:GTRTO
AT+GTHMC
+ACK:GTHMC
AT+GTWLT
+ACK:GTWLT
AT+GTUPC
+ACK:GTUPC
AT+GTGAM
+ACK:GTGAM
AT+GTVVS
+ACK:GTVVS
AT+GTAVS
+ACK:GTAVS
AT+GTVMS
+ACK:GTVMS
AT+GTFVR
+ACK:GTFVR

✧ **Position Related Report**

+RESP:GTTOW
+RESP:GTEPS
+RESP:GTFRI
+RESP:GTGEO
+RESP:GTSPD
+RESP:GTRTL
+RESP:GTDOG
+RESP:GTVGL
+RESP:GTHBM
+RESP:GTGES

✧ **Device Information Report**

+RESP:GTINF

✧ **Report for Querying**

+RESP:GTGPS
+RESP:GTALM
+RESP:GTCID
+RESP:GTCSQ
+RESP:GTVER
+RESP:GTBAT
+RESP:GTTMZ
+RESP:GTALS

+RESP:GTGSV
+RESP:GTATI

✧ **Event Report**

+RESP:GTPNA
+RESP:GTPFA
+RESP:GTMPN
+RESP:GTMPF
+RESP:GTBTC
+RESP:GTSTC
+RESP:GTBPL
+RESP:GTSTT
+RESP:GTPDP
+RESP:GTVGN
+RESP:GTVGF
+RESP:GTIDN
+RESP:GTIDF
+RESP:GTGSM
+RESP:GTGSS
+RESP:GTCRA
+RESP:GTASC
+RESP:GTSTR
+RESP:GTSTP
+RESP:GTLSP
+RESP:GTRMD
+RESP:GTUPC
+RESP:GTEUC

✧ **Crash Data Packet**

+RESP:GTCRD

Heartbeat

+ACK:GTHBD
+SACK:GTHBD

✧ **Server Acknowledgement**

+SACK

✧ **Hex Format Report Message**

+ACK
+RSP
+EVT
+INF
+HBD

+ATI