SC350M @Track Air Interface Protocol

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

QSZTRACSC350MAN0106

Version: 1.06

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0. Revision History

Version	Date	Author	Description of Change
1.00	2023-04-18	Flame Zheng	Initial
1.01	2023-07-28	Liven Huang	1. Made the description of <Reserved> consistent. 2. Deleted <GNSS Fix Failure Timeout> in AT+GTGAM. 3. Modified the example of command AT+GTSIM, AT+GTPEO, AT+GTBZA and AT+GTTMA. 4. Deleted "3: Message for input triggered reboot" of <Report ID/Report Type> in +RESP:GTDOG. 5. Added the example of +RESP:GTERI. 6. Modified the example of +ACK:GTIGD. 7. Deleted note for +RESP:GTIGS. 8. Modified the example of +RESP:GTINF and +RESP:GTIDN. 9. Modified <*LED On*> description of command AT+GTCFG. 10. Modified <*Mask*> description of command AT+GTCFG. 11. Deleted <*Motion Status*> description of 1A|16|41|42. 12. Deleted Mode 3 of command AT+GTSIM.
	2023-08-07	Hickey Liao	1. Modified the description of <*Power Saving Mode*> in AT+GTCFG command.
	2023-11-27	Liven Huang	1. Modified description of command AT+GTRTO. 2. Modified <Min. Threshold> <Max. Threshold> range of values of command AT+GTEPS. 3. Modified the example of AT+GTIGD,+ACK:GTGEO,+ACK:GTPEO,+RESP:GTIGN ,+RESP:GTVGN,+RESP:GTVGF and +RESP:GTGSM.
1.02	2023-12-20	Liven Huang	Added AT+GTOUT command.
1.03	2024-01-16	Liven Huang	Added AT+GTTOW command.
1.04	2024-02-19	Liven Huang	1. Added AT+GTECU, AT+GTECM, AT+GTLIM and AT+GTASL commands. 2. Added sub command of 30-43 to AT+GTRTO. 3.Added +RESP:GTECU, +RESP:GTSTS, +RESP:GTBTN, +RESP:GTBTF, +RESP:GTBKN, +RESP:GTBKF, +RESP:GTLTN, +RESP:GTLTF, +RESP:GTEBC, +RESP:GTEBR, +RESP:GTELS, +RESP:GTEUS, +RESP:GTELF and +RESP:GTEUF.

1.05	2024-04-24	Liven Huang	1. Modified the maximum value of <Motion Duration> in AT+GTTOW to 100. 2. Added GSM deep saving mode to <Power Saving Mode> in AT+GTCFG command. 3. Added <Wakeup Hour Interval>, <Sensor Wakeup Debounce>, <Work Time per Wakeup> to AT+GTCFG command.
1.06	2024-08-13	Liven Huang	1. Modified the maximum value of <Current Packet> in **+RESP:GTALC** to 6. 2. Added <Tow Distance> to AT+GTTOW command. 3. Added <Report ID/Report Type> 01 in **+RESP:GTTOW** to indicate the device is in fake tow status and about to go into real tow status.

1. Overview

1.1. Scope of This Document

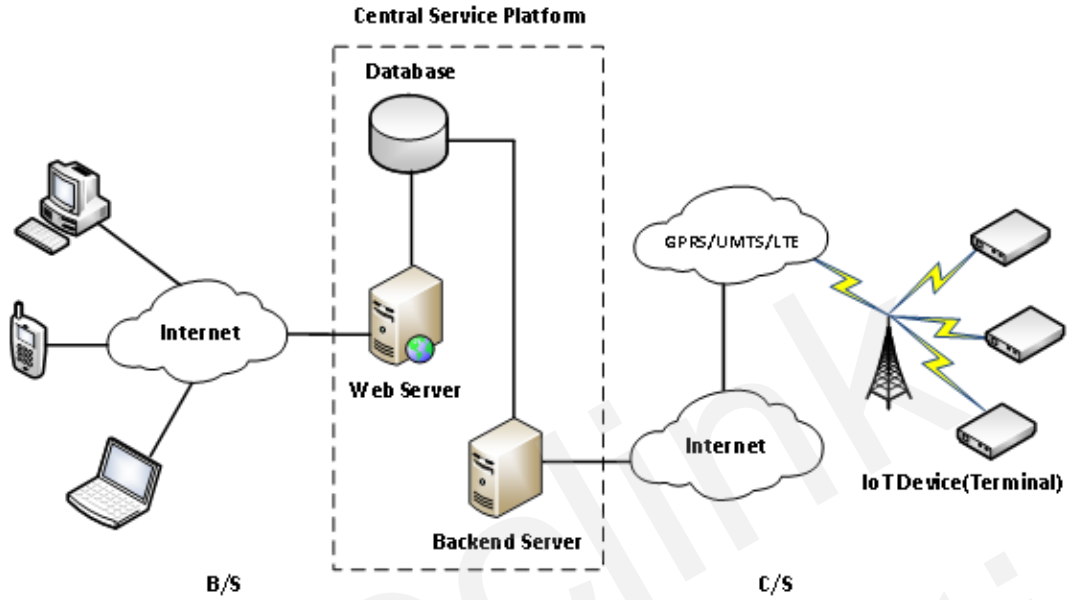
The @Track Air Interface Protocol is a digital communication interface based on printable ASCII characters over network, which is used for all communications between the backend server and the terminal. The backend server sends a command to the terminal and then the terminal confirms the receipt with 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 Name
ASCII	American National Standard Code for Information Interchange
GNSS	Global Navigation Satellite System
HDOP	Horizontal Dilution of Precision
ICCID	Integrated Circuit Card Identity
IP	Internet Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
UTC	Coordinated Universal Time

2. System Architecture



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

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

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 neighboring parameter characters. The parameter string may contain the following ASCII characters: '0'–'9', 'a'–'z', and 'A'–'Z'.
Detailed information of each message format is 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:

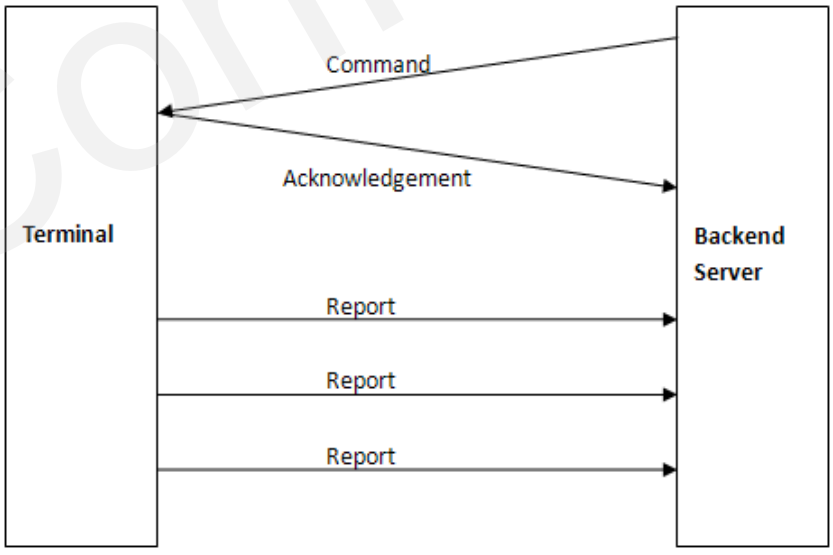


Figure 1: @Track Protocol Message Flow

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 parameters for EGPRS/LTE Cat-M1/LTE Cat-NB1 data connection.

➢ **AT+GTBSI=**

Example: **AT+GTBSI=sc350m,,,,,,,00,0,1,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Main APN	<=40	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '.'	
3	Main APN User Name	<=30		
4	Main APN Password	<=30		
5	Backup APN	<=40	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '.'	
6	Backup APN User Name	<=30		
7	Backup APN Password	<=30		
8	Network Mode/APN Authentication Methods	2	00--0x33	00
9	LTE Mode	1	0-5	0
10	Manual Netreg	1	0-1	1
11	Reserved	0		
12	Reserved	0		
13	Reserved	0		
14	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <*Password*>: The valid characters of password include '0'–9', 'a'–'z', 'A'–'Z'. The default value is "sc350m".

✧ <*Main APN*>: Main access point name.

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

current value of this parameter will be cleared.

- ✧ <*Main APN Password*>: The main APN Password. If the parameter field is empty, the current value of this parameter will be cleared.
- ✧ <*Backup APN*>: Backup access point name.
- ✧ <*Backup APN User Name*>: The backup APN user name. If the parameter field is empty, the current value of this parameter will be cleared.
- ✧ <*Backup APN Password*>: The backup APN Password. If the parameter field is empty, the current value of this parameter will be cleared.

Note:

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

  Mobile network modes of the device:
  - 0: Auto (LTE First & GSM).
  - 1: GSM only.
  - 2: LTE only.
  - 3: GSM first (LTE&GSM).

  Mobile APN authentication methods of the device:
  - 0: No authentication
  - 1: PAP authentication
  - 2: CHAP authentication
  - 3: PAP Or CHAP authentication
- ✧ <*LTE Mode*>: Select Cat-M1 and Cat-NB1 work mode.
  - 0: Cat-M1&Cat-NB1 (Cat-M1 first)
  - 1: Cat-M1&Cat-NB1 (Cat-NB1 first).
  - 2: Cat-M1.
  - 3: Cat-NB1.
  - 4: Cat-NB1 first (network search sequence: NB1, 2G, M1). It is valid when <*Network Mode*> is set to 0: Auto. (LTE &GSM).
  - 5: Cat-NB1 only (network search sequence: NB1, 2G). It is valid when <*Network Mode*> is set to 0: Auto. (LTE &GSM).

Note: When **"***Network Mode" is 0/2/3, "LTE Mode" is valid.*

The network search sequence list is shown as below:

Network Mode		**LTE Mode**		**Search Order**		
Mode	Detail	Mode	Detail	1	2	3
0	Auto	0	Cat-M1&Cat-NB1 (Cat-M1 first)	M1	2G	NB1
		1	Cat-M1&Cat-NB1 (Cat-NB1 first)	2G	NB1	M1
		2	Cat-M1	M1	2G	N/A
		3	Cat-NB1	2G	NB1	N/A
		4	Cat-NB1 First	NB1	2G	M1
		5	Cat-NB1 Only	NB1	2G	N/A
1	GSM Only	N/A	N/A	2G	N/A	N/A
2	LTE Only	0	Cat-M1&Cat-NB1 (Cat-M1 first)	M1	NB1	N/A
		1	Cat-M1&Cat-NB1 (Cat-NB1 first)	NB1	M1	N/A
		2	Cat-M1	M1	N/A	N/A

		3	Cat-NB1	NB1	N/A	N/A
3	GSM First	0	Cat-M1&Cat-NB1(Cat-M1 first)	2G	M1	NB1
		1	Cat-M1&Cat-NB1(Cat-NB1 first)	2G	NB1	M1
		2	Cat-M1	2G	M1	N/A
		3	Cat-NB1	2G	NB1	N/A

✧ <*Manual Netreg*>: Manually register the network selection.
- 0: Disable manually register the network.
- 1: Enable manually register the network.

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

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

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

➢ **+ACK:GTBSI,**

Example: **+ACK:GTBSI,BC0101,868446036548044,sc350m,0655,20210303062849,0CA7$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Protocol Version*>: The protocol version that the terminal conforms to. The first two characters represent the device type. As in the example, "**BC**" means sc350m. The middle two characters represent the major version number of the protocol and the last two characters represent the minor version number of the protocol. Both version numbers are hex digits. For example, "**0101**" means version 1.01.

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

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

✧ <*Serial Number*>: A serial number which is the same as the <*Serial Number*> in the corresponding command. It is used to distinguish which command the ACK message is for.

✧ <*Send Time*>: The local time to send the ACK message.

✧ <*Count Number*>: A self-increasing count number in each acknowledgment message and report message. It begins from 0000 and increases by 1 for each message. It recycles back after "FFFF".

✧ <*Tail Character*>: A character which indicates the end of the command. It must be '$'.

Note: Only after both the commands **AT+GTBSI** and **AT+GTSRI** are properly set can the ACK messages and other report messages be received by 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 communication method between the backend server and the terminal. When the terminal is configured correctly, it should be able to report data to the backend server.

➢ **AT+GTSRI=**

Example: **AT+GTSRI=sc350m,3,,1,218.17.46.11,80,,0,13836001234,0,0,1,0,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Report Mode	1	0|2|3|4|6|7	0
3	Reserved	0		
4	Buffer Mode	1	0|1|2	1
5	Main Server IP/ Domain Name	<=60		
6	Main Server Port	<=5	0 – 65535	
7	Backup Server IP/ Domain Name	<=60		
8	Backup Server Port	<=5	0 – 65535	
9	Reserved	0		
10	Heartbeat Interval	<=3	0|5 – 360min	0
11	SACK Enable	1	0|1|2	0
12	Reserved	0		
13	Reserved	0		
14	Reserved	0		
15	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <*Report Mode*>: This defines the communication method between the backend server and the terminal. Supported report modes are as follows:

- 0: Stop mode.
- 2: TCP short-connection 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. And if it 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 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 terminal.
- 4: UDP mode. The terminal will send data to the backend server through the UDP protocol. Receiving protocol commands via UDP is supported if the network allows it. It is recommended to enable heartbeat sending and **+RESP:GTPDP** report when receiving commands via UDP is the case.
- 6: UDP with fixed local port. Like the UDP mode, the terminal will send data using the 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 primary 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 connection to the main server is lost, it will try to connect to the backup server. If the connection to the backup server is also lost, it will try to connect to the main server again.

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

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

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

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

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

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

✧ <*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.

✧ <*Enable SACK*>: This defines whether the backend server should respond to the device with

a SACK message when it receives messages from the device.

- 0: The backend server does not reply with a SACK message after receiving a message from the device.
- 1: The backend server replies with a SACK message when receiving a message from the device.
- 2: The backend server replies with a SACK message when receiving a message from the device, but the device does not check the serial number of the SACK message. **Note:** If the device receives **+SACK:GTHBD** from the backend server, the device must check the serial number of the SACK message **+SACK:GTHBD** no matter what <*Enable SACK*> is.

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

➢ **+ACK:GTSRI,**

Example: **+ACK:GTSRI,BC0101,135790246811220,,0001,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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

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=sc350m,,sc350m,0,0,,,007F,1,00,00003FFF,,0,0,300,,,0,0,001F,0,,,,,,24,10,5,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**

1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	New Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	
3	Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	sc350m
4	Enable ODO	1	0|1	0
5	ODO Initial Mileage	<=9	0.0 – 4294967.0Km	0.0
6	Reserved	0		
7	Reserved	0		
8	Report Composition Mask	<=4	0 – FFFF	7F
9	Power Saving Mode	1	0 – 3	1
10	IGS Composition Mask	<=2	0 – FF	0
11	Event Mask	<=8	0 – FFFFFFFF	3FFF
12	Reserved	0		
13	LED On	1	0|1	0
14	Enable Info Report	1	0|1	0
15	Info Report Interval	<=5	30 – 86400sec	300
16	Reserved	0		
17	Reserved	0		
18	Backup Battery Charge Mode	1	0|1	0
19	AGPS Mode	1	0|1	0
20	GSM Report	<=4	00 – FFFF	1F
21	Duration of GNSS Signal Loss	2	0 – 30min	0
22	Reserved	0		
23	Reserved	0		
24	Reserved	0		
25	Reserved	0		
26	Reserved	0		
27	Wakeup Hour Interval	<=3	1-720	24
28	Sensor Wakeup Debounce	<=2	0-60(s)	10
29	Work Time per Wakeup	<=2	1-60	5

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

- <*New Password*>: It is set to change the current password.
- <*Device Name*>: An ASCII string which represents the name of the device.
- <*Enable ODO*>: Enable/disable the odo graph 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 a report message, especially the composition of GNSS information.
  - Bit 0 for <*Speed*>
  - Bit 1 for <*Azimuth*>
  - Bit 2 for <*Altitude*>
  - Bit 3 for Cell tower 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*>

  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 fixed report will follow <*IGF Report Interval*> when the engine is off. If <*Power Saving Mode*> is set to 1, the fixed report, geo-fence (**AT+GTGEO** and **AT+GTPEO**) report functions will be suspended when the device is at a standstill or the engine is off, but auto parking fence and manual parking fence will not be suspended. 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 <*IGF Report Interval*> in **AT+GTFRI** will be followed instead of the fix and send interval of the fixed report when the engine is off.
  - 0: Disable the power saving function.
  - 1: GPS deep saving mode.
  - 2: GPS low saving mode.
  - 3: GSM deep saving mode. When this mode is selected, the parameters <Wakeup Hour Interval>, <Sensor Wakeup Debounce> and <Work Time per Wakeup> will be valid. 5 minutes in stillness status after ignition off, the device will enter power saving mode with both the modem and GPS module turned off. After that, the device will wake up periodically as <Wakeup Hour Interval> and <Work Time per Wakeup> determines how long the device will work upon each wake-up, a **+RESP:GTFRI** (<Report ID/Report Type> is 60) will be sent out. Triggers such as

Movement, Inputs and Ignition can be used to wake up the device. The device will enter into sleep again once the triggers disappear.

✧ <*IGS Composition Mask*>: Bitwise mask to configure the composition of the **+RESP:GTIGS** message.

- Bit 0 for <*Duration of Ignition On*>
- Bit 1 for <*Ignition On Time*>
- Bit 2 for <*Ignition Off Time*>
- Bit 3 for Highest Speed Point data including <*GNSS Accuracy*>, <*Speed*>, <*Azimuth*>, <*Altitude*>, <*Longitude*>, <*Latitude*> and <*GNSS UTC Time*>

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 only for the **+RESP:GTIGS** message.

✧ <*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 5 for **+RESP:GTBPL**
- Bit 6 for **+RESP:GTBTC**
- Bit 7 for **+RESP:GTSTC**
- Bit 8 for **+RESP:GTSTT**
- Bit 10 for **+RESP:GTPDP**
- Bit 11 for the power on **+RESP:GTRTL**
- Bit 12 for the ignition report **+RESP:GTIGN**, **+RESP:GTIGF,** **+REPS:GTVGN** and **+RESP:GTVGF**
- Bit 13 for ignition on/off location report **+RESP:GTIGL** and **+RESP:GTVGL**
- Bit 17 for the statistical information report **+RESP:GTIGS**

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

✧ <*LED On*>: It is used to configure the working mode of LED.

- 0: Each time the device powers on, LED will work for 30 minutes and then turn off.
- 1: LED operates in its original working mode.

✧ <*Enable Info Report*>: Enable/disable the device information report (**+RESP:GTINF**). The device information includes state of the device, ICCID, cell signal strength, voltage of external power supply, battery voltage, charging status, Power and GNSS LED working mode, the last known time of GNSS fix, time zone information and daylight saving setting.

- 0: Disable the device information report function.
- 1: Enable the device information report function.

✧ <*Info Report Interval*>: The interval for reporting the device information.

✧ <*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 only charged

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 which indicates whether to enable AGPS. AGPS helps increase the chances of getting GNSS position successfully and reduces the time needed to get GNSS position.

- 0: Disable the AGPS function.
- 1: Enable the AGPS function.

✧ <*GSM Report*>: It controls how or when to report cell information..

The 2 high bits, Bit 14 – 15, represent GSM reporting mode.

- 0: Do not allow the cell information report.
- 1: Allow the cell information report in case of failure to get GNSS position if cell information is available.
- 2: Send the message **+RESP:GTGSM** after each successful GNSS fix if cell information is available.
- 3: Send the message **+RESP:GTGSM** regardless of whether getting GNSS position is successful or not 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 2 for **+RESP:GTFRI/+RESP:GTERI**
- Bit 4 for **+RESP:GTTOW**
- Bit 1,3,5–13 Reserved

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

✧ <*Duration of GNSS Signal Loss*>: A time parameter to monitor the GNSS signal. If there is no GNSS signal or no successful GNSS fix for consecutive <*Duration of GNSS Signal Loss*>, the device will send the event report **+RESP:GTGSS** to indicate the "GNSS signal lost". When the GNSS signal is recovered or a successful fix is obtained, 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 though it has reported **+RESP:GTGSS** to indicate "GNSS signal lost" before reboot.

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

➢ **+ACK:GTCFG,**

Example: **+ACK:GTCFG,BC0101,135790246811220,,0003,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	

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

3.2.2.2. Auto-unlock PIN

The command **AT+GTPIN** is used to configure the auto-unlock PIN function of the device. Some operators offer USIM card with PIN code protection by default. To make the device work with the PIN-protected USIM card, this command is used to configure the device to auto-unlock the USIM PIN with the pre-set PIN code.

➢ **AT+GTPIN=**

Example: **AT+GTPIN=sc350m,1,0000,,,,,,0014$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Enable Auto-unlock PIN	1	0|1	0
3	PIN	4 – 8	'0' – '9'	
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <*Enable Auto-unlock PIN*>: Set the field to 1 to enable the auto-unlock PIN function, and 0 to disable the function.

✧ <*PIN*>: The code used to unlock the USIM PIN.

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

➢ **+ACK:GTPIN,**

Example: **+ACK:GTPIN,BC0101,135790246811220,,0014,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

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

3.2.2.3. Binding SIM Card

The **AT+GTSIM** command is used to bind SIM card. If the current SIM card is replaced by another SIM card, it works according to the mode and trigger operation according to the value of <*Operation Mask*>.

➢ **AT+GTSIM =**

Example: **AT+GTSIM=sc350m,2,123456789012345678901,1,,,,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|1|2	0
3	ICCID	20		
4	Operation Mask	<=8	0-FFFFFFFF	0
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	$	$

✧ <*Mode*>: A numeral which indicates whether to bind SIM card.
- 0: Do not bind SIM card.
- 1: Bind the current SIM card.
- 2: Bind the specified SIM card by ICCID.

✧ <*ICCID*>: The ICCID of the SIM card to be bound.

✧ <*Operation Mask*>: Bitwise mask to configure which operation will be trigged while current SIM card is replaced by another SIM card.
- Bit 0: Unregister to the network.

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

➢ **+ACK:GTSIM,**

Example: **+ACK:GTSIM,BC0101,135790246811220,,0013,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.2.4. 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 status for a long time.

➢ **AT+GTDOG=**

Example: **AT+GTDOG=sc350m,1,,1,0130,,1,1,,60,60,,0013$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|1|2	0
3	Ignition Frequency	<=3	10 – 120 min	60

4	Interval	<=2	1 – 30 day	30
5	Time	4	HHMM	0200
6	Reserved	0		
7	Report Before Reboot	1	0|1	1
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

- <*Mode*>: The working mode of the watchdog function.
  - 0: Disable
  - 1: Auto reboot
  - 2: Ignition reboot
- <*Ignition Frequency*>: If the time interval between the current ignition on and last ignition-on reboot is greater than the specified value when the working mode is 2, the device will automatically reboot upon ignition on. The device will reboot automatically upon the second ignition-on used for the first time whatever the time interval between the first ignition on.
- <*Interval*>: The interval for rebooting the device. It is measured in days. First time reboot of the device will ignore this interval.
- <*Time*>: It specifies the time at which the reboot operation is performed when the <*Interval*> condition is met.
- <*Report Before Reboot*>: Whether to report the **+RESP:GTDOG** message before reboot. 0 means "Do not report the **+RESP:GTDOG** message before reboot", and 1 means "Report the **+RESP:GTDOG** message before reboot". If this parameter is enabled, the device will initiate a real-time fix before sending the message with the current location information.

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

- **+ACK:GTDOG,**

Example: **+ACK:GTDOG,BC0101,135790246811220,,0013,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	

Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.2.5. 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 settings. 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=sc350m,+,0,0,0,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Sign	1	+|–	+
3	Hour Offset	<=2	0 – 12	
4	Minute Offset	<=2	0 – 59	
5	Daylight Saving	1	0|1	
6	UTC Time	14	YYYYMMDDHHMMSS	
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character			

✧ <*Sign*>: It indicates positive or negative offset of the local time from UTC.
✧ <*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 is used to adjust for the local time.

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

➢ **+ACK:GTTMA,**

Example: **+ACK:GTTMA,BC0101,865284040842605,,0113,20220309095146,3D63$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.2.6. Outside Working Hours

To protect the privacy of the driver when he is off duty, the device can 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.

➢ **AT+GTOWH=**

Example: **AT+GTOWH=sc350m,3,1F,0900,1200,1300,1800,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|3	0
3	Day of Work	<=2	0 – 7F	1F
4	Working Hours Start1	4	HHMM	0900

5	Working Hours End1	4	HHMM	1200
6	Working Hours Start2	4	HHMM	1300
7	Working Hours End2	4	HHMM	1800
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <*Mode*>: The working mode of this function.
- 0: Disable this function.
- 3: Enable this function. The device will automatically check the current time against the working hours range. If it is outside the working hours, the location information will be hidden. Otherwise the location information will be sent 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,BC0101,135790246811220,,0012,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	

Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.2.7. Settings for Preserving Device's Specified Logic States

The command **AT+GTPDS** is used to preserve specified logic states of the device. This function works according to the <*Mode*> setting and the logic states to be saved are selected according to the value of <*Mask*>.

➢ **AT+GTPDS=**

Example: **AT+GTPDS=sc350m,1,1F,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|1|2	1
3	Mask	<=4	0000-7FF	7FF
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

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

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

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

Each bit represents a state.

- Bit 0: States of GEO
- Bit 1: Reserved
- Bit 2: Reserved
- Bit 3: Information of last known position
- Bit 4: State of ignition
- Bit 8: State of SSR
- Bit 9: State of main power
- Bit 10: State of PEO

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

➢ **+ACK:GTPDS,**

Example: **+ACK:GTPDS,BC0101,135790246811220,,000D,20160329093254,FFFF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.3. ECU Configuration

3.2.3.1. AT+GTECU: ECU Configuration

The **AT+GTECU** command is used to configure the ECU attribution.

➢ **AT+GTECU=**

Example: **AT+GTECU=sc350m,0,0,,,0,,0,,0,0,0,0,0,,0,,0,80,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	ECU Mode	<=1	0|1	0
3	ECU Type	<=1	0|2|3|6	0
4	Reserved	0		
5	Reserved	0		
6	ECU ON Control	<=1	0|4	0
7	Reserved	0		

8	ECU OFF Control	<=1	0|4	0
9	Reserved	0		
10	Battery ON Control	<=1	0|2|4|6	0
11	Relay Output Mode for Battery ON Control	<=3	0 - 600	0
12	Battery OFF Control	<=1	0|2|4|6	0
13	Relay Output Mode for Battery OFF Control	<=3	0 - 600	0
14	ECU Lock	<=1	0|1	0
15	Reserved	0		
16	Smart Lamp	<=1	0|1	0
17	Reserved	0		
18	External battery on when SC350M battery low	<=1	0-6	0
19	Delay to Check Battery Status	<=3	10 - 600	80
20	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <ECU Mode>: Enable or disable the ECU function. If it is disabled (set to 0), no matter what the <ECU Type> is, the UART works as debug serial port.

- 0: Disable ECU function.
- 1: Enable ECU function.

✧ <ECU Type>: Specify the ECU type.

- 0: None
- 2: Bosch (CAN-Bus)
- 3: Bafang (CAN-Bus)
- 6: Rhino2 (UART)

✧ <ECU ON Control>: Specify how the ECU ON status should be controlled.

- 0: None (ECU is switched on in another way, e.g. when the battery is switched on)
- 4: CAN Command

✧ <ECU OFF Control>: Specify how the ECU OFF status should be controlled.

- 0: None (ECU is switched off in another way, e.g. when the battery is switched off)
- 4: CAN Command

✧ <Battery ON Control>: Specify how the Battery ON status should be controlled.

- 0: None (Battery cannot be controlled through SC350M)
- 2: Relay 1 Pulse
- 4: CAN Command
- 6: Relay 2 Pulse

✧ <Relay Output Mode for Battery ON Control>: it specifies the function mode of the relay output status.

When the <Battery ON Control> is set to 2 or 6: Relay Pulse, it specifies the duration of the pulse. Unit: 100ms.

- x: In this mode, relay output is in low level status for <Relay Output Mode for Battery

ON Control> time and then goes back to high level status.

✧ <Battery OFF Control>: Specify how the Battery OFF status should be controlled.

- 0: None (Battery cannot be controlled through SC350M)
- 2: Relay 1 Pulse
- 4: CAN Command
- 6: Relay 2 Pulse

✧ <Relay Output Mode for Battery OFF Control>: it specifies the function mode of the relay output status.

When the <Battery OFF Control> is set to 2 or 6: Relay Pulse, it specifies the duration of the pulse. Unit: 100ms.

- x: In this mode, relay output is in low level status for <Relay Output Mode for Battery OFF Control> time and then goes back to high level status.

✧ <ECU Lock>: It specifies whether to use ECU Lock function. In case of Accell E-Motion, the relay is used for this function. If ECU Locking is supported over CAN, the CAN interface is used.

- 0: Disable the ECU Lock function.
- 1: Enable the ECU Lock function.

✧ <Smart Lamp>: It specifies whether to use smart lamp function. Based on support in the ECU, the smart lamps can be toggled over CAN or over the digital IO.

- 0: Disable the Smart Lamp function
- 1: Enable the Smart Lamp function.

✧ <External battery on when SC350M battery low>: It specifies whether to enable the function that external battery on automatically when SC350M battery low.

- 0: Disable.
- 1: External battery on, turn off it after SC350M battery fully charged.
- 2: External battery on, keep it on when SC350M battery fully charged.
- 3: Turn ECU on, turn off it after SC350M battery is fully charged.
- 4: Turn ECU on, keep it on when SC350M battery is fully charged.
- 5: Turn external battery & ECU on, turn off them after SC350M battery is fully charged.
- 6: Turn external battery & ECU on, keep them on when SC350M battery is fully charged.

✧ <Delay to Check Battery Status>: After executing the battery power-on/off command, waiting for the time specified by <Delay to Check Battery Status> before checking the battery status. Unit: 100ms.

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

➢ **+ACK:GTECU,**

Example: **+ACK:GTECU,BC0104,135790246811220,sc350m,000D,20160329093254,FFFF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	

Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.3.2. AT+GTECM: ECU Message

The **AT+GTECM** commands are used to configure the parameters for the messages of the bike's ECU.

➢ **AT+GTECM=**

Example: **AT+GTECM=sc350m,0,0,1FFFFFFFFFFFFF,1F,30,3600,30,3600,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1.	Password	4 – 7	'0' – '9', 'a' – 'z', 'A' – 'Z'	sc350m
2.	Group ID	1	0-4	0
3.	Mode	1	0|1	0
4.	Report Mask	<=32	0 - FFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFF	0
5.	Active Triggers Mask	2	00-7F	2B
6.	Backup Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
7.	Backup Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
8.	External Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
9.	External Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
10.	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <Group ID>: The ID of the ECU message mode. A total of 5 types (0 - 4) are supported.

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

- 0: Disable this function.
- 1: Enable this function.

✧ <Report Mask>: Bitwise report mask to configure the composition of +RESP:GTECU message.

Bit0 (0000000000000001): ECU Type

Bit1 (0000000000000002): ECU Lock State

Bit2 (0000000000000004): Reserved
Bit3 (0000000000000008): Bike Type
Bit4 (0000000000000010): Serial Number of the Bike
Bit5 (0000000000000020): Serial Number of the Bike Battery
Bit6 (0000000000000040): Bike Software Version
Bit7 (0000000000000080): Battery Software Version
Bit8 (0000000000000100): Controller Software Version
Bit9 (0000000000000200): Display Software Version
Bit10 (0000000000000400): Bike Status
Bit11 (0000000000000800): Reserved
Bit12 (0000000000001000): Odometer
Bit13 (0000000000002000): Bike Design Capacity
Bit14 (0000000000004000): Bike Full Charge Capacity (FCC) Raw
Bit15 (0000000000008000): Bike Full Charge Capacity (FCC) Percentage
Bit16 (0000000000010000): Bike Actual State of Charge (SOC) Raw
Bit17 (0000000000020000): Bike Actual State of Charge (SOC) Percentage
Bit18 (0000000000040000): Bike Range
Bit19 (0000000000080000): Bike Battery Temperature
Bit20 (0000000000100000): Bike Battery Charging Cycles
Bit21 (0000000000200000): Bike Battery Pack Voltage
Bit22 (0000000000400000): Nominal Pack Voltage
Bit23 (0000000000800000): Actual Current
Bit24 (0000000001000000): Bike Battery Cell Voltages
Bit25 (0000000002000000): Charging Interval
Bit26 (0000000004000000): Battery Error Code
Bit27 (0000000008000000): Battery State
Bit28 (0000000010000000): Electronics Temperature
Bit29 (0000000020000000): Wheel Diameter
Bit30 (0000000040000000): Motor Temperature
Bit31 (0000000080000000): Support Mode
Bit32 (0000000100000000): Light Status
Bit33 (0000000200000000): Motor Error Code
Bit34 (0000000400000000): Bike Wheel Speed
Bit35 (0000000800000000): Pedal Cadence
Bit36 (0000001000000000): Actual Motor Torque
Bit37 (0000002000000000): Maximum Motor Torque
Bit38 (0000004000000000): Motor Power
Bit39 (0000008000000000): Pedal Power
Bit40 (0000010000000000): Bike Speed
Bit41 (0000020000000000): Pedal Torque
Bit42 (0000040000000000): Reserved
Bit43 (0000080000000000): Reserved
Bit44 (0000100000000000): Reserved
Bit45 (0000200000000000): Reserved

Bit46 (0000400000000000): Controller Serial Number
Bit47 (0000800000000000): Display Serial Number
Bit48 (0001000000000000): DC-DC Serial Number
Bit49 (0002000000000000): DC-DC Software Version
Bit50 (0004000000000000): POD Serial Number
Bit51 (0008000000000000): POD Software Version
Bit52 (0010000000000000): Last Recharge Date
Bit53 (0020000000000000): MOSFET Temperature U/V/W
Bit54 (0040000000000000): Riding Mode
Bit55 (0080000000000000): Daylight Status
Bit56 (0100000000000000): Controller ODO Meter
Bit57 (0200000000000000): Walk Assist Status
Bit58 (0400000000000000): Trip Counter
Bit59 (0800000000000000): Charger Connected
Bit60 (1000000000000000): Speed Limit
Bit61 (2000000000000000): Park Brake Status
Bit62 (4000000000000000): Pin TH4 Level
Bit63 (8000000000000000): Pin TH6 Level
Bit64 (00000000000000010000000000000000): Pin TH12 Level
Bit65 (00000000000000020000000000000000): Pin TH14 Level
Bit66 (00000000000000040000000000000000): Controller Current Rating
Bit67 (00000000000000080000000000000000): Time Powered up
Bit68 (00000000000000100000000000000000): Power up Count
Bit69 (00000000000000200000000000000000): Time Driving
Bit70 (00000000000000400000000000000000): Drive Count
Bit71 (00000000000000800000000000000000): Deep Discharge Count
Bit72 (00000000000001000000000000000000): Overcharge Count
Bit73 (00000000000002000000000000000000): Condition Code
Bit74 (00000000000004000000000000000000): Active Flash Code
Bit75 (00000000000008000000000000000000): Ambient Temperature
Bit76 (00000000000010000000000000000000): Reserved
Bit77 (00000000000020000000000000000000): Reserved
Bit78 (00000000000040000000000000000000): Reserved
Bit79 (00000000000080000000000000000000): Reserved
Bit80 (00000000001000000000000000000000): Reserved
Bit81 (00000000002000000000000000000000): Reserved
Bit82 (00000000004000000000000000000000): Reserved
Bit83 (00000000008000000000000000000000): Reserved
Bit84 (00000000010000000000000000000000): Reserved

✧ <Active Triggers Mask>: It is used to configure the active triggers which should be used to set the device send speed. If the bit is set to 1, the corresponding activity function will be enabled. Otherwise, it will be disabled. Following is the matching between the bit and the active trigger.

Bit 0 (01): Active when external power supply connected

Bit 1 (02): Active when movement detected
Bit 2 (04): Reserved
Bit 3 (08): Active by ACC on
Bit 4 (10): Reserved
Bit 5 (20): Active when external battery is charging
Bit 6 (40): Active when ECU status is ON

- ✧ <Backup Battery Active Send Interval>: The period to send the ECU information when the device has no external power and is active. The value range is 0 – 604800 and the unit is second.
- ✧ <Backup Battery Inactive Send Interval>: The time interval to send the ECU information when the device has no external power and is inactive. The value range is 0 – 604800 and the unit is second.
- ✧ <External Battery Active Send Interval>: The period to send the ECU information when the device has external power and is active. The value range is 0 – 604800 and the unit is second.
- ✧ <External Battery Inactive Send Interval>: The time interval to send the ECU information when the device has external power and is inactive. The value range is 0 – 604800 and the unit is second.

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

➢ **+ACK:GTECM,**

Example: **+ACK:GTECM,BC0104,135790246811220,sc350m,0,000D,20160329093254,FFFF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Group ID	1	0-4	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.3.3. AT+GTLIM: Set Max Speed and/or Max Assist Level

The **AT+GTLIM** configuration command is used to set a limit on the maximum speed the motor controller supports and/or the maximum assist level that can be set in the motor controller. The availability of these features depends on the support by the ECU type.

➢ **AT+GTLIM=**

Example: **AT+GTLIM=sc350m,0,0,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9', 'a' – 'z', 'A' – 'Z'	sc350m
2	Max Speed	<=2	0 - 99	0
3	Max Assist Level	<=2	0 - 20	0
4	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <Max Speed>: The maximum speed to which the motor should provide support.

- 0: Do not override the maximum speed of the motor.
- 1 - 99: The maximum speed to which the motor should provide support.

✧ <Max Assist Level>: The maximum assist level that can be chosen by the user.

- 0: Do not override the maximum assist level.
- 1 - 20: The maximum assist level the motor should provide.

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

➢ **+ACK:GTLIM,**

Example: **+ACK:GTLIM,BC0104,135790246811220,sc350m,000D,20160329093254,FFFF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.3.4. AT+GTASL: Set Default Assist Level

The **AT+GTASL** configuration command is used to set a default assist level during movement. The default level can be enforced, locking down the motor's assist level and not allowing the user to change it.

➢ **AT+GTASL=**

Example: **AT+GTASL=sc350m,0,0,0,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**

1	Password	4 – 7	'0' – '9', 'a' – 'z', 'A' – 'Z'	sc350m
2	Mode	1	0|1	0
3	Enforce	<=1	0|1	0
4	Default Assist Level	<=2	0 - 20	0
5	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <Mode>:

- 0: Enable. SC350M will set the default assist level to bike.
- 1: Disable. SC350M will not set an assist level.

✧ <Enforce>: If enforce is enabled, the SC350M will always set the Assist Level to this level, overriding any changes made by the user.

- 0: Do not enforce, allow it to be changed by the user.
- 1: Enforce assist level and change it back to <Default Assist Level>.

✧ <Default Assist Level>: The level to which the assist level of the motor should be set.

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

➢ **+ACK:GTASL,**

Example:
+ACK:GTASL,BC0104,135790246811220,sc350m,000D,20160329093254,FFFF$

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

3.2.4. Position Related Report

3.2.4.1. Fixed Report Information

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

➢ **AT+GTFRI=**

Example:
AT+GTFRI=sc350m,0,,,,,,,,,,,,,,,0009$
AT+GTFRI=sc350m,1,1,,1,1000,2300,,30,,,,,600,,,,,0009$

AT+GTFRI=sc350m,3,1,,1,1000,2300,,,,1000,,,,,,,,0009$ AT+GTFRI=sc350m,5,1,,,,,,30,,1000,,,600,00000000,,,,FFFF$				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0 – 5	0
3	Discard No Fix	1	0|1	1
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	IGN Report Interval	<=5	5 – 86400sec	30
10	Reserved	0		
11	Mileage	<=5	50 – 65535m	1000
12	Reserved	0		
13	Reserved	0		
14	IGF Report Interval	<=5	0|5-86400sec	600
15	ERI Mask	8	00000000-FFFFFFFF	00000000
16	Reserved	0		
17	Reserved	0		
18	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*>.
- 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*>. It is necessary to connect the ignition signal to the device or enable virtual ignition detection for this mode.
- 5: Fixed Time or Mileage Report. The device checks either time interval or path

length between two adjacent reports. Device position will be reported if the calculated time interval between current time and time of last report is greater than <*Send Interval*>, or the length of path between the current position and the last position is greater than <*Mileage*>. It is necessary to connect the ignition signal to the device or enable virtual ignition detection for this mode.

Note: If the engine is off, the position report message is sent to the backend server periodically according to the parameter <*IGF Report Interval*>.

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

✧ <*IGN Report Interval*>: Period to send the position information. The value range is 5 – 86400 and the unit is second.

✧ <*Mileage*>: The specified length for sending the position information when <*Mode*> is 3, 4 and 5. Unit: meter.

✧ <*IGF Report Interval*>: If vehicle ignition is off, no matter which report mode it is, even if <*Power Saving Mode*> is set to "GPS low saving mode" in **AT+GTCFG**, the **+RESP:GTFRI** report is sent to the server using the time interval of <*IGF Report Interval*>. The range is 0|5 – 86400 and the unit is second.

✧ <*ERI Mask*>: This mask is used to configure whether to report the data from peripherals via **+RESP:GTERI**. When the serial port is connected with peripherals, and the bit for this peripheral is set to 1, the device will report **+RESP:GTERI** instead of **+RESP:GTFRI**.
- Bit 7 for on-board temperature.
- Bit 8 for Bike Status
- Bit 9 for ECU Lock State
- Bit 15 for the <*RAT and Band Data*> field in **+RESP:GTERI.** RAT means Radio Access Technology.

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

➢ **+ACK:GTFRI,**

Example: **+ACK:GTFRI,BC0101,135790246811220,,0009,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5. Alarm Settings

3.2.5.1. Geo-Fence Information

The command **AT+GTGEO** is used to configure the parameters of Geo-Fence. (Geo-Fence is a virtual perimeter around a geographic area using a location-based service. When the geo fencing terminal enters or exits the area, a notification is generated. The notification contains information of the location of the terminal and will be sent to the backend server according to the <*Mode*> setting.)

➢ **AT+GTGEO=**

Example: **AT+GTGEO=sc350m,0,3,121.412248,31.187891,1000,600,1,1,0,0,0,0,,,000A$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	GEO ID	<=2	0 – 19	
3	Mode	1	0 – 3	0
4	Longitude	<=11	-180 - 180	
5	Latitude	<=10	-90 - 90	
6	Radius	<=7	50 – 6000000m	50
7	Check Interval	<=5	0|5 – 86400sec	0
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Trigger Mode	<=2	0|21|22	0
13	Trigger Report	1	0|1	0
14	State Mode	1	0|1	0
15	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <*GEO ID*>: The ID of the Geo-Fence. A total of 50 zones (0 - 49) are supported.

✧ <*Mode*>: The working mode of the device reporting the Geo-fence message **+RESP:GTGIN** or

+RESP:GTGOT to the backend server.

- 0: Disable the zone's circular Geo-fence function.
- 1: Entering the zone. Device will send report **+RESP:GTGIN** to the server when it detects that vehicle enters the Geo-fence area.
- 2: Exiting the zone. Device will send report **+RESP:GTGOT** to the server when it detects that vehicle exits the Geo-fence area.
- 3: Report the **+RESP:GTGIN** and **+RESP:GTGOT** when entering and exiting the Geo-fence zone respectively.

✧ <*Longitude*>: The longitude of a point which is defined as the center of the circular region for Geo-Fence. 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 region for Geo-Fence. 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 of GNSS checking position information against the Geo-Fence alarm.

✧ <*Trigger Mode*>: A numeral which indicates the trigger mode of the geofencing function.

- 0: Disable auto trigger mode.
- 21: Auto parking fence (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. It will only send the alarm report when exiting the Geo-Fence zone. The Geo-Fence will be canceled after the device exits the zone.
- 22: Manual parking fence (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. It will only send the alarm report when exiting the Geo-Fence zone. When the device exits this Geo-Fence, it will cancel this 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*>: Enable/disable the **+RESP:GTGES** report when the specified trigger mode is activated and when the Geo-Fence is canceled.

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

✧ <*State Mode*>: A numeral to indicate the mode of reporting GEO state.

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

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

➢ **+ACK:GTGEO,**

Example: **+ACK:GTGEO,BC0101,865284040837449,sc350m,0,0091,20231017082615,01E1$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
GEO ID	<=2	0 – 19	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.2. Polygon Geo-Fence

The command **AT+GTPEO** is used to configure the parameters of Polygon Geo-Fence. (Geo-Fence is a virtual perimeter around a geographic area using a location-based service. When the geo-fencing terminal enters or exits the area, a notification is generated. The notification contains information of the location of the terminal and will be sent to the backend server according to the <*Mode*> setting.)

- **AT+GTPEO=**

Example: **AT+GTPEO=sc350m,0,3,1,3,121.412240,31.187801,121.412248,31.187891,121.412258,31.187991,600,,,,,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	PEO ID	<=2	0 – 19	0
3	Mode	1	0 – 3	0
4	Start Point	<=2	1-8	1
5	End Point	<=2	3-10	3
5+2N-1	Longitude	<=11	-180 - 180	
5+2N	Latitude	<=10	-90 - 90	
6+2N	Check Interval	<=5	0|5 – 86400sec	0

7+2N	Reserved	0		
8+2N	Reserved	0		
9+2N	Reserved	0		
10+2N	Reserved	0		
11+2N	Reserved	0		
12+2N	Reserved	0		
13+2N	Reserved	0		
14+2N	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

- <*PEO ID*>: The ID of the Peo-Fence. A total of 20 zones (0 – 19) are supported.
- <*Mode*>: The working mode for the polygon Geo-Fence to report message to the backend server.
  - 0: Disable the zone's Geo-Fence function.
  - 1: Entering the zone. The **+RESP:GTGIN** report will be generated only when the terminal enters the Geo-Fence.
  - 2: Exiting the zone. The **+RESP:GTGOT** report will be generated only when the terminal exits from the Geo-Fence.
  - 3: Report message upon both entering and exiting the zone.
- <*Start Point*>: The start point of the polygon GEO-Fence of a set of points.
- <*End Point*>: The end point of the polygon GEO-Fence of a set of points.
- <*Longitude*>: The longitude of a point which is defined as the endpoint of the polygon 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 endpoint of the polygon 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 "+".

  Note: If more sets of <*Longitude*> and <*Latitude*> are needed, please adjust <*Start Point*> and <*End Point*> for appropriate setup. If some <*Longitude*> and <*Latitude*> are empty, then the corresponding vertex will be deleted. For example, to delete the 4th, 5th and 6th vertex of a polygon Geo-Fence, please set <*Start Point*> to 4 and set <*End Point*> to 6 and keep the three groups of <*Longitude*> and <*Latitude*> empty.
- <*Check Interval*>: The interval of GNSS checking position information against the polygon Geo-Fence alarm.

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

- **+ACK:GTPEO,**

Example: **+ACK:GTPEO,BC0101,865284040837449,sc350m,0,0125,20231017082908,01F6$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
PEO ID	1	0 – 19	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.3. Overspeed Alarm

This command is used to set the speed thresholds and bind one alarm type with each speed threshold for the buzzer alarm. If the current speed meets one of the thresholds, the buzzer will make a sound corresponding to the alarm type.

- **AT+GTSPA**

Example: **AT+GTSPA=sc350m,1,20,,2,1,,,40,,2,2,,,60,,2,3,,,80,,2,4,,,,,,,,000C$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|1|2	0
3	Speed Threshold 1	<=3	0 – 400km/h	50
4	Reserved	0		
5	Validity	<=4	0 – 3600sec	60
6	Alarm Type	1	0|1 – 4	0
7	Reserved	0		
8	Reserved	0		
9	Speed Threshold 2	<=3	0 – 400km/h	70
10	Reserved	0		

11	Validity	<=4	0 – 3600sec	60
12	Alarm Type	1	0|1 – 4	0
13	Reserved	0		
14	Reserved	0		
15	Speed Threshold 3	<=3	0 – 400km/h	90
16	Reserved	0		
17	Validity	<=4	0 – 3600sec	60
18	Alarm Type	1	0|1 – 4	0
19	Reserved	0		
20	Reserved	0		
21	Speed Threshold 4	<=3	0 – 400km/h	110
22	Reserved	0		
23	Validity	<=4	0 – 3600sec	60
24	Alarm Type	1	0|1 – 4	0
25	Reserved	0		
26	Reserved	0		
27	Reserved	0		
28	Reserved	0		
29	Reserved	0		
30	Reserved	0		
31	Reserved	0		
32	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

- ✧ <*Mode*>: The working mode of overspeed alarm.
  - 0: Disable this function.
  - 1: Strict standard mode. In this mode, the device will check the speed and trigger the buzzer alarm during speedup or slowdown.
  - 2: Warning mode. In this mode, the device will only check the speed and trigger the buzzer alarm during speedup.
- ✧ <*Speed Threshold*>: The minimum speed to trigger the buzzer alarm.
- ✧ <*Validity*>: If the speed meets the alarm condition and is maintained for a period of time

longer than the time specified by <*Validity*>, the buzzer alarm will be triggered.

✧ <*Alarm Type*>: The alarm type for each speed threshold. 0 means “No buzzer alarm”.

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

➢ **+ACK:GTSPA,**

Example: **+ACK:GTSPA,BC0101,135790246811220,,000D,20160329093254,FFFF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{‘A’ – ‘Z’, ‘0’ – ‘9’}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.4. Buzzer Alarm

This command is used to set the buzzer alarm. There are four kinds of alarm. Each kind outputs a different sound. Before using these alarms, configure the output ID connected to the buzzer and enable it. The following event, over speed, can trigger the buzzer alarm defined by this command. Please refer to the command **AT+GTSPA** for details.

➢ **AT+GTBZA=**

Example: **AT+GTBZA=sc350m,2,,,,1,2,10,,,0,6,10,,,0,10,10,,,0,20,10,,,,,,,,0000$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv350m
2	Output ID	1	0 - 2	0
3	Reserved	0		
4	Reserved	0		
5	Reserved	0		
6	Alarm 1 Output Status	1	0 - 1	
7	Duration	<=3	0 – 255 (×100ms)	0

8	Toggle Times	<=3	0 – 255	0
9	Reserved	0		
10	Reserved	0		
11	Alarm 2 Output Status	1	0 - 1	
12	Duration	<=3	0 – 255 (×100ms)	0
13	Toggle Times	<=3	0 – 255	0
14	Reserved	0		
15	Reserved	0		
16	Alarm 3 Output Status	1	0 - 1	
17	Duration	<=3	0 – 255 (×100ms)	0
18	Toggle Times	<=3	0 – 255	0
19	Reserved	0		
20	Reserved	0		
21	Alarm 4 Output Status	1	0 - 1	
22	Duration	<=3	0 – 255 (×100ms)	0
23	Toggle Times	<=3	0 – 255	0
24	Reserved	0		
25	Reserved	0		
26	Reserved	0		
27	Reserved	0		
28	Reserved	0		
29	Reserved	0		
30	Reserved	0		
31	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <Output ID>: The output port which connects to the buzzer.

The acknowledgment report of the **AT+GTBZA** command:

➢ **+ACK:GTBZA,**

Example:

+ACK:GTBZA,F1030A,868446036599153,gv350m,0848,20190823174524,1422$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.5. Excessive Idling Detection

The command **AT+GTIDL** is used to detect the engine excessive idling (Vehicle stays stationary while the ignition is on). To use this command, the ignition signal must be connected to the device or enable virtual ignition detection. The device will report the event message **+RESP:GTIDN** to the backend server according to the <*Mode*> setting when it detects that the vehicle is entering into idle status. It will, according to the <*Mode*> setting, report the event message **+RESP:GTIDF** to the backend server when the vehicle leaves idle status.

- **AT+GTIDL=**

Example: AT+GTIDL=sc350m,1,2,1,,,,,1,1,0,0,,,,,000F$				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|1	0
3	Idling Detection Time	2	1 – 30 min	2
4	Idling End Time	1	1 – 5 min	1
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	Debounce Option	1	0 - 1	0
14	Reserved	0		
15	Reserved	0		
16	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.
- ✧ <*Idling Detection Time*>: If the vehicle is detected to be static with ignition on for this time long, it is considered to be in idling state.
- ✧ <<*Idling End Time*>: After the vehicle goes into idling state, if it moves again or ignition is off and hold that state for the time specified by <Idling End Time>, the vehicle is considered to exit idling state.
- ✧ <*Debounce Option*>: Specify required debouncing time to exit idle state after ignition off. 0 means needing no debounce. 1 means needing to debounce <Idling End Time>.

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

➢ **+ACK:GTIDL,**

Example: **+ACK:GTIDL,BC0101,135790246811220,,000F,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.6. Start/Stop Report

The command **AT+GTSSR** is used to detect the status of a vehicle (Start or Stop status). When the vehicle entering into Start status is detected, the device can report the event message **+RESP:GTSTR** to the backend server. When the vehicle leaves 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=sc350m,1,2,1,5,0,,,,000F$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|1	0
3	Time to Stop	<=4	(0 – 30 min)| (0 – 1800 sec)	2 min
4	Time to Start	<=3	(0 – 5 min) | (0 – 300 sec)	1 min
5	Start Speed	<=2	1 – 10 Km/h	5
6	Long Stop	<=5	0 – 43200 min	0
7	Time Unit	1	0|1	0
8	Reserved	0		
9	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 becomes motionless and stays in that status for the length of time specified by this parameter after it enters into Start status, the vehicle 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. When the built-in motion sensor detects the device is moving with ignition on, the device will start to check the speed from GNSS. If the device speed is maintained at a level higher 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 at a level lower than or equal to <*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 error lasts more than 1 minute, the built-in motion sensor is used to detect the Start/Stop status only and the speed is not checked.

✧ <*Long Stop*>: After the vehicle enters into Stop status and stays in the Stop state for the length 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,BC0101,135790246811220,,000F,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.7. Roaming Detection Configuration

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

➢ **AT+GTRMD=**

Example: **AT+GTRMD=sc350m,0,,,,,1,2,46000F,46002F,,,1,1,,,,2,2,,,,1f,,,1f,,,,,0,0,0,0,,,0001$** **AT+GTRMD=sc350m,1,,,,,1,3,46000,46002,46003,,,2,2,46007,,,1,1,46001,,,3fff,,,2ff,,,,,0,0,0,0,,,,0002$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0/1	0
3	Reserved	0		
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Home Operator Start	<=2	1-10	1

8	Home Operator End	<=2	1-10	1
9	Home Operator List	<=6*10		
10	Reserved	0		
11	Reserved	0		
12	Roaming Operator Start	<=3	1-100	1
13	Roaming Operator End	<=3	1-100	1
14	Roaming Operator List	<=6*100		
15	Reserved	0		
16	Reserved	0		
17	Black Operator Start	<=2	1-20	1
18	Black Operator End	<=2	1-20	1
19	Black Operator List	<=6*20		
20	Reserved	0		
21	Reserved	0		
22	Known Roaming Event Mask	<=6	000000 – FFFFFF	27DEF
23	Reserved	0		
24	Reserved	0		
25	Unknown Roaming Event Mask	<=6	000000 – FFFFFF	27DEF
26	Reserved	0		
27	Reserved	0		
28	Reserved	0		
29	Reserved	0		
30	Reserved	0		
31	Reserved	0		
32	Reserved	0		
33	Reserved	0		
34	Reserved	0		
35	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 which indicates 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.
- <*Operator End*>: A numeral which indicates 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.
- <*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 the mobile network operators all across China.
- <*Roaming Operator List*>: It is mostly like the <*Home Operator List*>, and the difference is that the operators in this list will be considered to be in "Known Roaming" state.
- <*Black List Operator*>: It is mostly like the <*Home Operator List*>, and the difference is that the operators in this list will be considered to be in "Blocking Report" state. In this state, the device works normally, but all reports except high priority reports will be buffered instead of being sent.

  Note: High priority reports include +RESP:GTUPD/+RESP:GTUPC/+ACK:GTx/reports for Real Time Querying.

  Operators that are not in <*Home Operator List*>, <*Roaming Operator List*> or <*Black List Operator*> will be considered to be in "Unknown Roaming" state.

  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 operator 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.
- <*Known Roaming Event Mask*>: Bitwise mask to configure which event report should be sent to the backend server when roaming state is detected. If the roaming state is "Known Roaming", the <*Known Roaming Event Mask*> parameter will be valid; otherwise, 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 ignition report **+RESP:GTIGN**, **+RESP:GTIGF,** **+RESP:GTVGN** and **+RESP:GTVGF**
- Bit 13 for the ignition on location report **+RESP:GTIGL** and **+RESP:GTVGL**
- Bit 17 for the statistical information report **+RESP:GTIGS**
- 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*>.

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

➢ **+ACK:GTRMD,**

Example: **+ACK:GTRMD,BC0101,135790246811220,,0000,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=10	'0' – '9' 'a' – 'z' 'A' – 'Z'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

Note: An AT command string which has no more than 100 fields can be accepted by the device.

3.2.5.8. 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 meets 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, please switch on the internal backup battery in case the voltage of the external power supply drops to a very low level.

➢ **AT+GTEPS=**

Example: **AT+GTEPS=sc350m,2,250,12000,3,2,1,1,0,0,1,,,,0007$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Mode	1	0|1|2	0
3	Min. Threshold	<=5	250 – 60000 mV	250
4	Max. Threshold	<=5	250 – 60000 mV	250
5	Reserved	0		
6	Debounce Time	1	0 – 5 (×10s)	0
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Sync with FRI	1	0|1	0
12	Voltage Margin Error	<=3	0 – 100(×10mv)	0
13	Reserved	0		
14	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

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

- 0: Disable external power supply monitoring.
- 1: Enable external power supply monitoring. 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. 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 voltage of the external power supply to trigger the alarm.

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

- <*Debounce Time*>: The debounce time to avoid excessive voltage drop of the external power supply.
- <*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 with the fixed report message.
  - 1: Report external power supply voltage with the fixed report message.
- <*Voltage Margin Error*>: This parameter will be used together with <*Min. Threshold*> and <*Max. Threshold*> parameters. It indicates the voltage margin error of the <*Min. Threshold*> and the <*Max. Threshold*>. If the current voltage detected falls within the range of the <*Voltage Margin Error*> of the <*Min. Threshold*> or <*Voltage Margin Error*> of the <*Max. Threshold*>, then the voltage value will not trigger **+RESP:GTEPS** alarm report. For example, if <*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 trigger **+RESP:GTEPS** alarm report when the current voltage meets the condition (5900mv < current voltage < 6100mv) or (11900mv < current voltage < 12100mv). The parameter improves the performance of the **+RESP:GTEPS** alarm report.

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

- **+ACK:GTEPS,**

Example: **+ACK:GTEPS,BC0101,135790246811220,,0007,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.5.9. Tow Alarm

The **AT+GTTOW** command is used to configure the motion sensor and the parameters for tow alarm. If the ignition state can't be known by hard-wired line, this function is invalid.

- **AT+GTTOW=**

Example: **AT+GTTOW=sc350m,1,,1,300,,,,,2,3,3,,,,,,,,,FFFF$**

SN	Parameter	Length (Byte)	Range/Format	Default
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv350m
2	Tow Enable	1	0/1	0
3	Reserved	0		
4	Fake Tow Delay	<=2	0 – 10 min	1
5	Report Interval	<=5	30 – 86400 sec	300
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Rest Duration	<=3	1 – 255 (×15sec)	2
11	Motion Duration	<=2	1 – 100 (×100ms)	3
12	Motion Threshold	1	2 – 4	3
13	Tow Distance	<=4	50-1000m	600
14	Reserved	0		
15	Reserved	0		
16	Reserved	0		
17	Reserved	0		
18	Reserved	0		
19	Reserved	0		
20	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <Tow Enable>: Enable or disable tow alarm (**+RESP:GTTOW**).

- 0: Disable the tow alarm
- 1: Enable the tow alarm

✧ <Fake Tow Delay>: After ignition off and vehicle has entered into static state, if device detects that vehicle is moved but the duration is no more than the threshold of <Fake Tow Delay>, this action will be regarded as fake car-towing. If the moving lasts longer than the threshold of <Tow Detection Time>, this action will be regarded as car-towing, and +RESP:GTTOW report will be sent to the backend server.

✧ <Report Interval>: The period to send tow alarm report.

✧ <Tow Distance>: If the distance between the current fix and the ACC off fix is greater than

this distance, it enters tow state. Unit is meter.

The acknowledgment report of **AT+GTTOW** command:

- **+ACK:GTTOW,**

Example: **+ACK:GTTOW,BC0103,865284040837449,sc350m,FFFF,20240119100225,05DA$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.6. IO Application

3.2.6.1. Digital Output Port Setting

The **AT+GTOUT** command is used to output specified wave shape from digital output ports. A total of four wave shapes are supported as shown below. If set to wave shape 1, the device will still output this wave shape at the specified output port after power reset.
The digital output 1 is a latched output. The final status of the output will be latched during power off. It only supports wave shape 1.

If a specified output port is set to wave shape 4, then the port will output square wave. When the main power is turned off, the port will stop outputting the wave. If the main power is turned on again, the port will start to output the wave again. If the device is rebooted, the port will still output the wave.

Wave Shape 1:

- ✓ <*Duration*> = 0ms, <*Toggle Times*> = 0

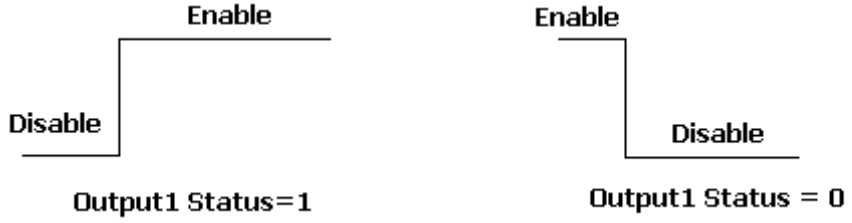


Figure 2: Wave Shape 1

Wave Shape 2:

✓ <*Duration*> = 500ms, <*Toggle Times*> = 1

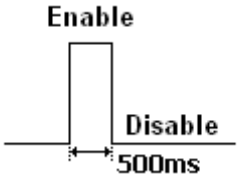


Figure 3: **Wave Shape 2**

Wave Shape 3:

✓ <*Duration*> = 800ms, <*Toggle Times*> = 3

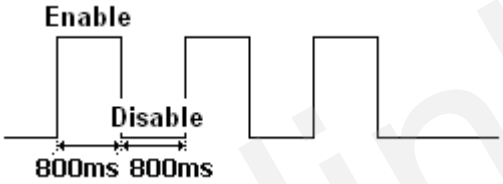


Figure 4: Wave Shape 3

Wave Shape 4:

✓ <*Duration*> = 800ms, <*Toggle Times*> = 0

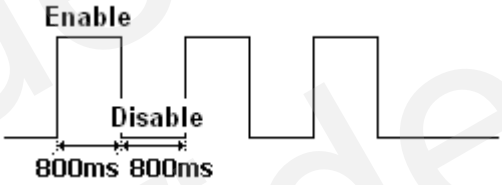


Figure 5: Wave Shape 4

➢ **AT+GTOUT=**

Example: **AT+GTOUT=sc350m,1,0,0,1,0,0,,,,,,,,,,0004$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	gv75m
2	Output1 Status	1	0 – 1	0
3	Duration1	<=3	0 – 255(×100ms)	0
4	Toggle Times1	<=3	0 – 255	0
5	Output2 Status	1	0 – 1	0
6	Duration2	<=3	0 – 255(×100ms)	0
7	Toggle Times2	<=3	0 – 255	0

8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
12	Reserved	0		
13	Reserved	0		
14	Reserved	0		
15	Reserved	0		
16	Reserved	0		
17	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

- ✧ <*Output1–2 Status*>: Valid only for the wave shape 1 as shown in **Figure 2**, it is used to set the final status of the output port.
  - 0: Disable status.
  - 1: Enable status.
- ✧ <*Duration1-2*>: Please refer to Figure 3, Figure 4 and Figure 5. The unit is 100ms.
- ✧ <*Toggle Times1-2*>: Please refer to Figure 3, Figure 4 and Figure 5. If the <*Duration1-2*> is set to 0, the <*Toggle Times1-2*> must be set to 0 rather than other values; otherwise the command will be invalid.

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

- ➢ **+ACK:GTOUT,**

Example: **+ACK:GTOUT,C80303,135790246811220,,0004,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.7. Ignition Detection

3.2.7.1. Ignition Detection

The command **AT+GTIGD** is used to configure the parameters for ignition detection.

➢ **AT+GTIGD=**

Example: **AT+GTIGD=sc350m,0,100,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
4	Ignition Detection Mode	1	0 – 4	0
5	Debounce Time	<=3	0 – 255(×10ms)	100
6	Reserved	0		
7	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <Ignition Detection Mode>:

- 0: Hard-wired ignition detection mode.
- 4: Accelerometer mode (virtual ignition detection). Ignition state correlates with the state of accelerometer. Please use command **AT+GTAVS** to configure the parameters.

Note: The priority of the hard-wired ignition detection mode is the highest. This means even if <*Ignition Detection Mode*> is not set to 0, but hard-wired line has been connected to the device, then the device will only measure the ignition state by hard-wired ignition detection mode.

When both virtual ignition detection function and the corresponding bits of <*Event Mas*k> in the command **AT+GTCFG** are enabled, **+RESP:GTVGN**, **+RESP:GTVGF** and **+RESP:GTVGL** will be reported to the backend server.

✧ <Debounce Time>: Checking twice in a short period of time to make sure the input is definitely triggered.

The acknowledgment report of **AT+GTIGD** command:

➢ **+ACK:GTIGD,**

Example: **+ACK:GTIGD,BC0101,866356061524947,SC350M,0141,20230713172438,0144$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	

Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.7.2. Accelerometer Virtual Ignition Settings

The command **AT+GTAVS** is used to configure parameters for checking ignition states based on motion status. It will work when hard-wired ignition line is not connected and Accelerometer (Motion status) Virtual Ignition mode is enabled by **AT+GTIGD** (*<Ignition Detection Mode>* is set to 4).

➢ **AT+GTAVS=**

Example: **AT+GTAVS=sc350m,20,30,,,,000B$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Password	4 - 20	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
Sensor Rest Duration	<=3	5 – 255 sec	120
Sensor Motion Validity	<=3	1 – 255 sec	10
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ *<Sensor Rest Duration>*: A time parameter to determine whether the device enters stationary state. The device will be considered in stationary state after the motion sensor detects stationary state and the stationary state is maintained for the period of time specified by the parameter *<Sensor Rest Duration>*.

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

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

➢ **+ACK:GTAVS,**

Example: **+ACK:GTAVS,BC0101,864802030065720,,FFFF,20191028022258,000D$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.8. FOTA

3.2.8.1. Over-the-air Configuration Update

The **AT+GTUPC** command is used to set the parameters for over-the-air configuration update.

➢ **AT+GTUPC=**

Example: **AT+GTUPC=sc350m,0,10,0,0,1,http://www.queclink.com/configure.ini,1,,0,0,,03,FFFF$**				
Sn	**Parameter**	**Length (Byte)**	**Range/Format**	**Default value**
1	Password	4~20	'0'-'9', 'a'-'z', 'A'-'Z'	sc350m
2	Max. Download Retry	1	0 – 3	0
3	Download Timeout	<=2	5 – 30 min	10
4	Download Protocol	1	0	0
5	Enable Report	1	0|1	0
6	Update Interval	<=4	0 – 8760 hour	0
7	Download URL	<=100	URL	
8	Mode	1	0|1	0
9	Reserved	0		
10	Extended Status Report	1	0|1	0
11	Identifier Number	8	00000000 – FFFFFFFF	0
12	Reserved	0		
13	Update Status Mask	1	0 – F	3
14	Serial Number	4	0000 – FFFF	
15	Tail Character	1	$	$

✧ <*Password*>: The valid characters for the password include '0'-'9', 'a'-'z', and 'A'-'Z'. The

default value is “sc350m”.

- <*Max. Download Retry*>: It specifies the maximum number of times to retry to download the configuration file upon download failure.
- <*Download Timeout*>: It specifies the expiration timeout of one 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 URL ends with “/”, which means this is just a path without file name, the unit will add <imei>.ini as the default configuration file name at the end of the URL. If it is larger 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.
- <*Identifier Number*>: A numeral to identify the update configuration request command. This will be included in the message **+RESP:GTEUC** to inform the request it is related to.
- <*Extended Status Report*>: A numeral to indicate the message to be reported 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.
- <*Update Status Mask*>: Bitwise mask to configure the status in which the device could update the configuration.
  - Bit 0 for <*ignition off*>.
  - Bit 1 for <*ignition on*>.

Note:

1. The maximum size of configuration file is 10240 bytes. If the file size exceeds the limit allowed, the device will fail to download the configuration file.
2. The length of one command should not exceed 320 bytes in the configuration file.
3. Make sure there is only one command per line in the configuration file.
4. There should be no space before each command.
5. It is not recommended to include the commands **AT+GTUPC** and **AT+GTUPD** in the configuration file to be downloaded.
6. Please DO NOT execute the commands **AT+GTUPC** and **AT+GTUPD** at the same time.
7. Please DO NOT execute another command when the **AT+GTUPC** is being executed (i.e. during the period from sending **AT+GTUPC** command until the reporting of **+RESP:GTUPC** with result 301 or 302).

8. <*Download URL*> should be a full URL ending with configuration file name. If <*Download URL*> ends with "/", which means the URL is just a path without file name, the unit will add <imei>.ini as the file name to complete the URL. If the URL is larger than 100 bytes in length, "error" will be returned.

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

- **+ACK:GTUPC,**

Example: **+ACK:GTUPC,BC0101,135790246811220,,0005,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device Name	20		
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.2.9. Others

3.2.9.1. 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=sc350m,0,,0,,,,FFFF$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
2	Sub Command	<=2	0 – 12	
3	AT Command/Configuration Mask/ATI Mask/Reset Level/Configuration Command	1|3|8|16	0-1/"SRI"/00000000000000000 – FFFFFFFFFFFFFFFFFFFF/0-1/00000000 – FFFFFFFF/0-2	
4	Output Direction	1	0|1	
5	Reserved	0		

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

✧ <*Sub Command*>: Valid values are 0 – 12.

- 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:GTALM**, **+RESP:GTALS** or **+RESP:GTALC**.
- 3: ***REBOOT***. Reboot the device.
- 4: ***RESET***. Reset all parameters to factory settings. Parameters configured by **AT+GTBSI**, **AT+GTSRI**, device password **(AT+GTCFG)**, **AT+GTTMA** and **AT+GTPIN** will not be reset.
- 5: ***PWROFF***. Power off the device.
- 6: ***CID***. Get the ICCID of the USIM card which is being used by the device via the message **+RESP:GTCID**.
- 7: ***CSQ***. Get the current network 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 level and adapter status of the device via the message **+RESP:GTBAT**.
- B: ***TMZ***. Get the time zone settings via the message **+RESP:GTTMZ**.
- C: ***GIR.*** Get cell information via report **+RESP:GTGSM**.
- D: ***AIF.*** Get APN, ICCID, RSSI, cell ID, IP, DNS server and network type via **+RESP:GTAIF**.
- E: ***GSV***. Request the device to report the GNSS fix level.
- F: ***Reserved***.
- 14: ***DELBUF***. Delete all the buffered reports.
- *1C:* ***ATI.*** Get basic device information via the message **+RESP:GTATI**.
- *30:* (**ECU**) Get the current ECU report via message +RESP:GTECU.
- *31:* (**ECUUNLOCK**): Unlock the ECU lock.
- *32:* (**ECULOCK**): Lock the ECU lock.
- *35:* (**ECUON**) Switch the ECU (and battery if needed) on, based on the ECU ON Control configuration in the AT+GTECU.
- *36:* (**ECUOFF**) Switch the ECU off, based on the ECU OFF Control configuration in the AT+GTECU.
- *37:* (**LMPON**) Turn on the smart lamps.
- *38:* (**LMPOFF**) Turn off the smart lamps.
- *3B:* (**ASSIST**) Set the current assist level.
- *3D:* (**STS**) Request the location and battery status report.

- *3E:* (**BATON**) Switch the external battery on, based on the Battery ON Control configuration in the AT+GTECU.
- *3F:* (**BATOFF**) Switch the external battery off, based on the Battery OFF Control configuration in the AT+GTECU.
- *41:* **(CLRODO)** Clear ODO meter data (Bafang only).
- *42:* **(36VLIGHT)** 36V light on/off comman (Bafang only).
- *43:* **(BATTCTRL)** Battery lock/unlock comman (Bafang only).

Note: Cmd 30-43, Rhino2 only supports 30 and 3D.

✧ < ***ATI Mask /Reset Level***>:

- AT Command: To get single AT command configuration when the <*Sub Command*> is set to 2, please follow the format in the following example. E.g. to get the configuration of **AT+GTFRI**, set AT+GTRTO=sc350m,2,FRI,0,,,,FFFF$, and get it via **+RESP:GTALS**.
- <Configuration Mask>: If <Sub Command> is set to 2, the configuration information of the specified <Configuration Mask> can be obtained via the message +RESP:GTALC. The Configuration Mask must be 16 bytes. If it's less than 16 bytes, '0' will be added in the high bytes of the Configuration Mask.

Configuration Mask Table:

Bit	Item to Mask
Bit 63	AVS
Bit 59	GAM
Bit 55	ASL
Bit 54	LIM
Bit 53	ECM
Bit 52	ECU
Bit 51	SIM
Bit 44	PEO
Bit 43	RMD
Bit 37	SPA
Bit 36	BZA
Bit 33	PDS
Bit 29	SSR
Bit 20	HMC
Bit 19	IDL
Bit 17	DOG

Bit 16	OWH
Bit 15	PIN
Bit 11	GEO
Bit 10	FRI
Bit 9	TMA
Bit 6	IGD
Bit 5	EPS
Bit 4	TOW
Bit 3	CFG
Bit 1	SRI
Bit 0	BSI

- ATI Mask: If <*Sub Command*> is set to 1C, the basic information will be reported via the message **+RESP:GTATI** according to chosen <*ATI Mask*>.

  ATI Mask Table:

Mask Bit	Item
Bit 0	Firmware Version
Bit 7	Modem Firmware Version
Bit 12	Hardware Version
Bit 13	Modem Hardware Version
Bit 16	Bootloader Version
Other Bits	Reserved

- <*Reset Level*>: If <Sub Command> is 0x04, this parameter works as follows.

  0: Light Reset. Reset all configuration parameters, except Parameters configured by **AT+GTBSI**, **AT+GTSRI,** device password **(AT+GTCFG), AT+GTPIN, AT+GTTMA** and **AT+GTDMS**.In addition,if ICCID is locked, **AT+GTGSIM** not reset.

  1: Heavy Reset. Reset all configuration parameters, except **AT+GTPIN**.In addition,if ICCID is locked, **AT+GTSIM** not reset.

- <Configuration Command>: Based on <Sub Command>

  35: (**BIKEON**)

  0 or empty: The bike will switch on regularly.

  1: The bike will switch on and the ECU will unlock.

  36: (**BIKEOFF**)

  0 or empty: Always switch off the ECU.

  3B: (**ASSIST**)

  An integer between 0 and 20, indicating the new assist level.

  42: (36VLIGHT)

  0: 36V light off.

1: 36V light on.

43: (BATTCTRL)

0: unlock battery.

1: lock battery.

✧ <*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 serial port.

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

➢ **+ACK:GTRTO,**

Example: **+ACK:GTRTO,BC0101,135790246811220,,IOS,0015,20160329093254,11F1$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Sub Command	<=6	Sub Command String	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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

3.2.9.2. Hour Meter Count

The command **AT+GTHMC** is used to measure the accumulated time of use with each actuation of ignition on. To use this command, the ignition signal must be connected to the device or enable virtual ignition detection. If the hour meter count function is enabled, <*Hour Meter Count*> will be included in the **+RESP:GTFRI**, **+RESP:GTIGN** or **+RESP:GTIGF** report message sent by the device.

➢ **AT+GTHMC=**

Example: **AT+GTHMC=sc350m,1,12345:12:34,,,,,,,,0018$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m

2	Enable Hour Meter	1	0|1	0
3	Initial Hour Meter Count	11	00000:00:00-99999:00:00	00000:00:00
4	Reserved	0		
5	Reserved	0		
6	Reserved	0		
7	Reserved	0		
8	Reserved	0		
9	Reserved	0		
10	Reserved	0		
11	Reserved	0		
	Serial Number	4	0000 – FFFF	
	Tail Character	1	$	$

- <*Enable Hour Meter*>: Enable/disable the hour meter count function. If the hour meter counter function is enabled, hour meter count will be increased when the device detects the vehicle ignition is turned on.
  - 0: Disable hour meter count function.
  - 1: Enable hour meter count function.
- <*Initial Hour Meter Count*>: It is formatted with 5 hour digits, 2 minute digits and 2 second digits, and ranges from 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:GTIGN** or **+RESP:GTIGF** will be increased based on this value.

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

- **+ACK:GTHMC,**

Example: **+ACK:GTHMC,BC0101,135790246811220,,0018,20160329093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	

Tail Character	1	$	$

3.2.9.3. GNSS-Assisted Motion Measurement

The command **AT+GTGAM** used to assist in motion judgment with GNSS if the sensor detects stationary status and the vehicle is ignition on.

➢ **AT+GTGAM=**

Example: **AT+GTGAM=sc350m,1,1,10,10,10,5,,,,,0006$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Password	4 – 7	'0' – '9' 'a' – 'z' 'A' – 'Z'	sc350m
Mode	1	0|1	1
Speed Mode	1	0|1	1
Motion Speed Threshold	<=2	5-50km/h	25
Motion Cumulative Time	<=3	10-100s	10
Motionless Cumulative Time	<=3	10-250s	60
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Serial Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Mode*>: The working mode of the GNSS-assisted 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 state.
- 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 in moving state.

✧ <*Motionless Cumulative Time*>: If the average speed is lower than <*Motion Speed Threshold*> for <*Motionless Cumulative Time*>, the device is considered in stationary state.

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

➢ **+ACK:GTGAM,**

Example: **+ACK:GTGAM,BC0101,135790246811220,,1,0006,20090214093254,11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Serial Number	4	0000 – FFFF	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.3. Report

This section defines the formats of the report messages. You can set the <*Report Composition Mask*> in **AT+GTCFG** to limit the length of the report which contains GNSS position information.

3.3.1. Position Related Report

➢ **+RESP:GTDOG,**

The protocol watchdog reboot message.

➢ **+RESP:GTIGL,**

The location message for ignition on and ignition off.

➢ **+RESP:GTVGL,**

The location message for virtual ignition on and ignition off.

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

Example:
+RESP:GTDOG,BC0101,866356061266739,SC350M,02,1,1,0.0,0,122.3,113.947936,22.573622,20230815031007,0460,0000,2495,116D,,0.0,12345:12:39,17241,0,210000,,,,20230815111007,0

058$

+RESP:GTIGL,BC0101,866356061266739,SC350M,01,1,1,0.0,0,122.3,113.947936,22.573622,20230815031017,0460,0000,2495,116D,,0.0,12345:12:49,17241,0,110000,,,,20230815111019,005E$

+RESP:GTVGL,BC0101,866356061266739,SC350M,40,1,1,0.0,0,119.3,113.948001,22.573568,20230815010429,0460,0000,2495,1179,,121143.7,,56273,0,210000,,,,20230815090430,0DD7$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Report ID/Report Type	2	X(0-F)X(0-5)	
Number	1	0 – 1	
GNSS Accuracy	<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
External Power VCC	<=5		
Battery Percentage	<=3	0 – 100	
Device Status	<=10	000000-0F0F424203	
Reserved	0		

Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
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 as follows.
  - The value of <*Ignition Detection Mode*>, which indicates the trigger of the message **+RESP:GTVGL**. The value range is 0 – 4.

  Report type has different meanings in different messages below.
  - In the protocol watchdog reboot message **+RESP:GTDOG**

  1: Reboot message for time based working mode
  2: Reboot message for ignition on working mode
  - In the ignition on and ignition off message **+RESP:GTIGL** and **+RESP:GTVGL**

  0: The engine is ignition on.
  1: The engine is ignition off.

  For other messages, it will always be 0.
- <*Number*>: The number of the GPS positions included in the report. Generally, it equals to 1.
- <*GNSS Accuracy*>: A numeral to indicate the GNSS fix status and HDOP of the GNSS position. 0 means the current GNSS fix fails and the last known GNSS position is used. A non-zero value (1 – 50) means 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 information 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 read from the GNSS chip.
- <*MCC*>: Mobile country code. It is 3 digits in length and ranges from 000 – 999.
- <*MNC*>: Mobile network code. It is 3 digits in length and ranges from 000 – 999.
- <*LAC*>: Location area code in hex format.
- <*Cell ID*>: Cell ID in hex format.
- <*Mileage*>: The current total mileage.

➢ **+RESP:GTTOW,**

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

Example: **+RESP:GTTOW,BC0103,866356061997770,sc350m,,00,1,1,55.6,30,113.7,126.761603,41.224949,20230130095737,0460,0000,2495,1179,,0.0,20230130095801,076D$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Reserved	0		
Report ID/Report Type	2	00|01	
Number	1	0 – 1	
GNSS Accuracy	<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ < *Report ID/Report Type* >: For real tow the value is 00; for fake tow the value is 01.

➢ **+RESP:GTFRI,**

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

according to the working mode.

Example: **+RESP:GTFRI,BC0101,866356061266739,SC350M,10,1,1,0.0,0,120.4,113.948002,22.573550,20230815031840,0460,0000,2495,116D,,0.0,12345:12:34,14758,0,110000,,,,20230815111858,007D$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Report ID/Report Type	2	X(1-5)X(0-6)	
Number	1	0 – 1	
GNSS Accuracy	<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
External Power VCC	<=5		
Battery Percentage	<=3	0 – 100	
Device Status	<=10	000000-0F0F424203	
Reserved	0		
Reserved	0		

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

- <*External Power VCC*>: The voltage of the external power supply. If the command **AT+GTEPS** is configured for the device to report the external power supply voltage periodically with fixed information report, the device will send the current voltage along with **+RESP:GTFRI** message to the backend server. If the command is not configured as such, 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 is the <mode> of GTFRI command.
  - 1: Fixed time report
  - 3: Fixed mileage report
  - 5: Fixed time or mileage report

  Report type has seven meanings below.
  - 0: Normal fixed report
  - 4: Mileage report
- <*Number*>: The number of the GNSS position(s) included in the report message. In the message **+RESP:GTFRI**, it is always 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 ranges from 00000:00:00 – 99999:00:00. If the function is disabled, this field will be empty.
- <*Backup Battery Percentage*>: The current volume of the backup battery in percentage.
- <*Device 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 to be 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.

  Output1 Logic Status or Output2 Logic Status:
  - 0: Disabled status.
  - 1: Enabled status.

Mask Bit	Item
Bit 16-23	Motion status of device
Bit 8	Ignition detection
Bit 7	Output1 Logic Status
Bit 6	Output2 Logic Status

➢ **+RESP:GTERI,**

If the **+RESP:GTERI** report is enabled, the device will send the **+RESP:GTERI** message to the backend server instead of **+RESP:GTFRI**.

Example:
+RESP:GTERI,BC0101,866833041332229,SC350M,10,00008080,22,5,8,1,1,0.0,0,116.1,113.947972,22.573522,20230713013430,0460,0000,1D2D,0D6DA243,,0.0,02000:14:17,12091,88,000011,,,,20230713093530,0053$

Parameter		Length (Byte)	Range/Format	Default
Protocol Version		6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID		15	IMEI	
Device Name		<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Report ID/Report Type		2	X(1-5)X(0-6)	
ERI Mask		8	00000000 – FFFFFFFF	
On-board temperature		<=3	-40 ~ 125(°C)	
Bike Status		1	0|1	
ECU Lock State		1	0|1	
RAT and Band Data (Optional)	RAT	<=2	0|1|3|4|5	
	Band	<=4	0-39|850|900|1800|1900	
Number		1	0 – 1	
GNSS Accuracy		<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
External Power VCC	<=5		
Battery Percentage	<=3	0 – 100	
Device Status	<=10	000000-0F0F424203	
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <Bike Status>: The bike status.
0: Bike off.
1: Bike on.

✧ <ECU Lock State>: The device ECU Lock state.(Rhino2 no support this status)
0: ECU not locked.
1: ECU locked.

✧ <*RAT*>: Radio Access Technology.
- 0: Invalid RAT
- 1: 2G
- 4: LTE CAT-M1
- 5: LTE NBIOT

✧ < *Band*>: 0 mean invalid band, 1-39 means band number and others mean GSM number.

Note: The items denoted with “Optional” are controlled by the parameter <*ERI Mask*>.

➢ **+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,BC0101,866833041332229,SC350M,01,1,0,0.0,0,113.9,113.947970,22.573545,20230710111041,0460,0000,2495,116D,,0.0,00000:39:10,12689,98,000011,,,,20230710192138,00BF$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Report Type	2	X(00-01)	
Number	1	0 – 1	
GNSS Accuracy	<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
External Power VCC	<=5		
Battery Percentage	<=3	0 – 100	
Device Status	<=10	000000-0F0F424203	
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	

Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- ✧ <*External Power*>: The value of the external power supply voltage. When the voltage of the external power supply meets the alarm condition as set by the command **AT+GTEPS**, the device will send the current external power supply voltage with the **+RESP:GTEPS** message to the backend server.
- ✧ <*Report Type*>: A numeral to indicate the type of the report.
  - 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*> in **AT+GTGEO** after the ignition is turned off.

Example:
+RESP:GTGES,BC0101,866356061266739,SC350M,01,1,21,50,10,1,1,0.0,0,108.0,113.947999,22.573545,20230815033042,0460,0000,2495,116D,,0.0,12345:12:34,15340,0,110000,,,,20230815113042,0091$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Report ID	2	X(00-13)	
Report Type	1	0|1	
Trigger Mode	<=3	0|21|22	
Radius	<=7	50 – 6000000m	
Check Interval	<=5	0|5 – 86400sec	
Number	1	0 – 1	
GNSS Accuracy	<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
External Power VCC	<=5		
Battery Percentage	<=3	0 – 100	
Device Status	<=10	000000-0F0F424203	
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Report ID* >: The ID of Geo Fence in HEX format. The range is 0x00 to 0x13.

✧ <Report Type>: 0 means “The current Parking-Fence is inactive”, and 1 means “The current Parking-Fence is active”.

➢ **+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.

Example:
+RESP:GTRTL,BC0101,866833041298537,SC350M,,,1,1,0.0,0,118.4,113.947959,22.573532,20230711031646,0460,0000,1D2D,0D6DA243,,0.0,20230711111647,0014$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	

Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Reserved	0		
Reserved	0		
Number	1	0 - 1	
GNSS Accuracy	<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- **+RESP:GTGIN**,

If Polygon Geo-fence is configured and enabled, the device will send the message **+RESP:GTGIN** to the backend server according to settings when the device enters the Polygon Geo-fence.

- **+RESP:GTGOT**,

If Polygon Geo-fence is configured and triggered, the device will send the message **+RESP:GTGOT** to the backend server according to settings when the device leaves the Polygon Geo-fence.

Example:
+RESP:GTGIN,BC0101,866356061266739,SC350M,01,00000008,1,1,0.0,0,97.0,113.948000,22.573544,20230815033924,0460,0000,2495,1179,,0.0,12345:12:54,17118,0,210000,,,,20230815113924,00AD$

+RESP:GTGOT,BC0101,866356061266739,SC350M,01,00000004,1,0,0.0,0,120.5,113.948000,22.573544,20230815033529,0460,0000,2495,116D,,0.0,12345:12:34,15340,0,110000,,,,20230815113532,0099$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Area Type	2	00|01	
Area Mask	8	00000000-000FFFFF	
Number	1	0 – 1	
GNSS Accuracy	<=2	0|1 – 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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
External Power VCC	<=5		
Battery Percentage	<=3	0 – 100	
Device Status	<=10	000000-0F0F424203	
Reserved	0		
Reserved	0		
Reserved	0		

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

- ✧ <*Area Type*>: This message is for polygon or circular area. 00 means “Polygon”, 01 means “Circular”.
- ✧ <*Area Mask*>: The bitwise mask for trigger condition composition of the corresponding GEO ID. Each bit, from bit 0 to bit 19, represents the logical state of the corresponding GEO ID to trigger the entering or exiting event. 1 means that the event of the GEO ID set has been triggered and 0 means has not.
  For example, if the Area Mask is 03, it means entering or exiting events of GEO-ID0 and GEO-ID1 occur at the same time

3.3.2. Device Information Report

If the device information report **+RESP:GTINF** is enabled by <*Enable Info Report*> in 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,BC0101,866833041333284,,11,898604A4192280200107,22,99,1,12581,,0,0,0,0,,20230718071447,,,,,,+0703,1,20230718151747,0004$

SN	Parameter	Length (Byte)	Range/Format	Default
1	Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
2	Unique ID	15	IMEI	
3	Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
4	Motion Status	2	16|1A|11|12|21|22	
5	ICCID	20		
6	CSQ RSSI	<=2	0 – 31|99	
7	CSQ BER	<=2	0 – 7|99	
8	External Power Supply	1	0|1	
9	External Power VCC	<=5	0 – 60000mV	
10	Reserved	0		
11	Backup Battery VCC	<=4	0 – 4500mV	
12	Charging	1	0|1	

13	LED On	1	0|1	
14	Power Saving Mode	1	0 - 2	
15	Reserved	0		
16	Last Fix UTC Time	14	YYYYMMDDHHMMSS	
17	Reserved	0		
18	Reserved	0		
19	Reserved	0		
20	Reserved	0		
21	Reserved	0		
22	Time Zone Offset	5	±HHMM	
23	Daylight Saving	1	0|1	
	Send Time	14	YYYYMMDDHHMMSS	
	Count Number	4	0000 – FFFF	
	Tail Character	1	$	$

- <*Motion Status*>: The 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 to be 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.
- <*ICCID*>: The ICCID of the USIM card.
- <*CSQ RSSI*>: The signal strength level.

CSQ RSSI	**Signal Strength (dBm)**
0	<-133
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 strength of signal.
- <*External Power Supply*>: Whether the external power supply is connected or not.
  - 0: Not connected
  - 1: Connected

- <*External Power Supply VCC*>: The voltage of the external power supply.
- <*Backup Battery VCC*>: The voltage of the backup battery. The value of this field is only valid when the external power is not connected.
- <*Charging*>: 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 the UTC time.
- <*Daylight Saving*>: The current setting of daylight saving.
  - 0: Daylight saving is disabled.
  - 1: Daylight saving is enabled.

+RESP:GTECU: ECU data and information report

If the ECU information report function is enabled by the command AT+GTECM, the device will send the ECU information via the message +RESP:GTECU to the backend server periodically.

+RESP:GTECU,

Example:
+RESP:GTECU,BC0104,865284040842605,A,5,0,-10,,,00000422,,1.1.1,02.13.07,2.1,1,8,4,17500,16470,100,,99,122,29,1,41.12,36.00,-140,131013101510111013101310 0D101010131008 10,,00,2,31,711,30,3,1,00,0,0,,,0,0,0.00,,,,,,LN17AK00,290,LN13AA0006,1.0.00,15,1.7,20200 5182026,31,31,31,2,1,2,0,1.0,20210302095122,B94C$

SN	Parameter	Length (Byte)	Range/Format	Default
1.	Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
2.	Unique ID	15	IMEI	
3.	Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
4.	Report Type	1	0 - 4|30	
5.	Report Mask	<=32	0 - FFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFF	
6.	ECU Type	1	0|2|3|6	
7.	ECU Lock State	1	0|1	
8.	Reserved	0		
9.	Bike Type	<=15	(e.g., 11.01.01)	
10.	Serial Number of Bike	<=30	(e.g., AC1234567)	
11.	Serial Number of Bike Battery	<=30	(e.g., GA1822001234)	
12.	Bike Software Version	<=20	(e.g., S0312)	
13.	Battery Software Version	<=15	(e.g., 1.04)	
14.	Controller Software Version	<=15	(e.g., 1.08)	
15.	Display Software Version	<=15	(e.g., 1.09)	
16.	Bike Status	1	0|1|2 (2-on, 1-on, 0-off)	

17.	Reserved	0		
18.	Odometer	<=10	0-2147483647 meters	
19.	Bike Design Capacity	<=5	0-65535 mAh/mWh	
20.	Bike Full Charge Capacity (FCC) Raw	<=10	0-4294967295 mAh/mWh	
21.	Bike Full Charge Capacity (FCC) Percentage	<=3	0-100 %	
22.	Bike Actual State of Charge (SOC) Raw	<=10	0-4294967295 mAh/mWh	
23.	Bike Actual State of Charge (SOC) Percentage	<=3	0-100 %	
24.	Bike Range	<=5	0-32767 Km	
25.	Bike Battery Temperature	<=4	-128 – 127 Celsius	
26.	Bike Battery Charging Cycles	<=5	0-32767 Times	
27.	Bike Battery Pack Voltage	<=5	0.00 - 99.99 Volts	
28.	Nominal Pack Voltage	<=5	0.00 - 99.99 Volts	
29.	Actual Current	<=6	-32768 - 32767 mA	
30.	Bike Battery Cell Voltages	<=200	(e.g., 3A 16 24 0E 68 10 68 10 68 10 68 10 68 10 68 10 68 10 90 03 0D 0A)	
31.	Charging Interval	<=5	0-32767 Hours	
32.	Battery Error Code	<=15	(e.g., 3EF)	
33.	Battery state	1	0|1|2|3	
34.	Electronics Temperature	<=4	-128-255 Celsius/K	
35.	Wheel Diameter	<=3	0-999 Mm	
36.	Motor Temperature	<=4	-128-255 Celsius/K	
37.	Support Mode	<=2	0-20	
38.	Light Status	1	0|1 (1- on, 0-off)	
39.	Motor Error Code	<=15	(e.g., 3EF)	
40.	Bike Wheel Speed	<=3	0-500 Rpm	
41.	Pedal Cadence	<=3	0-500 Rpm	
42.	Actual Motor Torque	<=5	0.00 - 99.99 Nm	
43.	Maximum Motor Torque	<=5	0.00 - 99.99 Nm	
44.	Motor Power	<=5	-1000-1000 W	
45.	Pedal Power	<=3	0-1000 W	
46.	Bike Speed	<=5	0.0 - 99.99 km/h	
47.	Pedal Torque	<=5	0.00 - 99.99 Nm	
48.	ABS Enabled	1	0|1	
49.	ABS Number of Times Activated	<=5	0 - 32767	
50.	ABS Error Code	<=15	(e.g. 3EF)	
51.	ABS Historical Braking Behavior	1	0|1|2|3	
52.	Controller Serial Number	<=20	(e.g. MC1234567)	

53.	Display Serial Number	<=20	(e.g. DI1234567)	
54.	DC-DC Serial Number	<=20	(e.g. DC1234567)	
55.	DC-DC Software Version	<=8	(e.g. 1.02)	
56.	POD Serial Number	<=20	(e.g. PO1234567)	
57.	POD Software Version	<=8	(e.g. 1.05)	
58.	Last Recharge Date	12	YYYYMMDDhhmm	
59.	MOSFET Temperature U	<=3	Celsius	
60.	MOSFET Temperature V	<=3	Celsius	
61.	MOSFET Temperature W	<=3	Celsius	
62.	Riding Mode	1	0-3	
63.	Daylight Status	1	0|1	
64.	Controller ODO Meter	<=10	Km	
65.	Walk Assist Status	1	0|1	
66.	Trip Counter	<=10	(e.g. 123.4 Km)	
67.	Charger Connected	1	0|1	
68.	Speed Limit	<=3	0 – 100	
69.	Park Brake Status	1	0|1	
70.	Pin TH4 Level	<=3	0 – 255	
71.	Pin TH6 Level	<=3	0 – 255	
72.	Pin TH12 Level	<=3	0 – 255	
73.	Pin TH14 Level	<=3	0 – 255	
74.	Controller Current Rating	<=3	90, 120, 160, 180	
75.	Time Powered up	<=8	0 – 16777215 minutes	
76.	Power up Count	<=8	0 – 16777215	
77.	Time Driving	<=8	0 – 16777215 minutes	
78.	Drive Count	<=8	0 – 16777215	
79.	Deep Discharge Count	<=5	0 – 65535	
80.	Overcharge Count	<=5	0 – 65535	
81.	Condition Code	<=5	XX.XX, X∈{'0'-'9'}	
82.	Active Flash Code	<=2	0 - 255	
83.	Ambient Temperature	<=4	-40– 60 Degree Celsius	
84.	Power Consumption	<=6	0~655.35 Wh/km	
85.	Total Ah Discharged	<=9	0~1677721.0 Ah	
86.	Total Ah Regenerated	<=9	0~1677721.0 Ah	
87.	Power On Service Time	<=5	0-65535 Hours	
88.	Power On Service Overdue Time	<=5	0-65535 Hours	
89.	Drive Service Time	<=5	0-65535 Hours	
90.	Drive Service Overdue Time	<=5	0-65535 Hours	
91.	Service Interval	<=5	0-65535 Hours	
92.	Service Elapsed Time	<=5	0-65535 Hours	
93.	Send Time	14	YYYYMMDDHHMMSS	

94.	Count Number	4	0000 – FFFF	
	Tail Character	1	$	$

- <Report Type>: A value to indicate the report type.
  - 0: ECU Message (AT+GTECM, Group ID=0)
  - 1: ECU Message (AT+GTECM, Group ID=1)
  - 2: ECU Message (AT+GTECM, Group ID=2)
  - 3: ECU Message (AT+GTECM, Group ID=3)
  - 4: ECU Message (AT+GTECM, Group ID=4)
  - 30: Real time request report
- <*Bike Parameters*>: Bike parameters from <Bike Type> to <Odometer>.
- <*Battery Parameters*>: Battery parameters from <Bike Design Capacity> to <Charging Interval>.
- <*Controller Parameters*>: Motor, controller & electronics parameters from <Electronics Temperature> to <Pedal Torque>.
- <*Protocol*>: When the ECU type is E-motion, initially, this field set to 0. And if detected the E-motion is Extended, set to 1.
  - 1: None
  - 2: Bosch
  - 4: Bafang (CAN)
  - 6: Rhino2 (UART)
- <*Battery State*>: Battery state is provided by the ECU.
  - 0: Rest
  - 1: Charge
  - 2: Discharge
  - 3: Disconnected
- <ABS Enabled>: The current status of the ABS Feature.
  - 0: The ABS is currently enabled in the ECU
  - 1: The ABS is currently disabled in the ECU
- <ABS Number of Times Activated>: The number of times the ABS has been activated.
- <ABS Error Code>: The raw error code as provided by the ABS module.
- <ABS Historical Braking Behavior>: The historical braking behavior as reported by the ABS module.
  - 0: No history reported by the ABS Module
  - 1: Soft braking behavior
  - 2: Normal braking behavior
  - 3: Aggressive braking behavior
- < Ambient Temperature >: only valid when ECU type is Rhino2.

+RESP:GTSTS - Location and Battery Status Report

The +RESP:GTSTS message is sent when the STS report has been requested through the AT+GTRTO command. It reports the current location, battery status and the status of the ECU lock .

- **+RESP:GTSTS**,

Example: **+RESP:GTSTS,BC0104,865284040842605,1,0.0,0,37.8,114.022054,22.536137,ElrCqEmy,0460,0000,27BD,122B,42,0,39015,4210,86,38.92,26,410400,0,0,71,0,20210302095122,8F73$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
2	Unique ID	15	IMEI	
3	Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
4	GPS Accuracy	<=2	0|1 – 50	
5	Speed	<=5	0.0 – 999.9km/h	
6	Azimuth	<=3	0 – 359	
7	Altitude	<=8	(-)xxxxx.x m	
8	Longitude	<=11	(-)xxx.xxxxxx	
9	Latitude	<=10	(-)xx.xxxxxx	
10	GPS UTC Time	14	YYYYMMDDHHMMSS	
11	MCC	0|4	0XXX	
12	MNC	0|4	0XXX	
13	LAC	0|4	0XXX	
14	Cell ID	<=8	XXXX|XXXXXXXX	
15	Reserved	0		
16	Device status	<=10	000000-0F0F424203	
17	External Power Supply	1	0|1	
18	Main Power Voltage	<=5	0|8000 – 60000 mV	
19	Backup Battery Voltage	<=4	0 – 4500 mV	
20	Backup Battery Percentage	<=3	0-100 %	
21	Bike Battery Pack Voltage	<=5	0.00 - 99.99 Volts	
22	Bike Battery Temperature	<=4	-128 – 127 Celsius	
23	Bike Full Charge Capacity (FCC) Raw	<=10	0-4294967295 mAh/mWh	
24	Bike Full Charge Capacity (FCC) Percentage	<=3	0-100 %	
25	Bike Actual State of Charge (SOC) Raw	<=10	0-4294967295 mAh/mWh	
26	Bike Actual State of Charge (SOC) Percentage	<=3	0-100 %	
27	ECU Lock State	<=1	0|1	
28	Reserved	0		
29	ACC Status	1	0|1	
30	Send Time	14	YYYYMMDDHHMMSS	
31	Count Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <ACC Status>: The ACC status.
0: ACC Off.
1: ACC On.

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,BC0101,865284040842605,SC350M,1,,,007F,,,20210302094834,20210302095122,0D17$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Power Saving Mode	1	0 - 2	
Reserved	0		
Reserved	0		
Report Composition Mask	4	0000 – FFFF	
Reserved	0		
Reserved	0		
Last Fix UTC Time	14	YYYYMMDDHHMMSS	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Report Composition Mask*>: Please refer to <*Report Composition Mask*> of the **AT+GTCFG** command.

3.3.3.2. +RESP:GTCID

After the device receives the command **AT+GTRTO** to read the ICCID of the USIM card, it will send the ICCID to the backend server via the message **+RESP:GTCID**.

➢ **+RESP:GTCID,**

Example: **+RESP:GTCID,BC0101,863835020303983,,898601148300292861 88,20210302095937,0623$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
ICCID	20		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.3.3.3. +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,BC0101,865284040842605,SC350M,16,0,20210302100215,0D2C$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
CSQ RSSI	<=2	0 – 31|99	
CSQ BER	<=2	0 – 7|99	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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

CSQ RSSI	**Signal Strength (dBm)**

0	<-133
1	-111
2 – 30	-109 – -53
31	>-51
99	Unknown

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

3.3.3.4. +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,BC0101,866833041298669,sc350m,BC,0206,0102,,BG95-M5,BG95M5LAR02A03,20231016142836,1DB6$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Device Type	<=10	'0' – '9' 'a' – 'z' 'A' – 'Z'	
Software Version	4	0000 – FFFF	
Hardware Version	4	0000 – FFFF	
Reserved	0		
Modem Hardware Version	<=20		
Modem Firmware Version	<=50		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Device Type*>: The type of the device.

✧ <*Software Version*>: The software 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**.

✧ <*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**.

3.3.3.5. +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,BC0101,865284040842605,SC350M,1,,,4.16,1,0,20210302100655,0D37$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
External Power Supply	1	0|1	
External Power VCC	<=5	0 – 60000mV	
Reserved	0		
Backup Battery VCC	<=4	0.00 – 4.50 V	
Charging	1	0|1	
LED On	1	0|1	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.3.3.6. +RESP:GTTMZ

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

➢ **+RESP:GTTMZ,**

Example:

+RESP:GTTMZ,BC0101,865284040842605,SC350M,+0000,0,20210302101208,0D3E$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Time Zone Offset	5	±HHMM	
Daylight Saving	1	0|1	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

3.3.3.7. +RESP:GTAIF

After the device receives the command **AT+GTRTO** to get information including APN, ICCID, RSSI, cell ID, IP, DNS server and network type, it will send the information via the message **+RESP:GTAIF** to the backend server.

- **+RESP:GTAIF,**

Example: **+RESP:GTAIF,BC0101,865284040842605,SC350M,jyy,,,,,,898604641919C0779899,16,0,0DFC,10.196.21.38,,,,,,1,20210302101250,0D40$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Main APN	<=47		
Main APN User Name	<=30		
Main APN Password	<=30		
Backup APN	<=47		
Backup APN User Name	<=30		
Backup APN Password	<=30		
ICCID	20		

CSQ RSSI	<=2	0 – 31|99	
CSQ BER	<=2	0 – 7|99	
Cell ID	<=8		
IP Address	<=15	0.0.0.0	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Network Type	1	0,1,3	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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

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

- <*CSQ BER*>: The quality of the signal. The range is 0-7, and 99 is for unknown strength of signal.
- <*Cell ID*>: The ID of the serving cell in hex format.
- <*IP Address*>: The IP address of the device.
- <*Main DNS*>: The main DNS server.
- <*Backup DNS*>: The backup DNS server.
- <*Network Type*>: The type of the mobile network the device is currently registered to.
  - 0: Unregistered.
  - 1: 2G
  - 3: 4G

3.3.3.8. +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,BC0101,866356061266739,SC350M,0,20230815111500,0074$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device name	<=20		
SV Count	2	0-32	
SV ID	2	> =0	
SV Power	2	> =0	
…			
SV ID	2	> =0	
SV Power	2	> =0	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*SV Count*>: The number of satellites the device finds.
- <*SV ID*>: Satellite ID. If there is no satellite, zero is filled in the field.
- <*SV Power*>: Satellite power. If there is no satellite, zero is filled in the field.

3.3.3.9. +RESP:GTATI

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

- **+RESP:GTATI,**

Example: **+RESP:GTATI,BC0101,865284040842605,SC350M,12081,0A0101,010201,BG96,BG96MAR04A03M1G,20210302101715,0D48$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	

Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
ATI Mask	<=8	'0' – '9' 'A' – 'F'	
Firmware Version	6	'0' – '9' 'A' – 'F'	
Hardware Version	4	'0' – '9' 'A' – 'F'	
Bootloader Version	6	'0' – '9' 'A' – 'F'	
Modem Hardware Version	<=20		
Modem Firmware Version	<=50		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*ATI Mask*>: This mask is set by **AT+GTRTO** command and used to control parameter fields in the **+RESP:GTATI** message.
- <*Firmware Version*>: The firmware version of the device. The first two characters indicate the branch number, the middle two characters indicate the major version and the last two characters indicate the minor version. For example, 000101 means version R00A01V01.
- <*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, 0101 means version 1.01.
- <*Bootloader Version*>: The bootloader version of the device. The first two characters indicate the branch number, the middle two characters indicate the major version and the last two characters indicate the minor version. For example, 000101 means version R00A01V01.
- <*Modem Hardware Version*>: It gives the modem hardware information of this device.
- <*Modem Firmware Version*>: It gives the modem firmware version information of this device.

3.3.3.10. +RESP:GTALM

After the device receives the command **AT+GTRTO** to read all the configurations, it will send all configurations to the backend server by the message **+RESP:GTALM**.

- **+RESP:GTALM,**

Example:
+RESP:GTALM,BC0101,866833041350312,sc350m,6,1,BSI,,,,,,00,0,0,,,,,SRI,3,,2,218.17.50.142,928,218.17.50.142,7076,,5,1,,,,,CFG,,sc350m,0,0.0,,,7F,1,0,3FFF,,0,0,300,,,0,0,1F,0,,,,,,,,,,EPS,0,250,250,,0,,,,,0,0,,,IGD,0,100,,,TMA,+,0,0,0,,,,,,FRI,0,1,,,,,30,,1000,,,600,0,,,,GEO,0,0,0.000000,0.000000,50,0,,,,,0,0,0,,1,0,0.000000,0.000000,50,0,,,,,0,0,0,,2,0,0.000000,0.000000,50,0,,,,,0,0,,3,0,0.000000,0.000000,50,0,,,,,0,0,0,,4,0,0.000000,0.000000,50,0,,,,,0,0,0,,5,0,0.000000,0.0

00000,50,0,,,,,0,0,0,,6,0,0.000000,0.000000,50,0,,,,,0,0,0,,7,0,0.000000,0.000000,50,0,,,,,0,0,0,,8,0,0.000000,0.000000,50,0,,,,,0,0,0,,9,0,0.000000,0.000000,50,0,,,,,0,0,0,,10,0,0.000000,0.000000,50,0,,,,,0,0,0,,11,0,0.000000,0.000000,50,0,,,,,0,0,0,,12,0,0.000000,0.000000,50,0,,,,,0,0,0,,13,0,0.000000,0.000000,50,0,,,,,0,0,0,,14,0,0.000000,0.000000,50,0,,,,,0,0,0,,15,0,0.000000,0.000000,50,0,,,,,0,0,0,,16,0,0.000000,0.000000,50,0,,,,,0,0,0,,17,0,0.000000,0.000000,50,0,,,,,0,0,0,,18,0,0.000000,0.000000,50,0,,,,,0,0,0,,19,0,0.000000,0.000000,50,0,,,,,0,0,0,,PIN,0,,,,,,,OWH,0,1f,0900,1200,1300,1800,,,,,,DOG,0,60,30,0200,,1,,,,,,IDL,0,2,1,,,,,,,,,0,,,,HMC,0,00000:00:00,,,,,,,,SSR,0,2,1,5,0,0,,,PDS,1,07FF,,,,,,,BZA,0,,,,0,0,0,,,0,0,0,,,0,0,0,,,0,0,0,,,,,,,,,SPA,0,50,,60,0,,,70,,60,0,,,90,,60,0,,,110,,60,0,,,,,,,,,20230815013038,0032$

+RESP:GTALM,BC0101,866833041350312,sc350m,6,2,RMD,0,,27DEF,,,27DEF,,,,,,,,,,,SIM,0,,0,,,,,,,,,,GAM,1,1,25,10,60,,,,,,AVS,120,10,,,,20230815013721,0033$

+RESP:GTALM,BC0101,866833041350312,sc350m,6,3,PEO,,0,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,1,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,2,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,3,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,4,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,20230815013721,0034$

+RESP:GTALM,BC0101,866833041350312,sc350m,6,4,PEO,,5,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,6,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,7,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,8,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,9,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,20230815013721,0035$

+RESP:GTALM,BC0101,866833041350312,sc350m,6,5,PEO,,10,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,11,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,12,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,13,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,14,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,20230815013721,0036$

+RESP:GTALM,BC0101,866833041350312,sc350m,6,6,PEO,,15,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,16,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,17,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,18,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,,19,0,1,3,,,0.000000,0.000000,0.000000,0.000000,0.000000,0.000000,,,,,,,,,,,,,0,,,,,,,,20230815013721,0037$

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

Total Packets	1	7	
Current Packet	1	1 – 7	
Configurations	< 1500		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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

Note: The length of each message **+RESP:GTALM** (including header and tail) <= 1500 characters.

3.3.3.11. +RESP:GTALC

After the device receives the command **AT+GTRTO** to read the configurations, it will, according to the mask of configuration, send corresponding configuration information to the backend server by the message **+RESP:GTALC**.

- ➢ **+RESP:GTALC,**

+RESP:GTALC,BC0101,866833041350312,sc350m,40B,BSI,,,,,,,00,0,0,,,,,SRI,3,,2,218.17.50.142,928,218.17.50.142,7076,,5,1,,,,,CFG,,sc350m,0,0.0,,,7F,1,0,3FFF,,0,0,300,,,0,0,1F,0,,,,,,,,,,FRI,0,1,,,,,,30,,1000,,,600,00000000,,,,20230815014802,0008$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Configuration Mask	<=16	0000000000000000 – FFFFFFFFFFFFFFFF	
Next Packet	1	0 – 1	0
Current Packet	1	1 – 6	1
BSI	3	BSI	BSI
Main APN	<=40	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '.'	
Main APN User Name	<=30		
Main APN Password	<=30		
Backup APN	<=40	'0' - '9', 'a' - 'z', 'A' - 'Z', '-', '.'	

Backup APN User Name	<=30		
Backup APN Password	<=30		
Network Mode/APN Authentication Methods	2	00--0x33	00
LTE Mode	1	0-5	0
Manual Netreg	1	0-1	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
SRI	3	SRI	SRI
Report Mode	1	0|2|3|4|6|7	0
Reserved	0		
Buffer Mode	1	0|1|2	1
Main Server IP/ Domain Name	<=60		
Main Server Port	<=5	0 – 65535	
Backup Server IP/ Domain Name	<=60		
Backup Server Port	<=5	0 – 65535	
Reserved	0		
Heartbeat Interval	<=3	0|5 – 360min	0
SACK Enable	1	0|1|2	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
CFG	3	CFG	CFG
Reserved	0		
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	sc350m
Enable ODO	1	0|1	0

ODO Initial Mileage	<=9	0.0 – 4294967.0Km	0.0
Reserved	0		
Reserved	0		
Report Composition Mask	<=4	0 – FFFF	7F
Power Saving Mode	1	0 – 2	1
IGS Composition Mask	<=2	0 – FF	0
Event Mask	<=8	0 – FFFFFFFF	3FFF
Reserved	0		
LED On	1	0|1	0
Enable Info Report	1	0|1	0
Info Report Interval	<=5	30 – 86400sec	300
Reserved	0		
Reserved	0		
Backup Battery Charge Mode	1	0|1	0
AGPS Mode	1	0|1	0
GSM Report	<=4	00 – FFFF	1F
Duration of GNSS Signal Loss	2	0 – 30min	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		
TOW	3	TOW	TOW

Tow Enable	1	0/1	0
Reserved	0		
Fake Tow Delay	<=2	0 – 10 min	1
Report 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	3
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
EPS	3	EPS	EPS
Mode	1	0|1|2	0
Min. Threshold	<=5	250 – 60000 mV	250
Max. Threshold	<=5	250 – 60000 mV	250
Reserved	0		
Debounce Time	1	0 – 5 (×10s)	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Sync with FRI	1	0|1	0

Voltage Margin Error	<=3	0 – 100(×10mv)	0
Reserved	0		
Reserved	0		
IGD	3	IGD	IGD
Ignition Detection Mode	1	0 – 4	0
Debounce Time	<=3	0 – 255(×10ms)	100
Reserved	0		
Reserved	0		
TMA	3	TMA	TMA
Sign	1	+|–	+
Hour Offset	<=2	0 – 12	
Minute Offset	<=2	0 – 59	
Daylight Saving	1	0|1	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
FRI	3	FRI	FRI
Mode	1	0 – 5	0
Discard No Fix	1	0|1	1
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
IGN Report Interval	<=5	5 – 86400sec	30
Reserved	0		
Mileage	<=5	50 – 65535m	1000
Reserved	0		

Reserved	0		
IGF Report Interval	<=5	0|5-86400sec	600
ERI Mask	8	00000000-FFFFFFFF	00000000
Reserved	0		
Reserved	0		
Reserved	0		
GEO	3	GEO	GEO
GEO ID0	<=2	0	
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		
GEO ID1	<=2	1	
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		
...			
GEO ID19	<=2	19	
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		
PIN	3	PIN	PIN
Enable Auto-unlock PIN	1	0|1	0
PIN	4 – 8	'0' – '9'	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
OWH	3	OWH	OWH
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		
DOG	3	DOG	DOG
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		
Reserved	0		
Reserved	0		
Reserved	0		
IDL	3	IDL	IDL
Mode	1	0|1	0
Idling Detection Time	2	1 – 30 min	2
Idling End Time	1	1 – 5 min	1
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		

Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Debounce Option	1	0 - 1	0
Reserved	0		
Reserved	0		
Reserved	0		
HMC	3	HMC	HMC
Enable Hour Meter	1	0|1	0
Initial Hour Meter Count	11	00000:00:00-99999:00:00	00000:00:00
Reserved	0		
Reserved	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)	2 min
Time to Start	<=3	(0 – 5 min) | (0 – 300 sec)	1 min
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		
PDS	3	PDS	PDS
Mode	1	0|1|2	1

Mask	<=4	0000-7FF	7FF
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
BZA	3	BZA	BZA
Output ID	1	0 - 2	0
Reserved	0		
Reserved	0		
Reserved	0		
Alarm 1 Output Status	1	0 - 1	
Duration	<=3	0 – 255 (×100ms)	0
Toggle Times	<=3	0 – 255	0
Reserved	0		
Reserved	0		
Alarm 2 Output Status	1	0 - 1	
Duration	<=3	0 – 255 (×100ms)	0
Toggle Times	<=3	0 – 255	0
Reserved	0		
Reserved	0		
Alarm 3 Output Status	1	0 - 1	
Duration	<=3	0 – 255 (×100ms)	0
Toggle Times	<=3	0 – 255	0
Reserved	0		
Reserved	0		
Alarm 4 Output Status	1	0 - 1	
Duration	<=3	0 – 255 (×100ms)	0
Toggle Times	<=3	0 – 255	0

Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
SPA	3	SPA	SPA
Mode	1	0|1|2	0
Speed Threshold 1	<=3	0 – 400km/h	50
Reserved	0		
Validity	<=4	0 – 3600sec	60
Alarm Type	1	0|1 – 4	0
Reserved	0		
Reserved	0		
Speed Threshold 2	<=3	0 – 400km/h	70
Reserved	0		
Validity	<=4	0 – 3600sec	60
Alarm Type	1	0|1 – 4	0
Reserved	0		
Reserved	0		
Speed Threshold 3	<=3	0 – 400km/h	90
Reserved	0		
Validity	<=4	0 – 3600sec	60
Alarm Type	1	0|1 – 4	0
Reserved	0		
Reserved	0		
Speed Threshold 4	<=3	0 – 400km/h	110
Reserved	0		

Validity	<=4	0 – 3600sec	60
Alarm Type	1	0|1 – 4	0
Reserved	0		
Reserved	0		
Reserved	0		
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		
Reserved	0		
Reserved	0		
Roaming Operator List	<=6*100		
Reserved	0		
Reserved	0		
Black Operator List	<=6*20		
Reserved	0		
Reserved	0		
Known Roaming Event Mask	<=6	000000 – FFFFFF	27DEF
Reserved	0		
Reserved	0		
Unknown Roaming Event Mask	<=6	000000 – FFFFFF	27DEF

Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
PEO	3	PEO	PEO
PEO ID	<=2	0 – 19	0
Mode	1	0 – 3	0
Start Point	<=2	1-8	1
End Point	<=2	3-10	3
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
…			
Longitude	<=11	-180 - 180	
Latitude	<=10	-90 - 90	
Check Interval	<=5	0|5 – 86400sec	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
SIM	3	SIM	SIM

Mode	1	0|1|2	0
ICCID	20		
Operation Mask	<=8	0-FFFFFFFF	0
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
ECU	3	ECU	ECU
ECU Mode	<=1	0|1	0
ECU Type	<=1	0|2|3|6	0
Reserved	<=1	0	0
Reserved	<=1	0	0
Reserved	<=1	0	0
ECU ON Control	<=1	0 - 6	0
Relay Output Mode for ECU ON Control	<=3	0 - 600	10
ECU OFF Control	<=1	0 - 6	0
Relay Output Mode for ECU OFF Control	<=3	0 - 600	0
Battery ON Control	<=1	0 - 6	0
Relay Output Mode for Battery ON Control	<=3	0 - 600	0
Battery OFF Control	<=1	0 - 6	0
Relay Output Mode for Battery OFF Control	<=3	0 - 600	0
ECU Lock	<=1	0|1	0
Reserved	0		

Smart Lamp	<=1	0|1	0
Reserved	0		
External battery on when SC350M battery low	<=1	0-6	0
Delay to Check Battery Status	<=3	10 - 600	80
ECM	3	ECM	ECM
Group ID	1	0	
Mode	1	0|1	0
Report Mask	<=32	0 - FFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFF	0
Active Triggers Mask	2	00-7F	3F
Backup Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
Backup Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
External Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
External Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
Group ID	1	1	
Mode	1	0|1	0
Report Mask	<=32	0 - FFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFF	0
Active Triggers Mask	2	00-7F	3F
Backup Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
Backup Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
External Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
External Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
Group ID	1	2	

Mode	1	0|1	0
Report Mask	<=32	0 - FFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFF	0
Active Triggers Mask	2	00-7F	3F
Backup Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
Backup Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
External Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
External Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
Group ID	1	3	
Mode	1	0|1	0
Report Mask	<=32	0 - FFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFF	0
Active Triggers Mask	2	00-7F	3F
Backup Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
Backup Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
External Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
External Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
Group ID	1	4	
Mode	1	0|1	0
Report Mask	<=32	0 - FFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFF	0
Active Triggers Mask	2	00-7F	3F
Backup Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
Backup Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600

External Battery Active Send Interval	<=6	0 | 5 – 604800 sec	30
External Battery Inactive Send Interval	<=6	0 | 5 – 604800 sec	3600
LIM	3	LIM	LIM
Max Speed	<=2	0 - 99	0
Max Assist Level	<=2	0 - 20	0
ASL	3	ASL	ASL
Mode	1	0|1	0
Enforce	<=1	0|1	0
Default Assist Level	<=2	0 - 20	0
AVS	3	AVS	AVS
Sensor Rest Duration	<=3	5 – 255 sec	120
Sensor Motion Validity	<=3	1 – 255 sec	10
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Next Packet*>: Related information packet is complete or not.
- 0: There is a complete information packet.
- 1: There is not a complete information packet.

✧ <*Current Packet*>: This is the index of **+RESP:GTALC**.

✧ <*Configurations*>: The current configuration of device. Please refer to the command protocol definition, and this message only contains the command data field.

3.3.3.12. +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**. Different AT Commands have different configuration information. For example, to get FRI configuration, please set **AT+GTRTO=sc350m,2,FRI,,,,,0015$.**

➢ **+RESP:GTALS,**

Example:

+RESP:GTALS,BC0101,866833041350312,sc350m,FRI,0,1,,,,,,30,,1000,,,600,00000000,,,,20230815014506,0006$			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Sub AT Command	3	'a' – 'z' 'A' – 'Z' '	
Mode	1	0 – 5	0
Discard No Fix	1	0|1	1
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
IGN Report Interval	<=5	5 – 86400sec	30
Reserved	0		
Mileage	<=5	50 – 65535m	1000
Reserved	0		
Reserved	0		
IGF Report Interval	<=5	0|5-86400sec	600
ERI Mask	8	00000000-FFFFFFFF	00000000
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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
+RESP:GTSTT: Device motion status indication when the motion status changes
+RESP:GTPDP: DS connection establishment report
+RESP:GTIGN: Ignition on report
+RESP:GTIGF: Ignition off report
+RESP:GTIDN: Enter into idling status
+RESP:GTIDF: Leave idling status
+RESP:GTGSS: GNSS signal status
+RESP:GTSTR: Vehicle enters into Start status
+RESP:GTSTP: Vehicle enters into Stop status
+RESP:GTLSP: Vehicle enters into Long Stop status
+RESP:GTRMD: The report for entering or leaving roaming state
+RESP:GTUPC: Report information about UPC
+RESP:GTIGS: Report the statistical information during the trip
+RESP:GTVGN: Virtual ignition on report
+RESP:GTVGF: Virtual ignition off report
+RESP:GTGSM: The report for the information of the serving cell and the neighbour cells.

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

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

Example:
+RESP:GTPNA,BC0101,865284040842605,sc350m,20210302074033,0CE6$
+RESP:GTPFA,BC0101,865284040842605,sc350m,20210302074510,0CEA$
+RESP:GTPDP,BC0101,865284040842605,sc350m,20210302111826,0D49$

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

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

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

Example:
+RESP:GTMPN,BC0101,866356061266739,SC350M,0,0.0,0,120.2,113.948000,22.573543,20230815035826,0460,0000,2495,1179,,20230815115844,00E1$
+RESP:GTMPF,BC0101,866356061266739,SC350M,0,0.0,0,120.2,113.948000,22.573543,20230815035826,0460,0000,2495,1179,,20230815115844,00E1$
+RESP:GTBTC,BC0101,866356061266739,SC350M,0,0.0,0,120.2,113.948000,22.573543,20230815035826,0460,0000,2495,1179,,20230815115850,00E4$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

➢ **+RESP:GTSTC,**

Example: **+RESP:GTSTC,BC0101,866356061266739,SC350M,0,0.0,0,147.7,113.948000,22.573543,20230815040024,0460,0000,2495,1179,,20230815120027,00E8$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

➢ **+RESP:GTBPL,**

Example: **+RESP:GTBPL,BC0101,865284040847182,SC350M,3.50,1,0.0,0,102.6,114.015355,22.537230,20220118065559,0460,0000,27BD,0DFC,,20220118065559,022B$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	

Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Backup Battery VCC	<=4	0.00 – 4.50 V	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

➢ **+RESP:GTSTT,**

Example:
+RESP:GTSTT,BC0101,865284040840609,SC350M,21,1,0.0,0,120.5,114.015554,22.537334,20220119034146,0460,0000,27BD,0DFC,,20220119034147,01CB$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Motion Status	2	16|1A|11|12|21|22	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Motion Status*>: The 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 to be 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.

➢ **+RESP:GTIGN,**

Example: **+RESP:GTIGN,BC0101,866356061266739,SC350M,48,1,0.0,0,117.3,113.947993,22.573585,20231013073630,0460,0000,2495,1179,,0.0,,20231013153631,005A$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Duration of Ignition Off	<=6	0 – 999999 sec	
GNSS Accuracy	<=2	0|1 – 50	0, Last known

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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Duration of Ignition Off*>: Duration since last time the ignition is turned off. If it 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 ranges from 00000:00:00 – 99999:00:00.

➢ **+RESP:GTVGN,**

Example:
+RESP:GTVGN,BC0101,866356061266739,SC350M,,4,174,1,0.0,0,116.0,113.948008,22.573600,20231013073936,0460,0000,2495,1179,,0.0,,20231013153937,006C$

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

Reprot Type	1	0 – 4	
Duration of Ignition Off	<=6	0 – 999999 sec	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	4	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Report Type*>: It indicates the trigger source of the ignition event.
  - 0: Hard-wired ignition detection mode.
  - 4: Accelerometer mode (virtual ignition detection)
- <*Duration of Ignition Off*>: Duration since last time the ignition is off. If it 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 ranges from 00000:00:00 – 99999:00:00.

➢ **+RESP:GTIGF,**

Example: **+RESP:GTIGF,BC0101,866356061266739,SC350M,21,1,0.0,0,128.5,113.947962,22.573548,20230815055125,0460,0000,2495,1179,,0.0,12345:31:38,20230815135126,01A5$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Duration of Ignition On	<=6	0 – 999999 sec	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

✧ <*Duration of Ignition On*>: Duration since last time the ignition is turned on. If it 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 ranges from 00000:00:00 – 99999:00:00.

➢ **+RESP:GTVGF,**

Example:
+RESP:GTVGF,BC0101,866833041298669,SC350M,,4,228,1,0.0,0,130.7,113.947980,22.573571,20231017072943,0460,0000,2495,116D,,0.0,00000:03:47,20231017072943,2060$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Reserved	0		
Reprot Type	1	2|4|7	
Duration of Ignition On	<=6	0 – 999999 sec	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
Speed	<=5	0.0 – 999.9 km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	(–)xxxxx.x m	
Longitude	<=11	(–)xxx.xxxxxx	
Latitude	<=10	(–)xx.xxxxxx	
GNSS UTC Time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Report Type*>: It indicates which mode triggers the virtual ignition event.
  - 0: Hard-wired ignition detection mode.
  - 4: Accelerometer mode (virtual ignition detection)
- <*Duration of Ignition On*>: Duration since last time the ignition is on. If it is greater than 999999 seconds, it is reported as 999999 seconds.
- <*Hour Meter Count*>: If 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 ranges from 00000:00:00 – 99999:00:00.

➢ **+RESP:GTIDN,**

Example: **+RESP:GTIDN,BC0101,866356061266739,SC350M,1,0.0,0,119.5,113.947962,22.573548,20230815055849,0460,0000,2495,1179,,20230815135849,01BC$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

➢ **+RESP:GTIDF,**

Example: **+RESP:GTIDF,BC0101,866356061266739,SC350M,11,690,0,0.0,0,119.5,113.947962,22.573548,20230815055905,0460,0000,2495,1179,,20230815135910,01C2$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF,	

		X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Motion State	2	16|1A|11|12|21|22	
Duration of Idling Status	<=6	0 – 999999 sec	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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

➢ **+RESP:GTGSS,**

Example:
+RESP:GTGSS,BC0101,865284040840609,SC350M,0,00,21,,0,0.0,0,162.4,114.015361,22.537203,20220119034808,0460,0000,27BD,0DFC,,20220119034908,01F0$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	

Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
GNSS Signal Status	1	0 | 1	
Satellite Number	2	0 0- 24	
Motion Status	2	16|1A|11|12|21|22	
Reserved	0		
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
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 visible satellites when fix succeeds. If fix fails, the parameter is empty.
- <*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 to be 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.

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

Example:
+RESP:GTSTR,BC0101,866833041298388,SC350M,,,1,13.0,30,113.7,114.034252,22.567831,20220507095023,0460,0000,0000,0000,,20220507095026,0006$
+RESP:GTSTP,BC0101,866833041298388,SC350M,,,1,0.0,30,113.7,114.037686,22.573357,20220507095421,0460,0000,2495,1179,,20220507095424,000B$
+RESP:GTLSP,BC0101,866833041298388,SC350M,,,1,0.0,30,113.7,114.037686,22.573357,20220507095520,0460,0000,2495,1179,,20220507095524,000D$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Reserved	0		
Reserved	0		
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

If the roaming state of the device changes, the **+RESP:GTRMD** message will report the current roaming state. The message is defined as an event message.

➢ **+RESP:GTRMD,**

Example: **+RESP:GTRMD,BC0101,865284040840609,SC350M,2,1,0.0,0,645.4,114.015339,22.537264,20220119055857,0460,0000,27BD,1346,,20220119055858,02A4$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=10	'0' – '9' 'a' – 'z' 'A' – 'Z'	
Roaming State	1	0-3	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	
Cell ID	<=8	XXXX	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

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

- 0: Home
- 1: Known roaming
- 2: Unknown roaming
- 3: Blocking report

➢ **+RESP:GTUPC,**

Example: **+RESP:GTUPC,BC0101,865284040840609,,0,100,http://218.17.46.11:9359/865284049248242.ini,20220119060659,02B4$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=10	'0'-'9','a'-'z','A'-'Z'	
Command ID	<=2		
Result	3	100|101|102|103|200|201|202|300|301|302	
Download URL	<=100	Complete URL	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000-FFFF	
Tail Character	1	$	$

✧ <*Command ID*>: The command ID in the update configuration file. It is 0 before the device starts to update device configuration. It indicates the total number of the commands updated successfully when the result code is 301. It indicates the command ID with wrong format when the result code is 302.

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

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

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

➢ **+RESP:GTIGS,**

This message is used to report statistical information during trip. A trip is considered to be from Ignition on to Ignition off. The message is reported after the ignition is turned off.

Example: **+RESP:GTIGS,BC0101,866356061266739,SC350M,0F,567,20230815140015,20230815140942,1,0.1,0,0.0,113.947947,22.573516,20230815060239,1,0.0,0,114.6,113.947948,22.573517,20230815060940,0460,0000,2495,1179,,0.0,12345:43:25,20230815140942,01D9$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**

Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
IGS Composition Mask	2	00 - FF	
Duration of Ignition On	<=6	0 – 999999 sec	
Ignition On Time	14	YYYYMMDDHHMMSS	
Ignition Off Time	14	YYYYMMDDHHMMSS	
GNSS Accuracy (Highest Speed Point)	<=2	0|1 – 50	0, Last known
Speed (Highest Speed Point)	<=5	0.0 – 999.9 km/h	
Azimuth (Highest Speed Point)	<=3	0 – 359	
Altitude (Highest Speed Point)	<=8	(–)xxxxx.x m	
Longitude (Highest Speed Point)	<=11	-180 - 180	
Latitude (Highest Speed Point)	<=10	-90 - 90	
GNSS UTC Time (Highest Speed Point)	14	YYYYMMDDHHMMSS	
GNSS Accuracy	<=2	0|1 – 50	0, Last known
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	XXXX	

Cell ID	<=8	XXXX	
Reserved	0		
Mileage	<=9	0.0 – 4294967.0 km	
Hour Meter Count	11	HHHHH:MM:SS	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*IGS Composition Mask*>: Bitwise mask to configure the composition of the **+RESP:GTIGS** message. (Please refer to <*IGS Composition Mask*> in **AT+GTCFG**)
- <*Duration of Ignition On*>: Duration since last time the ignition is turned on. If it is greater than 999999 seconds, it will be reported as 999999 seconds.
- <*GNSS Accuracy (Highest Speed Point)*>: The GNSS accuracy of the highest speed position.
- <*Speed (Highest Speed Point)*>: The speed of the highest speed position. Unit: km/h.
- <*Azimuth (Highest Speed Point)*>: The azimuth of the highest speed position.
- <*Altitude (Highest Speed Point)*>: The height of the highest speed position above sea level.
- <*Longitude (Highest Speed Point)*>: The longitude of the highest speed position.
- <*Latitude (Highest Speed Point)*>: The latitude of the highest speed position.
- <*GNSS UTC Time (Highest Speed Point)*>: The UTC time of the highest speed position.
- <*MCC*>: Mobile country code. It is 3 digits in length and ranges from 000 – 999.
- <*MNC*>: Mobile network code. It is 3 digits in length and ranges from 000 – 999.
- <*LAC*>: Location area code in hex format.
- <*Cell ID*>: Cell ID in hex format.
- <*Mileage*>: The current total mileage.
- <*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 ranges from 00000:00:00 – 99999:00:00.

➢ **+RESP:GTGSM,**

Example:
+RESP:GTGSM,BC0101,866833041298669,SC350M,GIR,0460,0000,247F,0EB1,25,,0460,0000,2495,0E4F,25,,0460,0000,247F,0EB3,18,,,,,,,,,,,,,,,,,,0460,0000,2495,116D,22,,20231017073502,2064$

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

Fix Type	3	RTLFRI|GIR|ERI	
MCC1	4	0XXX	
MNC1	4	0XXX	
LAC1	4		
Cell ID1	4 – 8		
RX Level1	2	0-63	
Reserved	0		
MCC2	4	0XXX	
MNC2	4	0XXX	
LAC2	4		
Cell ID2	4 – 8		
RX Level2	2	0-63	
Reserved	0		
MCC3	4	0XXX	
MNC3	4	0XXX	
LAC3	4		
Cell ID3	4 – 8		
RX Level3	2	0-63	
Reserved	0		
MCC4	4	0XXX	
MNC4	4	0XXX	
LAC4	4		
Cell ID4	4 – 8		
RX Level4	2	0-63	
Reserved	0		
MCC5	4	0XXX	
MNC5	4	0XXX	
LAC5	4		
Cell ID5	4 – 8		
RX Level5	2	0-63	

Reserved	0		
MCC6	4	0XXX	
MNC6	4	0XXX	
LAC6	4		
Cell ID6	4 – 8		
RX Level6	2	0-63	
Reserved	0		
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4		
Cell ID	4 – 8		
RX Level	2	0-63	
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
Tail Character	1	$	$

- <*Fix Type*>: A string to indicate the type of GNSS fix this cell information is for.
  "RTL": This cell information is for RTL request.
  "FRI": This cell information is for FRI request.
  "GIR": This cell information is for sub command "**C**" in the **AT+GTRTO** command.
  "ERI": This cell information is for ERI request.
- <*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 several neighbor cells (or even no neighbor cell information). If no neighbor cell is found, all the fields of the neighbor cell will be empty.
2. "ffff" in the fields <*LAC(i)*> and <*Cell ID(i)*> indicates the device does not know the value.

➢ **+RESP:GTEUC,**

Example: **+RESP:GTEUC,BC0101,865284040840609,,0,100,http://218.17.46.11:9359/865284049248242.ini,00000000,,,,,20220119080911,051A$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z', '0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=10	'0' – '9', 'a' – 'z', 'A' – 'Z'	
Command ID	<=3		
Result	3	100|101|102|103|200|201|202|300|301|302	
Download URL	<=100	Complete URL	
Identifier Number	8	000000000 – FFFFFFFF	
Reserved	0		
Reserved	0		
Reserved	0		
Reserved	0		
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
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 wrong format of command ID when the response code is 302. It is empty when the response code is 304 or 305.

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

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

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

✧ <*Identifier Number*>: Please refer to the parameter <*Identifier Number*> in the command **AT+GTUPC**.

ECU Events

- **+RESP:GTBKN: Bike on report**
- **+RESP:GTBKF: Bike off report**
- **+RESP:GTBTN: BAT switch on report**
- **+RESP:GTBTF: BAT switch off report**
- **+RESP:GTLTN: Light on report**
- **+RESP:GTLTF: Light off report**

Example: **+RESP:GTBKN,BC0104,865284040842605,0,0,1,1,0,20210303055440,7BA2$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
2	Unique ID	15	IMEI	
3	Device Name	<=20	'0' – '9', 'a' – 'z', 'A' – 'Z'	
4	Report Type	1	0|1	
5	Bike Status	1	0|1	
6	ECU Lock State	1	0|1	
7	Reserved	0		
8	ACC Status	1	0|1	
9	Send Time	14	YYYYMMDDHHMMSS	
10	Count Number	4	0000 – FFFF	
	Tail Character	1	$	$

✧ <Report Type>: This field is only valid for **+RESP:GTBKN** **+RESP:GTBKF** **+RESP:GTBTN** **+RESP:GTBTF** **+RESP:GTLTN** and **+RESP:GTLTF** report. For other reports this field is always set to 0.

- For **+RESP:GTBKN**
  0: ECU on failed.
  1: ECU on successful.
- For **+RESP:GTBKF**
  0: ECU off failed.
  1: ECU off successful.
- For **+RESP:GTBTN**
  0: BAT on failed.
  1: BAT on successful.
- For **+RESP:GTBTF**
  0: BAT off failed.
  1: BAT off successful.
- For **+RESP:GTLTN**
  0: Light on failed.

1: Light on successful.

- For **+RESP:GTLTF**

  0: Light off failed.

  1: Light off successful.

- **+RESP:GTEBR: External battery stops charging report**
- **+RESP:GTEBC: External battery starts charging report**

Example: **+RESP:GTEBR,BC0104,865284040842605,1,0,36691,4113,95,1,1,1,1,20210303055440,AA33$**				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
2	Unique ID	15	IMEI	
3	Device Name	<=20	'0' – '9', 'a' – 'z', 'A' – 'Z'	
4	Reserved	0		
5	External Power Supply	1	0|1	
6	Main Power Voltage	<=5	0|8000 – 60000 mV	
7	Backup Battery Voltage	<=4	0 – 4500 mV	
8	Backup Battery Percentage	<=3	0-100 %	
9	Bike Status	1	0|1	
10	ECU Lock State	1	0|1	
11	Reserved	0		
12	ACC Status	1	0|1	
13	Bike Full Charge Capacity (FCC) Raw	<=10	0-4294967295 mAh/mWh	
14	Bike Full Charge Capacity (FCC) Percentage	<=3	0-100 %	
15	Bike Actual State of Charge (SOC) Raw	<=10	0-4294967295 mAh/mWh	
16	Bike Actual State of Charge (SOC) Percentage	<=3	0-100 %	
17	Send Time	14	YYYYMMDDHHMMSS	
18	Count Number	4	0000 – FFFF	
	Tail Character	1	$	$

- **+RESP: GTELS: The report for successfully locking ECU lock**
- **+RESP: GTEUS: The report for successfully unlocking ECU lock**
- **+RESP: GTELF: The report for failed locking ECU lock**
- **+RESP: GTEUF: The report for failed unlocking ECU lock**

Example:

+RESP:GTELS,BC0104,865284040842605,0,1,0.0,0,44.6,114.022142,22.536125,ElrCaa+S,0460,0000,27BD,122B,41,0,1,1,0,20210303055440,7BAA$				
SN	**Parameter**	**Length (Byte)**	**Range/Format**	**Default**
1	Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
2	Unique ID	15	IMEI	
3	Device Name	<=20	'0' – '9', 'a' – 'z', 'A' – 'Z'	
4	Reserved	0		
5	GPS Accuracy	<=2	0|1 – 50	
6	Speed	<=5	0.0 – 999.9km/h	
7	Azimuth	<=3	0 – 359	
8	Altitude	<=8	(-)xxxxx.x m	
9	Longitude	<=11	(-)xxx.xxxxxx	
10	Latitude	<=10	(-)xx.xxxxxx	
11	GPS UTC Time	14	YYYYMMDDHHMMSS	
12	MCC	0|4	0XXX	
13	MNC	0|4	0XXX	
14	LAC	0|4	0XXX	
15	Cell ID	0|4|8	XXXX|XXXXXXXX	
16	Reserved	0		
17	Device status	<=10	000000-0F0F424203	
18	Bike Status	1	0|1	
19	ECU Lock State	1	0|1	
20	Reserved	0		
21	ACC Status	1	0|1	
22	Send Time	14	YYYYMMDDHHMMSS	
23	Count Number	4	0000 – FFFF	
	Tail Character	1	$	$

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.

- ✧ HSPA context activation for the TCP or UDP connection fails.
- ✧ Establishment of the TCP connection with the backend server fails.

These messages will be sent to the backend server when the connection to the server is recovered. The buffer reports are saved to the built-in non-volatile memory in case the device is reset. The device can buffer up to 10000 messages (160 bytes per message).

Detailed information of buffer report is as follows.

- ✧ Only **+RESP** messages except **+RESP:GTPDP** are buffered.

- In the buffered report, the original header string "**+RESP**" is replaced by "**+BUFF**" while the other content including the original sending time and count number remains unchanged.
- 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 a buffered message:

```
+BUFF:GTFRI,BC0101,865284040842605,,,10,1,1,0.0,0,119.9,114.015466,22.537155,202103030
55440,0460,0000,2493,17FD,00,0.0,,,,0,210000,,,,20210303055440,014A$
```

3.4. Heartbeat

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

➢ **+ACK:GTHBD,**

Example:
+ACK:GTHBD,BC0101,865284040842605,,20210303065932,01A0$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Unique ID	15	IMEI	
Device Name	<=20	'0' – '9' 'a' – 'z' 'A' – 'Z' '-' '_'	
Send Time	14	YYYYMMDDHHMMSS	
Count Number	4	0000 – FFFF	
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,BC0101,11F0$
+SACK:GTHBD,,11F0$

Parameter	Length (Byte)	Range/Format	Default
Protocol Version	6	XX0000 – XXFFFF, X∈{'A' – 'Z','0' – '9'}	
Count Number	4	0000 – FFFF	
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.

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

3.5. Server Acknowledgement

➢ **+SACK:**

Example: **+SACK:11F0$**			
Parameter	**Length (Byte)**	**Range/Format**	**Default**
Count Number	4	0000 – FFFF	
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.

Appendix A: Two's Complement

For a positive value, the two's complement is itself. Take 17 as an example. Its hex format is 0x11 and the two's complement for it is 0x11. For a negative value, the following gives detailed calculations.

-X is a negative value.
Firstly, get to know the number of bits for the negative value N, then the two's complement for it is:

2^N - X

For example, to use 16 bits to represent -100, the two's complements for it should be:

2^16 – 100 = 65436 = 0xFF9C

Above is two's complement for -100 in hex format.

On the contrary, the two's complement can also be converted to the hex value that it represents in a similar way.

1. Get to know the number of bits for the two's complement.
2. Get the sign of the value, positive or negative. If the highest bit is 1, it is a negative value. If the highest bit is 0, it is a positive value.
3. If it is a positive value, there is no need for conversion. It is the value.
4. If it is a negative value, get the real value through the following calculation:

   -(2^N – X)

   Where:

   N is the number of bits for the two's complement.

   X is the value that is converted from the two's complement directly.

For example, if the number of bits for the two's complement is 16 and the two's complement is 0xFF9C, then it is a negative value as the highest bit is 1, and the detailed calculation for it is:

-(2^16 – 0XFF9C) = -100

Appendix B: Message Index

- **Command and ACK**

+ACK:GTRMD
AT+GTSIM
+ACK:GTSIM
AT+GTUPC
+ACK:GTUPC
AT+GTGAM
+ACK:GTGAM
AT+GTAVS
+ACK:GTAVS

✧ **Position Related Report**

+RESP:GTEPS
+RESP:GTFRI
+RESP:GTRTL
+RESP:GTDOG
+RESP:GTIGL
+RESP:GTGES
+RESP:GTGIN
+RESP:GTGOT

✧ **Device Information Report**

+RESP:GTINF

✧ **Report for Querying**

+RESP:GTGPS
+RESP:GTCID
+RESP:GTCSQ
+RESP:GTVER
+RESP:GTBAT
+RESP:GTIOS
+RESP:GTTMZ
+RESP:GTAIF
+RESP:GTALS
+RESP:GTALC
+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:GTIGN
+RESP:GTIGF
+RESP:GTIDN
+RESP:GTIDF
+RESP:GTGSM
+RESP:GTGSS
+RESP:GTSTR
+RESP:GTSTP
+RESP:GTLSP
+RESP:GTRMD
+RESP:GTUPC
+RESP:GTIGS

✧ **Heartbeat**

+ACK:GTHBD
+SACK:GTHBD

✧ **Server Acknowledgement**

+SACK