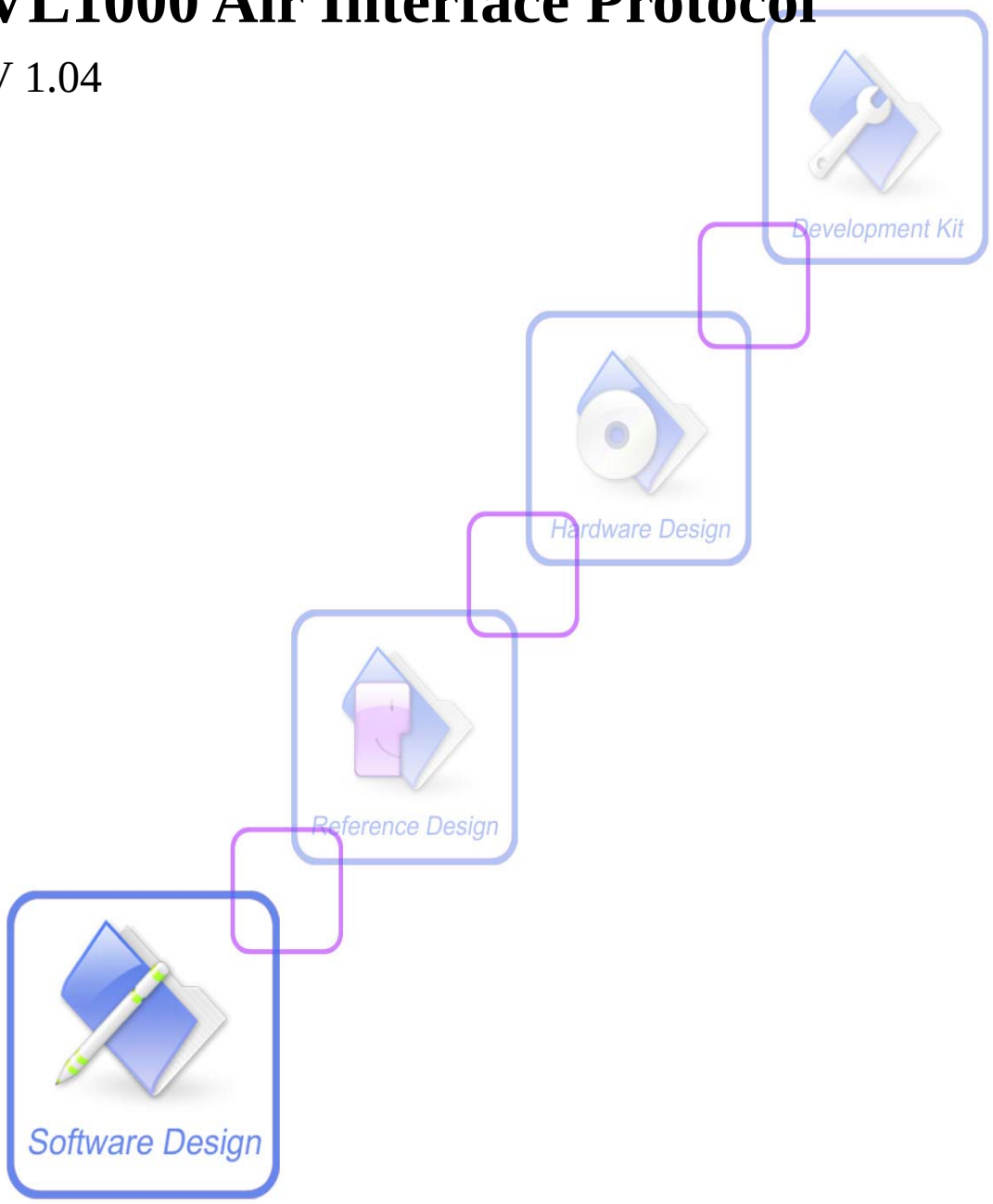
VL1000 Air Interface Protocol

V 1.04



Document Title	VL1000 Air Interface Protocol
Version	1.04
Date	2012-04-01
Status:	Release
Document Control ID	

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Revision history

Revision	Date	Description of change	Author
1.01	2011-7-8	Initial	Yang.chen
1.02	2011-7-19	1. Chapter 3.2.4: ✧ Added “Power down delay” parameter. ✧ Changed the length of the “Device Name” parameter. ✧ Added two event masks. 2. Chapter 3.3.9: Added “Report type” parameter. 3. Chapter 3.2.5: Added “Fence enable” parameter.	Yang.chen
1.03	2011-7-31	1. Deleted the “Super Password” command. 2. Added GTFRI command and event. 3. Added GTSPD command and event. 4. Deleted CELL ID request. 5. Added GSM information request. 6. Added GTRGI command. 7. Added GTREM command.	Yang.chen
	2011-8-2	Added GTGSV event.	Yang.chen
	2011-8-4	1. Added corresponding software version and PC tools version in chapter 1.1. 2. The <GPS HPA> could be set by VL1000 manager, delete it in the note of chapter 3.2.4 3. Modified the description of <Super sleep mode> parameter in chapter 3.2.7. 4. Added <Check interval2> and <Send interval2> parameters and modified the description of <Check interval1> and <Send interval1> parameters in chapter 3.2.11. 5. Refresh the examples of AT+GTRGI and AT+GTREM command. 6. Delete "The power key will be disabled at the same time" in chapter 3.3.8 according to the software. 7. Added description of <Black Call Number> parameter. 8. Changed the scope of <GTCFG Event Mask> parameter to “0000-FFFF”. 9. Added the scope of <DOP> parameter.	Yang.chen
	2011-8-5	1. Deleted <Reserved> parameter which is after <CELL ID> parameter of GTFRI event. 2. Modified the description of Bit3 (0008) of parameter <Report mask> in chapter 3.2.11.	Yang.chen

		3. Modified the description of <Super sleep mode> parameter. 4. Refresh the example of GTFRI event.	
	2011-8-8	1. Added <Report mode> parameter of GTCONF event. 2. Deleted neighborhood cell parameters <MCC4>,<MNC4>,<LAC4>,<CELL ID4>, <MCC5>,<MNC5>,<LAC5> and <CELL ID5> to shorten the GTGSM message.	Yang.chen
	2011-8-12	1. Modified the description of <Super sleep mode> parameter. 2. Added value “F” of <sub command> parameter for AT+GTRTO command. 3. Added “GTRFC” event in chapter 3.3.22. 4. Added LED light description if the terminal enters super sleep mode.	Yang.chen
	2011-8-15	1. Added a new parameter <Report type> of GTPWD event. 2. Modified the description of <Super sleep mode> parameter.	Yang.chen
	2011-8-17	1. Added a new parameter <SSM2 battery percentage threshold> of GTCFG command. 2. Modified the description of <Super sleep mode> parameter. 3. Modified the message head of GTREM command to “+BUFF” 4. Added one note of GTFRI command.	Yang.chen
	2011-8-17	1. Modified the default value of <SSM2 battery percentage threshold> parameter to 50 seconds. 2. Optimized the description of (SSR) subcommand.	Yang.chen
	2011-8-19	1. Modified note 2 in 3.2.11 (Fixed Report Information) If motion sensor function is disabled, fixing GPS every <Check interval1> second(s) while sending GTFRI every <Send interval1> second(s) no matter the terminal moves or not.	Zhengning .wang
	2011-10-10	1. Added value 0 of parameter <Check interval 1>, <Send interval 1>, <Check interval 2> and <Send interval 2>	Yang.chen
	2011-10-11	1. Modified the example of GTPWD event.	Yang.chen
	2011-10-14	1. Added AGPS command (AT+GTAGP) 2. Added value 1 and 2 of parameter <Report mode> in “AT+GTQSS” command.	Yang.chen

		3. Used the second <Reserved> parameter as <Short TCP hold time> in “AT+GTQSS” command.	
	2011-10-18	1. Added chapter 3.2.15 “Power on Mode Setting”	Yang.chen
	2011-10-21	1. Added subcommand RESET (0x4) of AT+GTRTO command. 2. Added the subcommand EMBUFF(0x10) of AT+GTRTO command. 3. Added “AT+GTGHR” command. 4. Modified the default hold time of pressing SOS key from 3 seconds to 2 seconds. 5. Modified the light indication. 6. Modified the report event of “AT+GTRTO” with subcommand = “A” from “+RESP:GTGHR” to “+RESP:GTSHR”.	Yang.chen
	2011-10-24	1. Added “Detect Freefall” function. 2. Added “Status of GPS History Fix Records Report” event.	Yang.chen
	2011-10-25	1. Added “GPS History Fix Records Report” 2. Added “Freefall Event Report”	Yang.chen
	2011-10-26	1. Added “+RESP:GTIGN” event 2. Added “+RESP:GTIGF” event	Yang.chen
	2011-10-27	1. Modified “SHORT_TCP_FORCED_MODE” to “SHORT_TCP_BUF_MODE”. 2. Modified <F-count> description. 3. Modified <AGPS Used> to <AGPS mode>	Yang.chen
	2011-10-28	1. Added “Ignition Event Report” 2. Modified the description of <SOS key> parameter.	Yang.chen
	2011-11-01	1. Added the principle of ignition detect function.	Yang.chen
	2011-11-15	Added GPS information of GTIGN and GTIGF event.	Yang.chen
	2011-11-25	1. Added chapter 3.2.19 GPS on Need	Yang.chen
	2011-12-19	Modified parameters “MCC1” “MNC1” “LAC1” “CELL ID1” to “Reserved” of GTFRI event.	Yang.chen
	2012-2-14	Added a note that <Send intervaln> cannot be set over 15 times of <Check intervaln>.	Yang.chen
1.04	2012-3-27	1. Added battery light and GPS light indication when the module is turned off manually. 2. Modified the default value of <GPS HPA> to 999. 3. Modified the default value of <Online User> and	Yang.chen

		<Online password> to effective user name and password. 4. Modified the default value of <Searching seconds> to 99. 5. Added a note of AssistNow Online mode, the module will download the online data automatically 2 minutes after it is started. 6. Modified the value description of LONG_TCP_BUF_MODE. 7. Modified the parameter name <Send interval> to <Speed send interval>. 8. Modified the max length of <Sub command> parameter to 2. 9. Modified bit field description of <Report mask> parameter in “AT+GTFRI” command. 10. Modified the parameter <Speed> to <Velocity>. 13. Changed the default value of <GPS fix delay time> to 4. 14. Modified four “Reserved” parameters of GTFRI event to “MCC1” “MNC1” “LAC1” “CELL ID1”. 15. Modified the “$” parameter to “;” of GTRGI response.	

1. Overview

1.1 Scope

The VL1000 Air Interface Protocol is a protocol of digital communication interface based on printable ASCII characters over SMS or GPRS 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 with an acknowledgement message. If necessary, the terminal also sends report messages to the backend server.
The purpose of this document is to describe how to build up the backend server based on the VL1000 Air Interface Protocol.

1.2 Terms and Abbreviations

Table 1: Terms and abbreviations

Abbreviation	Description
APN	Access Point Name
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
IMEI	International Mobile Equipment Identity
IP	Internet Protocol
SMS	Short Messaging Service
TCP	Transmission Control Protocol
GPS	Global Positioning System
HPA	Horizontal Position Accuracy
VPA	Vertical Position Accuracy
DOP	Dilution of Precision
MCC	Mobile Country Code
MNC	Mobile Network Code
LAC	Location Area Code
TA	Timing Advance

2. System Architecture

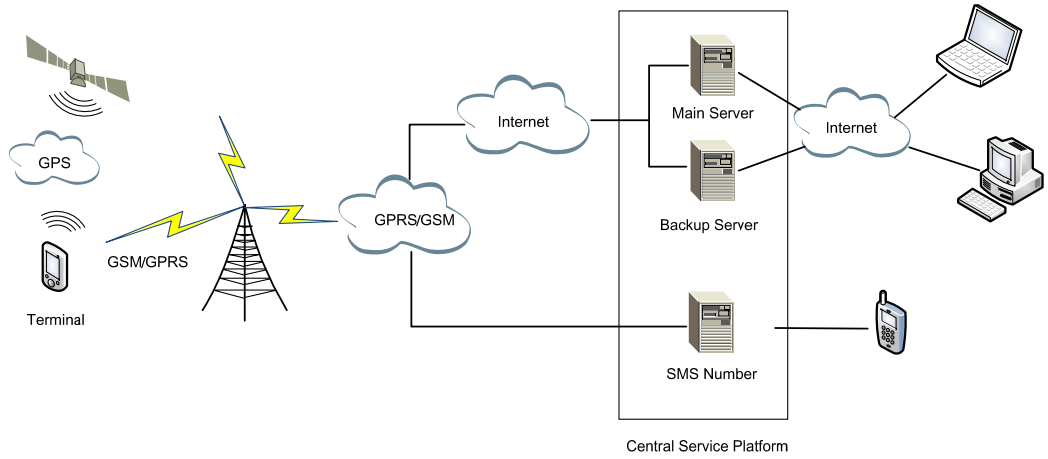

Figure 1: System architecture

The backend server can be accessed by many terminals and should have the following capabilities:

- The backend server should be able to access the internet and listen to the connection originated from the terminal.
- The backend server should be able to support a TCP connection with the terminal. It should be able to receive data from the terminal and send data to the terminal.
- If user wants to control the terminal by SMS, the backend server should be able to receive and send SMS. Note that the message which length exceeds 160 bytes cannot be sent to the terminal.

3. Message Description

3.1 Message Format

All of the VL1000 Air Interface Protocol messages are composed of printable ASCII characters. Each message has the following format:

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

An entire message string ends with character '$'.

The characters 'XXX' identify different messages.

The identifiers "<parameter1>,<parameter2>,…" carry the message's parameters. The number of parameters is different for different messages. The ASCII character ',' is used to separate the neighboring parameters. The parameter strings may contain ASCII characters: '0'-'9', 'a'-'z', 'A'-'Z'.

Detailed descriptions of each message format are located in the specific message sections accordingly.

By sending commands to the terminal, the backend server can either configure and query the parameters of the terminal or control the terminal to perform specific actions. When the terminal receives the 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. Refer to the following figure:

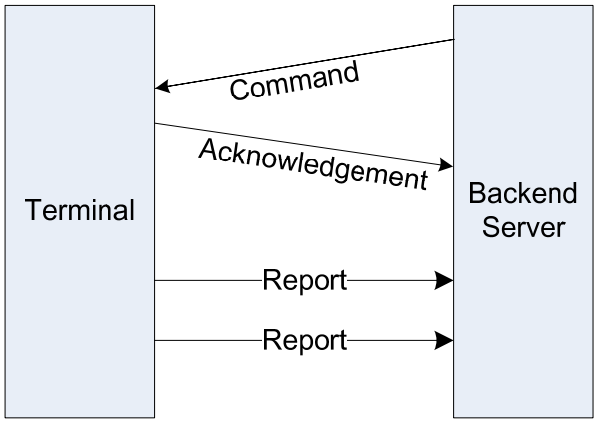

Figure 2: VL1000 Protocol messages flow

3.2 Command and Acknowledgement

3.2.1 Quick Start Setting

The command **AT+GTQSS** is used to set the GPRS parameters and backend server information. It can be separated by two commands which are **AT+GTBSI** and **AT+GTSRI** if the length of AT+GTQSS command is over 160 bytes which exceeds the maximum send bytes via SMS.

AT+GTQSS=

Example: **AT+GTQSS=vl1000,AT&T,us,pwd,4,,0,116.236.221.75,9090,,,,30,,,0,10,0001$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	vl1000
APN	<=40		
APN user name	<=20		
APN password	<=20		
Report mode	1	0|1-6	0
Reserved	<=1		
Short TCP hold time	<=1	0|1-9 minute	0
Main server IP	<=60		
Main server port	<=5	0-65535	
Backup server IP	<=15		
Backup server port	<=5	0-65535	
SMS number	<=20		
Heartbeat interval	<=5	0|30-86400 second	30
Reserved	<=1		
Reserved	<=1		
Server switch	<=2	0|1-99	3
Connection threshold	<=2	0|1-99	10
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- <*Password*>*:* The valid characters of password are ‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’, it is case sensitive. The default value is “vl1000”.
- <*APN*>*:* Access point name (APN).
- <*APN user name*>*:* The GPRS APN user name.
- <*APN password*>*:* The GPRS APN password.
- <*Report mode*>*:* Supports report modes as following:
  - 0 STOP_REPORTING_MODE. Stop reporting.
  - 1 SHORT_TCP_SMS_MODE. The connection is based on TCP protocol. The terminal connects to the backend server every time it needs to send data and will shutdown the connection when the terminal finishes sending data. And if it is failed to establish a TCP connection with the backend server, it will try to send data via SMS.

2 SHORT_TCP_BUF_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 a TCP connection with the backend server it will store data in the buffer.

3 LONG_TCP_SMS_MODE. The connection is based on TCP protocol. The terminal connects to the backend server and maintains the connection using the heart beat data. Please note that in this mode the backend server should respond to the heart beat data from the terminals. And if the TCP connection is lost with the backend server (including Main Server and Backup Server), it will try to send data via SMS.

4 LONG_TCP_BUF_MODE. Terminal connects to server via TCP protocol. If the connection is not successful (including main server or backend server), or connection is disconnected, all message contents that terminal prepares to send will be stored in the buffer zone.

5 UDP_MODE. The terminal will send data to the backend server by UDP protocol. It supports the protocol command sent from server via UDP. But it is recommended to make sure the IP address and UDP port of the device can be visited via internet, and the port should be stabilized in a certain time which is generally realized by heart beat package and the message is "+RESP:GTHBD".

6 FORCE_ON_SMS. Only use the SMS for transmitting.

- *<Reserved>:* Not used at present.
- *<Short TCP hold time>:*

  0 shutdown TCP connection immediately after data is sent successfully.

  1~9 shutdown TCP connection if there is no data to be sent after <short TCP hold time> minutes.
- *<Main server IP>:* The IP address of the main server.
- *<Main server port>:* The port of the main server.
- *<Backup server IP>:* The IP address of the backup server.
- *<Backup server port>:* The port of the backup server.
- *<SMS number>:* The number of Mobile device to which SMS will be sent, this SMS contains AT response or event report.
- *<Heartbeat interval>:* The interval for the terminal to send heartbeat package message to the backend server. If it is set to 0, it will close heartbeat.
- *<Server switch>:* Maximum times that the terminal tries to connect to the main server via TCP/IP protocol. Once exceeding the maximum times, the terminal will connect backup server automatically if the backup server is configured.

  0 close this function, do not change (by default if the backup server is not set)

  1-99 maximum times to connect (3 is the default value if backup server is set)

Note: This parameter cannot be set by user at present.

- *<Connection threshold>:* Maximum TCP/IP connection failure times. If failure time exceeds it (including main and backup server), the terminal will be reset.

  0 close this function

  1-99 maximum times to connect

Note: This parameter cannot be set by user at present.

- *<Sequence number>:* The sequence number for the command. It will be invoked in the ACK

message of the command.

- *<Tail character>:* A character to indicate the end of the command. It should be "$".

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

+ACK:GTQSS

Example: **+ACK:GTQSS,010000,012207000000015,DevName,0001,20120331015942,0001$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<Protocol version>:* The version number of the applied protocol. The first two characters 'XX' indicate the main version number. The middle two characters are the minimum version number. The last two characters are temporary version number. For example, '010200' means version 1.02.00.
- *<Unique ID>:* IMEI of the device.
- *<Device name>:* Name of the device, which appears in each uplink message (ACK response and event report). It is case sensitive.
- *<Sequence number>:* The same Sequence number which is sent to the device with the corresponding command. The backend server could use it to distinguish which command the ACK message is for.
- *<Send time>:* The UTC time to send the ACK message.
- *<Count number>:* The self-increasing count number which will be put into every acknowledgment message and report message. The count begins from 0 and increases by 1 every time. It will roll back after "FFFF".

3.2.2 Bearer Setting Information

The command **AT+GTBSI** is used to set the GPRS parameter.

AT+GTBSI=

Example: **AT+GTBSI=vl1000,AT&T,us,pwd,,,,,0002$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	vl1000
APN	<=40		
APN user name	<=20		
APN password	<=20		
Reserved	<=1		

Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

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

+ACK: GTBSI

Example: **+ACK:GTBSI,010000,012207000000015,DevName,0002,20120331020745,0002$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.3 Backend Server Register Information

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

AT+GTSRI=

Example: **AT+GTSRI=vl1000,4,,0,116.236.221.75,9090,116.236.221.75,9090,,0,,,3,10,,0003$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-’9’, ‘a’-’z’, ‘A’-’Z’	vl1000
Report mode	1	0|1-6	0
Reserved	<=1		
Short TCP hold time	<=1	0|1-9 minute	0
Main server IP	<=60		
Main server port	<=5	0-65535	
Backup server IP	<=15		
Backup server port	<=5	0-65535	
SMS number	<=20		
Heartbeat interval	<=5	0|30-86400 second	30
Reserved	<=1		
Reserved	<=1		
Server switch	<=2	0|1-99	3

Connection threshold	<=2	0|1-99	10
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

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

+ACK: GTSRI

Example: **+ACK:GTSRI,010000,012207000000015,DevName,0003,20120331021206,0003$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.4 Global Configuration and Password Change

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

AT+GTCFG=

Example: **AT+GTCFG=vl1000,,DevName,5,6,0,50,,,0000,1800,,0,4,999,200,,,,,0004$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	vl1000
New password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	
Device name	0|3-10	'0'-'9', 'a'-'z', 'A'-'Z'	DevName
Battery report interval	<=4	0|5-1440 minute	5
Power down delay	<=2	1-30 second	6
Geofence check interval	<=5	0|30-86400 second	0
SSM2 battery percentage threshold	<=2	0-99	50
Reserved	<=1		
Reserved	<=1		
Button mask	4	0000-FFFF	0000
Event mask	4	0000-FFFF	1800
Reserved	<=1		
Satellite number	1	0-8	0
GPS fix delay time	<=2	0-99 second	4
GPS HPA	<=3	0-999 meter	999

GPS VPA	<=3	0-999 meter	200
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<New password>:* Set the new password.
- *<Device name>:*Null means the current value without change.
- *<Battery report interval>:* The time interval for reporting battery level periodically.
- *<Power down delay>:* The terminal will send data to the server after user presses power key for more than 3 seconds to power off the terminal. The power delay time is the maximum time to complete data transmission. After which the terminal will be shut down completely. Default value is 6 seconds.
- *<Geofence check interval>:* Location interval for geofence evaluation, if any geofences are provisioned. Each geofence is evaluated against the location returned at this interval.
  0 second means using latest GPS fix to check geofence.
- *<SSM2 battery percentage threshold>:* Under the premise of setting the <Super sleep mode> parameter to automobile mode (value 2), if the battery percentage is lower than this value, the terminal will enter super sleep mode unconditionally. To exit super sleep mode, refer to the conditions of automobile mode in chapter 3.2.7.
- *<Button mask>:* A Hex value
  0000 will not close TCP/IP connection when GTNMR happens.
  0010 will close TCP/IP connection when GTNMR happens.
- *<Event mask>:* A Hex value to configure which event will be reported to the backend server: Each bit corresponds to a report message. And if the bit is set to 1, the corresponding report message can be sent to the backend server. Otherwise, it cannot be sent to the backend server. Here is the mapping between each bit and each report message respectively.
  Bit5(0020) +RESP:GTBAT Real time battery level report.
  Bit6(0040) +RESP:GTINF Device information report. It is reported when the terminal is powered on.
  Bit7(0080) +RESP:GTPWD Device power down report. It is reported when the terminal is powered down.
  Bit8(0100) +RESP:GTBCI Report illegal incoming call if the incoming call number is not in the white list set by Google Map link function.
  Bit9(0200) +RESP:GTCEP Connection to external power supply report.
  Bit10(0400) +RESP:GTDEP Disconnection from external power supply report.
  Bit11(0800) +RESP:GTMOV Movement detected by motion sensor report.
  Bit12(1000) +RESP:GTNMR Non movement detected by motion sensor report.
- *<Satellite number>:* Used to set the minimum satellite number of a valid GPS fix. Normally, 4 satellites are relatively reasonable value.

- *<GPS fix delay time>:* Positioning delay time parameter. After successful fix, the position information is valid only when the consecutive positioning seconds are not smaller than the set value. This function could be set according to different situation. The default value is 0 second.
- *<GPS HPA>:* Horizontal Position Accuracy. After successful fix, the position information is valid only when it is not more than the set value. User could set that value according to its HPA requirement. For example, when the set value is 18 meters, the majority of drift could be controlled within 36 meters. The smaller the value, the more accurate the fix will be. While the value is too small, (like 10 meters), it might significantly increase the time cost to fix.
- *<GPS VPA>:* Vertical Position Accuracy. After successful fix, the position information is valid only when it is not more than the set value. Similarly, user could set that value according to its VPA requirement.

Note: The parameter <GPS VPA> and <GPS HPA> could not be set by VL1000 manager. It will use the default value.

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

+ACK:GTCFG

Example: **+ACK:GTCFG,010000,012207000000015,DevName,0004,20120331021749,0004$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.5 Geo-Fence Information

The command **AT+GTGEO** is used to configure the parameters of Geo-Fence. Geo-Fence is a virtual zone on a geographic area using a location-based service. When the geo fencing terminal exits or enters the area a notification is generated depending on the mode. The notification contains terminal location information.

AT+GTGEO=

Example: **AT+GTGEO=vl1000,0,1,121.354468,31.221912,50,1,0,,,,,,,,0005$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	vl1000
GEO ID	1	0-4	0
Mode	1	0-3	0

Longitude0	<=11	(-)xxx.xxxxxx	
Latitude0	<=10	(-)xx.xxxxxx	
Radius	<=7	50-6000000 meter	
Figure	1	1-4	1
Confirming retries	1	0-7	0
Longitude1	<=11	(-)xxx.xxxxxx	
Latitude1	<=10	(-)xx.xxxxxx	
Longitude2	<=11	(-)xxx.xxxxxx	
Latitude2	<=10	(-)xx.xxxxxx	
Longitude3	<=11	(-)xxx.xxxxxx	
Latitude3	<=10	(-)xx.xxxxxx	
Longitude4	<=11	(-)xxx.xxxxxx	
Latitude4	<=10	(-)xx.xxxxxx	
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- <*GEO ID*>: A numeric to identify the Geo-Fence.
- <*Mode*>:
  - 0 disable Geo-Fence.
  - 1 report when terminal enters the Geo-Fence.
  - 2 report when terminal leaves the Geo-Fence.
  - 3 report when terminal enters or leaves the Geo-Fence.
- <*Longitude0*>: The longitude of a point which is defined as the center of the Geo-Fence circular region. The format is "(-)xxx.xxxxxx" and the value range is from "-180.000000" to "180.000000". The unit is degree. West longitude is defined as negative starting with minus sign "-" *and east* longitude is defined as positive without "+" sign.
- <*Latitude0*>: The latitude of a point which is defined as the centre of the Geo-Fence circular region. The format is "(-)xx.xxxxxx" and the value range is from "-90.000000" to"90.000000". The unit is degree. South Latitude is defined as negative starting with minus sign"-" and north Latitude is defined as positive without "+" sign.
- <*Radius*>: The radius of the Geo-Fence circular region. The value range is (50-6000000) and the unit is meter. If user uses polygons, not circular region, terminal shall ignore the radius value.
- <*Figure*>:
  - 1 circularity with center and radius
  - 2 circularity with center and one point on the circle
  - 3 triangle
  - 4 quadrangle
- <*Confirming retries*>: When a geofence violation is first detected, there shall be this many position retry attempts to confirm that the position is consistently in violation. The retries shall occur 10 seconds apart. If any of the retries returns a position that does not qualify, then the GTGEO report is not sent. Failure to get some or all of the retry fixes shall not prevent the alarm.

  0 means no retry.

- *<Longitude-n> <Latitude-n>:*

  1. Set circle by center and radius:

  <Longitude0>, <Latitude0> indicate the center of the circle.

  <Radius> indicates the radius of the circle.

  2. Set the circle by the center and one point on the circle:

  <Longitude1>, <Latitude1>, <Longitude2>, <Latitude2> need to be valid, <Longitude3>, <Latitude3>, <Longitude4>, <Latitude4> need to be 0.

Note: Make sure <Longitude1> and <Latitude1> indicate the location of the center of the circle; <Longitude2>,<Latitude2> indicate the point on the circle.

  3. Set triangle:

  <Longitude1>, <Latitude1>, <Longitude2>, <Latitude2>, <Longitude3>, <Latitude3> need to be valid and <Longitude4>, <Latitude4> need to be 0.

  4. Set convex quadrilateral:

  <Longitude1>, <Latitude1> …<Longitude4>, <Latitude4> should be all valid.

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

+ACK:GTGEO

Example: **+ACK:GTGEO,010000,012207000000015,DevName,0,0005,20120331022025,0005$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
GEO ID	1	0-4
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.6 Speed Alarm

The **AT+GTSPD** command is used to configure speed alarm of the terminal. Based on the setting of working mode, the terminal will report speed alarm when its speed is outside or inside of a predefined range.

AT+GTSPD=

Example: **AT+GTSPD=vl1000,0,0,0,0,300,0,,,,,,,,,,,,,,0006$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	vl1000
Mode	1	0-2	0
Min speed	<=3	0-400 km/h	0
Max speed	<=3	0-400 km/h	0

Speed check interval	<=5	0|30-86400 second	0
Speed send interval	<=4	30-3600 second	300
Confirming retries	1	0-7	0
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Mode>:* A numeric to indicate the working mode of speed alarm.
  - 0 disable speed alarm.
  - 1 enable speed alarm. If the current speed is within the speed range defined by <Min speed> and <Max speed>, a speed alarm is sent.
  - 2 enable speed alarm. If the current speed is outside the speed range defined by <Min speed> and <Max speed>, a speed alarm is sent.
- *<Min speed>:* The lower limit of the speed range.
- *<Max speed>:* The upper limit of the speed range.
- *<Speed check interval>:* Location interval for purpose of speed check. When speed alarm is enabled, a timer for checking the speed starts. It will reset after <Speed check interval>. Once the timer expires, the terminal will try to fix GPS actively. If motion sensor is enabled and no motion is detected then location interval is skipped.
- *<Speed send interval>:* Once a speed alarm is triggered, and no "+RESP: GTSPD" report has been sent in the current <Speed send interval> period, then GTSPD report will be sent to the backend server one time. Otherwise, no report is sent. After GTSPD report is sent, the send timer restarts, no GTSPD report is allowed to send in the period of this send interval, and GPS fix is triggered at this moment.
- *<Confirming retries>:* Retry times to confirm whether the speed is consistently in the alarm range when the speed is first detected in the range for speed alarm. The retries shall occur 10 seconds apart. If any of the retries returns a speed that doesn't meet the qualification of speed alarm, the speed alarm will be triggered. Failure to get some or all of the retry fixes shall not prevent the alarm.
  - 0 means no retry

The acknowledgement message of **AT+GTSPD** command:

+ACK:GTSPD

Example: **+ACK:GTSPD,010000,012207000000015,DevName,0006,20120331022648,0006$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.7 Motion Sensor Setting

The **AT+GTMSS** command is used to configure the parameters of motion sensor.

AT+GTMSS=

Example: **AT+GTMSS=vl1000,1,2,,120,6,1,0,0007$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	vl1000
M-threshold	<=3	0|1-127	1
M-delay-time	<=3	0|1-255 (10 millisecond)	2
Reserved	<=1		
Static arbitration time	<=5	0|1-65535 second	120
Axis	1	2|4|6	6
Mode	1	0|1	1
Super sleep mode	1	0-2	0
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<M-threshold>:* M-threshold is a parameter to decide the threshold of Movement Event Report. The movement is judged when terminal detects that its acceleration exceeds preset threshold acceleration and movement time exceeds preset movement cycle. Then it reports these events to GPS module. GPS module will process the request and follow the requirement whether to report the data to server. The smaller the value, the more accurate the detection will be.

  Acceleration value (g) = <M-threshold>*0.063

Note: The object’s surrounding environment will bring some jitter, when acceleration threshold is set to 1, that jitter will result in minor acceleration and in turn false judgement of movement. As the result, it is suggested to set the threshold to be bigger than 1. In ideal environment, the required detect object is sensitive, threshold could be set smaller. In other scenes, the setting needs to be adjusted according to actual applications.

- <*M-delay-time*>: The time that the terminal's acceleration maintains.
  0 means to use the default parameter 2 (*10 millisecond)
- <*Static arbitration time*>: The time from movement to still state exceeds which will be considered to be still.
  0 means to use the default parameter 120 seconds
- <*Axis*>:
  2 only enable x axis acceleration
  4 only enable y axis acceleration
  6 enable x and y axes acceleration
- <*Mode*>:
  0 disable motion sensor function
  1 enable motion sensor function
- <*Super sleep mode*>: In super sleep mode, the terminal will enter a super low power consuming mode that GSM transceiver will be powered down and GSM light will be turned off.
  0 disable
  1 normal mode
  2 automobile mode

Only if all the following conditions are fulfilled, terminal will enter super sleep mode:

1) No external power plugged in.
2) <Super sleep mode> parameter is set to either 1 or 2
3) Terminal is in non-movement state
4) Terminal is not in SOS state
5) There is no GTFRI event to be reported currently
6) <Send interval2> parameter in "Fixed Report Information" (Paragraph 3.2.11) is larger than 10 minutes

Note:

1. ***In normal mode or automobile mode, the terminal will enter into super sleep mode unconditionally if backend server sends AT+GTRTO command with <Sub command> = "F". To exit the super sleep mode, refer to the conditions listed in the following section.***
2. ***In automobile mode, the terminal will enter super sleep mode unconditionally if the battery is lower than <SSM battery percentage threshold>. To exit the super sleep mode, refer to the conditions listed in the following section.***

Under normal mode, if one of the following events happens, terminal will exit super sleep mode:

1) External power is plugged in.
2) When motion is first detected, the terminal will exit super sleep mode.
3) When SOS key is pressed for more than 2 seconds, the terminal will enter SOS state and exit super sleep mode. Only if SOS event is stopped by backend server via AT command (refer to AT+GTRTO, giving parameter <*Sub command*> as "C") that the terminal could exit SOS state.
4) The terminal is in low battery voltage, it will exit super sleep mode and GTBPL event will

be reported continuously.

5) If fixed report information function is enabled, the module will exit the super sleep mode when there is a GTFRI report ready to send.

Under automobile mode, if one of the following events happens, terminal will exit super sleep mode:

1) External power is plugged in.
2) When SOS key is pressed more than 2 seconds, the terminal will enter SOS state and exit super sleep mode. Only if SOS event is stopped by backend server via "AT+GTRTO" command with <Sub command> = "C" that the terminal could exit SOS state.

The acknowledgement message of **AT+GTMSS** command:

+ACK: GTMSS

Example: **+ACK:GTMSS,010000,012207000000015,DevName,0007,20120331022156,0007$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.8 Google Link Setting

The **AT+GTGMP** command is used to set legal phone number to connect Google link.

AT+GTGMP=

Example: **AT+GTGMP=vl1000,,,123456789,,,,,,,,,,0008$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	vl1000
Reserved	<=1		
Reserved	<=1		
White call list	<=20*10	'*','+','0'-'9'	
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<White call list>:* A phone number list. It could include several phone numbers. And two adjacent phone numbers are separated with ",". Once an incoming call is from white call list, the terminal will terminate the call, and send a SMS to that number which contains a web link leads to the current location of the terminal. User could click the link to get the terminal's

current location.

Note: To delete the phone number set previously, user should reset the number to "0". The phone number with null input means not to change the number set previously.

The acknowledgement message of **AT+GTGMP** command:

+ACK: GTGMP

Example: **+ACK:GTGMP,010000,012207000000015,DevName,0008,20120331022533,0008$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

Google link example:

VL1000 is located at east longitude 121.354463 degree, north latitude 31.222038 degree.

http://maps.google.com/?q=31.222038,121.354463

3.2.9 Function Key Setting

The **AT+GTFKS** command is used to configure the function of the power key and the SOS key.

AT+GTFKS=

Example: **AT+GTFKS=vl1000,1,0,10,,0,,,0009$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	vl1000
Power key	1	0|1	1
SOS key	1	0|1	0
SOS report interval	<=3	5-600 second	10
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Power key>:* A numeric to indicate the working mode of the power key.
  - 0 disable, pressing power key could not power down the device.
  - 1 enable, pressing power key could power down the device.

Note:

1. ***Execute "AT+GTRTO" command with <Sub command> = "C" which can also enable the power key.***
2. ***If power key is enabled, to turn off VL1000, press and hold the power key for approximately 3 seconds, until both the battery light and GPS light are lightened, and release the power key. VL1000 is completely shut down when all lights are off.***

- *<SOS key>:* Selection of SOS key function (press SOS key for more than 2 seconds).

  0 Fix GPS first, and then report the SOS event with real GPS information, it may take about 2 minutes to fix. If GPS can still not be fixed after that time, the terminal will report the last GPS information and stop positioning to prevent the battery from running out.

  1 SOS event will be reported to the backend server immediately. (If the <Report mode> is set to TCP or UDP mode and the <SMS number> is set, the SOS event will also be sent to the <SMS number> via SMS for one time.) Then the terminal will fix the GPS, and report SOS event with location every <SOS report interval> seconds, the backend server could send command to stop the reporting. (Refer to "AT+GTRTO" command, giving parameter <Sub command> as"C").

- *<SOS report interval>:* The interval of reporting GPS information. Unit: second.

The acknowledgement message of **AT+GTFKS** command:

+ACK:GTFKS

Example: **+ACK:GTFKS,010000,012207000000015,DevName,0009,20120331021848,0009$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.10 Real Time Operation

The **AT+GTRTO** command is used to remotely control the terminal by the server.

AT+GTRTO=

Example: **AT+GTRTO=vl1000,0,,,,,,,000A$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	vl1000
Sub command	<=2	0-1|3-5|7-A|C-10	
Reserved	<=1		
Reserved	<=1		

Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Sub command>:* A numeric to indicate the sub command to be executed.
  - 0 (**GPS**): Request GPS related information. "+RESP:GTGPS" event will be reported.
  - 1 (**CONF**): Request the device to report the current configuration list. "+RESP:GTCONF" event will be reported.
  - 3 (**REBOOT**): Reboot the device remotely.
  - 4 (**RESET**): Reset all the protocol command parameter to factory setting, the terminal will restart itself after resetting.
  - 5 (**PWDOFF**): Power off the device remotely.
  - 7 (**CSQ**): Request the device to report the current GSM signal level. "+RESP:GTCSQ" event will be reported.
  - 8 (**VER**): Request the device to report the current version. "+RESP:GTVER" event will be reported.
  - 9 (**BAT**): Request the device to report the current battery level. "+RESP:GTBATR" event will be reported.
  - A (**GTSHR**): Inquiry of the total number of GPS history fix records which are stored in the device, and the index range which user inquires last time. "+RESP:GTSHR" event will be reported. If GPS fixed report is needed, refer to "AT+GTGHR" command.
  - C (**SSR**): Turn off SOS alert, stop SOS event report, and return to normal mode. Meanwhile, the power key is enabled.
  - D (**GSM**): GSM information. "+RESP:GTGSM" event will be reported.
  - E (**GSV**): Report all visible satellites information including satellite number and relevant signal strength. "+RESP:GTGSV" event will be reported.
  - F (**RF**): If super sleep mode is not disabled (refer to <Super sleep mode> parameter of GTMSS command), power down GSM transceiver unconditionally, the terminal will enter into super sleep mode, "+RESP: GTRFC" event will be reported.
  - 10 (**EMBUFF**): Disable, enable or delete event message in the buffer according to the first <Reserved> parameter. Note that the message which has been reported before will not be reported again.

    The description of the first <Reserved> parameter:
    - 0 disable report of the event messages in the buffer.
    - 1 enable report of the event messages in the buffer.
    - 2 delete all the event messages in the buffer.

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

+ACK:GTRTO

Example:

+ACK:GTRTO,010000,012207000000015,DevName,GPS,000A,20120331023044,000A$		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sub command	<=6	String of subcommand
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.11 Fixed Report Information

The **AT+GTFRI** command is used to configure the parameters of scheduled report.

AT+GTFRI=

Example: **AT+GTFRI=vl1000,1,,,,0000,2359,120,360,120,360,0000,,,0,0,0,,,,000B$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	vl1000
Mode	1	0|1	1
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Begin time	<=4	HHMM	0000
End time	<=4	HHMM	2359
Check interval1	<=5	0|5-86400 second	120
Send interval1	<=5	0|5-86400 second	360
Check interval2	<=5	0|5-86400 second	120
Send interval2	<=5	0|5-86400 second	360
Report mask	4	0000-FFFF	0000
Reserved	<=1		
Reserved	<=1		
Movement detect mode	1	0|1	0
Movement speed	<=3	0|1-999 km/h	0
Movement distance	<=4	0|1-9999 meter	0
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Mode>:*

0 disable fixed report function.

1 enable fixed report function.

- *<Begin time>:* The start time of scheduled fixed report. The valid format is “HHMM”. The value range of “HH” is “00”-“23”. The value range of “MM” is “00”-“59”. It is noticed UTC time should be used here.
- *<End time>:* The end time of scheduled fixed report. The valid format and range are same as <Begin time>.
- *<Check interval1>:* The interval time to fix GPS when the terminal is in motion state. 0 means not to check.
- *<Send interval1>:* The period to send the position information when the terminal is in motion state. 0 means not to send.
- *<Check interval2>:* The interval time to fix GPS when the terminal is in motionless state. 0 means not to check.
- *<Send interval2>:* The period to send the position information when the terminal is in motionless state. 0 means not to send.
- *<Report mask>:*

  Bitwise report mask to configure the composition of GPS position information for fixed report. If some bit is set as 1, the corresponding field will be filled in the position related message. Otherwise, the field will be empty.

  Bit0(0001): <Velocity>

  Bit1(0002): <Azimuth>

  Bit2(0004): <Altitude>

  Bit3(0008): GSM LAI and CI, including <MCC>, <MNC>, <LAC>, <CELL ID>, <CSQ RSSI> and <TA>.

  Bit4 (0010): <Send time>
- *<Movement detect mode>:* Use GPS fix position to calculate distance or speed.

  0 disable the movement detection function.

  1 enable the movement detection function.
- *<Movement speed>:* The speed threshold of movement detection.

  0 not detect speed
- *<Movement distance>:* The distance threshold of movement detection.

  0 not detect distance

Note:

1. ***If motion sensor function is enabled (refer to AT+GTMSS command), GTFRI event will be reported when the terminal is considered in movement, otherwise, it will not be reported.***
2. ***If motion sensor function is disabled, fixing GPS every <Check interval1> second(s) while sending GTFRI* every *<Send interval1> second(s) no matter the terminal moves or not.***
3. ***If <Check intervaln> is set no more than 60 seconds and shorter than <Send intervaln>, the terminal will send the report every <Check intervaln> seconds.***
4. ***<Send intervaln> cannot be set over 15 times of <Check intervaln>.***

The acknowledgement message of **AT+GTFRI** command:

+ACK:GTFRI

Example:

+ACK:GTFRI,010000,012207000000015,DevName,000B,20120331022623,000B$		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.12 Read Instored GPS Message Locally

The **AT+GTRGI** command is used to read the GPS information in the buffer, the maximum buffer capacity is 10000 GPS messages.

AT+GTRGI

Example: **AT+GTRGI** **31.221910,121.354495,46.6,3.6,330,20110731145958;** **31.221955,121.354486,40.0,0.5,0,20110731150016;** **…** **OK**		
Parameter	**Length (byte)**	**Range/Format**
Latitude	<=10	(-)xx.xxxxxx
Longitude	<=11	(-)xxx.xxxxxx
Altitude	<=8	(-)xxxxx.x meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
GPS UTC time	14	YYYYMMDDHHMMSS
Tail character	1	$

3.2.13 Read Instored Event Message Locally

The **AT+GTREM** command is used to read the event information (not including ACK message of AT command) in the buffer, the maximum buffer capacity is 500 event messages.

AT+GTREM

Example: **AT+GTREM** **+BUFF:GTMOV,010000,012207008347236,DevName,0,0,2,61,3.1,132,53.4,121.354477,31.221894,20110731054323,460,00,1816,F621,,27,460,00,1816,F212,20110731060947,0117$** **+BUFF:GTBAT,010000,012207008347236,DevName,,,94,4128,,,20110731061113,0118$**

```
…
OK
```

3.2.14 AGPS Setting

The **AT+GTAGP** command is used to set AssistNow Online/offline Server information.

AT+GTAGP=

Example: **AT+GTAGP=vl1000,0,1,,agps.u-blox.com:46434,jianying.hu@sim.com,Nbafcq,3,120,,,,http://alp.u-blox.com/current_3d.alp,,,3,1440,,,,000E$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’,‘A’-‘Z’	vl1000
AGPS mode	1	0-3	0
Autonomous control	1	0|1	1
Reserved	<=1		
Online Server Address	<=40	URL	agps.u-blox.com:46434
Online User	<=28	Email Address	jianying.hu@sim.com
Online password	<=12	‘0’-‘9’, ‘a’-‘z’,‘A’-‘Z’	Nbafcq
Online retry times	1	0-9	3
Online update Interval	<=3	0|20-240minutes(4 hours)	120
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Offline Server Address	<=40	URL	http://alp.u-blox.com/current_3d.alp
Reserved	<=1		
Reserved	<=1		
Offline retry times	1	0-9	3
Offline almanac age	<=5	0|30-20160minutes(14 days)	1440
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<AGPS mode>:*
  - 0 not use AGPS
  - 1 use AssistNow online AGPS
  - 2 use AssistNow offline AGPS

3 use AssistNow online and offline AGPS both

- *<Autonomous control>:*

  0 do not use AssistNow Autonomous

  1 use AssistNow Autonomous

Note: AssistNow Autonomous is an embedded feature available free-of-charge which accelerates GPS positioning by capitalizing on the periodic nature of GPS satellite orbits. GPS orbit predictions are directly calculated by the GPS receiver and no external aiding data or connectivity is required. AssistNow Autonomous can be used alone, or together with AssistNow Online or AssistNow Offline to increase GPS fixing speed and accuracy.

- *<Online Server Address>:* AssistNow online server address
- *<Online User>:* AssistNow online server user name
- *<Online password >:* AssistNow online server password
- *<Online retry times>:* AssistNow online server connect retry times limit
- *<Online update Interval>:* Update local online data from AssistNow online server time interval.

  0 means no update
- *<Offline Server Address>:* AssistNow offline server address
- *<Offline retry times>:* AssistNow offline server connection retry time limit
- *<Offline almanac age>:* It indicates the period exceeds which the almanac will be invalid. It is recommended to set it more than 4 hours.

  0 means no update

Note:

1. To register for AssistNow Online, simply send an e-mail to agps-account@u-blox.com. An automatic reply will be generated with the following information:
User name (same as e-mail address) and Password.
The account is activated immediately.

2.“http://” in parameter <Online Server Address> and <Offline Server Address> can be omitted.

3. If AssistNow Online mode is enabled, VL1000 will download the online data automatically 2 minutes after it is started.

The acknowledgement message of **AT+GTAGP** command:

+ACK:GTAGP

Example: **+ACK:GTAGP,010000,012207000000015,DevName,000E,20120331022726,000E$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.15 Power on Mode Setting

The **AT+GTPOM** command is used to change the power on mode when the locater is plugged into a charger.

AT+GTPOM=

Example: **AT+GTPOM=vl1000,0,,,,000F$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	vl1000
Mode	1	0|1	0
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Mode>:*
  - 0 automobile mode
  - 1 pet mode

The parameter is used to define VL1000 power-on or power-off state if a charger is connected.
For automobile mode:
VL1000 will be power on when a charger is connected
For pet mode:
If the previous state of VL1000 is powered off manually, VL1000 will stay in power-off state when a charger is connected. Otherwise, VL1000 will be powered on.
Note: If the state of VL1000 is powered on, the state will not be changed when a charger is connected.

The acknowledgement message of **AT+GTPOM** command:

+ACK: GTPOM

Example: **+ACK:GTPOM,010000,012207000000015,DevName,000F,20120331094453,000F$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.16 Request GPS History Fix Records Report

The **AT+GTGHR** command is used to request GPS history fix records report to backend server by TCP and UDP.

AT+GTGHR=

Example: **AT+GTGHR=vl1000,1,0,9999,,,,,00010$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	vl1000
Mode	1	0-2	0
Begin index	<=4	0-9999	
End index	<=4	0-9999	
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Mode>:*
  - 0 stop GPS history fix records report.
  - 1 start GPS history fix records report.
  - 2 delete all the GPS history fix records.
- *<Begin index>:* Begin index of GPS history fix records report request.
- *<End index>:* End index of GPS history fix records report request.

Note: If <mode> is set to 1 and the index scope is right (valid scope can be got from "+RESP:GTSHR" event which is required by "AT+GTRTO" command with <Sub command> = "A"), after executing this command, the GPS history fix records will be reported via the event "+RESP:GTGHR". During the reporting of GPS information, user can stop it at any time via this command by setting parameter <mode> to 0.

If user terminates the reporting by setting <mode> to "0" while the records were not completely reported, then next time user requires the state of GPS history fix records ("+RESP:GTSHR"), both the <Begin index>and <End index> will be 0.

The acknowledgement message of **AT+GTGHR** command:

+ACK:GTGHR

Example: **+ACK:GTGHR,010000,012207000000015,DevName,0010,20120331023306,0010$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Sequence number	4	0000-FFFF

Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.17 Detect Freefall

The **AT+GTFFA** command is used to configure the motion sensor to detect freefall.

AT+GTFFA =

Example: **AT+GTFFA=vl1000,0,25,,,,,,0011$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	'0'-'9', 'a'-'z', 'A'-'Z'	vl1000
Mode	1	0|1	0
F-count	<=3	1-255	25
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Mode>:*
  - 0 disable freefall detection.
  - 1 enable freefall detection.
- *<F-count>:* The time that the terminal's acceleration maintains. Every count is 20 milliseconds. The smaller the value, the more sensible the detection will be.

Freefall will be detected when the terminal's acceleration is below 0.2 gravity and the time it maintains is more than parameter <F-count>*20 millisecond.

The following table is a reference to determine the time that a fall will take based on the distance or vice-versa.

Time	Distance
20 ms	1.96 mm
60 ms	1.77 cm
100 ms	4.91 cm
200 ms	19.6 cm
300 ms	44.1 cm
500 ms	1.23m
1s	5.00m

Distance	Time
1 cm	45 ms
10 cm	142 ms
20 cm	202 ms
25 cm	226 ms
30 cm	247 ms
1m	351 ms
5m	1s

The acknowledgement message of **AT+GTFFA** command:

+ACK: GTFFA

Example: **+ACK:GTFFA,010000,012207000000015,DevName,0011,20120331022802,0011$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.18 Ignition Event Setting

The **AT+GTIGN** command is used to enable/disable ignition event report.

AT+ GTIGN =

Example: **AT+GTIGN=vl1000,1,00012$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’	vl1000
Ign report	1	0|1	0
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<Ign report>:* enable/disable ignition event report
  - 0 disable
  - 1 enable

Principle:

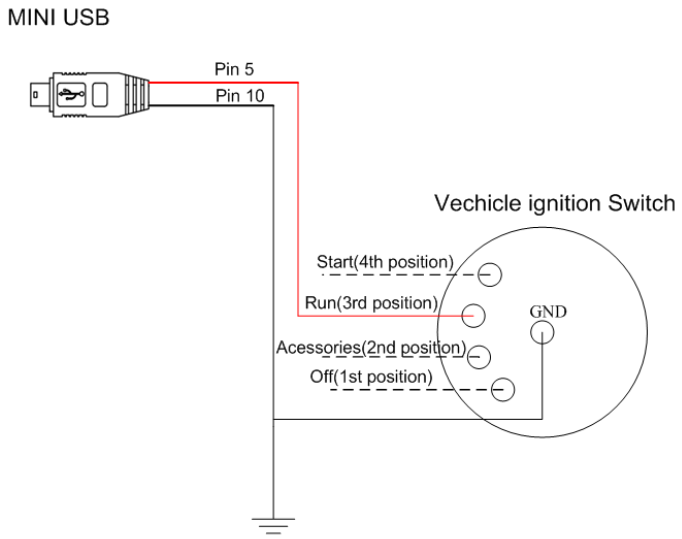

Figure 3: Pin connection

The pin5 of MINI USB is ignition input. Its electrical conditions are:

Logical state	Electrical state
Active	8.5V to 80V
Inactive	0V to 4.5 V or open

Software design:

The following flow chart gives user an overview of the whole ignition process.

If the steps before “ignition on” are all completed, “+RESP:GTIGN” event will be reported when ignition input is drove up to a high level.

After a period of time, when ignition input is pulled to a low level for more than 5 seconds, “+RESP:GTIGF” event will be reported.

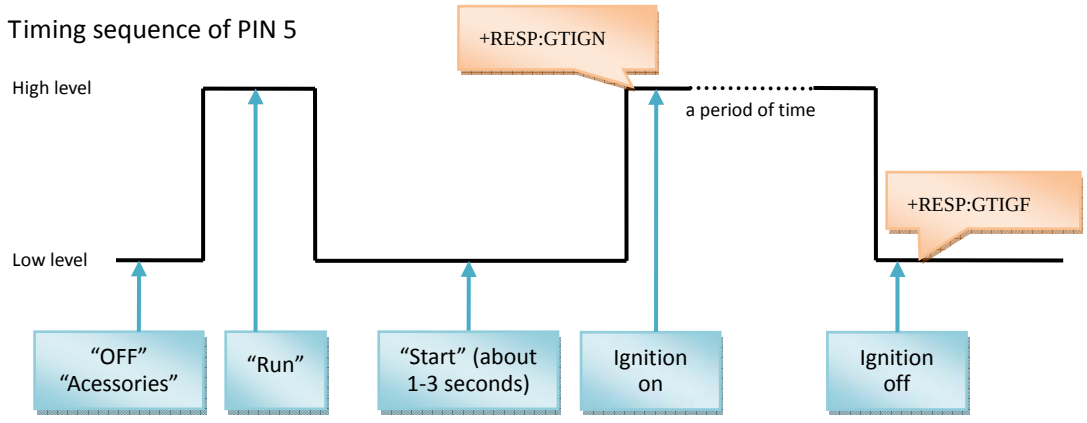

Figure 4: Ignition process

The acknowledgement message of **AT+ GTIGN** command:

+ACK: GTIGN

Example: **+ACK:GTIGN,010000, 012207000000015,DevName,0012,20120331094346,0012$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.2.19 GPS on Need

The **AT+GTGON** command is used to set GPS power characteristic.

AT+GTGON=

Example: **AT+GTGON=vl1000,0,,1,15,99,,,,0013$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Password	4-6	‘0’-‘9’, ‘a’-‘z’,‘A’-‘Z’	vl1000
Mode	1	0-1	0
Reserved	<=1		
GPS in view	1	0-9	1
GPS SNR	2	0-50	15
Searching seconds	2	5-99	99
Reserved	<=1		
Reserved	<=1		
Reserved	<=1		
Sequence number	<=4	0-FFFF	
Tail character	1	$	$

- *<mode>:*
  0 normal mode
  1 always on mode
  If< mode> is equal to 1, then GPS will keep on after power on.
- *<GPS in view>:* minimum numbers of satellite in view of which total SNR is larger than 0.
- *<GPS SNR>:* minimum of GPS Satellite’s SNR sum limit.
- *<Searching seconds>:*
  If <mode> is equal to 0, after GPS have been powered on for <Searching seconds>, if the numbers of GPS is less than<GPS in view>, at the same time, sum of GPS signal value is less

than <GPS SNR>, then GPS will be powered off this round.

The acknowledgement message of **AT+ GTGON** command:

+ACK: GTGON

Example: **+ACK:GTGON,010000,012207000000015,DevName,0013,20120331022932,0013$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Sequence number	4	0000-FFFF
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3 Report Message

3.3.1 Device Information Report

"+RESP:GTINF": Device Information Report

Example: +RESP:GTINF,010000,012207000000015,DevName,,,22,0,0,,,,,,,,,,,,,,,20120331075623,0001$		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
CSQ RSSI	<=2	0-31|99
CSQ BER	<=2	0-7|99
External power supply	1	0|1
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<CSQ RSSI>:* Receiving signal strength indication
  - 0 less than or equal-115dBm
  - 1 -111dBm
  - 2...30 -110... -54dBm
  - 31 greater than or equal to -52dBm
  - 99 unknown or undetectable
- *<CSQ BER>:* Channel bit error rate

0...7 RXQUA value in the chart, refer to GSM 05.08 [20] chapter 7.2.4

99 unknown or undetectable

- *<External power supply>:* External power indication

0 no external power connected

1 external power connected

3.3.2 Device Power Down Report

"+RESP:GTPWD": Device Power Down Report

Example: **+RESP:GTPWD,010000,012207000000015,DevName,,0,0,15,0.0,0,38.0,121.354515,31.221968,20120331075503,460,000,1816,F621,00,0,460,000,1816,F212,20120331075504,002C$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Report type	1	0|1
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<Report type>:* Power down type

0 power down the terminal actively. (Backend server power off the device remotely via AT

command or the power key is pressed)

1 low power

- *<DOP>:* Dilution of precision. If this value is above 10, the cell ID information will be shown no matter the GPS information exists or not.
- *<GPS accuracy>:* The accuracy of GPS.
- *<Velocity>:* The velocity from GPS.
- *<Azimuth>:* The azimuth from GPS.
- *<Altitude>:* The height above sea level from GPS.
- *<Longitude>:* The longitude of the current position. The format is "(-)xxx.xxxxxx" and the value ranges from "-180.000000" to "180.000000". The unit is degree. West longitude is defined as negative start with minus sign "-" and east longitude is defined as positive without "+" sign.
- *<Latitude>:* The latitude of the current position. The format is "(-)xx.xxxxxx" and the value range is from "-90.000000" to "90.000000". The unit is degree.
  South Latitude is defined as negative starting with minus sign "-" and north Latitude is defined as positive without "+" sign.
- *<GPS UTC time>:* UTC time from GPS.
- *<CELL ID>:* CELL ID in hex format of the service cell.
- *<MCC>:* Mobile country code of the service cell.
- *<MNC>:* Mobile network code of the service cell.
- *<LAC>:* Location area code in hex format of the service cell.
- *<TA>:* Timing advance. Blank when it cannot be obtained.
- *<CSQ RSSI>:* Receiving signal strength indication
- *<CELL ID1>:* CELL ID of one neighbor cell.
- *<MCC1>:* Mobile country code of one neighbor cell.
- *<MNC1>:* Mobile network code of one neighbor cell.
- *<LAC1>:* Location area code of one neighbor cell.

Note: If the fields from <MCC> to <CELL ID1> are empty, that indicates "GPS FIXED SUCCESSFULLY" and the GPS information is the real time information; otherwise the GPS information reported is of the last time.

3.3.3 Battery Percentage Timer Report

"+RESP:GTBAT": Battery Percentage timer report.

Example: **+RESP:GTBAT,010000,012207000000015,DevName,,,85,3996,,,20120331075912,0005$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	

Battery percentage	<=3	0-100
Battery voltage	<=4	0-4500 mV
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- <*Battery percentage*>*:* The percentage of battery left.
- <*Battery voltage*>*:* The voltage of battery.

3.3.4 Low Battery Voltage Report

"+RESP:GTBPL": Low battery report. If voltage is lower than 3.5V this event will be reported automatically.

Example: **+RESP:GTBPL,010000,012207000000015,DevName,,,2,3482,,,20110731164946,0007$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
Battery percentage	<=3	0-100
Battery voltage	<=4	0-4500 mV
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.5 SOS Event Report

"+RESP:GTSOS": Report after long pressing the SOS key (more than 2 seconds) , and the power key will be disabled at the same time.

Example: **+RESP:GTSOS,010000,012207000000015,DevName,,,1,18,0.0,0,50.1,121.354517,31.221949,20120331075305,,,,,,,,,,20120331075305,0022$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI

Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- <*Velocity*>*:* The velocity from GPS.
- <*Azimuth*>*:* The azimuth from GPS.
- <*Altitude*>*:* The height above sea level from GPS.
- <*Longitude*>*:* The longitude of the current position. The format is “(-)xxx.xxxxxx” and the value ranges from “-180.000000” to “180.000000”. The unit is degree. West longitude is defined as negative start with minus sign “-” and east longitude is defined as positive without “+” sign.
- <*Latitude*>*:* The latitude of the current position. The format is “(-)xx.xxxxxx” and the value range is from “-90.000000” to “90.000000”. The unit is degree.
  South Latitude is defined as negative starting with minus sign “-” and north Latitude is defined as positive without “+” sign.
- <*GPS UTC time*>*:* UTC time from GPS.

3.3.6 Non Movement Event Report

"+RESP:GTNMR": Non movement is detected by motion sensor.

Example:

+RESP:GTNMR,010000,012207000000015,DevName,,,1,10,0.0,0,41.2,121.354512,31.221972, 20120331075431,,,,,,,,,,20120331075431,0027$		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.7 Movement Event Report

"+RESP: GTMOV": Movement is detected by motion sensor.

Example: +RESP:GTMOV,010000,012207000000015,DevName,,,1,18,0.0,0,50.1,121.354517,31.221949, 20120331075305,,,,,,,,,,20120331075305,0023$		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	

Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.8 Cross-border Event Report

"+RESP:GTGEO": This event report happens when the terminal has crossed the fence which was set by **AT+GTGEO** command earlier.

Example: **+RESP:GTGEO,010000,012207000000015,DevName,0,1,2,26,0.0,0,64.2,121.354435,31.221972,20120331074435,,,,,,,,,,20120331074436,000C$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
GEO ID	1	0-4
Report type	1	0|1
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter

Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<Report type>:*

  0 exit the corresponding Geo-Fence.

  1 enter the corresponding Geo-Fence.

3.3.9 Speed Alarm

"+RESP:GTSPD" The speed is outside or inside of a predefined range.

Example: **+RESP:GTSPD,010000,012207000000015,DevName,,,2,26,0.0,0,64.2,121.354435,31.221972,20120331074435,460,000,1816,F621,00,29,460,000,1816,F212,20120331074435,000B$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX

MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.10 Power Key Short Press Event Report

"+RESP:GTPKS": Report the GPS information of the device when the power key is pressed shortly (approximately 1 second), which will not turn off the power.

Example: **+RESP:GTPKS,010000,012207000000015,DevName,,,0,15,0.0,0,0.0,121.354515,31.221968,20120331075503,460,000,1816,F621,00,25,460,000,1816,F202,20120331075959,0008$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX

MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.11 Black Call Incoming Report

"+RESP:GTBCI": Report illegal incoming call only if it is enabled by AT+GTCFG command.

Example: **+RESP:GTBCI,010000,012207000000015,DevName,15000660271,,,,,20120331075401,0026$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Black Call number	<=20	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<Black Call number>:* Illegal incoming call number which cannot be found in <white call list> (set by "AT+GTGMP" command).

3.3.12 Connecting External Power Supply Event Report

"+RESP:GTCEP": The report for connecting to the external power supply.

Example: **+RESP:GTCEP,010000,012207000000015,DevName,,,86,4004,,,20120331075324,0024$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
Battery percentage	<=3	0-100
Battery voltage	<=4	0-4500 mV
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.13 Disconnection of External Power Supply Event Report

"+RESP:GTDEP": The report of unplugging the external power supply.

Example: **+RESP:GTDEP,010000,012207000000015,DevName,,,86,4004,,,20120331075332,0025$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
Battery percentage	<=3	0-100
Battery voltage	<=4	0-4500 mV
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.14 GPS Request Report

"+RESP:GTGPS": The report for real time GPS request.

Example: **+RESP:GTGPS,010000,012207000000015,DevName,,,1,11,0.0,0,49.2,121.354467,31.221972,20120331074644,,,,,,,,,,20120331074644,0012$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS

MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.15 GSM/GPRS Signal Strength Request Report

"+RESP:GTCSQ": The report for real time CSQ request.

Example: **+RESP:GTCSQ,010000,012207000000015,DevName,24,0,20120331074752,0016$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'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	$

3.3.16 Battery Level Report

"+RESP:GTBATR": Report for real time battery level request.

Example: **+RESP:GTBATR,010000,012207000000015,DevName,,,56,3778,,,20110731170317,0063$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
Battery percentage	<=3	0-100
Battery voltage	<=4	0-4500 mV
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.17 Device Configuration Parameters Inquiry Report

"+RESP:GTCONF": Report for real time configuration inquiry.

Example: **+RESP:GTCONF,010000,012207000000015,DevName,116.236.221.75,3118,15000660271,3,10,1800,0,5,4,0,999,200,1,2,120,0,0,20120331074649,0014$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Backend server IP	<=15	
Backend server port	<=5	0-65535
SMS number	<=20	
Server switch	<=2	0|1-99
Connection threshold	<=2	0|1-99
GTCFG Event mask	4	0000-FFFF
Heartbeat interval	<=5	0|30-86400 second
Battery report interval	<=4	0|5-1440 minute
Report mode	1	0|1-6

Satellite number	1	0-8
GPS HPA	<=3	0-999 meter
GPS VPA	<=3	0-999 meter
M-threshold	<=3	0|1-127
M-delay-time	<=3	0|1-255 (10 millisecond)
Static arbitration time	<=5	0|1-65535 second
Power key	1	0|1
SOS key	1	0|1
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- <*GTCFG Event mask*>*:* Current event mask, refer to the parameter <Event mask> of AT+GTCFG command for details.

3.3.18 VERSION Request Report

"+RESP:GTVER": Report for real time version request.

Example: **+RESP:GTVER,010000,012207000000015,DevName,,,VL1000B04M64_ST,V02,,,20120331074754,0018$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
Version number	15	
Version sub ID	3	
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- <*Version number*>*:* The current version.
- <*Version sub ID*>*:* The sub ID of the current version.

3.3.19 GSM Information

"+RESP:GTGSM": Report for real time GSM information request.

Example:

+RESP:GTGSM,010000,012207000000015,DevName,460,000,1816,F621,00,23,460,000,1816,F212,460,000,1816,F202,460,000,1816,F411,20120331075033,001C$		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
MCC2	3	XXX
MNC2	3	XXX
LAC2	4	XXXX
CELL ID2	4	XXXX
MCC3	3	XXX
MNC3	3	XXX
LAC3	4	XXXX
CELL ID3	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- <*CELL IDn*>*:* n:1-3 CELL ID of the neighbor cell n, n is the index of the neighbor cell.
- <*MCCn*>*:* n:1-3 Mobile country code of the neighbor cell n.
- <*MNCn*>*:* n:1-3 Mobile network code of the neighbor cell n.
- <*LACn*>*:* n:1-3 Location area code of the neighbor cell n.

3.3.20 Fixed Report

“**+RESP:GTFRI**": Report of AT+GTFRI.

Example: **+RESP:GTFRI,010000,012207000000015,DevName,,,0,2,999,0.0,0,3.5,121.354525,31.221991,20120331080106,460,000,1816,F621,00,28,,,,,85,20120331080106,000C$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999

Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
Number	<=2	0-14
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Battery percentage	<=3	0-100
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<Number>:* Number of points in the report message. According to the setting of fixed report, there could be up to 15 points in one **+RESP:GTFRI** report.

Note: If GPS information is not null even it is the previous positioning information, the event will not contain the neighbor cell information.

3.3.21 GSV Request Report

"+RESP:GTGSV": The report for real time GNSS Satellites in View request.

Example: **+RESP:GTGSV,010000,012207000000015,DevName,,,,,,,,,,,,,,,,,,,,,,,,20120331075041,001E$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’

Satellites in View	<=2	blank |1-12
Satellite ID 1	<=3	blank |1-255
Satellite ID 1 SNR	<=2	blank |0-99
Satellite ID 2	<=3	blank |1-255
Satellite ID 2 SNR	<=2	blank |0-99
Satellite ID 3	<=3	blank |1-255
Satellite ID 3 SNR	<=2	blank |0-99
Satellite ID 4	<=3	blank |1-255
Satellite ID 4 SNR	<=2	blank |0-99
Satellite ID 5	<=3	blank |1-255
Satellite ID 5 SNR	<=2	blank |0-99
Satellite ID 6	<=3	blank |1-255
Satellite ID 6 SNR	<=2	blank |0-99
Satellite ID 7	<=3	blank |1-255
Satellite ID 7 SNR	<=2	blank |0-99
Satellite ID 8	<=3	blank |1-255
Satellite ID 8 SNR	<=2	blank |0-99
Satellite ID 9	<=3	blank |1-255
Satellite ID 9 SNR	<=2	blank |0-99
Satellite ID 10	<=3	blank |1-255
Satellite ID 10 SNR	<=2	blank |0-99
Satellite ID 11	<=3	blank |1-255
Satellite ID 11 SNR	<=2	blank |0-99
Satellite ID 12	<=3	blank |1-255
Satellite ID 12 SNR	<=2	blank |0-99
Send time	14	YYYYMMDDHHMMSS
Count number	<=4	0-FFFF
Tail character	1	$

- <Satellites in View>*:* Number of Satellites in View.
- <Satellite ID *i*>*:* Satellite ID , *i* count from 1 to 12.
- <Satellite ID *i* SNR>*:* Signal Noise Ratio of Satellite ID, *i* count from 1 to 12.

Note: Null when not tracking (blank).

3.3.22 RF Report

"**+RESP:GTRFC"**: Report for entering super sleep mode.

Example: **+RESP:GTRFC,010000,012207000000015,DevName,20120331075448,002A$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI

Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.23 Status of GPS History Fix Records Report

"+RESP:GTSHR": The report for real time GTSHR request.

Example: **+RESP:GTSHR,010000,012207000000015,DevName,0,0,0,0,20120331075924,0007$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Total of GPS history records	<=5	0-10000
Begin index	<=4	0-9999
End index	<=4	0-9999
Number of unreported	<=5	0-10000
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<Total of GPS history records>:* The total number of GPS history fix records which are stored in the device.
- *<Begin index>:* Begin index of last request GPS history fix records report.
- *<End index>:* End index of last request GPS history fix records report.
- *<Number of unreported>:* The number of GPS history fix records which have not been reported in the last requirement.

Note: The larger the index, the newer the record.

3.3.24 GPS History Fix Records Report

"+RESP:GTGHR": Report GPS history fix records to backend server.

Example: **+RESP:GTGHR,010000,012207000000015,DevName,31.221945,121.354488,36.9,0.0,0,20120331080704;31.221943,121.354491,37.3,0.0,0,20120331080656;31.221945,121.354492,36.5,0.0,0,20120331080651;31.221947,121.354494,35.8,0.0,0,20120331080646;31.221949,121.354495,35.9,0.0,0,20120331080641;31.221948,121.354493,36.3,0.0,0,20120331080636;20120331080716,0025$**		
Parameter	**Length (byte)**	**Range/Format**

Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Latitude	<=10	(-)xx.xxxxxx
Longitude	<=11	(-)xxx.xxxxxx
Altitude	<=8	(-)xxxxx.x meter
Velocity	<=5	0.0-499.9km/h
Azimuth	<=3	0-359 degree
GPS UTC time	14	YYYYMMDDHHMMSS
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

Note: The “+RESP:GTGHR” message contains up to 10 GPS information, separated between two GPS information with sign “;”.

3.3.25 Freefall Event Report

"+RESP:GTFFA": Report detection of freefall event.

If motion sensor detects freefall, the terminal will report last GPS fix first, then report real GPS fix once.

Example: **+RESP:GTFFA,010000,012207000000015,DevName,,,1,17,0.0,0,36.6,121.354502,31.221951,20120331080546,,,,,,,,,,20120331080546,0019$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX

TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.26 GTIGN Car Ignition On

"+RESP:GTIGN": Report the car ignition on event.

Example: **+RESP:GTIGN,010000,012207000000015,DevName,,,3,36,1.9,0,61.9,121.354283,31.221522,20111115020320,,,,,,,,,,20111115020320,0040$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS

Count number	4	0000-FFFF
Tail character	1	$

3.3.27 GTIGF Car Ignition Off

"+RESP:GTIGF": Report the car ignition off event.

Example: **+RESP:GTIGF,010000,012207000000015,DevName,,,3,36,1.9,0,61.9,121.354283,31.221522,20111115020320,,,,,,,,,,20111115020320,0041$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	'0'-'9', 'a'-'z', 'A'-'Z'
Reserved	<=1	
Reserved	<=1	
DOP	<=2	0-50
GPS accuracy	<=3	0|1-999 meter
Velocity	<=5	0.0-499.9 km/h
Azimuth	<=3	0-359 degree
Altitude	<=8	(-)xxxxx.x meter
Longitude	<=11	(-)xxx.xxxxxx
Latitude	<=10	(-)xx.xxxxxx
GPS UTC time	14	YYYYMMDDHHMMSS
MCC	3	XXX
MNC	3	XXX
LAC	4	XXXX
CELL ID	4	XXXX
TA	<=2	Blank|0-99
CSQ RSSI	<=2	0-31|99
MCC1	3	XXX
MNC1	3	XXX
LAC1	4	XXXX
CELL ID1	4	XXXX
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

3.3.28 AGPS Data Download Status Report

"+RESP:GTAGP": Report for AGPS data download status.

Example: **+RESP:GTAGP,010000,012207000000015,DevName,,,offline,SUCCESS,24532,,,,20110930075002,004E$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Reserved	<=1	
Reserved	<=1	
AGPS style	<=7	
Status	<=7	
Size	<=5	
Reserved	<=1	
Reserved	<=1	
Reserved	<=1	
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

- *<AGPS style>:*
  “online”: AssistNow online AGPS
  “offline”: AssistNow offline AGPS
- *<Status>:*
  “SUCCESS”: Get AGPS data from server successfully
  “FAILURE”: Get AGPS data from server failed
- *<Size>:* Actual got data size (Bytes)

3.4 Heartbeat

Heartbeat is used to maintain the connection between the device and the backend server if communication is via GPRS. The heartbeat package is sent to the backend server at the interval defined by <*Heartbeat interval*> in **AT+GTQSS** command. Whenever the backend server receives a heartbeat package, it should reply an acknowledgement to the device.

+RESP:GTHBD

Example: **+RESP:GTHBD,010000,012207000000015,DevName,20120331074450,000D$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Unique ID	15	IMEI
Device name	3-10	‘0’-‘9’, ‘a’-‘z’, ‘A’-‘Z’
Send time	14	YYYYMMDDHHMMSS
Count number	4	0000-FFFF
Tail character	1	$

+SACK:GTHBD

Example: **+SACK:GTHBD,010000,322$**		
Parameter	**Length (byte)**	**Range/Format**
Protocol version	6	000000-999999
Count number	4	0000-FFFF
Tail character	1	$

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

4. LED Light Indication

LED	State	Event
GSM light	Fast flash (every 5 seconds)	Trying to connect to network
	Slow flash (every 10 seconds)	Locater connected
	Off	Power off or in super sleep mode
GPS light	Off	Normal
Battery light	Solid	Charging
	Flash	Low battery
All three lights	Solid	SOS alert(1)

Notes

(1) All three lights are on when SOS alert happens (SOS key is pressed for more than 2 seconds). Only when SOS alert is cleared by "AT+GTRTO" command with <Sub command> = "C" which is executed by backend server, the three lights could return to their normal state.

(2) Both the battery light and GPS light are lightened, that means VL1000 is preparing to shut down by pressing the power key. VL1000 is completely shut down when all lights are off.

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