GSM/GPRS/GPS Tracker **GL200**

External Battery Kit User Manual

Application Notes: GL200EBKUM001

Revision: 1.20

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0. Revision history

Revision	Date	Author	Description of change
1.00	2010-11-01	Hendry PAN	Initial
1.10	2011-05-03	Hendry PAN	Replace two 4-pin connectors for Digital Input interface and PWR Output interface with one 8-pin connector.
1.20	2011-06-10	Leo LEI	Exchange the sequence of digital input 1 and digital input 2 on 8-pin connector.

1. Introduction

GL200 External Battery Kit is a set of accessories include an external battery, a power control unit and a pelican waterproof casing. It will greatly improve the working time of GL200 and also let the GL200 can be used for some special application like container tracking.

1.1. Reference

Table 1: Reference

SN	Document name	Remark
[1]	GL200 @Tracker Air Interface Protocol.pdf	

1.2. Terms and abbreviations

Table 2: Terms and abbreviations

Abbreviation	Description
NO	Normally Open
NC	Normally Close
EBK	External Battery Kit
PCU	Power Control Unit

2. Product Overview

2.1. Appearance

Figure 1**: Appearance of GL200 EBK**

2.2. Parts List

Table 3: Part List

Name	Picture	Description
PCU		PCU manages the power from the external battery. It has build in motion sensor and external digital inputs.
Pelican 1020 Waterproof Box		All the components except the AC-DC charger will be put into the Pelican 1020 Waterproof Box.
Frame for GL200 and PCU		The frame is used to fix the PCU and GL200.
AC-DC Charger for External Battery		AC-DC Charger is used to charger the external battery. Please notice that the PCU must be removed from the external battery when charging.
External Battery		High capability battery, 17600 mAh.
Connect Cable		This cable is used to connect GL200 to PCU and connect external switch to PCU.

3. PCU (Power Control Unit)

3.1. Overview

There are two connectors on the GL200 EBK: One is 4-pin connector for VBAT IN interface; the other is 8-pin connector for Digital Input and PWR Output interface.

The PCU has an onboard motion sensor which can detect the motion/rest status of the PCU.

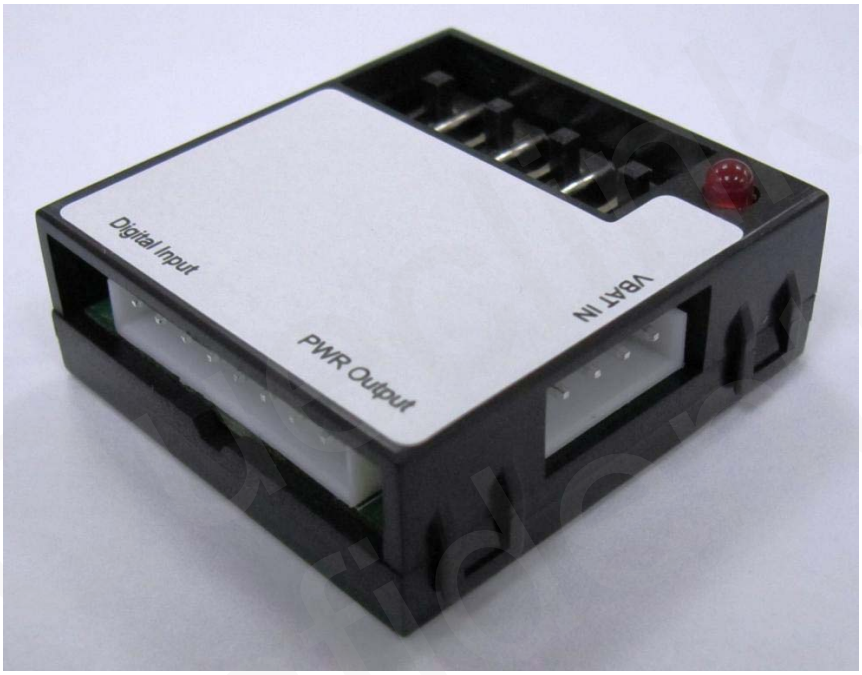

Figure 2: PCU Interface

3.2. Interfaces

3.2.1. VBAT IN Interface

The external battery should be connected to 4-pin connector which used as VABT IN interface of PCU. The pin description is shown in Table 4.

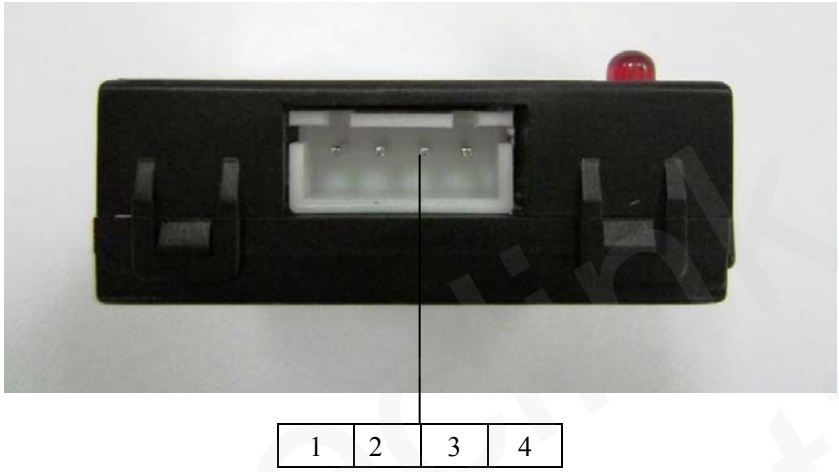

Figure 3: VBAT IN Interface

Table 4: VBAT IN Interface Reference

Pin Number	Description
1	GND
2	GND
3	Power(3.4V～4. 2V)
4	Power(3.4V～4. 2V)

3.2.2. Digital Input Interface

Digital Input interface includes 2 digital inputs which can be used to monitor the external digital signal. They can be connected to toggle switch, tact switch or reed switch. There are four pins on the left side of the 8-pin connector. The pin description is shown in Table 5.

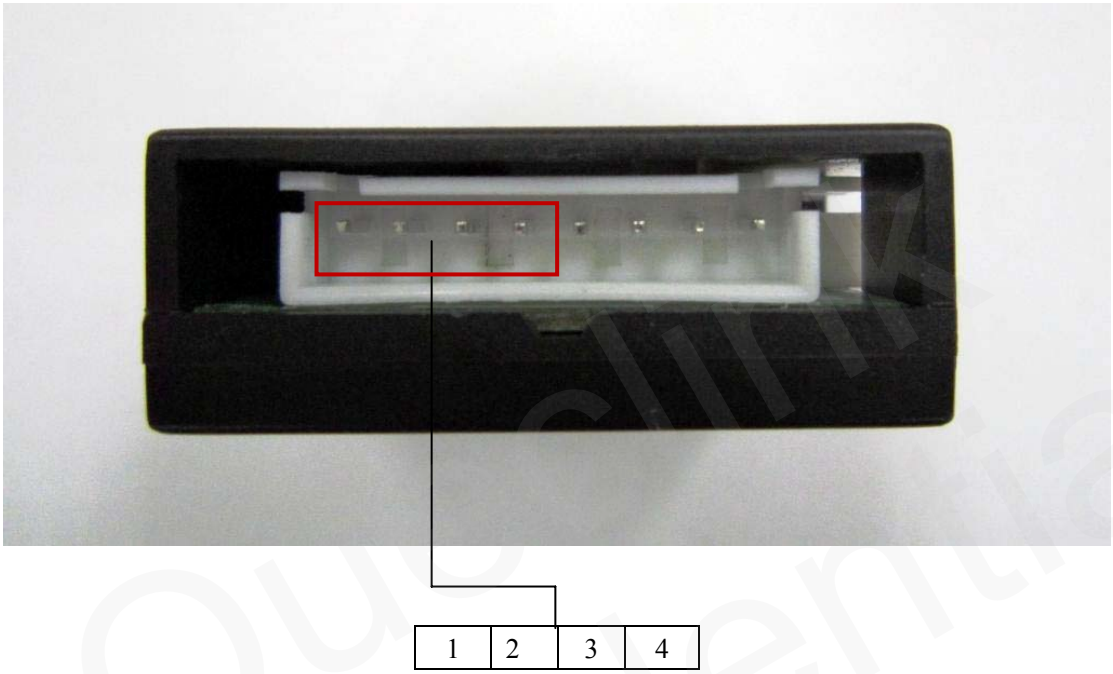

Figure 4: Digital Input Interface

Table 5: Digital Input Interface Reference

Pin Number	Description
1	Digital input 1
2	Digital input 2
3	2.8V output
4	GND

3.2.2.1. Digital Input 1

Digital input 1 work as a lock switch and it is recommended to connect to a toggle switch or a reed switch.

If SW103 is set to ‘H’, the logical status is ‘0’ when the electrical level of digital input 1 is high. It will be ‘1’ if the electrical level of digital input 1 is low.

If SW103 is set to ‘L’, the logical status is ‘1’ when the electrical level of digital input 1 is high. It

will be '0' if the electrical level of digital input 1 is low.

The logical status of digital input 1 will effect on the power output of PCU. Please refer to chapter 3.6 for detail.

The reference connection of digital input 1 is shown in following figure.

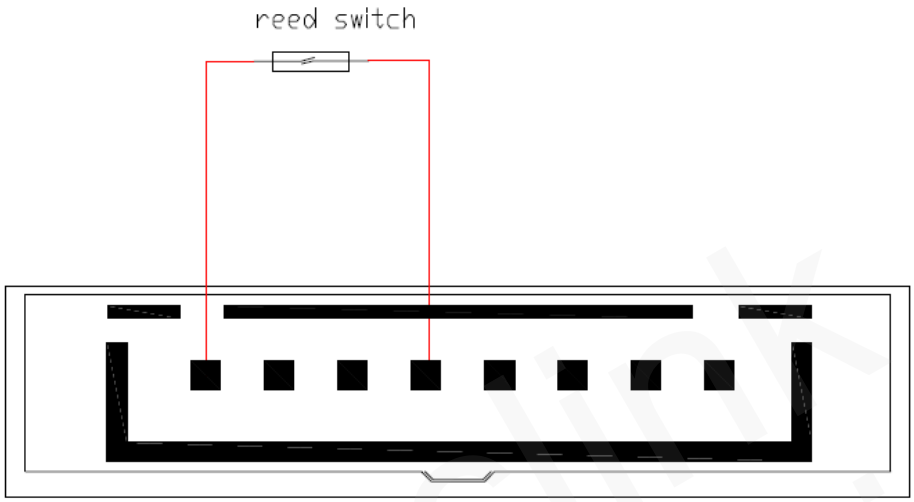

Figure 5: Digital Input 1 Connect to Reed Switch

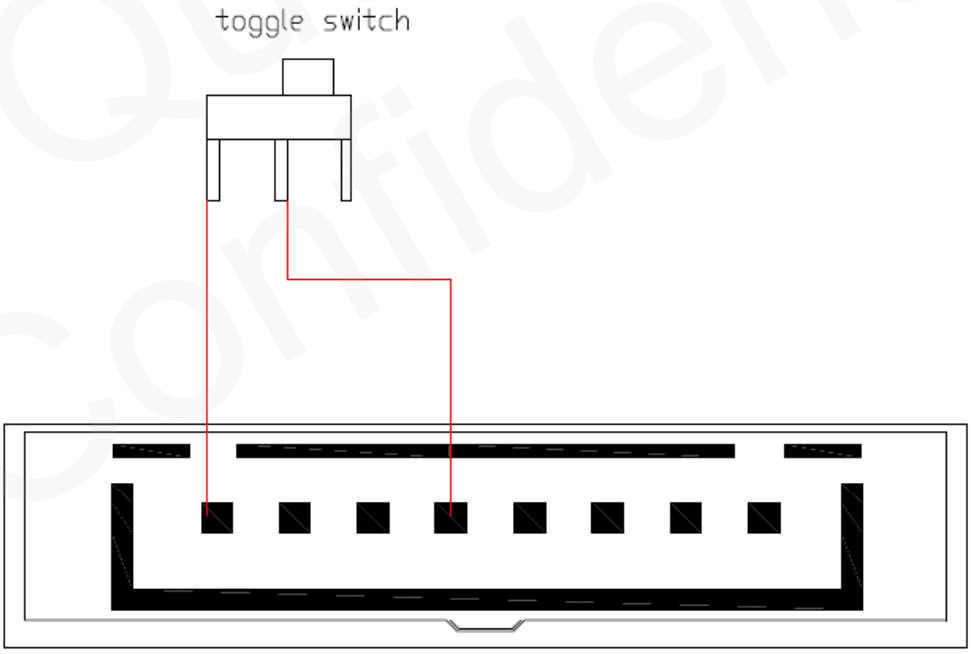

Figure 6: Digital Input 1 Connect to Toggle Switch

3.2.2.2. Digital Input 2

Digital input 2 works as a trigger switch and it is recommended to connect it to a tact switch or a

reed switch.

The default logical status of digital input 2 is ‘0’ and it will be reversed when the electrical level of digital input 2 changes two times.

The logical status of digital input 2 will effect on the power output of PCU. Please refer to chapter 3.6 for detail.

The reference connection of digital input 2 is shown in following figure.

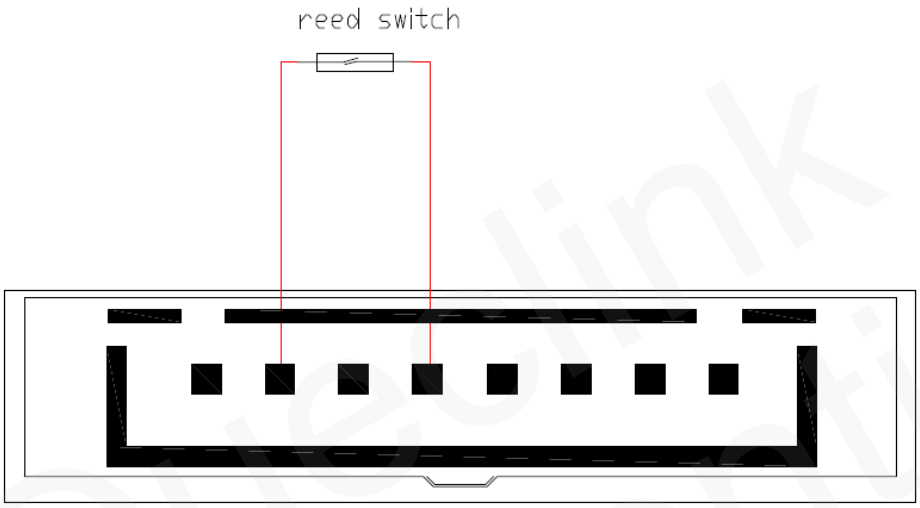

Figure 7: Digital Input 2 Connect to Reed Switch

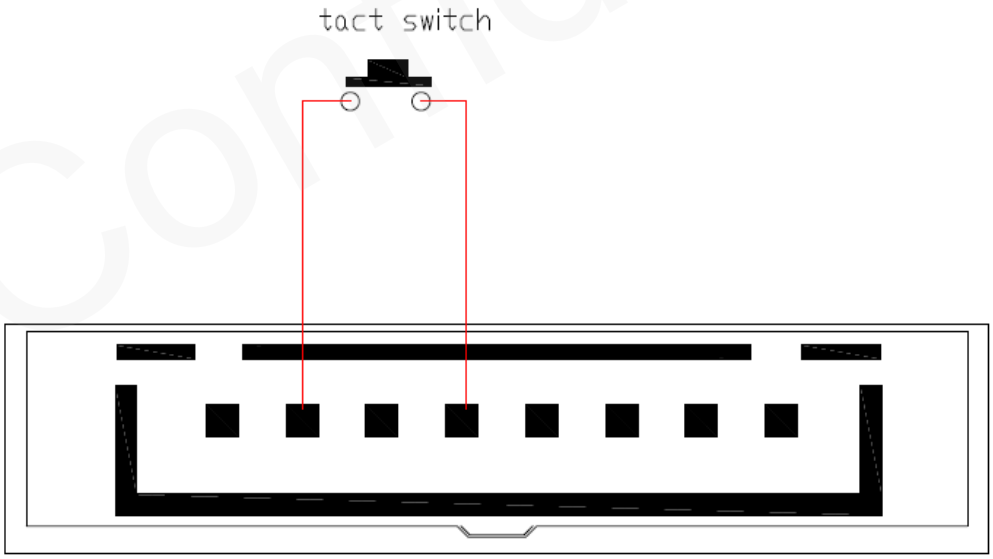

Figure 8: Digital Input 2 Connect to Tact Switch

3.2.3. PWR Output Interface

The power output is included in the PWR Output interface. It also includes the UART interface for the communication between GL200 and PCU. There are four pins on the right side of the 8-pin connector. The pin description is shown in Table 6.

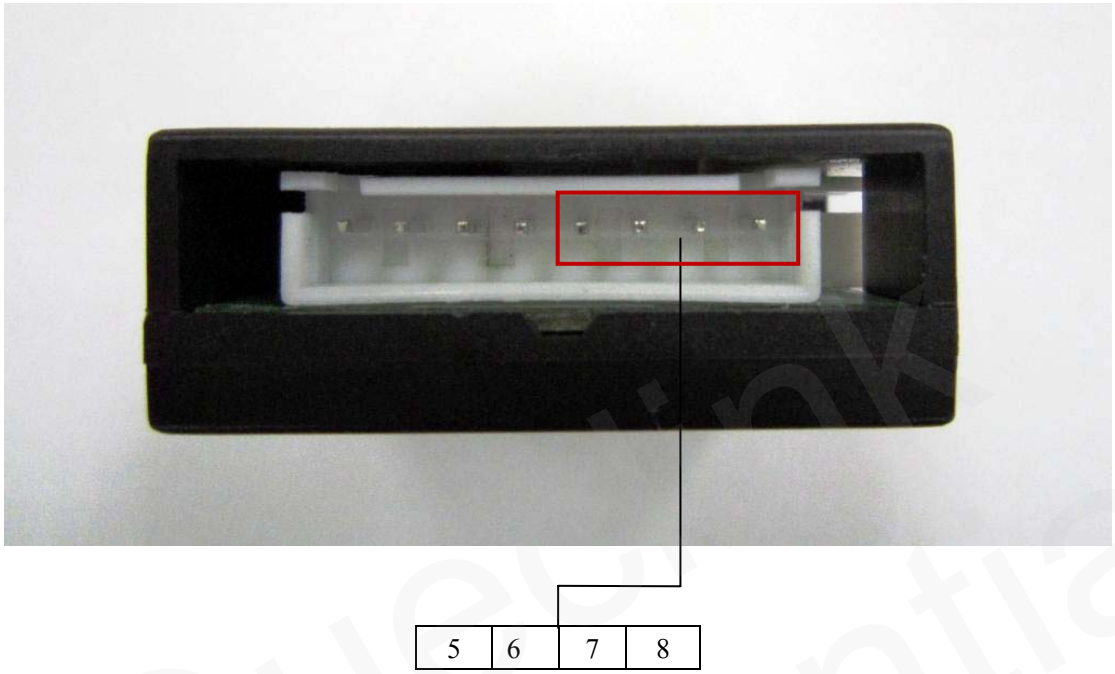

Figure 9: PWR Output Interface

Table 6: PWR Output Interface Reference

Pin Number	Description
5	RXD
6	TXD
7	GND
8	Power output(3.4V～4. 2V)

3.3. Toggle Switch

The PCU has four toggle switches: SW101 to SW104. They are used for the configuration of the PCU.

Figure 10: Toggle Switches

3.3.1. SW101

SW101 is used to enable/disable the onboard motion sensor.

3.3.2. SW102

SW102 is used to configure the auto power up function. If it is set to 'L', the power output will be enabled for at least 5 minutes every day even when the PCU is in rest. If SW102 is set to 'H', the power output will never be enabled when the PCU is in rest. (In case the logical status of two digital inputs are all 0).

There are some reporting messages relate to this function. Please refer to chapter 6.2.4 for details.

3.3.3. SW103

SW103 is used to configure the logical status of digital input 1.

3.3.4. SW104

SW104 is used to enable/disable the indication LED. If SW104 is set to 'H', the LED will be

disabled. If SW104 is set to ‘L’, the LED will be enabled.

Please notice that even when the LED is enabled, it will only light when the power output is enabled.

3.4. Indication LED

The Red LED is used to indicate the output of the power. It is controlled by the toggle switch SW104 and the power output.

3.5. Onboard Motion Sensor

If SW101 is set to 'H', the motion sensor will be disabled and the logical status of motion sensor will always be '0'. If SW101 is set to 'L' then the motion sensor will be enabled. The logical status of motion sensor will be '1' when the PCU is in motion, and be '0' when the PCU is in rest. Please notice that there will be five minutes' delay after the logical status of motion sensor change from '1' to '0'.

The logical status of motion sensor will effect on the power output. Please refer to chapter 3.6 for detail.

3.6. Relations between Logical Status and Power Output

Only when the logical status of digital input 1 and 2 are all 0, the power output can be disabled. PCU will send the report on every logical status change to the backend server via GL200. Please refer to chapter 6.2 for detail.

The description of the logical status is shown in following table. The power output will be disabled when the logical status of power output changes from 1 to 0. But please notice that there will be five minutes delay to let the GL200 send out the report message to backend.

Table 7: Logical Status Relations

Logical status of digital input 1	Logical status of digital input 2	Logical status of motion sensor	Logical status of Power output
0	0	0	0
		1	1
	1	0	1
		1	1
1	0	0	1
		1	1
	1	0	1
		1	1

4. External Battery

4.1. Battery Specification

The GL200 EBK includes a large capacity battery which can provide long standby time. The size of the battery is about 38mm * 80mm * 71mm. There are two connectors on the battery, one is for power output, and another is used for charging.
The specification of the external battery is listed in following.

Table 8: Battery Specification

Item	Specification
Rated Capacity min	17.6Ah
Normal Voltage	3.7V
Charge Ending Voltage	4.2 ± 0.05V
Charge current	Standard charge:0.2CmA
	Rapid charge:1500mA
Discharge Ending Voltage	2.75V
Max Discharging Current	2A
Impedance	≦130mΩ

4.2. How to Charge the Battery

- Plug the AC-DC power adapter provided by Queclink into the DC connector of the external battery.
- The indication LED on the adapter will be red during charging and changes to green when the battery is fully charged.
- Charging time is about 16 hours.

Figure 11: How to Charge the External Battery

5. Pelican 1020 BOX

The GL200 EBK is included in a Pelican 1020 waterproof casing. It is designed following the IP67 standard which can provide protection for internal components. The dimension of this box is 16cm * 12cm * 6cm.

Figure 12: Pelican 1020 Box Appearance

6. System Connection With GL200

6.1. Connection Overview

The connection between external battery, PCU and GL200 is shown in following figure.

Figure 13: Connection Overview

6.2. Air Protocol Interface Relate to PCU

6.2.1. GTLSW

If the PCU detects that the logical status of digit input 1 changes, it will send +RESP:GTLSW message to the backend server through GL200.

Table 9: +RESP:GTLSW Message Format

Example: **+RESP:GTLSW,020002,135790246811220,,0,1,0,4.3,92,70.0,121.354335,31.222073,20090214013254,0460,0000,18d8,6141,00,20100214093254,11F0$**			
Parameter	**Length(byte)**	**Range/format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Type	1	0|1	
State	1	0|1	
GPS accuracy	1	0	0
Speed	<=5	0.0 – 999.9km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	±XXXXX.X m	
Last longitude	<=11	±XXX.XXXXXX	
Last latitude	<=10	±XX.XXXXXX	
GPS UTC time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	4	XXXX	
Reserved	2	00	00
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Type*>: defines SW103 status.

- 0: SW103 is in 'H'.
- 1: SW103 is in 'L'.

✧ <*State*>: defines the logical status of digit input 1.

- 0: the logical status of digit input 1 is 0.
- 1: the logical status of digit input 1 is 1.

6.2.2. GTTSW

The +RESP:GTTSW is used to indicate the logical status change of digital input 2.

Table 10: +RESP:GTTSW Message Format

Example: **+RESP:GTTSW,020002,135790246811220,,1,0,0,4.3,92,70.0,121.354335,31.222073,20090214013254,0460,0000,18d8,6141,00,20100214093254,11F0$**			
Parameter	**Length(byte)**	**Range/format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Type	1	0|1	1
State	1	0|1	
GPS accuracy	1	0	0
Speed	<=5	0.0 – 999.9km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	±XXXXX.X m	
Last longitude	<=11	±XXX.XXXXXX	
Last latitude	<=10	±XX.XXXXXX	
GPS UTC time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	4	XXXX	
Reserved	2	00	00
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Type*>: reserved and its value is 1.

✧ <*State*>: defines the logical status of digit input 2.

- 0: the logical status of digit input 2 is 0.
- 1: the logical status of digit input 2 is 1.

6.2.3. GTOMS

If the PCU detects that the motion state changes according to motion sensor's output or SW101 state changes, it will send +RESP:GTOMS message indicate this changes to the backend server through GL200.

Table 11: +RESP:GTOMS Message Format

Example: **+RESP:GTOMS,020002,135790246811220,,1,0,0,4.3,92,70.0,121.354335,31.222073,20090214013254,0460,0000,18d8,6141,00,20100214093254,11F0$**			
Parameter	**Length(byte)**	**Range/format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Type	1	0|1	
State	1	0|1|3	
GPS accuracy	1	0	0
Speed	<=5	0.0 – 999.9km/h	
Azimuth	<=3	0 – 359	
Altitude	<=8	±XXXXX.X m	
Last longitude	<=11	±XXX.XXXXXX	
Last latitude	<=10	±XX.XXXXXX	
GPS UTC time	14	YYYYMMDDHHMMSS	
MCC	4	0XXX	
MNC	4	0XXX	
LAC	4	XXXX	
Cell ID	4	XXXX	
Reserved	2	00	00
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

✧ <*Type*>: defines motion sensor is enabled or disabled.

- 0: motion sensor is disabled.
- 1: motion sensor is enabled.

✧ <*State*>: defines motion sensor state.

- 0: motion sensor detects rest and its logical.
- 1: motion sensor detects movement.
- 3: motion sensor is in initial status.

6.2.4. GTRST

If SW102 is set to 'L', the PCU will send +RESP:GTRST message to the backend server every 24 hours.

Table 12: +RESP:GTRST Message Format

Example: **+RESP:GTRST,020002,135790246811220,,,,20100214093254,11F0$**			
Parameter	**Length (byte)**	**Range/Format**	**Default**
Protocol version	6	XX0000 – XXFFFF, X∈{'A'-'Z','0'-'9'}	
Unique ID	15	IMEI	
Device name	10		
Reserved	0		
Reserved	0		
Send time	14	YYYYMMDDHHMMSS	
Count number	4	0000 – FFFF	
Tail character	1	$	$

7. Configuration Q&A

Question1: I am using the PCU. How can I configure the system to report when motion and stop reporting when rest?
Answer: Please set the SW103 to ‘H’ and set the SW101 to ‘L’. The configuration on SW102 and SW104 is depending on your requirement.

Question2: I am using the PCU. How can I configure the system to be always reporting?
Answer: Please set the SW103 to ‘L’. The configuration on SW101 and SW102 can be ignored. The configuration on SW104 is depending on your requirement.