GV650MG User Manual

LTE/GRPS GNSS Tracker

QSZTRACGV650MGUM0100

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International Telematics Solutions Innovator

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0. Revision History

Version	Date	Author	Description of Change
1.00	2026-05-29	Wokky Lin	Initial

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1. Introduction

GV650MG is an IP67/IP69K GNSS tracker designed for a wide variety of vehicle tracking applications.

It supports dual-band 4-constellation GNSS receiver, which provides high precision location tracking ability. And it supports 4G and 2G network connection, and BLE 5.2 features. It also has multiple I/O interface for input trigger or output control. Along with 1-wire interface, analog input and serial port, etc., it can meet users' flexible configuration and multiple working scenarios.

The GV650MG supports Queclink 2nd generation message protocol, the @Track protocol Pro. This protocol makes more savings on internet data traffic, and unify the protocol features of all Queclink products which embed the @Track protocol Pro.

1.1. GV650MG Product

Table 1. GV650MG Product

Model No.	Region	Technology	Operating Band (MHz)
GV650MG	Global	LTE-FDD Cat M1 LTE-FDD Cat NB2 GSM (EGPRS)	LTE-FDD Cat M1: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/ B25/B26/B27/B28/B66/B85 LTE-FDD Cat NB2: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/ B25/B28/B66/B71/B85 GSM: 850/900/1800/1900MHz

1.2. Reference

Table 2. GV650 Protocol Reference

SN	Document Name	Remark
[1]	GV650 @Track Protocol Pro	The air protocol interface between GV650 and backend server.

1.3. Terms and Abbreviations

Table 3. Terms and Abbreviations

Abbreviation	Description
AGND	Analogue Ground
AIN	Analogue Input
DIN	Digital Input
DOUT	Digital Output
GND	Ground
RXD	Receive Data
TXD	Transmit Data

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2. Product Overview

2.1. Product Appearance



Figure 1. GV650MG Product View

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2.2. LED Description

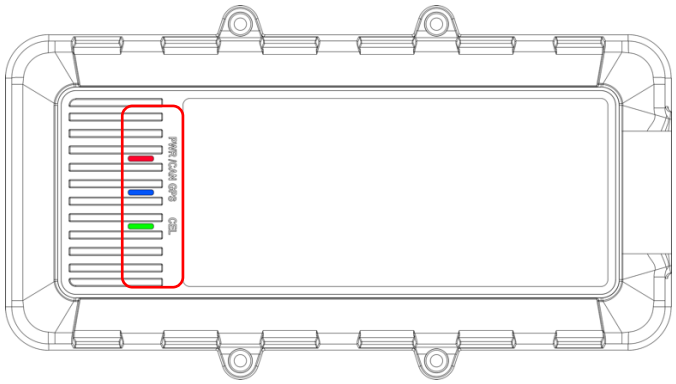


Figure 2. GV650MG LEDs

There are three LEDs on Figure 2. GV650MG. For details, please see the table below.

Table 4. GV650MG LEDs Description

LED	Device Status	LED Status
CELL①	Device is searching CELL network.	Fast flashing ③
	Device has registered to CELL network.	Slow flashing ④
	Device goes into sleep mode.	OFF
	SIM card needs pin code to unlock.	ON
GPS①	GPS chip is powered off.	OFF
	GPS sends no data or data format error occurs.	Slow flashing
	GPS chip is searching GPS info.	Fast flashing
	GPS chip has gotten GPS info.	ON
PWR①	No external power and internal battery capacity is above 5%.	OFF
	No external power and internal battery capacity is below 5%.	Slow flashing
	External power in and internal battery is charging.	Fast flashing
	External power in and internal battery is fully charged.	ON
CAN②	CAN module abnormal	ON
	CAN module works well	Yellow LED will not display

Note:

① All LEDs will off after 30 minutes when external power on;

② The CAN fault indicating LED share the same LED with PWR, but the color is in yellow. When the CAN fault occurs, the PWR LED and the CAN LED will display alternately with 5s time interval;

③ Fast flashing: about 100ms ON/200ms OFF

④ Slow flashing: about 200ms ON/1000ms OFF

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2.3. Parts List

Table 5. GV650MG Parts List

Name	Picture	Description
GV650MG Tracker		LTE/GSM Tracker
User Cable		GV650MG standard cable
Upgrade and Configuration Set (optional accessory)		The kit for upgrade and configuration.
External GNSS Antenna Dual-Band 2M SMA (optional accessory)		External dual-band GNSS antenna

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3. Interface Description

The GV650MG has a 16-pin interface connector which contains the connections for power, CAN, I/O, RS232, etc. The sequence and definition of the 16-pin connector are shown in the following figure:

1	ADC_IN1	9	IGN
2	1-WIRE	10	VIN
3	485 A	11	3V3_OUT
4	CAN2_L	12	485 B
5	RS232_RX1	13	CAN2_H
6	RS232_TX1	14	CAN1_H
7	CAN1_L	15	OUT2/IN2
8	OUT1/IN1	16	GND

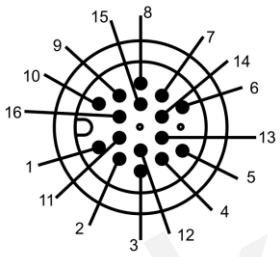


Figure 3. The 16-pin Connector on the GV650MG

Table 6. Description of 16-pin Connections

Index	Description	Comment
1	ADC_IN1	1 ports for ADC in, range 0V~32V, absolute voltage withstand value 48V
2	1-Wire	External port for 1-wire accessories
3	485A	2nd dual protocol serial port for Rx from CAN MCU
4	CAN2_L	Secondary CAN BUS low side
5	RS232_RX1	1st dual protocol serial port for Rx from main MCU
6	RS232_TX1	1st dual protocol serial port for Tx from main MCU
7	CAN1_L	Primary CAN BUS low side
8	OUT1/IN1	Configurable digital input and output IO ports, for input trigger or output control. Maximum driving current 150mA, maximum input voltage 50V
9	IGN	Input for ignition detection
10	VIN	External main power input, support DC 8V~90V
11	3V3_OUT	3.3V power output, maximum driving current 350mA
12	485B	2nd dual protocol serial port for Tx from CAN MCU
13	CAN2_H	Secondary CAN BUS high side
14	CAN1_H	Primary CAN BUS high side
15	OUT2/IN2	Configurable digital input and output IO ports, for input trigger or output control. Maximum driving current 150mA, maximum input voltage 50V
16	GND	Ground pin for power or signal reference

The GV650MG has a SMA connector for external GNSS antenna:

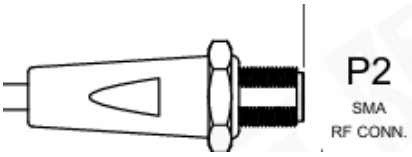


Figure 4. The SMA Connector on the GV650MG

4. GV650MG Device User Cable Color

Table 7. GV650MG Device Cable Color Definition

Pin No.	Color	Definition
#1	Orange	ADC_IN1
#2	Gray	1-Wire
#3	Blue	485A
#4	Green/White	CAN2_L
#5	Purple/White	RX232_RX1
#6	Purple	RX232_TX1
#7	Green	CAN1_L
#8	Pink	OUT1/IN1
#9	White	IGN
#10	Red	Vin
#11	Red/White	3V3_OUT
#12	Blue/White	485B
#13	Yellow/White	CAN2_H
#14	Yellow	CAN1_H
#15	Pink/White	OUT2/IN2
#16	Black	GND



Note:

The main color of the dual color cable is the first color, for example, Green/White means green is the main color, and white is the secondary color.

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5. Getting Started

5.1. Opening and Closing the Case

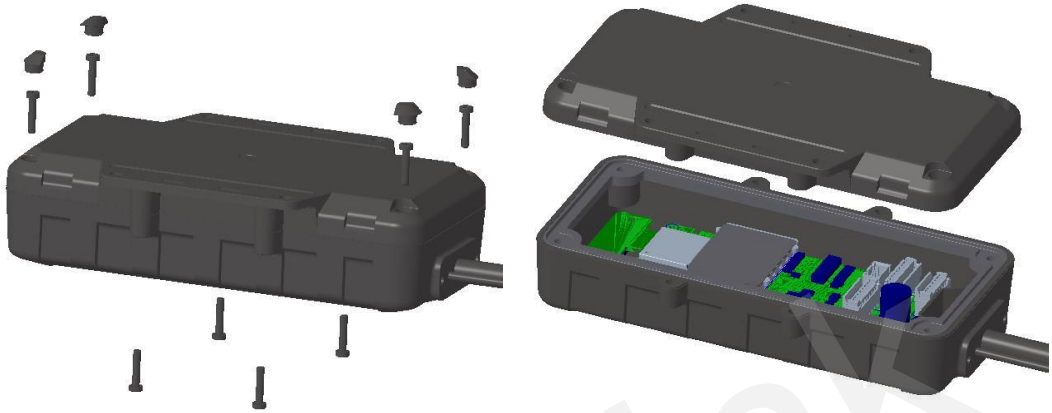


Figure 5. Open/close the Case

To open: Use a cross screwdriver to loosen the screws and then lift the bottom case.
To close: Align the bottom cover with the top cover, then check for any areas around that are not properly snapped together, and then secure the device with screws. Please note that if the upper and lower covers do not properly latch, it will cause the device to fail to achieve the IP69K waterproof and dustproof rating. Therefore, after snapping and locking the cover, please carefully check for any abnormalities in the case closing.

5.2. Installing the SIM Card

Open the case and ensure the unit is powered off (unplug the cable and disconnect the internal battery). Lift the rubber cover of the SIM card holder and insert the SIM card into the holder and then press the cover back.

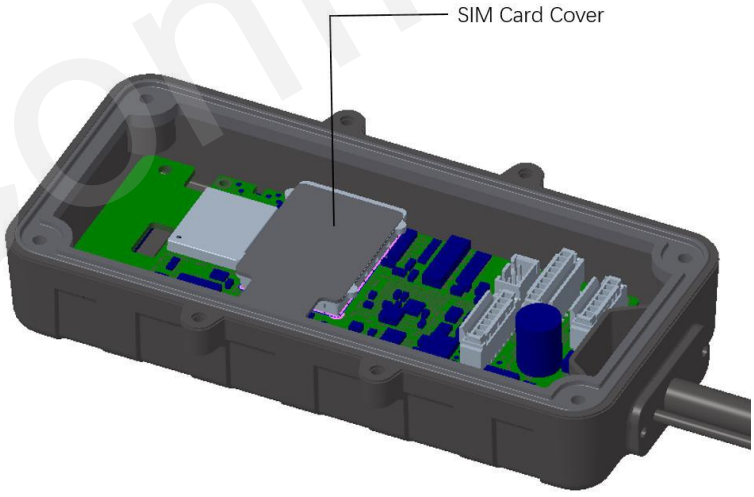


Figure 6. SIM Card Installation

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5.3. Installing the Internal Backup Battery

GV650MG has an internal backup Li-ion battery (5800mAh, standby time: 120 days with 1 report per day) for power supply when the external power lost. Please make sure the battery connects to the PCBA correctly.



Figure 7. Backup Battery Installation

5.4. Connecting the Device to the User Cable

Align the male and female connectors of the device and user cable separately and then join the plugs and tighten the plastic nut to secure the cable connection.



Figure 8. Connecting to User Cable

5.5. Power On the Device

Find the <VIN> and <GND> terminals on the user cable and power on the device by using an external supply or by connecting to the vehicle's power source, ensuring the negative lead is connected to <GND> and the positive lead to <VIN> and the input voltage should be between 8V and 90V. Be very careful to avoid electric shock when the operating voltage exceeds 36V. Additionally, please note that there is an overcurrent protection fuse on the <VIN> line. When the

current exceeds 5A, the fuse will blow to protect the power system. Please repair and test the device before replacing the fuse to get the device working again.



Figure 9. External Power Supply Connection

5.6. Ignition Detection

Table 8. Electrical Characteristics of Ignition Detection

Logical Status	Electrical Characteristics
Active	5.0V to 32V
Inactive	0V to 3V or open loop

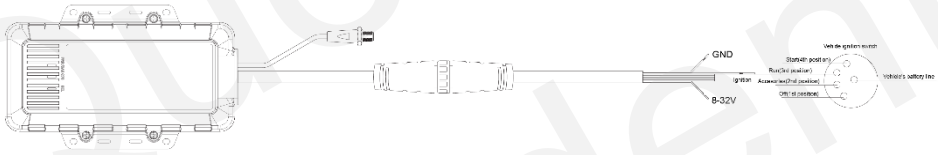


Figure 10. Typical Ignition Detection

The <IGN> pin is for ignition detection. It's advisable to connect this pin to the vehicle's ignition switch in the "RUN" position, as depicted above. Alternatively, you can connect it to a non-permanent power source that's active only when the car is running, such as the FM radio's power source.

The IGN signal can be set to trigger sending data to the backend server when the ignition is active and switch to power-saving mode when it's turned off.

5.7. Digital Inputs/Outputs

The digital inputs/outputs on the GV650MG have the ability to receive digital signals and drive output signals. When the <OUTx/INx> pins are configured as input ports, the signals connected to the input ports can trigger the corresponding actions of the device to achieve vehicle management or information reporting. Following table shows the circuit parameters when the digital IO ports are configured as input ports.

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Table 9. Electrical Characteristics of the Digital Inputs

Logical Status	Electrical Characteristics
Inputs active	0V to 0.8V
Inputs inactive	Open loop

The image below illustrates the suggested connection for digital inputs.

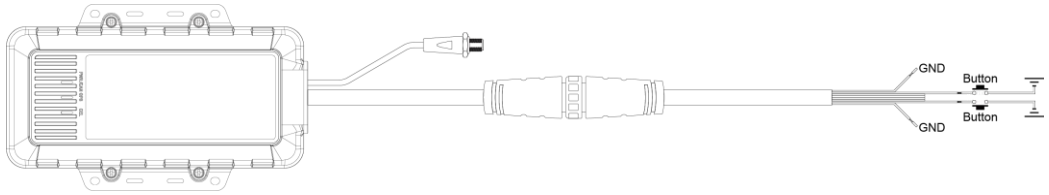


Figure 11. Typical Digital Input Connection

When a digital I/O port is configured as an output, it can provide an output capability of 1.5V and 150mA. The output circuit is of an open-drain type. Each output is equipped with a built-in resettable PTC fuse for overcurrent protection. It can drive peripherals such as LED lights, electromagnetic relays, buzzers, etc. When integrated with vehicle circuits, it enables control over the vehicle.

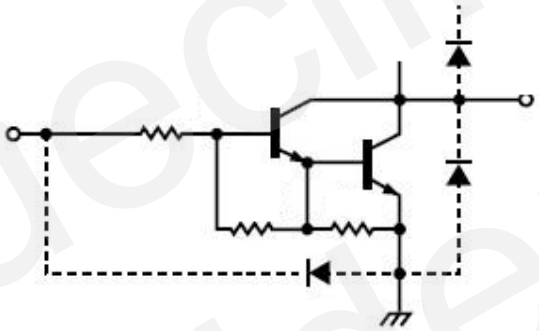


Figure 12. Digital Output Internal Drive Circuit

Table 10. Electrical Characteristics of Digital Outputs

Logical Status	Electrical Characteristics
Enable	<1.5V @150 mA
Disable	Open drain

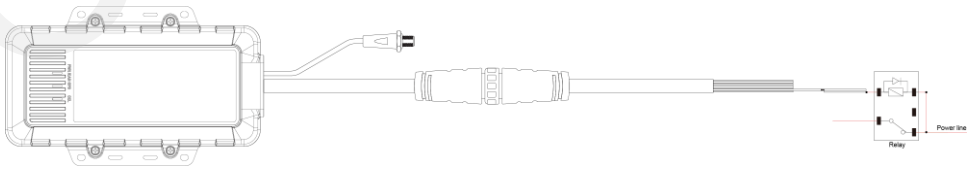


Figure 13. Typical Connection with a Relay

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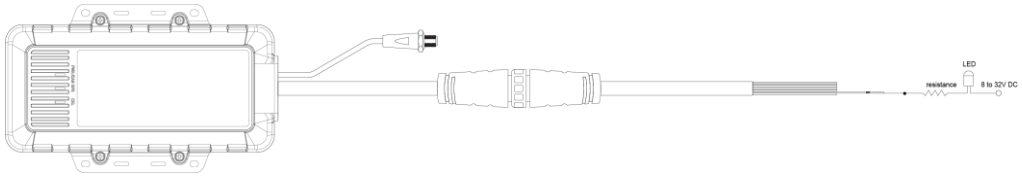


Figure 14. Typical Connection with a LED

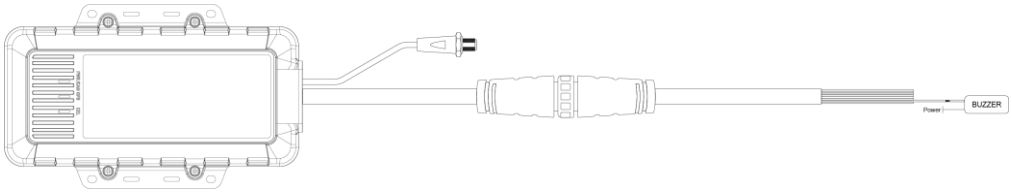


Figure 15. Typical Connection with a Buzzer

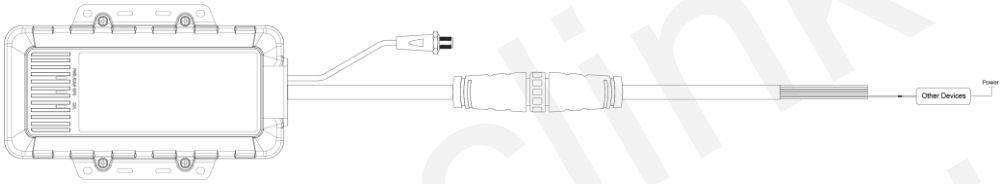


Figure 16. Typical Connection with Other Devices

Note:

Pay attention to the polarity of the relay if it is pre-installed with an internal flyback diode during connection. Install an additional diode externally if there is no pre-installed internal diode. A common diode such as a 1N4004 one will work in most circumstances.

5.8. Analog Input

The <ADC_INx> on device are with the voltage range from 0 to 32V, the absolute voltage withstand value is 48V. The following picture shows the recommended connection.

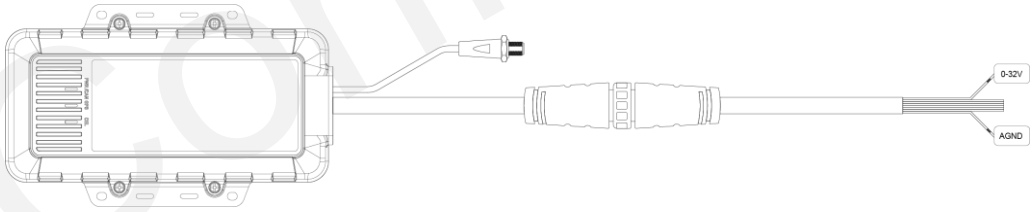


Figure 17. Typical Analogue Input Connection

5.9. 1-wire Interface

The <1-Wire> pin can support 1-wire peripherals such as iButton or temperature sensor.

Below picture shows how to connect the <1-WIRE> to the iButton device.

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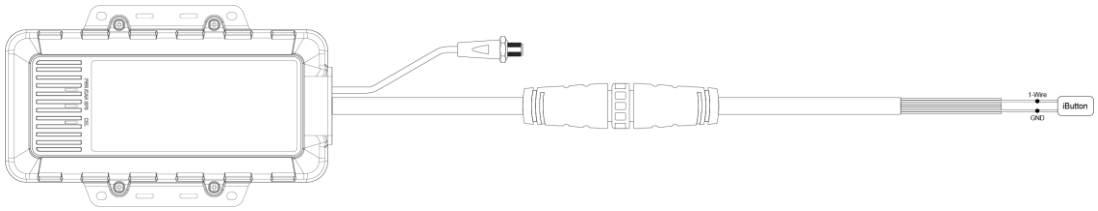


Figure 18. iButton Device Connection

1) If the <1-Wire> pin need connect to a temperature sensor with 3-wire connection method, connect the temperature sensor to the device with <1-WIRE> pin, <GND> pin and also <3V3_OUT> pin.

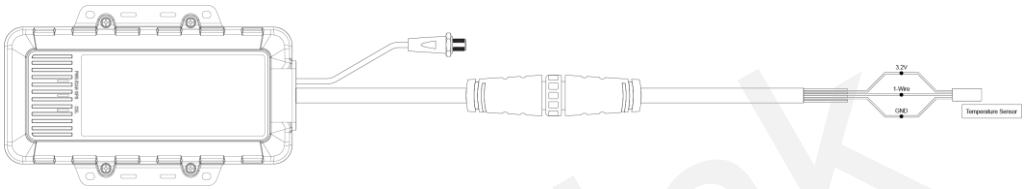


Figure 19. 3-wire Temperature Sensor 1-Wire Connection

2) If the <1-Wire> pin need connect to a temperature sensor with 2-wire connection method, connect the temperature sensor to the device with <1-WIRE> pin and <GND> pin

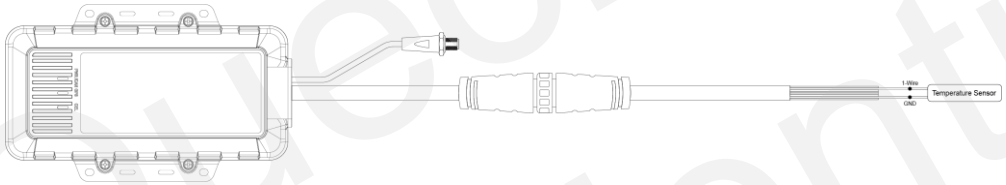


Figure 20. 2-wire Temperature Sensor 1-Wire Connection

5.10. Serial Port Interface

Pins <RS232_TX1>/<RS232_RX1> are the serial ports interface. RS232 is with standard serial port voltage levels. TXD and RXD are standard TTL signal.

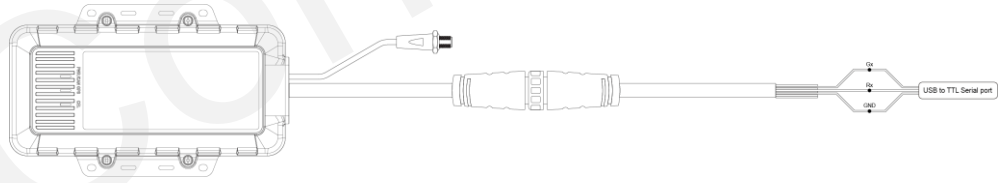


Figure 21. Typical Connection with RS232 Serial Port

Serial Port Functions:

1. Device Configuration: Use a USB to RS232 serial port converter to connect the device to the Manage Tool Pro;
2. Data pass-through;
3. Serial port peripherals, such as DR102, oil sensors, and other peripherals;

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5.11. 3.3V Output

The <3V3_OUT> pin is a power output pin, mainly for peripherals. This pin can output 3.3V voltage and maximum 350mA current.

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6. Installation Precautions

- Firmly install the device to a reliable surface to prevent falling off.
- Make sure the side with label face to the sky to have better GNSS signal reception.
- Do not install the device under metal surface or in enclosed environments having difficulty in receive GNSS and network signal.
- Install the device in places away from water source, water can corrode the installation screws, and after a long time, the equipment may fall off from the installation position.
- Use an electric screwdriver (torque 4.0kg±0.2kg) to tighten the screws. Please make sure the tightening torque for every screw is enough and even. Otherwise, the waterproof capability of the device will be deteriorated and water may seep inside causing damage. And such failure will not be covered by the warranty.

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7. Troubleshooting and Safety Info

7.1. Troubleshooting

Table 11. GV650MG Troubleshooting List

Problem	Possible Reason	Solution
After the device is turned on, the CEL LED always flashes quickly.	The signal is too weak. The device isn't registered to the network.	Move the device to a place with good network coverage.
Messages can't be reported to the backend server by network.	APN is not right.	Ask the network operator for the right APN.
	The IP address or port of the backend server is wrong.	Make sure the IP address for the backend server is an identified address in the internet.
There is no response from the device when the device is configured by using the serial port.	The port is not ready or the device is not powered on.	Please check the port and the device to ensure they are working properly.
The device can't get GPS fix.	The GPS signal is weak.	Move the device to a place under open sky.
		It is better to make the side with antenna face the sky.

7.2. Safety Info

- Do not disassemble the device more than installing SIM card.
- Do not put the device in the overheated or too humid place, and avoid exposure to direct sunlight. Too high temperature will damage the device or even cause battery explosion.
- Do not use the device on the airplane or near medical equipment.
- Be careful of the electric shock when the operating voltage exceeds 36V.

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8. Appendix: Supported Accessories

- BLE multi-function sensor: WMS301 (Tem/Hum/Door), WTH301(Tem/Hum), WID330.
- Movement-Angle BLE Sensor: WID320G.
- BLE TPMS sensor: ATP10X.
- BLE Key Fob: WKF300, WKF310.
- RS232 RFID Reader: MR2, VD RFID, DR102.
- 1-Wire: Temperature sensor, i-Button, RFID Reader DR200.

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