VL141
Vehicle GNSS Tracker
User Manual V1.3

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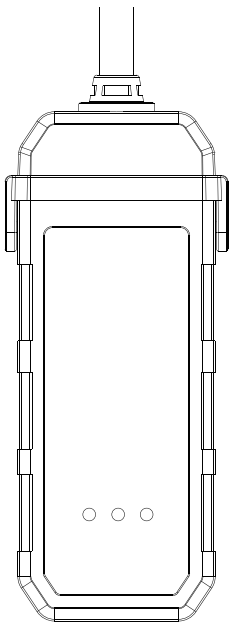
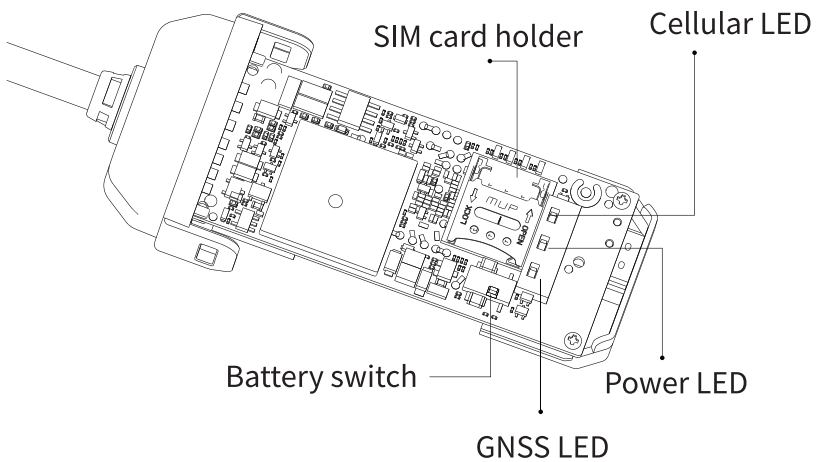
Overview

1.1 Description

- VL141 is a portable compact 4G Cat.1 GPS tracker for tracking and monitoring automobiles, motorcycles, electric two-wheelers, and other types of transportation whose voltages range from 9V to 90V. It has a built-in GPS antenna with good RX capabilities for precise position fixes. It can offer TTL/RS485 interfaces on demand to communicate with the BMS or controller of a vehicles. The 4G capability enables it to be widely used in different countries and regions.
- The black appearance makes the VL141 easy to hide on a vehicle. It can fix positions in real-time, generate tracks of traveled routes, send out alerts for exceptions, help immobilize vehicles by cutting off fuel and power supply, and other functions, making it a suitable choice for businesses trying to lower their management risks, protect the vehicles from theft, or monitor and manage their shared batteries.





1.2 Product Schematic Diagrams

Hubodometer	1
Axle cover	1

Tips:

- Please check the received package to see if all accessories are included.
- The accessories are subject to actual items. As the product is in constant upgrade, no prior notification will be sent to you for any update in this User Manual.

1.3 Accessories

VL141	1	PCS	—
IMEI Tags	1	PCS	—
Power cable	1	PCS	Cable length=1m
Relay	1	PCS	Optional

1.4 Definitions of Interfaces

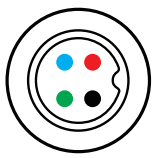
1.4.1 2-Pin Connector

	V+	Red	To the positive end (9–90V)
	V–	Black	To the negative end

1.4.2 4-Pin Connector

	V+	Red	To the positive end (9–90V)
	V–	Black	To the negative end
	ACC	Orange	For ACC detection
	Relay	Yellow	For cutting fuel/power supply

1.4.3 4-Pin Connector



	V+	Red	To the positive end (9–90V)
	V–	Black	To the negative end
	Tx	Blue	To peripherals such as SOS button
	Rx	Green	To peripherals such as SOS button

1.5 Connotations of LEDs

1.5.1 Power LED (Red)

0.3s-0.3s (On-Off)	The battery is low.
1s-3s (On-Off)	Charging complete.
0.1s-3s (On-Off)	The device operates correctly.
Solid on	The device is charging (which prioritizes over low battery).
Off	The battery is under voltage or encounters an internal failure.

1.5.2 GNSS LED (Blue)

Fast blink [0.3s-0.3s (on-off)]	The device is searching for satellite signals.
Solid on	Position fixed
Off	The GNSS module is in sleep or not operating.

1.5.3 Cellular LED (Green)

Fast blink [0.3s-0.3s (on-off)]	Network initialization.
Slow blink [1s-3s (on-off)]	The cellular module works normally.
0.1s-3s (On-Off)	The device goes online.
Solid on	The device is engaged in a call.
Off	No GSM signal/No SIM card

1.5.4 External Power Status

Red, blue, and green LEDs solid on for 3s	Plug or unplug the external power source

Tips:

- The three LEDs will go off after the device operates correctly for a while. You can unplug and plug the external power source to activate them or you can deliver a command to keep them always on.

Introduction

2.1 Specifications

Network Communication	
System	4G
Bands	FDD: B1/ B3/ B5/ B8
	TDD: B34/B38/B39/B40/B41
Internal Memory	64Mb+128Mb
Phase Error	RMSPE: <5, PPE: <20
Max. Output Power	LTE-TDD: Class3 (23dBm+1/－3dB)
	LTE-FDD:Class3 (23dBm±2dB)
Max. Frequency Error	±0.1ppm
RX Sensitivity	TD-LTE: ≤ －96dBm (10M)
	LTE-FDD: ≤ －96dBm (10M)

GNSS Parameters	
Frequency	BDS B1 1561.098MHz; GPS L1 1575.42MHz; RF Channel: BDS, GPS single-/dual-channel switch
No. of Channels	66
Antenna	18mm x 18mm x 2mm
Positioning Accuracy	<10m
Tracking Sensitivity	－165dBm
Acquisition Sensitivity	－148dBm
TTFF	Avg. hot start: <1s (open sky)
	Avg. cold start: ≤ 32s (open sky)

Overall Specification	
Antenna	Built-in GPS ceramic antenna and 4G FPC antenna
LEDs	GNSS (blue), Cellular (green), Power (red)
Battery	60mAh/3.7V industrial-grade Li-polymer battery (optional: 270mAh/3.7V)
Operating Voltage	9–90VDC
Standby Current	⩽ 5mA (battery-powered)
Device Color	Black
Dust & Water Resistance	IP66
Dimensions (LxWxH)	71mm x 31mm x 13.6mm
Operating Temperature	–20°C to +70°C
Interface	4-Wire edition (standard): P+, P–, ACC, and relay for power connection, ACC detection, and power/fuel cutoff
	2-Wire edition (optional): P+ and P–
	4-Wire edition (serial): P+, P–, TX (RS485A), and RX (RS485B) for power connection and communicating with external devices (such as BMS). The TX and RX wires can also be changed to be able to connect with an SOS button.

2.2 Features

- Real-time Tracking

  The positioning accuracy could reach under 10m under open sky.

- Power-cut Alert

  An alert will be triggered if the power supply to the device is disconnected or its power cable has been cut.

- Tamper Alert
  An alert will be triggered if the device is removed.

- Driving Behaviors
- Harsh Acceleration
  The device will report a harsh acceleration event to the platform when it detects the vehicle's speed increases abruptly due to a hardstepping on the accelerator.
- Harsh Braking
  The device will report a hard braking event to the platform if it detects the vehicle's speed decreases abruptly.
- Sharp Cornering
  The device will report a harsh turn event to the platform if it detects the vehicle is cornering sharply during moving.
- Collision
  The device will report a collision event to the platform if it detects the vehicle in motion collides with another object or vehicle.

- Low External Power Alert
  If the device detects the voltage of the external power is under the preset threshold, it will send out an alert message.

- Low Internal Battery Alert
  If the device detects that thee voltage of its internal battery is lower than the preset threshold, it will send out an alert message.

- Geofence Alert
  Provided that you have set a geofence and the alert conditions on the designated platform, you will be alerted if the device detects the vehicle enters or leaves the geofence and the alert conditions are met.

- RSpeed Alert
  Provided that you have set the speed limit for the vehicle on the platform or via SMS, you will be alerted if the device detects the vehicle moves at a speed greater than the speed limit for a set duration.

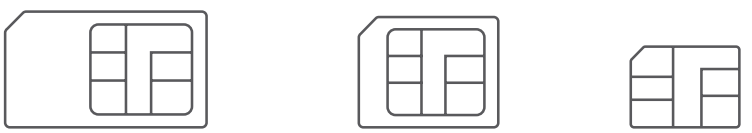
- Vibrating Alert
  If the device detects any vibration when the vehicle stops and has its ignition off, it will send out an alert.

Installation

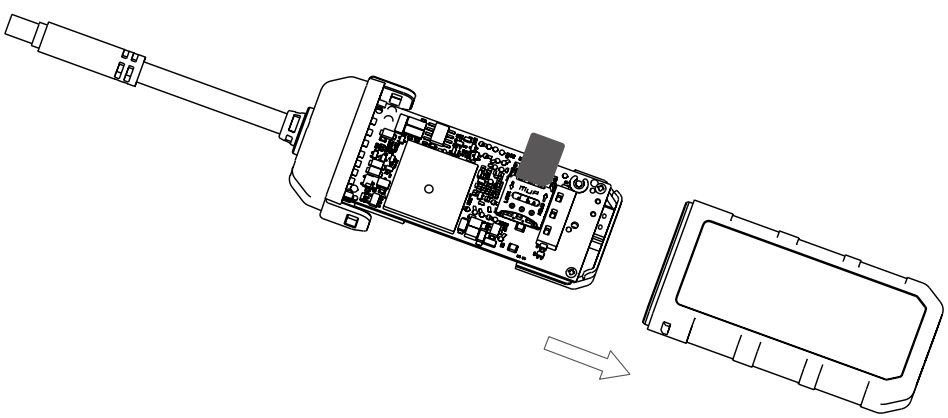
3.1 Installing the Device

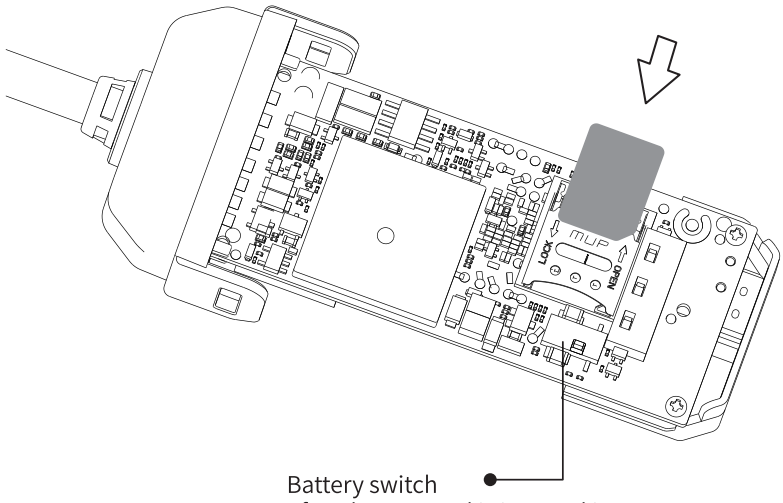
- Device check
  Check visually whether the device is in good condition and whether the relevant accessories are complete.

3.2 SIM Card Attachment

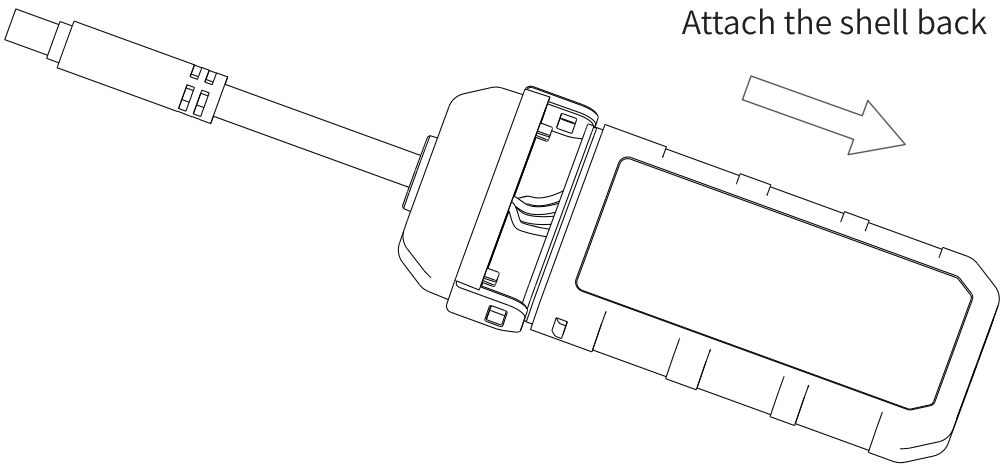


- Insert the SIM card (power off the device before inserting or removing the SIM card) as the following figure shows:
  Remove the shell of device. Make sure the switch is OFF.





Attach the shell back

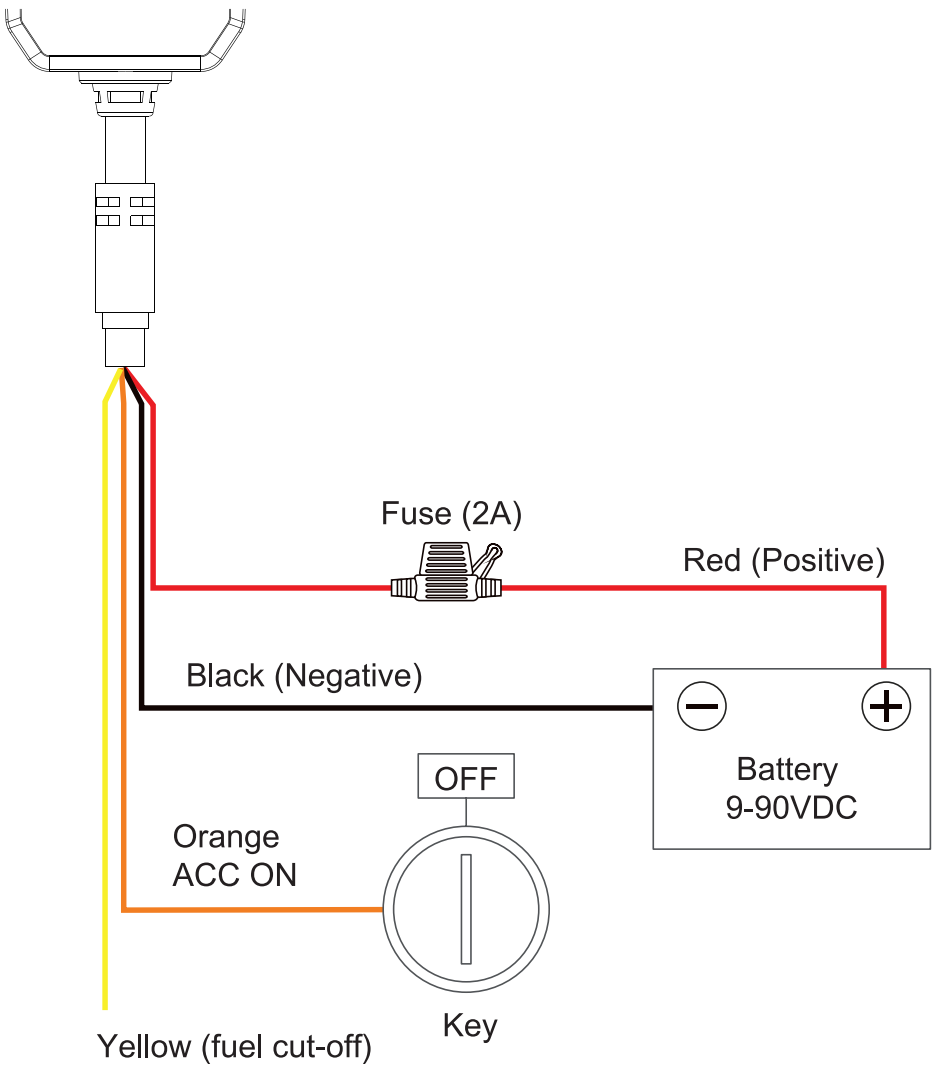


Note:

The SIM card should be inserted correctly. Make sure the SIM has data services activated and is not in arrears. Disconnect the external power and slide the battery switch to OFF before inserting or removing the SIM card. After the SIM card is placed in the slot, slide the battery switch to ON and lock the SIM.

3.2 Wiring Diagram

- Use a multimeter to determine the positive and negative wires of the battery.
- Use the multimeter to determine the ACC wire. Provided the black and red probes of the multimeter are connected with two wires separately, if the multimeter reads 0V when the key points to OFF and reads the same as the supply voltage of the vehicle when the key points to ON, then the wire connected by the red probe of the multimeter is the ACC wire.
- Connect the red wire (positive) of the device power cable with the positive pole of the Electric Two-Wheelers/Motorcycles/Automobiles battery.
- Mate the connectors as the following figure shows.



Note:

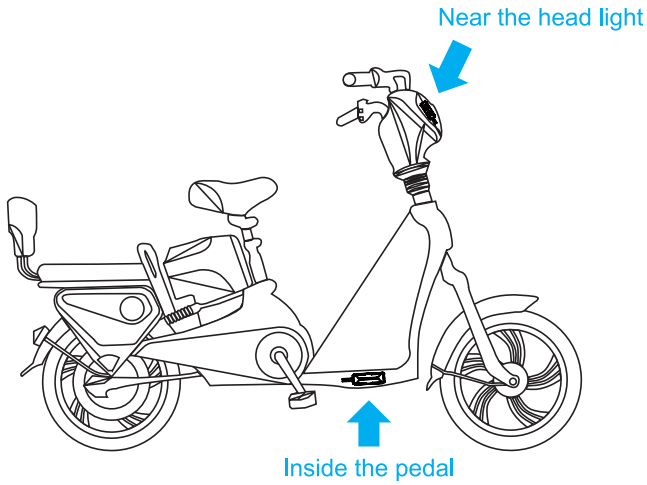
Choose accessories specified by the manufacture.

The standard supply range is 9–90V, please use the original power cable and ensure that the positive and negative ends are correctly wired.

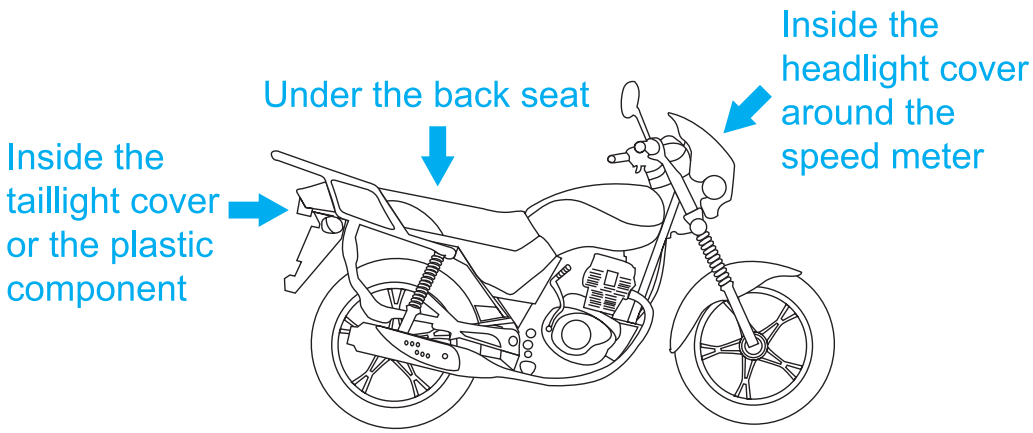
Description on device installation：

To ensure that the device is installed and debugged correctly, professional agencies and personnel designated by your dealer are recommended.

Possible Install Positions for Electric Two-Wheelers

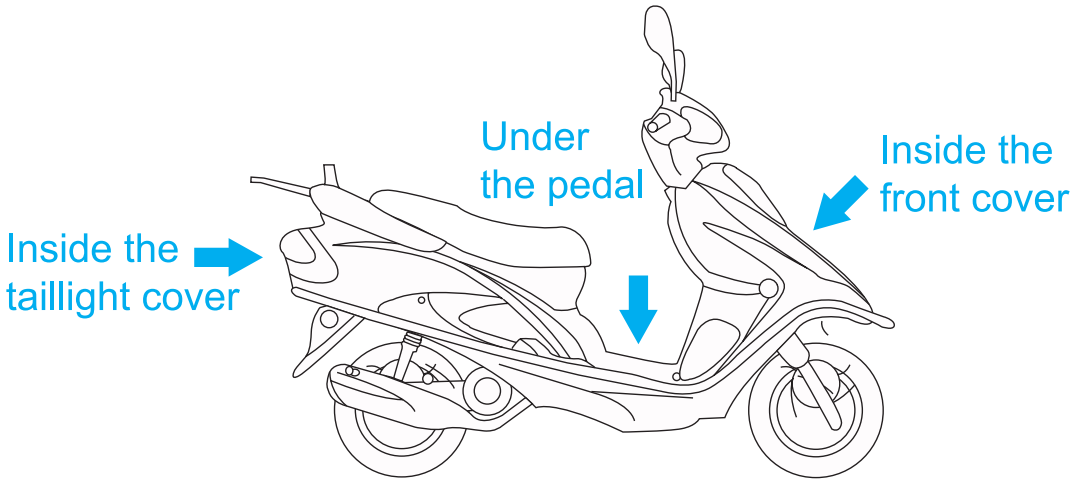


Possible Install Positions for Motorcycles

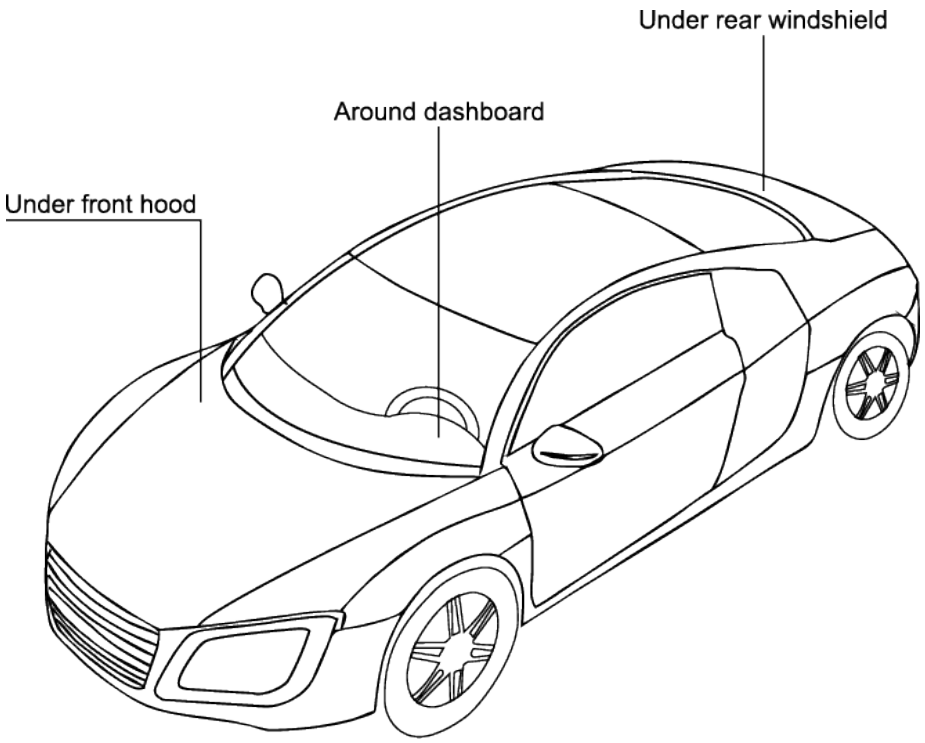


Note:

If the device is installed under the rider, the strength of satellite signals reaching the device will be seriously affected.



Possible Install Positions for Automobiles



Note:

Make sure the front side of the device is facing to the sky;

Avoid positions where a metal insulation layer or heating layer may exist; as such a layer may affect the strength of satellite signals reaching the device.

Platform Operations

4.1 Logging In to Service Platform

- You can configure and control the device via the designated location service platform.
- You can download the mobile app via the URL provided by your dealer.

iOS

Android

Appendix

5.1 Battery Safety

- Please use batteries that are specified by the manufacturer of the device. The use of any non-original accessories will void the warranty services. The manufacturer will disclaim any repair liabilities for damages caused by the use of any non-original accessories.
- Avoid metal objects as they may cause short circuits on battery contacts.
- Do not bend or forcibly open the battery.
- Do not soak the battery in water or expose it to fire.
- Charge the battery at room temperature. If the temperature is lower than 0°C or higher than 45°C during charging, the battery may fail to be charged.
- It is forbidden to use batteries that are deformed, discolored, spilled, or package-damaged.
- It is forbidden to disassemble or modify the battery.

Troubleshooting

When an issue arises with the device, you can troubleshoot it by the following solution. If the issue persists, please don't hesitate to contact your dealer or service provider.

Common Issues	Possible Causes	Solutions
Poor signal	The device is used in an area where radio waves cannot reach, such as near high-rise buildings or in a basement.	Try it in a place where satellite signals can be well received.
Power-on failure	No SIM	Insert a SIM.
	The battery is exhausted.	Charge the device.
Failed to access the network	The SIM card may be attached improperly.	Check the SIM.
	The metal side of the SIM card is stained.	Clean it with an eraser.
	The SIM card is invalid.	Please contact your network service provider.
	The device is out of cellular service areas.	Try it in a service area.
	The signal is extremely weak.	Try it in an area with strong signals.
Failed to query a location	The SIM is not activated with the GPRS service.	Please contact your network service provider and activate the GPRS service.
	The device keeps replying with "No data found, please try again".	Please contact your dealer.

Warranty Instructions and Servic

7.1 Special Note

- No prior notice will be given if the product is upgraded due to technological reasons.
- The appearance or color of the product is subject to the actual.
- The warranty card applies to the services of repair, replacement and refund of the product with the following IMEI.
- Please keep this warranty card and the original purchase receipt together in a safe place, as these will be needed at time of services.

7.2 Warranty Terms

- For damages not caused by human factors, this warranty lasts for one year starting from the date of purchase.
- You can choose to pay for the repair services in any of the following cases:
  ① The warranty card expires;
  ② No warranty card or valid proof of purchase;
  ③ The product, including its accessories, is not in the warranty period;
  ④ Quality issues resulted from unauthorized repair, crash, liquid spillage, accident, modification, or incorrect voltage input; or the label, IMEI, or counterfeit mark of the device is broken or scribbled;
  ⑤ Damage caused by installing or using the device without following the instructions in this User Manual;
  ⑥ The warranty does not cover damages resulted from soaking in liquid;
  ⑦ The product model is inconsistent with that on the warranty card or the warranty card was altered;
  ⑧ Damage caused by force majeure such as fire, flood, or lightning.

7.3 Note

- For vehicle trackers
  As of January 1, 2016, the warranty lasts for 1 (one) year from the date of purchase.

- The specific terms are
  1. A full replacement, including accessories, if the product is found defective during the unpacking check (that is, the device has neither been installed nor used);
  2. If a defect occurs within one year after installation, then:
     ① ©Replace only the mainboard if the housing is intact and doesn't affect normal use; or
     ② @Replace the housing and the mainboard if the housing is defective and affects normal use (Please be noted that man-made damages will void the replacement service for the housing).
  3. Free repair services will be given to the product if a defect is found during the first year under proper use.

Warranty Card

Customer Information

Customer Name		IMEI No.	
Mailing Address			
Product Model		Phone	
Date of Purchase		Invoice No.	
Purchased From			
Address			
Phone			

***This is the basic document for warranty services. Please carefully fill in and safely keep this card.**

Maintenance Record

Service Start Date	Problem and Solution	Service End Date	Customer Signature

Important

Please keep this warranty card in a safe place, as it is the proof for one-year free warranty services. If this card is lost, the Company will determine the date of purchase to be the thirtieth (30th) day after the date of production.