TrackingTheWorld
GPS Tracking Solutions

TrackingThe

# AVL-50 4G

## Vehicle Tracking Device

# USER MANUAL

| | |
|---|---|
| Document Title | AVL-50 4G User Manual |
| Version | 2.01 |
| Date | 2018-04-02 |
| Status | Released |
| Document Control ID | TTW-AVL504G-UM002 |

**General Notes**

TrackingTheWorld offers this information as a service to its customers, to support application and engineering efforts that use the products designed by TrackingTheWorld. The information provided is based upon requirements specifically provided to TrackingTheWorld by the customers. TrackingTheWorld has not undertaken any independent search for additional relevant information, including any information that may be in the customer's possession. Furthermore, system validation of this product designed by TrackingTheWorld within a larger electronic system remains the responsibility of the customer or the customer's system integrator. All specifications supplied herein are subject to change.

**Copyright**

This document contains proprietary technical information which is the property of TrackingTheWorld, copying of this document and giving it to others and the using or communication of the contents thereof, are forbidden without express authority. Offenders are liable to the payment of damages. All rights reserved in the event of grant of a patent or the registration of a utility model or design. All specification supplied herein are subject to change without notice at any time.

Copyright © TrackingTheWorld 2018

WARNING: The device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) The device may not cause harmful interference.
(2) The device must accept any interference received, including interference that may cause undesired operation.

Change or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC RF Exposure Statement:

The normal use condition for the product is at least 20cm away from the body of the user, so the user must keep a distance of at least 20cm from the product.

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

# Contents

1 Introduction ..... 8
1.1. Reference ..... 8
1.2. Terms and Abbreviations ..... 8
2 Product Overview ..... 9
2.1. Check Part List ..... **Error! Bookmark not defined.**
2.2. Parts List ..... **Error! Bookmark not defined.**
2.3. Interface Definition ..... 9
2.4. AVL50 4G User Cable Color ..... 10
3 .Getting Started ..... 14
3.1. Opening the Case ..... **Error! Bookmark not defined.**
3.2. Closing the Case ..... **Error! Bookmark not defined.**
3.3. Installing a SIM Card ..... **Error! Bookmark not defined.**
3.4. Installing the Internal Backup Battery ..... **Error! Bookmark not defined.**
3.5. Switch ON the Backup Battery ..... **Error! Bookmark not defined.**
3.6. Power Connection ..... **Error! Bookmark not defined.**
3.7. Ignition Detection ..... **Error! Bookmark not defined.**
3.8. Digital Inputs ..... **Error! Bookmark not defined.**
3.9. Digital Outputs ..... **Error! Bookmark not defined.**
3.10. Device Status LED ..... **Error! Bookmark not defined.**
3.11. Motion Sensor direction ..... **Error! Bookmark not defined.**

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

# Table Index

Table 1. AVL50 4G Protocol Reference ..... 8
Table 2. Terms and Abbreviations..... 8
Table 3. Part List..... **Error! Bookmark not defined.**
Table 4. Description of 6 PIN Connections ..... 10
Table 5. AVL50 4G User Cable Colour definition..... 10
Table 6. Electrical Characteristics of Ignition Detection ..... **Error! Bookmark not defined.**
Table 7. Electrical Characteristics of the digital inputs ..... **Error! Bookmark not defined.**
Table 8. Electrical Characteristics of Digital Outputs..... **Error! Bookmark not defined.**
Table 9. Definition of Device status and LED ..... **Error! Bookmark not defined.**

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

## Figure Index

Figure 1. Appearance of AVL50 4G ..... 9
Figure 2. The 6 PIN connector on the AVL50 4G ..... 9
Figure 3. Opening the Case ..... **Error! Bookmark not defined.**
Figure 4. Closing the Case ..... **Error! Bookmark not defined.**
Figure 5. SIM Card Installation ..... **Error! Bookmark not defined.**
Figure 6. Backup Battery Installation ..... 15
Figure 7. Switch and ON/OFF position ..... **Error! Bookmark not defined.**
Figure 8. Typical Power Connection ..... **Error! Bookmark not defined.**
Figure 9. Typical Ignition Detection ..... **Error! Bookmark not defined.**
Figure 10. Typical Digital Input Connection ..... **Error! Bookmark not defined.**
Figure 11. Digital Output Internal Drive Circuit ..... **Error! Bookmark not defined.**
Figure 12. Typical Connection with Relay ..... **Error! Bookmark not defined.**
Figure 13. Typical Connection with LED ..... **Error! Bookmark not defined.**
Figure 14. AVL50 4G LED on the Case ..... **Error! Bookmark not defined.**
Figure 15. Motion sensor direction ..... **Error! Bookmark not defined.**

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

**Revision History**

| Revision | Date | Author | Description of change |
|---|---|---|---|
| 1.00 | 2017-11-18 | Jake.su | Initial Version |
| 2.00 | 2017-11-30 | Jake.su | Revision Version |
| 2.01 | 2018-04-02 | Louis Wang | Add positive trigger in Section2.6 |
| | | | |
| | | | |
| | | | |

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

# 1 Introduction

The AVL50 4G is a powerful CAT-M1, CAT-NB1, LTE GPS locator designed for a wide variety of vehicle tracking applications. They have multiple I/O interfaces that can be used for monitoring or controlling external devices. The built-in GPS receiver has superior sensitivity and fast initial positioning. Their multiband LTE Cat-M1 and Cat-NB1 allow the AVL-50 4G Series' location to be monitored in real time or periodically tracked by a backend server and mobile devices. System integration is straightforward as complete documentation is provided for the full featured @Track protocol. The @Track protocol supports a wide variety of reports including emergency alarm, geo-fence boundary crossings, as well as external power supply monitoring and position reports.

## 1.1. **Reference**

**Table 1. AVL50 4G Protocol Reference**

| SN | Document name | Remark |
|---|---|---|
| [1] | AVL50 4G @Track Air Interface Protocol | The air protocol interface between AVL50 4G and backend server. |

## 1.2. **Terms and Abbreviations**

**Table 2. Terms and Abbreviations**

| Abbreviation | Description |
|---|---|
| RXD | Receive Data |
| TXD | Transmit Data |
| VIN | External DC Power Input |
| IGN | Ignition |
| OUT1/IN1 | Output 1/Input 1 |
| OUT2 | Output 2 |
| GND | Ground |

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

# 2 Product Overview

## 2.1. Appearance

Before starting, check all the following items have been included with your AVL50 4G. If anything is missing, please contact your supplier.

**Figure 1. Appearance of AVL50 4G**

## 2.2. Interface Definition

The AVL50 4G has a 7 PIN interface connector. It contains the connections for power, and I/O. The sequence and description of the connector are shown in the following figure::

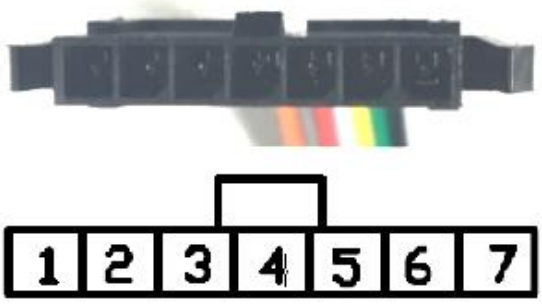



**Figure 2. The 7 PIN connector on the AVL50 4G**



Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

**Table 3. Description of 6 PIN Connections**

| Index | Description | Comment |
|---|---|---|
| 1 | RXD | UART RXD; TTL |
| 2 | TXD | UART TXD; TTL |
| 3 | VIN | External DC power input, 8-32V |
| 4 | IGN | Ignition input, positive trigger |
| 5 | OUT1/IN1 | Digital output/input; Open drain,150mA max |
| 6 | OUT2 | Open drain, 150mA max |
| 7 | GND | GND |

## 2.3. **AVL50 4G LED Description**

AVL50 4G has two status LEDs; CELL LED (Green color) and GPS LED (Red color)

**Table 4. AVL50 4G LED Description**

| | | |
|---|---|---|
| CELL | Device is searching for CELL network. | Fast flashing |
| | SIM card needs PIN code to be unlocked. | ON |
| | Device has registered to CELL network. | Slow flashing |
| GPS | GPS is asleep. | OFF |
| | GPS is fixed. | ON |
| | Device is searching for GPS. | Fast flashing |

**Note:**

1. Fast flashing intervals are about 500ms ON/1sec OFF.
2. Slow flashing intervals are about 500ms ON/15sec OFF.

## 2.4. **Power Connection**

VIN (PIN3)/GND (PIN7) are the power input pins. The input voltage range for this device is from 8V to 32V. The device is designed to be installed in vehicles that operate on 12V/24V systems without the need for external transformers.

**Figure 3. Typical Power Connection**

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

## 2.5. **Ignition Detection**

IGN (Pin4) is used for ignition detection. It is recommended to connect this pin to the “RUN” position of the vehicle ignition switch as shown below.
An alternative to connect to the ignition switch is to find a non-permanent power source that is only available when the vehicle is running. For example, the power source for the FM radio.
IGN signal can be configured to transmit information to the backend server when ignition is on and enter power saving mode when ignition is off

**Table 5. AVL50 4G Electrical Characteristics of Ignition Detection**

| Logical State | Electrical Characteristics |
|---|---|
| Active | 5.0V to 32V |
| Inactive | 0V to 3V or Open loop |

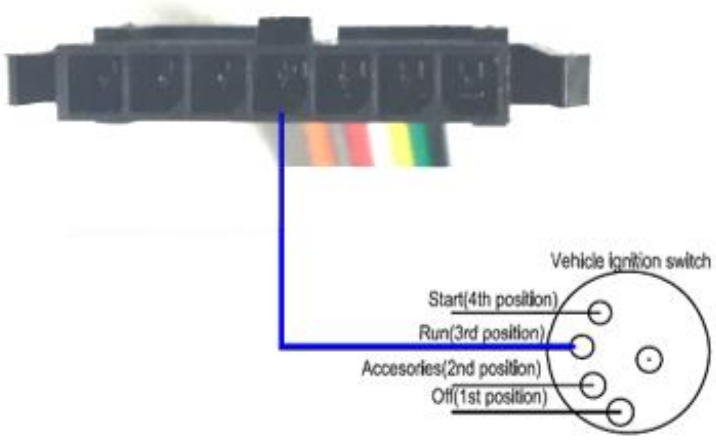



**Figure 4. Typical Power Connection**

## 2.6. **Digital Output/Input Connection**

OUT1/IN1 (PIN5) is a digital Output/Input on AVL50 4G. It is of open drain type and the maximum drain current is 150mA. The OUT1/IN1 (PIN5) can be used either as a digital output or a (positive and negative trigger) digital input

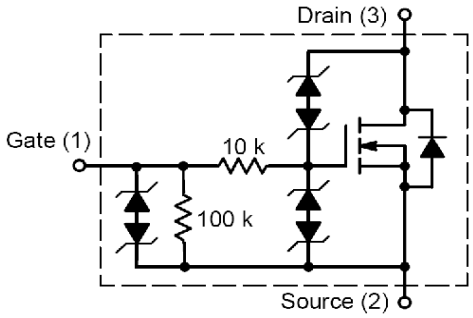



**Figure 5. Digital Output Internal Drive Circuit**

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

**Table 6. Electrical Characteristics of Digital Output**

| Logical State | Electrical Characteristics |
|---|---|
| Enable | <1.5V @150mA |
| Disable | Open drain |

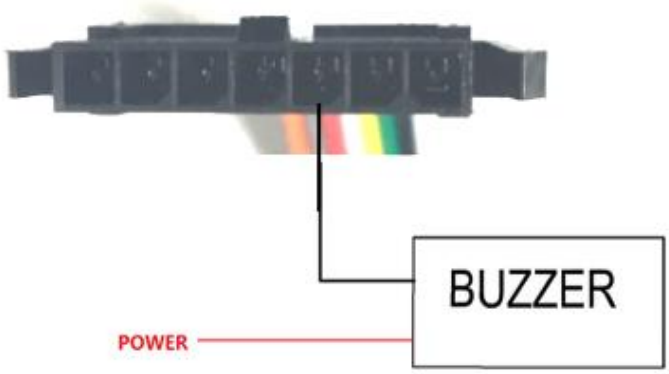



**Figure 6. Typical Connection with a Buzzer as Digital Output**

**Table 7. Electrical Characteristics of Digital Input**

| Logical State | Electrical Characteristics |
|---|---|
| Active | 0V to 0.8V |
| Inactive | Open loop |

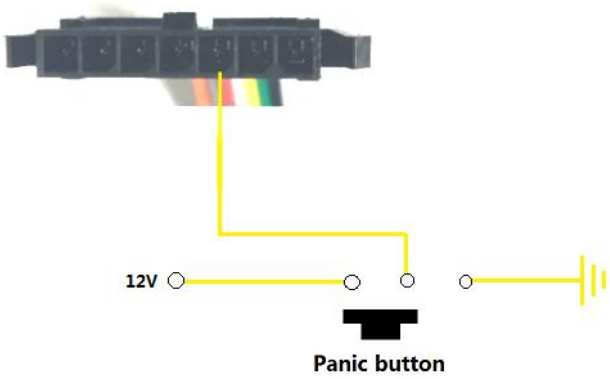



**Figure 7. Typical Digital Input Connection**

## 2.7. Digital Output/Input Connection

There is a digital output (PIN6) on AVL50 4G. It is of open drain type and the maximum drain current is 150mA



Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

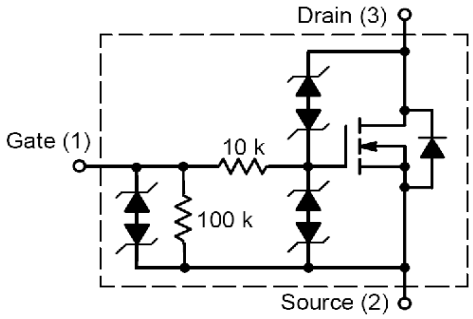



**Figure 8. Digital Output Internal Drive Circuit**

**Table 8. Electrical Characteristics of Digital Output**

| Logical State | Electrical Characteristics |
|---|---|
| Enable | <1.5V @150mA |
| Disable | Open drain |

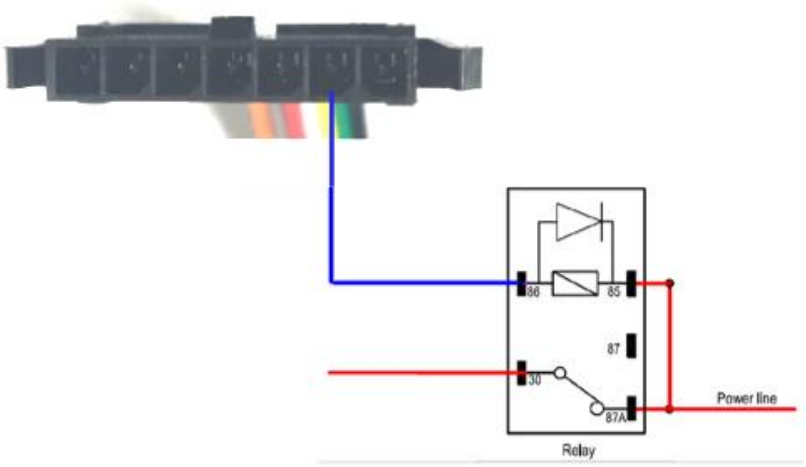



**Figure 9. Typical Connection with a Relay**

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

# 3 .Getting Started

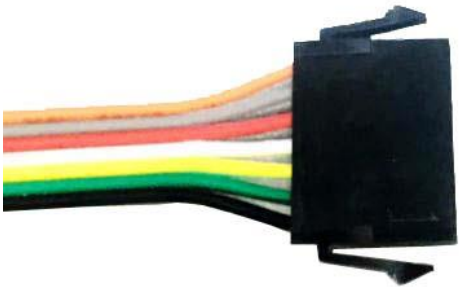
## 3.1. **Parts List**

**Table 9. Parts List**

| Name | Picture |
|---|---|
| AVL50 4G Locator | 90mm*55mm*13mm |
| Extension Harness | |

## 3.2. **AVL50 4G Device Cable Interface**

**Table 10. AVL50 4G User Cable Color Definition**

| Definition | Color | PIN No. | Cable |
|---|---|---|---|
| RXD | Orange | 1 |  |
| TXD | Gray | 2 | |
| VIN | Red | 3 | |
| IGN | White | 4 | |
| OUT1/IN1 | Yellow | 5 | |
| OUT2 | Green | 6 | |
| GND | Black | 7 | |

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

## 3.3. **Open the SIM Card Cover**

Follow the direction on the case and push to open the SIM card cover.

**Figure 10. Open the SIM card cover**

## 3.4. **Close the SIM card cover**

**Figure 11. Backup Battery Installation**

Align and push to close the SIM card cover.

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

## 3.5. **Install a SIM Card**

Install the SIM card into the holder when power is off as shown blow. Take care to align the cut mark, and then close the case.

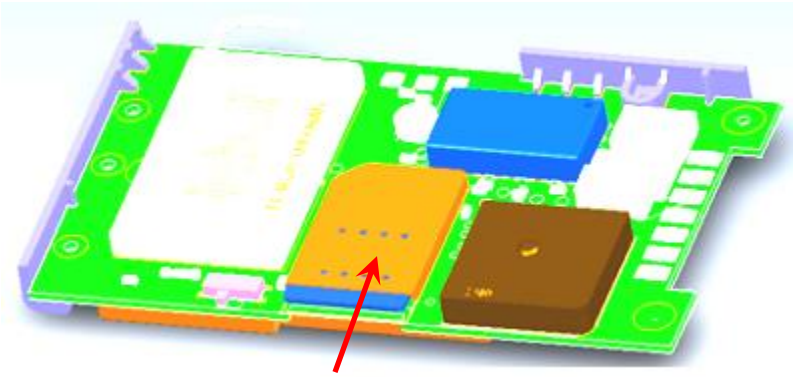


**Figure 12. SIM Card Installation**

## 3.6. **Switch on the Backup Battery**

To use the AVL50 4G backup battery, the switch must be at the ON position. The switch and the ON/OFF position are shown as below.

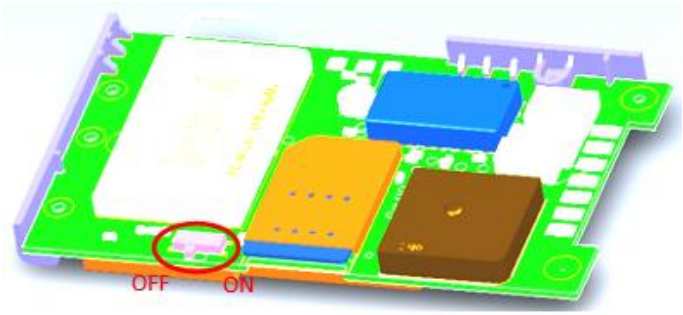



**Figure 13. Switch ON/OFF Position**

Note:
1. The switch must be at the “OFF” position when the AVL50 4G is being shipped on an aircraft.
2. When the switch is at the “OFF” position, the battery cannot be charged or discharged and cannot be turned on.

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.

# 4 .Troubleshooting and Safety Info

## 4.1. **Troubleshooting**

| Problem | Possible Reason | Solution |
|---|---|---|
| After AVL50 4G is turned on, the CELL LED always flashes quickly. | AVL50 4G isn't registered to the ISP. | Please register the AVL50 4G again and make sure the device gets the correct MDN. |
| | The signal is too weak, and AVL50 4G can't be registered to the network. | Please move AVL50 4G into places with good LTE coverage. |
| Messages can't be reported to the backend server by LTE. | The IP address or port of the backend server is wrong. | Make sure the IP address for the backend server is an identified address on the Internet. |
| AVL50 4G cannot power off no matter the device is in charge or not. | Unable to power off AVL50 4G if charger is connected. | Disconnect charger and try again. |
| AVL50 4G can't get successful GPS fixing. | The GPS signal is weak. | Please move AVL50 4G to a place with open sky. |
| | | It is better to let the top surface (which comes with LED indicator) face the sky. |

## 4.2. **Safety Info**

- Do not disassemble the device by yourself.
- Do not put the device in over heated too humid place and avoid exposure to direct sunlight. Too high temperature will damage the device or even causes battery explosion.
- Do not use AVL50 4G on the airplane or near medical equipment.

**For More Information:** Please contact TrackingTheWorld, 1633 Bayshore Highway, Suite 390, Burlingame, CA. 94010, USA
Phone: +1.650.692.8100 – Email: info@trackingtheworld.com – Website: www.trackingtheworld.com

Copyright © TrackingTheWorld. All rights reserved. Information in this publication supersedes that in all previously published material. Specification and price change privileges reserved. All trade names referenced are the service marks, trademarks, or registered trademarks of their respective companies.