GV350CEU User Manual

GSM/GPRS/LTE CAT1/GNSS Tracker

TRACGV350CEUUM001

Version: 1.00

Driving Smarter IoT

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0. Revision History

Version	Date	Author	Description of Change
1.00	2022-03-30	Willie Liu	Initial

1. Introduction

The GV350CEU is a compact GNSS tracker designed for a wide variety of vehicle tracking applications. It has multiple I/O interfaces that can be used for monitoring or controlling external devices. Its built-in GNSS receiver has superior sensitivity and fast time to first fix. Its six-band LTE-FDD in Europe and GSM/GPRS 850/900/1800/1900 MHz allowing the GV350CEU's location to be monitored in real time or periodically tracked by a backend server and mobile devices. Its built-in 3-axis accelerometer allows driving behaviour monitoring, motion detection and extended battery life through sophisticated power management algorithms. It also has built-in CAN Module. 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, geo-fence boundary crossings, driving behaviour, low battery and scheduled GNSS position.

1.1. Reference

Table 1. GV350CEU Protocol Reference

SN	Document Name	Remark
[1]	GV350CEU @Track Air Interface Protocol	The air protocol interface between GV350CEU and backend server.

1.2. Terms and Abbreviations

Table 2. Terms and Abbreviations

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

2. Product Overview

2.1. Check Parts List

Before starting, check whether all the following items have been included with your GV350CEU. If anything is missing, please contact the supplier.

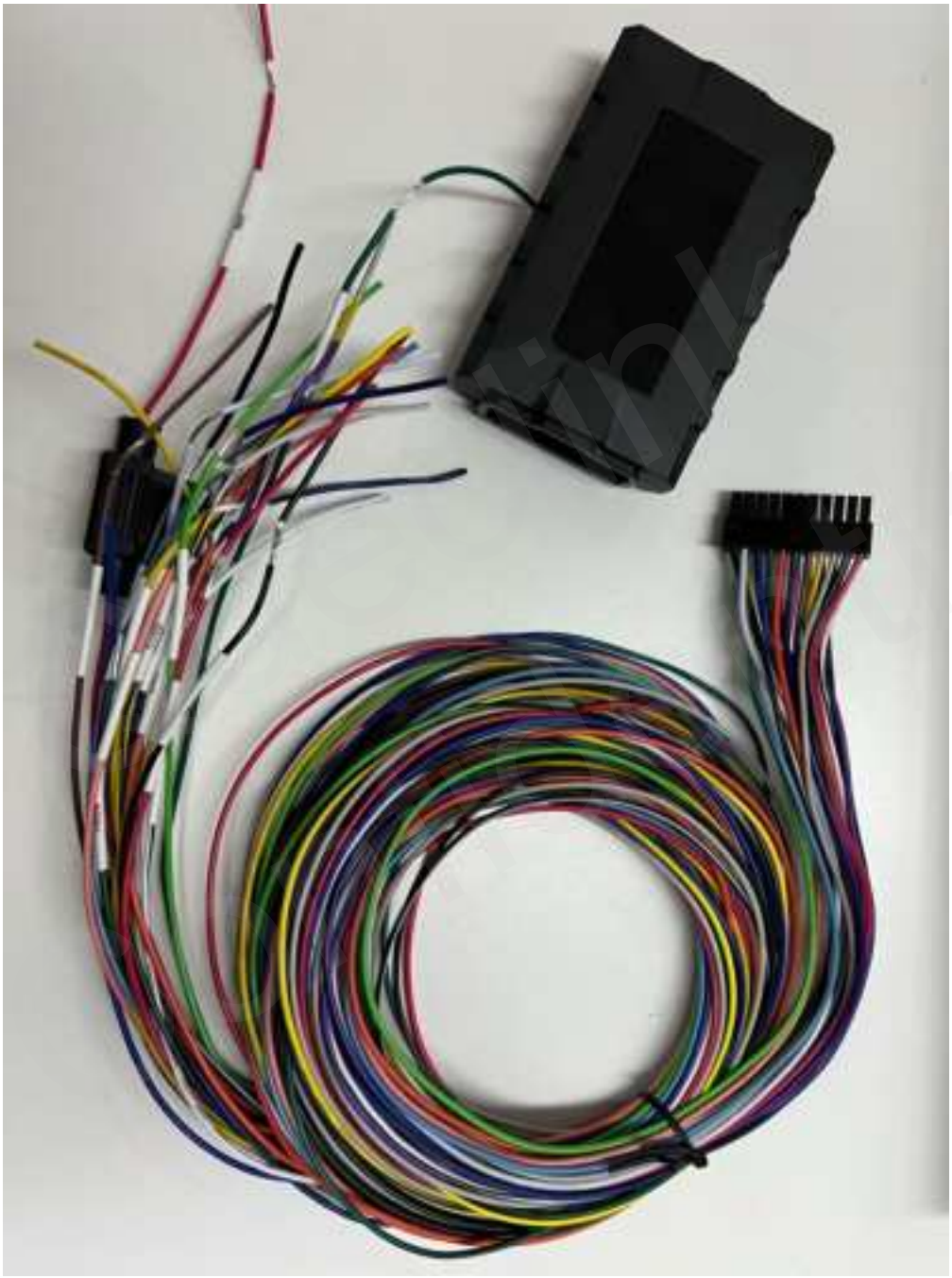

Figure 1. Appearance of GV350CEU

2.2. Parts List

Table 3. Parts List

Name	Picture
GV350CEU Locator	94*58.5*21 mm
User Cable	
DATA_CABLE_W (Optional)	
Power Protection Cable_Kit (Optional)	

2.3. Interface Definition

The GV350CEU has a 22 PIN interface connector which contains the connections for power, I/O, RS232, etc. The sequence and definition of the 22-PIN connector are shown in the following figure:

Figure 2. The 22 PIN Connector on the GV350CEU

Table 4. Description of 22 PIN Connections

Index	Description	Comment
1	ADC_IN	Analog input (0-32V)
2	ADIN1	Analog input (0-16V)
3	OUT 1	Digital output, Open drain, 150 mA max, with latch circuit
4	OUT 3	Digital output
5	OUT 5	Digital output
6	OUT 4	Digital output
7	/IN2	Digital input, negative trigger
8	/IN1	Digital input, negative trigger
9	VIN	External DC power input, 8-32V
10	DATA_1W	Data for one wire
11	VDD_1W	VDD for one wire
12	ADIN2	Analog input (0-16V)
13	/IN3	Digital input, Negative trigger
14	TXD	UART RXD, RS232
15	RXD	UART TXD, RS232
16	IGN	Ignition input, positive trigger
17	OUT2	Digital output
18	GND	Power and digital ground
19	CAN1L	CAN 1 negative
20	CAN1H	CAN 1 positive
21	CAN2H	CAN 2 negative
22	CAN2L	CAN 2 positive

2.4. GV350CEU User Cable and Color

Table 5. GV350CEU User Cable and Color Definition

Definition	Color	PIN No	Cable	PIN No	Color	Definition
VDD_1W	Orange	11		22	Green/Black	CAN2L
DATA_1W	Gray	10		21	Green/White	CAN2H
VIN	Red	9		20	Orange/Green	CAN1H
/IN1	Brown	8		19	Orange/Brown	CAN1L
/IN2	Yellow	7		18	Black	GND
OUT4	Navy Blue/White	6		17	Navy Green	OUT2
OUT5	Blue	5		16	Purple	IGN
OUT3	Navy Green/White	6		15	Pink/White	RXD
OUT1	Navy Blue	3		14	Pink	TXD
ADIN1	White/Black	2		13	Yellow/Black	/IN3
ADC_IN	White	1		12	White/Brown	ADIN2

3. Get Started

3.1. Open the Case

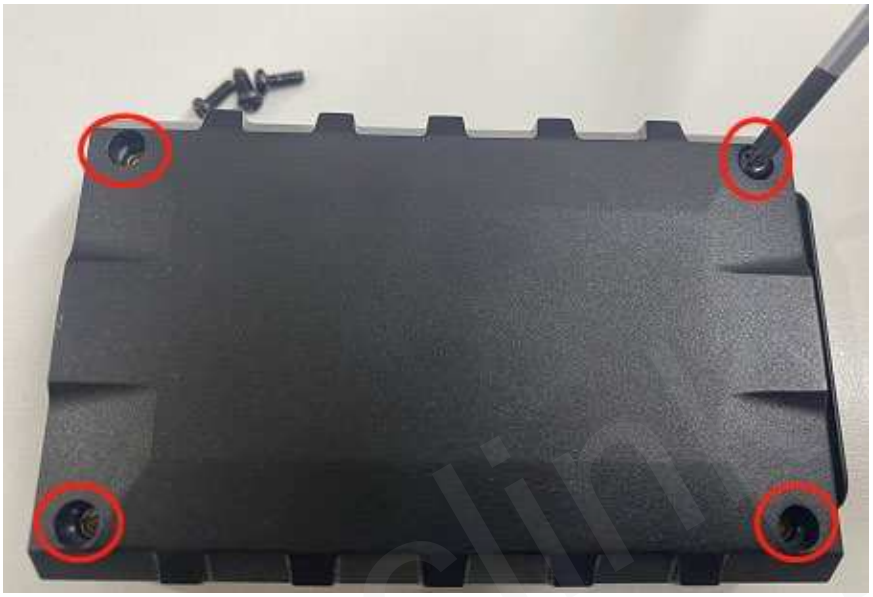

Figure 3. Open the Case

Use the screwdriver to remove the screws on the four corners to open the device.

3.2. Close the Case

Figure 4. Close the Case

Use the screwdriver to tighten the screws on the four corners to complete device assembly.

3.3. Install a SIM Card

Open the case and ensure the unit is not powered. Slide the holder right to open the SIM card holder. Insert the SIM card into the holder as shown below with the gold-colored contact area facing down. Take care to align the cut mark. Close the SIM card holder. Close the case.

Figure 5. SIM Card Installation

3.4. Install the Internal Backup Battery

Figure 6. Backup Battery Installation

GV350CEU has an internal backup Li-ion battery.

3.5. Power Connection

PWR (PIN9)/GND (PIN18) 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 common vehicles that operate on 12V or 24V systems without the need for external transformers. But it is recommended to use Power Protection Cable Kit if it is installed in a truck with 24V battery.

Figure 7. Typical Power Connection

3.6. Power On

Please pay attention to the following situations when powering on the device:

1. Backup battery is connected to the device:

- The device can be powered on when the USB cable is connected.
- The device can be powered on when the external power supply is connected.

2. Backup battery is not connected to the device:

- The device cannot be powered on when the USB cable is connected only.
- The device can be powered on when the external power supply is connected only.

3.7. Ignition Detection

Table 6. Electrical Characteristics of Ignition Detection

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

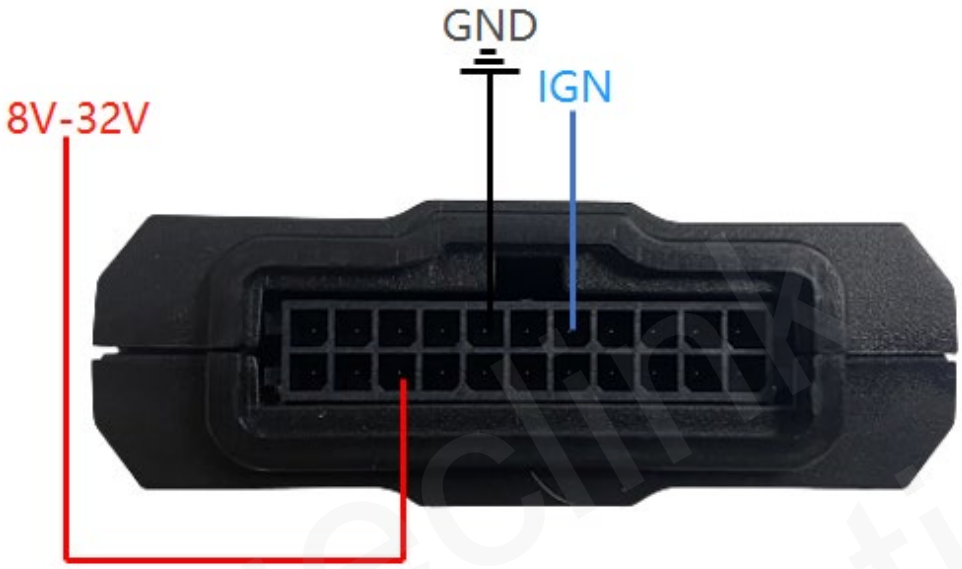

Figure 8. Typical Ignition Detection

IGN (Pin16) is used for ignition detection. It is strongly recommended to connect this pin to ignition key “RUN” position as shown above.

An alternative to connecting 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 start transmitting information to the backend server when ignition is on, and enter the power saving mode when ignition is off.

3.8. Digital Inputs

There are three general purpose digital inputs on GV350CEU. They are all negative triggers.

Table 7. Electrical Characteristics of the Digital Inputs

Logical Status	Electrical Characteristics
Active	0V to 0.6V
Inactive	Open

The following figure shows the recommended connection of a digital input.

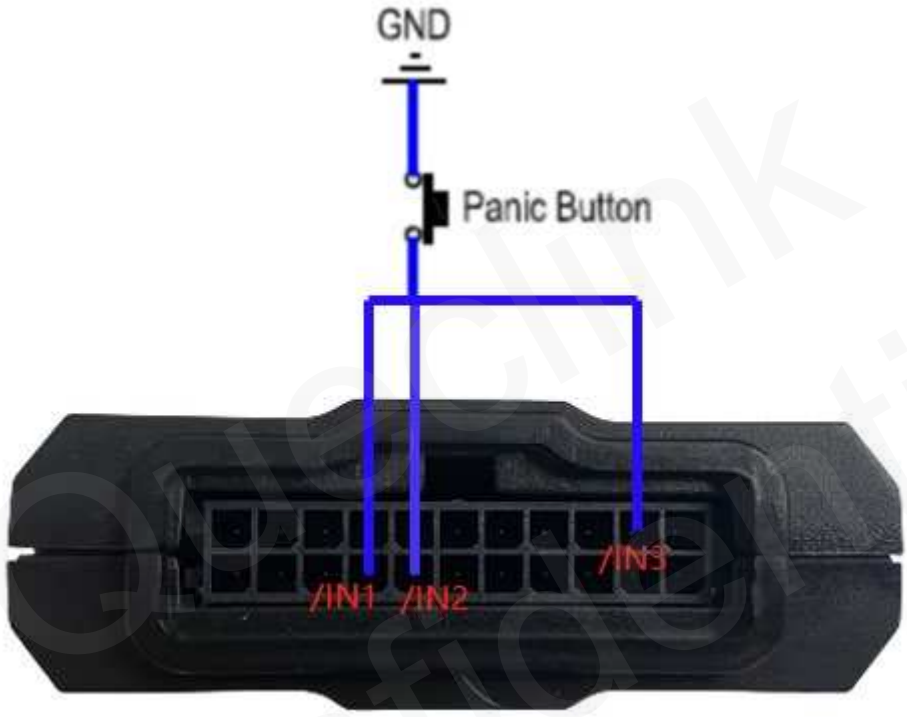

Figure 9. Typical Digital Input Connection

3.9. Analog Inputs

There are three analog inputs on GV350CEU, and the analog input voltage ranges are 0-16V and 0-30V. The following figure shows the recommended connection.

Figure 10. Typical Analog Input Connection

Note:

1. For PIN 12 and PIN2, the voltage range is 0-16V.
2. For PIN 1, the voltage range is 0-30V.

3.10. Digital Outputs

There are three digital outputs on GV350CEU. All three digital outputs are of open drain type and the maximum drain current is 150mA. Each output has the built-in over current PTC resettable fuse.

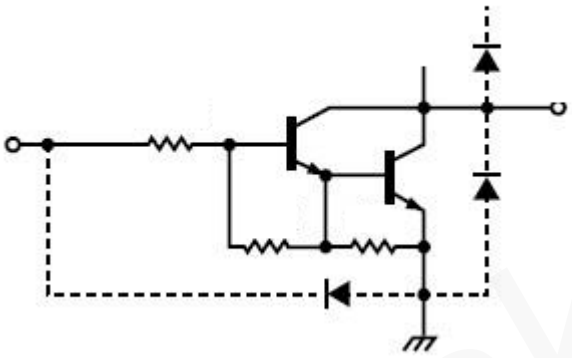

Figure 11. Digital Output Internal Drive Circuit

Table 8. Electrical Characteristics of Digital Outputs

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

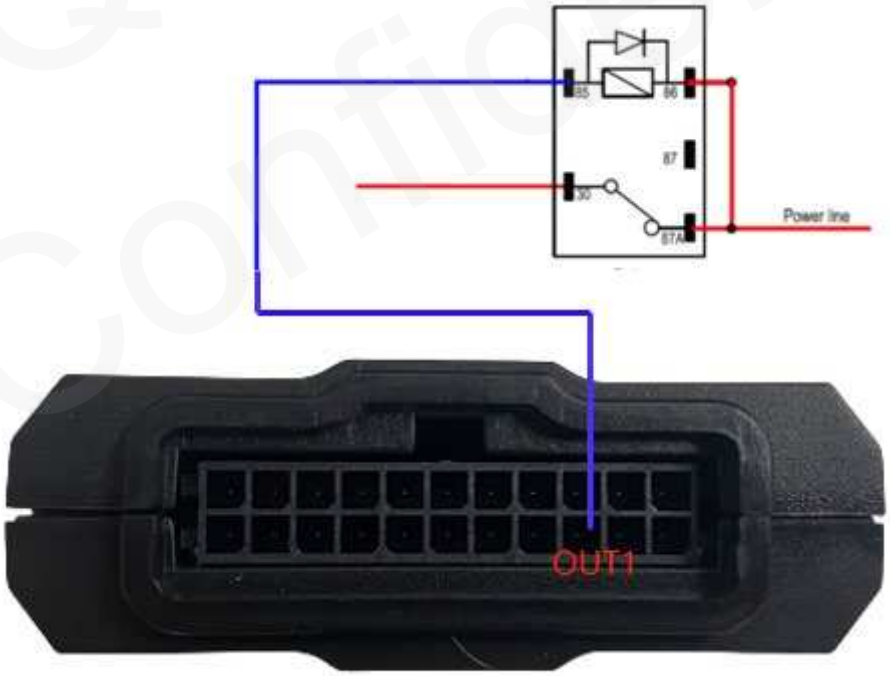

Figure 12. Typical Connection with Relay

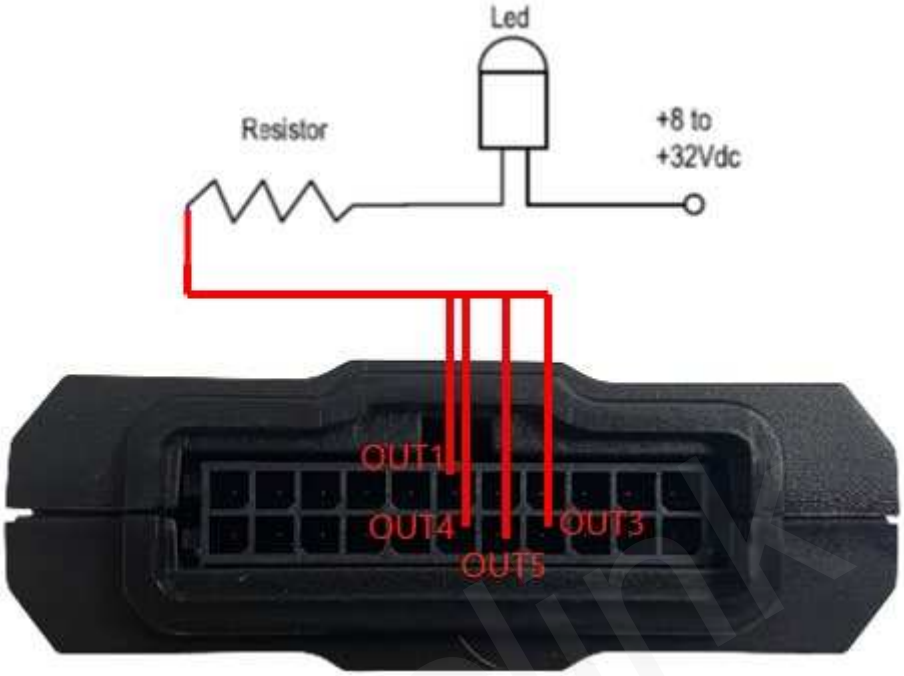

Figure 13. Typical Connection with LED

Note:

1. OUT1 will latch the output state during reset.
2. Many modern relays come with a flyback diode pre-installed internal to the relay itself. If the relay has this diode, please ensure the relay polarity is properly connected. If this diode is not internal, it should be added externally. A common diode such as a 1N4004 will work in most circumstances.

3.11. Device Status LED

Figure 14. GV350CEU LED on the Case

Table 9. Definition of Device Status and LED

LED	Device Status	LED Status
CAN	Operating mode, CAN-bus or J1708 active (only one of those)	Blinks green once every 1s
	Operating mode, CAN-bus(es) and J1708 sleep or disabled	Blinks green once every 4s
	Low power mode (sleep)	Off
	CAN-bus codes synchronization	Blinks red quickly (ca.7times per second)
	CAN-bus codes synchronization finished successfully	Green on (after synchronization)
	CAN-bus codes synchronization failed (CAN-bus wires are properly connected, but codes have not been recognized).	Red on (after synchronization)
	CAN-bus codes synchronization failed (no CAN-bus connection or CAN-bus sleep).	Flashes red 0.5s on / green 0.5s on
	Device startup failed. Return the device to the producer for diagnosis.	Red on (after power-on)
GNSS (Note 2)	GPS chip is powered off.	OFF
	GPS sends no data or data format error occurs.	Slow flashing
	GPS chip is searching GPS information.	Fast flashing
	GPS chip has gotten GPS information.	ON
CEL (Note 1)	Device is searching network.	Fast flashing (Note 3)
	Device has registered to network.	Slow flashing(Note 4)

	SIM card needs pin code to unlock.	ON
PWR (Note 2)	No external power and internal battery voltage is lower than 3.5V.	OFF
	No external power and internal battery voltage is below 3.65V.	Slow flashing
	The external power supply has been connected to the device and the internal battery of the device is charging.	Fast flashing
	The external power supply has been connected to the device and the internal battery of the device is fully charged.	ON

Note:

1. CEL LED cannot be configured.
2. GNSS LED and PWR LED can be configured to be turned off after a period time by using the configuration tool.
3. Fast flashing: For CEL LED, it is about 60 Ms ON/780 Ms OFF. For GPS LED and PWR LED, it is about 100 Ms ON/100 Ms OFF.
4. Slow flashing: For CEL LED, it is about 60 Ms ON/1940 Ms OFF. For GPS LED and PWR LED, it is about 600 Ms ON/600 Ms OFF.

3.12. Serial Port/UART Interface

There are two lines dedicated to the Serial Port/UART interface (TXD and RXD). TXD/RXD is standard RS232 signal.

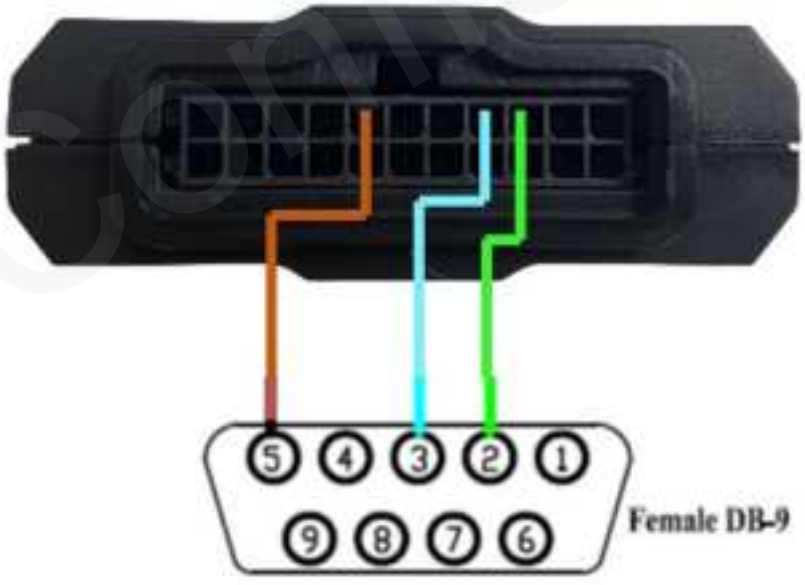

Figure 15. Typical Connection with RS232 Port

3.13. 1-WIRE Interface

There are two lines dedicated to the 1-WIRE, VDD and Data for one wire.

Figure 16. 1-WIRE Interface

3.14. Motion Sensor Direction

GV350CEU has an internal 6-axis gyroscope sensor supporting driving behavior monitoring, crash detection and motion detection. The following shows the directions of the motion sensor:

Figure 17. Motion Sensor Direction

Note:

1. The opposite direction of the cable harness is the positive direction of the X-axis.
2. The z-axis is in positive direction above the label surface.

3. The positive directions of the three axes are perpendicular to each other, as shown in the figure.

3.15. CAN Installation

3.15.1. CAN Interface

There are two CAN interfaces, CAN2L/CAN2H, CAN1L/CAN1H.
CAN1: J1939 (FMS data)
CAN2: J1708

Figure 18. CAN Interface

3.15.2. Device Installation

Here are the steps to connect CANH and CANL to CAN-bus in the vehicle.

Step_1. Connect CAN1 to CAN-bus in the vehicle.

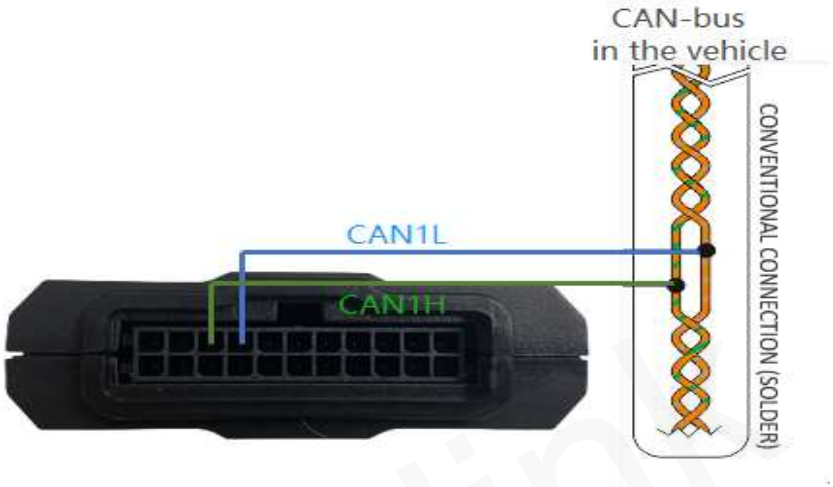

Figure 19. CAN1 Connection

Physically weld CAN1H and CAN1L to the OBD (CANH pin 6, CANL pin 14) interface of the vehicle. Then turn the ignition on.

Note:

Machines are supported in GV350CEU only if they are based on J1939/FMS protocol. Any others will not be supported. All the heavy trucks, cars and buses are supported in the same firmware. Please consult the supplier for a detailed support list.

Step_2. Connect CAN2 to CAN-bus or J1708-bus in the vehicle.

Figure 20. CAN2 Connection

Connect CAN2 to CAN-bus or J1708-bus in the vehicle. Automatic synchronization will detect J1708 as usual.

Note:

If necessary, please read the passenger car DTC, and connect CAN2 to OBD (CANH pin 6, CANL pin 14). If CAN1 is connected there, then void connecting CAN2. Not all cars would require connecting CAN2, but for now this is the most generic instruction and it doesn't go wrong even if it would be connected for nothing.

Operating Temperature:-30℃ ~ +70℃

RF exposure st*atement*

RF exposure information: The Maximum Permissible Exposure (MPE) level has been calculated based on a distance of d=20 cm between the device and the human body. To maintain compliance with RF exposure requirement, use product that maintain a 20cm dist

ance between the device and human body.

GSM900	30.01 dBm
GSM1800	27.63 dBm
Band 1	24.53 dBm
Band 3	23.96 dBm
Band 7	24.59 dBm
Band 8	22 dBm
Band 20	23.57 dBm
Band 28	21.64 dBm
BLE	7.25dbm

Hereby, Queclink Wireless Solutions Co., Ltd. declares that the radio equipment it is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

http://www.queclink.com/

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device,
pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates,
uses and can radiate radio frequency energy and, if not installed and used in accordance with
the instructions, may cause harmful interference to radio communications. However, there is
no guarantee that interference will not occur in a particular installation. If this equipment does
cause harmful interference to radio or television reception, which can be determined by turning
the equipment off and on, the user is encouraged to try to correct the interference by one of the
following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

-
Connect the equipment into an outlet on a circuit different from that to which the receiver is
connected.
-
Consult the dealer or an experienced radio/TV technician for help.

FCC Caution:
Any changes or modifications not expressly approved by the party responsible for compliance
could void the user's authority to operate this equipment.
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two
conditions:
(1)This device may not cause harmful interference, and
(2)This device must accept any interference received, including interference that may cause
undesired operation.
FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm
between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

3.15.3. CAN-bus Synchronization

CAN-bus codes synchronization function allows GV350CEU to detect the vehicle model to which the GV350CEU is connected. Switch vehicle ignition on and send the command **AT+GTRTO**=gv350ceu,22,2,,,,,FFFF$ after GV350CEU is installed in the vehicle, and then the synchronization will start. During synchronization, the flashing of the can lamp can be observed. For details, please refer to command **AT+GTRTO**-22 and **AT+GTRTO**-2F.

3.15.4. Firmware Upgrade

A file with the firmware / configuration is supplied by the manufacturer. CAN firmware upgrade or CAN configuration upgrade can be set through **AT+GTCFU**. For details, please refer to command **AT+GTCFU**.