RIFA-B Easy Plug Tracker Support OBDII/J1939

USER MANUAL

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Antzer Tech RIFA Series User Manual

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1. Product Description

1.1. Introduction

Antzer-Tech Automotive-Grade RIFA-B OBDII/J1939 vehicle tracker provides a compact, economic, easy plug and track dongle solution for fleet management. RIFA's self-designed firmware not only supports OBDII & J1939 protocols, but integrates superior cellular modem, highly sensitive GPS, gyroscope and accelerometer in one end-to-end solution. With built-in antennas for both GPS and Cellular modules, RIFA engineers a truly robust connectivity. RIFA-B is combining with the most comprehensive and economical vehicle diagnostics technology, which provides real-time engine monitoring and GPS location. The engine diagnostic data is collected through the vehicle's OBD-II communication port and is transmitted via cellular network to the back-end center. In this way, potential engine problems can be identified earlier before the vehicle breaks down at an inopportune time. Furthermore, you may configure other advanced driving behavior events such as harsh braking, sudden acceleration, speeding, cornering, and much more in order to reduce the risks of vehicle damage and drive down the costs of fuel. This user manual is intended to guide you through the installation and configuration process.

1.2. Document History

Version	Date	Author	Description
1.0	14-Mar-18	Leopold Chen	First version of this document
2.0	11-July-18	Leopold Chen	Revision of this document
3.0	30-July-18	Leopold Chen	Add BLE application
4.0	30-Oct-18	Leopold Chen	Update Configurator Software

1.3. Hardware Specification

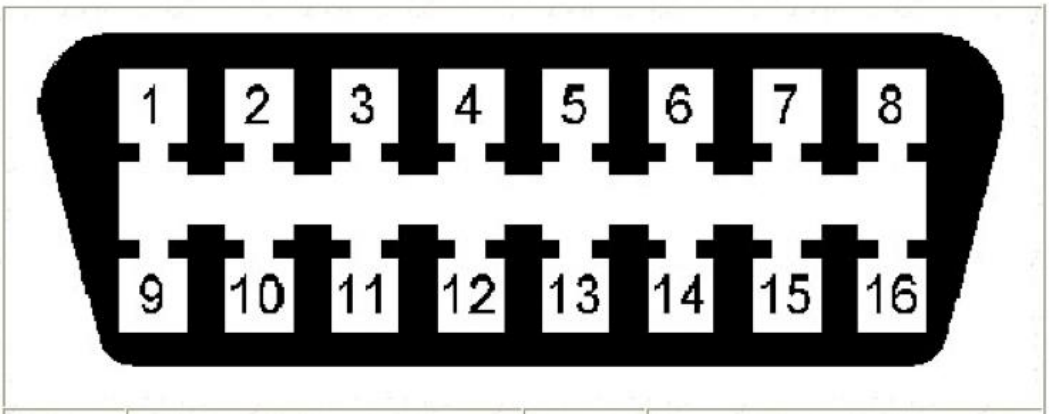
General	Vehicle Interface	Built-in OBD-II(J1962) Compliant Connector
	Messages	12,000 buffered messages
	Geofencing	Geofences Zones (Polygon, Rectangular or Circle Setting)
	Configuration	Over-The-Air Firmware and Remote Maintenance API
Vehicle Network	Connector Type	SAE J1962, Male
	OBD-II(J1962) Connector	CANbus, Power and Ground
	Vehicle Protocols	ISO15765-4 On-Board Diagnostic and J1939
Cellular Network	Frequency Band	GSM/GPRS: 850,900,1800,1900 Mhz
		HSPA/UMTS : 800,850,900,1700,1900,2100 Mhz
		LTE Cat 1 : Band 4, 13 or Band 3,7,20
		LTE Cat M1/NB 1 : Band 2,3,4,5,8,12,13,20,28
		LoRa[1]: US915,EU868,AS923 channel plan
	Data Protocol	TCP, UDP, HTTPs , MQTT , LoRaWAN
Wireless Network	Bluetooth	2.4GHz Low Energy Bluetooth Class 2
GPS	Chipset	Ublox Neo M8 Engine, 72Channels support GPS, Galileo, GLONASS, BeiDou
	Dead Reckoning	Optionally Support UDR, Tracking with GPS Signal Loss
Sensor		3-Axis G-sensor with Auto-Calibrating Function
LED Indicator		x2 LEDS (2 Colors each for GPS, Cellular Network, and System Status)
SIM Card	Form Factor	Mini SIM 2FF (25 x 15mm)
Configuration Port		MicroUSB Port for RS-232 Configuration Tool
Power	Power Input Range	9~32V DC Power Input from OBDII Connector
	Power Mode	Operating Mode, Sleep Mode, and Battery Mode
	Min. Power Consumption	<3mA @ 12V (Sleep mode), Support CAN Wakeup Function
Buzzer		Built-in Buzzer for System Status
Environment	Operating Temperature	-30 ~ 70 °C (Without Battery); -20 ~ 70 °C (With Battery)
	Storage Temperature	-40 ~ 85 °C
	Certificate and Vibration	CE, FCC, RoHS and MIL-STD-810G 514.6
	Humidity	10% to 90% R.H. (Non-Condensing) Compliant
Dimensions		86 x 56 x 28 mm
Battery	Lithium Ion Polymer Battery	Optionally support Built-in 3.7V 130mAh Battery
Accessories	Maintenance Kit	RS232-to-MicroUSB Cable Length: 1M

1.External antenna is needed

2. Hardware Feature

2.1. OBD Connector

Antzer-Tech RIFA-B can support ISO 15765-4, SAE J2284 and SAE J1939 on HD OBD by pin 6/14 with CAN High/Low signal. Also, RIFA-B support wide range power input from 9V to 32V by pin 16/5.



PIN	DESCRIPTION	PIN	DESCRIPTION
1	NC.	9	NC.
2	NC.	10	NC.
3	NC.	11	NC.
4	NC.	12	NC.
5	Ground	13	NC.
6	CAN High	14	CAN Low
7	NC.	15	NC.
8	NC.	16	Power In

OBD-II Connector and Pinout

2.2. Micro-USB Connector

There is an RS-232 port on the RIFA-B through the Micro-USB port for configuration usage. This topic shows you how to connect PC to RIFA-B by the Micro-USB port. Please follow below steps:

1. Prepare one USB to RS-232 cable

Note: You can buy this cable from FTDI website:
http://www.ftdichip.com/Products/Cables/USBRS232.htm

2. Prepare one RIFA-B Micro-USB to RS-232 cable (Antzer PN: T1700000001)

3.

3.1 Connect the RS-232 side of USB to RS-232 cable to the RS-232 side of RIFA Micro-USB to RS-232 cable

3.2 Connect the Micro-USB side of RIFA-B Micro-USB to RS-232 cable to the Micro-USB port of the RIFA-B device

3.3 Connect the USB side of USB to RS-232 cable to the USB port of PC

4. Make sure the COM port location of the USB to RS-232 cable recognized by PC (Win OS, Device Manage)

Run the RIFA-B Configuration Tool to execute the settings on RIFA-B (see chapter 3).

2.3. LED Indication

There is a LED indicator of RIFA to show the status of WWAN(cellular network),GPS and System power.

Link(LED1) Green Light: to show RIFA's WWAN module works fine.

Link(LED1) Yellow Light: to show RIFA's GPS module works fine.

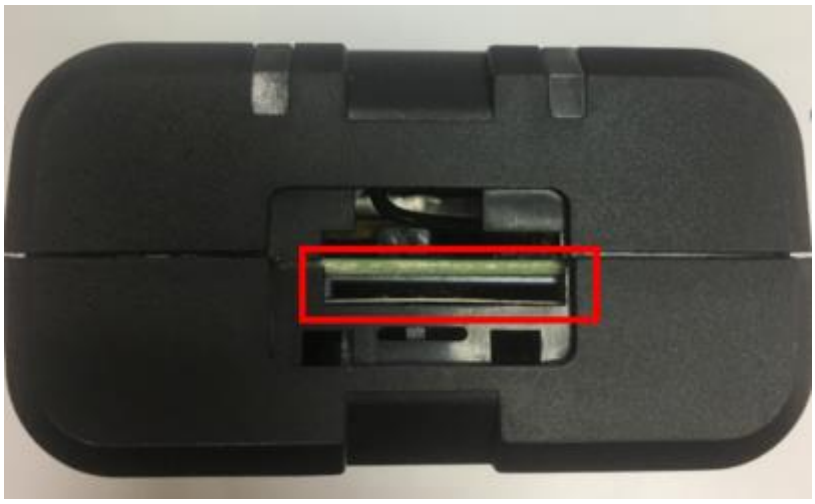
System(LED2) Red Light: to show RIFA's power-input works fine.

2.4. Buzzer Operation

There is a buzzer equipped on RIFA to indicate (1) System reboot (2) Waring on unsafe driver behavior (3) Waring on driving to restricted area (Geofence) (4) GPS signal detection

2.5. SIM Card Slot

User can insert the SIM card (MiniSIM,2FF) to RIFA's SIM card slot showing by below photo.



2.6. Power Supply

If you want to test RIFA's function in your office, you can power up RIFA-B by the Micro-USB port with 5V input following below instruction.

Customer's verification in the office (5V power input)

1.Before testing finished and 5V power input was removed, our software command on configuration tool can keep battery power off

2.Remove Micro-USB power input , battery will keep power-off

2.7. Backup Battery

The RIFA-B is optionally equipped a backup battery which allows RIFA-B keep operating for about 30 min. and sending the alarm to central management center at a power loss. However, you may not want to enable the battery after testing. You can switch off the power following below procedure.

1. If you want to do the on-road test, please follow below steps after finished your testing. It can help RIFA to keep the battery life cycle.

Customer's verification on road (12V power input)

1.After verification finished and removed RIFA from car power, customer need to remove battery jumper block.

2.Once jumper block is removed from RIFA , battery will keep power-off. Even re-installing jumper block into RIFA without external power input, the battery will keep power-off status for saving power.

Below photo shows the jumper's location on RIFA

2. For real application, you just need to check below steps and then use RIFA on your vehicle.

Real application on road (12V power input)

1.Before RIFA was connected to the car, user need to check battery jumper block is installed on RIFA.

2.Now battery's behavior works fine. Once RIFA was forcedly removed from car (even system is in sleep mode), the system will wake up powered by battery.

3. Configuration

Antzer Tech supply a simplicity and clarity configuration tool which is so user-friendly. RIFA collects the common setting by default that customer only need to define the impactive setting.

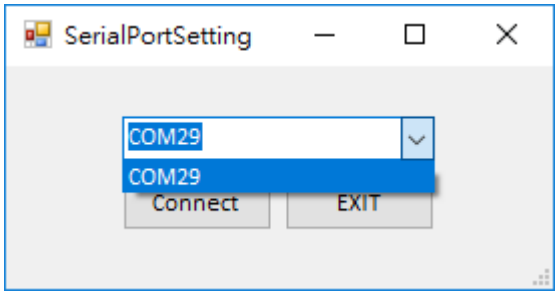
3.1. USB Driver Installation

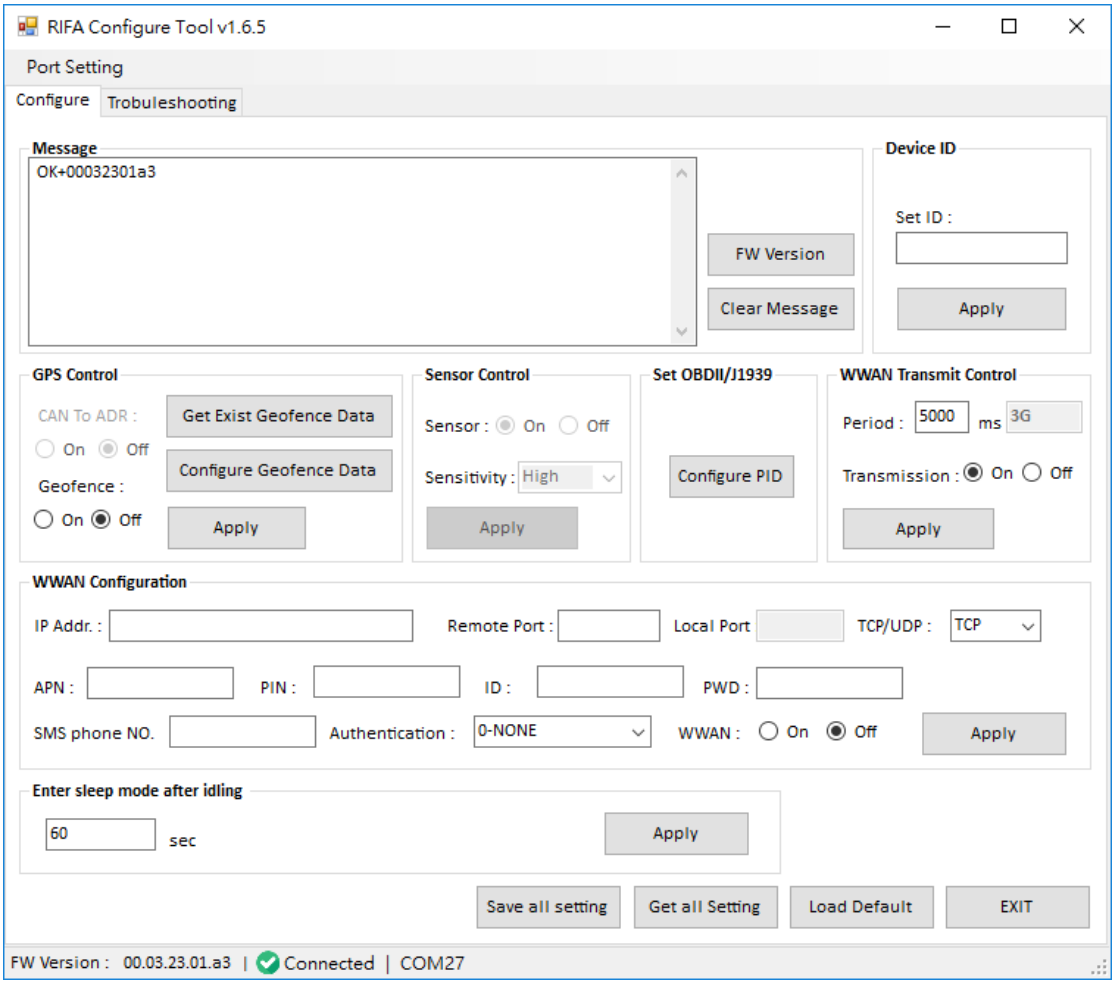
Following section 2.2. Checking the driver of RS232-to-USB cable is already installed on your laptop or notebook PC which you want to use it to configure the RIFA.

3.2. Configuring RIFA-B

Checking the hardware set-up is finished by section2.2. And then executing the "RIFA configure Tool" to configure RIFA.

First, you need to select the COM port correctly with your host device. And then click "Connect" button to start your RIFA's configuration.





Message

You can check the system status in message box.

FW Version: Click this button to check the firmware version in message box.

You can clean all the messages by clicking “Clear Message”.

Device ID

You can set up the ID of the RIFAs from 00000~99999, it can help you to track the device by ID and show IDs in your backend server.

GPS Control

(1) CAN To ADR: Set “On” to execute CAN-to-ADR function (Optional). If your RIFA equips ADR function, then you can activate the CAN-to-ADR function. It can improve the performance of GPS locating under poor signal circumstance.

(2) Geofence: Set “On” to execute Geofence function

(3) Get Exist Geofence Data: Check now the geofence region (coordinates) which is setting.

(4) Configure Geofence Data: Set up a new geofence region (coordinates).

(5) Apply: Click this button to save all the “GPS control” settings.

Sensor Control

(1) Sensor: Set “On” to execute G-sensor (or Gyroscope) function

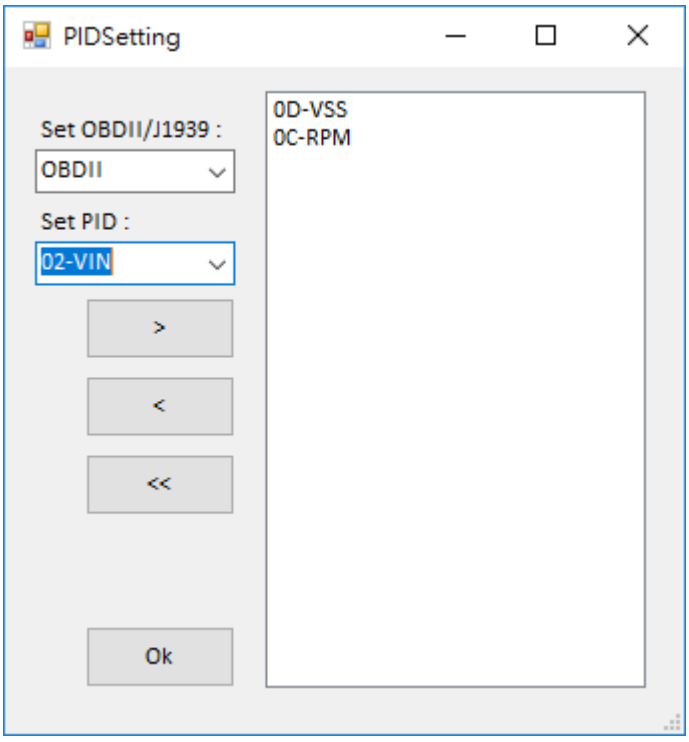
(2) Sensitivity: Select the sensitivity to trigger RIFA’s buzzer (or send event record to backend center) by unsafe driving behavior such ad harsh braking and over-acceleration.

(3) Apply: Click this button to save all the “Sensor control” settings.

Set OBDII/J1939

(1)Set OBDII/J1939:Select OBDII or J1939 for your vehicle protocol

(2)Set PID: Click this button and it will help you to choose what PID data you want to get form vehicles (OBDII or J1939).



Click “OK” to exit from “Configure PID” and save the configurations.

WWAN Transmit Control

(1) Period: Type the period value (milliseconds) you want to send data via cellular network. (System will show the network type such as 3G , 4G or NBIoT)

(2) Transmission: Set “On” to request WWAN module to send data by defined time interval.

(3) Apply: Click this button to save all the “WWAN Transmit control” settings.

WWAN configuration

(1) IP Addr/Remote Port/Local Port : Type the IP address, remote port and local port(if needed) of your server uploading by RIFA

(2) TCP/UDP: Select the data transmission protocol by RIFA’s data uploading

(3) APN/PIN/ID/PWD: Type the APN,PIN,ID and password provided by your WWAN SIM card carrier

(4) SMS phone No.: Type the phone number used which you want to remotely configure (dial into) RIFA by SMS

(5) Authentication: Select the authentication type by data transmission

(6) WWAN: Set “On” to wake up WWAN module

(7) Apply: Click this button to save all the “WWAN configuration” settings.

RTC Control

(1) Date/Time: Set RTC timer(0-None) or you can select GPS UTC time (1-GPS) for your system

(2) Enter sleep mode after idling: Set the time period to enter sleep mode while there is no OBD or J1939 data input to RIFA.

(3) Apply: Click this button to save all the “RTC Control” settings.

Save all setting : Click this button to save all of your settings.

Noted:Please don't forget to click "Save all setting" button, it will keep all your settings after finished configuration procedure.

Get all setting : Click this button to check the previous settings of your RIFA.

Load Default: Click this button to set factory settings to the RIFA.

EXIT: Click this button to close configuration tool.

3.3. BLE Function for Android App Application

3.3.1 System Requirement

Software version needed is Android 6.0.0 with BLE 4.0
(or above version)

3.3.2 APK File

Please install Antzer BLE software APK : Antzer_BLE_vX_X_X.apk

3.3.3 Installation

1.Copy above .apk file into Android cell phone.
2.Click the apk and following the installing steps to install the BLE application.
3. It appears an ANTZER-BLE icon on Android cell phone Apps list as Figure 1.

Figure 1

3.3.4 Connect Procedures

1.Plug in the power adapter and power on RIFA BLE dongle.

2.Wait for booting ready buzzer beep (1 high and 1 low beep).

3.Launching ANTZER BLE ANTZER-BLE app as Figure 2

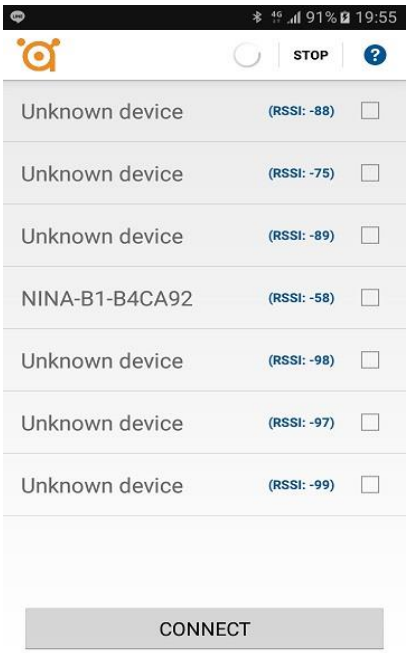


Figure 2

4. Select RIFA BLE device on the list (check BLE mac address) and click the "CONNECT" button as Figure 3.

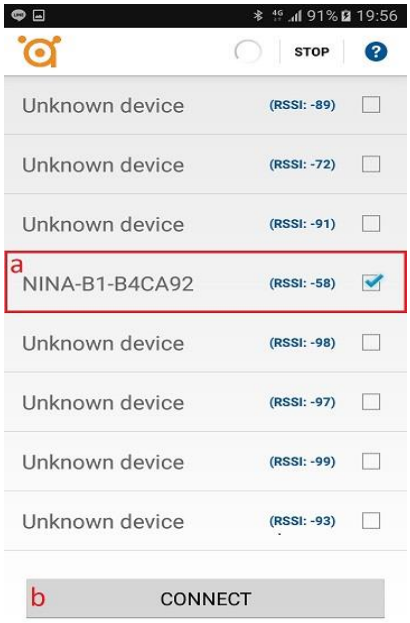


Figure 3

5. Waiting for RSSI value appearance (BLE signal checking) and then click "CHAT" tab button to read CAN bus data as Figure 4.

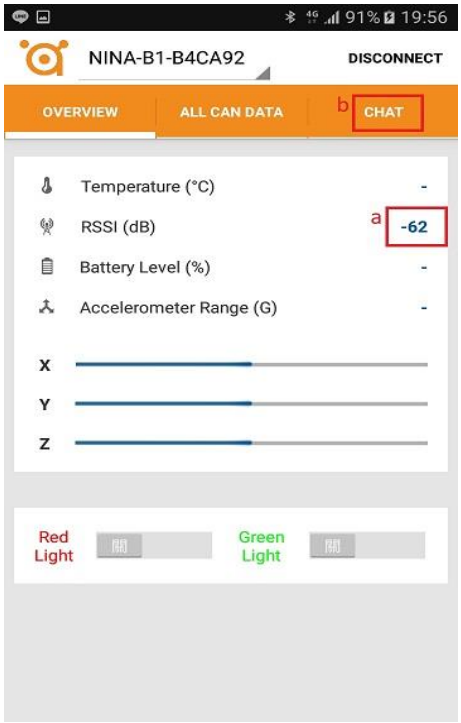


Figure 4

6. CAN bus data appears by hex data format and in a row by data scrolling as Figure 5.

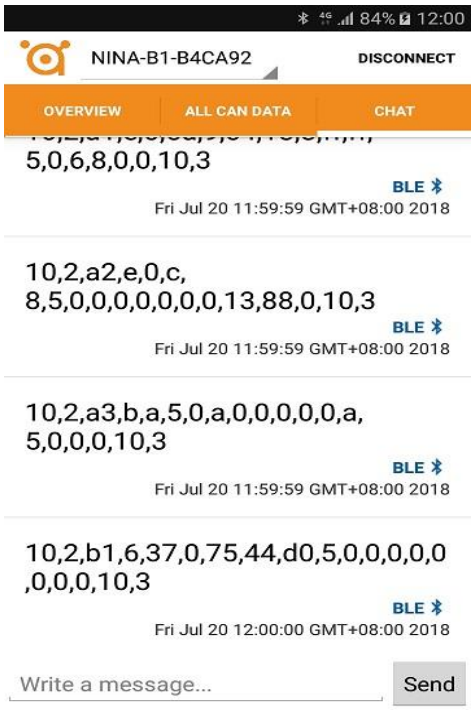


Figure 5

For OBDII/J1939 Data Collection, please follow below steps

7. Waiting for RSSI value appearance (BLE signal checking) and then click "ALL CAN DATA" sheet to read CAN(J1939) data as Figure 6.

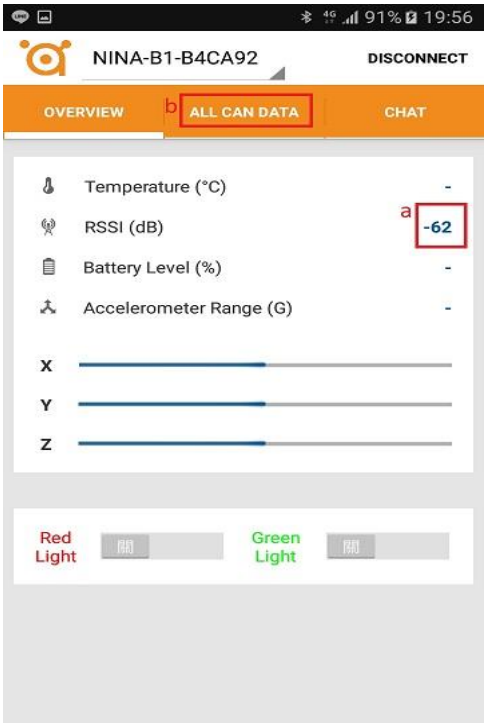


Figure 6

8. CAN (OBDII/J1939) bus data will appear by readable format as Figure 7.

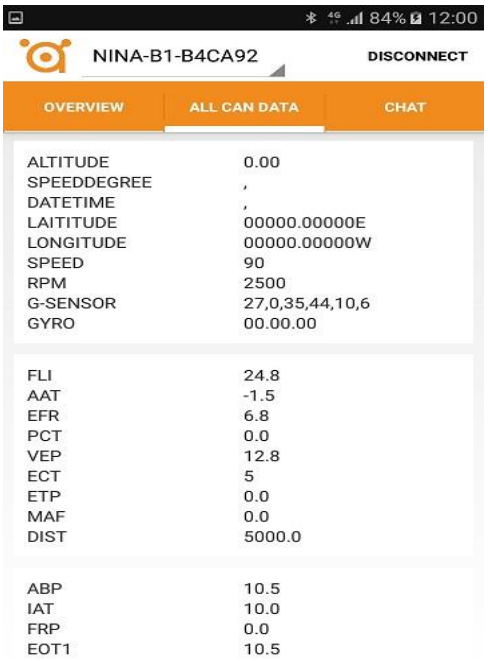


Figure 7

3.3.5 Bluetooth Disconnection Procedures

1. 1.Click “DISCONNECT” button as Figure 9(a).

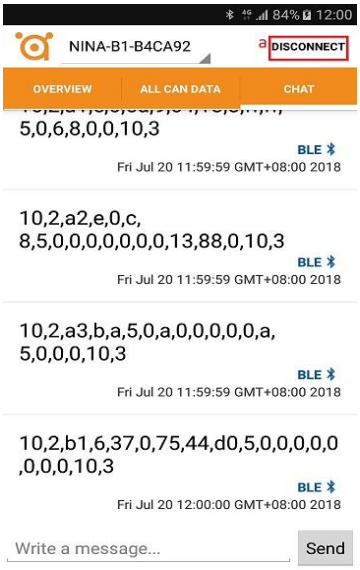


Figure 9

2. The App will stop data appearance scrolling, and RIFA BLE dongle will have a short beep buzzer after completing BLE disconnection between smart phone

and RIFA.

3. 3.The “DISCONNECT” button will change to “CONNECT” button around 30 seconds as Figure 10(a).

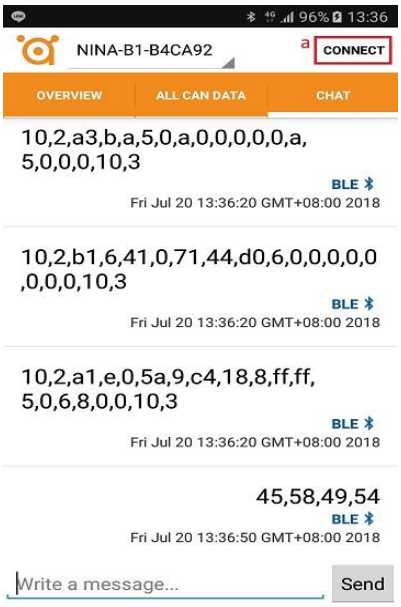


Figure 10

4. For re-connection of BLE device, click Android device button ( ) to initialize connection(as Figure 2).

3.3.6 Known Issues and troubleshooting (depends on Android Version)

1. sometimes in disconnection procedure, the “DISCONNECT” button may not change to “CONNECT” button after 30 seconds waiting.
Troubleshooting – click Android device button ( ) to forcing disconnection.

2. Sometimes in BLE re-connection, Android app may not read CAN bus data.

Troubleshooting – click Android device button ( ) to return to initial connection screen and doing connection procedures again.

3. In disconnection procedure, it could not beep the buzzer of disconnection and can’t be re-connected anymore. (It may happen in some specific Android devices with low possibility).

Troubleshooting – Power off RIFA dongle (re-connect from vehicle) for forcingly

disconnect BLE connection and then re-connect it.

4. Firmware Update

1. Launch RIFAUpdTool_V2_1x.exe
2. Select the appropriate serial port from the column “Serial Port”.
3. Press “Open Port” to open the serial port.
4. Press “Reboot” to enter to firmware update mode and then it will display update messages. Once “Waiting for the file to be sent…” appears, then you can
5. Press “Update” to start firmware update and waiting for firmware update completely.
6. It will display “Start Program execution…” when firmware update and reset completely, and then press “Close Port” to finish RIFA firmware update procedures.

5.Dimension Drawing

6.Reliability Specifications

6.1 Environmental

Environmental specifications of RIFA-B follow MIL-STD-810G, as indicated in the following table.

Environment	Specifications
Operating Temperature	-40°C to 85°C (without Battery) -20°C to 60°C (with Battery)
Vibration	Operating: Random, 7.69(Grms), 20~2000(Hz) Compliant with MIL-STD-810G

6.2 Certification and Compliance

Antzer-Tech RIFA-B complies with the following standards:

- CE
- FCC Class B
- RoHS
- MIL-STD-810G Vibration Compliant

7. Ordering Information

RIFA-B Product Part Number

Part Number	Description
RIFA-B73Q-G01000	OBDII CONN, OBDII, J1939, 3G, GPS
RIFA-B7LQ-E01000	OBDII CONN, OBDII, J1939, 4G C1(EU), GPS
RIFA-B7LU-E01000	OBDII CONN, OBDII, J1939, 4G C1(EU), GPS UDR
RIFA-B7LQ-A01000	OBDII CONN, OBDII, J1939, 4G C1(US), GPS
RIFA-B7LU-A01000	OBDII CONN, OBDII, J1939, 4G C1(US), GPS UDR
RIFA-B7MQ-G01000	OBDII CONN, OBDII, J1939, 4G CM1, NBIoT GPS
RIFA-B7MU-G01000	OBDII CONN, OBDII, J1939, 4G CM1, NBIoT GPS UDR

Part Number	Description
T1700000001	RS232-to-MicroUSB Cable (1M)

8. Appendix A - The default WWAN data transmitting format

RIFA 3G/LTE Transmission Protocol Format **Default: UART_1, 115200 bps**	
SendMessage	
Syntax: $FRCMD,IMEI,_SendMessage,,latitude,hemi,longitude,hemi,alt,speed,heading,date,time,valid,Analog1=value,Analog2=value...*XX	
Field	Descriptions
Device ID	Device ID, e.g. 24680 (from 00000 to 99999)
latitude	Latitude (NMEA format), e.g. DDMM.mmmm
hemi	Hemisphere N or S
longitude	Longitude DDMM.mmmm (NMEA format)
hemi	Hemisphere E or W
alt	Altitude in meters above sea level, e.g. AA.a
speed	Speed over ground in knots, e.g. SSS.ss
heading	Heading over ground in degrees, e.g. HHH.h
date	Date, DDMMYY
time	Time (UTC), hhmmss.dd

valid	1 if a vlid fix. 0 if not a valid fix.
Analog1=value	Status signals. Analog1=VSS (Vehicle Speed, 2 bytes)
Analog2=value	Status signals. Analog2=RPM (Vehicle RPM, 2 bytes)
Analog3=value	Status signals. Analog3=FLI (Fuel Level, 2 bytes, FLI.f_FLI)
Analog4=value	Status signals. Analog4=AAT (Ambient air temperature, 3 bytes, AAT_H_L.f_AAT)
Analog5=value	Status signals. Analog5=EFR(Engine fuel rate, 3 bytes, EFR_H_L.f_EFR)
Analog6=value	Status signals. Analog6=PCT(Calculated engine load, 2 bytes, PCT.f_PCT)
Analog7=value	Status signals. Analog7=VEP(Vehicle Electrical Power, 3 bytes, VEP_H_L.f_VEP)
Analog8=value	Status signals. Analog8=ECT(Engine coolant temperature, 1 byte, ECT)
Analog9=value	Status signals. Analog9=ETP(Engine Throttle Position, 2 bytes, ETP.f_ETP)
Analog10=value	Status signals. Analog10=MAF(Mass Air Flow, 3 bytes, MAF_H_L.f_MAF)
Analog11=value	Status signals. Analog11=DIST(Vehicle Distance, 5 bytes, DIST_H1_H2_L1_L2.f_DIST)
Analog12=value	Status signals. Analog12=ABP(Absolute Barometric Pressure, 2 bytes, ABP.f_ABP)
Analog13=value	Status signals. Analog13=IAT(Intake air temperature, 3 bytes, IAT_H_L.f_IAT)
Analog14=value	Status signals. Analog14=FRP(Engine Fuel Valve 1 Inlet Absolute Pressure, 3 bytes, FRP_H_L.f_FRP)
Analog15=value	Status signals. Analog15=EOT1(Engine oil temperature, 3 bytes, EOT1_H_L.f_EOT1)
Analog16=value	Status signals. Analog16= ()
Analog17=value	Status signals. Analog17=()
Analog18=value	Status signals. Analog18= ()
Analog19=value	Status signals. Analog19= ()
Analog20=value	Status signals. Analog20=()
Analog21=value	Status signals. Analog21= ()
Analog22=value	Status signals. Analog22= ()
Analog23=value	Status signals. Analog23= ()
Analog24=value	Status signals. Analog24=()
Analog25=value	Status signals. Analog25= ()
Analog26=value	Status signals. Analog26= ()
Analog27=value	Status signals. Analog27=()
Analog28=value	Status signals. Analog28= ()

Analog29=value	Status signals. Analog29= ()
Analog30=value	Status signals. Analog30=()
Analog31=value	Status signals. Analog31= ()
Analog32=value	Status signals. Analog32= ()
Analog33=value	Status signals. Analog33=()
Analog34=value	Status signals. Analog34=()
XX	Checksum, 1 byte
Total	~512 bytes

9. Appendix B – AT command list of RIFA

RIFA Configuration List

Field	Description	CMD	Notes
Firmware Version	Get Firmware Version	> AT+VER? A(0x41) T(0x54) 0x2B V(0x56) E(0x45) R(0x52) ?(0x3F)	DUT should return firmware information correctly to Host PC. e.g. OK+010900A1 = v01.09.00.A1
Reset	Reset DUT	> AT+RST,1	DUT should auto-reboot itself.
Update	Firmware update function	> AT+UPD,2	After finished update procedure, the system should boot successfully.
Reset to default setting	Initialize settings about DUT.	> AT+RST,3	1. System reset.

Sleeping Time Out	Set the range of Sleeping Time Out Configure is 10 to 300 seconds.	> AT+CFGS,x (x=010s ~ 300s, Unit: mS.)	1. If the range of setting parameter is 10 to 300 Sec., the return value is OK. 2. If the setting parameter is other value, the return value will show FAIL. 3. When the set time is reached, the DUT should enter sleep mode.
PIN Code	Setup the specific PIN code for the SIM card	> AT+PIN,'**xxxxxxxx**' (**Set the PIN Code range is from 4 to 8 characters.**)	1. If the range of PIN Code is correct, the return value is OK. 2. If the range of PIN Code is abnormal, the return value will show FAIL.
3G Register - Protocol type	Setup WWAN communication protocol type	> AT+GPRS,<Protocol type>	1. If the Protocol type is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL. 3. The Mapping Table about 0x08004032 (1 Byte) value is correct. e.g.: 0x31 = IPV4(defalt value), 0x30 ~ 0x39
3G Register - APN	Setup WWAN APN	> AT+APN,<APN> (APN = 16 bytes)	1. If the APN is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL.
3G Register - User name	Setup WWAN Login user name	> AT+UNAME,<User Name>	1. If the UNAME is correct, the return value is OK. 2. If the Protocol type is

			abnormal, the return value will show FAIL.
3G Register - Password	Setup WWAN Login password	> AT+PWD,<Password>	1. If the password is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL.
3G Register - Authentication	Setup WWAN Authentication	> AT+AUTH,<Authentication>	1. If the Authentication is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL.
3G Register - Service Type	Setup WWAN Service Type	> AT+STYPE,<Service Type>	1. If the Service Type is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL.
3G Register - Host IP Address	Setup WWAN Host IP Address	> AT+HIP,<Host IP Address>	1. If the Host IP Address is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL.
3G Register - Remote Port	Setup WWAN Remote Port	> AT+RPORT,<Remote Port>	1. If the Remote Port is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL.

3G Register - Local Port	Setup WWAN Local Port	> AT+LPORT,<Local Port>	1. If the Remote Port is correct, the return value is OK. 2. If the Protocol type is abnormal, the return value will show FAIL.
Gyro Threshold Data	Get Gyro Threshold Data	> AT+GTHS?	1. DUT should return Gyro Threshold Data to Host PC. Data format: O K + 0xXX_H 0xXX_L 0xYY_H 0xYY_L 0xZZ_H 0xZZ_L (Total 9 Bytes) 2. If communication fail or appear any errors, the return value will show FAIL.
	Set Gyro Threshold Data	> AT+STHS,<Gyro Threshold Data>	1. If the Gyro Threshold Data is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.
Gyro Duration Data	Get Gyro Duration Data	> AT+GDUR?	1. DUT should return Gyro Duration Data to Host PC. Data format: O K + 0xXX (Total 4 Bytes) 2. If communication fail or appear any errors, the return value will show FAIL.

	Set Gyro Duration Data	> AT+SDUR,<Gyro Duration Data> e.g.: A T + SDUR , 0xXX (Total 9 Bytes)	1. If the Gyro Duration Data is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.
Accelerometer Data	Get Accelerometer Threshold 1	> AT+EATHS1?	1. DUT should return Accelerometer Data to Host PC. Data format: O K + 0xXX (Total 4 Bytes) 2. If communication fail or appear any errors, the return value will show FAIL.
	Get Accelerometer Threshold 2	> AT+EATHS2?	1. DUT should return Accelerometer Data to Host PC. Data format: O K + 0xXX (Total 4 Bytes) 2. If communication fail or appear any errors, the return value will show FAIL.
Accelerometer Duration Data	Get Accelerometer Duration 1	> AT+EADUR1?	1. DUT should return Accelerometer Duration Data to Host PC. Data format: O K + 0xXX (Total 4 Bytes) 2. If communication fail

			or appear any errors, the return value will show FAIL.
	Get Accelerometer Duration 2	> AT+EADUR2?	1. DUT should return Accelerometer Duration Data to Host PC. Data format: O K + 0xXX (Total 4 Bytes) 2. If communication fail or appear any errors, the return value will show FAIL.
	Set Accelerometer Threshold 1	> AT+SATHS1,<Accelerometer Threshold_1 value>	1. If the Accelerometer Threshold 1 Data is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.
	Set Accelerometer Threshold 2	> AT+SATHS2,<Accelerometer Threshold_2 value>	1. If the Accelerometer Threshold 2 Data is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.

	Set Accelerometer Duration 1	> AT+SADUR1,<Accelerometer Duration_1 value>	1. If the Accelerometer Duration 1 Data is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.
	Set Accelerometer Duration 2	> AT+SADUR2,<Accelerometer Duration_2 value>	1. If the Accelerometer Duration 2 Data is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.
AVL Sensor Data Transmission	Disable / Enable AVL Sensor Data Transmission	> AT+SENS,x (x= 0/1, Disable/Enable)	1. If the AVL Sensor Data Transmission function is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL. 3. Mobile phone device should receive Sensor Data via BT from DUT. 4. Cloud server should receive Sensor Data via WWAN from DUT.

Transmitted Time Interval Configure	Setup Transmitted Time Interval Configure	> AT+CFGI,<Transmitted interval time> (Transmitted interval time=1ms ~ 65535ms)	1. If the AVL Transmitted interval time is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL. 3. Mobile phone device should receive Sensor Data by Transmitted interval time via BT from DUT. 4. Cloud server should receive Sensor Data by Transmitted interval time via WWAN from DUT.
RTC Configure	RTC Configure - Date	> AT+RTCD,<date> (date format (HEX) = 00YYMMDD YY: Year, MM: Month, DD: Day)	1. If the AVL RTC(date) is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.
	RTC Configure - Time	> AT+RTCT,<date> (date format (HEX) = 00hhmmss hh: Hour, mm: Minute, ss: Second)	1. If the AVL RTC(time) is correct, the return value is OK. 2. If communication fail or appear any errors, the return value will show FAIL.
OBDII PID	Configure OBDII PID	> AT+PID,<PID Code> (PID Code (HEX) = xxxxxxxxxx)	1. If the OBDII PID is correct, the return value is OK. 2. If communication fail or appear any errors, the

			return value will show FAIL.
Gyro Angular Rate	Get Gyro Angular Rate Data	> AT+GOUT?	1. DUT should return Gyro Angular Rate Data to Host PC. Data format: O K + 0xXX_H 0xXX_L 0xYY_H 0xYY_L 0xZZ_H 0xZZ_L (Total 9 Bytes) 2. If communication fail or appear any errors, the return value will show FAIL.
Accelerometer Data	Get Accelerometer Data	> AT+AOUT?	1. DUT should return Accelerometer Data to Host PC. Data format: O K + 0xXX_H 0xXX_L 0xYY_H 0xYY_L 0xZZ_H 0xZZ_L (Total 9 Bytes) 2. If communication fail or appear any errors, the return value will show FAIL.
Geofence Data (SPI ROM)	Store Geofence Data (SPI ROM)	> AT+GEOF,<geofence data>	1. If the writed gofence command is correct, the return value is OK. 2. If communication fail or appear any errors, the

			return value will show FAIL.
	Get Geofence Data (SPI ROM)	> AT+GEOFxxx? (xxx = 000 ~ 255)	1. DUT should return Geofence Data to Host PC. 2. If communication fail or appear any errors, the return value will show FAIL.
OBD/J1939 request time interval Configure	Setup OBD/J1939 request time interval Configure	> AT+CFGI,<OBD/J1939 requested interval time> (OBD/J1939 requested interval time = ??? ~ ???, Unit: ms: OBDII default vale: 50 ms J1939 default vale: 2 s)	1. If the range of setting parameter is ??? to ???, the return value is OK. 2. If the setting parameter is other value, the return value will show FAIL.

10. Appendix C – RIFA BLE Transmit Protocol Format

Framing: Total = 20 bytes

DLE	STX	CMD	DLC	Data														DLE	ETX
0x10	0x02	0xA1	14	14 bytes														0x10	0x03
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0x91: Receive GPS Latitude + Hemisphere Data (ASCII)

DLE	STX	CMD	DLC	Latitude										Hemi	0x00			DLE	ETX
0x10	0x02	0x91	11	10 bytes										N or S	3 bytes			0x10	0x03
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0x92: Receive GPS Longitude + Hemisphere Data (ASCII)

DLE	STX	CMD	DLC	Longitude											Hemi	0x00		DLE	ETX
0x10	0x02	0x92	12	11 bytes											E or W	2 byte		0x10	0x03
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0x93: Receive GPS Altitude Data (ASCII)

DLE	STX	CMD	DLC	Altitude						0x00								DLE	ETX
0x10	0x02	0x93	7	7 bytes						7 bytes								0x10	0x03
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0x94: Receive GPS Speed + Degree Data (ASCII)

DLE	STX	CMD	DLC	Speed				Degree				0x00				DLE	ETX
0x10	0x02	0x94	11	6 bytes				5 bytes				3 bytes				0x10	0x03
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0x96: Receive GPS Date + Time (ASCII)

DLE	STX	CMD	DLC	Date						Time (UTC)								DLE	ETX
0x10	0x02	0x96	14	6 bytes (DDMMYY)						8 bytes (hhmmss.d)								0x10	0x03
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0xA1: Receive Vehicle VSS + RPM + FLI + AAT + EFR + PCT Data (Binary)

DLE	STX	CMD	DLC	VSS (unsign)		RPM (unsign)		FLI (unsign)		AAT (sign)			EFR (unsign)			PCT (unsign)		DLE	ETX
0x10	0x02	0xA1	14	2 bytes		2 bytes		1 byte	1 byte	2 bytes		1 byte	2 bytes		1 byte	1 byte	1 byte	0x10	0x03
				VSS_H	VSS_L	RPM_H	RPM_L	FLI	f_FLI	AAT_H	AAT_L	f_AAT	EFR_H	EFR_L	f_EFR	PCT	f_PCT		
								FLI.f_FLI		AAT.f_AAT			EFR.f_EFR			PCT.f_PCT			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0xA2: Receive Vehicle VEP + ECT + ETP + MAF + DIST Data (Binary)

DLE	STX	CMD	DLC	VEP (unsign)			ECT (sign)	ETP (unsign)		MAF (unsign)			DIST (unsign)					DLE	ETX
0x10	0x02	0xA2	14	2 bytes		1 byte	1 byte	1 byte	1 byte	2 bytes		1 byte	4 bytes				1 byte	0x10	0x03
				VEP_H	VEP_L	f_VEP	ECT	ETP	f_ETP	MAF_H	MAF_L	f_MAF	DIST_H1	DIST_H2	DIST_L1	DIST_L2	f_DIST		
				VEP.f_VEP				ETP.f_ETP		MAF.f_MAF			DIST.f_DIST						
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0xA3: Receive Vehicle ABP + IAT + FRP + EOT1 Data (Binary)

DLE	STX	CMD	DLC	ABP (unsign)		IAT (sign)			FRP (unsign)			EOT1 (sign)			Run Time (unsign)		0x00	DLE	ETX
0x10	0x02	0xA3	11	1 byte	1 byte	2 bytes		1 byte	2 bytes		1 byte	2 bytes		1 byte	2 bytes		1 byte	0x10	0x03
				ABP	f_ABP	IAT_H	IAT_L	f_IAT	FRP_H	FRP_L	f_FRP	EOT1_H	EOT1_L	f_EOT1	RUNTM_H	RUNTM_L			
				ABP.f_ABP		IAT.f_IAT			FRP.f_FRP			EOT1.f_EOT1			Reserved				
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Response = 0xB1: Receive G-Sensor Data (Binary)
(**available data length = 12bit, lowest 4bit is unavailable data**)

DLE	STX	CMD	DLC	XX YY ZZ (sign)						0x00								DLE	ETX
0x10	0x02	0xB1	6	6 bytes, XX_L/H(4,5), YY_L/H(6,7), ZZ_L/H(8,9)						8 bytes								0x10	0x03
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19