

Medium Range Collision Avoidance Radar

# RFS40-M-CAN

Application Manual



## **Preface**

This user manual contains the introduction, use and maintenance of 2D LiDAR. Please read this manual carefully before formal use, and strictly follow the steps described in the manual during use to avoid product damage, property loss, personal injury or/and violation of product warranty terms. If you encounter problems that cannot be solved during use, please contact SentiAcu staff for assistance.

## **Contact Details**

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For technical questions, please contact: [support@sentiacu.com](mailto:support@sentiacu.com)

## **Copyright Notice**

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## **Disclaimer**

The product is constantly being improved, and its specifications and parameters will undergo iterative changes. Please refer to the official website for latest version



# Content

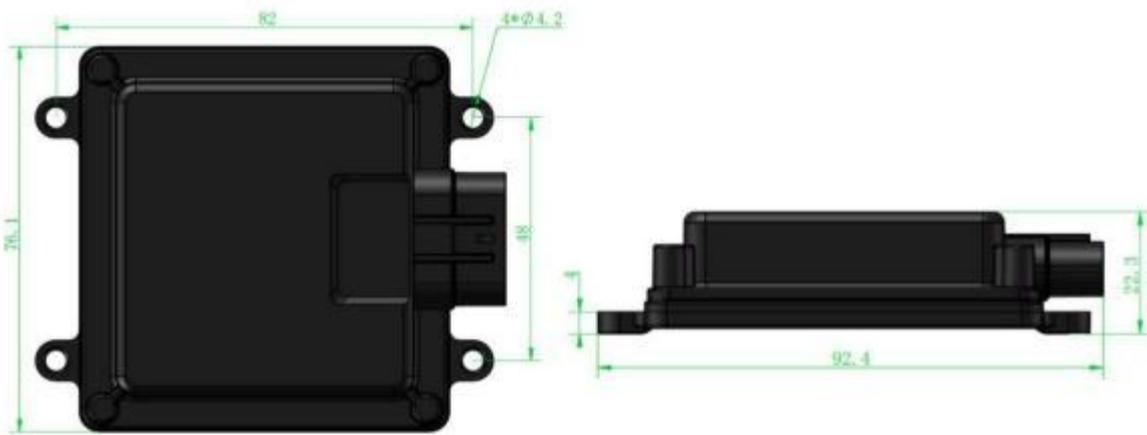
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# 1. Brief Introduction

RFS40-M-CAN is 77GHz millimeter wave collision avoidance radar. It is developed for the detection of obstacles in front and forward collision warning when driving at medium/low speed. Compared with infrared, laser and ultrasonic radars, millimeter wave radar is less affected by weather changes and has good anti-jamming performance and range detection ability.

The dimension is 92.4 \* 76.1 \* 22.3mm. The detection distance 40m and integrated CAN interface.



To facilitate customer development and testing, RFS40-M-CAN provides a CAN communication interface.

The default baud rate of the board communication CAN interface is 500kbps, and the target refresh rate is 33Hz.

Fast integration with MCU, saving the user's configuration time.

# 2. Application Scenarios

RFS40-M-CAN receives the reflection of target echo by transmitting double-beam fan-shaped electromagnetic waves to the front, judges whether there are obstacles in front, and feedback the relative distance, relative speed and Angle between obstacles and radar.

Vehicle anti-collision system uses RFS40-M-CAN millimeter wave radar sensor to detect the target in front or behind the vehicle, output the detected target distance, Angle, speed information and timely send to the vehicle control box. The vehicle control box combines the target information detected by the radar with the vehicle condition, and then makes risk warning or automatic deceleration, braking and other functions after a comprehensive decision.



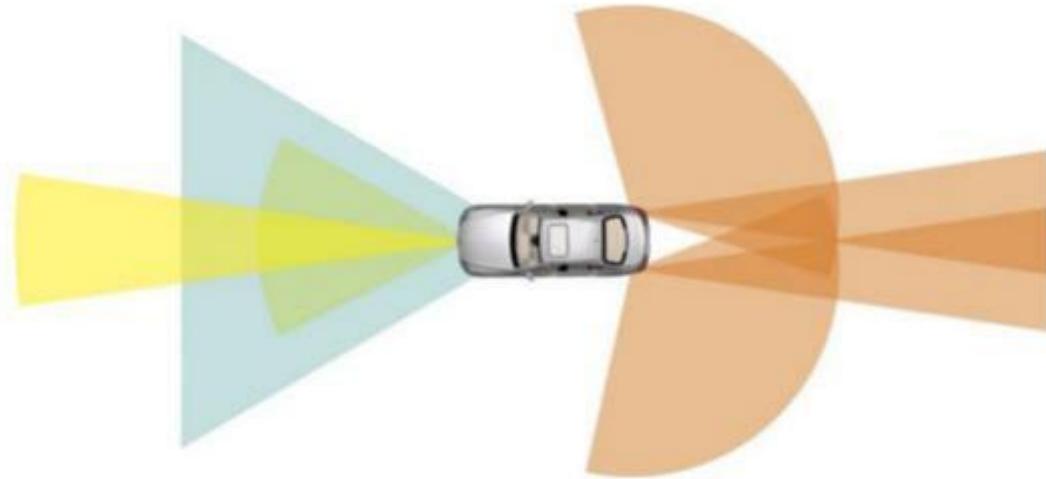


Figure1 Detection Diagram

### 3. Precautions for product use

- Please keep the radome clean during installation. Clean the radome with a soft wet cloth, and then dry it naturally.
- Please pay attention to the shape of the radar during installation to ensure that the radar is not deformed, and do not squeeze, bump or fall.
- During installation, try to stay away from high-power electrical equipment and motors with strong magnetic field Interference.
- During the test, there shall be no obstructions within the radar beam range, and the test environment shall be as wide as possible to avoid affecting the measurement results.
- During installation, ensure that the radar is brand new, and do not disassemble it by yourself.

If you encounter problems that cannot be solved during installation and use, please contact the manufacturer for assistance.



## 4. Specifications and parameters

| Items               | Parameter                      | Technical Specification |
|---------------------|--------------------------------|-------------------------|
| System Properties   | Working Voltage                | 12V/24V                 |
|                     | Power supply range             | 8~26V                   |
|                     | Operating Temperature          | -40°C~85°C              |
|                     | Power                          | < 3.5W                  |
|                     | Waterproof grade               | IP67                    |
|                     | Frequency Band                 | 77-78GHz                |
|                     | Interface                      | CAN/500kbps             |
|                     | Refresh rate                   | 33Hz                    |
|                     | Shell size                     | 92*76.1*22.3mm          |
|                     | Product weight                 | 109.5g                  |
| Antenna performance | Number of transceiver channels | 2TX*4RX                 |
|                     | Elevation beam width(-6dB)     | -1 ° ~+2 °              |
|                     | Horizontal beam width(-6dB)    | - 60。 ~+60。             |
|                     | Range resolution               | 0.2m                    |
|                     | Velocity resolution            | 1.9km/h                 |
|                     | Speed measuring range          | ±60km/h                 |
|                     | Detection distance             | 40m                     |



## 5. Quick use guide

### 5.1 Definition of wire harness

RFS40-M-CAN uses 10 PIN connector, outline structure is shown as below.

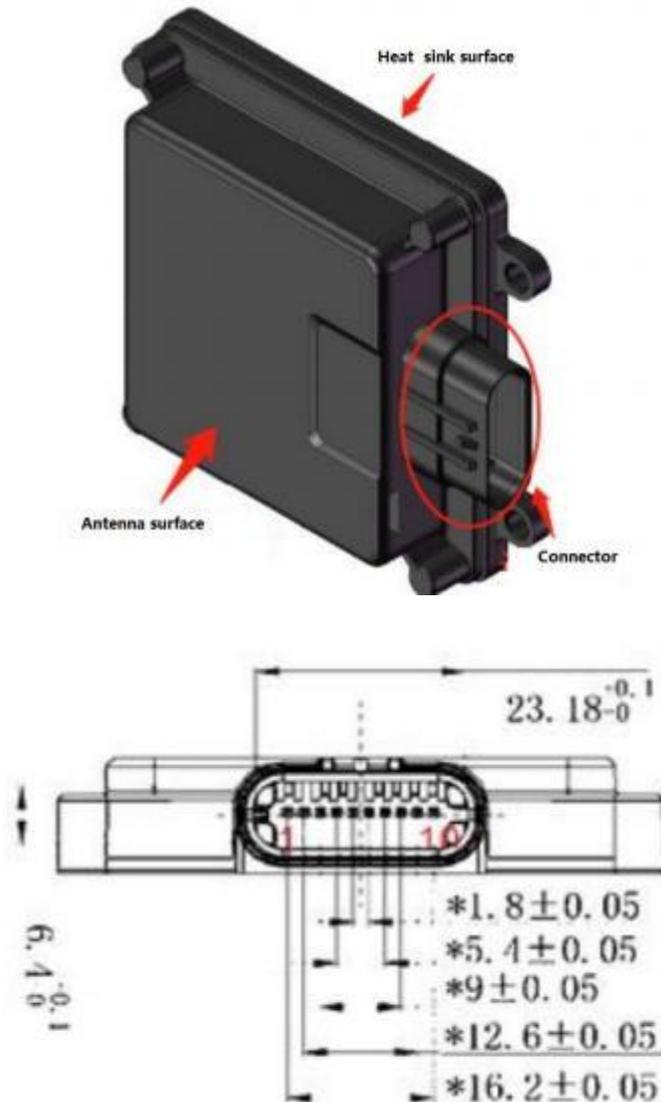


Figure2 10PIN Diagram

Table 1 PIN Description

| PIN No. | Cable ID | Cable color | Description    |
|---------|----------|-------------|----------------|
| 1       | VCC      | red         | Power positive |
| 5       | GND      | black       | Power negative |
| 6       | CAN_H    | yellow      | CAN_H          |
| 7       | CAN_L    | white       | CAN_L          |



## 5.2 Installation and Coordinate system

### 5.2.1 Installation

#### 5.2.1.1 Installation precautions

- 1) Try to stay away from the signal antenna in the car
- 2) Away from large electrical equipment start frequently position
- 3) Away from the motor actuator and drive
- 4) Radar antenna surface is prohibited from covering

It is not recommended to install it in the bumper. Like the radome, the bumper will have a great impact on the radar performance. If it must be installed in the bumper, try to comply with the following principles:

- 1) Select the area with smooth surface;
- 2) Avoid corners or areas with thickness changes;
- 3) Avoid chrome plating or any other additional decorative areas;
- 4) It is forbidden to glue on the radar antenna surface.

#### 5.2.1.2 Recommended Installation Direction and Installation Height

1) Installation direction: The antenna surface of the radar module (flat surface) faces the detection area and is installed vertically (due to the small pitch angle of the antenna, it should be kept perpendicular to the ground during installation); Radar connector facing right.

The installation diagram is as below:

2) Installation height: it is recommended to be 0.40-0.80 m from the ground. If the installation height is less than 0.3m, please adjust the mounting pitch angle appropriately.

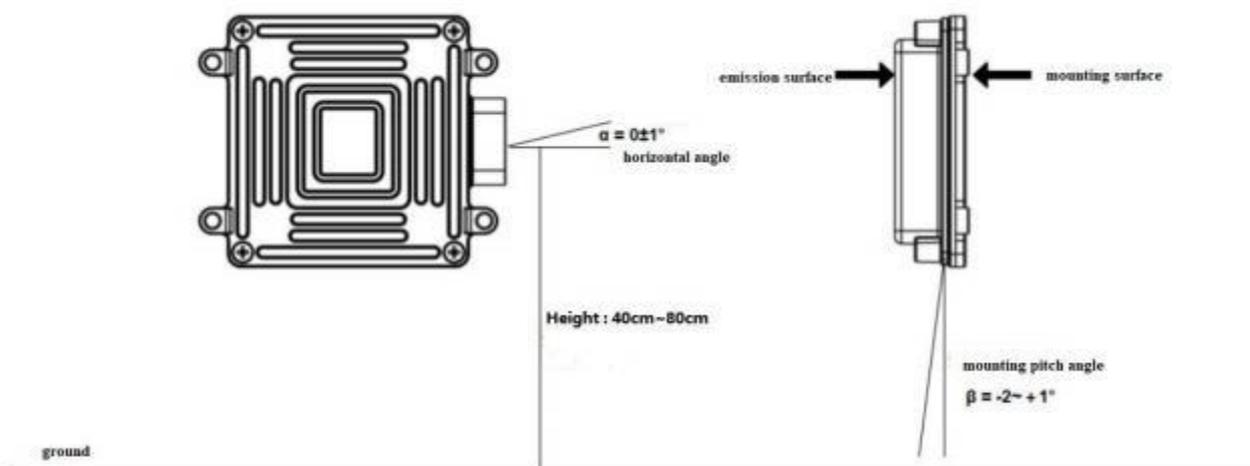


Figure3 Installation Diagram



## 5.2.2 Coordinated system

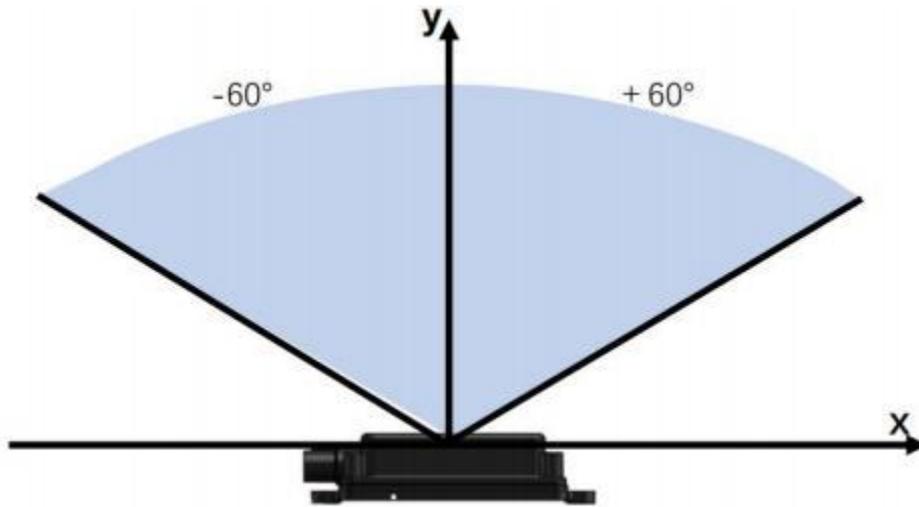


Figure4 Coordinated system Diagram

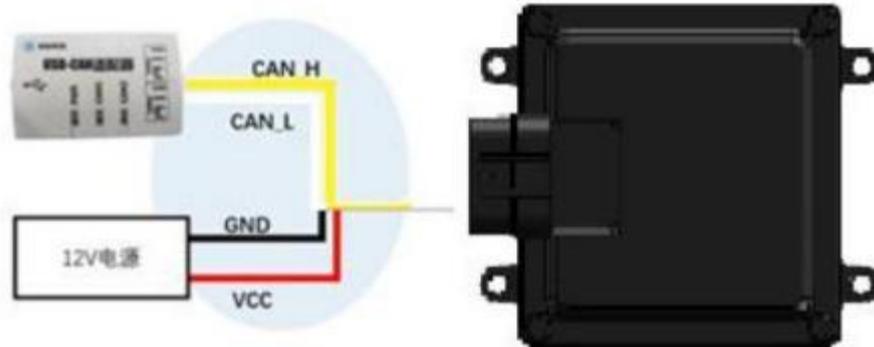
## 5.3 Test operation steps

The following devices need to be prepared during the test:

| Sr No. | Device name                     | Q'ty |
|--------|---------------------------------|------|
| 1      | RFS40-M-CAN radar               | 1    |
| 2      | RFS40-M-CAN radar wire harness  | 1    |
| 2      | Laptop                          | 1    |
| 3      | USB CAN box(adaptor)            | 1    |
| 4      | Power terminal (DC female head) | 1    |
| 5      | 12V power adapter               | 1    |
| 6      | Test software                   | 1    |

2. Prepare the USB CAN box (support USBCAN (CANalyst-II) ), and install the driver on the Laptop at the same time.
3. Connect the radar harness end blue wire (CAN\_H) and yellow wire (CAN\_L) to the corresponding terminal on the USB CAN box, also connect the radar harness end red wire (power positive) and black wire (power negative) to the DC female head (power supply end).
4. After the 12VDC power supply is connected, the green light (power) of the USB CAN box will be on continuously.





As shown in the figure below, the CAN box communicates with the radar. The delivery packing list does not include the CAN box. If necessary, customers can purchase by themselves or from the radar manufacturer,.



5. Connect the USB interface of the USB CAN box(adaptor) to the laptop and open the test software. If

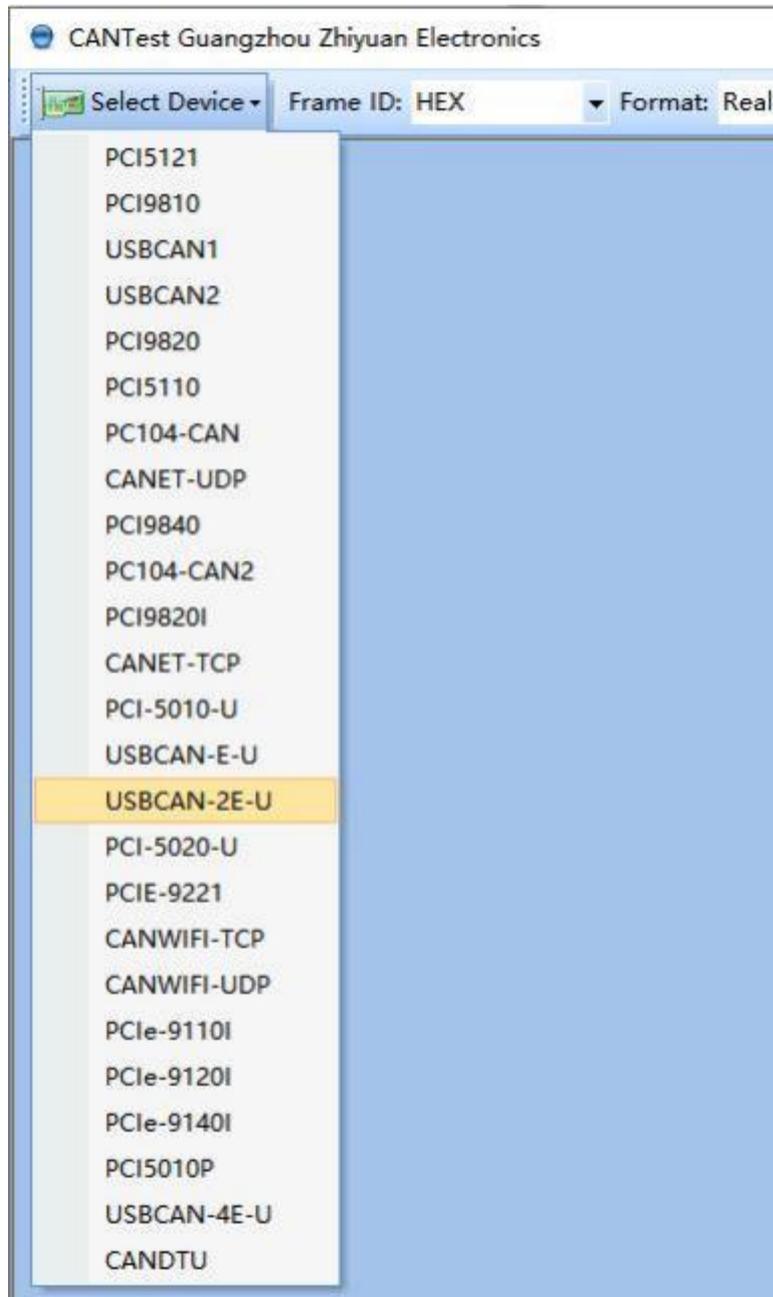
there is no data output, the CAN box test can be carried out first,

1) Open CANTest software

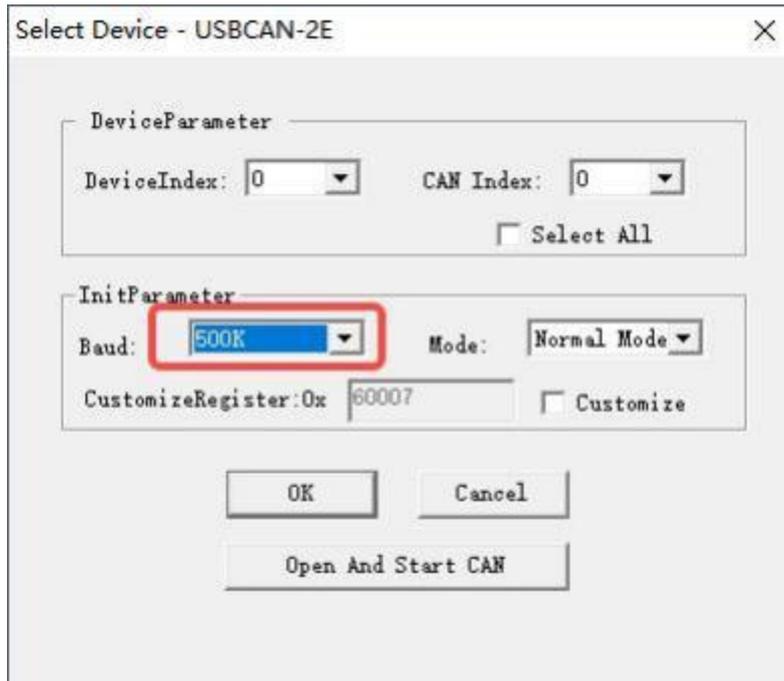


2) Select "select device - USBCAN-2E-U " in the software





3) Select 500K baud rate, click "Open And Start CAN"



4) the following picture indicates data output.



## 6. Frequently asked questions (FAQs)

### **Q1: During the test, click the open test and there is no response**

A:

1. Whether the USB CAN box(adaptor) is suitable.
2. Whether the power supply is connected correctly ( 12V).
3. Whether CAN box drive is installed

### **Q2: Poor test results?**

A: Please check the quick use guide carefully, pay attention to the installation height and direction of the radar, and keep the radar perpendicular to the ground. In case of detection distance short, please check whether the radar is installed vertically.

### **Q3: Poor indoor detection effect?**

A: There is multi-path effect indoors. It is recommended to evaluate it outdoors. If test Indoors, the radar can be tested against strong reflectors such as the ceiling.

