

Operating Instructions



77GHz 2T4R RADAR SENSOR

Please read this manual thoroughly before operating the radar,
and keep it for future reference.

V1.0

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1. Precautions

● Storage and Keeping

- 1) Do not expose the device to excessive heat or cold. The storage temperature of this device is $-40\sim+90^{\circ}\text{C}$, and the operating temperature is $-40\sim+85^{\circ}\text{C}$.
- 2) Never use this device in environments with excessive moisture, dust or smoke.
- 3) Avoid dropping or striking this device.
- 4) Never puncture, scratch or use abrasive cleaning materials on this device.
- 5) Do not place cables where they may be pinched or stepped on.

● Operating Precautions

- 1) The device may be powered by a 12 or 24 volt automotive battery or vehicle electrical system.
- 2) Improper connection or power supply will damage the sensor.
- 3) Testing and inspection of the sensor in accordance with these instructions and a record of the results should be listed on the daily maintenance report. The radar sensor on operating vehicles must be tested each day prior to the vehicle's operation. Results of this test must be recorded in the maintenance log.
- 4) The radar is intended for use on commercial vehicles and machinery equipment. Proper installation requires a good understanding of vehicle/machine electrical systems and procedures, along with proficiency in the installation.



Warning!

1. Do not open the sensor's enclosure. This can cause damage, short-circuiting or electrical shocks that could lead to serious injury or death.
2. The equipment is not an alternative to safe driving practices.



This symbol is intended to alert the user not to dispose of electrical and electronic equipment.

2. Product Features

- 1) Advanced 77GHz microwave sensing technology.
- 2) CAN BUS interface, comply with ISO 11898-2.
- 3) Detect moving objects including any transportation vehicles, motorcycles, bicycles, pedestrians, etc.
- 4) Work effectively in harsh environment and in poor visibility including darkness, smoke, fog and dust.

3. Technical Specifications

- 1) Frequency of Radar sensor: 76.00...77.00GHz.
- 2) Transmitter Type: FMCW.
- 3) Power Supply: 6 to 32V DC.
- 4) Power Consumption: 2.5W
- 5) Detection Range: 0.2- 40m(horizontal angle:120° ,vertical angle:14°).
- 6) Antenna Beam: 2TX/4RX.
- 7) Range Detection Accuracy: $\pm 0.1\text{m}$.
- 8) Range Detection Resolution:0.2m.
- 9) Angle Accuracy: $\pm 0.5^\circ$
- 10) Speed Range: $\pm 18\text{m/s}$
- 11) Speed Resolution: $\pm 0.58\text{m/s}$
- 12) Speed Accuracy: $\pm 0.3\text{m/s}$
- 13) Reflash Rate: 33ms
- 14) CAN Bus Baud Rate:1Mbps(250Kbps and 500Kbps are optional)
- 15) Operating Temperature: -40 to +85°C.
- 16) Storage Temperature: -40 to +90°C.
- 17) IP Protection: IP69K
- 18) Vibration Rating: 5.9G
- 16) Dimensions: Sensor: 106.6(W) ×72.9(H) ×34.5(D) mm.
- 17) Weight: 158.8Grams
- 18) Mounting: Two (4.5mm) diameter mounting holes (sensor)



Special Notice

All specifications are subject to change without notice.

4. Accessories

 Sensor Transition Cable 3m red (4 pin aviation interface, female to male)	 Dual Sensors Transition cable (4 pin aviation interface, one female to two male) 3m red (Optional)
 Sensor mounting Bracket (Optional)	 Silicone Pad

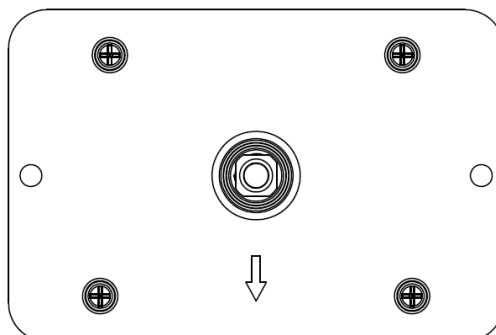
Attention: “Optional” means that this is an optional accessory.

5. Installation

Operation Manual & some installation accessories, some accessories may be excluded if they are optional.

5.1 Sensor Installation

The radar sensor mounting location is important to proper operation. Ideally the sensor should be mounted on the rear center of the vehicle at roughly 0.4~1.5m above the ground with silicone pad. The sensor face should be perpendicular to the ground. The arrow on the back of the sensor must be placed downward.



It can be tilted horizontally at a certain angle with sensor mounting bracket (Optional).

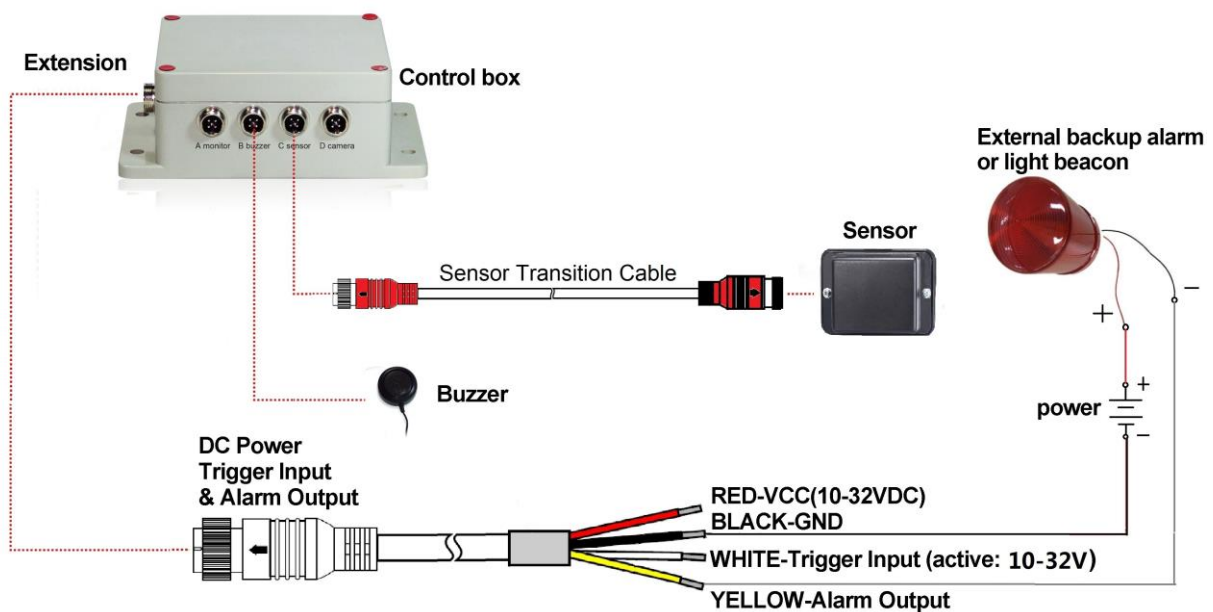


Important!

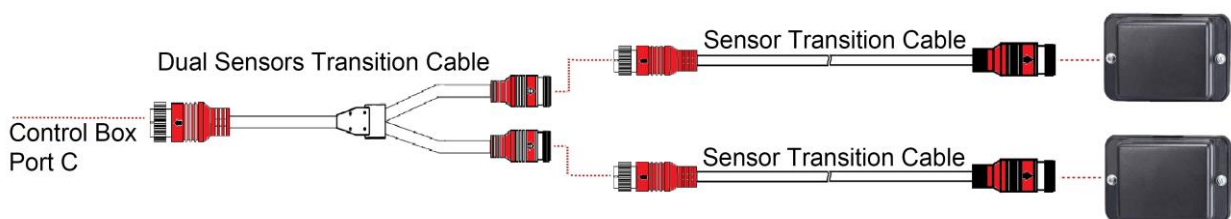
Before the RADAR DETECTION SYSTEM is permanently installed to the vehicle, verify that the sensor mounting location provides a clear detection zone. Temporarily attach the sensor in the proposed mounting location, apply power to the system, and verify that nothing is being detected.

5.2 System Connection Diagram

Integrating with Control Box System



Port C in Control Box is for radar sensor (through Cable 3m Sensor Transition Cable red for one sensor, and cable 3m dual Sensors Transition cable for two sensors, each sensor can be extended with Sensor Transition Cable)



The connection of two sensors (Optional)

6. Object Detection Capability

Tips for Users

Radar works on the principle of line of sight and relies on some of the electromagnetic energy transmitted by the sensor being reflected back from the object to the sensor. If an object does not reflect enough electromagnetic energy back to the sensor it will not be detected.

In the case where there are multiple objects in the detection area at various distances and/or angles, the sensor detects the closest object, which is the most important one for collision avoidance.

The object nature, location and direction are key influences in determining if an object is detected or not. The influencing factors are listed below.

- Size: Larger surfaces are detected better than smaller surfaces.
- Material: Metal is detected better than non-metal materials, e.g. wood, plastic.
- Surface: A smooth and solid surface is detected better than rough, uneven, porous, fragmented or liquid surfaces, e.g. bushes, gravel, water.
- Shape: A flat object is better detected than a complex shape.
- Angle: An object facing directly towards the sensor (perpendicular, orientation head on to the sensor) is detected better than an object that is located towards the edges of the detection area or at an angle.
- Distance: An object closer to the sensor is better detected than one that it is further away.

7. Troubleshooting

The symptoms described below do not necessarily mean a failure within the radar sensor. Please check the following items before you initiate request for repair.

Symptoms	Causes	Solutions
No reaction from the radar sensor while the power is on.	No power input	Check whether the power cable is in well connection.
There is no obstacle within the detecting area, but constant warning occurs.	The ground is detected or there are obstacles in the detection area.	Adjust the angle of sensor and remove all of the obstacles in the detection area.

Federal Communications Commission (FCC) 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 generate, 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.

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 Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF exposure warning

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.