
User Manual

1、Equipment name: Radar for vehicle

2、Model: CTLRR-230 Pro

3、RF performance

Modulation	FMCW		
Technical Parameter	Frequency range	Occupied bandwidth	Transmitting power
Value	76-77GHz	≤800MHz	≤55dbm

4、Warning

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the 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.

Note: 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 or more 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 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.

5、Precautions before installation

- When installing, try to stay away from the signal antenna inside the vehicle body as much as possible;
- During installation, keep away from locations where large electrical equipment frequently starts up;
- The installation position of the radar is away from the motor actuator and driver;
- The radiation direction of the radar sensor is not obstructed by metal components;
- Ensure that the vehicle has completed four wheel alignment before radar calibration;
- Calibrate when the vehicle is unloaded.

6、Installation flowchart

6.1.Radar installation process

6.1.1.Radar installation

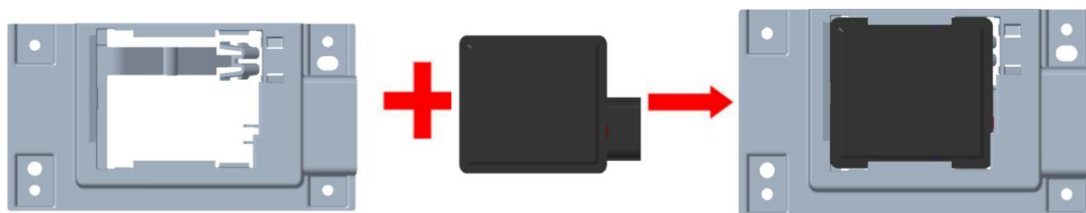


Figure 1.Radar installation diagram

As shown in the **Figure 1**, fix the radar to the installation bracket, which is customized and processed according to different vehicle models.

Attention: The radar connector faces the driver!

6.1.2.Bracket installation

The process of installing the bracket is to first determine the installation position of the radar using an inclinometer, and then tighten the fixing screws.

The specific steps are as follows:

A. Select the radar installation position directly in front of the front of the vehicle body's central axis. Park the car on a level surface and install the bracket with the radar at a suitable position on the front edge of the car to fix the bracket. The radar must be located on the central axis of the vehicle body. As shown in the following figure.

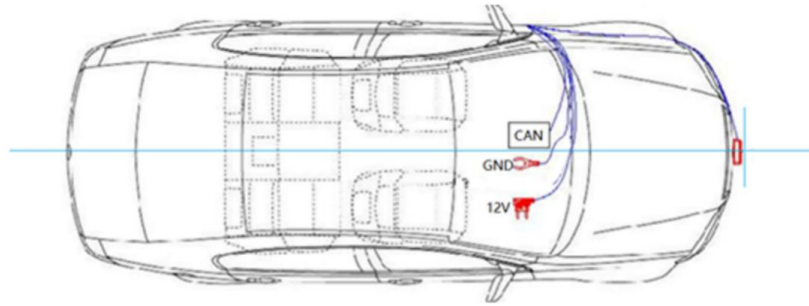


Figure 2. Selection of radar installation location

B. Select radar installation height.

Attention: The installation height of the radar is required to be within the range of 30cm to 100cm.



Figure 3. Radar installation height selection 30cm---100cm

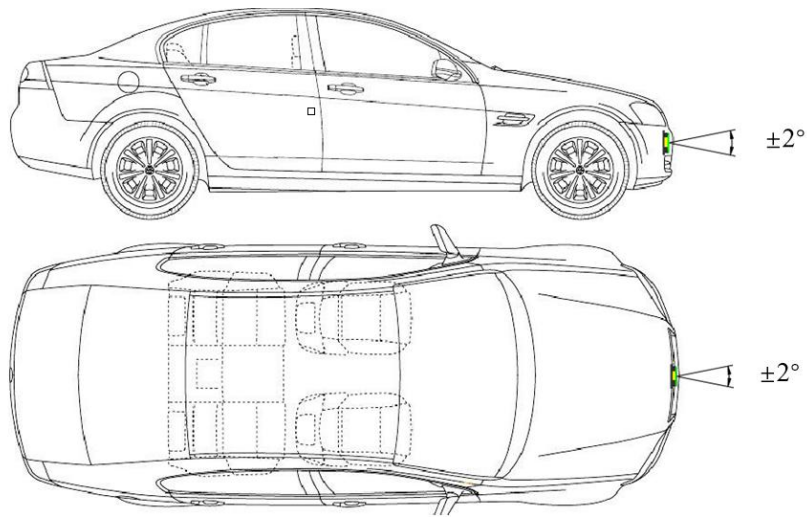


Figure 4. The horizontal and pitch angles of the radar cannot exceed $\pm 2^\circ$

C. Ensure that the radar is level, and the horizontal angle error range should not exceed $\pm 2^\circ$. If the horizontal angle measurement exceeds $\pm 2^\circ$, the installation position of the bracket and radar should be checked for deviation until it is adjusted to the required angle range. (The closer the angle deviation value is to 0° , the better).



Figure 5. Horizontal angle adjustment not exceeding $\pm 2^\circ$

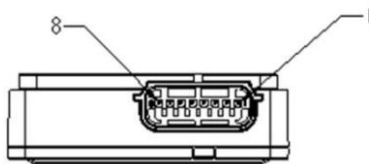
D. The pitch angle error range should not exceed $\pm 2^\circ$. If the pitch angle exceeds the specified range, shims can be used to adjust it when installing the lining plate. If an adjustable radar bracket is installed, the angle can be adjusted through the bracket. It is recommended to use a level to assist in calibration for adjusting the pitch direction.(The closer the angle deviation value is to 0° , the better).



Figure 6. Pitch angle adjustment not exceeding $\pm 2^\circ$

E. After completing the above steps, the position of the radar bracket was determined and fixed with screws. After the screws are fixed, retesting can be carried out again to prevent deviations.

6.1.3.Wiring harness connection and fixation



NO.	Definition	NOTE
1	CAN1-H	CAN1 high voltage level
2	CAN1_L	CAN1 low voltage level
3	CAN2-H	CAN2 high voltage level
4	CAN2_L	CAN2 low voltage level
5	KL15/KL30	power input
6	NC	/
7	NC	/
8	GND	power GND

Figure 7. Radar harness function definition

6.1.4.Forward radar calibration

Note: For the installation of upper computer software, please refer to the <<Upper Computer Operation Guide>>

- 1) Park the test vehicle equipped with radar on a straight, open road with lane markings. The calibration environment requires the vehicle to be in front, and there should be no interference targets such as vehicles, street lights, trees, and guardrails in the three lanes on the left and right sides of the vehicle. And ensure that the radar outputs no fault codes.
- 2) Park the vehicle in the upright position, measure the lateral width of the rear of the vehicle with a tape measure, measure the center position of the rear, and use a plumb line to hang it to the ground at the center position of the rear, marking it on the ground. Do not move the vehicle after marking the ground.



Figure 8.Confirmation of rear center position

- 3) Measure the center position of the front of the vehicle (i.e. the radar installation position) with a tape measure, place a corner reflector, and ensure that the height of the corner reflector is the same as the radar installation height.



Figure 9.Place the corner reflector in the center of the front of the vehicle

4) Place the laser at the ground position marked with a lead hammer at the rear of the vehicle. The laser emits a beam of light, which passes through the front chassis from below. Adjust the angle of the laser ruler to make the beam spot hit the corner reflector support frame and fix the position of the laser. In this way, the two points determine the straight line, and the light path is the direction of the body's central axis.



Figure 10. Find the centerline of the vehicle body

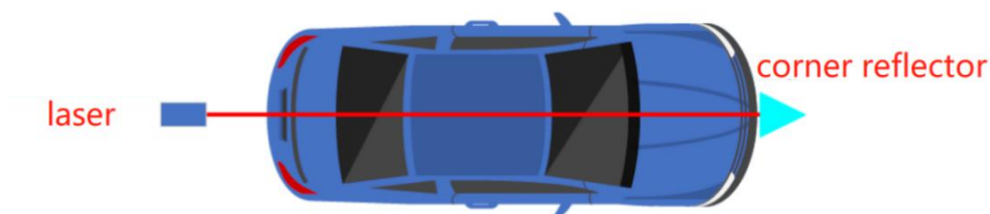


Figure 11. Find the centerline of the vehicle body

5) After fixing the laser position and confirming the center position of the corner reflector, slowly move the corner reflector back to ensure that the installed radar and corner reflector are at a distance of 3m, and ensure that the light spot is always hitting the corner reflector. Start the calibration upper computer to set the calibration parameter distance of 3m, and then proceed with calibration.



Figure 12. Ensure that the corner reflector support rod is at the laser irradiation point

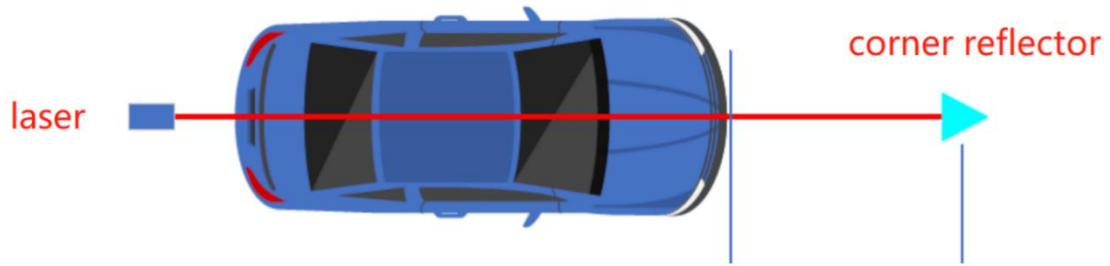


Figure 13. The corner reflector moves to a distance of 3m from the front radar of the vehicle

6) Operation of calibration upper computer: Turn on the upper computer to ensure that it is in normal operation. The target point of the corner reflector placed at 3 meters can be seen through the upper computer, indicating that the radar communication is normal.

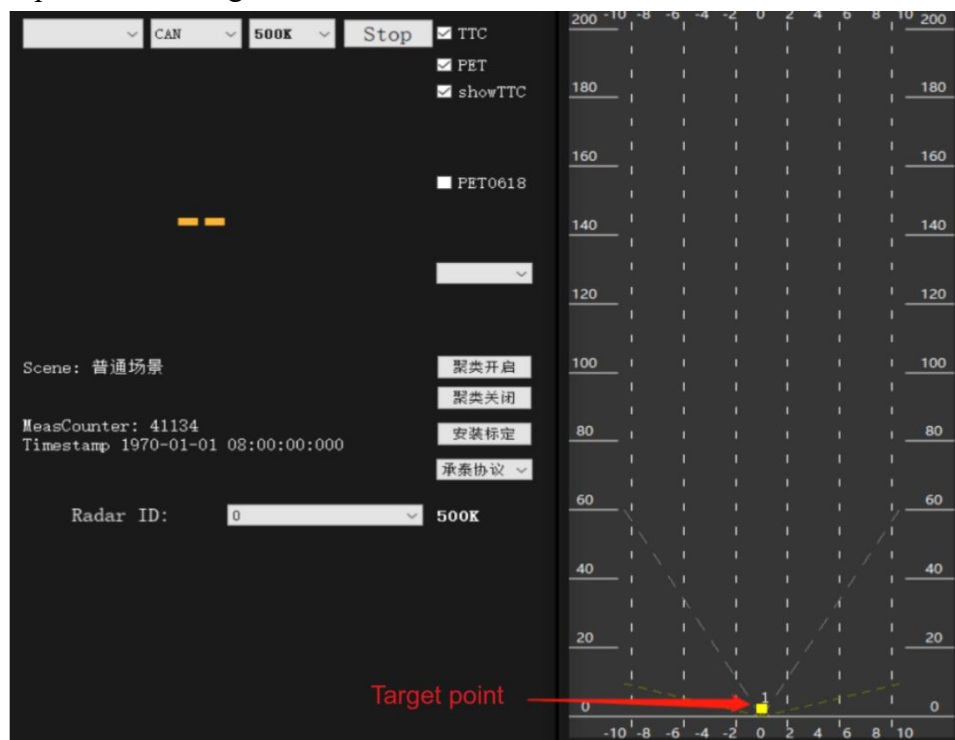


Figure 14. Upper computer viewing corner reflector target

7) Please use specialized calibration software for radar calibration“RadarCalibrationTool_V1.2.0”



Figure 15. Calibration software shortcut icon

8) Due to the inability to open both the upper computer and calibration software simultaneously, please close the upper computer first and then open the dedicated calibration software. The calibration software operation method is as follows: After completing steps 1 to 4, click the "Start" button in the offline calibration area to start the calibration. Wait for 5 seconds, and the upper computer will display the status "calibration ok". The calibration is successful. If the second reading does not display the status, please stop calibration and close the calibration software to check if the radar is working properly. Then, open the calibration software again and try again.



Figure 16. Calibration software operation process

- If you have any questions about our products, please feel free to contact us at any time. We will wholeheartedly provide you with better products and services !