24GMilimeterwave Bio-sensing radar

R24DVD1-Human existence module manual

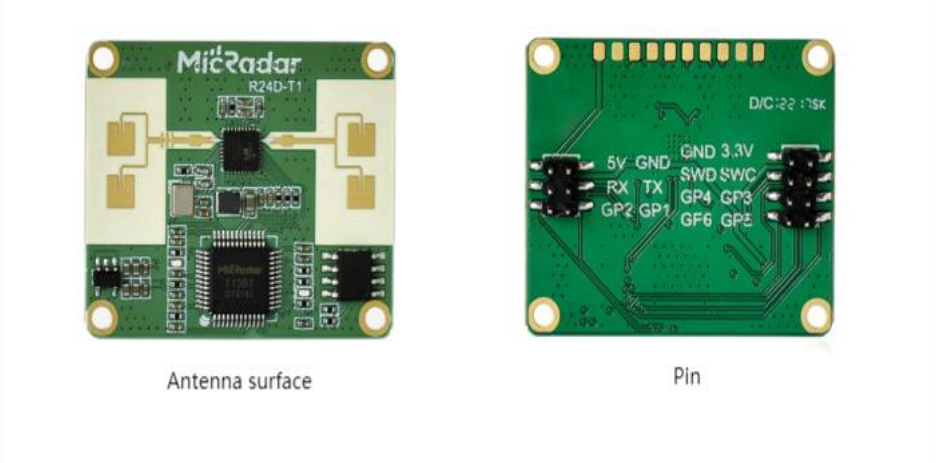
Please read the product instructions carefully before use and keep them properlyV1.0

MicRadar Technology (Shenzhen) Co. ,LTD

1. Product description

The life-aware radar is based on the frequency-modulated continuous wave system to realize human biological existence perception and human motion perception, continuously record human existence, dwell time, and can notify the gateway through wireless signals to achieve scene linkage. This product is installed on the top of the room. Human function detection is not affected by factors such as temperature, humidity, noise airflow, dust, light, and complete stillness of the human body.

2. Appearance introduction



Antenna surface　　Pin

3. Main performance description

3.1. Main functions of radar

function points	State change time/function explanation
DP1: Someone/Nobody	No one to someone, report within 0.5s From someone to no one, output stateless within 1 minute
DP 2 : Sensitivity settings 1 - 10 stops	In the default scene mode, it can support 10 gear adjustments
DP 3 : Scene mode (bed, bathroom, hotel, bedroom, office, default mode)	Adapt to different scenarios according to the size of the area

DP 4 : No Time Setting	After the environment is unoccupied, output the unmanned status information according to the set time.

4. Module package size and pin description

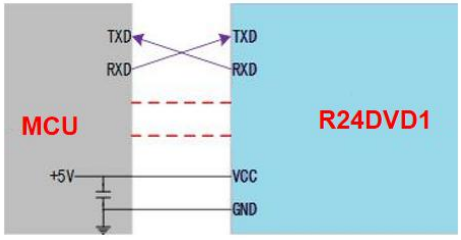
interface	pin	describe	Typical value	illustrate
interface 1	1	5V	5.0V	Power input positive terminal
	2	GND		land
	3	RX	3.3v _	Serial receive
	4	TX	3.3v _	Serial send
	5	GP2	3.3V / 0V	Someone/Nobody
	6	GP1	3.3V / 0V	active/still
interface 2	1	3V3	3.3V	output power
	2	GND		land
	3	SL		reserve
	4	SD		reserve
	5	GP 3		Spare expansion pins
	6	GP 4		Spare expansion pins
	7	GP 5		Spare expansion pins
	8	GP 6		Spare expansion pins

Pin Description

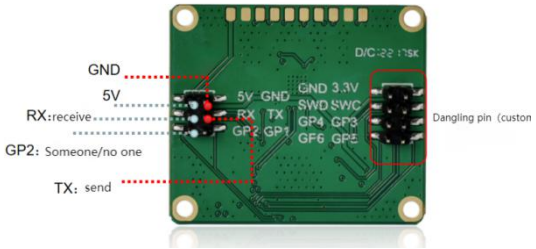
Note: 1) GP2 output: high level - someone, low level - no one;

2) GP1~GP4 are parameter selection control terminals, which can be redefined according to user needs.

3) The output signals of this interface are all 3.3V level.



Use wiring diagrams



Module wiring diagram

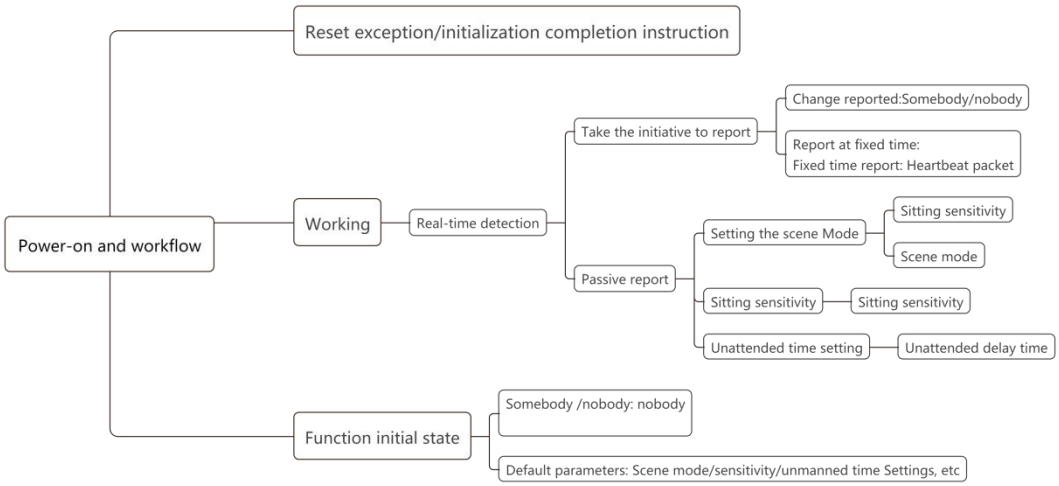
5. Tool preparation

5.1. TTL serial port tool, DuPont line, PC computer, serial port assistant terminal

5.2. Radar-EVB demo board (default Tuya platform, you can freely adapt your own communication module)

5.3. Radar User Manual (Protocol)

6. Power-up and data rules



7. Sensitivity setting

The sensitivity setting is used to adapt to the different use environments of the product to avoid false positives and false negatives from the sensor.

Sensitivity adjustment range: 1-3 ; 1 is low sensitivity, 3 is high sensitivity, and the default parameter is 3 .

High sensitivity (3): It is suitable for scenarios with relatively small environmental interference and high requirements for detection sensitivity, and can detect subtle movement changes, such as confined spaces, warehouses, insurance banks, etc.; (note that this mode is too sensitive to be easily affected by environmental interference and error sentenced)

Medium sensitivity (2): suitable for common indoor scenes such as homes, hotels, etc.; (default)

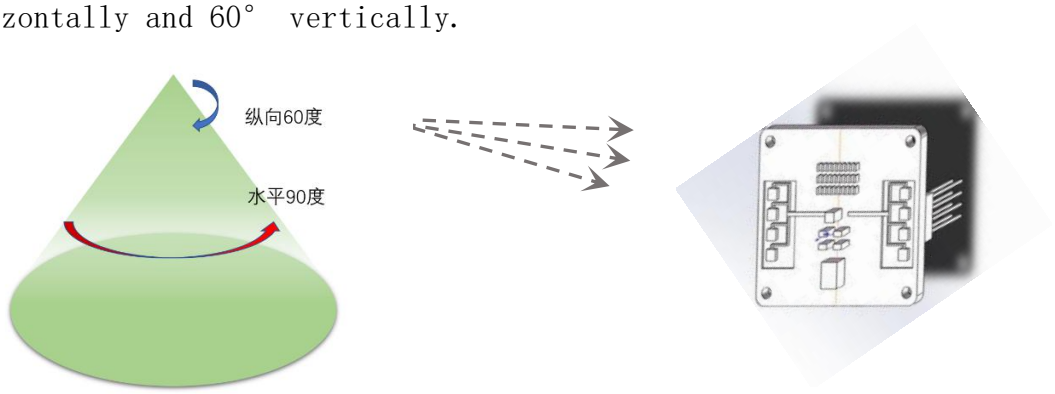
Low sensitivity (1): It requires a large amount of movement to trigger, and it is not easy to be disturbed by the shaking of curtains and plants.

This scene is suitable for corridors, parking lots and other scenes.

8. Radar Installation Instructions

8.1. Radar module working range

The beam coverage of the R24 D VD1 radar module is shown in the figure below. The radar coverage is a three-dimensional sector of 90° horizontally and 60° vertically.



Schematic diagram of R24DVD1 radar coverage area

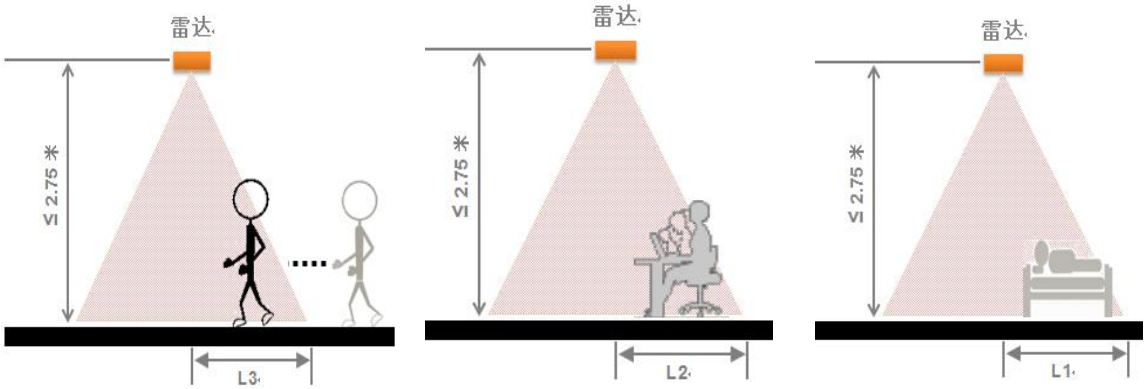
8.2. Radar installation direction and detection range

8.2.1. Top installation

*To ensure the accuracy of radar detection, please install it on the top!

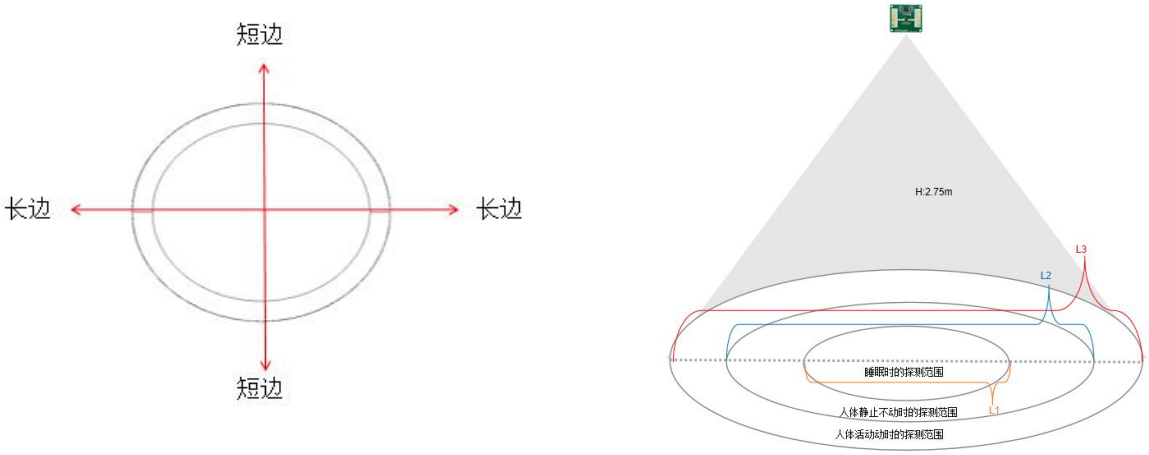
The radar is installed vertically, and the horizontal deviation angle is ≤3° to ensure that the main beam of the radar covers the detection area; the recommended installation height of the radar is ≤2.75 meters; there are no obvious obstructions and coverings in front of the radar.

Affected by the radar installation height and radar beam range, in this installation mode, the maximum diameter of moving human detection is L3 ≈ 4.5 meters; the maximum diameter of human sitting/fretting detection is L2 ≈ 2.5 meters, and the maximum diameter of human sleep detection is L1 ≈ 1.8 meters.



Detection range

The range of the overhead radar to detect human activity is about 6 meters * 9 meters, the range of detecting human body motion is 4 meters * 5 meters, and the range of scanning sleep is about 3 meters * 2 meters.



8.2.2. Scene setting (sensing range setting)

	Trigger detection distance (diameter)	Static detection distance (diameter)	Sensitivity
maximum area mode	Wide angle 9 m/Narrow angle 6 m	/ Narrow angle 5m	3
Area detection mode (default scene)	Wide angle 7 m/Narrow angle 5 m	Wide angle 5m /Narrow angle 4m	2
bathroom mode	Wide angle 5.5m /Narrow angle 4m	Wide angle 2.5 m/Narrow angle 2 m	1

9. Guide to the actual installation steps of the radar

Step 1: Determine a scene mode by comparing the approximate area of the space

Step 2: Confirm the main activity and stay area of the person, and the center of this position is the installation position of the radar

Step 3: Determine the entrance and exit of the space, and point the long side of the radar to the entrance and exit to ensure the trigger effect of people entering

Step 4: Confirm whether there is an interference source within the radar detection range

Step 4: When there is an interference source in the radar detection range, reduce the dynamic detection range (adjust a smaller scene mode)

(A trade-off is made between the good triggering effect of the entrance and the anti-jamming stability of radar detection. It is recommended to give priority to ensuring the anti-jamming and stability of radar detection)

Step 6: Confirm whether the real use scene of the radar is a home scene or an office scene. It is recommended to set the initial sensitivity

(Small space will enhance the reflection of the radar, enhance the radar detection effect, adjust the sensitivity to neutralize the reflection interference, and ensure the stability of unmanned judgment)

(Large space will reduce the reflection of the radar, weaken the radar detection effect, increase the sensitivity to neutralize and weaken the interference, and ensure the stability of the presence of someone)

Step 7: Follow the steps to confirm the final scene mode and sensitivity for normal use

Example:

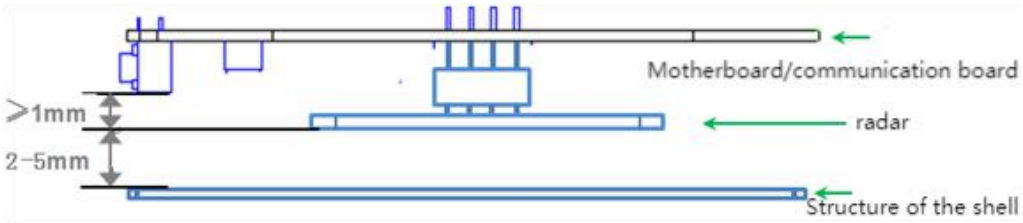
Hotel space size: 10㎡ - 20㎡
Interference source: air conditioner outdoor unit/blackout curtain/partition wall
Recommended Mounting Sensitivity: 3 (adjusted according to space)
Recommended scene mode: area detection mode **(need to evaluate the selected scene mode according to the actual space size)**
Installation orientation: the long side faces the door

10. Layout Requirements for Antenna and Housing

PCBA: Need to keep the height of the radar patch ⩾ 1mm than other devices

3 mm between the radar antenna surface and the housing surface

Shell detection surface: non-metallic shell, need to be straight, avoid curved surface, affect the performance of the entire scanning area.



11. Common problem

Interference factors: Radar is an electromagnetic wave detection sensor, and active non-living will cause false alarms. The movement of metals, liquids, can lead to false positives. Usually, electric fans, pets close to the radar, and the shaking of metal curtains can cause false positives. Radar needs to be planned in terms of installation angle.

Non-interfering factors: radar electromagnetic waves will penetrate human clothing, curtains, thin wood, and glass. The installation angle and performance of the radar need to be determined according to the application.

Semi-interference factor: Radar judges the existence of human body and is not suitable for directly facing the air conditioner. The motor inside the air conditioner can cause the radar to misjudge. It is required that the radar product does not directly face the air conditioner. Or in the same direction as the air conditioner.

12. Historical version update instructions

Revision	Release Data	Summary	Author
V1.0_0 520	2022/5/20 _ _ _	first draft	OF_Frank