

# 60G Millimeterwave Bio-sensing radar

## R60ATR1-Single track module using guide

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Please read the product instructions carefully before use and keep them properly V1.0

### 1. Product description

Trajectory tracking radar, based on the real-time collection of personnel movement amplitude, distance, angle, including breathing movement and other subtle amplitudes, detects the basic personnel movement trajectory and static position. By judging the changes of the distance and angle of the personnel in real time by the changes of the radar echo, the real-time reporting of the personnel's position is realized, and the trajectory tracking effect is realized. According to the movement amplitude (sign size) and the weak human breathing micro-motion signal, it can identify the static and active situation of the target, and output a stable static position locking function.

### 2. Appearance introduction



Antenna surface



pin

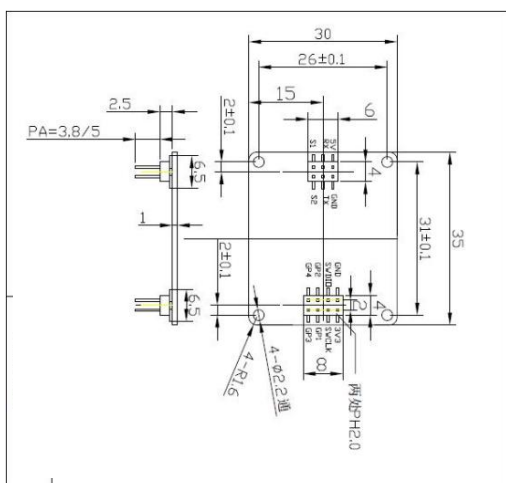
### 3. Main performance description

#### 3.1. Main functions of radar

(For the single-person trajectory tracking radar application installed on the top, the angular distance information is converted into the change of the x/y axis coordinate data of the elevation plane)

Function points	State change time/function explanation
DP1: real-time x-axis coordinate data changes	Report once in 1s
DP2: real-time y-axis coordinate data changes	Report once in 1s

### 4. Module package size and pin description

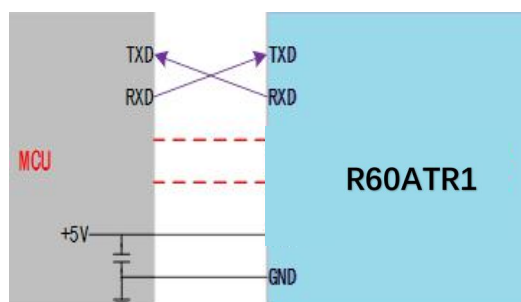


接口	引脚	描述	典型值	说明
接口 1	1	5V	5.0V	电源输入正端
	2	GND		地
	3	RX	3.3v	串口接收
	4	TX	3.3v	串口发送
	5	GP2		备用扩展引脚
	6	GP1		备用扩展引脚
接口 2	1	3V3	3.3V	输入电源
	2	GND		地
	3	SL		保留
	4	SD		保留
	5	GP3		备用扩展引脚
	6	GP4		备用扩展引脚
	7	GP5		备用扩展引脚
	8	GP6		备用扩展引脚

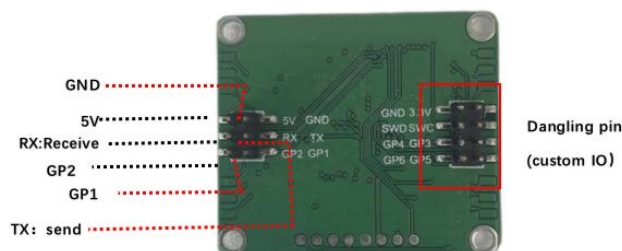
Radar module structure diagram Pin description

Note:

- 1) GP1~GP6 are parameter selection control terminals, which can be redefined according to user needs.
- 2) The output signals of this interface are all 3.3VTTL level.



Use wiring diagrams

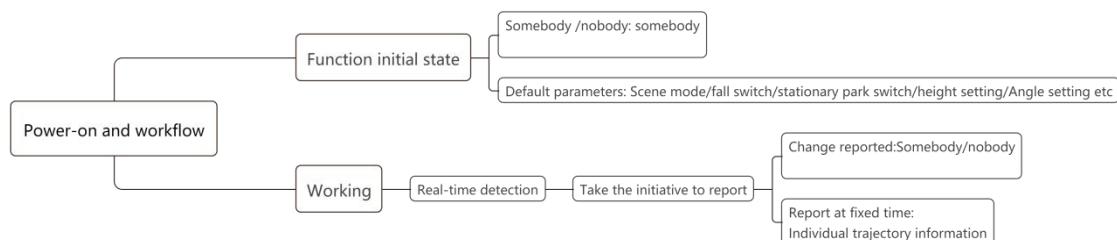


Module wiring diagram

### 5. Tool preparation

- 5.1. TTL serial port tool, DuPont line, PC computer, serial port assistant terminal
- 5.2. Radar User Manual (Protocol)

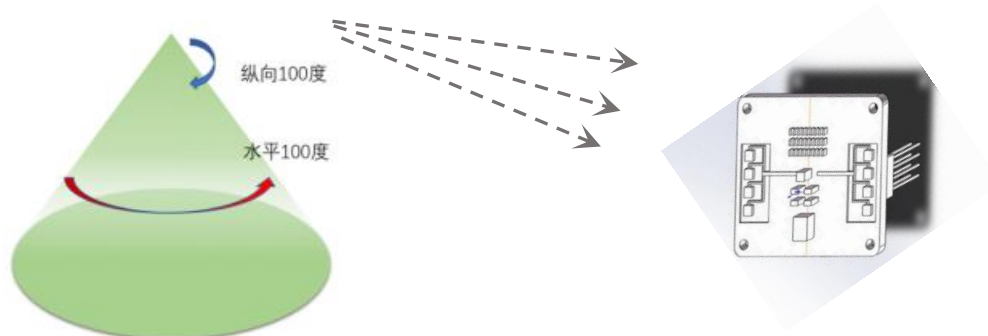
### 6. Power-up and data rules



### 7. Radar Installation Instructions

#### 7.1. Working range of radar module

The beam coverage of the R60ATR1 radar module is shown in the figure below. The radar coverage is a three-dimensional sector area of 100° horizontally and 100° vertically.



Schematic diagram of R60ATR1 radar coverage area

#### 7.2. Radar installation direction and detection range

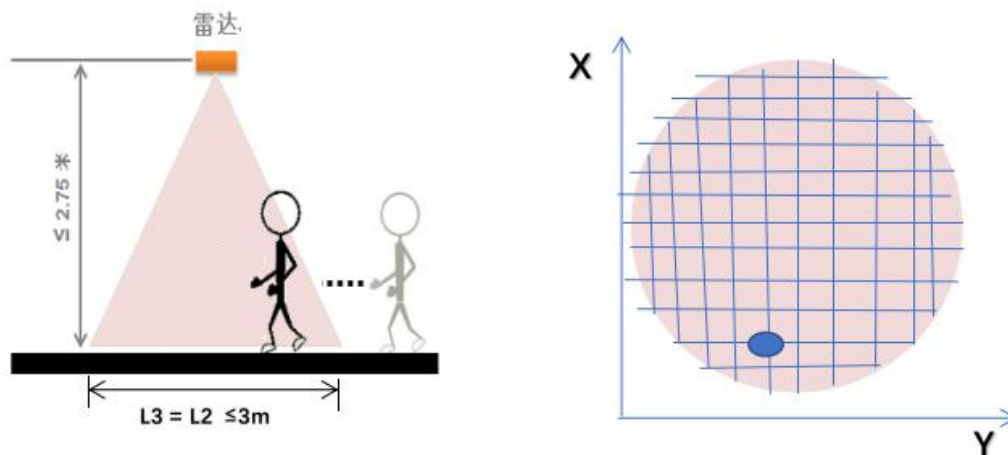
##### 7.2.1 Top installation

\* To ensure the accuracy of radar detection, please install it on the top, and the installation height is 2.4 meters!

The radar is installed on the top to ensure that the main beam of the radar covers the detection area; the installation height of the radar is 2.4m. There are no obvious obstructions and coverings in front of the radar.

Affected by the installation height of the radar and the range of the radar beam, in this installation mode, the maximum diameter of motion track tracking detection is  $L3 \approx 3$  meters, and the maximum diameter of stationary position detection is  $L2 \approx 3$  meters.

(For the single-person trajectory tracking radar application installed on the top, the angular distance information is converted into the change of the x/y axis coordinate data of the elevation plane)



### 8. Key Functional Testing Guidelines

(For the single-person trajectory tracking radar application installed on the top, the angular distance information is converted into the change of the x/y axis coordinate data of the elevation plane)

Motion track tracking test:

- Track tracking real-time test:

When performing a mobile test within the radar detection range, the radar will report the real-time coordinate data change information of the target every second, and form a real-time trajectory through the real-time position.

carry out testing Move freely within a certain distance	When judging whether the radar can normally report the real-time coordinate change information of the target every second, if the output can be judged normally, it means "passed"
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Example test table format:

Testing frequency	move	Is the location report normal?	pass
the first time	move freely	Yes	pass

Static position detection test:

- Static coordinate information accuracy test:

The mobile test is carried out within the radar detection range, and when it stops at a random position, the coordinate data finally reported by the radar is compared with the real position to confirm whether the distance error value is within a reasonable range to confirm the accuracy of the distance information.

carry out testing Move freely within the range for a certain distance and then stop at any position	Determine whether the error between the coordinate data finally reported by the radar and the real distance is within the specified accuracy range, and within the specified accuracy range, it means "pass"
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Example test table format:

Testing frequency	Radar Coordinate Information	Compare with real location information Whether it is within the accuracy requirements	pass
the first time	(x=1, y=1.2)	Yes	pass

## 9. Guide to the actual installation steps of the radar

Step 1: Confirm the main activity and stay area of the person, which is the coverage area of the radar

Step 2: Confirm that the actual installation height of the radar is 2.4m

Step 3: Confirm whether there is an interference source within the radar detection range, and remove the interference source as much as possible

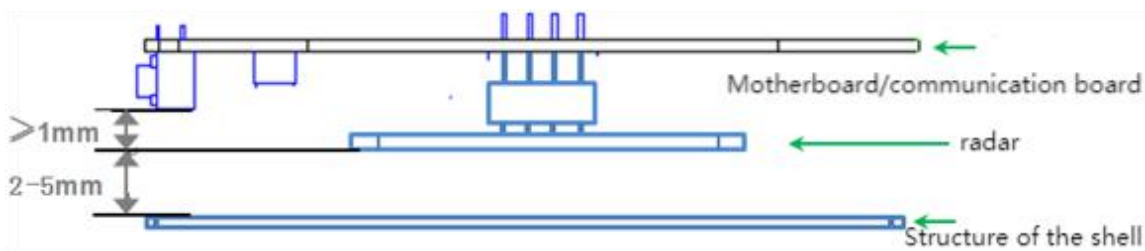
Step 4: Follow the steps to confirm the final installation location for normal use

## 10. Layout Requirements for Antenna and Housing

PCBA: Need to keep the height of the radar patch  $\geq 1\text{mm}$  than other devices

Shell structure: It is necessary to maintain a distance of 3mm between the radar antenna surface and the shell 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
V1.0_0520	2022/05/20	first draft