Hi-Link

2021-9-16

Human presence detection radar**HLK-LD1125H-24G**Application Note

Due to product upgrades or other reasons, the content of this document will be updated from time to time. This document

is only a guide for use, and the information and suggestions stated do not constitute any express or implied warranty.

V1.2

2021-9-16

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1 Overview

HLK-LD1125H-24GIt is a highly sensitive24GHzMillimeter wave human presence detection radar module. Different from traditional radar that detects the presence of a human body by detecting large-scale movements or small-scale body movements of the human body, the main feature of this module is to determine the existence of the human body by detecting and accumulating small-scale movements such as human breathing. Therefore, the detection of human presence is more accurate than traditional motion detection radar. Hard to miss.

Indoor human presence detection

Human body micro-motion sensor

The module can penetrate non-metallic housings without opening holes. Common materials include plastic, glass, acrylic, ceramic, etc.
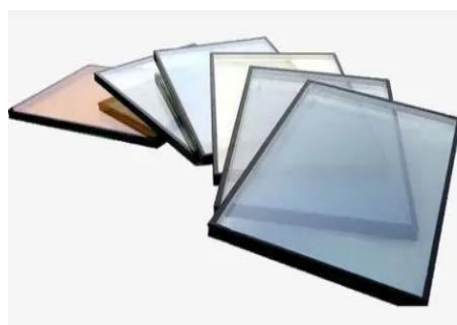

Embedded ceiling buckle shell (recommended)
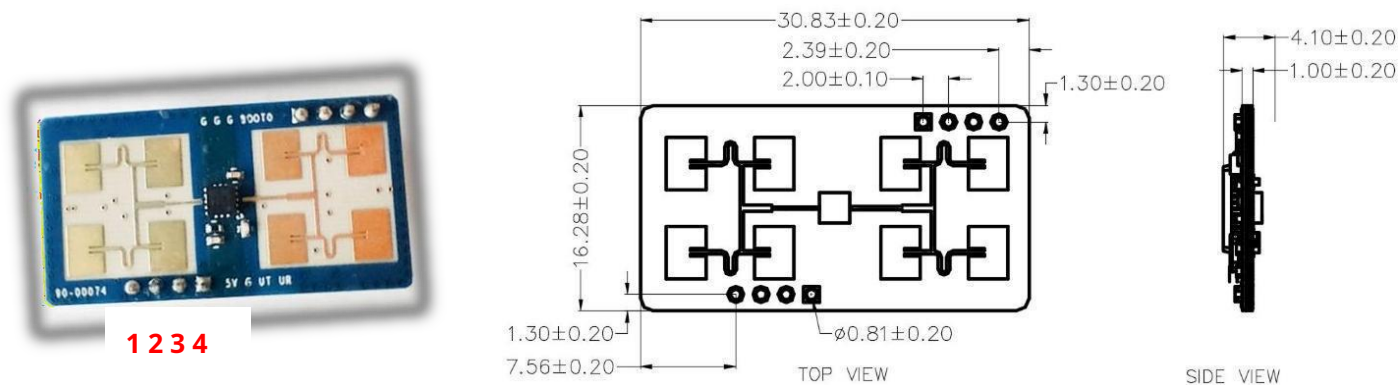

86Box plastic panel (recommended)

Various acrylics

Glass

2. Module appearance and interface

Pin interface definition: (It is recommended to use a 2mm pitch pin header connector for the interface)

Pin	name	Remark
1	VCC	power supply5Vpowered by
2	GND	ground
3	URX	TTLSerial port reception
4	UTX	TTLSerial port transmission

3 module performance

parameter	type value
frequency	3.5G-24.5GHz
Modulation	FMCW
Detection distance	4m for sitting, 8m for exercise
scope	Hanging height 3m, stationary human body detection coverage radius >2m
powered by	3.3-5V
current	80mA
Output serial port level	3.3V
Testing cycle	Adaptive
Antenna half power angle	+/-22° (horizontal/vertical)
Data Format	Serial ASCII output

Debugging wiring

HLK-LD1125H-2.4GThe serial port is used to output the detection results in string format, so when testing the module, users can first conduct a quick test evaluation on the serial port assistant.
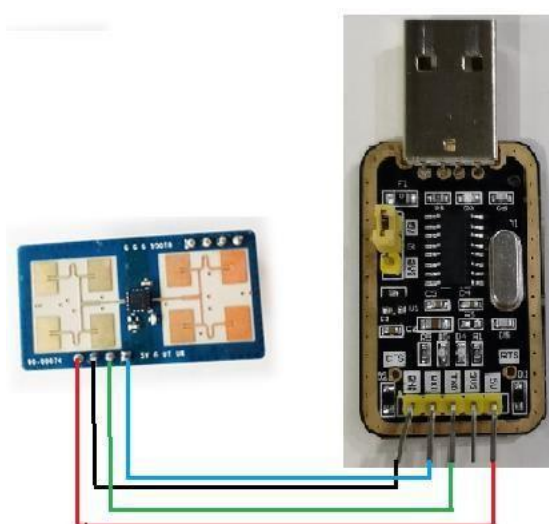
You can connect the module and serial port board as shown on the left: module1Pin connection to serial port board5V

module2Pin connection to serial port boardGND

module3Pin connection to serial port boardTx

module4Pin connected to serial port boardRX

4 Debug configuration

You can debug and test on the computer through the serial port assistant.HLK-LD1125H-2.4G.

Use any serial port debugging tool. baud rate115200,8bit data bit,1Stop bits, parity bits and flow control areNone,Receive settings optionASCII, select Send SettingsASCII.

product supportUARTtext agreement		
1	baud rate	115200
2	Character width	8bit
3	Stop bit	1
4	parity check	None

radar output

When the radar detects a larger motion, it outputsmov,dis=***. When the radar detects that the human body is stationary or has slight movements, it outputsocc,dis=***. disRepresents the target distance in meters.

When the radar cannot detect the target, it stops output. Users can set a certain delay on the upper layer to avoid frequent unmanned status when the signal is weak.
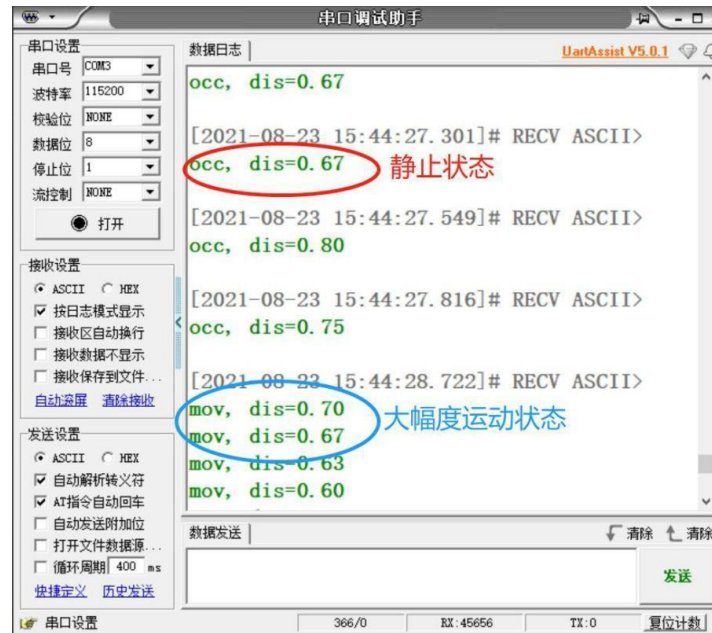
Configuration instructions

rmax=, set the maximum detection distance. The distance value to one decimal place can be set, in meters. For example: Set the module to only detect6Target within meters distance. then sendrmax=6, at this time the module will only output6goal within meters.6Targets outside meters will not be output. module defaultrmax=6.

mth1_mov=xx : Set the motion detection threshold within 2.8 meters, the default value is 30

mth2_mov=xx : Set the motion detection threshold within 2.8~8 meters, the default value is 15

mth3_mov=xx : Set the motion detection threshold above 8 meters, the default value is 6

mth1_occ=xx : Set within 2.8 meters, there is a detection threshold, the default value is 30

mth2_occ=xx : Set the detection threshold within 2.8~8 meters, the default value is 15

mth3_occ=xx : If set above 8 meters, there is a detection threshold, the default value is 6. The larger the sensitivity value, the less sensitive the module is. The main reason for segmented sensitivity is that the reflected signal of a target at a close distance is relatively stronger, so the sensitivity at a close distance is not required to be the same as at a long distance. At the same time, targeted settings can also be made for different environments. Segmented sensitivity can be debugged with the test mode. It is generally recommended that customers test according to the default parameters. If you encounter any problems, please consult our technical staff.

**save**,Save Settings. Otherwise, the default value will be restored after power failure.

get_all, get the current parameter settings.

**Note: The command needs to be sent with carriage change and line change to take effect.**

Configuration command demonstration

Take the serial port assistant window as an example to demonstrate the function and output of each command:

- send**rmax=8**, the module will feedback "**received message: rmax=8   rmax is8.00**" indicates that the command is configured as

  achievement. If you do not receive this feedback message, please check whether the sent command contains a carriage change and resend the command.
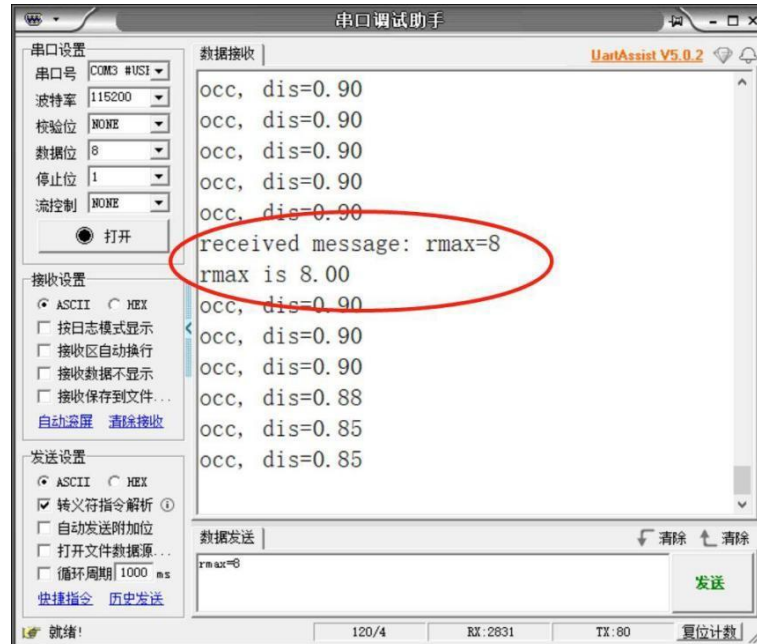

- send**mth1=100**, the module will feedback "**received message:mth1=80 mth1 is 80**" indicates that the command configuration is successful. If you do not

  receive this feedback message, please check whether the sent command returns a carriage change and resend the command.

mth2andmth3They are all the same operations and will not be repeated.

7
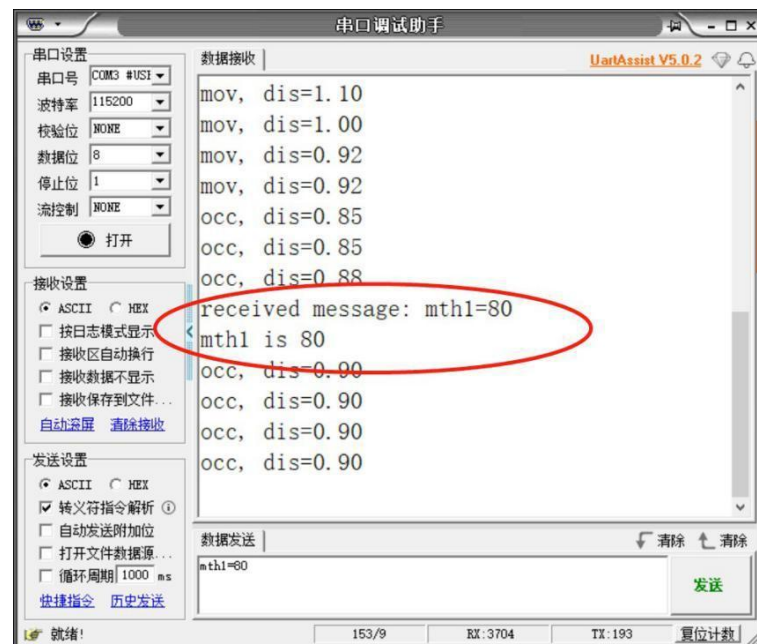
- send**save**, the module will feedback "**received message: save all vars have been saved**" indicates that the command configuration is successful and the

  parameters are saved. If you do not receive this feedback message, please check whether the sent command returns a carriage change and resend the
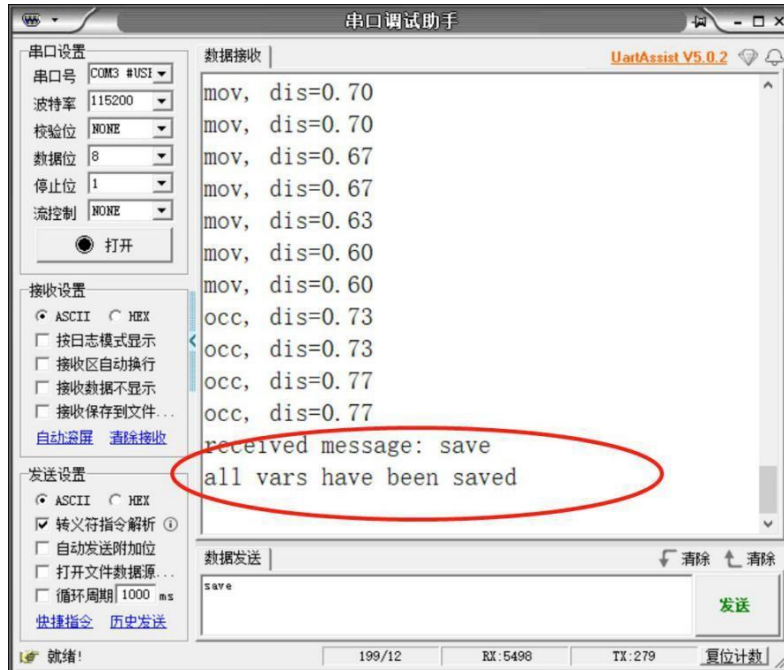
  command.

- send**get_all**, the module will feedback "**received message: get_all**" and returns all parameter settings of the current module. If you do not receive this

  feedback message, please check whether the sent command returns a carriage change and resend the command. You can use this command to check

  whether the module parameter settings are normal: set the parameters and send**save**After that, power off the module and restart it, and then send**get_all**to

  check whether the parameters are configured correctly.
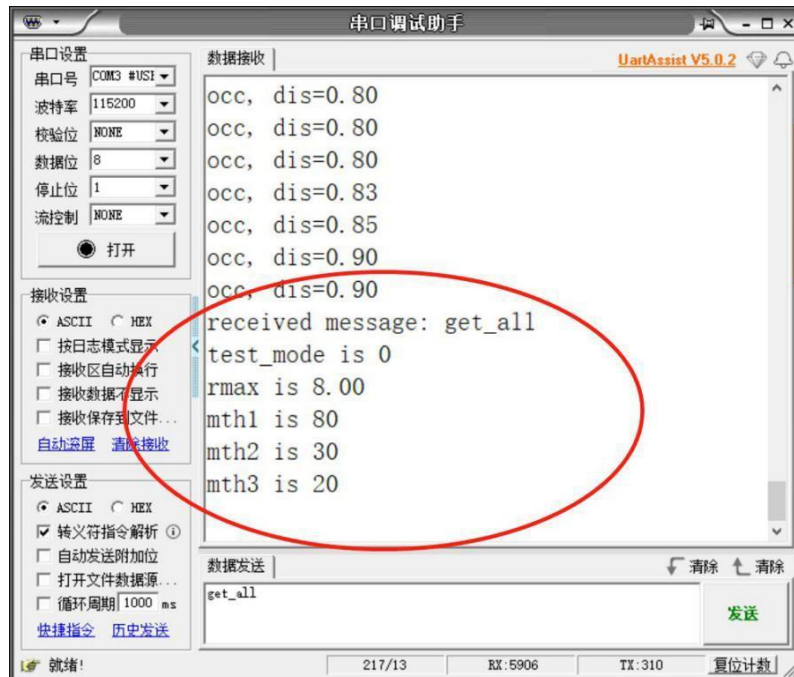
- send**test_mode=1**, the module enters test mode. At this time, the module output information will include signal strength. The default settings of the module are set according to the highest sensitivity, and the test site is a large, empty room (see the test site map in the appendix).

When the application environment changes, such as entering a smaller closed room, the noise floor may rise beyond the default sensitivity threshold due to multiple reflections and refractions of the signal due to the small size of the room, or other surrounding electromagnetic factors. At this time, you need to enter through test_mode, observe when no one is around dis as well as str size to set the corresponding mth value.

For example: if entering test_mode After that, there is no one in the room, but the module keeps outputting mov or occ, dis exist 2 mine, str exist 80 Within. According to the default mth1=60, at this time str That's more than mth1. Therefore, in such an environment, it is necessary to mth1 Set to >80. Users can mth The corresponding range, the distance to observe the output and str, to determine each mth Is the value appropriate? It is recommended that customers consult our technical personnel during actual debugging for this setting. Our technical staff will provide professional guidance.
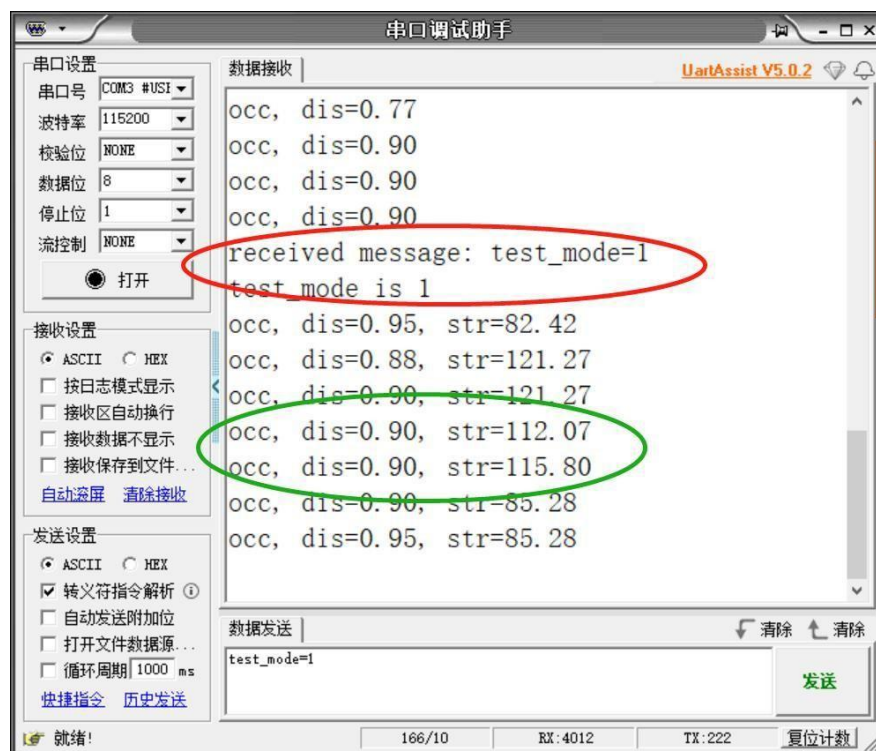
PC use

We provide supporting host computers for users to use and evaluate. Different from directly observing the module output through the serial port, the host computer can do some upper-layer delay processing after receiving the serial port signal output by the module.

1.After connecting the module, click**Serial port detection**—**Serial port selection**—**Open serial port**,at this time**The display interface will show the distance value** and **state**.**Someone's status**Corresponding module serial port**mov**output. The displayed distance is the module serial port**dis=**output value.

2.Application layer settings: Mainly used to set the switching between occupied, stationary and unmanned states. exist**Still state window**Enter greater than 2integer, click Set. When the host computer continuously receives**occ**When the number of times is greater than or equal to the set value, the host computer displays that someone is stationary. For example, set6, it means that the host computer needs to continuously receive6Second-rate**occ**When , it shows that someone is still.

3.exist**Switch unmanned window**Enter in>1is an integer, then the host computer will enter the unmanned state if it does not receive any data within the set time.

The unit of this window value is seconds. For example, set30, it represents30If the radar output cannot be received within seconds, it will enter the unmanned
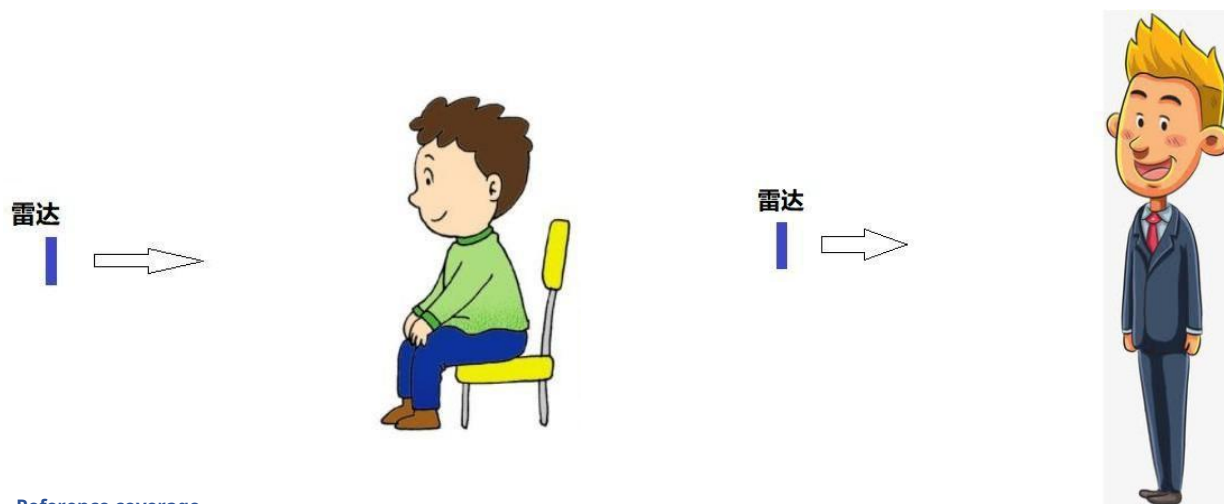
state.

4.Click**Set interface**, enter the parameter setting interface.**Sensitivity drop-down menu**optional1-9,1is the default sensitivity setting, each increase1

Then the sensitivity thresholdmth1/mth2/mth3all increase10%.**maximum distance window**Set the distance threshold corresponding tormax

parameter. After setting, click**save**, otherwise it will fail after power failure, corresponding to**save**instruction.

5 Radar installation and testing

Test application scenario 1: horizontal installation straight line test

The installation height is 1 meter, and the human body is facing the radar when measuring. Test coverage while sitting still and while walking.
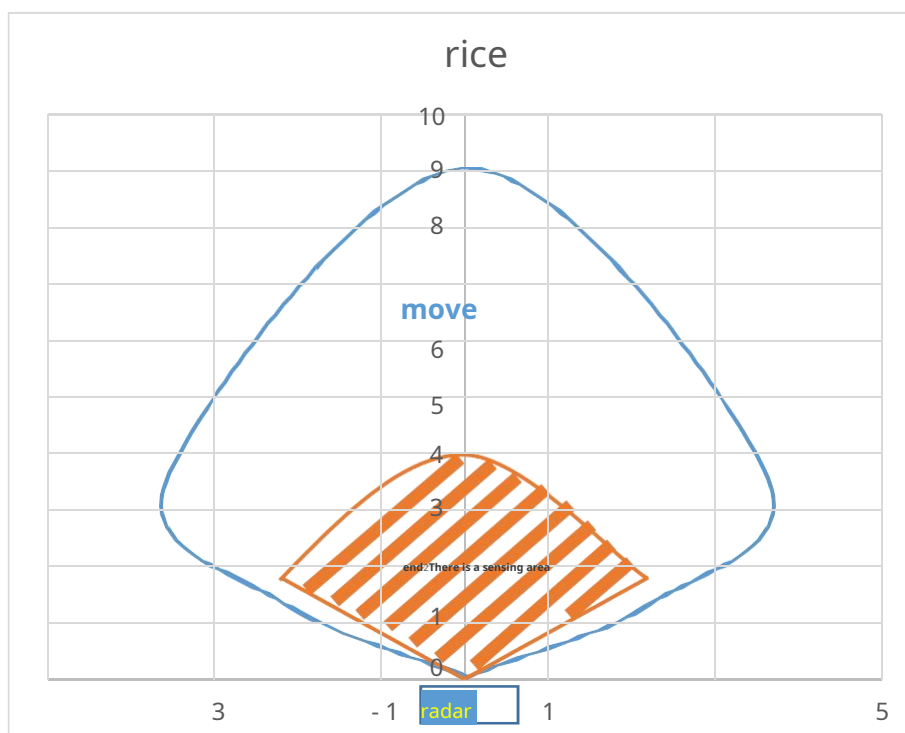
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Reference coverage

The figure below shows the radar coverage when detecting sitting and walking states. for reference.

The blue area is the motion sensing area

The orange area is the stationary presence sensing area.


rice

move

end2There is a sensing area

radar

Test application scenario 2: high vertical test

    This module can also be hung high for human presence detection. Our test scenario is to hang high3Meters, measuring the length of a human body standing still and walking FOV.
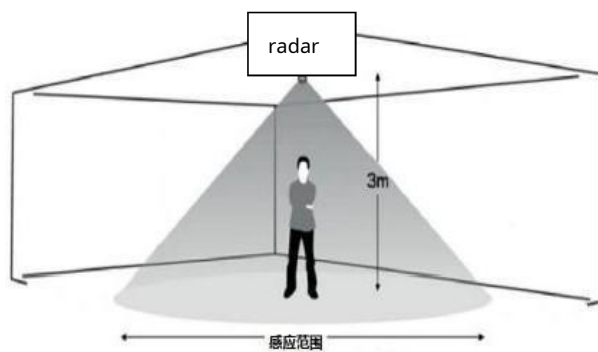
The blue area is the motion sensing area

The orange area is the stationary presence sensing area.

Hang highFOV
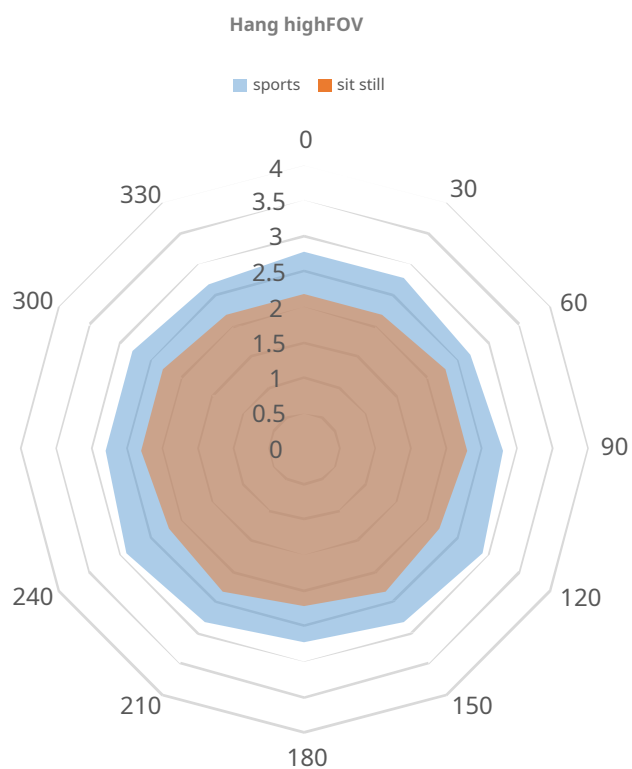
6 things to note

- When the radar is working, there should be no metal or other electromagnetic wave transmission media blocking the antenna in front; different shell materials, and different distances between the module and the inner surface of the

- shell, the returned spectrum energy and parameter settings will be different, and need to be fine-tuned according to the actual parts. It is generally recommended that the distance between the module and the housing5-6mm, which   strip

  can be adjusted according to actual measurement conditions. We recommend that users first test the module according to the default settings. If the effect is not as expected, the shell structural parts can be sent to the original

- factory. The original factory will conduct a test and adjust a reference setting.   Measurement

- The module is for human movement and presence detection, so the distance value given is not a precise distance measurement, but only indicates the approximate distance of the target. If the person

- being tested sits quietly with his back to the radar, the sensing effect will be reduced. Because when your back is turned to the radar, the pressure in the chest or abdomen caused by breathing cannot be   rise

  measured.

- It is recommended to use plastic as the casing, because the human body radar is a very sensitive module. If the material with large attenuation is used as the casing, it may affect the   meeting

  detection.

- Install away from air conditioning outlets, fans and other objects.

- The sensitivity is adjustable according to user scenarios. This manual gives the highest sensitivity situation. If you need to adjust the sensitivity, please contact technical support. If you

- need more technical support, please contact sales.

Module test environment display: an open room 18 meters long and 10 meters wide.

High installation test: