

Human Presence Detection Radar HLK-LD1125H-24G Application Manual



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1. Module Appearance and Interface

HLK-LD1125H-24G is a high sensitivity 24GHz millimeter wave human presence detection radar module. Different from the traditional radar, which judges the existence of the human body by detecting the large-scale movements of the human body or the small-scale body movements, the main feature of this module is to judge the existence of the human body by detecting the accumulated human breathing and other small-scale movements. Therefore, the detection of human presence is more accurate than traditional mobile detection radars. Not easy to miss.



Indoor human presence detection



Human body slight moving induction

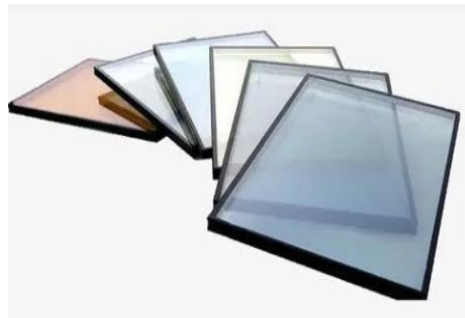
Modules can penetrate non-metallic enclosures without openings. Common materials include plastic, glass, acrylic, ceramic, etc.



Embedded ceiling buckle shell (recommended) 86 boxes of plastic panels (recommended)

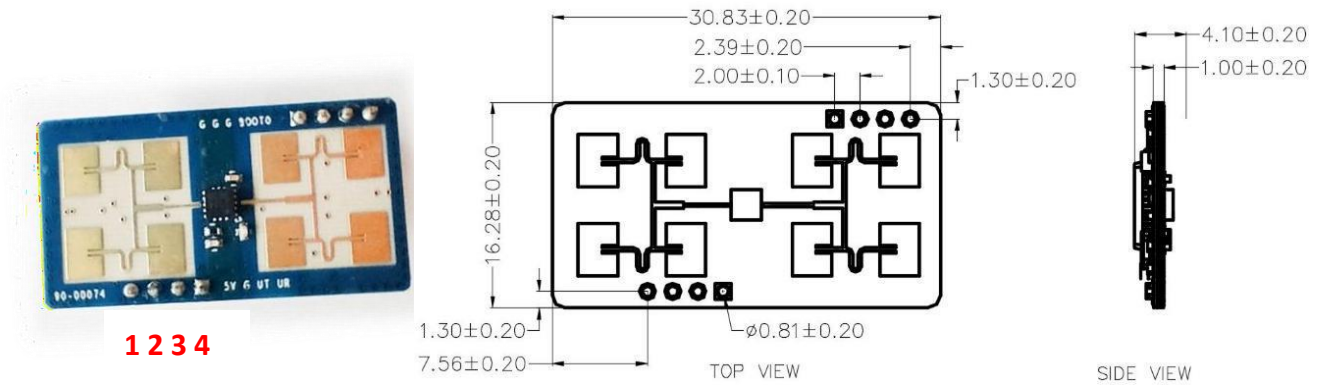


Colourful acrylic



Glass

2. Module Appearance and Interface



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

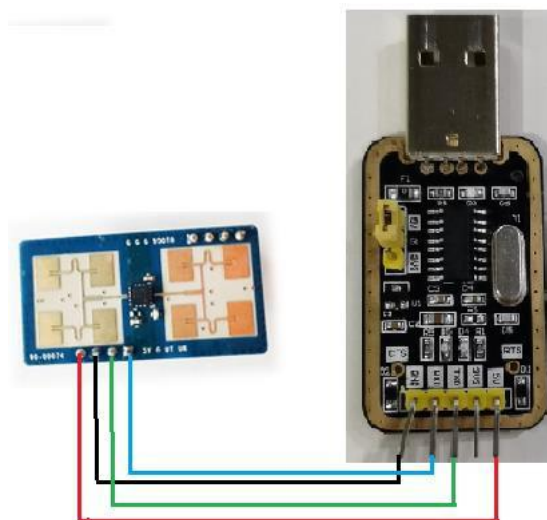
Pin	Name	Remark
1	VCC	Power supply 5V power supply
2	GND	Touchdown
3	URX	TTL serial port receive
4	UTX	TTL serial transmission

3. Module Performance

Parameter	Typical value
Frequency	23.5G-24.5GHz
Modulation	FMCW
Detection distance	4m meditate, 8m exercise
Scope	Hanging height 3m, static human detection coverage radius>2m
Power	3.3-5V
Current	80mA
Output serial	3.3V
Detection cycle	adaptive
Antenna half power	+/-22° (horizontal/vertical)
Data Format	Serial ASCII

4. Debug wiring

HLK-LD1125H-24G uses the serial port to output the test results in string format, so in the testing, you can do a quick test evaluation on the serial port assistant firstly.



The module and serial board can be connected as shown as above:

- Module 1 pin is connected to serial board 5V
- Module 2 pin is connected to serial board GND
- Module 3 pin is connected to serial board TX module
- Module 4 pin is connected to serial board RX

5.Debug configuration

The HLK-LD1125H-24G can be debugged and tested on the computer through the serial port assistant.

Use any serial debugging tool. The baud rate is 115200, 8 data bits, 1 stop bit, check bit and flow control are None, select ASCII for receive settings, and select ASCII for send settings.

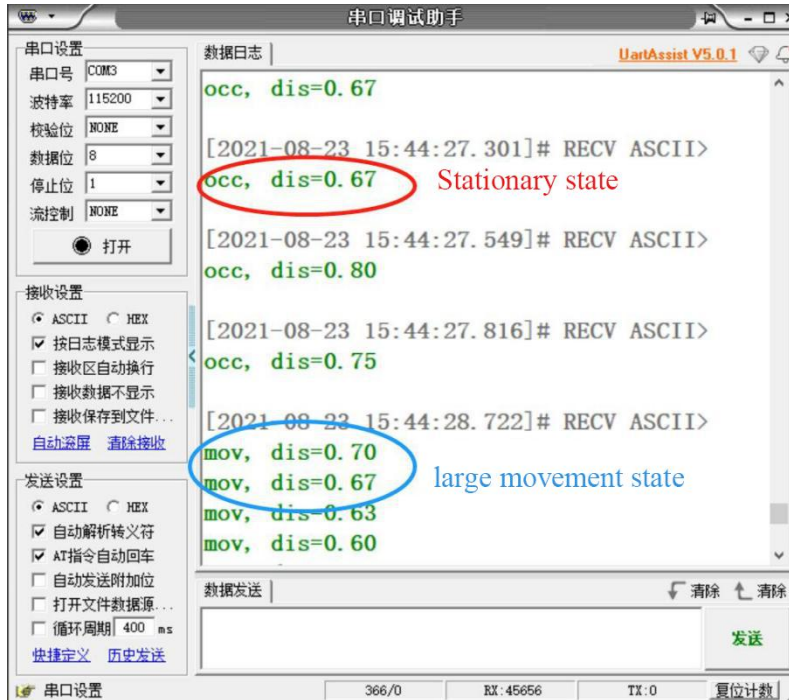
Product supports UART text protocol		
1	baud rate	115200
2	word width	8bit
3	stop bit	1
4	even-odd check	None

Radar output

When the radar detects a larger motion, it outputs `mov, dis=***`.

When the radar detects the static state of the human body or the movement of a small amplitude, it will output `occ, dis=***`. `dis` represents the target distance, in meters.

When the radar cannot detect the target, it stops outputting. The user can make a certain delay in the upper layer to avoid frequent unmanned state when the signal is weak.



Configuration directives

rmax=**, Set the maximum detection distance. The distance value with one decimal place can be set, and the unit is meters. For example: Set the module to only detect targets within a distance of 6 meters. Then send `rmax=6`, at this time the module will only output the target within 6 meters. Targets 6 meters away will not output. The module defaults to `rmax=6`.

mtl1=**, Set the segmentation sensitivity threshold of 1. `mtl1` corresponds to the signal threshold within 2.8 meters. The default value is 60.

mtl2=**, Set the segmentation sensitivity threshold of 2. `mtl2` corresponds to the signal threshold within 2.8-8 meters. The default value is 30.

mtl3=**, Set the segmentation sensitivity threshold of 3. `mtl3` corresponds to the signal threshold beyond 8 meters. The default value is 20.

The larger the sensitivity value, the less sensitive the module is. The main reason for segment sensitivity is that the reflected signal of the short-range target will be relatively stronger, so the same sensitivity as the long-distance target is not required at short distances. At the same time, according to different environments, you can also make targeted settings. The segment sensitivity can be debugged with the test mode. Generally, it is recommended that customers test according to the default parameters. If you encounter problems, please consult our technical staff.

test_mode=*, The setup module goes into the test module. When test_mode=1, the module enters the test module. In the test mode, the module will output the signal strength str value in addition to the mov and dis information. The module defaults to test_mode=0.

save, Save Settings. Otherwise, power down and restore the default value.

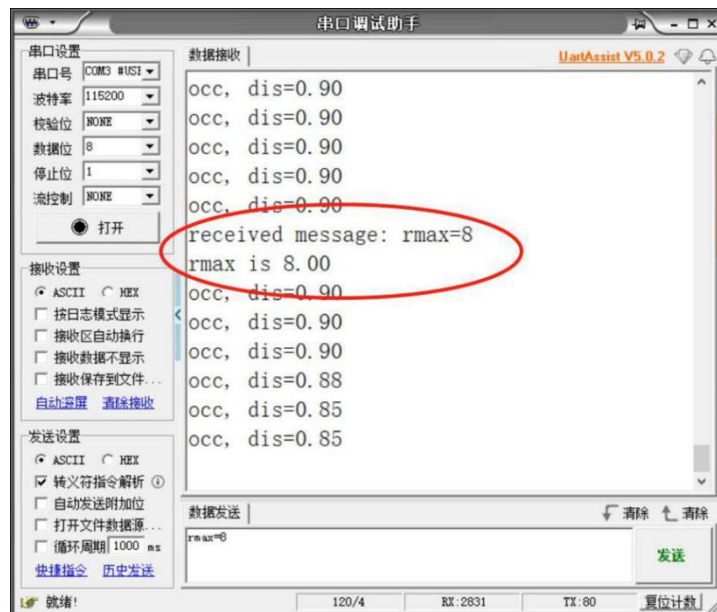
get_all, Get the current parameter settings.

Note: The command needs to be sent with carriage return and line feed to take effect.

Configuration instruction demonstration

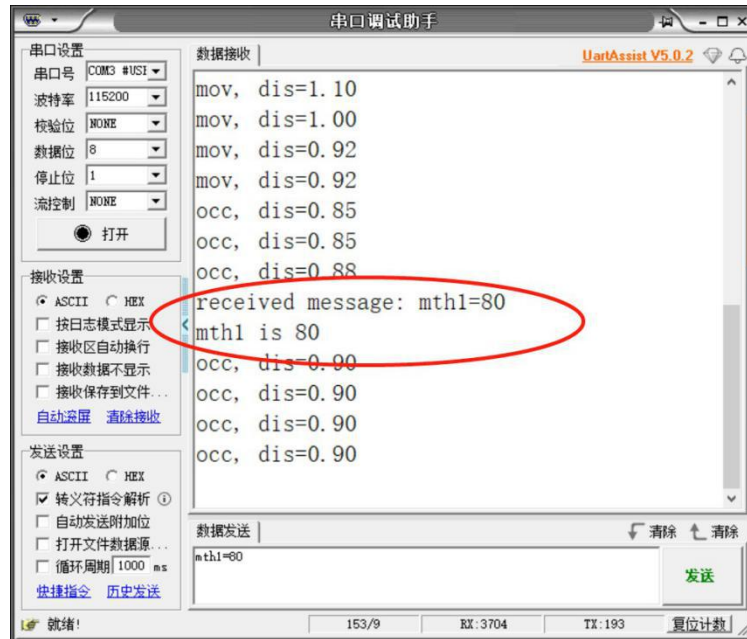
Take the serial port assistant window as an example to demonstrate the function and output of each command:

Send rmax=8, the module will feedback “**received message: rmax=8**
rmax is 8.00” Indicates that the command configuration is successful. If you do not receive this feedback, please check whether the sending command has a carriage return and line feed, 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, please check whether the sending command has a carriage return and line feed, and resend the command.

Both mth2 and mth3 are the same operation, so won't repeat them.

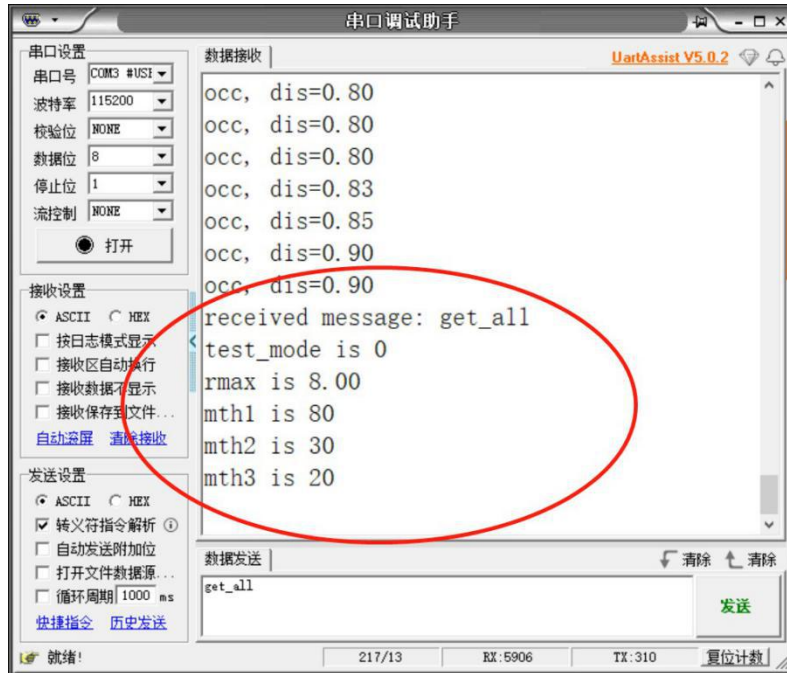


Send save, the module will feedback “received message: save all vars have been saved”, indicating that the command configuration is successful and the parameters are saved. If you do not receive this feedback, please check whether the sending command has a carriage return and line feed, and resend the command.



Send get_all, the module will feedback “**received message: get_all**” And return all parameter settings of the current module. If you do not receive this feedback, please check whether the sending command has a carriage return and line feed, and resend the command. You can use this command to check whether the parameter settings of the module are normal: after setting the parameters and sending save, power off

and restart the module, and then send `get_all` to check whether the parameters are configured normally.

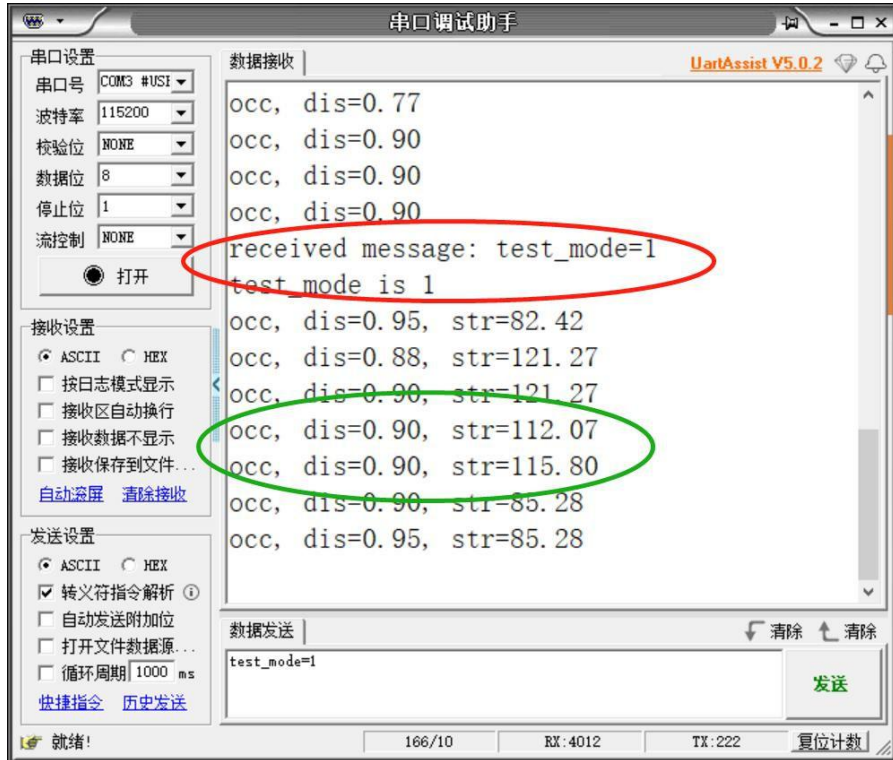


Send `test_mode=1`, the module enters the test mode, and the output information of the module will have signal strength.

The default setting of the module is set according to the highest sensitivity, and the test site is an open large room (see the test site diagram in the appendix).

When the application environment changes, such as entering a small closed room, the noise floor may be raised beyond the default sensitivity threshold due to multiple reflections and refractions of the signal due to the small room, or other surrounding electromagnetic factors. At this time, you need to set the corresponding `mth` value by entering `test_mode` and observing the size of `dis` and `str` when no one is present.

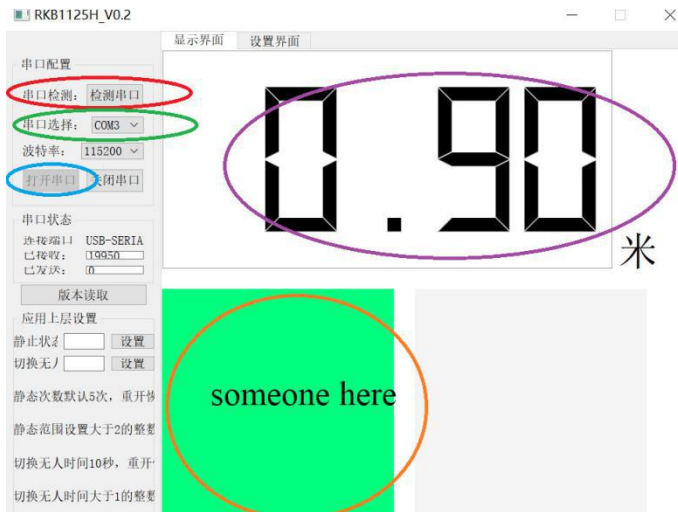
For example: if after entering `test_mode`, there are no people in the room, but the module keeps outputting `mov` or `occ`, `dis` is within 2 meters, and `str` is within 80. According to the default `mth1=60`, the `str` at this time exceeds `mth1`. Therefore, in such an environment, `mth1` needs to be set to >80 . Users can observe the output distance and `str` according to the range corresponding to `mth` to determine whether each `mth` value is suitable. For this setting, it is recommended that customers consult our technical staff during actual debugging. Our technical staff will provide professional guidance.



Using the host computer

We provide a matching host computer for users to use for evaluation. Different from the direct observation of 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**, the display interface will display the distance value and status. **Someone's here status** corresponds to the module serial port mov output. The displayed distance is the output value of the module serial port dis=**.



2. Application layer settings: It is mainly used to set the switching between people, static and unmanned states. Enter an integer greater than 2 in the **Static State window** and click Set. When the host computer continuously receives occ times greater than or equal to the set value, the host computer displays that someone is still. For example, if it is set to 6, it means that when the host computer needs to receive occ 6 times continuously, it will display that someone is still.



3. Enter an integer > 1 in the **switch unmanned window**, and the host computer will enter the system when it does not receive any data within the set time. into an unmanned state. The window value unit is seconds. For example, if it is set to 30, it means that the radar output will not be received within 30 seconds. enter the unmanned state.

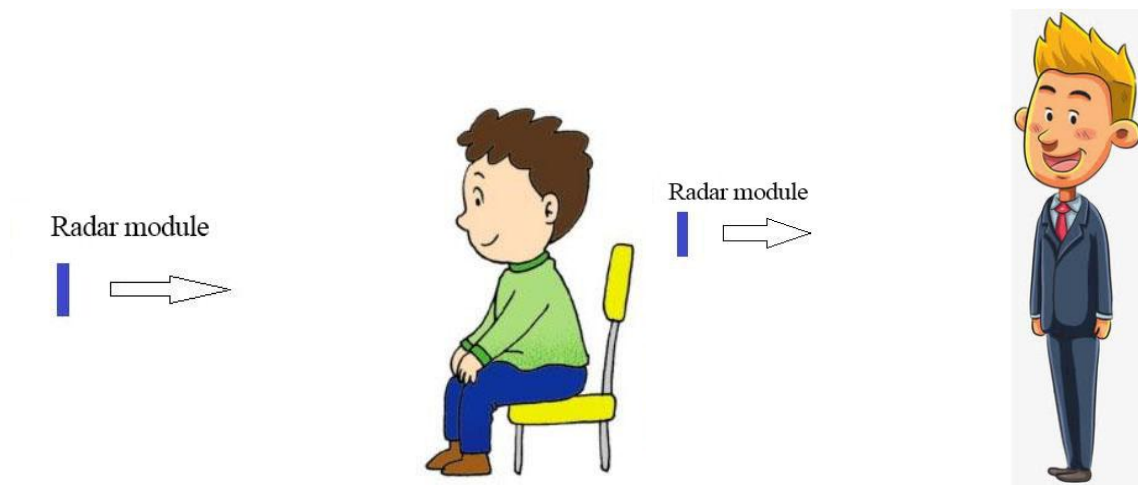


4. Click the setting interface to enter the parameter setting interface. Sensitivity drop-down menu selects 1-9, 1 is the default sensitivity setting, and each increase of 1 increases the sensitivity threshold $mth1/mth2/mth3$ by 10%. The maximum distance window sets the distance threshold, corresponding to the $rmax$ parameter. Click save after setting, otherwise it will fail when power off, corresponding to the save command.

6. 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 in both sitting and walking states.

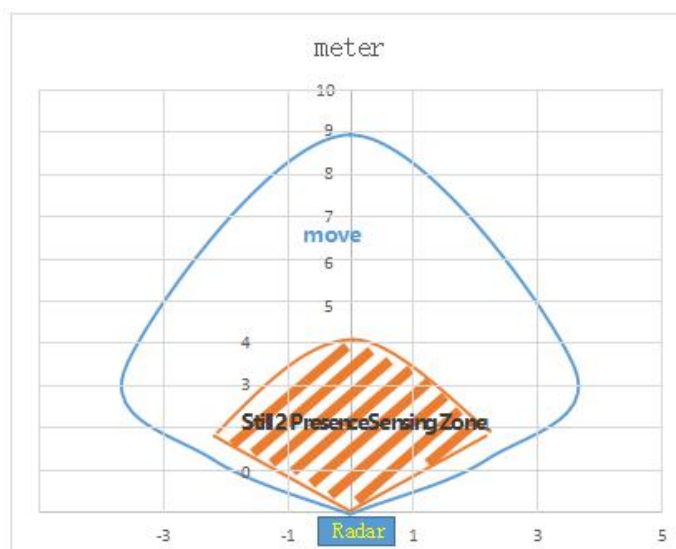


Reference coverage

The figure below shows the radar coverage when it detects sitting and walking. for reference.

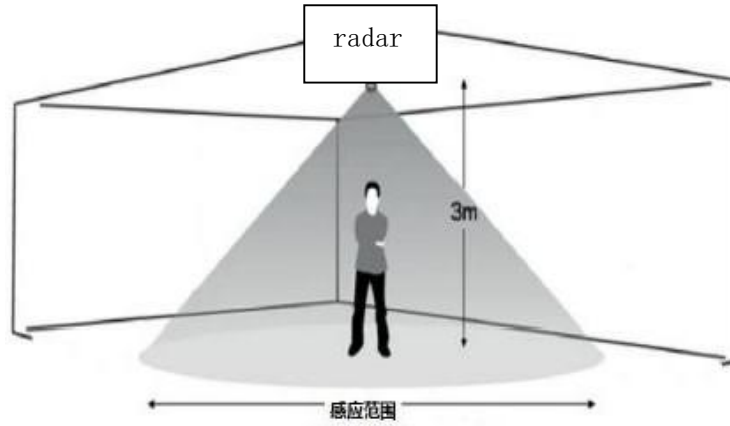
The blue area is the mobile sensing area

The orange area is the static presence sensing area



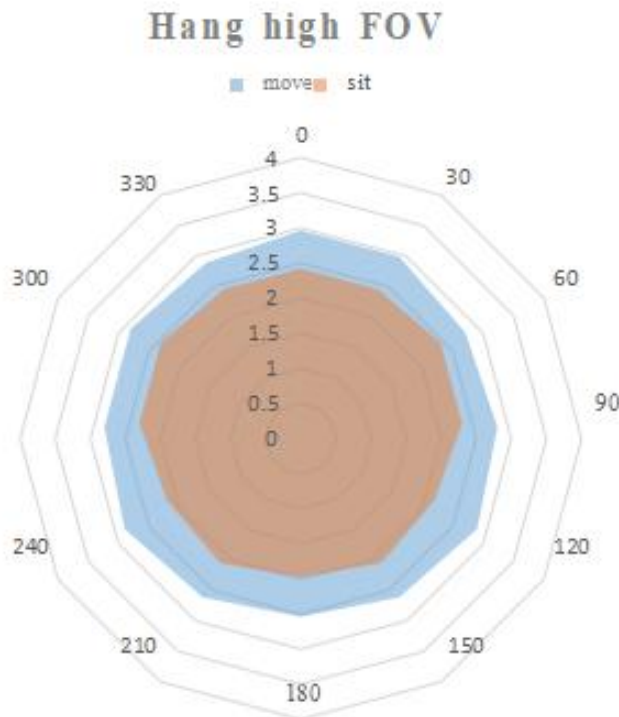
Test application scenario 2: hanging height vertical test

This module can also be hung up for human presence detection. Our test scenario is a hanging height of 3 meters to measure the FOV of the human body standing still and walking.



The blue area is the mobile sensing area

The orange area is the static presence sensing area



Precautions

- When the radar is working, there should be no metal or other medium that hinders the transmission of electromagnetic waves in front of the antenna;
- Different housing materials and the distance between the module and the inner surface of the housing will result in different spectral energy returned and parameter settings, which need to be fine-tuned according to actual conditions. It is generally recommended that the module be 5-6mm away from the housing, which can be adjusted according to the actual measurement.
- We recommend users to test according to the default settings of the module. If the effect is not as expected, you can send the shell structure to the original factory, and the original factory will test and adjust a reference setting.
- The module is for human movement and presence detection, so the distance value given is not accurate distance measurement, but only indicates the approximate distance of the target.
- If the person under test sits quietly with his back to the radar, the sensing effect will decrease. The rise and fall of the chest or abdomen caused by breathing cannot be detected when the back is facing the radar.
- It is recommended to use plastic as the casing, because the radar is a very sensitive module in the presence of the human body. If the casing is made of a material with large attenuation, it may affect the detection.
- Install to avoid the air outlet of the air conditioner, fans and other objects.
- Sensitivity is adjustable according to user scenarios. This manual gives the highest sensitivity case. To adjust sensitivity, contact technical support
- If you need more technical support, you can contact sales.

Appendix

Module test environment display: an empty room with a length of 18 meters and a width of 10 meters.



Hanging height installation

