Shenzhen Hi-Link Electronic Co., Ltd.

HLK-LD012-5G Radar Module

User Manual

Contents

1.Brief Introduction

HLK-LD012-5G is an ultra-low power 5.8G radar sensor launched by Hilink Electronics, with an overall power consumption of about 68uA.

The module size is 20mm*20mm. The module fully integrates 5.8GHz microwave circuit, intermediate frequency amplifier circuit and signal processor.

It has high integration and good production consistency. The peripheral is equipped with a small planar antenna to ensure the performance of the sensor while greatly reducing total measurement. The sensor can be used to detect the presence of human body or various scenes of moving target sensing, including smart home, Internet of Things, and smart lighting.

It is especially suitable for low-power battery-powered scenes such as night lights, solar street lights, and wireless cameras.

2. Module Picture
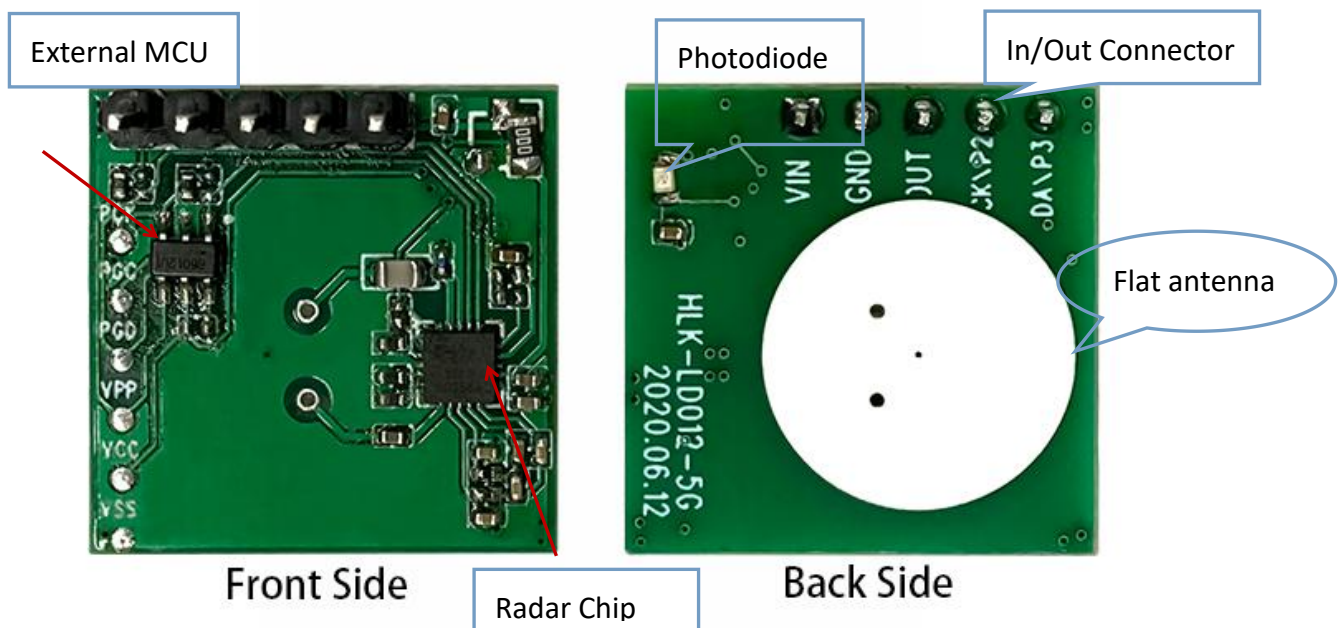
HLK-LD012-5G Radar Module physical picture

The module reserves 5 pin holes, with a total of five signal PINs VCC, GND, OUT, P2 and P3.
The PIN distance is 2.54mm. If you need to tune the distance and delay time and other parameters, you can hang or pull down P2 and P3.

The state matches the specific resistance on the module to select the corresponding gear or use the external MCU reserved on the module to rewrite the internal parameters. The following table shows the definition of each PIN:

Pin	Funtion	Remark
VIN	Module power supply	LDO is not attached by default. Lithium battery or dry battery can be used for direct power supply (2.7~4.8V). If the power supply voltage exceeds 5V, LDO needs to be added. At this time, the power supply VCC is 5~12V
GND	GroundedPIN	
OUT	Output Signal	Output signal is high and low level(0V/2.2V)
P2	GPIO2	Receiving gain gear selection
P3	GPIO3	Delay time gear selection

3. Module size and pin position

The figure below is a schematic diagram of the size and pin position of the module.

The length and width of the module are 20mm*20mm, and the factory default does not have pins

The overall thickness is 2.5mm, if you need to bring pins, the default pin height is 12mm.
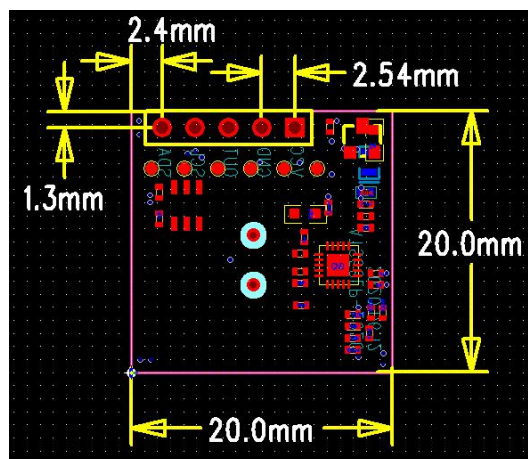
4. Electrical parameters

| Parameters	Minimum Value	Typical Value	Maximum Value	Unit	Remarks
Transmit frequency	5725		5875	MHz	
Transmit power		0.2	0.5	mW	
Input voltage	2.7	3.3	4.8	V	LDO is not attached by default
Output high level		2.2		V	
Output low level		0		V	
Working current		68	75	uA	Average working current
Hanging height		8	10	M	Forward sensing distance
Sensing radius		15		S	Adjustable according to specific needs
Delay time		10		Lux	Adjustable according to specific needs
Photosensitive threshold	-30		85	°C	

5.Sensing time and sensing distance adjustment

The P2 and P3 pins on the HLK-LD012-5G module are used to select different sensing distances and delay gears; P2 is used to adjust the sensing distance, which can be provided with the 3 resistors (th0, th1, th2) reserved on the module 16 different sensing distance options.

When P2 is suspended or pulled up, the sensing distance of the module is far; when P2 is pulled down, the receiving gain is reduced by 18dB and the sensing distance is short. The three distance adjustment resistors on the module are used to adjust the threshold of the inductive judgment. The resistance bit NC represents 1, and the 0 ohm resistor represents 0. Refer to Figure 4 for the status of the 3 resistance bits and the corresponding threshold. The smaller the threshold, the farther the sensing distance.

P3 is used to select the pull-up time of the OUT signal after sensing. When P3 is floating or pulled

high, the sensing pull-up time is 2 seconds; when P3 is pulled low, the sensing pull-up time is 15 seconds. If there is a new trigger during the inductive output pull-up period, the inductive time will be extended.


th0	th1	th2	Threshold
0	0	0	64
1	0	0	49
0	1	0	38
1	1	0	29
0	0	1	22
1	0	1	17
0	1	1	13
1	1	1	10
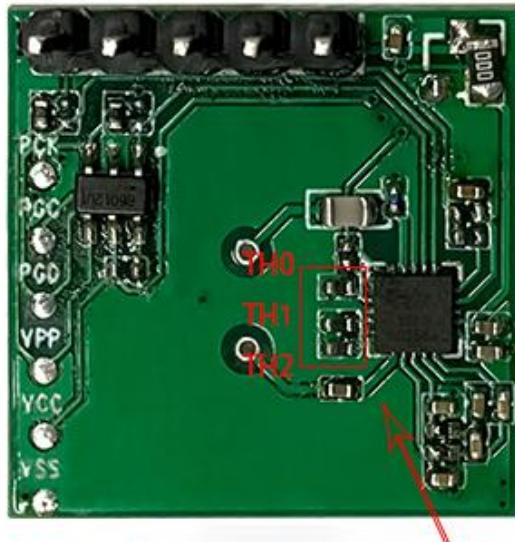
Induction distance adjustment resistance

6. Photosensitive detection

The module supports photosensitive detection. The sample module does not enable the photosensitive detection function by default.

The position shown in Figure 5 is a photosensitive diode. The photosensitive threshold can be adjusted by changing the photosensitive judgment threshold or tuning the photosensitive resistance. In the version with photosensitive function, the radar sensor will be activated only when the ambient light is lower than the set illuminance.

If the light is too bright, the module will not activate the sensor function. (After the photodiode is mounted in a bright environment, the current consumption of the module will increase by about 5uA)

Photosensitive position

Back Side
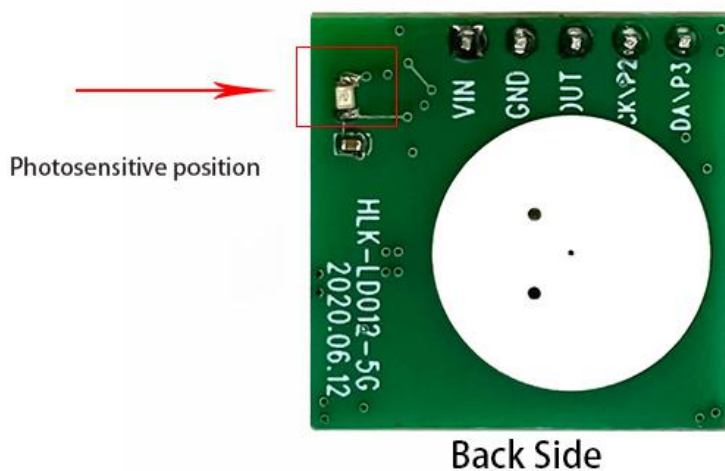
7. Module power-on sequence diagram

The module has a power-on self-check function, that is, after the module is powered on, the OUT pin first outputs a high level, and then outputs a low level after a delay of 2S, and enters the normal induction mode after a delay of 0.5S.

The following is the control signal after the module is powered on Timing diagram:

VCC

OUT   2 S   0.5 S   Inductive OUT=1, No inductionOUT=0
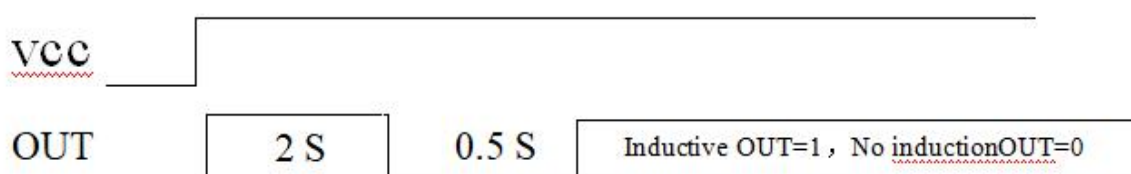
8. Schematic diagram of detection range

The sensing sensitivity of the radar sensor can be configured by adjusting the resistance, and its positive limit sensing distance is 10 meters, and the actual sensing distance can be adjusted appropriately as needed.

The following schematic diagram of the radar detection range of the typical scene. If the

sensitivity is set higher, the detection range will be correspondingly larger.

The dark area in the figure is the high sensitivity area, which can be fully detected in the area, and the light color area is the low sensitivity detection area. , Objects can be basically detected in this area.
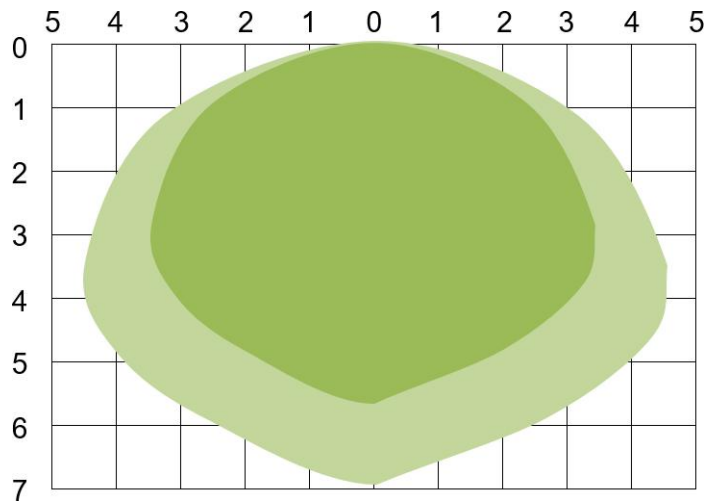
HLK-LD012-5G lateral sensing range diagram (unit m)

9. Precautions

1. When installing the antenna, avoid metal shells or components on the front of the antenna to avoid shielding the signal. Plastic or glass is allowed, but the obstruction should not be close to the front of the antenna;

2. Try to avoid directing the radar antenna to large metal equipment or pipelines;

3. When installing multiple radar modules, try to ensure that the antennas of each radar module are parallel to each other, avoid direct illumination between the antennas, and keep a distance of more than 1m between the modules;

4. The radar sensor should avoid facing the AC drive power supply and try to stay away from the rectifier bridge of the drive power supply to avoid power frequency interference with radar signals;

10. Revision History

Revision	Release Date	Description
1.0	2020/12/22	Initial version