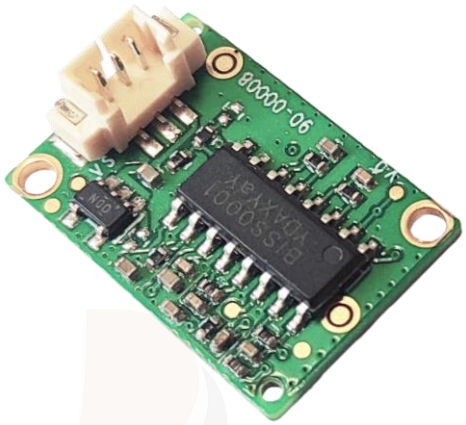
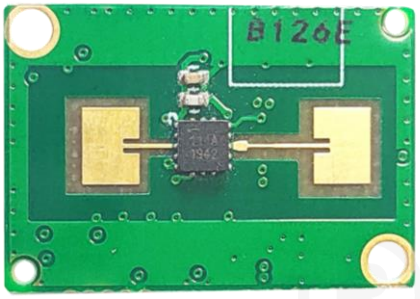
HLK-LD116-24G
Wave Radar Sensor



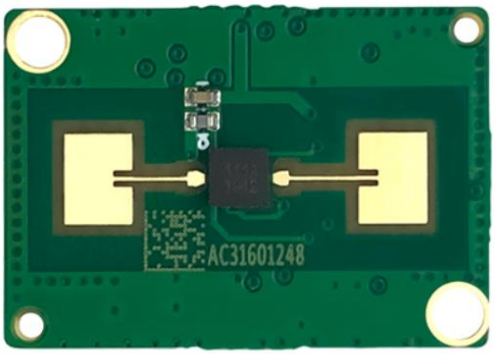


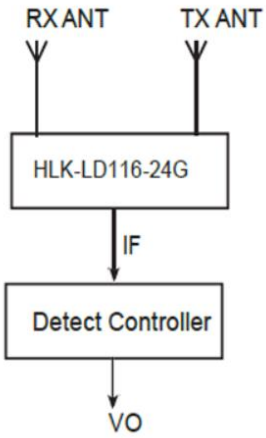
24GHz millimeter wave radar sensor PIR motion monitoring module LD116 small size, low power consumption, wide detection

Description:

HLK-LD116-24G IoT millimeter wave radar module, which can be used to detect moving targets in a small range, and output high and low level information, and is not affected by temperature, humidity, airflow, dust, noise, brightness, etc., anti-interference Strong ability to penetrate acrylic, glass, plastic and other thin non-metal materials.

HLK-LD116-24G has industry-leading excellent performance, small size, low cost, and low power consumption. It can provide customers with ideal and better performance object movement monitoring solutions.





Specifications:

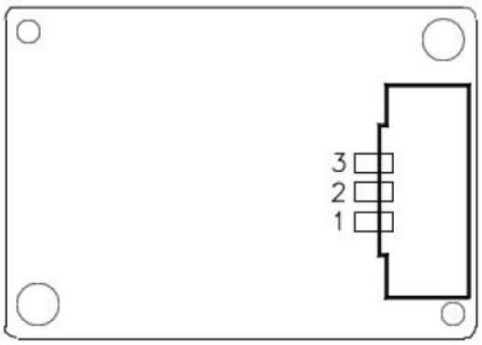
- TX frequency range: 24~24.25GHz
- TX EIRP: 6dBm
- Phase noise: -96dBc/Hz@1MHz offset
- RX noise figure: 10 dB DSB
- Power consumption: 55mA@Vcc=5V
- Effective linear detection distance: 6m
- Detection angle (3dB): horizontal ±41°, vertical ±38°
- Small size: 22.95mm×20mm

Electrical characteristics:

Parameter	MIN	TYP	MAX	UNITS	CONDITIONS
PowerSupply					
VCC	3.2	3.3	3.4	V	
Current		55		mA	All function on
Transmitter					
Output power EIRP		6		dBm	
Phase noise		-96		dBc/Hz	@1MHz offset
Receiver					
Noise figure		10		dB	DSB
Antenna					
TX antenna gain		2		dB	
TX side lobe suppression		20		dB	
RX antenna gain		2		dB	
RX side lobe suppression		20		dB	
TX antenna pattern (3dB)		±38		deg	azimuth
		±38		deg	elevation
RX antenna pattern (3dB)		±38		deg	azimuth
		±38		deg	elevation
Parameter	**MIN**	**TYP**	**MAX**	**UNITS**	**CONDITIONS**
PowerSupply					
VCC	3.2	3.3	3.4	V	

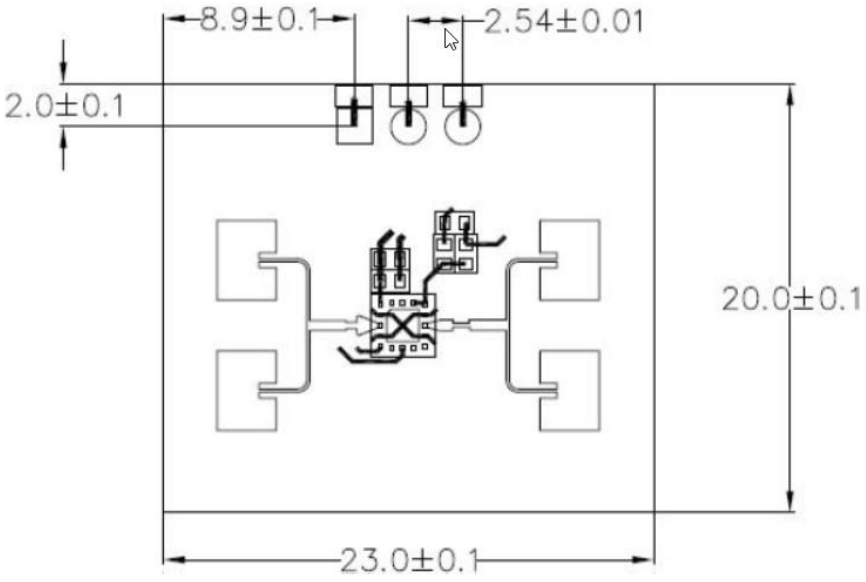
Connections:

The pin is 2mm, and the 3-pin connector is connected.

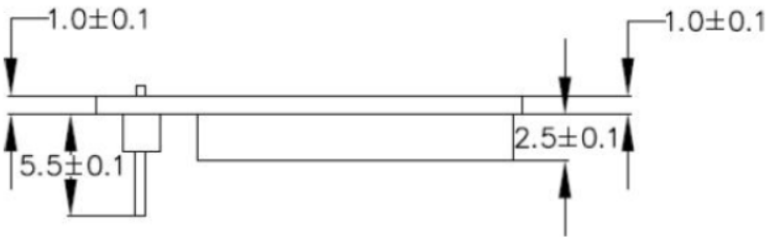


pin	name	notes
1	VCC	Power supply
2	GND	Ground
3	VO	Single Output

Dimensions:



<TOP VIEW>



<SIDE VIEW>

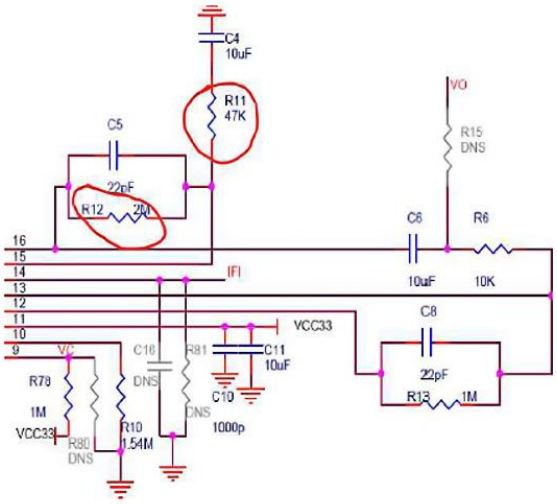
Parameter debugging method:

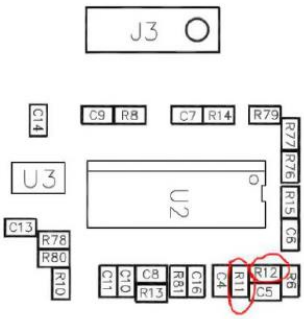
*** VO**: Detection level output. When a person or an object is detected to move, it outputs a high level for about 1 second. Low level when there is no object moving.
*** GND**: Ground.
*** VCC**: Power supply. The version with LDO is powered by a 5V power supply.

1. Sensitivity debugging method A

A1. Current sensitivity magnification = (R12/R11)*(R13/R6) = (1M/20K)*(1M/10K) = 5000 times. Considering that some shell materials have greater attenuation of electromagnetic waves, the default sensitivity is 5000 times, which is a relatively sensitive value. The sensitivity can be modified according to actual application scenarios.

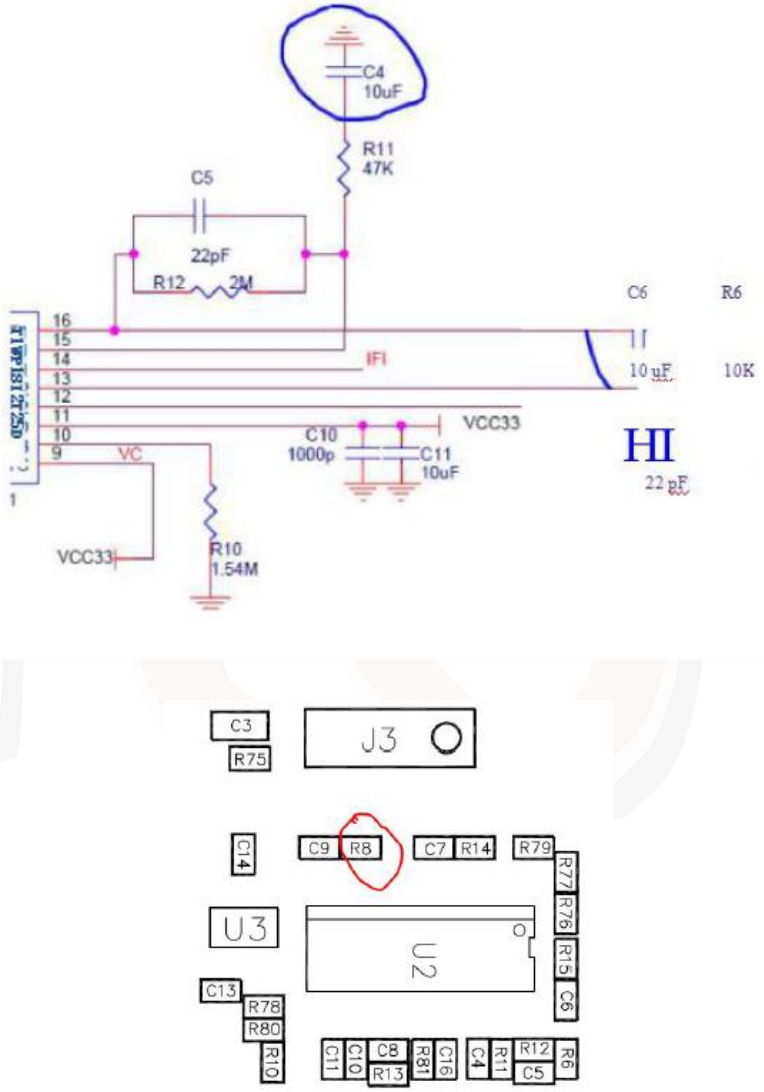
A2. If you need to reduce the sensitivity, it is recommended to directly change the resistance of R11 and increase the resistance of R11. For example, if you need to modify it to 2000 times, then just change R11 to 50k.



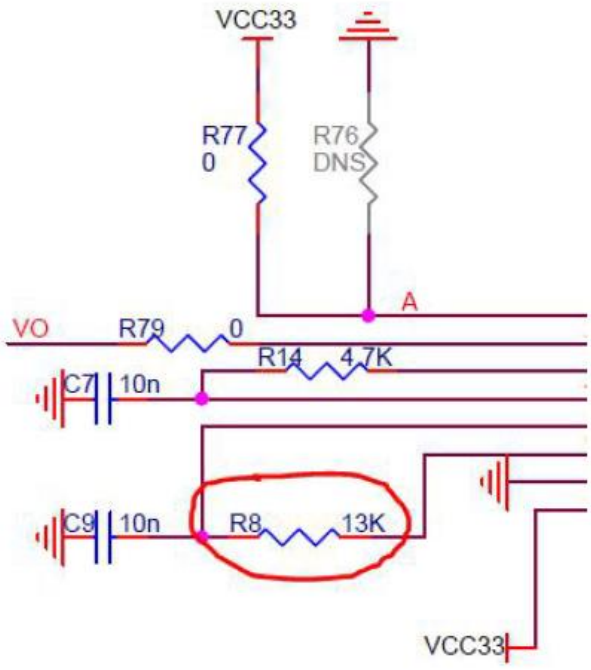


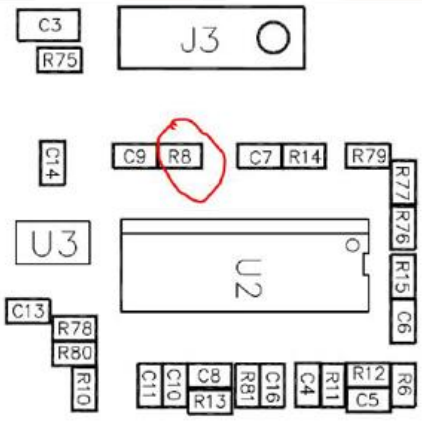
1-2. Sensitivity debugging method B

Decreasing the capacitance of C4 and C6 can change the link bandpass characteristics and increase the high-pass cut-off frequency. In this way, the module will be insensitive to some minor actions, and the module will be more stable and difficult to trigger. At the same time, the initial startup time of the module can be greatly reduced. It is recommended to change to 2.2uF or 1uF. Specific effects can be debugged according to actual conditions. The side effect is that the sensing distance will be reduced by about 20%.



2. Block time debugging method





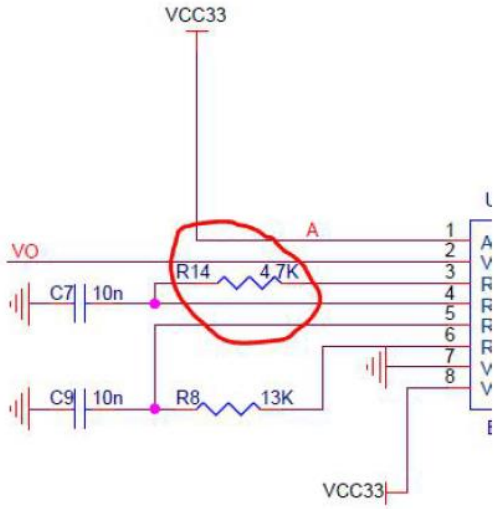
A1. Blocking time refers to the time after the current detection is completed and the output level returns to 0 level until the next detection takes effect. This time can be adjusted by changing the resistance of R8.

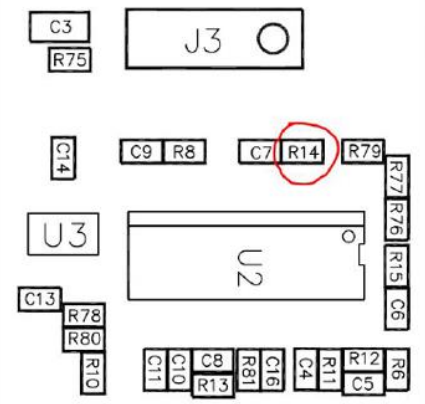
A2. The current blocking time is about 0.8 seconds, corresponding to R8=39k. It is not recommended to reduce it. If the blocking time is too small, the module will be easily triggered by interference. An excessively large R8 will cause the module to underreport.

The approximate relationship between block time and R8:

47KΩ	1.0 sec
62KΩ	1.4 sec
91KΩ	2.0 sec
120KΩ	2.6 sec
150KΩ	3.3 sec
180KΩ	3.9 sec

3. Debugging method of high-level output maintenance time after trigger





A1. The high level maintenance time after triggering is the maintenance time for the module to output 3.3V high level after detecting a moving object.

A2. The current high-level output sustain time is about 1 second, corresponding to 14=4.7k. The value of R14 corresponding to the output holding time is shown in the table below.

The current module is powered by 5V, and there is an LDO on the module to change 5V to 3.3V, so VD=3.3V shall prevail.

电阻	VDD=5V	VDD=3.3V
	Tx 时间	Tx 时间
22KΩ	6.0 sec	4.6 sec
47KΩ	13 sec	10 sec
100KΩ	26 sec	20 sec
200KΩ	53 sec	40 sec
330KΩ	87 sec	66 sec
680KΩ	179 sec	135 sec
1MΩ	283 sec	198 sec