



Shenzhen Hi-Link Electronic Co., Ltd.

HLK-LD101V Data Sheet



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1. Introduction

HLK-LD101V is an X-band radar module working at 10.525GHz. Based on the Doppler effect, this design uses fixed-frequency, directional transmitting and receiving antennas, which are first combined with chip integration technology and microwave antennas on the market. It has the characteristics of anti-interference, small size, no wall penetration, high stability, good consistency, and good clutter and high-order harmonic suppression effect. The on-board integrated IF demodulation, signal amplification, digital processing, light intensity detection, timing and other functions are integrated on the module, and the serial port function is opened at the same time, which is convenient for users to adjust relevant parameters. This product adopts pulse power supply mode, and the average power consumption can be reduced to 7mA.

2. Product Features

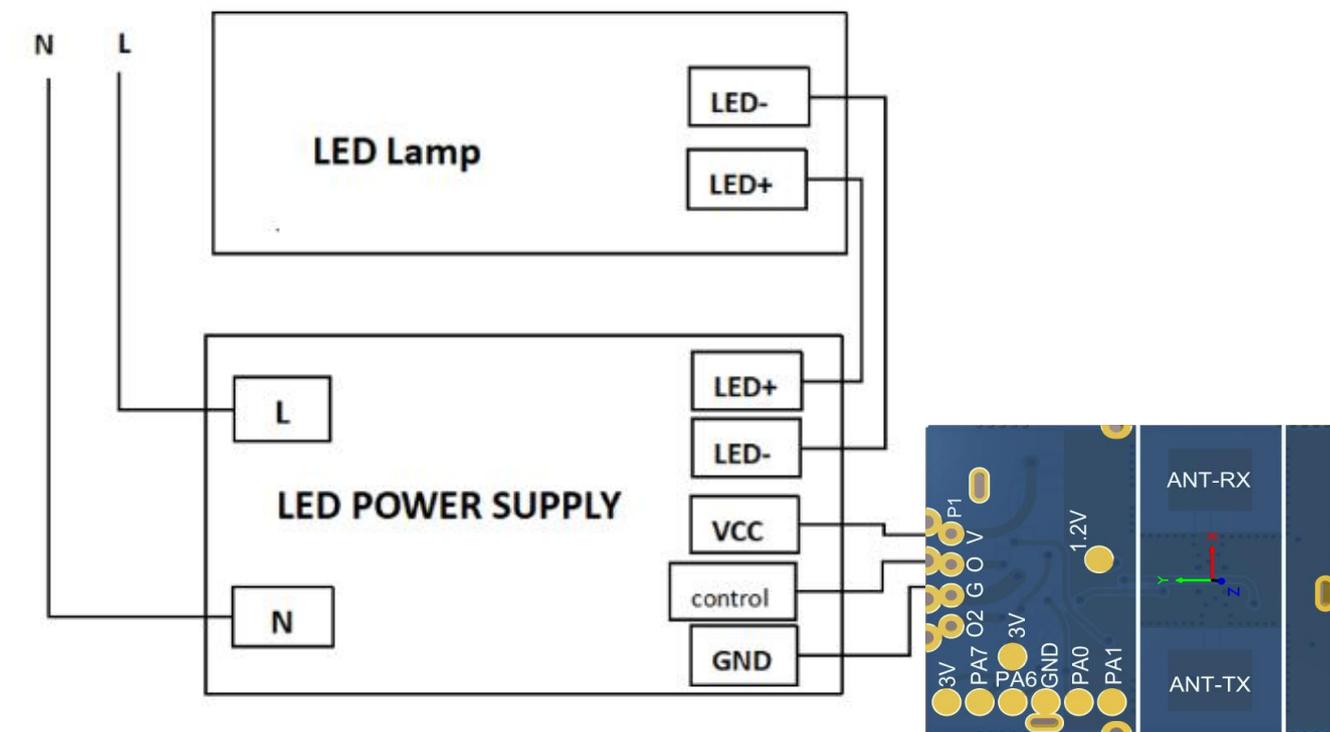
- Working frequency 10.525GHz
- Wide voltage operation: +3.3V~15V
- Module size: 20mm*25mm*4mm
- The sensing distance is about 7m (straight line distance)
- Detect angle 100°
- Maximum transmit power: 2dBm
- Maximum receiving sensitivity: -95dBm
- Motion detection
- Onboard integrated transmit and receive antennas

3. Product Application

- Smart home
- Smart lighting
- Smart home appliances
- Smart security



Typical application(LED sensor light)



Block diagram

4. Product Parameters

TA=25°C

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
Input power						
VCC	Working voltage		3.3		15	V
I	Working current	VCC=5V	8	12	35	mA
Output						
fosc	Microwave frequency	VCC=3.3~12V		10.525		GHz
P	Transmit power	VCC=3.3~12V			2	dBm
Vout	Output voltage		2.9	3	3.1	V
Iout	Output current				10	mA
Tw	Power-on stabilization time		10	15	25	S

Temperature and humidity range						
T _A	Working temperature		-20		+60	°C
T _B	Storage temperature		-40		+85	°C
H _A	Working humidity		10		95	%
H _B	Storage humidity		0		95	%
Detection range						
	Radial detection distance ①		1	1.2	1.5	m
T _s	Turn-off delay ②			5		S
ESD features						
	Touch discharge			2		kV
	Air discharge			2		kV

Table 1: electrical parameters

Notes:

- ① The sensing distance can be set according to customer needs
- ② The turn-off delay can be set according to customer needs

5. Pin configuration and function description

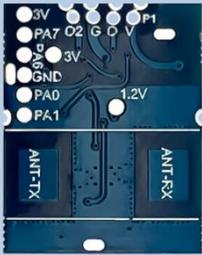
No.	Part	Port	Illustrate		Schematic
1	P1	V	DC 3.3~15V	Front	
2		O	TTL high level 3V		
3		G	Power ground		
4		O2	NC Reserved		
5	P3	Pad	Program download port (from top to bottom, 3.3V/RX/PA6/GND/PA0/TX)	Back	

Table 2: pin description

5.1 Design considerations for matching drive power

- A.** Be sure to use a drive power supply with output voltage, current and ripple factor that meets the standards. The drive power supply is unstable and the electromagnetic radiation is too strong, which will cause the radar module to false alarm, no induction, and cycle self-starting and other phenomena;
- B.** The matching drive power supply should be 3.3V~15V, the power should be greater than 250mW, and the power supply ripple and burr should be as small as possible, the power supply ripple amplitude should be controlled within 50mV, and the power frequency fluctuation amplitude should be small;
- C.** When assembling the driving power supply and the radar module, avoid the bottom of the radar module or the antenna surface, facing the driving power supply module, and try to stay away from the rectifier bridge, switching transformer and other devices with large power frequency interference in the driving power supply module. Anti-interference microwave signal;
- D.** The input voltage range of the ADC pin should be controlled within 0~2V, otherwise the radar module may be damaged if it exceeds the range

5.2 Radar module testing and precautions for use

- A.** When there are walls or obstacles around to reflect microwaves, the sensing distance and the sensing angle will gain; when the surroundings are relatively empty, the sensing distance and angle will be attenuated;
- B.** Since the detection of the microwave antenna can be changed by a small change, please protect the antenna, and there should be no metal objects (such as solder wire) on the surface, otherwise it will affect the sensing distance during application;

- C. Handle with care, avoid violent vibration, and keep the radar module flat and not deformed;
- D. The radar module maintains an independent use space, and the surrounding space maintains a free space interval of more than 2mm;
- E. There is about 15s initialization noise analysis time after power-on, during this period it is abnormal induction work;
- F. If the photosensitive device of the radar module is blocked (such as the casing, etc.), it is necessary to re-test to determine the photosensitive threshold value;
- G. During production line testing and aging operations, if a large number of radar modules are stacked together when powered on, there may be a self-excitation phenomenon. Please ensure that a safe distance of more than 30cm is maintained between powered radar modules.

5.3 Precautions for application and installation of devices with built-in radar modules

- A. For devices equipped with radar modules, the installation position should be far away from ventilation pipes, fire pipes, drainage pipes, mechanical vibrations or places with strong vibration objects such as large metal equipment, because it will affect the radar reflection wave and detection induction effect;
- B. It is strictly forbidden to work with electricity, so as to avoid wrong action, wrong connection, burn out the circuit or electric shock;
- C. Avoid installing in places exposed to the sun and rain to prevent damage and affect the service life;
- D. The device must be installed in a place far away from the electromagnetic field to avoid malfunction due to electromagnetic interference; it should also be installed away from a place where objects are fixedly rotating or swinging (such as electric fans, swaying leaves, drying clothes in the wind, etc.) to avoid malfunctions produce;

E. When several devices with built-in radar modules are fixedly installed, the distance between each device should be ≥ 0.5 meters;

F. The antenna surface of the radar microwave module is recommended to be more than 5mm away from the product shell, otherwise the sensing distance will be affected;

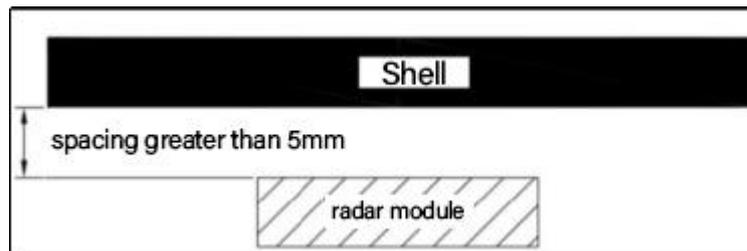


Diagram 1: Shell install instruction

G. After the device has a built-in radar module, it is recommended to place it horizontally or vertically. Within the effective sensing range, try to avoid installing two or more devices with built-in radar modules face-to-face;

H. Avoid other light sources (such as emergency lights, guide lights, etc.) near the device (such as lamps) with built-in radar modules, so as to avoid the failure of the built-in photosensitive judgment of the device (lamp), so that the device (lamp) cannot work normally (Always off, misjudged as daytime);

I. If a device with a built-in radar module (such as a lamp) is always on (always on) and cannot be turned on and off according to moving target detection, it may be that the radar module is interfered by the intermediate frequency, causing the module to always be judged as moving. The target moves within the sensing range. At this time, the power should be turned off to check whether the power supply status of the power board is normal and whether the module space distance has changed.

J. If the above problems cannot be solved, please turn off the power and observe the surroundings of the installation location first, and eliminate the influence of the surrounding environmental interference factors; after restarting the power supply, if there is still a problem, consider replacing the drive power board of the device, or verify the radar module again.

Induction direction

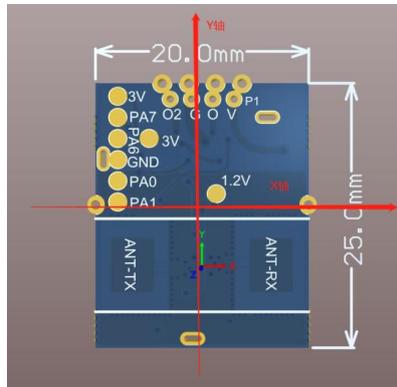


Diagram 2: Induction direction

6. Dimension(mm) 20mm*25mm*4mm

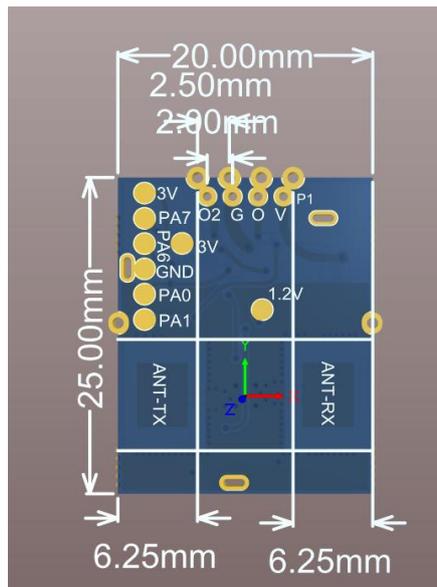


Diagram 3: Module size

Appendix A document revision history

Version No.	Scope of revision	Date
V1.0	Initial version	2022-11-10