HY5L14-B
Microwave Radar module
Datasheet V1.4

CONTENTS

1. Product overview

HY5L14-B Microwave radar module uses 10.5GHz MMIC, which transmits the pulse mode radio wave of fixed frequency 10.55GHz ± 25 MHz to the detected area, and receives all the reflected radio waves in the area to differential frequency electrical signal. According to the Doppler effect principle, through high performance digital signal identification algorithm, analyze the motion target in the area, so as to control the load power module.

HY5L14-B Microwave radar module can be widely used in smart lighting, security, home appliances, smart home, IOT devices and other products that need to detect human movement, to add intelligent perception function for the device, to bring users excellent perception experience.

1.1 Function

■ **motion detection**

Walking, running, turn around, and jump can be detected

1.2 Features

■ **Strong anti-interference capability**

Module integrates multiple digital signal processing algorithms to suppress power frequency interference, higher-order harmonic interference, and sudden interference, and it can effectively filter out certain interference such as curtains, fans, air conditioners, etc.

■ **High performance antenna**

Optimized design of the plane micro-band antenna, with high gain and low Side flap and less posterior radiation characteristics

■ **Flexible configuration of parameters**

The dial code module can flexibly configure the "radar distance, output delay time, light sense" and other parameters, convenient for users to field test and adapt to different application scenarios

■ **High reliability**

High sensitivity in detecting targets; good consistency in mass production.

■ **Not affected by the environment**

Not affected by snow, haze, temperature and humidity, dust, light, noise and

■ **Strong penetration**

Penetrable through glass, plastic, clothes, quilts, ceramic, thin Boards and other materials

other environmental effects

2. Application

Smart lighting, security, smart home, home appliances, bathroom, hotel, garage, smart building, transportation, IOT and other industries that need to detect human body movement

3. Technical parameter

Main parameter

Table 3.1 Main technical parameters

	Parameter item	Min. value	Typical value	Max. value	Unit	Note
system parameter	transmitting power		-4		dbm	Pt
	Beam Angle	120×120			°	@-3dB
	service frequency	10.525		10.575	MHz	ISM frequency range
functional parameter	Motion sensing distance	2	-	3	m	Wall assembly: related to distance / sensitivity configuration
	Time delay time	-	400	-	ms	Hardware adjustable
Operation condition	working current	50	75	100	uA	
	Operating voltage	2.7		4.2	V	DC
	working temperature	-25		85	℃	
	Storage temperature	-40		125	℃	
	Working humidity	5		95	%RH	

Output	VOH		OPV		V	Operating Voltage
	VOL		0		V	Low level

✳ The recommended height of the top installation shall not exceed 4.5m.
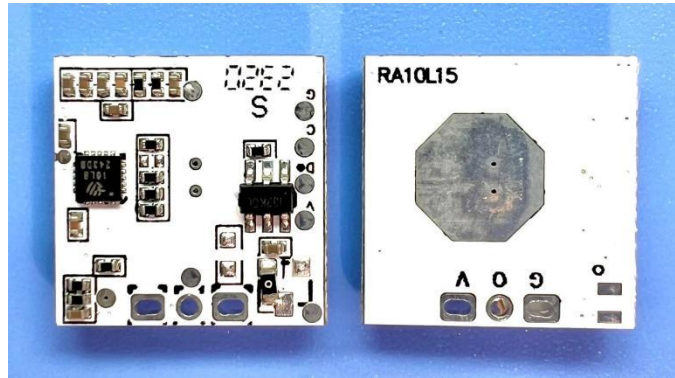
4. Interface and size

Figure 4.1 picture of the HY5L14-B module

4.1 Interface definition

Table 4.1 HY5L14-B module interface definition table

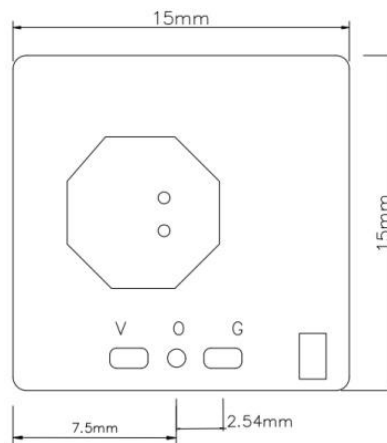| Pin NO.	Define	Description
1	V	Power supply
2	O	Output
3	G	Ground

4.2 Size

Figure 4.2 HY5L14 -B module Size Drawing

5. Output signal timing diagram

- ## power on:

  HY5L14-B module powering on requires an initialization process. After power, OUT, the foot first output 3 seconds high level, then output 200ms low level (configurable), and then enter the normal radar mode.

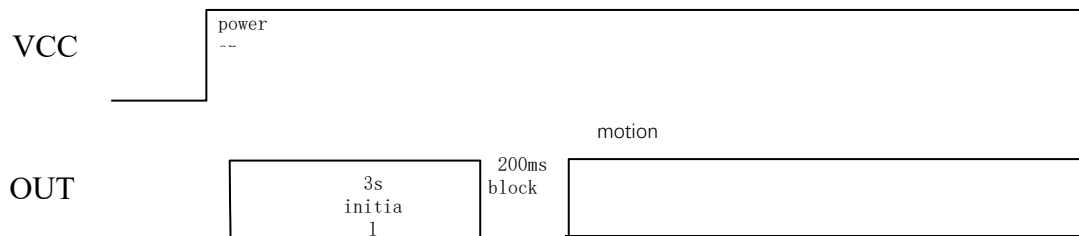 The power sequence is shown in Figure 5.1:

Figure 5.1 Power up: timing diagram

6. Application notes

1   Antenna radiation:

The front of the module antenna should avoid metal objects (including shell), can have plastic, glass, wood and other penetrating shielding, but the shielding should not be close to the antenna, so as not to affect the resonance, radiation capacity or shielding signal. In addition, the larger the ground plane provided to the module by the bottom plate, the less the backward radiation, and the more energy will radiate out from the front of the antenna.

2   Other motion object interference:

Try to avoid the module against large metal equipment, ventilation pipes, fire pipes, drainage pipes and other moving / shaking objects. Because it is possible that their movement Doppler frequency falls into the personnel movement frequency, causing false positives. Some customized versions can solve the problem of fixed interference sources (such as electric fans, air conditioning, bath bully and other interference).

3   Multi-modules installation:

When multiple modules are installed, ensure that the antennas of each module are parallel in the same direction or in the opposite direction, avoid the opposite irradiation of each other, and keep the distance between modules and modules of more than 1m.

4   Power frequency and harmonic interference:

module has done a variety of power frequency interference and multiple harmonic suppression algorithms, but it is still recommended to try as far away from high voltage AC, source, rectifier bridge, high power electrical drive and other circuits, and do a good job of voltage stabilization, shielding, power integrity design, so as to avoid super power frequency interference, beyond the range of module suppression ability, causing false positives.

5   Light interference:

The luminescence change of the light emitting component may cause the excessive change in the light intensity detected by the light sensing device, causing the module between the off detection and open detection functions, and the control signal is abnormal. It is suggested that during installation, the light-sensing device on the module should not being directly or indirectly illuminated by the light emitted by the light-emitting components. This version of module uses a single light sensor device to detect ambient light, and can use natural light detection sensor and multi-light sensor sensor combination to avoid this problem.

6   Strong penetration:

Compared to 24GHz, 60GHz and 77GHz millimeter wave, 5.8GHz microwave has a stronger penetration ability, for thin wood board, ceramics, glass, plastic can penetrate, but generally not easy to penetrate the brick wall.

7   Note the ESD protection:

Do not touch the antenna and circuit by hand to avoid excessive human contact discharge and damage to the module.

7. Production code rule

RA	10	L	15	–	B	–	LMLD	–	00	–	00
MWRange	frequency	product series	identification of product		Foot position order		hardware configuration		Hold on time		Other configuration
	5：5.8G	L: General lighting			A:OGV		L1:LDO				
	10: 10.5G	G: High-end features			B:VOG		M: MCU				
	24: 24G	H: High altitude series			C:VGO		L2: photosensitive				
	60: 60G	S: Short range series					D: connector				
		N: Networking series									
		U: Ultra low power consumption									
		K: module train									
		B: There is a series									
		R: Ranging series									

Note: LMLD: LDO / MCU / Light sensor / DIP

8. Version history

edition	Product name / Product model number	Change the content	state	date
V1.0	HY5L14-B	----	Officially released	2023.3.21
V1.1	HY5L14-B	Initialization time change	Officially released	2023.7.29

V1.2	HY5L14-B	Improve latch time	Officially released	2023.8.03

9. Statement

Please read this statement carefully before using the products described in this document. Once used, it is deemed to be a recognition and acceptance of the contents of this statement.

When the customer applies the HY5L14-B module, according to the product characteristics, performance and functions described in this document, it must retest it to meet the requirements of the customer application. In case of any damage or damage caused by improper use, Shenzhen MWRange Intelligent Co., Ltd. shall not bear the corresponding damage and compensation liability.

Due to continuous update and iteration, the document may be changed without notice. Please confirm the update and errata information through appropriate channels during the application. Sorry, the right of final interpretation belongs to Shenzhen MWRange Intelligence Co., LTD.

10.Warning

Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.