



MS58-2020D9M4-L

MoreSense 5.8G Radar Sensor Module

User Manual V1.1



Revision History

Revision	Description	Release Date
V1.0	MS58-2020D9M4 User Manual Initial Version	2020-5-1
V1.1	Optimized Product Description's Structure	2021-10-12

Proprietary Statement:

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1 Product Description

MS58-2020D9M4-L is a miniaturized 5.8G radar sensor module launched by MoreSense. This module uses high-performance radar sensors combined with miniaturized planar antennas to achieve a size of 20 x 20mm while ensuring the performance of the sensor.

The sensor can detect that if there have the moving objects in the region by frequent difference between the transmit and receive signals (Doppler Principle) or high-frequency electromagnetic waves. The sensor is not affected by ambient temperature, humidity, airflow, dust, noise, brightness and so on. With a built-in multi-filter algorithm, the module has a strong anti-jamming capability and its signal can penetrate glass, acrylic and other non-metallic materials.

The sensor can be used to detect various scenes of human being or moving target sensing, including Smart Home, IOT, Intelligent Security surveillance and so on. Especially in the field of Intelligent Lighting, it has widely used in standard lighting products such as induction LED bulbs and T8 tubes lamps.

The module comes with its own default parameters and can be chosen through the reserved IO of the module when in use.



2 Product Features

- a. Working Frequency Band: 5.8G ISM Frequency Band;
- b. Microwave sensor based on Doppler effect;
- c. Sensing distance and delay time can be adjusted flexibly according to different application;
- d. Using mature CMOS technology to achieve fully integration of ultra-cost-effective;
- e. The chip has a built-in LDO that supports wide-voltage power supply;
- f. SoC signal processor, which can directly output sensing control signals from a single chip;
- g. Ultra low-power consumption, the overall current is less than 9 mA, and can be used for resistance-capacitance step-down power supply;
- h. Support standard IIC interface, can be interconnected with other main control or sensors;

3 Key Application

- Smart Home: Wall Switch; Refrigerator...
- Induction of Moving Targets: Smart Door Locks; Smart Doorbells...
- Intelligent Lighting: Corridor Lights; Mirror Lights; Disinfection Lights; Miner's Lamps...
- Security and Smart Surveillance: Cameras...



4 Parameter

Type	Parameter	Value
RF Parameter	Certification Standards	FCC/CE/SRRC/RoHS
	Frequency Range	5.725GHz-5.875GHz
	Transmit Power	-4dBm
	Antenna	Built-in;Flat Antenna
Hardware Parameter	Data Interface	GPIO
	Operating Voltage	5-12V
	Operating Current	9MA(Typical Value)
	Operating Temperature	-30°C- 85°C
	Storage Temperature	-40°C- 150°C
	Humidity	<85%
	Dimension	20mm x 20mm
Default Parameter	Power-On Self-Test Time	2s
	Sensing Output Level	3.3V
	Silent Output Level	0V
	Sensing Output Time	2s
	Inducting Distance	About 6m
	Customizing the Largest Sensing Distance	10m
	Max. Induction Radius with Hanging Height 3m	5m
	Setting Parameter Method	I2C

5 Pin Definition

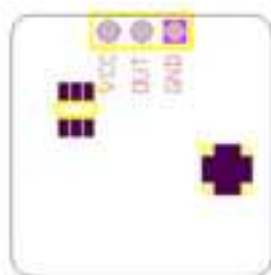
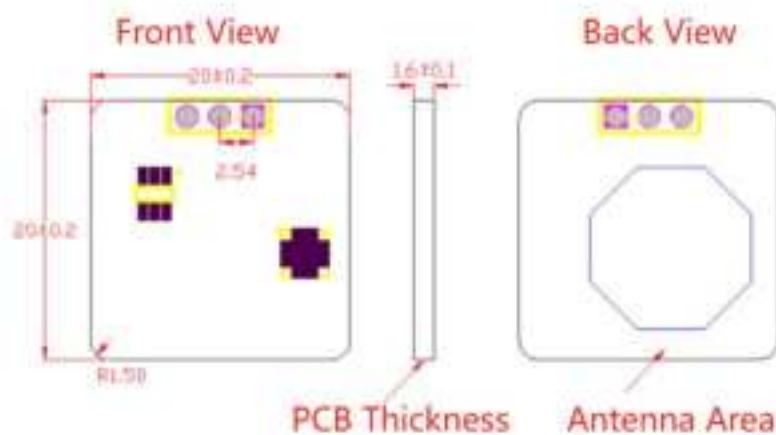


Table.1 MS58-2020D9M4 Pin Function Definition

Pin	Name	Type	Discription
1	VCC		Power Supply
2	GND		Ground
3	OUT	I	Signal Signal Output

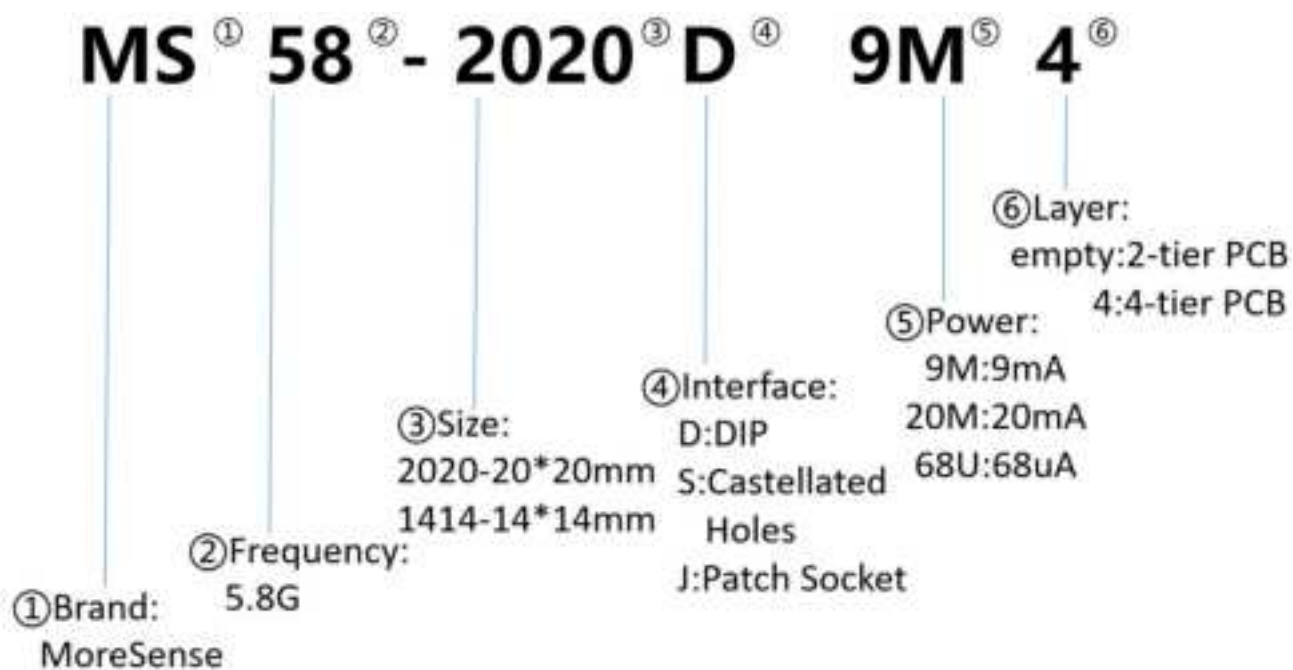
I:Input O:Output

6 Module Dimension



Unit:mm

7 Name Rules

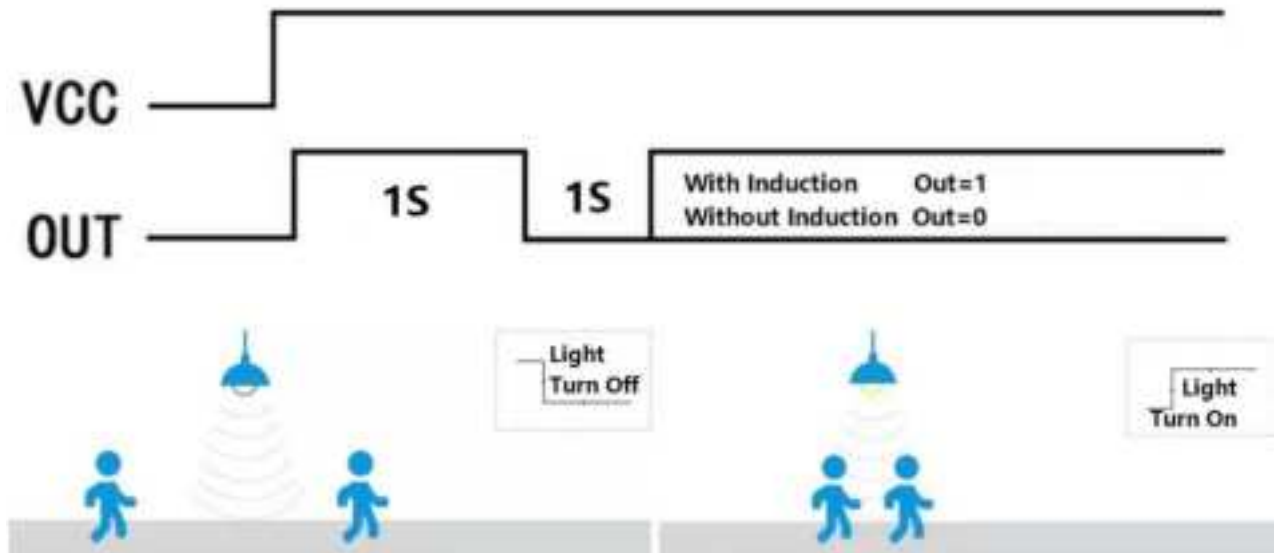


④ Interface



8 Operation Guideline

8.1 Module OUT RAM Timings



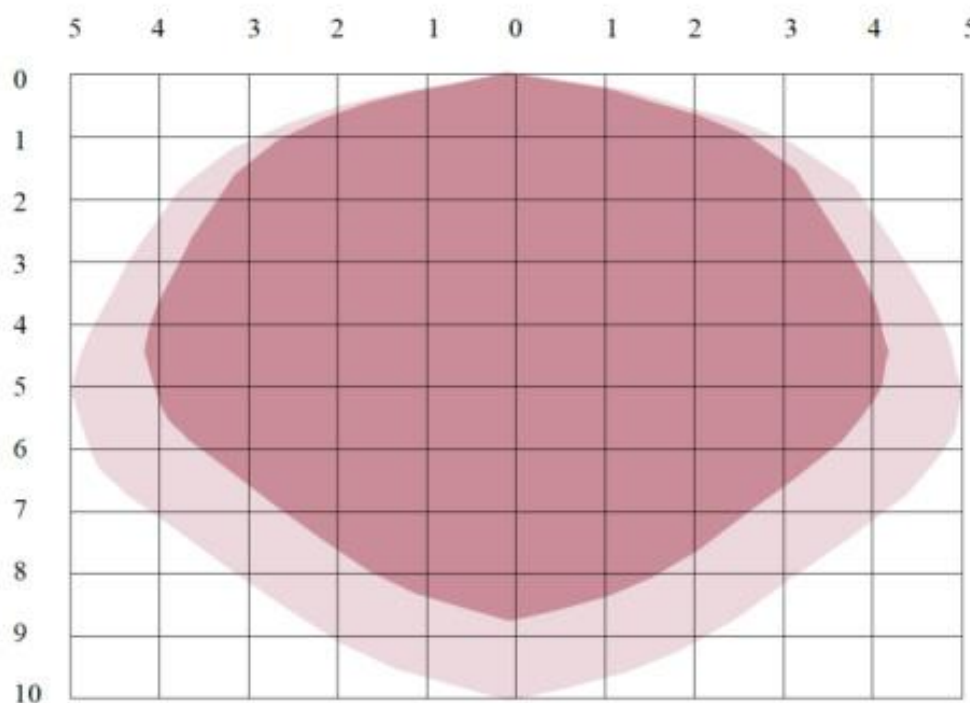
8.2 Module Sensitivity Configuration

The sensitivity of the default radar sensor can be configured through IO to provide four adjustable gears. The configuration is achieved by configuring the P3 and P2 pins as shown in the following table:

	TTL	Gear	Default Distance(support adjustment)
[P3:P2]	00	0	1.5m
	01	1	1.2m
	10	2	1.0m
	11	3	0.8m

8.3 Induction Range

The actual sensing distance can be adjusted according to the needs. The above is the schematic diagram of radar detection range in case of high hanging. If the sensitivity is set higher, the detection range will be correspondingly larger. In the figure, the dark area is the high sensitivity area that the object can be fully detected, while the light area is the low sensitivity area that the object can be detected basically. The actual product structure and assembling environment also affect the distance and angle of radar detection.



9 Precautions



Precautions

Try to avoid placing the radar antenna in the direction of large metal equipment or pipes,etc.

The front of the antenna should be installed without a metal shell or components to avoid shielding the signal.

The power frequency will interfere with the radar signals.During installation,it should avoid forwarding the AC drive power supply,staying away from AC power lines,rectifier bridges and other lines.

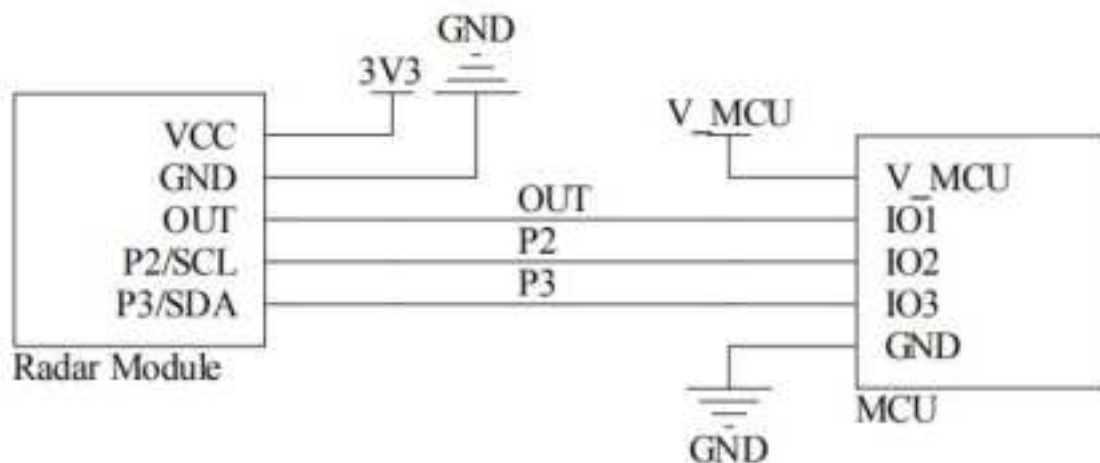
Covers such as glass,acrylic,or plastic are allowed,but there should be a proper clearance area in front of the antenna,and a minimum spacing of 5mm or more is recommended.

During installing multiple radar modules,please try to ensure that the antennas of each radar module are parallel to each other,avoiding positive irradiation between the antennas,and to maintain more than 1 m of space between the modules.

10 Customization

Power Supply Voltage	Sensing Out Method	Setting Parameter	Supplement
<input checked="" type="checkbox"/> 3.3V	<input checked="" type="checkbox"/> IO Out (Reverse Supported)	<input checked="" type="checkbox"/> IO Setting Para.	<input checked="" type="checkbox"/> Photosensitive
<input type="checkbox"/> 5V	<input type="checkbox"/> UART	<input type="checkbox"/> UART	<input type="checkbox"/> Power Management Function
<input type="checkbox"/> 12V	<input type="checkbox"/> PWM	<input checked="" type="checkbox"/> IIC	—
<input type="checkbox"/> 24V	—	—	—
<input type="checkbox"/> : Supporting <input checked="" type="checkbox"/> : Supported			

11 Hardware Typical Application



12 Package Information

12.1 Recommended Reflow Soldering Profile

Figure 1.Thermal Reflow Profile

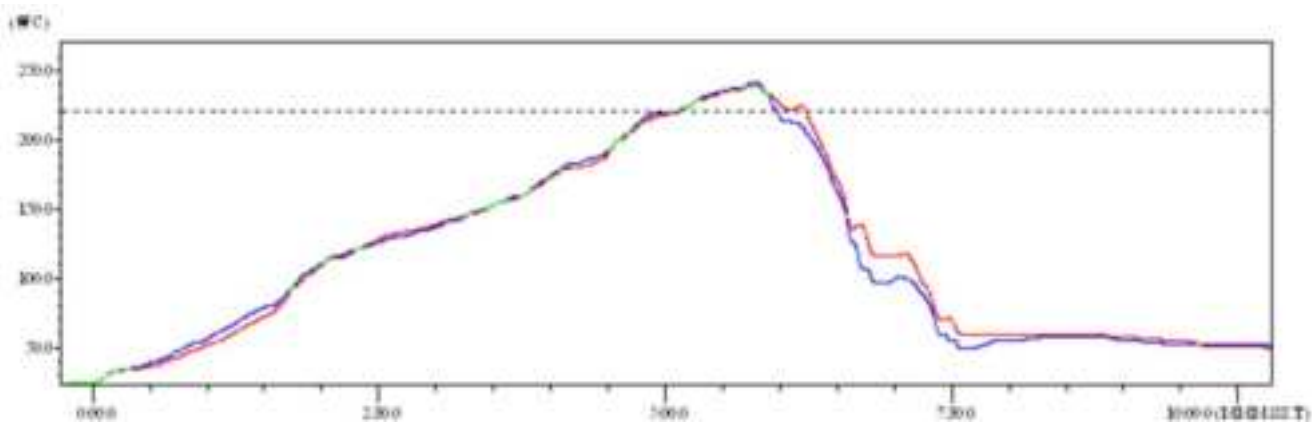


Table 1.Reflow Data

No.	Program	Temp. (°C)	Time(S)
1	Refluxing Time	Above 220°C	35~55S
2	Peak Temp.	Highest 260°C	

Note:

- 1.It is recommended to use a nitrogen reflux furnace;
- 2.The oxygen content is less than 300ppm.

12.2 Instruction

A. Sealed storage period: 12 months in an environment with a temperature of less than 30°C and a relative humidity of less than 60%.

B. Be re-baked before using if the window time exceeds 168 hours after unpacking.

C. Recommended to use nitrogen filling method for baking.

D. Recommended to use nitrogen filling method.

E. Baking and rework requirements for this model: 125±5°C, 24 hours.

F. Recommended storage conditions $\leq 10\%$, relative humidity under vacuum packaging.

G. If the SMT process requires to pass twice reflow ovens:

① TOP Surface ② BOT Surface

Situation 1: The radar module is designed on the TOP surface of the customer's PCB. The TOP surface needs to be baked when the TOP surface has not been produced after the BOT surface has been finished 168 hours (window time).

Situation 2: The radar module is designed on the BOT side of the customer's PCB and follows the normal baking rules.

Note: The window time means 168 hours from the end of the last baking to the beginning of the next reflow.

12.3 Package Method

Blister Packaging (Insulation)

Dim. : 170*170*17 mm

