



AT58L4M32-2020
5.8GHz
Microwave Motion sensor

Version: 1.2

FCC ID: 2AVK2-AT5820-2020

Made in China

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.

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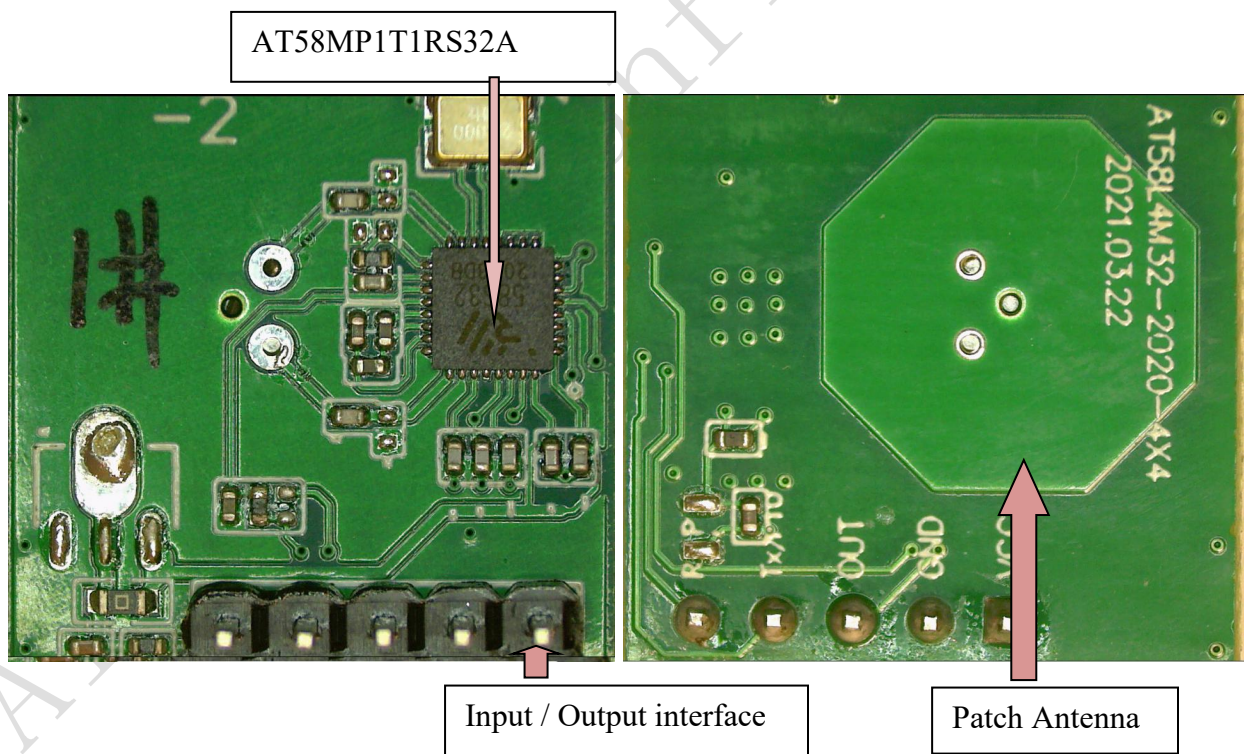
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AT58L4M32-2020 5.8GHz User Guide

Description

AT58L4M32-2020 is a 5.8G radar sensor with low power consumption, which is launched by AirTouch. The power consumption is about 20mA, and the module size is 20mm * 20mm. The sensor adopts the self-developed radar induction chip AT58MP1T1RS32A, which integrates a 5.8GHz microwave circuit, an intermediate frequency amplifier circuit, a signal processing circuit and a powerful MCU, with high integration and good production consistency, A miniaturized path antenna is used in the periphery to ensure the performance of the sensor and greatly reduce the overall size. Because of its low power consumption, low cost and compliance certification, the sensor has been widely used in intelligent lighting, smart home and other fields. This scheme is the first choice for upgrading the traditional non fixed frequency scheme, and also the preferred scheme for improving the performance of traditional 5.8G microwave induction products.

Radar Sensor illustration



Front side

Back side

Figure1 AT58L4M32-2020 Radar Sensor

Input and Output Interface

Five pinholes are reserved in the module. There are five signal pins, VCC, GND, out, TX and Rx. The pin distance is 2.54mm. If you need to adjust the distance and delay time online, you can rewrite the internal parameters through the communication between TX, RX of UART with AT58MP1T1RS32A. The following table is the definition of each pin :

Pin Name	Function	Note
VIN	Power supply	VCC is 5V by default, external LDO is needed if VCC higher than 6V.
GND	Ground PIN	
OUT	Output control	Output is 5V TTL by default, could be PWM if needed
TX	TX of UART	used for software upgrade or performance parameter adjustment. The high level voltage is 3.3V
RX	RX of UART	used for software upgrade or performance parameter adjustment. The high level voltage is 3.3V

Module size and Pin position

Figure 2 below is the schematic diagram of module size and pin position. The length and width of the module is 20 mm * 20 mm. By default, there is no pin, and the overall thickness is 2.5 mm. If a pin is required, the default pin height is 12 mm.

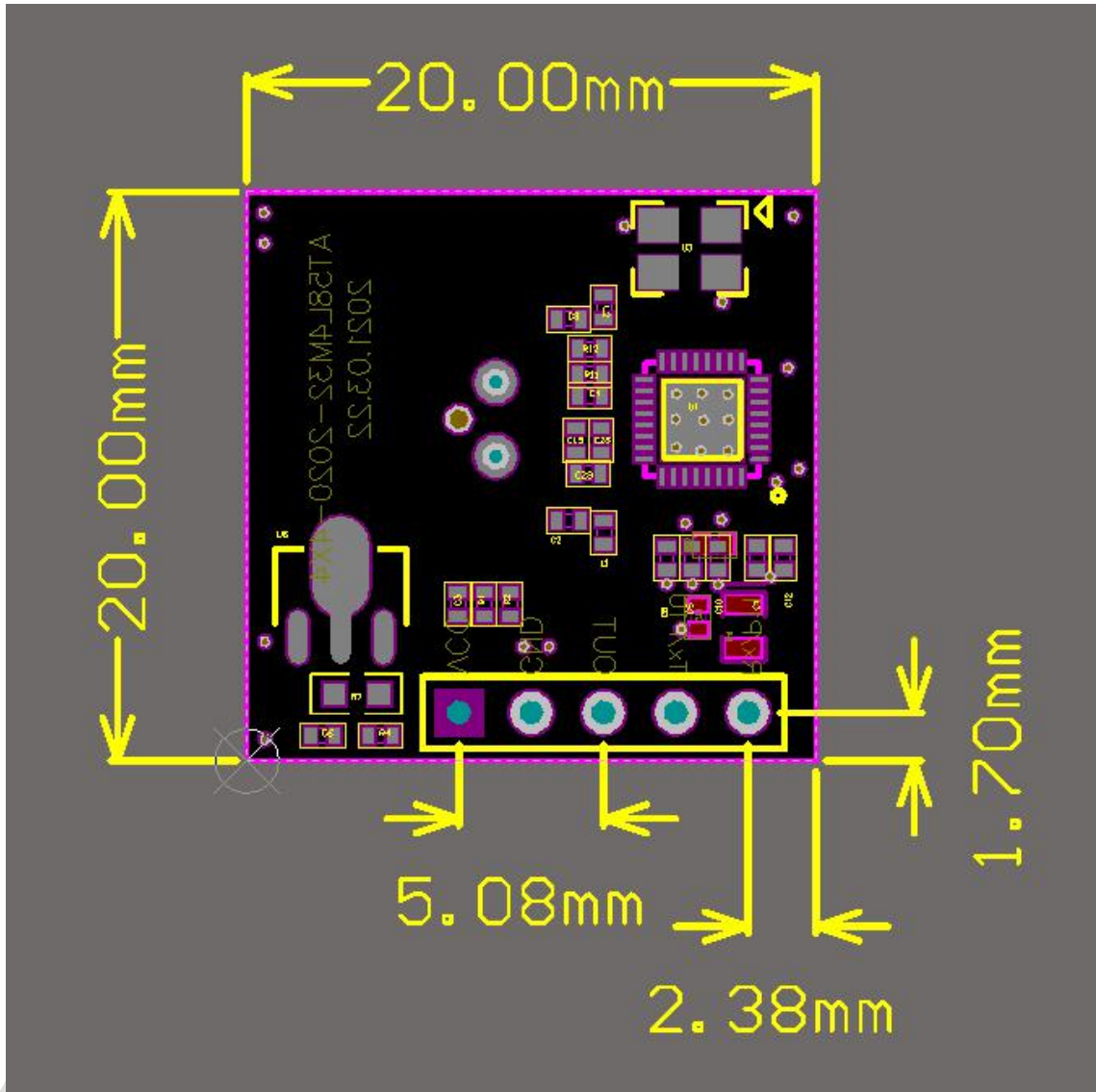


Figure 2 Module size and pin position of AT58L4M32-2020

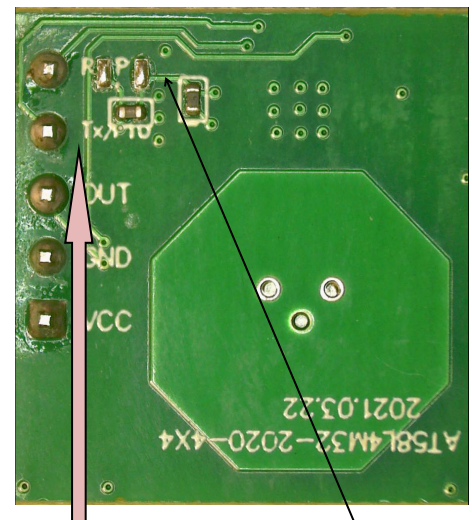
Electrical characteristics

Parameters	Min.	Typical	Max.	Unit	Note
Frequency	5725		5875	MHz	Adjustable according to specific needs
TX Power		-5		dBm	Adjustable according to specific needs
Input VCC	4.5	5	5.5	V	LDO is not pasted by default, and 5V is input by default
Output High (OUT)		5		V	
Output High (TX, RX and other GPIO)		3.3		V	
Output Low		0		V	
Current		20	28	mA	Average working current
Detection Radius		6	10	M	Related to mounting height
Hold time		15		S	Adjustable according to specific needs
Daylight sensor		10		Lux	Adjustable according to specific needs
Operating temperature	-30		85	°C	

The delay time and detection area

The module has three pins by default, namely VCC, GND and OUT. The delay time and detection distance are fixed values. If you need to adjust the delay time and detection distance and other related parameters, you need to add RX and TX pins as shown in Figure 3.

The RX and TX interfaces in the figure3 can be used as UART ports to adjust module parameters. When they are used as UART ports, please refer to the document "AirTouch radar setting tool instructions" for detailed instructions. If the sensor is triggered again within the delay time, the timing will start again.



UART

photodiode

Figure3 UART and photodiode

Photosensitive Detection

The module supports photosensitive detection. The sample module does not turn on the photosensitive detection function by default. The position shown in Figure 3 is the photodiode. The photosensitive threshold can be adjusted by changing the photosensitive judgment threshold or tuning the photosensitive resistance. When the photosensitive function is turned on, the radar sensing will be started only when the ambient light is lower than the set value. If the light is too bright, the module will not start the sensing function.

Power on Sequence

The module has a power-on self-test function, that is, after the module is powered on, the out pin outputs the high level first, the low level is output after the delay of 2s, and the low level is delayed for 0.5s before entering the normal induction mode. The following is the sequence diagram of the control signal after the module is powered on:

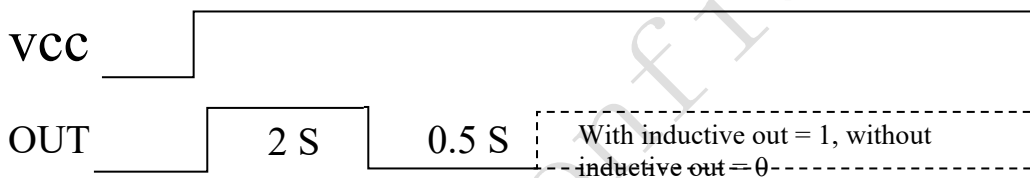


Figure4 Power on Sequence

Detection Pattern

The sensing sensitivity of radar sensor can be configured by MCU, and its limit sensing distance is 20 meters. The actual sensing distance can be adjusted according to the needs. The following 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, which can be fully detected, while the light area is the low sensitivity detection area, which can basically detect objects.

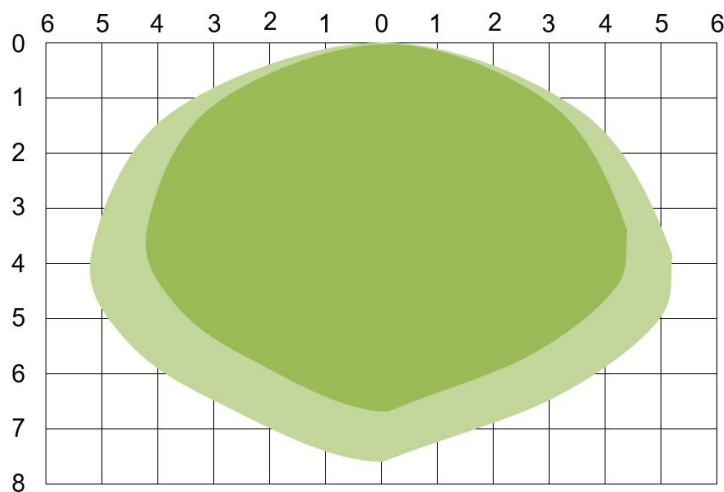


Figure5 AT58L4M32-2020 Detection Pattern

Precautions

- During installation, the front of the antenna shall be free of metal shell or parts to avoid signal shielding. Plastic or glass and other materials are allowed, but these materials shall not be close to the front of the antenna;
- Try to avoid pointing the radar antenna at the large metal equipment or pipeline, etc;
- When multiple radar modules are installed, the antennas of each radar module shall be parallel to each other as much as possible to avoid direct radiation between the antennas, and the distance between the modules shall be more than 1m;
- The radar sensor should avoid facing the AC driving power supply and keep away from the rectifier bridge of the driving power supply as far as possible to avoid the interference of the power frequency;
- The power supply driving capacity of the radar module needs to be greater than 30mA, otherwise the sensor will work abnormally.

Revision History

Revision	Release Date	Description
1.0	2021/01/04	Initial version
1.1	2021/04/26	Update the description of 4x4 chip
1.2	2021/06/03	Update the description of supply voltage

Requirement of FCC KDB 996369 D03 for module certification:

1. List of applicable FCC rules:

The module complies with FCC Part 15.249

2. Summarize the specific operational use conditions:

The module has been certified for Fix, Mobile, Portable applications. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

3. Limited module procedures:

The module has not its own RF shielding, The host should provide the RF shielding to the modular , which belong to Limited module.

Standard requires:

Clear and specific instructions describing the conditions, limitations and procedures for third-parties to use and/or integrate the module into a host device (see Comprehensive integration instructions below).

Resolve: Supply example as follows:

Installation Notes:

1) AT58L4M32-2020 module Power supply range is DC 4.5-5.5V, when you use AT58L4M32-2020 module design product, the power supply cannot exceed this range.

2) When connect AT58L4M32-2020 module to the host device, the host device must be power off.

3) Make sure the module pins correctly installed.

4) Make sure that the module does not allow users to replace or demolition.

4 .Trace antenna designs:

Not applicable.

5. RF exposure considerations:

This equipment complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must not be collocated or operating in conjunction with any other antenna or transmitter.

Note: the host product manuals must include a statement in order to alert the users of FCC RF exposure compliance.

6. Antennas:

The antenna is permanently attached, can't be replaced.

Type	Gain	Impedance	Application
PCB type	2.3dBi	50Ω	Fixed, Mobile, Portable

7. Label and compliance information

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.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

The system integrator must place an exterior label on the outside of the final product housing the AT58L4M32-2020 Modules. Below is the content that must be included on this label.

The host product Labeling Requirements:

NOTICE: The host product must make sure that FCC labeling requirements are met. This includes clearly visible exterior label on the outside of the final product housing that displays the contents shown in below:

Contains FCC ID: 2AVK2-AT5820-2020

8 .Information on test modes and additional testing requirements:

When testing host product, the host manufacture should follow FCC KDB Publication 996369 D04 Module Integration Guide for testing the host products. The host manufacturer may operate their product during the measurements. In setting up the configurations, if the pairing and call box options for testing does not work, then the host product manufacturer should coordinate with the module manufacturer for access to test mode software.

9. Additional testing, Part 15 Subpart B disclaimer:

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.249) list on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuitry.

When testing host product, the host manufacture should follow FCC KDB Publication 996369 D04 Module Integration Guide for testing the host products. The host product shall work normally, all the transmitters installed must be operating, investigate the fundamental and unwanted/spurious emissions with the modular transmitter(s) operating in a normal mode. When testing for emissions from the unintentional radiator, the transmitter shall be placed in the receive mode or idle mode if possible, if receive mode only is not possible, test laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s).