

MSCZ2305M-S Wireless Module Product Manual

Model number	functional characteristics	Antenna type
MSCZ2305M-S	Includes full product feature software	PCB board antenna



catalogue

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1. Function Overview

The MSCZ2305M-S wireless module is a high-power communication module for wireless sensor network networking, operating in the 2.4 GHz band and compliant with IEEE 802.15.4. It is designed with a SOC processor chip at its core, featuring a 32-bit RISC processor core and a 2.4 GHz IEEE 802.15.4 wireless transceiver. The module has 512K Flash and 64K RAM, along with various digital interfaces such as digital IO ports and UART. It hides the complex design process involving communication chips, external components, and high-frequency traces, forming a stable communication module with excellent RF performance. Users do not need to understand RF expertise or perform complex RF debugging; they can simply solder the module onto their base board using a soldering iron, creating an intelligent wireless communication device or system.

Users can independently develop applications and communication programs using the processor core in the MSCZ2305M-S module, eliminating the need for external processor chips. Alternatively, external processors can operate the MSCZ2305M-S wireless module via serial port transmission of AT commands to achieve wireless communication and networking functions, requiring no expertise in wireless programming to meet diverse customer needs. The MSCZ2305M-S module can also integrate with our IOT hosts or third-party hosts, connecting IOT devices within the network to the cloud to form a complete IOT application system.

1.1 Module Appearance and Framework

The MSCZ2305M-S is a versatile package design, compatible with mainstream wireless module packaging available on the market.



MSCZ2305M-S

Figure 1. The appearance of the MSCZ2305M-S module

1.2 Application Methods

The MSCZ2305M-S module can be used in two ways:

(1) Product design based on module

Our company specializes in firmware development for smart hotel and home automation applications. Customers can simply produce hardware products based on our reference designs, integrate our wireless module, and achieve mass production—no additional software development required.

(2) Serial port transparent transmission mode using module

The MSCZ2305M-S module for such applications comes preload with professional wireless communication software and peripheral control programs from the manufacturer, providing users with AT commands for serial port transmission. This allows users to quickly develop communication systems without requiring specialized network knowledge. In practical implementation, customers connect their external processor's USART to the AJ31 module's USART, enabling IOT communication through the customer's USART to control the wireless module. While this approach requires additional processor development and increases costs, it offers easy product upgrades and low barriers to entry for wireless communication system development.

2. Module interface description

2.1 Pin Arrangement

The MSCZ2305M-S module features three rows of pins with a 3.5-pin package and 2mm spacing between pins, as shown in the figure below. It can be mounted using SMT or hand-soldered.

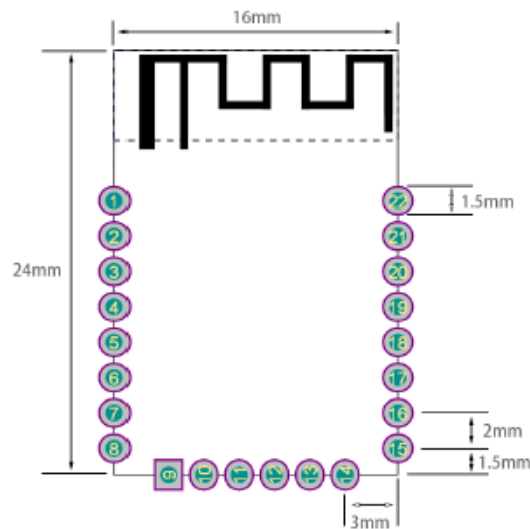


Figure 4. Schematic diagram of the pin layout for the MSCZ2305M-S module

2.2 Pin Definition and Description

The MSCZ2305M-S module has 22 pins, with their functions detailed in the table below.

Table 2. Pin Configuration of MSCZ2305M-S

pin	name	function	functional description	remarks
1	RESET	reset	Module reset signal input	
2	PB4	digital port	Normal IO port or second function	
3	PD7	digital port	Normal IO port or second function	
4	PD4	digital port	Normal IO port or second function	
5	PC0	digital port	Normal IO port or second function	
6	PA0	digital port	Normal IO port or second function	
7	PC6	digital port	Normal IO port or second function	
8	VCC	source	Positive terminal of the power supply	
9	VCC	source	Positive terminal of the power supply	
10	SWS	burning port	Download the program to the FLASH inside the module	
11	PD2	digital port	Normal IO port or second function	
12	GND	source	Negative terminal of the power supply	
13	RESET	reset	Module reset signal input	
14	GND	source	Negative terminal of the power supply	
15	GND	source	Negative terminal of the power supply	
16	PD3	digital port	Normal IO port or second function	
17	PB6	digital port	Normal IO port or second function	
18	PB5	digital port	Normal IO port or second function	
19	PC4	digital port	Normal IO port or second function	
20	PC5	digital port	Normal IO port or second function	
21	RXD	digital port	Uart_RXD (ADC), corresponding to PB7	
22	TXD	digital port	Uart_TXD (ADC), corresponding to PB1	

2.3 Relevant explanations:

- (1) For the MSCZ2305M-S module, when users need to develop their own software, the corresponding pin functions can be configured as secondary function pins through software settings.
- (2) The VCC, GND, and SWS pins form a 3-pin programming port for downloading firmware to the wireless module. In practical use, these pins should not be used for other functions.
- (3) For the MSCZ2305M-S module, non-functional digital ports should remain unused in practical applications.

3. Electrical parameters

3.1 Module Working Environment

The MSCZ2305M-S module requires a specific voltage range to operate properly. Operating below the minimum rated voltage or above the maximum rated voltage may cause instability or even damage. It can be powered by a DC-DC converter, an LDO regulator, or a battery. See Table 5 for the relevant parameters.

Table 5. Module power supply voltage parameters

symbol	name	description	remarks
VCC	service voltage	Minimum 1.8V, typical 3.3V, maximum 3.6V	
TA	operating temperature range	-40°C~85°C	

3.2 Absolute maximum rated values

Operating beyond the maximum rated value of the module may cause permanent hardware damage. Therefore, avoid exceeding the rated value when using the module.

Table 6. Absolute maximum rated values

symbol	name	Description	remarks
VCC	service voltage	Minimum-0.3V, maximum 3.6V	
VIO	Port pin voltage	Minimum-0.3V, maximum VCC+0.3V	
RFout	output RF signal	Maximum 20 dBm	
Tsto	storage temperature	Minimum-45°C, maximum 120°C	

3.3 Digital I/O Port Parameters

The operational parameters of the digital I/O ports are shown in Table 8.

Table 8. Static parameters of digital I/O ports

symbol	name	description	minimum	typical case	maximum	unit
VIH	Input high level	The external input voltage is recognized as the range of logic 0	0.7VDD		VDD	V
VIL	Input low level	The external input voltage is recognized as the range of logic 1	VSS		0.3VDD	V
VOH	high level output	Output logic 1 voltage range	0.9VDD		VDD	V
VOL	output low level	Output logic 0 voltage range	VSS		0.1VDD	V

3.4 Reset RESET Pin Parameters

The RESET pin resets the system. For stability, connect it to VCC with a 10K resistor. The RESET pin normally remains high. Apply a low level to the RESET pin to reset.

4. Radio Frequency Characteristics

The basic RF characteristics are shown in Table 9.

Table 9. Basic parameters of radio frequency characteristics

Parameter	parameter values	remarks
service frequency	2.405 Ghz ~2.480 Ghz	Programmable in 5MHz step
Modulation type	O-QPSK	
transmission rate	250Kbps@802.15.4 mode	
receiving sensitivity	-102dBm@250k	
transmitting power	Maximum +17.5 dbm	Set register or AT instruction modification
Antenna type	PCB board antenna	factory default onboard antenna

5. Antenna usage

5.1 Types of Antennas

The MSCZ2305M-S module supports only PCB board antennas, which serve as the default factory configuration. The corresponding antenna configurations for each module sub-model are shown in Table 10.

Table 10. AJ31-H Module Sub types and Corresponding Antenna Types

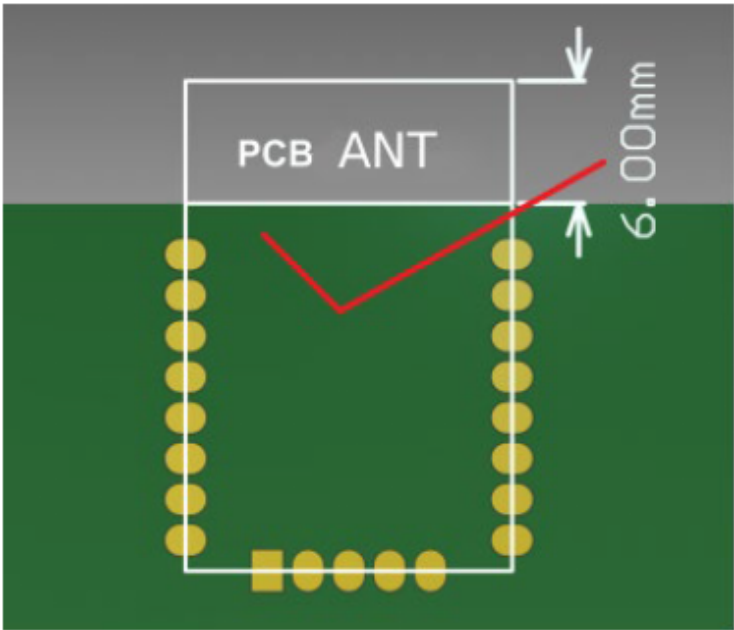
Module Sub model	Antenna type	remarks
MSCZ2305M-S	PCB board antenna	give tacit consent to

5.2 Reducing Antenna Interference

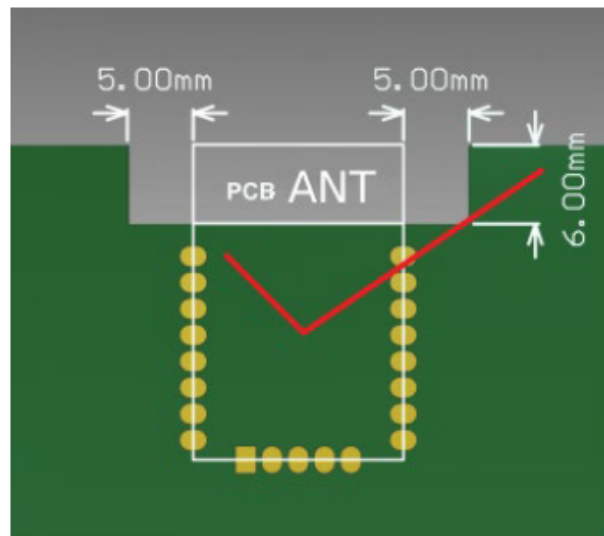
The MSCZ2305M-S module with PCB-embedded antennas is mounted on the customer's functional baseboard using surface-mount technology, positioned along the board's edge. If the antenna does not extend beyond the PCB edge, the corresponding PCB area on the baseboard must be cleared. Additionally, maintain a minimum distance of 30mm between the PCB-embedded antenna and other metal components, and ensure at least 5mm clearance between the module's antenna and its enclosure. Failure to meet these specifications may compromise the radio frequency performance and communication capability of the wireless transceiver.

The following is the correct PCB layout diagram:

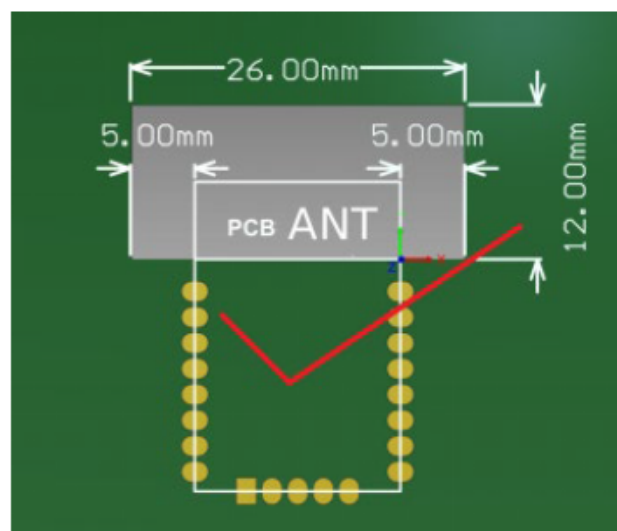
1. The module antenna section extends beyond the PCB edge placement.



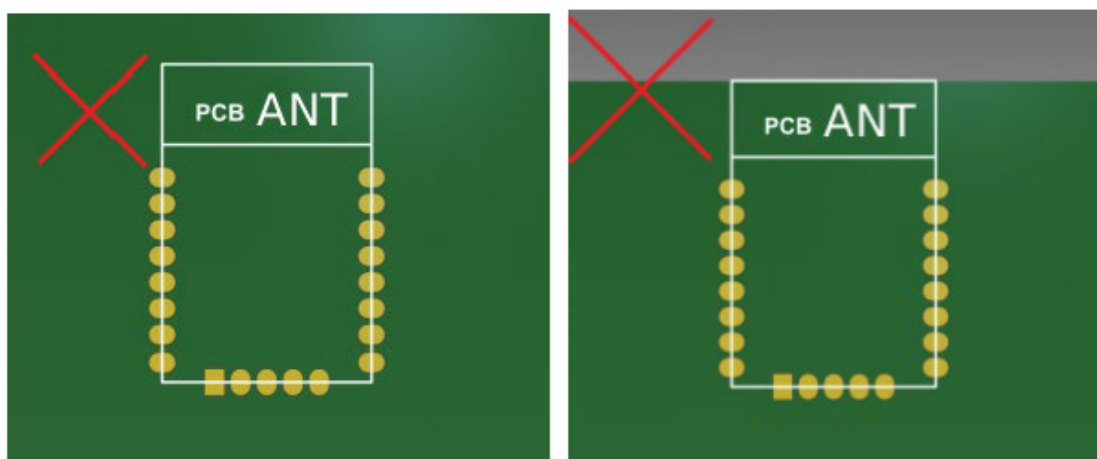
2. Align the module with the edge and leave a gap for the slot.



3. The module is located inside the PCB with slots left open



The following is an incorrect PCB layout diagram: The module antenna section is not left blank.



This module can be applied in hid,sports and fitness sensors,health sensors,mobile accessories as well as smart home.The input voltage to the module Should be nominally 3.0-3.6V DC, typical value

3.3V DC and the ambient temperature of the module should not exceed 105°C.

7.3 limited module procedures

Not applicable

7.4 trace antenna designs

not applicable

7.5 RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body. If the device is built into a host as a portable usage, the additional RF exposure evaluation may be required as specified by 2.1093.

7.6 Antennas

The module has PCB antenna

7.7 Label and compliance information

The outside of final products that contain this module must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains transmitter module FCC ID: 2BG6M-MG2305M-S" or "Contains FCC ID: 2BG6M-MG2305M-S". Any similar wording that expresses the same meaning may be used.

7.8 Information on test modes and additional testing requirements

A) The modular transmitter has been fully tested by the module grantee on the required number of channels, modulation types, and modes; it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer, installing the modular transmitter, perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

B) The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

C) If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected.

The MSCZ2305M-S module is based on TLSR8359 chip. Support standard UART commands.

7.9 additional testing, part 15 subpart B disclaimer

The final host module combination needs to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized.

For operation as a part 15 digital device.

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical

assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

Frequency spectrum to be investigated

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in section 15.33(b)(1), whichever is the higher frequency range of investigation.

Operating the host product

When testing the host product, all the transmitters must be operating. The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.

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 then, the radio shall be passive (preferred) and/or active scanning. In these cases, this would need to enable activity on the communication bus (i.e., PCIE, SDIO, USB) to ensure the unintentional radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4, ANSI C63.10 for further general testing

details.

The product under test is placed into a normal ‘paired’ mode with another ble device, as per the normal intended use of the product (for example, Transferring data).

IC Label Instructions:

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: “contains transmitter module IC: 28738-MG2305M” ,or “contains IC: 28738-MG2305M” any similar wording that expresses the same meaning may be used Instructions

d’ étiquetage IC: L’ extérieur des produits finis contenant ce module doit afficher une étiquette faisant référence au module inclus.Cette étiquette extérieure peut utiliser des libelles tels que:contient le module émetteur IC: “28738-MG2305M” ou “contient IC: 28738-MG2305M” I tout libelle similaire exprimant le même sens peut être utilisé

8. Version revision records

date	edition	expurgator	Changes
2019-04-08	1.0	S21	Initial version
2021-11-14	1.1	S21	release version
2021-11-14	1.2	S21	release version
2023-07-20	1.3	S21	Add content to the revision
2023-09-19	1.4	S21	Add tolerance information to the revision
2024-05-19	1.5	S21	Modify tolerance information

FCC Statement

1. 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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

15.21

Note: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user’ s authority to operate the equipment.

15.105(b)

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

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with ISED RF 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. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body.

Conforme aux limites d'exposition de rayonnement RF ISED établies pour un environnement non contrôlé. Cet émetteur ne doit pas être co-implanté ou fonctionner en conjonction avec toute autre antenne ou transmetteur. Cet équipement doit être installé et utilisé avec une distance minimale de 20cm entre le radiateur & votre corps.