

MM591050-10

Wi-Fi Module

Datasheet

Revision	Date	Description	Author
1.0	2016-09-27	initial release	

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1. Introduction

MM591050-10 Wireless WIFI module is a low-power WIFI module for the Internet of Things. It supports IEEE802.11b / g / n protocol. It also embeds IPV4 / IPV6 TCP / IP, HTTP, DNS, FTP and other complete network protocols, making the terminal more reliable, convenient and easy to use.

The MM591050-10 module contains a Midea MS51001 single-chip solution. the chip in software and hardware are used in low-power technology, the purpose is to lower the power consumption of the entire board, the product more competitive. At present, the module provides a complete serial interface functions and equipment to communicate, so you can through the serial port and mobile client to connect the cloud and equipment.

- IEEE 802.11b/g/n, 2.4Ghz ,1T1R
- internal antennas
- Green TX Low power saving technology
- Low power monitor mode
- Support 150Mbps
- Support PWM
- Full encryption support: WPS, WPA, WPA2, WAPI, WEP, TKIP
- Support IPV4/IPV6, TCP/IP protocol
- Support HTTP, DNS, FTP and other network protocols

- Support AES 128/256, DES/3DES, SHA1, SHA224 and other hardware encryption

1.1 Module System Block Diagram

As shown in Figure 1, MM591050-10 using the Midea MS51001 single-chip 1T1R program, the chip highly integrated CPU, PMU, RAM, Transceiver, LNA, PA, memory, XTAL and other major parts, thus greatly reducing the machine power, Amplitude reduces the layout area. The module uses the internal antenna design in PCB, both for customers to reduce the cost of the antenna, but also eliminates the need to consider the antenna assembly space.

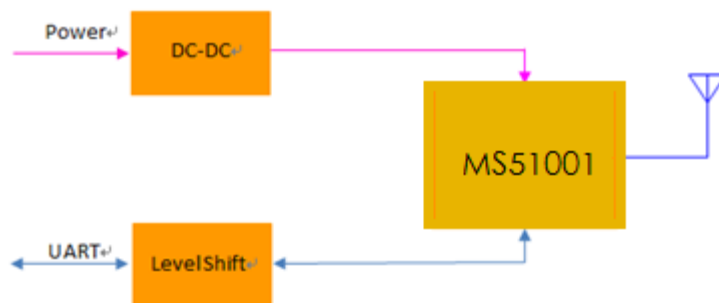


figure 1. Module System Block Diagram

1.2 Module technical specifications

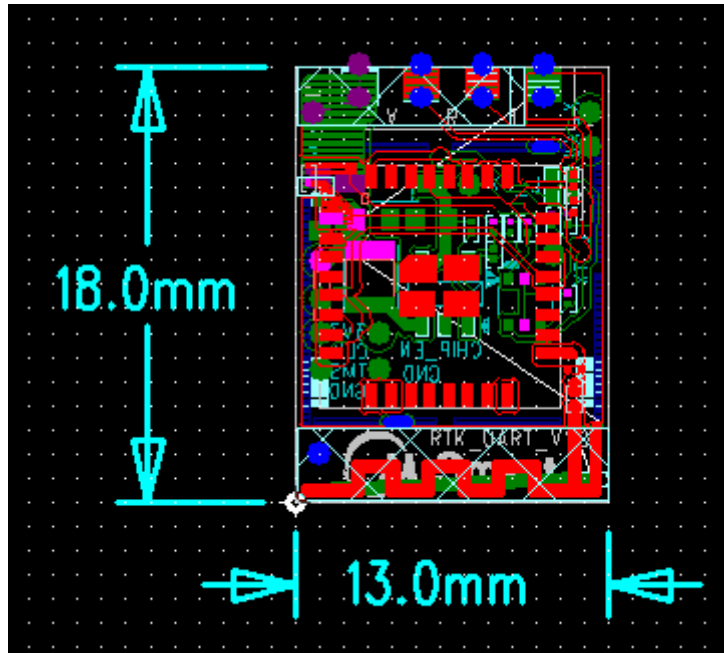
Main chip	Midea MS51001
Workingfrequency	2.412GHz~2.462GHz
SupportedWIFI standard	802.11b/g/n(1x1)
Modulation	11b: DBPSK, DQPSK, CCK, DSSS 11g: BPSK, QPSK, 16QAM, OFDM

	11n: MCS0~MSC7 OFDM
Supported rates	11b: 1, 2, 5.5 和 11Mbps 11g: 6,9,12,18,24,36,48,54Mbps 11n: MCS0~7, up to 150Mbps
communication interface	UART
PCB layer structure	2 Layer
PCB size	18mm(L)x13mm(W)x1.0mm(H)
Antenna	PCB internal antennas
Working temperature	-20℃~+85℃
Storage temperature	-40℃~+125℃
Hardware version number	RTK_UART_V1.0

2 Structure specification

2.1 Module structure size





The size of the module as shown above, length 18mm, width 13mm, thickness 1.0mm (error +/- 0.1mm)

2.2 Hardware interface definition

PIN	Signal Name	Description
1	VCC(V)	Supply Input Pin
2	RXD(R)	UART receive data
3	TXD(T)	UART transmit data
4	VSS(GND)	Ground

3 Wireless Specification

3.1 802.11b mode

Item	Content				
Standard	IEEE802.11b				
Mode	DSSS/CCK				
Channel	CH1-CH11				
Data Rate	1,2,5.5,11Mbps				
DC Characteristics	Min.	Typ.	Max.	Unit	Remark
DC Current(Average)@3.3V input					

1) TX only @17dBm	-	-	280	mA	
2) TX throughput mode	-	-	120		
3) RX throughput mode	-	-	100	mA	
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Level(Calibrated)					
17dBm Target	15	17	19	dBm	
3.Spectrum Mask @target Power					
Fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
Fc> +/- 22MHz	-	-	-50	dBr	
4.Frequency Error	-25	0	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5.Minmum Input Level Sensitivity					
1) 1Mbps(FER≤8%)			-80	dBm	
2) 2Mbps(FER≤8%)			-80	dBm	
3) 5.5Mbps(FER≤8%)			-79	dBm	
4) 11Mbps(FER≤8%)		-82	-76	dBm	
6. Maximum Input Level(FER≤8%)	-20	-10	-	dBm	

3.2 802.11g mode

Item	Content				
Standard	IEEE802.11g				
Mode	OFDM				
Channel	CH1-CH11				
Data Rate	6,9,12,18,24,36,48,54Mbps				
DC Characteristics	Min.	Typ.	Max.	Unit	Remark
DC Current(Average)@3.3V input					
1) TX only @16dBm	-	-	280	mA	
2) TX throughput mode	-	-	120	mA	
3) RX throughput mode	-	-	100	mA	
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Level(Calibrated)					
1) 17dBm Target @6Mbps	15	17	19	dBm	
2) 14dBm Target @54Mbps	12	14	16	dBm	
3.Spectrum Mask @target Power					
at fc +/-11MHz to +/-20MHz	-	-	-20	dBr	
at fc +/- 20MHz	-	-	-28	dBr	
at fc> +/-30MHz			-40	dBr	
4.Constellation Error(EVM)@target power					
1)6Mbps			-5	dB	
2)9Mbps			-8	dB	

3) 12Mbps			-10	dB	
4) 18Mbps			-13	dB	
5) 24Mbps			-16	dB	
6) 36Mbps			-19	dB	
7) 48Mbps			-22	dB	
8) 54Mbps		-28	-25	dB	
5. Frequency Error	-20	0	20	Ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
6. Minimum Input Level Sensitivity					
1) 6Mbps(PER ≤ 10%)			-82	dBm	
2) 9Mbps(PER ≤ 10%)			-81	dBm	
3) 12Mbps(PER ≤ 10%)			-79	dBm	
4) 18Mbps(PER ≤ 10%)			-77	dBm	
5) 24Mbps(PER ≤ 10%)			-74	dBm	
6) 36Mbps(PER ≤ 10%)			-70	dBm	
7) 48Mbps(PER ≤ 10%)			-66	dBm	
8) 54Mbps(PER ≤ 10%)		-71	-65	dBm	
7. Maximum Input Level (PER ≤ 10%)	-20	-10	-	dBm	

3.3 802.11n HT20mode

Item	Content				
Standard	IEEE802.11n HT20 @2.4Ghz				
Mode	OFDM				
Channel	CH1-CH11				
Data Rate(MCS Index)	MCS0/1/2/3/4/5/6/7				
DC Characteristics	Min.	Typ.	Max.	Unit	Remark
DC Current(Average) @5V input					
1) TX only @17dBm Target(each port), (continue Tx MIMO MCS7)	-		280	mA	
2) TX throughput mode	-		120	mA	
3) RX throughput mode	-		100	mA	
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Level					
1) 17dBm Target@MCS0	15	17	19	dBm	
2) 13dBm Target@MCS7	11	13	15	dBm	
3.Spectrum Mask @target Power					
at fc +/-11MHz	-	-	-20	dBr	
at fc +/- 20MHz	-	-	-28	dBr	
at fc > +/-30MHz			-45	dBr	
4.Constellation Error(EVM) @target power					
1) MCS0			-5	dB	

2)MCS1			-10	dB	
3)MCS2			-13	dB	
4)MCS3			-16	dB	
5)MCS4			-19	dB	
6) MCS5			-22	dB	
7) MCS6			-25	dB	
8) MCS7		-30	-27	dB	
5. Frequency Error	-20	0	20	Ppm	
RX Characteristics		Min.	Typ.	Max.	Unit
6. Minimum Input Level Sensitivity					
1) MCS0(PER ≤ 10%)			-82	dBm	
2) MCS1(PER ≤ 10%)			-79	dBm	
3) MCS2(PER ≤ 10%)			-77	dBm	
4) MCS3(PER ≤ 10%)			-74	dBm	
5) MCS4(PER ≤ 10%)			-70	dBm	
6) MCS5Mbps(PER ≤ 10%)			-66	dBm	
7) MCS6Mbps(PER ≤ 10%)			-65	dBm	
8) MCS7Mbps(PER ≤ 10%)		-70	-64	dBm	
7. Maximum Input Level (PER ≤ 10%)	-20	-10	-	dBm	

3.4 802.11n HT40mode

Item	Content					
Standard	IEEE802.11n HT40 @2.4Ghz					
Mode	OFDM					
Channel	CH3-CH9					
Data Rate(MCS Index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15					
DC Characteristics		Min.	Typ.	Max.	Unit	Remark
DC Current(Average)@5V input						
1) TX only @16dBm Target	-		240	mA		
2) TX throughput mode	-		120	mA		
3) RX throughput mode	-		100	mA		
TX Characteristics		Min.	Typ.	Max.	Unit	
2. Power Level						
1) 14dBm Target	14	16	18	dBm		
2) 12dBm Target	10	12	14	dBm		
3.Spectrum Mask @target Power						
at fc +/-21MHz	-	-	-20	dBr		
at fc+/- 40MHz	-	-	-28	dBr		
at fc> +/-60MHz			-45	dBr		
4.Constellation Error(EVM)@target power						
1)MCS0			-5	dB		

2)MCS1			-10	dB	
3)MCS2			-13	dB	
4)MCS3			-16	dB	
5)MCS4			-19	dB	
6) MCS5			-22	dB	
7) MCS6			-25	dB	
8) MCS7		-30	-27	dB	
5. Frequency Error	-20	0	20	Ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
6. Minimum Input Level Sensitivity					
1) MCS0(PER ≤ 10%)			-79	dBm	
2) MCS1(PER ≤ 10%)			-76	dBm	
3) MCS2(PER ≤ 10%)			-74	dBm	
4) MCS3(PER ≤ 10%)			-71	dBm	
5) MCS4(PER ≤ 10%)			-67	dBm	
6) MCS5Mbps(PER ≤ 10%)			-63	dBm	
7) MCS6Mbps(PER ≤ 10%)			-62	dBm	
8) MCS7Mbps(PER ≤ 10%)		-66	-61	dBm	
7. Maximum Input Level (PER ≤ 10%)	-20	-10	-	dBm	

Federal Communication Commission Interference Statement

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

This transmitter must not be co-located or operating in conjunction with any other antenna or

transmitter.

Radiation Exposure Statement:

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 & your body.

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required.

However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for reevaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCCID: 2AIRV0002". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as shown in this manual.