Jem WM-AC201 Wireless module User Manual

JEM Product user's manual
802.11AC 2T2R Module
Model : WM-AC201
Datasheet Number: UM-WM-AC201
Reversion 1.0
Author:
JEM, TAIWAN

Contents

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Revision and history:

Rev.	Description:	Originated or modified by:	Checked by:	Approved by:
1.0	Initial Release	James Hsieh	–	

About
This specification is a preliminary product specification written by Joinsoon Electronics MFG. Co., Ltd for the “WM-AC201 AC 2T2R Module”.

Product description

WM-AC201 is a highly integrated 802.11a/b/g/n/ac 2T2R module that supports 2-stream 802.11ac solutions with Multi-user MIMO. It integrates a high-performance 1GHz IPS24Kc processor, Fast Ethernet switch with RGMII, USB2.0 controller, DRAM and flash memory controller, and useful peripheral interfaces. It combines a WLAN MAC, a T2R capable WLAN baseband. It provides a complete solution for a high throughput performance integrated wireless LAN device. It is designed to provide excellent performance with low power consumption and enhance the advantages of a robust system and cost-effectiveness. It is targeted at competitive superior performance, better power management applications The RTL8197F delivers high-performance with low power consumption for applications such as 11ac dual-band smart routers, IoT gateway, VPN gateway, VoIP gateway, Network Storage, LTE routers, etc.

Product features

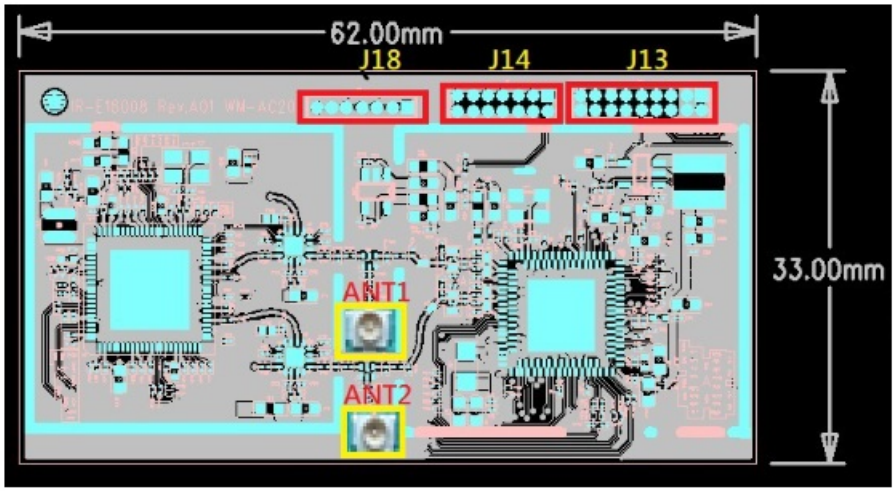
- IEEE802.11a/b/g/n and 802.11ac compliant.
- Operates at 2.4GHz and 5GHz frequency bands.
- CPU MIPS 24Kc speed up to 1GHZ
- Chipset embedded DDRII 128MB
- Support STBC, transmit Bean Forming.
- Modulation: BPSK, QPSK,16 QAM, 64-QAM, 256-QAM, OFDM.
- WPA, WPA2 and hardware accelerated AES encryption/decryption.
- Support 2T/2R transmission rate 300Mbps in 802.11n, and 867Mbps in 802.11ac(Physical rate) at 20MHz /40Mhz /80MHz Bandwidth.
- Support Multiple SSID
- QOS: Traffic Control & WMM/WMM-PS
- Various peripheral: USB host, UART, WAN Port, GPIO.. and so on.
- USB2.0 support for date rates up to 480Mbps high speed
- 2 IPEX Antenna Connectors (with 2 switches for 2.4G/5G selection)
- Support AP client for internet access.
- Support PC/NB wireless access interface
- Support UPnP medial (DLNA compatible) access
- Dimension 62x33x5 mm

Application

- Mobile Internet Device
- TV

- IP-cam
- STB

Mechanism



Pin Definition

I: Input O: Output P: Digital Power G: Digital Ground	AI: Analog Input AO: Analog Output AI/O: Analog Bi-Directional Input/Output I/O: Bi-Directional Input/ Output

J13 18pin(9*2)

Pin No.	Name	In/Out/P/G	Function
1	VDD	P	3V3 Power Input
2	VDD	P	3V3 Power Input
3	GND	G	Ground
4	GND	G	Ground
5	GPIOE2	B	General-purpose pin E2
6	GPIOE3	B	General-purpose pin E3
7	GPIOE4	B	General-purpose pin E4
8	GPIOE1	B	General-purpose pin E1
9	GPIOH0	B	General-purpose pin H0
10	GPIOG6	B	General-purpose pin G6

11	GPIOH1	B	General-purpose pin H1
12	GND	G	Ground
13	GND	G	Ground
14	USB_HSDM1	AI/O	USB Port1 Host Device Data Minus Pin
15	GPIOH2	B	General-purpose pin H2
16	USB_HSDP1	AI/O	USB Port1 Host Device Data Plus Pin
17	CPIOA5	B	General-purpose pin A5
18	GND	G	Ground

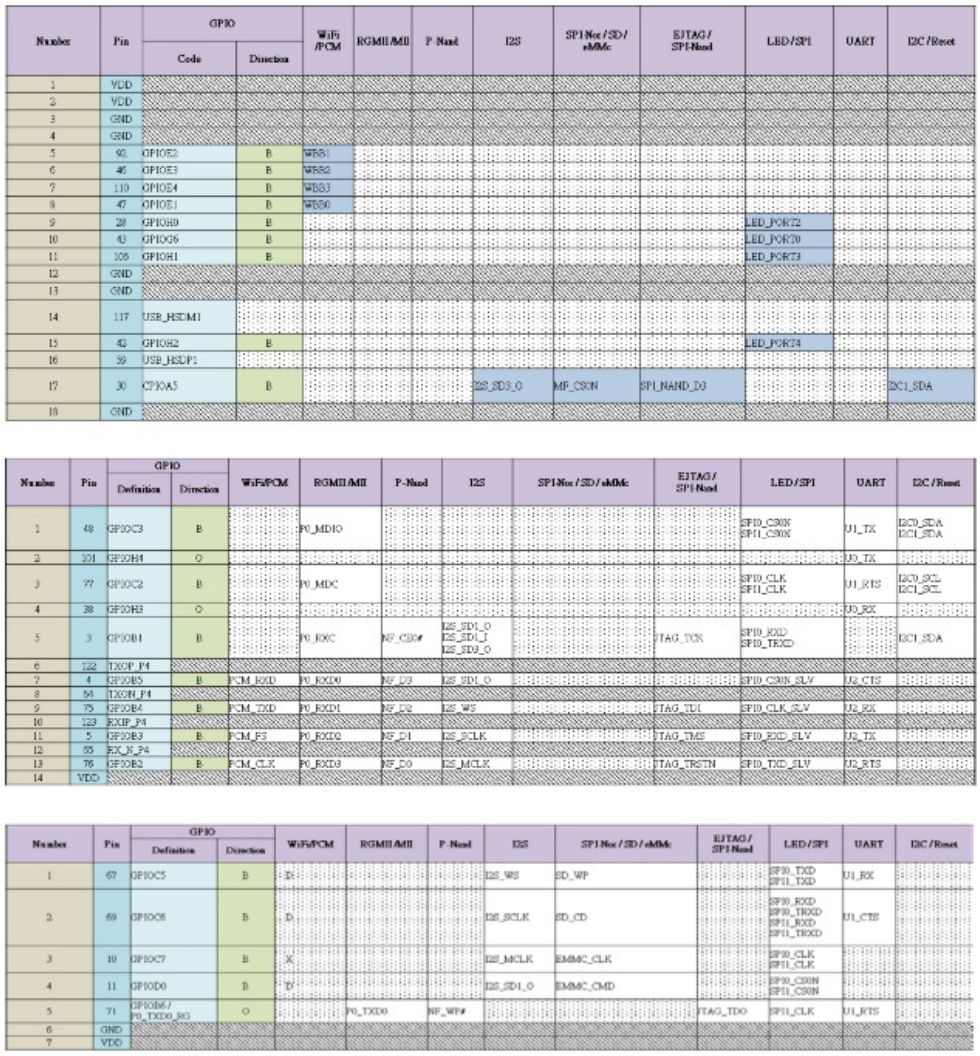
J14 14pin(7*2)

Pin No.	Name	In/Out/P/G	Function
1	GPIOC3	B	General-purpose pin C3
2	GPIOH4	O	General-purpose pin H4
3	GPIOC2	B	General-purpose pin C2
4	GPIOH3	O	General-purpose pin H3
5	GPIOB1	B	General-purpose pin B1
6	TXOP_P4	AO	10/100M Ethernet Transmit Pair
7	GPIOB5	B	General-purpose pin B5
8	TXON_P4	AO	10/100M Ethernet Transmit Pair
9	GPIOB4	B	General-purpose pin B4
10	RXIP_P4	AI	10/100M Ethernet Receive Pair
11	GPIOB3	B	General-purpose pin B3
12	RX_N_P4	AI	10/100M Ethernet Receive Pair
13	GPIOB2	B	General-purpose pin B2
14	VDD	P	3V3 Power Input

J18 7pin(7*1)

Pin No.	Name	In/Out/P/G	Function
1	GPIOC5	P	General-purpose pin C5
2	GPIOC6	P	General-purpose pin C6
3	GPIOC7	G	General-purpose pin C7
4	GPIOD0	G	General-purpose pin D0
5	GPIOB6	B	General-purpose pin B6
6	GND	G	Ground
7	VDD	P	3V3 Power Input

Pin out Specification



Number	Pin	GPIO		WiFi /PCM	RGMII/MII	P-Nand	I2S	SPI Nor / SD / eMMc	EJTAG / SPI-Nand	LED/SPI	UART	I2C/Reset
		Code	Direction									
1	VDD											
2	VDD											
3	GND											
4	GND											
5	92	GPIOE2	B	WB61								
6	46	GPIOE3	B	WB62								
7	110	GPIOE4	B	WB63								
8	47	GPIOE1	B	WB60								
9	28	GPIOH0	B							LED_PORT2		
10	43	GPIOG6	B							LED_PORT0		
11	105	GPIOH1	B							LED_PORT3		
12	GND											
13	GND											
14	117	USB_HSDM1										
15	42	GPIOH2	B							LED_PORT4		
16	39	USB_HSDP1										
17	30	GPIOA5	B				I2S_SD3_0	MF_CS0N	SPI_NAND_D3			I2C1_SDA
18	GND											

Number	Pin	GPIO		WiFi/PCM	RGMII/MII	P-Nand	I2S	SPI-Nor / SD / eMMc	EJTAG / SPI-Nand	LED/SPI	UART	I2C/Reset
		Definition	Direction									
1	48	GPIOC3	B		P0_MDIO					SPI0_CS0N SPI1_CS0N	U1_TX	I2C0_SDA I2C1_SDA
2	101	GPIOH4	O								U0_TX	
3	77	GPIOC2	B		P0_MDC					SPI0_CLK SPI1_CLK	U1_RTS	I2C0_SCL I2C1_SCL
4	38	GPIOH3	O								U0_RX	
5	3	GPIOB1	B		P0_RXC	NF_CE0#	I2S_SD1_0 I2S_SD1_1 I2S_SD3_0		JTAG_TCK	SPI0_RXD SPI0_TRXD		I2C1_SDA
6	122	TX0P_P4										
7	4	GPIOB5	B	PCM_RXD	P0_RXD0	NF_D3	I2S_SD1_0			SPI0_CS0N_SLV	U2_CTS	
8	84	TX0N_P4										
9	75	GPIOB4	B	PCM_TXD	P0_RXD1	NF_D2	I2S_WS		JTAG_TDI	SPI0_CLK_SLV	U2_RX	
10	123	RX1P_P4										
11	5	GPIOB3	B	PCM_FS	P0_RXD2	NF_D1	I2S_SCLK		JTAG_TMS	SPI0_RXD_SLV	U2_TX	
12	85	RX_N_P4										
13	76	GPIOB2	B	PCM_CLK	P0_RXD3	NF_D0	I2S_MCLK		JTAG_TRSTN	SPI0_TXD_SLV	U2_RTS	
14	VDD											

Number	Pin	GPIO		WiFi/PCM	RGMII/MII	P-Nand	I2S	SPI Nor / SD / eMMc	EJTAG / SPI-Nand	LED/SPI	UART	I2C/Reset
		Definition	Direction									
1	67	GPIOC5	B				I2S_WS	SD_WP		SPI0_TXD SPI1_TXD	U1_RX	
2	69	GPIOC6	B				I2S_SCLK	SD_CD		SPI0_RXD SPI0_TRXD SPI1_RXD SPI1_TRXD	U1_CTS	
3	10	GPIOC7	B				I2S_MCLK	EMMC_CLK		SPI0_CLK SPI1_CLK		
4	11	GPIOD0	B				I2S_SD1_0	EMMC_CMD		SPI0_CS0N SPI1_CS0N		
5	71	GPIOB6 / P0_TXD0_RG	O		P0_TXD0	NF_WP#			JTAG_TDO	SPI1_CLK	U1_RTS	
6	GND											
7	VDD											

VDD: Digital I/O Power in 3V3
GND: Digital ground
GOIO: General-purpose In /Out interface. Internal pull-High/pull-down Resistor
※GPIOH4 internal pull-down only in strap period, GPIOC7 None

General Specification

Main Chipset	Realtek RTL8197FS and RTL8812BRH
WLAN Standard	IEEE802.11a/b/g/n and 802.11ac compliant
LED indicator	Drive operation status: Busy/Read/Write
OS Support	Linux, Windows 7/8/10
Dimensions(W*D*H)	62mm* 33mm* 5mm
Power consumption	3.3V/1.37A (at AP mode with 5GHz data transmission)
Temperature-Operating	5 to 40 (℃)
Temperature-Storage	-40 to 60 (℃)
Humidity-Operating	10 to 80 (%RH)
Humidity-Storage	10 to 90 (%RH)

Parameter	Protocol	Value
Operating Frequency	IEEE802.11 b/g/n	2.412 GHz ~2.484GHz
	IEEE802.11 a/n/ac	5.15GHz ~5.85GHz
Support Data Rates	IEEE802.11b	1, 2, 5.5, 11 Mbps
	IEEE802.11g	6, 9, 12, 18, 24, 36, 48, 54 Mbps
	IEEE802.11a	6, 9, 12, 18, 24, 36, 48, 54 Mbps
	IEEE802.11n	MCS0 – MCS7
	IEEE802.11ac	MCS0 – MCS9
Support Bandwidth	IEEE802.11b	20MHz
	IEEE802.11g	20MHz
	IEEE802.11a	20MHz
	IEEE802.11n	20MHz, 40MHz
	IEEE802.11ac	20MHz, 40MHz, 80MHz
Modulation Technique	IEEE802.11b	DSSS and CCK
	IEEE802.11g	OFDM
	IEEE802.11a	OFDM
	IEEE802.11n	OFDM
	IEEE802.11ac	OFDM
Transmit Power	IEEE802.11b	18 dBm ± 2 dBm
	IEEE802.11g	15 dBm ± 2 dBm
	IEEE802.11a	15 dBm ± 2 dBm

	IEEE802.11n	15 dBm ± 2 dBm
	IEEE802.11ac	15 dBm ± 2 dBm

Receive Sensitivity		Signal Strength	Data Rate	Bandwidth
2.4G Receive Sensitivity	IEEE 802.11b	-98 dBm ± 1 dBm	1 Mbps	20MHz
		-89 dBm ± 1 dBm	11 Mbps	20MHz
	IEEE 802.11g	-91 dBm ± 1 dBm	6 Mbps	20MHz
		-74 dBm ± 1 dBm	54 Mbps	20MHz
	IEEE 802.11n	-91 dBm ± 1 dBm	MCS0	20MHz
		-73 dBm ± 1 dBm	MCS7	20MHz
		-89 dBm ± 1 dBm	MCS0	40MHz
5G Receive Sensitivity	IEEE 802.11a	-91 dBm ± 1 dBm	6 Mbps	20MHz
		-74 dBm ± 1 dBm	54 Mbps	20MHz
	IEEE 802.11n	-90dBm ± 1 dBm	MCS0	20MHz
		-72 dBm ± 1 dBm	MCS7	20MHz
		-88 dBm ± 1 dBm	MCS0	40MHz
	IEEE 802.11 ac	-85 dBm ± 1 dBm	MCS0	80MHz

Antenna support list

This module has been approved to operate with the antenna types listed below, with the maximum permissible gain indicated.

Antenna Type	Model Number	connector	Gain(dB)	
			2.4G	5G
PIFA	JEMPCBWIFI -2	I-Pex	3.	4.
PIFA	JEMPCBWIFI -1	I-Pex	3.	2.60
Dipole	JEMPDIPOLEWIFI -1	I-Pex	5.	4.
Dipole	JEMPDIPOLEWIFI -1	I-Pex	5.	4.
Dipole	3.07.XXXX	I-Pex	3.	4.
Dipole	3.07.XXXX	I-Pex	3.	4.

Federal Communication Commission Interference Statement
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 easonable 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.

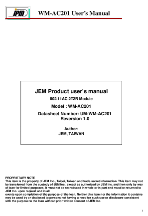
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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 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.
This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter. For products available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible. This device is restricted to indoor use.
FCC 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 a minimum distance 20cm between the radiator & your body.

This module is intended for OEM integrators under the following conditions: This module is certified pursuant to two Part 15 rules sections(15.407, 15.247).
Label of the end product:
The host product must be labeled in a visible area with the following " Contains
FCC ID: N8J-WFMD001 ".
The end product shall bear the following 15.19 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.
This module is restricted to integration into hosts for indoor use only.
This module has been approved under a stand-alone configuration.
OEM integrator has be limited the operation channels in channels 1-11 for the 2.4GHz band.
The separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and different antenna configurations The information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, , versus with multiple, simultaneously transmitting modules or other transmitters in a host can be found at KDB Publication 996369 D04
Appropriate measurements (e.g. 15 B compliance) and if applicable additional equipment authorizations (e.g. SDoC) of the host product to be addressed by the integrator/manufacturer. This module is only FCC authorized for the specific rule parts 15.247, 15.407 listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host product as being Part 15 Subpart B compliant.

The user manual of the end product
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons.
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.
This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Documents / Resources

 WM-AC201 User's Manual JEM Product user's manual 802.11AC 2T2R Module Model : WM-AC201 Datasheet Number: UM-WM-AC201 Reversion 1.0 Author: JEM, TAIWAN PROPRIETARY NOTE This item is the property of JEM Inc., Taipei, Taiwan and trade secret information. This item may not be transferred from the custody of JEM Inc., except as authorized by JEM Inc. and then only by way of loan for limited purposes. It must not be reproduced in whole or in part and must be returned to JEM Inc. upon request and in all events upon completion of the purpose of the loan. Neither this item nor the information it contains may be used by or disclosed to persons not having a need for such use or disclosure consistent with the purpose to the loan without prior written consent of JEM Inc. i	**Jem WM-AC201 Wireless module** [pdf] User Manual WM-AC201 Wireless module, Wireless module