

MCR-WMDBE-CWP User Manual

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■ Revision History

Version	Date	Description	Author
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1. System Overview

1.1 General Description

MCR-WMDBE-CWP is a highly integrated single Module which features an application processor, a low power 1x1 11n single-band Wi-Fi subsystem, a Bluetooth subsystem, and a Power Management Unit.

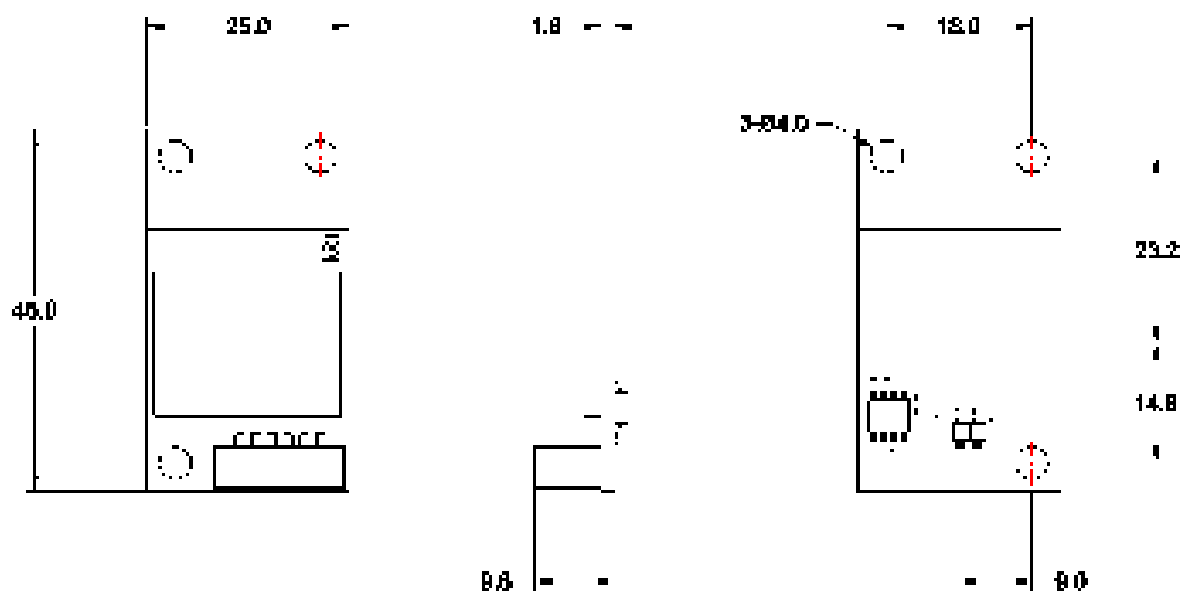
The Wi-Fi subsystem contains the 802.11a/b/g/n radio, baseband, and MAC that are designed to meet both the low power and high throughput application. It also contains a 32-bit RISC CPU that could fully offload the application processor.

The Bluetooth subsystem contains the Bluetooth radio, baseband, link controller. It also uses the same 32-bit RISC CPU for the Bluetooth protocols.

1.2 Features

1.2.1 Physical Dimension

ITEM	Specification
Dimension	45.0 x 25.0 x 12.0 mm
Weight	Typ. 6.0 gram
Modem Interface	SMW200-H06G (Yeonho Electronics)
External Antenna Connector	RF 2.5H REC CONNECTOR (7.005A5-000-1R0)
Mounting Hole	3 Hole



[Fig.1] Physical dimension

1.2.2 WLAN

- IEEE 802.11 a/b/g/n Complicant
- Supports 20MHz bandwidth in 2.4GHz and 5GHz band
- Single-band 1T1R mode with data rate up to 75Mbps
- Greenfield, mixed mode, legacy modes support
- When the module is operated with the AP mode, 2.4GHz is only activated

1.2.3 Bluetooth

- Bluetooth 4.2 Low Energy (LE)
- Integrated Balun and PA
- Supports SCO AND Esco link with re-transmission
- Channel assessment for AFH

1.2.4 Applications

- MCR-WMDBE-CWP is designed for Internet-of-Things that is Wi-Fi and Bluetooth design.

2. Electrical Characteristics

2.1 Absolute Maximum Raing

Item	Min.	Max.	Unit
VCC_5V	-0.3	+20	V
Storage Temperature	-40	+85	°C
ESD (ESD HBM Protection)		+2000	V

2.2 Recommended Operating Range

Item	Min.	Max.	Unit
VCC_5V	+4.5	+5.5	V
Operating Temperature	-30	+85	°C

2.3 Current Consumption

The listed current consumption is tested at 5V power supply.

Mode				Average (mA)	Peak (mA)
WiFi	Standby				
	Tx mode	2G	802.11b CCK, 11Mbps		
			802.11g OFDM, 54Mbps		
			802.11n OFDM, MCS7		
		5G	802.11a OFDM, 6Mbps		
			802.11a OFDM, 54Mbps		
			802.11n OFDM, MCS7		
	RX Mode	2G	802.11b/g/n		
		5G	802.11b/g/n		
BLE	Tx mode				
	RX Mode				

3. Radio Characteristics

3.1 Wi-Fi 2.4GHz Band RF transmitter Specifications

Parameters	Description	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range	Center channel Frequency	2412		2462	MHz
Output Power	1 Mbps CCK	18			dBm
	11 Mbps CCK	18			
	6 Mbps OFDM	18			
	54 Mbps OFDM	15			
	HT20, MCS0	16.5			
	HT20, MCS7	15			
Tx EVM	1 Mbps CCK			35	%
	11 Mbps CCK			35	
	6 Mbps OFDM			-5	dB
	54 Mbps OFDM			-25	
	HT20, MCS0			-5	
	HT20, MCS7			-28	
frequency Tolerance	802.11b Chip Clock Frequency Tolerance			+/-25	ppm
	802.11g/n Symbol Clock Frequency Tolerance			+/-20	

3.2 Wi-Fi 2.4GHz Band RF Receiver Specifications

Parameters	Description	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range	Center channel Frequency	2412		2462	MHz
RX Sensitivity	1 Mbps CCK		-97	-94	dBm
	2 Mbps CCK		-93	-90	
	5.5 Mbps CCK		-91	-88	
	11 Mbps CCK		-89	-86	
	BPSK rate 1/2, 6 Mbps OFDM		-94	-91	
	BPSK rate 3/4, 9 Mbps OFDM		-91	-88	
	QPSK rate 1/2, 12 Mbps OFDM		-89	-86	
	QPSK rate 3/4, 18 Mbps OFDM		-87	-84	
	16QAM rate 1/2, 24 Mbps OFDM		-83	-80	
	16QAM rate 3/4, 36 Mbps OFDM		-80	-77	
	64QAM rate 1/2, 48 Mbps OFDM		-78	-75	
	64QAM rate 3/4, 54 Mbps OFDM		-76	-73	
	HT20, MCS0		-93	-90	
	HT20, MCS1		-90	-87	
	HT20, MCS2		-87	-84	
	HT20, MCS3		-84	-81	
	HT20, MCS4		-81	-78	
	HT20, MCS5		-76	-73	
	HT20, MCS6		-75	-72	
	HT20, MCS7		-73	-70	
Maximum Receiver Level	802.11b	-10			dBm
	802.11g	-20			
	802.11n	-20			

3.3 Wi-Fi 5GHz Band RF transmitter Specifications

Parameters	Description	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range	Center channel Frequency	5180		5825	MHz
Output Power	6 Mbps OFDM	16			
	54 Mbps OFDM	14			
	HT20, MCS0	16			
	HT20, MCS7	14			
Tx EVM	6 Mbps OFDM			-5	dB
	54 Mbps OFDM			-25	
	HT20, MCS0			-5	
	HT20, MCS7			-28	
Frequency Tolerance	802.11g/n Symbol Clock Frequency Tolerance			+/-20	ppm

3.4 Wi-Fi 5GHz Band RF Receiver Specifications

Parameters	Description	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range	Center channel Frequency	5180		5825	MHz
RX Sensitivity	BPSK rate 1/2, 6 Mbps OFDM		-92	-89	dBm
	BPSK rate 3/4, 9 Mbps OFDM		-90	-87	
	QPSK rate 1/2, 12 Mbps OFDM		-90	-86	
	QPSK rate 3/4, 18 Mbps OFDM		-88	-85	
	16QAM rate 1/2, 24 Mbps OFDM		-85	-82	
	16QAM rate 3/4, 36 Mbps OFDM		-81	-78	
	64QAM rate 1/2, 48 Mbps OFDM		-77	-74	
	64QAM rate 3/4, 54 Mbps OFDM		-75	-72	
	HT20, MCS0		-92	-89	
	HT20, MCS1		-90	-87	
	HT20, MCS2		-87	-84	
	HT20, MCS3		-84	-81	
	HT20, MCS4		-81	-78	
	HT20, MCS5		-76	-73	
	HT20, MCS6		-74	-71	
	HT20, MCS7		-73	-70	
Maximum Receiver Level	802.11g	-20			dBm
	802.11n	-20			

3.5 Bluetooth LE transmitter Specifications

Parameters	Description	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range	Center channel Frequency	2402		2480	MHz
Output Power	At max power out level	-20	7	10	dBm
Carrier Frequency offset and Drift	Frequency offset	-150		150	kHz
	Frequency drift	-50		50	kHz
	Max. drift rate	-20		20	Hz/us
Modulation characteristic	$\Delta f_{1\text{avg}}$	225		275	kHz
	$\Delta f_{1\text{max}}$	185			kHz
	$\Delta f_{2\text{avg}} / \Delta f_{1\text{avg}}$	0.8	0.94		Hz/us
In-band Spurious Emission	$\pm 2\text{M}$ offset			-20	dBm
	$> \pm 3\text{M}$ offset			-30	dBm

3.6 Bluetooth LE Receiver Specifications

Parameters	Description	Spec.			
		Min.	Typ.	Max.	Unit
Frequency Range	Center channel Frequency	2402		2480	MHz
Min Sensitivity	PER < 30.8%		-95	-92	dBm
Max input Level	PER < 30.8%	-10	-5		dBm

4. Module Interface Description

4.1 I/O Interface Connector (power / Reset / UART)

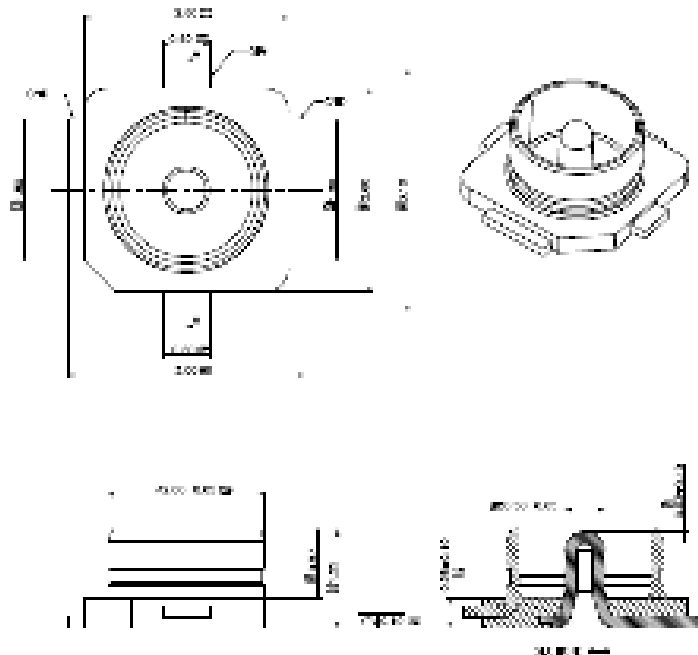


[Fig.3] I/O Interface Connector

ITEM	PIN No.	PIN Name	Description
SMW200-H06G (Yeonho)	1	GND	System Ground
	2	GND	System Ground
	3	VCC_5V	Power Supply (5V)
	4	TX	UART TXD (5V level)
	5	RX	UART RXD (5V level)
	6	RSTN	5V Level active low Reset input

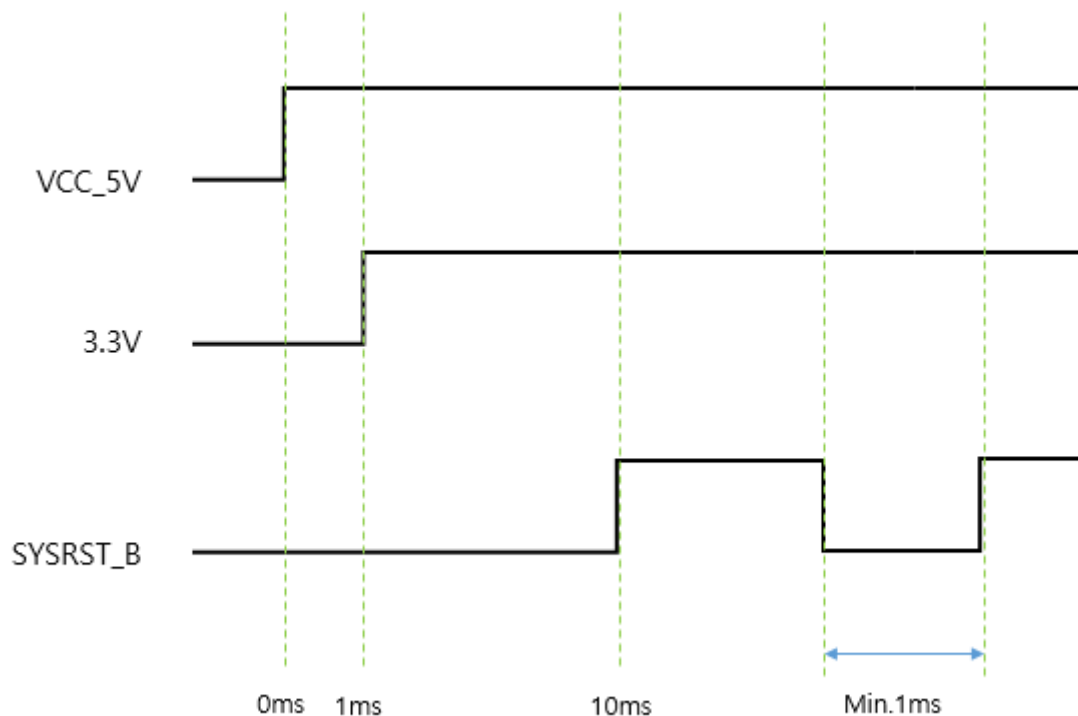
4.2 Coaxial RF Connector

Item	Description
Manufacturer	Kunshan Jiahua Electronics Co., Ltd
Part Number	7.005A5-000-1R0



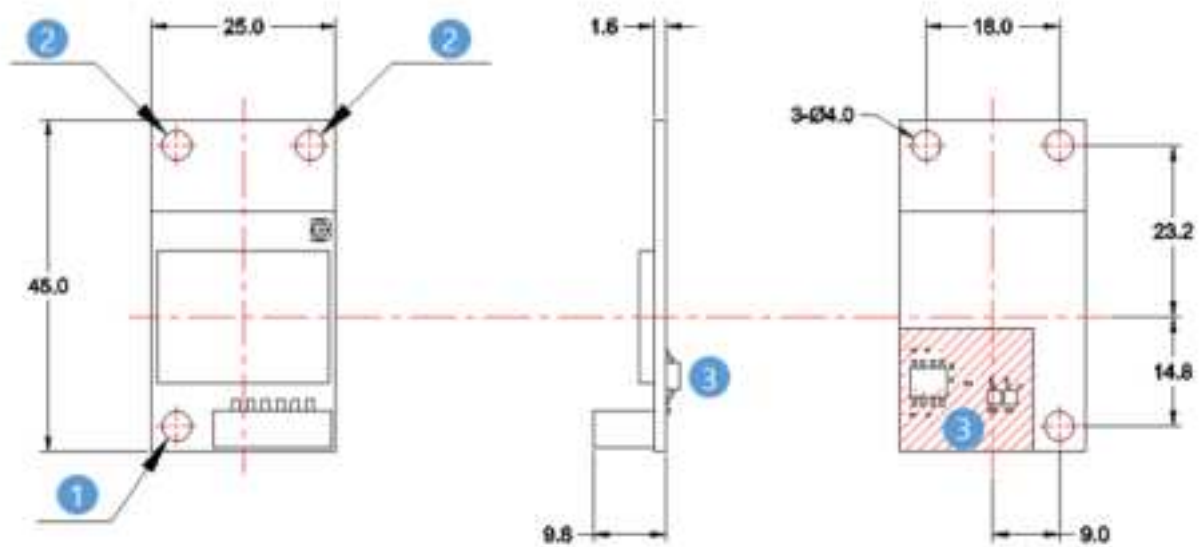
[Fig.4] Coaxial RF Connector Dimension

5. Power on Sequence & HW reset



[Fig.5] I/O Interface Connector

6. Mechanical Guide & Assembly



①	This is a Screw hole for fixing the Module. You can use screws of M4 or less.
②	<p>1. In case of using the external antenna This is a Screw hole for fixing the Module. You can use screws of M4 or less.</p> <p>2. in case of using the internal antenna This is just an module hole for fixing the module. Do not insert the screw.</p>
③	Be careful not to interfere with module's parts on bottom and Injection equipment
④	We recommend to place the antenna as free of metallic materials as possible

7. FCC 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.

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

This device should be installed and operated with minimum 20 cm between the radiator and your body.

INTEGRATION INSTRUCTIONS

List of applicable FCC rules

Complies with part 15.247, Part 15.407

Summarize the specific operational use conditions

This device should be installed and operated with minimum 20 cm between the radiator and your body. The module must not be co-located or operating in conjunction with any other antenna or transmitter.

Limited module procedures

Not applicable

Trace antenna designs

Not applicable

RF exposure considerations

This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. The module is limited to installation in mobile or fixed applications. At least 20 Cm of separation distance between the transmitting antenna and the user's body must be maintained at all times.

The host manual shall include the RF exposure statements.

Antennas

This device is designed to operate with antennas listed in table below.

Manufacture	Model	Antenna type
K-MARU	MW25DEC130PT-V	PCB Antenna
INNO-LINK	INNO-APC-0321	PCB Antenna
COWAY	CWA-01	PCB Antenna
WINIZEN	W5I-BO-07	PCB Antenna

Label and compliance information

The module is labeled with its own FCC. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

"Contains FCC ID: 2AVW5MCRWMDBE-CWP"

The host manual shall include the following regulatory 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.

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

This device should be installed and operated with minimum 20 cm between the radiator and your body.

Information on test modes and additional testing requirements

This module is tested in a standalone. Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures.

Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed 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 host product may need 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.