



M7663BU3

**802.11ac 2T2R 866Mbps WLAN + BT5.1
USB Combo Module Specification**



Module Name: M7663BU3	
Module Type: 802.11a/b/g/n/ac 867Mbps WLAN + Bluetooth v5.1 USB Combo Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
Approval:	
Title:	
Signature:	Date:

Revision History

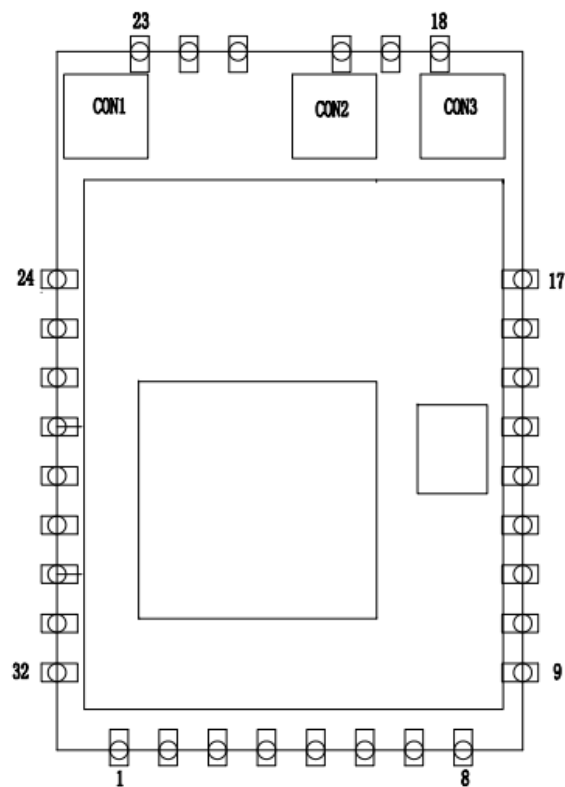
Revision	Summary	Release Date
0.1	Initial release	2021-08-21

1. Introduction

The M7663BU3 is a highly integrated 2T2R 802.11a/b/g/n/ac Wireless LAN (WLAN) network and

Chipset	MT7663BUN
WLAN Standard	IEEE 802.11 a/b/g/n/ac
BT Specification	Bluetooth Core Specification v5.1/4.2/4.1/2.1
Host Interface	USB2.0 for WiFi and Bluetooth
Antenna	Connect to the external antennas through IPEX connectors
Dimension	SMD 32Pins --27.0*18.0*3.0mm (L*W*H), Tolerance: +/-0.15mm
Power Supply	DC 3.3V±0.2V @ 1500 mA (Max)
Operation Temperature	-20°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



(TOP View)

2.1 Pin Definition

No.	Pin Name	Type	Level	Module Pin Description
1	NC	-	-	NC
2	NC	-	-	NC
3	NC	-	-	NC
4	NC	-	-	NC
5	GND	P		GND
6	USB_DP	I/O		USB differential data line
7	USB_DM	I/O		USB differential data line
8	GND	P		GND
9	NC	-	-	NC
10	NC	-	-	NC
11	GND	P		GND
12	NC	-	-	NC
13	GND	P		GND
14	BT_WAKE_HOST	O		BT CHIP WAKES UP HOST
15	NC	-	-	NC
16	NC	-	-	NC
17	NC	-	-	NC
18	GND	P		GND
19	NC	-	-	NC
20	GND	P		GND
21	GND	P		GND
22	NC	-	-	NC
23	GND	P		GND
24	GND	P		GND
25	GND	P		GND
26	WLAN_WAKE_HOST	O		WLAN CHIP WAKES UP HOST
27	NC	-	-	NC
28	RESET			System reset Input(active low)
29	GND	P		GND
30	VDD33	P		Main Power supply

31	NC	-	-	NC
32	GND	P		GND
CON1	BT_RF	RF		IPEX connector for BT RF to BT_ANT
CON2	WLAN_RF0	RF		IPEX connector for 2.4G / 5G RF to WLAN_ANT0
CON3	WLAN_RF1	RF		IPEX connector for 2.4G / 5G RF to WLAN_ANT1

P: Power or Ground; I/O: In/Output; I: Input; O:Output; RF: Analog RF Port or RF Ground;

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-20	25	70	°C
External Antenna VSWR			1.92		/
Supply Voltage	VDD33	3.1	3.3	3.5	V

3.2 Current Consumption

Conditions : VDD33=3.3V ; Ta:25°C ;			
Use Case	VDD33 Current (average)		
	Typ	Max	Units
WLAN Unassociated (Linux Driver, BT_Disable)	68	75	mA
2.4G 11b 1Mbps TX @ 19dBm (1TX RF test)	368	398	mA
2.4G 11b 1Mbps RX (1RX RF test)	98	128	mA
2.4G 11g 6Mbps TX@18dBm (1TX RF test)	331	361	mA
2.4G 11g 6Mbps RX (1RX RF test)	96	126	mA
2.4G 11n HT20 MCS8 TX@14dBm (2TX RF test)	591	621	mA
2.4G 11n HT20 MCS8 RX (2RX RF test)	125	155	mA
2.4G 11n HT40 MCS15 TX@14dBm (2TX RF test)	384	414	mA
2.4G 11n HT40 MCS15 RX (2RX RF test)	119	149	mA

5G 11a 6Mbps TX @ 18dBm (1TX RF test)	456	506	mA
5G 11a 6Mbps RX (1RX RF test)	127	177	mA
5G 11n HT20 MCS8 TX@15.5dBm (2TX RF test)	703	753	mA
5G 11n HT20 MCS8 RX (2RX RF test)	144	194	mA
5G 11n HT40 MCS15 TX@14dBm (2TX RF test)	508	558	mA
5G 11n HT40 MCS15 RX (2RX RF test)	146	196	mA
5G 11ac VHT80 MCS9 TX@14dBm (2TX RF test)	476	526	mA
5G 11ac VHT80 MCS9 RX (2RX RF test)	156	206	mA

4. WLAN & Bluetooth RF Specifications

4.1 2.4G WLAN RF Specification

Conditions : VDD33=3.3V ; Ta:25°C	
Features	Description
WLAN Standard	IEEE 802.11b/g/n/ac, CSMA/CA
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)
Channels	Ch1~Ch13 (For 20MHz Channels)
Modulation	802.11b (DSSS): CCK, DQPSK, DBPSK; 802.11g (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11ac (OFDM): BPSK, QPSK, QAM16, QAM64, QAM256;
Date Rate	802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps; 802.11ac (VHT20): MCS0~MCS8(1T1R) 6.5~86.7Mbps; 802.11ac (VHT20): MCS0~MCS8(2T2R) 13~173.3Mbps; 802.11ac (VHT40): MCS0~MCS9(1T1R)13.5~200Mbps; 802.11ac (VHT40): MCS0~MCS9(2T2R)27~400Mbps;
Frequency Tolerance	≤±15ppm

2.4G Receiver Specifications (WLAN_ANT0 & WLAN_ANT1)

RX Rate	Min Input Level (dBm)	Max Input Level (dBm)	PER
802.11b@1Mbps	-92dBm	-5	< 8%
802.11b@11Mbps	-86dBm	-5	< 8%
802.11g@6Mbps	-90dBm	-5	< 10%
802.11g@54Mbps	-72dBm	-5	< 10%
802.11n@HT20_MCS0	-88dBm	-5	< 10%
802.11n@HT20_MCS7	-70dBm	-5	< 10%
802.11n@HT40_MCS0	-86dBm	-5	< 10%
802.11n@HT40_MCS7	-68dBm	-5	< 10%
802.11ac@VHT40_MCS9	-61dBm	-5	< 10%

4.2 5G WLAN RF Specification

Conditions: VDD33=3.3V ; Ta:25°C

Features	Description
WLAN Standard	IEEE 802.11a/n/ac, CSMA/CA
Frequency Range	5.15~5.25GHz; 5.735~5.835GHz (5GHz ISM Band)
Channels	Ch36, Ch40, Ch44, Ch48; Ch149~Ch165 (For 20MHz Channels)
Modulation	802.11a (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64; 802.11ac (OFDM): BPSK, QPSK, QAM16, QAM64, QAM256;

Date Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R) 27~300Mbps; 802.11ac (VHT20): MCS0~MCS8(1T1R) 6.5~86.7Mbps; 802.11ac (VHT20): MCS0~MCS8(2T2R) 13~173.3Mbps; 802.11ac (VHT40): MCS0~MCS9(1T1R)13.5~200Mbps; 802.11ac (VHT40): MCS0~MCS9(2T2R)27~400Mbps; 802.11ac (VHT80): MCS0~MCS9(1T1R)29.3~433.3Mbps; 802.11ac (VHT80): MCS0~MCS9(2T2R)58.5~866.7Mbps;
Frequency Tolerance	$\leq \pm 15\text{ppm}$

5G Receiver Specifications (WLAN_ANT0 & WLAN_ANT1)				
RX Rate	Min Input Level (dBm)	Max Input Level (dBm)	PER	
802.11a@6Mbps	-91	-5	< 10%	
802.11a@54Mbps	-72	-5	< 10%	
802.11n@HT20_MCS0	-90	-5	< 10%	
802.11n@HT20_MCS7	-70	-5	< 10%	

802.11n@HT40_MCS0	-86	-5	< 10%	
802.11n@HT40_MCS7	-69	-5	< 10%	
802.11ac@VHT80_MCS0	-86	-5	< 10%	
802.11ac@VHT80_MCS9	-56	-5	< 10%	

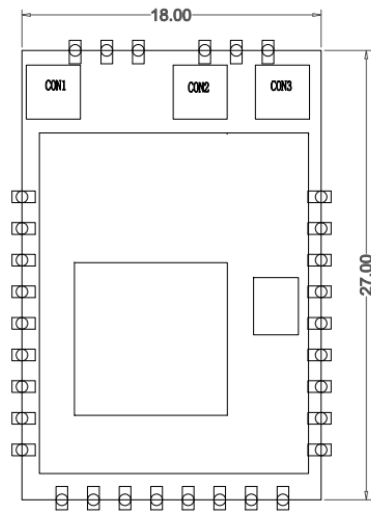
4.3 Bluetooth RF Specification

Conditions: VDD33=3.3V ; Ta:25°C			
Features	Description		
Bluetooth Specification	Bluetooth Core Specification v5.1/4.2/4.1/2.1		
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)		
Channels	Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels); Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);		
Power Classes	Bluetooth Classic: Class1; Bluetooth Low Energy: Class1.5;		
Date Rate & Modulation	BR_1Mbps: GFSK; EDR_2Mbps: π/4-DQPSK; EDR_3Mbps: 8DPSK; LE_1Mbps: GFSK (Uncoded);		
	</		

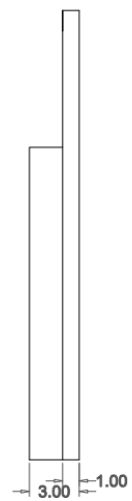
Δf2max	115KHz	154.3kHz	/	
Δf2avg/Δf1avg	0.8	0.89	/	
Items	Min	Typ	Max	
EDR_3M(3DH5) EDR Carrier Frequency Stability and Modulation Accuracy				
ωi	-75KHz	-8.16kHz	+75KHz	
ωi+ωo	-75KHz	-9.03kHz	+75KHz	
ωo	-10KHz	-0.9kHz	+10KHz	
8DPSK RMS DEVM	/	0.026	0.13	
8DPSK DEVM	/	0.059	0.25	
Items	Min	Typ	Max	
LE_1M Modulation Characteristics				
Δf1avg	225KHz	250KHz	275KHz	
Δf2avg	/	234.4KHz	/	
Δf2max	185KHz	225KHz	/	
Δf2avg/Δf1avg	0.8	0.93	/	
Items	Min	Typ	Max	
Bluetooth Receiver Specifications(BT_ANT)				
Items	Sensitivity		Maximum Input Level	
	Input Level(Typ)	BER	Input Level(Typ)	BER
BR_1M (DH1)	-91 dBm	≤ 0.1%	-5 dBm	≤ 0.1%
EDR_3M (3DH5)	-80 dBm	≤ 0.01%	-5 dBm	≤ 0.1%
	Input Level (Typ)	PER	Input Level (Typ)	PER
LE_1M	-91 dBm	≤ 5%	-5 dBm	≤ 5%

5. Mechanical Specifications

5.1 Module Outline Drawing



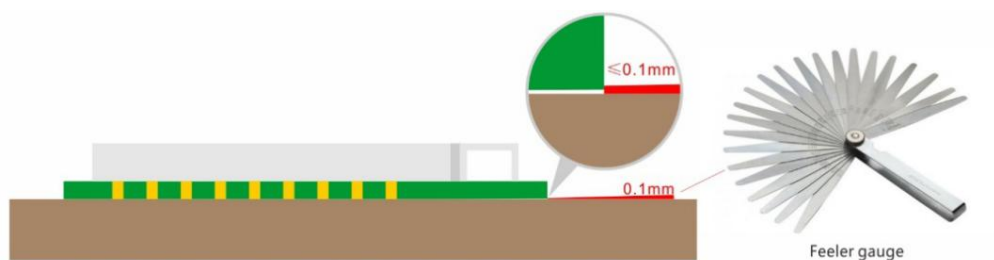
Top View



Side View

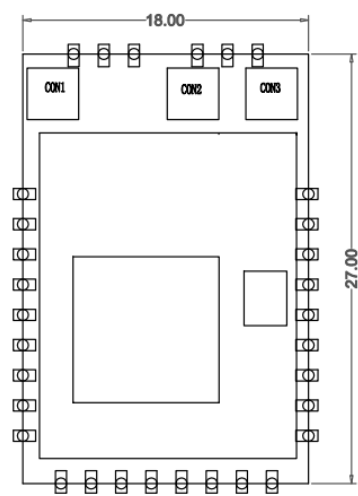
Module dimension: 27.0mm*18.0mm*3.0mm (L*W*H ; Tolerance: $\pm 0.15\text{mm}$)

IPEX / MHF-1 connector dimension: 2.6*3.0*1.2mm (L*W*H, $\varnothing 2.0\text{mm}$)

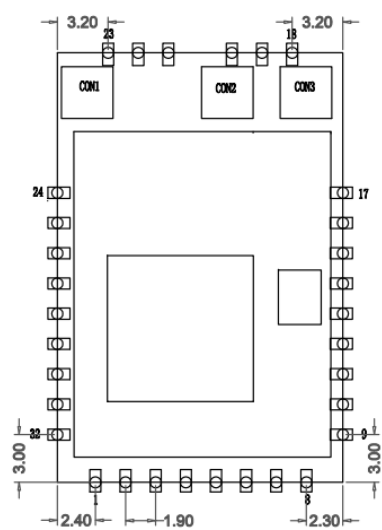
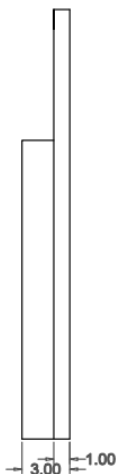


Module Bow and Twist: $\leq 0.1\text{mm}$

5.2 Mechanical Dimensions



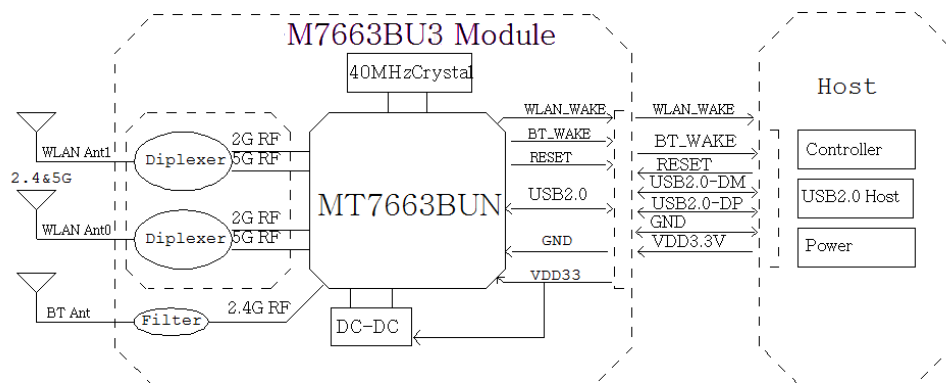
Top View



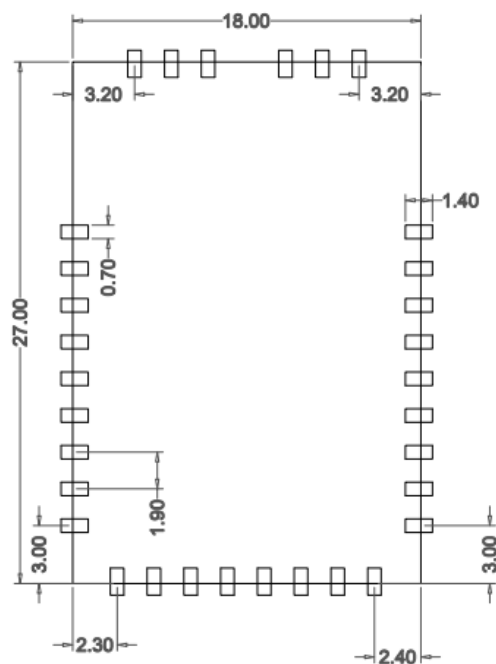
Bottom View

Application Information

5.3 Typical Application Circuit

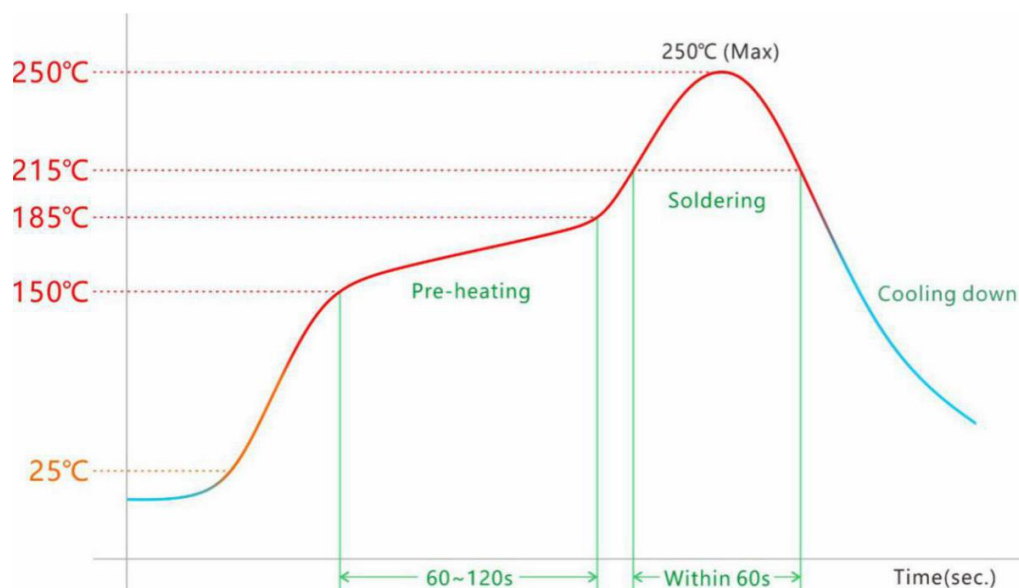


5.4 Recommend PCB Layout Footprint



Bottom View

6.3 Reflow Soldering Standard Conditions



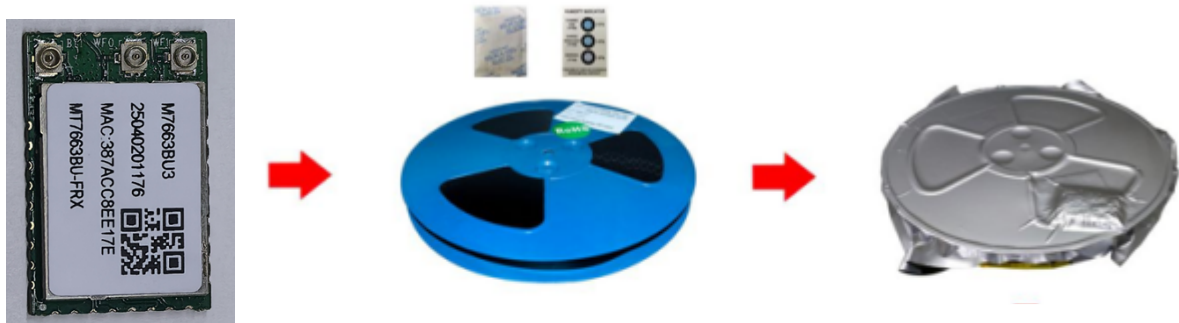
Please use the reflow within 2 times.
Set up the highest temperature within 250°C.

6. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	MT7663BUN	MediaTek Inc.	
2	PCB	M7663BU3	Shenzhen Tie Fa Technology CO. LTD	
			Guangdong KINGSHINE ELECTRONICS CO., LTD	
			Quzhou Sunlord Electronics CO., LTD	
3	Crystal	40MHz-12pF-10ppm-3225	Lucki Electronics Co., Ltd	
			Shenzhen Kaiyuexiang Electronics Co., Ltd	
			Chengde Oscillator Electronic Technology Co., Ltd.	
4	Diplexer	DP1608-A2455DTB2	Advanced Ceramic X Corp.	
		RFDIP160806ELM6T63	Walsin Technology CORP.	

7. Package and Storage Information

7.1 Package Dimensions



Package specification:

1. 700 modules per roll and 2,800 modules per box.
2. Outer box size: 37.5*36*29cm.
3. The diameter of the blue environment-friendly rubber plate is 13 inches, with a total thickness of 48mm (with a width of 44mm carrying belt).
4. Put 1 package of dry agent (20g) and humidity card in each anti-static vacuum bag.
5. Each carton is packed with 4 boxes.

7.2 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -40°C to +85°C,
Storage humidity: 10% to 95 (Non-Condensing)

Recommended Storage Conditions:

Storage temperature: 5°C to +40°C,
Storage humidity: 20% to 90% RH

Please use this Module within 12month after vacuum-packaged.

The Module shall be stored without opening the packing.

After the packing opened, the Module shall be used within 72hours.

When the color of the humidity indicator in the packing changed,

The Module shall be baked before soldering.

Baking condition: 60°C, 24hours, 1time.

ESD Sensitivity:

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!



ESD CAUTION

電波法により 5GHz 帯は屋内使用に限ります

Warning

1) This device was tested for typical body-worn operations. To comply with RF exposure requirements, a minimum separation distance of 20cm must be maintained between the user' s body and the handset, including the antenna.

2) This product can be used across EU member states.

BT frequency range: 2402-2480MHz, Maximum E.I.R.P:5.95dBm

BLE frequency range: 2402-2480MHz, Maximum E.I.R.P:5.91dBm

2.4GWi-Fi frequency range: 2412-2472MHz, Maximum E.I.R.P: 15.46dBm

5.2GWi-Fi frequency range: 5180-5240MHz, Maximum E.I.R.P: 15.18dBm

5.8GWi-Fi frequency range: 5745-5825MHz, Maximum E.I.R.P: 12.81dBm

RED 2014/53/EU

Declaration Of Conformity

This product can be used across EU member states .

Hereby, Shenzhen Feng Rui Xiang Intelligent Technology Co., Ltd. declares that this 802.11ac 2T2R 867Mbps WLAN + BT5.1 USB Combo Module Specification is in compliance with the essential requirements and other relevant provisions of directive 2014/53/EU.

This equipment may be operated in all European countries. The 5150-5250 MHz of Wi-Fi 5GHz can be used indoors only when the equipment is not attached to a fixed installation or to the external body of road vehicles, a fixed infrastructure or a fixed outdoor antenna.

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.

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 modular has been tested and found to comply with part 15 requirements for Modular Approval.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiated Exposure Statement

This device 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. The antenna used for this transmitter must not transmit simultaneously with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. The OEM integrator is still responsible for testing their end-user end-product for any additional compliance requirements required with this modular installed.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

2.2 List of applicable FCC rules

CFR 47 FCC Part 15 Subpart C has been investigated. It is applicable to the modular transmitter

2.3 Specific Operational Use Conditions - Antenna Placement Within the Host Platform

The module is tested for standalone mobile RF exposure use condition.

The antenna must be installed such that 20cm is maintained between the antenna and users,

The transmitter module may not be co-located with any other transmitter or antenna.

In the event that these conditions cannot 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 cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

2.4 Limited Module Procedures

Not applicable

2.5 Trace Antenna Designs

Not applicable

2.6 RF Exposure Considerations

This device 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.

2.7 Antenna Type and Gain

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation.

Antenna Specification list below:

Model	Type	Connector	Peak gain (dBi)				
			2400-2483.5 MHz	5150-5250 MHz	5250-5350 MHz	5470-5725 MHz	5725-5850 MHz
M7663BU3	External Antenna	/	3.00dBi	3.00dBi	/	/	3.00dBi

2.8 End Product Labelling Compliance Information

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily removed. If not, a second label must be placed on the outside of the final device that contains the following text: "Contains FCC ID: **2AVED-M7663BU3**". The FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on Test Modes and Additional Testing Requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new FCC authorization.

Host manufacturer installed this modular with single modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C, 15.209, 15.207 requirement, only if the test result comply with FCC part 15C, 15.209, 15.207 requirement, then the host can be sold legally.

2.10 Additional testing, Part 15 Subpart B Disclaimer

This transmitter modular is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B rules requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rules requirements if applicable.

As long as all 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 modular installed.

2.11 Note EMI Considerations

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 host integrator must follow the integration instructions provided in this document and ensure that the composite system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB Publication 996369.

OEM/Host Manufacturer Responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and RF Exposure essential requirements of the FCC rules.

2.12 How to Make Changes - Important Note

In the event that these conditions cannot 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 cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.