

# **BL-M 2268BU1-B**

**802.11ac 867Mbps WLAN + BT5.0**

**MT7668BU USB2.0**

**Module Specification**



Module Name: BL-M2268BU1-B	
Module Type: 802.11a/b/g/n/ac 867Mbps WLAN + Bluetooth 5.0 USB2.0 Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
BL-link Approval:	
Title:	
Signature:	Date:

## Revision History

Revision	Summary	Release Date
0.1	First release	2020-09-3
1.0	Official release	2020-10-20

## 1. Introduction

BL-M2268BU1-B is a highly integrated module composed of two independent Dual-band WLAN 2T2R USB2.0 submodules, it is designed base on MT7668BU chipset. The independent submodules support IEEE 802.11a/b/g/n/ac standard and provides the maximum PHY data rate up to 867Mbps, and supports 802.11ac Wave-2 MU-MIMO and 802.11n MIMO for 2.4/5G band. 7668BU includes Bluetooth 2.1+EDR/4.2+LE and support BT5.0 system, This module can offer feature-rich wireless connectivity and reliable throughput from an extended distance.

BL-M2268BU1-B is applicable for InteractiveMeetingBoard/OTT Box/IP TV and other smart wireless devices, the typical application is 7668BU connecting to router used for network, the other one submodule used for Wireless projection as access point (AP). AP and WLAN both work on 2.4GHz is not suggested, 7668BU works as AP is not suggested.

## Feature

Operating Frequencies: 2.4~2.4835GHz or 5.15~5.835GHzs

Interface: USB2.0

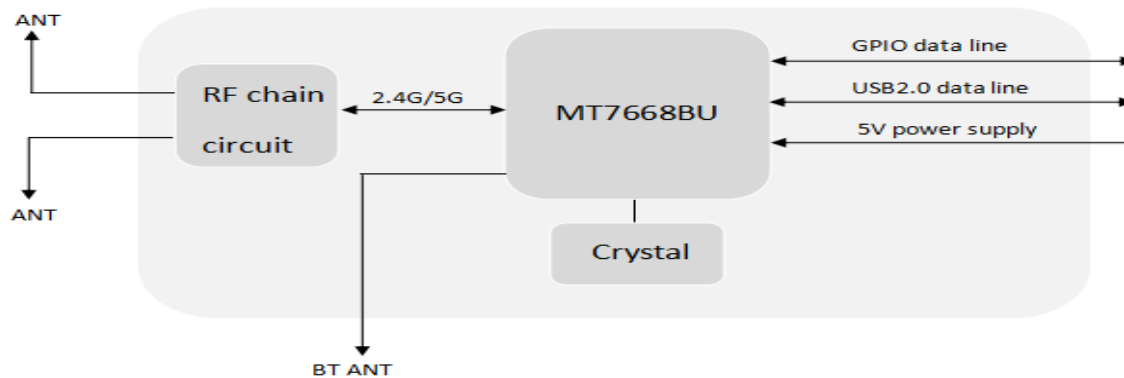
IEEE Standards: IEEE 802.11a/b/g/n/ac

Wireless data rate can reach up to 876Mbps

WLAN supports PIFA antenna, BT supports PCB printed antenna

Power Supply: VDD5.0V±0.3V main power supply

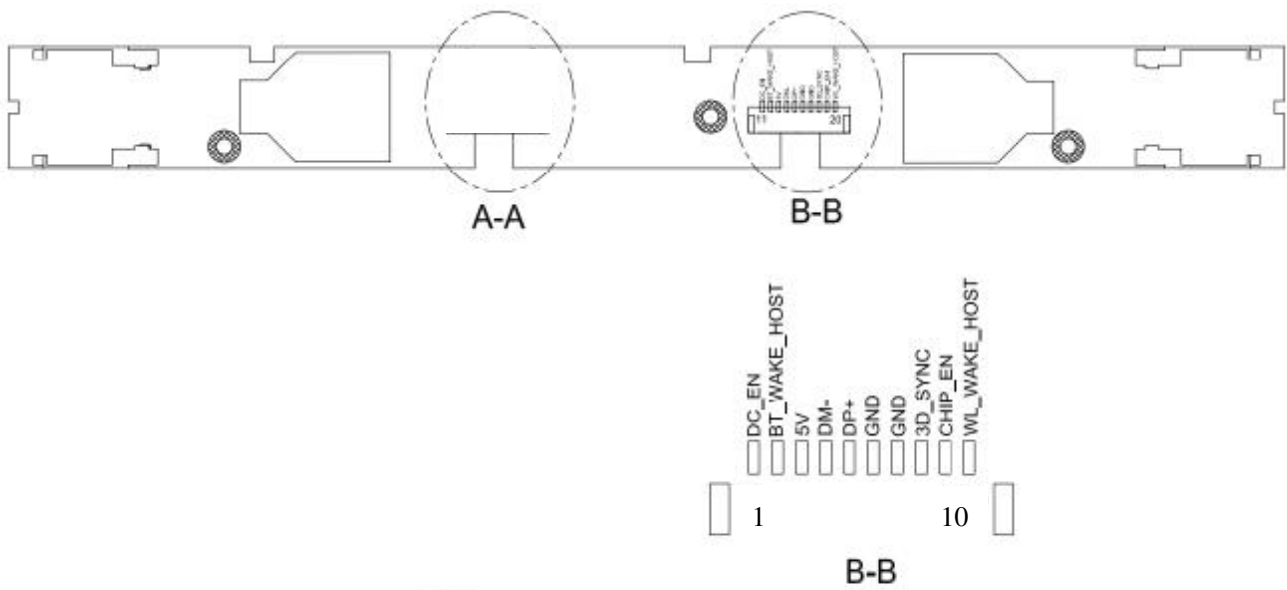
## Block Diagram



## General Specifications

Module Name	BL-M2268BU1-B 867Mbps WLAN + BT5.0 USB2.0 Module
Chipset	MT7668BU
WLAN Standards	IEEE802.11a/b/g/n/ac
Host Interface	USB2.0
Antenna	WLAN: PIFA antenna, BT: PCB printed antenna
Dimension	200*19*5.5mm (L*W*H)
Power Supply	MT7668BU: DC 5.0V±0.3V @ 500 mA (Max),
Operation Temperature	-20°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)
Storage Temperature	-40°C to +85°C
Storage Humidity	10% to 95% RH (Non-Condensing)

## 2. Pin Assignments



放大比例 1 : 3

### Pin Definition

No	Pin Name	Type	Voltage	Module Pin Description
7668BU - B				
1	DC_EN	I	5V	Power enable, active low module power disable, pull high internal
2	BT_WAKE_HOST	I	3.3V	BT wake up host, 200ms pulse, low level effective or high level effective can be configured
3	VDD	P	5V	5V power supply
4	USB_D-	I/O		USB differential data line
5	USB_D+	I/O		USB differential data line
6	GND	RF		GND
7	GND	RF		GND
8	NC	--		--
9	CHIP_IN	I	3.3V	Chip enable, active low shutdown the module, pull high internal
10	WL_WAKE_HOST	I	3.3V	WLAN wake up host, 200ms pulse, low level effective or high level effective can be configured

### 3. Electrical and Thermal Specifications

#### Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-20	25	70	°C
Supply Voltage	VDD	4.7	5	5.3	V

#### Digital I/O DC Specifications

Symbol	Parameter	Min	Typ	Max	Units
VIH	Input High Voltage	2.0	3.3	3.6	V
VIL	Input Low Voltage	--	0	0.9	V
VOH	Output High Voltage	2.97	--	3.3	V
VOL	Output Low Voltage	0	--	0.33	V

#### Current Consumption

7668BU Current Consumption			
Conditions : VDD=5V ; Ta:25°C			
Use Case	VDD5V Current (average)		
	Typ	Max	Units
WiFi Unassociated (Linux Driver)	85.1	92.5	mA
2.4G TX CCK 1Mbps @ 17dBm (RF-Test)	258	285	mA
2.4G TX CCK 11Mbps @ 17dBm (RF-Test)	270	298	mA
2.4G TX HT20 MCS8 @ 14dBm (RF-Test)	400	428	mA
2.4G TX HT20 MCS15 @ 14dBm (RF-Test)	283	315	mA
2.4G TX HT40 MCS8 @ 14dBm (RF-Test)	332	360	mA
2.4G TX HT40 MCS15 @ 14dBm (RF-Test)	254	278	mA
2.4G RX Active HT40 MCS15 (RF-Test)	95.5	125	mA
5G TX 11G 6Mbps @ 14dBm (RF-Test)	247	275	mA
5G TX 11G 541Mbps @ 13dBm (RF-Test)	189	215	mA

5G TX HT20 MCS8 @ 13dBm (RF-Test)	448	479	mA
5G TX HT20 MCS15 @ 13dBm (RF-Test)	327	255	mA
5G TX HT40 MCS8 @ 13dBm (RF-Test)	442	470	mA
5G TX HT40 MCS15 @ 13dBm (RF-Test)	290	322	mA
5G TX HT80 MCS0 @ 12dBm (RF-Test)	381	415	mA
5G TX HT80 MCS9 @ 11dBm (RF-Test)	252	285	mA
5G RX Active VHT80 MCS9 (RF-Test)	115	145	mA
BT			
BT Unassociated (Linux Driver)	21.8	35	mA
Bluetooth TX @ 5dBm	159	186	mA
Bluetooth RX	138	165	mA

## 4. WIFI& Bluetooth RF Specifications

### 2.4G WIFI RF Specification

Conditions : VDD=5V ; Ta:25°C			
Features		Description	
WLAN Standard		IEEE 802.11b/g/n, 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, QAM 16, QAM 64; 802.11n (OFDM): BPSK, QPSK, QAM 16, QAM 64;	
Data 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_SISO) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R_MIMO) 27~300Mbps;	
Frequency Tolerance		±15ppm	
MT7668BU Receiver Specifications			
RX Rate	Min Input Level (dBm)	Max InputLevel (dBm)	PER
802.11b@1Mbps	-95	0	< 8%

802.11b@11Mbps	-86	0	< 8%
802.11g@6Mbps	-89	0	< 10%
802.11g@54Mbps	-73	0	< 10%
802.11n@HT20_MCS0	-88	0	< 10%
802.11n@HT20_MCS7	-70	0	< 10%
802.11n@HT40_MCS0	-87	0	< 10%
802.11n@HT40_MCS7	-68	0	< 10%

## 5G WIFI RF Specification

Conditions : VDD=5V ; Ta:25°C	
Features	Description
WLAN Standard	IEEE 802.11a/n/ac, CSMA/CA
Frequency Range	5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.73GHz; 5.735~5.835GHz(5GHz ISM Band)
Channels	Ch36, Ch40, Ch44, Ch48; Ch52~Ch64; Ch100~Ch140; Ch149~Ch165(For 20MHz Channels)
Modulation	802.11a (OFDM): BPSK, QPSK, QAM 16, QAM 64; 802.11n (OFDM): BPSK, QPSK, QAM 16, QAM 64; 802.11ac (OFDM): BPSK, QPSK, QAM 16, QAM 64, QAM 256;
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_SISO) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R_MIMO) 27~300Mbps; 802.11ac (VHT20): MCS0~MCS8(1T1R_SISO) 6.5~86.7Mbps; 802.11ac (VHT20): MCS0~MCS8(2T2R_MIMO) 13~173.3Mbps; 802.11ac (VHT40): MCS0~MCS9(1T1R_SISO)13.5~200Mbps; 802.11ac (VHT40): MCS0~MCS9(2T2R_MIMO)27~400Mbps; 802.11ac (VHT80): MCS0~MCS9(1T1R_SISO)29.3~433.3Mbps; 802.11ac (VHT80): MCS0~MCS9(2T2R_MIMO)58.5~866.7Mbps;
Frequency Tolerance	≤ ±15ppm



MT7668BU 5G Receiver Specifications			
RX Rate	Min Input Level (dBm)	Max InputLevel (dBm)	PER
802.11a@6Mbps	-89	0	< 10%
802.11a@54Mbps	-73	0	< 10%
802.11n@HT20_MCS0	-88	0	< 10%
802.11n@HT20_MCS7	-70	0	< 10%
802.11n@HT40_MCS0	-87	0	< 10%
802.11n@HT40_MCS7	-66	0	< 10%
802.11ac@VHT80_MCS0	-85	0	< 10%
802.11ac@VHT80_MCS9	-56	0	< 10%

## Bluetooth RF Specification

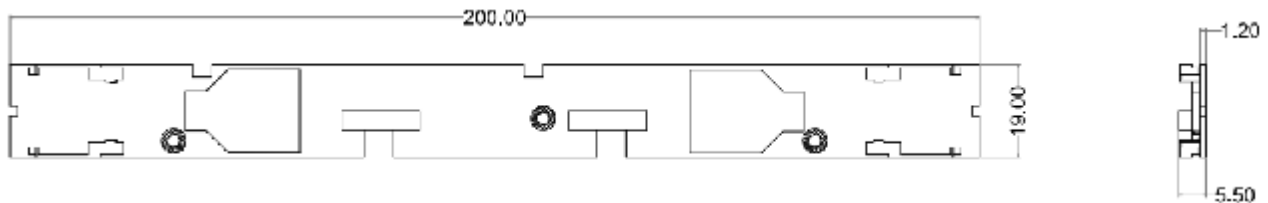
Conditions: VDD= 5V; Ta:25°C	
Features	Description
Bluetooth Specification	Bluetooth v2.1+ EDR/ 3.0+ HS/ 4.2/ 5.0
Frequency Range	2.4~ 2.4835GHz (2.4GHz ISM Band)
Channels	Bluetooth Classic: Ch0~ Ch78 (For 1MHz Channels); Bluetooth Low Energy: Ch0~ Ch39 (For 2MHz Channels);
Power Classes	Bluetooth Classic: Class1; Bluetooth Low Energy: Class1.5;

Date Rate & Modulation	BR_1Mbps: GFSK; EDR_2Mbps: $\pi/4$ -DQPSK; EDR_3Mbps: 8DPSK; LE_125Kbps: GFSK (Coded_S= 8); LE_500Kbps: GFSK (Coded_S= 2); LE_1Mbps: GFSK (Uncoded); LE_2Mbps: GFSK (Uncoded);			
Bluetooth Receiver Specifications				
Items	Sensitivity		Maximum Input Level	
	Input Level (Typ: dBm)	BER	Input Level (Typ: dBm)	BER
BR_1M	-90	$\leq 0.1\%$	-5dBm	$\leq 0.1\%$
EDR_2M	-80	$\leq 0.01\%$	-5dBm	$\leq 0.1\%$
EDR_3M	-70	$\leq 0.01\%$	-5dBm	$\leq 0.1\%$
	Input Level(Typ)	PER	Input Level (Typ)	PER
LE_125K	-80	$\leq 30.8\%$	-5dBm	$\leq 30.8\%$
LE_500K	-80	$\leq 30.8\%$	-5dBm	$\leq 30.8\%$
LE_1M	-80	$\leq 30.8\%$	-5dBm	$\leq 30.8\%$
LE_2M	-80	$\leq 30.8\%$	-5dBm	$\leq 30.8\%$

Note: For BER receiver sensitivity test, bit error rate (BER) better than 0.1% for a minimum of 1600000 bits transmitted by the tester; For EDR receiver sensitivity test, bit error rate (BER) better than 0.01% for a minimum of 16000000 bits transmitted by the tester; For LE receiver sensitivity test, packet error rate (PER) better than 30.8% for a minimum of 1500 packets transmitted by the tester.

## 5. Mechanical Specifications

### Module Outline Drawing

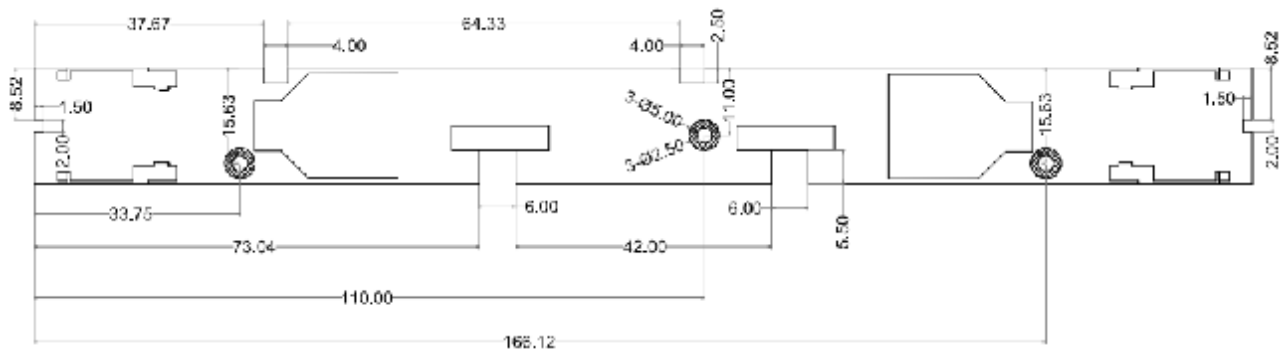


Module dimension: 200\*19\*5.5mm (L\*W\*H; Tolerance:  $\pm 0.15$ mm)



Module Bow and Twist:  $\leq 0.1$ mm

### Mechanical Dimensions



## 6. Application Information

### 6.1 Antenna Information

The module supports on-board PCB printed antenna for BT and PIFA antenna for WLAN, max gain 4dBi,

linear polarization, return loss 2.412GHz~2.483GHz<-7dB, 5.15GHz~5.835GHz<-7dB. Make sure that the area around the antenna should be keep clear of metallic components, connectors, via, traces and other materials that can interfere with the radio signal.

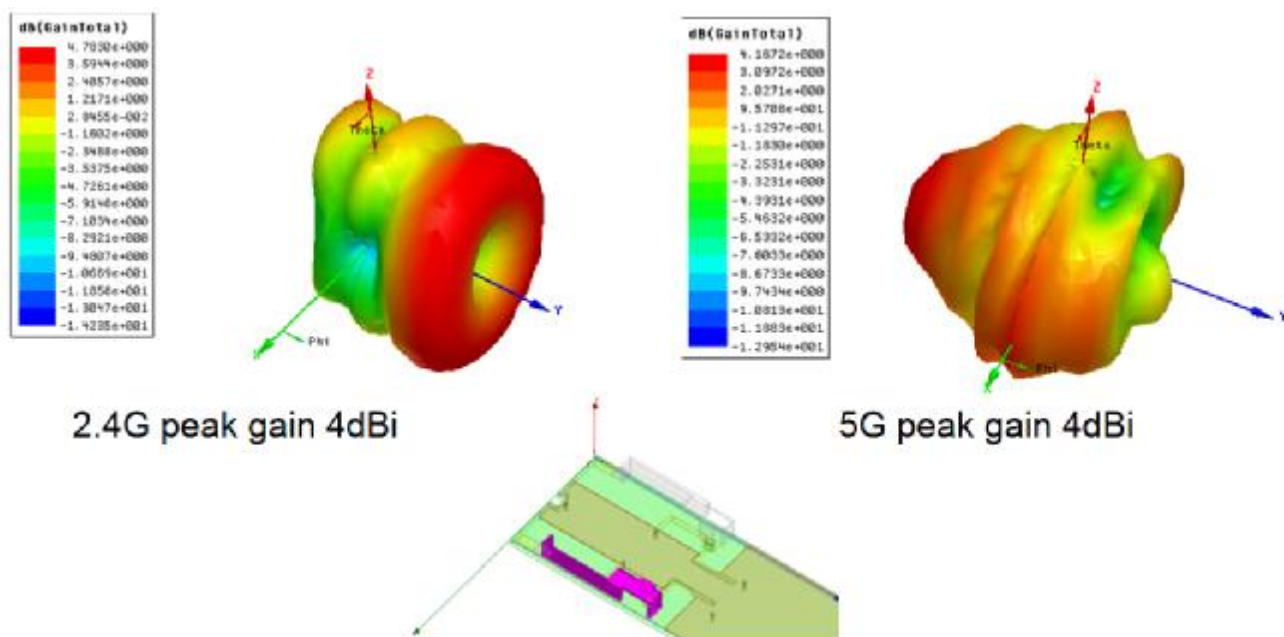


Figure 1 3D radiation pattern of left PIFA antenna

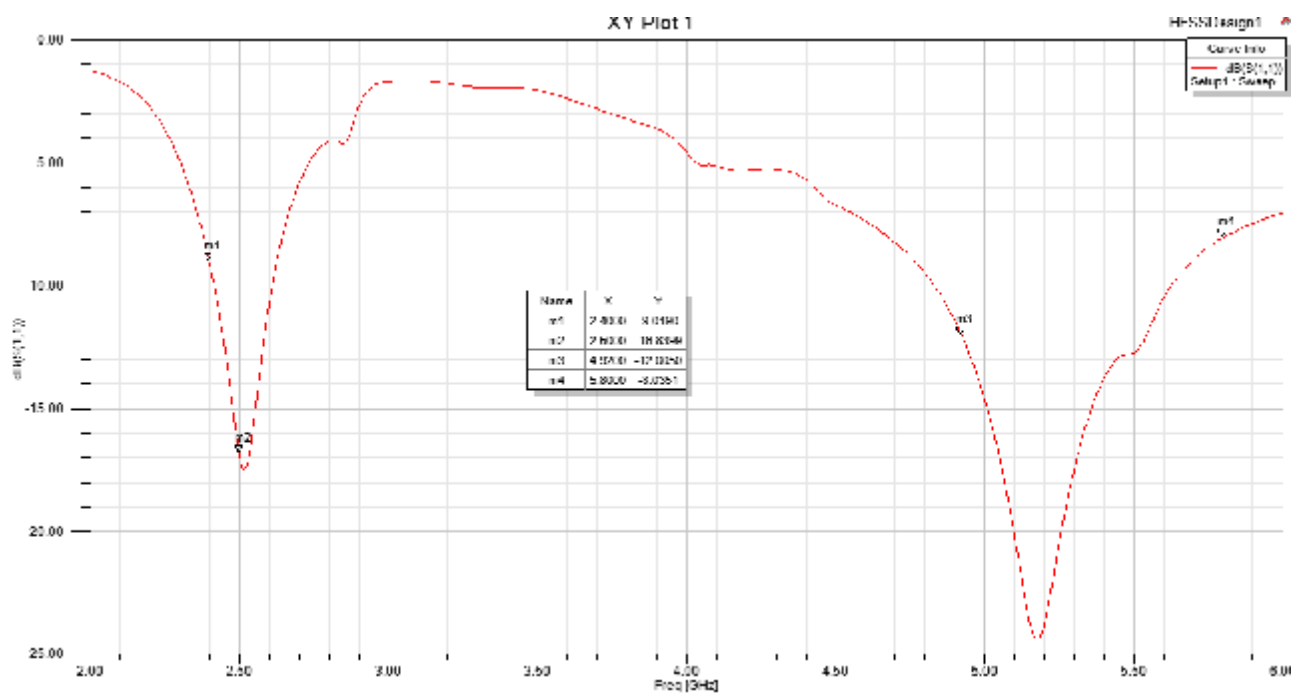


Figure 2 Left PIFA antenna return loss

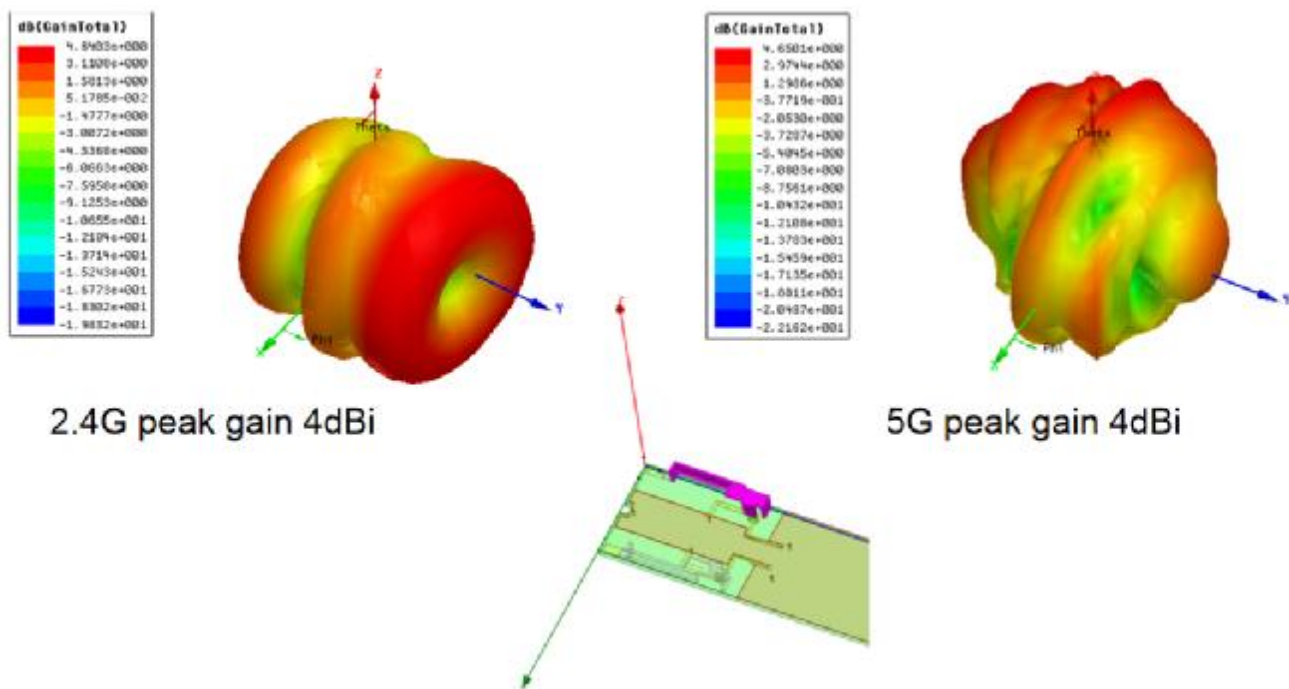


Figure 3 3D radiation pattern of right PIFA antenna

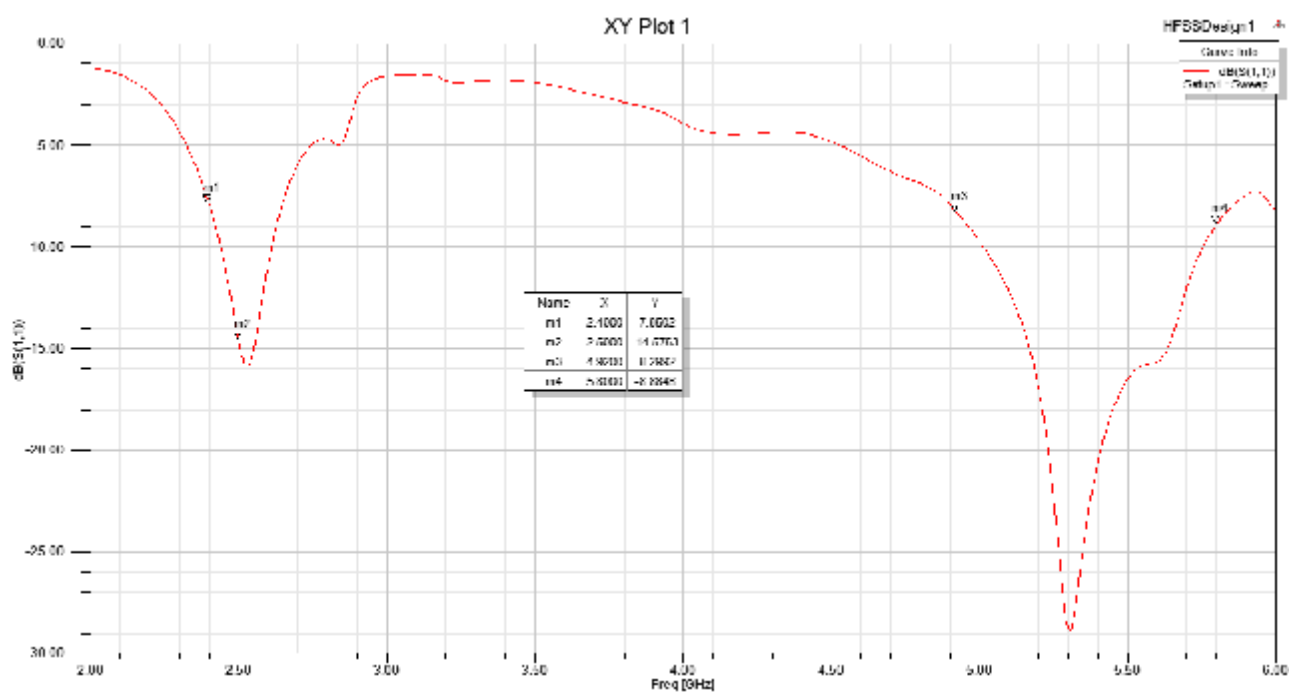


Figure 4 Right PIFA antenna return loss

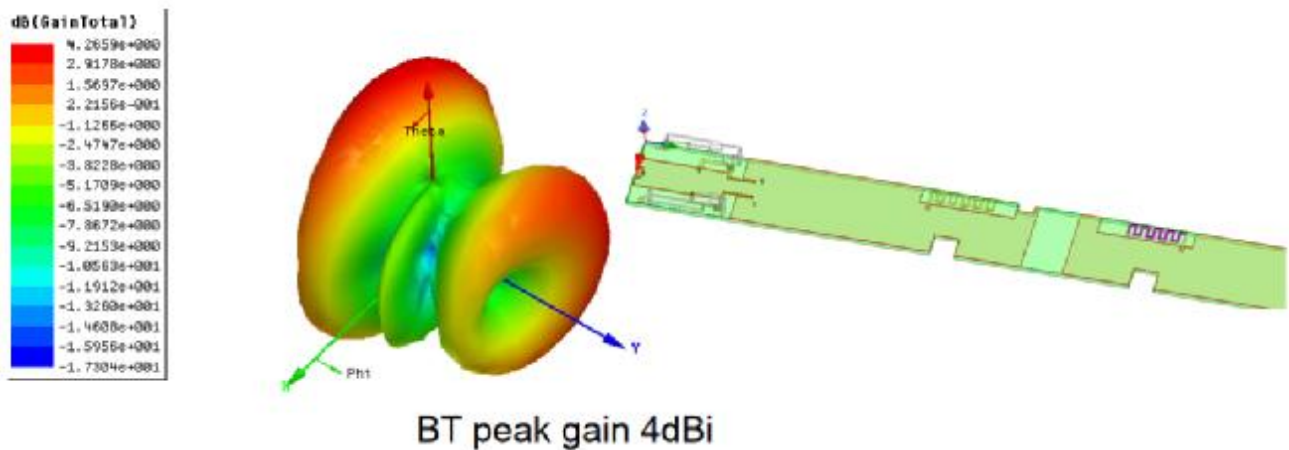


Figure 5 3D radiation pattern of PCB printed antenna

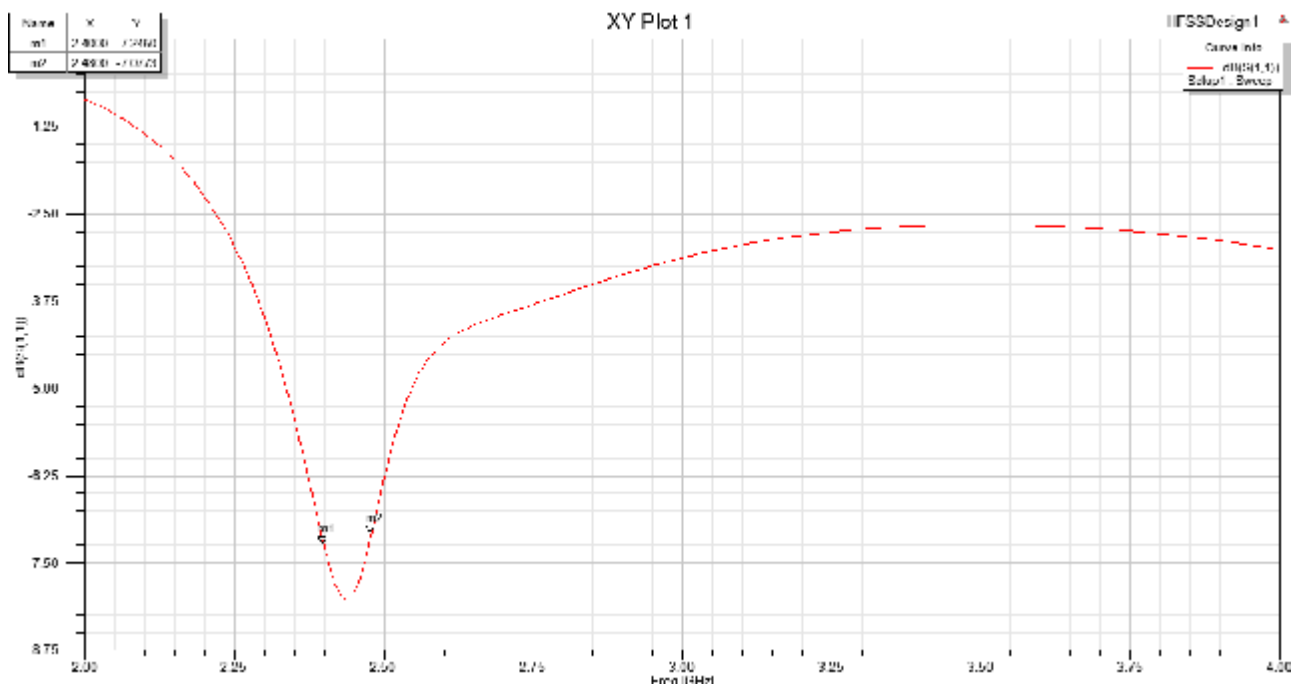


Figure 6 PCB printed antenna return loss

## Structural design

The material that around the module should be plastic. In order to get stable high rate wireless connectivity keep the module away from metal and metallic components as far as possible especially around the antenna, antenna far away from metal at least 15cm is suggested.

## Recommend PCB Layout Footprint

Please use 10 PIN 1.25 GH connector.

## 7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
		MT7668BUN	MediaTek CO., LTD	
2	PCB	BL-M2268BU1-B	Shenzhen Tie Fa TechnologyCO. LTD	
			Guangdong KINGSHINE ELECTRONICS CO., LTD	
			Quzhou Sunlord Electronics CO., LTD	
3	Crystal	40MHz-12pF-10ppm-3225	HUBEI TKD ELECTRONICS CO., LTD	
			Shenzhen Kaiyuexiang Electronics Co., Ltd	
			Lucki Electronics Co., Ltd	
4	Diplexer	DP1608-R2455BUT-LF	ACXCO., LTD	

## 8. Package and Storage Information

### Package Dimensions



Package specification:

1. 10 modules per blister plate and 150 modules per box.
2. The outer box size is 30\*25\*16cm.

### Package Dimensions

#### 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!



**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.

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 important announcement

Important Note:

**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 0cm between the radiator and your body.

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

Country Code selection feature to be disabled for products marketed to the US/Canada.

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,
3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)

As long as the three conditions above are met, further transmitter testing 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 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.

**End Product Labeling**

The final end product must be labeled in a visible area with the following" Contains FCC ID:**2AVEDBL-M2268BU1-B** "

**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 show in this manual.

## Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

### 2.2 List of applicable FCC rules

CFR 47 FCC Part 15.247 and FCC Part 15.407 has been investigated. It is applicable to the modular transmitter

### 2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

### 2.4 Limited module procedures

Not applicable

### 2.5 Trace antenna designs

Not applicable

### 2.6 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 & your body.

### 2.7 Antennas

This radio transmitter **FCC ID: 2AVEDBL-M2268BU1-B** has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Model	Type	Connector	Peak gain ( dBi )				
			2400-2483.5 MHz	5150-5250 MHz	5250-5350 MHz	5470-5725 MHz	5725-5850 MHz
2400-2483.5 MHz	External Antenna	/	2.0dBi	/	/	/	/
5.0 – 6.0 GHz	External Antenna	/	/	2.0dBi	/	/	2.0dBi

### 2.8 Label and compliance information

The final end product must be labeled in a visible area with the following" Contains FCC ID:2AVEDBL-M2268BU1-B".

### 2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

### 2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.