



BL-M7663BU4

802.11ac 867Mbps WLAN + BT v5.1

Combo USB2.0 Module Specification

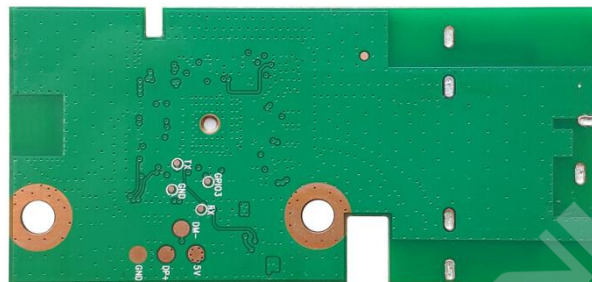
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(Top View)



(Bottom View)

Module Name: BL-M7663BU4	
Module Type: 802.11a/b/g/n/ac 867Mbps WLAN + Bluetooth v5.1 Combo USB2.0 Module	
Revision: V1.2	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
LB-link Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date	Revised By
1.0	Official release	2021-01-26	
1.1	Modify Package specification	2022-11-5	
1.2	Update the specification version	2023-03-23	Ch

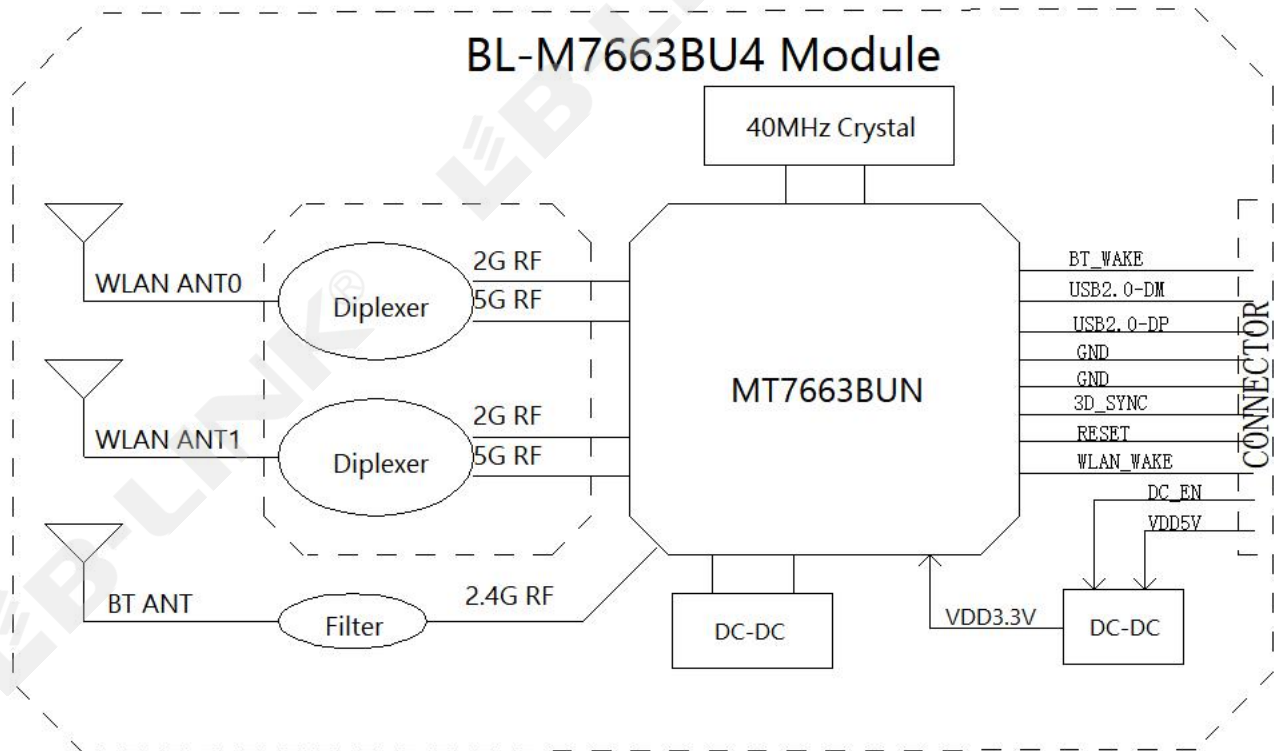
1. Introduction

BL-M7663BU4 is a highly integrated Dual-band WLAN + Bluetooth v5.1 Combo module. It combines a 2T2R Dual-band WLAN subsystem and a Bluetooth v5.1 subsystem. This module compatible with IEEE 802.11a/b/g/n/ac standard and provides the maximum PHY rate up to 867Mbps, it supports BR/EDR and BLE dual mode , offering feature-rich wireless connectivity at high standards, and delivering reliable, cost-effective throughput from an extended distance.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz and 5.15~5.85GHz
- Host Interface is USB2.0
- IEEE Standards: IEEE 802.11a/b/g/n/ac
- Wireless PHY rate can reach up to 867Mbps
- Supports Bluetooth v5.1 system
- Module built-in antennas
- Power Supply: DC 5V±0.3V

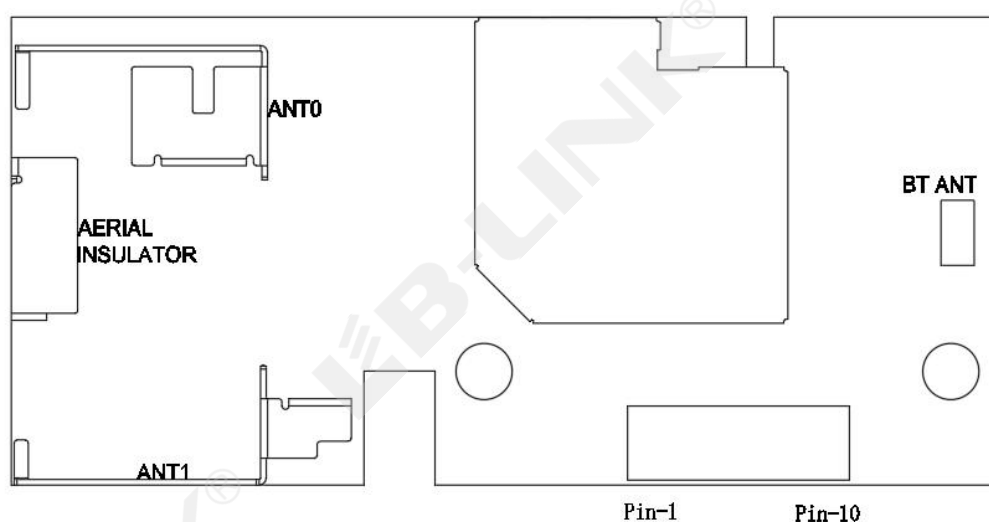
1.2 Block Diagram



1.3 General Specifications

Module Name	BL-M7663BU4
Chipset	MT7663BUN
WLAN Standards	IEEE802.11a/b/g/n/ac
Host Interface	USB2.0 for WLAN & BT
Antenna	Built-in antennas
Dimension	70.0mm x 33.0mm x 6.0mm (L*W*H) ,Tolerance: $\pm 0.15\text{mm}$
Power Supply	DC 5V $\pm 0.3\text{V}$ 1500mA (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	I/O Level	Module Pin Description
1	DC_EN	I	5V	The board DC / DC enable active high input, Internal pull high by 10K resistor to 5V.
2	BT_WAKE	O	3.3V	Bluetooth wake up host, internal pull high by 10K resistor
3	VDD5V	P		DC 5.0V Main power supply
4	USB 2.0 -DM	A I/O		USB Transmitter/Receiver Differential Pair

5	USB 2.0 -DP	A I/O		USB Transmitter/Receiver Differential Pair
6	GND	P		GND for power
7	GND	P		GND for power
8	3D_SYNC	O	3.3V	Synchronization function, internal pull high by 10K resistor
9	RESET	I	3.3V	System reset Input, active low, internal pull high by 10K resistor
10	WLAN_WAKE	O	3.3V	WLAN_wake up host, internal pull high by 10K resistor
	ANT0	RF		Built-in antennas for 2.4G / 5G RF ANT0
	ANT1	RF		Built-in antennas for 2.4G / 5G RF ANT1
	BT ANT	RF		Built-in antennas for BT RF
	Aerial Insulator	RF		Aerial Insulator, used to increase the isolation between ANT0 and ANT1

P: Power or Ground; I/O: In/Output; I: Input; A I/O: Analog In/Output; AI: Analog Input;
 AO: Analog 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
Supply Voltage	VDD5V	4.7	5	5.3	V

3.2 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

3.3 Antenna Specifications

Items	Frequency Range	Gain(max)	VSWR	polarization
WLAN ANT0 & WLAN ANT1	2.4~2.4835GHz(2.4GHz ISM Band)	2.0dBi	≤ 1.92	Linear polarization
	5.15~5.835GHz(5GHz ISM Band)	3.0dBi	≤ 1.92	Linear polarization
BT ANT	2.4~2.4835GHz(2.4GHz ISM Band)	2.0dBi	≤ 2.0	Linear polarization

3.4 Current Consumption

Conditions : VDD5V=5V ; Ta:25°C ;			
Use Case	VDD5V Current		
	Typ(I _{RMS})	Max(I _{Peak})	Units
WLAN & BT Unassociated (Linux Driver)	148	240	mA
2.4G 11b@1Mbps TX@19dBm (1TX RF-Test)	287	336	mA
2.4G 11b@11Mbps TX@19dBm (1TX RF-Test)	284	412	mA
2.4G 11g@54Mbps TX@16dBm (1TX RF-Test)	242	420	mA
2.4G 11n@HT20_MCS0 TX@17dBm (1TX RF-Test)	283	412	mA
2.4G 11n@HT20_MCS7 TX@15.5dBm (1TX RF-Test)	242	416	mA
2.4G 11n@HT40_MCS8 2TX@14dBm (2TX RF-Test)	530	704	mA
2.4G 11n@HT40_MCS15 (2RX RF-Test)	120	148	mA
5G 11a @6Mbps TX @ 18.5dBm (1TX RF test)	376	408	mA
5G 11a @54Mbps TX @ 16dBm (1TX RF test)	342	420	mA
5G 11a @54Mbps RX (1RX RF test)	112	142	mA
5G 11n@VHT40_MCS8 TX@14dBm (2TX RF test)	749	888	mA
5G 11n@HT40_MCS8 RX (2RX RF test)	145	172	mA
5G 11n@VHT80_MCS8 TX@14dBm (2TX RF test)	472	656	mA
5G 11n@VHT80_MCS8 RX (2RX RF test)	145	172	mA
BT BR_1M TX@7dBm (BT RF test, WLAN disable)	110	130	mA
BT BR_1M RX Active (BT RF test, WLAN disable)	60	90	mA
BT EDR_3M TX@7dBm (BT RF test, WLAN disable)	110	120	mA
BT EDR_3M RX Active (BT RF test, WLAN disable)	70	100	mA
BT LE_2M TX@7dBm (BT RF test, WLAN disable)	110	120	mA
BT LE_2M RX Active (BT RF test, WLAN disable)	70	100	mA

4. WLAN & Bluetooth RF Specifications

4.1 2.4G WLAN RF Specification

Conditions : VDD5V=5V ; 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;
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) 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	≤±20ppm

2.4G Transmitter Specifications(WLAN_Ant0&WLAN_Ant1)

TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11b@1~11Mbps	19	±2	≤-10
802.11g@6Mbps	18	±2	≤-10
802.11g@54Mbps	16	±2	≤-25
802.11n@HT20_MCS0	17	±2	≤-10
802.11n@HT20_MCS7	15.5	±2	≤-28
802.11n@HT40_MCS0	17	±2	≤-10
802.11n@HT40_MCS7	15	±2	≤-28
802.11ac@VHT40_MCS9	13	±2	≤-32

2.4G Receiver Specifications(WLAN_Ant0&WLAN_Ant1)

RX Rate	Min Input Level(Typ, dBm)	Max Input Level(Typ, dBm)	PER
802.11b@1Mbps	-91	-5	< 8%
802.11b@11Mbps	-85	-5	< 8%
802.11g@6Mbps	-90	-5	< 10%
802.11g@54Mbps	-73	-5	< 10%

802.11n@HT20_MCS0	-86	-5	< 10%
802.11n@HT20_MCS7	-70	-5	< 10%
802.11n@HT40_MCS0	-86	-5	< 10%
802.11n@HT40_MCS7	-68	-5	< 10%
802.11ac@VHT40_MCS9	-63	-5	< 10%

4.2 5G WLAN RF Specification

Conditions: VDD5V=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, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;	
Data 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		≤ ±20ppm	
5G Transmitter Specifications(WLAN_Ant0&WLAN_Ant1)			
TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11a@6Mbps	18.5	±2	≤-10
802.11a@54Mbps	16	±2	≤-25

802.11n@HT20_MCS0 802.11ac@VHT20_MCS0	17.5	± 2	≤ -10
802.11n@HT20_MCS7 802.11ac@VHT20_MCS7	15	± 2	≤ -28
802.11n@HT40_MCS0 802.11ac@VHT40_MCS0	17.5	± 2	≤ -10
802.11n@HT40_MCS7	15	± 2	≤ -28
802.11ac@VHT80_MCS0	17.5	± 2	≤ -10
802.11ac@VHT80_MCS9	14	± 2	≤ -32

5G Receiver Specifications(WLAN_Ant0&WLAN_Ant1)

RX Rate	Min Input Level(Typ, dBm)	Max Input Level(Typ, 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	-71	-5	< 10%
802.11n@HT40_MCS0	-87	-5	< 10%
802.11n@HT40_MCS7	-68	-5	< 10%

4.3 Bluetooth RF Specification

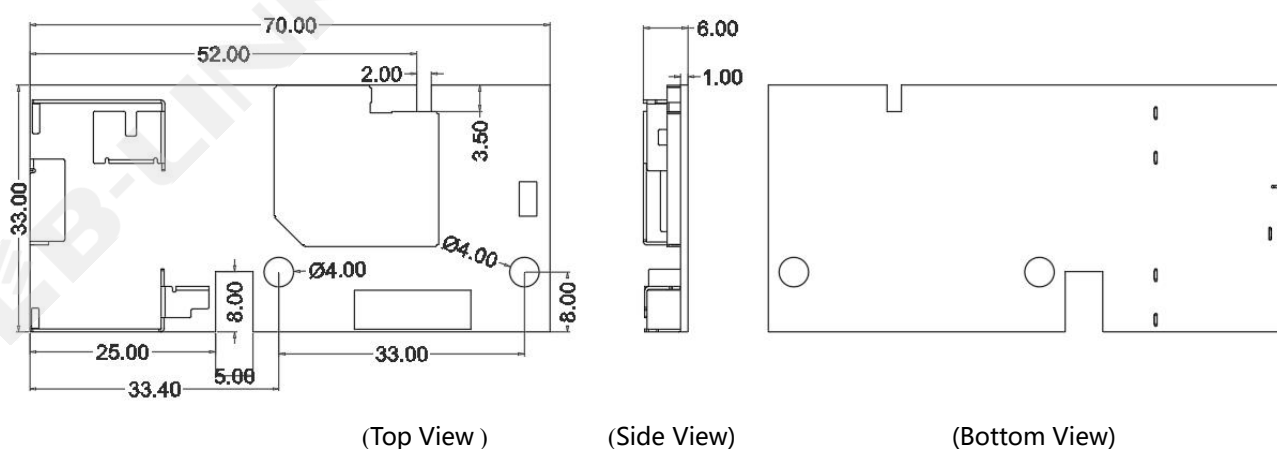
Conditions: VDD5V=5V; Ta:25°C	
Features	Description
Bluetooth Specification	Bluetooth Core Specification v5.1
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)
Channels	Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels); Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);
Power Classes	Bluetooth Classic BR/EDR: Class1; Bluetooth Classic Low Energy: Class1.5;

Data 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 Transmitter Specifications (BT_Ant)			
Items	Min (dBm)	Typ (dBm)	Max (dBm)
TX Power			
BR_1M	5	8	11
EDR_2/3M	5	8	11
LE_125K/500K/1M/2M	2	5	8
Items	Min	Typ	Max
BR_1M (DH1) Modulation Characteristics			
Δf_{1avg}	140KHz	158.9KHz	175KHz
Δf_{2avg}	115KHz	159.15KHz	/
Δf_{2max}	115KHz	154.3KHz	/
$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.89	/
Items	Min	Typ	Max
EDR_3M(3DH5) EDR Carrier Frequency Stability and Modulation Accuracy			
ω_i	-75KHz	-8.16KHz	+75KHz
$\omega_i + \omega_o$	-75KHz	-9.03KHz	+75KHz
ω_o	-10KHz	-0.9KHz	+10KHz
8DPSK RMS DEVM	/	0.026	0.13
8DPSK Peak DEVM	/	0.059	0.25
Items	Min	Typ	Max
LE_1M Modulation Characteristics			
Δf_{1avg}	225KHz	250KHz	275KHz
Δf_{2avg}	185KHz	234.4KHz	/

Δf2max	185KHz	225KHz	/	
Δf2avg/Δf1avg	0.8	0.93	/	
Items	Min	Typ	Max	
LE_2M Modulation Characteristics				
Δf1avg	450KHz	501.3KHz	550KHz	
Δf2avg	370KHz	234.2KHz	/	
Δf2max	370KHz	502.5KHz	/	
Δf2avg/Δf1avg	0.8	0.99	/	
Bluetooth Receiver Specifications (BT_Ant)				
Items	Sensitivity		Maximum Input Level	
	Input Level(dBm)	BER	Input Level(dBm)	BER
BR_1M (DH1)	-90	≦ 0.1%	-5	≦ 0.1%
EDR_3M (3DH5)	-80	≦ 0.01%	-5	≦ 0.1%
	Input Level(dBm)	PER	Input Level(dBm)	BER
LE_125K	-91	≦ 5%	-5	≦ 5%
LE_1M	-89	≦ 5%	-5	≦ 5%
LE_2M	-88	≦ 5%	-5	≦ 5%

5. Mechanical Specifications

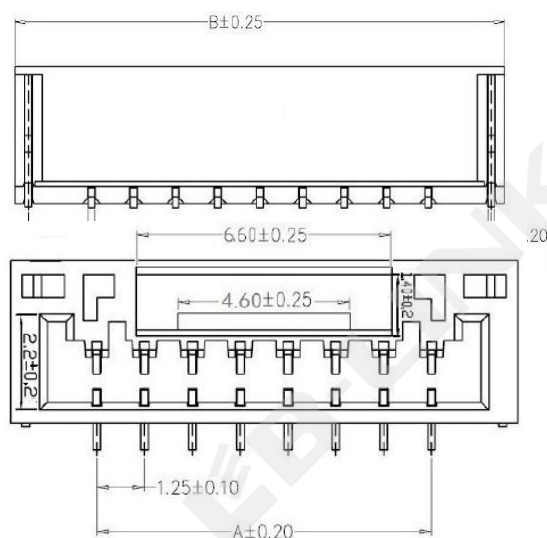
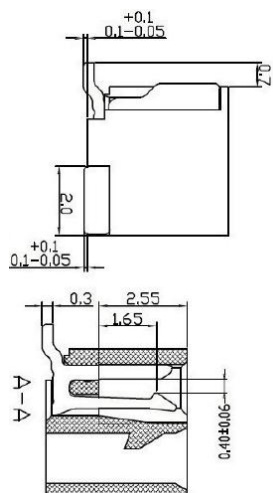
5.1 Module Outline Drawing



Module dimension: 70.0*33.0*6.0mm (L*W*H; Tolerance: $\pm 0.15\text{mm}$)

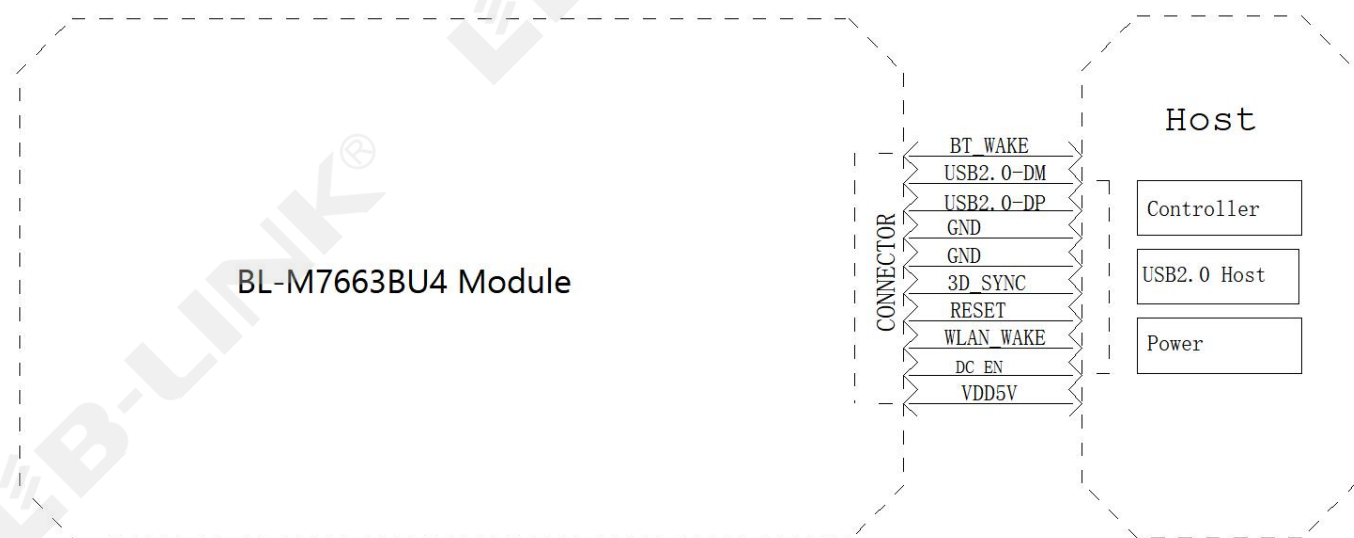
5.2 Connector Specification

Poles	DIM.A	DIM.B
2P	1.25	5.75
3P	2.50	7.00
4P	3.75	8.25
5P	5.00	9.50
6P	6.25	10.75
7P	7.50	12.00
8P	8.75	13.25
9P	10.00	14.50
10P	11.25	15.75
11P	12.50	17.00
12P	13.75	18.25
13P	15.00	19.50
14P	16.25	20.75
15P	17.50	22.00



6. Application Information

6.1 Typical Application Circuit



7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	MT7663BUN	MediaTek Inc.	
2	PCB	BL-M7663BU4	ShenZhen Tie Fa Technology Limited	
			MILLION SOURCE PRINTED CIRCUIT BOARD CO.,LTD	
			SHEN ZHEN QILI ELECTRON CO.,LTD	
3	Crystal	40MHZ-3225	LUCKI CM ELECTRONICS CO.,LTD	
			Chengde oscillator Electronic Technology CO.,LTD	
			JinHua East Crystal Electronic CO.,LTD	
4	Diplexer	DP1608	Advanced Ceramic X Corp.	
			Dongguan Hekang Electronics Co.,LTD	
			Walsin Technology Corporation	

8. Package and Storage Information

8.1 Package Dimensions



Package specification:

1. 16 modules per blister plate and 416 modules per box.
2. The blister is bound with wire membrane and put into anti-static vacuum bag.
3. Put 1 bag of dry beads (20g) in each anti-static vacuum bag. 1 pcs 3 point humidity card.
4. The outer box size is 41*34.5*16cm.

8.2 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 use.

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

ESD Sensitivity:

ESD Protection: 4KV(HBM ,Maximum rating)

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!



ESD CAUTION