



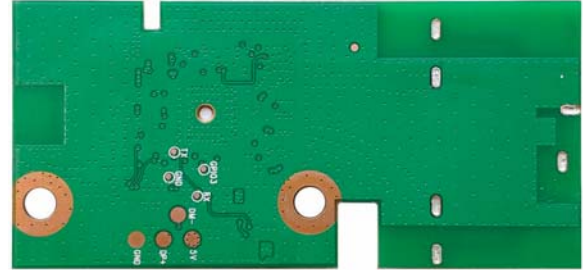
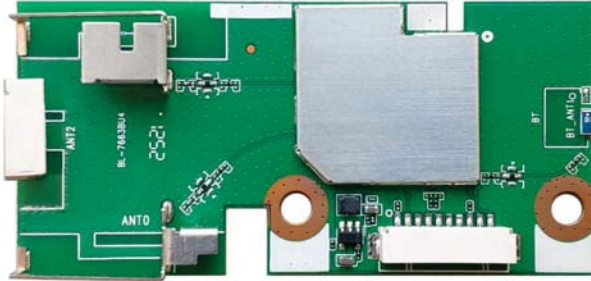
BL-M7663BU4

**802.11ac 2T2R 867Mbps WLAN + BT5.1
USB Combo Module Specification**

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Module Name: BL-M7663BU4

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:

BL-link Approval:

Title:

Signature:

Date:

Revision History

Revision	Summary	Release Date
0.1	Initial release	2021-09-30
1.0	Official version	2021-11-02

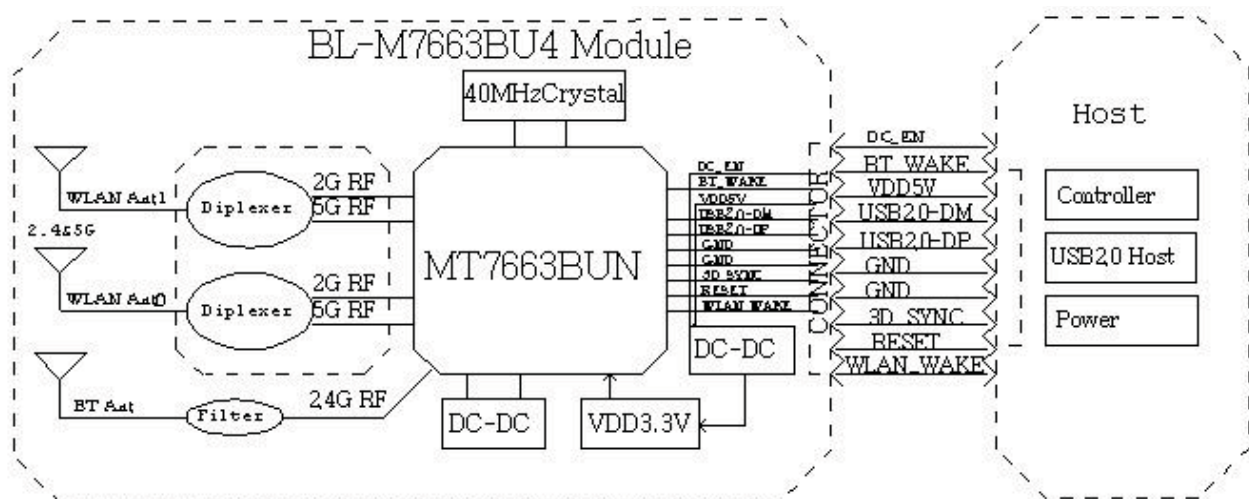
1. Introduction

The BL-M7663BU4 is a highly integrated 2T2R 802.11a/b/g/n/ac Wireless LAN (WLAN) network and bluetooth combo module. The module's interface is USB 1.0/1.1/2.0. It combines a WLAN MAC, a 2T2R capable WLAN base band. Bluetooth support 5.1 performance. The BL-M7663BU4 module provides a complete solution for a high throughput performance integrated wireless LAN and BT device.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz and 5.15~5.250GHz、5.725~5.85GHz
- Host Interface is USB2.0
- IEEE Standards: IEEE 802.11a/b/g/n/ac
- Wireless data rate can reach up to 867Mbps
- Bluetooth v2.1/4.1/4.2 and supports Bluetooth 5.1 system
- Built- in antenna
- Power Supply: VDD5V±0.2V

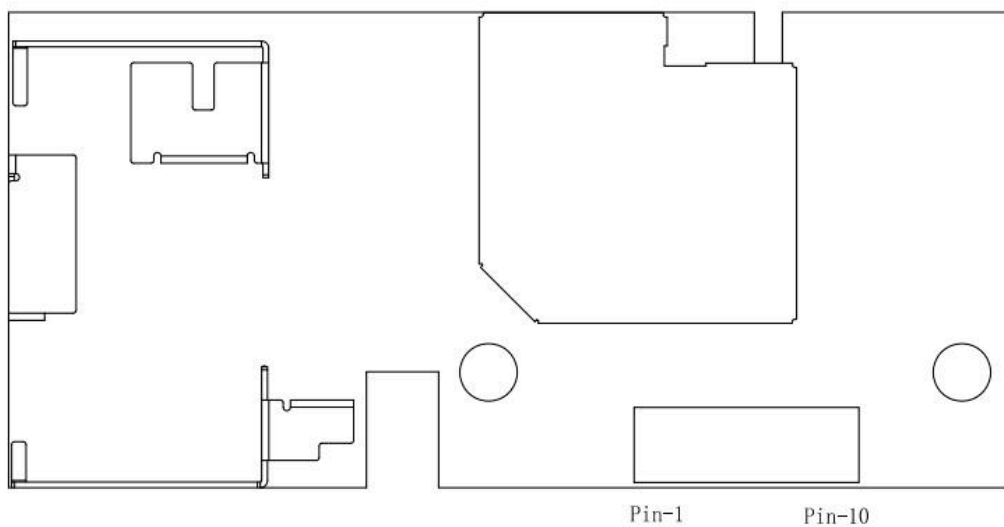
1.2 Block Diagram



1.3 General Specifications

Module Name	BL-M7663BU4
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
Dimension	70mmx33mmx6.0mm (L*W*H), Tolerance: +/-0.15mm
Antenna	Built-in antenna
Power Supply	DC 5V±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
PIN-1	DC_EN	I	5V	Reset the module by controlling the DC / DC enable pin
PIN-2	BT_WAKE	I/O	3.3V	Bluetooth wake up host

PIN-3	VDD5V	P	5V	Main power supply
PIN-4	USB_DM	I/O		USB differential data line
PIN-5	USB_DP	I/O		USB differential data line
PIN-6	GND	P		GND
PIN-7	GND	P		GND
PIN-8	3D_SYNC	I/O	3.3V	Synchronization function(NC)
PIN-9	RESET	I/O	3.3V	System reset Input(active low)
PIN-10	WLAN_WAKE	I/O	3.3V	WLAN wake up host

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

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		/	/	/	/
Supply Voltage	VDD5V	4.8	5	5.2	V

3.2 Current Consumption

Conditions : Supply Voltage=5V ; Ta:25°C ;			
Use Case	VDD3.3V 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	351	mA
2.4G 11g 6Mbps RX (1RX RF test)	96	125	mA
2.4G 11n HT20 MCS8 TX@14dBm (2TX RF test)	591	521	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	505	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	195	mA
5G 11ac VHT80 MCS9 TX@14dBm (2TX RF test)	476	525	mA
5G 11ac VHT80 MCS9 RX (2RX RF test)	156	205	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~Ch11 (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	$\leq \pm 15\text{ppm}$		
2.4G Transmitter Specifications (WLAN_ANT0 & WLAN_ANT1)			
TX Rate	TX Power (dBm)	TX Power Tolerance (dB)	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
2.4G Receiver Specifications (WLAN_ANT0 & WLAN_ANT1)			
RX Rate	Min Input Level (dBm)	Max Input Level (dBm)	PER
802.11b@1Mbps	-92	-5	< 8%
802.11b@11Mbps	-86	-5	< 8%
802.11g@6Mbps	-90	-5	< 10%
802.11g@54Mbps	-74	-5	< 10%
802.11n@HT20_MCS0	-88	-5	< 10%
802.11n@HT20_MCS7	-70	-5	< 10%
802.11n@HT40_MCS0	-86	-5	< 10%
802.11n@HT40_MCS7	-68	-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; 5.725~5.85GHz (5GHz ISM Band)
Channels	Ch36-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 Transmitter Specifications (WLAN_ANT0 & WLAN_ANT1)

TX Rate	TX Power (dBm)	TX Power Tolerance (dB)	EVM (dB)
802.11a@6Mbps	18.5	± 2	$\leq -10\text{dB}$
802.11a@54Mbps	16	± 2	$\leq -25\text{dB}$

802.11n@HT20_MCS0 802.11ac@VHT20_MCS0	17.5	± 2	$\leq -10\text{dB}$	
802.11n@HT20_MCS7 802.11ac@VHT20_MCS7	15	± 2	$\leq -28\text{dB}$	
802.11n@HT40_MCS0 802.11ac@VHT40_MCS0	17.5	± 2	$\leq -10\text{dB}$	
802.11n@HT40_MCS7	15	± 2	$\leq -28\text{dB}$	
802.11ac@VHT80_MCS0	17.5	± 2	$\leq -10\text{dB}$	
802.11ac@VHT80_MCS9	14	± 2	$\leq -32\text{dB}$	

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	-74	-5	< 10%

802.11n@HT20_MCS0	-90	-5	< 10%	
802.11n@HT20_MCS7	-72	-5	< 10%	
802.11n@HT40_MCS0	-86	-5	< 10%	
802.11n@HT40_MCS7	-71	-5	< 10%	
802.11ac@VHT80_MCS0	-86	-5	< 10%	
802.11ac@VHT80_MCS9	-60	-5	< 10%	

4.3 Bluetooth RF Specification

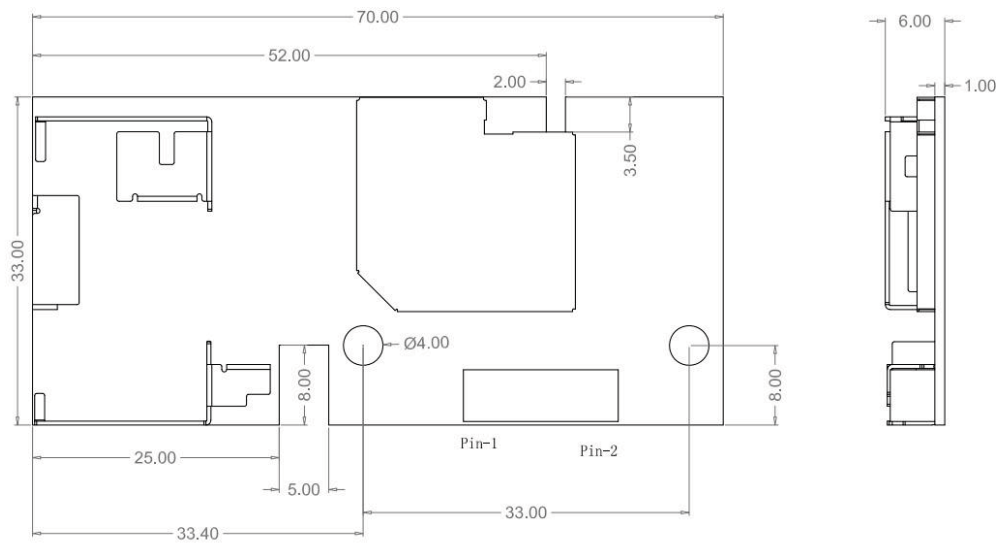
Conditions: VDD33=3.3V ; Ta:25°C			
Features	Description		
Bluetooth Specification	Bluetooth Core Specification v5.1/4.2/4.1/2.1		
Frequency Range	2.4~2.4835GHz (2.4GHz ISM Band)		
Channels	Bluetooth Classic: Ch0~Ch78 (For 1MHz Channels); Bluetooth Low Energy: Ch0~Ch39 (For 2MHz Channels);		
Power Classes	Bluetooth Classic: Class1; Bluetooth Low Energy: Class1.5;		
Date Rate & Modulation	BR_1Mbps: GFSK; EDR_2Mbps: $\pi/4$ -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			
Items	Min (dBm)	Typ (dBm)	Max (dBm)
TX Power			
BR_1M	5	9	12
EDR_2/3M	5	9	12
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}	/	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 DEVM	/	0.059	0.25	
Items	Min	Typ	Max	
LE_1M Modulation Characteristics				
Δf_{1avg}	225KHz	250KHz	275KHz	
Δf_{2avg}	/	234.4KHz	/	
Δf_{2max}	185KHz	225KHz	/	
$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.93	/	
Items	Min	Typ	Max	
LE_2M Modulation Characteristics				
Δf_{1avg}	450KHz	501.3KHz	550KHz	
Δf_{2avg}	/	234.2KHz	/	
Δf_{2max}	370KHz	502.5KHz	/	
$\Delta f_{2avg}/\Delta f_{1avg}$	0.8	0.99	/	
Bluetooth Receiver Specifications(BT_ANT)				
Items	Sensitivity		Maximum Input Level	
	Input Level(Typ)	BER	Input Level(Typ)	BER
BR_1M (DH1)	-91 dBm	$\leq 0.1\%$	-5 dBm	$\leq 0.1\%$
EDR_3M (3DH5)	-80 dBm	$\leq 0.01\%$	-5 dBm	$\leq 0.1\%$
	Input Level (Typ)	PER	Input Level (Typ)	PER

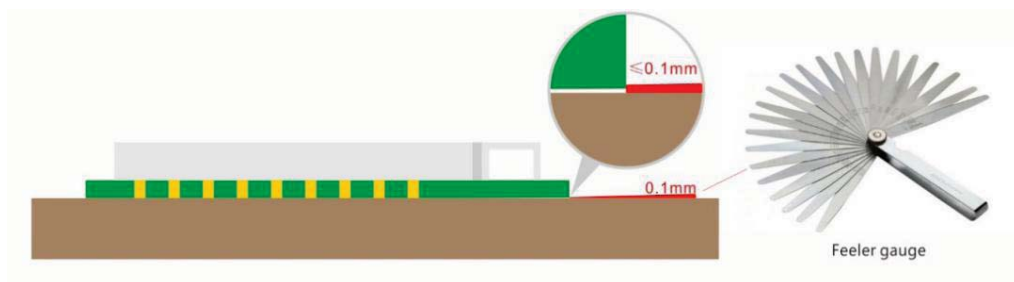
LE_125K	-90 dBm	$\leq 5\%$	-5 dBm	$\leq 5\%$
LE_1M	-91 dBm	$\leq 5\%$	-5 dBm	$\leq 5\%$
LE_2M	-89 dBm	$\leq 5\%$	-5 dBm	$\leq 5\%$

5. Mechanical Specifications

5.1 Module Outline Drawing



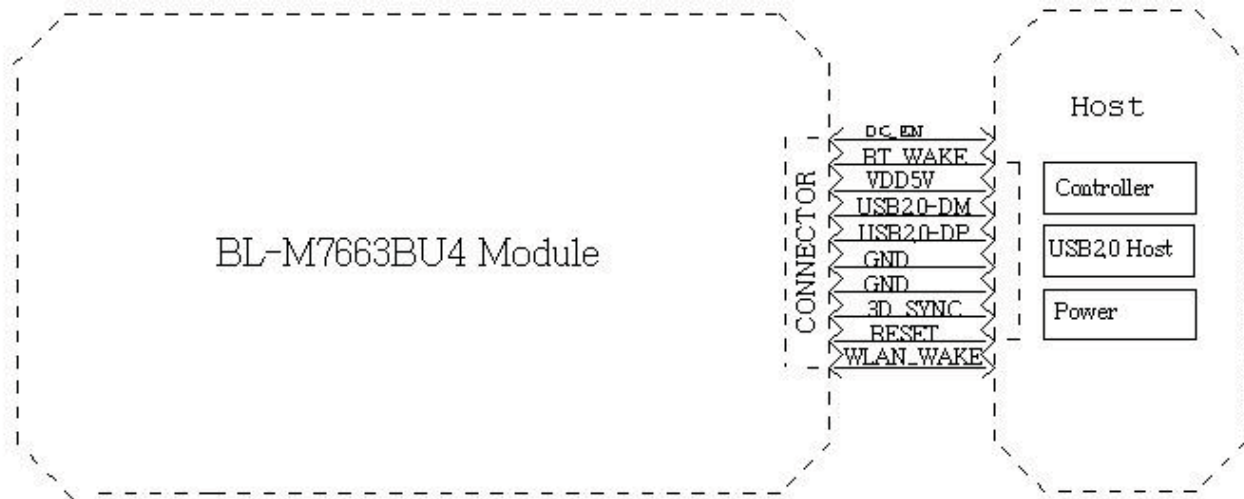
Module dimension: 70.0mm*33.0mm*6.0mm (L*W*H ; Tolerance: ± 0.15 mm)



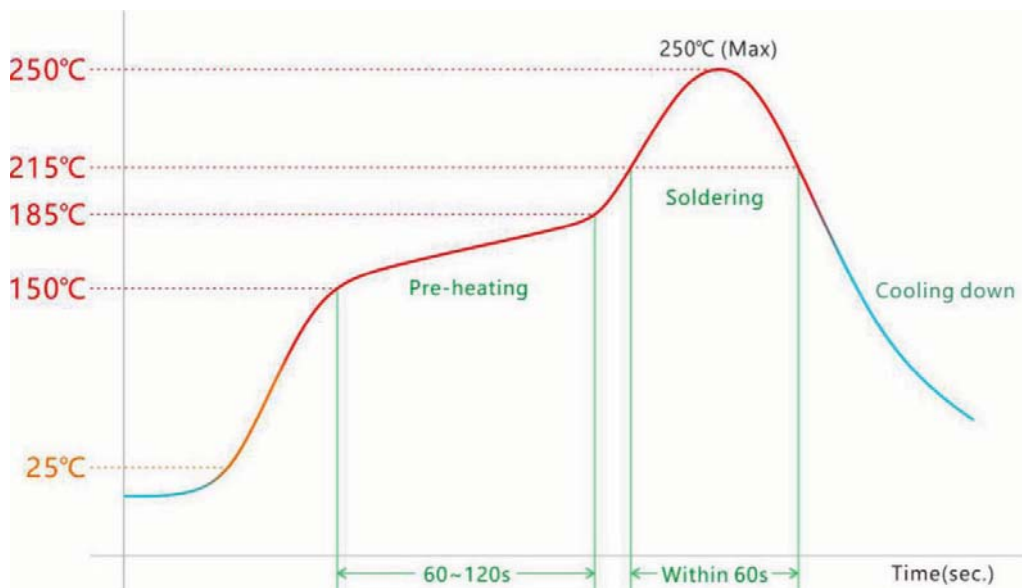
Module Bow and Twist : ≤ 0.1 mm

6. Application Information

6.1 Typical Application Circuit



6.2 Reflow Soldering Standard Conditions



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

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	MT7663BUN	MediaTek Inc.	
2	PCB	BL-M7663BU4 V1.0	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	
			Chengde Oscillator Electronic Technology Co., Ltd.	
4	Diplexer	DP1608-A2455DTB2	Advanced Ceramic X Corp.	
		RFDIP160806ELM6T63	Walsin Technology CORP.	

8. Package and Storage Information

8.1 Package Dimensions



Package specification:

1. 16 modules per blister plate and 208 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 35.2*21.5*15.5cm.

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 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

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 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 device 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 device does cause harmful interference to radio or television reception, which can be determined by turning the device 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 device and receiver.
- Connect the device 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

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

FCC Radiation Exposure Statement The antennas used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located for operating in conjunction with any other antenna or transmitter.

Please notice that if the FCC identification number 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. This exterior label can use wording such as the following: "Contains FCC ID: 2AL6KBL-M7663BU4" any similar wording that expresses the same meaning may be used.

The module is limited to OEM installation ONLY. The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.