BL-M2268BU1

802.11ac 867Mbps WLAN + BT5.0

RTL8822CU + MT7668BU USB2.0

Module Specification

Module Name: BL-M2268BU1	
Module Type: 802.11a/b/g/n/ac 867Mbps WLAN + Bluetooth 5.0 Combo 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. Introduction

BL-M2268BU1 is a highly integrated module composed of two independent Dual-band WLAN + bluetooth5.0 2T2R USB2.0 submodules, it is designed base on RTL8822CE and MT7668BU chipset. The two independent submodules both 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, it can offer feature-rich wireless connectivity and reliable throughput from an extended distance.

This module is applicable for OTT Box/IP TV and other smart wireless devices, the typical application is one submodule for Wireless projection, the other for wireless network.
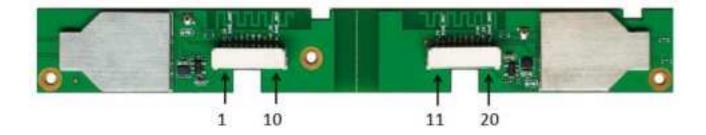
1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHzs
- 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±0.2V main power supply

1.2 General Specifications

Module Name	BL-M8822CP2 867Mbps WLAN + BT5.0 USB2.0 Module
Chipset	RTL8822CU+MT7668BU
WLAN Standards	IEEE802.11a/b/g/n/ac
Host Interface	USB2.0
Antenna	WLAN: PIFA antenna, BT: PCB printed antenna
Dimension	200*18.0*1.2mm (L*W*H)
Power Supply	MT7668: DC 5.0V±0.3V @ 780 mA (Max), RTL8822CU: DC 5.0V±0.3V @ 780 mA (Max)
Operation Temperature	-20℃ to +85℃
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments

2.1 Pin Definition

No	Pin Name	Type	Voltage	Module Pin Description
1	DC_EN	I	5V	5V DC enable, active low module reset, pull high internal
2	BT_WAKE_HOST	I	3.3V	WLAN wake up host
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 module reset, pull high internal
10	WL_WAKE_HOST	I	3.3V	WLAN wake up host
11	DC_EN	I	5V	5V DC enable, active low module reset, pull high internal
12	BT_WAKE_HOST	I	3.3V	BT wake up host
13	VDD	P	5V	5V power supply
14	USB_D-	I/O		USB differential data line
15	USB_D+	I/O		USB differential data line
16	GND	RF		GND
17	GND	RF		GND
18	NC	--		--
19	CHIP_IN	I	3.3V	Chip enable, active low module reset, pull high internal
20	WL_WAKE_HOST	I	3.3V	BT wake up host

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-40	25	85	℃
Supply Voltage	VDD	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 Current Consumption

RTL8822CU Current Consumption			
Conditions : VDD=5V ; Ta:25℃			
Use Case	VBAT Current (average)		
	Typ	Max	Units
WiFi Radio Off (Linux Driver)	30	50	mA
WiFi Unassociated (Linux Driver)	102	150	mA
2.4G 1Mbps TX (RF-Test)	230	244	mA
2.4G 1Mbps RX (RF-Test)	65	74	mA
2.4G 11Mbps TX (RF-Test)	198	256	mA
2.4G 11Mbps RX (RF-Test)	65	75	mA
2.4G MCS7(HT40) TX (RF-Test)	332	604	mA
2.4G MCS7(HT40) RX (RF-Test)	62	75	mA
2.4G MCS8(HT40) TX (RF-Test)	189	476	mA
2.4G MCS15(HT40) RX (RF-Test)	61	75	mA
5.8G 6Mbps TX (RF-Test)	459	712	mA
5.8G 6Mbps RX (RF-Test)	62	75	mA
5.8G 54Mbps TX (RF-Test)	283	762	mA
5.8G 54Mbps RX (RF-Test)	62	75	mA
5.8G MCS0(HT80) TX (RF-Test)	361	744	mA
5.8G MCS0(HT80) RX (RF-Test)	58	75	mA
5.8G MCS9(HT80) TX (RF-Test)	196	718	mA
5.8G MCS9(HT80) RX (RF-Test)	61	75	mA

BT BR_1M DH5 TX(RF-Test)	120	150	mA
BT EDR_3M DH5 TX(RF-Test)	118	148	mA
BT LE_1M TX(RF-Test)	123	160	mA
BT LE_2M TX(RF-Test)	113	150	mA

MT7668BU Current Consumption			
Conditions : VDD=5V ; Ta:25℃			
Use Case	VBAT Current (average)		
	Typ	Max	Units
WiFi Radio Off (Linux Driver)	60	80	mA
WiFi Unassociated (Linux Driver, BT_Disable)	70	100	mA
2.4G 1Mbps TX (RF-Test)	370	410	mA
2.4G 1Mbps RX (RF-Test)	110	130	mA
2.4G 11Mbps TX (RF-Test)	360	408	mA
2.4G 11Mbps RX (RF-Test)	120	140	mA
2.4G 6Mbps TX (RF-Test RF0 and RF1)	460	510	mA
2.4G 6Mbps RX (RF-Test)	120	150	mA
2.4G 54Mbps TX (RF-Test)	350	380	mA
2.4G 54Mbps RX (RF-Test)	117	142	mA
2.4G MCS7(HT40) TX (RF-Test)	440	490	mA
2.4G MCS7(HT40) RX (RF-Test)	120	160	mA
2.4G MCS8(HT40) TX (RF-Test)	430	480	mA
2.4G MCS8(HT40) RX (RF-Test)	110	150	mA
2.4G MCS15(HT40) TX (RF-Test)	280	320	mA
2.4G MCS15(HT40) RX (RF-Test)	120	150	mA

5.8G 6Mbps TX (RF-Test RF0 and RF1)	640	690	mA
5.8G 6Mbps RX (RF-Test)	130	160	mA
5.8G 54Mbps TX (RF-Test)	420	490	mA
5.8G 54Mbps RX (RF-Test)	130	170	mA
5.8G MCS0(HT80) TX (RF-Test)	410	460	mA
5.8G MCS0(HT80) RX (RF-Test)	140	180	mA
5.8G MCS9(HT80) TX (RF-Test)	270	310	mA
5.8G MCS9(HT80) RX (RF-Test)	140	180	mA
Bluetooth Unassociated (Linux Driver, WiFi_Disable)	50	70	mA
BT BR_1M DH5 TX@6dBm(MPTools, WiFi_Disable)	160	180	mA
BT EDR_3M DH5 TX@6dBm(MPTools, WiFi_Disable)	150	170	mA
BT LE_1M TX@6dBm(MPTools, WiFi_Disable)	170	190	mA
BT LE_2M TX@6dBm(MPTools, WiFi_Disable)	160	180	mA
BT LE_2M RX Active(MPTools, WiFi_Disable)	70	90	mA

4. WIFI& Bluetooth RF Specifications

4.1 2.4G WIFI RF Specification

Conditions : VDD=3.3V ; Ta:25℃	
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, QAM16, QAM64; 802.11n (OFDM): BPSK, QPSK, QAM16, QAM64;
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_SISO) 13.5~150Mbps;
	802.11n (HT40): MCS8~MCS15(2T2R_MIMO) 27~300Mbps;
Frequency Tolerance	≦±15ppm

RTL8822CU 2.4G Receiver Specifications

RX Rate	Min Input Level (dBm)	Max Input Level (dBm)	PER
802.11b@1Mbps	-95	0	< 8%
802.11b@11Mbps	-87	0	< 8%
802.11g@6Mbps	-92	0	< 10%
802.11g@54Mbps	-74	0	< 10%
802.11n@HT20_MCS0	-91	0	< 10%
802.11n@HT20_MCS7	-71	0	< 10%
802.11n@HT40_MCS0	-87	0	< 10%
802.11n@HT40_MCS7	-69	0	< 10%

MT7668BU Receiver Specifications

RX Rate	Min Input Level (dBm)	Max Input Level (dBm)	PER
802.11b@1Mbps	-95	0	< 8%
802.11b@11Mbps	-87	0	< 8%
802.11g@6Mbps	-92	0	< 10%
802.11g@54Mbps	-74	0	< 10%
802.11n@HT20_MCS0	-91	0	< 10%
802.11n@HT20_MCS7	-71	0	< 10%
802.11n@HT40_MCS0	-87	0	< 10%
802.11n@HT40_MCS7	-69	0	< 10%

4.2 5G WIFI RF Specification

Conditions : VDD=5V ; Ta:25℃	
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; 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_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	$\leqq$ ±15ppm
RTL8822CU 5G Transmitter Specifications	

RTL8822CU 5G Receiver Specifications

RX Rate	Min Input Level（dBm）	Max Input Level（dBm）	PER
802.11a@6Mbps	-91	0	< 10%
802.11a@54Mbps	-73	0	< 10%
802.11n@HT20_MCS0	-91	0	< 10%
802.11n@HT20_MCS7	-70	0	< 10%
802.11n@HT40_MCS0	-88	0	< 10%
802.11n@HT40_MCS7	-67	0	< 10%
802.11ac@VHT80_MCS0	-85	0	< 10%
802.11ac@VHT80_MCS9	-59	0	< 10%

MT7668BU 5G Receiver Specifications

RX Rate	Min Input Level（dBm）	Max Input Level（dBm）	PER
802.11a@6Mbps	-91	0	< 10%
802.11a@54Mbps	-73	0	< 10%
802.11n@HT20_MCS0	-91	0	< 10%
802.11n@HT20_MCS7	-70	0	< 10%
802.11n@HT40_MCS0	-88	0	< 10%
802.11n@HT40_MCS7	-67	0	< 10%
802.11ac@VHT80_MCS0	-85	0	< 10%
802.11ac@VHT80_MCS9	-59	0	< 10%

4.3 Bluetooth RF Specification

Conditions: VDD33=5V; Ta:25℃	
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: π/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				
	Sensitivity		**Maximum Input Level**	
Items	**Input Level (Typ: dBm)**	**BER**	**Input Level (Typ: dBm)**	**BER**
BR_1M	-90	≤0.1%	-5dBm	≤0.1%
EDR_2M	-80	≤0.01%	-5dBm	≤0.1%
EDR_3M	-70	≤0.01%	-5dBm	≤0.1%
	Input Level(Typ)	**PER**	**Input Level (Typ)**	**PER**
LE_125K	-90	≤30.8%	-5dBm	≤30.8%
LE_500K	-90	≤30.8%	-5dBm	≤30.8%
LE_1M	-90	≤30.8%	-5dBm	≤30.8%
LE_2M	-90	≤30.8%	-5dBm	≤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.
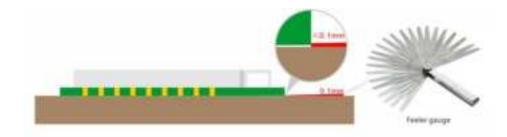
5. Mechanical Specifications

5.1 Module Outline Drawing

Module dimension:200*18*1.2mm(L*W*H; Tolerance: ±0.15mm)

Module Bow and Twist：≤0.1mm

6. Application Information

6.1 Antenna Information

The module supports on-board PCB printed antenna for BT and PIFA antenna for WLAN, max gain 2.5dBi, linear polarization, return loss 2.412GHz~2.483GHz<-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.

6.2 Recommend PCB Layout Footprint

Please use 10 PIN 1.25 GH connector.

6.3 Structural design

The material that around the module should be plastic. Keep the module away from metal and metallic components as far as possible especially the antenna in order to get stable high rate wireless connectivity.

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8822CE-CG	Realtek CO., LTD	
		MT7668BUN	MediaTek CO., LTD	
2	PCB	BL-M2268BU1	Shenzhen Tie Fa Technology CO. 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

Absolute Maximum Ratings:
    Storage temperature: -40℃ to +85℃,
    Storage humidity: 10% to 95（Non-Condensing）
Recommended Storage Conditions:

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℃, 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:**2AL6KBL-M2268BU1**"

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 SUBPART C 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:2AL6KBL-M2268BU1** 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:2AL6KBL-M2268BU1".
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.