



BL-M8811CU2

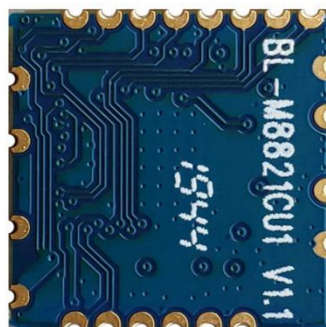
**802.11ac 433Mbps Dual-band WLAN
USB2.0 Module Specification**

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(Top View)



(Bottom View)

(Note: BL-M8811CU2 and BL-M8821CU1 share PCB design)

Module Name: BL-M8811CU2	
Module Type: 802.11a/b/g/n/ac dual-band 433Mbps WLAN USB2.0 Module	
Revision: V1.2	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
BL-link Approval:	
Title:	
Signature:	Date:

Revision History

Revision	Summary	Release Date	Revised By
0.1	Initial release	2022-8-16	
1.0	Official release	2019-09-01	
1.1	Content optimization	2023-03-30	Cxf
1.2	Update dimensions	2023-09-07	Fnz

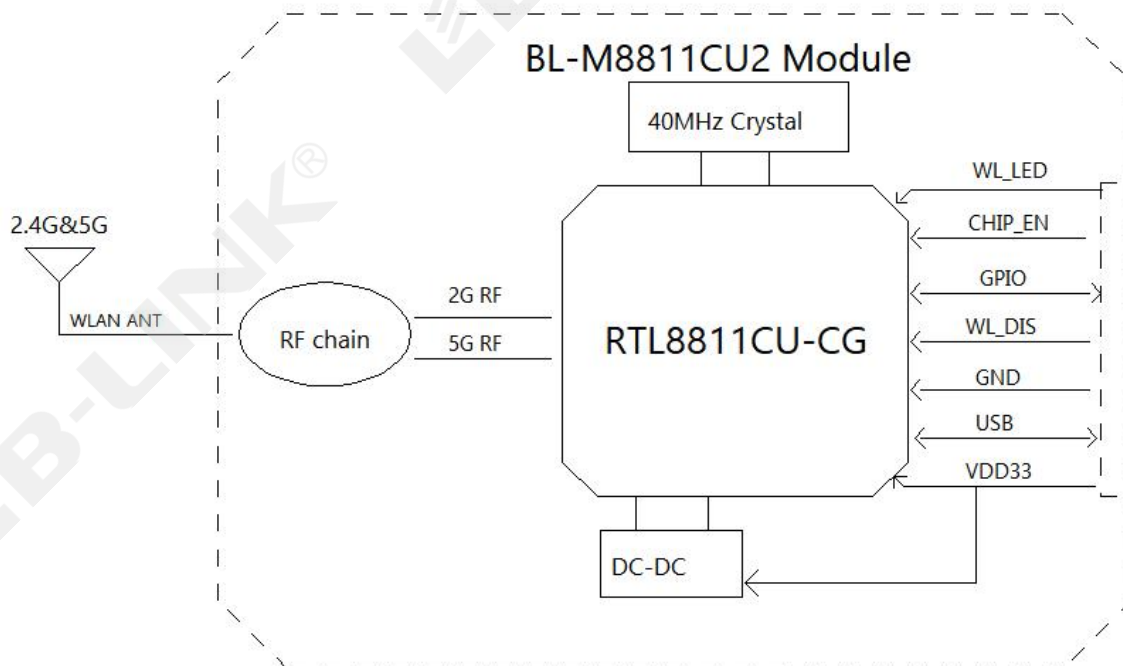
1. Introduction

BL-M8811CU2 is a highly integrated dual-band WLAN module base on RTL8811CU, which combines WLAN MAC, 1T1R Baseband and Radio in single chip. It compatible IEEE 802.11a/b/g/n/ac standard and supports Maximum PHY rate up to 433Mbps. The module provides excellent WLAN performance and lower cost ideal for wireless network applications such as Smart TV, OTT boxes, IP cameras, LED projectors.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Host Interface is USB2.0
- IEEE standard: IEEE 802.11a/b/g/n/ac
- Wireless PHY rate up to 433Mbps
- Connect to external antenna through half hole
- DC 3.3V±0.2V main power supply

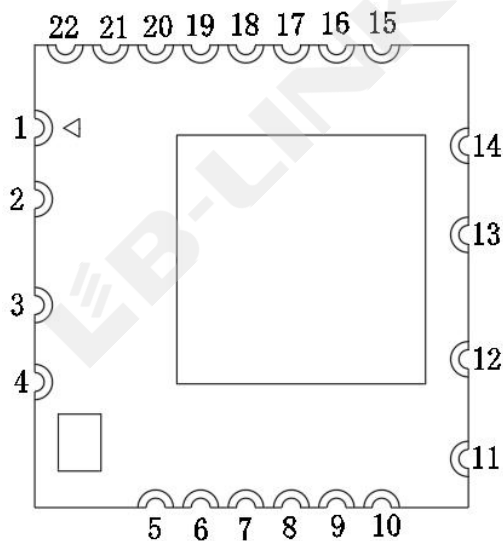
1.2 Block Diagram



1.3 General Specifications

Module Name	BL-M8811CU2
Chipset	RTL8811CU-CG
WLAN Standard	IEEE 802.11 a/b/g/n/ac
Host Interface	USB2.0
Antenna	Connect to the external antenna through half hole pad
Dimension	12.9*12.2*1.7mm (L*W*H)
Power Supply	DC 3.3V±0.2V @ 500 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	I/O Level	Module Pin Description
1	GND	RF		RF Ground for WLAN_ANT
2	WLAN_ANT	RF		2.4G / 5G RF PAD for WLAN_ANT
3	NC	/		No connection(floating)
4	GND	P		Ground connection
5	NC	/		No connection(floating)

6	NC	/		No connection(floating)
7	NC	/		No connection(floating)
8	NC	/		No connection(floating)
9	NC	/		No connection(floating)
10	NC	/		No connection(floating)
11	VDD33	P	VDD33	VDD 3.3V Power Supply
12	DM	AI/O		USB2.0 Transmitter/Receiver Differential Pair
13	DP	AI/O		USB2.0 Transmitter/Receiver Differential Pair
14	GND	P		Ground connection
15	NC	/		No connection(floating)
16	WL_DIS	I	VDD33	WLAN disable (active low)
17	NC	/		No connection(floating)
18	CHIP_EN	I	VDD33	This PIN can externally shut down module(active low, internal pull high)
19	GPIO7	I/O		GPIO7 (Host wake up WLAN, input signal control by software)
20	GPIO6	I/O		GPIO6 (WLAN to wake up host, output signal control by software)
21	NC	/		No connection(floating)
22	WL_LED	I		WLAN LED (active low)

P: Power or Ground; I/O: In/Output; I: Input; O: Output; AI/O: Analog In/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		/	1.7	2	/
Supply Voltage	VDD33	3.1	3.3	3.5	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

Conditions : VDD33=3.3V ; Ta:25°C

Use Case	VDD33 Current(average)		
	Typ	Max	Units
WLAN Unassociated (Linux Driver)	86	98	mA
2.4G WLAN 150Mbps Web browsing (Linux Driver)	114	133	mA
5G WLAN 433Mbps Web browsing (Linux Driver)	128	162	mA
2.4G 11b@1Mbps TX (RF test)17dBm	388	410	mA
2.4G 11g@11Mbps TX(RF test)17dBm	334	444	mA
2.4G 11g@6Mbps TX (RF test)17dBm	249	360	mA
2.4G 11g@54Mbps TX(RF test)15dBm	225	376	mA
2.4G 11n@HT20_MCS0 TX(RF test)17dBm	246	338	mA
2.4G 11n@HT20_MCS7 TX(RF test)15dBm	196	346	mA
2.4G 11n@HT40_MCS0 TX (RF test)16dBm	235	348	mA
2.4G 11n@HT40_MCS7 TX(RF test)14dBm	197	342	mA
2.4G 11b@11Mbps RX (RF test)	89	104	mA
2.4G 11n@6Mbps RX (RF test)	95	142	mA
2.4G 11n@HT20_MCS0 RX (RF test)	96	144	mA
2.4G 11n@HT40_MCS7 RX (RF test)	101	140	mA
5G 11a@6Mbps TX (RF test)16dBm	314	388	mA
5G 11a@54Mbps TX (RF test)14dBm	268	404	mA
5G 11n@HT20_MCS0 TX(RF test)15dBm	303	391	mA
5G 11n@HT20_MCS7 TX(RF test)13dBm	242	394	mA
5G 11n@HT40_MCS0 TX (RF test)15dBm	296	393	mA
5G 11n@HT40_MCS7 TX(RF test)13dBm	226	386	mA
5G 11ac@VHT80_MCS0 TX(RF test)14dBm	288	380	mA

5G 11ac@VHT80_MCS9 TX (RF test)12dBm	162	334	mA
5G 11n@6Mbps RX (RF test)	101	138	mA
5G 11n@HT20_MCS0 RX (RF test)	99	140	mA
5G 11n@HT40_MCS7 RX (RF test)	101	142	mA
5G 11ac@VHT80_MCS9 RX (RF test)	107	126	mA

4. WLAN 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	
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 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7 13.5~150Mbps;	
Frequency Tolerance		≤±20ppm	
2.4G Transmitter Specifications (TX power of some rates is calibrated, customers can define the target TX power of other rates by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)			
TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11b@1Mbps	Recommended Target TX Power : 17	±1.5	≤ -10
802.11b@11Mbps	Calibrated TX Power : 17	±1.5	≤ -10
802.11g@6Mbps	Recommended Target TX Power : 17	±1.5	≤ -10
802.11g@54Mbps	Calibrated TX Power : 15	±1.5	≤ -25

802.11n@HT20_MCS0	Recommended Target TX Power : 17	± 1.5	≤ -10
802.11n@HT20_MCS7	Calibrated TX Power : 15	± 1.5	≤ -28
802.11n@HT40_MCS0	Recommended Target TX Power : 16	± 1.5	≤ -10
802.11n@HT40_MCS7	Calibrated TX Power : 14	± 1.5	≤ -28

2.4G Receiver Specifications

RX Rate	Min Input Level (Typ.dBm)	Max Input Level (Typ.dBm)	PER
802.11b@1Mbps	-96	-5	< 8%
802.11b@11Mbps	-86	-5	< 8%
802.11g@6Mbps	-90	-5	< 10%
802.11g@54Mbps	-73	-5	< 10%
802.11n@HT20_MCS0	-88	-5	< 10%
802.11n@HT20_MCS7	-68	-5	< 10%
802.11n@HT40_MCS0	-86	-5	< 10%
802.11n@HT40_MCS7	-67	-5	< 10%

4.2 5G WLAN RF Specification

Conditions: VDD33=3.3V; Ta:25°C

Features	Description
WLAN Standard	IEEE 802.11a/n/ac
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;
Date Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7 13.5~150Mbps; 802.11ac (VHT80): MCS0~MCS9(1T1R)29.3~433.3Mbps;
Frequency Tolerance	$\leq \pm 20\text{ppm}$

5G Transmitter Specifications (TX power of some rates is calibrated, customers can define the target TX power of other rates by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)

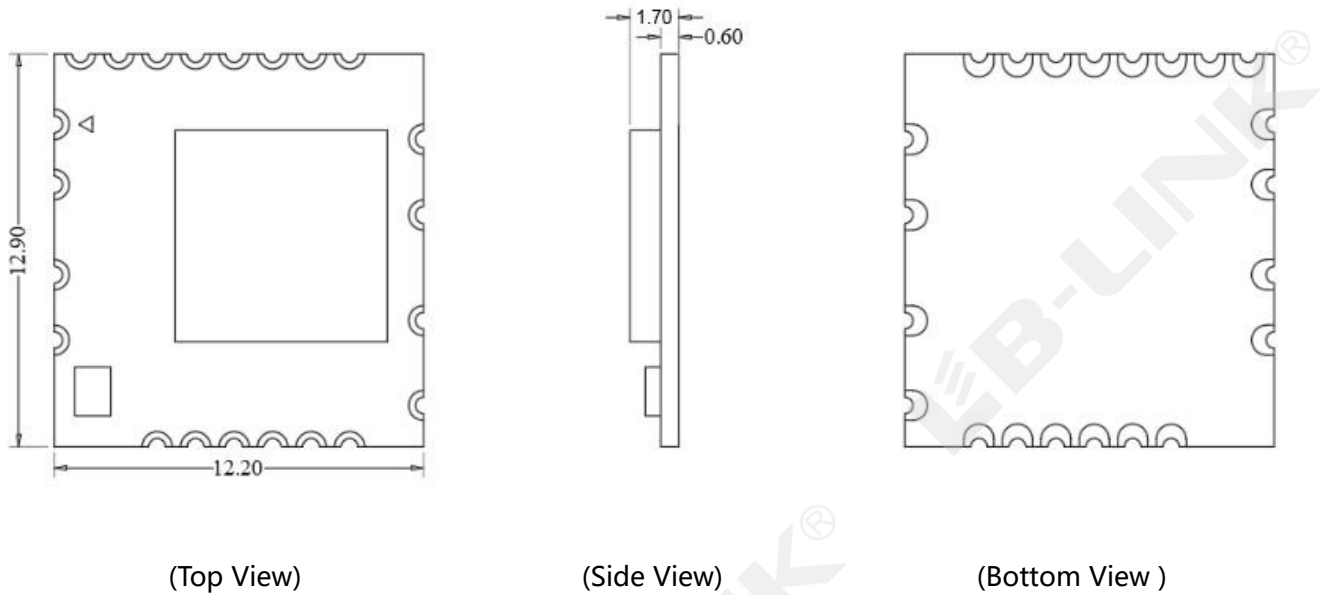
TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11a@6Mbps	Recommended Target TX Power : 16	±2	≤ -10
802.11a@54Mbps	Calibrated TX Power : 14	±2	≤ -25
802.11n@HT20_MCS0	Recommended Target TX Power : 15	±2	≤ -10
802.11n@HT20_MCS7	Calibrated TX Power : 13	±2	≤ -28
802.11n@HT40_MCS0	Recommended Target TX Power : 15	±2	≤ -10
802.11n@HT40_MCS7	Calibrated TX Power : 13	±2	≤ -28
802.11ac@VHT80_MCS0	Recommended Target TX Power : 14	±2	≤ -10
802.11ac@VHT80_MCS9	Calibrated TX Power : 12	±2	≤ -32

5G Receiver Specifications

RX Rate	Min Input Level (Typ.dBm)	Max Input Level (Typ.dBm)	PER
802.11a@6Mbps	-89	-5	< 10%
802.11a@54Mbps	-71	-5	< 10%
802.11n@HT20_MCS0	-87	-5	< 10%
802.11n@HT20_MCS7	-68	-5	< 10%
802.11n@HT40_MCS0	-86	-5	< 10%
802.11n@HT40_MCS7	-67	-5	< 10%
802.11ac@VHT80_MCS0	-82	-5	< 10%
802.11ac@VHT80_MCS9	-57	-5	< 10%

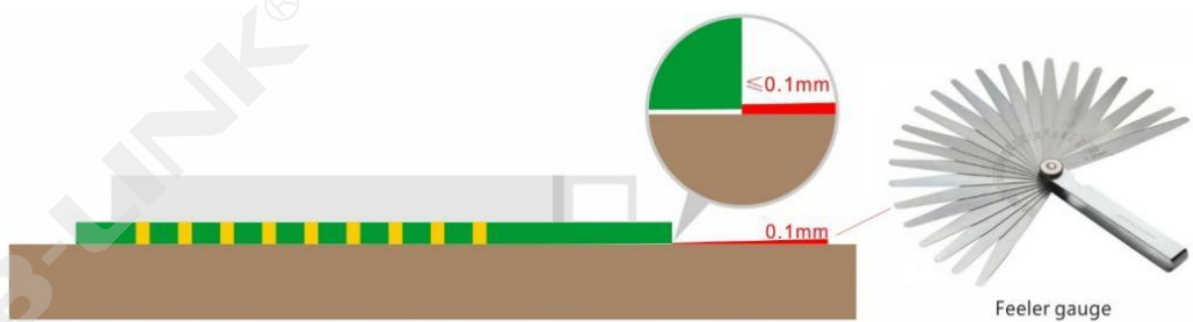
5. Mechanical Specifications

5.1 Module Outline Drawing



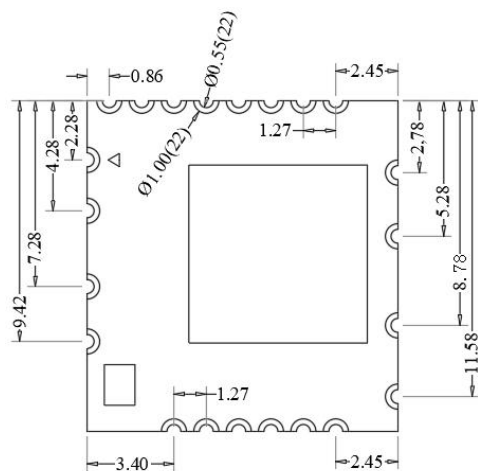
Module dimension: 12.9*12.2*1.7mm(L*W; Tolerance: +0.3/-0.10mm)

Module dimension: 12.9*12.2*1.7mm(H; Tolerance: ± 0.2 mm)

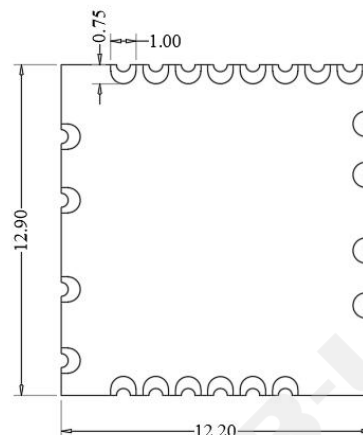


Module Bow and Twist: ≤ 0.1 mm

5.2 Mechanical Dimensions



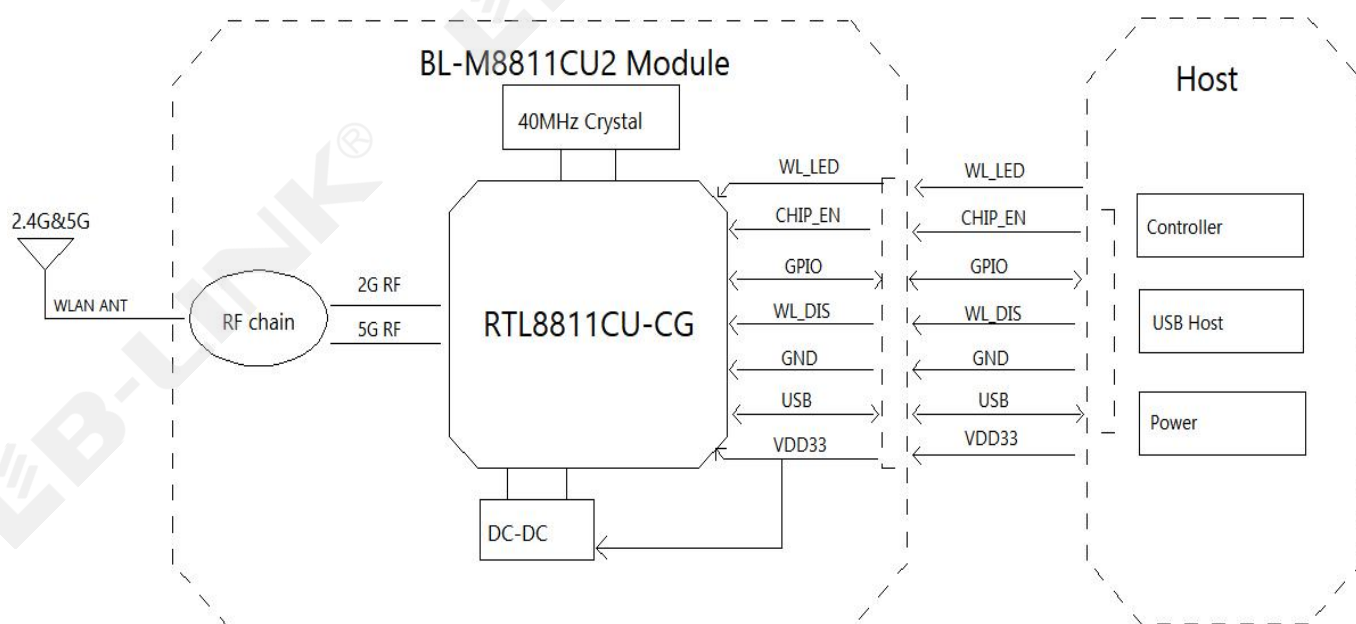
(Top View)



(Bottom View)

6. Application Information

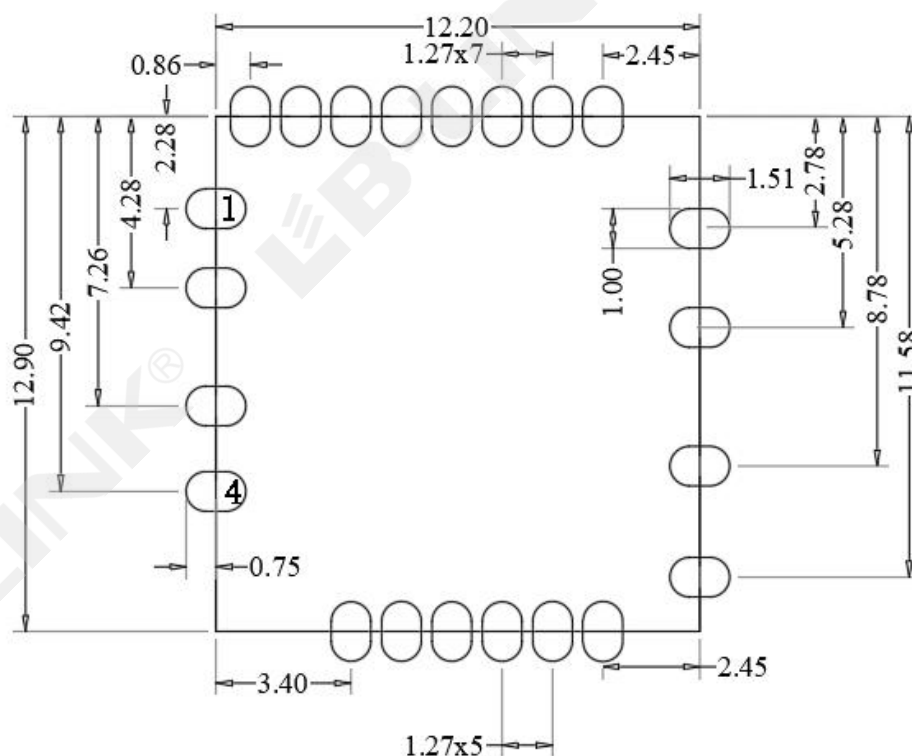
6.1 Typical Application Circuit



6.2 HW Application Note

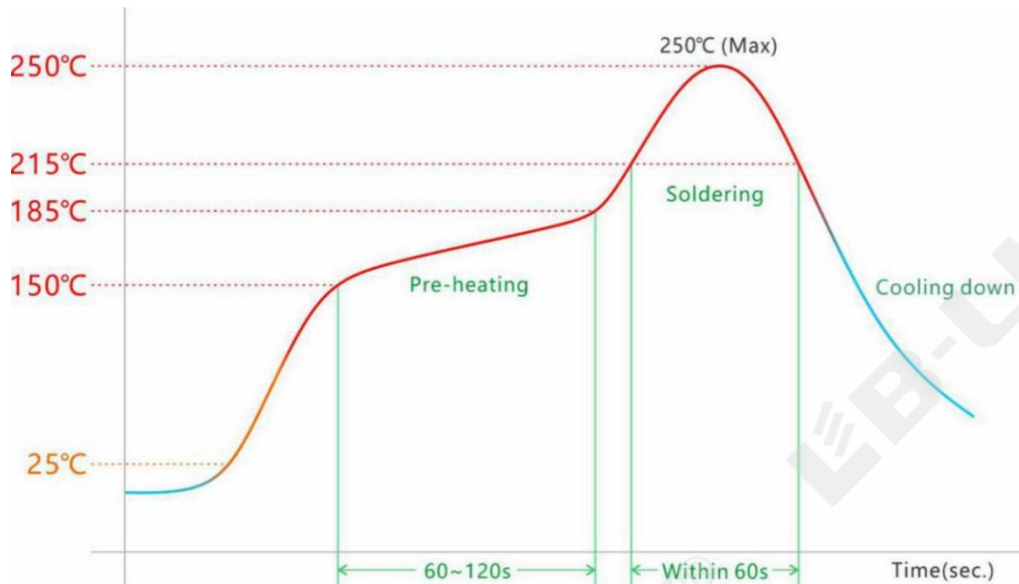
- PCB traces of the USB high-speed signal pair as short as possible, minimize the length mismatch of signal pair, avoid layer change and maintain a complete reference plane to reduces signal reflections and impedance changes.
- PCB traces of the RF path as short as possible, as far away from other signal as possible, and should be maintain continuous 50Ω characteristic impedance, structure of "Differential Coated Coplanar Wave-guide With Ground" with the advantages of impedance control and GND surrounding isolation interference may be an ideal choice. It is necessary to maintain a complete GND reference layer below the RF path area.
- The module's RF PAD and antenna PAD / RF connector PAD on customer's motherboard are significantly wider than PCB traces of the RF path, which will cause RF impedance discontinuity. To improve this problem, in addition to adjusting the local impedance of these PADs, a " π " circuit can be reserved near the antenna / RF connector, which can match the impedance of the entire RF path and the impedance of the antenna.

6.3 Recommend PCB Layout Footprint



(Design size: mm)

6.4 Reflow Soldering Standard Conditions



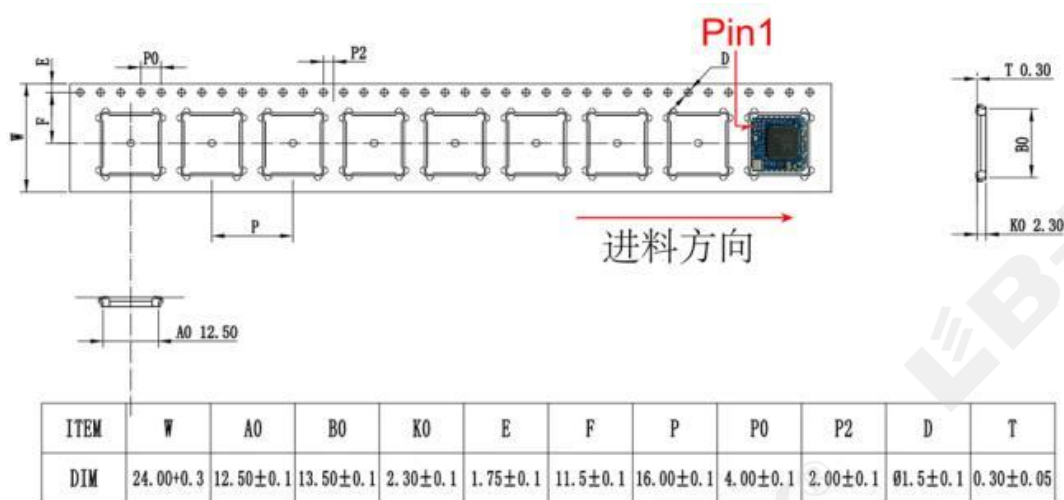
Please use the reflow within 2 times.
Set up the highest temperature within 250°C.

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8811CU-CG	Realtek Semiconductor Corp.	
2	PCB	BL-M8821CU1	ShenZhen Tie Fa Technology Limited	
			MILLION SOURCE PRINTED CIRCUIT BOARD CO.,LTD	
			Quzhou Sunlord Electronics Co.,Ltd	
3	Crystal	40MHz-2520	HUBEI TKD CRYSTAL ELECTRONIC SCIENCE AND TECHNOLOGY CO.,LTD	
			HOSONIC ELECTRONIC CO.,LTD	
			LUCKI CM ELECTRONICS CO.,LTD	
4	Diplexer	DIP1005	TDK China Co.,Ltd	

8. Package and Storage Information

8.1 Package Dimensions



Package specification:

1. 2000 modules per roll and 10,000 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 28mm (with a width of 24mm 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 5 boxes.

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:

ESD Protection: 2KV(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