

**B-LINK®**

## **BL-M8811CU2**

**802.11ac 433Mbps WiFi**

**USB Module Specification**

**SHENZHEN BILIAN ELECTRONIC CO., LTD**

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## Revision History

Module Name: BL-M8811CU2	
Module Type: 802.11a/b/g/n/ac 433MbpsWiFi USB Module	
Revision: V1.0	
Customer Approval:	
Company:	
Title:	
Signature:	Date:
BL-link Approval:	
Title:	
Signature:	Date:

## Revision History

Revision	Summary	Release Date
1.0	Official release	2019-09-01

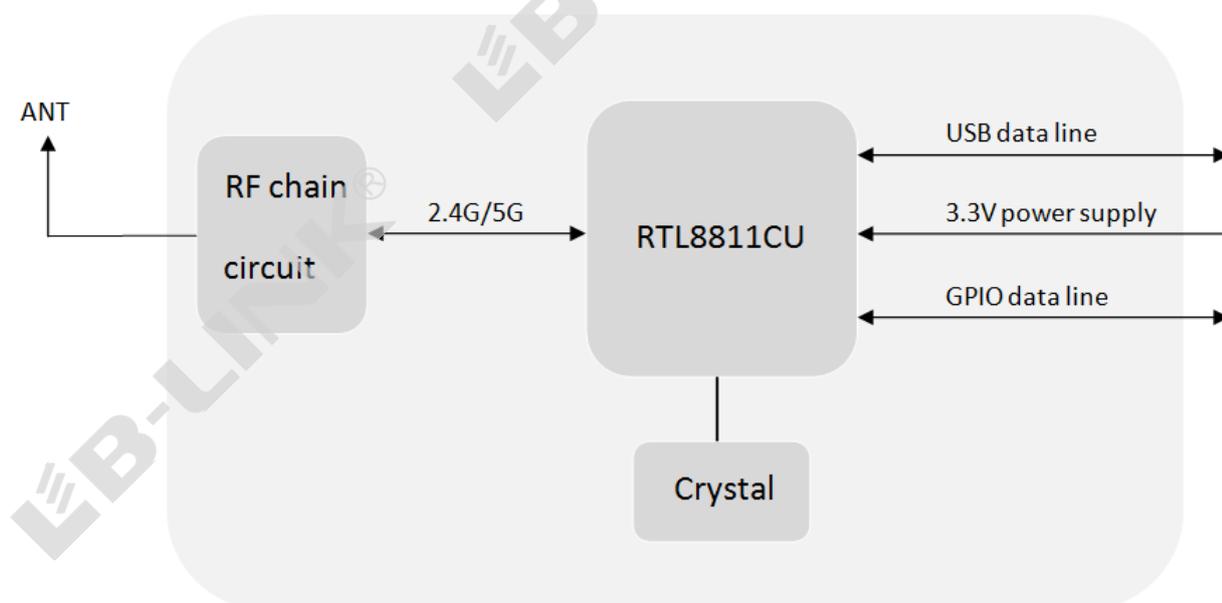
## 1. Introduction

BL-M8811CU2 module is designed base on RTL8811CU. It supports IEEE 802.11a/b/g/n/ac 1T1R with high throughput data rate for WLAN products and provides the highest PHY rate up to 433.3Mbps. It combines a WLAN MAC, a 1T1R capable WLAN baseband, modem and offers stable, high rate, long distance wireless connectivity through external antenna. It can be used on the IP Camera/ Smart TV and other wireless devices easily.

### 1.1 Features

- Operating Frequencies: 2.4~2.4835GHz or 5.15~5.85GHz
- Host Interface is USB
- IEEE Standards: IEEE 802.11a/b/g/n/ac
- Wireless data rate can reach up to 433Mbps
- Connect to external antenna through half hole
- Power Supply: DC 3.3V±0.2V main power supply

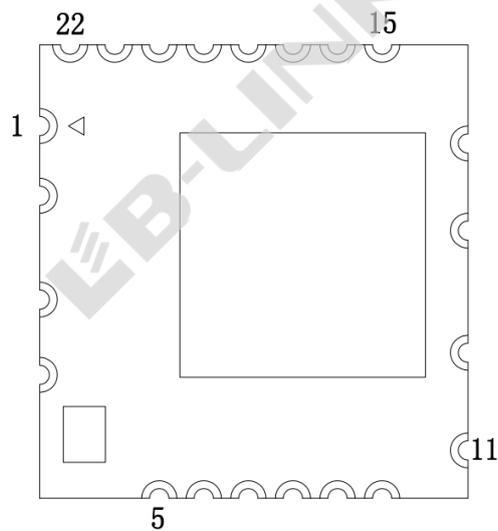
### 1.2 Block Diagram



### 1.3 General Specifications

Module Name	BL-M8811CU2 WiFi USB Module
Chipset	RTL8811CU-CG
WiFi Standards	IEEE 802.11a/b/g/n/ac
Host Interface	USB2.0
Antenna	Connect to the external antenna through half hole
Dimension	SMD 22Pins, 13.0*12.2*1.8mm (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	Description	Supply
1	GND	RF	Ground	
2	ANT	RF	2G/5G WIFI ANT	
3	NC	--	No connection(floating)	

4	GND	P	Ground	
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	VDD 3.3V Power Supply	
12	USB_DM	I/O	USB Transmitter/Receiver Differential Pair	
13	USB_DP	I/O	USB Transmitter/Receiver Differential Pair	
14	GND	P	Ground	
15	NC	--	No connection(floating)	
16	WL_DIS	I	WIFI disable (active low)	VDD33
17	NC	--	No connection(floating)	
18	CHIP_EN	I	This PIN can externally shut down module ( active low, internal pull high )	VDD33
19	GPIO7	I/O	GPIO7 (Host wake up WIFI, input signal control by software)	
20	GPIO6	I/O	GPIO6 (WIFI to wake up host, output signal control by software)	
21	NC	--	No connection(floating)	
22	WL_LED	O	WIFI LED (active low)	

P: Power, I: Input, O: Output, I/O: In/Output, RF: Analog RF Port

### 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			1.92:1	2:1	/
Supply Voltage	VDD	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 : VDD=3.3V ; Ta:25°C			
Use Case	VDD Current (average)		
	Typ	Max	Units
WiFi Unassociated (Linux)	130	160	mA
2.4G 11Mbps TX (RF test)	330	400	mA
2.4G HT40 MCS0 TX (RF test)	292	345	mA
2.4G HT40 MCS7 TX (RF test)	280	320	mA
5G VHT80 MCS0 TX (RF test)	338	372	mA
5G VHT80 MCS9 TX (RF test)	304	364	mA
2.4G RX Active (RF test)	140	165	mA
5G RX Active (RF test)	160	185	mA

## 4. WiFi RF Specifications

### 4.1 2.4G WiFi RF Specification

Conditions: VDD=3.3V; 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): DBPSK, DQPSK, CCK; 802.11a/g (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 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7 13.5~150Mbps;		
Frequency Tolerance	$\leq \pm 15\text{ppm}$		
<b>2.4G Transmitter Specifications</b>			
<b>TX Rate</b>	<b>TX Power (dBm)</b>	<b>TX Power Tolerance (dB)</b>	<b>EVM (dB)</b>
802.11b@1~11Mbps	17	$\pm 1$	$\leq -15$
802.11g@6Mbps	15	$\pm 1$	$\leq -15$
802.11g@54Mbps	15	$\pm 1$	$\leq -25$
802.11n@HT20_MCS0	15	$\pm 1$	$\leq -10$
802.11n@HT20_MCS7	15	$\pm 1$	$\leq -28$
802.11n@HT40_MCS0	14	$\pm 1$	$\leq -10$
802.11n@HT40_MCS7	14	$\pm 1$	$\leq -28$
<b>2.4G Receiver Specifications</b>			
<b>RX Rate</b>	<b>Min Input Level (dBm)</b>	<b>Max InputLevel (dBm)</b>	<b>PER</b>
802.11b@1Mbps	-96	-5	< 8%
802.11b@11Mbps	-87	-5	< 8%
802.11g@6Mbps	-90	-5	< 10%
802.11g@54Mbps	-73	-5	< 10%
802.11n@HT20_MCS0	-89	-5	< 10%
802.11n@HT20_MCS7	-69	-5	< 10%
802.11n@HT40_MCS0	-87	-5	< 10%
802.11n@HT40_MCS7	-68	-5	< 10%

## 4.2 5G WiFi RF Specification

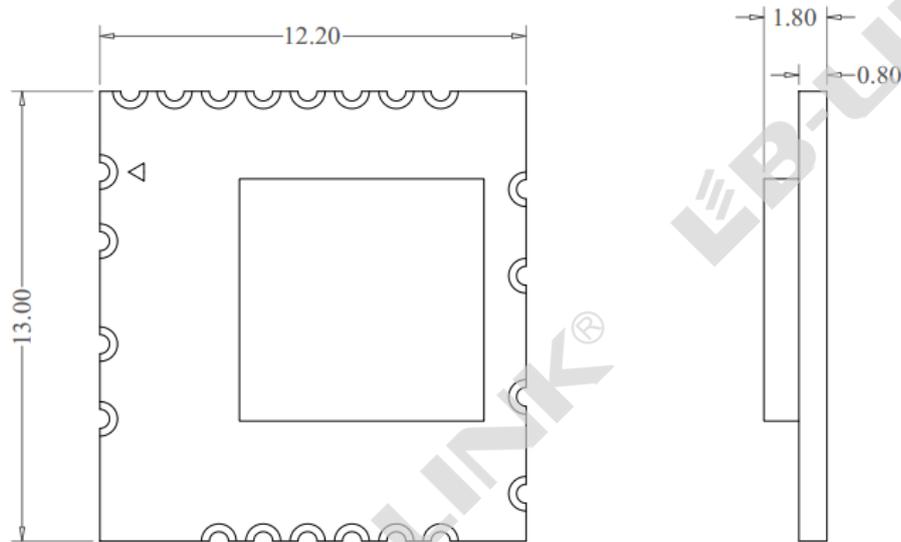
<b>Conditions: VDD=3.3V; Ta:25°C</b>	
<b>Features</b>	<b>Description</b>
WLAN Standard	IEEE 802.11a/n/ac, CSMA/CA
Frequency Range	5.15~5.25GHz; 5.725~5.850GHz (5GHz ISM Band)

Channels	Ch36, Ch40, Ch42, Ch44, Ch48; Ch149, Ch151, Ch153, Ch155, Ch157, Ch159, Ch161, Ch165		
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 6.5~72.2Mbps; 802.11n (HT40): MCS0~MCS7) 13.5~150Mbps; 802.11ac (VHT20): MCS0~MCS8 6.5~86.7Mbps; 802.11ac (VHT40): MCS0~MCS9 13.5~200Mbps; 802.11ac (VHT80): MCS0~MCS9 29.3~433.3Mbps;		
Frequency Tolerance	$\leq \pm 15\text{ppm}$		
<b>5G Transmitter Specifications</b>			
TX Rate	TX Power (dBm)	TX Power Tolerance (dB)	EVM (dB)
802.11a@6Mbps	14	$\pm 1$	$\leq -10$
802.11a@54Mbps	14	$\pm 1$	$\leq -25$
802.11n@HT20_MCS0	12	$\pm 1$	$\leq -10$
802.11n@HT20_MCS7	12	$\pm 1$	$\leq -28$
802.11n@HT40_MCS0	13	$\pm 1$	$\leq -10$
802.11n@HT40_MCS7	12	$\pm 1$	$\leq -28$
802.11ac@VHT80_MCS0	13	$\pm 1$	$\leq -10$
802.11ac@VHT80_MCS9	13	$\pm 1$	$\leq -32$
<b>5G Receiver Specifications</b>			
RX Rate	Min Input Level (dBm)	Max Input Level (dBm)	PER
802.11a@6Mbps	-89	-5	< 10%
802.11a@54Mbps	-72	-5	< 10%
802.11n@HT20_MCS0	-87	-5	< 10%
802.11n@HT20_MCS7	-69	-5	< 10%
802.11n@HT40_MCS0	-86	-5	< 10%
802.11n@HT40_MCS7	-67	-5	< 10%

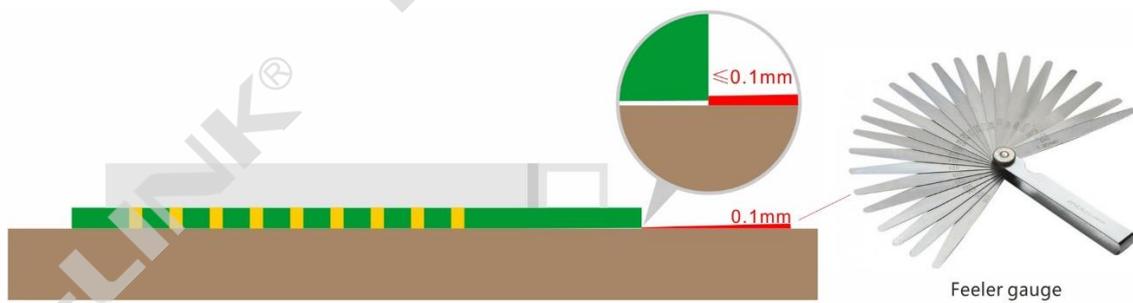
802.11ac@VHT80_MCS0	-82	-10	< 10%
802.11ac@VHT80_MCS9	-57	-10	< 10%

## 5. Mechanical Specifications

### 5.1 Module Outline Drawing

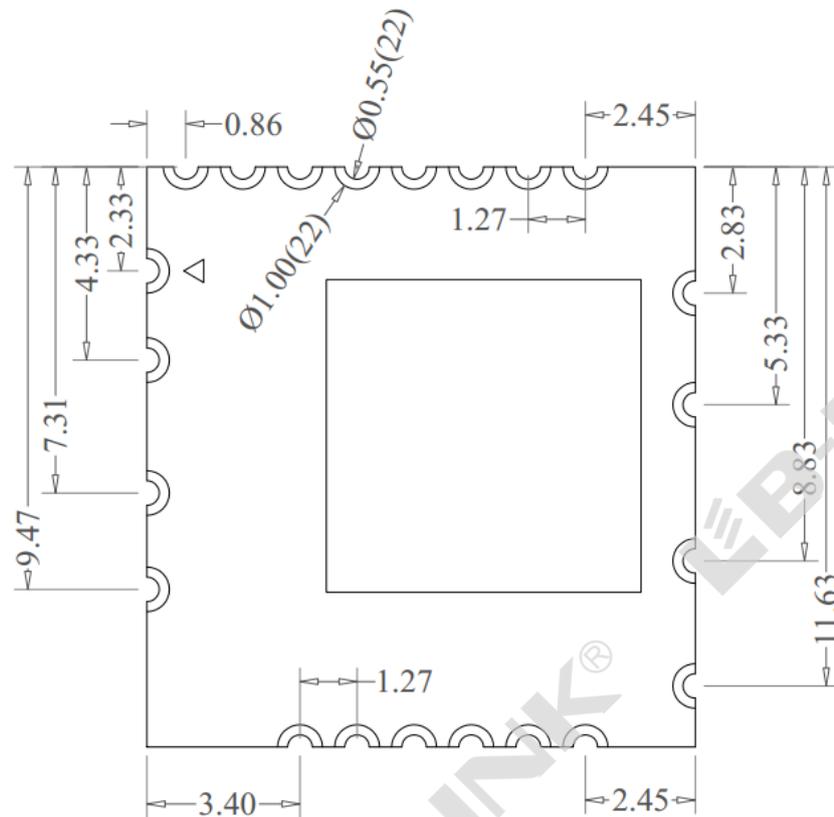


Module dimension: 13.0\*12.2\*1.8mm(L\*W\*H; Tolerance:  $\pm 0.15$ mm)



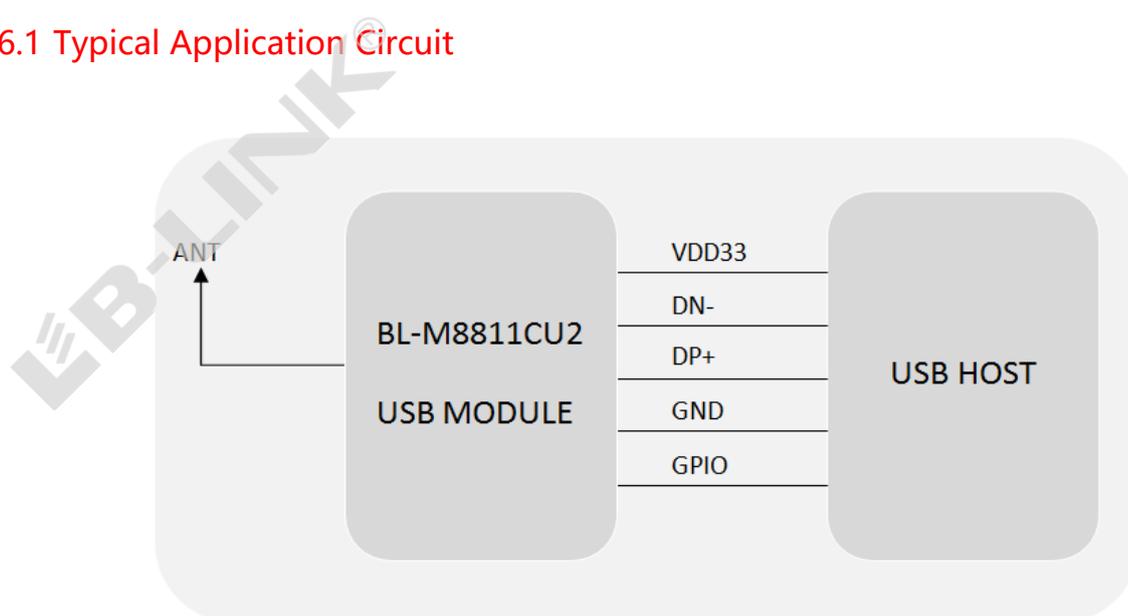
Module Bow and Twist:  $\leq 0.1$ mm

## 5.2 Mechanical Dimensions

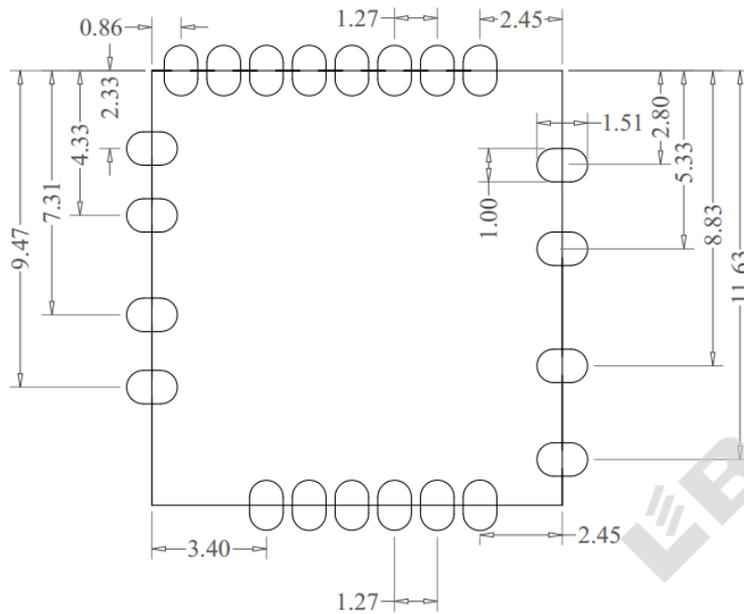


## 6. Application Information

### 6.1 Typical Application Circuit

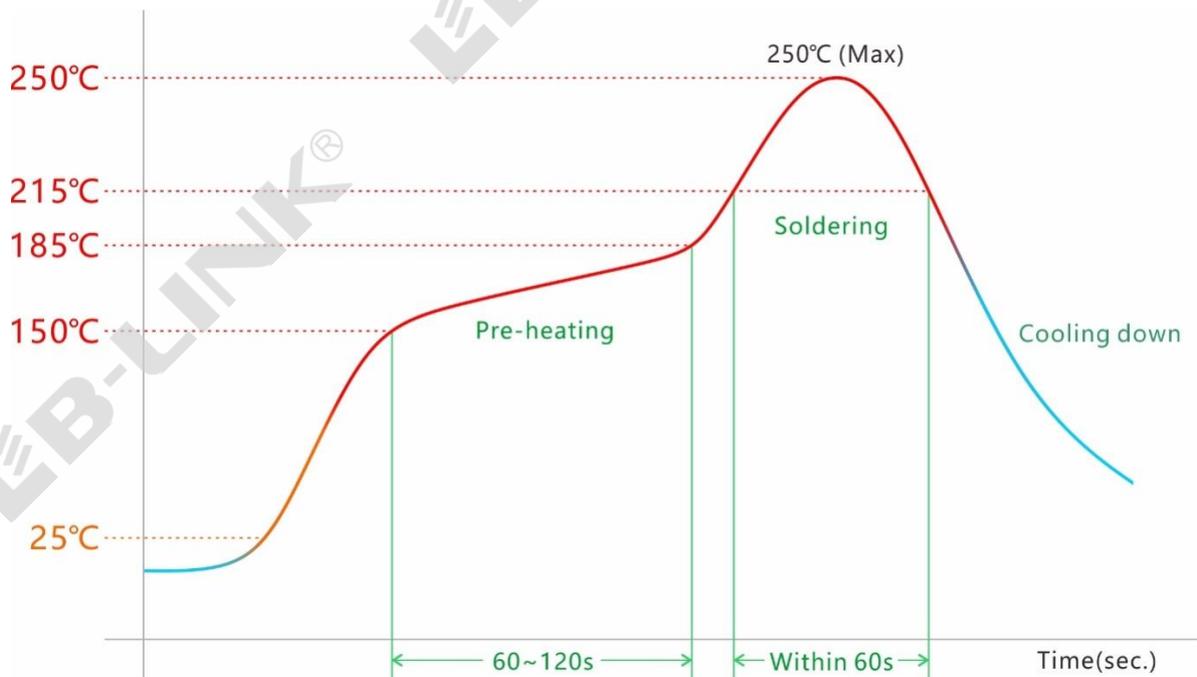


**6.2 Recommend PCB Layout Footprint**



Top View

**6.3 Reflow Soldering Standard Condition**



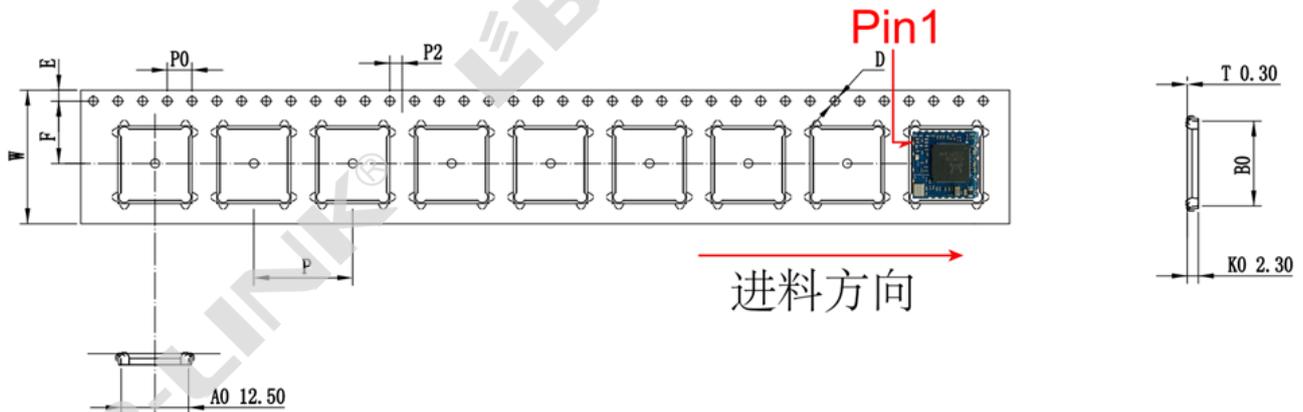
Please use the reflow within 2 times.  
Set up the highest temperature within 250°C.

## 7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8811CU-CG	Realtek	
2	PCB	BL-M8821CU1	Shenzhen Tie Fa Technology	
			Guangdong KINGSHINE ELECTRONICS CO., LTD	
			MILLION SOURCE PRINTED CIRCUIT BOARD CO., LTD	
			Quzhou Sunlord Electronics Co., Ltd	
2	Crystal	40MHz-15pF-10ppm-2520	HUBEI TKD ELECTRONICS	
			TECHNOLOGY CO., LTD	
			HOSONIC ELECTRONIC CO., LTD	
3	Diplexer	DPX105850DT-6019A1	TDK China Co., Ltd	

## 8. Package and Storage Information

### 8.1 Package Dimensions



ITEM	W	A0	B0	K0	E	F	P	P0	P2	D	T
DIM	24.00±0.3	12.50±0.1	13.50±0.1	2.30±0.1	1.75±0.1	11.5±0.1	16.00±0.1	4.00±0.1	2.00±0.1	Ø1.5±0.1	0.30±0.05



## Package specification:

1. 2,000 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: -45°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!

## **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&E 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**

This module is Limited modular without shielding, host manufacturer have to consult with module manufacturer for the module limiting conditions when integrate the module in the host, module manufacturer should reviews detailed test data or host designs prior to giving the host manufacturer approval.

When this Module is installed into the end product, a Class II Permissive Change or a New FCC ID submission is required to ensure the full compliance of FCC relevant requirements.

### **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: 2AL6K-BL-M8811CU2 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.

Antennas Information

Antenna No.	Type of antenna	Gain of antenna (Max.)	Frequency Range
2.4G Wi-Fi	External Antenna	2dBi	2400.0MHz-2483.5MHz
5G Wi-Fi	External Antenna	2dBi	5150.0MHz-5250.0MHz 5725.0MHz-5850.0 MHz

### **2.8 Label and compliance information**

The final end product must be labeled in a visible area with the following" Contains FCC ID: 2AL6K-BL-M8811CU2".

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

Host manufacturer which install this modular with limit modular approval should perform the test of radiated emission and spurious emission according to FCC part 15C:15.247&15.407 and 15.209&15.207 requirement, only if the test result comply with FCC part 15247&15.407 and 15.209&15.207 requirement, then the hast can be sold legally.

### **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.

**FCC Warning :**

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.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product