



8812CU3

User Manual



(Top View)

Module Name:	
Module Type: 802.11ac 867Mbps 2T2R WiFi USB 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	2020-05-20
1.0	Official release (change product picture)	2020-06-24

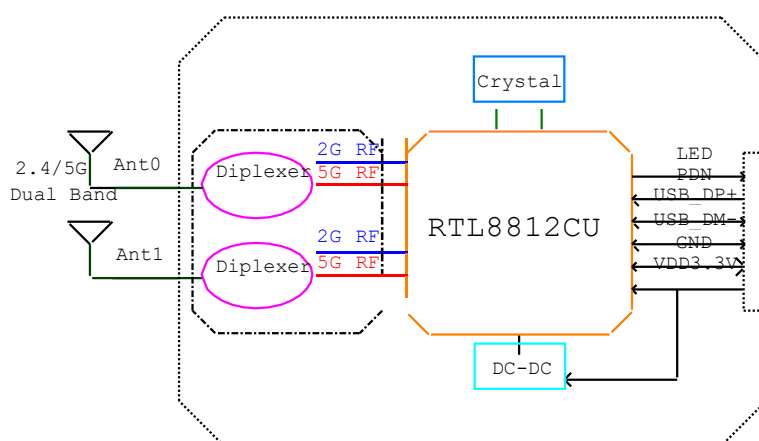
1. Introduction

8812CU3 is a highly integrated 2*2 dual-band wireless LAN module. It combines a WLAN MAC, a 2T2R capable WLAN base band, a dual-band WLAN radio. It supports IEEE 802.11a/b/g/n/ac standard and provides the highest PHY rate up to 867Mbps, It can offer feature-rich wireless connectivity and reliable 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 data rate can reach up to 867Mbps
- Connect to external antenna through IPEX connectors
- Power Supply: VDD 3.3V±0.2V

1.2 Block Diagram

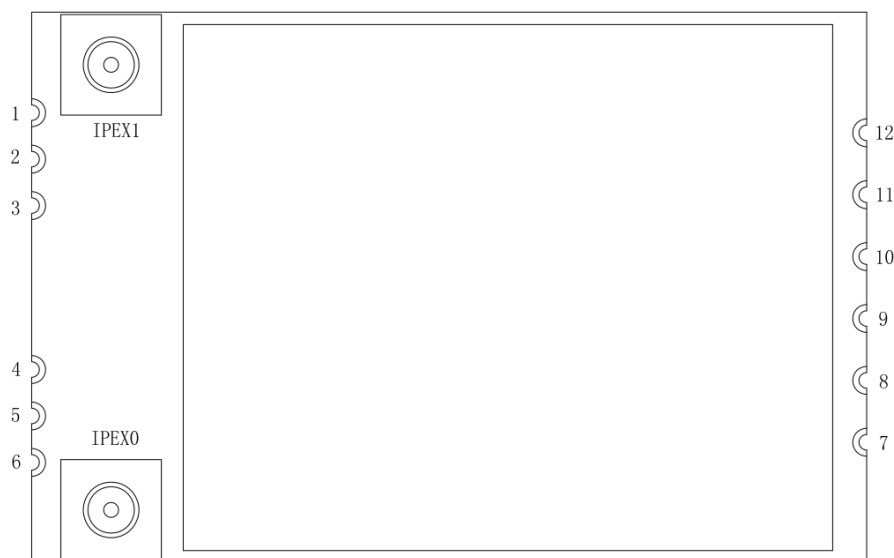


1.3 General Specifications

Module Name	8812CU3
Chipset	RTL8812CU-CG
WiFi Standards	IEEE802.11a/b/g/n/ac, 2T2R MIMO, 2.4G/5GHz, 867Mbps (Max)
Host Interface	USB2.0
Antenna	Connect to the external antennas through IPEX connectors
Dimension	SMD 12Pins, 27.0*17.8*3.1mm (L*W*H, Tolerance:±0.15mm)

Power Supply	VDD 3.3V±0.2V @850mA 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	RF Ground	
2	NC	RF	NC (Reserved for 2.4/5G-ANT1)	
3	GND	RF	RF Ground	
4	GND	RF	RF Ground	
5	NC	RF	NC (Reserved for 2.4/5G-ANT0)	
6	GND	RF	RF Ground	
7	LED	O	WiFi_LED Pin (Active Low, external current limiting resistor required)	VDD
8	GND	P	Ground	
9	DP+	I/O	USB 2.0 differential pair	VDD
10	DM-	I/O	USB 2.0 differential pair	VDD
11	VDD	P	DC 3.3V power supply	
12	PDN	I	Power Down, this Pin can externally shutdown the	VDD

			Module (Active Low, internal pull high by 47K resistor)	
IPEX0	2.4/5G-ANT0	RF	2.4G / 5G RF to IPEX connector for ANT0	
IPEX1	2.4/5G-ANT1	RF	2.4G / 5G RF to IPEX connector for ANT1	

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 (Voltage Standing Wave Ratio)			1.7	2	
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 Radio Off (Linux Driver)	20	50	mA
WiFi Unassociated (Linux Driver)	100	150	mA
2.4G 11Mbps TX (RF-Test, 1TX) for 18dBm	340	380	mA

2.4G 11Mbps RX (RF-Test, 1RX)	200	250	mA
2.4G 6Mbps TX (RF-Test, 1TX) for 16dBm	330	370	mA
2.4G 6Mbps RX (RF-Test, 1RX)	200	240	mA
2.4G 54Mbps TX (RF-Test, 1TX) for 16dBm	240	270	mA
2.4G 54Mbps RX (RF-Test, 1RX)	200	230	mA
2.4G MCS15(HT20) TX (RF-Test, 2TX) for 16dBm	270	310	mA
2.4G MCS15(HT20) RX (RF-Test, 2RX)	210	230	mA
2.4G MCS15(HT40) TX (RF-Test, 2TX) for 16dBm	255	285	mA
2.4G MCS15(HT40) RX (RF-Test, 2RX)	220	260	mA
5.8G 6Mbps TX (RF-Test, 1TX) for 16dBm	390	430	mA
5.8G 6Mbps RX (RF-Test, 1RX)	190	210	mA
5.8G 54Mbps TX (RF-Test, 1TX) for 16dBm	255	285	mA
5.8G 54Mbps RX (RF-Test, 1RX)	210	260	mA
5.8G MCS0(HT20) TX (RF-Test, 2TX) for 16dBm	290	340	mA
5.8G MCS0(HT20) RX (RF-Test, 2RX)	190	200	mA
5.8G MCS15(HT40) TX (RF-Test, 2TX) for 16dBm	260	290	mA
5.8G MCS15(HT40) RX (RF-Test, 2RX)	210	240	mA
5.8G MCS9(VHT80) TX (RF-Test, 2TX) for 14dBm	250	290	mA
5.8G MCS9(VHT80) RX (RF-Test, 2RX)	210	230	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~Ch11 (For 20MHz Channels)		
Modulation	802.11b (DSSS): DBPSK, DQPSK, CCK; 802.11g (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM;		
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;		
Antenna type	PCB antenna		
Antenna Gain	Ant0: 6.07dBi ant1: 5.15dBi		
Frequency Tolerance	≤ ±20ppm		
2.4G Transmitter Specifications (Ant0/Ant1)			
TX Rate	TX Power	TX Power Tolerance	EVM
802.11b@1~11Mbps	18dBm	± 1.5dBm	≤-10dB
802.11g@6Mbps	16dBm	± 1.5dBm	≤-10dB
802.11g@54Mbps	16dBm	± 1.5dBm	≤-25dB
802.11n@HT20_MCS0	16dBm	± 1.5dBm	≤-10dB
802.11n@HT20_MCS7	16dBm	± 1.5dBm	≤-28dB
802.11n@HT40_MCS0	16dBm	± 1.5dBm	≤-10dB
802.11n@HT40_MCS7	16dBm	± 1.5dBm	≤-28dB
2.4G Receiver Specifications (Ant0/Ant1)			
RX Rate	Min Input Level (Typ)	Max Input Level (Typ)	PER
802.11b@1Mbps	-93dBm	-5dBm	< 8%
802.11b@11Mbps	-87dBm	-5dBm	< 8%
802.11g@6Mbps	-91dBm	-10dBm	< 10%
802.11g@54Mbps	-73dBm	-10dBm	< 10%
802.11n@HT20_MCS0	-90dBm	-10dBm	< 10%
802.11n@HT20_MCS7	-71dBm	-10dBm	< 10%
802.11n@HT40_MCS0	-86dBm	-10dBm	< 10%
802.11n@HT40_MCS7	-68dBm	-10dBm	< 10%

4.2 5G WiFi RF Specification

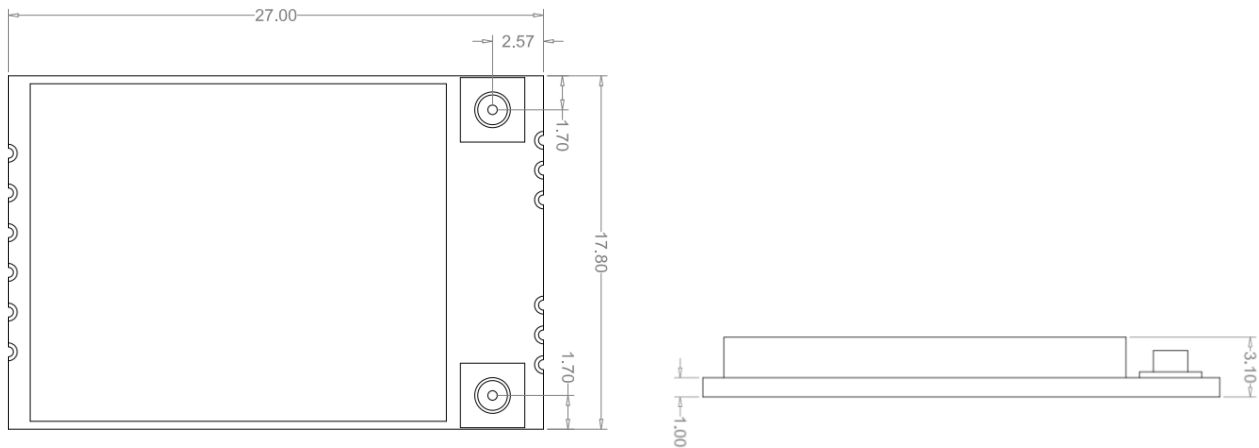
Conditions: VDD=3.3V; Ta:25°C	
Features	Description
WLAN Standard	IEEE 802.11a/n/ac CSMA/CA

Frequency Range	5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.725GHz; 5.725~5.85GHz (5GHz ISM Band)		
Channels	Ch36, Ch40, Ch44, Ch48; Ch52~Ch64; Ch100~Ch140; Ch149~Ch165 (For 20MHz Channels)		
Modulation	802.11a (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11ac (OFDM): BPSK, QPSK, 16QAM, 64QAM, 256QAM;		
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;		
Antenna type	PCB antenna		
Antenna Gain	Ant0	5150 -5250MHz	5.02 dBi
		5250-5350MHz	6.15 dBi
		5470-5725MHz	8.46 dBi
		5725-5850MHz	9.23 dBi
	Ant1	5150 -5250MHz	6.45 dBi
		5250-5350MHz	6.48 dBi
		5470-5725MHz	7.26 dBi
		5725-5850MHz	5.38 dBi
Frequency Tolerance	≤ ±20ppm		
5G Transmitter Specifications (Ant0/Ant1)			
TX Rate	TX Power	TX Power Tolerance	EVM
802.11a@6Mbps	16dBm	±2dBm	≤-10dB
802.11a@54Mbps	16dBm	±2dBm	≤-25dB
802.11n@HT20_MCS0 802.11ac@VHT20_MCS0	16dBm	±2dBm	≤-10dB

802.11n@HT20_MCS7 802.11ac@VHT20_MCS7	16dBm	±2dBm	≤-28dB
802.11n@HT40_MCS0 802.11ac@VHT40_MCS0	16dBm	±2dBm	≤-10dB
802.11n@HT40_MCS7 802.11ac@VHT40_MCS7	16dBm	±2dBm	≤-28dB
802.11ac@VHT20_MCS8	16dBm	±2dBm	≤-30dB
802.11ac@VHT40_MCS8 802.11ac@VHT40_MCS9	16dBm	±2dBm	≤-32dB
802.11ac@VHT80_MCS0	14dBm	±2dBm	≤-10dB
802.11ac@VHT80_MCS9	14dBm	±2dBm	≤-32dB
5G Receiver Specifications (Ant0/Ant1)			
RX Rate	Min Input Level(Typ)	Max Input Level(Typ)	PER
802.11a@6Mbps	-90dBm	-10dBm	< 10%
802.11a@54Mbps	-72dBm	-10dBm	< 10%
802.11n@HT20_MCS0	-89dBm	-15dBm	< 10%
802.11n@HT20_MCS7	-70dBm	-15dBm	< 10%
802.11n@HT40_MCS0	-86dBm	-15dBm	< 10%
802.11n@HT40_MCS7	-68dBm	-15dBm	< 10%
802.11ac@VHT80_MCS0	-84dBm	-15dBm	< 10%
802.11ac@VHT80_MCS9	-58dBm	-15dBm	< 10%

5. Mechanical Specifications

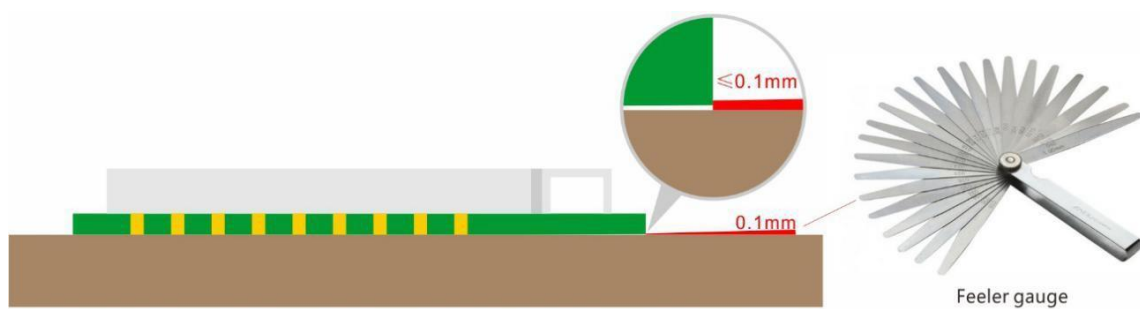
5.1 Module Outline Drawing



(Top View)

Module dimension: 27.0mm*17.8mm*3.1mm (L*W*H , Tolerance: $\pm 0.15\text{mm}$)

IPEX connector dimension: 2.6*3.0*1.2mm (L*W*H, $\varnothing 2.0\text{mm}$)

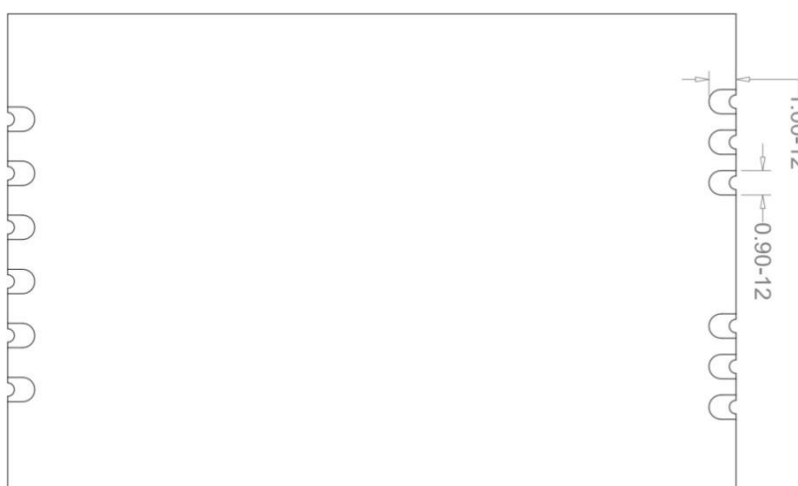


Module Bow and Twist: $\leq 0.1\text{mm}$

5.2 Mechanical Dimensions



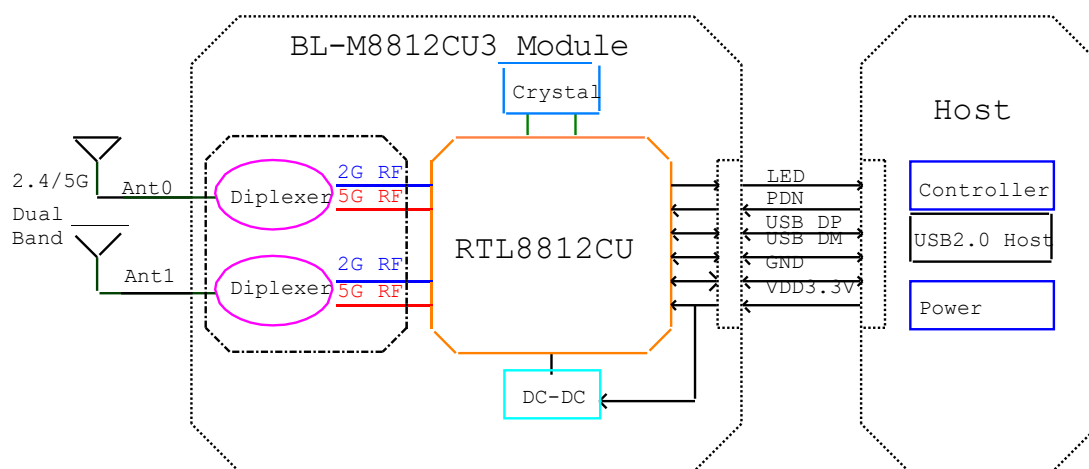
(Top View)



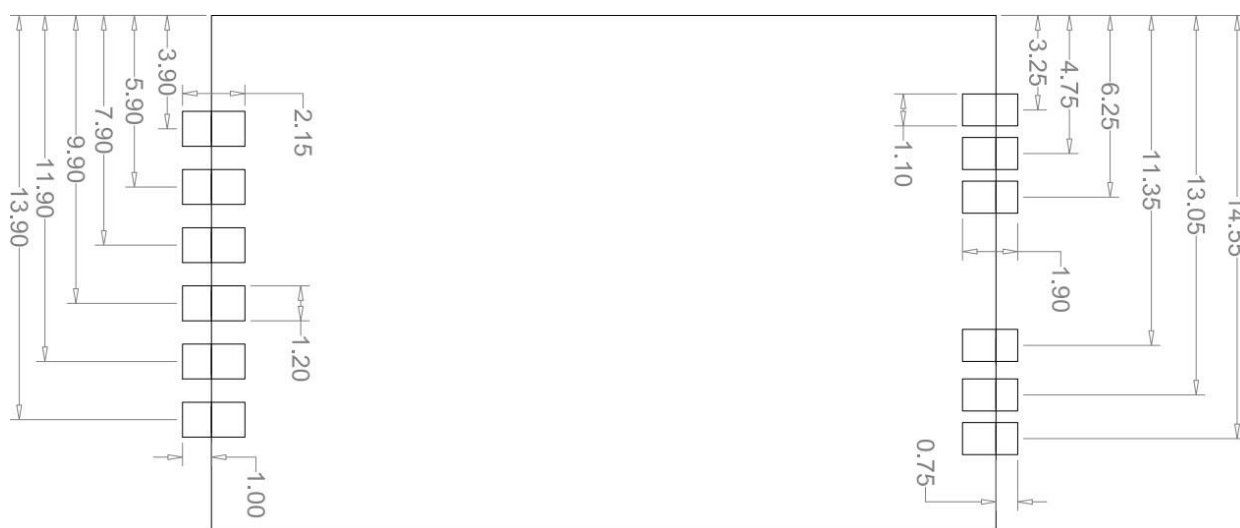
(Bottom View)

6. Application Information

6.1 Typical Application Circuit

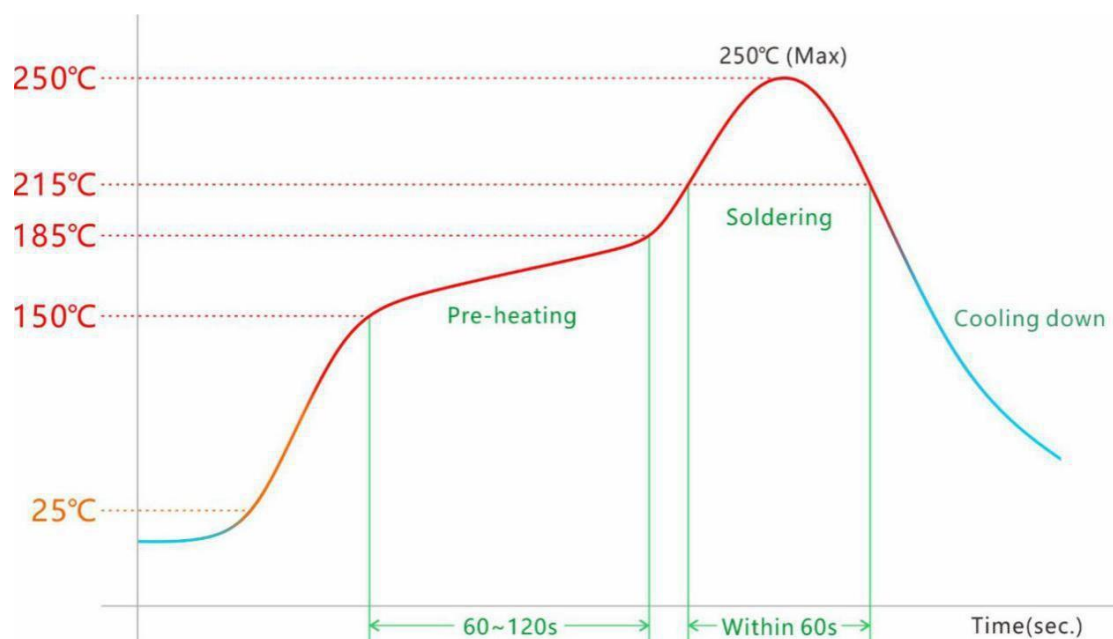


6.2 Recommend PCB Layout Footprint



(Bottom View)

6.3 Reflow Soldering Standard Conditions



Please use the reflow within 2 times.

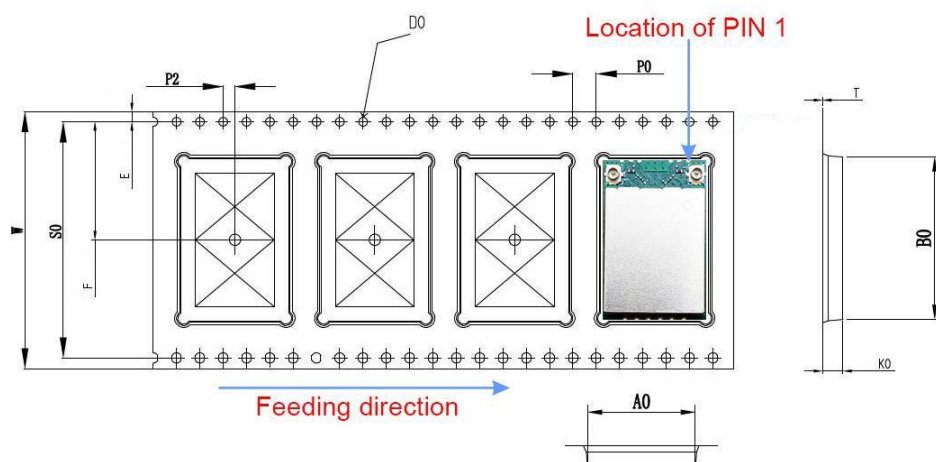
Set up the highest temperature within 250°C.

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8812CU-CG	Realtek	
2	PCB	BL-M8812CU3	Shen Zhen Tie Fa Technology limited	
			MILLION SOURCE PRINTED CIRCUIT BOARD CO., LTD	
			Quzhou Sunlord Electronics Co., Ltd	
3	Crystal	40MHz-10pF-10ppm-3225	HUBEI TKD ELECTRONICS TECHNOLOGY CO., LTD.	
			LUCKI CM ELECTRONICS CO., LTD	
			HOSONIC ELECTRONIC CO., LTD.	
4	Diplexer	DPX166000DT-8093A1 /DP1608-A2455BKH0T	TDK China Co., Ltd.	
			Advanced Ceramic X	

8. Package and Storage Information

8.1 Package Dimensions



ITEM	W	A0	B0	KO	E	F	P	P0	P2	D0	T
DIM	44.00±0.3	18.10±0.1	27.40±0.1	3.50±0.1	1.75±0.1	20.2±0.1	24.00±0.1	4.00±0.1	2.00±0.1	Ø1.5±0.1	0.30±0.05



Package specification:

1. 700 modules per roll and 2,800 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 48mm (with a width of 44mm 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 4 boxes.

8.2 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -45°C to +85°C

Storage humidity: 10% to 95% RH (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!

U.S. FCC Part 15 Regulatory Information

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.

Any 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 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 the user's body.

The device is going to be operated in 5150~5350MHz frequency range. It is restricted indoor environment only.

The end product must carry a label stating "Contains FCC ID: SVN-R8812AF" or shall use e-labeling.

Manufacturer's name and address: SHENZHEN BILIAN ELECTRONIC CO., LTD

10~11/F, Building 1A, Huaqiang idea park, Guangming district, Shenzhen. Guangdong, China