HK NATER TECH LIMITED

RTL8812BU Module Specification

Customer: _____

Description: RL-UM02SPC-8812BU-V1.0

Customer P/N:_____

Date: _____

Customer		
Approve	Auditing	Admit

Provider		
Approve	Auditing	Admit

Customer;
Add:
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SPECIFICATIONS

IEEE 802.11a/b/g/n/ac 2T2R WLAN WiFi Module

USB Interface Dual-band 2T1R 11ac

11ac Dual-WiFi Module

RL-UM02SPC-8812BU

Version: V1.0

1.General

1.1 The General of WIFI

General

- CMOS MAC,Baseband PHY and RF in a single chip for IEEE 802.11a/b/g/n/ac Draft 2.0 compatible WLAN
- 802.11ac MIMO solution for 5G band
- Complete 802.11n MIMO solution for 2.4GHz and 5GHz band
- 2×2 MIMO technology for extended reception robustness and exceptional throughput
- Maximun PHY data rate up to173.3Mbps using 20Mhz bandwidth, 400Mbps using 40MHz bandwidth, and 866.7Mbps using 80MHz bandwidth
- Backward compatible with 802.11a/b/g devices while operating at 802.11n data rates
- Backward compatible with 802.11a/n devices while operating at 802.11ac data rates.

Host Interface

- Complies with USB Specification Revision 2.0

Standards Supported

- IEEE 802.11a/b/g/n/ac Draft 2.0 compatible WLAN
- IEEE 802.11e QoS Enhancement (WMM)
- IEEE 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services
- IEEE 802.11h TPC, Spectrum Measurement
- IEEE 802.11k Radio Resource Measurement
- WAPI (Wireless Authentication Privacy Infrastructure) certified.
- Cisco Compatible Extensions (CCX) for WLAN devices

MAC Features

- Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)
- Low latency immediate High-Throughput Block Acknow ledgement (HT-BA)
- Long NAV for media reservation with CF-End
- for NAV release
- PHY-level spoofing to enhance legacy compatibility
- MIMO power saving mechanism
- Channel management and co-existence
- Multiple BSSID feature allows the RTL8812AU-VS to assume multiple MAC identities when used as a wireless bridge
- Transmit Opportunity (TXOP) Short Inter-Frame Space (SIFS) bursting for higher multimedia bandwidth
- WiFi Direct supports wireless peer to peer applications

Other Features

- Supports Wake-On-WLAN via Magic Packet and Wake-up frame
- Transmit Beamforming
- CCA on secondary through RTS/CTS handshake.
- Support TCP/UDP/IP checksum offload

Peripheral Interfaces

- Up to 12 General Purpose Input/Output pins
- Three configurable LED pins (mux with GPIO pins)
- Configurable Bluetooth Coexistence Interface (mux with GPIO pins)
- Generates 40MHz clock for peripheral chip
- Single external power source 3.3V only

PHY Features

- IEEE 802.11ac MIMO OFDM
- IEEE 802.11n MIMO OFDM
- Two Transmit and Two Receive paths
- 5MHz / 10MHz / 20MHz / 40MHz / 80MHz bandwidth transmission
- Support 2.4Ghz and 5Ghz band channels
- Short Guard Interval (400ns)
- Sounding packet.
- DSSS with DBPSK and DQPSK, CCK

- OFDM with BPSK, QPSK, 16QAM,64QAM and 256QAM modulation.Convolutional Coding Rate: 1/2, 2/3, 3/4, and 5/6
- Maximum data rate 54Mbps in 802.11g, 300Mbps in 802.11n and 866.7Mbps in 802.11ac.
- OFDM receive diversity with MRC using up to 2 receive paths. Switch diversity used for DSSS/CCK
- Support STBC
- Support LDPC
- Hardware antenna diversity

modulation with long and short preamble

- Selectable digital transmit and receiver FIR filters
- Programmable scaling in transmitter and receiver to trade quantization noise against increased probability of clipping
- Fast receiver Automatic Gain Control (AGC)
- On-chip ADC and DAC
- Build-in both 2.4GHz and 5GHz PA
- Build-in both 2.4GHz and 5GHz LNA

2.PRODUCT SPECIFICATIONS

Main chipset :WiFi Single Chip: Realtek RTL8812BU-CG unctional Specifications

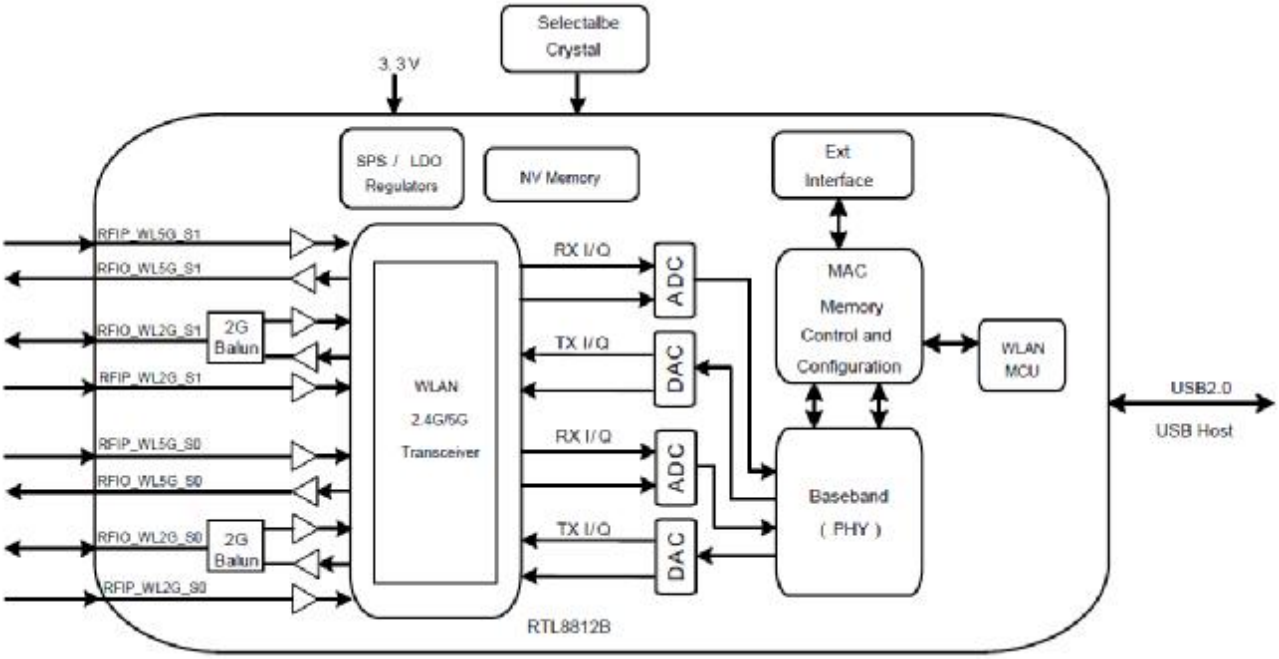
Main chipset	RTL8812BU-CG
Standards	***WiFi:*** IEEE 802.11a,IEEE 802.11b, IEEE 802.11g, IEEE 802.11n, IEEE 802.11ac, IEEE 802.11e,, IEEE 802.11i
Bus Interface	***WiFi:*** USB2.0
Data Rate	**802.11b:** 11, 5.5, 2, 1 Mbps **802.11g:** 54, 48, 36, 24, 18, 12, 9, 6 Mbps **802.11n:** MCS 0 to 7 for HT20MHz ;MCS 0 to 7 for HT40MHz **802.11ac:** 866.7Mbps
Modulation Techniques	**802.11b(DSSS) :** CCK, DQPSK, DBPSK **802.11 g (OFDM) :** 64 QAM, 256 QAM, QPSK, BPSK
Operating Channel	**WiFi 2.4GHz:** 11: (Ch. 1-11) – United States 13: (Ch. 1-13) – Europe 14: (Ch. 1-14) – Japan
Frequency Range	**WIFI:2.4GHz 5GHz**
Security	WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit,WMM, IEEE 802.11e, IEEE 802.11i
OS supported	Linux/Android/Windows

3.Temperature Limit Ratings

Parameter	Minimum	Maximum	Units
Storage Temperature	-20	+85	℃
Ambient Operating Temperature	0	70	℃
Junction Temperature	0	125	℃

4.Diagram

Dual-Band 11ac (1x1) Solution with Single Antenna



5.Power Supply DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
WLA_VD33_PA,WLA_VD33_PAD, WLG_VD33_PAD,WL_VD33_SYN, VD33IO,SW_HV3,V33USB,VD33A	3.3V I/O and RFAFE Supply Voltage	3.0	3.3	3.6	V

DC Characteristics

Module	Voltage	Current Consumption (linking)
RL-UM02SPC-8812BU-V1.0	3.3V	

6. Electrical Specifications

1) RF Characteristics for IEEE802.11b (11Mbps mode unless otherwise specified)

Items	**Contents**			
Specification	IEEE802.11b			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤-85 dBm@8%)	-85 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dBm)		17		dBm
EVM (≤-18)		-18		dB

2) RF Characteristics for IEEE802.11g (54Mbps mode unless otherwise specified)

Items	**Contents**			
Specification	IEEE802.11g			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤-70 dBm@10%)	-70 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2dBm)		14		dBm
EVM (≤-25)		-27		dB

3) RF Characteristics for IEEE802.11n (BW20_MCS7)

Items	**Contents**			
Specification	IEEE802.11n (BW20_MCS7)			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤-65 dBm@10%)	-65 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

4) RF Characteristics for IEEE802.11n (BW40_MCS7)

Items	**Contents**			
Specification	IEEE802.11n (BW40_MCS7)			
Channel frequency	2412 ~ 2484 MHz			
RX (per≤-65 dBm@10%)	-65 dBm			
Freq err Limit	±13PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dBm)		13		dBm
EVM (≤-28)		-28		dB

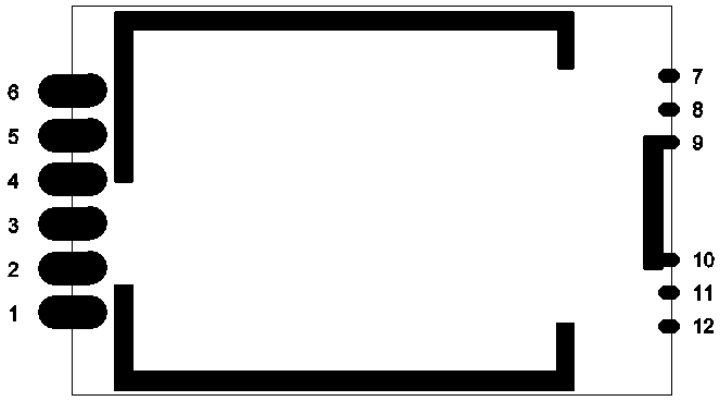
5) RF Characteristics for IEEE802.11AC (BW40_MCS7)

Items	**Contents**			
Specification	IEEE802.11AC (BW40_MCS7)			
Channel frequency	4.9GHz ~ 6.0GHz			
RX (per≤-65 dBm@10%)	-63 dBm			
Freq err Limit	±10PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dBm)		10		dBm
EVM (≤-32)		-32		dB

6) RF Characteristics for IEEE802.11AC (BW80_MCS9)

Items	**Contents**			
Specification	IEEE802.11AC (BW80_MCS9)			
Channel frequency	4.9GHz ~ 6.0GHz			
RX (per≤-60 dBm@10%)	-60 dBm			
Freq err Limit	±10PPM			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level (±2 dBm)		10		dBm
EVM (≤-32)		-32		dB

7.MODULE PIN ASSIGNMENT

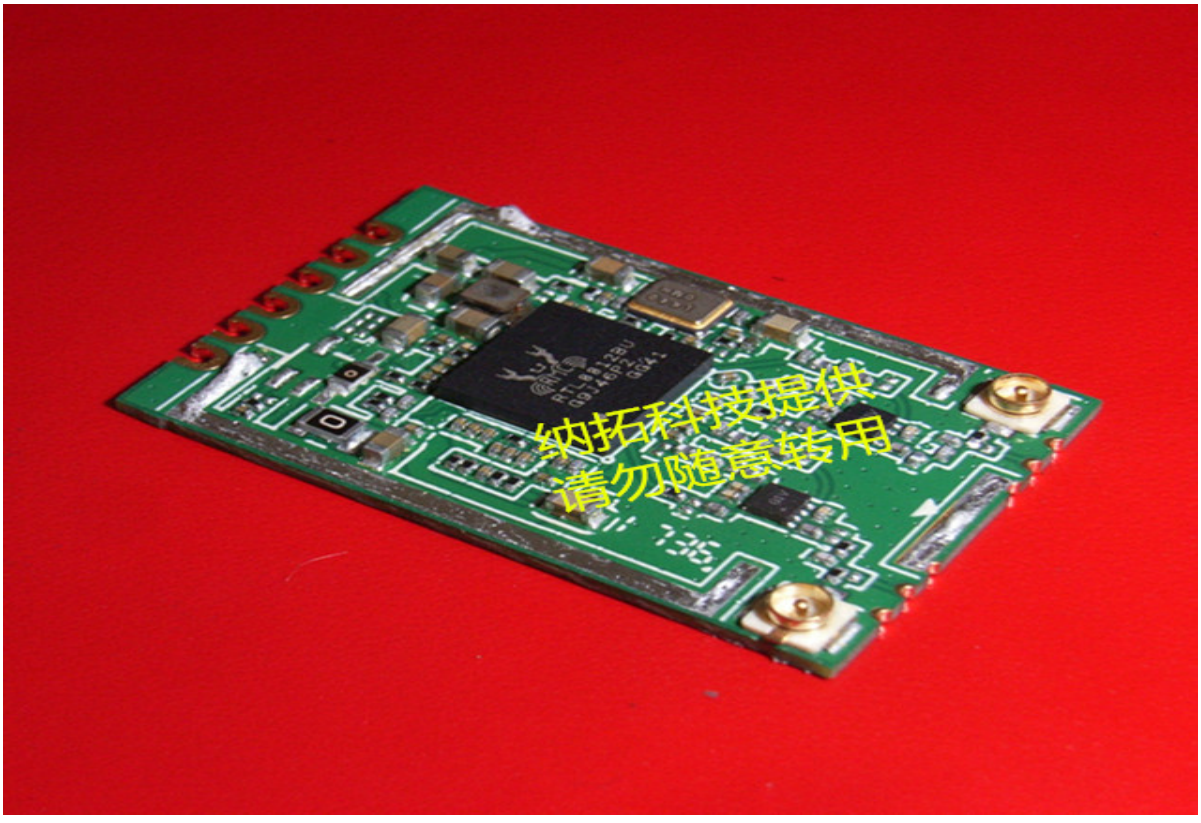


PIN	Function	Type	Description
1	WL_DIS_N	I	Shared with GPIO9. This pin can externally shut down the RTL8812BU-CG WLAN function when WL_DIS# is pulled low. This pin can also be configured as the WLAN Radio-off function with host interface remaining connected.
2	VDD33		3.3V
3	HSDM	I/O	USB D-
4	HSDP	I/O	USB D+
5	GND		Ground
6	WL_WAKE_HST	I/O	General Purpose Input/Output Pin
7	GND		Ground
8	RF_0		ANT RF0
9	GND		Ground
10	GND		Ground
11	RF_1		ANT RF1
12	GND		Ground

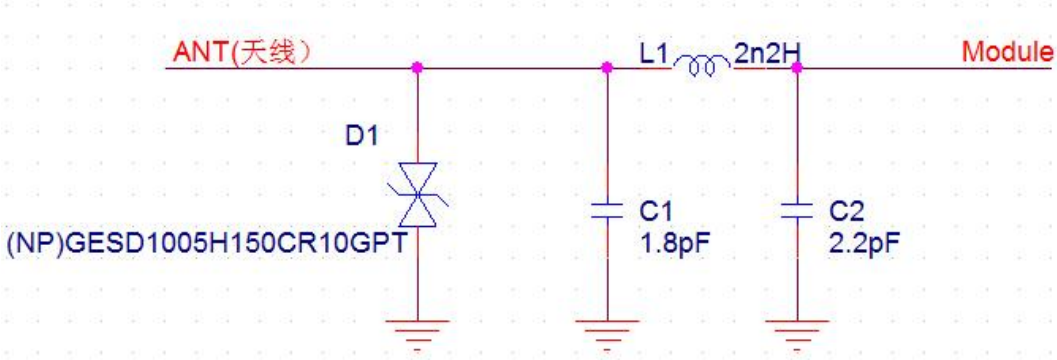
8. Size reference

Dimensions (mm)	Length	Width	Height
	27.149 (Tolerance:±0.2mm)	**17.56** (Tolerance:±0.2mm)	**2.9** (Tolerance:±0.2mm)





9.1.WIFI/BT RF Circuit reference pictures

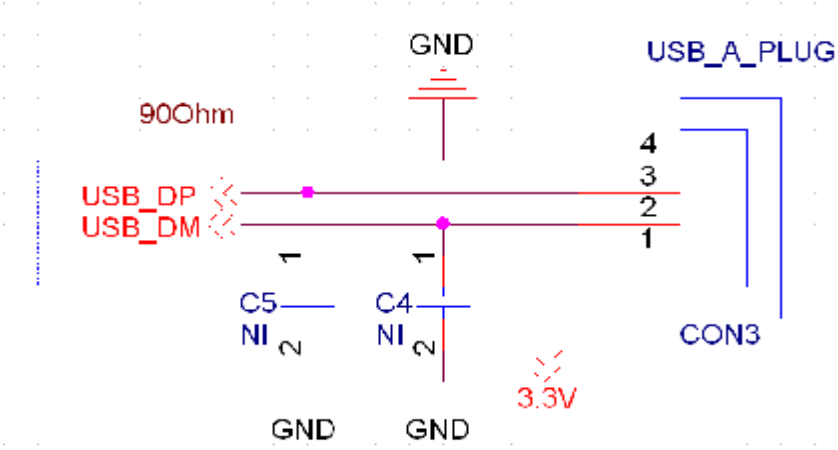


1. Above the dotted box part of the antenna matching is needed, the actual antenna matching electronic parameters shall prevail.

2.For RF part layout to do 50 ohm impedance. can't go on 90° of layout .The line length can't more than 20 mm.

注明：请一定要在焊天线端加一个 TVS 管，防止 ESD 静电打坏 WIFI 模组（如上图参考电路）.

9.2. USB interface electrical characteristics



注：1.USB 数据线需要做 90Ohm 的阻抗。

2.建议电源输入端留一个电源开关，每次开关卡时可以做一个上电断电的作用

可以使用 wifi 复位，就不会有打不开 wifi 的错误现象出现。

Note:1.Two root go line do difference , but also required to make 90Ohm the impedance test.e get lock can do

2.Suggested that leave a power switch power supply input terminal ,every tim a electric power is on

Environmental Requirements and Specifications TP Content

1 Temperature

1.1 Operating Temperature Conditions

The product shall be capable of continuous reliable operation when operating in ambient temperature of -10℃ to +70℃.

1.2 Non-Operating Temperature Conditions

Neither subassemblies shall be damaged nor shall the operational performance be degraded when restored to the operating temperature when exposed to storage temperature in the range of -45℃ to +135℃.

2 PCB Bending

The PCB bending spec shall be keep planeness under 0.1mm for both NATER and end assembly customer.

3 Handling environment

3.1. ESD

Symbol	Ratings	Max	Unit
V_{ESD}(HBM)	Electrostatic discharge voltage (human body model)	2000	V
V_{ESD}(CDM)	Electrostatic discharge voltage (charge device model)	500	

Please handle it under ESD protection environment.

3.2. Terminals

The product is mounted with motherboard through half hole. In order to prevent poor soldering, please do not touch the pad by hand.

3.3. Falling

It will cause damage on the mounted components when the product is falling or receiving drop shock. It may cause the product mal-function.

4 Storage Condition

4.1 Moisture barrier bag before opened

Moisture barrier bag must be stored under 30 degree C, humidity under 85% RH. The calculated shelf life for the dry packed product shall be a 12 months from the bag seal date.

4.2. Moisture barrier bag open

Humidity indicator cards must be blue, <30%.

5 Baking Condition

Products require baking before mounting if

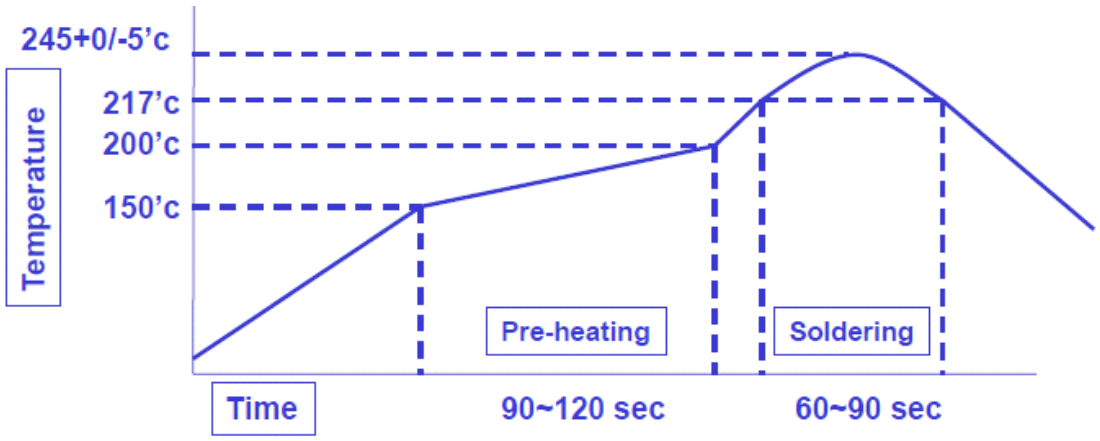
a) humidity indicator cards reads >30%

b) temp <30 degree C, humidity < 70% RH, over 96 hours

Baking condition: 90 degree C, 12-24 hours

Baking times: 1 time

6 Soldering and reflow condition



- Follow the solder paste composition to set the reflow profile
- Lead free solder paste(SAC305, SAC387 or SAC405) reflow profile setting as above :
  - Ramp up rate (to Peak temp) : < 1.2'c/sec, typically
  - Time above Liquidus(217'C) : 60~90Sec
  - Peak Temp : 245+0/-5'C
  - Ramp-down rate (Peak to RT) : 1~3'C/sec, typically