

EL.RTL8822CU-CWFT
(CDT P/N: CDW-F7822CU-00)
Dual band WiFi5+BT5.1 Module Spec
DATASHEET

Software:

客 户 Customer	客户承认 Approve (请盖印章)	日 期 Date

拟制 Design	审核 Check	批准 Approve	版本 Version	日期 Date
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更改记录:

Reversion History:

版本 Version	日期 Date	更改内容 Modification
1.0	2025.03.14	First release
1.1	2025.6.13	1. Module size 2. Package 3. BT power

1. Overview

The EL.RTL8822CU-CWFT is a highly integrated single-chip that support 2-stream 802.11ac solutions with Multi-user MIMO (Multiple-Input, Multiple-Output) with Wireless LAN (WLAN) USB2.0 network interface controller. It combines a WLAN MAC, a 2T2R capable WLAN baseband, and RF in a single chip.

The EL.RTL8822CU-CWFT provides a complete solution for a high-performance integrated wireless and Bluetooth device.

2. Features

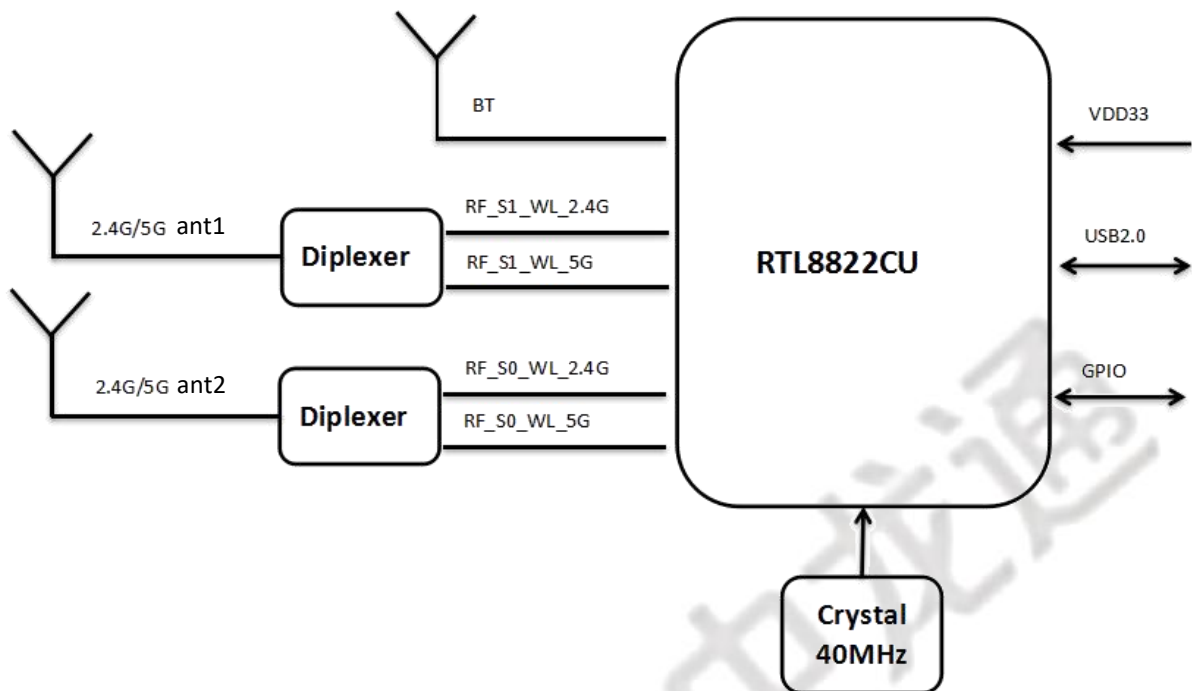
2.1 WLAN

- IEEE 802.11a/b/g/n/ac compatible WLAN
- 20MHz / 40MHz / 80MHz bandwidth transmission
- Complies with USB2.0 for WLAN and BT controller
- Dual-band 2T2R mode with data rate up to 867Mbps
- Support 802.11ac 2x2, Wave-2 compliant with MU-MIMO
- Complete 802.11n MIMO solution for 2.4GHz and 5GHz band
Maximum PHY data rate up to 173.3 Mbps using 20MHz bandwidth,
400Mbps using 40MHz bandwidth, and 866.7Mbps using 80MHz bandwidth
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble
- Short Guard Interval (400ns)
- Sounding packet

2.1 Bluetooth

- Support Bluetooth 5.0 system
- Compatible with Bluetooth v2.1 Systems
- Supports all packet types in basic rate and enhanced data rate
- Dual Mode support: Simultaneous LE and BR/EDR
- Enhanced BT/Wi-Fi Coexistence Control to improve transmission quality in different profiles
- Integrated MCU to execute Bluetooth protocol stack
- Supports Bluetooth Low Energy
- Supports Enhanced Power Control

3. System Block Diagram



4. General Specification

Model	EL.RTL8822CU-CWFT
Product Name	WiFi 11a/b/g/n/ac 2T2R and BT5.0 Module
Standard	IEEE802.11a/b/g/n/ac, BT2.1/3.0/4.2/5.0
Data Transfer Rate	1,2,5.5,6,11,12,18,22,24,30,36,48,54,60, 90,120 and maximum of 867Mbps
Modulation Method	DSSS/DBPSK/DQPSK/16-QAM/ 64-QAM/256QAM
Frequency Band	2.4~2.4835GHz , 5.0~5.8 GHz
Spread Spectrum	IEEE 802.11b: DSSS (Direct Sequence Spread Spectrum) IEEE802.11a/g/n/ac: OFDM (Orthogonal Frequency Division Multiplexing)
Interface	USB2.0
Operating Temperature	-10°C to 70°C (Ambient)
Storage Temperature	-40°C to 90°C

Humidity	5 to 90 % maximum (non-condensing)
Dimension	21*15*2.8mm (LxWxH) ±0.2mm

5. DC Characteristics

Symbol	Parameter	Min.	Typ.	Max	Units
VD33	3.3V I/O supply Voltage	3.0	3.3	3.6	V
IDD_3.3V	3.3V Rating Current	--	--	800	mA
VD10	1.05V Core Supply Voltage	0.945	1.05	1.155	V
V _{IH}	Input high Voltage	2.0	3.3	3.6	V
V _{IL}	Input low Voltage	--	0	0.9	V
V _{OH}	output high Voltage	2.97	--	3.3	V
V _{OL}	output low Voltage	0	--	0.33	V

6. Electrical Characteristics

6.1 WiFi Section:

2.4GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11a/b/g/n/ac WiFi compliant
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)
Number of Channels	2.4GHz : Ch1 ~ Ch11
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM, 16-QAM, QPSK, BPSK
Output Power	802.11b /11Mbps : 16dBm ± 2dB @ EVM ≤ -15dB
	802.11g /54Mbps : 15 dBm ± 2dB @ EVM ≤ -28dB
	802.11n /MCS7: 14 dBm ± 2dB @ EVM ≤ -30dB
Receive Sensitivity 11b,20MHz @8%PER	- 1Mbps PER≤8% ≤ -83 dBm
	- 11Mbps PER≤8% ≤ -76 dBm
Receive Sensitivity 11g,20MHz @10%PER	- 6Mbps PER≤10% ≤ -85 dBm
	- 54Mbps PER≤10% ≤ -68 dBm
Receive Sensitivity	- MCS=0 PER≤10% ≤ -85 dBm

	- MCS=7	PER≤10%	≤ -67dBm
Receive Sensitivity	- MCS=0	PER≤10%	≤ -82dBm
11n,40MHz @10%PER	- MCS=7	PER≤10%	≤ -64dBm

5GHz RF Specification

Feature	Description
WLAN Standard	IEEE 802.11a/n 2x2, WiFi compliant
Frequency Range	5.150 GHz ~ 5.850 GHz (5.0 GHz ISM Band)
Number of Channels	5.0GHz : Please see the table
Modulation	802.11a : OFDM /64-QAM,16-QAM, QPSK, BPSK 802.11n : OFDM /64-QAM,16-QAM, QPSK, BPSK
Output Power	802.11a 54Mbps : 15 dBm ± 2dB @ EVM ≤ -25dB 802.11n HT20 /MCS7 : 14 dBm ± 2 dB @ EVM ≤ -28dB 802.11n HT40 /MCS7 : 14 dBm ± 2 dB @ EVM ≤ -28dB 802.11ac VHT20 /MCS8 : 14 dBm ± 2 dB @ EVM ≤ -30dB 802.11ac VHT40 /MCS9 : 13 dBm ± 2 dB @ EVM ≤ -32dB 802.11ac VHT80 /MCS9 : 13 dBm ± 2 dB @ EVM ≤ -32dB
Receive Sensitivity	- 6Mbps PER≤10% ≤ -85 dBm
11a,20MHz @10%PER	- 54Mbps PER≤10% ≤ -68 dBm
Receive Sensitivity	- MCS=0 PER≤10% ≤ -85 dBm
11n,20MHz @10%PER	- MCS=7 PER≤10% ≤ -67 dBm
Receive Sensitivity	- MCS=0 PER≤10% ≤ -82 dBm
11n,40MHz @10%PER	- MCS=7 PER≤10% ≤ -64dBm
Receive Sensitivity	- MCS=0, NSS1 PER≤10% ≤ -82 dBm
11ac,20MHz @10%PER	- MCS=8, NSS1 PER≤10% ≤ -60 dBm
Receive Sensitivity	- MCS=0, NSS1 PER≤10% ≤ -79 dBm
11ac,40MHz @10%PER	- MCS=9, NSS1 PER≤10% ≤ -55 dBm
Receive Sensitivity	- MCS=0, NSS1 PER≤10% ≤ -79 dBm
11ac,80MHz @10%PER	- MCS=9, NSS1 PER≤10% ≤ -54 dBm

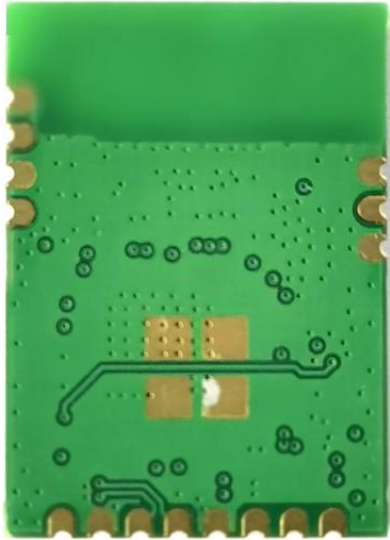
6.2 Bluetooth Section:

Feature	Description		
General Specification			
Bluetooth Standard	BT2.1/3.0/4.2/5.0		
Host Interface	USB2.0		
Frequency Band	2402 MHz ~ 2480 MHz		
Number of Channels	79 channels		
Modulation	FHSS, GFSK, DPSK, DQPSK		
RF Specification			
	Min.	Typical.	Max.
Output Power	5dBm	7dBm	9dBm
Sensitivity @ BER=0.1% for GFSK (1Mbps)	—	-86dBm	-70dBm
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)	—	-86dBm	-70dBm
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)	—	-80dBm	-70dBm
Maximum Input Level	GFSK (1Mbps):-20dBm		
	π/4-DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		

7. Supplier

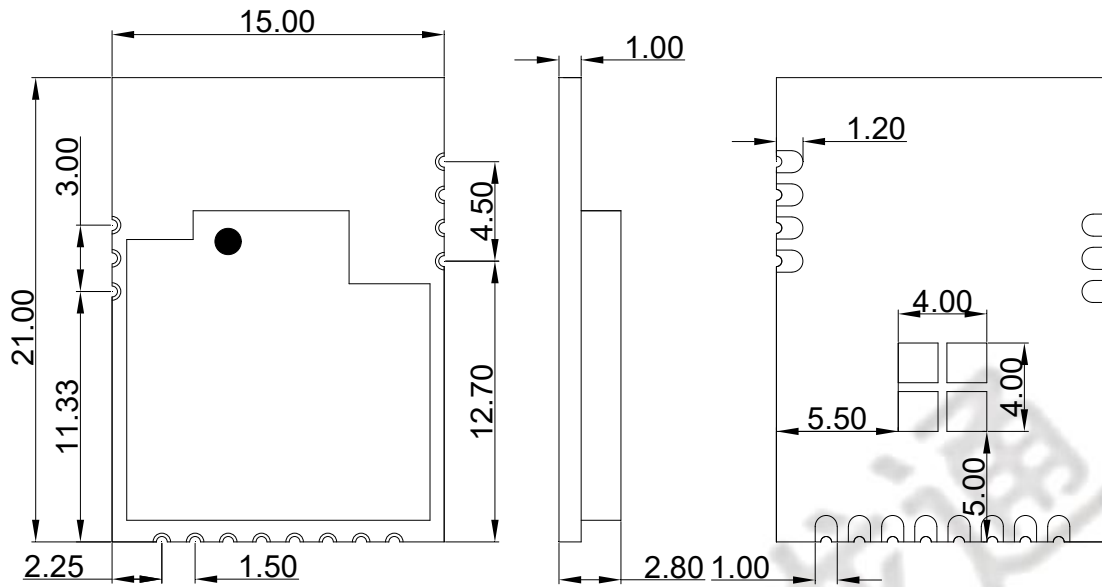
Supplier list	
Name of Material	Supplier brand
Main chip	RTL
Crystal	FK/TKD/TXC/JWT
PCB	Bomin/Benchuang/E-Tech/MInzhenghon/Zhuoyi
Diplexer	ACX/Walsin/GLEAD/TDK/ Sunlord
Inductor	Sunlord/CHILISIN/SAMWHA/TDK
Capacitance	SAMSUNG /EYANG/ WALSIN/ muRata/TAIYO/ Darfon
Resistor	UniOhm /YAGEO/ WALSIN

8. Module photo

	
TOP VIEW	BOTTOM VIEW
Dimension: 21.0*15.0*2.8mm (LxWxH) ±0.2mm	

Note: During mass production, the window at the bottom of the module chip will have solder mask plugged vias.

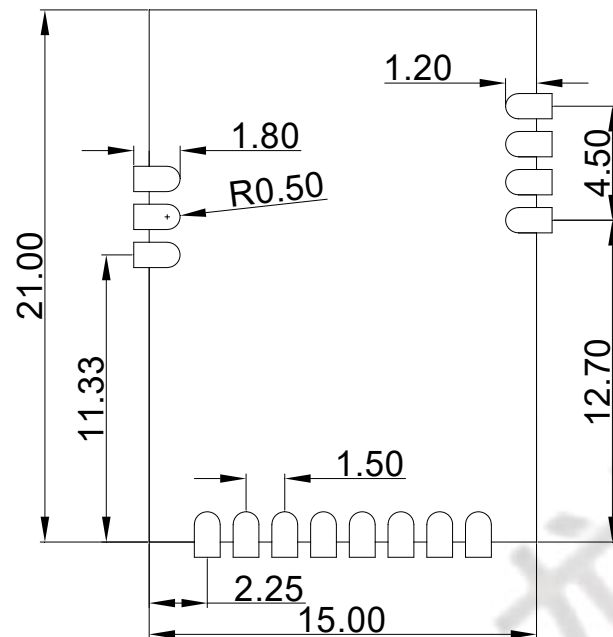
9. Module size



10. Pin Description

NO.	Symbol	Description
1	GND	Ground connections
2	BT_RF	Bluetooth RF output
3	GND	Ground connections
4	RESET	System reset RTL8822CU,low active(模组 47k 上拉串 100R)
5	WOW	Wake up system via wifi,low active(模组 10k 上拉)
6	BT_WAKE_HOST	Wake up system via BT,low active(模组 10k 上拉)
7	GND	Ground connections
8	DM	USB negative differential data lines
9	DP	USB positive differential data lines
10	GND	Ground connections
11	VCC	Power supply 3.3V
12	NC	
13	GND	Ground connections
14	WIFI1_RF	WIFI1_RF
15	GND	Ground connections

11. Package Size

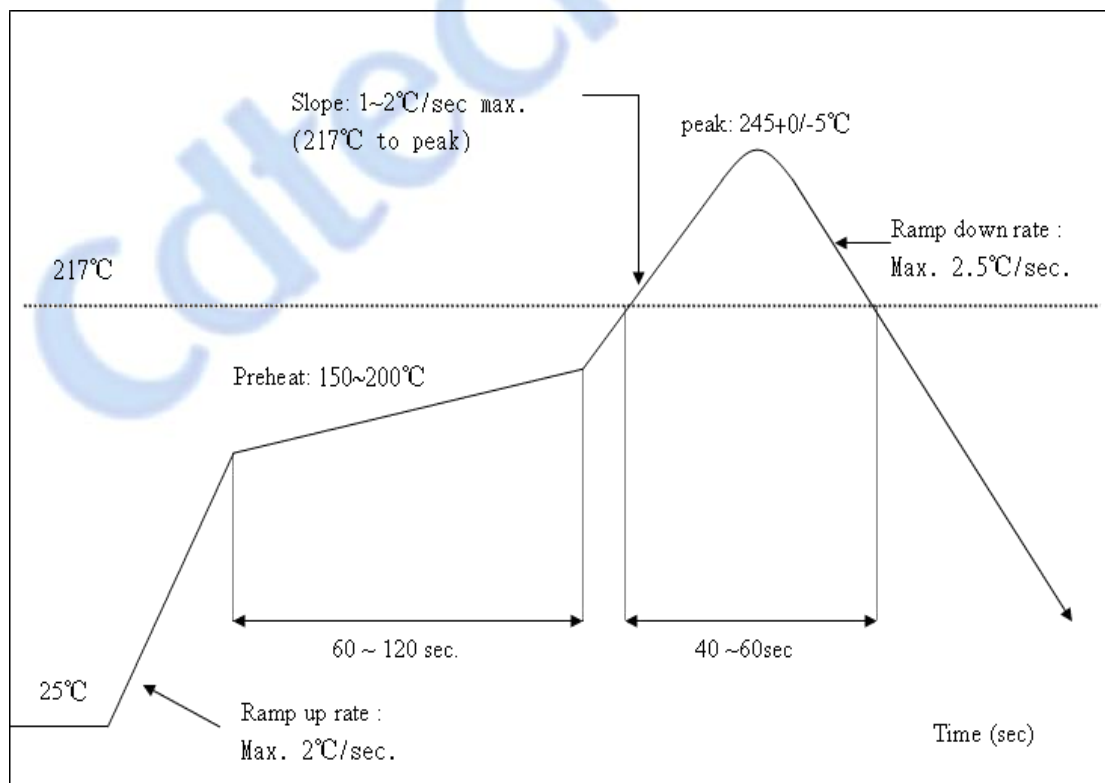


12. Recommended Reflow Profile

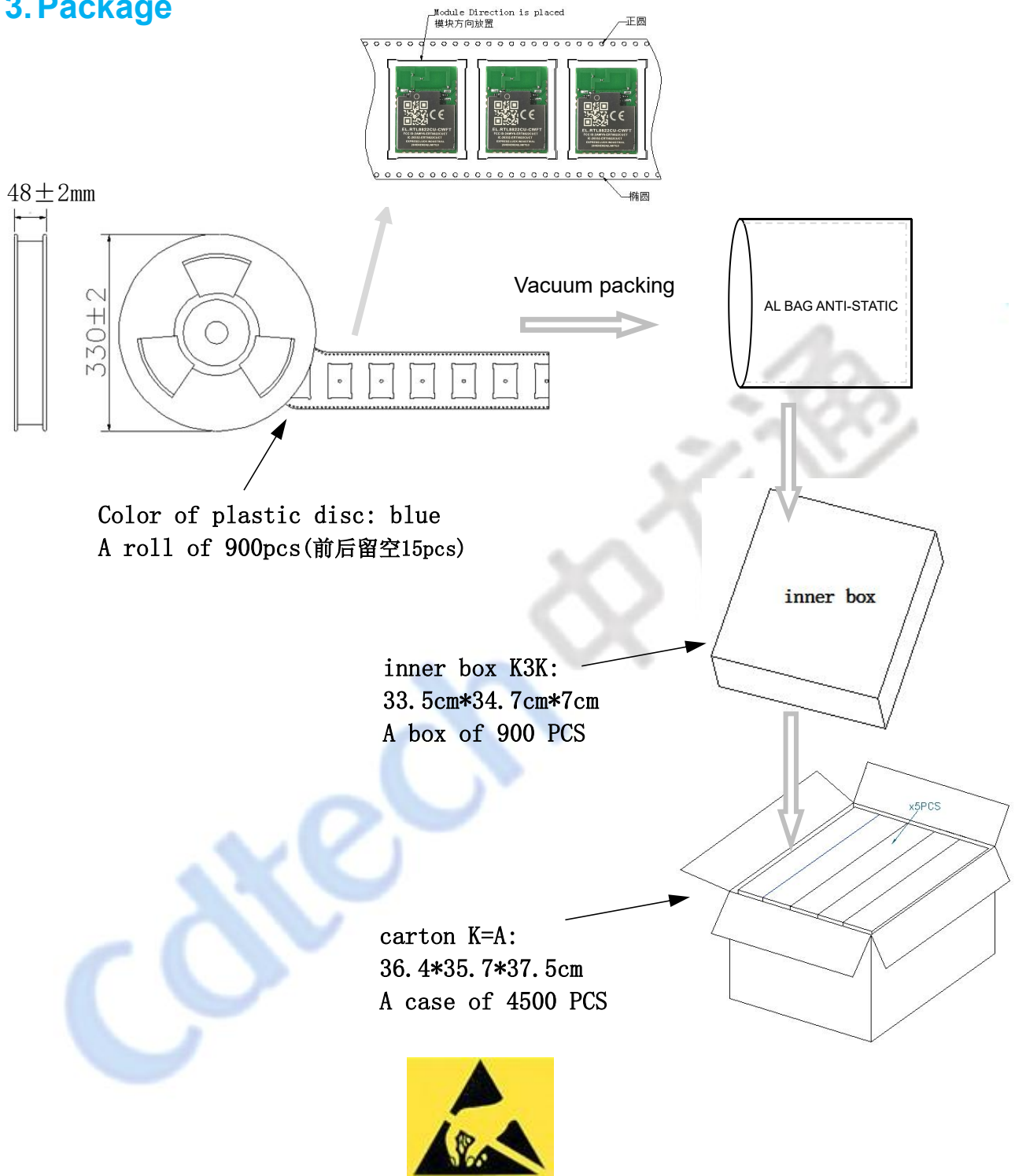
Referred IPC/JEDEC standard.

Peak Temperature : $<250^{\circ}\text{C}$

Number of Times : 2 times



13. Package

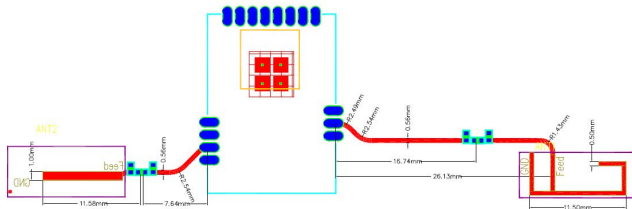


ESD CAUTION

The EL.RTL8822CU-CWFT is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although EL.RTL8822CU-CWFT is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

14. RF Antenna Interface

Appropriate antenna type and design should be used with matched antenna parameters according to specific application. It is required to perform a comprehensive functional test for the RF design before mass production of terminal products. The entire content of this chapter is provided for illustration only. Analysis, evaluation and determination are still necessary when designing target products. For single-antenna module, ANT_BT and 2.4WIFI&5G WIFI ANT2 are unconnected



14.1. Antenna Design Requirements

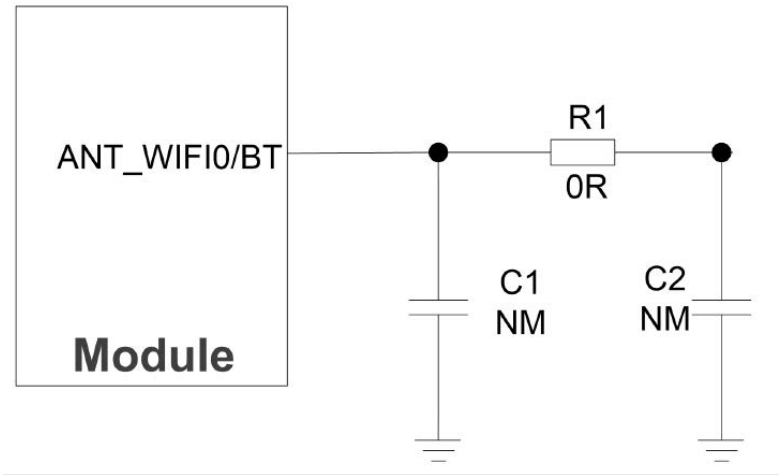
Antenna Design Requirements

Parameter	Requirement ²
Frequency Ranges (GHz)	● 2.400–2.4835 ● 5.150–5.850
Cable Insertion Loss (dB)	< 1
VSWR	≤ 2 (Typ.)
Max Input Power (W)	50
Input Impedance (Ω)	50
Polarization Type	Vertical

14.2. Reference Design

A reference circuit for the RF antenna interface is shown below. It is recommended to reserve a π -type matching circuit and add ESD protection components for better RF performance. Reserved matching components (R1, C1, C2) shall be placed as close to the antenna as possible. C1, C2 and are not mounted by default. The parasitic capacitance of TVS should be less than 0.05 pF and R1 is recommended to be 0 Ω .

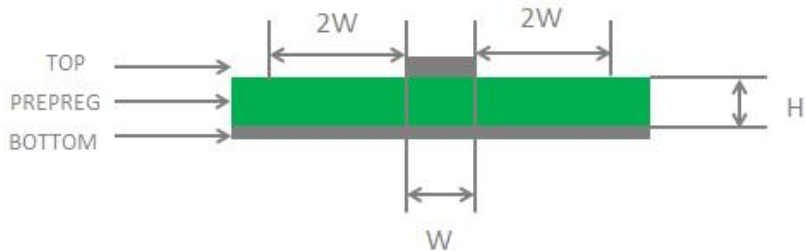
The following reference design is based on ANT_WIFI0/BT as an example, the reference design of other RF antenna interfaces is the same.



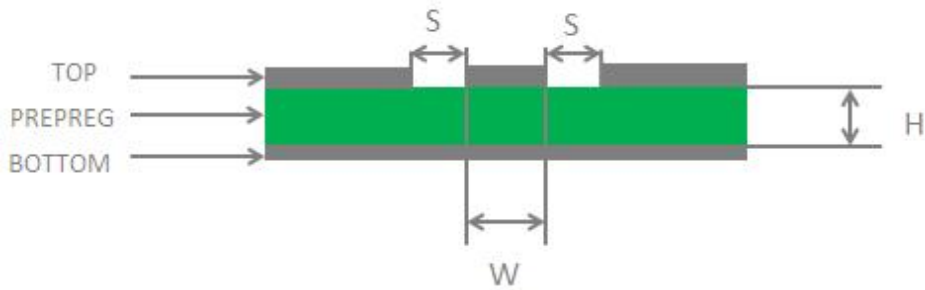
Reference Circuit for RF Antenna Interface

14.3. RF Routing Guidelines

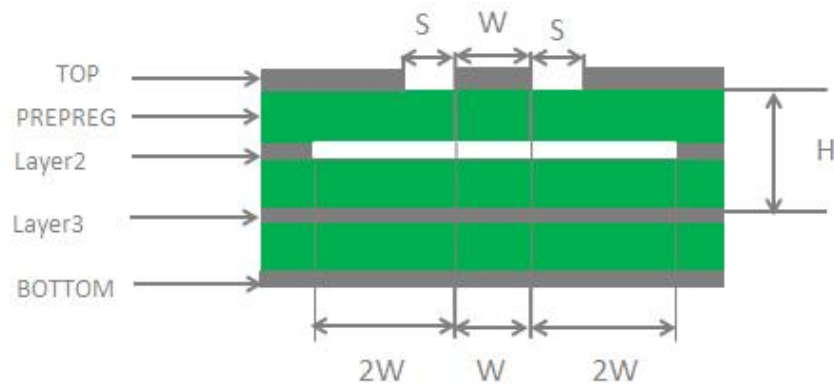
For user's PCB, the characteristic impedance of all RF traces should be controlled to 50 Ω. The impedance of the RF traces is usually determined by the trace width (W), the materials' dielectric constant, the height from the reference ground to the signal layer (H), and the spacing between RF traces and grounds (S). Microstrip or coplanar waveguide is typically used in RF layout to control characteristic impedance. The following are reference designs of microstrip or coplanar waveguide with different PCB structures.



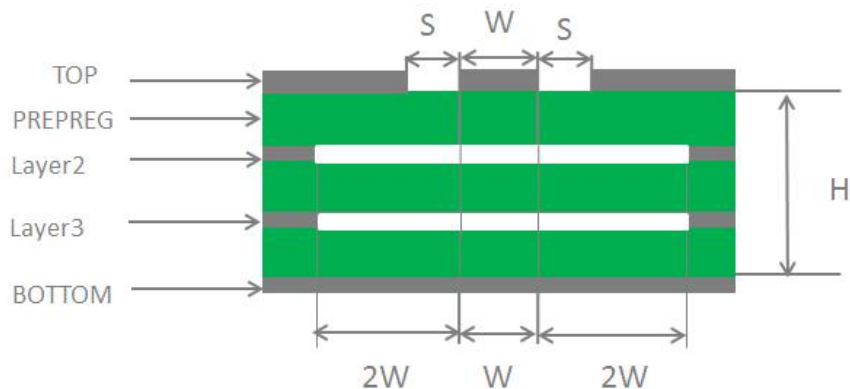
Microstrip Design on a 2-layer PCB



Coplanar Waveguide Design on a 2-layer PCB



Coplanar Waveguide Design on a 4-layer PCB (Layer 3 as Reference Ground)



Coplanar Waveguide Design on a 4-layer PCB (Layer 4 as Reference Ground)

To ensure RF performance and reliability, follow the principles below in RF layout design:

- Use an impedance simulation tool to accurately control the characteristic impedance of RF traces to $50\ \Omega$.
- The GND pins adjacent to RF pins should not be designed as thermal relief pads, and should be fully connected to ground.
- The distance between the RF pins and the RF connector should be as short as possible and all the right-angle traces should be changed to curved ones. The recommended trace angle is 135° . There should be clearance under the signal pin of the antenna connector or solder joint.
- The reference ground of RF traces should be complete. Meanwhile, adding some ground vias around RF traces and the reference ground could help to improve RF performance. The distance between the ground vias and RF traces should be not less than twice the width of RF signal traces ($2 \times W$).
- Keep RF traces away from interference sources, and avoid intersection and paralleling between traces on adjacent layers.

On the left is the Bluetooth antenna. The radio frequency signal is output from the stamp hole at the module end, and the RF Trace reaches the pcba print antenna through the series $0 - \text{ohm } \pi$ - type circuit.

On the right is wifi Antenna 2. Similarly, the RF signal is output from the module's stamp hole and passes through a series $0 - \text{ohm } \pi$ - type circuit to the pcba print antenna for output.

FCC Caution.

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.

Operations in the 5.15-5.35GHz band are restricted to indoors usage only.

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.

*RF warning for Mobile device:

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.

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

2.2 List of applicable FCC rules

This module has been tested for compliance with FCC Part 15C&Part 15 E

2.3 Summarize the specific operational use conditions.

The module is tested for standalone mobile RF exposure use conditions. Any other usage conditions such as co-location with other transmitter(s) or in a portable condition will need to be separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

BT and 2.4G & 5G ANT2 are used Trace antenna designs , Design-related content is on page 15 of the manual.2.4G & 5G ANT1 is not used Trace antenna designs。

2.6 RF exposure considerations

Exposure to Radio Frequency Radiation. This equipment must be installed and operated in accordance with provided instructions, and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

2.7 Antennas Manufacturer: EXPRESS LUCK INDUSTRIAL (SHENZHEN) LIMITED

Address: Floor1, Workshop1, No.88, South Baotong Road, Xikeng Community Yuanshan Street, Longgang District, Shenzhen,GuangDong, China

BT Antenna style: PCB antenna, Max Antenna Gain 3.43dBi, model number:BT1, manufacturer:cdtech WIFI 1 Antenna style: PCB antenna, Max Antenna Gain 2.10dBi for 2.4G and 5G WIFI is 4.46dBi

model number:WIFI1, manufacturer:cdtech

WIFI 2 Antenna style: PCB antenna, Max Antenna Gain 3.28dBi for 2.4G and 5G WIFI is 4.16dBi

model number:WIFI2, manufacturer:cdtech

2.8 Label and compliance information

if the host is marketed so that end users do not have straight forward commonly used methods for access to remove the module so that the FCC ID of the module is visible; then an additional permanent label referring to the enclosed module: Contains Transmitter Module FCC ID: 2AWY6-ERT8822CUCT or Contains FCC ID: 2AWY6-ERT8822CUCT must be used.

2.9 Information on test modes and additional testing requirements

Not applicable

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B rule requirement applicable to the final host. The final host will still need to comply with Part 15 Subpart B rule requirement if applicable.

ISED:

This device contains licence-exempt transmitter(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

The device for operation in the band 5150–5250 MHz is only for indoor use

The module is tested for standalone mobile RF exposure use conditions. The distance between user and products should be no less than 20cm.

Any other usage conditions such as co-location with other transmitter(s) or in a portable condition will need to be separate reassessment through ISED rules or new certification.

If the IC number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 26332-ERT8822CUCT"

This equipment must be installed and operated in accordance with provided instructions, and the antenna(s) used for this transmitter must not be colocated or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

ISED :

Cet appareil contient des émetteurs exempts de licence qui sont conformes aux RSÉ exempts de licence d'Innovation, Sciences et Développement économique Canada. Son utilisation est soumise aux deux conditions suivantes :

1. Cet appareil ne doit pas causer d'interférences.
2. Cet appareil doit accepter toutes les interférences, y compris celles pouvant provoquer un fonctionnement indésirable de l'appareil.

L'appareil destiné à fonctionner dans la bande 5150–5250 MHz est uniquement destiné à un usage en intérieur

Le module est testé pour des conditions d'exposition RF mobiles autonomes. La distance entre l'utilisateur et les produits ne doit pas être inférieure à 20 cm.

Toutes les autres conditions d'utilisation, telles que le co-emploi avec d'autres émetteurs ou en condition portable, nécessiteront une réévaluation distincte conformément aux règles ISED ou une nouvelle certification.

Si le numéro IC n'est pas visible lorsque le module est installé à l'intérieur d'un autre appareil, l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module intégré. Cette étiquette extérieure peut utiliser une formulation telle que : « Contient IC : 26332-ERT8822CUCT »

Cet équipement doit être installé et utilisé conformément aux instructions fournies, et l'(les) antenne(s) utilisée(s) pour cet émetteur ne doivent pas être co-localisées ou fonctionner conjointement avec d'autres antennes ou émetteurs. Les utilisateurs finaux et les installateurs doivent recevoir des instructions d'installation de l'antenne et des conditions de fonctionnement de l'émetteur pour garantir la conformité à l'exposition RF.