PRODUCT SPECIFICATION

Version 1.2

IEEE 802.11 a/b/g/n/ac 2T/2R Band USB2.0 Module Integrated Bluetooth V2.1/3.0/4.0/4.1/5.0

Model Number: WCT1ER2511

(REALTEK RTL8822CU-CG)

客户认可 Custom Approval Section		
Custom Name		
Department		
Approval		Date：

拟制 DESIGN	审核 CHECK	批准 APPROVAL
张森林	高照	孙燕
20201228	20201228	20201228

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Document revision history

Revision	Date	Approved by	Remarks
Version 1.0	20200821		Draft
Version 1.1	20201024		Add Product picture 、package、schematic diagram
Version 1.2	20201228		Update product picture 、schematic diagram

目录

1. General Description

This document is to specify the product requirements for 802.11a/b/g/n/ac USB Module. This Card is based on REALTEK RTL8822CU chipset .It is a complete dual-band(2.4GHz and 5GHz)WIFI 2×2 MIMO MAC/PHY/Radio System-on-a-Chip. This module provides a high level of integration with a dual-stream IEEE 802.11ac MAC/ base band/radio. The WLAN operation supports 20MHz,40MHz and 80MHz channels for data rates up to 866.7Mbps. It is also backward complied with IEEE 802.11a/n standard from 5.15~5.825GHz wideband and IEEE 802.11b/g/n standard from 2.4~2.5GHz. It can be used to provide up to 54Mbps for IEEE 802.11a and IEEE 802.11g, 11Mbps for IEEE 802.11b and 300Mbps for IEEE 802.11n. The Bluetooth part supports latest 5.0.

2. Features

- Compatible with IEEE 802.11a standard to provide wireless 54Mbps data rate.
- Compatible with IEEE 802.11b standard to provide wireless 11Mbps data rate.
- Compatible with IEEE 802.11g standard to provide wireless 54Mbps data rate.
- Compatible with IEEE 802.11n standard to provide wireless 300Mbps data rate.
- Compatible with IEEE 802.11ac standard to provide wireless 866.7Mbps data rate.
- Operation at 2.4~2.4835GHz and 5.15~5.825GHz frequency band to meet worldwide regulations.
- Supports Bluetooth V2.1/3.0/4.0/4.1/5.0.
- Supports Bluetooth Low Energy.
- Supports MU-MIMO.
- Supports wireless peer-to-peer.
- Supports IEEE 802.11i (WPA and WPA2), WAPI.
- Drivers support Windows, Linux, Android.
- Complies with USB2.0 for WLAN and BT controller.
- RoHS compliant.

3. Application Diagrams

3.2 General Requirements

3.2.1 IEEE 802.11b Section

	Feature	Detailed Description
3.2.1.1	Standard	● IEEE 802.11b
3.2.1.2	Radio and Modulation Schemes	● DQPSK , DBPSK , DSSS , and CCK
3.2.1.3	Operating Frequency	● 2400 ～ 2483.5MHz ISM band
3.2.1.4	Channel Numbers	● 13 channels for WorldWide
3.2.1.5	Data Rate	● at most 11Mbps
3.2.1.6	Media Access Protocol	● CSMA/CA with ACK
3.2.1.7	Transmitter Output Power at Antenna Connector	● Typical RF Output Power (tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25 degree C ● 16±2 dBm at 11Mbps
3.2.1.8	Receiver Sensitivity at Antenna Connector	● Typical Sensitivity at Which Frame(1000-byte PDUs)Error Rate=8% at room Temp 25℃ ● -83dBm at 11Mbps

3.2.2 IEEE 802.11g Section

	Feature	Detailed Description
3.2.2.1	Standard	• IEEE 802.11g
3.2.2.2	Radio and Modulation Type	• QPSK , BPSK , 16QAM ,64QAM with OFDM
3.2.2.3	Operating Frequency	• 2400 ～ 2483.5MHz ISM band
3.2.2.4	Channel Numbers	• 13 channels for WorldWide
3.2.2.5	Data Rate	• at most 54Mbps
3.2.2.6	Media Access Protocol	• CSMA/CA with ACK
3.2.2.7	Transmitter Output Power at Antenna Connector	• Typical RF Output Power(tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25degree C • 14±2 dBm at 54Mbps
3.2.2.8	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at each RF chain. Frame(1000-byte PDUs)Error Rate<10% at room Temp 25 degree C • -71 dBm at 54Mbps

3.2.3 IEEE 802.11a Section

	Feature	Detailed Description
3.2.3.1	Standard	• IEEE 802.11a
3.2.3.2	Radio and Modulation Type	• QPSK, BPSK, 16QAM ,64QAM with OFDM
3.2.3.3	Operating Frequency	• 5.15~5.25GHz • 5.25~5.35GHz • 5.47~5.725GHz • 5.725~5.825GHz
3.2.3.4	Data Rate	• at most 54 Mbps
3.2.3.5	Media Access Protocol	• CSMA/CA with ACK
3.2.3.6	Transmitter Output Power at Antenna Connector	• Typical RF Output Power(tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25degree C • 14±2 dBm at 54Mbps
3.2.3.7	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at each RF chain. Frame (1000-byte PDUs) Error Rate<10% at room Temp 25 degree C • -71 dBm at 54Mbps

3.2.4 IEEE 802.11n Section

	Feature	Detailed Description	
3.2.4.1	Standard	• IEEE 802.11n	
3.2.4.2	Radio and Modulation Type	• BPSK , QPSK , 16QAM ,64QAM with OFDM	
3.2.4.3	Operating Frequency	• 2.4GHz band:2400 ~ 2483.5MHz • 5GHz : 5.15~5.25GHz； 5.25~5.35GHz； 5.47~5.725GHz； 5.725~5.825GHz；	
3.2.4.4	Data Rate	• at most 300 Mbps	
3.2.4.5	Media Access Protocol	• CSMA/CA with ACK	
3.2.4.6	Transmitter Output Power at Antenna Connector	• Typical RF Output Power (tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25 degree C	
		2.4GHz Band/HT20 • 14±2 dBm at MCS7	2.4GHz Band/HT40 • 14±2 dBm at MCS7
		5GHz Band/HT20 • 14±2 dBm at MCS7	5GHz Band/HT40 • 14±2 dBm at MCS7
3.2.4.7	Receiver Sensitivity at Antenna Connector	Typical Sensitivity at each RF chain at Which Frame(1000-byte PDUs)Error Rate=10% and at room Temp.25 degree C	
		2.4GHz Band/HT20 • -68 dBm at MCS7	2.4GHz Band/HT40 • -66 dBm at MCS7
		5GHz Band/HT20 • -68 dBm at MCS7	5GHz Band/HT40 • -66 dBm at MCS7

3.2.5 IEEE 802.11ac Section

	Feature	Detailed Description	
3.2.5.1	Standard	• IEEE 802.11ac	
3.2.5.2	Radio and Modulation Type	• QPSK , BPSK , 16QAM ,64QAM,256QAM with OFDM	
3.2.5.3	Operating Frequency	• 5GHz : 5.15~5.25GHz； 5.25~5.35GHz； 5.47~5.725GHz； 5.725~5.825GHz；	
3.2.5.4	Data Rate	• at most 866.7 Mbps	
3.2.5.5	Media Access Protocol	• CSMA/CA with ACK	
3.2.5.6	Transmitter Output Power at Antenna Connector	• Typical RF Output Power(tolerance±2dB) at each RF chain, Data Rate and at room Temp. 25degree C	
		HT80 13±2 dBm at MCS9	
3.2.5.7	Receiver Sensitivity at Antenna Connector	• Typical Sensitivity at each RF chain. Frame(1000-byte PDUs)Error Rate<10% at room Temp 25 degree C	
		5GHz Band / HT20 • -64dBm at MCS8	5GHz Band / HT40 • -58dBm at MCS9
		5GHz Band / HT80 • -55dBm at MCS9	

3.2.6 Bluetooth Section

Feather	**Description**		
General specification			
Bluetooth standard	Bluetooth V2.1/3.0/4.2/5.0		
Frequency band	2402MHz-2480MHz		
Channel Numbers	79 channels for BDR+EDR 40 channels for BLE		
Modulation	GFSK, π/4-DQPSK and 8DPSK		
RF specification			
	Min（dBm）	Type（dBm）	Max（dBm）
BDR Output Power		6	
BLE Output Power		4	
Sensitive @BER=0.1% FOR GFSK(1Mbps)		-86	
Sensitive @BER=0.01% FOR π/4-DQPSK(2Mbps)		-86	
Sensitive @BER=0.01% FOR 8DPSK(3Mbps)		-80	
Maximum input level	GFSK(1Mbps) -20dBm		
	π/4-DQPSK(2Mbps) -20dBm		
	8DQPSK(3Mbps) -20dBm		
Sensitive @PER=30.8% FOR BLE		-90	

4. Electrical and Thermal Characteristics

4.1 Environmental Requirements

Parameter	Minimum	Maximum	Units
Storage Temperature	-40	+80	℃
Ambient Operating Temperature	0	70	℃
Junction Temperature	0	125	℃

4.2 General Section

	Feature	Detailed Description
4.2.1	Antenna Type	● WIFI ANT: PIFA Antenna BT ANT: PIFA Antenna
4.2.2	Operating Voltage	● 5 V±10%
4.2.3	Current Consumption	● ＜300mA@RX ● ＜1000mA@TX
4.2.4	Form Factor and Interface	● High Speed USB2.0 Interface

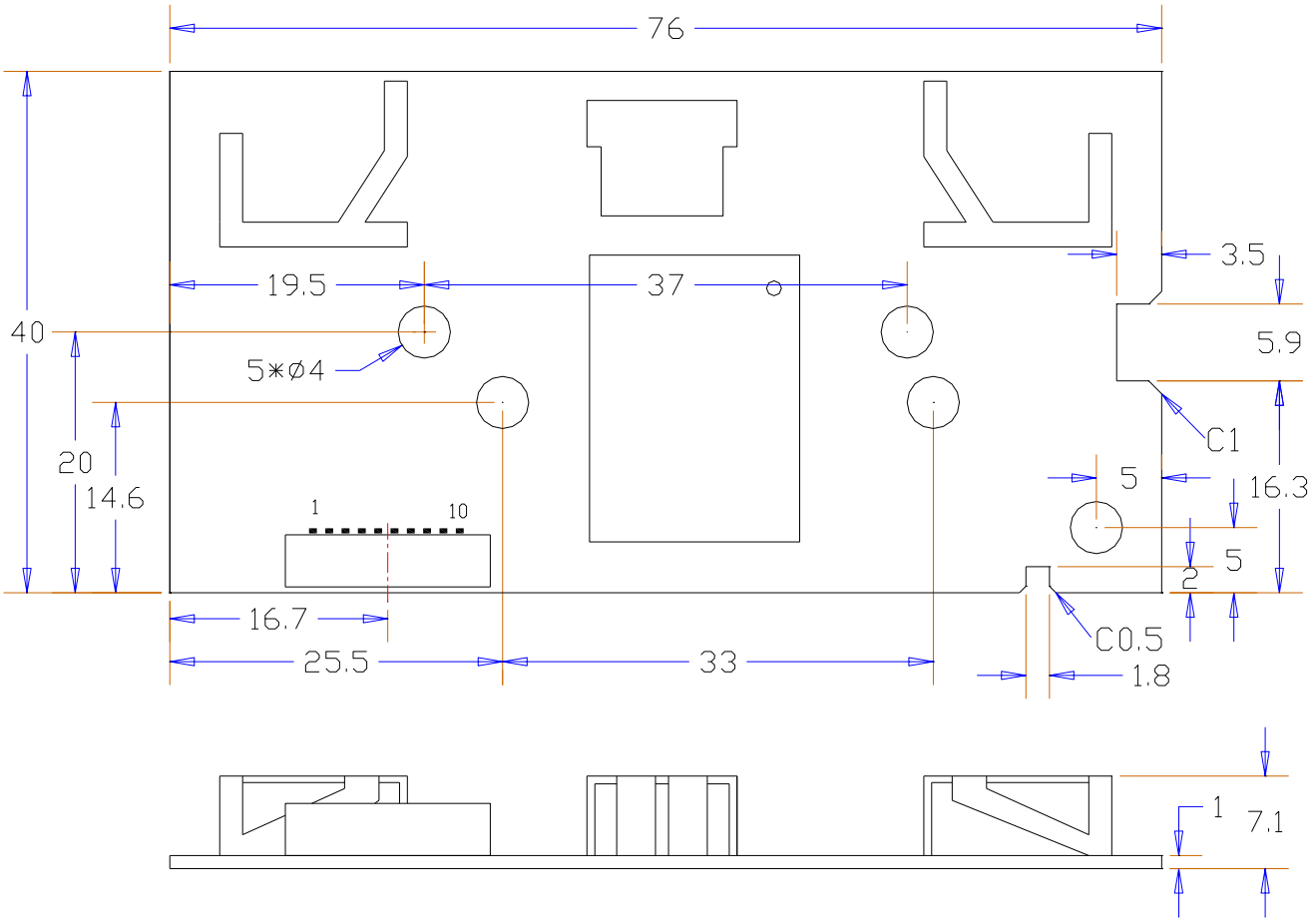
4.3 Software

Driver	Windows, Linux,Android
Security	WPA and WPA2,WAPi

4.4 Mechanical Dimensions

	Feature	Detailed Description
4.4.1	Length	● 76mm
4.4.2	Width	● 40mm
4.4.3	Height	● 7.1mm(PCB 1.0mm)

5.Mechanical Dimensions



Size error range:

Length (mm)	Error (mm)
0-5	±0.15
5-10	±0.20
10-50	±0.30
>50	±0.40

6. Connector Definition

Pin	Symbol	Remark	I/O
1	NC	-	-
2	NC	-	-
3	BT_HOSTWAKE	BT wake up host(with 10K resistance to 3.3V pull-up), low level is effective	O
4	GND	GND	-
5	WOWLAN	Wake on Wireless LAN (with 10K resistance to 3.3V pull-up), low level is effective	O
6	RESET	Reset controlled by main SOC(with 47K resistance to 3.3V pull-up), low level is effective	I
7	GND	GND	-
8	USB -DP	USB Communication signal USB-DP	I/O
9	USB -DM	USB Communication signal USB-DM	I/O
10	5V	VDD 5V	P

Note: WiFi and BT share the same address segment, but it will not share the same address.

BT_ WAKE_ Host, the internal of the module has been pulled up to 3.3V, do not pull up the host end, and the port status should be configured to be effective at low level.

WL_ WAKE_ Host, the internal of the module has been pulled up to 3.3V, do not pull up the host end, and the port status should be configured to be effective at low level.

The reset module has been pulled up to 3.3V. Do not pull up the host terminal. The low level is valid.

7.DC Characteristics

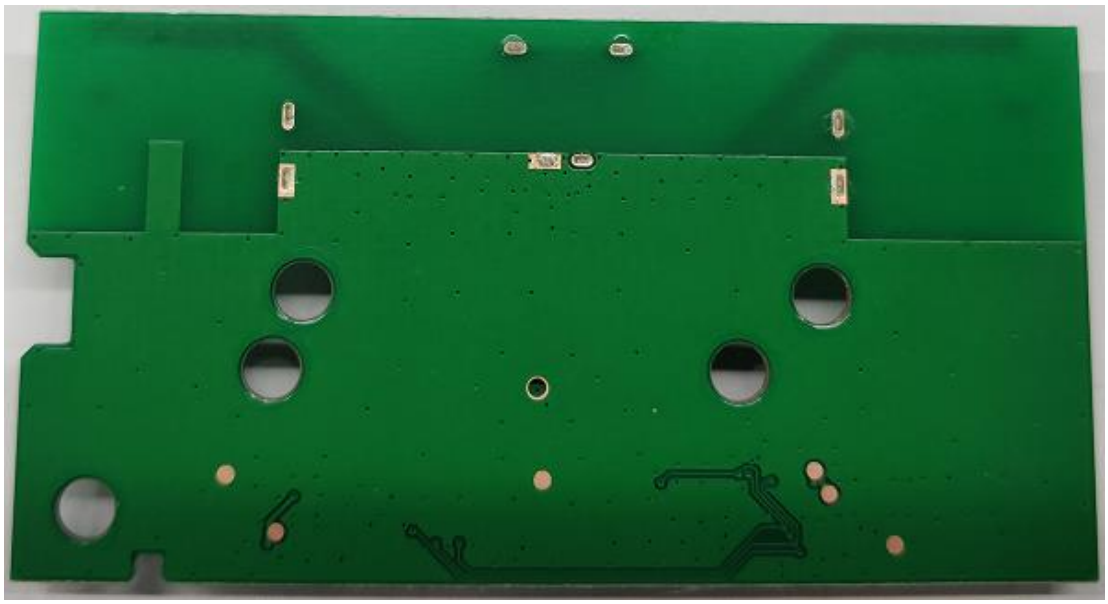
DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Units
VD33	3.3V I/O Supply Voltage	3.0	3.3	3.6	V
VD10	1.1V Core Supply Voltage	0.945	1.05	1.155	V

3.3V GPIO DC Characteristics

Symbol	Parameter	Minimum	Normal	Maximum	Units
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

8.Product picture



9.Power on sequence timing

The typical timing range

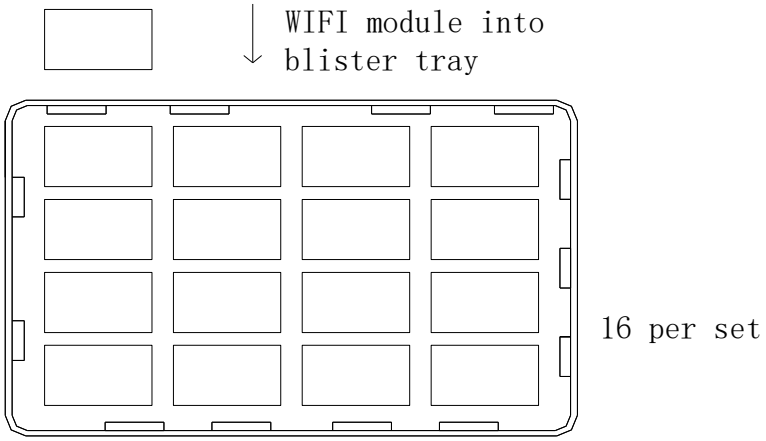
	Unit	Min	Typical	Max
T_1	ms	0.25	1.5	5
T_2	ms	1.5		

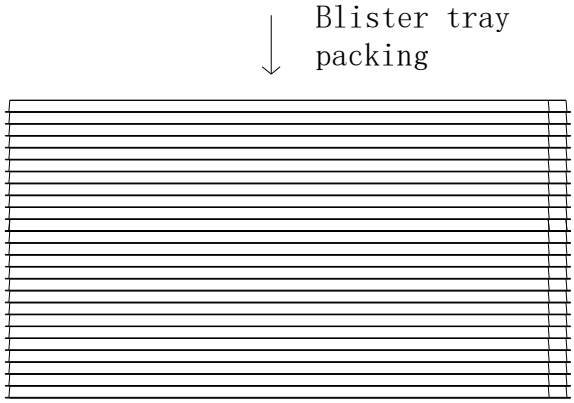
Note:T2 must be asserted after 3.3V ready

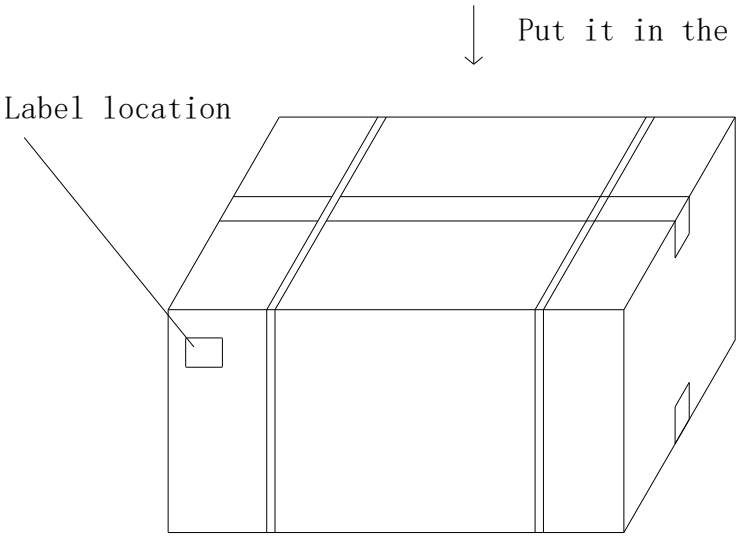
10.Component preparation

Material name	Manufacturer
Crystal/oscillator	CREC/HARMONY
Resistance	Walsin/ Yageo
WIFIIC	RTL
Capacitance	Murata/Walsin/Yageo
Inductance	Murata/CHILISIN
PCB	Fuzhixiang/ Kexiang/ Baoxin Xinwang
Duplexer/IC	Walsin
Pressure reducing tube (DC-DC)	FITI/ Tuoer Microelectronics
SMT connector	Zhejiang Chuangjia/ xinfuer

11.Package

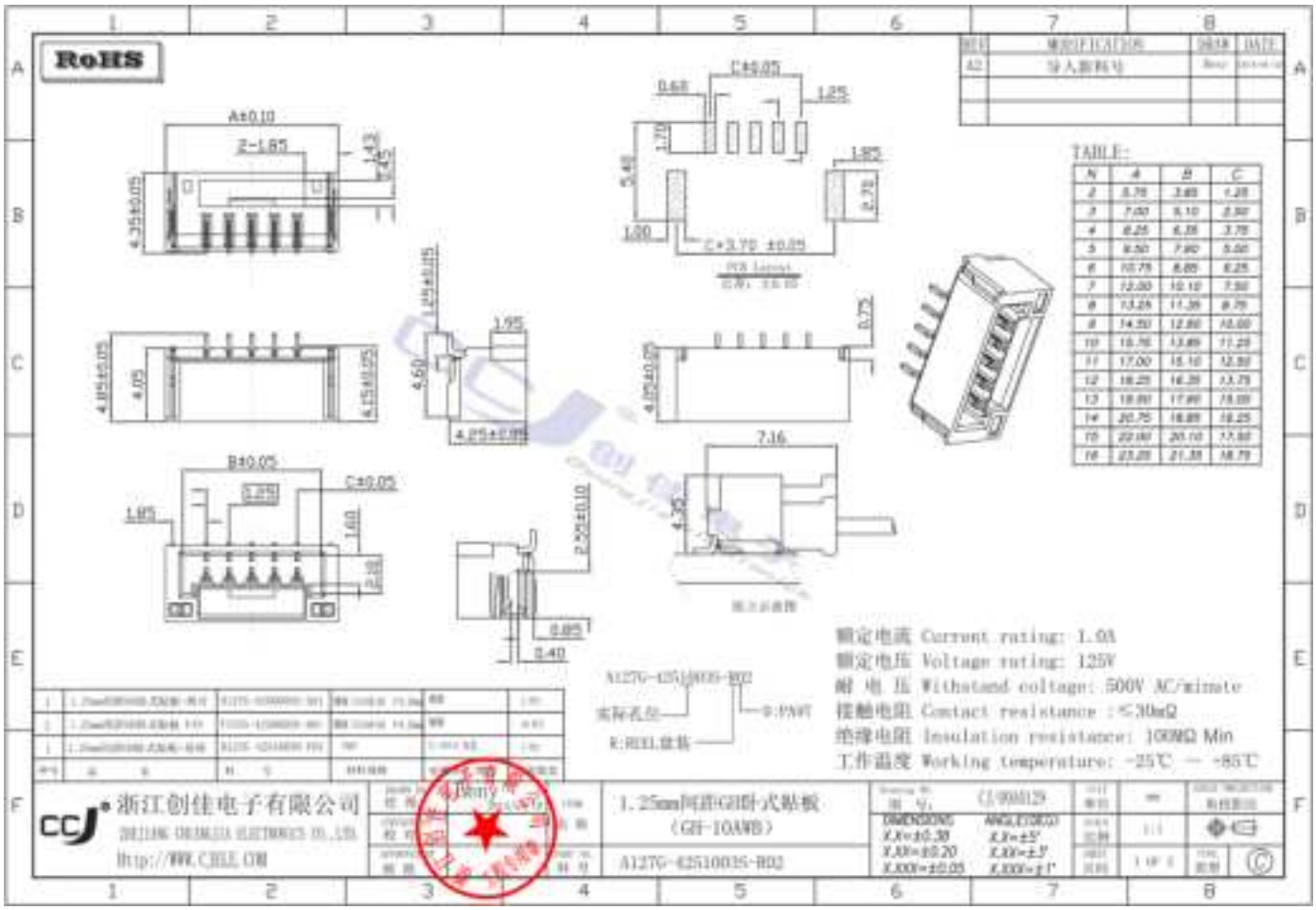


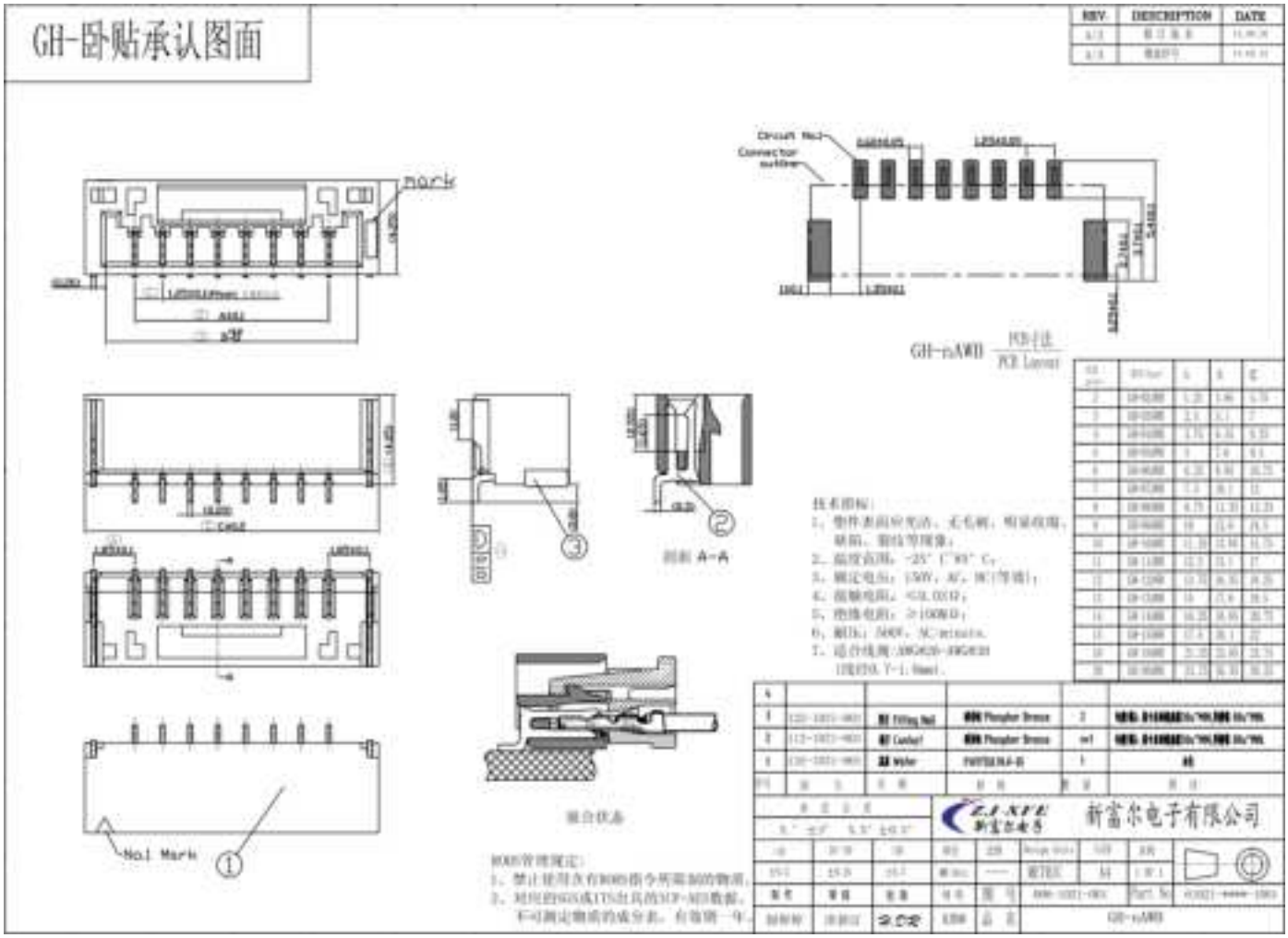




Size：390*290*230mm
Quantity/box：320

Appendix 1: SMTconnector




GH-卧贴承认图面
mark
No.1 Mark
新富尔电子有限公司

FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditio ns:

(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 devic e, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection a gainst harmful interference in a residential installation. This equipment generates uses and can radia te radio frequency energy and, if not installed and used in accordance with the instructions, may cau se 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 e ncouraged 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.

Radiation Exposure Statement

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 and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/Canada.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna,

Important Note:

This modular transmitter is only FCC authorized for FCC Part 15.247&15.407 as listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

End Product Labeling

If the FCC identification number is not visible when the module is installed insideanother 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 Transmitter Module FCC ID: 2A3LP-MW50A

Table for Filed Antenna

For BT&BLE

Antenna Type	PIFA Antenna
Antenna Gain	4.78dBi

For WIFI 2.4G &5G

Antenna Type	PIFA Antenna
Antenna Gain	2400MHz-2500MHz: Antenna A: 4.6dBi; Antenna B: 4.1dBi 5150MHz - 5250MHz: ANT A:5.35dBi; ANT B: 4.94dBi 5250MHz - 5350MHz: ANT A: 5.05dBi; ANT B:4.68dBi 5470MHz - 5725MHz: ANT A: 5.57dBi; ANT B: 4.88dBi 5725MHz - 5850MHz: ANT A: 5.59dBi; ANT B: 4.53dBi

ISED Statement

- English: This device complies with Industry Canada license-exempt RSS standard(s).Operation is s ubject to the following two conditions: (1) This device may not cause interference, and (2) This devic e must accept any interference, including interference that may cause undesired operation of the de vice.The digital apparatus complies with Canadian CAN ICES-3 (B)/NMB-3(B).
- French:Le présentappareilestconforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitationestautorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareildoit accepter tout brouillageradioélec triquesubi, mêmesi le brouillageest susceptible d'encompromettre le fonctionnement.

This radio transmitter (ISED certification number:27906-MW50A) has been approved by Industry Canada to operate with theantenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présentémetteur radio (ISED certification number: 27906-MW50A) aétéapprouvé par Industrie Canada pour fonctionner avecles types d'antenneénumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclusdanscetteliste, etdont le gain estsupérieur au gain maximal indiqué, sontstrictementinterdits pour l'exploitation de l'émetteur.

Radiation Exposure Statement

This equipment complies with Canada 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.

Déclarationd'exposition aux radiations

Cetéquipementestconforme Canada limitesd'exposition aux radiations dans un environnement non contrôlé. Cetéquipementdoitêtreinstallé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

This device is intended only for OEM integrators under the following condition:

The transmitter module may not be co-located with any other transmitter or antenna.

As long as the condition above is met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cetappareilestconçuuniquement pour les intégrateurs OEM dans les conditions suivantes:

Le module émetteurpeut ne pas êtrecoïmplanté avec unautreémetteurouantenne.

Tant que les 1 condition ci-dessussontremplies, des essaissupplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM esttoujoursresponsable des essais sur son produit final pour toutesexigences de conformitésupplémentairesrequis pour ce module installé.

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the ISED cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

Note Importante:

Dans le casoùces conditions ne peuventêtresatisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autreémetteur), l'autorisation du Canada n'est plus considérécommevalide et l' ISED ne peut pas êtreutilisé sur le produit final. Danscescirconstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y comprisl'émetteur) etl'obtentiond'uneautorisationdistincte au Canada.

End Product Labeling

The final end product must be labeled in a visible area with the following: Contains IC: 27906-MW50A

Plaque signalétique du produit final

Le produit final doitêtreétiquetédansunendroit visible avec l'inscriptionsuivante: Contient des IC: 27906-MW50A

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doitêtreconscient de ne pas fournir des informations à l'utilisateur final quant à la façond'installerou de supprimerce module RF dans le manuel de l'utilisateur du produit final qui intègrece module.

Le manuel de l'utilisateur final doitincluretoutes les informationsréglementairesrequises et avertissementscommeindiquédanscemanuel.

The device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems.

les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilization à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.