PRODUCT SPECIFICATION

Version 1.8

WiFi module

Model Number : WC0NR2201

(Realtek : RTL 8812CU)

CMIIT ID : 2020AP 1926 (M)

(MAC address from GSD)

Customer recognition Customer Approval Section		
Customer Name	Shenzhen Ruilian Technology Co., LTD	
D epartment	48010010041	
A pproval		Date :

fiction D ESIGN	examine and verify C HECK	ratify A P PROVAL
Xu Huan	Hou Dewei	High according to
2024.05.30	2024.05.30	2024.05.30

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HSF

Goldman sachs 48.01.001.0041WIFI Module module specification document RE

PRODUCT SPECIFICATION

Version 1.8

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HUIZHOU GAOSHENGDA TECHNOLOGY CO.,LTD

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Document revision history

Revision	Date	Approved by	R emarks
Version 1.0	2019-09-11		Dra ft
Version 1.1	2019-09-19		Update PIN Description
Version 1.2	2020-03-07		Increase Schematic
Version 1.3	2020-04-22		Increase CMIIT ID
Version 1.4	2020-11-27		Increase Product pictures and label
Version 1.5	2021-03-05		Increase Package & Wireless module before the SMT note
Version 1.6	2023-02-20		Update customer information
Version 1.7	2023-02-22		Add General Requirements
Version 1.8	2024-05-30		Add Chinese information

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 RTL 8812CU 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. 1 1ac 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. 1 1a standard from 5. 15~5.825GHz wideband and IEEE 802. 11b /g standard from 2.4~2.5GHz .It can be used to provide up to 54Mbps for IEEE 802. 1 1a and IEEE 802. 11g , 11Mbps for IEEE 802. 1 1b and 300Mbps for IEEE 802. 1 1n .

This document mainly describes the product requirements of the 802.11a / b / g / n / ac USB module. This module is based on the Realtek RTL 8812CU chipset and is a complete dual-frequency (2.4GHz and 5GHz) WIFI 22 MIMO MAC / PHY / Radio System-on-a-Chip. The module provides high integration with the dual-stream IEEE 802.11ac MAC / baseband / radio. WLA N Operation supports 20 MHz, 40 MHz and 80 MHz channels with data rate up to 866.7Mbps. It is also backwards compatible with IEEE 802.11a standard 5. 15~5.825GHz broadband and IEEE 802.11b / g standard 2.4~2.5GHz broadband. It can provide 54Mbps for IEEE 802.11a and IEEE 802.11g, 11Mbps for IEEE 802.11b, and 300Mbps for IEEE 802.11n.

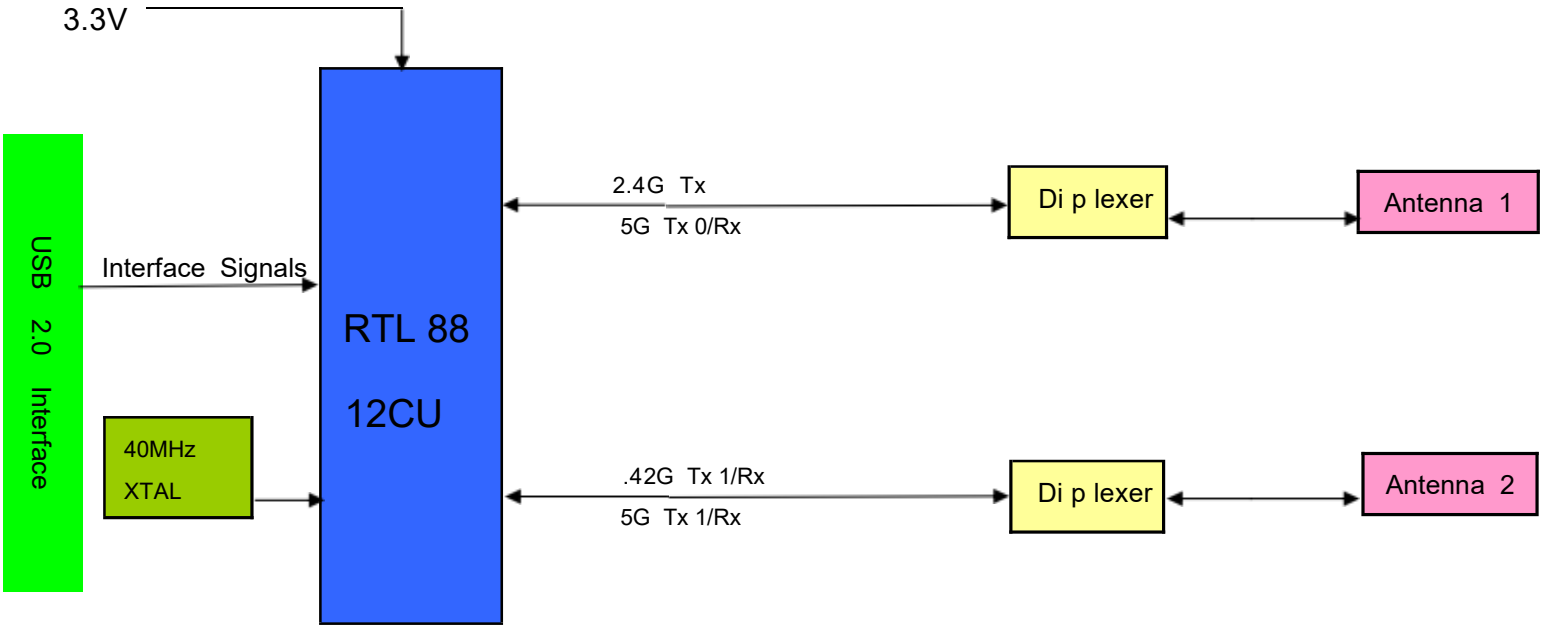
2. Features

- Compatible with IEEE 802. 1 1a standard to provide wireless 54Mbps data rate .
- Compatible with IEEE 802. 1 1b standard to provide wireless 11Mbps data rate .
- Compatible with IEEE 802. 11g standard to provide wireless 54Mbps data rate .
- Compatible with IEEE 802. 1 1n standard to provide wireless 300Mbps data rate .
- Compatible with IEEE 802. 1 1ac standard to provide wireless 866.7Mbps data rate .
- Support 20MHz , 40MHz bandwidth in 2.4GHz band
- Support 20MHz , 40MHz , 80Mhz bandwidth in 5GHz band
- Operation at 2.4~2.5GHz and 5. 15~5.825GHz frequency band to meet worldwide regulations Supports MU -MIMO .
- Support STBC , LDPC
- Supports IEEE 802. 11i (WPA and WPA 2), WAPI .
- Drivers support Windows , Linux , Android .
- High speed USB 2.0 interface
- HSF compliant
- Compatible with IEEE 802.11a standard and provides 54Mbps wireless data rate.
- Compatible with IEEE 802.11b standard and provides wireless 11Mbps data rate.
- Compatible with IEEE 802.11g standard and provides 54Mbps wireless data rate.
- Compatible with IEEE 802.11n standard and provides wireless 300Mbps data rate.
- Compatible with IEEE 802.11ac standard and provides wireless 866.7Mbps data rate.
- Support 2.4GHz frequency band 20 MHz, 40 MHz bandwidth
- Support 5GHz frequency band 20 MHz, 40 MHz, 80 Mhz bandwidth
- Work in the 2.4~2.5GHz and 5. 15~5.825GHz frequency bands, in compliance with international specifications
- Support for MU-MIMO.
- Support for STBC, and LDPC
- Support for IEEE 802.11i (WPA and WPA 2), WAPI.

- Support for Windo ws, Linux, and Android.
- High-speed USB 2.0 interface
- accord with HSF

3. Application Diagrams

3.1 FunctionalBlockDiagram functional box diagram



.23 GeneralRequirements Performance requirements

3.2. 1 IEEE 802. 11b Section

	Fea ture	Detailed Description
3.2.1.1	Standard Standard	• IEEE 802. 11b
3.2.1.2	Radio and M odulation Schemes Modulation mode	• DQPSK , DBPSK , DSSS , and CCK
3.2.1.3	O p erating Frequency Frequency range	• 2412-2462MHz ISM band
3.2.1.4	Channel Numbers Number of channels	• 11 channels for WorldWide
3.2.1.5	Data Rate Rate	• at most 11Mbps
3.2.1.6	Media Access Protocol Access to the protocol	• CSMA /CA with ACK
3.2.1.7	Transmitter Output Power at Antenna Connector Emission power	• Typical RF Output Power (tolerance ± 2dB) at each RF chain, Data Rate and at room Temp 25℃, typical RF output power (error at room temperature ± 2dB) • 16±2 dBm at 11Mbps
3.2.1.8	R eceiver S ensitivity at Antenna Connector Receiving sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate <8% at room Temp 25℃, minimum sensitivity with bit error rate less than 8% at room temperature • -82 dBm at 11Mbps

3.2.1.9	Center Frequency Tolerance Frequency error	• ±10ppm

3.2.2.0	EV M	● ≤- 10dB at 11Mbps

3.2.2 IEEE 802. 11g Section

	F eature	Detailed Description
3.2.2.1	Standard Standard	● IEEE 802. 11g
3.2.2.2	Radio and Mo d ulation Schemes Modulation mode	● QPSK , BPSK , 16QAM ,64QAM with OFDM
3.2.2.3	O p erating Frequency Frequency range	● 2412-2462MHz ISM band
3.2.2.4	Channel Numbers Number of channels	● 11 channels for WorldWide
3.2.2.5	Data Rate Rate	● at most 54Mbps
3.2.2.6	Media Access Protocol Access to the protocol	● CSMA /CA with ACK
3.2.2.7	Transmitter Output Power at Antenna Connector Emission power	● Typical RF Output Power (tolerance ± 2dB) at each RF chain, Data Rate and at room Temp 25℃, typical RF output power (error at room temperature ± 2dB) ● 15±2 dBm at 54Mbps
3.2.2.8	R eceiver S ensitivity at Antenna Connector Receiving sensitivity	● Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate <10% at room Temp 25℃, minimum sensitivity with bit error rate less than 10% at 25 degrees at room temperature ● -73 dBm at 54Mbps
3.2.2.9	Center Frequency Tolerance Frequency error	● ±10ppm
3.2.3.0	EV M	● ≤-25dB at 54Mbps

.2.33 IEEE 802. 11a Section

	Featur e	Detailed Description
3.2.3.1	Standard Standard	● IEEE 802. 11a
3.2.3.2	Radio and Mo d ulation Schemes Modulation mode	● QPSK , BPSK , 16QAM ,64QAM with OFDM
3.2.3.3	O p erating Frequency Frequency range	● 5. 15~5.25GHz ● 5.25~5.35GHz ● 5.47~5.725GHz ● 5 725~5 85GHz
3.2.3.4	Data Rate Rate	● at most 54 Mbps
3.2.3.5	Media Access Protocol Access to the protocol	● CSMA /CA with ACK

3.2.3.6	Transmitter Output Power at Antenna Connector Emission power	• Typical RF Output Power (tolerance ± 2dB) at each RF chain, Data Rate and at room Temp 25℃, typical RF output power per rate at 25℃ at room temperature (error ± 2dB) • 15±2 dBm at 54Mbps

3.2.3.7	R eceiver S ensitivity at Antenna Connector Receiving sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate <10% at room Temp 25℃, minimum sensitivity with bit error rate less than 10% at 25 degrees at room temperature • -73 dBm at 54Mbps
3.2.3.8	Center Frequency Tolerance Frequency error	• ±10ppm
3.2.3.9	EV M	• ≤-25dB at 54Mbps

3.2.4 IEEE 802. 11n Section

	Featur e	Detailed Description	
3.2.4.1	Standard Standard	• IEEE 802. 1 1n	
3.2.4.2	Radio and Mo d ulation Schemes Modulation mode	• BPSK , QPSK , 16QAM ,64QAM with OFDM	
3.2.4.3	O p erating Frequency Frequency range	• 2.4GHz band :2412-2462MHz • 5GHz : 5. 15~5.25GHz ； 5.25~5.35GHz ； 5 47~5 725GHz ； 5 725~5 85GHz ；	
3.2.4.4	Data Rate Rate	• at most 300 Mbps	
3.2.4.5	Media Access Protocol Access to the protocol	• CSMA /CA with ACK	
3.2.4.6	Transmitter Output Power at Antenna Connector Emission power	• Typical RF Output Power (tolerance ± 2dB) at each RF chain, Data Rate and at room Temp 25℃, typical RF output power per rate at 25℃ at room temperature (error ± 2dB)	
		.42GHz Band /HT 20 • 15±2 dBm at MCS 7	.42GHz Band /HT 40 • 15±2 dBm at MCS 7
		5GHz Band /HT 20 • 15±2 dBm at MCS 7	5GHz Band /HT 40 • 15±2 dBm at MCS 7
3.2.4.7	R eceiver S ensitivity at Antenna Connector Receiving sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate <10% at room Temp 25℃, minimum sensitivity with bit error rate less than 10% at 25 degrees at room temperature	
		.42GHz Band /HT 20 • -70 dBm at MCS 7	.42GHz Band /HT 40 • -66 dBm at MCS 7
		5GHz Band /HT 20 • -71 dBm at MCS 7	5GHz Band /HT 40 • -67 dBm at MCS 7
3.2.4.8	Center Frequency Tolerance Frequency error	• ±10ppm	
3.2.4.9	E VM	• ≤-5dB at MCS0	• ≤-28dB at MCS7

3.2.5 IEEE 802. 11ac Section

	Featur e	Detailed Description
3.2.5.1	Standard Standard	• IEEE 802. 1 1ac
3.2.5.2	Radio and Mo d ulation Schemes Modulation mode	• QPSK , BPSK , 16QAM ,64QAM ,256QAM with OFDM

3.2.5.3	O p erating Frequency Frequency range	• 5GHz : 5. 15~5.25GHz； 5.25~5.35GHz； 5.47~5.725GHz； 5.725~5.85GHz；

3.2.5.4	Data Rate Rate	• at most 866.7 Mbps	
3.2.5.5	Media Access Protocol Access to the protocol	• CSMA /CA with ACK	
3.2.5.6	Transmitter Output Power at Antenna Connector Emission power	Typical RF Output Power (tolerance ± 2dB) at each RF chain, Data Rate and at room Temp 25℃, typical RF output power per rate at 25℃ at room temperature (error ± 2dB)	
		HT 20 • 15±2 dBm at MCS 8	HT 40 • 15±2 dBm at MCS 9
		HT 80 • 13±2 dBm at MCS 9	
3.2.5.7	R eceiver S ensitivity at Antenna Connector Receiving sensitivity	• Typical Sensitivity at Which Frame (1000-byte PDUs) Error Rate <10% at room Temp 25℃, minimum sensitivity with bit error rate less than 10% at 25 degrees at room temperature	
		5GHz Band / HT 20 • -64dBm at MCS 8	5GHz Band / HT 40 • -61dBm at MCS 9
		5GHz Band / HT 80 • -58dBm at MCS 9	
3.2.5.8	Center Frequency Tolerance Frequency error	• ±10ppm	
3.2.5.9	E VM	• ≤-5dB at MCS0 • ≤-30dB at MCS8 • ≤-32dB at MCS9	

4. Electrical and Thermal Characteristics Electrical and temperature characteristics

4.1 Temperature Limit Rating s Temperature limit range

Parameter	Minimum Min. the value	Maximum Maximum value	Units unit
Storage Temperature Storage temperature	-40	+80	℃
Ambient Operating Temperature Operating temperature	0	70	℃
Junction Temperature Junction temperature	0	125	℃

4.2 General Section

	Fe a ture	Detailed Description
4.2. 1	Antenna Type, The antenna	• I -PEX connector (WIFI)

	type	
4.2.2	Operating Voltage Operating voltage	● 3.3 V ± 10%
4.2.3	Current Consumption Operating current	● ＜1000mA
4.2.4	Interface Interface	● High Speed USB 2.0 Interface High-speed USB 2.0 interface

.3 4 Software

Driver Drive	Windows , Linux ,Android
Security Encryption mode	WPA and WPA 2,WAPi

5. PIN Description module pin definition

PIN	S YMBOL	DESCRIPTIO N	TYP E
1	CHIP _EN	Shutdown CHIP (Internal 47K Ω pull up to 3.3V ， low level active)	I
2	VDD 33	3.3V	/
3	WL USB DN	USB D-	I /O
4	WL USB DP	USB D +	I /O
5	GN D	GN D	/
6	WLAN _WAKE _HOST	WLAN CHIP WAKES UP HOST (Internal 10K Ω pull up to 3.3V) WiFi wake up host (internal 10k Ω pull up to 3.3V)	O
7	GN D	GN D	/
8	NC	Not Connect	/
9	GN D	GN D	/
10	GN D	GN D	/
1 1	NC	Not Connect	/
12	GN D	GN D	/
13	GN D	GN D	/
14	NC	Not Connect	/
15	GN D	GN D	/
16	NC	NC	/

CONT 1：TX 0/RX 0(WIFI) CONT2：TX1/RX1(WIFI)

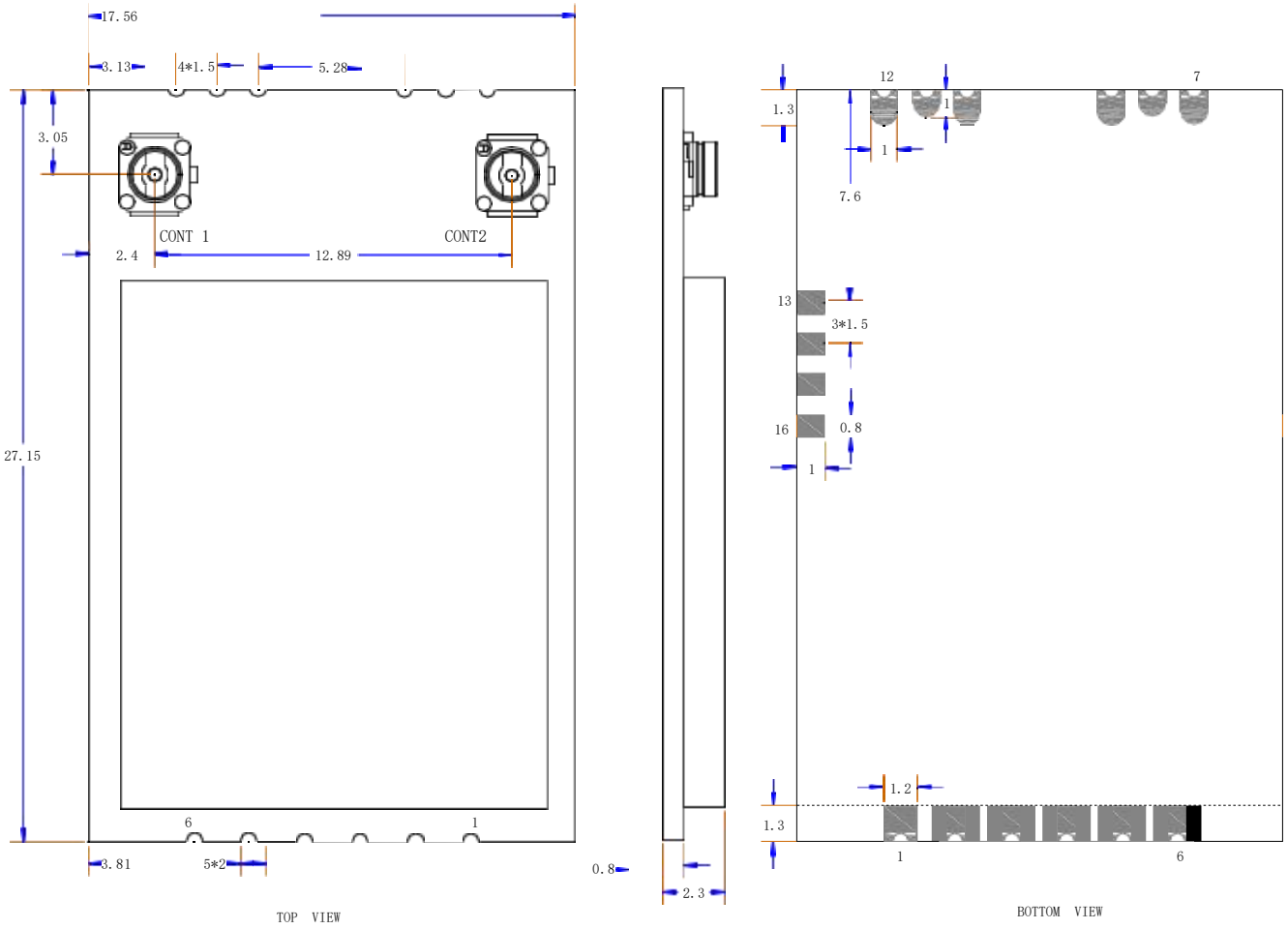
pour:

Pin 1 CHIP _EN module has been pulled up to 3.3V, Host end do not pull up.
Pin 6 WLAN _ WAKE _ HOST, the module has been pulled up to 3.3V, Host end do not pull up, port status should be configured with low level effective.

6 Mechanical Characteristics Mechanical characteristics

6.1 Mechanical Dimensions Mechanical dimensions

	Feature Features	Detailed Description Detailed description
4.4. 1	Length long	• 27. 15mm
4.4.2	Width wide	• 17.56mm
4.4.3	Height tall	• MAX 2.7mm (PCB 0.8mm)



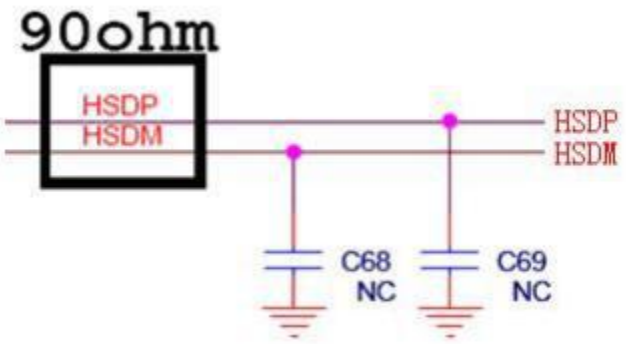
Unit :mm

Dimensional error range:

Length (mm)	Error (mm)
0-5	±0. 15
510	±0.20
10-50	±0.30

7 Note

7.1 USB interface electrical characteristics



Note: USB D + / D-differential line impedance control 90 OHM; C 68 and C 69 should be reserved in advance and adjusted according to the actual situation;

7.1 ESD

Can't get the wifi module bare hands when needs ,must we wear the gloves and static ring. When you need to take a wifi module, do not contact it with your hands. Always wear gloves and electrostatic rings.

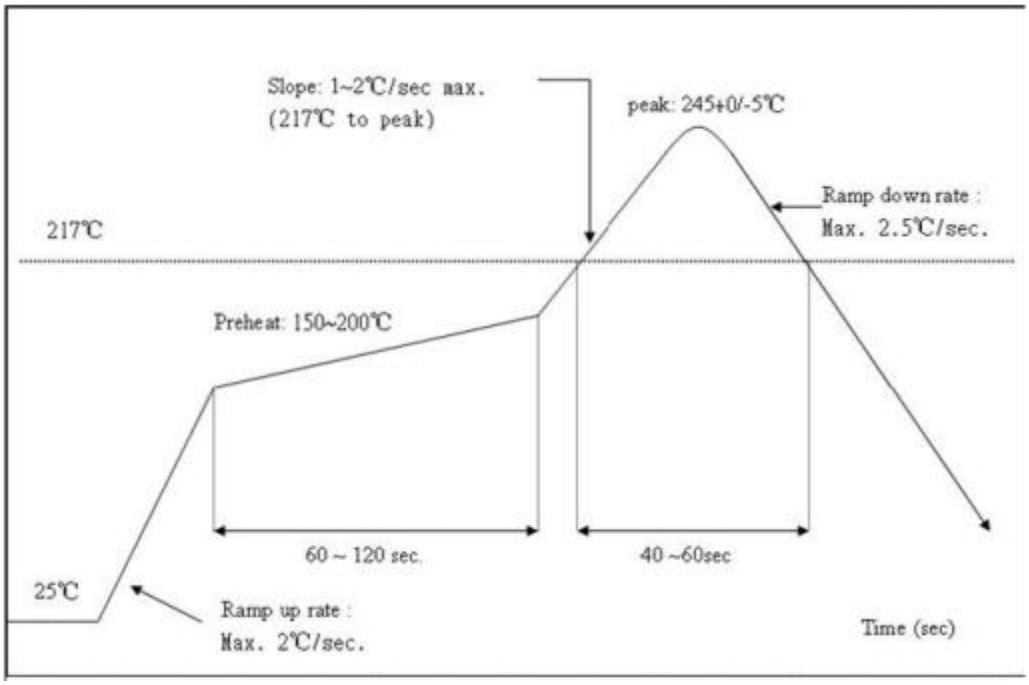
7.2 MSL

Moisture Sensitivity Level (MSL): JEDEC L 3 Humidity Sensitive Grade (MSL): JEDEC L 3

			Soak Requirements (濕度環境要求)			
	Floor Life (車間時間)		Standard (標準)		Accelerated (加速)	
Level	Time	Cond °C／%RH	Time (hrs)	Cond °C／%RH	Time (hrs)	Cond °C／%RH
1	unlimited	≦30/85%	168+5/-0	85/85	n/a	n/a
2	1 year	≦30/60%	168+5/-0	85/60	n/a	n/a
2a	4 weeks	≦30/60%	696+5/-0	30/60	120+1/-0	60/60
3	**168 hours**	**≦30/60%**	**192+5/-0**	**30/60**	**40+1/-0**	**60/60**
4	72 hours	≦30/60%	96+2/-0	30/60	20+0.5/-0	60/60
5	48 hours	≦30/60%	72+2/-0	30/60	15+0.5/-0	60/60
5a	24 hours	≦30/60%	48+2/-0	30/60	10+0.5/-0	60/60
6	TOL	≦30/60%	TOL	30/60	n/a	60/60

Check the humidity card :stored at ≦20%RH .If :30%~40%(pink)or greater than 40%(red),The module has inhaled moisture. Check the humidity card: Keep at 20% RH. If: 30% to 40% (pink) or greater than 40% (red), the module has inhaled moisture.

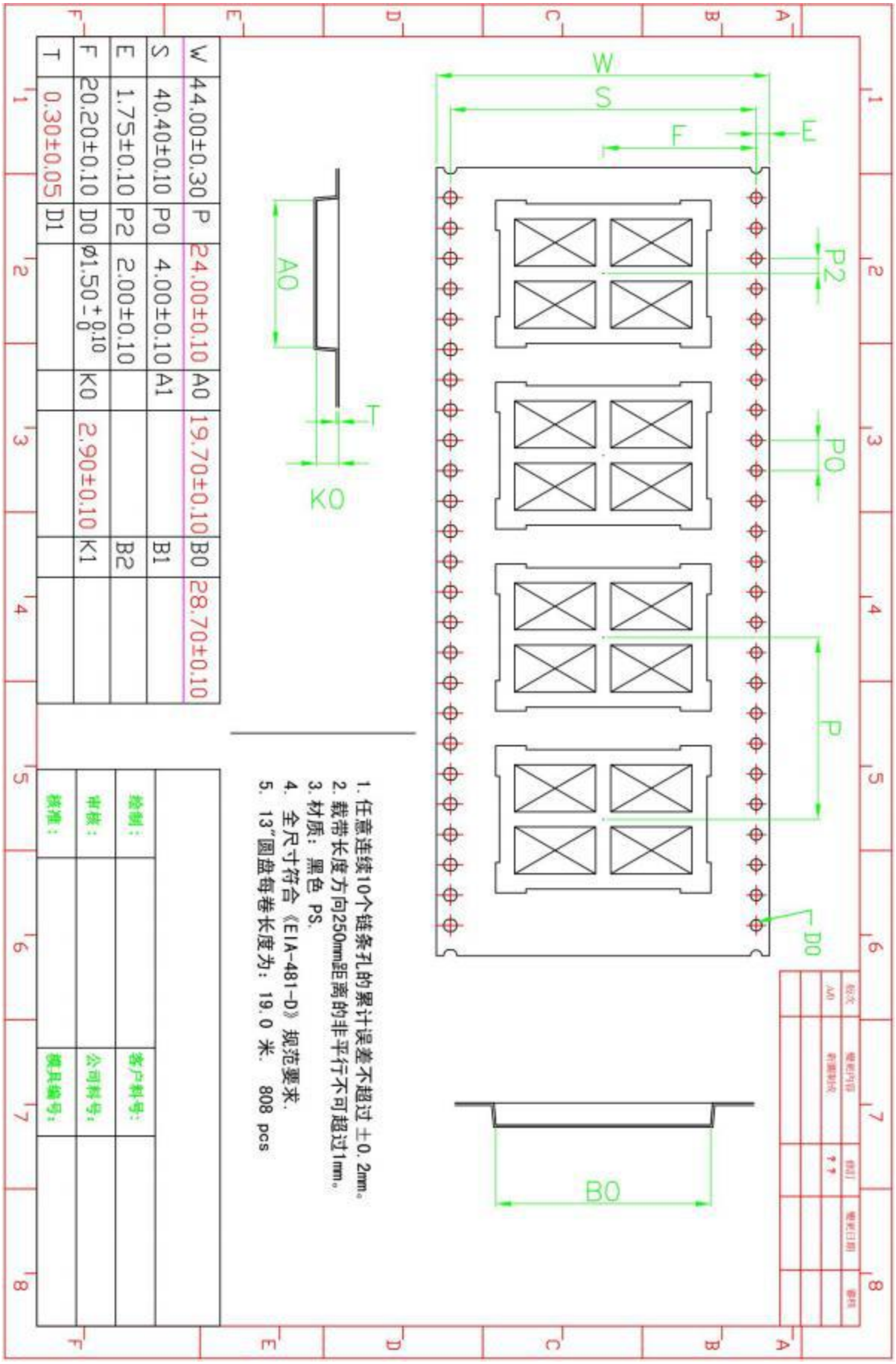
7.3 Recommended Reflow Profile



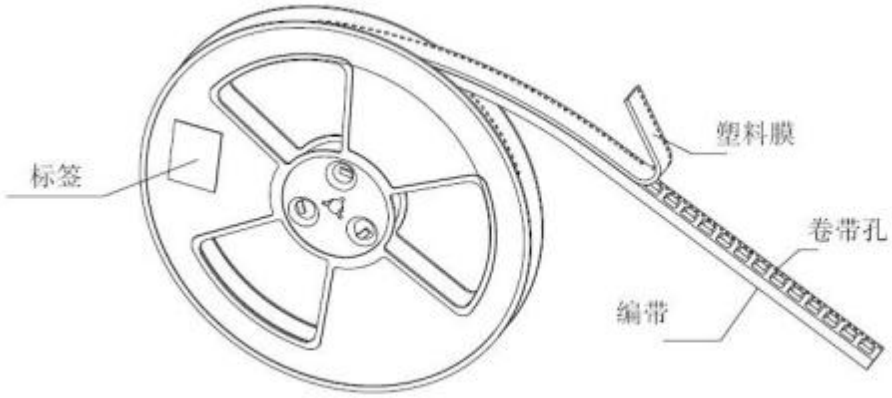
Referred to IPC /JEDEC standard .Peak Temperature : 245+0/-5°C Times : ≤2 s

8. Product picture Product pictures

10. Package packaging



W	44.00±0.30	P	24.00±0.10	A0	19.70±0.10	B0	28.70±0.10		
S	40.40±0.10	P0	4.00±0.10	A1		B1			
E	1.75±0.10	P2	2.00±0.10			B2			
F	20.20±0.10	D0	ø1.50 $^{+0.10}_{-0}$	K0	2.90±0.10	K1			
T	0.30±0.05	D1							



Outer box: 426 * 378 * 300mm

Inner box: 411 * 365 * 54m m

Anti-static vacuum bag: 450X500mm

Package quantity: 4000 PCS per box (5 boxes, 800 PCS per box)

11 Wireless module before the SMT note :

1.When customers Open stencil advice sure the hole bigger to the Wireless module plate , please press 1 to 1 and 0.7 mm is widened to open outward , the thickness of 0. 12 mm .
2 .Can 't get the wifi module bare hands when needs ,must we wear the gloves and static ring .
3.The furnace temperature according to the size of the customer the mainboard ,generally like to stick on a tablet standard temperature of 250 + - 5

Storage and use Wifi module control should pay attention to the following matters :
•Module of the storage life of vacuum packaging：
11 .Storage life ： 12 months .Storage conditions :<40C .Relative humidity :<90%R .H .
1-2.After this bag is opened , devices that will be subjected to infrared reflow , vapor -phase reflow , or equivalent processing must be :
1-3 .Check the humidity card :stored at
≦20%RH .If :30%~40%(pink)or greater than 40%(red).Labeling module has moisture absorption .①
Mounted within 168 hours at factory
conditions of : t ≦30%C， ≦60%R .H .
② Once opened , the workshop the preservation of life for 168 hours .1-4.If
baking is required ,devices may be baked for :
① Modules must be to remove module moisture problem .
② Baking temperature : 50C , 72 hours .
③ After baking , put proper amount of desiccant to seal packages .
1-5. The actual number of module vacuum packing which is based on the actual number of packages to the customer requirements , vacuum packing of picture <1>
2 .Module reel packaging items as follows .
21 .Storage life ： 12 months .Storage conditions :<40C .Relative humidity :<90%R .H .
2-2.Module apart packing after 168 hours， To launch patch need to bake ,to remove the modulehygroscopic , baking temperature
conditions： 50C， 72hours .
2-3. The actual number of module reel packing which is based on the actual number of packages to the customer requirements , Reel packing of picture <2>
3 .Module pallet packaging items as follows：
31 .Storage life： 3 months .Storage conditions :<40C .Relative humidity :<90%R .H .
3-2.Module if not used within 48 hours , before launch the need for baking , baking temperature : 125 C , 8 hours .
3-3. Pallet packaging each plate is 100 PCS .The actual number of module pallet packing which is based on the actual number of packages to the customer requirements .

12 Wifi module patch installation:

1. The customer suggests that the hole of the wifi module welding pad should expand the steel mesh by 0.7mm with a thickness of 0. 12mm.

2. When you need to take the wifi module, you should not take it alone. You must wear gloves and static rings.
3. The furnace temperature should be determined according to the size of the customer's

motherboard, generally like the standard temperature on a tablet computer is 250 + -5°

The Wifi module storage and use control should be noted as follows:

1. Storage period of the vacuum packaging of the module:
11. Storage period: 12 months, storage environment conditions: temperature: <40℃, relative humidity: <90%R.H .
1-2. Time limit for SMT assembly after the module packaging is removed:

1-3. Check the humidity card: the display value shall be less than 30% (blue), such as: 30%~40% (pink) or greater than 40% (red) indicates module moisture.
① Plant environmental temperature and humidity control: 30% ℃, 60%R.H 。
② After unpacking, the storage life of the workshop is 168 hours.
1-4. If not used up within 168 hours after unpacking, the baking conditions are as follows:
① The module must be reagain to remove moisture absorption.
② Baking temperature condition: 50℃, 72 hours.
③ After baking, put in the appropriate amount of desiccant and reseal the package.
1-5. The quantity of module vacuum packaging shall be subject to the actual packaging quantity required by the customer, and the vacuum packaging picture <1>

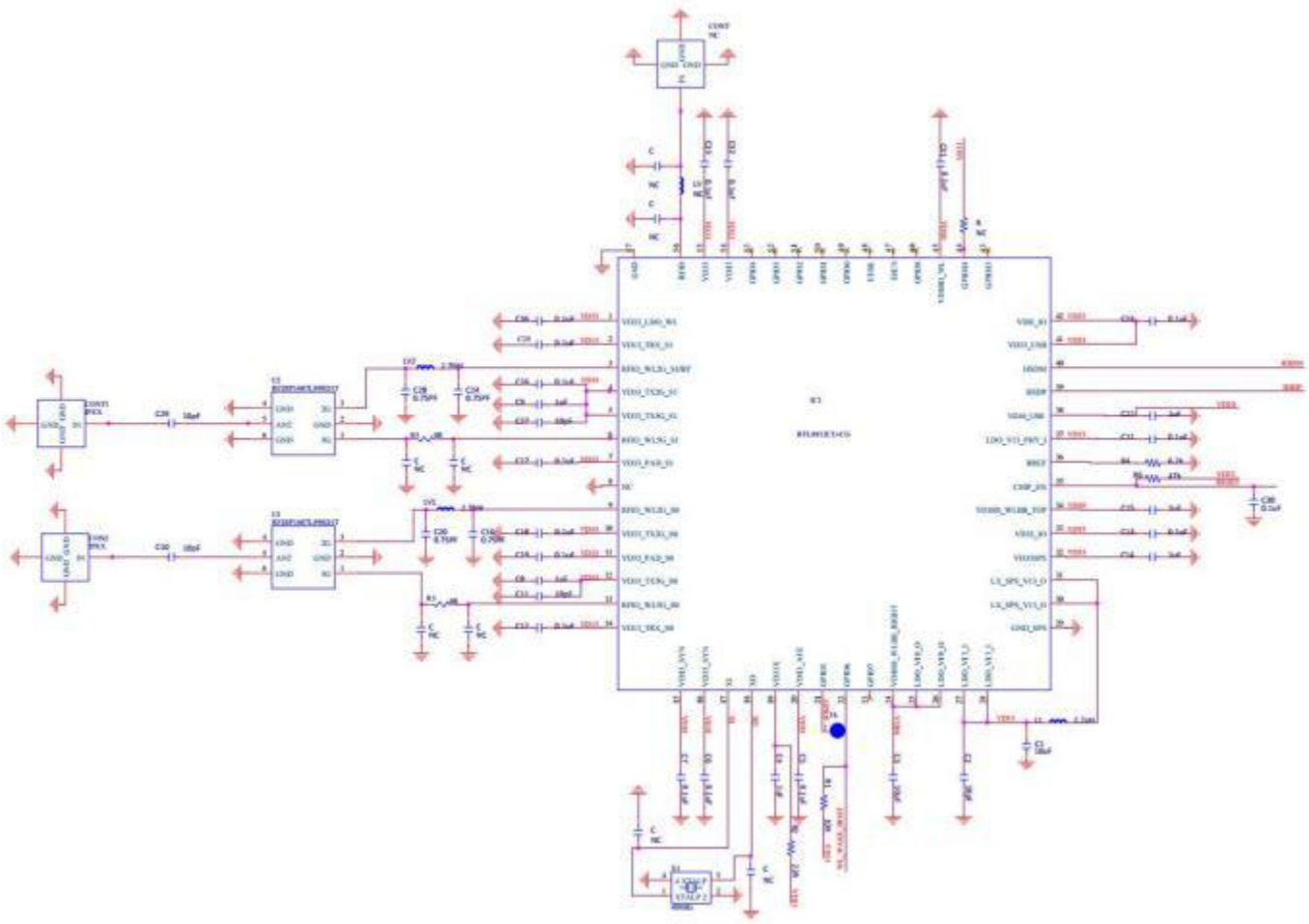
2. Packaging items of the module reel are as follows:
21. Storage period: 12 months, storage environment conditions: temperature: <40℃, relative humidity: <90%R.H .2-2. 168 hours after the module is packed, if the patch needs to be rebaked on the line to remove the moisture absorption problem of the module. The baking temperature condition: 125℃, 8 hours.
2-3. The module coil packaging shall be subject to the actual packaging quantity required by the customer. The reel packaging picture <2>

3. The module tray packaging items are as follows:
31. Storage period: 3 months, storage environment conditions: temperature: <40℃, relative humidity: <90%R.H.

3-2. If the module is not used within 48 hours, it should be baked before launching,
Baking temperature condition: 50℃, 72 hours.
3-3. The tray packaging is 100 pcs per plate, and the module tray packaging is subject to the actual packaging quantity required by the customer.

Note: The above packaging method is according to customer requirements, the packaging is subject to the actual shipment.

Appendix 1: Schematic diagram of the Sc hematic



FCC WARNING

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

15.105 Information to the user.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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 equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Radiation Exposure Statement:

This equipment complies with FCC 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.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module FCC ID:2AYHE-2404A”

Requirement per KDB996369 D03

2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.3

Explanation: This module meets the requirements of FCC part 15C(15.247).FCC Part 15.407

2.3 Summarize the specific operational use conditions

Describe use conditions that are applicable to the modular transmitter, including for example any limits on antennas, etc. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, then this information must be in the instructions. If the use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain.

Explanation: The EUT only have two FPC antenna, Yes, the module contains a permanently attached antenna, The antenna gain is 2.4G antenna A 3.9dBi, 2.4G antenna B 2.6dBi, 5G antenna A 5dBi, 5G antenna B 3.9dBi ,The use condition of the prototype is mobile.

2.4 Limited module procedures

If a modular transmitter is approved as a "limited module," then the module manufacturer isresponsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval.

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed will be maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited

module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.
Explanation: The module is a single module.

2.5 Trace antenna designs

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);

b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);

c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;

d) Appropriate parts by manufacturer and specifications;

e) Test procedures for design verification; and

f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

Explanation: No, The module has no tracking antenna design, is FPC antenna.

2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Explanation: This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to comply with the FCC statement,
FCC ID: 2AYHE-2404A

2.7 Antennas

A list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Explanation: The EUT only have two FPC antenna, Yes, the module contains a permanently attached antenna, The antenna gain is 2.4G antenna A 3.9dBi, 2.4G antenna B 2.6dBi, 5G antenna A 5dBi, 5G antenna B 3.9dBi.

2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This

includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

Explanation: The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: 2AYHE-2404A

2.9 Information on test modes and additional testing requirementss

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer’s determination that a module as installed in a host complies with FCC requirements.

Explanation: Any company of the host device which install this modular with limit modular approval should perform the test ofradiated & conducted emission and spurious emission,etc. according to FCC part 15C: 15.247 and 15.209 &15.207, 15B Class B requirement, Only if the test result comply with FCC part 15C: 15.247 and 15.209 &15.207, 15B Class B requirement, then the host can be sold legally.The module is installed in the host and can be transmitted independently.

2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that 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. If the grantee markets their product as being Part 15

Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Explanation: The host shoule be evaluated by the FCC Subpart B.

This product uses FPC antenna with a maximum antenna gain of 2.4G antenna A 3.9dBi, 2.4G antenna B 2.6dBi, 5G antenna A 5dBi, 5G antenna B 3.9dBi.

IC statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science
and Economic DevelopmentCanada'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 term "IC: " before the certification/registration number only signifies that the Industry Canada
technical specifications were met.
This product meets the applicable Industry Canada technical specifications.
Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS)
d'Innovation, Sciences etDéveloppement économique Canada. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pasproduire de brouillage,et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible
d'en compromettre le fonctionnement.
L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme auxCNR
d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.
L'exploitation est autorisée aux deux conditions suivantes :
1)L'appareil ne doit pas produire de brouillage;
2)L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre lefonctionnement.
Please notice that if the ISED certification number is not visible when the module is installed inside
another device, then theoutside of the device into which the module is installed o display a label referring to the enclosed module. This exteriorlabel can use wording such as the following:
"Contains IC: 26839-2404A" any similar wording that expresses the same meaningmay be used.
l'appareil hôte doit porter une étiquette donnant le numéro de certification du module d'Industrie

Canada, précédé des mots «Contient un module d'émission », du mot « IC: 26839-2404A » ou d'une formulation similaireexprimant le même sens, comme suit

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 andcompliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure andcompliance.

Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS
102 etla conformité
à l'expositionde RSS-102 rf, utilisateurs peut obtenir l'information canadienne surl'exposition et la
conformité de rf.

This transmitter must not be co-located or operating in conjunction with any other antenna ortransmitter. This equipment should be installed and operated with a minimum distance of 20centimeters between the radiator and your body.

Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ouémetteur. Cet équipementdevrait être installé et actionné avec une distance minimum
de 20 centimètres entre le radiateur et votre corps.

Operation of this device is restricted to indoor use only. (5180-5240MHz)

Le fonctionnement de cet appareil est limité à une utilisation en intérieur uniquement. (5180-5240MHz)

Cet émetteur radio IC : 26839-2403E a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous, avec le gain maximal admissible indiqué. Les types d'antenne non inclus dans cette liste qui ont un gain supérieur au gain maximum indiqué pour tout type répertorié sont strictement interdits pour une utilisation avec cet appareil.

The radio transmitter IC: 26839-2403Ehas been approved by The Ministry of Innovation, Science and Economic Development of Canada to use the following antenna types with the specified maximum allowed gain. Antenna types not included in this list, whose gain is higher than the maximum gain of any type listed, are strictly prohibited from use with this device.

antenna A

Type of antenna	FPC antenna
Antenna Gain	2400-2500MHz(3.9dBi) 5150-5850MHz(5.0dBi)
Impedance	50hm
Manufacture	SHENZHEN LINRONG TECHNOLOGY CO.,LTD

antenna B

Type of antenna	FPC antenna
Antenna Gain	2400-2500MHz(2.6dBi) 5150-5850MHz(3.9dBi)
Impedance	50hm
Manufacture	SHENZHEN LINRONG TECHNOLOGY CO.,LTD