

保密等级：机密

SPECIFICATION

产品规格书

SKI.WB822CU.5 A23406

IEEE 802.11a/b/g/n/ac 2T2R Wi-Fi Module

Integrated BT 2.1/3.0/4.2/5.0

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REVISION HISTORY.

VERSION	DATE	BOARD ID	PAGE	DESCRIPTION	AUTHOR
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1. Introduction（简介）

SKI.WB822CU.5 module is based on Realtek RTL8822CU-CG solution. The Realtek RTL8822CU-CG 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 RTL8822CU provides a complete solution for a high-performance integrated wireless and Bluetooth device.

This documentation describes the engineering requirements specification.

SKI.WB822CU.5 模块基于 Realtek RTL8822CU-CG 解决方案。Realtek RTL8822CU-CG 是一款高度集成的芯片，支持双频 802.11ac 解决方案，拥有多用户 MIMO（多输入、多输出）和无线 WLAN（WLAN）USB2.0 网络接口控制器，此芯片集成 WLAN MAC、支持 2T2R 的 WLAN 基带和射频电路。RTL8822CU 为高性能集成无线和蓝牙设备提供了完整的解决方案。

本文档描述了产品的设计要求规范。

2. Features（特性）

Reserving System 接收制式 Protocol 支持标准	IEEE Std. 802.11b
	IEEE Std. 802.11g
	IEEE Std. 802.11n
	IEEE Std. 802.11a
	IEEE Std. 802.11ac
	Bluetooth 2.1/3.0/4.2/5.0
Chip Solution 芯片方案	RTL8822CU-VB-CG
Band 波段	2.4GHz/5GHz
Bandwidth 带宽	20/40M/80M
Dimensions 尺寸	36.00mm×26.00mm×3.00mm
Remark 备注	

型号	安装方式	支持标准	频段	天线接口	备注
SKI.WB822CU.5	SMD	IEEE 802.11a/b/g/n/ac+ Bluetooth 2.1/3.0/4.2/5.0	2.4GHz/5GHz	WIFI PCB 天线*2, BT IPEX 插座	36.00mm× 26.00mm× 3.00mm

3. Block Diagram (结构框图)

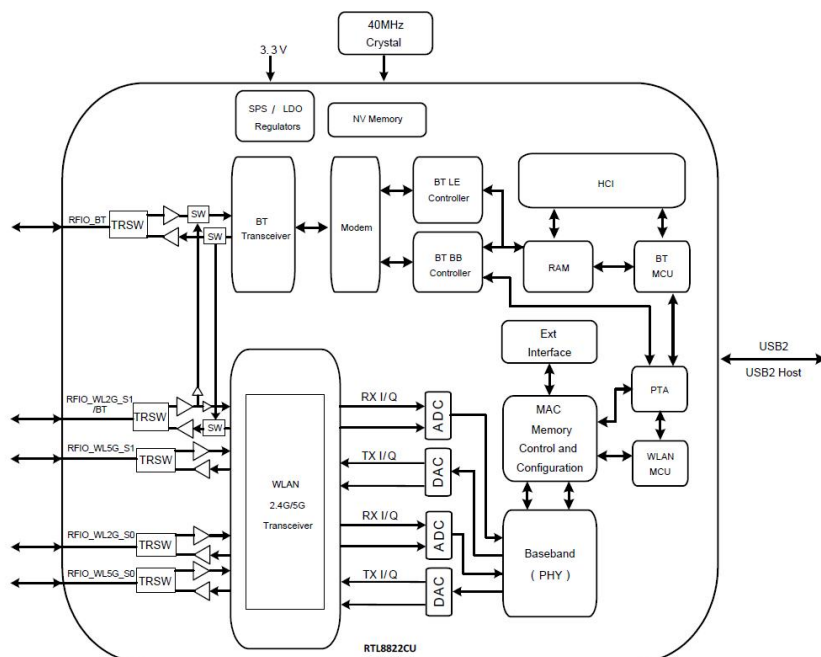
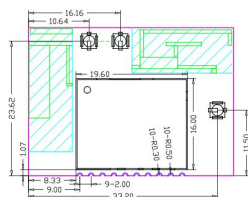


Figure 1. Dual-Band MIMO 2x2 Solution with Integrated Bluetooth Controller Solution

Figure 1 Block Diagram

4. Package Outline and Mounting (外形及安裝尺寸)

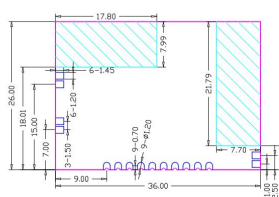
配置1【帶屏線單】
Ver. A0



模组俯视图



模组侧视图

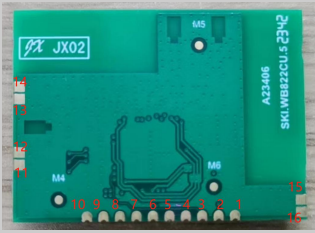


模组底视图

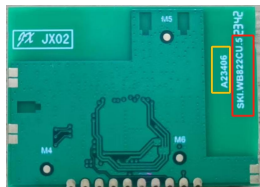
NOTE:

1. 除特殊说明区域, 板内顶层器件最高2.0mm, 底层无器件;
2. 模组外形尺寸公差为 $\pm 0.15\text{mm}$, 板厚以及未标注公差为 $\pm 0.1\text{mm}$;
3. 条纹区域为天线净空区

5. Pin Definition (引脚定义)

 模组背视图			
PIN	SYMBOL	DESCRIPTION	Voltage
1	GND	Connected to Ground \ 接地	
2	WL_HOST_WAKE	WIFI Device Wake Host\ WIFI 唤醒主机, 低电平有效	
3	BT_HOST_WAKE	BT Wake Host\ BT 从机唤醒主机, 低电平有效	
4	RESET	Power Down\ 复位, 低电平有效	
5	GND	Connected to Ground \ 接地	
6	USB_DP	WLAN USB2.0 DP Signal\ USB 差分正电压信号	
7	USB_DM	WLAN USB2.0 DM Signal\ USB 差分负电压信号	
8	VDD33	3.3V input\ 3.3V 供电输入	3.3V
9	VDD33	3.3V input\ 3.3V 供电输入	3.3V
10~16	GND	Connected to Ground \ 接地	

6. Product Pictures (参考图片)

模组料号	正视图	背视图	备注
002.029.0001190			RTL8822CU-CG 芯片 带屏蔽罩 带 IPEX

丝印说明:

- (1) 红色方框内的字符为产品 PCB 型号;
- (2) 黄色方框内的字符为产品周期号;
- (3) 其他为非关键字符, 无须管控。

7. Key Materials (关键物料)

序号	关键件名称	型号	规格/材料	备注
1	集成电路	RTL8822CU-CG	QFN56	
2	PCB	SKI.WB822CU.5	FR-4, 4LAY	
3	晶体振荡器	PF4040M00012T2115138	40MHz	
4	双工器	SLFD18-2R450G-06T		

8. General Requirements (一般要求)

No.	Feature	Description
8-1	Operation Voltage\ 工作电压范围	3.3V+/-0.3
8-2	Current Consumption\ 最大电流	<1000mA
8-3	Ripple\ 波纹	≤120mV
8-4	Operation Temperature\ 工作温度范围	0°C to +40°C
8-5	Antenna Type\ 天线类型	External antenna\ 外置天线
8-6	USB	High Speed USB 2.0 Interface\ 高速 USB2.0 接口
8-7	Storage Temperature\ 存储温度	-40°C to +125°C

*纹波：定义是主板给模组供电处的纹波要求

特别说明：模组 **Chip_Enable** 以及电源 **Power off** 须满足如下要求：

1、For CHIP_EN

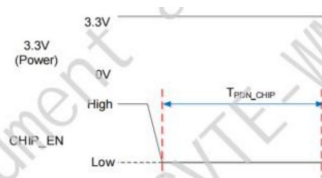


Fig 3.2 USB Power OFF Sequence

	Min.	Typical	Max.	Unit	Description
T _{PDN_CHIP}	10	100	X	ms	CHIP_EN keep low duration

Table 3.2 USB Power off timing parameters

CHIP_EN can externally shutdown RT_8822CU when CHIP_EN is pulled low. The keeping low duration must be more than T_{PDN_CHIP}

2、For 3.3V Platform

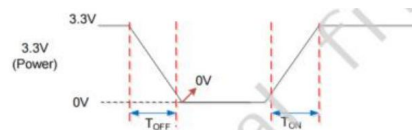


Fig 3.3 Power OFF Sequence of 3.3V platform

Symbol	Min	Typical	Max	Unit	Description
T _{OFF}	5	--	--	ms	Measure point start on 100% Measure point end on 0% (must be 0V)
T _{ON}	0.5	1.5	5	ms	Measure point start on 0% (must be 0V) Measure point end on 100%

Table 3.3 Power Off Timing Parameters of 3.3V platform

9. Electrical Characteristics（电气特性）

除非另有说明，电气规范试验都在下列条件下进行：

环境条件温度：25℃±5℃；

电源电压：模块输入电压 3.3V+/-0.3；

The Test for electrical specification was performed under the following condition unless otherwise specified:

Ambient condition Temperature :25℃ ± 5℃；

Power supply voltages: 3.3V+/-0.3 input power at the Module;

9.1 IEEE 802.11b Section(2.4GHz)

Items	Contents				
Specification	IEEE802.11b				
Mode	CCK				
Channel	CH1 to CH13				
Data rate	1, 2, 5.5, 11Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels(Calibrated)					
1) For antenna port (CCK 11M)	15	17	19	dBm	
2. Spectrum Mask @ target power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3 Constellation Error(EVM)@ target power					
1) 1Mbps	-	-	-10	dB	
2) 2Mbps	-	-	-10	dB	
3) 5.5Mbps	-	-	-10	dB	
4) 11Mbps	-	-	-10	dB	
4. Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity (each chain)					
1) 1Mbps (FER ≤8%)	-98	-	-83	dBm	
2) 2Mbps (FER ≤8%)	-	-	-80	dBm	
3) 5.5Mbps (FER ≤8%)	-	-	-79	dBm	
4) 11Mbps (FER ≤8%)	-89	-	-76	dBm	
6 Maximum Input Level (FER ≤8%)	-10	-	-	dBm	

9.2 IEEE 802.11g Section(2.4GHz)

Items	Contents				
Specification	IEEE802.11g				
Mode	OFDM				
Channel	CH1 to CH13				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) For antenna port (54M)	13	15	17	dBm	
2. Spectrum Mask @ target power					
1) at fc +/-11MHz	-	-	-20	dBm	
2) at fc +/-20MHz	-	-	-28	dBm	
3) at fc > +/-30MHz	-	-	-40	dBm	
3 Constellation Error(EVM)@ target power					
1) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4 Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity (each chain)					
1) 6Mbps (PER ≤ 10%)	-93	-	-85	dBm	
2) 9Mbps (PER ≤ 10%)	-	-	-84	dBm	
3) 12Mbps (PER ≤ 10%)	-	-	-82	dBm	
4) 18Mbps (PER ≤ 10%)	-	-	-80	dBm	
5) 24Mbps (PER ≤ 10%)	-	-	-77	dBm	
6) 36Mbps (PER ≤ 10%)	-	-	-73	dBm	
7) 48Mbps (PER ≤ 10%)	-	-	-69	dBm	
8) 54Mbps (PER ≤ 10%)	-76	-	-65	dBm	
6 Maximum Input Level (PER ≤ 10%)	-20	-	-	dBm	

9.3 IEEE 802.11n Section(2.4GHz)

Items	Contents					
Specification	IEEE802.11n HT20/HT40@2.4GHz					
Mode	OFDM					
Channel	HT20:CH1 to CH13 HT40:CH3 to CH11					
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7					
TX Characteristics	Min.	Typ.	Max.	Unit		
1. Power Levels						
1) For antenna port (MCS7)	12	14	16	dBm		
2. Spectrum Mask @ target power						
1) at fc +/-11MHz	-	-	-20	dBm		
2) at fc +/-20MHz	-	-	-28	dBm		
3) at fc > +/-30MHz	-	-	-45	dBm		
3. Constellation Error(EVM)@ target power						
1) MCS0	-	-	-5	dB		
2) MCS1	-	-	-10	dB		
3) MCS2	-	-	-13	dB		
4) MCS3	-	-	-16	dB		
5) MCS4	-	-	-19	dB		
6) MCS5	-	-	-22	dB		
7) MCS6	-	-	-25	dB		
8) MCS7	-	-	-28	dB		
4. Frequency Error	-20	-	20	ppm		
RX Characteristics	Min.	Typ.	Max.	Unit		
5. Minimum Input Level Sensitivity (each chain)	HT20	HT40		HT20	HT40	
1) MCS0 (PER ≤10%)	-93	-90	-	-82	-79	dBm
2) MCS1 (PER ≤10%)	-	-	-	-79	-76	dBm
3) MCS2 (PER ≤10%)	-	-	-	-77	-74	dBm
4) MCS3 (PER ≤10%)	-	-	-	-74	-71	dBm
5) MCS4 (PER ≤10%)	-	-	-	-70	-67	dBm
6) MCS5 (PER ≤10%)	-	-	-	-66	-63	dBm
7) MCS6 (PER ≤10%)	-	-	-	-65	-62	dBm
8) MCS7 (PER ≤10%)	-74	-71	-	-64	-61	dBm
7. Maximum Input Level (PER ≤10%)	-20	-	-	-	-	dBm

9.4 IEEE 802.11a Section(5GHz)

Items	Contents				
Specification	IEEE802.11a				
Mode	OFDM				
Channel	CH36 to CH165				
Data rate (MCS index)	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels (Calibrated)					
1) For antenna port	12	14	16	dBm	
2. Spectrum Mask @target power					
1) at fc +/-11MHz	-	-	-20	dBm	
2) at fc +/-20MHz	-	-	-28	dBm	
3) at fc > +/-30MHz	-	-	-40	dBm	
3. Constellation Error(EVM)@ target power					
1) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4 Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity (each chain)					
1) 6Mbps (PER ≤ 10%)	-	-	-82	dBm	
2) 9Mbps (PER ≤ 10%)	-	-	-81	dBm	
3) 12Mbps (PER ≤ 10%)	-	-	-79	dBm	
4) 18Mbps (PER ≤ 10%)	-	-	-77	dBm	
5) 24Mbps (PER ≤ 10%)	-	-	-74	dBm	
6) 36Mbps (PER ≤ 10%)	-	-	-70	dBm	
7) 48Mbps (PER ≤ 10%)	-	-	-66	dBm	
8) 54Mbps (PER ≤ 10%)	-	-	-65	dBm	
6. Maximum Input Level (PER ≤ 10%)	-30	-	-	dBm	

9.5 IEEE 802.11n Section(5GHz)

Items	Contents
Specification	IEEE802.11n HT20/HT40 @ 5GHz

Mode	OFDM					
Channel	HT20:CH36 to CH165 HT40:CH38 to CH163					
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7					
TX Characteristics	Min.	Typ.	Max.	Unit		
1. Power Levels (Calibrated)						
1) For antenna port (MCS0~MCS7)	12	14	16	dBm		
2. Spectrum Mask @target power						
1) at fc +/-11MHz	-	-	-20	dBr		
2) at fc +/-20MHz	-	-	-28	dBr		
3) at fc > +/-30MHz	-	-	-45	dBr		
3. Constellation Error(EVM)@ target power						
1) MCS0	-	-	-5	dB		
2) MCS1	-	-	-10	dB		
3) MCS2	-	-	-13	dB		
4) MCS3	-	-	-16	dB		
5) MCS4	-	-	-19	dB		
6) MCS5	-	-	-22	dB		
7) MCS6	-	-	-25	dB		
8) MCS7	-	-	-28	dB		
4. Frequency Error	-20	-	20	ppm		
RX Characteristics	Min.	Typ.	Max.	Unit		
5. Minimum Input Level Sensitivity (each chain)	HT20	HT40		HT20	HT40	
1) MCS0 (PER ≤ 10%)	-	-	-	-82	-79	dBm
2) MCS1 (PER ≤ 10%)	-	-	-	-79	-76	dBm
3) MCS2 (PER ≤ 10%)	-	-	-	-77	-74	dBm
4) MCS3 (PER ≤ 10%)	-	-	-	-74	-71	dBm
5) MCS4 (PER ≤ 10%)	-	-	-	-70	-67	dBm
6) MCS5 (PER ≤ 10%)	-	-	-	-66	-63	dBm
7) MCS6 (PER ≤ 10%)	-	-	-	-65	-62	dBm
8) MCS7 (PER ≤ 10%)	-	-	-	-64	-61	dBm
6. Maximum Input Level (PER ≤ 10%)	-30	-	-	-	-	dBm

9.6 IEEE 802.11ac Section(5GHz)

Items	Contents
Specification	IEEE802.11ac
Mode	BPSK, QPSK, 16QAM, 64QAM, 256QAM and OFDM
Channel	CH36 to CH165 VHT20 CH38 to CH163 VHT40 CH42 to CH157 VHT80

Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9					
TX Characteristics	Min.	Typ.	Max.			Unit
1. Power Levels (Calibrated)						
1) For antenna port (MCS0~MCS9)	11	13	15			dBm
2. Spectrum Mask @VHT20/VHT40 target power						
1) at fc +/-11MHz/21MHz/41MHz	-	-	-20			dBr
2) at fc +/-20MHz/40MHz/80MHz	-	-	-28			dBr
3) at fc +/-30MHz/60MHz/120MHz	-	-	-40			dBr
3. Constellation Error(EVM)@ target power						
1) MCS0	-	-	-5			dB
2) MCS1	-	-	-10			dB
3) MCS2	-	-	-13			dB
4) MCS3	-	-	-16			dB
5) MCS4	-	-	-19			dB
6) MCS5	-	-	-22			dB
7) MCS6	-	-	-25			dB
8) MCS7	-	-	-27			dB
9) MCS8	-	-	-30			dB
10) MCS9	-	-	-32			dB
4. Frequency Error	-20	-	20			ppm
RX Characteristics	Min.	Typ.	Max.			Unit
5. Minimum Input Level Sensitivity (each chain)			VHT20	VHT40	VHT80	
1) MCS0 (PER ≤ 10%)	-	-	-82	-79	-76	dBm
2) MCS1 (PER ≤ 10%)	-	-	-79	-76	-73	dBm
3) MCS2 (PER ≤ 10%)	-	-	-77	-74	-71	dBm
4) MCS3 (PER ≤ 10%)	-	-	-74	-71	-68	dBm
5) MCS4 (PER ≤ 10%)	-	-	-70	-67	-64	dBm
6) MCS5 (PER ≤ 10%)	-	-	-66	-63	-60	dBm
7) MCS6 (PER ≤ 10%)	-	-	-65	-62	-59	dBm
8) MCS7 (PER ≤ 10%)	-	-	-64	-61	-58	dBm
9) MCS8 (PER ≤ 10%)	-	-	-59	-57	-53	dBm
10) MCS9 (PER ≤ 10%)	-	-	-56	-53	-51	dBm
6. Maximum Input Level (PER ≤ 10%)	-30		-	-		dBm

9.7 Bluetooth Section

Items	Contents
Specification	BT2.1+BR/EDR/4.2
Mode	FHSS,GFSK,DPSK,DQPSK
Number of Channel	79 Channels

Frequency Band	2.402 GHz ~2.480GHz				
	Min.	Typ.	Max.	Unit	Remark
1. Output Power	-	4	-	dBm	
2. Gain step	-	1	-	dB	
3. Receiver sensitivity (BER $\leq 0.1\%$)	-	-93.5	-80	dBm	
4. Maximum usable signal (BER $\leq 0.1\%$)	-	-5	-		
5. C/I co-channel (BER<0.1%)	-	4	11	dB	
6. C/I 1MHz (BER<0.1%)	-	-14	0	dB	
7. C/I 2MHz (BER<0.1%)	-	-42	-30	dB	
8. C/I ≥ 3 MHz (BER<0.1%)	-	-49	-40	dB	
9. C/I Image channel (BER<0.1%)	-	-25	-9	dB	
10. C/I Image 1MHz (BER<0.1%)	-	-50	-20	dB	
11. Inter-modulation	-	-13	-	dB	
12. Out-of-band blocking					
1). 30MHz to 2000MHz	-10	-	-	dBm	
2). 2000MHz to 2399MHz	-27	-	-	dBm	
3). 2498MHz to 3000MHz	-27	-	-	dBm	
4). 3000MHz to 12.75GHz	-10	-	-	dBm	
13. Modulation characteristics					
1). Δf_{1avg}	140	157	175	KHz	
2). Δf_{2max} (For at least 99.9% of all Δf_{2max})	115	140	-	KHz	
3). $\Delta f_{1avg} / \Delta f_{2avg}$	0.8	0.98	-	KHz	
14. ICFT	-75	± 20	+75	KHz	
15. Carrier frequency drift					
1). One slot packet (DH1)	-25	± 15	+25	KHz	
2). Two slot packet (DH3)	-40	± 15	+40	KHz	
3). Five slot packet (DH5)	-40	± 15	+40	KHz	
4). Max drift rate	-	6	20	KHz/50us	
16. TX output spectrum(20dB bandwidth)	-	922	1000	KHz	
17. In-Band spurious emission					
1). ± 2 MHz offset	-	-45	-20	dBm	
2). ± 3 MHz offset	-	-48	-40	dBm	
3). $> \pm 3$ MHz offset	-	-48	-40	dBm	

10. Mechanical, Environmental and Reliability Tests

(机械、环境和可靠性测试)

Test Items		Test Conditions	Qty	Criteria Condition
10-1	Drop test	The packed samples was tested at below condition: Drop height: 760mm(0.5~9.5kg) 610mm(9.5~18.5kg) Drop time: 1x corner, 3x edge and 6x face.	1xBox	After test, the outer box and inner box will not been broken by appearance visual inspection, and the products should be ok.
10-2	Vibration test	X-Y-Z direction, first Frequency changing from 10Hz to 30Hz to 10Hz, amplitude 2.0mm, 5 times vibrations, 5x times vibration.	1xBox	After test, the outer box and inner box will not been broken by appearance visual inspection and the products should be ok.
10-3	Soldering ability test (Only for SKI module)	Soldering temperature: 245±5℃ Soldering duration: 3±0.5S	3	1. After soldering, the soldered area must be covered by a smooth bright solder layer, some deficiencies such as a small amount of the pinhole, not wetting are allowed, but the deficiencies can not be in the same place; 2. At least 90% of soldered area shall be covered continuously by the soldering material.
10-4	High Temperature and Humidity Operation Test	Leave samples in 60℃, 90% RH @ 24 hours	4	After test, the products appearance, power, EVM and frequency error functional parameter shall be satisfied with the test specification.
10-5	Low Temperature Operation Test	Leave samples in -15℃ @24 hours	4	After test, the products appearance, power, EVM and frequency error functional parameter shall be satisfied with the test specification.

10-6	High Temperature and Humidity Start Test	Leave samples in 60℃, 90% RH for 4x hours	4	After test, power on and off the samples for 3x tiems, the samples should be able to start normally
10-7	Low temperature start test	Leave samples in -15℃ for 4x hours	4	After test, power on and off the samples for 3x tiems, the samples should be able to start normally
10-8	High Temperature and Humidity Storage Test	Leave samples in 85℃, 95% RH @ 48 hours	4	After test, the products appearance, power, EVM and frequency error functional parameter shall be satisfied with the test specification.
10-9	Low Temperature Storage Test	Leave samples in -40℃, @48 hours	4	After test, the products appearance, power, EVM and frequency error functional parameter shall be satisfied with the test specification.
10-10	Thermal Shock Test	-40~85℃, dwell time: 30min, 50cycles	4	After test, the products appearance, power, EVM and frequency error functional parameter shall be satisfied with the test specification.
10-11	Aging Test	60℃, 120Hrs	10	The products at high temperature for a long time can continuous work normally
10-12	Salt spray test	NSS,35℃,PH:6.5~7.2, 24H	2	The Sample shall has no minor or major defects, such as physical damage, crack, corrosion, deformation etc;
10-13	ESD	Discharge voltage: 1kV C: 150pF Discharge resistance: 330Ω Positive10 times 1 time for each second	3	The products can recoverable smoothly after ESD test.

11. Package（包装）

（1）托盘或者编带尺寸示意图

托盘尺寸示意图

编带尺寸示意图

（2）托盘或编带方向

托盘方向示意图

编带方向示意图

（3）外箱尺寸

（4）包装数量

每盘包装 **xxpcs**，每箱装 **xx** 盘，每箱数量=**xx*xx=xxxxpcs**

12. Storage and Production（存储、生产）

12.1 Storage requirements（存储要求）

本产品的湿敏特性为 4 级（MSL4），出厂时以真空密封袋包装。产品搬运、存储、加工过程必须遵循 IPC/JEDEC J-STD-033。在环境温度低于 40 摄氏度，空气湿度小于 90%的情况下，真空包装下产品可存放 12 个月。在产品存放有效期内，如发现真空包装有漏气、湿敏卡变色达到烘烤标准、开封暴露时间超过 72H，需要烘烤后使用。

12.2 Production parameters（生产参数）

炉温最高不能超过 250℃，推荐是 240℃。

推荐 SMT 焊炉温曲线如下图所示。

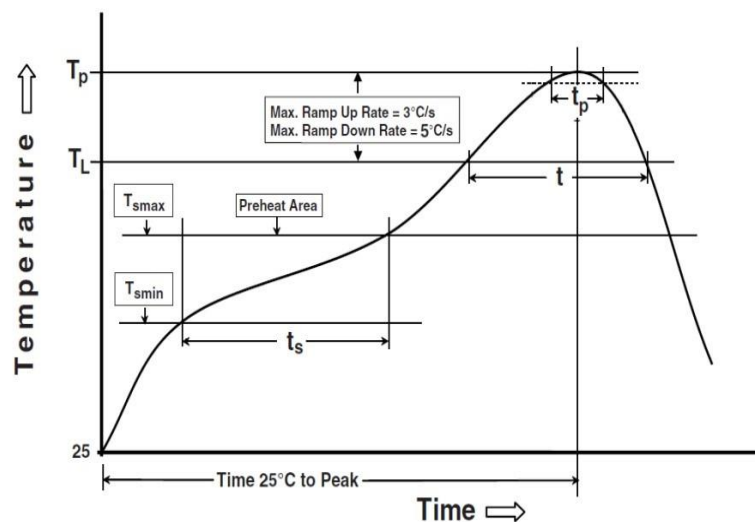


图 6-1 炉温曲线推荐图

表 16-2 炉温曲线参数

炉温参数	最小值	典型值	最大值	单位
预热区最低温度 Tsmin	150			℃
预热区最高温度 Tsmax			200	℃
预热上升时间 ts	80		120	s
回流焊区升温速率(TL 到 Tp)			3	℃/s
回流焊区低温 TL		220		℃
回流焊区峰值温度 Tp	235	240	250	℃
回流焊峰值温度时间 tp(Tp 波动 5℃ 范围)			30	s
回流焊区冷却降温速率 (Tp 到 TL)	-5	-3	-1	℃/s
回流时间 t	40		60	s

FCC Statement:

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 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 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.

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

List of applicable FCC rules

This module has been tested and found to comply with [part 15](#), [part 2](#) requirements for Modular Approval.

Antenna Placement Within the Host Platform

The module is tested for standalone mobile RF exposure use condition.

(1) The antenna must be installed such that 20 cm is maintained between the antenna and users,

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

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID 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 FCC authorization.

RF exposure considerations

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.

Antenna Type and Gain

The following antennas have been certified for use with this module.

Only antennas of the same type with equal or lower gain may also be used with this module.

Other types of antennas and/or higher gain antennas may require the additional authorization for operation.

Antenna Specification list below:

Antenna Type	Frequency Bands	Max. Antenna Gain (dBi)
Shrapnel Antenna (BT)	2.4GHz	1.72
PCB Antenna (WiFi)	2.4GHz	3.99
PCB Antenna (WiFi)	5GHz	4.94

End Product Labeling

When the module is installed in the host device, the FCC ID label must be visible through a window on the final device or it must be visible when an access panel, door or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “[Contains FCC ID: 2AR82-SKIWB822CU5](#)”. The FCC ID can be used only when all FCC compliance requirements are met.

The end product shall bear the following 15.19 statement: 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.

Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new certification.

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 be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are 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.

Important Note

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered

valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for reevaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

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 host integrator must follow the integration instructions provided in this document and ensure that the composite-system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB 996369.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

The module complies with FCC Part 15.247 / Part 15.407 and apply for Single module approval.

Trace antenna designs: Not applicable.

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.