

保密等级：机密

SPECIFICATION

产品规格书

SKI.WB822CU.2 A21376

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

Bluetooth 2.1/3.0/4.2/5.0

Approved by Shikun		
Checked by 审核	Rechecked by 复审	Approved by 批准
周钊	吴庭能	吴庭能

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REVISION HISTORY

VERSION	DATE	BOARD ID	PAGE	DESCRIPTION	AUTHOR
V0	2021.09.22	SKI.WB822CU.2 A21376	All	First Issued.	Zhouz
V1.0	2021.12.11	SKI.WB822CU.2 A21376	All	Update physical picture	Zhouz
V1.1	2022.8.11	SKI.WB822CU.2 A21376	All	Update the pin definition	Zhouz
V1.2	2022.10.27	SKI.WB822CU.2 A21376	1/4/ 17/18	Update Description	Zhouz
V1.3	2023.06.01	SKI.WB822CU.2 A21376	8	增加Chip Enable 及 Power off需求说明	Zhouz
V1.4	2023.09.15	SKI.WB822CU.2 A21376	8	Add Digital IO Features	Zhouz
V1.5	2023.12.28	SKI.WB822CU.2 A21376	3/4	Update picture	Zhouz

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1. Introduction (简介)

SKI.WB822CU.2 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-CG provides a complete solution for a high-performance integrated wireless and Bluetooth device. This documentation describes the engineering requirements specification.

SKI.WB822CU.2 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-CG 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	IEEE Std. 802.11a
	IEEE Std. 802.11b
	IEEE Std. 802.11g
	IEEE Std. 802.11n
	IEEE Std. 802.11ac
	Bluetooth 2.1/3.0/4.2/5.0
Chip Solution 芯片方案	RTL8822CU-CG
Bandwidth 带宽	20/40/80M
Band 波段	2.4/5GHz
Dimensions 尺寸	27mm × 18mm × 3mm

型号	安装方式	支持标准	数据速率 (MAX)	频段	天线接口	备注
SKI.WB822CU.2	SMD	IEEE 802.11a/b/g/n/ac+ Bluetooth 2.1/3.0/4.2/5.0	866.66 Mbps	2.4/5GHz	Ipex 插座	27mm × 18mm × 3mm

Diagram (结构框图)

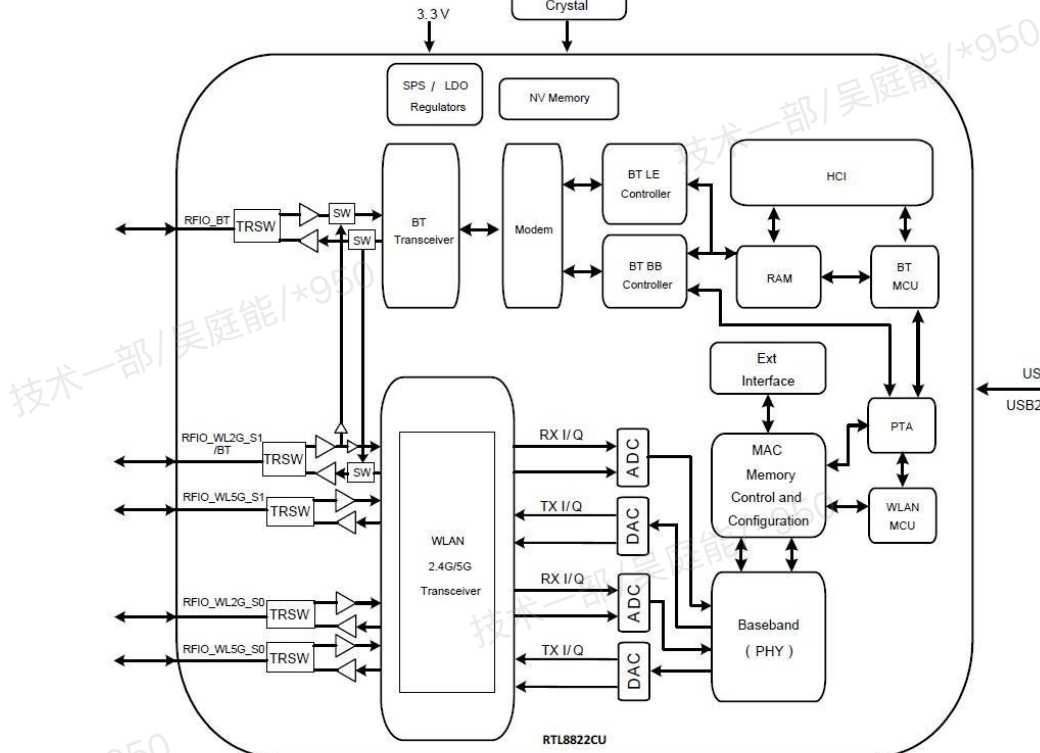
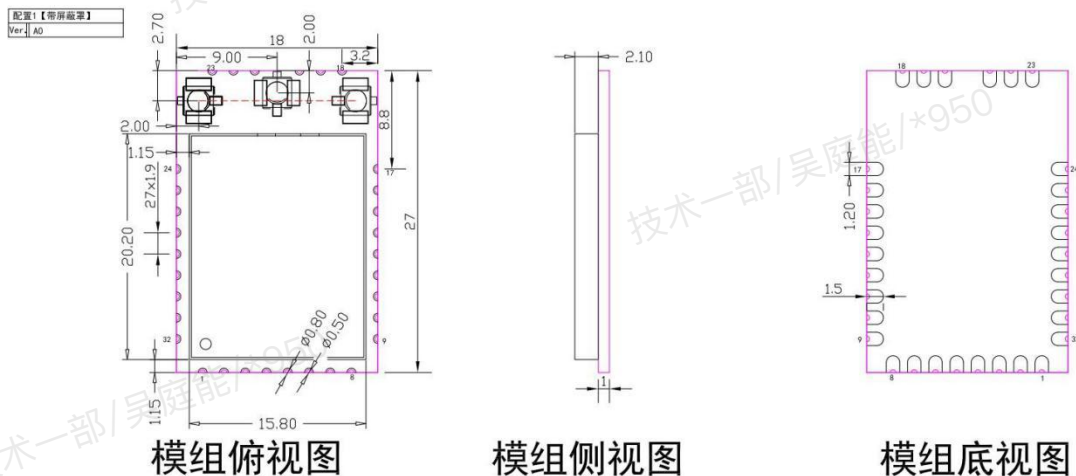


Figure 1. Dual-Band MIMO 2x2 Solution with Integrated Bluetooth Controller Solution

Figure 1 SKI.WB822CU.2 Block Diagram

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



5. Pin Definition (引脚定义)



PIN	SYMBOL	DESCRIPTION
1	NC	No connect
2	NC	No connect
3	NC	No connect
4	NC	No connect
5	GND	Ground\接地
6	WL_USB_DP	WLAN USB2.0 DP Signal\ USB 差分正电压信号
7	WL_USB_DM	WLAN USB2.0 DM Signal\ USB 差分负电压信号
8	GND	Ground\接地
9	NC	No connect
10	NC	No connect
11	GND	Ground\接地
12	NC	No connect\BT Ant

13	GND	Ground\接地
14	BT_WAKE_Host	BT Wake Host\ BT 从机唤醒主机, 低电平有效
15	Host_WAKE_BT	Host Wake BT\ 主机唤醒BT, 低电平有效
16	NC	No connect
17	SUS_CLK	No connect\External 32K or RTC clock input
18	GND	Ground\接地
19	NC	No connect
20	GND	Ground\接地
21	GND	Ground\接地
22	NC	No connect
23	GND	Ground\接地
24	GND	Ground\接地
25	GND	Ground\接地
26	WL_WAKE_Host	WIFI Device Wake Host\ WIFI 唤醒主机, 低电平有效
27	NC	No connect
28	CHIP_EN	Chip Enable, H Active\ 芯片使能, 高电平有效, 默认高电平
29	GND	Ground\接地
30	VDD33	3.3V input\ 3.3V 供电输入
31	GPIO5	General I/O interface
32	GND	Ground\接地

Digital IO Pin DC Characteristics

Table 13. 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

备注: 本产品默认配置为三天线, 邮票孔输出, 兼容双天线设计, 以及RF 邮票孔输出配置

6. Product Pictures (实物图片)

模组料号	正视图	背视图	备注
002.029.0000927			使用8822CU-CG芯片 三天线配置 有屏蔽罩 有 Ipex

产品铭牌内容如下



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	RTK
2	PCB	SKI.WB822CU.2	FR-4,4LAY	
3	晶体振荡器	40MHz,±10ppm,SMD3225	40MHz	JWT,MDH,TXC
4	双工器	SLFD18-2R450G-06T		Sunlord

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

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

1、For CHIP_EN

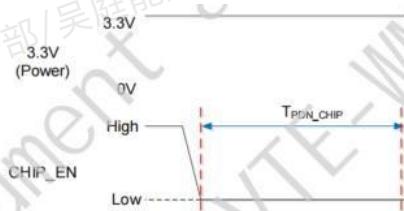


Fig 3.2 USB Power OFF Sequence

	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 RTL8822CU when CHIP_EN is pulled low. The keeping low duration must be more than T_{PDN_CHIP}

2、For 3.3V Platform

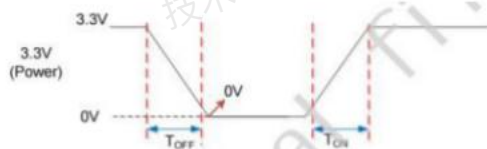


Fig 3.3 Power OFF Sequence of 3.3V platform

Symbol	Min	Typical	Max	Unit
T _{OFF}	5	--	--	ms
T _{ON}	0.5	1.5	5	ms

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

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 Each antenna port	15	17	19	dBm	
2. Spectrum Mask @ target power					
1) $f_c \pm 11\text{MHz}$ to $\pm 22\text{MHz}$	-	-	-30	dBr	
2) $f_c > \pm 22\text{MHz}$	-	-	-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	-25	-	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity (each chain)					
1) 1Mbps ($\text{FER} \leq 8\%$)	-	-	-83	dBm	
2) 2Mbps ($\text{FER} \leq 8\%$)	-	-	-80	dBm	
3) 5.5Mbps ($\text{FER} \leq 8\%$)	-	-	-79	dBm	
4) 11Mbps ($\text{FER} \leq 8\%$)	-	-	-76	dBm	
6 Maximum Input Level ($\text{FER} \leq 8\%$)	-10	-	-	dBm	

9.2 IEEE 802.11g Section

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 Each antenna port	13	15	17	dBm	
2. Spectrum Mask @ target power					
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dBr	
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dBr	
3) at $f_c > \pm 30\text{MHz}$	-	-	-40	dBr	
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	-25	-	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity (each chain)					
1) 6Mbps (PER $\leq 10\%$)	-	-	-85	dBm	
2) 9Mbps (PER $\leq 10\%$)	-	-	-84	dBm	
3) 12Mbps (PER $\leq 10\%$)	-	-	-82	dBm	
4) 18Mbps (PER $\leq 10\%$)	-	-	-80	dBm	
5) 24Mbps (PER $\leq 10\%$)	-	-	-77	dBm	
6) 36Mbps (PER $\leq 10\%$)	-	-	-73	dBm	
7) 48Mbps (PER $\leq 10\%$)	-	-	-69	dBm	
8) 54Mbps (PER $\leq 10\%$)	-	-	-65	dBm	
6 Maximum Input Level (PER $\leq 10\%$)	-20	-	-	dBm	

9.3 IEEE 802.11n HT20 Section(2.4GHz)

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4GHz				
Mode	OFDM				
Channel	CH1 to CH13				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Levels					
1) For Each antenna port	12	14	16	dBm	
3. Spectrum Mask @ target power					
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dBm	
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dBm	
3) at $f_c > \pm 30\text{MHz}$	-	-	-45	dBm	
4. 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	
5. Frequency Error	-25	-	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
6. Minimum Input Level Sensitivity (each chain)					
1) MCS0 (PER $\leq 10\%$)	-	-	-82	dBm	
2) MCS1 (PER $\leq 10\%$)	-	-	-79	dBm	
3) MCS2 (PER $\leq 10\%$)	-	-	-77	dBm	
4) MCS3 (PER $\leq 10\%$)	-	-	-74	dBm	
5) MCS4 (PER $\leq 10\%$)	-	-	-70	dBm	
6) MCS5 (PER $\leq 10\%$)	-	-	-66	dBm	
7) MCS6 (PER $\leq 10\%$)	-	-	-65	dBm	
8) MCS7 (PER $\leq 10\%$)	-	-	-64	dBm	
7. Maximum Input Level (PER $\leq 10\%$)	-20	-	-	dBm	

9.4 IEEE 802.11n HT40 Section(2.4GHz)

Items	Contents				
Specification	IEEE802.11n HT40 @ 2.4GHz				
Mode	OFDM				
Channel	CH3 to CH11				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
	Min.	Typ.	Max.	Unit	Remark
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels (Calibrated)					
1) For Each antenna port	12	14	16	dBm	
2. Spectrum Mask @target power					
1) at fc +/-22MHz	-	-	-20	dBr	
2) at fc +/-40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz	-	-	-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	-25	-	25	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	

5. Minimum Input Level Sensitivity (each chain)					
1) MCS0 (PER $\leq 10\%$)	-	-	-79	dBm	
2) MCS1 (PER $\leq 10\%$)	-	-	-76	dBm	
3) MCS2 (PER $\leq 10\%$)	-	-	-74	dBm	
4) MCS3 (PER $\leq 10\%$)	-	-	-71	dBm	
5) MCS4 (PER $\leq 10\%$)	-	-	-67	dBm	
6) MCS5 (PER $\leq 10\%$)	-	-	-63	dBm	
7) MCS6 (PER $\leq 10\%$)	-	-	-62	dBm	
8) MCS7 (PER $\leq 10\%$)	-	-	-61	dBm	
6. Maximum Input Level (PER $\leq 10\%$)	-20	-	-	dBm	

9.5 IEEE 802.11a Section

Items	Contents				
Specification	IEEE802.11a				
Mode	OFDM				
Channel	CH36 to CH165				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) For Each antenna port	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	-	-	-40	dBr	
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 $\leq 10\%$)	-	-	-82	dBm	
2) 9Mbps (PER $\leq 10\%$)	-	-	-81	dBm	
3) 12Mbps (PER $\leq 10\%$)	-	-	-79	dBm	
4) 18Mbps (PER $\leq 10\%$)	-	-	-77	dBm	

5) 24Mbps (PER $\leq 10\%$)	-	-	-74	dBm	
6) 36Mbps (PER $\leq 10\%$)	-	-	-70	dBm	
7) 48Mbps (PER $\leq 10\%$)	-	-	-66	dBm	
8) 54Mbps (PER $\leq 10\%$)	-	-	-65	dBm	
6 Maximum Input Level (PER $\leq 10\%$)	-30	-	-	dBm	

9.6 IEEE 802.11n HT20 Section(5GHz)

Items	Contents				
Specification	EEE802.11n HT20 @ 5GHz				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH36 to CH165				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
TX Characteristics	Min.	Typ.	Max.	Unit	
2. Power Levels					
1) For Each antenna port	12	14	16	dBm	
3. Spectrum Mask @ target power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
4. 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	
5. Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
7. Minimum Input Level Sensitivity (each chain)					
1) MCS0 (PER $\leq 10\%$)	-	-	-82	dBm	
2) MCS1 (PER $\leq 10\%$)	-	-	-79	dBm	
3) MCS2 (PER $\leq 10\%$)	-	-	-77	dBm	
4) MCS3 (PER $\leq 10\%$)	-	-	-74	dBm	
5) MCS4 (PER $\leq 10\%$)	-	-	-70	dBm	
6) MCS5 (PER $\leq 10\%$)	-	-	-66	dBm	
7) MCS6 (PER $\leq 10\%$)	-	-	-65	dBm	
8) MCS7 (PER $\leq 10\%$)	-	-	-64	dBm	
7. Maximum Input Level (PER $\leq 10\%$)	-30	-	-	dBm	

9.7 IEEE 802.11n HT40 Section(5GHz)

Items	Contents				
Specification	IEEE802.11n HT40 @ 5GHz				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH38 to CH163				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7				
	Min.	Typ.	Max.	Unit	Remark
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels (Calibrated)					
1) For Each antenna port	12	14	16	dBm	
2. Spectrum Mask @target power					
1) at fc +/-21MHz	-	-	-20	dBr	
2) at fc +/-40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz	-	-	-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	
6. Minimum Input Level Sensitivity (each chain)					
1) MCS0 (PER ≤10%)	-	-	-79	dBm	
2) MCS1 (PER ≤10%)	-	-	-76	dBm	
3) MCS2 (PER ≤10%)	-	-	-74	dBm	
4) MCS3 (PER ≤10%)	-	-	-71	dBm	
5) MCS4 (PER ≤10%)	-	-	-67	dBm	
6) MCS5 (PER ≤10%)	-	-	-63	dBm	
7) MCS6 (PER ≤10%)	-	-	-62	dBm	
8) MCS7 (PER ≤10%)	-	-	-61	dBm	
6. Maximum Input Level (PER ≤10%)	-30	-	-	dBm	

9.8 IEEE 802.11ac Section

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					
	Min.	Typ.	Max.		Unit	Remark
TX Characteristics	Min.	Typ.	Max.		Unit	
1. Power Levels (Calibrated)						
1) For Each antenna port	11	13	15		dBm	
2. Spectrum Mask @VHT20/VHT40/VHT80 target power						
1) at fc +/-11MHz/21MHz/41MHz	-	-	-20		dB	
2) at fc +/-20MHz/40MHz/80MHz	-	-	-28		dB	
3) at fc +/-30MHz/60MHz/120MHz	-	-	-40		dB	
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	
7. Minimum Input Level Sensitivity (each chain)			VHT 20	VHT 40	VHT 80	
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	-56	-53	dBm
10) MCS9 (PER ≤10%)			-57	-54	-51	dBm
6. Maximum Input Level (PER ≤10%)	-30	-	-			dBm

9.9 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	2	4	8	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 2).	-10	-	-	dBm	
2000MHz to 2399MHz3).	-27	-	-	dBm	
2498MHz to 3000MHz4).	-27	-	-	dBm	
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). ±2MHz offset	-	-45	-20	dBm	
2). ±3MHz offset	-	-48	-40	dBm	
3). >±3MHz offset	-	-48	-40	dBm	

10. Mechanical, Environmental and Reliability Tests

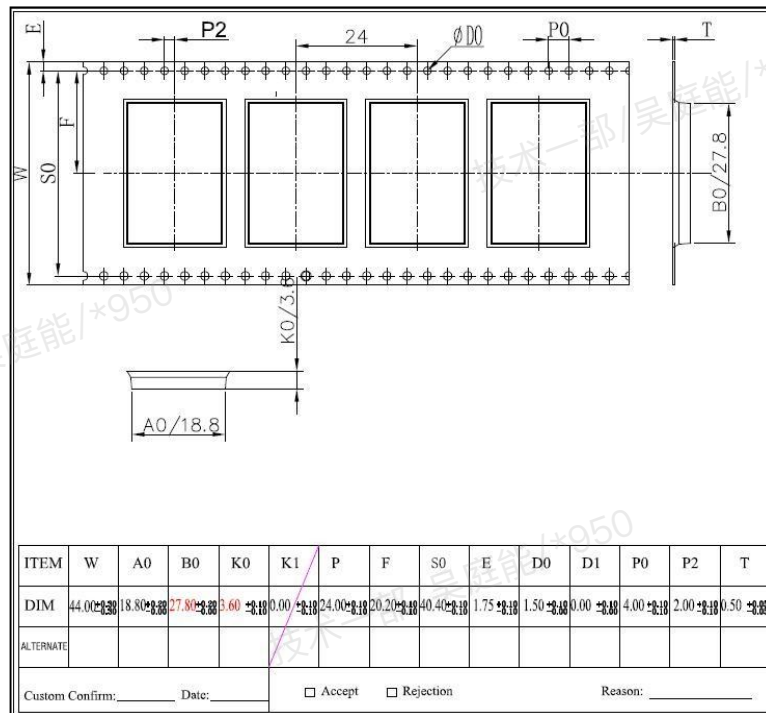
(机械、环境和可靠性测试)

Test Items		Test Conditions	Qty	Criteria Condition
10-1	Drop test	The packed samples within 100Kg can be tested Drop height: Face Side: 800/600/450mm Edge line: 600/450/350mm Drop time: 1 each Face and edge.	1xBox	After drop test, the outer box and inner box will not be broken by appearance visual inspection.
10-2	Vibration test	X-Y-Z direction, first Frequency changing from 10Hz to 30Hz to 10Hz, amplitude 0.75mm, 5 times vibrations, then frequency Changing from 30Hz to 55 Hz to 30 Hz, amplitude 0.15mm, 5 time vibration.	3	After test, the Appearance, Power EVM and Frequency error shall be satisfied with the specification.
10-3	Impact test	Impact acceleration: 50m/sec ² ; Impact duration: 16ms; Impact times: 1000.	3	After test, the Appearance, Power EVM and Frequency error shall be satisfied with the specification.
10-4	Soldering ability test	Soldering temperature: 235±5℃ Soldering duration: 2±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.
10-5	Humidity test	Leave samples in $40\pm3^{\circ}\text{C}$, 93% RH @ 96 hours	3	Leave samples in standard test condition for 2 hours then test, the Appearance, Power, EVM and Frequency error functional parameter shall be satisfied with the test specification.
10-6	High temperature load life test	Thermostat cabinet temperature: $55\pm5^{\circ}\text{C}$ Applied voltage: 110% rated voltage Working duration: 200 hour (Supply Voltage Cycle 23h power on, 1h power off)	60	After test, leave samples in standard condition for 1 hour and test, Power, EVM and Frequency error shall be satisfied with the test specification.
10-7	High temperature load test	Temperature: $55\pm5^{\circ}\text{C}$ Samples work for 16 hours	3	After test, the Appearance, Power, EVM and Frequency error shall be Satisfied with the test specification.
10-8	Low temperature storage test	Leave the samples in $-25\pm3^{\circ}\text{C}$ @24 hours	3	Leave samples in standard test condition for 2 hours then test, the Appearance, Power, EVM and Frequency error shall be satisfied with the test specification.
10-9	Low temperature load test	Leave samples in $-15\pm3^{\circ}\text{C}$ @ 2 hours, samples' function shall be normal, the let samples work for 1 hour	3	After test, leave the samples in standard condition and tested the Appearance, Power, EVM and Frequency error shall be satisfied with the test specification.
10-10	Temperature circle test	One cycle duration $-10\pm3^{\circ}\text{C}$ @3H $40\pm3^{\circ}\text{C}$ @3H Total cycle: 10x	3	After test, leave the samples in standard condition and tested Power EVM and Frequency error shall be qualified and all the characters shall be satisfied with the test specification.
10-11	Continuous TP test	Twice cycle duration $-10\pm3^{\circ}\text{C}$ @4H $+60\pm3^{\circ}\text{C}$ @4H, $+25$ @2H@2H	3	During test, There will not been appeared signal disconnection or interruption between DUT and AP.
10-12	ESD	Discharge voltage: 1kV C: 150pF Discharge resistance: 330Ω Positive 10 times 1 time for each second	3	The products can recoverable smoothly after ESD test.

11. Package (包装)

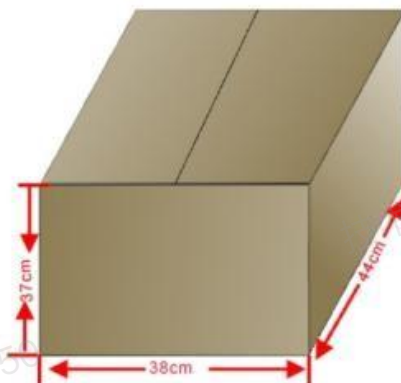
(1) 编带尺寸:



(2) 编带方向: (箭头代表编带走向)



(3) 包装示意图:



(4) 包装数量:

每盘包装 700pcs, 每箱装 7 盘, 每箱数量=700*7=4900pcs

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。

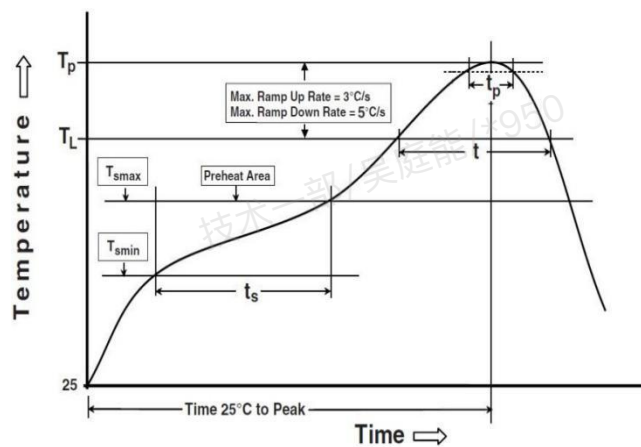


图 13-1 炉温曲线推荐图

表 13-2 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 $T_{\min}$	150			℃
预热区最高温度 $T_{\max}$			200	℃
预热上升时间 t_s	80		120	s
回流焊区升温速率(TL 到 T_p)			3	℃/s
回流焊区低温 T_L		220		℃
回流焊区峰值温度 T_p	235	240	250	℃
回流焊峰值温度时间 t_p (T_p 波动5℃范围)			30	s
回流焊区冷却降温速率 (T_p 到 T_L)	-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.

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.

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:

Original grant:

BT/BLE

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2402-2480	PCB Antenna	3

2.4GHz WIFI

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2412-2462	PCB Antenna	3
2	2412-2462	PCB Antenna	3

5GHz WIFI

Antenna No.	Frequency Band	Antenna Type	Max Antenna Gain (dBi)
1	5180-5825	PCB Antenna	3.5
2	5180-5825	PCB Antenna	3.5

C2PC:

BT/BLE

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2402-2480	Shrapnel Antenna	3.32

2.4GHz WIFI

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2412-2462	Shrapnel Antenna	4.58
2	2412-2462	Shrapnel Antenna	4.58

5GHz WIFI

Antenna No.	Frequency Band	Antenna Type	Max Antenna Gain (dBi)
1	5180-5825	Shrapnel Antenna	4.89
2	5180-5825	Shrapnel Antenna	4.89

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-SKIWB822CU2](#)”. 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

ISED Statement:

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe B est conforme à la norme canadienne ICES-003.

This device complies with Innovation, Science and Economic Development Canada's licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

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

Le présent appareil est conforme aux CNR d'Industrie 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, et*
- 2) *l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

RF Radiation Exposure Statement

This equipment complies with ISED 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.

Operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Déclaration d'exposition aux radiations

Cet appareil est conforme aux limites d'exposition aux rayonnements définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 centimètres entre le radiateur et votre corps.

Le fonctionnement dans la bande 5150-5250 MHz est uniquement destiné à une utilisation en intérieur afin de réduire le potentiel d'interférences nuisibles aux systèmes mobiles par satellite dans le même canal.

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 Canada authorization is no longer considered valid and the IC can not 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 cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considérée comme valide et IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

Required end product labeling

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: “[Contains IC: 24728-SKIWB822CU2](#)”.

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l'antenne peut être installée et utilisée à plus de 20 cm entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "[Contient des IC: 24728-SKIWB822CU2](#)".

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.

The following text, or an equivalent notice, that shall be displayed in a conspicuous location, either in the user manual or on the device, or both:

This device contains licence-exempt transmitter(s)/receiver(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.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

l'énoncé qui suit, ou l'équivalent, à un endroit bien en vue dans le manuel d'utilisation ou sur l'appareil, ou encore aux deux endroits :

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR 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 toute interférence, y compris toute interférence pouvant entraîner un fonctionnement indésirable du dispositif.*

Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

This radio transmitter has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

ANTENNE

Les antennes suivantes ont été certifiées pour une utilisation avec ce module; des antennes du même type à gain égal ou inférieur peuvent également être utilisées avec ce module. L'antenne doit être installée de telle sorte que 20 cm puissent être maintenus entre l'antenne et les utilisateurs.

Cet émetteur radio a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous, avec le gain maximal autorisé 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 l'utilisation avec cet appareil.

Antenna Specification list below:

Original:

BT/BLE

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2402-2480	PCB Antenna	3

2.4GHz WIFI

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2412-2462	PCB Antenna	3
2	2412-2462	PCB Antenna	3

5GHz WIFI

Antenna No.	Frequency Band	Antenna Type	Max Antenna Gain (dBi)
1	5180-5825	PCB Antenna	3.5

2	5180-5825	PCB Antenna	3.5
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Alternative:

BT/BLE

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2402-2480	Shrapnel Antenna	3.32

2.4GHz WIFI

Antenna	Frequency (MHz)	Antenna Type	Max Antenna Gain (dBi)
1	2412-2462	Shrapnel Antenna	4.58
2	2412-2462	Shrapnel Antenna	4.58

5GHz WIFI

Antenna No.	Frequency Band	Antenna Type	Max Antenna Gain (dBi)
1	5180-5825	Shrapnel Antenna	4.89
2	5180-5825	Shrapnel Antenna	4.89