保密等级：机密

SPECIFICATION

产品规格书

SKO.WB921A.2

IEEE 802.11b/g/n/a/ac/ax 2T2R USB WiFi Module

Integrated BT 2.1+EDR/4.2/5.2

Approved by Shikun		
Checked by 审核	Rechecked by 复审	Approved by 批准
		

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Comments 确认意见	Approved by 批准签字	Company's seal 盖章
Customer's Name:		

REVISION HISTORY.

VERSION	DATE	BOARD ID	PAGE	DESCRIPTION	AUTHOR
V0	2021.07.06	SKO.WB921A.2 A21201	All	First Issued.	Lee
V1	2021.10.12	SKO.WB921A.2 A21201	All	Modify Features, Electrical Characteristics and Package.	Lee

Content

1. Introduction（简介）

SKO.WB921A.2 module is based on MediaTek MT7921AU solution.

MT7921A is a highly integrated single chip which features a low power 2x2 11a/b/g/n/ac/ax dual-band Wi-Fi subsystem and a Bluetooth v5.2 subsystem, offering feature-rich wireless connectivity at high standards,and delivering reliable,cost-effective throughput from an extended distance.

MT7921AUN data rate up to 800Mbps with USB3.0.Optimized RF architecture and baseband algorithms provide superb performance and low power consumption. Intelligent MAC design deploys a high efficient offload engine,and hardware data processing accelerators which fully offloads Wi-Fi task of the host processor, MT7921A is designed to support standard based features in the areas of security, quality of service and international regulations, giving end users the greatest performance any time and in any circumstance.This documentation describes the engineering requirements specification.

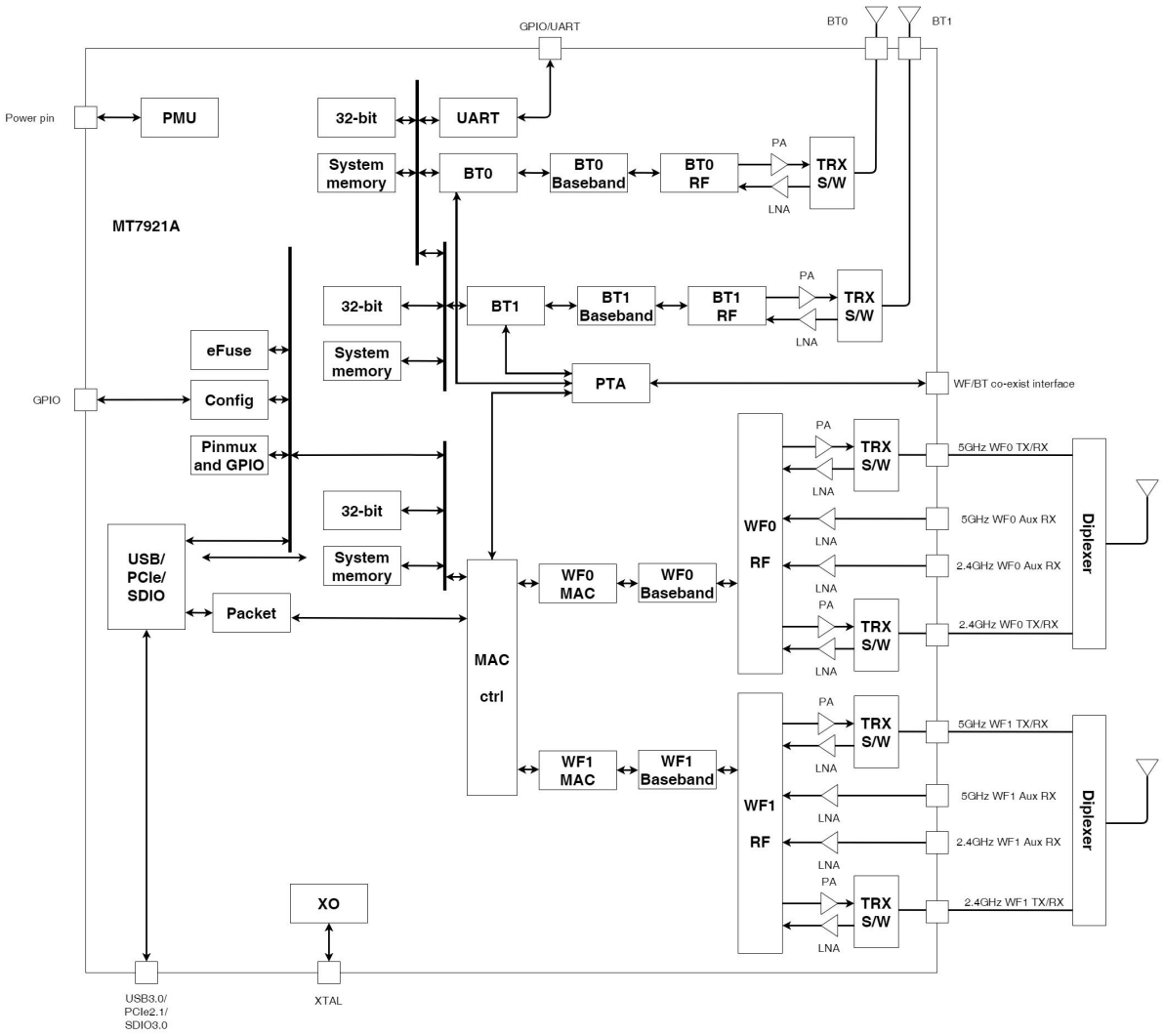
SKO.WB921A.2 模块基于联发科 MT7921AU 方案。MT7921A 是一款高度集成的单芯片，符合 2x2 11a/b/g/n/ac/ax 标准，支持低功耗的双频 Wi-Fi 和蓝牙 v5.2 子系统，提供功能丰富的无线标准接口，以及可靠、高效的远距离吞吐量。

MT7921AUN 使用 USB3.0 高速接口，数据速率高达 800Mbps，优化后的射频架构和基带算法提供了卓越的性能，并且功耗很低。MAC 部署了一个高效的卸载引擎和硬件数据处理加速器，可完全卸载主机处理器的 Wi-Fi 任务。MT7921A 安全、优异的性能，并且符合国际法律法规标准，无论何时何地都为用户提供最好的应用体验。本文档描述了工程要求规范。

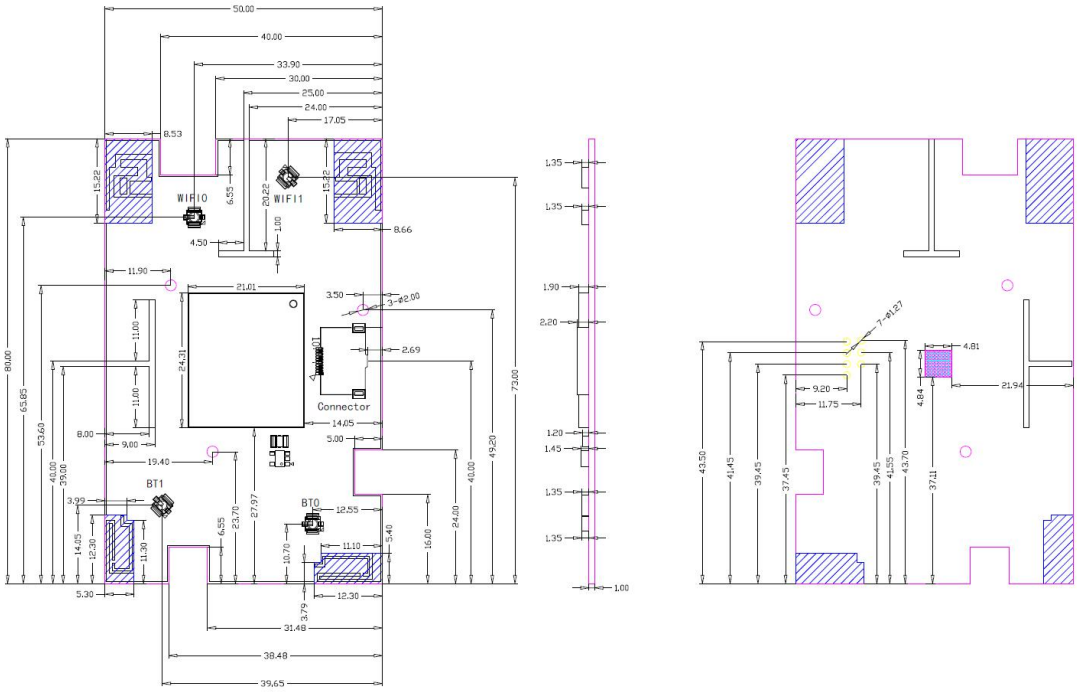
2. Features（特性）

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
	IEEE Std. 802.11ax
	BT 2.1+EDR
	BT 4.2
	BT 5.2 with BLE (BT low energy)
Chip Solution 芯片方案	MT7921AU
Band 波段	2400 - 2483.5MHz & 4905 - 5915MHz & 5930 - 7110MHz
Dimensions 尺寸	80mm × 50mm × 3.2mm
Antenna 天线	On-board Antenna*4
Installation Mode 安装方式	Ext-WIFI
Remark 备注	2T2R WiFi Module Integrated BT 5.2

3. Block Diagram（结构框图）



4. Package Outline and Mounting（外形及安装尺寸）



模组俯视图　　模组侧视图　　模组底视图

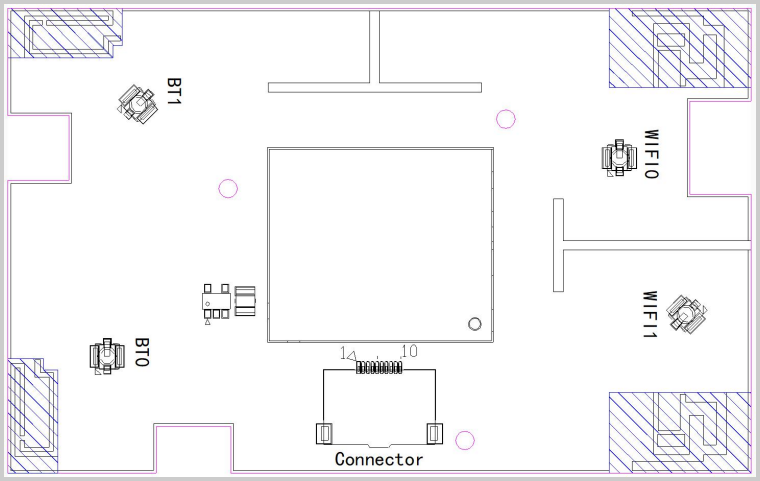
Note:1. The unit is mm.

2.The tolerance of the external dimensions of the module is ±0.2mm, and the tolerance of the board thickness and unmarked is ±0.2mm.

注意：1. 单位为 mm。

2.模组外形尺寸公差为±0.2mm，板厚及未标注公差为±0.2mm。

Pin Definition（引脚定义）

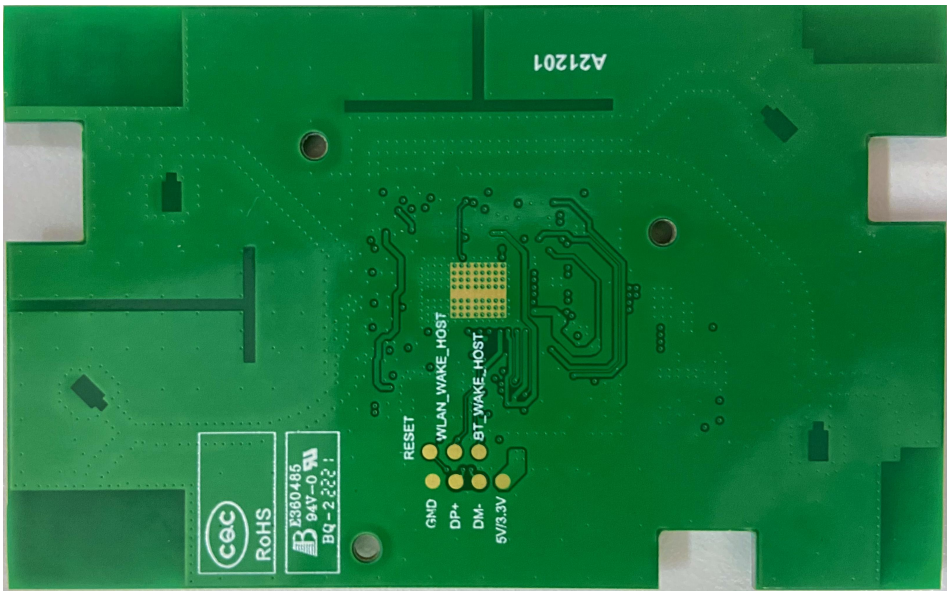


模组正视图

PIN	SYMBOL	DESCRIPTION
1	VDD_5V	VDD 5.0V \ +5.0V 直流供电输入
2	VDD_5V	VDD 5.0V \ +5.0V 直流供电输入
3	BT_WAKE_HOST	BT Wake on HOST \ BT 唤醒主机引脚 （低电平有效，内有 10K 电阻到 3.3V 上拉）
4	GND	Connected to Ground \ 连接到地
5	GND	Connected to Ground \ 连接到地
6	USB_DM	USB2.0 DM Signal \ USB2.0 差分负电压信号
7	USB_DP	USB2.0 DP Signal \ USB2.0 差分正电压信号
8	GND	Connected to Ground \ 连接到地
9	WIFI_WAKE_HOST	Wireless LAN Wake on HOST \ WLAN 唤醒主机引脚 （低电平有效，内有 10K 电阻到 3.3V 上拉）
10	RESET	RESET \ 复位引脚 (低电平有效，内部接芯片 EN 脚)

5. Product Pictures（实物图片）

正视图（top view）



背视图（bottom view）

标签信息（information view）

6. 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	MT7921AU	109-DRQFN	
2	PCB	SKO.WB921A.2	FR-4,4LAY	
3	晶体振荡器	CF4040M00006T2115218	40MHz	

7. General Requirements（一般要求）

No.	Feature	Description
7-1	Operation Voltage 工作电压范围	5V±10%
7-2	Current Consumption 最大电流	900mA（预留 2A）
7-3	Ripple 纹波	≤120mV
7-4	Operation Temperature 工作温度范围	0°C to +40°C
7-5	Antenna Type 天线类型	On-board Antenna
7-6	USB	High Speed USB 2.0 Interface
7-7	Storage Temperature 存储温度	-40°C to +85°C

8. 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：模块输上入电压 5V±10%；

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

Ambient condition Temperature :25℃ ± 5℃;

Power supply voltages：5V±10% input power at the Module;

8.1 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%)	-	-	-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	

8.2 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）	15	17	19	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 ≦10%)	-	-	-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%)	-	-	-65	dBm	
6 Maximum Input Level (PER ≦10%)	-20	-	-	dBm	

8.3 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	
1. Power Levels					
1) For antenna port（MCS7）	14	16	18	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)					
1) MCS0 (PER ≦10%)	-	-	-82	dBm	
2) MCS1 (PER ≦10%)	-	-	-79	dBm	
3) MCS2 (PER ≦10%)	-	-	-77	dBm	
4) MCS3 (PER ≦10%)	-	-	-74	dBm	

5) MCS4 (PER ≦10%)	-	-	-70	dBm	
6) MCS5 (PER ≦10%)	-	-	-66	dBm	
7) MCS6 (PER ≦10%)	-	-	-65	dBm	
8) MCS7 (PER ≦10%)	-	-	-64	dBm	
7. Maximum Input Level (PER ≦10%)	-20	-	-	dBm	

8.4 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				
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels (Calibrated)					
1) For antenna port（MCS7）	14	16	18	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	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. 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%)	-72	-	-61	dBm	
6. Maximum Input Level (PER ≦10%)	-20	-	-	dBm	

8.5 IEEE 802.11ax Section(2.4GHz)

Items	Contents				
Specification	IEEE802.11ax				
Mode	BPSK, QPSK, 16QAM, 64QAM,256QAM, 1024QAM and OFDMA				
Channel	HE20：CH1 to CH13 HE40：CH3 to CH11				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11				
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels (Calibrated)					
1) For antenna port（MCS11）	12	14	16	dBm	
2. Spectrum Mask @VHT20/VHT40/VHT80 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	
11) MCS10			-34	dB	
12) MCS11			-35	dB	
4. Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.		Unit
5.Minimum Input Level Sensitivity (each chain)			HE 20	HE 40	
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	
9) MCS8(PER ≦10%)	-	-	-59	-56		dBm	
10) MCS9(PER ≦10%)	-	-	-57	-54		dBm	
11) MCS10(PER ≦10%)	-	-	-54	-51		dBm	
12) MCS11(PER ≦10%)	-	-	-52	-49		dBm	
6. Maximum Input Level (PER ≦10%)	-30	-	-			dBm	

8.6 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（54M）	15	17	19	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 ≦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%)	-75	-	-65	dBm	

6. Maximum Input Level (PER ≦10%)	-30	-	-	dBm	

8.7 IEEE 802.11n HT20 Section(5GHz)

Items	Contents				
Specification	IEEE802.11n 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	
1. Power Levels (Calibrated)					
1) For antenna port（MCS7）	13	15	17	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	
6. Minimum Input Level Sensitivity (each chain)					
1) MCS0 (PER ≦10%)	-	-	-82	dBm	
2) MCS1 (PER ≦10%)	-	-	-79	dBm	
3) MCS2 (PER ≦10%)	-	-	-77	dBm	
4) MCS3 (PER ≦10%)	-	-	-74	dBm	
5) MCS4 (PER ≦10%)	-	-	-70	dBm	
6) MCS5 (PER ≦10%)	-	-	-66	dBm	
7) MCS6 (PER ≦10%)	-	-	-65	dBm	
8) MCS7 (PER ≦10%)	-	-	-64	dBm	
6. Maximum Input Level (PER ≦10%)	-30	-	-	dBm	

8.8 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				
TX Characteristics	Min.	Typ.	Max.	Unit	
1. Power Levels (Calibrated)					
1) For antenna port（MCS7）	13	15	17	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	
7. 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	

8.9 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（MCS9）	11	13	15			dBm	
2. Spectrum Mask @VHT20/VHT40/VHT80 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)	VHT 40		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%)	-65	-	-57	-54	-51	dBm	
6. Maximum Input Level (PER ≦10%)	-30	-	-			dBm	

8.10 IEEE 802.11ax Section(5&6GHz)

Items	Contents						
Specification	IEEE802.11ax						
Mode	BPSK, QPSK, 16QAM, 64QAM,256QAM, 1024QAM and OFDMA						
Channel	5G	CH36 to CH165 HE20 CH38 to CH163 HE40 CH42 to CH157 HE80					
	6G	CH1 to CH221 HE20 CH3 to CH219 HE40 CH7 to CH199 HE80					
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11						
TX Characteristics	Min.	Typ.	Max.			Unit	
1. Power Levels (Calibrated)							
1) For antenna port（MCS11）	10	12	14			dBm	
2. Spectrum Mask @VHT20/VHT40/VHT80 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	
11) MCS10			-34			dB	
12) MCS11			-35			dB	
4. Frequency Error	-20	-	20			ppm	
RX Characteristics	Min.	Typ.	Max.			Unit	
5.Minimum Input Level Sensitivity (each chain)	HE 80		HE 20	HE 40	HE 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%)	-61	-	-57	-54	-51	dBm	
11) MCS10(PER ≦10%)	-	-	-54	-51	-48	dBm	
12) MCS11(PER ≦10%)	-	-	-52	-49	-46	dBm	
6. Maximum Input Level (PER ≦10%)	-30	-	-			dBm	

8.11 Bluetooth Section

Items	Contents				
Specification	BT2.1+EDR/4.2/5.2 with BLE				
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	-	7	-	dBm	
2. Gain step	-	1	-	dB	
3. Receiver sensitivity (BER ≦0.1%)	-	-93.5	-80	dBm	
4. Maximum usable signal (BER ≦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≥3MHz (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). Δf1avg	140	157	175	KHz	
2). Δf2max (For at least 99.9% of all Δf2max)	115	140	-	KHz	
3). Δf1avg /Δf2avg	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	

9. Mechanical,Environmental and Reliability Tests

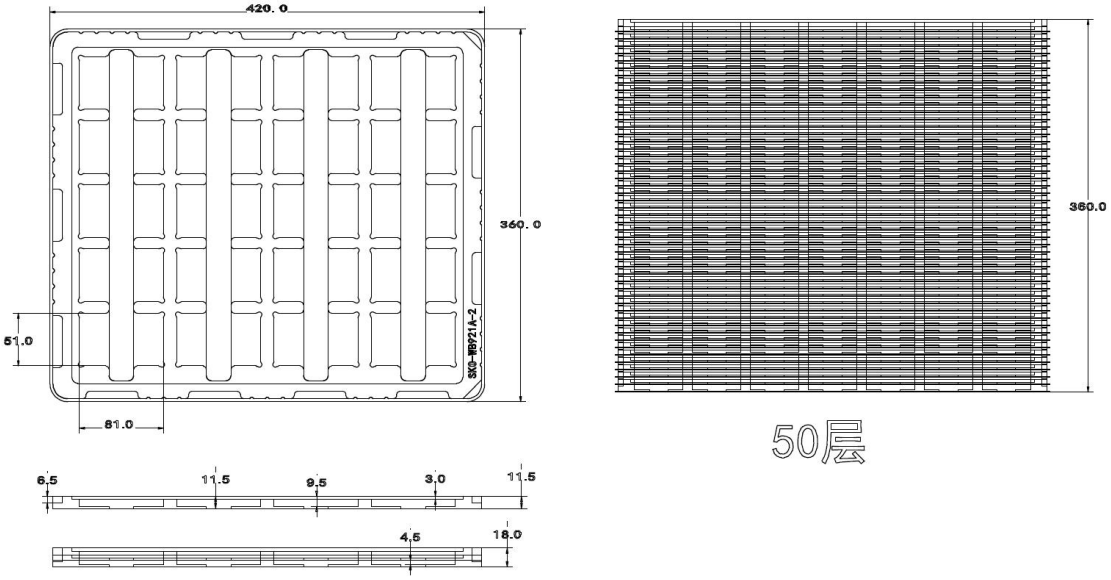
（机械、环境和可靠性测试）

Test Items		Test Conditions	Qty	Criteria Condition
9-1	**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.
9-2	**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.
9-3	**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.
9-4	**High Temperature and Humidity**	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.

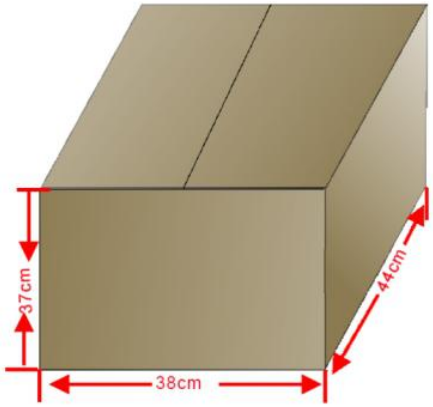
	Operation Test			
9-5	**Low Temperature Operation Test**	Leave samples in -15℃ @24 hours	4	After test, the products appearance, power, EVM and frequency error functional parameter shall be satisfied with the test specification.
9-6	**High Temperature and Humidity Start Test**	Leave samples in 60℃, 90% RH for 4x hours	4	After test, power on and off the samples for 3x tiems, the samples should be able to start normally
9-7	**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
9-8	**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.
9-9	**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.
9-10	**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.
9-11	**Aging Test**	60℃，120Hrs	10	The products at high temperature for a long time can continuous work normally
9-12	**Salt spray test**	NSS,35C,PH:6.5~7.2，24H	2	The Sample shall has no minor or major defects, such as physical damage, crack, corrosion, deformation etc;
9-13	**ESD**	Discharge voltage: 1kV C: 50pF Discharge resistance：330Ω Positive10 times 1 time for each second	3	The products can recoverable smoothly after ESD test.

10. Package（包装）

（1）托盘尺寸：



（2）外箱示意图：



（3）标签样式：

广州视琨电子科技有限公司[RoHS]

PO

P/N: CustPN

Cvte.Des: DESC

D.C: DateCode

LOT NO: LotNo

Month

G.W(kg):

N.W(kg):

Q'ty: Qty

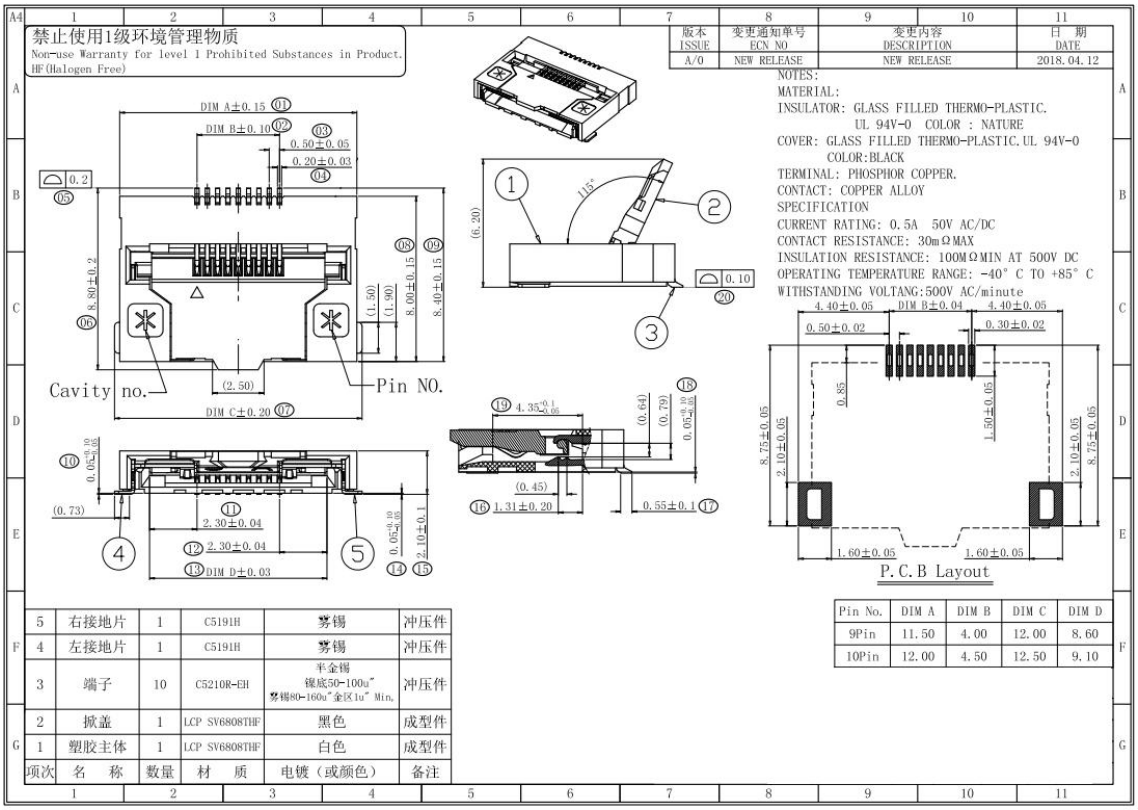
V.DES: Model

C.SIZE(mm): 440*380*370

CVTE

外箱标签示例【具体内容根据系统打印为准】

11. Socket Specification（插座规格）



版本 ISSUE	变更通知单号 ECN NO	变更内容 DESCRIPTION	日 期 DATE
A/0	NEW RELEASE	NEW RELEASE	2018.04.12

项次	名 称	数量	材 质	电镀（或颜色）	备注
5	右接地片	1	C5191H	雾锡	冲压件
4	左接地片	1	C5191H	雾锡	冲压件
3	端子	10	C5210R-EH	半金锡 镍底50-100u" 雾锡80-160u"金区1u" Min.	冲压件
2	掀盖	1	LCP SV6808THF	黑色	成型件
1	塑胶主体	1	LCP SV6808THF	白色	成型件

Pin No.	DIM A	DIM B	DIM C	DIM D
9Pin	11.50	4.00	12.00	8.60
10Pin	12.00	4.50	12.50	9.10

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.
Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital 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.

If power exceeds the limit and the distance（Over 20cm distance in actual use between the device and user） is compliant with the requirement

FCC RF Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

The device must be professionally installed

The intended use is generally not for the general public.It is generally for industry/commercial use.
The connector is within the transmitter enclosure and can only be accessed by disassembly of the transmitter that is not normally required. the user has no access to the connector.
Installation must be controlled. Installation requires special training

Canada Statement

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.

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 tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Please notice that if the ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “ Contains IC: 24728-SKOWB921A21” any similar wording that expresses the same meaning may 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: 24728-SKOWB921A21 » ou d'une formulation similaire exprimant le même sens, comme suit

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.
Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 etla conformité à l'exposition de 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 or transmitter. This equipment should be installed and operated with a minimum distance of 20 centimeters 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 équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

This radio transmitter 24728-SKOWB921A21 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.
Le présent émetteur radio 24728-SKOWB921A21 a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.
The concrete contents to check are the following three points.

1）Must use PCB antenna with maximum 1.5dBi (2.4G), 1.75dBi (5G),1.25dBi(6G) gain supplied by the manufacturer;
2）Should be installed so that the end user cannot modify the antenna;
3）Feed line should be designed in 50ohm

Fine tuning of return loss etc. can be performed using a matching network.
Le contenu concret à vérifier sont les trois points suivants.

1) doit utiliser une antenne comme WA-M-LB-02-164 avec pifa gain n'excédant pas 1.75 dbi
2) doivent être installés de façon que l'utilisateur final ne peut pas modifier l'antenne
3) La ligne d’alimentation doit être conçue en 50ohm

Le réglage précis de la perte de rendement, etc. peut être effectué en utilisant un réseau correspondant.

WiFi:

Frequency (MHz) fréquences	Antenna Type types d'antenne	Antenna Gain (dBi) Gain maximal d'antenne
2412-2462	PCB Antenna	1.5
5180-5825	PCB Antenna	1.75
5955-7055	PCB Antenna	1.25

BT：

Frequency (MHz) fréquences	Antenna Type types d'antenne	Antenna Gain (dBi) Gain maximal d'antenne
2402-2480	PCB Antenna	1.5

Notice to OEM integrator

Must use the device only in host devices that meet the FCC/ISED RF exposure category of mobile, which means the device is installed and used at distances of at least 20cm from persons.
The end user manual shall include FCC Part 15 /ISED RSS GEN compliance statements related to the transmitter as show in this manual.
Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B, ICES 003.
Host manufacturer is strongly recommended to confirm compliance with FCC/ISED requirements for the transmitter when the module is installed in the host.

Must have on the host device a label showing Contains FCC ID: 2AR82-SKOWB921A21， IC: 24728-SKOWB921A21

l'hôte doit utiliser l'instrument uniquement dans des dispositifs qui répondent à la fcc / (catégorie d'exposition rf mobile, ce qui signifie le dispositif est installé et utilisé à une distance d'au moins 20 cm de personnes.
le manuel de l'utilisateur final doit inclure la partie 15 / (fac rss gen déclarations de conformité relatives à l'émetteur que de montrer dans ce manuel.
le fabricant est responsable de la conformité de l'hôte, le système d'accueil avec le module installé avec toutes les autres exigences applicables du système comme la partie 15 b, ices - 003.
accueillir le fabricant est fortement recommandé de confirmer la conformité avec les exigences de la fcc / (émetteur lorsque le module est installé dans l'hôte.

le dispositif d'accueil doivent avoir une étiquette indiquant contient FCC ID:2AR82-SKOWB921A21， IC: 24728-SKOWB921A21