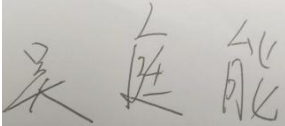


保密等级：机密

SPECIFICATION

产品规格书

SKO.W2890.1 IEEE 802.11 a/b/g/n/ac AP Module

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

Please send the original back to us after you have approved and signed.

客户承认签章后敬请寄回正本一份。

Approved by customer		
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
V1.0	2025.1.11	SKO.W2890.1 A24455	ALL	First Issued	Lvguitian
V1.1	2025.3.10	SKO.W2890.1 B25075	ALL	First Issued	Lvguitian
V1.2	2025.3.13	SKO.W2890.1 B25075	ALL	增加B版本料号	Lvguitian

本产品的型号核准代码标识在产品标签上。

模块通过型号核准并不代表嵌入或使用该模块的最终设备符合相关无线电管理技术规定或标准，最终设备厂商须对产品的技术特性是否符合无线电管理技术规定或标准负责。

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13.2 生产参数	错误! 未定义书签。

1. Introduction（简介）

SKO.W2890.1 module is based on SF19A2890 solution. SKO.W2890.1 is a Wi-Fi AP module supporting 2T2R. Its WLAN function supports the PHY 1000M interface, and the module meets the requirements of standard protocol IEEE 802.11 a/b/g/n/ac. Such units as power management, power amplifier and low-noise amplifier are integrated in the main chip of the module. The module can be applied in smart sound boxes, set-top boxes, game machines, printers, IP cameras, tachographs, and other smart equipment. This documentation describes the engineering requirements specification.

SKO.W2890.1模块基于 SF19A2890 方案。SKO.W2890.1是一款支持2T2R AP模组，支持千兆网口的高性能、高集成度双频无线通信模块。该模块支持WLAN 单口千兆网口功能。满足 IEEE 802.11 a/b/g/n/ac 标准协议要求。本文档描述了工程要求规范。

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
Chip Solution 芯片方案	SF19A2890
Band 波段	2.4GHz/5GHz
Dimensions 尺寸	
Antenna 天线	Ipex
Installation Mode 安装方式	外挂
Remark 备注	

3. Block Diagram (结构框图)

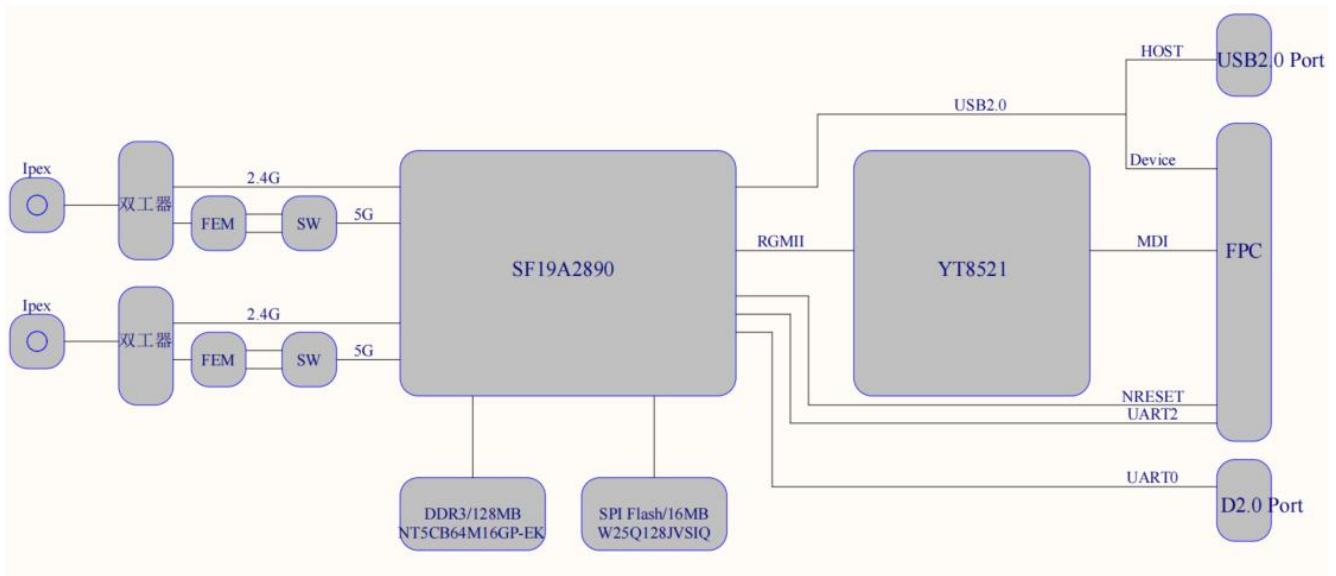
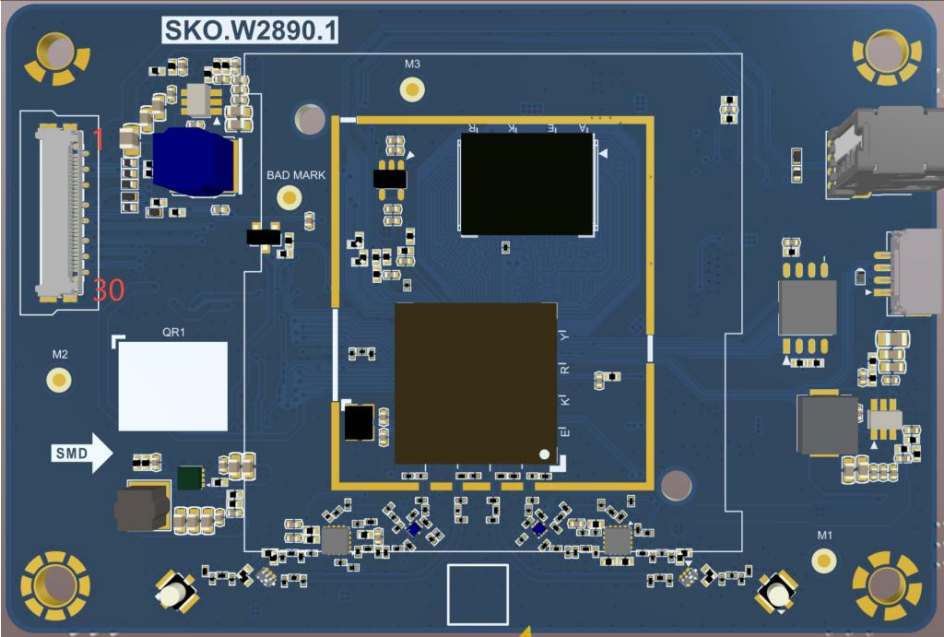


Figure 1 SKI.WB265U1.1 Block Diagram

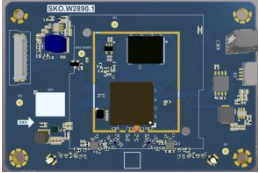
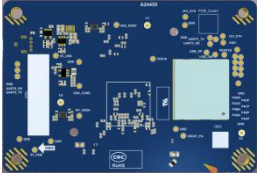
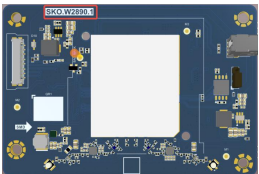
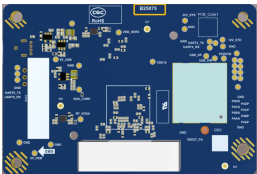
4. Package Outline and Mounting (外形及安装尺寸)

5. Pin Definition (引脚定义)

		
PIN	SYMBOL	DESCRIPTION
1	12V_ETH	12V 供电
2	12V_ETH	12V 供电
3	NC	NC
4	NC	NC
5	NC	NC
6	GND	Ground\ 接地
7	NC	NC
8	NC	NC
9	GND	BT_WAKE_HOST
10	NC	NC
11	NC	NC
12	GND	Ground\ 接地
13	USB_DP	USB_DM
14	USB_DM	USB_DP
15	GND	Ground\ 接地
16	PERSTB	复位
17	NC	NC
18	GND	Ground\ 接地
19	ETH_RT_P4DN	网口差分信号P4DN
20	ETH_RT_P4DP	网口差分信号P4DP
21	GND	Ground\ 接地
22	ETH_RT_P4CN	网口差分信号P4CN
23	ETH_RT_P4CP	网口差分信号P4CP
24	GND	Ground\ 接地

25	ETH_RT_P4BN	网口差分信号P4BN
26	ETH_RT_P4BP	网口差分信号P4BP
27	GND	Ground\ 接地
28	ETH_RT_P4AN	网口差分信号P4AN
29	ETH_RT_P4AP	网口差分信号P4AP
30	GND	Ground\ 接地

6. Product Pictures (实物图片)

模组料号	正视图	背视图	备注
002.029.0001505			
002.029.0001549			

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	SF19A2890	BGA	SiFlower
2	DDR	NT5CB64M16GP-EK	64MB	Nanya
3	Flash	W25Q128JVSQ	16MB	Winbond
4	PHY	YT8521SC-CA	QFN48	MotorComm
5	PCB	SKO.W2890.1	FR-4,4LAY	
6	晶体振荡器	40MHz, $\pm 10\text{ppm}$, 3225	40MHz	JWT
7	晶体振荡器	25MHz, $\pm 10\text{ppm}$, 10pF, 3225	25MHz	JWT
8	射频功率放大器	KCT8525D-2	QFN-16L	kxcomtech
9	射频开关	WS7872DA-6/TR	QFN6	Willsemi
10	合路器	FLT18D254959D-3206A	1608	FTR
11	合路器	FLT18D24254959D-3268B	1608	FTR

8. General Requirements (一般要求)

No.	Feature	Description
8-1	Operation Voltage 工作电压范围	12V $\pm$ 0.6
8-2	Current Consumption 最大电流	2A
8-3	Ripple 纹波	$\leq 600\text{mV}$
8-4	Operation Temperature 工作温度范围	-10°C to +70°C

8-5	Antenna Type 天线类型	External antenna
8-6	Interface	ETH
8-7	Storage Temperature 存储温度	-40°C to +85°C

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°C ± 5°C；

电源电压：模块输入电压 12V (±5%)；

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

Ambient condition Temperature :25°C ± 5°C；

Power supply voltages: 12V (±5%) 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 at each rate	15	17	19	dBm	
(1Mbps~11Mbps)					
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	-	-	-9.11	dB	
2) 2Mbps	-	-	-9.11	dB	
3) 5.5Mbps	-	-	-9.11	dB	
4) 11Mbps	-	-	-9.11	dB	
4. Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity					
1) 1Mbps (FER $\leq 8\%$)	-	-	-83	dBm	
2) 2Mbps (FER $\leq 8\%$)	-	-	-80	dBm	
3) 5.5Mbps (FER $\leq 8\%$)	-	-	-79	dBm	
4) 11Mbps (FER $\leq 8\%$)	-	-	-76	dBm	
6. Maximum Input Level (FER $\leq 8\%$)	-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 (6~9M)	15	17	19	dBm	
2) For antenna port (12~18M)	14	16	18	dBm	
3) For antenna port (24~36M)	13	15	17	dBm	
4) For antenna port (48~54M)	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					
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	

9.3 IEEE 802.11n HT20/40 Section(2.4GHz)

Items	Contents
Specification	IEEE802.11n HT20/40@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 (Calibrated)					
1) For antenna port (MCS0~1)	15	17	19	dBm	
2) For antenna port (MCS2~3)	14	16	18	dBm	
3) For antenna port (MCS4~5)	13	15	17	dBm	
4) For antenna port (MCS6~7)	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	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity			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%)	-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 (6~9M)	14	16	18	dBm	
2) For antenna port (12~18M)	13	15	17	dBm	
3) For antenna port (24~36M)	12	14	16	dBm	
4) For antenna port (48~54M)	11	13	15	dBm	
2. Spectrum Mask @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) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps			-19		
7) 48Mbps	-	-	-22	dB	
8) 54Mbps			-25		
4. Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity					
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 HT20/40 Section(5GHz)

Items	Contents				
Specification	IEEE802.11n HT20/40@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 (MCS0~1)	14	16	18	dBm	
2) For antenna port (MCS2~3)	13	15	17	dBm	
3) For antenna port (MCS4~5)	12	14	16	dBm	
4) For antenna port (MCS6~7)	11	13	15	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)			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 VHT20/40/80 Section(5GHz)

Items	Contents				
Specification	IEEE802.11ac VHT20/40/80@5GHz				
Mode	OFDM				
Channel	VHT20:CH36 to CH165 VHT40:CH38 to CH163 VHT80:CH42 to CH155				
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 (MCS0~1)	15	17	19	dBm	

2) For antenna port (MCS2~3)	14	16	18	dBm		
3) For antenna port (MCS4~5)	13	15	17	dBm		
4) For antenna port (MCS6~7)	12	14	16	dBm		
5) For antenna port (MCS8~9)	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 20	VHT 40	VHT 80	
1) MCS0 (PER $\leq 10\%$)	-	-	-82	-79	-76	dBm
2) MCS1 (PER $\leq 10\%$)	-	-	-79	-76	-74	dBm
3) MCS2 (PER $\leq 10\%$)	-	-	-77	-74	-71	dBm
4) MCS3 (PER $\leq 10\%$)	-	-	-74	-71	-67	dBm
5) MCS4 (PER $\leq 10\%$)	-	-	-70	-67	-63	dBm
6) MCS5 (PER $\leq 10\%$)	-	-	-66	-63	-62	dBm
7) MCS6 (PER $\leq 10\%$)	-	-	-65	-62	-61	dBm
8) MCS7 (PER $\leq 10\%$)	-	-	-64	-61	-56	dBm
9) MCS8 (PER $\leq 10\%$)	-	-	-59	-56	-54	dBm
10) MCS9 (PER $\leq 10\%$)	-	-	-57	-54	-51	dBm
6. Maximum Input Level (PER $\leq 10\%$)	-30	-	-	dBm		

10. Reference Design (参考设计)

10.1 Chip power on sequence and DC Electrical Characteristics

10.2 Reference schematic (参考原理图)

11. Mechanical,Environmental and Reliability Tests

Test Items		Test Conditions	Qty	Criteria Condition
11-1	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 been broken by appearance visual inspection.
11-2	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.
11-3	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.
11-4	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.
11-5	Humidity test	Leave samples in 40±3℃, 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.

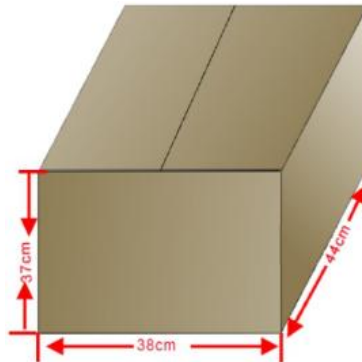
11-6	High temperature load life test	Thermostat cabinet temperature: $55\pm 5^{\circ}\text{C}$ Applied voltage: 110% rated voltage Working duration: 200 hour (Supply Voltage Cycle 23h power on, 1h power off)	60	After test, leave samples in standard condition for 1 hour and test, Power, EVM and Frequency error shall be satisfied with the test specification.
11-7	High temperature load test	Temperature: $55\pm 5^{\circ}\text{C}$ Samples work for 16 hours	3	After test, the Appearance, Power, EVM and Frequency error shall be Satisfied with the test specification.
11-8	Low temperature storage test	Leave the samples in $-25\pm 3^{\circ}\text{C}$ @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.
11-9	Low temperature load test	Leave samples in $-15\pm 3^{\circ}\text{C}$ @ 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.
11-10	Temperature circle test	One cycle duration $-10\pm 3^{\circ}\text{C}$ @3H $40\pm 3^{\circ}\text{C}$ @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.
11-11	Continuous TP test	Twice cycle duration $-10\pm 3^{\circ}\text{C}$ @4H $+60\pm 3^{\circ}\text{C}$ @4H, $+25$ @2H@2H	3	During test, There will not been appeared signal disconnection or interruption between DUT and AP.
11-12	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.

12. Package (包装)

(1) 编带包装示意图

(2) 编带方向

(3) 外箱图纸示意图



(4) 包装要求信息

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 [FCC 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:

Antenna Type	Frequency Bands	Max. Antenna Gain (dBi)
External Antenna (WiFi)	2.4GHz	4.94
External Antenna (WiFi)	5GHz	4.88

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-SKOW28901](#)”. 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.

Note EMI Considerations

Note that a host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties

For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode; see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

How to make changes

Since . only Grantees are permitted to make permissive changes, it is recommended that module manufactures provide contact information and some guidance to host providers in the integration instructions if they expect their module will be used differently than granted.

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

According to country code, channel 12 and 13 would be disabled in North America.

Equipment operating in the 5150-5250 MHz band is for indoor use only.

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-SKOW28901](#)”.

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-SKOW28901](#)".

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 [[IC:24728-SKOW28901](#)] 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.

Antenna Specification list below:

Antenna Type	Frequency Bands	Max. Antenna Gain (dBi)
External Antenna (WiFi)	2.4GHz	4.94
External Antenna (WiFi)	5GHz	4.88

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 [[IC:24728-SKOW28901](#)] 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.

Equipment operating in the 5150-5250 MHz band is for indoor use only.

(1) Les appareils fonctionnant dans la bande de fréquences 5150-5250 MHz sont destinés à une utilisation intérieure uniquement