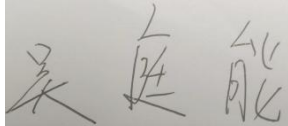


保密等级：机密

SPECIFICATION

产品规格书

SKI.WB800D80U.5 A23453**IEEE 802.11 a/b/g/n/ac/ax 1T1R USB Wi-Fi****Integrated Bluetooth 2.1+EDR/3.0/4.x/5.2/5.3/5.4**

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

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	DESCRIPTI ON	AUTHOR
V1.01	2023.12.07	SKI.WB800D80U.5 A23453	ALL	First Issued	FAN
V1.03	2024.04.18	SKI.WB800D80U.5 A23453	ALL	更新 5G_MCS8~9目 标功率	徐浩

本产品的型号核准代码标识在产品后标牌上。

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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1. Introduction (简介)

SKI.WB800D80U.5 module is based on AIC8800D80 solution. SKI.WB800D80U.5 is a WiFi6/BT5.4 combo low-power, high-performance and high-integrated dual band wireless communication module which is designed for meeting the customers' needs of small size and low cost. This module supports both WLAN and BT functions. Its WLAN/BT function supports the USB2.0 interface, and its BT function supports the UART interface, and the module meets the requirements of standard protocol IEEE 802.11 a/b/g/n/ac/ax. Such units as power management, power amplifier and low-noise amplifier are integrated in the main chip of the module. Its WLAN PHY rate is up to 600.4Mbps@TX. 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.

SKI.WB800D80U.5 模块基于 AIC8800D80 方案。SKI.WB800D80U.5 是一款 Wi-Fi6/BT5.4

组合的低功耗、高性能、高集成度双频无线通信模块，专为满足客户小尺寸、低成本的需求而设计。该模块支持WLAN 和BT 功能。WLAN/BT 功能支持USB2.0 接口，BT 功能支持UART接口，满足 IEEE 802.11 a/b/g/n/ac/ax 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/b/g/n/ac/ax
	Bluetooth 2.1+EDR/3.0/4.x/5.2/5.3/5.4
Chip Solution 芯片方案	AIC8800D80
Band 波段	2.4GHz/5G
bandwidth 带宽	20/40/80M
Dimensions 尺寸	19mm×17mm×3.2mm
Antenna 天线	Stamp Hole
Installation Mode 安装方式	SMD
Low Power Mode 低功耗模式	不支持
备注	2.4GHz/5G: *中国大陆: 2400-2483.5MHz、5150-5350MHz、5725-5850MHz

3. Block Diagram (结构框图)

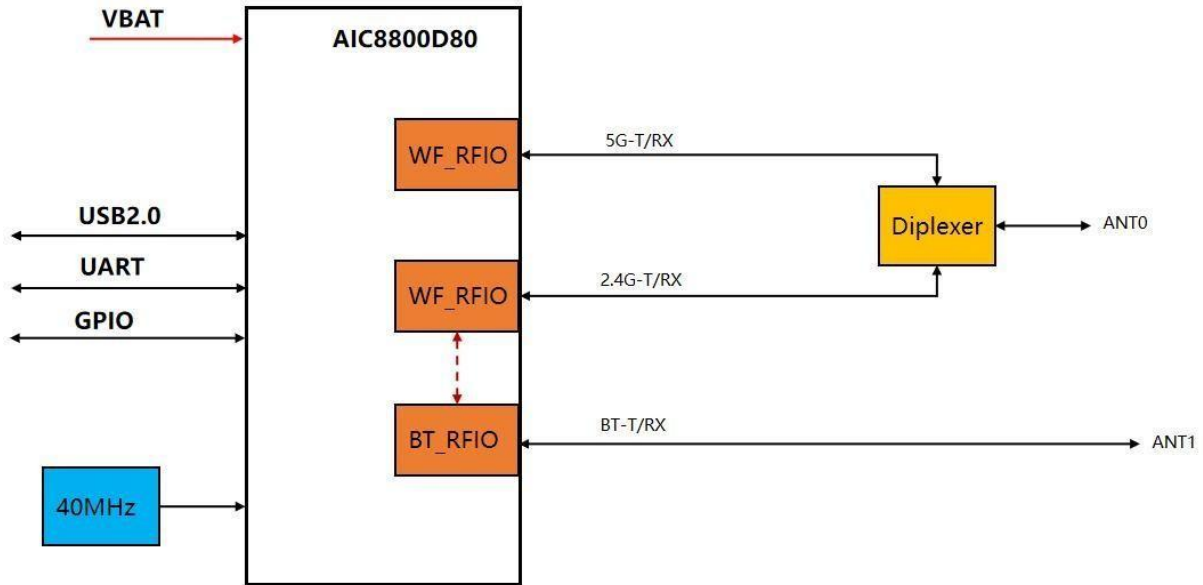
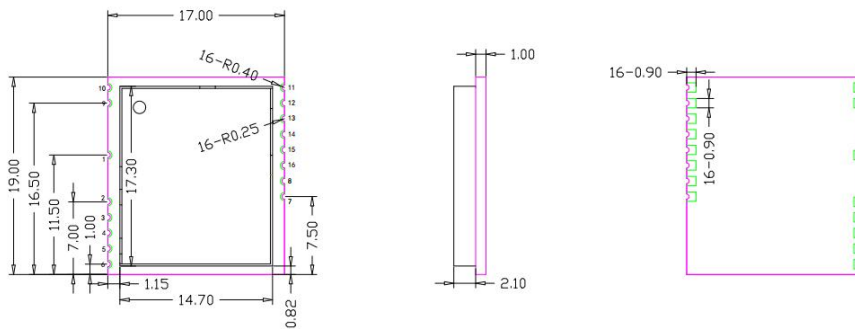


Figure 1 SKI.WB800D80U.5 Block Diagram

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. 板内顶层器件最高2.1mm;
2. 模组外形尺寸公差为 $\pm 0.15\text{mm}$, 板厚以及未标注公差为 $\pm 0.1\text{mm}$;

5. Pin Definition (引脚定义)



PIN	SYMBOL	DESCRIPTION
1	GPIOB2	GBIOB2
2	GND	Connected to Ground
3	WF	2.4&5G_WIFI天线接口
4	GND	Connected to Ground
5	BT	蓝牙天线接口
6	GND	Connected to Ground
7	BT_DIS	NC
8	WL_DIS	NC
9	VDD33	3.3V供电
10	GND	Connected to Ground
11	USB_DM	USB_DM接口
12	USB_DP	USB_DP接口
13	GND	Connected to Ground
14	PWRKEY	PWRKEY
15	WF_WAKE_HOST	Wifi唤醒主机
16	HOST_WAKE_WF	主机唤醒wifi

6. Product Pictures (实物图片)



正视图 (Top view)



背视图 (Bottom view)

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	AIC8800D80	QFN48	AIC
2	PCB	SKI.WB800D80U.5	FR-4,4LAY	
3	晶体振荡器	40MHz, ± 10 ppm, 2016	40MHz	JWT,MDH,TXC,Murata
4	双工器	1608 Dual-band, dual-mode 2.4GHz/5GHz WLAN	2.4GHz/5GHz	Sunlord,ACX,TDK,PSA

8. General Requirements (一般要求)

No.	Feature	Description
8-1	Operation Voltage 工作电压范围	3.3V $\pm$ 0.3
8-2	Current Consumption 最大电流	800mA
8-3	Ripple 纹波	≤ 120 mV
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
8-6	Interface	USB2.0/UART
8-7	Storage Temperature 存储温度	-40°C to +85°C

lvl_11b_11ag_1m_2g4=18	lvl_11a_9m_5g=18
lvl_11b_11ag_2m_2g4=18	lvl_11a_12m_5g=18
lvl_11b_11ag_5m5_2g4=18	lvl_11a_18m_5g=18
lvl_11b_11ag_11m_2g4=18	lvl_11a_24m_5g=18
lvl_11b_11ag_6m_2g4=18	lvl_11a_36m_5g=18
lvl_11b_11ag_9m_2g4=18	lvl_11a_48m_5g=16
lvl_11b_11ag_12m_2g4=18	lvl_11a_54m_5g=16
lvl_11b_11ag_18m_2g4=18	lvl_11n_11ac_mcs0_5g=16
lvl_11b_11ag_24m_2g4=18	lvl_11n_11ac_mcs1_5g=16
lvl_11b_11ag_36m_2g4=18	lvl_11n_11ac_mcs2_5g=16
lvl_11b_11ag_48m_2g4=16	lvl_11n_11ac_mcs3_5g=16
lvl_11b_11ag_54m_2g4=16	lvl_11n_11ac_mcs4_5g=16
lvl_11n_11ac_mcs0_2g4=18	lvl_11n_11ac_mcs5_5g=16
lvl_11n_11ac_mcs1_2g4=18	lvl_11n_11ac_mcs6_5g=16
lvl_11n_11ac_mcs2_2g4=18	lvl_11n_11ac_mcs7_5g=16
lvl_11n_11ac_mcs3_2g4=18	lvl_11n_11ac_mcs8_5g=14
lvl_11n_11ac_mcs4_2g4=18	lvl_11n_11ac_mcs9_5g=14
lvl_11n_11ac_mcs5_2g4=16	lvl_11ax_mcs0_5g=16
lvl_11n_11ac_mcs6_2g4=16	lvl_11ax_mcs1_5g=16
lvl_11n_11ac_mcs7_2g4=16	lvl_11ax_mcs2_5g=16
lvl_11n_11ac_mcs8_2g4=16	lvl_11ax_mcs3_5g=16
lvl_11n_11ac_mcs9_2g4=16	lvl_11ax_mcs4_5g=16
lvl_11ax_mcs0_2g4=18	lvl_11ax_mcs5_5g=16
lvl_11ax_mcs1_2g4=18	lvl_11ax_mcs6_5g=16
lvl_11ax_mcs2_2g4=18	lvl_11ax_mcs7_5g=16
lvl_11ax_mcs3_2g4=18	lvl_11ax_mcs8_5g=14
lvl_11ax_mcs4_2g4=18	lvl_11ax_mcs9_5g=14
lvl_11ax_mcs5_2g4=16	lvl_11ax_mcs10_5g=14
lvl_11ax_mcs6_2g4=16	lvl_11ax_mcs11_5g=14
lvl_11ax_mcs7_2g4=16	
lvl_11ax_mcs8_2g4=16	
lvl_11ax_mcs9_2g4=16	
lvl_11ax_mcs10_2g4=15	
lvl_11ax_mcs11_2g4=15	

功率配置表:

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 $\pm$ 5°C；

电源电压：模块输入电压 3.3V ($\pm 10\%$)；

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

Ambient condition Temperature :25°C $\pm$ 5°C；

Power supply voltages: 3.3V ($\pm 10\%$) 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					
(1Mbps~11Mbps)	16	18	20	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	-	-	-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 (6~36M)	16	18	20	dBm	
2) For antenna port (48~54M)	14	16	18	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	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity					
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	

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 (MCS0~4)	16	18	20	dBm	
2) For antenna port (MCS5~7)	14	16	18	dBm	
2. Spectrum Mask @target power					
1) at $f_c \pm 22\text{MHz}$	-	-	-20	dBr	
2) at $f_c \pm 40\text{MHz}$	-	-	-28	dBr	
3) at $f_c > \pm 60\text{MHz}$	-	-	-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 $\leq 10\%$)	-	-	-82	-79	dBm
2) MCS1 (PER $\leq 10\%$)	-	-	-79	-76	dBm
3) MCS2 (PER $\leq 10\%$)	-	-	-77	-74	dBm
4) MCS3 (PER $\leq 10\%$)	-	-	-74	-71	dBm
5) MCS4 (PER $\leq 10\%$)	-	-	-70	-67	dBm
6) MCS5 (PER $\leq 10\%$)	-	-	-66	-63	dBm
7) MCS6 (PER $\leq 10\%$)	-	-	-65	-62	dBm
8) MCS7 (PER $\leq 10\%$)	-	-	-64	-61	dBm
6. Maximum Input Level (PER $\leq 10\%$)	-20	-	-	dBm	

9.4 IEEE 802.11ax HE20/40 Section (2.4GHz)

Items	Contents				
Specification	IEEE802.11ax HE20/40@2.4GHz				
Mode	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 (MCS0~4)	16	18	20	dBm	
1) For antenna port (MCS5~9)	14	16	18	dBm	
2) For antenna port (MCS10~11)	13	15	17	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			HE20	HE40	
1) MCS0 (PER $\leq 10\%$)	-	-	-82	-79	dBm
2) MCS1 (PER $\leq 10\%$)	-	-	-79	-76	dBm
3) MCS2 (PER $\leq 10\%$)	-	-	-77	-74	dBm
4) MCS3 (PER $\leq 10\%$)	-	-	-74	-71	dBm
5) MCS4 (PER $\leq 10\%$)	-	-	-70	-67	dBm
6) MCS5 (PER $\leq 10\%$)	-	-	-66	-63	dBm
7) MCS6 (PER $\leq 10\%$)	-	-	-65	-62	dBm
8) MCS7 (PER $\leq 10\%$)	-	-	-64	-61	dBm
9) MCS8 (PER $\leq 10\%$)	-	-	-59	-56	dBm
10) MCS9 (PER $\leq 10\%$)	-	-	-57	-54	dBm
11) MCS10 (PER $\leq 10\%$)	-	-	-54	-51	dBm
12) MCS11 (PER $\leq 10\%$)	-	-	-51	-49	dBm
6. Maximum Input Level (PER $\leq 10\%$)	-30	-	-	dBm	

9.5 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 (0~36M)	15	17	19	dBm	
1) For antenna port (48~54M)	14	16	18	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) 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 $\leq 10\%$)	-	-	-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 HT20/40 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 (MCS0~7)	14	16	18	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 $f_c > \pm 30\text{MHz}$	-	-	-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 $\leq 10\%$)	-	-	-82	-79	dBm
2) MCS1 (PER $\leq 10\%$)	-	-	-79	-76	dBm
3) MCS2 (PER $\leq 10\%$)	-	-	-77	-74	dBm
4) MCS3 (PER $\leq 10\%$)	-	-	-74	-71	dBm
5) MCS4 (PER $\leq 10\%$)	-	-	-70	-67	dBm
6) MCS5 (PER $\leq 10\%$)	-	-	-66	-63	dBm
7) MCS6 (PER $\leq 10\%$)	-	-	-65	-62	dBm
8) MCS7 (PER $\leq 10\%$)	-	-	-64	-61	dBm
6. Maximum Input Level (PER $\leq 10\%$)	-30	-	-	dBm	

9.7 IEEE 802.11ac VHT20/40/80 Section(5GHz)

Items	Contents				
Specification	IEEE802.11ac VHT20/40@5GHz				
Mode	OFDM				
Channel	VHT20:CH36to CH165 VHT40:CH38to CH163 VHT80:CH42to CH157				
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 (MCS0~7)	14	16	18	dBm	
2) For antenna port (MCS8~9)	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	
4. Frequency Error	-20	-	20			ppm	
RX Characteristics	Min.	Typ.	Max.			Unit	
5.Minimum Input Level Sensitivity (each chain)			VHT20	VHT40	VHT80		
1) MCS0 (PER ≤10%)	-	-	-82	-79	-76	dBm	
2) MCS1 (PER ≤10%)	-	-	-79	-76	-73	dBm	
3) MCS2 (PER ≤10%)	-	-	-77	-74	-71	dBm	
4) MCS3 (PER ≤10%)	-	-	-74	-71	-68	dBm	
5) MCS4 (PER ≤10%)	-	-	-70	-67	-64	dBm	
6) MCS5 (PER ≤10%)	-	-	-66	-63	-60	dBm	
7) MCS6 (PER ≤10%)	-	-	-65	-62	-59	dBm	
8) MCS7 (PER ≤10%)	-	-	-64	-61	-58	dBm	
9) MCS8(PER ≤10%)	-	-	-59	-56	-53	dBm	
10) MCS9(PER ≤10%)	-	-	-57	-54	-51	dBm	
6. Maximum Input Level (PER ≤10%)	-30	-	-			dBm	

9.8 IEEE 802.11ax HE20/40/80 Section(5GHz)

Items	Contents				
Specification	IEEE802.11ax HE20/40@5GHz				
Mode	OFDMA				
Channel	HE20:CH36to CH165 HE40:CH38to CH163 HE80:CH42to CH157				
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 (MCS0~7)	14	16	18	dBm	
2) For antenna port (MCS8~11)	12	14	16	dBm	
2. Spectrum Mask @VHT20/VHT40/VHT80 target power					
1) at $f_c \pm 11\text{MHz}/21\text{MHz}/41\text{MHz}$	-	-	-20	dBr	
2) at $f_c \pm 20\text{MHz}/40\text{MHz}/80\text{MHz}$	-	-	-28	dBr	
3) at $f_c \pm 30\text{MHz}/60\text{MHz}/120\text{MHz}$	-	-	-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			HE20	HE40	HE80
1) MCS0 (PER $\leq 10\%$)	-	-	-82	-79	-76
2) MCS1 (PER $\leq 10\%$)	-	-	-79	-76	-73
3) MCS2 (PER $\leq 10\%$)	-	-	-77	-74	-71
4) MCS3 (PER $\leq 10\%$)	-	-	-74	-71	-68
5) MCS4 (PER $\leq 10\%$)	-	-	-70	-67	-64
6) MCS5 (PER $\leq 10\%$)	-	-	-66	-63	-60
7) MCS6 (PER $\leq 10\%$)	-	-	-65	-62	-59
8) MCS7 (PER $\leq 10\%$)	-	-	-64	-61	-58
9) MCS8 (PER $\leq 10\%$)	-	-	-59	-56	-53
10) MCS9 (PER $\leq 10\%$)	-	-	-57	-54	-51
11) MCS10 (PER $\leq 10\%$)	-	-	-54	-51	-49
12) MCS11 (PER $\leq 10\%$)	-	-	-51	-49	-46
6. Maximum Input Level (PER $\leq 10\%$)	-30	-	-	dBm	

9.9 Bluetooth Section

Items	Contents				
Specification	BT2.1+EDR/4.2/5.2/5.3/5.4				
Mode	FHSS,GFSK,DPSK,DQPSK				
Number of Channel	79Channels				
Frequency Band	2.402 GHz ~2.480GHz				
	Min.	Typ.	Max.	Unit	Remark
1. Output Power	-	7	-	dBm	
2. Gain step	-	1.0	-	dB	
3. Receiver sensitivity (BER $\leq 0.1\%$)					
1).Basic data rate receiver specifications (BER $\leq 0.1\%$)	-	-92	-80		
2).Enhanced data rate receiver specifications (BER $\leq 0.1\%$)	-	-93	-80		
3).Bluetooth LE receiver specifications (PER $\leq 30.8\%$)	-	-95	-80		
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≥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				KHz	
2). Δf2max (For at least 99.9% of all Δf2max)	-	-	-	KHz	
3). Δf1avg /Δf2avg	-	-	-	KHz	
14. ICFT	-	-	-	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	

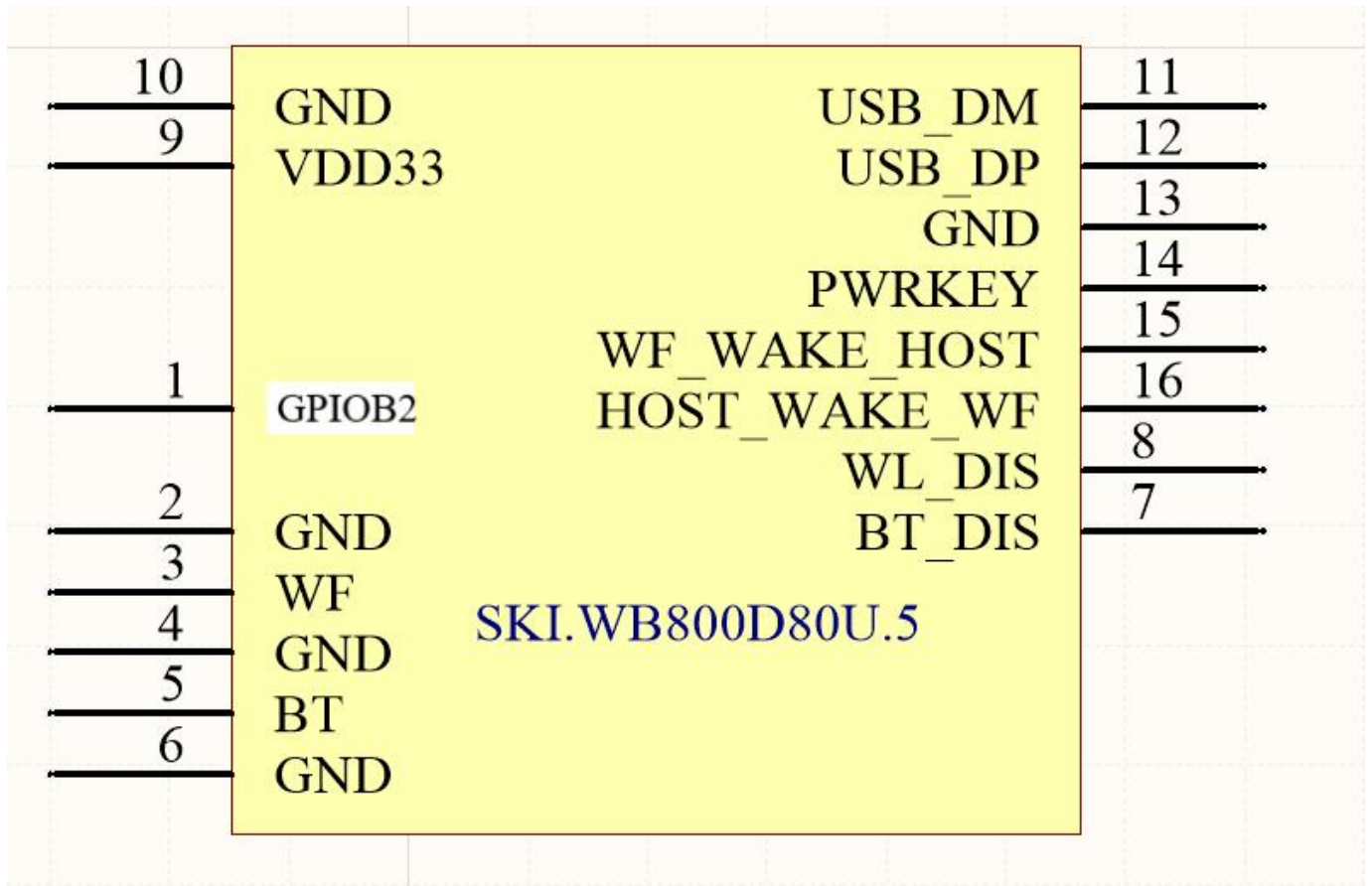
10. Reference Design (参考设计)

10.1 DC Electrical Characteristics (直流电气特性)

Symbol	Description	conditions	Min.	Typ.	Max.	Unit
VDD33	Power supplies	-	3.0	3.3	3.6	V
VDDIO	I/O input power supplies	-	3.0	3.3	3.6	V
			1.7	1.8	1.9	
IVDD33	Power supply current	-	-	-	800	mA
IVDDIO	I/O supply current	-	-	-	50	mA
VIH	High-level input voltage	VDDIO=3.3V	VDDIO*0.625	-	VDDIO+0.3	V
		VDDIO=1.8V	VDDIO*0.65			
		VDDIO=3.3V			VDDIO*0.25	

V _{IL}	Low-level input voltage	VDDIO=1.8V	-0.3	-	VDDIO*0.35	V
V _{OH}	High-level output voltage	VDDIO=3.3V	VDDIO-0.4	-	VDDIO+0.3	V
		VDDIO=1.8V	VDDIO-0.2			
V _{OL}	Low-level output voltage	VDDIO=3.3V	-0.3	-	0.4	V
		VDDIO=1.8V			0.2	
R _{PU}	Internal pull-up resistor	VDDIO=3.3V	40	75	190	kΩ
		VDDIO=1.8V	10	50	100	
R _{PD}	Internal pull-down resistor	VDDIO=3.3V	40	75	190	kΩ
		VDDIO=1.8V	10	50	100	

10.2 Reference schematic (参考原理图)



注意事项:

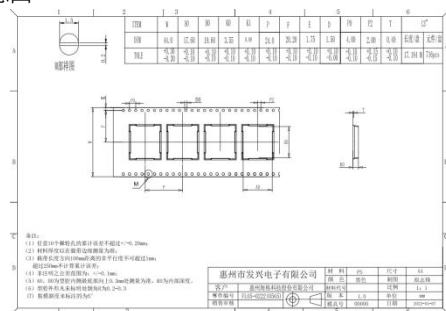
1. WF & BT 为天线接口，需按照50Ω控制阻抗。
2. 靠近 WF & BT 的 GND PIN 引脚需保证良好接地（建议用直接铺地的方式铺铜）。
3. 为了方便调节射频性能，WF & BT 与天线之间需预留n型匹配电路，此n电路需靠近天线放置，根据实际情况进行规格选型。当天线和 RF 走线均有良好性能时，可在链路上贴0Ω，当天线阻抗失配时，可通过此电路进行匹配调试。。
4. RF走线要尽可能短，且避免直角和锐角走线。
5. VBAT网络在靠近模组端放置两颗 4.7uF 电容

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 be 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	Leavesamples 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, $+25^{\circ}\text{C}$ @ 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.

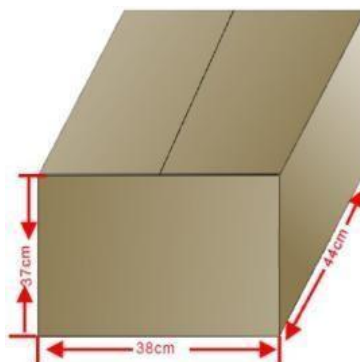
(1) 编带包装示意图



(2) 编带方向



(3) 外箱图纸示意图



(4) 包装要求信息

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

13. 存储、生产

13.1 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。

13.2 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。

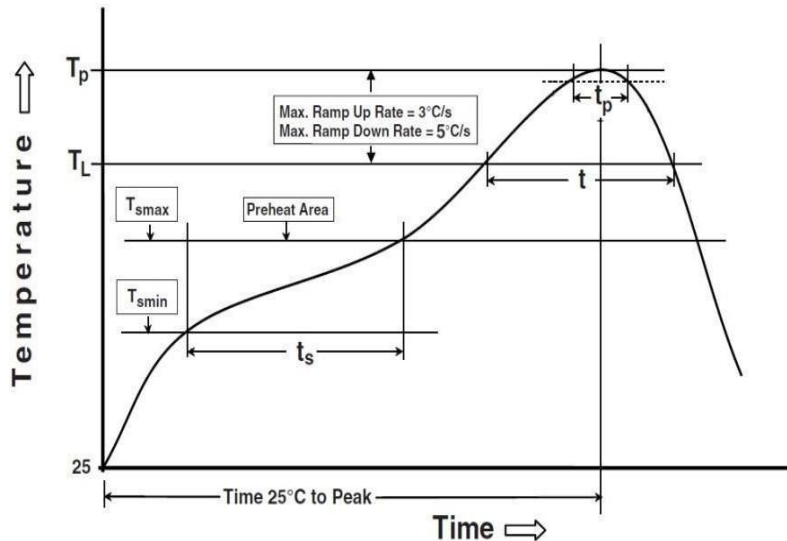


图 13-1 炉温曲线推荐图

炉温参数	最小值	典型值	最大值	单位
预热区最低温度 T_{smin}	150			℃
预热区最高温度 T_{smax}			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

图 13-2 炉温曲线参数