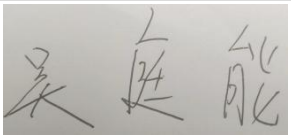
保密等级：机密

SPECIFICATION

产品规格书

SKI.WB800D80S.1 B23082

IEEE 802.11 a/b/g/n/ac/ax 1T1R USB+SDIO 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		

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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	2023.02.27	SKI.WB800D80S.1 B23082	ALL	First Issued	Lvguitian
V1.1	2023.03.10	SKI.WB800D80S.1 B23082	ALL	更新射频参数	Lvguitian

Content

目录

1. Introduction（简介）

SKI.WB800D80S.1 module is based on AIC8800D80 solution. SKI.WB800D80S.1 is a WiFi6/BT5.4combo 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/SDIO3.0 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.WB800D80S.1 模块基于 AIC8800D80 方案。SKI.WB800D80S.1 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 / SDIO3.0 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
	IEEE Std. 802.11b
	IEEE Std. 802.11g
	IEEE Std. 802.11n
	IEEE Std. 802.11ac
	IEEE Std. 802.11ax
	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
Dimensions **尺寸**	12mm×12mm×2.1mm
Antenna **天线**	Stamp Hole
Installation Mode **安装方式**	SMD
Remark **备注**	

3. Block Diagram（结构框图）

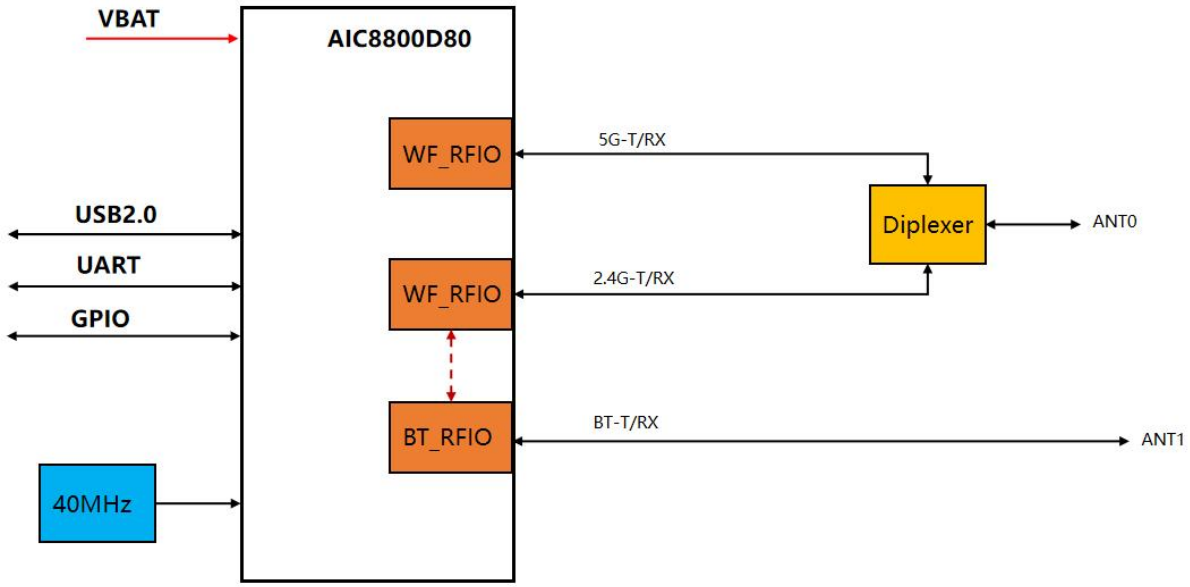
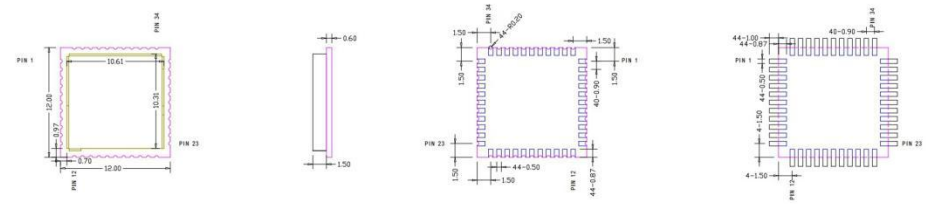


Figure 1 SKI.WB800D80S.1 Block Diagram

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



模组主视图　　模组侧视图　　模组后视图　　建议上板封装尺寸

NOTE:

1. 板内顶层器件最高1.5mm，底层无器件；
2. 模组外形尺寸公差为±0.15mm，板厚以及未标注公差为±0.1mm。

5. Pin Definition（引脚定义）

PIN	SYMBOL	DESCRIPTION
1	GND	Connected to Ground
2	WL_ANT	2.4&5G_WIFI天线接口
3	GND	Connected to Ground
4	BT_5G_ANT	BT&5G从天线接口
5	NC	-
6	GPIOB5/HOST_WAKE_BT	通用GPIO/主机唤醒蓝牙
7	GPIOB3/BT_WAKE_HOST	通用GPIO/蓝牙唤醒主机
8	NC	-
9	VBAT	3.3V 供电
10	USB_DM	USB 功能
11	USB_DP	USB 功能
12	PWR_WF	PWR_KEY
13	WL_WAKE_HOST	WIFI唤醒主机
14	SDIO_D2	I/O
15	SDIO_D3	I/O
16	SDIO_CMD	I/O
17	SDIO_CLK	I/O
18	SDIO_D0	I/O
19	SDIO_D1	I/O
20	GND	Connected to Ground
21	NC	-
22	VIO	3.3V/1.8V
23	NC	-
24	HSOT_WAKE_WL	通用GPIO/主机唤醒WIFI
25	PCM_OUT	I/O
26	PCM_CLK	I/O
27	PCM_IN	I/O

28	PCM_SYNC	I/O
29	UART0_TX	I/O
30	UART0_RX	I/O
31	GND	Connected to Ground
32	NC	-
33	GND	Connected to Ground
34	PWR_BT	通用GPIO/BT_DIS 使能
35	NC	通用GPIO
36	GND	Connected to Ground
37	NC	-
38	NC	-
39	NC	-
40	NC	-
41	UART1_RTS	I/O
42	UART1_TX	I/O
43	UART1_RX	I/O
44	UART1_CTS	I/O

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.WB800D80S.1	FR-4,4LAY	
3	晶体振荡器	40MHz,±10ppm, 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±0.3
8-2	Current Consumption 最大电流	600mA
8-3	Ripple 纹波	≤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
8-6	Interface	SDIO3.0/USB2.0/PCM/UART
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℃±5℃;

电源电压：模块输上入电压 3.3V（±10%）;

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

Ambient condition Temperature :25℃ ± 5℃;

Power supply voltages：3.3V (±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	18	20	22	dBm	

(1Mbps~11Mbps)					
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	-	-	-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 ≦8%)	-	-	-83	dBm	
2) 2Mbps (FER ≦8%)	-	-	-80	dBm	
3) 5.5Mbps (FER ≦8%)	-	-	-79	dBm	
4) 11Mbps (FER ≦8%)	-	-	-76	dBm	
6. Maximum Input Level (FER ≦8%)	-10	-	-	dBm	

9.2 IEEE 802.11g Section (2.4GHz)

Items	Contents				
Specification	IEEE802.11g				
Mode	OFDM				
Channel	CH1 to CH13				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) For antenna port（6~36M）	18	20	22	dBm	
2) For antenna port（48~54M）	17	19	21	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（MCS0~7）	17	19	21	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 802.11ax 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					
TX Characteristics	Min.	Typ.	Max.		Unit	
1. Power Levels (Calibrated)						
1) For antenna port（MCS0~7）	17	19	21		dBm	
2) For antenna port（MCS8~9）	16	18	20		dBm	
3) For antenna port（MCS10~11）	15	17	19		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 ≦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%)	-	-	-51	-49	dBm	
6. Maximum Input Level (PER ≦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）	16	18	20	dBm	
2) For antenna port（48~54M）	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					
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					
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	

9.6 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（MCS0~5）	15	17	19		dBm	
2) For antenna port（MCS6~7）	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)			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	

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

Items	Contents					
Specification	IEEE802.11ac VHT20/40@5GHz					
Mode	OFDM					
Channel	VHT20:CH36 to CH165 VHT40:CH38 to CH163 VHT80:CH42 to 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（MCS0~5）	15	17	19		dBm	
2) For antenna port（MCS6~7）	13	15	17		dBm	
3) 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:CH36 to CH165 HE40:CH38 to CH163 HE80:CH42 to 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（MCS0~5）	15	17	19	dBm	
2) For antenna port（MCS6~7）	13	15	17	dBm	
3) For antenna port（MCS8~9）	12	14	16	dBm	
4) For antenna port（MCS10~11）	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			HE20	HE40	HE80		
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	
11) MCS10(PER ≦10%)	-	-	-54	-51	-49	dBm	
12) MCS11(PER ≦10%)	-	-	-51	-49	-46	dBm	
6. Maximum Input Level (PER ≦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	0 Channels				
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 ≦0.1%)					
1).Basic data rate receiver specifications (BER ≦0.1%)	-	-92	-80		
2).Enhanced data rate receiver specifications (BER ≦0.1%)	-	-93	-80		
3).Bluetooth LE receiver specifications (PER ≦30.8%)	-	-95	-80		
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	

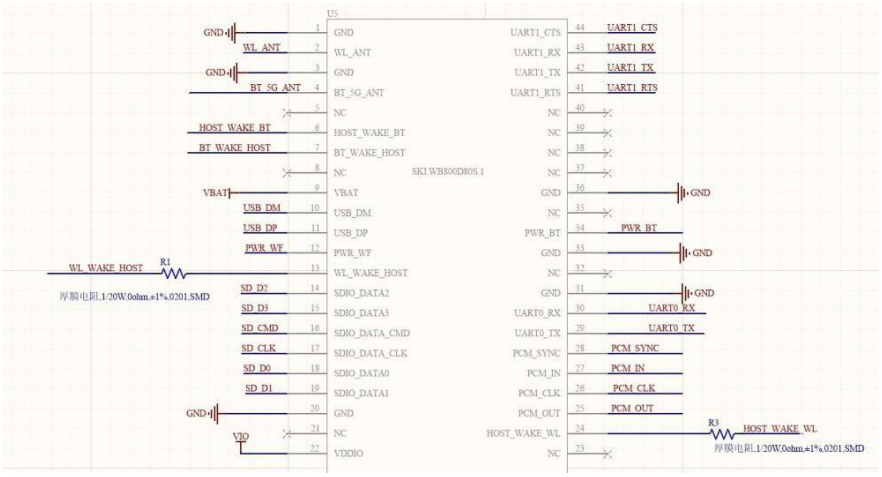
2). 2000MHz to 2399MHz	-27	-	-	dBm	
3). 2498MHz to 3000MHz	-27	-	-	dBm	
4). 3000MHz to 12.75GHz	-10	-	-	dBm	
13. Modulation characteristics					
1). Δf1avg				KHz	
2). Δf2max (For at least 99.9% of all Δf2max)	-	-	-	KHz	
3). Δf1avg /Δf2avg	-	-	-	KHz	
14. ICFT	-	-	-	KHz	
15. Carrier frequency drift					
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			
VIL	Low-level input voltage	VDDIO=3.3V	-0.3	-	VDDIO*0.25	V
		VDDIO=1.8V			VDDIO*0.35	
VOH	High-level output voltage	VDDIO=3.3V	VDDIO-0.4	-	VDDIO+0.3	V
		VDDIO=1.8V	VDDIO-0.2			
VOL	Low-level output voltage	VDDIO=3.3V	-0.3	-	0.4	V
		VDDIO=1.8V			0.2	
RPU	Internal pull-up resistor	VDDIO=3.3V	40	75	190	kΩ
		VDDIO=1.8V	10	50	100	
RPD	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. WL_ANT & BT_5G_ANT为天线接口，需按照50Ω控制阻抗。
2. 靠近 WL_ANT & BT_5G_ANT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，WL_ANT & BT_5 G_ANT 与天线之间需预留π型匹配电路，此π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，VIO网络在靠近模组端放置 1 颗 2.2uF电容
6. UART0&UART1-PIN脚拉出，预留测试点，以便后续的射频性能测试及Debug

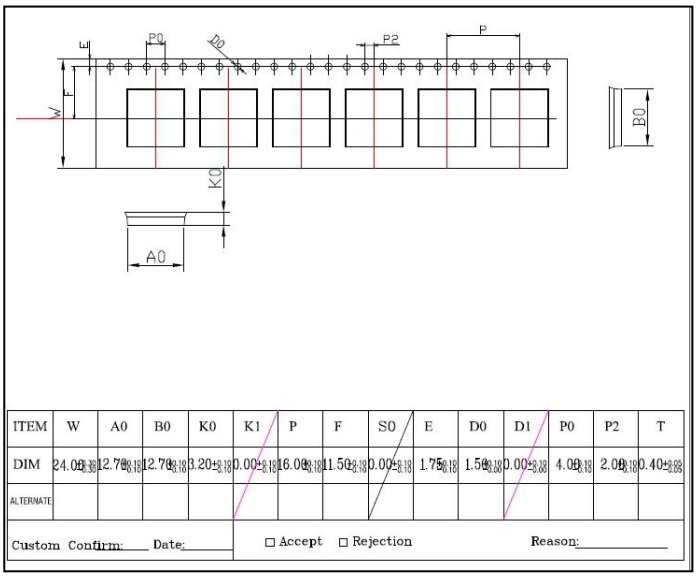
11. Mechanical,Environmental and Reliability Tests

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/sec2; 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±5℃ 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±5℃ 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±3℃@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±3℃@ 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±3℃@3H 40±3℃ @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±3℃@4H +60±3℃@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 Positive10 times 1 time for each second	3	The products can recoverable smoothly after ESD test.

12. Package（包装）

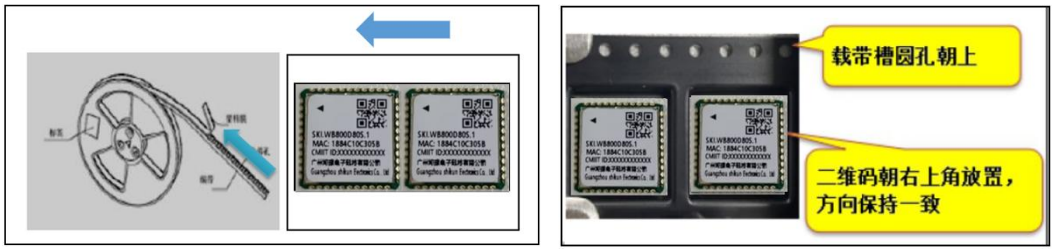
（1） 编带包装示意图



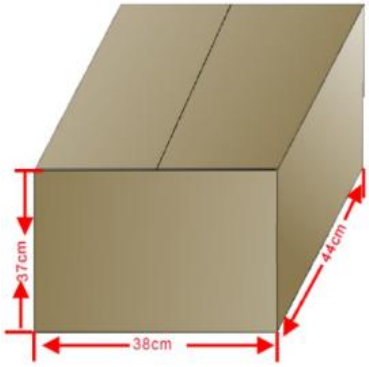
ITEM	W	A0	B0	K0	K1	P	F	S0	E	D0	D1	P0	P2	T
DIM	24.00	12.70	12.70	3.20	0.00	16.00	11.50	0.00	1.75	1.50	0.00	4.00	2.00	0.40
ALTERNATE														

Custom Confirm:____ Date:____ □ Accept □ Rejection Reason:____

（2） 编带方向



（3） 外箱图纸示意图



（4） 包装要求信息

每盘包装1200pcs，每箱装8盘，每箱数量=1200*8=9600pcs

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。

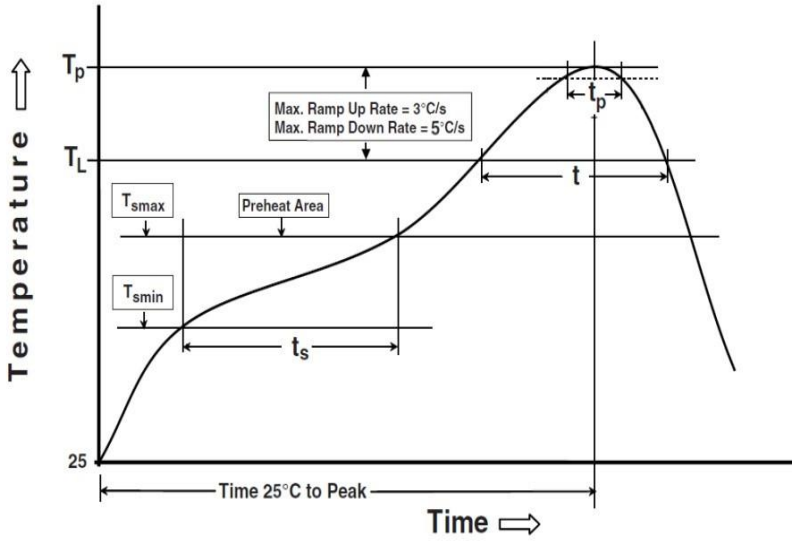


图 13-1 炉温曲线推荐图

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

图 13-2 炉温曲线参数