

保密等级：机密

SPECIFICATION

产品规格书

SKI.WB921AU.1

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

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
V0	2020.07.06	SKI.WB921AU.1 A20273	All	First Issued	San
V1.0	2020.09.06	SKI.WB921AU.1 B20415	All	Change PCB's structure	San
V1.1	2020.10.06	SKI.WB921AU.1 C20523	All	Black PCB turn to Green	San

Content

1. Introduction (简介)	1
2. Features (特性)	1
3. Block Diagram (结构框图)	2
4. Package Outline and Mounting (外形及安装尺寸)	3
5. Product Pictures (实物图片)	5
6. Key Materials (关键物料)	6
7. General Requirements (一般要求)	6
8. Electrical Characteristics (电气特性)	7
8.1 IEEE 802.11b Section(2.4GHz).....	7
8.2 IEEE 802.11g Section(2.4GHz).....	8
8.3 IEEE 802.11n HT20 Section(2.4GHz).....	9
8.4 IEEE 802.11n HT40 Section(2.4GHz).....	10
8.5 IEEE 802.11ax Section(2.4GHz).....	10
8.6 IEEE 802.11a Section(5GHz).....	12
8.7 IEEE 802.11n HT20 Section(5GHz).....	13
8.8 IEEE 802.11n HT40 Section(5GHz).....	13
8.9 IEEE 802.11ac Section(5GHz).....	14
8.10 IEEE 802.11ax Section(5GHz).....	15
8.11 Bluetooth Section.....	17
9. Mechanical,Environmental and Reliability Tests (机械、环境和可靠性测试)	18
10. Reference Design (参考设计)	20
11. Package (包装)	21

1. Introduction（简介）

SKI.WB921AU.1 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.

SKI.WB921AU.1 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。

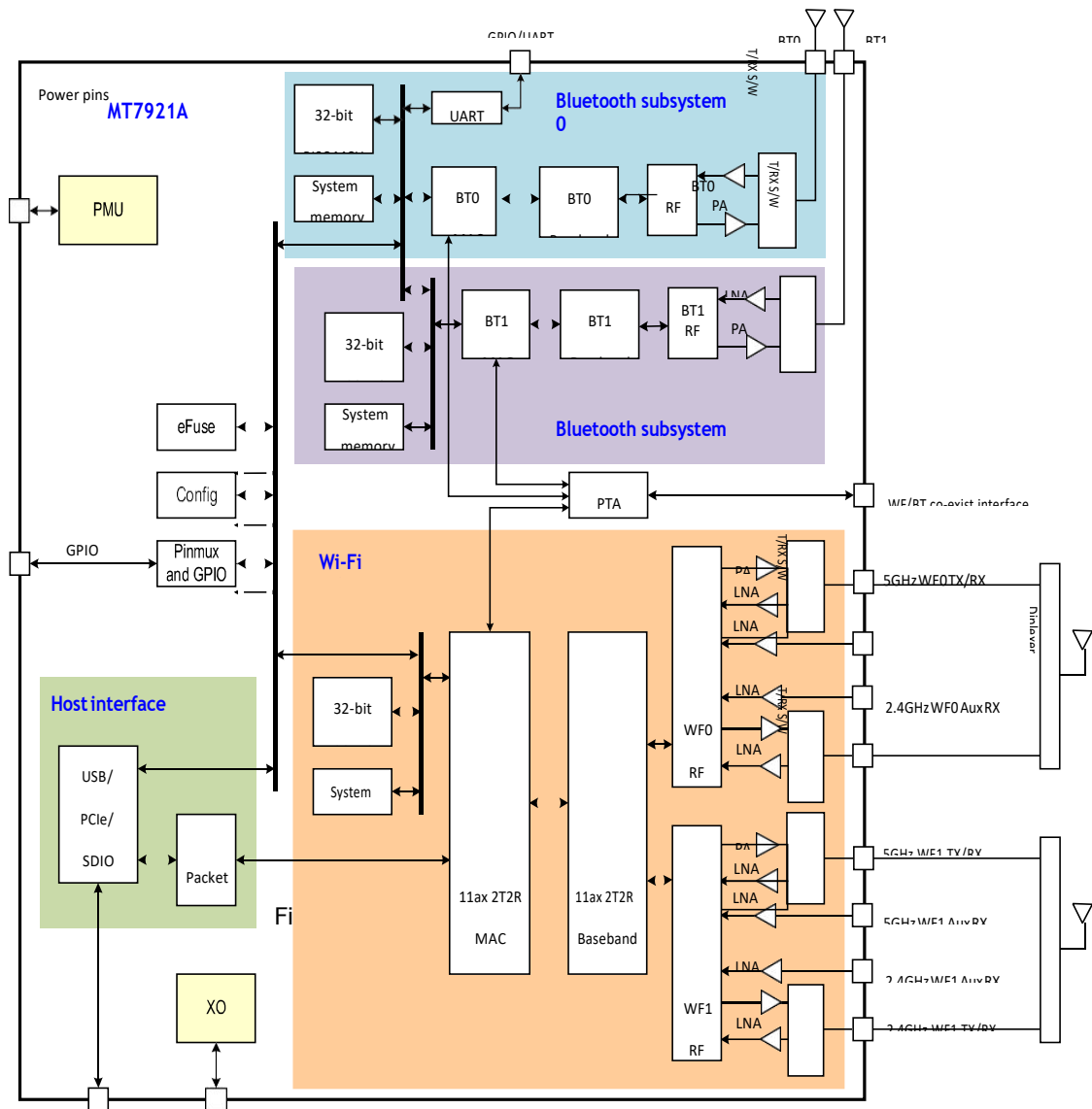
MT7921AUN 使用 USB3.0 高速接口，数据速率高达 800Mbps，优化后的射频架构和基带算法提供了卓越的性能，并且功耗很低。MAC 部署了一个高效的卸载引擎和硬件数据处理加速器，可完全卸载主机处理器的 Wi-Fi 任务。MT7921A 安全、优异的性能，并且符合国际法律法规标准，无论何时何地都为用户提供最好的应用体验。本文档描述了工程要求规范。

2. Features（特性）

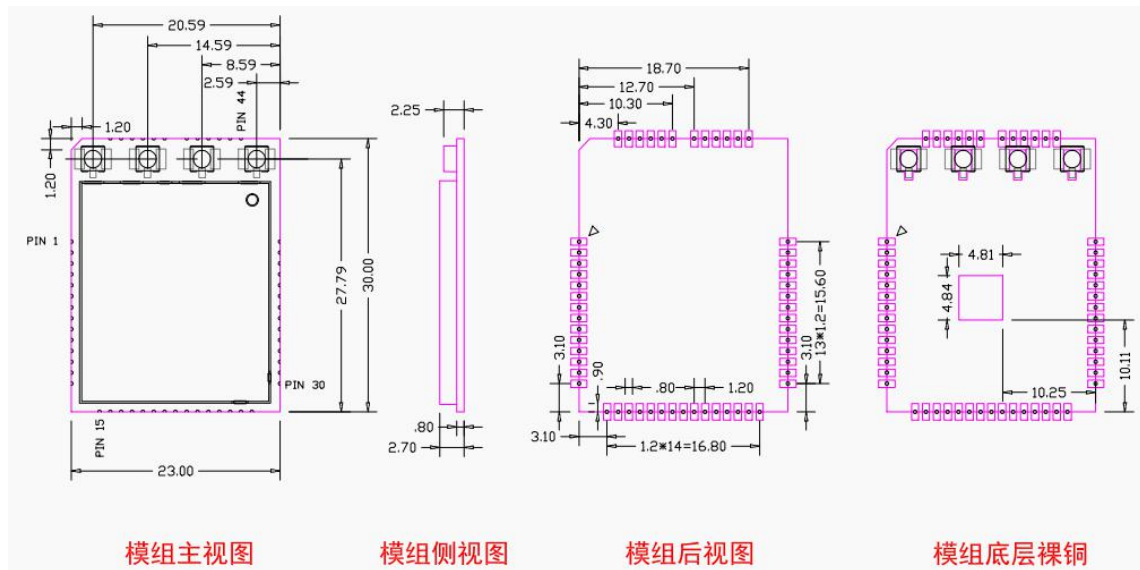
Reserving System 接收制式	IEEE Std. 802.11a
	IEEE Std. 802.11b
	IEEE Std. 802.11g
	IEEE Std. 802.11n
	IEEE Std. 802.11ac
	IEEE Std. 802.11ax
	BT 2.1+EDR
	BT 4.2
	BT 5.2 with BLE (BT low energy)
Chip Solution 芯片方案	MT7921AU
Band 波段	2.4GHz&5GHz
Dimensions 尺寸	30mm×23mm×2.6mm

Model 型号	Installation Mode 安装方式	Protocol I 支持标准	Frequency 频段	Antenna 天线	Remark 备注
SKI.WB921AU.1	SMD	IEEE 802.11a/b/g/n/ac/ax BT 2.1+EDR/4.2/5.2	2.4GHz/5GHz	WiFi&BT : 一代 IpeX	30mm×23mm× 2.6mm

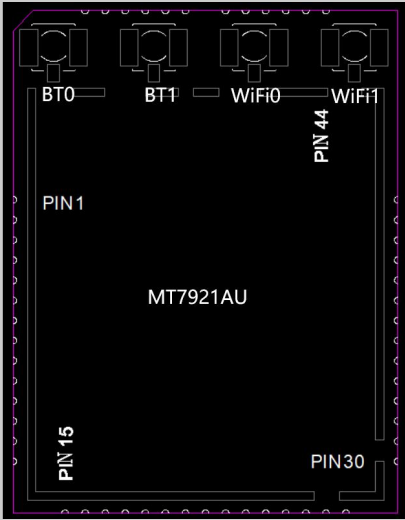
3. Block Diagram (结构框图)



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



Pin Definition（引脚定义）

		
模组正视图		
PIN	SYMBOL	DESCRIPTION
1	GND	GND
2	NC	Not connect
3	NC	Not connect
4	GND	GND
5	RESET	PMU RESET, 内部 10K 上拉, 低电平有效
6	GND	GND
7	GND	GND
8	3.3V	3.3V (DCDC 单独供电, 预留 2A, 纹波小于 120mV)
9	3.3V	3.3V (DCDC 单独供电, 预留 2A, 纹波小于 120mV)

10	GND	GND
11	NC	Not connect
12	NC	Not connect
13	GPIO13	DEBUG,WL FW LOG
14	GPIO4	DEBUG,BT FW LOG
15	GND	GND
16	WIFI_WAKE	WIFI 唤醒，内部 10K 上拉，低电平有效
17	GPIO12	ICE DEBUG
18	GPIO11	ICE DEBUG
19	NC	Not connect
20	GND	GND
21	U3-TXN	USB3.0 TXN，连接主平台 RXN
22	U3-TXP	USB3.0 TXP，连接主平台 RXP
23	GND	GND
24	NC	Not connect
25	NC	Not connect
26	GND	GND
27	U3-RXN	USB3.0 RXN，连接主平台 TXN
28	U3-RXP	USB3.0 RXP，连接主平台 TXP
29	GND	GND
30	U2-DP	USB2.0 DP，连接主平台 DP
31	U2-DM	USB2.0 DM，连接主平台 DM
32	GND	GND
33	NC	Not connect
34	BT_WAKE	BT 唤醒，内部 10K 上拉，低电平有效
35	NC	Not connect
36	NC	Not connect
37	GND	GND
38	NC	Not connect
39	NC	Not connect
40	NC	Not connect
41	NC	Not connect
42	GND	GND
43	GND	GND
44	GND	GND
45	WiFi1	Not connect(默认使用板载 ipex)
46	GND	GND
47	GND	GND

48	WiFi0	Not connect(默认使用板载 ipex)
49	GND	GND
50	GND	GND
51	BT1	Not connect(默认使用板载 ipex)
52	GND	GND
53	GND	GND
54	BT0	Not connect(默认使用板载 ipex)
55	GND	GND

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	SKI.WB921AU.1	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	3.3V+/-0.3
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	External antenna
7-6	USB	High Speed USB 3.0 Interface (兼容 High Speed USB 2.0 Interface)
7-7	Storage Temperature 存储温度	-40°C to +125°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°C ± 5°C；

电源电压：模块输入电压 3.3V+/-0.3；

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

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

Power supply voltages: 3.3V+/-0.3 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)	16	18	19.5	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 $\leq 8\%$)	-	-	-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	

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)	16	18	19.5	dBm	
2. Spectrum Mask @ target power					
1) at fc +/-11MHz	-	-	-20	dB	
2) at fc +/-20MHz	-	-	-28	dB	
3) at fc > +/-30MHz	-	-	-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	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4 Frequency Error	-20	-	20	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5 Minimum Input Level Sensitivity (each chain)					
1) 6Mbps (PER $\leq 10\%$)	-	-	-85	dBm	
2) 9Mbps (PER $\leq 10\%$)	-	-	-84	dBm	
3) 12Mbps (PER $\leq 10\%$)	-	-	-82	dBm	
4) 18Mbps (PER $\leq 10\%$)	-	-	-80	dBm	
5) 24Mbps (PER $\leq 10\%$)	-	-	-77	dBm	
6) 36Mbps (PER $\leq 10\%$)	-	-	-73	dBm	
7) 48Mbps (PER $\leq 10\%$)	-	-	-69	dBm	
8) 54Mbps (PER $\leq 10\%$)	-	-	-65	dBm	

6 Maximum Input Level (PER $\leq 10\%$)	-20	-	-	dBm	
--	-----	---	---	-----	--

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 $\leq 10\%$)	-	-	-82	dBm	
2) MCS1 (PER $\leq 10\%$)	-	-	-79	dBm	
3) MCS2 (PER $\leq 10\%$)	-	-	-77	dBm	
4) MCS3 (PER $\leq 10\%$)	-	-	-74	dBm	
5) MCS4 (PER $\leq 10\%$)	-	-	-70	dBm	
6) MCS5 (PER $\leq 10\%$)	-	-	-66	dBm	
7) MCS6 (PER $\leq 10\%$)	-	-	-65	dBm	
8) MCS7 (PER $\leq 10\%$)	-	-	-64	dBm	
7. Maximum Input Level (PER $\leq 10\%$)	-20	-	-	dBm	

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%)	-	-	-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 $\leq 10\%$)	-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)	16	18	19.5	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 (each chain)					
1) 6Mbps (PER $\leq 10\%$)	-	-	-82	dBm	
2) 9Mbps (PER $\leq 10\%$)	-	-	-81	dBm	
3) 12Mbps (PER $\leq 10\%$)	-	-	-79	dBm	
4) 18Mbps (PER $\leq 10\%$)	-	-	-77	dBm	
5) 24Mbps (PER $\leq 10\%$)	-	-	-74	dBm	
6) 36Mbps (PER $\leq 10\%$)	-	-	-70	dBm	
7) 48Mbps (PER $\leq 10\%$)	-	-	-66	dBm	
8) 54Mbps (PER $\leq 10\%$)	-	-	-65	dBm	
6. Maximum Input Level (PER $\leq 10\%$)	-30	-	-	dBm	

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	dBm	
2) at fc +/-20MHz	-	-	-28	dBm	
3) at fc > +/-30MHz	-	-	-45	dBm	
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 $\leq 10\%$)	-	-	-79	dBm	
2) MCS1 (PER $\leq 10\%$)	-	-	-76	dBm	
3) MCS2 (PER $\leq 10\%$)	-	-	-74	dBm	
4) MCS3 (PER $\leq 10\%$)	-	-	-71	dBm	
5) MCS4 (PER $\leq 10\%$)	-	-	-67	dBm	
6) MCS5 (PER $\leq 10\%$)	-	-	-63	dBm	
7) MCS6 (PER $\leq 10\%$)	-	-	-62	dBm	
8) MCS7 (PER $\leq 10\%$)	-	-	-61	dBm	
6. Maximum Input Level (PER $\leq 10\%$)	-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 20	VHT 40	VHT 80		
1) MCS0 (PER $\leq 10\%$)	-	-	-82	-79	-76	dBm	
2) MCS1 (PER $\leq 10\%$)	-	-	-79	-76	-73	dBm	
3) MCS2 (PER $\leq 10\%$)	-	-	-77	-74	-71	dBm	
4) MCS3 (PER $\leq 10\%$)	-	-	-74	-71	-68	dBm	
5) MCS4 (PER $\leq 10\%$)	-	-	-70	-67	-64	dBm	
6) MCS5 (PER $\leq 10\%$)	-	-	-66	-63	-60	dBm	
7) MCS6 (PER $\leq 10\%$)	-	-	-65	-62	-59	dBm	
8) MCS7 (PER $\leq 10\%$)	-	-	-64	-61	-58	dBm	
9) MCS8 (PER $\leq 10\%$)	-	-	-59	-56	-53	dBm	
10) MCS9 (PER $\leq 10\%$)	-	-	-57	-54	-51	dBm	
6. Maximum Input Level (PER $\leq 10\%$)	-30	-	-			dBm	

8.10 IEEE 802.11ax Section(5GHz)

Items	Contents
Specification	IEEE802.11ax
Mode	BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM and OFDMA
Channel	CH36 to CH165 HE20

	CH38 to CH163 HE40 CH42 to CH157 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			dB
2) at fc +/-20MHz/40MHz/80MHz	-	-	-28			dB
3) at fc +/-30MHz/60MHz/120MHz	-	-	-40			dB
3. Constellation Error(EVM)@ target power						
1) MCS0	-	-	-5			dB
2) MCS1	-	-	-10			dB
3) MCS2	-	-	-13			dB
4) MCS3	-	-	-16			dB
5) MCS4	-	-	-19			dB
6) MCS5	-	-	-22			dB
7) MCS6	-	-	-25			dB
8) MCS7	-	-	-27			dB
9) MCS8	-	-	-30			dB
10) MCS9	-	-	-32			dB
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	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%)	-	-	-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	-	4	-	dBm	
2. Gain step	-	2	-	dB	
3. Receiver sensitivity (BER $\leq 0.1\%$)	-	-93.5	-80	dBm	
4. Maximum usable signal (BER $\leq 0.1\%$)	-	-5	-		
5. C/I co-channel (BER $<0.1\%$)	-	4	11	dB	
6. C/I 1MHz (BER $<0.1\%$)	-	-14	0	dB	
7. C/I 2MHz (BER $<0.1\%$)	-	-42	-30	dB	
8. C/I ≥ 3 MHz (BER $<0.1\%$)	-	-49	-40	dB	
9. C/I Image channel (BER $<0.1\%$)	-	-25	-9	dB	
10. C/I Image 1MHz (BER $<0.1\%$)	-	-50	-20	dB	
11. Inter-modulation	-	-13	-	dB	
12. Out-of-band blocking					
1). 30MHz to 2000MHz	-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). Δf_{1avg}	140	157	175	KHz	
2). Δf_{2max} (For at least 99.9% of all Δf_{2max})	115	140	-	KHz	
3). $\Delta f_{1avg} / \Delta f_{2avg}$	0.8	0.98	-	KHz	
14. ICFT	-75	± 20	+75	KHz	
15. Carrier frequency drift					
1). One slot packet (DH1)	-25	± 15	+25	KHz	
2). Two slot packet (DH3)	-40	± 15	+40	KHz	
3). Five slot packet (DH5)	-40	± 15	+40	KHz	
4). Max drift rate	-	6	20	KHz/50us	
16. TX output spectrum(20dB bandwidth)	-	922	1000	KHz	
17. In-Band spurious emission					
1). ± 2 MHz offset	-	-45	-20	dBm	
2). ± 3 MHz offset	-	-48	-40	dBm	
3). $> \pm 3$ MHz offset	-	-48	-40	dBm	

9. Mechanical, Environmental and Reliability Tests

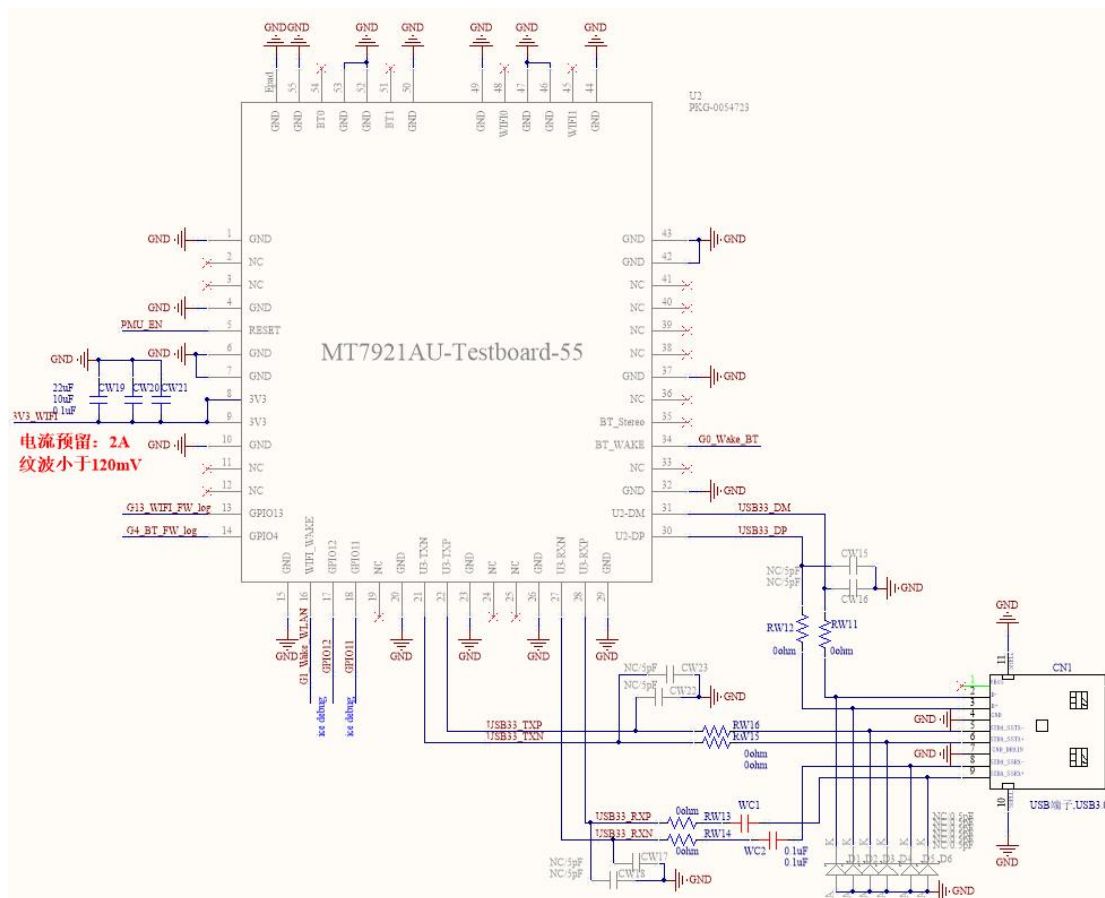
(机械、环境和可靠性测试)

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 Operation Test	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.
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

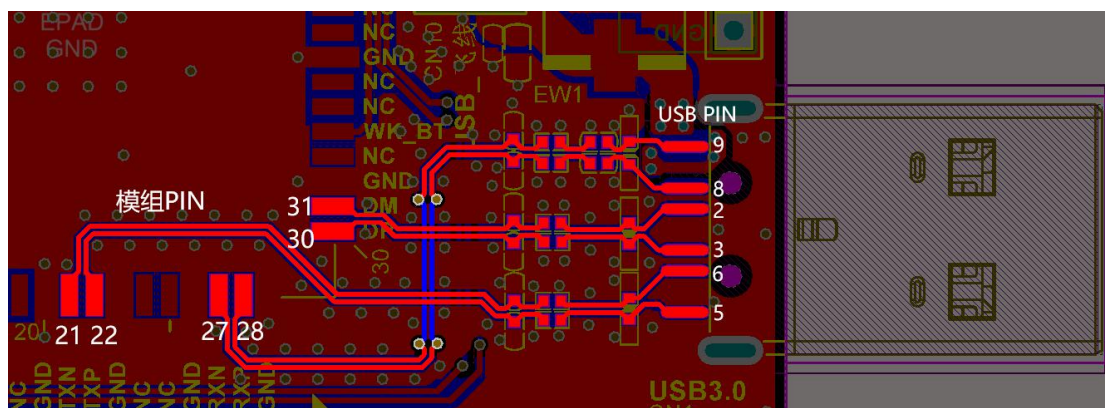
9-7	Low temperature start test	Leave samples in -15℃ for 4x hours	4	After test, power on and off the samples for 3x tiems, the samples should be able to start normally
9-8	High Temperature and Humidity Storage Test	Leave samples in 85℃, 95% RH @ 48 hours	4	After test, the products appearance, power, 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.

SCH 参考

需要注意：不同 USB3.0 端子的网络定义命名不一，请客户加以甄别，避免接线错误！



PCB 参考



11. Package（包装）

（1）编带尺寸：

暂无

（2）编带方向：

暂无

（3）包装示意图：

暂无

（4）标签样式：

暂无