

天线规格书

Antenna specification for approval

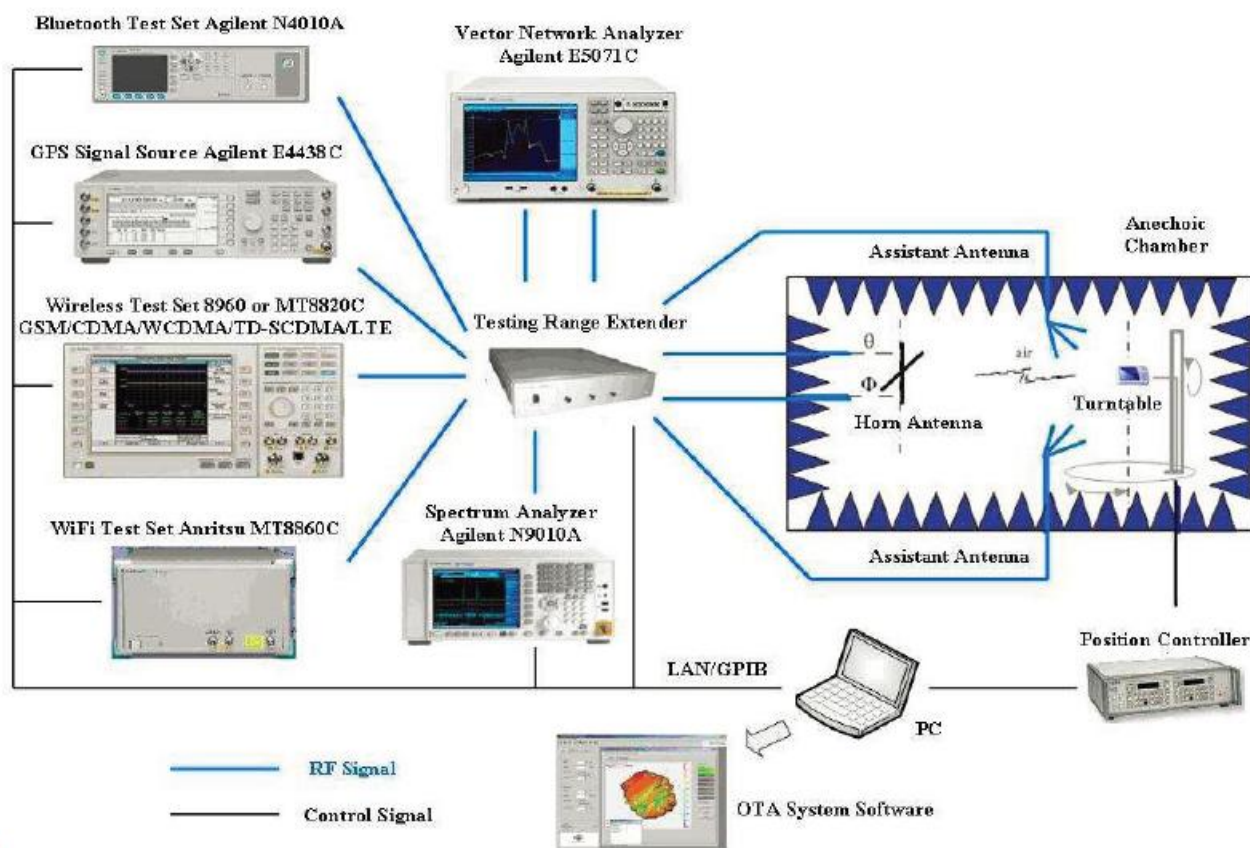
客户名称 Customer name	蓝晨		
机型 Model	N14CPE (14 寸塑胶壳-亿道主板-6221C 模块)		
天线频段 Antenna frequency	2. 4GHZ&5GHz		
天线功能 Antenna function	WIFI&BT&5Gwifi (副) 天线		
天线材质 Antenna material	FPC	FPC 颜色 FPC color	黑色
型号 model	SF2104A-1B2-A		
料号 Material number	SF2104A-1L24G-305-A		
客户料号 Customer Part Number			
索沃德承认签章 Ward accepted the signature		客户承认签章 Client acknowledges signature	
结构 structure		采购 Purchase	
文控 Document control		结构 structure	
射频 radio frequency		工程 engineering	
审核 To examine		品质 QC	
承办人 Responsible 李婷婷		审核 To examine	
日期 date 2023. 07. 27	盖章区 Seal area	日期 date 2023. 07. 27	盖章区 Seal area

序号	认证编号	材质类型	发证日期	备注
1	A2230173541101001E	镀锡铜线	2023-04-24	一年
2	CANEC2227657302	卤素	2022-12-28	一年
3	CANEC2227657303	背胶	2022-12-28	一年
4	SHAEC23000346911	FEP 护套	2023-01-13	一年
5	SHAEC22004639301	FEP 绝缘	2022-12-15	一年
6	SZXEC2203054804	锡线	2022-09-19	一年
7	SZXEC2203054808	锡条	2022-09-19	一年
8	ETR22800844	印刷油墨	2022-08-09	一年
9	A2230173918101001E	基材	2023-04-18	一年
10	CANEC2227574118	EVA 泡棉	2023-01-03	一年
11	SZXEC2202709609	导电布	2022-08-16	一年
12	CANEC2218227002	金镀层	2022-08-30	一年

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一:设备支持&可测试天线类型



天线功能	频率范围	测试仪器	测试方式	测试标准
2G天线 (GSM)	824MHz-960MHz, 1710MHz-1990MHz	5071B、8960、 OTA暗室	有源测试、无源测试	索沃德标准、客户要求
3G天线 (WCDMA/TDSCDMA/CDMA-EVDO/2000)	824MHz-960MHz, 1710MHz-2170MHz	5071B、8960、 OTA暗室	有源测试、无源测试	索沃德标准、客户要求
4G天线 (LTE-FDD/LTE-TDD)		5071B、CMW500、 SP8011、OTA暗室	有源测试、无源测试	索沃德标准、客户要求
WIFI天线	2.4GHz-2.48GHz, 5.15GHz-5.35GHz, 5.725GHz-5.825GHz	5071B、CMW500、 OTA暗室、路由器 、PC	有源测试、无源测试 、APK实测、吞吐量 测试	索沃德标准、客户要求
BT天线	2.4GHz-2.48GHz	5071B、OTA暗室 、蓝牙音箱	无源测试、实测	索沃德标准、客户要求
定位天线 (GPS、GLONASS、北斗、伽利略)	1575.42MHz±10MHz 1602MHz±0.5625MHz 1561MHz±2.046MHz	5071B、OTA暗室 、APK	无源测试、实测	索沃德标准、客户要求
NFC天线	13.56MHz	5071B、专用测试 治具、OTA暗室、 APK	无源测试、实测	索沃德标准、客户要求
遥控天线	433MHz	5071B、OTA暗室	无源测试、实测	索沃德标准、客户要求

二:概述

(1)Antenna performance

- 1.This approval sheet supports for MID project. FPC antennas include in this project. This report is for the performance of WIFI&BT antenna.
- 2.Antenna shape size: Meet the requirement of MID
- 3.Antenna band: 2.4GHz~5GHz
- 4.Antenna material: Antenna material meet the requirement of MID
- 5.Adhesive performance: Adhesive performance meet the requirement of MID
- 6.Antenna performance meet the spec below:

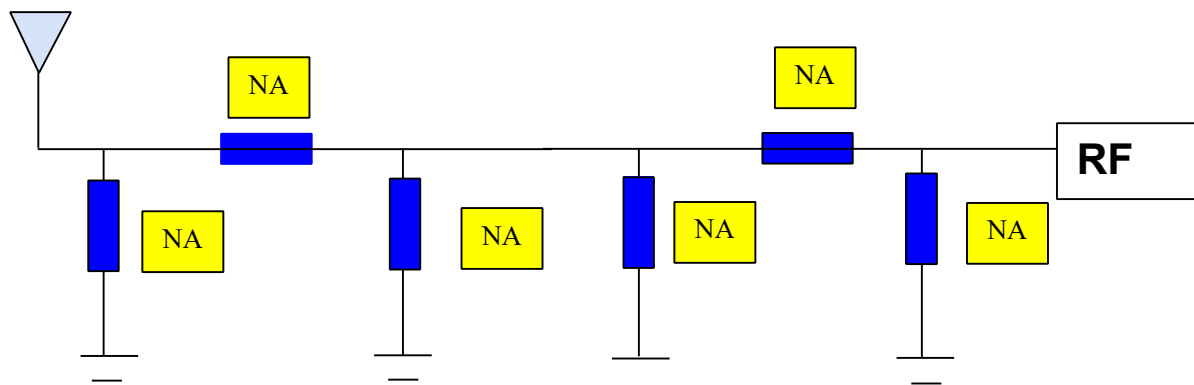
Description	2.4GHz~5GHz	Units
VSWR	≤ 2.0	
Average Antenna Gain	≥ -4.5	dB
Feed Impedance	50 ohms	
Operating Temperature	-40 to +85 deg C	
Polarization / Azimuth	Linear / Omni-directional	

(2)Mechanical Information

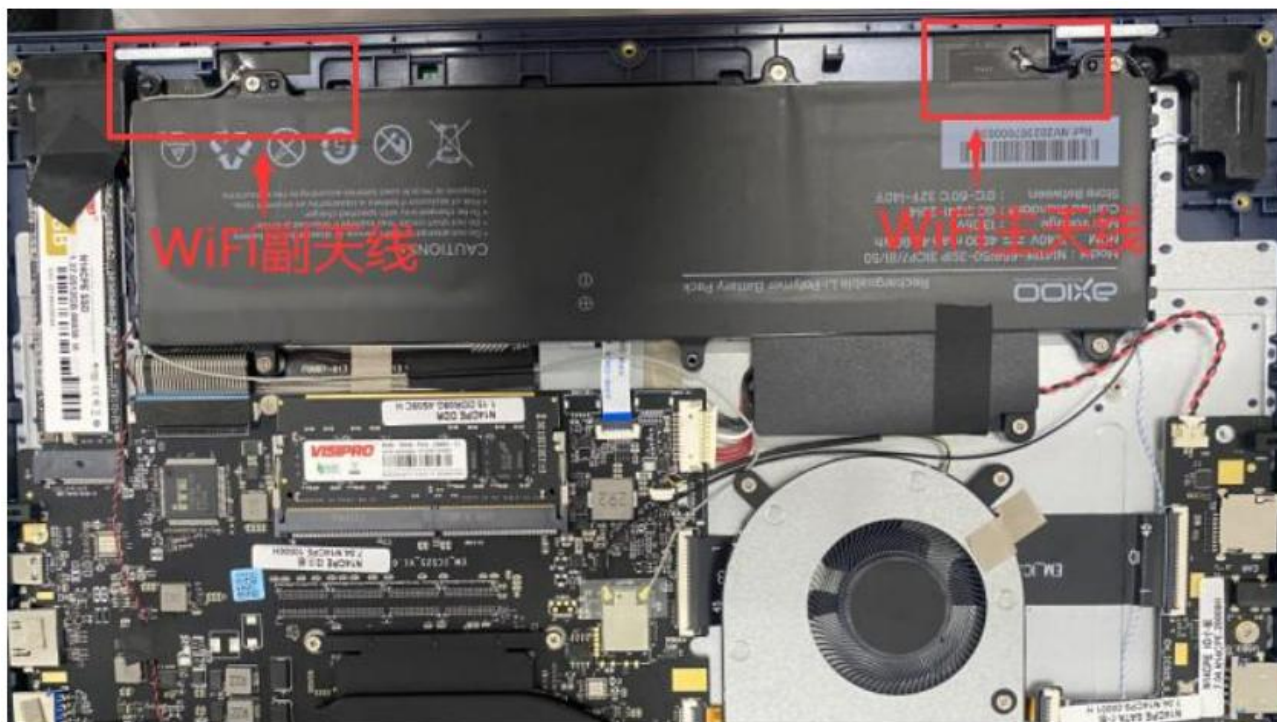
Mechanical Dimension	
Cable Length	305mm/GRAY
Description	WIFI&BT antenna
Material	FPC
Coaxial Cable	50 Ω /O. D. 0.81mm
Environmental	
Operation Temperature	-40 to +85 deg C
Storage Temperature	-40 to +85 deg C

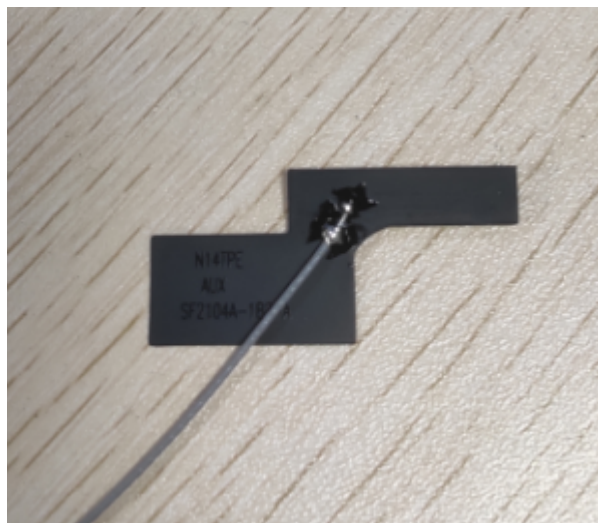
三:匹配电路图&机器图片&天线图片

(1)匹配电路

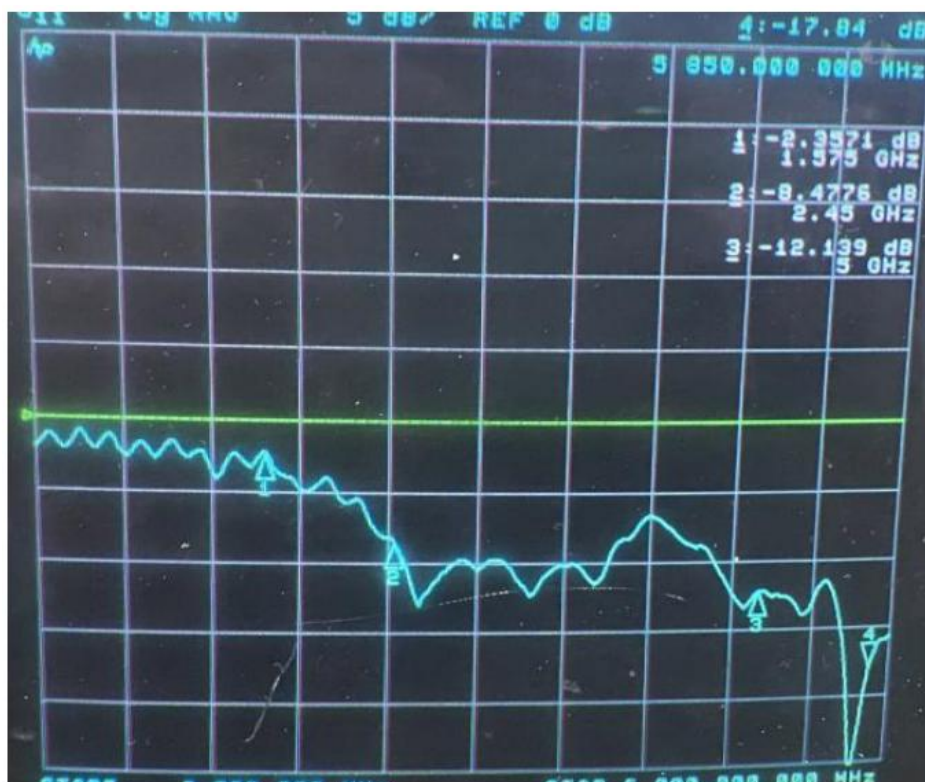


(2) 机器图片&天线图片





四: 天线驻波比&天线效率 (VSWR)

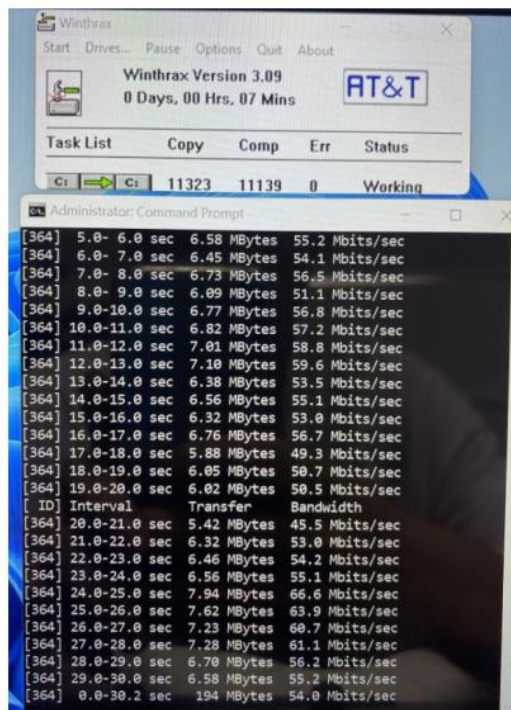


Passive Test For 2.4G-WiFi-BT			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
2400	36.04	-4.43	1.58
2410	35.96	-4.44	1.79
2420	35.56	-4.49	1.76
2430	34.74	-4.59	1.9
2440	41.15	-3.86	2.59
2450	45.61	-3.41	3.06
2460	47.69	-3.22	3.1
2470	46.66	-3.31	3.04
2480	47.84	-3.2	3.17
2490	47.62	-3.22	3.21
2500	49.87	-3.02	3.52

Passive Test For 5G-WiFi			
Freq	Effi	Effi	Gain
(MHz)	(%)	(dB)	(dBi)
5000	44.6	-3.51	1.58
5100	41.84	-3.78	0.95
5200	46.15	-3.36	1.59
5300	53.75	-2.7	2.44
5400	47.73	-3.21	2.52
5500	56.44	-2.48	3.11
5600	53.14	-2.75	3.64
5700	72.34	-1.41	6.57
5800	68.6	-1.64	5.28
5900	66.59	-1.77	3.93
6000	75.17	-1.24	4.59

五:吞吐量测试

测试数据2.4Gwifi上传/下载



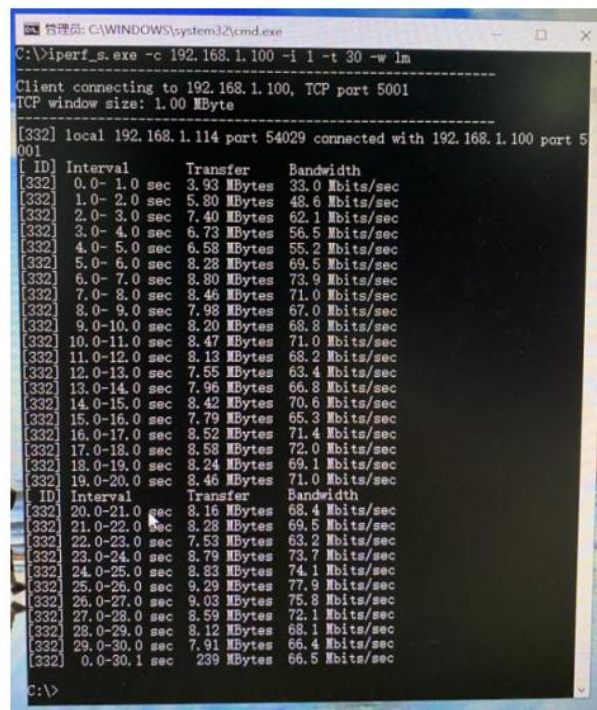
WinThrax Version 3.09
0 Days, 00 Hrs, 07 Mins

Task List: Copy, Comp, Err, Status

C:\ 11323 11139 0 Working

Administrator: Command Prompt

ID	Interval	Transfer	Bandwidth
[364]	5.0-6.0 sec	6.58 MBytes	55.2 Mbits/sec
[364]	6.0-7.0 sec	6.45 MBytes	54.1 Mbits/sec
[364]	7.0-8.0 sec	6.73 MBytes	56.5 Mbits/sec
[364]	8.0-9.0 sec	6.09 MBytes	51.1 Mbits/sec
[364]	9.0-10.0 sec	6.77 MBytes	56.8 Mbits/sec
[364]	10.0-11.0 sec	6.82 MBytes	57.2 Mbits/sec
[364]	11.0-12.0 sec	7.01 MBytes	58.8 Mbits/sec
[364]	12.0-13.0 sec	7.10 MBytes	59.6 Mbits/sec
[364]	13.0-14.0 sec	6.38 MBytes	53.5 Mbits/sec
[364]	14.0-15.0 sec	6.56 MBytes	55.1 Mbits/sec
[364]	15.0-16.0 sec	6.32 MBytes	53.0 Mbits/sec
[364]	16.0-17.0 sec	6.76 MBytes	56.7 Mbits/sec
[364]	17.0-18.0 sec	5.88 MBytes	49.3 Mbits/sec
[364]	18.0-19.0 sec	6.05 MBytes	50.7 Mbits/sec
[364]	19.0-20.0 sec	6.02 MBytes	50.5 Mbits/sec
[364]	20.0-21.0 sec	5.42 MBytes	45.5 Mbits/sec
[364]	21.0-22.0 sec	6.32 MBytes	53.0 Mbits/sec
[364]	22.0-23.0 sec	6.46 MBytes	54.2 Mbits/sec
[364]	23.0-24.0 sec	6.56 MBytes	55.1 Mbits/sec
[364]	24.0-25.0 sec	7.94 MBytes	66.6 Mbits/sec
[364]	25.0-26.0 sec	7.62 MBytes	63.9 Mbits/sec
[364]	26.0-27.0 sec	7.23 MBytes	60.7 Mbits/sec
[364]	27.0-28.0 sec	7.28 MBytes	61.1 Mbits/sec
[364]	28.0-29.0 sec	6.79 MBytes	56.2 Mbits/sec
[364]	29.0-30.0 sec	6.58 MBytes	55.2 Mbits/sec
[364]	30.0-30.2 sec	194 MBytes	54.0 Mbits/sec



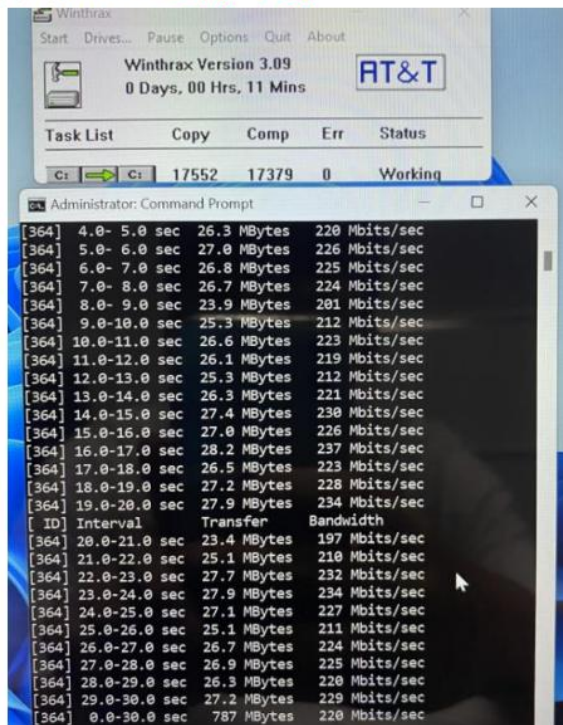
C:\>iperf_s.exe -c 192.168.1.100 -i 1 -t 30 -w 1m

Client connecting to 192.168.1.100, TCP port 5001
TCP window size: 1.00 MByte

[332] local 192.168.1.114 port 54029 connected with 192.168.1.100 port 5001

ID	Interval	Transfer	Bandwidth
[332]	0.0-1.0 sec	3.93 MBytes	33.0 Mbits/sec
[332]	1.0-2.0 sec	5.80 MBytes	48.6 Mbits/sec
[332]	2.0-3.0 sec	7.40 MBytes	62.1 Mbits/sec
[332]	3.0-4.0 sec	6.73 MBytes	56.5 Mbits/sec
[332]	4.0-5.0 sec	6.58 MBytes	55.2 Mbits/sec
[332]	5.0-6.0 sec	8.28 MBytes	69.5 Mbits/sec
[332]	6.0-7.0 sec	8.80 MBytes	73.9 Mbits/sec
[332]	7.0-8.0 sec	8.46 MBytes	71.0 Mbits/sec
[332]	8.0-9.0 sec	7.98 MBytes	67.0 Mbits/sec
[332]	9.0-10.0 sec	9.20 MBytes	68.8 Mbits/sec
[332]	10.0-11.0 sec	8.47 MBytes	71.0 Mbits/sec
[332]	11.0-12.0 sec	8.13 MBytes	68.2 Mbits/sec
[332]	12.0-13.0 sec	7.55 MBytes	63.4 Mbits/sec
[332]	13.0-14.0 sec	7.96 MBytes	66.8 Mbits/sec
[332]	14.0-15.0 sec	8.42 MBytes	70.6 Mbits/sec
[332]	15.0-16.0 sec	7.79 MBytes	65.3 Mbits/sec
[332]	16.0-17.0 sec	8.52 MBytes	71.4 Mbits/sec
[332]	17.0-18.0 sec	8.58 MBytes	72.0 Mbits/sec
[332]	18.0-19.0 sec	8.24 MBytes	69.1 Mbits/sec
[332]	19.0-20.0 sec	8.46 MBytes	71.0 Mbits/sec
[332]	20.0-21.0 sec	8.16 MBytes	68.4 Mbits/sec
[332]	21.0-22.0 sec	8.28 MBytes	69.5 Mbits/sec
[332]	22.0-23.0 sec	7.53 MBytes	63.2 Mbits/sec
[332]	23.0-24.0 sec	8.79 MBytes	73.7 Mbits/sec
[332]	24.0-25.0 sec	8.83 MBytes	74.1 Mbits/sec
[332]	25.0-26.0 sec	9.29 MBytes	77.9 Mbits/sec
[332]	26.0-27.0 sec	9.03 MBytes	75.8 Mbits/sec
[332]	27.0-28.0 sec	8.59 MBytes	72.1 Mbits/sec
[332]	28.0-29.0 sec	8.12 MBytes	68.1 Mbits/sec
[332]	29.0-30.0 sec	7.91 MBytes	66.4 Mbits/sec
[332]	30.0-30.1 sec	239 MBytes	66.5 Mbits/sec

测试数据5Gwifi上传/下载



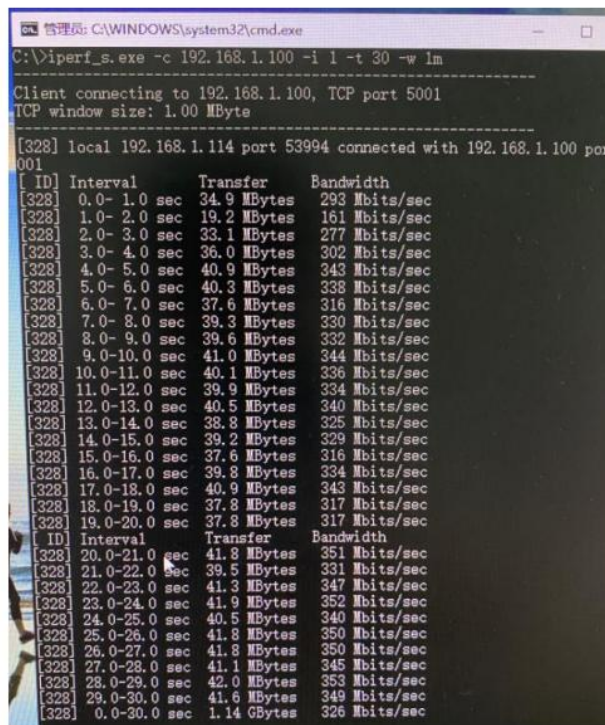
WinThrax Version 3.09
0 Days, 00 Hrs, 11 Mins

Task List: Copy, Comp, Err, Status

C:\ 17552 17379 0 Working

Administrator: Command Prompt

ID	Interval	Transfer	Bandwidth
[364]	4.0-5.0 sec	26.3 MBytes	220 Mbits/sec
[364]	5.0-6.0 sec	27.0 MBytes	226 Mbits/sec
[364]	6.0-7.0 sec	26.8 MBytes	225 Mbits/sec
[364]	7.0-8.0 sec	26.7 MBytes	224 Mbits/sec
[364]	8.0-9.0 sec	23.9 MBytes	201 Mbits/sec
[364]	9.0-10.0 sec	25.3 MBytes	212 Mbits/sec
[364]	10.0-11.0 sec	26.6 MBytes	223 Mbits/sec
[364]	11.0-12.0 sec	26.1 MBytes	219 Mbits/sec
[364]	12.0-13.0 sec	25.3 MBytes	212 Mbits/sec
[364]	13.0-14.0 sec	26.3 MBytes	221 Mbits/sec
[364]	14.0-15.0 sec	27.4 MBytes	230 Mbits/sec
[364]	15.0-16.0 sec	27.0 MBytes	226 Mbits/sec
[364]	16.0-17.0 sec	28.2 MBytes	237 Mbits/sec
[364]	17.0-18.0 sec	26.5 MBytes	223 Mbits/sec
[364]	18.0-19.0 sec	27.2 MBytes	228 Mbits/sec
[364]	19.0-20.0 sec	27.9 MBytes	234 Mbits/sec
[364]	20.0-21.0 sec	23.4 MBytes	197 Mbits/sec
[364]	21.0-22.0 sec	25.1 MBytes	210 Mbits/sec
[364]	22.0-23.0 sec	27.9 MBytes	232 Mbits/sec
[364]	23.0-24.0 sec	27.7 MBytes	234 Mbits/sec
[364]	24.0-25.0 sec	27.1 MBytes	227 Mbits/sec
[364]	25.0-26.0 sec	25.1 MBytes	211 Mbits/sec
[364]	26.0-27.0 sec	26.7 MBytes	224 Mbits/sec
[364]	27.0-28.0 sec	26.9 MBytes	225 Mbits/sec
[364]	28.0-29.0 sec	26.3 MBytes	220 Mbits/sec
[364]	29.0-30.0 sec	27.2 MBytes	229 Mbits/sec
[364]	30.0-30.0 sec	787 MBytes	220 Mbits/sec



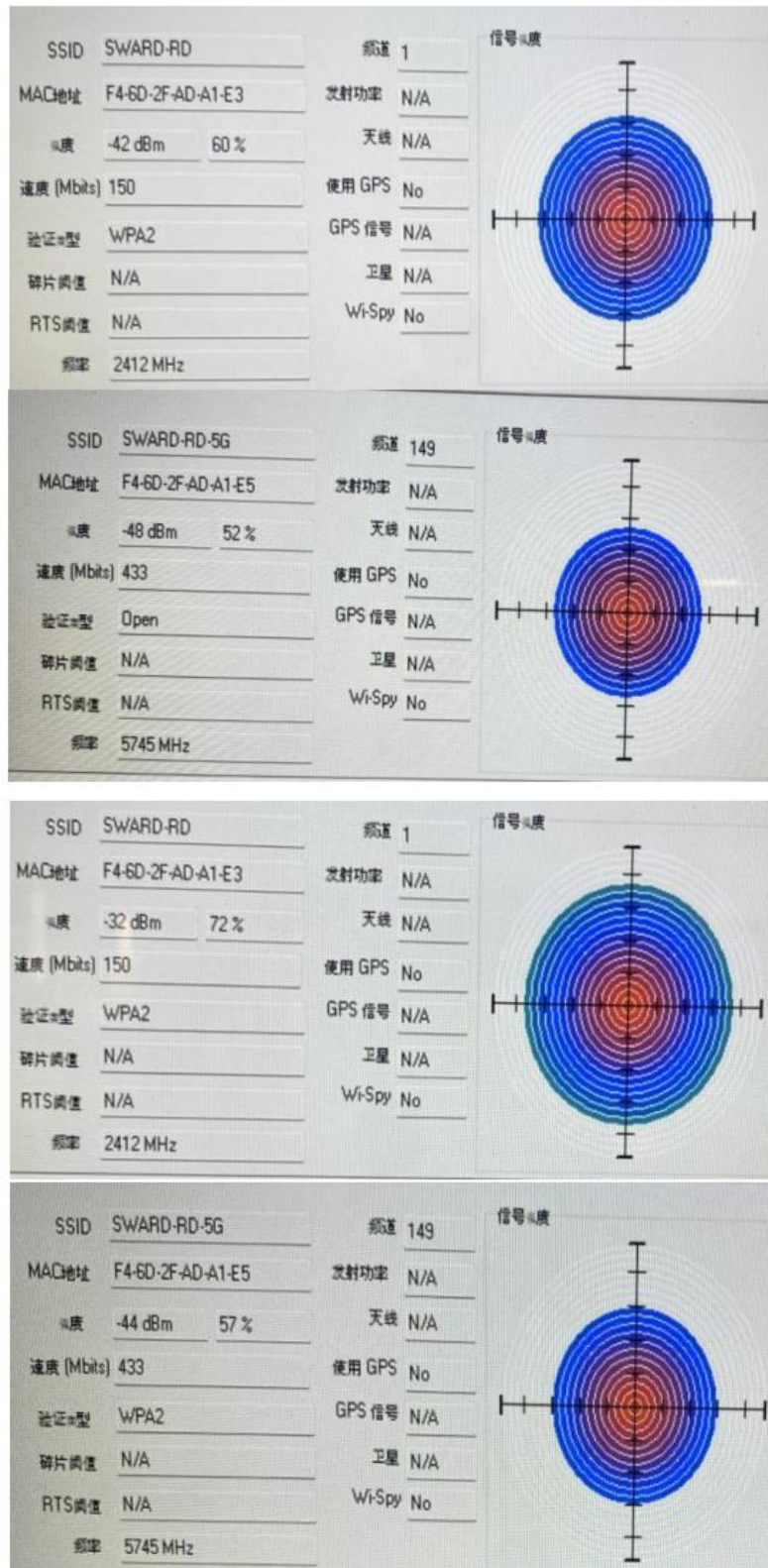
C:\>iperf_s.exe -c 192.168.1.100 -i 1 -t 30 -w 1m

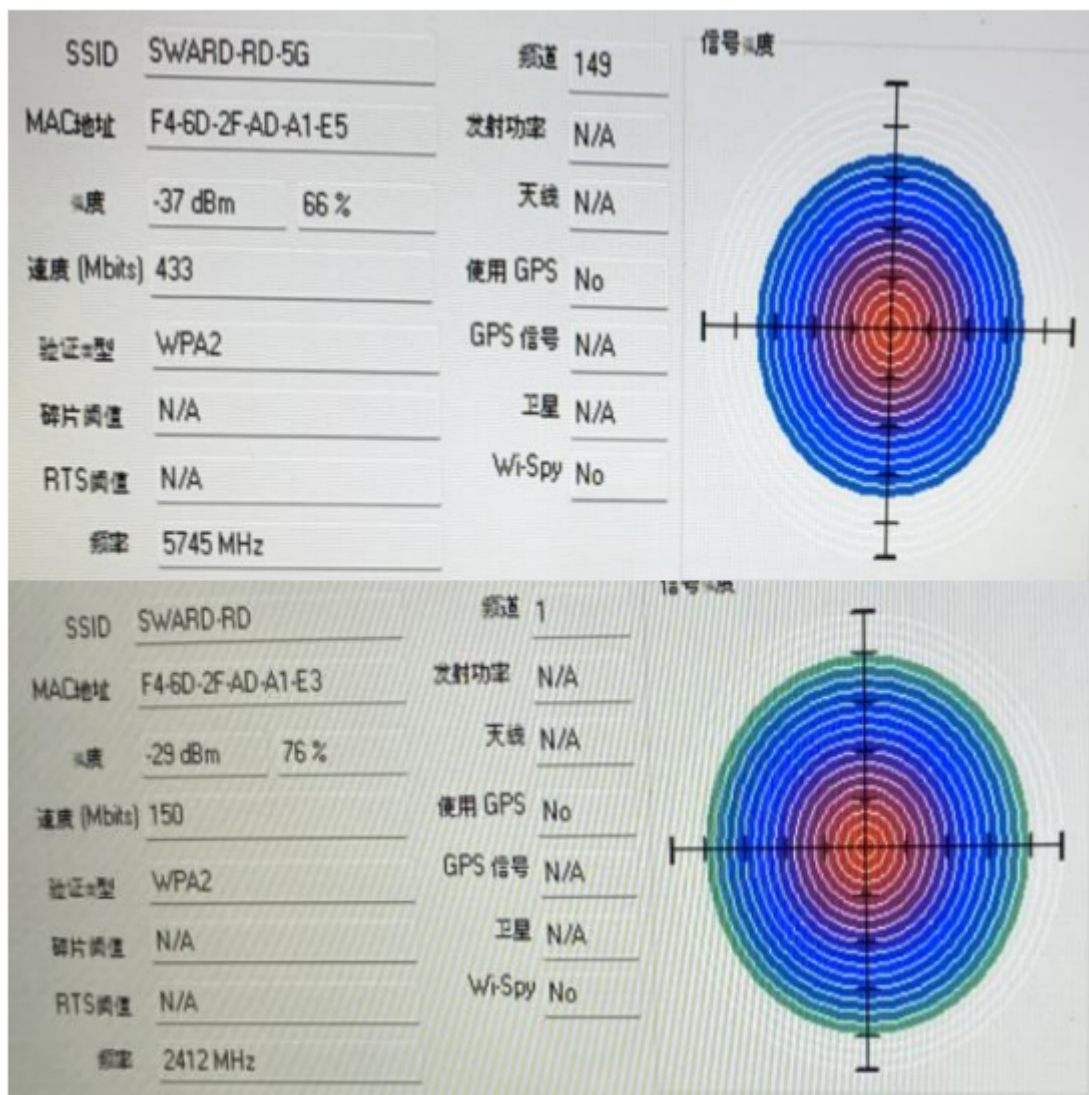
Client connecting to 192.168.1.100, TCP port 5001
TCP window size: 1.00 MByte

[328] local 192.168.1.114 port 53994 connected with 192.168.1.100 port 5001

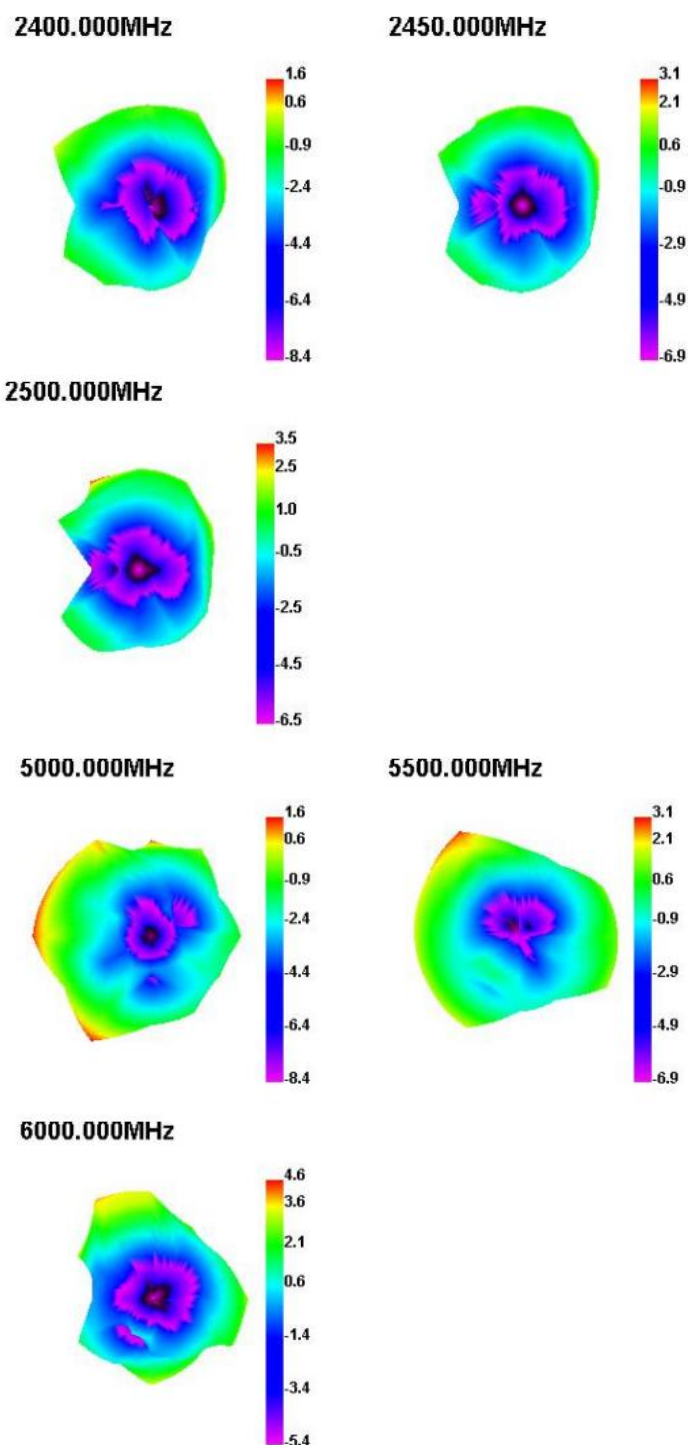
ID	Interval	Transfer	Bandwidth
[328]	0.0-1.0 sec	34.9 MBytes	293 Mbits/sec
[328]	1.0-2.0 sec	19.2 MBytes	161 Mbits/sec
[328]	2.0-3.0 sec	33.1 MBytes	277 Mbits/sec
[328]	3.0-4.0 sec	36.0 MBytes	302 Mbits/sec
[328]	4.0-5.0 sec	40.9 MBytes	343 Mbits/sec
[328]	5.0-6.0 sec	40.3 MBytes	338 Mbits/sec
[328]	6.0-7.0 sec	37.6 MBytes	316 Mbits/sec
[328]	7.0-8.0 sec	39.3 MBytes	330 Mbits/sec
[328]	8.0-9.0 sec	39.6 MBytes	332 Mbits/sec
[328]	9.0-10.0 sec	41.0 MBytes	344 Mbits/sec
[328]	10.0-11.0 sec	40.1 MBytes	336 Mbits/sec
[328]	11.0-12.0 sec	39.9 MBytes	334 Mbits/sec
[328]	12.0-13.0 sec	40.5 MBytes	340 Mbits/sec
[328]	13.0-14.0 sec	38.8 MBytes	325 Mbits/sec
[328]	14.0-15.0 sec	39.2 MBytes	329 Mbits/sec
[328]	15.0-16.0 sec	37.6 MBytes	316 Mbits/sec
[328]	16.0-17.0 sec	39.8 MBytes	334 Mbits/sec
[328]	17.0-18.0 sec	40.9 MBytes	343 Mbits/sec
[328]	18.0-19.0 sec	37.8 MBytes	317 Mbits/sec
[328]	19.0-20.0 sec	37.8 MBytes	317 Mbits/sec
[328]	20.0-21.0 sec	41.8 MBytes	351 Mbits/sec
[328]	21.0-22.0 sec	39.5 MBytes	331 Mbits/sec
[328]	22.0-23.0 sec	41.3 MBytes	347 Mbits/sec
[328]	23.0-24.0 sec	41.9 MBytes	352 Mbits/sec
[328]	24.0-25.0 sec	40.5 MBytes	340 Mbits/sec
[328]	25.0-26.0 sec	41.8 MBytes	350 Mbits/sec
[328]	26.0-27.0 sec	41.8 MBytes	350 Mbits/sec
[328]	27.0-28.0 sec	41.1 MBytes	345 Mbits/sec
[328]	28.0-29.0 sec	42.0 MBytes	353 Mbits/sec
[328]	29.0-30.0 sec	41.6 MBytes	349 Mbits/sec
[328]	30.0-30.0 sec	1.14 GBytes	326 Mbits/sec

六:信号强度

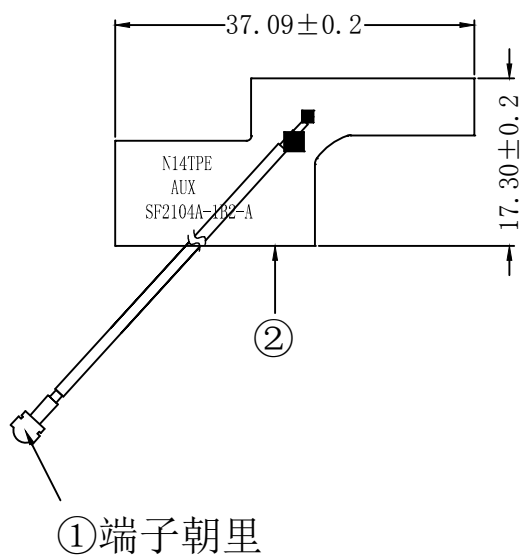
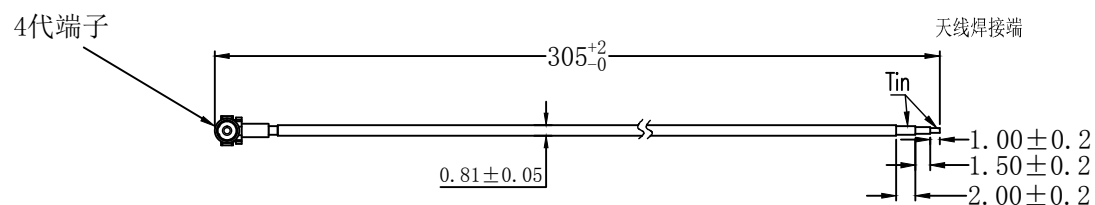




七:3D pattern



八:结构图纸



技术要求:

1. 打*为重点尺寸;
2. 尺寸符合图纸要求;
3. 焊点无虚焊、假焊。要求圆润、饱满。
4. 网分测试通过（出现指定波形）。
5. 线形尺寸未注公差按照SJ/T 10628 1995 6级，公差值由上下偏差均分;

5												SWARD				SF2104A-1L24G-305-A					
4																					
3							签名	年月日	量产	签名	年月日	阶段标记			比例	<div>ROHS</div>					
2	FPC		黑色	1	SF2104A-1B2-A		RD	YWD	2023. 07. 27	Q C			1							A	
1	同轴线	4代端子	灰色	1	∅=0. 81mm	RF															
序号	名称	材料	颜色	数量	描述	审核			批准			共 1 张		第 1 张							



深圳市索沃德通讯技术有限公司

Shenzhen Suo Ward Communication Technology Co., Ltd.

九:样品检验标准

样品检验标准

客户	蓝晨	品名规格	SF2104A-1L24G-305-A	样品数量	3PCS	送样日期	2023. 07. 27	
检验标准	<input checked="" type="checkbox"/> 正常检验 <input type="checkbox"/> 加严检验 <input type="checkbox"/> 减量检验							
抽样方式	MIL-STD-105E 抽样表 AQL:0.040%							
抽样数	3				抽检结果	OK		
项目	检验内容	检验标准	检验方法	检验结果			判定	
包装检验	OQC 检验	1. 符合客户要求包装方式，无混装。		OK			合格	
		2. 数量准确，备品明确		OK			合格	
		3. 标识清楚、完整、无误、尾数箱有明确标记		OK			合格	
尺寸外观检验	IQC 检验	1. FPC 主体尺寸检验，符合精度要求（主体外形尺寸及 FPC 厚度）	卡尺/千分尺	标准尺寸				合格
				外形尺寸公差	样品 1	样品 2	样品 3	
				正负 0.01				
				长	37.09	37.09	37.09	
		宽	17.30	17.30	17.30			
		高	0.125	0.125	0.125			
		2. 油墨颜色与图纸要求一致，无色差	样品对比	OK			合格	
		3. FPC 表面无压痕、折痕		OK			合格	
4. 金手指电金饱满，无剥离象限	高温测试	OK			合格			
FPC 材质可靠性测试		1. 背胶厚度、粘性是否符合要求，拉力测试，背胶 3M9495 (≥0.425MPa)，背胶 3M300 (≥0.38Mpa)	拉力计	OK			合格	
		2. 天线试装机壳后，12 小时是否有起翘，测试条件常温放置。（可加高低温测试）	装机壳实测	OK			合格	
		3. FPC 基材厚度及柔软性是否达标。（对比测试）	样品对比/千分尺	OK			合格	
		4. FPC 抗拉性是否达标	拉力计	OK			合格	
电气特性		1. FPC 内层电路有无毛刺、沙眼、断线、粘连	万用表	OK			合格	
		2. 装样机实测效果是否与调试一致（在合理范围内）。	暗室、实测	OK			合格	
其它								
最终判定	<input checked="" type="checkbox"/> OK <input type="checkbox"/> NG&							

核准： 杨文德 审核： 汤刘星 制表： 李婷婷