PSA

佳邦科技股份有限公司

INPAQ TECHNOLOGY CO., LTD.

Copyright © by Passive System Alliance | All rights reserved.

PSA

PASSIVE SYSTEM ALLIANCE

INPAQ TECHNOLOGY CO., LTD.

Copyright © by Passive System Alliance | All rights reserved.

华阳_HM5102A_ Antenna_Spec.

Presented by: Guangmang. Chen, 华南研发
Checked by :Apple_Zhao
Approved by :Kevin_Yang
INPAQ Technology Co., Ltd.

Last updated in Jun.09th, 2023

Copyright © by Passive System Alliance | All rights reserved.

Contents

- Revised History
- Requirement of Antenna Design and Measurement
- Antenna Placement & Solution
- VSWR Results
- Antenna Matching Network
- Test Setup for Radiation Pattern Measurement
- 3D Radiation Pattern Results
- 2D Radiation Pattern Results
- Results Summary (peak gain , efficiency)
- Conclusion

COPYRIGHT © INPAQ TECHNOLOGY CO., LTD ALL RIGHT RESERVED.

Revision History

Released Date	Version	Record
Jun.09th,2023	V0.0	Initial Release

Requirements of Antenna Design and Measurement

Requirements of Antenna Design

RF Function	Number of ANT	Frequency Band	Remark
WIFI	2	2350 –2450MHz，5150-5850MHz	WIFI1.WIFI2

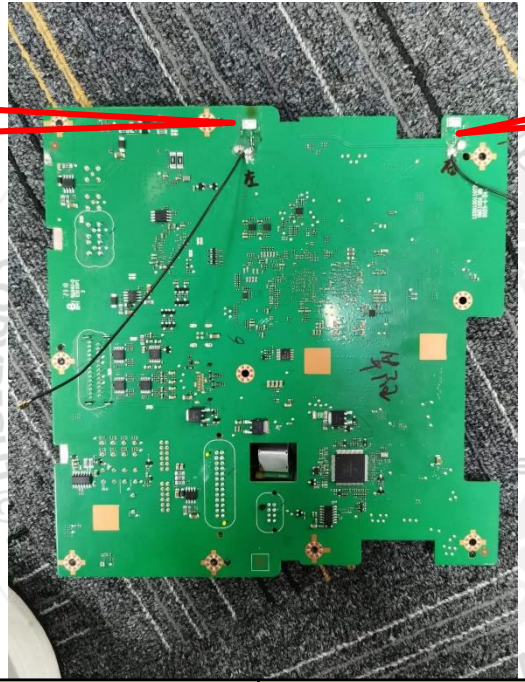
Requirements of Measurement

Test Item	Specification	Remark
VSWR	N/A	
Peak gain	N/A	
Efficiency	N/A	

Antenna Placement & Solution

WIFI1

for BT Antenna



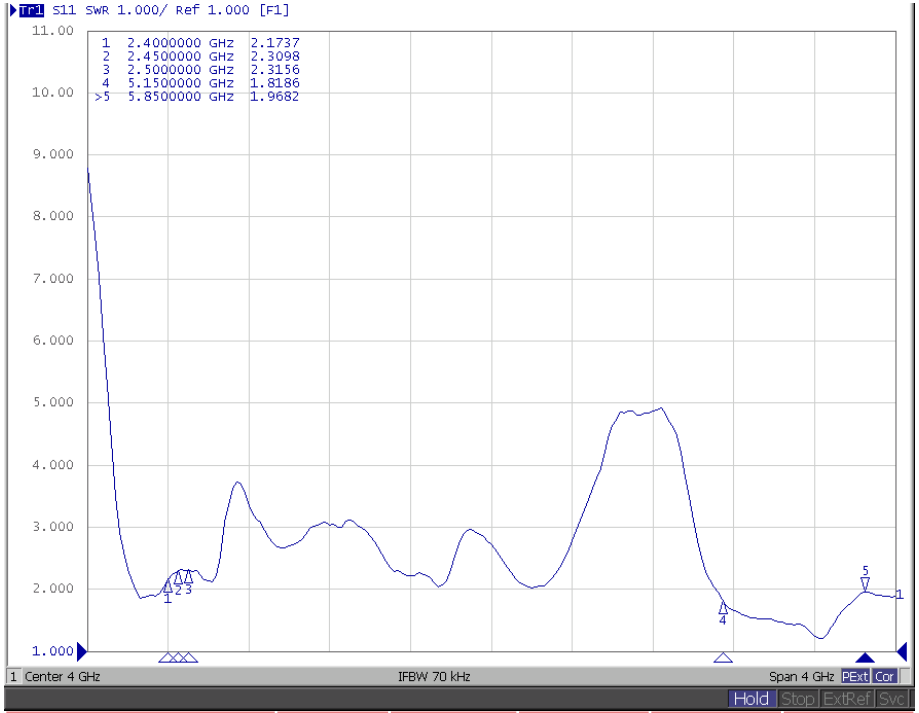
WIFI2

for 5G WIFI Antenna

Antenna	Chip Type
WIFI1	VGAP-CLB-AS-A1
WIFI2	VGAP-CLB-AS-A1

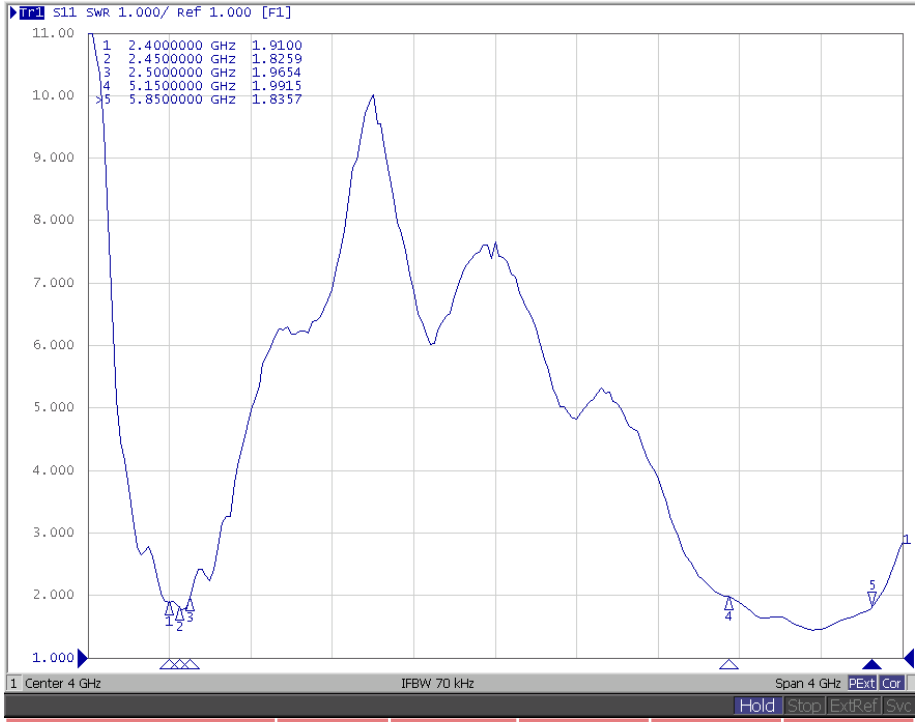
COPYRIGHT © INPAQ TECHNOLOGY CO., LTD. ALL RIGHT RESERVED.

VSWR Results—WIFI1



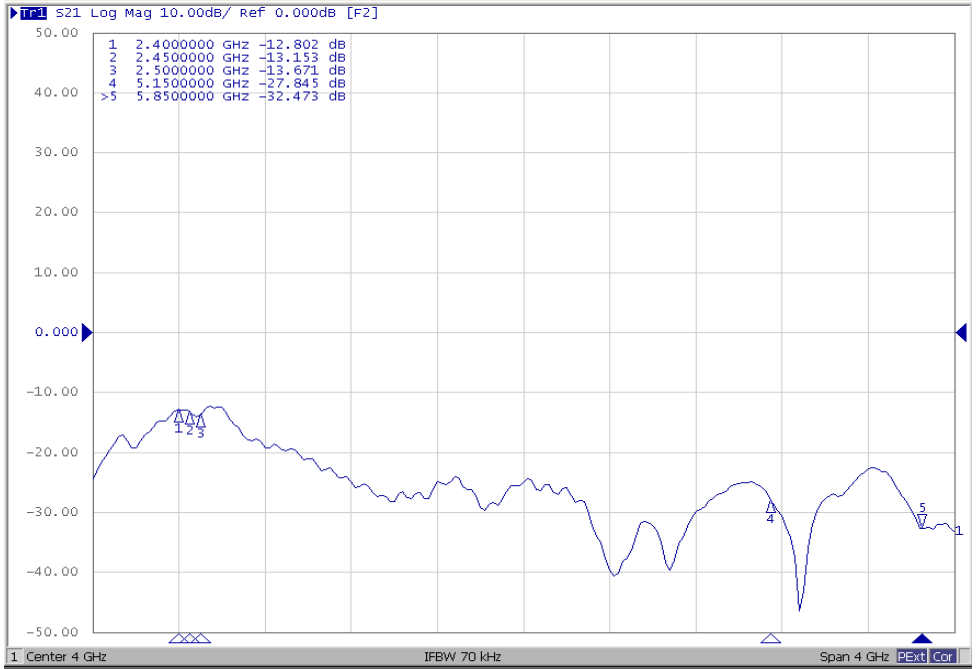
Frequency（MHz）	2400	2450	2500	5150	5850
VSWR	2.17	2.30	2.31	1.81	1.96

VSWR Results—WIFI2



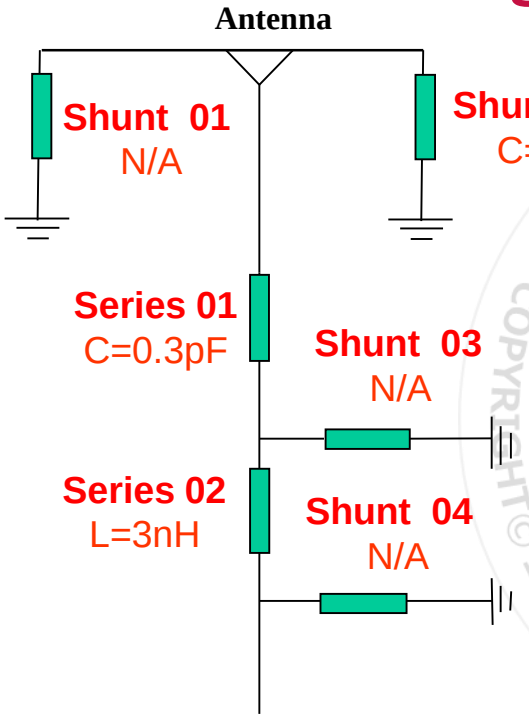
Frequency（MHz）	2400	2450	2500	5150	5850
VSWR	1.91	1.82	1.96	1.99	1.83

Isolation between WIFI1 and WIFI2



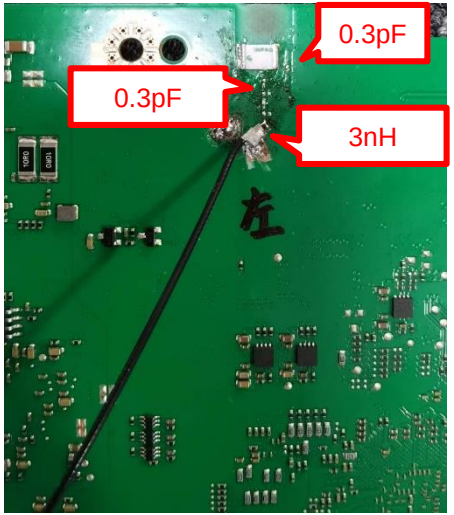
Frequency（MHz）	2400	2450	2500	5150	5850
isolation	-12.80	-13.15	-13.67	-27.84	-32.47

Antenna Matching Network-WIFI1



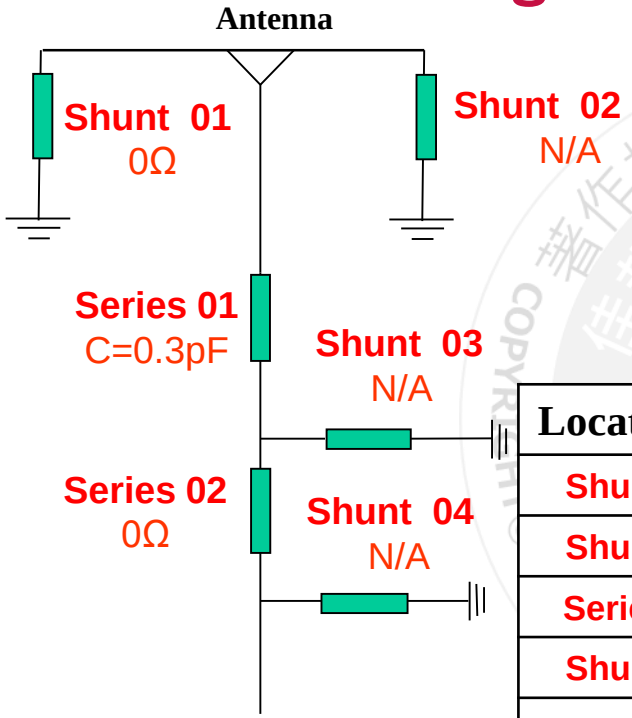
Matching Circuit on PCB

Location	Description	Vendor
Shunt 01	N/A	N/A
Shunt 02	C=0.3pF	Murata
Series 01	C=0.3pF	Murata
Shunt 03	N/A	Murata
Series 02	L=3.0nH	Murata
Shunt 04	N/A	N/A



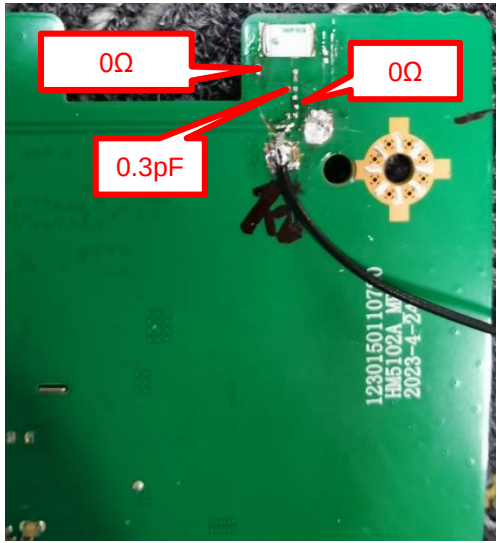
著作權所有 侵害必究
COPYRIGHT©

Antenna Matching Network-WIFI2



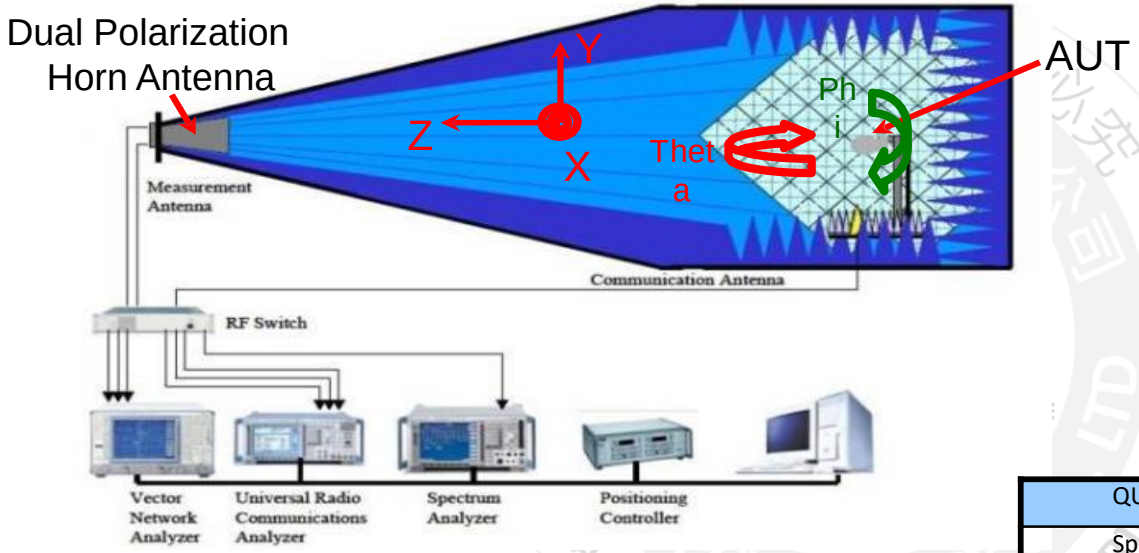
Matching Circuit on PCB

Location	Description	Vendor
Shunt 01	0Ω	Murata
Shunt 02	N/A	Murata
Series 01	C=0.3pF	Murata
Shunt 03	N/A	Murata
Series 02	0Ω	Murata
Shunt 04	N/A	Murata



Test Setup for Radiation Pattern Measurement

ETS Ams-8600 12.91x3.05x3.05 m3 Tapered Chamber



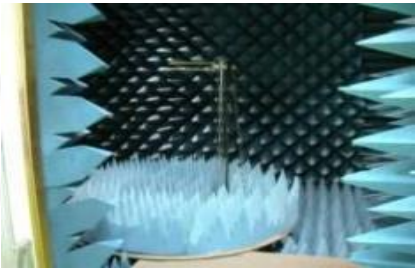
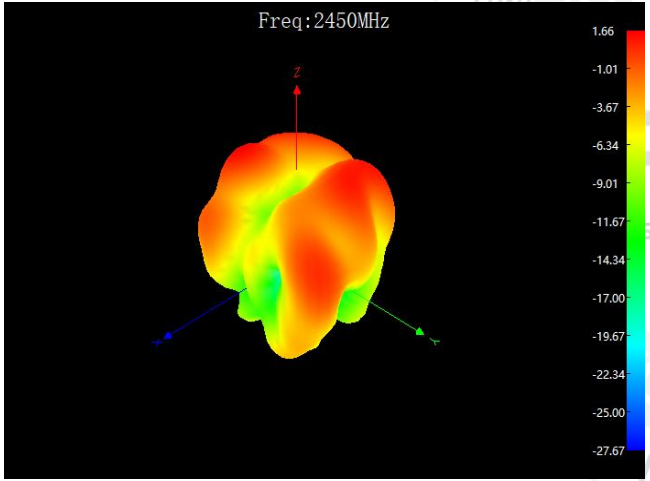


Figure 1: System diagram for test system including compact-size tapered anechoic chamber and optional test instrumentation

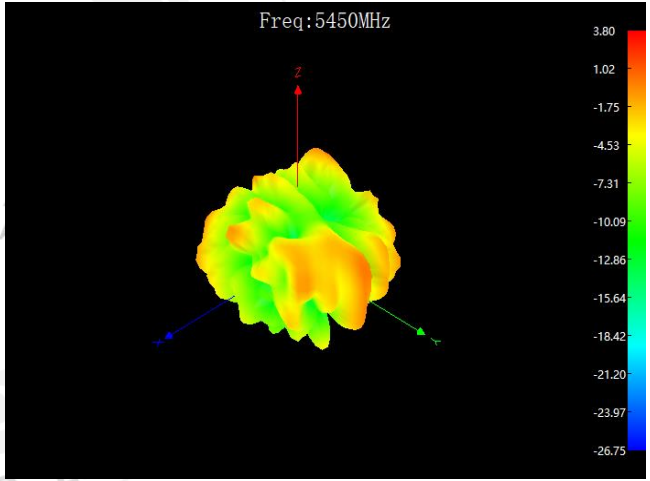
QUIPMENT	BRAND	MODULE TYPE
Spectrum	Agilent	E4402B
Signal Generator	Agilent	8960
Switch	Agilent	3499A
Switch	ETS	2090
Network Analyzer	Agilent	N5230A

3D Radiation Pattern Results-WIFI1

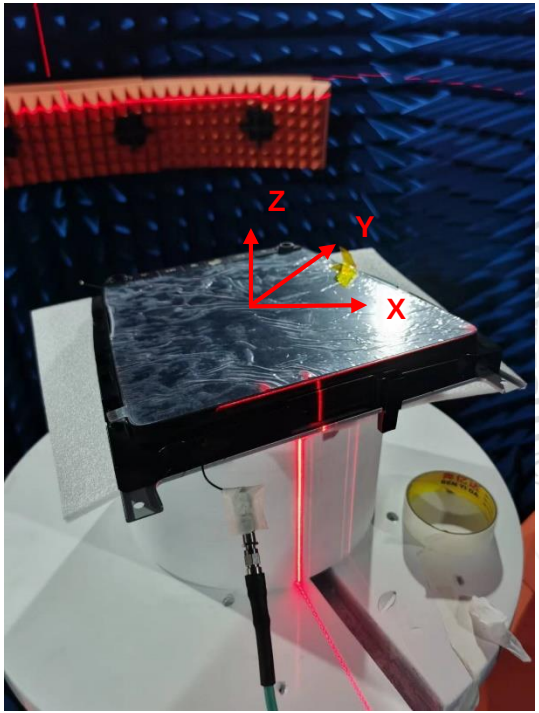
◆ **2450MHz**



◆ **5450MHz**



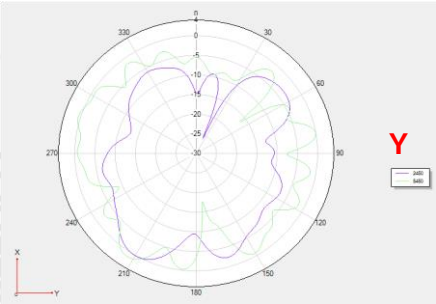
2D Radiation Pattern Results-WIFI1



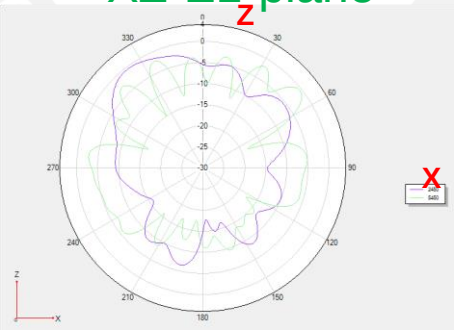
2450MHz

5450MHz

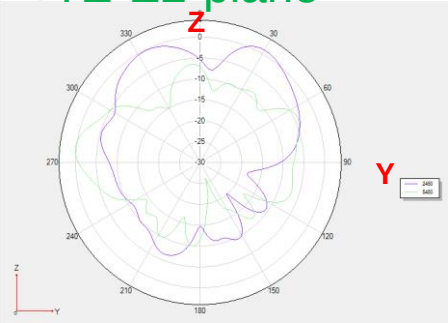
XY-H-plane



XZ-E1-plane



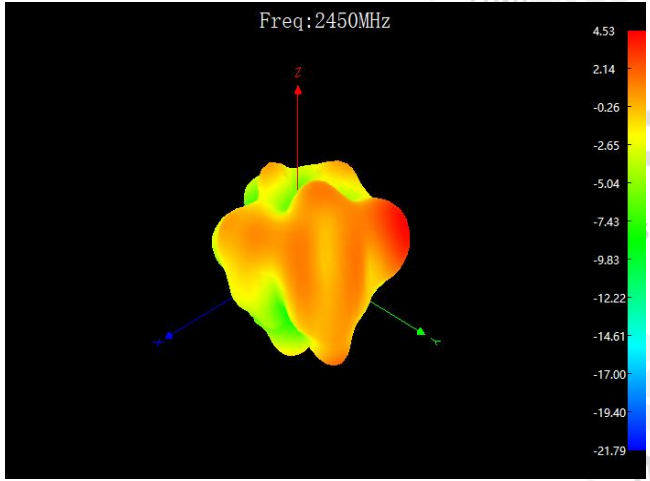
YZ-E2-plane



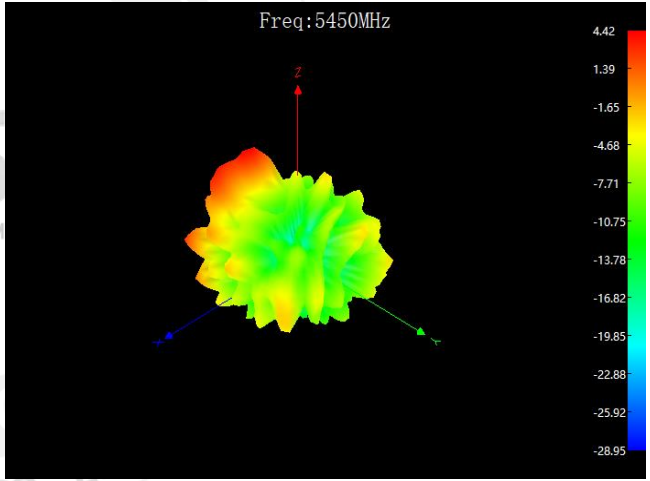
著作權所有 侵害必究
佳邦科技股份有限公司
PASSIVE SYSTEM ALLIANCE
INPAQ TECHNOLOGY CO., LTD.

3D Radiation Pattern Results-WIFI2

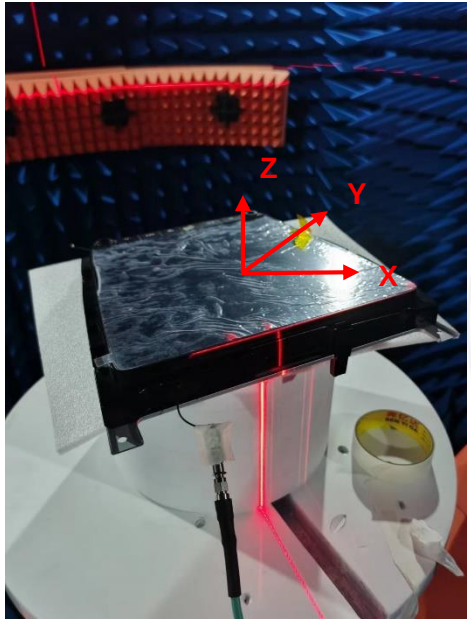
◆ **2450MHz**



◆ **5450MHz**



2D Radiation Pattern Results-WIFI2

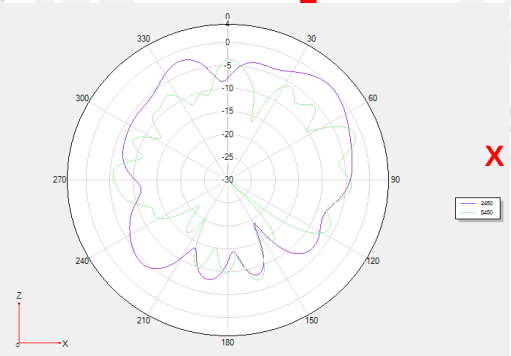


2450MHz

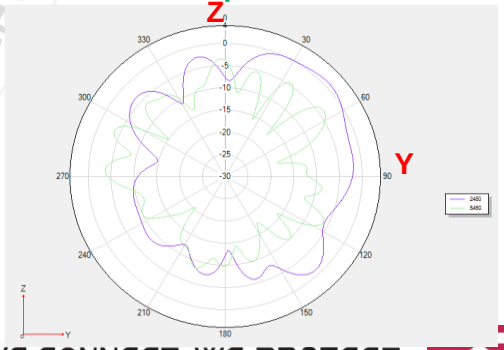
5450MHz

XY-H-plane

XZ-E1-plane



YZ-E2-plane



著作權所有 侵害必究
COPYRIGHT© INPAQ 佳邦科技股份有限公司 ALL RIGHT RESERVED, LTD.
PSA PASSIVE SYSTEM ALLIANCE

Results Summary-Peak Gain & Efficiency-WIFI1

Freq. (MHz)	Efficiency (%)	Peak Gain (dBi)
2400	42.27	2.7
2410	39.99	2.47
2420	40.46	2.4
2430	39.99	2.13
2440	39.54	1.94
2450	38.82	1.66
2460	37.07	1.43
2470	38.9	1.41
2480	38.37	1.29
2490	39.08	1.55
2500	38.46	1.63
AVG	39.36	1.87

Freq. (MHz)	Efficiency (%)	Peak Gain (dBi)
5100	24.89	3.79
5200	25.64	4.4
5300	26.3	3.94
5400	32.58	4.58
5450	31.62	3.8
5500	33.34	3.97
5600	31.55	4.07
5700	29.79	4.27
5800	25.82	3.52
5900	21.33	2.69
AVG	28.29	3.90

Results Summary-Peak Gain & Efficiency-WIFI2

Freq. (MHz)	Efficiency (%)	Peak Gain (dBi)
2400	38.19	3.84
2410	38.37	4.01
2420	41.11	4.43
2430	42.95	4.57
2440	44.57	4.63
2450	44.87	4.53
2460	43.05	4.18
2470	44.77	4.15
2480	42.46	3.52
2490	42.17	3.27
2500	39.9	2.64
AVG	42.03	3.98

Freq. (MHz)	Efficiency (%)	Peak Gain (dBi)
5100	23.71	2.07
5200	24.72	2.58
5300	27.8	3.76
5400	27.8	4.37
5450	25.23	4.42
5500	26.06	4.83
5600	28.31	5.11
5700	27.48	4.69
5800	25.06	3.66
5900	26.73	4.34
AVG	26.29	3.98

Conclusion

1.测试数据如下：

Antenna	WIFI1	WIFI2
Average of Efficiency	2.4G:39.36% 5G:28.29%	2.4G:42.03% 5G:26.29%

2.因为机台预留给天线空间较小，天线距离金属较近,所以导致天线性能偏低；

3. 建议贵司后续项目在Layout时，将图档发给我们，我们根据实际情况给出天线参考位置，这样可以有效提升天线性能。

以上请知悉，感谢！

Thank you

本資料均屬機密，僅供指定之收件人使用，未經寄件人許可不得揭露、複製或散佈本信件。

This message and any attachments are confidential and may be legally privileged. Any unauthorized review, use or distribution by anyone other than the intended recipient is strictly prohibited. If you are not the intended recipient, please immediately notify the sender, completely delete this documents, and destroy all copies. Your cooperation will be highly appreciated.