



WHA YU INDUSTRIAL CO., LTD.(HEAD OFFICE)

DONGGUAN AEON TECH CO.,LTD.(CHINA)

SPECIFICATION FOR APPROVAL

CUSTOMER: DONGGUAN PROTRONIC ELECTRONICS LTD.

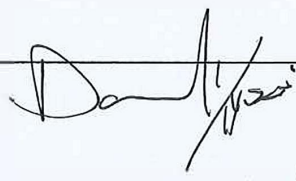

PART NAME: PIFA Antenna

PART NO.:

REVISION:

W. Y. P/NO.: SSR-220022

REV.: X1

	MANUFACTURER	CUSTOMER
APPROVED BY :		
DATE :	 1/14	

WHA YU GROUP

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PIFA Antenna

Specification

1. Electrical Properties : With Housing (ANT 1)

- 1.1 Frequency Range..... 2400~2500 MHz
- 1.2 Impedance 50Ω Nominal
- 1.3 VSWR 1.92:1 Max.
- 1.4 Return Loss 10 dB Min.
- 1.5 Peak Gain 3.84 dBi Max.
- 1.6 Radiation Omni-directional
- 1.7 Admitted Power..... 1 W

2. Physical Properties :

- 2.1 Operating Temp. -20°C ~ +90°C
- 2.2 Storage Temp. -20°C ~ +140°C

PIFA Antenna

Specification

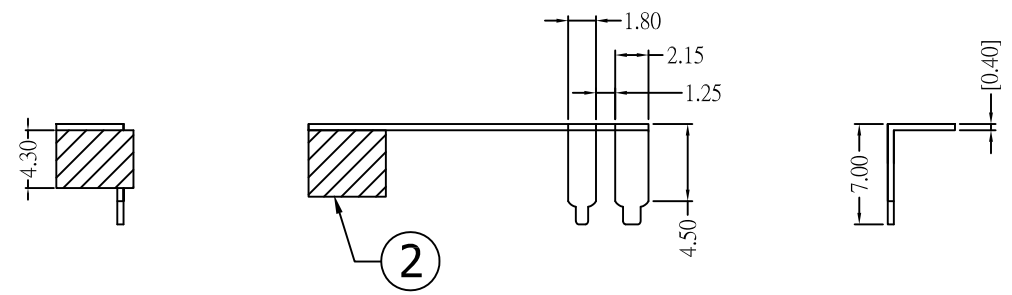
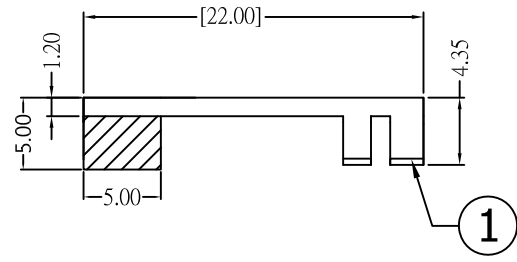
1. Electrical Properties : With Housing (ANT 2)

- 1.1 Frequency Range..... 2400~2500 MHz
- 1.2 Impedance 50Ω Nominal
- 1.3 VSWR 1.92:1 Max.
- 1.4 Return Loss 10 dB Min.
- 1.5 Peak Gain 3.63 dBi Max.
- 1.6 Radiation Omni-directional
- 1.7 Admitted Power..... 1 W

2. Physical Properties :

- 2.1 Operating Temp. -20°C ~ +90°C
- 2.2 Storage Temp. -20°C ~ +140°C

REV	DATE	DESCRIPTION
X1	01/13-2022	New Issue



NO	DESCRIPTION	Q'TY	REMARK
2	矽膠墊+背膠 矽膠墊+ 3M 9495LE背膠;5.00*5.00*4.30mm	1	
1	PIFA Antenna SUS 430;預鍍鎳,霧面版	1	100-4012849-AZ

CUSTOMER'S SINGATURE	XX.	±5.0	APPROVED Spring	CUSTOMER: 保力		
	X.	±3.0		PART NO :		
	.X	±1.0	CHECKED	PART NAME: PIFA Antenna		
	.XX	±0.5		W.Y P/NO :		
	.XXX	±0.1	DRAWING	REV	UNIT	FILE : SSR-220022
 白玉俠			X1	mm	SHEET : 1/1	

Wha Yu Group

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TNP-21023 Antenna Test Report

Version: 1.5

Released Date: 2021/12/16

Prepared By: Yi Jia

Reviewed By: Daniel

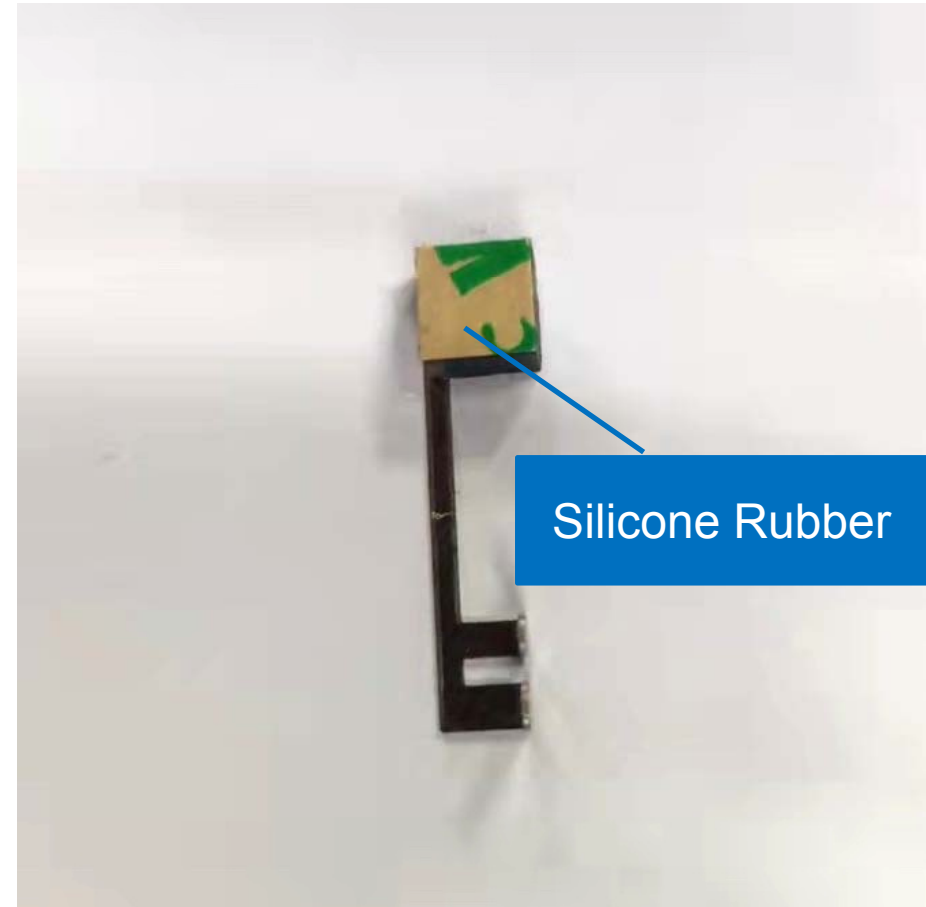
confidential

Revision History

Released Date	Version	Revised Records
2021/6/29	V1.0	<ul style="list-style-type: none">Antenna test report
2021/7/8	V1.1	<ul style="list-style-type: none">Update distance test data (p.22)
2021/9/14	V1.2	<ul style="list-style-type: none">Evaluate antenna position to achieve Isolation spec 20dB
2021/12/8	V1.3	<ul style="list-style-type: none">Antenna test with silicone rubber holder
2021/12/10	V1.4	<ul style="list-style-type: none">Modify antenna with silicone rubber holder
2021/12/16	V1.5	<ul style="list-style-type: none">Connection distance test with modify antenna with silicone rubber holder

Antenna Placement & Solution

Antenna before modified



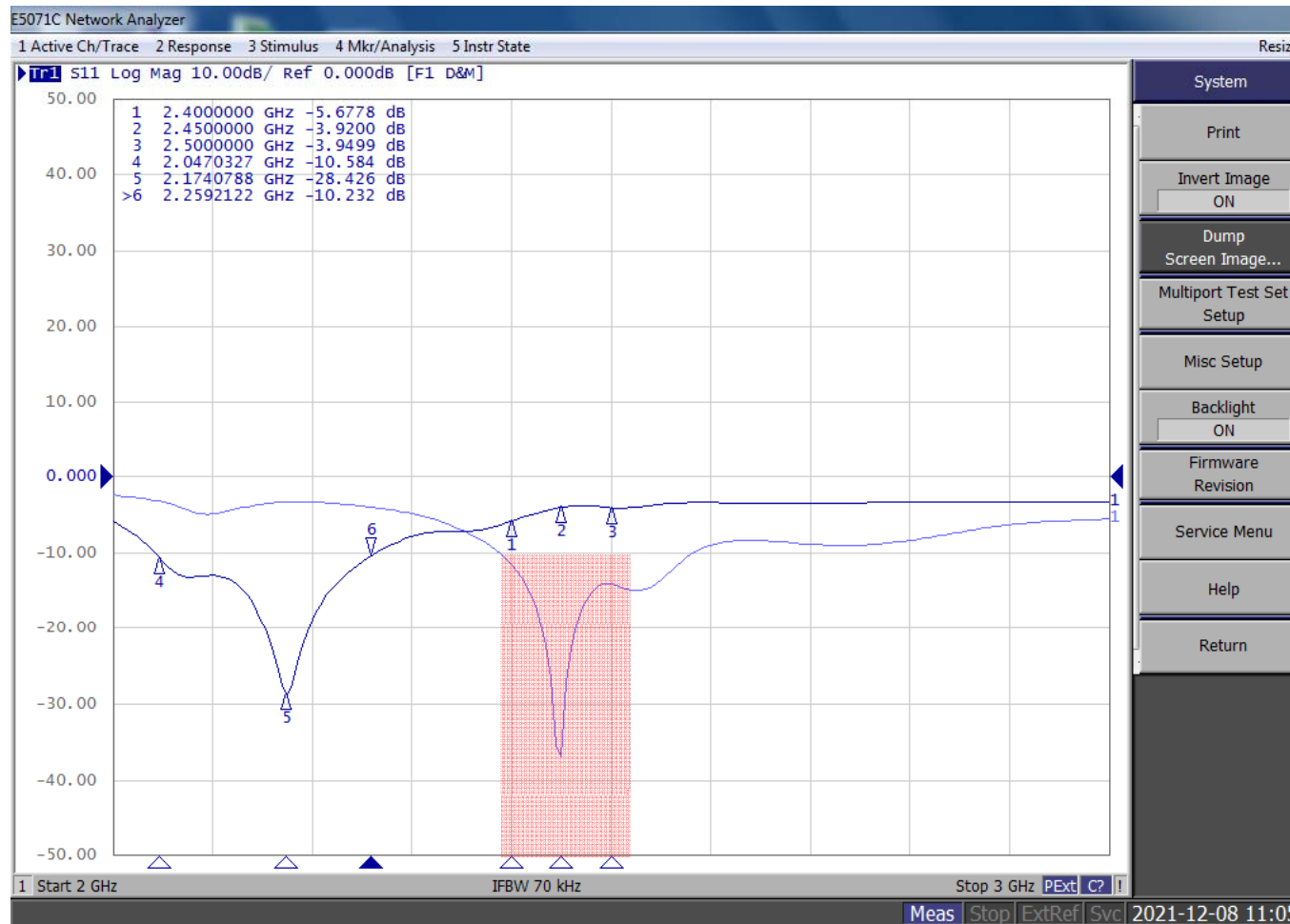
S-Parameters Test

ANT1 (before modified) (Criterion: $\leq -10\text{dB}$)



S-Parameters Test

ANT2 (before modified) (Criterion: $\leq -10\text{dB}$)



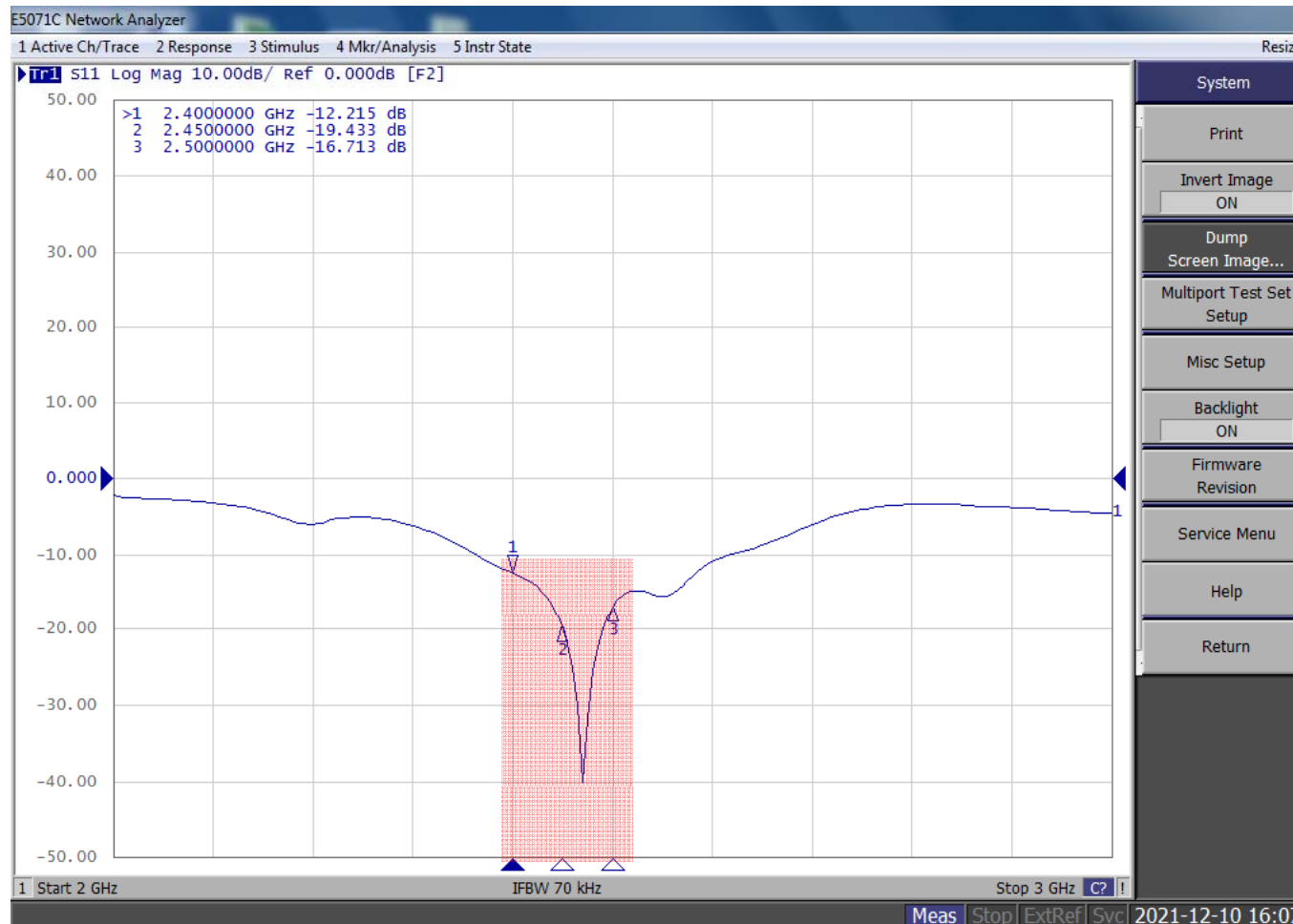
Results Summary

Criterion: $\leq -10\text{dB}$

Frequency (MHz)	Before modified		After modified	
	ANT1	ANT2	ANT1	ANT2
2181	-10.38	-10.58	--	--
2264	-22.28	-28.42	--	--
2350	-10.03	-10.23	--	--
2400	-6.49	-5.67	-12.5	-22.6
2450	-5.76	-3.92	-19.4	-20.3
2500	-4.14	-3.94	-16.7	-10.8

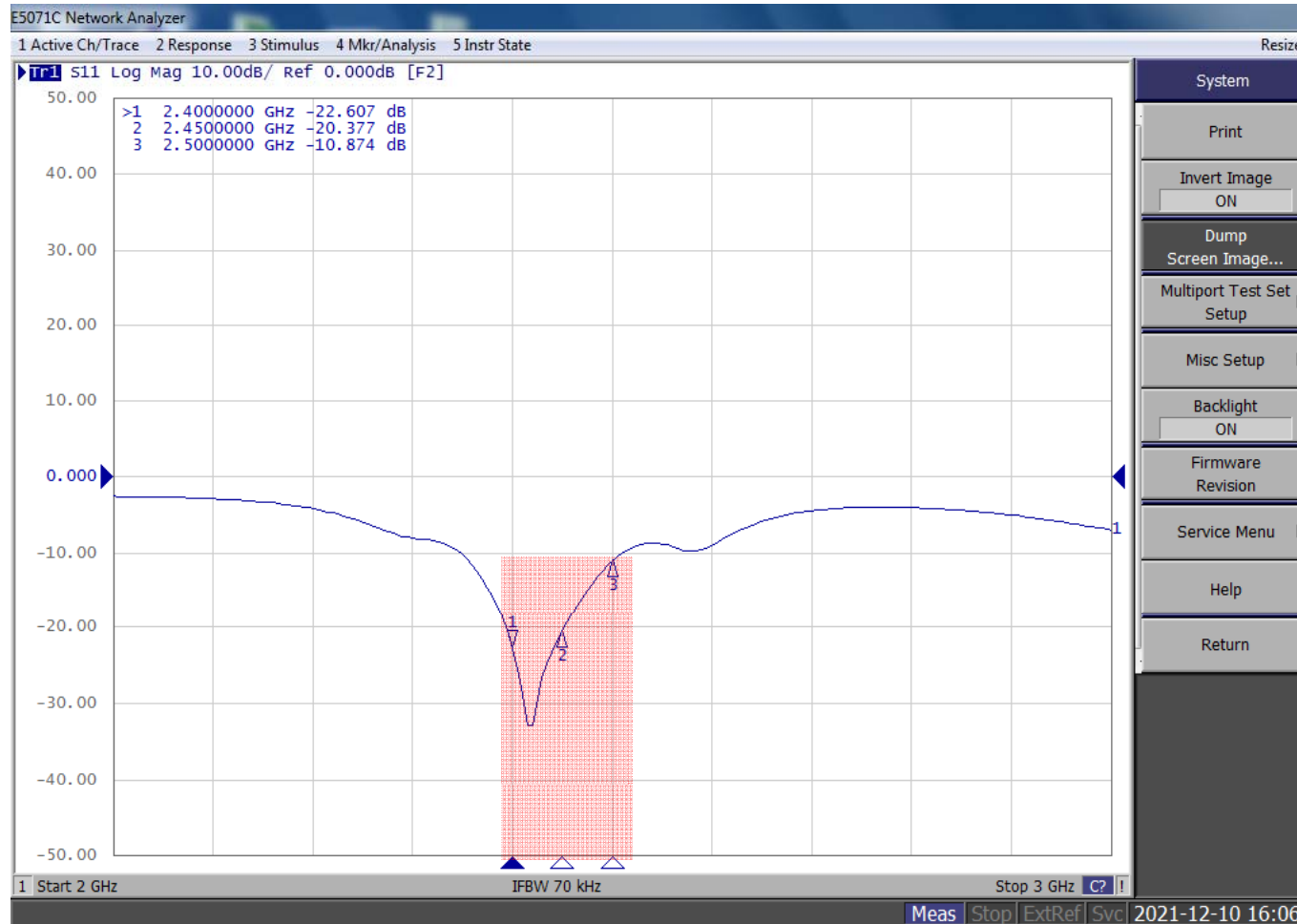
S-Parameters Test

ANT1 (after modified) (Criterion: $\leq -10\text{dB}$)



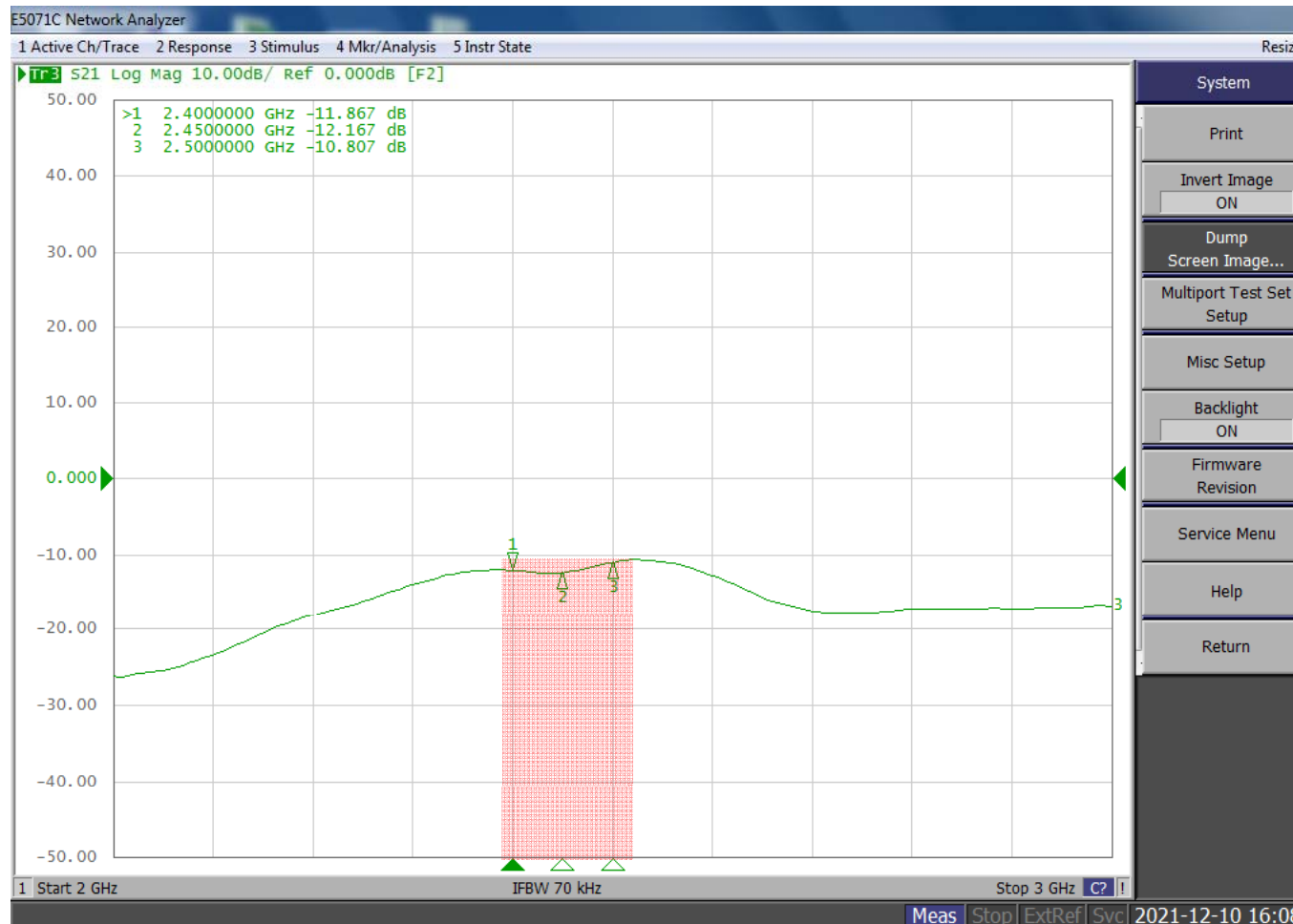
S-Parameters Test

ANT2 (after modified) (Criterion: $\leq -10\text{dB}$)

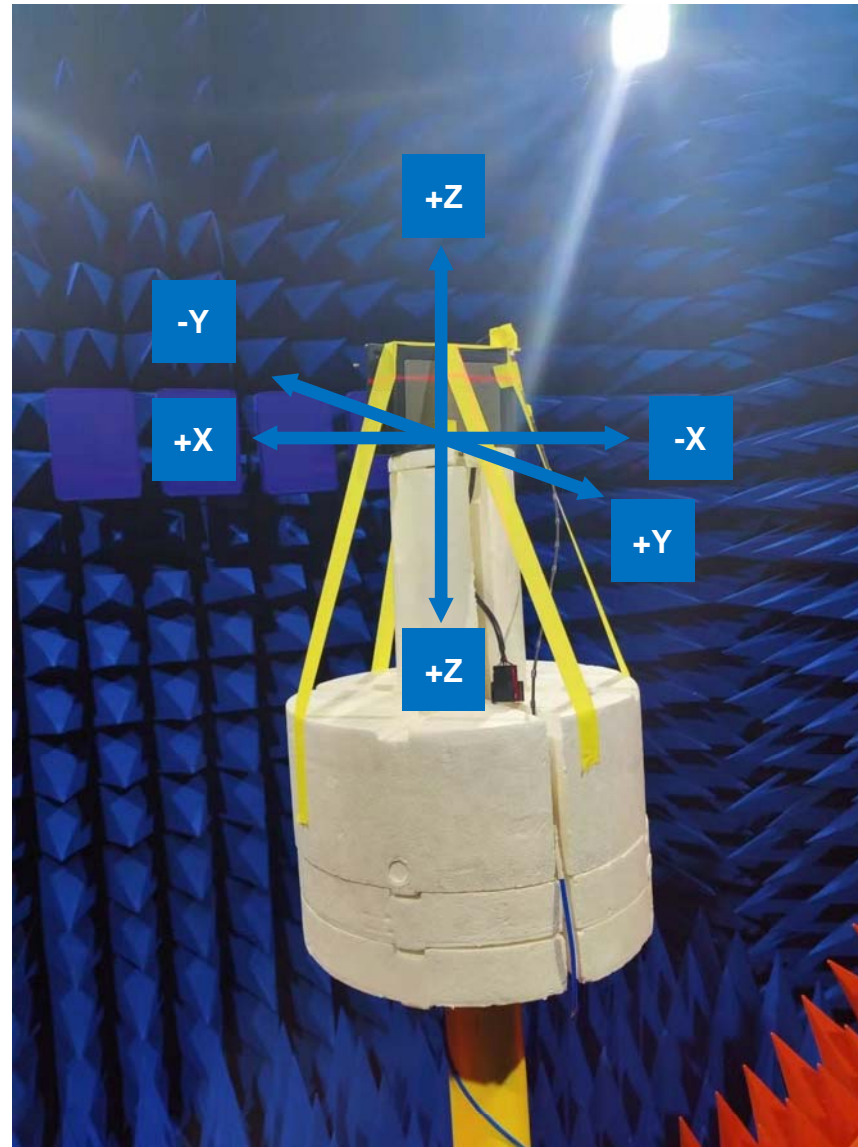


Isolation Test

ANT1 & ANT2 (Criterion: $\geq 20\text{dB}$)

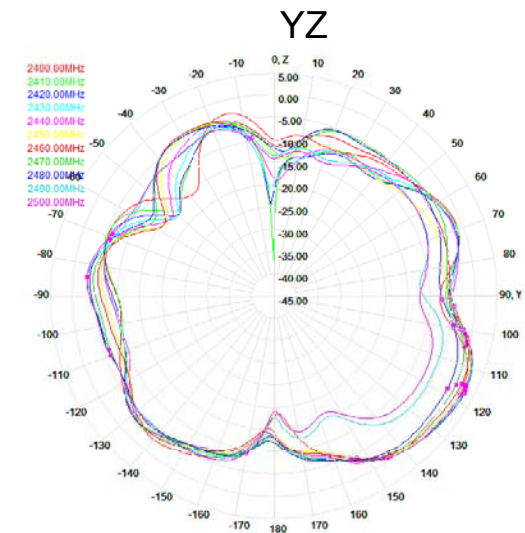
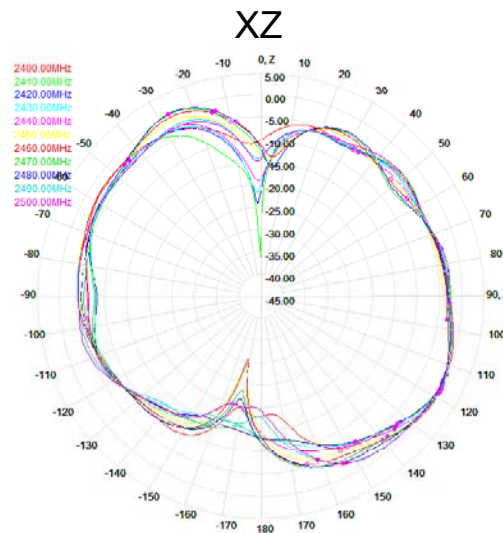
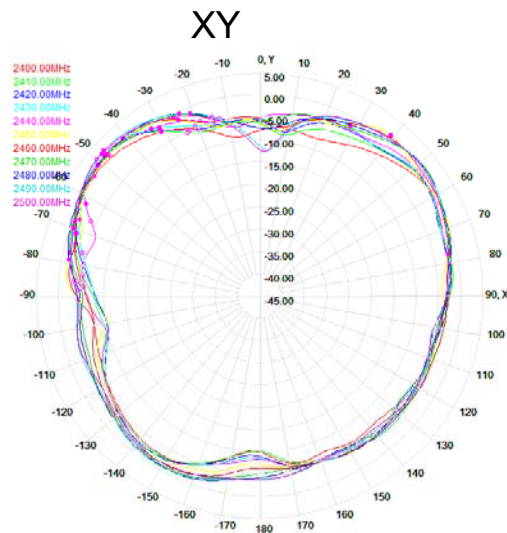
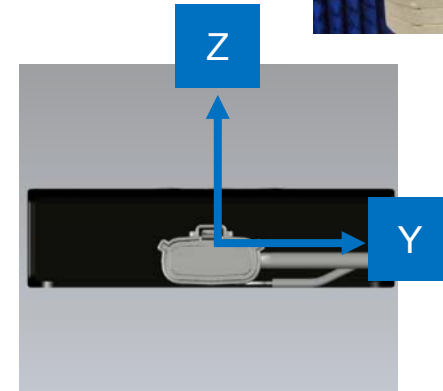
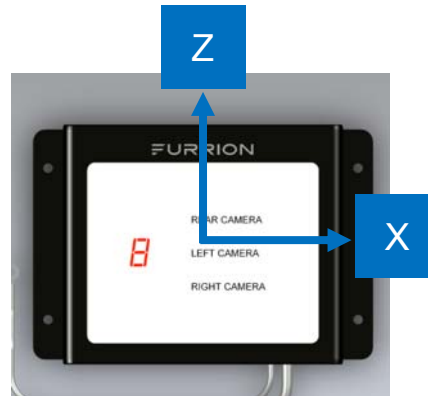
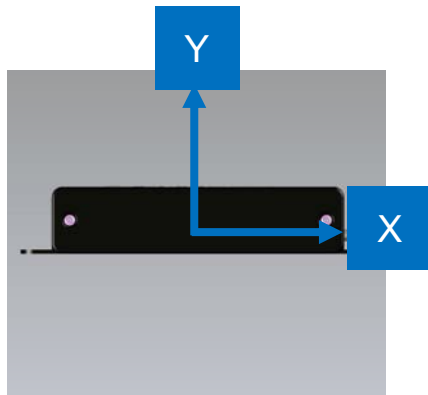
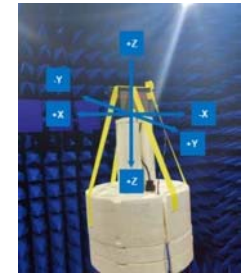


Test Setup for OTA Measurement



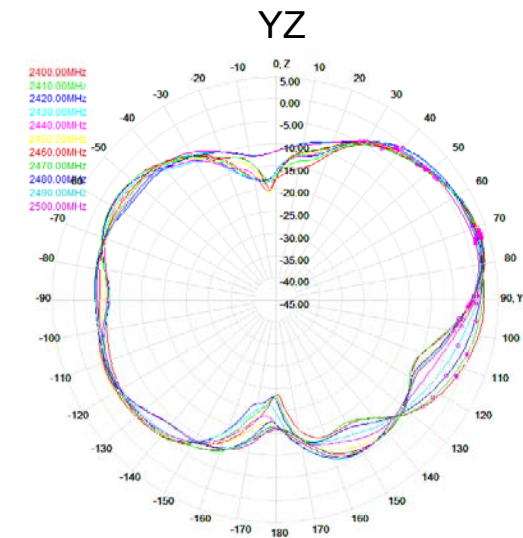
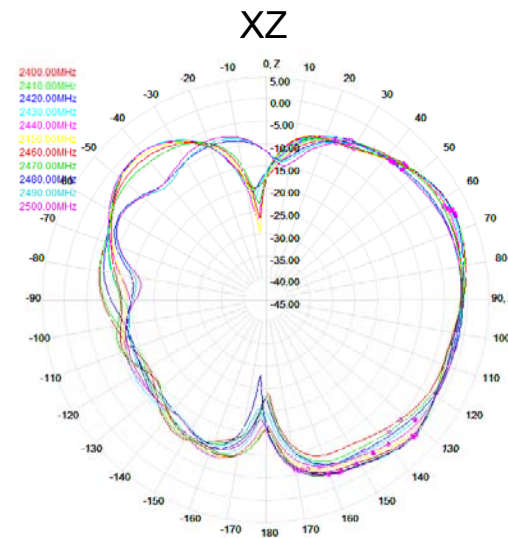
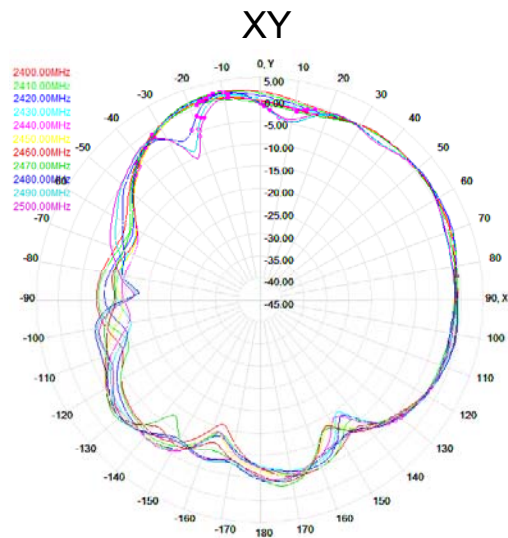
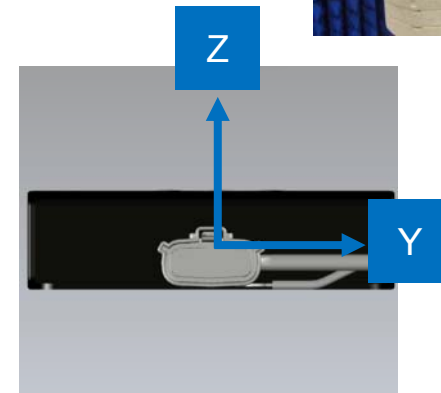
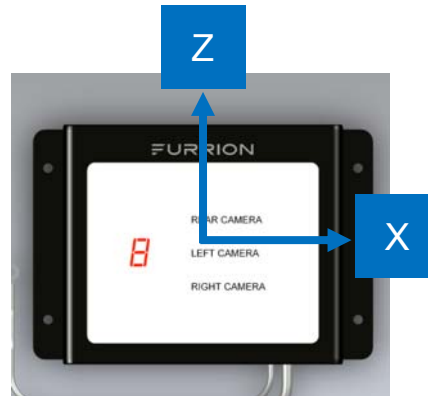
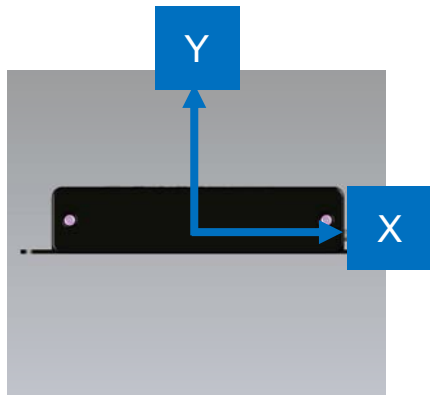
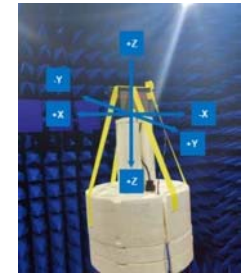
2D Radiation Pattern

ANT1



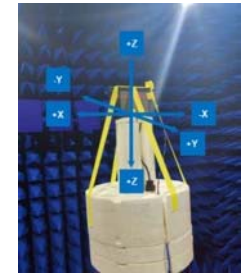
2D Radiation Pattern

ANT2

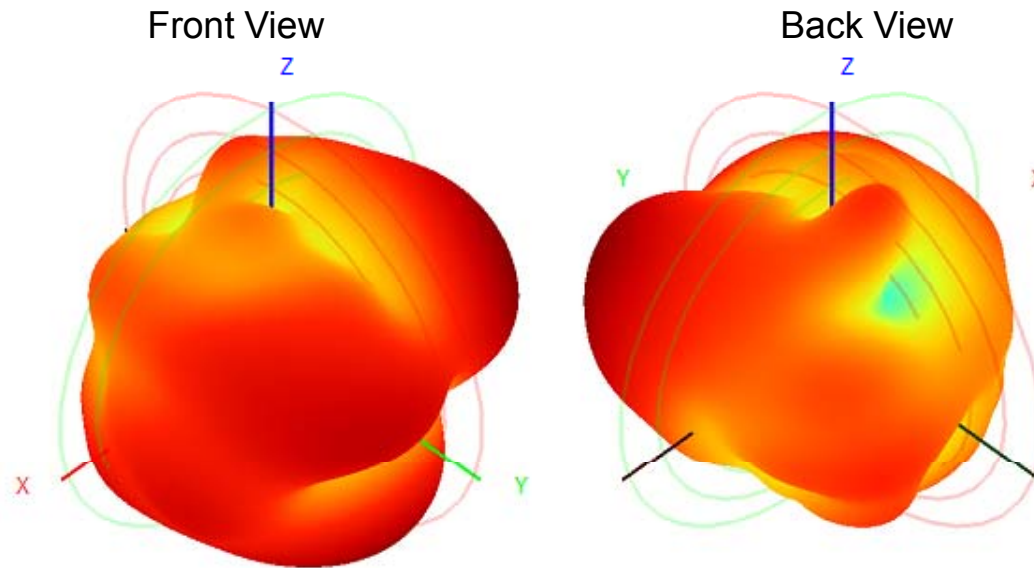


3D Radiation Pattern

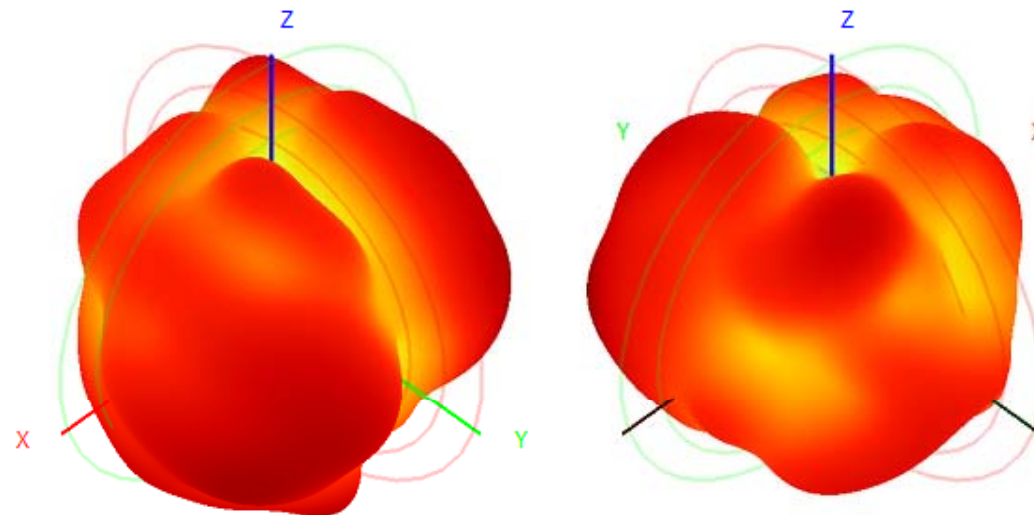
ANT1



2400 MHz

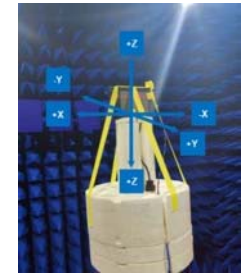


2500 MHz

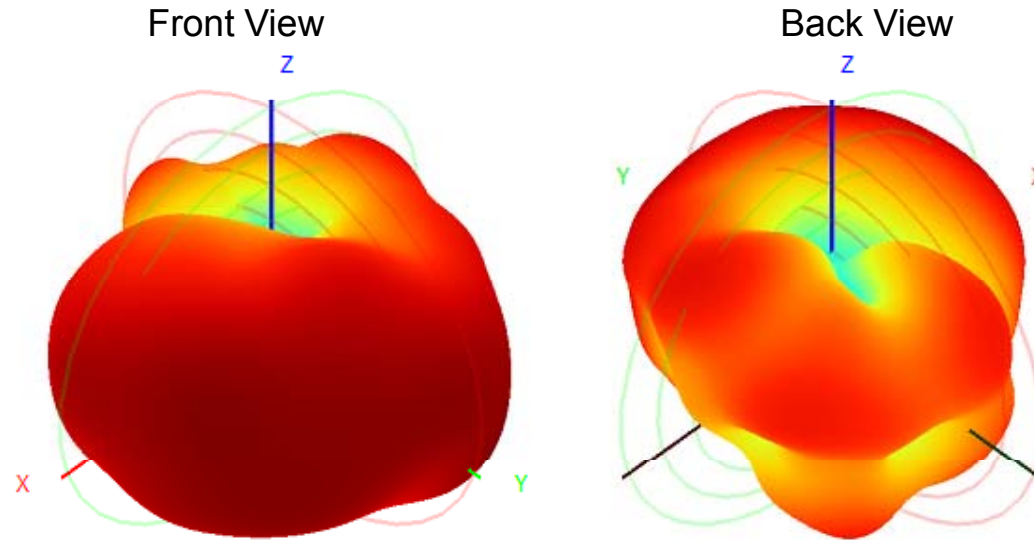


3D Radiation Pattern

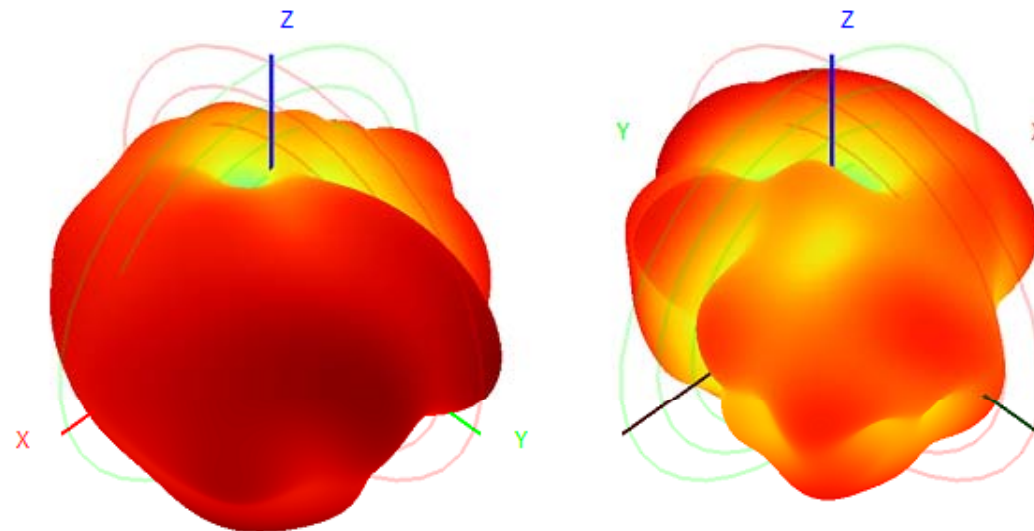
ANT2



2400 MHz



2500 MHz



Results Summary

Isolation (Criterion: $\geq 20\text{dB}$)

Frequency (MHz)	ANT1 & ANT2
2400	11.86
2450	12.16
2500	10.80

Results Summary

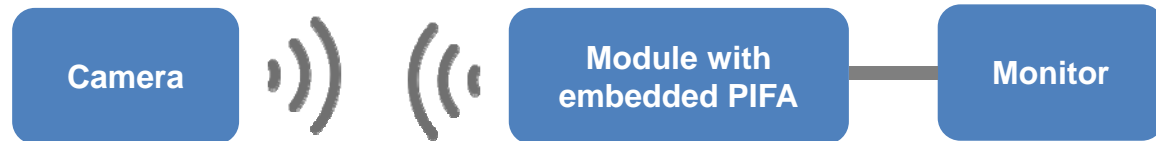
Peak Gain & Efficiency (ANT1)(≥45%)

Frequency (MHz)	ANT1 (After modified)		ANT2 (After modified)	
	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)
2400	3.27	51.34	2.46	49.60
2410	3.84	52.54	2.82	53.42
2420	3.60	50.89	2.93	53.75
2430	3.34	48.72	3.08	52.32
2440	3.69	48.65	3.13	51.76
2450	3.57	50.11	3.21	52.06
2460	2.81	50.46	3.17	51.26
2470	2.07	50.13	2.68	50.30
2480	1.95	49.41	3.63	48.81
2490	2.71	49.44	2.99	48.43
2500	2.52	48.33	2.37	47.46

Results Summary



Outdoor Distance test (2021/12/16)		
Distance	Result	Signal Strength
0-225m	流暢無卡頓	> -85dBm
225-300m	卡頓	About -90dBm
>300m	掉線	About -95dBm



Summary & Comments

Antenna Performance Summary

- Frequency of ANT1 and ANT2 shifted to 2181-2350MHz with silicone rubber holder.
- Performance of ANT1 / ANT2 (gain / efficiency / Return Loss) were improved after modified.

Comments for Further Improvement