

PIFA Antenna

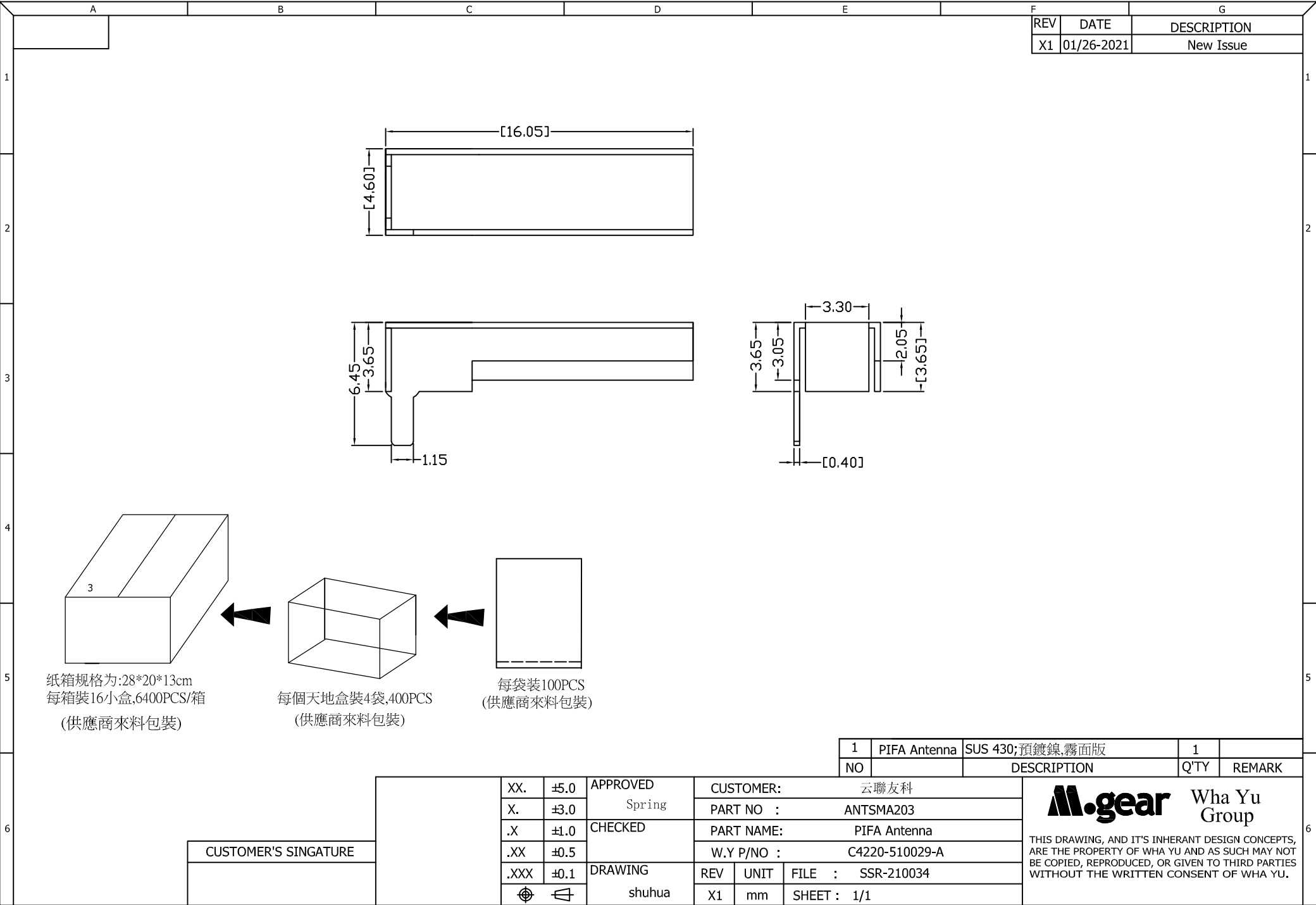
Specification

1. Electrical Properties : With housing/5G_ANT0~ANT1

1.1 Frequency Range.....	5150~5850 MHz
1.2 Impedance	50Ω Nominal
1.3 VSWR	1.92 : 1 Max.
1.4 Return Loss.....	10 dB Min.
1.5 Radiation	Omni-directional
1.6 Peak Gain.....	4.6 dBi@5G_ANT0 4.4 dBi@5G_ANT1
1.7 Cable Loss.....	NA
1.8 Polarization.....	Linear
1.9 PIFA Antenna	SUS 430

2. Physical Properties :

2.1 Operating Temp.	-10°C ~ +60°C
2.2 Storage Temp.	-10°C ~ +70°C



TNP-21005

Antenna Test Report

(Model: FAP800)

Version: v 1.1

Released Date: 2021/01/26

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Reviewed By: Daniel



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Revision History

Released Date	Version	Revised Records
2021/01/23	1.0	2.4/5G Wi-Fi Antenna Test Report
2020/01/26	1.1	Test with Wire-EDM Sample and update 5G_ANT

Summary & Comments

Antenna Performance Summary

- Wire-EDM sample and 5G_ANT1 is replaced with the same as 5G_ANT0
- Performance of wire-EDM sample antenna is better than hand-made sample

Comments for Further Improvement

- Isolation between 2G_ANT0 & 2G_ANT1
- To be confirmed by customer

Specification

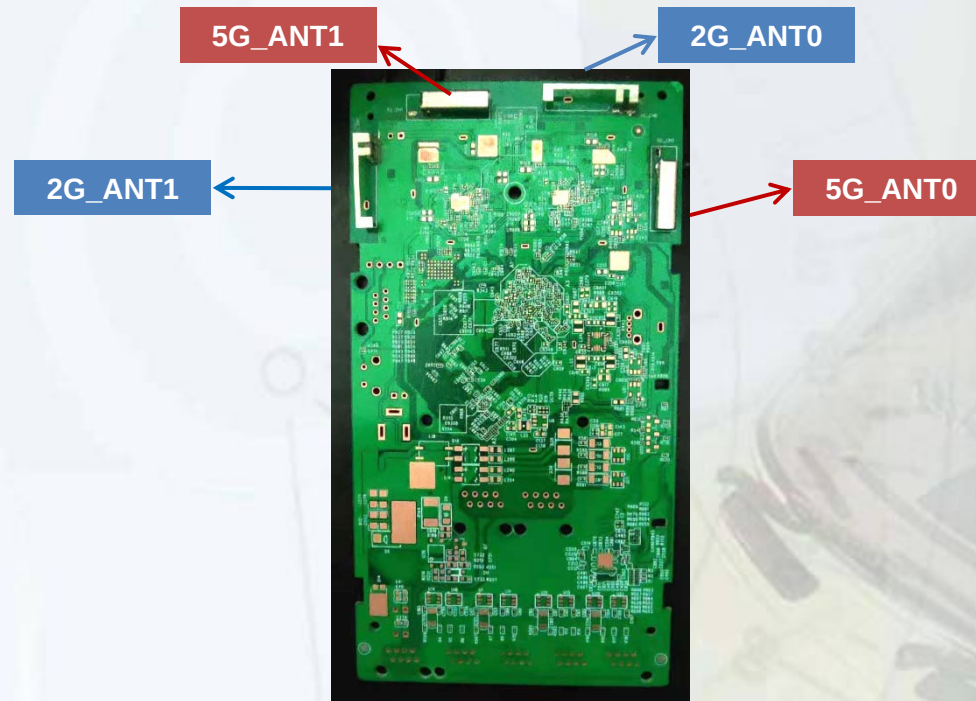
Requirements of Antenna Design

RF Function	Number of ANT	Frequency Band	Remark
Wi-Fi	2	2400~2500 MHz	
	2	5150~5850 MHz	

Requirements of Measurement

Test Item	Specification	Remark
VSWR	≤ 1.92	
Isolation	$\geq 20\text{dB}$	TBD
Peak Gain	$\geq 0\text{dBi}$	TBD
Efficiency	2.4GHz $\geq 50\%$; 5GHz $\geq 50\%$	TBD
Radiation Pattern	Scale: +10 ~ -30dBi@2.4/5G	

Antenna Placement & Solution

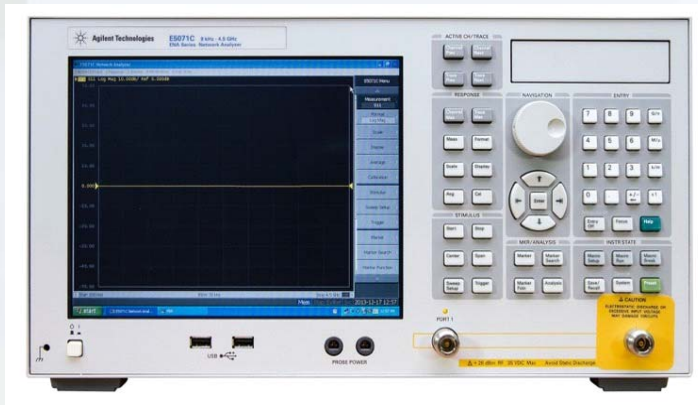


Antenna	ANT Type	Size (L * W * H)	Cable Type
2G_ANT0 & 2G_ANT1	PIFA	22mm*4.35mm*7mm	N/A (Dip)
5G_ANT0 & 5G_ANT1	PIFA	16.05mm*4.6mm*6.45mm	

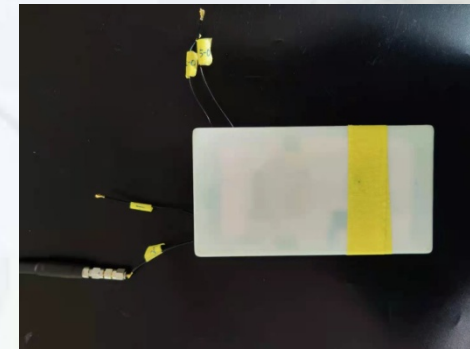
Antenna Placement & Solution

Antenna	Current Version
2G_ANT0 2G_ANT1	
5G_ANT0 5G_ANT1	

Test Setup for S-parameter Measurement



Equipment	Brand	Model
Network Analyzer	Keysight	E5071C



Antenna

RF Cable
(1.37mm,90mm) with
MHF conn.

Network Analyzer

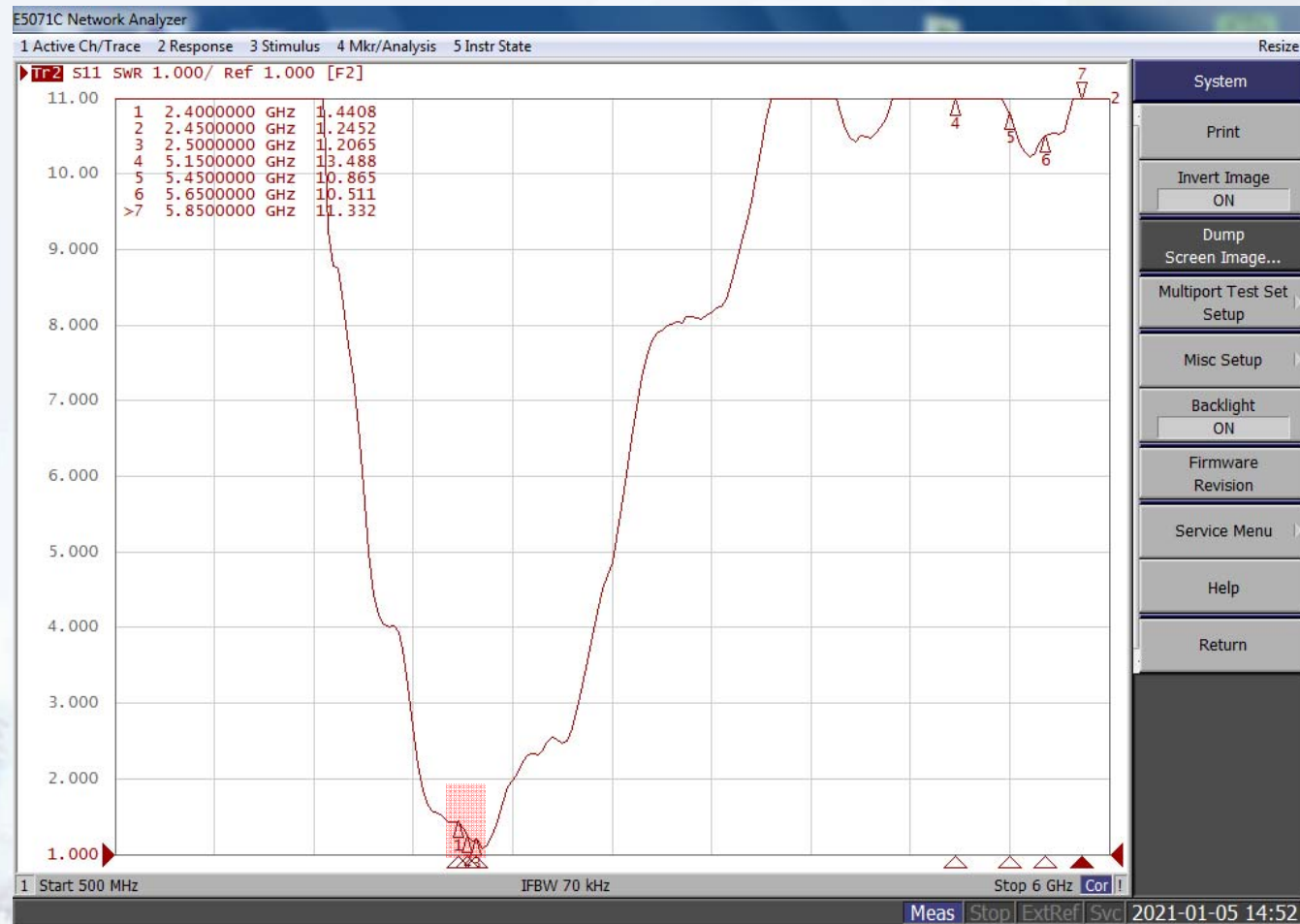
VSWR Results

2G_ANT0 (2400~2500 MHz) (Criterion: ≤ 1.92)



VSWR Results

2G_ANT1 (2400 – 2500 MHz) (Criterion: ≤ 1.92)



VSWR Results

5G_ANT0 (5150 – 5850 MHz) (Criterion: ≤ 1.92)



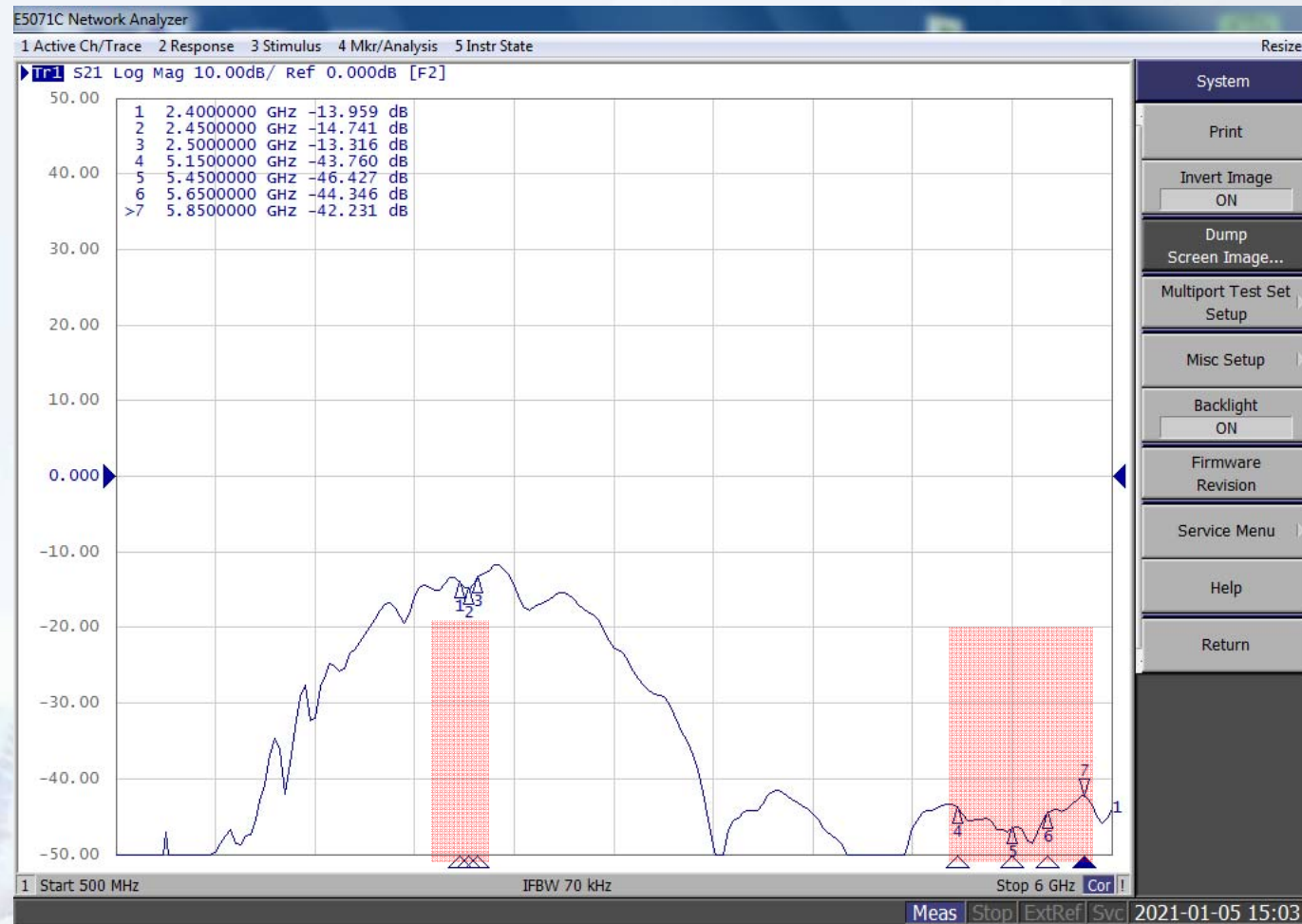
VSWR Results

5G_ANT1 (5150 – 5850 MHz) (Criterion: ≤ 1.92)



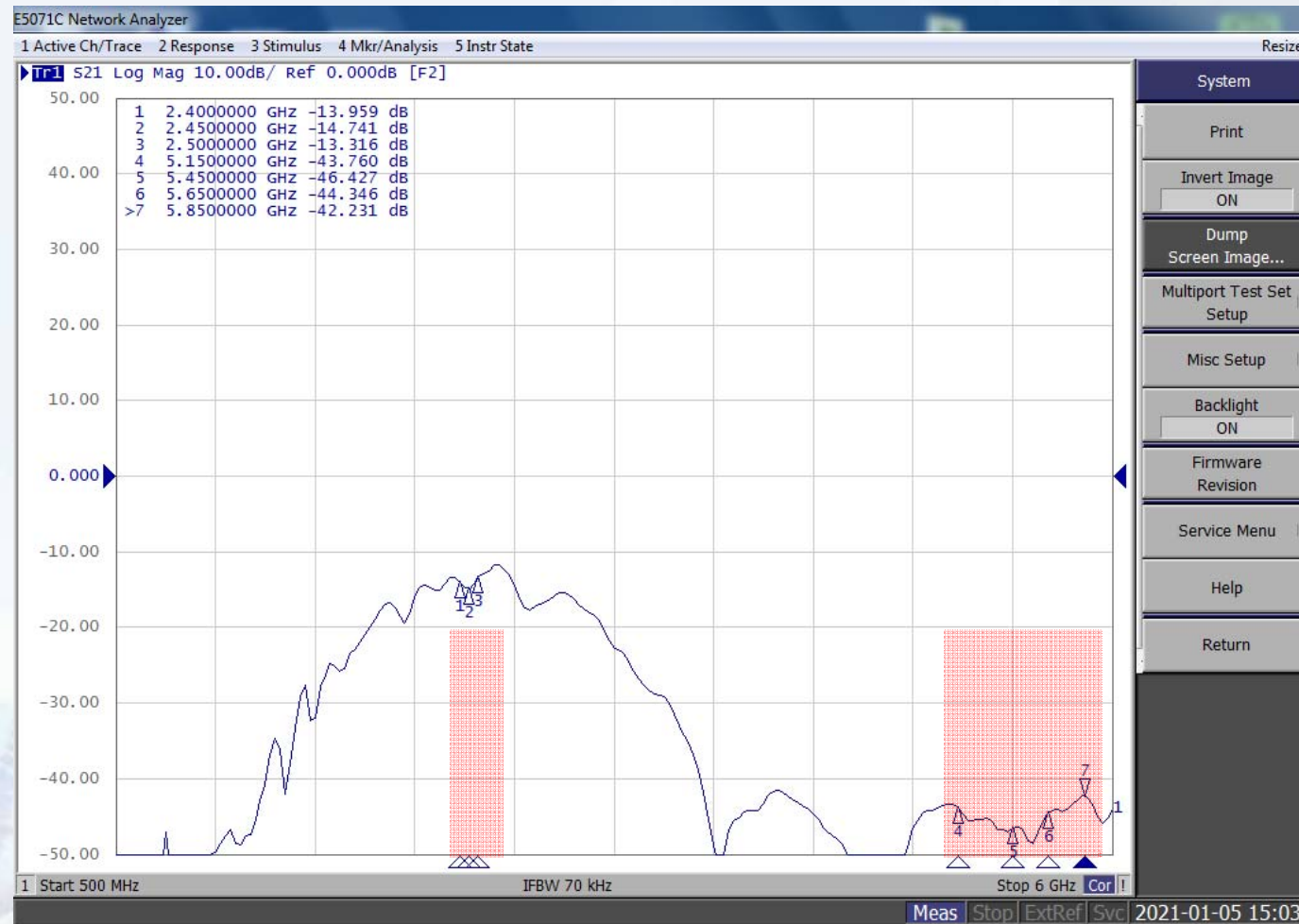
Isolation Results

2G_ANT0 & 2G_ANT1(Criterion: $\geq 20\text{dB}$)



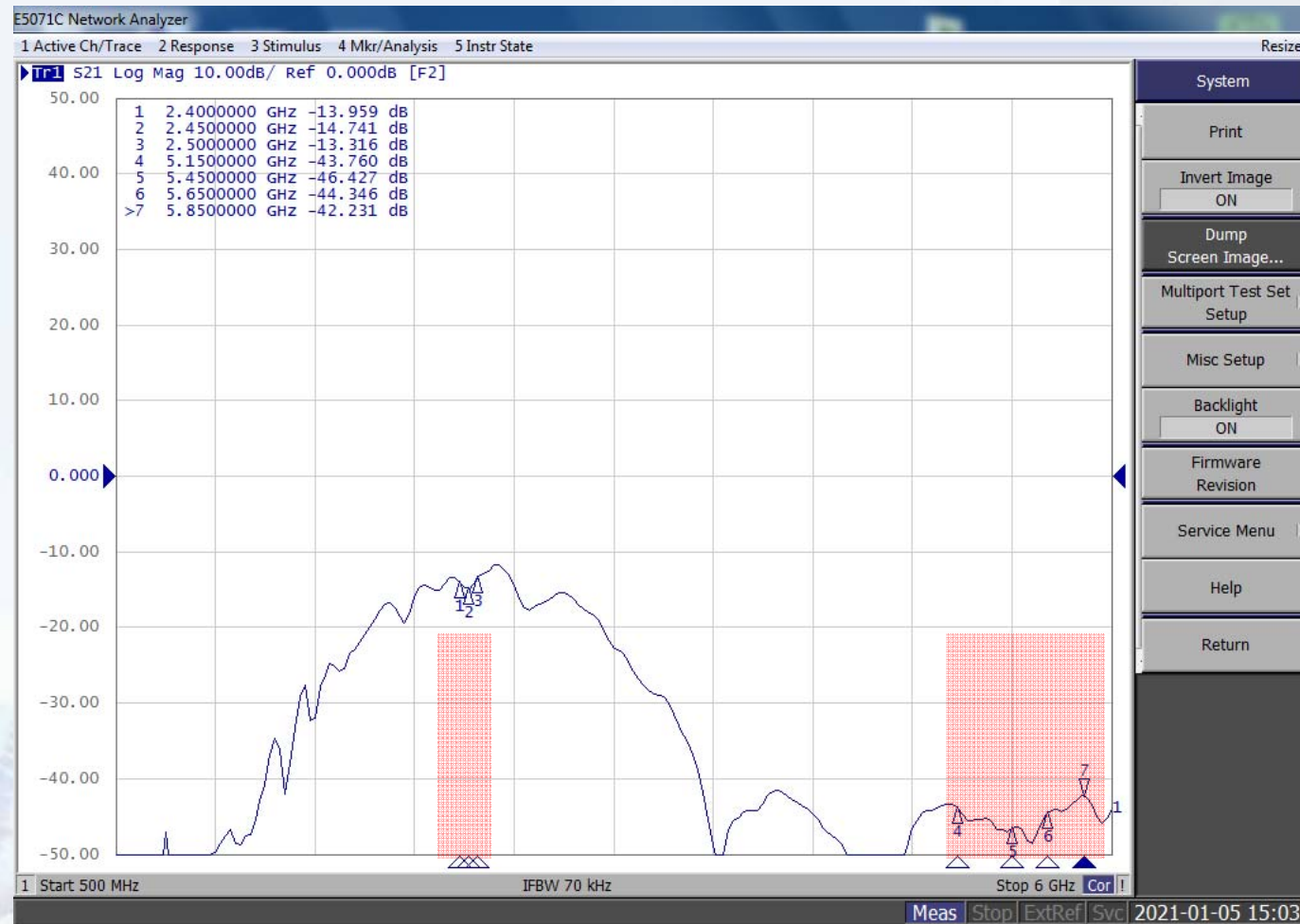
Isolation Results

2G_ANT0 & 5G_ANT0(Criterion: $\geq 20\text{dB}$)



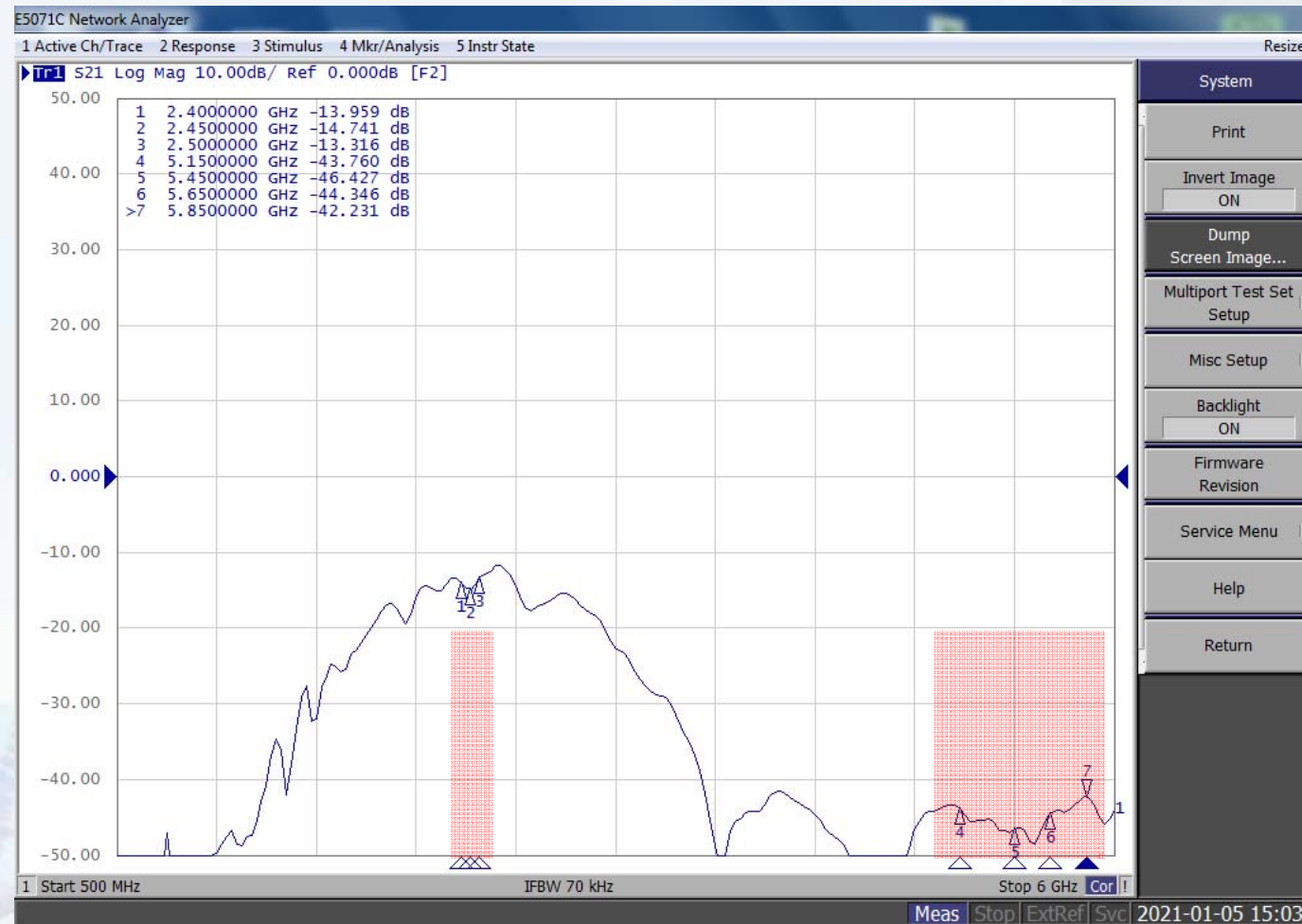
Isolation Results

2G_ANT0 & 5G_ANT1(Criterion: $\geq 20\text{dB}$)



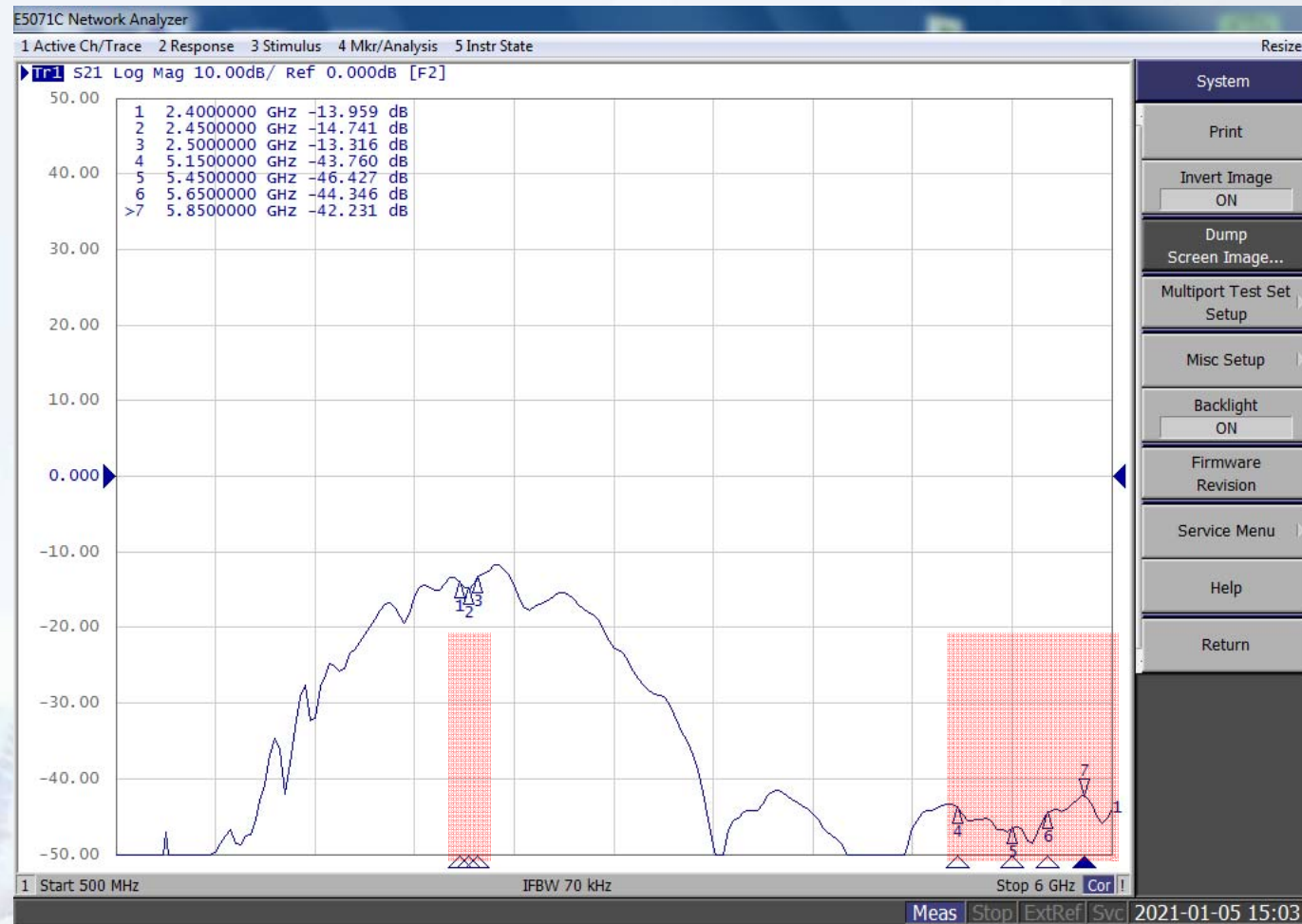
Isolation Results

2G_ANT1 & 5G_ANT0(Criterion: $\geq 20\text{dB}$)



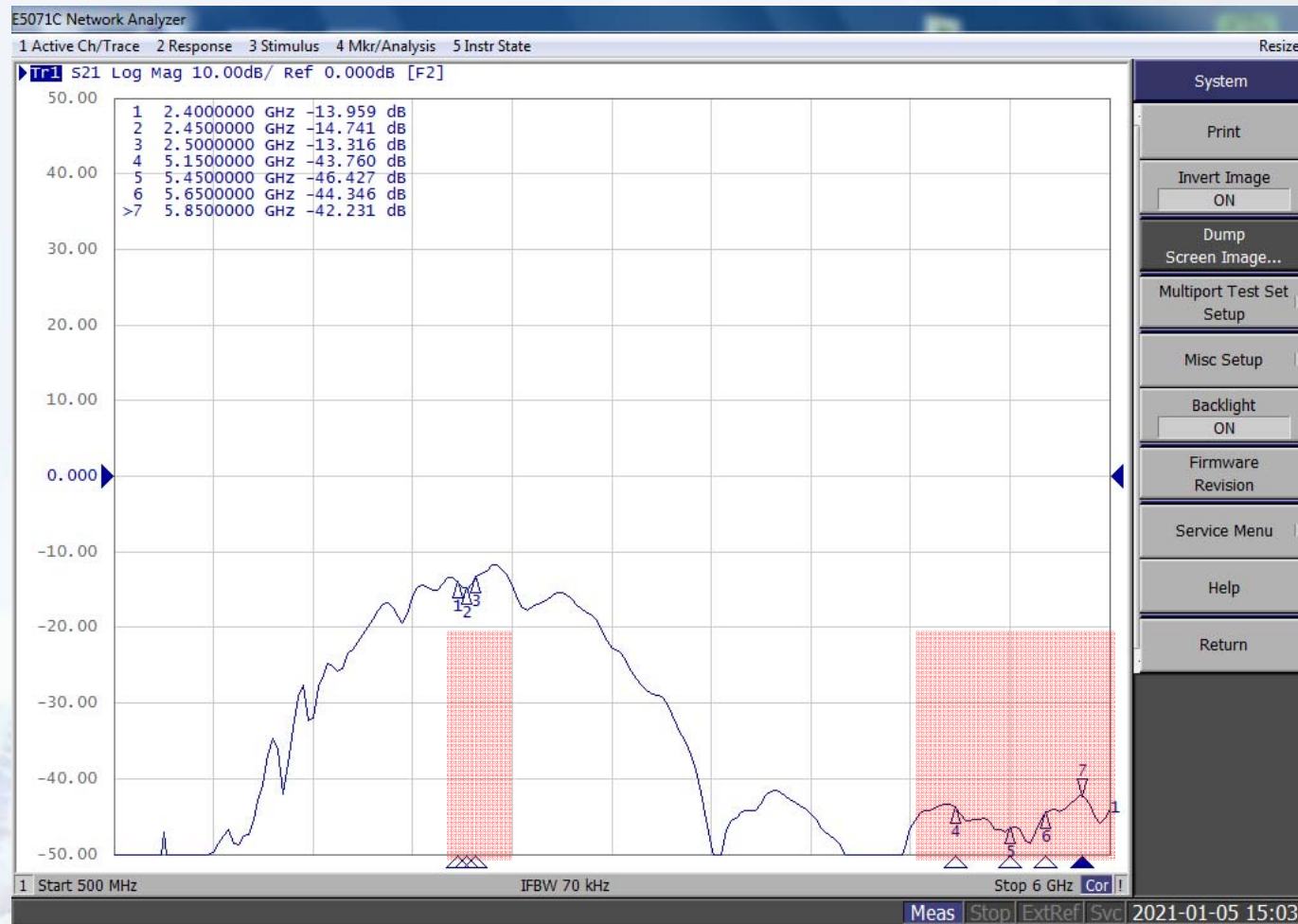
Isolation Results

2G_ANT1 & 5G_ANT1(Criterion: $\geq 20\text{dB}$)

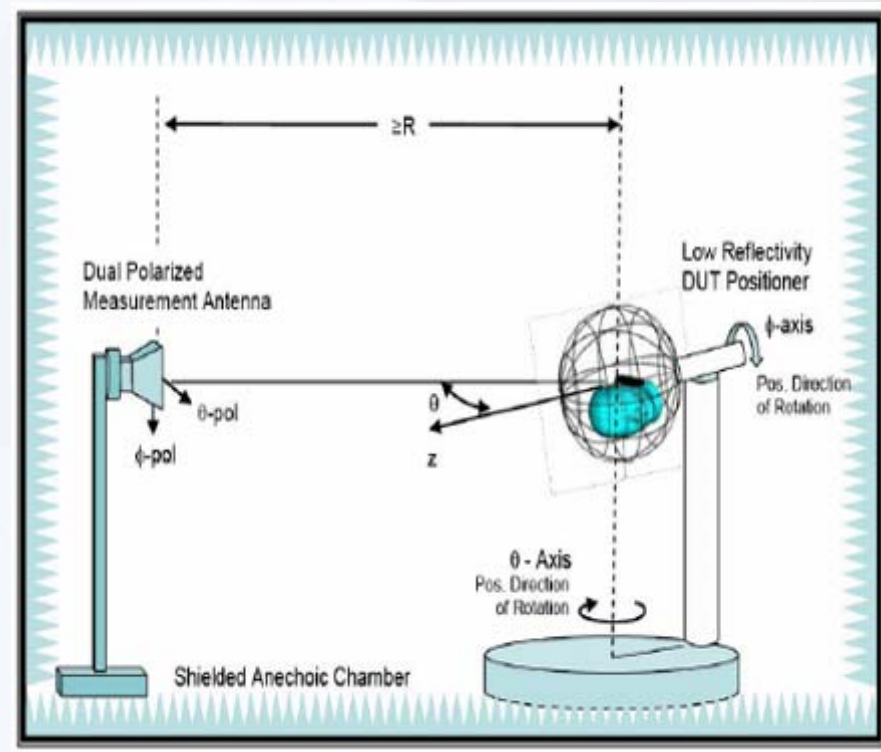
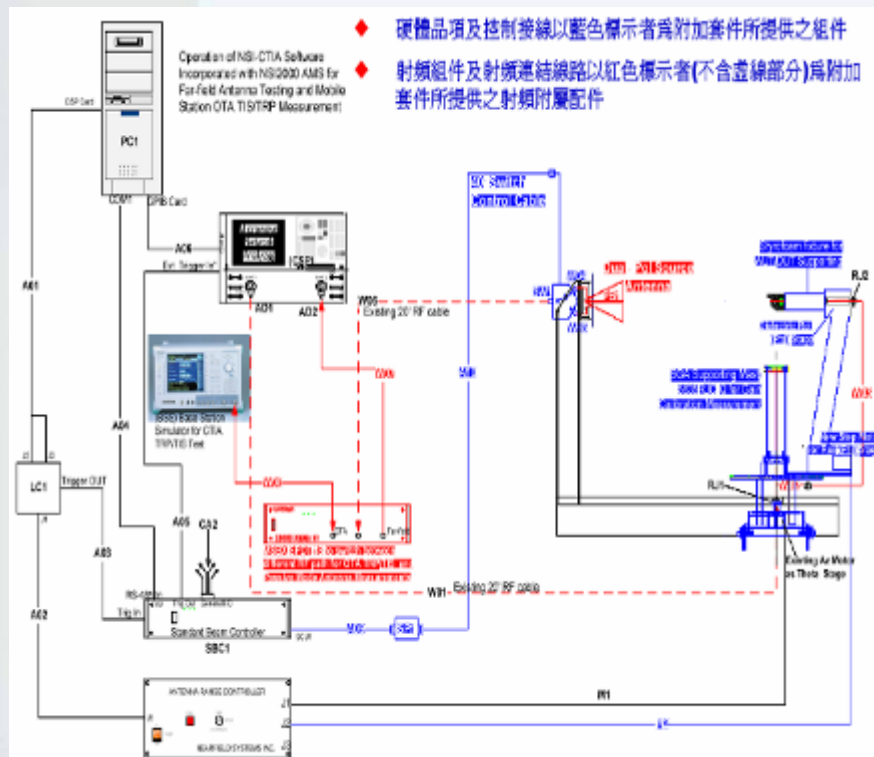


Isolation Results

5G_ANT0 & 5G_ANT1(Criterion: $\geq 20\text{dB}$)

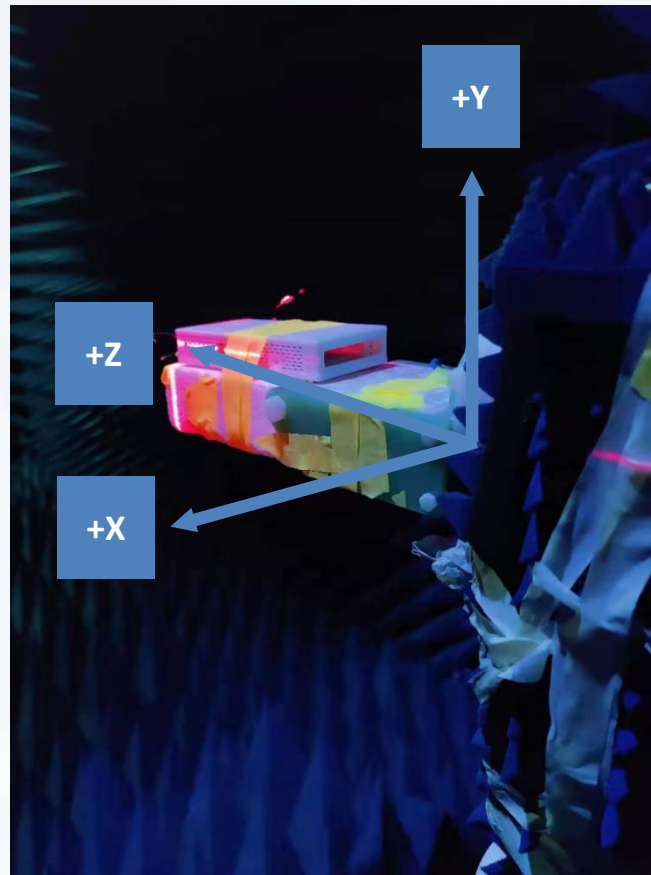


Chamber Information



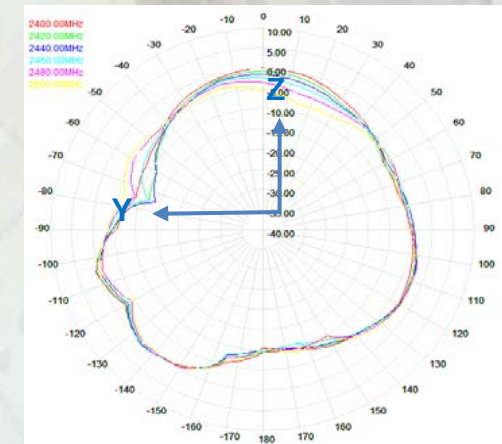
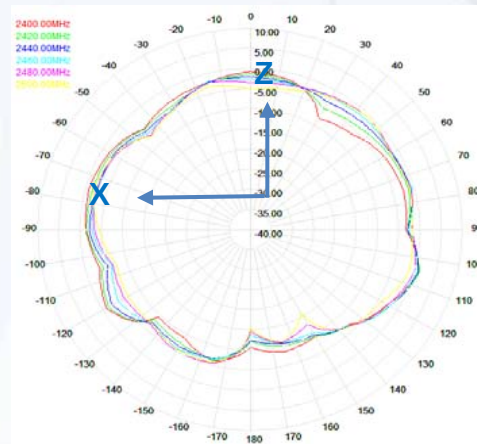
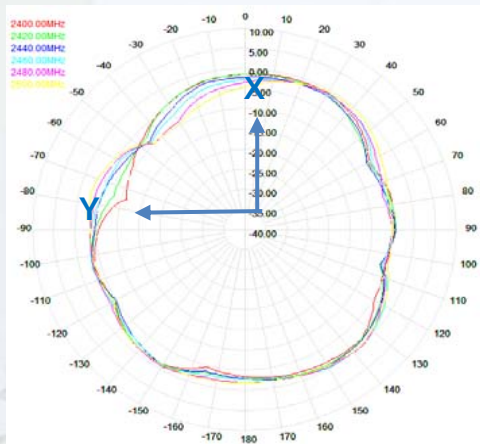
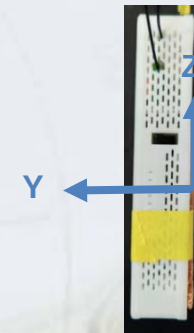
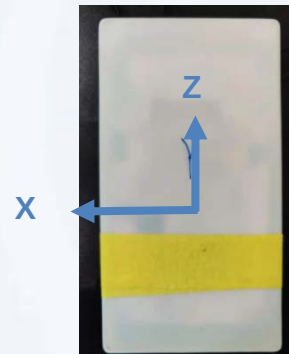
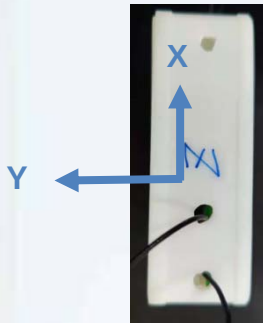
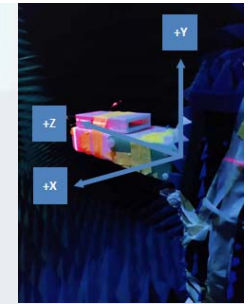
Chamber	Brand	Model	Location
WavePro	WavePro	FFC-700	China, Dongguan

Test Setup for Radiation Pattern Measurement



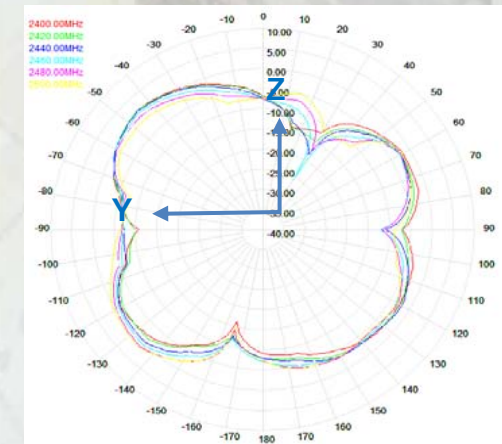
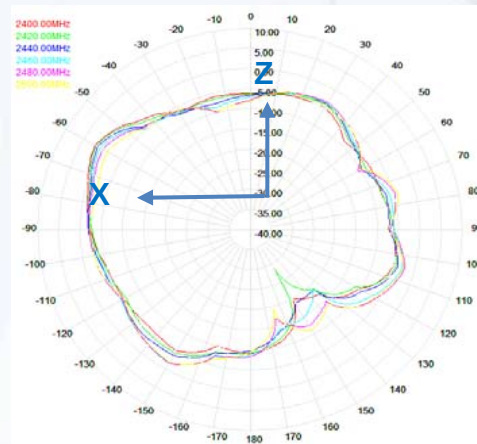
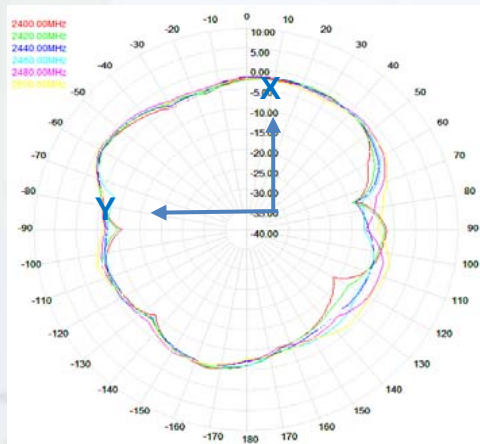
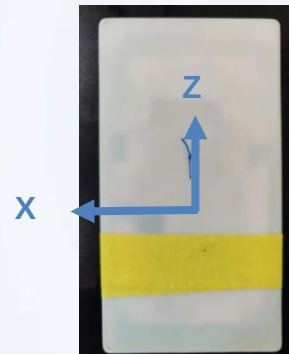
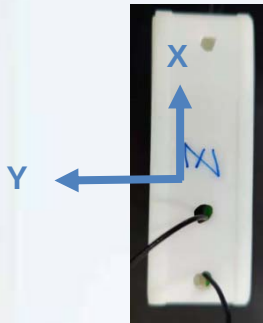
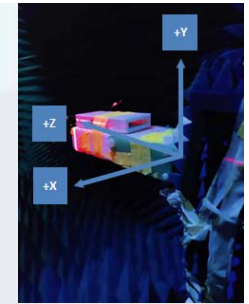
2D Radiation Pattern Results

2G_ANT0



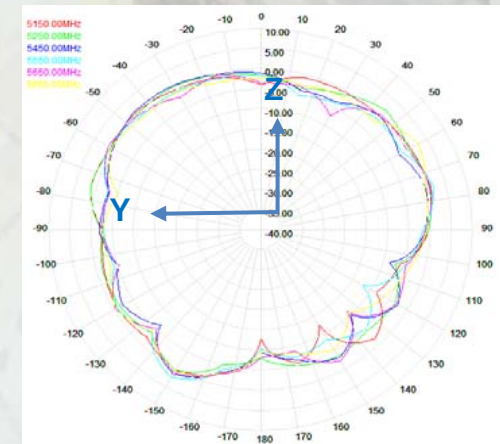
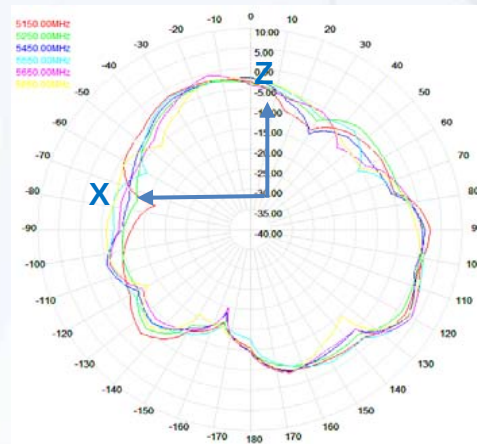
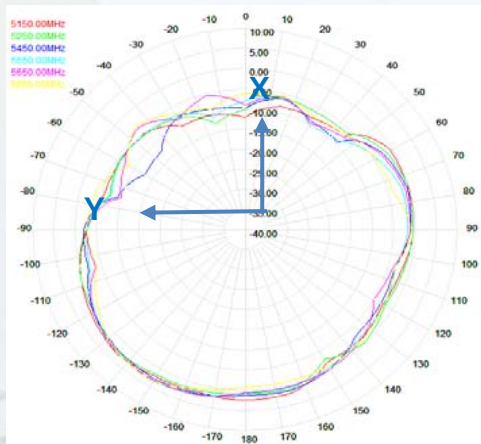
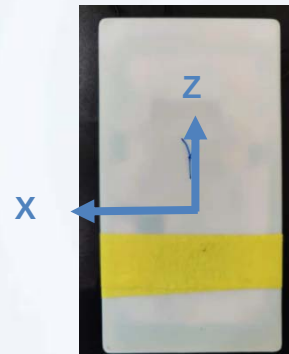
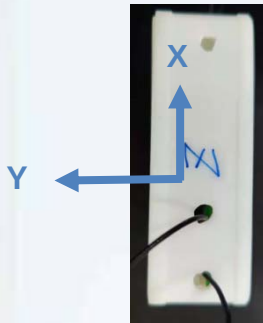
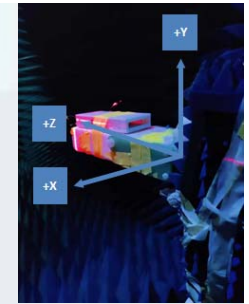
2D Radiation Pattern Results

2G_ANT1



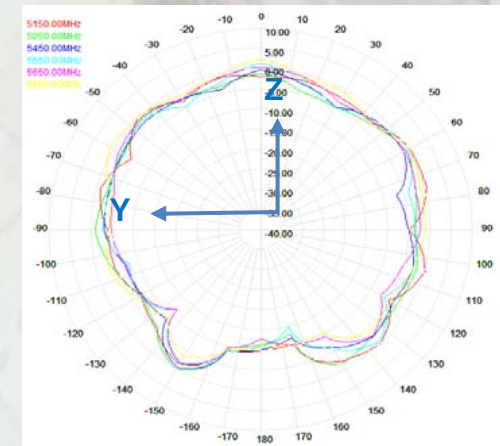
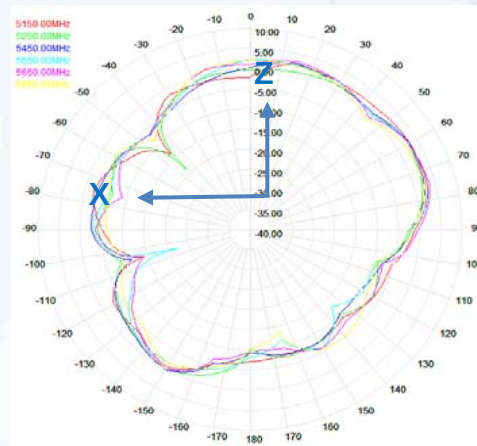
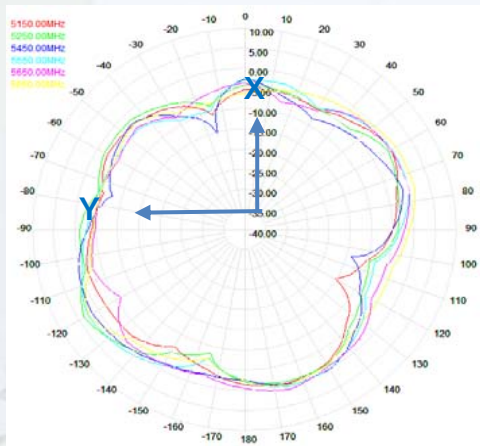
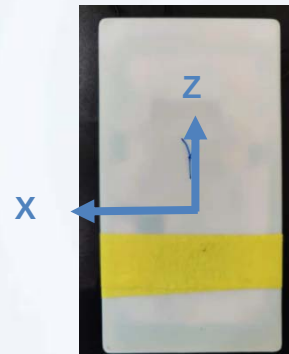
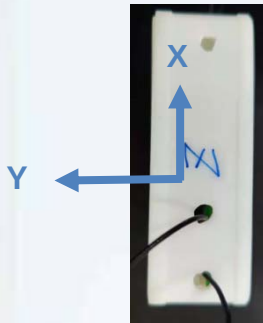
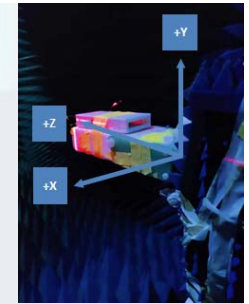
2D Radiation Pattern Results

5G_ANT0



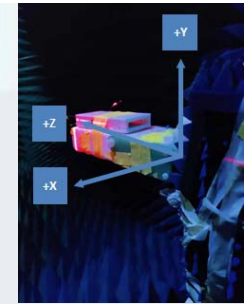
2D Radiation Pattern Results

5G_ANT1

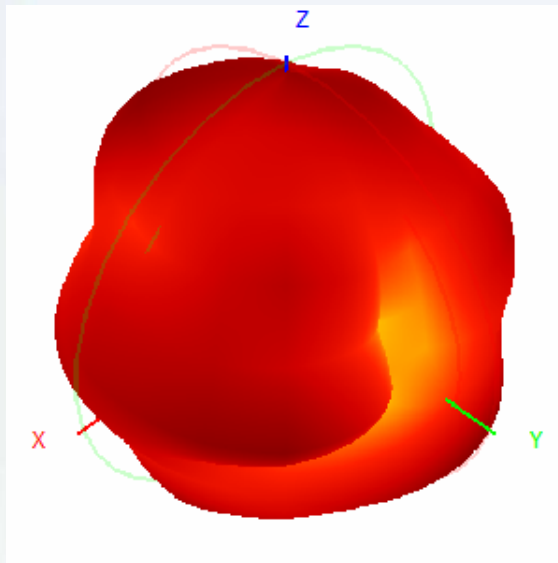


3D Radiation Pattern Results

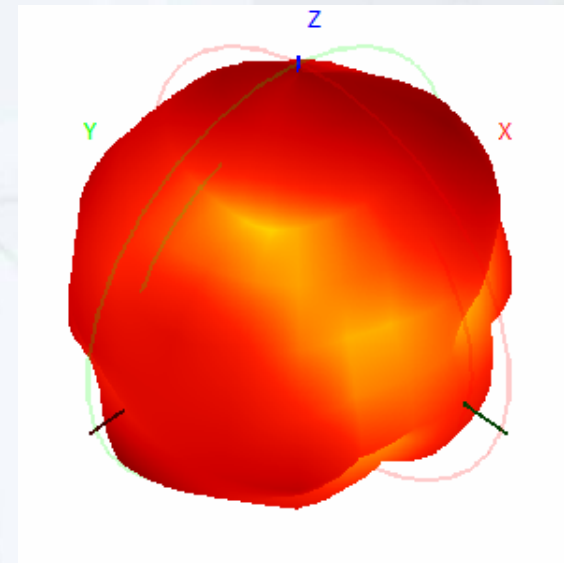
2G_ANT0, 2400 MHz



Front View

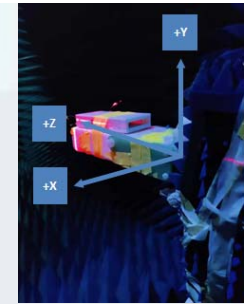


Back View

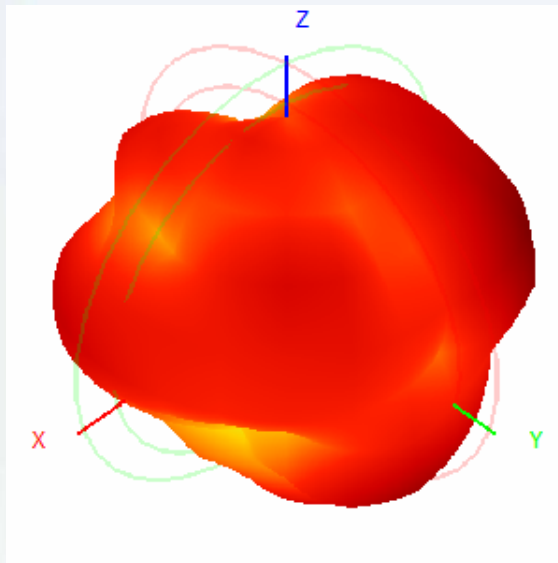


3D Radiation Pattern Results

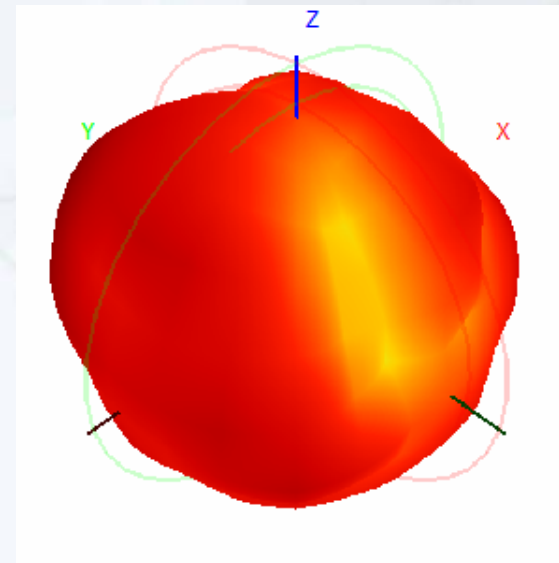
2G_ANT0, 2500 MHz



Front View

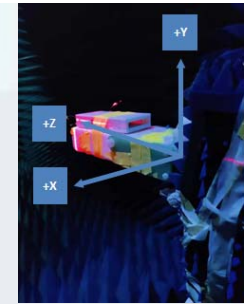


Back View

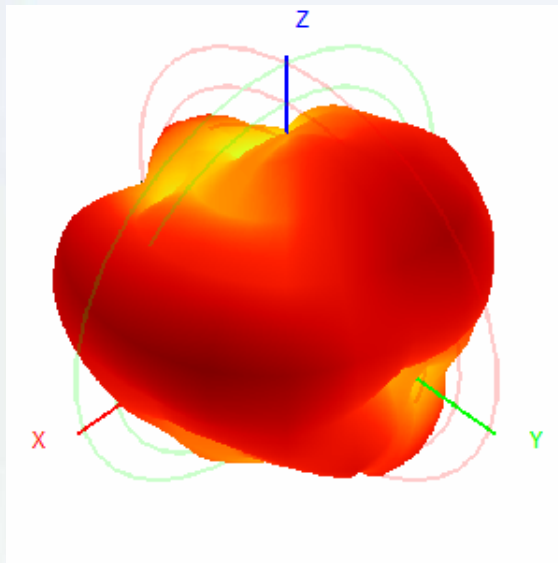


3D Radiation Pattern Results

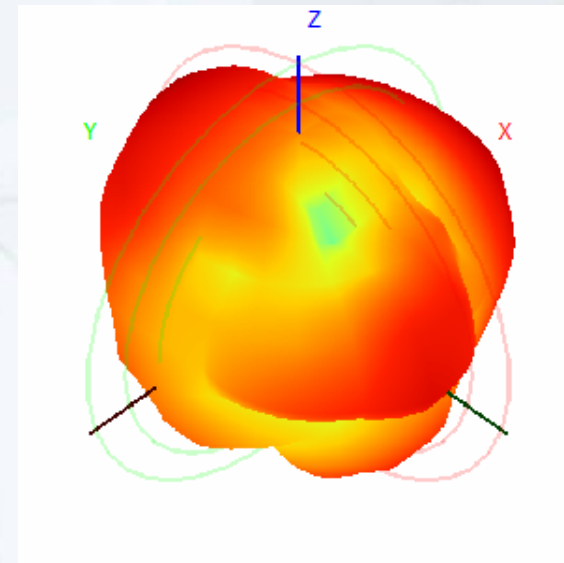
2G_ANT1, 2400 MHz



Front View

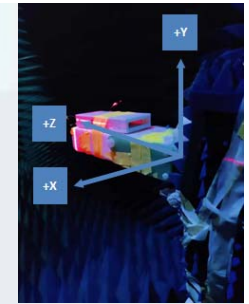


Back View

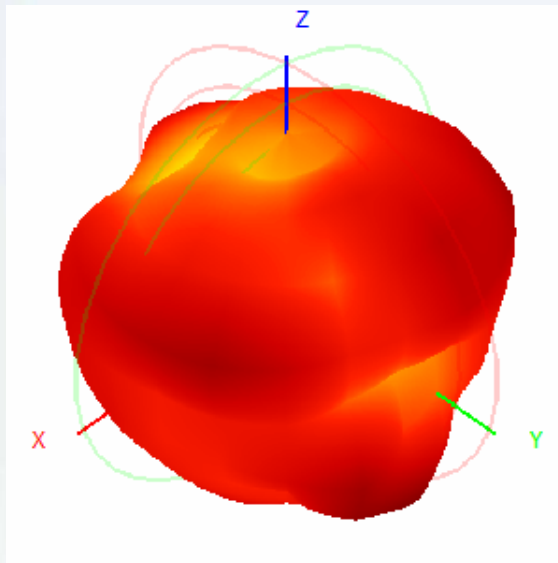


3D Radiation Pattern Results

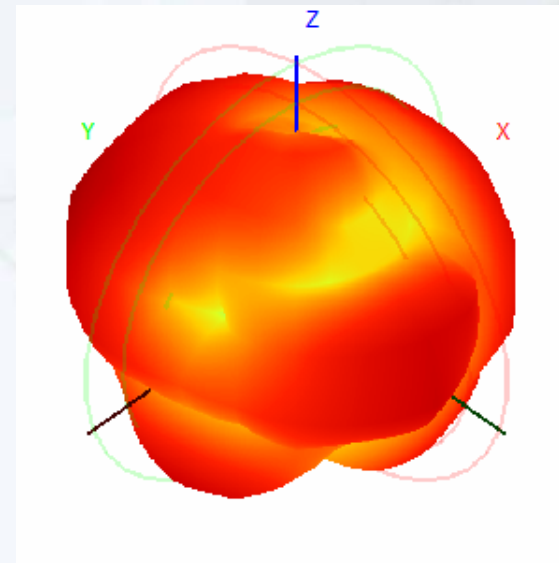
2G_ANT1, 2500 MHz



Front View

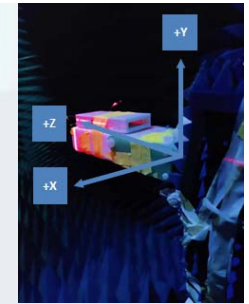


Back View

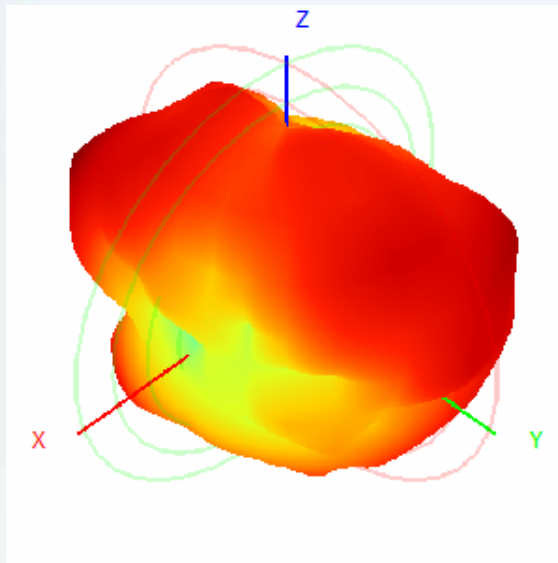


3D Radiation Pattern Results

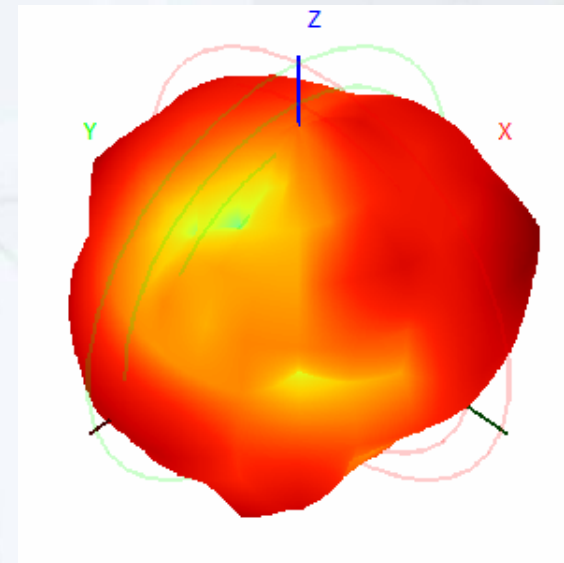
5G_ANT0, 5150 MHz



Front View

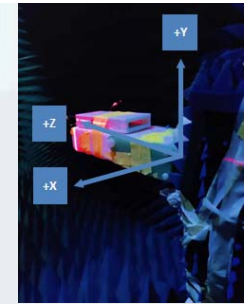


Back View

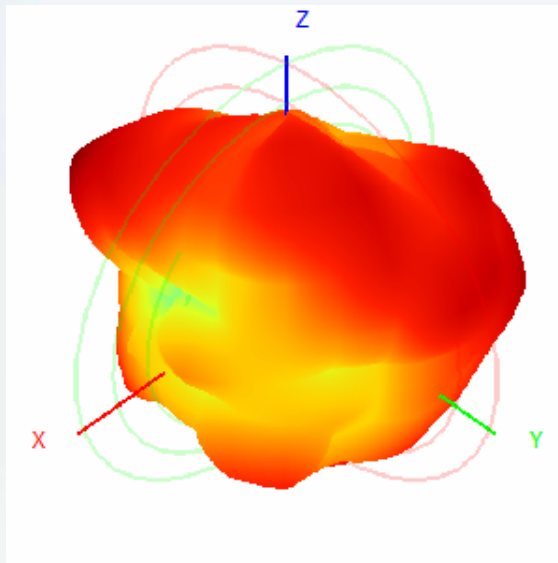


3D Radiation Pattern Results

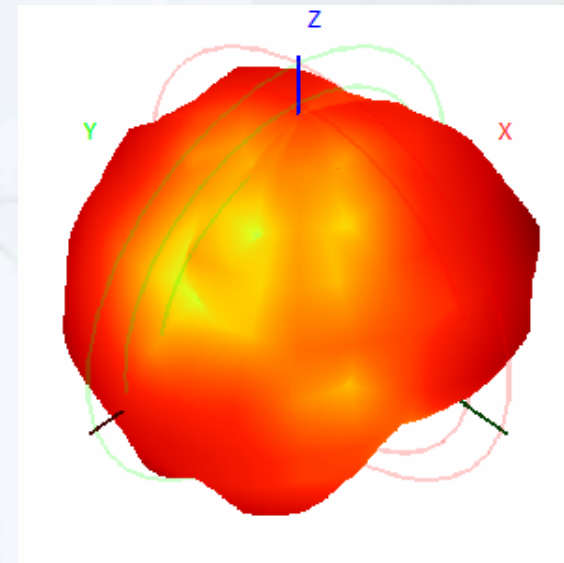
5G_ANT0, 5550 MHz



Front View

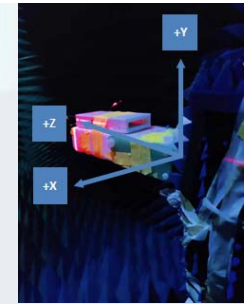


Back View

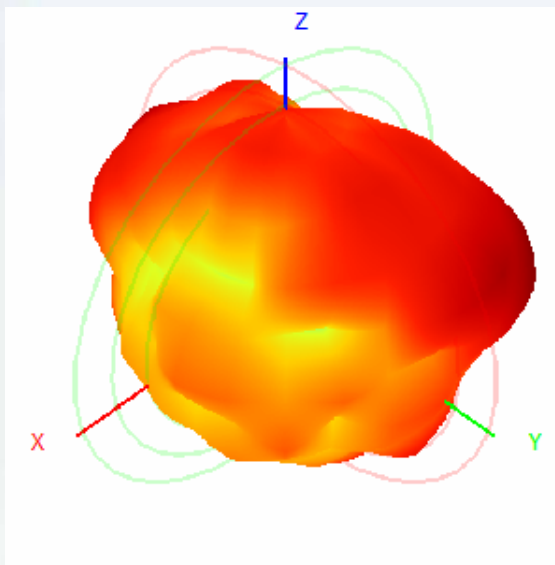


3D Radiation Pattern Results

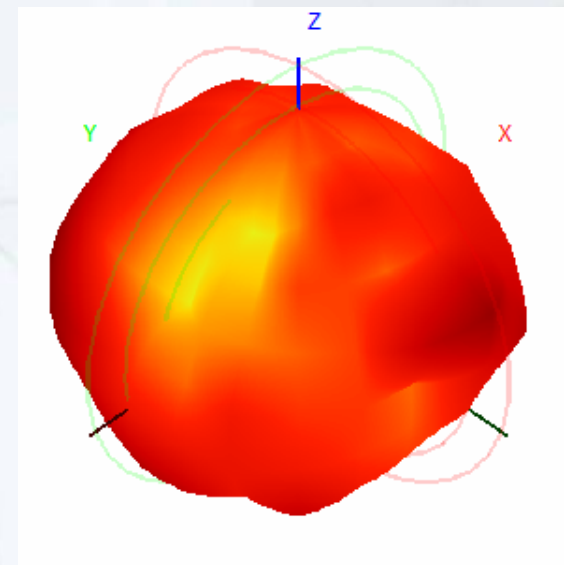
5G_ANT0, 5850 MHz



Front View

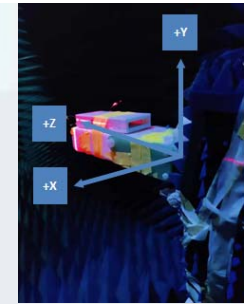


Back View

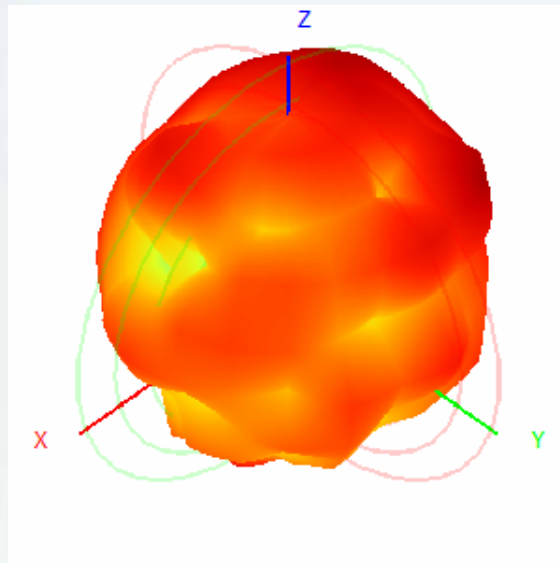


3D Radiation Pattern Results

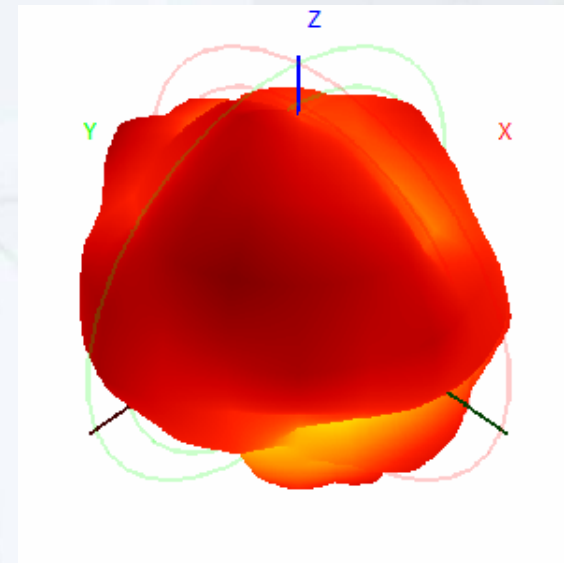
5G_ANT1, 5150 MHz



Front View

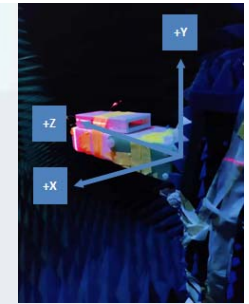


Back View

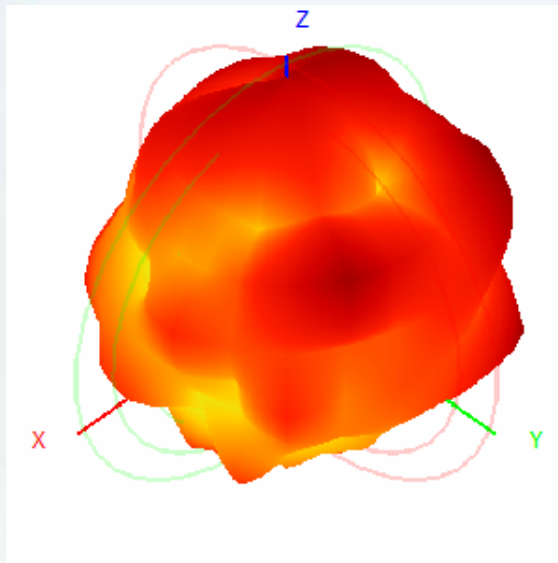


3D Radiation Pattern Results

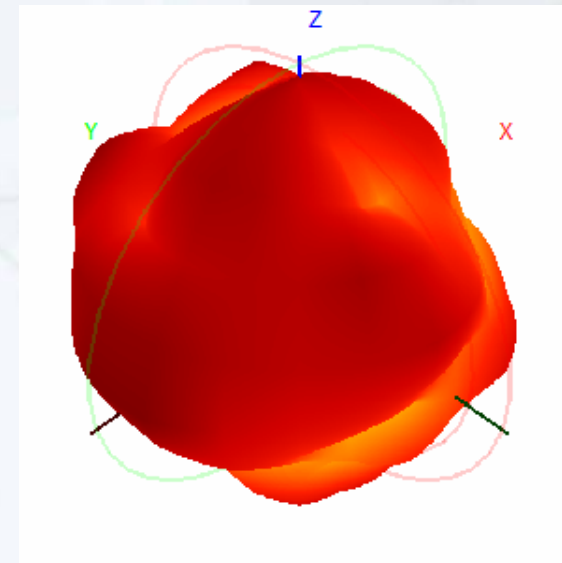
5G_ANT1, 5550 MHz



Front View

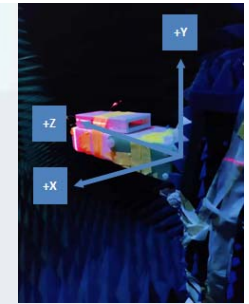


Back View

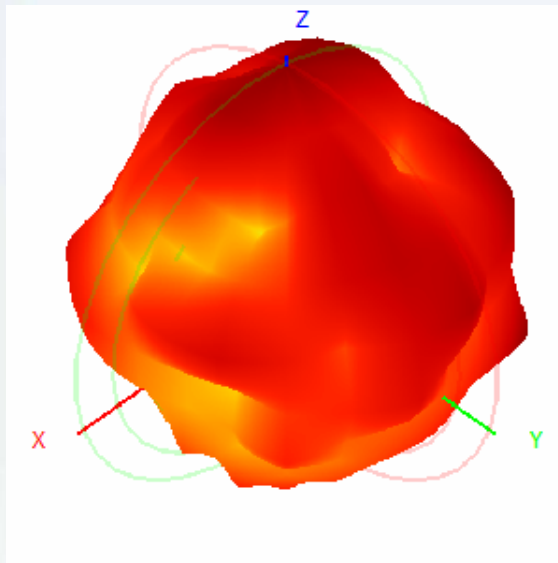


3D Radiation Pattern Results

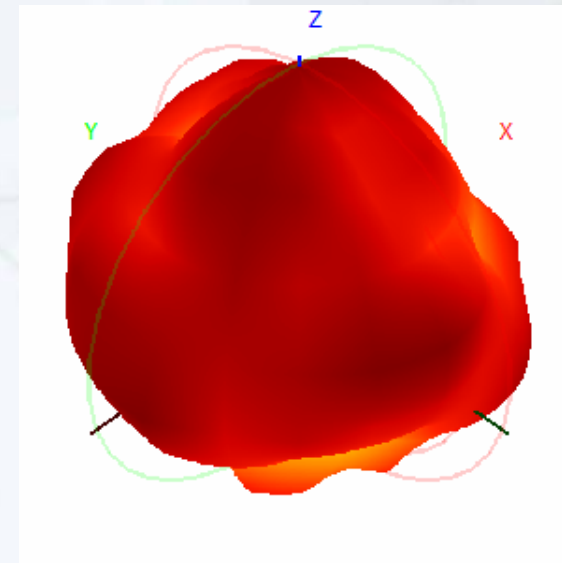
5G_ANT1, 5850 MHz



Front View



Back View



Results Summary

VSWR (Criterion: ≤ 1.92)

Frequency (MHz)	2G_ANT0	2G_ANT1
2400	1.3	1.4
2450	1.2	1.2
2500	1.1	1.2

Frequency (MHz)	5G_ANT0	5G_ANT1
5150	1.2	1.7
5450	1.1	1.6
5650	1.2	1.4
5850	1.4	1.4

Results Summary

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

Frequency (MHz)	2G_ANT0 & 2G_ANT1	2G_ANT0 & 5G_ANT0	2G_ANT0 & 5G_ANT1	2G_ANT1 & 5G_ANT0	2G_ANT1 & 5G_ANT1	5G_ANT0 & 5G_ANT1
2400	13.9	30.0	22.1	25.5	26.3	29.9
2450	14.7	22.0	20.6	24.4	22.4	33.0
2500	13.3	24.7	18.0	27.1	22.7	40.4
5150	43.7	35.7	25.4	39.2	40.4	28.6
5450	46.2	37.4	26.5	43.1	47.0	29.4
5650	44.3	38.8	28.0	41.8	43.5	28.9
5850	42.2	44.0	30.0	45.2	39.3	29.3

Results Summary

Peak Gain & Efficiency (Criterion: Efficiency $\geq 50\%$)

Frequency (MHz)	2G_ANT0		2G_ANT1	
	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)
2400	0.8	46.4	2.9	40.1
2430	1.2	46.7	2.7	40.8
2450	1.4	47.7	2.0	40.5
2480	1.3	48.6	1.0	41.4
2500	1.7	47.0	1.2	40.2

Results Summary

Peak Gain & Efficiency (Criterion: Efficiency $\geq$ 50%)

Frequency (MHz)	5G_ANT0		5G_ANT1	
	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)
5150	4.4	62.5	4.4	59.6
5250	4.6	59.6	3.5	55.0
5450	3.9	57.3	3.7	54.5
5650	4.4	59.8	4.1	57.4
5750	3.5	57.2	3.1	58.8
5850	3.7	55.3	2.7	57.5