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

DONGGUAN AEON TECH CO.,LTD.(CHINA)

SPECIFICATION FOR APPROVAL

CUSTOMER: *ASUS*

PART NAME: *RF Antenna Assembly*

PART NO.: *REVISION:*

W. Y. P/NO.: *C660-510629-A(SRF2024191)* *REV.: X1*

s

	MANUFACTURER SIGNATURE	CUSTOMER SIGNATURE
APPROVED BY :		
DATE :		

WHA YU GROUP

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Contents

RF Antenna Assembly

Specification

1. Electrical Properties With housing(ANT1)

1.1	Frequency Range……	2.442 GHz /5.20~5.785 GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.67：1 Max.
1.4	Return Loss……	12 dB Min.
1.5	Radiation ……	Omni-directional
1.6	Peak Gain……	5.03dBi
1.7	Cable Loss……	0.4dB
1.8	Polarization……	Linear
1.9	Cable……	1.37 Coaxial Cable
1.10	Connector……	IPEX

2. Physical Properties :

2.1	Operating Temp. ……	-10℃ ~ +60℃
2.2	Storage Temp. ……	-10℃ ~ +70℃

RF Antenna Assembly

Specification

1. Electrical Properties With housing(ANT2)

1.1	Frequency Range……	2.442 GHz /5.20~5.785 GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.67：1 Max.
1.4	Return Loss……	12 dB Min.
1.5	Radiation ……	Omni-directional
1.6	Peak Gain……	4.59dBi
1.7	Cable Loss……	0.4dB
1.8	Polarization……	Linear
1.9	Cable……	1.37 Coaxial Cable
1.10	Connector……	IPEX

2. Physical Properties :

2.1	Operating Temp. ……	-10℃ ~ +60℃
2.2	Storage Temp. ……	-10℃ ~ +70℃

RF Antenna Assembly

Specification

1. Electrical Properties With housing(ANT3)

1.1	Frequency Range……	5.20~5.785 GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.67：1 Max.
1.4	Return Loss……	12 dB Min.
1.5	Radiation ……	Omni-directional
1.6	Peak Gain……	6.11dBi
1.7	Cable Loss……	0.4dB
1.8	Polarization……	Linear
1.9	Cable……	1.37 Coaxial Cable
1.10	Connector……	IPEX

2. Physical Properties :

2.1	Operating Temp. ……	-10℃ ~ +60℃
2.2	Storage Temp. ……	-10℃ ~ +70℃

RF Antenna Assembly

Specification

1. Electrical Properties With housing(ANT4)

1.1	Frequency Range……	5.20~5.785 GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.67：1 Max.
1.4	Return Loss……	12 dB Min.
1.5	Radiation ……	Omni-directional
1.6	Peak Gain……	6.22dBi
1.7	Cable Loss……	0.4dB
1.8	Polarization……	Linear
1.9	Cable……	1.37 Coaxial Cable
1.10	Connector……	IPEX

2. Physical Properties :

2.1	Operating Temp. ……	-10℃ ~ +60℃
2.2	Storage Temp. ……	-10℃ ~ +70℃

RF Antenna Assembly

Specification

1. Electrical Properties With housing(ANT5)

1.1	Frequency Range……	5.5~5.895 GHz,6.175~6.995 GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.67：1 Max.
1.4	Return Loss……	12 dB Min.
1.5	Radiation ……	Omni-directional
1.6	Peak Gain……	5.12 dBi
1.7	Cable Loss……	0.37dB
1.8	Polarization……	Linear
1.9	Cable……	1.37 Coaxial Cable
1.10	Connector……	IPEX

2. Physical Properties :

2.1	Operating Temp. ……	-10℃ ~ +60℃
2.2	Storage Temp. ……	-10℃ ~ +70℃

RF Antenna Assembly

Specification

1. Electrical Properties With housing(ANT6)

1.1	Frequency Range……	5.5~5.895 GHz,6.175~6.995 GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.67：1 Max.
1.4	Return Loss……	12 dB Min.
1.5	Radiation ……	Omni-directional
1.6	Peak Gain……	3.77 dBi
1.7	Cable Loss……	0.39dB
1.8	Polarization……	Linear
1.9	Cable……	1.37 Coaxial Cable
1.10	Connector……	IPEX

2. Physical Properties :

2.1	Operating Temp. ……	-10℃ ~ +60℃
2.2	Storage Temp. ……	-10℃ ~ +70℃

RF Antenna Assembly

Specification

1. Electrical Properties With housing(ANT7)

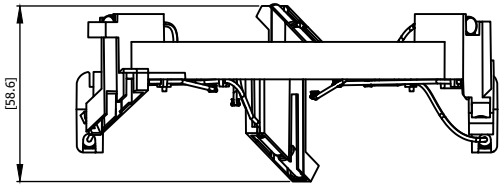
1.1	Frequency Range……	5.5~5.895 GHz,6.175~6.995 GHz
1.2	Impedance ……	50Ω Nominal
1.3	VSWR ……	1.67：1 Max.
1.4	Return Loss……	12 dB Min.
1.5	Radiation ……	Omni-directional
1.6	3D Peak Gain……	3.25dBi
1.7	Cable Loss……	0.45dB
1.8	Polarization……	Linear
1.9	Cable……	1.37 Coaxial Cable
1.10	Connector……	IPEX

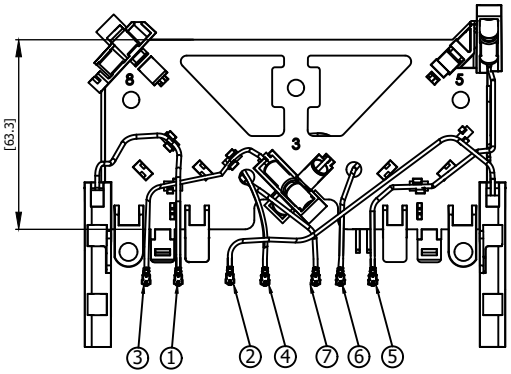
2. Physical Properties :

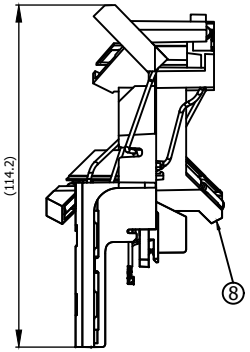
2.1	Operating Temp. ……	-10℃ ~ +60℃
2.2	Storage Temp. ……	-10℃ ~ +70℃

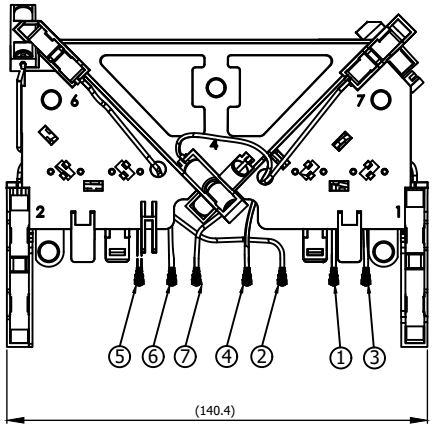
CG-XXXX

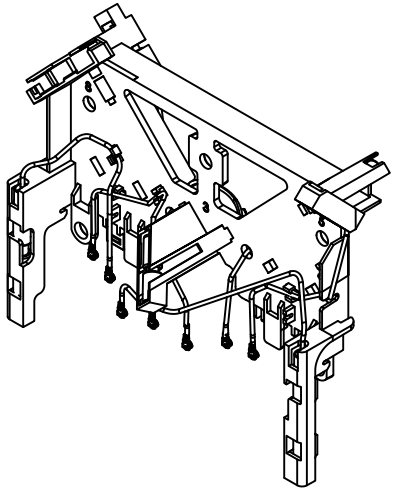
REV	DATE	DESCRIPTION
X1	03/18-2024	New Issue
X9	05/24-2024	新增號碼球&變更線色
X10	05/27-2024	新增note





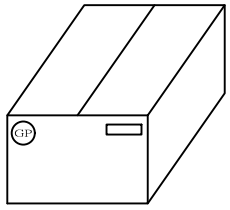






Note:
1.外露線長:銅管組裝入塑件,塑件開始量測到I-PEX中心點長度

NO	DESCRIPTION		Q'TY	REMARK
8	Holder	(CD-1948)ABS;Color:Black	1	
7	Antenna	6G-3 antenna;φ1.37+I-PEX;外露線長=100±3mm;Yellow	1	
6	Antenna	6G-2 antenna;φ1.37+I-PEX;外露線長=83±3mm;Green	1	
5	Antenna	6G-1 antenna;φ1.37+I-PEX;外露線長=86±3mm;White	1	
4	Antenna	5G-2 antenna;φ1.37+I-PEX;外露線長=88±3mm;Gray	1	
3	Antenna	5G-1 antenna;φ1.37+I-PEX;外露線長=70±3mm;Blue	1	
2	Antenna	Dual Band 2 antenna;φ1.37+I-PEX;外露線長=92±3mm;Black	1	
1	Antenna	Dual Band 1 antenna;φ1.37+I-PEX;外露線長=87±3mm;Black	1	



GP標籤貼於紙箱側麥左上角(共2PCS)
外箱標籤貼於紙箱側麥右上角(共1PCS)

CUSTOMER'S SINGATURE

XXX.	± 5.0	APPROVED
XX.	± 3.0	
X.	± 1.0	CHECKED
.X	± 0.5	
.XX	± 0.2	DRAWING

CUSTOMER: ASUS
PART NO :
PARTNAME: RF Antenna Assembly
W.Y P/NO : C660-510629-A

REV	UNIT	FILE : SRF2024883
X10	m/m	SHEET : 1/1

M.gear Wha Yu Group

NE3-23107
ASUS BT8
Antenna 2/5Gx2 5Gx2 6Gx3
(CN Ver. 2/5Gx2 5Gx5)

*Version:**V1.02***
*Released Date: **2024/03/27***
Prepared By:
Reviewed By: STONE

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Contents

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- Conclusion & Comments
- Specification
- Antenna Placement & Solution
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- Return Loss Results
- Isolation Results
- Test Setup for Radiation Pattern Measurement
- 2D Radiation Pattern Results
- Results Summary (return loss, isolation, peak gain, efficiency)

Revision History

Released Date	Version	Record
2024/01/24	1.01	Antenna Testing Report With Housing
2024/03/08	1.02	Antenna Testing Report With Housing (6Gx3)
2024/03/18	1.02	Antenna Testing Report With Housing 2/5Gx2 5Gx2 6Gx3 (CN Ver. 2/5Gx2 5Gx5)
2024/03/27	1.02	Antenna Testing Report With Housing 2/5Gx2 5Gx2 6Gx3 (CN Ver. 2/5Gx2 5Gx5) Update frequency point

Specification

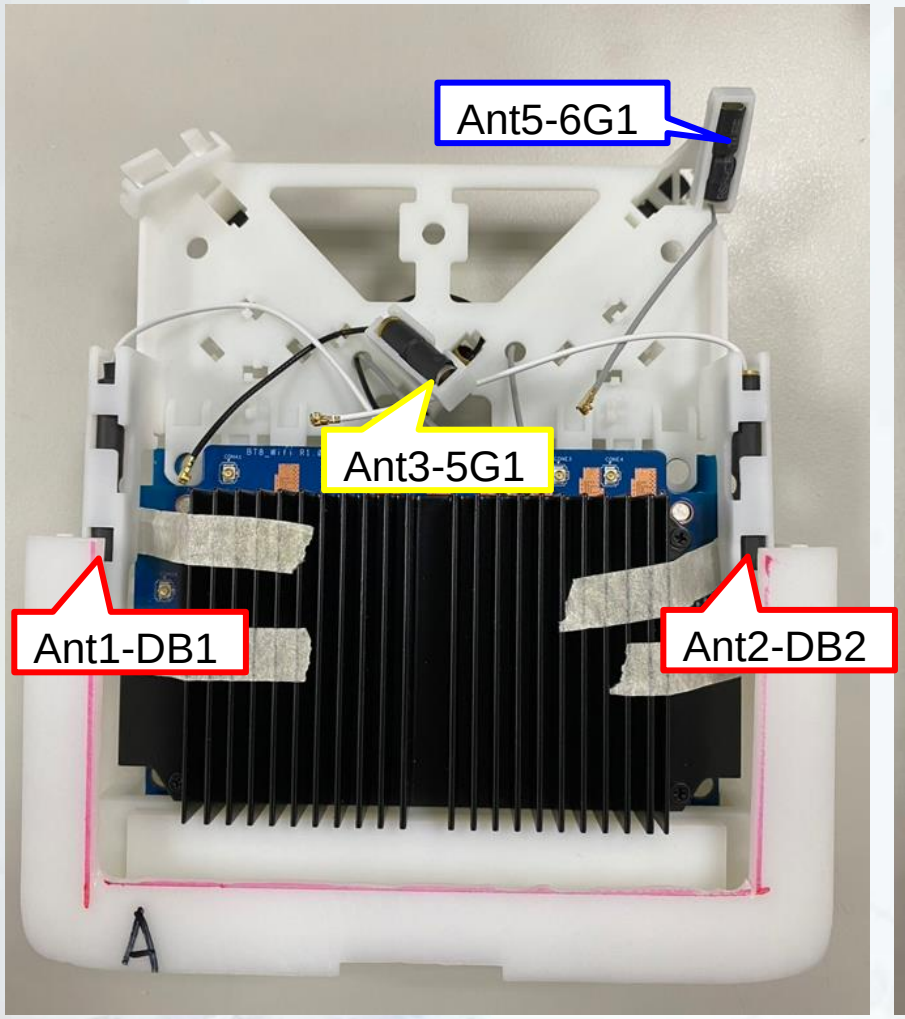
Requirements of Antenna Design

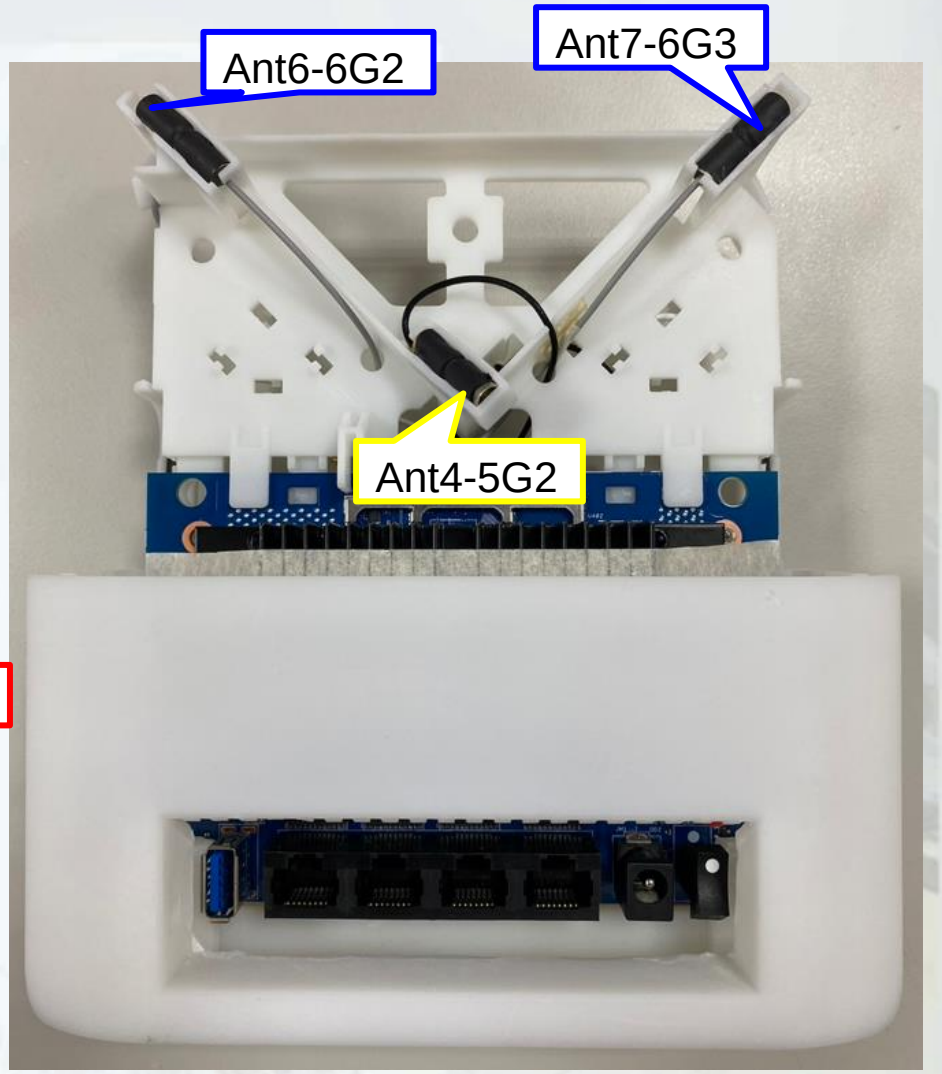
RF Function	Number of ANT	Frequency Band	Remark
2/5G	2	2442 & 5200– 5785 MHz	
5G	2	5200 – 5785 MHz	
6G	3	6175– 6995 MHz	

Requirements of Measurement

Test Item	Specification	Remark
Return Loss	RD hand sample > 15dB , mass product > 12dB	
Isolation	5G to 6G > 25dB , other> 20dB	
Peak gain	N/A	
Efficiency	> 60%	
Radiation pattern	Scale: +10 ~ 40dBi, Angle step size: 5 degree	

Antenna Placement & Solution



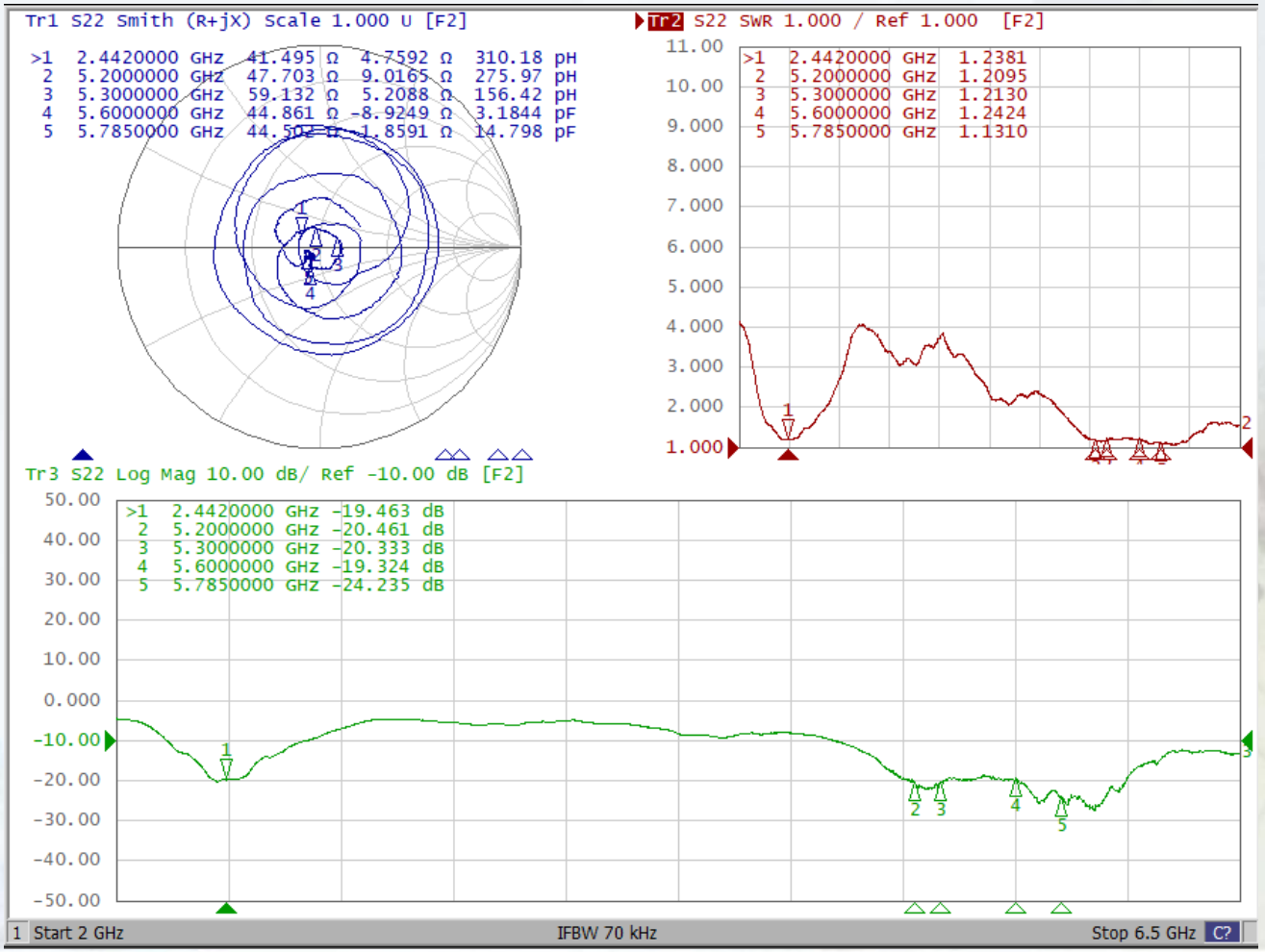


Test Setup for S-parameter Measurement

Equipment	Brand	Model	S/N
Network Analyzer	Keysight	E5071C	MY46107744

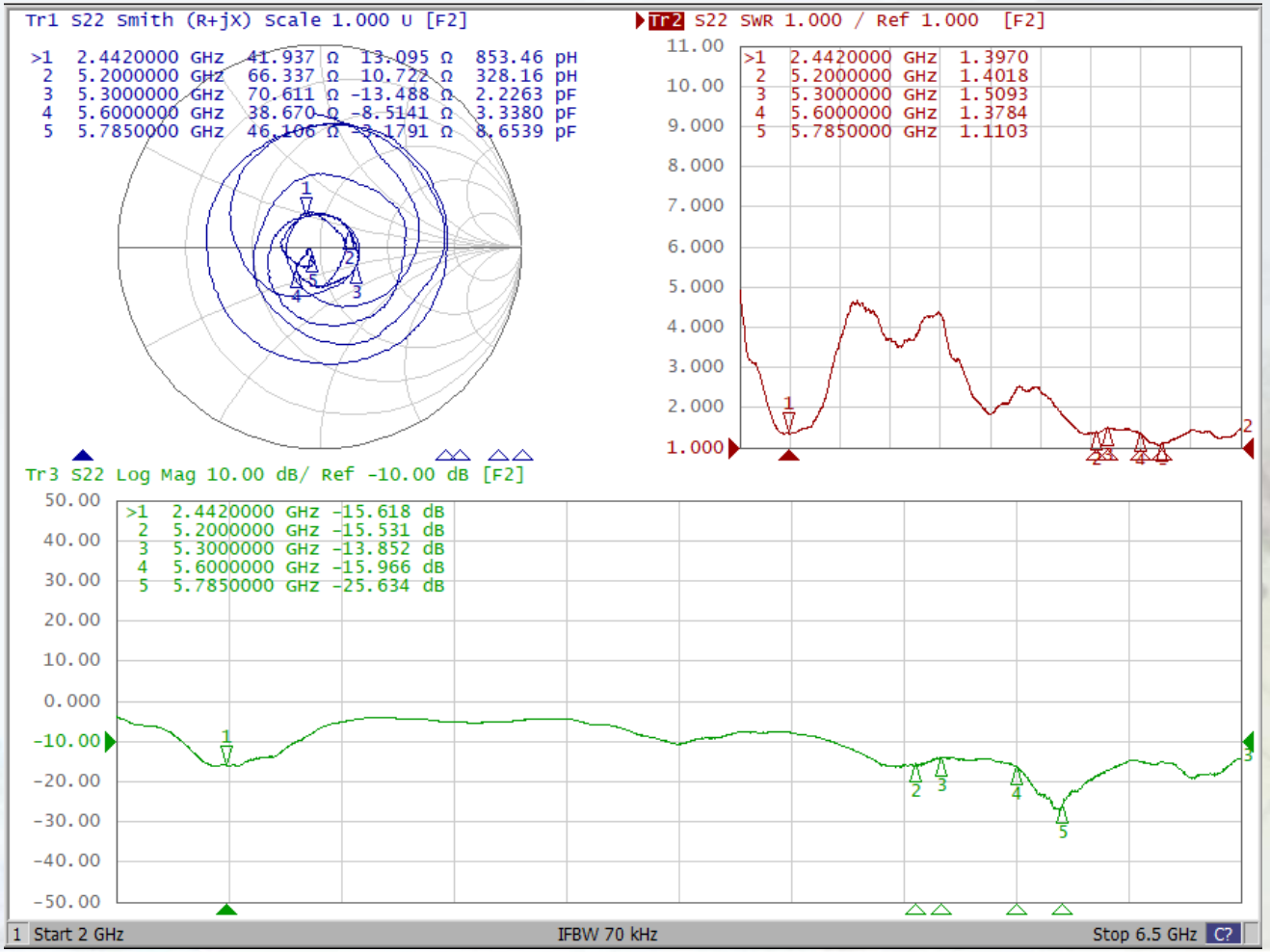
Return Loss Results

Ant1-DB1 (2442MHz & 5200MHz – 5785MHz)



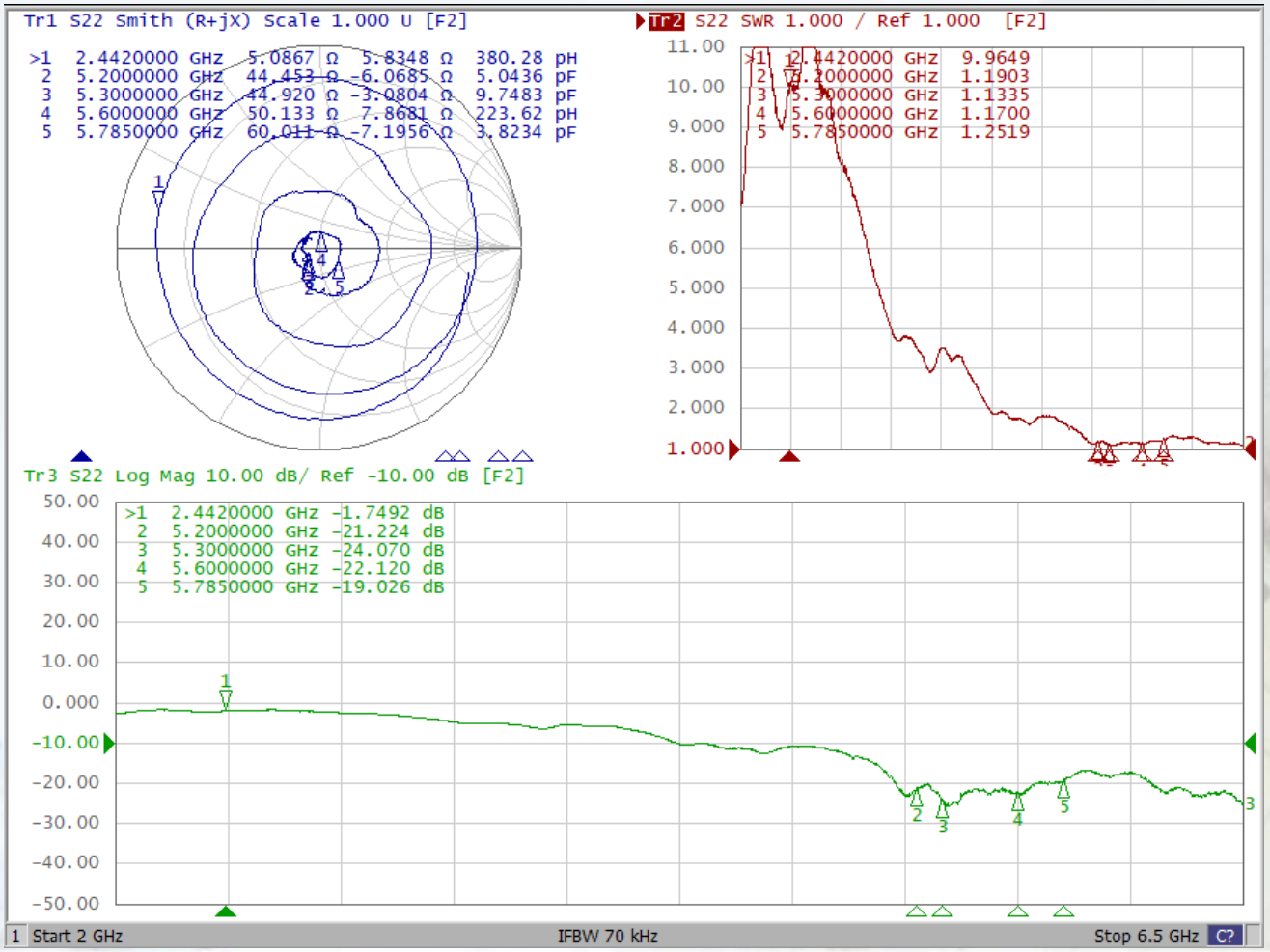
Return Loss Results

Ant2-DB2 (2442MHz & 5200MHz – 5785MHz)



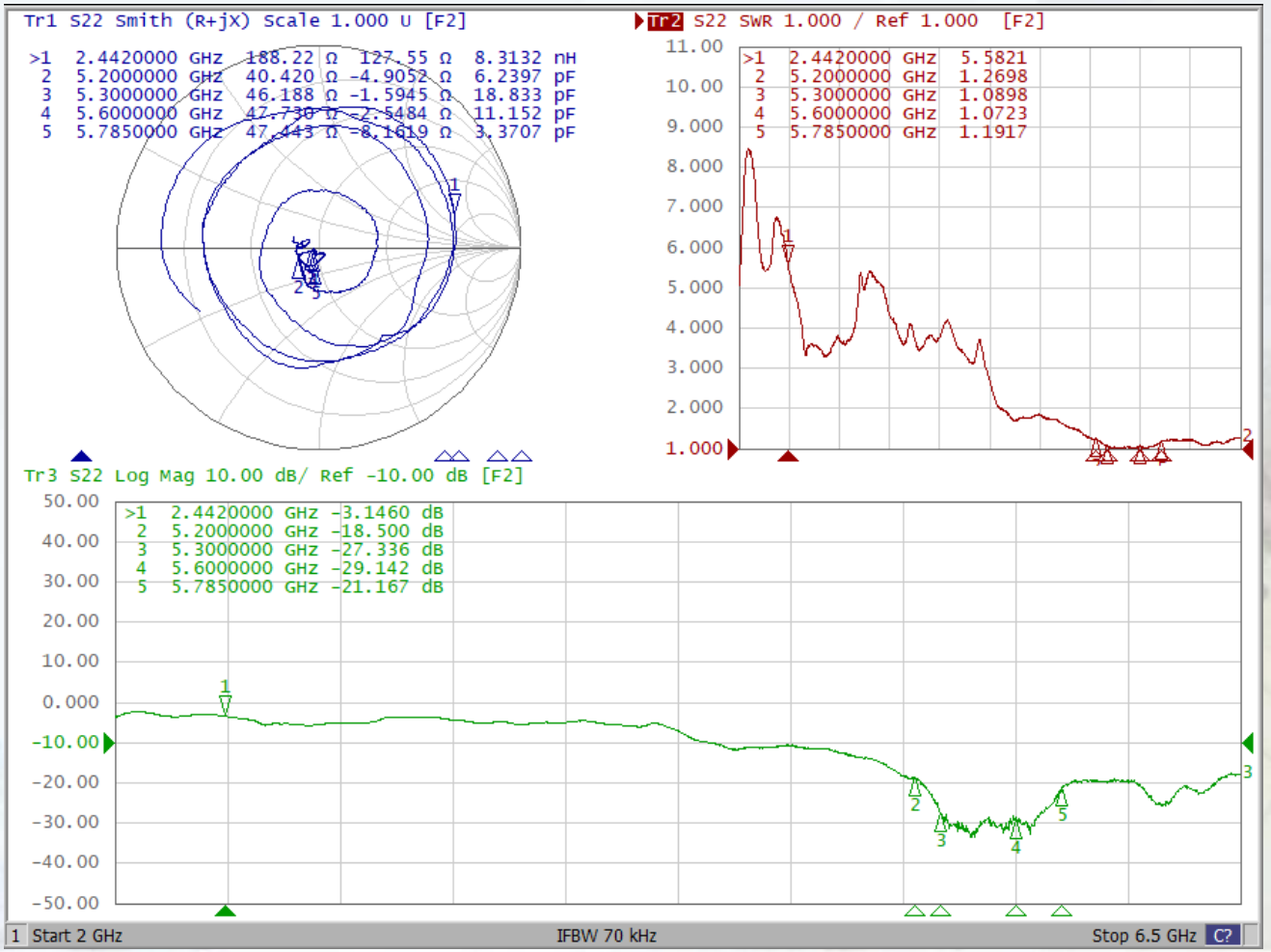
Return Loss Results

Ant3-5G1 (5200MHz – 5785MHz)



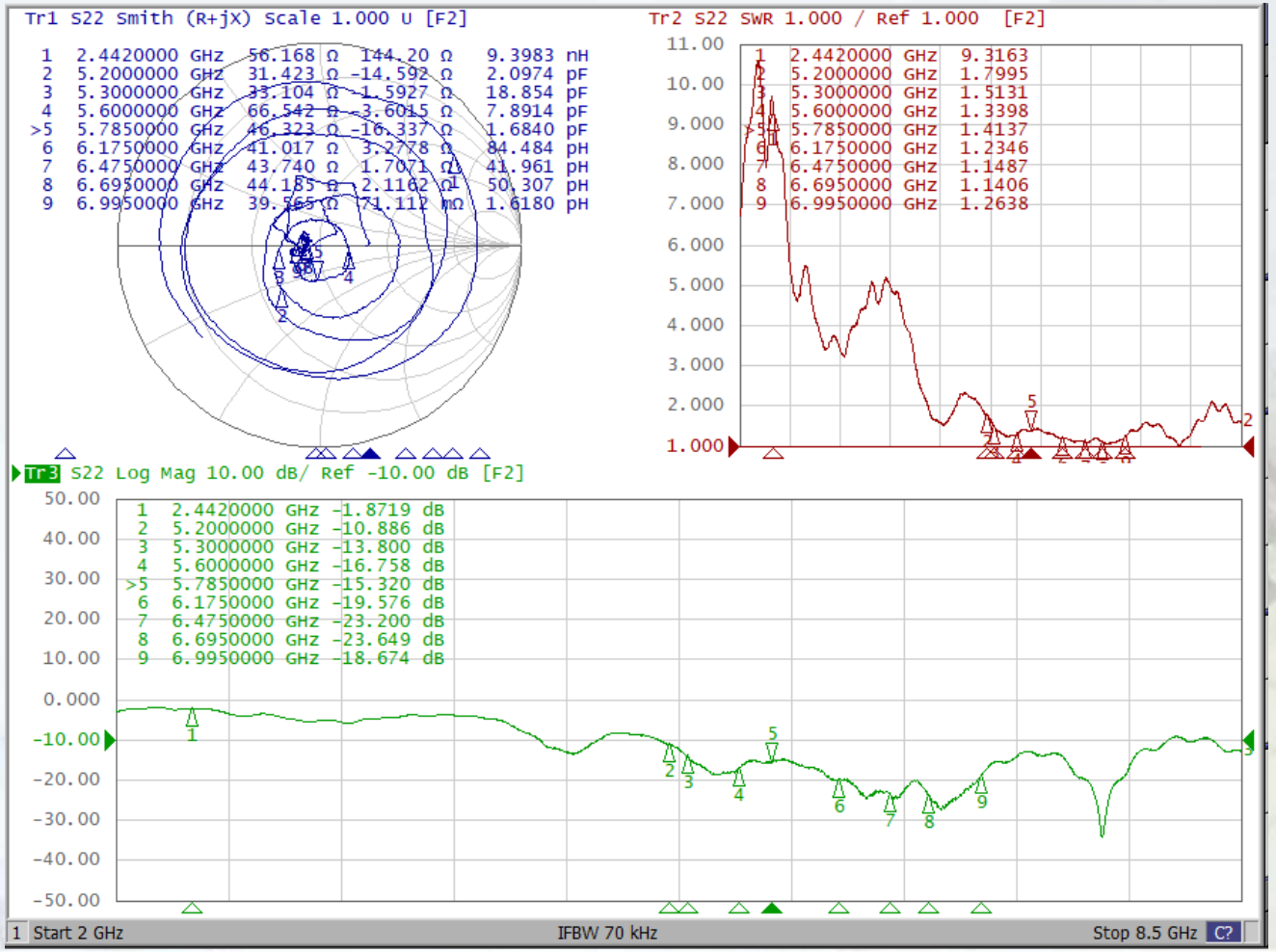
Return Loss Results

Ant4-5G2 (5200MHz – 5785MHz)



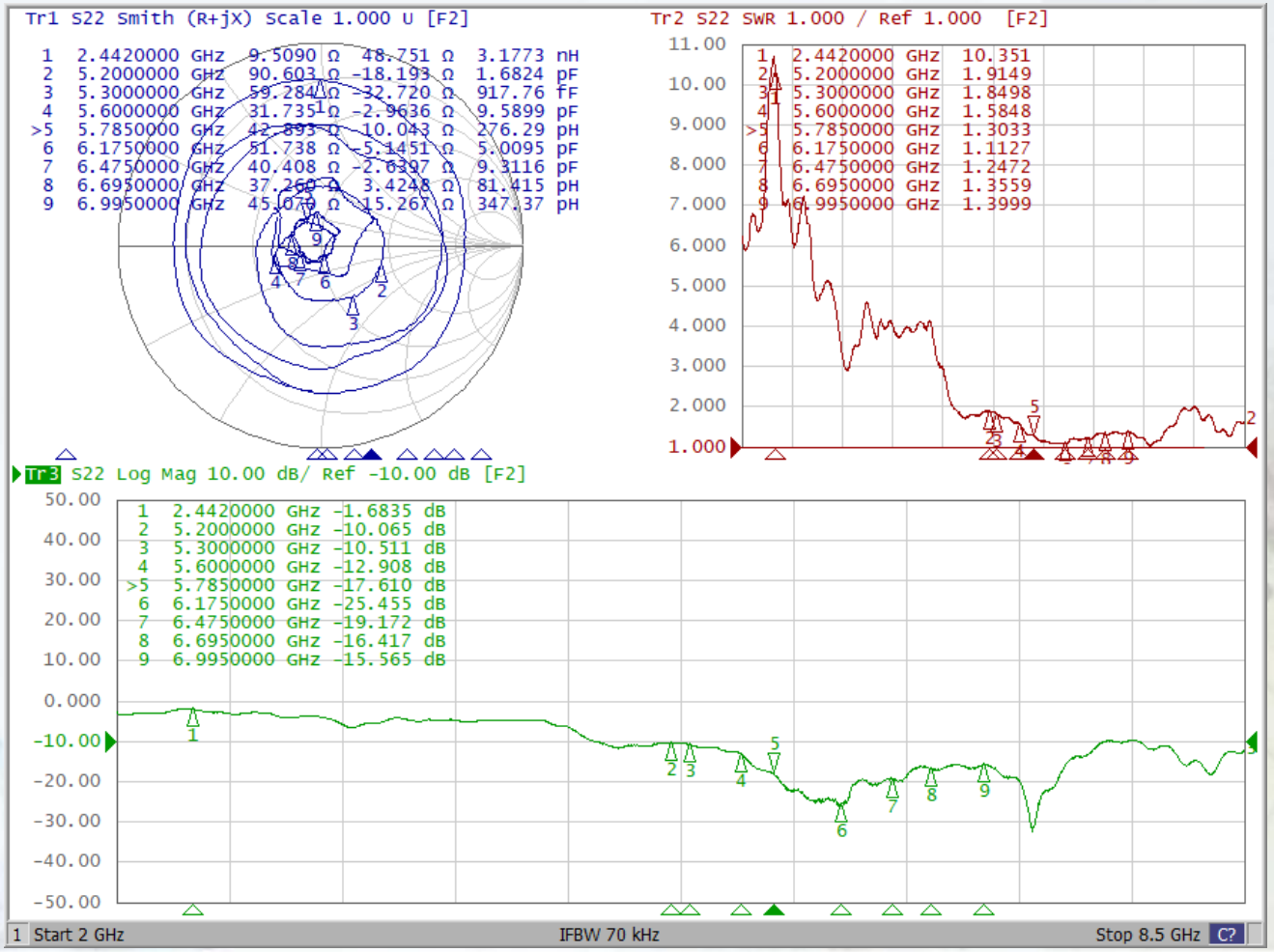
Return Loss Results

Ant5-6G1 (6175MHz – 6995MHz)



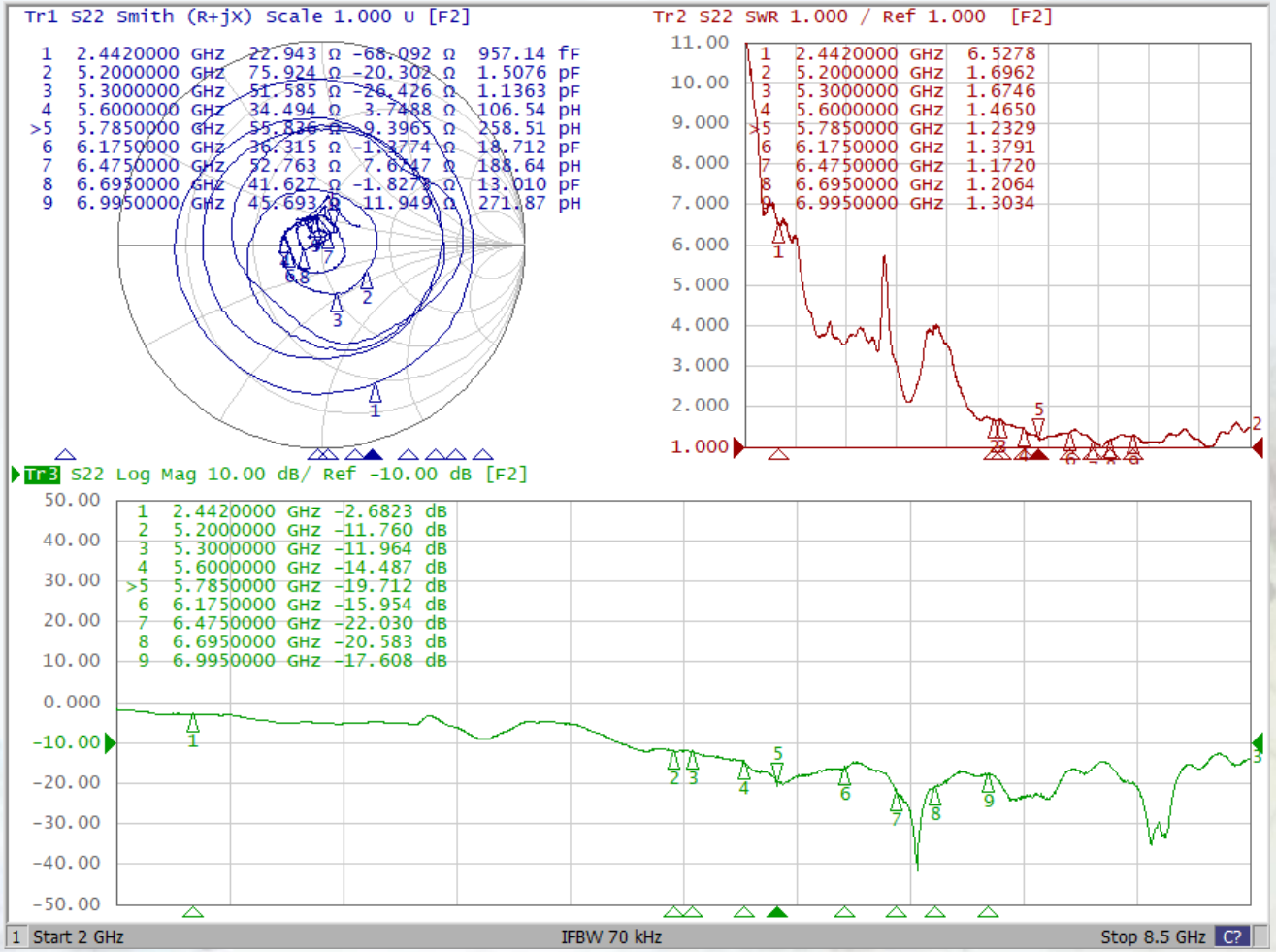
Return Loss Results

Ant6-6G2 (6175MHz – 6995MHz)



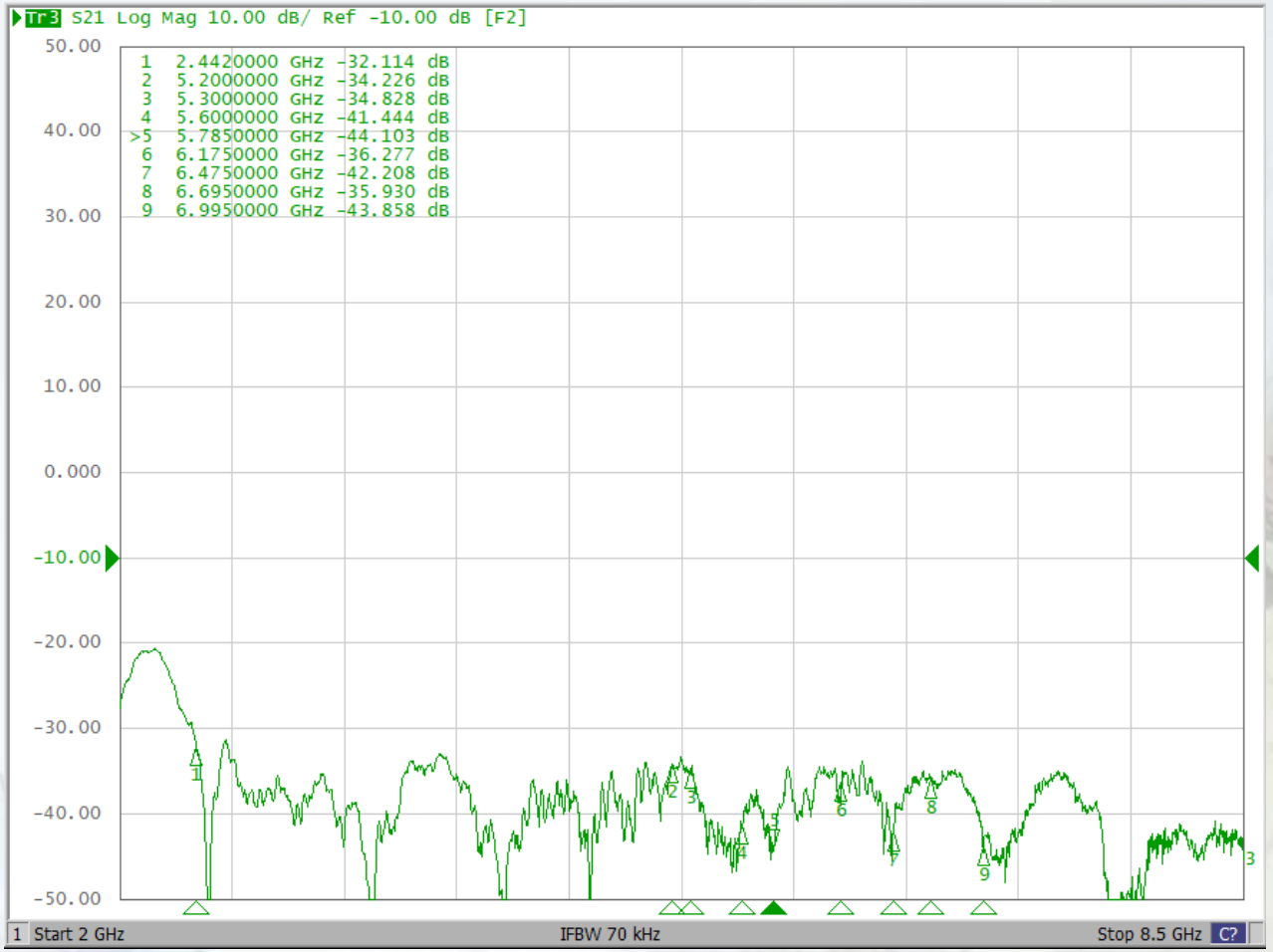
Return Loss Results

Ant7-6G3 (6175MHz – 6995MHz)



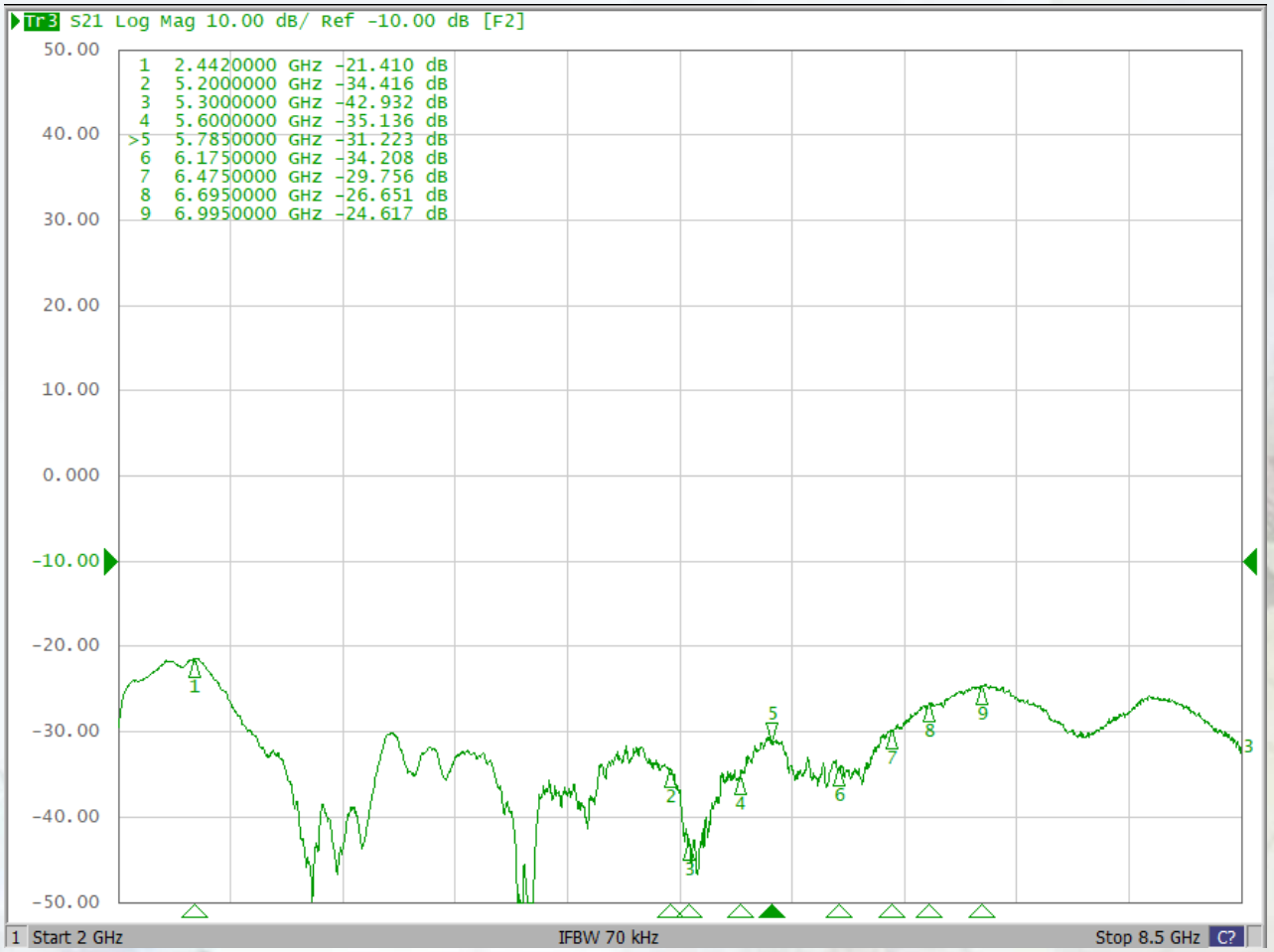
Isolation Results

ANT1-DB1 to ANT2-DB2



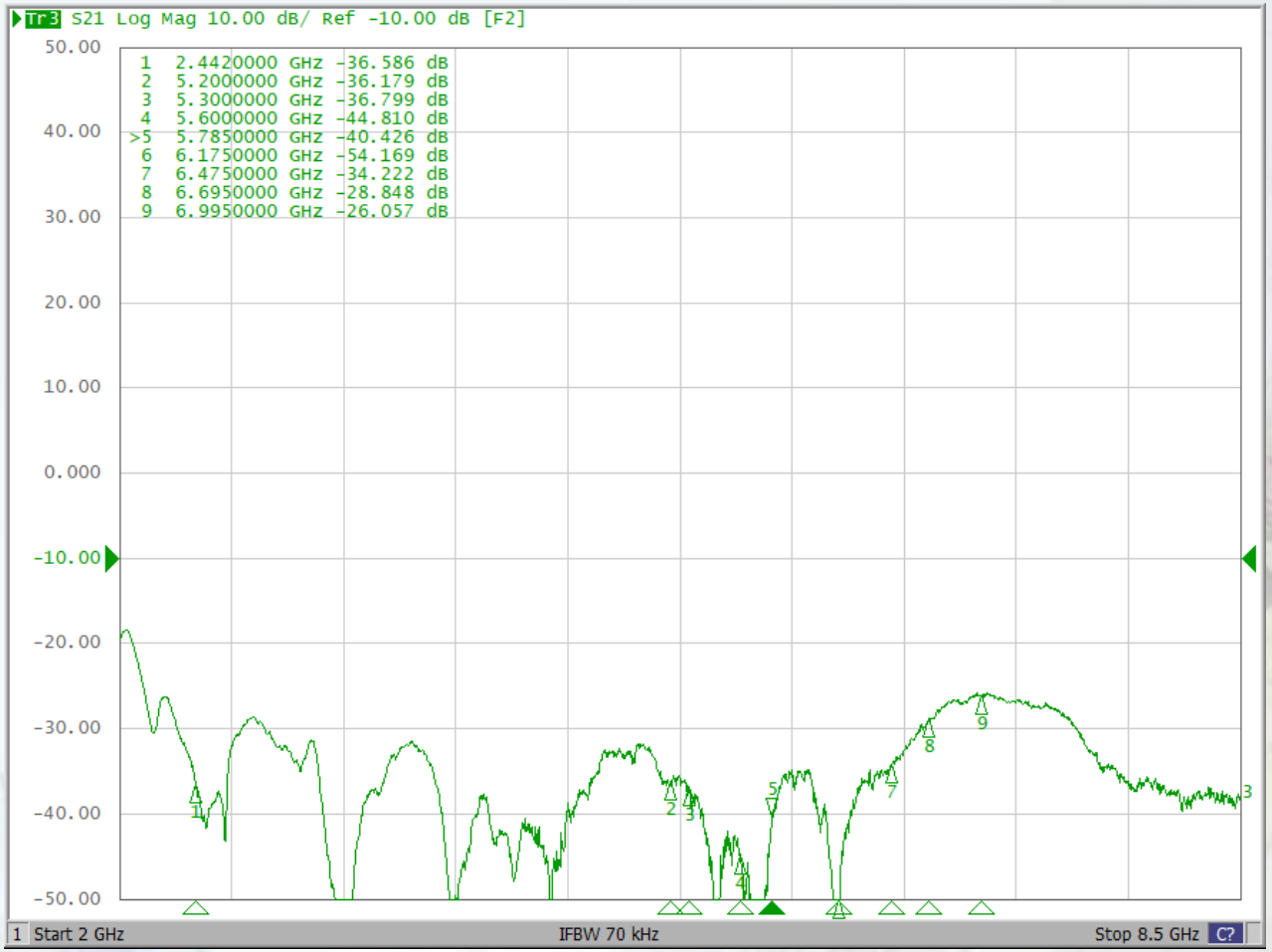
Isolation Results

ANT1-DB1 to ANT3-5G1



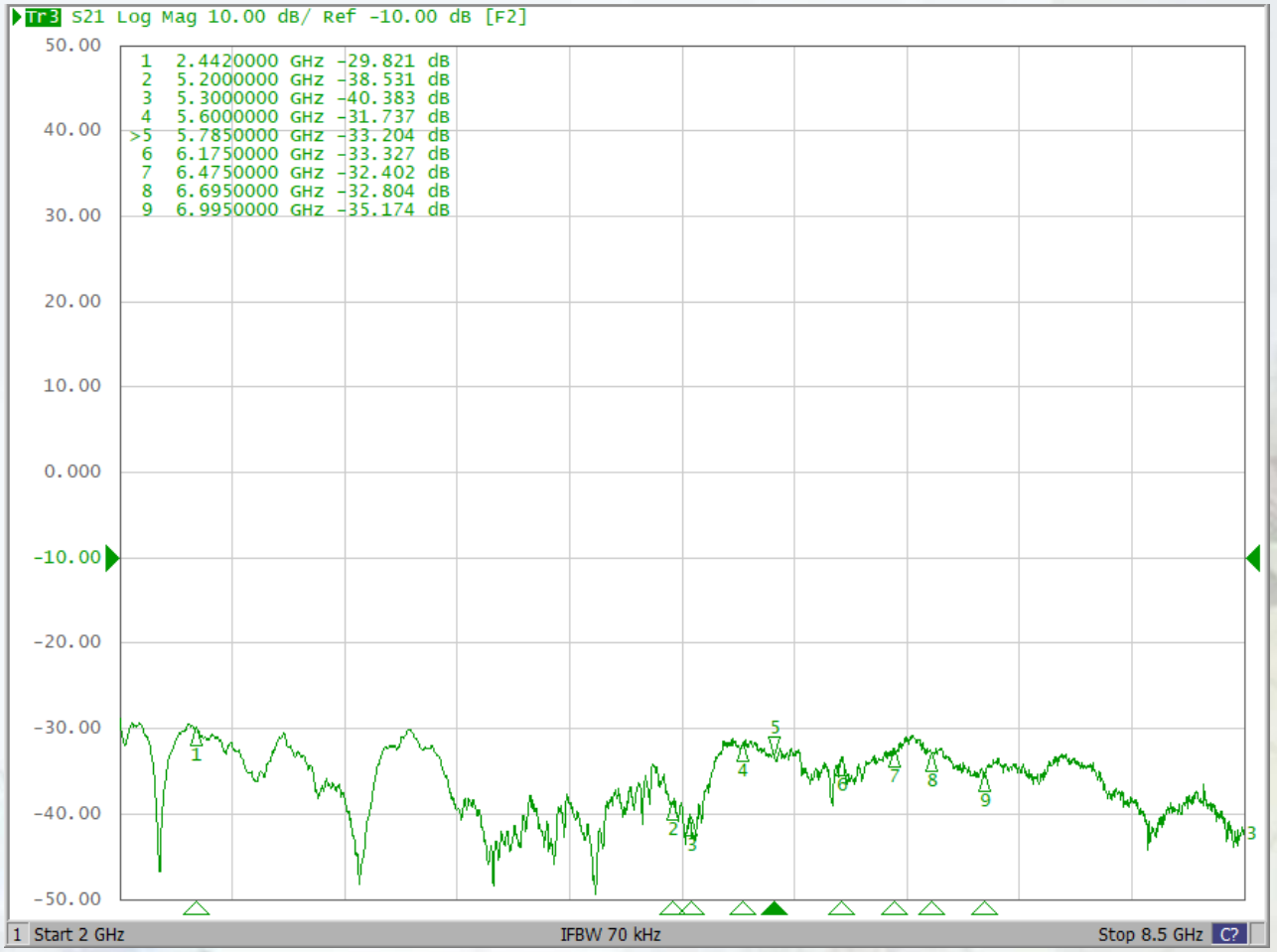
Isolation Results

ANT1-DB1 to ANT4-5G2



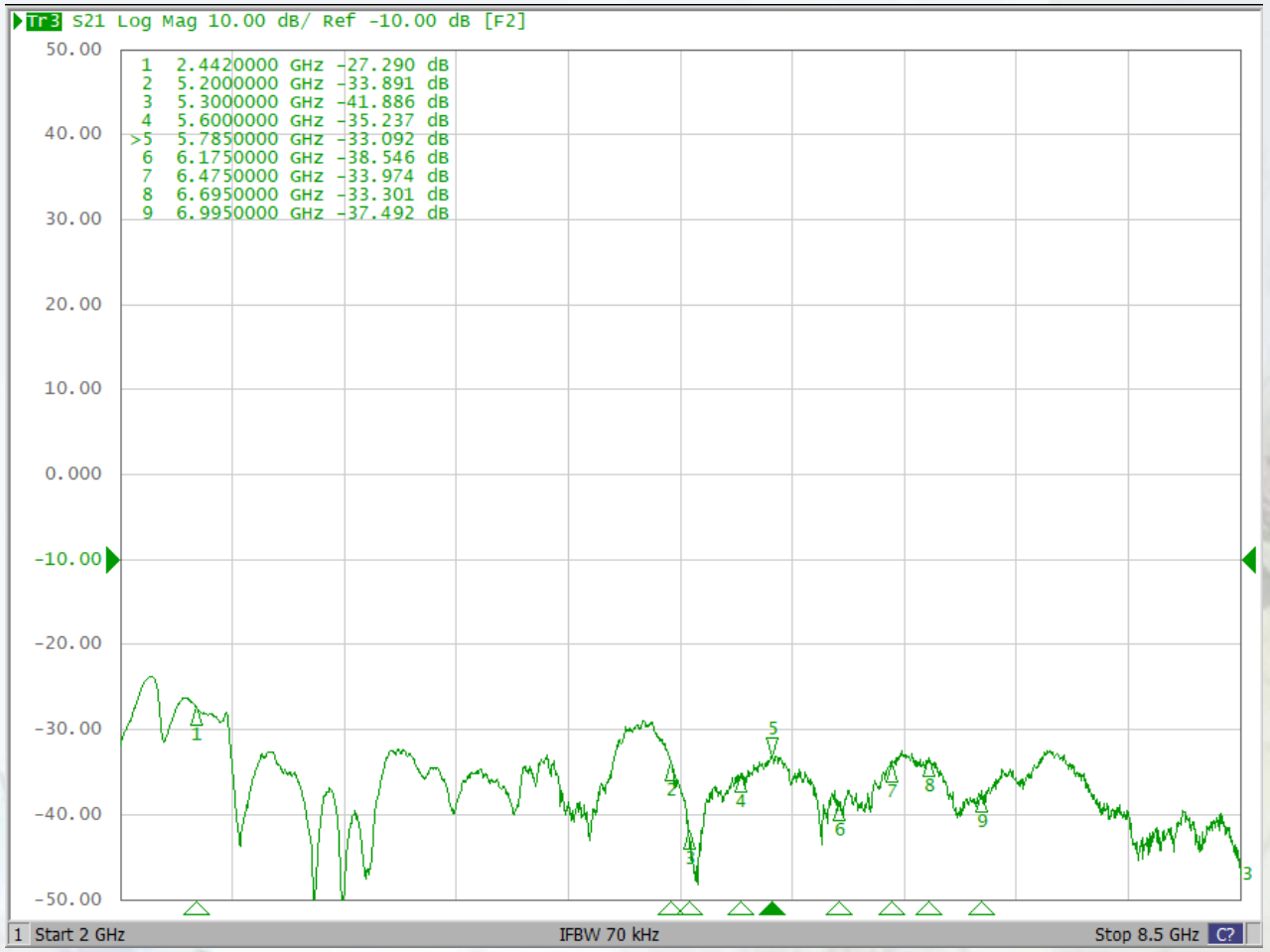
Isolation Results

ANT1-DB1 to ANT5-6G1



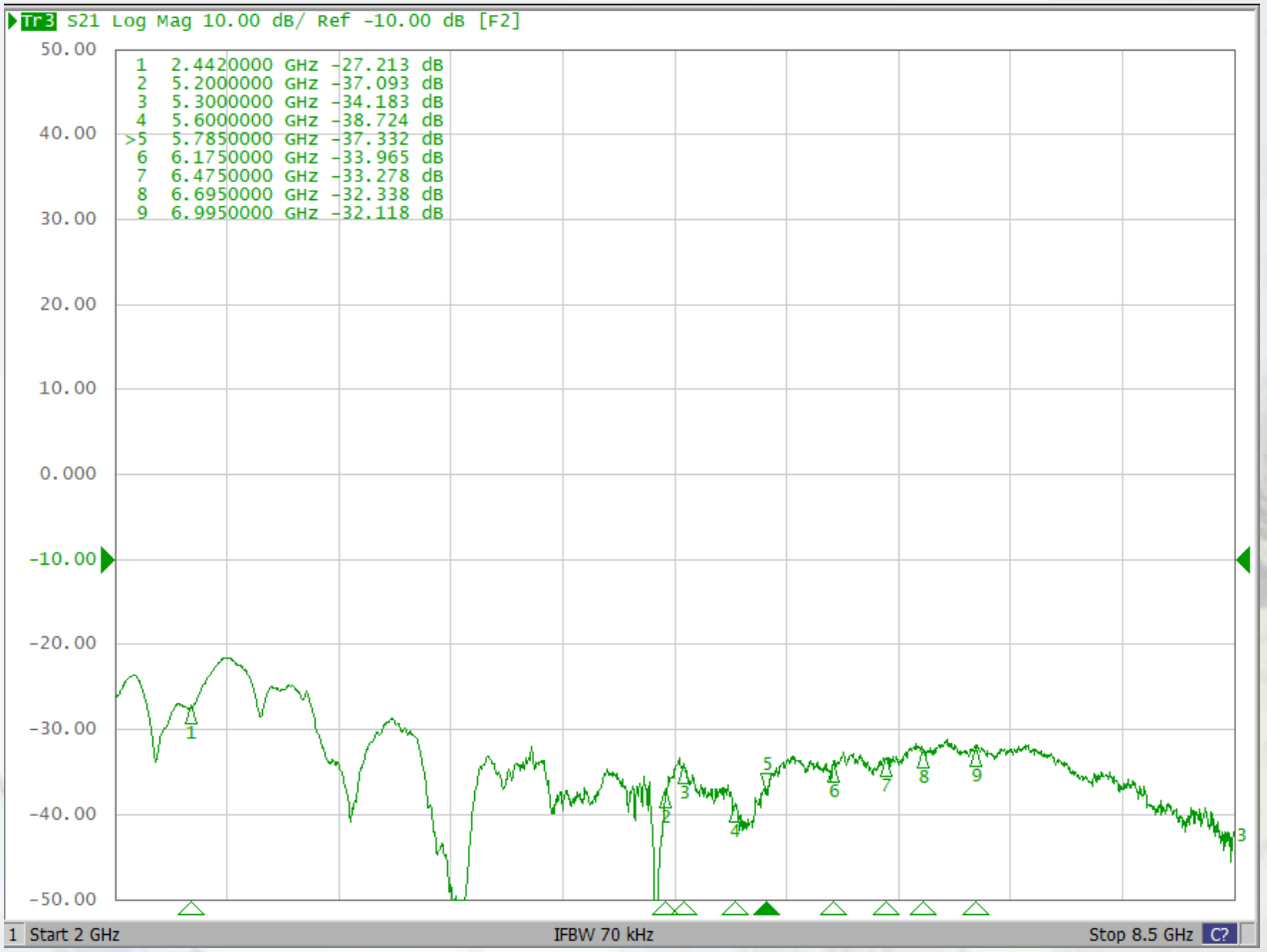
Isolation Results

ANT1-DB1 to ANT6-6G2



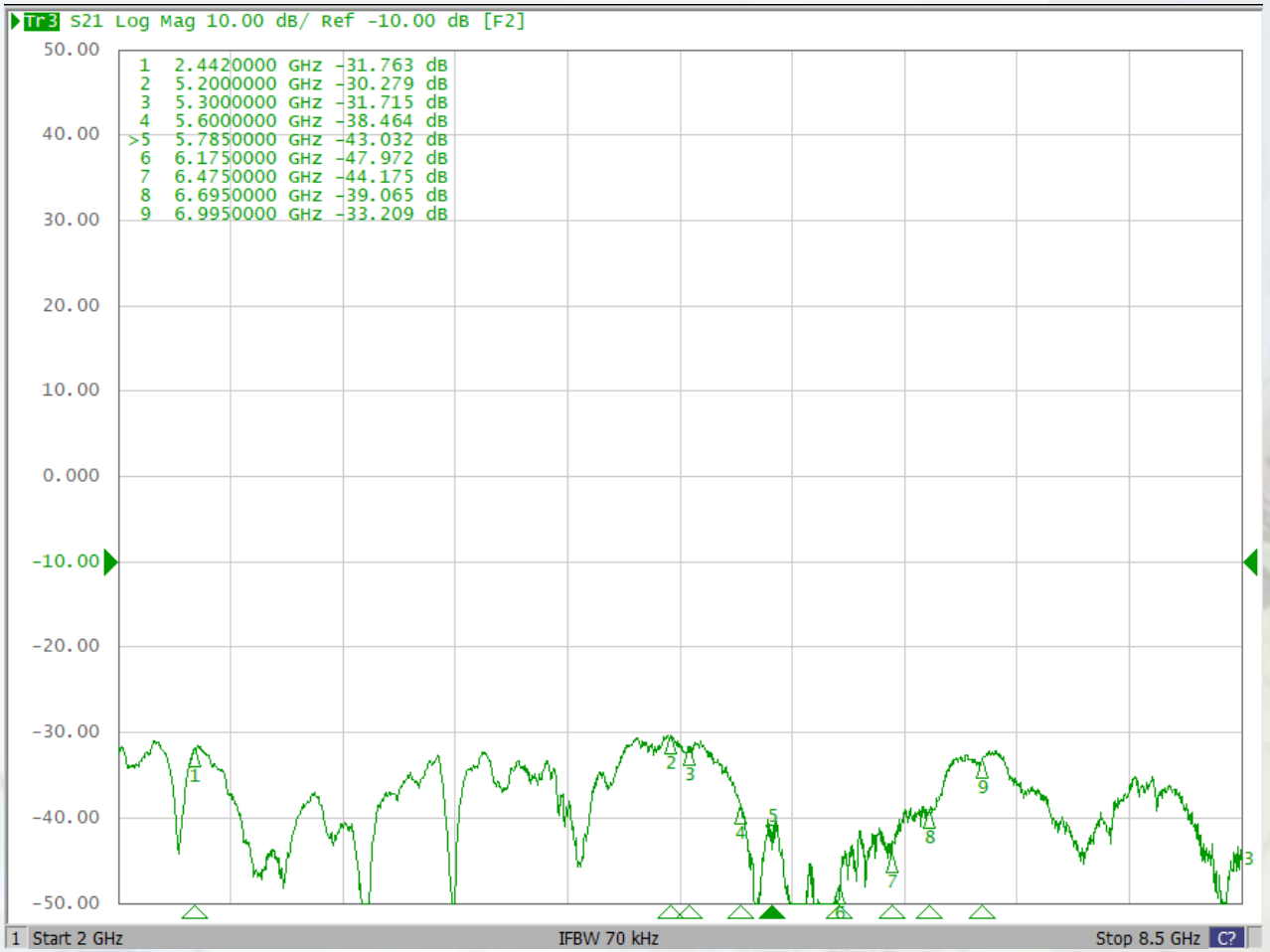
Isolation Results

ANT1-DB1 to ANT7-6G3



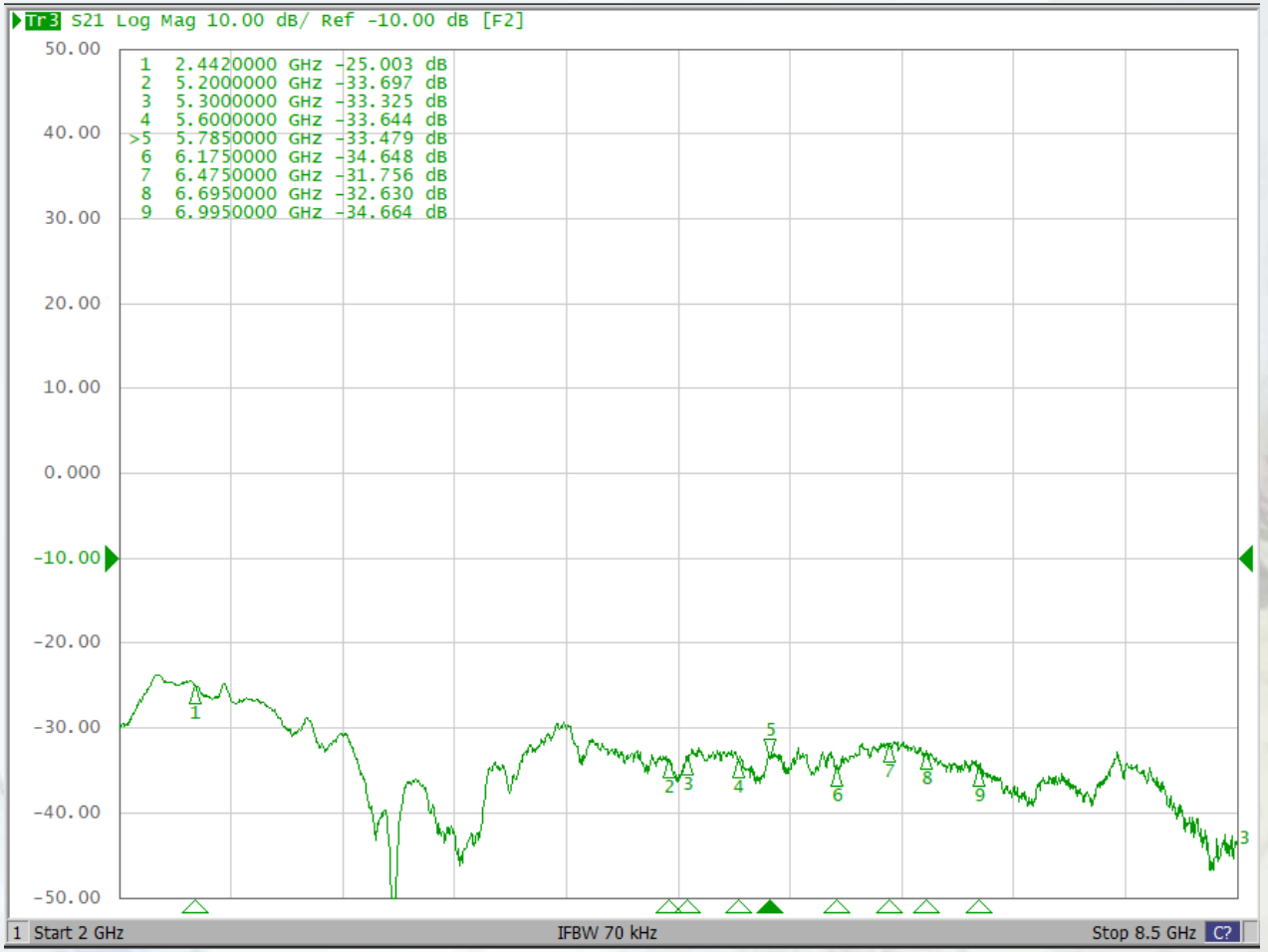
Isolation Results

ANT2-DB2 to ANT3-5G1



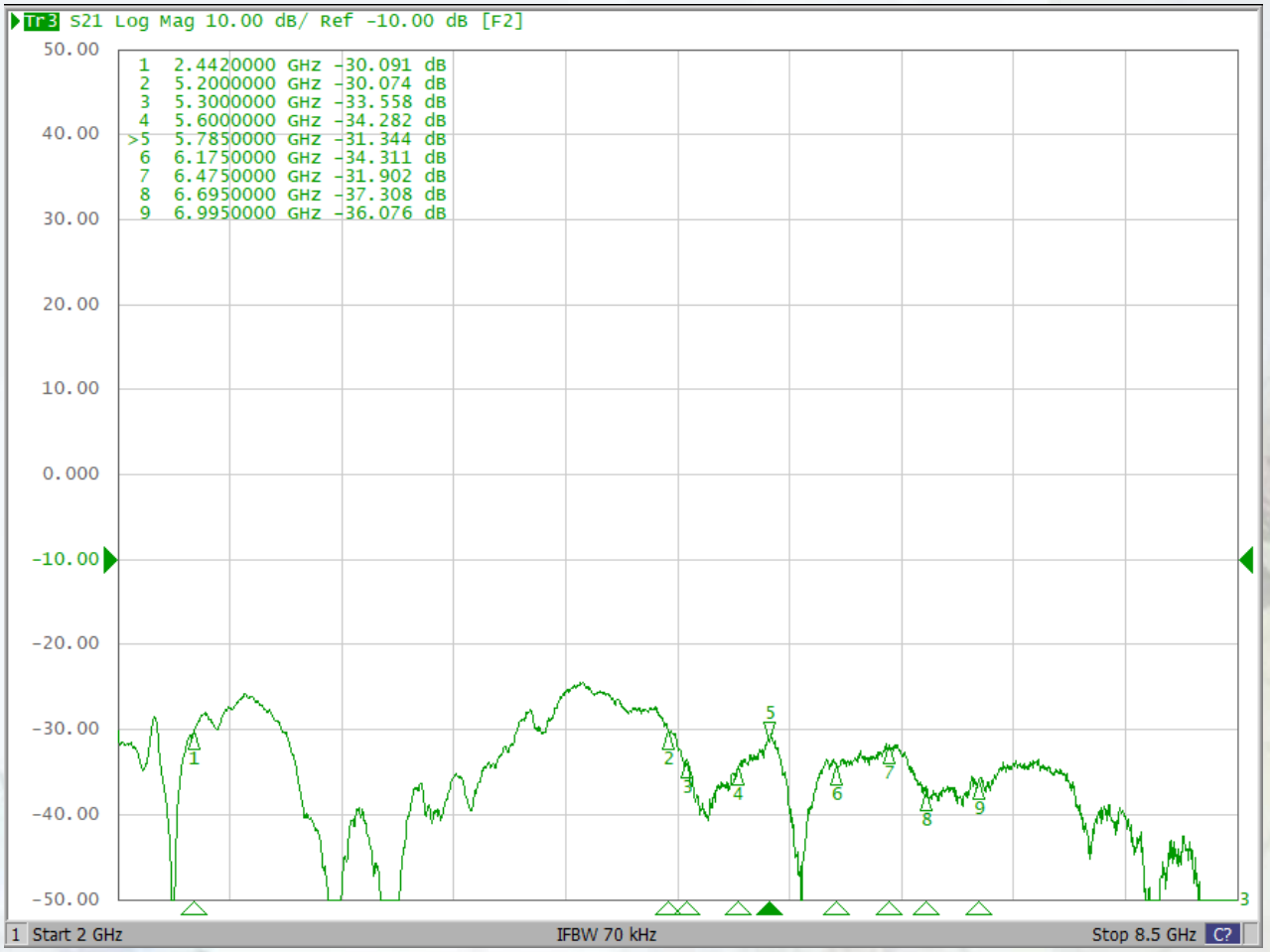
Isolation Results

ANT2-DB2 to ANT4-5G2



Isolation Results

ANT2-DB2 to ANT5-6G1



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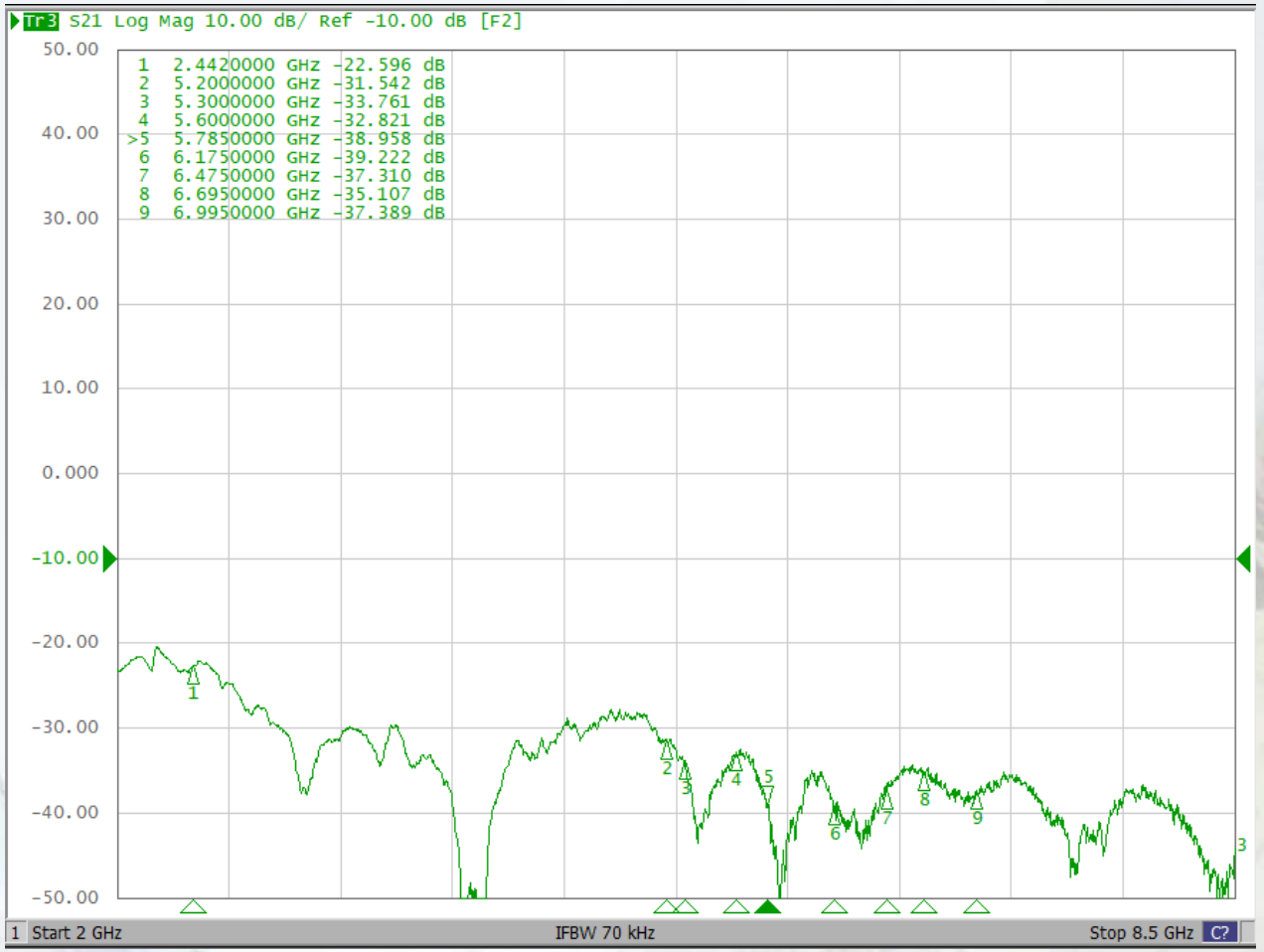
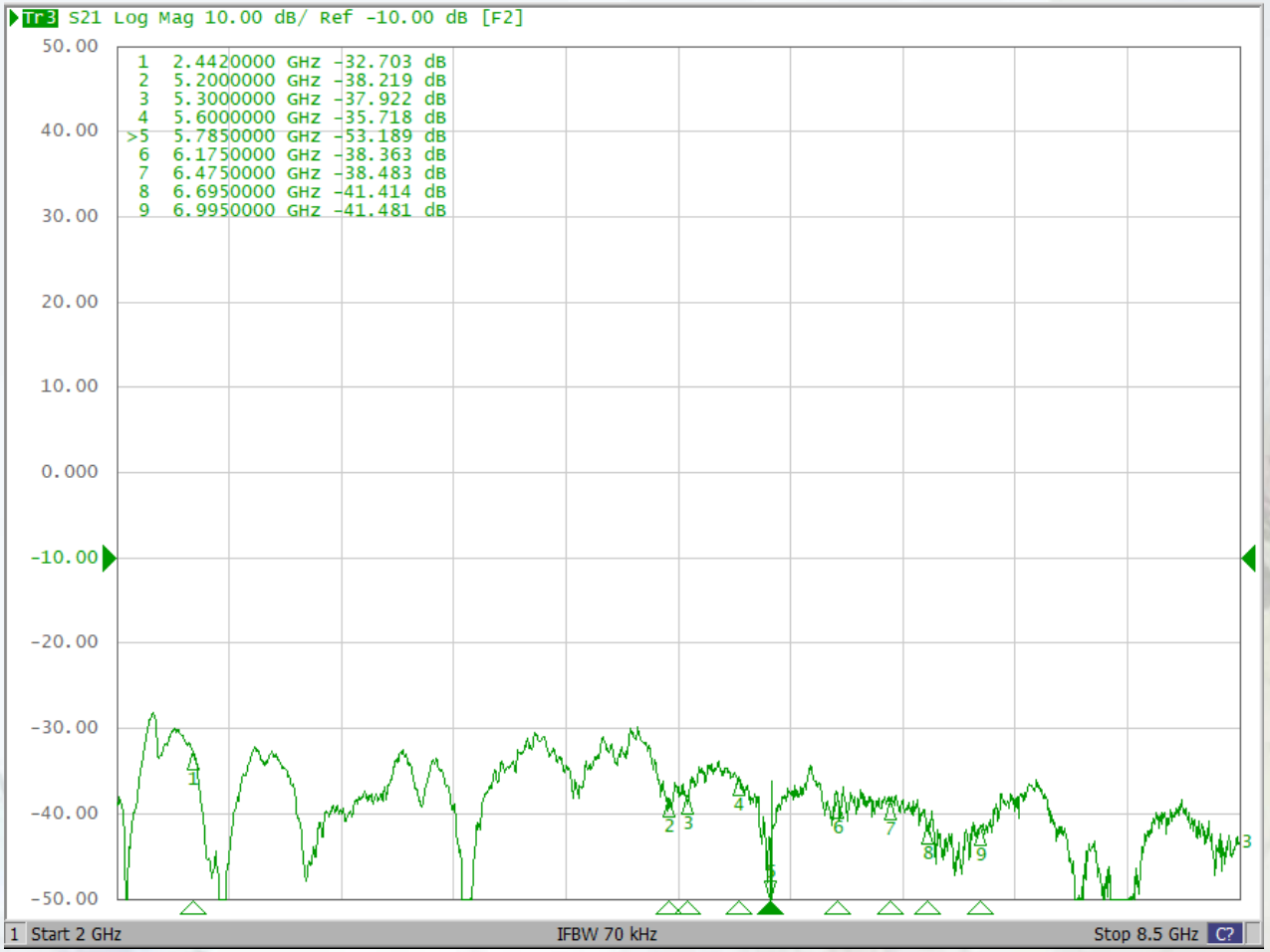


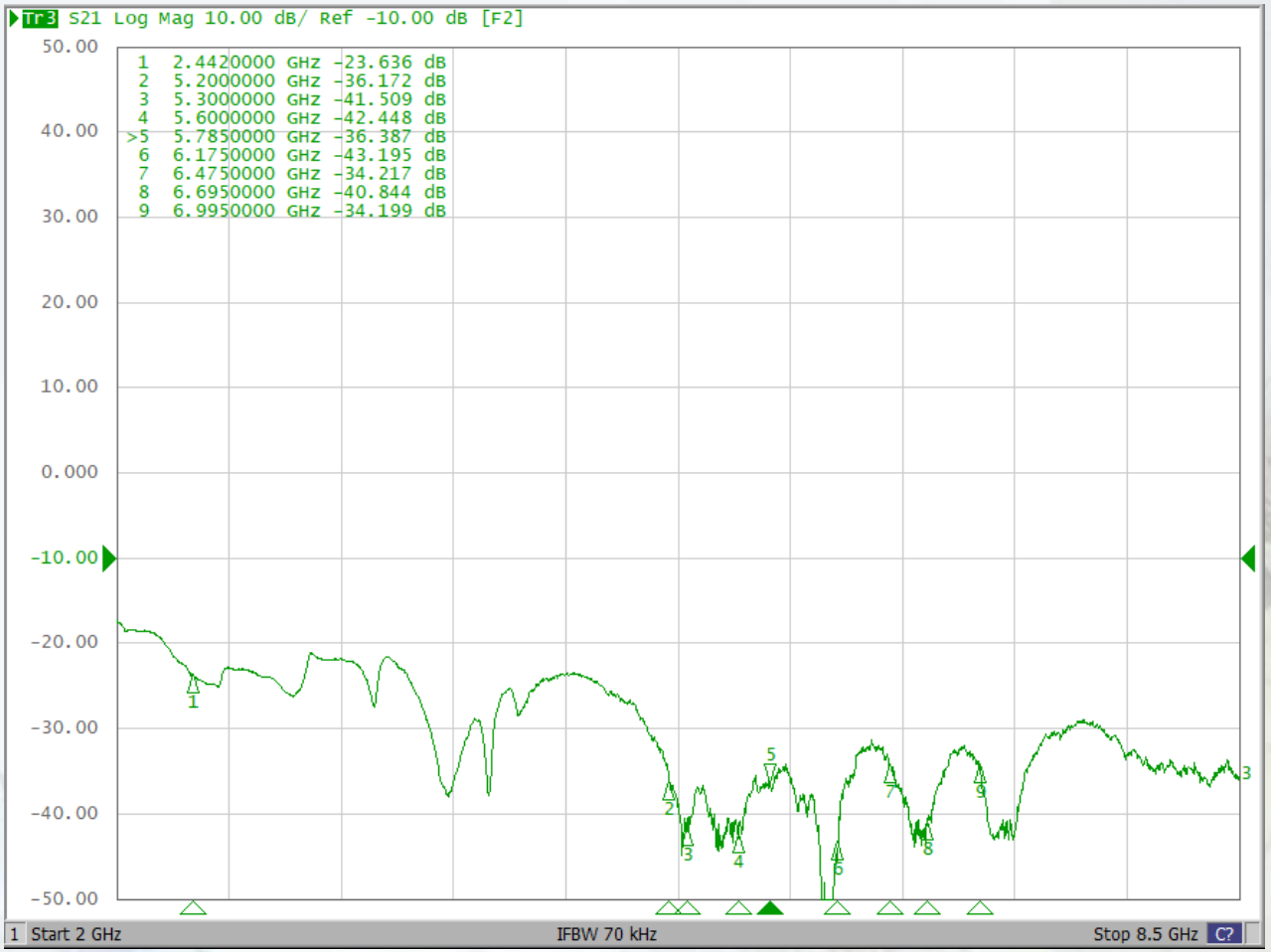
Isolation Results

ANT2-DB2 to ANT7-6G3



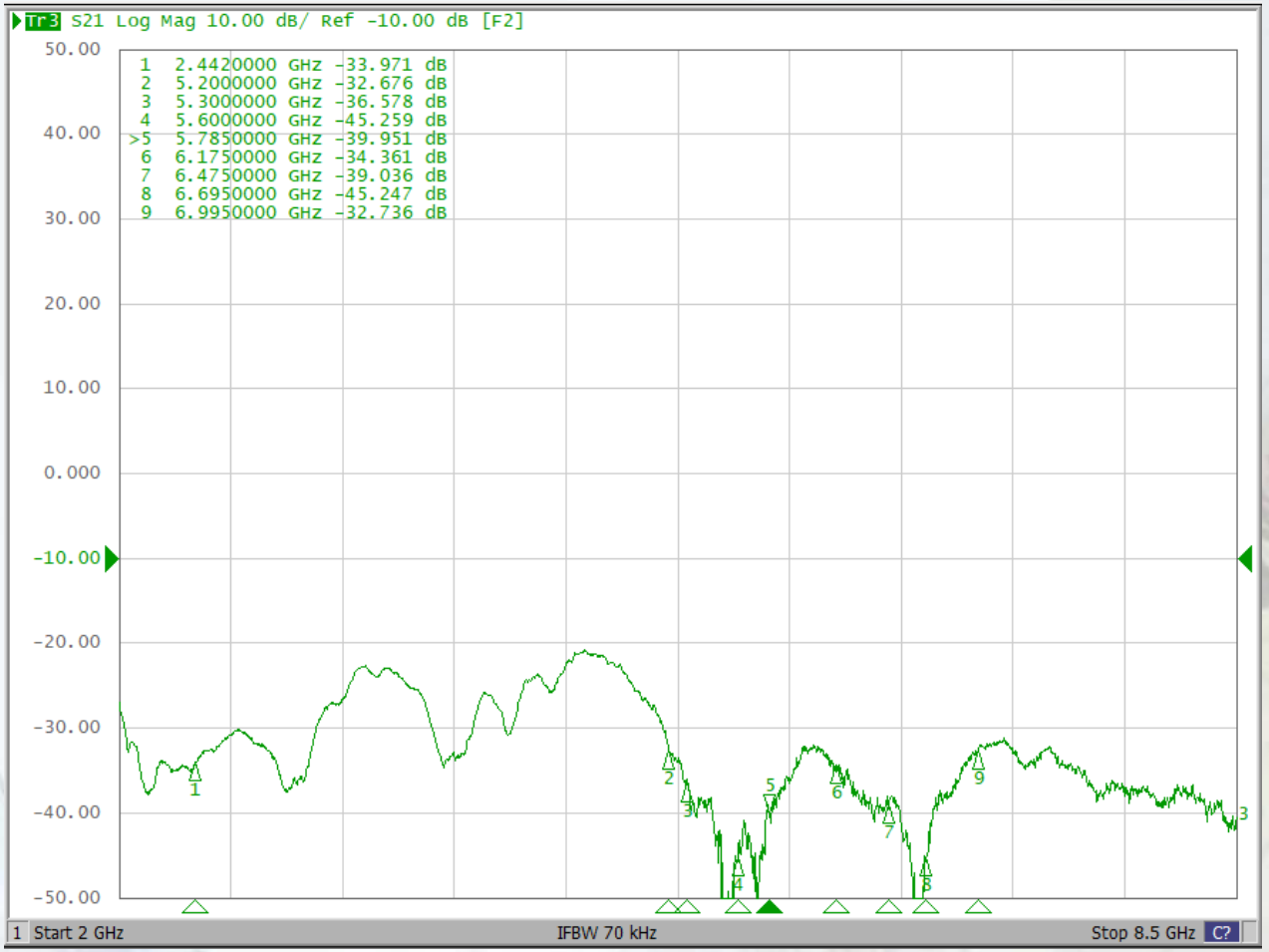
Isolation Results

ANT3-5G1 to ANT4-5G2



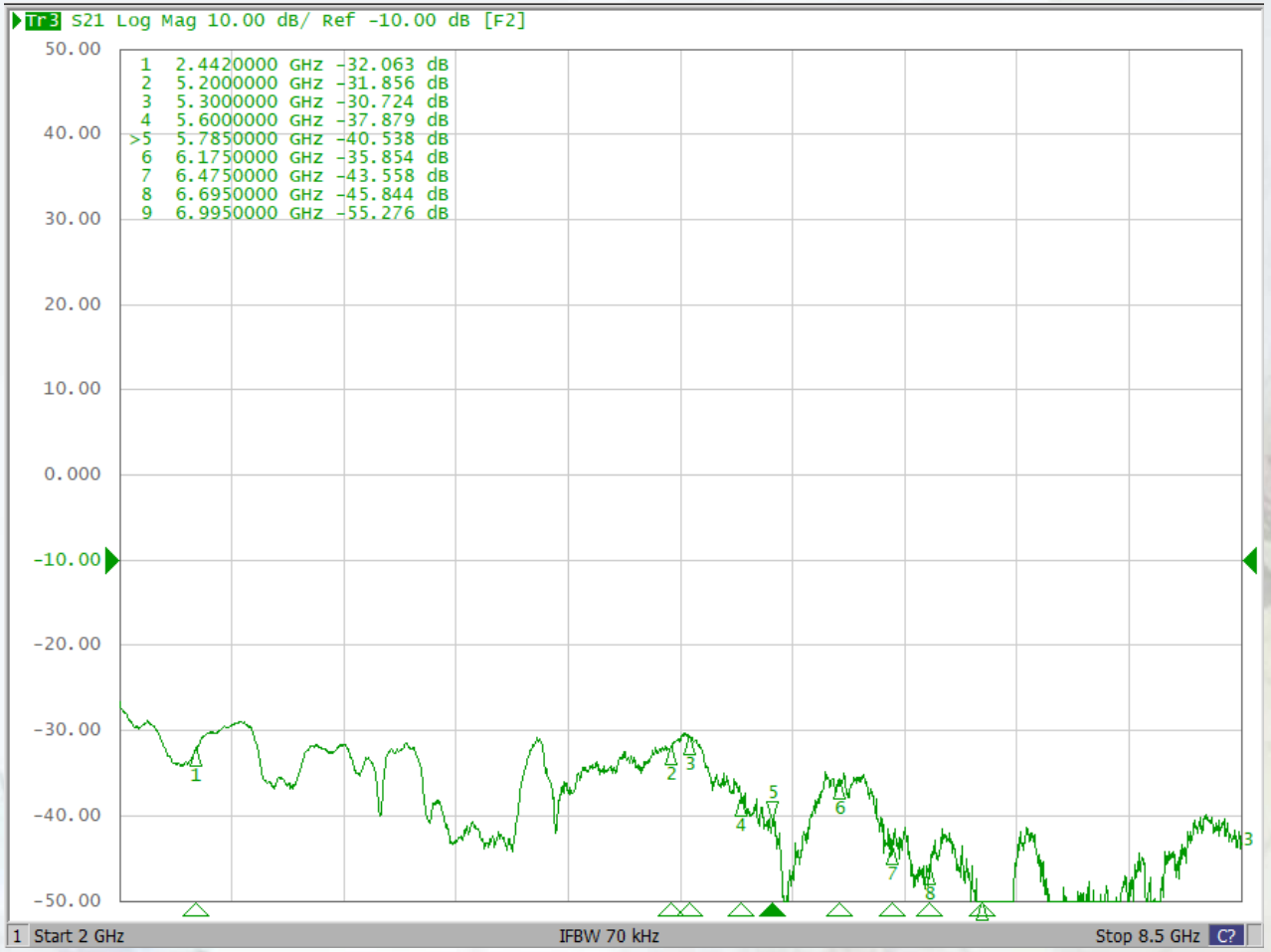
Isolation Results

ANT3-5G1 to ANT5-6G1



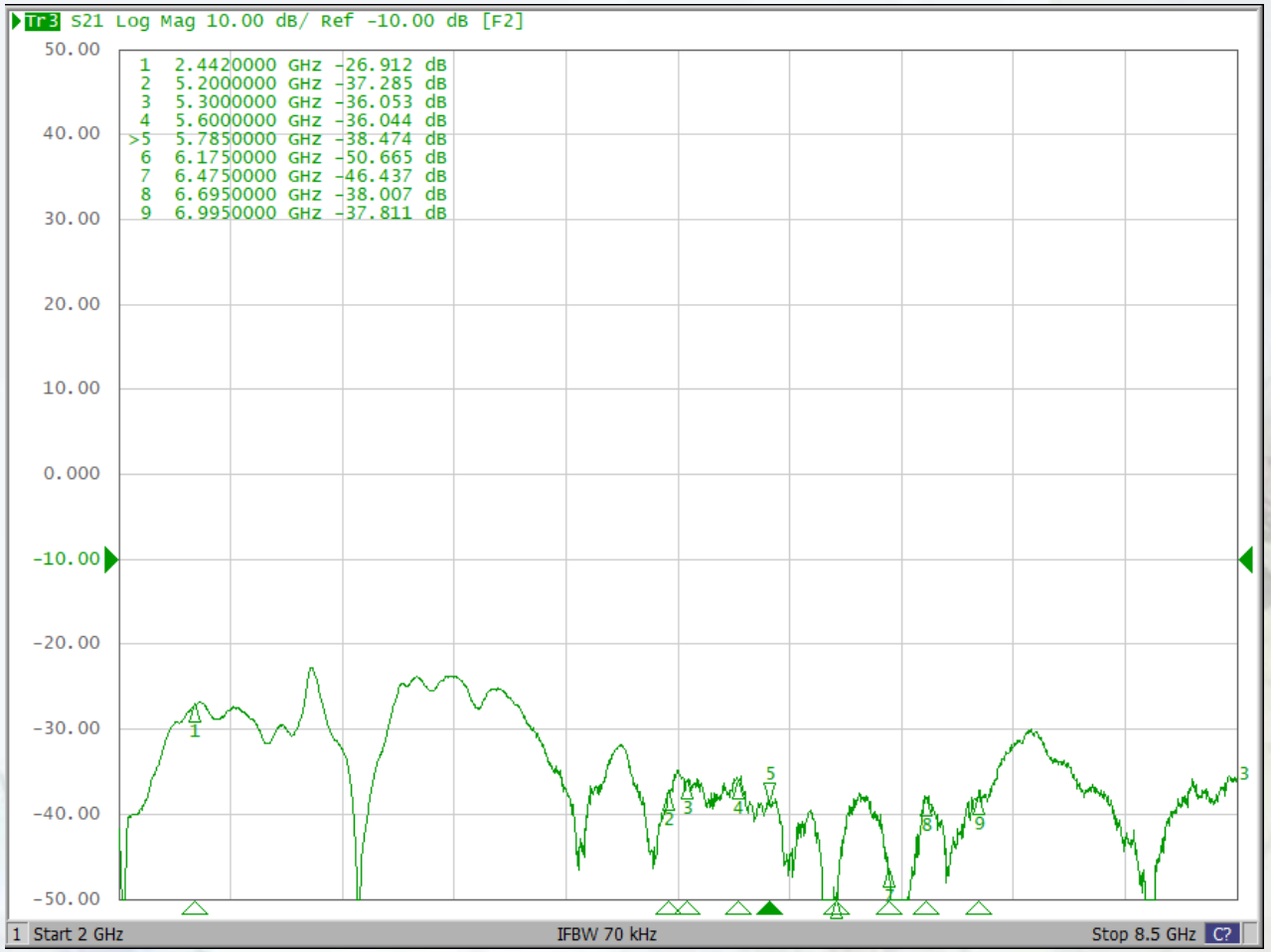
Isolation Results

ANT3-5G1 to ANT6-6G2



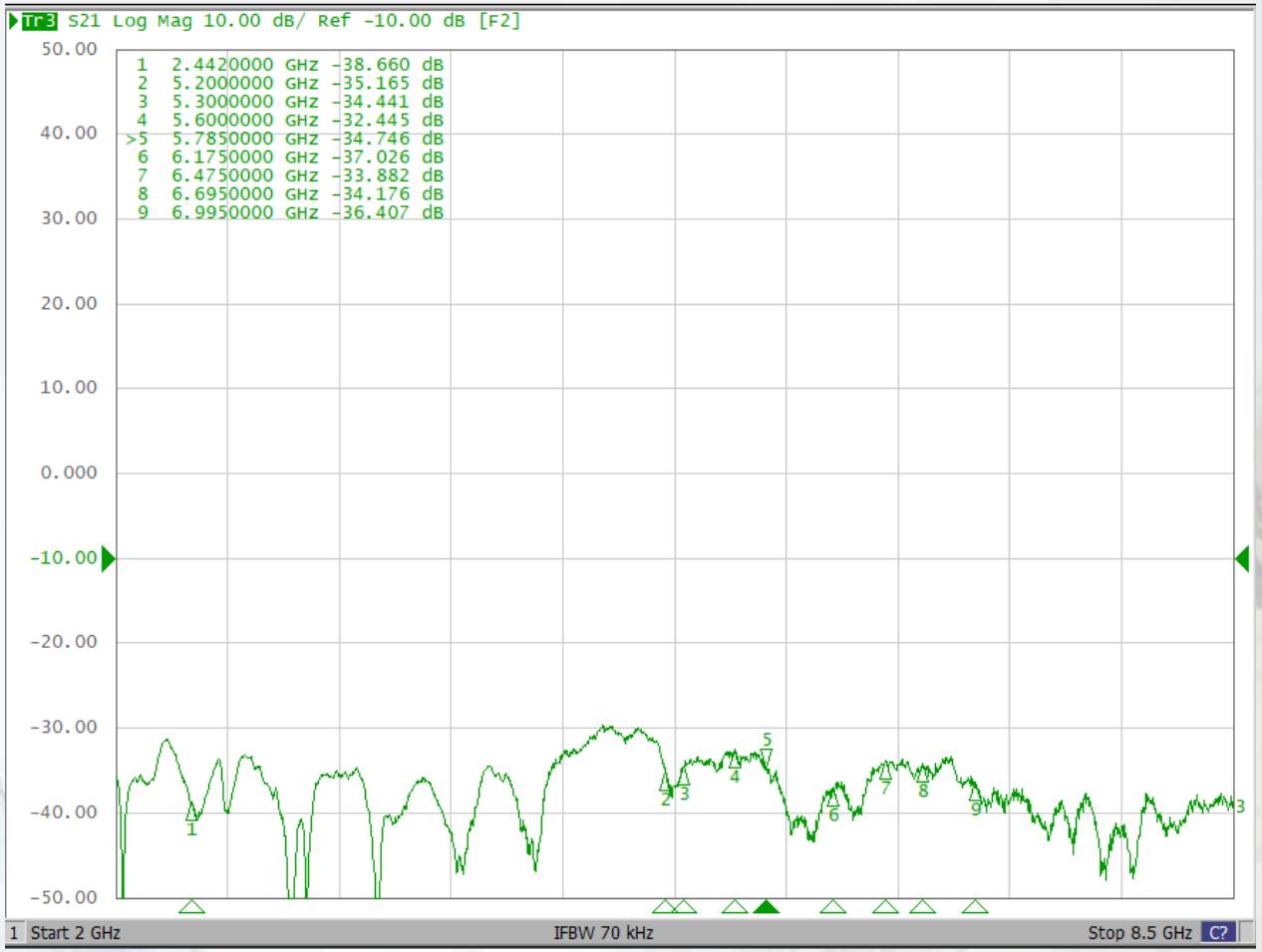
Isolation Results

ANT3-5G1 to ANT7-6G3



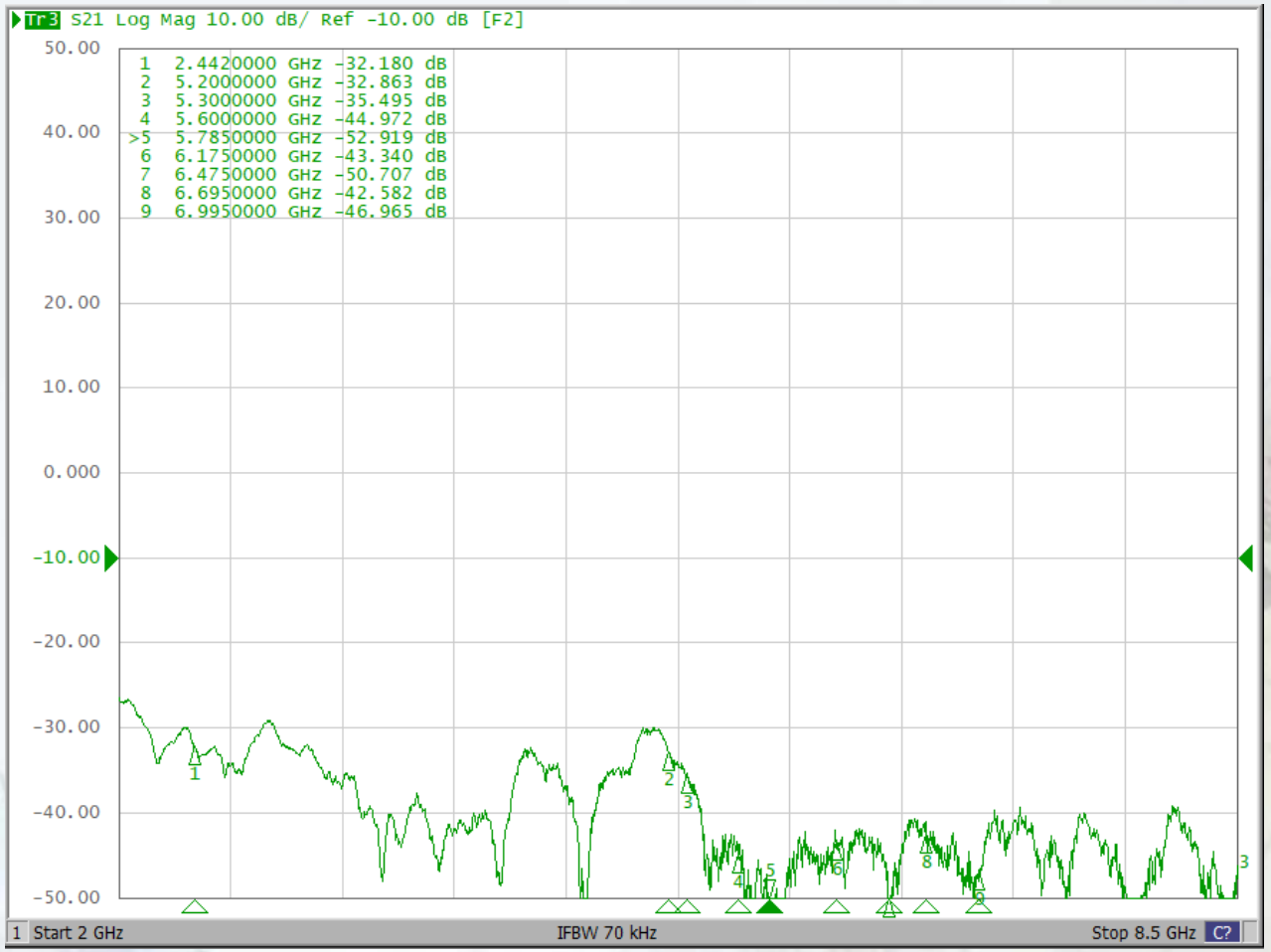
Isolation Results

ANT4-5G2 to ANT5-6G1



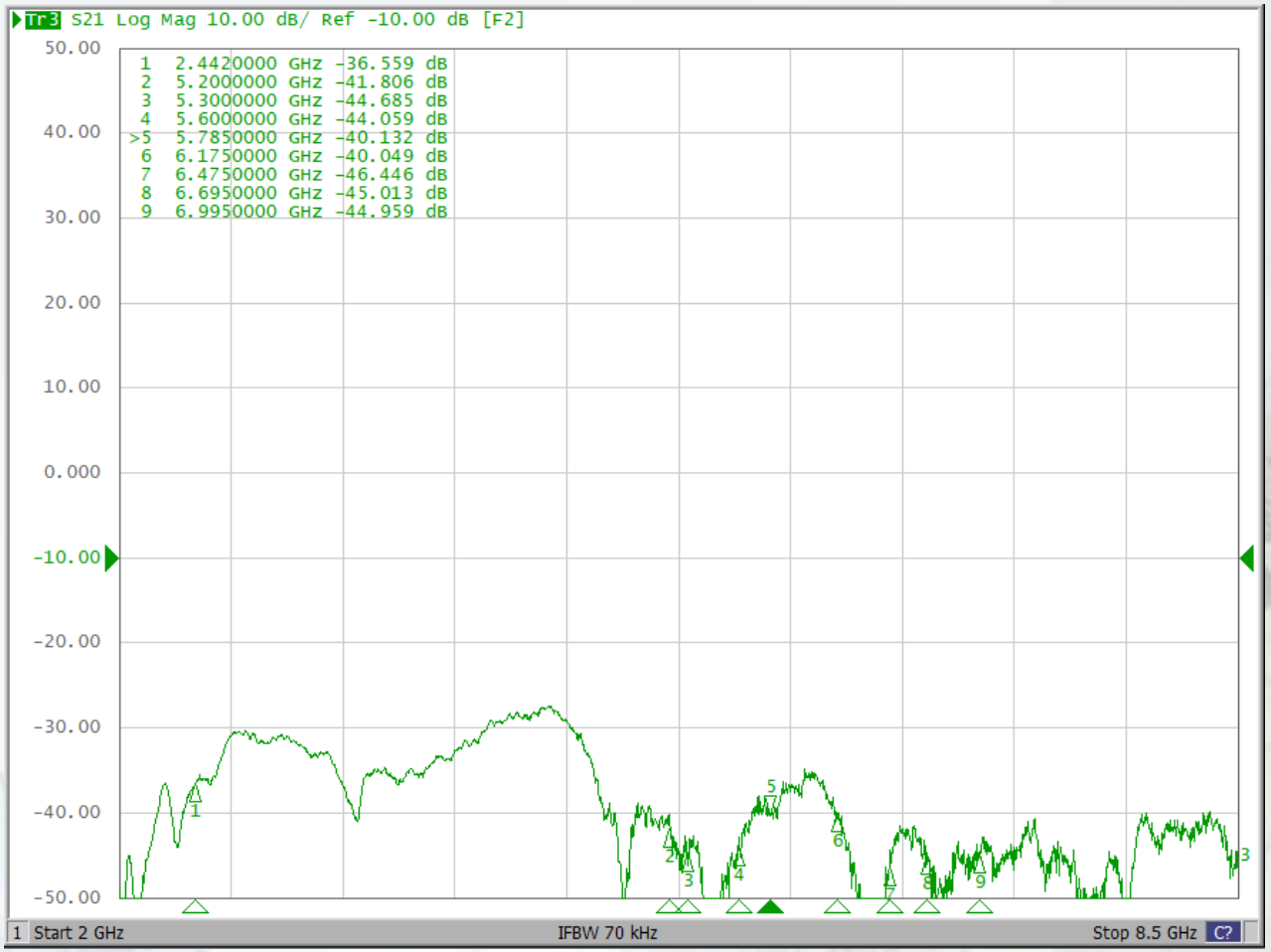
Isolation Results

ANT4-5G2 to ANT6-6G2



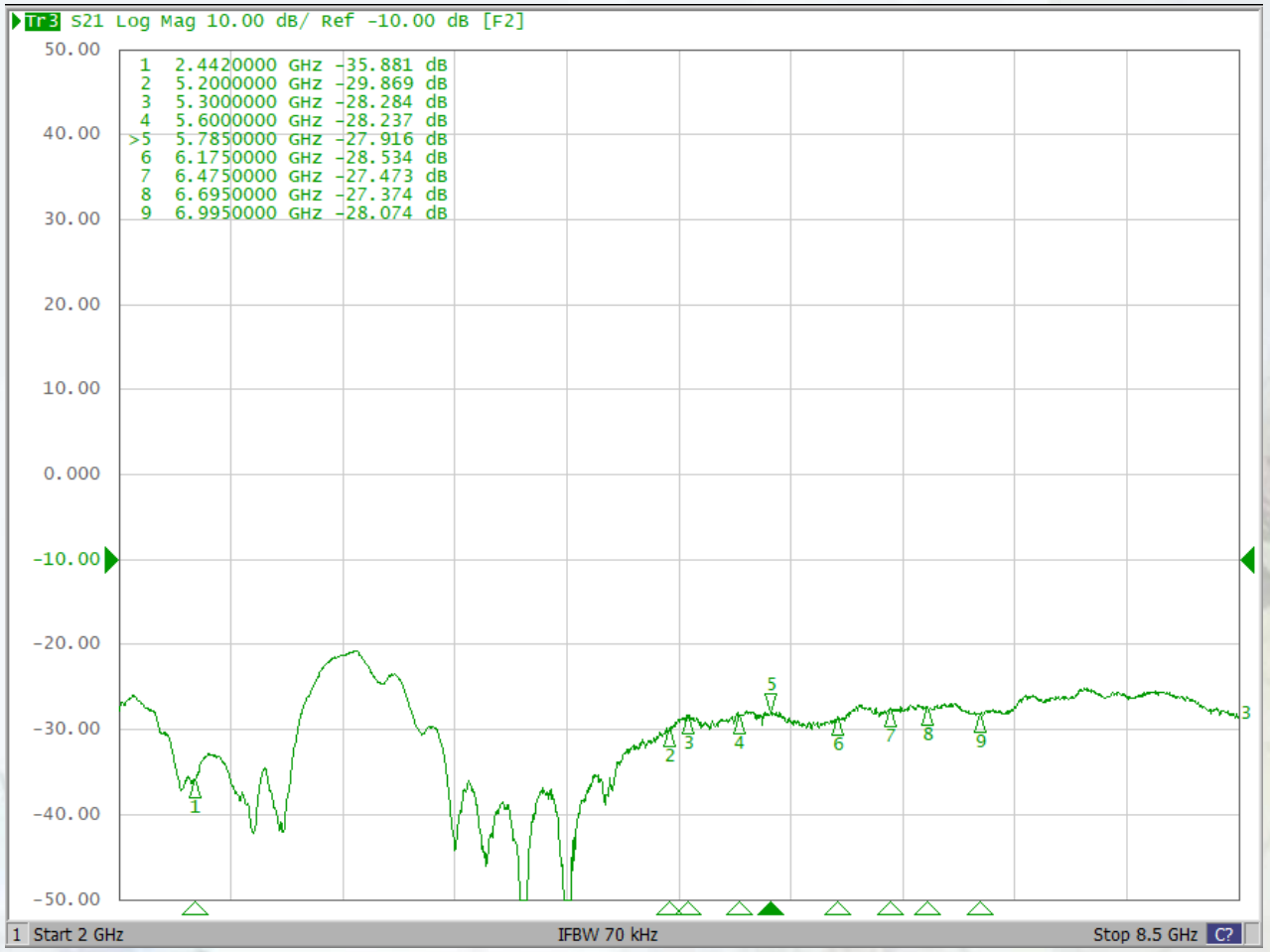
Isolation Results

ANT4-5G2 to ANT7-6G3



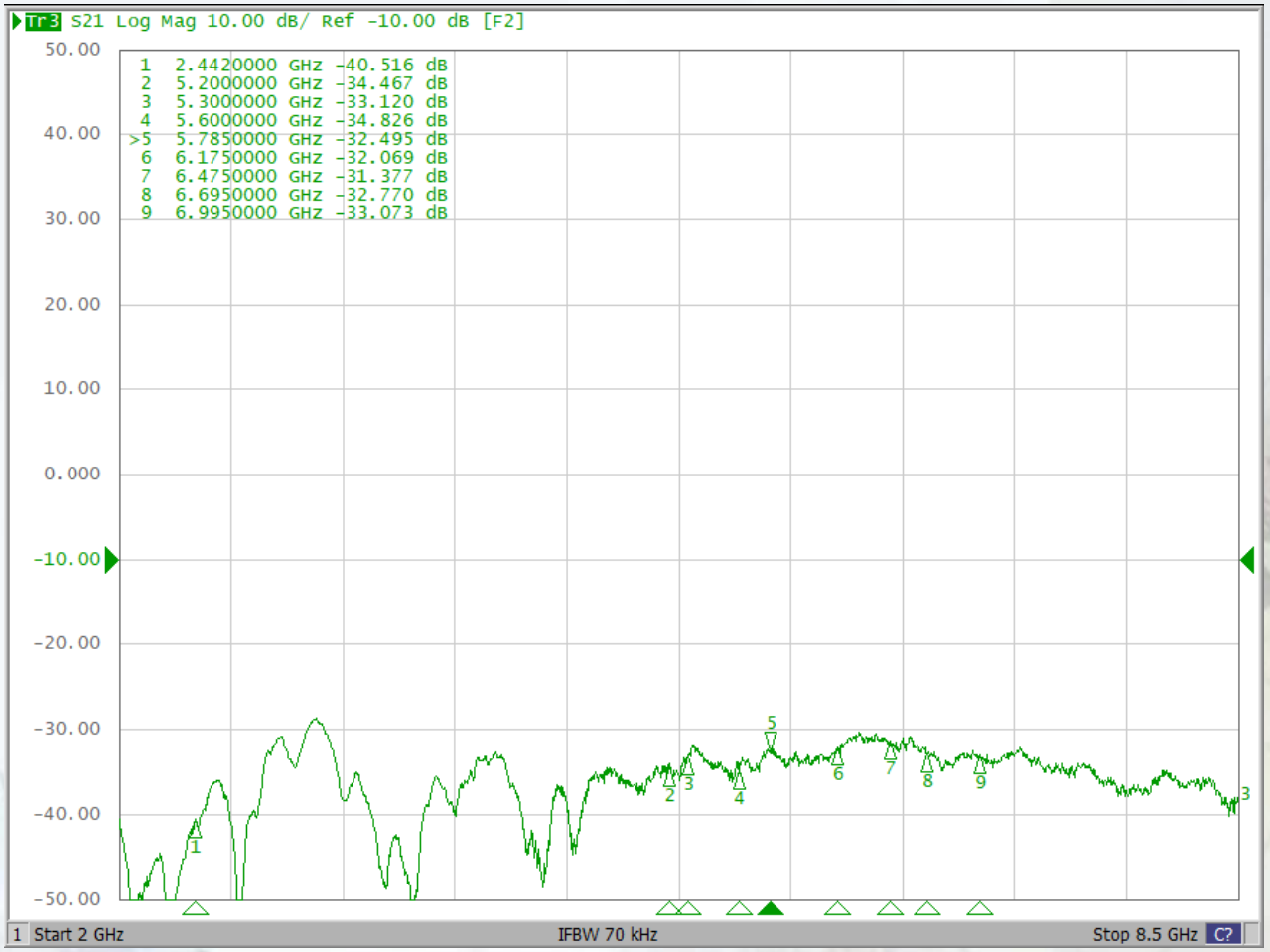
Isolation Results

ANT5-6G1 to ANT6-6G2



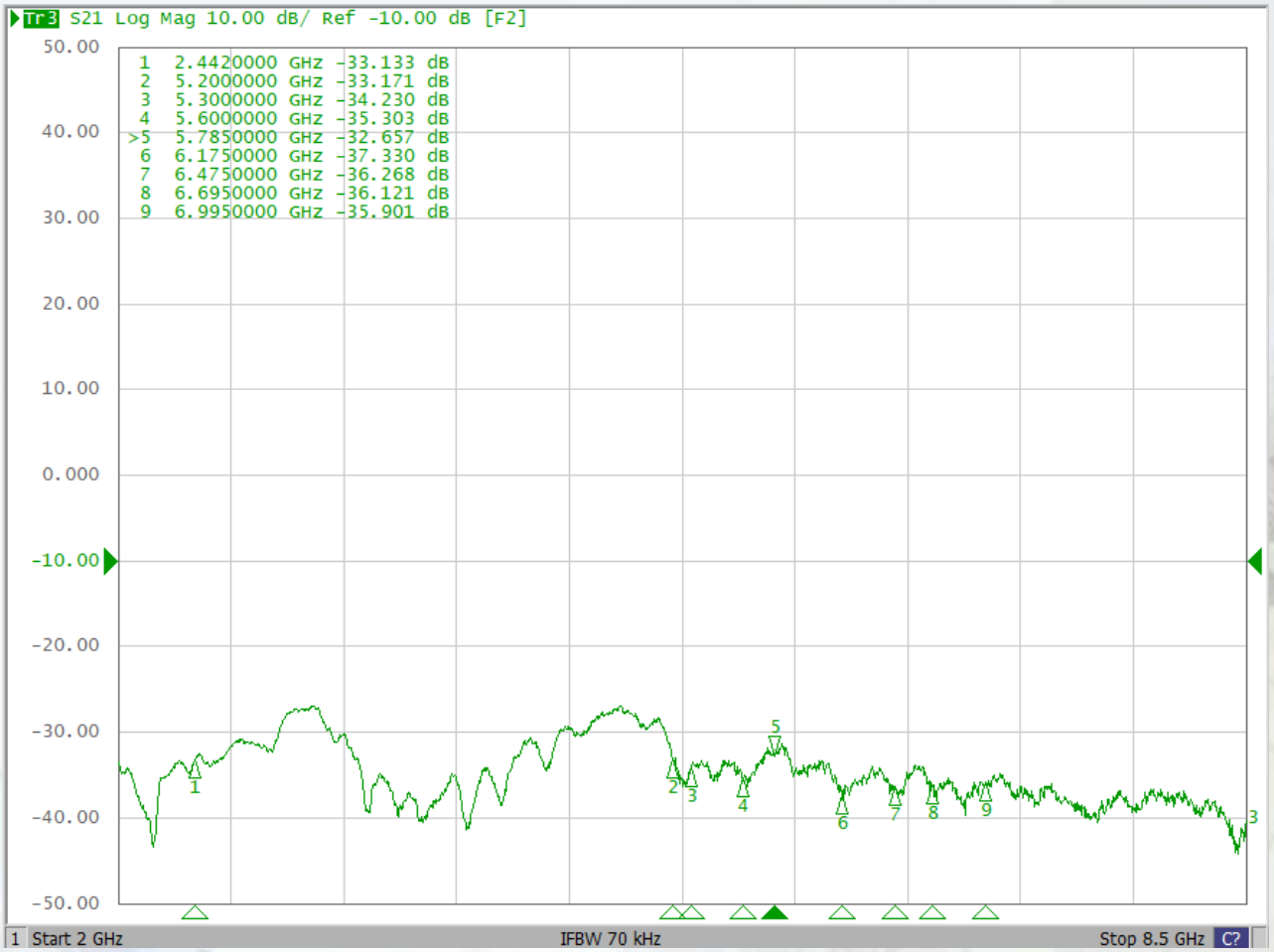
Isolation Results

ANT5-6G1 to ANT7-6G3



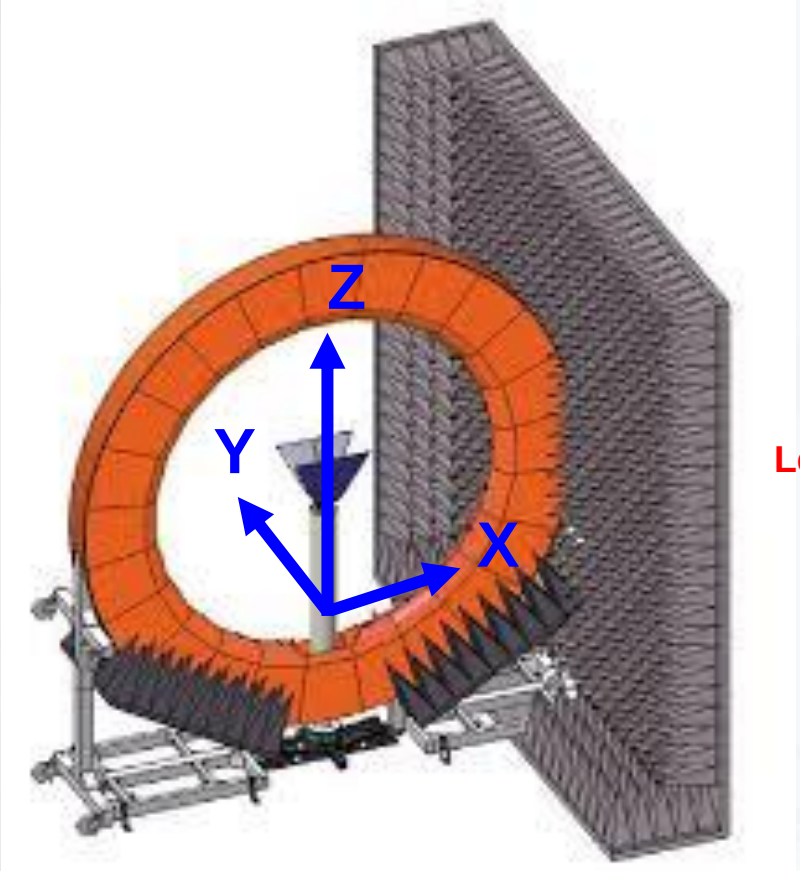
Isolation Results

ANT6-6G2 to ANT7-6G3

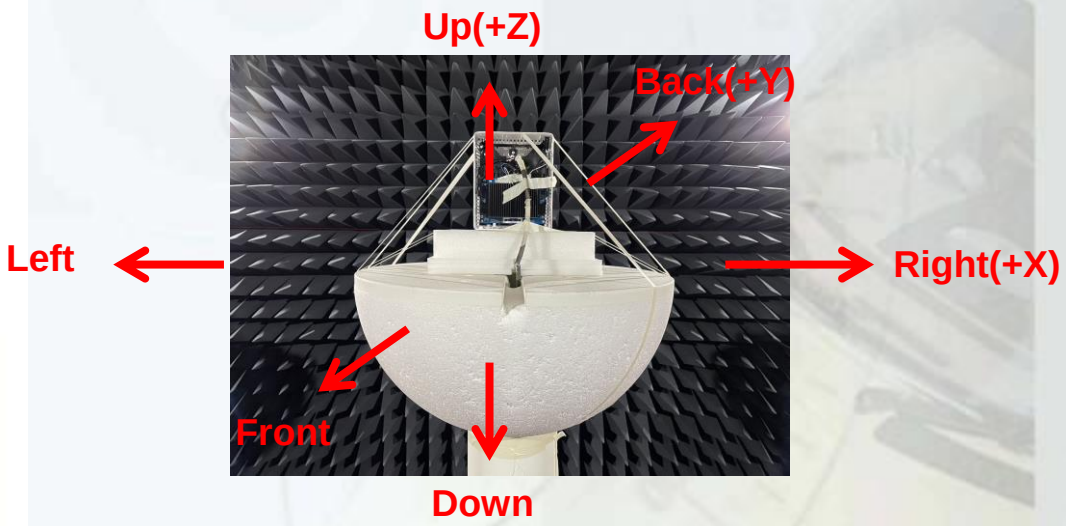


Test Setup for Radiation Pattern Measurement

Chamber Information



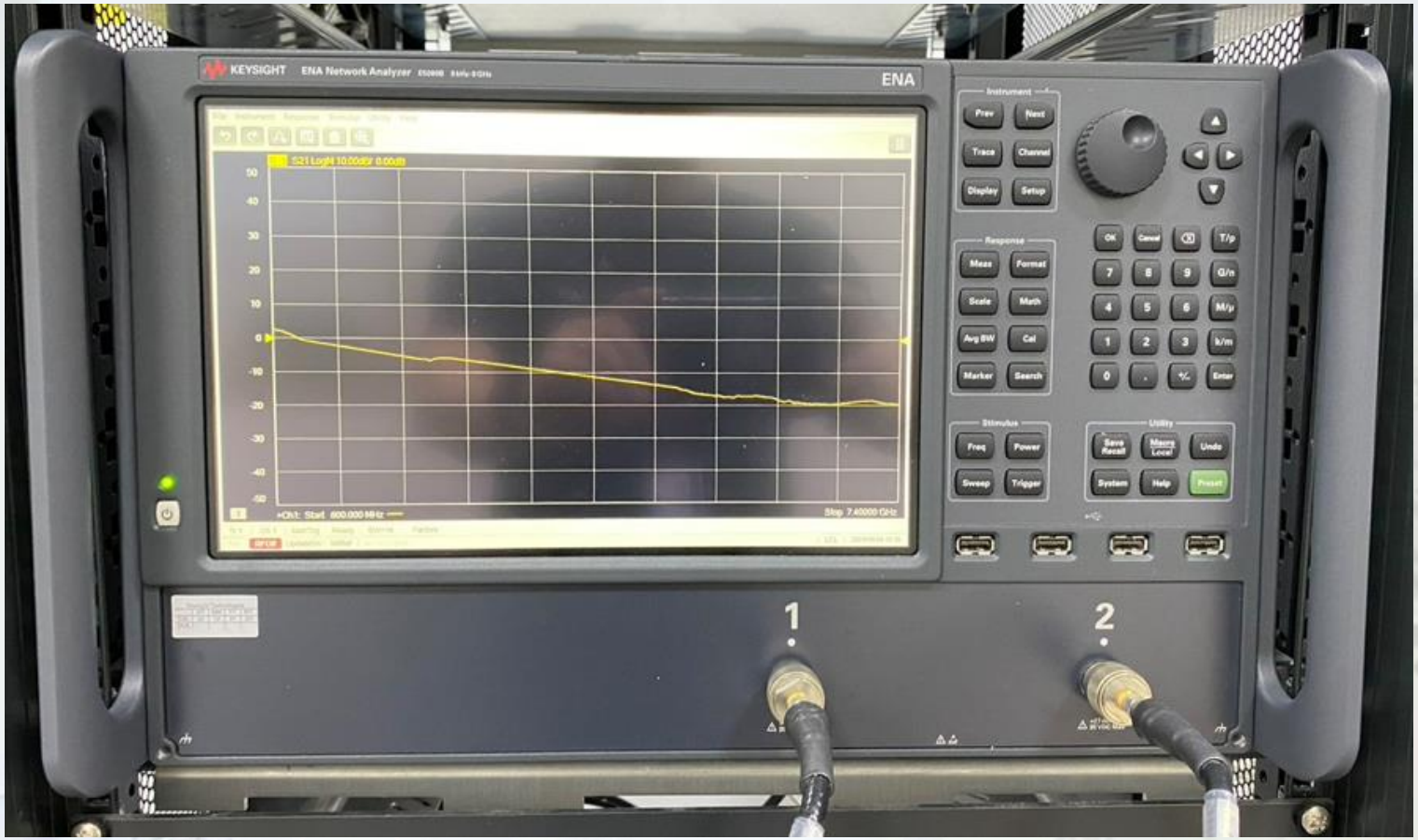
- **SATIMO SG-24L Multi-Probe Antenna Measurement System**
  - **Angle between probes: 15˚**
  - **Frequency range: 400 MHz – 9 GHz**
  - **Chamber Room Size: 5m L x 5m W x 5m H**



較驗日期:2024/04/19

peak計算公式&過程:
➔與標準天線對比,Chamber換算出Peak值.

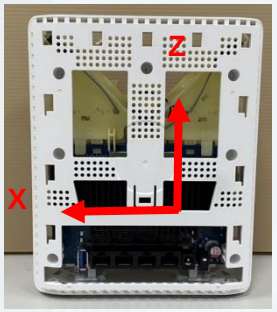
量測儀器 E5080B

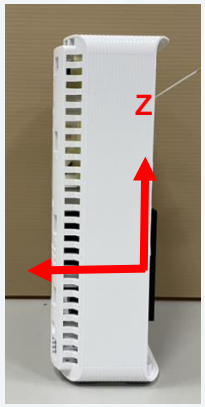


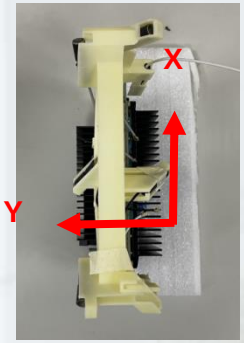
較驗日期:2024/03/19

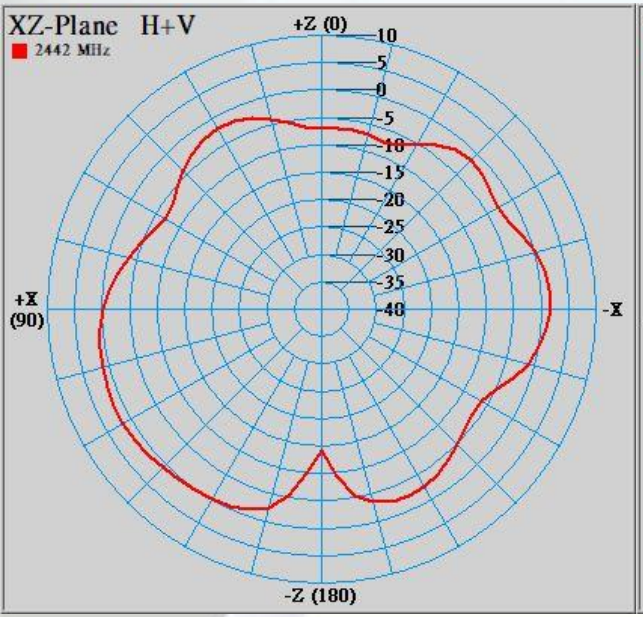
2D Radiation Pattern Results

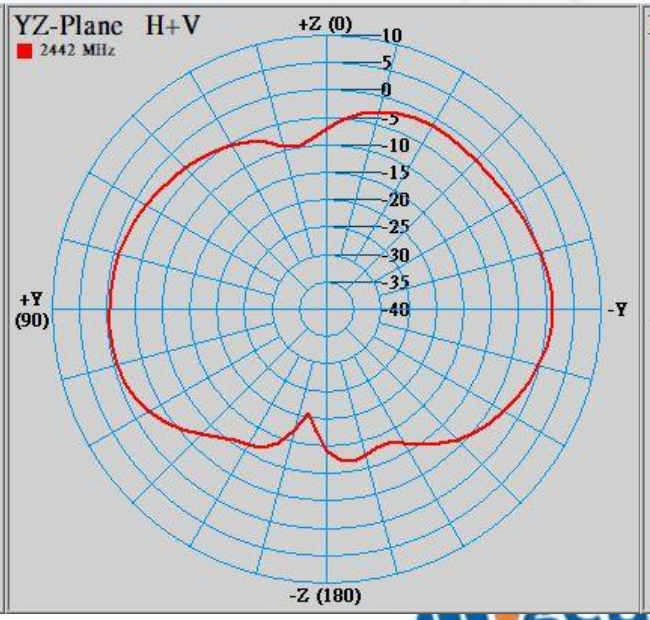
Ant1-2G

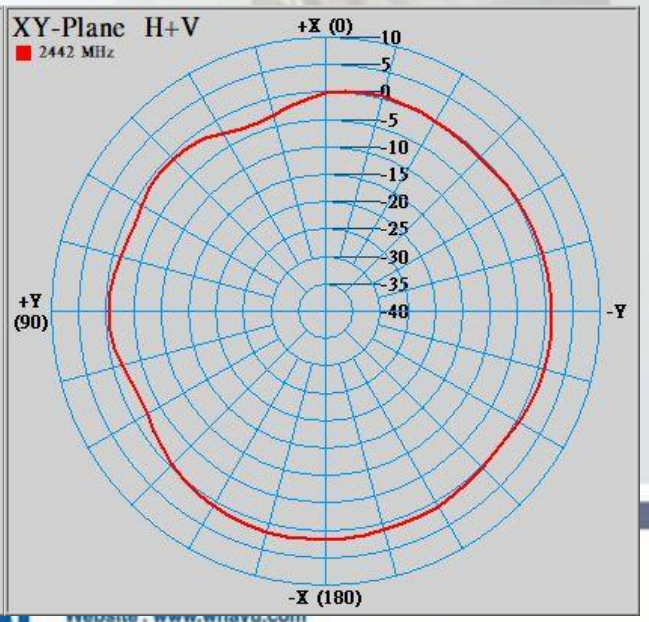












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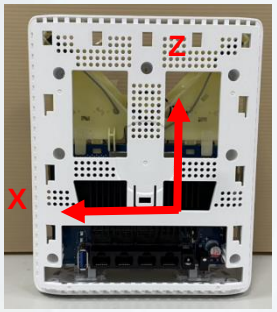
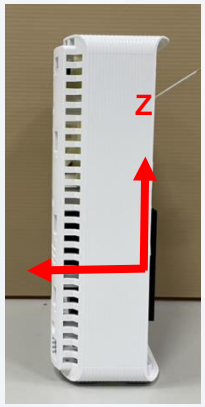
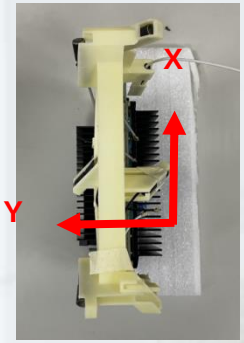
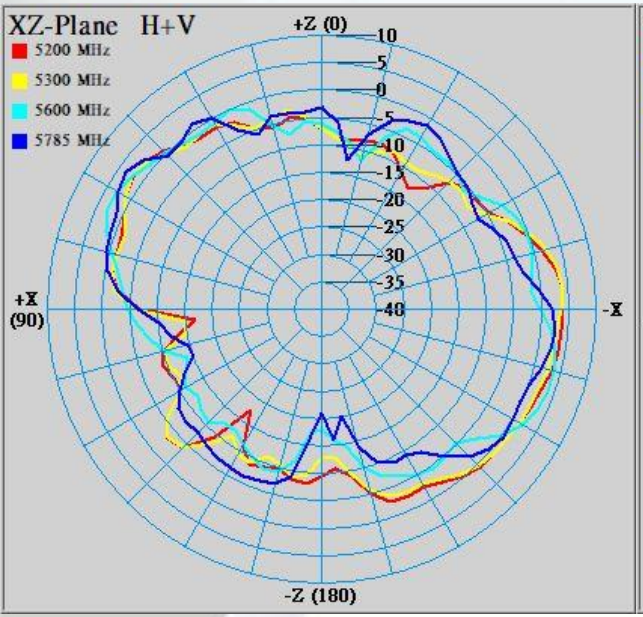
2D Radiation Pattern Results

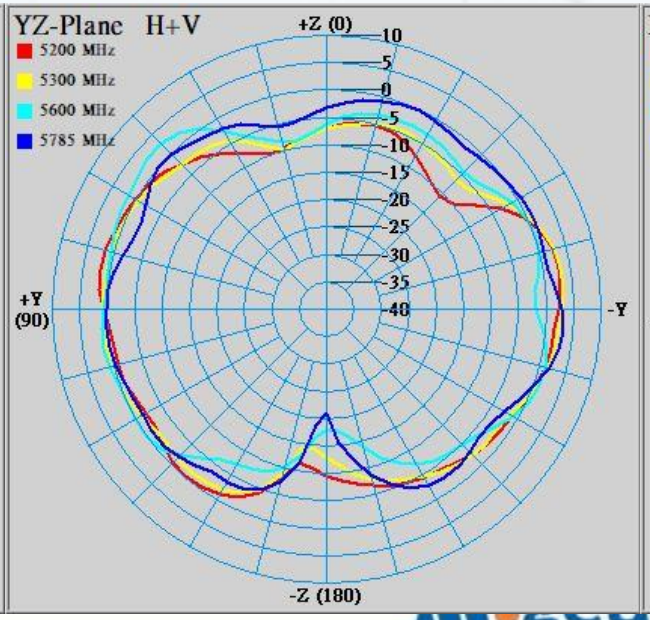
Ant1-5G

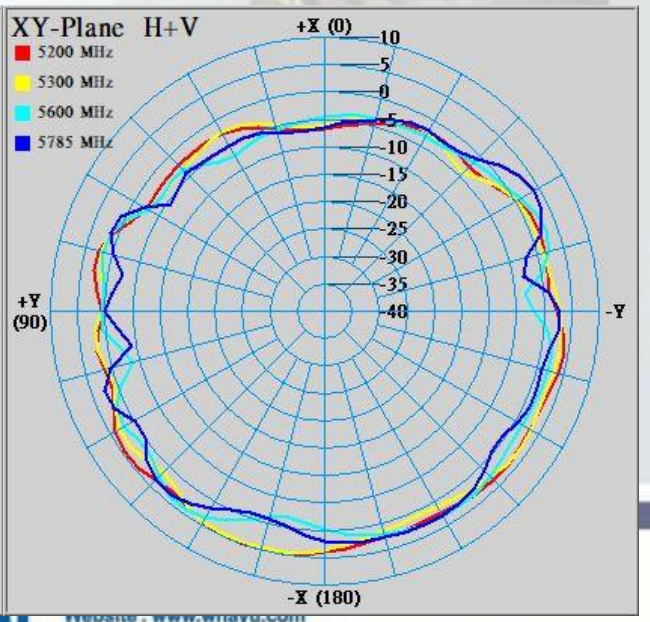












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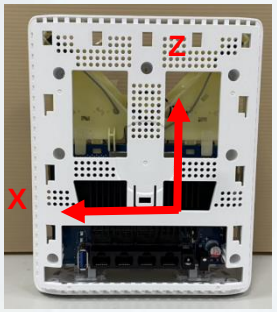
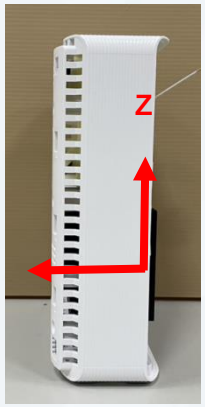
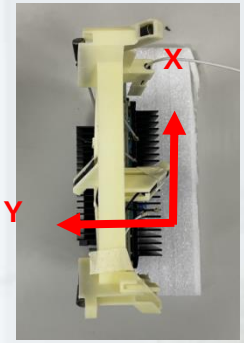
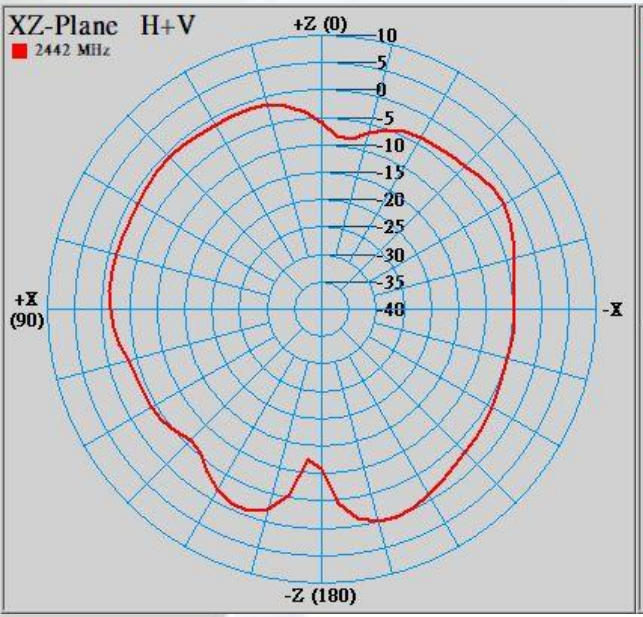
2D Radiation Pattern Results

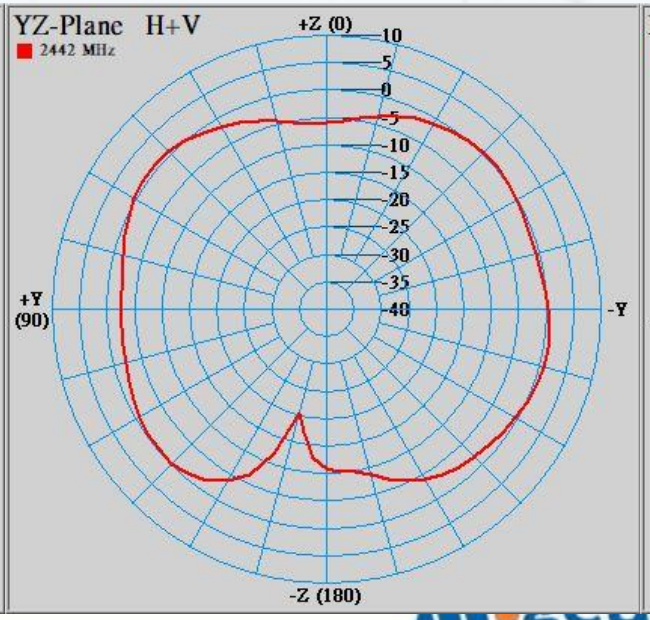
Ant2-2G

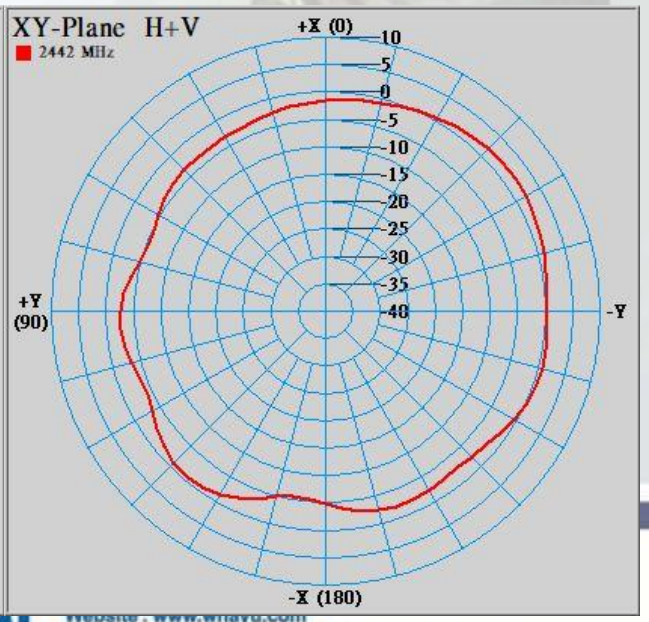












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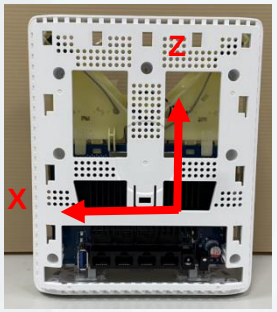
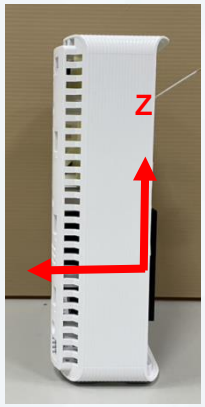
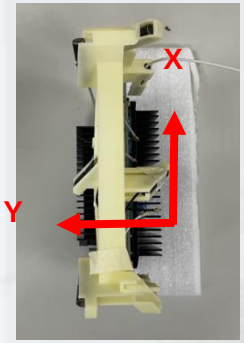
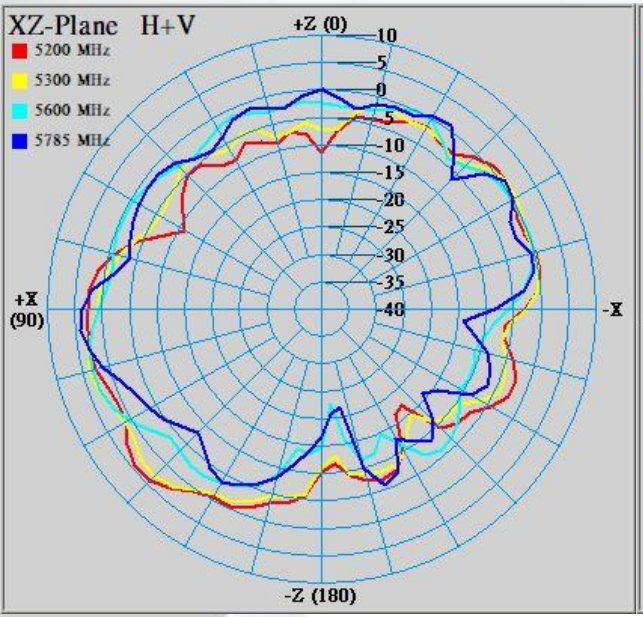
2D Radiation Pattern Results

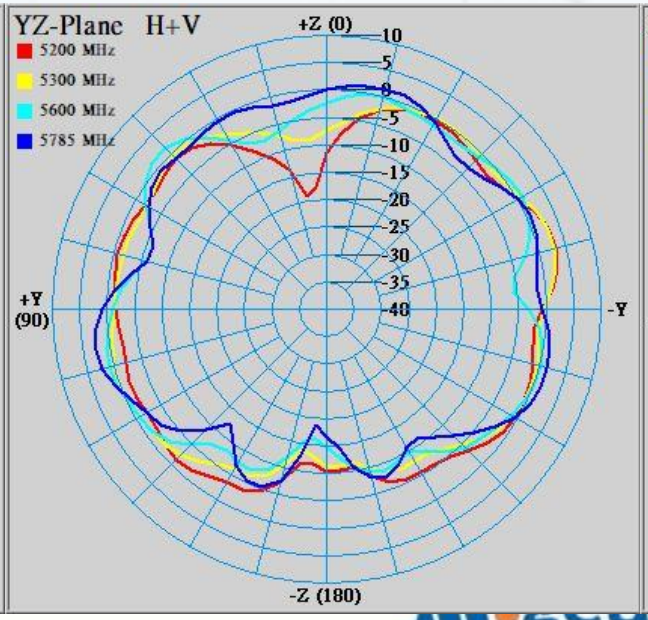
Ant2-5G

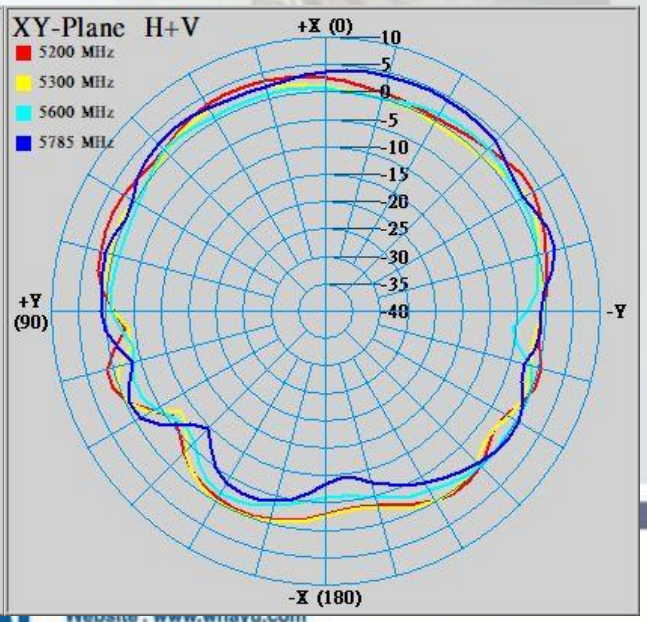












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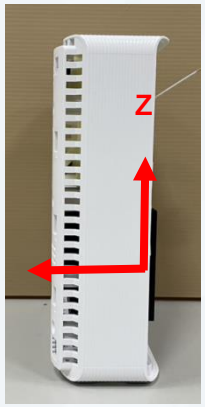
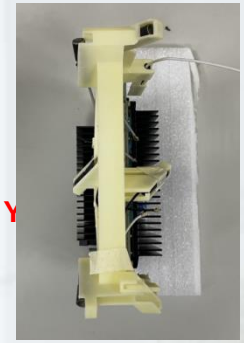
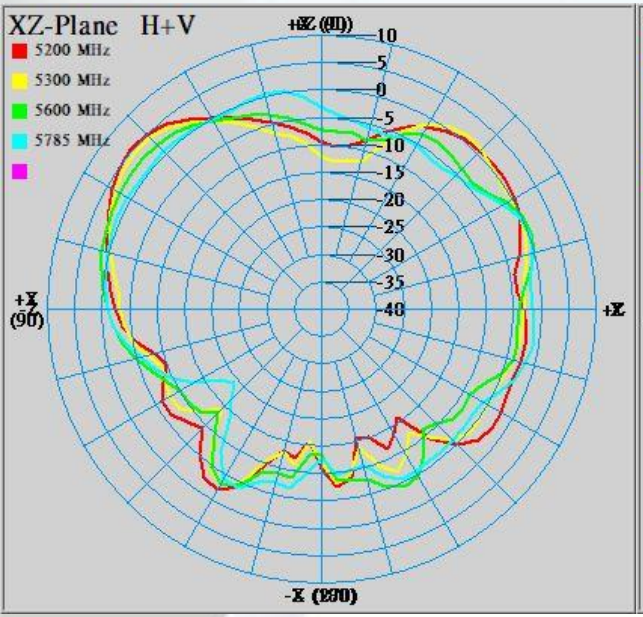
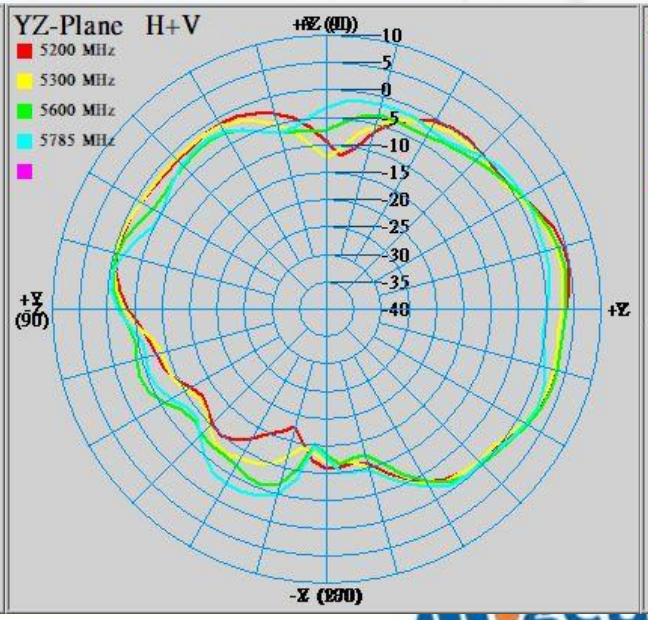
2D Radiation Pattern Results

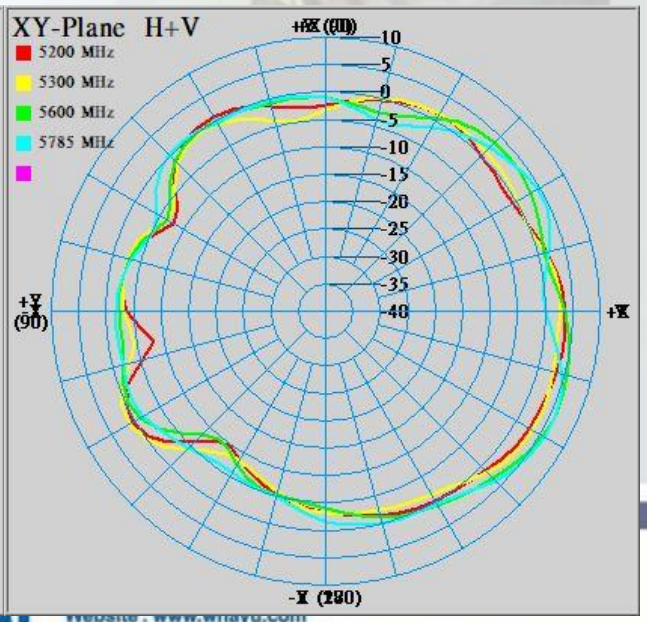
Ant3-5G1











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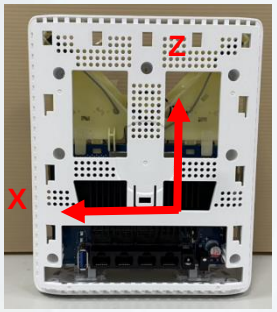
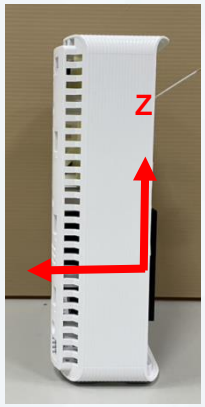
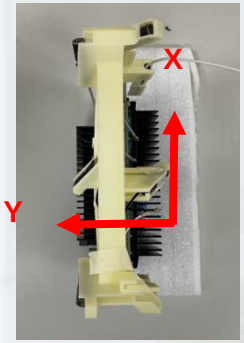
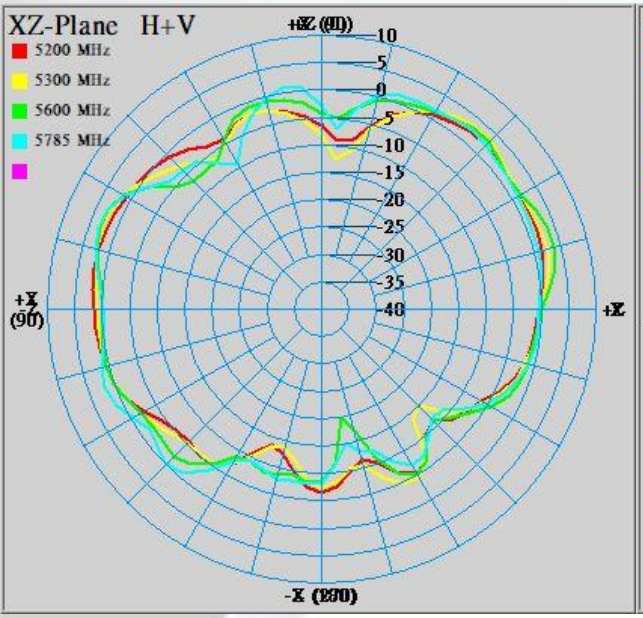
2D Radiation Pattern Results

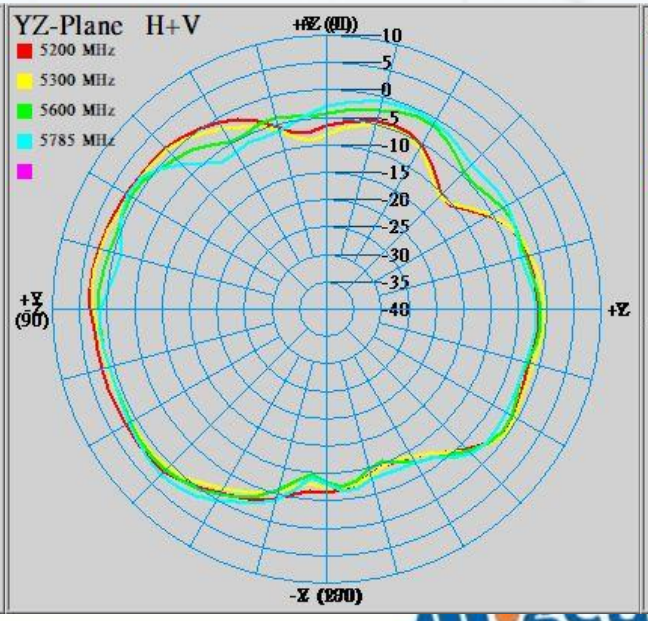
Ant4-5G2

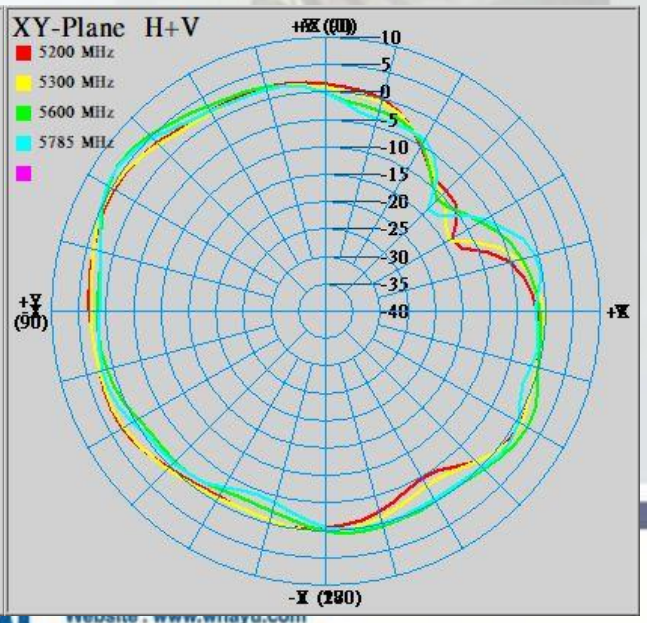












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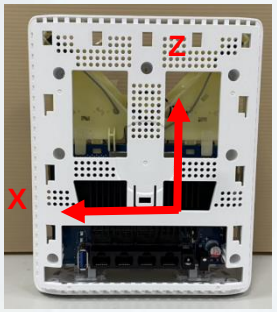
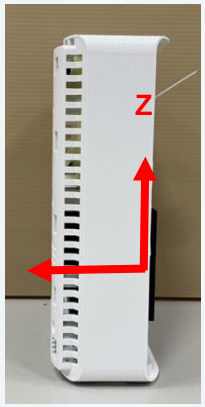
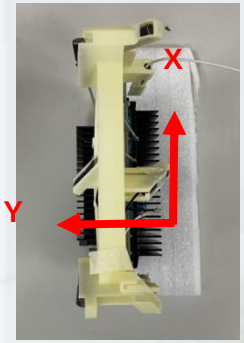
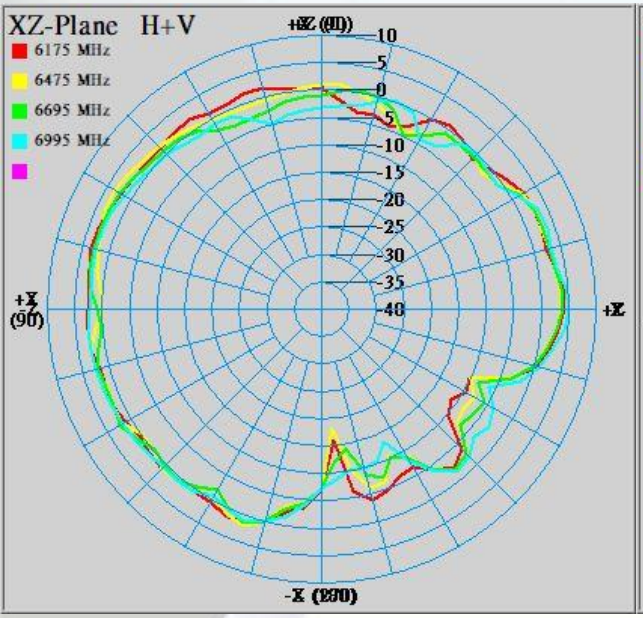
2D Radiation Pattern Results

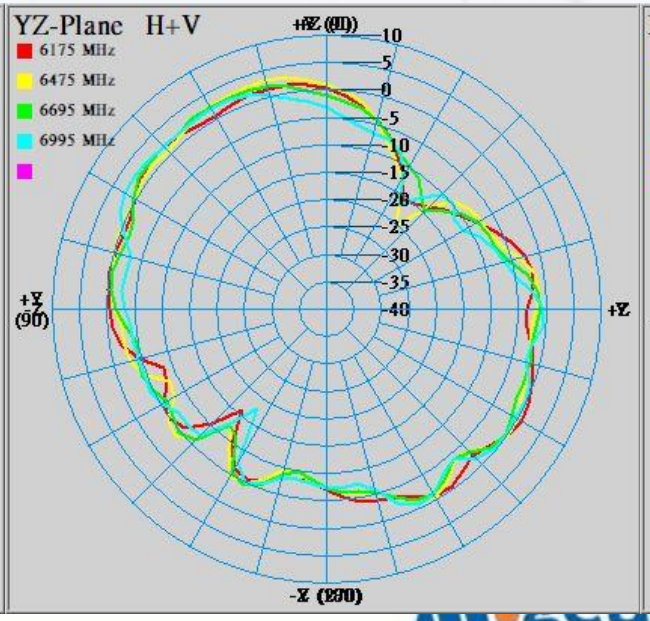
Ant5-6G1

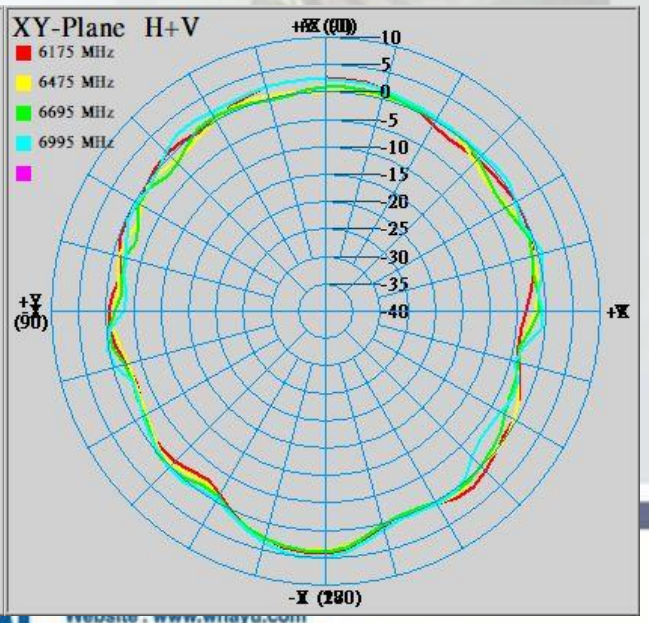












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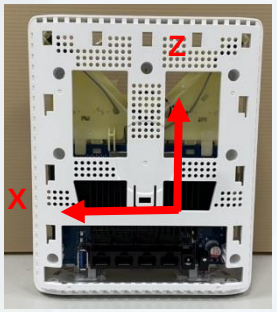
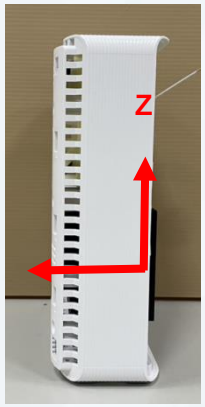
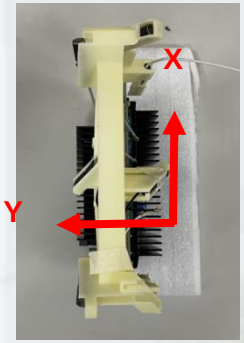
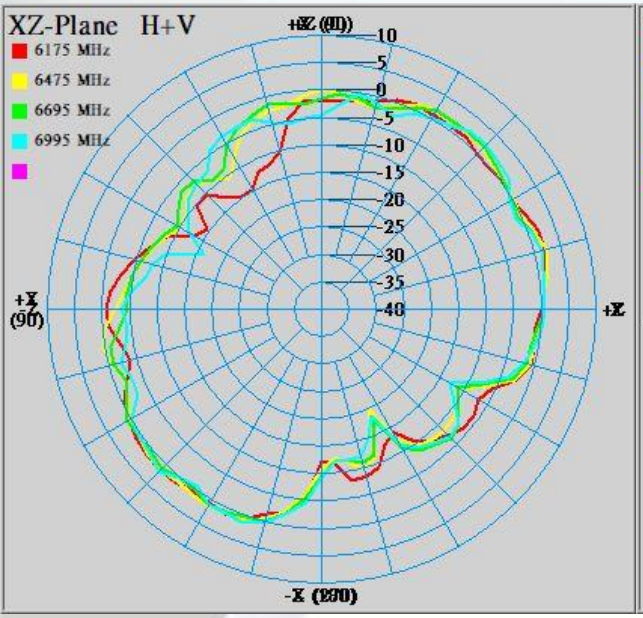
2D Radiation Pattern Results

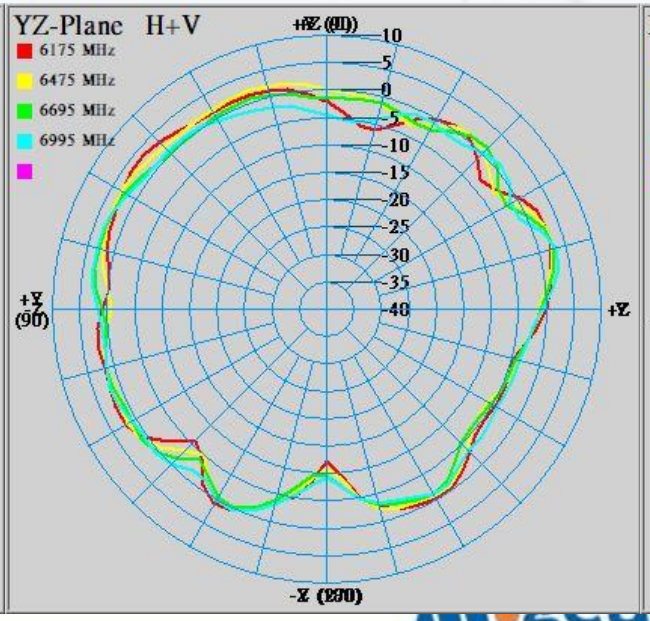
Ant6-6G2

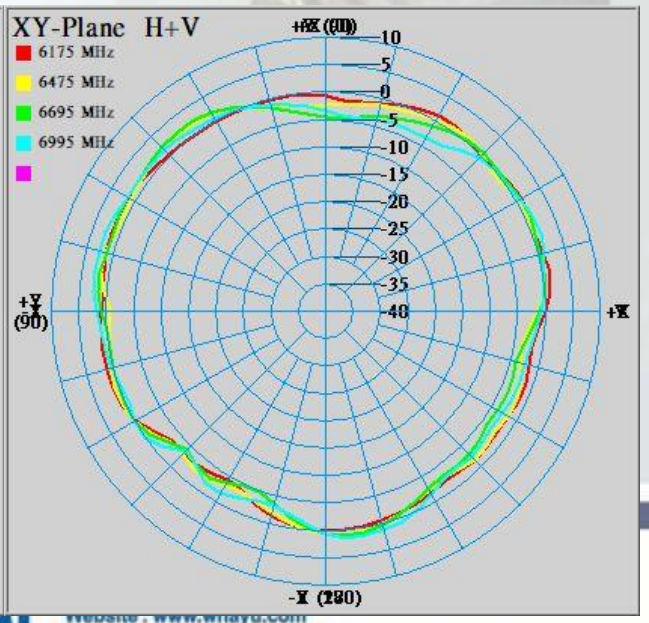












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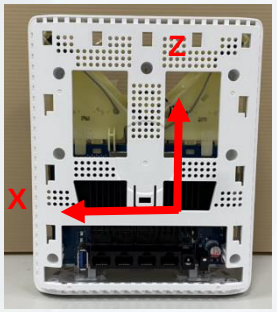
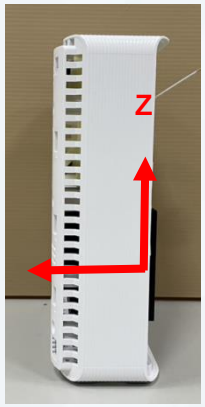
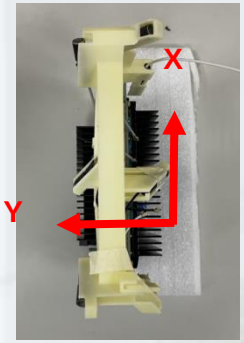
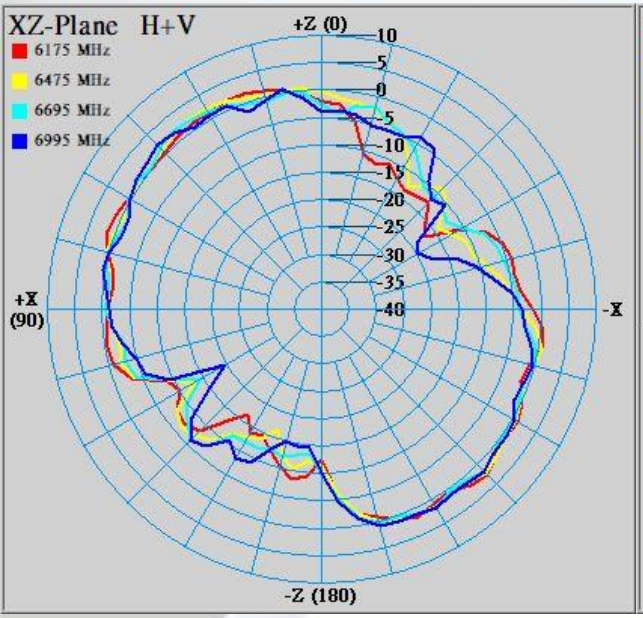
2D Radiation Pattern Results

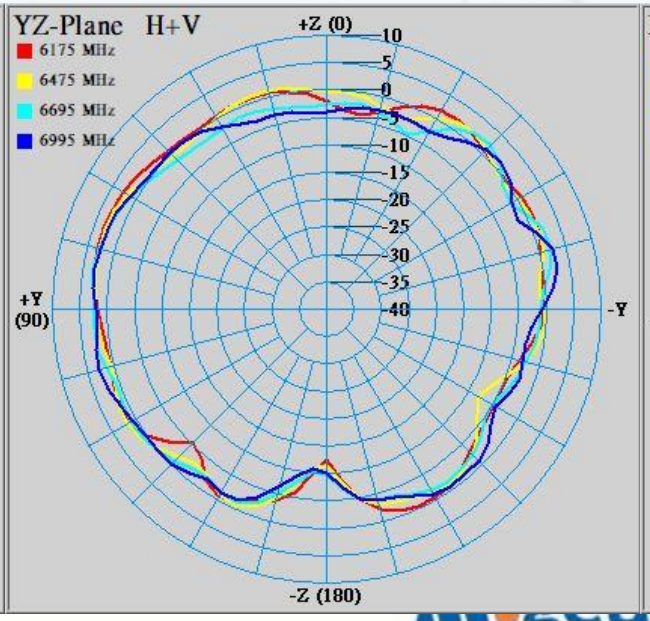
Ant7-6G3

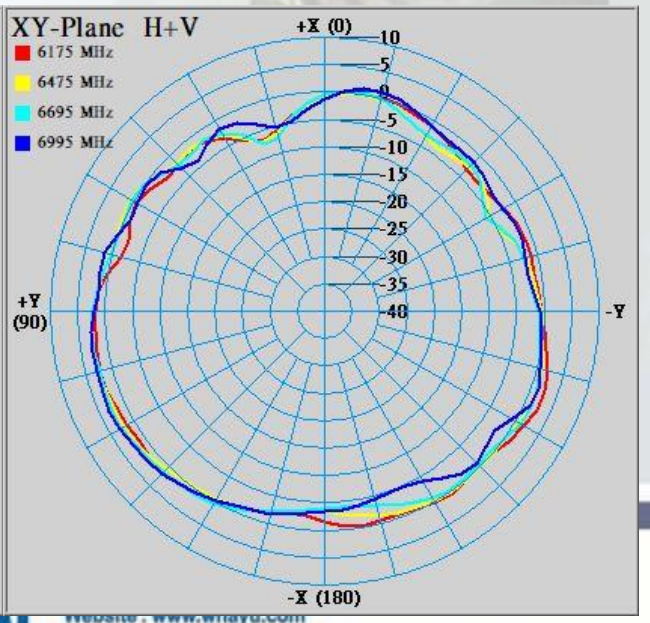












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Results Summary

Return Loss

Frequency (MHz)	Ant1-DB1	Ant2-DB2
2442	19	15
5200	20	15
5300	20	13
5600	19	15
5785	24	25

Frequency (MHz)	Ant5-6G1	Ant6-6G2	Ant7-6G3
6175	19	25	15
6475	23	19	22
6695	23	16	20
6995	18	15	17

Frequency (MHz)	Ant3-5G1	Ant4-5G2
5300	24	27
5600	22	29
5785	19	21

Results Summary

Isolation

Frequency	Ant1-DB1 to ANT2-DB2	Ant1-DB1 to ANT3-5G1	Ant1-DB1 to ANT4-5G2	Ant1-DB1 to ANT5-6G1	Ant1-DB1 to ANT6-6G2	Ant1-DB1 To ANT7-6G3
2442MHz	32	21	36	29	27	27
5200MHz	34	34	36	38	33	37
5300MHz	34	42	36	40	41	34
5600MHz	41	35	44	31	35	38
5785MHz	44	31	40	33	33	37
6175MHz	36	34	54	33	38	33
6475MHz	42	29	34	32	33	33
6695MHz	35	26	28	32	33	32
6995MHz	43	25	26	35	37	32

Results Summary

Isolation

Frequency	Ant2-DB2 to ANT3-5G1	Ant2-DB2 to ANT4-5G2	Ant2-DB2 to ANT5-6G1	Ant2-DB2 to ANT6-6G2	Ant2-DB2 To ANT7-6G3
2442MHz	31	25	30	22	32
5200MHz	30	33	30	31	38
5300MHz	31	33	33	33	37
5600MHz	38	33	34	32	35
5785MHz	43	33	31	38	53
6175MHz	47	34	34	39	38
6475MHz	44	31	31	37	38
6695MHz	39	32	37	35	41
6995MHz	33	34	36	37	41

Results Summary

Isolation

Frequency	Ant3-5G1 to ANT4-5G2	Ant3-5G1 to ANT5-6G1	Ant3-5G1 to ANT6-6G2	Ant3-5G1 to ANT7-6G3
2442MHz	23	33	32	26
5200MHz	36	32	31	37
5300MHz	41	36	30	36
5600MHz	42	45	37	36
5785MHz	36	39	40	38
6175MHz	43	34	35	50
6475MHz	34	39	43	46
6695MHz	40	45	45	38
6995MHz	34	32	55	37

Results Summary

Isolation

Frequency	Ant4-5G2 to ANT5-6G1	Ant4-5G2 to ANT6-6G2	Ant4-5G2 to ANT7-6G3
2442MHz	38	32	36
5200MHz	35	32	41
5300MHz	34	35	44
5600MHz	32	44	44
5785MHz	34	52	40
6175MHz	37	43	40
6475MHz	33	50	46
6695MHz	34	42	45
6995MHz	36	46	44

Results Summary

Isolation

Frequency	Ant5-6G1 to ANT6-6G2	Ant5-6G1 to ANT7-6G3	Ant6-6G2 to ANT7-6G3
2442MHz	35	40	33
5200MHz	29	34	33
5300MHz	28	33	34
5600MHz	28	34	35
5785MHz	27	32	32
6175MHz	28	32	37
6475MHz	27	31	36
6695MHz	27	32	36
6995MHz	28	33	35

Results Summary

Peak gain – Ant1 & ANT2

ANT1-DB1	
Frequency (MHz)	2D peak gain (dBi)
2442MHz	1.81
5200MHz	5.03
5300MHz	4.71
5600MHz	4.19
5785MHz	3.99

ANT2-DB2	
Frequency (MHz)	2D peak gain (dBi)
2442MHz	2.18
5200MHz	4.43
5300MHz	3.78
5600MHz	3.18
5785MHz	4.59

Results Summary

Peak gain – Ant3 & ANT4

ANT3-5G1	
Frequency (MHz)	2D peak gain (dBi)
5200MHz	5.51
5300MHz	4.65
5600MHz	5.95
5785MHz	6.11

ANT4-5G2	
Frequency (MHz)	2D peak gain (dBi)
5200MHz	4.56
5300MHz	4.84
5600MHz	6.22
5785MHz	6.19

Results Summary

Peak gain – Ant5 & ANT6 & ANT7

ANT5-6G1	
Frequency (MHz)	2D peak gain (dBi)
6175MHz	4.25
6475MHz	3.88
6695MHz	3.93
6995MHz	5.12

ANT6-6G2	
Frequency (MHz)	2D peak gain (dBi)
6175MHz	3.77
6475MHz	3.26
6695MHz	2.96
6995MHz	3.34

ANT7-6G3	
Frequency (MHz)	2D peak gain (dBi)
6175MHz	3.19
6475MHz	3.07
6695MHz	2.36
6995MHz	3.25

Results Summary

Efficiency – Ant1 & ANT2

ANT1-DB1	
Frequency (MHz)	Efficiency (%)
2442MHz	70
5200MHz	86
5300MHz	81
5600MHz	85
5785MHz	83

ANT2-DB2	
Frequency (MHz)	Efficiency (%)
2442MHz	74
5200MHz	89
5300MHz	81
5600MHz	82
5785MHz	84

Results Summary

Efficiency – Ant3 & ANT4

ANT3-5G1	
Frequency (MHz)	Efficiency (%)
5200MHz	85
5300MHz	85
5600MHz	84
5785MHz	84

ANT4-5G2	
Frequency (MHz)	Efficiency (%)
5200MHz	84
5300MHz	85
5600MHz	85
5785MHz	84

Results Summary

Efficiency – Ant5 & ANT6 & ANT7

ANT5-6G1	
Frequency (MHz)	Efficiency (%)
6175MHz	76
6475MHz	78
6695MHz	73
6995MHz	75

ANT6-6G2	
Frequency (MHz)	Efficiency (%)
6175MHz	80
6475MHz	76
6695MHz	73
6995MHz	73

ANT7-6G3	
Frequency (MHz)	Efficiency (%)
6175MHz	81
6475MHz	80
6695MHz	75
6995MHz	76

gain 最大方位標示(θ, ϕ)

		XZ			
2G		ANT1-DB1	ANT2-DB2		
	Frequency	(θ , Φ)	(θ , Φ)		
	2442	(120,0)	(175,0)		
5G		ANT1-DB1	ANT2-DB2	ANT3-5G1	ANT4-5G2
	Frequency	(θ , Φ)	(θ , Φ)	(θ , Φ)	(θ , Φ)
	5200MHz	(270,0)	(220,0)	(215,0)	(160,0)
	5300MHz	(275,0)	(220,0)	(175,0)	(225,0)
	5600MHz	(250,0)	(185,0)	(175,0)	(190,0)
	5785MHz	(55,0)	(190,0)	(130,0)	(190,0)
		XZ			
6G		ANT5-6G1	ANT6-6G2	ANT7-6G3	
	Frequency	(θ , Φ)	(θ , Φ)	(θ , Φ)	
	6175MHz	(185,0)	(30,0)	(305,0)	
	6475MHz	(185,0)	(205,0)	(160,0)	
	6695MHz	(190,0)	(205,0)	(120,0)	
	6995MHz	(205,0)	(205,0)	(120,0)	

gain 最大方位標示(θ, ϕ)

		YZ			
2G		ANT1-DB1	ANT2-DB2		
	Frequency	(θ , ϕ)	(θ , ϕ)		
	2442	(270,90)	(165,90)		
5G		ANT1-DB1	ANT2-DB2	ANT3-5G1	ANT4-5G2
	Frequency	(θ , ϕ)	(θ , ϕ)	(θ , ϕ)	(θ , ϕ)
	5200MHz	(280,90)	(10,90)	(165,90)	(310,90)
	5300MHz	(280,90)	(170,90)	(170,90)	(315,90)
	5600MHz	(45,90)	(175,90)	(175,90)	(200,90)
	5785MHz	(265,90)	(175,90)	(175,90)	(175,90)
		YZ			
6G		ANT5-6G1	ANT6-6G2	ANT7-6G3	
	Frequency	(θ , ϕ)	(θ , ϕ)	(θ , ϕ)	
	6175MHz	(265,90)	(180,90)	(180,90)	
	6475MHz	(260,90)	(180,90)	(180,90)	
	6695MHz	(260,90)	(180,90)	(175,90)	
	6995MHz	(255,90)	(180,90)	(175,90)	

gain 最大方位標示(θ, ϕ)

		XY			
2G		ANT1-DB1	ANT2-DB2		
	Frequency	(θ , Φ)	(θ , Φ)		
	2442	(170,90)	(170,90)		
5G		ANT1-DB1	ANT2-DB2	ANT3-5G1	ANT4-5G2
	Frequency	(θ , Φ)	(θ , Φ)	(θ , Φ)	(θ , Φ)
	5200MHz	(165,90)	(125,90)	(145,90)	(300,90)
	5300MHz	(160,90)	(125,90)	(150,90)	(300,90)
	5600MHz	(145,90)	(130,90)	(140,90)	(315,90)
	5785MHz	(300,90)	(135,90)	(145,90)	(315,90)
		XY			
6G		ANT5-6G1	ANT6-6G2	ANT7-6G3	
	Frequency	(θ , Φ)	(θ , Φ)	(θ , Φ)	
	6175MHz	(265,90)	(150,90)	(20,90)	
	6475MHz	(260,90)	(260,90)	(20,90)	
	6695MHz	(260,90)	(155,90)	(20,90)	
	6995MHz	(255,90)	(355,90)	(15,90)	