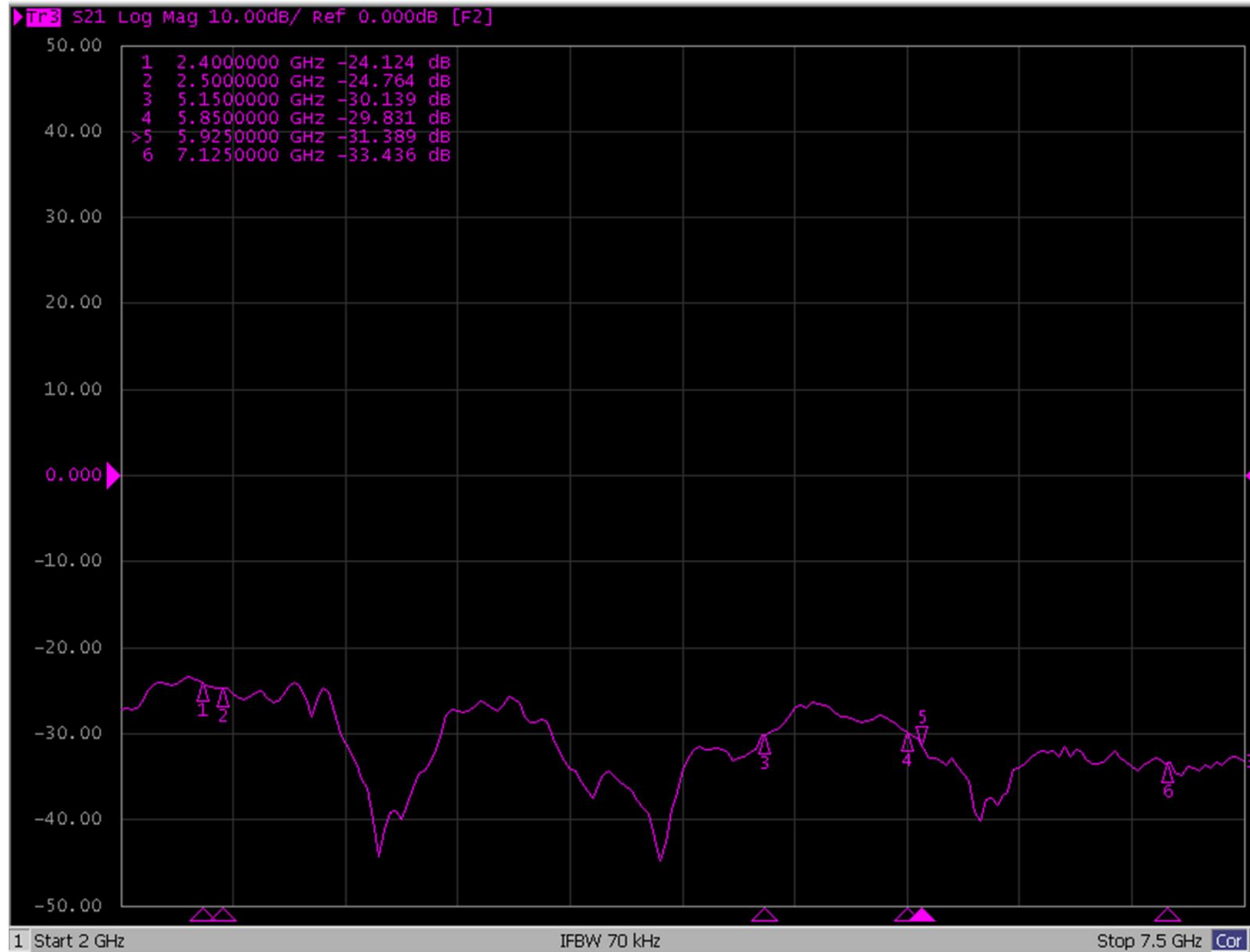
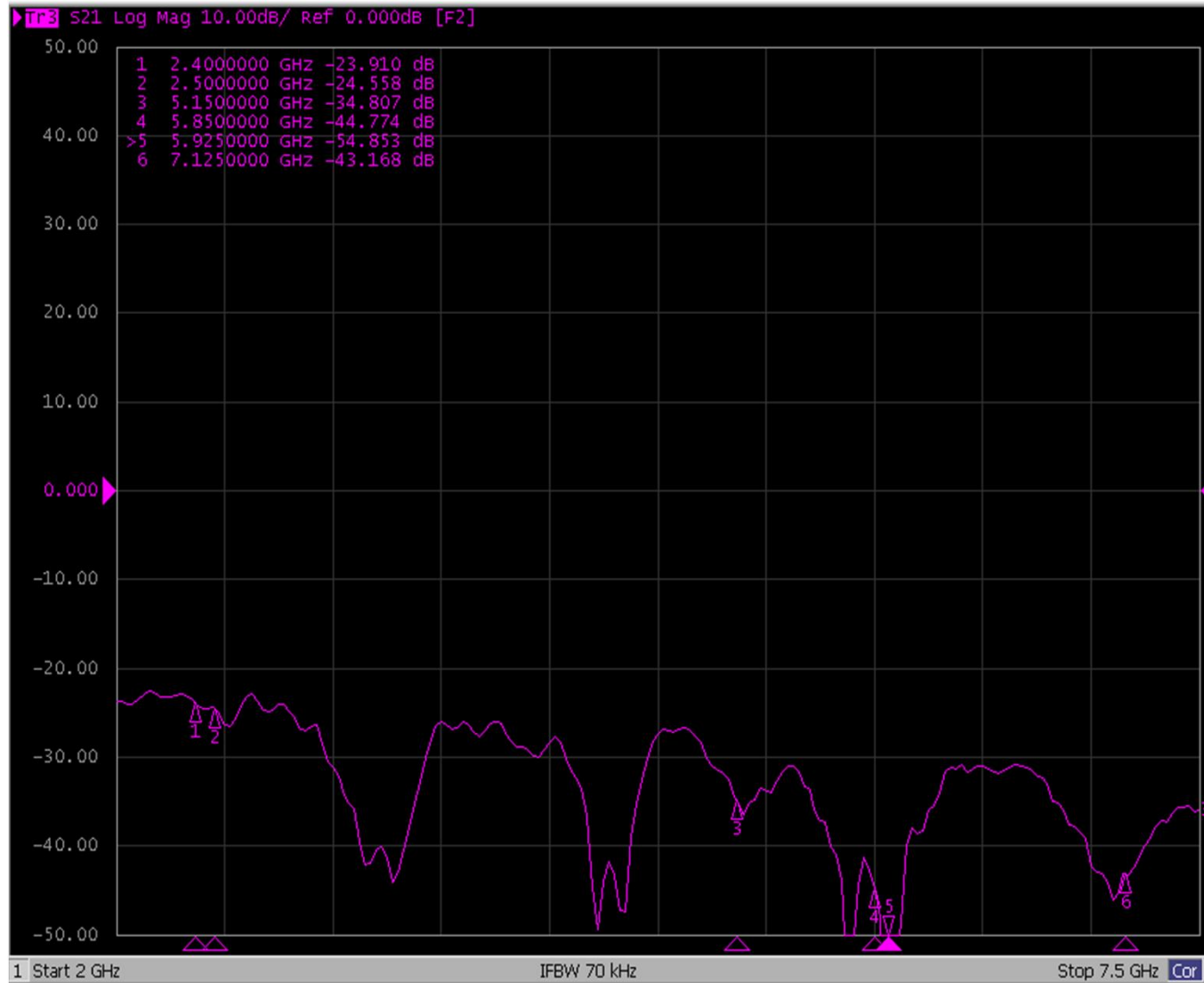


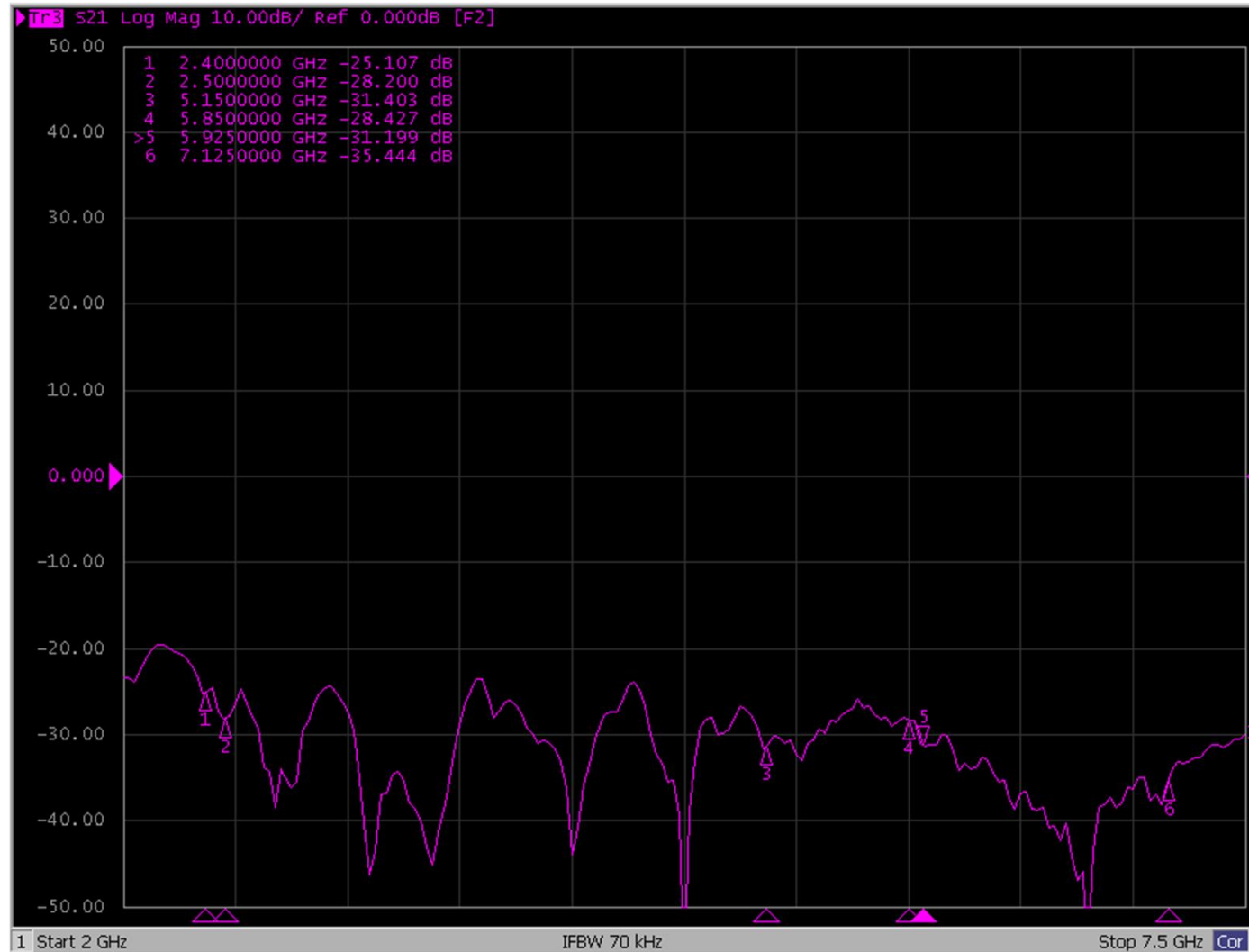
# ANT2&ANT7 Isolation



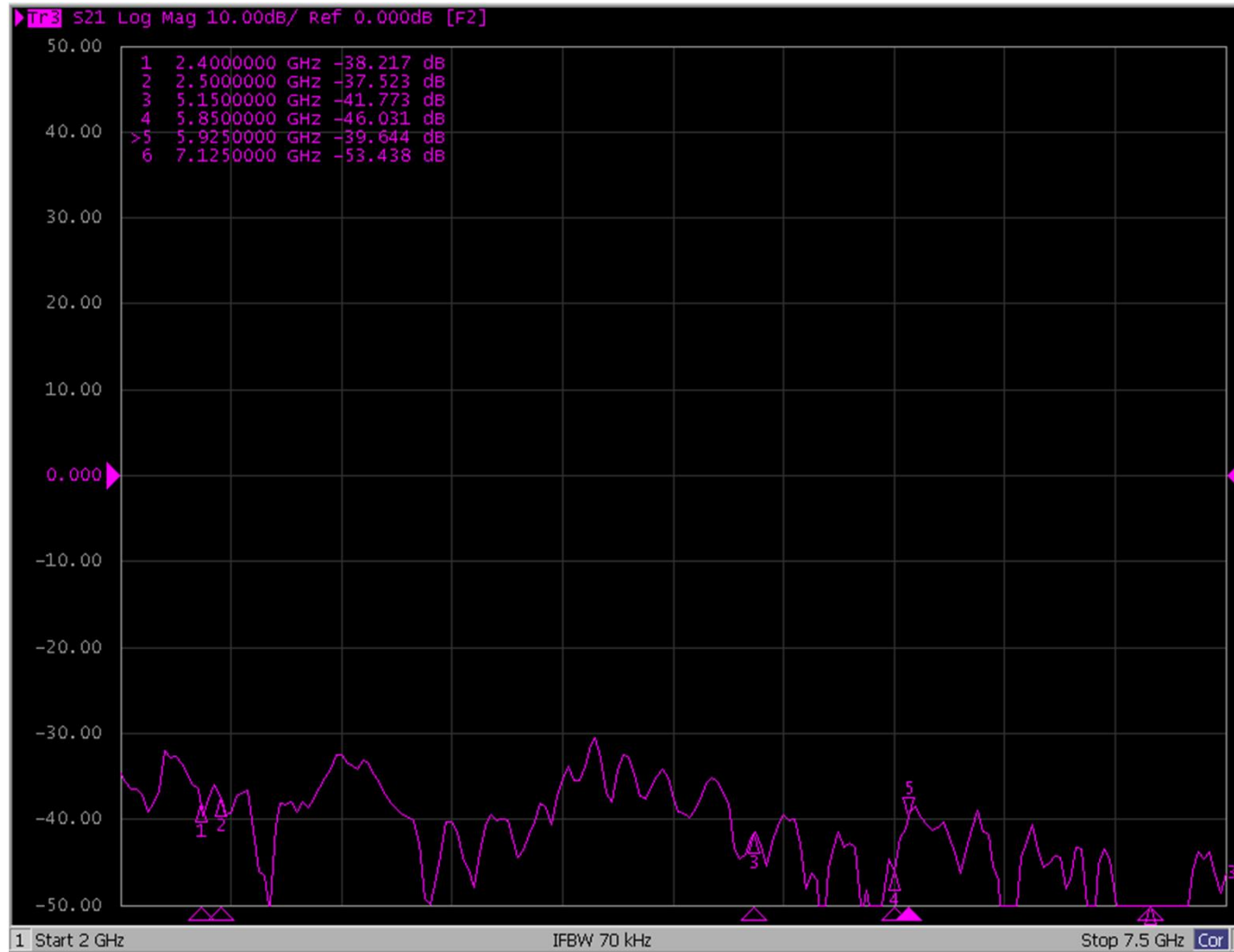
# ANT2&ANT8 Isolation



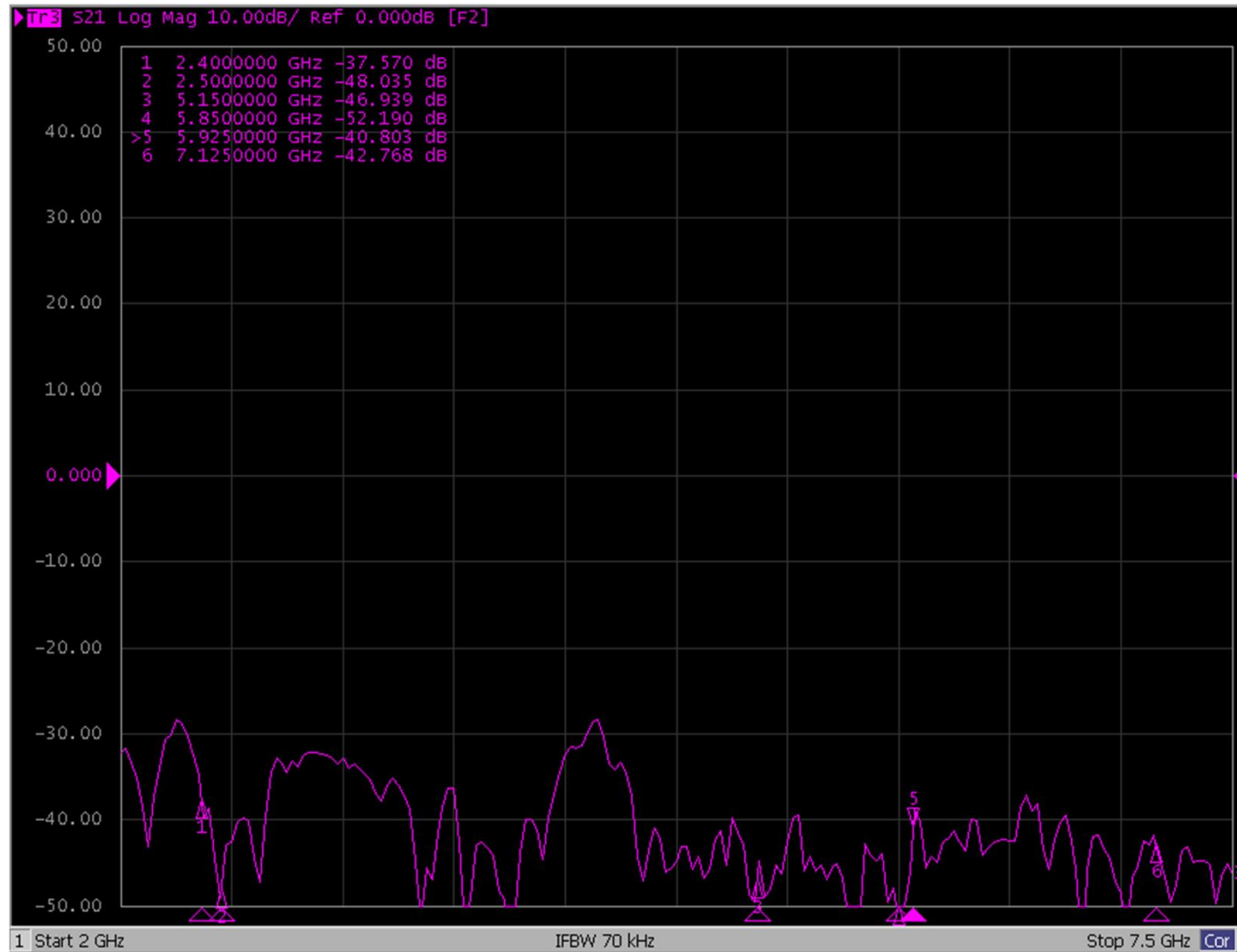
# ANT3&ANT4 Isolation



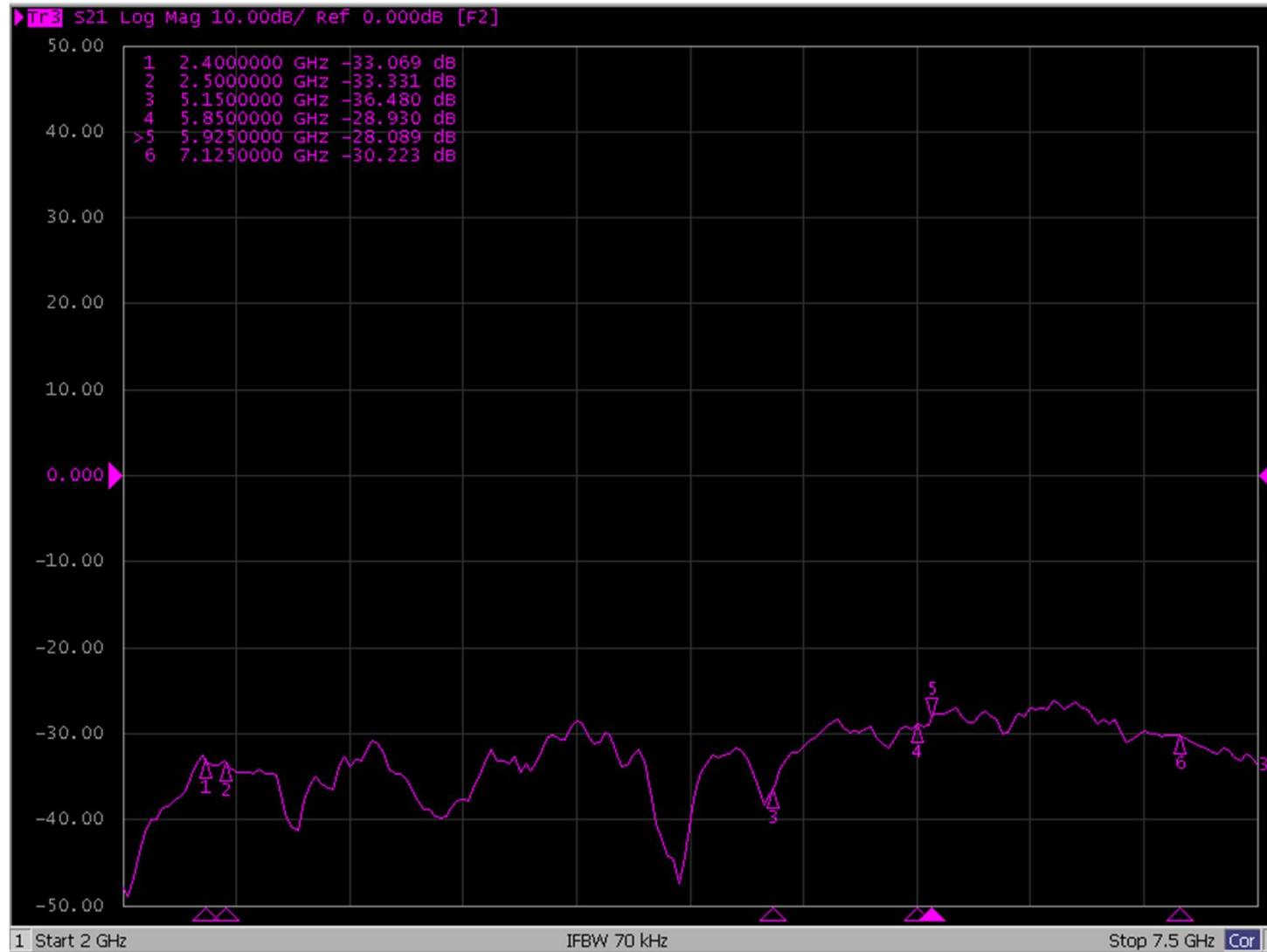
# ANT3&ANT5 Isolation



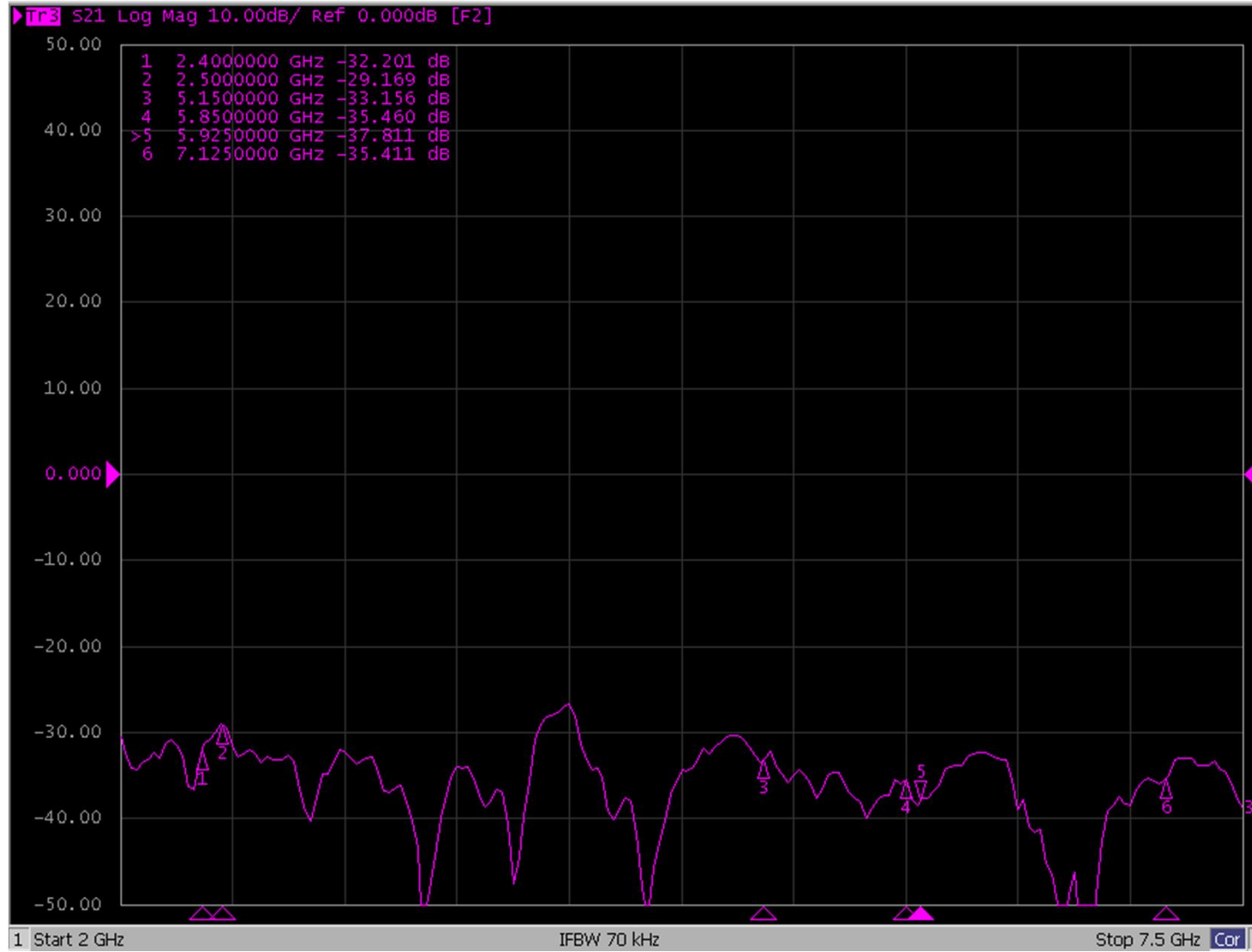
# ANT3&ANT6 Isolation



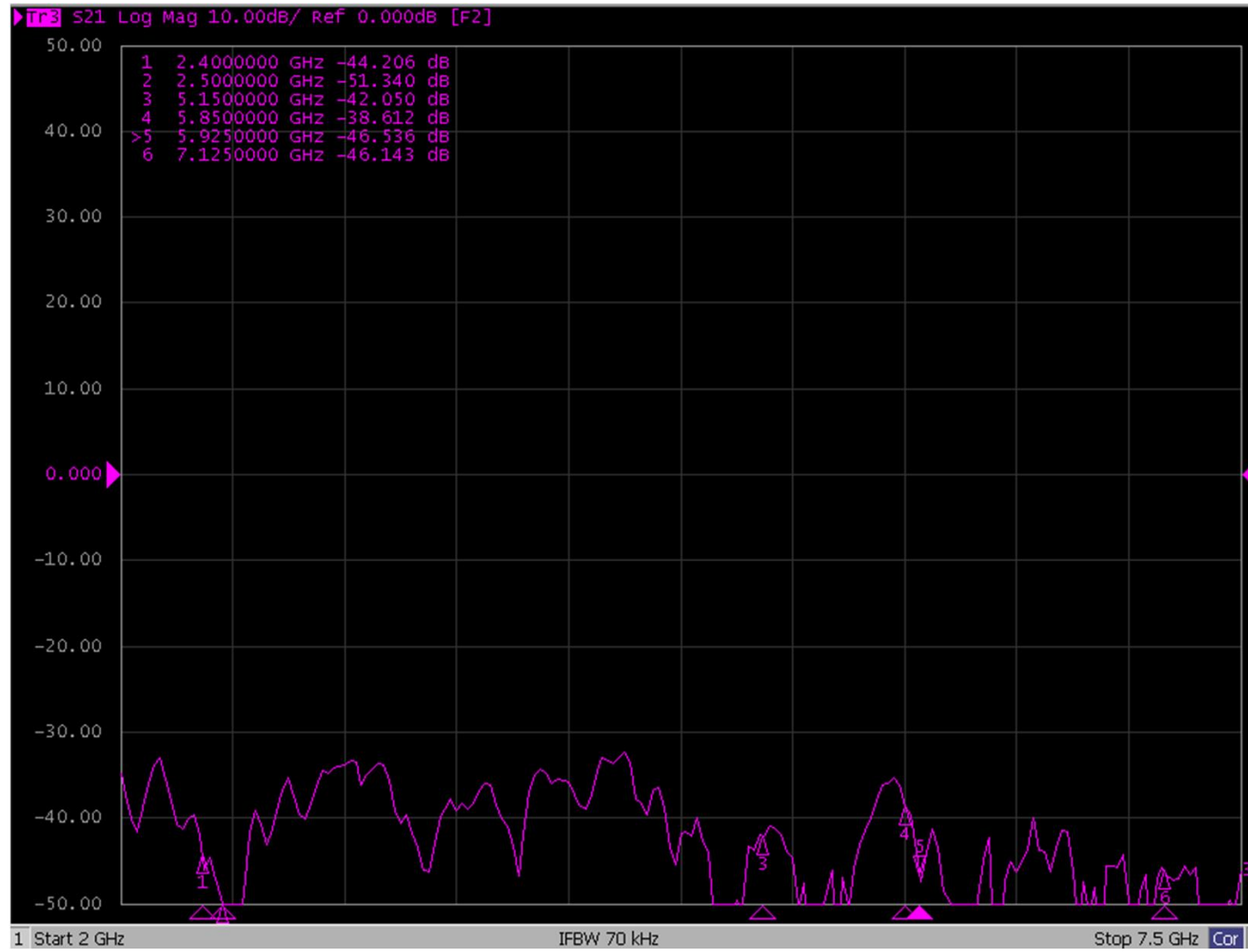
# ANT3&ANT7 Isolation



# ANT3&ANT8 Isolation

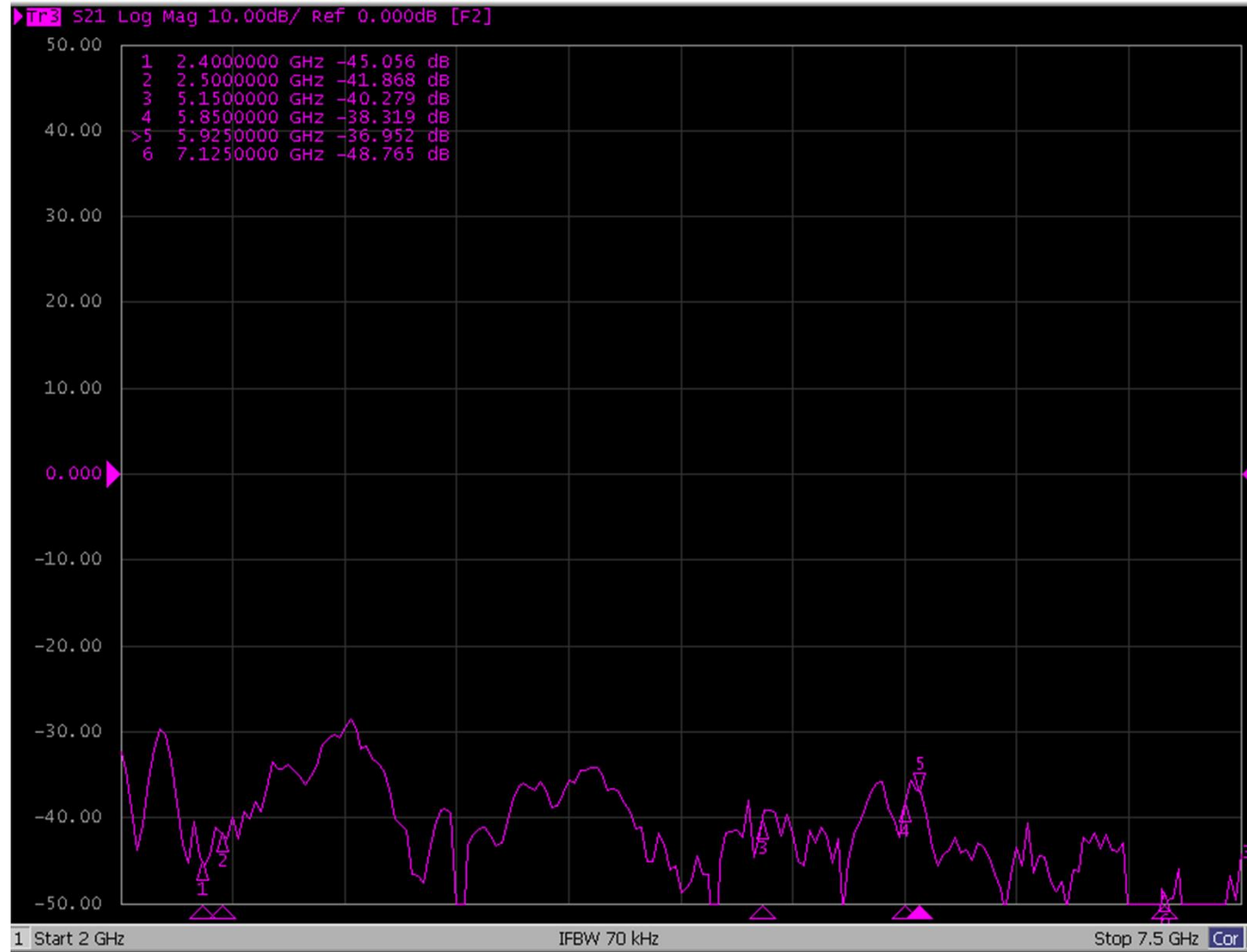


# ANT4&ANT5 Isolation

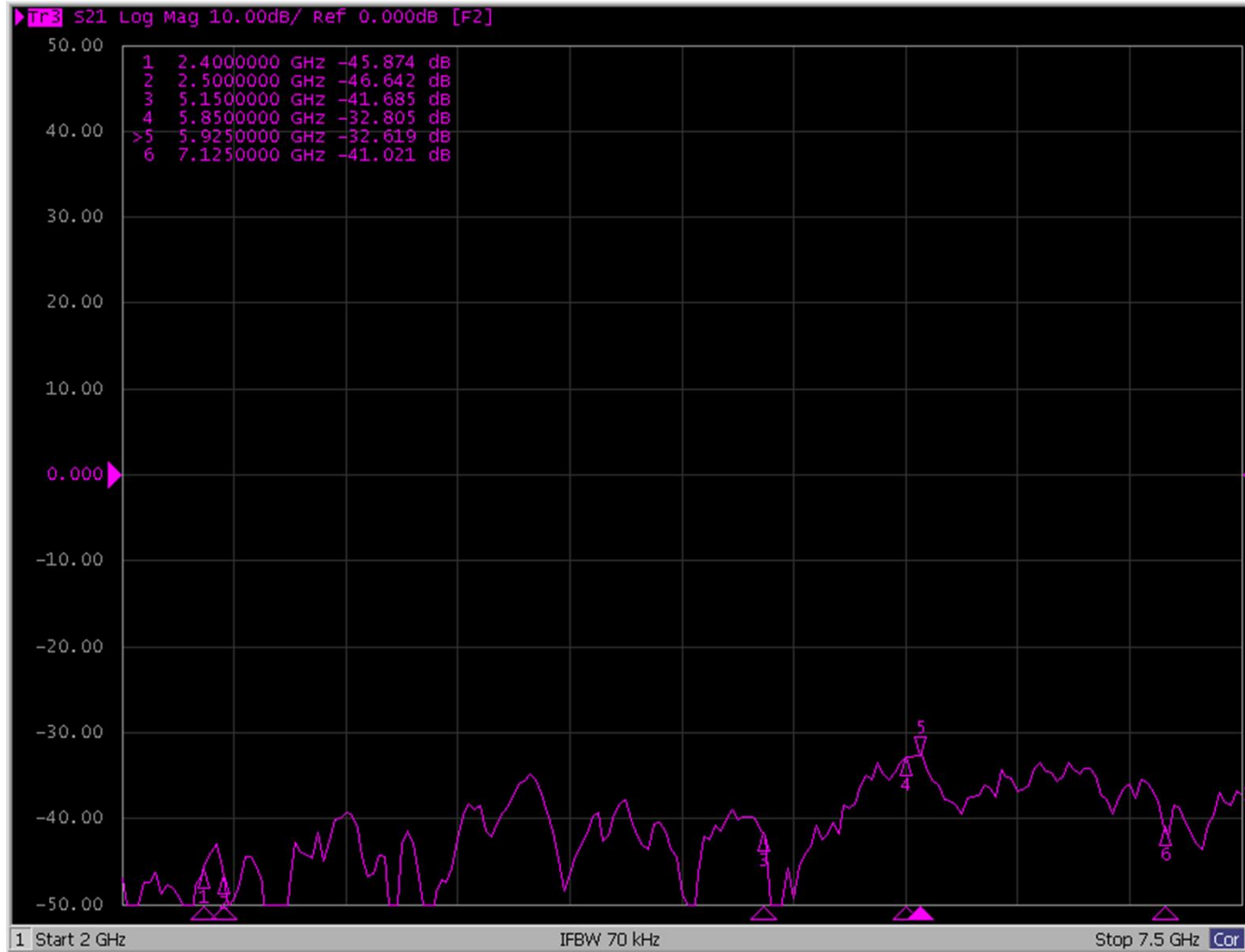




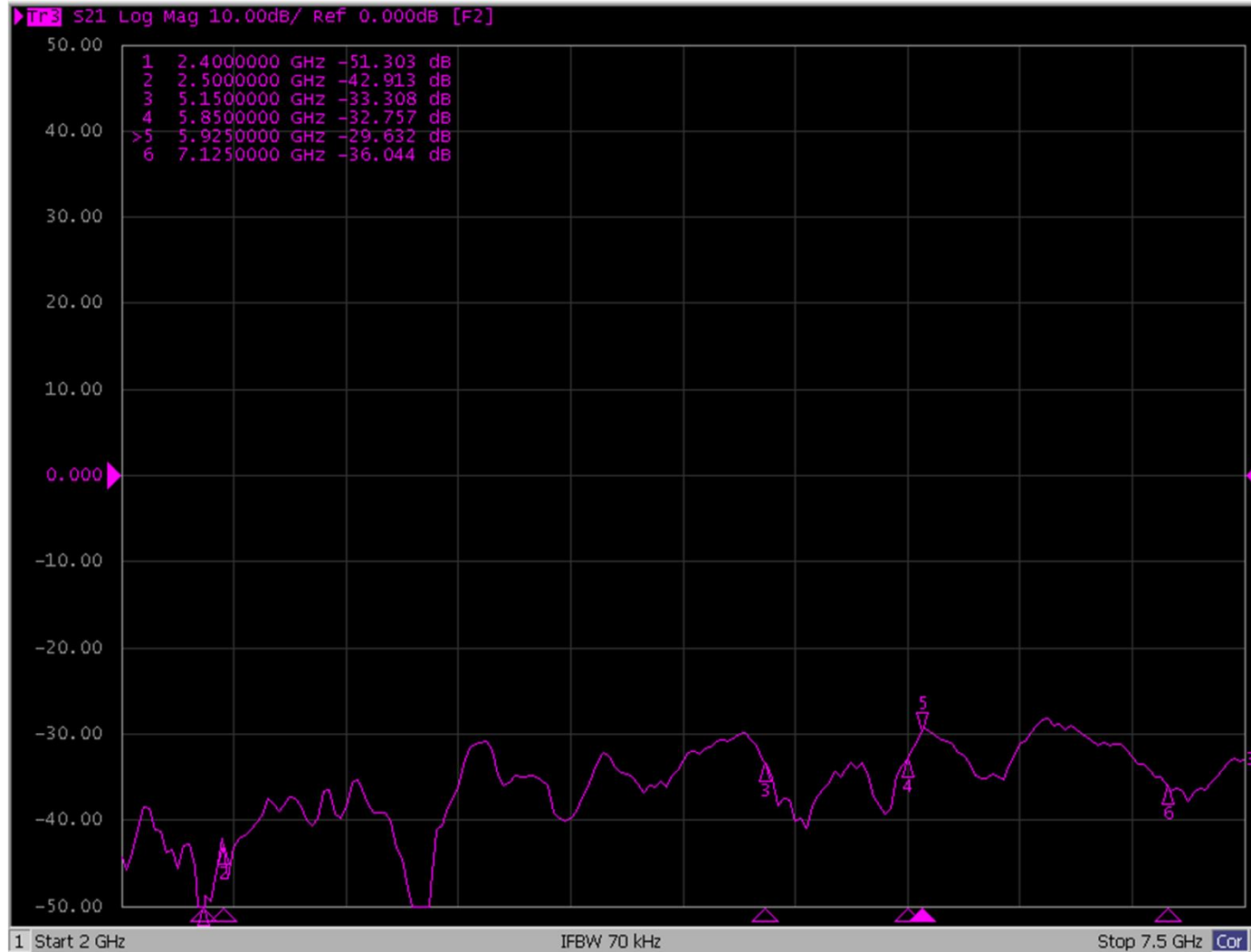
# ANT4&ANT6 Isolation



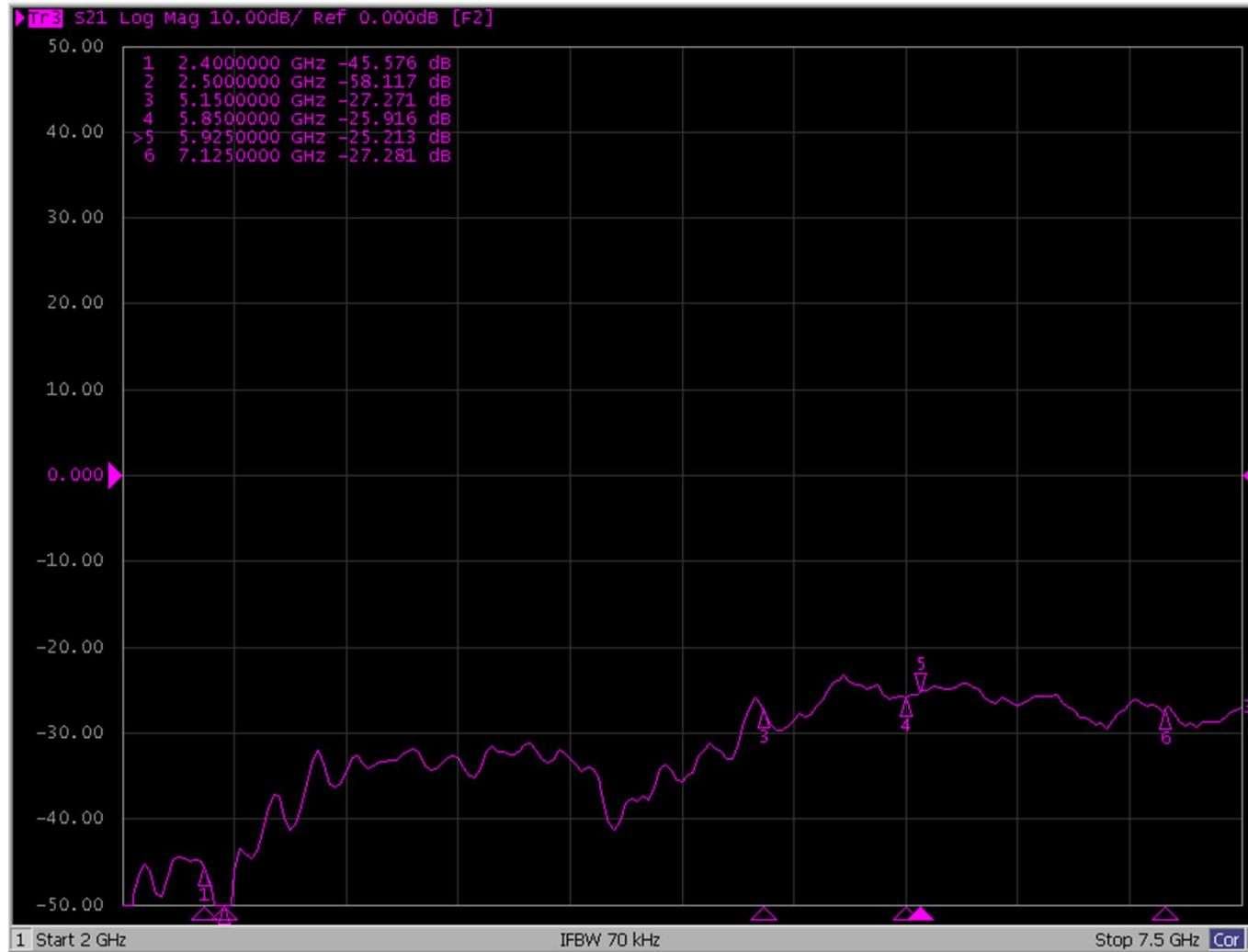
# ANT4&ANT7 Isolation



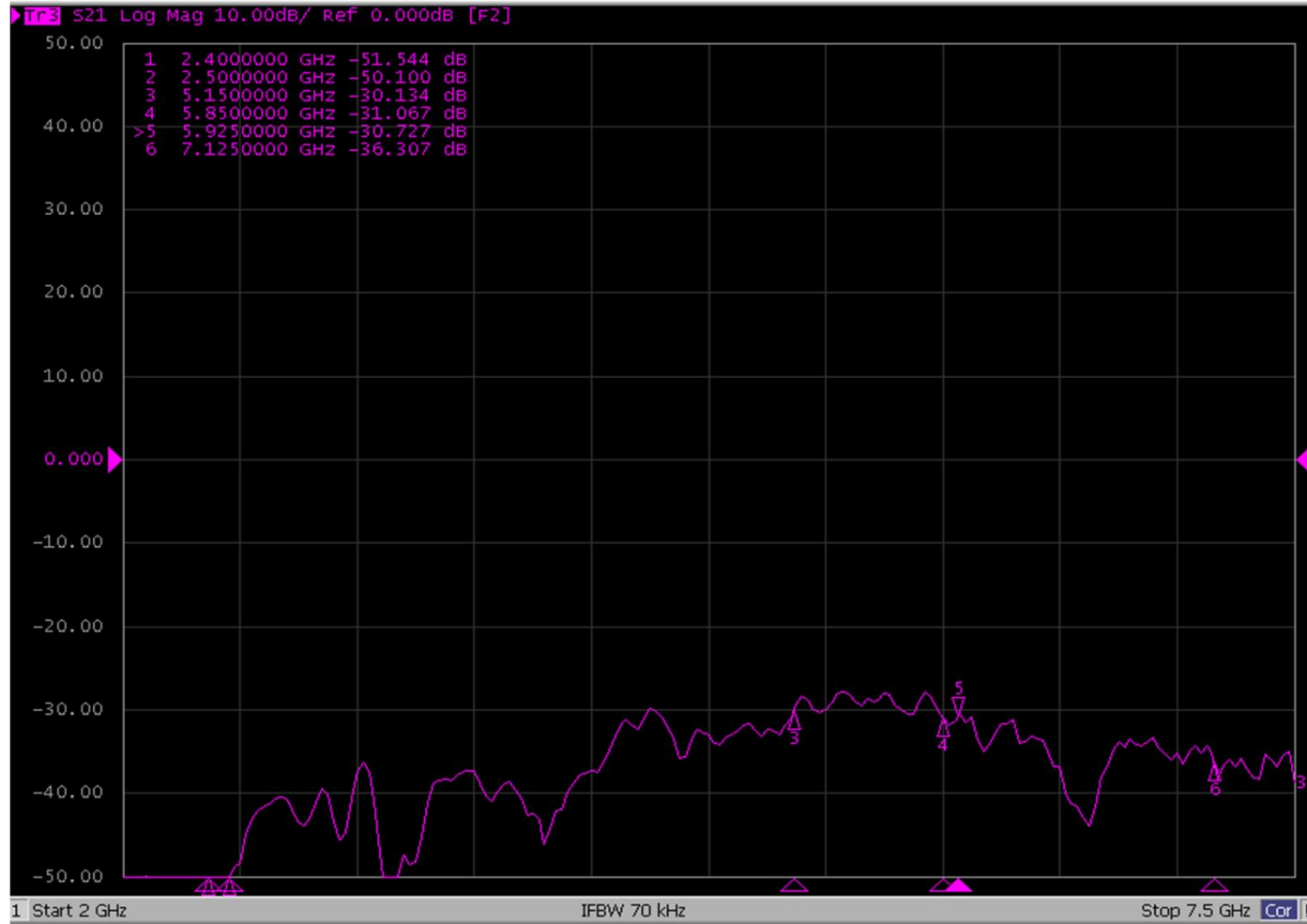
# ANT4&ANT8 Isolation



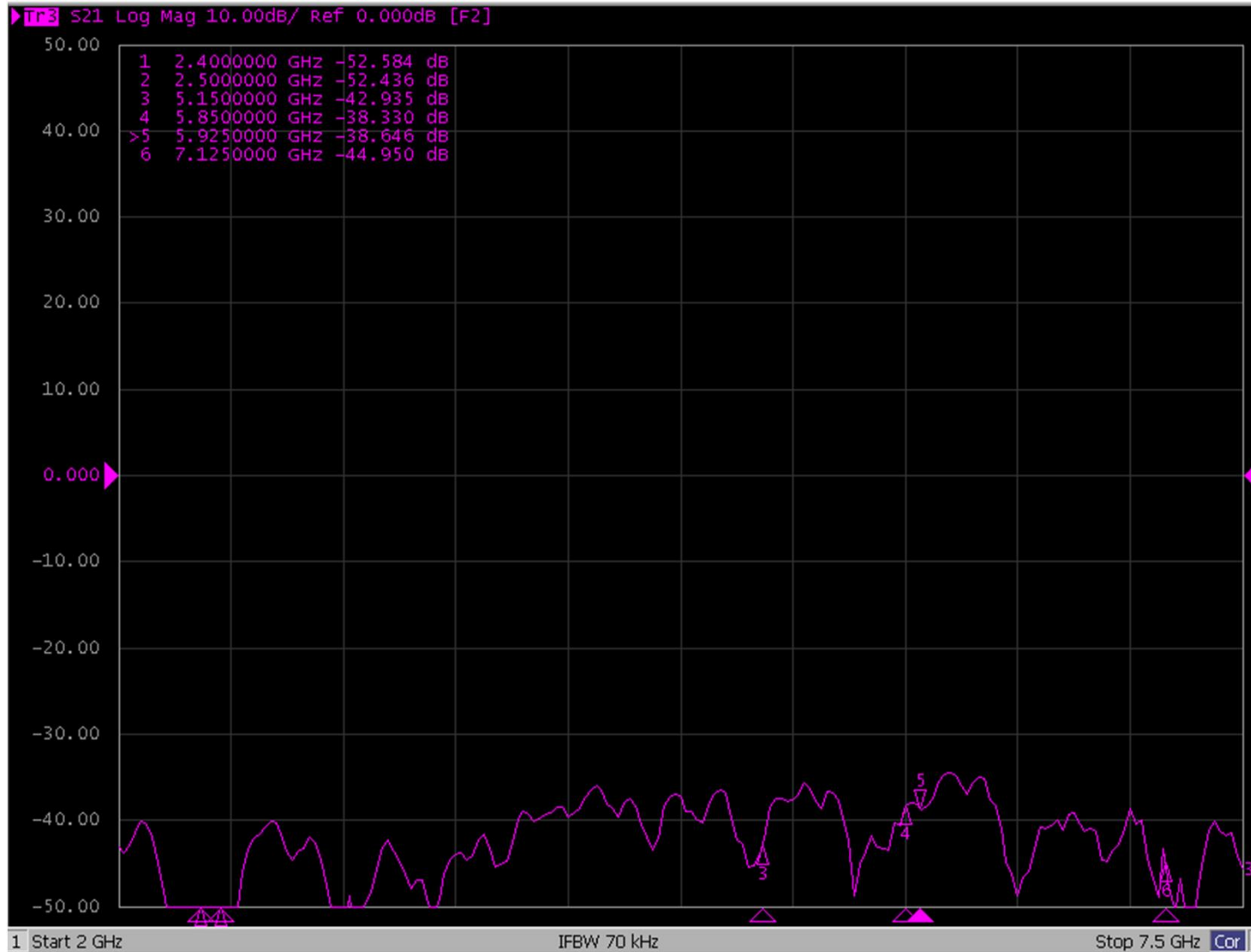
# ANT5&ANT6 Isolation



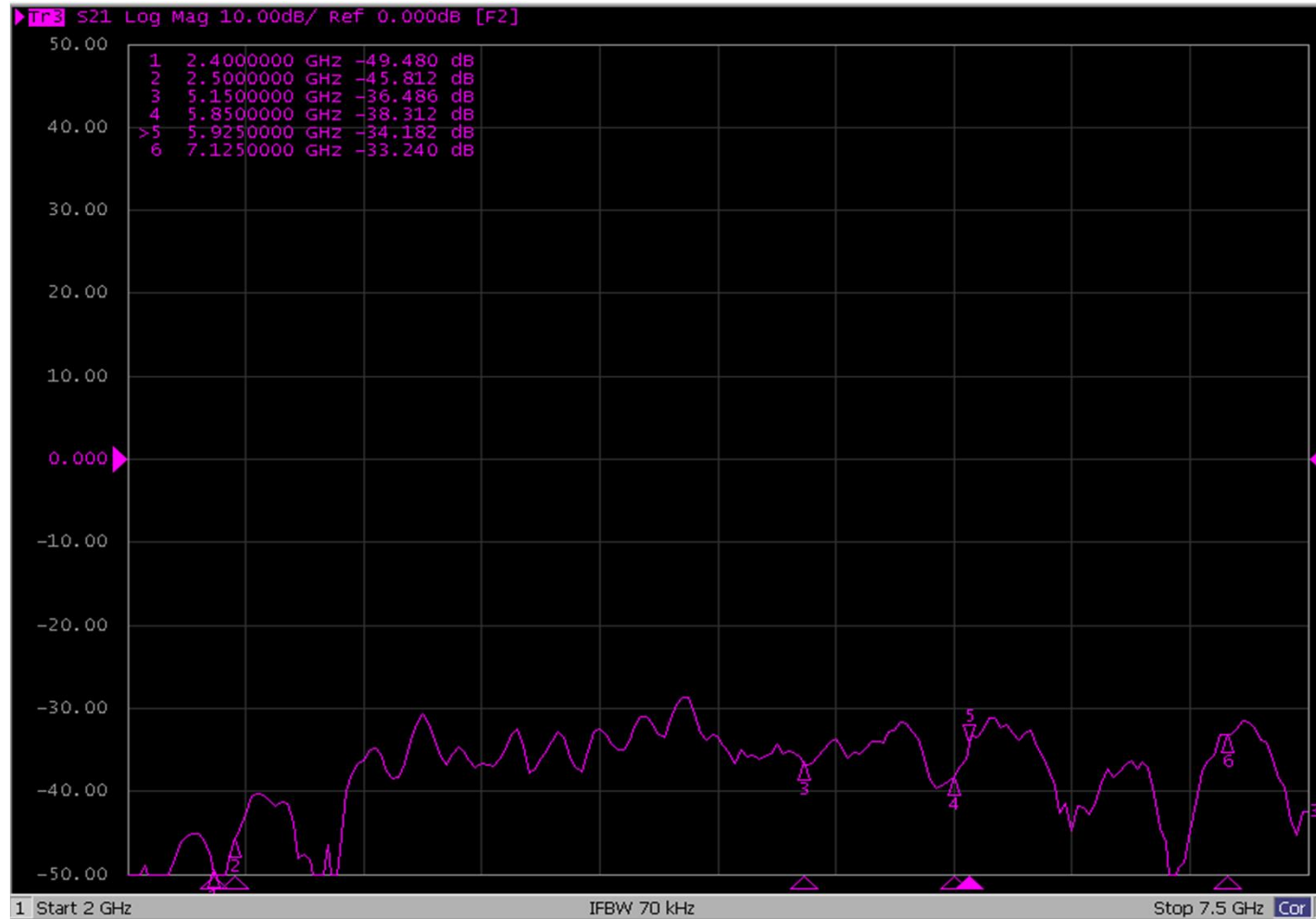
# ANT5&ANT7 Isolation



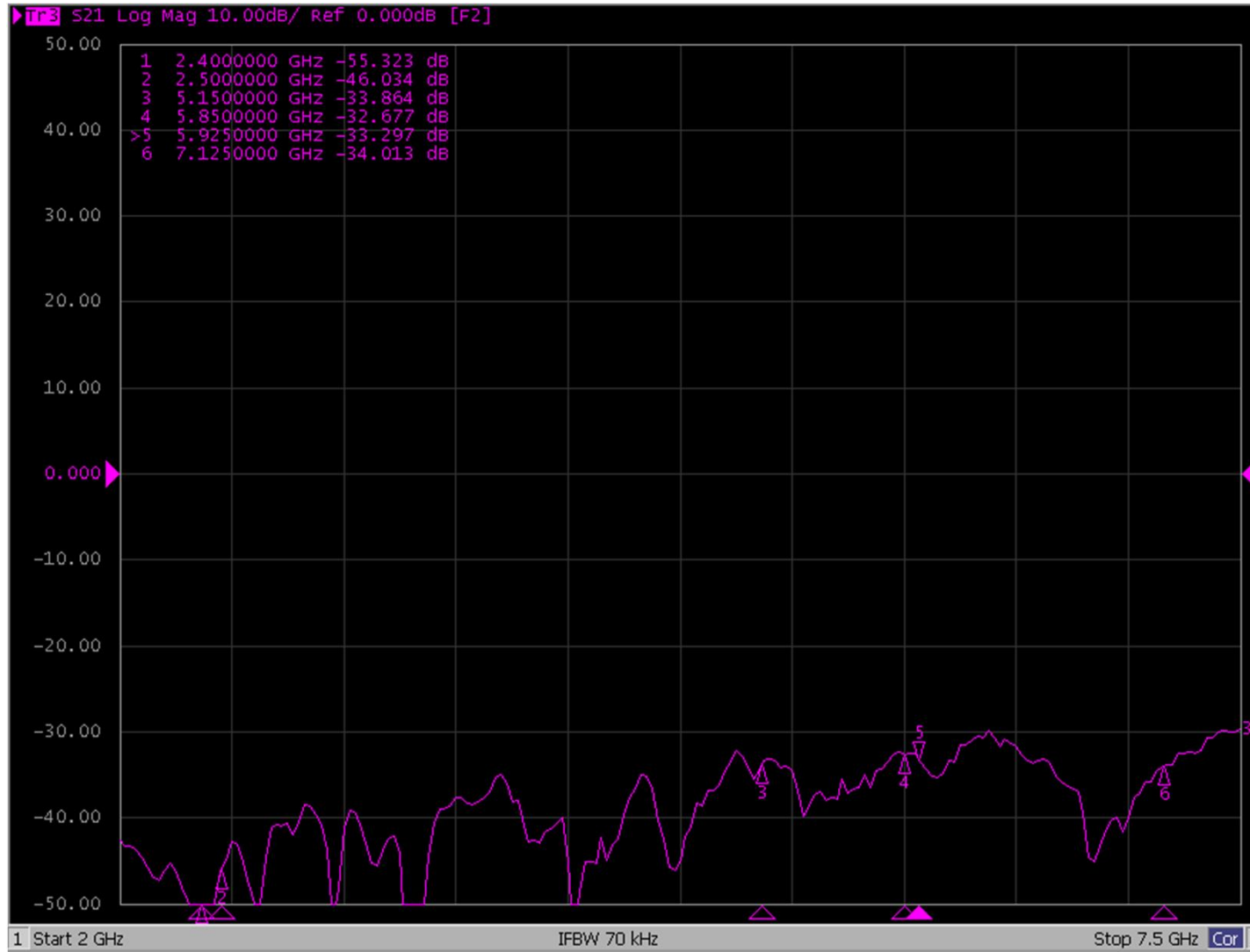
# ANT5&ANT8 Isolation



# ANT6&ANT7 Isolation

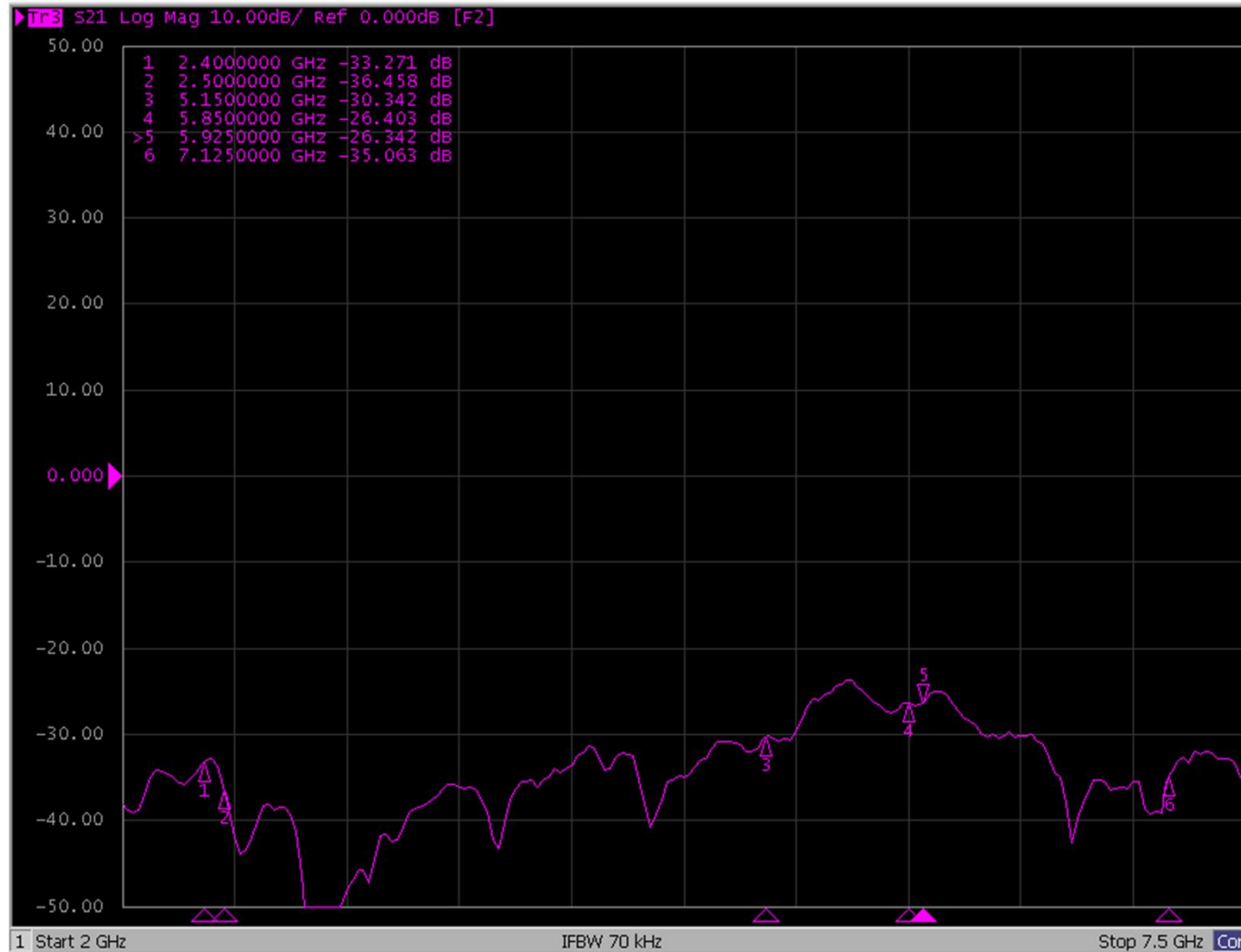


# ANT6&ANT8 Isolation





# ANT7&ANT8 Isolation

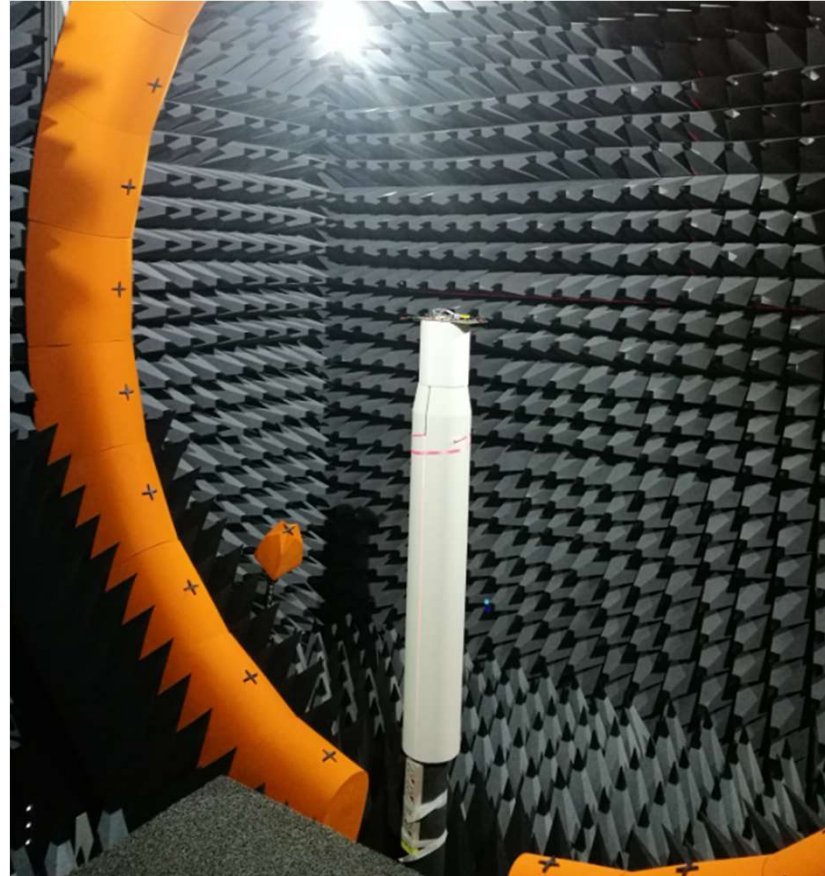


# Summary

- ◆ All antennas` Return loss are  $\leq -10\text{dB@ } 2.4\text{G}$
- ◆ All antennas` Return loss are  $\leq -10\text{dB@ } 5\text{G}$
- ◆ All antennas` Return loss are  $\leq -10\text{dB@ } 6\text{G}$
- ◆ The isolation of all WIFI 2.4G/5G antennas are  $\leq -20\text{dB}$ .
- ◆ The isolation of all WIFI 6G antennas are  $\leq -25\text{dB}$ .

# 2D/3D Radiation pattern

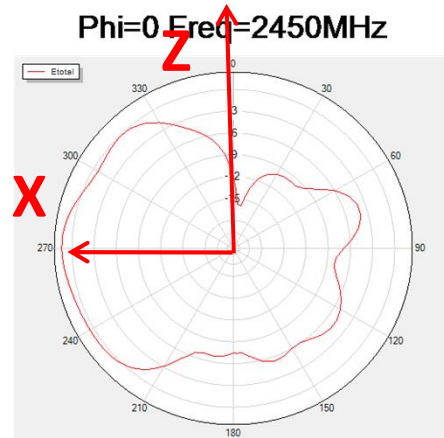
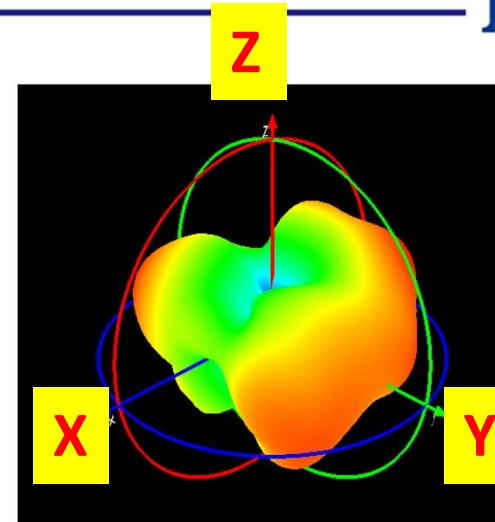
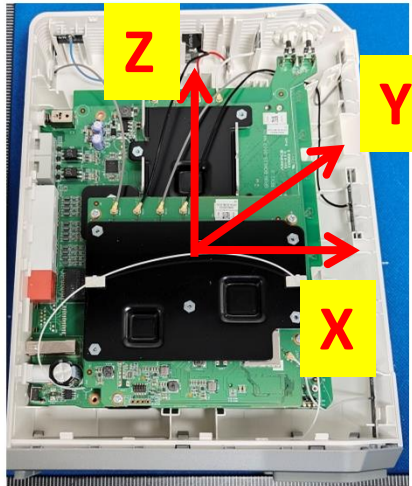
## Measurement Condition



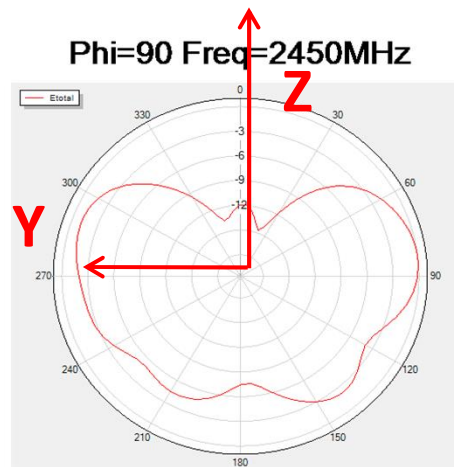
Microwave anechoic chamber

# Radiation Pattern

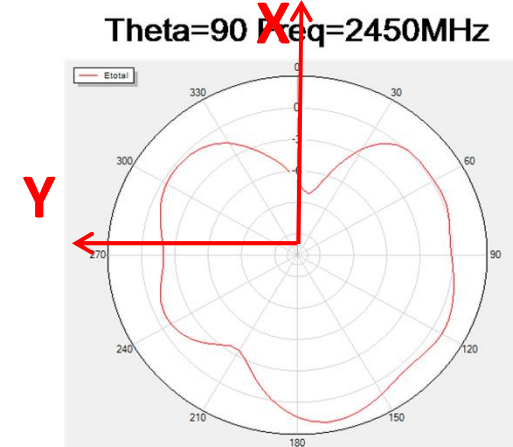
Ant1-2.4G



E1 (Phi=0)



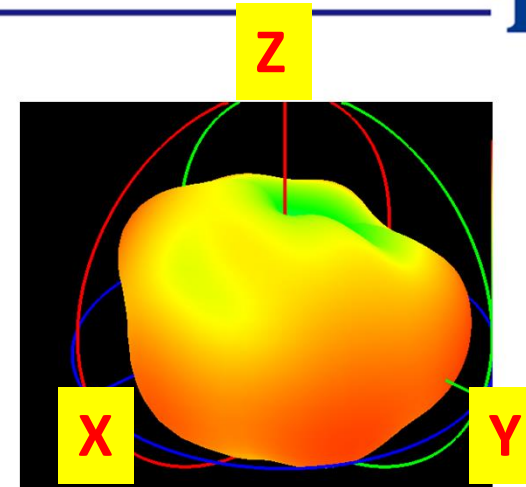
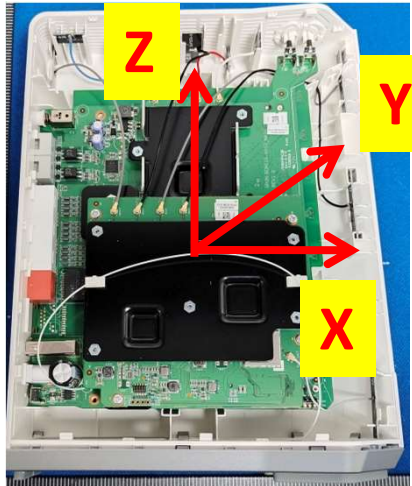
E2 (Phi=90)



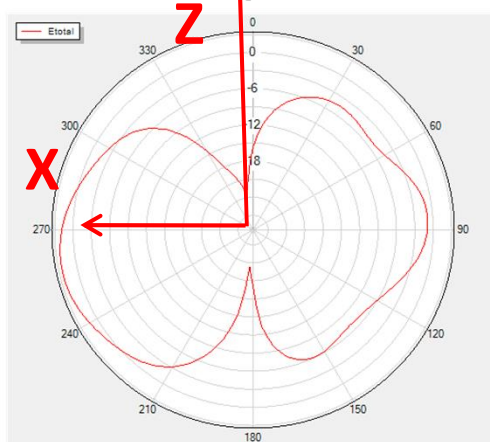
H (Theta=90)

# Radiation Pattern

Ant1-5G

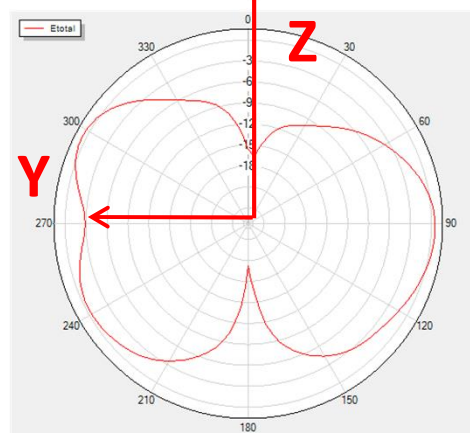


Phi=0 Freq=5500MHz



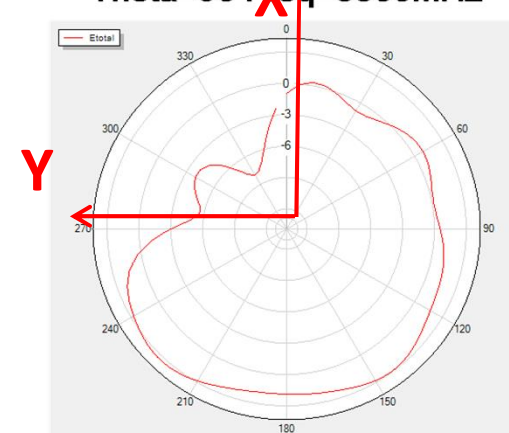
E1 (Phi=0)

Phi=90 Freq=5500MHz



E2 (Phi=90)

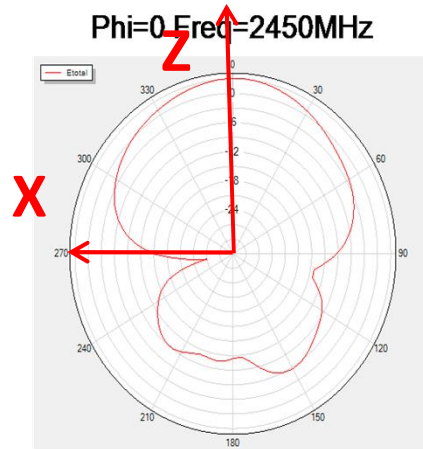
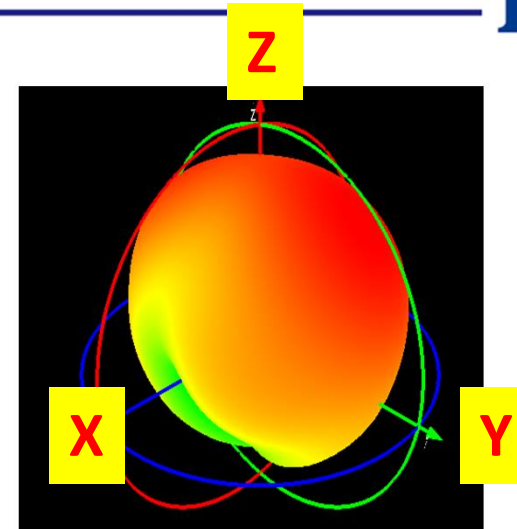
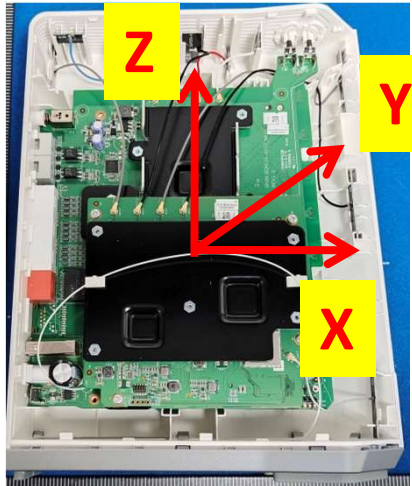
Theta=90 Freq=5500MHz



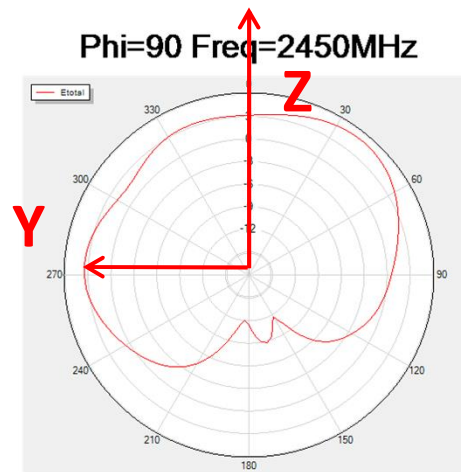
H (Theta=90)

# Radiation Pattern

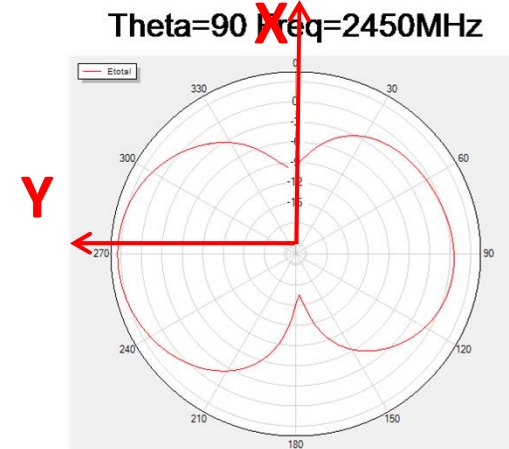
Ant2-2.4G



E1 (Phi=0)



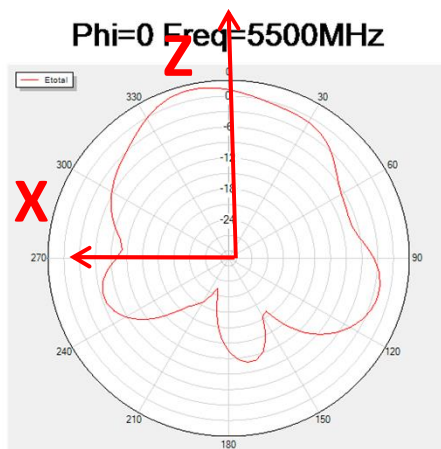
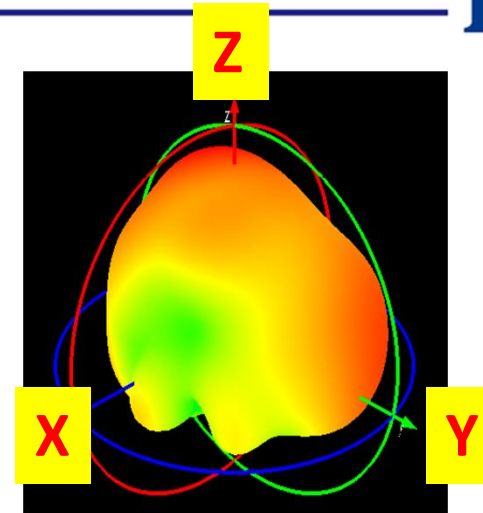
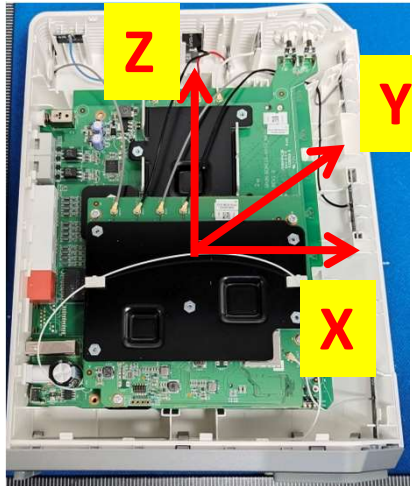
E2 (Phi=90)



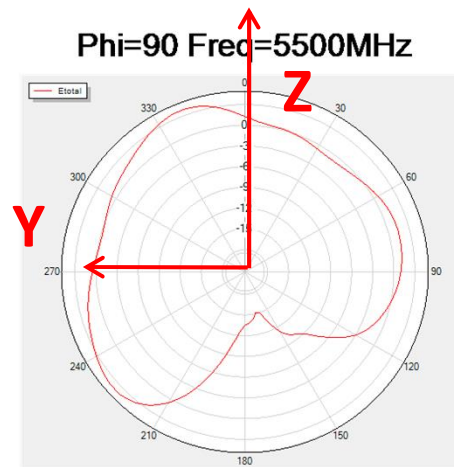
H (Theta=90)

# Radiation Pattern

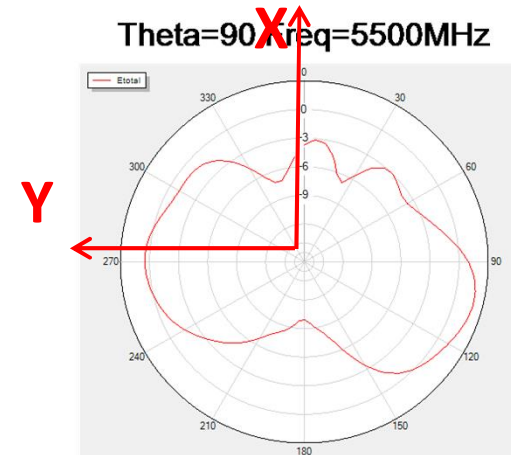
Ant2-5G



E1 (Phi=0)



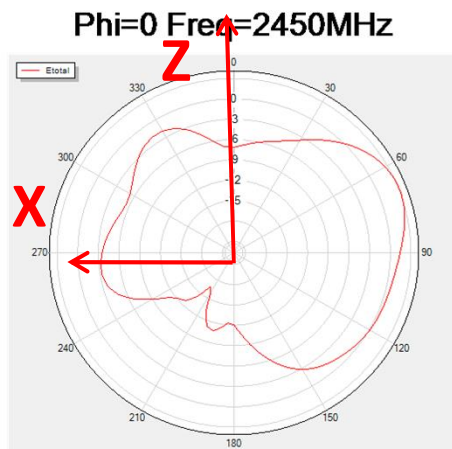
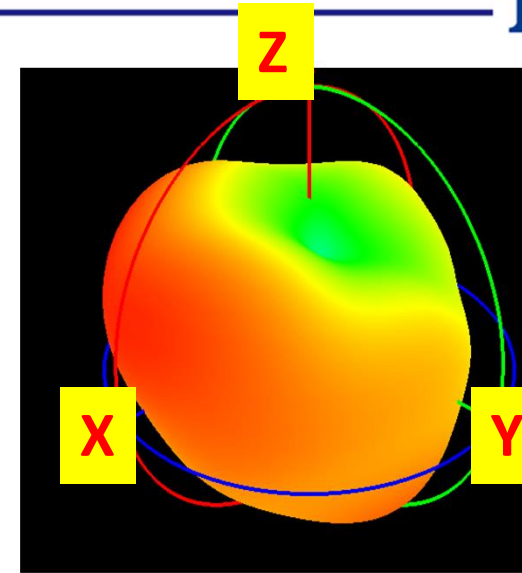
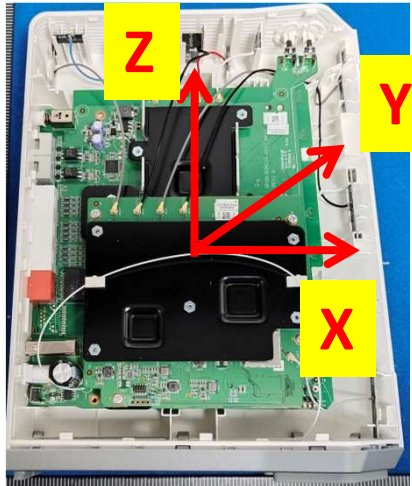
E2 (Phi=90)



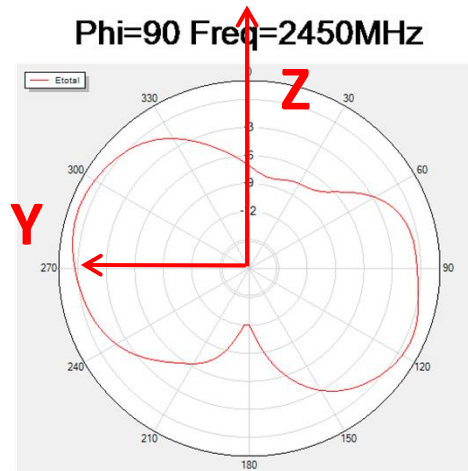
H (Theta=90)

# Radiation Pattern

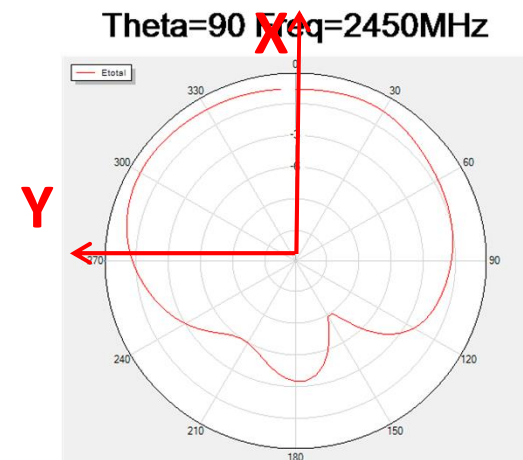
Ant3-2.4G



E1 (Phi=0)



E2 (Phi=90)

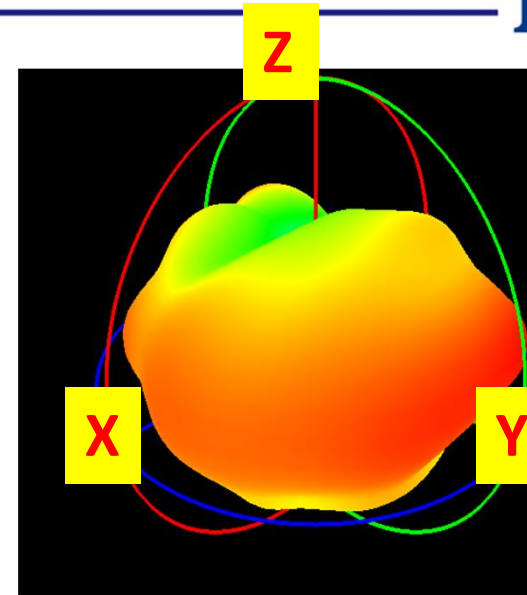
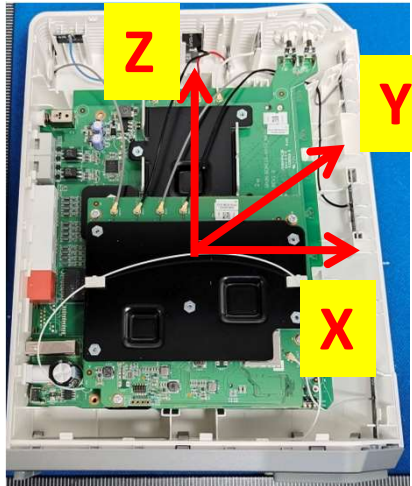


H (Theta=90)

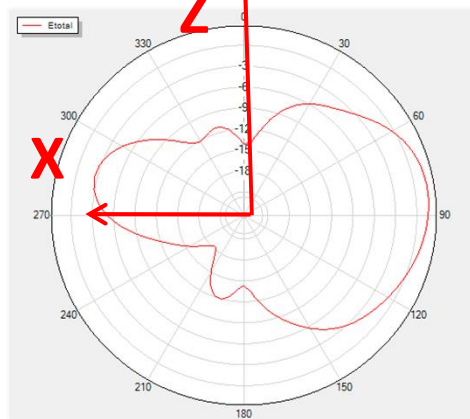


# Radiation Pattern

Ant3-5G

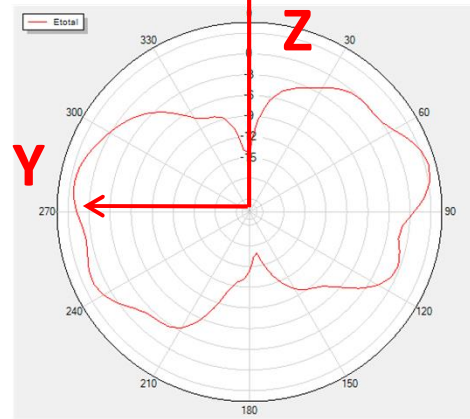


Phi=0 Freq=5500MHz



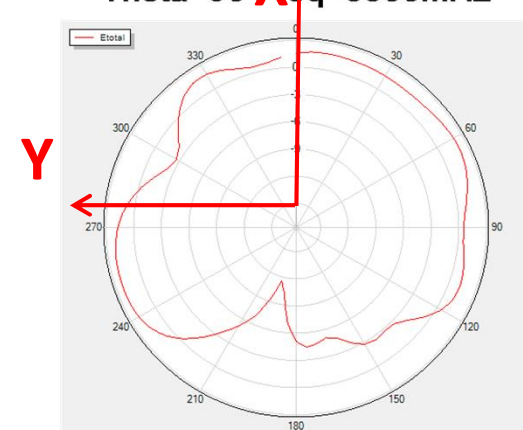
E1 (Phi=0)

Phi=90 Freq=5500MHz



E2 (Phi=90)

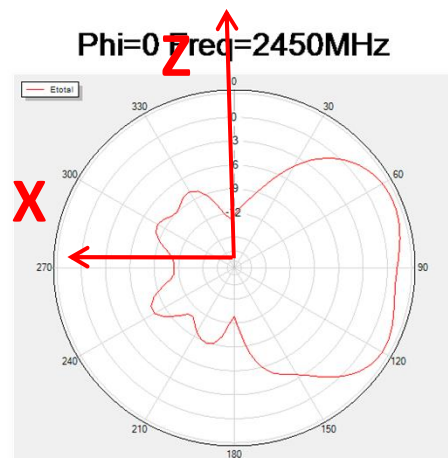
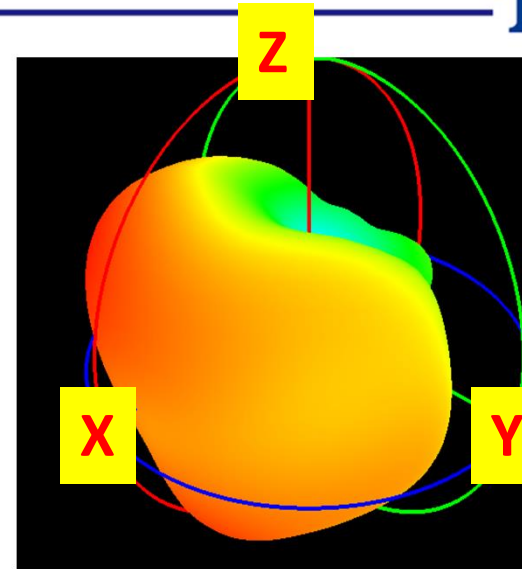
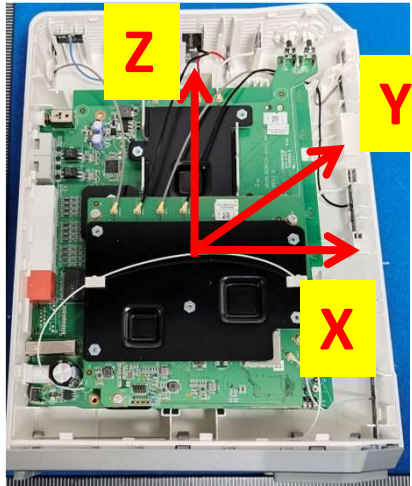
Theta=90 Freq=5500MHz



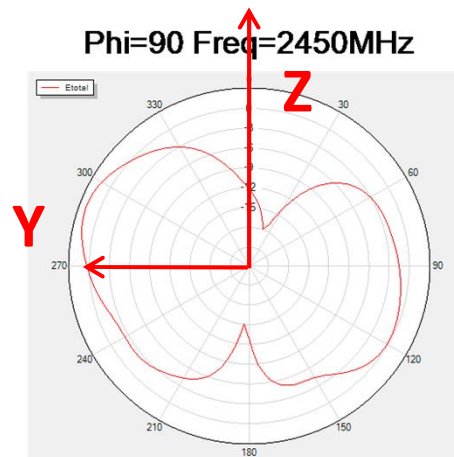
H (Theta=90)

# Radiation Pattern

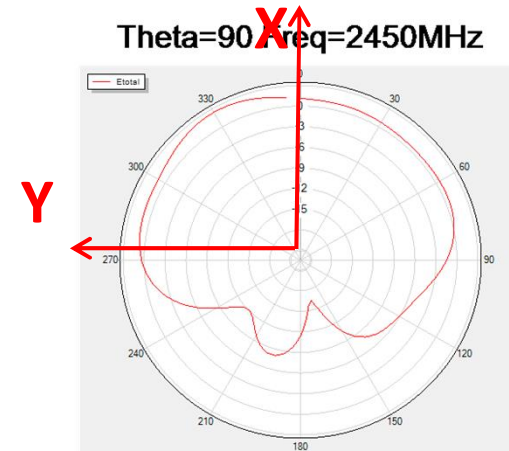
Ant4-2.4G



E1 (Phi=0)



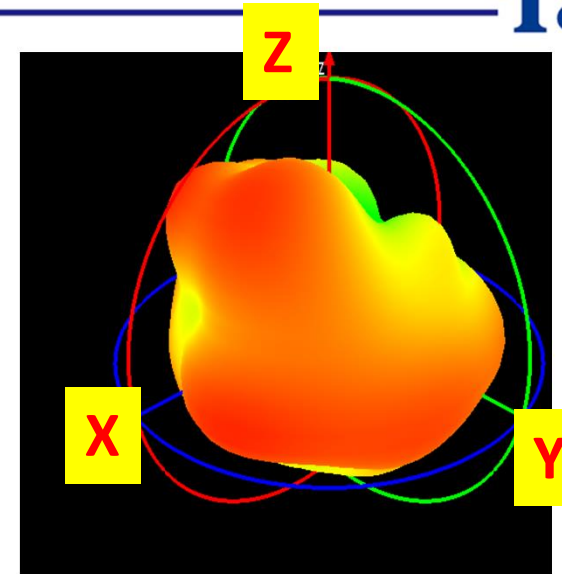
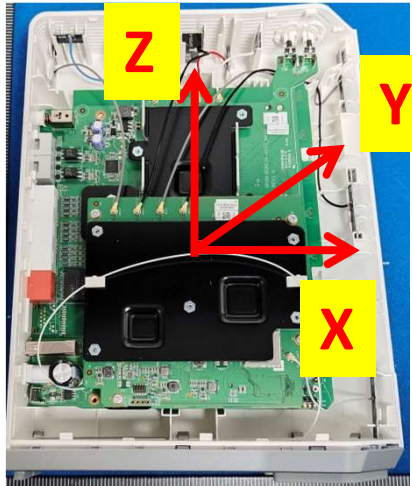
E2 (Phi=90)



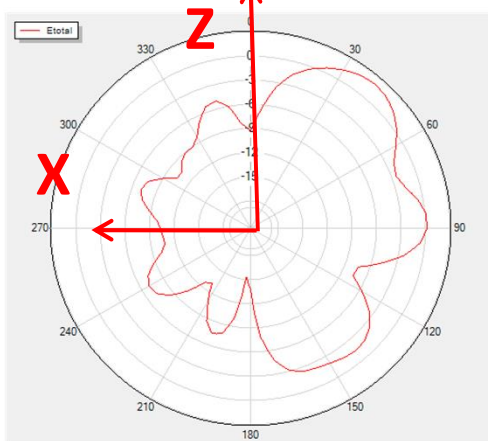
H (Theta=90)

# Radiation Pattern

Ant4-5G

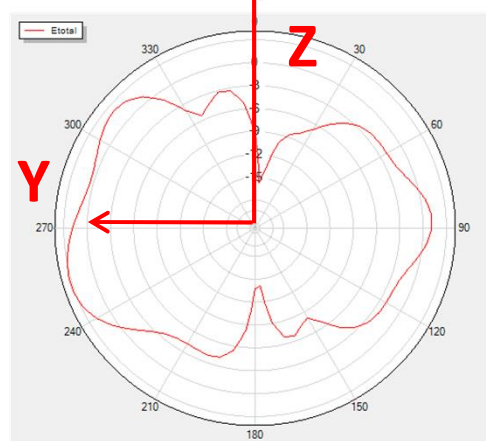


Phi=0 Freq=5500MHz



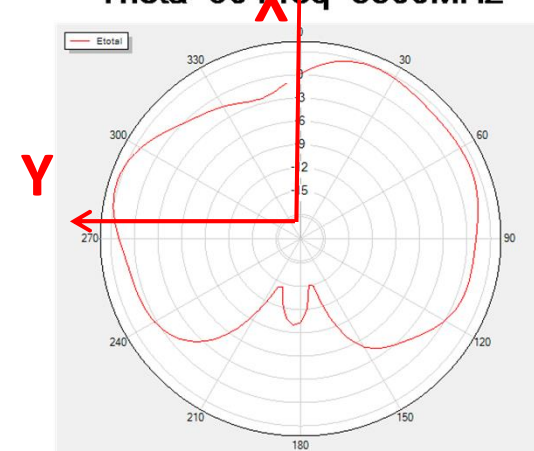
E1 (Phi=0)

Phi=90 Freq=5500MHz



E2 (Phi=90)

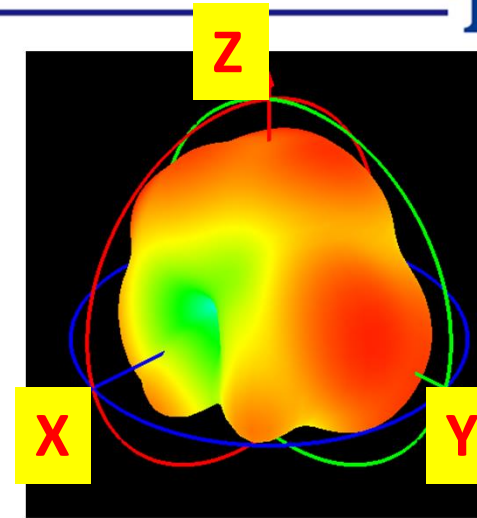
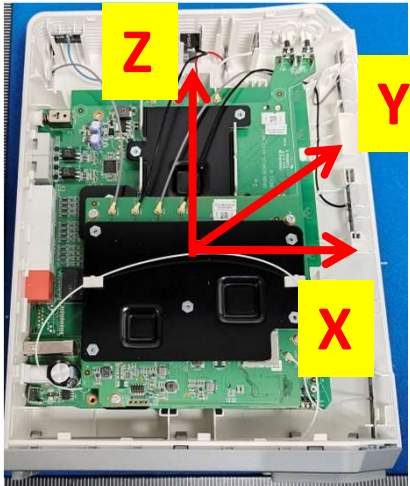
Theta=90 Freq=5500MHz



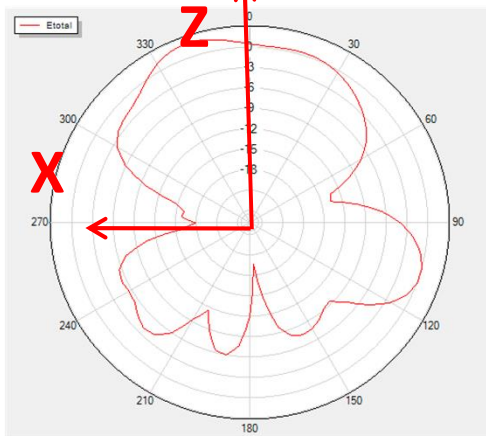
H (Theta=90)

# Radiation Pattern

Ant5-6G

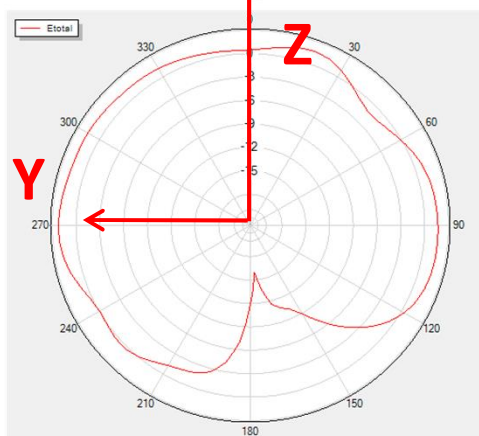


Phi=0 Freq=6525MHz



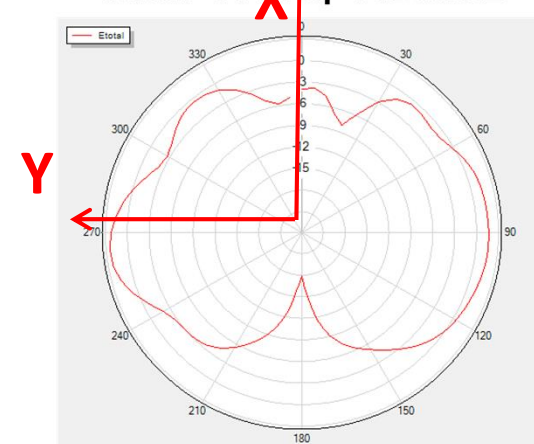
E1 (Phi=0)

Phi=90 Freq=6525MHz



E2 (Phi=90)

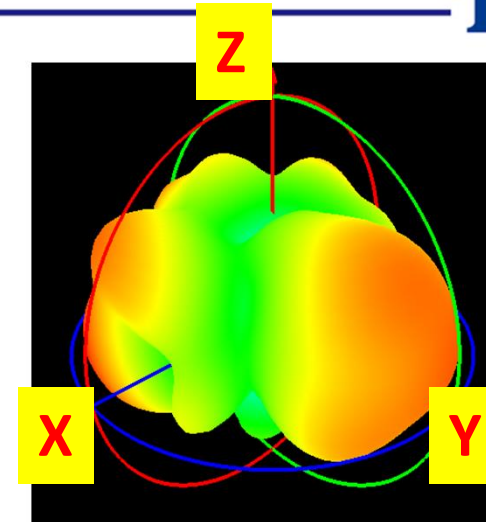
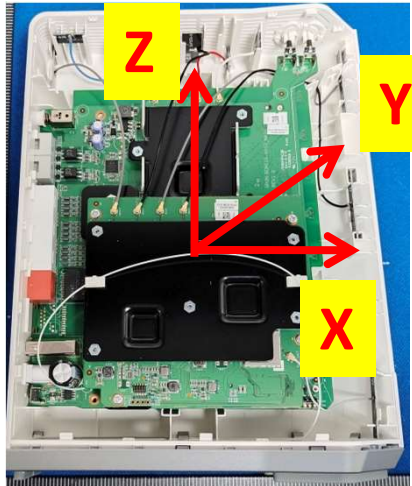
Theta=90 Freq=6525MHz



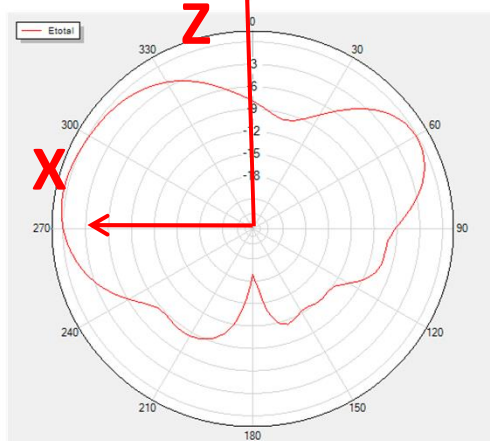
H (Theta=90)

# Radiation Pattern

Ant6-6G

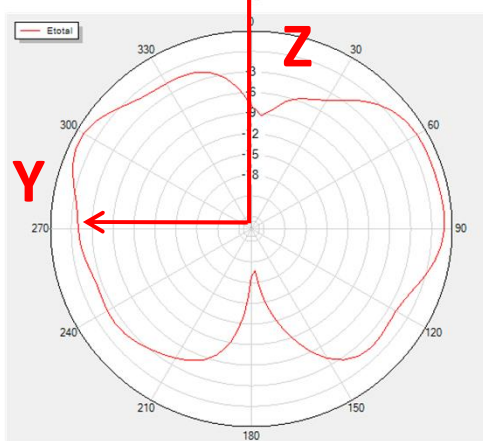


Phi=0 Freq=6525MHz



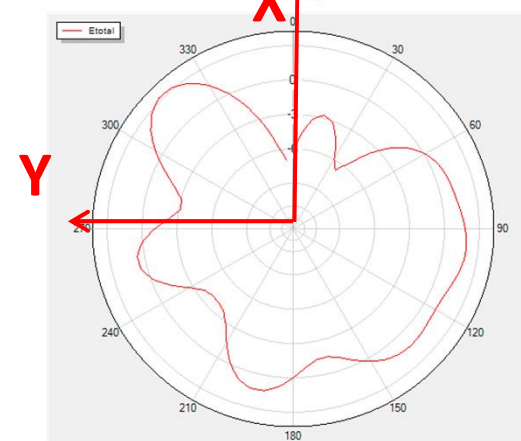
E1 (Phi=0)

Phi=90 Freq=6525MHz



E2 (Phi=90)

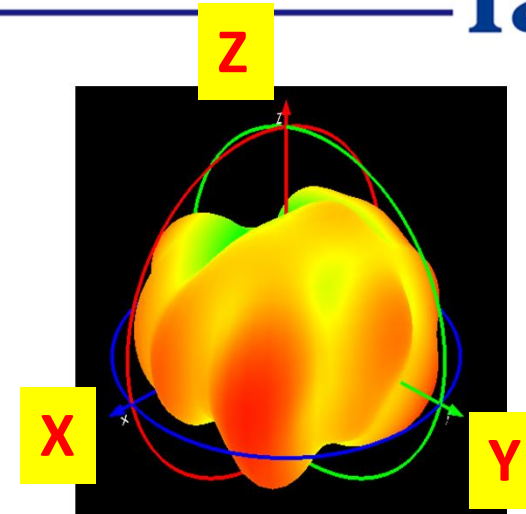
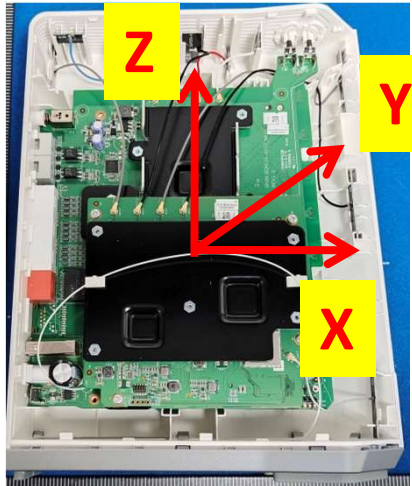
Theta=90 Freq=6525MHz



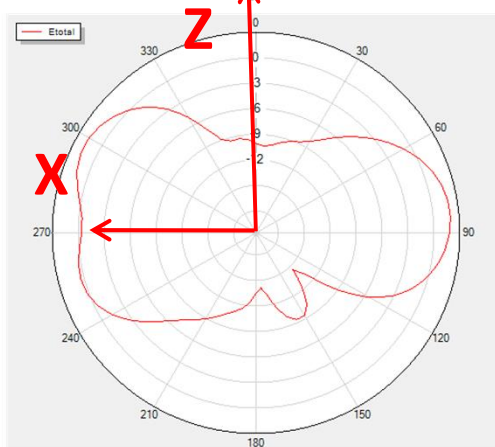
H (Theta=90)

# Radiation Pattern

Ant7-6G

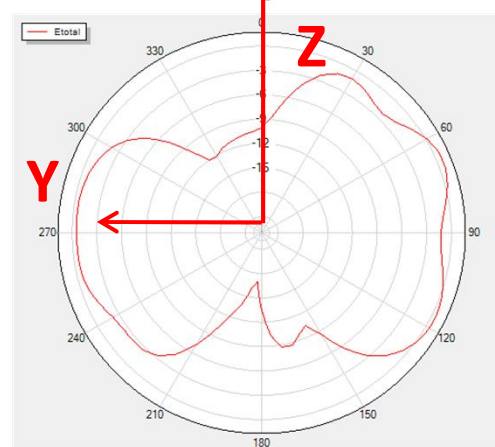


Phi=0 Freq=6525MHz



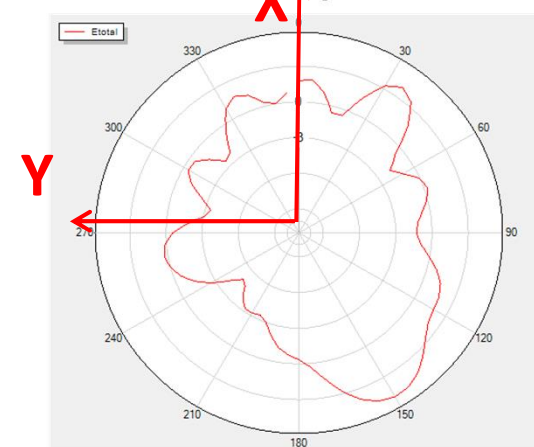
E1 (Phi=0)

Phi=90 Freq=6525MHz



E2 (Phi=90)

Theta=90 Freq=6525MHz

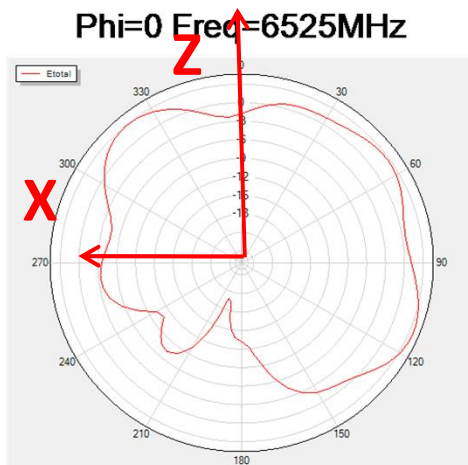
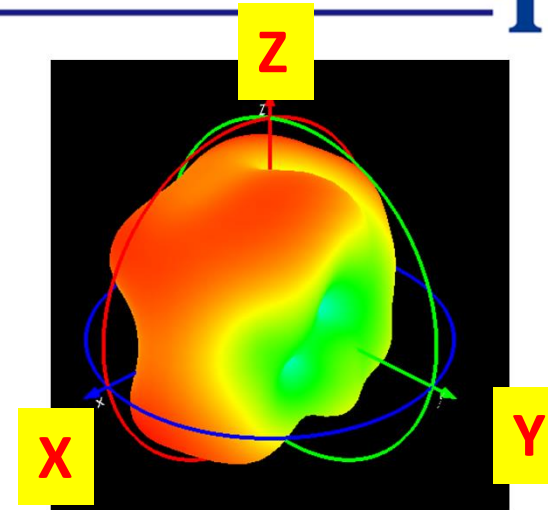
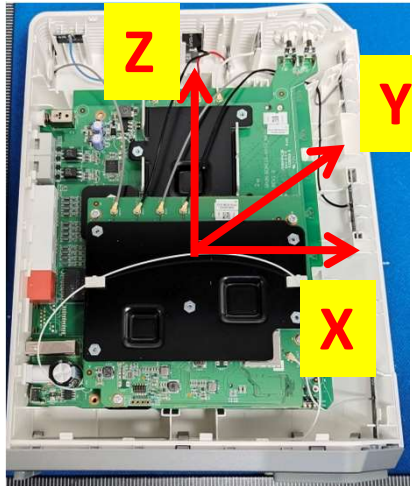


H (Theta=90)

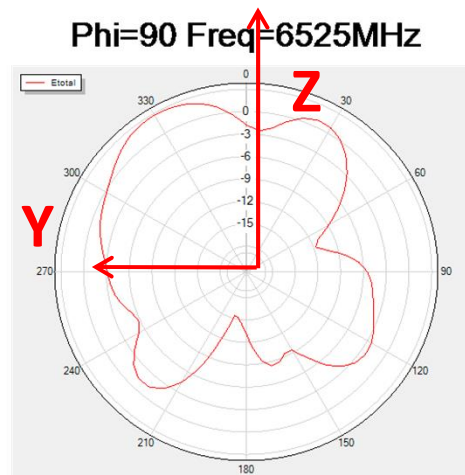
# Radiation Pattern

T&W

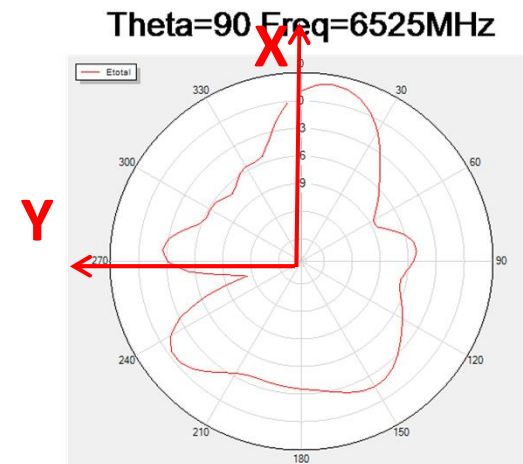
Ant8-6G



E1 (Phi=0)



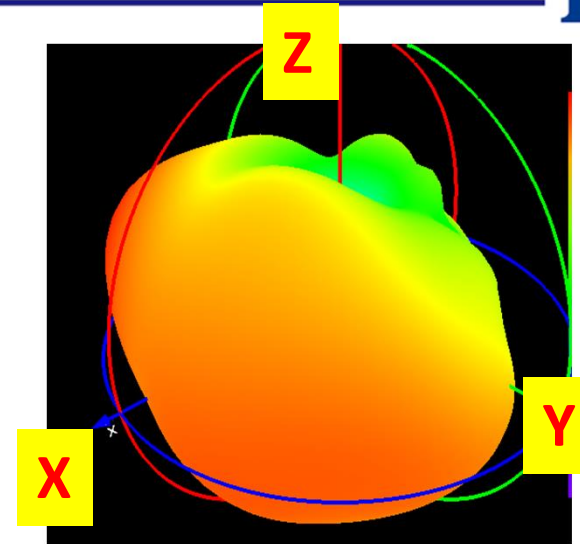
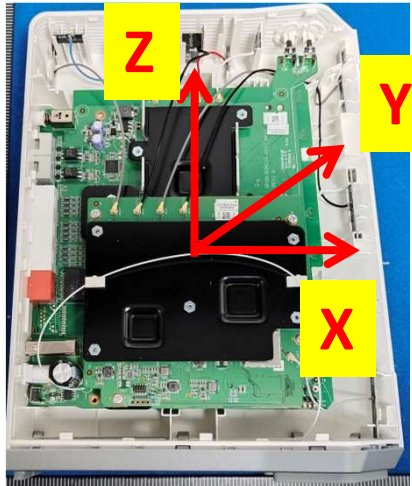
E2 (Phi=90)



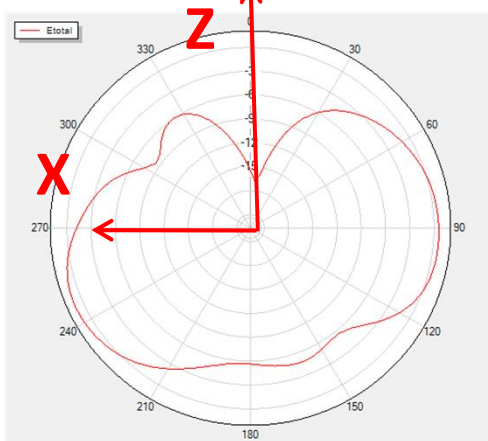
H (Theta=90)

# Radiation Pattern

## Bluetooth

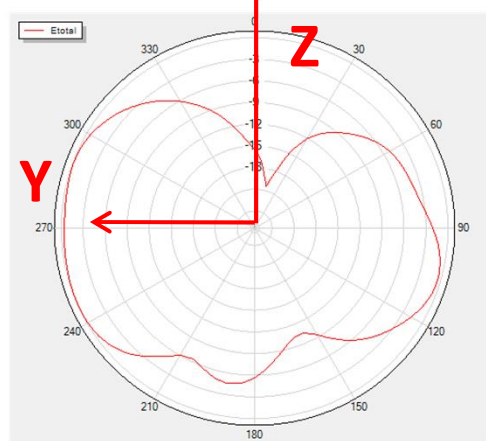


Phi=0 Freq=2450MHz



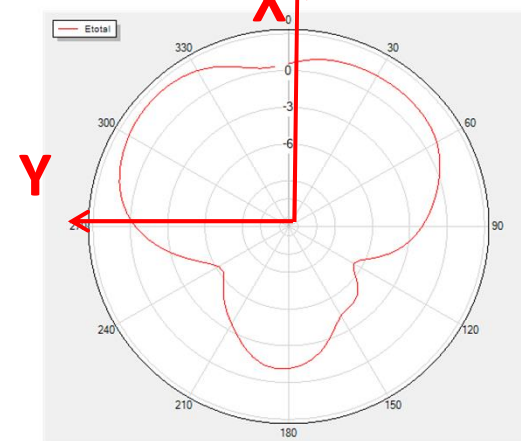
E1 (Phi=0)

Phi=90 Freq=2450MHz



E2 (Phi=90)

Theta=90 Freq=2450MHz



H (Theta=90)



# Efficiency and Peak Gain



	ANT-1		ANT-2		ANT-3		ANT-4	
Frequency	Efficiency	Gain(dBi)	Efficiency	Gain(dBi)	Efficiency	Gain(dBi)	Efficiency	Gain(dBi)
2.4	65%	3.3	71%	3.7	68%	3.2	65%	3.8
2.45	68%	3.4	67%	3.7	70%	3.7	67%	3.5
2.5	67%	3.1	68%	3.3	71%	3.7	70%	3.6
5.15	71%	3.5	65%	4.0	67%	3.6	66%	3.9
5.55	68%	4.2	66%	3.9	67%	3.8	66%	4.2
5.85	68%	4.3	66%	4.1	71%	4.1	68%	4.3

# Efficiency and Peak Gain:



	ANT-5		ANT-6		ANT-7		ANT-8	
Frequency	Efficiency	Gain(dBi)	Efficiency	Gain(dBi)	Efficiency	Gain(dBi)	Efficiency	Gain(dBi)
5.925	67%	3.6	68%	4.2	66%	4.4	67%	4.2
6.525	68%	3.9	68%	4.4	71%	4.7	68%	4.4
7.125	71%	4.4	70%	4.6	72%	4.9	70%	4.5

	Bluetooth	
Frequency	Efficiency	Gain(dBi)
2.4	66%	3.6
2.5	68%	3.5

# Efficiency and Peak Gain

## Test results

Used for FCC and CE certification

Frequency (GHz)		2.400	2.45	2.5
Peak Gain (dBi)	ANT1	3.3	3.4	3.1
	ANT2	3.7	3.7	3.3
	ANT3	3.2	3.7	3.7
	ANT4	3.8	3.5	3.6
Directional Gain (dBi)	4S4T	1.63	1.81	1.85

Frequency (GHz)		5.15	5.55	5.85
Peak Gain (dBi)	ANT1	3.5	4.2	4.3
	ANT2	4.0	3.9	4.1
	ANT3	3.6	3.8	4.1
	ANT4	3.9	4.2	4.3
Directional Gain (dBi)	4S4T	1.96	2.03	2.11

Frequency (GHz)		5.925	6.525	7.125
Peak Gain (dBi)	ANT5	3.6	3.9	4.4
	ANT6	4.2	4.4	4.6
	ANT7	4.4	4.7	4.9
	ANT8	4.2	4.4	4.5
Directional Gain (dBi)	4S4T	2.26	2.19	2.06

$$\text{Directional gain} = 10 \log \left[ \frac{(10^{G1 \phi / 10} + 10^{G2 \phi / 10} + \dots + 10^{GN \phi / 10}) / N_{\text{ANT}} + (10^{G1 \theta / 10} + 10^{G2 \theta / 10} + \dots + 10^{GN \theta / 10}) / N_{\text{ANT}}}{N_{\text{ANT}}} \right] \text{ dBi}$$

# Summary



- ◆ ANT efficient: 65%~71%@2.4G, 66%~71%@5G, 66%~72%@6G
- ◆ 2.4G ANT peak gain < 3.7dBi
- ◆ 5G ANT peak gain < 4.3dBi
- ◆ 6G ANT peak gain < 4.6dBi

**T&W**

Thanks!

