



# **OAW-AP1451**

## **Antenna Test Report**

Date : Mar. 10, 2021

Prepared by : Vangie Wen

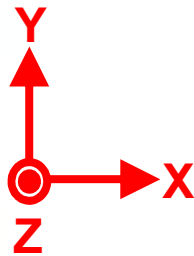
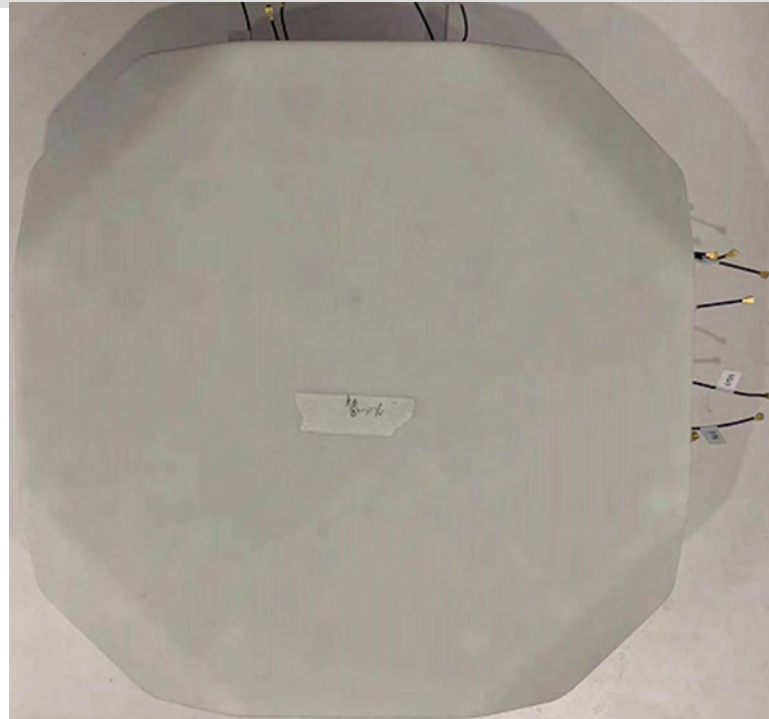


# Outline

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- Antenna Structure & Placement
- Return Loss & Isolation
- Radiation Pattern
- Peak Gain & Efficiency

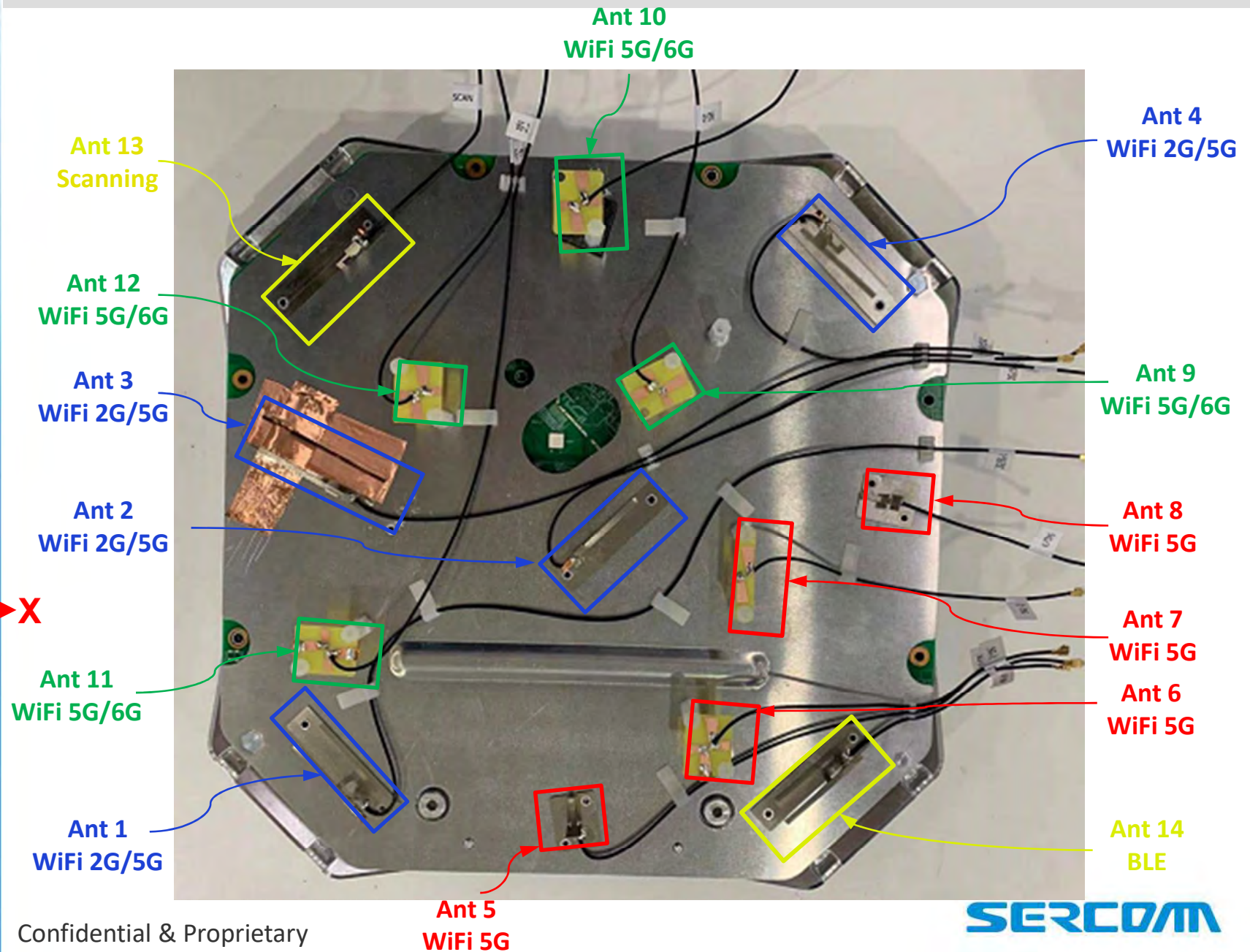
# Antenna Structure & Placement



Ant No.	Operating Band	Type	Material	Feeding	Dimension
Ant 1-4	WiFi 2.4G/5G	PIFA	Metal	Cable	45(L) x 11.4(W) x 8.5(H) mm <sup>3</sup>
Ant 5, 8	WiFi 5G	PIFA	Metal	Cable	19(L) x 15(W) x 10.8(H) mm <sup>3</sup>
Ant 6	WiFi 5G	Dipole	PCB	Cable	20(L) x 15(W) x 0.4(T) mm <sup>3</sup>
Ant 7	WiFi 5G	Dipole	PCB	Cable	28(L) x 6.5(W) x 0.4(T) mm <sup>3</sup>
Ant 9-12	WiFi 5G/6G	Dipole	PCB	Cable	20(L) x 15(W) x 0.4(T) mm <sup>3</sup>
Ant 13	Scanning	Dipole	PCB	Cable	45(L) x 11.4(W) x 8.5(H) mm <sup>3</sup>
Ant 14	BLE	Dipole	PCB	Cable	45(L) x 11.4(W) x 8.5(H) mm <sup>3</sup>

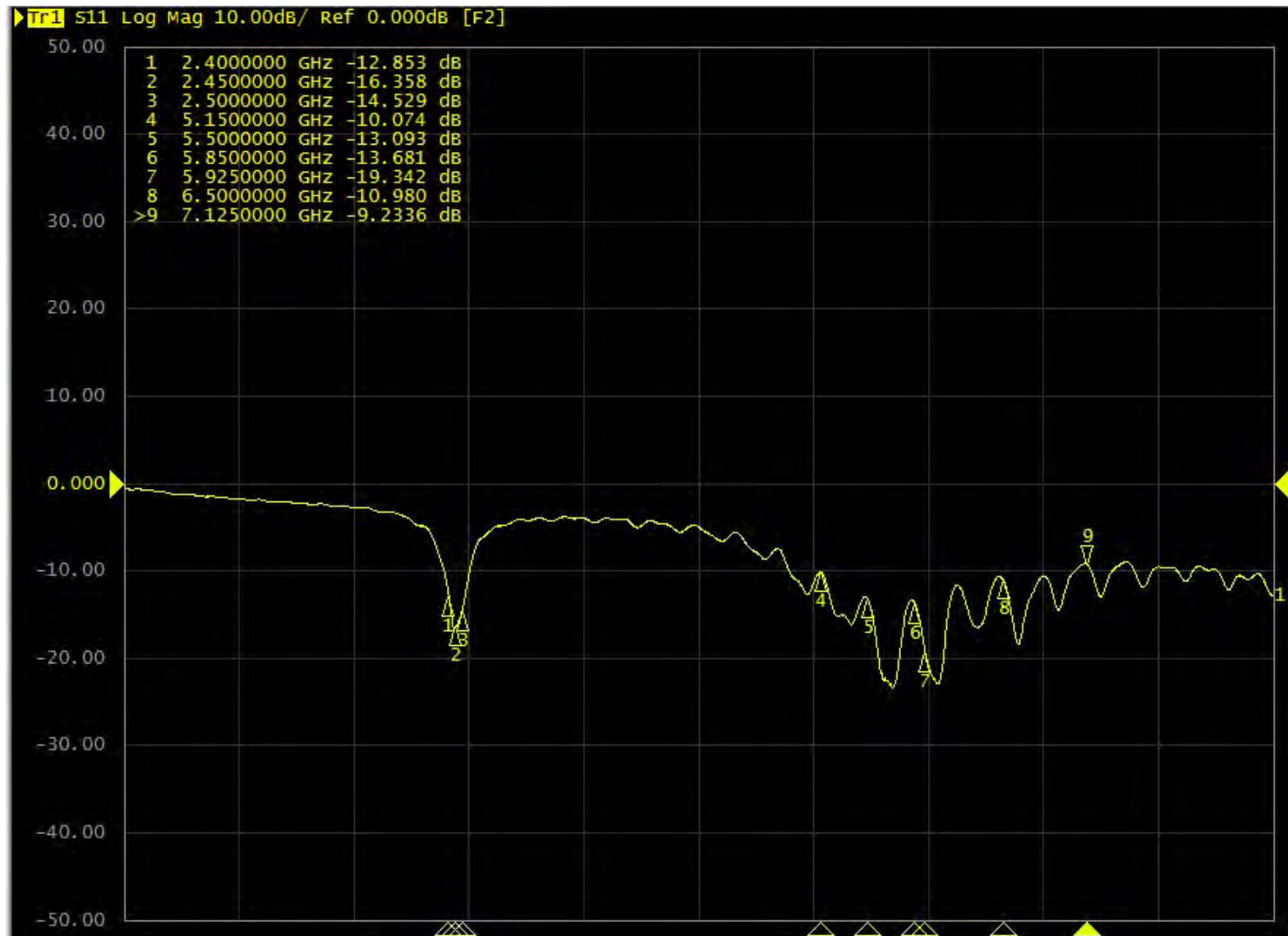


# Antenna Structure & Placement

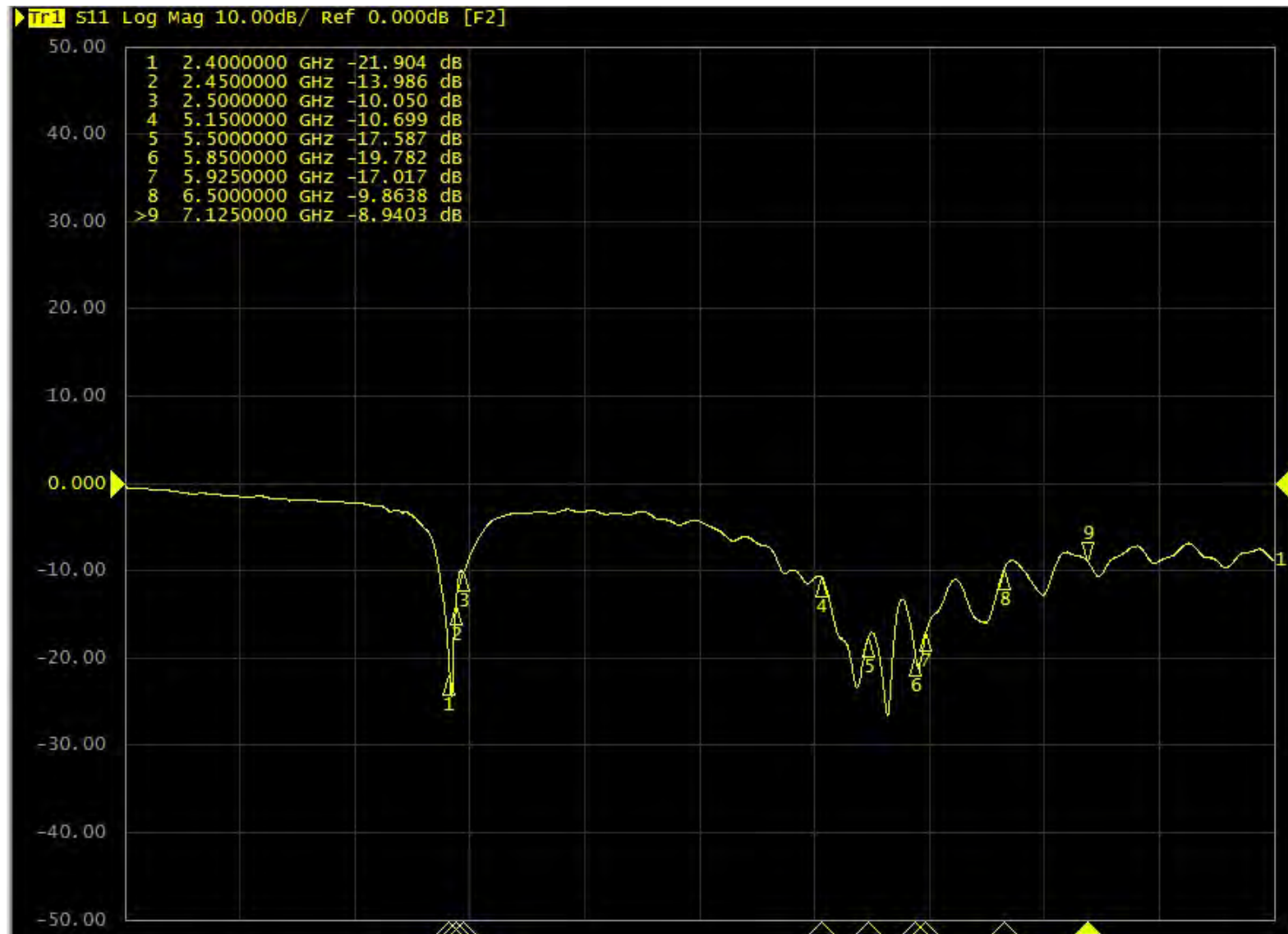




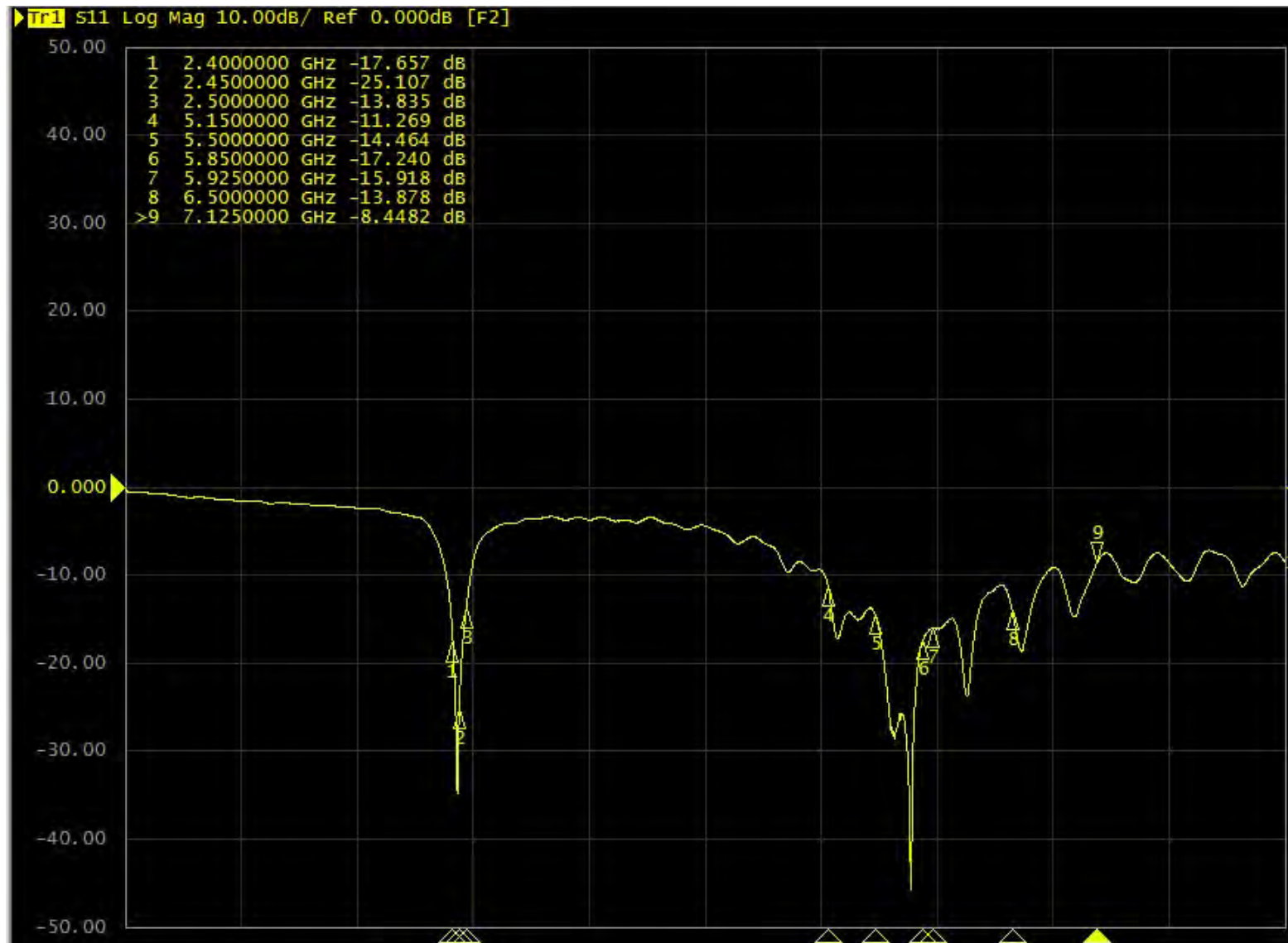
# Return Loss – Ant 1



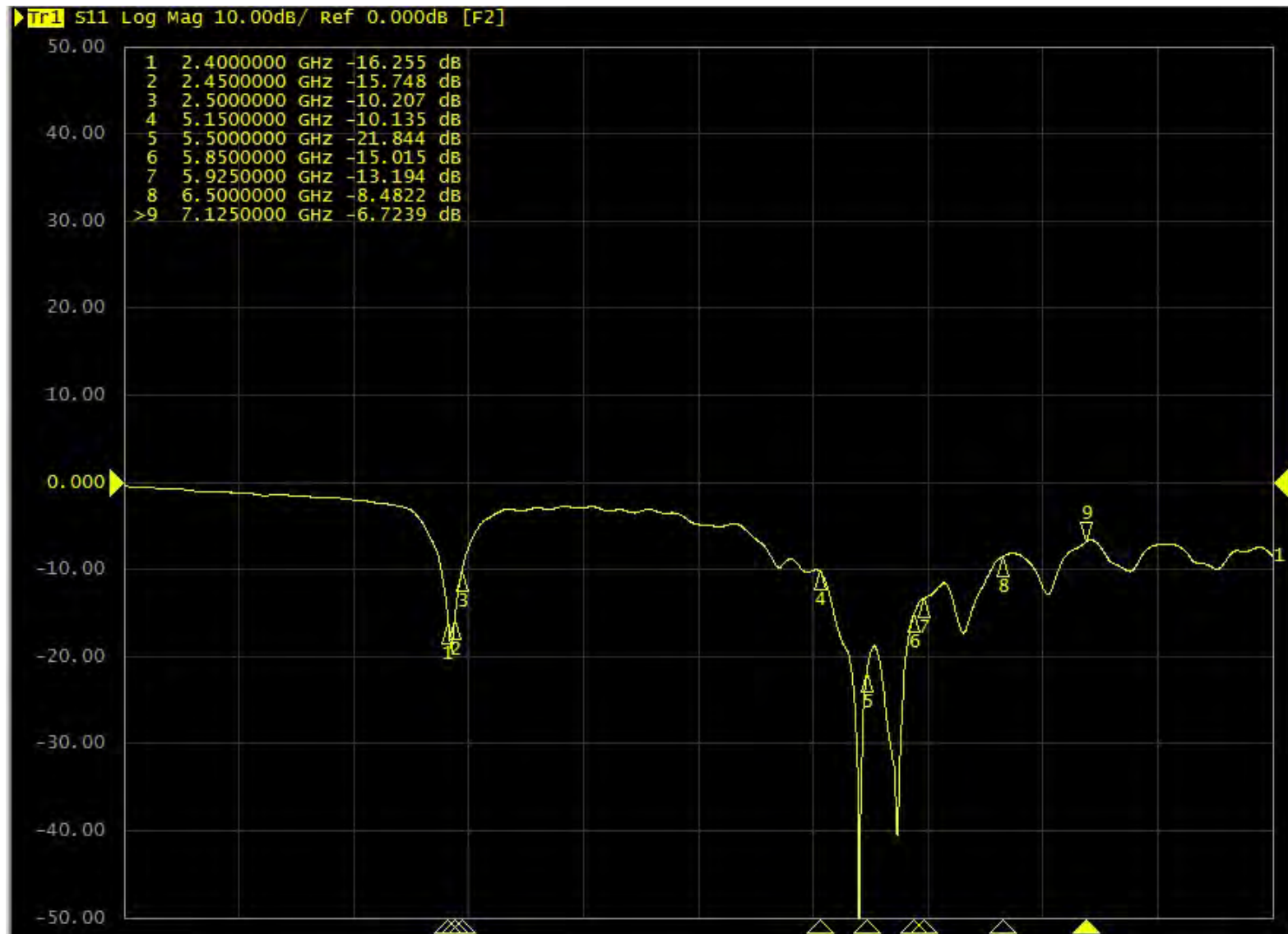
# Return Loss – Ant 2



# Return Loss – Ant 3

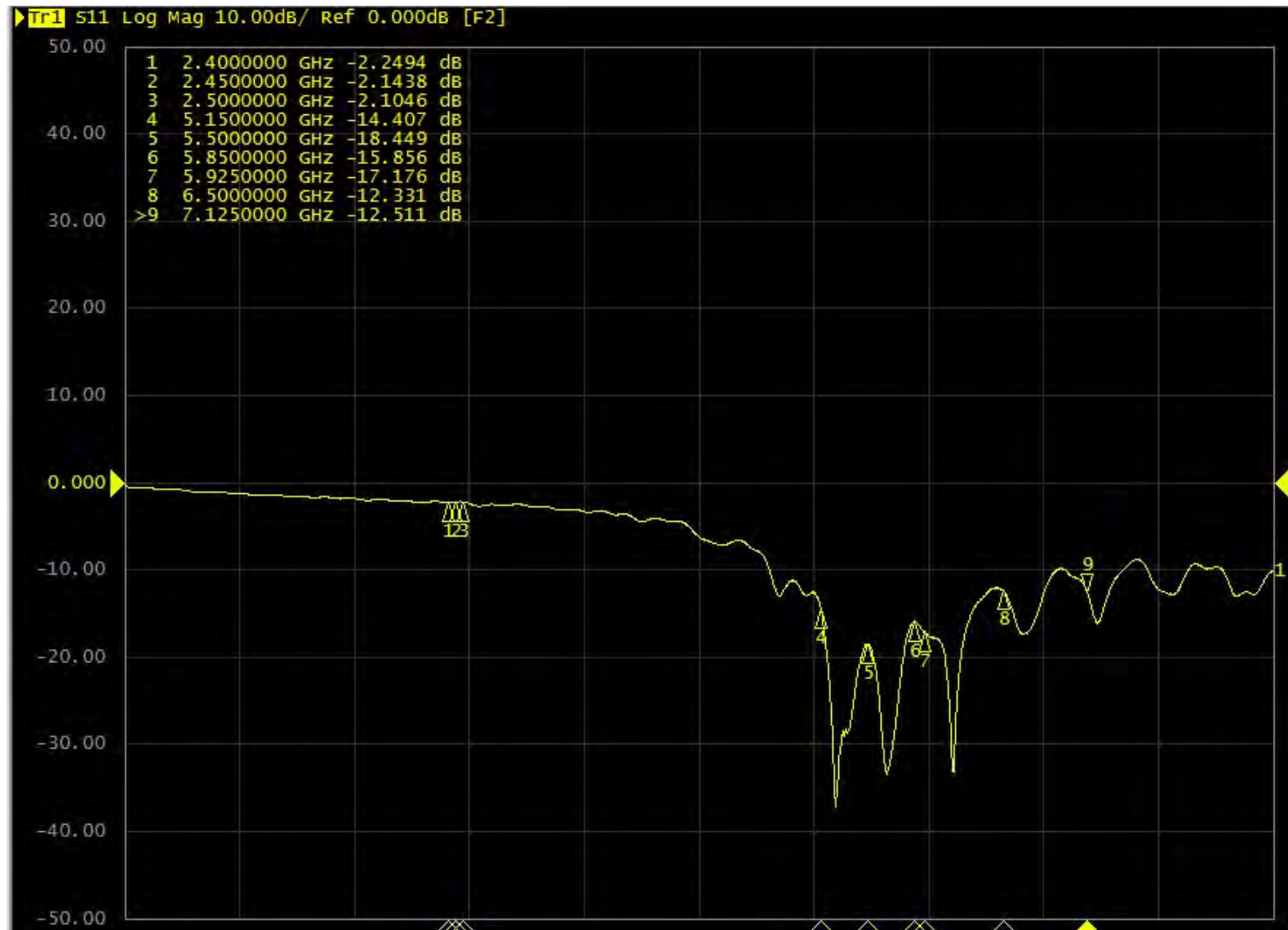


# Return Loss – Ant 4

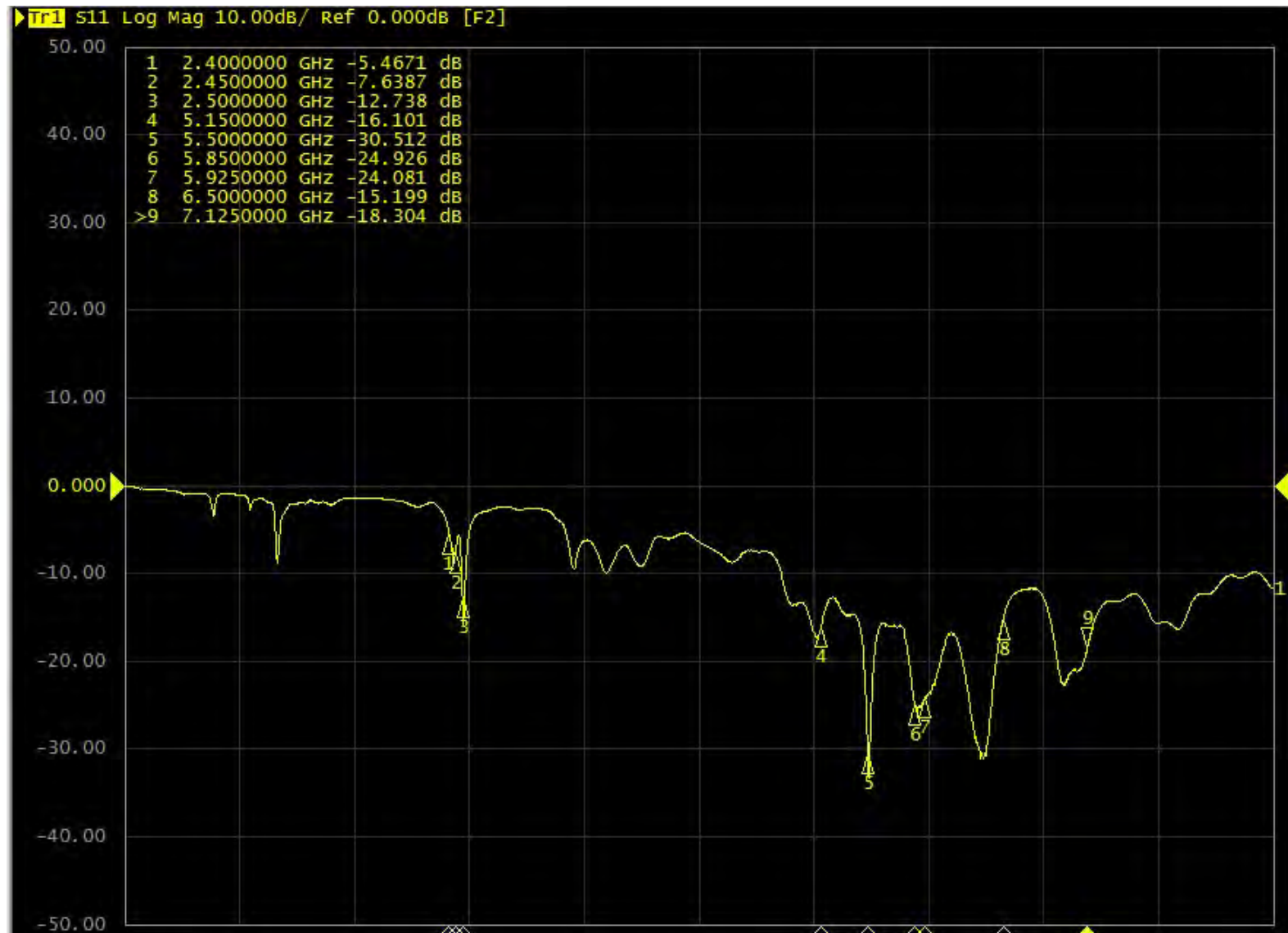




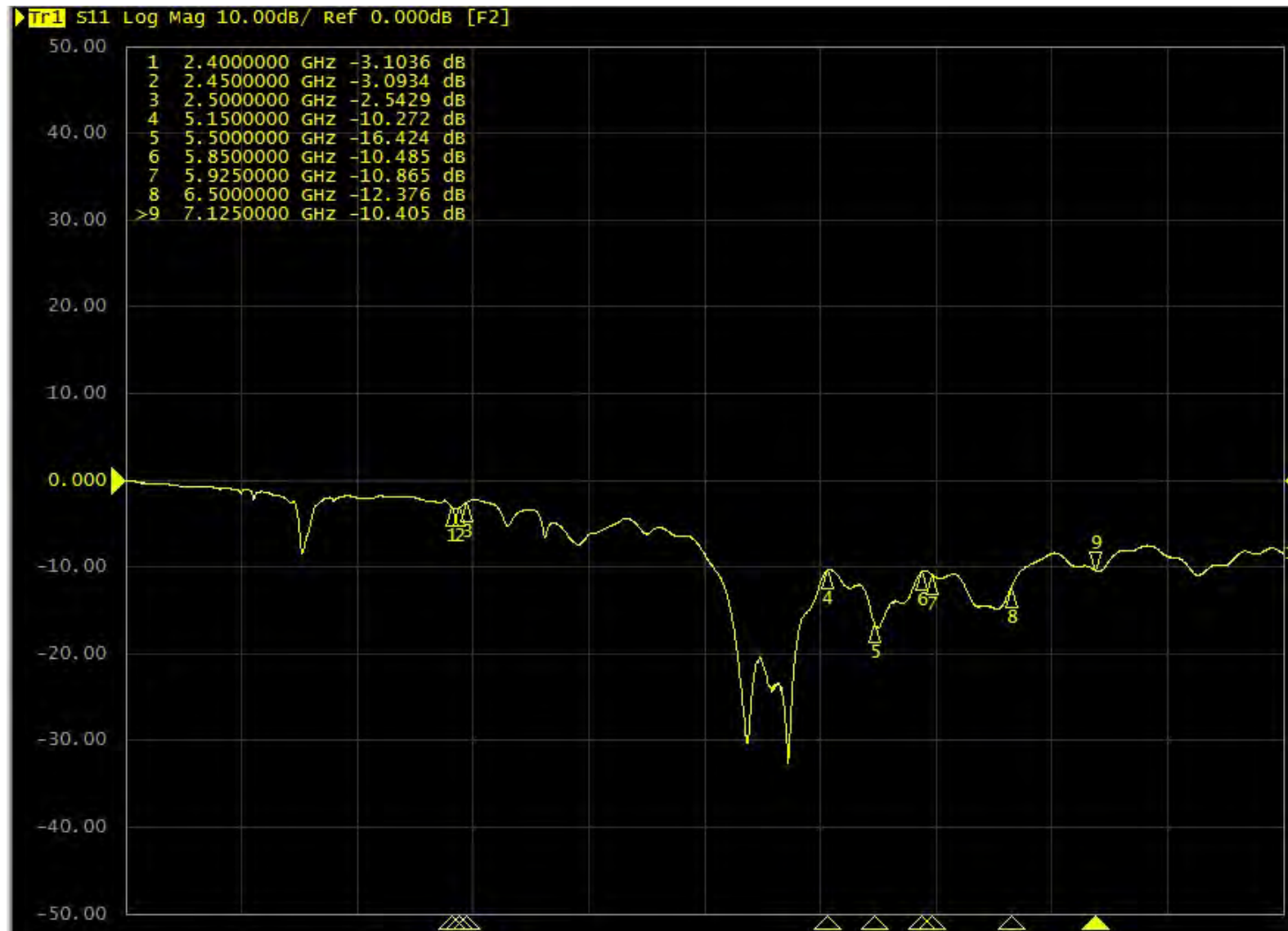
# Return Loss – Ant 5



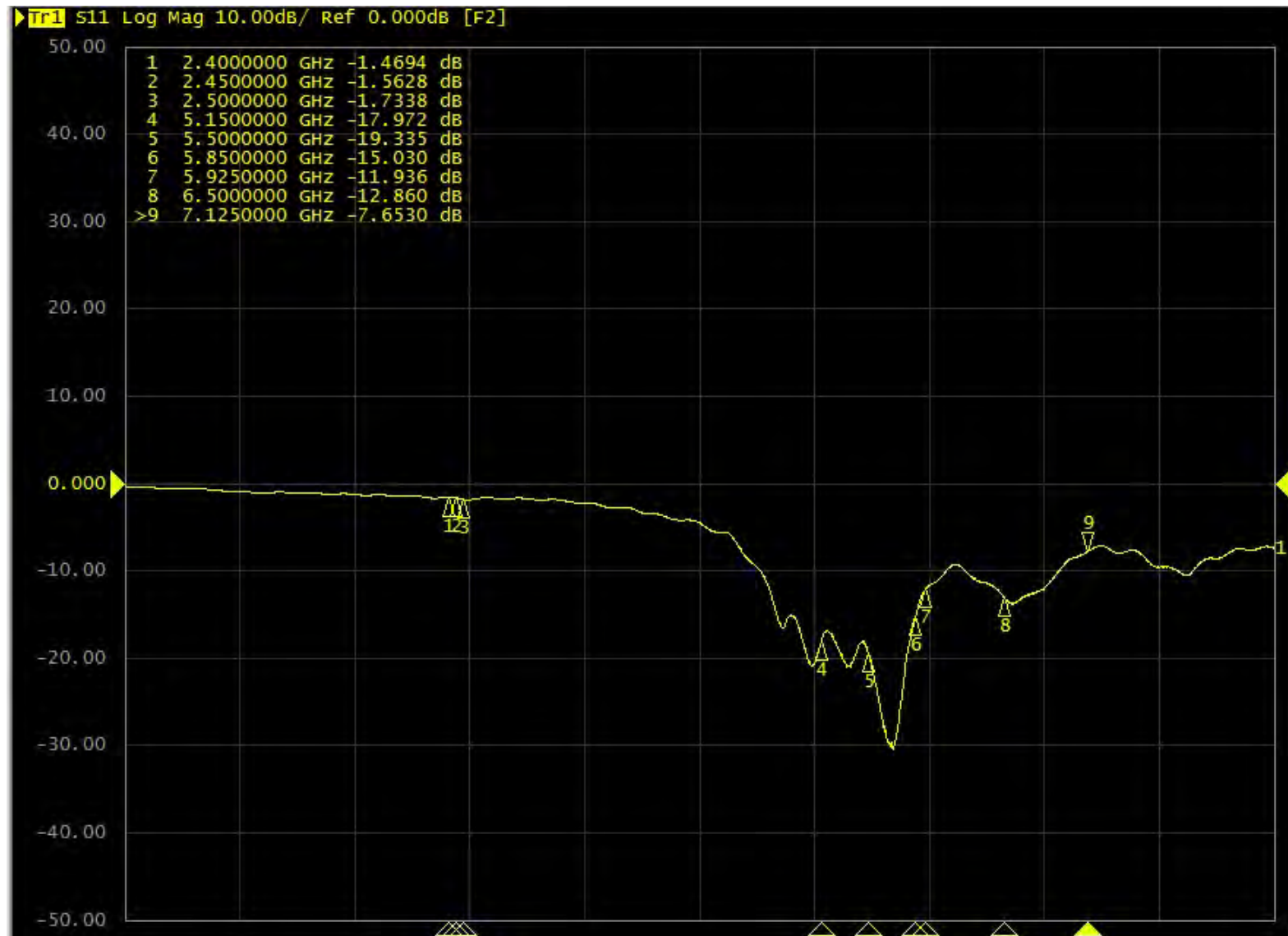
# Return Loss – Ant 6



# Return Loss – Ant 7

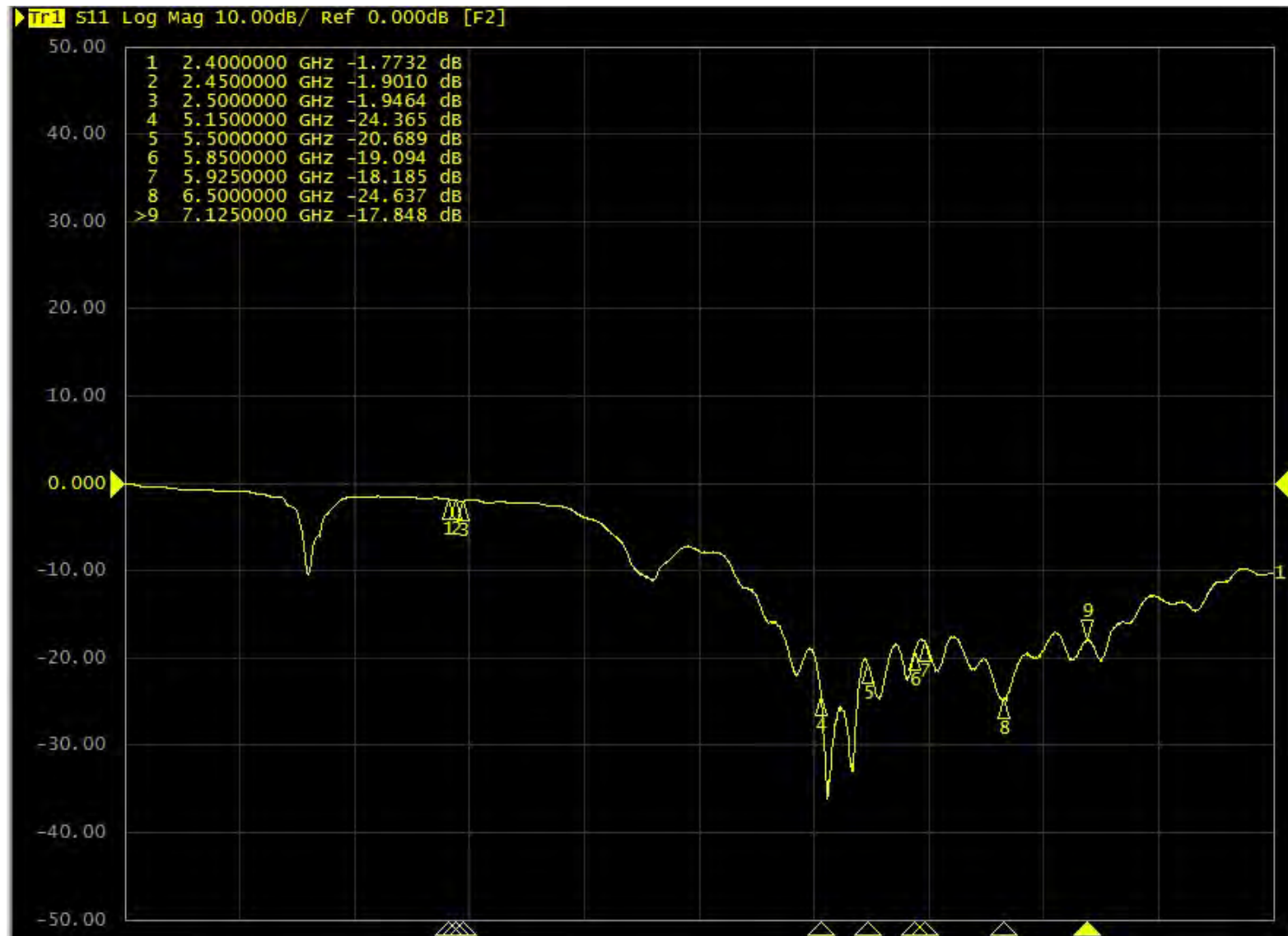


# Return Loss – Ant 8

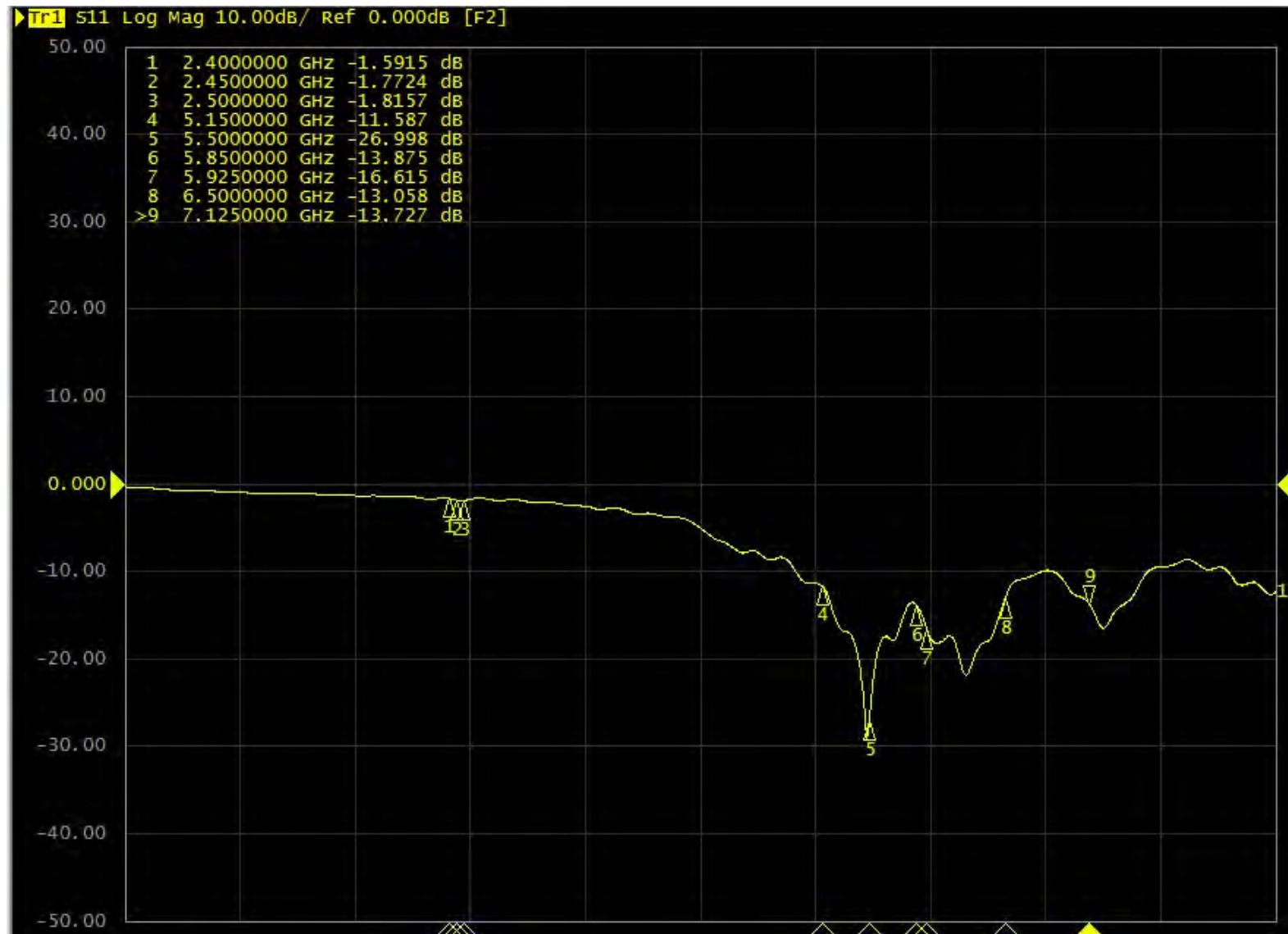




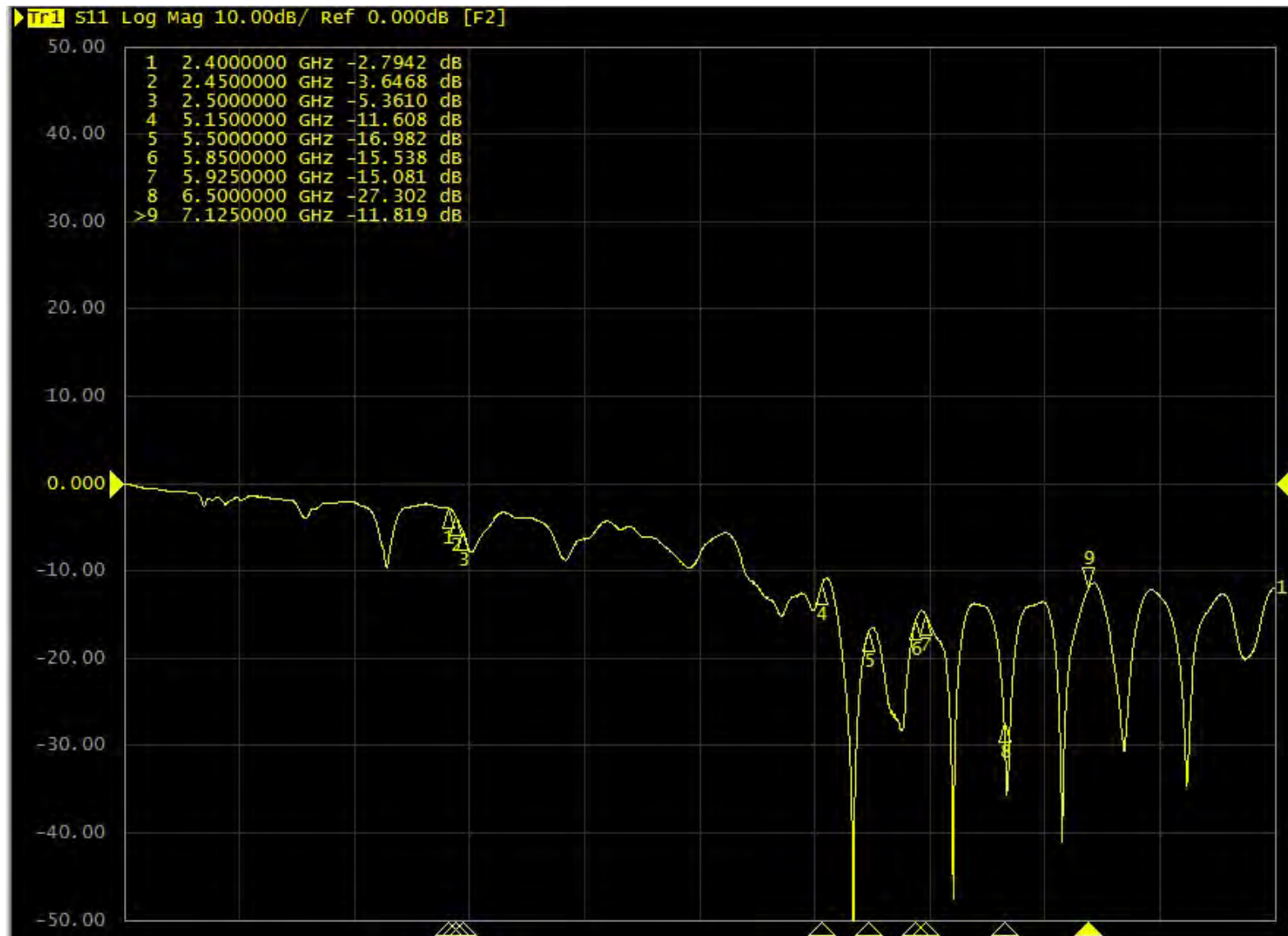
# Return Loss – Ant 9



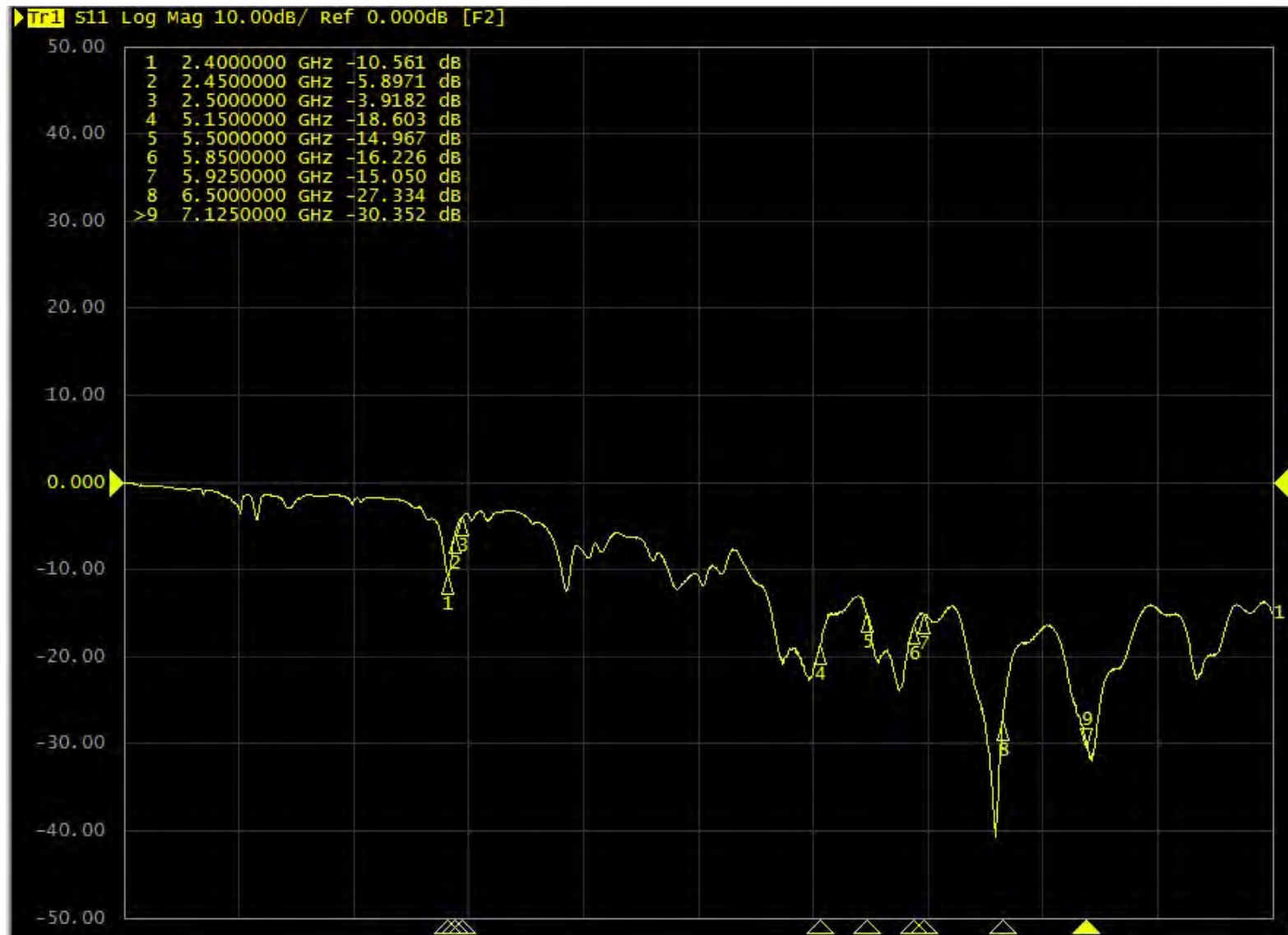
# Return Loss – Ant 10



# Return Loss – Ant 11

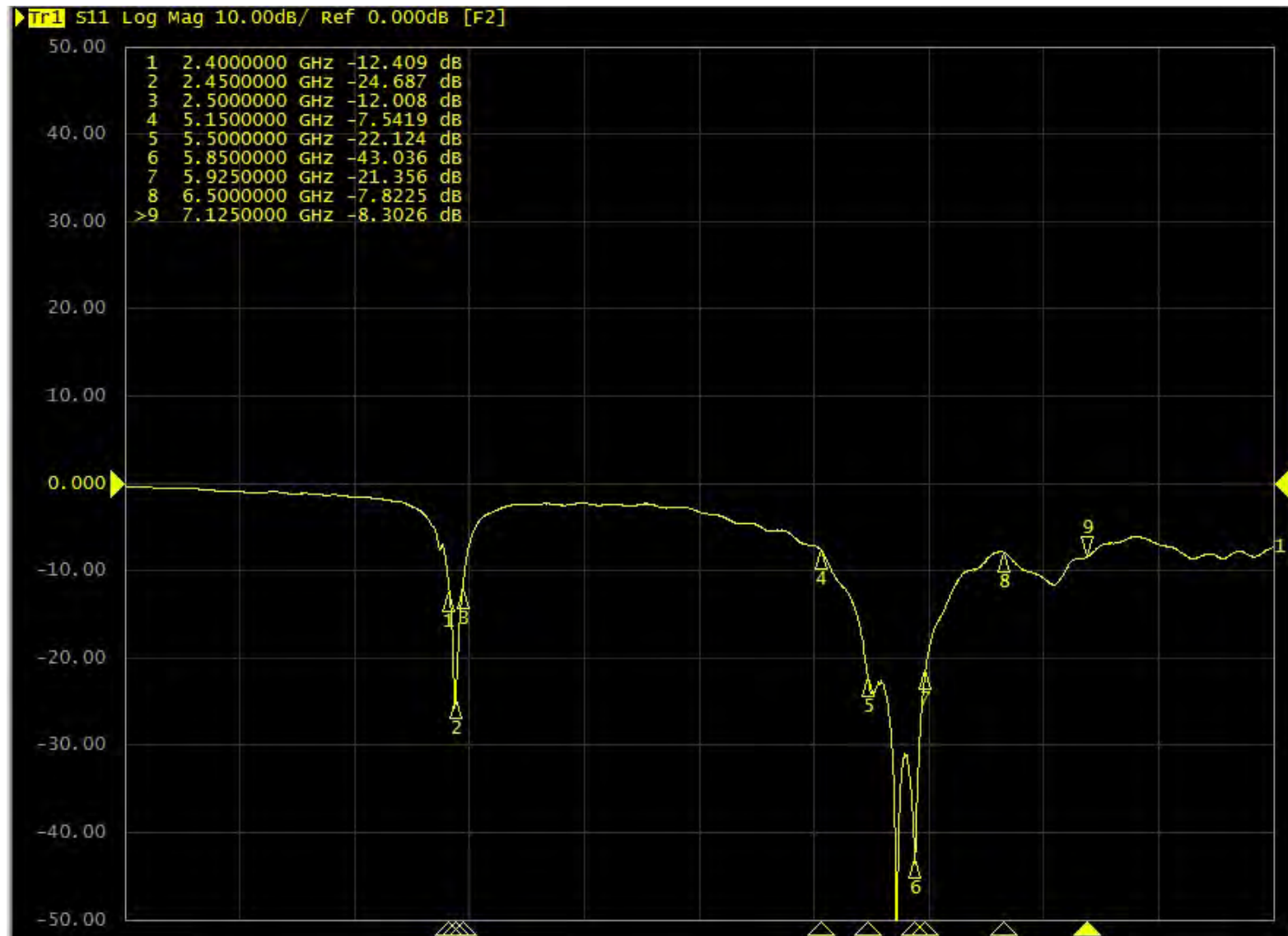


# Return Loss – Ant 12

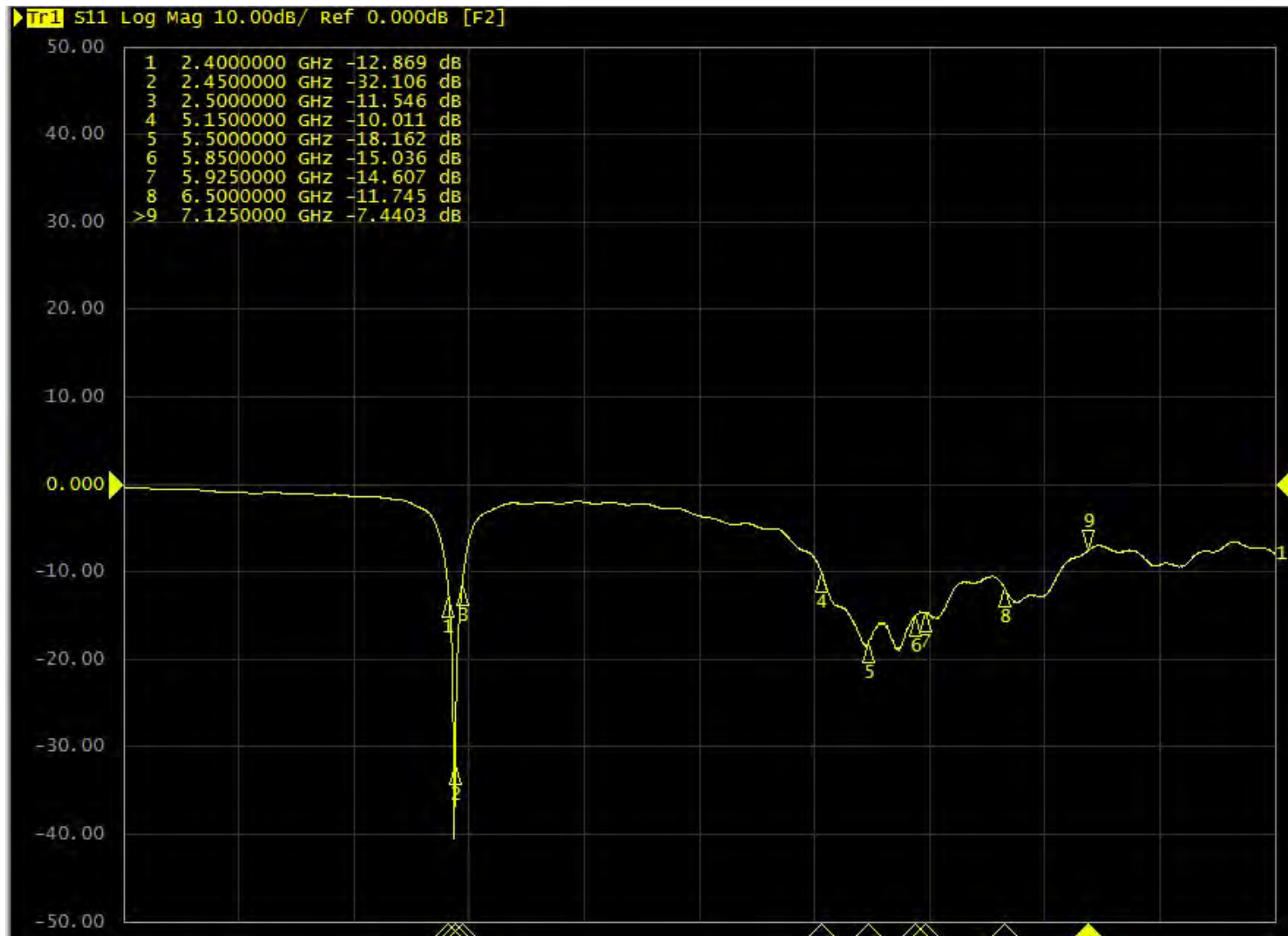




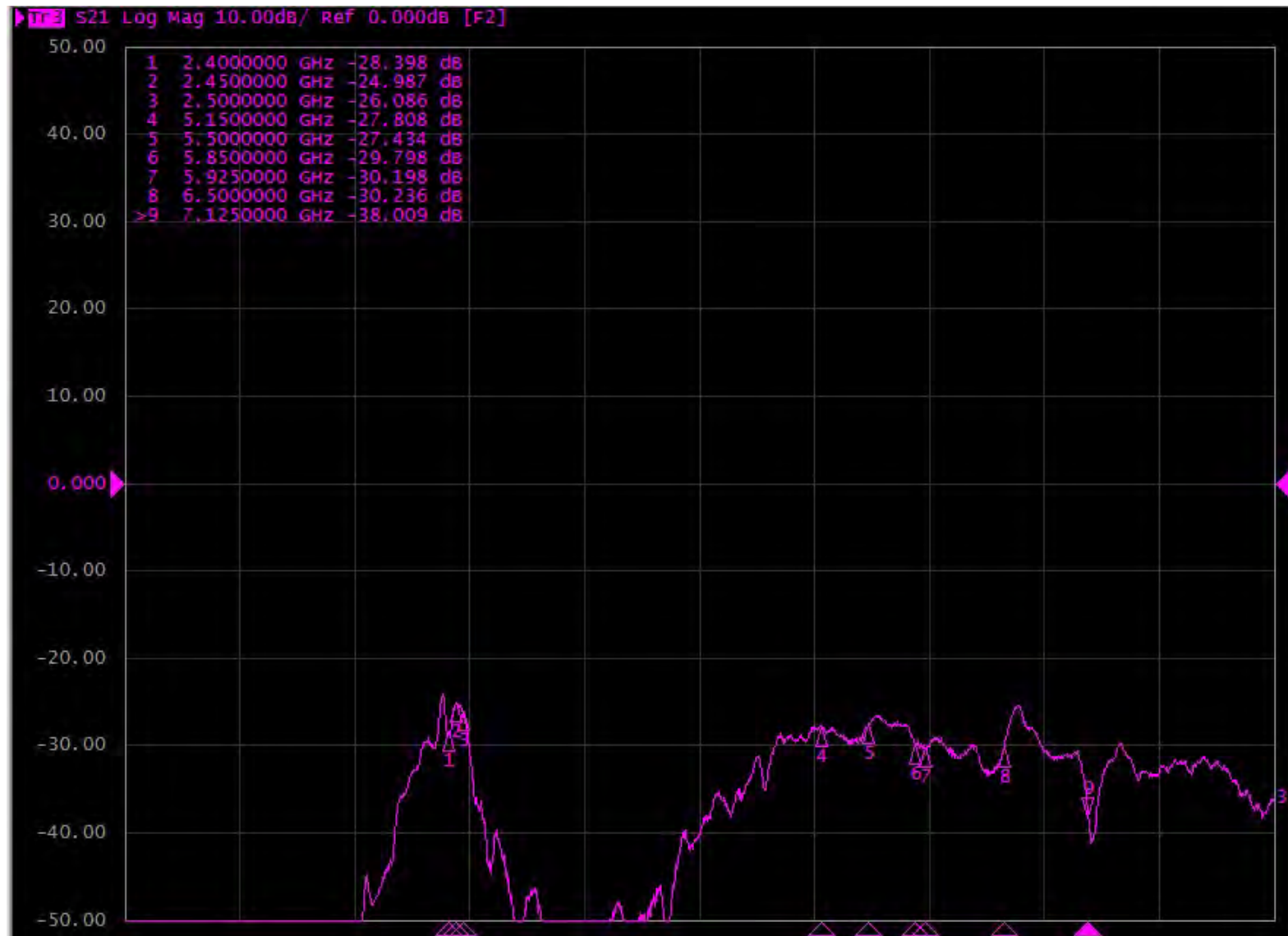
# Return Loss – Ant 13



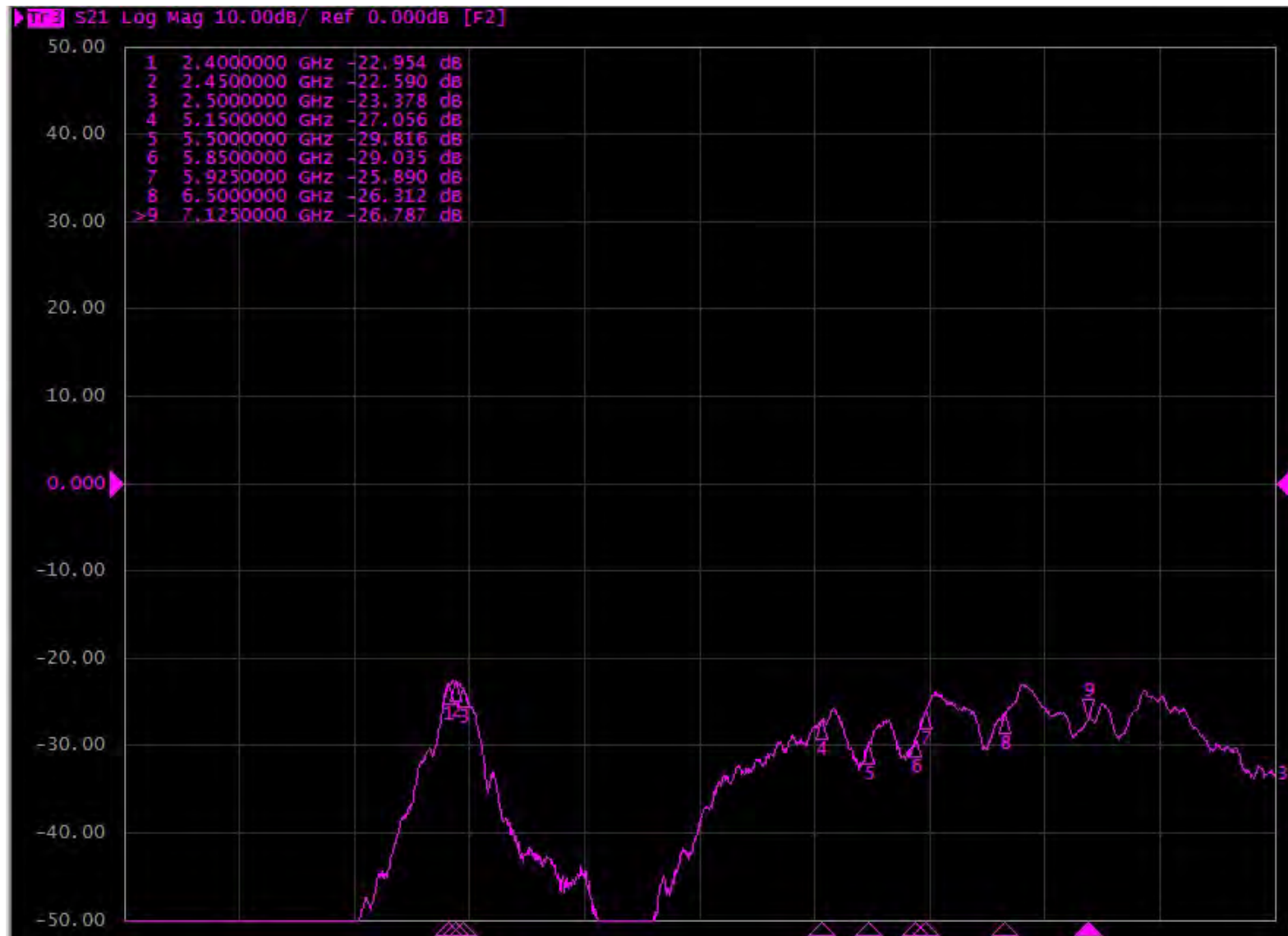
# Return Loss – Ant 14



# Isolation – Ant 1 & Ant 2

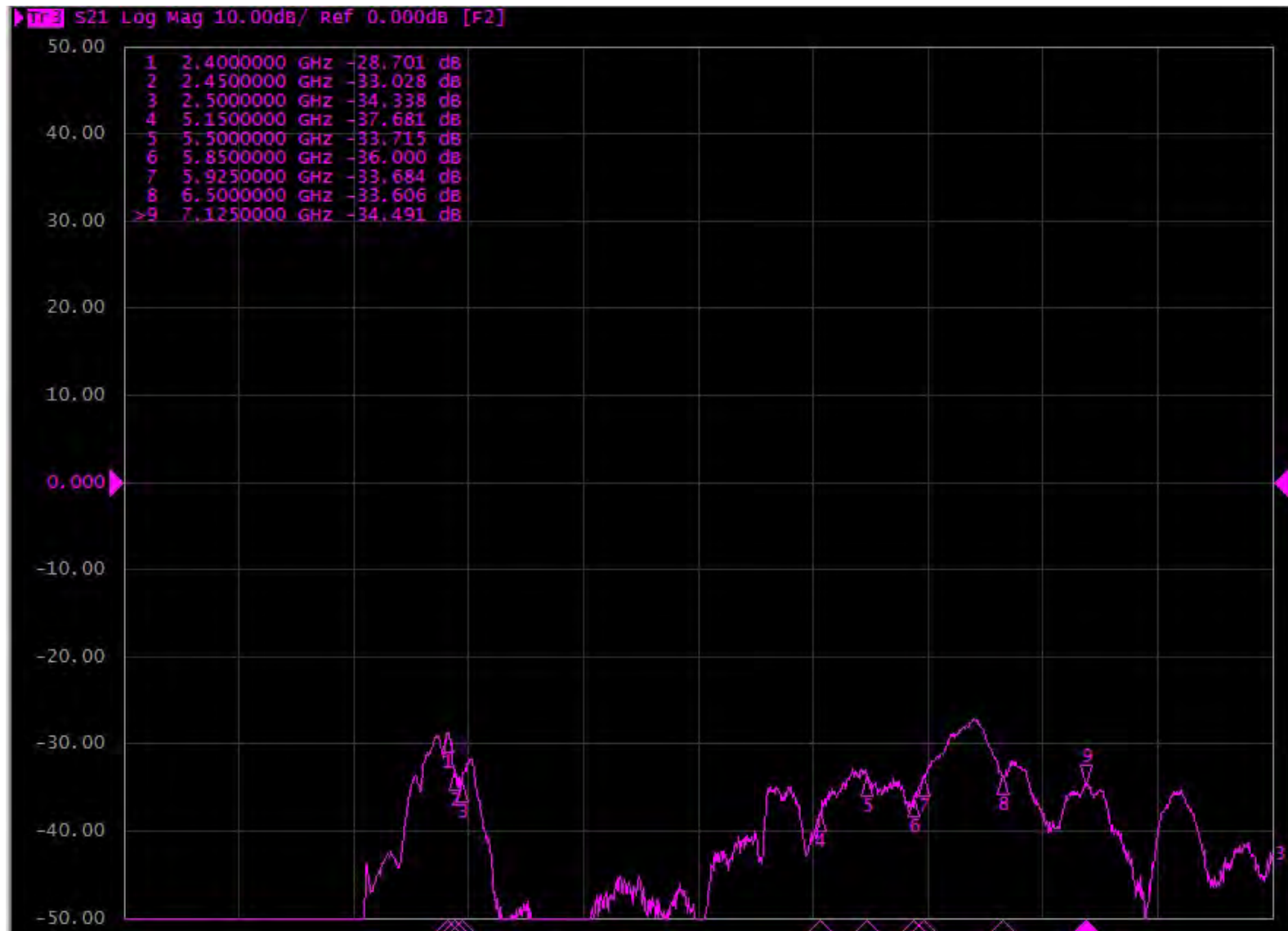


# Isolation – Ant 1 & Ant 3

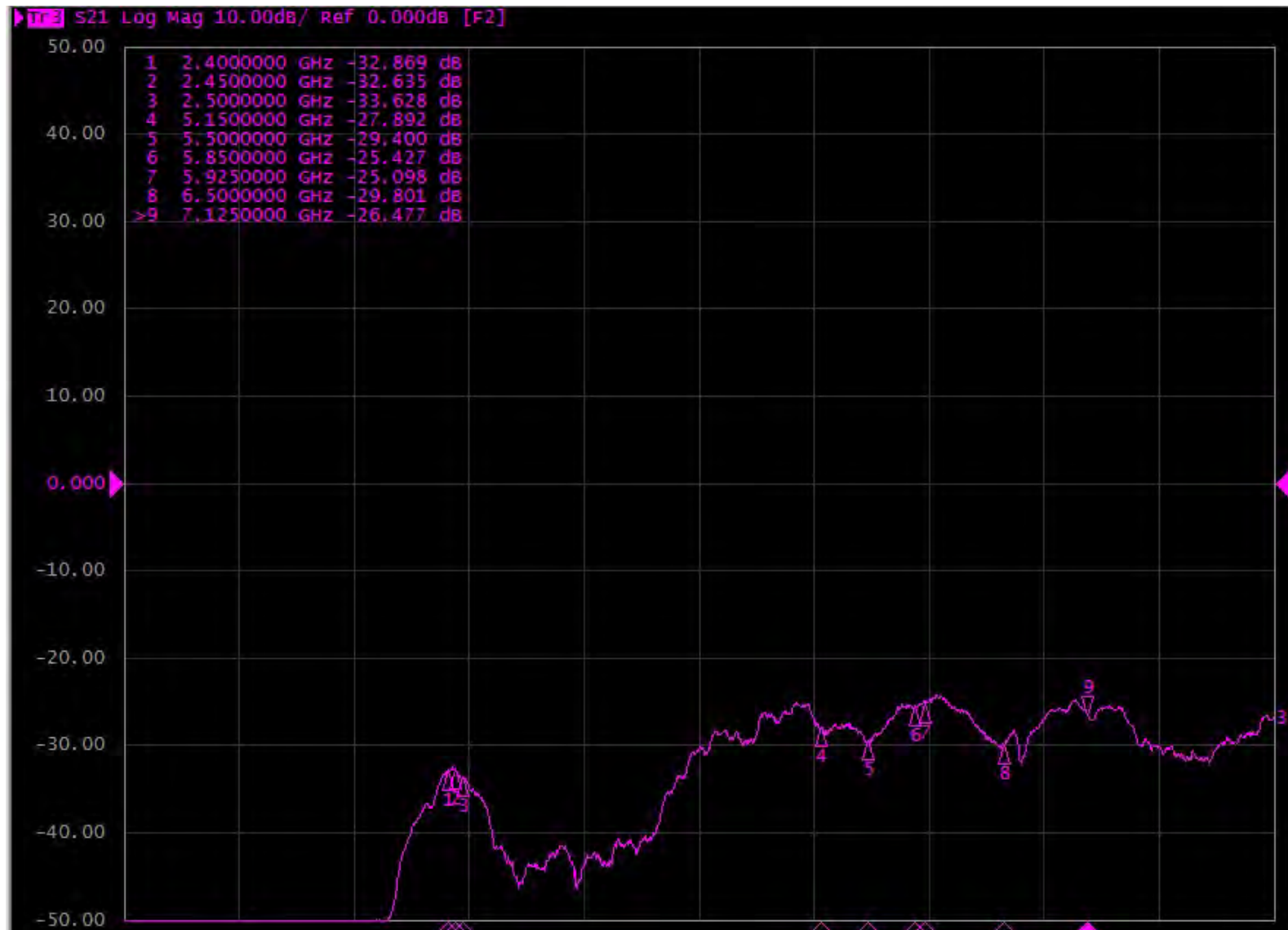




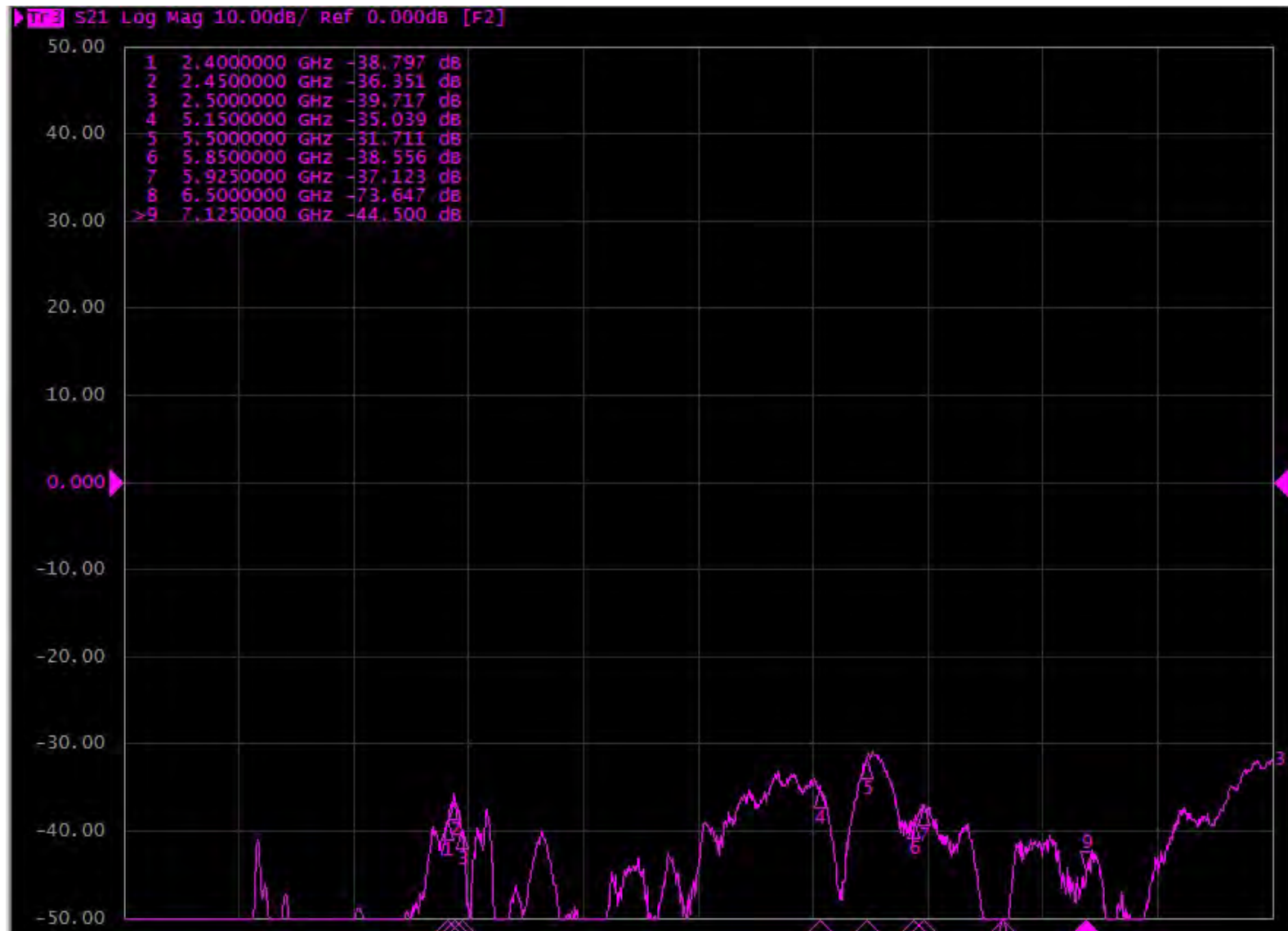
# Isolation – Ant 1 & Ant 4



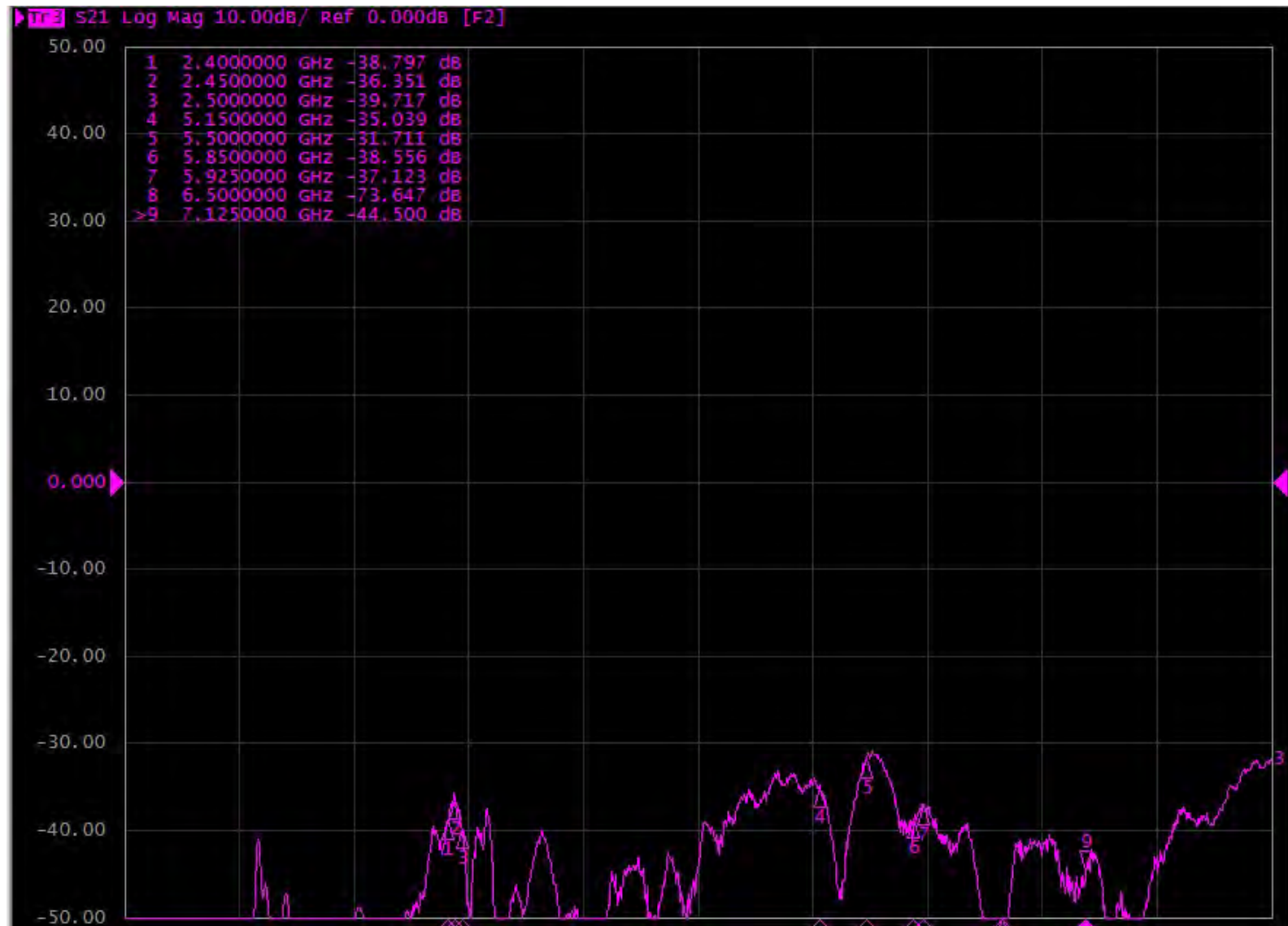
# Isolation – Ant 1 & Ant 5



# Isolation – Ant 1 & Ant 6

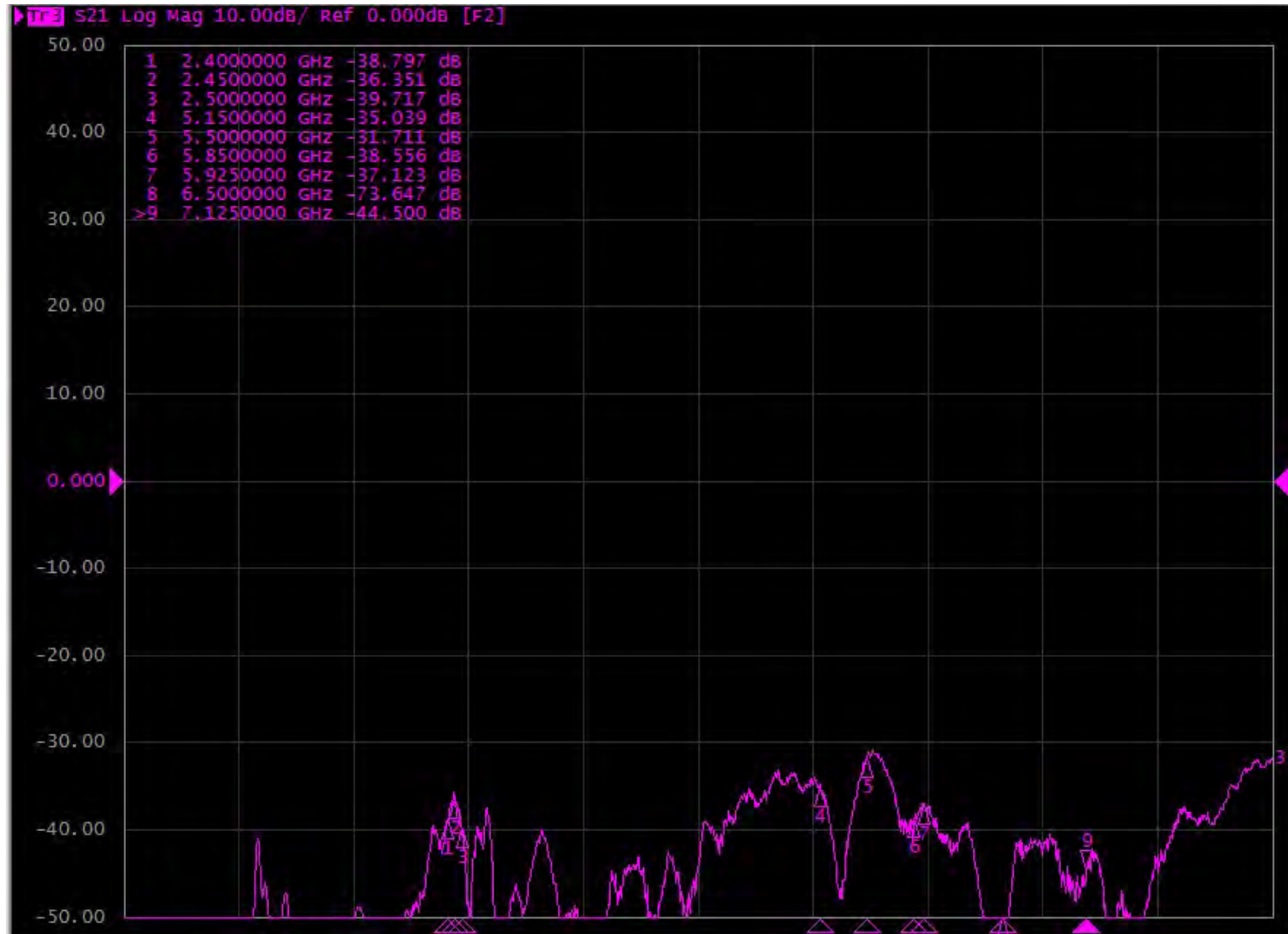


# Isolation – Ant 1 & Ant 7

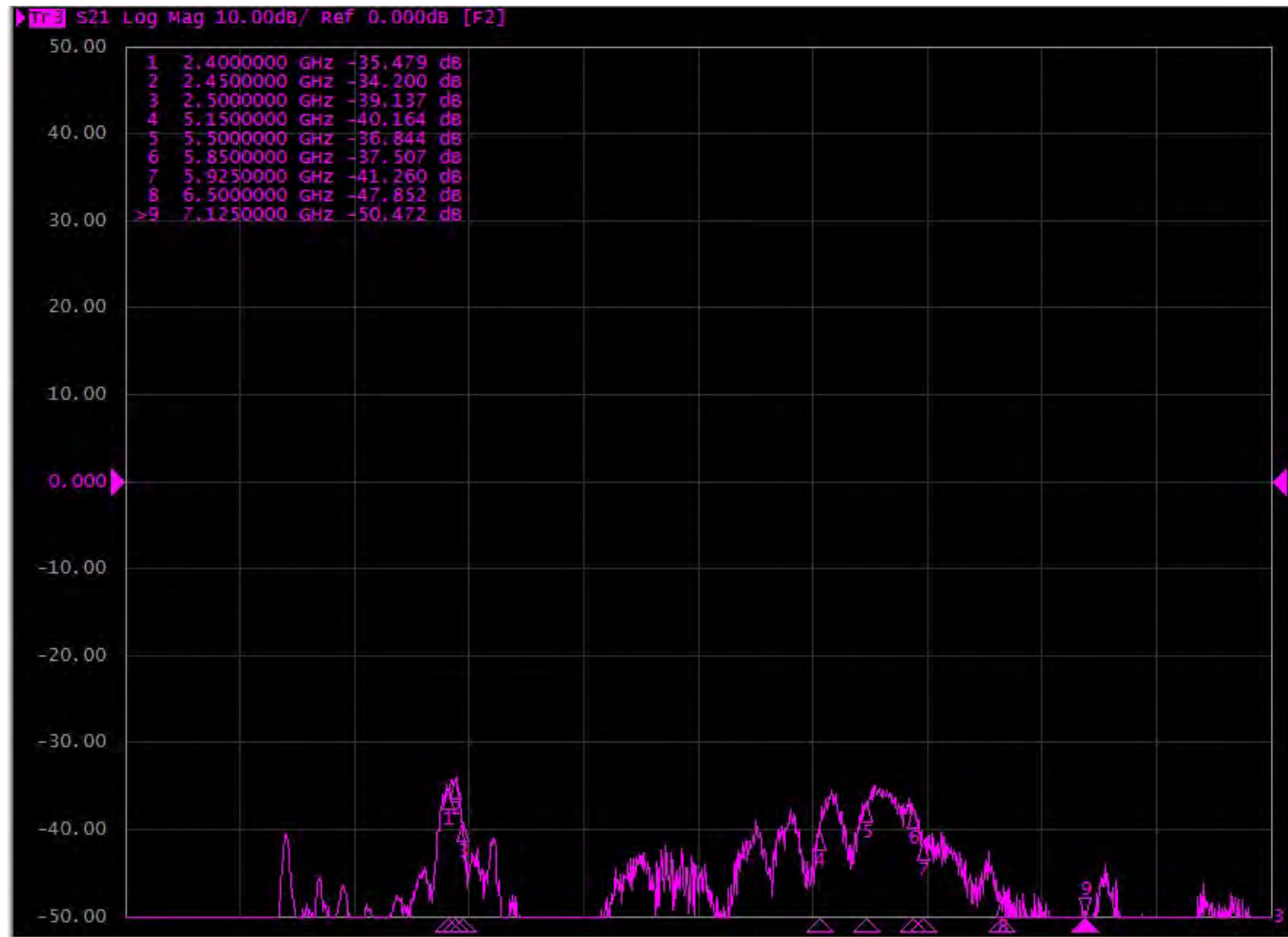




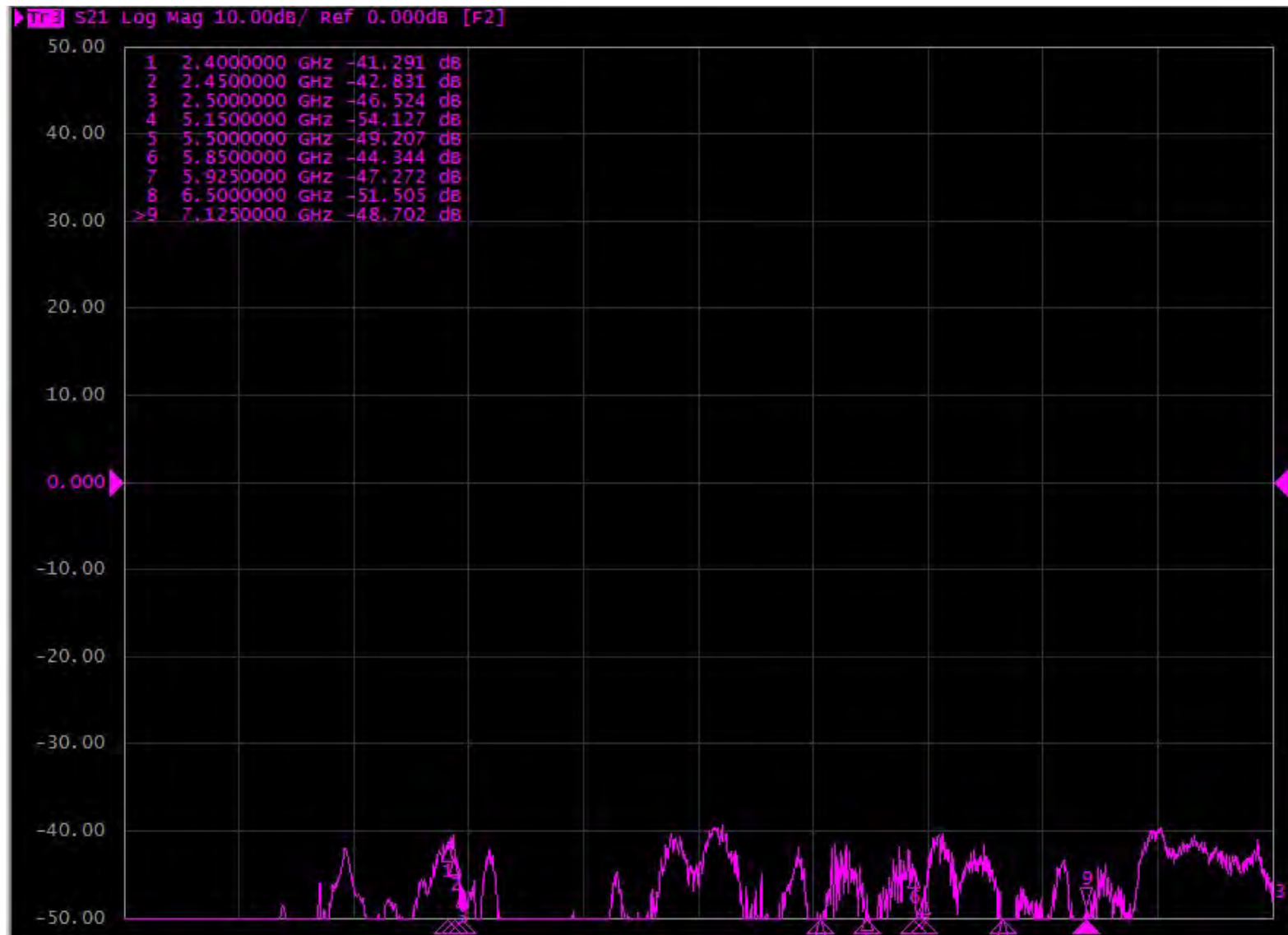
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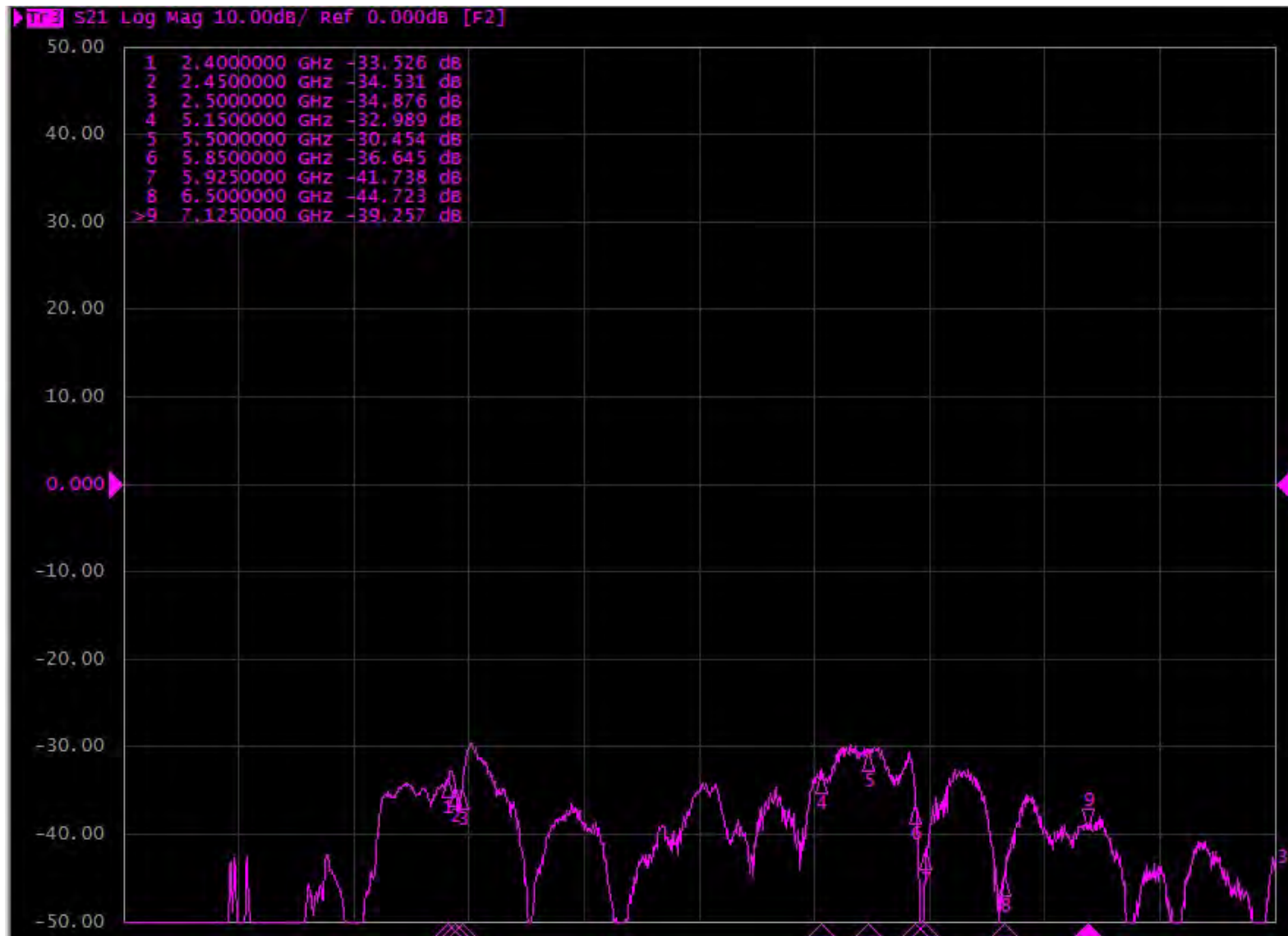
# Isolation – Ant 1 & Ant 9



# Isolation – Ant 1 & Ant 10

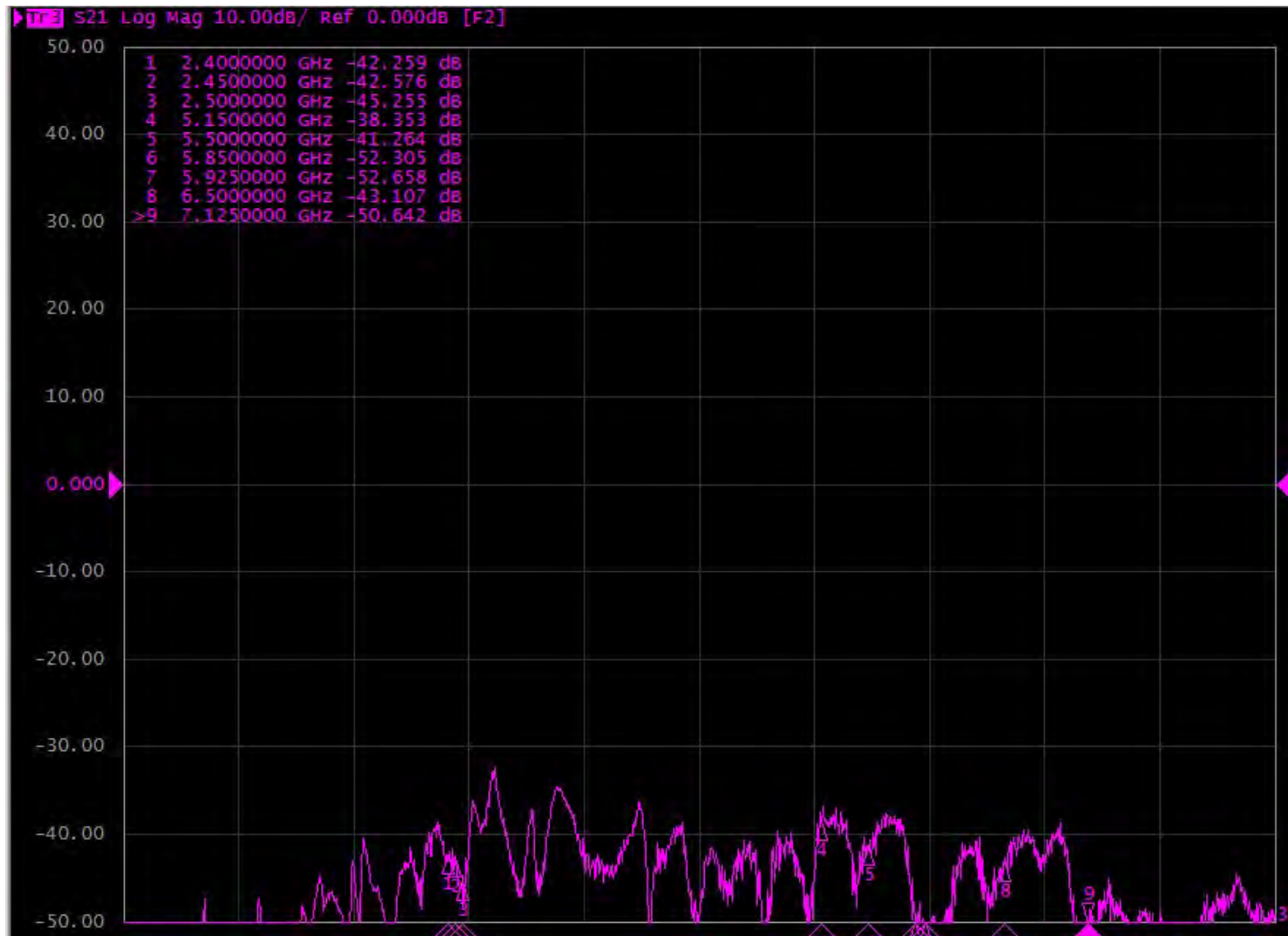


# Isolation – Ant 1 & Ant 11

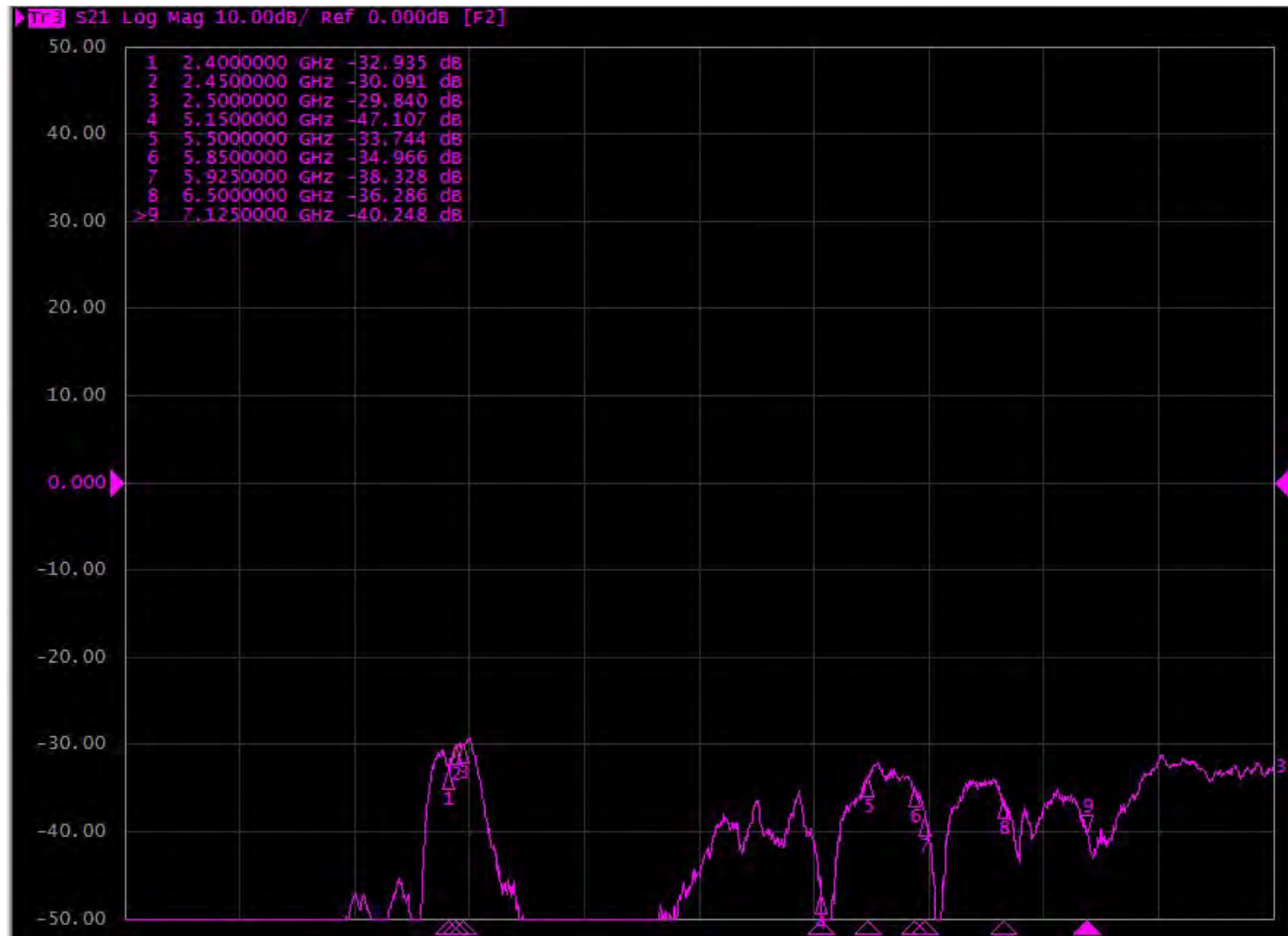




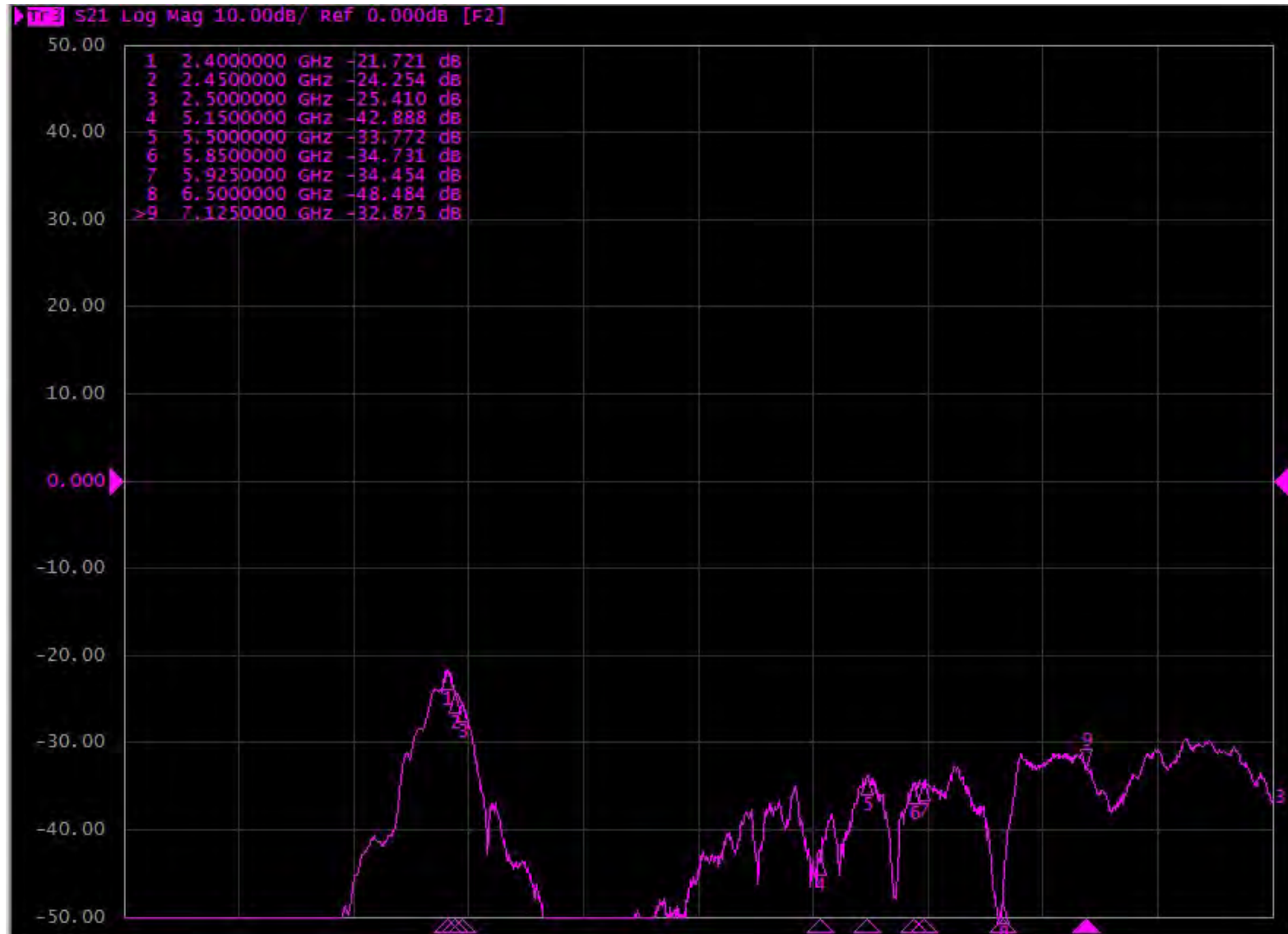
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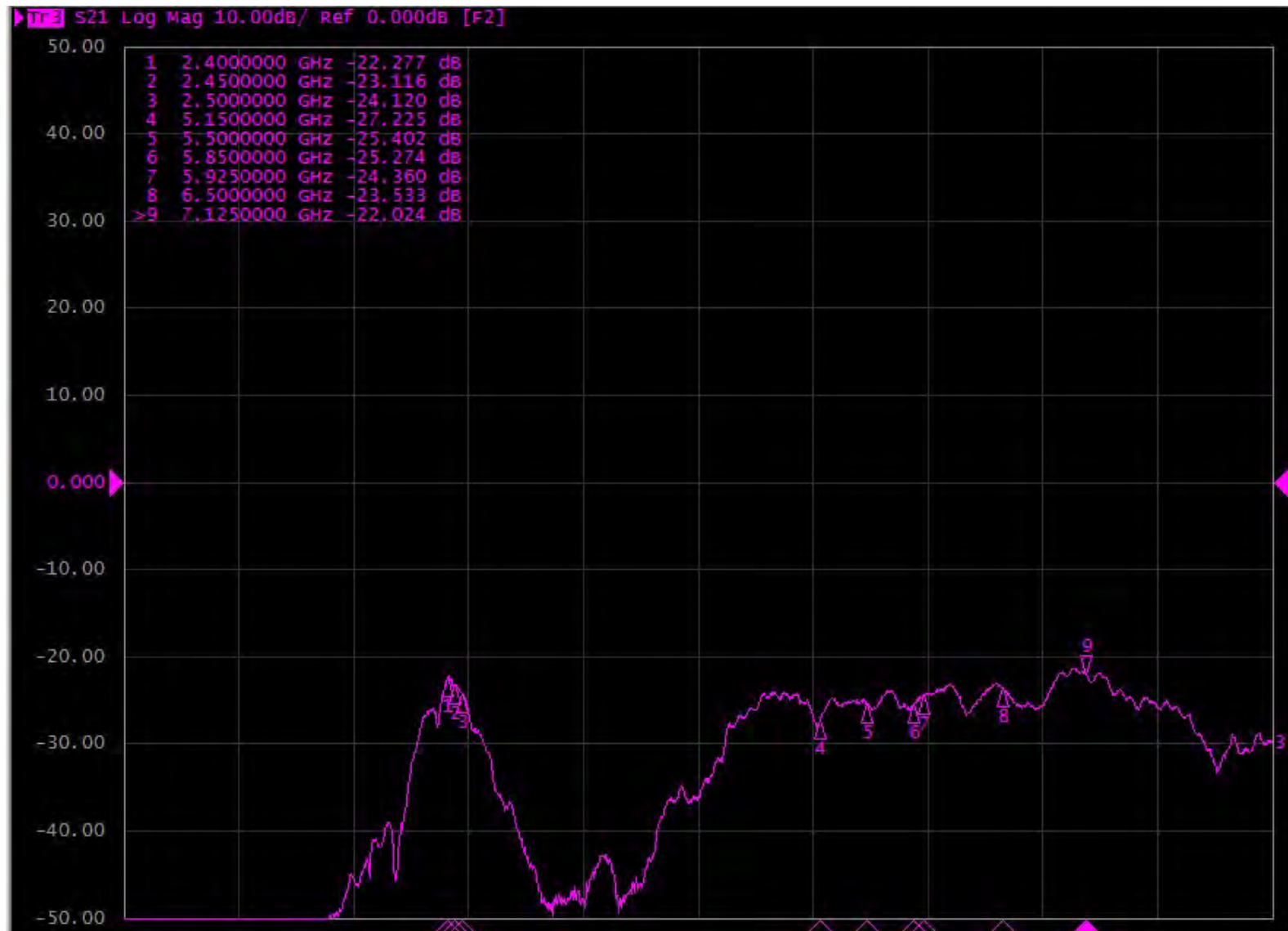
# Isolation – Ant 1 & Ant 13



# Isolation – Ant 1 & Ant 14

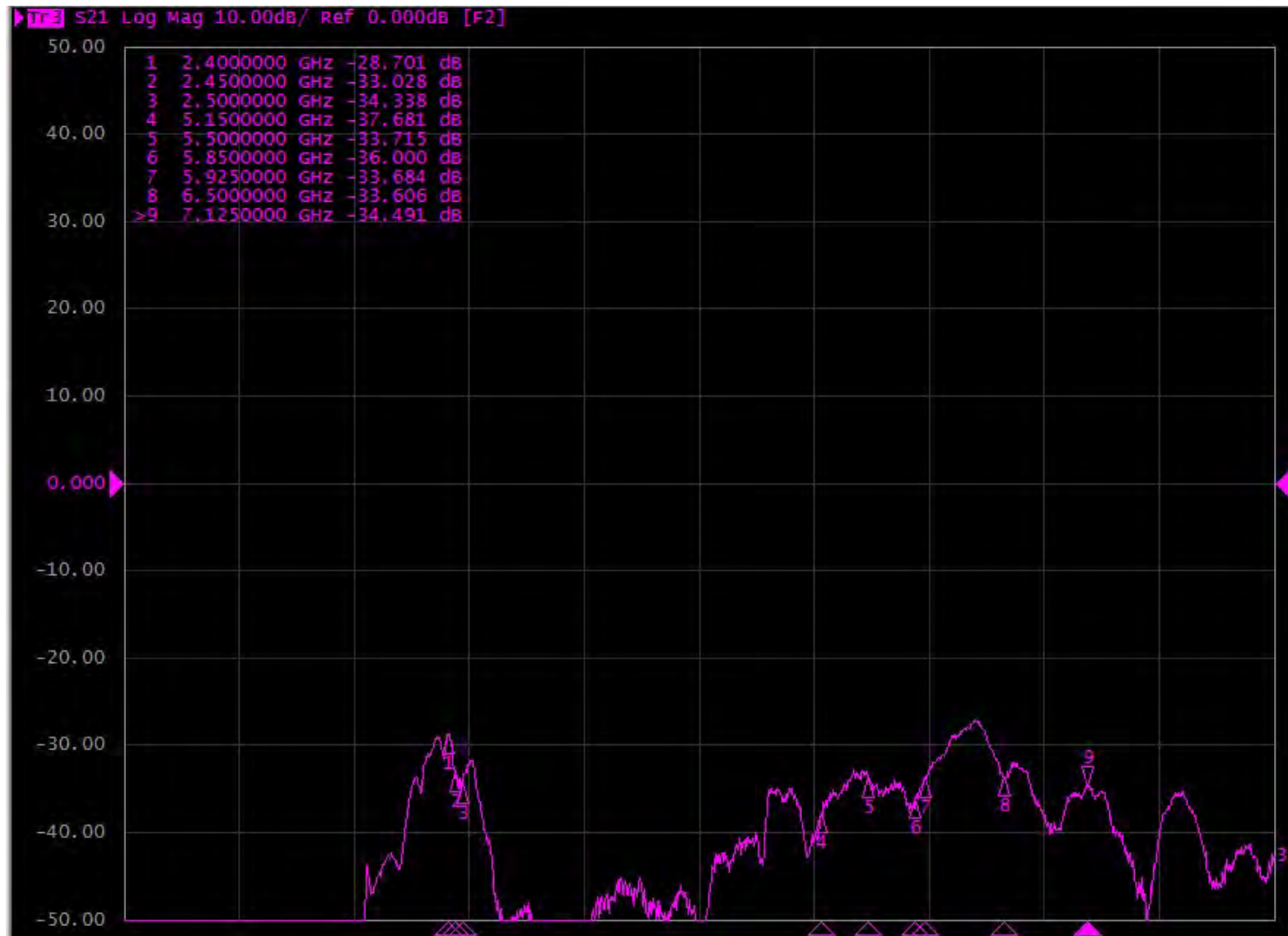


# Isolation – Ant 2 & Ant 3

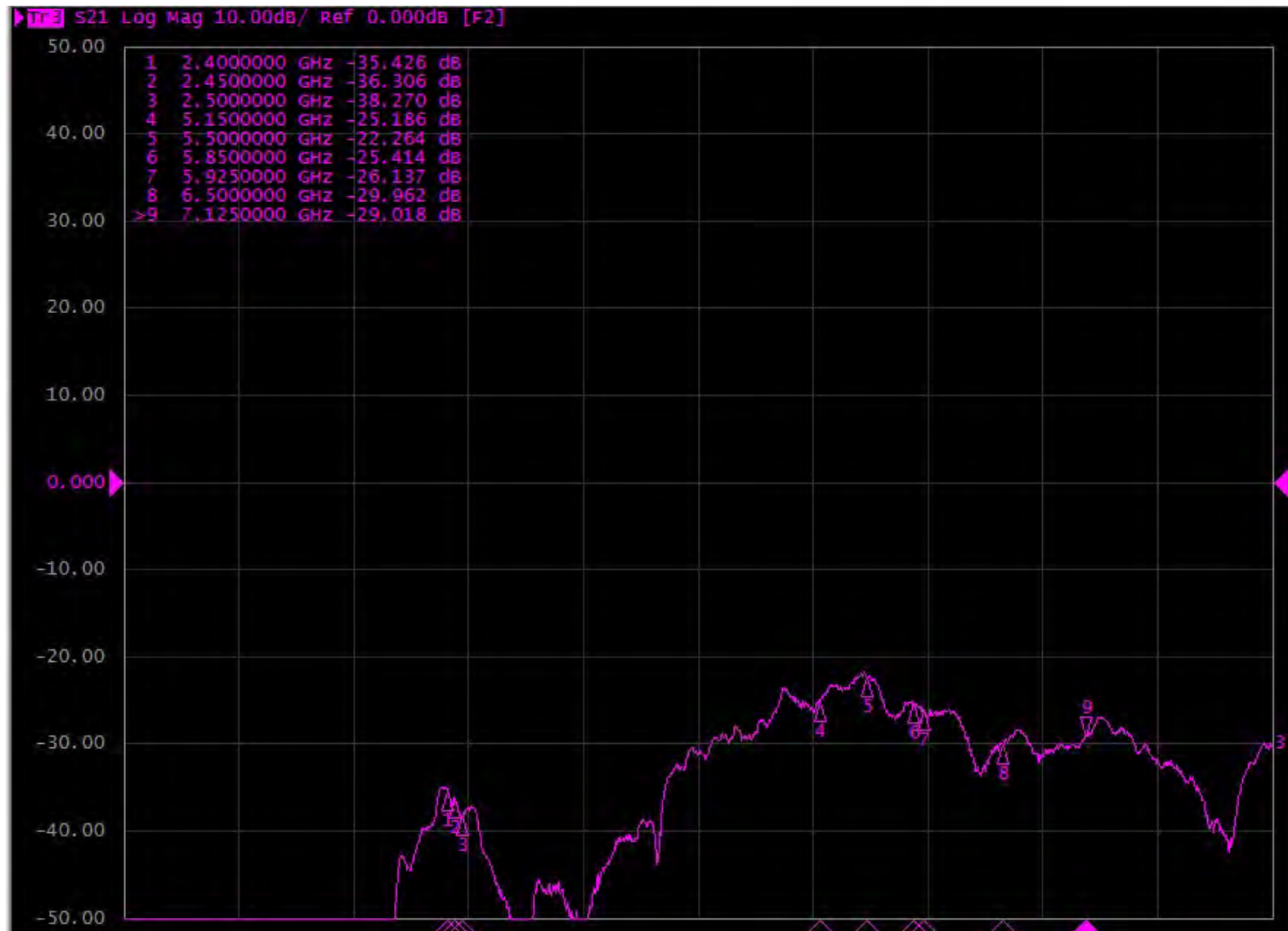




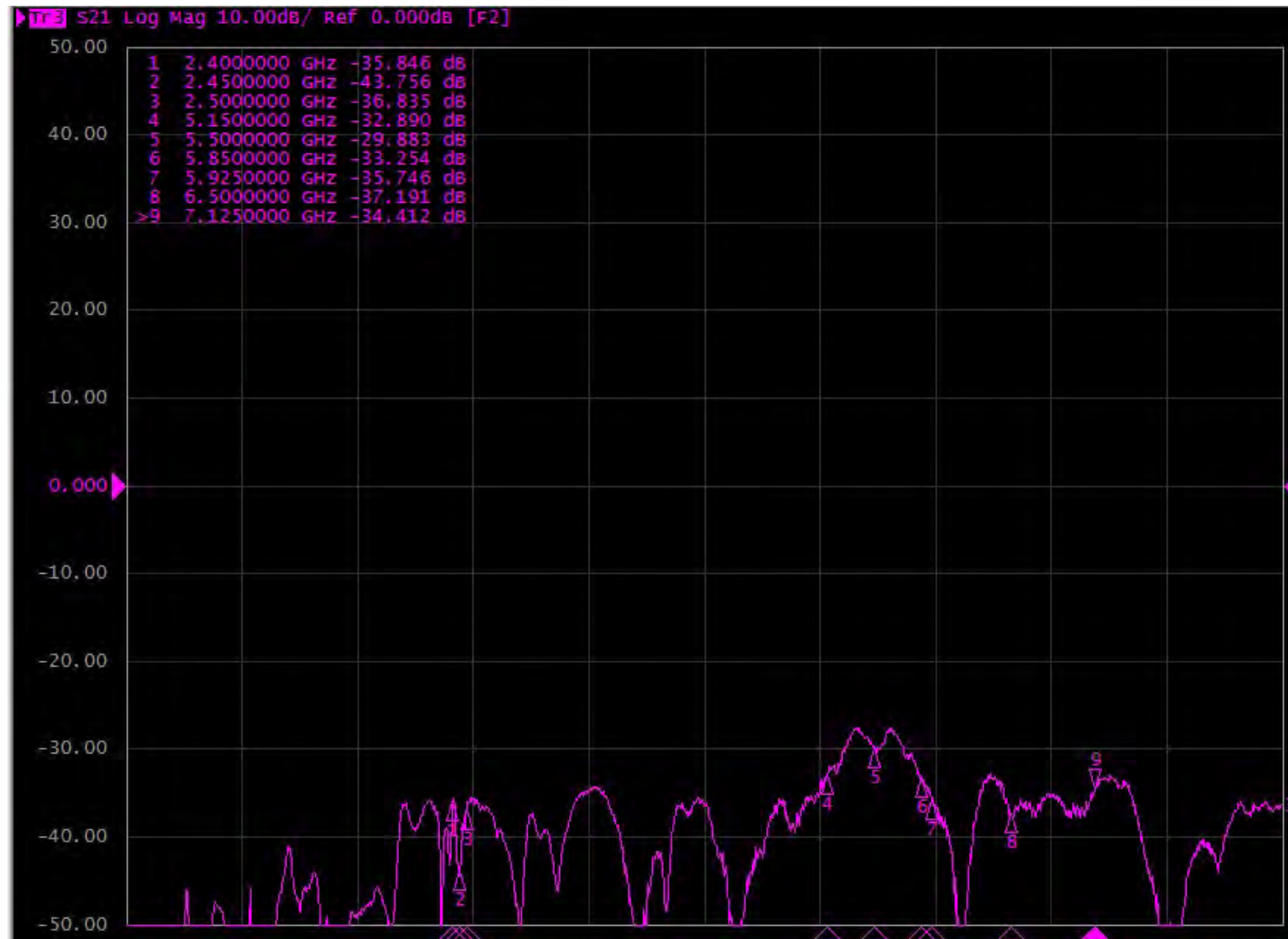
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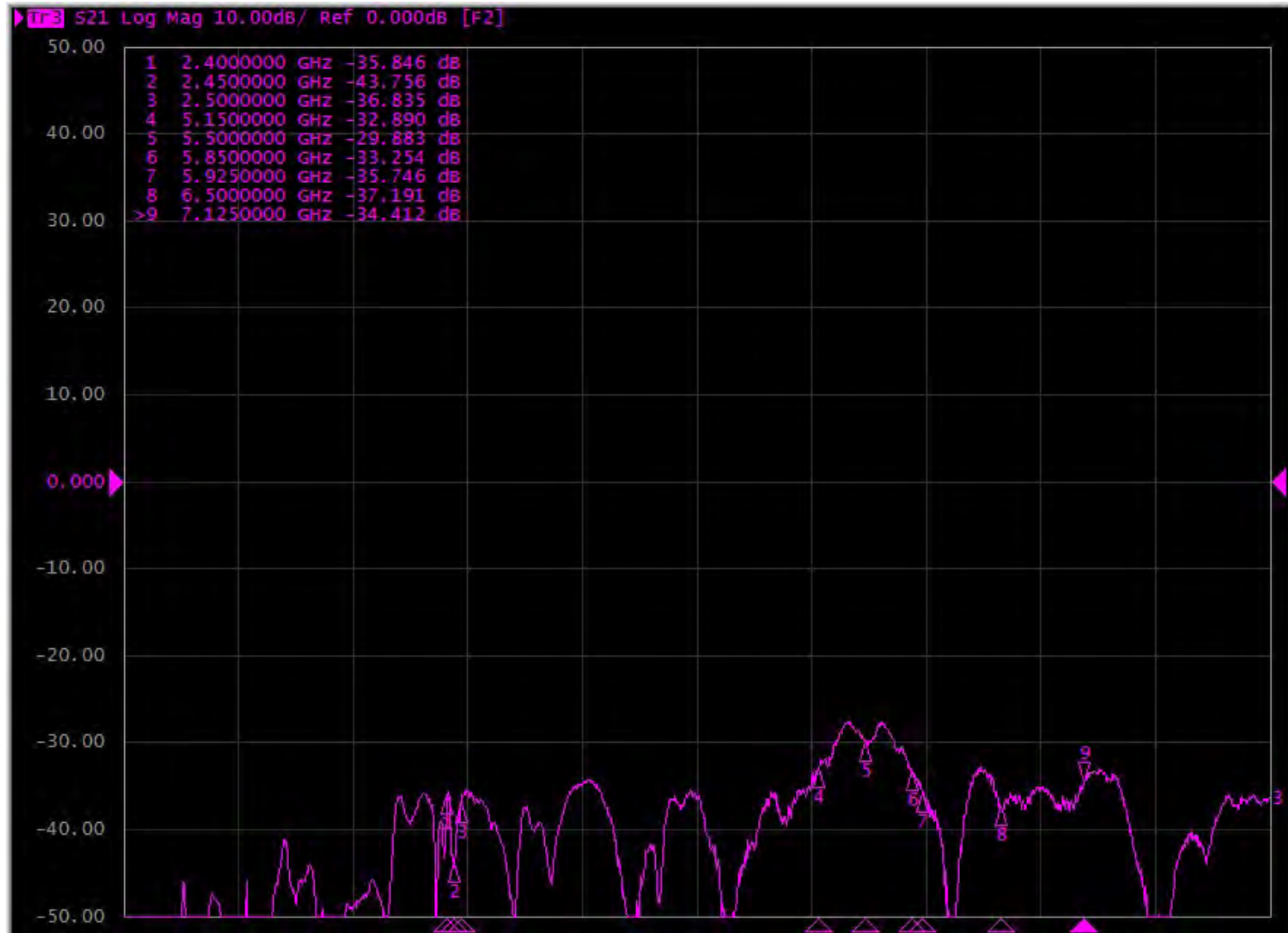
# Isolation – Ant 2 & Ant 5



# Isolation – Ant 2 & Ant 6

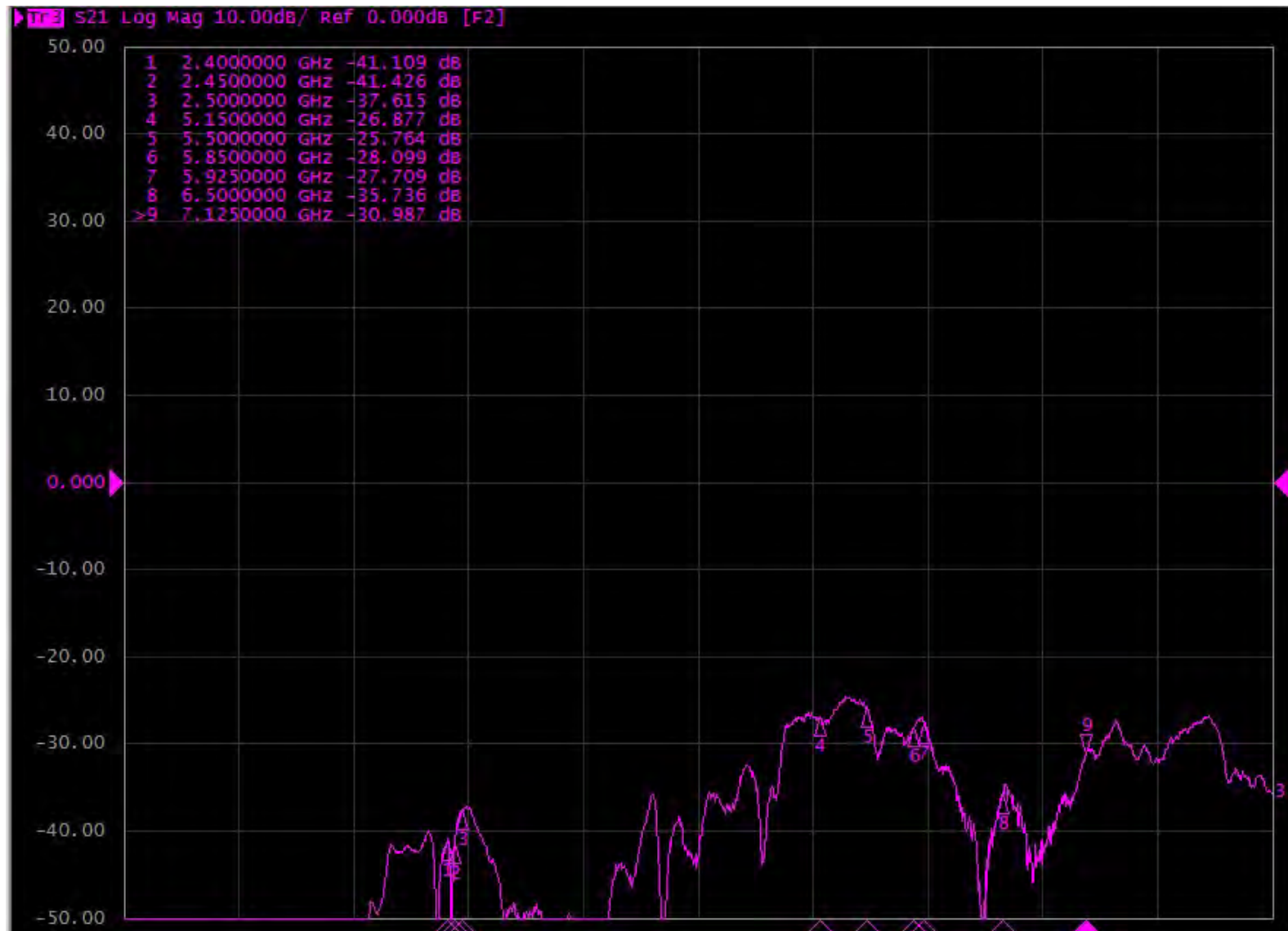


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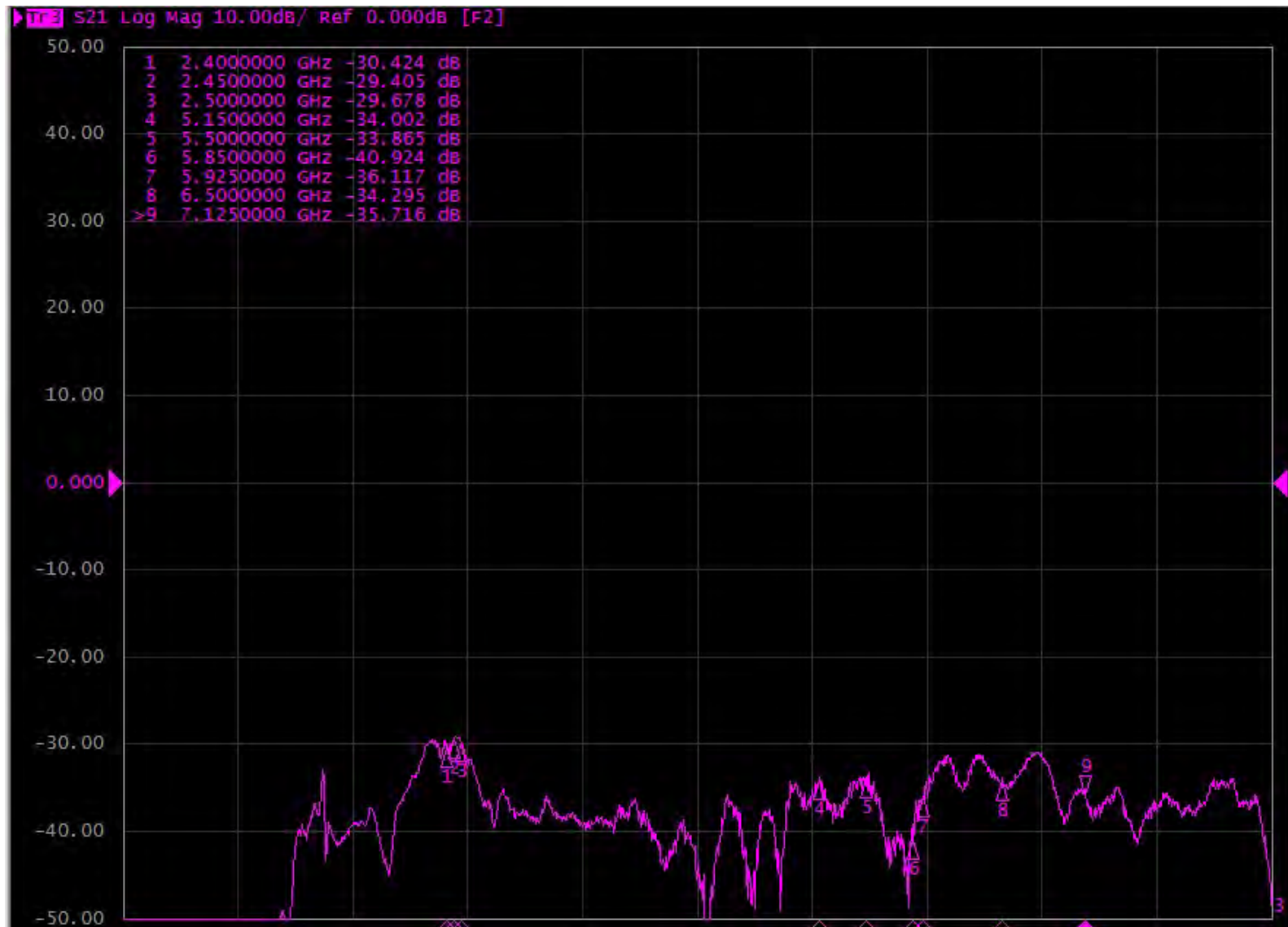




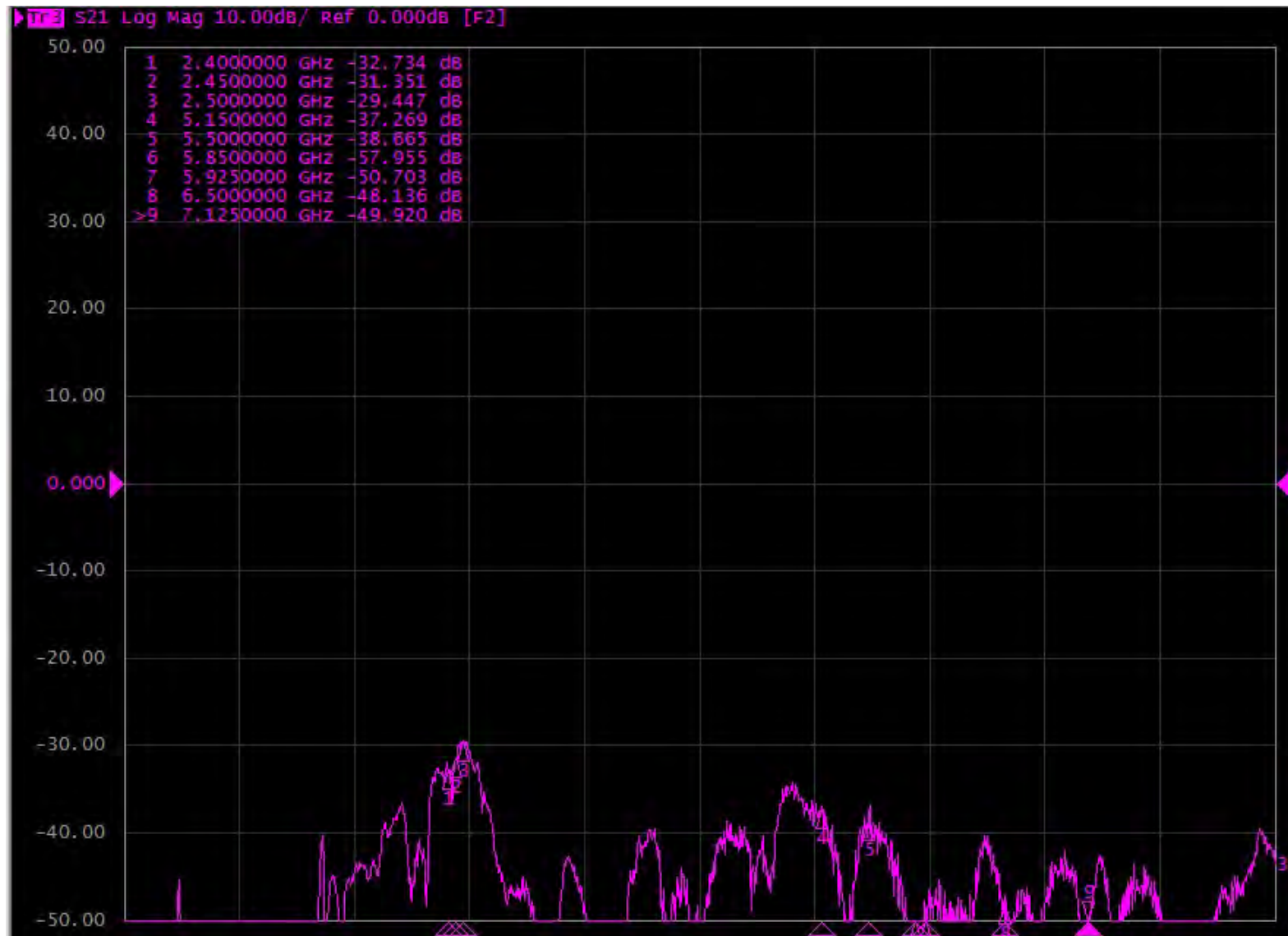
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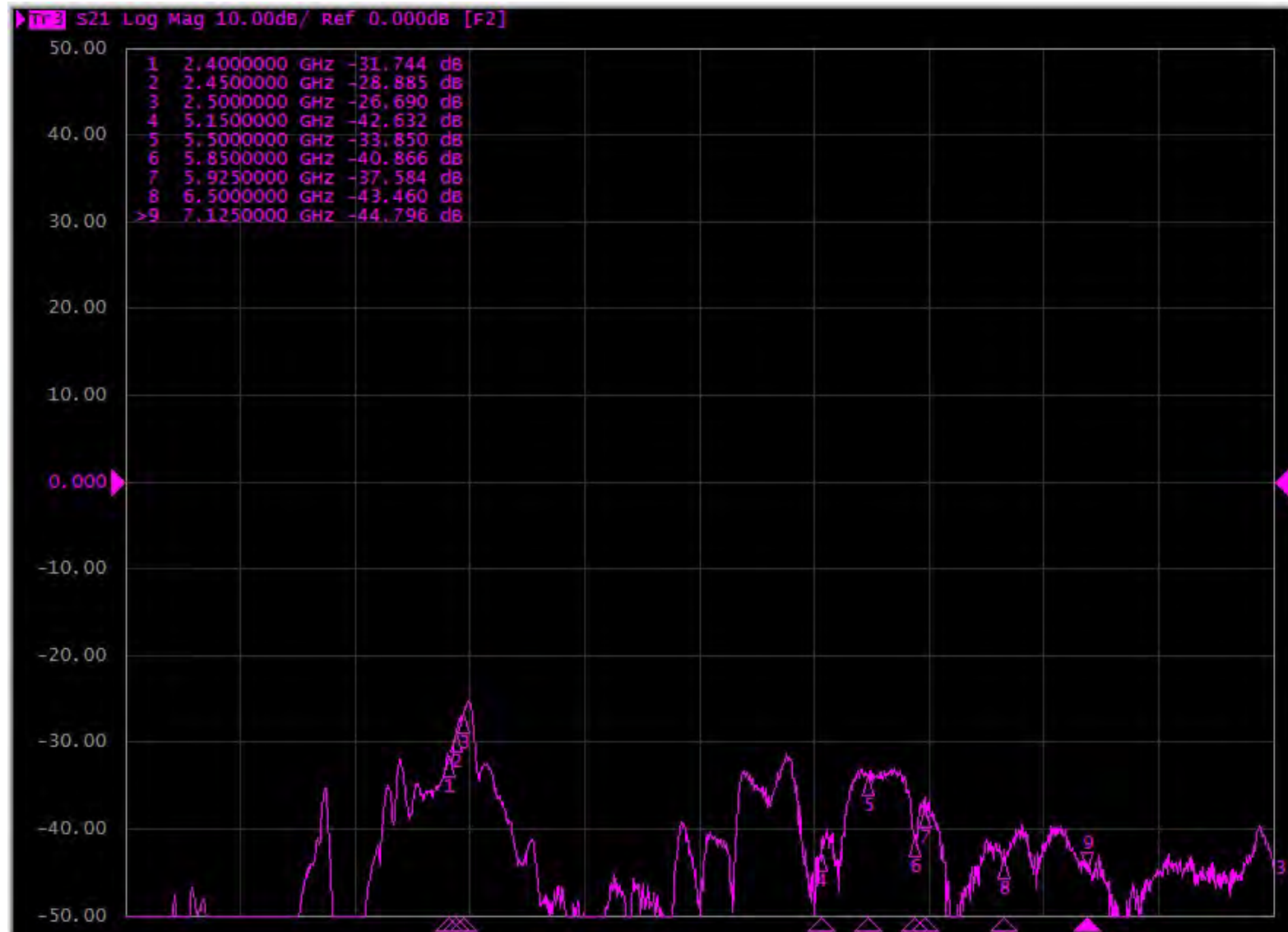
# Isolation – Ant 2 & Ant 9



# Isolation – Ant 2 & Ant 10

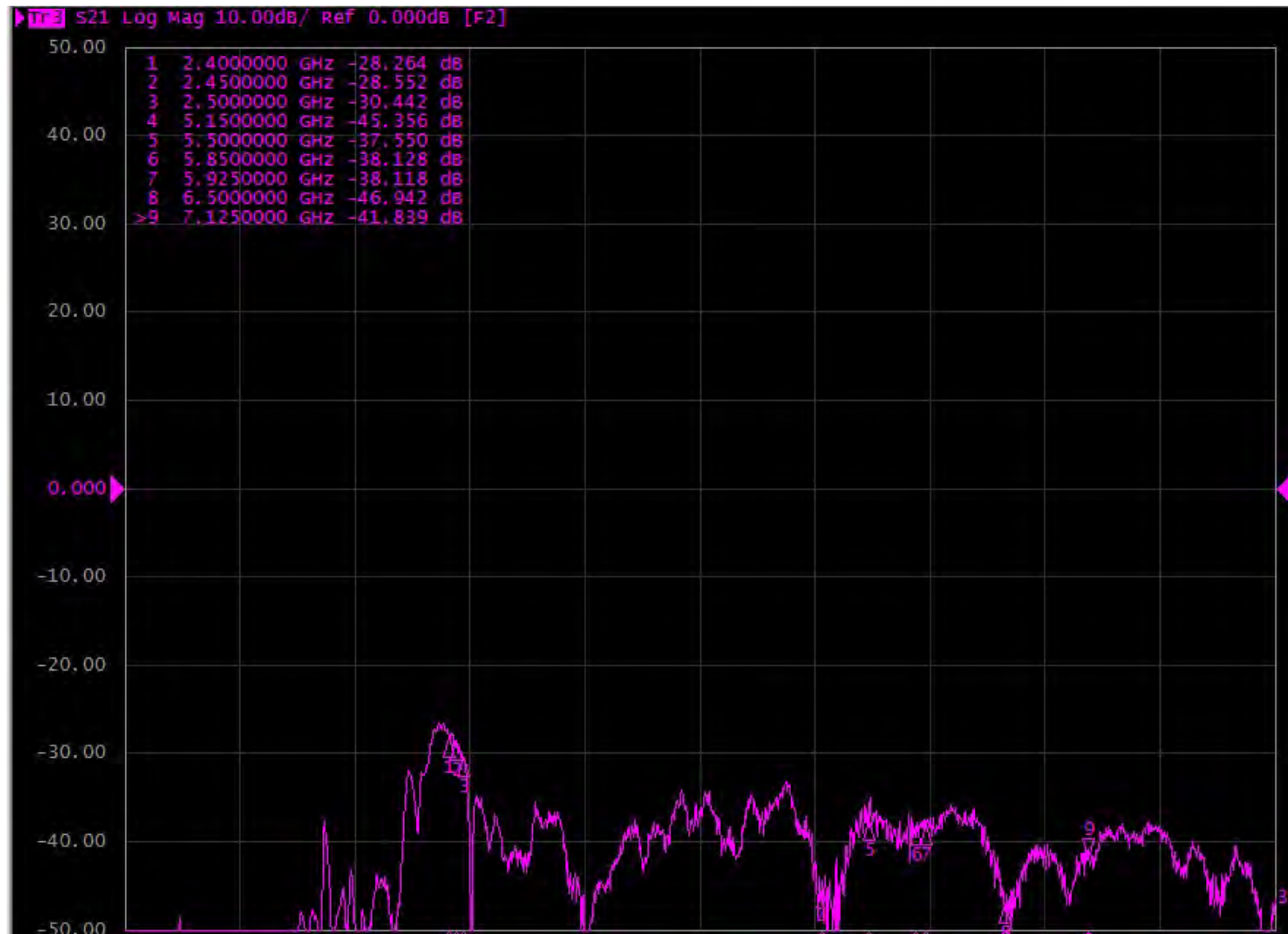


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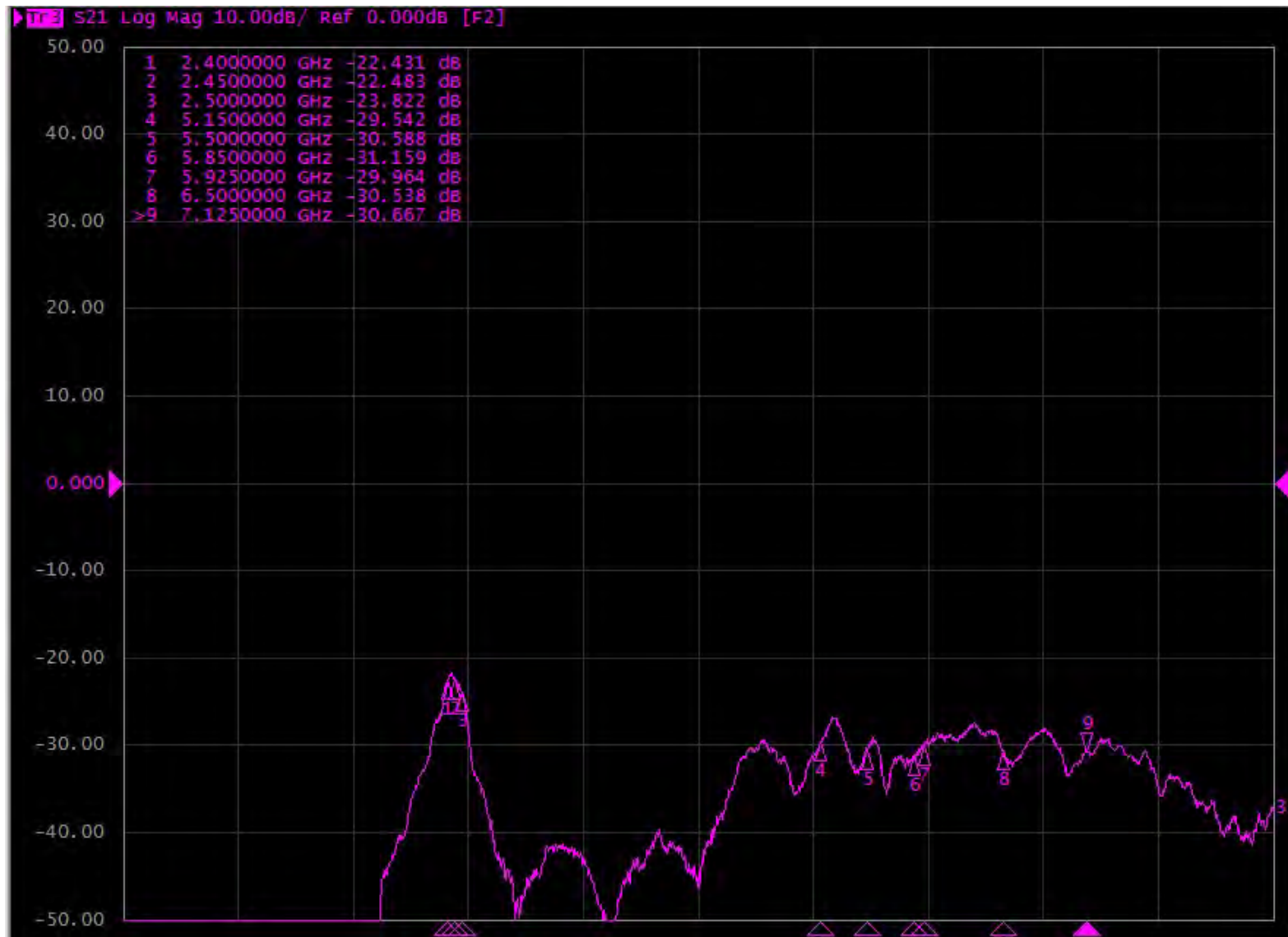




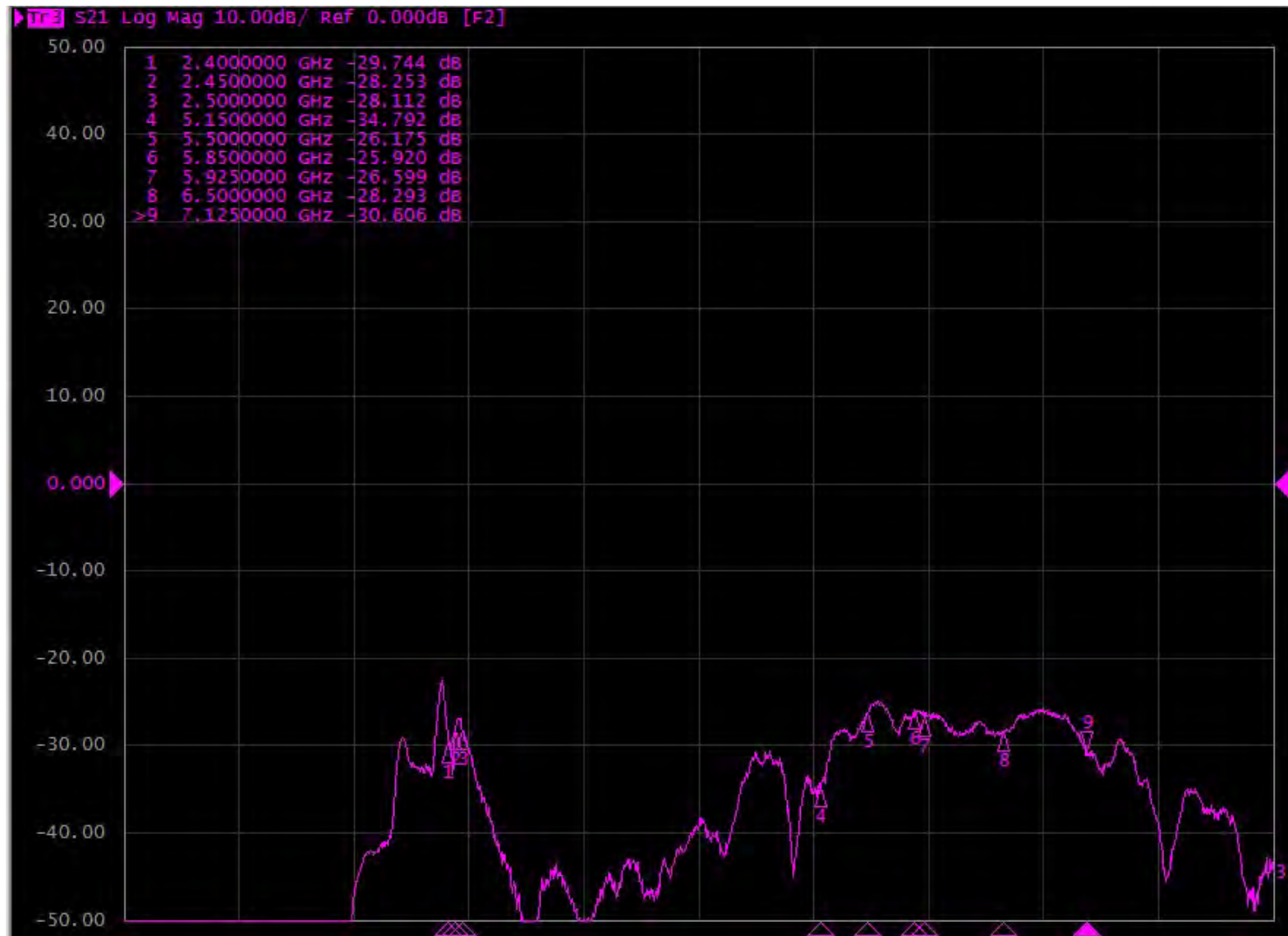
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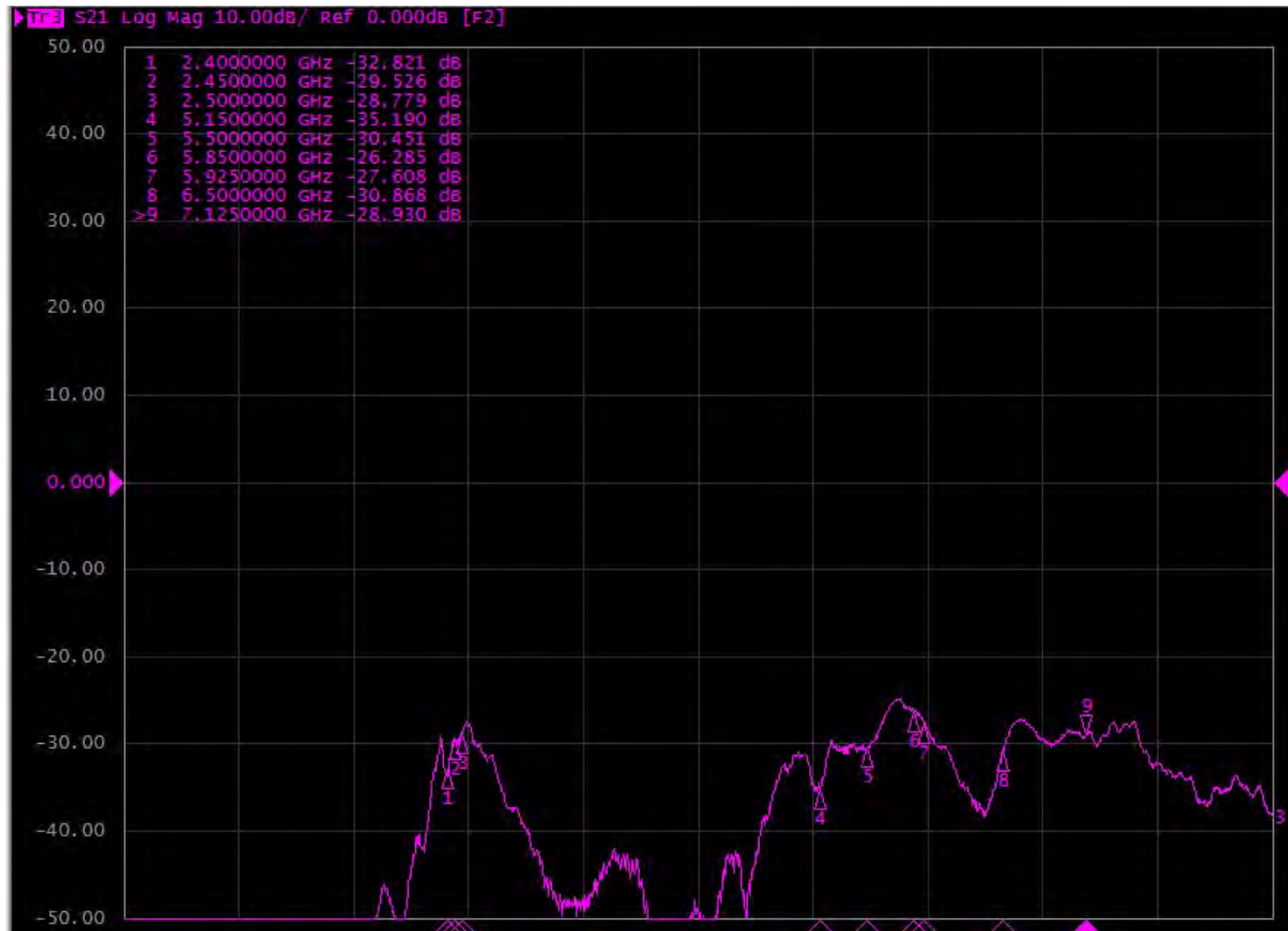
# Isolation – Ant 2 & Ant 13



# Isolation – Ant 2 & Ant 14

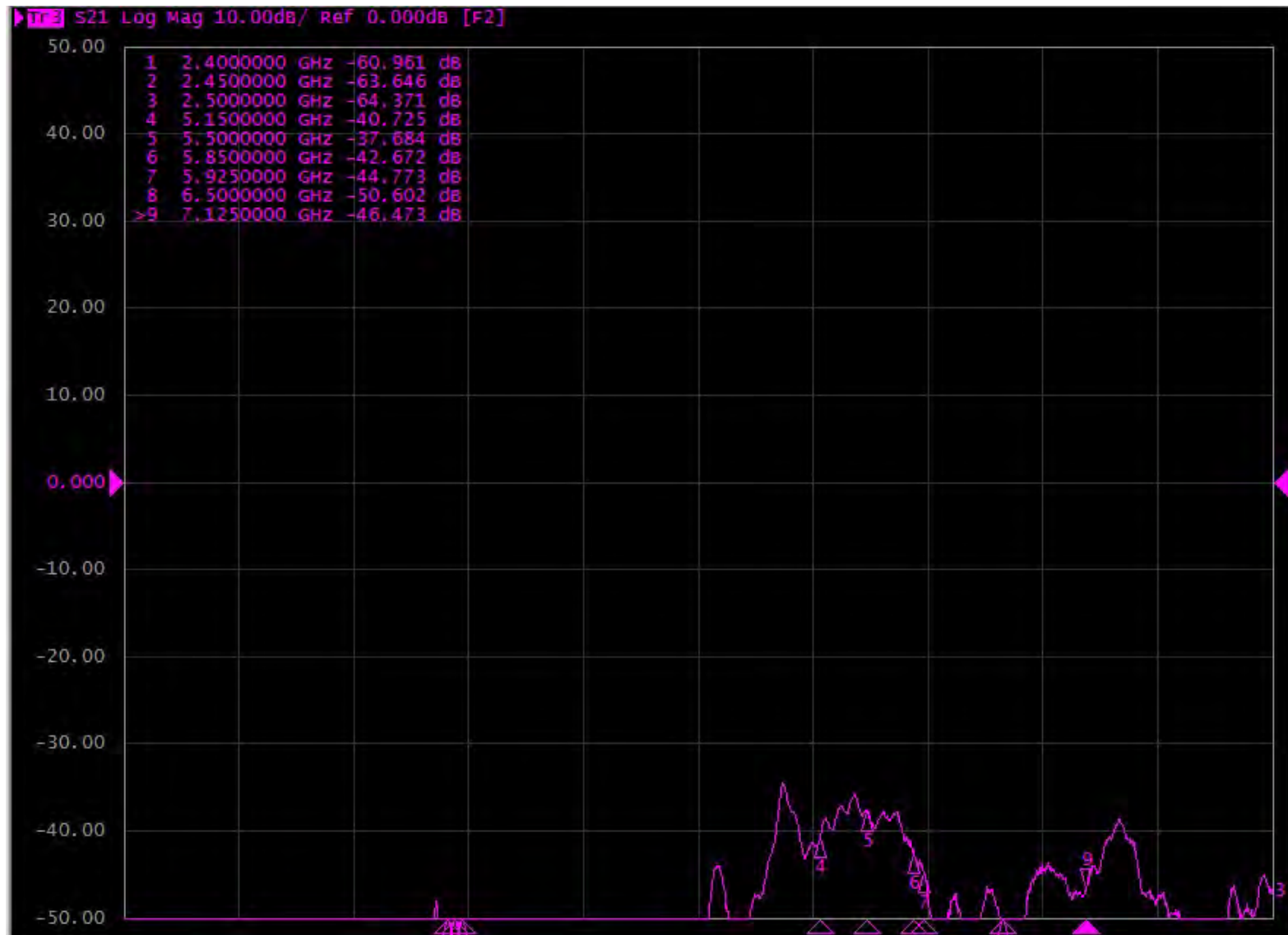


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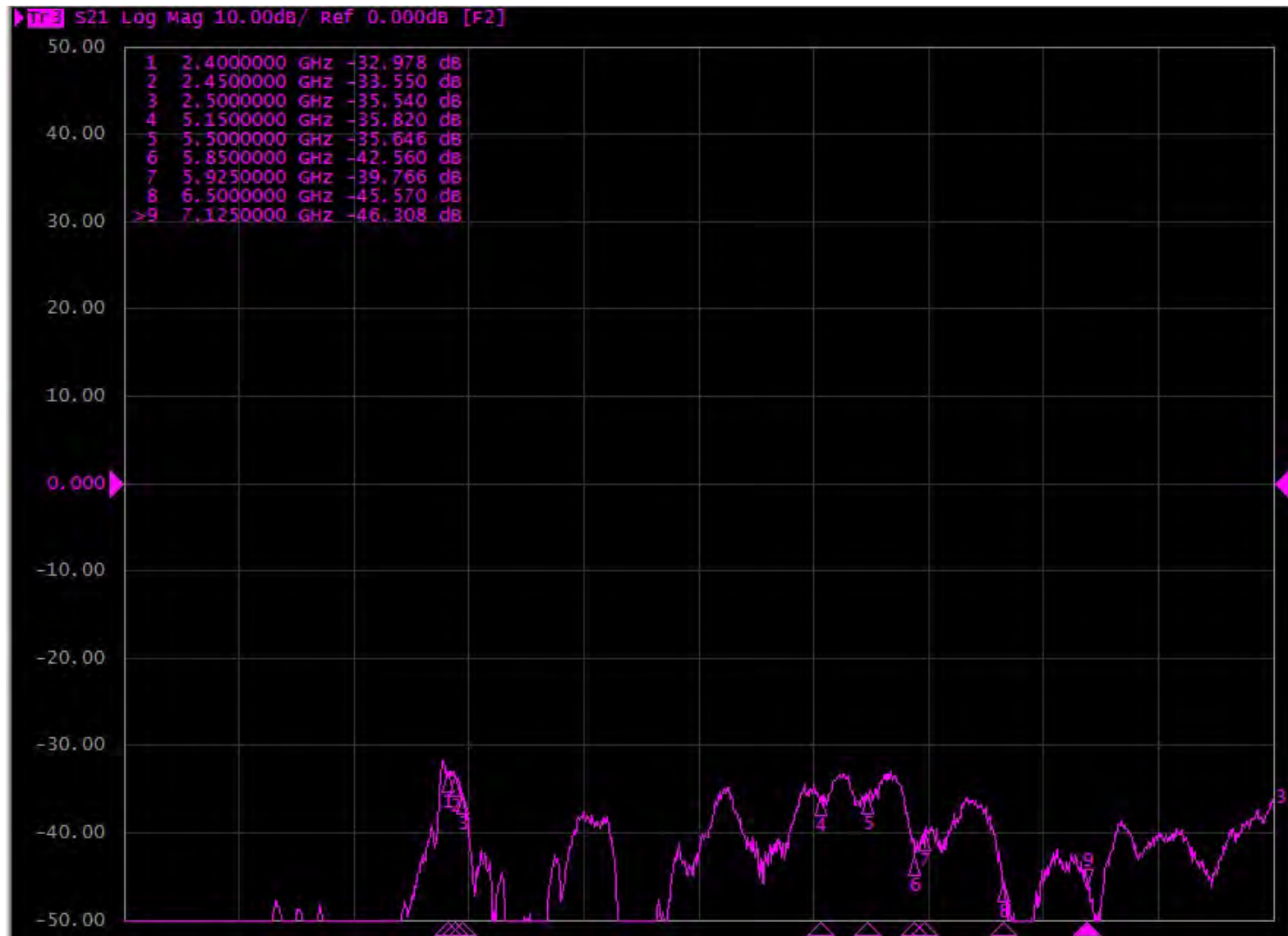




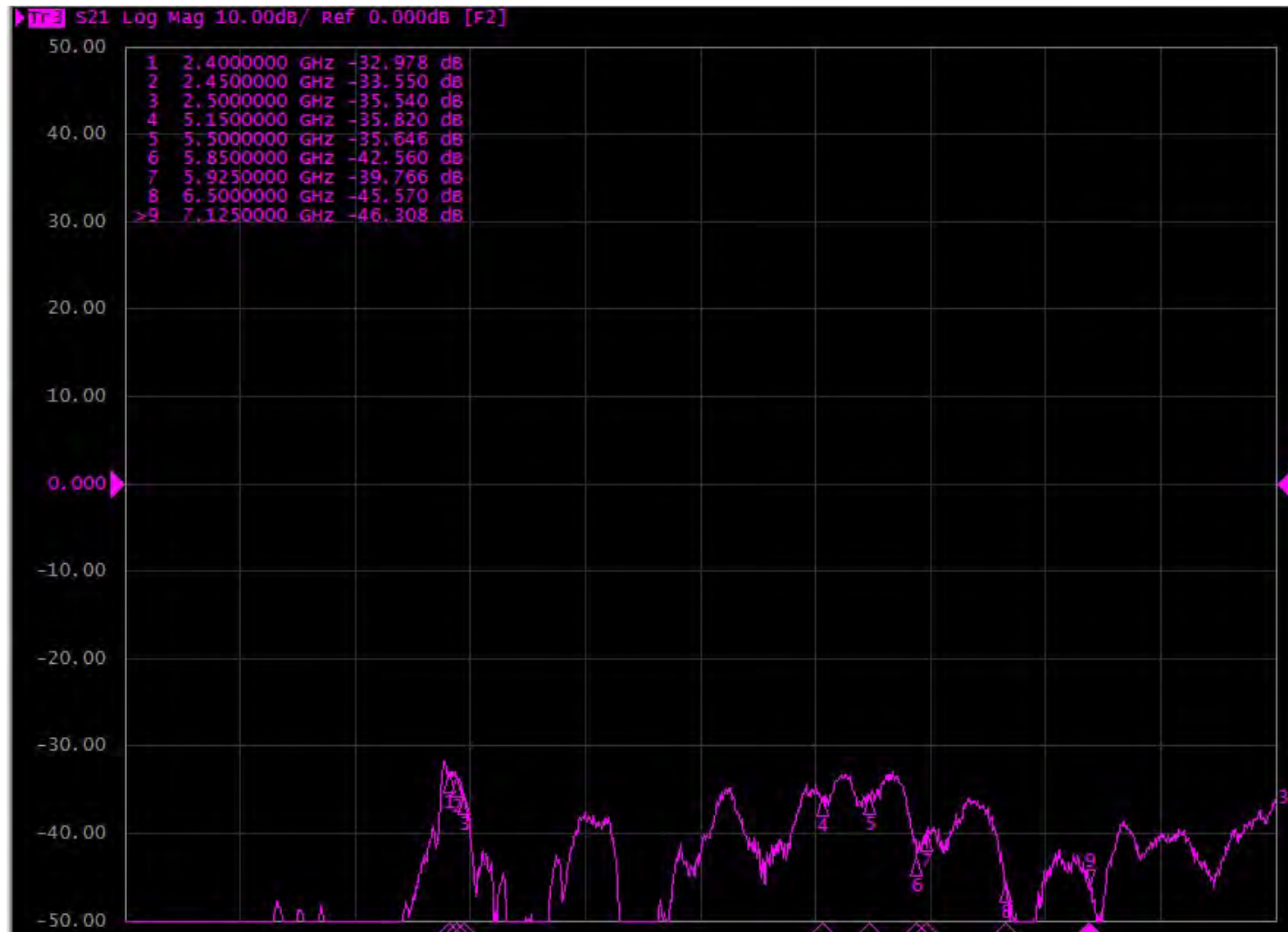
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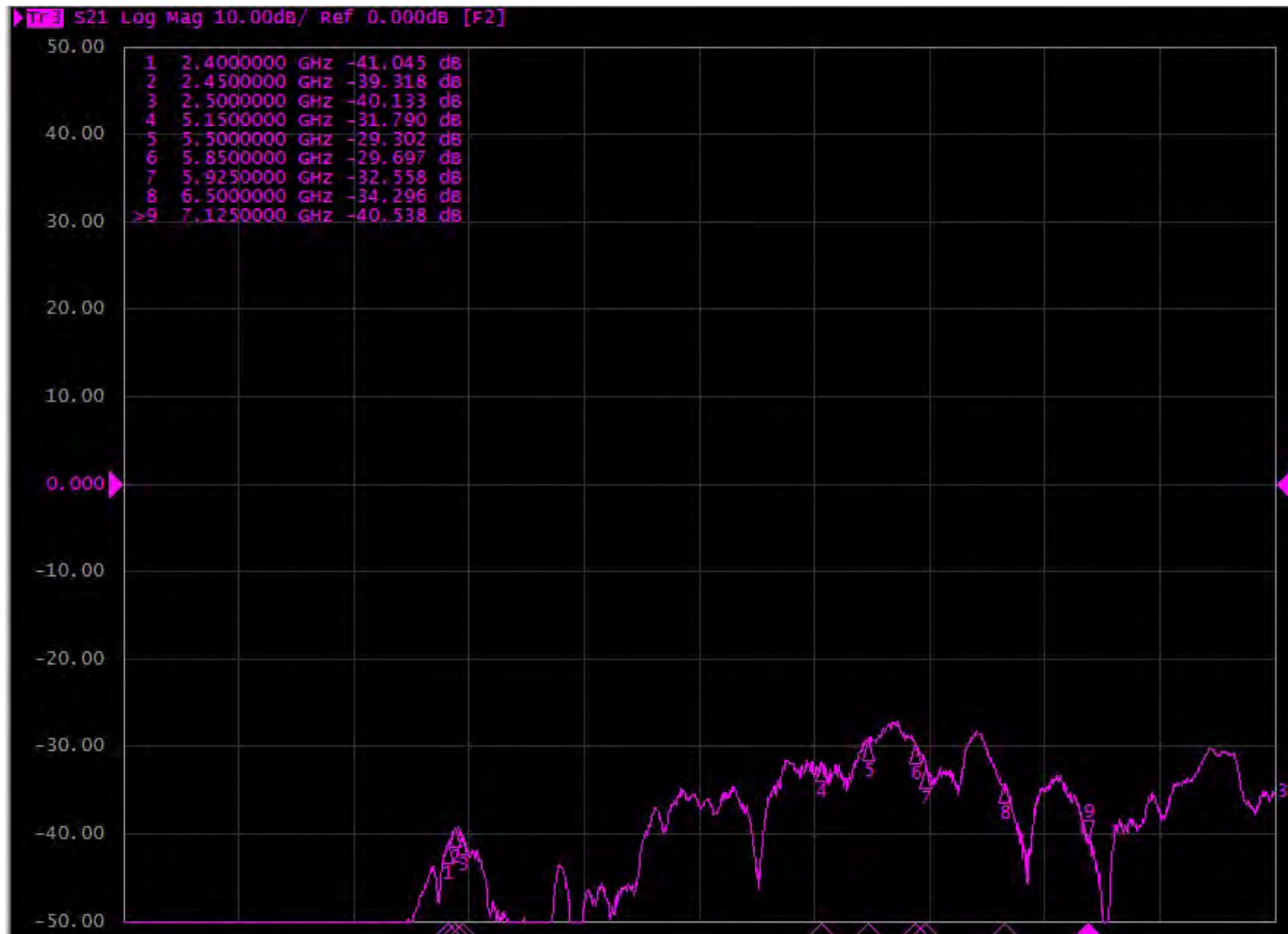
# Isolation – Ant 3 & Ant 6



# Isolation – Ant 3 & Ant 7

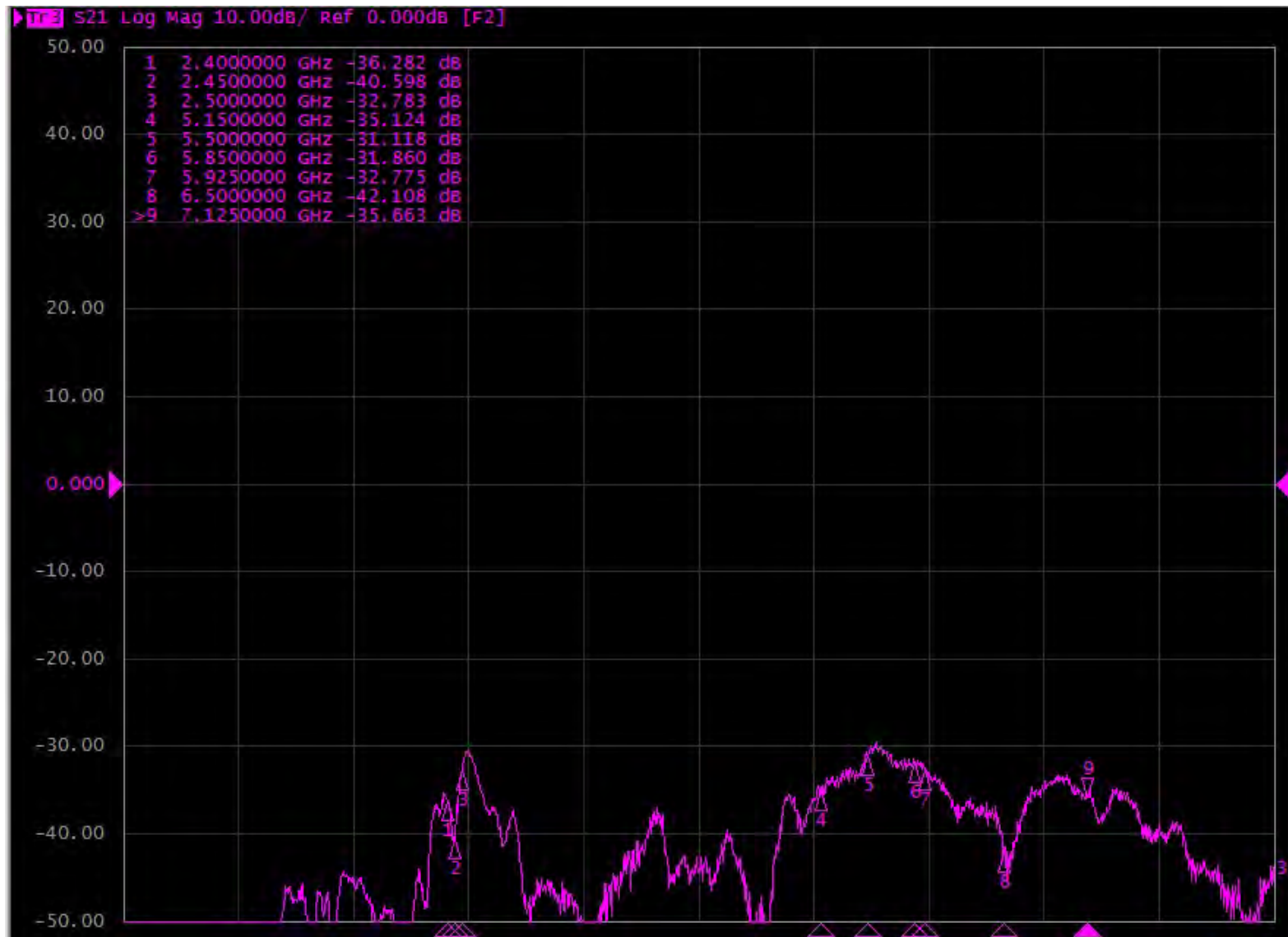


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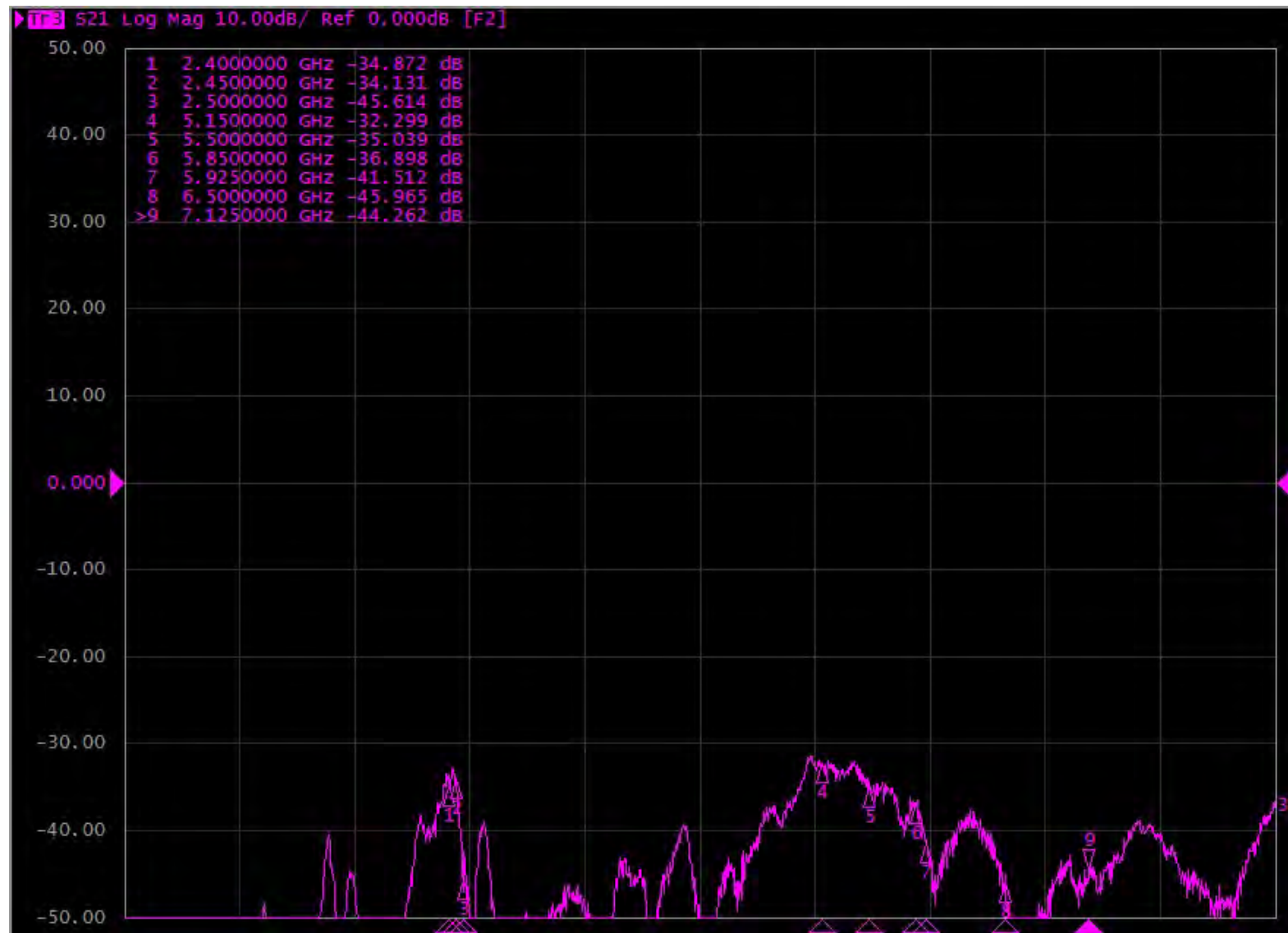




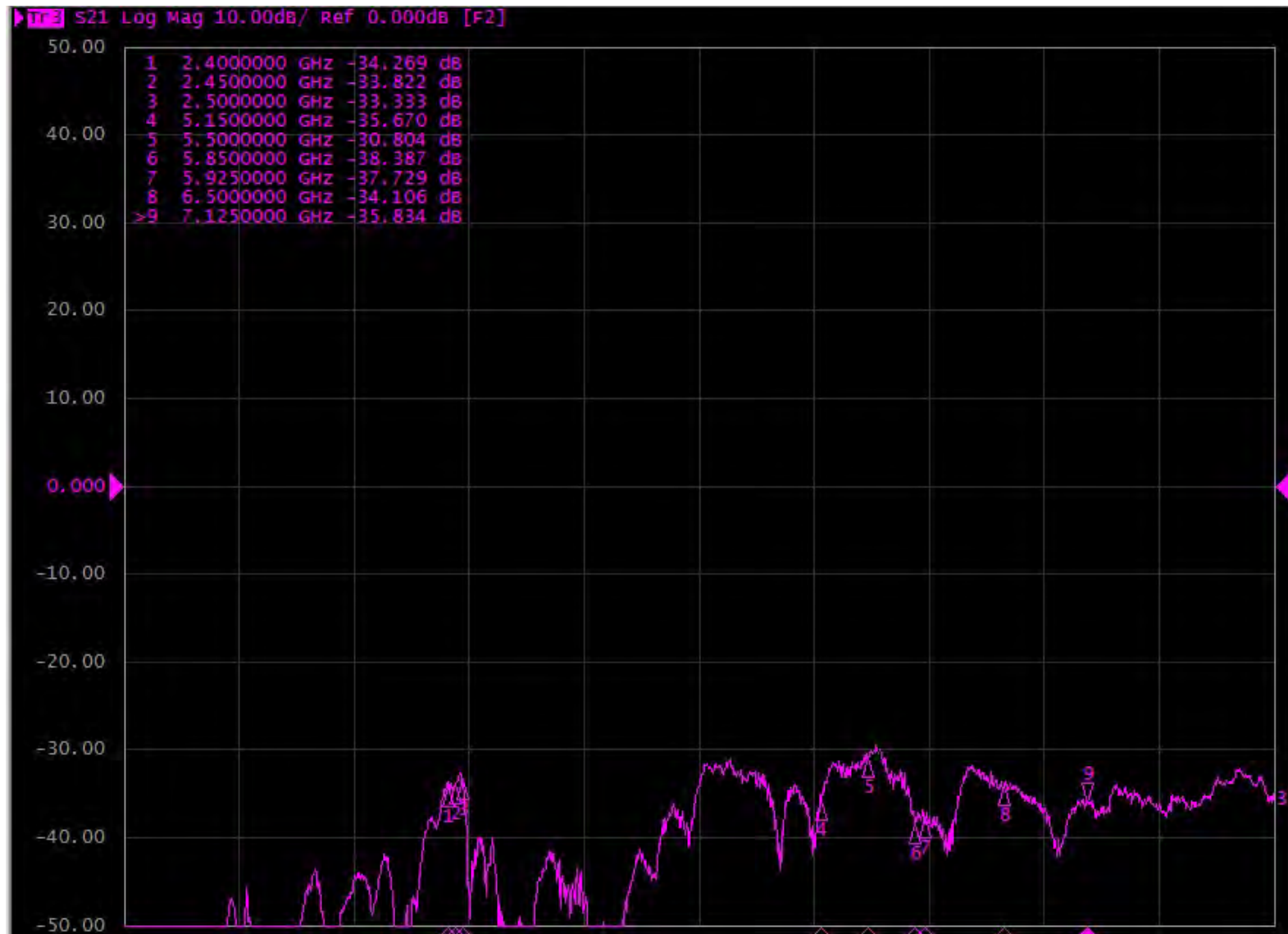
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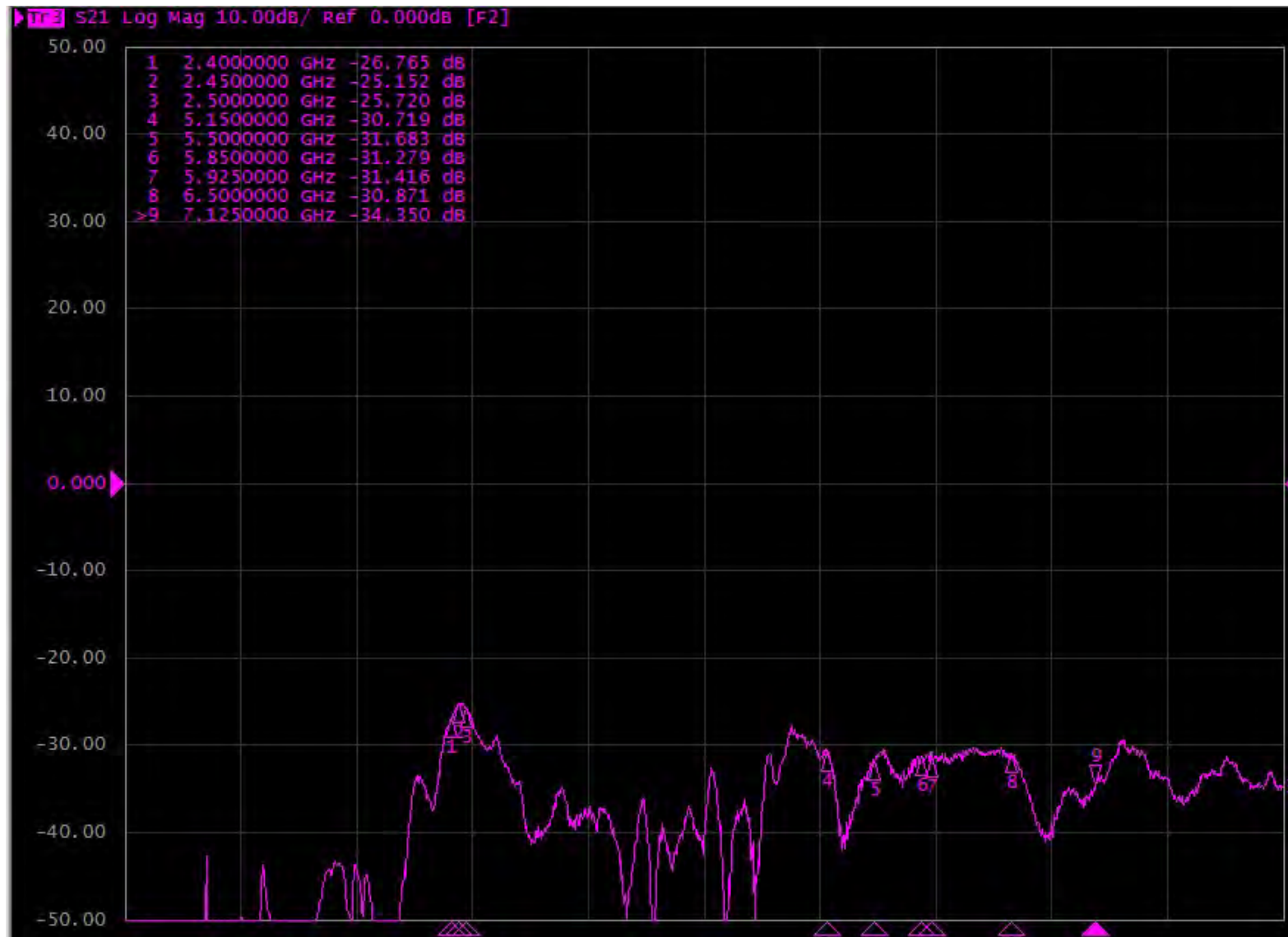
# Isolation – Ant 3 & Ant 10



# Isolation – Ant 3 & Ant 11

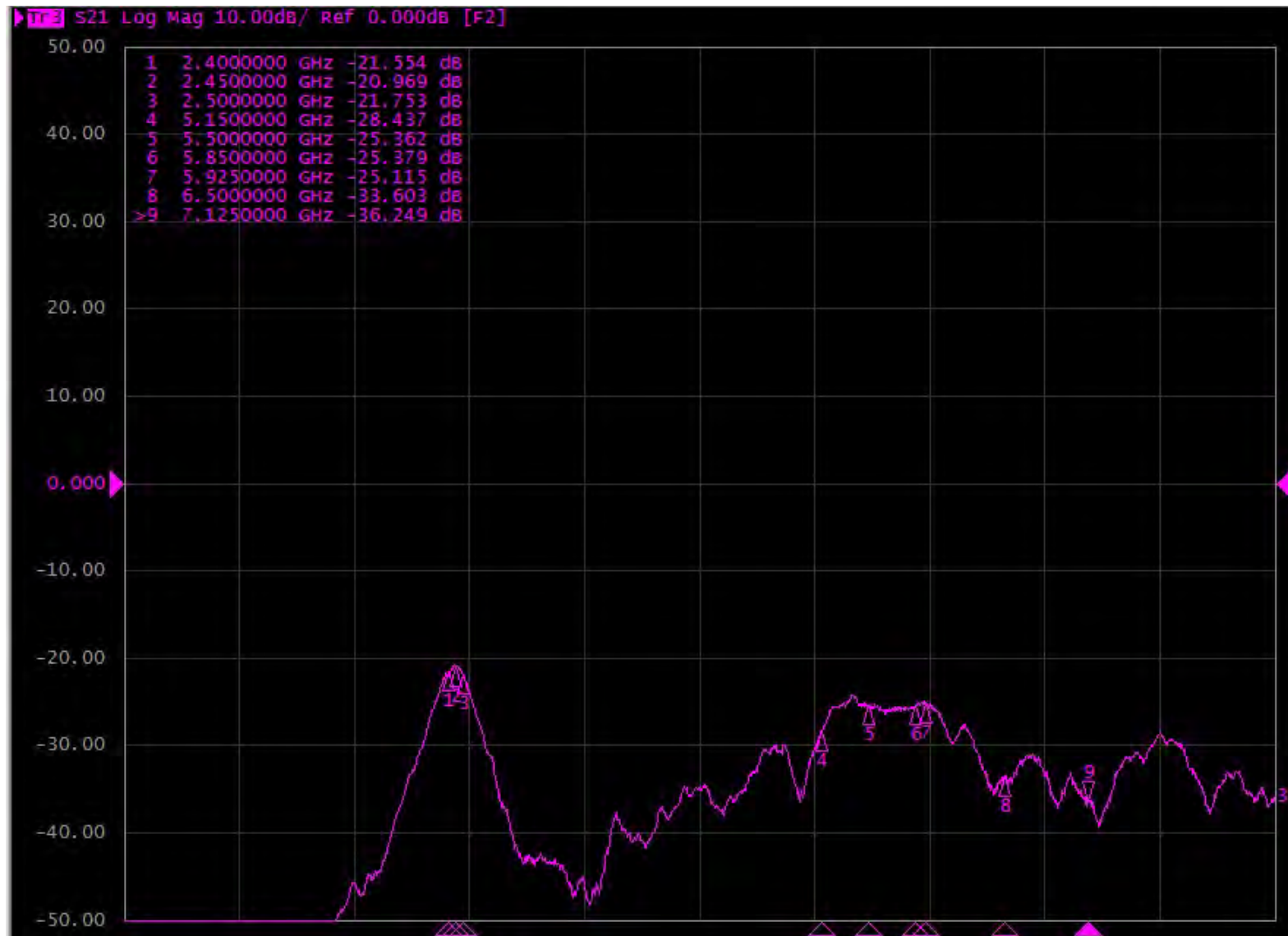


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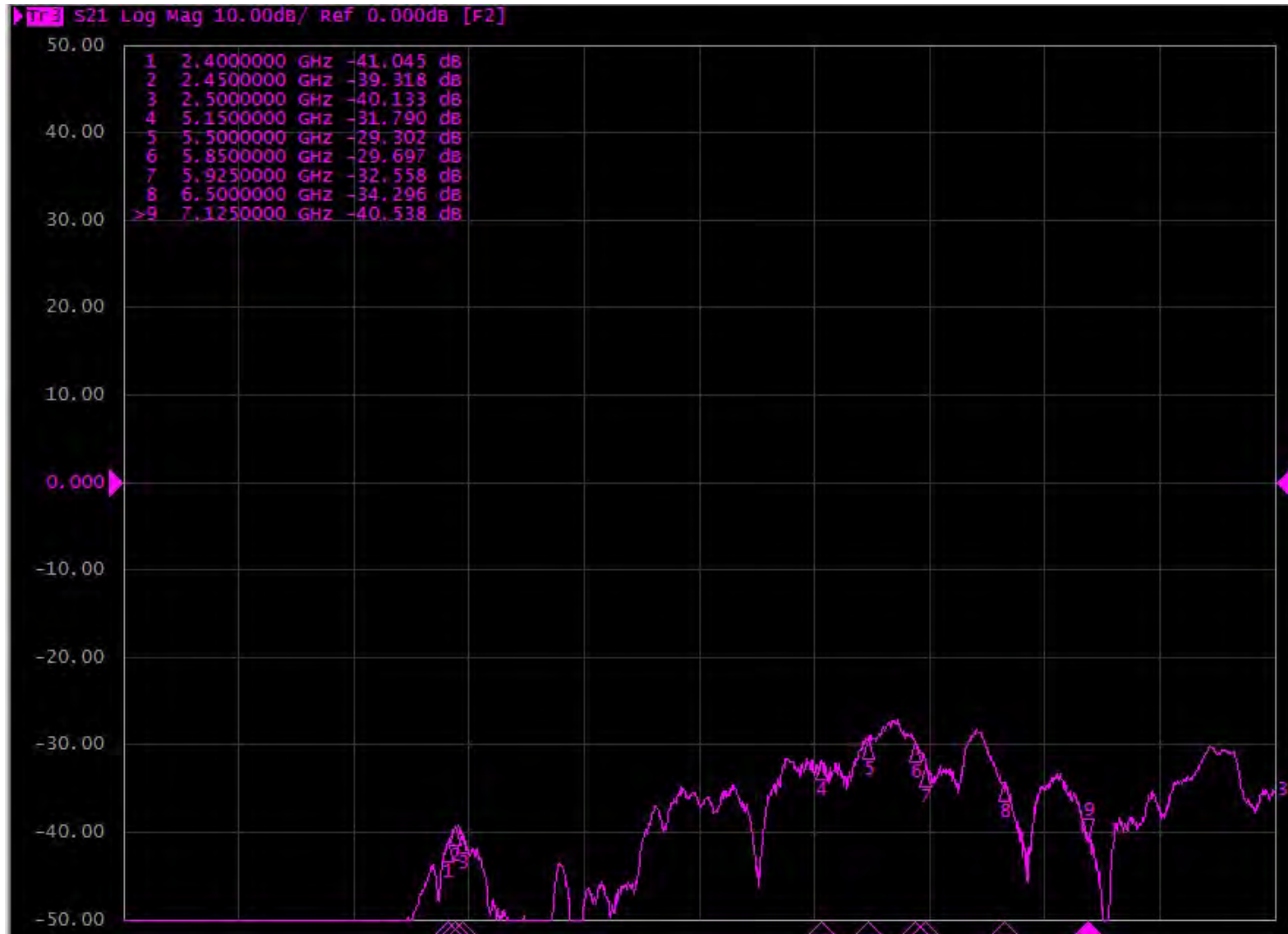




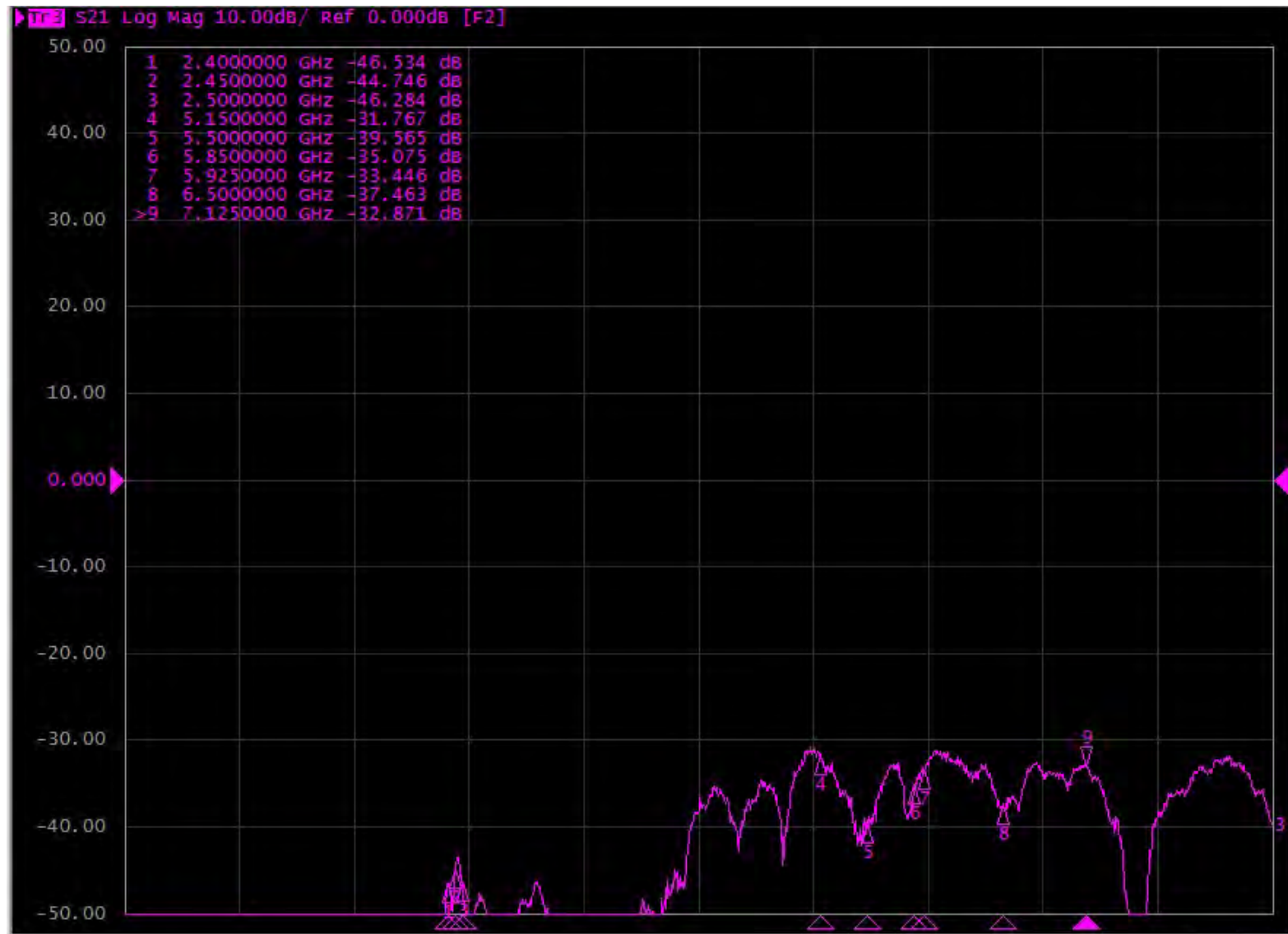
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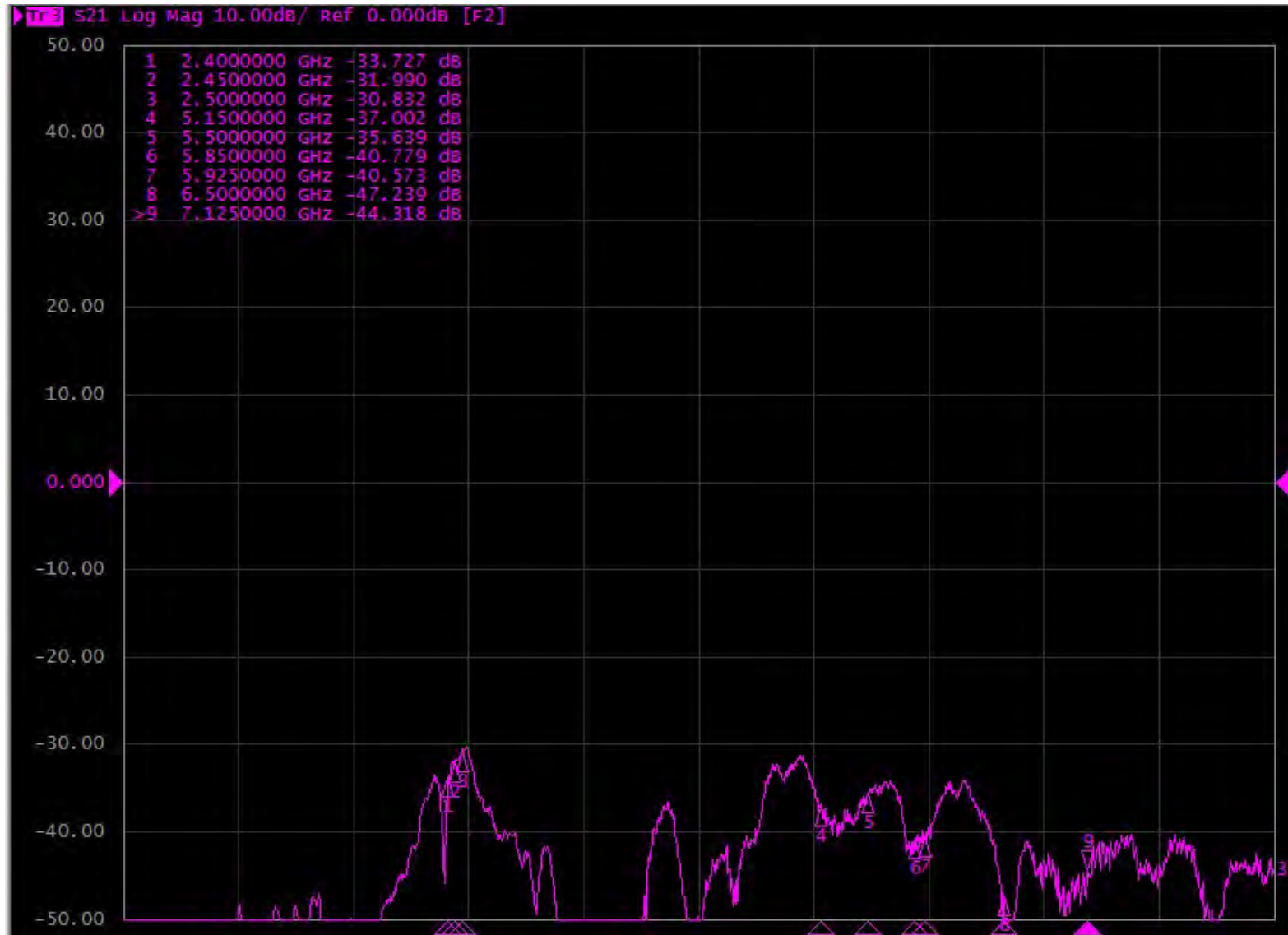
# Isolation – Ant 3 & Ant 14



# Isolation – Ant 4 & Ant 5

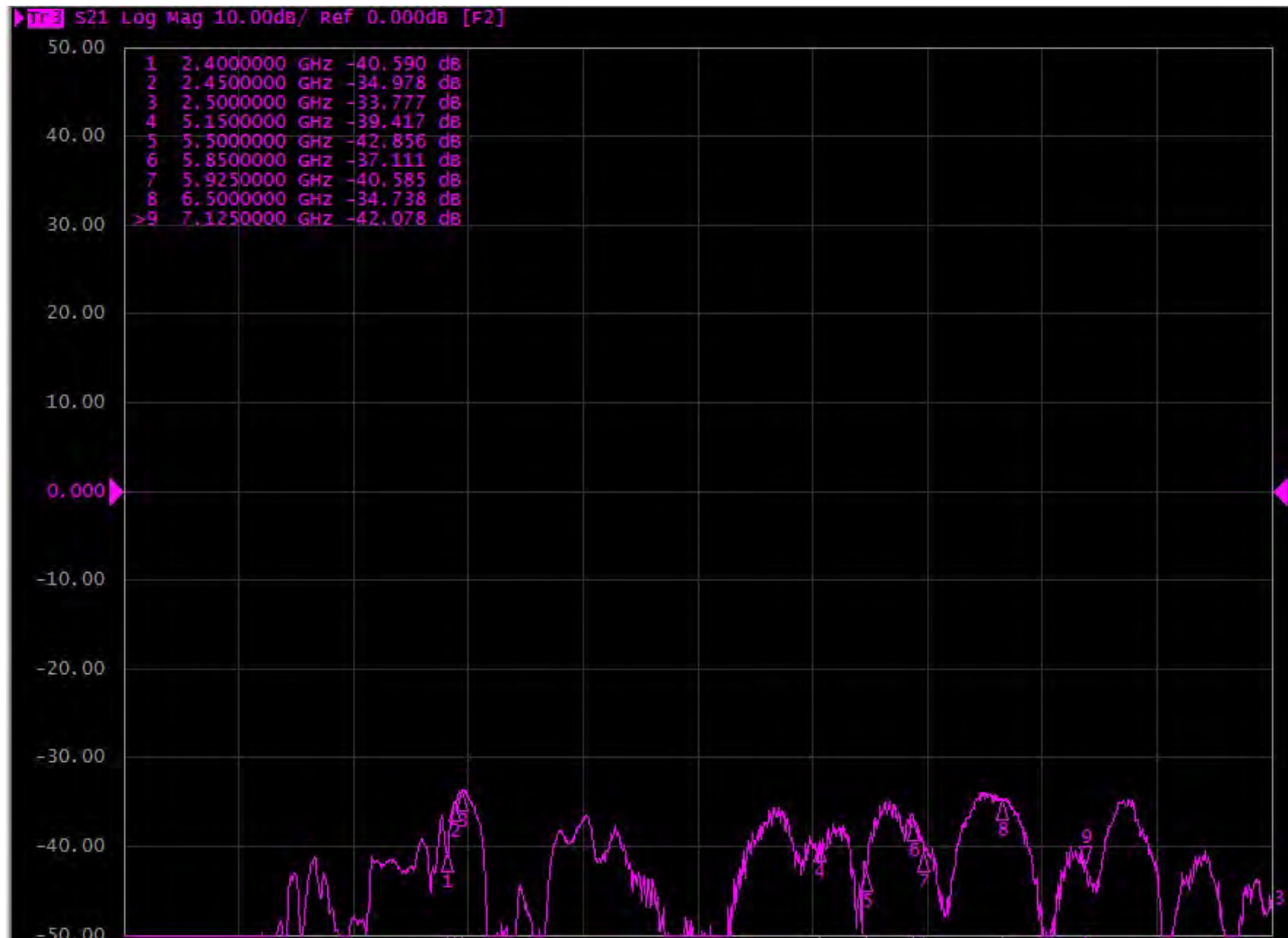


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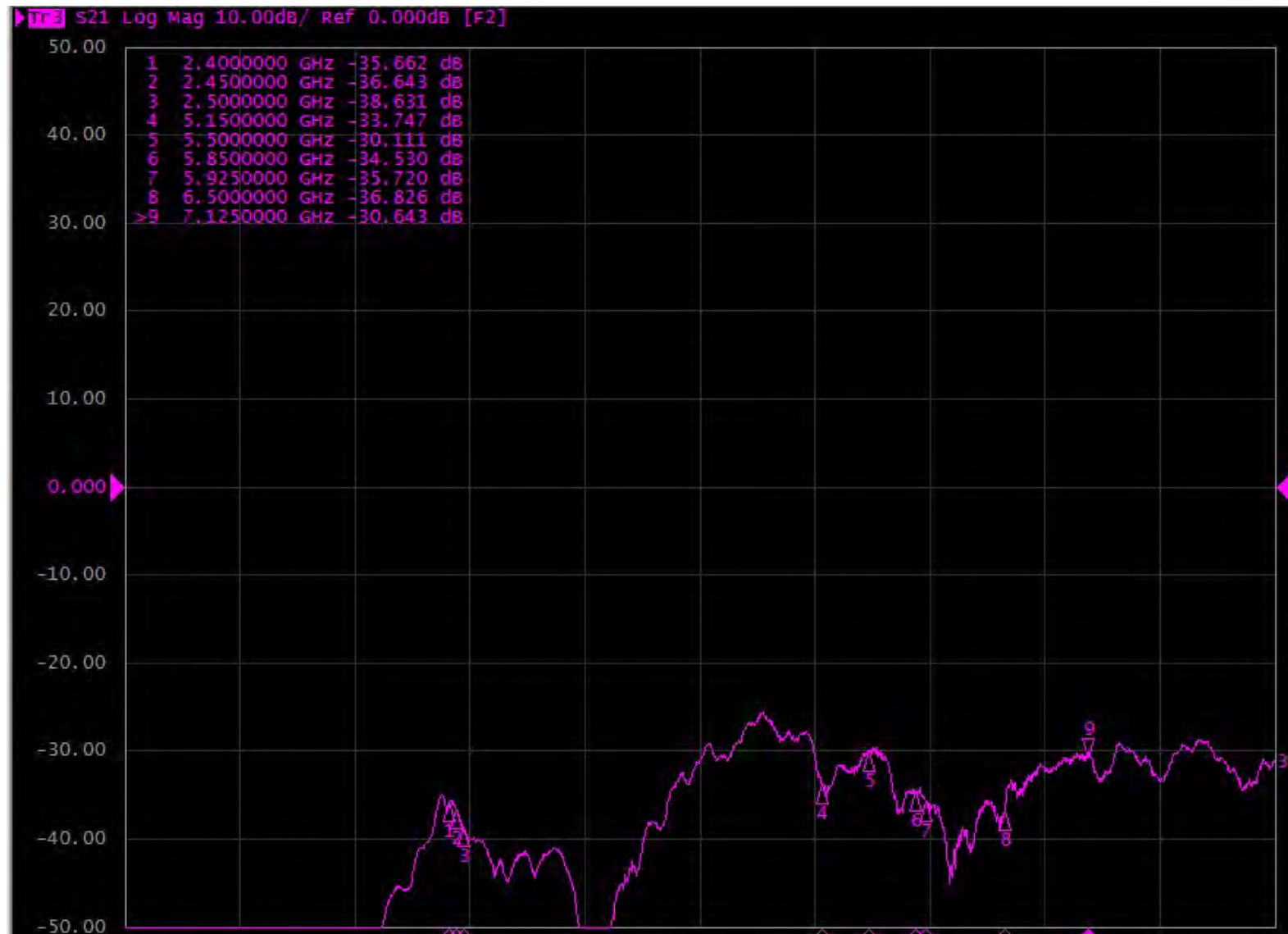




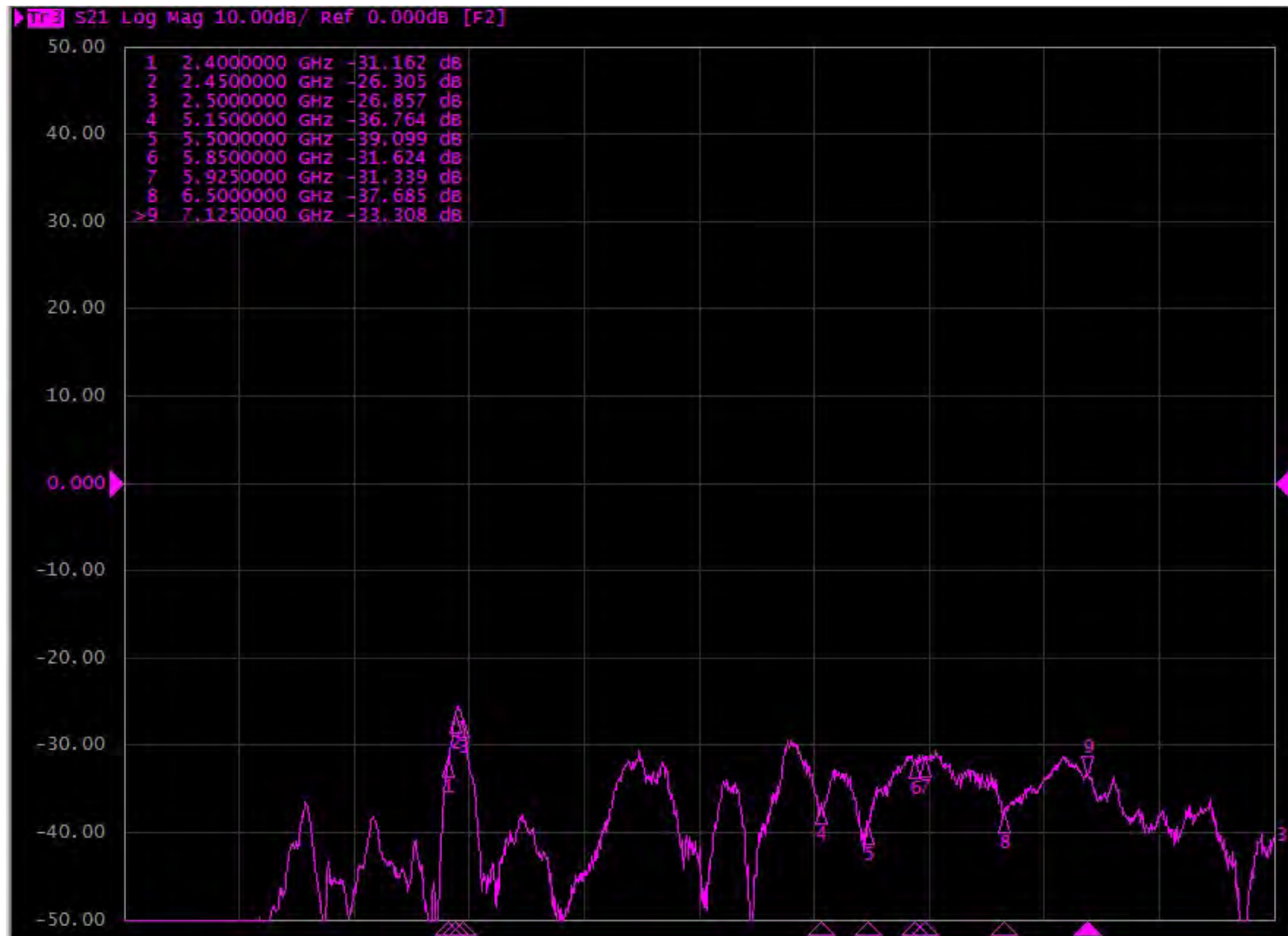
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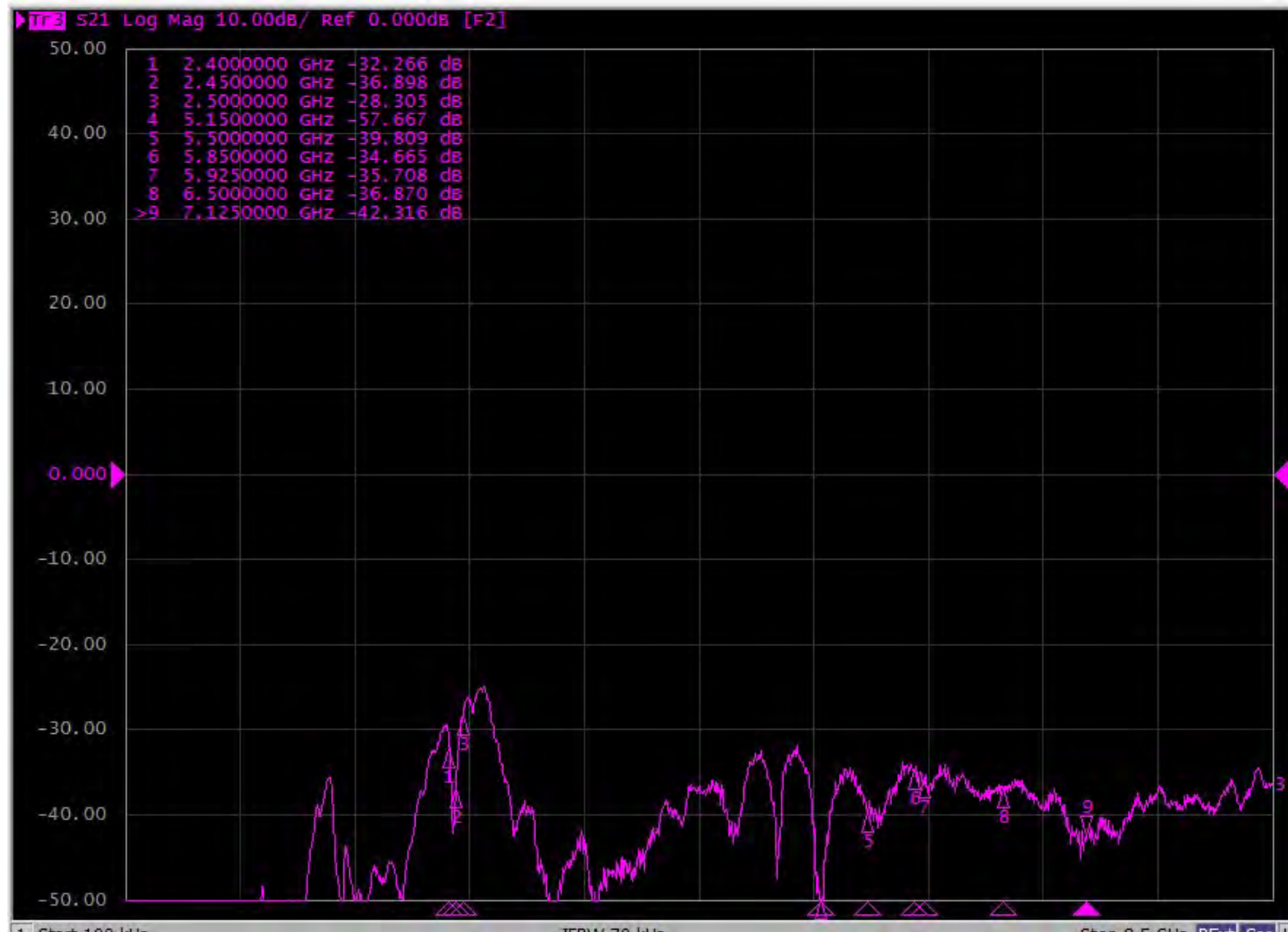
# Isolation – Ant 4 & Ant 8



# Isolation – Ant 4 & Ant 9

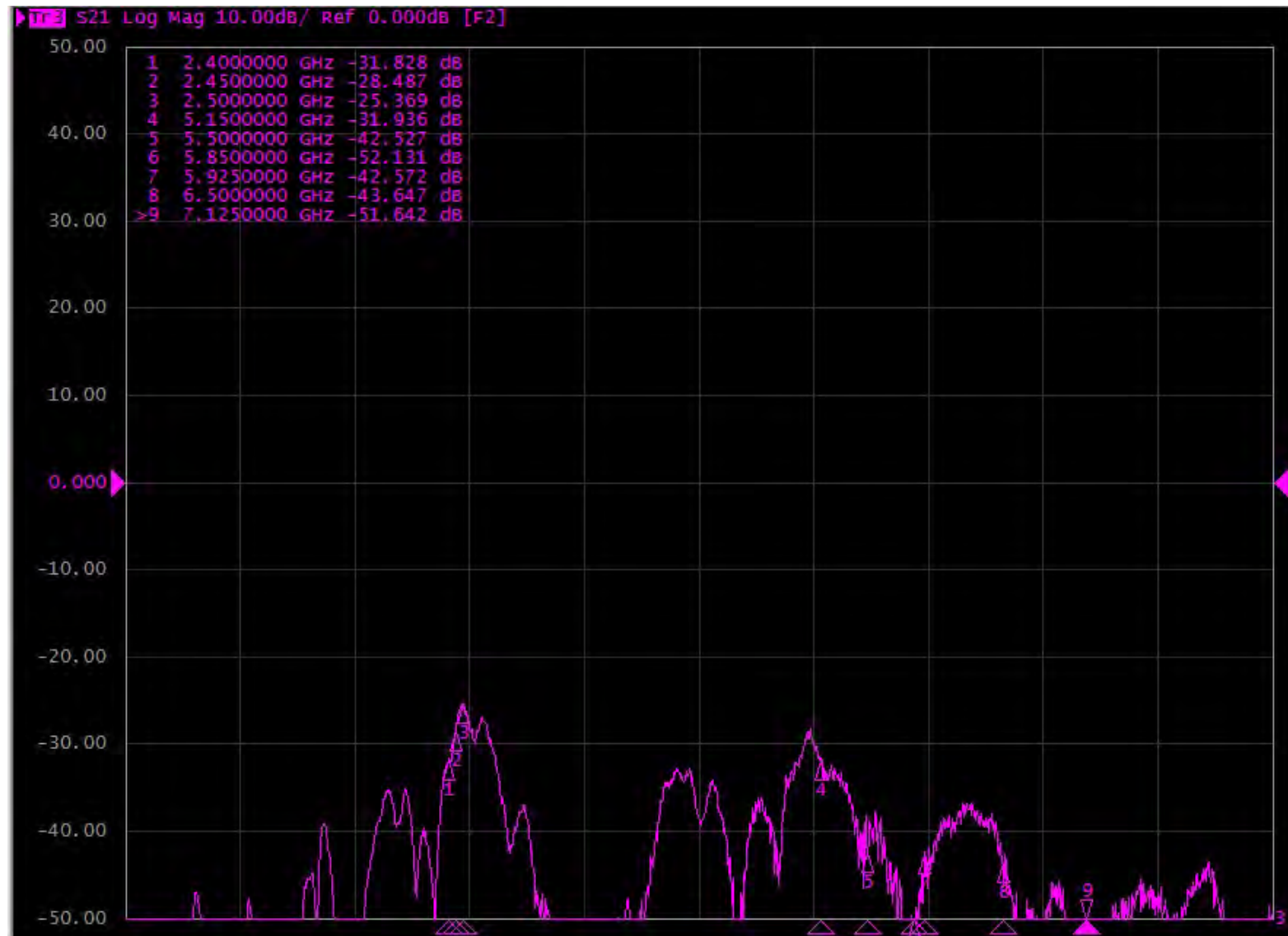


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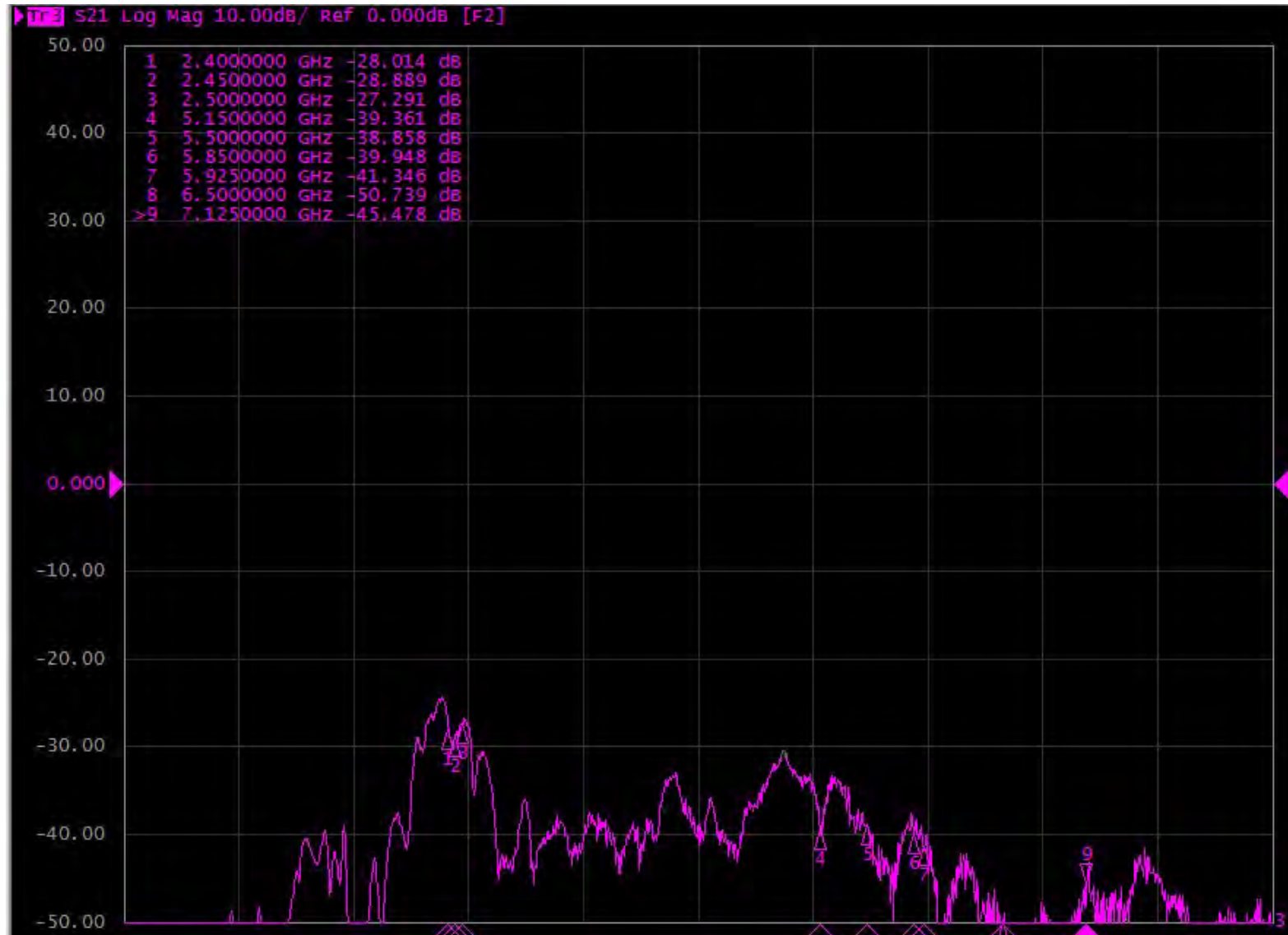




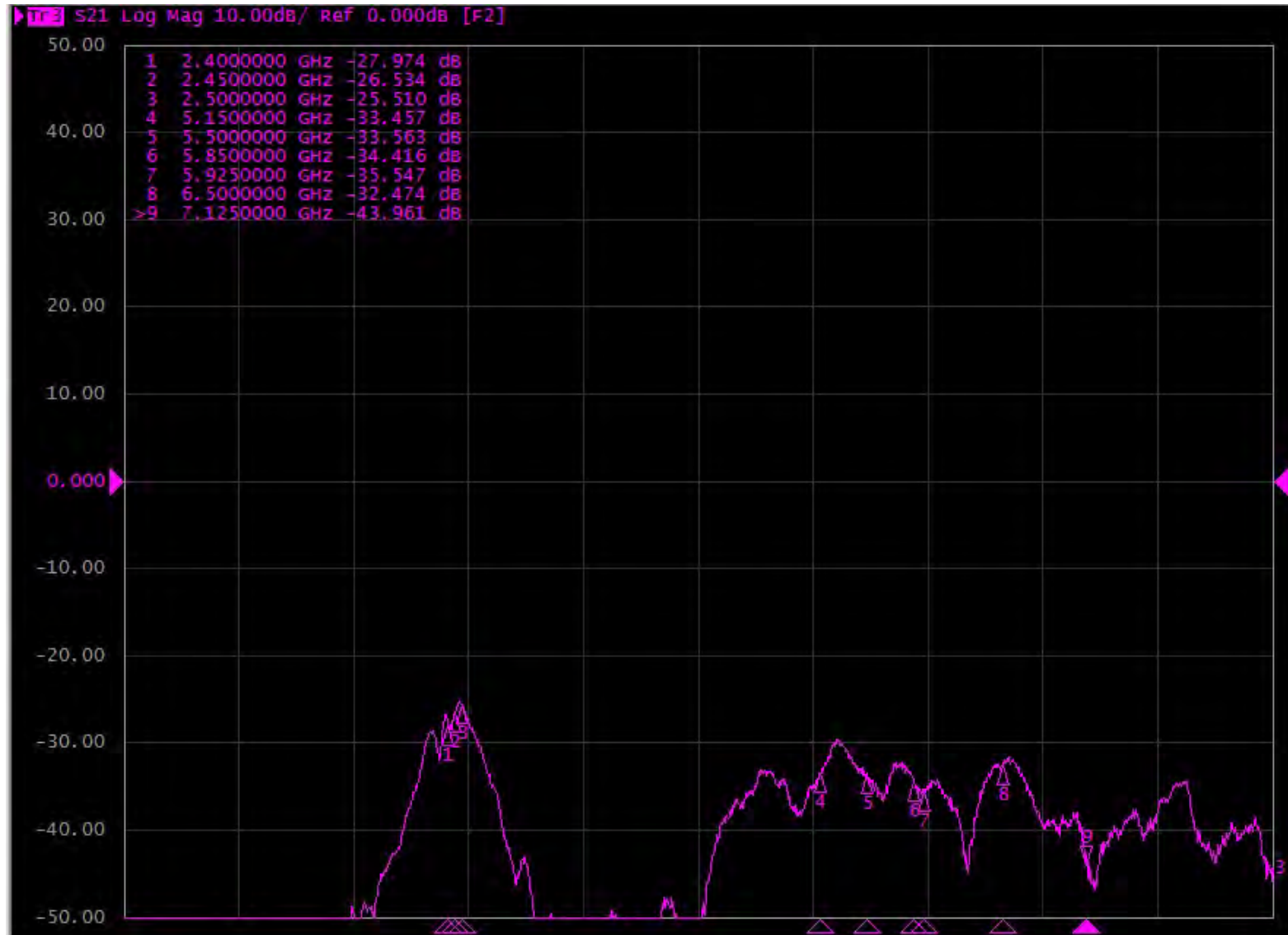
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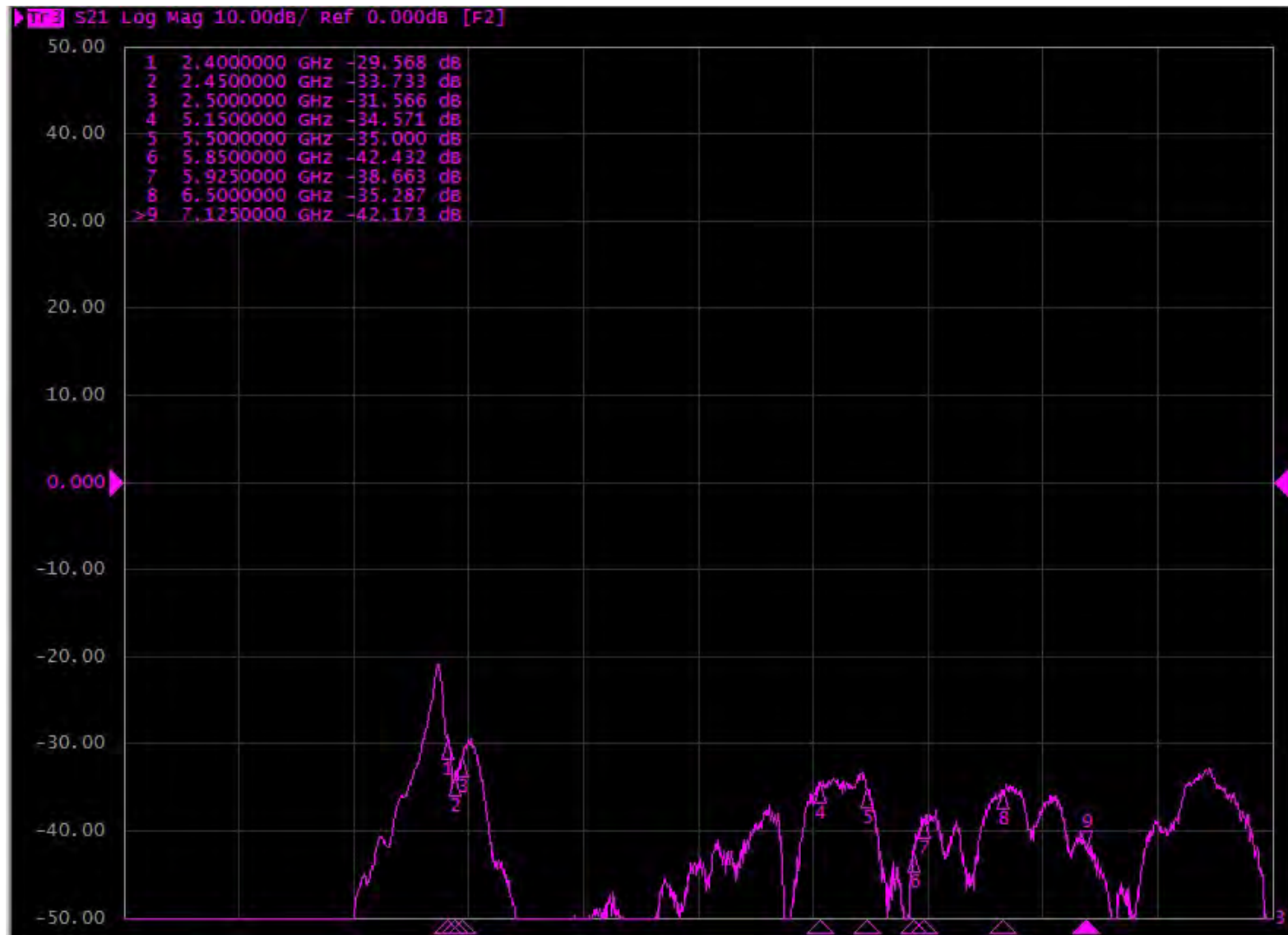
# Isolation – Ant 4 & Ant 12



# Isolation – Ant 4 & Ant 13

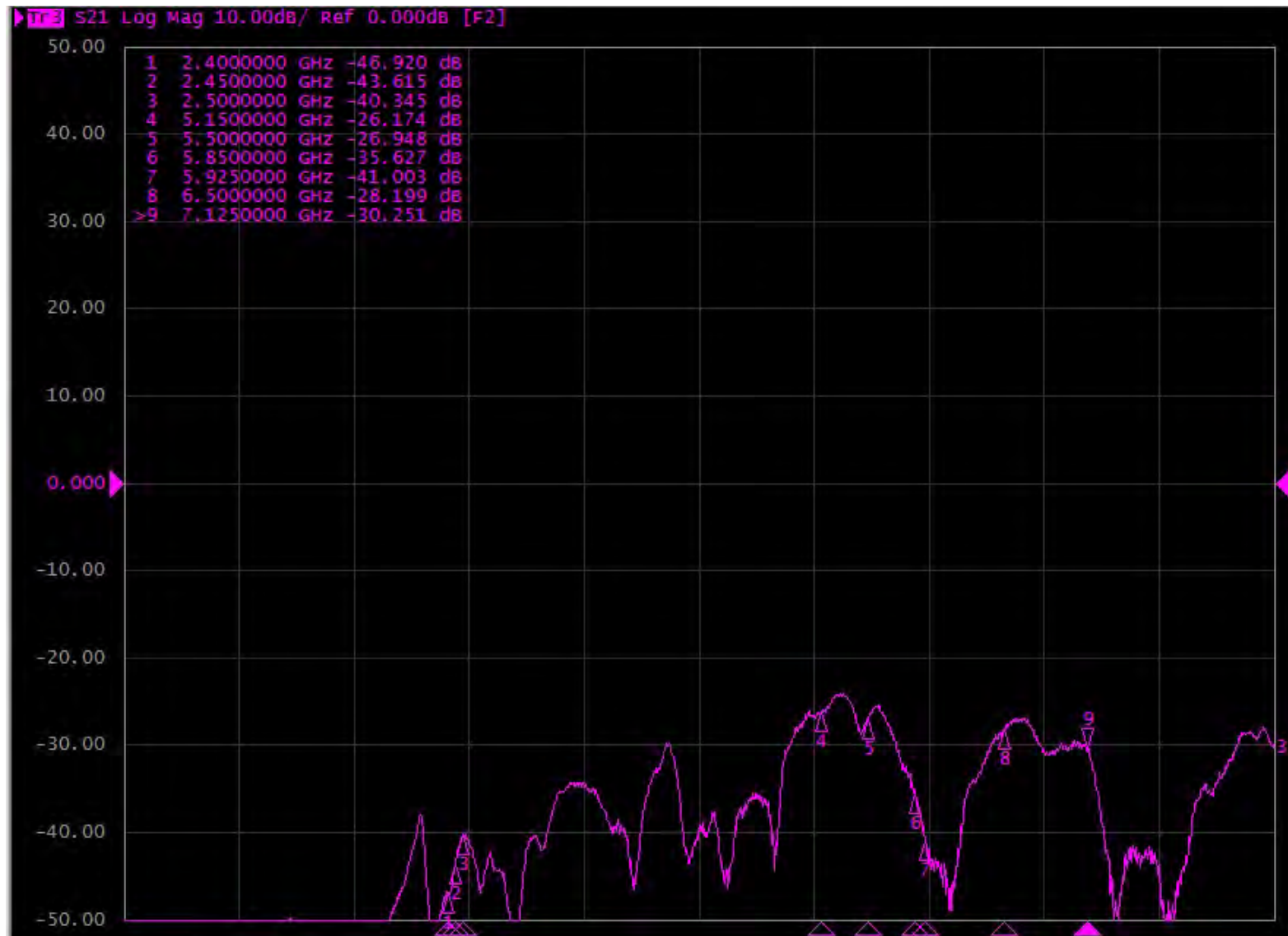


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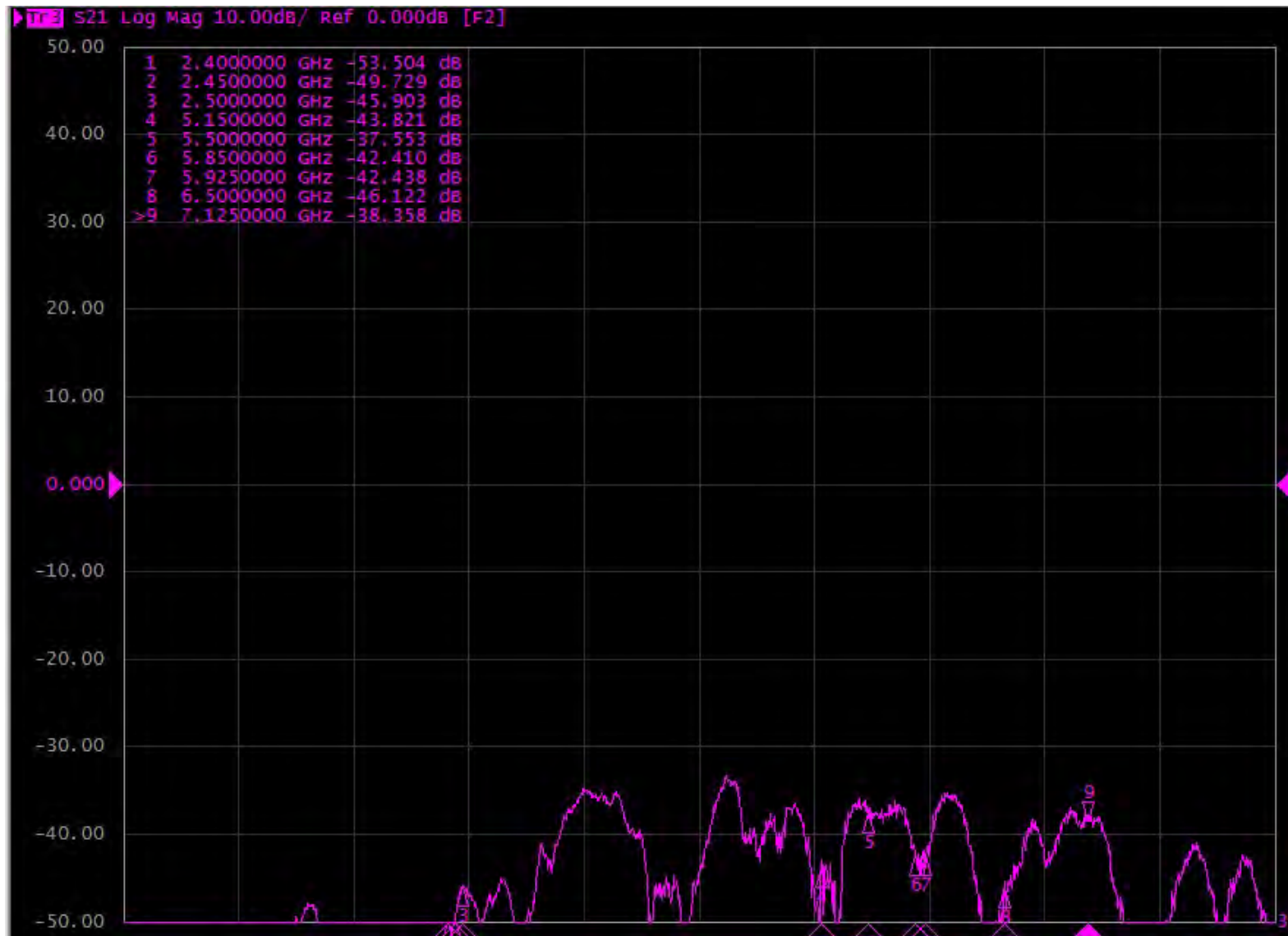




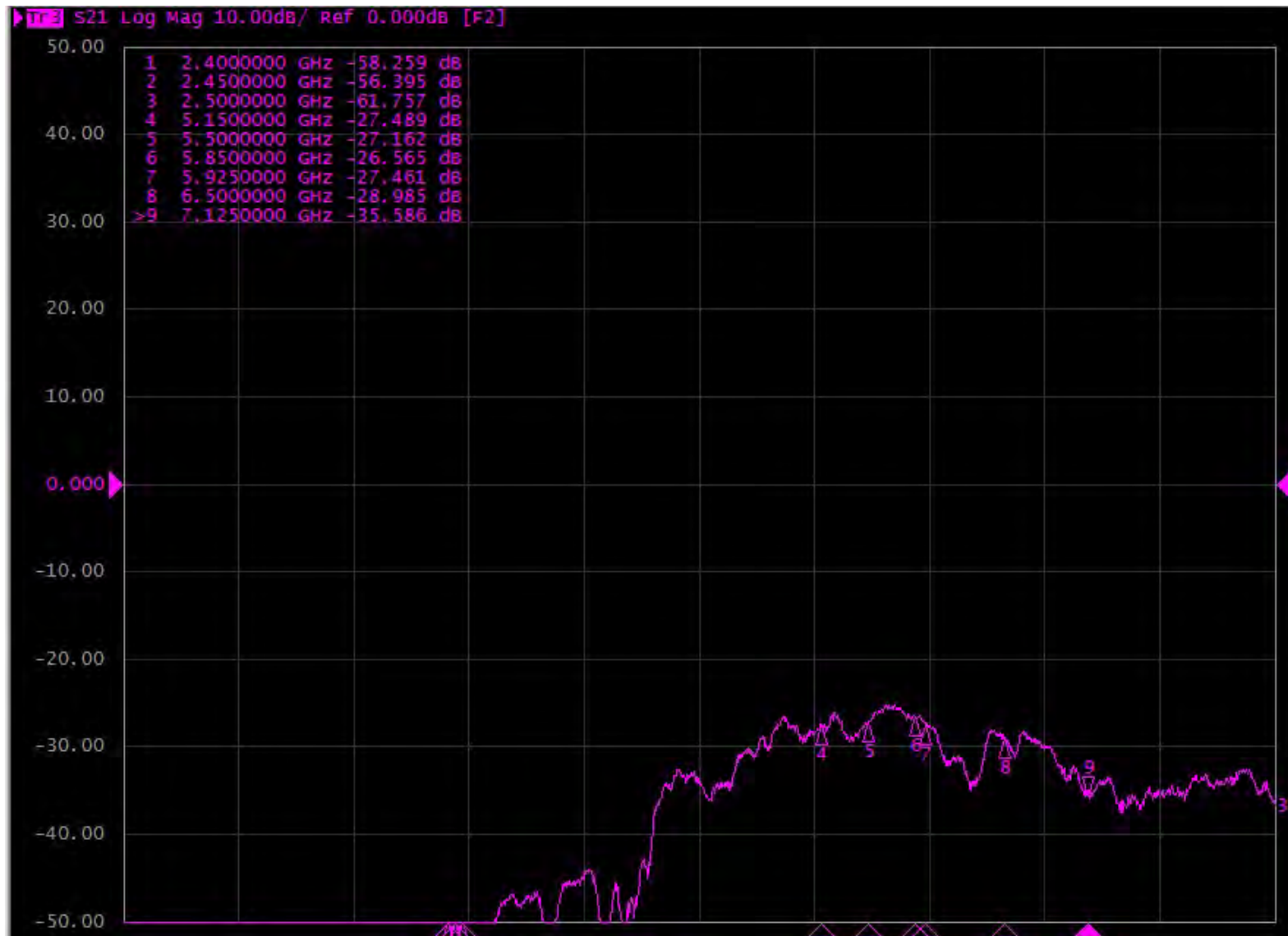
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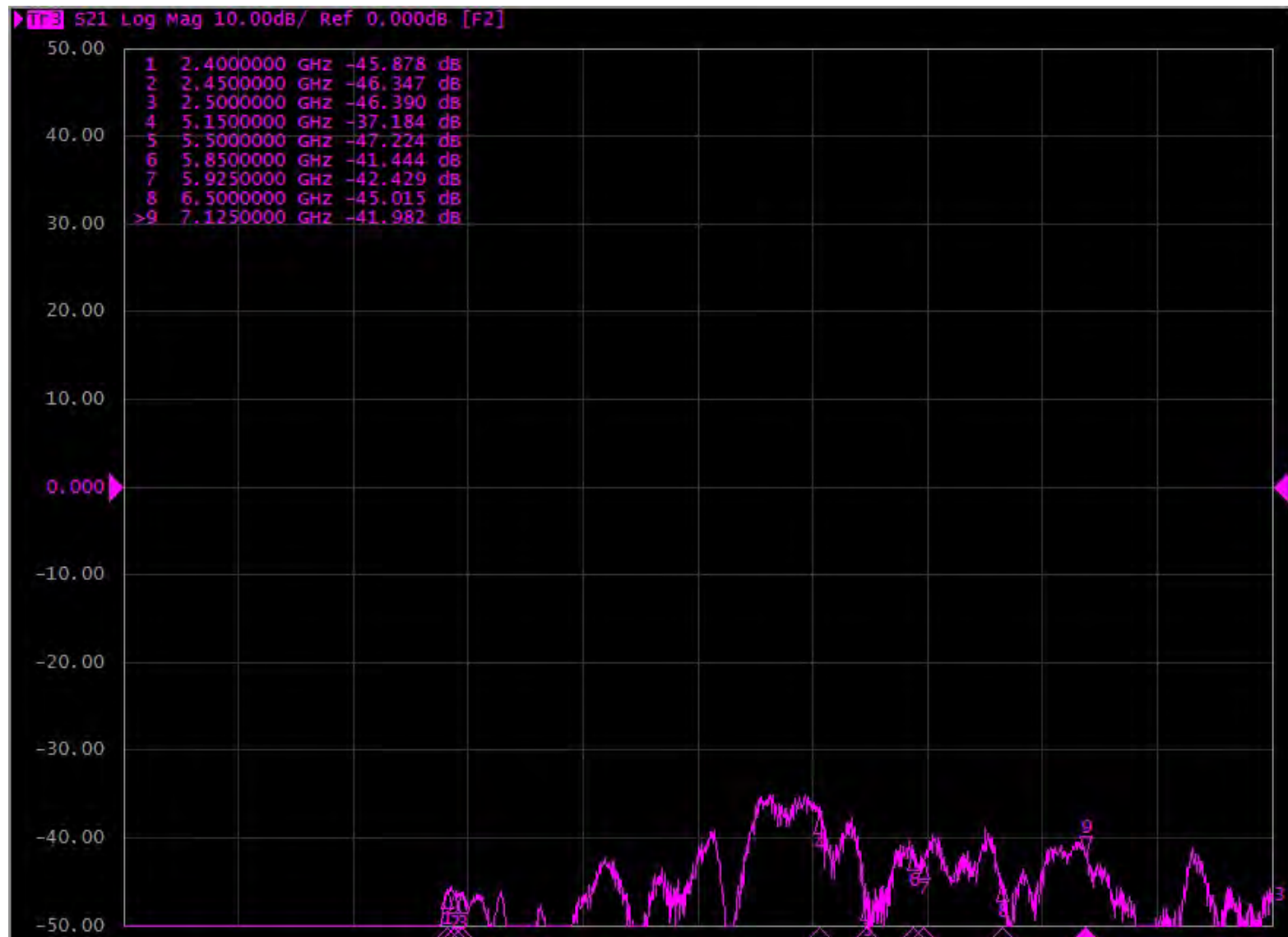
# Isolation – Ant 5 & Ant 7



# Isolation – Ant 5 & Ant 8

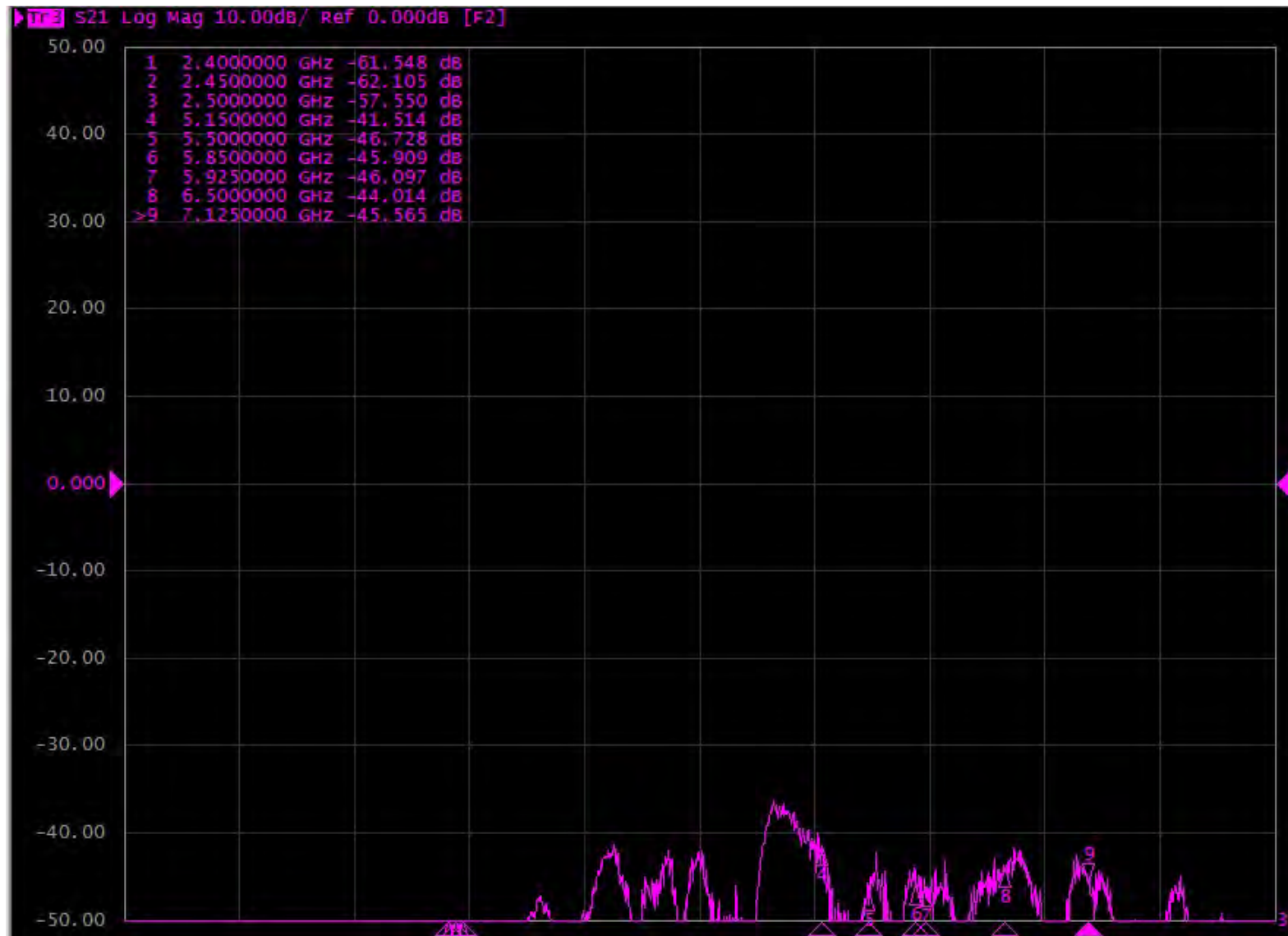


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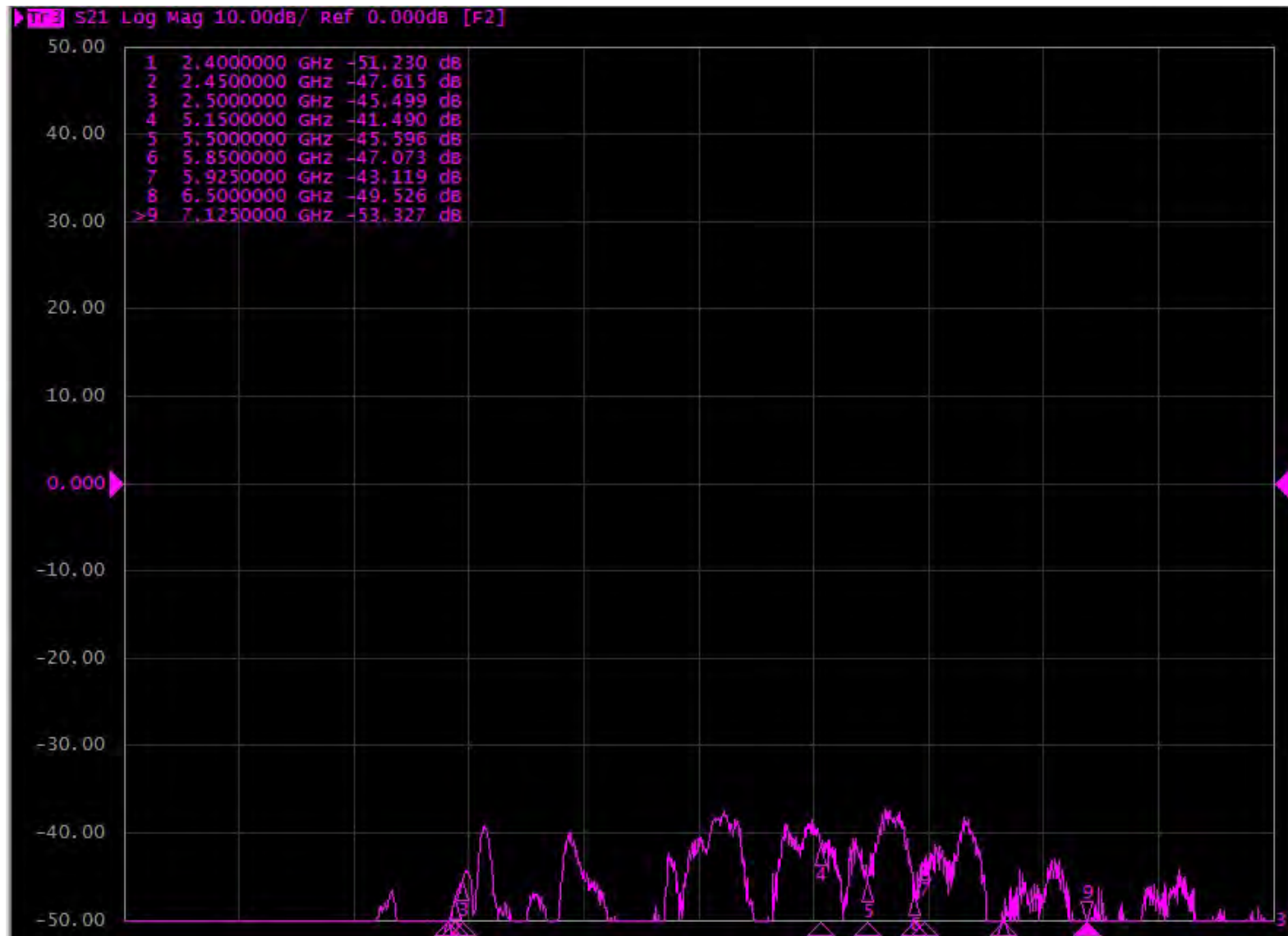




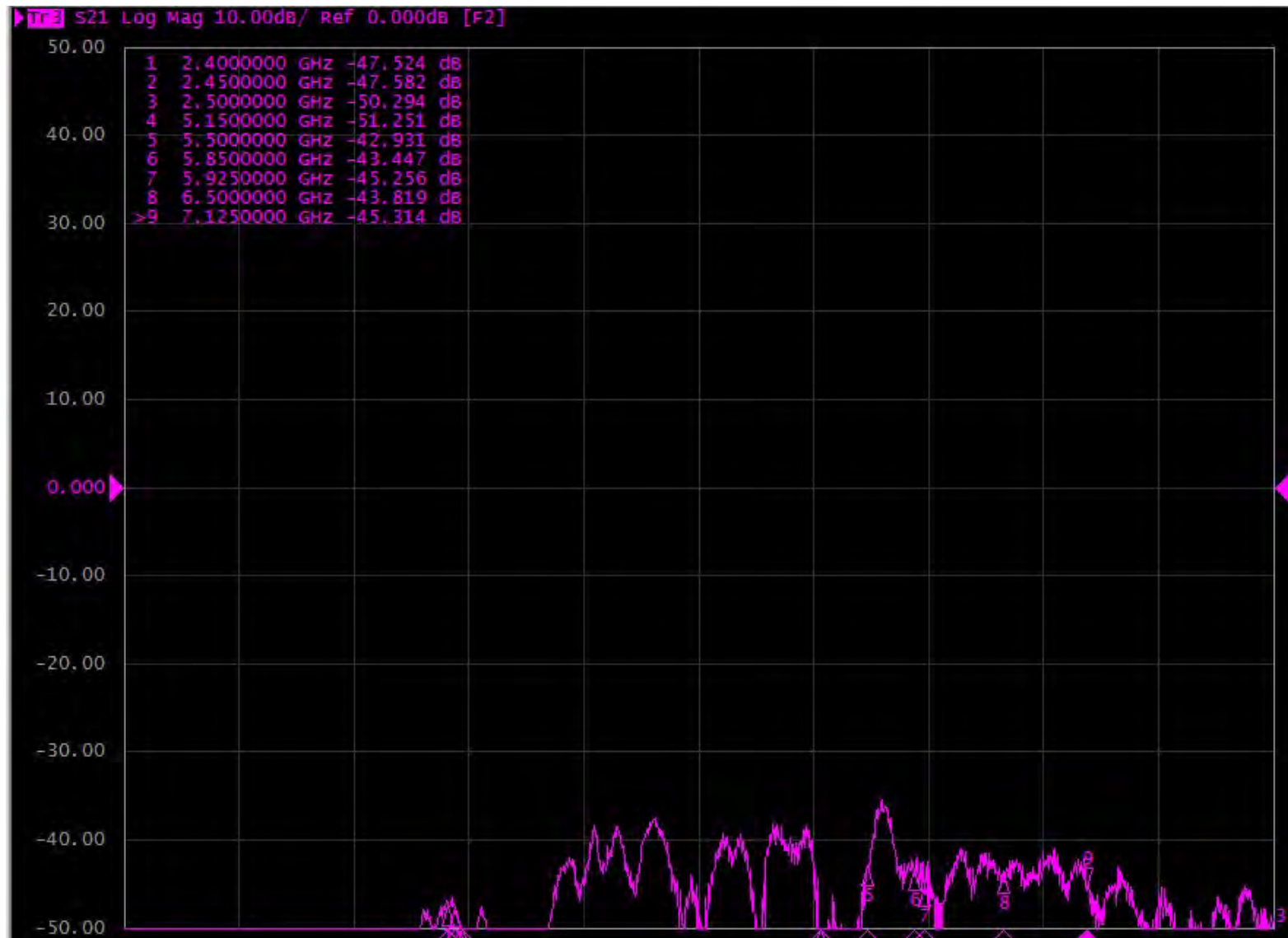
# Isolation – Ant 5 & Ant 10



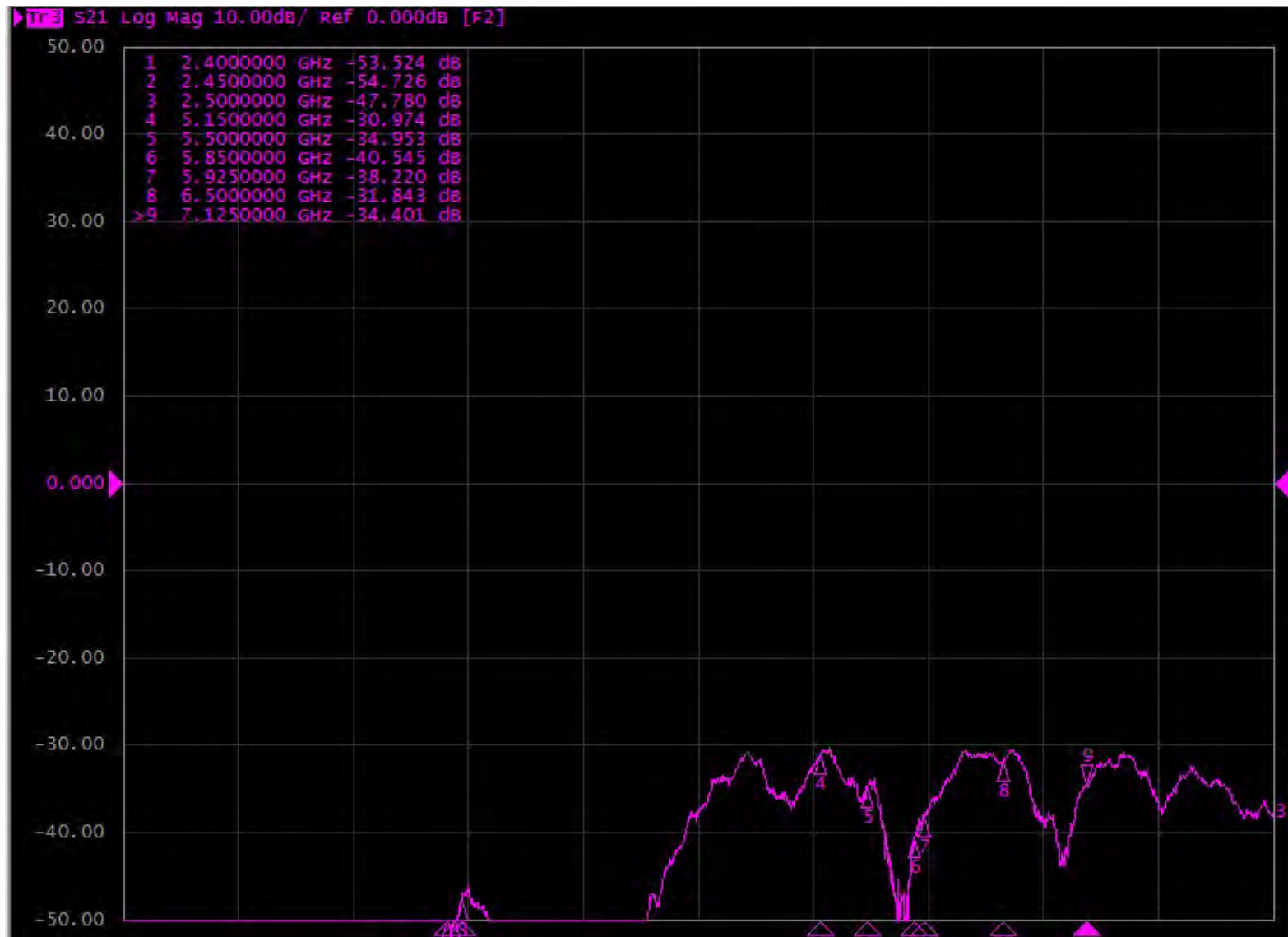
# Isolation – Ant 5 & Ant 11



# Isolation – Ant 5 & Ant 12

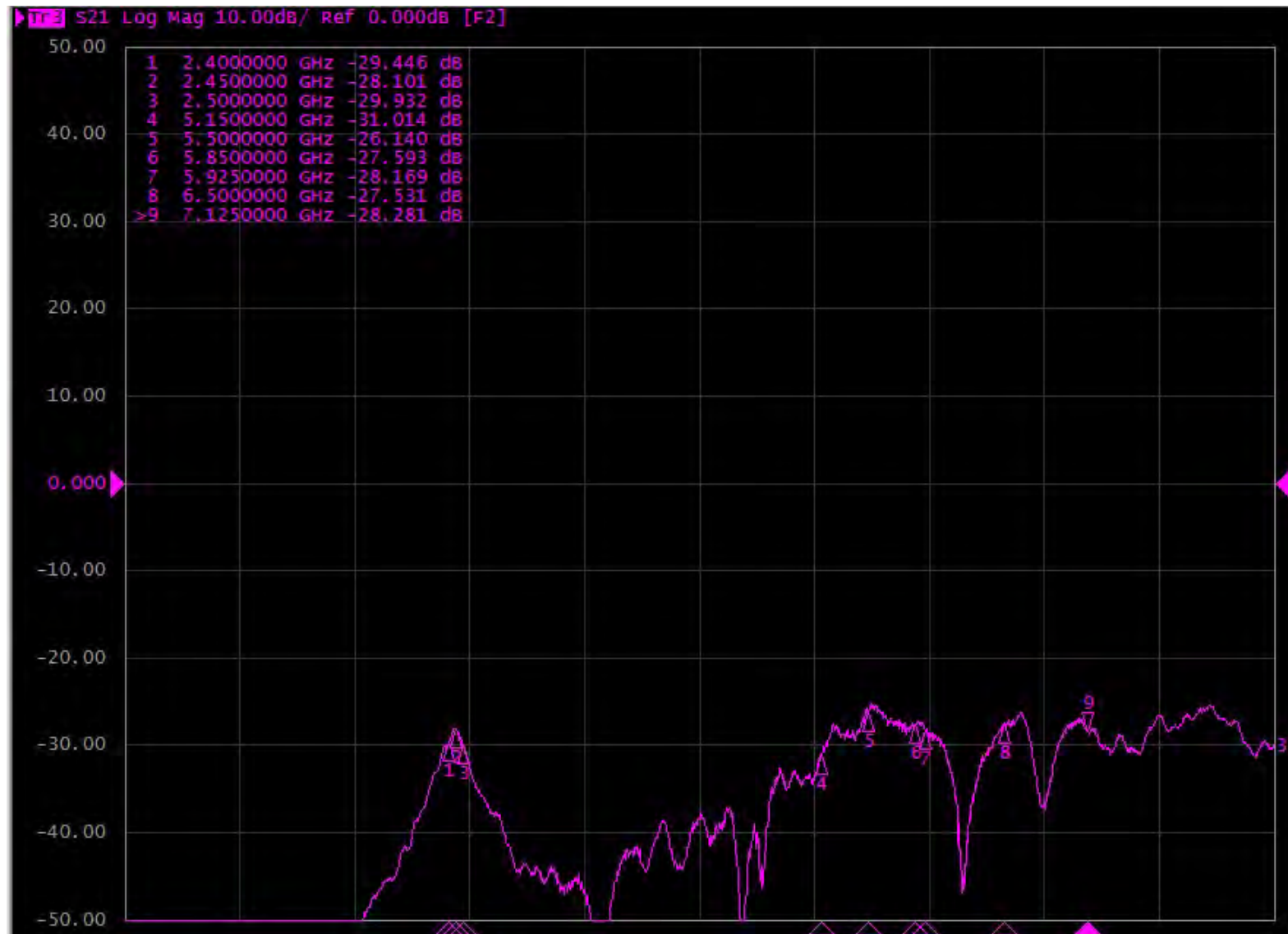


# Isolation – Ant 5 & Ant 13

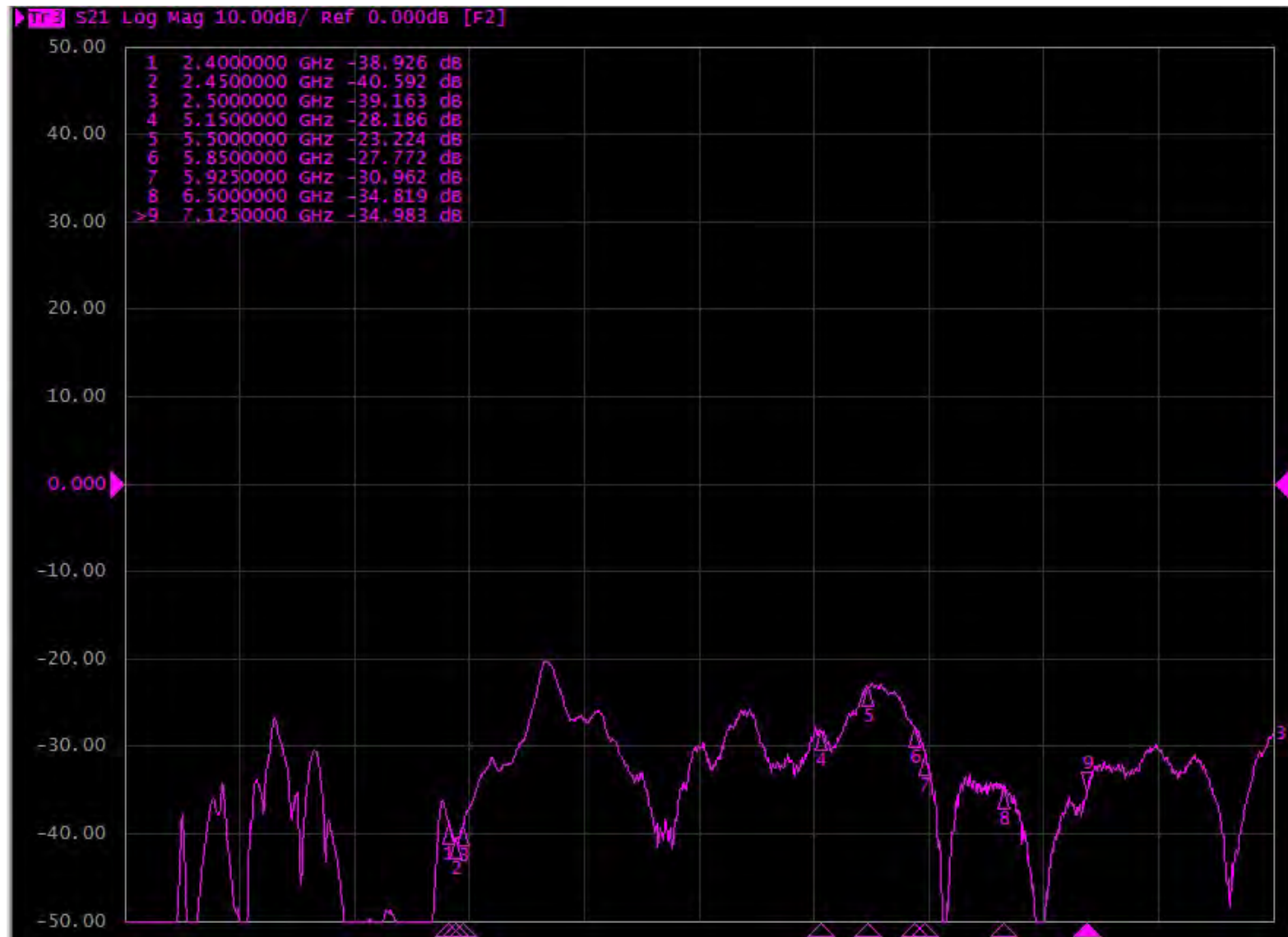




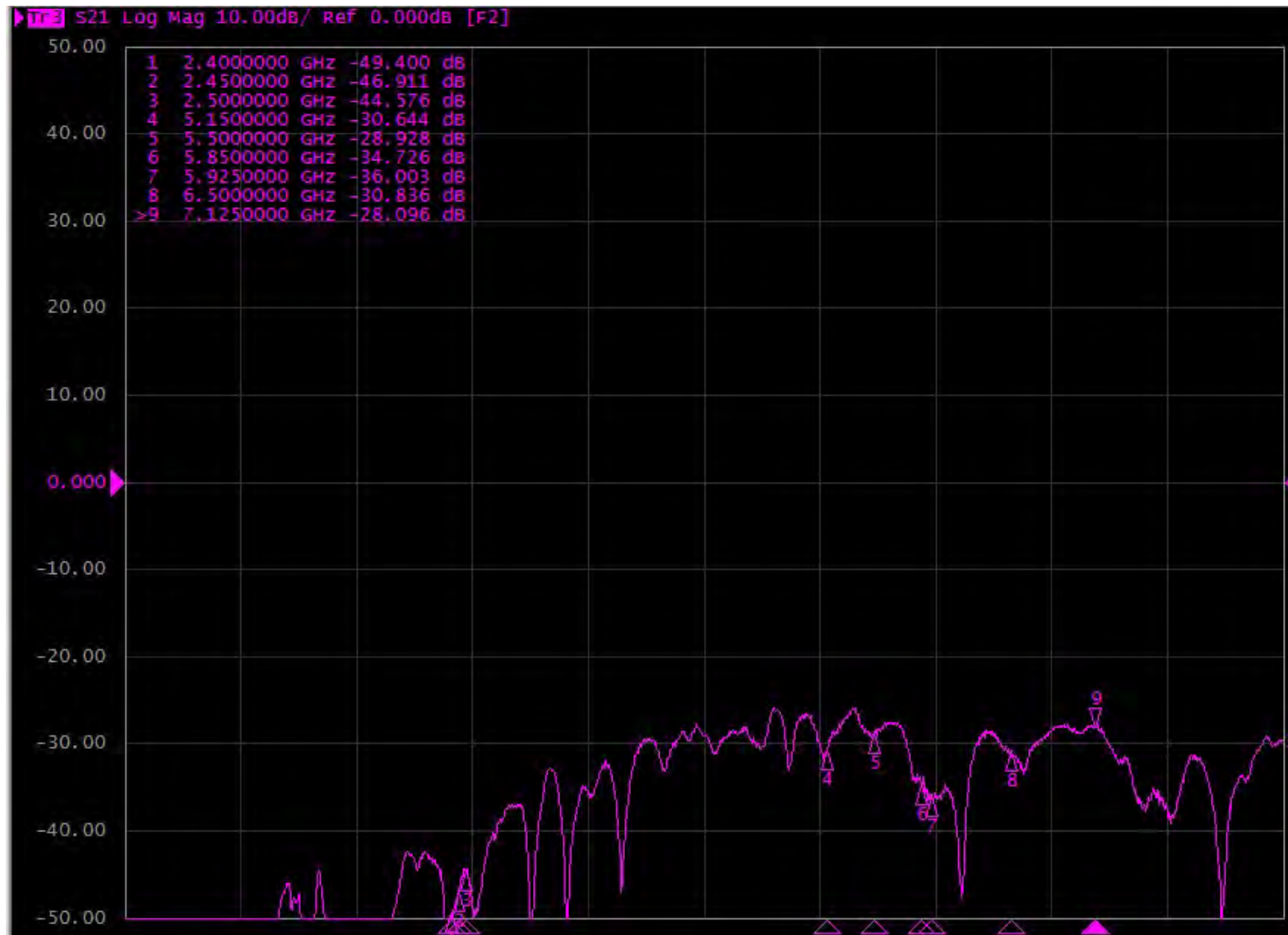
# Isolation – Ant 5 & Ant 14



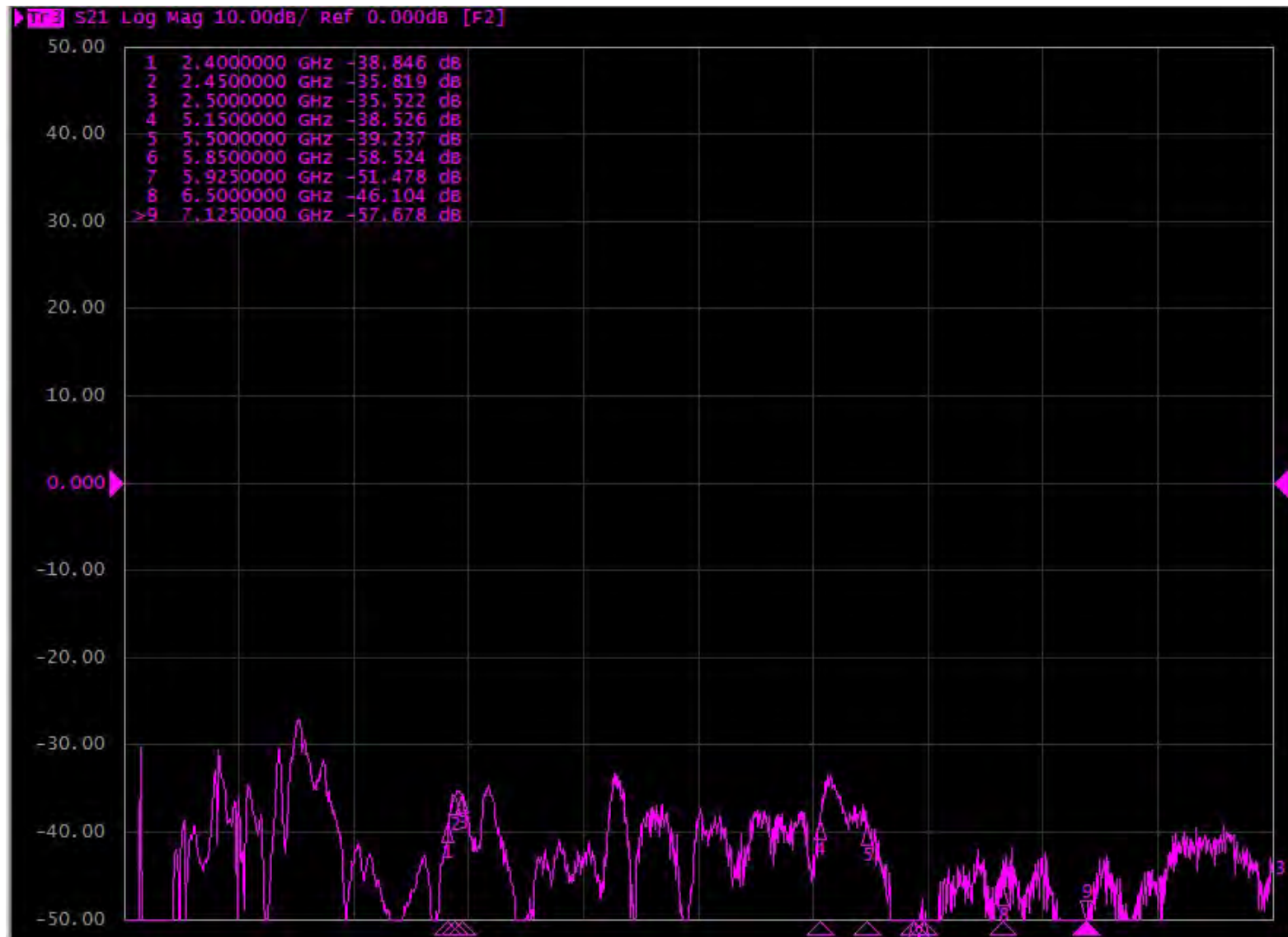
# Isolation – Ant 6 & Ant 7



# Isolation – Ant 6 & Ant 8

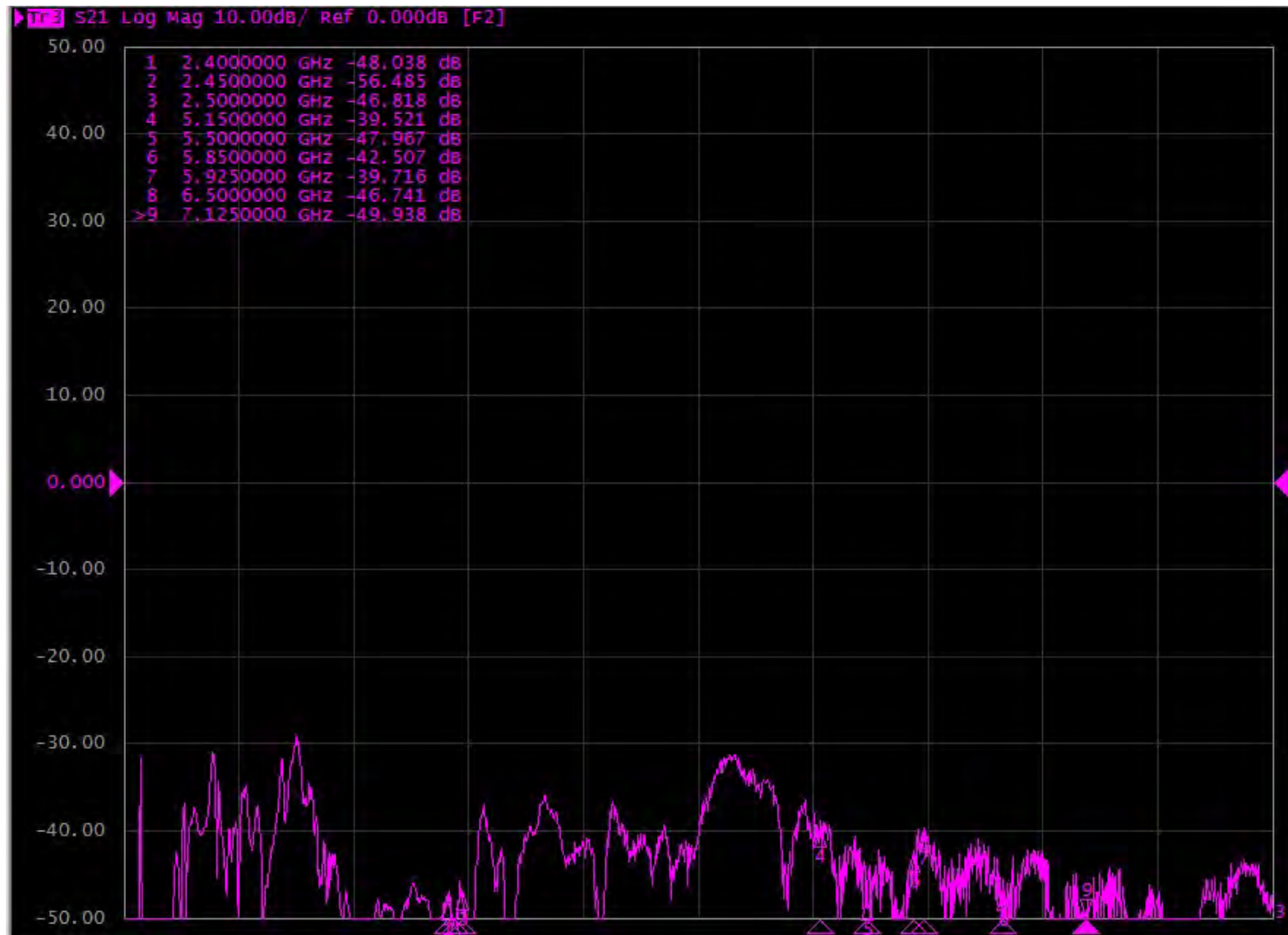


# Isolation – Ant 6 & Ant 9

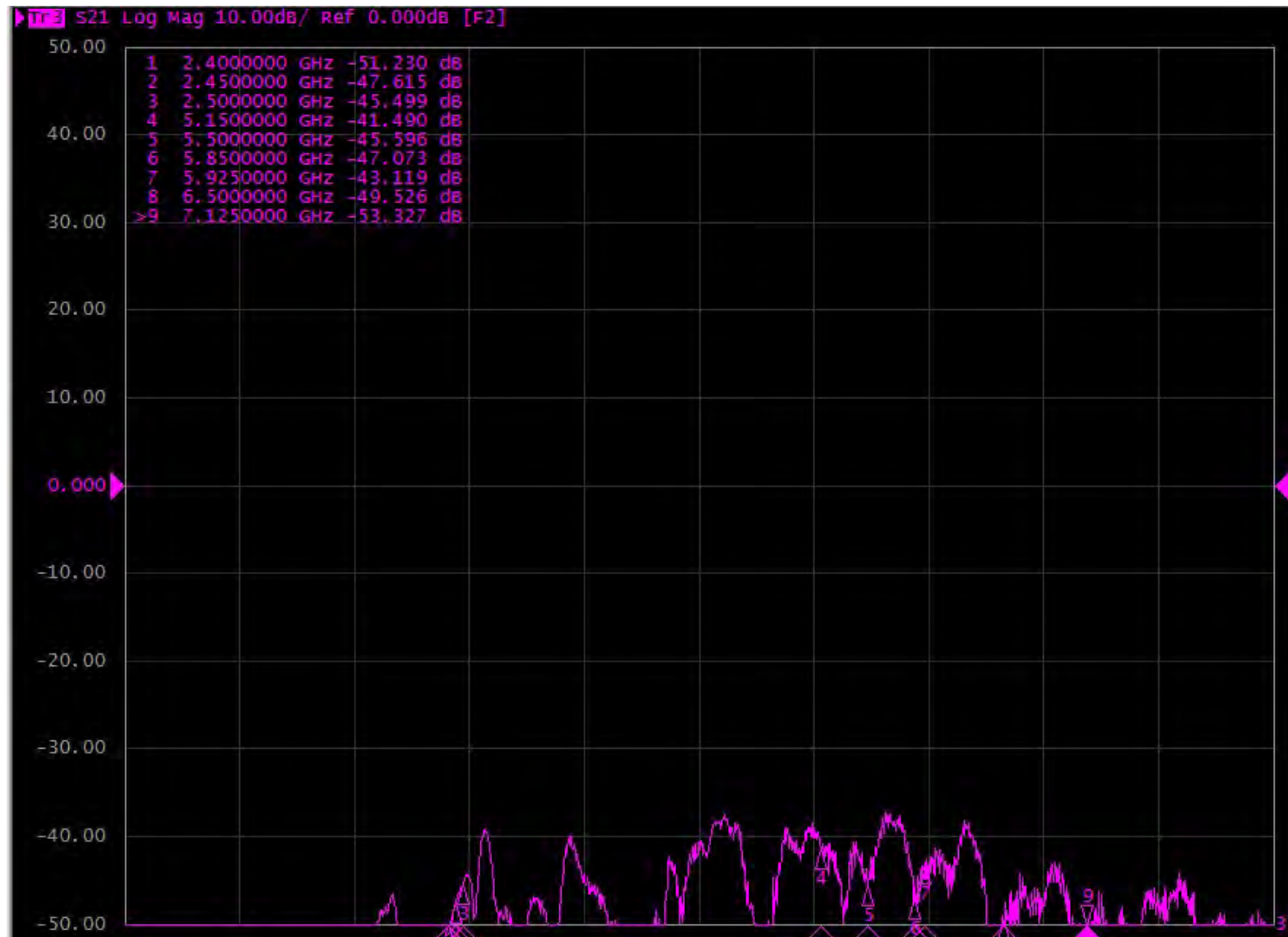




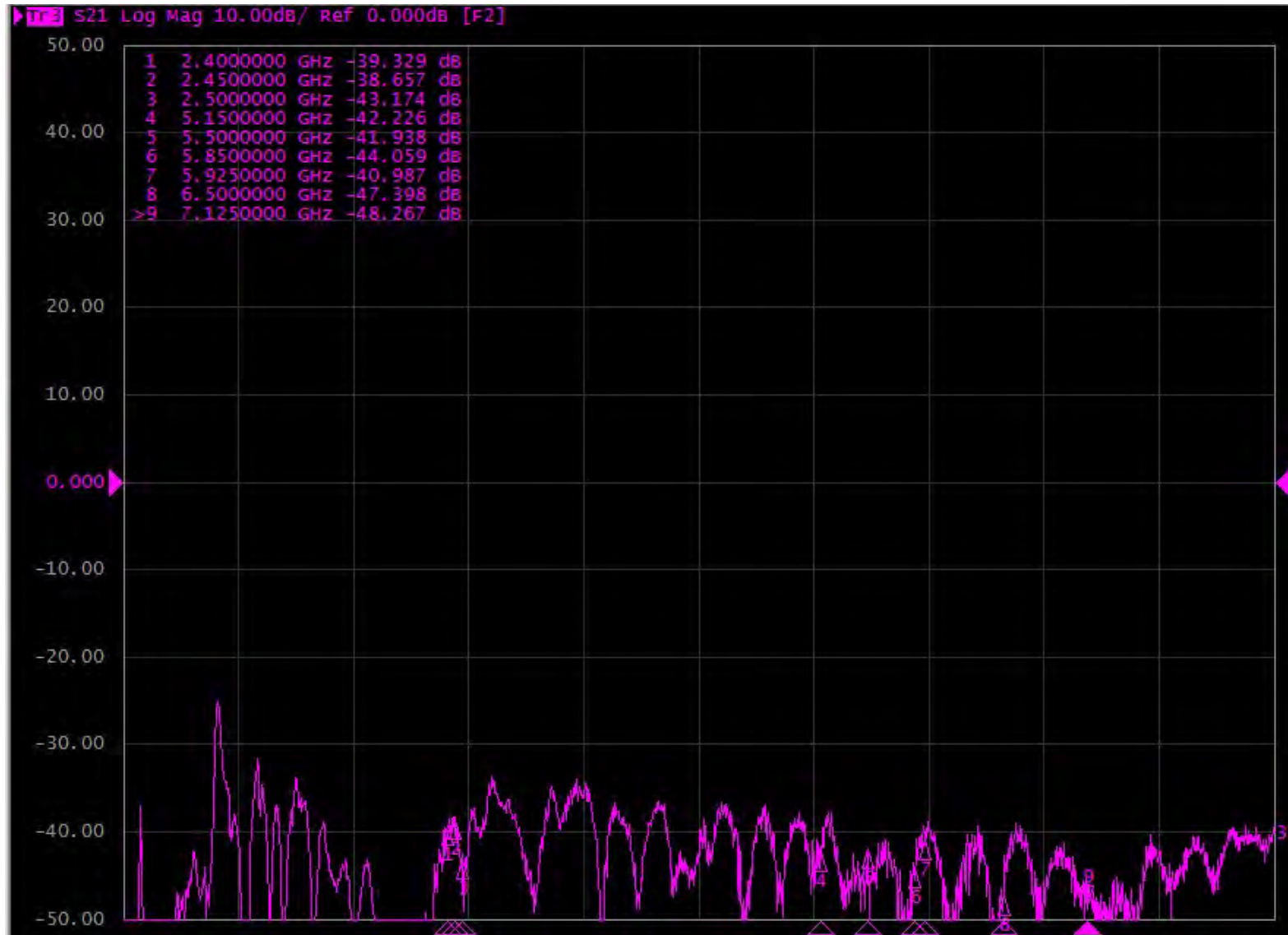
# Isolation – Ant 6 & Ant 10



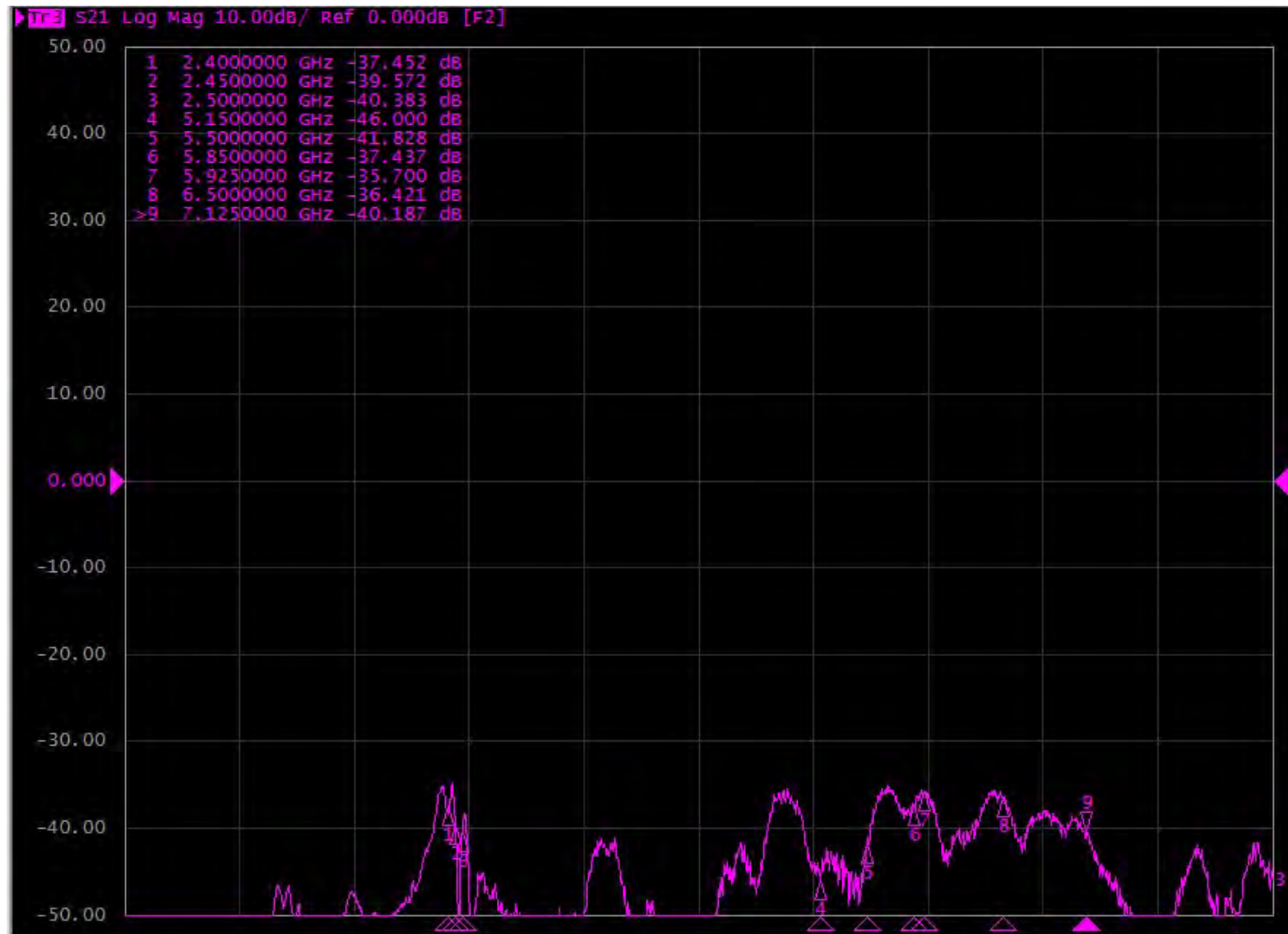
# Isolation – Ant 6 & Ant 11



# Isolation – Ant 6 & Ant 12

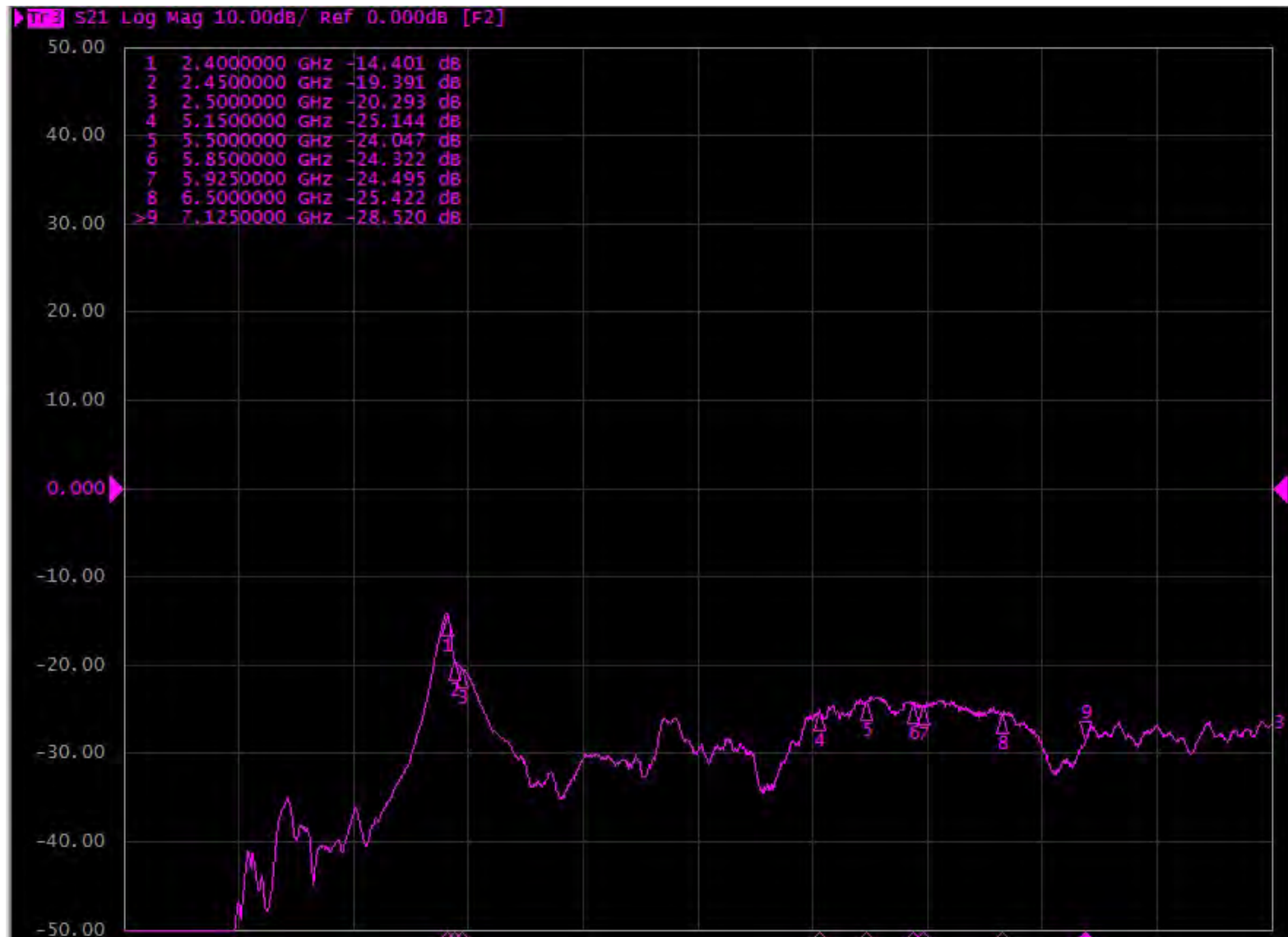


# Isolation – Ant 6 & Ant 13

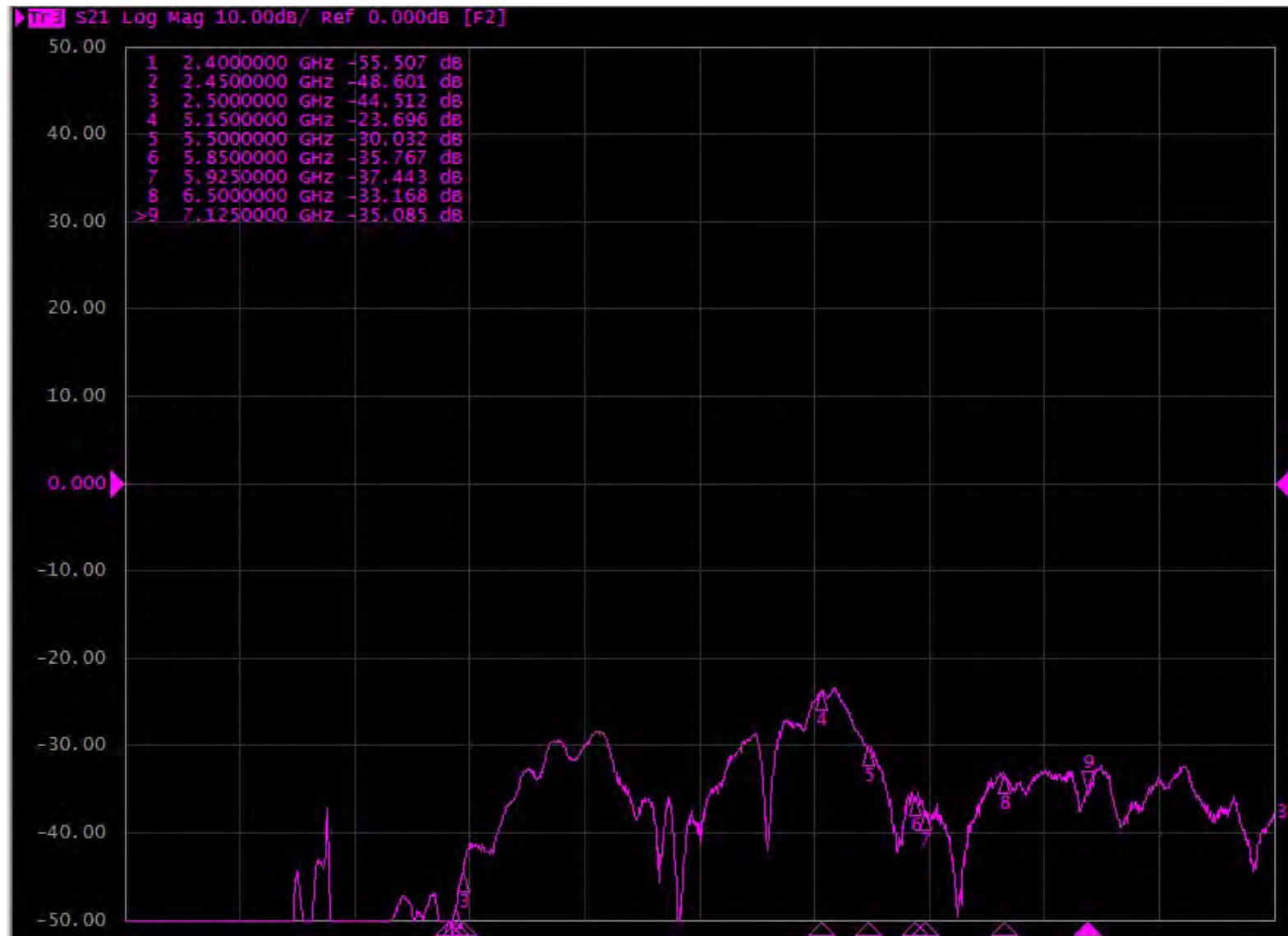




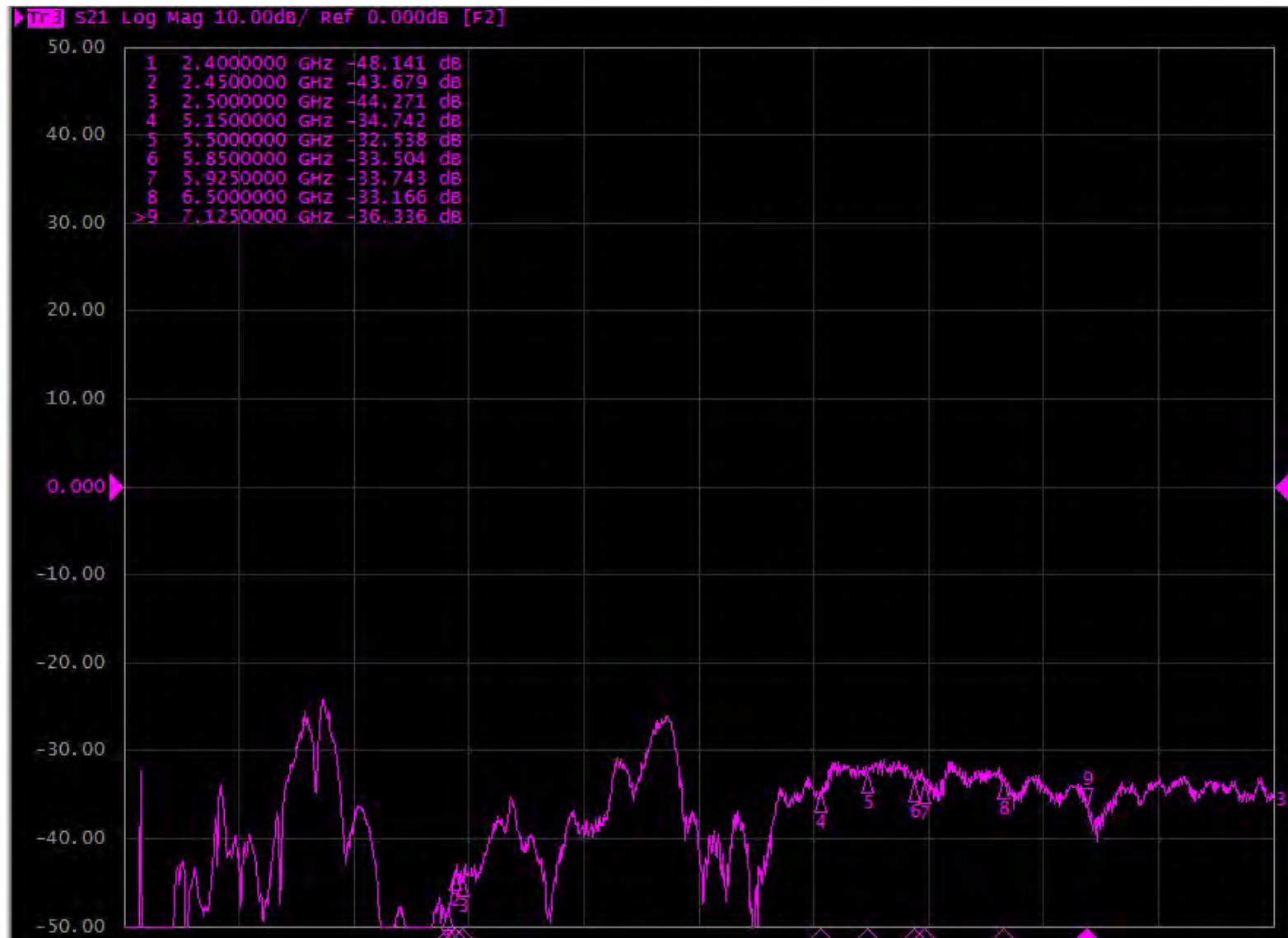
# Isolation – Ant 6 & Ant 14



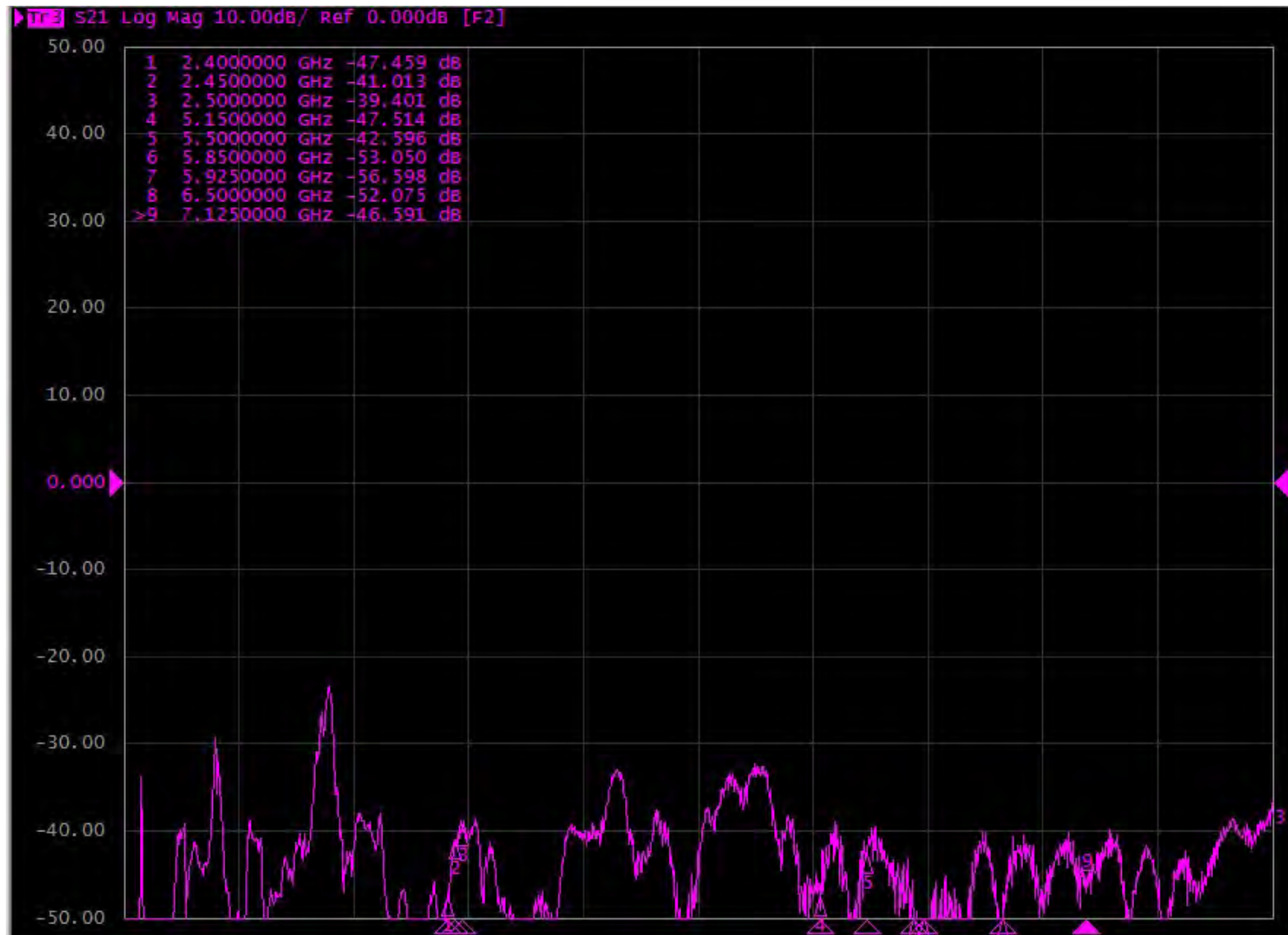
# Isolation – Ant 7 & Ant 8



# Isolation – Ant 7 & Ant 9

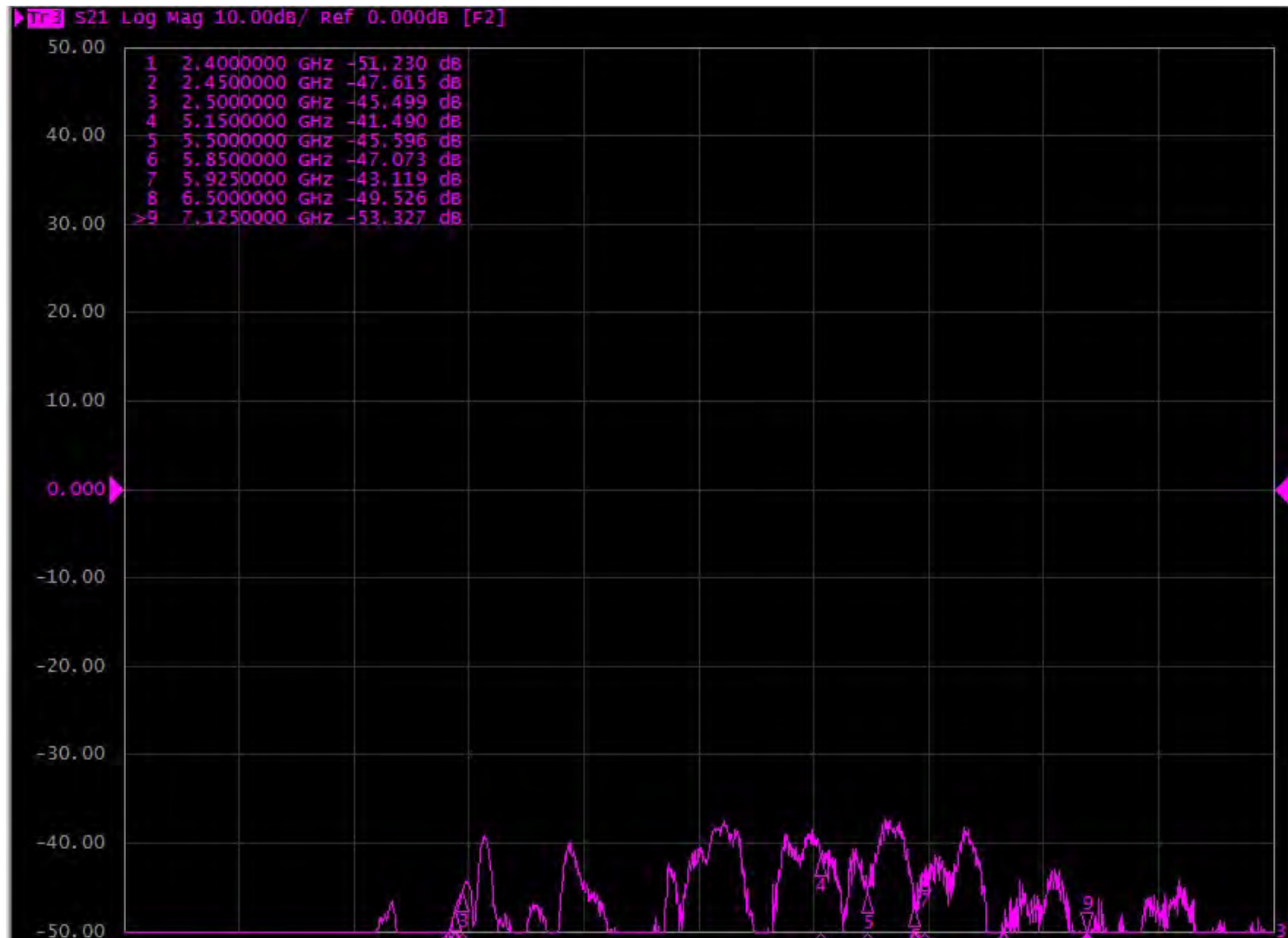


# Isolation – Ant 7 & Ant 10

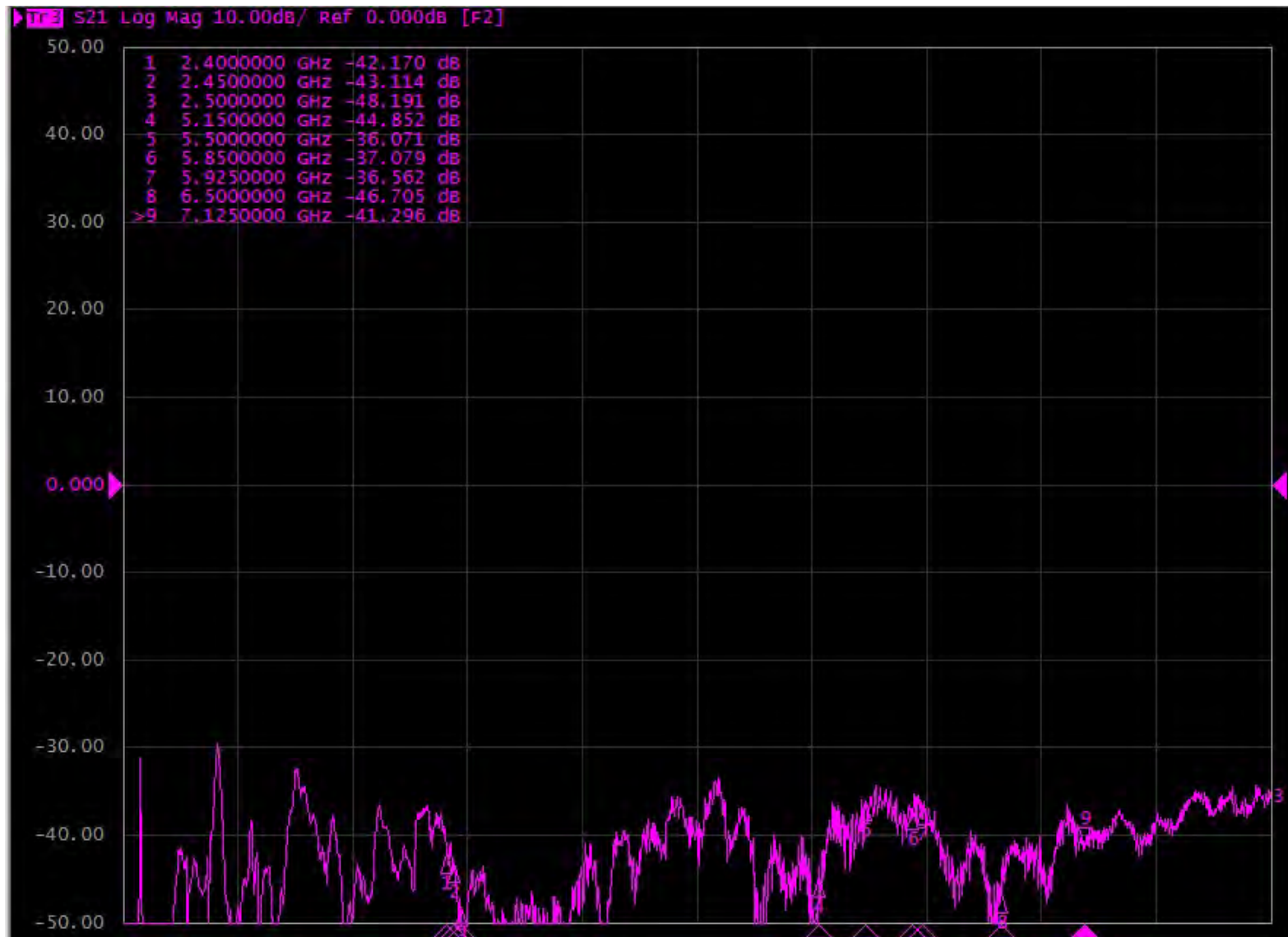




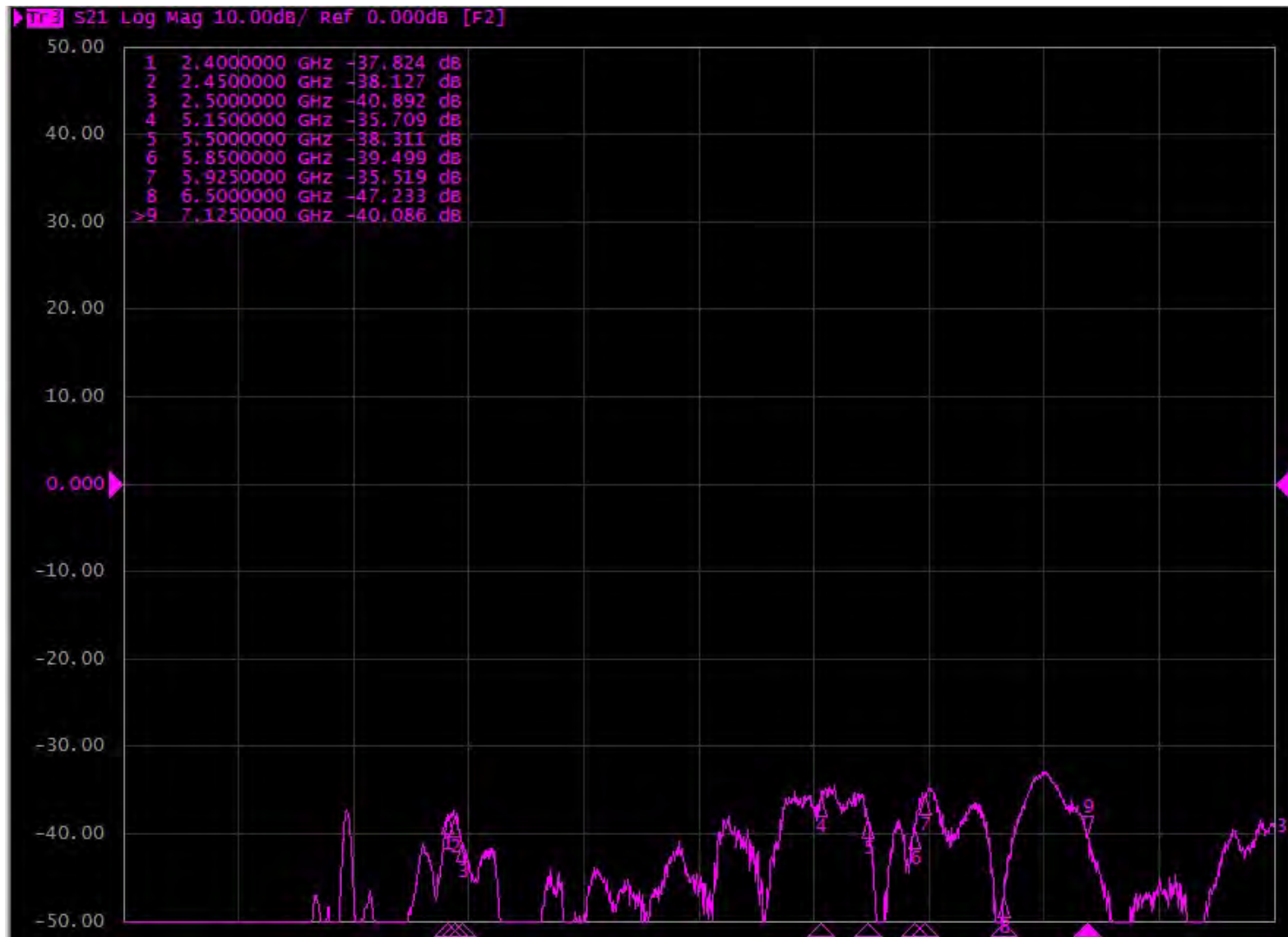
# Isolation – Ant 7 & Ant 11



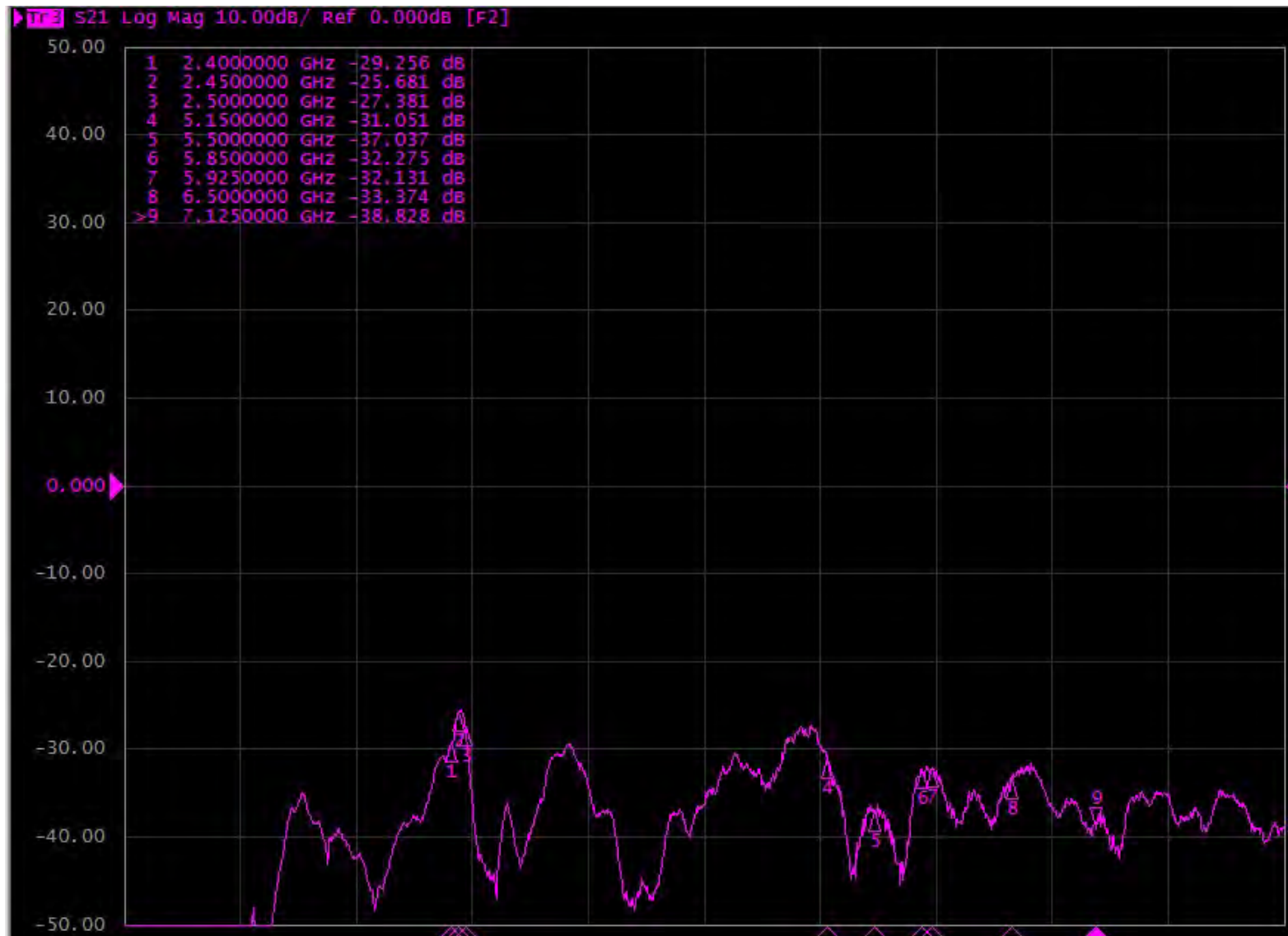
# Isolation – Ant 7 & Ant 12



# Isolation – Ant 7 & Ant 13

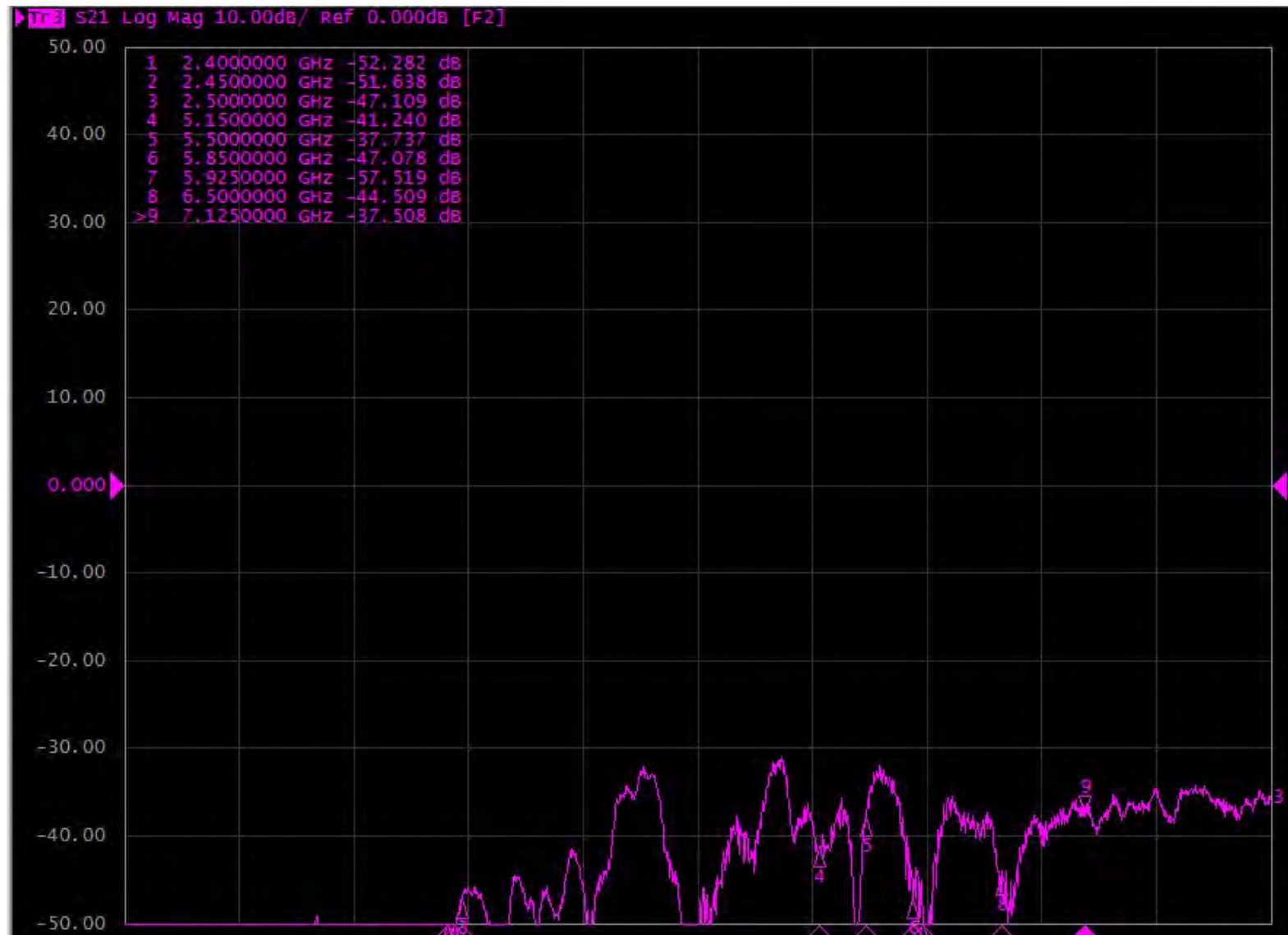


# Isolation – Ant 7 & Ant 14

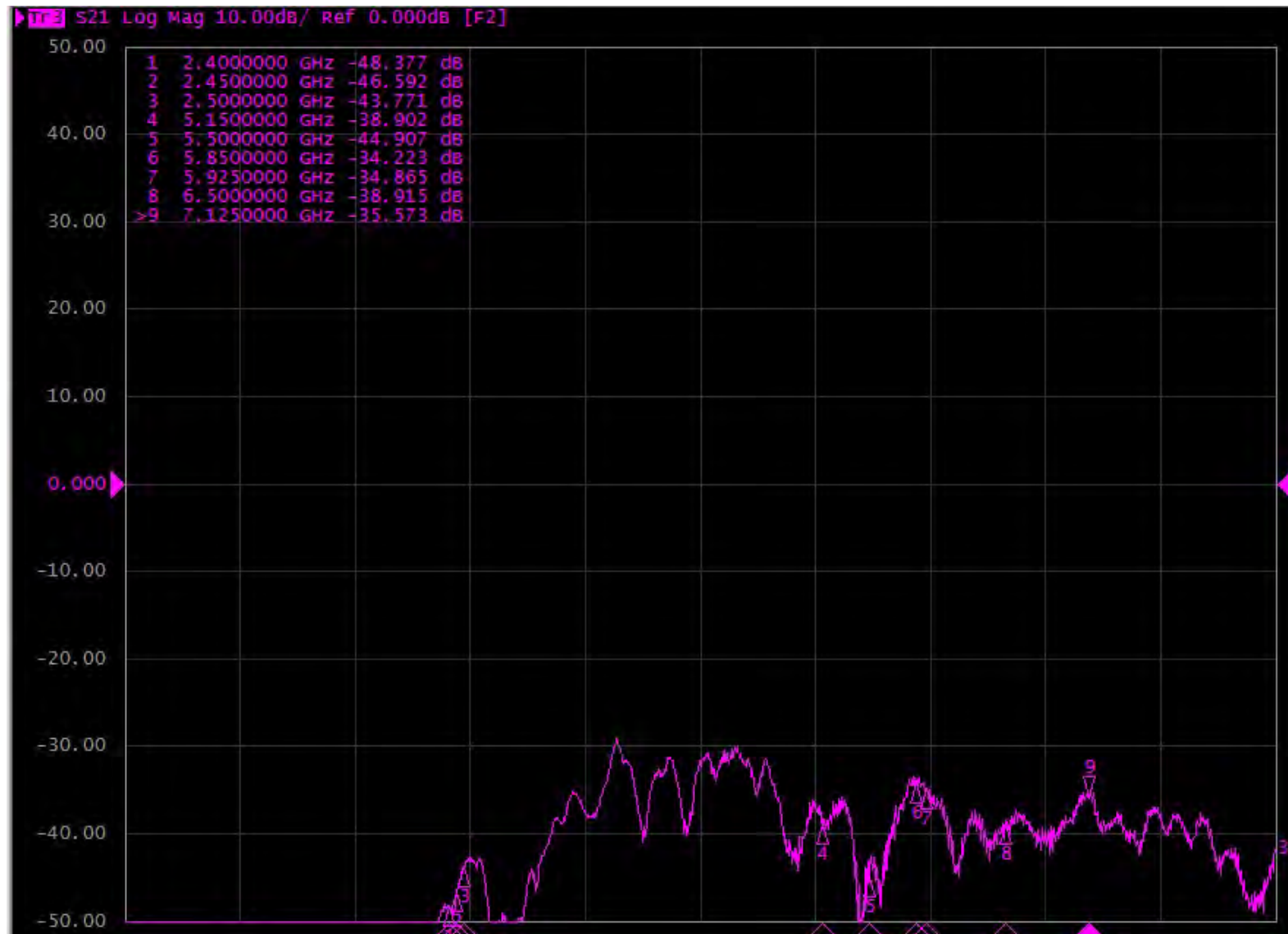




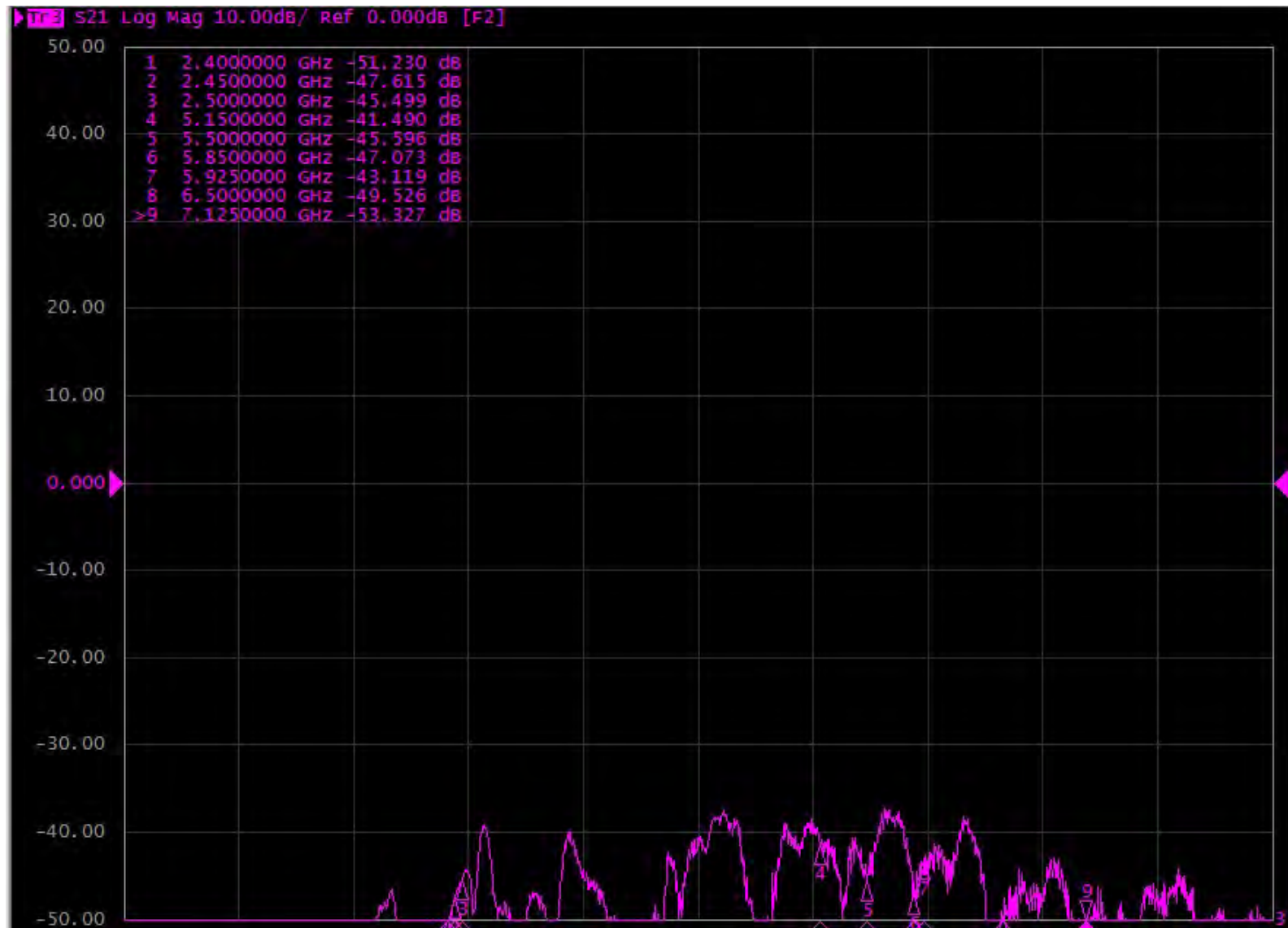
# Isolation – Ant 8 & Ant 9



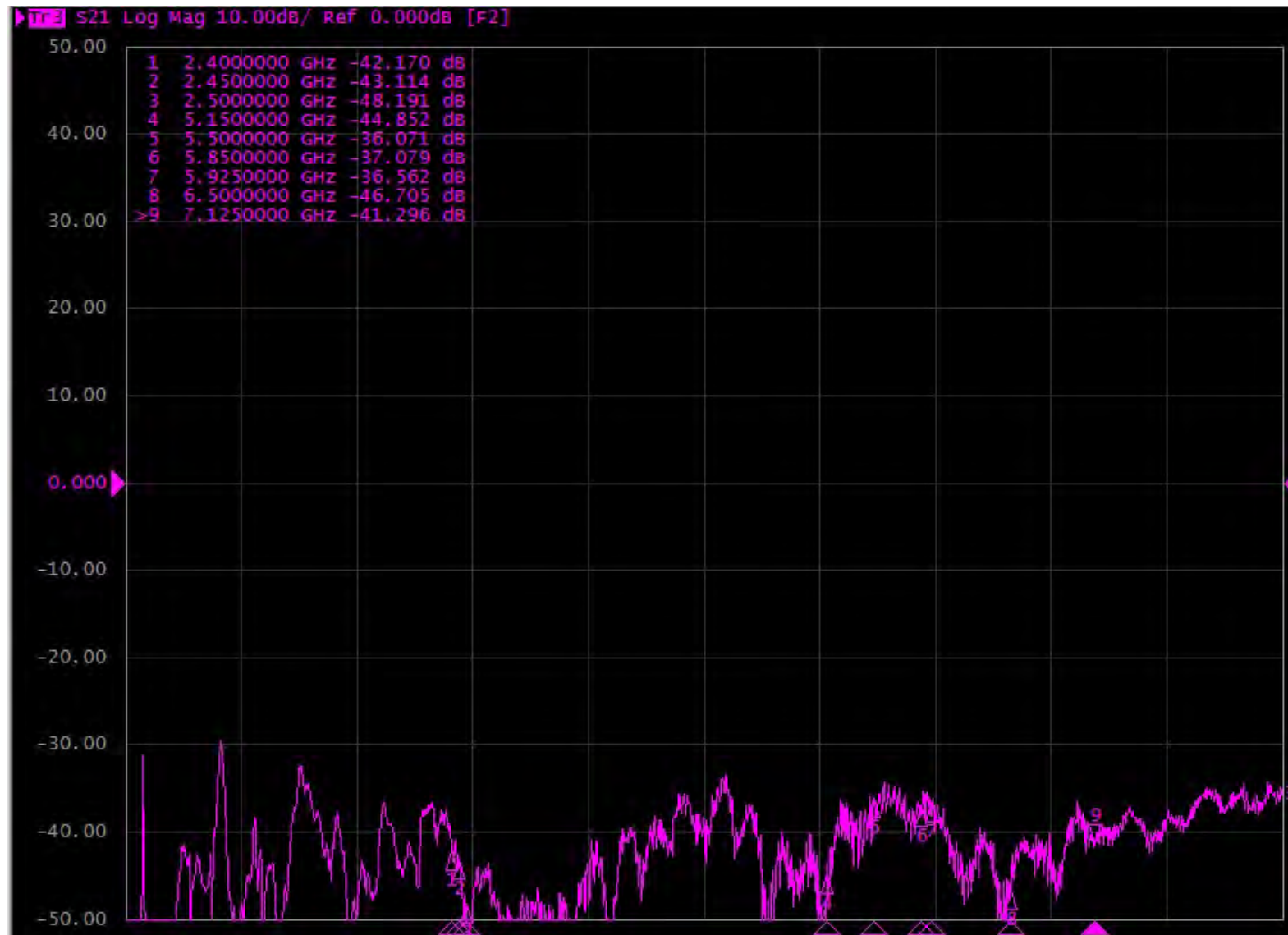
# Isolation – Ant 8 & Ant 10



# Isolation – Ant 8 & Ant 11

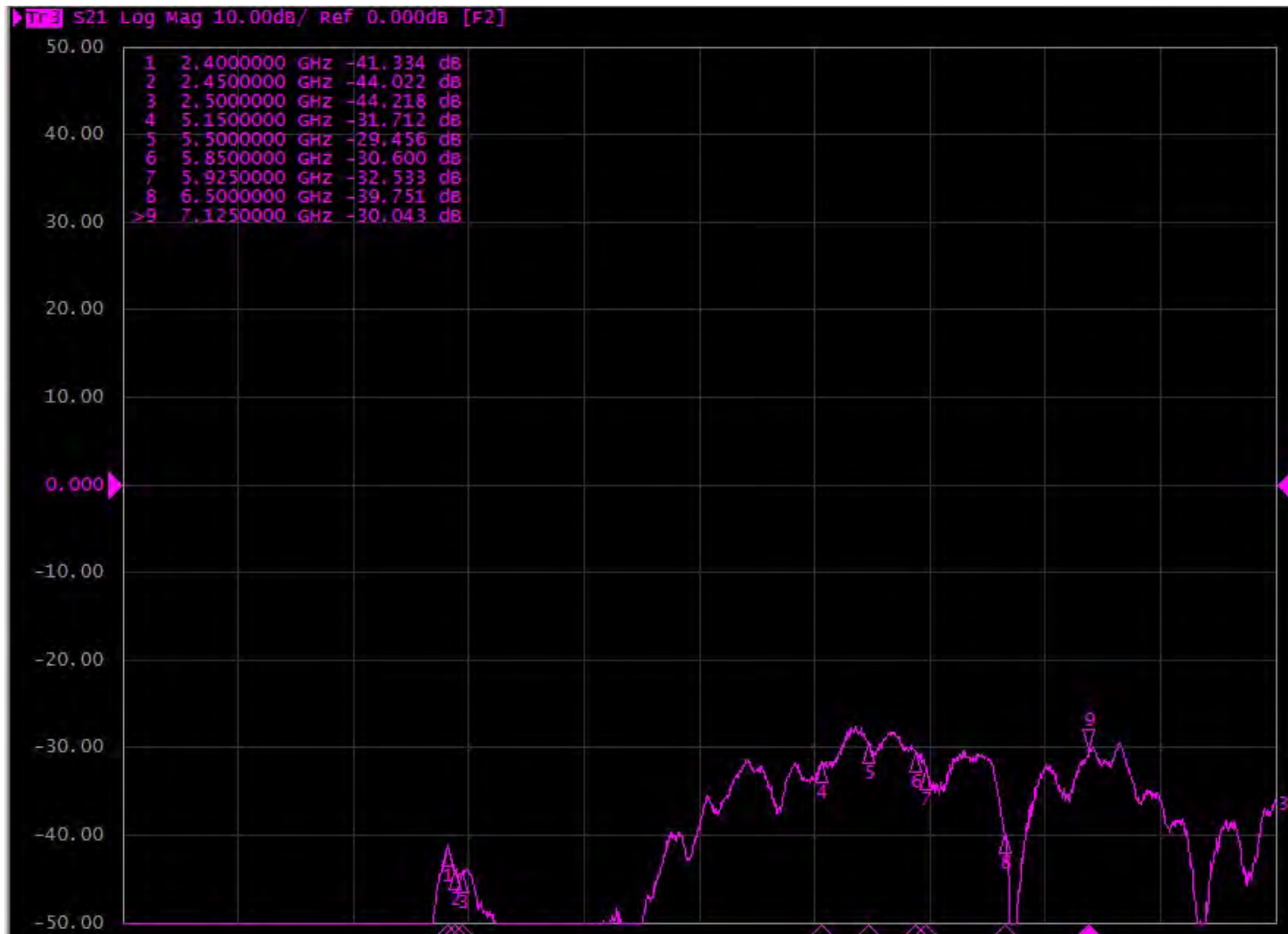


# Isolation – Ant 8 & Ant 12

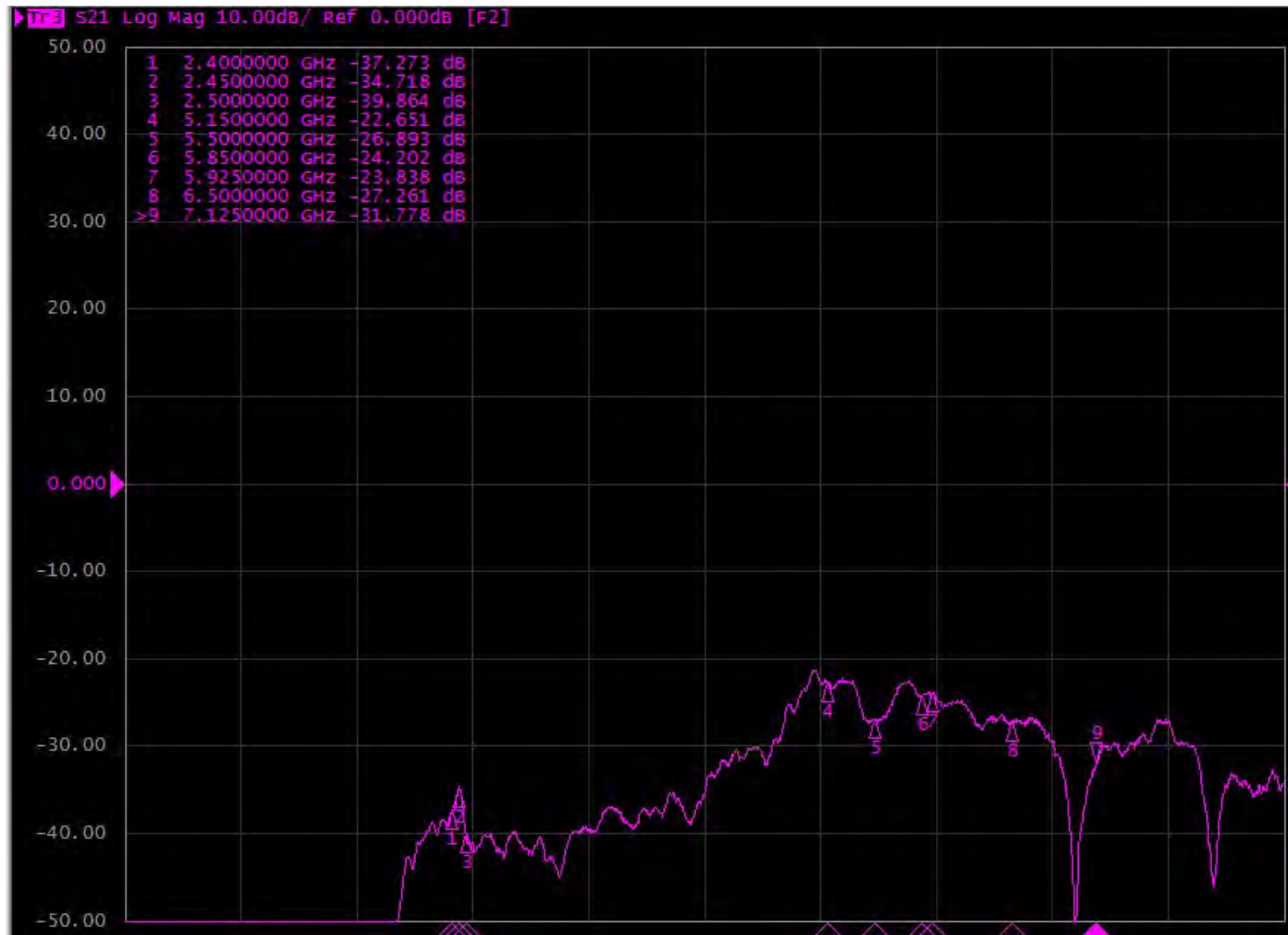




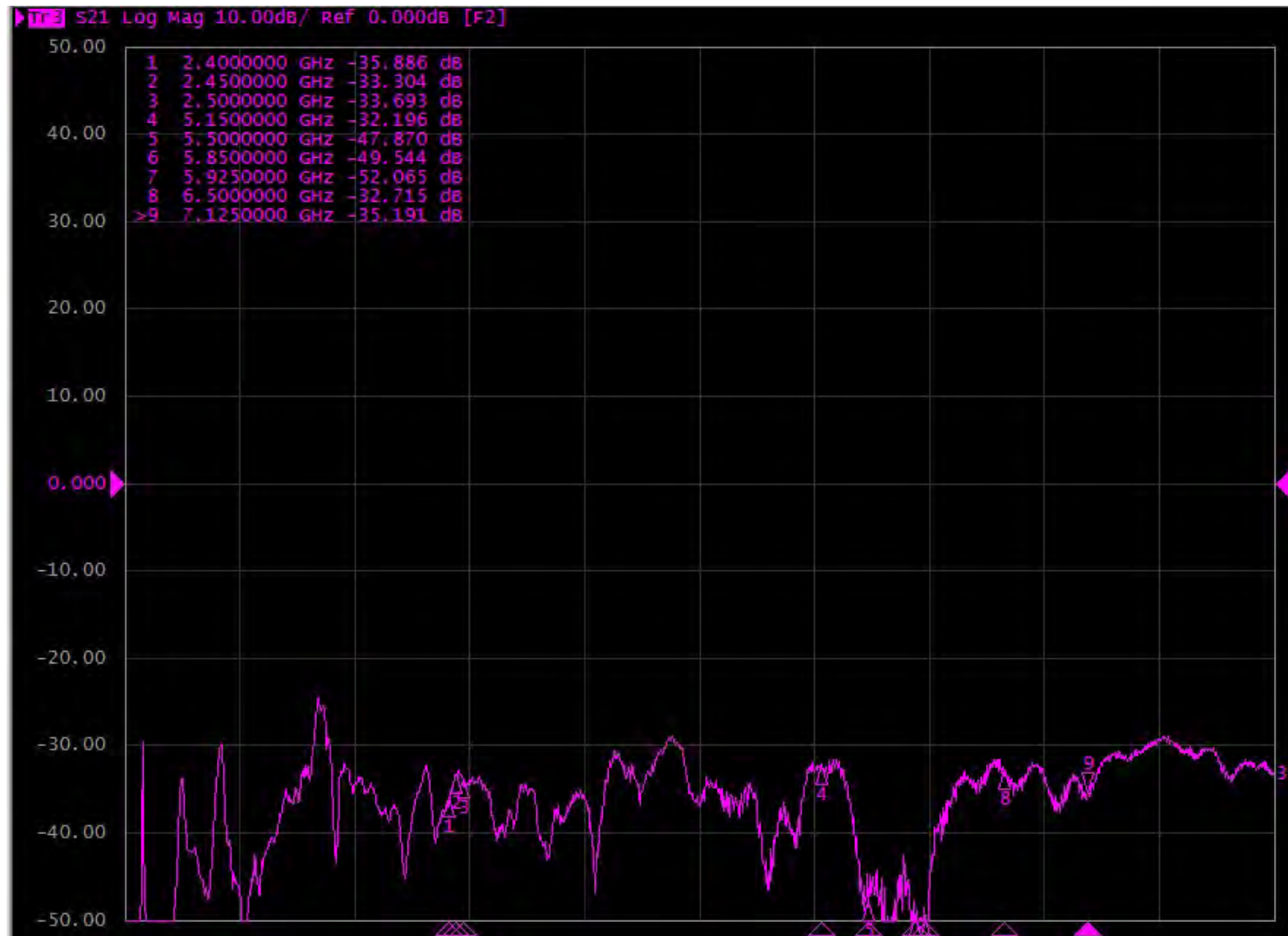
# Isolation – Ant 8 & Ant 13



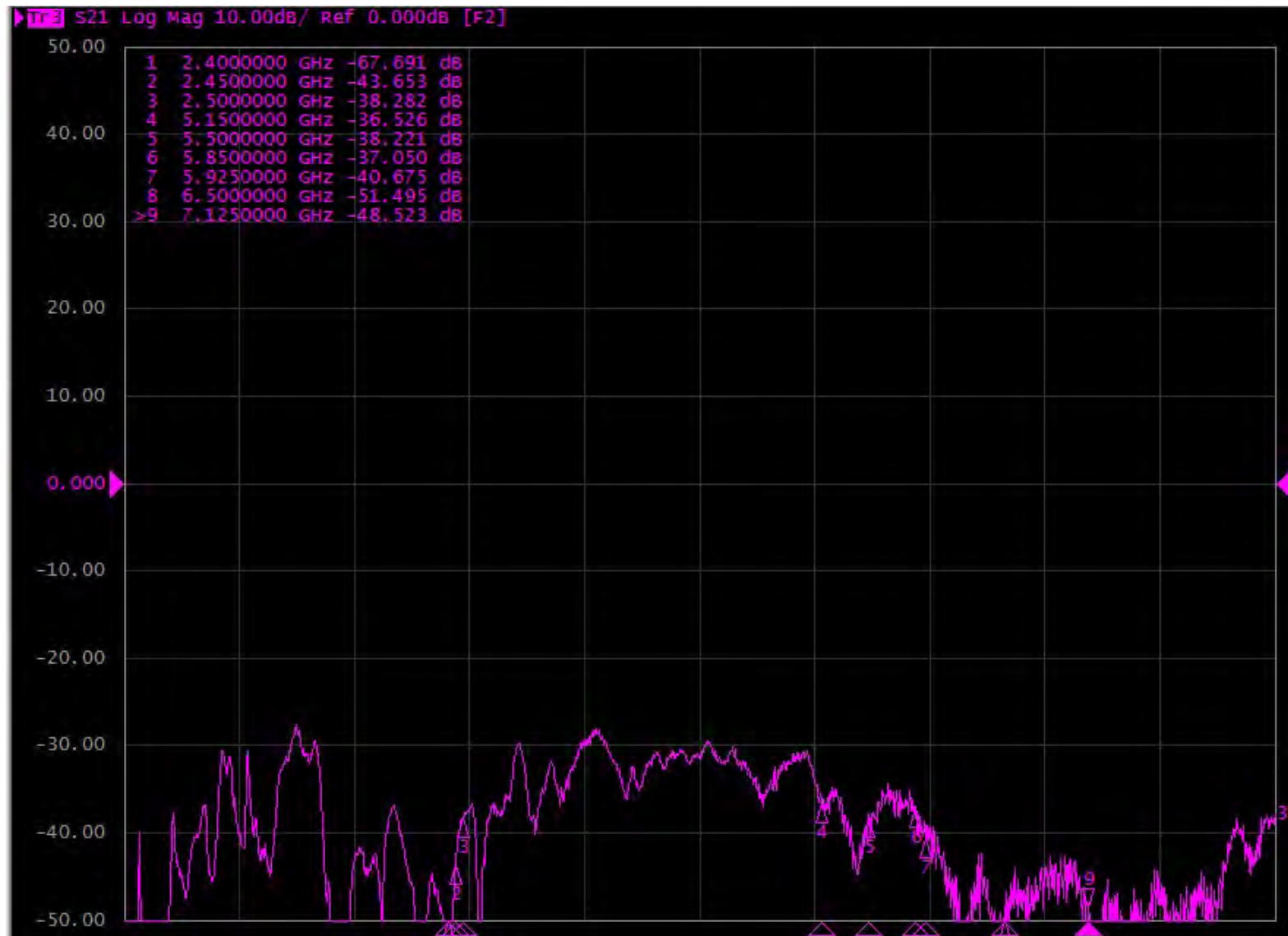
# Isolation – Ant 8 & Ant 14



# Isolation – Ant 9 & Ant 10

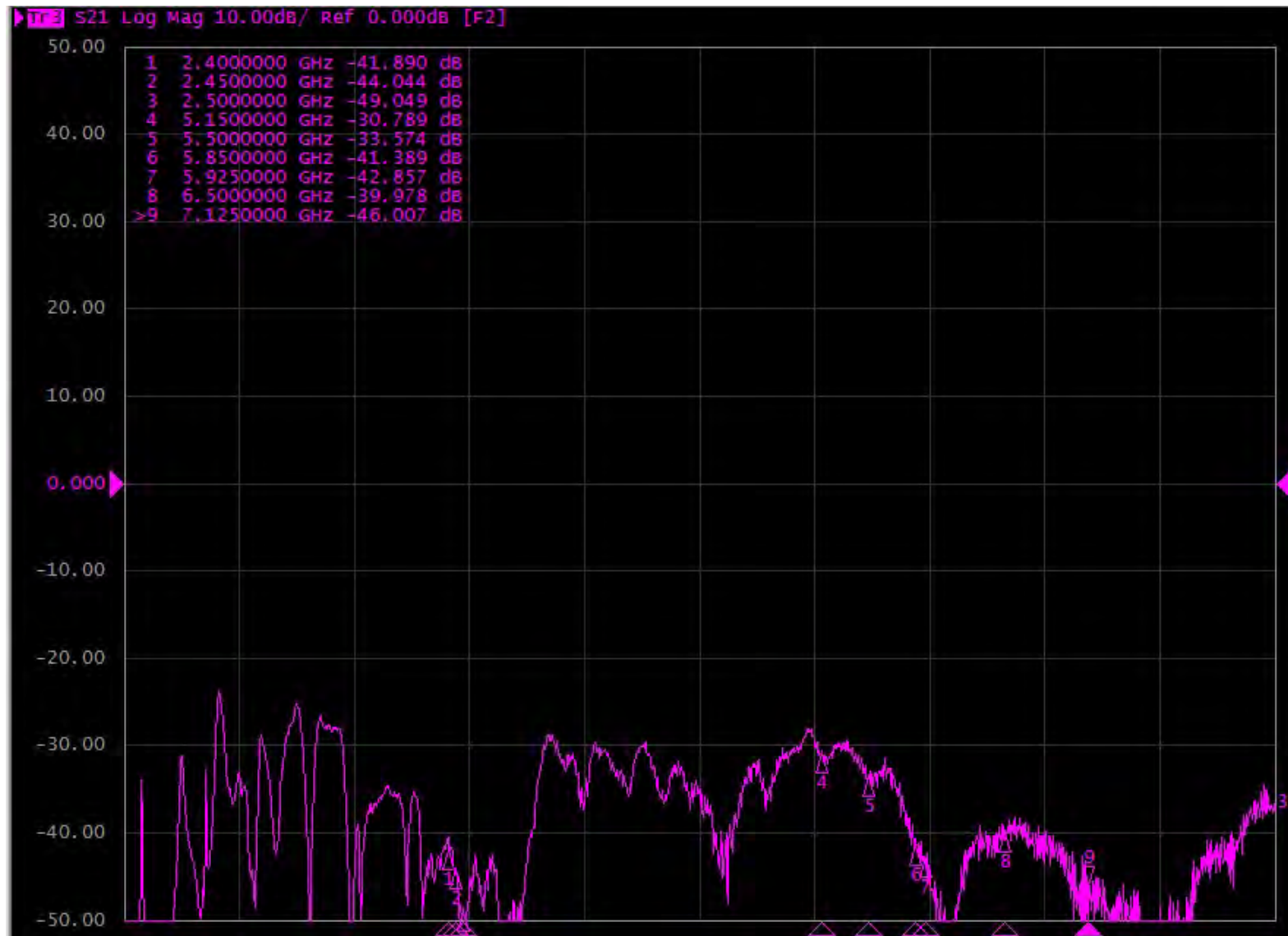


# Isolation – Ant 9 & Ant 11

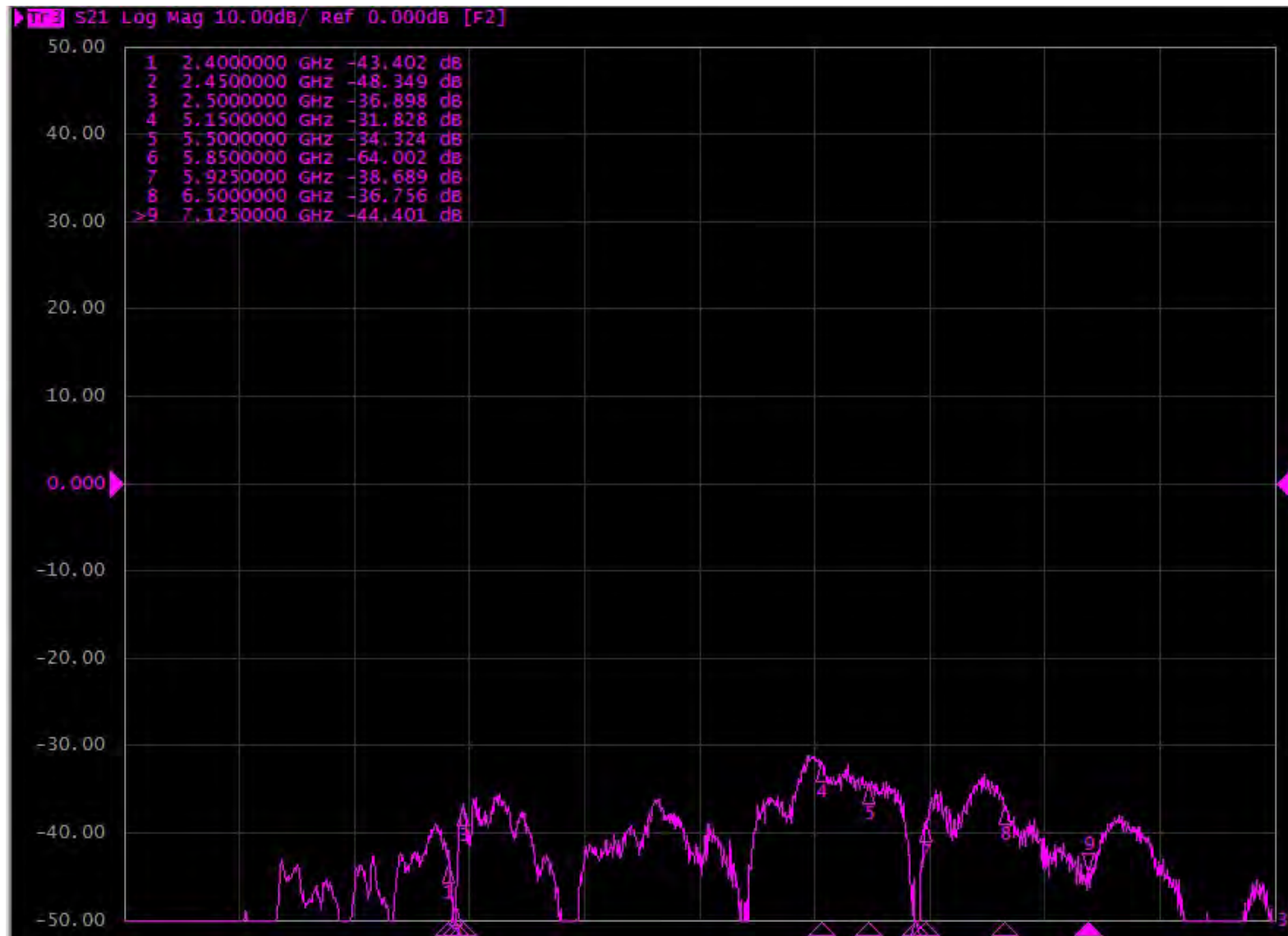




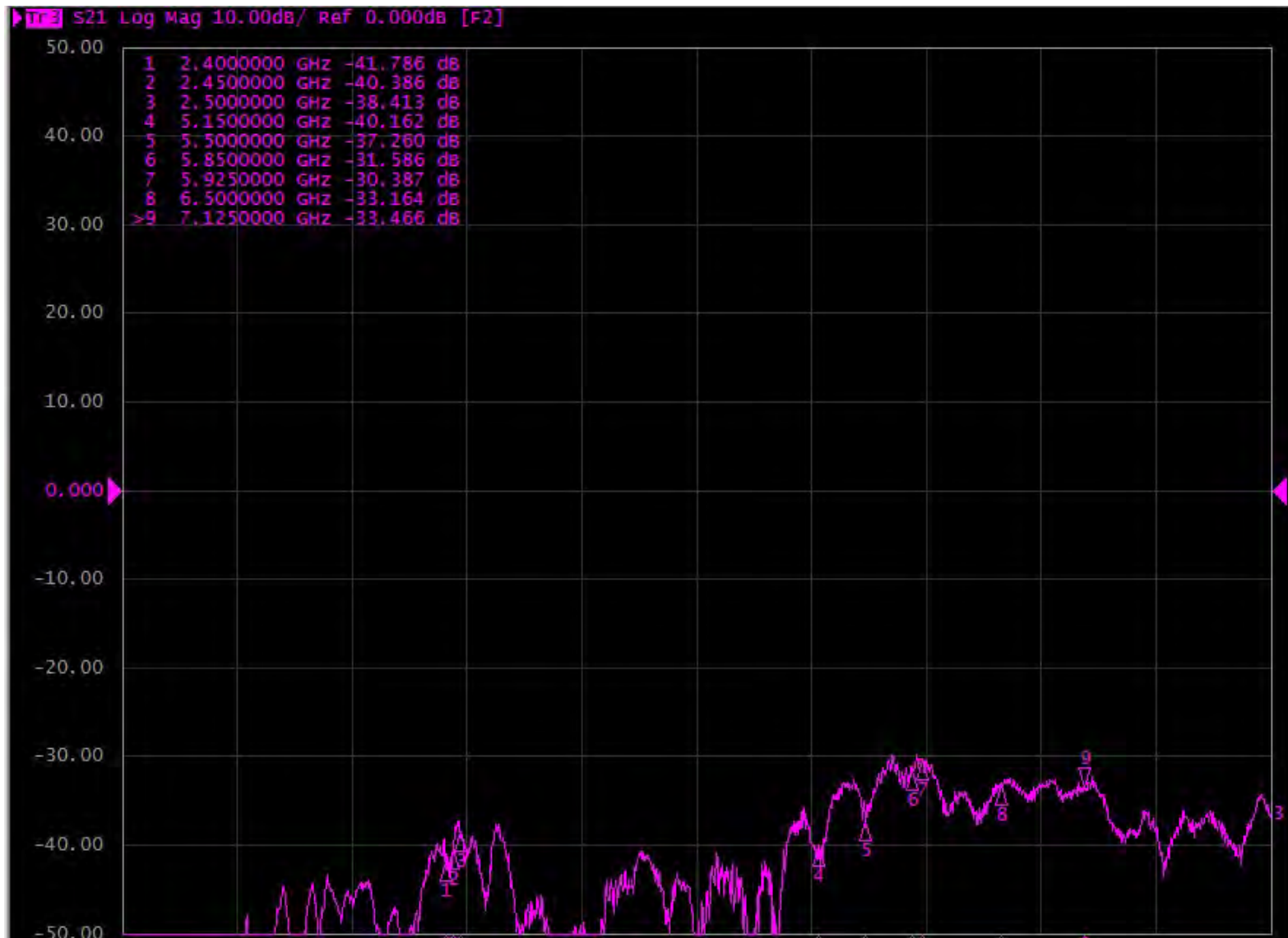
# Isolation – Ant 9 & Ant 12



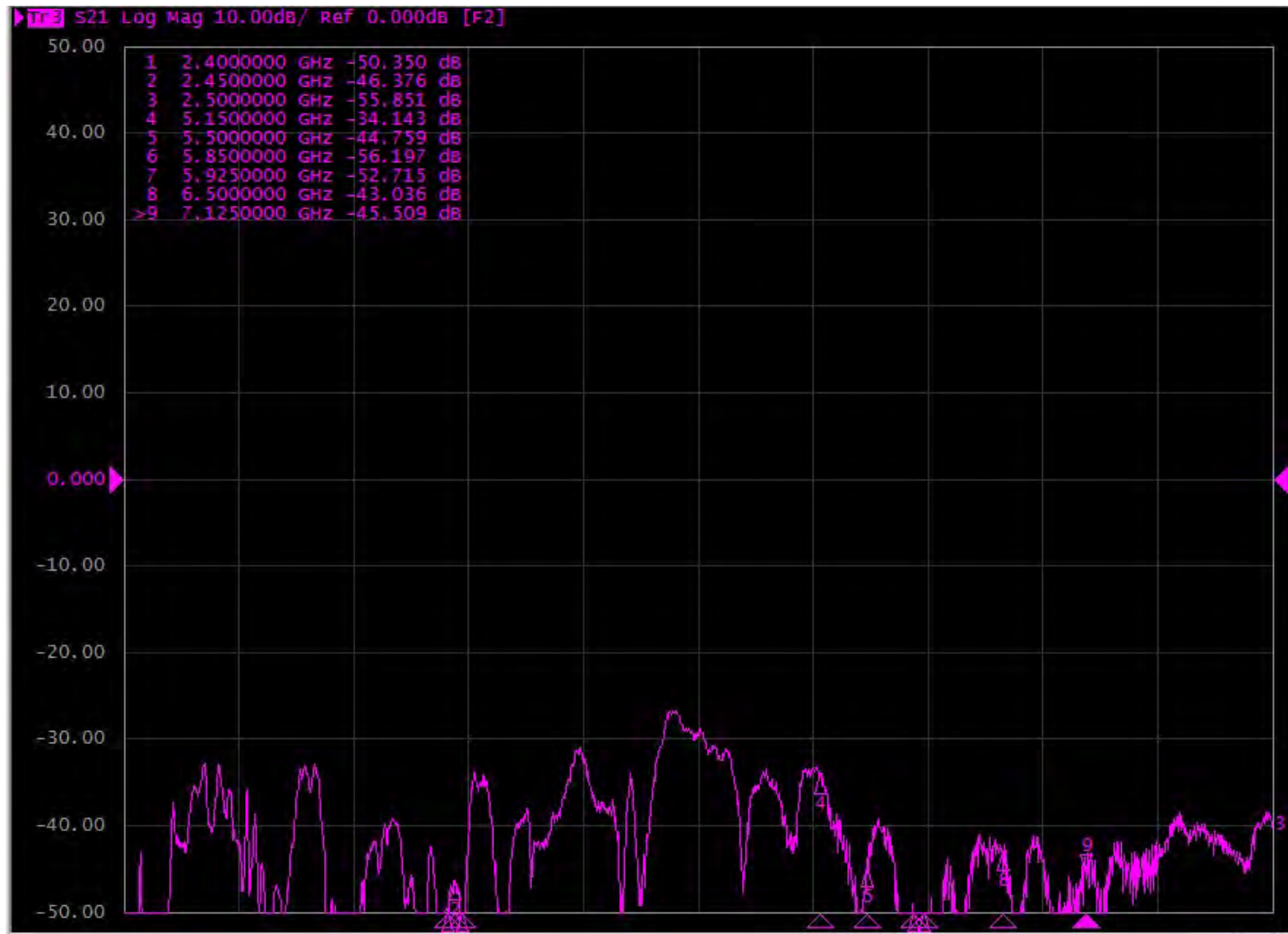
# Isolation – Ant 9 & Ant 13



# Isolation – Ant 9 & Ant 14

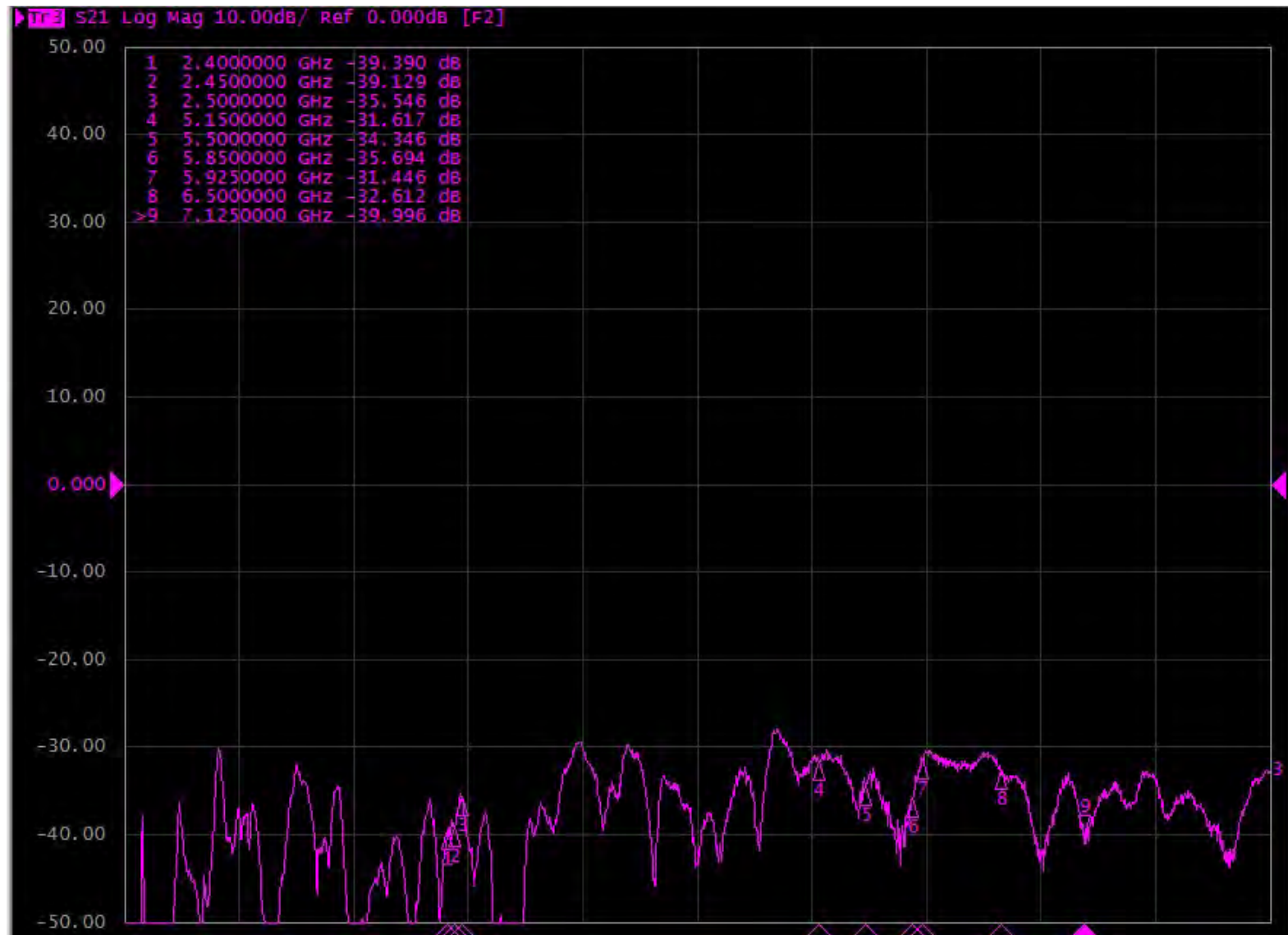


# Isolation – Ant 10 & Ant 11

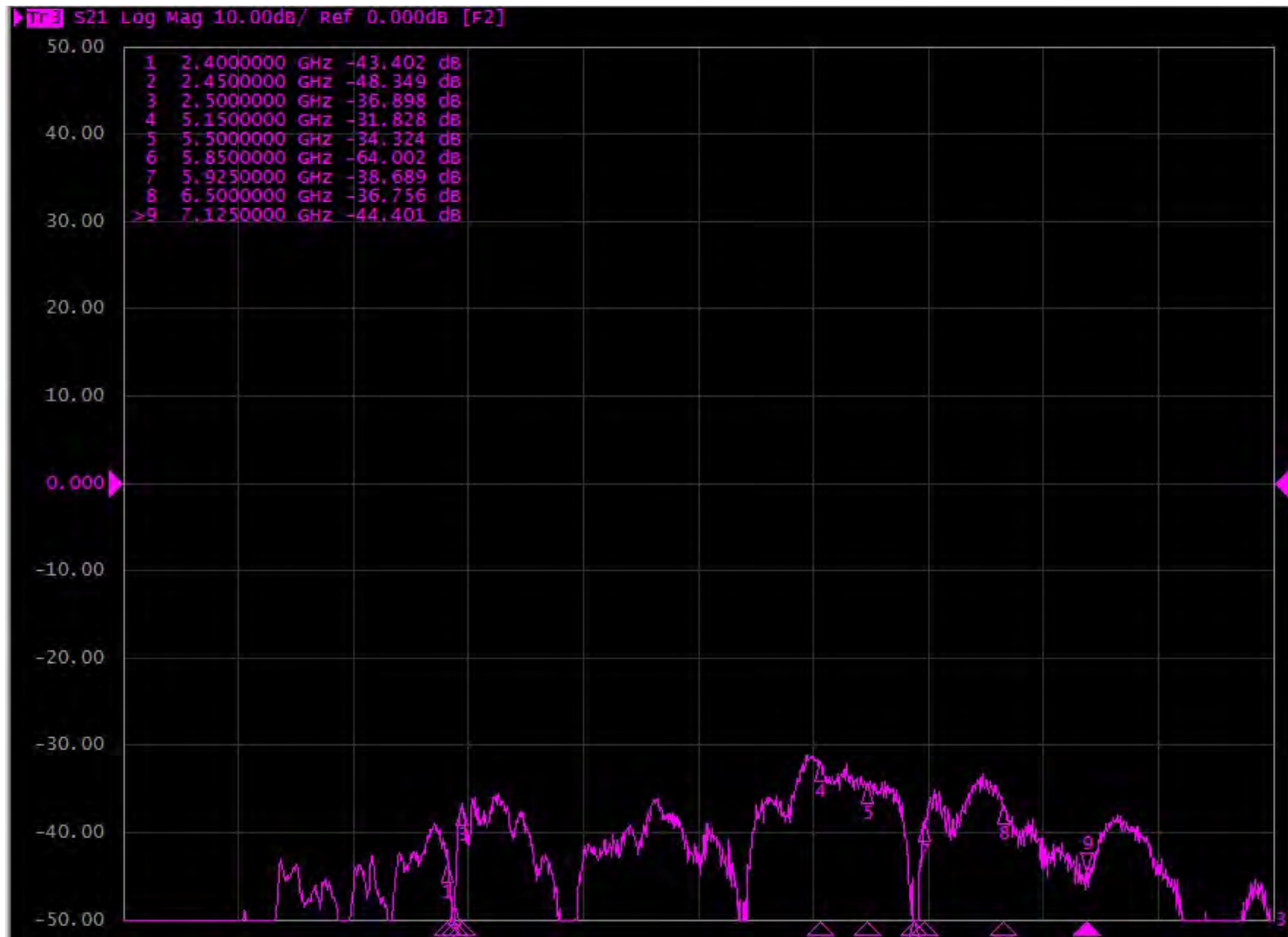




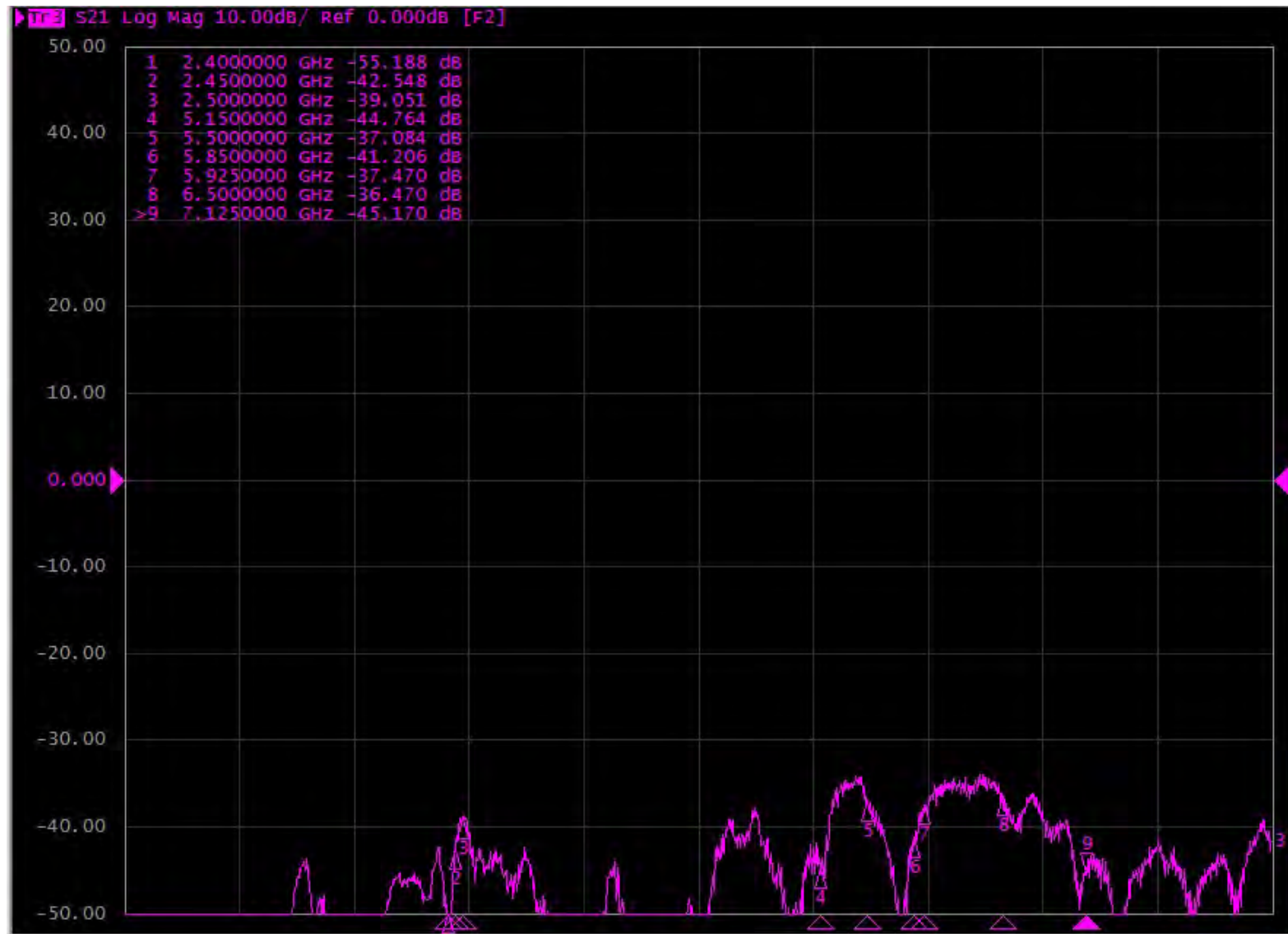
# Isolation – Ant 10 & Ant 12



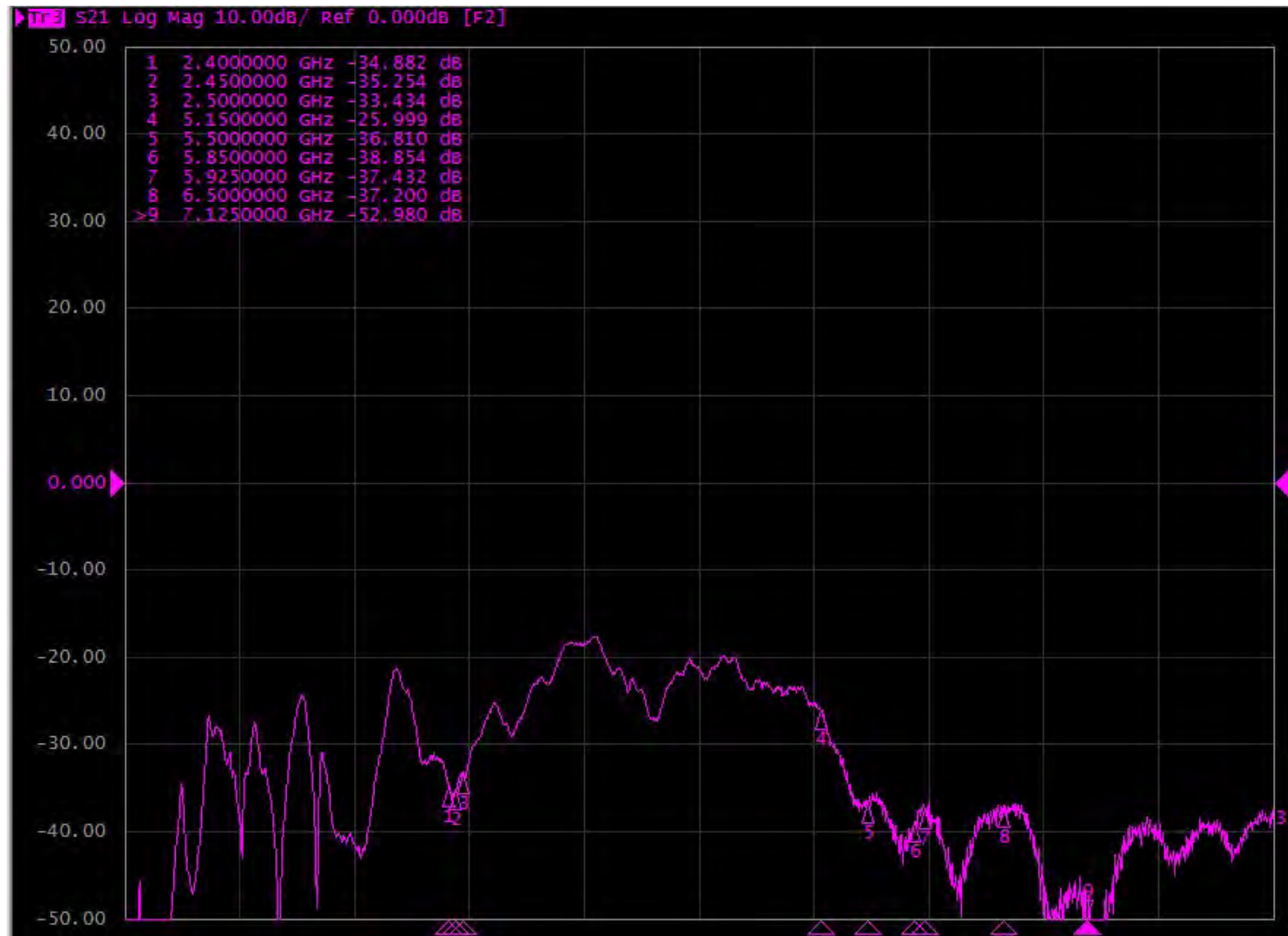
# Isolation – Ant 10 & Ant 13



# Isolation – Ant 10 & Ant 14

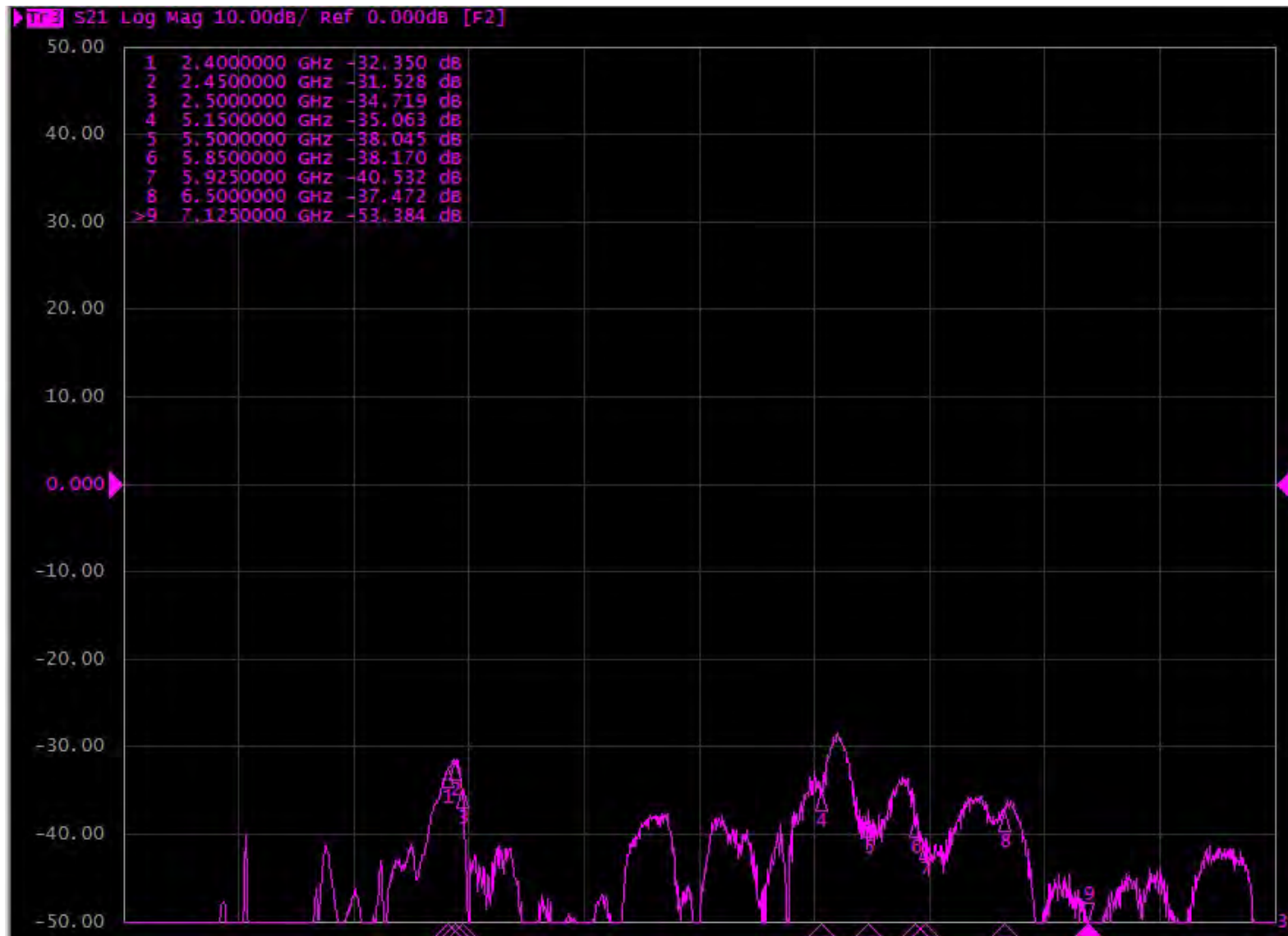


# Isolation – Ant 11 & Ant 12

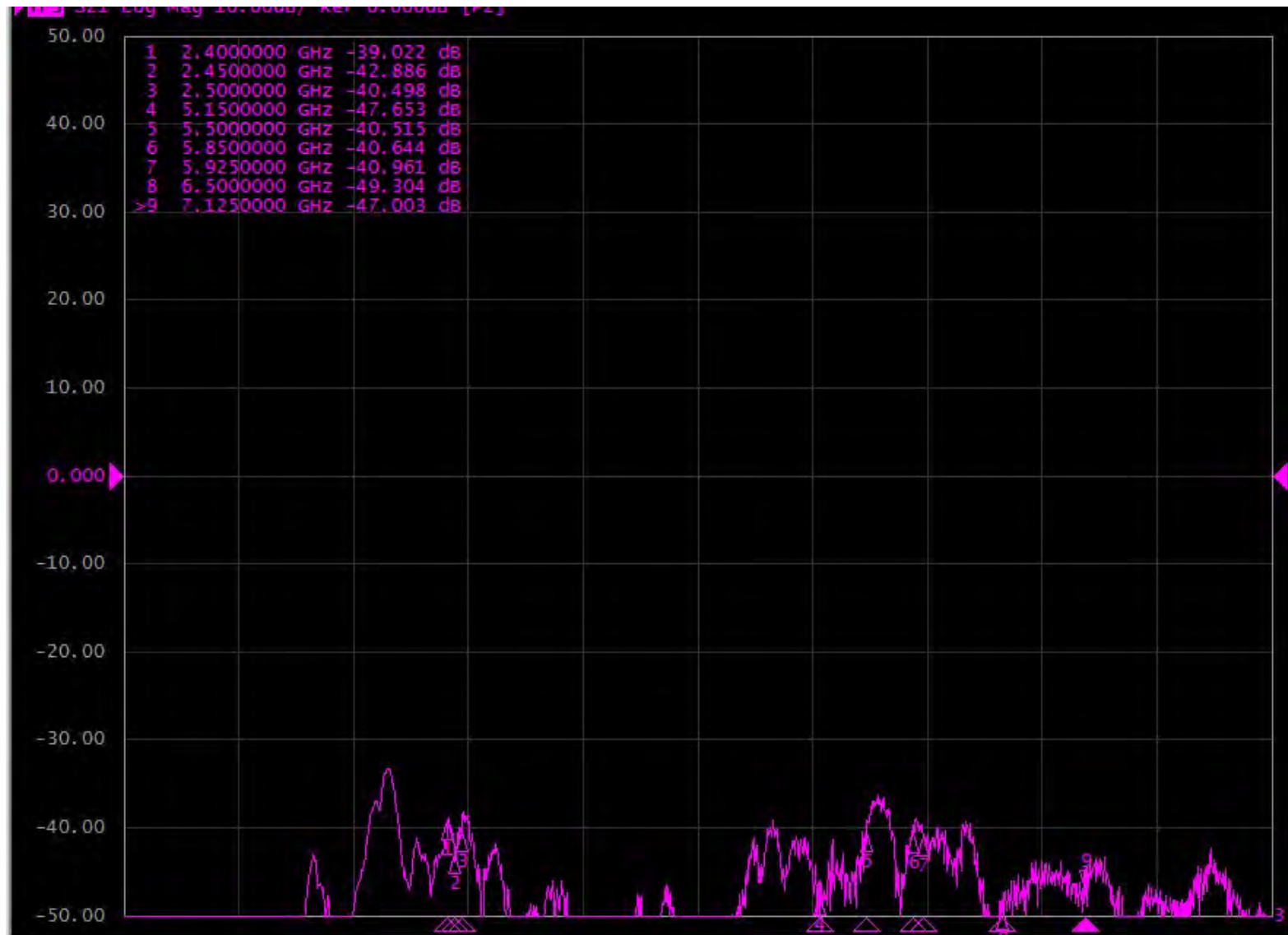




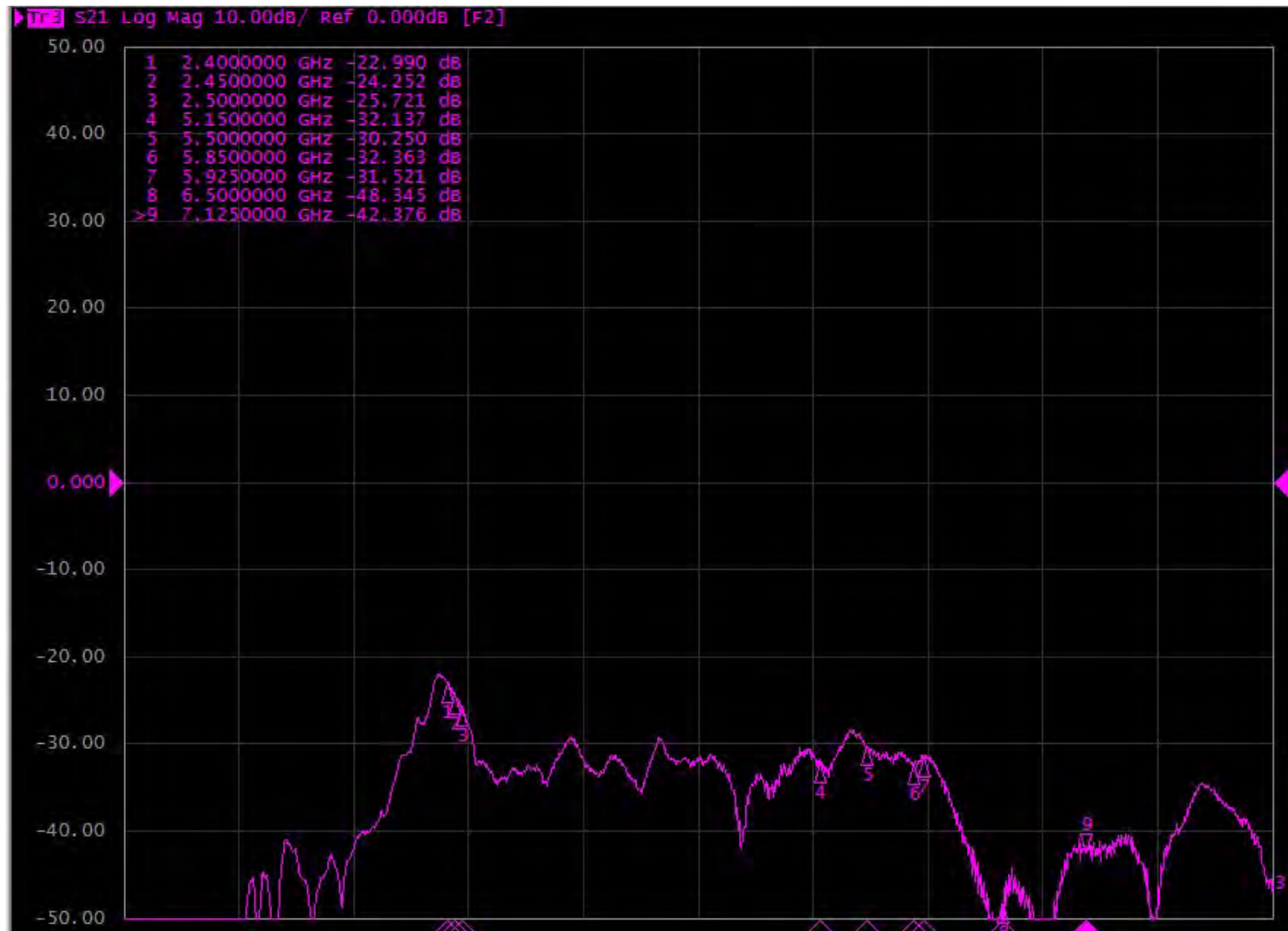
# Isolation – Ant 11 & Ant 13



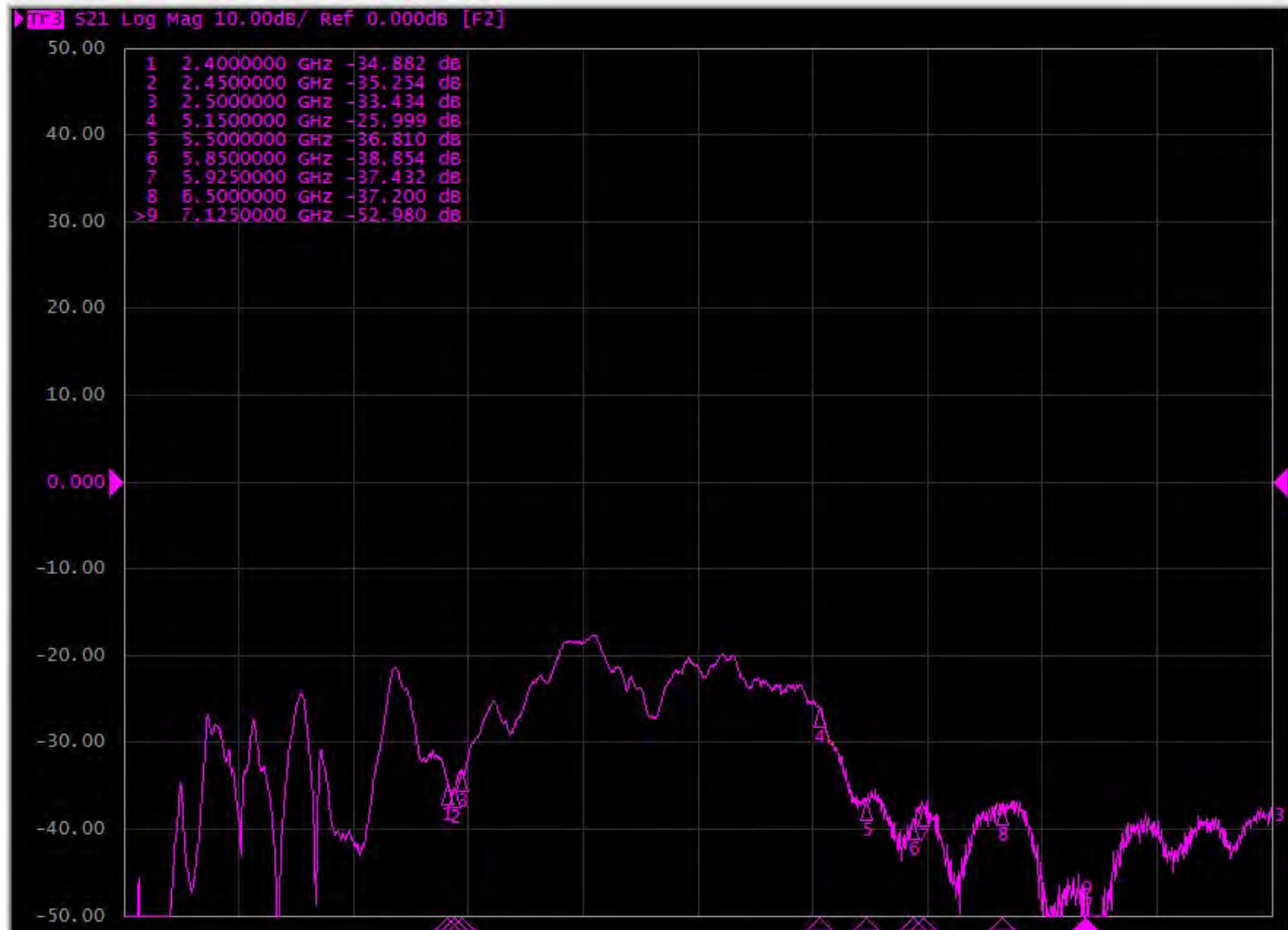
# Isolation – Ant 11 & Ant 14



# Isolation – Ant 12 & Ant 13

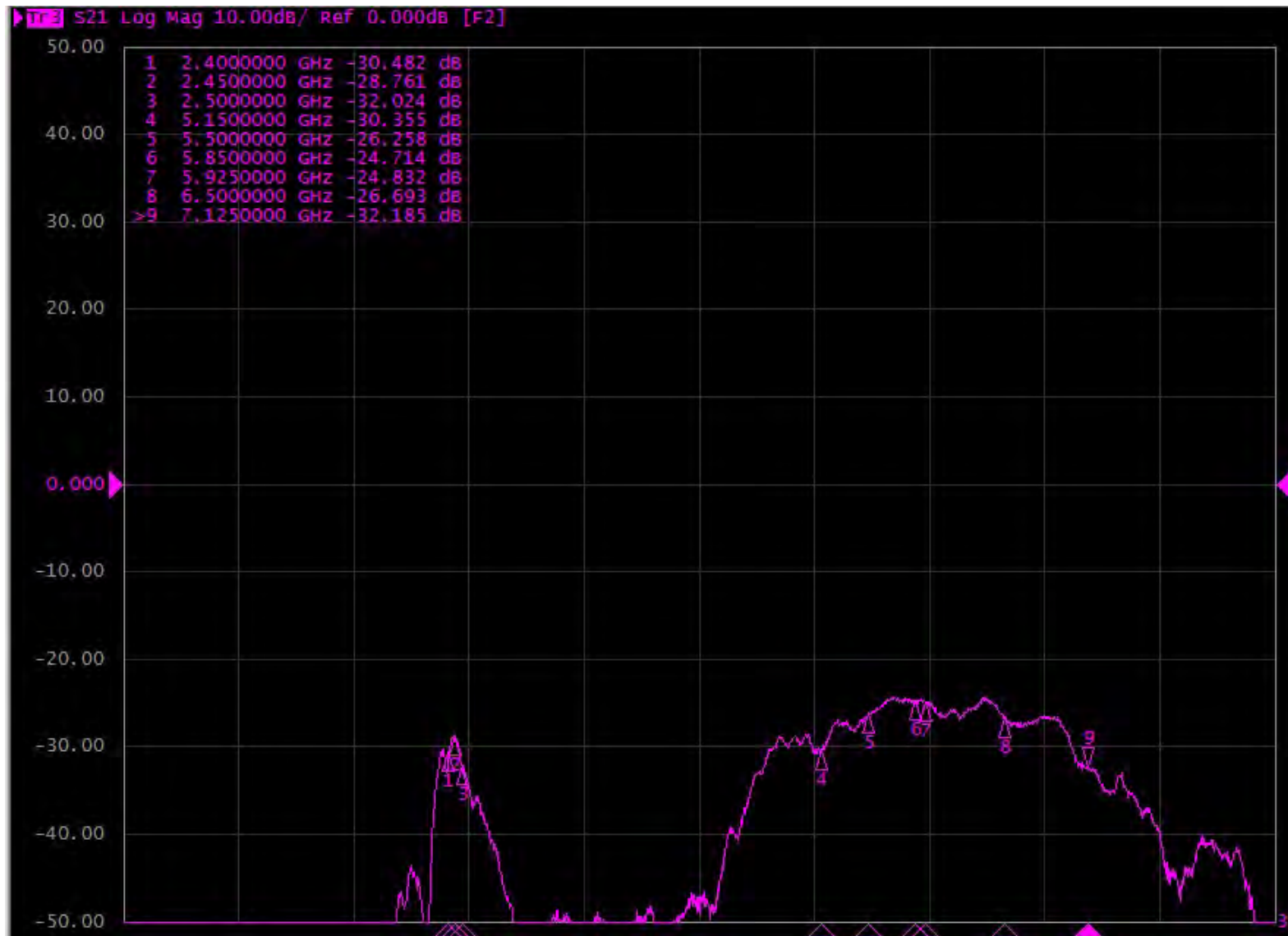


# Isolation – Ant 12 & Ant 14



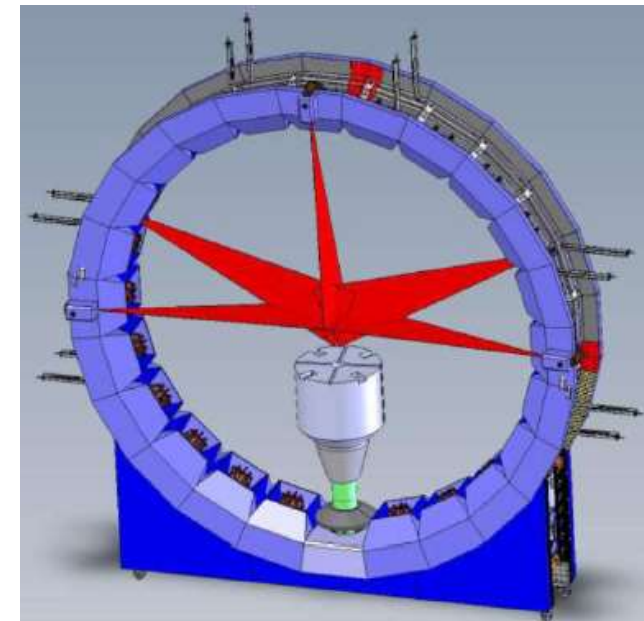
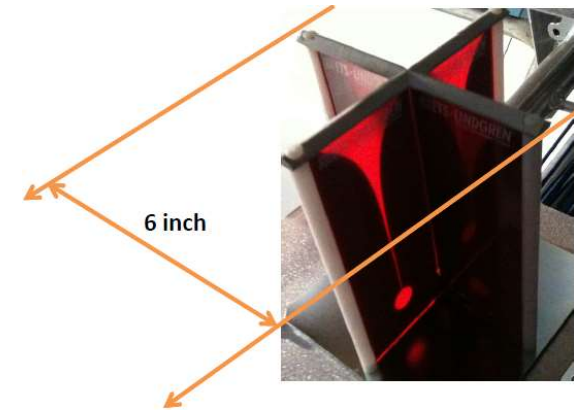
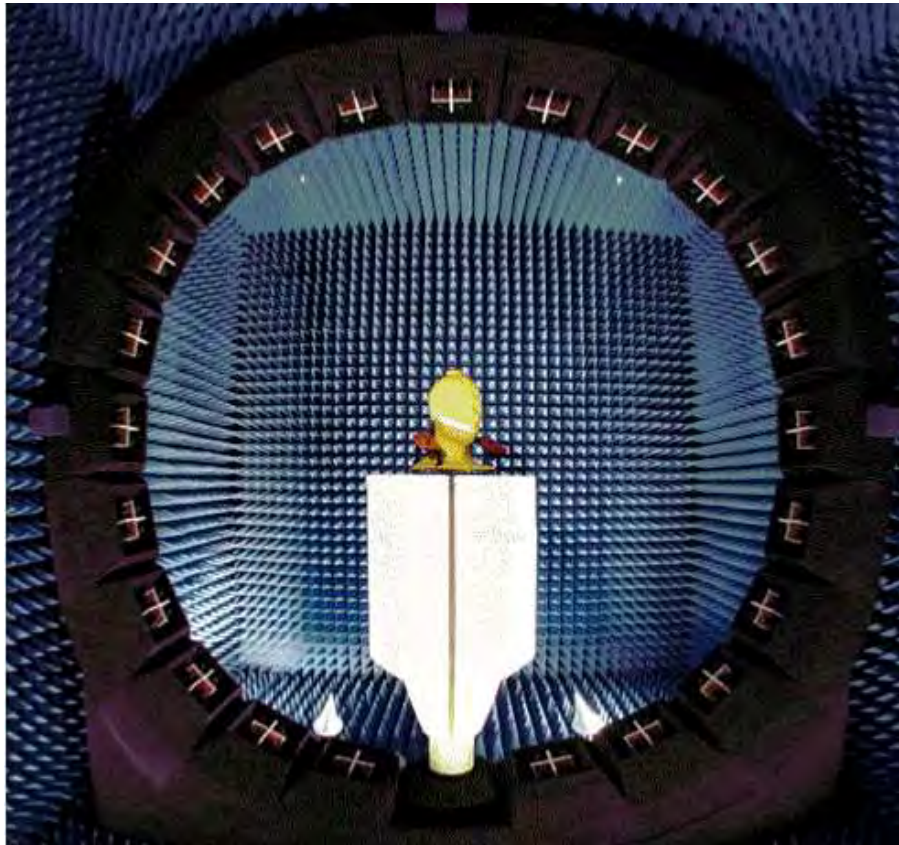


# Isolation – Ant 13 & Ant 14



# Antenna Measurement Chamber

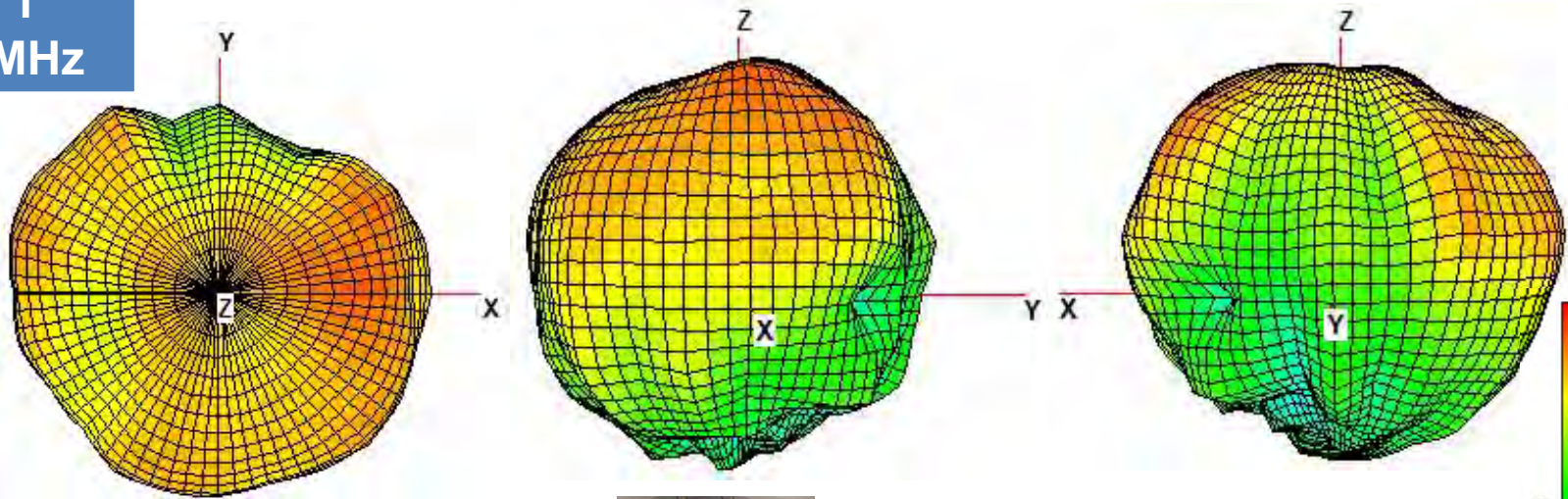
- ETS AMS8923 antenna measurement system
- Interior dimensions : 4.9(L)×4.9(W)×4.9(H)m<sup>3</sup>
- Operating band : 600 MHz – 6 GHz
- Support passive test & TRP/TIS test
- Provide graphic data display



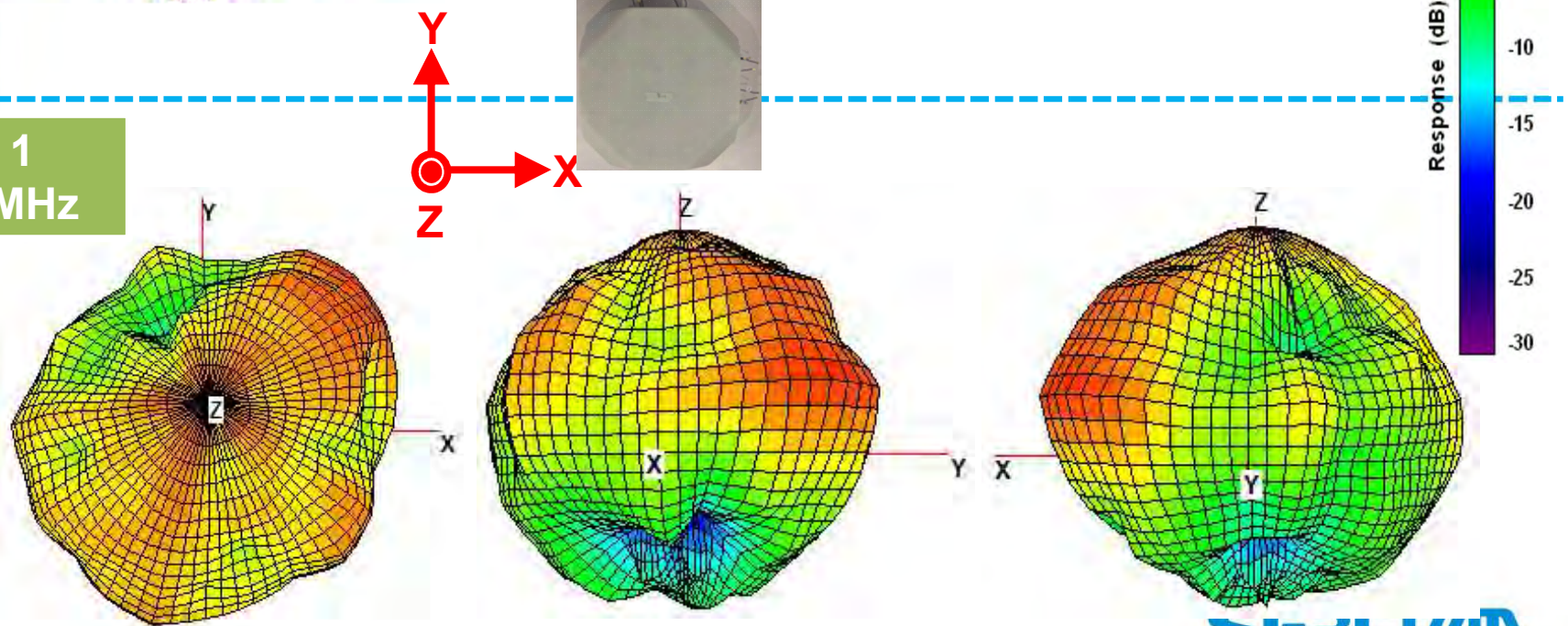


# 3D Radiation Pattern – Ant 1 WiFi 2G/5G

Ant 1  
2450 MHz



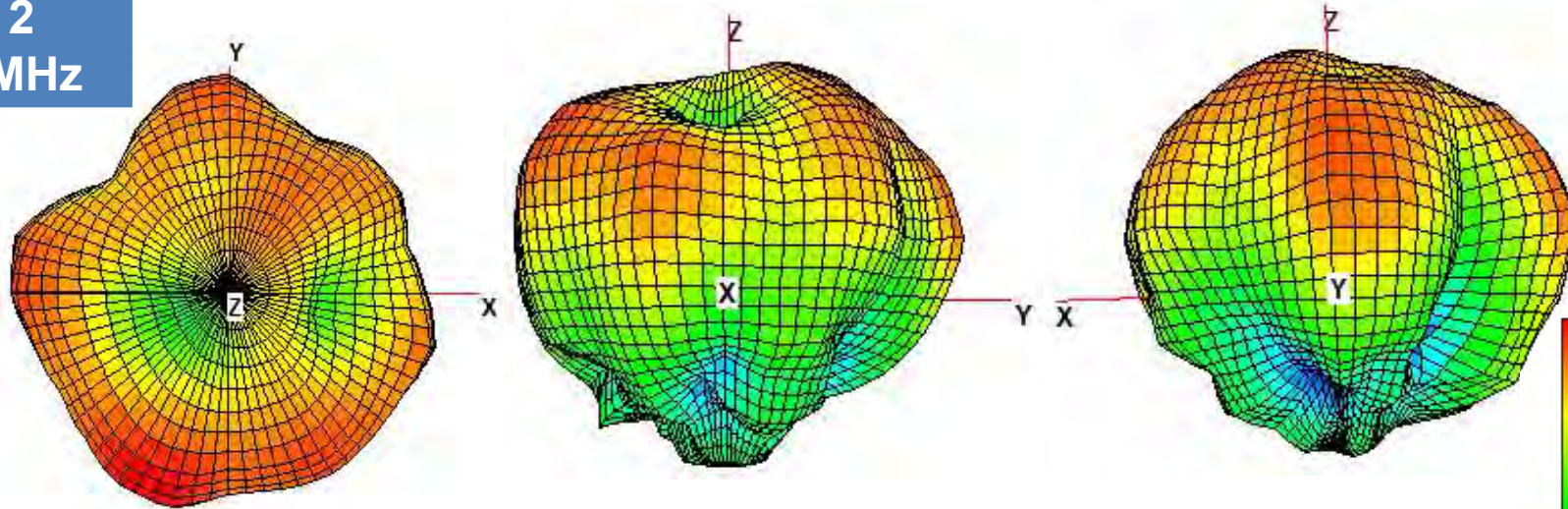
Ant 1  
5500 MHz



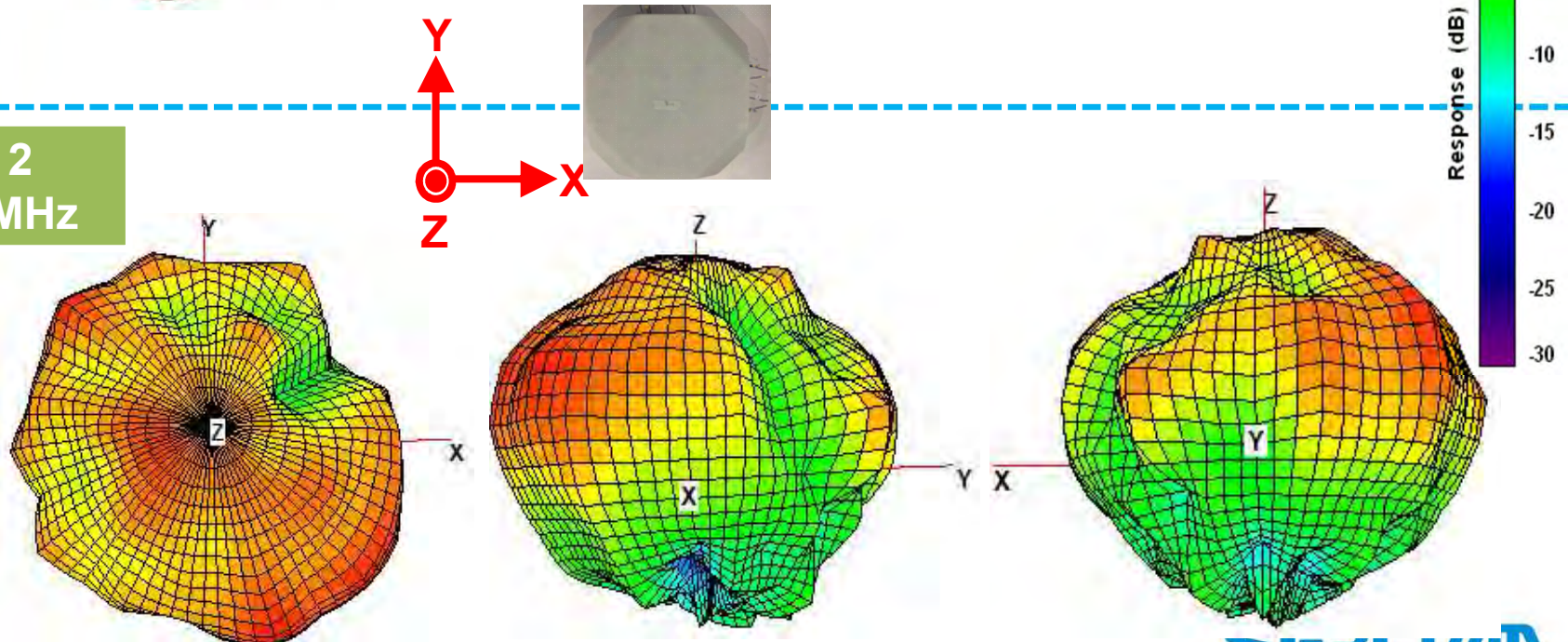


# 3D Radiation Pattern – Ant 2 WiFi 2G/5G

Ant 2  
2450 MHz



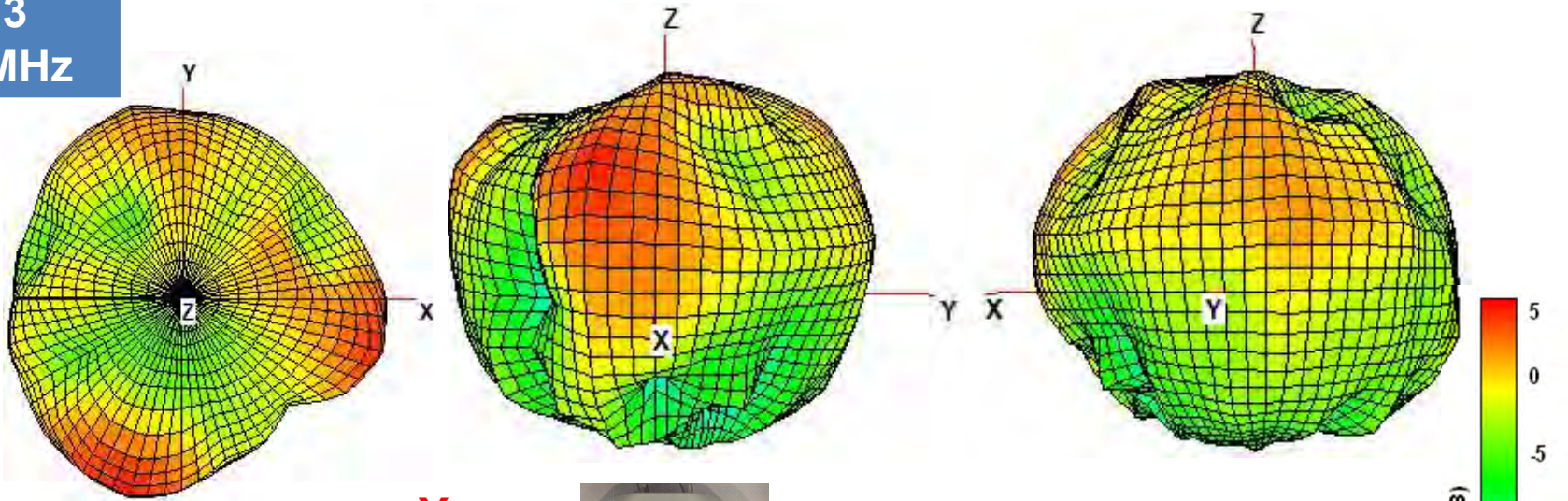
Ant 2  
5500 MHz



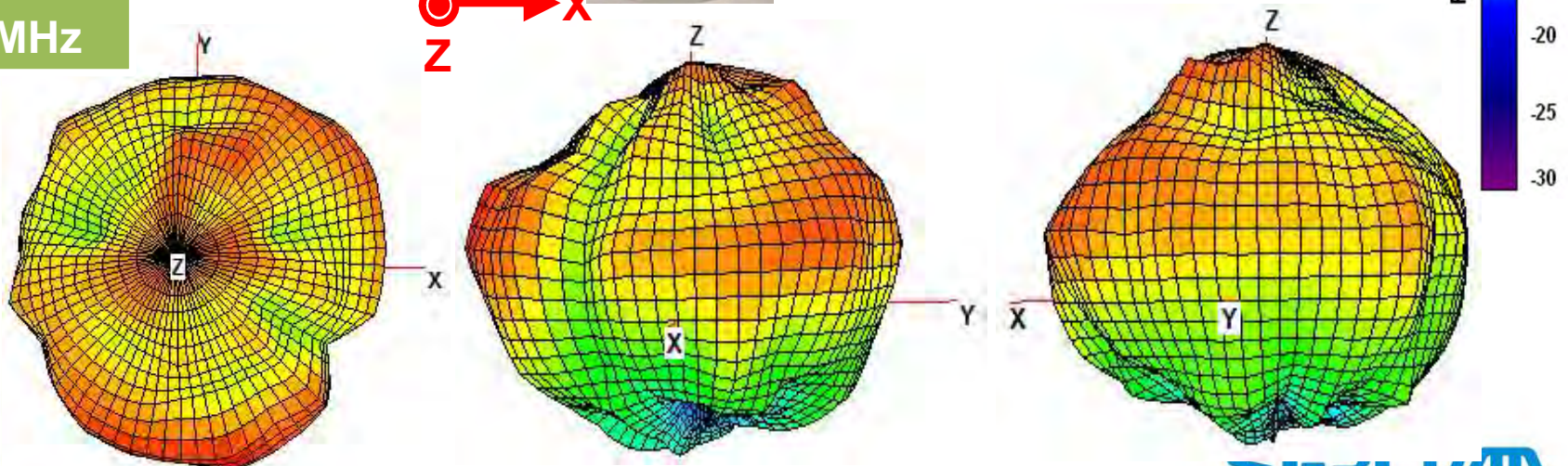


# 3D Radiation Pattern – Ant 3 WiFi 2G/5G

Ant 3  
2450 MHz



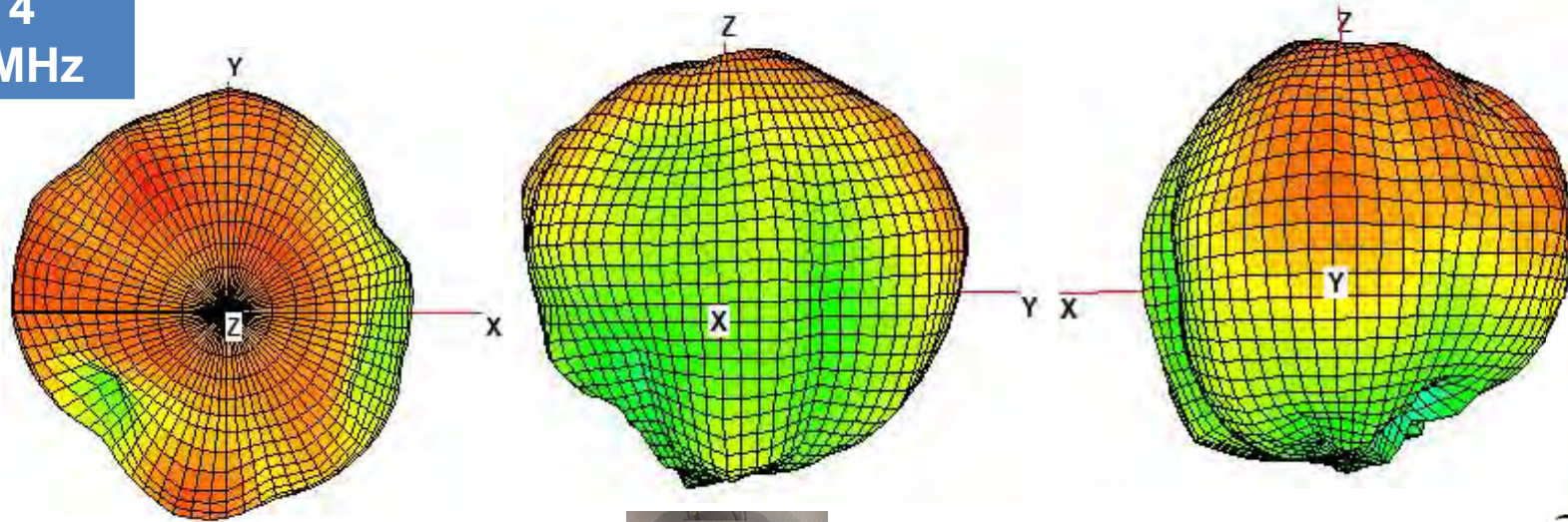
Ant 3  
5500 MHz



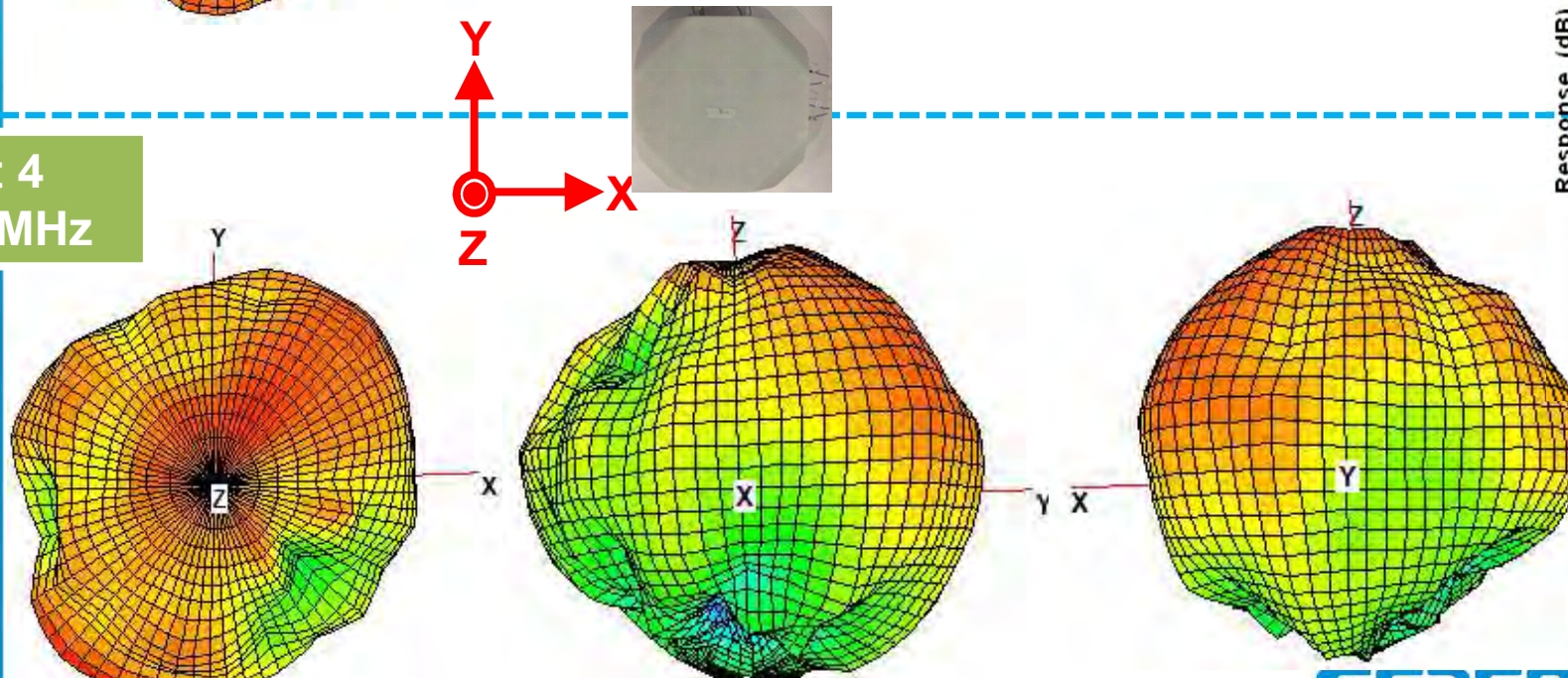


# 3D Radiation Pattern – Ant 4 WiFi 2G/5G

Ant 4  
2450 MHz



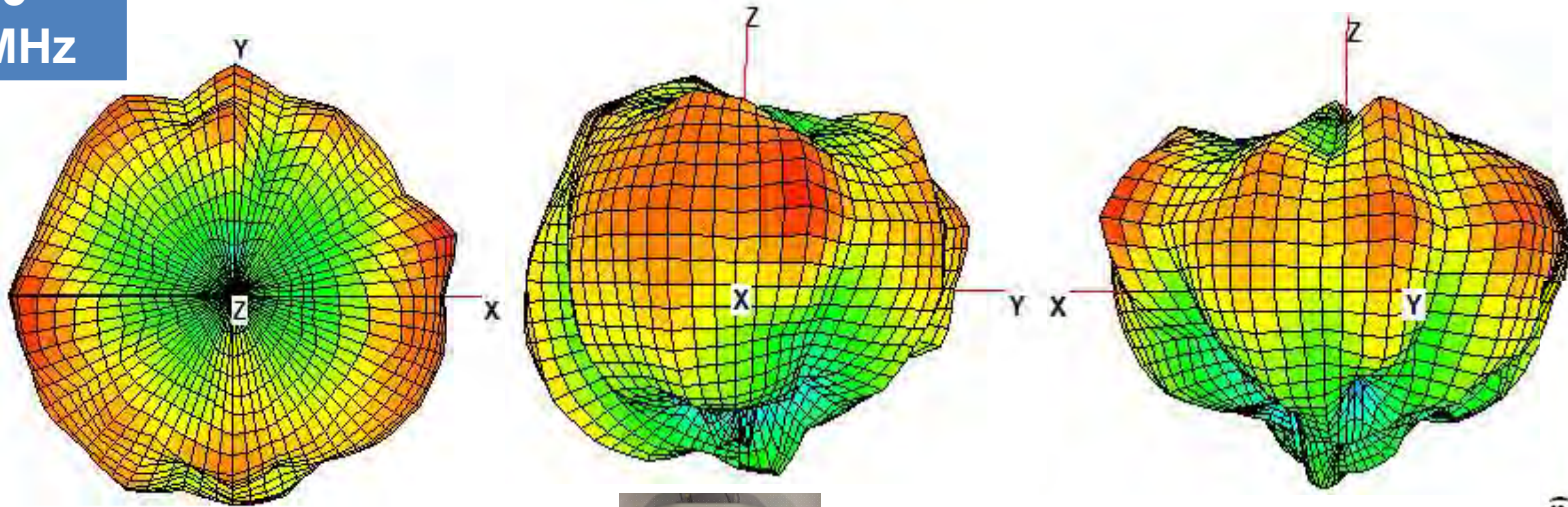
Ant 4  
5500 MHz



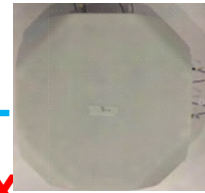
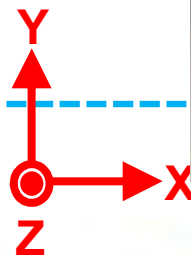
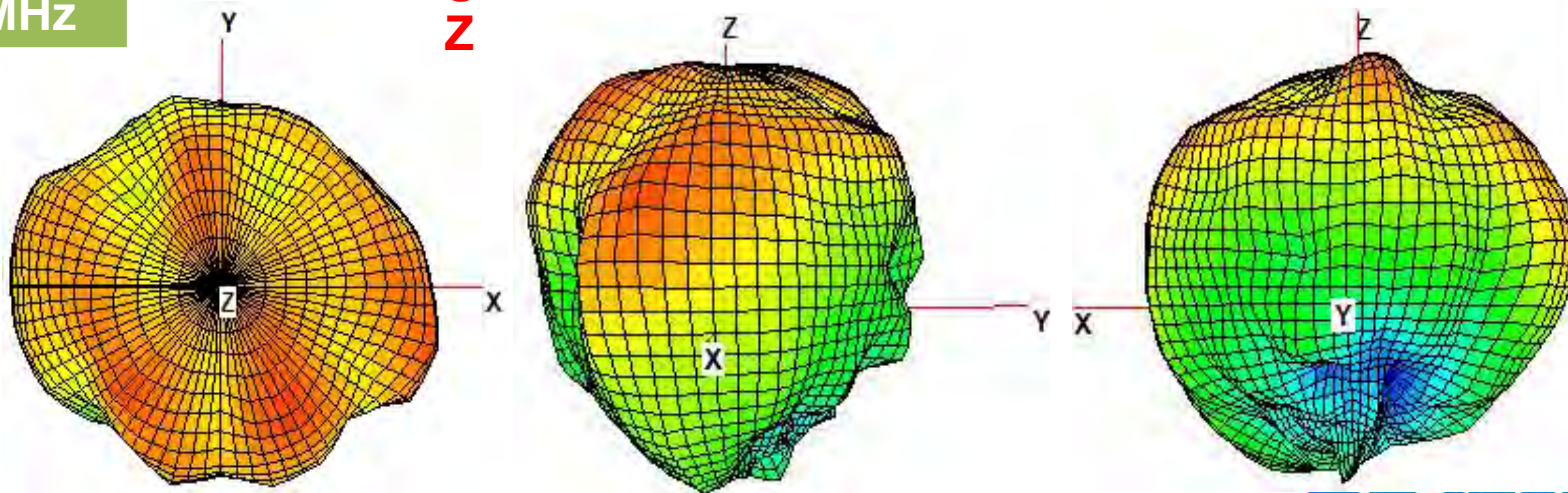


# 3D Radiation Pattern – Ant 5 & Ant 6 WiFi 5G

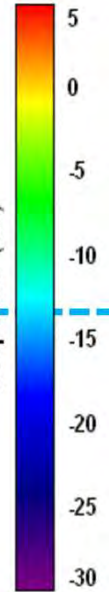
Ant 5  
5500 MHz



Ant 6  
5500 MHz



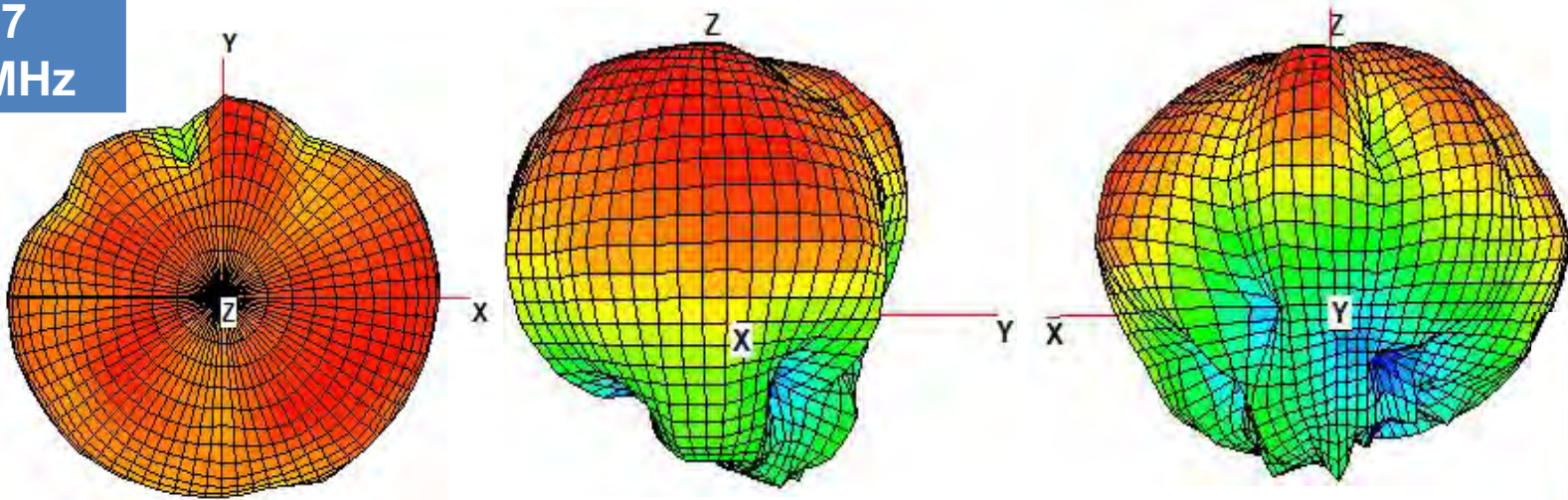
Response (dB)



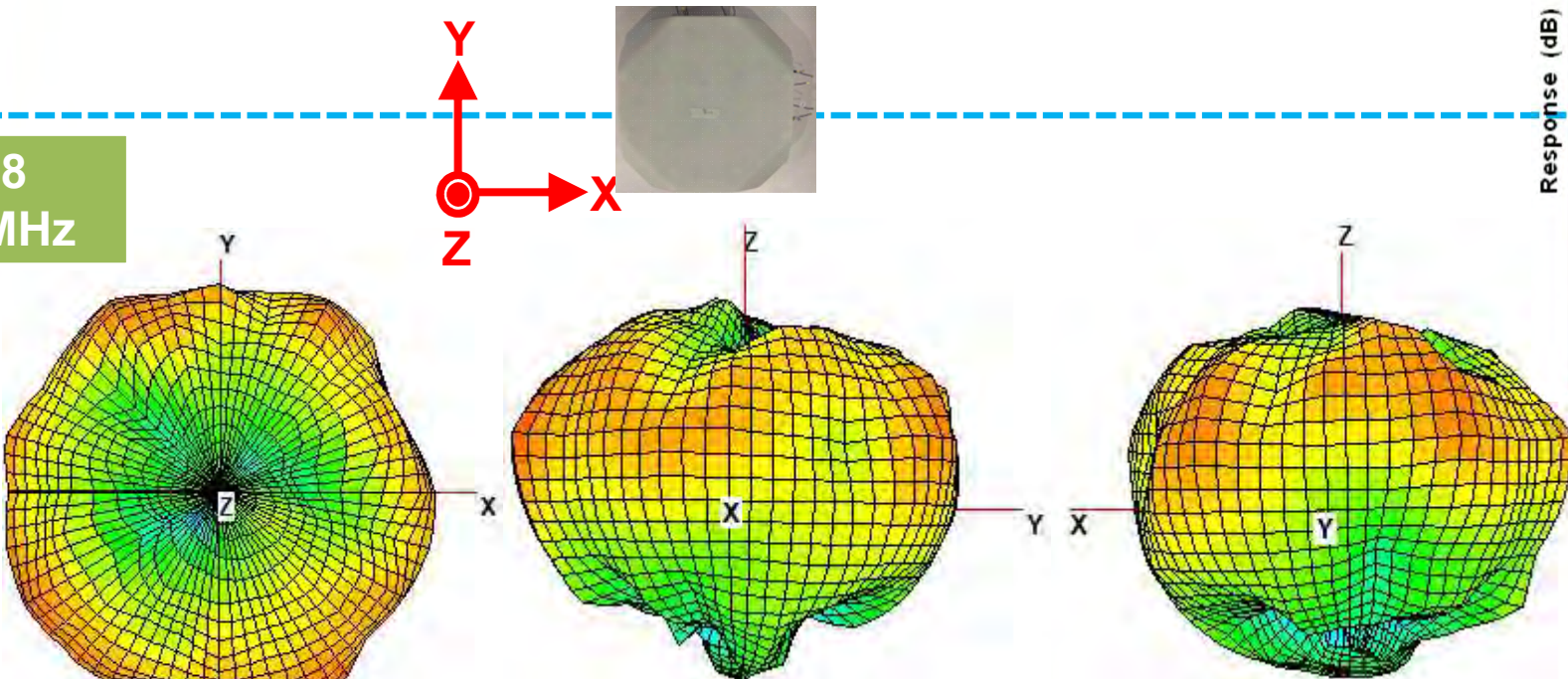


# 3D Radiation Pattern – Ant 7 & Ant 8 WiFi 5G

Ant 7  
5500 MHz



Ant 8  
5500 MHz

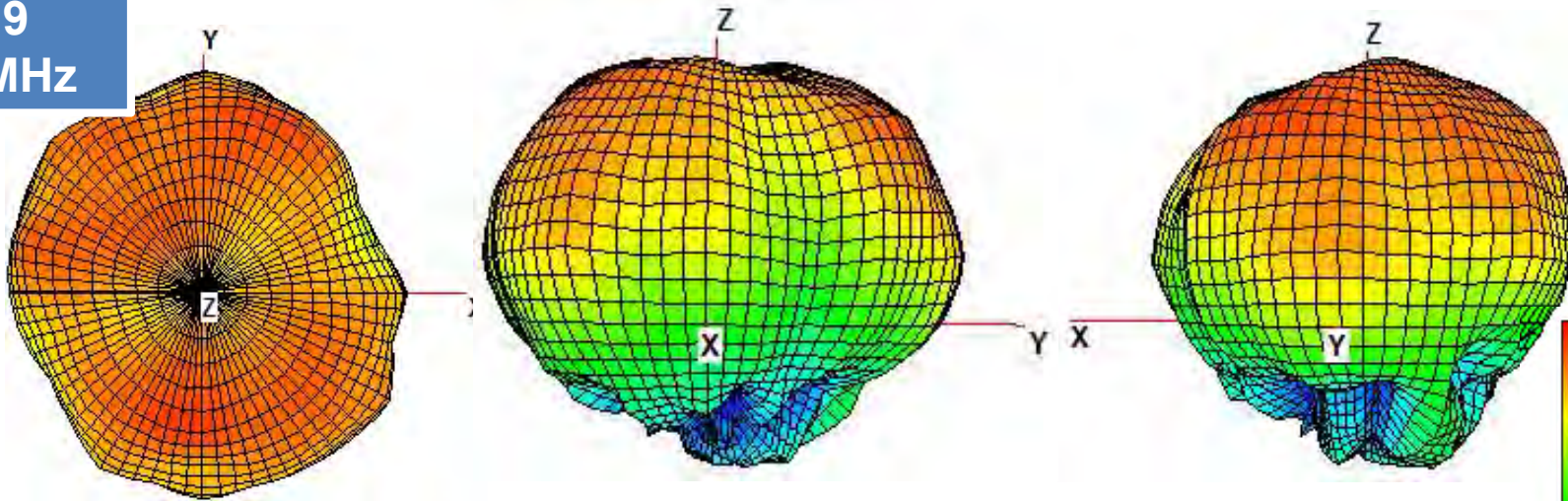


Response (dB)  
5  
0  
-5  
-10  
-15  
-20  
-25  
-30

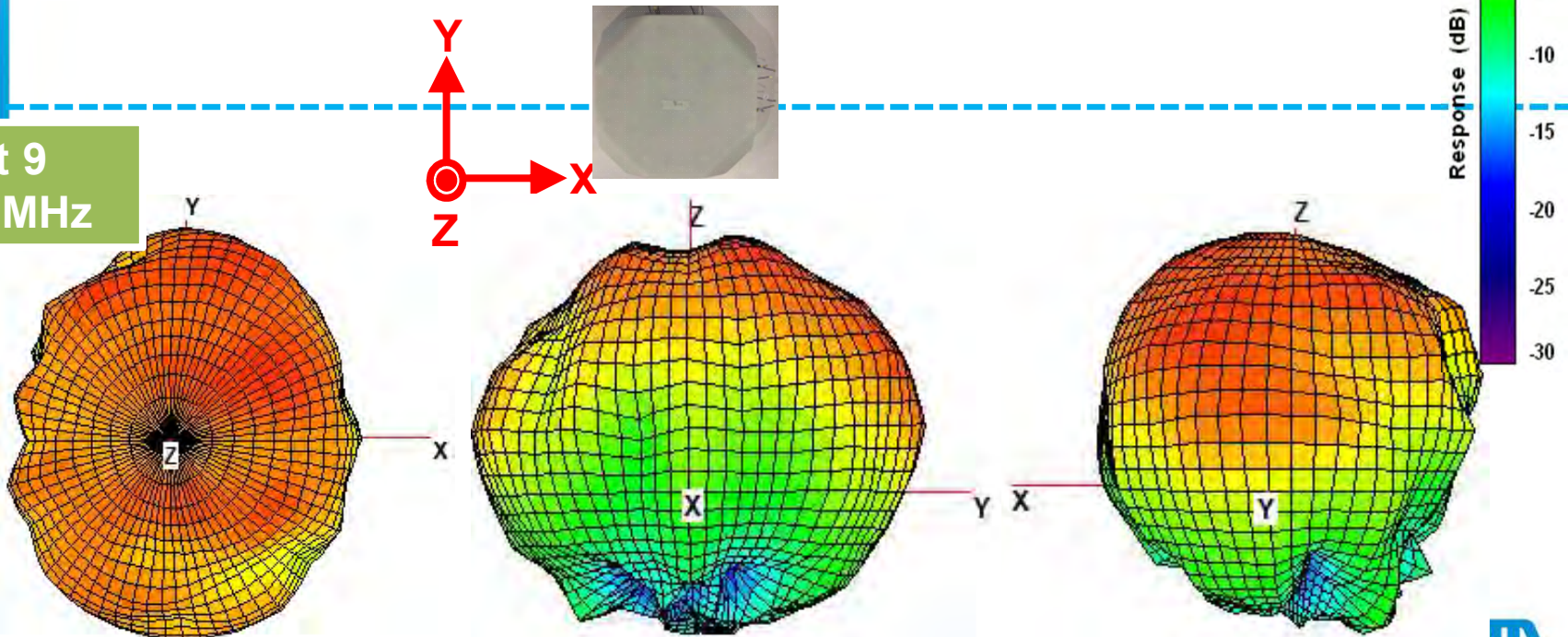


# 3D Radiation Pattern – Ant 9 WiFi 5G/6G

Ant 9  
5500 MHz



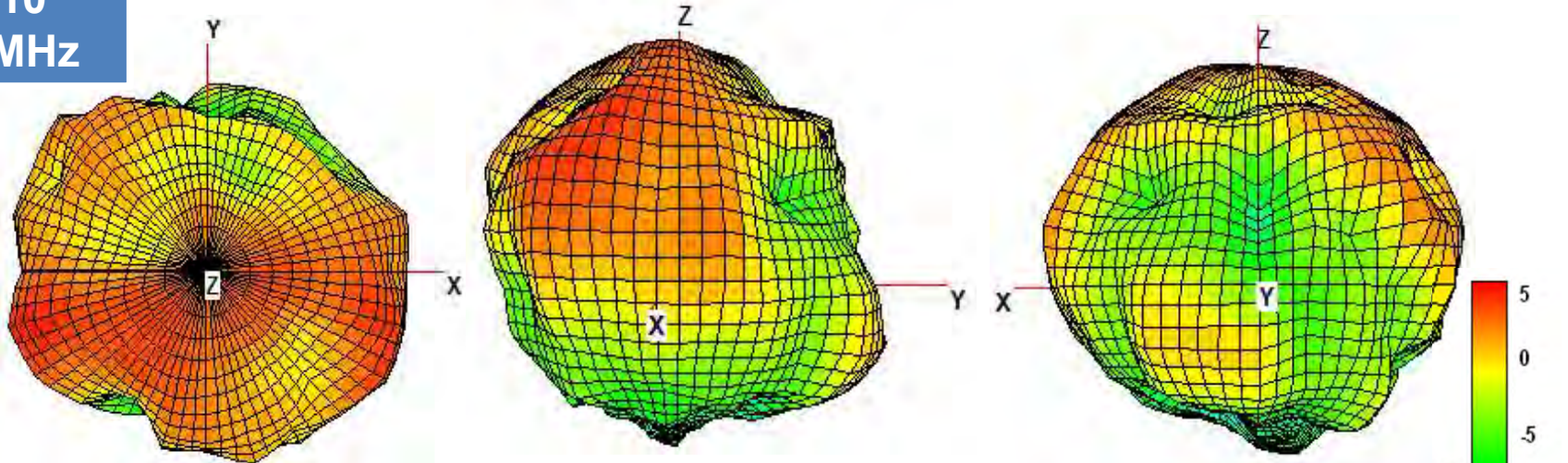
Ant 9  
6500 MHz



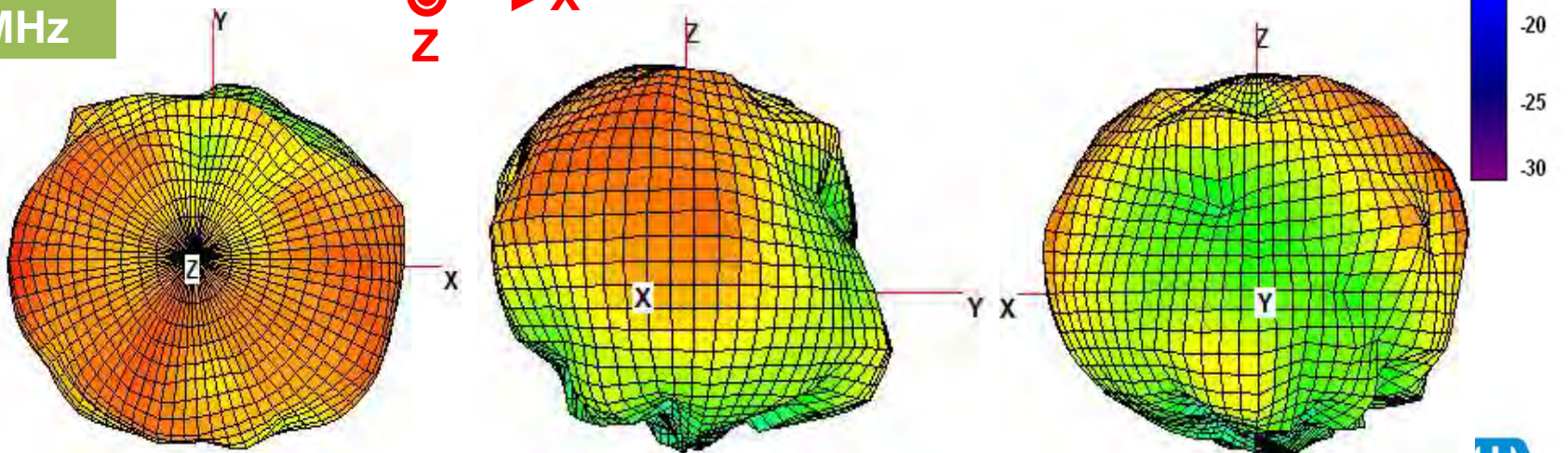


# 3D Radiation Pattern – Ant 10 WiFi 5G/6G

Ant 10  
5500 MHz



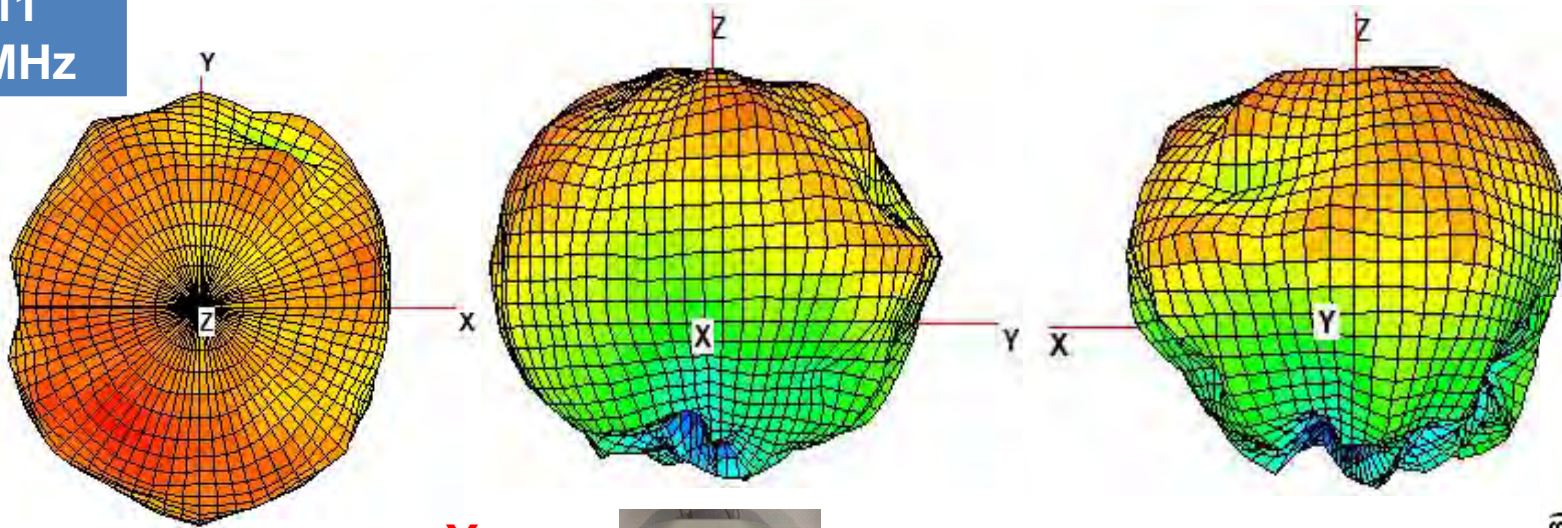
Ant 10  
6500 MHz



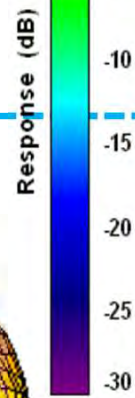
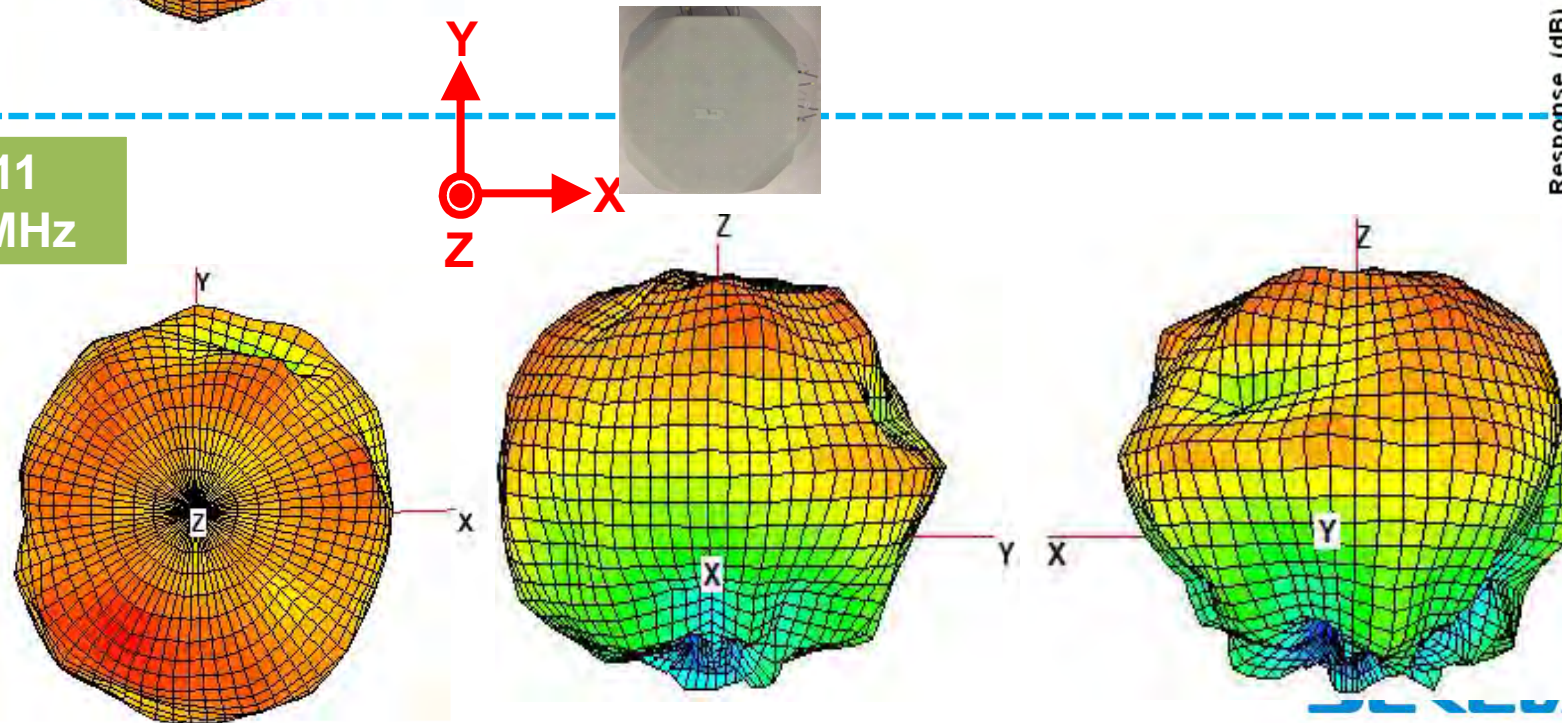


# 3D Radiation Pattern – Ant 11 WiFi 5G/6G

Ant 11  
5500 MHz



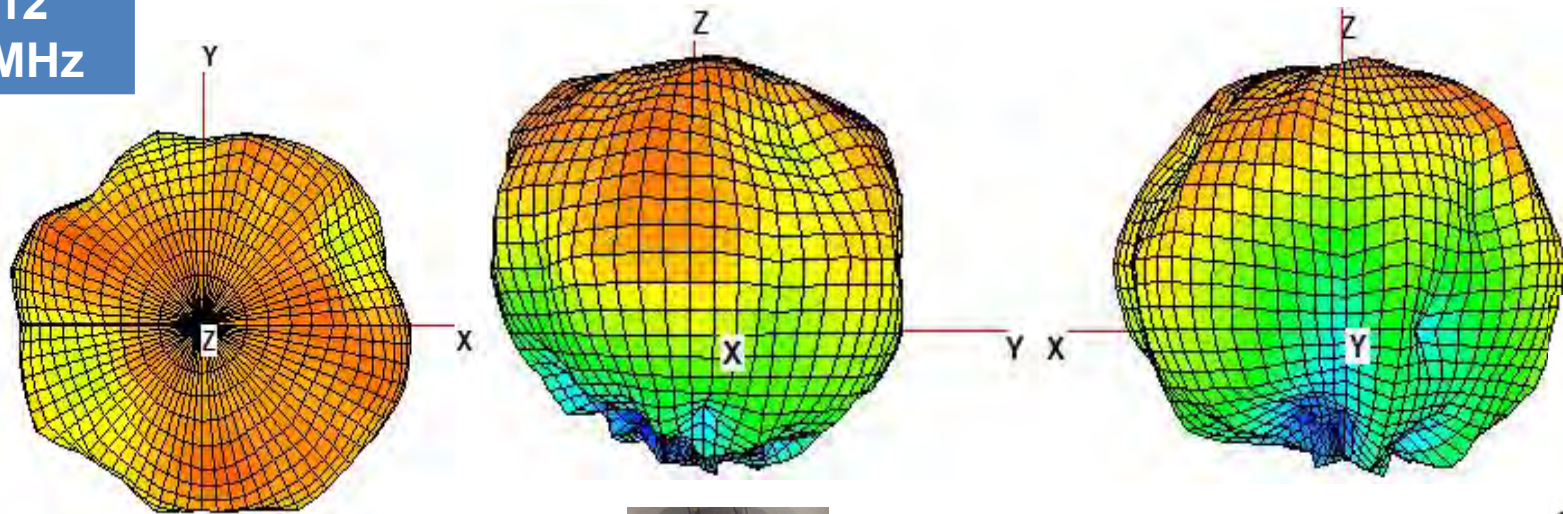
Ant 11  
6500 MHz



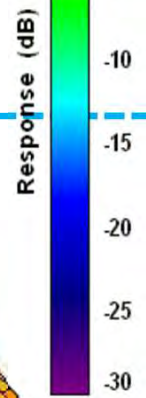
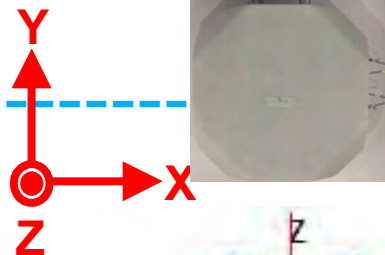
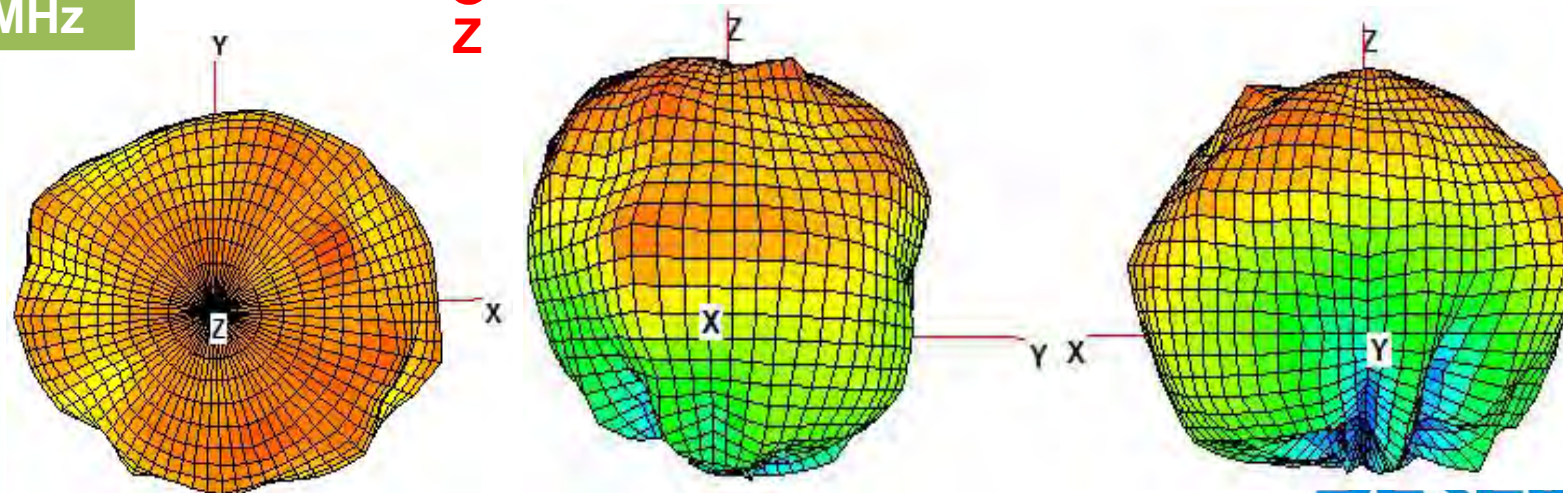


# 3D Radiation Pattern – Ant 12 WiFi 5G/6G

Ant 12  
5500 MHz



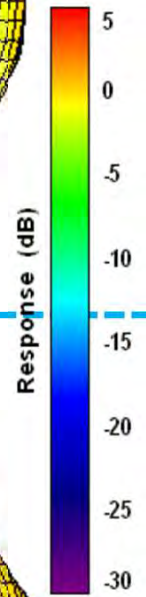
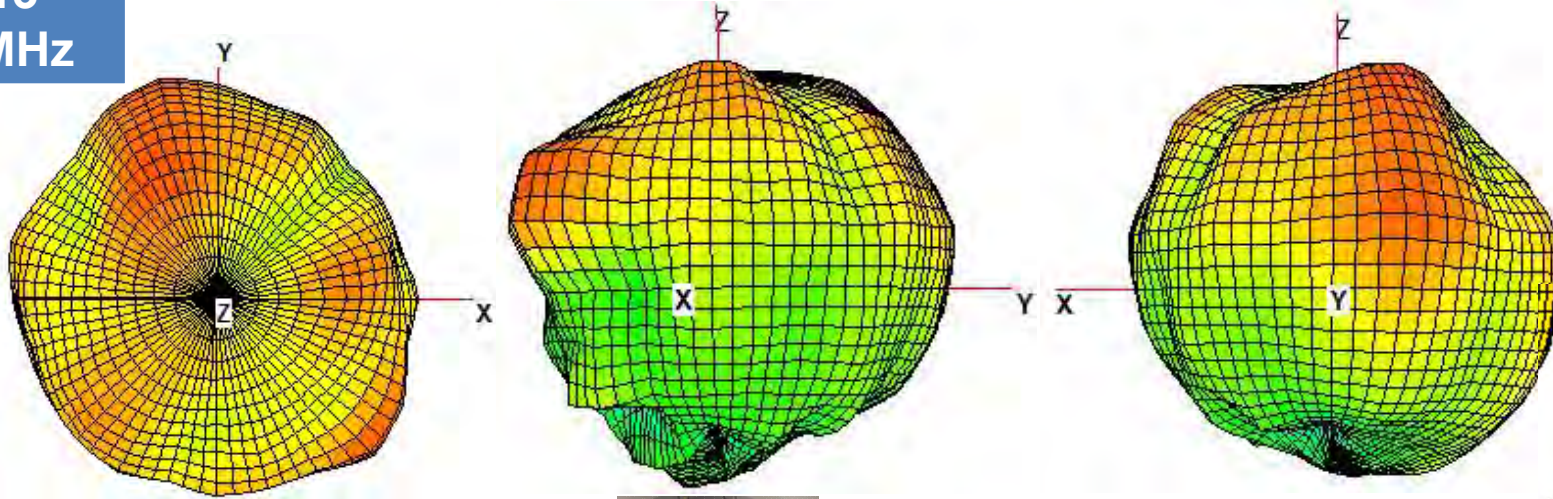
Ant 12  
6500 MHz



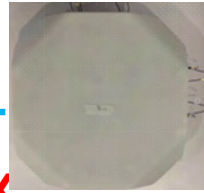
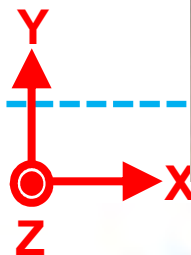
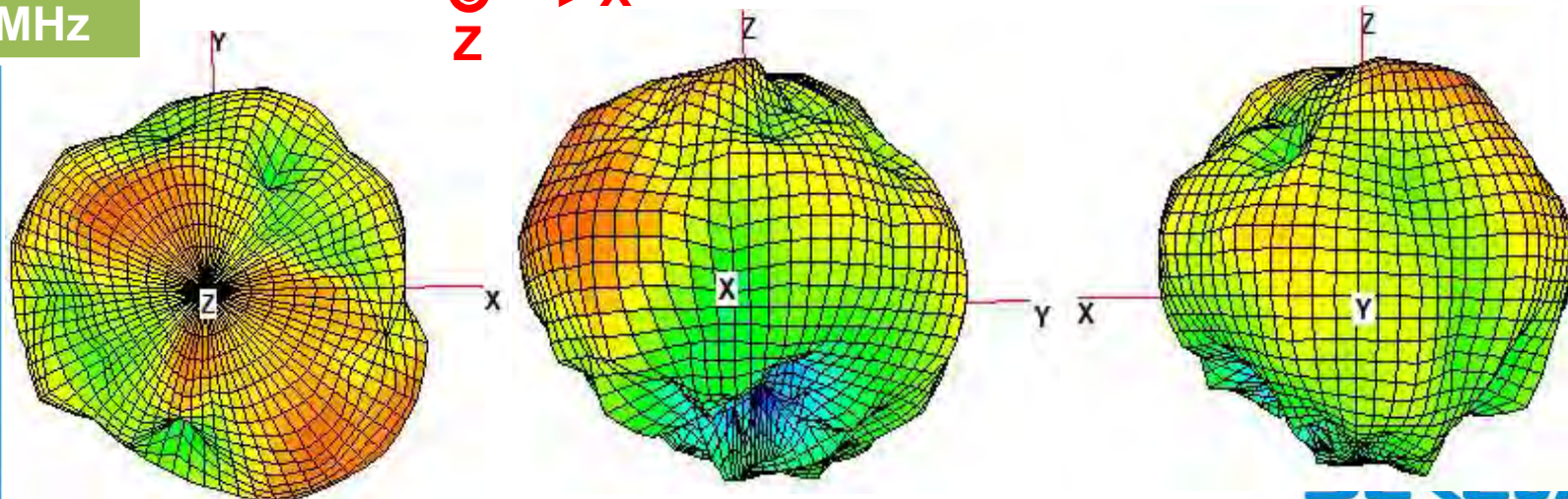


# 3D Radiation Pattern – Ant 13 Scanning

Ant 13  
2450 MHz

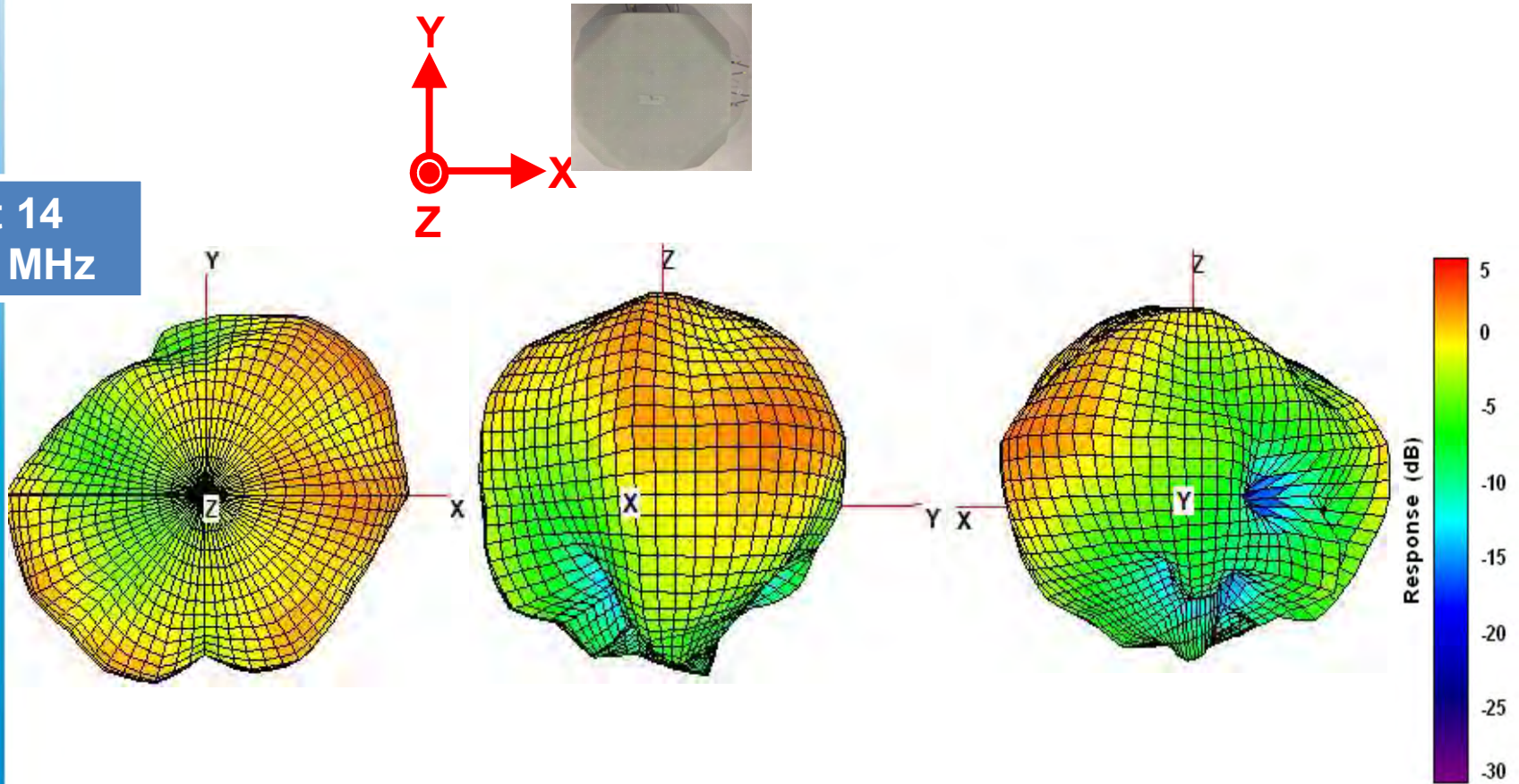


Ant 13  
5500 MHz



# 3D Radiation Pattern – Ant 14 BLE

Ant 14  
2450 MHz





# Peak Gain & Efficiency

Ant 1 (WiFi 2.4G/5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
2400	3.4	55
2450	3.5	60
2500	3.9	59
5150	3.6	58
5500	3.8	61
5850	3.9	59

Ant 2 (WiFi 2.4G/5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
2400	3.8	66
2450	3.9	68
2500	3.7	64
5150	3.5	66
5500	3.8	67
5850	3.9	68

Ant 3 (WiFi 2.4G/5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
2400	3.6	65
2450	3.9	63
2500	3.8	61
5150	3.7	65
5500	3.8	67
5850	3.9	66

Ant 4 (WiFi 2.4G/5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
2400	3.6	64
2450	3.9	65
2500	3.5	61
5150	3.6	64
5500	3.8	66
5850	3.9	66

# Peak Gain & Efficiency

Ant 5 (WiFi 5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.7	62
5500	3.9	61
5850	3.7	60

Ant 6 (WiFi 5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.5	61
5500	3.9	64
5850	3.7	65

Ant 7 (WiFi 5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.7	60
5500	3.9	61
5850	3.7	62

Ant 8 (WiFi 5G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.8	62
5500	3.9	63
5850	3.7	65



# Peak Gain & Efficiency

Ant 9 (WiFi 5G/6G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.7	61
5500	3.9	67
5850	3.5	66
5925	3.8	68
6500	3.7	65
7125	3.8	66

Ant 10 (WiFi 5G/6G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.8	62
5500	3.9	64
5850	3.7	61
5925	3.8	63
6500	3.5	62
7125	3.7	62

Ant 11 (WiFi 5G/6G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.8	62
5500	3.9	64
5850	3.8	64
5925	3.8	63
6500	3.4	61
7125	3.8	64

Ant 12 (WiFi 5G/6G)		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
5150	3.8	62
5500	3.2	62
5850	3.2	65
5925	3.6	68
6500	3.6	65
7125	3.8	63

# Peak Gain & Efficiency

Ant 13 Scanning		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
2400	3.0	60
2450	3.5	61
2500	3.0	60
5150	3.9	63
5500	3.9	62
5850	3.8	64

Ant 14 BLE		
Freq. (MHz)	Peak Gain (dBi)	Efficiency (%)
2400	3.1	62
2450	3.5	63
2500	3.2	61

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