

ASKEY

CHS3320N-D388

Antenna Passive Report

P/N:A8M8P-E00004

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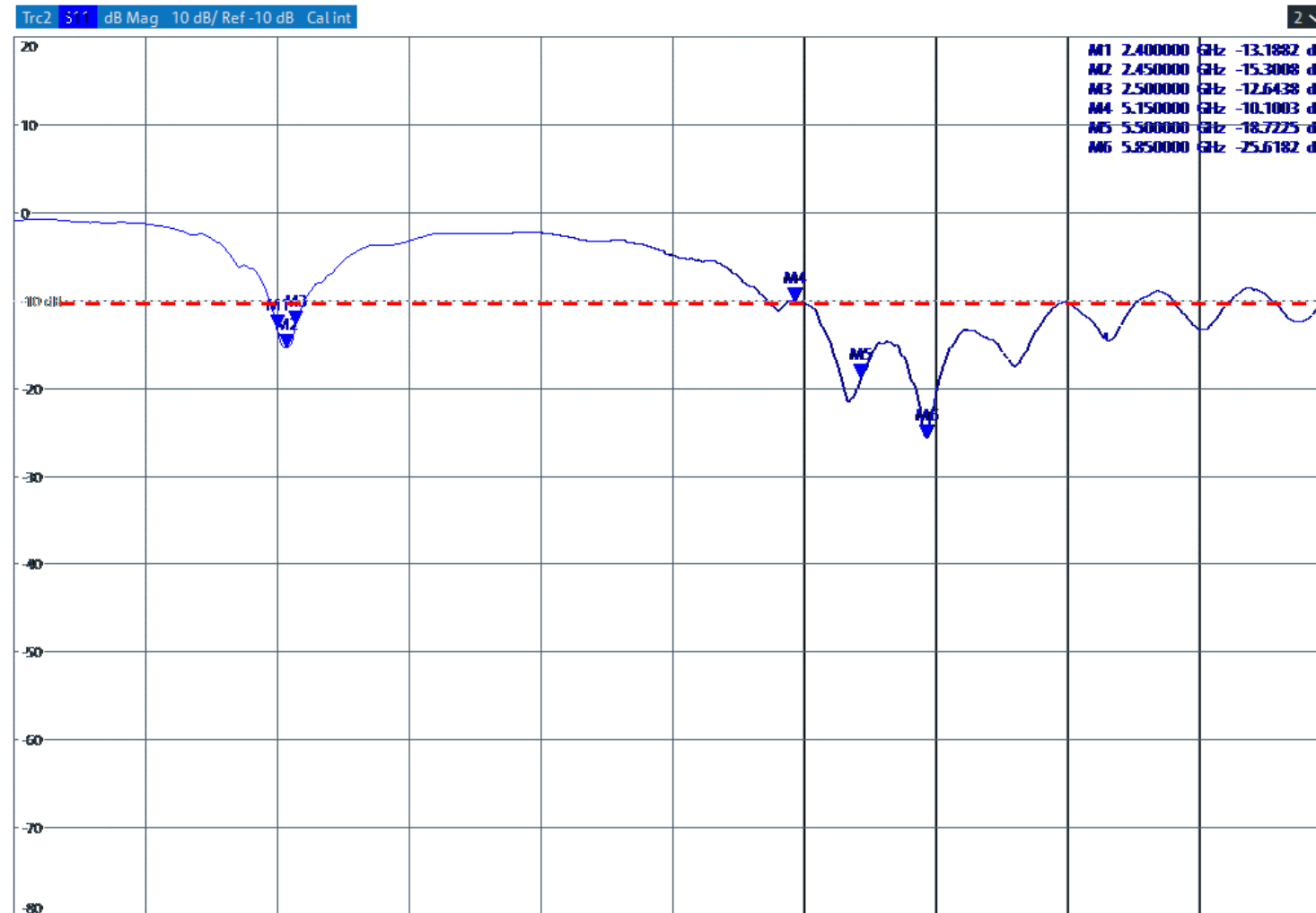


Outline

- Antenna Placement
- Return Loss & Isolation
- Gain Table
- Radiation Pattern
- Summary

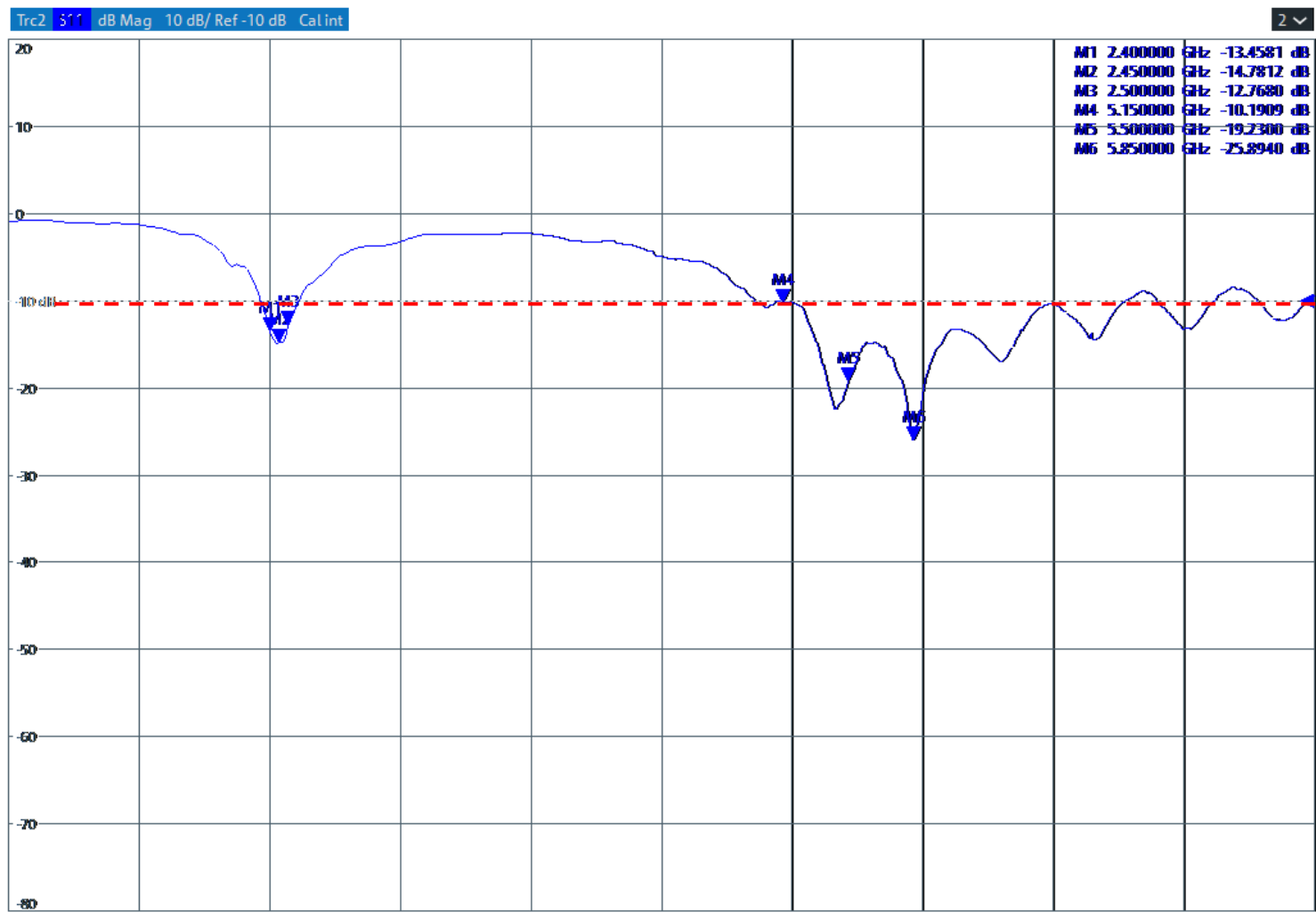
S-parameter

Antenna_1 Return Loss



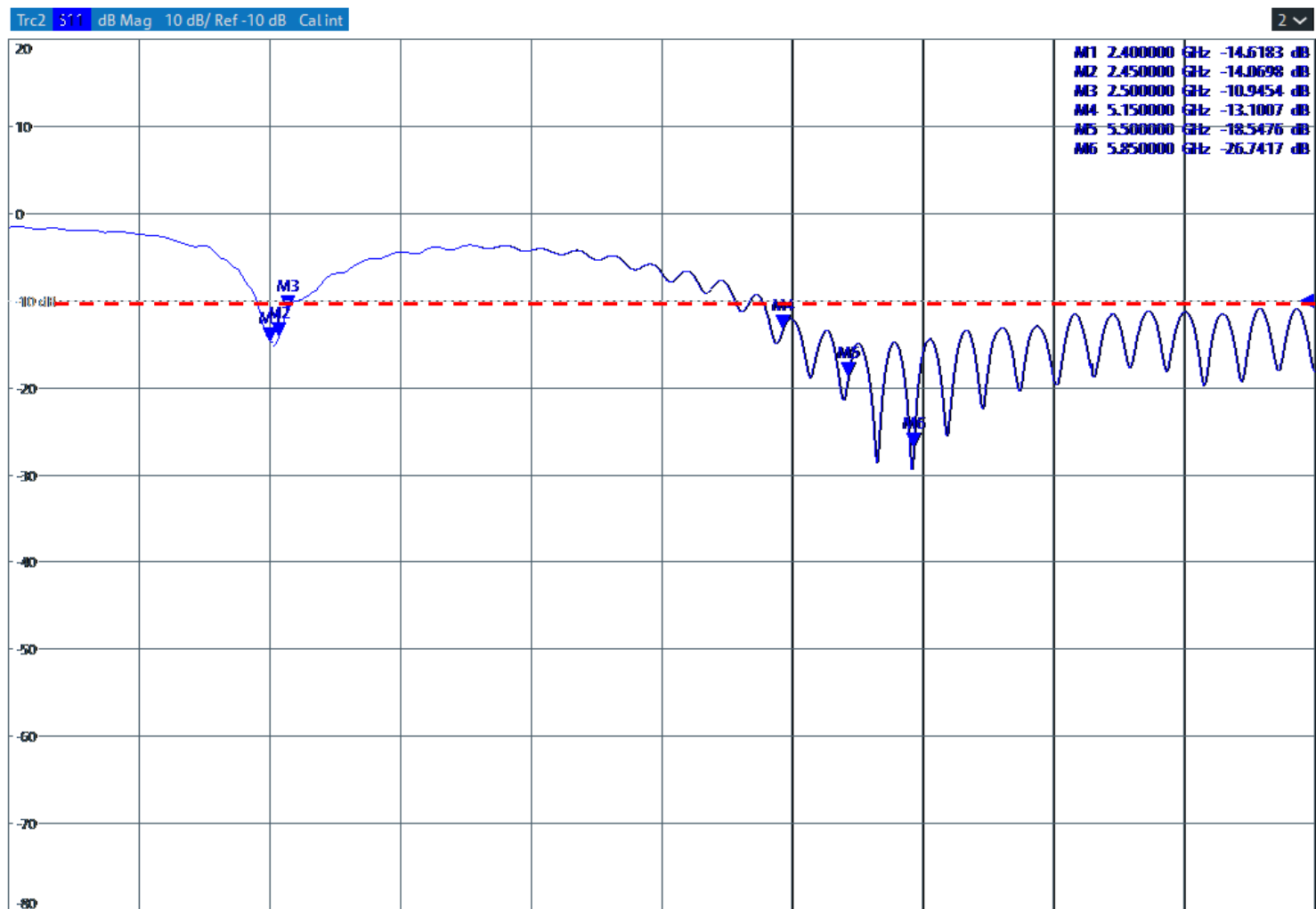
Return Loss -10dB

Antenna_2 Return Loss



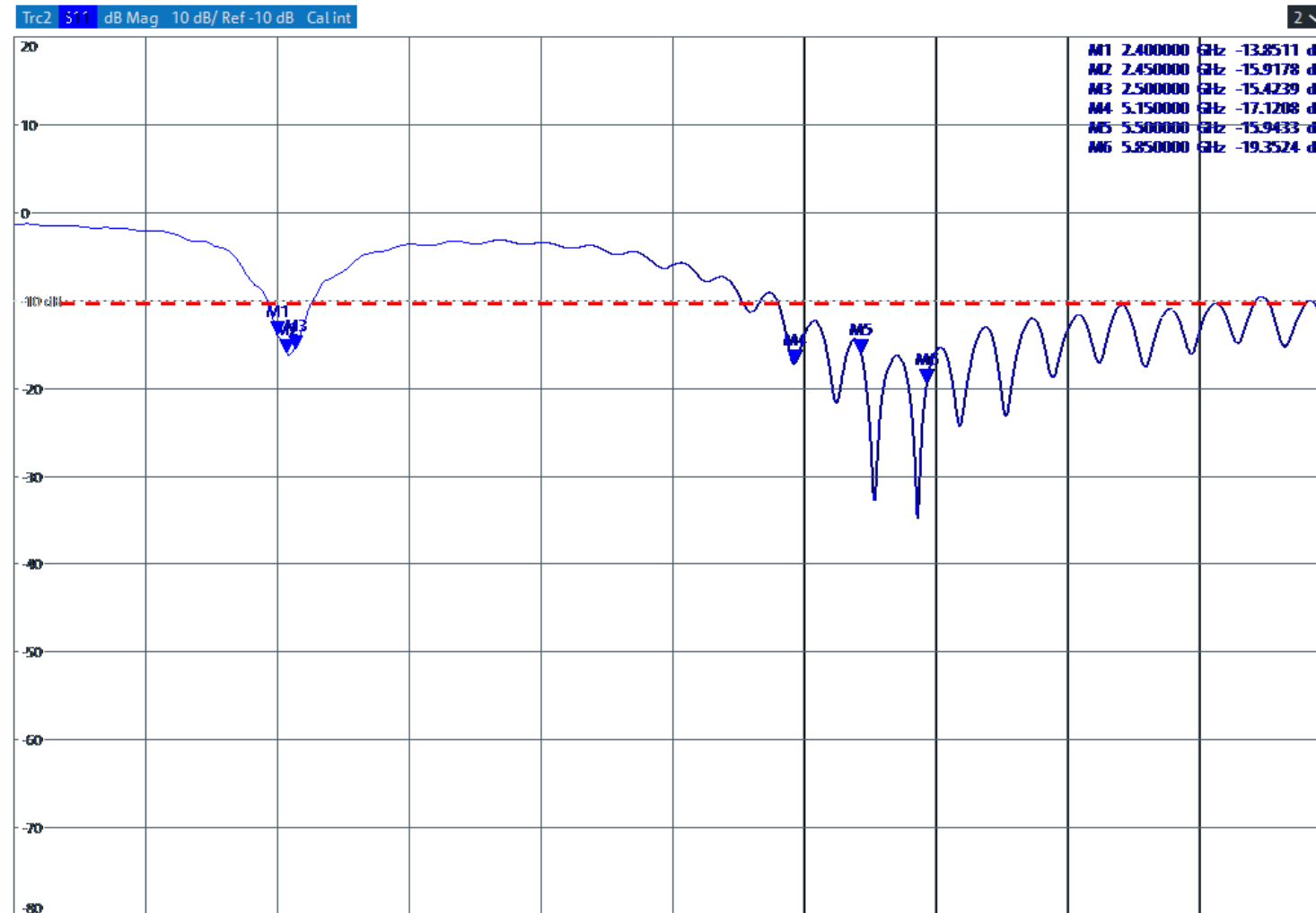
Return Loss -10dB

Antenna_3 Return Loss



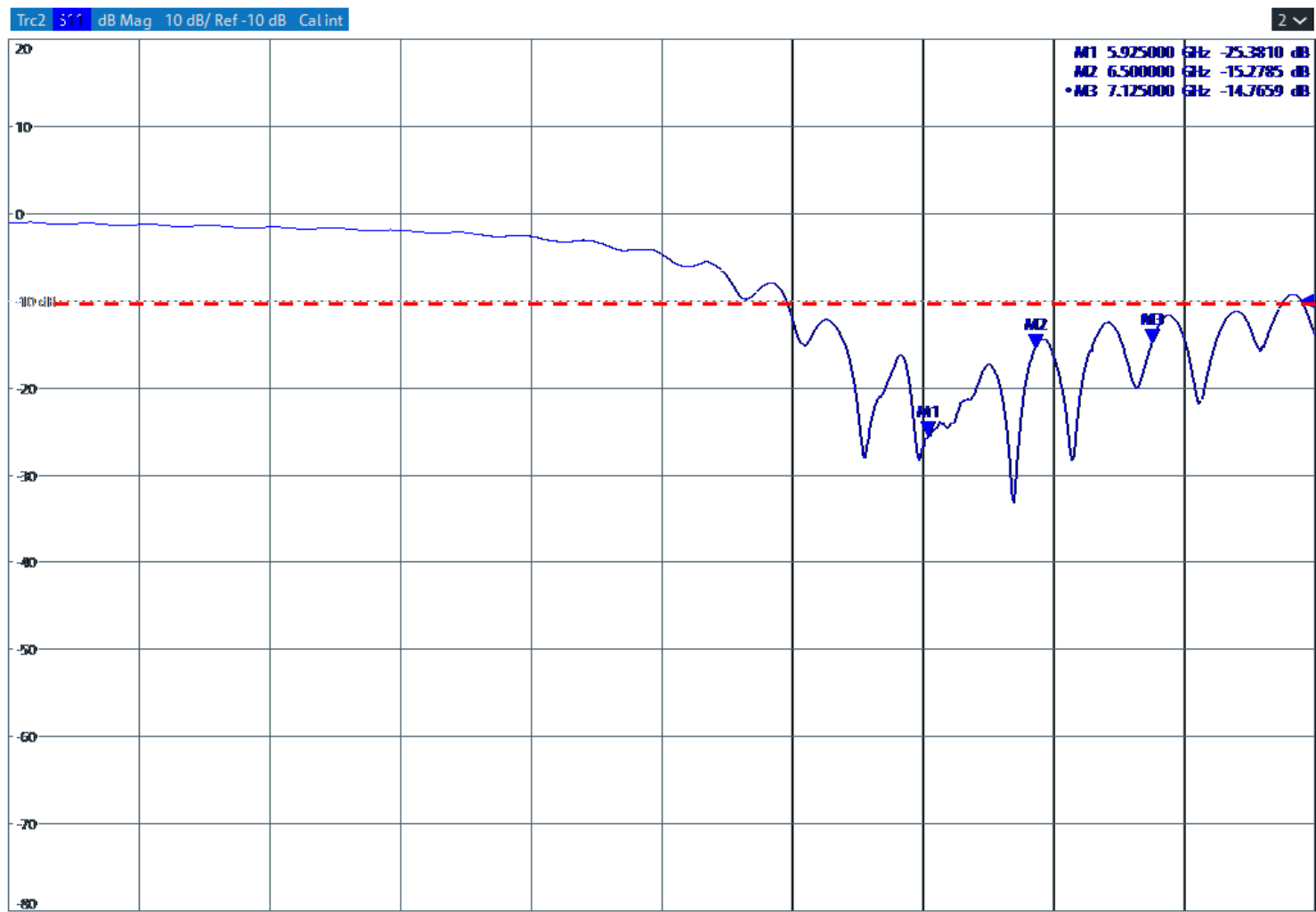
Return Loss -10dB

Antenna_4 Return Loss



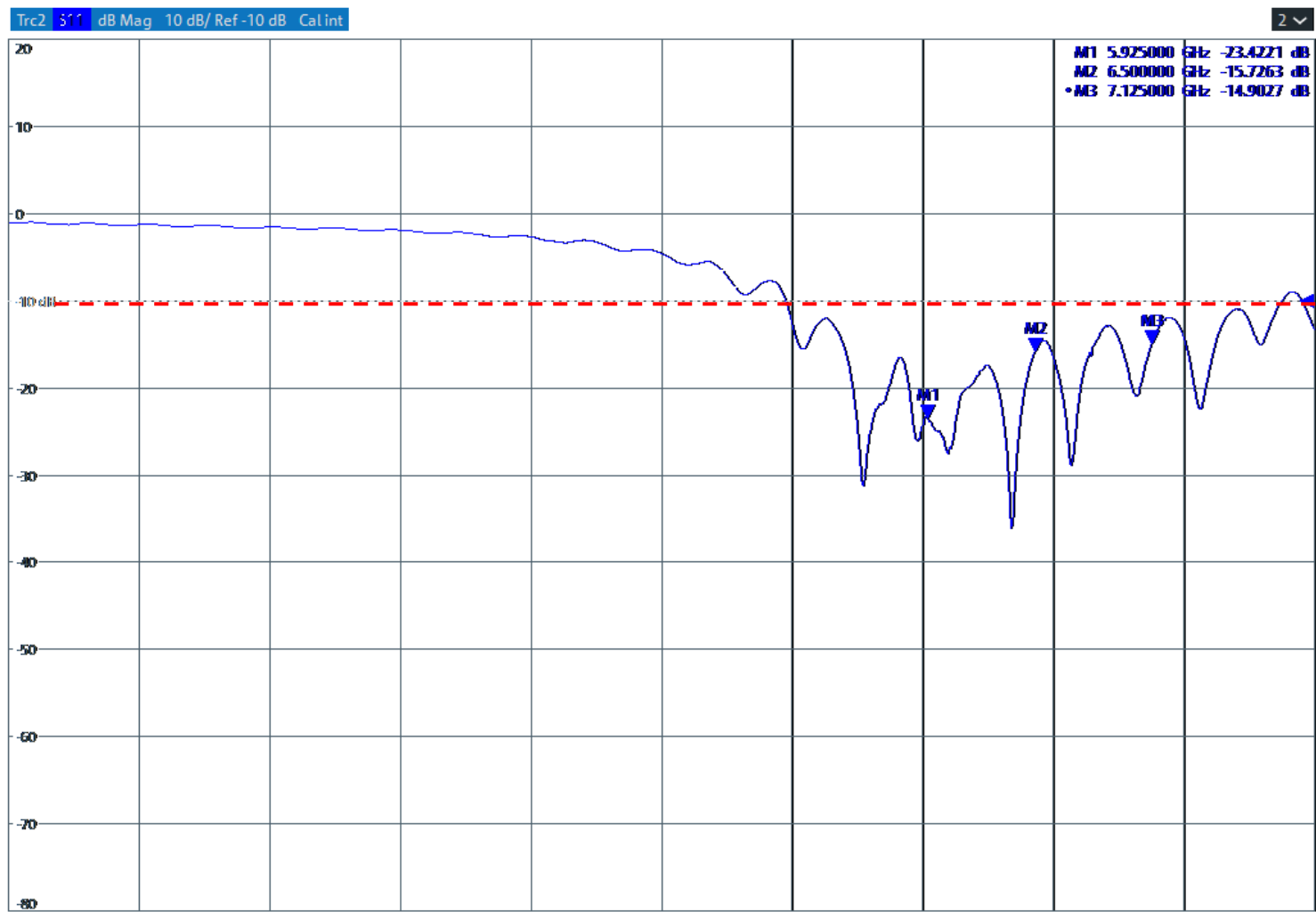
Return Loss -10dB

Antenna_5 Return Loss



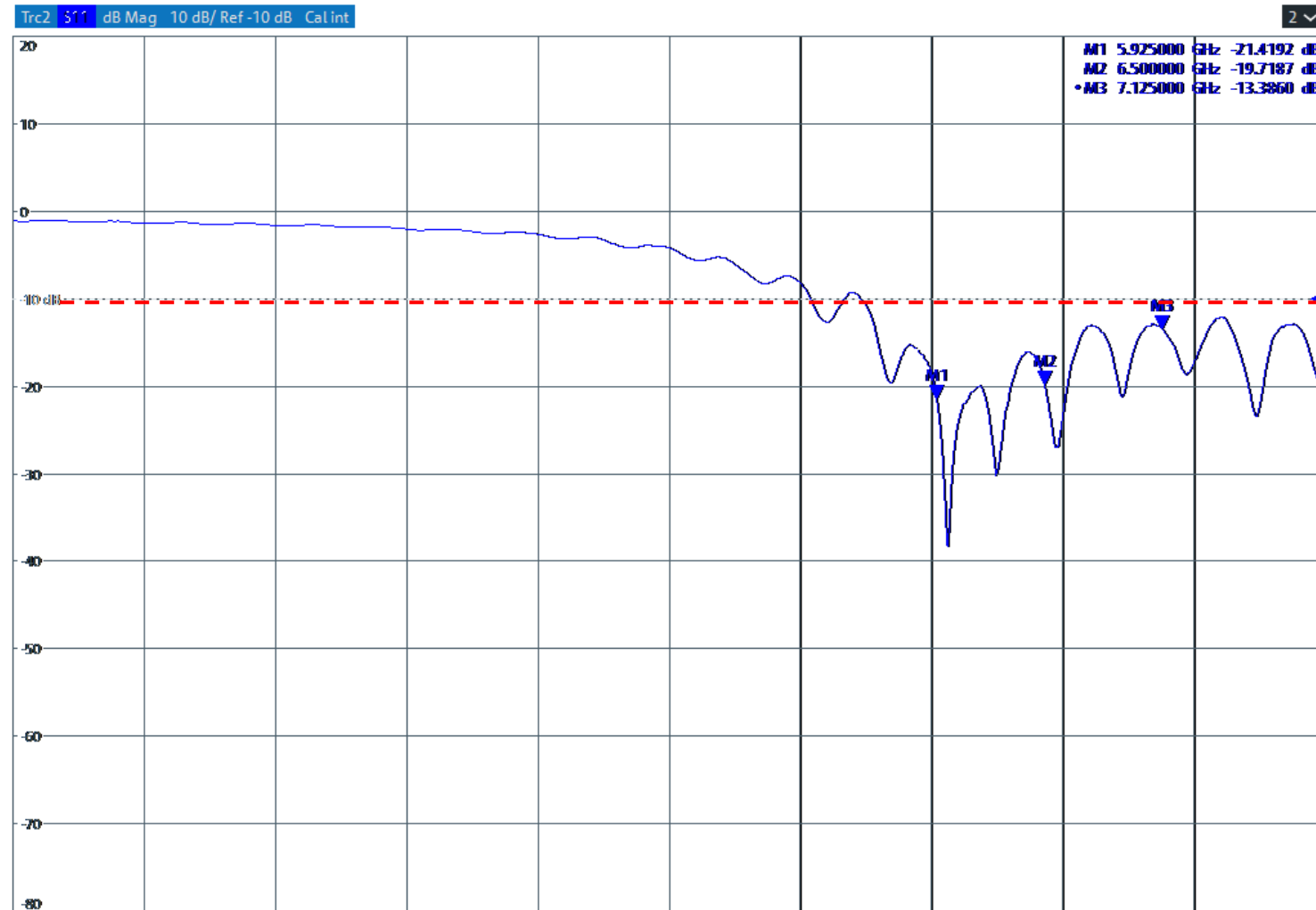
Return Loss -10dB

Antenna_6 Return Loss



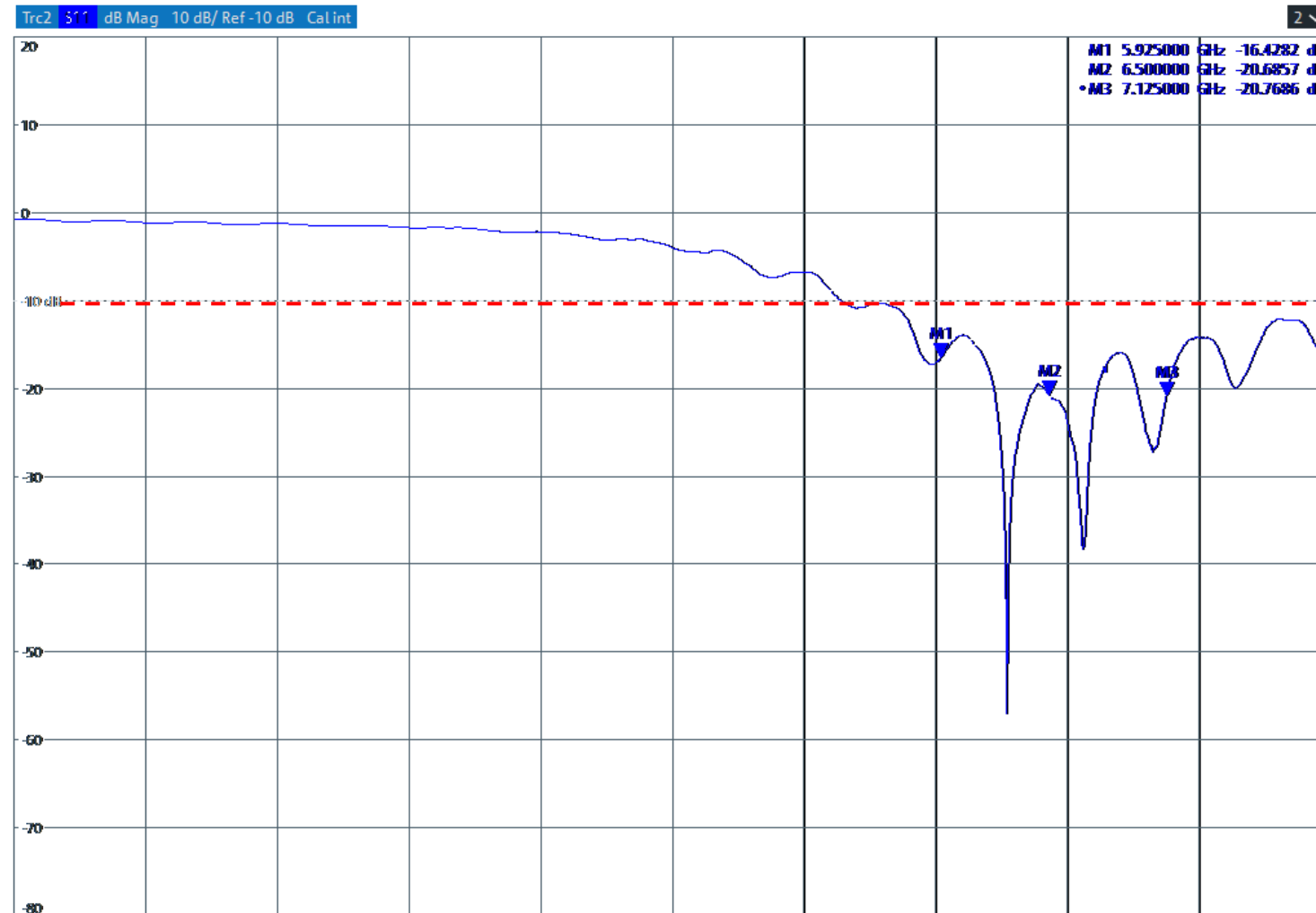
Return Loss -10dB

Antenna_7 Return Loss



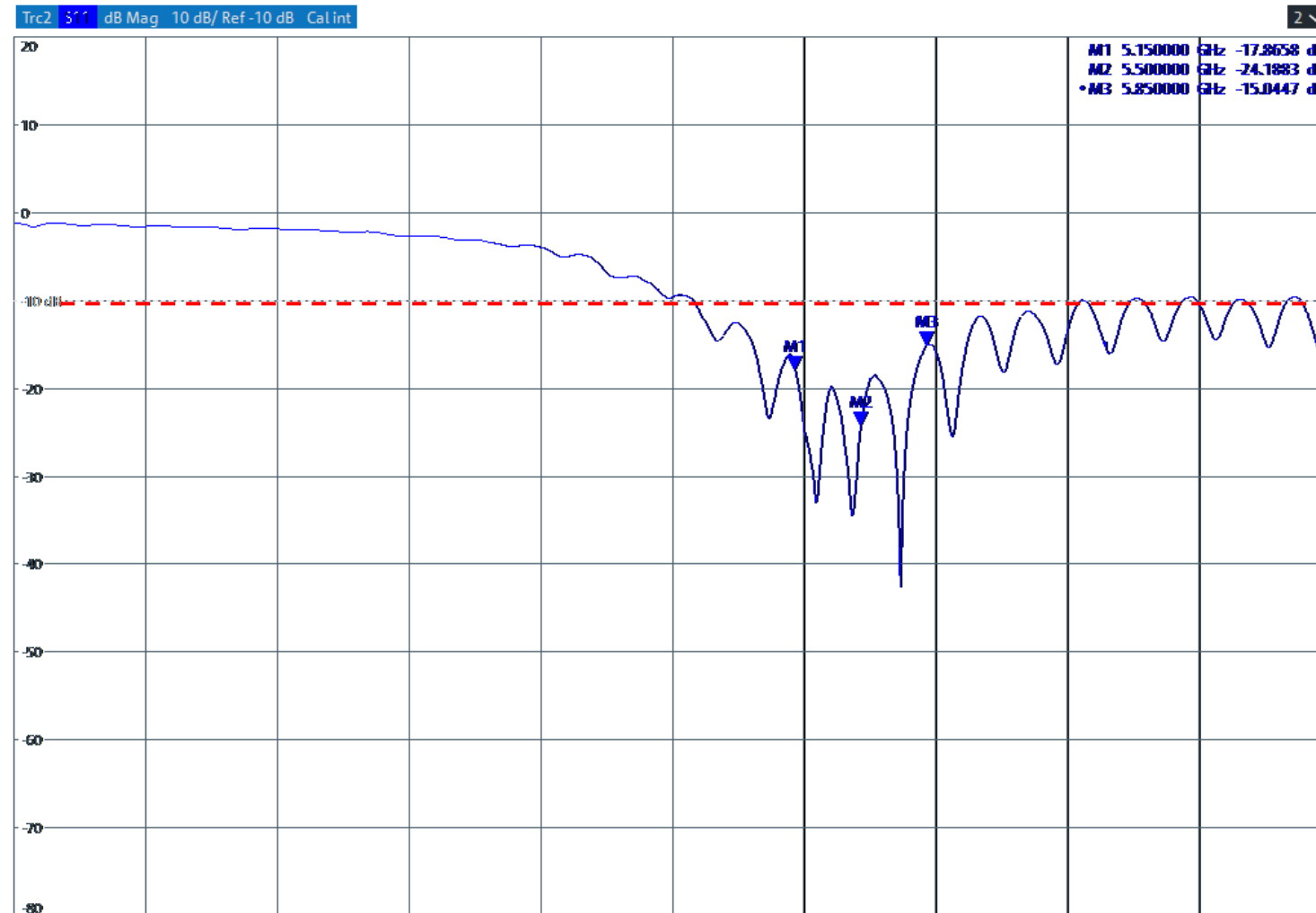
Return Loss -10dB

Antenna_8 Return Loss

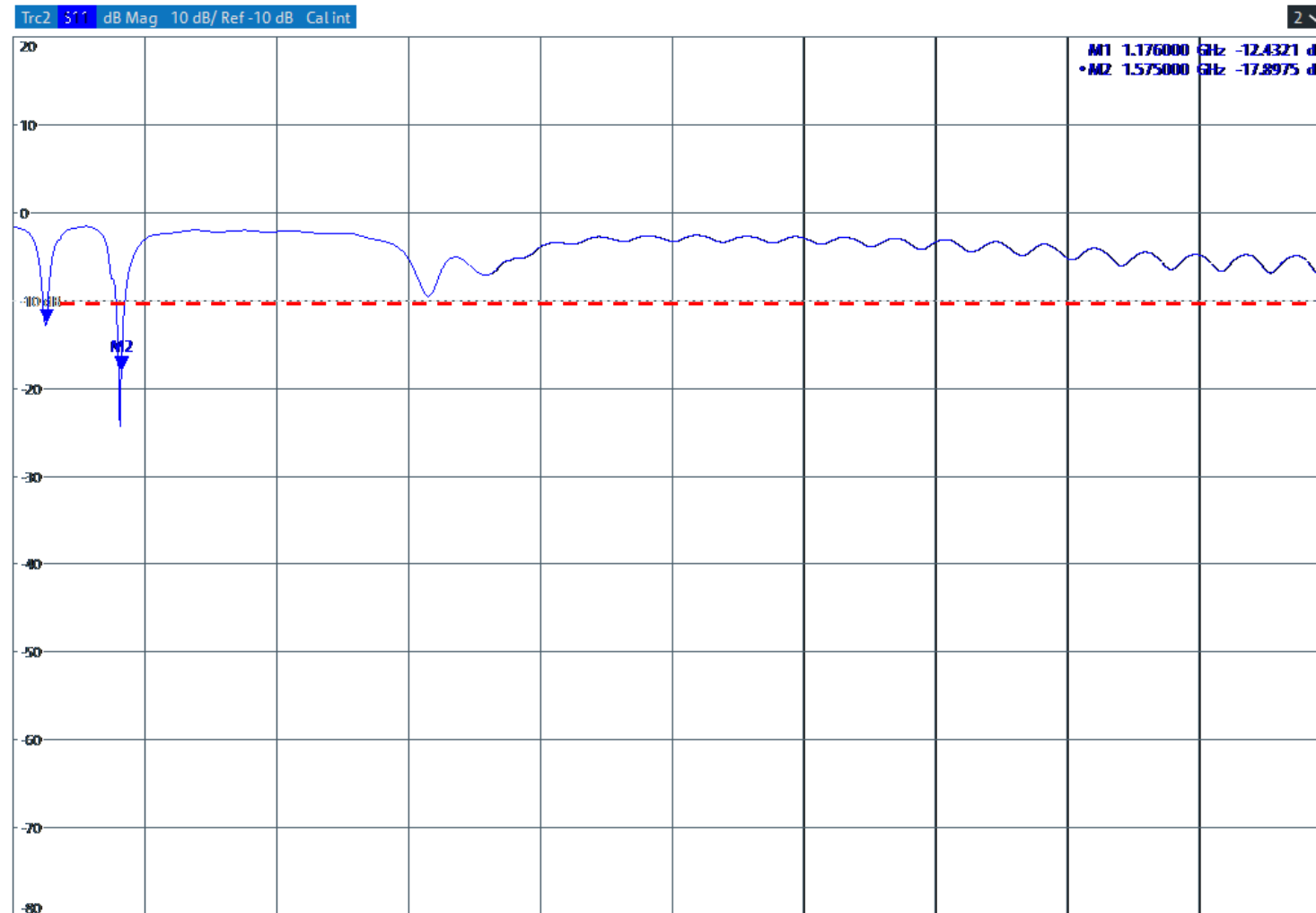


Return Loss -10dB

Antenna_9 Return Loss



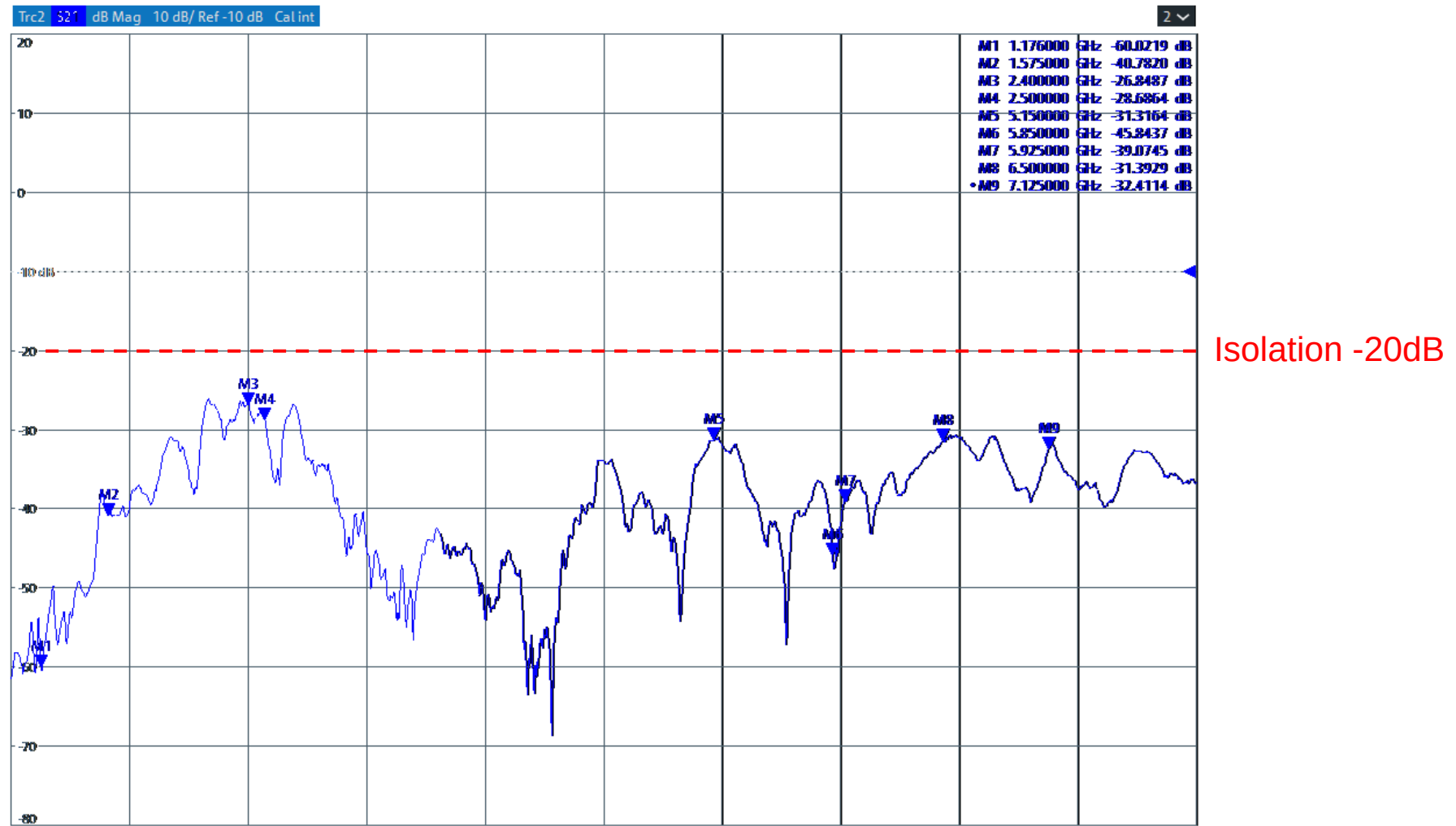
Antenna_10 Return Loss



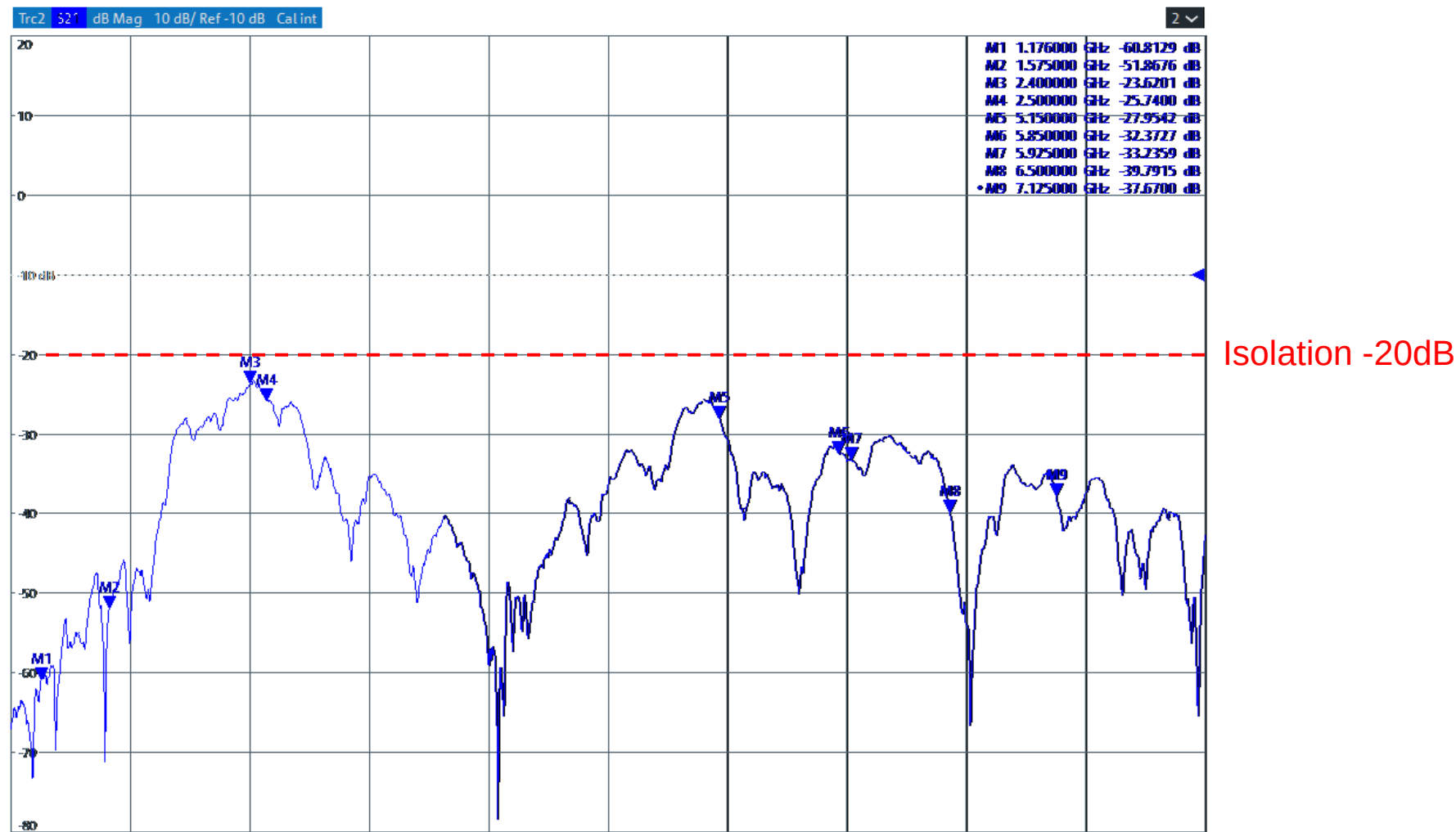
Return Loss -10dB

S-Parameter

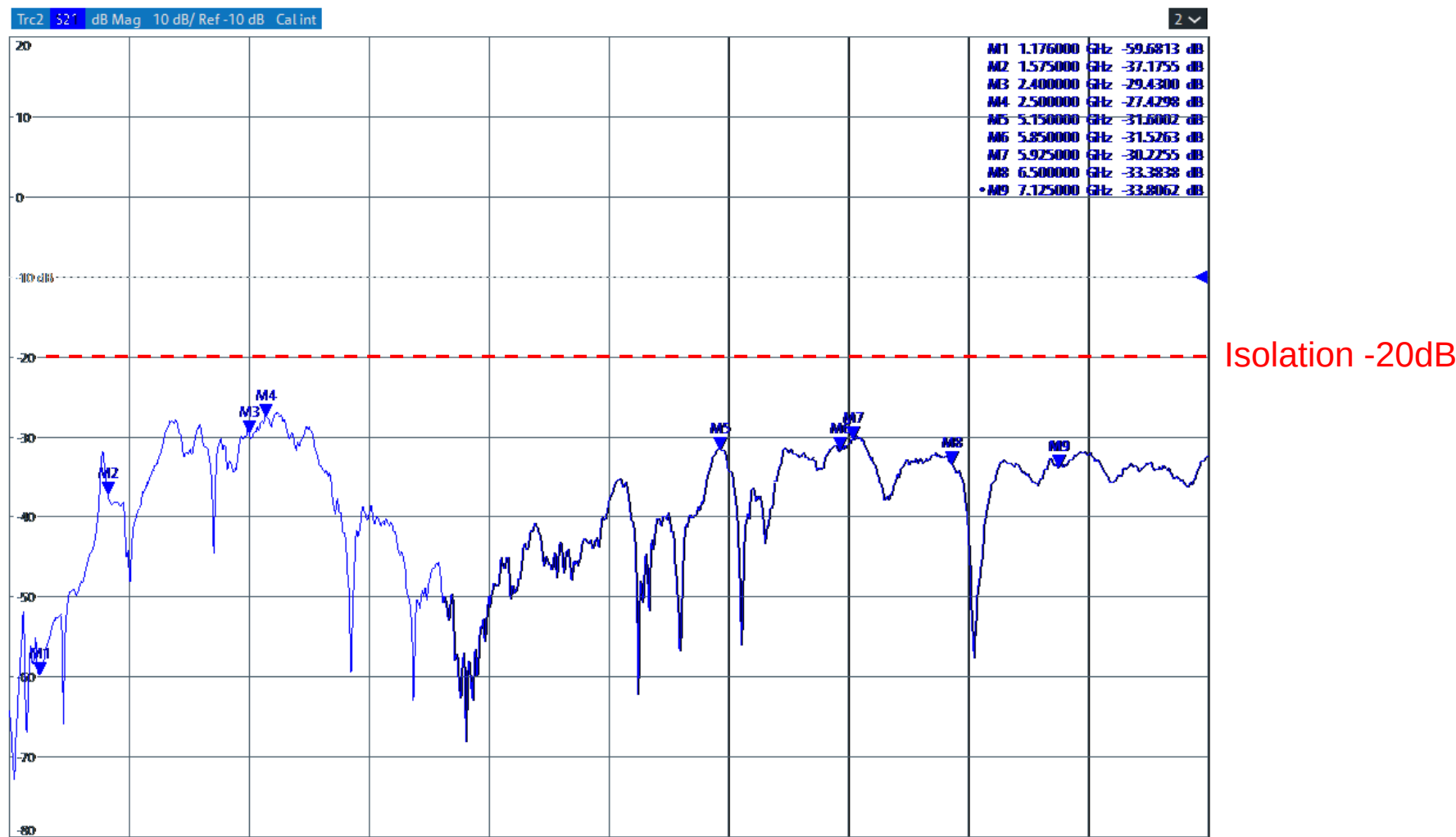
Antenna_1→Antenna_2 Isolation



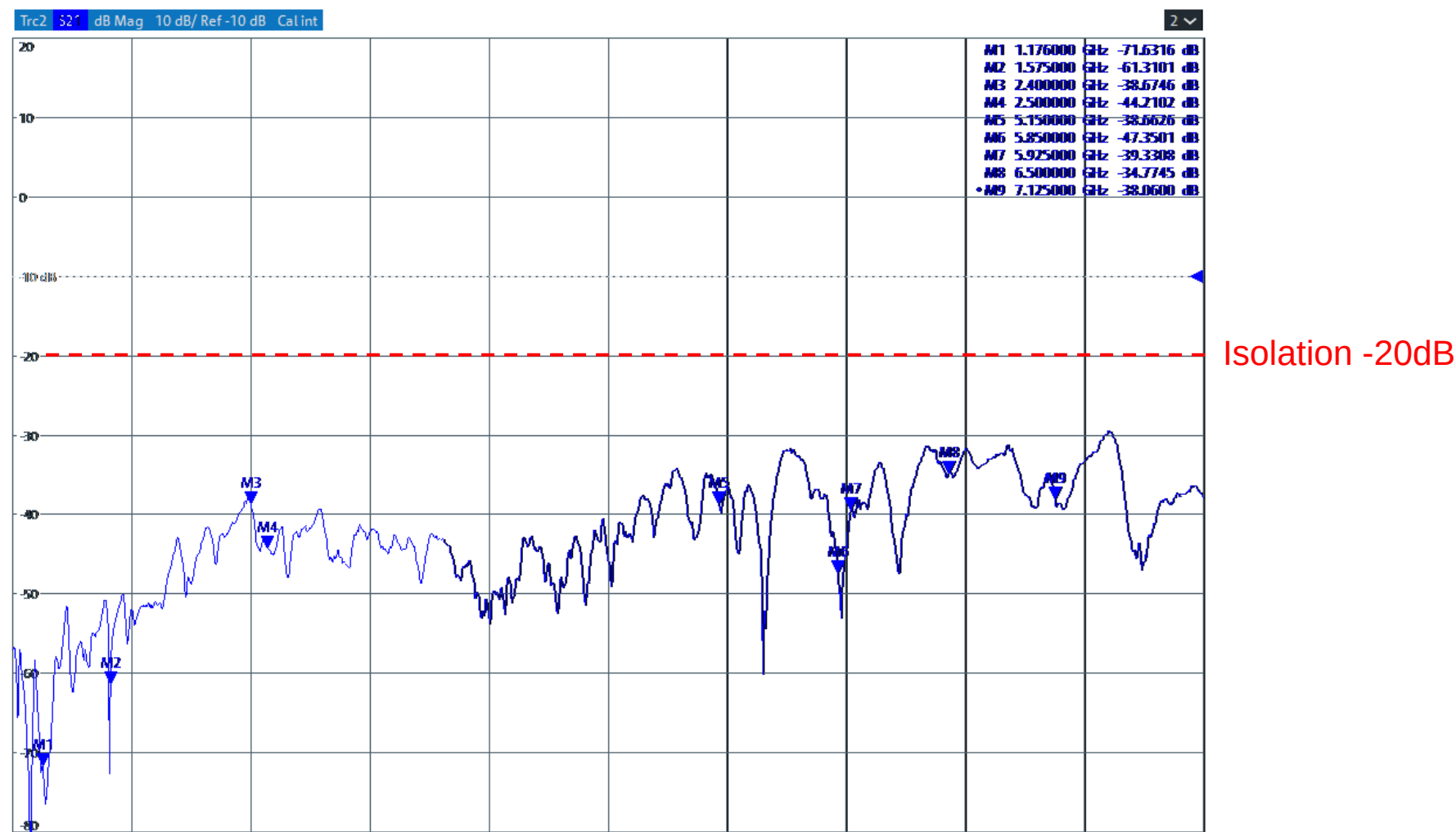
Antenna_1→Antenna_3 Isolation



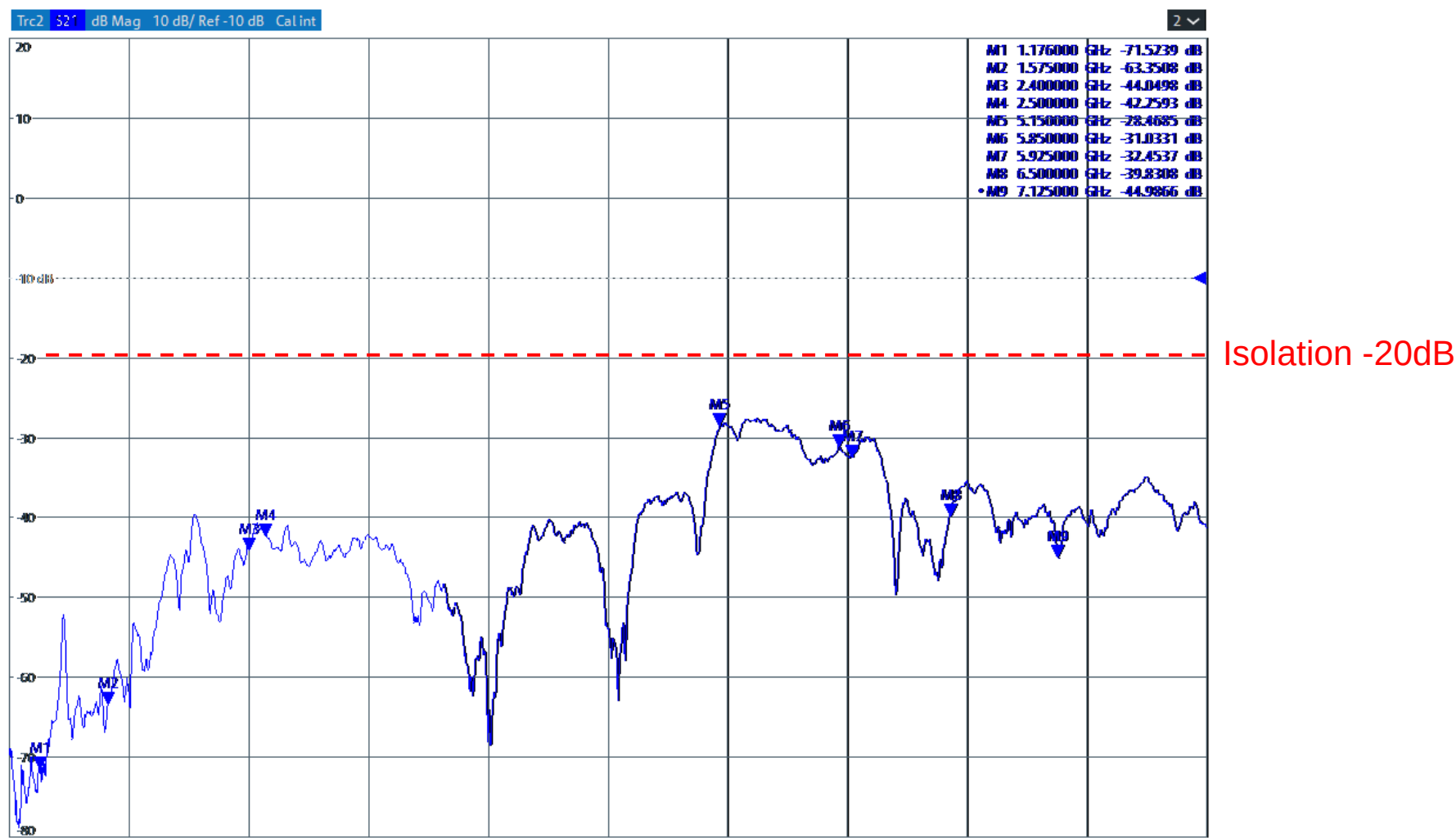
Antenna_1→Antenna_4 Isolation



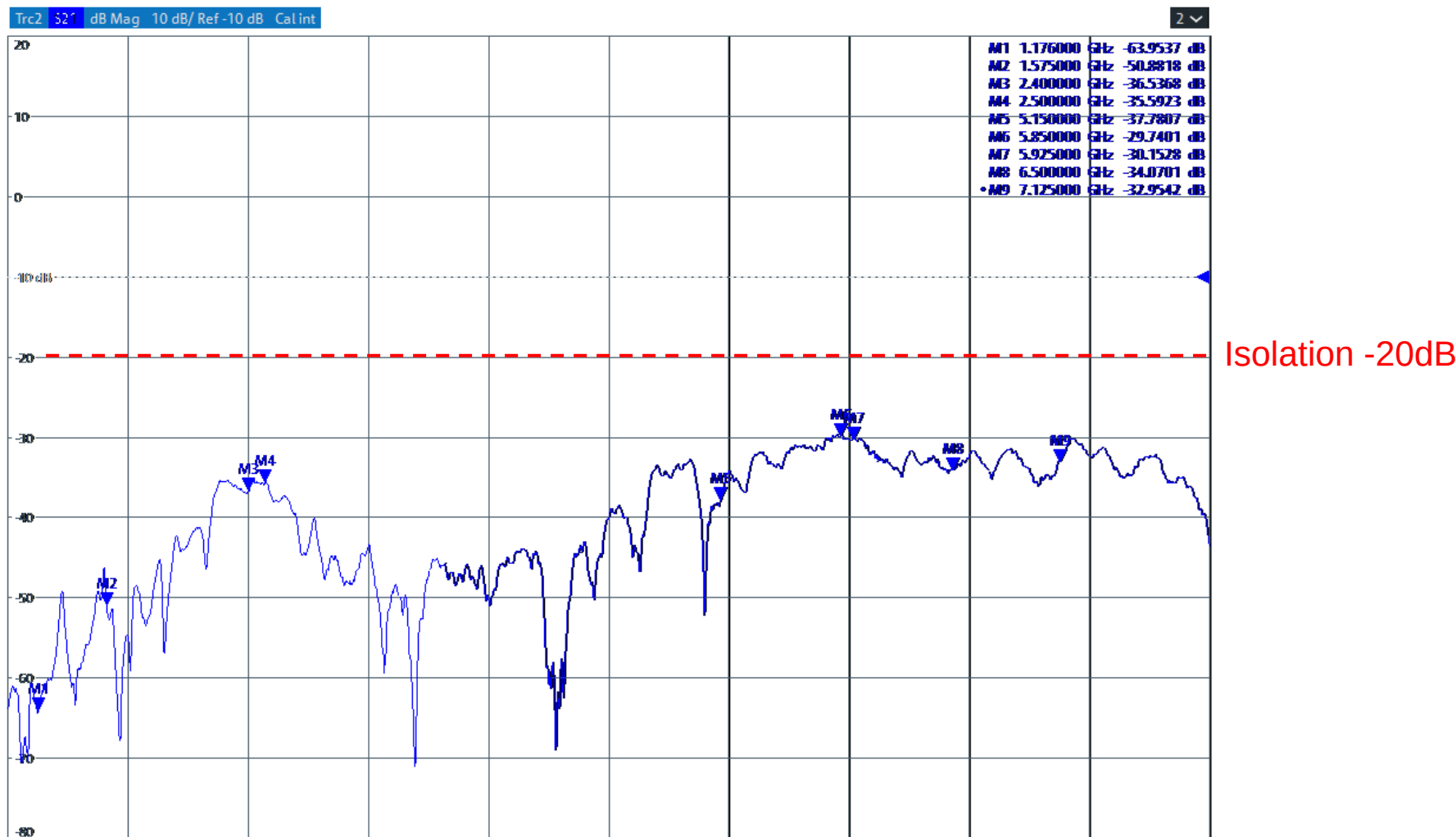
Antenna_1→Antenna_5 Isolation



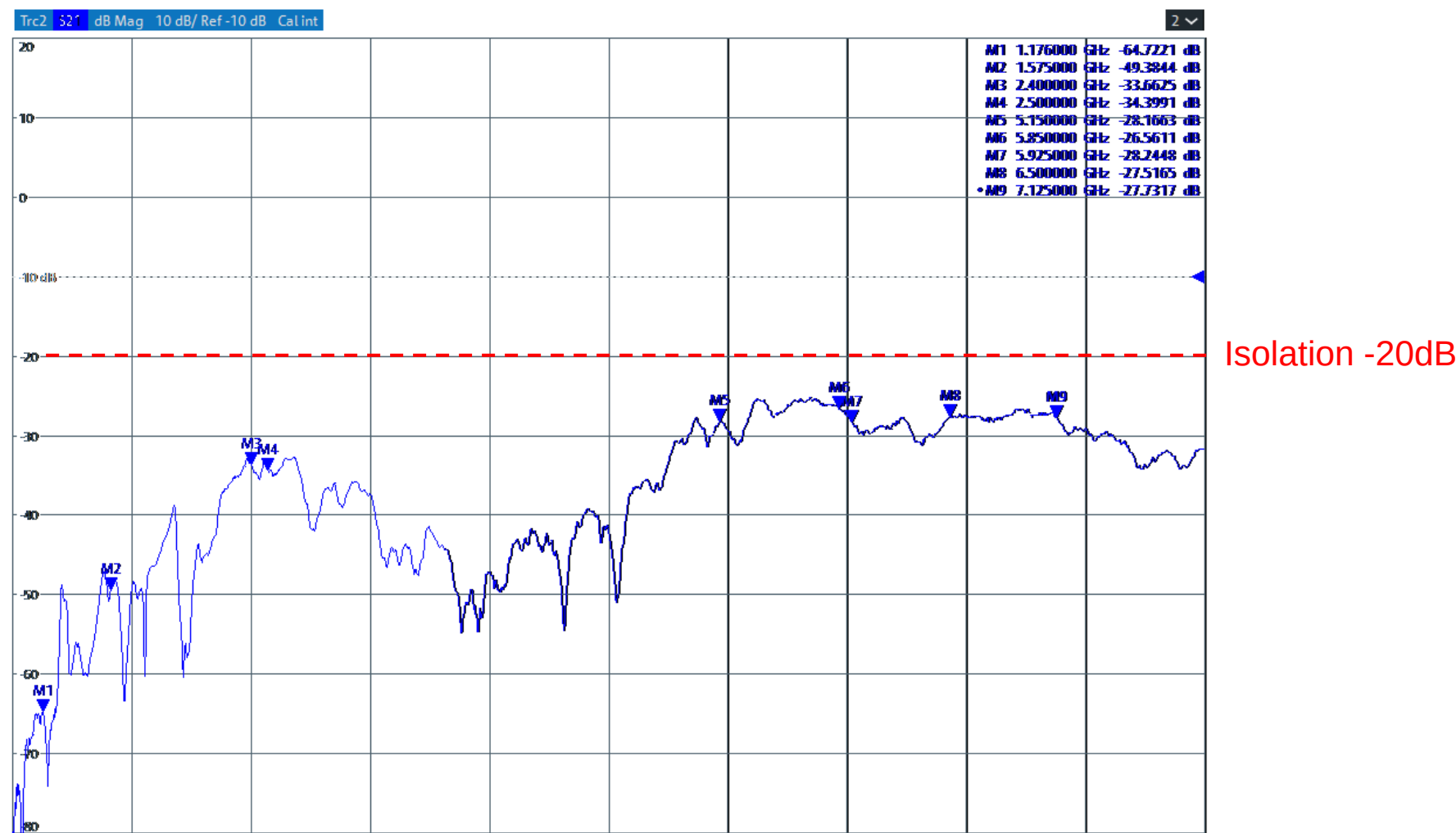
Antenna_1→Antenna_6 Isolation



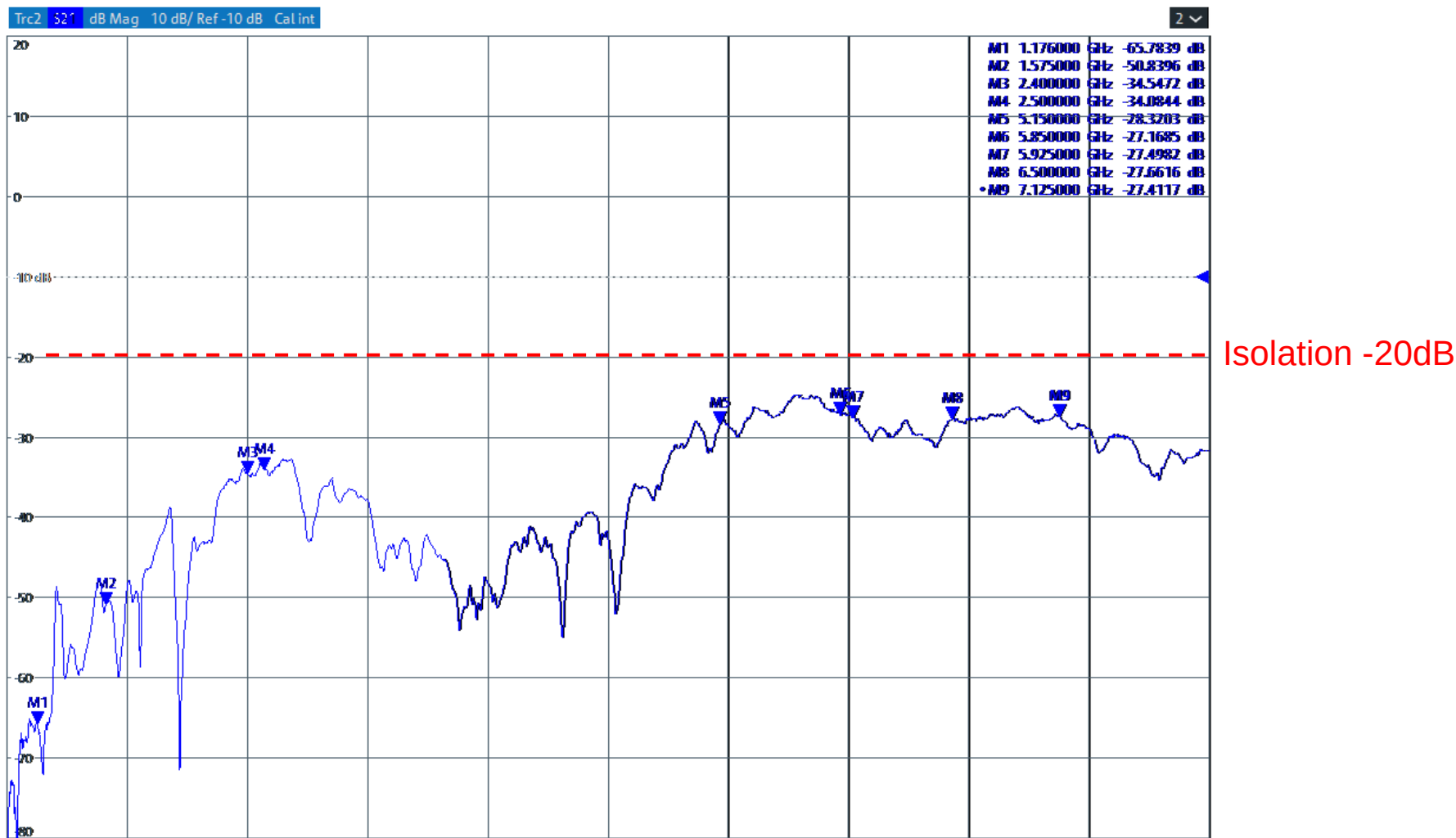
Antenna_1→Antenna_7 Isolation



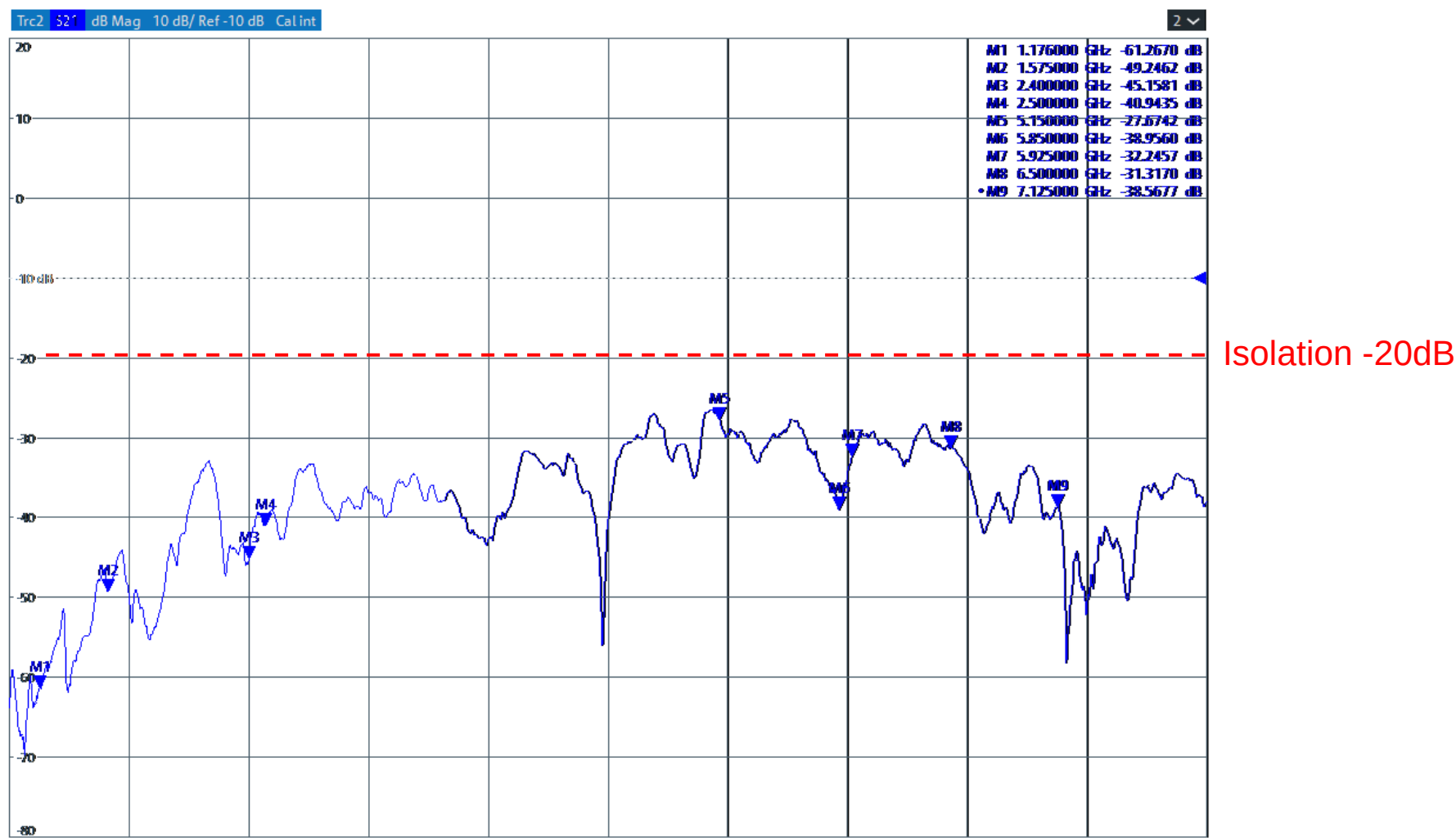
Antenna_1→Antenna_8 Isolation



Antenna_1→Antenna_9 Isolation

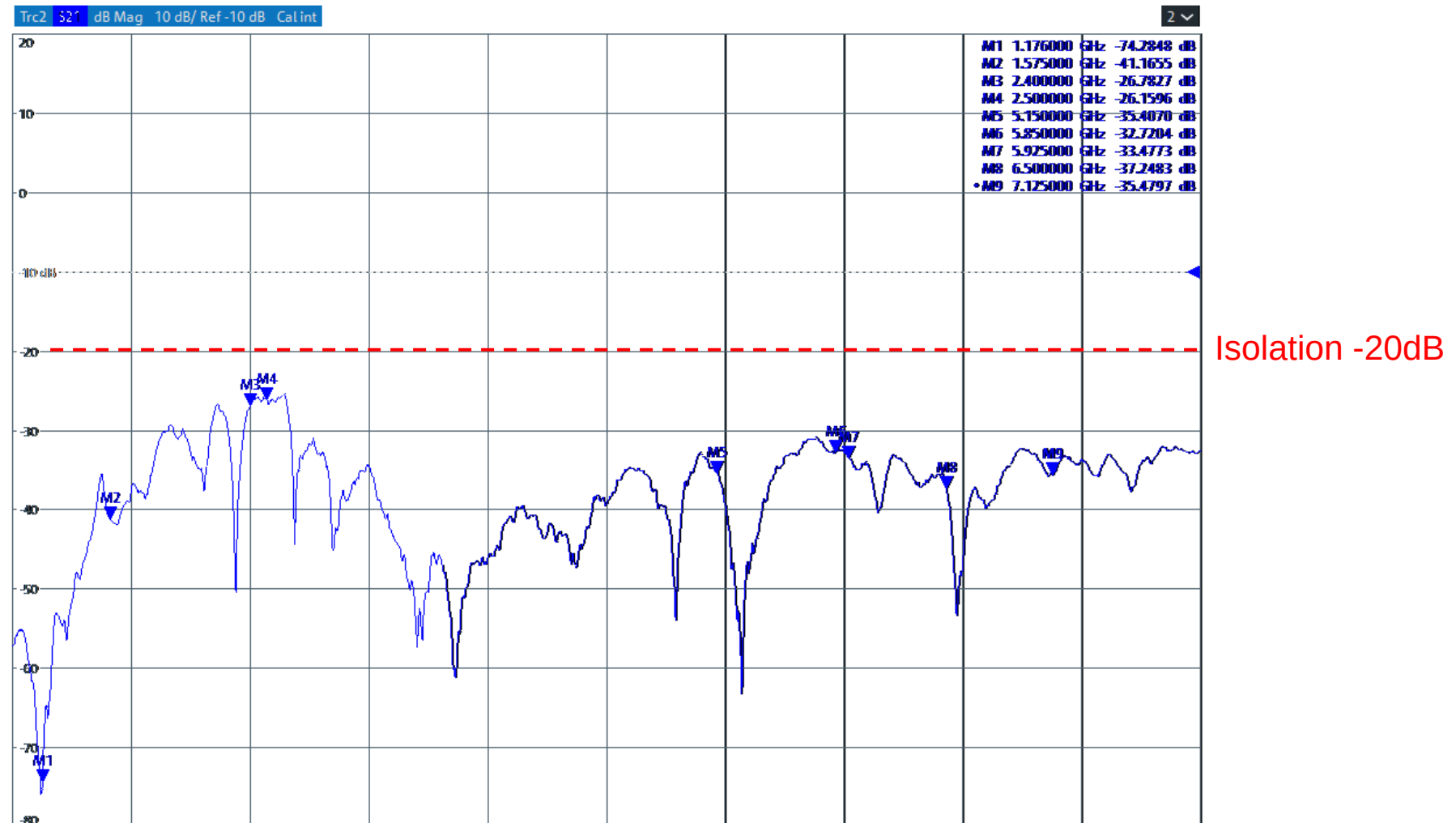


Antenna_1→Antenna_10 Isolation

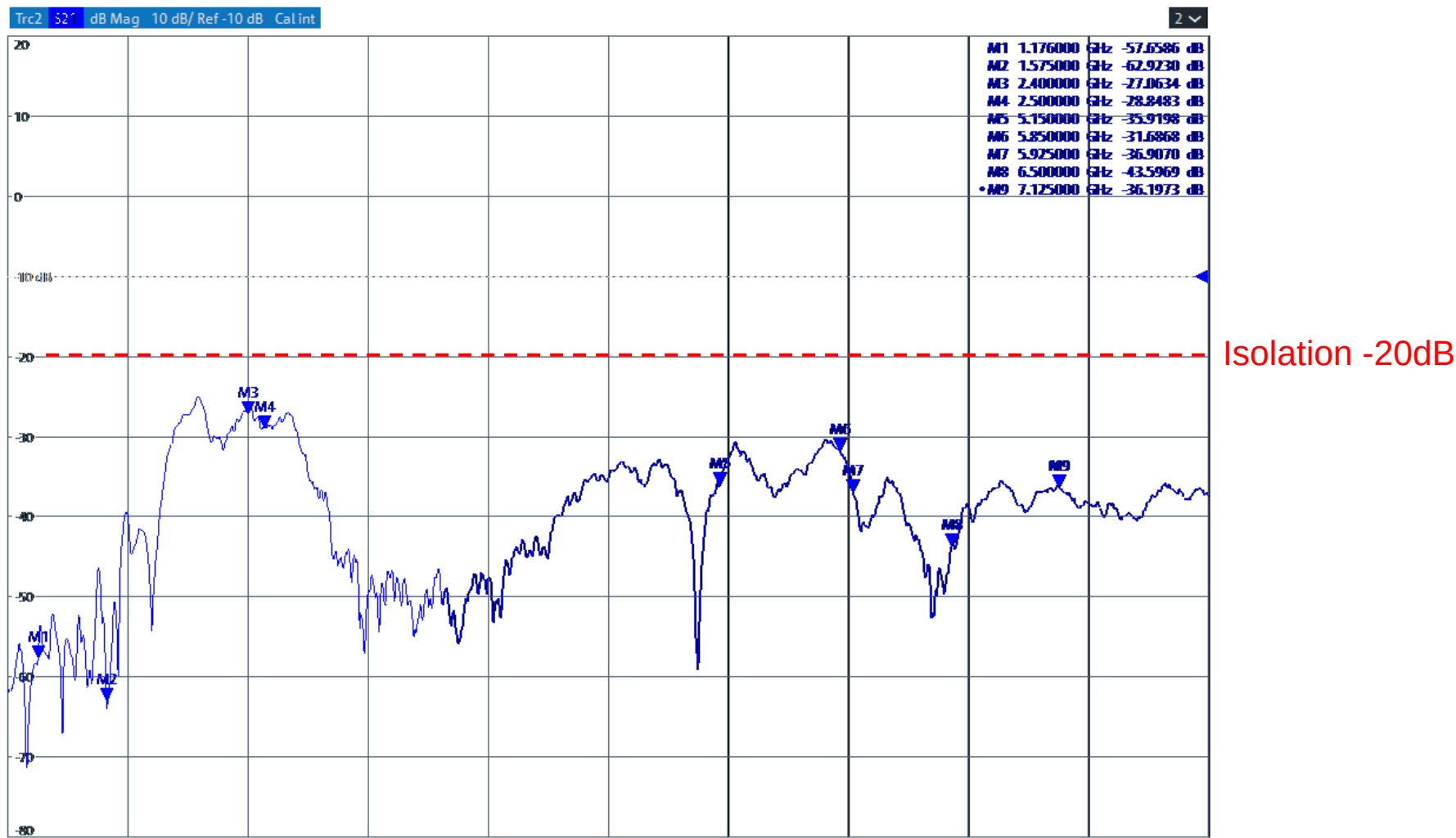


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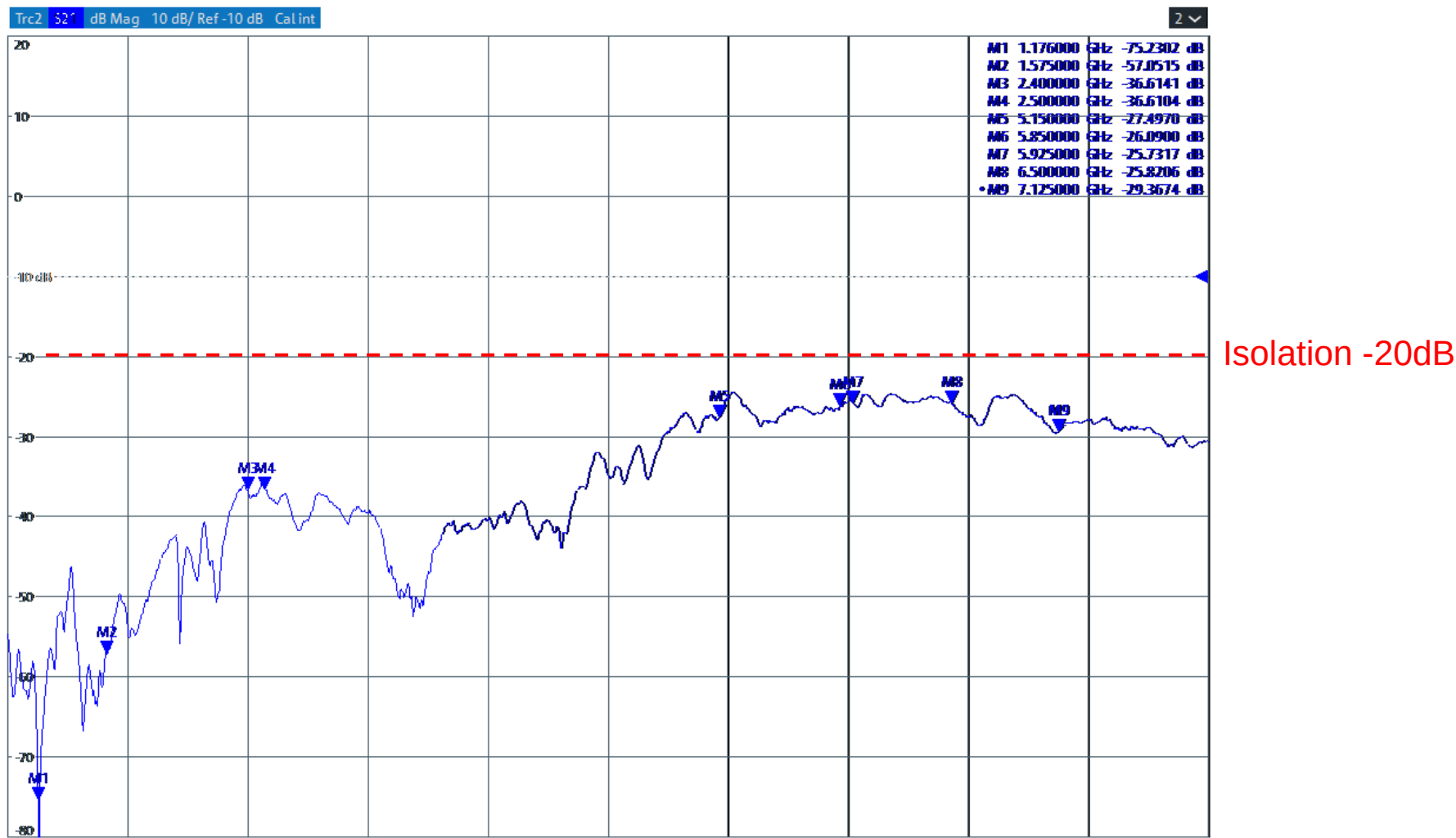
Antenna_2→Antenna_3 Isolation



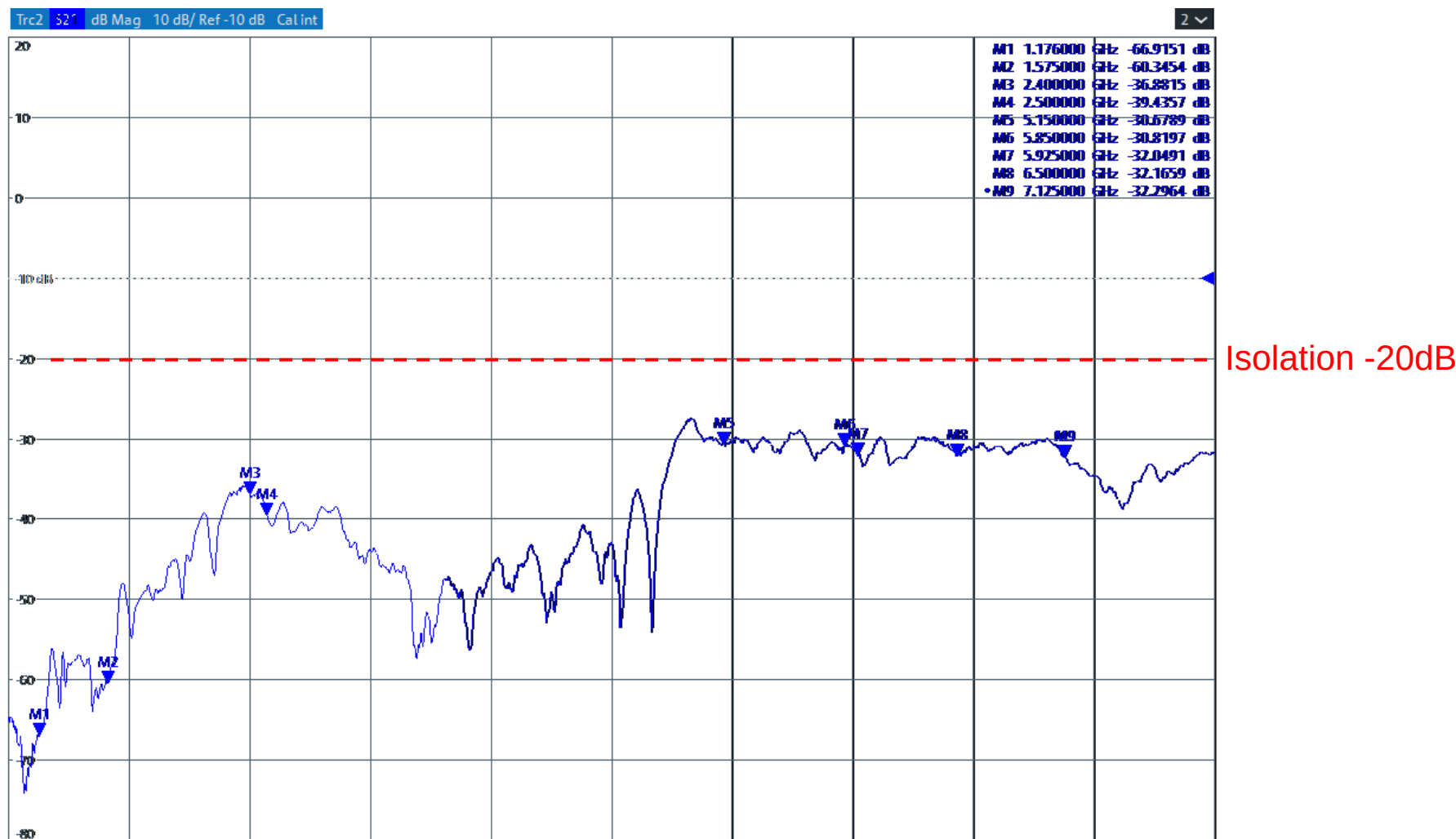
Antenna_2→Antenna_4 Isolation



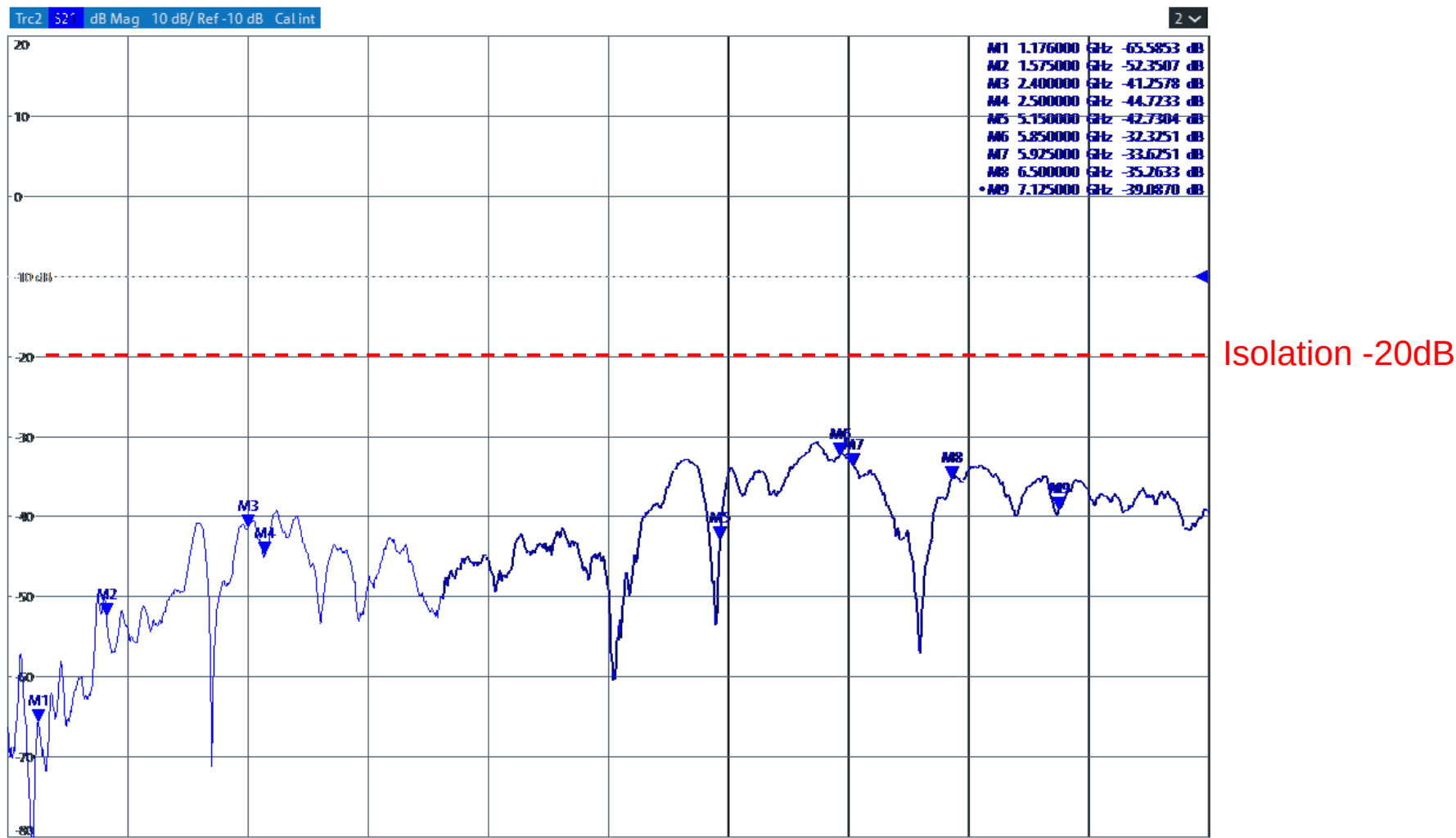
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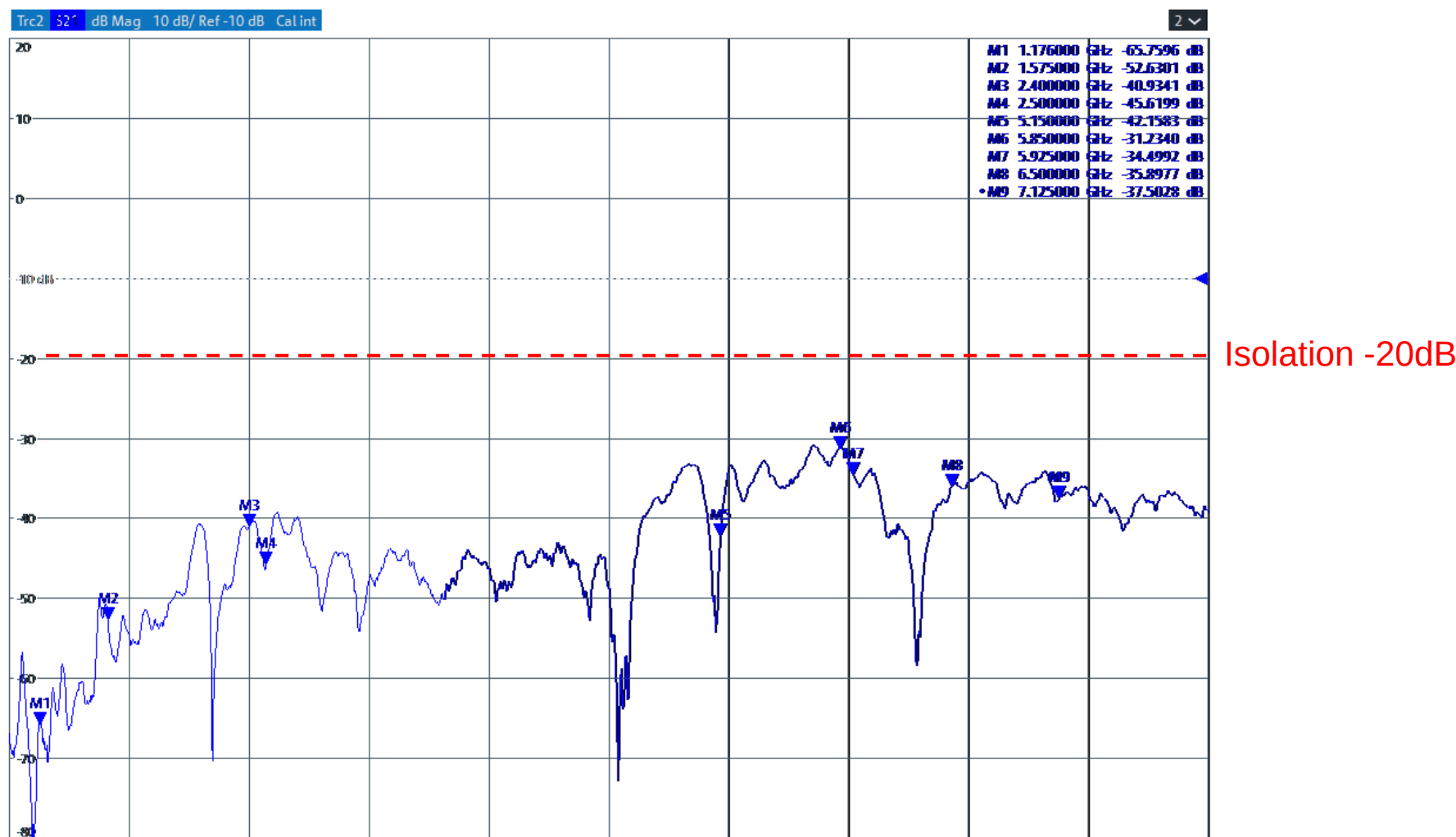
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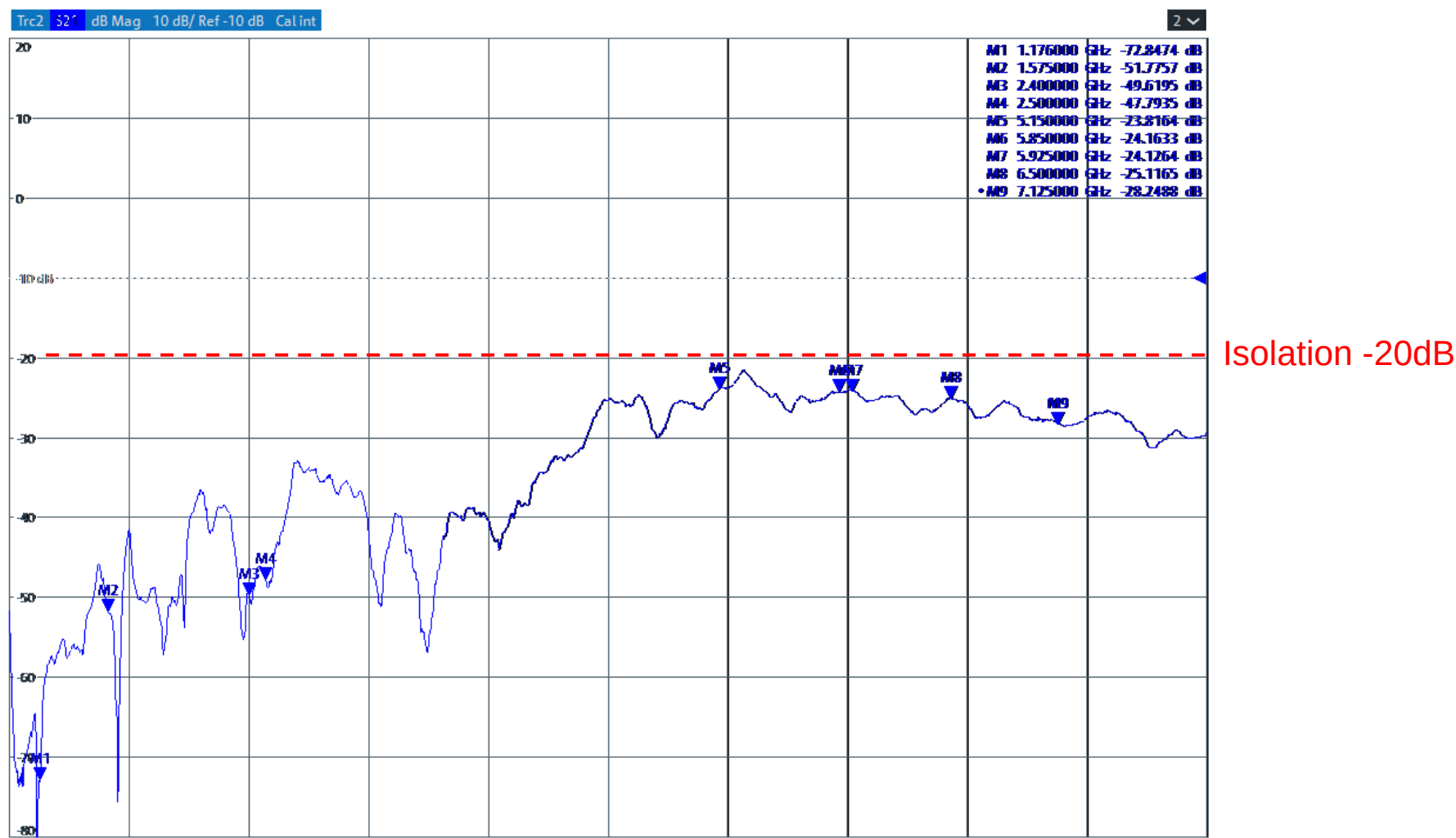
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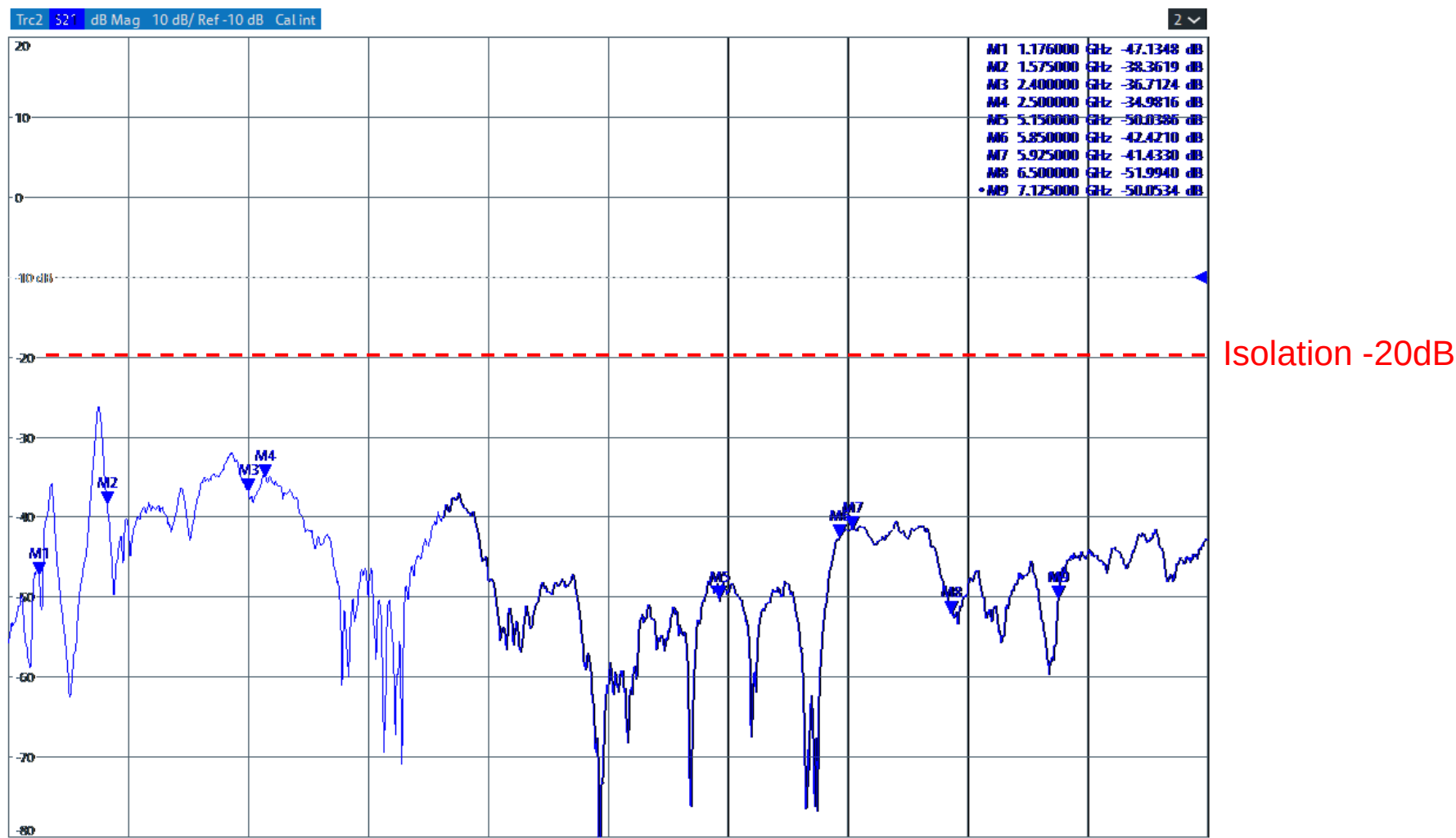
Antenna_2→Antenna_8 Isolation



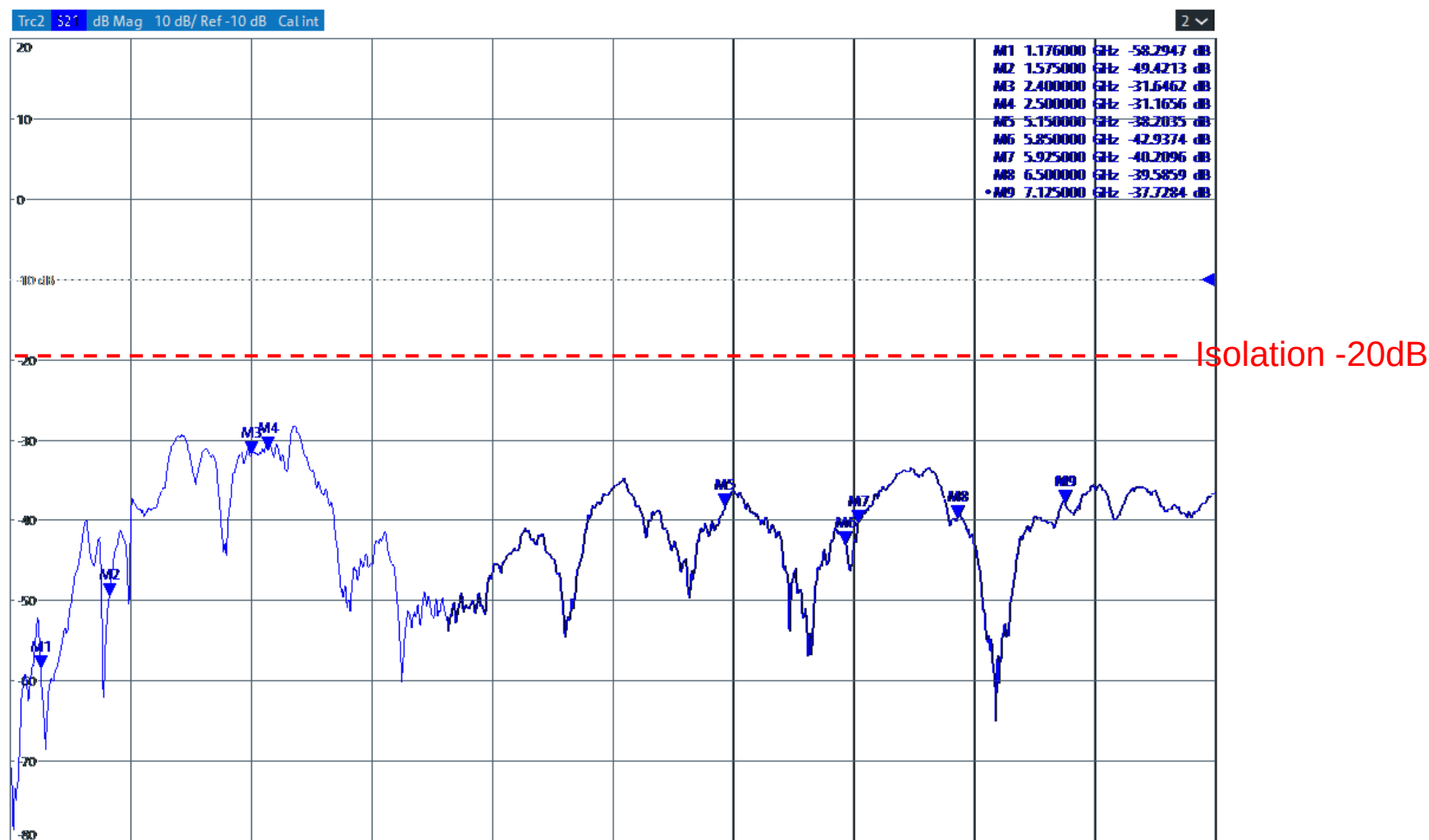
Antenna_2→Antenna_9 Isolation



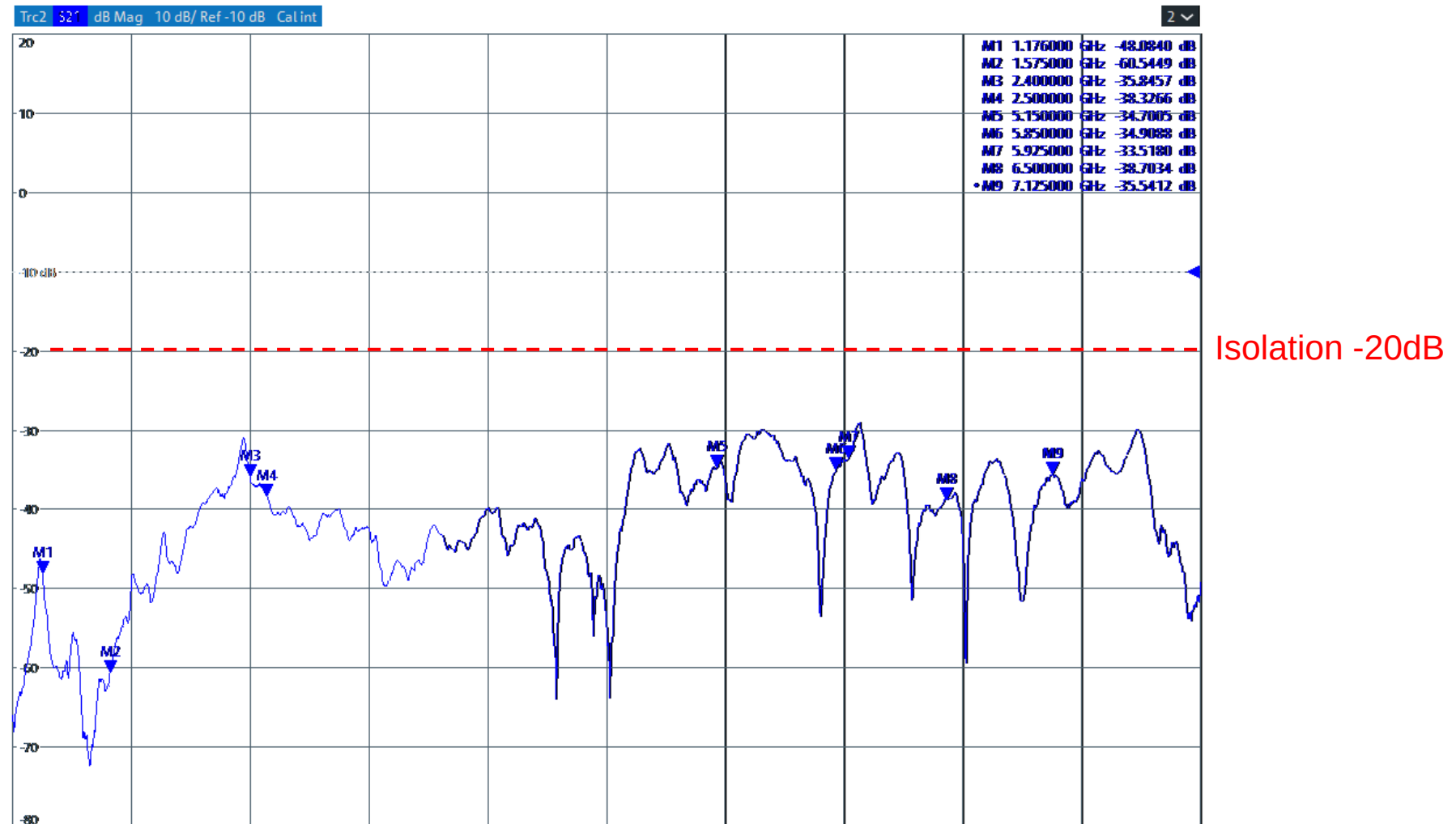
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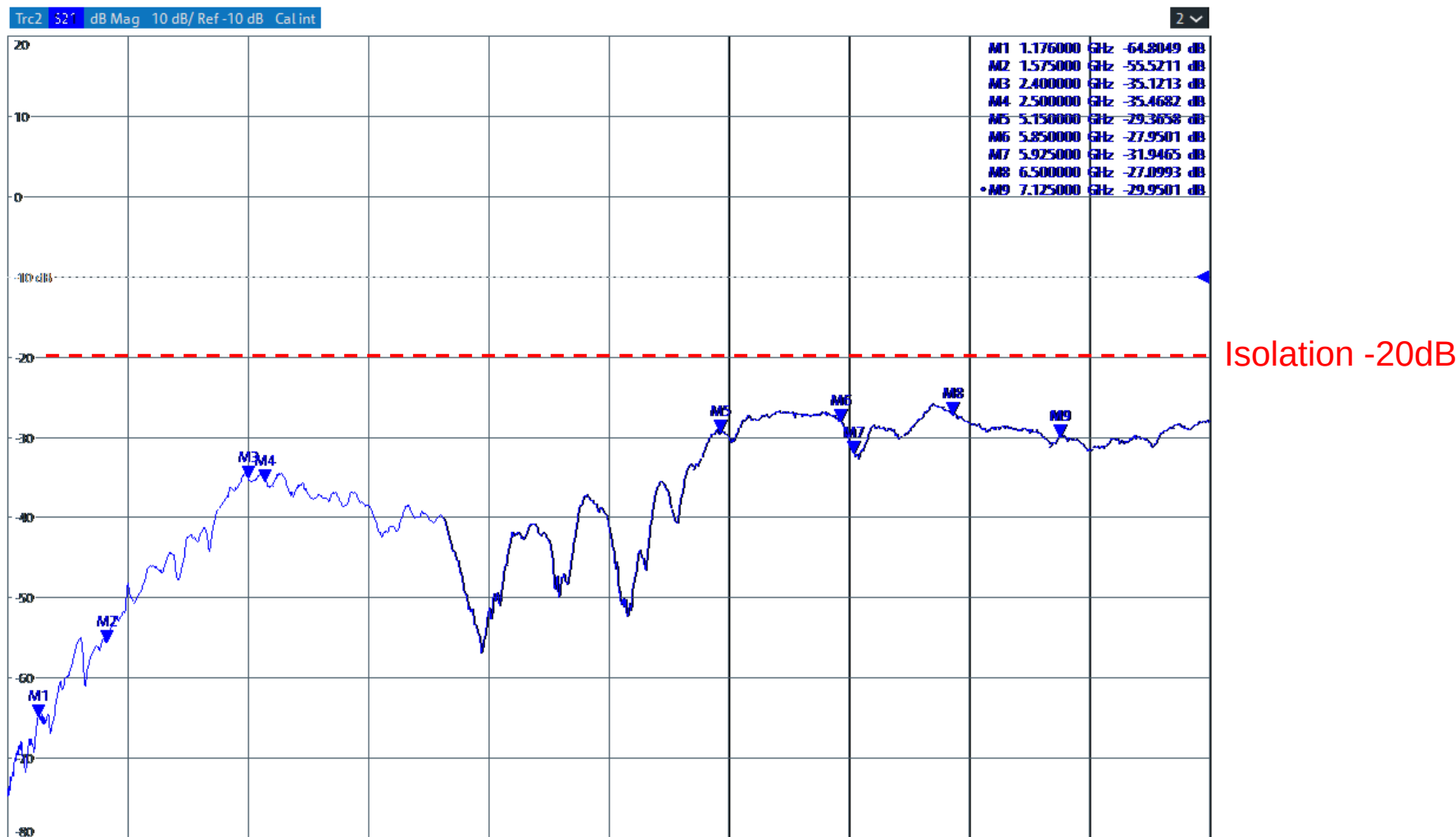
Antenna_3→Antenna_4 Isolation



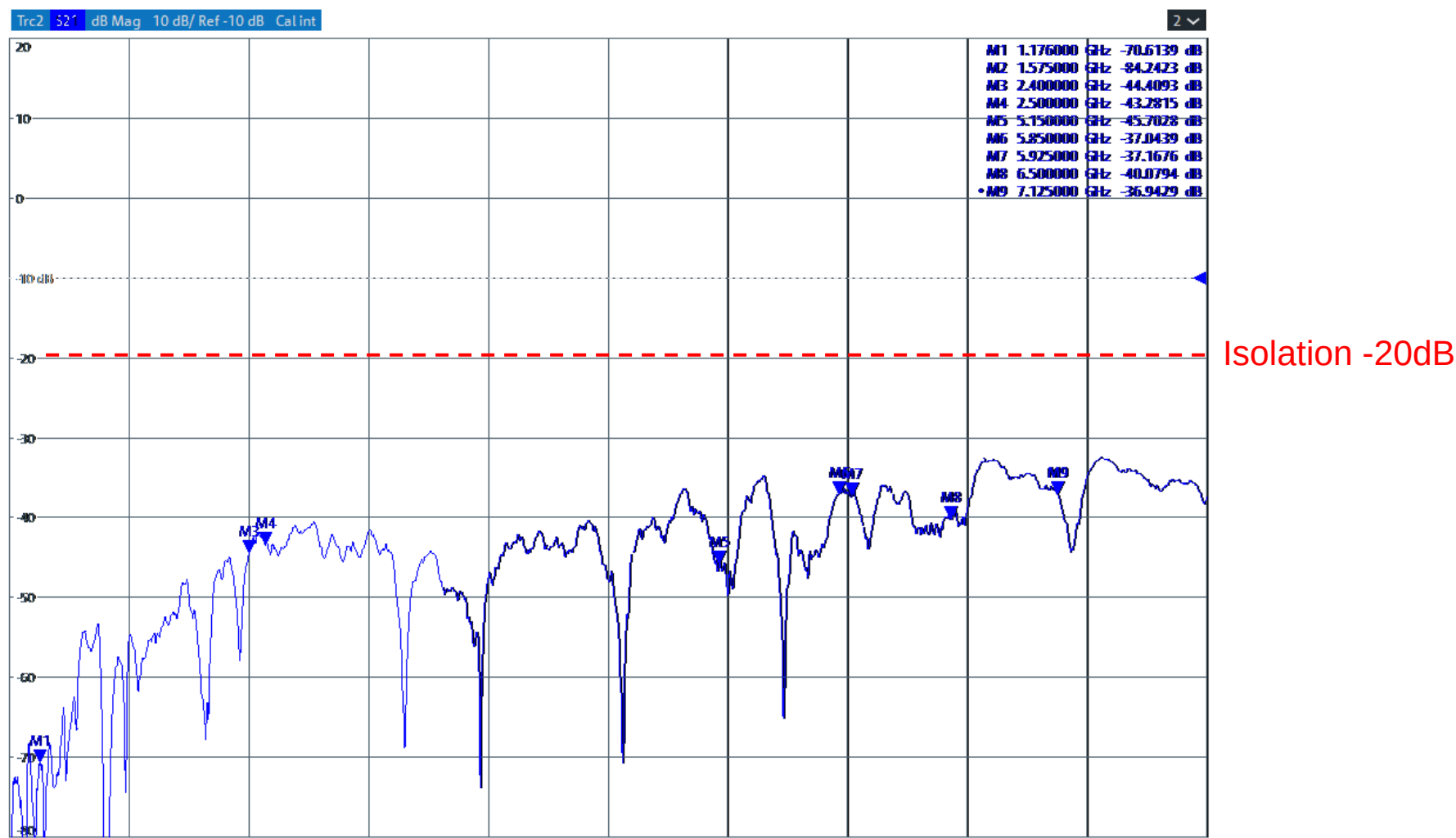
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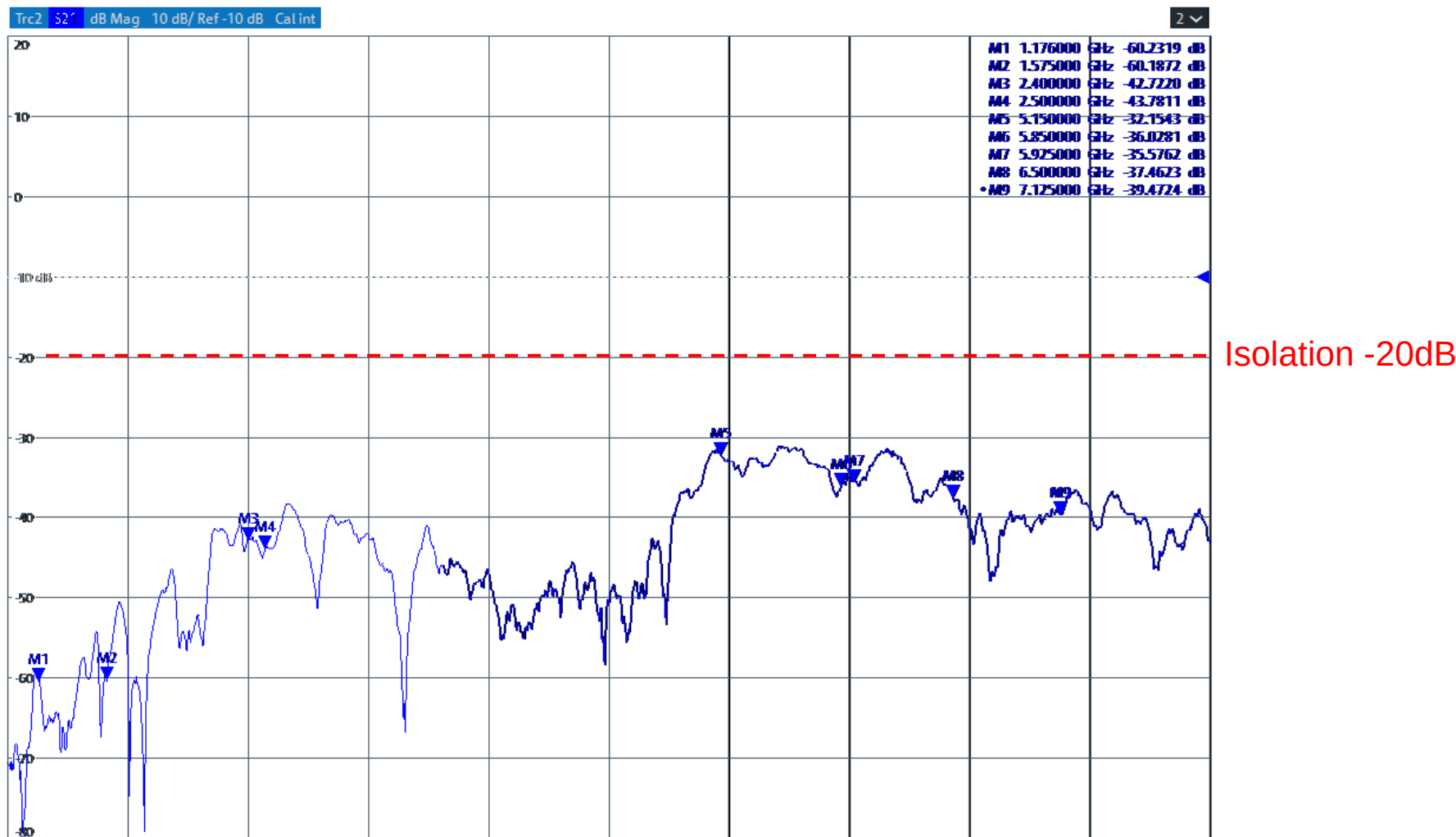
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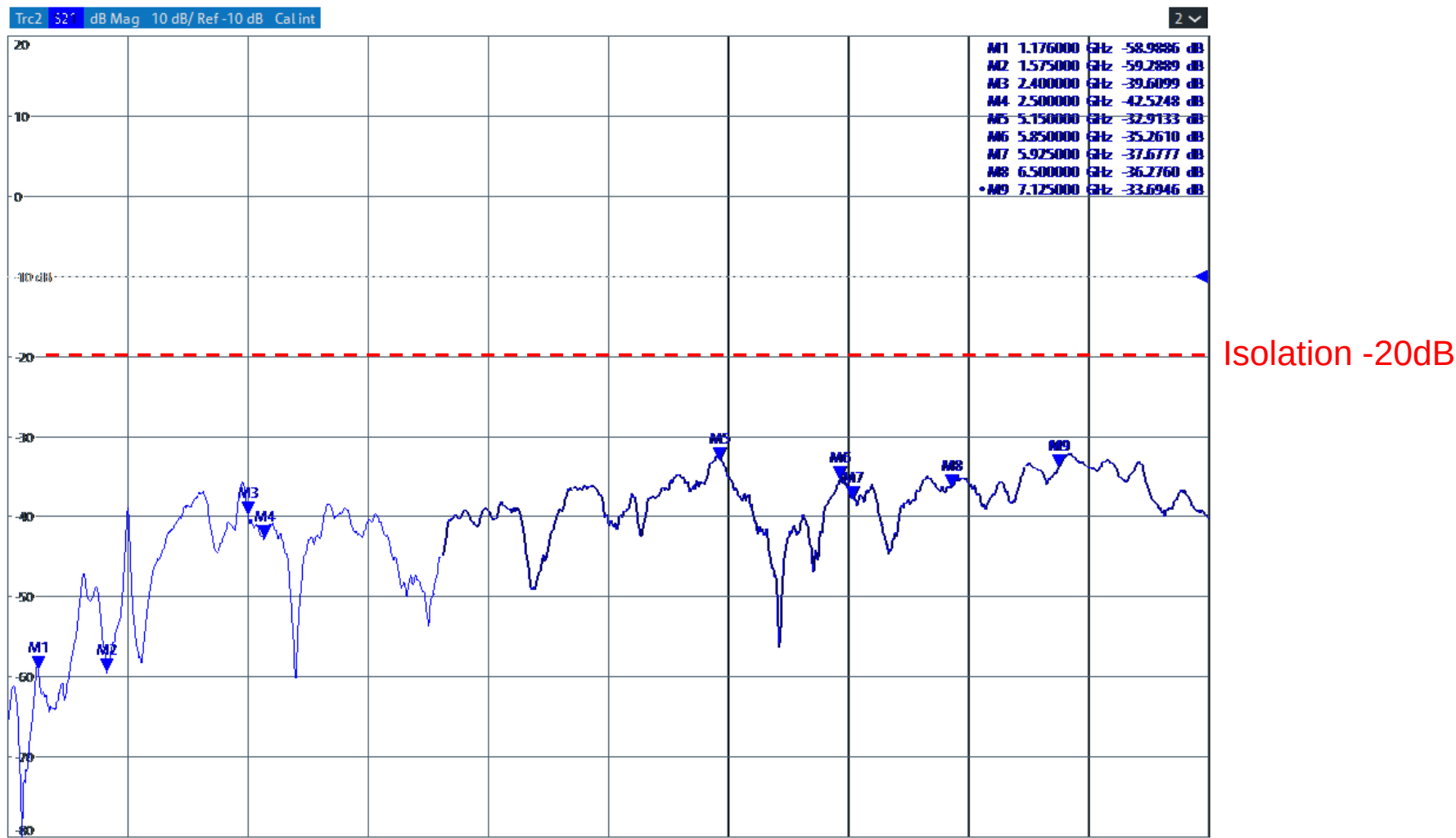
Antenna_3→Antenna_7 Isolation



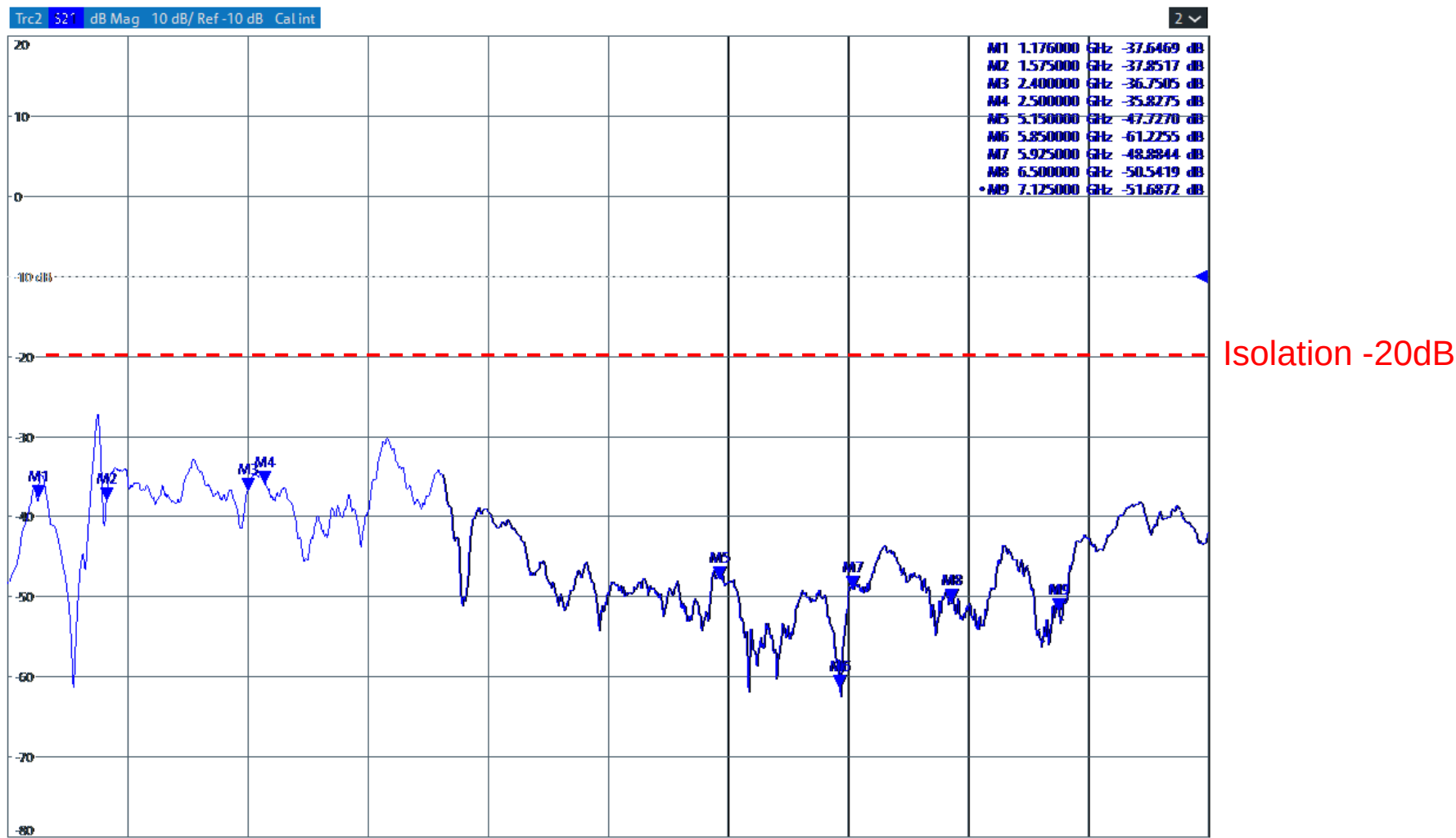
Antenna_3→Antenna_8 Isolation



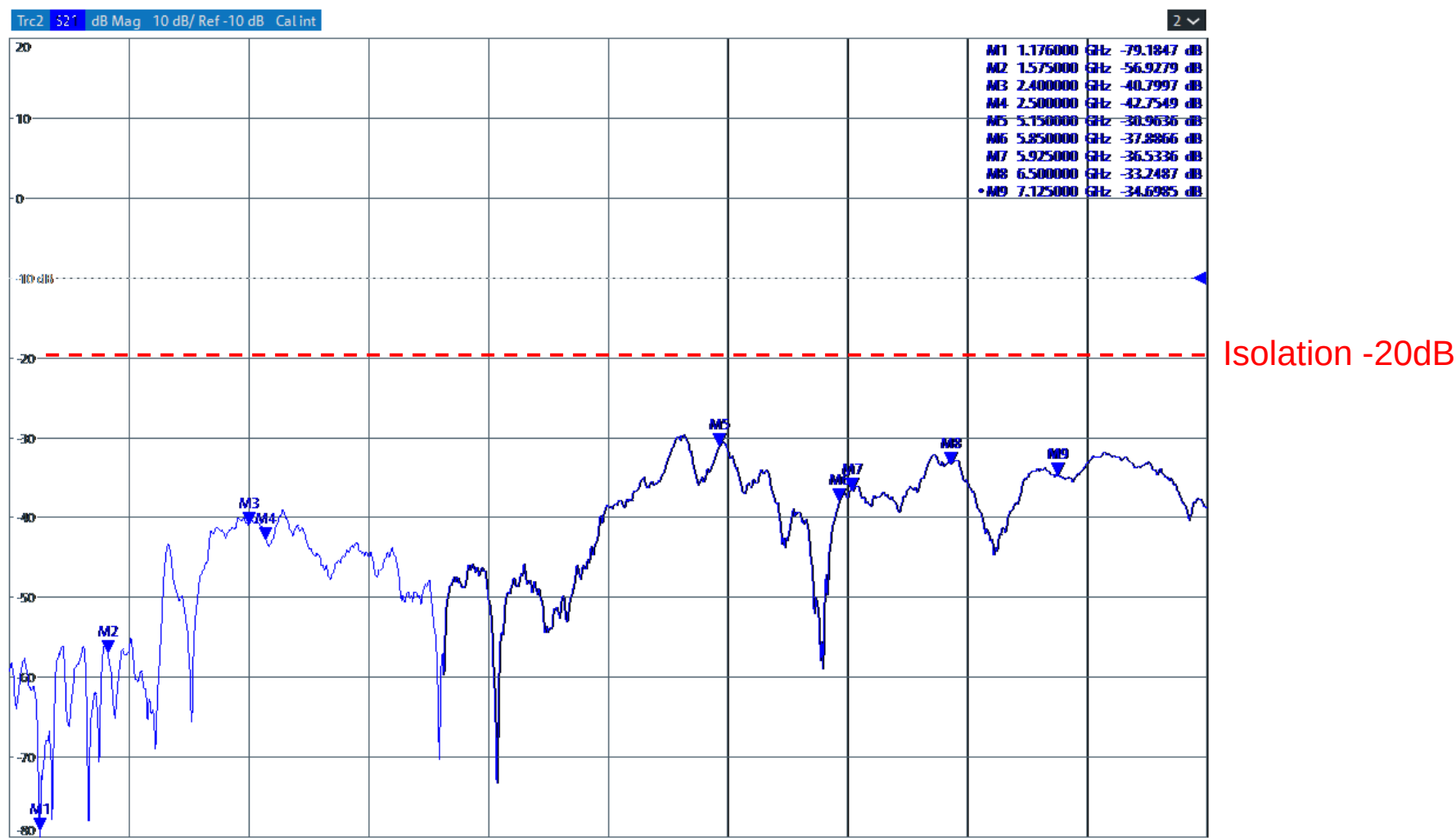
Antenna_3→Antenna_9 Isolation



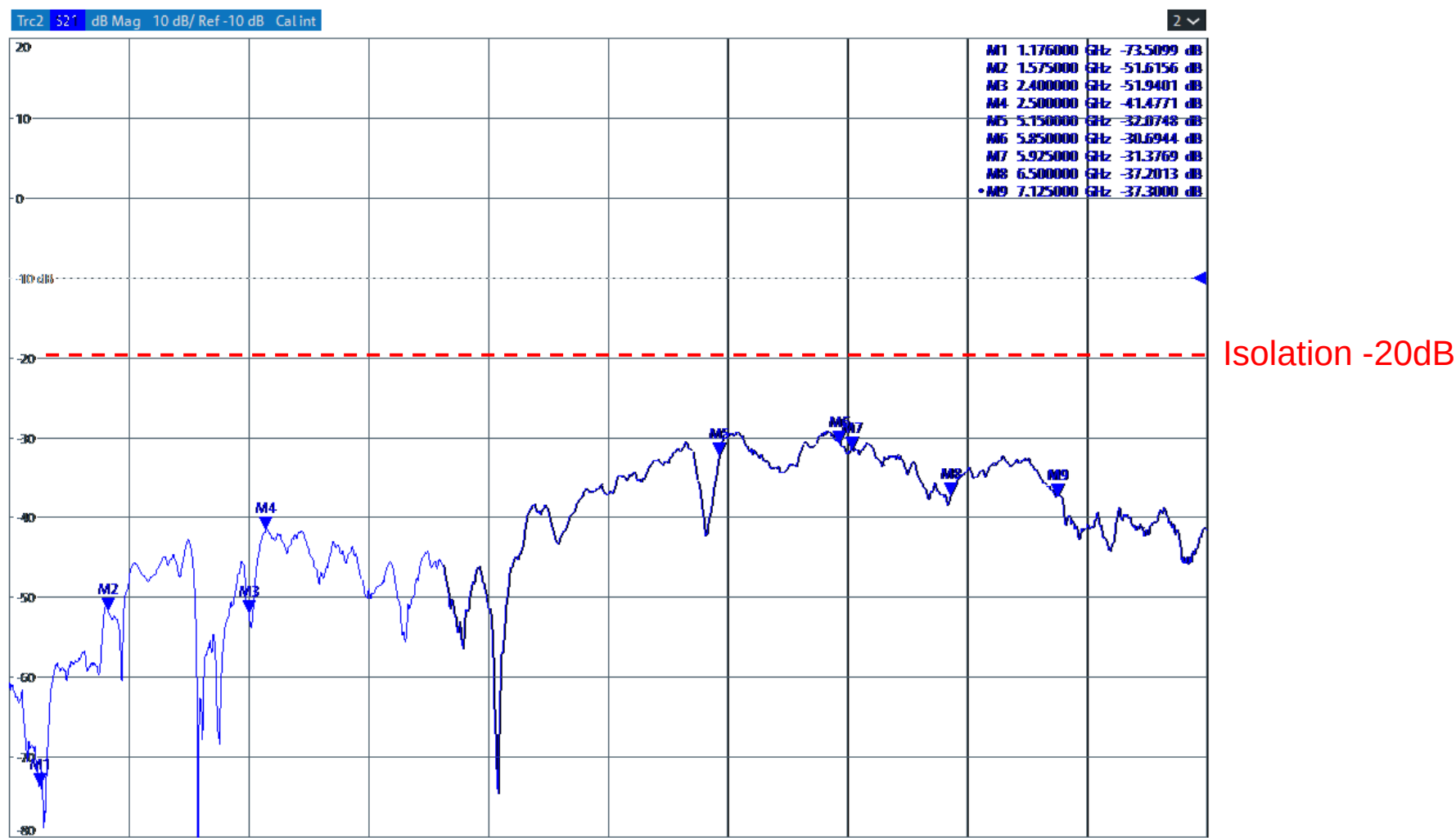
Antenna_3→Antenna_10 Isolation



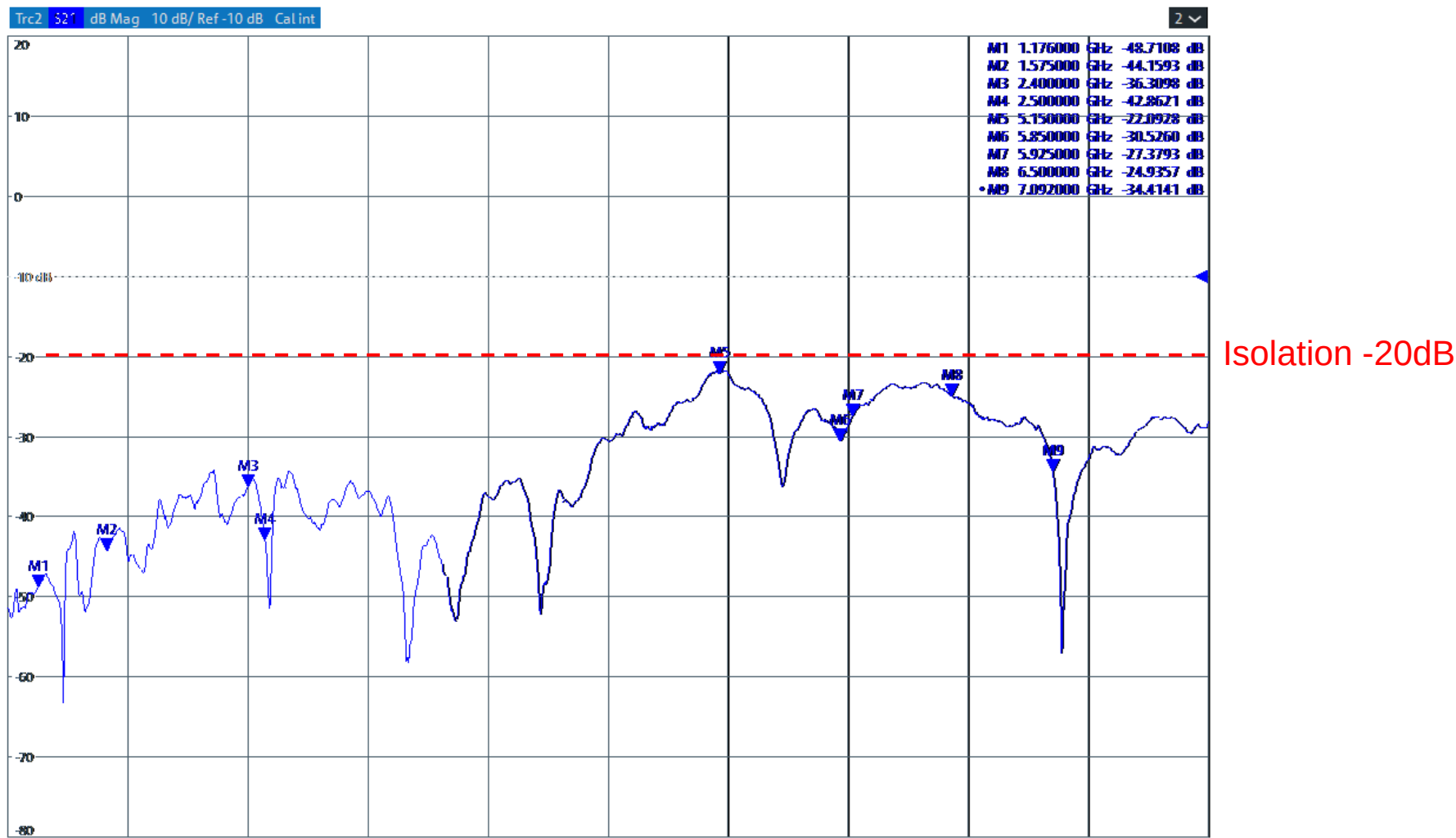
Antenna_4→Antenna_5 Isolation



Antenna_4→Antenna_6 Isolation

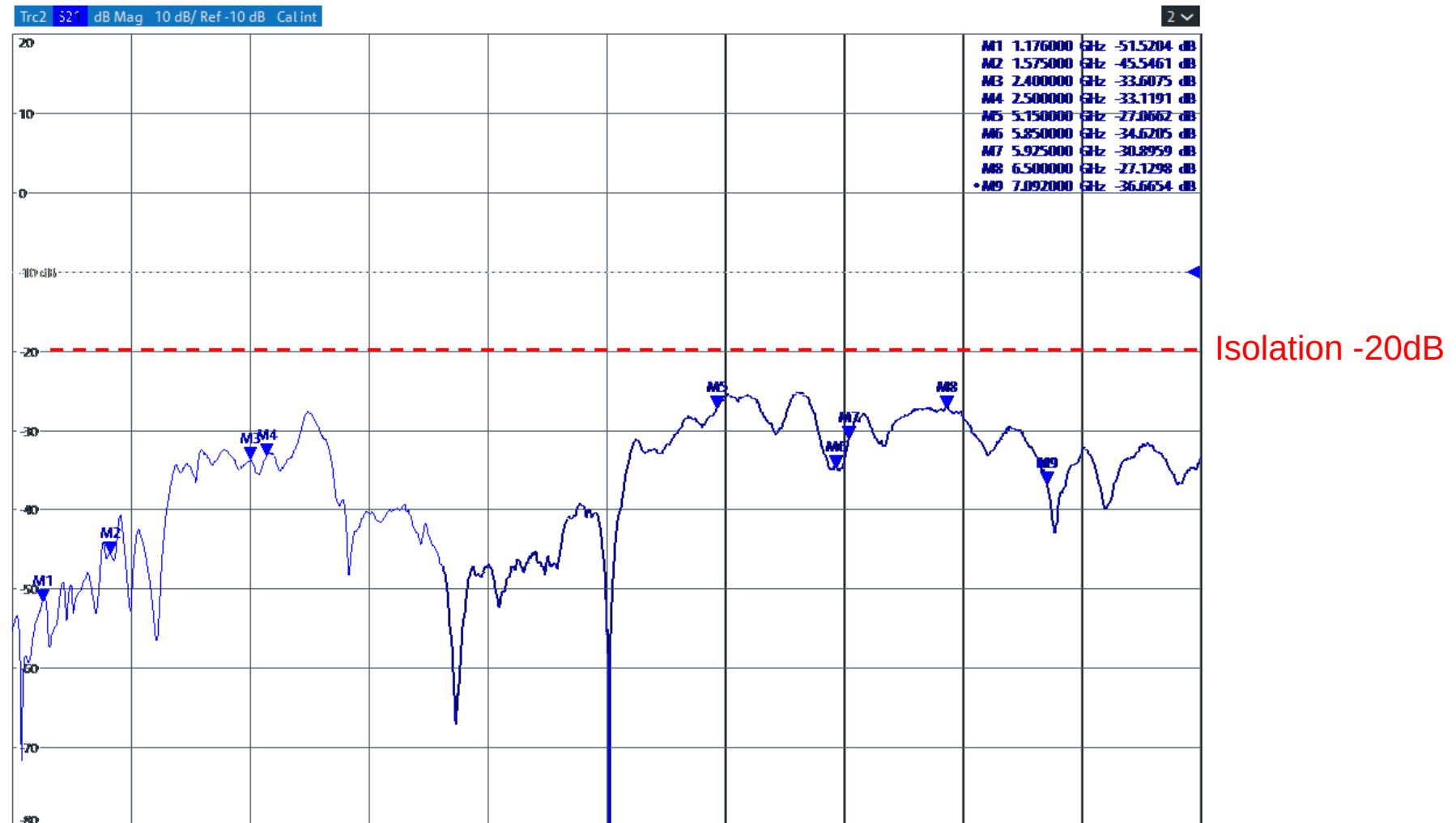


Antenna_4→Antenna_7 Isolation

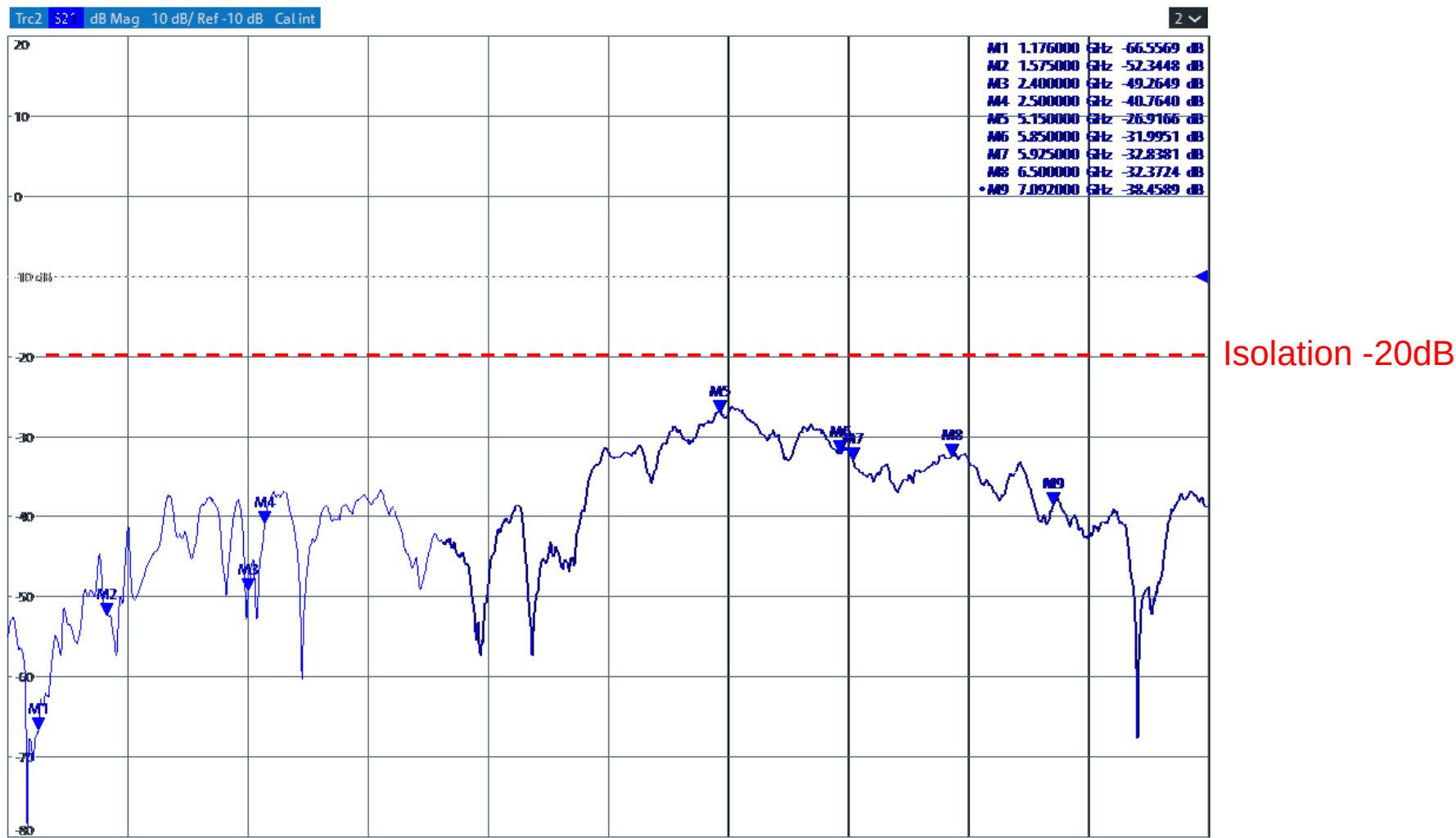


S-Parameter

Antenna_4→Antenna_8 Isolation



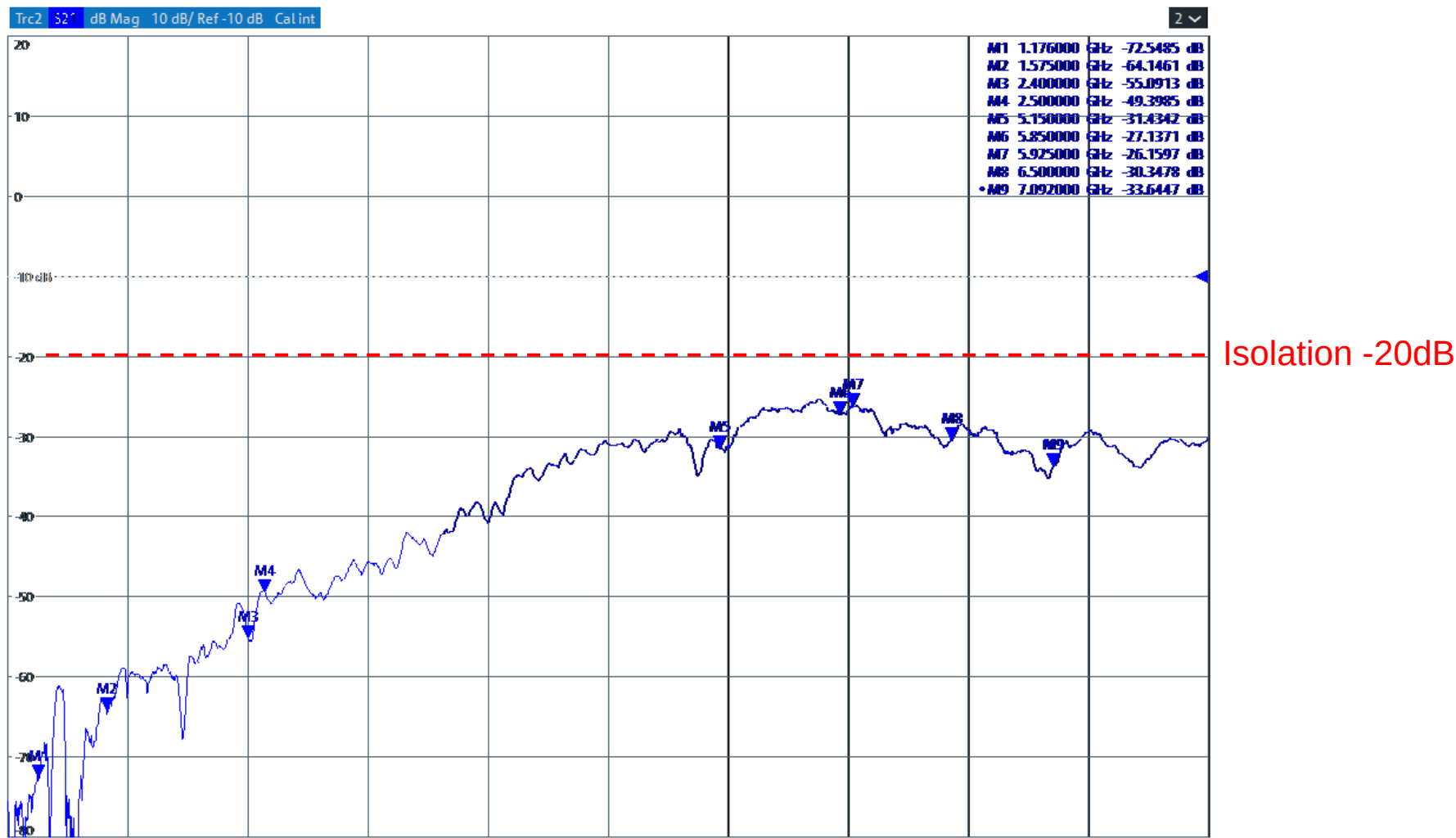
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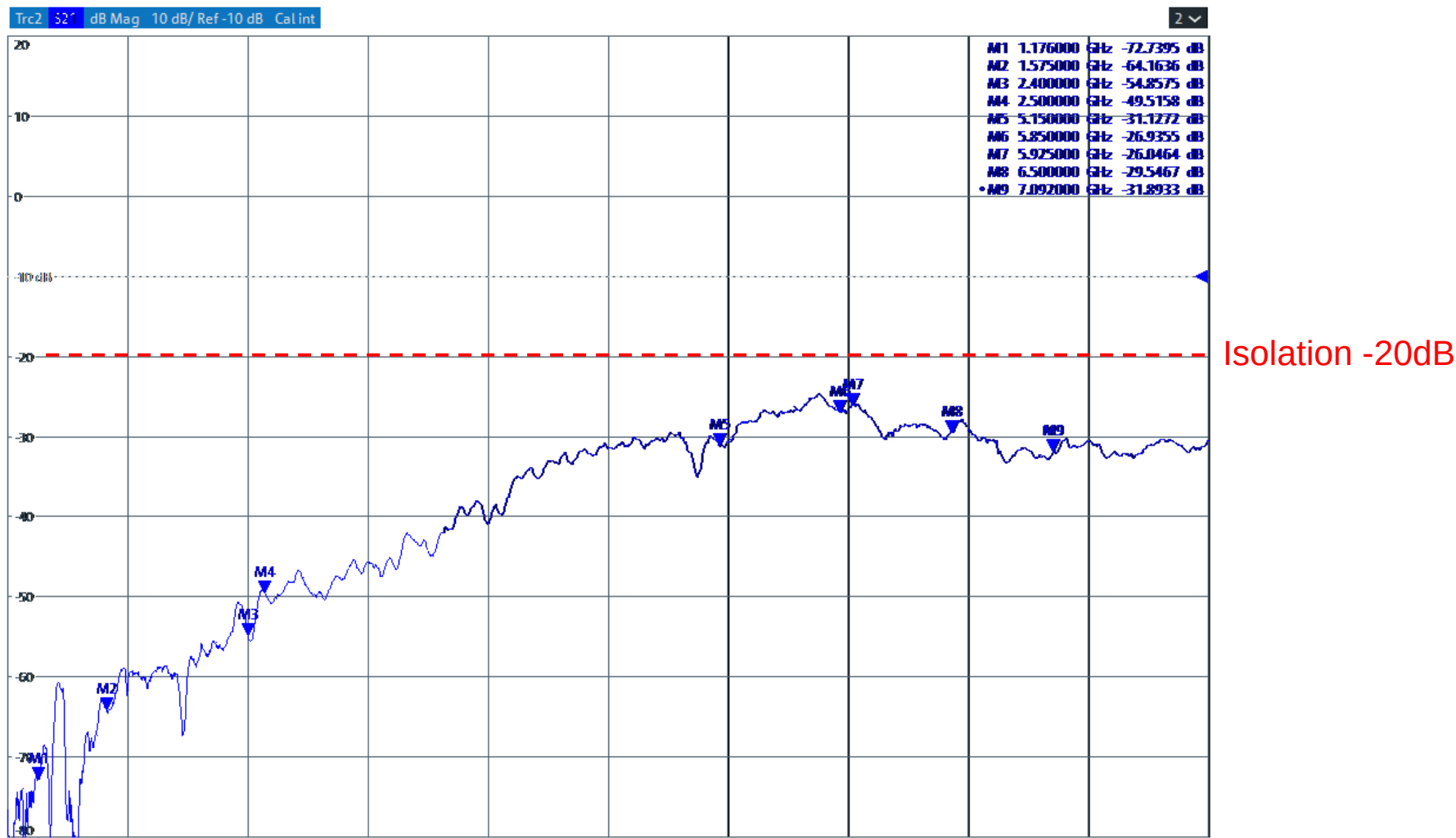
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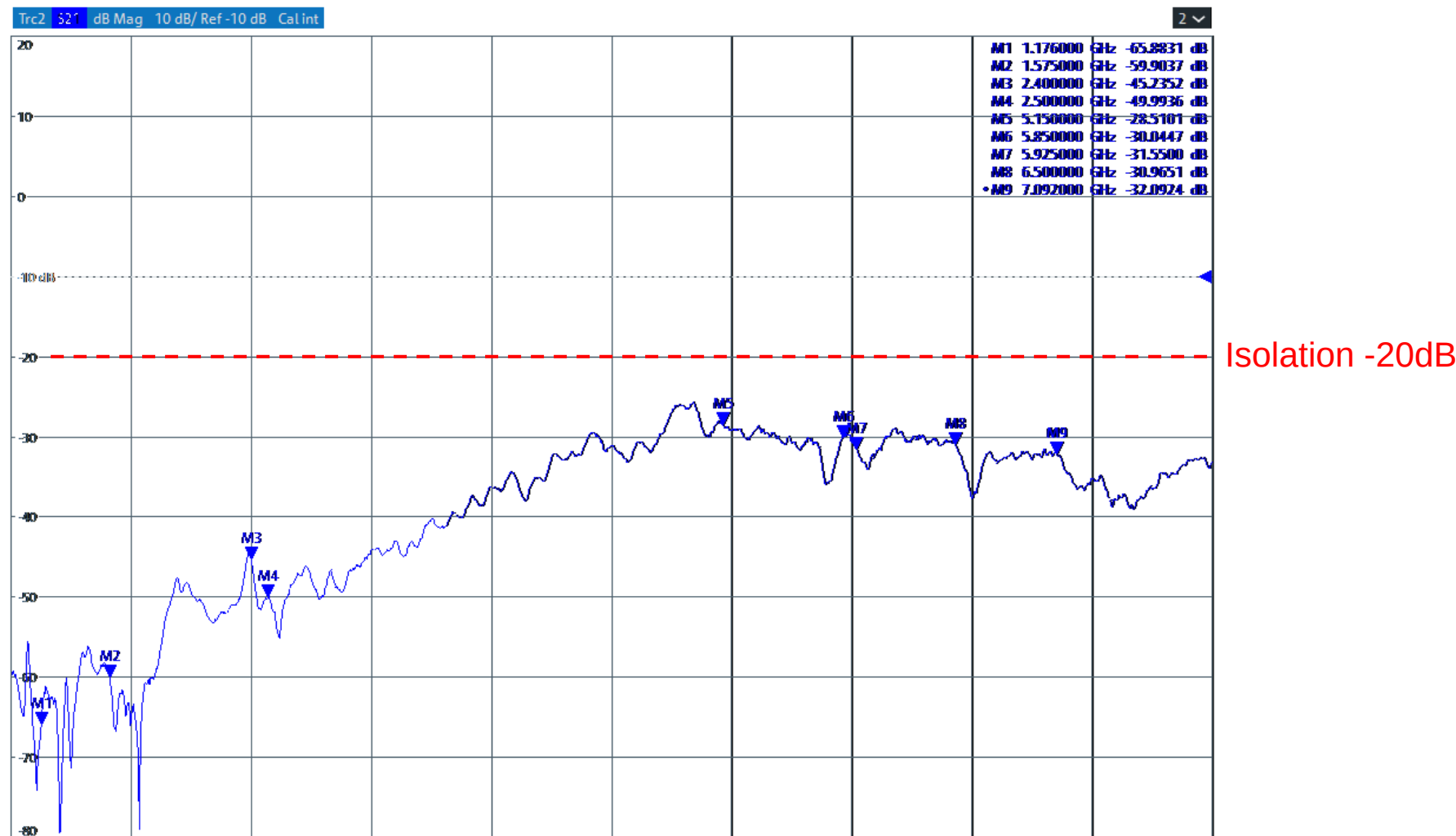
Antenna_5→Antenna_6 Isolation



Antenna_5→Antenna_7 Isolation

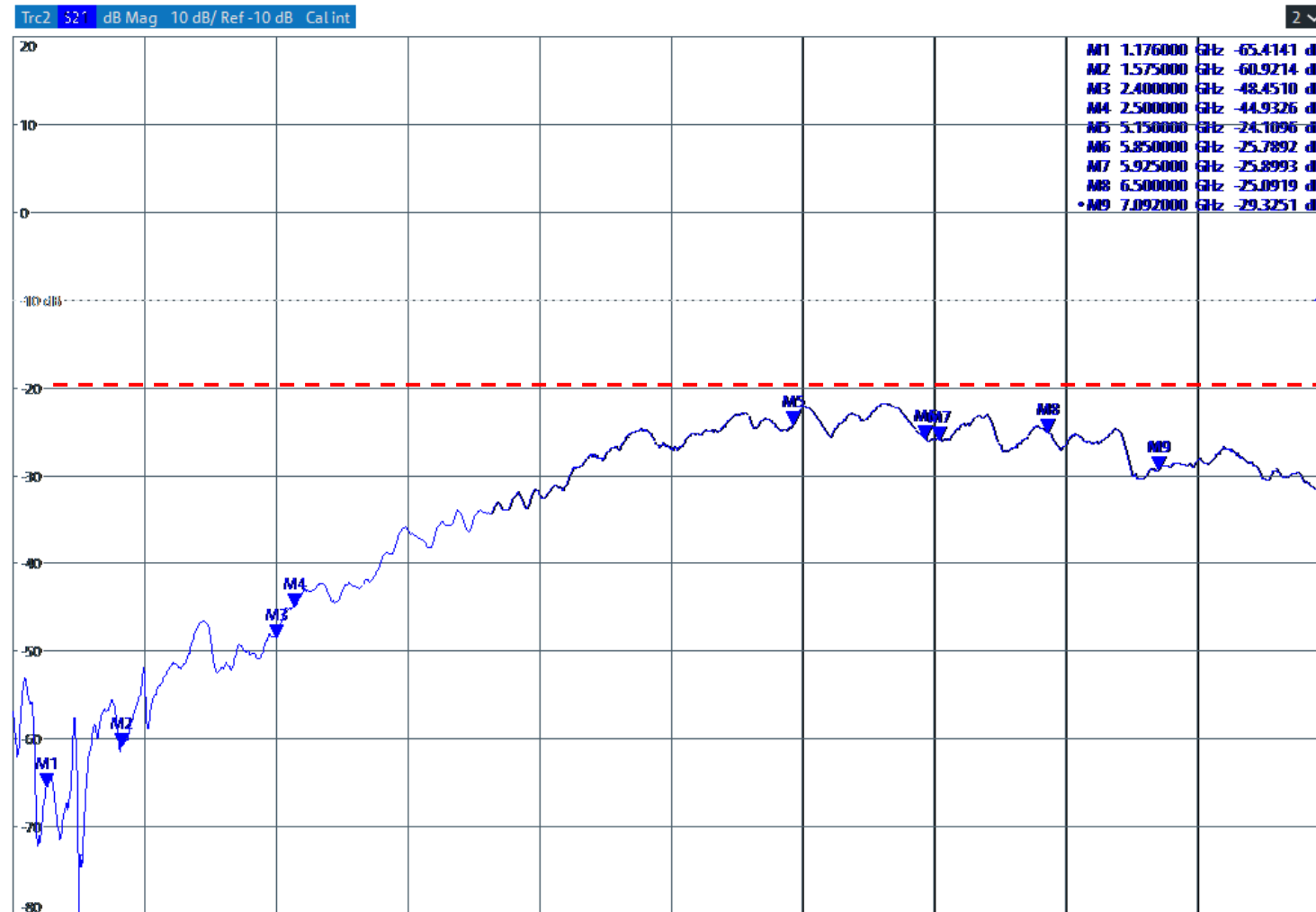


Antenna_5→Antenna_8 Isolation



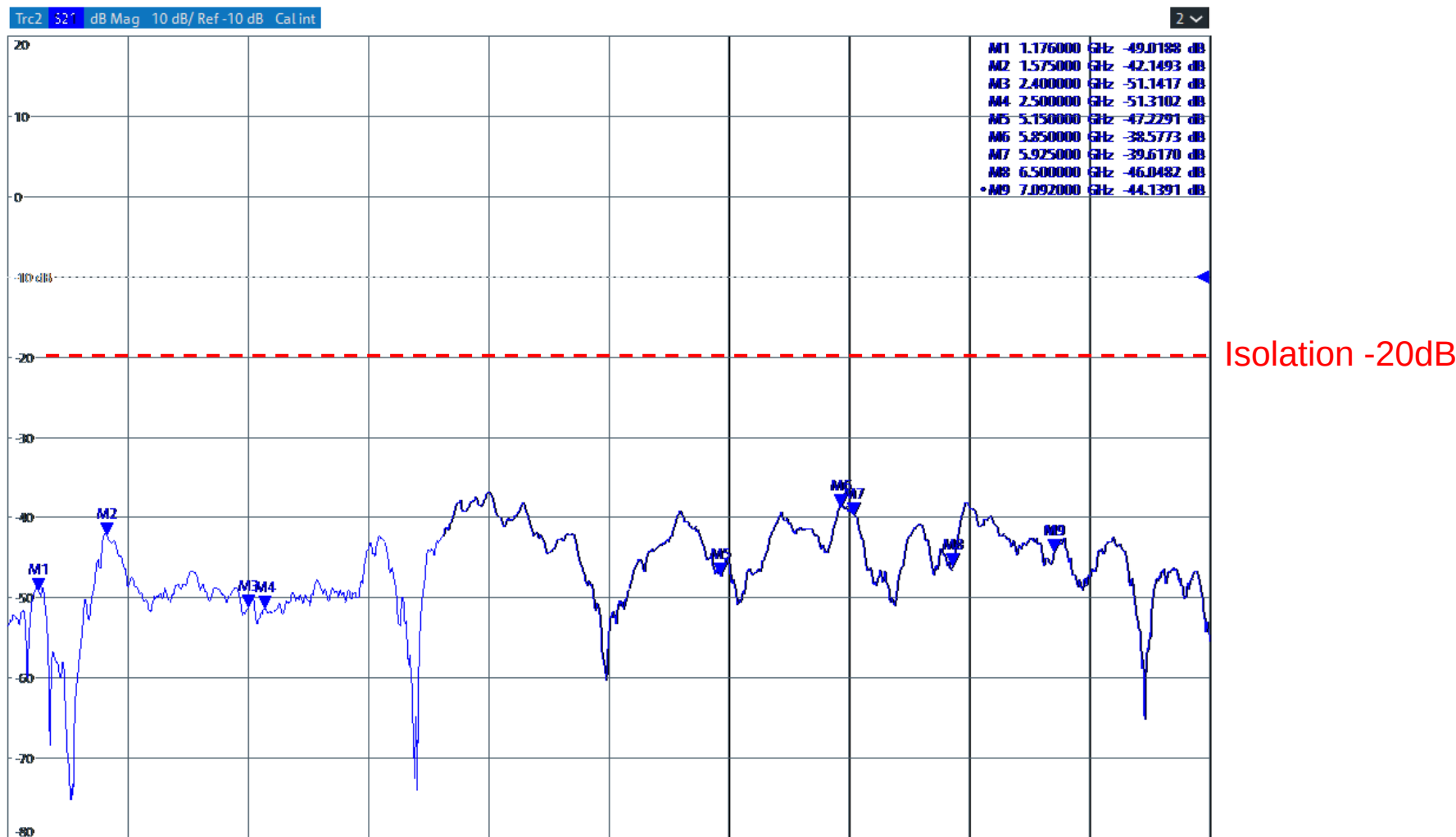
S-Parameter

Antenna_5→Antenna_9 Isolation

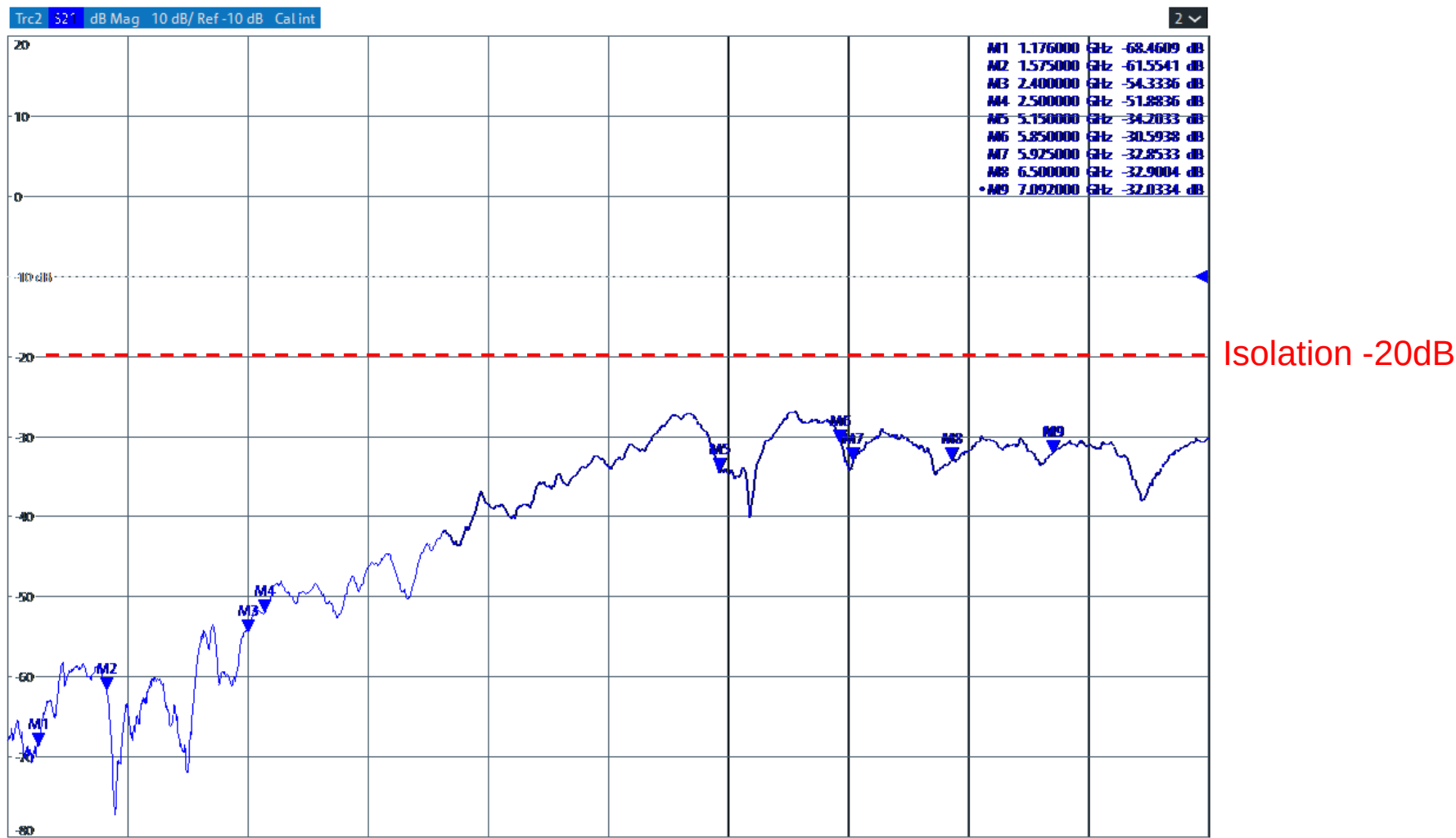


Isolation -20dB

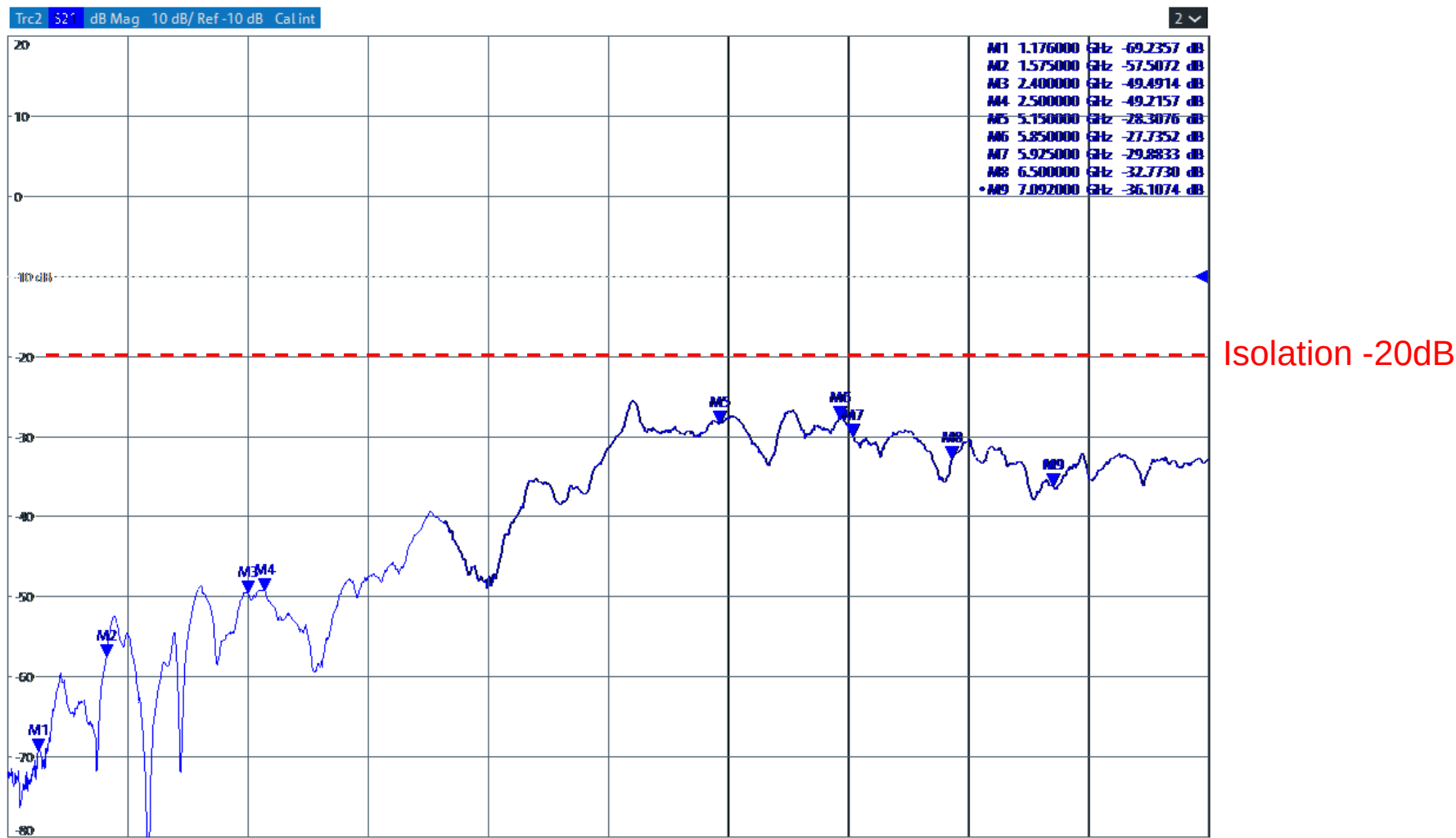
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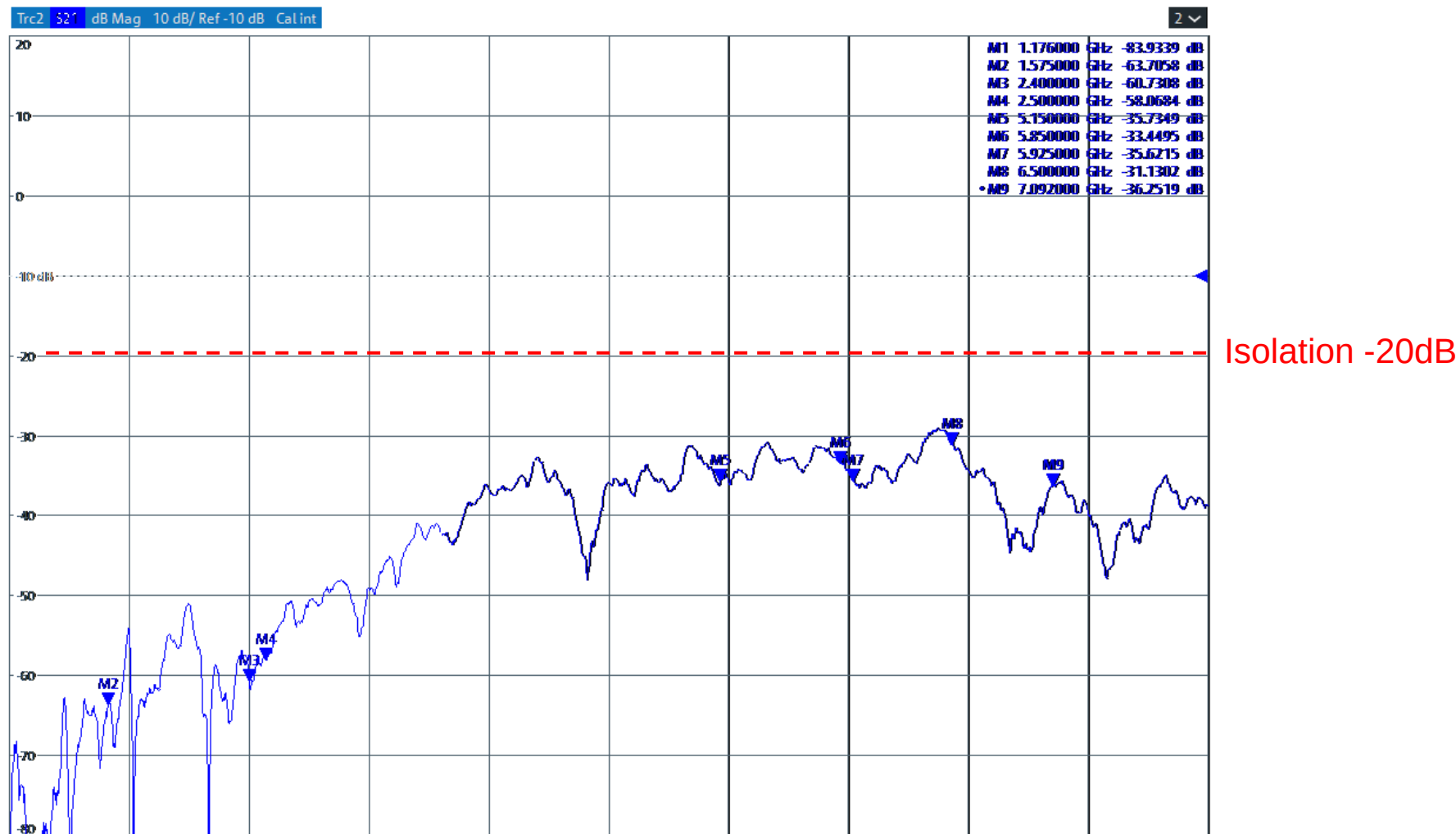
Antenna_6→Antenna_7 Isolation



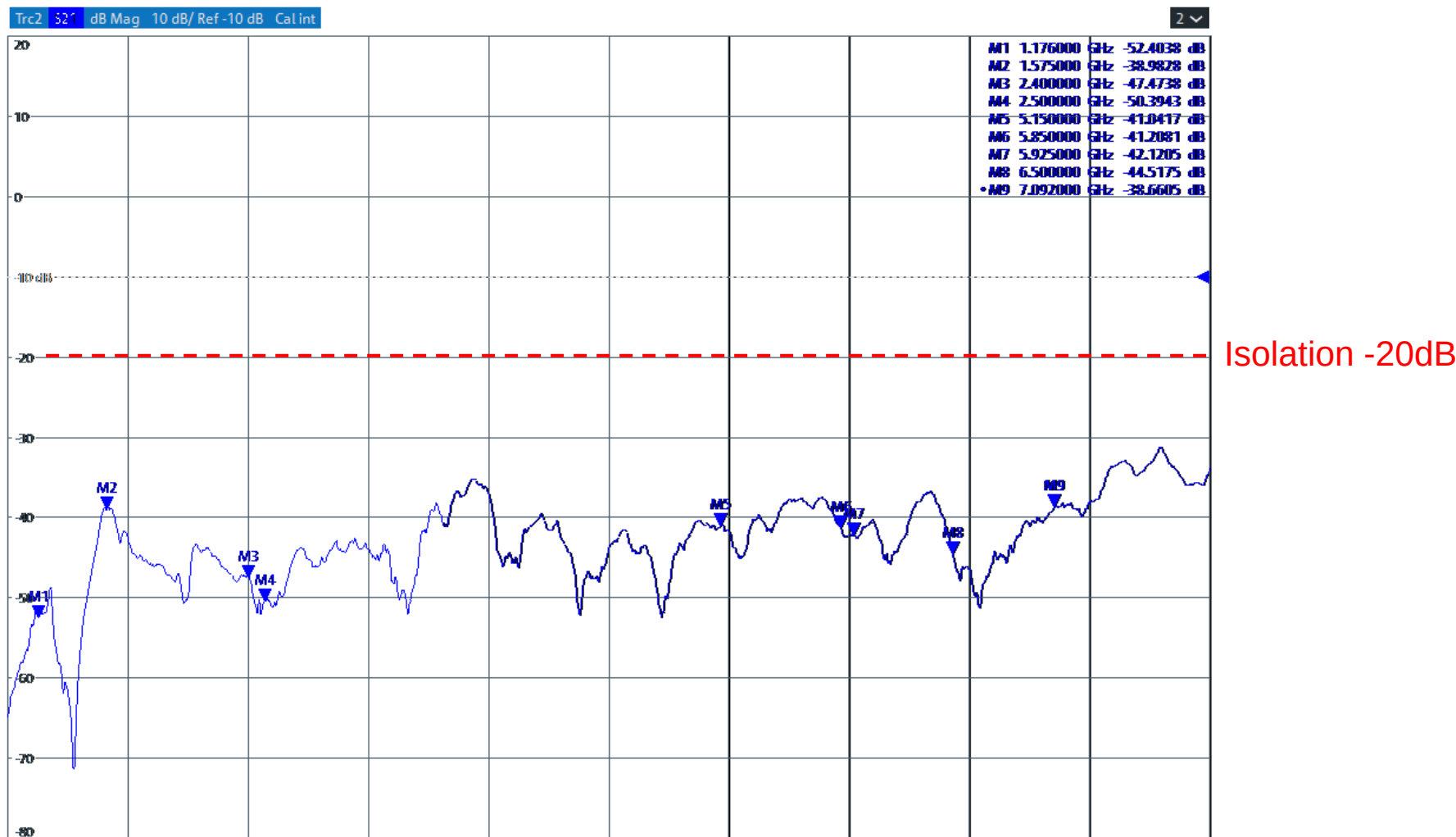
Antenna_6→Antenna_8 Isolation



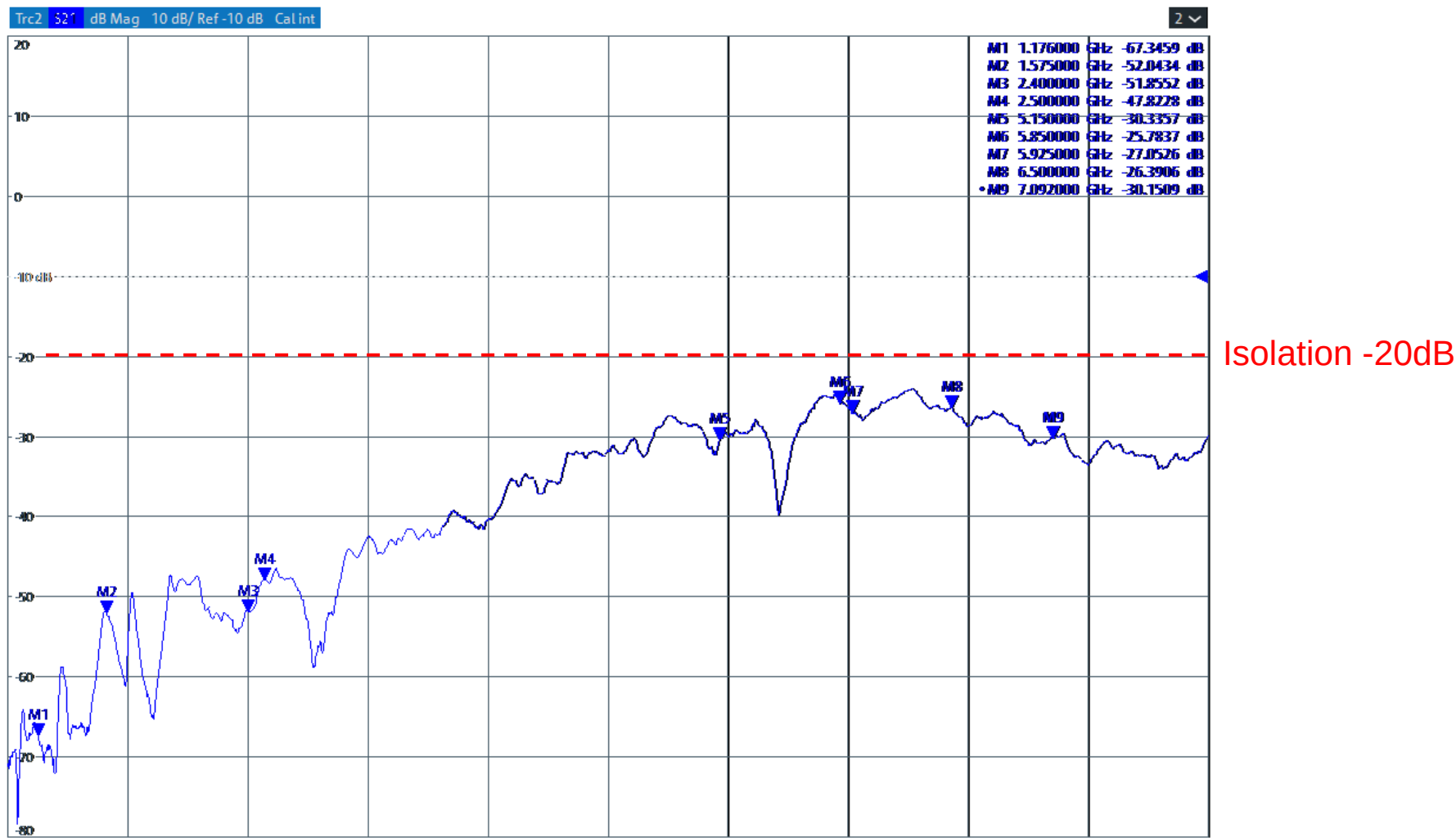
Antenna_6→Antenna_9 Isolation



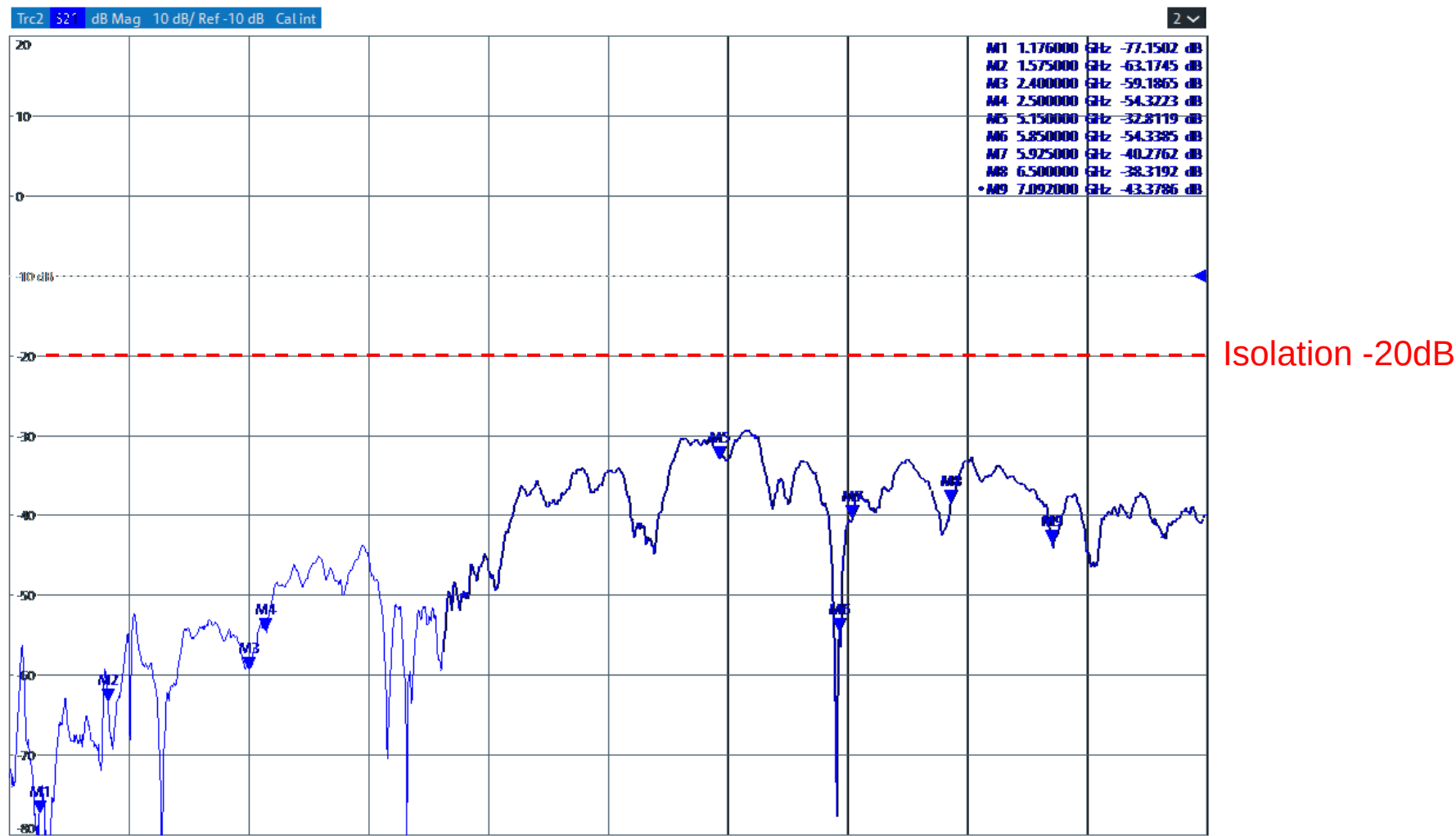
Antenna_6→Antenna_10 Isolation



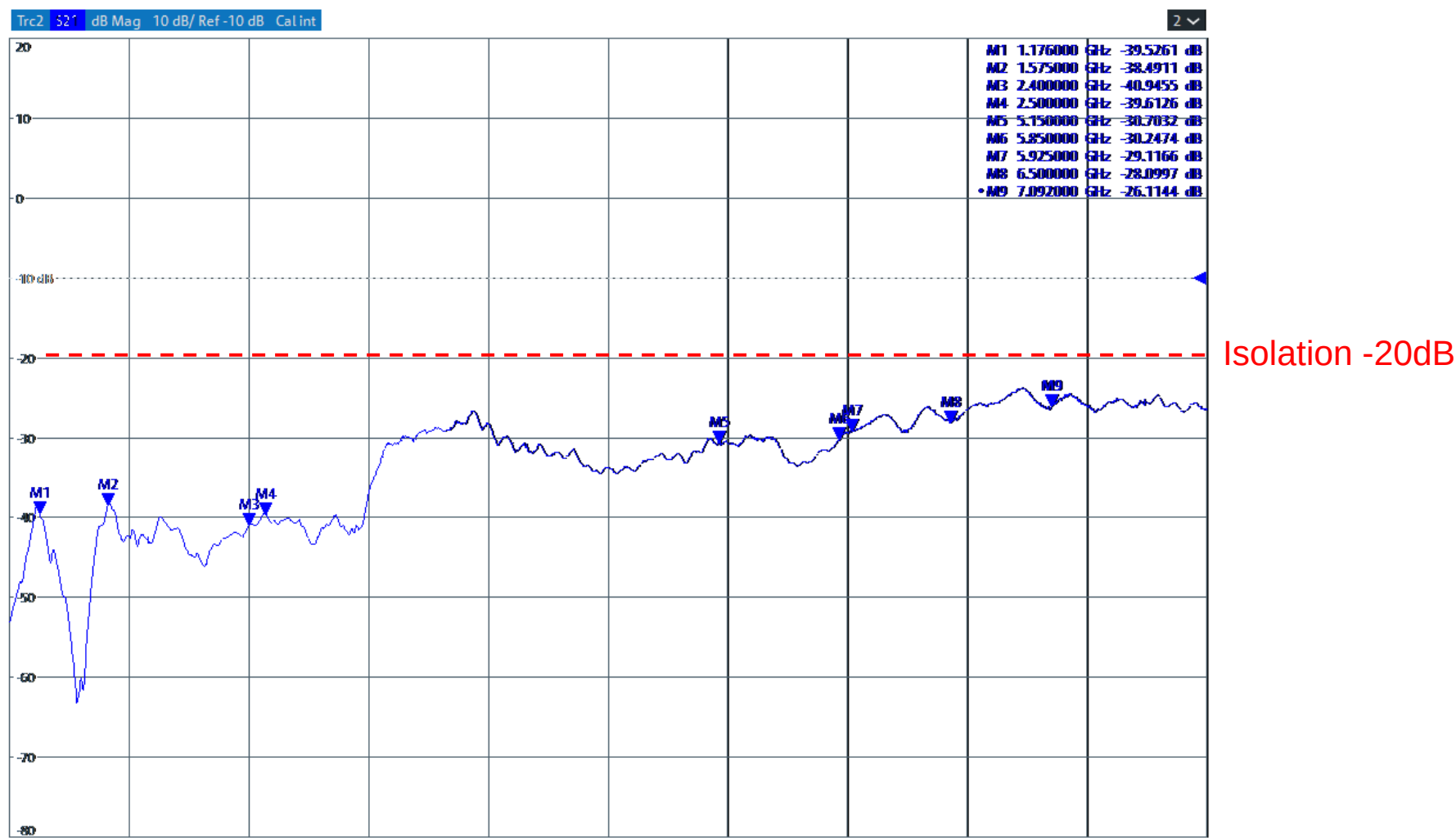
Antenna_7→Antenna_8 Isolation



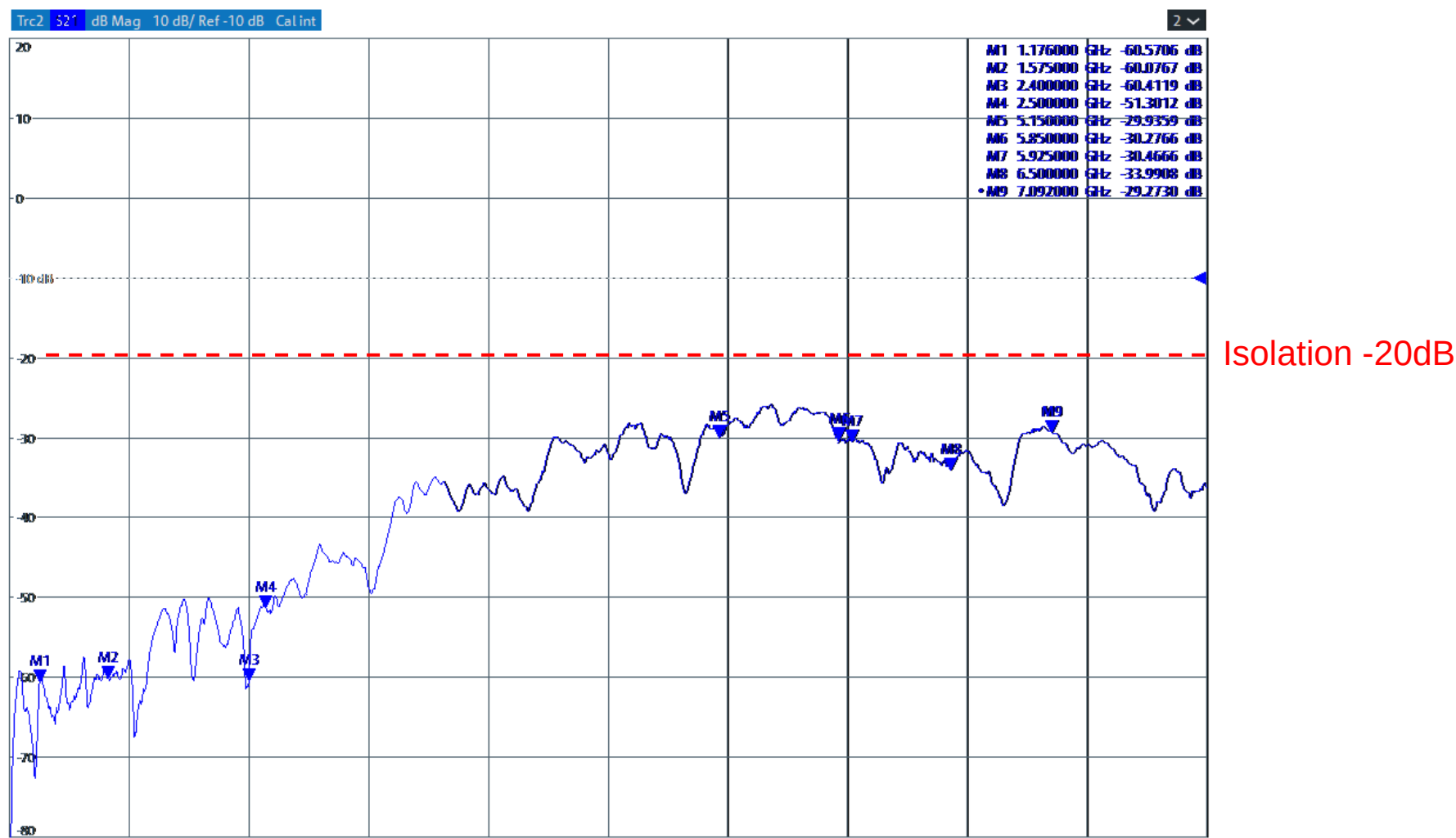
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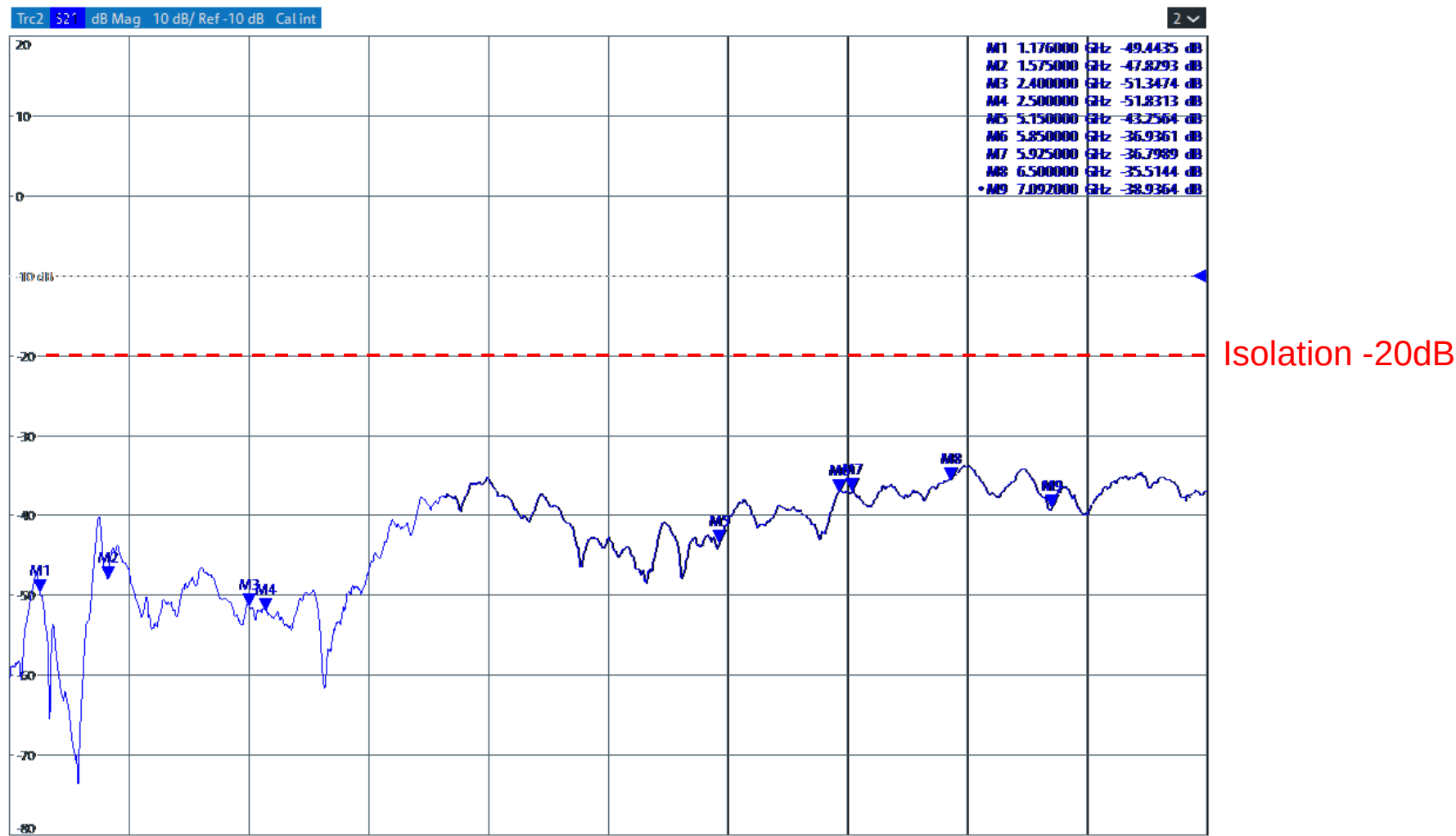
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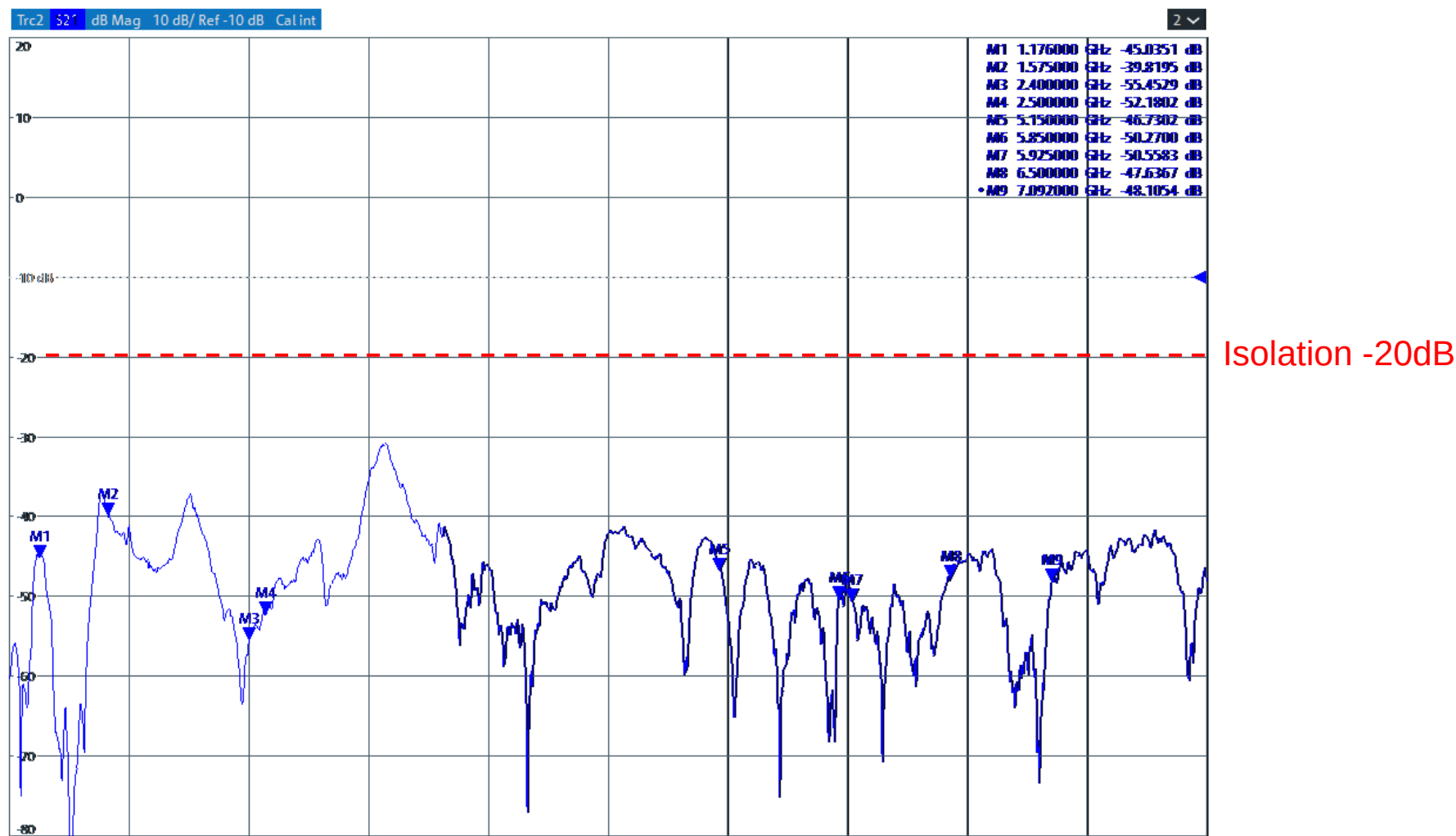
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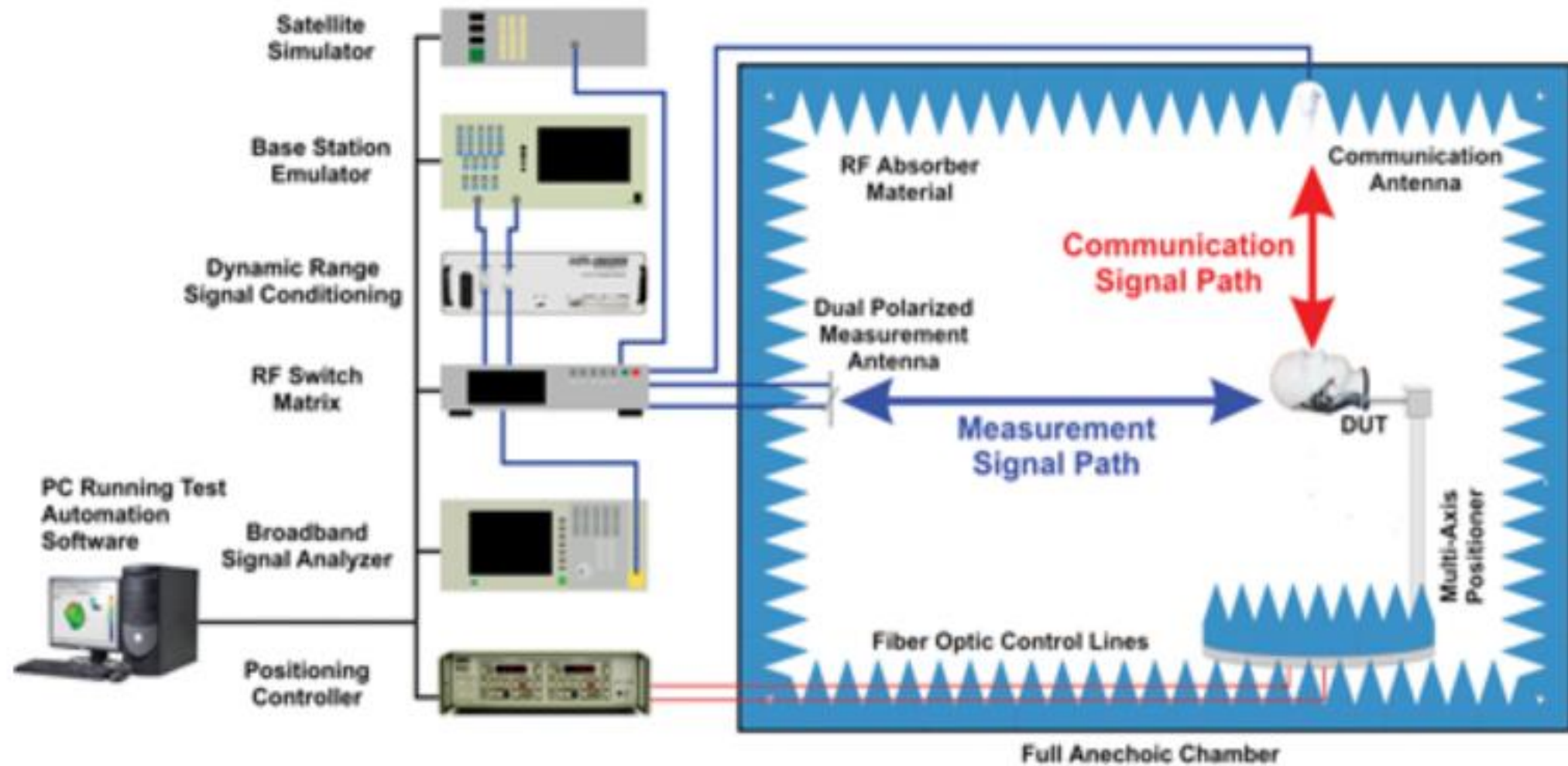
Antenna_8→Antenna_10 Isolation



Antenna_9→Antenna_10 Isolation

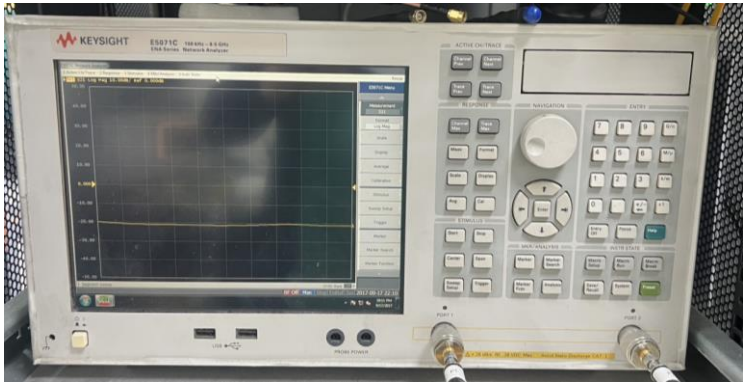


Antenna Test System



Actual Equipment List and Calibration Information

Vendor	Model	Calibrated Date	Calibrated Until
MVG industries	AMS-8500	2024/01	2025/01
KSYSIGHT	E5071C	2024/01	2025/01



- location of the testing:
AWAN Taiwan office in Xindian
- Test date: 2024/12/05
- Test software:
EMQuest Version 1.17 Build 34070

Connect DUT with Chamber

- Connect cable coming from DUT, designated as “Antenna 1 ” to the chamber’s cable.
- Run sequence of radiated tests .
- Disconnect the chamber’s cable from Antenna 1 .
- Repeat this process for all 10 RF ports of DUT.

Gain Table

Antenna_1				Antenna_2			
		Gain Theta	Gain Phi			Gain Theta	Gain Phi
2450MHz	MAX Gain	3.95	-6.36	2450MHz	MAX Gain	4.3	-3.6
		052 ; 054	0162 ; 0-126			0135 ; 054	0 168 ;0 -12
	MaxGain above 30°	-6.8	-6.36		MaxGain above 30°	-6.63	-6.43
5200MHz	MAX Gain	4.15	2.21	5200MHz	MAX Gain	4.09	0.04
		072 ; 063	042 ; 033			0159 ; 069	0135 ; 036
	MaxGain above 30°	-10.16	-11.3		MaxGain above 30°	-10.6	-9.07
5300MHz	MAX Gain	3.85	2.36	5300MHz	MAX Gain	4.01	0.32
		072 ;066	060 ;027			0153 ;072	0138 ;039
	MaxGain above 30°	-9.11	-11.26		MaxGain above 30°	-10.54	-10.09
5600MHz	MAX Gain	4.42	-1.27	5600MHz	MAX Gain	4.25	0.38
		066 ; 066	060 ; 030			0156 ; 069	0129 ;039
	MaxGain above 30°	-10.23	-10.56		MaxGain above 30°	-10.62	-9.8
5800MHz	MAX Gain	3.96	-0.92	5800MHz	MAX Gain	4.5	-2.04
		081 ; 066	0156 ; 0-36			0156 ; 069	0153 ; 033
	MaxGain above 30°	-9.48	-10.83		MaxGain above 30°	-10.85	-10.18

Gain Table

Antenna_3				Antenna_4			
		Gain Theta	Gain Phi			Gain Theta	Gain Phi
2450MHz	MAX Gain	4.32	-5.51	2450MHz	MAX Gain	4.48	0.19
		θ 75;Φ -63	θ 168 ;Φ 126			θ144 ;Φ -63	θ165 ; Φ 12
	MaxGain above 30°	-9.52	-5.51		MaxGain above 30°	-3.55	-5.29
5200MHz	MAX Gain	4.32	1.16	5200MHz	MAX Gain	3.89	1.7
		θ75 ; Φ-63	θ12 ; Φ-27			θ177 ;Φ-72	θ135 ; Φ-18
	MaxGain above 30°	-9.52	-9.92		MaxGain above 30°	-8	-8.87
5300MHz	MAX Gain	4.55	-0.16	5300MHz	MAX Gain	4.65	1.44
		θ75 ; Φ-66	θ42 ;Φ18			θ162 ; Φ-66	θ174 ;Φ-33
	MaxGain above 30°	-9.59	-9.39		MaxGain above 30°	-7.24	-9.46
5600MHz	MAX Gain	4.46	-0.69	5600MHz	MAX Gain	4.51	0.5
		θ72 ; Φ-66	θ162 ; Φ36			θ162 ; Φ-69	θ132 ; Φ-39
	MaxGain above 30°	-11.2	-11.15		MaxGain above 30°	-10.16	-10.78
5800MHz	MAX Gain	4.05	-0.92	5800MHz	MAX Gain	4.26	-1.5
		θ90 ; Φ-69	θ39 ; Φ39			θ165 ; Φ-66	θ159 ; Φ-30
	MaxGain above 30°	-9.38	-9.49		MaxGain above 30°	-10.54	-11.7

Gain Table

Antenna_5				Antenna_6			
		Gain Theta	Gain Phi			Gain Theta	Gain Phi
6175MHz	MAX Gain	3.96	-1.56	6175MHz	MAX Gain	4.65	-3.38
		039 ; Φ-72	018 ; Φ-48			033 ; Φ66	0138 ; Φ42
	MaxGain above 30°	-10.35	-9.84		MaxGain above 30°	-11.47	-12.27
6475MHz	MAX Gain	4.23	-3.37	6475MHz	MAX Gain	4.26	-3.75
		0132 ; Φ60	051 ; Φ27			030 ; Φ57	0147 ; Φ39
	MaxGain above 30°	-10.39	-10.67		MaxGain above 30°	-11.76	-11.5
6725MHz	MAX Gain	4.28	-2.64	6725MHz	MAX Gain	4.35	-3.14
		0162 ; Φ72	0153 ; Φ36			033 ; Φ48	0177 ; Φ-27
	MaxGain above 30°	-9.88	-9.85		MaxGain above 30°	-11.66	-12.42
6975MHz	MAX Gain	4.2	-4.56	6975MHz	MAX Gain	4.62	-3.12
		0129 ; Φ66	0120 ; Φ15			0120 ; Φ-60	045 ; Φ-42
	MaxGain above 30°	-8.35	-9.87		MaxGain above 30°	-13.18	-13.9

Gain Table

Antenna_7				Antenna_8			
		Gain Theta	Gain Phi			Gain Theta	Gain Phi
6175MHz	MAX Gain	4.08	-1.64	6175MHz	MAX Gain	4.34	-1.2
		063 ; 063	051 ; 0-33			0126 ; 069	051 ; 0-21
	MaxGain above 30°	-8.44	-7.43		MaxGain above 30°	-6.17	-9.34
6475MHz	MAX Gain	4.76	-3.01	6475MHz	MAX Gain	4.34	-3.2
		090 ; 0-66	036 ; 0-36			0108 ; 063	015 ; 0-39
	MaxGain above 30°	-10.38	-12.12		MaxGain above 30°	-8.74	-11.52
6725MHz	MAX Gain	4.41	-2.41	6725MHz	MAX Gain	4.33	-3.54
		0171 ; 0-69	060 ; 0-30			0114 ; 060	018 ; 0-39
	MaxGain above 30°	-9.67	-11.3		MaxGain above 30°	-7.94	-10.29
6975MHz	MAX Gain	4.5	-0.9	6975MHz	MAX Gain	4.43	-4.27
		0168 ; 0-72	033 ; 0-24			0141 ; 072	012 ; 0-39
	MaxGain above 30°	-10.07	-9.57		MaxGain above 30°	-9.4	-12.86

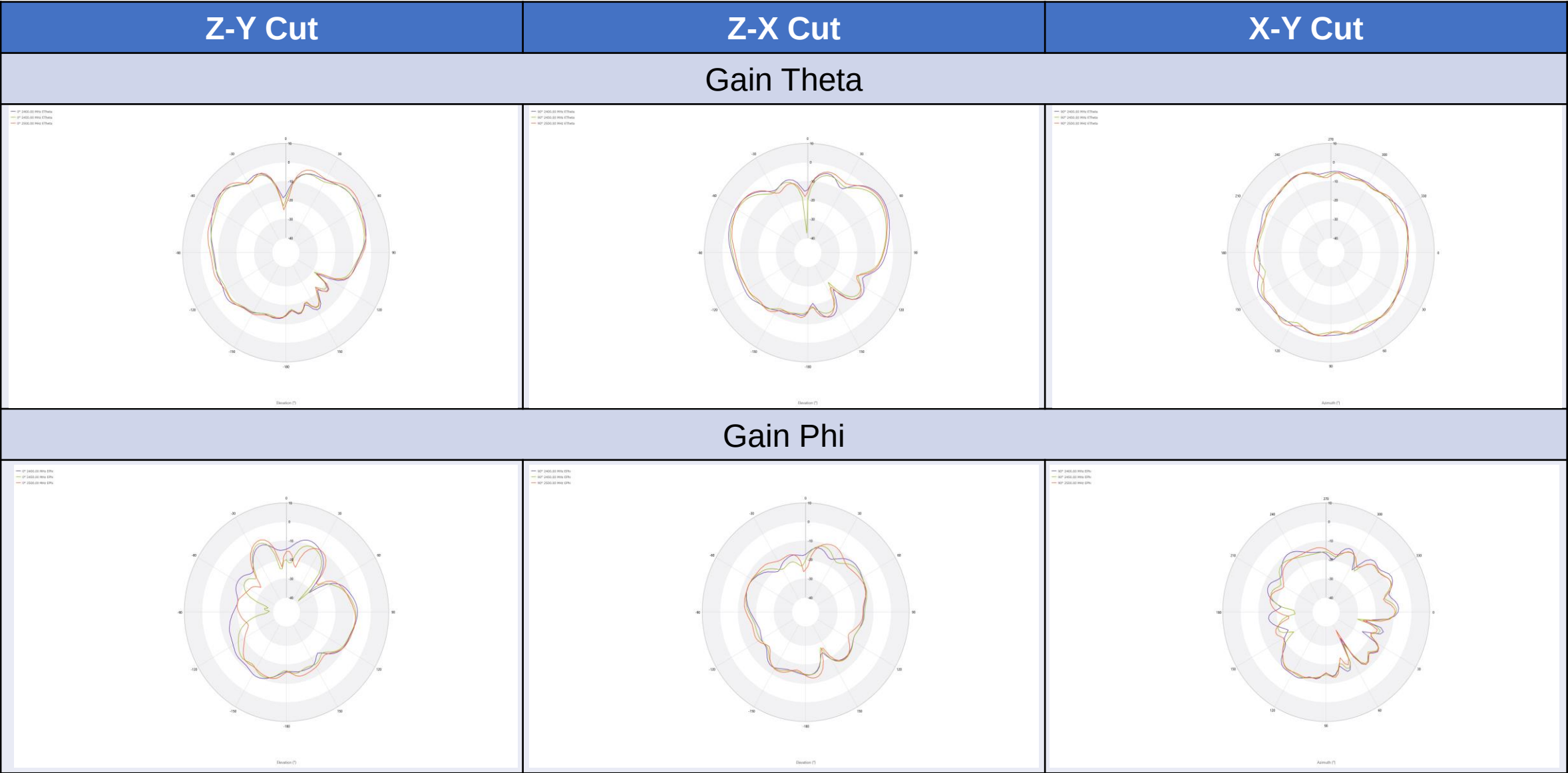
Gain Table

	Antenna_9	
Frequency (MHz)	Efficiency (%)	Peak Gain (dBi)
5150	60.95	4.19
5500	65.16	4.57
5850	63.24	4.16

	Antenna_10	
Frequency (MHz)	Efficiency (%)	Peak Gain (dBi)
1176	63.39	4.13
1575	65.61	4.33

2D Radiation Pattern

Antenna_1 @ 2.4GHz



2D Radiation Pattern

Antenna_1 @ 5GHz



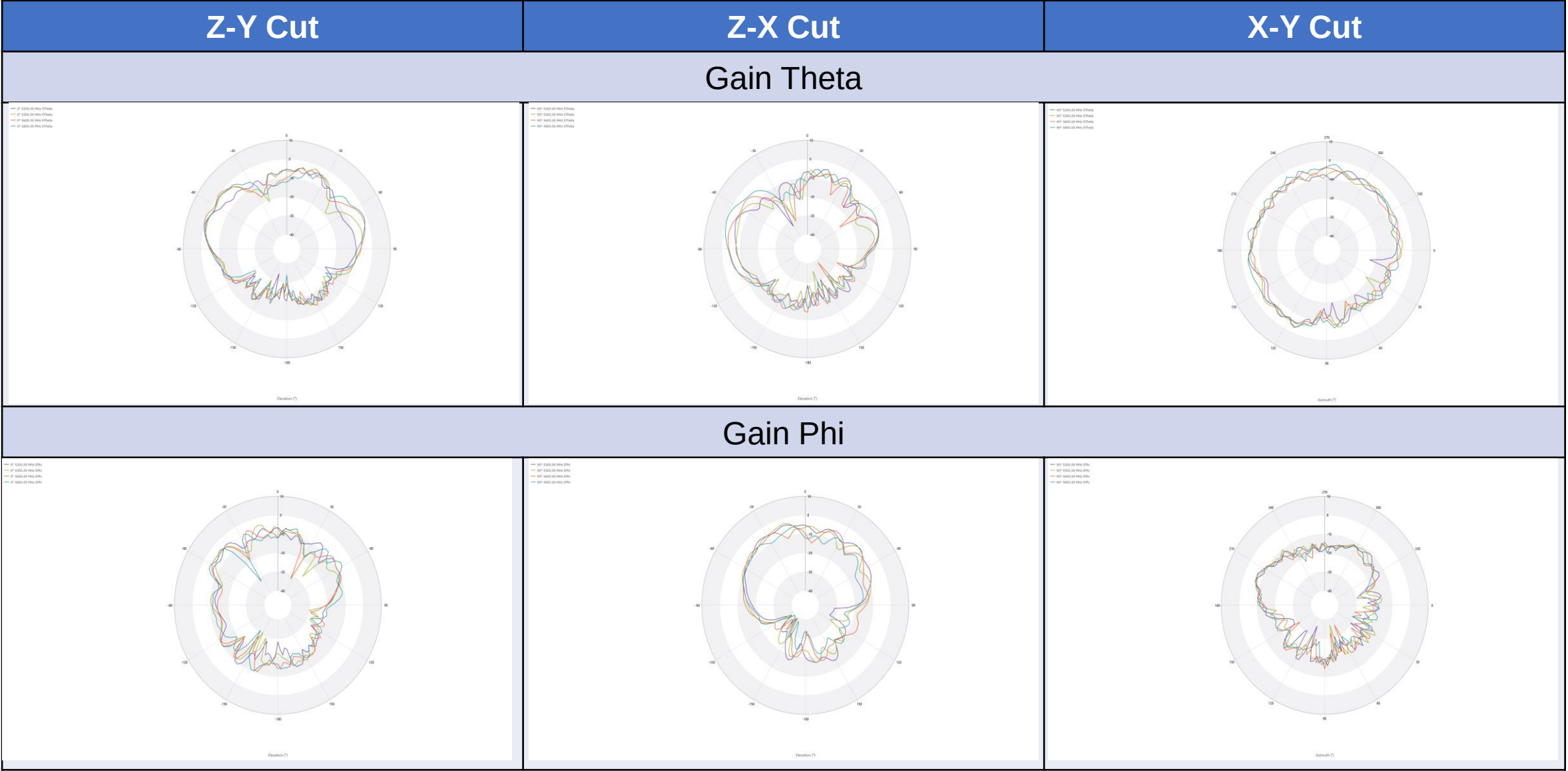
2D Radiation Pattern

Antenna_2 @ 2.4GHz



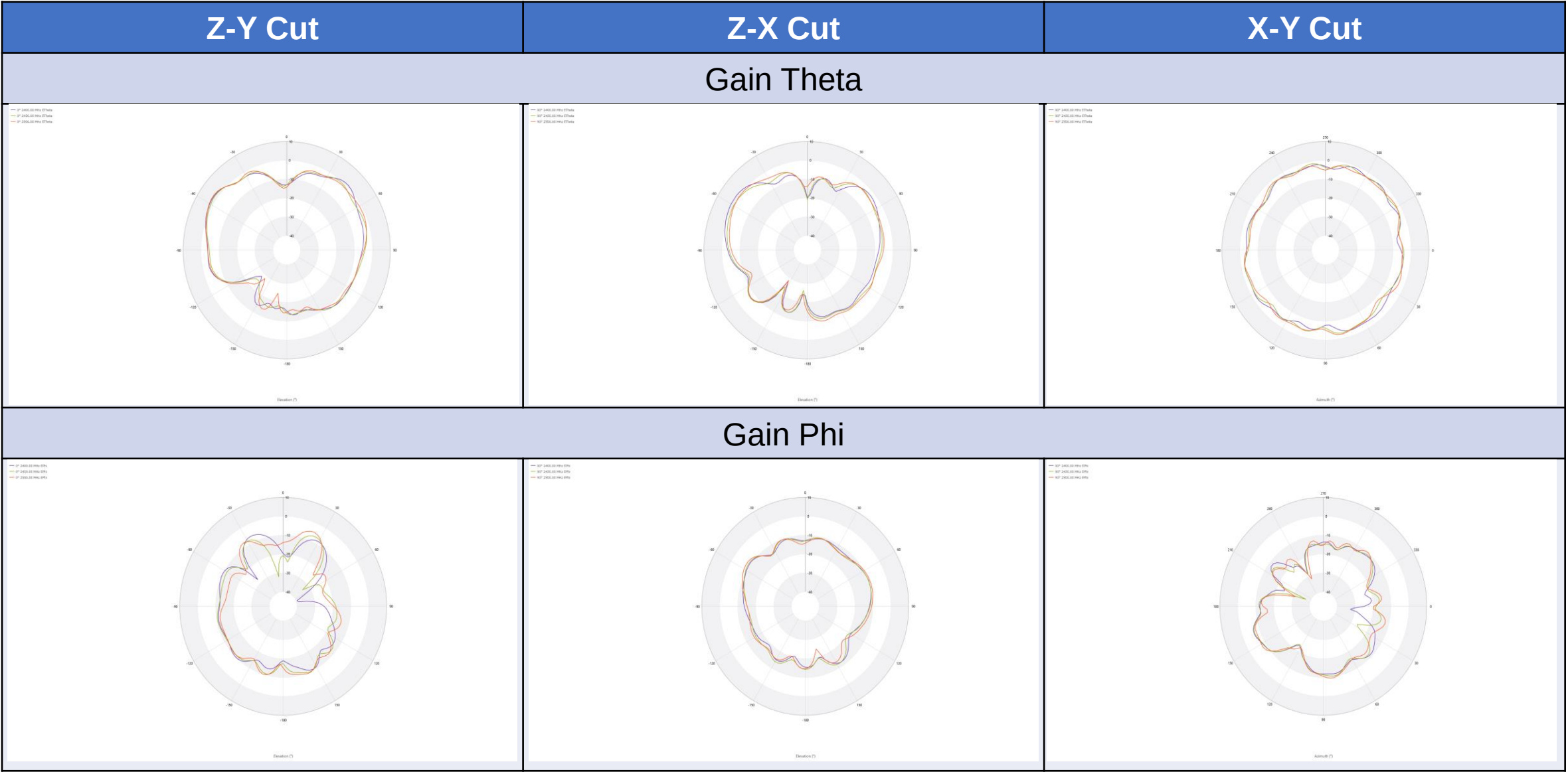
2D Radiation Pattern

Antenna_2 @ 5GHz



2D Radiation Pattern

Antenna_3 @ 2.4GHz



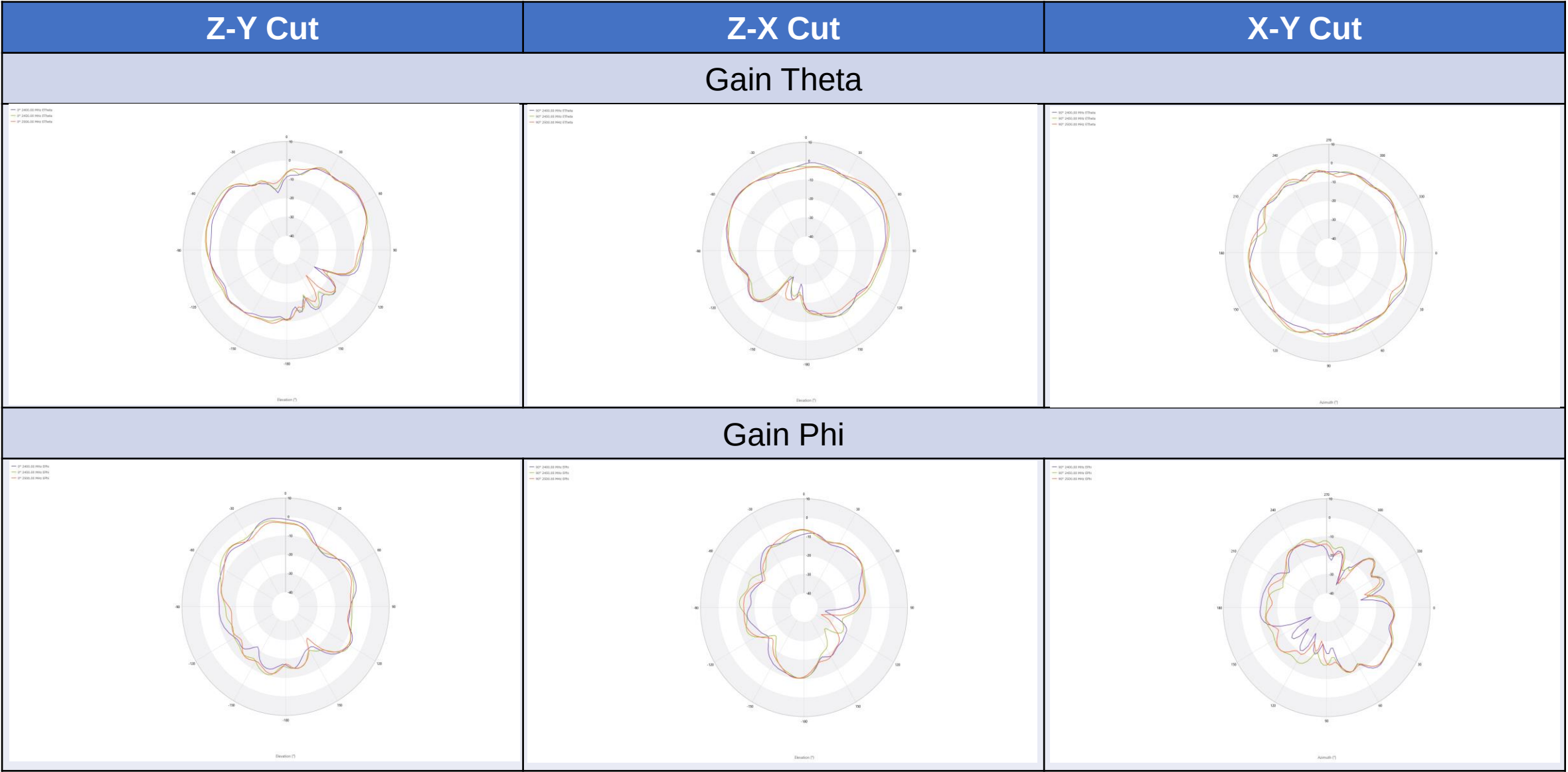
2D Radiation Pattern

Antenna_3 @ 5GHz



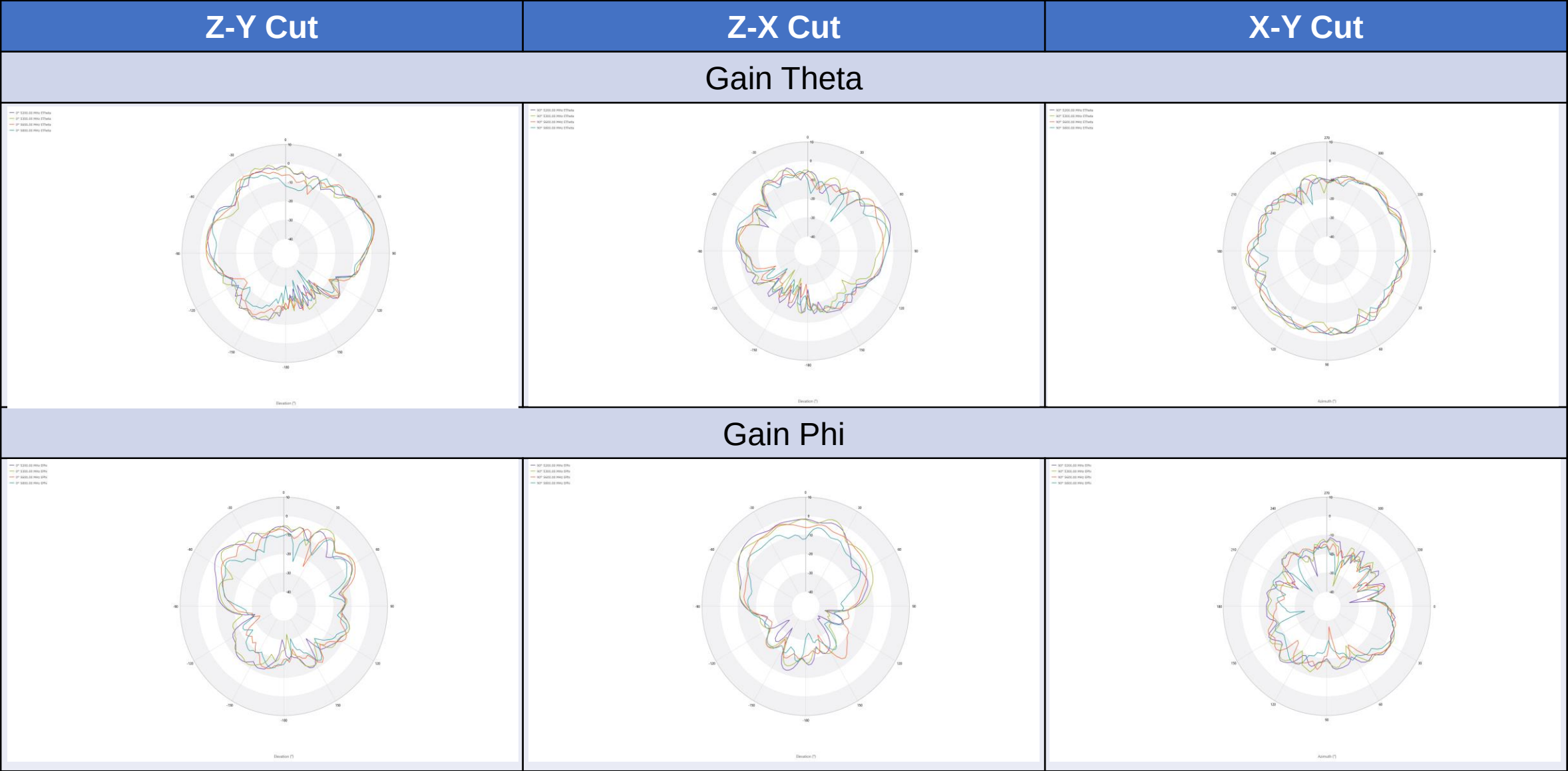
2D Radiation Pattern

Antenna_4 @ 2.4GHz



2D Radiation Pattern

Antenna_4 @ 5GHz



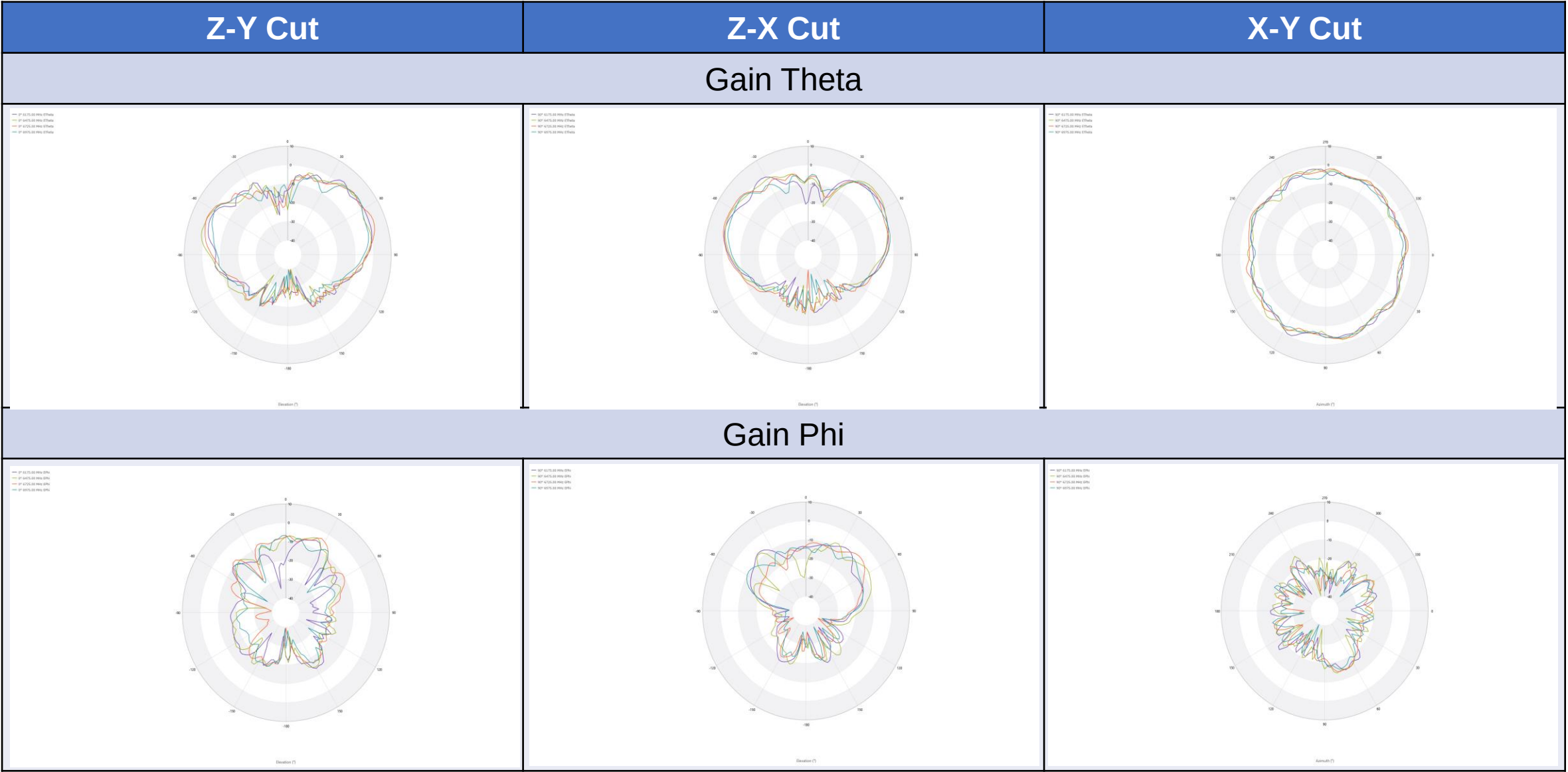
2D Radiation Pattern

Antenna_5



2D Radiation Pattern

Antenna_6



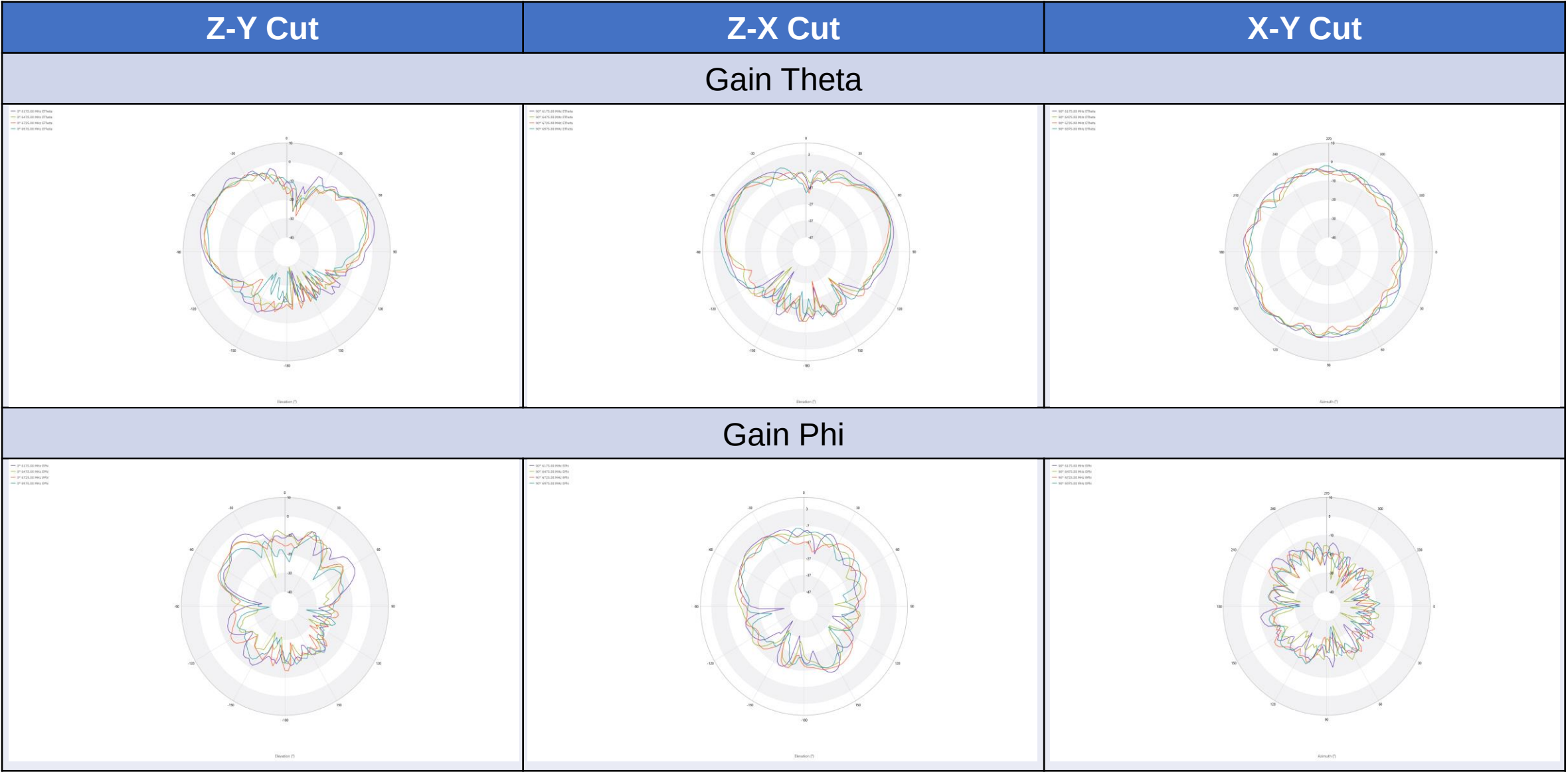
2D Radiation Pattern

Antenna_7



2D Radiation Pattern

Antenna_8



2D Radiation Pattern

Antenna_9



2D Radiation Pattern

Antenna_10



Summary

- (i) If transmit signals are *correlated*, then

Directional gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{\text{ANT}}]$ dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

- (ii) If all transmit signals are *completely uncorrelated*, then

Directional gain = $10 \log[(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10}) / N_{\text{ANT}}]$ dBi

Uncorrelated			
		Gain Theta	Gain Phi
2450MHz	MAX Gain	5.9949	-2.0825
		θ ₁₂₉ ; ϕ ₅₄	θ ₁₆₈ ; ϕ ₋₁₂
	MaxGain above 30°	-3.9751	-4.8875
5200MHz	MAX Gain	4.904	3.5236
		θ ₇₂ ; ϕ ₆₆	θ ₄₂ ; ϕ ₃₃
	MaxGain above 30°	-8.6941	-7.4643
5300MHz	MAX Gain	4.8922	3.3966
		θ ₁₅₃ ; ϕ ₇₂	θ ₆₀ ; ϕ ₂₇
	MaxGain above 30°	-8.2236	-8.5642
5600MHz	MAX Gain	4.9339	1.2222
		θ ₆₆ ; ϕ ₆₆	θ ₁₂₉ ; ϕ ₃₉
	MaxGain above 30°	-9.117	-8.6723
5800MHz	MAX Gain	5.7697	1.7613
		θ ₁₅₃ ; ϕ ₇₂	θ ₅₁ ; ϕ ₃₀
	MaxGain above 30°	-8.1607	-8.0708

Correlated			
		Gain Theta	Gain Phi
2450MHz	MAX Gain	6.4216	0.8901
		θ ₁₄₇ ; ϕ ₋₅₇	θ ₉ ; ϕ ₁₈
	MaxGain above 30°	0.3626	0.4203
5200MHz	MAX Gain	5.2513	4.6364
		θ ₁₇₇ ; ϕ ₋₇₂	θ ₁₅₉ ; ϕ ₂₇
	MaxGain above 30°	-1.9069	-1.267
5300MHz	MAX Gain	5.8649	4.2427
		θ ₁₆₂ ; ϕ ₋₆₆	θ ₄₅ ; ϕ ₃₃
	MaxGain above 30°	-1.5559	-1.7901
5600MHz	MAX Gain	5.9053	3.4452
		θ ₁₅₉ ; ϕ ₋₆₉	θ ₆₃ ; ϕ ₃₀
	MaxGain above 30°	-2.1588	-2.2887
5800MHz	MAX Gain	5.4561	3.8099
		θ ₁₆₅ ; ϕ ₋₆₆	θ ₅₁ ; ϕ ₃₀
	MaxGain above 30°	-1.6752	-1.2549

Summary

- (i) If transmit signals are *correlated*, then

Directional gain = $10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{\text{ANT}}]$ dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

- (ii) If all transmit signals are *completely uncorrelated*, then

Directional gain = $10 \log[(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10}) / N_{\text{ANT}}]$ dBi

Uncorrelated			
		Gain Theta	Gain Phi
6175MHz	MAX Gain	7.063	-0.7834
		033 ; 066	045 ; 027
	MaxGain above 30°	-7.483	-9.0138
6475MHz	MAX Gain	7.1559	-0.8801
		021 ; 069	0150 ; 036
	MaxGain above 30°	-8.1843	-8.5607
6725MHz	MAX Gain	7.3218	-0.9842
		0126 ; 066	0156 ; 036
	MaxGain above 30°	-7.6229	-8.711
6975MHz	MAX Gain	6.6078	-1.5254
		0129 ; 066	0123 ; 015
	MaxGain above 30°	-7.3553	-9.1936

Correlated			
		Gain Theta	Gain Phi
6175MHz	MAX Gain	7.5772	2.3832
		0126 ; 069	048 ; 033
	MaxGain above 30°	-1.3096	-1.4095
6475MHz	MAX Gain	7.4597	2.3298
		0108 ; 063	0150 ; 036
	MaxGain above 30°	-1.68	-1.5887
6725MHz	MAX Gain	7.1478	2.2719
		0126 ; 069	0156 ; 036
	MaxGain above 30°	-1.4423	-1.8346
6975MHz	MAX Gain	7.0248	2.145
		036 ; 072	048 ; 033
	MaxGain above 30°	-1.6781	-1.6806

