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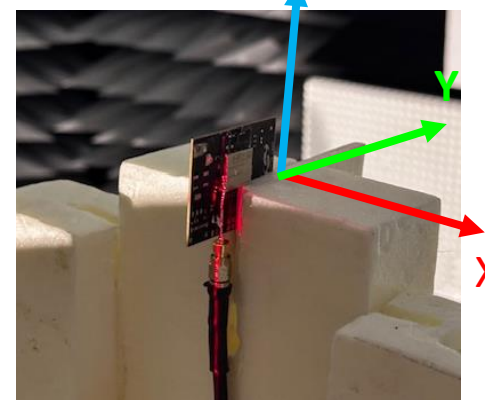
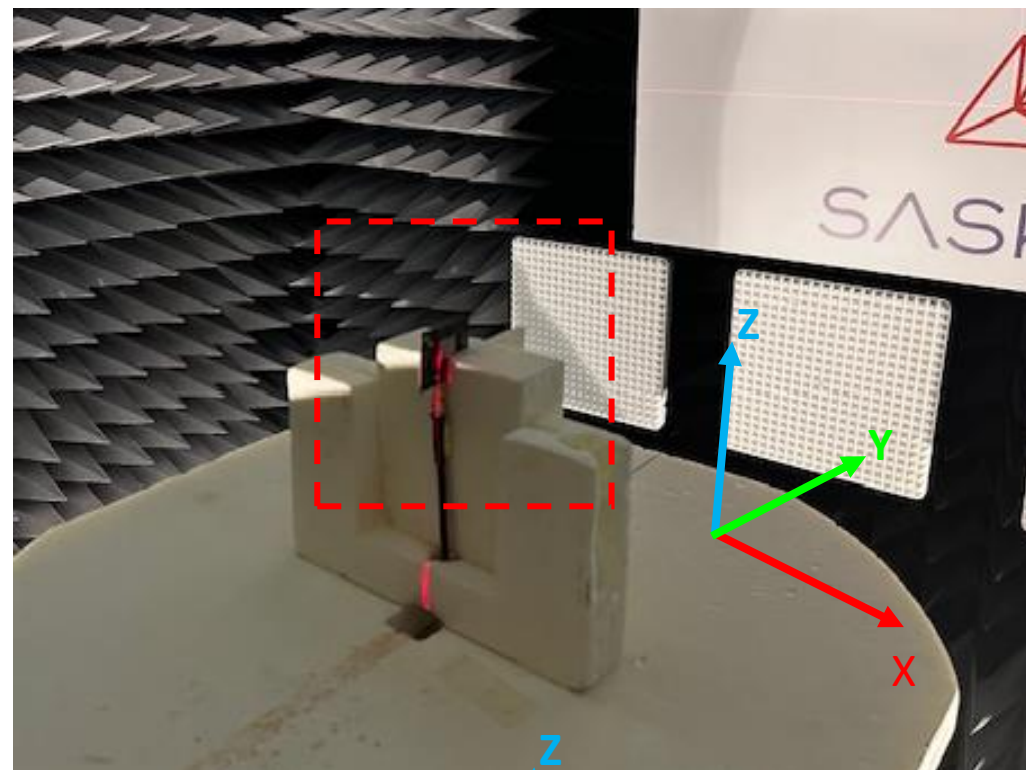
Silicon Labs GM260PA Antenna Measurements

Aki Myllymäki

09-Sep-2024

Introduction

- Test Date
 - 4th of Sep 2024
- Operator
 - Aki Myllymäki
- In this document, measurement results are presented for the embedded integral antenna of a radio module soldered to a validation and certification board received from Silicon Laboratories:
 - Module markings
 - GM260PA
- Parameters measured
 - Efficiency (dB)
 - Peak gain (dB)
 - 3D radiation pattern
 - 1D radiation pattern (dB), Polar Mode, Phi 0, Phi 90 and Theta 90 cuts
- Measurement frequencies:
 - Gain patterns: 2402, 2440, 2480MHz
 - Peak Gain and Efficiency curves for 2300 - 2700 MHz
- In all measurements, the module was placed in the same position and in the same orientation as shown in the pictures.



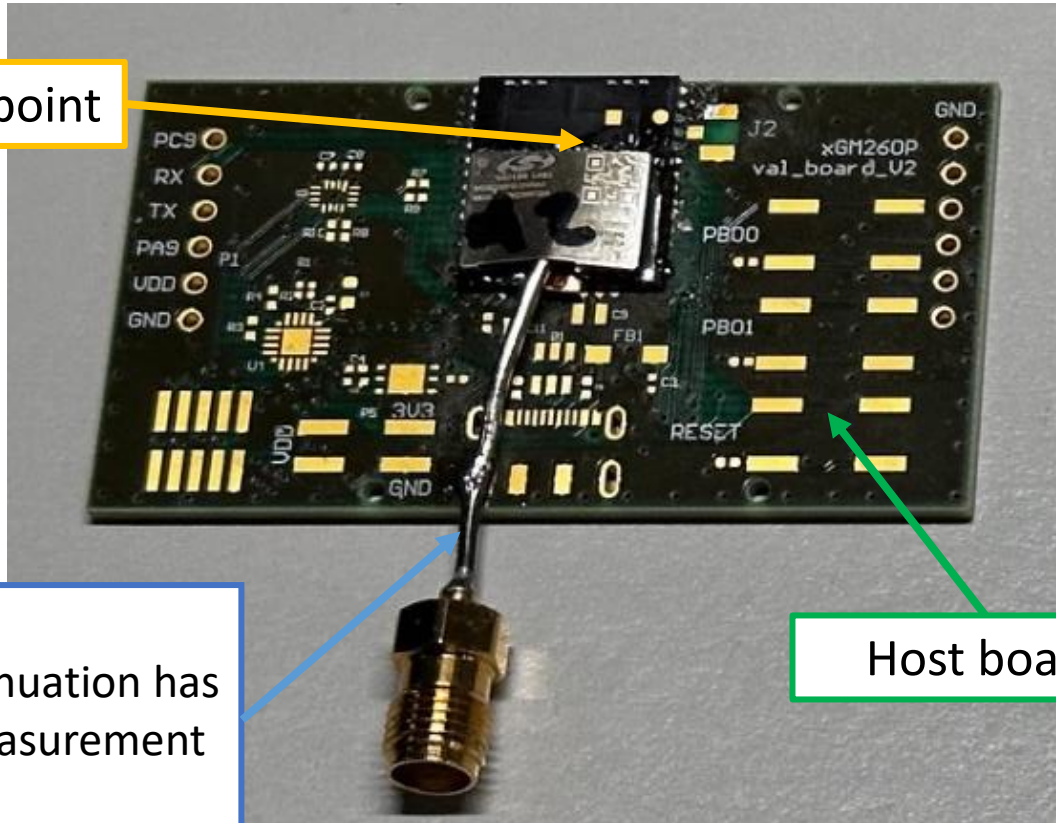
Device Under Test

GM260PA

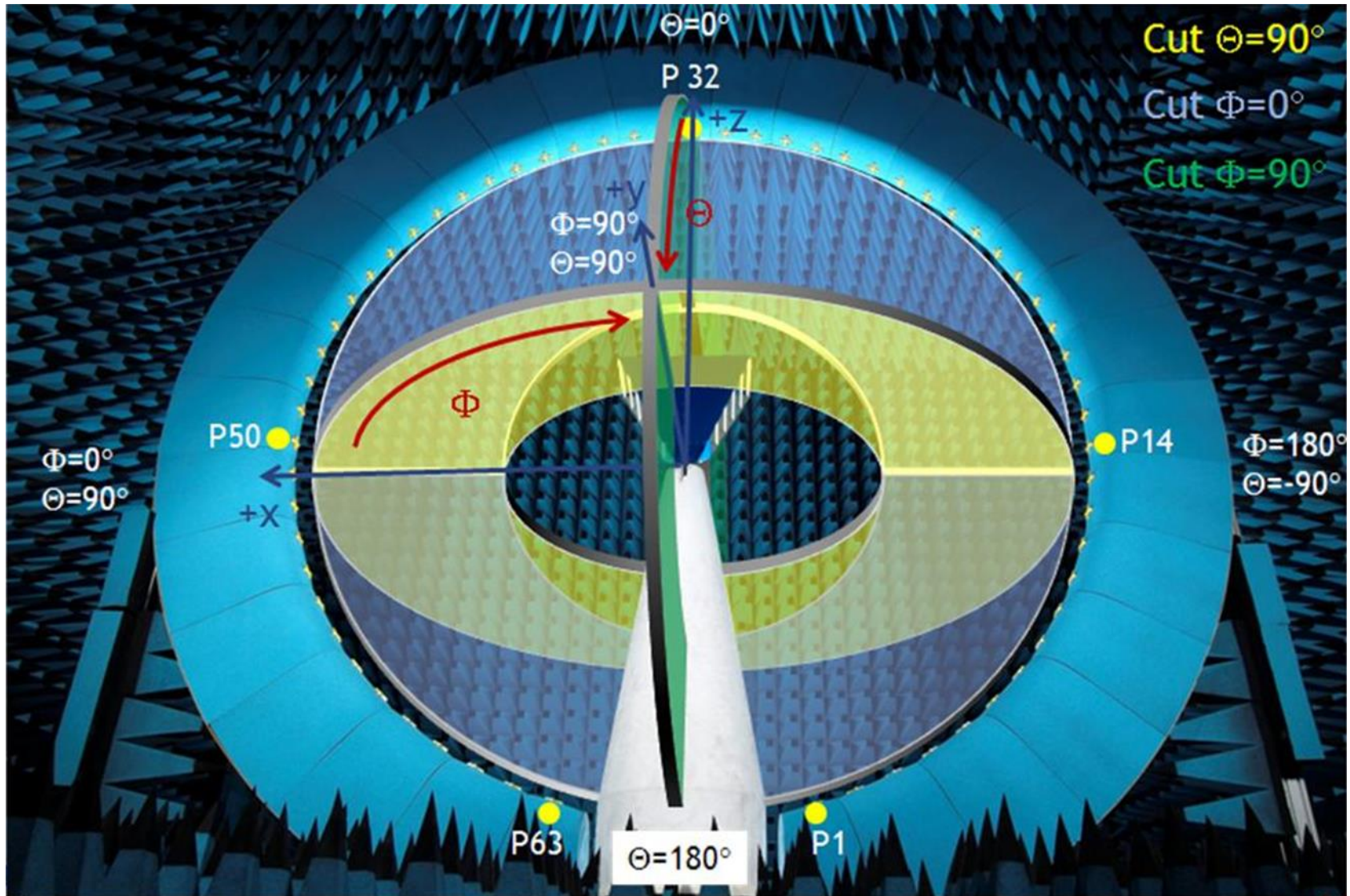
Reference point

Note!
Probe cable 0.1dB attenuation has
been considered in measurement
results

Host board



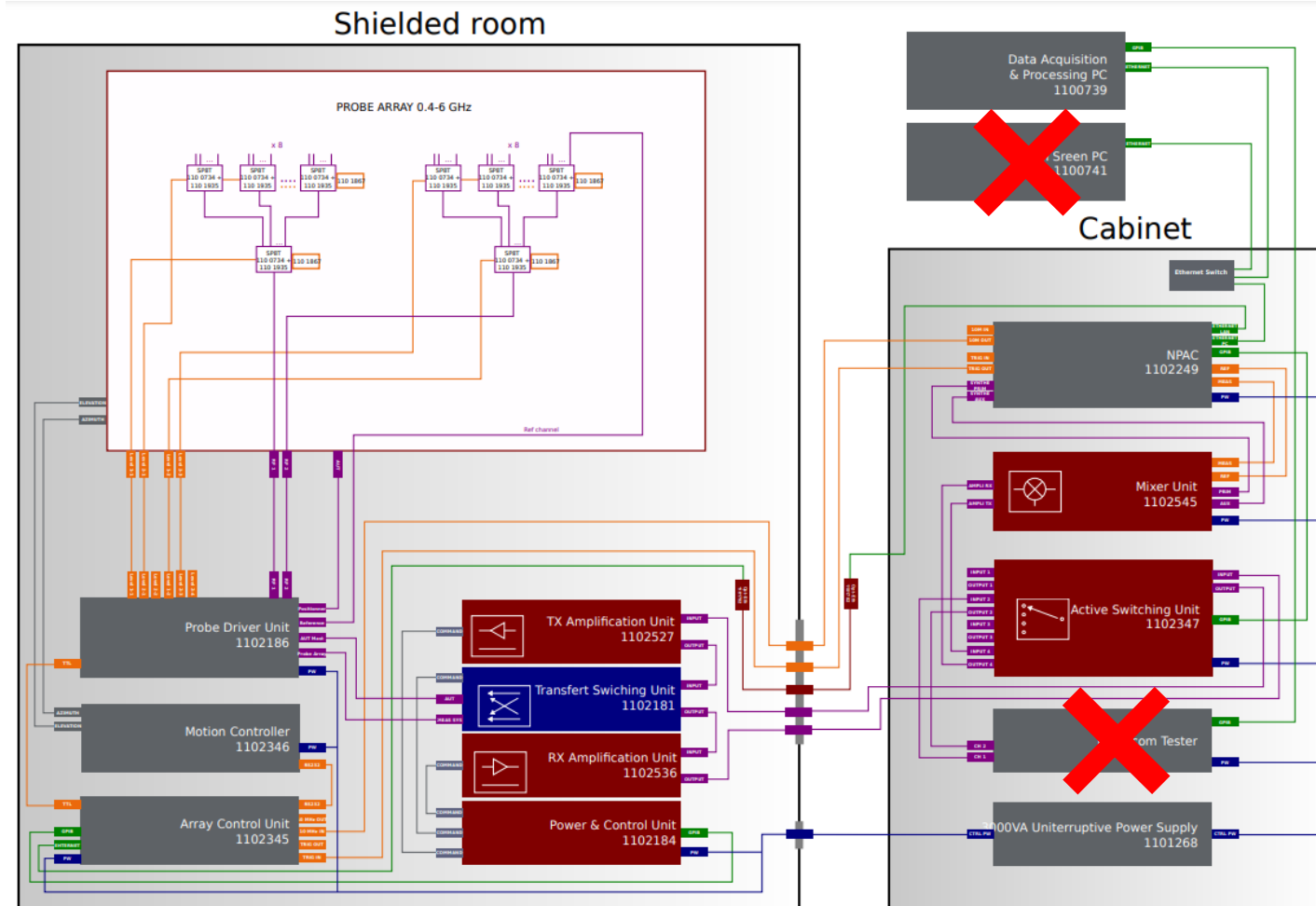
Sasken coordinate system



Passive Measurement Setup

- All antenna measurements were done using Satimo SG64 Passive Measurement Setup.
- Setup:
 - DUT is prepared with coaxial probe cable to be connected with antenna feed cable coming from the antenna mast on the turntable.
 - Satimo test system feeds the signal on specified frequencies through the antenna feed cable to DUT
 - The DUT is then rotated with turntable and the Satimo probe array will measure the signal from all directions for all rotation steps to get a 3D radiation pattern.
 - Near-field to far-field transformation will be then done to the measurement data.
- Software
 - WaveStudio 23.3.2
- Calibration
 - Satimo SG 64 system efficiency calibration using reference antenna SH400/S#0040. (Sasken internal calibration check)
 - Calibration date 8th of Feb 2024
 - Calibration validity period: 1 year
 - Satimo SG 64 System calibration including all System related parts
 - Calibration date 8th of Feb 2024
 - Calibration validity period: 2 years

X = not included to setup



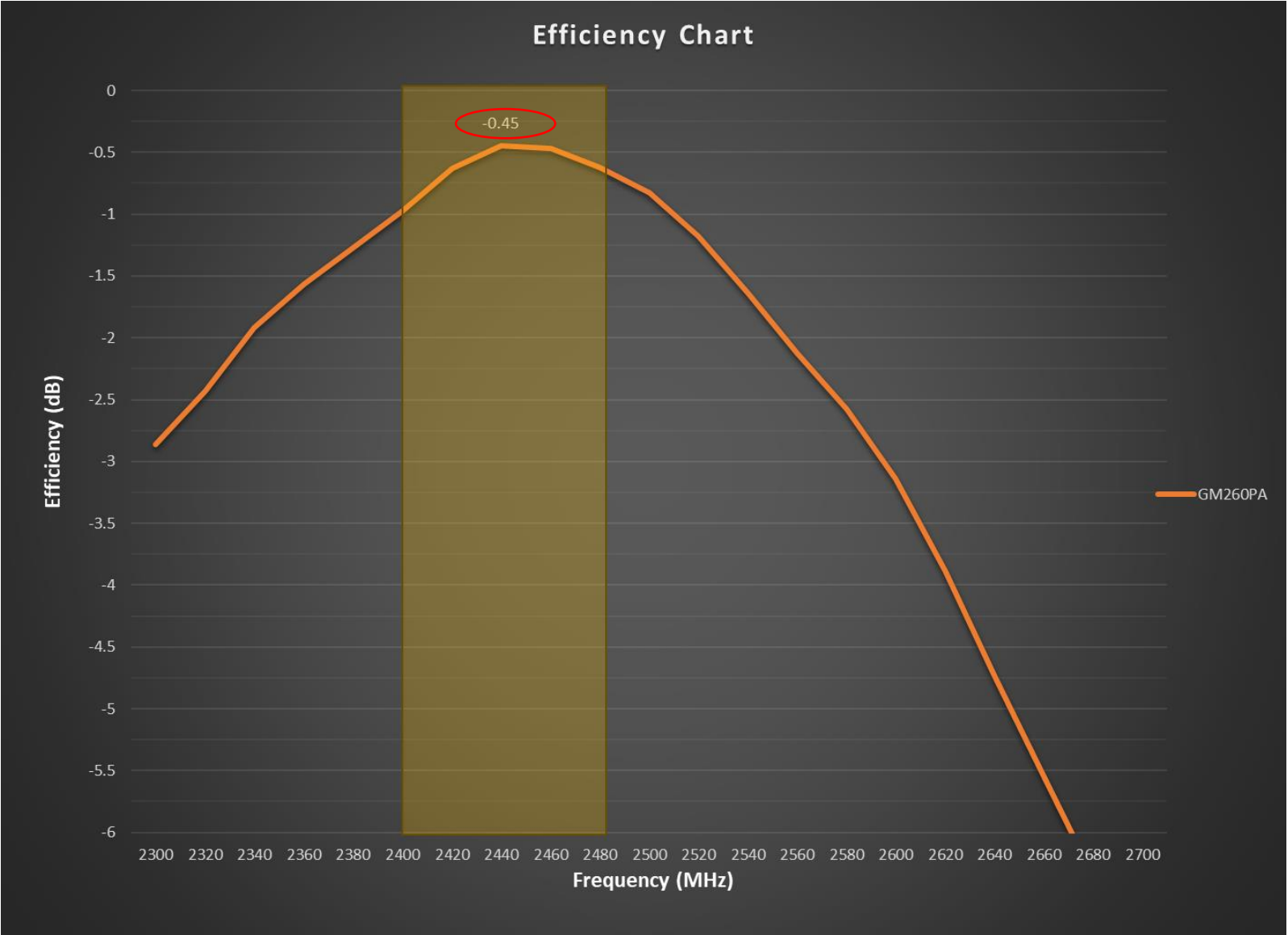
Efficiency



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Efficiency (dB)

GM260PA



Frequency (MHz)	GM260PA
2300	-2.86
2320	-2.43
2340	-1.92
2360	-1.57
2380	-1.27
2400	-0.97
2420	-0.63
2440	-0.45
2460	-0.47
2480	-0.62
2500	-0.83
2520	-1.18
2540	-1.64
2560	-2.12
2580	-2.58
2600	-3.14
2620	-3.89
2640	-4.73
2660	-5.55
2680	-6.35
2700	-7.01



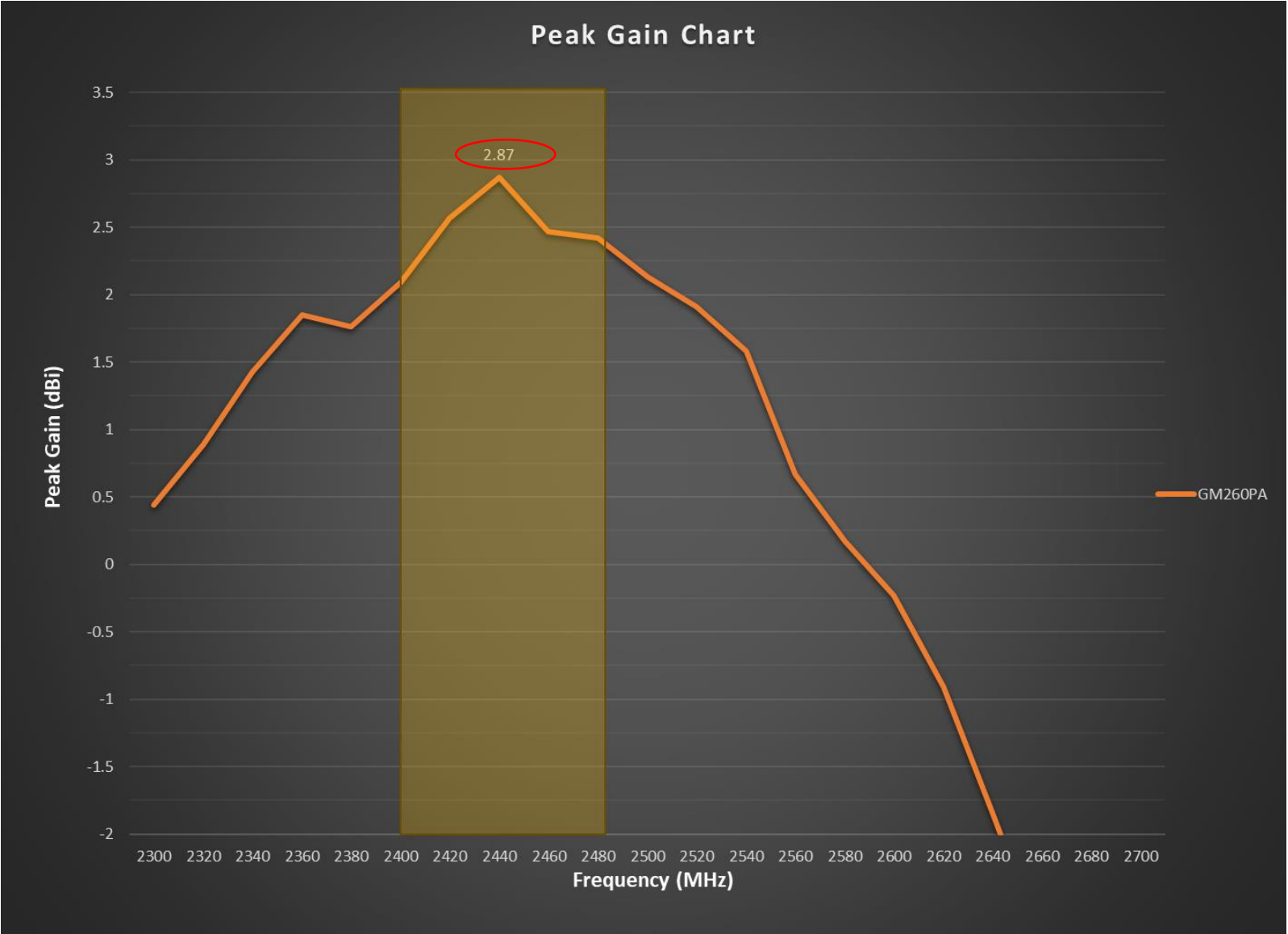
Peak Gain



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Peak Gain (dBi)

GM260PA



Frequency (MHz)	GM260PA
2300	0.44
2320	0.89
2340	1.43
2360	1.85
2380	1.76
2400	2.09
2420	2.57
2440	2.87
2460	2.47
2480	2.42
2500	2.13
2520	1.91
2540	1.58
2560	0.67
2580	0.17
2600	-0.23
2620	-0.91
2640	-1.84
2660	-2.82
2680	-3.64
2700	-4.16



Gain Patterns

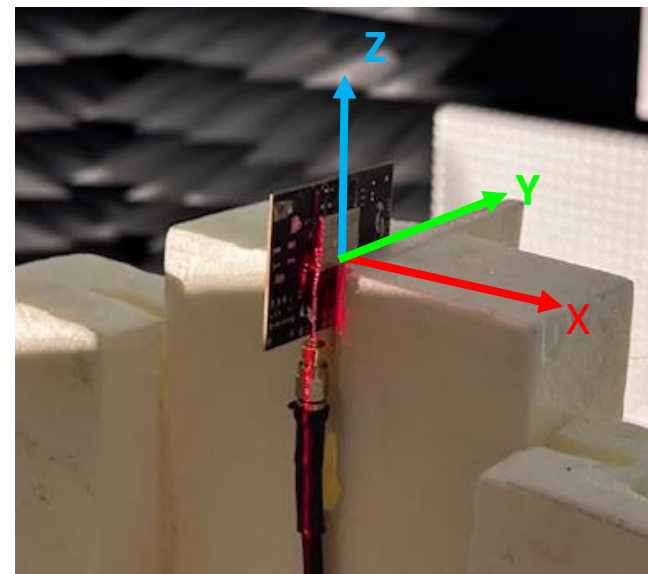
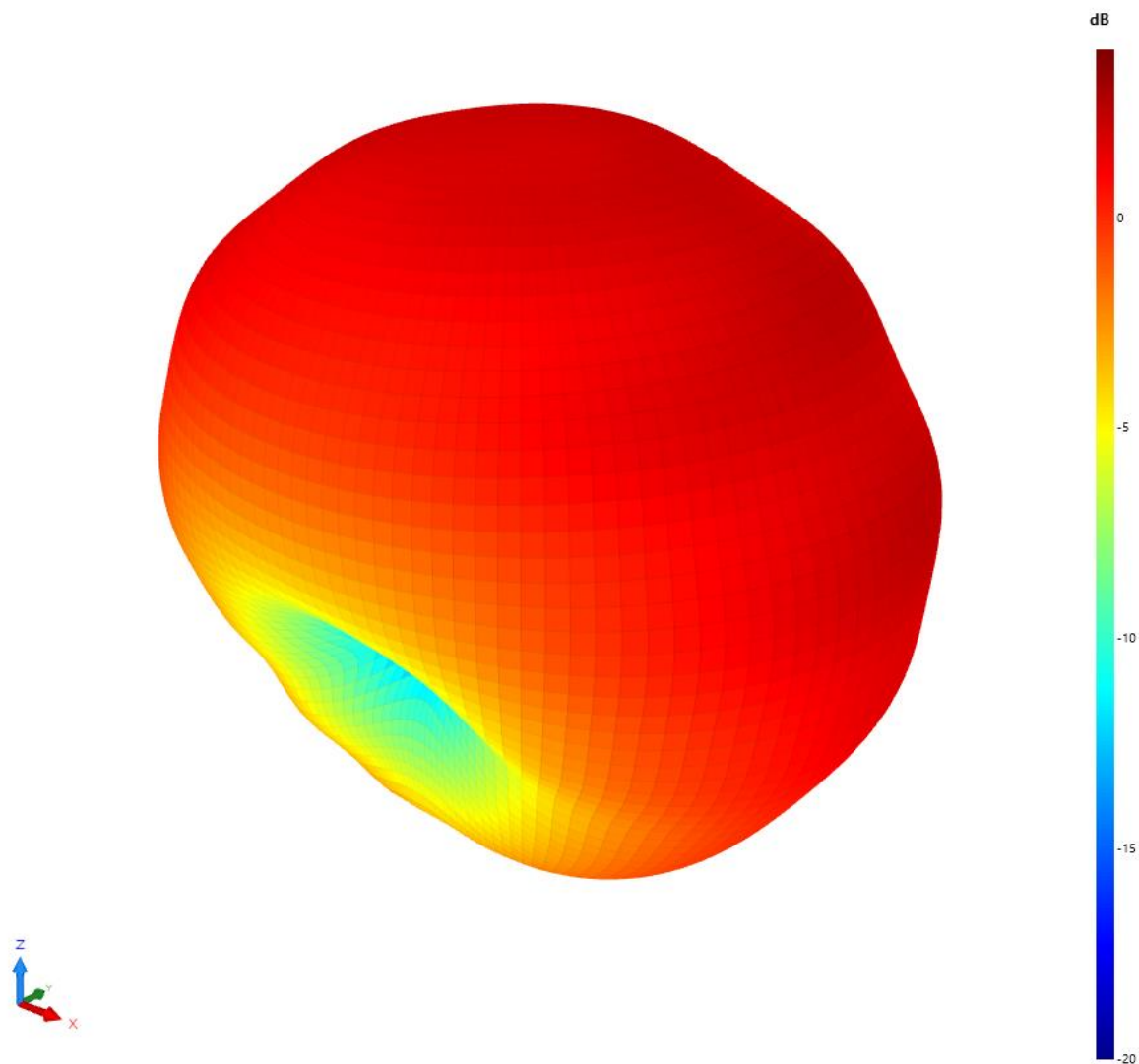


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3D gain pattern @ 2402MHz, View 1

GM260PA

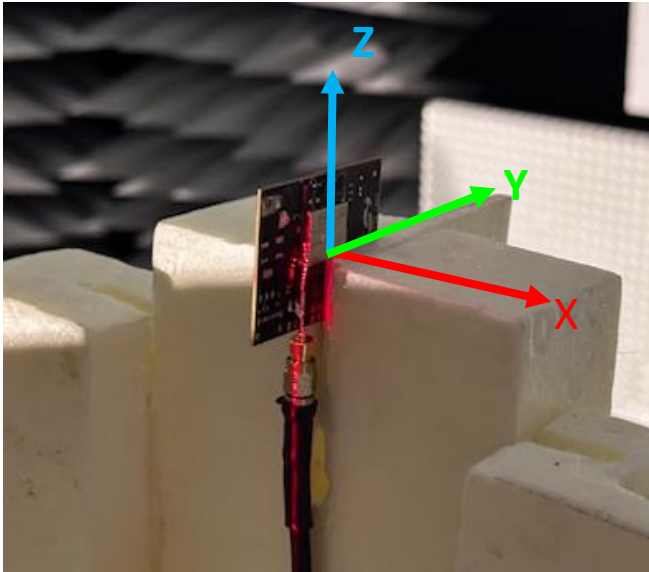
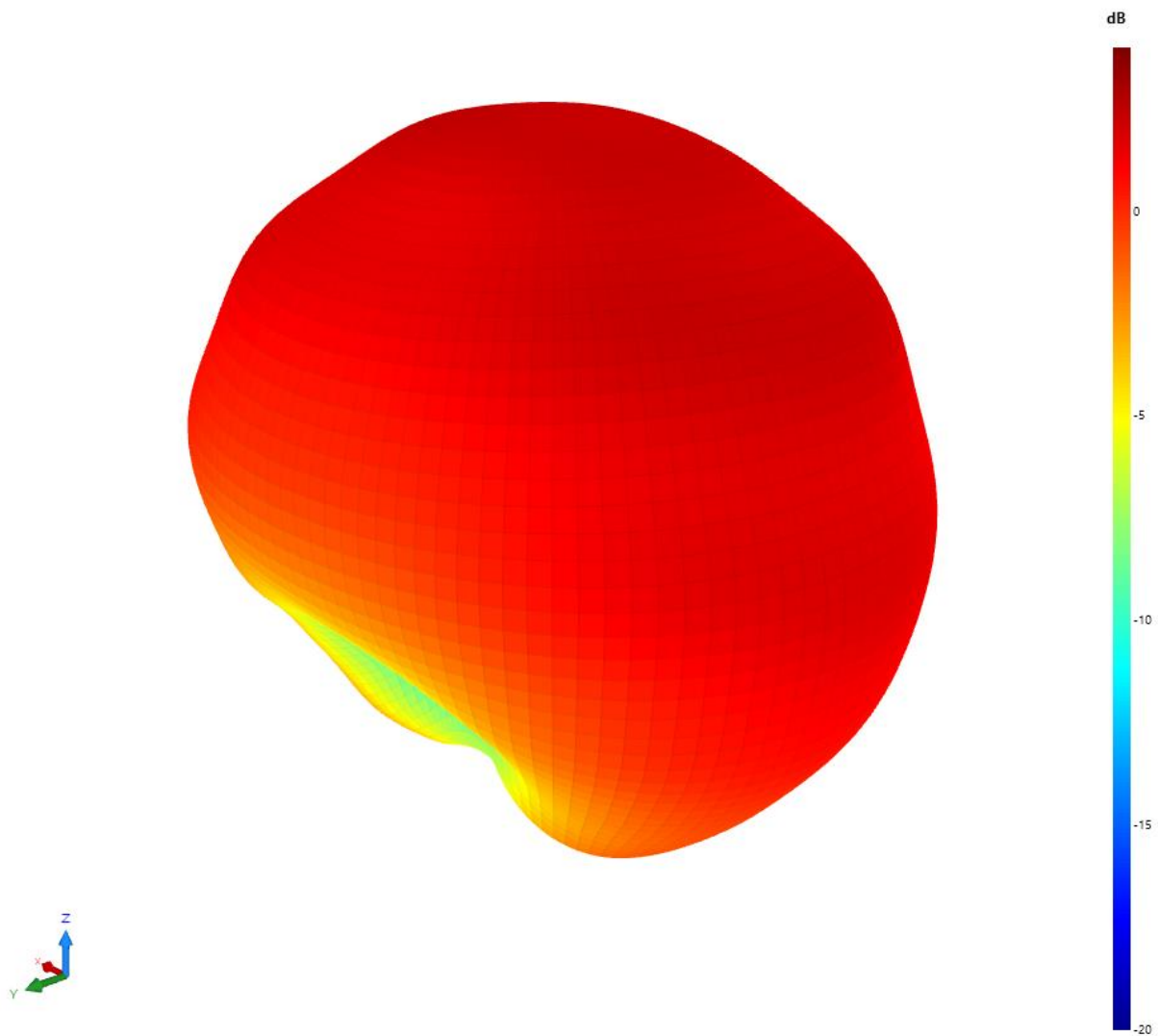
[Gain] Elevation over Azimuth (Gain in dB)



3D gain pattern @ 2402MHz, View 2

GM260PA

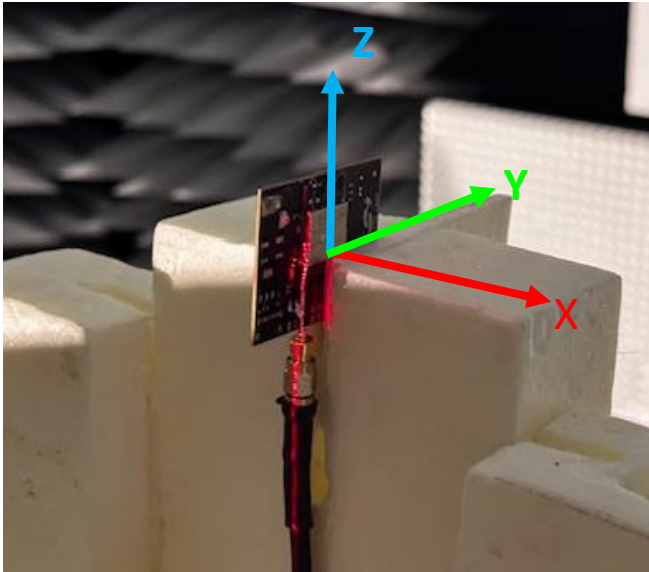
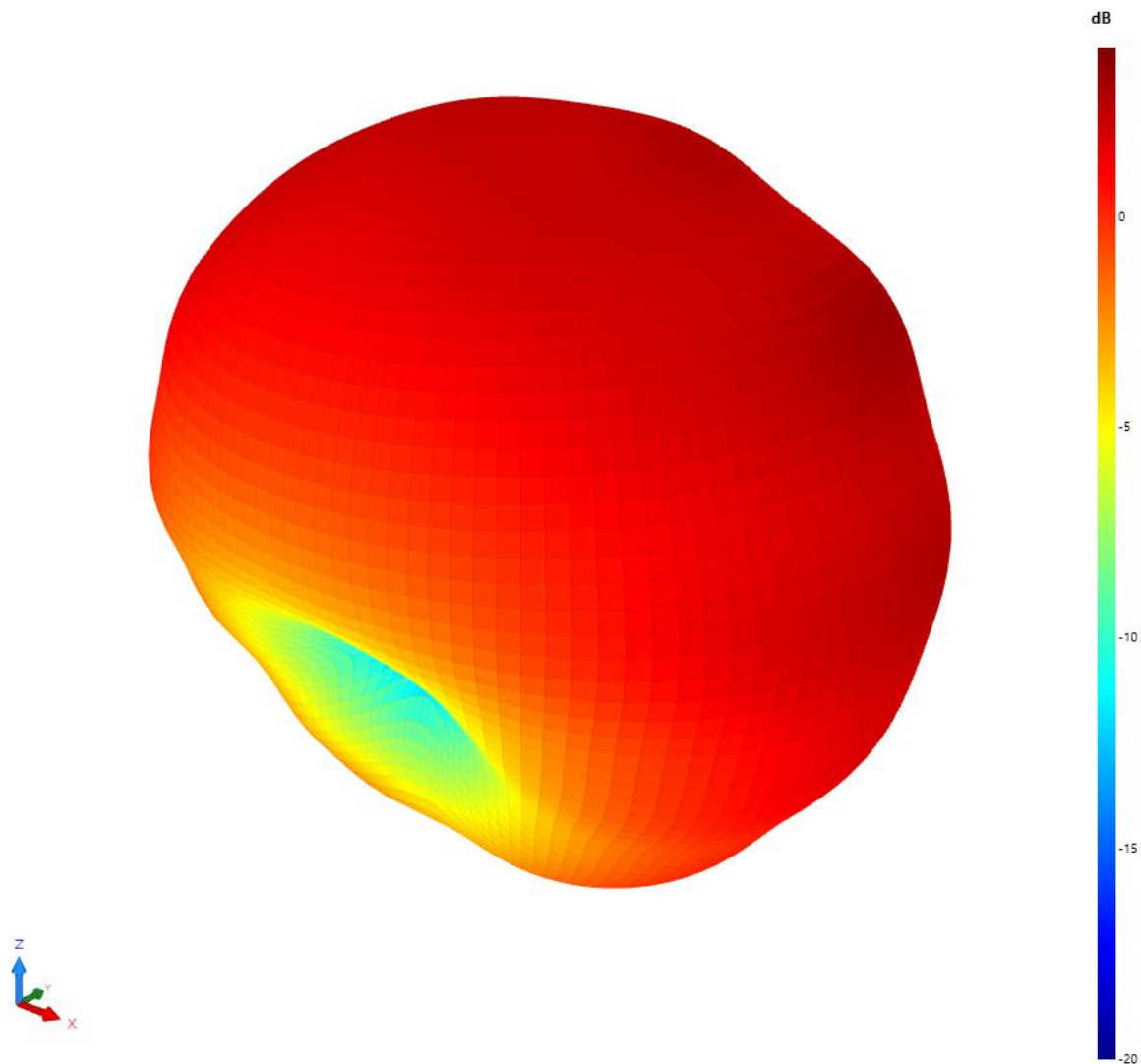
[Gain] Elevation over Azimuth (Gain in dB)



3D gain pattern @ 2440MHz, View 1

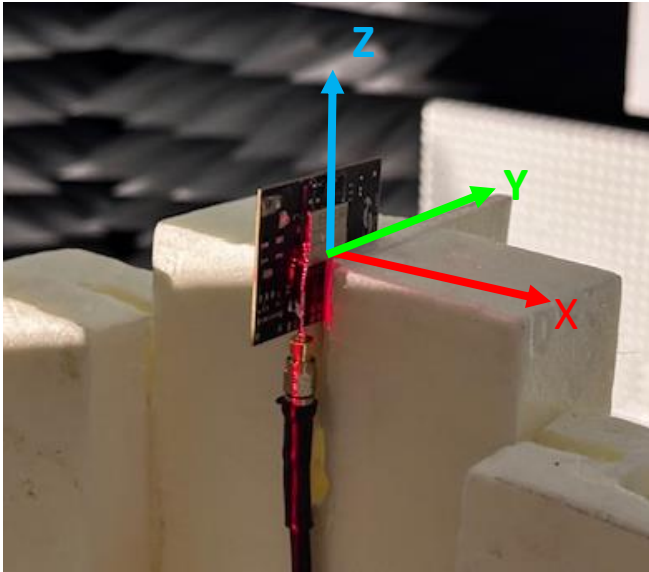
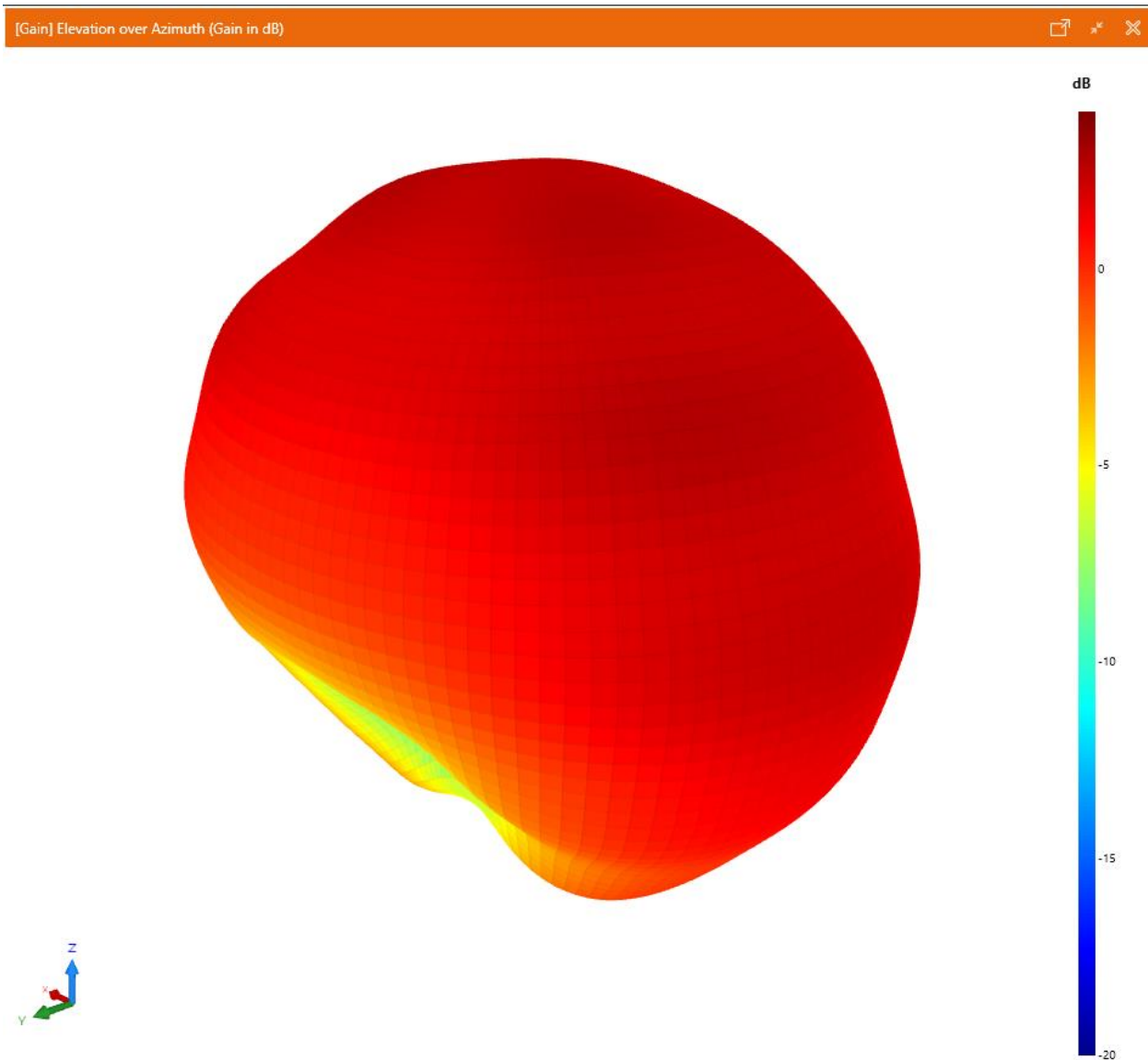
GM260PA

[Gain] Elevation over Azimuth (Gain in dB)



3D gain pattern @ 2440MHz, View 2

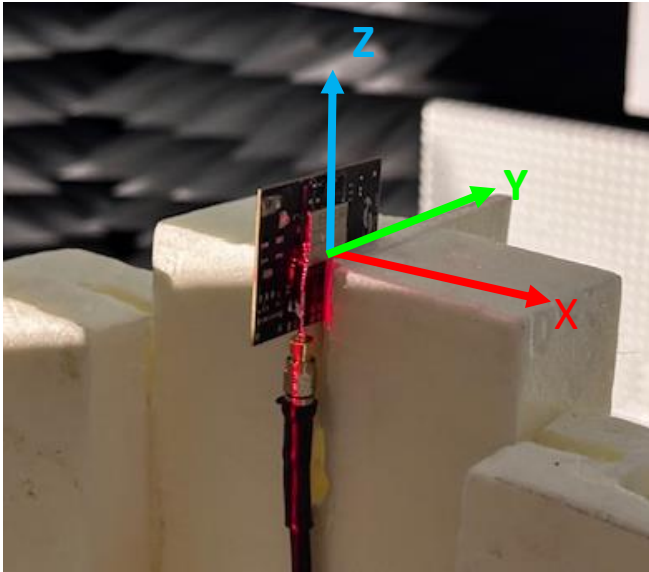
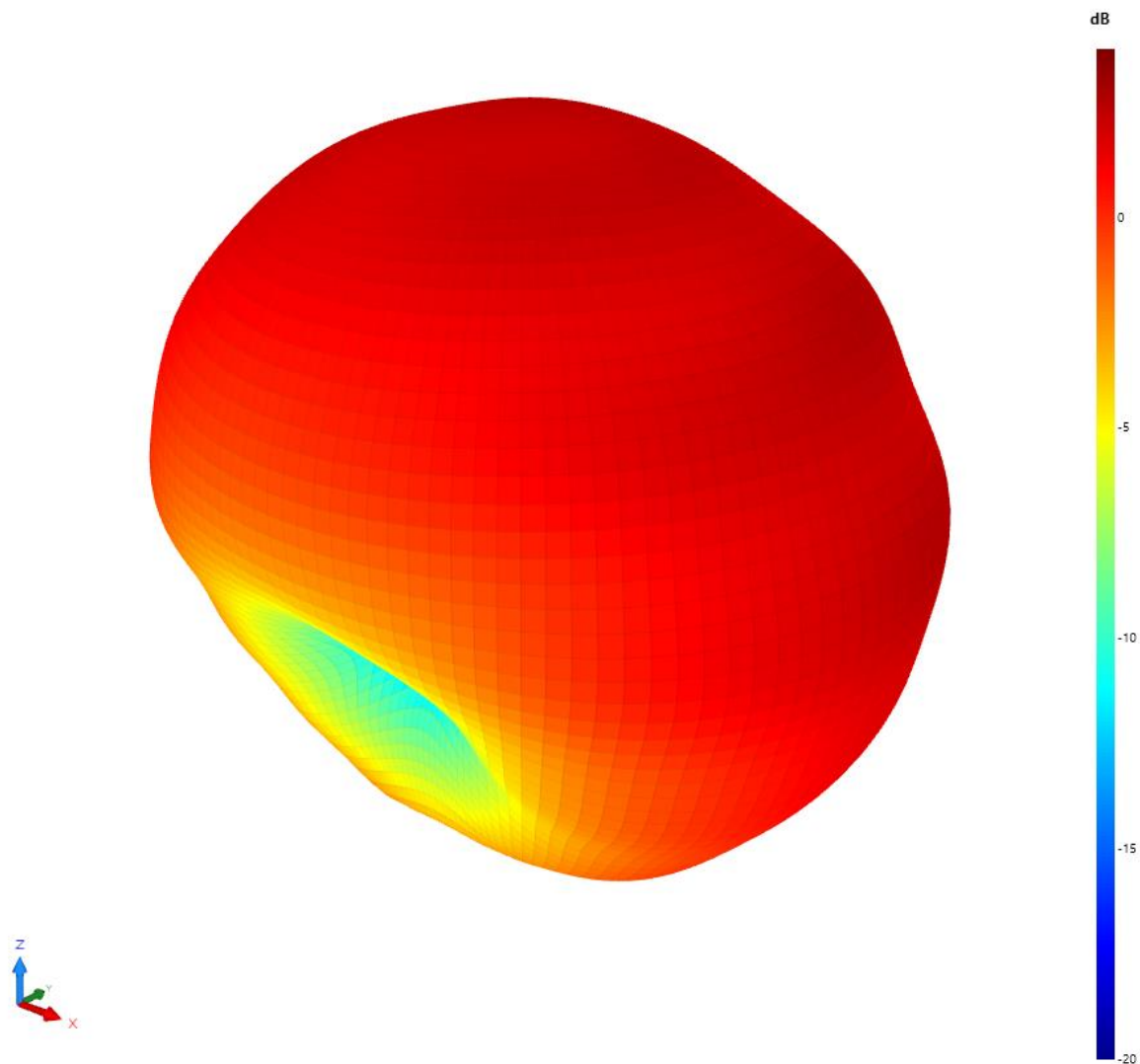
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3D gain pattern @ 2480MHz, View 1

GM260PA

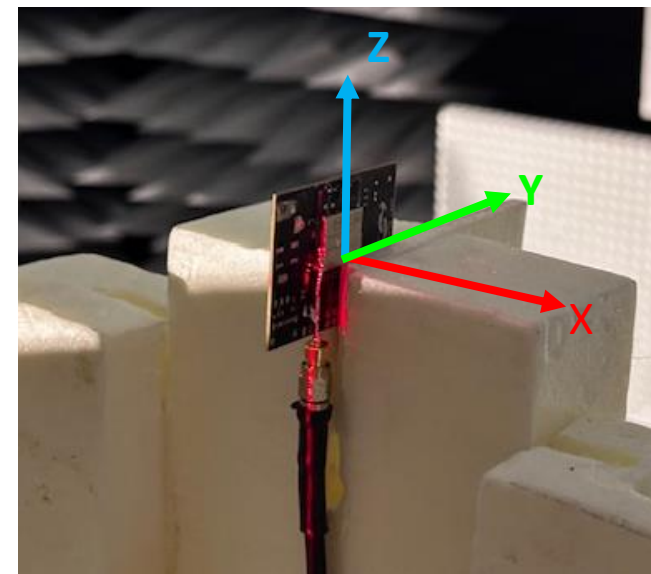
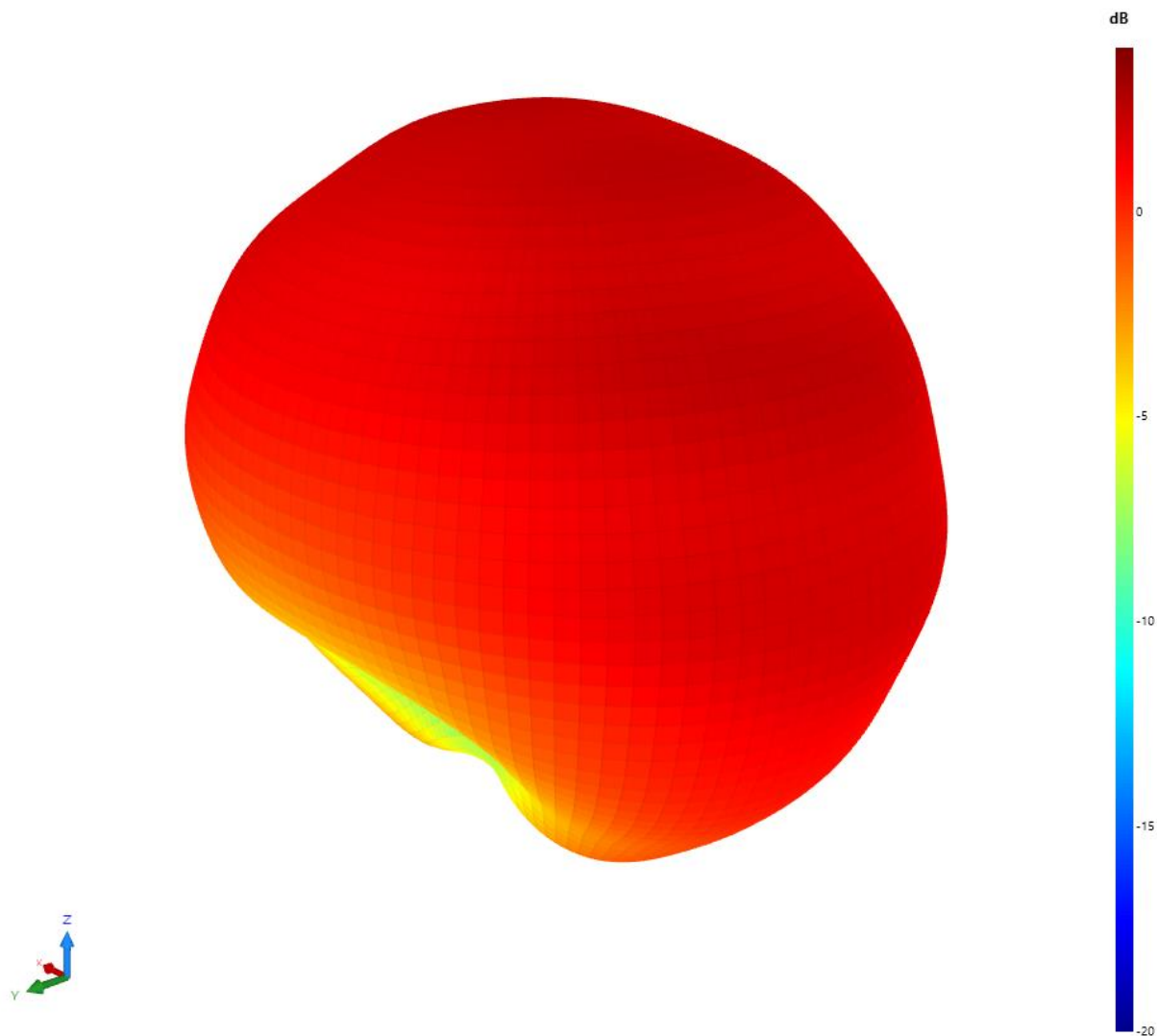
[Gain] Elevation over Azimuth (Gain in dB)



3D gain pattern @ 2480MHz, View 2

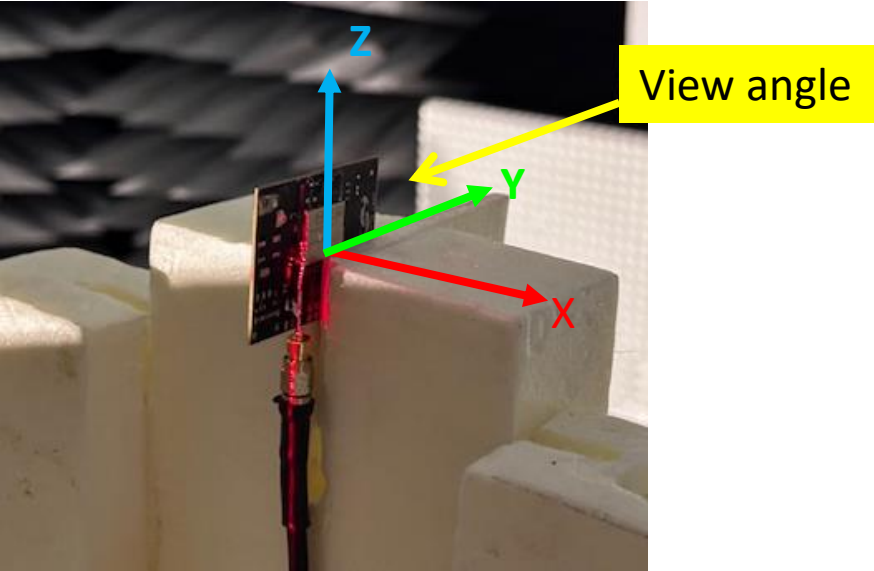
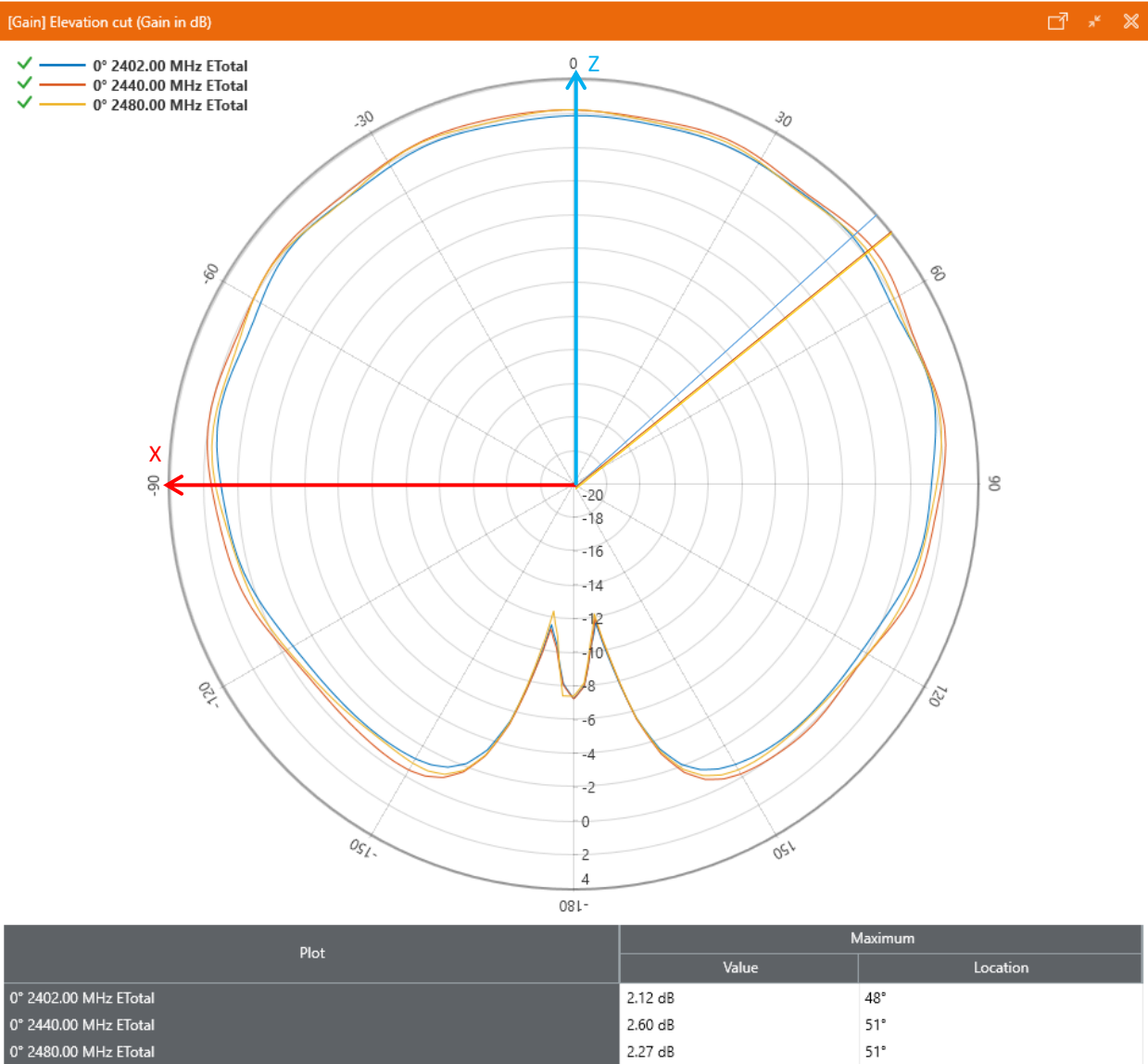
GM260PA

[Gain] Elevation over Azimuth (Gain in dB)



Phi0 Gain cut (dBi)

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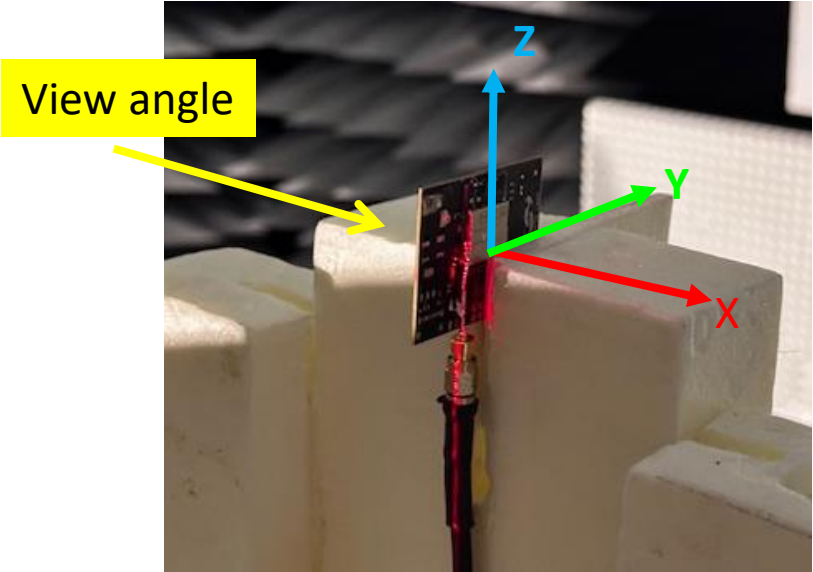
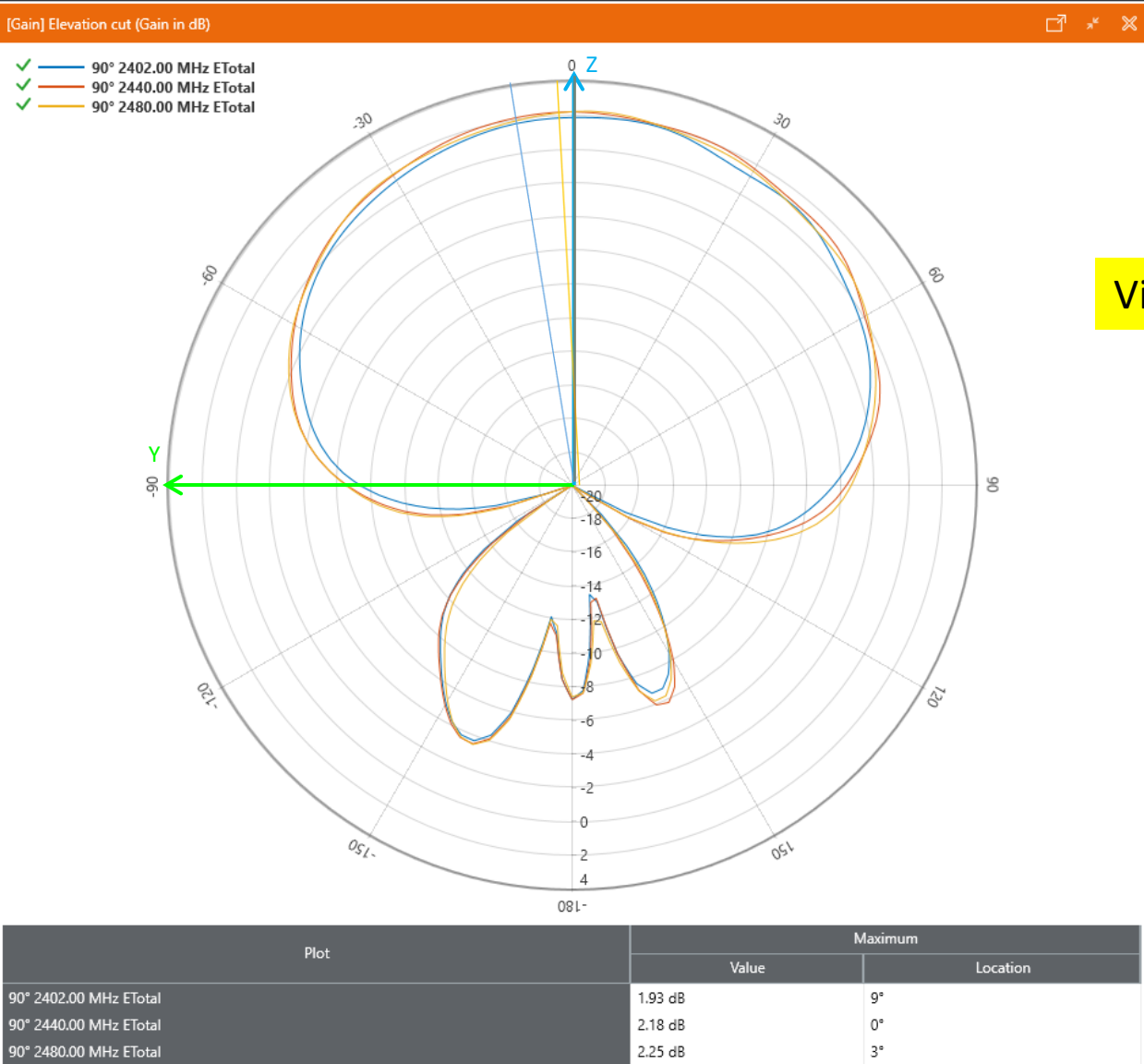


Frequency	3dB beam width
2402MHz	269.0 deg
2440MHz	263.1 deg
2480MHz	271.1 deg



Phi90 Gain cut

GM260PA

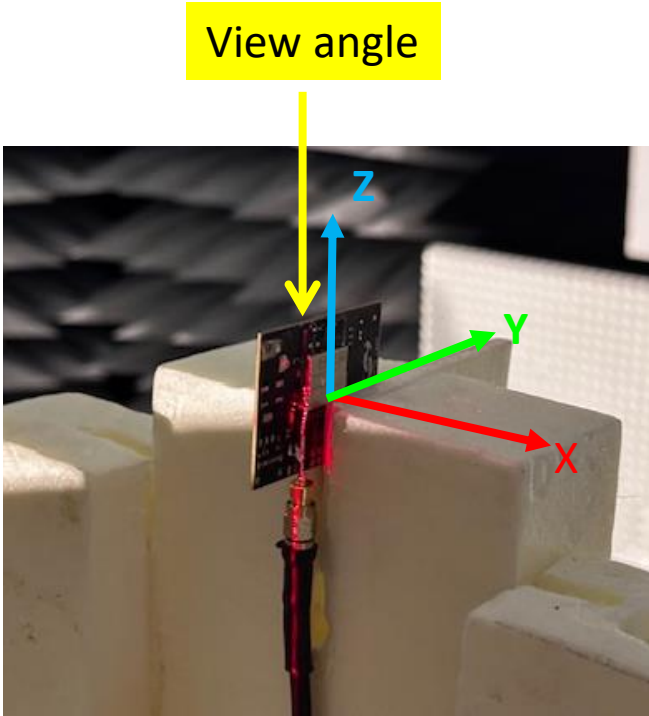
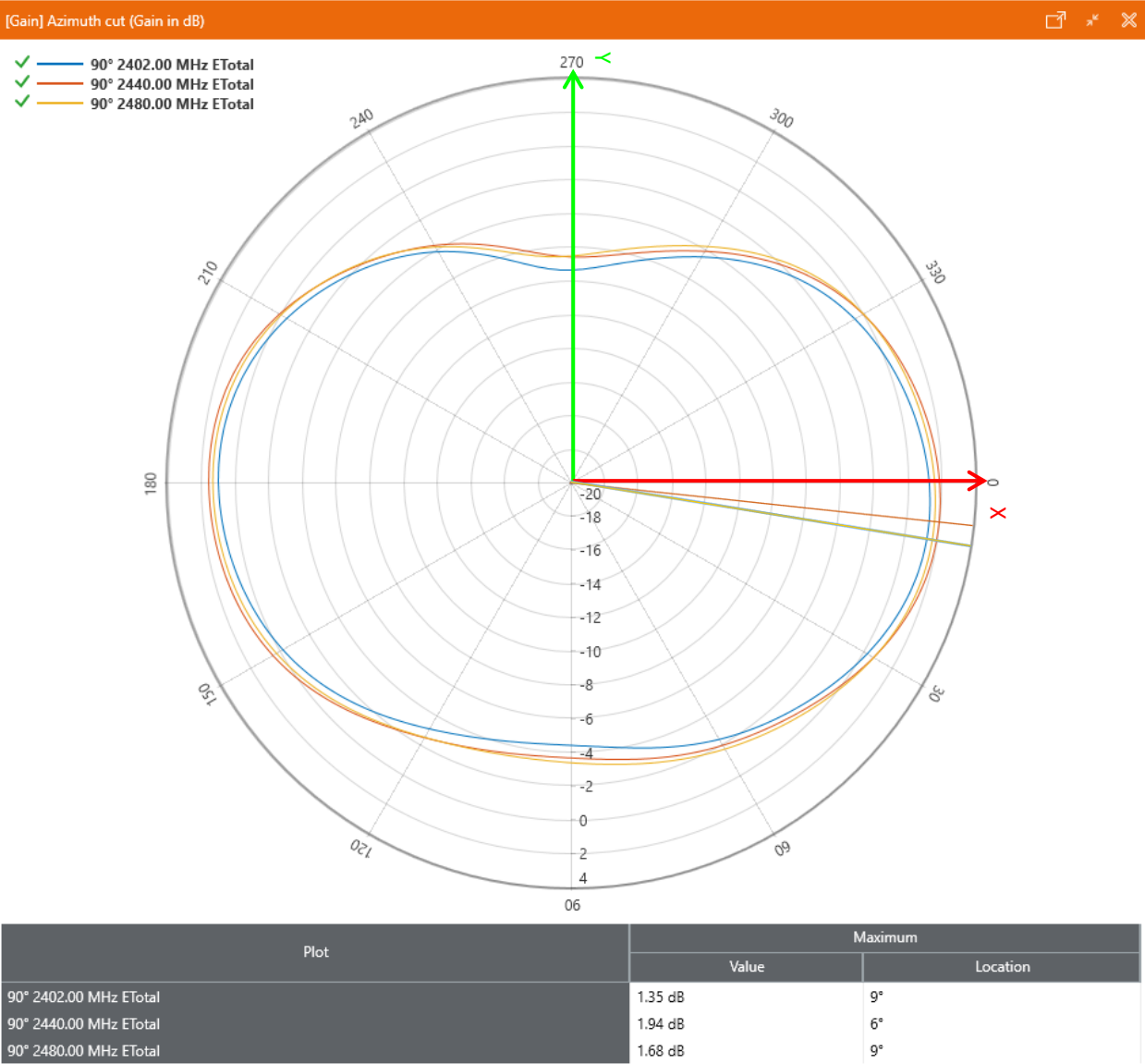


Frequency	3dB beam width
2402MHz	118.6 deg
2440MHz	125.7 deg
2480MHz	123.2 deg



Theta90 Gain cut

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Frequency	3dB beam width
2402MHz	90.2 deg
2440MHz	89.0 deg
2480MHz	93.3 deg





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Thank You