

OBJECTIVES OF THE STUDY
COMPACT WIDEBAND SLIT GROUND ANTENNA USING FELT SUBSTRATE

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VIGNESH KAILASH

Indian Institute of Information Technology, Nagpur

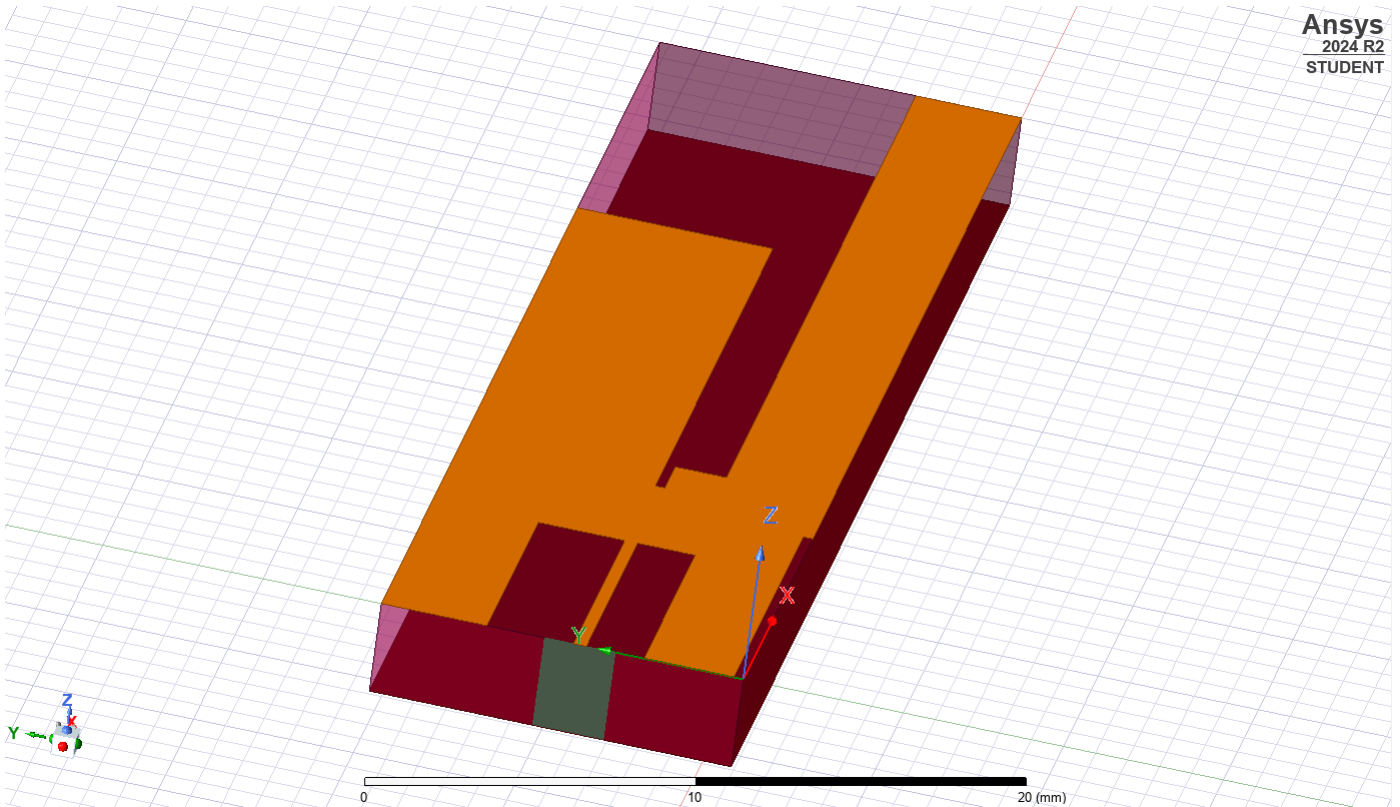
ABSTRACT

In this work, a compact dual-band microstrip antenna with overall dimensions of $40 \times 11.2 \times 3 \text{ mm}^3$ is designed and analyzed using Ansys HFSS for operation at 2.52 GHz and 3.71 GHz, targeting modern wireless communication applications. The antenna structure incorporates strategic slotting and geometric modifications to support dual resonance behavior within a compact footprint. Simulated results show excellent impedance matching, with S11 values of -29 dB at 2.52 GHz and -19 dB at 3.71 GHz, indicating efficient energy coupling and minimal reflection. The electric field distribution reveals strong localized excitation with high-intensity regions concentrated around the feed and radiating areas, while the majority of the structure maintains a lower field profile, confirming stable mode propagation. The radiation pattern exhibits directional characteristics with consistent gain values across varying phi angles, making it suitable for integration into compact wireless systems. This dual-band antenna design is well-suited for ISM bands, sub-6 GHz 5G, and other emerging communication platforms requiring efficient and space-saving RF solutions.

INTRODUCTION

Modern wireless systems demand compact, lightweight, and wideband antennas. This design targets 2.45 to 3.8 GHz, covering common wireless communication frequencies, with a focus on portable devices. The choice of felt substrate not only achieves the necessary mechanical flexibility but also allows integration into compact spaces without compromising signal performance.

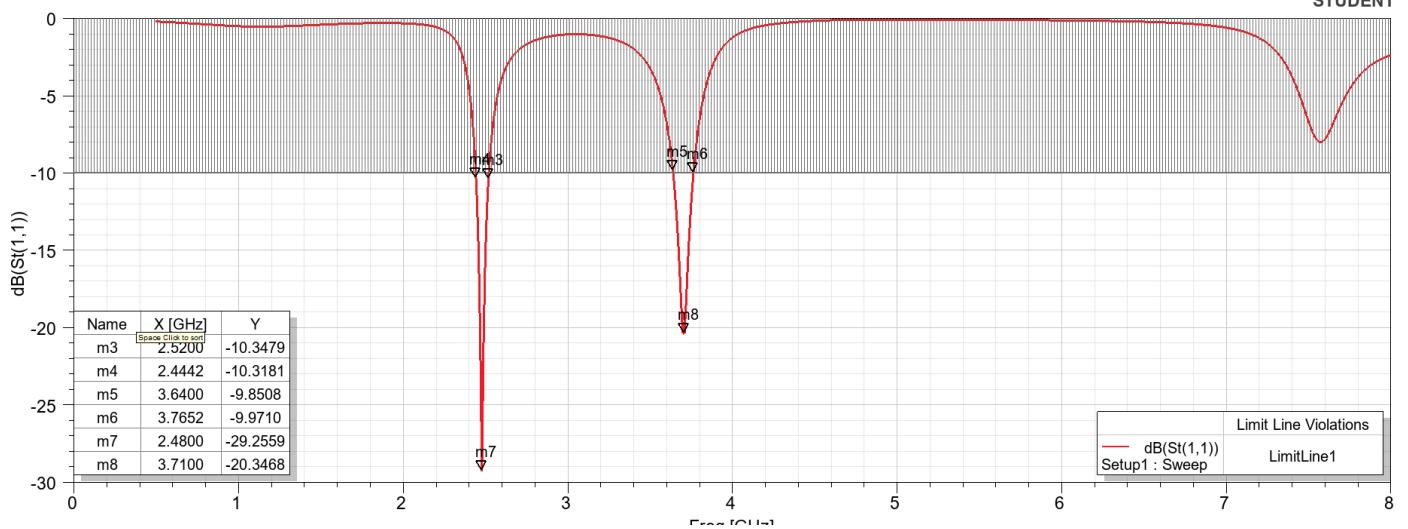
ANTENNA DESIGN



RESULTS

Terminal S Parameter Plot 4

HFSSDesign1
Ansys
2024 R2
STUDENT



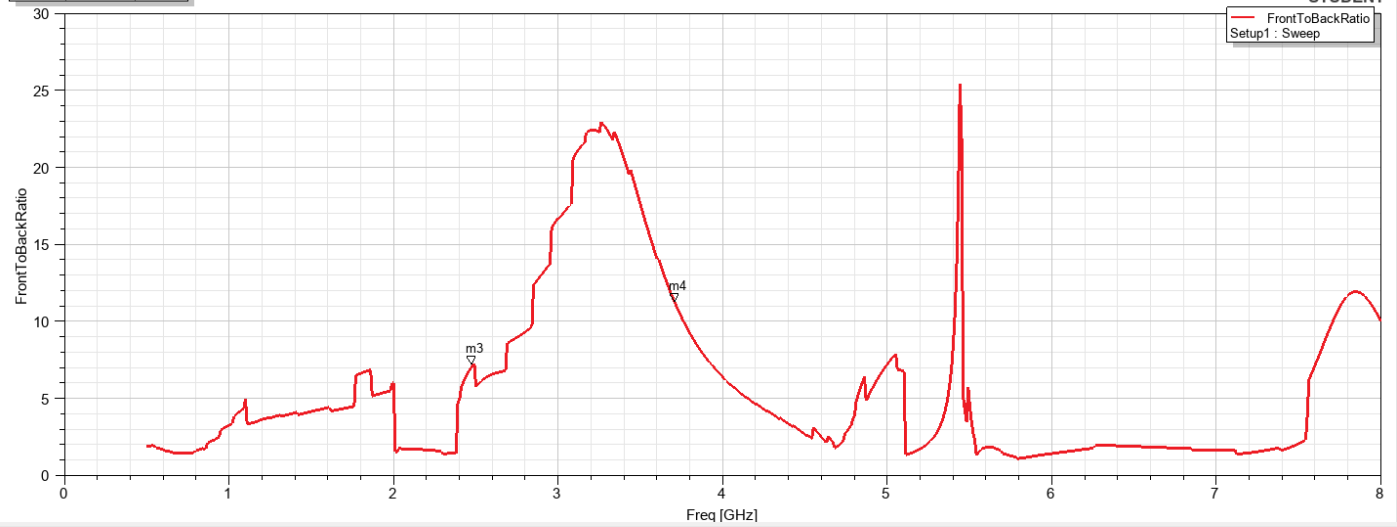
ANTENNA DESIGN

Antenna Params Plot 3

HFSSDesign1

Ansys
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Name	X [GHz]	Y
m3	2.4800	7.1593
m4	3.7100	11.1917

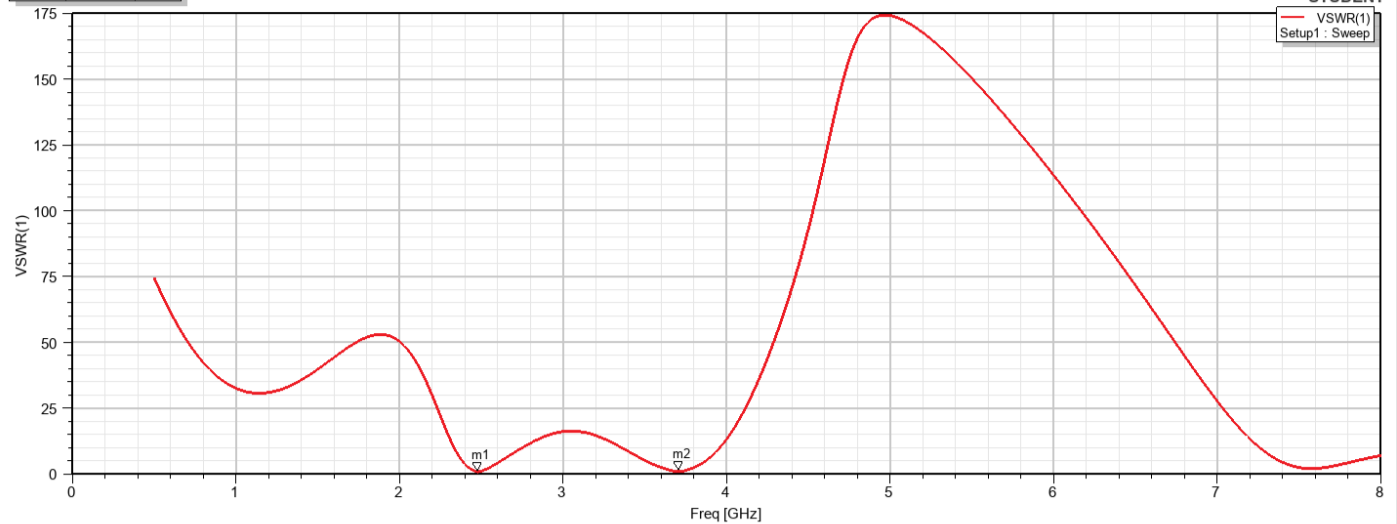


VSWR Plot 2

HFSSDesign1

Ansys
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Name	X [GHz]	Y
m1	2.4800	1.0714
m2	3.7100	1.2126

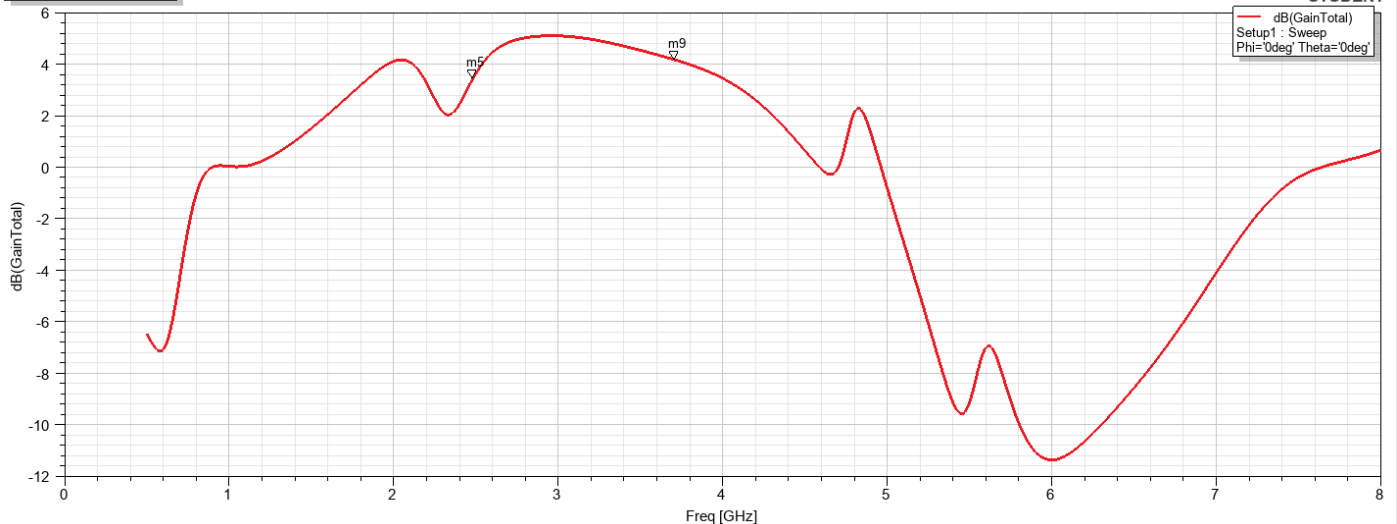


Gain Plot 1

HFSSDesign1

Ansys
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Name	X [GHz]	Y
m5	2.4800	3.4287
m9	3.7100	4.1617

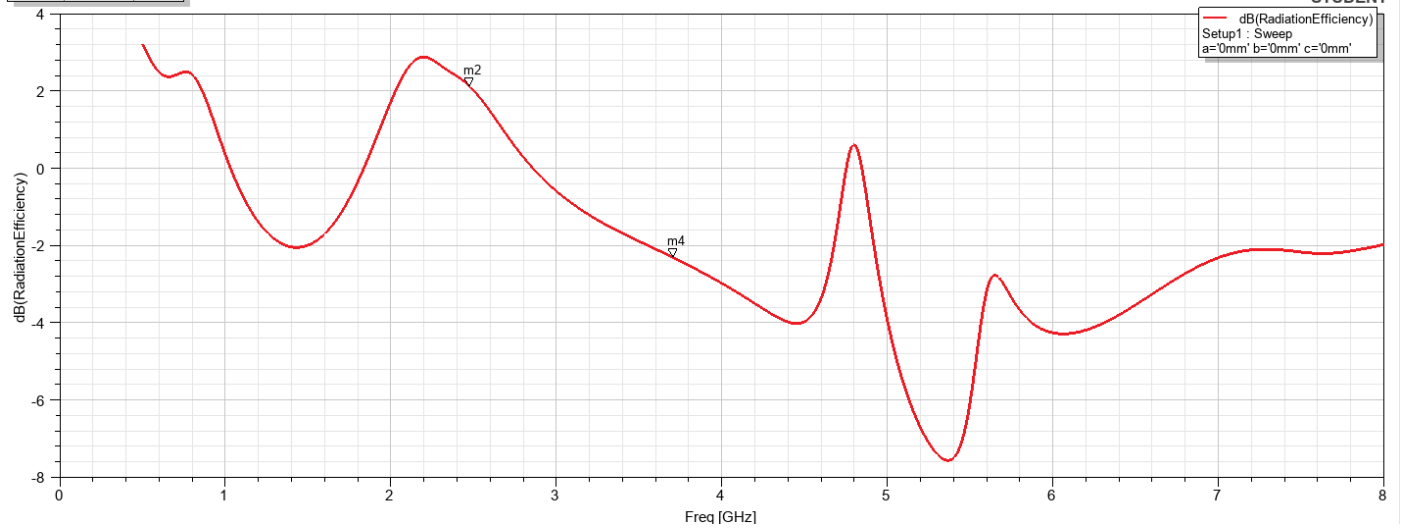


ANTENNA DESIGN

Antenna Params Plot 2

HFSSDesign1
Ansys
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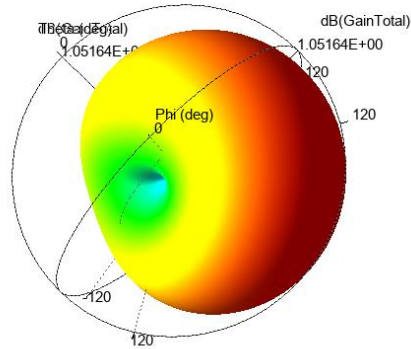
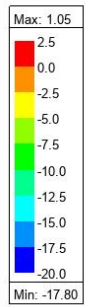
Name	X [GHz]	Y
m2	2.4800	2.0996
m4	3.7100	-2.3164



Ansys Inc.

Gain Plot 3

Ansys
2024 R2
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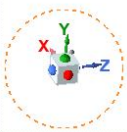
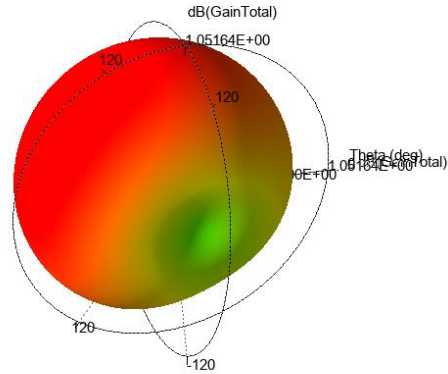
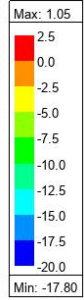


ANTENNA DESIGN

Anslys Inc.

Gain Plot 3

Anslys
2024 R2
STUDENT



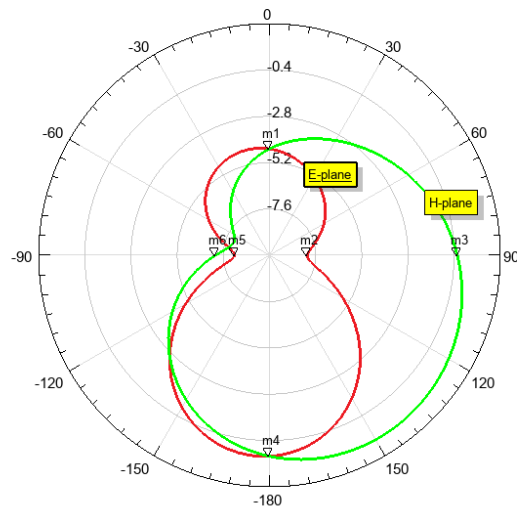
Name	Theta [degmin]	Ang	Mag
m1	2.16E+04	-5.1159E-13	-4.4888
m2	5400	90.0000	-8.0220
m3	5400	90.0000	-0.2356
m4	1.08E+04	180.0000	0.4198
m5	1.62E+04	-90.0000	-8.2038
m6	1.62E+04	-90.0000	-7.2020

Gain Plot 4

HFSSDesign1

Anslys
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— dB(GainTotal)
Setup1 : LastAdaptive
Freq=2.45GHz' Phi=0deg'
— dB(GainTotal)
Setup1 : LastAdaptive
Freq=2.45GHz' Phi=90deg'

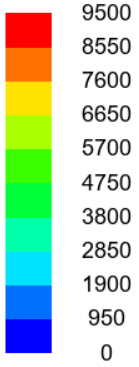


ANTENNA DESIGN

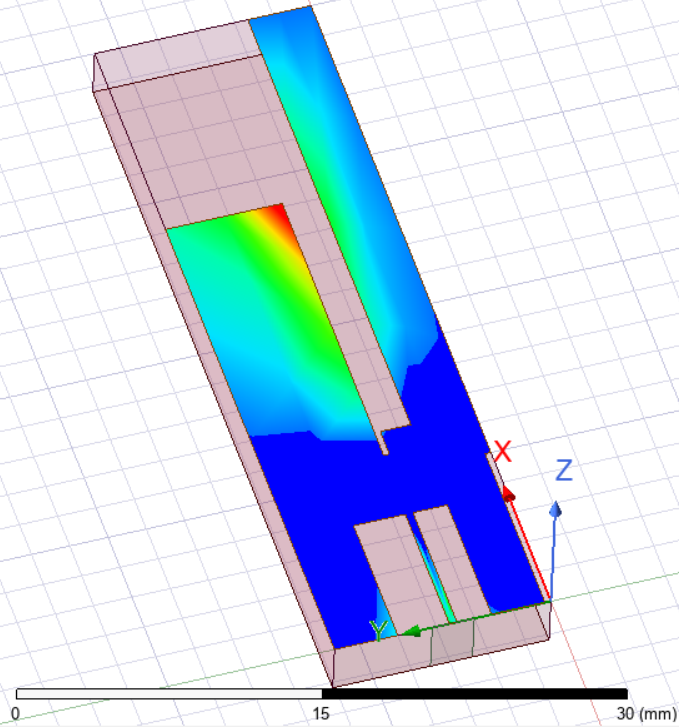
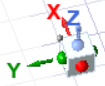
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E Field
[V/m]

Max: 9424.607

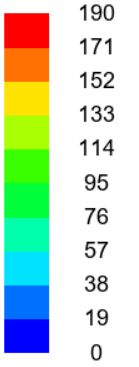


Min: 33.852

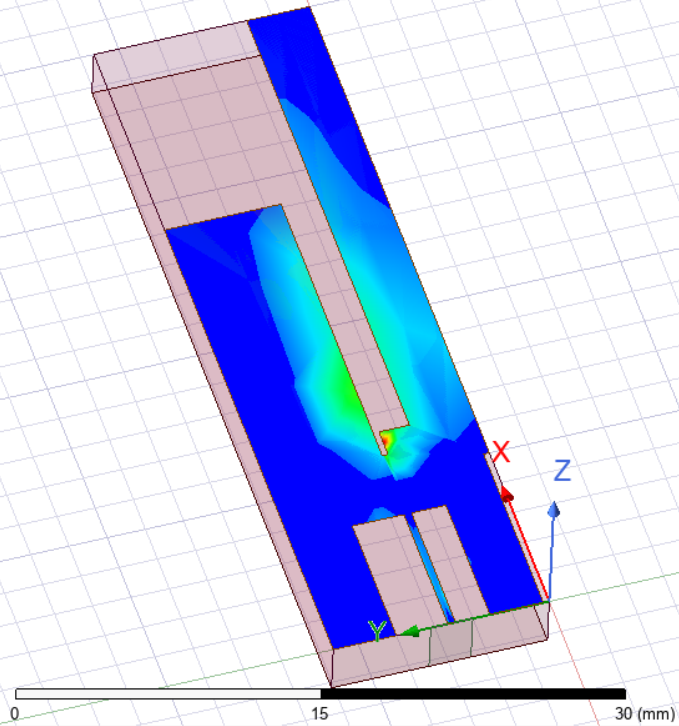
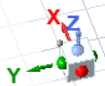


H Field
[A/m]

Max: 182.558

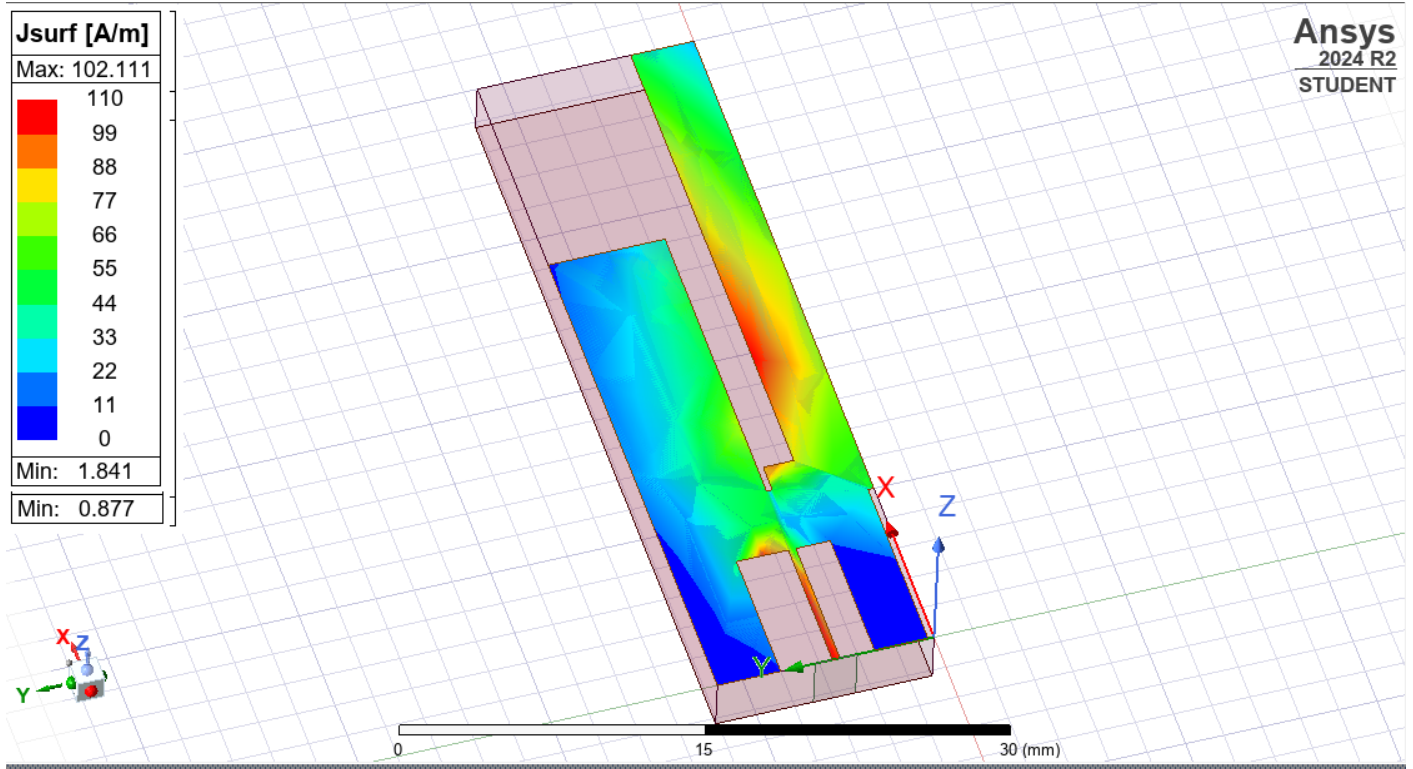


Min: 0.877



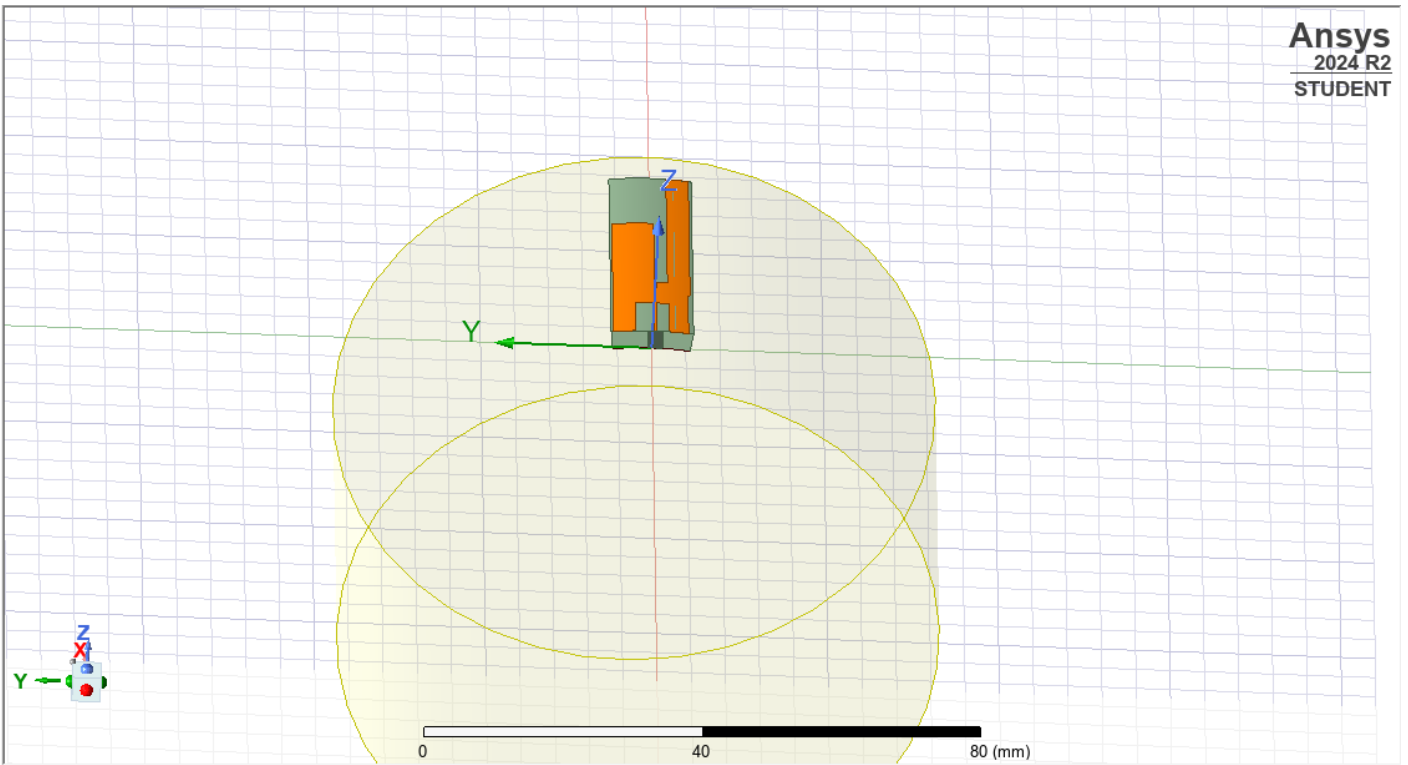
Ansys
2024 R2
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ANTENNA DESIGN



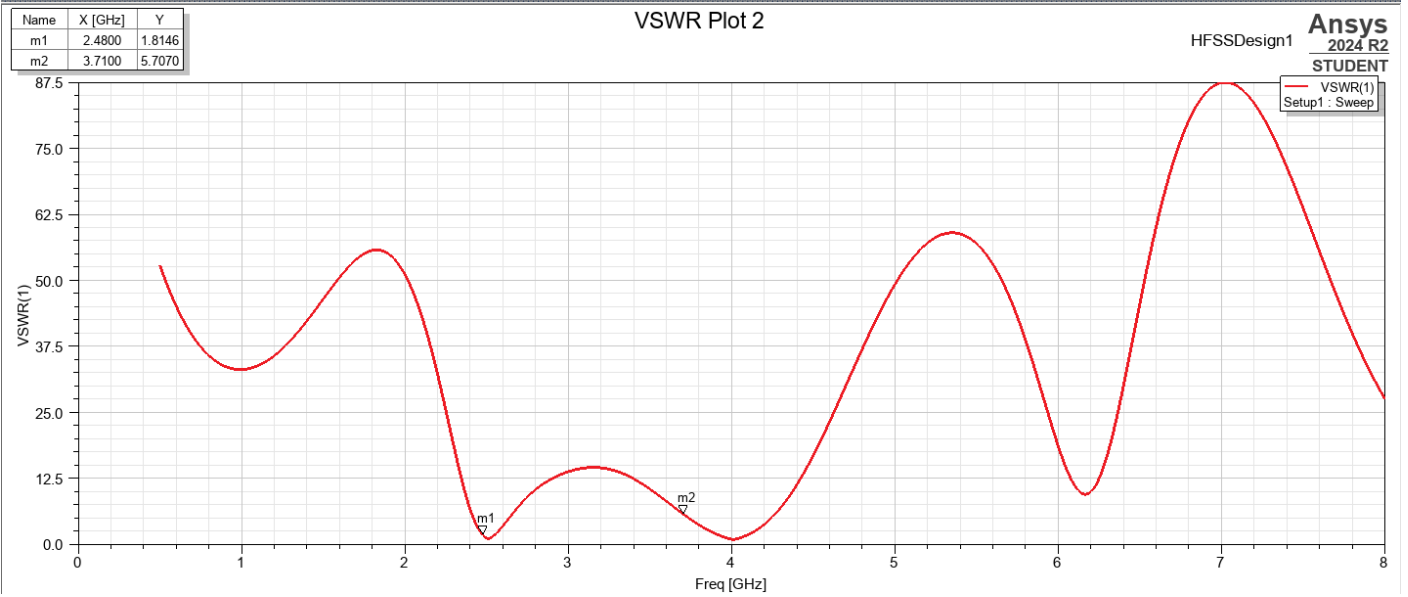
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VSWR Plot 2

HFSSDesign1
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ANTENNA DESIGN

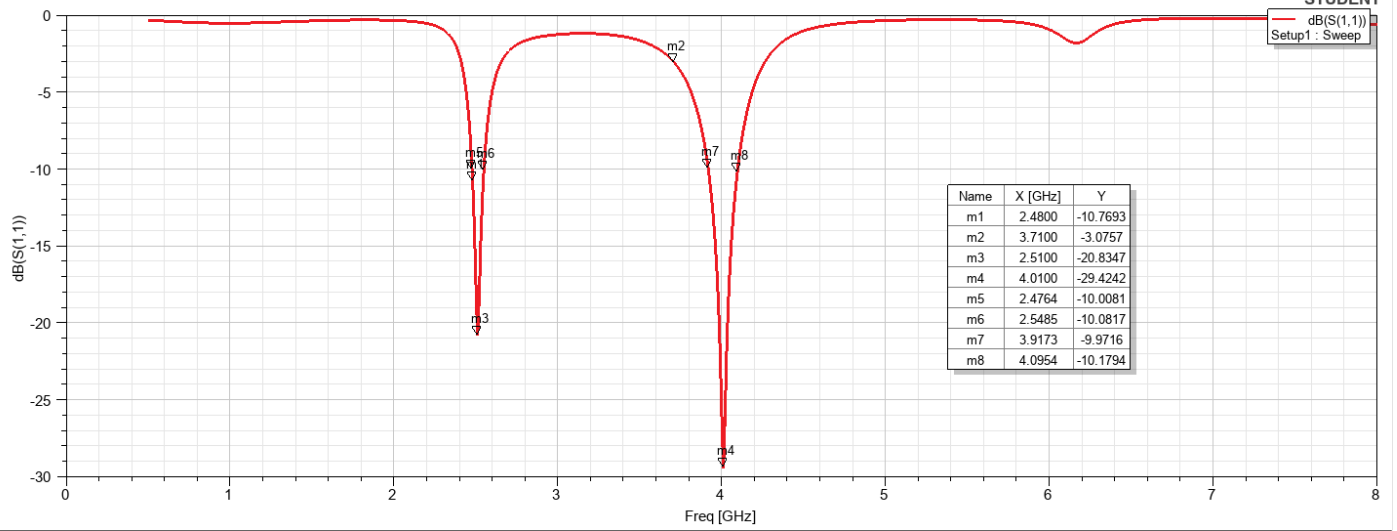
S Parameter Plot 1

HFSSDesign1

Ansys
2024 R2

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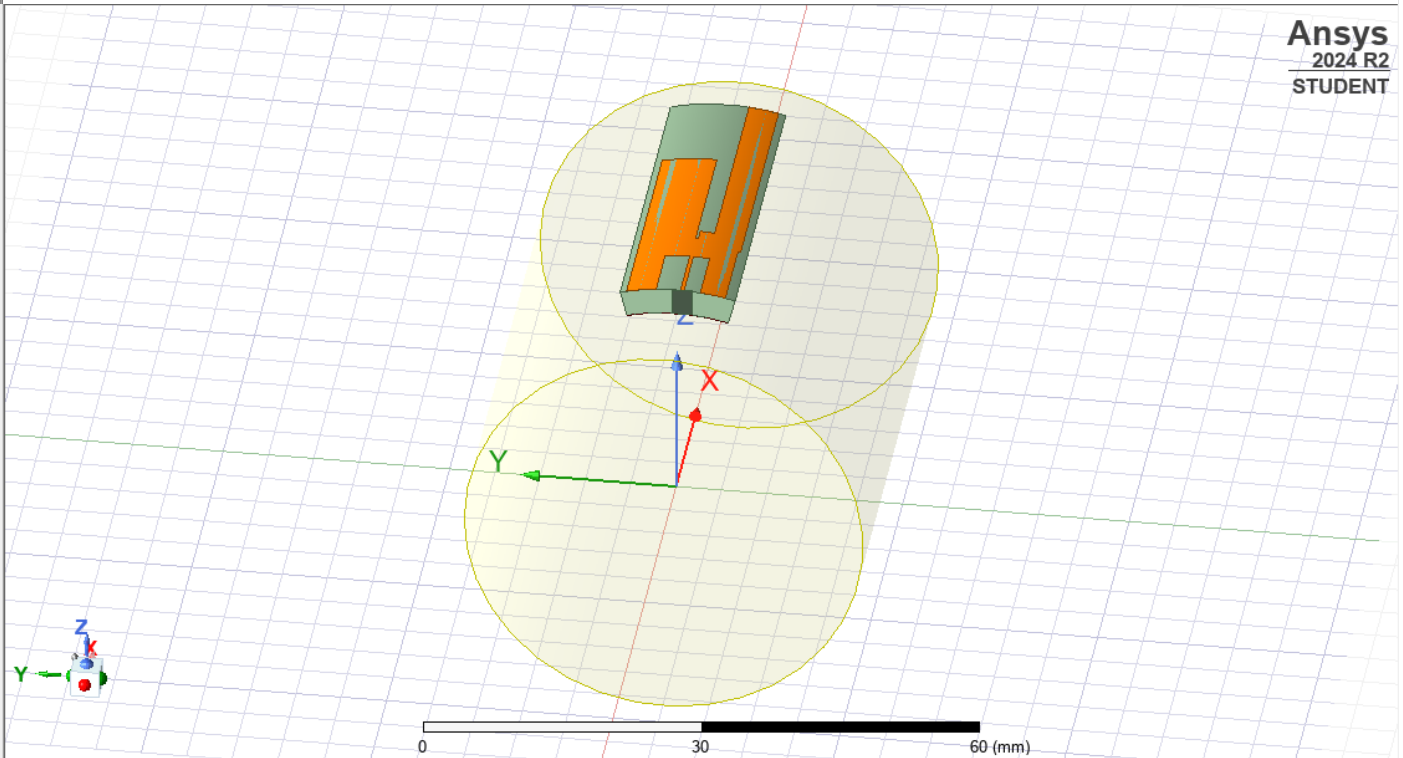
Setup1 : Sweep



Ansys

2024 R2

STUDENT



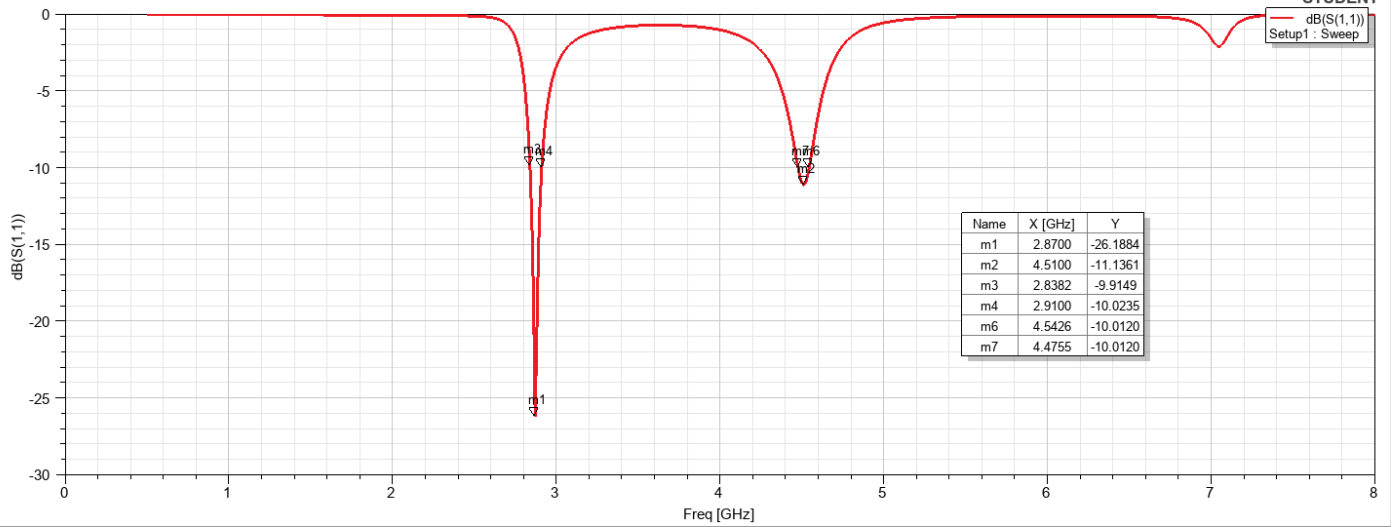
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Band Bend S11

HFSSDesign1

Ansyz
2024 R2
STUDENT

Setup1 : Sweep

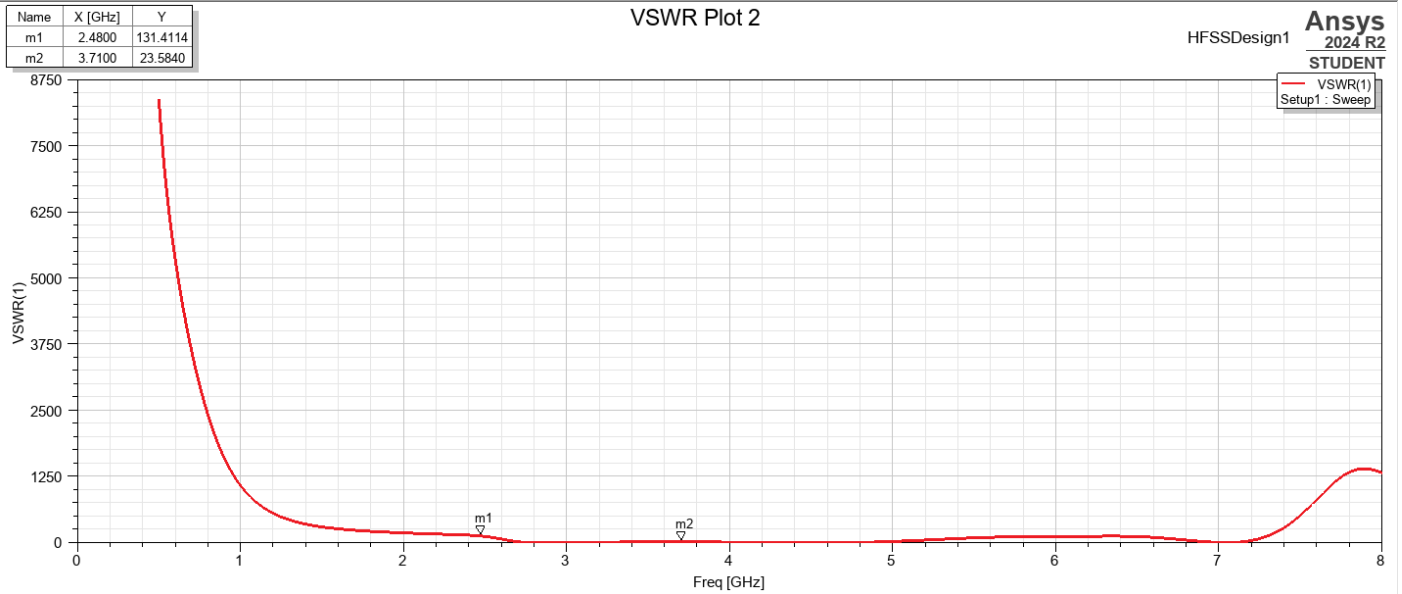


VSWR Plot 2

HFSSDesign1

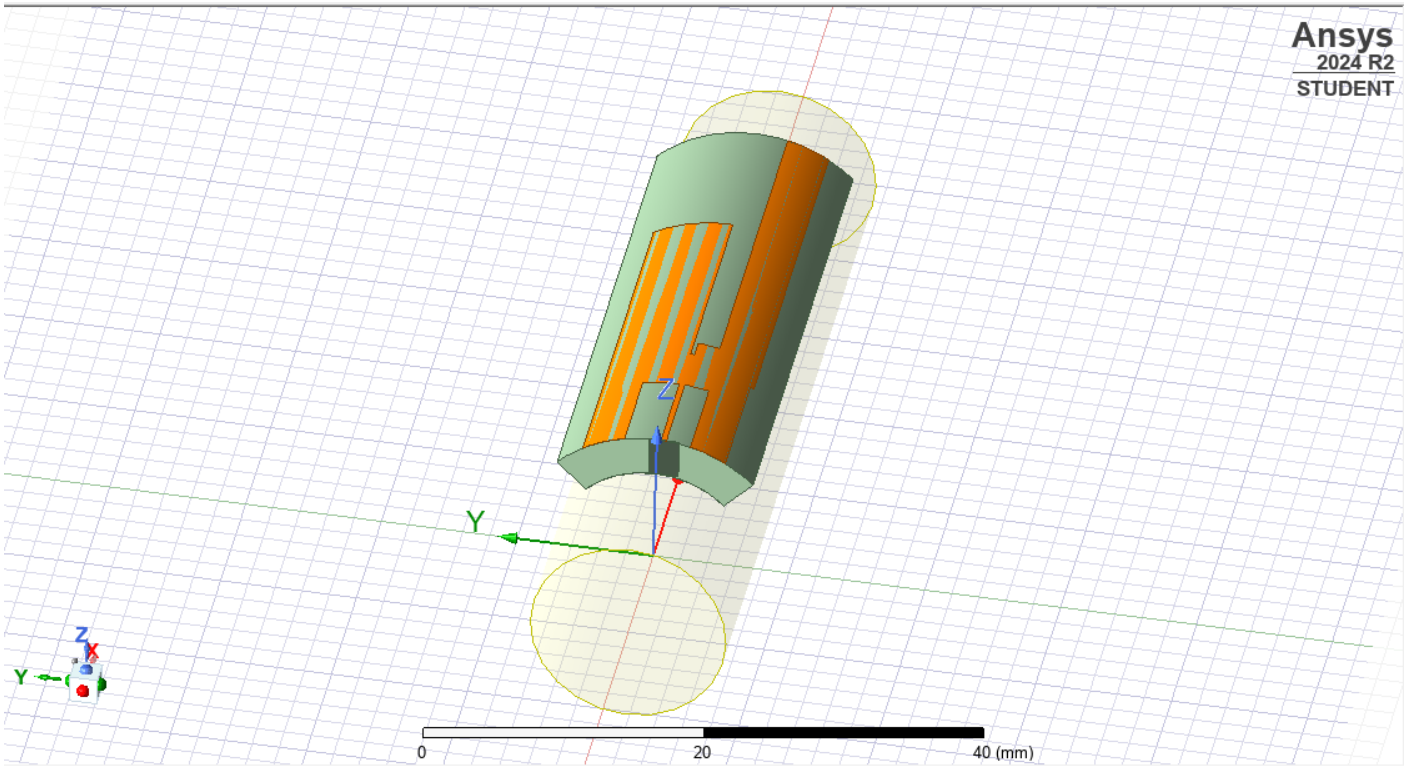
Ansyz
2024 R2
STUDENT

Setup1 : Sweep



ANTENNA DESIGN

Ansys
2024 R2
STUDENT

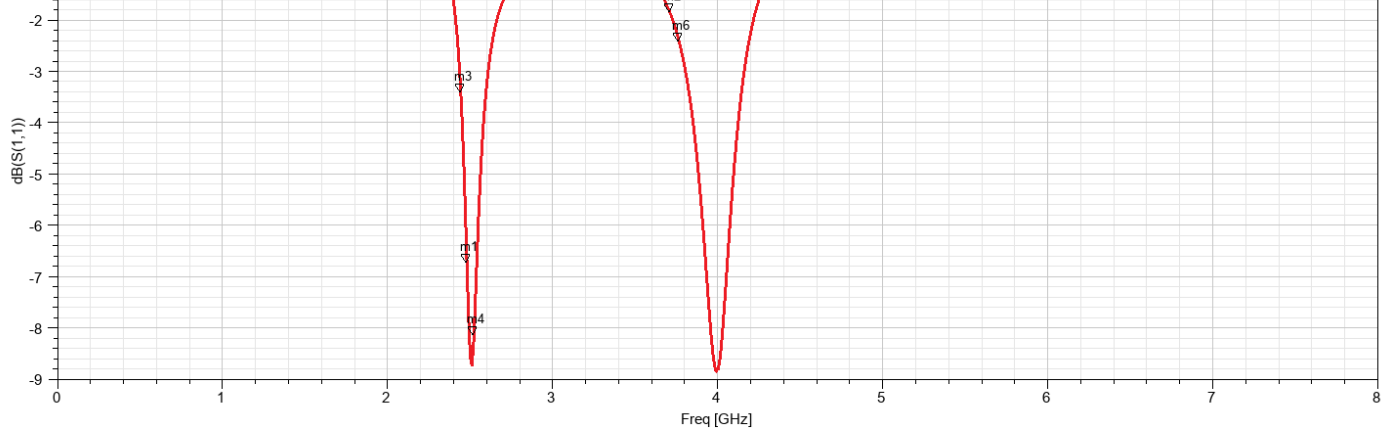


S Parameter Plot 1

HFSSDesign1

Ansys
2024 R2
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Name	X [GHz]	Y
m1	2.4800	-6.7395
m2	3.7100	-1.8591
m3	2.4428	-3.4197
m4	2.5222	-8.1420
m5	3.6415	-1.4188
m6	3.7650	-2.4224



ANTENNA DESIGN

VSWR Plot 2

HFSSDesign1

Ansys

2024 R2

STUDENT

Setup1 : Sweep

