S-band antenna development

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SpaceLab - UFSC

Summary

Calculation of S-band antenna patch

S-band antenna with FR4 and width of 2.5

S-band antenna with FR4 and width of 1.6

S-band antenna with phenolyte and width of 1.6

Prototype S-band antenna with phenolyte and width of 1.6

Calculation of S-band antenna patch

Calculation

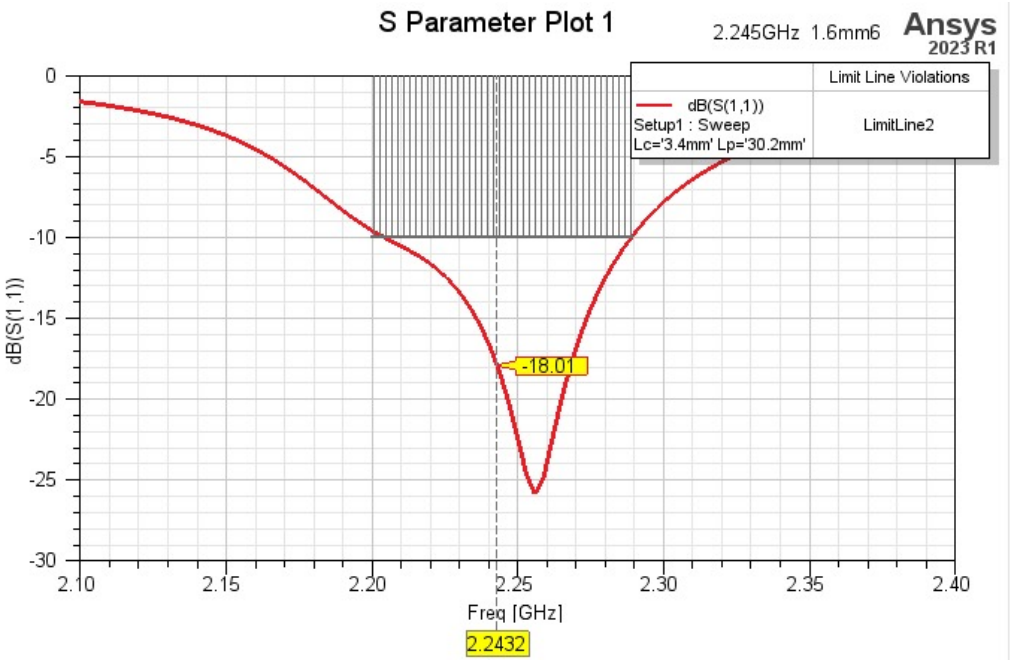
S-band antenna with FR4 and width of 2.5

Parameters

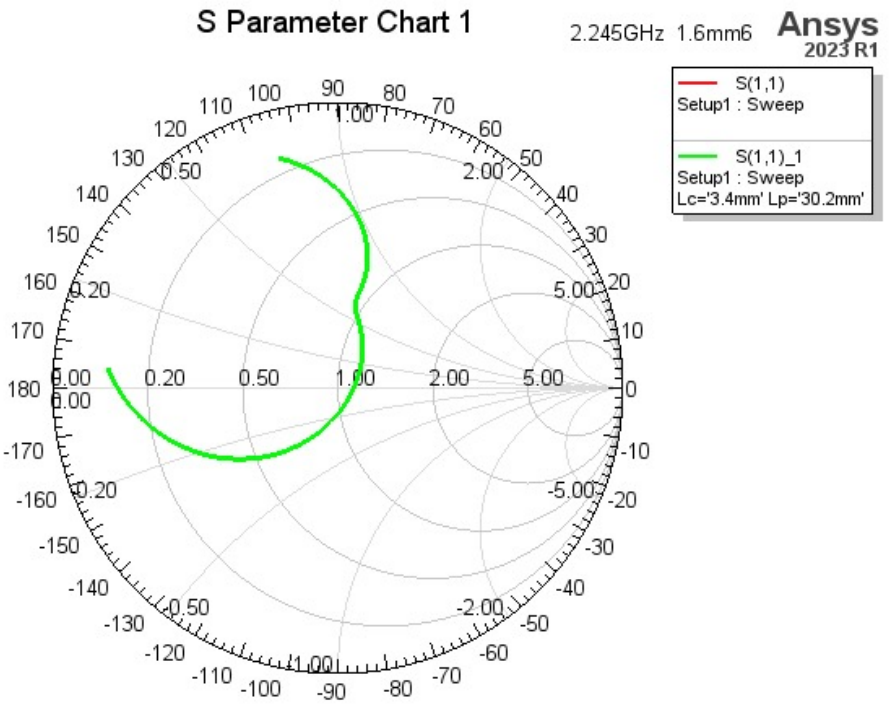
roperties

Name	Value	Unit	Evaluated Value	Type
h	2.5	mm	2.5mm	Design
hc	0.035	mm	0.035mm	Design
dh	3	mm	3mm	Design
dp	1	mm	1mm	Design
Lp	30.2	mm	30.2mm	Design
Lc	3.4	mm	3.4mm	Design
Lc1	0.001	mm	0.001mm	Design
dz_p1	-12	mm	-12mm	Design
dx_p1	-1	mm	-1mm	Design
dz_p2	-12	mm	-12mm	Design
dx_p2	3.5	mm	3.5mm	Design
w_LT	2	mm	2mm	Design
dz_LT	3	mm	3mm	Design
pin_pos	6	mm	6mm	Design
pin_pos2	0	mm	0mm	Design

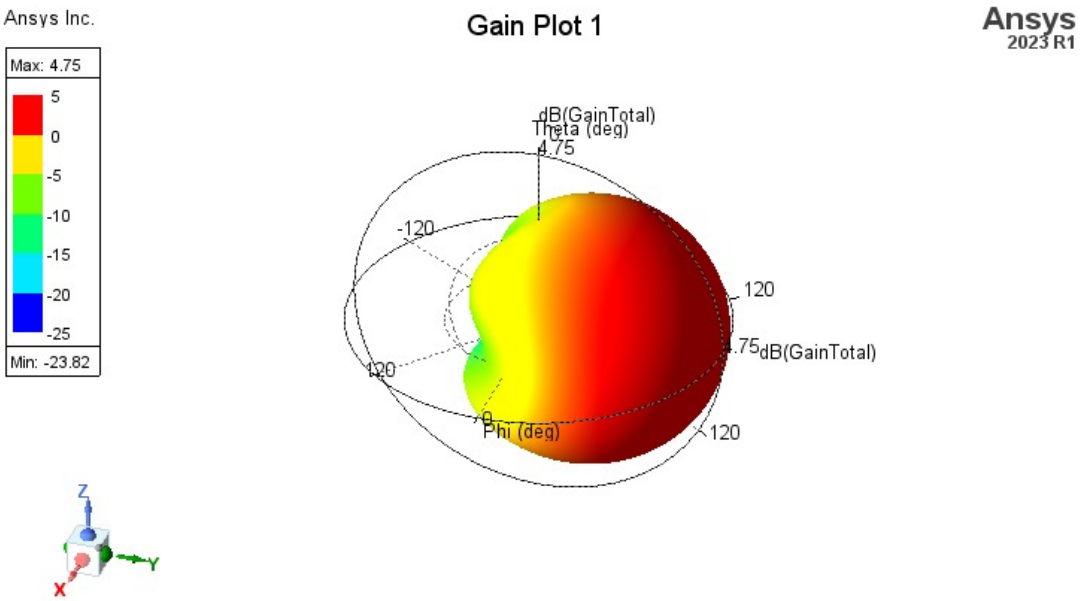
S-Parameter plot



S-Parameter chart

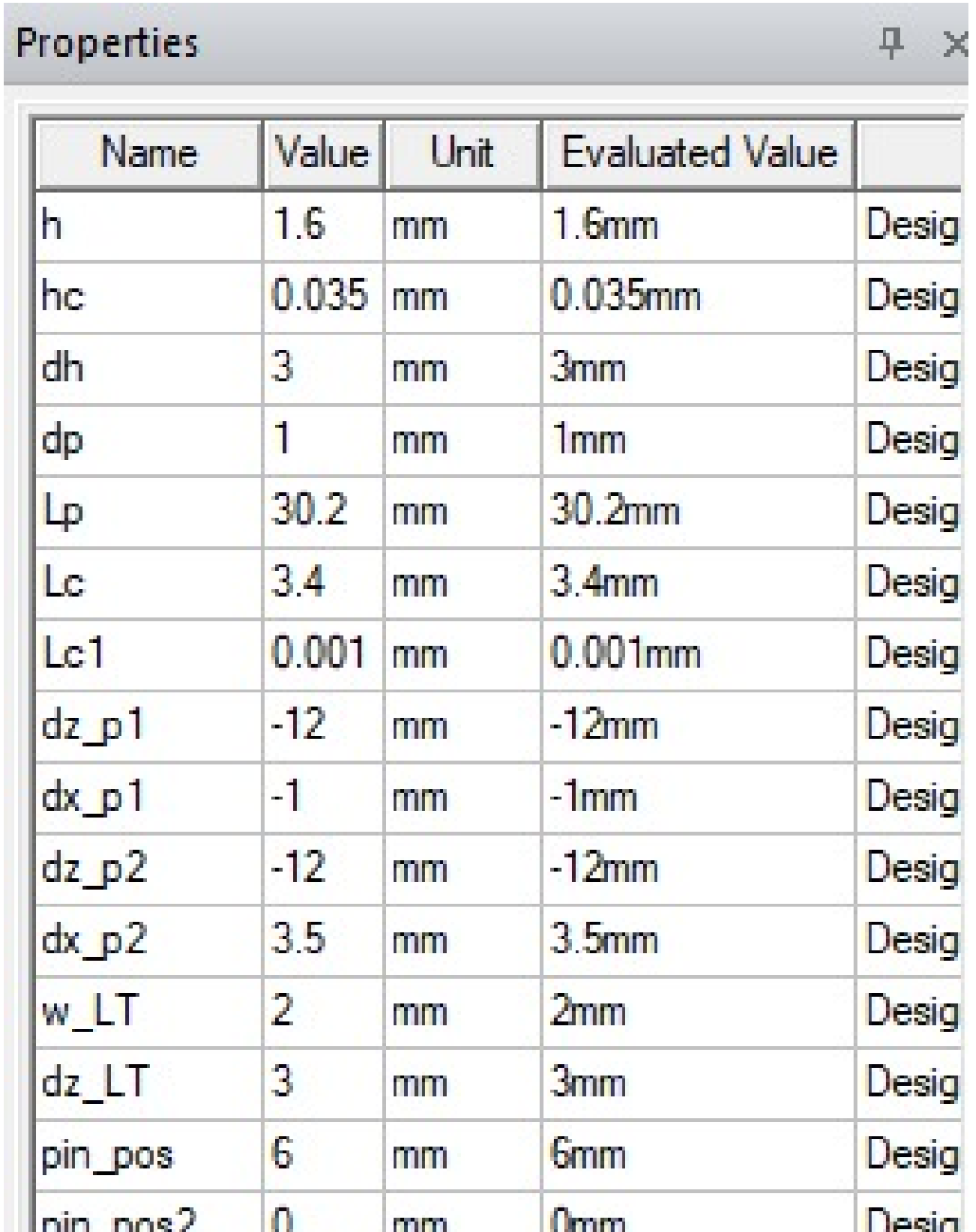


Gain plot


Ansys Inc.
Max: 4.75
5
0
-5
-10
-15
-20
-25
Min: -23.82
Gain Plot 1
Ansys
2023 R1
dB(GainTotal)
Theta (deg)
4.75
-120
120
120
4.75 dB(GainTotal)
0
Phi (deg)
120
Z
Y
X

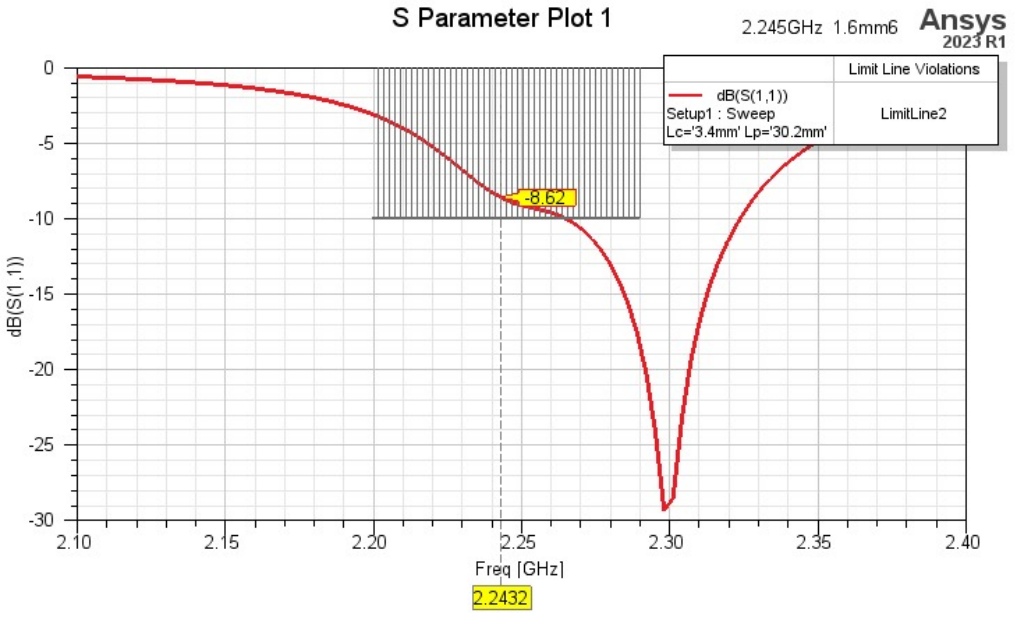
S-band antenna with FR4 and width of 1.6

Properties

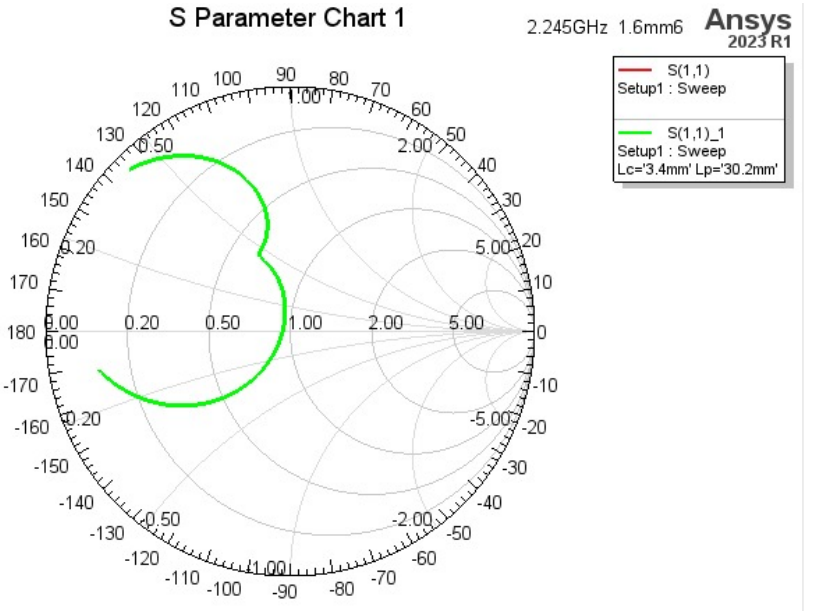

Properties

Name	Value	Unit	Evaluated Value	
h	1.6	mm	1.6mm	Desig
hc	0.035	mm	0.035mm	Desig
dh	3	mm	3mm	Desig
dp	1	mm	1mm	Desig
Lp	30.2	mm	30.2mm	Desig
Lc	3.4	mm	3.4mm	Desig
Lc1	0.001	mm	0.001mm	Desig
dz_p1	-12	mm	-12mm	Desig
dx_p1	-1	mm	-1mm	Desig
dz_p2	-12	mm	-12mm	Desig
dx_p2	3.5	mm	3.5mm	Desig
w_LT	2	mm	2mm	Desig
dz_LT	3	mm	3mm	Desig
pin_pos	6	mm	6mm	Desig
pin_pos2	0	mm	0mm	Desig

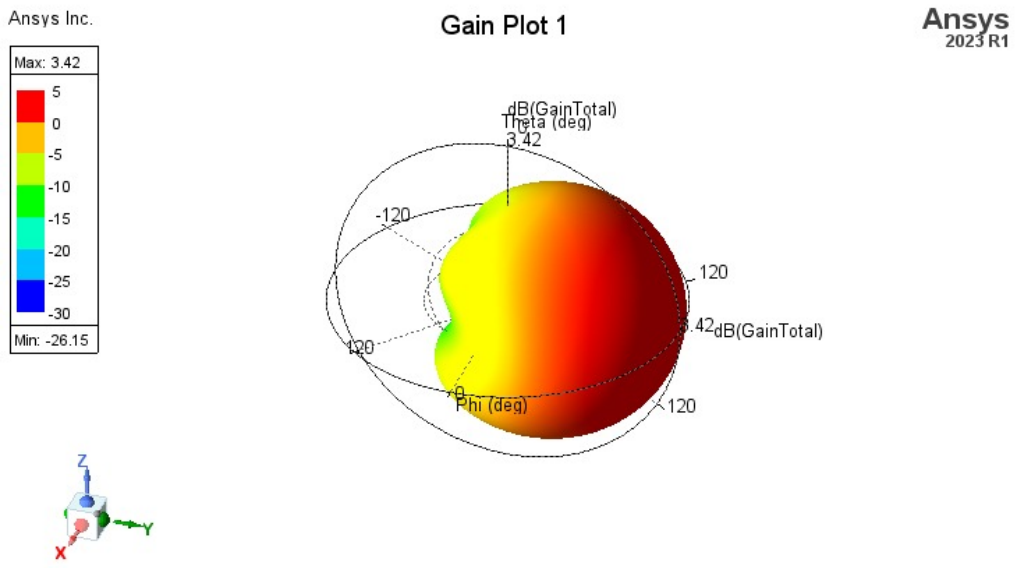
S-parameter plot



S-parameter chart



S-parameter chart



S-band antenna with phenolyte and width of 1.6

Prototype S-band antenna

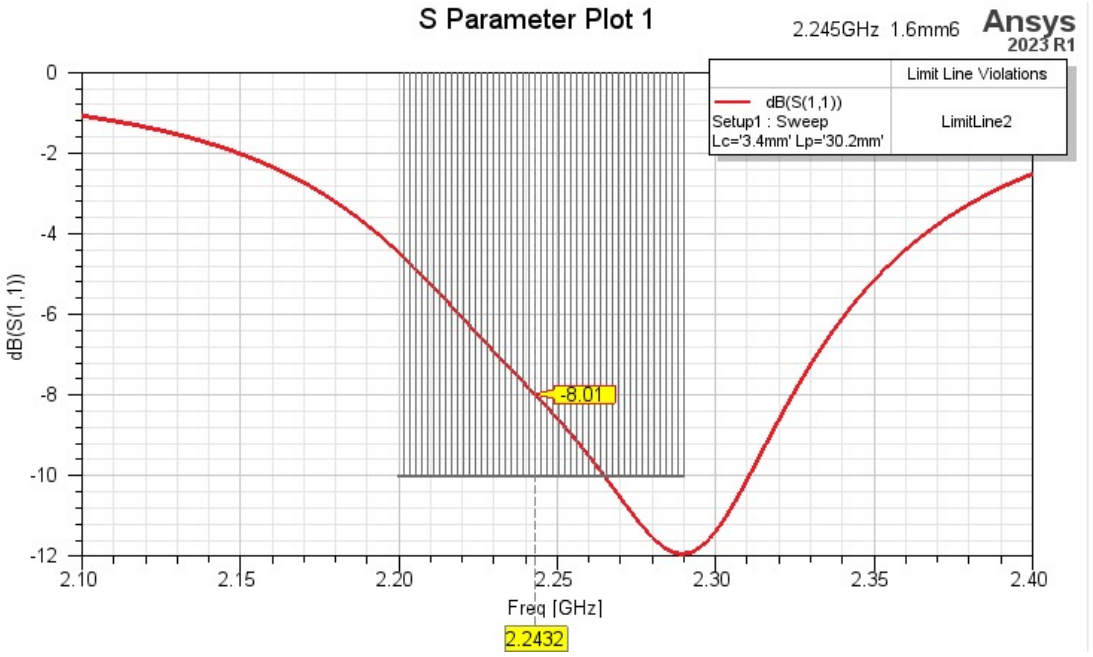
The values utilized for the dielectric parameters are: Df=0.04; Dk=4.6.

Parameters

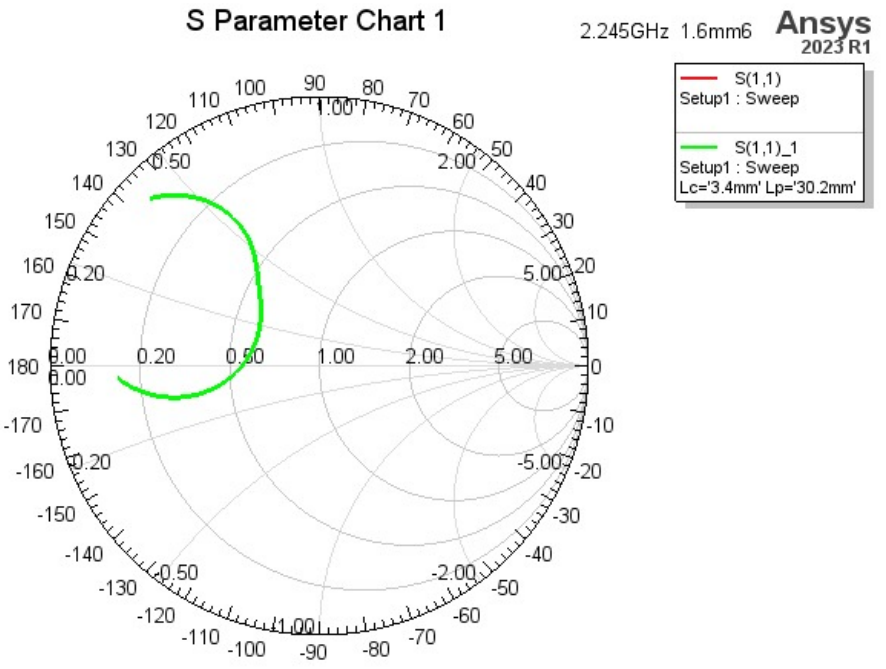
Properties

Name	Value	Unit	Evaluated Value	
h	1.6	mm	1.6mm	Desig
hc	0.035	mm	0.035mm	Desig
dh	3	mm	3mm	Desig
dp	1	mm	1mm	Desig
Lp	30.2	mm	30.2mm	Desig
Lc	3.4	mm	3.4mm	Desig
Lc1	0.001	mm	0.001mm	Desig
dz_p1	-12	mm	-12mm	Desig
dx_p1	-1	mm	-1mm	Desig
dz_p2	-12	mm	-12mm	Desig
dx_p2	3.5	mm	3.5mm	Desig
w_LT	2	mm	2mm	Desig
dz_LT	3	mm	3mm	Desig
pin_pos	6	mm	6mm	Desig

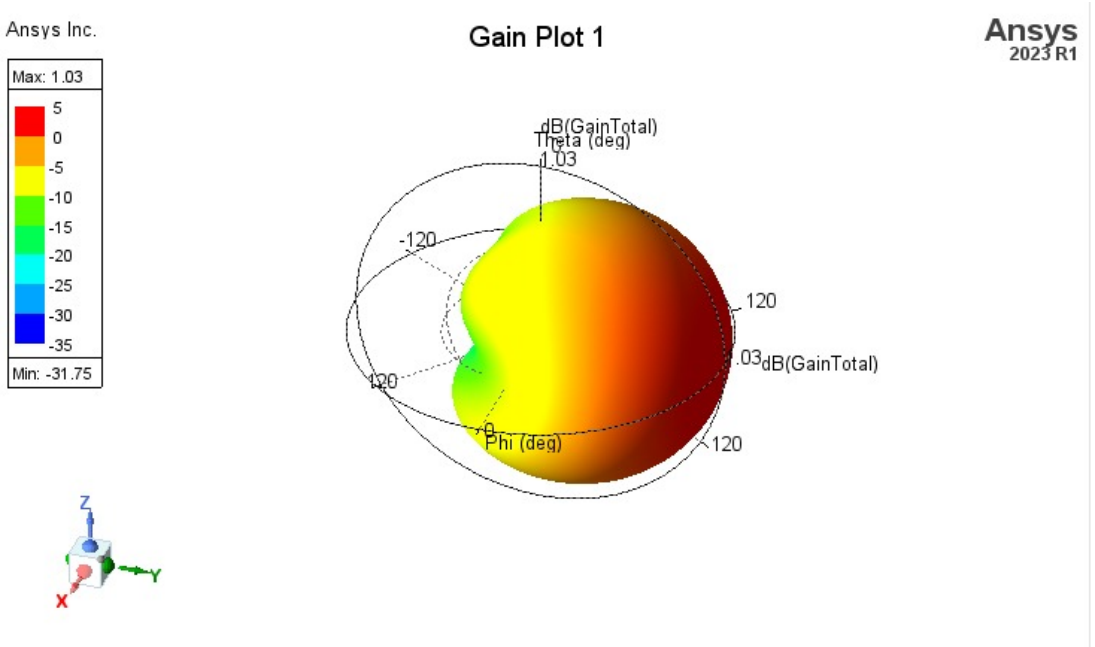
S-Parameter plot



S-Parameter chart



Gain plot

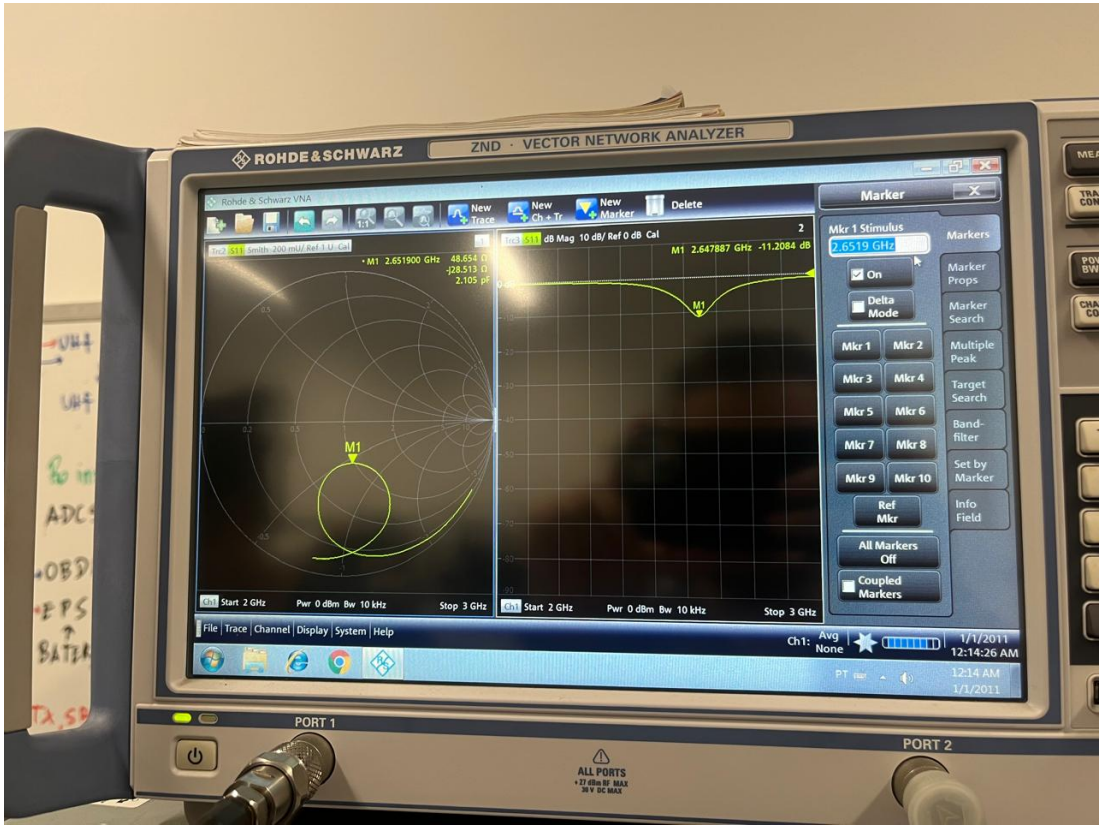

Ansys Inc.
Max: 1.03
5
0
-5
-10
-15
-20
-25
-30
-35
Min: -31.75
Gain Plot 1
Ansys
2023 R1
dB(GainTotal)
Theta (deg)
1.03
-120
120
.03dB(GainTotal)
120
0
Phi (deg)
120
Z
Y
X

Prototype S-band antenna with phenolyte and width of 1.6

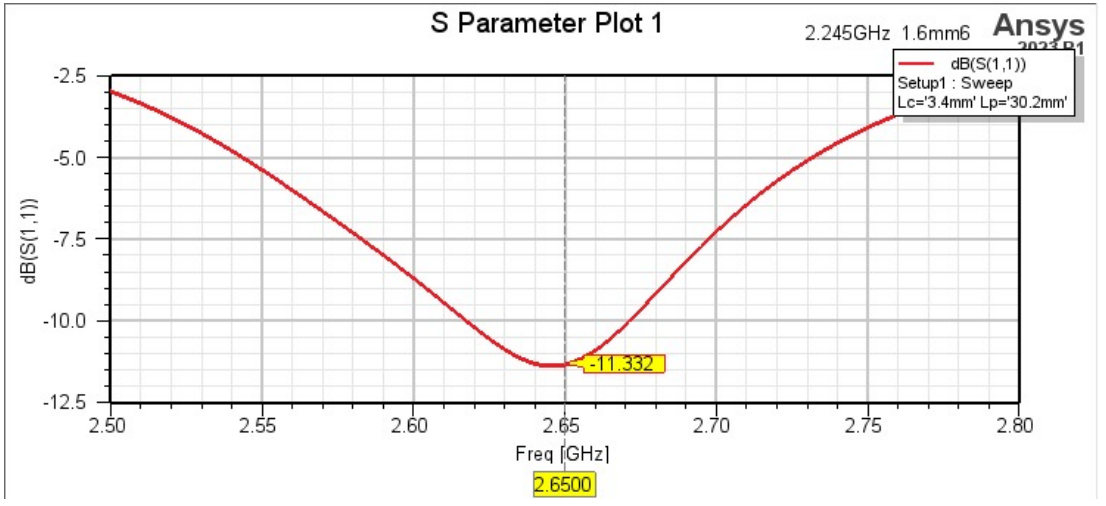
Prototype S-band antenna

To obtain such values on simulation both parameters of the phenolity dielectric were altered: Df=0.048; Dk=3.4.

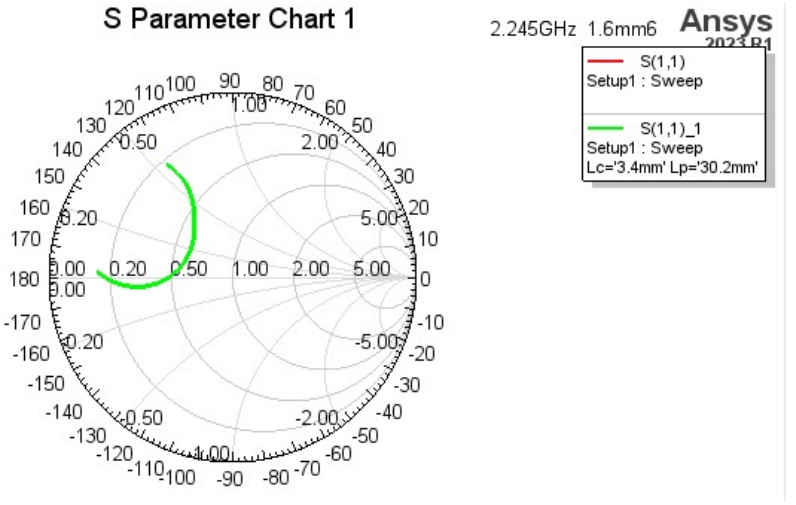
S-Parameter plot of prototype



S-Parameter plot



S-Parameter chart



Thanks!