Design and analysis of Compact Dual Resonance Patch Antenna

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Overview

Introduction

Microwave - definition

Microstrip (advantages and disadvantages)

Microstrip structure

Main characteristics of the Compact Dual Resonance Patch Antenna

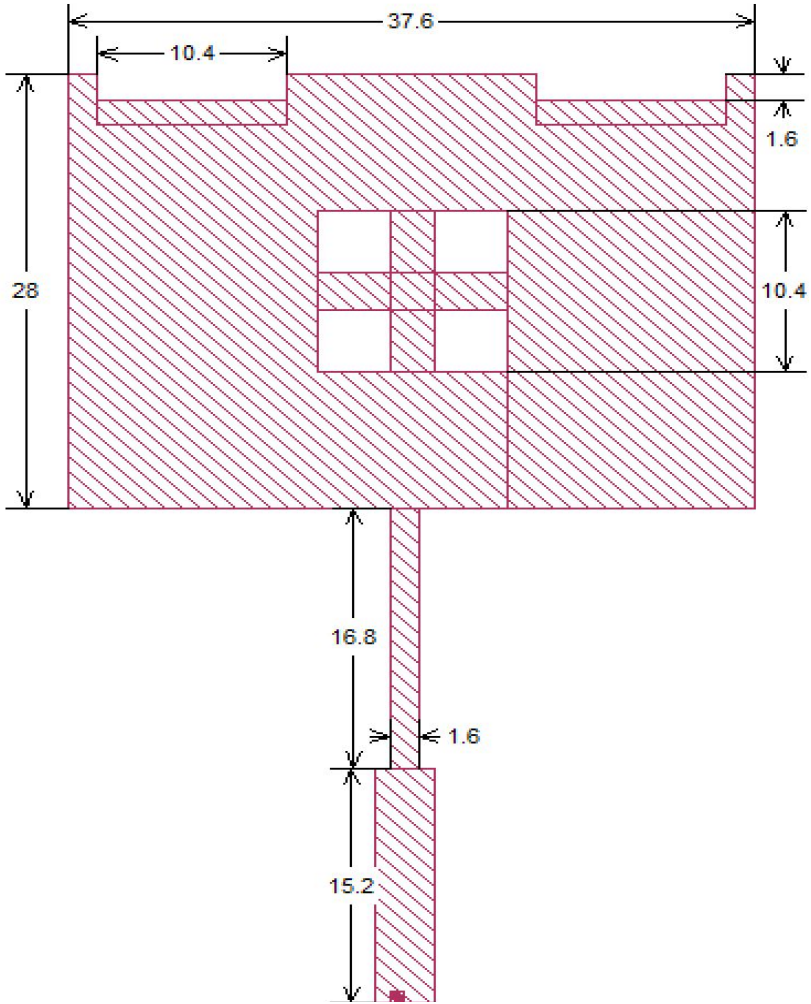
Sonnet software

Design methodology

01 box size: 500mm x 500mm

02 cell size: 0.8mm

03 frequency range: 4GHz to 9GHz

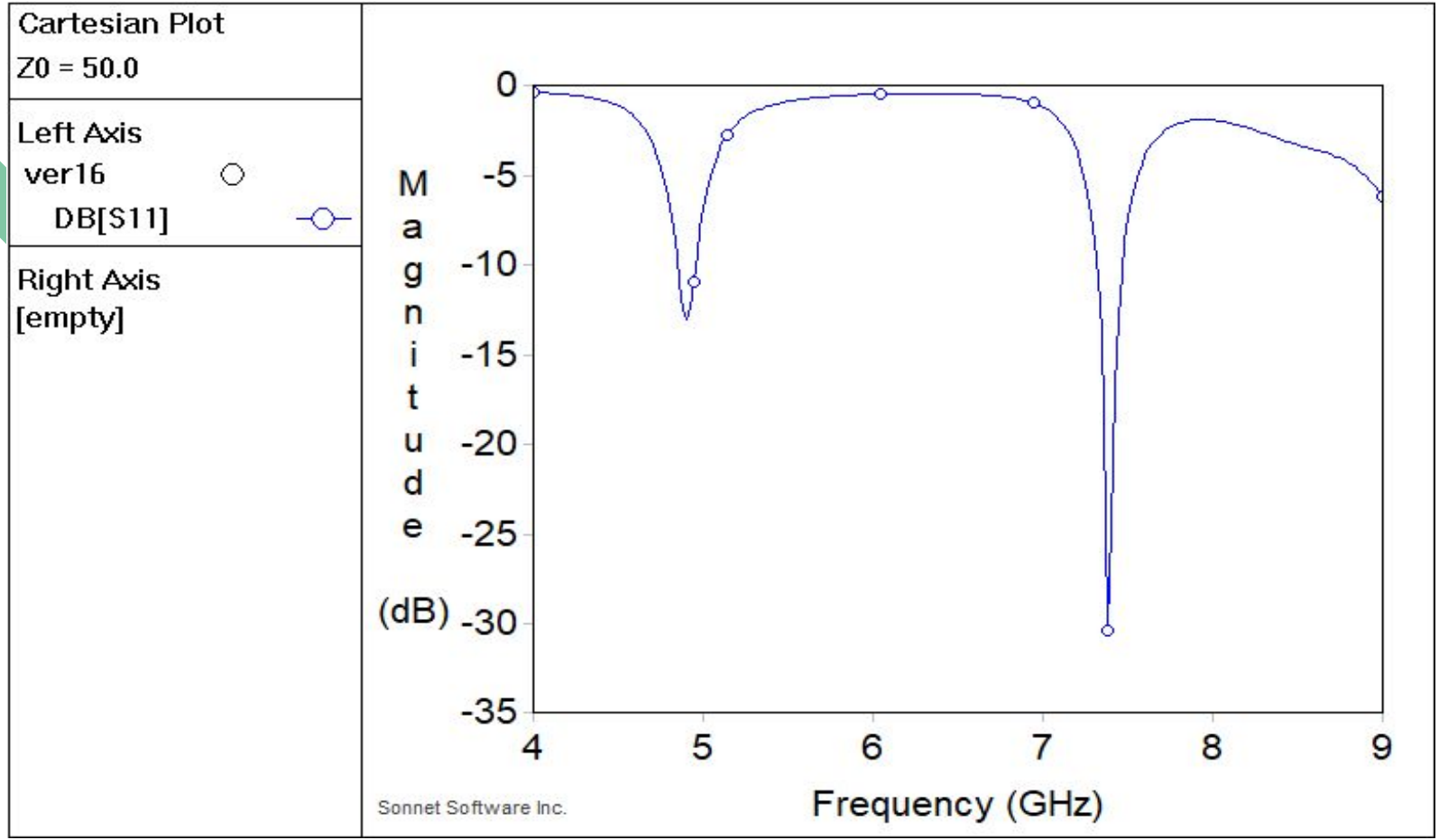


Compact Dual Resonance Patch Antenna

Design methodology

Dual characteristic is obtained by compilation of rectangular slits.
Via feeding method is used in order to increase overall performance of the antenna and to simplify manufacturing of the antenna.

Output signals are **S11 and gain**

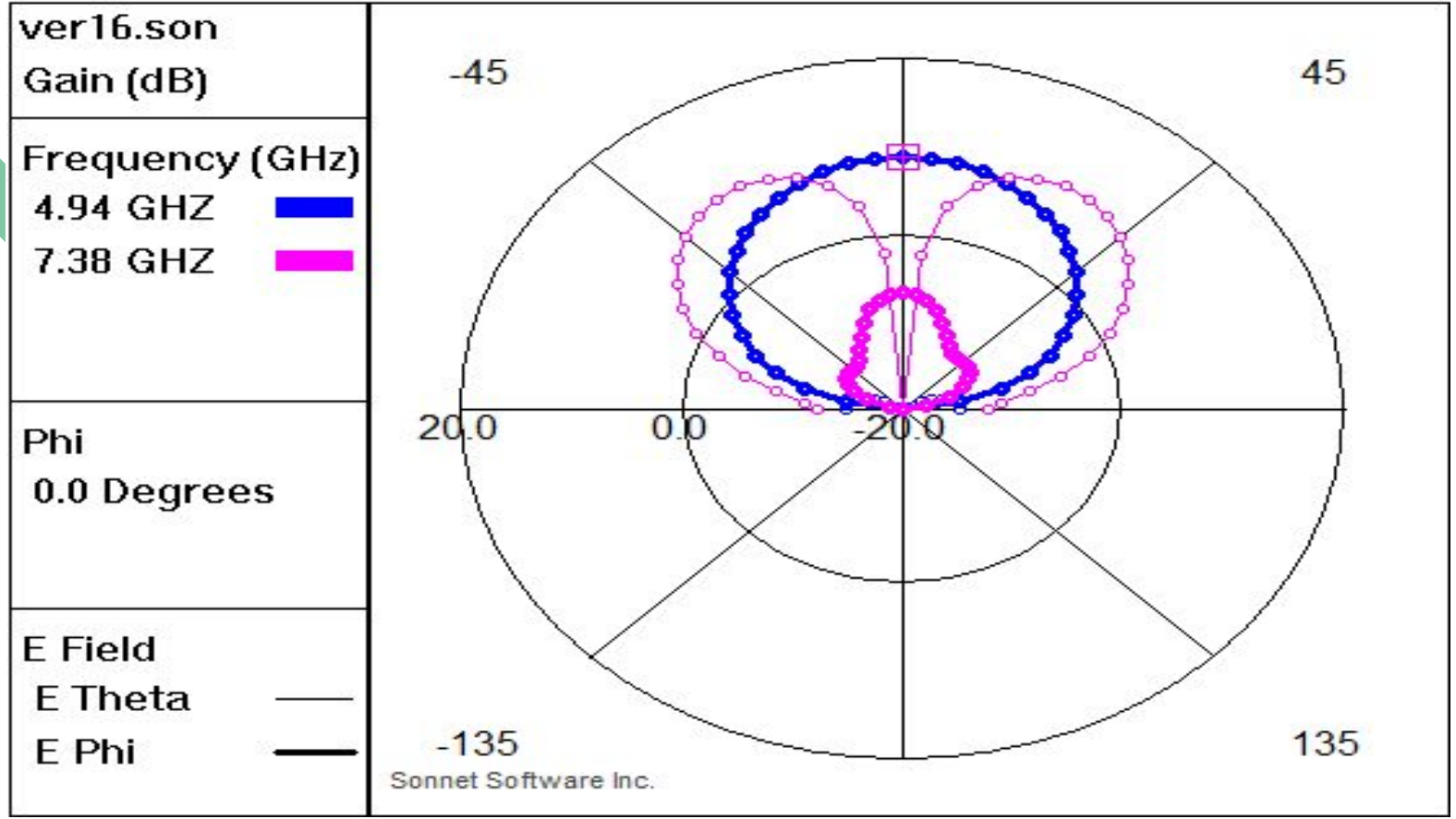


Input match response of dual resonance patch antenna

Design methodology

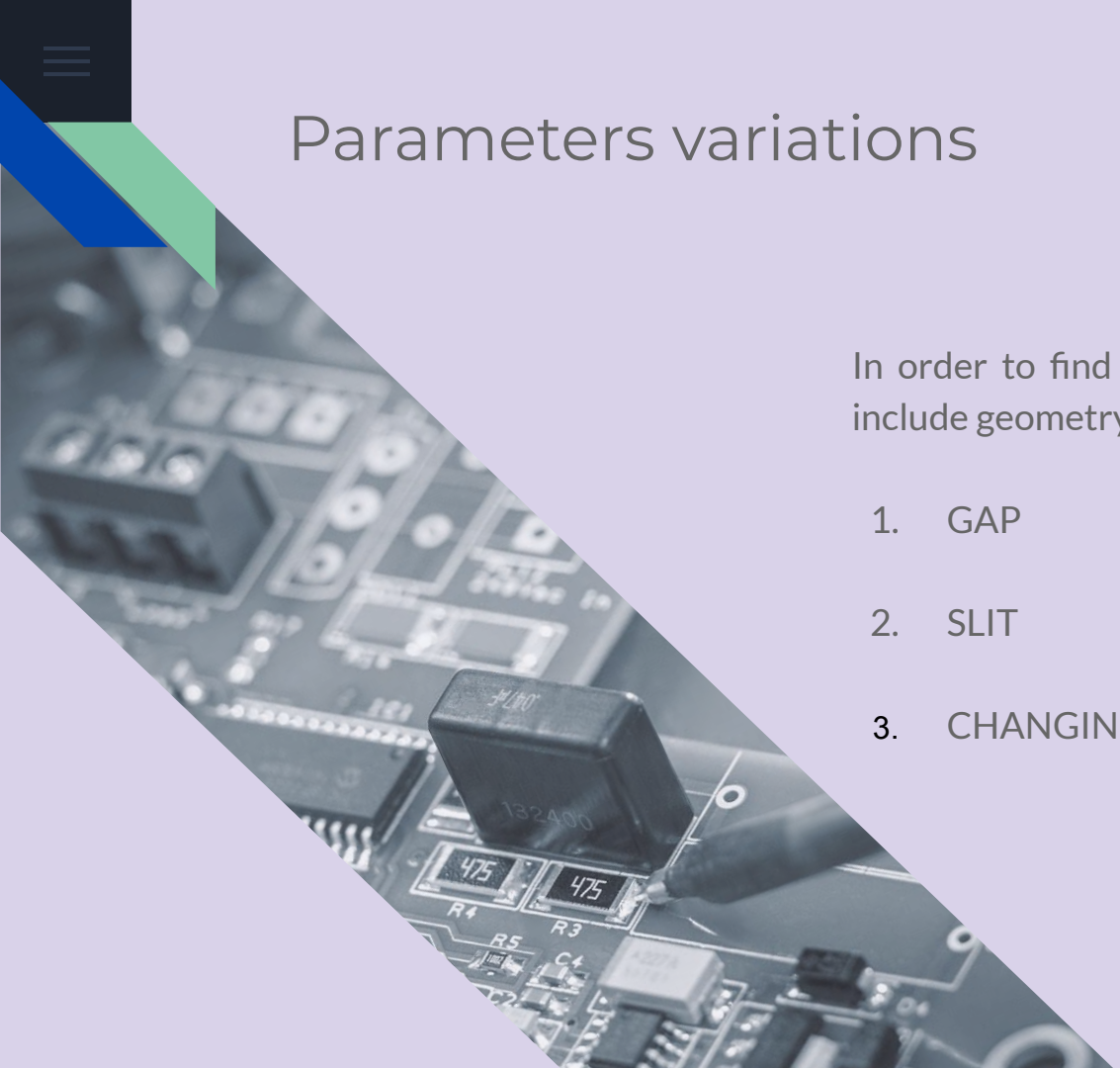
While designing we aim for the high absolute value of the input match (s11) since it represents the measure of the power absorbed by load.

Gain is the representation of the power density concentrated in a particular direction



Gain response of dual resonance patch antenna

Parameters variations



In order to find optimum design adjustments which include geometry and dielectric thickness are done.

1. GAP WIDTH CHANGES
2. SLIT LENGTH CHANGES
3. CHANGING DIELECTRIC THICKNESS

GAP WIDTH CHANGES

WIDTH (mm)	Frequency (GHz)	S11(dB)	Gain(dB)
7.2	5.04	-16.47	8.88
	7.42	-19.32	5.71
8.8	4.98	-15.48	8.82
	7.42	-22.01	5.92
10.4	4.94	-10.97	8.85
	7.38	-30.33	6.59
12	4.8	-10.73	8.56
	7.32	-24.07	7.08
13.6	4.74	-8.71	8.39
	7.12	-17.26	6.13

SLIT LENGTH CHANGES

LENGTH (mm)	Frequency (GHz)	S11 (dB)	Gain(dB)
0.8	4.88	-10.99	8.76
	7.48	-23.25	7.28
1.6	4.94	-10.97	8.85
	7.38	-30.33	6.59
2.4	4.96	-13.35	8.81
	7.24	-23.50	5.25
3.2	4.98	-13.77	8.77
	7.06	-18.41	3.15
4	5.02	-14.86	8.81
	6.82	-13.94	2.19

CHANGING DIELECTRIC THICKNESS

Dielectric thickness (mm)	Frequency (GHz)	S11 (dB)	Gain(dB)
5	4.92	-20.45	6.45
	7.28	-15.26	5.30
10	4.94	-10.97	8.85
	7.38	-30.33	6.59
15	4.92	-10.00	9.55
	7.38	-24.32	7.04
20	4.92	-9.54	10.44
	7.38	-19.88	7.48

Conclusion

simple, affordable and compact device

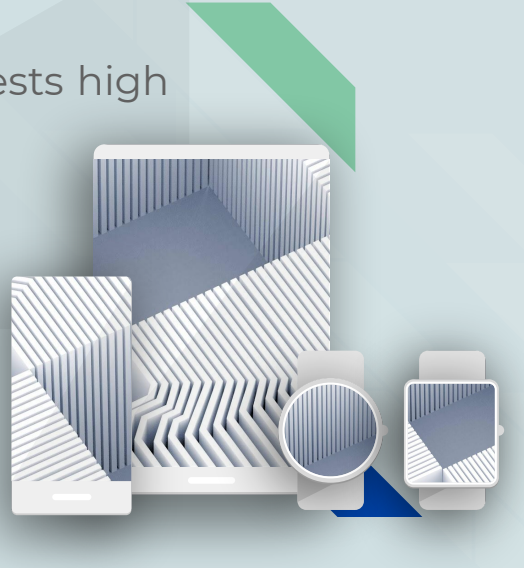
an important part of the communication wireless technology

simulations are done in one minute which manifests high speed response

Values for S11 parameters
-10.97 dB and **–30 dB**

Gain exceeds:
8.85 dB and **6.59 dB**

for **4.94GHz** and **7.38GHz**, respectively.



Acknowledgment

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