International Journal of Scientific Engineering and Technology (ISSN : 2277-1581)
www.ijset.com, Volume No.1, Issue No.4, pp : 16-20 01 Oct. 2012

Micro-strip Patch Antenna on Glass Proxy Substrate for Infinite and Finite Ground Plane

Samvedna Srivastava, Prof. Rajesh Nema, Prof. Rajeev Kumar Thakur

Department of Electronics and Communication N.R.I.I.S.T. Bhopal (M.P.) India
Email: simmi.samvedna@gmail.com, rajeshnema2010@rediffmail.com, rajeevthakur@gmail.com

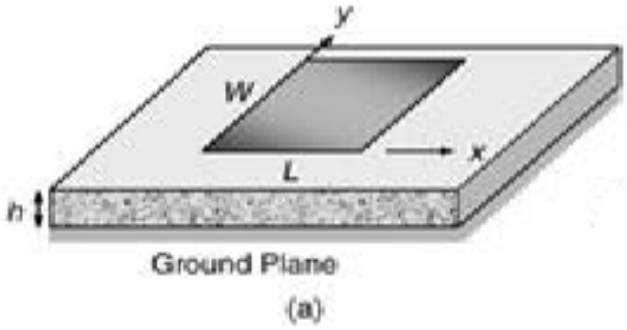
ABSTRACT

In this paper we have analysed and designed a rectangular microstrip antenna. We analyzed micro strip antenna in IE3D by finite moment of method. In this paper we have compare and analyzed the micro strip antenna in infinite ground plane having dimension length, L = 700mil & width, W=800mil to the micro strip antenna in finite ground plane having dimension length, L = 1468mil & width, W=1568mil. The proposed antenna designs have been analyzed between 1GHz to 10 GHz. When the proposed antenna design on a 59mil GLASS PROXY Substrate of different dimension were examined for the same dielectric constant 4.3, loss tangent .019. At 5GHz the verify and Tested result on IE3D SIMULATOR for infinite ground plane are Return loss = -19dB, VSWR= 1.249. At 2GHz and 6GHz the verify and tested result on IE3D SIMULATOR for finite ground plane are Return loss = -11.81dB and -16dB, VSWR= 1.726 and 1.379. All results shown in Simulation results.

Keywords
Micro strip antenna, IE3D Simulator, Dielectric, Patch width, Patch Length, Characteristic Impedance, Losses

1. INTRODUCTION

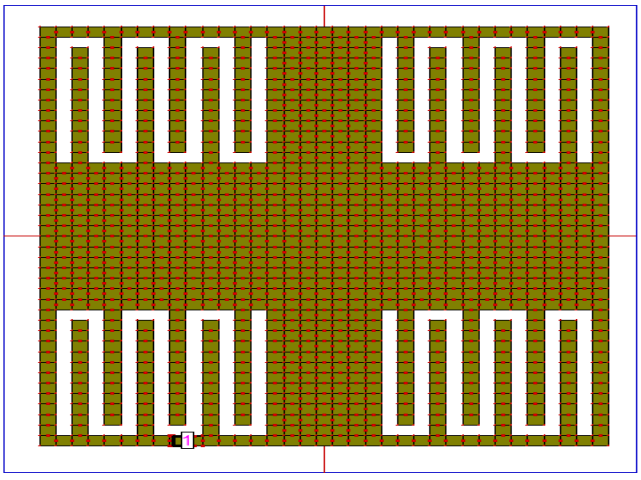
The area of microstrip antennas has seen some inventive work in recent years and is currently one of the most dynamic fields of antenna theory.This designing is very easy and chip in microstrip antenna designing.For simplity analysis and performance prediction, the patch is generally square, rectangular, circular, triangular, and elliptical or some other common. Among these the rectangular and circular patches are probably the most extensively used patches. As it is very easy to analyze a rectangular microstrip antenna. So in our paper we shall be designing a rectangular microstrip antenna. In this paper we have analyzed and tried to find out at which feed point in antenna will give better return loss. For our detected feed point, we have checked out all remaining parameters for it such as dB and phase of S parameter, real and imaginary part of Z, Smith chart and VSWR.



(a) Rectangular micro strip patch antenna

2. ANTENNA DESCRIPTION

A. PROPOSED ANTENNA AT 5GHz ON 59mil GLASS PROXY SUBSTRATE FOR INFINITE GROUND PLANE



The Proposed antenna has:-

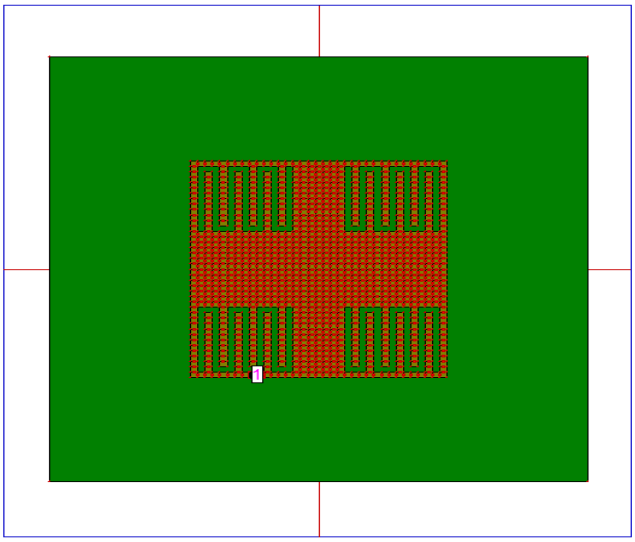
Proposed Patch length = 700 mil

Proposed Patch width = 800 mil

Proposed Height = 128 mil

Bandwidth = $(F_H - F_L)/[(F_H + F_L)/2]$

B. PROPOSED ANTENNA AT 2GHz AND 6GHz ON 59mil GLASS PROXY SUBSTRATE FOR FINITE GROUND PLANE



The Proposed antenna has:-

Proposed Patch Length = 6H + L

= 6(128) + 700

= 1468 mil

Proposed Patch Width = 6H + W

= 6(128) + 800

= 1568 mil

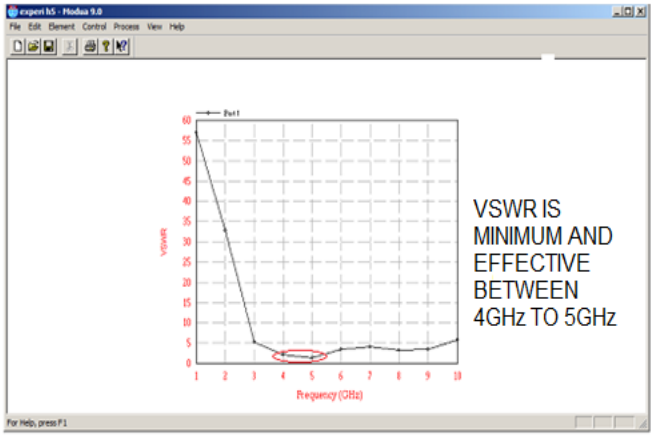
Proposed Height = 128 mil

Bandwidth = $(F_H - F_L)/[(F_H + F_L)/2]$

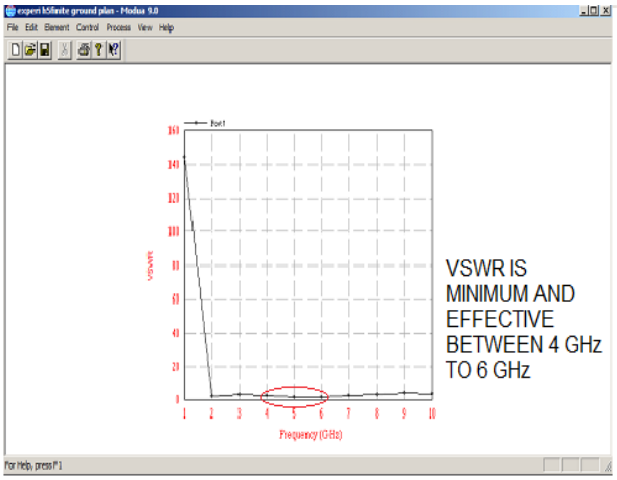
3. RESULT AND DISSCUSSIONS

SIMULATED MICROSTRIP PATCH ANTENNA IN IE3D SIMULATOR FOR 59 mil GLASS PROXY SUBSTRATE

(1) VSWR VS FREQUENCY (IN GHz)

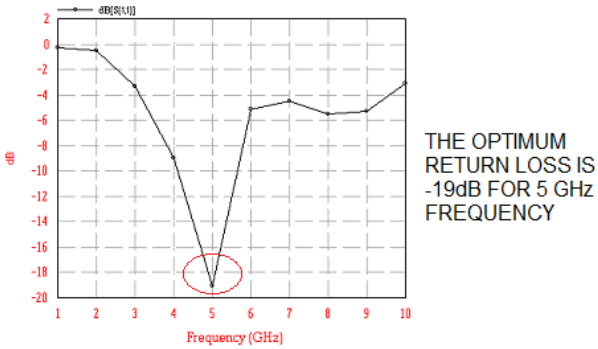


(a) FOR INFINITE GROUND PLANE



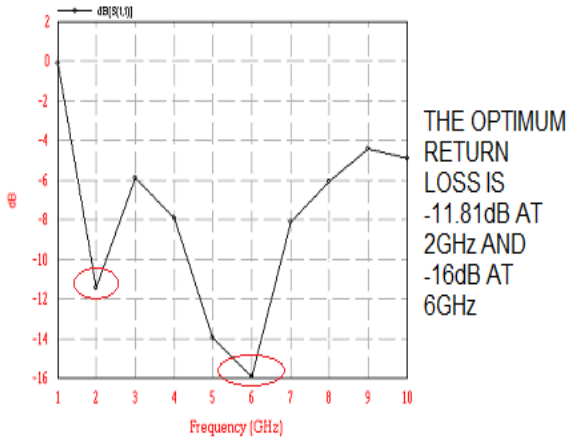
(b) FOR FINITE GROUND PLANE

(2) *RETURN LOSS VS FREQUENCY (IN GHz)*



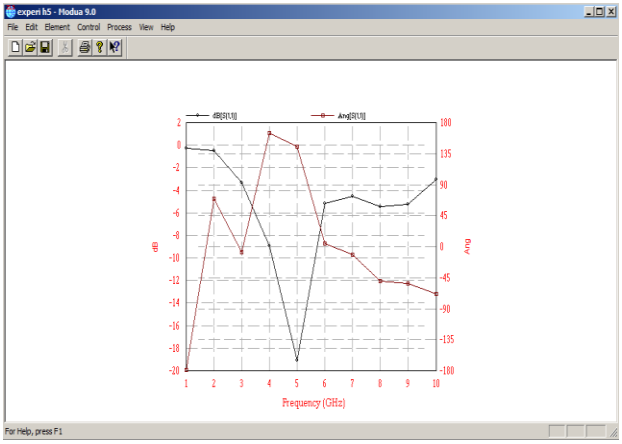
(a) FOR INFINITE GROUND PLANE

International Journal of Scientific Engineering and Technology (ISSN : 2277-1581)
www.ijset.com, Volume No.1, Issue No.4, pp : 16-20 01 Oct. 2012

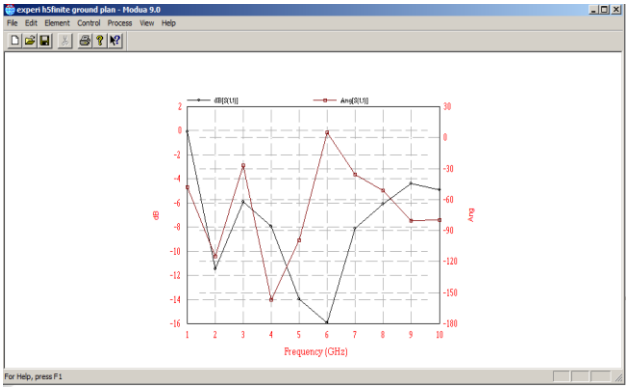


(b) FOR FINITE GROUND PLANE

(3) S PARAMETER *(*MAGNITUDE IN dB AND PHASE*) VS FREQUENCY (IN GHz)*

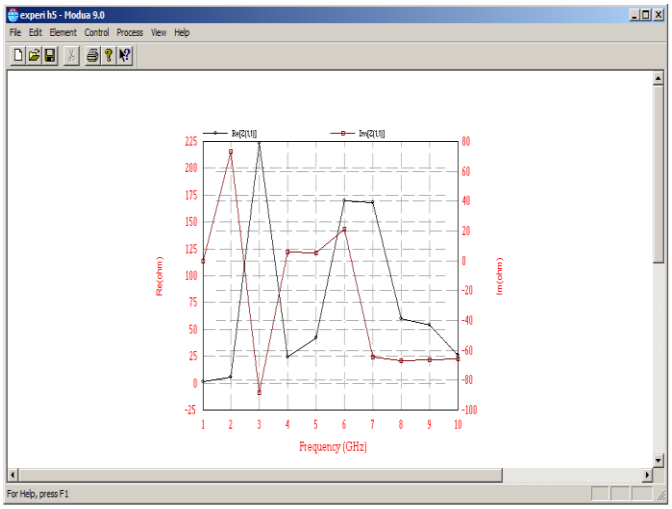


(a) FOR INFINITE GROUND PLANE

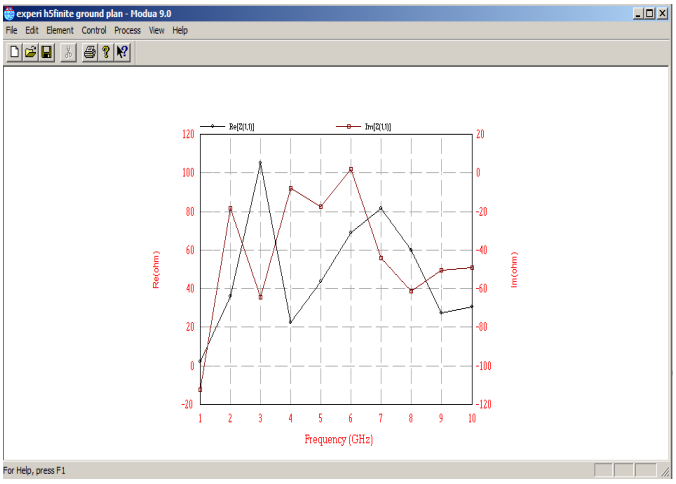


(b) FOR FINITE GROUND PLANE

(4) REAL & IMAGINARY PARTS OF Z-PARAMETERS



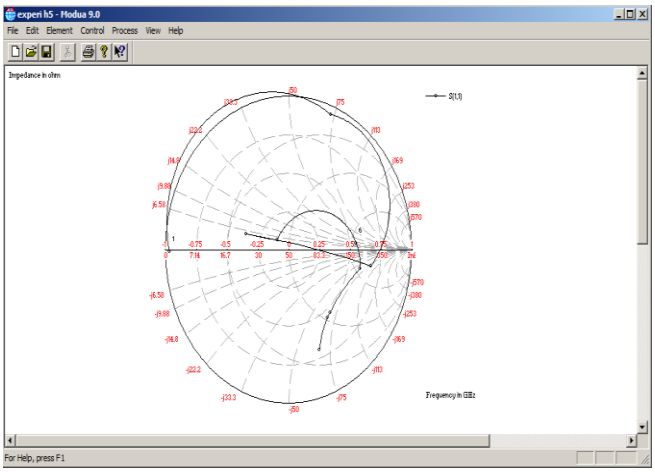
(a) FOR INFINITE GROUND PLANE



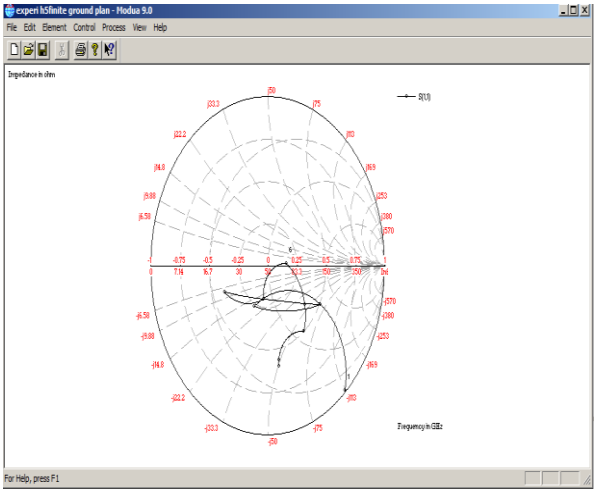
(b) FOR FINITE GROUND PLANE

(5) SIMTH CHART FOR DIFFERENT MEASURMENT

International Journal of Scientific Engineering and Technology (ISSN : 2277-1581)
www.ijset.com, Volume No.1, Issue No.4, pp : 16-20 01 Oct. 2012



(a) FOR INFINITE GROUND PLANE



(b) FOR FINITE GROUND PLANE

SIMULATION TABLE :-

TABLE -1 FREQUENCY (GHz) VS. VSWR (MEASUREMENT BY IE3D SIMULATOR)

FREQUENCY(GHz)	VSWR FOR INFINITE GROUND PLANE	VSWR FOR FINITE GROUND PLANE
1	56.9	144
2	32.63	1.726
3	5.19	3.044
4	2.106	2.332
5	1.249	1.497
6	3.448	1.397
7	3.904	2.288
8	3.253	2.97
9	3.385	4.01
10	5.682	3.601

TABLE -2 dB [S (i j)] IN dB and Ang[S (i j)] IN DEG

(MEASUREMENT BY IE3D SIMULATOR)

FREQ.(GHz)	dB[s(1,1)] FOR INFINITE GROUND PLANE	Ang[s(1,1)] FOR INFINITE GROUND PLANE	dB[s(1,1)] FOR FINITE GROUND PLANE	Ang[s(1,1)] FOR FINITE GROUND PLANE
1	-0.3053	-179.3	-0.1206	-47.92
2	-0.5325	68.63	-11.49	-115.2
3	-3.39	-9.161	-5.926	-26.97
4	-8.968	163.8	-7.965	-157
5	-19.12	145.1	-14.02	-99.64
6	-5.187	4.424	-15.96	4.379
7	-4.551	-12.26	-8.14	-36.04
8	-5.579	-50.47	-6.087	-51.64
9	-5.29	-54.29	-4.425	-80.89
10	-3.09	-68.89	-4.955	-80.26

TABLE-3 REAL AND IMAGINARY PARTS OF Z-PARAMETERS

(MEASUREMENT BY IE3D SIMULATOR)

FREQ.(GHz)	Re[z(1,1)] FOR INFINITE GROUND PLANE	Im[z(1,1)] FOR INFINITE GROUND PLANE	Re[z(1,1)] FOR FINITE GROUND PLANE	Im[z(1,1)] FOR FINITE GROUND PLANE
1	0.8787	-0.3122	2.104	-112.5
2	4.812	73.04	35.8	-18.58
3	222.7	-88.58	105	-64.67
4	24.11	5.477	22.16	-8.249
5	41.37	5.302	43.4	-17.74
6	169.7	20.66	68.86	1.719
7	167.9	-65.02	81.41	-44.33
8	59.33	-67.39	59.8	-61.73
9	53.28	-66.82	27.29	-50.68
10	25.81	-66.28	30.16	-49.38

4. CONCLUSION

Micro strip antennas have become a rapidly growing area of research. Their potential applications are limitless, because of their light weight, compact size, and ease of manufacturing. One limitation is their inherently narrow bandwidth. However, recent studies and experiments have found ways of overcoming this obstacle. A variety of approaches have been taken, including modification of the patch shape, experimentation with substrate parameters, Most notably mobile communication systems where many frequency ranges could be accommodated by a single antenna. We here design simple and low costlier patch antenna for pervasive wireless communication by using different patch length. .In this paper we have compare and analysed the micro strip antenna in infinite ground plane having dimension length, L = 700mil & width, W=800mil to the micro strip antenna in finite ground plane having dimension length, L = 1468mil & width, W=1568mil. The proposed antenna designs have been analyzed between 1GHz to 10 GHz. When the proposed antenna design on a 59mil GLASS PROXY Substrate of different dimension were examined for the same dielectric constant 4.3, loss tangent .019. At 5GHz the verify and Tested result on IE3D SIMULATOR for infinite ground plane are Return loss = -19dB, VSWR= 1.249. At 2GHz and 6GHz the verify and tested result on IE3D SIMULATOR for finite ground plane are Return loss = -11.81dB and -16dB, VSWR= 1.726 and 1.379. All results shown in Simulation results. The optimum results of proposed antenna verify and tested in IE3D SIMULATOR.

ACKNOWLEDGMENT

The Authors would like to thanks Prof. Rajesh Nema, HOD of Electronics and Communication Department and Asst. Prof. Rajeev Kumar Thakur of Electronics and Communication Department of NRI Institute of Science and Technology, Patel Nager, raisen Road Bhopal (M.P.) for their support and Encouragements, and for given testing and development facility for this work.

REFERENCES

[1] Design considerations for rectangular rmicrostrip patch antenna on electromagnetic crystal substrate at terahertz frequency Infrared *Physics & Technology, Volume 53, Issue 1, January 2010, Pages 17-22* G. Singh

[2] Ahmed H. Reja "Study of Micro Strip Feed Line Patch Antenna", Antennas and Propagation International Symposium, vol. 27, pp. 340- 342, December 2008.

[3] Ahmed H. Reja "Study of Micro Strip Feed Line Patch Antenna", Antennas and Propagation International Symposium, vol. 27, pp. 340-342 December 2008.

[4] Mohammad A. A. Subhi H. Ahmad A. K. and Juma S. M. "Cavity model analysis of rectangular micro strip antenna operating in TM03 mode", IEEE proc. pp. 0-2218-2223, 2006.

[5] S. C. Gao, L. W. Li, M. S. Leong, and T. S. Yeo, "Design and analysis of a novel wideband microstrip antenna," in IEEE Antennas and Propagation International Symposium,vol. 1, (Boston, Massachusetts), pp. 90–93, IEEE, July 2001.

[6] M. Khodier and C. Christodoulou, "A technique to further increase the bandwidth Of stacked microstrip antennas," in IEEE Antennas and Propagation International Symposium, vol. 3, (Salt Lake City, Utah), pp. 1394–1397, IEEE, July 2000.

[7] A.Shackelford, K. F. Lee, D. Chatterjee, Y. X. Guo, K. M. Luk, and R. Chair, "Smallsize wide bandwidth microstrip patch antennas," in IEEE Antennas and Propagation International Symposium,vol. 1, (Boston, Massachusetts), pp. 86–89, IEEE, July 2001

[8] R. Garg, P. Bhartia, I. Bahl, and A. Ittipiboon, Microstrip Antenna Design Handbook.London: Artech House, 2001.

[9] C. Balanis, Antenna Theory: Analysis and Design. Toronto: John Wiley and Sons, 2nd ed., 1997

[10] J. Bahl and P. Bhartia, *Microstrip Antennas*. Dedham, MA: Artech House, 1980

[11] S. K Satpathy, Vijay Srinivasan, K P Ray and G Kumar, "Compact microstrip antennas for personal mobile communication", IEEE proc.pp. 245-248, 1998.

[12] Dr. Anubhuti Khare, Rajesh Nema and Puran Gour (2010)," *New Multiband E-Shape Microstrip Patch Antenna on RT DUROID 5880 Substrate and RO4003 Substrate for Pervasive Wireless Communication*, International Journal of Comput