CPW FEED MICROSTRIP PATCH ANTENNA FOR BROADBAND WIRELESS SYSTEM

Sahithya Kandi[#1], Samiran Chatterjee[#2], S. Sudhakar[#3], T. Aruna [#4], Tejaswini Palle[#5],
Suma Reddy Lingala[#6], M.Ramakrishna[#7]

[#1,4,5,6,7]Student, ECE Department, ECE Department, Jyothishmathi Institute of Technology & Science (Affiliated to JNTU, Hyderabad), Nustulapur, Karimnagar, Telangana-505481
*[*2]Associate Professor, ECE Department, Jyothishmathi Institute of Technology & Science (Affiliated to JNTU, Hyderabad), Nustulapur, Karimnagar, Telangana-505481*
*[*3]Assistant Professor, ECE Department, Jyothishmathi Institute of Technology & Science (Affiliated to JNTU, Hyderabad), Nustulapur, Karimnagar, Telangana-505481*

Abstract— *Design and analysis of CPW feed microstrip patch antenna for broadband wireless system is presented in this paper. Antennas are very important components in modern communication. By defi By definition, the antenna is used to convert the radio frequency signal transmitted on the conductor to an electromagnetic wave in free space and the broadband circularly polarized MSA, play a vital role in wireless communication due to its low profile,small size and light weight. Conventional designs of MSA for circular polarization are usually are achieved by truncating patch corners,cutting rectangular ring slots in the rectangular patch.we design the circular microstrip antenna by using the MoM based software IE3D.we present feeding approaches of coplanar wave guide fed CPW, with and without DGS. The antenna matched impedance is 50ohms for FR4, a high dielectric constant substrate to obtain broad impedance bandwidth along with stability of the radiation patterns.*

***Keywords*— Polarized, CPW, Impedance, Band-Width.**

I. INTRODUCTION

The microstrip component consists primarily of the above-ground metal support area, which is called a microstrip patch. The supporting element is called the substrate material that is placed between the patch and the ground level. A microstrip antenna can be manufactured using low-cost lithographic technology or homogeneous integrated circuit technology. Using homogeneous integrated circuit technology, we can manufacture phase switches, amplifiers and other necessary devices, all on the same substrate through an automatic process [1-8]. In most cases, antenna performance characteristics depend on substrate material and physical parameters. This module will give the basic picture of microstrip antenna configurations, analysis methods and some feeding techniques. In the microstrip antenna, the top surface of the insulating substrate supports the printed conductive strip that surrounds it properly while the bottom surface of the substrate is supported by a connected ground plane. This antenna is sometimes called the printed antenna because the manufacturing procedure is similar to the printed circuit board procedure [9-14]. Many types of microstrip antennas have been developed which are differences in the infrastructure. Microstrip antennas can be designed as thin, flat-level antennas which are very useful components for communication applications. Many advantages and applications of microstrip patch antennas can be mentioned on conventional antennas. There are many unwanted features that we have encountered with conventional antennas, they are huge problems, incompatibility and difficult to carry out their operations and so on. Advantages include flat surface, potential integration with circuit elements, small surface, and generation with printed circuit technology, and can be designed for dual frequency and multi-band. Disadvantages include narrowband bandwidth, low power to deal with RF power, greater OMA loss, low efficiency due to surface waves, and so forth. Over the past two decades, researchers have been struggling to overcome these problems and have succeeded several times in their new designs and new results. There are basically four basic ways of feeding on these antennas Method of coupling probe method Feed line Microstrip slot method Coupling Microstrip Feeding method Proximity coupling.

II. ANTENNA DESIGN

Designed antenna is displays in Fig1. We are designed antenna consists of both the layers with the same PTFE substrate which dielectric constant 4.4 and height 1.6mm in the top layer we cut one circular slot with FR4 substrate and in the bottom layer which is shown in fig2 is consists of one rectangular slot and one W shaped with rectangular slot. We use coaxial feeding which considered as a point (0,0) as same as the middle point of the patch and achieve frequency for the intended application. The overall antenna size is 15mm*15mm square patch. All the work is simulated by Electromagnetic solver IE3D [15].

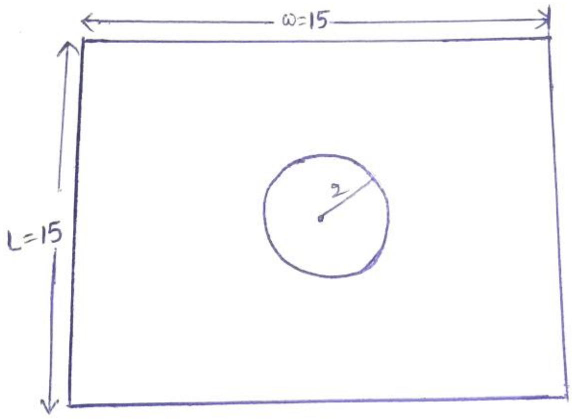

Fig1: Top Structure of Designed Antenna

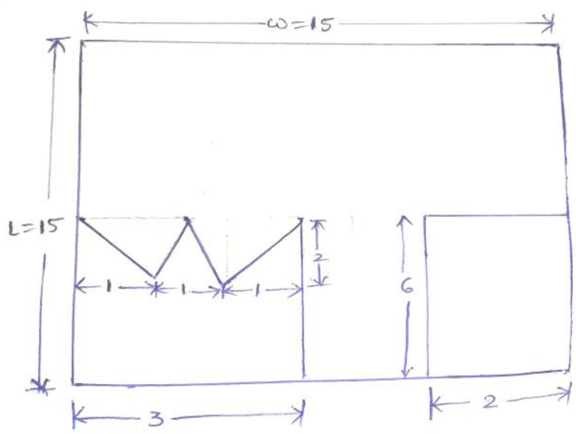

Fig2: Bottom Structure of Designed Antenna

III. RESULTS AND DISCUSSION

Different boundary analysis of the antenna is performed and presented. Analysis and optimization were done to get the best bandwidth resistance. Figure 3 shows the simulation return loss for the proposed antenna; the VSWR figure for the antenna shown in Fig. 4. It shows clearly that the impedance bandwidth for the proposed antenna is 6.33 GHz and its bandwidth is approximately 382.82 MHz for loss of return (S_{11}) below -10 dB.

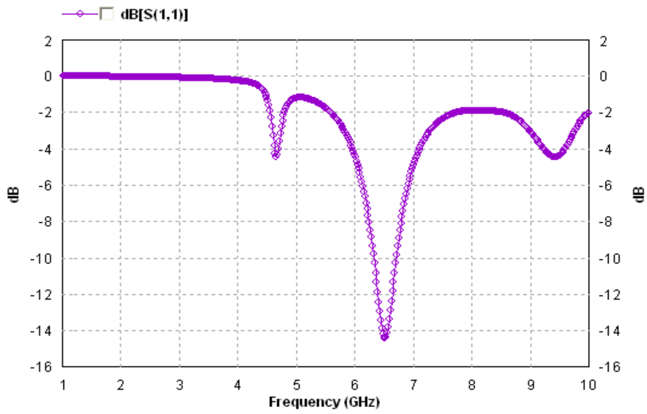

Fig 3: Return Loss Pattern

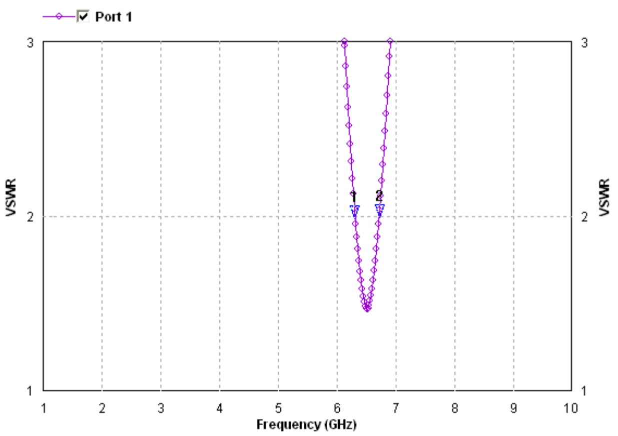

Fig: 4 VSWR Pattern

The smith chart for the proposed antenna is shown in fig. 5.

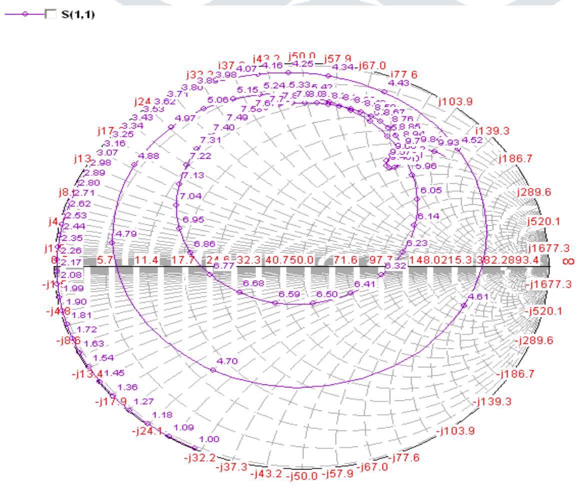

Fig 5:Smith chart pattern

Figure 6 displays the radiation pattern of designed structure.

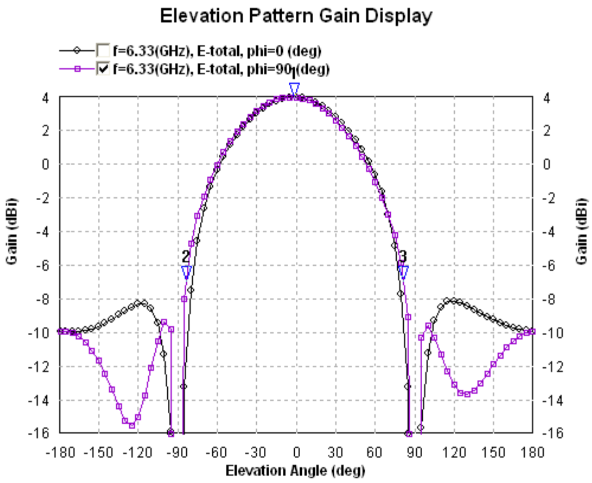

Fig 6: Radiation pattern

Cumulative Results are summarized in Table-1, Table-2 and Table-3.

Table 1: FREQUENCY with VSWR

Frequency (GHz)	VSWR
6.33	1.47

Table 2: FREQUENCY with GAIN

Frequency (GHz)	Gain (dBi)	Beam width (Degree)
6.33	3.928	164.926^0

TABLE 3: FREQUENCY with RETURN LOSS

Frequency (GHa)	return loss(dB)	bandwidth (MHZ)
6.33	- 14.345	382.82

IV. CONCLUSION

Double layer, single CPW feed antenna printed micro patch that conducted theoretical investigations using the immediate program of IE3D. This paper describes a detailed analysis and implementation of patch micro-patch CPW antenna for wireless broadband system. The big improvement shows a maximum loss of yield of -14.345 dB plus a VSWR of about 1.47. Another finding was also observed that, for the proposed antenna, the three-dimensional beam width of the radiation scheme of about 164.93^0 was sufficiently wide for the intended applications

ACKNOWLEDGEMENT

We are grateful for the financial support for this work provided by the JYOTHISHMATHI INSTITUTE OF TECHNOLOGY AND SCIENCE and all faculty members of the ECE department to carry out this work successfully.

REFERENCES

1. I. Sarkar, P. P. Sarkar, S. K. Chowdhury A new compact printed antenna for mobile communication. 2009, Loughborough Antennas & Propagation Conference 16-17 Nov. 2009, Loughborough, UK.
2. J.-W. Wu, H.-M. Hsiao, J.-H. Lu and S.-H. Chang, "Dual broadband design of rectangular slot antenna for 2.4 and 5 GHz wireless communication", IEE Electron. Lett. Vol. 40 No. 23,11th November 2004.
3. Samiran Chatterjee, Joydeep Paul, Kalyanbrata Ghosh, P. P. Sarkar, D.Chanda (Sarkar) and S. K. Chowdhury "A Compact Microstrip Antenna for WLAN Communication", National Conference of Electronics, Communication and Signal Processing, 2011, Paper ID: 116
4. Rohit K. Raj, Monoj Joseph, C.K. Anandan, K. Vasudevan, P. Mohanan, " A New Compact Microstrip-Fed Dual-Band Coplaner Antenna for WLAN Applications", IEEE Trans. Antennas Propag., Vol. 54, No. 12, December 2006, pp 3755-3762.
5. U. Chakraborty, S. Chatterjee, S. K. Chowdhury, and P. P. Sarkar, "Triangular Slot Microstrip Patch Antenna for Mobile Communication", India Conference (INDICON), 2010 Annual IEEE, pp 4-7, Paper ID: 511
6. J. -Y. Jan and L. -C. Tseng, " Small planar monopole Antenna with a shorted parasitic inverted-L wire for Wireless communications in the 2.4, 5.2 and 5.8 GHz bands" , IEEE Trans. Antennas and Propag., VOL. 52, NO. 7, July 2004, pp -1903-1905.
7. S. Chatterjee, U. Chakraborty, I.Sarkar, S. K. Chowdhury, and P. P. Sarkar, "A Compact Microstrip Antenna for Mobile Communication", India Conference (INDICON), 2010 Annual IEEE, pp 1-3, Paper ID: 510
8. Danideh, A., R. S. Fakhr, and H. R. Hassani, "Wideband coplanar microstrip patch antenna," Progress In Electromagnetics Research Letters, PIER 4, 81–89, 2008.
9. Samiran Chatterjee, Joydeep Paul, Kalyanbrata Ghosh, P. P. Sarkar and S. K. Chowdhury "A Printed Patch Antenna for Mobile Communication", Convergence of Optics and Electronics conference, 2011, Paper ID: 15, pp 102-107
10. J. Bahl and P. Bhartia, "Microstrip Antennas", Artech House, Dedham, MA, 1980.
11. U. Chakraborty, S. Chatterjee, S. K. Chowdhury, and P. P. Sarkar, "A compact microstrip patch antenna for wireless communication," Progress In Electromagnetics Research C, Vol. 18, 211-220, 2011
12. R.Fallahi, A.-A.Kalteh, M. Golparvar Roozbahani, "A novel UWB elliptical slot antenna with band-notched characteristics," Progress In Electromagnetics Research C, Vol. 18, 211-220, 2011
13. Samiran Chatterjee, Santosh Kumar Chowdhury, Partha Pratim Sarkar and Debasree Chanda Sarkar, "Compact Microstrip Patch Antenna for Microwave Communication", Indian Journal of Pure & Applied Physics, Vol. 51, November 2013, pp 800-807.
14. C. A. Balanis, "Advanced Engineering Electromagnetic", John Wiley & Sons., New York, 1989.
15. Zeland Software Inc. IE3D: MOM-Based EM Simulator. Web: http://www.zeland.com