ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 4, April 2015

Design of Six Slotson Microstrip Patch Antenna

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Abstract: In this paper a microstrip slot patch antenna is designed for WLAN applications. The antenna is designed to operate at 2.4GHz using the Advanced Digital System(ADS) software. The proposed antenna is designed and fabricated usingFR4 substrate with the design specification dielectric constant of 4.6 and thickness (d) of 3.2mm. The antenna produces gains of 3.75dBiand a directivity of 6.58dBi at 2.4GHz which suitable for WLAN applications.

Keywords: ADS, FR4, WLAN, Patch

I. INTRODUCTION

There is a developmental trend in wireless communication system that demands the use of antennas capable of accessing services in various frequency bands . The increasing demand for modern mobile, satellite and wireless communication systems. Microstrip antennas are relatively inexpensive to manufacture. They are usually employed at UHF and higher frequencies because the size of the antenna is directly tied to the wavelength at the resonant frequency.The rectangular patch antenna is approximately a one-half wavelength long section of rectangular microstrip transmission line.One of the major disadvantages of patch antenna is its narrow bandwidth.

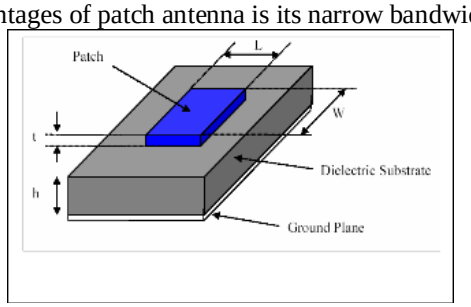

Fig 1: General Patch Antenna

world make many researchers worked hard in order to improve the performances and enhance the application of the Microstrip Patch Antenna (MSA). Modern implementations of WLANs range from small in-home networks to large, campus-sized ones to completely mobile networks on airplanes and train.

A wireless local area network (WLAN) which links two or more devices using a wireless distribution method within a limited area such as a home, school, computer laboratory, or office building.Wireless LANs have become popular in the home due to ease of installation and use, and in commercial complexes offering wireless access to their customers. In this paper, sixslots are incorporated in microstrip patch antenna.

The patch was mounted on substrate FR4.The behaviours of a rectangular microstrip slot patch antenna of operating at 2.4 GHz havebeen studied and analyzed. Antenna parameters like Gain,Directivity and Power radiated are analysed.

II. ANTENNA DESIGN

The geometry of the proposed antenna shown in figure 2 is fabricated on an FR4 substrate.The thickness of dielectric substrate (FR4) is 3.2mm and its relative permittivity of 4.6.The overall dimensions of patch antenna are 37 mm x28mm(WXL).Each slots has a width of 1mm and length of 10mm.The spacing between slots are 4.3mm.

The antenna is built on the FR4 substrate of the thickness 3.2 mm. The effective dielectric constant of the substrate is 4.6. The FR4 substrate is used to be very cost effective and easy to fabricate the antenna. Hence the FR4 substrate is widely preferred than any other substrate.

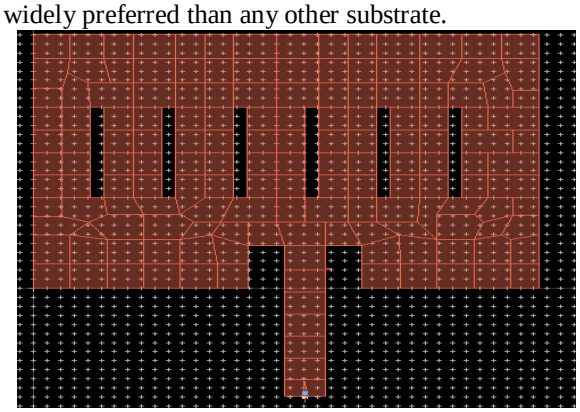

Figure 2: Design of Patch

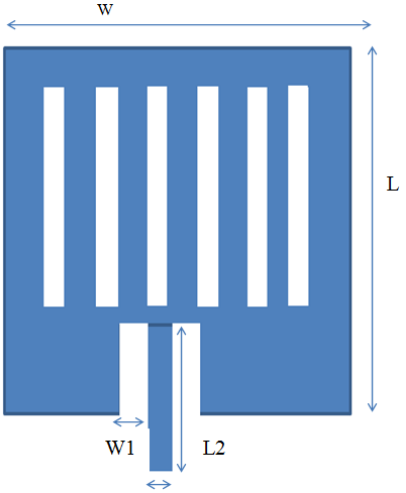

Figure 3: Dimensions of the strips

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The dimensions of the entire antenna is shown in the tabulation below

Parameters	Dimensions
Width W	37mm
Length L	28mm
Slot length	10mm
Slot Width	1mm
Spacing between Slots	4.3mm
W1	2.4mm
W2	3mm
L2	16.6mm

Table 1: Dimensions

III. RESULTS

The simulated S11 of the proposed antenna which works at the frequency of 2.4GHz of WLAN application. The simulation is carried out in Advanced Design System (ADS). It produces the 8 pattern shape which produces the radiation to its orthogonal side of each lobe.

m1
Freq=2.4GHz
dB(s11_fitted)= -40.000

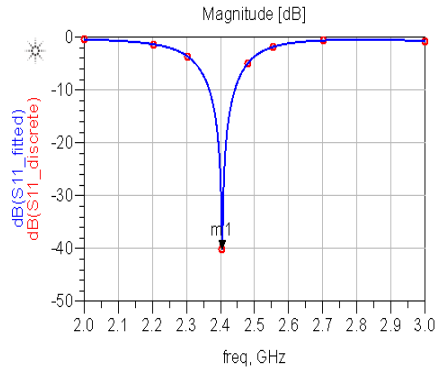

Figure 4: Obtained return loss at S(1,1)

The return loss at the port S(1,1) is obtained at the frequency of 2.4 GHz frequency of WLAN application. The radiation patterns that are obtained at this particular frequency is shown below

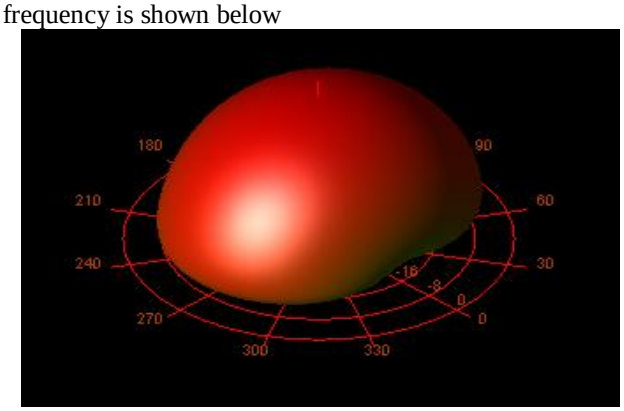

Figure 5: 3D Radiation pattern

The antenna parameters that are obtained during the simulation was at satisfactory level. The parameters are given below

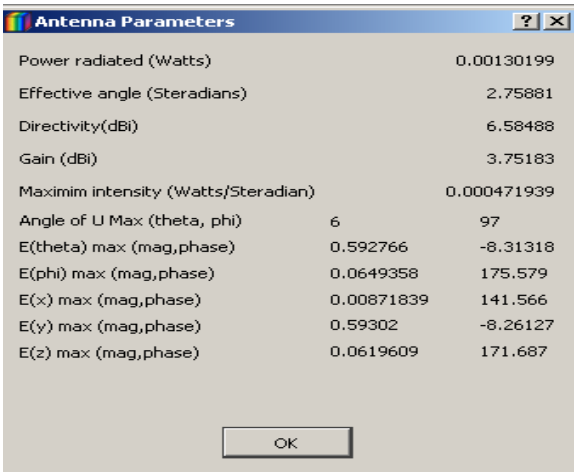

Figure 6: Antenna Parameters

The radiation throughout the antenna is shown here. The red color denoted the maximum radiation across the antenna.

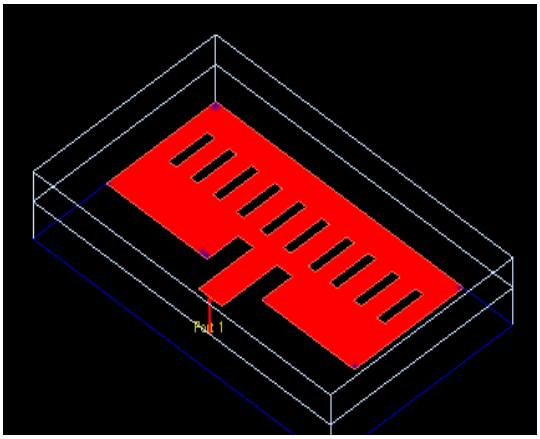

Figure 7: Radiating region

The 2D radiation pattern is also obtained which also denotes the efficiency of the antenna in percent. Hence the radiation pattern is given below

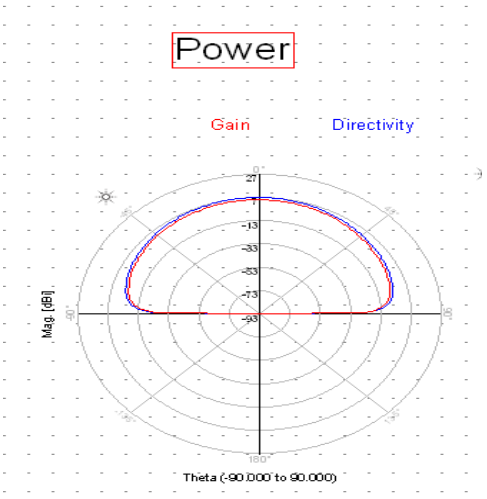

Figure 8: 2D radiation pattern

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IV. CONCLUSION

The directivity of the antenna is 6.58dbi and the gain of the antenna is 3.75dbi .The proposed method uses FR4 as substrate and hence the cost of the antenna is also low. It is also showed that the antenna is achieved the satisfactory level of radiating properties and antenna parameters.

REFERENCE

[1]. Iftikhar Ahmed, Imran Shoaib, NosherwanShoaib, ArslanRasheed and Sultan Shoaib**"**A Printed Hybrid Loop Planar Inverted-F Antenna for Next Generation Handheld Terminals" 7th European Conference on Antenna and Propagation 2013**.**

[2]. J. L. Pan, S. S. Rappaport, and P. M. Djuric, "A multibeam medium access scheme for multiple services in wireless cellular communications," in Proc. IEEE 1999 Int. Conf. Communication, vol.3, 1999, pp. 1673–1677.

[3]. L. Jofre, B. A. Cetiner, and F. Flaviis, "Miniature Multi-Element Antenna for Wireless Communications," IEEE Trans. Antennas Propagat., vol.50, N. 5. pp. 658–669, May 2002.

[4]. I-F. Chen, C. M. Peng, and S-C. Liang, "Single Layer Printed Monopole Antenna for Dual ISMBand Operation," IEEE Trans. Antennas Propagat., vol.53, N. 4. pp. 1270–1273, April. 2005.

[5]. R. Jordan and C.T. Abdallah, "Wireless communications and networking: An overview," IEEE Antennas Propag. Mag., vol. 44, pp. 185– 193, Feb. 2002.

[6]. Y. Ge, K. P. Esselle, and T. S. Bird, "E-Shaped Patch Antennas for High-Speed Wireless Networks," IEEE Trans. Antennas Propagat., vol.52, N. 12.pp. 3213–3219, December. 2004.