International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2018 IJSRCSEIT | Volume 3 | Issue 3 | ISSN : 2456-3307

E Shaped Multiband Microstrip Patch Antenna

Rahul Ohlan
M.Tech ECE Department D.C.R.U.S.T Murthal, MSc Computer Science Department, A.I.J.H.M.C Rohtak, Haryana, India

ABSTRACT

This research paper aims to design the E shape multiband microstrip patch antenna. A single layer, single feed compact slot patch antenna, is thoroughly surveyed. Resonant frequency has been drastically reduced by cutting slots. Design parameter can be calculated by transmission line model. For the simulation process CST microwave studio software has been used.

Keywords : CST, FR4 Epoxy

I. INTRODUCTION

This paper provides a complete design study of Multiband Micro-strip Patch Antenna using E-shape slotted patch with Micro-strip feed line .This is a simulation based study. Firstly antennae are designed for 3.4 GHZ frequency. The antenna parameters are varied to study the effect of variation of the antenna parameters on antenna performance. CST software is used for the design and simulation of antenna. The patch and feeding lines are usually photoetched on the dielectric substrate. The conducting patch is designed in any shape such as square triangular, circular, rectangular .Rectangular microstrip patch antenna is used in this paper.

II. MICROSTRIP PATCH ANTENNA

A microstrip patch antenna made of radiating patch on one side of a dielectric substrate which consist of a ground plane on the other side. The microstrip antenna includes patch metallic strip placed on the ground plane. The thickness of the patch can be considered as (thickness << wave length). Patch can be of any shape and is made of conducting materials. Substrate which consists of di-electric material is placed between radiating patch and ground plane. The (di-electric) constant range should lie between 2.2-12.

1) Feeding Technique

Microstrip patch antennas are feed by two methods namely contacting and non contacting methods. Feeding antenna refers to give power to the antenna.In contacting method,connecting element which is also known as microstrip feed line is used to give the radio matching frequency power to the patch of the antenna. Co-axial feed is also contacting method. In this paper feeding to antenna is done through microstrip feed line.In this method matching element to match impedance is not required. An effective impedance matching is done by controlling the inset positions.

Characteristics of microstrip feed line technique

- ✓ It provides better reliability as compared to coaxial feed method.
- ✓ Easy to fabricate.
- ✓ No matching element required.

Methods for analysis of Antenna

For the analysis of microstrip patch antenna, different models are being used namely transmission line model, cavity model and Full wave model. Transmission line model is simplest model for the analysis of antenna. It is less accurate. In this paper, transmission line model has been used.

$$W = \frac{c}{2f}\left((\varepsilon_r + 1)/2\right)^{-1/2} \quad \text{----- (1)}$$

$$L = \frac{c}{2f}\sqrt{\varepsilon_{eff}} - 2\Delta L \quad \text{------ (2)}$$

Software

In this paper the software tool CST Micro-wave Studio is used for designing and simulation of antenna.CST is a software that provide number of tools for each stage of out design flow and CST also helps to improve, the design of the antenna

The most prominent feature of the CST is that it is able to give results in one go. The ability to operate in time domain and converts the result in frequency domain gives speed to CST.

Antenna Design

In this section, the geometry of E-shape multiband micro-strip patch antenna is described and the methodology for the design of the antenna at 3.4 GHZ, 6.6GHZ, and 8.7 GHZ is also discussed for S-Band applications.

Antenna Geometry

The Geometry of the E-shape multiband microstrip patch antenna is shown in the table

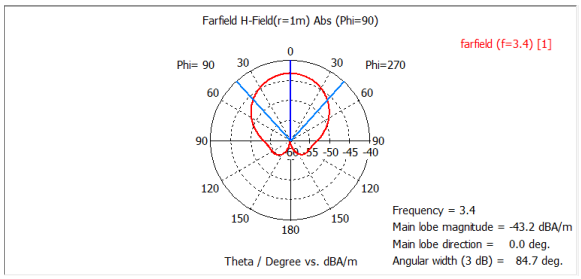
Table 1

	Length (in mm)	Width(in mm)	Thickness(in mm)
Patch	30	30	.007
Substrate	50	50	1.524

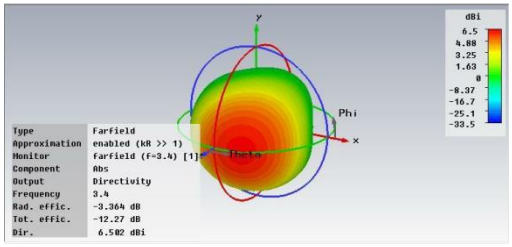
Simulation Results

When CST has completed the solution, the results can be displayed and analysed, Reports on S-Parameter, impedance radiation parameter are generated.

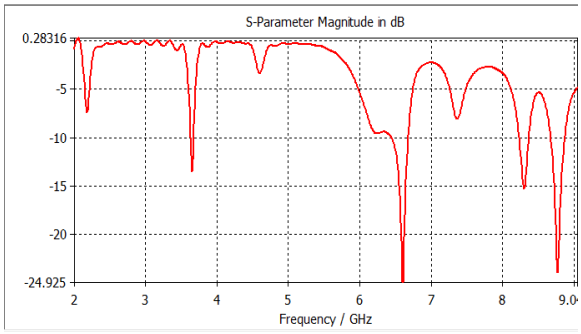
Polar plot at 3.4 GHZ



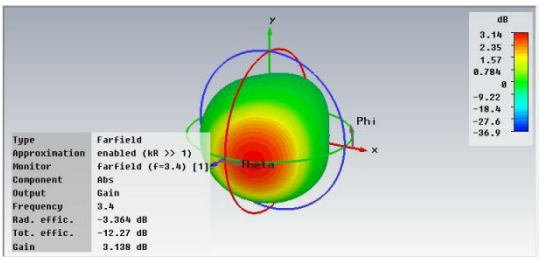
Directivity at 3.4 GHZ



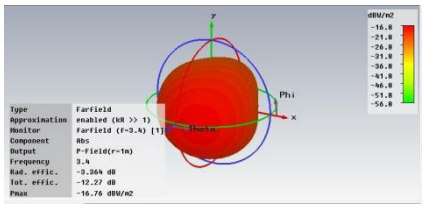
S11 – Frequency Graph



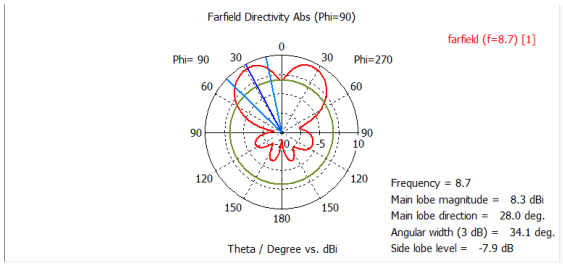
Gain at 3.4 GHZ



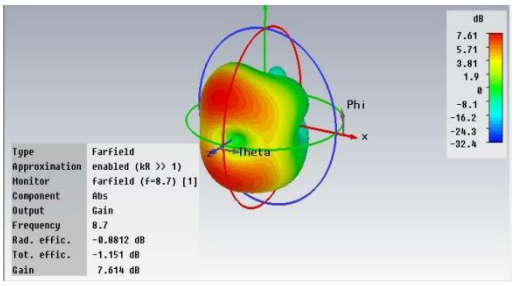
Power Pattern at 3.4 GHZ



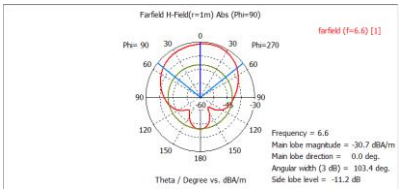
Polar Plot aT 8.7 GHZ



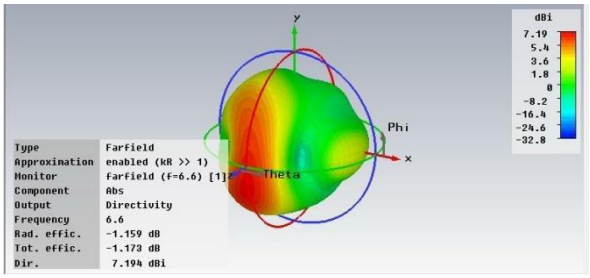
Gain at 8.7 GHZ



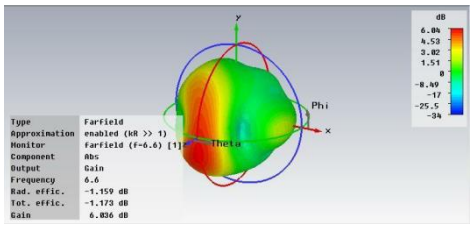
Polar Plot at 6.6GHZ



Directivity at 6.6 GHZ



Power pattern at 6.6 Ghz



III. CONCLUSION

This paper gives a detail study of E-shape multiband microstrip patch antenna. CST software tools are used for designing and simulation of the antenna. Initially, the E-shape micro-strip patch antenna is designed at 3.4 GHZ Further,it can be made to extend to work at 6.6 and 8.7 GHZ. The antenna has to be made to work for the applications for WLAN and Wi-Fi etc.

IV. FUTURE SCOPE

This paper provides a detailed study of E-shape multiband microstrip patch antenna. Here a micro-strip feed line feed is used. The characteristic of the antenna can be increased by using other feeding techniques. Bandwidth of the E-shape can be further increased by techniques such as increasing substrate thickness. A thorough analysis of the antenna is done. Different methods are proposed for reducing the operating frequency range for applications in the field of mobile communication.

V. REFERENCES

[1]. A. A. Heidari,M. Heyrani,And M. Nakhkash,"A Dual-Band Circularly Polarized Stub Loaded Microstrip Patch Antenna For Gps Applications",Progress In Electromagnetics Research,Pier 92,2009.

[2]. C.A. Balanis,"Antenna Theory: Analysis And Design",2nd Ed.,John Willey And & Son,Inc.,1997.

[3]. EM Simulation Software CST Studio Suite™,V9.

[4]. D. M. Pozar and D. H. Schaubert,Microstrip antennas,the analysis and design of Microstrip antennas and arrays,New York: IEEE press,1995

[5]. Garg,R.,P. Bhartia,I. Bahl,And A. Ittipiboon,"Microstrip Antenna Design Handbook",Arech House,Norwood,2001

[6]. M. Tariqul Islam,M.N. Shakib,N. Misran.,and B. Yatim," Analysis of L-Probe Fed Slotted Microstrip Patch Antenna," in Eleventh IEEE International Conference on Communication Systems (IEEE ICCS 2008),Guangzhou,China,November 19-21,2008.

[7]. N. Ghassemi,J. Rashed-Mohassel,M. H. Neshati And S. Tavakoli,M. Ghassemi,"A High Gain Dual Stacked Aperture Coupled Microstrip Antenna For Wideband Applications",Progress In Electromagnetics Research B,Vol. 9,2008.

[8]. Rahul Verma,Nitin Vyas,Rahul Rana,Vipin Kaushik,A. K. Arya," Design Study of Microstrip Antenna with Various Feeding Techniques: A Review",International Journal of Engineering Research & Technology (IJERT),Vol. 3 Issue 5,May 2014

[9]. Ysai,S.N.,H.H. Hsin,H.K. Dai,and K.T. Cheng,Arcuate Slot Antenna Assembly,2002