ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

DESIGNING OF TWO ELEMENT SINGLE BAND ANTENNA WITH IMPROVED ISOLATION

Roshani Patidar [*1], Prof.Vijay Bisen [2]
[*] Electronics & Communication Engineering, VITM Indore, India.

DOI: 10.5281/zenodo.1042102

ABSTRACT

In the recent years the development in communication systems requires the development of low cost, minimal weight, low profile antennas that are capable of maintaining high performance over a wide spectrum of frequencies. In this thesis, the 2X1 Hexagonal shape designs of a Micro strip patch antenna have been analyzed and studied. The designed having resonant frequencies 2.4 GHz for wireless communication standards. The proposed patch antenna is designed and simulated on CST microwave studio simulation software and it is designed to operate in 2.4 GHz,. The good return loss, isolation, ECC and bandwidth of 50 MHz found.

KEYWORDS: MPA, MIMO, ECC, VSWR, FR4**.**

I. INTRODUCTION

An Antenna is one of the essential parts for microwave communication. Since it help both transmitting and receiving the information. Antenna is a transducer which converts the voltage and current on a transmission line into an electromagnetic field which consists of an electric and magnetic field travelling right angles at each other. Microstrip patch antenna is a small size antenna and it can be printed directly on a circuit board. Microstrip patch antennas due to their many attractive features have drawn attention of industries for an ultimate solution for wireless communication [1]. It is analyze that the patch is generally square, rectangular, circular, triangular, and elliptical or some other common shape. The most commonly employed microstrip patch antenna is a rectangular patch. The rectangular patch antenna is a one wavelength long section of rectangular microstrip transmission line. When the air in the antenna substrate the length of the rectangular microstrip antenna is approximate one half of a free space wavelength. The antenna consists of a dielectric as its substrate the length of the antenna decreases as the relative dielectric constant of the substrate increases the proper miniaturized antenna will improve the transmission and reception [1].

Antennas play a very important role in the field of wireless communication. Few of them are Parabolic Reflector, Patch Antennas, Slot Antennas, and Folded Dipole Antennas. Each type of antenna is good in their own properties and usage. It is said that the antennas are backbone in the wireless communication without which the world could have not reached at this age of technology [2]. Patch antennas play a very significant role in today's world of wireless communication. A Microstrip patch antenna is very simple in the designing & using a conventional Microstrip fabrication technique. The most commonly used Microstrip patch antennas are rectangular and circular patch antennas. Some important phenomena like dual characteristics, circular polarizations, dual frequency operation, frequency agility, broad band width, feed line flexibility, beam scanning can be easily obtained from these patch antennas [2].

Design of antenna:

The front view of proposed antenna is given in figure 1 and back side is represented in figure 2. The antenna design geometry is given in figure 3 where first full hexagon structure is designed and then cut of hexagon is created.

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

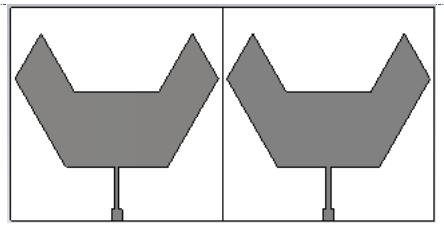


Figure 1 Front View of designed antenna

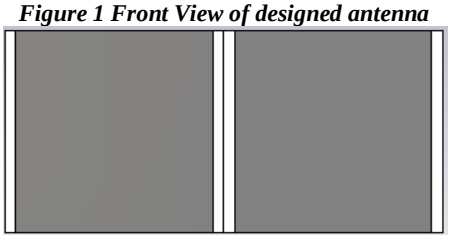
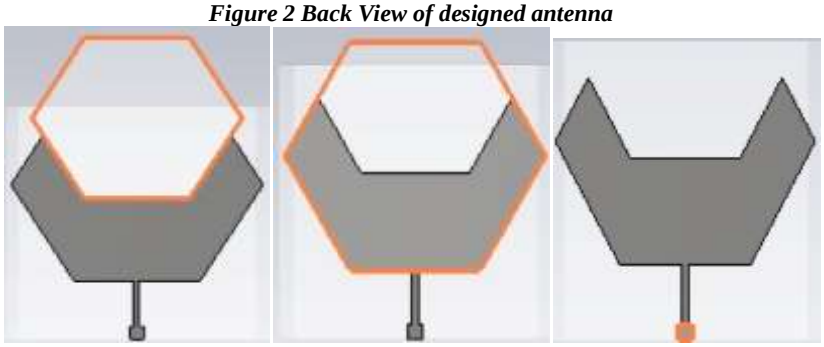


Figure 2 Back View of designed antenna



(a) *(b)* *(c)*

Figure 3. Complete design geometry

II. MATERIALS AND METHODS

Literature Review and Methodology

In the early 1970's, the first practical microstrip radiating antenna was presented by Byron [1]. In [3], the basic design of rectangular and circular patch antennas was presented by Howell. An experimental study on the rectangular microstrip patch antenna was performed by C.L Mak and Y.L Chow et al. [4] using L-shaped probe. To use various applications simultaneously, we use multiple antennas instead of single antenna at the transmitter and the receiver. This technology is known as MIMO technology.

There are several design challenges in microstrip patch antenna with MIMO technology. Main challenges are to provide high isolation or to increase bandwidth. Several researches were proposed to increase isolation. High isolation can be achieved by various methods which involve different shape of patch, different structure placed in between radiating element, modified ground plane etc. [2]

R. Leclaratne presented a micro strip patch antenna which works for satellite communications [6]. The antenna uses circular polarization. A wide-band Dual polarized microstrip patch antenna with Directional Coupler is presented by K.L. Lau in [7]. A directional coupler mounted at the back of the ground plane and an enhancement of the isolation between the L-shaped antennas. The antenna has high isolation and simple structure. Kin-Lu Wong et al. presents Broadband Dual-polarized Aperture Coupled patch antennas with modified H-Shaped Coupling slots.

A new design of aperture coupled patch antenna with modified H-Shaped coupling slots to achieve dual polarized radiation with high isolation over a wide range of frequency presented in this paper. A simple impedance matching technique is presented by Jeen-sheen Row [8] for patch antennas which is fed by coplanar microstrip line. By shorting through hole at a proper position the resonant input resistance of the edge-fed patch antenna can be easily adjusted to 50 ohm. In [9] a probe fed stacked microstrip patch antenna is proposed to operate in dual polarisation mode to enhance isolation.

III. RESULTS AND DISCUSSION

The design antenna produced return loss of -14 db with -19 db of isolation. As the both antenna element is symmetrical so $S_{11}=S_{22}$ and $S_{21}=S_{12}$. The bandwidth obtained as 50 MHz. The ECC found less than 0.5 between antennas. The s-parameter graph and bandwidth graph and ECC presented in figure 4, 5 and 6.

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

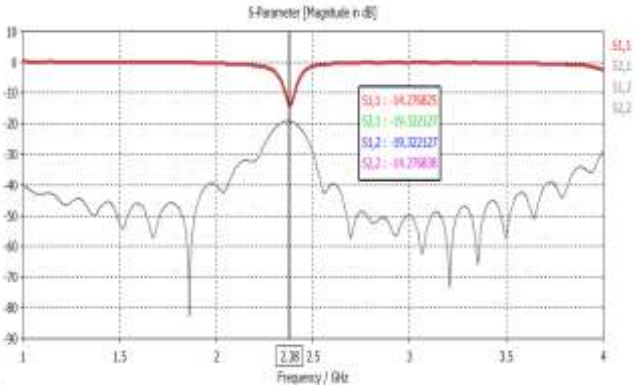


Figure 4. S-Parameter of design antenna

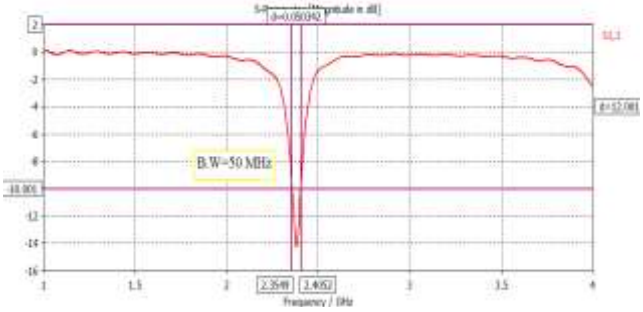


Figure 5 Bandwidth of design antenna

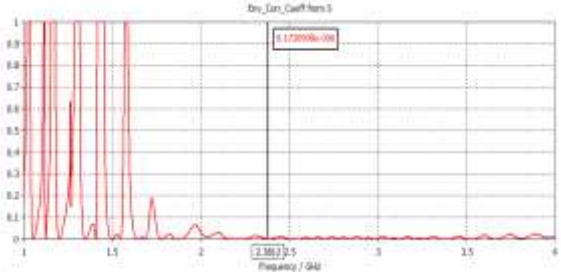


Figure 6 ECC of design antenna

IV. CONCLUSION

A Hexagon cut micro strip patch antenna is designed with full ground simulated using the CST Studio Suite software. The antenna is designed for frequency 2.4 GHz with FR-4 substrate (ε_r =4.3), h=1.524mm. The return loss produced below -10 dB in band with isolation less than -15 dB.

V. ACKNOWLEDGEMENTS

First of all, We would like to express our deep sense of respect and gratitude towards our guide & **Head of Electronics & Communication Engineering Department, "Mr. Vijay Bisen"** who has been the guiding force behind this Project work. We are greatly indebted to him for his constant encouragement, invaluable advice for every aspect of our academic life.

We are heartily grateful to Director/Principal, **"Prof. Ravi Khatri"** Vikrant Institute of Technology and Management, Indore for his moral support for all the facilities provided for doing Project work under such a great team.

We also want to thank Vice Principal **"Mr. Sandeep Singh Gautam"** Vikrant Institute of Technology and Management, Indore for valuable input during the development and evaluation process of this Project.
We would like to extend our sincere thanks and gratitude to all the learned members of our project and provide guidance from time to time specially **Mr. Aashish Patidar** who took keen interest in the development of our project and provide guidance.

We would like to Special thanks all faculty members and staff of the Department of Electronics and Communication /Electrical Engineering, Vikrant Institute of Technology and Management, Indore for their generous help in various ways for the completion of this Project.

Last but not the least; we would like to take this opportunity to thank our parents, friends and all the colleagues & everyone who helped us directly or indirectly during the entire span of this project.

VI. REFERENCES

1. T.Suganthi, Dr.S.Robinson, G.Kanimolhi, and T.Nagamoorthy "Design and Analysis of Rectangular Microstrip Patch Antenna for GSM Application," IJISET International Journal of Innovative Science, Engineering & Technology, Vol. 1 Issue 2, April 2014.
2. Vivekananda Lanka Subrahmanya "Pattern Analysis of 'The Rectangular Microstrip Patch Antenna"
3. R. Jothi Chitra,V. Nagarajan ,2013. "Double L-slot microstrip patch antenna array for WiMAX and WLAN applications", *IEEE Transactions on Antennas and Propagation*, Vol. 39, pp 1026-1041.
4. Bharath Kelothu, K.R. Subhashini, *IEEE* Transactions 2012."A compact high-gain microstrip patch antenna for dual band WLAN application".
5. Xu-bao Sun ,Mao-Young Cao, 2012. "A rectangular slot with *Transactions* improved bandwidth", *Elsevier Science Direct*, Vol. 66, pp 465-466.
6. M A Matin, M.P Saha, H. M. Hasan, 2010 " Design of broadband patch antenna for WiMAX and WLAN", IEEE.
7. Chien- Yuan Pan, Tzyy-sheng horng, 2007. "Dual wideband printed monopole antenna for WLAN/WiMAX application", IEEE.
8. Govardhani Immadi, M.S.R.S Tejaswi, 2011. "Design of coaxial fed microstrip patch antenna for 2.4 GHz Bluetooth Applications", *Journal of emerging trends in computing and information sciences*, Vol.2, pp 686-690.
9. Lin Dang, Zhenya Lei, 2010. "A compact microstrip slot Triple-band Antennna for WLAN / WiMAX applications", *IEEE Antennas and Wireless Propagation Letters*, Vol.9, pp 1178-1181.
10. Weiye Li1, Wenbin Lin1, *, and Guangli Yang , "A Compact MIMO Antenna System Design with Low Correlation" from 1710MHz to 2690MHz ", Progress In Electromagnetics Research, Vol. 144, 59-65, 2014.
11. Henridass Arun, Aswathy K. Sarma, Malathi Kanagasabai, Sangeetha Velan,Chinnambeti Raviteja, and M. Gulam Nabi Alsath , "Deployment of Modified Serpentine Structure for Mutual Coupling Reduction in MIMO Antennas", IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, VOL. 13, pp. 277-280, 2014.
12. Angus C. K. Mak, Corbett R. Rowell, and Ross D. Murch , " Isolation Enhancement Between Two Closely Packed Antennas", IEEE Transactions On Antennas And Propagation, Vol. 56, No. 11, pp. 3411- 3419, November 2008.
13. Priya Upadhyay, Richa Sharma, "Design and study of inset feed square microstrip patch antenna for s-band application", IJAIEM Volume 2, Issue 1, January 2013.
14. Haili Zhang, Zhihong Wang, Jiawei Yu, and Jia Huang "A compact MIMO antenna for wireless communication" IEEE Antennas and Propagation Magazine, Vol. 50, No.6, December 2008.
15. Microwave Studio 2012. CST Computer Simulation Technology, Framingham, MA, USA [online]. Available: http://www.cst.com.
16. C.A. Balanis, Antenna Theory, 3rd edition, John Wiley, New York, 2005.

CITE AN ARTICLE

Patidar , R., & Bisen, V. (2017). DESIGNING OF TWO ELEMENT SINGLE BAND ANTENNA WITH IMPROVED ISOLATION. *INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY*, *6*(11), 151-154.