



International Journal Of
**Recent Scientific
Research**

ISSN: 0976-3031
Volume: 7(4) April -2016

U-I SLOT MICROSTRIP PATCH ANTENNA FOR S BAND APPLICATIONS

Amandeep Kaur and Gurpreet Bharti



THE OFFICIAL PUBLICATION OF
INTERNATIONAL JOURNAL OF RECENT SCIENTIFIC RESEARCH (IJRSR)
<http://www.recentscientific.com/> recentscientific@gmail.com



ISSN: 0976-3031

Research Article

U-I SLOT MICROSTRIP PATCH ANTENNA FOR S BAND APPLICATIONS

Amandeep Kaur and Gurpreet Bharti

Yadavindra College of Engineering Punjabi University Gurukashi Campus Talwandi Sabo,
Punjab, India

ARTICLE INFO

Article History:

Received 11th January, 2016
Received in revised form
14th February, 2016
Accepted 18th March, 2016
Published online 28th April, 2016

ABSTRACT

This paper deals with design of modified Slotted microstrip patch antenna for S band Applications. In this paper U-I slotted microstrip antenna design at resonant frequency of 2.95GHz. FR4 epoxy material is used for substrate of proposed antenna (Dielectric Constant-4.4). Some Applications of proposed antennas are Wireless Local Area Network (WLAN), Satellite Communications and Radar Applications. For the design and important parameters such as Return loss, VSWR, Gain are presented in this paper.

Keywords:

Microstrip patch antenna, HFSS,
U-I Slot

Copyright © Amandeep Kaur and Gurpreet Bharti., 2016, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Now a days Microstrip patch antenna works at different frequencies for the different applications [1]. Microstrip patch antenna is commonly used for wireless communication systems to transfer the information from one place to another [2]. Basically Microstrip antenna consist a ground, substrate and radiating patch [3]. The ground plane is placed at the bottom of the substrate and radiating patch is placed at the top of the substrate [4]. Microstrip patch antenna are trendy for their smart features such as low profile, light weight, low cost [5]. In Microstrip patch antenna different feeding methods are used such as coaxial probe feed, microstrip line feed, proximity coupled feed and aperture coupled feed. In this paper U-I slot cut inside the patch for improving the performance antenna parameters. The path of current in patch is effected by slots [6]. The resonant frequency is determined 2.95GHz for S-Band applications. The overall size of proposed antenna is 48.22mm×62.46mm×1.6mm. The substrate material is used for this antenna is FR4 epoxy with 4.4 dielectric constant. When the size of antenna reduce then the number of operating frequency bands increase [7]. The simulation of proposed antenna is carried out by ANSOFT HFSS software [8]. Some others applications of Microstrip patch antennas are GPS, WiMAX, Wi-Fi, Mobile satellite communication and space communications [9].

Antenna Design

The configuration of the proposed U-I Slot Microstrip patch antenna is shown in figure 1. The proposed antenna is designed on FR4 epoxy substrate with dielectric constant 4.4. The thickness of substrate is 1.6mm. Simple ground is used for proposed antenna and dimensions of ground are 48.22mm×62.46mm. The size of substrate is same as the size of ground of designed microstrip antenna. L and W are length and width of substrate and ground respectively. The dimensions of patch is 24.11mm length and 31.23mm width.

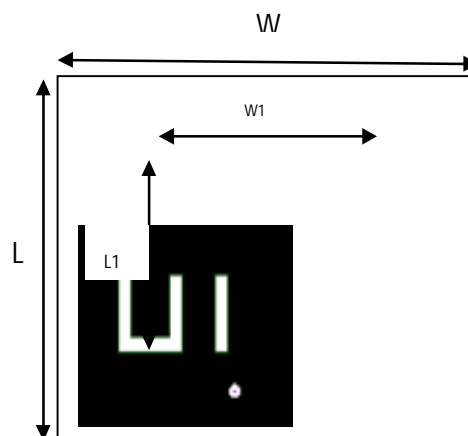


Fig.1 Geometry of proposed antenna

*Corresponding author: Amandeep Kaur

Yadavindra College of Engineering Punjabi University Gurukashi Campus Talwandi Sabo, Punjab, India

The proposed antenna is work at 2.95GHz resonant frequency. U and I slots are cut from the patch. The length of the vertical slots is 8mm and width is 2mm and the length of horizontal slot is 2mm and width is 8mm. Coaxial probe feed technique is used in this antenna.

Table1 Optimized parameter values of proposed antenna

Parameters	Values
Length of substrate	48.22mm
Width of substrate	62.46mm
Thickness of substrate	1.6mm
Length of patch	24.11mm
Width of patch	31.23mm
Dielectric constant	4.4
Length of ground	48.22mm
Width of ground	62.46mm
Length of slots	8mm
Width of slots	2mm
Resonant frequency	2.95GHz

RESULTS

Utilizing HFSS (High Frequency structure simulate) software the proposed design of antenna has been simulated and obtained some results. Four parameters are obtained which are Return loss, VSWR, Gain and Radiation pattern by simulation process of U-I slot microstrip patch antenna.

Return Loss

The return loss of U-I slot microstrip antenna is shown in Fig 2. Proposed antenna has -19dB return loss at 2GHz. The resonant frequency of U-I slot antenna is shifted toward the lower side when slots are introduce on the surface of patch.

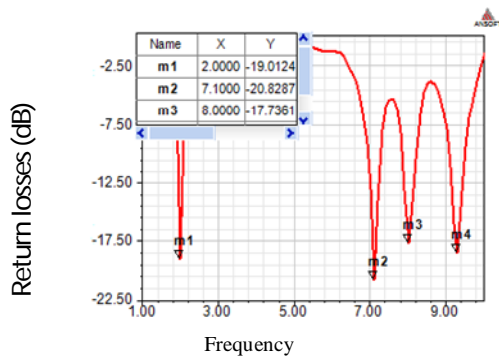


Fig.2 Plot of return loss v/s Frequency

VSWR

The simulation result for VSWR is shown in Fig 3.

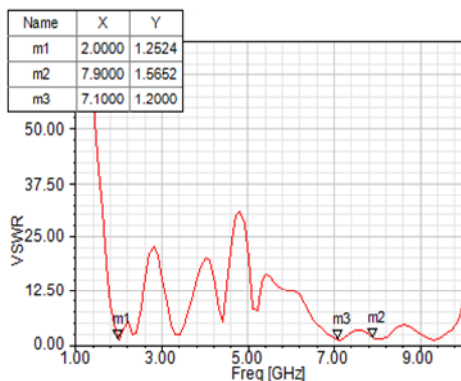


Fig.3 Plot of VSWR v/s frequency

VSWR of proposed antenna is 1.2dB at resonant frequency 2GHz. VSWR is an essential parameter for communication devices. It is responsible for antenna matching with cable impedance.

Radiation Pattern

The simulated two dimensional radiation pattern of proposed antenna at 2GHz frequency is shown in Fig 4. Radiation pattern is a graphical representation which defines the radiating signal of proposed antenna in space [4].

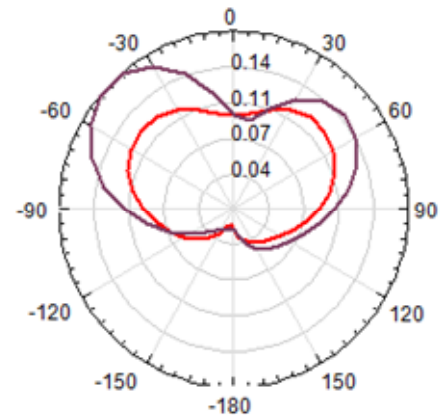


Fig. 4 2D plot of radiation pattern

GAIN

Gain of U-I slotted microstrip patch antenna is shown in Fig 5. The gain of proposed antenna is 9.42dB at resonant frequency. Its is quite high value of gain. Basically gain is useful measurement to describing the antenna performance. It is measured in dB.

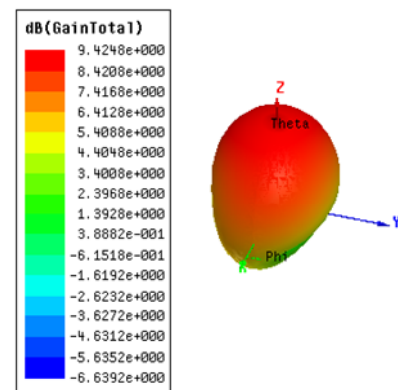


Fig.5 Gain of proposed antenna

CONCLUSION

In this paper we successfully designed and simulating U-I slot microstrip patch antenna by using HFSS software. This proposed antenna is operates at 2.95 GHz resonant frequency which is suitable for s band applications. The gain of proposed antenna is 3.26dB and return loss is -19dB. Gain can be increasing by cutting slot on patch surface. In this patch antenna simple feeding technique is used. Applications of proposed antenna are Satellite communication. The future plan about this paper is that fabricates the proposed antenna and verifies all results.

References

1. Mohammad Shawkat Habib, I.M. Rafiqul, Khaizuran Abdullah and M. Jamil Jakpar, "U-Slot rectangular patch antenna for dual band Application" Springer International Publishing Switzerland, 2015.
2. Swaraj Panusa, Mithilesh Kumar, "Design and Analysis of Triple-Band F-Slot Microstrip Patch Antenna", *International Journal of Computer Application*, vol 104, October 2014.
3. Shilpa K. Jose, Dr.S.Suganthi, "Rectangular Microstrip Antenna for WLAN Application", IEEE(Institute of Electrical and Electronics Engineers), 2015.
4. C.A. Balanis, "Antenna Theory, Analysis and Design", John Wiley & Sons, Inc. U.K., 2013.
5. Binod K.Kanaujia, Sachin Kumar, Mukesh K.Khandelwal and A.K.Gautam, "Single Feed L-Slot Microstrip Antenna for circular Polarization", Springer, 2015.
6. Adil Zaman, "U Slot Microstrip Patch Antenna with truncated corners and its Performance Improvement Using EBG structures", International Bhurban Conference on Applied Sciences & Technology(IBCASC), 2015.
7. Wen-Chung Liu Senior Member IEEE, Chao-Ming Wu and Yang Dai, "Design of Triple-Frequency Microstrip fed Monopole antenna Using Defected Ground structure", IEEE Transaction on Antenna and propagation, vol 59, No.7, 2011.
8. Hai-Wen Liu, Feng Qin, Jiu-Huai Lei, Pin Wen, Bao-Ping Ren and Xiang Xiao, "Dual-Band Microstrip-Fed Bow-Tie Antenna for GPS & Wlan Applications ", *Microwave and Technology Letters*, vol.56, No. 9, 2014.
9. Pradutt K. Bharti, H.S. Singh, G.K. Pandey and M.K. Meshram, "Slot Loaded Microstrip Antenna For GPS, Wi-Fi, and WiMAX Applications Survey", *International journal of Microwave Applications*, vol. 2, No. 2 2013.

How to cite this article:

Amandeep Kaur and Gurpreet Bharti.2016, U-I Slot Microstrip Patch Antenna for S Band Applications. *Int J Recent Sci Res.* 7(4), pp. 10410-10412.

T.SSN 0976-3031



9 770976 303009 >