

A REVIEW PAPER ON DIFFERENT SHAPE OF MICROSTRIP PATCH ANTENNA

Suman Rani¹, Ria Kalra²

^{1,2}JCDMCOE, Sirsa

ABSTRACT:- Microstrip patch antenna is mostly used in wireless communication device because now a days the scope of the wireless communication system on the rises. The wireless communication system includes mobile phone, [10] tablets, laptop, satellite phones and receivers and GPS (global positioning system) etc. In this review paper a survey is conducted on commonly used techniques. In this paper design and simulated different shape of initiator patch used in the microstrip patch antenna to find out the efficient, small size and low profile. The proposed antenna is design and simulated using high frequency structure simulation software. The microstrip patch antenna has the following advantages but its major disadvantages are its bandwidth can be improved using different bandwidth enhancement techniques.

Key Words – MPA, Bandwidth, Patch, HFSS, S11, Substrate

INTRODUCTION

Microstrip patch antenna is mostly used for their advantages such as low profile, small size, low cost, light in weight and easy [18] fabrication with circuit element. In this review paper an initiator patch is design in different shapes like as circular, square and triangular. Microstrip patch antenna is consists of a radiating patch on one side of a substrate material and other side is ground plane and printed on the taflon substrate has a dielectric constant (ϵ_r) 2.01 and height (h) 1.5 mm and [mpa1] this is simple geometric calculated by using technique equation. A 50Ω microstrip line is used to feed the patch antenna. The radiating patch and ground plane antenna geometry of the square, circle and triangular patch shown in fig. 1. The microstrip patch antenna suffer from its biggest drawback are its bandwidth and return loss. In order to improve the antenna characteristics different bandwidth enhancement techniques can be used but in this paper slot cutting technique is used. The slot cut inside of the patch in the shape of the patch to obtain the better characteristics of the antenna.

LITRATURE SURVEY

D. Rajeswari etc. all [1] in this review paper design microstrip patch antenna. In this p paper a survey a commonly used techniques are used for design of the microstrip patch antenna, is used for designed reconfiguration, multiband and wideband antennas and techniques is also applied for analysis of different parameters of the antenna. After searched the research paper, found out the point where is the design in this review paper based on the ADS and limitation of the microstrip patch antenna and bandwidth of the antenna is improved.

Nidhi etc. all [2] in this review paper antenna is design for the purpose of multiband and ultra-wideband and proposed antenna is design rectangular type using defected ground structure and high frequency structure simulation software is used. The antenna is design using different feeding techniques such as MS line feed, coaxial probe feed are conducting and aperture feed, coupling feed are non-conducting schemes. This antenna provided an improvement in return loss, bandwidth of the antenna and better understanding of the antenna parameters.

E. Sarva Rameswarudu etc. all [3] in this paper bandwidth enhancement defected ground structure microstrip patch antenna designed for K and Ka band applications. In this paper, (mpa1) a different method used for designing a compact microstrip patch antenna with etched a step slot on the ground plane and split square ring slots etched on the patch plane has been designed with wide bandwidth and minimum return loss characteristics. . The Simulated results obtained for this antenna resonant frequency at 20.6281GHz with 45.06dB and wide bandwidth is 11.3853 GHz.

Amandeep singh etc. all [4] this paper design slotted rectangular microstrip patch antenna with single feed for (25) WiMax applications. The proposed antenna is designed using FR4 substrate with thickness of 1.6mm and resonant frequency is shifted toward lower side by etching the rectangular slot at upper edge of patch. Gain of the proposed antenna improves by adding a small piece of rectangular patch within the area of rectangular slot. The proposed antenna at a resonant frequency 3.3 GHz, 4.7 GHz and 6.7 GHz the return loss of the antenna are -15.68dB, -17.71dB and -33.82dB respectively.

Minahaz G. Vayada etc. all [5] design and simulation of rectangular shaped patch antenna used for ISM band using HFSS. This antenna used in ISM band which works on 2.4 GHz can also be designed using these tools. In this work HFSS is used for designing and simulating patch antenna for getting better bandwidth, VSWR.

Vikaram Thakur etc.all [6] in this review paper a survey is on commonly used techniques and design different types of microstrip patch antenna. This antenna design using antenna simulation software and improvement in isolation by 16db with reduce edge to edge spacing of 7 mm. To design the antenna in this review paper high frequency structure simulation software is used.

Gurbaj Singh etc. all [7] In this report design antenna using three configuration of microstrip patch antenna using microstrip inset feeding techniques and with the help of CST software. The first design of single band microstrip patch antenna with a H-shape, second is dual band rectangular microstrip patch antenna with a slot in ground plane and third is multiband rectangular microstrip patch antenna with a reduce ground and defect in ground plane.

Sunil Kumar etc. all [8] in this paper design and improve bandwidth using bandwidth enhancement techniques by etching slot in radiating patch in shape of W. By etching the multiple slots inside the patch, bandwidth of the antenna is increased. The frequency band of proposed antenna is between 1.45-3.25 GHz.

Princy Maria Paul [9] in this paper a compact square patch antenna is designed and patch is loaded by a layer of metal between the patch and the ground which makes the antenna operate at a lower frequency. The antenna is design to obtain a resonant frequency of 2.45 GHz. The proposed antenna substrate used is FR4.

Sahaib Maalik [10] in this report discuss about antenna design for UWB radar detection application which is built on CMOS technology. (Chalmers) The goal of this thesis is design a compact and directional antipodal Vivaldi antenna. This proposed antenna operates over the frequency band 2.7 GHz to more than 12 GHz. The antenna has the linear phase response over the entire UWB frequency range.

DESIGN OF ANTENNA ELEMENT

There are three essential parameters for design of the microstrip patch antenna:

- $f_0 = 3.5$ GHz
- $\epsilon_r = 2.01$
- $L = 28$ mm
- $W = 35$ mm
- $H = 1.5$ mm

Step 1: Calculation of the Width (W) –

$$W = \frac{c}{2f_0\sqrt{(\epsilon_r+1)/2}}$$

Step 2: Calculation of Effective Length (Leff) –

$$L_{eff} = \frac{c}{2f_0\sqrt{\epsilon_{reff}}}$$

Step 3: Calculation of the Actual Length of Patch (L) –

$$L = L_{eff} - 2\Delta L$$

INITIATOR PATCH DESIGN

Microstrip patch antenna has been used for various application like mobile phone, [18] tablets, laptop, satellite phones and receivers and GPS (global positioning system) etc. But microstrip patch antenna has a biggest disadvantage are its bandwidth and return loss. In order to improve antenna characteristics, different techniques can be used but in this paper a slot cutting technique is used. In this paper slot is cut inside the patch to obtain the better characteristics in the shape of reference antenna. The length and width of the antenna is taken $L \times W = 28 \text{ mm} \times 35 \text{ mm}$ and ground to be $L \times W = 28 \text{ mm} \times 35 \text{ mm}$ and taflon substrate is used with dielectric constant $\epsilon_r = 2.01$. The square, circle and triangle patch is design

as shown in fig. 1. This propagated antenna is design and simulated using HFSS (High Frequency Structure Simulation) Software. The simulation result of return loss is shown in fig. 2. The microstrip feeding is used to feed the located point of the radiating patch with the impedance of 50 Ω .

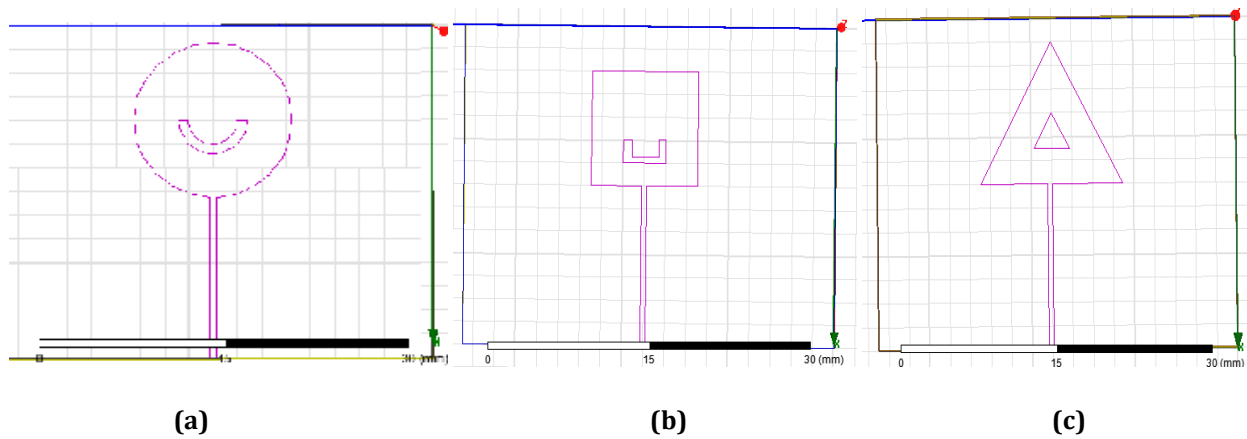


Fig1 Microstrip Patch Antenna Design (a) Circular shape (b) Square (c) Triangle

RESULT AND DISCUSSION

Fig 2 shows simulation results of microstrip patch antenna and designs return loss is $s_{11} < -10$ db. The return loss of the circular shape antenna is -10.89 db and square shape antenna return loss is -10.66 db and triangular shape antenna return loss is -10.56 db.

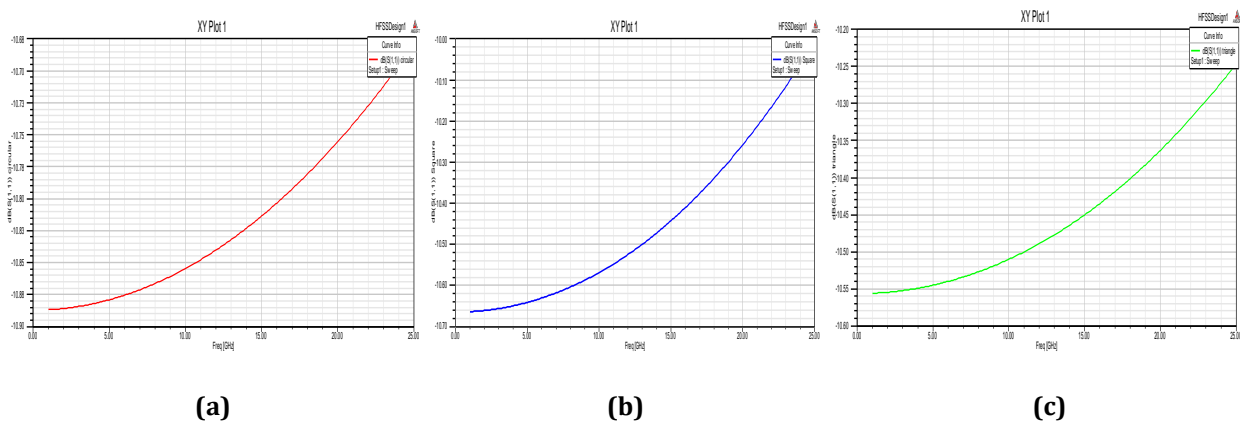


Fig 2 Microstrip Patch Antenna Return Loss (a) circular (b) square (c) Triangle

CONCLUSION

This paper shows the review and literature survey and design for the designing of efficient microstrip patch antenna. The microstrip patch antenna suffers form the biggest disadvantages is its bandwidth and return loss. This review work is done to reduce this problem by etching the slot on the patch and reduce the return loss of the antenna. This work is done using the High Frequency Structure Simulation Software (HFSS).

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