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Experimental Analysis of CONCISE NARROWBAND MICROSTRIP ANTENNA WITH DIELECTRIC PATCH

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Abstract - *The proposed design of Concise Narrowband Microstrip Antenna with Dielectric patch, aim to bring more accurate result with high speed of data transmission and reception based on application. For the design and simulation of the microstrip antenna, the I3ED EM simulation software is used. The reduction of size the frequency band fixed within 3GHz to 10GHz. The return losses has less according to the reduction of size and less frequency. The result have getting the more efficiency for the patch antenna. The cupper plate is used for the ground plane and the patch field which is the radiating slot has been placed into the ground plane. The probe feed has been used 0.5 in the center and connected with the cupper plane. The connector has been used in the upper side of the patch field and connected with the radiating slot. The radiation pattern has measured by the computer and compare with the theoretical value. The reduction of size measured with the previous value of the cutting slot and the without slot. The first width and length calculation done by the equation of microstrip antenna. After the calculation the measuring value has input in the simulation software and resulting the value. The slot is cutting preliminary to taking the measured ground plane and without any patch field. After getting the value of the return losses and defected ground the next patch field operation has started. In the patch field the defected ground plane measured by using of the patch field. Taking simultaneous value for the each and every measurement. Moreover it's doing like a trial and error method. The operation has going non-stop by taking the various value of the size, probe feed, permeability etc. and continuing the process. Also in the time of the size of patch field the defected ground plane size has taken randomly. With the best value taken for the final value and comparing with the previous value and then continuing for the live model.*

Key Words: Microstrip Antenna, Patch, Concise, Return loss, Resonant frequency

1. INTRODUCTION

The dielectric microstrip patch antenna is one of the most preferable antenna of all of them. The design and the fabrication of antenna has low cost and compact the sizes. This can be used in the wireless system and the RF application. The simple patch antenna geometry has a small size, low profile, light weight which gives the high efficiency. The resonant frequency is fixed with the band 3GHz to 10GHz. According to this value the return losses has been changed with their size. These requirement forced workers for modification in patch antenna geometry. The large number of Microstrip antenna has been developed for the wireless application. The Federal Communication Commission [FCC] has allocated 7.5GHz of the spectrum for unlicensed used of the Ultra Wideband devices in the 3.1 GHz to 10.6GHz frequency band. In this paper we defined that, after cutting slot of the microstrip antenna the return loss is as less as compared to the size reduction. The resonant frequency is also less to save the bandwidth.

2. ANTENNA STRUCTURE

The Width (W) and length (L) of Antenna1 are calculated from Conventional equations

$$fr=\frac{c}{2W}\sqrt{\frac{2}{1+\varepsilon r}}$$

$$L= Leff - 2\Delta L$$

$$\frac{\Delta L}{h}=0.412\times\frac{(\varepsilon reff+0.3)(\frac{w}{h}+0.264)}{(\varepsilon reff-0.258)(\frac{w}{h}+0.8)}$$

$$\varepsilon reff=\frac{\varepsilon r+1}{2}+\frac{\varepsilon r-1}{2}\left[1+12\frac{h}{w}\right]$$

$$Leff=\frac{c}{2fr\sqrt{\varepsilon reff}}$$

Where, Leff=Effective length of the patch, $\frac{\Delta L}{h}$ =Normalized extension of the patch, εreff=Effective dielectric constant. The length and Width of the microstrip patch antenna operating in frequency 4.3GHz are 20mm and 16mm respectively with substrate thickness h=1.6mm and dielectric constant= 2.4

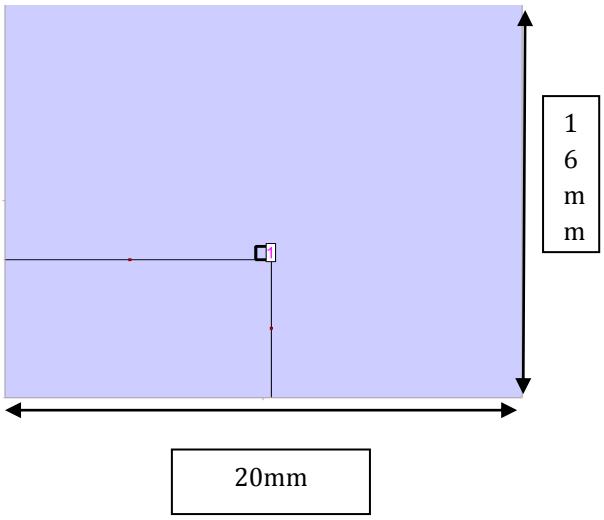

Fig (1): Antenna Structure without Slot design

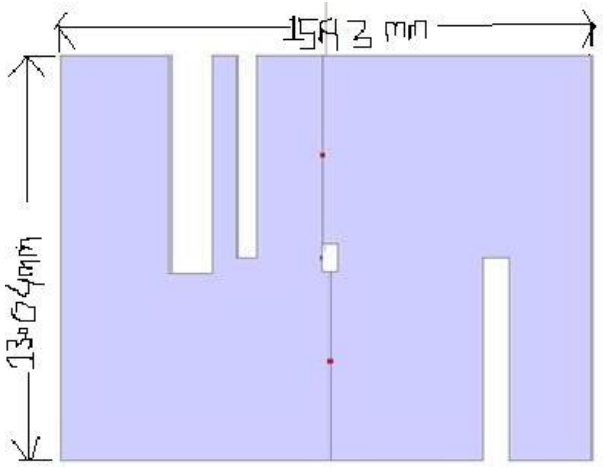

Fig (2): Antenna Structure With slot design

3. RESULT AND DISSCUSSION

The experiment has done in the IE3D simulation software. The all of this figure has completed in this software. In fig (1) the antenna size is taken L=20mm and W=16mm and we have resulted that the Resonant frequency = 1.0 GHz and Return Loss= -0.018db which shown in the Fig (3). After cutting slot of the antenna, the Fig (2) the antenna size is L= 15.43mm and W=13.04mm and we have resulted the value of Resonant frequency= 9GHz and Return loss= -11.9db. The total resulted value have taken in the IE3D simulation software. After taking the value, the comparison is shown below,

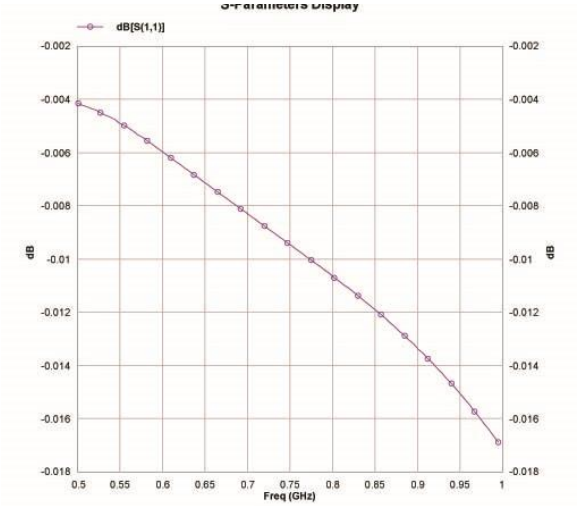

Fig (3): Antenna Return loss

Width=16mm

Length=20mm

Resulted in Graph

Resonant Frequency= 1.0 GHz

Return losses= -0.018 Db

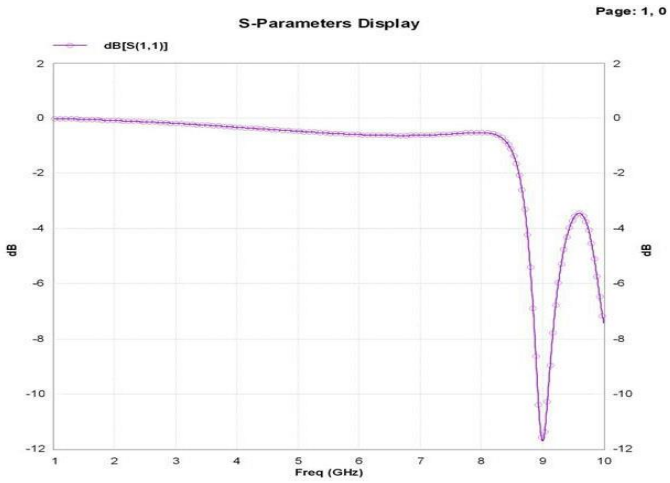

Fig (4): Antenna Return Loss

Length=15.43mm

Width=13.04mm

Resulted in Graph

Resonant Frequency= 9 GHz

Return losses= -11.9 Db

Table -1: Comparison Table of two antenna

Antenna Structure	Resonant Frequency(GHz)	Return loss(db)
1.	f=9	-11.8
	f=10	-7.2
2.	f=3.2	-14.3
	f=5.1	-2.2
	f=7.2	-3.7
	f=8.1	-10

Table -2: Comparison of Area reduction of two antennas

Antenna Structure	Area(mm2)	% of area reduction(mm2)
1.	207.09	
2.	646.8314	212.3424

4. CONCLUSIONS

Theoretical investigations of a single layer single feed microstrip patch antennas have been carried out using Method of Moment based software IE3D.Introducing slots at the edges of the patch a size reduction of about 212.3424% has been achieved with increased frequency ratio and multi-frequency operation. The multi resonant frequency antenna presented in this paper for a particular location of feed point(0.1mm,-0.175mm considering the centre as the origin) was quite narrow as is evident from table1.Alteration of the location of the feed point results in a less sharp resonances. The proposed antenna structure in this paper can be used for Mobile Communication. The antenna proposed in this paper can also be used for S-Band and C-Band applications.

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BIOGRAPHIES

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