ISSN (Online) 2321 – 2004
ISSN (Print) 2321 – 5526

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING
Vol. 2, Issue 8, August 2014

Design of Co axial Feed 'O' Slotted Corner Truncated Rectangular Microstrip Patch Antenna

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Abstract: A new design or compact co axial feed 'o' slotted corner truncated rectangular microstrip patch antenna is proposed. This proposed design enhanced bandwidth and reflection coefficient. Co axial feed 'o' slotted corner truncated rectangular microstrip patch antenna is designed by adopting a rectangular patch on FR4 substrate with 4.3 permittivity and 1.5 thickness. The circular ring on patch not only achieve a higher bands but it also used to for better tunning. This proposed antenna operated on 3.75 GHz. This antenna is used for S-Band Applications such as WiFi, GPRS etc. The Band Width is achieved approximate 15 % of operating frequency.

Keywords: FR4, BW, VSWR, CORNER TRUNCATED

I. INTRODUCTION

Recently a microstrip patch antenna is widely used in wireless communication applications. It is widely used because of their Features such as low cost, light weight, easy to model, fabricate and also their insensitivity to the polarization matching between the source antenna and destination antenna i.e Transmitter and Receiver. To design microstrip antenna a various methods or techniques are available in market. This antenna is firstly design on software for their results. If antenna gives required results then it will be ready to fabricate. This can be achived by Ansoft HFSS, IE3D, ADS, CST HP 8510 CVNA, GEMS and so on. A co axial feed 'o' slotted corner truncated rectangular microstip patch antenna is designed by introducing two circular ring on the patch. These ring are cuts from four sides of the patch. This method is similar to slot loading technique. In this proposed antenna Co axial probe feed method are used for to become a universal design. This proposed antenna design on single layer, single feed, and multiband frequency antenna. The proposed antenna has single band with its operating mode centered at 3.75 GHz.

II. DESIGN OF ANTENNA

A co axial feed 'o' slotted corner truncated rectangular microstrip patch antenna is shown in following : Fig. 1 Shows rectangular patch with ring slot considered as radiating patch with length L and width W. The circle radius r1 and r2. The length and width are calculated by transmission line model and radius of circle are estimated by circular patch antennas formula. In this proposed antenna four corner cuts by twin slot method on patch.

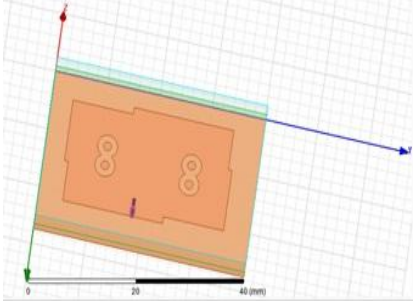

Fig 1: Design of proposed Antenna.

Rectangular patches can achieved as transmission lines, because these antenna have physical shape derived from microstrip transmission line. The transmission line is one of the most intuitively appealing models for analysis the rectangular microstrip patch antenna. The circular microstrip patch antenna is analysis by cavity model, by two good conductors one at top and second at bottom, and a cylindrically perfect and better magnetic conductor around the circular periphery of the cavity can be design a circular patch microstrip antenna. The geometry of the co axial feed 'o' slotted corner truncated rectangular microstrip patch antenna, where Length = 18.5 mm i.e. on x-axis, Width = 31.25 mm i.e. on y axis, for two patch cutting on both sides of width d1 = 1.15 mm and c1 = 11.5 mm on 'y' axis , or two patch cuts on both sides of length on 'x' axis where c2 = 6.8 mm and d2 = 0.7 mm.

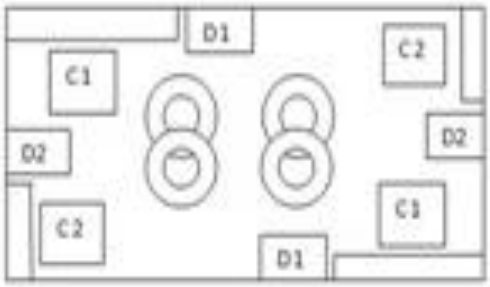

Fig 1.1: Geometry of proposed antenna.

Sl. No.	Parameters	Values
1	W0	18.5 mm
2	L0	31.25 mm
3	R1	0.7 mm
4	R2	1.9 mm
5	C1	11.5 mm
6	D1	1.15 mm
7	C2	6.8 mm
8	D2	0.7 mm
9	Er	4.3
10	h	1.5 mm

Fig 1.2: Table for parameters of proposed antenna.

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Fig 1.1 shows the geometry and Fig 1.2 shows parameters of proposed antenna. The size of the patch is 18.5mm * 31.25mm. The dielectric FR4 substrate is placed between ground plane and radiating patch. The thickness of the patch is 1.5 mm, relative permeability is 4.3 and loss tangent 0.02. It is a 50 ohm microstrip patch antenna. Here probe of co axial feed is shorted to the patch and outer connector are connect to the ground plane. The band width of the antenna without corner cut are very small. To broaden its bandwidth, a pair of slots with length and thickness are cuts from width of radiating patch. For two slot cutting, results are not so good therefore to get better result again two slot cuts on length of the radiating patch.

III. RESULTS OF PROPOSED RMSA

Fig 2: shows the S11 reflection coefficient graph for the proposed RMSA. From the graph it can be seen that the antenna give the resonating frequency of 3.75 GHz with a BW of nearly 575.5 MHz (3.5769-GHz – 4.1522 GHz)(15%). Fig 3: shows the VSWR graph for the designed proposed RMSA. From the graph it can be seen that for the resonating frequency of 3.75 GHz the VSWR is 1.2. Figure:4 shows the smitt chart of proposed antenna, Fig 7: shows the gain for the proposed antenna is 1.3 dB and Fig: 8 shows the directivity of proposed antenna, here is 1.65dB.

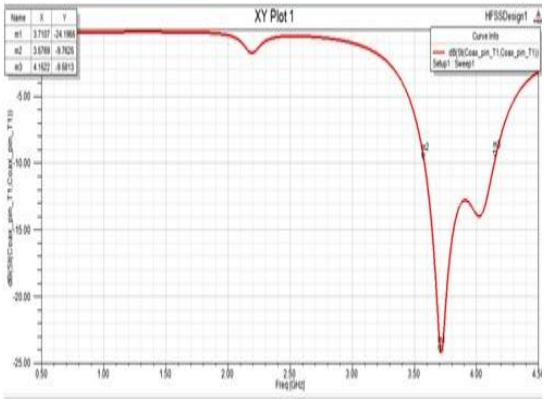

Fig 2: S11 reflection coefficient of proposed Antenna.

The S11 graph of proposed antenna is shown in Fig 2. Where S11 reflection coefficient at -24.27 dB for 3.75 GHz. And Band Width for that is about 15 % of 3.75 GHz operating frequency i.e. 575.7 MHz . Fig 2 it shows that band ranges from 3.5769 GHZ to 4.1522 GHz.

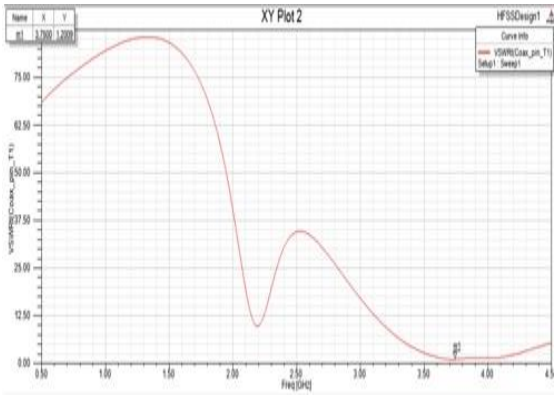

Fig 3: Graph for VSWR of proposed Antenna.

A Fig 3Shows VSWR graph of proposed antenna. This shows 1.2 i.e. < 2 at 3.75 GHz operating frequency.

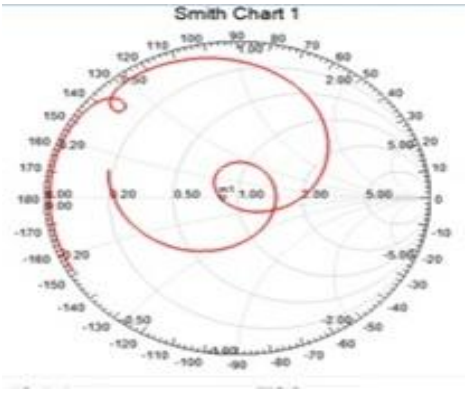

Fig 4: Smitt chart for proposed antenna.

A Fig 4 shows Smitt chart for proposed antenna at 3.75 GHz operating frequency. Where real and imaginary values are shows good matching between the load and source.

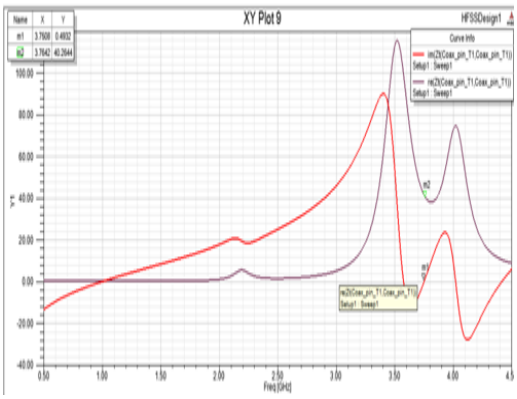

Fig 5: Graph of Real and Imaginary values of proposed antenna.

A Fig 5 also shows the real and imaginary values in XY plot.

Fig 6: Radiation pattern of proposed antenna.

A Fig 6 shows the graphical representation of Radiation pattern of proposed antenna.

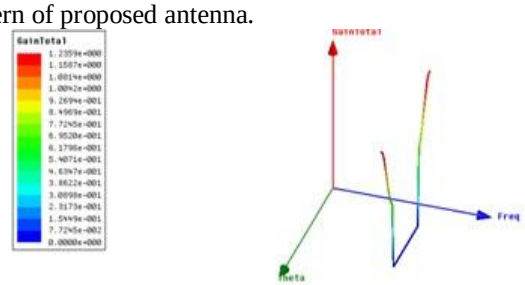

Fig 7: Gain of proposed antenna.

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A Fig 7 shows the gain of proposed antenna, here it is 1.3 in dB at 3.75 GHz operaring frequency.

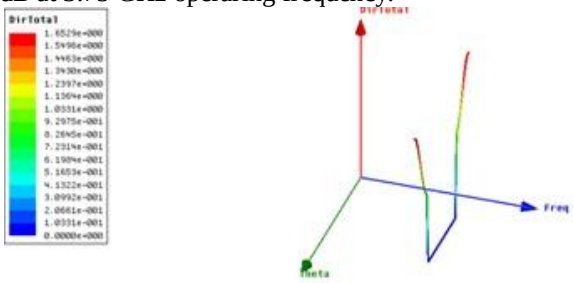

Fig 8: Directivity of proposed antenna.

A Fig 8 shows Directivity of proposed antenna, here directivity 1.65 dB.

IV. CONCLUSION

In this project work Design of co axial feed 'o' slotted corner truncated rectangular microstrip patch antenna is proposed. The cutting of corners enhanced the S11 and increased band width, whereas the insertion of slot increases the BW of the antenna. Final gain of 1.3 dB is obtained for the proposed antenna with a BW of 575.5 MHz and VSWR 1.2. The proposed antenna can be used for various applications such as PTP, GPRS, WiFi communication.

FUTURE SCOPE OF PROPOSED ANTENNA

To fabricate the proposed antenna and get it tested using VNA. To get a comparison of fabrication and simulation results

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