

# Dual Feed Double patchy Broadband Microstrip Antenna for UHF Communication Applications

**ABSTRACT :** Three short circuited microstrip patch antenna structure with dual feed has been proposed with conical via. The design is based on rectangular hole structure with conical via loading and slit loading technique. The simulation is based on method of moment method, using IE3D software. It is also observed that by cutting slits of different areas, the resonating frequencies are getting changed along with bandwidth and return loss. This antenna can operate at GSM frequency, UHF communication. and also this antenna can be applied for 30-300 GHZ applications.

A dual feed wideband microstrip antenna has been proposed. The design is based on dual feed technique. In this paper, the two patches at the either side acts as resistive elements to the main patch in the middle. We have observed that least the area of flowing of the current through the patch, better the wideband.

**Keywords:** – Dual Feed, Three short circuited Patch, Wideband Microstrip Antenna, GSM Microstrip Antenna,



## 1. INTRODUCTION

With the increase of the wireless communication systems we can notice the urge of future technologies are in need of low-profile antennas for wireless communications [1-2]. Because of many attractive features, microstrip antennas have received considerable attraction for mobile communication handset terminals.

There are several techniques to reduce the size of microstrip antennas at resonant frequencies. Using microwave substrate of high dielectric constant, patch dimension can be reduced, but the antenna shows poor efficiency due to surface wave generation. Edge-shortened patches using shorting wall or shorting plate can lower the physical dimensions of a microstrip patches. Further lowering of antenna dimension is possible using shorting pin at the proper position and by using shorting-pin loaded technique, antenna size reduction of about 89% can be achieved [3]. Also slot loaded patches are used to design small microstrip antennas.

The disadvantage of microstrip patch antenna is that it gives narrow bandwidth. However, researchers have made outstanding efforts to overcome this problem and configurations have been presented to increase the bandwidth.

In this paper we have designed a dual feed conical via loaded rectangular structure having three patches which gives a wideband at frequencies 710MHz to 1100MHz and 5.9GHz to 7.2GHz and narrowband at frequency 3.8GHz. We have taken the FR4 substrate which has dielectric constant as 4.4 and loss tangent 0.02 having substrate thickness 1.4mm.

## 2. INDENTATIONS AND EQUATIONS

We have a taken a rectangular microstrip antenna whose length was calculated depending on the dominant mode of operation i.e  $m=1$  and  $n=0$  from the equation given below.

The length L is calculated as:

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

The width W is calculated as:

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

The equations are [4]: For our design,  $\epsilon_e = 4.4$  [FR4 Substrate]

The length and width of patch 1 and patch 2 = 10 mm

The length and width of patch 3 = 15 mm

we are able to get better return loss with wider bandwidth. And because of that the current path is getting directed in definite direction, thus showing us characteristics of wideband antenna. As well as the current well formed by the dual side rectangular patches.

### 3. FIGURES AND TABLES

We have proceeded from the basic patch to the slit cut-off final patch. The respective Figures show the path to our designed antenna.

**Figure 3.1-** Shows the three rectangular patches proposed firstly.

**Figure 3.2 -** Shows the final structure with dual feed and conical via. (Here Conical via location is -7.5, -14.5 according to the axis taken.) Feed 1 is at location (-15,0) Feed 2 is at (0,0)

The Table 3.1 shows the best results we have found out from the carried out simulations. Simulations are done using IE3D [7].

Index: CVia Location= Conical Via Location

RF1= Resonating Frequency 1 (in MHz)

RF2= Resonating Frequency 2 (in GHz)

RF3= Resonating Frequency 3 (in GHz)

RL1= Return Loss 1 (in dB)

RL2= Return Loss 2 (in dB)

RL3

=

Retu

rn

Loss

4.5

(in

dB)

CVia

Loca

tion

-7.5, 700 3.8 6 > -50 -28 > -20

-14.5 MHz GHz GHzt dB dB dB

to 1100 GHz

MHz

-5.5, 720 --- 6.2 < -20 --- < -25

-14.5 MHz GHz dB dB dB

to to 7 dB

1050 GHz



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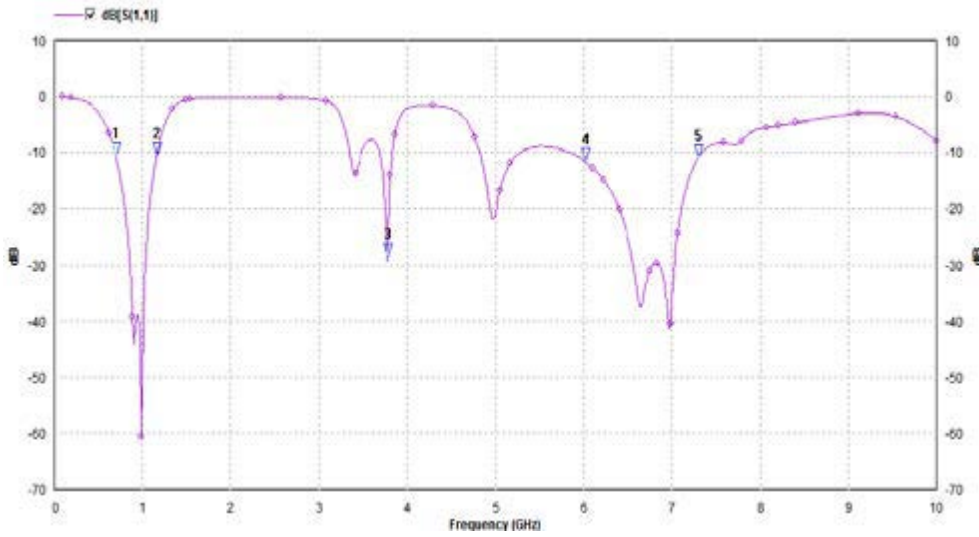


Figure 3.1: Return Loss Graph

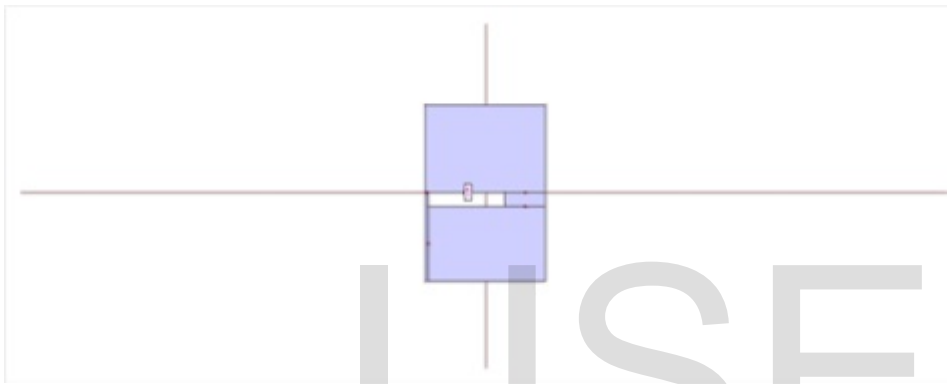
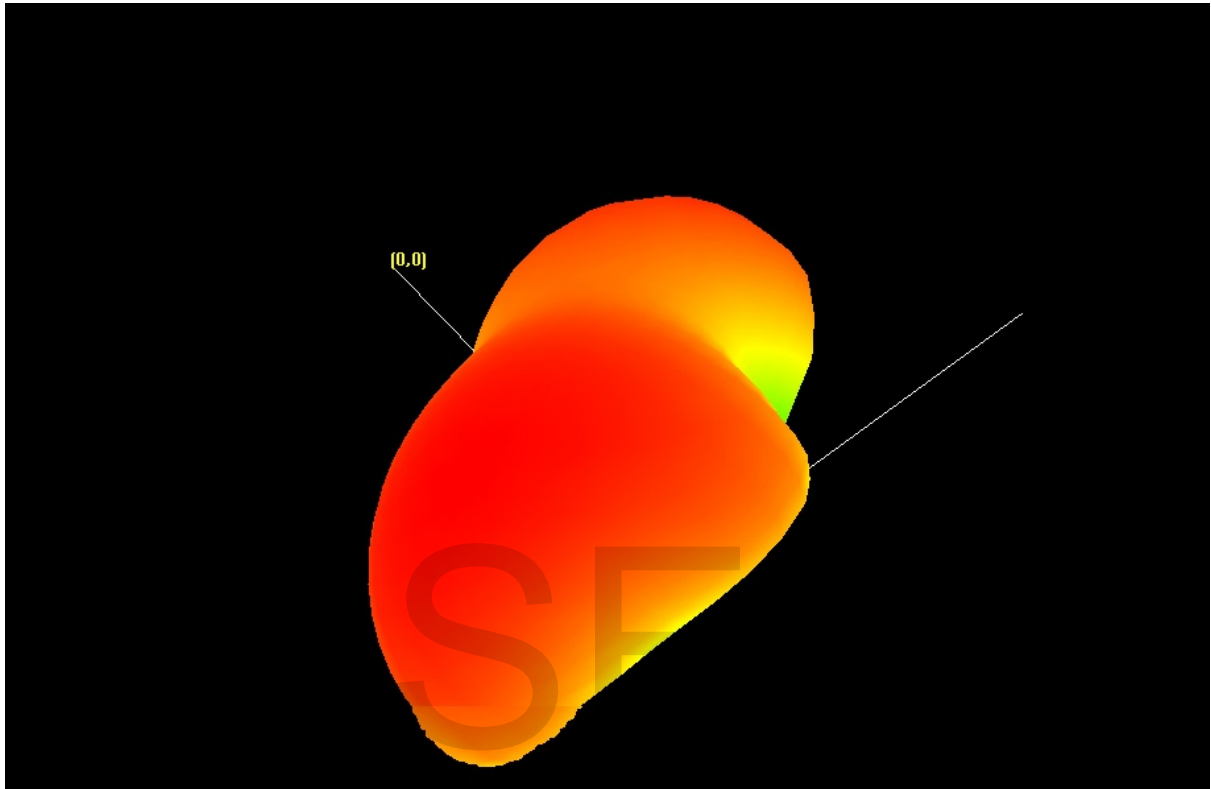


Figure 3.2: - Antenna Structure

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**.CONCLUSION:** We have seen dual feed triple patch rectangular microstrip antenna resonating at multiple frequencies and also giving wide bandwidth in GSM range, WLAN frequency and C BAND. But it provides with low gain.

Our further study will follow the miniaturization of our antenna and obtaining better gain with almost fixed bandwidth i.e wide. We will study it using ground defected structure. We are trying to develop a small sized antenna for mobile terminals as well as WLAN applications



**Figure 3.3** – 3D radiation pattern at 4.8GHz with -1dbi gain.

## REFERENCES

- [1] P.N. MISRA “*PLANAR RECTANGULAR MICROSTRIP ANTENNA FOR DUALBAND OPERATION*” ISSN : 2229-4333 ( PRINT ) | ISSN :0976- 8491 IJCST VOL. 2, ISSUE 3, SEPTEMBER 2011.
- [2] VIDHI SHARMA, DWEJENDRA ARYA “*DUAL BAND MICROSTRIP PATCH ANTENNA USING DUAL FEED FOR WIRELESS APPLICATIONS*” INTERNATIONAL JOURNAL OF ELECTRONICS AND COMPUTER SCIENCE ENGINEERING AT WWW.IJECSE.ORG ISSN: 2277-1956.
- [3] WONG, K. L., *COMPACT AND BROADBAND MICROSTRIP ANTENNAS*, WILEY, 2002. *TECHNOLOGY*, 2002.
- [4] BALANIS C. A, “*MICROSTRIP ANTENNAS*”, *ANTENNA THEORY, ANALYSIS AND DESIGN*, THIRD EDITION, JOHN WILEY & SONS
- [5] J.S.ROY, N.CHATTORAJ, N.SWAIN *NEW-DUAL FREQUENCY MICROSTRIP ANRENNAS FOR WIRELESS COMMUNICATIONS* ROMANIAN JOURNAL OF INFORMATION SCIENCE AND TECHNOLOGY, VOLUME 10, NUMBER 1,2007,113-119

[6] *HANDBOOK OF MICROSTRIP ANTENNAS* BY J R JAMES AND P S HALL, IEEE EMWAVE SERIES 28, 1989.

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