Micro strip Antenna with CPW Fed U-Shaped Cut-off and Circular Slot For Wireless Application

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Abstract: In this research paper we have designed CPW feed microstrip antenna with circular slot and U-shaped cut on the rectangular patch to operate on resonant frequency is 1.9 GHz. These types of antennas are of tremendous proficiency, robust in a design and easy to assemble. The interesting and attractive features like transfer of data wirelessly, versatility of converting its designs into any geometrical shapes and compact sizes have elevated their requirementhugely. Patch elements are placed are FR4 epoxy substrate of relative permittivity 4.4 kept at in height of 1.6mm. Simulation results are presented using HFSS version 13.0. a return loss measures -24 dB, antenna gives the impedance bandwidth of 45%, VSWR observed is 1.15 the gain proposed and is 1.55dBat centre frequency of 1.9GHz.

Keywords: *Microstrip antenna, CPW feed, HFSS 13.0, 1.9 GHz and FR4 epoxy.*

I. INTRODUCTION

In early 1970's the first practical antenna was fabricated by Howel & Munson and microstrip antennas became popular during are 70's period as they are had the space borne applications. With the use of a physical medium the long range of a communication was impossible impractical so the wireless mode has to enabled it use for the long range of communication with they advancement of technology better and quicker mode of a communication are invented that covers larger distances.

Antennas play is a vital role in communication systems to transmit and receive signals. They are versatile in geometrical dimensions and can be implemented easily. They are useful as they are of low profile, low power handling, low weight, simple and cheap [3]. Due to their attractive features like high rate of a transfer of data wirelessly and compact size have increased their demand highly and have various applications. The microstrip antennas are of very high performance, robust in design and easy to fabricate[1].

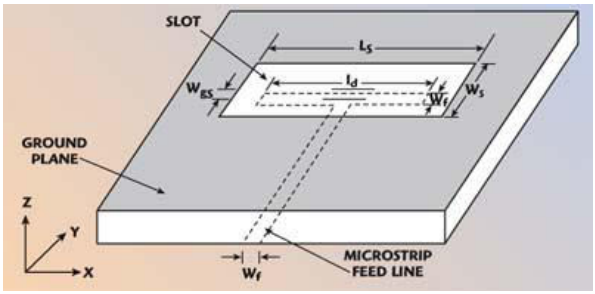


Figure 1: Microstrip Antenna

Many problems such as the surface wave excitation and narrow bandwidth are overcome by various methods such a cutting slot, increasing thickness, etc. CPW is used in designing antenna which has low weight and low transmission losses and this method was introduced by C.P. W in 1969 [4]. CPW-Fed method is cheap and the line impedance and phase velocity is less dependent on the substrate height then on slot width [5]. The further section of this paper presents the design, geometry and the results of the designed antenna.

II. ANTENNADESIGN

The design is based on the transmission line model analysis an it has rectangular patch with U-shaped cut on the rectangular patch with a circular cut on the ground. In the are designing of antenna three basic parameters are required such as thickness of substrate, relative permittivity and dielectric substrate. Thickness of a substrate reduces the size of an antenna and surface radiations and low dielectric constant is preferred because the antenna gives better efficiency, low losses or higher bandwidth so, patch elements are placed on FR4 epoxy substrate of relative permittivity 4.4(low) kept at 1.6mm height. Feed line width is such that impedance is 50Ω [2]. The antenna is a designed at the centre frequency of 2.4GHz.

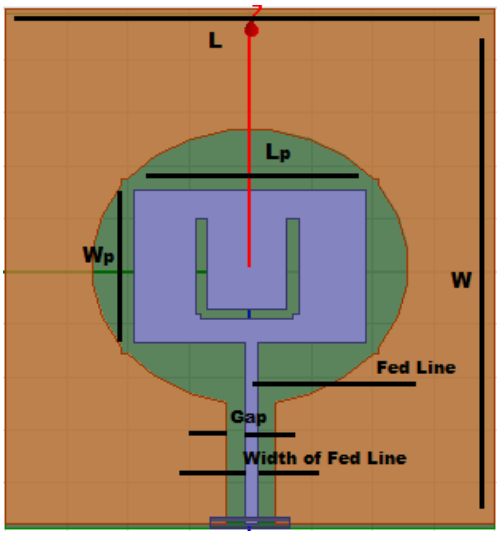


Figure 2: Design of the proposed antenna

Parameter	Value
Length of patch (Lp)	29mm
Width of patch (Wp)	38mm
Length of substrate (L)	97.48mm
Width of substrate (W)	80mm
Length of feed line	34.24mm
Width of feed line	2.2mm
Height of substrate	1.6mm
Radius of circle	26mm

Table 1 The dimensions of the proposed antenna.

III. SIMULATION AND MEASURED RESULTS

Simulated results are obtained by using Ansoft HFSS 13.0 software. The results achieved are discussed in the section.

I. Return Loss

It is the measurement which shows that how the antenna is effective in delivering the power from the source to the antenna. Return loss measured here the
$-24\ dB$.

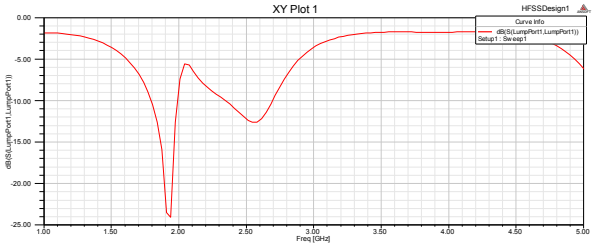


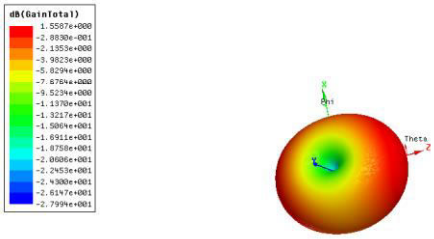
Figure 3: Return Loss

II. Bandwidth

S-parameter can be used in the calculating the bandwidth of the antenna. The antenna gives to the 10 dBiimpedance bandwidth of 45%. The frequency ranges from 1.79GHz to 2.00 GHz.

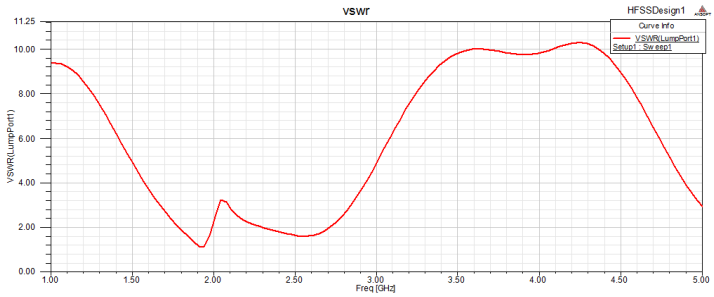
III. Radiation Pattern

The radiation pattern is shows the direction in a which the power is directed and is also the measure whichshows the radiation distribution and the power distribution in the particular direction. Radiation pattern at centre frequency 1.9 GHz figure follows.



IV. VSWR

VSWR is an application of the maximum and minimum voltages at the feed line and their ratio is the VSWR showed. The value of VSWR which isdetermined for perfect functioning of the antenna isthat it is should be less than 2. The value of should be 1:1 for perfect matching and the antenna to perform efficiently. The plot shows the VSWR observed as the 1.15 at 1.9 Ghz.



V. Gain

Value of gain shows in the amount of a power transmitted in the maximum radiation direction where the isotropic source is taken. The gain should not be less than to 0dB otherwise the antenna is a not radiating. We can get the gain of the antenna by the division of a radiation intensity and peak intensity. We have got the maximum gain as 1.55 dBat our taken frequency.

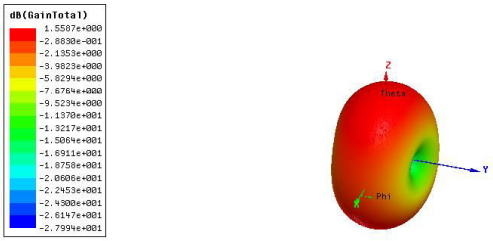


Figure 7: Gain

IV.CONCLUSION

The design is a made with CPW-Fed method and the study of the result shows utmost gain the calculated is a 1.55dB and the return loss calculated is a -24dB, VSWR calculated is 1.15 and the impedance bandwidth calculated is 45% in the proposed antenna. Simulation and design of the micro strip patch antenna is done on a substrate of dielectric constant 4.4 at the resonant frequency of a 1.9 GHz which ranges from 1.79GHz to 2.00 GHz is successfully done on HFSS. Several more designs can be simulated using different parameters gaining better results and higher efficiency finding its place in the field of wireless communication. Their main applications are in GSM 1800/1900.

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