

# A Microstrip Slotted Rectangular U-Shaped Patch Antenna Wlan/Wifi/Wimax For Uwb Applications

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**Abstract**— Since the beginning of the human civilization mankind is trying to communicate with the others. It's the communication process i.e. the sharing of feelings, emotions and information has made us the greatest creation of God on this green earth. It all started with hand gestures, then sounds. Communication. in wireless communication we mainly exploit the Electromagnetic Spectrum. Earlier systems were narrowband long range systems but in order to extend the use of available spectrum we are now using UWB (ultra-wide band) short range systems which require low power and these are built using expensive digital components. A microstrip antenna is a narrowband, wide-beam antenna fabricated by etching the antenna element pattern in metal trace bonded to an insulating dielectric substrate, such as a printed circuit board. Microstrip antenna is used for implementing UWB systems as it shows good broadband characteristics. We propose a Slotted MSA (Microstrip Antenna) for UWB (Ultra-Wide Band) applications. The aforementioned antenna is designed using IE3D SOFTWARE. This design consists of a rectangular patch U-shape antenna, two slots have been used which are at the ground. The technique used for feeding is the aperture feeding technique. FR4 substrate has been used because of its low cost and good reproductivity. The proposed Antennas were successfully designed, simulated and measured showing broadband features, stable radiation patterns and consistent gain. Measured results and graphs show validity of our suggested design.

## I. INTRODUCTION

Since the Federal Communications Commission (FCC) approved rules for the commercial use of the ultra-wideband (UWB) with a frequency range of 3.1{10.6 GHz for commercial purposes, in 2002 [1], the feasible design and implementation of UWB system has become a highly competitive topic in both academy and industry communities of telecommunications. As the front-end equipment of the UWB communication systems, the UWB antenna is of course very vital. A suitable UWB antenna is supposed to fulfill many requirements such as small size, omnidirectional radiation patterns, constant group delay and a high and stable gain across the whole band. In practical, it is desired to design an ultra wide band antenna that can operate in multifunctional wireless communication systems without performance distortion, such as wireless cellular telephone technology, Bluetooth, WiMAX and the UWB technology [2, 3].

In this paper, a new rectangular slotted U-shape antenna covers WIFI, WLAN, WiMAX, The design produces an ultra-wide bandwidth with return loss less than -10 dB in the frequency range of 5GHz for WIFI, WiMAX (5.8 GHz), WiFi (5 and 5.9 GHz). The mechanism of the antenna design accomplished with simulated results, measured data and equivalent circuit results are presented and discussed in the following sections.

## II. ANTENNA DESIGN

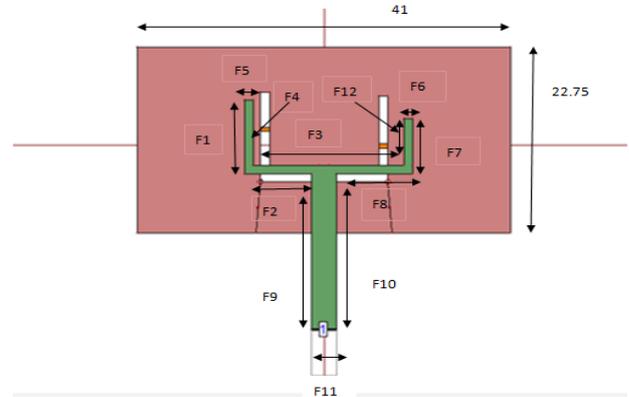


Fig. 1: antenna feed line

The feed which we have used is the microstrip feed. The above shown figure is of antenna feed which is highlighted in green. The dimensions of the feed line are as follows:

F1= 9	F9= -19
F2= -5.25	F10= -19
F3= 16.5	F11= -2.8
F4= -8	F12= 5.75
F5=1	L= 22.75
F6=1	W= 41
F7= -6.75	
F8= -8.35	

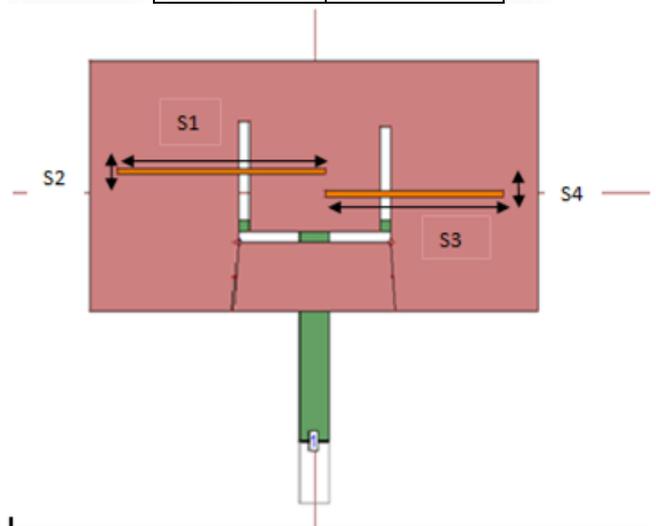


Fig. 2: slots of antenna

Here comes the slots of microstrip antenna as shown in the figure it contains two slots, one at the right hand side and another one at left hand side. The dimensions of the slots are given below:

S1= 18.9999	S3= 17.05
S2=-0.5	S4= -0.4999

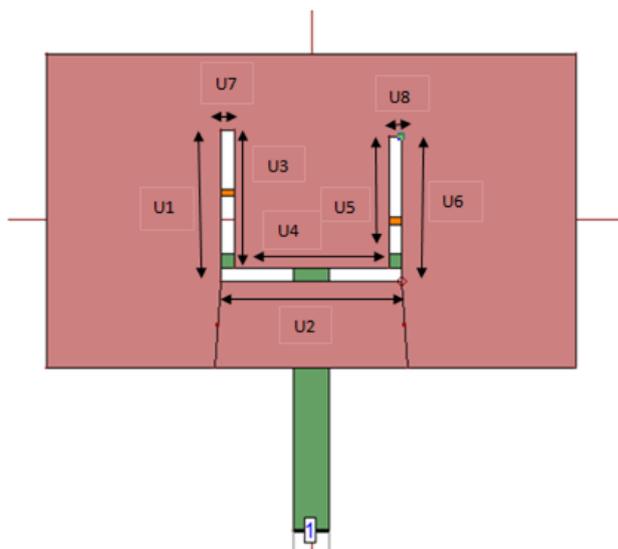


Fig. 3: u-shaped patch

The dimensions of U-shaped patch antenna is shown below:

U1= -11	U5= -9.5
U2= -4	U6= 10.5
U3= 10	U7= -1
U4= -12	U8= 1

### III. RESULTS

#### A. 3D-geometry

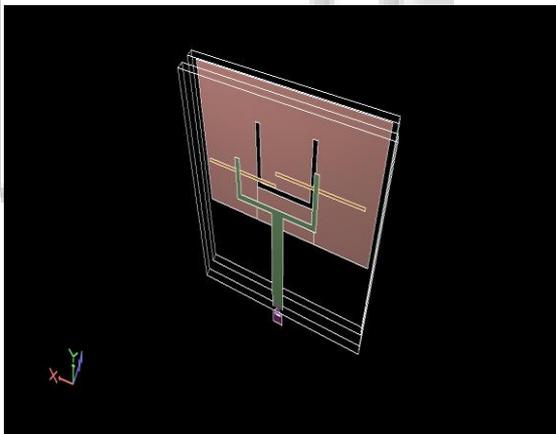


Fig. 4:

As the 3D geometry shown in the figure the ground is at the lower side and patch is at the upper side both are separated by the air gap in between. We have used a slotted antenna with a “U-shaped” patch. The “u shape” is at the patch and we have used two slots which are at the ground..We have used a aperture feeding technique as it has got less spurious radiation and is reliable We have used FR4 substrate because it has a low cost race. The operating frequency of this antenna is 5-6GHZ which would be covering the bands of WLAN, WIMAX and WiFi.

#### B. s-parameters:

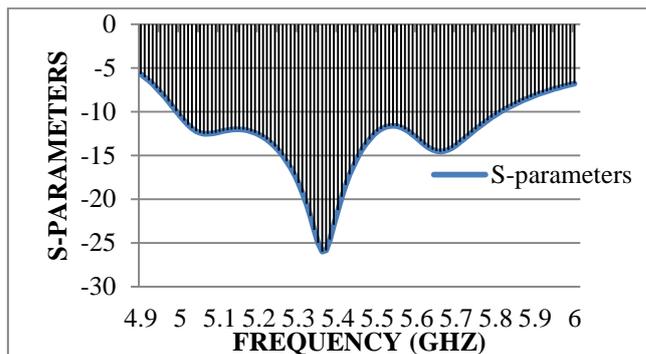


Fig. 5:

#### C. VSWR vs Frequency:

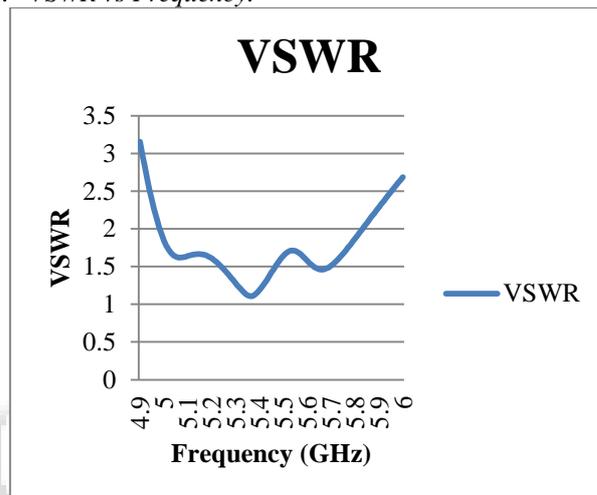
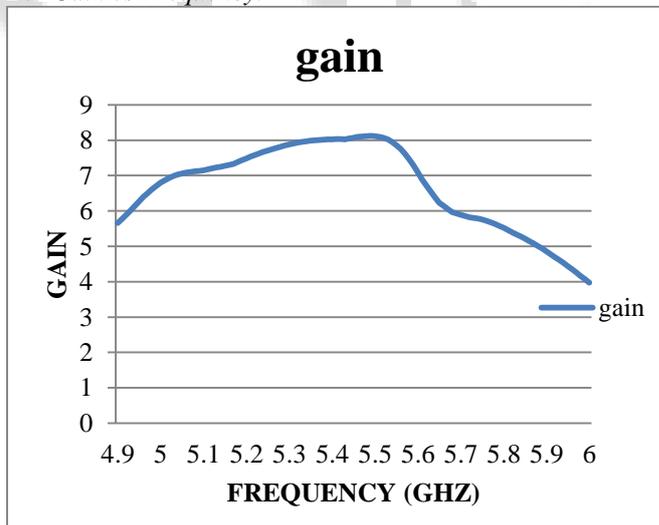


Fig. 6:

#### D. Gain vs Frequency:



### IV. CONCLUSION

#### A. Summary of work done

We have designed a rectangular patch microstrip antenna for ultra wide band applications. We have used two slots, both the slots are at the ground. We have used a rectangular “U-shaped” patch. aperture feeding technique has been used to design a antenna.

### B. Scope of future enhancement

Fabrication of the proposed microstrip antenna will be carried out in future. The measured results will be compared with simulation results. Different shapes and feeding techniques of microstrip antenna are to be analyzed.

### C. Conclusion

- (1) Antenna is designed to cover WLAN, WIMAX and WIFI bands, the band which we have covered while designing microstrip antenna is from 5-6GHZ, therefore it covers the following bands in WIFI, WIMAX and WLAN  
WIFI- 5GHZ  
WIMAX- 5.8GHZ  
WLAN- 5GHZ AND 5.9GHZ
- (2) Aperture feeding technique is used as it is easy to fabricate and less complex.

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