Compact Ultra Wide Band Antenna for Wireless Applications

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***Abstract*— The experimental study and design of a triangular microstrip antenna with V-slot is presented in this paper. Triangular patch on a FR4 substrate is designed having thickness of 0.6 mm and relative permittivity of 4.4 and it is mounted at a height of 5.5 mm above the ground plane. Bandwidth as high as 9.17% are achieved with stable pattern characteristics, such as gain within its bandwidth. This technological design is achieved by the two narrow slots embedded on the microstrip antenna in V shape and placing a single feed. Antenna gain, Impedance bandwidth and return loss are examined for the proposed antenna. This antenna was designed on Ansoft HFSS v-11.1.1 software. Details of the deliberated and simulated results are presented and discussed.**

***Index Terms*— Slotted Microstrip Antenna, Bandwidth, Returns Loss**

I. Introduction

Microstrip patch antennas are extensively implemented in lots of applications, particularly in wireless communiqué. This all is because of the attractive features of microstrip antenna such as light weight, low profile, low cost, sky-scraping efficiency, manufacture simplicity and ease of integration to circuits. Though the chief shortcoming of the microstrip patch antenna is its intrinsically tapered impedance bandwidth. Much concentrated research has been done in the last few years to expand bandwidth enhancement techniques. These techniques comprises the employment of thick substrates with low dialectic constant [2], and the slotted patch [3].The employment of electronically thick substrate merely result in inadequate success for the reason that a large inductance is ascertain by the enlarged length of the probe feed, resulting not many percentage of bandwidth at resonant frequency.

Now with the loading some precise slot in the radiating patch of microstrip antennas, compact or reduced size microstrip antennas can be achieved. The loading the slots in the radiating patch can result rambling of the agitated patch face current paths and cause the lowering of the antenna's elementary resonant frequency, which keep up a correspondences to the condensed antenna size for such an antenna, as compared to conventional microstrip antenna at similar working frequency.

In this paper, triangular microstrip antenna with V- slot on patch is proposed. The patch mounted on FR4 substrate (thickness=0.6mm) and above from ground plane at a height of 5.5 mm. It is found that proposed design can also cause noteworthy subordinating of antennas fundamental resonant frequency because of enlarged length of the probe feed.

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II. ANTENNA DESIGN

To design an antenna in the Wi-max band signified that the antenna dimension could be bulky which is not greeting-able. Owing to it purpose is to design a diminished size wide band microstrip antenna; the design idea was taken from wideband antennas to make the antenna work in a huge band of frequencies of the numerous wideband antennas, triangular patch antenna was preferred. Hence the chosen shape of the patch was cut with a V-shaped slot, with an aim to achieve smaller size antenna.

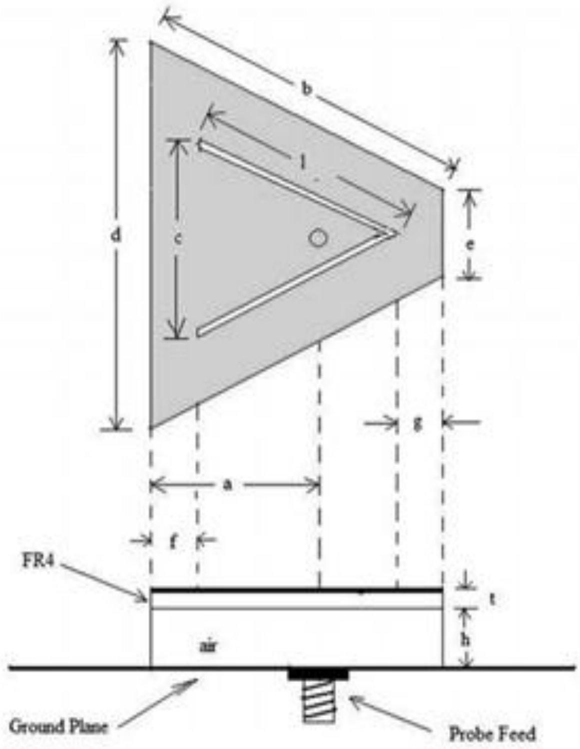

Fig 1: Geometry of Proposed Triangular Microstrip Antenna with Dimensions a = 21mm, b = 41.2mm, c = 29.6mm, d = 50mm, e = 9.8mm, g = 5.7mm, f = 4.7mm h = 5.5mm, l = 29.6mm, t = 0.6mm.

III. RESULTS AND DISCUSSION

The projected antenna has been simulated using Ansoft HFSS v-11.1.1 software [6]. Fig.2 shows the variation of return loss with frequency. Plot result shows resonant frequency 3.6 GHz. And total available impedance band width of 330 MHz that is 9.17% from the proposed antenna. Minimum -26 db return loss is available at resonant frequency which is noteworthy. Fig.3 shows the input impedance loci using smith chart. Input impedance curve passing close to the 1 unit impedance circle that shows the ideal matching of input. Fig.4 shows the VSWR of the planned antenna that is 1:1.11 at the resonant frequency 3.6 GHz.

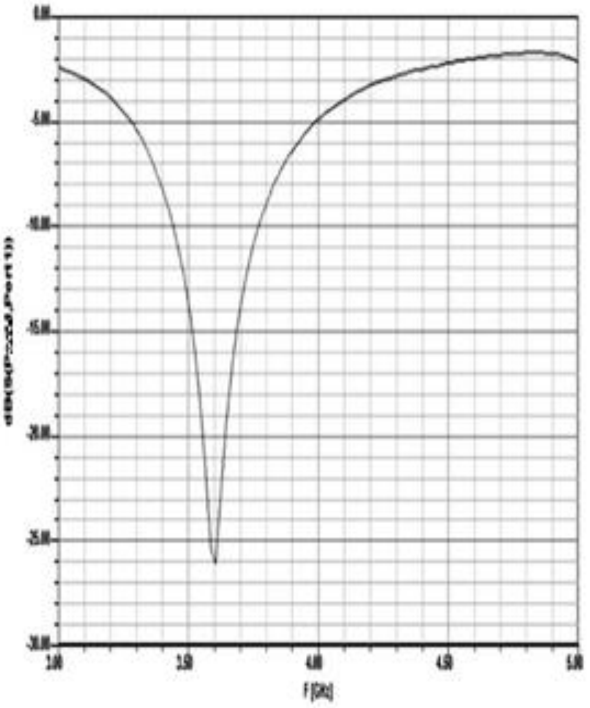

Fig 2: Return Loss vs. Frequency Curve for the Proposed Antenna.

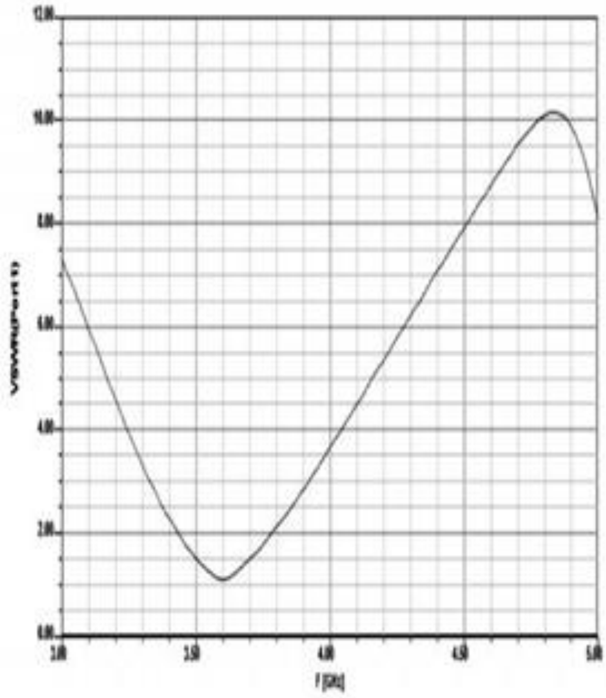

Fig 4: VSWR vs. Freq. Curve for the Proposed Antenna

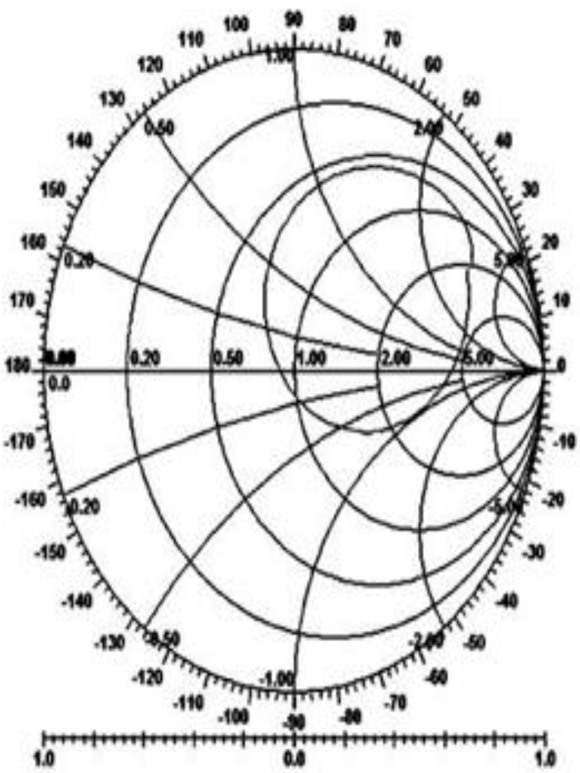

Fig 3: Input impedance loci using smith chart

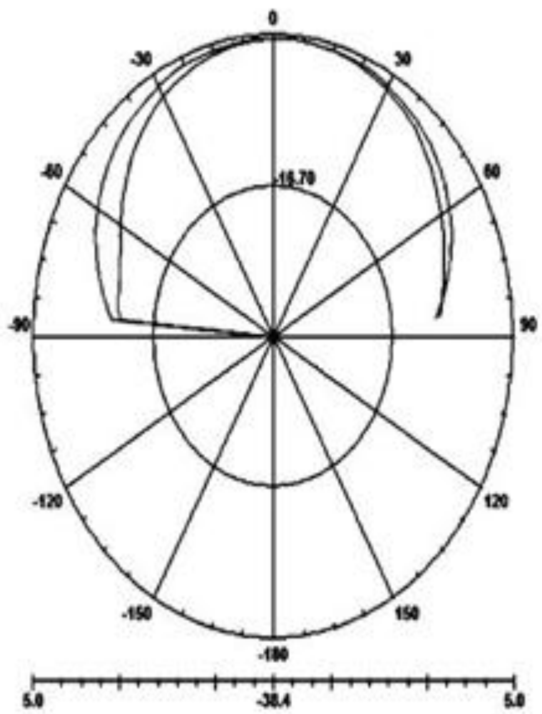

Fig 5: Radiation Pattern for the proposed Antenna

IV. CONCLUSION

The design has revealed that a single probe feed triangular patch with V-shaped slot on the patch can be utilized to form an antenna with impedance bandwidth of 9.17% working in Wi-max wireless communication system. These contemporary communication systems necessitate antennas with ultra wideband and/or multi-frequency operation means. These objects have been achieved utilizing slotted patch for the radiating element, with the aim to conserve compactness necessities and to sustain the taken as a whole layout as simply as promising and maintaining the realization cost very stumpy.

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