



DESIGN AND SIMULATION OF WIDE- BAND HUT SHAPED PATCH ANTENNA

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ABSTRACT:-

In this paper a hut shaped wide band hut -shaped antenna is proposed. This antenna is operated in the frequency range of 3.32 -4.41 GHz. This antenna is designed on FR-4 substrate, having dielectric constant of 4.4 and loss tangent 0.02. A partial ground plane is used. The complete structure is size of 30X30X1.6 mm³. This antenna is useful for WiMax application. For simulation purpose High Frequency Structure Simulator (HFSS 11.1 version) is used.

INDEX TERMS- *wide-band, Microstrip patch antenna, partial ground, monopole.*

I INTRODUCTION :

In the present era , wireless communication take great attention . Microstrip patch antenna is widely used antenna in wireless communication due its light weight, low cost and easily integrated with devices.

There are various literature are present related to wide band antenna [1-3].

II. PROPOSED ANTENNA CONFIGURATION

Proposed wide band hut – shaped antenna is shown in Fig. 1.

The complete dimension of proposed antenna is 30X30X1.6 mm³. Antenna used a partial ground having dimension of 30X10mm². This makes the antenna as a monopole antenna. FR- 4 is used as the dielectric material having thickness of 1.6mm and dielectric constant of 4.4 with loss tangent of 0.02.

Transmission line is using for the feeding purpose of the antenna.

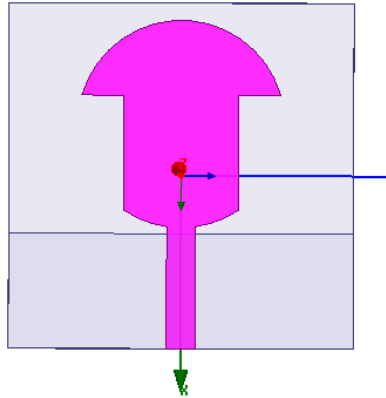


Fig 1. Proposed wide- band Hut – Shaped antenna

This antenna is designed by using circular patch antenna having radius of 9mm and having two rectangular slots of dimension $9.98 \times 3.64 \text{ mm}^2$.

III SIMULATION AND RESULT

For the simulation purpose HFSS -11.1 software is used. Various parameters such as return loss, VSWR, 3-D radiation Pattern, 2-D radiation pattern, Current distribution are observed.

Fig 2. Shows the return loss Vs Frequency graph. This graph shows that the antenna is operated in frequency range of 3.32-4.41 GHz.

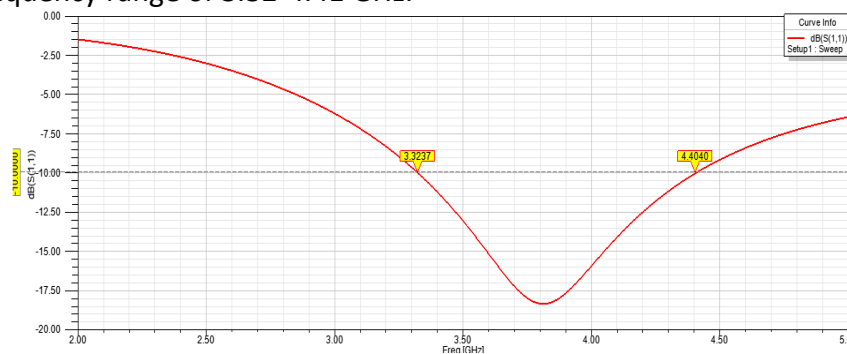


Fig.2 return loss vs frequency graph of proposed wide band Hut –shaped antenna

Fig. 3 shows the VSWR of the proposed antenna , its value is below 2 in the operating as shown in the figure

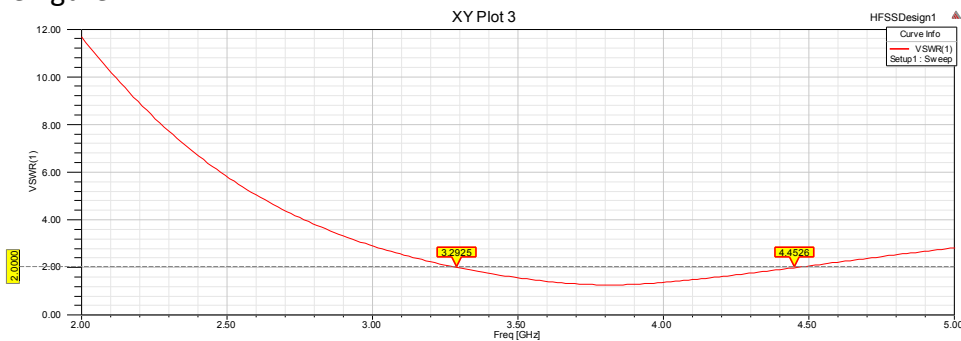


Fig.3. VSWR of the proposed antenna

Fig. 4 (a) shows the 3 D radiation pattern of the proposed antenna at centre resonant frequency of 3.845 GHz . It shows that antenna gives the omnidirectional pattern with the gain of 2.8 dBi.

Fig 4 (b) shows the 2-D radiation pattern of the proposed antenna. It shows that the radiation pattern is look like a figure of eight as shown in figure.

Fig. 5 shows the current distribution at the centre resonant frequency of 3.845 GHz.

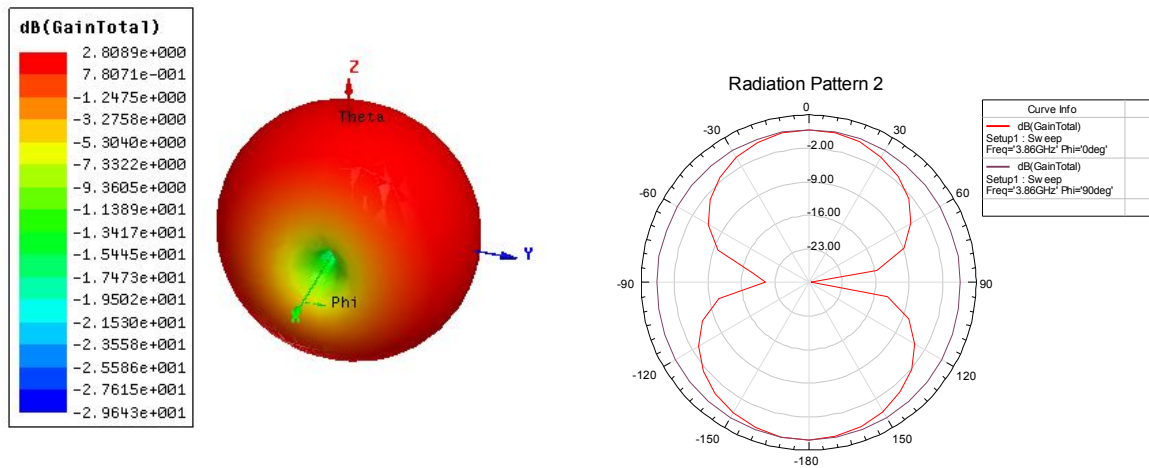


Fig .4.(a) 3 –D radiation Pattern of proposed antenna (b)2-D radiation of the proposed antenna

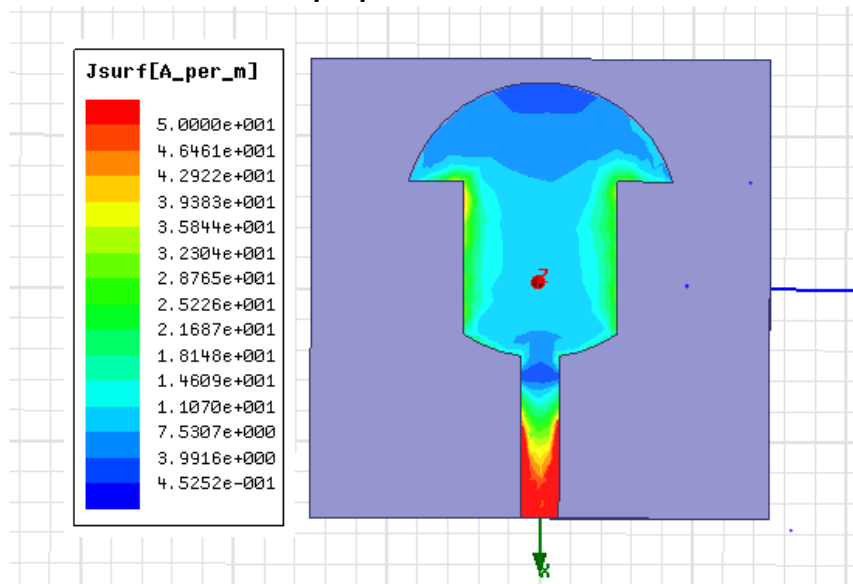


Fig.5 Current distribution at frequency of 3.845GHz

IV. CONCLUSION

In this paper a wide band Hut shaped microstrip patch antenna is proposed. It used transmission line feeding method for feeding purpose. This antenna is operated in the

frequency range of 3.32-4.41 GHz. It covers approximate 1 GHz frequency band. The proposed antenna gain is near to 3 dBi. This antenna is useful for WiMax application.

REFERENCES

- [1]. Gao, Steven & Sambell, A.. (2006). A simple broadband printed antenna. Progress in Electromagnetics Research-pier - PROG ELECTROMAGN RES. 60. 119-130. 10.2528/PIER05092603.
- [2]. Yang, Tang & Tian, X.-J & Chen, C.-F & Gao, Wen. (2012). CPW antenna aims at UWB applications. Microwaves and RF. 51.
- [3]. Chu, J.-H & Ruan, Chongwen & Ding, C.-Y & Yin, C.-X. (2012). A Novel Wideband Electrically Small Monopole. Journal of Electromagnetic Waves and Applications. 22. 1199-1204. 10.1163/156939308784158779.
- [4]. C.A. Balanis , Antenna Theory ,2nd Ed. , Jhon Wiley & Sons inc. New York . 1982.
- [5]. John D. Kraus and Ronald J Marhefra , Antennas : for all Applications , McGraw-Hill , 3rd edition ,2002, pg. 387-391.