COMPUTER AIDED DESIGN OF BROADBAND MODIFIED CIRCULAR MICROSTRIP PATCH ANTENNA.

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Key Words: *VSWR, RETURN LOSS, BANDWIDTH, HFSS, MICRO STRIP PATCH, RADIATION PATTERN, SMITH CHART.*

INTRODUCTION

An antenna is defined as a transducer that transmits and receives transmits electromagnetic waves. so antenna is referred as directional also probing device. For space borne application the primarily and popularly used antennas are the Micro strip patch antennas. The Micro strip patch antennas have many features, these features makes the microstrip patch antennas popularly used in space applications.

ANTENNA FEED NETWORK

For the feeding of Microstrip patch antenna there is variety of methods. Mainly these methods are classified into two categories –

1) contacting method.

2) No contacting method.

In contacting method, the radiating patch is directly feeding of RF power by using a connecting element such as a microstrip line. In the non-contacting method for transferring power between the coaxial probe and micro strip line electromagnetic field is coupled. The insect type of feed is used in this research paper.

ANTENNA CONFIGURATION.

In this antenna rectangular patch is taken having length of 43 mm & width of 38 mm. In this antenna feed line used for feeding is having length of 19 mm & width of 2.6 mm. Identical two ground planes around the feed line are used which are referred as Ground plane 1 & ground plane 2. The dimensions used for these two ground planes are also identical with each other. The length of ground plane1 is 18.4, the width is 16.9 mm, the circular edge of ground plane 1 is 11.8 mm, width of the ground plane after circular edge is 9.312 mm & radius of the circular edge of ground plane 1 is 21.6 mm. The length of ground plane 2 is 18.4, the width is 16.9 mm, the circular edge of ground plane 2 is 11.8 mm, width of the ground plane after circular edge is 9.312 mm & radius of the circular edge of ground plane 2 is 21.6 mm. The circular patch having radius of 9.2 mm. In this circular patch three circles of slit rings are mounted. In the most outer circle of slit rings total 5 slits are mounted, these slits are having length of 3.7 mm & width of 0.2 mm. In the inner circle of slit rings total 6 slits are mounted, these slits are having length of 3.7 mm & width of 0.2 mm. In the inner most circle of slit rings total 6 slits are mounted, these slits are having length of 2.7 mm & width of 0.2 mm. Actual designed antenna configuration shown in fig.4.1

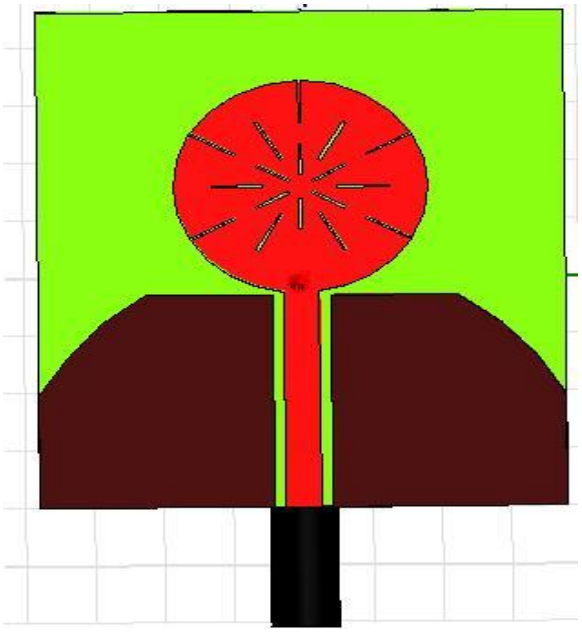

Fig.4.1 Actual Antenna Design.

RESULTS ANALYSIS & MEASUREMENT

Designed antenna simulated by using HFSS software. Simulated parameters are simulated return loss, VSWR, smith chart, radiation pattern & 3D radiation pattern.

Acceptable value of Return loss is below 10 dBs for practical application. In simulated return loss value is below 10 dBs at a frequency from 3.5973GHz to 8.06GHz. Simulated return loss shown in Fig.4.2.

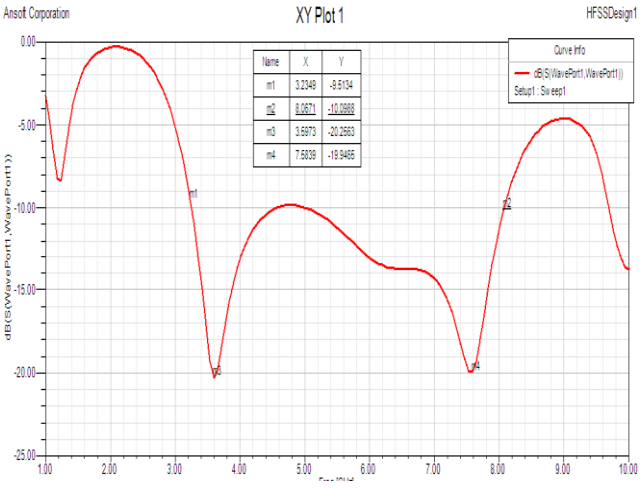

Fig.4.2 Simulated Return Loss.

The VSWR can be defined as impedance mismatching between the antenna and transmitter. When the mismatch is greater the higher is the value of VSWR. The minimum value acceptable for VSWR which for a perfect match is unity. The input impedance of practical antenna design should have an 50 ohm. An acceptable value of VSWR is up to 2 for practical applications. At a frequency of 3.5973 GHz VSWR is 1.21 & At a frequency of 7.5839 GHz VSWR is 1.22, as shown in below figures 4.3 & 4.4.

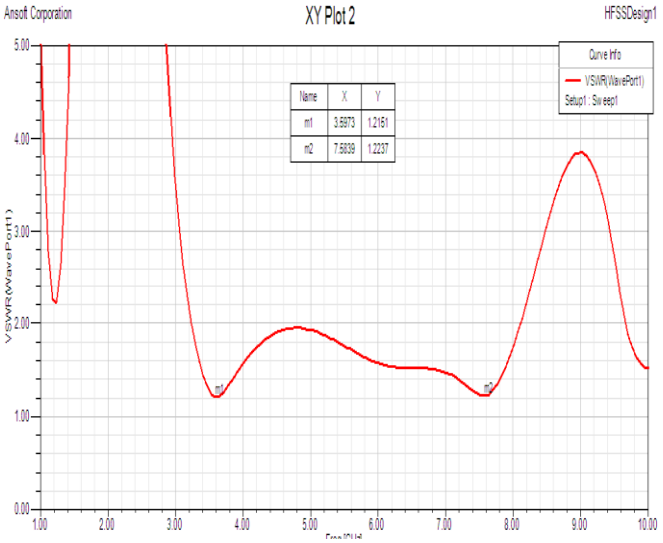

Fig.4.3 Simulated VSWR.

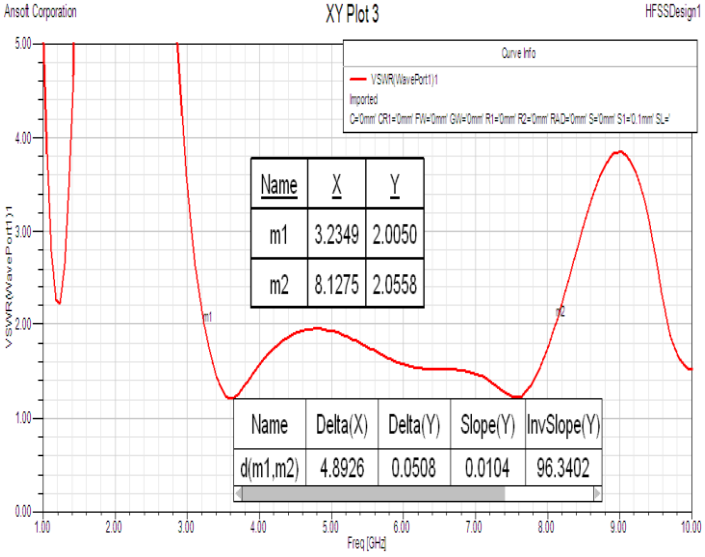

Fig.4.4 Simulated VSWR.

The various impedances offered by antenna are clearly given by Smith Chart. Simulated smith chart is shown in Fig.4.5.

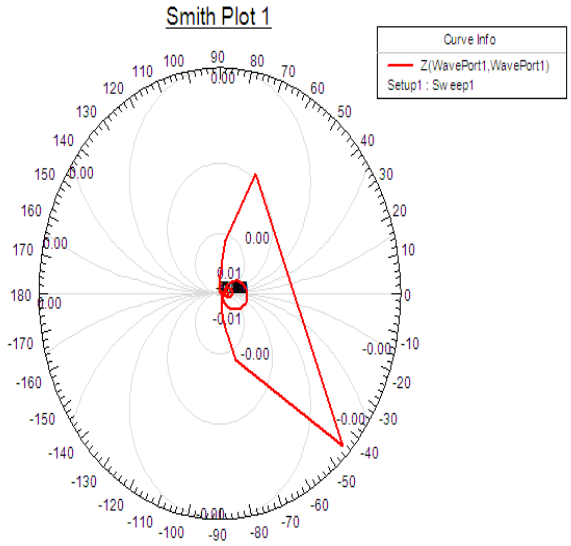

Fig. 4.5.Smith Chart. (Simulated)

A 3D radiation patterns are shown in below figures 4.6 & 4.7

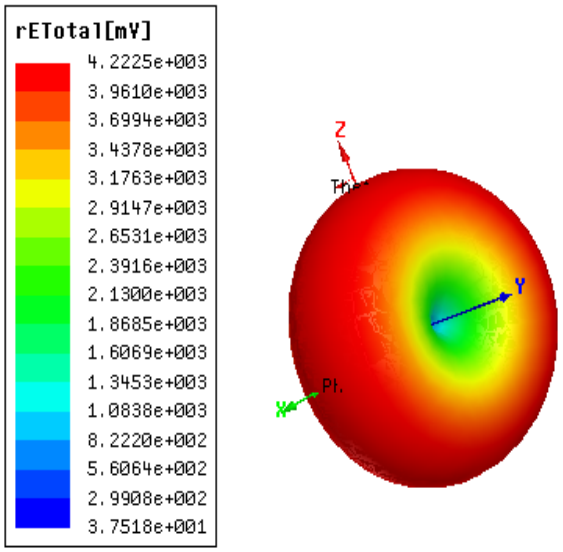

Fig.4.6 3D Radiation pattern at 3.5973 GHz Freq.(Simulated)

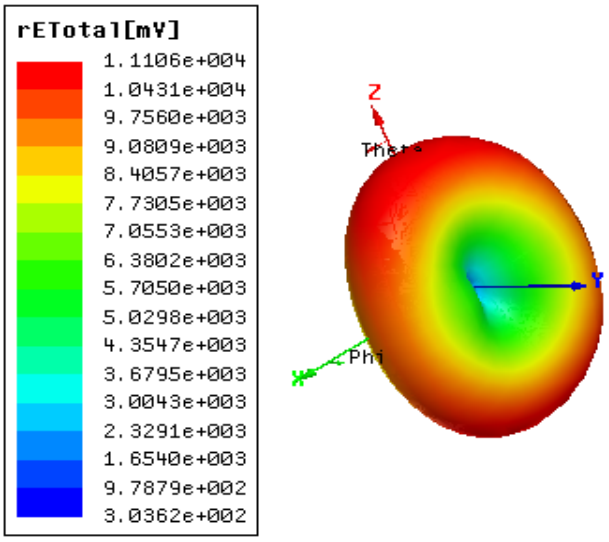

Fig.4.7 3D Radiation pattern at 7 GHz Freq.(Simulated)

A radiation patterns are shown in below figures 4.8 & 4.9.

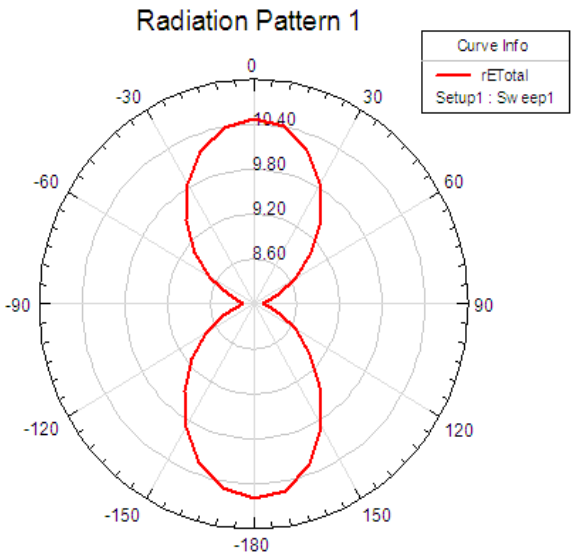

Fig.4.8. Radiation pattern at 3.5973 GHz Freq. (Simulated)

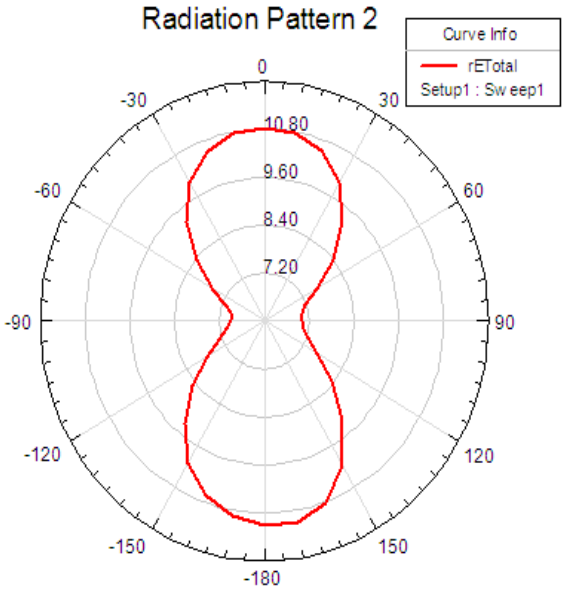

Fig.4.9. Radiation pattern at 4.4229 GHz Freq. (Simulated)

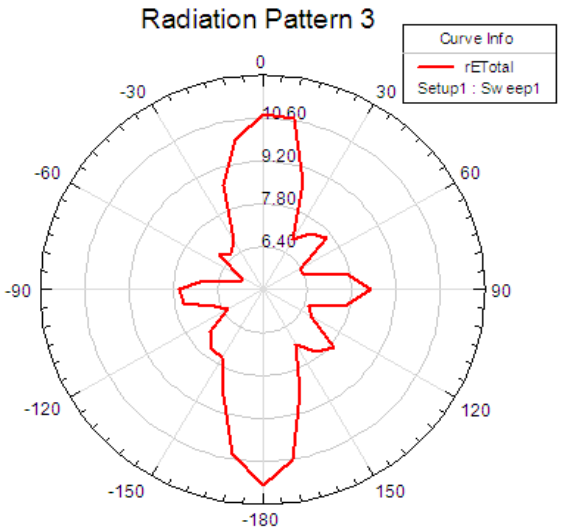

Fig.4.10 Radiation pattern at 7.5234 GHz Freq.(Simulated)

CONCLUSION

In this paper improvement in the bandwidth of the antenna is carried out by using circular microstrip patch antenna. This antenna radiates or receives power from 3.5973GHz to 8.06GHz. So this antenna is having more increased bandwidth. This antenna applicable where the light weight is the main requirement. This antenna used from 3.2 GHz to 8.00GHz frequency for industrial or mobile base station applications.

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