DESIGN ANALYSIS OF THREE AND FOUR INSET FEED MICROSTRIP PATCH ANTENNA

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ABSTRACT

This paper presents comparison of three and four feed microstrip patch antenna. Return loss of the proposed antennas are analyzed at operating frequency range 1 to 10 GHz. The proposed antenna is simulated using HFSS11 software. The epoxy and inset feeding is used as the substrate material and designing the antenna respectively. The three inset feeds provide better return loss than patch with four inset feeds.

Keywords: Microstrip antenna, inset feed, return loss, HFSS 11

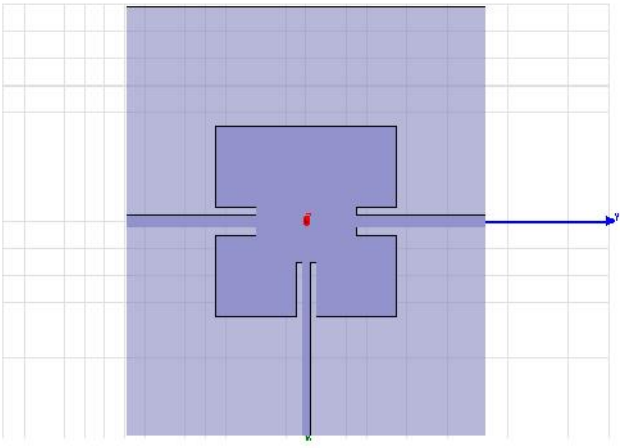
1. INTRODUCTION

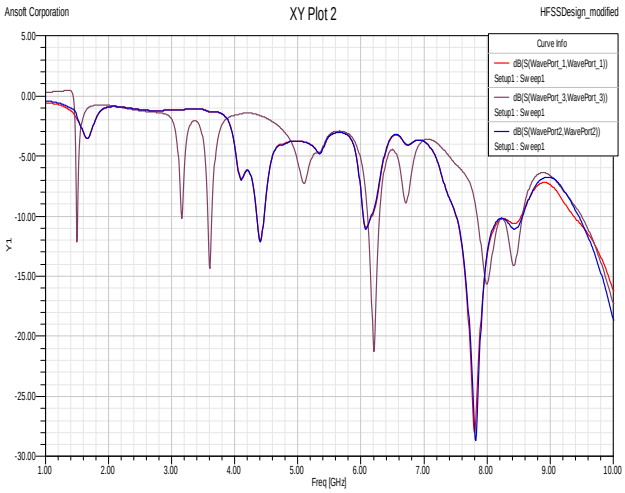
Microstrip antennas are used in mobile devices due to their compact size, low profile and conformal properties. Due to low cost and low profile properties microstrip antennas are widely used in WLAN/Wi-Max application systems.

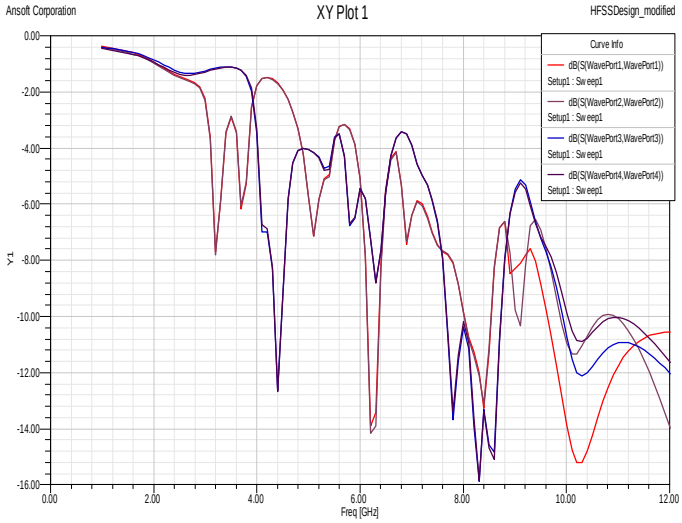
A microstrip antenna consists of radiating patch and ground plane separated by a dielectric material known as substrate. Various feeding techniques employed in microstrip antennas are microstrip feed, co-axial feed and proximity feed. But microstrip feed and co-axial feed are easier to fabricate. However in microstrip feed the spurious radiation increase with the increase in the substrate thickness [1].

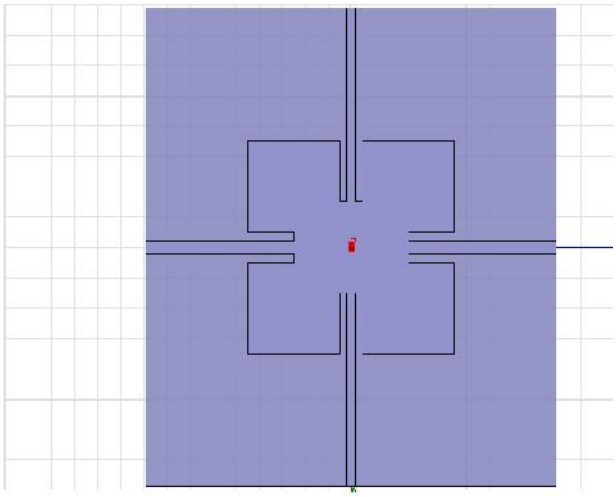
The narrow bandwidth problem of microstrip patch antennas due to surface wave losses and large size of patch can be eliminated by increasing the thickness of the substrate, cutting a resonant slot inside the patch, using low dielectric constant substrate material, multi- resonator stack configurations, use of various feeding techniques and slot antenna geometry like u-slot patch antennas together with shorted patch, double U-slot patch antenna, L-slot patch antenna, E-shaped patch antenna can be employed. The bandwidth and the size of the microstrip antennas are mutually conflicting properties [2].

The techniques to reduce the size of the patch are use of short-circuited element, resistive loading, high dielectric constant material, slots. But the drawback of slot antenna is poor circular polarization and laser cutting of solar cells is complex which is required to achieve desired shape at the time of fabrication. The bandwidth can be improved to a larger extent by the use of monopole, printed monopole and dipole antennas. But monopole antennas are difficult to build and large sized whereas printed monopole antenna are low profile, small size and easily integrate but suffer from low omnidirectional radiation pattern and low broad impedance bandwidth. The dipole antennas have









S No.	Configuration	Dimensions	Remark
1.	Triple inset fed microstrip patch antenna	35X45 mm^2 patch Three-35X3 mm^2 feed Dielectric constant 4.4 Substrate height=1.6mm	Maximum return loss of 29dB is obtained at frequency range of 1-10GHz
2.	Patch with four inset feeds	35X45 mm^2 patch Four-35X3 mm^2 feed Dielectric constant 4.4 Substrate height=1.6mm	Maximum return loss of 15.9dB is obtained at frequency range of 1-10GHz

5. CONCLUSION

With the same dimension minimum return loss of 15.9dB is achieved by using patch with four inset feeds, whereas with triple inset fed microstrip patch antenna the return loss of 29 dB is obtained. On comparison configuration with three feeds provides better return loss than four feeds.

REFERENCES

1. Ruchi, Rajesh Khanna, "Microstrip Patch Antennas for Dual Band WLAN Applications using Rectangular, Triangular and Pentagonal Shapes of Patch", IJIEASR, Volume 1, No. 1, pp 54-57, October 2012, ISSN: 2319-4413
2. D.Sugumar , Shalet sydney et al., "Bandwidth Enhancement of Coaxial Feed U Slotted Microstrip Antenna Modeled with FDTD Algorithm", 2010 IEEE International Conference on Computational Intelligence and Computing Research, ISBN:97881 8371 362 7
3. Govardhani.Immadi , M.S.R.S Tejaswi et al., "Design of Coaxial fed Microstrip Patch Antenna for 2.4GHz BLUETOOTH Applications", Journal of Emerging Trends in Computing and Information Sciences", VOL.2, NO.12, pp 686-690, December 2011, ISSN 2079-8407
4. B.T.P.Madhav, J.Chandrasekhar Rao et al., "Analysis of Coaxial Feeding and Strip Line Feeding on the Performance of the Square Patch Antenna", Int. J. Comp. Tech. Appl., Vol 2 (5), pp1352 -1356, SEPT-OCT 2011, ISSN:2229-6093
5. Mayank Dwivedi, Vinod Kumar Singh et al., " DESIGN OF A WIDEBAND INSET FEED MICROSTRIP PATCH ANTENNA", International Journal of Engineering Science and Technology (IJEST), Vol. 4, No.07, pp 3212-3218, July 2012, ISSN : 0975-5462
6. M.Ramesh,and YIP KB, "Design Formula for Inset Fed Microstrip Patch Antenna", *Journal of Microwaves and Optoelectronics, Vol. 3, No. 3, pp 5-10, December 2003,* ISSN 1516-7399
7. Priya Upadhyay and Richa Sharma, "DESIGN AND STUDY OF INSET FEED SQUARE MICROSTRIP PATCH ANTENNA FOR S-BAND APPLICATION", *International Journal of Application or Innovation in Engineering & Management (IJAIEM),* Volume 2, Issue 1, pp 256-262, January 2013, ISSN 2319 – 4847