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Bandwidth Enhancement of Rectangular Micro-strip Patch Antenna Using Slotting Methods For X band Applications

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ABSTRACT

This paper introduces a slotting approach for enhancing the bandwidth of the micro strip patch antenna.By addition of slot into the patch and ground adds a new resonance frequency. *The patch of antenna is fed by using a microstrip transmission line feeding network.* ***In this work RF power is directly fed to radiating patch using a connecting element such as microstrip line.*** *This RMPA is designed which works at 5.2 GHz frequency. This work acheived bandwidth of 12.24 GHZ,gain of 2.79 dBi and addition of two resonant frequencies.one of them is applicable for X band application.*

Keywords: ***Rectangular Microstrip patch antenna, Slotting method, Microstrip line feed, Bandwidth enhancement,CADFEKO,FR4***

1. INTRODUCTION

These days, there is a very large demand for wireless applications. Antennas which are used in these applications require being low profile, light weight and easily mounted [4].In conventional form, Microstrip patch antennas are narrow-band structures. Their impedance bandwidth is limited because of the resonant style of antenna and the thin thickness of antenna.In this paper there is use of one of the technique for bandwidth enhancement is introduction of slotting methods. The slots are implanted on the patch radiator to improve the impedance matching.In general the microstrip patch antenna with multiple slots demonstrates bandwidth enhancement [1].To enhance the efficiency of antenna different dielectric substrates such as foam,duroid,rogger,epoxy ,FR4 are used. it gives mechanical strength to antenna. And if dielectric substrate is thick it has direct proportionality with bandwidth and therefore FR4 substrate with dielectric constant of 4.4 is choose for this work.

The selection of feeding technique is also an important task as it indicate efficient transfer of power between the radiating structure and feed structure .[6]

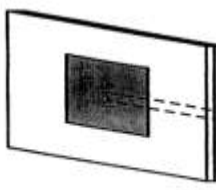

Fig 1:Microstrip Line Feed [6]

In this microstrip patch antenna some basic requirements are

- Type of substrate:FR4
- Shape of patch: Rectangular with lower corner cut
- Dimension of patch: Approx.16mm*18mm
- Feeding technique:Microstrip line feed
- Resonant frequency: Approx.5.2 GHZ
- Substrate thickness: 1.6mm

2. PROPOSED WORK

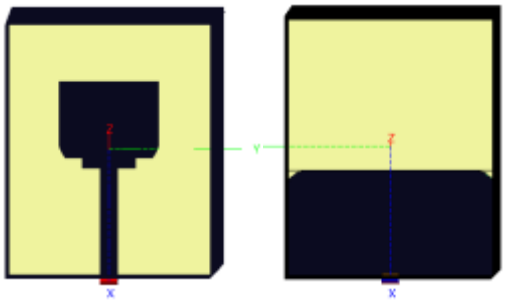

Fig.2:Proposed antenna

An X-band microstrip antenna for bandwidth enhancement is presented in this paper. Commercially available electromagnetic solver CADFEKO is used which based on method of moment.The proposed antenna is comprised of circular and rectangular slots fed by a 50 Ω microstrip line. Substrate dimensions are 36 mm × 45 mm . The impedance bandwidth (VSWR≤2) of the proposed antenna is 12.99 GHz . 1.66 dBi is the average gain where maximum gain is 2.79 dBi.

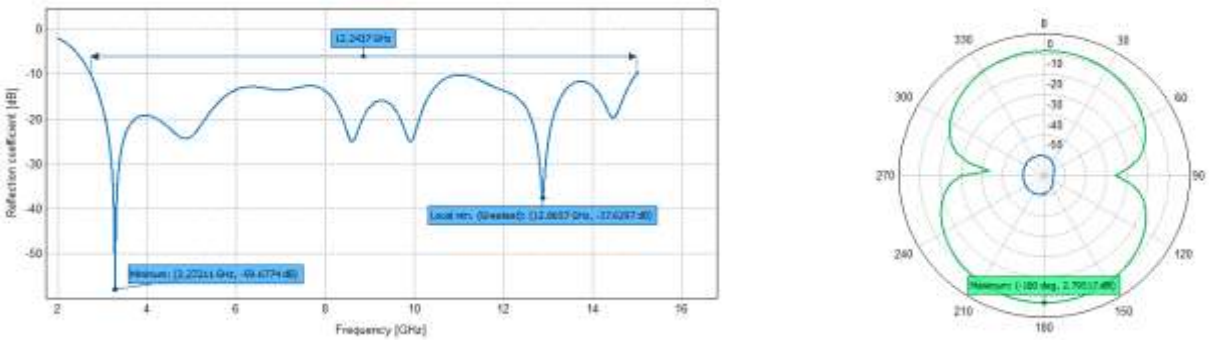

Fig 3: Reflection coefficient [S11] , Gain

Dimensions		Results	
Substrate width	45mm	Bandwidth	12.24Ghz
Substrate Length	36mm	S11	-59.67dB,-37.63dB
Patch Width	15mm	Gain	2.79dBi
Patch Length	18mm	Directivity	1.5,0.5
Partial ground length	36mm	VSWR<2	12.99Ghz
Substrate Height	1.6mm	Efficiency	90%

3. CONCLUSIONS

An X-band microstrip antenna for bandwidth enhancement has been demonstrated in this study. Introduction of slotting method results in enhancement in bandwidth. Simulation results indicate that the bandwidth of the proposed microstrip antenna has considerably been improved by placing circular slot and rectangular slot on the patch. The proposed antenna exhibits bandwidth of 12.24 GHz (lower cutoff frequency is 2.72GHz).

5. REFERENCES

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