International Journal of Electrical and Electronics Engineers
Vol. No.8 Issue 01, January-June 2016
www.arresearchpublication.com
IJEEE
ISSN 2321 - 2055

DESIGN AND ANALYSIS OF APERTURE COUPLED FLIPPED STAIRED DIELECTRIC RESONATOR ANTENNA

Mr.D.Naresh Kumar[1], V.Likhita[2], T.Bharat Varma[3], V.Ravi Kumar[4], P.Aravind Karteek[5]

[1,2,3,4,5]*Department of Electronics and Communication Engineering, JNTUK, LIET, Jonnada (India)*

ABSTRACT

As the Wireless communication grows very fast, the antenna devices designs must have enhanced output parameters according to the new generation need. A flipped staired DRA is used to enhance the various parameters is proposed for wireless LAN applications. In this paper, stair shaped resonator improves or enhances the gain, Band width and Radiation performances of DRA. This is achieved using low permittivity DRA volume is placed on High permittivity DRA volume.

The stair shaped DRA is excited by an aperture coupled to a microstrip line feed which is an effective feed mechanism to obtain wide band operations. Physical parameter of flipped stair shaped Dielectric Resonator Antenna has been optimized by extensive simulations using Ansoft HFSS. The resonators are located at the center of the rectangular slot and are excited by center feed microstrip line. This stair shaped Dielectric Resonator Antenna is simulated using CST Microwave Studio Suite 2010. The results of the simulation shows that the proposed Dielectric Resonator Antenna achieves an impedance bandwidth of about 49% with Voltage Standing Wave Ratio (VSWR) less than 2 and operates at the frequency of 4GHz to 6GHz. This Stair shaped Dielectric Resonator Antenna exceeds the Band Width requirement for IEEE 802.11 a WLAN applications with required VSWR. Parametric studies of Stair shaped DRA are presented.

Keywords: Dielectric Resonator Antenna, Stair Shaped DRA, CST Microwave Studio Suit 2010, Cross Slot Micro Strip Line, Wireless LAN.

I. INTRODUCTION

Increase in multimedia applications in modern day mobile phones has resulted in an increase in bandwidth requirement. To accommodate such needs broadband antennas are necessary and Dielectric Resonator antennas with relatively low Q-factors, high radiation efficiencies, small size are suitable for such applications. High radiation efficiency is due to the low discipationlossess. Several efforts have been made to improve the bandwidth of DRAs like stacking DRA elements.

Dielectric Resonator Antennas have some special properties which translates them into millimetre wave applications. DRAs can also be excited with different feeding methods, such as probes, microstriplines, slots

International Journal of Electrical and Electronics Engineers
Vol. No.8 Issue 01, January-June 2016
www.arresearchpublication.com
IJEEE
ISSN 2321 - 2055

and co-planar lines. The DRA has compact size, low weight flexibility in their shape etc., By choosing different Dielectric constant of Resonator material the operating bandwidth of DRA can be varied.

Stacking of DRA instead of using single DRA the bandwidth and gain can be modified. To improve the gain, bandwidth and radiation performances sta44iring of DRA is an efficient technique.

In this work we propose a broad band DRA fed by across slot aperture coupled for staired square shaped Dielectric Resonator Antenna.

II. ANTENNA DESIGN

The geometry of the aperture slot coupled flipped staired dielectric resonator antenna is shown in figure fig.1 dielectric constants of DRA's equal to 10 the square shaped DRA's has base length (L3=10mm) has the diameter of 3mm the length (L1) of the square shape resonator is 20mm detailed dimensions of DRA is shown in table .

The dielectric resonator is placed at the center of a rectangular shaped aperture the dielectric constant of the dielectric substrate is 3.38 the thickness (h=1.6mm) a stub length of (ls=5mm) and width (2.16mm) is used to excite the square shaped DRA a square ground plane of dimensions 100mm* is used in this study a cross slot aperture where the two slots are placed at 90° to each other to obtain broadband flipped stepped DRA .

The dimensions of proposed DRA are shown in table:

		Substrate	L1	L2	L3	LStub
square	10	H=1.6mm	20mm	20mm	10mm	5mm

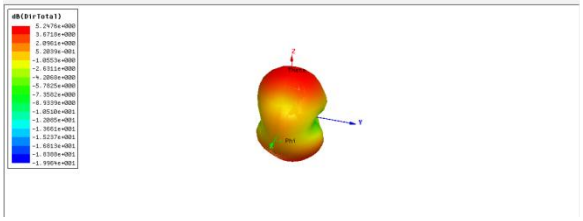
	H1	H2	H3	H(total)	W slot
squre	5mm	4mm	3mm	12mm	2.16mm

The directivity of the proposed antenna is obtained as 5.84 db. The directivity is shown in figure 3:

The simulated 3D polar plot of gain in db is shown in the figure 4.The gain obtained of the proposed antenna is 2

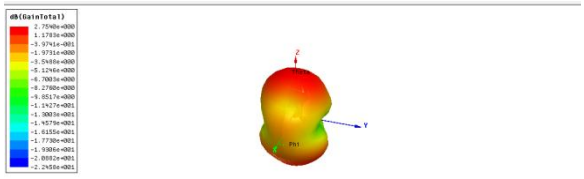
References:

The gain of the proposed DRA is obtained as 2.3db. The gain is shown in fig 2.



The directivity of the proposed antenna is obtained as 5.84 db. The directivity is shown in figure 3:

International Journal of Electrical and Electronics Engineers
Vol. No.8 Issue 01, January-June 2016
www.arresearchpublication.com
IJEEE
ISSN 2321 - 2055



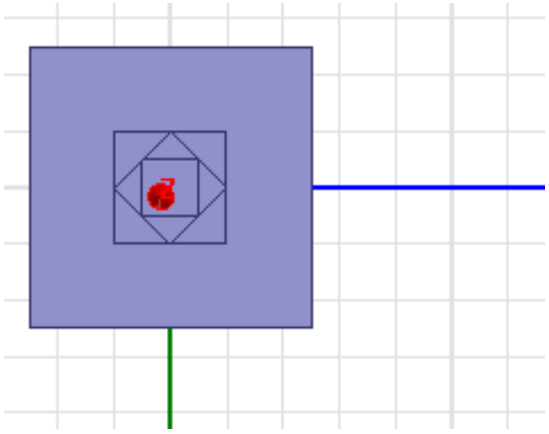


Fig 1. The geometry of proposed DRA

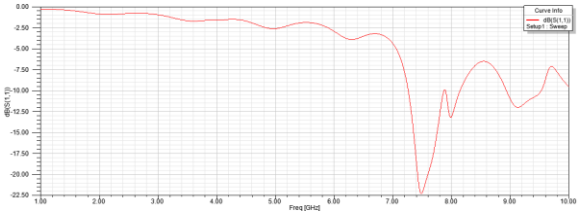
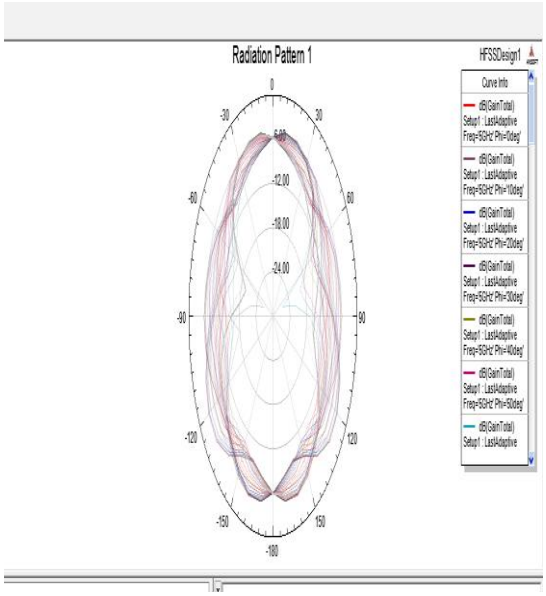


Figure 3:Return loss(S11) of the proposed antenna.

To achieve better impedance in the antenna the step shaped defect is presented in the ground plane. The two parallel slits in the backward direction forms the e shaped slot. it effects the impedance and resonant frequencies performance using HFSS simulator.

The results of return loss, gain, radiation pattern, directivity, bandwidth of the stepped dielectric resonator antenna are shown here. simulated return loss of Stepped Dielectric Resonator antenna is shown in figure3



Simulated return loss and frequencies obtained are used in many applications.

III. CONCLUSION

The aperture coupled flipped stepped DRA is suitable for different applications such as WLAN,WIMAX, radar, satellite, C-band applications. using the square shaped defect on the ground plane an excellent impedance is

achieved. moreover the antenna has several advantages like small size ,high directivity. these are very important in wireless communication systems.

REFERENCES

[1] A.Petosa, "Dielectric Resonator Antenna Handbook", Artech House Publishers,2007.

[2] Runa Kumari, "Conformal Patch Fed Stacked Triangular Dielectric Resonator Antenna for WLAN application"

[3] R.Chair , "Broadband Aperture coupled Flipped staired DRA"

[4] Sayantan Dhar,"Circularly polarized Minkowski Fractral DRA"