International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 01 | Jan 2020 www.irjet.net p-ISSN: 2395-0072

Hybrid Dielectric Resonator Antenna for Wi-Max Application

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ABSTRACT:- In this article I have shown a dual-band ring di-electric resonator antenna for Wi-MAX applications. The introduced antenna is made up of several elements of ring di-electric resonator antenna and an improved square shaped slot antenna. A modified square shaped slot is used as both radiator and excitation mechanism for ring DRA. The layout of this antenna is made with the aid of Ansoft HFSS simulation software. The resonance frequency of the proposed DRA is 3.2 GHz and 5.7 GHz respectively. The introduced, radiator operates in two frequency bands like 2.81–3.47 GHz, 5.54–5.96 GHz respectively. The application of the presented antenna is Wi-Max application.

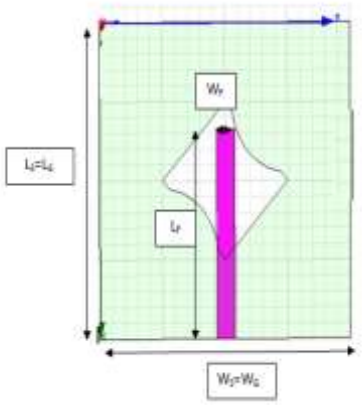
Keywords: Dielectric resonator antenna, Slot antenna, Return loss, Wi-Max

1. INTRODUCTION

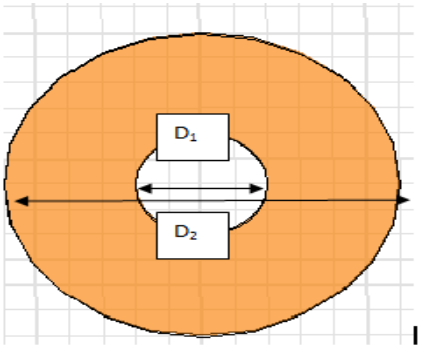
The article on Dielectric Resonator Antenna has given a great progress in the latest years. It differentiated with the traditional antennas, Dielectric Resonator Antenna has better advantages and more features. In the present time we need high data rate and size of device is getting compact day by day. In this progression two important applications are Wi-Fi (WLAN) and Wi-MAX. For achievement of all these wireless applications we require effective and compact antenna because wireless is more useful in our day to day life. Dielectric Resonator Antenna has peculiar quality cost effective and low profile which prove Dielectric Resonator Antenna is well suited for WLAN/ Wi-MAX application systems. The field of wireless communications has been undergoing a revolutionary growth in the last few years Hamsakutty et al. presented a metal-coated dielectric resonator antenna with a coaxial feed [5]. Techniques such as CPW feed, coaxial probe, L-shaped microstrip line is used by few research papers [6,7,8]. Brar et al. [9] proposed pentagon shaped DRA along with Kumar et al. [10] introduced hexagonal shaped DRA for multiband operations. Utilizing the benefit of DRA structure, flexibility of various geometries of DRAs also submitted to get augmentation of broadside radiation likes R-DRA [11], L-shaped [12], T-shaped [13], H-shaped [14], Z-shaped [15].

2. ANTENNA DESIGN

Figure 1illustrated that DRA which is composed of a square shaped slot and ring DRA and a substrate with an area of 50mm x 50mm where L_S is the length of the substrate and W_S is the width of the substrate. Under mentioned characteristics of used FR4 substrate are 1.6mm of thickness and loss tangent of 0.02 and relative permittivity of 4.4. The area of a ground plane is 50mm x 50mm.The square shaped slot antenna is excited by the micro strip feed line of width W_f and length L_F. The ring DRA is made up of Alumina ceramic material and a dielectric permittivity of 9.8 and loss tangent of 0.002.The parameters of the DRA are height (H), the inner diameter of the DRA is D_1 and the outer diameter of the DRA is D_2. The optimized parameters of the antenna is L_F=20mm, W_F = 2.7mm, H=14mm, D_0=24mm, D_1=8 mm, L_S=W_S=50mm.



(a)



(b)

Figure 1 Schematic Diagram of Antenna (a) Feeding Structure (b) Isometric View

3. SIMULATION RESULT

The presented hybrid DRA is designed and the software generated result was carried out using Ansoft HFSS. Figure 2 is exhibit Reflection coefficient of the presented antenna which shows that the resonance frequency of the proposed radiator is3.2GHz, 5.72GHz respectively with return loss of -35.18dB, -23.66 dB respectively. The figure 3 shows the VSWR of the proposed antenna.

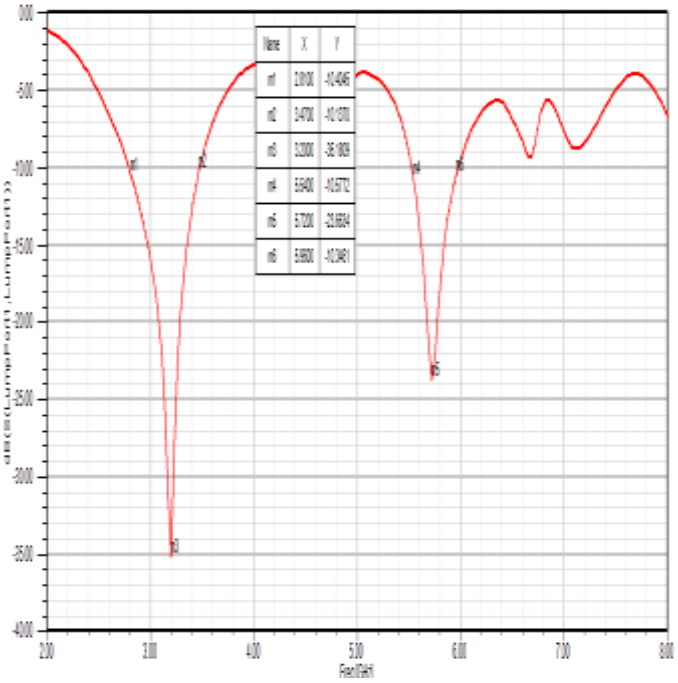


Figure 2 S_{11} of Proposed Radiator

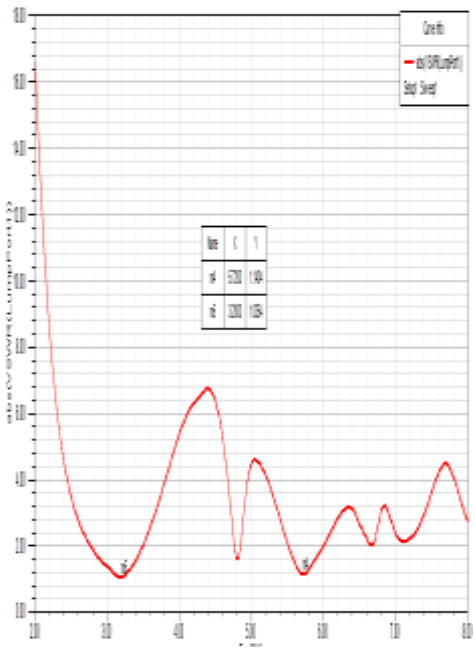


Figure 3 VSWR of Proposed Radiator

4. CONCLUSION

This research paper has explained the design and analysis of dual-band integrated antenna. Integrated antenna is the combination of slot and dielectric resonator based radiator. The suggested integrated radiator gives dual-band working frequency is 2.9–3.6 GHz, 5.2–5.6 GHz respectively. The important feature of the suggested article is generating of Dual-band (2.9–3.6 GHz and 5.2–5.6 GHz). The suggested antenna is suitable for Wi-MAX applications.

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