Dual Band Monopole Antenna with a Reflector and a Director

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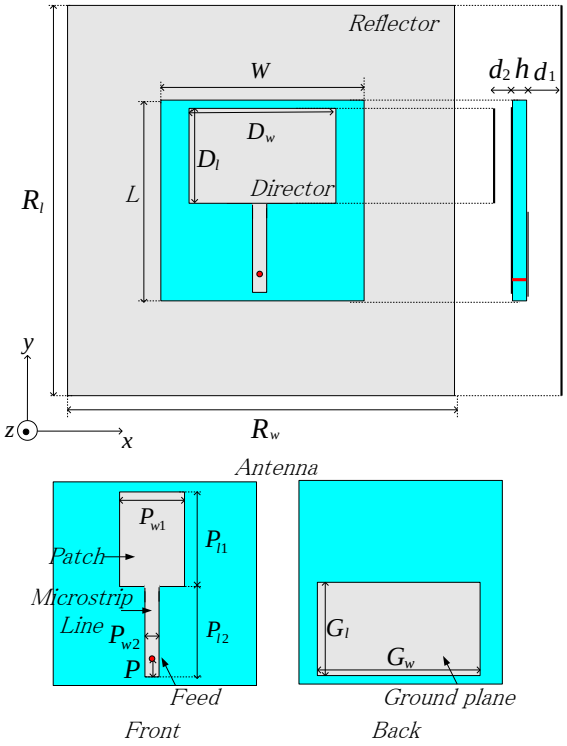
1 Introduction

Authors have proposed a wide band and unidirectional printed monopole antenna with a reflector and a director[1]. In this paper, the printed monopole antenna in [1] is designed as a dual band (2.45GHz/3.5GHz bands) antenna.

2 Antenna Design

Figure 1 shows a dual band monopole antenna with a reflector and a director. The thickness and the relative dielectric constant of the dielectric layer is h =1.6mm and ε_r =2.6, respectively. The loss tangent of the dielectric substrates is 0.001. The distances from the antenna to the reflector and the director are d_1 =5mm and d_2 =2mm, respectively. The total thickness of the antenna is $h+d_1+d_2$ =8.6mm.



L=76,W=76,h=1.6,P_{l1}=32,P_{l2}=32,P_{w1}=21,P_{w2}=2,G_l=32, G_2=68,P=3,D_w=56,D_l=32,d_1=5,d_2=2,R=160[mm]

Fig. 1. Geometry of a proposed monopole antenna with a reflector and a director

3 Antenna Characteristics

For the calculations, in this paper, the simulation software package FEKO [2], which is based on the method of moment, is used. Figure 2 shows the simulated results of the return loss and gain. The simulated bandwidth of 10dB-return loss is from 2.35GHz to 3.98GHz (51.6%). The simulated bandwidth satisfies the frequency band for WLAN and WiMAX applications. The gain of the antenna is from 2.6dBi to 10.5 dBi in the +z direction in the frequency band. The proposed antenna has unidirectional radiation pattern with 10 dB return loss. Figure 3 shows the simulated input impedance. The simulated input impedance of the antenna without a director is also shown for comparison. For the proposed antenna, two new resonances are produced in 3.5GHz and 3.875GHz. The resonance of 2.4GHz band is caused by the monopole antenna and the resonance of 3.5GHz and 3.875GHz is caused by the director.

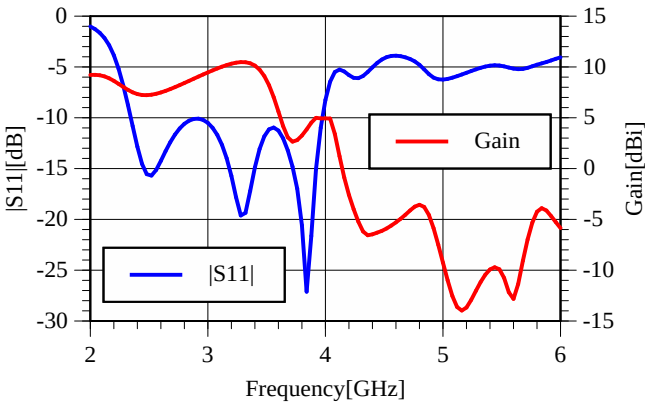


Fig. 2. Simulated |S11| and Gain

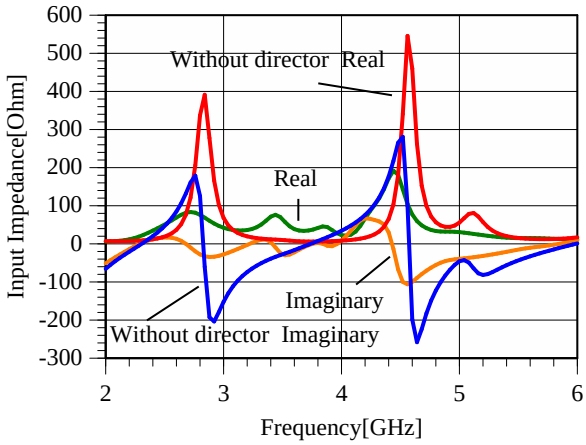


Fig. 3. Simulated input impedance

4 Conclusion

A dual band square monopole antenna with a reflector and a director has been proposed. The bandwidth of 10dB-return loss of the proposed antenna satisfies the specification of the frequency band for WLAN and WiMAX applications.

References

[1] D. Hisatomi, et al. JCEEE, 07-1A-02, p. 29 (Sep. 2015)
[2] http://www.feko.info/