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Design and Analysis of CPW Fed Patch Antenna at 2.4GHz

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Abstract: ***In this paper, a CPW-fed microstrip antenna for wireless (ISM Band) application was designed and simulated. For examine purpose the performances of this antenna, a simple prototype was designed at 2.4 GHz frequency and simulated in high frequency software simulator (HFSS). In this paper we getting return loss is -19.65dB at 2.4GHz in simulation.. Also in this paper results of gain of antenna and radiation patterns are represents.***
Keywords: CPW fed antenna, low profile antenna, RMPA

I. INTRODUCTION:

Now a days, Microstrip antennas are highly in demand, having large applications areas as of late as a result of its light weight, little size, conformity [1]. The fast advancement in the digital wireless communication prompted incredible interest for remote sensing devices that can work for various models, for example, the widespread portable media communications framework UMTS, Bluetooth, the wireless local area network (WLAN) and furthermore satellite communication[2]. As technology advances in electronic field such as smartphones, smart watch and wearable gadgets have increased the demand for the small conformal antennas. The Internet of things(IOT) recently have increased lot of popularity where most of the gadgets and things are easily be able to communicate with each other, which will lead to increase in number of wireless devices working at different frequencies. Microstrip antennas are broadly utilized in light of their numerous benefits, like, the very low profile, lightweight and congruity. Notwithstanding, antennas have the fundamental weakness that is narrow bandwith leading to very limited data transfer capacity. Scientists have tried numerous endeavours to beat this issue and numerous configurations have been displayed to broaden the transmission capacity.

Microtrip printed antennas are very low profile, light weight, small size and thus widely used in wireless and mobile communications, as well as radar applications. Microstrip antennas can be divided into two basic types by structure, firstly microstrip patch antenna and microstrip slot antenna [1, 2]. The slot antennas can be fed by microstrip insert feedline, slot line and CPW [3, 4]. In CPW both patch and ground are sharing same plane. The CPW is the type of feeding in which side-plane conductor is ground and center strip carries the signal. The main advantage of CPW fed antenna is wideband antenna which mainly use in WLAN applications. In this paper, we proposed the microstrip antenna fed by CPW at a designed frequency of 2.4 GHz and its coverage of frequencies are ranging from 2.1–2.6 GHz [5].

II. DESIGN OF PROPOSED ANTENNA AND MODEL

The Coplanner waveguide (CPW) fed microstrip rectangular patch antenna is designed at 2.4 GHz with the structure, as shown in Figure 1(a). The substrate of the antenna is FR_4 and the substrate height is 1.6mm,, the substrate with thickness (h) of 1.6 mm and dielectric constant (εr) of 4.4. The antenna is simulated in HFSS and dimensions are given in table 1.

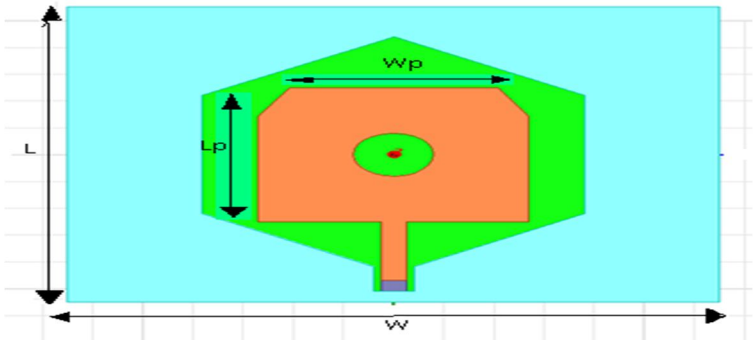

Figure 1. Geometry of proposed antenna

Table 1. Antenna design parameters

L (substrate length)	55mm
W(Substrate width)	65mm
H (substrate height)	1.6mm
Lp (patch length)	28mm
Wp (patch width)	27mm
R (Radius)	5mm
L1(Length of hexagon)	22mm

III. SIMULATION RESULTS

High frequency software simulator was used for the designing and simulation purpose, which provides accurate results for RF antennas. Simulation results obtained after analysing the design are as follows. Figure 2 represents the Return Loss (S11) versus the frequency (in GHz) plot of the proposed design. In paper also represents radiation pattern in 2D and 3D polar plots and also shows gain (in dB.) For given design we get gain 4.65 dB for 2.4 GHz.

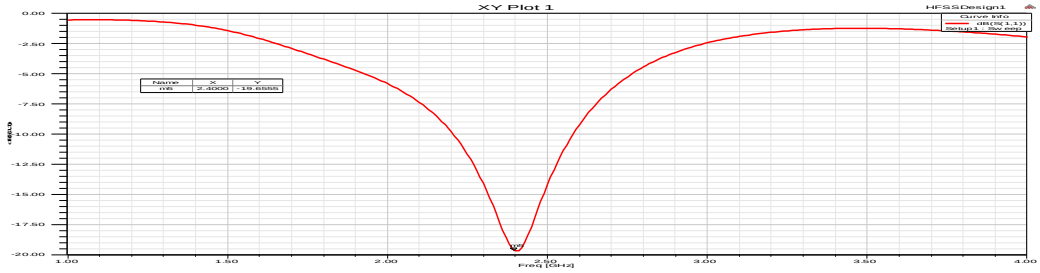

Figure 2. Return loss (S_{11})

Figure 3. 3D radiation pattern

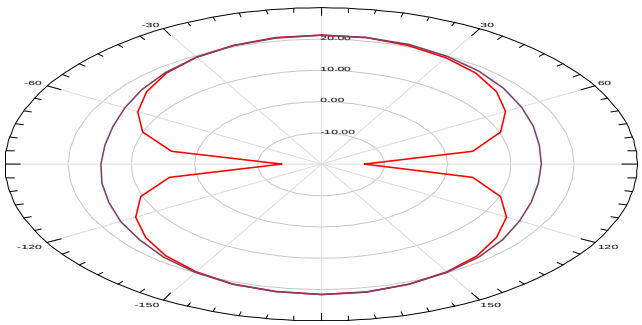

Figure 4. 3D Gain (In dB)

Figure 5. 2Dradiation pattern (E-plane and H-plane)

Above result shows radiation pattern in 2D and 3D for frequency 2.4GHz. Here for design antenna we getting gain of 4.65 dB at 2.4GHz.

IV. CONCLUSIONS

Microstrip antenna has turned into a quickly developing region of research. Their applications are boundless, in view of their less weight, small size, and simplicity of assembling of antenna. The design of antenna fed by CPW is considered on the basic structure. It is proved by varying the length of the hexagon for achieving the desired results for use in WLAN applications. The antenna design is compact with dimension 55 x 65 x 1.6 mm^3. The antenna had a simple geometry and is relatively easy to fabricate. The outcomes are in great concurrence with the industry standards.

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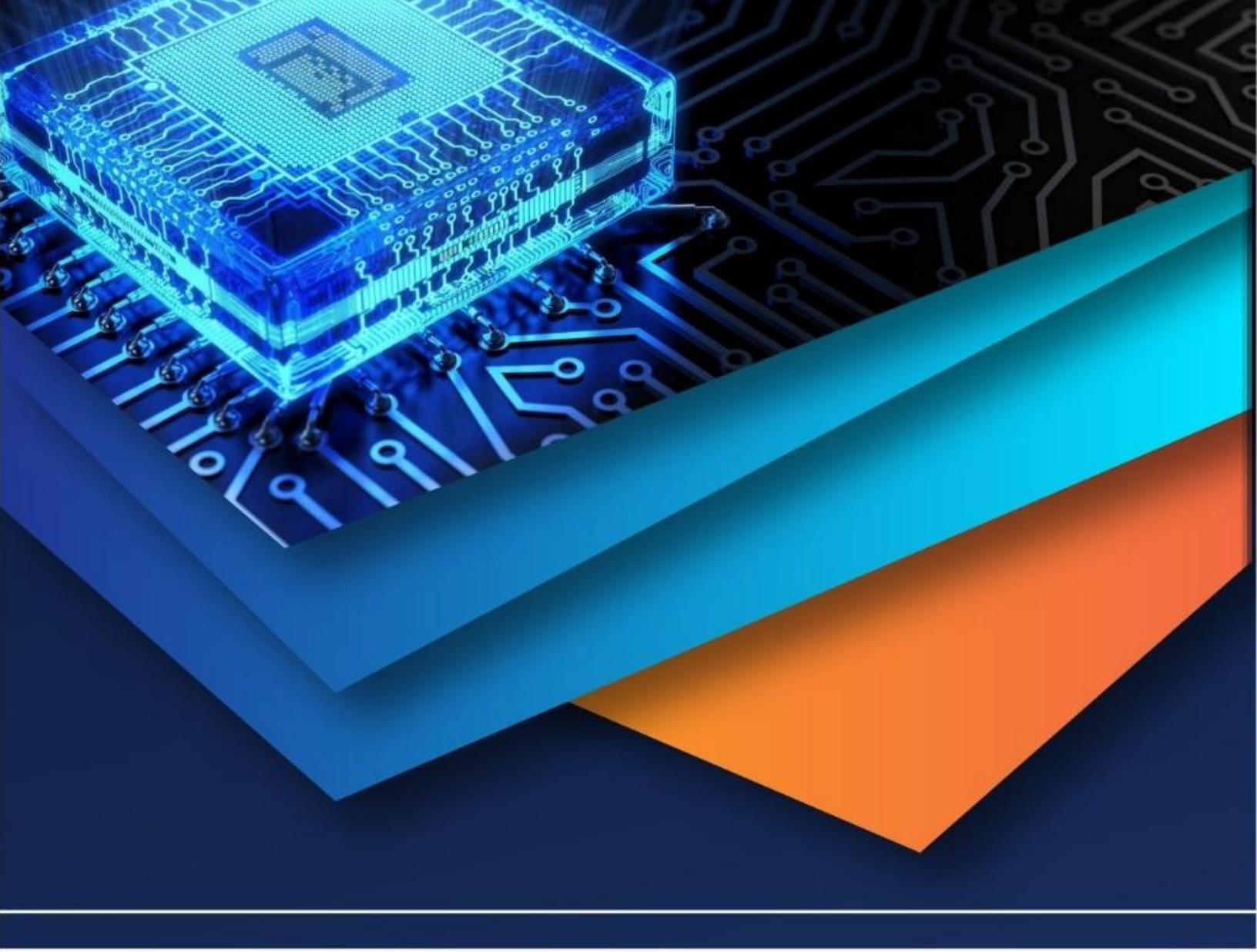

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