ABSTRACT

This paper presents a microstrip-fed monopole antenna for ultra wideband (UWB) applications with notch filter. This antenna is based on the planar rectangle monopole antenna. The notch filter is added at 5.2 GHz. The characteristic of the antenna is improved by altering the figure of the radiation patch and the ground. HFSS is used to conduct simulation calculation so as to get various performance parameter of the antenna, to make sure that its frequency band range is 3.1GHz~10.6GHz, and to meet the design requirement of the ultra-wideband antenna.

Keywords— Monopole antenna, Ultra-wide band, Notch filter, Micro-strip line feed, HFSS

II. DESIGN OF THE ANTENNA

The geometry of proposed antenna is shown in Fig.1 and Fig.2. It is fed by 50 ohm micro-strip line. The size of micro-strip feed line is chosen 3 × 35 as milli-meter to achieve the characteristics impedance of 50 ohm. Radiating patch is designed on 1.6mm thick FR4 substrate with the relative permittivity and loss tangent of substrate is 4.4 and 0.02, respectively.

In this paper, a compact UWB monopole antenna with a band notched characteristics has been proposed. The proposed antenna’s radiating patch fed by 50 ohm micro-strip line and a rectangular shaped ground plane. To achieve the band notched characteristics, a pair of L-shaped slots forming U-Shape and symmetrical step slot is etched on the ground plane to obtain the centre frequency of 5.2 GHz band notched characteristics. The proposed antenna is simulated by HFSS 13 Software which is electromagnetic solver.
In antenna design, we analyze and simulate this antenna by using Ansoft HFSS 13 software. For better matching of input impedance, the radiating patch is placed in the position with respect to ground plane of the antenna. The radiating patch of the antenna is designed by following steps as: 1) First created outer circle of radius 12 mm. 2) Then circle 2 of radius 7 is deleted from it. 3) Inside that now inserted rectangle 1 of 11 x 11. 4) From this rect. Delete circle 3 of radius 4.5. 5) Now insert rectangle of 7x7 in between. 6) Delete circle 4 of radius 3 from it.

The shape of the ground plane as rectangle with dimension 48 mm x 34 mm. It exhibits a better result. Dimensions of rectangular ground plane have been optimized to exhibit best gain and bandwidth. These optimized dimensions are obtained after a good number of simulations.

### III. THE SIMULATION AND ANALYSIS OF THE ANTENNA

In this paper, we use Ansoft HFSS 13 to simulate the UWB monopole antenna. The return loss S11 of the simulation result is shown in Fig. 3. It is easy to find that when the bandwidth is in 5.5-15 GHz, the value of S11 is less than -10 dB. Maximum radiation is 30dbi.

![Fig.3. The simulated return loss S11 of the antenna](image)

The voltage standing-wave ratio (VSWR) is shown in Fig. 4. It can be seen that when the bandwidth is in 5.5-15 GHz, the VSWR value is less than or equal to 2. So the bandwidth is larger than the FCC’s requirement. VSWR is 6.64 at 5.2 GHz indicates strong rejection. Its very close to 1 in pass band.
The proposed UWB Monopole antenna will radiates from 1.5 GHz to 15 GHz. Fig.5 and Fig.6. shows the 2D and 3D radiation pattern of antenna. We have added notch filter at 5.2 GHz. thus antenna will not radiate from 4.2 GHz to 5.6 GHz with center frequency of 5.2 GHz which is WLAN frequency. The radiation characteristics of the antenna in the whole bandwidth are suitable for UWB communication system requirements.

Gain achieved for proposed antenna is almost constant for all pass band frequencies. The Fig.7 shows the gain of the antenna. Maximum value 4.84 dB and it also decreased at 5.2 GHz.

**IV. CONCLUSION**

The monopole antenna is a hot one for the research of the UWB antennas. In this paper, radiating patch and ground plane are designed to increase the bandwidth of the monopole antenna. The bandwidth is extended to 1.5 GHz to 15 GHz. Moreover, the radiation characteristic is good in working bandwidth. The size is small and the structure is simple, so the proposed antenna meets the design standards of the UWB antennas with WLAN band notched characteristics.

**REFERENCES**


