A Compact Ultra Wide Band Monopole Antenna for Wireless Application

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Abstract- In this project, a quad-band notched antenna is proposed, which is obtained by integrating an antennas and some non-radiating resonant structures in the radiation patch. Ultra wide band is a technology for transmitting information spread over a larger bandwidth (>500MHz); this should, in theory and under the right circumstances, be able to share spectrum with other users. Regulatory settings by the Federal Communications Commission's (FCC) in the United States intend to provide an efficient use of radio bandwidth while enabling high data-rate personal area network (PAN) wireless connectivity; longer-range, low-data-rate applications; and radar and imaging systems. With a cooperative symmetric two-way metering technique, distances can be measured to high resolution and accuracy by compensating for local clock drift and stochastic inaccuracy. The project helps in the method of practically realizing the proposed antenna performance reconfiguration. A lateral L-shaped slot loading is employed in the ground-plane to obtain wide resonant band.

Index Terms- HFSS, ROGERS5880, Substrate.

I. INTRODUCTION

Ultra-Wide band (UWB) radio system has been getting increasingly popular from the academic and industry fields. As the key component of the UWB wireless communication system, the UWB antenna has drawn increasing attention. The feasible UWB antenna should be designed with compact size, good impedance matching, flat group delay and Omni-directional radiation patterns. However, a permanent challenge is that there are interferences between the designed UWB system and some overlapping frequency bands. To avoid the interferences, it is necessary to filter out the overlapping frequency bands. Since the approach to use filters applied to UWB RF front ends to reject dispensible bands may take too much space and leads to significant increase in the design complexity, UWB antennas with band-notched characteristic function to avoid potential interference have been put forward. In a quad band-notched antenna is obtained based on a rectangular slot patch and closed-loop ring resonators on multilayered planes, but the radiation patterns is not Omni-directional in the H-plane and the structure is too complex. Moreover, the mentioned UWB antennas only have fixed notched bands Procedure for Paper Submission

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When you submit your final version, after your paper has been accepted, prepare it in two-column format, including figures and tables.

I. Figures

As said, to insert images in Word, position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with "Float over text" unchecked).

II. UWB ANTENNA DESIGN

The antenna was printed on the ROGERS 5880 substrate with a dimension 30*31*1mm3. The width of the microstrip feed line is fixed at 3mm to achieve 50 characteristic impedance. In order to create the higher resonance, a lateral L-shaped structure is embedded in the ground as shown the compared graph by varying the width gL of the lateral L-shaped slot in the ground plane. Ultimately, the basic antenna covers the entire UWB band of 3-10GHz (VSWR<6:0) with gL=7.5mm. It can be seen that the strong currents concentrate along the L-shaped slot on the ground plane and wrap around it at 10GHz. In this way, the L-shaped slot plays the role of coupling slots and couple energy to free space. Simulation is done using Ansys HFSS (high frequency structural simulator). Therefore 3GHz bandwidth in the higher frequency band is broadened[1].

Figure 1: Geometry of the proposed UWB antenna. Top view. All dimensions are in mm: WS=30mm, Ls=31mm, Lg=9mm, d1=0.8mm, d2=1.2mm, gL=2.4mm, L0=6mm, W0=3.2mm, Wf=3mm, D1=5.45mm, D2=6.06mm, D3=...
1:3mm, T1= 2:775mm, T2= 1:795mm, T3= 6:43mm, H1= 10:46mm, H2= 4:31mm, H3= 3:54mm, L1= 11mm, L2= 8:95mm, L3= 8:27mm, L4 =7:92mm, WSlot= 0:3mm, W1= 12:4mm, W2= 9mm, W3= 7:2mm, W4= 6mm.

III. POST ANALYSIS

The slot can act as one half-wavelength resonator. The desired notch frequency can be achieved by adjusting the dimension of the U-shaped slot. The proposed UWB antenna consists of four U-shaped slots nested together to achieve four notched bands. It can be observed that gL has deterministic influence on the high frequency impedance matching. The measurement was performed with an Agilent NS5230A vector network analyzer. The antenna with four half wavelength slots successfully exhibits four designed notched bands in 3.5{3.6, 4.5{4.8, 5.15(5.35 and 5.725{5.825GHz, which maintain broadband performance from 3.1 to 10GHz with VSWR would more than 6{2].

There are some differences in terms of the value of VSWR being due to the fabrication accuracy on the width of U-shaped slots, quite good agreement is obtained in terms of frequency. Meanwhile, the quad band notched UWB antenna can be reconfigurable by shorting the corner point of the single U-shaped slot and the corresponding notched band is removed with the remain band notched frequency nearly invariable. In addition, the different notched bands can be changed independently.

The concentrate realization method is to short the corners of the U-shaped slot resonator by passing metal film and welding resistance: such as 0 ohm resistance. The advantage of shorting elements in reheard to removing the entire element from the layout is that it enables future printing techniques to preserve the layout with all the other U-shaped slots in variant.

Each HFSS solver incorporates a powerful, automated solution process, so you need only to specify geometry, material properties and the desired output. From there, HFSS automatically generates an appropriate, efficient and accurate mesh for solving the problem using the selected solution technology. With HFSS, the physics defines the mesh; the mesh does not define the physics [3].

IV. RESULTS

The proposed quad band notched UWB antenna is measured with SATIMOSG24 measured far field radiation patterns at 3.1, 5 and 7GHz, which show good agreement. Since the radiating element is printed on the xy-plane of which monopole lies along the x direction, its radiation pattern is x-polarized. Therefore the E-plane corresponds to the xz-plane while the H-plane corresponds to yz-plane. The proposed quad band notched antenna has characteristics of nearly Omni-directional radiation patterns. Their measured results are VSWR starts from 6 and bandwidth is increased up to 28. So the proposed antenna will introduce little distortion on signals during the pulse transmission and the receiving antenna signals will not distorted seriously compared with the input signals. In order to quantify the pulse distortion, merit referring to the correlation factor and the pulse width stretch ratio SR are introduced. They could be calculated between the input signal at the transmitting antenna terminal and the signal at the receiving antenna terminal by using transmission characteristics of the proposed antennas[1].

Their measured results are $\frac{1}{2}$=0:9023 and SR=3:1[29[32]], respectively. We can see that note all the energy is concentrated in the vicinity of the peak, and a little noise energy deviated from the peak introduces the ringing distortion which introduced by antenna characteristics of rejection bands[1].

![Fig 2: Simulation Circuit](image)
REFERENCES


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