



# Dual Band Antenna Design for Pulse Shapping in UWB Cognitive Radio

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*Abstract*— UWB is characterized by an unique potential in short range high data rate wireless communications . it is mainly used in different applications such as military, radar and it's carried by transmitting short pulses , Uwb is limits to low energy levels so therefore the federal communication committee (FCC) release spectral mask emission power in 2002. The uwb ranges from 3.1GHZ - 10.6GHZ commercially used as per FCC. In this we have a problem of interference in system using same frequency band so we proposed an monopole antenna with circular shaped with complementary split ring slots in feed line which will have better matching impedances at high frequencies .in this we have two antenna one with rectangular split ring slots in feed line and other was circular split ring slots in patch . The monopole antenna was invented by "guglielmo marconit ".This monopole antennas will transmits for a longer distances . In this we made bends over the edges for better matching and also have multiband characteristics' .

**Index terms** : multi band ,complementary split ring slots ultra wide band .

## I.INTRODUCTION

The development of communication system and technology has lead to the demand of high functioned antennas for short range and high data rate wireless communications. As per federal communicational committee (FCC) commercialized the frequency band from 3.1GHZ to 10.6 GHz (UWB) in 2002,and the demand further increased for high data rate and EIPR value as -41.3dbm/MHZ,and also having multiband or broadband characteristics. As a result of such demand lead to have a lot of research in the field of

antennas as well as in UWB bands . This band is generally used for very short distance communication .

Several types of antennas for UWB band were developed in the past decade due to their simplicity in fabrication and lower complexity , and larger bandwidth in the order of GHZ .The antenna for UWB is made with the help of a rectangular patch on which the ground plane and the design is made .The monopole antenna design .There are several methods by which the efficiency and the performance can be improved ;some of them have partial ground plane , slits are introduced in feed line for ,feed optimization . Feeding techniques are used here is waveport .

In this paper a monopole antenna with slightly circular patch antenna was desinged .so we optimized the required parameters for the design which represents a circular shape antenna to have an circle with radius "r" is to inserted in to a rectangular patch and a microstrip feed line is united with the patch of the antenna and it looks like an monopole antenna with circular shape which has curved shape at bottom edges of the patch.

## II.MONOPOLE ANTENNA CONCEPT

A monopole antenna is a class of radio antenna consisting of a straight rod-shaped conductor ,often mounted perpendicularly over some type of conductive surface, and called ground plane. The driving signal from the transmitter is applied, or for receivi-ng antennas the output signal to the receiver is taken , between the lower end of the monopole and the ground plane.One sideof the antenna feed line attached to the lower end of the monopole and the other side is attached to the ground plane The monopole is a resonant antenna , the rod functions as

a resonator for radio waves, with oscillating standing waves of voltage and current is along its length. Therefore length of the antenna is determine by the wavelength of the radio wave it is used with the most common form is the quarter-wave monopole ,in which the antenna is approximately 1/4 of a wavelength of the radio waves.

### III.ANTENA DESIGN AND IMPLEMENTATION

In this both rectangular and circular shape patch are utilized in order to have a mono-pole circular shape antenna the two designs ,The two designs we A and B are based on the same mono pole antenna, which is printed on substrate dimensions of  $50 \times 40 \times 1.6$  mm<sup>3</sup> Rogers RO 3203 substrate with a dielectric constant " $\epsilon_r=3.02$ "The antenna has a micro strip feed line and partial ground plane. The patch is rectangular shape and had 20 mm  $\times$  18.5 mm in size,the ground is 40mm  $\times$  32mm and the feed line is 4mm  $\times$  26 mm. For better matching , the corner of the patch are covered by intersecting with a circle of radii 10mm and patch is almost circular in shape , this antenna has an impedance band width that covers the whole UWB frequency range. And in this two complementary split ring slots which has dimensions of 3mm  $\times$  12.7mm and 1.8mm  $\times$  9mm and for circular ring slots the outer most radius is 6mm and the inner circles is reduced by 0.5 mm.

#### Antenna Design A :

In Fig:1 the Antenna Design A will represent the monopole antenna with circular shape having two rectangular split ring slots having two switches etched on them and these slots are on the feed line of the antenna with dimensions as 3mm  $\times$  12.7mm and 1.8mm  $\times$  9mm both split rings has an 0.2mm gap in between them.

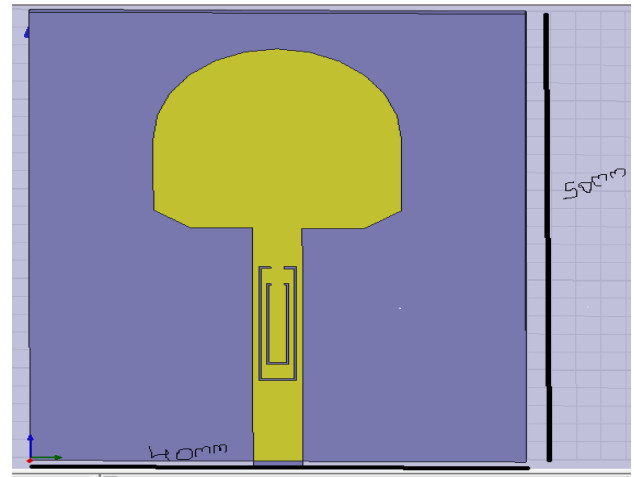


Fig 1: Proposed antenna design A

The above antenna has feed length of 4mm  $\times$  26mm and the patch is 20mm  $\times$  18.75mm and the split ring slots inside the feed line has the measurements as 3mm  $\times$  12.7mm and 1.8mm  $\times$  9mm and these slots will have their succeeding slot gap of 0.2 mm on each side of the SRR and the switches are mounted on. from this shape of monopole circular shape antenna with rectangular split ring slots having switches will have on and off conditions of SRR .so that the shape of the antenna covers the UWB range and through this on condition of switches will have stop band notches at 3.5GHZ and 5.2 GHZ .

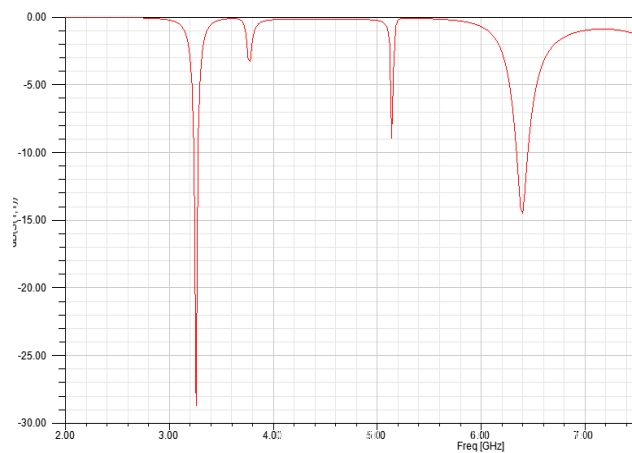


Fig 2: Return loss for switches in on condition at 3.25GHZ and 6.3 GHz

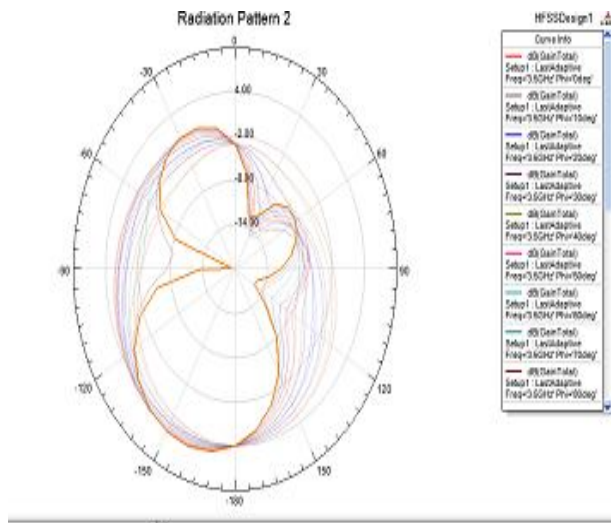


Fig 3. radiation pattern at 3.5GHz

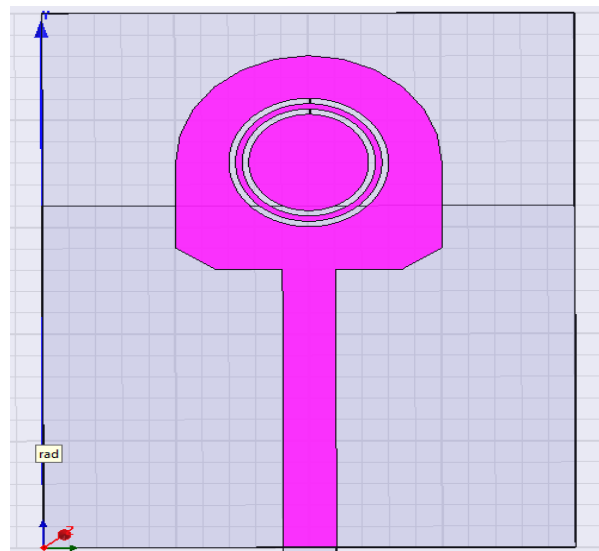


fig (b) proposed circular antenna

**Antenna Design B:**

The design B consist of same proposed antenna of the substrate roger RO3203, printed on 50mm×40mm×1.6mm with an feed width of 4mm and feed length of 26mm and rectangular patch of 20mm×18.53mm and a circle of radii 10mm is inserted in the rectangular patch so the propose antenna have circular split ring slots of radii 6mm of outer most which has 0.5mm gap between inner circles of the patch. The proposed antenna has the circular split ring slots on the patch of the antenna therefore two electronic switches mounted on it which has on and off conditions so that the antenna will band notches at desired frequencies.

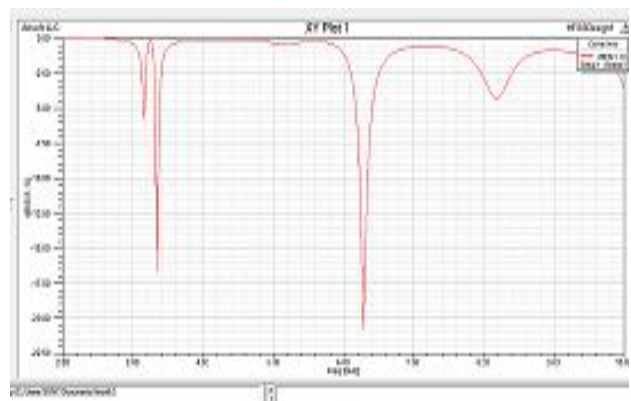
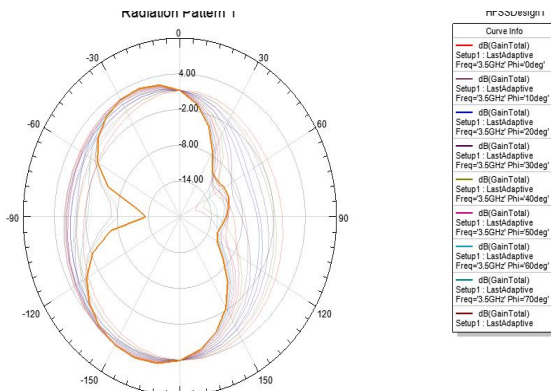
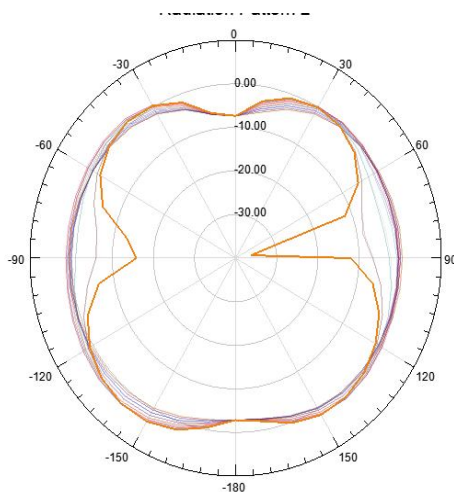


Fig 5: Return Loss of The Antenna At 3.4GHz And 6.2GHz



(b) RADIATION PATTERN FOR 3.5 GHZ



(C) RADIATION PATTERN FOR 6.25 GHZ

#### IV. CONCLUSION

The proposed antenna in this paper is used for the application of uwb cognitive radio with the help of splitting slots in the feed line we have band notches in 3.5GHZ and 6.4GHZ, ie WIMAX (3.5 GHZ) and c-band (4GHZ - 8GHZ) in this the circular split ring slots will have the band notch 3.25 GHZ and 6.2 GHZ bands.

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