Ultra Wideband CPW Antenna With Single Rejection Band

Surya narain Dikshit, Mohammad Imroz Khan

Abstract — An ultra wideband antenna using hexagonal shaped ground plane is presented in this work. Presented structure consists of coplanar waveguide (CPW) feed. Hexagonal shaped ground slot results in gradual variation in slot impedance, thereby improving impedance matching. This results in wide impedance bandwidth. A horizontal conducting strip is embedded in the ground plane and is protruded into the ground slot for changing the capacitive reactance of slot impedance. This variation in slot impedance results in single band rejection, extending from 6.7-7.9 GHz. Hence, proposed structure covers the entire ultra wideband range with a single rejection band.

Keywords — cpw, slot, ultra wideband

I. INTRODUCTION

Ultra wideband antenna uses a part that will be wide of and gives information transfer it is certainly higher in addition to high information rate. This is actually modern-day program, item compactness has triggered getting a single ultra-wideband antenna for a variety of frequency solutions in this extremely time. But this outcomes which happen to be overall interference between different bands that is certainly averted by integrating volume notches as required. Split musical organization resonators are majorly employed to frequency that was actually include, whose placement this is certainly precise be a crucial requirement for reaching volume notches that's a struggle and additionally performance with the antenna becomes painful and sensitive to resonator position. In [1] a coplanar this is certainly differential antenna that is ultra-wideband proposed with tapered place and manageable regularity notch, in a modified Sierpinski square fractal antenna is recommended having ultra-wideband character alongside frequency level traits, in another ultra-wideband antenna was evaluated which uses separate band resonator to appreciate preferred consistency notch, in [2] a CPW fed ultra-wideband antenna with volume notches is recognized using separate musical organization resonator and metallic shunt strips, very wideband antenna loaded with parasitic slit for achieving consistency level is literally analyzed in [3]. These techniques are occasionally connected with the compactness issues of the antenna or the use of intricate resonator circuits.

II. ANTENNA CONFIGURATION AND ANALYSIS

An ultra wideband planar antenna utilizing CPW feed is provided in this letter. Suggested antenna consists of the hexagonal soil that is actually shaped on FR4 epoxy of width 1.6 mm. The proposed antenna covers the whole ultra-volume that is actually wideband by having a single frequency level from 6.7-7.9 GHz. The view that is schematic of proposed antenna is actually illustrated in fig. 1 together with its geometrical measurements (mm) presented in Table I.

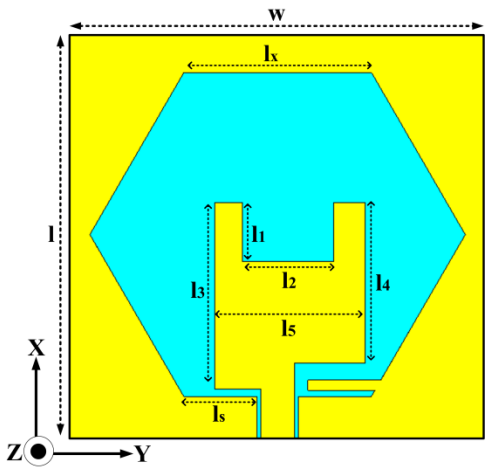


Fig. 1. Schematic view of proposed antenna

TABLE I. GEOMETRICAL DIMENSIONS

l_1	l_2	l_3	l_4	l_5	l_x	l_s	l	w	h
5.7	8.8	18	15.5	7	18	7	40	40	1.6

Effect of Horizontal Strip

A horizontal strip of length 7.0 mm is embedded in the ground plane and is protruded into the hexagonal slot. This changes the capacitive reactance of slot impedance, resulting in net change in slot impedance. By controlling the depth of penetration of this strip, rejection band can be controlled. Geometrical view of antenna with and without horizontal strip is depicted in fig. 2 and its effect on impedance bandwidth is illustrated in fig. 3

Revised Manuscript Received on February 11 , 2019.

Surya narain Dikshit, Department of Electronics and Communication Engineering, Vignan's Foundation for Science, Technology and Research, Guntur, Andhra Pradesh, India- 522213 (Email: dixitsurya.20@gmail.com)

Mohammad Imroz Khan, Department of Electronics and Communication Engineering, Vignan's Foundation for Science, Technology and Research, Guntur, Andhra Pradesh, India- 522213 (Email: iitdhanbad.imroz@gmail.com)

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

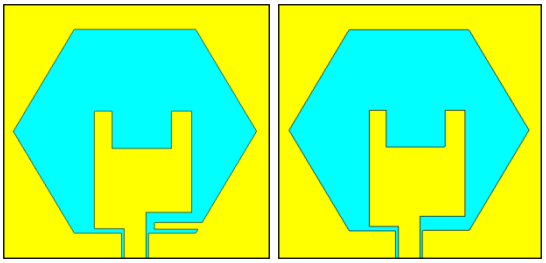


Fig. 2. Top view of antenna with and without horizontal strip

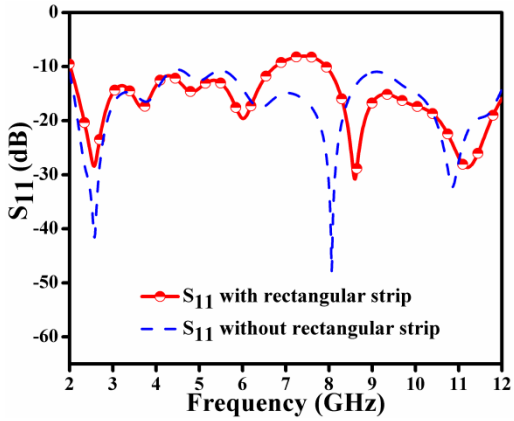


Fig. 3. Effect of horizontal strip on S_{11}

Surface Current Density Distribution

Current distribution in the ground plane and radiating patch is demonstrated in fig. 4. On analyzing the surface current density, it can be concluded that current is majorly concentrated in ground plane, which is due to field coupling. Hence, by embedding a grounded strip we get a frequency notch for desired range.

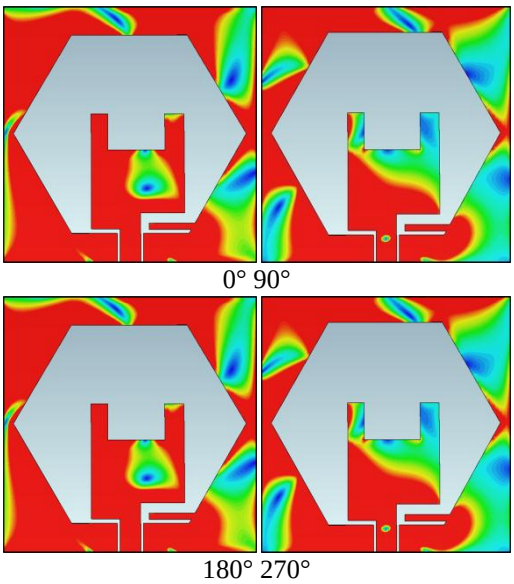


Fig. 4. Surface current density distribution at 3.3 GHz

III. RESULT AND DISCUSSIONS

Return loss with the antenna is found in fig. 5 which demonstrates the ultra nature that will be wideband of. Impedance coordinating of antenna is examined by studying VSWR storyline, illustrated in fig. 6. VSWR storyline confirms the regularity level from 6.7-7.9 GHz. Normalized radiation habits at 3.3 GHz and 10 GHz tend to be plotted in fig. 7 and fig. 8, conforming radiation pattern this is certainly monopole. Gain of antenna for your functioning that is whole is depicted in fig. 9, conforming a gain that is maximum of dBi.

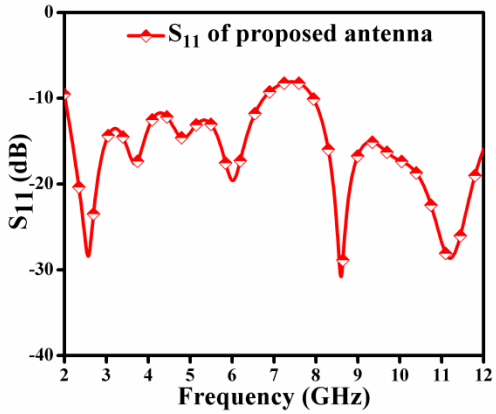


Fig. 5. Return loss

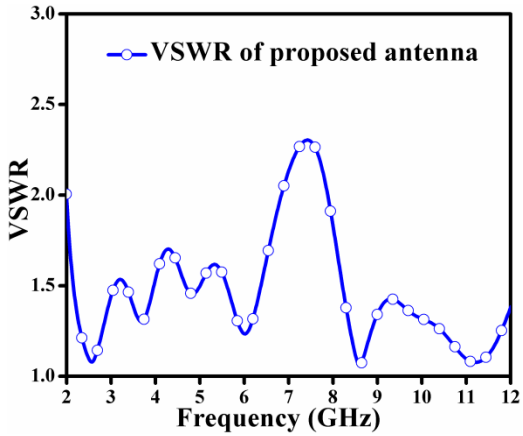
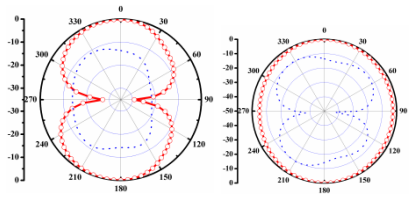
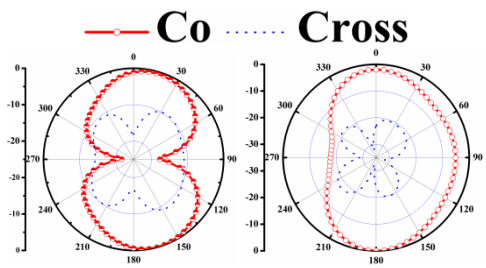


Fig. 6. VSWR



(a) (b)

Fig. 7. Radiation pattern at 3.3 GHz: (a) : XZ- plane, (b) : YZ- plane



(a) (b)

Fig. 8. Radiation pattern at 10 GHz: (a) : XZ- plane, (b) : YZ- plane

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

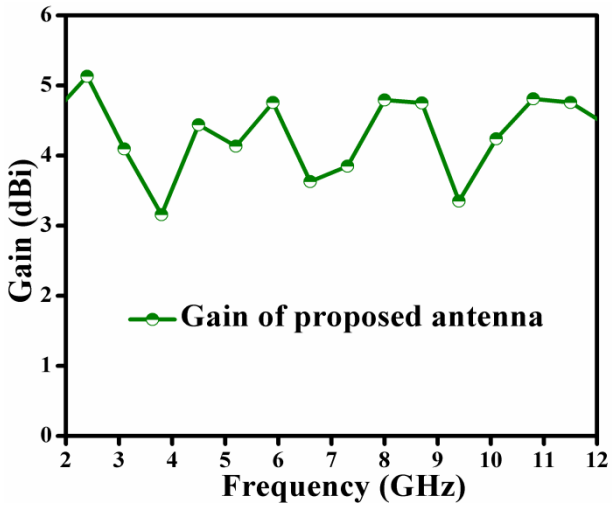


Fig. 9. Gain

TABLE II. COMPARISON TABLE

Reference Ultra Wideband Antenna	mm ×mm
[3]	50×50
[4]	50×50
[6]	50×70
[7]	40.4×40.2
Proposed Antenna	40×40

IV. CONCLUSION

An extremely antenna that is wideband single frequency notch utilizing coplanar waveguide has become studied in this page. The antenna is made up of hexagonal surface that is designed and a protruded grounded remove. A square level happens to be stuck in the feed range for enhancing the impedance matching and obtaining ultra nature that will be wideband. Grounded remove that is metallic protruded into the surface slot for managing the rejection band. The proposed antenna reduces disturbance between the band that will be unlicensed the downlink satellite communication range, therefore assisting EMI reduction. On comparison with recently reported antennas with similar field that will be far, proposed antenna proves to be small in the wild.

REFERENCES

1. Tu, Zhi-hong, Wen-Ao Li, and Qing-Xin Chu. "Single-layer differential CPW-fed notch-band tapered-slot UWB antenna." IEEE Antennas and Wireless Propagation Letters 13 (2014): 1296-1299.
2. Siddiqui, Jawad Y., Chinmoy Saha, and Yahia MM Antar. "A novel ultrawideband (UWB) printed antenna with a dual complementary characteristic." IEEE Antennas and Wireless Propagation Letters 14 (2015): 974-977.
3. Azim, Rezaul, Mohammad Tariqul Islam, and Ahmed Toaha Mobashsher. "Design of a dual band-notch UWB slot antenna by means of simple parasitic slits." IEEE Antennas and Wireless Propagation Letters 12 (2013): 1412-1415.

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication