World Journal of Engineering Research and Technology
WJERT
www.wjert.org
SJIF Impact Factor: 3.419

COMPACT CPW – UWB ANTENNA FOR WIRELESS APPLICATIONS

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Article Received on 26/05/2016 **Article Revised on 15/06/2016** **Article Accepted on 05/07/2016**

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ABSTRACT

Meander Line Coplanar Waveguide (CPW) antenna with operating at UltraWidebandwidth (UWB) is to design and analyzed. The proposed antenna is designed by using ANSOFT HFSS 13.0. Finite Element Method (FEM). By simply embedding the metal strips is made meander line structure. The proposed antenna was constructed and measured to show an ultra wide operating band with 10-dB return-loss bandwidth of 9.17 GHz ranging from 0.91 to 12.17 GHz, which sufficiently covers the operating band, 3.1 to 10.6 GHz. The antenna size $30\times11\times1.2mm^3$ it is very suitable for USB devices.

Index Terms: Ultrawideband (UWB), Universal Serial Bus (USB).

I. INTRODUCTION

Nowadays interest in ultra wideband (UWB) communication systems such as wireless USB covering band from 3.1 to 10.6 GHz has rapidly increased due to their many advantages including the low-spectral-density radiated power and potential for accommodating higher data rate. Meanwhile, considering that the Universal Serial Bus (USB) is a well-adopted portable connectivity tool in data exchange between various consumer electronics and mobile devices, much attention is therefore being focused on the UWB operation in the wireless USB dongle device. Compared to the conventional USB devices, the new realized wireless UWB USB dongle has a potential function to provide short-range and high-data communication without requiring a wire simultaneously among a wide range of devices. In wireless USB dongle applications is to achieve antenna compactness to be covered small

space. The CPW UWB type[1], the meandered strip type[2], the microstrip-fed patch types.[3][9] These earlier designs are very complex and the size is large for built into the compact space of a USB dongle device. This paper is aimed at describing the design and realization of a compact coplanar waveguide (CPW) antenna suitable for use in the USB dongle. Meanwhile, regarding that the Meander line CPW antenna is initially not only has a planar and simple structure to make it easy to integrate itself with the system circuit, but also has a chance to achieve a low -factor for effectively increasing bandwidth by means of simply cutting the patch, and insert the triangular shape in to the rectangular plate. It produces the Ultra Wideband width in terms of return Loss.

II. ANTENNA CONFIGURATION

Fig. 1 illustrates the geometry of the synthesized UWB CPW antenna. It is evolved from the various metal strips combining with each other and made the Meander Line Shape.. This structure as a radiator was etched on the top portion of one side of an FR4 substrate with initial dimensions of 30× 11 mm[2], which is in general approaching the size of a portable USB dongle device, The specified characteristics of this substrate are 1.2 mm in thickness and 4.4 in relative permittivity (ε_r). The dimension of the antenna is 30 × 11 × 1.2 mm.[3] was used to evolve this design. A 50- microstrip line of width 1.5 and length 8.5 was then adopted for feeding the patch. For improving the matching condition and then effectively extending the impedance bandwidth, dual triangular slots are inserted, the length of the metal slots are 9, 4.5 and3 respectively. The width of the patch is 11mm.

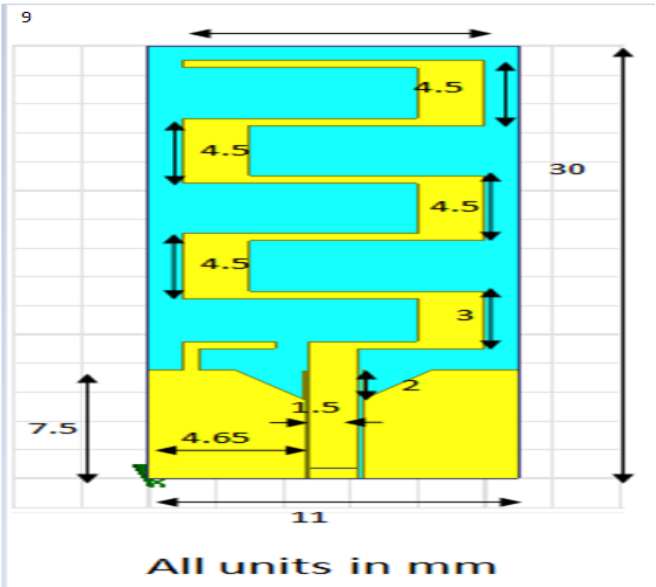

Fig 1: Configuration of proposed compact CPW antenna.

III. SIMULATED RESULTS

The proposed antenna Return loss is shown in Fig.2, resonant band is 7.07 GHz have resonance is excited and bandwidth is 9.17 GHz ranging from 2.41-11.58 GHz and it covers the UWB band. The antenna has two resonant frequency point is 7.07GHz. This frequency point is making slots in the antenna. The resonance frequency is matching at return loss are -43.63db as the resonance frequency. The proposed antenna return loss is shown in Fig.2.

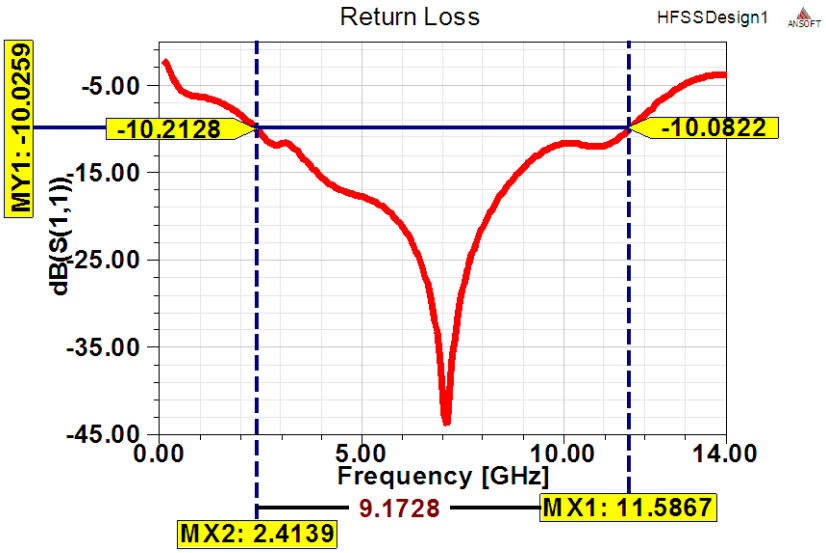

Fig 2: Simulated Return loss.

Fig.3 presents the simulated VSWR values against frequency.

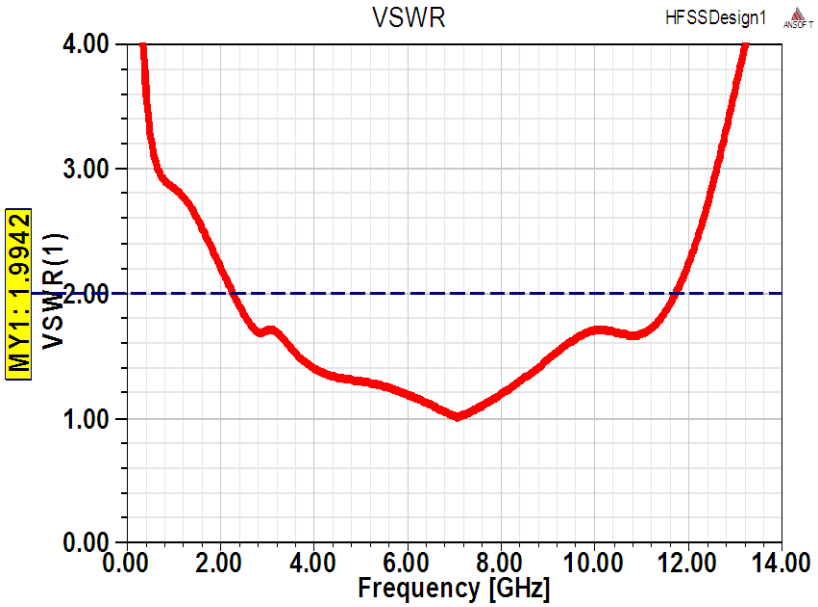

Fig 3: Simulated VSWR.

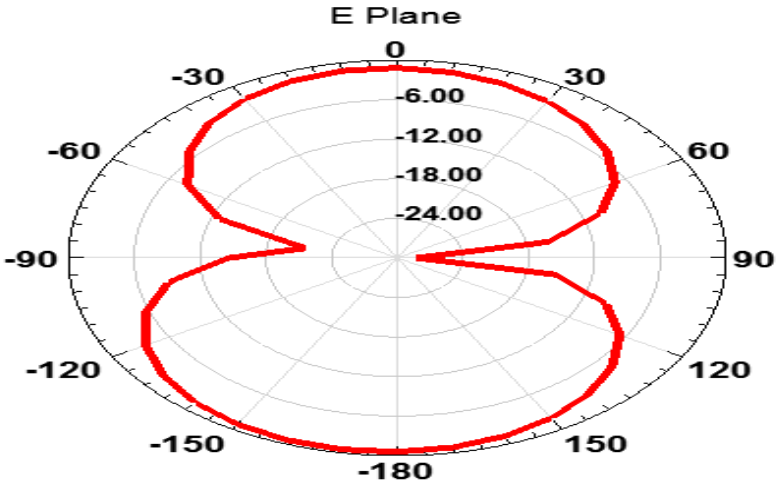

Fig 4: E-Plane.

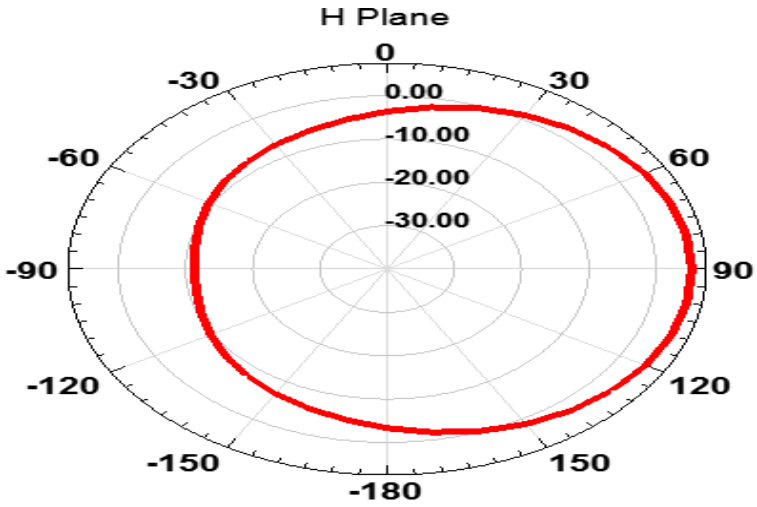

Fig 5: H-Plane.

The far-field 2D radiation patterns at frequency of 7.07 GHz for the proposed antenna. 7.07 GHz simulated radiation pattern of E plane and H plane are shown in Fig.4.and Fig.5. E plane has bidirectional pattern. And the H plane has unidirectional pattern.

IV. CONCLUSION

The optimal slotted patch antenna was designed and simulated by using ANSOFT HFSS 13.0. This CPW UWB USB dongle is operating band width -10dB return loss bandwidth of about 9.17 GHz ranging from 2.41 – 11.58 GHz. The Antenna gain is about 4dbi around the frequency range is 2.14-11.58 GHz. With an antenna size is only 30× 11 mm^2, multi resonance having ultra wide bandwidth and suitable for USB dongle devices. Simulated antenna results are showing a good behavior.

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