ISSN: 0975-766X
CODEN: IJPTFI
Available Online through ***Research Article***
www.ijptonline.com

MICROSTRIP-LINE-FED MONOPOLE ANTENNA FOR UWB APPLICATION

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Received on: 15.10.2016 *Accepted on: 22.11.2016*

Abstract

This paper presents associate degree optimized style for a platelike microstrip-fed monopole antenna. the planned antenna covers the band three.1 to 10.6 GHz, that has been approved by the federal communications commission (fcc) as an ad band for ultra-wideband (uwb)c communications. a constant study of the planned antenna was administered so as to optimize the most parameters. this style , provides a 2:1 vswr information measure of one hundred fifteen.3 % at 3.1 to 11.5 GHz.

I. Introduction

A rapid climb in technology and trade of transportable and mobile communication systems, that incorporates a important interest in wireless communication with high rate, miniaturized and low power consumption communication systems encourage for the look and implementation of ultra-wideband antennas. Ultra-wideband (UWB) communication systems have the promise of terribly high information measure (>500 MHz), reduced weakening from multipath, and low power necessities [1]. Ultra-wideband (UWB) wireless technology is most needed for terribly high-data-rate, short-range wireless communication systems and for contemporary microwave radar systems. Ultra-wideband is outlined as any transmission that occupies a information measure of quite two hundredth of its center frequency, or quite 500MHz [2]. The Federal Communications Commission authorizes the unauthorized waveband within the vary of three.1 to 10.6 rate for the ultra-wideband applications, that represents a fractional information measure of one hundred and tenth. The antennas given during this article covers this operative information measure. Several UWB antennas are introduced for applications, within which each microstrip-fed platelike monopole [3-8] and CPW-fed monopole [9-10] antennas ar appropriate candidates as a result of their characteristics of wide ohmic resistance information measure, compact and easy structure, low cost, spatial relation radiation diagram, and simple fabrication. The written ultra-wideband antennas comprises a platelike radiator and ground planes. The performance of the written ultra-wideband antenna is considerably suffering from the form and size of the radiator moreover because the ground plane in terms of the operative frequencies, bandwidth, and radiation patterns of the antenna. The challenge with the dimensions of antennas has been the trade-off between the information measure and therefore the reduction of the physical size of the antenna.

In this paper, we have a tendency to gift associate degree optimized style for a written microstrip-line-fed monopole antenna for UWB applications. Microstrip- fed antennas have the advantage of being compatible with different microwave integrated circuits. The antenna dimensions ar optimized victimisation the 3 dimensional finite integration time domain (FITD) technique based mostly business machine. The parameters that have an effect on the antenna characteristics also are studied and mentioned.

II. Pure Mathematics

The pure mathematics of the planned microstrip-fed monopole antenna is illustrated in Fig. one The antenna is written on a FR4 substrate with a relative insulator constant (€r) of four.4, a thickness of one.6 mm, a breadth W of 34 mm, and a length L of thirty four metric linear unit. the essential antenna structure consists of an oblong patch, a feed line, and a truncated ground plane. the oblong patch incorporates a breadth Wp=15.9 metric linear unit and Length Lp=12.3 mm. The patch is connected to a microstrip-line of breadth Wf= 3mm and length Lf=17 metric linear unit . The breadth of the microstrip feed line is fastened at three metric linear unit to realize 50- characteristic ohmic resistance. On the opposite aspect of the substrate, a conducting ground plane of breadth Wg=34 metric linear unit and length Lg=16.16 metric linear unit is placed. The truncated ground plane is enjoying a very important role within the broadband characteristics of this antenna, as a result of it helps in matching the patch with the feed line in an exceedingly big selection of frequencies. this can be as a result of the truncation creates a electrical phenomenon load that neutralizes the inductive nature of the patch, and produces nearly pure resistive input ohmic resistance.

A constant study of written microstrip-line-fed monopole (PMFM) antenna on the most parameters has been optimized. Simulations are performed victimisation Central Time Microwave studio (MWS) supported the 3 dimensional finite integration time domain (FITD) technique.

A. Result Of Feed Position

The feed position d is that the distance of microstrip-line from the middle of the planned structure within the x direction. it's a key parameter for the PMFM antenna style. As shown in Fig.2, the come back loss characteristics as a perform of frequency for the PMFM antenna was simulated for various feed positions (d= -0.63, 0.0 and 0.05mm). it's shown that the -10dB operative information measure of the antenna varies remarkably with the variation of the feed position d, however the comeback loss curves have similar form for the various feed positions. The best feed position is found to be at d= -0.63 mm.

B. Result Of The Feed Gap

The feed gap h is that the distance between the oblong patch radiator and therefore the ground plane. it's a key parameter for the PMFM antenna style. As shown in Fig.3, the come back loss characteristics as a perform of frequency for the PMEM antenna was simulated for various feed gaps (h=0.5, 0.84 and 3mm). it's shown that the -10dB operative information measure of the antenna varies remarkably with the variation of the feed gap h.. The best feed gap is found to be at h=0.84 mm.

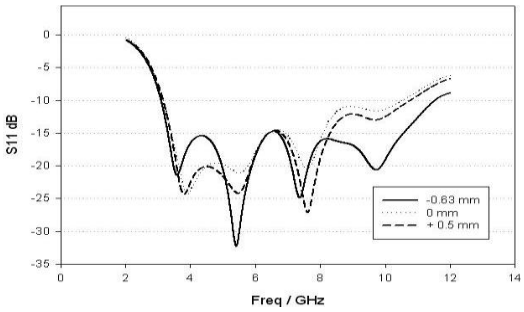

Fig.1 Simulated Return loss characteristic for various feed positions.

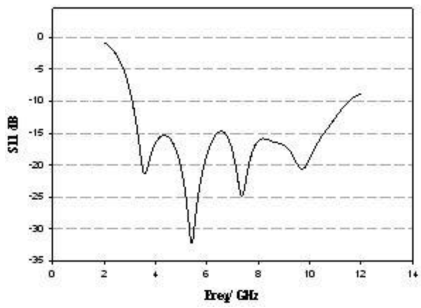

Fig.2 Return loss characteristic for the optimized design.

B. Effect of the Feed Gap

The feed gap h is the distance between the rectangular patch radiator and the ground plane. It is a key parameter for the PMFM antenna design. As shown in Fig.3, the return loss characteristics as a function of frequency for the PMEM antenna was simulated for different feed gaps (h=0.5, 0.84 and 3mm). It is shown that the -10dB operating bandwidth of the antenna varies remarkably with the variation of the feed gap h.. The optimal feed gap is found to be at h=0.84 mm.

IV. Conclusion

The return loss characteristic of the optimized design is shown in Fig.4. It is seen that the antenna resonates with the band starting from 3.1 GHz to 11.5 GHz with a percentage bandwidth of 115.3 % at the centre frequency 7.3 GHz. The VSWR level is less than 1.32 in almost the entire operating band.quarter guided wavelength (λg). In the E-plane, the antenna provides almost dipole like radiation patterns in entire band that are deteriorated little at higher frequencies and affected by the truncated ground plane.

References

1. F. Dowla.. "Ultra-wideband communication." In Handbook of RF and Wireless Technologies, edited by F. Dowla. Burlington, MA. Newnes. 2004.
2. W. Pam Siriwongpairat, K. J. Ray Liu "Ultra-wideband communications systems" *A JOHN WILEY & SONS, INC., PUBLICATION* 2007.
3. K.H. Kim, Y.J. Cho, S.H. Hwang, and S.O. Park, "Band-notched UWB planar monopole antenna with two parasitic patches", *Electron Lett* 41(2005), 783_785.
4. K.L. Wong, C.H. Wu, and S.W. Su, "Ultrawide-band square planar metal-plate monopole antenna with a trident-shaped feeding strip", *IEEE Trans Antennas Propag* 53 (2005), 1262_1269.
5. Kimouche, H.; Abed, D.; Atrouz, B.," Investigation on microstrip-fed modified elliptical monopole antenna for UWB communications",*Antenna propog 3rd European conference* 2009 , Page(s): 1450 – 1454.
6. Yaoyao Cui; Yunqing Sun; Yang Li; Hongchun Yang; Xingliang Liao**,**" Microstrip-fed monopole antenna for UWB application", *Antennas, Propagation and EM Theory, ISAPE-8th International Symposium,2008,* Page(s): 306 – 308.
7. W.C. Liu and P.C. Kao, "CPW-fed triangular monopole antenna for ultra-wideband operation", *Microwave Opt Technol Lett* 47 (2005), 580_582.
8. Yogesh Kumar Choukiker and S K Behera ,"Microstrip line-fed modified sierpinki fractal monopole antenna for dual-wideband applications", *Communication Control and Computing Technologies (ICCCCT), IEEE International Conference* 2010, Page(s): 17 – 20.
9. S.H. Lee, J.K. Park, and J.N. Lee, "A novel CPW-fed ultra-wideband antenna design", *Microwave Opt Technol Lett* 44 (2005), 393_396.
10. A.C.Shagar and R.S.D.Wahidabanu," New design of CPW-Fed rectangular slot antenna for ultra wideband applications", *International Journal of Electronics Engineering*, 2010, pp. 69-73.