

Microstrip Patch 2x1 Array Antenna with T Slot in Radiating Patch and DGS

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Abstract—This paper illustrates the comparison between fabricated and simulated results of the designed T-Slot 2x1 Microstrip Patch Antenna Array which operates for the Wi-max and WLAN applications. Designed array antenna is compact in size with complete dimensions of 82 X 48 X 1.5 mm³ including the ground plane. Fr-4 substrate of 4.6 dielectric constant is used for this antenna. This antenna array have two distinct frequency bands with resonant frequencies 3.5GHz and 5.5GHz. The antenna array structure is simulated using the CST electromagnetic (EM) simulation software, the results like return loss and VSWR are compared with the results obtained after the fabrication of this antenna.

Index Terms— Array, microstrip feed line, resonance frequency, rod-shaped parasitic element, slit and slot.

I. INTRODUCTION

There is a developmental slope towards wireless communication system that needs the use of antennas capable of accessing services in various frequency bands [1], sometimes with the use of a single antenna [2]. Enhancement in technology is increasing, the wireless communication systems such as WiFi (Wireless Fidelity) and WiMAX (Worldwide Interoperability Mobile Access). As WLAN and Wimax have applications in day to day life with a multiplicity of advantages, such as to grant communication services at anytime and anywhere to the users. At the present time, there is huge demand by the end user for integrated wireless digital applications. These demands are completed by microstrip antenna.

In this paper a multiband microstrip patch antenna is designed which can be obtained by various techniques like etching slots on the patch or on the ground plane, for examples H-shaped slot [4], U-shaped slot [5], C-shaped slot [6]. Some other techniques of this are parasitic strips [7] near the radiation elements or the ground plane for achieving the notched band and multi-functionality.

Also to enhance the performance DGS (defected ground plane) is used, that adds an extra degree of freedom in microwave circuit design and also opens the door to a wide range of applications. In

DGS resonant gap or slot in the ground metal is placed directly under a transmission line and aligned for efficient coupling to the line [8]. The name for this technique itself defines the meaning that the "defect" has been placed in the ground plane, which is typically considered to be an approximation of an infinite, perfectly-conducting current sink. Single microstrip antenna has various advantages but at the same time it has disadvantages like as low gain, narrow bandwidth with low efficiency, so in order to achieve higher gain (directivity) antenna array is preferred over single microstrip antenna. In general, the more the number of individual antenna elements used, the higher the gain and the narrower the beam is achieved [10]. Also antenna array can detect and process signals arriving from different directions in Comparison with single antenna.

This antenna array is designed for Wi-Max and WLAN applications. Firstly a microstrip patch antenna with dual band is designed then array of that antenna is designed for improving directivity gain beam-width and other antenna parameters. A T-slot is cut into patch for improving the return loss at particular frequencies.

In this paper there are three sections. First section includes introduction about the need of antenna array. In second section the designed and fabricated structure of antenna array is explained. In third section the simulated and measured results of the designed and fabricated array antenna are explained, in results we are calculating return loss and VSWR of the antenna. And in final section there is conclusion of the paper.

II. ANTENNA ARRAY STRUCTURE

An antenna array of 2X1 elements is shown in Fig.1. The array is designed using two single microstrip patch antenna and then these two same antennas are connected using quarter wave transformer technique [10]. Microstrip feed line technique is used here to feed both the antennas. The impedance at main input port should be half of input at input lines connected to both antennas, only then proper feeding will be provided to both antennas. Size of the designed antenna is kept small with complete dimensions

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Microstrip Antennas Sudipta Chattopadhyay, 2017-11-15 The progress in modern tiny multifunctional wireless devices has dramatically increased the demand for microstrip antennas in recent years Furthermore in the last few years such microstrip antennas found numerous applications in both the military and the commercial sectors Therefore microstrip patch antenna has become a major focus to the researchers in the field of antenna engineering In this book some recent advances in microstrip antennas are presented This book contains mainly three sections In the first section some new approaches to modern analytical techniques rather than the conventional cavity model transmission line model or spectral domain analysis have been discussed In the second section of the book a light has been showered on some new techniques for bandwidth enhancement of microstrip radiators In the last section of the book the recent trends in microstrip antenna research have been showcased Some newfangled application oriented approach to this field is vividly discussed The book's main objective is to facilitate the microstrip antenna researchers for exploring the subject in more vibrant manner and also to revolutionize wireless communications A sufficient number of topics have been covered some for the first time in a research handbook I hope that the book will surely be beneficial for scientists practicing engineers and researchers working in the field of microstrip antennas IEEE Antennas and Propagation Society International Symposium IEEE Antennas and Propagation Society, 1996 *American Book Publishing Record*, 2003 Antenna Theory and Microstrip Antennas D. G. Fang, 2019-08-30 Antenna Theory and Microstrip Antennas offers a uniquely balanced analysis of antenna fundamentals and microstrip antennas Concise and readable it provides theoretical background application materials and details of recent progress Exploring several effective design approaches this book covers a wide scope making it an ideal hands on resource for professionals seeking a refresher in the fundamentals It also provides the basic grounding in antenna essentials that is required for those new to the field The book's primary focus is on introducing practical techniques that will enable users to make optimal use of powerful commercial software packages and computational electromagnetics used in full wave analysis and antenna design Going beyond particular numerical computations to teach broader concepts the author systematically presents the all important spectral domain approach to analyzing microstrip structures including antennas In addition to a discussion of near field measurement and the high frequency method this book also covers Elementary linear sources including Huygen's planar element and analysis and synthesis of the discrete and continuous arrays formed by these elementary sources The digital beam forming antenna and smart antenna Cavity mode theory and related issues including the design of irregularly shaped patches and the analysis of mutual coupling Based on much of the author's own internationally published research and honed by his years of teaching experience this text is designed to bring students engineers and technicians up to speed as efficiently as possible This text purposefully emphasizes principles and includes carefully selected sample problems to ease the process of understanding the often intimidating area of antenna technology

Paying close attention to this text you will be able to confid

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