

# Ansoft Hfss Manual For Rectangular Microstrip Antenna

## **Microstrip and Printed Antenna Design**

Randy Bancroft 2009-06-30 Offering extensive coverage of microstrip antennas, from rectangular and circular to broadband and dual-band, this text gives a complete introduction to useful designs and the implementation aspects of these types of antennas.

Size Reduction of Microstrip Antennas Using Left-handed Materials Realized by Complementary Split-ring Resonators Aparna U. Limaye 2006 "Recently, metamaterials (MTMs) engineered to have negative values of permittivity and permeability, resulting in a left-handed system, have provided a new frontier for microwave circuits and antennas with possibilities to overcome limitations of the right-handed system. Microwave circuit components

such as waveguides, couplers, power dividers and filters, constructed on left-handed materials, have demonstrated properties of backward coupling, phase compensation, reduced sizes, and propagation of evanescent modes. However, there is very limited work to date, on the microstrip antennas with metamaterials.

Microstrip antenna is widely used for its low-profile, simplicity of feed and compatibility with planar microstrip circuitry. As the trend towards miniaturization of electronic circuitry continues, antennas remain as the bulkiest part of wireless devices. There are three primary objectives to the present work: 1. Explore the possibility of miniaturizing microstrip patch antennas using left-handed materials through phase-compensation 2. Achieve negative permittivity using Complementary Split-Ring Resonators

(CSRR) 3. Implement CSRR in the ground plane of a rectangular patch antenna, and validate through simulation and measurement A rectangular patch antenna with a combined DPS-DNG substrate has been analyzed with the cavity model, from which the condition for mode propagation has been derived. Criteria for 'electrically small' patch, using phase-compensation have been developed and propagating modes that satisfy these criteria have been obtained. With an objective to design practically realizable antennas, amongst several available LHM structures, the Complementary Split Ring Resonators (CSRR) has been chosen, primarily for the ease of implementation in the ground plane. CSRRs are periodic structures which alter the bulk effective permittivity of a host medium in which they are embedded. The effective permittivity becomes negative in a certain frequency band defined as a 'stop-band'. In the present work the frequency response of the CSRR and the 'stop-band' has been

determined using a full wave solver, from which, effective permittivity of the composite with CSRRs has been obtained by parameter extraction. Finally, several combinations of patch and CSRR in the ground plane have been designed and constructed in the X-band frequency range. Measurements of input characteristics and directivity have been validated through simulation by Ansoft Designer and HFSS. It has been observed that the best designs are achieved when the 'stop-band' of the CSRR corresponds to the desired resonant frequency of the antenna. Under these conditions, a size reduction of up to fifty percent has been achieved and it is noted that the back lobe is negligible and the directivity is comparable to that of a right-handed microstrip antenna"--Abstract.

### **Design and Implementation of Rectangular Patch Antenna for Tri-Band Operation**

Prashant S. Mahajan 2015-04-15 Master's Thesis from the year 2013 in the subject

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Electrotechnology, grade: First Class, course: Master Of Engineering, language: English, comment: These antennas can be designed in a variety of shapes in order to obtain enhanced gain and bandwidth for dual band and tri-band operation. This book focus on a detailed study of how to design and simulate a microstrip fed rectangular patch antenna using IE3D software with effect of antenna dimensions length ( L ), width ( W ), relative dielectric constant, substrate thickness ( t ) on the radiation parameters of bandwidth and gain. The design parameters of the antenna calculated using the transmission line model., abstract: In today's modern communication industry, antennas are the most important components required to create a communication link. Microstrip antennas are the most suited for aerospace and mobile applications because of their low profile, light weight and low power handling capacity. These antennas can be designed in a variety of shapes in order to obtain enhanced gain and

bandwidth for dual band and tri-band operation. This book focus on a detailed study of how to design and simulate a microstrip fed rectangular patch antenna using IE3D software with effect of antenna dimensions length ( L ), width ( W ), relative dielectric constant, substrate thickness ( t ) on the radiation parameters of bandwidth and gain. The design parameters of the antenna calculated using the transmission line model. Here antenna operates for tri- band operation, the operating bands are GSM, PCA and UTMS for antenna geometry -I and WLAN and WiMAX for antenna geometry -II. The fractional bandwidths (FB) after simulation obtain under criterion ( S<sub>11</sub>

*Design and Analysis of Microstrip Patch Antenna for Beginners* Dr. Anurima Majumdar  
2024-06-28 In the world of communication engineering, microstrip patch antennas (MPA) play an important role. Hence, the design and analysis of microstrip patch antennas are introduced in many disciplines of engineering.

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Not only in the academic field but also in the research areas of broadband communication, wireless communication, satellite communication, 5G/6G communication, etc. This book will be helpful for beginners to understand the basic steps to designing a MPA and its numerical analysis. It covers topics ranging from the fundamentals of patch antennas to designing procedures, MATLAB analysis, and software simulation (HFSS). We hope this book will help the students of diploma and UG study to gain thorough knowledge in the subject. We earnestly thank the students and teachers who helped us with their valuable suggestions. We request that the readers give their feedback for further improvements.

**Analysis of a Linear Series-fed Rectangular Microstrip Antenna Array** Sohini Sengupta 2011

*Microstrip Antenna* J. R. James 1986 In the past few years, the concept of creating microwave antennas using microstrip has attracted

increasing attention and viable practical designs are now emerging. The purpose of this monograph is to present the reader with an appreciation of the underlying physical action, up-to-date theoretical treatments, useful antenna design approaches and the overall state-of-the-art situation. The emphasis is on antenna engineering design, but to achieve this goal it has been necessary to delve into the behaviour of microstrip in a much wider sense and also include aspects of electromagnetic analysis. As a consequence, the monograph will also be of interest to microstrip circuit designers and to some extent those seeking electromagnetic problems of a challenging nature. The astronomical progress in miniaturising and integrating electronic circuits in the past decade has recently created a positive demand for a new generation of antenna systems. In principle, microstrip antennas are thin planar configurations that are lightweight, low cost, easy to manufacture and can be made conformal

with the surfaces of vehicles, missiles etc. The compatibility of microstrip antennas with integrated electronics is another great advantage. However, the microstrip wavetrapping effects inhibit the radiation mechanism and must be taken into account in antenna design. Wave-trapping effects in substrates involve the study of surface waves and discontinuities in open waveguide structures. The microstrip antenna designer must therefore encompass many more effects than previously considered by microstrip circuit designers. It is for these reasons that the scope of this monograph is necessarily somewhat wider than the title may suggest. The ten chapters are a blend of introductory, practical and theoretical treatments and likely future developments are also highlighted. A good selection of past and current references are given and each chapter concludes with a helpful summary comment.

**Microstrip Patch Antennas** Kai Fong Lee

2010-09-03 Microstrip patch antennas have become the favorite of antenna designers because of its versatility and advantages of planar profile, ease of fabrication, compatibility with integrated circuit technology, and conformability with a shaped surface. As there is currently an urgent need for graduate students and practicing engineers to gain an in-depth understanding of this subject, this book was written with this purpose in mind. The authors are IEEE Fellows who have made significant contributions to their fields of expertise.

Professor K F Lee was the recipient of the 2009 John Kraus Antenna Award of the IEEE Antennas and Propagation Society. /a

*Design, Simulation, Fabrication and Measurement of a Rectangular Microstrip Antenna* 2006

**Microstrip Antennas** N Nasimuddin

2011-04-04 In the last 40 years, the microstrip antenna has been developed for many communication systems such as radars, sensors,

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wireless, satellite, broadcasting, ultra-wideband, radio frequency identifications (RFIDs), reader devices etc. The progress in modern wireless communication systems has dramatically increased the demand for microstrip antennas. In this book some recent advances in microstrip antennas are presented.

*RFID Handbook* Syed A. Ahson 2017-12-19  
Radio Frequency Identification (RFID) tagging is now used by the department of defense and many of the world's largest retailers including Wal-Mart. As RFID continues to infiltrate industries worldwide, organizations must harness a clear understanding of this technology in order to maximize its potential and protect against the potential risks it poses. The RFID Handbook provides an overview of RFID technology, its associated security and privacy risks, and recommended practices that will enable organizations to realize productivity improvements while also protecting sensitive information and the privacy of individuals.

Expert contributors present a host of applications including RFID enabled automated receiving, triage with RFID for massive incidents, RFID and NFC in relation to mobile phones, and RFID technologies for communication robots and a privacy preserving video surveillance system. The unprecedented coverage also includes detailed descriptions of adaptive splitting protocols as well as tree-based and probabilistic anti-collision protocols. Drawing on its distinguished editors and world-renowned contributors, this one-of-a-kind handbook serves as the ultimate reference on RFID, from basic research concepts to future applications.

Frequency Selective Surfaces based High Performance Microstrip Antenna Shiv Narayan 2015-09-24  
This book focuses on performance enhancement of printed antennas using frequency selective surfaces (FSS) technology. The growing demand of stealth technology in strategic areas requires high-performance low-

RCS (radar cross section) antennas. Such requirements may be accomplished by incorporating FSS into the antenna structure either in its ground plane or as the superstrate, due to the filter characteristics of FSS structure. In view of this, a novel approach based on FSS technology is presented in this book to enhance the performance of printed antennas including out-of-band structural RCS reduction. In this endeavor, the EM design of microstrip patch antennas (MPA) loaded with FSS-based (i) high impedance surface (HIS) ground plane, and (ii) the superstrates are discussed in detail. The EM analysis of proposed FSS-based antenna structures have been carried out using transmission line analogy, in combination with the reciprocity theorem. Further, various types of novel FSS structures are considered in designing the HIS ground plane and superstrate for enhancing the MPA bandwidth and directivity. The EM design and performance analyses of FSS-based antennas are explained

here with the appropriate expressions and illustrations.

### **Microstrip Antennas Modeling for Recent Applications** 2016-09-01

Microstrip Patch Antenna Learning using MATLAB. Theory and Implementation Jagadish Jadhav 2021-07-30 Scientific Study from the year 2021 in the subject Engineering - Communication Technology, , course: M. Tech, language: English, abstract: Microstrip patch antenna is used to send onboard parameters of article to the ground while under operating conditions. By the study of this book we find out how to investigate a new method of teaching microstrip patch antenna design for undergraduate students by using MATLAB. Effect of changes in basic parameter microstrip patch antenna on its radiation pattern and other parameters to study the effect of resonant frequency and substrate parameters like, relative dielectric constant, substrate thickness on the radiation parameters of bandwidth and

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physical dimension of the microstrip patch antenna can be determined by using GUI. In this book we develop simple CAD (GUI) formulas that describe the basic properties of microstrip patch antenna using MATLAB. By the usage of this teaching tool we can analyze the behaviour of the microstrip patch antenna and design of it for different material. Satellite communication and wireless communication has been developed rapidly in the past decades and it has already a dramatic impact on human life. In the last few years, the development of wireless local area networks (WLAN) represented one of the principal interests in the information and communication field. Thus, the current trend in commercial and government communication systems has been to develop low cost, minimal weight, low profile antennas that are capable of maintaining high performance over a large spectrum of frequencies. This technological trend has focused much effort into the design of microstrip (patch) antennas. The variety in

design that is possible with microstrip antenna probably exceeds that of any other type of antenna element. In addition, once the shape and operating mode of the patch are selected, designs become very versatile in terms of operating frequency, polarization, pattern, and impedance. They are extremely low profile, lightweight, simple and inexpensive to fabricate using modern day printed circuit board technology, compatible with microwave and millimeter-wave integrated circuits (MMIC), and have the ability to conform to planar and non planar surfaces.

Microstrip Antenna Design K. C. Gupta 1988  
*Proceedings of International Conference on Recent Advancement on Computer and Communication* Basant Tiwari 2018-04-18  
The book is a compilation of best papers presented at International Conference on Recent Advancement in Computer and Communication (ICRAC 2017) organized by IMPLab Research and Innovation Foundation, Bhopal, India. The

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book covers all aspects of computers and communication techniques including pervasive computing, distributed computing, cloud computing, sensor and adhoc network, image, text and speech processing, pattern recognition and pattern analysis, digital signal processing, digital electronics, telecommunication technologies, robotics, VLSI technologies, embedded system, satellite communication, digital signal processing, and digital communication. The papers included are original research works of experts from industry, government centers and academic institutions; experienced in engineering, design and research.

### **Microstrip Antenna Design Handbook**

Ramesh Garg 2001 Based on Bahl and Bhartia's popular 1980 classic, Microstrip Antennas, this all new book provides the detail antenna engineers and designers need to design any type of microstrip antenna. After addressing essential microchip antenna theory, the authors highlight

current design and engineering practices, emphasizing the most pressing issues in this area, including broadbanding, circular polarization, and active microstrip antennas in particular. Special design challenges, ranging from dual polarization, high bandwidth, and surface wave mitigation, to choosing the proper substrate, and shaping an antenna to achieve desired results are all covered.

### **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.

Microstrip Antennas David M. Pozar 1995-05-15  
"This anthology combines 15 years of microstrip antenna technology research into one significant volume and includes a special introductory tutorial by the co-editors. Covering theory, design and modeling techniques and methods, this source book is an excellent reference tool for engineers who want to become more familiar with microstrip antennas and microwave systems. Proven antenna designs, novel solutions to practical design problems and relevant papers describing the theory of operation and analysis of microstrip antennas are contained within this convenient reference."

**Microstrip Antenna Design for Wireless Applications** Praveen Kumar Malik 2021-11-29  
This book focuses on recent advances in the field of microstrip antenna design and its applications in various fields including space communication, mobile communication, wireless communication, medical implants and wearable applications. Scholars as well as researchers and those in the

electronics/ electrical/ instrumentation engineering fields will benefit from this book. The book shall provides the necessary literature and techniques using which to assist students and researchers would design antennas for the above- mentioned applications and will ultimately enable users to take measurements in different environments. It is intended to help scholars and researchers in their studies, by enhancing their the knowledge and skills in on the latest applications of microstrip antennas in the world of communications such as world like IoT, D2D, satellites and wearable devices, to name a few. FEATURES Addresses the complete functional framework workflow in printed antenna design systems Explores the basic and high-level concepts, including advanced aspects in planer design issues, thus serving as a manual for those in the the industry while also assisting beginners Provides the latest techniques used for antennas in terms of structure, defected ground, MIMO and fractal designs Discusses

case studies related to data-intensive technologies in microchip antennas in terms of the most recent applications and similar uses for the Internet of Things and device-to-device communication

**Handbook of Microstrip Antennas** James R. James 1989 The book reviews developments in the following fields:circular microstrip antennas; microstrip patch antennas; circular polarisation and bandwidth; microstrip dipoles; multilayer and parasitic configurations; wideband flat dipole and short-circuit microstrip patch elements and arrays; numerical analysis; multiport network approach; transmission-line model; rectangular microstrip antennas; low-cost printed antennas; printed phased-array antennas; circularly polarised antenna arrays; microstrip antenna feeds; substrate technology; computer-aided design of microstrip and triplate circuits; resonant microstrip antenna elements and arrays for aerospace applications; mobile and satellite systems; conical conformal

microstrip tracking antenna; and microstrip field diagnostics.

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