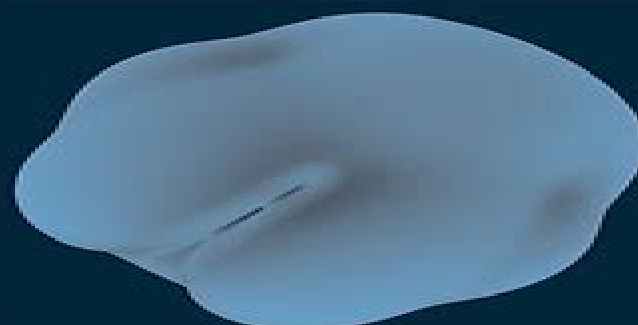
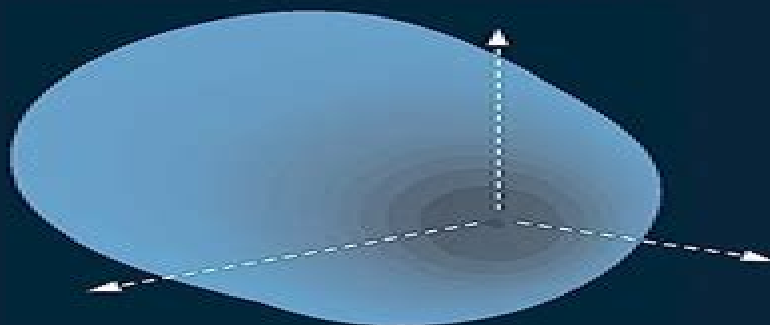


ULTRAWIDEBAND ANTENNAS FOR MICROWAVE IMAGING SYSTEMS

TAYEB A. DENIDNI • GIJO AUGUSTIN



Ultrawideband Antennas Ultrawideband Antennas

**James Becker, Dejan Filipovic, Hans
Schantz, Seong-young Suh**



Ultrawideband Antennas Ultrawideband Antennas:

The Art and Science of Ultrawideband Antennas, Second Edition Hans G. Schantz, 2015-06-01 This comprehensive treatment of ultrawideband UWB antennas and time domain microwave engineering serves as an invaluable practical reference for anyone involved in antenna and RF design work This authoritative volume enables readers to select the proper UWB antennas for their applications design and analyze UWB antennas and integrate these antennas in an RF system By applying time domain thinking to problems of practical interest the reader will not only learn how to build and analyze antennas but also understand them at the most fundamental level This second edition is updated and expanded throughout providing readers with a history of antennas numerous new problem sets and worked examples along with new information on plotting time domain field lines time domain reflectometry matching techniques and more This book also addresses system issues like spectral control and antenna efficiency *Ultra Wideband Antennas* Giselle M. Galvan-Tejada, Marco Antonio Peyrot-Solis, Hildeberto Jardón Aguilar, 2016

Ultra-Wideband Antennas and Propagation Ben Allen, Mischa Dohler, Ernest Okon, Wasim Malik, Anthony Brown, David Edwards, 2006-11-02 Providing up to date material for UWB antennas and propagation as used in a wide variety of applications Ultra wideband Antennas and Propagation for Communications Radar and Imaging includes fundamental theory practical design information and extensive discussion of UWB applications from biomedical imaging through to radar and wireless communications An in depth treatment of ultra wideband signals in practical environments is given including interference coexistence and diversity considerations The text includes antennas and propagation in biological media in addition to more conventional environments The topics covered are approached with the aim of helping practising engineers to view the subject from a different angle and to consider items as variables that were treated as constants in narrowband and wideband systems Features tables of propagation data photographs of antenna systems and graphs of results e g radiation patterns propagation characteristics Covers the fundamentals of antennas and propagation as well as offering an in depth treatment of antenna elements and arrays for UWB systems and UWB propagation models Provides a description of the underlying concepts for the design of antennas and arrays for conventional as well as ultra wideband systems Draws together UWB theory by using case studies to show applications of antennas and propagation in communication radar and imaging systems The book highlights the unique design issues of using ultra wideband and will serve both as an introductory text and a reference guide for designers and students alike

Ultra Wide Band Antennas Xavier Begaud, 2013-03-04 Ultra Wide Band Technology UWB has reached a level of maturity that allows us to offer wireless links with either high or low data rates These wireless links are frequently associated with a location capability for which ultimate accuracy varies with the inverse of the frequency bandwidth Using time or frequency domain waveforms they are currently the subject of international standards facilitating their commercial implementation Drawing up a complete state of the art Ultra Wide Band Antennas is aimed at students engineers and researchers and presents a

summary of internationally recognized studies **The Art and Science of Ultrawideband Antennas** Hans Schantz, 2005
Ultra wideband UWB technology is on the cutting edge of contemporary wireless development and this comprehensive treatment of UWB antennas serves as an invaluable practical reference for your antenna and RF design work. Generously supported with over 200 equations and more than 200 illustrations, this authoritative volume enables you to select the proper UWB antennas for your applications, design and analyze UWB antennas, and integrate these antennas in an RF system.

Multifunctional Ultrawideband Antennas Chinmoy Saha, Jawad Y Siddiqui, Y M M Antar, 2019-03-19
Multifunctional Antennas (MFA) are comparatively a new area for antenna research and finds applications in various modern wireless radios like Cognitive Radio (CR) in Software Defined Radio (SDR) technology and MIMO technology. This book is a first attempt and an invaluable resource which deals with the design and realization of various kinds of multifunctional antennas. After clearly explaining the exclusive features of MFAs, the book presents various designs of such antennas considering versatile modern and upcoming applications. Written by three internationally known researchers, *Multi Functional Ultra Wideband Antennas: Trends, Techniques and Applications* provides a lucid introduction on UWB systems, historical perspective, and discusses various applications of such systems. It discusses fundamentals of antennas and its characterization in time and frequency domains, primarily aimed for the beginners in the area. It revisits the design and realization of various classical UWB antennas, discusses various techniques of designing frequency notched UWB antennas, and provides a detailed comparison of the techniques. It deals with the techniques of deriving multiple antenna functionalities from a single antenna. It incorporates exclusive discussions on modern reconfigurable antennas and printed and dielectric resonator based MIMO antennas with clear focus on recent and upcoming technological requirements. With *Multi Functional Ultra Wideband Antennas: Trends, Techniques and Applications*, antenna engineers, communication system engineers, graduate students, academic industry researchers will gain a thorough knowledge on design of such antennas with clear physical insight and understanding.
Chinmoy Saha, PHD, is an associate Professor in the Department of Avionics at Indian Institute of Space Science and Technology, Thiruvananthapuram, Kerala, India. His current research interest includes Microwave Circuits, Engineered Materials, Metamaterial Inspired Antennas, and Circuits, reconfigurable and multi functional antennas for modern wireless applications, Dielectric Resonator antennas, THz antennas, and wireless power transfer. He is the author or coauthor of several books, scientific journals, and recipient of several prestigious awards.
Jawad Yaseen Siddiqui, PHD, is an associate Professor in the Department of Radio Physics and Electronics at University of Calcutta, Kolkata, India. His current research interest includes ultra wideband antennas, frequency reconfigurable antennas, tapered slot antennas, and multi functional antennas for cognitive radio application. He is the author or coauthor of several books, scientific journals, and recipient of prestigious awards. He is a Co-Principal Investigator on Stratosphere Troposphere Scatter (ST) Radar Project at the University of Calcutta, Kolkata, India.
Yahia M M Antar, PHD, is a Professor in the Department of Department of Electrical and Computer Engineering at the

Royal Military College of Canada Kingston ON Canada He is the author or coauthor of several books scientific journals and recipient of prestigious awards which includes IEEE Antennas and Propagation Society prestigious Chen To Tai Distinguished Educator Award for 2017 2015 IEEE Canada J M Ham outstanding Engineering Education Award 2014 IEEE Canada RA Fessenden Silver Medal 2012 Queen s Diamond Jubilee Medal from the Governor General of Canada and many more

Ultrawideband Antennas Daniel Valderas, 2011 Ultrawideband UWB technology positioned as the cutting edge of research and development paves the way to meet the emerging demands set by broadband wireless applications such as high speed data transmission medical imaging short range radars electromagnetic testing etc This breathtaking resource builds upon the basics of UWB technology to provide a complete compilation of figures of merit along with a vital state of the art of the different antenna alternatives that are to be employed according to the specific application Without excessive recourse to mathematics this volume emphasizes on the UWB antenna design and equips readers with practical prediction techniques based on simple formulas and models The big picture of UWB antenna technology would not be complete without addressing its applications and this will serve to provide consultants with key clues for slot market searching Containing over 150 supporting illustrations and figures this comprehensive overview of UWB technology antenna design and applications is a vital source of information and reference for R D organizations researchers practitioners consultants RF professionals and communication engineers

Ultra Wideband Antennas Giselle Galvan-Tejada, Marco Peyrot-Solis, Hildeberto Aguilar, 2015 Ultra Wideband Antennas Design Methodologies and Performance presents the current state of the art of ultra wideband UWB antennas from theory specific for these radiators to guidelines for the design of omnidirectional and directional UWB antennas Offering a comprehensive overview of the latest UWB antenna research and development this book Discusses the developed theory for UWB antennas in frequency and time domains Delivers a brief exposition of numerical methods for electromagnetics oriented to antennas Describes solid planar equivalence which allows flat structures to be implemented instead of volumetric antennas Examines the impedance matching phase linearity and radiation patterns as design objectives for omnidirectional and directional antennas Addresses the time domain signal analysis for UWB antennas from which the distortion phenomenon can be modeled Includes illustrative examples design equations CST MICROWAVE STUDIO simulations and MATLAB plot generations Compares the performance of different UWB antennas supplying useful insight into particular tendencies and unresolved problems Ultra Wideband Antennas Design Methodologies and Performance provides a valuable reference for the scientific community as UWB antennas have a variety of applications in body area networks radar imaging spectrum monitoring electronic warfare wireless sensor networks and more

Ultrawideband Antennas for Microwave Imaging Systems Tayeb A. Denidni, Gijo Augustin, 2014-08-01 This book presents ultrawideband antennas and their applications on microwave imaging The chapters focus on recent techniques analysis and applications along with the future vision of this emerging field of applied electromagnetics Several emerging topics are essayed including

dielectric resonator antennas and planar ultrawideband antennas for microwave imaging This resource incorporates modern design concepts analysis and optimization techniques based on recent developments Readers are also provided with an extensive overview of current regulations including those related to microwave effects in biological tissues The WLAN Band-Notching of Ultra WideBand Antennas Zeeshan Ahmed, 2016-06-17 Technical Report from the year 2013 in the subject Engineering Communication Technology grade A course Electrical Engineering language English abstract In this report three staircase UWB antennae with WLAN band notch characteristic each having different ground planes are presented These include a Co Planar Waveguide fed antenna a Transmission Line fed antenna with partial ground plane having a Defected Ground Structure DGS and a Transmission Line fed antenna with slotted ground plane All the band notched antennae have rejection characteristics at 5 GHz WLAN band 5 15GHz to 5 35GHz and 5 725GHz to 5 825 GHz while the antenna with slotted ground plane rejects the 4 9GHz WLAN band 4 94GHz to 4 99GHz as well In all the three antennae the WLAN band is notched by embedding a U shaped slot in the transmission line The proposed antennae are carefully designed simulated and tested in order to fulfill the UWB antennae s pre defined criteria The Simulated and Measured results are found to be in good agreement which show the validity of the suggested designs Since the commencement of human civilization humankind attempts to communicate with each other It is the process of communication namely the sharing of information emotions and feelings that has made the mankind the sterling creation of God It all started with gestures of hands and sounds produced by the vocal cords and gradually evolved into wired and wireless communication now The orthodox wireless systems were long range narrowband systems but in order to use the available spectrum now UWB Ultra Wideband short range systems are being used which consume low power and built using low priced digital components The Microstrip Antennae are designed to implement UWB systems because they show effective results for broadband antennae Ultra wideband UWB antennae are by far the most essential elements for UWB systems With the launch of the 3 1GHz to 10 6GHz band applications for short range and high bandwidth portable gadgets are major research areas in UWB systems Consequently the acknowledgment of UWB antennas in printed circuit systems within comparatively small substrate areas is of major significance Band-Notch Characteristics in Ultra-Wideband Antennas Taimoor Khan, Yahia M.M. Antar, 2021-06-08 This book comprehensively reviews ultra wideband UWB and UWB multi input multi output MIMO antennas with band notched characteristics with a focus on interference cancellation functionality The book is organized into seven chapters that cover single band dual band and multi band notched UWB antennas followed by band notched characteristics in UWB MIMO antennas Further it explains the mechanism of reconfigurability and tunability in band notched UWB antennas including advanced applications of UWB systems Overall it covers different techniques of canceling the electromagnetic interference in UWB in a concise volume Features Provides a comprehensive presentation of avoiding interference in UWB systems Reviews state of the art literature related to UWB antennas filtennas and various

reconfigurable technologies Explains different techniques for producing band notch characteristics in UWB systems Includes discussion on historical perspectives of UWB technology Consolidates different research activities carried out on the electromagnetic interference cancellation techniques in the UWB communication systems Band Notch Characteristics in Ultra Wideband Antennas is aimed at researchers and graduate students in electrical and antenna engineering Taimoor Khan has been an Assistant Professor at the Department of Electronics and Communication Engineering National Institute of Technology Silchar since 2014 In addition to this Dr Khan has also worked as a Visiting Assistant Professor at Asian Institute of Technology Bangkok Thailand during September-December 2016 His active research interests include Printed Microwave Circuits Electromagnetic Bandgap Structures Ultra wideband Antennas Dielectric Resonator Antennas Ambient Microwave Energy Harvesting and Artificial Intelligence Paradigms in Electromagnetics Dr Khan has successfully guided three Ph D theses and is supervising six Ph D students He has published over 75 research articles in well indexed journals and in world renowned conference proceedings Currently he is executing three funded research projects including two international collaborative SPARC and VAJRA research projects In September 2020 Dr Khan has been awarded a prestigious national IETE Prof SVC Aiya Memorial Award for the year 2020 Yahia M M Antar has been a Professor at the Department of Electrical and Computer Engineering Royal Military College of Canada since 1990 He served as the Chair of CNC URSI from 1999 to 2008 Commission B from 1993 to 1999 and has a cross appointment at Queen's University in Kingston He has authored and co-authored over 250 journal papers several books and chapters in books over 500 refereed conference papers holds several patents has chaired several national and international conferences and has given plenary talks at many conferences Dr Antar is a fellow of the Engineering Institute of Canada the Electromagnetic Academy and an International Union of Radio Science URSI He was elected by the URSI to the Board as the Vice President in 2008 and in 2014 and to the IEEE AP AdCom in 2009 In 2011 he was appointed as a member of the Canadian Defence Advisory Board DAB of the Canadian Department of National Defence He serves as an Associate Editor for many IEEE and IET Journals and as an IEEE APS Distinguished Lecturer Presently he is working as President Elect for IEEE Antenna and Propagation Society for the year 2020

Ultra-Wideband, Short-Pulse Electromagnetics 7 Frank Sabath, Eric L. Mokole, Uwe Schenk, Daniel Nitsch, 2010-05-30 This book presents selected contributions of the Ultra Wideband Short Pulse Electromagnetics 7 Conference including electromagnetic theory scattering Ultrawideband UWB antennas UWB systems ground penetrating radar UWB communications pulsed power generation time domain computational electromagnetics UWB compatibility target detection and discrimination propagation through dispersive media and wavelet and multi resolution techniques

Multifunctional Ultrawideband Antennas Chinmoy Saha, Jawad Y Siddiqui, Y M M Antar, 2019-03-19 Multifunctional Antennas MFA are comparatively a new area for antenna research and finds applications in various modern wireless radios like Cognitive Radio CR in Software Defined Radio SDR technology and MIMO technology This book is first attempt and an

invaluable resource which deals with the design and realization of various kinds of multifunctional antennas After clearly explaining the exclusive features of MFAs the book presents various designs of such antennas considering versatile modern and upcoming applications Written by three internationally known researchers Multi Functional Ultra Wideband Antennas Trends Techniques and Applications Provides a lucid introduction on UWB systems historical perspective and discusses various applications of such systems Discusses fundamentals of antennas and its characterization in time and frequency domains primarily aimed for the beginners in the area Revisits the design and realization of various classical UWB antennas Discusses various techniques of designing frequency notched UWB antennas and provide detailed comparison of the techniques Deals with the techniques of deriving multiple antenna functionalities from a single antenna Incorporates exclusive discussions on modern reconfigurable antennas and printed and dielectric resonator based MIMO antennas with clear focus on recent and upcoming technological requirements With Multi Functional Ultra Wideband Antennas Trends Techniques and Applications antenna engineers communication system engineers graduate students academic industry researchers will gain a thorough knowledge on design of such antennas with clear physical insight and understanding

Chinmoy Saha PHD is an associate Professor in the Department of Avionics at Indian Institute of Space Science and Technology Thiruvananthapuram Kerala India His current research interest includes Microwave Circuits Engineered Materials Metamaterial Inspired Antennas and Circuits reconfigurable and multi functional antennas for modern wireless applications Dielectric Resonator antennas THz antennas and wireless power transfer He is the author or coauthor of several books scientific journals and recipient of several prestigious awards

Jawad Yaseen Siddiqui PHD is an associate Professor in the Department of Radio Physics and Electronics at University of Calcutta Kolkata India His current research interest includes ultra wideband antennas frequency reconfigurable antennas tapered slot antennas and multi functional antennas for cognitive radio application He is the author or coauthor of several books scientific journals and recipient of prestigious awards He is a Co Principal Investigator on Stratosphere Troposphere ST Radar Project at the University of Calcutta Kolkata India

Yahia M M Antar PHD is a Professor in the Department of Department of Electrical and Computer Engineering at the Royal Military College of Canada Kingston ON Canada He is the author or coauthor of several books scientific journals and recipient of prestigious awards which includes IEEE Antennas and Propagation Society prestigious Chen To Tai Distinguished Educator Award for 2017 2015 IEEE Canada J M Ham outstanding Engineering Education Award 2014 IEEE Canada RA Fessenden Silver Medal 2012 Queen s Diamond Jubilee Medal from the Governor General of Canada and many more

Novel Ultra Wideband Antennas for Wireless Systems Abdallah A. Alshehri, 2008 **Ultra-Wideband Short-Pulse Electromagnetics 8** Carl E. Baum, Alexander P. Stone, J. Scott Tyo, 2007-12-05 The eighth conference on Ultra Wideband Short Pulse Electromagnetics UWBSP8 was held at the Convention Center of Albuquerque New Mexico USA on 9 14 July 2006 This was part of AMEREM 2006 This in turn was part of a Joint Symposium including IEEE Antennas and Propagation

Society International Symposium and USNC US National Committee URSI International Union of Radio Science National Radio Science Meeting This continues the tradition extending through Magdeburg Germany 2004 on back to their beginning at Polytechnic University in Brooklyn New York USA 1992 Like the previous conferences the eighth in this series extends the earlier results The subjects include pulse radiation and measurement scattering theory target detection and identification antennas signal processing communications and related subjects It should be noted that at this Joint Symposium ultra wideband was prominently recognized by the presentation of the John Kraus Antenna Award of the IEEE Antennas and Propagation Society to C E Baum E G Farr and D V Giri For development of novel and innovative ultra wideband antenna concepts that have enabled a new area of electromagnetics The photograph on the front cover is that of JOLT an extremely powerful radiator of impulse like electromagnetic waves It was developed by the Air Force Research Laboratory Directed Energy Directorate on Kirtland AFB adjacent to Albuquerque The editors wish to thank all of those involved in the Joint Symposium The University of New Mexico Department of Electrical and Computer Engineering made an especially large contribution of personnel Ultra-Wideband Antennas James Becker, Dejan Filipovic, Hans Schantz, Seong-young Suh, 2008-04

Ultra Wideband Communications Mohammad Abdul Matin, 2011-08-09 This book explores both the state of the art and the latest achievements in UWB antennas and propagation It has taken a theoretical and experimental approach to some extent which is more useful to the reader The book highlights the unique design issues which put the reader in good pace to be able to understand more advanced research Compact Planar Uwb Antennas for Wireless Device Applications Li Liu, 2017-01-27 This dissertation Compact Planar UWB Antennas for Wireless Device Applications by Li Liu was obtained from The University of Hong Kong Pokfulam Hong Kong and is being sold pursuant to Creative Commons Attribution 3.0 Hong Kong License The content of this dissertation has not been altered in any way We have altered the formatting in order to facilitate the ease of printing and reading of the dissertation All rights not granted by the above license are retained by the author Abstract The thesis report presents the designs of compact planar ultra wideband UWB antennas for wireless devices applications Three main designs of UWB antennas are studied namely single UWB antennas UWB multiple input multiple out MIMO antennas and transparent UWB antennas on the screens of mobile phones For single UWB antennas the designs of two compact planar monopole antennas with compact sizes of 2628 mm² and 3039 3mm² are presented The UWB operations of the antennas are achieved using a ground slot under the feed line offsetting the feed line and the radiator from the middle of the ground plane and smoothly transforming the feed line Simulation and measurement show that the two antennas can achieve an ultra wide bandwidth with approximately omnidirectional patterns A deep notch band in 5.1585 GHz is created in one of the UWB antennas by employing two pairs of meander lines MLs one pair being close to the feed line and the other pair along the upper edge of the ground plane At the notch frequency the simulated efficiency is only 4% Three compact UWB MIMO antennas with very compact sizes of 2640 mm DEGREES² 2138 mm DEGREES² and 2236 mm DEGREES² are

designed Each of them is designed using two UWB antenna elements perpendicularly or symmetrically placed Different techniques such as using ground stubs besides the radiators cutting inclined slots on the ground and adding a T shaped protruding from ground are proposed to lower mutual coupling between the two antenna elements One of the antennas is designed to generate a notched band in 5.15-5.85 GHz using two ground strips Simulation and measurement results show that these antennas can cover the entire UWB of 3.1-10.6GHz with mutual coupling of less than 15 dB and envelope correlation coefficient of less than 0.1 An UWB antenna is designed using a transparent conductive film for applications on mobile phone screens The effects of a finger touching the screen are studied Results show that with the radiator on the bottom side of the screen and a thin film with a thickness of 0.05 mm on the top side to separate the finger and the antenna the effects of the finger can be minimized In measurement of monopole antennas with small ground planes due to the feeding cable used there are always discrepancies between the simulated and measured results in radiation patterns efficiencies and gains at lower frequencies To verify that the discrepancies in the results of these studies are indeed due to the feeding cable used in measurement the models of the feeding cables are developed and used for simulation Results show that by using the cable model the simulated and measured results in radiation patterns efficiencies and gains agree very well DOI 10.5353/th_b5334867

Subjects Wireless communication systems Equipment and supplies Design and construction Ultra wideband antennas

Ultrawideband Phased Array Antenna Technology for Sensing and Communications Systems Alan J. Fenn, Peter T. Hurst, 2015-04-10 Practical ultrawideband phased array technology used in airborne and ground based systems applications

Ultra-wideband Antennas and Components for Wireless Communication Systems Osama Mohamed Haraz Ahmed, 2011 Ultra wideband UWB technology is rapidly developing as a high speed and high data rate wireless communication mode There are many challenges in dealing with this new emerging technology One of these challenges is how to design an antenna element that can operate effectively in the entire UWB frequency range Another big challenge is to design UWB antenna beamforming systems including suitable UWB components such as feed networks transitions crossovers hybrid couplers and phase shifters to meet the UWB requirements This thesis is primarily focused on designing UWB antenna elements and other microwave components for UWB wireless communications applications The thesis starts with designing and implementing different new UWB disc monopole and hybrid antennas with discussions covering their operation electrical behavior and performance Antennas are developed using microstrip technology to achieve low profile and compatibility with printed circuit board PCB technology Different techniques for obtaining a bandstop function in the 5.0-6.0 GHz frequency band to avoid interference with other existing wireless local area network WLAN systems are numerically and experimentally presented A UWB feed network prototype based on a modified two section Wilkinson power divider is then developed The designed feed network has been used in constructing two element and four element antenna arrays The two element antenna array has a total directive gain of about 5.5-8.5 dBi within the whole UWB frequency band

while for the four element antenna array the achieved total directive gain is about 7.5115 dBi. Two different UWB slot coupled microstrip to microstrip vertical transitions are also addressed. The proposed transitions utilize trapezoidal and butterfly shaped microstrip patches at the top and bottom layers. The broadside coupling between microstrip coupled patches is achieved by cutting a rectangular shaped slot in the mid layer ground plane. The designed transitions are used to develop 3dB 90° hybrid couplers with good return loss, insertion loss, coupling and isolation characteristics across the desired frequency range. Then two different 45° phase shifters are developed to be used in building 4 x 4 Butler matrices for UWB beamforming applications. Finally two compact and inexpensive multiple beamforming network MBFN prototypes are developed. The developed microwave components using multi layer microstrip PCB technology are used to design 4 x 4 Butler matrices. These matrices avoid using any crossing lines or crossovers and exhibit large bandwidth for UWB applications. To validate the proposed design, experimental prototypes of the proposed 4 x 4 matrices are designed, fabricated and tested. A four patch antenna array is connected to these matrices to form multiple beamforming array systems. Simulations are carried out on these beamforming systems and the obtained radiation characteristics are also presented and discussed.

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