

GIOVANNI CRUPI | DOMINIQUE M. M.-P. SCHREURS

MICROWAVE DE-EMBEDDING

FROM THEORY TO APPLICATIONS



Microwave De Embedding From Theory To Applications

Weiping Ni



Microwave De Embedding From Theory To Applications:

Microwave De-embedding Giovanni Crupi,Dominique Schreurs,2013-11-09 This groundbreaking book is the first to give an introduction to microwave de embedding showing how it is the cornerstone for waveform engineering The authors of each chapter clearly explain the theoretical concepts providing a foundation that supports linear and non linear measurements modelling and circuit design Recent developments and future trends in the field are covered throughout including successful strategies for low noise and power amplifier design This book is a must have for those wishing to understand the full potential of the microwave de embedding concept to achieve successful results in the areas of measurements modelling and design at high frequencies With this book you will learn The theoretical background of high frequency de embedding for measurements modelling and design Details on applying the de embedding concept to the transistor s linear non linear and noise behaviour The impact of de embedding on low noise and power amplifier design The recent advances and future trends in the field of high frequency de embedding Presents the theory and practice of microwave de embedding from the basic principles to recent advances and future trends Written by experts in the field all of whom are leading researchers in the area Each chapter describes theoretical background and gives experimental results and practical applications Includes forewords by Giovanni Ghione and Stephen Maas

Microwave De-Embedding Giovanni Crupi,Dominique M. M. -P Schreurs,Professor Dominique Schreurs,2017-11-13 This groundbreaking book is the first to give an introduction to microwave de embedding showing how it is the cornerstone for waveform engineering The authors of each chapter clearly explain the theoretical concepts providing a foundation that supports linear and non linear measurements modelling and circuit design Recent developments and future trends in the field are covered throughout including successful strategies for low noise and power amplifier design This book is a must have for those wishing to understand the full potential of the microwave de embedding concept to achieve successful results in the areas of measurements modelling and design at high frequencies With this book you will learn The theoretical background of high frequency de embedding for measurements modelling and design Details on applying the de embedding concept to the transistor s linear non linear and noise behaviour The impact of de embedding on low noise and power amplifier design The recent advances and future trends in the field of high frequency de embedding Presents the theory and practice of microwave de embedding from the basic principles to recent advances and future trendsWritten by experts in the field all of whom are leading researchers in the areaEach chapter describes theoretical background and gives experimental results and practical applications Includes forewords by Giovanni Ghione and Stephen Maas

Microwave De-embedding Antonio Raffo,Valeria Vadalà,Giorgio Vannini,2013-11-09 The chapter deals with two recently proposed characterization techniques of microwave transistors oriented to high frequency power amplifier PA design In particular the nonlinear embedding and de embedding design techniques are detailed along with evidence of their advantages with respect to conventional design approaches in terms of power and frequency handling

capability The discussion also details the differences between the two techniques despite the fact that they share the same theoretical basis the techniques suffer from different critical facets Finally with the aim of guiding the reader towards full comprehension of the topic different experimental examples are provided for transistor characterization and PA design

Microwave De-embedding Giovanni Crupi,Dominique M.M.-P. Schreurs,Alina Caddemi,2013-11-09 The first chapter is intended primarily for those readers who are new to the de embedding concept To serve as a gateway into this fascinating but also challenging field of knowledge the present chapter will show how to extract the full potential of the microwave de embedding concept from the theoretical background to practical applications As a broad definition de embedding can be regarded as the mathematical process by which electrical reference planes can be set to desired locations Its importance originates from the fact that electrical characteristics are not always directly measurable at the reference planes of interest Hence moving the electrical reference planes mathematically enables one to discover precious information With the aim to provide an introductory and comprehensive overview of the de embedding concept this chapter discusses its effectiveness for different purposes measurements modeling and design Experimental results will be analyzed to act as a valuable support for gaining a clear cut understanding On-Wafer Microwave Measurements and De-embedding Errikos

Lourandakis,2016-07-31 This new authoritative resource presents the basics of network analyzer measurement equipment and troubleshooting errors involved in the on wafer microwave measurement process This book bridges the gap between theoretical and practical information using real world practices that address all aspects of on wafer passive device characterization in the microwave frequency range up to 60GHz Readers find data and measurements from silicon integrated passive devices fabricated and tested in advance CMOS technologies Basic circuit equations terms and fundamentals of time and frequency domain analysis are covered This book also explores the basics of vector network analyzers VNA two port S parameter measurement routines signal flow graphs network theory error models and VNA calibrations with the use of calibration standards

Microwave De-embedding Gilles Dambrine,2013-11-09 This chapter aims to describe experimental tools and techniques used for on wafer millimeter mm wave characterizations of silicon based devices under the small signal regime We discuss the basics of scattering parameters S parameters high frequency HF noise concept and measurement facilities and expert details concerning experimental procedures In this chapter we describe first the basic notions of the S parameters concept and its limitations as well of as those HF noise Secondly the main experimental tools such as mm wave vectorial network analyzer noise setup and on wafer station are depicted The third part concerns the description and the methodology of on wafer calibration and de embedding techniques applied for mm wave advanced silicon devices Finally the last section focuses on the presentation and description of several examples of device characterizations The main objective of this chapter is to propose a tradeoff between basic information and details of experience **Linear CMOS RF Power Amplifiers for Wireless Applications** Paulo Augusto Dal Fabbro,Maher Kayal,2010-06-22 Advances in

electronics have pushed mankind to create devices ranging from credible gadgets to medical equipment to spacecraft instruments. More than that, modern society is getting used to, if not dependent on, the comfort solutions and astonishing amount of information brought by these devices. One field that has continuously benefited from those advances is the radio frequency integrated circuit (RFIC) design, which in its turn has promoted countless benefits to mankind as a payback. Wireless communications is one prominent example of what the advances in electronics have enabled and their consequences to our daily life. How could anyone back in the eighties think of the possibilities opened by the wireless local area networks (WLANs) that can be found today in a host of places such as public libraries, coffee shops, trains, to name just a few? How can a youngster who lives this true WLAN experience nowadays imagine a world without it? This book deals with the design of linear CMOS RF Power Amplifiers (PAs). The RF PA is a very important part of the RF transceiver, the device that enables wireless communications. Two important aspects that are key to keep the advances in RF PA design at an accelerated pace are treated: efficiency enhancement and frequency-tunable capability. For this purpose, the design of two different integrated circuits realized in a 0.11 μm technology is presented, each one addressing a different aspect. With respect to efficiency enhancement, the design of a dynamic supply RF power amplifier is treated, making up the material of Chaps 2 to 4.

Principles and Applications of Vector Network Analyzer Calibration Techniques J. Apolinar Reynoso Hernández, Manuel Alejandro Pulido Gaytan, 2024-12-19. This book summarizes the work developed over more than two decades in the field of advanced calibration techniques for vector network analyzers by the RF and Microwave Group at The Center for Scientific Research and Higher Education of Ensenada, Baja California, Mexico, which is led by Dr. J. Apolinar Reynoso Hernández, author of this book. This book is written so that every electrical engineer with knowledge of electrical circuits and linear algebra basics can understand the principles of VNA calibration techniques. Vector network analyzers are normally used by engineers and researchers working in the RF and microwave field, which usually requires advanced and specialized courses at graduate level. The reader should be able to implement any VNA calibration technique, decide the most adequate calibration for a given measurement condition, and interpret the measurement results as a seasoned RF metrology expert. **Principles and Applications of Vector Network Analyzer Calibration Techniques** is a useful book for beginners and professionals working on Microwave de-embedding and test fixture characterization. Characterization of uniform transmission lines, Load pull measurements. It is also an ideal tutorial for professionals and postgraduate research students taking courses in microwave calibration techniques. A useful textbook for practicing electronics engineering and researchers working in the RF/microwave field calibration techniques and load pull measurements.

On-Wafer Calibration Techniques Enabling Accurate Characterization of High-Performance Silicon Devices at the mm-Wave Range and Beyond Andrej Rumiantsev, 2022-09-01. The increasing demand for more content services and security drives the development of high-speed wireless technologies, optical communication, automotive radar imaging and sensing systems, and many other mm-wave and

THz applications S parameter measurement at mm wave and sub mm wave frequencies plays a crucial role in the modern IC design debug. Most importantly however is the step of device characterization for development and optimization of device model parameters for new technologies. Accurate characterization of the intrinsic device in its entire operation frequency range becomes extremely important and this task is very challenging. This book presents solutions for accurate mm wave characterization of advanced semiconductor devices. It guides through the process of development implementation and verification of the in situ calibration methods optimized for high performance silicon technologies. Technical topics discussed in the book include Specifics of S parameter measurements of planar structures. Complete mathematical solution for lumped standard based calibration methods including the transfer Thru Match Reflect TMR algorithms. Design guideline and examples for the on wafer calibration standards realized in both advanced SiGe BiCMOS and RF CMOS processes. Methods for verification of electrical characteristics of calibration standards and accuracy of the in situ calibration results. Comparison of the new technique vs conventional approaches the probe tip calibration and the pad parasitic de embedding for various device types geometries and model parameters. New aspects of the on wafer RF measurements at mmWave frequency range and calibration assurance. Load-Pull Techniques with Applications to Power Amplifier Design Fadhel M.

Ghannouchi, Mohammad S. Hashmi, 2012-06-06 This first book on load pull systems is intended for readers with a broad knowledge of high frequency transistor device characterization nonlinear and linear microwave measurements RF power amplifiers and transmitters. Load Pull Techniques with Applications to Power Amplifier Design fulfills the demands of users designers and researchers both from industry and academia who have felt the need of a book on this topic. It presents a comprehensive reference spanning different load pull measurement systems waveform measurement and engineering systems and associated calibration procedures for accurate large signal characterization. Besides this book also provides in depth practical considerations required in the realization and usage of load pull and waveform engineering systems. In addition it also provides procedure to design application specific load pull setup and includes several case studies where the user can customize architecture of load pull setups to meet any specific measurement requirements. Furthermore the materials covered in this book can be part of a full semester graduate course on microwave device characterization and power amplifier design. Microwave Journal, 2003 **Measurement and Modeling of Silicon Heterostructure**

Devices John D. Cressler, 2018-10-03 When you see a nicely presented set of data the natural response is How did they do that what tricks did they use and how can I do that for myself. Alas usually you must simply keep wondering since such tricks of the trade are usually held close to the vest and rarely divulged. Shamefully ignored in the technical literature measurement and modeling of high speed semiconductor devices is a fine art. Robust measuring and modeling at the levels of performance found in modern SiGe devices requires extreme dexterity in the laboratory to obtain reliable data and then a valid model to fit that data. Drawn from the comprehensive and well reviewed Silicon Heterostructure Handbook this volume focuses on

measurement and modeling of high speed silicon heterostructure devices The chapter authors provide experience based tricks of the trade and the subtle nuances of measuring and modeling advanced devices making this an important reference for the semiconductor industry It includes easy to reference appendices covering topics such as the properties of silicon and germanium the generalized Moll Ross relations the integral charge control model and sample SiGe HBT compact model parameters

Microwave Wireless Communications Antonio Raffo, Giovanni Crupi, 2016-03-01 To design and develop fast and effective microwave wireless systems today involves addressing the three different levels Device circuit and system This book presents the links and interactions between the three different levels rather than providing just a comprehensive coverage of one specific level With the aim of overcoming the sectional knowledge of microwave engineers this will be the first book focused on explaining how the three different levels interact by taking the reader on a journey through the different levels going from the theoretical background to the practical applications Explains the links and interactions between the three different design levels of wireless communication transmitters device circuit and system Presents state of the art challenges and future trends in the field of wireless communication systems Covers all aspects of both mature and cutting edge technologies for semiconductor devices for wireless communication applications Many circuit designs outlining the limitations derived from the available transistor technologies and system requirements Explains how new microwave measurement techniques can represent an essential tool for microwave modellers and designers

Microwaves David E. Clark, J. Binner, David A. Lewis, 2000

RF Circuit Design Reinhold Ludwig, Gene Bogdanov, 2009 This straightforward volume takes a distributed transmission line approach to RF circuit design with a focus on methodology fundamentals and minimal discussion of theoretical concepts The Second Edition introduces RF design tools such as the Smith Chart dual port networks S parameters and provides extensive coverage of RF filter design matching networks active and passive device modeling narrow and broadband amplifiers mixers and oscillators Approaches RF design from a circuit perspective so readers need little or no background in electromagnetic fields Prominently features key RF concepts in sidebars throughout the text For anyone interested in learning more about RF circuit design

Microwaves & RF., 1989

The Development and Characterization of Self-packages Using Micromachining Techniques for High Frequency Circuit Applications Rhonda Franklin Drayton, 1995

The Engineering Index Annual, 1994 Since its creation in 1884 Engineering Index has covered virtually every major engineering innovation from around the world It serves as the historical record of virtually every major engineering innovation of the 20th century Recent content is a vital resource for current awareness new production information technological forecasting and competitive intelligence The world's most comprehensive interdisciplinary engineering database Engineering Index contains over 10.7 million records Each year over 500,000 new abstracts are added from over 5,000 scholarly journals trade magazines and conference proceedings Coverage spans over 175 engineering disciplines from over 80 countries Updated weekly

Characterization and Application of Advanced VLSI Interconnects

Weiping Ni,2007 *IEEE Transactions on Microwave Theory and Techniques* ,1953

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