



Digital Circuit

Analog

Substrate Coupling

Substrate Noise

Ahmed Helmy, Mohammed Ismail



Substrate Noise:

Substrate Noise Coupling in Mixed-Signal ASICs Stéphane Donnay, Georges Gielen, 2006-05-31 This book is the first in a series of three dedicated to advanced topics in Mixed Signal IC design methodologies It is one of the results achieved by the Mixed Signal Design Cluster an initiative launched in 1998 as part of the TARDIS project funded by the European Commission within the ESPRIT IV Framework This initiative aims to promote the development of new design and test methodologies for Mixed Signal ICs and to accelerate their adoption by industrial users As Microelectronics evolves Mixed Signal techniques are gaining a significant importance due to the wide spread of applications where an analog front end is needed to drive a complex digital processing subsystem In this sense Analog and Mixed Signal circuits are recognized as a bottleneck for the market acceptance of Systems On Chip because of the inherent difficulties involved in the design and test of these circuits Specially problems arising from the use of a common substrate for analog and digital components are a main limiting factor The Mixed Signal Cluster has been formed by a group of 11 Research and Development projects plus a specific action to promote the dissemination of design methodologies techniques and supporting tools developed within the Cluster projects The whole action ending in July 2002 has been assigned an overall budget of more than 8 million EURO

Substrate Noise Coupling in Analog/RF Circuits Stephane Bronckers, Geert Van der Plas, Gerd Vandersteen, Yves Rolain, 2010 This book presents case studies to illustrate that careful modeling of the assembly characteristics and layout details is required to bring simulations and measurements into agreement Engineers learn how to use a proper combination of isolation structures and circuit techniques to make analog RF circuits more immune to substrate noise Topics include substrate noise propagation passive isolation structures noise couple in active devices measuring the coupling mechanisms in analog RF circuits prediction of the impact of substrate noise on analog RF circuits and noise coupling in analog RF systems

Substrate Noise Edoardo Charbon, Ranjit Gharpurey, Paolo Miliozzi, Robert G. Meyer, Alberto L. Sangiovanni-Vincentelli, 2007-05-08 In the past decade substrate noise has had a constant and significant impact on the design of analog and mixed signal integrated circuits Only recently with advances in chip miniaturization and innovative circuit design has substrate noise begun to plague fully digital circuits as well To combat the effects of substrate noise heavily over designed structures are generally adopted thus seriously limiting the advantages of innovative technologies Substrate Noise Analysis and Optimization for IC Design addresses the main problems posed by substrate noise from both an IC and a CAD designer perspective The effects of substrate noise on performance in digital analog and mixed signal circuits are presented along with the mechanisms underlying noise generation injection and transport Popular solutions to the substrate noise problem and the trade offs often debated by designers are extensively discussed Non traditional approaches as well as semi automated techniques to combat substrate noise are also addressed Substrate Noise Analysis and Optimization for IC Design will be of interest to researchers and professionals interested in signal integrity as well as to

mixed signal and RF designers *Substrate Noise Coupling in RFICs* Ahmed Helmy, Mohammed Ismail, 2008-03-23 The book reports modeling and simulation techniques for substrate noise coupling effects in RFICs and introduces isolation structures and design guides to mitigate such effects with the ultimate goal of enhancing the yield of RF and mixed signal SoCs The book further reports silicon measurements and new test and noise isolation structures To the authors knowledge this is the first title devoted to the topic of substrate noise coupling in RFICs as part of a large SoC **Substrate Noise** Edoardo Charbon, Ranjit Gharpurey, Paolo Miliozzi, 2014-01-15 **Designing TSVs for 3D Integrated Circuits** Nauman Khan, Soha Hassoun, 2012-09-23 This book explores the challenges and presents best strategies for designing Through Silicon Vias TSVs for 3D integrated circuits It describes a novel technique to mitigate TSV induced noise the GND Plug which is superior to others adapted from 2 D planar technologies such as a backside ground plane and traditional substrate contacts The book also investigates in the form of a comparative study the impact of TSV size and granularity spacing of C4 connectors off chip power delivery network shared and dedicated TSVs and coaxial TSVs on the quality of power delivery in 3 D ICs The authors provide detailed best design practices for designing 3 D power delivery networks Since TSVs occupy silicon real estate and impact device density this book provides four iterative algorithms to minimize the number of TSVs in a power delivery network Unlike other existing methods these algorithms can be applied in early design stages when only functional block level behaviors and a floorplan are available Finally the authors explore the use of Carbon Nanotubes for power grid design as a futuristic alternative to Copper **Noise Coupling in System-on-Chip** Thomas Noulis, 2018-01-09 Noise Coupling is the root cause of the majority of Systems on Chip SoC product fails The book discusses a breakthrough substrate coupling analysis flow and modelling toolset addressing the needs of the design community The flow provides capability to analyze noise components propagating through the substrate the parasitic interconnects and the package Using this book the reader can analyze and avoid complex noise coupling that degrades RF and mixed signal design performance while reducing the need for conservative design practices With chapters written by leading international experts in the field novel methodologies are provided to identify noise coupling in silicon It additionally features case studies that can be found in any modern CMOS SoC product for mobile communications automotive applications and readout front ends *Signal Integrity Effects in Custom IC and ASIC Designs* Raminderpal Singh, 2001-12-12 offers a tutorial guide to IC designers who want to move to the next level of chip design by unlocking the secrets of signal integrity Jake Buurma Senior Vice President Worldwide Research Development Cadence Design Systems Inc Covers signal integrity effects in high performance Radio Frequency RF IC Brings together research papers from the past few years that address the broad range of issues faced by IC designers and CAD managers now and in the future A Wiley IEEE Press publication *Information Sciences 2007 - Proceedings Of The 10th Joint Conference* Paul P Wang, 2007-07-18 This proceeding contains the cutting edge research results in information science and technology and their related technology Recent scientific breakthroughs such as

invisibility cloak and meta materials data mining techniques advanced game playing in artificial intelligence nano technology unlikely event probability and fuzzy logic reasoning are just a few outstanding examples Walter Freeman s 80th birthday celebration is another highlight of this proceedings because this major event is attended by many leading scientists from around the world Key speakers include Charles Falco Water Freeman Thomas Huang Meyya Meyyappan Lotfi Zadeh Bernette Bouchon Meunier Heather Carlson Ling Guan Etienne Kerre and John Mordes

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Francis Balestra,2014-06-02 This book offers a comprehensive review of the state of the art in innovative Beyond CMOS nanodevices for developing novel functionalities logic and memories dedicated to researchers engineers and students It particularly focuses on the interest of nanostructures and nanodevices nanowires small slope switches 2D layers nanostructured materials etc for advanced More than Moore RF nanosensors energy harvesters on chip electronic cooling etc and Beyond CMOS logic and memories applications

Introduction to Avionics Systems R.P.G. Collinson,2002-12-31 Evaluation copies are available Please contact textbooks wkup com Provide the course number number of students and present textbook used Introduction to Avionics Systems Second Edition explains the basic principles and underlying theory of modern avionic systems and how they are implemented with current technology for both civil and military aircraft in a clear and easy to read manner All systems are explained so that their design and performance can be understood and analysed Worked examples are included to illustrate the application of the theory and principles covered The latest developments and directions of research for future systems are included This new second edition has approximately 25% new material and takes into account the technology developments which have taken place since the first edition was published in January 1996 The book is well illustrated with line drawings and photos with some in colour where appropriate Readership Graduates or equivalent from a range of disciplines entering the avionics and aerospace industries Engineers at all levels engaged in the design and development of avionic systems and equipment in the avionic and aerospace industries Students and post graduate students taking avionics and aeronautical engineering courses Staff in the armed services and civil airlines engaged in the support or operation of aircraft who wish to acquire a deeper understanding of the design and implementation of avionic systems and equipment

Physical Design for 3D Integrated Circuits Aida Todri-Sanial,Chuan Seng Tan,2017-12-19 Physical Design for 3D Integrated Circuits reveals how to effectively and optimally design 3D integrated circuits ICs It also analyzes the design tools for 3D circuits while exploiting the benefits of 3D technology The book begins by offering an overview of physical design challenges with respect to conventional 2D circuits and then each chapter delivers an in depth look at a specific physical design topic This comprehensive reference Contains extensive coverage of the physical design of 2 5D 3D ICs and monolithic 3D ICs Supplies state of the art solutions for challenges unique to 3D circuit design Features contributions from renowned experts in their respective fields Physical Design for 3D Integrated Circuits provides a single convenient source of cutting edge information for those pursuing 2 5D 3D technology

Analog Circuit Design

Rudy J. van de Plassche, Johan Huijsing, Willy M.C. Sansen, 2013-03-09 This book contains the extended and revised editions of all the talks of the ninth AACD Workshop held in Hotel Bachmair April 11-13 2000 in Rottach Egem Germany. The local organization was managed by Rudolf Koch of Infineon Technologies AG Munich Germany. The program consisted of six tutorials per day during three days. Experts in the field presented these tutorials and state of the art information is communicated. The audience at the end of the workshop selects program topics for the following workshop. The program committee consisting of Johan Huijsing of Delft University of Technology, Willy Sansen of Katholieke Universiteit Leuven and Rudy van de Plassche of Broadcom Netherlands BV Bunnik elaborates the selected topics into a three day program and selects experts in the field for presentation. Each AACD Workshop has given rise to publication of a book by Kluwer entitled Analog Circuit Design. A series of nine books in a row provides valuable information and good overviews of all analog circuit techniques concerning design, CAD simulation and device modeling. These books can be seen as a reference to those people involved in analog and mixed signal design. The aim of the workshop is to brainstorm on new and valuable design ideas in the area of analog circuit design. It is the hope of the program committee that this ninth book continues the tradition of emerging contributions to the design of analog and mixed signal systems in Europe and the rest of the world. Emerging Electronics and Automation

Daniel-Ioan Stroe, Nasimuddin, Shahedul Haque Laskar, Shivendra Kumar Pandey, 2025-02-12 This book includes peer reviewed papers presented at the 3rd International Conference on Emerging Electronics Automation E2A 2023. This volume will serve as a comprehensive compilation of the scientific exchanges that took place during the conference at NIT Silchar India. These proceedings aim to provide readers with insights into the latest scientific endeavors and accomplishments of the conference participants in various emerging fields including instrumentation, control, signal processing, communication and related computational techniques. The book seeks to present the global audience with exciting updates, novel findings and solutions to challenging questions in the field while also inspiring aspiring scientists to pursue meaningful scientific research. Despite its specialization, the field of instrumentation spans a wide range of disciplines such as electronics, computation, automation, microelectronic technology, nanomaterials and biomedical engineering applications. Consequently, this publication is expected to appeal to a diverse audience within the scientific and engineering domains.

Analog Design Essentials Willy M Sansen, 2007-02-03 This unique book contains all topics of importance to the analog designer which are essential to obtain sufficient insights to do a thorough job. The book starts with elementary stages in building up operational amplifiers. The synthesis of opamps is covered in great detail. Many examples are included operating at low supply voltages. Chapters on noise, distortion, filters, ADCs, DACs and oscillators follow. These are all based on the extensive amount of teaching that the author has carried out world wide. **EDA for IC Implementation, Circuit Design, and Process Technology** Luciano Lavagno, Louis Scheffer, Grant Martin, 2018-10-03 Presenting a comprehensive overview of the design automation algorithms, tools and methodologies used to design integrated circuits, the Electronic Design

Automation for Integrated Circuits Handbook is available in two volumes The second volume EDA for IC Implementation Circuit Design and Process Technology thoroughly examines real time logic to GDSII a file format used to transfer data of semiconductor physical layout analog mixed signal design physical verification and technology CAD TCAD Chapters contributed by leading experts authoritatively discuss design for manufacturability at the nanoscale power supply network design and analysis design modeling and much more Save on the complete set

Computer-Aided Design of Analog Integrated Circuits and Systems Rob A. Rutenbar, Georges G. E. Gielen, 2002-05-06 The tools and techniques you need to break the analog design bottleneck Ten years ago analog seemed to be a dead end technology Today System on Chip SoC designs are increasingly mixed signal designs With the advent of application specific integrated circuits ASIC technologies that can integrate both analog and digital functions on a single chip analog has become more crucial than ever to the design process Today designers are moving beyond hand crafted one transistor at a time methods They are using new circuit and physical synthesis tools to design practical analog circuits new modeling and analysis tools to allow rapid exploration of system level alternatives and new simulation tools to provide accurate answers for analog circuit behaviors and interactions that were considered impossible to handle only a few years ago To give circuit designers and CAD professionals a better understanding of the history and the current state of the art in the field this volume collects in one place the essential set of analog CAD papers that form the foundation of today s new analog design automation tools Areas covered are Analog synthesis Symbolic analysis Analog layout Analog modeling and analysis Specialized analog simulation Circuit centering and yield optimization Circuit testing Computer Aided Design of Analog Integrated Circuits and Systems is the cutting edge reference that will be an invaluable resource for every semiconductor circuit designer and CAD professional who hopes to break the analog design bottleneck

Electronic Design Automation for IC Implementation, Circuit Design, and Process Technology Luciano Lavagno, Igor L. Markov, Grant Martin, Louis K. Scheffer, 2017-02-03 The second of two volumes in the Electronic Design Automation for Integrated Circuits Handbook Second Edition Electronic Design Automation for IC Implementation Circuit Design and Process Technology thoroughly examines real time logic RTL to GDSII a file format used to transfer data of semiconductor physical layout design flow analog mixed signal design physical verification and technology computer aided design TCAD Chapters contributed by leading experts authoritatively discuss design for manufacturability DFM at the nanoscale power supply network design and analysis design modeling and much more New to This Edition Major updates appearing in the initial phases of the design flow where the level of abstraction keeps rising to support more functionality with lower non recurring engineering NRE costs Significant revisions reflected in the final phases of the design flow where the complexity due to smaller and smaller geometries is compounded by the slow progress of shorter wavelength lithography New coverage of cutting edge applications and approaches realized in the decade since publication of the previous edition these are illustrated by new chapters on 3D circuit integration and clock design Offering

improved depth and modernity Electronic Design Automation for IC Implementation Circuit Design and Process Technology provides a valuable state of the art reference for electronic design automation EDA students researchers and professionals

Simulation Techniques and Solutions for Mixed-Signal Coupling in Integrated Circuits Nishath K. Verghese, Timothy J. Schmerbeck, David J. Allstot, 2012-12-06 The goal of putting systems on a chip has been a difficult challenge that is only recently being met Since the world is analog putting systems on a chip requires putting analog interfaces on the same chip as digital processing functions Since some processing functions are accomplished more efficiently in analog circuitry chips with a large amount of analog and digital circuitry are being designed Whether a small amount of analog circuitry is combined with varying amounts of digital circuitry or the other way around the problem encountered in marrying analog and digital circuitry are the same but with different scope Some of the most prevalent problems are chip package capacitive and inductive coupling ringing on the RLC tuned circuits that form the chip package power supply rails and off chip drivers and receivers coupling between circuits through the chip substrate bulk and radiated emissions from the chip package interconnects To aggravate the problems of designers who have to deal with the complexity of mixed signal coupling there is a lack of verification techniques to simulate the problem In addition to considering RLC models for the various chip package board level parasitics mixed signal circuit designers must also model coupling through the common substrate when simulating ICs to obtain an accurate estimate of coupled noise in their designs Unfortunately accurate simulation of substrate coupling has only recently begun to receive attention and techniques for the same are not widely known Simulation Techniques and Solutions for Mixed Signal Coupling in Integrated Circuits addresses two major issues of the mixed signal coupling problem how to simulate it and how to overcome it It identifies some of the problems that will be encountered gives examples of actual hardware experiences offers simulation techniques and suggests possible solutions Readers of this book should come away with a clear directive to simulate their design for interactions prior to building the design versus a build it and see mentality

International Conference on Wireless, Intelligent, and Distributed Environment for Communication Isaac Woungang, Sanjay Kumar Dhurandher, 2018-04-17 This book presents the proceedings of the International Conference on Wireless Intelligent and Distributed Environment for Communication WIDECOM 2018 organized by SRM University NCR Campus New Delhi India February 16 18 2018 The conference focuses on challenges with respect to the dependability of integrated applications and intelligence driven security threats against the platforms supporting these applications The WIDECOM 2018 proceedings features papers addressing issues related to the new dependability paradigms design control and management of next generation networks performance of dependable network computing and mobile systems protocols that deal with network computing mobile ubiquitous systems cloud systems and Internet of Things IoT systems The proceeding is a valuable reference for researchers instructors students scientists engineers managers and industry practitioners in industry in the aforementioned areas The book s structure and content is organized in such a manner that

makes it useful at a variety of learning levels Presents the proceedings of the International Conference on Wireless Intelligent and Distributed Environment for Communication WIDECOM 2018 organized by SRM University NCR Campus New Delhi India February 16 18 2018 Includes an array of topics related to new dependability paradigms design control and management of next generation networks performance of dependable network computing and mobile systems protocols that deal with network computing mobile ubiquitous systems cloud systems and Internet of Things IoT systems Addresses issues related to the design and performance of dependable network computing and systems and to the security of these systems

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