# HIGH DATA RATE TRANSMITTER CIRCUITS

RF CMOS Design and Techniques for Design Automation

Carl De Ranter and Michiel Steyaert



Kluwer Academic Publishers

# **High Data Rate Transmitter Circuits**

Cecilia Gimeno Gasca, Santiago Celma Pueyo, Concepción Aldea Chagoyen

#### **High Data Rate Transmitter Circuits:**

High Data Rate Transmitter Circuits C.J. de Ranter, Michiel Steyaert, 2006-04-18 High Data Rate Transmitter Circuits is a practical guide and introduction to the design of key RF building blocks used in high data rate transmitters The emphasis lies on CMOS circuit techniques applicable to oscillators and upconvertors Furthermore a method for RF specific design automation is exemplified by the CYCLONE tool for automated LC VCO synthesis Written in an easily accessible manner High Data Rate Transmitter Circuits is essential reading for both students and practicing engineers interested in analog RF design and RF specific design automation The book has been praised for its pleasant and light style of writing without losing detail Continuous-Time Digital Front-Ends for Multistandard Wireless Transmission Pieter A. J. on the technical side Nuyts, Patrick Reynaert, Wim Dehaene, 2014-01-03 This book describes the design of fully digital multistandard transmitter front ends which can directly drive one or more switching power amplifiers thus eliminating all other analog components After reviewing different architectures the authors focus on polar architectures using pulse width modulation PWM which are entirely based on unclocked delay lines and other continuous time digital hardware As a result readers are enabled to shift accuracy concerns from the voltage domain to the time domain to coincide with submicron CMOS technology scaling The authors present different architectural options and compare them based on their effect on the signal and spectrum quality Next a high level theoretical analysis of two different PWM based architectures baseband PWM and RF PWM is made On the circuit level traditional digital components and design techniques are revisited from the point of view of continuous time digital circuits Important design criteria are identified and different solutions are presented along with their advantages and disadvantages Finally two chips designed in nanometer CMOS technologies are described along with measurement results for validation Bandwidth and Efficiency Enhancement in Radio Frequency Power Amplifiers for Wireless Transmitters Karun Rawat, Patrick Roblin, Shiban Kishen Koul, 2020-03-05 This book focuses on broadband power amplifier design for wireless communication Nonlinear model embedding is described as a powerful tool for designing broadband continuous Class J and continuous class F power amplifiers The authors also discuss various techniques for extending bandwidth of load modulation based power amplifiers such as Doherty power amplifier and Chireix outphasing amplifiers The book also covers recent trends on digital as well as analog techniques to enhance bandwidth and linearity in wireless transmitters Presents latest trends in designing broadband power amplifiers Covers latest techniques for using nonlinear model embedding in designing power amplifiers based on waveform engineering Describes the latest techniques for extending bandwidth of load modulation based power amplifiers such as Doherty power amplifier and Chireix outphasing amplifiers Includes coverage of hybrid analog digital predistortion as wideband solution for wireless transmitters Discusses recent trends on on chip power amplifier design with GaN GaAs MMICs for high frequency applications High Speed Circuits For Lightwave Communications, Selected Topics In Electronics And Systems, Vol 1 Keh-chung Wang, 1999-01-25

High speed circuits are crucial for increasing the bandwidth of transmission and switching of voice video data over optical fiber networks The ever increasing demand for bit rates higher than those available due to the explosion of Internet traffic has driven engineers to develop integrated circuits of performance approaching 100 Gb s Commercial lightwave products using high speed circuits of 10 Gb s and beyond are readily available High Speed Circuits for Lightwave Communications presents the latest information on circuit design measured results applications and product development It covers electronic and opto electronic circuits for transmission receiving and cross point switching These circuits were implemented with various state of the art IC technologies including Si BJT GaAs MESFET HEMT HBT as well as InP HEMT and HBT The book written by more than 50 experts will benefit graduate students researchers and engineers who are interested in or work in this exciting and challenging field of optical communications Charge-based CMOS Digital RF Transmitters Pedro Emiliano Paro Filho, Jan Craninckx, Piet Wambacq, Mark Ingels, 2016-09-27 This book introduces a completely novel architecture that can relax the trade off existing today between noise power and area consumption in a very suitable solution for advanced wireless communication systems Through the combination of charge domain operation with incremental signaling this architecture gives the best of both worlds providing the reduced area and high portability of digital intensive architectures with an improved out of band noise performance given by intrinsic noise filtering capabilities Readers will be enabled to design higher performance radio front ends that consume less power and area especially with respect to the transmitter and power amplifier designs considered by many the battery killers on most mobile devices Integrated Circuit Technology Mark J. W. Rodwell, 2001 This book reviews the state of the art of very high speed digital integrated circuits Commercial applications are in fiber optic transmission systems operating at 10 40 and 100 Gb s while the military application is ADCs and DACs for microwave radar The book contains detailed descriptions of the design fabrication and performance of wideband Si SiGe GaAs and InP based bipolar transistors The analysis design and performance of high speed CMOS silicon bipolar and III V digital ICs are presented in detail with emphasis on application in optical fiber transmission and mixed signal ICs The underlying physics and circuit design of rapid single flux quantum RSFQ superconducting logic circuits are reviewed and there is extensive coverage of recent integrated circuit results in this White Space Communication Technologies Nuno Borges Carvalho, Alessandro Cidronali, Roberto technology Gómez-García, 2014-10-09 Increase the efficient use of time varying available spectrum with this unique book the first to describe RF hardware design for white space applications including both analog and digital approaches Emerging technologies are discussed and signal processing issues are addressed providing the background knowledge and practical tools needed to develop future radio technologies Real world examples are included together with global spectrum regulations and policies for a practical approach to developing technologies for worldwide applications Cross analog and digital design quidelines are provided to help cut design time and cost This holistic system level view of transceiver design

for white space technologies is ideal for practising engineers and students and researchers in academia **Components of** Fiber Optic Lans IGI Staff, 1994 Fiber Optic Design Considerations IGIC, Inc. Staff, 1994 **CMOS Continuous-Time** Adaptive Equalizers for High-Speed Serial Links Cecilia Gimeno Gasca, Santiago Celma Pueyo, Concepción Aldea Chagoyen, 2014-09-22 This book introduces readers to the design of adaptive equalization solutions integrated in standard CMOS technology for high speed serial links Since continuous time equalizers offer various advantages as an alternative to discrete time equalizers at multi gigabit rates this book provides a detailed description of continuous time adaptive equalizers design both at transistor and system levels their main characteristics and performances The authors begin with a complete review and analysis of the state of the art of equalizers for wireline applications describing why they are necessary their types and their main applications Next theoretical fundamentals of continuous time adaptive equalizers are explored Then new structures are proposed to implement the different building blocks of the adaptive equalizer line equalizer loop filters power comparator etc The authors demonstrate the design of a complete low power low voltage high speed continuous time adaptive equalizer Finally a cost effective CMOS receiver which includes the proposed continuous time adaptive equalizer is designed for 1 25 Gb s optical communications through 50 m length 1 mm diameter plastic optical fiber POF

The Navy Electricity and Electronics Training Series: Module 24 Introduction To Fiber Optics United States. Navy,2018-09-16 Module 24 Introduction to Fiber Optics is an introduction to fiber optics The Navy Electricity and Electronics Training Series NEETS was developed for use by personnel in many electrical and electronic related Navy ratings Written by and with the advice of senior technicians in these ratings this series provides beginners with fundamental electrical and electronic concepts through self study The presentation of this series is not oriented to any specific rating structure but is divided into modules containing related information organized into traditional paths of instruction

Circuits and Applications Using Silicon Heterostructure Devices John D. Cressler, 2018-10-03 No matter how you slice it semiconductor devices power the communications revolution Skeptical Imagine for a moment that you could flip a switch and instantly remove all the integrated circuits from planet Earth A moment's reflection would convince you that there is not a single field of human endeavor that would not come to a grinding halt be it commerce agriculture education medicine or entertainment Life as we have come to expect it would simply cease to exist Drawn from the comprehensive and well reviewed Silicon Heterostructure Handbook this volume covers SiGe circuit applications in the real world Edited by John D Cressler with contributions from leading experts in the field this book presents a broad overview of the merits of SiGe for emerging communications systems Coverage spans new techniques for improved LNA design RF to millimeter wave IC design SiGe MMICs SiGe Millimeter Wave ICs and wireless building blocks using SiGe HBTs The book provides a glimpse into the future as envisioned by industry leaders

3D Stacked Chips Ibrahim (Abe) M. Elfadel, Gerhard Fettweis, 2016-05-11 This book explains for readers how 3D chip stacks promise to increase the level of on chip integration

and to design new heterogeneous semiconductor devices that combine chips of different integration technologies incl sensors in a single package of the smallest possible size The authors focus on heterogeneous 3D integration addressing some of the most important challenges in this emerging technology including contactless optics based and carbon nanotube based 3D integration as well as signal integrity and thermal management issues in copper based 3D integration Coverage also includes the 3D heterogeneous integration of power sources photonic devices and non volatile memories based on new materials Analog Circuit Design Arthur H.M. van Roermund, Herman Casier, Michiel Steyaert, 2009-12-01 Analog Circuit Design contains the contribution of 18 tutorials of the 18th workshop on Advances in Analog Circuit Design Each part discusses a specific to date topic on new and valuable design ideas in the area of analog circuit design Each part is presented by six experts in that field and state of the art information is shared and overviewed This book is number 18 in this successful series of Analog Circuit Design providing valuable information and excellent overviews of Smart Data Converters Chaired by Prof Arthur van Roermund Eindhoven University of Technology Filters on Chip Chaired by Herman Casier AMI Semiconductor Fellow Multimode Transmitters Chaired by Prof M Steyaert Catholic University Leuven Analog Circuit Design is an essential reference source for analog circuit designers and researchers wishing to keep abreast with the latest development in the field The tutorial coverage also makes it suitable for use in an advanced design Low-Power Millimeter Wave Transmitters for High Data Rate Applications Khaled Khalaf, Vojkan Vidojkovic, John R. Long, Piet Wambacg, 2019-04-09 This book discusses low power techniques for millimeter wave transmitter IC Considerations for the front end design are followed by several implementation examples in the 60GHz band in CMOS down to 28nm technology Additionally the design and implementation details of digitally modulated millimeter wave polar transmitters are presented Long Distance-High Bit Rate Systems IGIC, Inc. Staff,1994 Wireless Medical Systems and Algorithms Pietro Salvo, Miguel Hernandez-Silveira, 2017-11-22 Wireless Medical Systems and Algorithms Design and Applications provides a state of the art overview of the key steps in the development of wireless medical systems from biochips to brain computer interfaces and beyond The book also examines some of the most advanced algorithms and data processing in the field Addressing the latest challenges and solutions related to the medical needs electronic design advanced materials chemistry wireless body sensor networks and technologies suitable for wireless medical devices the text Investigates the technological and manufacturing issues associated with the development of wireless medical devices Introduces the techniques and strategies that can optimize the performances of algorithms for medical applications and provide robust results in terms of data reliability Includes a variety of practical examples and case studies relevant to engineers medical doctors chemists and biologists Wireless Medical Systems and Algorithms Design and Applications not only highlights new technologies for the continuous surveillance of patient health conditions but also shows how disciplines such as chemistry biology engineering and medicine are merging to produce a new class of smart devices capable of managing and monitoring a wide range of cognitive and

physical disabilities Design, Modeling and Testing of Data Converters Paolo Carbone, Sayfe Kiaei, Fang Xu, 2013-10-05 This book presents the a scientific discussion of the state of the art techniques and designs for modeling testing and for the performance analysis of data converters The focus is put on sustainable data conversion Sustainability has become a public issue that industries and users can not ignore Devising environmentally friendly solutions for data conversion designing modeling and testing is nowadays a requirement that researchers and practitioners must consider in their activities This book presents the outcome of the IWADC workshop 2011 held in Orvieto Italy **Digital Front-End in Wireless** Communications and Broadcasting Fa-Long Luo, 2011-09-29 Covering everything from signal processing algorithms to integrated circuit design this complete guide to digital front end is invaluable for professional engineers and researchers in the fields of signal processing wireless communication and circuit design Showing how theory is translated into practical technology it covers all the relevant standards and gives readers the ideal design methodology to manage a rapidly increasing range of applications Step by step information for designing practical systems is provided with a systematic presentation of theory principles algorithms standards and implementation Design trade offs are also included as are practical implementation examples from real world systems A broad range of topics is covered including digital pre distortion DPD digital up conversion DUC digital down conversion DDC and DC offset calibration Other important areas discussed are peak to average power ratio PAPR reduction crest factor reduction CFR pulse shaping image rejection digital mixing delay gain imbalance compensation error correction noise shaping numerical controlled oscillator NCO and various diversity methods 5G Physical Layer Technologies Mosa Ali Abu-Rgheff, 2019-09-04 Written in a clear and concise manner this book presents readers with an in depth discussion of the 5G technologies that will help move society beyond its current capabilities It perfectly illustrates how the technology itself will benefit both individual consumers and industry as the world heads towards a more connected state of being Every technological application presented is modeled in a schematic diagram and is considered in depth through mathematical analysis and performance assessment Furthermore published simulation data and measurements are checked Each chapter of 5G Physical Layer Technologies contains texts mathematical analysis and applications supported by figures graphs data tables appendices and a list of up to date references along with an executive summary of the key issues Topics covered include the evolution of wireless communications full duplex communications and full dimension MIMO technologies network virtualization and wireless energy harvesting Internet of Things and smart cities and millimeter wave massive MIMO technology Additional chapters look at millimeter wave propagation losses caused by atmospheric gases rain snow building materials and vegetation wireless channel modeling and array mutual coupling massive array configurations and 3D channel modeling massive MIMO channel estimation schemes and channel reciprocity 3D beamforming technologies and linear precoding strategies for multiuser massive MIMO systems Other features include In depth coverage of a hot topic soon to become the backbone of IoT connecting devices machines and vehicles Addresses the need for green communications for the 21st century Provides a comprehensive support for the advanced mathematics exploited in the book by including appendices and worked examples Contributions from the EU research programmes the International telecommunications companies and the International standards institutions ITU 3GPP ETSI are covered in depth Includes numerous tables and illustrations to aid the reader Fills the gap in the current literature where technologies are not explained in depth or omitted altogether 5G Physical Layer Technologies is an essential resource for undergraduate and postgraduate courses on wireless communications and technology It is also an excellent source of information for design engineers research and development engineers the private public research community university research academics undergraduate and postgraduate students technical managers service providers and all professionals involved in the communications and technology industry

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