1. Record Nr. UNINA9910139233103321

Autore	Rosa Josae M. de la
Titolo	CMOS sigma-delta converters : practical design guide / / Josae M. de la Rosa and Rocaio del Raio
Pubbl/distr/stampa	Hoboken [New Jersey] : , : Wiley-Blackwell, , 2013 [Piscataqay, New Jersey] : , : IEEE Xplore, , [2013]
ISBN	1-118-56843-5 1-299-27753-5 1-118-56922-9
Edizione	[3rd ed.]
Descrizione fisica	1 online resource (428 p.)
Collana	Wiley - IEEE
Disciplina	621.3815/9
Soggetti	Metal oxide semiconductors, Complementary - Design and construction
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	List of Abbreviations xvii -- Preface xxi -- Acknowledgements xxvii -- 1 Introduction to Modulators: Basic Concepts and Fundamentals 1 -- 1.1 Basics of A/D Conversion 2 -- 1.2 Basics of Sigma-Delta Modulators 8 -- 1.3 Classification of Modulators 15 -- 1.4 Single-Loop Modulators 16 -- 1.5 Cascade Modulators 24 -- 1.6 Multibit Modulators 29 -- 1.7 Band-Pass Modulators 36 -- 1.8 Continuous-Time Modulators 41 -- 1.9 Summary 49 -- 2 Circuits and Errors: Systematic Analysis and Practical Design Issues 54 -- 2.1 Nonidealities in Switched-Capacitor Modulators 55 -- 2.2 Finite Amplifier Gain in SC-Ms 56 -- 2.3 Capacitor Mismatch in SC-Ms 60 -- 2.4 Integrator Settling Error in SC-Ms 62 -- 2.5 Circuit Noise in SC-Ms 71 -- 2.6 Clock Jitter in SC-Ms 75 -- 2.7 Sources of Distortion in SC-Ms 76 -- 2.8 Nonidealities in Continuous-Time Modulators 80 -- 2.9 Clock Jitter in CT-Ms 81 -- 2.10 Excess Loop Delay in CT-Ms 85 -- 2.11 Quantizer Metastability in CT-Ms 88 -- 2.12 Finite Amplifier Gain in CT-Ms 89 -- 2.13 Time-Constant Error in CT-Ms 92 -- 2.14 Finite Integrator Dynamics in CT-Ms 94 -- 2.15 Circuit Noise in CT-Ms 95 -- 2.16 Sources of Distortion in CT-Ms 97 -- 2.17 Case Study: High-Level Sizing of a M 99 -- 2.18 Summary 107 -- 3 Behavioral Modeling and High-Level Simulation

110 -- 3.1 Systematic Design Methodology of Modulators 110 -- 3.2 Simulation Approaches for the High-Level Evaluation of Ms 113 -- 3.3 Implementing M Behavioral Models 118 -- 3.4 Efficient Behavioral Modeling of M Building Blocks using C-MEX S-Functions 134 -- 3.5 SIMSIDES: A SIMULINK-Based Behavioral Simulator for Ms 159 -- 3.6 Using SIMSIDES for the High-Level Sizing and Verification of Ms 167 -- 3.7 Summary 183 -- 4 Circuit-Level Design, Implementation, and Verification 186 -- 4.1 Macromodeling Ms 186 -- 4.2 Including Noise in Transient Electrical Simulations of Ms 199 -- 4.3 Processing M Output Results of Electrical Simulations 208. 4.4 Design Considerations and Simulation Test Benches of M Basic Building Blocks 213 -- 4.5 Auxiliary M Building Blocks 250 -- 4.6 Layout Design, Floorplanning, and Practical Issues 257 -- 4.7 Chip Package, Test PCB, and Experimental Set-Up 263 -- 4.8 Summary 270 -- 5 Frontiers of Modulators: Trends and Challenges 273 -- 5.1 Overview of the State of the Art on Ms 274 -- 5.2 Empirical and Statistical Analysis of State-of-the-Art Ms 291 -- 5.3 Cutting-Edge M Architectures and Techniques 300 -- 5.4 Classification of State-of-the-Art References 319 -- 5.5 Summary 319 -- A SIMSIDES User Guide 334 -- A.1 Getting Started: Installing and Running SIMSIDES 334 -- A.2 Building and Editing M Architectures in SIMSIDES 335 -- A.3 Analyzing Ms in SIMSIDES 337 -- A.4 Example 345 -- A.5 Getting Help 354 -- B SIMSIDES Block Libraries and Models 355 -- B.1 Overview of SIMSIDES Libraries 355 -- B.2 Ideal Libraries 355 -- B.3 Real SC Building-Block Libraries 361 -- B.4 Real SI Building-Block Libraries 364 -- B.5 Real CT Building-Block Libraries 371 -- B.6 Real Quantizers and Comparators 382 -- B.7 Real D/A Converters 382 -- B.8 Auxiliary Blocks 384 -- Index 389.

Sommario/riassunto

This book offers a timely practical design guide and comprehensive description of Sigma-Delta Modulators (Ms). With emphasis on the most important design issues and the multiple trade-offs involved in the whole design flow from specifications to chip implementation and characterization, it compiles the enormous number of technical and research works reported to date on the topic of Ms, and presents the results of such a compilation in a didactical, pedagogical, and intuitive style. Various design methodologies and practical considerations are described with a top-down approach, presenting from theoretical fundamentals, system-level design equations and behavioral models in MATLAB/SIMULINK, to circuit, transistor-level realization in Cadence Design FrameWork II, and physical implementation, chip prototyping and experimental characterization.Other key features: . a comprehensive and systematic description of M architectures from the basic operating principles to state-of-the-art advances in architectures and circuits, and considering both switched-capacitor and continuous-time circuit implementations. a detailed review of state-of-the-art M ICs, extracting statistical and empirical design guidelines, identifying trends, design challenges and solutions. case studies showing the different stages of the design flow of Ms. a complete description of SIMSIDES (SIMulink Sigma-Delta Simulator), a time-domain behavioral simulator for the high-level sizing and verification of Ms, implemented in MATLAB/SIMULINK. a number of electronic resources (available through a companion website) including practical examples using SIMSIDES, the statistical data used in the state-of-the-art survey, as well as many design examples and simulation test benchesUsing a pedagogical and intuitive approach, this is an essential guide for designers of mixed-signal circuits in nanometer CMOS. It doubly serves as a self-contained reference for researchers, designers and non-experienced engineers wanting to acquire an insight into

Ms and for undergraduate and graduate students in electronics engineering.