Advanced Data Converters

Need to get up to speed quickly on the latest advances in high-performance data converters? Want help choosing the best architecture for your application? With everything you need to know about the key new converter architectures, this guide is for you.

It presents basic principles, circuit and system design techniques, and associated trade-offs, doing away with lengthy mathematical proofs and providing intuitive descriptions upfront. Everything is covered, from time-to-digital converters to comparator-based/zero-crossing ADCs, and each topic is introduced with a short summary of the essential basics.

Practical examples describing actual chips, together with extensive comparisons between architectural or circuit options, ease architecture selection and help you cut design time and engineering risk. Trade-offs, advantages, and disadvantages of each option are put into perspective with a discussion of future trends, showing where this field is heading, what is driving it, and what the most important unanswered questions are.

Gabriele Manganaro is currently an Engineering Director in High Speed Data Conversion at Analog Devices, Inc. He is a Fellow of the IET and has extensive industrial design experience, having previously held positions at National Semiconductor, Engim, Inc., and Texas Instruments.

Advanced Data Converters provides a comprehensive overview and comparison of numerous architectures and techniques that are central to understanding modern data converter design, selection, and application. The book explores not only the "what?" and the "how?," but also the "why?," providing the reader with insights into the factors that drive the trade-offs in modern converter designs. The material is presented in an approachable manner, it reads like a tutorial by a friend who is an expert in the field.
David Robertson, Analog Devices

The field of data conversion has been following a steep trajectory that is hard to track even for experienced designers. Manganaro's book fulfills a critical role in capturing the most significant advancements of the past decade in a refreshingly intuitive format; I look forward to having this monograph in my library.
Boris Murmann, Stanford University

Data converters are used more and more uby electronic systems. The requests of designers and users to better understanding architectures and to know practical aspects is appropriately satisfied by *Advanced Data Converters*, by Gabriele Manganaro. It is surely a precious working aid for professionals but also is a valid help for graduate students that can find in the book the necessary background notions and valuable information on architectures, practical limits and design tricks. The comprehensive list of references is a unique source of additional information. It complements and makes more valuable the book.
Franco Maloberti University of Pavia, Italy

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For Nancy, Alessandra, and Umberto

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Preface

Advances in semiconductor technology together with increased demand for complex IC solutions in wireless, consumer, health care or industrial applications have driven significant innovation in data converters during the last decade. While some very good introductory books on the traditional converters and related fundamental concepts are readily available, a coverage of modern advanced analog-to-digital (A/D) and digital-to-analog (D/A) converters and emerging ones is missing. Having to deal with several hundred academic papers and patents as well as tens of specialized monographs aimed at an audience of experts can be frightening and downright disorienting to many practitioners (including IC designers, system designers, and users of data converters) or graduate students attempting to gain insight into one of today's hottest IC areas. This book attempts to cover some of this knowledge gap, offering a bird's-eye view of the relevant principles, the competing requirements, architectures, and circuit techniques, and, perhaps, providing a vision for future developments in this field. It explains the motivations, ideas, and trends associated with the latest and most attention-worthy topics in data conversion of the last ten years or so.

It is assumed that the typical reader has mastered the basics of both analog/mixed-signal design and data conversion. Each subject is introduced by a short summary of the key concepts at its base and complemented by several references guiding readers who might want to look more deeply at each topic.

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