

Analog Circuit Design Techniques at 0.5V

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Preface

The field of analog circuit design has transformed itself over the past decades. Interest in integrating analog circuits side-by-side with digital circuits has led to the use of smaller and smaller devices, and lower and lower power supply voltages. The material presented in this book takes ultra-low voltage analog circuit design to a power supply voltage as low as 0.5 V.

The book discusses general design ideas and techniques for a supply voltage of 0.5 V. OTA design and biasing are covered extensively. We further present the design of analog systems using these techniques. They include the design of a filter with a PLL, a continuous-time $\Sigma\Delta$ modulator, a track-and-hold circuit, and receiver front-end circuits.

Much of the material presented in this monograph, originates in work done by Shouri Chatterjee for his Ph.D. at Columbia University. The continuous-time $\Sigma\Delta$ modulator was developed by Kong Pang Pun during his stay at Columbia as a visiting research scholar. The receiver front-end circuits were developed by Nebojša Stanić as part of work done for his Ph.D. at Columbia University.

We would like to acknowledge Tawfiq Musah, Ajay Balankutty, Edward Chiang and Junhua Shen (graduate and undergraduate students at Columbia University) for helping out with a variety of experiments and measurements. Many thanks to Professor Ken Shepard and Dr. Robert Melville of Columbia University for facilitating the use of various measurement instruments. Special thanks to Erwin Deumens of IMEC for the great support while taping out the filter and the continuous-time sigma-delta circuits. We also thank Analog Devices and Intel for supporting parts of this work. The track-and-hold circuit was fabricated with the generous support of Philips Semiconductors.

Finally, we would like to thank the staff of Springer for their helpful efforts during the writing of the book. The professionalism and enthusiasm of Katelyn Stanne (production editor) was especially appreciated.

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