



ADA

Analog-to-Digital and Digital-to-Analog Conversion

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ADA Structure

A/D & D/A Converter

Theory

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2. Value Discrete (Quantized)

3. Time Discrete (Sampled)

4. A/D/A Behavioral Modeling

5. Noise / Accuracy

Practical

GetStart w. DE1-SoC Board

Use ADA Board

Use DSM Board

DE1-SoC: ADC LTC2308

GetStart w. DCDCbuck

Check Digital PWM

Matlab: A/D/A modeling

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Preface

The objective of this communication is to present some fundamental principles of A/D and D/A conversion together with system-level considerations rather than particular applications. Consequently, the emphasis is rather on system-level decision making than detailed device application.

Section 1 is an introduction to the field of A/D and D/A conversion.

Section 2 describes value-discretization, also termed quantization, presenting D/A and A/D converter architectures to give the reader an understanding what converter type is appropriate for which need, e.g. accuracy, speed, throughput, etc.

Section 3 describes time-discretization, also termed sampling, and its consequences like Nyquist / Shannon criteria, aliasing, how to avoid it and how to match analog and digital filters.

Chapter 4 presents some first steps to mathematical and Matlab based DAC and ADC modeling.

Chapter 5 is focused on system-level noise budgeting. As “accuracy” is mainly defined as signal-to-noise ratio (SNR) we investigate noise sources, how they add and how we can budget their power to obtain a desired SNR specification.

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