Analog Signal Generation For Built-In Self Test Of Mixed Signal Integrated

Are you curious about how built-in self test (BIST) can be applied to mixed signal integrated circuits? Look no further! In this article, we will dive deep into the world of analog signal generation for BIST of mixed signal integrated circuits.

Understanding BIST

Built-in self test (BIST) is a technique used to test integrated circuits (ICs) without the need for external test equipment. It involves adding specific circuitry to the IC that allows it to generate test signals, apply them to internal components, and analyze the responses to determine if the IC is functioning correctly.

In the case of mixed signal integrated circuits, BIST becomes more challenging due to the presence of both analog and digital components. Analog signal generation is a crucial part of BIST for mixed signal ICs as it enables testing of analog subcircuits, such as filters, amplifiers, DACs, and ADCs.

Analog Signal Generation for Built-In-Self-Test of Mixed-Signal Integrated Circuits (The Springer International Series in Engineering and Computer Science Book 312)

by Gordon W. Roberts (1995th Edition, Kindle Edition)

★★★★★ 5 out of 5

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The Role of Analog Signal Generation

Analog signal generation in BIST involves creating specific test signals that are representative of real-world analog inputs. These signals are applied to the analog subcircuits of the mixed signal IC to evaluate their performance and verify their functionality.

One important aspect of analog signal generation is the ability to accurately replicate the desired signal characteristics. This includes parameters such as frequency, amplitude, phase, and distortion. By generating signals that mimic real-world conditions, the BIST process can effectively assess the performance of the analog subcircuits.

Methods of Analog Signal Generation

There are several methods available for analog signal generation in the context of BIST for mixed signal ICs. Let's explore some of the commonly used approaches:

1. Direct Digital Synthesis (DDS)

DDS is a widely used method for generating precise analog signals in BIST. It involves generating a digital representation of the desired analog waveform and then converting it to an analog signal using a digital-to-analog converter (DAC). DDS offers flexibility in terms of signal frequency, phase, and amplitude control.

2. Programmable Oscillators

Programmable oscillators can be used to generate analog signals within a specific frequency range. These oscillators typically operate within the RF range and allow for frequency tuning. They offer a quick and efficient way to generate test signals with different frequencies for testing various analog subcircuits.

3. Arbitrary Waveform Generators (AWGs)

AWGs are versatile instruments that can generate complex analog waveforms with high precision. These instruments allow users to generate customized waveforms by specifying the desired parameters, such as frequency, amplitude, and phase. AWGs are particularly useful for testing analog subcircuits that require complex input signals, such as modulators and demodulators.

Challenges and Considerations

While analog signal generation for BIST in mixed signal ICs offers various benefits, there are also challenges and considerations to keep in mind:

1. Signal Integrity

Ensuring signal integrity is crucial when generating analog test signals. Noise, distortion, and signal loss can significantly impact the accuracy of the test results. Proper design techniques, such as proper grounding and shielding, should be implemented to minimize these issues.

2. Signal Range and Resolution

The signal range and resolution of the generated analog signals should match the requirements of the analog subcircuits being tested. Insufficient signal range or resolution can lead to inaccurate results and improper evaluation of the circuit performance.

3. Test Time

Efficiency and test time are essential considerations in BIST. Analog signal generation techniques should strive to minimize the time required to generate and apply test signals while maintaining accuracy and reliability.

Analog signal generation plays a vital role in built-in self test (BIST) for mixed signal integrated circuits. By accurately replicating real-world analog signals, BIST can effectively assess the performance and functionality of analog subcircuits within the IC. Various methods, such as DDS, programmable oscillators, and arbitrary waveform generators, are available for analog signal generation. However, challenges such as signal integrity, signal range and resolution, and test time should be considered and addressed to ensure accurate and efficient BIST. With the continuous advancement of technology, analog signal generation techniques for BIST are expected to evolve further, enabling more comprehensive testing of mixed signal integrated circuits.

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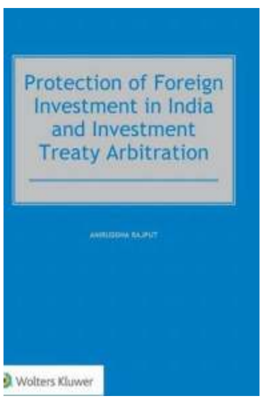
Analog Signal Generation for Built-In-Self-Test (BIST) ofMixed-Signal Integrated Circuits is a concise to a powerful new signal generation technique.
The book begins with a brief to the testing problem and a review of conventional signal generation techniques. The book then describes an oversampling-based

oscillator capable of generating high-precision analog tones using a combination of digital logic and D/A conversion. These concepts are then extended to multi-tone testing schemes without introducing a severe hardware penalty. The concepts are extended further to encompass piece-wise linear waveforms such as square, triangular and sawtooth waves. Experimental results are presented to verify the ideas in each chapter and finally, s are drawn. For those readers unfamiliar with delta-sigma modulation techniques, a brief to this subject is also provided in an appendix.
The book is ideal for test engineers, researchers and circuits designers with an interest in IC testing methods.



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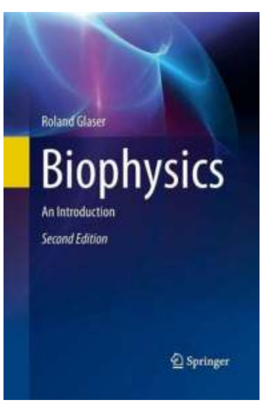

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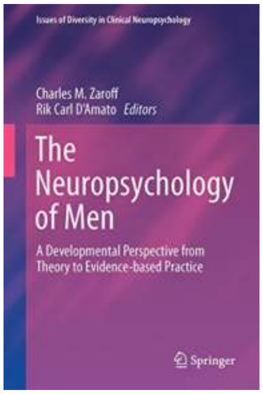

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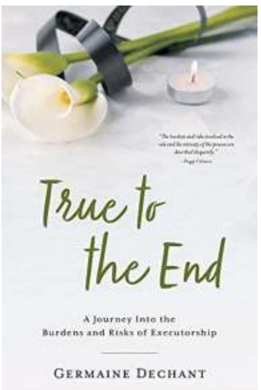

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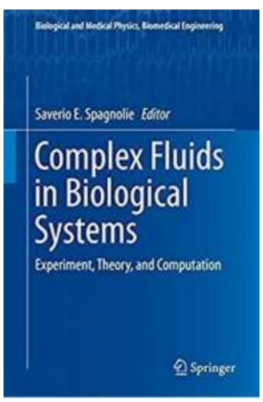

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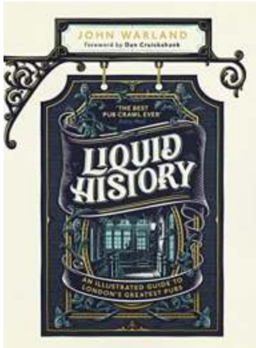

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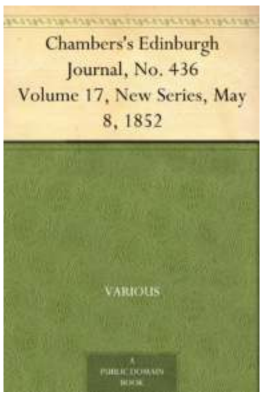

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