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Fault Detect ability in Analog IC Using OBIST Method

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Abstract: -The Oscillation Based Built in Self test strategy for analog and mixed-signal circuits is given. In the proposed methodology, OP-AMP is used. Furthermore, this solution conjointly brings the risk to implement Oscillation-Based Built In Self-Test (OBIST) method for analog and mixed- signal integrated circuits. The OBT method is a vector less output take a look at strategy simply applicable to integral self-test. During take a look at mode, the filter under take a look at is reborn into associate degree oscillator by establishing the oscillation condition in its transfer function. The oscillator frequency will be measured exploitation digital circuitry and deviations from the cut-off frequency indicate faulty behavior of the filter. The proposed methodology is appropriate for both ruinous and constant quantity fault diagnosing and is effective in detecting single and multiple faults in analog circuits. The validity of the proposed methodology has been verified by doing comparison between circuit under test and ideal circuit simulation results.

Keywords:- *Fault detection, mixed-signal test, oscillation- based BIST, parametric test, technology variations.Analog testing,Oscillation-based test (OBT).*

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I. INTRODUCTION

Ever-increasing applications of the analog and mixed-signal embedded-core-based system-on-chips (SOCs) [5], in recent years, have motivated system designers and take a look at engineers to shift their analysis direction to embrace this explicit space of terribly large-scale integrated circuits and systems to develop specifically their effective take a look at ways. The modern technology of producing high-volume merchandise demands that substantial efforts be directed toward the look, test, and evaluation of the prototypes before the beginning of the particular production cycle [4].An necessary objective to comprehend through elaborate testing is to confirm that the factory-made merchandise square measure free from defects and at the same time guarantee that they meet all the desired specifications. Besides, the information which will be noninheritable through the method may ultimately facilitate in increasing the merchandise yield, thereby reducing the product cost. The integrated-circuit (IC) fabrication process involves lithography, printing, etching, and doping steps. In the real-world situations, none of these steps is ever perfect, and the resulting imperfections could eventually result in failures within the operation of the individual ICs [4].Specifically, the performance of mixed-signal ICs willbe greatly degraded, since these circuits are very sensitive toeven small imperfections in any step of the fabrication process.In the digital-circuit domain, however, some of these could also be rather unimportant, but in mixed-signal circuits, imperfection in the sort of little capacitance between the traces will gift a major circuit-parameter variation, thereby changing the circuit behavior drastically. Because of the shrinking of the circuit pure mathematics, the circuit performance sensitivity is also increased. That is why every IC should be terribly strictly tested before being shipped to their customers. The testing improves the overall quality of the ultimate product, although it has no result on the ICs' producing excellence [5].Furthermore, the testing assures the product flawlessness once enforced throughout the key phases of a development. Besides, it can additionally be a technique for corroboratory the look and checking processes. The high sensitivity of mixed-signal circuits to very tiny imperfections throughout method implementations and their broad specifications necessitate careful and long performance tests as well [4]. All these requirements eventually lead to high check value, thus forcing analysis efforts to be directed in the domain of mixed-signal testability. Researchers are currently seeking to mix each the analog- and therefore the digital-circuits testing either by applying digital signals, such as serial bit streams to drive analog circuits, or by using analog signals to drive digital circuits. The oscillation-based take a look at (OBT) has been used as a affordable test technique at the structural level for hard-fault detection in analog and mixed-signal circuits [2]–[3]. The core idea is to convert the circuit below take a look at (CUT) into associate generator throughout the take a look at mode by adding a feedback network. The defects will modification the frequency and amplitude of the oscillation in the faulty circuit as compared to the fault-free circuit. The major advantages of this method area unit its abstract simplicity, its robustness, and the elimination of the test stimuli generation downside. In analog circuits, the circuit integrity does not guarantee the fulfillment of its specifications [1]. One of the most issues is that the issue of setting the CUT in a very essential oscillation condition. The feedback network has to ensure safe oscillation settled at intervals a brief transient time. However, this may force the oscillations to be controlled by the circuit saturation at the availability voltage [1]. Hence, there could be a loss of potency in predicting the performance parameters, which area unit largely connected to the small-signal characteristics of the circuit.

II. METHODOLOGY

General OBIST Environment

In OBIST method, the circuit-under-test tests itself whereas in test vector methodology, some test

vectors are applied to the circuit-under-test and various responses of the CUT are obtained. These responses are then compared with results of ideal circuitsThen, from the comparison results, it is decided whether the CUT is fault-free or not. In test vector methodology, take a look at vector generators and advanced test response analysers are needed however these don't seem to be needed just in case of OBIST methodology.

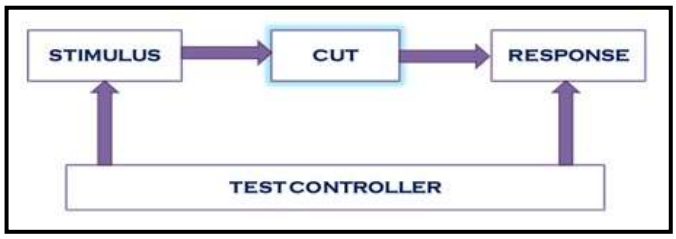

Figure 1: OBIST Structure

Need of OBIST Method

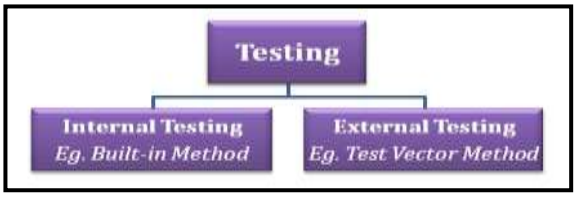

Figure 2: Types of Testing

i) *Built-in Testing Method*:

In built-in testing method, the extra circuitry for testing is built into the circuit which is to be tested. So, when the circuit is switched on, it tests itself. It is internal type of testing.

ii) *Test Vector Method*:

In test vector method, test vectors are applied to the circuit which is to be tested. It is external type of testing. Test vector method includes generation of test vector, application of test vectors and comparison of results with desired results.

There are some issues in test vector method. If the circuit is very complex, the test pattern required is very large. If test patterns are large, the storage required for test pattern is also large. Also, the time required for testing is large for large size of test vectors. Similarly, large number of test vectors gives large number of results. So, the storage required for these results is more.

III. CONCLUSION

A new method called Signature Analysis Method has been described for testing and diagnosis of analog integrated circuits. This method has the ability not only to check whether the circuit is fault-free or not but also to detect the type and location of the fault present in the circuit. The most powerful aspect of this method is the ability to implement it for single failures. In this project, this method is used for testing of second order active low pass and high pass filters. For both these circuits, 100% fault coverage is obtained using Signature Analysis Method.

IV. REFERENCES

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