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S E M I N A R

Room 223B ZEC

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AN ON-CHIP TRANSFER FUNCTION CHARACTERIZATION SYSTEM FOR ANALOG BUILT-IN TESTING

by

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Abstract: Modern integrated systems involve both analog and digital circuits. Their testing, at both the development and production stages, has become increasingly complex and a major factor in determining the final product cost and time to market. The use of built-in testing (BIT) techniques can potentially reduce the cost of testing in comparison to traditional methods with off-chip equipment. In the case of digital systems, BIT implementations are relatively well established; however, the development of BIT for analog circuits presents challenges of greater complexity and, as a result, further research is demanded in this direction.

The most important specifications of an analog circuit such as a filter or programmable gain amplifier (PGA), are related to their frequency response. The majority of the reported BIT techniques propose indirect testing methods for the detection of faults and do not verify the target specifications directly. In this work, a compact system for the on-chip transfer function characterization of an analog circuit is presented. It consists of a phase and amplitude detector and a signal generator. The use of analog instrumentation is avoided, reducing the test time and cost. Two integrated implementations of the proposed system in CMOS 0.35 μ m technology are described along with circuit-level design considerations. Experimental results of the application of this testing technique in the characterization of a commercial programmable gain amplifier for frequencies up to 160MHz are also presented.

Alberto Valdes-Garcia. Born in 1978, grew up in San Mateo Atenco, Mexico. He received the B.S. in Electronic Systems Engineering degree from the Monterrey Institute of Technology (ITESM), Campus Toluca, Mexico in 1999 (with honors as the best score from all majors). Since the fall of 2000 he has been working towards the Ph.D. degree at the Analog and Mixed Signal Center (AMSC), Texas A&M University, College Station, TX.

During the spring and summer of 2000 he was a Design Engineer with Motorola Broadband Communications Sector. In the summer of 2002 he was an intern with the Read Channel Design Group at Agere Systems where he investigated wide tuning range LC VCOs for mass storage applications. Since the fall of 2001 he has been a Semiconductor Research Corporation (SRC) research assistant at the AMSC working on the development of analog built-in testing techniques. During his doctoral studies he has been involved in the design of two integrated receivers for Bluetooth and WLAN.

Since the fall of 2000, Alberto has been the recipient of an scholarship from the Mexican National Council for Science and Technology (CONACYT). He represented Mexico in the 1994 'Odyssey of the Mind' World Creativity Contest and in the 1997 International Exposition for Young Scientists. He is also the recipient of the 2003 'State of Mexico Youth Award for Academic Achievements'. His present research interests include built-in testing implementations for analog and RF circuits, system level design for wireless receivers and RF circuit design for Ultra Wide Band (UWB) communications.

