UNIVERSITAT POLITÈCNICA DE CATALUNYA
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Low frequency Non-Intrusive built-in strategy to test and characterize RF and mmW integrated analogue circuits

Set of procedures and circuit sensors to embed within high frequency analogue circuits (e.g.: RF, mmW), whose goal is to enhance either test production or self healing strategies to reduce performance spreading and to enhance yield. The technique is based on measuring the temperature at selected locations of the circuit under test with the goal of extracting information about the performances of the individual blocks that constitute a complete system (e.g. low noise amplifier, power amplifier, etc). Partners to further develop the system and/or to establish commercial agreements along with technical cooperation are sought.

The Challenge

The scaling down of CMOS technologies has enabled a whole system to be integrated on a single silicon chip (System on Chip, SoC). The benefits of this are low cost, high reliability and low power consumption. A drawback of SoC integration is the significant loss of observability that it entails, since few nodes are accessible from the outside. As a consequence, the complexity and cost of testing, monitoring and characterizing individual parts of the system increase, specifically in RF front-ends in which the operating frequency is in the range of gigahertz.
One strategy that is used to enhance observability is to include circuit sensors in the same silicon die than the circuit under test to measure electrical signals at selected SoC nodes in order to extract figures of merit of the of the individual blocks that constitute the SoC. However, as the sensor loads the high frequency signal path, its presence degrades the performances of the circuit under test. Moreover, the sensor must deal with high frequency electrical signals, making its design a real challenge

The Technology

The present inventions allows to perform test and characterization of the individuals blocks that constitute the SoC by measuring temperature variations at selected locations of the silicon surface with a temperature sensor embedded with the circuit to test/characterize.

Innovative advantages

- The technology enhances SoC observability, allowing to extract information about the individual blocks.
- Measurements are done at low frequency regardless the circuit under test working frequency, reducing the cost of the measuring equipment.
- The same sensor can be re-used to be used in circuits under test working at different frequency bands (e.g. RF or mmW)
- The procedure does not electrically load the circuit under test. Therefore, it does not alter their behaviour. No co-design is needed.
- Applications: production test enhancement, failure analysis, on-field test and use in self-calibrating strategies.

Current stage of development

Successful tests have been done in RF (1GHz, 2.4GHz) and mmW (62GHz) linear amplifiers. Prototype sensors have been fabricated. They need further design work to be considered a valid IP.

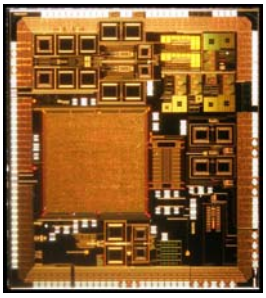
Applications and Target Market

Analog circuit designers and testers. IP vendors. IP designers. Design for Test companies.

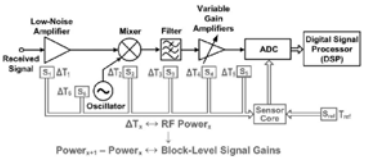
Reference number

MKT2012/0111_I

New procedure that allows to measure high frequency characteristics of RF ICs with built-in temperature measurements



High frequency characteristics extracted from DC or low frequency temperature measurements, regardless the IC working frequency



Applications:
Go-no go test.
Electrical characterization.
Built-in Test.

Business Opportunity
Technology available for licensing with technical cooperation

Patent Status
Set of patent applications

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