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## **Abstract**

A number of test problems that can be used for initial testing and verification of the simulation software developed throughout the CHAMELEON RF project have been inventoried. These test cases were already available at the start of the project, and have been collected from various sources. The main selection criteria used are the accuracy of the geometrical and physical data, and the availability of measurement data. These test problems have been described in an internal confidential Chameleon RF document.

# 1 Introduction

Simulation of complete nanoscale RF blocks, which is the main objective of the CHAMELEON RF project, is an extremely challenging task. It places a heavy burden and very strict requirements on the software to be developed. An indispensable ingredient in achieving this objective is the accurate validation of simulation results by direct comparison with measurements. Only after such very strict verification of software tools it is possible to guarantee the predictive value of the simulation software.

As the design, manufacturing and measurement of the challenging RF structures is an integral part of the CHAMELEON RF part, initial testing of the simulation software must be performed on test structures that are already available from other sources. Although these structures will be simpler than the ultimate test cases, they are essential for software testing. Indeed, professional software test collections range from very simple to challenging problems, each new software release being preceded by carefully running all test cases and observing the minutest departure from available measurement and simulation results.

The test structures presented in the confidential report range from relatively simple to quite advanced. Components such as passive devices (resistors, capacitors and inductors), micro strips, and coplanar lines have been omitted, since these were already used in the CODESTAR project, and have been shown to yield good agreement with the simulation software developed in that project. Therefore, the collection starts with a variety of high frequency and interconnect structures. Detailed measurements are available for these structures. Through consultations with industrial users the most characteristic ones were filtered out from the different realizations. The selected structures were then merged into dedicated test chips including only those elements to be measured for validation purposes. The test chips were fabricated by state of the art process technologies. The measurement data for these examples are represented in the confidential report as well.

Next, more challenging structures, namely RF pads and L-C complexes, have been described in the confidential report. These structures are all strongly relying on physical phenomena taking place in the substrate.

Finally, a number of real-life test cases are described in the confidential report. Within Philips, a number of existing test cases are available of which a few representative examples are chosen. These test cases are examples of complete RF-IC functional blocks, including active and passive components, where the layout, a description and measurements are given. Also databases are available which will be made available as practical test cases for development testing.

