

Nonlinear Microwave Circuit Design

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Preface

Nonlinear microwave circuits is a field still open to investigation; however, many basic concepts and design guidelines are already well established. Many researchers and design engineers have contributed in the past decades to the development of a solid knowledge that forms the basis of the current powerful capabilities of microwave engineers.

This book is composed of two main parts. In the first part, some fundamental tools are described: nonlinear circuit analysis, nonlinear measurement, and nonlinear modeling techniques. In the second part, basic structure and design guidelines are described for some basic blocks in microwave systems, that is, power amplifiers, oscillators, frequency multipliers and dividers, and mixers. Stability in nonlinear operating conditions is also addressed.

A short description of fundamental techniques is needed because of the inherent differences between linear and nonlinear systems and because of the greater familiarity of the microwave engineer with the linear tools and concepts. Therefore, an introduction to some general methods and rules proves useful for a better understanding of the basic behaviour of nonlinear circuits. The description of design guidelines, on the other hand, covers some well-established approaches, allowing the microwave engineer to understand the basic methodology required to perform an effective design.

The book mainly focuses on general concepts and methods, rather than on practical techniques and specific applications. To this aim, simple examples are given throughout the book and simplified models and methods are used whenever possible. The expected result is a better comprehension of basic concepts and of general approaches rather than a fast track to immediate design capability. The readers will judge for themselves the success of this approach.

Finally, we acknowledge the help of many colleagues. Dr. Franco Di Paolo has provided invaluable help in generating simulation results and graphs. Prof. Tom Brazil, Prof. Aldo Di Carlo, Prof. Angel Mediavilla, and Prof. Andrea Ferrero, Dr. Giuseppe Ocera and Dr. Carlo Del Vecchio have contributed with relevant material. Prof. Giovanni Ghione and Prof. Fabrizio Bonani have provided important comments and remarks,

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