



Design and Characterization of Integrated Varactors for RF Applications

Inigo Gutierrez, Juan Meléndez, Erik Hernández

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Varactors are passive semiconductor devices used in electronic circuits, as a voltage-controlled way of storing energy in order to boost the amount of electric charge produced. In the past, the use of low-cost fabrication processes such as complementary metal oxide semiconductor (CMOS) and silicon germanium (SiGe) were kept for integrated circuits working in frequency ranges below the GHz. Now, the increased working frequency of radio frequency integrated circuits (RF ICs) for communication devices, and the trend of system-on-chip technology, has pushed the requirements of varactors to the limit. As the frequency of RF applications continues to rise, it is essential that passive devices such as varactors are of optimum quality, making this a critical design issue.

Initially describing the physical phenomena that occur in passive devices within standard IC fabrication processes, *Design and Characterization of Integrated Varactors for RF Applications* goes on to:

- present information on the design of wide band electrical varactor models (up to 5 GHz) which enable the accurate prediction of device performance;
- propose a specific methodology for the measurement of integrated varactors, covering on-wafer measurement structures, the calibration process, and detailed descriptions of the required equipment;
- explain de-embedding techniques and also analyse confidence level and uncertainty linked to the test set-up;
- examine the design of a voltage controlled oscillator (VCO) circuit as a practical example of the employment of methods discussed in the book.

Providing the reader with the necessary technical knowledge for dealing with challenging VCO designs, this book is an essential guide for practising RF and microwave engineers working on the design of electronic devices for integrated circuits. It is also a useful reference for postgraduate students and researchers interested in electronic design for RF applications.

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