Abstracts

Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements

T. Fernandez, Y. Newport, J.M. Zamanillo, A. Tazon and A. Mediavilla. "Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 372-378.

In this paper a new large-signal metal semiconductor field effect transitor (MESFET) model suitable for applications to nonlinear microwave CAD has been developed and the different phenomena involved in the nonlinear behavior of the transistor have been studied. The importance of this work lies in the fact that multibias starting points (hot and cold device) for pulsed measurements are used to derive a single expression for I/sub ds/ that describes the dc as well as the small and large signal behavior of the transistor, while taking into account the quiescent point dependence. The algorithms of this new model can easily be incorporated into commercially available nonlinear simulators. The operating-point dependent current I/sub ds/ is modeled by two nonlinear sources: one of them is the dc characteristic nonlinear equation, and the other represents the differences between dc and pulsed characteristics at every bias point. A complete large-signal model is presented for a 10 * 140 µm GaAs-MESFET chip (F20 process) from the GEC-MARCONI Foundry and a 16 * 250 µm MESFET chip (DIOM process) from the Siemens Foundry. Comparisons have been made between simulations and measurements of pulsed characteristics at different operating points. There was very good agreement between the P/sub m//P/sub out/ measurements and the MDS simulations using the complete large signal model.

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