Abstracts

Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's

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The basic cell for linear, nonlinear, and noise models is the intrinsic transistor. To determine the intrinsic device elements a de-embedding of the parasitic elements is needed. A good extraction of the extrinsic device elements along with a suitable topology leads to the true values of the intrinsic transistor and therefore to good models. In this paper, three methods for access resistances computation are investigated. Two of them are based on DC measurements with floating drain or source and they use a modified Schottky model for determining the gate resistance. The third method is an improved cold-FET technique based on RF measurements with floating drain instead of the V/sub ds/ = O condition. The originality of the proposed RF method is the use of the floating drain configuration which overcomes the inconsistencies between DC and RF methods. On the other hand, extended expressions for parasitic inductances calculation are presented. These expressions take into account the influence of different factors such as parasitic capacitances and access resistances. Based on both, the improved cold-FET technique for access resistances computation, and the extended equations for parasitic inductances, this paper presents also an alternative method for extracting the small-signal equivalent circuit on PHEMT's by means of RF measurements only, with no optimization procedures.

❑ Return to main document.