

Abstracts

Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications

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In this paper we discuss the small-signal modeling of HFET's at millimeter-wave frequencies. A new and iterative method is used to extract the parasitic components. This method allows calculating of a pi-network to model the heterojunction field-effect transistor (HFET) pads, thus extending the validity of the model to higher frequencies. Formulas are derived to translate this pi-network into a transmission line. A new and general cold field-effect transistor (FET) equivalent circuit, including a Schottky series resistance, is used to extract the parasitic resistances and inductances. Finally, a new and compact set of analytical equations for calculation of the intrinsic parameters is presented. The real part of Y_{12} accounted for in these equations and its modeling is discussed. The accounting of $\text{Re}(Y_{12})$ improves the S-parameter modeling. Model parameters are extracted for an InAlAs/InGaAs/InP HFET from measured S-parameters up to 50 GHz. and the validity of the model is evaluated by comparison with measured data at 75-110 GHz.

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