Abstracts

A new extraction method to determine bias-dependent source series resistance in GaAs FET's

A new method is proposed to determine bias-dependent source resistances for GaAs field-effect transistors (FET's). This method, which is a cold-FET measurement technique, utilizes the relations between the real part of the two-port impedances transformed from the measured S-parameters and their algebraic derivatives. It is based on the fact that the algebraic derivatives of the two-port resistances result in the simple form at the normal cold-FET condition. A bias-independent gate resistance is extracted at the pinched-off cold-FET condition to fulfill necessary and sufficient conditions in extraction. The proposed method is a direct measurement because only algebraic calculation is required, and it is general enough to need only one assumption of the laterally symmetric channel-doping profile. The deleterious results of dispersion (frequency dependence) and negative value in source resistances at the pinched-off cold-FET condition are explained by the effects of the leakage current and the on-wafer pad parasitics, respectively. The problem of deviation of /spl alpha//sub 21/ and /spl alpha//sub 12/ from 0.5 at the normal cold-FET condition is also resolved by deembedding the on-wafer pad parasitics. This method allows one to extract bias-dependent source resistances for GaAs FET's.

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