Abstracts

Direct parameter-extraction method for HBT small-signal model

S. Bousnina, P. Mandeville, A.B. Kouki, R. Surridge and F.M. Ghannouchi. "Direct parameter-extraction method for HBT small-signal model." 2002 Transactions on Microwave Theory and Techniques 50.2 (Feb. 2002 [T-MTT]): 529-536.

An accurate and broadband method for the direct extraction of heterojunction bipolar transistor (HBT) small-signal model parameters is presented in this paper. This method differs from previous ones by extracting the equivalent-circuit parameters without using special test structures or global numerical optimization techniques. The main advantage of this method is that a unique and physically meaningful set of intrinsic parameters is extracted from the measured S-parameters for the whole frequency range of operation. The extraction procedure uses a set of closed-form expressions derived without any approximation. An equivalent circuit for the HBT under a forward-bias condition is proposed for extraction of access resistances and parasitic inductances. An experimental validation on a GaInP/GaAs HBT device with a 2/spl times/25 /spl mu/m emitter was carried out, and excellent results were obtained up to 30 GHz. The calculated data-fitting residual error for three different bias points over 1-30 GHz was less then 2%.

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