Abstracts

A New Large-Signal AlGaAs/GaAs HBT Model Including Self-Heating Effects, with Corresponding Parameter-Extraction Procedure

K. Lu, P.A. Perry and T.J. Brazil. "A New Large-Signal AlGaAs/GaAs HBT Model Including Self-Heating Effects, with Corresponding Parameter-Extraction Procedure." 1995 Transactions on Microwave Theory and Techniques 43.7 (Jul. 1995, Part I [T-MTT]): 1433-1445.

Accurate modelling of the microwave large-signal characteristics of AIGaAs/GaAs Heterojunction Bipolar Transistors (HBT's) is extremely useful for microwave power applications of the device. This paper presents a new type of HBT large-signal model which is valid for dc, small-signal and large-signal ac modes of operation. The model may be used over a wide range of operating conditions and includes allowance for self-heating effects which are very important for HBT's. Through the use of several novel features, the proposed approach is differentiated from the traditional Ebers-Moll or Gummel-Poon BJT representations. The new model is accompanied by a very simple parameter extraction process requiring only a series of conventional dc and multi-bias point small-signal S-parameter measurements. Finally, the model is validated by independent power sweep measurements on HBT's from two different manufacturers.

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