Abstracts

An AlGaAs/InGaAs Pseudomorphic High Electron Mobility Transistor with Improved Breakdown Voltage for X- and Ku-Band Power Applications

J.C. Huang, G.S. Jackson, S. Shanfield, A. Platzker, P.K. Saledas and C. Weichert. "An AlGaAs/InGaAs Pseudomorphic High Electron Mobility Transistor with Improved Breakdown Voltage for X- and Ku-Band Power Applications." 1993 Transactions on Microwave Theory and Techniques 41.5 (May 1993 [T-MTT]): 752-759.

This work determined that RF drain current degradation is responsible for the poor power performance of wide-recessed PHEMT. A model based on surface states was proposed to explain this phenomenon, which then led to the use of charge-screen layers and a double-recessed gate process to suppress surface effects. Combined, these two modifications increased the device's gate-drain reverse breakdown voltage without causing a degradation in the transistor's RF drain current. This allowed the simultaneous achievement of high power-added efficiency and high power density which established a new performance record for power PHEMTs at X- and Ku-bands. Delay time analyses of single- and double-recessed PHEMTs revealed that the benefit of a larger breakdown voltage in the latter device design came at the cost of a larger drain delay time, Drain delay accounted for 45% of the total delay when the 0.35 µm, double-recessed PHEMT was biased at Vds = 6 V.

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