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Modeling of 2deg Sheet Carrier Density, DC Characterization

M. Arthi raj

Abstract - It has been observed from literature a 2-d physics based model for two dimensional electron gas (2DEG)Sheet carrier density n, and DC characteristic of the proposed spacer layer based $In_xal_{1-x}N$/InAIN/GaN High Electron Mobility Transistors (HEMTs)is modulated by considering the triangular quantum well.To obtain charge density n_s, the variation of Fermi level with supply voltage and the formation of Energy Sub-bands E_0, E_1 is considered. The obtained results are simple and easy to analyze the sheet charge density, DC characteristic model for spacer layer based $In_xAl_{1-x}N$/InAIN /GaN HEMT power devices. Due to large two dimensional electron gas (2DEG) Sheet carrier density and high velocity, the maximum drain current density achieved is very high. The trans conductance and frequency are analyzed. All results are calibrated and verified with experimental data This work presents a model to forecast the simplified sheet carrier density, drain current performance and this model show excellent agreement with experimental data that proves the validity of our model.