



International Journal on Recent Researches In Science, Engineering & Technology

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Research Paper

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ISSN (Print) : 2347-6729
ISSN (Online) : 2348-3105

Volume 1, Issue 9,
September 2013

DIIF IF :1.46
SJIF IF: 1.329

An Analytical Physics Based Model

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Abstract - Literature review revealed that the high electron mobility transistors (HEMT'S)in general and InAlN/GaN/InAlN dual hetero junction high electron mobility transistors (DHHEMT) specifically have been studied. These devices show superior characteristics over other types of FET's for high frequency microwave power applications. The structure of a hetero junction have been discussed. Several model shave been reviewed for calculating the density of charge in the dual 2-dimensional electron gas (2DEG) channel present in DH-HEMT GaN layer, which leads to the device current-voltage characteristics. To obtain charge density ns, the variation of Fermi level with supply voltage and the formation of Energy Sub-bands E0, E1 is considered . The obtained results are simple and easy to analyze the sheet charge density, DC characteristics model for spacer layer based $\text{In}_x\text{Al}_{1-x}\text{N}/\text{GaN}/\text{InAlN}$ HEMT power devices. An InAlN/GaN/InAlN DH-HEMT has been designed based on the theories provided in earlier sections with describing several step taken to optimize its performance and simulations showing the effects of various design parameters.