December 2019

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What's New

Modelithics Releases the COMPLETE+3D Library v19.6 for ANSYS HFSS with 117 New Full Wave Electromagnetic Models

Press Release | Release Notes | Library Brochure

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Includes new model for QPD1006 internally-matched CW-capable discrete GaN

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March 16-19 2020
San Diego, CA

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WAMICON 2020
April 15-17 2020
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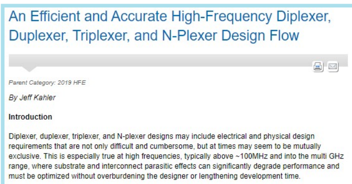
Press Release   Library Brochure

The Modelithics COMPLETE Library v19.5 Update 4 for Keysight PathWave ADS

Press Release   Library Brochure



An Efficient and Accurate High-Frequency Diplexer, Duplexer, Triplexer, and N-Plexer Design Flow

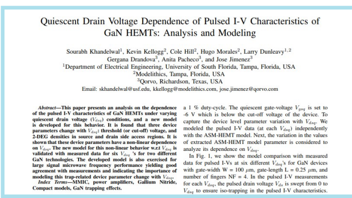
Parent Category: 2019 HFE

By Jeff Kahler

Introduction

Diplexer, duplexer, triplexer, and N-plexer designs may include electrical and physical design requirements that are not only difficult and cumbersome, but at times may seem to be mutually exclusive. This is especially true at high frequencies, typically above ~100MHz and into the multi GHz range, where substrate and interconnect parasitic effects can significantly degrade performance and must be optimized without overburdening the designer or lengthening development time.

An Efficient and Accurate High-Frequency Diplexer, Duplexer, Triplexer, and N-Plexer Design Flow



Quiescent Drain Voltage Dependence of Pulsed I-V Characteristics of GaN HEMTs: Analysis and Modeling

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Abstract—This paper presents an analysis on the dependence of the pulsed I-V characteristics of GaN HEMTs under varying quiescent drain voltage (V_{dsq}) conditions, and a new model is developed for this behavior. It is found that three device parameters change with V_{dsq}: threshold (or cut-off) voltage, and 2-DEG densities in source and drain side access regions. It is shown that these device parameters have a non-linear dependence on V_{dsq}. The new model for this non-linear behavior w.r.t V_{dsq} is validated with measured data for six V_{dsq} 's for two different GaN technologies. The developed model is also exercised for large signal microwave frequency performance yielding good agreement with measurements and indicating the importance of modeling this trap-related device parameter change with V_{dsq}.

Index Terms—MMIC, power amplifiers, Gallium Nitride, Compact models, GaN trapping effects.

a 1 % duty-cycle. The quiescent gate-voltage V_{gsq} is set to -6 V which is below the cut-off voltage of the device. To capture the device level parameter variation with V_{dsq}. We modeled the pulsed I-V data (at each V_{dsq}) independently with the ASM-HEMT model. Next, the variation in the values of extracted ASM-HEMT model parameter is considered to analyze its dependence on V_{dsq}.

In Fig. 1, we show the model comparison with measured data for pulsed I-Vs at six different V_{dsq}'s for GaN devices with gate-width W = 100 μm, gate-length L = 0.25 μm, and number of fingers NF = 4. In the pulsed I-V measurements for each V_{dsq}, the pulsed drain voltage V_{ds} is swept from 0 to V_{dsq} to ensure iso-trapping in the pulsed I-V characteristics.

Quiescent Drain Voltage Dependence of Pulsed I-V Characteristics of GaN HEMTs: Analysis and Modeling

Literature & Presentations

Check out our new and updated Literature & Presentations!

- Modelithics COMPLETE+3D Library for ANSYS HFSS Brochure
- Modelithics Qorvo GaN Library v19.4.2 Release Notes