

# Abstract and Synopsis

**Title of the Paper:** Modeling of Dynamic Properties of SiC JFETs

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## Problem Statement:

The nonlinear and dynamic behavior of silicon carbide (SiC) junction field-effect transistors (JFETs) is difficult to describe accurately using conventional compact models. These devices exhibit voltage-dependent capacitances and nonlinear channel current variations that strongly influence their switching performance. Accurate modeling of these phenomena is essential for predicting circuit behavior in power electronics and high-frequency applications.

## Abstract:

This paper presents a refined analytical and behavioral model of SiC JFETs based on the Shichman–Hodges framework. The authors propose an improved equivalent circuit that includes gate–source and gate–drain capacitances, intrinsic diodes, and a voltage-controlled current source to represent the channel conduction. The model parameters are extracted from static and dynamic measurements and validated through simulation in SPICE environments. Experimental results show excellent agreement between the measured and simulated waveforms, confirming the model’s capability to reproduce both steady-state and transient device characteristics. This work contributes to more reliable and efficient JFET-based power and analog circuit designs.