# Article information:

Predicting SiC MOSFET Behavior Under Hard-Switching, Soft-Switching, and False Turn-On Conditions | IEEE Journals & Magazine | IEEE Xplore
<https://ieeexplore.ieee.org/document/8003485>

# Article summary:

1. This article describes circuit-level analytical models for hard-switching, soft-switching, and dv/dt-induced false turn on of SiC MOSFETs and their experimental validation.

2. The models include the high-frequency parasitic components in the circuit and enable fast, accurate simulation of the switching behavior using only datasheet parameters.

3. The numerical solutions of the analytical models provide more accurate prediction than an LTspice simulation with a threefold reduction in the simulation time.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

This article provides a detailed analysis of SiC MOSFETs and their behavior under hard-switching, soft-switching, and false turn-on conditions. The authors present an analytical model to evaluate the full switching behavior of these devices which includes nonlinearities in junction capacitances as well as circuit parasitics. The model is validated experimentally at 25°C and 125°C, providing evidence for its accuracy. Additionally, the effect of snubber capacitors on soft-switching waveforms is explained analytically and validated experimentally. Finally, false turn on conditions are predicted analytically and validated experimentally as well.

The article appears to be reliable overall; however there are some potential biases that should be noted. For example, while the authors do discuss other modeling approaches such as semiconductor physics models and behavioral models, they focus primarily on their own approach which may lead to a bias towards their own work over other approaches that could potentially be more effective or efficient in certain scenarios. Additionally, while the authors do discuss possible risks associated with false turn on conditions (e.g., increased switching loss), they do not explore any potential counterarguments or alternative solutions that could mitigate these risks or provide additional benefits beyond what is discussed in this article. Furthermore, while the authors do provide evidence for their claims through experimental validation at two different temperatures (25°C and 125°C), it would have been beneficial if they had provided additional evidence from other temperatures or environmental conditions to further support their claims regarding accuracy of their model predictions under various scenarios.

# Topics for further research:

* SiC MOSFET switching behavior
* SiC MOSFET snubber capacitors
* SiC MOSFET false turn-on conditions
* Semiconductor physics models for SiC MOSFETs
* Behavioral models for SiC MOSFETs
* Mitigation of SiC MOSFET false turn-on risks

# Report location:

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