

# POWER & ENERGY SPECIAL SEMINAR

Wednesday, November 2, 2017, 11:00 am – 12:00 pm, ECEB 5070

## A High-Density, High-Speed 10 kV Silicon Carbide (SiC) MOSFET Power Module

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### Abstract

Power electronics is facing significant challenges due to the increasing need for higher efficiency, smaller size and weight, lower cost, and greater functionality and flexibility in applications such as consumer electronics, renewable energy, electrified transportation, datacenters, and the power grid. Silicon carbide (SiC) power semiconductors, are enabling power electronics to meet these growing demands, and have begun appearing in commercial products from traction and solar inverters to uninterruptible power supplies.

Even greater strides can be made in high-power conversion systems due to the high breakdown electric field of SiC, which enables the fabrication of power devices with voltage ratings exceeding 10 kV. The ability of these devices to efficiently switch higher voltages at switching frequencies in the tens of kilohertz range will allow for the realization of new technologies, such as high-frequency solid state transformers, which will revolutionize existing applications and fuel emerging ones.

However, current power module packaging technologies are limiting the performance of these 10 kV SiC switches. The aim of this work is hence to develop an improved package that, in addition to addressing the usual electromagnetic and thermal challenges associated with the high-density packaging of fast-switching devices, will also resolve the added issues of high electric fields and electromagnetic interference. This presentation will discuss the design of this optimized package for 10 kV SiC MOSFETs.

### Biography

Christina DiMarino received her Bachelor's degree in engineering from James Madison University in Virginia in 2012. She joined the Center for Power Electronics Systems (CPES) at Virginia Tech in the fall of 2012 as a direct Ph.D. student. In 2014, Christina earned her Master's degree at CPES for her work on the high-temperature characterization of silicon carbide transistors. She is now in her fourth year of her Ph.D. at CPES and is working on the high-density packaging of 10 kV silicon carbide MOSFETs. Since 2015, Christina has been the Student Membership Chair for the IEEE Power Electronics Society (PELS). In 2016, Christina restarted the PELS Student Branch Chapter at Virginia Tech after it had been dormant for nearly a decade. She served as the President for the first year and is still actively involved with the student chapter. Christina is also on the committees for the PELS Young Professionals, IEEE International Technology Roadmap for Wide-Bandgap Power Semiconductors, and PELS Mentorship Program.

