



## Tutorial Title

**Practical Considerations for the Application of High Power Si and SiC Modules**

## Instructor Team

Team Chair: Michael Rogers, Mitsubishi Electric US, Inc.

Co-Speakers: Eric Motto, Mitsubishi Electric US, Inc.

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## Abstract

This seminar will be an in-depth lesson targeted at the entry level power electronics engineer which introduces the fundamental elements relevant to the design and application of high-power Silicon IGBTs and SiC MOSFETs. The seminar will focus on the issues a designer must contend with when using large, high power (high current and/or high voltage) IGBT and SiC modules. Topics covered include basic module characteristics, failure modes, reliability, chip and packaging technology, application considerations such as voltage/current ratings, thermal impedance, paralleling, etc. as well as gate driver circuit design, short circuit protection methods, power circuit design such as low inductance busbars, snubbers, etc. including design examples with power loss simulations. Measurement techniques such as double pulse testing will also be covered with specific focus on the new challenges of SiC MOSFET characterization.

## Instructor Team Biographies

Eric R. Motto is Chief Engineer with Mitsubishi Electric US. He holds a Bachelor of Science in Electrical Engineering from Pennsylvania State University and a Bachelor of Arts in Mathematics from Saint Vincent College. From 1987 to 1990 Eric worked as a design engineer at Lutron Electronics in Coopersburg Pennsylvania developing circuits for the control and stabilization of electronic dimming ballasts. From 1990 to 2017 Eric was with Powerex, Inc. in Youngwood Pennsylvania providing technical support for users of Mitsubishi power semiconductor devices in North America. He is now with Mitsubishi Electric in the same capacity. Eric has written and presented more than forty technical papers at industry conferences and published numerous application notes and magazine articles related to the design and application of IGBT and Intelligent Power Modules.

Michael J. Rogers is a member of the IEEE, holds a BSEE from Pennsylvania State University, and has worked in the power electronics field since 2011. He is a Power Module Applications Engineer for Mitsubishi Electric US Inc. and provides technical support for users of power semiconductor devices. Michael authored industry sessions and exhibitor seminars at the 2016 through 2024 APEC and ECCE conferences related to high power IGBT and SiC devices.

Mark Steiner is an Electrical Engineer with experience in semiconductor and device applications. He



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holds a Bachelor's Degree in Electrical Engineering with honors from the Pennsylvania State University and has worked for a combined 8 years with Mitsubishi Electric US and Powerex Inc. He is an applications engineer with a focus on IGBT and SiC-MOSFET power modules for the automotive, locomotive, and high-voltage industries. He has assisted in the publication of several technical papers, presentations, and application notes, presenting material at past conferences including APEC, ECCE, The Battery Show, and ITEC.