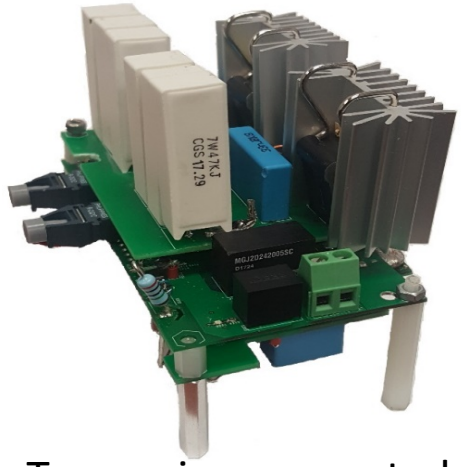
EPRI/Univ of Arkansas Membership Level – University

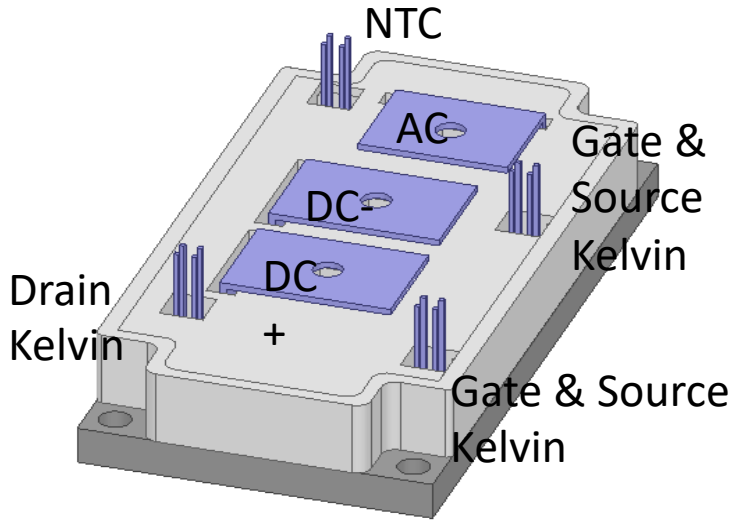
Project Title: Medium-Voltage SiC-based Compensators for Distribution Systems

Objectives:
(1) Design 3.3-kV SiC MOSFET switching positions
(2) Design and fabricate a three-phase 13.8-kV 750-kVA MV-UCSC using 3.3-kV SiC MOSFET switching positions
(3) Design a three-phase 25-kV, 2-MVA MV-UCSC using 10-kV SiC MOSFETs.

Task No. BP5-4.44, PI: Ram Adapa, radapa@epri.com, Phone:650-855-8988; J C Balda, Univ of Arkansas, jbalda@uark.edu, Phone: 479-713-9026



Two series-connected 1.7-kV 72-A SiC MOSFETs



3.3-kV SiC MOSFET module

WBG Technology Impact

1. SiC devices enable higher switching frequencies than silicon devices bringing a reduction of grid-connected output filters
2. Flying-capacitor converters require smaller capacitors than topologies like modular multi-level converters yielding compact realizations
3. Application: D-FACTS
4. Timeframe for commercialization: 2 years for utility pilot applications
5. This project should increase the penetration of medium-voltage power converters in distribution systems

Accomplishments/Outcomes

- Design of a medium-voltage unbalanced-current static compensator rated 13.8 kV and 750 kVA
- Preliminary design of a 3.3-kV power module and selection of the 3.3-kV gate driver