

Abstract:

**5 kV DC to LV DC or 3 Phase AC Microgrid Power Conditioning Modules**

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The objective of the project is to design and build of a universal MVDC converter that can interface with either LVAC or LVDC while providing bi-directional power flow and high frequency isolation. The proposed universal MVDC converter module can serve as a building block for higher-voltage higher-power systems. The converter modules are based on soft switching solid state transformer (S4T), realized using 3.3 kV SiC MOSFETS, and can provide integrated high frequency isolation, low EMI through low dv/dt, and high efficiency over the full operating load range realized with soft switching techniques. The topology, operating principle, control philosophy addressing challenges associated with modular converters including dynamic and steady state voltage sharing between modules on the HV side, design and selection of components to realize a 50 kVA 5 kVDC to 600 V DC/480 V AC are presented. Simulation results verifying the operation of the MVDC converter are also presented.