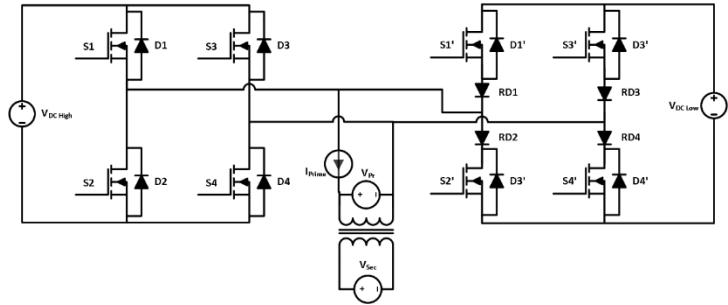


Advanced Magnetics Characterization

Richard Byron Beddingfield, Dr. Subhashish Bhattacharya

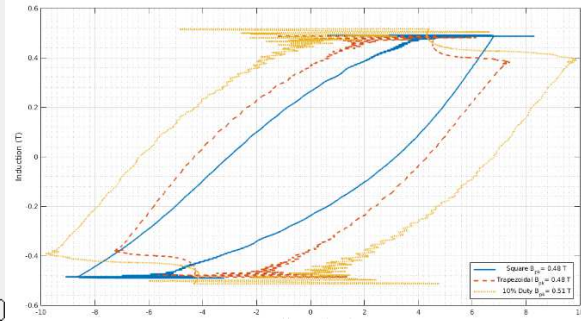
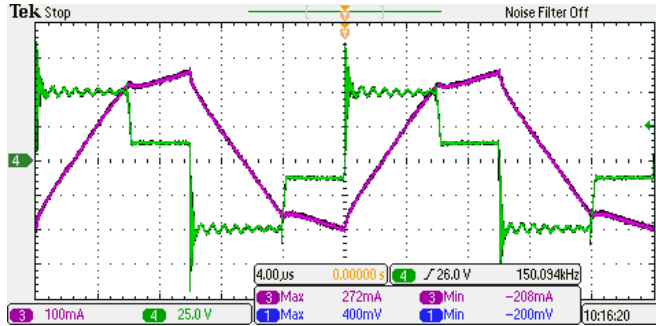
Circuit Topology

Using the latest silicon carbide devices, this test circuit is rated for 1700 V_{DC} and 75 A, providing a wide range of characterization capabilities. With two stages, the circuit can provide true 'flat top' trapezoidal current. It can also provide multiple slope excitation as seen in multiport dual active bridges, volts /



turn mismatched active bridges and a variety of other test circuits. The low voltage side can be cascaded N time to provide nearly infinite possibilities including sinus / resonant excitation at switching frequencies, quasi resonant and DC offset excitations with minimal filter requirements.

Example Trapezoidal Excitation



Relevant Publications

R. Beddingfield, S. Bhattacharya, D. Storelli, Circuit for Providing Variable Waveform Excitation, Provisional Patent: 98192/1063283, 62/583,843, November 10, 2017, United States

R. Beddingfield, P. Vora, D. Storelli and S. Bhattacharya, "Trapezoidal characterization of magnetic materials with a novel dual voltage test circuit," 2017 IEEE Energy Conversion Congress and Exposition (ECCE), Cincinnati, OH, 2017, pp. 439-446.

R. Beddingfield, S. Bhattacharya, "Multi-parameter Magnetic Material Characterization for High Power Medium Frequency Converters", The Materials, Metals, & Materials Society (TMS) Supplemental Proceedings, 2017, 693-708

R. Beddingfield, D. Storelli and S. Bhattacharya, "A novel dual voltage source converter for magnetic material characterization with trapezoidal excitation," 2017 IEEE Applied Power Electronics Conference and Exposition (APEC), Tampa, FL, 2017, pp. 1659-1666.

Collaborators



Carnegie Mellon University



This technical effort was performed in support of the National Energy Technology Laboratory's ongoing research under the RES contract DE-FE0004000.