

SiC-MOSFET-Based High Voltage Pulse Generator for Testing Motor Insulation Used in EVs

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The use of wide bandgap (WBG) power semiconductor devices in the transportation electrification area is gaining increased interest due to high power density, low power losses, high switching frequencies, and high operating temperatures. In specific, power electronics-based converters play a crucial role in driving the motors employed in the transportation area. However, concerns arise regarding motor insulation when employing WBG switching devices due to their fast rise time and high-frequency characteristics. These characteristics can place significant stress on the motor insulation, potentially causing premature failures. As such, it is essential to investigate motor insulation under the operation of WBG-based power converters. In this work, a high voltage (HV) pulse generator is developed specifically for studying the motor insulation of electric vehicles (EVs). The proposed system incorporates a converter based on SiC-MOSFETs, offering flexibilities with pulse amplitude, frequency, duty cycle, rise time, overshoot, and wave shape. The design and functionality of the proposed generator are evaluated through both MATLAB Simulink simulations and experimental results.