Research on Driving Reliability of SiC MOSFET Inverter Welding Power Supply

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Abstract

The Silicon Carbide (SiC) MOSFET inverter welding power supply produces high rates of voltage and current change (dv/dt and di/dt) as well as a reverse recovery current transient rate during the high-frequency and high-voltage switching process. This causes a serious crosstalk issue and affects the driving reliability of SiC MOSFETs. This research creates a half-bridge crosstalk model based on the properties of SiC MOSFET power devices and an inverter welding power supply. Further analysis is done on the crosstalk mechanism of the SiC MOSFETs used in the half-bridge application as well as the impact of the driving parameters on the switching process. A SiC MOSFET drive circuit with protection functions is designed. By constructing a double pulse circuit, the SiC MOSFET driving circuit's functionality and its driving parameters are assessed. The driving waveform of the SiC MOSFET is stable and within the expected range in the SiC MOSFET inverter welding power supply. The experimental findings demonstrate the viability of the driving circuit that was created. SiC MOSFETs can operate consistently and produce an excellent switching waveform.

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