

High-efficiency bidirectional ac-dc converter for energy storage systems

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This study presents a high-efficiency three-phase bidirectional dc-ac converter for use in energy storage systems (ESSs). The proposed converter comprises a modified three-level T-type converter (M3LT 2 C) and a three-level bidirectional dc-dc converter.

In this paper, a novel high-efficiency bidirectional isolated DC-DC converter that can be applied to an energy storage system for battery charging and discharging is proposed. By integrating a coupled inductor and switched-capacitor voltage doubler, the proposed converter can achieve isolation and bidirectional power flow.

oHigh efficiency >95.8% as charger & >95.5% as boost converter oSeamless (50uS) transitions between charge and boost modes oZVS at high loads and synchronous rectification switching

The versatile bidirectional power supply is an integration of two systems: a DC-DC synchronous buck converter for charging a lead acid battery and a DC-DC synchronous boost converter for driving a CC-CV DC load from the lead acid battery. Control of the system is managed through an onboard MSP430F5132 microcontroller.

Application key features: 6.6kW output in both AC-DC operation and DC-AC operation. 176V-265V input voltage (grid), 550V output voltage (DC BUS) Peak efficiency > 98%. iTHD < 5% at half load. High switching frequency 130kHz enables high power density.

Abstract: This paper proposes a high efficiency and conversion ratio bidirectional isolated DC-DC converter with three-winding coupled inductor, which can fulfil storage system charging and discharging. The proposed topology is ...

An efficient AC-DC converter facilitates smooth transitions between modes, responding to grid directives for active and reactive power. A soft-switching dual active bridge (SS-DAB) DC-DC converter optimally interfaces with the EV battery pack, while dual active LCL filters suppress harmonics, enhancing system performance.

Abstract: A high-efficient bidirectional ac-dc converter is proposed for energy storage system. The proposed converter can transfer both active and reactive power between ac grid and dc sources.

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