

High Performance Power Converter for Ship-Electric-Power-Distribution Systems

By

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Summary

In zonal ship-electric-power-distribution systems, there are various challenges in providing uninterrupted power to mission-critical loads which would allow the ships to overcome a potentially damaging situation. The design of the power system is based on the 800kW-1,000 Vdc output. As part of the house keeping power supply, a high performance 7kW power converter is required to provide power to vital loads. The converter is to generate a nominal output voltage of 68Vdc given the input voltage range requirement of 750VDC to 1250 VDC. It supplies power to 24V dc/dc converters and 110VAC dc/ac inverter. The converter should internally provide protection against the reverse power flow.

To form a solution that provides enough power as well as meets the size, weight, and efficiency constraints, the newly half-bridge 3-level zero-voltage-switching (ZVS) dc-dc converter topology will be introduced for high voltage dc-dc converter applications.

This seminar will cover the design, analysis, and implementation of the proposed converter with adaptive phase-shifting control. Furthermore, to minimize the circulation current, the optimum design results will be presented with a voltage controller. The proposed converter achieves 96% efficiency under a 7kW load condition.