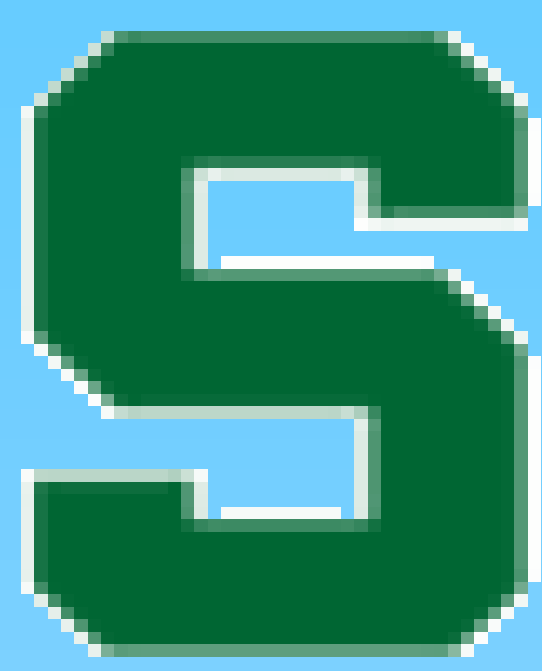
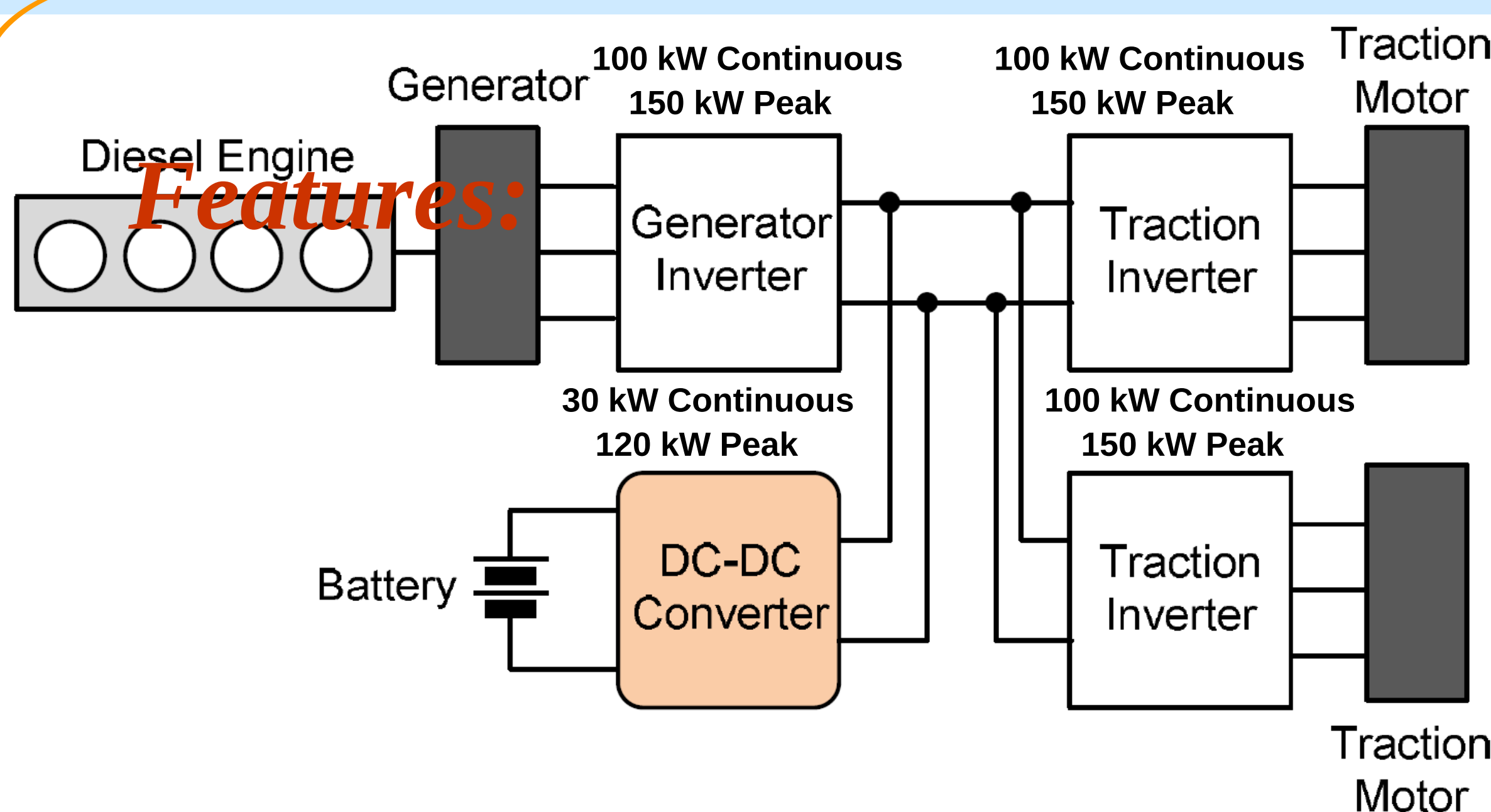




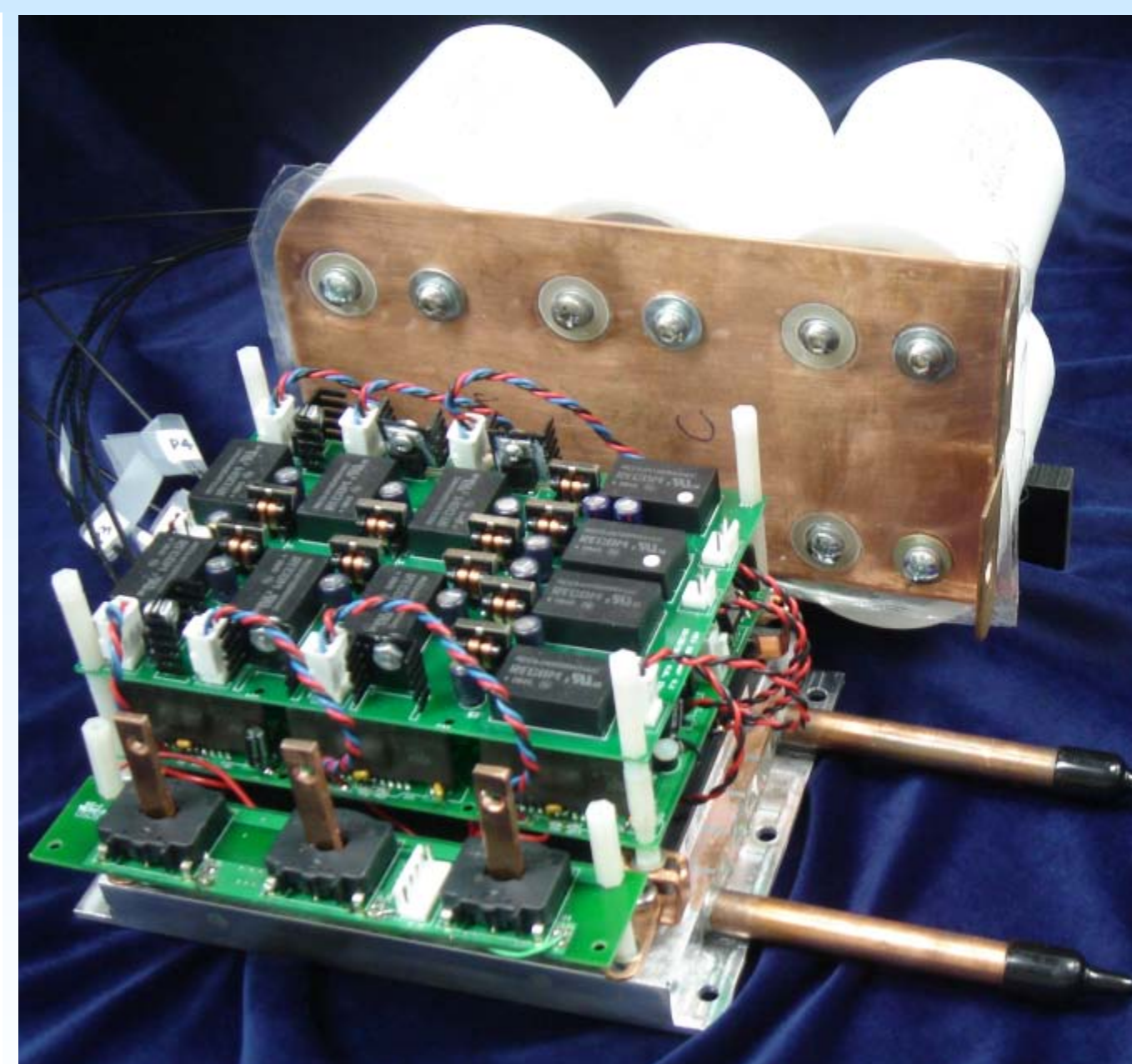
Inverter/Converter System for Series Hybrid Electric Bus

Honnyong Cha, Xi Lu and Craig Rogers

Abstract—The power electronics system is designed to condition and transfer power from the generator, which is connected to the internal combustion diesel engine (ICE), to or from the hybrid battery pack and to or from the two traction motors / regenerative brakes. This system gains efficiencies with 95% efficient power conversion in the inverters and converter, by operating the ICE at its most optimum speed and torque, and by recapturing braking energy by using the traction motors as regenerative brakes. Each inverter and converter is developed on the same platform for enhanced interchangeability and maintainability.



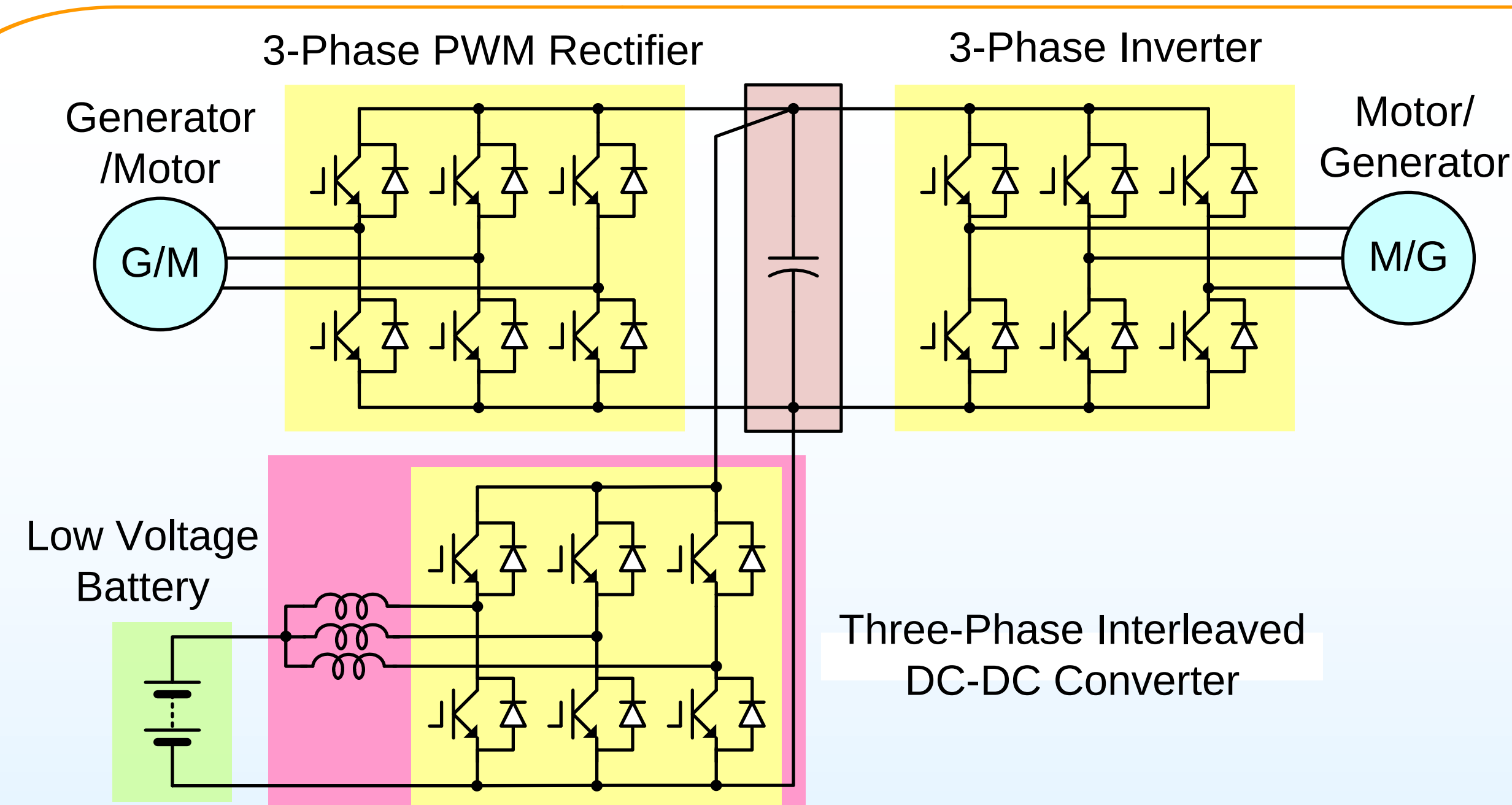
Block Diagram of Series Hybrid Electric Bus System



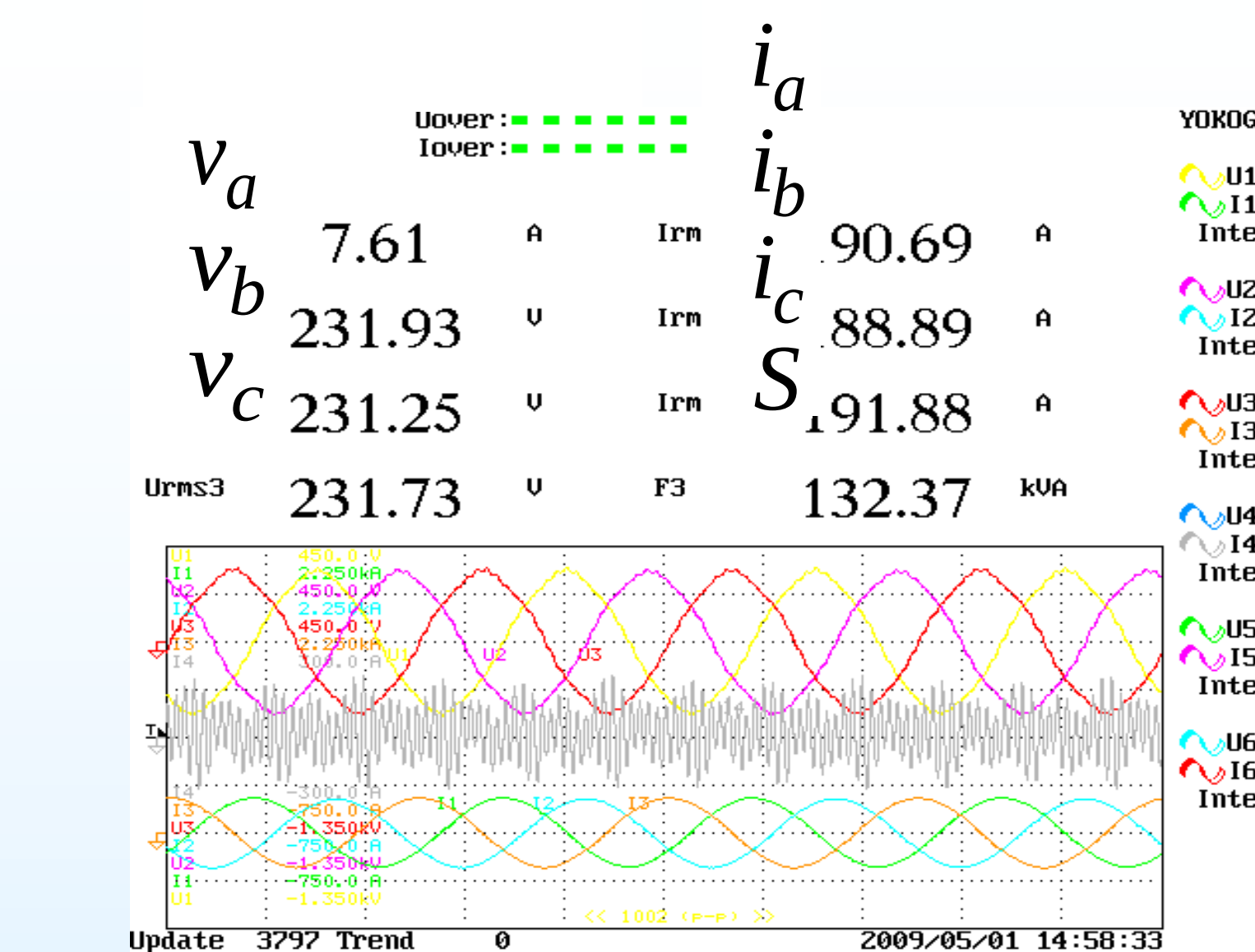
100kW Continuous, 150kW Peak Inverter/Converter

Electrical Specifications for Hybrid Electric Bus System

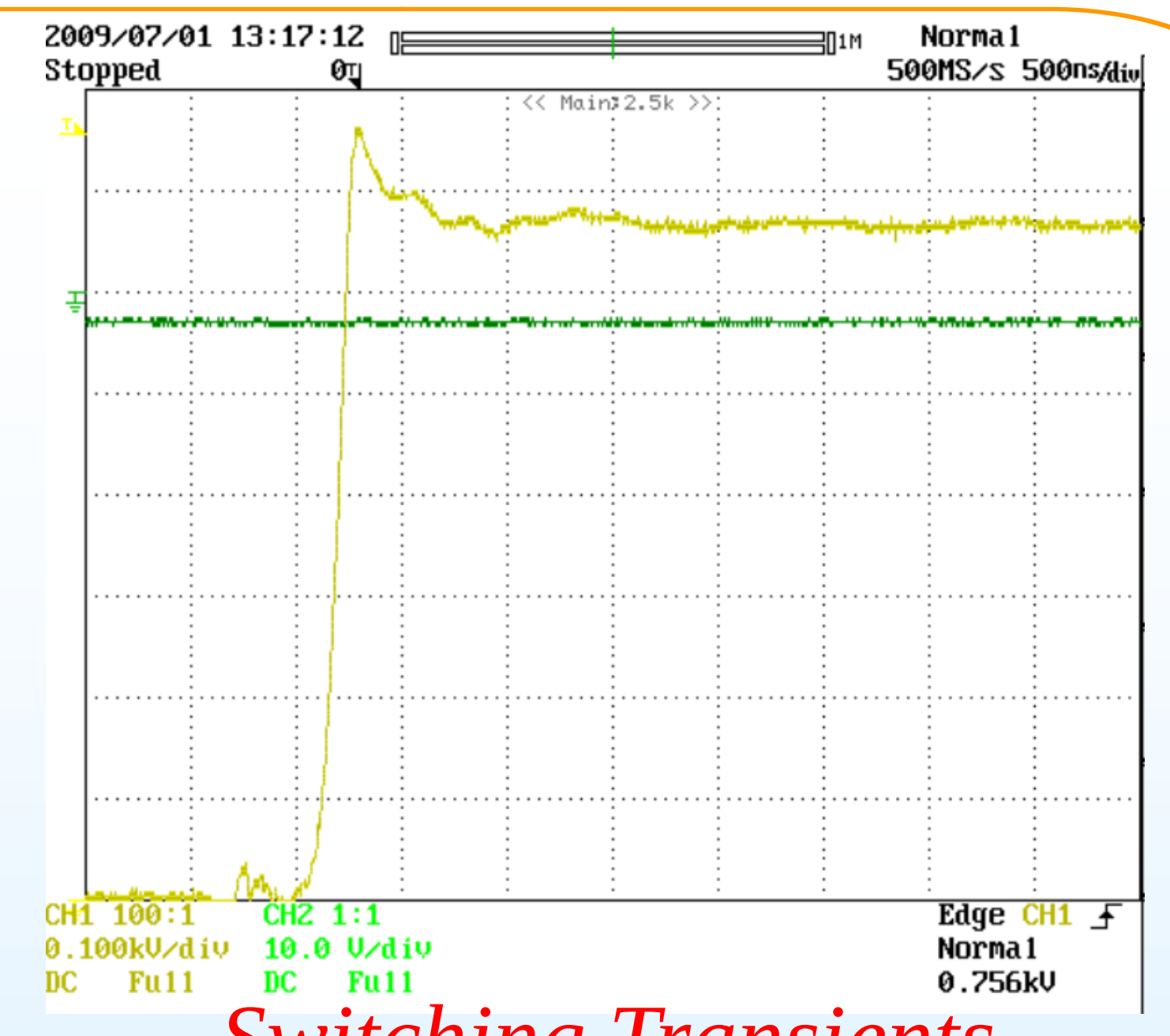
- DC link voltage: 680 Vdc
- Output: 480 VAC line-to-line
- Switching frequency: 10 kHz
- Output power: 100 kW (continuous), 150 kW (peak)
- IGBT: Fuji 6MBI450U4-120
- Capacitor Bank: Electronic Concepts UL30, 1000 V, 85 μ F (510 μ F totally)
- Water cooling: 70°C max inlet temp.



Schematic of the Power Electronics System in SHEB



Measured Results from Power Meter



Switching Transients with 12.5% Overshoot

3 Phase Interleaved DC-DC Boost Converter with Integrated Magnetics

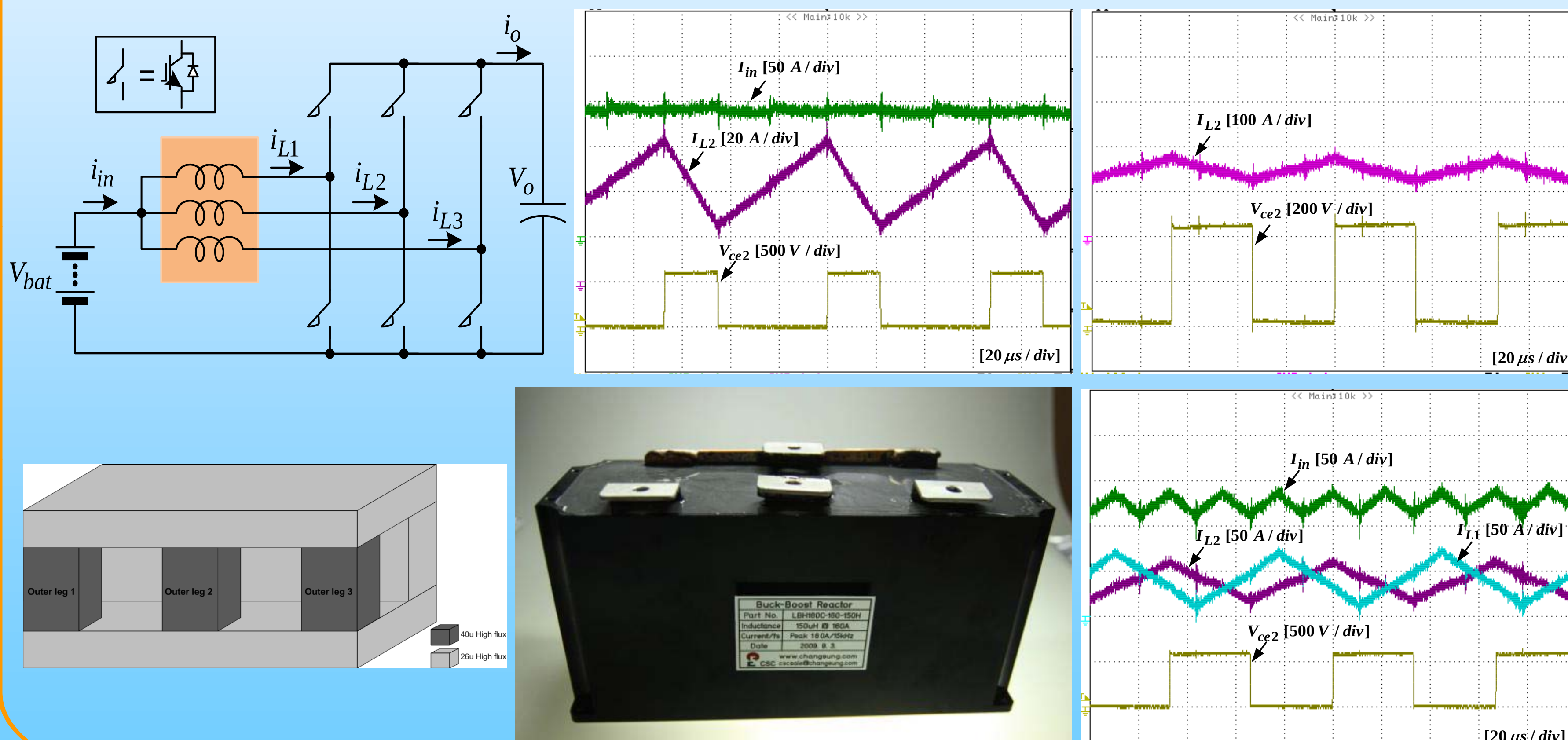


Table of Electrical Specifications of Battery and Boost DC-DC Converter

Battery	• Voltage range: 240-340 VDC • Maximum Current: 500 A
DC-DC Converter	• Average Power: 30kW • Peak Power: 120kW • Input Voltage: 240-340 VDC • Output Voltage: 600-700 VDC • Switching Freq: 15kHz

✚ **Efficiency: 96.7 % @30kW, 98.1% @120kW**