



Project Title: Power Dense Engine Coolant 200 kW 1050 VDC Bus SiC Inverter for Heavy-Duty Vehicles

Objectives: 200 kW 1050 VDC bus SiC inverter manufacturing and commercialization

Major Milestones: Technology demonstration of cost competitive engine coolant (max temperature 115°C) high power density (> 25 kW/Liter) SiC inverter in JD 644K WBG Loader

Significant Equipment Acquisition: None

Deliverables: Establish SiC MOSFET inverter cost parity with the performance comparable silicon IGBT inverter



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WBG Technology Impact

1. Higher DC bus voltage, higher switching frequency, higher junction temp and heat flux, higher kW/L and kW/kg, smaller passives and system level advantages.
2. Heavy-duty off-highway and on-highway vehicles.
3. Technology readiness by end of 2020
4. Switching frequency (> 15 kHz with SiC versus 8 kHz with Si). DC bus cap (300 μF - 400 μF with SiC versus 2000 μF with silicon). Inverter power density (> 25 kW/L with SiC versus ~11 kW/L with silicon)

Additional Impacts

1. Realization of engine coolant WBG technology
2. **WBG tech suitable for innovations by 9C solutions:** Capacitor, Coolant, Connector, Case, Control, CCS (coreless current sensor), Copper, Cable, and Cost
3. WBG product manufacturing jobs in Fargo
4. WBG power electronics workforce development
 - Summer internship opportunities at JDES
 - Co-op student opportunities at JDES
4. Current Technology Readiness Level: TRL 3/4
5. Projected TRL at end of project: TRL 6/7