

Project Title: High power density, high efficiency, wide range GaN-based 48V-1V, 300A single-stage LLC converter

Objectives: To demonstrate a commercially viable, 48V direct-to-processor point of load converter that offers industry-leading efficiencies and occupies less than half the board space of equivalent solutions

Major Milestones: Matrix transformer design, LLC converter control design, Integrated system demo

Deliverables: Converter hardware with >1000 W/in³ max power density, >95% peak efficiency

Example 1V, 170A POL converter from ABB



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WBG Technology Impact

- 1. Improvement over Si approach:** GaN enables MHz switching LLC converter leading to higher power density and efficiency
- 2. Market segments impacted:** High performance computing, servers in datacenters
- 3. Timeframe for commercialization:** 2020-22
- 4. Quantitative comparison against existing technology:** Proposed development would result in a product with higher power density (> 3x better) and higher peak efficiency (> 1% better) than ABB's current Si-based solutions

Additional impacts

- 1. Impact on the cost of WBG compared to Silicon:** Increases volume demand of GaN devices, which would help manufacturers lower the price
- 2. Potential for Job Creation & Economic impact:** Allows optimizations in datacenter design that lowers cost for end customer
- 3. Workforce Development and Education:** Partnership with **Virginia Tech** to train students on magnetics and controls for WBG-based converters
- 4. Improving technology maturity or reliability:** Advances TRL for low voltage high current LLC converter with wide range