

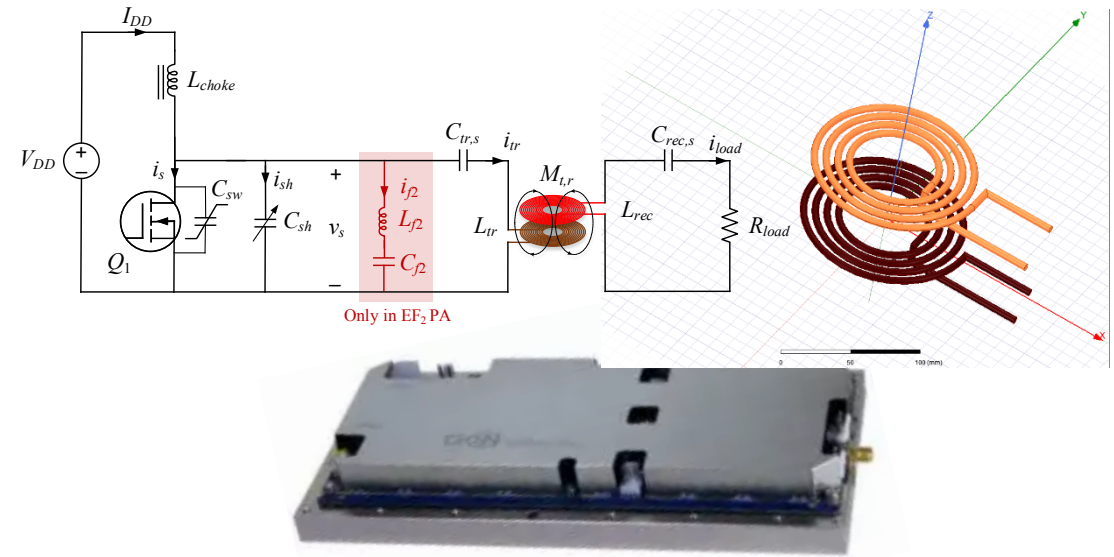
Project Title: 6.78-MHz, 200-W GaN-Based Class E and EF Inverters for Wireless Power Mats with Enhanced Load and Reactance Range Employing a Nonlinear Shunt Capacitor
Objectives: to investigate and test a novel approach of tuning Class E- and Class EF₂-based resonant wireless chargers with GaN switches in order to maintain safe and efficient operation for a wide range of loads and reflected reactances.

Task No. BP5- BP5-4.43 (OIF)

PI: Zeljko Pantic

Email: zpantic@ncsu.edu

Phone: 010-593-4052



WBG Technology Impact

1. This project will expand the application field of GaN switches toward ISM-band wireless charging by enhancing the robustness of the design
2. The project will deliver enabling technology for the use of GaN devices in Class E and Class EF₂ inverters for wireless charging applications allowing free receiver positioning and load variation
3. Expected time for commercialization is 1-2 years after the end of the project
4. The proposed design competes against low-efficient Class D and Class DE inverter topologies which are typically employed for the design of low power wireless charger (<50 W) operated in the ISM band (6.78 MHz)

Expected Accomplishments/Outcomes

- The project outcomes will **Improve the Reliability** of the broad family of GaN-based Class E and EF₂ inverters intended for wireless chargers. The new design procedure that incorporates variable nonlinear capacitors should provide better efficiency (>90%) for a wide load range and misalignment tolerance for the charger receiving unit.
- **Enhance Performance Capability** for the specific category of ISM band wireless chargers through the process of structure optimization that includes the GaN device, resonant circuit elements, and circuit parasitics. Spatial freedom will allow the receiver to move inside the range of 5 cm (2 inches) laterally and 1.25 cm (0.5 inches) vertically with respect to its nominal position.