Resonant Full-Bridge Synchronous Rectifier Utilizing 15 V GaN Transistors for Wireless Power Transfer Applications Following AirFuel Standard Operating at 6.78 MHz - DTU Orbit (30/07/2019)

Resonant Full-Bridge Synchronous Rectifier Utilizing 15 V GaN Transistors for Wireless Power Transfer Applications Following AirFuel Standard Operating at 6.78 MHz

Connectivity in smart devices is increasingly realized by wireless connections. The remaining reason for using connectors at all is for charging the internal battery, for which wireless power transfer is an alternative. Two industry standards, AirFuel and Qi, exist to support compatibility between devices. This work is focusing on the AirFuel standard, as it is operating at a higher frequency (6.78 MHz), than the Qi standard, and therefore allows smaller passive components, including the coupling coils. Whereas gallium-nitride (GaN) devices are being widely used on the transmitter (Tx) side, this work uses low voltage GaN transistors on the receiver (Rx) side to allow synchronous rectification and soft switching, thereby achieving high efficiency. After analyzing adequate Class-DE rectifier topologies, a ClassDE full-bridge 5 W rectifier using 15 V GaN transistors are designed and implemented. The experimental results show an efficiency above 80% over a wide operating range and a peak efficiency of 89%, at an arbitrary alignment of Tx and Rx coils with 3 cm distance between them.

General information
Publication status: Published
Organisations: Department of Electrical Engineering, Electronics, Technical University of Denmark
Number of pages: 7
Pages: 3131-3137
Publication date: 2018

Host publication information
Title of host publication: Proceedings of 2018 IEEE Applied Power Electronics Conference and Exposition
Publisher: IEEE
Keywords: Wireless power transfer, AirFuel, Synchronous rectification, Resonant circuit, soft-switching, GaN devices
Electronic versions:
APEC2018.pdf
DOIs:
10.5281/zenodo.1220264
Source: PublicationPreSubmission
Source-ID: 145260426
Research output: Chapter in Book/Report/Conference proceeding › Article in proceedings – Annual report year: 2018 › Research › peer-review