Outphasing control of gallium nitride based very high frequency resonant converters

In this paper an outphasing modulation control method suitable for line regulation of very high frequency resonant converters is described. The pros and cons of several control methods suitable for very high frequency resonant converters are described and compared to outphasing modulation. Then the modulation technique is described and the design equations given. Finally a design example is given for a converter consisting of two class E inverters with a lossless combiner and a common half bridge rectifier. It is shown how outphasing modulation can be used for line regulation while insuring equal and purely resistive loading of the inverters. Combined with a proper design of the inverters that, insures they can achieve zero voltage switching across a wide load range, and gallium nitride FETs for the switching devices, this makes it possible to achieve more than 90% efficiency across most of the input voltage range with good line regulation.

General information
State: Published
Organisations: Department of Electrical Engineering, Electronics, Department of Applied Electronics, Massachusetts Institute of Technology
Contributors: Madsen, M. P., Knott, A., Andersen, M. A. E., Perreault, D. J.
Pages: 1-7
Publication date: 2015

Host publication information
Title of host publication: Proceedings of 2015 IEEE 16th Workshop on Control and Modeling for Power Electronics
Publisher: IEEE
ISBN (Print): 9781467368476
Keywords: invertors, phase control, rectifying circuits, resonant power convertors, Power, Energy and Industry Applications, class-E inverter, Frequency control, Frequency conversion, Gallium nitride, half bridge rectifier, Inverters, modulation technique, outphasing control, Phase control, Power control, Power generation, Rectifiers, Resonant frequency, Switches, very high frequency resonant convertors, VHF circuits, Zero voltage switching
DOIs: 10.1109/COMPEL.2015.7236493
Source: FindIt
Source-ID: 276091287
Research output: Research - peer-review › Article in proceedings – Annual report year: 2015