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In an isolated power supply, the inter-winding parasitic capacitance plays a vital role in the mitigation of common mode noise currents created by fast voltage transient responses. The lower the transformer inter-winding capacitance, the more immune the power supply is to fast voltage transient responses. This requirement is even more critical for modular stacking applications in which multiple power supplies are stacked. This paper addresses the issue by presenting a detailed analysis and design of an unconventional isolated power supply that uses a ring core transformer with a very low inter-winding parasitic capacitance of 10 pF. Considering its output power of 300 W, this approach yields about 0.033 pF/W inter-winding capacitance over output power, approximately thirty times lower than existing approaches in the literature. This makes the converter a suitable solution for modular stacking of fast voltage switching applications. Mathematical derivation of the inter-winding capacitance and experiments are carried out to prove the validity of the approach.

General information
State: Published
Organisations: Department of Electrical Engineering, Electronics
Contributors: Nguyen-Duy, K., Ouyang, Z., Knott, A., Andersen, M. A. E.
Number of pages: 10
Publication date: 2014

Host publication information
Title of host publication: Proceeding of The 16th European conference on Power Electronics and Applications
Publisher: IEEE
Article number: 6910843
ISBN (Print): 9781479930159
Keywords: Parasitic capacitance, Current transformers, Dc-dc power converters, Electromagnetic devices
Electronic versions:
EPE14_final_IEEEcompatible.pdf
DOIs:
10.1109/EPE.2014.6910843
Source: PublicationPreSubmission
Source-ID: 99356669
Research output: Research - peer-review › Article in proceedings – Annual report year: 2015