A 10 MHz GaNFET Based Isolated High Step-Down DC-DC Converter

This paper presents design of an isolated high-step-down DC-DC converter based on a class-DE power stage, operating at a 10 MHz switching frequency using enhancement mode Gallium Nitride (GaN) transistors. The converter operating principles are discussed, and the power stage design rated for 20 W is presented for a stepdown from 200-300 V to 0-28 V. Commercially available magnetic materials were explored and the high-frequency (HF) resonant inductor and transformer designs using a low-loss Fair-Rite type 67 material are presented. Finite element simulations have been performed to estimate the AC resistances of magnetics at 10 MHz. Experimental results are presented at 12 W, 254 V to 22 V on a laboratory prototype operating at 10 MHz. At 20 W the experimental prototype achieved an efficiency of 85.2%.