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Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

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David J. Kappas

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(54) **HALF-BRIDGE LLC RESONANT CONVERTER WITH SELF-DRIVEN SYNCHRONOUS RECTIFIERS**

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See application file for complete search history.

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(57) **ABSTRACT**

The present invention discloses a half-bridge LLC resonant converter with self-driven synchronous rectifiers, which utilizes a primary IC controller and a gate driver to drive the secondary synchronous rectifiers. In correspondence with the gate drive output voltages of the primary IC controller to the primary switch transistors, the gate driver for the secondary synchronous rectifiers comprises a differential transformer if the primary IC controller outputs two ground-referenced gate drive voltages, which cannot directly drive the primary switch transistors but can be imposed on the differential transformer; or comprises a DC shifter, a DC restorer and a differential transformer if the primary IC controller outputs two gate-source voltages, which can directly drive the primary switch transistors but cannot be imposed on the differential transformer. The drive voltages of the primary switch transistors are unipolar; however the drive voltage of the secondary synchronous rectifiers can be bipolar or unipolar. Under the valid operation mode, this converter can decrease the rectifier conduction losses to increase the power converter efficiency.

5 Claims, 14 Drawing Sheets

