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Flyback Converter ICs With GaN Power Switch Simplify Adapter Designs

STMicroelectronics is introducing a series of GaN flyback converters that simplify designing and building compact, efficient USB-PD adapters/chargers, fast battery chargers, and auxiliary power supplies. The converters handle reduced loads with a proprietary technique that ensures power supplies and chargers always operate soundlessly for a superior user experience.

Beginning with the VIPerGaN50W, which contains a 700-V GaN power transistor, the converters also integrate the flyback controller, and optimized gate driver in a compact power package (Fig. 1). The integrated gate driver saves fine-tuning the gate resistance and inductance, helping accelerate time to market, in addition to increasing power density and minimizing the bill of materials. Note that the GaN HEMT is an e-mode device as opposed to the d-mode transistor that Power Integrations uses in its power supply ICs.

The 50-W flyback controller operates in quasi-resonant mode with zero-voltage switching (ZVS) up to the full load. Frequency foldback at light load and valley skipping at mid-to-high load limit the switching frequency for optimal efficiency. In valley skipping, ST's proprietary valley lock stabilizes the number of valleys skipped to prevent variations at audio frequencies and thus ensure silent operation across the load range. At no-load the converter operates in burst mode, cutting power consumption below 30 mW to help meet stringent eco-design regulations.

Advanced power-management features ensure the output-power capability and switching frequency remain stable, even when the supply voltage changes. These include line-voltage feedforward to prevent excessive output power, which lets designers avoid overspecifying power supply components, and dynamic blanking time that minimizes switching losses by limiting the frequency. There is also input and output overvoltage protection, thermal shutdown, and brown-in and brown-out protection (see Fig. 2).

An evaluation board, the EVLVIPGAN50WF is available now to accelerate converter development with the VIPerGaN50W by implementing a 15-V/50-W isolated flyback converter with secondary-side synchronous rectification. Developed for general-purpose applications operating from 90 to 265 Vac, the converter exercises VIPerGaN50W features including its embedded senseFET and high-voltage startup circuitry.

The VIPerGaN50W is in production, in a 5-mm x 6-mm PQFN package, and available at the eSTore and distributors from $1.09 for orders of 1000 pieces. For more information see the website and to order parts see the e-store page. See the EVLVIPGAN50WF page for more on the eval board.

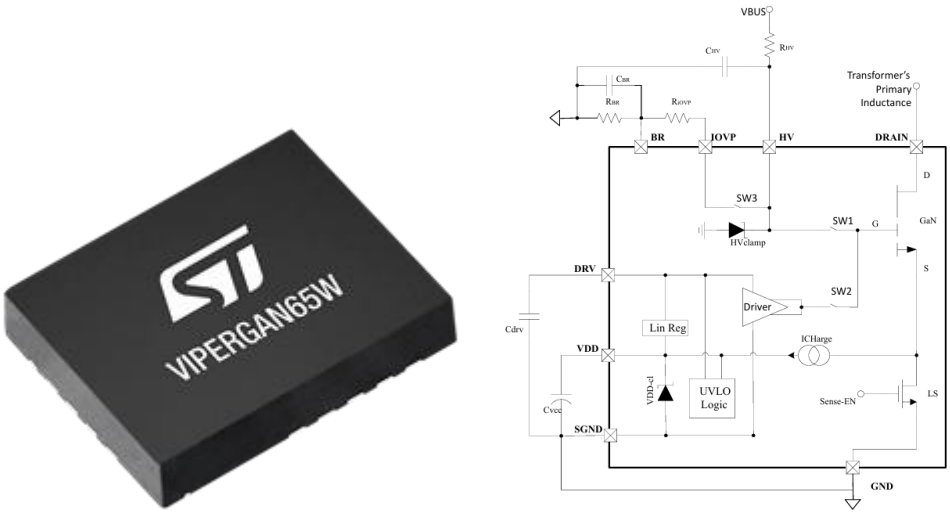

Fig. 1. The VIPERGAN50W is a 50-W advanced quasi-resonant offline high-voltage converter IC with co-packaged 700-V e-mode GaN HEMT. It supports a wide input voltage range and delivers up to 75 W, while maintaining low standby power below 30 mW. Shown here are the part's 5-mm x 6-mm PQFN package (left) and its internal diagram (right).

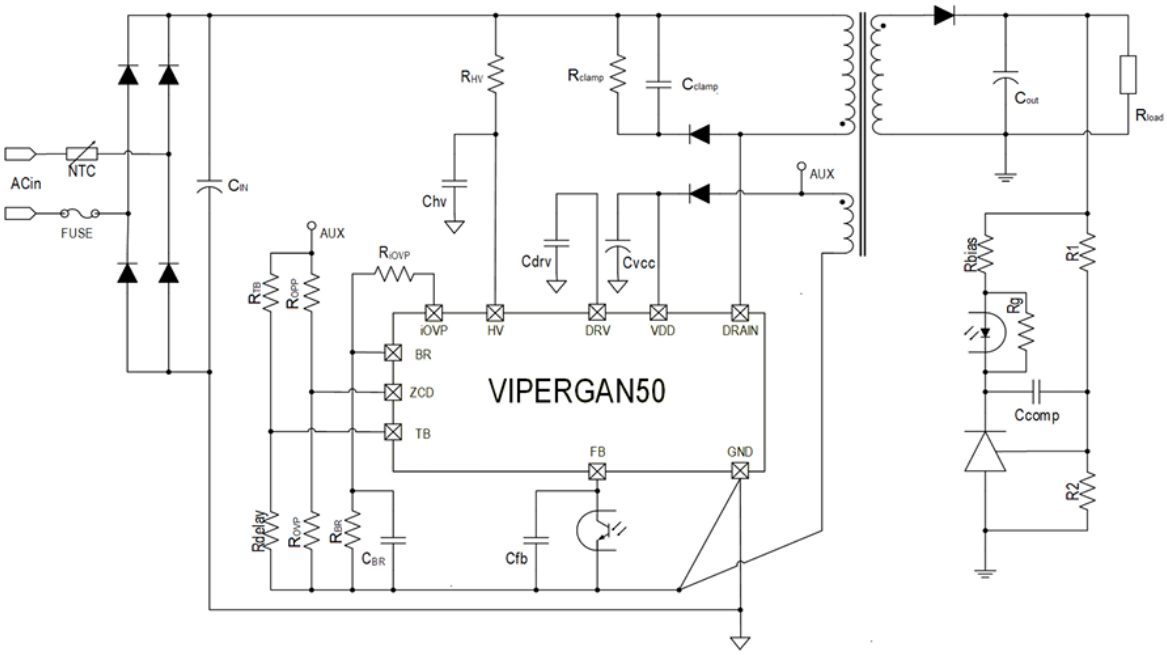

Fig. 2 Typical application circuit with full features.