Power-Supply Controller Touts Desirable Efficiency and Power Density Characteristics

STMicroelectronics' L6699D controller for LLC resonant voltage converters is believed to be the first of its type to combine anti-capacitive protection, auto-adaptive dead-time and enhanced safe-start operation. These features are implemented using patented techniques, and effectively reduce stress on associated power semiconductors while enabling optimized zero-voltage switching for greater energy efficiency across the power supply's full load range, according to the company. By reducing stress on the power MOSFETs of the converter half-bridge, the L6699D's anti-capacitive protection and safe start-up allow designers to specify smaller, lower-cost MOSFETs. There is also a patented method for improving burst-mode operation, which reduces audible noise from the converter without requiring a large or expensive filter.

The company's auto-adaptive dead-time adjusts the duration when both power switches in the half-bridge are turned off. This enables optimized zero-voltage switching over the complete load range from light load to full load using a smaller transformer and resonant components, thereby minimizing both solution size and energy loses in the resonant components. By increasing efficiency at light loads, the L6699D can also save the need for a separate standby power supply in equipment such as televisions pr all-in-one PCs thereby further reducing cost and form factor.

The L6699D is used with two companion chips, the L6563H Power-Factor Correction (PFC) controller and SRK2000 synchronous rectifier driver, to create a complete control solution for medium to high-power applications. Compared to other approaches that combine resonant control, PFC control and sometimes also power MOSFETs in the same package, ST's discrete devices enhance functionality and flexibility for designers. The L6699D is the most feature-rich LLC resonant controller on the market, building on the industry-leading efficiency and performance of previous-generation controllers. Moreover, the three small, low pin-count packages enable small form factors and high power density that cannot be achieved using a bulky, integrated device. The three chips are also competitively priced compared to more expensive integrated devices.

Accompanying innovation: robust, efficient IGBTs

For use in PFC circuits, as well as other energy-conscious equipment such as solar-power inverters, welders or uninterruptible power supplies, ST is also unveiling its first trench-gate field-stop IGBTs at APEC 2012. By combining trench-gate and field-stop technologies, which reduce conduction and switching losses respectively, these devices can improve overall system energy efficiency. ST's field-stop process also achieves high thermal performance and helps enhance safety in high-power applications using multiple devices in parallel. So far, ST has introduced two devices in its new field-stop trench-gate family; the 650V/60A STGW60H65F and 600V/50A

STGW50H60DF.

Major features of L6699D

Anti capacitive mode detection
Adaptive dead time
Reduced audible noise with enhanced burst mode
Reduced stress on power mosfets with enhanced safe start feature
Direct interface with PFC stage
Two-level Over-Current Protection (OCP): frequency shift and immediate shutdown

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Links:
[1] http://www.st.com