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BLDC Motor Driver Eliminates Heatsinks, Slashes Certification Time For Appliance Designs

Members of Power Integrations' BridgeSwitch integrated half-bridge (IHB) motor driver IC family feature high-side and low-side advanced FREDFETs (fast recovery diode field effect transistors) with integrated lossless current sensing, resulting in inverter conversion efficiency of up to 98.5% in brushless dc (BLDC) motor drive applications up to 300 W. According to the vendor, the high efficiency along with the distributed thermal footprint provided by the IHB driver eliminates the need for a heatsink, reducing both system cost and weight (see Figs. 1 and 2).

Integrated lossless current sensing, bus voltage sensing and system-level thermal sensing makes this device family well suited for BLDC motors in home-appliance applications. BridgeSwitch devices target refrigerator compressors, HVAC system fans and other residential and light commercial pumps, fans and blowers.

The 600-V FREDFETs used in BridgeSwitch ICs incorporate fast, ultra-soft-recovery body diodes. This drastically reduces losses during switching and reduces noise generation, which simplifies system level EMC. The new high-voltage, self-powered, half-bridge motor driver ICs also feature built-in device protection and system monitoring and a robust single-wire status update interface, which enables communication between the motor-microcontroller and up to three BridgeSwitch devices.

Each BridgeSwitch device may be configured with different high- and low-side current limits, eliminating the need for the microcontroller and external circuitry to protect the system from open or shorted motor windings. Integrated lossless current monitoring provides hardware-based motor fault protection. This simplifies the task of providing protection under motor-fault conditions to satisfy IEC60335-1 and IEC60730-1 requirements.

Comments senior product marketing manager Cristian Ionescu-Catrina: "We have taken a fresh look at the challenges posed by the burgeoning BLDC market and ever-tightening energy-use regulations worldwide, and produced an innovative solution that saves energy and space while reducing the BOM. This eases compliance with safety standards, simplifies circuitry and reduces development time."

Other features include up to 20-kHz PWM frequency, and a small-signal output that provides accurate, real-time reporting of FREDFET drain current, which mirrors the positive motor winding current. Safety features include two-level device overtemperature detection, low-side and high-side cycle-by-cycle current limit, as well as dc bus overvoltage and undervoltage protection and reporting.

Devices in this family are compatible with all common control algorithms including field oriented control (FOC), sinusoidal, and trapezoidal modes with sensor and sensorless detection. These are described in reference designs DER-654, DER-653 and DER-749. The BridgeSwitch is available in the InSOP-24C, a small surface-mount package offering creepage distances greater than 3.2 mm and enabling PCB heatsinking via two exposed pads.

Samples of BridgeSwitch ICs are available now and are priced at $1.69 each in 10,000-piece quantities. Visit PI's new motor drivers subsite for technical support.

Fig. 1. The BridgeSwitch family of integrated half-bridges dramatically simplifies the development and production of high-voltage inverter driven two- or three-phase PM or BLDC motor drives. It incorporates two high-voltage n-channel power FREDFETs with low- and high-side drivers in a single small-outline package. Offering inverter conversion efficiency of up to 98.5% in brushless dc (BLDC) motor drive applications up to 300 W and a distributed thermal footprint, the IHB driver eliminates the need for a heatsink.

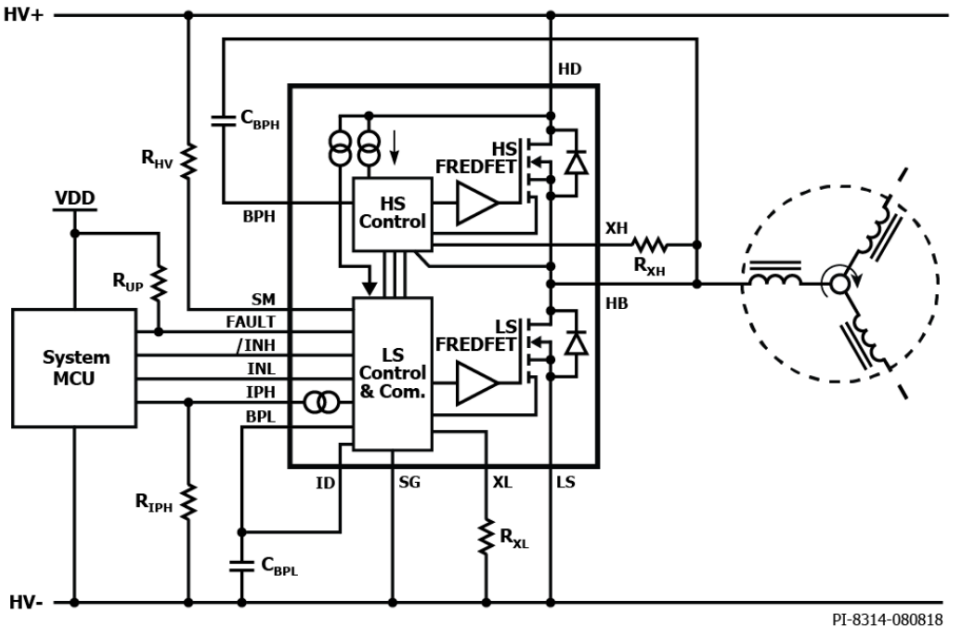

Fig. 2. The BridgeSwitch is a high-voltage, self-powered, half-bridge motor driver with integrated device protection and system monitoring.