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BLDC Motor Hardware-Software Combo Slashes Inverter Sleep-Mode Consumption

[Power Integrations](#) enhanced its hardware-software bundle for brushless dc motors (BLDC) with BridgeSwitch-2, a high-voltage integrated half-bridge (IHB) motor-driver IC family targeting applications up to 1 HP (746 W). The ICs, which feature high- and low-side drivers and advanced FREDFETs with integrated lossless current sensing, deliver inverter efficiency of up to 99% (see the figure).

The IHB architecture eliminates hot spots, which increases design flexibility and reliability, slashes component count and saves PCB area. BridgeSwitch-2 is supported by Power Integrations' MotorXpert software suite which includes single-phase trapezoidal control and three-phase sensor-less field oriented control (FOC) modules, speeding inverter development.

BridgeSwitch-2 ICs handle operational exceptions in hardware, which permits the use of IEC 60730 Class A safety software, reducing certification time by months. Quiescent BLDC inverters can be ordered into sleep-mode, reducing driver power consumption to less than 10 mW; this leaves more power available under regulated standby power limits to be allocated for loads such as network access and monitoring.

Cristian Ionescu-Catrina, product marketing manager at Power Integrations, said, "The low standby consumption of BridgeSwitch-2-based motor drives enables designers to meet new and emerging EU ERP regulations. BridgeSwitch-2 ICs are also far more efficient than IGBT-based IPMs across the entire load range."

Ionescu-Catrina continued, "From startup to performance optimization, the GUI-based tool, terminal emulator and MISRA C-compliant code library of MotorXpert greatly simplifies the design process, allowing the motor architecture to be optimized in real-time without repeated firmware updates. BridgeSwitch-2 is microprocessor agnostic, easing its adoption into existing systems—this is important as engineers update designs to meet more stringent standby regulations."

BridgeSwitch-2 ICs address a power range of 30 to 746 W (1 HP), encompassing a broad range of applications including heat exchanger fans, refrigerator compressors, fluid and circulation pumps, gas boiler combustion fans, washing machine drums and kitchen blenders and mixers. Table 1 lists BridgeSwitch-2 family members by phase-output current ratings.

According to the company, the IHB architecture reduces component count by 50% and PCB space by 30% over discrete designs by eliminating shunt resistors and associated signal conditioning circuits. Shunt losses are also eliminated, improving efficiency. Precise motor control is achieved with the built-in real-time reporting of phase current (IPH) information. Accurate turn-on/off gate drive and a soft-body diode result in a typical EMI profile 10 dB lower than existing drivers, so a smaller EMI filter can be selected.

The ICs also feature built-in dc overvoltage protection and current limits that protect the inverter and the system without relying on system software. The choice of error-flag or comprehensive fault bus reporting supports a range of system requirements. Emerging use-cases like failure prediction are now possible with the high accuracy of the built-in IPH information and comprehensive reporting via the fault bus. Table 2 lists family members by reporting features and availability of IPH current information.

BridgeSwitch-2 motor drives use built-in, hardware-based low- and high-side overcurrent protection to meet IEC 60335-1 Class A requirements. BridgeSwitch-2 also works without an auxiliary power supply, further reducing PCB area and component count.

Pricing for BridgeSwitch-2 ICs starts at \$0.48 for 10,000-unit quantities. A 150-W reference design and design report, RDK-974 can be freely downloaded. For further information, contact a Power Integrations sales representative or one of the company's authorized worldwide distributors—[DigiKey](#), [Newark](#), [Mouser](#) and [RS Components](#). Also see the [BridgeSwitch-2](#) and [MotorXpert](#) pages.

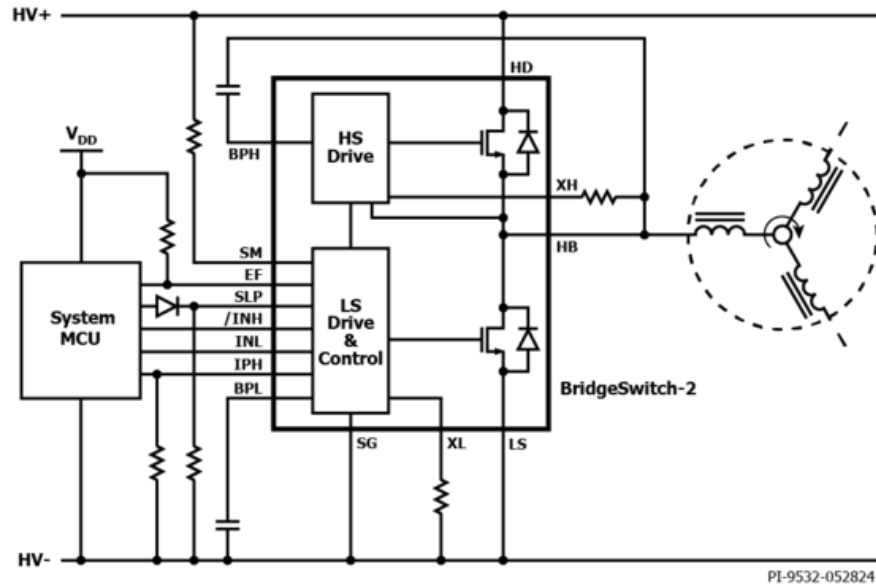


Figure. The BridgeSwitch-2 ICs are high-voltage, self-powered, half-bridge motor drivers with integrated device protection and system monitoring. Quiescent BLDC inverters can be ordered into sleep-mode, reducing driver power consumption to less than 10 mW; this leaves more power available under regulated standby power limits to be allocated for loads such as network access and monitoring.

Table 1. Product family members listed by phase-output current ratings.

Product ³	FREDFET DC Output Current ¹	Continuous Phase RMS Current ²
BRD2x60C	1.0 A	0.22 A
BRD2x61C	1.7 A	0.50 A
BRD2x63C	3.0 A	0.75 A
BRD2x65C	5.5 A	1.00 A
BRD2x67C	11.5 A	1.33 A

Notes:

1. Continuous DC output current per FREDFET, calculated at 25 °C case and 125 °C junction temperature. Normally limited by internal circuitry
2. Continuous phase RMS current, internal self-supply, 340 V bus, trapezoidal commutation with 10 kHz high-side PWM, PCB heat sinking with 50 °C case temperature rise.
3. Package. C: InSOP-24C.

Table 2. Product family members listed by reporting information.

Product Family	Reporting	IPH Current Information
BRD216x	FAULT & ID	-
BRD226x	FAULT & ID	Yes
BRD236x	EF	-
BRD246x	EF	Yes