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GaN IPM Enables Smaller, More Efficient High-Voltage Motors

Texas Instruments' DRV7308 is being introduced as the industry's first 650-V three-phase GaN IPM for 250-W motor drive applications. The GaN IPM addresses many of the design and performance compromises engineers typically face when designing major home appliances and heating, ventilation and air-conditioning (HVAC) systems. The DRV7308 enables more than 99% inverter efficiency, optimized acoustic performance, reduced solution size and lower system costs (Figs. 1 and 2).

"Designers of high-voltage home appliances and HVAC systems are striving to meet higher energy-efficiency standards to support environmental sustainability goals around the world," said Nicole Navinsky, Motor Drives business unit manager at TI. "They are also addressing consumer demand for systems that are reliable, quiet and compact. With TI's new GaN IPM, engineers can design motor driver systems that deliver all of these expectations and operate at peak efficiency."

Worldwide efficiency standards for appliances and HVAC systems such as SEER, MEPS, Energy Star and Top Runner are becoming increasingly stringent. The DRV7308 helps engineers meet these standards, leveraging GaN technology to deliver more than 99% efficiency and improve thermal performance, with 50% reduced power losses compared to existing solutions.

In addition, the DRV7308 achieves industry-low dead time and low propagation delay, according to TI, with both less than 200 ns. This enables higher PWM switching frequencies that reduce audible noise and system vibration. These advantages plus the higher power efficiency and integrated features of the DRV7308 also reduce motor heating, which can improve reliability and extend the lifetime of the system.

Supporting the trend of more compact home appliances, the DRV7308 helps engineers develop smaller motor drive systems. Enabled by GaN technology, the IPM delivers high power density in a 60-pin, 12-mm-by-12-mm QFN package, making it the industry's smallest IPM for 150-W to 250-W motor-drive applications, according to TI (Fig. 3).

Pre-production quantities of the DRV7308 are available for purchase now on TI.com. Pricing starts at $5.50 in 1,000-unit quantities. The DRV7308EVM evaluation module is also available at $250. For more information, see the DRV7308 page and the DRV7308EVM page,

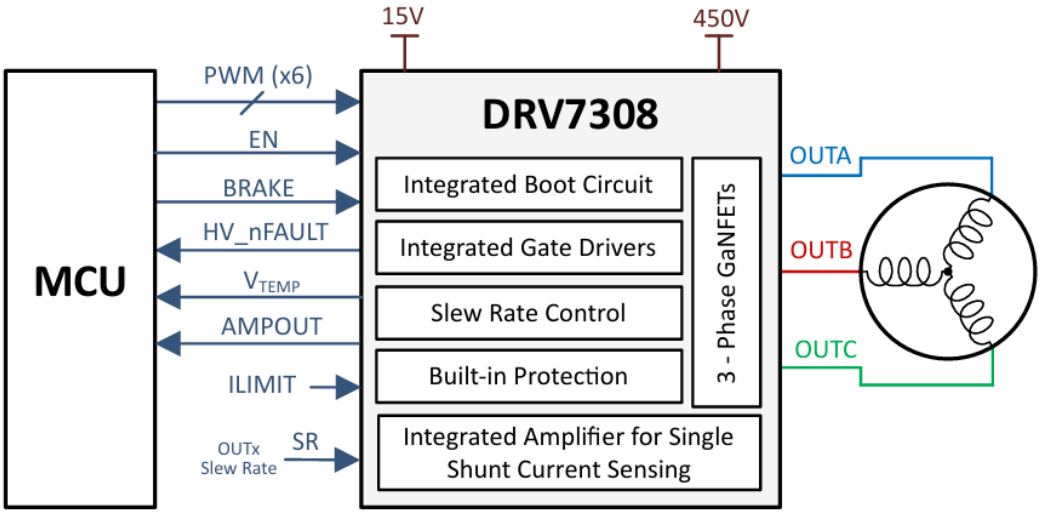

Fig. 1. Simplified application diagram. Because of its high efficiency, the DRV7308 three-phase GaN IPM for 250-W motor drive applications eliminates the need for an external heatsink, resulting in motor-drive-inverter-PCB size reduction of up to 55% compared to competing IPM solutions, according to TI. The integration of a current sense amplifier, protection features and inverter stage further reduces solution size and cost.

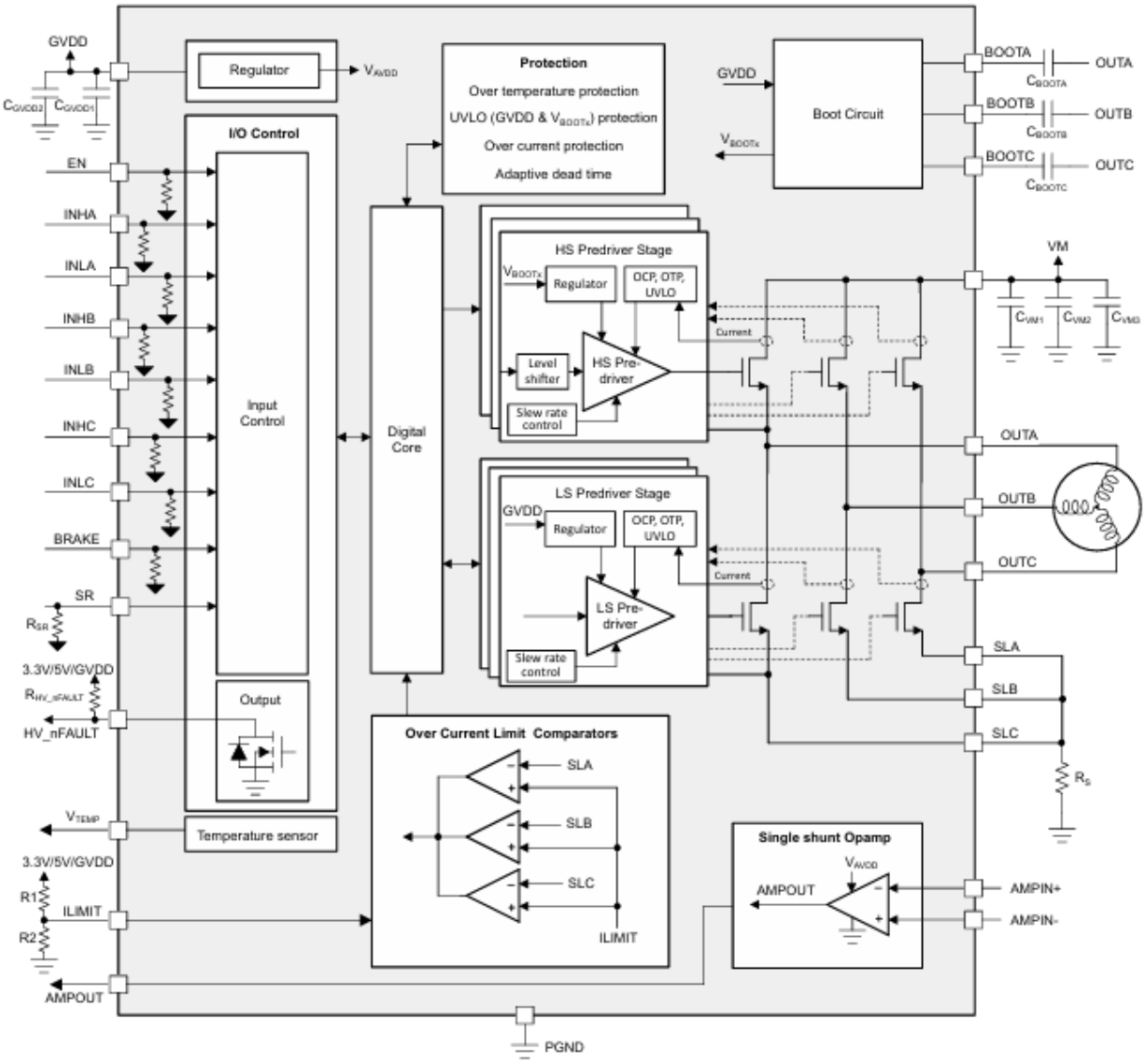

Fig. 2. Internal block diagram. The integration of multiple power electronic components into a single module will deliver improved efficiency, reduced size, and enhanced performance compared to conventional discrete solutions.

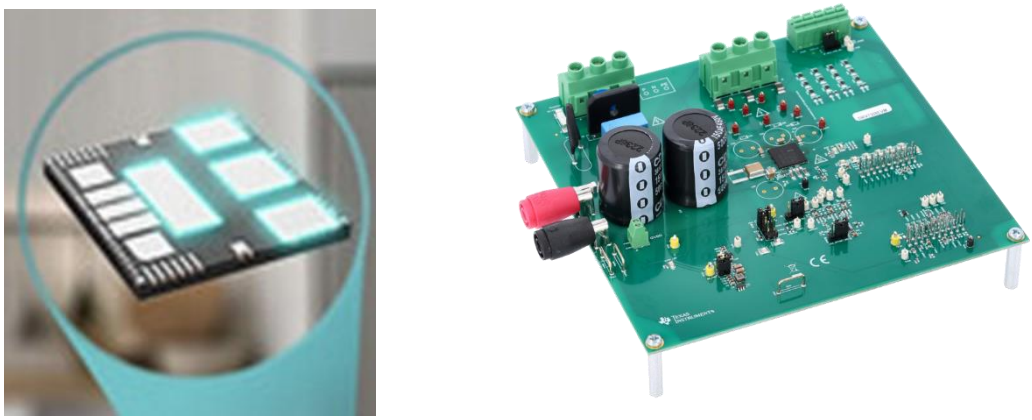

Fig. 3. The DRV7308 motor driver module, shown in closeup on the left, measures 12 mm x 12 mm. On the right, the module is shown mounted on its eval board, the DRV7308EVM.