ISSUE: May 2026

BLDC Motor Drive Board Demos Performance Of Seventh-Generation GaN

From Efficient Power Conversion (EPC), the EPC91121 motor drive inverter evaluation board is built around the company's Gen-7 EPC2366 40-V eGaN power transistor. Measuring 79 mm × 80 mm, the EPC91121 is engineered for rapid prototyping of advanced motor drive architectures in applications such as drones, robotics, industrial automation, handheld power tools, and other compact electromechanical systems where high efficiency and power density are critical (see the figure).

High-bandwidth current sensing on all three phases supports measurements up to ±125 A, while phase and dc-bus voltage sensing provide the feedback needed for precise monitoring and advanced motor-control techniques such as field-oriented control (FOC) and space-vector PWM. Additional features include shaft encoder and Hall-sensor interfaces and multiple test points, simplifying system integration, measurement, and debugging during development.

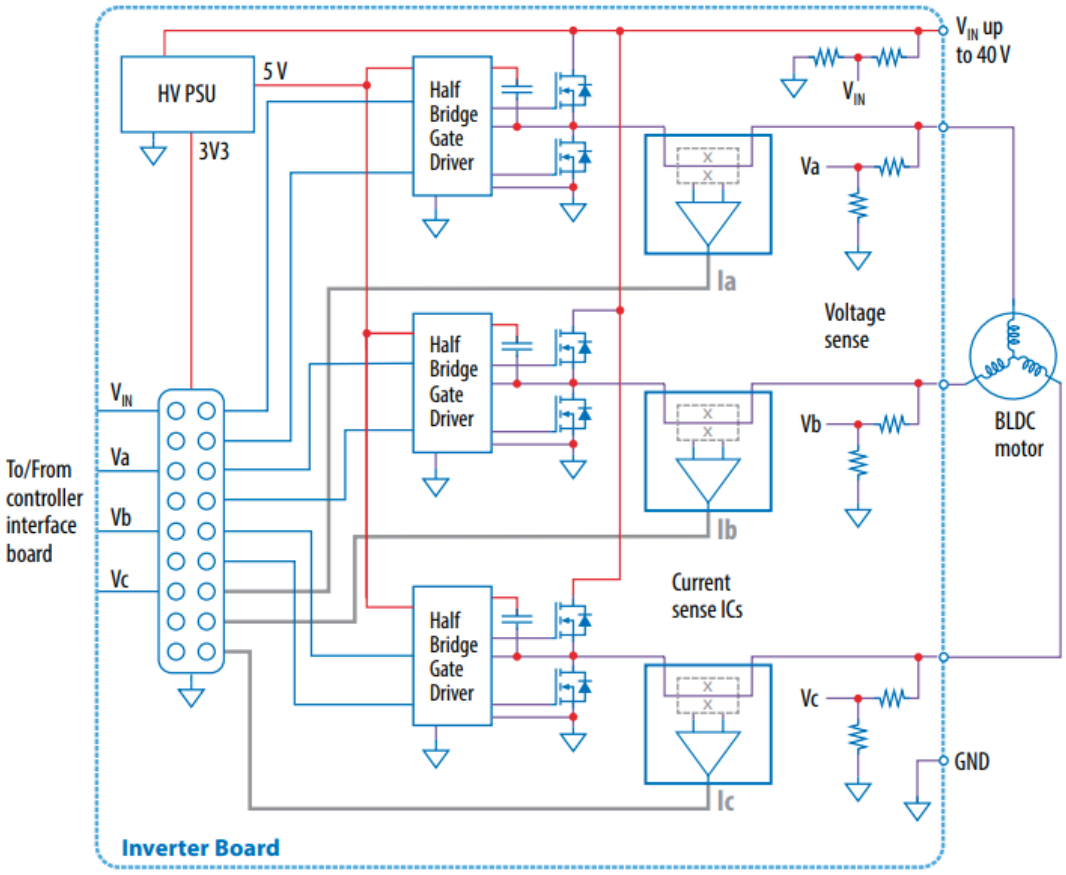
At the heart of the design is the 40-V EPC2366 Gen 7 eGaN FET, featuring an ultra-low on-resistance of 0.84 mΩ, enabling extremely efficient power conversion and fast switching performance. The evaluation platform supports PWM switching frequencies up to 150 kHz, significantly higher than typical silicon-based motor drives. This capability allows engineers to reduce magnetic component size, minimize switching losses, and improve overall system responsiveness.

"With the EPC91121, engineers can evaluate high-frequency GaN-based three-phase inverter designs while leveraging integrated sensing and control interfaces for advanced motor control, " said Marco Palma, director, Motor Drives Systems and Applications at EPC.

The board's optimized layout ensures low-distortion switching, reducing motor acoustic noise and torque ripple while controlling dv/dt to below 10 V/ns for stable operation and improved electromagnetic compatibility. For rapid development, the board features a 40-pin controller interface compatible with platforms from Renesas, Microchip, Texas Instruments and STMicroelectronics, allowing engineers to leverage existing motor-control ecosystems.

Complete design support files, including schematic, bill of materials (BOM), and Gerber files, are available on the EPC91121 product page. Reference design boards and devices are available for immediate delivery from Digi-Key at and Mouser. The EPC91121 reference design board is priced at $335.

(a)



(b)

Figure. The EPC91121 is a complete three-phase inverter solution capable of delivering up to 70-Apeak (50 Arms) output current from input voltages ranging between 18 V and 30 V, making it well suited for battery-powered systems operating around a 24-V supply. Designed for rapid prototyping and evaluation, the board integrates the key functions required for a motor drive inverter, including gate drivers, housekeeping power supplies, voltage and temperature monitoring, and current sensing. A photo of the board and example application are shown in (a). A block diagram of the board in a BLDC drive example is shown in (b).