First GaN-Based Motor Drive Reference Design for Humanoid Robots Delivers up to 15 ARMS in an Ultra-Compact Format

EPC91118 Reference Design Combines Power, Sensing, and Control in an Ultra-Compact Format for Robot Joints and UAVs

EL SEGUNDO, CA, UNITED STATES, July 10, 2025 /EINPresswire.com/ -- Efficient Power Conversion Corporation (EPC), the world leader in enhancement-mode gallium nitride (eGaN®) power devices introduces the EPC91118, the first commercially available reference design to integrate gallium nitride (GaN) IC technology for humanoid robot motor joints. Optimized for space-constrained and weight-sensitive applications such as humanoid limbs and compact drone propulsion, the EPC91118 delivers up to 15 ARMS per phase from a 15 V to 55 V DC input in an ultra-compact circular form factor.

> The EPC91118 is a breakthrough for humanoid robotics, shrinking inverter size by 66% vs. silicon while eliminating electrolytic capacitors—thanks to GaN ICs and high-frequency operation,"
>
> *Alex Lidow, CEO and co-founder of EPC*

At the heart of the EPC91118 is the EPC23104 ePower™ Stage IC, a monolithic GaN IC that enables higher switching frequencies and reduced losses. The GaN-based power stage is combined with current sensing, a rotor shaft magnetic encoder, a microcontroller, RS485 communications, and 5 V and 3.3 V power supplies—all on a single board that fits entirely within a 32 mm diameter footprint.

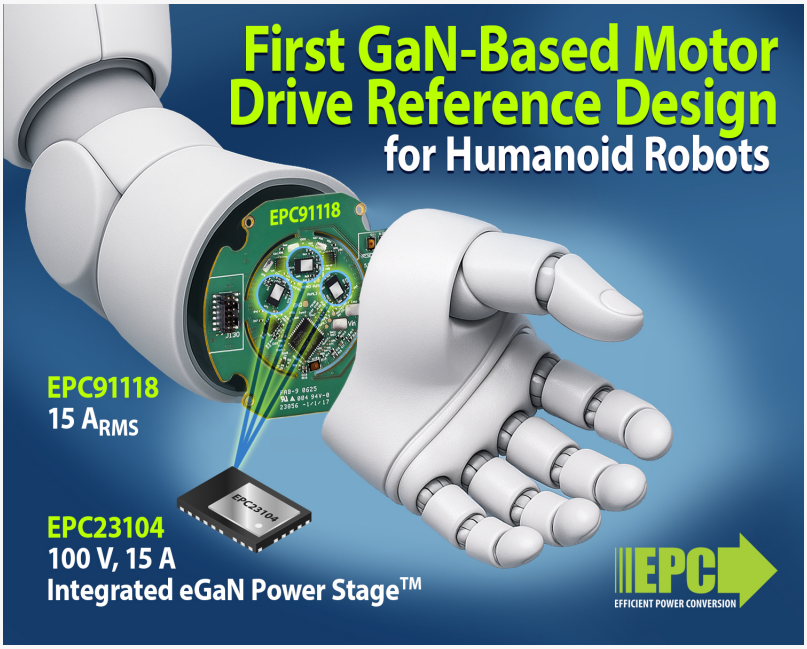
"The EPC91118 is a breakthrough for humanoid robotics, shrinking inverter size by 66% vs. silicon while eliminating electrolytic capacitors—thanks to GaN ICs and high-frequency operation," said Alex Lidow, CEO and co-founder of EPC.

Key Features of the EPC91118 Evaluation Board:

- 15 ARMS per phase drive capability for 3-phase BLDC motors
- Integrated current and voltage sensing with high-resolution encoder for rotor position
- RS485 protocol support for real-time communication
- 100 kHz PWM frequency with 50 ns dead time
- Fully integrated board including controller, sensing, and power conversion

• MLCC-only DC link reduces size and enhances reliability
• Dimensions: 32 mm diameter inverter, 55 mm diameter external frame

The design was shaped to fit seamlessly inside humanoid joint motors, enabling low-profile, high-efficiency motion control. The high switching frequency enabled by GaN allows the use of compact multi-layer ceramic capacitors (MLCCs) rather than bulkier electrolytic capacitors, contributing to a lower profile and higher reliability design.



GaN-Based Motor Drive Reference Design for Humanoid Robots

With a 66% smaller footprint compared to traditional silicon MOSFET implementations, the EPC91118 sets a new standard in motor drive integration for emerging robotics and drone markets.

For detailed technical specifications, schematics, and to request a sample, visit the EPC91118 product page.

Price and Availability
The EPC91118 reference design boards are priced at $394.02
The EPC23104 is priced at $2.69/ea in 3Ku reels.

Reference design boards and devices are available for immediate delivery from Digi-Key at https://www.digikey.com/en/supplier-centers/epc

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