Partner Brief

Building the DC Link 800V+ SiC E-Mobility Demands

PEAK NANO X ADVANCED CONVERSION

The shift to Silicon Carbide (SiC) in e-mobility was supposed to unlock faster switching, higher efficiency, and better power density. Instead, engineers keep hitting the same wall: DC-link capacitors weren't built for the environment SiC creates. Peak Nano and Advanced Conversion are partnering to remove that wall.

The Partnership

Advanced Conversion is a U.S.-based manufacturer of advanced DC-link integration solutions for high-voltage power electronics. With deep expertise in annular winding technology and integrated fabrication, Advanced Conversion has developed a patented Power Ring platform that delivers the lowest commutation loop inductance in the industry.

Peak Nano's NanoPlex™ LDF capacitor film was selected by Advanced Conversion as the film foundation for its next-generation Power Ring DC-link solutions, targeting 800V+ SiC inverter systems across e-mobility, electrified aviation, and DC fast-charging infrastructure.

Evaluation products are in joint development, with first releases planned for late 2026.

THE DC LINK SUPPLY CHAIN

800V+ SiC inverter systems face a fundamental mismatch between what Silicon Carbide switches can do and what traditional DC-link capacitors can support. BOPP-based capacitors derate above 85°C, forcing engineers to oversize the DC link, add cooling, and accept compromises in packaging density and system lifetime. Traditional DC-link topologies weren't designed for sub-5nH-inductance fast switching in SiC modules, adding switching losses and limiting SiC efficiency gains. Over 70% of conventional capacitor film is sourced from China, leaving EV and e-mobility developers exposed to supply chain risk.

This partnership addresses these challenges with a fully domestic, allied-supply-chain solution.

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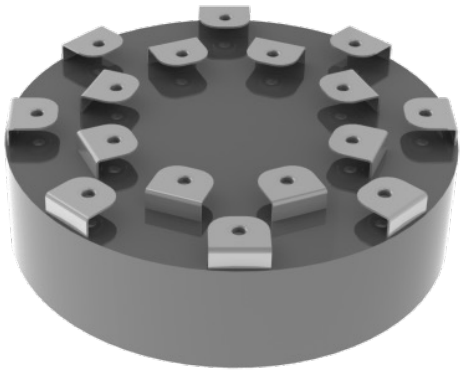
ADVANCED FILM + LOWEST-INDUCTANCE INTEGRATION

NanoPlex LDF Film

Engineered using nanolayer polymer architecture, Peak's NanoPlex LDF achieves new levels of thermal stability and voltage endurance that conventional single-polymer films cannot reach. It maintains 95% of room-temperature breakdown strength at 135°C, delivers 25% higher current handling than BOPP at the same voltage and temperature, and requires no derating up to 135°C, enabling capacitors to sit directly adjacent to hot SiC modules. NanoPlex LDF is a drop-in replacement for polyester-based films in existing winding and fabrication recipes.



From Film to Optimized DC Link

Advanced Conversion translates NanoPlex LDF into fully integrated DC-link assemblies using its patented Power Ring platform. The annular winding geometry achieves ultra-low commutation loop inductance (under 5nH) while maximizing thermal extraction from the capacitor. The Power Ring eliminates through-hole connections, removes thermal expansion mismatch risks, and enables direct interface with a cooling block. A geometric ideal for motor housing, it is configurable for flat inverter packaging or ring shapes that mount directly onto motor ends, accessing unused volumetric space. NanoPlex LDF provides the thermal capability to perform reliably in those high-heat environments.

INTEGRATED DEVELOPMENT PATHWAY

Stage	Description
Pre-Study & Application Review	Application engineers review your system parameters (voltage class, switching frequency, thermal environment, packaging constraints) and provide CAD, thermal models, reliability predictions, and a custom specification within 4–8 weeks.
Evaluation & Prototyping	First-article DC-link builds with NanoPlex LDF film, validated against your application-specific duty profile. Standard test kits built around popular switch module packages, including Infineon HYBRIDPACK Drive, are available for immediate benchmarking.
Design Integration	Application engineering support through design-in, with full documentation and traceability for qualification milestones.
Life Testing & Supply Chain Qualification	Pre-study thermal analysis maps your operating conditions to predicted film life. From there, Peak Nano and Advanced Conversion provide instrumented prototypes for in-system validation, giving customers the measured data needed to clear the supply chain and quality gates that stand between design integration and volume commitment.
Volume Production	U.S.-based winding, fabrication, and manufacturing, scaling with your program timeline.

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PEAK NANO AND ADVANCED CONVERSION CAPABILITIES

NANOPLEX™ LDF Capacitor Film

NanoPlex LDF is a nanolayered capacitor film engineered for the demands of high-voltage DC-link assemblies to achieve thermal stability and voltage endurance that conventional single-polymer films cannot reach. Its architecture enables higher current handling and eliminates derating penalties in applications where BOPP has hit its limits.

LDF Performance vs. BOPP:

- Maintains 95% of room-temperature breakdown strength at 135°C, vs. significant derating above 85°C for BOPP.
- 25% higher current handling at the same voltage and temperature.
- Drop-in replacement for BOPP in existing fabrication processes.
- Domestically engineered and manufactured.

Power Ring DC Link Integration

Advanced Conversion's DC-link integration solutions for high-voltage power electronics leverage a patented Power Ring platform that delivers ultra-low commutation loop inductance and superior thermal performance, enabling SiC-based inverter systems to operate at their full potential.

Core Capabilities:

- Annular winding geometry with ultra-low commutation loop inductance (<5nH).
- Integrated fabrication with direct cooling interface.
- Configurable for flat inverter packaging or ring-form motor housing integration.
- U.S.-based manufacturing across four facilities.
- SiC control ASIC compatibility with On Semi, Infineon, RTX, and others.

Serves:

EV and e-mobility OEMs, Tier 1 automotive suppliers, commercial vehicle manufacturers, eVTOL and electrified aviation developers, and DC fast-charging infrastructure providers.

A Long-Term Platform for Next-Generation E-Mobility

Peak Nano and Advanced Conversion are establishing a long-term co-development platform for DC-link solutions aligned with evolving 800V+ e-mobility requirements. This partnership is structured across passenger EVs, commercial vehicles, off-highway platforms, electrified aviation, and DC fast-charging infrastructure, delivering compact, thermally robust, low-inductance DC-link assemblies manufactured entirely within the United States and through allied supply chains.

LET'S BUILD WHAT'S NEXT.

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NanoPlex™ metamaterials for peak performance

