



## Combined Capacitor/Inductor with Improved Performance

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**WARF: P150389US01**

Inventors: Daniel Ludois, Andy Schroedermeier

**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a low-bulk capacitor/inductor design with low parasitic inductance.**

### Overview

Inductors and capacitors are fundamental building blocks in many electrical devices and provide energy storage. In many applications (both low- and high-powered electronics) the physical size of these components makes it difficult to fabricate smaller circuits.

A UW-Madison researcher recently devised a method for integrating capacitors and inductors into a single energy storage component, dramatically reducing bulk. In essence, the capacitor incorporates into its layers a material of high magnetic permeability so that it may fit into the inductor coil in place of the normal core (see WARF reference number [P140216US01](#)).

By increasing the magnetic permeability of the material in the core structure, the inventors recognized that this can undesirably increase parasitic equivalent series inductance (ESL) at the capacitor terminals, particularly for devices operating at higher frequencies.

### The Invention

UW-Madison researchers have now mitigated the problem of parasitic inductance. Their new design features a loop-back terminal structure that minimizes the net magnetic field induced by the capacitor current. In other words, the capacitor leads are routed back up through the middle of the core to cancel the increased inductance seen at the capacitor terminals.

### Applications

- Manufacturing integrated capacitors and inductors
- Power electronics for aerospace, automotive applications and utility/microgrids
  - Input/output filters for DC and AC power converters/inverters
  - Boost/buck inductors and capacitors
  - Snubbers

### Key Benefits

- Low ESL (parasitic inductance)
- Reduces circuit bulk up to 50 percent
- Simplifies manufacturing
- Ideal for applications where space is at a premium

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Stage of Development

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A preliminary prototype and testing have been carried out.

The development of this technology was supported by the WARF Accelerator Program. The Accelerator Program selects WARF's most commercially promising technologies and provides expert assistance and funding to enable achievement of commercially significant milestones. WARF believes that these technologies are especially attractive opportunities for licensing.

## Additional Information

### For More Information About the Inventors

- [Daniel Ludois](#)

### Related Technologies

- [For more information on the original Dual Energy Core concept, see WARF reference number P140216US01.](#)

### Tech Fields

- [Engineering : Power electronics & control systems](#)

For current licensing status, please contact Emily Bauer at [emily@warf.org](mailto:emily@warf.org) or 608-960-9842

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