
Opportunity

Seeking a licensing and development partner to bring this converter topology to market.

Development Stage

Validated through PLECS simulation of an 800 VDC to 48 VDC, 1500 W design.

Intellectual Property

Provisional Patent Application In Preparation

Publication

Coming Soon

IDF#

26-MST-045

Interleaved Tapped-Inductor Buck-Based Dual Active Bridge Power Electronic Converter

Amirhossein Habibi and Mehdi Ferdowsi

PROBLEM STATEMENT

High-conversion-ratio isolated DC-DC converters usually rely on the dual-active-bridge topology. Achieving a large step-down ratio with a DAB converter typically requires a transformer with a high turns ratio. A higher turns ratio brings more parasitic effects, more challenging transformer design, and higher secondary-side currents, all of which reduce efficiency. Two-stage designs that place a separate buck converter in front of a DAB converter can ease this but add parts and an extra conversion stage. The market needs a single-stage isolated step-down converter that does not put the entire conversion burden on the transformer alone.

SOLUTION

Researchers at Missouri University of Science and Technology have developed a new single-stage isolated DC-DC converter. The design integrates an interleaved tapped-inductor buck converter into the primary bridge of a dual-active-bridge converter, using the same switches for both step-down and inversion. Part of the voltage step-down occurs at the primary bridge before the transformer stage, and the transformer's turns ratio handles the rest while maintaining full galvanic isolation. A PLECS simulation of an 800VDC-to-48VDC, 1500 W design confirmed the approach and matched the theoretical model.

VALUE PROPOSITION

This topology provides a compact, single-stage path to high-step-down isolated power conversion for applications such as 800 V-to-48 V power delivery in AI data centers, electric vehicles, and renewable energy systems. By sharing the step-down task between the primary bridge and the transformer, the design reduces the transformer's turns ratio required for a given conversion ratio. That means lower secondary-side currents, lower conduction loss, lower switch stress, and better efficiency. It also uses fewer parts than a conventional two-stage buck-plus-DAB setup.