TECHNOLOGY

Wide-Band Transformer for Enhanced Common Mode Rejection in Ethernet Magnetics

OVERVIEW

Background

Ethernet is now the worldwide standard in wired broadband communication between computers, and the world market for Ethernet devices is estimated at over fifteen billion dollars for 2009. In 2007, the top five manufacturers of Ethernet devices shipped over 80 million units. Every Ethernet controller contains multiple Ethernet transformers to isolate the device from the media. However, current Ethernet magnetics still rely on traditional transformer designs using legacy manufacturing processes (sometimes by hand). Specifically, the current design of wide-band Ethernet isolation transformers uses interleaved windings to minimize leakage inductance but do not enable the control of cross-winding capacitance, which is a channel for Common Mode noise coupling.

Innovative Technology

University of Maryland researchers have developed and demonstrated a new design for Ethernet transformers utilizing a nested winding structure around a dielectric core that is found to have superior ability to confine flux for enhanced coupling of the primary to secondary winding. Also, through control of the separation between the primary and secondary winding, the cross-winding capacitance of nested transformers can be controlled independently from the transformer's inductance, greatly improving control of Common Mode noise. Lastly, without the need for a ferrite core, these new transformers can be manufactured on printed circuit boards with smaller footprints than current transformer packages or even fabricated on silicon.

Advantages
- Enhanced Common Mode rejection
- Superior cross-winding capacitance control
- Superior flux confinement and primary-to-secondary magnetic coupling
- Ability to engineer the turn ratio without affecting winding symmetry

Applications
- Ethernet transformers

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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

Available for exclusive license

CATEGORIES

- Microelectronics
- Power Electronics

EXTERNAL RESOURCES

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