



PRODUCTION

All Ferrite Formulations Are Not Created Equal

By Blake Roberts, FerriShield Ferrite Product Manager

Recent empirical testing of FerriShield Ferrites shows that there is a notable increase in Ohms of impedance when compared to the exact same competitive alternative. Over the past few years, as the commodity price for raw materials including Ni, Cu and Zn has become unstable, many ferrite manufacturers initiated a product formulation change to maintain competitive market pricing. This composition shift not only provided a net lower cost for the manufacturer but it also resulted in a lower perm material. The effects of permeability on a ferrite core can dramatically reduce a part's impedance at higher frequencies (10MHz and above).

Due to this industry-wide shift in raw material formulation and manufacturing processes, many RFI/EMI ferrites on the market are delivering lower than expected performance across a wide-band frequency range. This variance is an important design consideration for most commercial, military and consumer electronics manufacturers that must meet Class B radiated emissions standards. To compensate for the lower performance, a larger and heavier ferrite must be specified to attain the same level of suppression that was once provided by the smaller and higher perm ferrite core.

These physical characteristics typically conflict with target engineering and market demands for smaller, lighter-weight electronic devices. In today's marketplace with the dramatic increase in specialized sub-cons that provide a single

component to the electronics package, most radiated emission problems are realized after the product is assembled and ready for market. In many instances, a component does not demonstrate an EMI problem when isolated but when assembled in close proximity to other devices, EMI compliance and signal integrity problems become apparent. Also, as technology changes and legacy platforms are enhanced with add-on features such as faster clock speeds, thumb drive readers and

additional USB ports, the once-compliant legacy product becomes a landscape for EMI problems. During the later stages of design and manufacturing, ferrites are typically the most prudent solution for eliminating the interference issue and maintain the shortest time to market.

For the purposes of testing the effects of industry-wide ferrite material formulation changes,

Leader Tech engineers selected one of the company's most popular FerriShield 28 Material Ferrites with a true 850 permeability. Competitive ferrite samples that exhibited the exact dimensions (outside diameter, inside diameter and length) as well as published permeability were procured for testing. All ferrites in the sample group were analyzed on the same test wire using an Agilent 4396B RF Network/Spectrum/Impedance Analyzer and an Agilent 16192A test meter.

Broadband frequencies ranging from 1 to 400MHz were generated across the test wire and ferrite impedance in Ohms

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was recorded. The FerriShield 850 perm material outperformed the other ferrites in the test group from 25MHz all the way through the 400MHz range. The performance variations among manufacturers that offer wideband ferrites are noteworthy. As engineers struggle to eliminate unwanted radio and electromagnetic interference and minimize space and weight allocations, the selection of a high-performance ferrite becomes increasingly important.

"The results of our recent performance tests are impressive," recounted Tim Black, Director-Business Development. "As most of our customers are trying to eliminate radiated emissions, high performance means more impedance in a smaller package. In today's marketplace, no one wants a bulky device; the smaller the better. If a manufacturer is looking for the industry's highest-performance solid or bisected ferrite, they can feel confident in selecting a FerriShield product from Leader Tech."

"We like to work closely with customers to identify the most effective and efficient solutions for their application," Tim continues. "Ferrites are all too often selected by simply pulling a ferrite from a sample kit that has been collecting dust in the corner of a testing lab. This method often results in a core that is too large and costly for the application. We prefer to partner with design teams to offer the most efficient core size and material in the shortest amount of time."

Since tooling provides a fixed envelope for the inside and outside ferrite diameter, the length and height of the core becomes a critical manufacturing variable. The height can be adjusted to produce many different sizes without additional non-recurring engineering or tooling charges.

In the troubleshooting stage, it is possible to take an off-the-shelf ferrite, offer many different heights and quickly determine the amount of impedance for a specific application. By maintain-

ing an 850 perm material, Ferrishield Ferrites are commonly able to offer a much smaller package size when compared to other broadband material providers. When asked about side-by-side performance comparisons, Leader Tech is confident that FerriShield Ferrites not only meet published performance levels but also offer a more efficient solution compared to many competitive alternatives.

In addition to offering the world's largest, in-stock selection of ferrite sizes and styles, Leader Tech has made a major commitment to providing unrivaled technical support from its Global EMI Shielding Technology Center in Tampa, Florida as well as the company's own network of dedicated Regional Sales Engineers.

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