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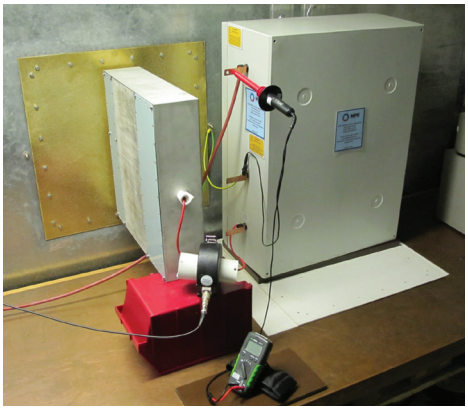
HEMP Filter Bulletin



The Marx pulse generator installed within MPE's in-house screened room test facility

An MPE HEMP filter undergoing subsequent independent PCI testing in the USA

Examples of MPE's commercial HEMP filters

PCI compliance at first time of asking

The well-established procedure for checking compliance of a HEMP filter with the Mil-Std-188-125 specification is to inject a very high current pulse into the front end of the filter and monitor the residual current flowing through. Such pulse current injection (PCI) testing is conducted independently of the filter manufacturer, by trusted test houses utilising specialist and often proprietary equipment. No test house in Europe offers such commercial PCI testing, and filters are most commonly tested in the USA.

This PCI testing can only be carried out at the final stage of development and requires that a prototype filter be made to the same standard as a finished production filter would be. Hence it is vital that any HEMP filter design submitted for PCI testing passes first time, with no requirement for design modifications – which can add both significant cost and further time delays.

When designing new or custom HEMP filter variants, MPE's philosophy centres upon achieving the most efficient and rapid design, with the clear objective of minimising any changes necessary to achieve the required filter specification and performance.

Software modelling is at the core of this philosophy. Based upon the OrCAD PSpice electrical design platform, MPE has built up a library of parametric component designs which accurately replicate real world conditions. In developing these libraries, particular attention has been given to inductor core and capacitor winding materials and their voltage, current and frequency performance. Cabling and in particular insulation properties and characteristics are modelled to accurately reproduce filter performance.

Whilst not exactly replicating Mil-Std pulse waveforms, MPE has developed, in conjunction with the University of Liverpool, an in-house pulse test capability which provides an accurate representation of the Mil-Std E1 pulse for testing and optimising new and variant designs.

Accordingly the Marx pulse generator comprises an 8/20µs pulse tester for bulk current handling tests with a pulse current of up to 5kA, and a 5/200ns pulse tester for rise time checks. The energy content of the 8/20µs pulse is higher than the Mil-Std E1 pulse, but its rise time is much slower. The 5/200ns pulse demonstrates the speed of response of the system. The 8/20µs pulse is used with a view to meeting the E1 residual current limit of 10A.

These PSpice software modelling and in-house pulse testing capabilities provide MPE with a high degree of confidence that, during subsequent external PCI testing, any new or custom HEMP filter designs will meet the requirements of Mil-Std-188-125 without the need for design modification work.

These in-house design and test capabilities are proving invaluable for the successful supply of MPE's new and variant, commercial and modular, HEMP filter ranges for high-profile programs around the world.