MPE
Quality, Reliability, Performance

Company Bulletin

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Example of a mobile radar installation in the USA

A typical MPE dataline filter

Filters for high-speed digital data

During 2016 MPE conducted a complex and extensive filter development program to meet the exacting requirements of a new mobile radar application in the USA. The system itself was to be, wherever possible, compliant with the HEMP protection requirements of the current MIL-STD-188-125, but also, amongst other stipulations, high-speed data equipment needed to be protected for operation in command-and-control shelters.

Data filters and higher frequency signal filters require a wider frequency passband to allow high-speed signals to pass without attenuation. Unfortunately part of the energy spectrum of the HEMP pulse falls also within this range, and so, for a filter to allow the data to pass, the filter will necessarily allow part of the HEMP energy to pass, displayed as a residual current.

This makes it impractical to be fully compliant with the requirements of MIL-STD-188-125 Parts 1 and 2, since to do so would negatively impact upon the data signals. Therefore the challenge for a filter manufacturer is to configure circuits which have a high input inductance in conjunction with surge suppression devices providing minimal residual pulse let-through, whilst not affecting the required data signals.

Following meetings with the system integrator in the USA, MPE embarked upon a new filter design. The foundations for this were already in place, with the filter ultimately being based on a combination of MPE's field-proven HEMP filter designs and its established, non-HEMP, dataline filter ranges.

Using practical application data, PSpice modelling and laboratory testing at MPE, a prototype unit was developed containing two different circuits which allowed both pulse current injection (PCI) testing and system level testing to be conducted in the USA. Upon completion of both these test procedures and selection of the most appropriate prototype circuit, MPE was contracted to prepare the finished product design and to deliver production units.

The finished product is a four-line data filter for use on 9600 baud rate digital datalines, providing attenuation against wideband EMI and with modified circuits to protect against fast pulse and HEMP. Mechanically the filter is bulkhead mountable for ease of installation, with connections made via spade tags and both end compartments being accessible to assist surge arrestor maintenance.

After MPE and its Gold-Certified territory partner Technical Sales Solutions LLC (TSS) (www.techsalesolutions.com) had afforded all necessary support during the installation of the system, a suite of the filters was supplied, and they have now been in successful operation in this mobile radar application for more than 12 months.

tss
Technical Sales Solutions