

TACKLING THE EMI PROBLEM

KEVIN BROOKS, PRODUCT MANAGER AT APC HI-REL, ADVANCED POWER COMPONENTS'S SPECIALIST HIGH-RELIABILITY DIVISION AND THE SOLE UK AND IRELAND DISTRIBUTOR OF VPT PRODUCTS, OFFERS ADVICE ON KEY FACTORS TO CONSIDER WHEN DESIGNING EMI AND TRANSIENT SUPPRESSION SOLUTIONS

1. Where will the design be used?

When designing a successful EMI and transient suppression system, one of the key considerations from the outset should be the specific needs of the end market that the product will serve. A design for the European market, for example, will probably take a different approach from one intended for the US or Asia.

Whilst most of the EMI and transient standards have similar roots, it is always best to work directly with the specifications for the target market to ensure full compliance. It is also worth noting that the military market is different from the commercial market in that specific performance criteria can vary from project to project. This adds another level of difficulty in that some projects may, for example, require circuitry to operate through particular surge voltages, whereas others will allow equipment to shut down and recover for the same input condition.

Solutions that meet as many of the performance standards as possible result in hardware that can be used in a variety of locations worldwide. The designer must realise, however, that a design that meets the requirements of many different specifications is usually over-designed and, therefore, more expensive, larger and heavier for some applications. As such it is necessary to trade off the overall performance of a system with the specifics of each application and the schedule requirements of the project.

2. How are EMI and transient voltage tests performed?

One of the main aims of the various EMI and transient voltage standards is to establish a common technique for the measurement and characterisation of EMI performance, ensuring that EMI characteristics can be reproduced from one test lab to another. However, while test conditions are designed to simulate the actual installation environment, the correlation between results in the test lab and those in the field is often difficult to establish.

A further complication is that not all standards measure the same characteristic in the same way. For example, MIL-STD-461C measures input conducted emissions using a current probe and states the emissions in terms of dB μ A, whereas MIL-STD-461E uses an input line impedance stabilisation network (LISN) and measures noise in terms of dB μ V.

DEF-STAN 59-41, on the other hand, uses a current probe and specifies the emission levels in terms of dB μ A, like 461C, but also uses an input LISN like that used in 461E. For this reason, it is necessary to determine the test method used to state the emission levels.

3. Are packaged solutions available that meet your needs?

Meeting the various EMI and transient suppression requirements issued by the different worldwide agencies involves a considerable amount of work and is often accomplished by designing bespoke solutions.

However, packaged filter solutions that are designed to operate with specific power converters can significantly reduce the time and cost required to achieve a compliant system. In addition, the packaged filter solution can be procured as a single unit, thereby reducing parts count and simplifying the qualification process.

The performance of packaged solutions can generally be determined ahead of time and this can increase confidence that a given solution will work for a particular application. The diagrams in **Figures 3** and **4** show the conducted EMI and transient performance of VPT's DVMN EMI filter/transient suppression module (available in the UK and Ireland exclusively through APC Hi-Rel). This type of information is generally available from module vendors for a variety of application conditions. In addition, application notes and application specific information are available to assist in the use of the packaged filter module for specific situations not covered by the standard datasheet. ■