

Six Basic Steps to Effective EMI Control

Portable electronics and wireless systems often have problems with EMI (electromagnetic interference). As these devices shrink in size and run at higher clock speeds, the chances for EMI trouble are on the upswing. These interference issues can wreak havoc on a project schedule and budget, especially if they're passed on to later stages in the development cycle. Here are some basic rules of thumb designers should know about taking care of EMI.

1. Deal with EMI control early in the design stage

EMI problems can usually be found early, but too often they get left for later in the development stage. What might be resolved by moving a PCB component, or integrating a simple shield easily into the assembly process is bypassed. The EMI action item is handled by an expensive, hard to apply, heavy and unreliable retrofit.

2. Know the requirements and certification process.

What specifications will your product be certified to? Various global standards limit emissions levels, and in some cases, require demonstrated resistance to EMI ([immunity](#)). A legitimate test lab can determine what specs need to be met, test for them and help with applying for certification. Larger labs can also pinpoint trouble areas when EMI levels are above the spec – which is often – and suggested methods for fixing the problem in your design.

3. EMI control starts on the PCB

Certain board components are the source of most EMI emissions. In some cases, the cycle rates of these components can be altered to reduce the emission levels. Board layout is another opportunity for control. Noisy components can sometimes be moved away from sensitive areas. Layout programs are available to help with this. When this isn't enough, some form of shielding is required to isolate the EMI source from other components and the local space. Shielding on a PCB is typically some form of conductive cover mounted over one or more components. This may be a metal 'can', or a plastic part with conductive paint or a layer of conductive elastomer. In some applications, a shielding barrier separates board components to prevent cross-talk. Shielding cans, cover and other barriers must be grounded, and this can be done using board traces and other nearby conductive surfaces.

4. Use the product's enclosure as an EMI shield

A conductive metal housing is inherently an effective EMI barrier. Plastic enclosure parts are readily made conductive with metallized paint or plating process. The best of these systems accommodate the deepest recesses in a plastic housing part, where the smallest discontinuity provides a pathway for spurious emissions. Another shielding system is to enclose board with a folded box made of plastic film laminated

to a layer of metal foil. The laminate shields are essentially an EMI enclosure set inside the product housing. Laminate shields must be commonly grounded to the enclosure.

5. Conductive gaskets are EMI shielding workhorses

There are many kinds of conductive EMI gaskets available and their performance in flexible hand-carried systems is critical to a device's shielding system. EMI gaskets maintain a conductive pathway across enclosure parts. Most will provide an effective environmental seal, and they are frequently used to provide ground paths on boards and other components. Versatile gaskets such as conductive elastomers have cross sections designed with Finite Element Analysis (FEA) to optimize their mechanical performance. The result is lighter gaskets that compress so softly that they can reduce the needed number of enclosure fasteners. Elastomer gaskets can be added to the mounting edges of a board-mounted shielding can or cover. The gasket makes conductive contact with board traces. This design better accommodates flexible plastic-housed devices in which soldered metal cans may break loose.

6. Get the best pricing

The costs for EMI shielding can be a bargain vs. leaving it out, e.g., malfunctioning or non-compliant finished parts. But, the major wireless and portable electronics OEMs continue to push shielding companies for lower cost solutions that fit into their manufacturing systems. To determine the best pricing, find a working solution with the lowest installed cost. Many of today's shielding solutions are designed for automated or enhanced manual assembly. They can be seamlessly integrated into existing manufacturing processes. And EMI solutions are closer than ever before. As global OEMs reduce time and shipping costs using local suppliers, EMI shielding services are often among these nearby resources.

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