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The Importance of Electromagnetic Compatibility

Gary Breed
Editorial Director



Next month (August 14-18) is the annual Symposium of the IEEE Electromagnetic Compatibility (EMC) Society. With that event as a reminder, this is a good time to comment on EMC as a regulatory matter, as well as a part of good engineering practice.

Electromagnetic compatibility is concerned with the prevention of interference, to or from, licensed spectrum users, end-user electronic equipment, or between circuits inside the equipment. Much of the EMC engineering specialty involves achieving and demonstrating compliance with national and international regulations. Another branch is concerned with the creation and coordination of those regulations. This includes more than simply determining the limits of unwanted radiated or conducted emissions—it also includes the important matters of spectrum management and frequency allocation, as well as international coordination of regulations to enable businesses to conduct commerce in an orderly manner.

EMC regulations are often viewed as a “necessary evil.” They are necessary because it’s good policy to require that electronic products operate without causing problems to other devices. The evil part is usually ascribed to the task of reducing emissions to regulatory limits, especially when this job comes after the product’s operational design is completed. Of course, this annoying part of EMC could be reduced or eliminated if more engineers would simultaneously design functional *and* EMC performance into the product. I should note that good EMC design process does happen in applications such as computer motherboards—and the importance of fast, easy compliance testing means that many EMC-related design techniques are jealously guarded as trade secrets.

Enforcement is another matter. It is a practical impossibility for the FCC or other regulators to test all electronic equipment for EMC compliance. Although some equipment must meet fully-documented testing, plenty of consumer electronic equipment reaches the marketplace with little or no EMC testing; some with no concern for EMC at all. Thus, it is up to the users to identify problems with unwanted interference.

In a few highly competitive market segments, self-regulation actually

works. If you don't make a compliant product, your competitor will make sure the regulatory authorities know about it! Unfortunately, this only happens in a small part of the electronics market.

Occasionally, a blatant problem occurs and the FCC makes a highly-publicized rejection of several shipping containers of products with high RF radiation levels. (Poorly-designed switching power supplies seem to be the worst offenders.) We hope that the publicity has a deterrent effect, but I suspect that some of the rejected devices simply return in another shipment with a new brand name.

Why is EMC Important?

Beyond the clear needs of health and safety, why are EMC regulations important? The reason is the same as it is for regulation of sulfur emissions from power plants, chem-

ical contamination of water supplies, or emissions from motor vehicle tailpipes—too much “bad stuff” has a detrimental effect on the environment.

In the case of EMC, the environment is the radio spectrum. This is the environment that has become the most relied upon by the public for their personal communications, entertainment and convenience. We expect a safe water supply and we worry about clean air—we should be equally concerned about an unpolluted radio environment, since it affects our daily lives nearly as much as water and air.

It's not just dropped cell phone calls, either. When interference is identified, it is often by operators of aviation navigation systems or public safety radio networks.

I am in favor of the “minimum necessary regulation” in all areas of government involvement. This does

not mean “deregulation” or “let the marketplace decide.” It means that regulatory bodies have a responsibility to be knowledgeable, thoughtful and independent when they establish the limits on the permissible levels of the “bad stuff” that is an unavoidable byproduct of technology.

In the area of EMC, I think there is currently too much self-regulation and self-certification of compliance. In some locations, interference levels are clearly excessive, but enforcement is poor, due to a lack of resources—which may mean it's not a priority.

To keep our valuable spectrum usable, it is up to our elected officials and the regulatory bureaucracy to shift course, instituting—and enforcing—a set of reasonable, but firm, EMC regulations.