Roadmap Charts Compliance Trends And Requirements For Power Supplies

by Kevin Parmenter, Chair, and James Spangler, Co-chair, PSMA Safety and Compliance Committee

Several years ago I [Kevin] gave a presentation at a few conferences on "what doesn't a power supply have to comply with these days?" That talk highlighted the challenges of meeting the various standards and regulatory requirements imposed on power supplies sold by power supply vendors. Since that presentation was given, the compliance landscape has gotten even more complicated as the pace of change in the power related regulatory environment has only increased. But you may wonder, why is this of interest to the industry at all?

If you are a user or specifier of power conversion products or involved in any way with them, if you cannot meet the regulatory requirements of your application and industry typically you cannot use or sell the end product in your target markets. Or at best you will have issues and challenges making the end equipment comply. For example, suppose the power supplies you have specified don't meet the necessary EMC standards. In that case, you likely will have to apply greater shielding and/or filtering to pass compliance testing.

Clearly there's a cost to not staying informed of compliance requirements for power supplies you'll be using in your applications. Similarly, there's a cost to power supply manufacturers and sellers who don't track the requirements and then design and qualify their products to support the compliance needs of their customers' applications.

With that in mind, the Power Sources Manufacturers Association (PSMA) devotes a section of its Power Technology Roadmap (PTR) to reporting on relevant trends in power supply safety and compliance. For those unfamiliar with the PTR, it is a document published every two years "to provide a consolidated outlook of trends in power conversion technology for the next two to five years. The trends provided in the report are intended to give a broad outlook of the power conversion technologies, components, and applications."

In the latest version of the roadmap, PTR 2019, which is due to be released at APEC 2019 in March, the section on Safety & Compliance describes how power supply compliance has become more challenging since the last PTR was published. Although certain requirements such as those for safety and EMC, have always been in conflict, it has become harder to strike the necessary balance in power supply development as both the safety and the EMC requirements have become more stringent. Then, on top of safety and EMC demands, there are more stringent environmental requirements coming from RoHS, WEEE and conflict material legislation. Plus, power supply manufacturers are expected to meet these various and almost mutually exclusive goals, while keeping component counts and costs down.

To understand why EMC and safety requirements are always in conflict, consider the tunnel vision that exists in the compliance business. For example, the individual screening the end product for safety does not care whether the end product radiates like a spark gap generator attached to an antenna system as long as it's safe and won't harm anyone. On the other hand, the EMC inspector typically doesn't care if the product is unsafe or even functional as long as it meets the EMC requirements. While the different test labs only issue reports on product compliance, and generally don't advise on fixes when products don't pass, their compliance goals always seem to be at odds.

For example, adding more filtering Y caps in the primary may reduce EMI, but then the leakage current increases, jeopardizing compliance with safety standards. And of course the finance department wants the lowest possible cost so adding more of anything is undesirable to them.

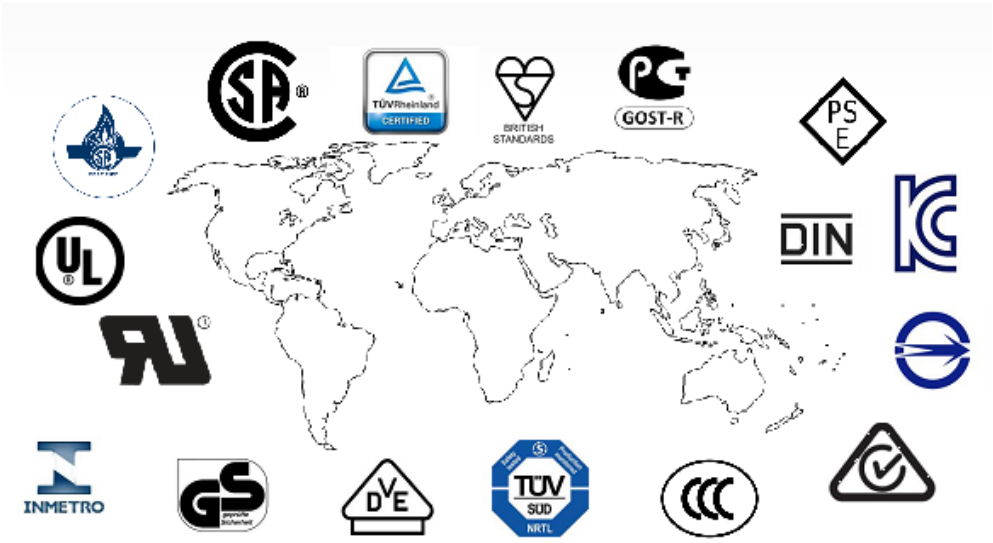
The PSMA maintains a dynamically updated safety and compliance database of associated standards which pertain to three areas relevant to power supplies and their end equipment and target applications. These include EMI-EMC, Safety and Environmental compliance, which includes RoHS, Weee, Reach, and some others. The PTR dives into the approval agencies and what they are looking for. This database is offered, along with the energy efficiency database as a service to the industry, all offered by the PSMA. You don't even have to be a member in order to take advantage of either the energy efficiency database or the safety and compliance database—see the website or contact PSMA for more information.

Some of the standards include IEC 60950-1 and IEC60065, which are both being replaced by IEC 62368 for the commercial–datacom and industrial markets; and IEC60601, which covers medical power supplies as well as a 4th edition EMC which now covers the increased EMC environment in the medical electronics applications space.

Another standard, 61010-1 covers laboratory equipment and industrial test and measurement applications while IEC 61204-7 covers dc output power supplies overall.

Safety agencies and approval agencies are often confused. The ISO and IEC organizations typically are responsible for issuing safety standards and then there are a wide range of organizations that provide certification of components, equipment and end products to the ISO and IEC standards (see the figure). The latter organizations are known as nationally recognized test labs (NRTLs) and tend to be regionally based, though often with satellite offices in other countries. Although not a comprehensive list, the figure names many of the well-known labs. Also, note that all NRTLs are supposed to accept each other's work.

(a)



(b)

Figure. The agencies that issue the standards such as IEC and ISO are separate and distinct from the organizations that certify the compliance of components and products to those standards (a). The organizations that certify compliance—the nationally recognized test labs (NRTLs) —typically are headquartered and dominant in certain regions, though they may have offices globally (b). Despite the regional nature of the NRTLs, their certifications are usually accepted globally.

Assuming you can meet the EMC-EMI certifications of FCC class B and the European CISPR standards, you also have to meet the safety and hipot–leakage current and medical MOOPs and MOPPS requirements. These standards are constantly in revision and various requirements such as the 5000-meter altitude specifications for medical safety have become a defacto standard recently.

The recent European RoHS directive (RoHS2) has become a global requirement for components and power converters used in end apparatus. Dodd-Frank–conflict materials is also a very necessary aspect of certification of your supply chain. Sometimes customers will ask for tin whisker test data to insure component reliability and manufacturing–long term reliability is assured. Moreover, many times customers will ask for detailed documentation on your supply chain and if your manufacturing facilities will meet IEC13485 compliance for medical devices to make sure your products are manufactured in an IEC13485 facility and comply with the necessary risk management requirements.

This landscape is always changing and requirements are always being modified, expanded or otherwise enhanced. The PSMA Safety and Compliance committee continuously monitors and reports on these changes in the industry at little or no cost as a service to the power electronics community, component suppliers and users.

The detailed chapter of the PSMA Power Technology roadmap on Safety and Compliance will cover all the issues highlighted here and more. For example, the PTR will discuss how component certification for isolation safety or flammability applies and relates to the end power converter or the product it is used in.

The Power Technology Roadmap includes the viewpoints of the product certification organizations, which are the same ones your products will have to get past in order to achieve your goal of smooth product certification and reliable operation in the end product application.

The PSMA Power Technology Roadmap is offered as a benefit of PSMA membership. It is also available for purchase by non-PSMA members. For more information, see the PSMA website.

For background on the standards cited in this article see the following websites:

- PSMA Safety and Compliance Committee Compliance and Risks :
- InCompliance Magazine
- IEEE EMC Society
- FCC:
- US Govt CFR: C63:
- IEEE Product Safety Society
- CENELEC
- IEC
- ANSI
- All UL standards

About The Authors

Kevin Parmenter is an IEEE Senior Member and has over 20 years of experience in the electronics and semiconductor industry. Kevin is currently director of Field Applications Engineering North America for Taiwan Semiconductor. Previously he was vice president of applications engineering in the U.S.A. for Excelsys, an Advanced Energy company; director of Advanced Technical Marketing for Digital Power Products at Exar; and led global product applications engineering and new product definition for Freescale Semiconductors AMPD - Analog, Mixed Signal and Power Division.

Prior to that, Kevin worked for Fairchild Semiconductor in the Americas as senior director of field applications engineering and held various technical and management positions with increasing responsibility at ON Semiconductor and in the Motorola Semiconductor Products Sector. Kevin also led an applications engineering team for the start-up Primarion where he worked on high-speed electro-optical communications and digital power supply semiconductors.

Kevin serves on the board of directors of the PSMA (Power Sources Manufacturers Association) and was the general chair of APEC 2009 (the IEEE Applied Power Electronics Conference.) Kevin has also had design engineering experience in the medical electronics and military electronics fields. He holds a BSEE and BS in Business Administration, is a member of the IEEE, and holds an Amateur Extra class FCC license (call sign KG5Q) as well as an FCC Commercial Radiotelephone License.

Jim Spangler is a Life Member of the IEEE with over 40 years of electronics design experience and is president of Spangler Prototype Inc. (SPI). His power electronics engineering consulting firm's priority is helping companies to place products into production, assisting them to pass government regulations and agency standards such as UL, FCC, ANSI, IES, and the IEC.

For many years, he worked as a field applications engineer (FAE) for Motorola Semiconductor, On Semiconductor, Cirrus Logic, and Active Semiconductor, assisting customers in using semiconductors. He published numerous application notes and conference papers at a variety of conferences: APEC, ECCE, IAS, and PCIM. Topics included power factor correction, lighting, and automotive applications. As an FAE, he traveled internationally giving switch-mode power supply seminars in Australia, Hong Kong, Taiwan, Korea, Japan, Mexico, and Canada.

Jim has a Master's Degree from Northern Illinois University (NIU), and was a PhD candidate at Illinois Institute of Technology (IIT). He taught senior and first-level graduate student classes: Survey of Power Electronics, Fields and Waves, and Electronic Engineering at IIT and Midwest College of Engineering.

Jim is a member of the IEEE: IAS, PELS, PES; the Illuminating Engineering Society (IES), and the Power Sources Manufacturers Association (PSMA) where he is co-chair of the Safety and Compliance Committee.

For further reading on power supply-related safety and compliance issues, see How2Power's special section on Power Supply Safety and Compliance.