

Q. What exactly is RFI?

A. Radio frequency interference (RFI) is the radiation or conduction of radio frequency energy (or electronic noise produced by electrical and electronic devices at levels that interfere with the operation of adjacent equipment. Frequency ranges of most concern are 10 kHz to 30 MHz (conducted) and 30 MHz to 1 GHz (radiated).

Q. What types of devices typically cause RFI?

A. Most electrical or electronic equipment can produce RFI. The most common sources include components such as switching power supplies, relays, motors and triacs, and equipment such as business computing devices, work processors, electronic printers, medical instrumentation, industrial controls, personal computers and electronic games.

Q. How do these devices cause RFI?

A. An electrical or electronic device emits RFI in two ways:

1. Radiated RFI is emitted directly into the environment from the equipment itself.
2. Conducted RFI is released from components and equipment through the power line cord into the AC power line network of the building. This conducted RFI can affect the performance of other devices on the same network.

Q. How can RFI be controlled?

A. Radiated RFI is usually controlled by providing proper shielding in the enclosure of the equipment. Conducted RFI can be attenuated to satisfactory levels by including a power line filter in the system. The filter suppresses conducted noise leaving the unit, reducing RFI to acceptable levels. It also helps to lower the susceptibility of the equipment to incoming power line noise that can affect its performance.

Q. As a manufacturer of electronic equipment, why do I need to be concerned with RFI?

A. Since no electronic equipment operates in total isolation, manufacturers must protect their own equipment from RFI noise produced by other devices functioning in close proximity or on the same power source. They are also responsible for making sure that their equipment does not transmit offending RFI noise, resulting in the malfunction of other devices.

Q. What is the government's role in regulating RFI?

A. Governments and safety agencies of major industrial countries, including the United States, Canada, Germany, Sweden, and Switzerland, have established noise emission regulations that are focused on digital and other electronic equipment. The most important of these guidelines are FCC docket 20780 in the United States and VDE 0871 and VDE 0875 in Germany.

FCC docket 20780 (Part 15, Subpart J) regulates the RF interference of electronic computing devices, defined as any electronic devices or system that generates and uses timing signals or pulses at a rate in excess of 10,000 pulses (cycles) per second and uses digital techniques. This definition includes telephone equipment that utilizes digital techniques and any device or system that generates and uses radio frequency energy for the purpose of performing data-processing functions such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval or transfer.

FCC regulations are broken down into Class A computing devices marketed for use in commercial, industrial or business environments, and Class B devices intended for use in a residential environment.

Verband Deutscher Electrontechniker (VDE), the Association of German Electrical Engineers, has established two guidelines on radio frequency interference, generally adhered to throughout Europe. VDE 0871 governs digital equipment generating a broad spectrum of energy in the 10 KHz to 1 GHz range. VDE 0875 applies to digital and non-digital equipment with low-frequency limits of 150 KHz.

In addition to governmental regulations, safety agencies worldwide have established guidelines for all electrical/electronic components. These include UL, CSA, VDE and SEV. They are designed to protect against shock and fire hazard.

Q. How do RFI power line filters work?

A. Consisting of a multiple-port network of passive components arranged as a dual low-pass filter, the RFI filter attenuates radio frequency current to pass through with little or no attenuation. Their function, essentially, is to trap noise and to prevent it from entering or leaving your equipment.

RFI is conducted through a power line in two modes. Asymmetric or common mode noise occurs between the line and ground. Symmetric or differential mode is measured from line to line.

