physical security measures, then they can be readily decoupled from the cables and wires, without the host being aware that his facility has been compromised. The solution to mitigate the risk is to install appropriate electrical filters at the architectural boundary of the red and black zones.

The filters selected must be verified as being effective across the full spectrum up to Super High Frequency. Commercial EMI filters will not support a performance at these high frequencies, and it is essential that professional TEMPEST filters utilising feedthrough suppression capacitors are installed. MPE has been supporting government and military establishments for over 25 years.

Paul Currie, Director of MPE, explains: "Electrical filters designed for TEMPEST anti-eavesdropping applications have to perform across the full frequency spectrum to Super High Frequency or SHF (3GHz to 30GHz), and above. Commercial grade equipment filters, employing two-terminal capacitors and designed for suppression of EMI up to typically 30MHz, will fall into resonance well before the SHF band, and are therefore unsuitable for TEMPEST uses."

Passbands, Stopbands and Integrated Hardening

The filters will have passbands which will allow those wanted frequencies to pass through with minimum attenuation, for example 0-50Hz passband for cables carrying AC power across the building boundary. The stopbands of the filters will be maximal across that frequency spectrum, constituting maximum risk of signal eavesdropping, that is 10kHz/100kHz to 1GHz/10GHz, depending upon a facility's at-risk classification.

Figure 3: 250V AC 16A TEMPEST powerline filter for data centres

MPE's range of TEMPEST power line filters of alternative performance specifications. These extend from 16A filters, which might be used to treat individual power inlets, up to 4800A filters for the hardening of a main building power supply. When specifying filters, data centre managers must also take into account the electrical loading that TEMPEST filters will impose on their power supplies.

TEMPEST hardening comes at a cost – filters cause leakage currents and power dissipation and take up space. On the plus side, the installation of TEMPEST filters supports the protection of equipment within the protected area from incoming mains-borne EMI and transients, which could otherwise pass unimpeded and cause damage and disruption to susceptible pieces of equipment. The TEMPEST filters will also contribute to the attenuation of secondary lightning effects not suppressed by primary building lightning protection devices.

When electrical filters can combine the multiple benefits of TEMPEST hardening, EMI suppression and transient attenuation, this is known as "integrated hardening".

Long-Term Reliability of Installed Filters

Now a critical consideration of any data centre manager is that installed TEMPEST filters will be reliable over time. The undiminished long-term performance of installed filters becomes highly significant when most cannot be accessed easily to survey or replace – having