



COMPUTERS

How Safe Are Your Surge Protectors?

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Most people do not have the training needed to evaluate the filtering and protection afforded by ordinary surge suppressors or know how much filtering or protection is really required to protect their important equipment from surges and noise. Common technologies use fixed voltage clamping elements and shunt capacitors which restrict the performance and endurance of the suppressors. MOV-based products for 120VAC 15 Amp generally give a protection level for 6,000V and only 200 or 500 Amps surge current, even though surges may be as large as 3,000 Amps. The spec is typically given as 330 or 400V, about 150 to 230V above the power wave peak voltage (compared with 10 volts above the power wave peak voltage for WVR-TSC — 15 to 40 times worse than WVR-TSC).

MOVs have an endurance rating in Joules and peak surge current, but there is no practical way to relate these numbers to an actual useful endurance rating. Usually the Joule rating is simply the summation of all the individual MOV Joule ratings, a technically indefensible practice.

Most MOV based products are Mode 2 products (3 modes of protection). These divert surges to the ground wire, thereby injecting noise into audio and video systems while endangering computer networks when surge current is diverted to the sensitive ground wire circuit, requiring additional "data line" surge protectors. Surges are not generated on data lines, but data lines become vulnerable when powerline surge suppressors divert surge energy onto the system ground wire, which is a voltage reference for these

data and signal lines.

Anticipating failure, most MOV based products use a "protection working" indicator light that indicates when the anticipated failure actually occurs. When failure occurs, either the protection is lost as indicated by an LED, or power to the "protected" equipment is shut off.

A product may be determined to be safe when new, but the product can degrade with use. The UL endurance tests involve less than 100 surges, while a suppressor may be exposed to over 1,000 surges in its lifetime. UL does not test to failure with worst-case surges, so a useful endurance rating is not established under UL1449.

Total Protection

A new powerline filter technology (Wide Voltage Range, Total Surge Cancellation- WVR-TSC), was introduced at the 2007 Consumer Electronics Show in Las Vegas. This filter technology is UL Listed for safety under UL1283 (Electromagnetic Interference Filters) and achieves total surge cancellation with a 1,000 worst-case surge endurance rating.

By using Total Surge Cancellation however, the uncertainty of protection requirements has been removed. The damaging surge energy and noise is simply gone! This new technology is suitable for even the most sensitive and critical applications.

Zero Surge has been exclusively in the power quality field since 1989, when they introduced series mode filter technology. Most of those early models are still in service today. In 2002, the WVR (Wide Voltage Range) technology was introduced and the

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patent issued in 2004. WVR enabled dynamic surge protection to operate over the entire 85 to 265 voltage range, compatible with modern switch-mode power supply operating voltages.

Carrier Current Compatible

Since WVR-TSC uses filter technology with inductive input, it actually enhances the powerline carrier signal environment used in powerline networking and X10 carrier current systems, while removing annoying and troublesome surges and noise from the powerline signals downstream from the protection. This offers benefits for audio/video systems, as well as any computing and most communications systems. Most power suppression strips place a capacitor directly across the powerline (their filtering) which short circuits the carrier signals on the powerline, and degrades the overall system performance. Some electronic equipment similarly uses a capacitor directly across the powerline disrupting the carrier signals. The WVR-TSC technology actually enhances the electrical environment for powerline communications systems when placed in front of products which disrupt the desired signals since the powerline is now interfacing with the WVR-TSC input circuit.

The key characteristics of the WVR-TSC technology:

- Filtering so effective it not only filters noise, but totally cancels dangerous surge energy — vital for most important applications.
- Wide voltage range operation: 85 to 175V rms standard, 85 to 265V rms enhanced — compatible with even the most advanced power supplies.
- Powerline networking compatible due to the inductive input.
- X10 carrier current compatible — can enhance the X10 signals.
- Surge endurance rating of 1,000 worst-case surges (no “protection working” lights required).
- OEM, panel mount for branch circuits and point-of-use models.

The WVR-TSC filter technology takes full advantage of the fact that the power frequency is only 60Hz, while surge frequencies and noise are much higher. Once the higher frequencies and noise are filtered off, if the residual surge voltage exceeds the normal power wave voltage range, additional filtering is added, since the powerline peak voltage is constantly being monitored

and dynamically filtered. In all cases, a canceling voltage is developed by an input transformer which cancels any voltage or noise that exceeds the power wave peak voltage. This is phase cancellation, very similar to audio noise canceling technology, only using a high power transformer to generate the phase canceling signal. The overall result is extremely effective noise and surge rejection.

Military, pro-audio/video, laboratory, medical and audiophile customers, while acknowledging the superior protection provided by Series Mode protection, were seeking even better levels of noise and surge abatement for their important and sensitive applications. After 3 months of intensive computer simulations and breadboarding in 2004, Total Surge Cancellation was born, with patent #7,068,487 issued in 2006.

One benefit of this new technology is the fact that many of the confusing industry buzz words are no longer relevant. Clamp level, Joule rating, response time, etc. relate to MOV technology but not this new filter technology.

The new, patented Wide Voltage Range Total Surge Cancellation (WVR-TSC) filter technology simplifies the selection of the desired level of protection, since the damaging surge energy and noise is simply gone — filtered and canceled, and unlike MOV technology, the products do not degrade with use.

For 120VAC, 15 Amp WVR-TSC Power Quality Filter products provide protection level for a 6,000V, 3,000Amp surge (industry worst-case surge): 10V above the power wave maximum. For all practical purposes the surge is gone, even for a worst-case surge condition. System endurance means surviving 1,000 worst-case surges minimum. Unlike MOVs, filters do not degrade with use, and do not require a “catastrophic failure” function. Mode 1 operation required to keep surges off the critical ground wire to avoid injecting noise and surges into sensitive interconnected equipment. The product’s reliability is borne out by its 10 year limited warranty; there are no MOVs to wear out or fail, and it is UL 1283 listed.

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