

Operating characteristics of suppression device components

The most common elements found within a surge suppression device are

- metal oxide varistors (MOVs),
- silicon avalanche diodes (SADs), and
- filtration capacitors.

MOV

An MOV is a nonlinear electrical circuit element that diverts high levels of current while maintaining a low voltage drop across its terminals. It is the most common device used in surge suppression devices.

When the MOV receives a transient voltage that exceeds its rated maximum continuous operating voltage (MCOV), it changes from a high-impedance to a low-impedance element. In its low-impedance state, the MOV can provide an alternative path away from sensitive electrical loads for the damaging transient current. When the transient is eliminated and the voltage returns to nominal, the MOV returns to its high-impedance state, thus eliminating the diversion path and allowing normal current flow to the load to resume.

As shown in Fig. 1, a key benefit of the MOV is that it permits a relatively small voltage change across

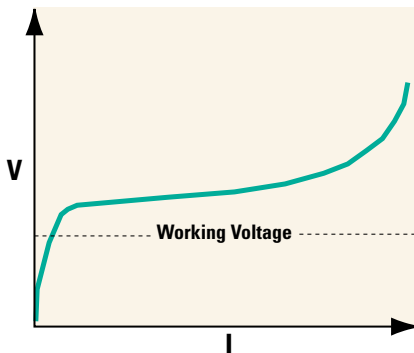


Fig. 1

its terminals while allowing disproportionately large surge current flow through it.

SAD

Best known for its fast response time, the SAD provides the lowest voltage clamping levels offered by a surge suppression component.

When the transient voltage reaches the SAD's breakdown voltage rating, the SAD lowers its normal high-impedance state and begins to conduct. This lower impedance allows the transient to be diverted through the SAD and away from the load. The SAD's voltage current curve is plotted in Fig. 2 and shows the component's fast response and steady voltage clamping.

Filtration capacitors

Lower magnitude impulses, also known as high-frequency noise, are common within electrical distribution systems.

With magnitudes reaching the tens to hundreds of volts, these impulses can cause electronic system upset and component degradation if left unaddressed.

While MOVs and SADs provide protection from large magnitude transient events, these traditional clamping components cannot eliminate high-frequency noise signals that occur below their "turn-on" voltage points. The addition of a frequency-based capacitive filter allows the suppression device to attenuate high-frequency noise signals, thereby increasing electronic system reliability.

MOV/SAD hybrid

An MOV/SAD hybrid combines the current-handling capabilities of MOVs with the fast response and reduced let-through voltage of SADs. This hybrid design leverages the unique strengths of each component. The MOV/SAD hybrid design offers high surge-current handling and the lowest voltage clamping values available.

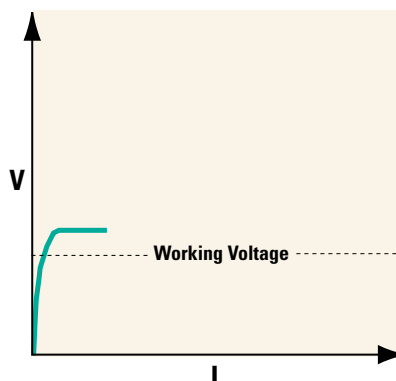


Fig. 2