FIGURE 113

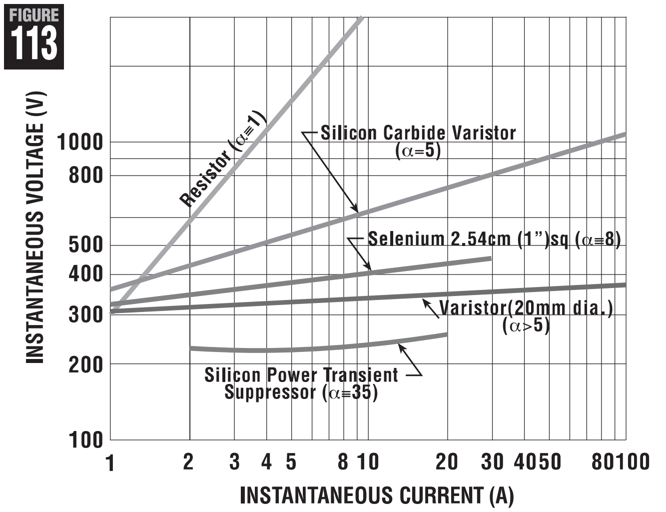
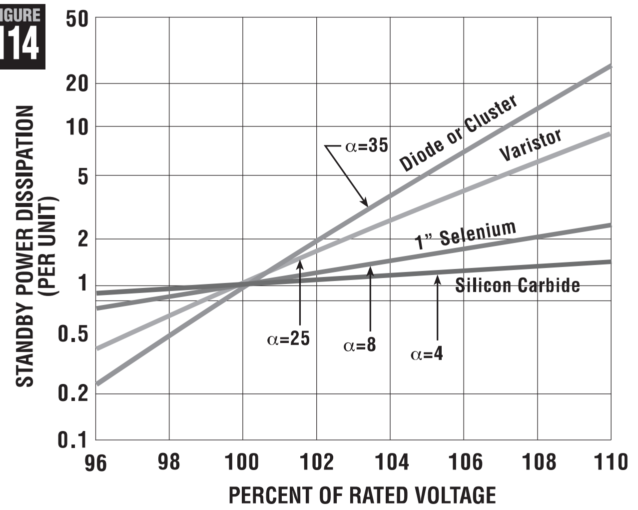


FIGURE 114



Curves used with permission from Littelfuse

Comparison Synopsis

Figures 113 & 114 show the characteristics of transient suppressors and compare their abilities to suppress transients and also handle elevated "swell voltages."

Figure 113 demonstrates the device's ability to clamp transients. The resistor curve, the first element shown, indicates that the current draw is in direct correlation to the voltage applied. The term Alpha (α) indicates the degree of component non-linearity and in this case is shown to be $\alpha = 1$. When a resistor is applied, any change in current will produce an equal change in voltage.

As the transient suppressor's α value increases, so does the degree of non-linearity of the device. In this case, a large change in current produces a smaller change in voltage. Since these active suppressors are voltage-dependent devices, when the voltage across the poles increases, the resistance or impedance of the device decreases exponentially as a factor of α. This is the basic concept of transient suppressors. As a transient voltage spikes upward, the suppressor reduces its impedance drastically and becomes a virtual short circuit to the transient energy. In doing so, the suppressor device clamps the transient spike to a safe level for the system being protected.

Figure 114 represents how the suppressor handles over-voltage events. The higher the α, the higher the current draw in relation to a given voltage input. This condition produces higher device dissipation. While this is the way they are designed to perform for very short transient voltage spikes, continued operation in the over-voltage region will produce excessive heating in devices that have low average power ratings. For this reason, most surge suppression devices are not suitable for long pulse or continuous over-voltage conditions (Swell Voltage).

Summary

Each device type has its own unique advantages and disadvantages. It is very important that the user understands the strengths and weaknesses of the selected suppressor in order to properly apply it to the target system needing protection. Characteristics such as response time, clamping voltage, maximum energy absorption or VI characteristics must be considered. Often, different suppressor types used together can produce the best result.

Examples

The first application presents an inductive load which produces a back EMF pulse of approximately 400 mS at a peak current of 50 to 100 amps. In such an application, options such as several large body MOVs, two or more Selenium suppressors or a single Silicon Carbide (SiCV) assembly can be utilized successfully.

In a second example, an op-amp feeding a capacitive load could use a through-hole or surface mount MOV to protect the op-amp but a TVSS device might be more economical and better suited to the task.

These are but a couple of many examples of where the proper knowledge of all the different surge suppression technologies offered by DTI will enable the designer to enhance the performance of protected systems.

See website www.deantechnology.com or contact factory for additional information on characteristic curves