



Rich's Tech Tip

SPD Response Time..... Clarified!

Abstract: Today's electronics demand that surge protection be provided to protect against both, utility supplied, and internally generated transient overvoltage. An SPD (Surge Protective Device), when properly installed and grounded, will provide that protection. But, just how fast should the SPD respond to these transients in order to provide the necessary protection to equipment?

Response Time by Definition: Response Time refers to the amount of time it takes for the surge protective device to "turn on" and start diverting energy. Surge protection components typically react faster than any available surge energy.

Specifying Response Time: It is typical for specifying engineers to reference response time as a critical parameter when qualifying an SPD. However, it is not uncommon for these specified response times to be a few nanoseconds or less. The confusion stems from SPD manufacturers who publish 1 nanosecond, or less, response time claims. Of these claims, you must ask, how is this value determined? What is the real value of this criteria? Is this level of response time even possible?

Component VS. SPD: SPD's are made from various component technologies such as MOV (Metal Oxide Varistor), SAD (Silicon Avalanche Diode), GDT (Gas Discharge Tube) and others. Each has its own performance characteristics and ratings. The manufacturers of these components publish their response times, typically in tens of nanoseconds. These response times represent the performance at component level. When that component is soldered into a printed circuit board and is combined with other components such as capacitors, resistors and wires to create an SPD, the result is a slower response time due to the added inductance. The commonly specified <1 nanosecond response time for a complete SPD is not realistic. This value has become a marketing tool that some SPD manufacturers use to promote their products. **Therefore, it is not common practice today for an SPD manufacturer to measure and publish the response time of a complete SPD. Instead, the typical values are provided at component level and are not representative of the complete system.**

Industry Standards: Industry standards committees that provide direction such as IEEE, NEMA and UL, have yet to include response time in their publications as an SPD's key performance specification criteria. As a result, there hasn't been an industry standard test procedure to determine how fast is fast enough. These groups agree that a response time should not be used as performance criteria when comparing SPDs.

Conclusion: It is more important to focus on the measured let-through voltage, or UL's VPR (Voltage Protection Rating) that takes into account many variables including the initial response of the components and the added inductance of the whole system. This industry-defined test provides a better representation of the overall level of protection an installed SPD will provide.

