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Application Note

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Subject: SCR's vs Sidactors

The new CLPS-3009 and CLPS-3009PI incorporate the 1900MD Sidactor into its design. The 1900MD Sidactor is a solid state crowbar device designed to protect CATV equipment during hazardous transient conditions. By capitalizing on the latest in thyristor developments. Teccor, (the manufacturer of the Sidactor) has designed the 1900MD with a patented ion implant technology that ensures effective protection within nanoseconds and a surge rating of 3000A.

The 1900MD differs from other transient voltage solutions for the CATV market because it is specifically designed to meet the rigors of this environment. The way the P1900MD works is fairly simple. In the standby mode the P1900MD exhibits a high off-state impedance which eliminates excessive leakage currents and makes it appear transparent to the equipment it protects. Upon application of a voltage exceeding the breakover voltage (V_{BO}), the P1900MD will crowbar (switch from a high off state impedance to a low on state impedance) and simulate a short until the current flowing through the device is either interrupted or drops below the devices holding current (I_H) at which time the P1900MD will reset.

Our previous design (CLPS-4065) was a hybrid which contains two SCRS and a SIDAC. The principle difference between the 1900MD and the solution designed around a Silicon controlled Rectifier (SCR) is that the P1900MD is turned on with voltage whereas the SCR is turned on with current. The net result is that since voltage always leads current in transient conditions, the P1900MD is able to offer a faster and more reliable response time.

Another major difference between the SCR and the P1900MD is the technology used during diffusion. SCR's principally use the same silicon and the same manufacturing process as they did during the 60's, and although this is very effective when manufacturing a power switching device, it is not necessarily the best technique when manufacturing surge protectors. The P1900MD on the other hand uses a patented technology that ensures uniform conduction throughout the silicon, enabling it to handle greater surge currents and offer better reliability.

The other benefit the 1900MD offers over a SCR is that it eliminates localized heating. Localized heating is one of the most damaging things you can do to a semiconductor, it results in premature fatiguing of the device which is caused by damaging glass passivations. The end result to the user is high leakage currents and ultimately complete failure (which is why SCR's are rated in terms of life cycles).

The 1900MD eliminates this problem. By simultaneously activating multiple regions of the silicon during turn on, the 1900MD ensures even conduction. The net result is that the P1900MD does not degrade with usage or time, hence it offers long term reliability and the assurance that it will operate under the most environmentally hazardous conditions

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