

Current Limiting Solid State Relays

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Current limited solid state relays (SSR) are fast becoming the wave of the future as a means for protection against power cross, transients, and lightning strikes. At present, IXYS Integrated Circuits Division offers the current limiting option for many of its 1-Form-A SSRs ("L" suffix is added to part number). The main advantage to using this type of relay is the "twofold" protection it provides. Because the integrated current limiting circuitry instantaneously limits current through the relay, it is in effect self-protecting. In addition to protecting itself, it also protects any circuitry beyond the relay from receiving high current spikes.

As designed, current applied to the input LED results in the emission of light, which is immediately sensed by the photovoltaic (PV) cell in the output circuitry of the relay. Once this occurs, the PV essentially becomes a voltage source. The voltage produced is instantaneously applied to the gates of the output MOSFETs, driving them into the "on" or "closed" state. If a fault occurs at the output while the relay is in this state, then the current limiting feature activates immediately. If the fault is continuous, then the proprietary circuitry will continue to limit the current, and the relay will begin to "shut down", causing a continuous decrease in the load current passed through the output of the relay.

The key to the current limiting circuitry is that it has a negative temperature coefficient, which keeps the limit of power dissipation to safe levels during high-on voltage conditions. Once these conditions are removed, the SSR resumes normal operation. It is important to realize that operation during the current limiting state is generally recommended for short duration high energy transients, not prolonged overvoltage conditions. This is mainly due to the fact that during the limiting state, the device actually exceeds the maximum total power dissipation rating for its package. Continuous operation under these conditions may eventually damage the SSR internally.

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