

Application Note 045 Current Limiting vs. Current Interrupting

Introduction:

Solid State Optronics, Inc. has developed two types of technology which help solid state relays (SSRs) limit the flow of current through their output structures. This application note will attempt to clarify the differences between the two and describe how each one performs.

Current Limiting is a mechanism where the load current is held to a certain value even if it tries to exceed that value. For instance, if the limiting value is 150mA, then during a fault condition of 300mA, the relay will attempt to limit the current to 150mA. The idea behind *Current Limiting* is to maintain a steady load current to downstream circuitry in situations where line impedance might be lowered momentarily creating a slight increase in current.

Current Interrupting is a mechanism where the load current through the SSR is rapidly pulled towards zero during a fault condition. The *Interrupting* feature is intended to protect downstream circuitry during rapid, large transient spikes such as a lightning strike along telephone lines.

Description:

Figure 1 depicts a test circuit used to evaluate the performance of both current limiting and current interrupting in a fault condition. The relays used were AD6C111 devices, some with current limiting, some with current interrupting.

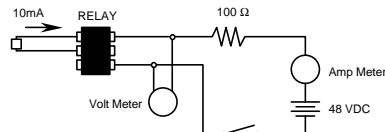


Figure 1: Test Circuit

As shown in the diagram, a load of 480mA was applied to the relay. This current exceeds the maximum allowable continuous current for the device

(For the AD6C111, 120mA is the maximum continuous load current), and causes the current limiting and interrupting functions to be activated.

The AD6C111-L has the current limiting function designed into it. The AD6C111-N is designed with a current interrupting function. Behavior of both functions is depicted below in Figure 2:

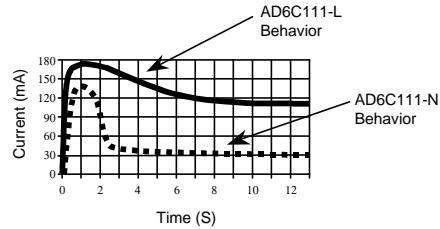


Figure 2: Device Behavior

From the graph in Figure 2, the difference in behavior can clearly be seen. *Current Limiting*, present in AD6C111-L units, limits the current to a preset value. This value will gradually decrease over time as package temperature begins to rise. *Current Interrupting*, present in AD6C111-N units, actually pulls the load towards zero and partially shuts the device down.

In both types of relays, power and heat dissipation becomes an important issue. In the case of the AD6C111-L devices, much more heat will be generated because the device is fighting to maintain high levels of current even while the voltage across it continues to rise. In the case of the AD6C111-N, less heat is generated because the current value allowed through the device drops as voltage rises. If no voltage suppressor devices (MOV, TVS) are placed across the devices, heat generated by the components will eventually destroy the devices.