Using Actel Devices in Hot Socketing Applications

Hot socketing refers to the practice of inserting and removing a module from a system board while system power is active. Hot socketing is a requirement for systems for which turning off the machine would be unacceptably disruptive. Telecommunications switches and routers are two examples.

The biggest concern regarding hot socketing devices is potential latch up—a well-known cause of failure in CMOS devices such as FPGAs. When a subsystem is plugged into active hardware, a low impedance path occurs between Vcc and ground. A large amount of current flows through this path and can temporarily make the device nonfunctional. Although latch up with Actel devices is not likely to occur, due to the robust internal protection diodes, there is a recommended technique to improve circuit integrity.

Actel recommends that the connector of hot socketing modules be modified to guarantee that Vcc and the Gnd connection be established prior to all other signals. This can be achieved by making the Vcc and Gnd contacts (or fingers) longer than all others. In this way, power will be applied to the FPGA prior to any logic signals, thereby preventing latch up.

The circuit shown in Figure 1 is an added precaution for hot socketing. This added circuit is recommended for FPGA input signals that are connected directly to the connector. It essentially duplicates the internal protection circuit with the input pad of the FPGA. The diodes prevent the input voltage from straying beyond one diode drop of Gnd or V_{CC}, which is within maximum device specifications. The protection resistor is used to limit safely peak current flowing in the diodes.

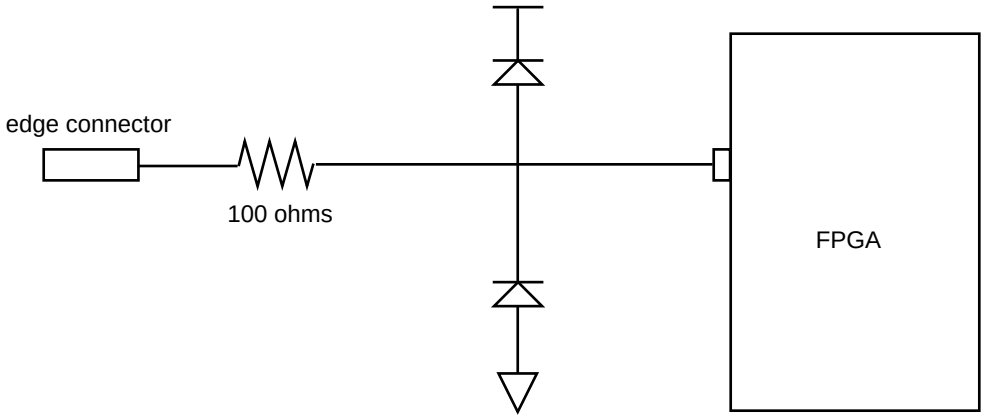

Figure 1 • *Added Circuit Recommended As Precaution for Hot Socketing*