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Using an ADM106x in a Hot Swap Application
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ADM106x PROGRAMMABLE SEQUENCERS

This application note covers the ADM1062 to ADM1069 devices only. The ADM1060 device is not discussed.

The ADM106x Super Sequencers® accurately monitor a number of input rails. The ADM1062 to ADM1067 have 10 input pins dedicated to monitoring (VH, VP1 to VP4, VX1 to VX5) and the ADM1068/ADM1069 have eight (VH, VP1 to VP3, VX1 to VX4). Each of these pins has two internal programmable comparator circuits. By programming these circuits as undervoltage only, overvoltage only, or undervoltage and overvoltage, trip points can be set up around each monitored supply.

The ADM106x devices have an internal supply arbitrator that automatically powers the device from the highest voltage rail on any one of its input supply pins (VH, VPx).

These devices are commonly used in applications that include line cards in telecommunications infrastructure equipment (such as central office, base stations), and blade cards in servers are commonly hot swapped into a live and powered backplane.

In line card applications, the ADM106x may need to be the first device that powers up on a board. This may be because it is required to monitor the input supplies to the board, and if they are within set limits they provide an enable signal to the hot swap controller to allow the main portion of the board to be powered.

This application note describes the design considerations that must be taken into account when the input supplies to the ADM106x come up when a card is hot swapped in a live, powered backplane.

VOLTAGE TRANSIENTS DURING A HOT SWAP EVENT

When a card is plugged into or removed from a powered backplane, there is the possibility of inductively induced transients appearing on the supply rails of the card. These transients appear as an overvoltage on the supply that can range from a few volts to tens of volts. The nature of the transient is highly dependent on the system's inductive and capacitive characteristics, and on the current levels being switched.

If an ADM106x is directly powered by a rail that is hot swapped, then there is the possibility of an overvoltage transient that exceeds the maximum ratings of the part, causing damage to the part.

PROTECTING THE ADM106x

When the supply rail to the device is hot swapped, protection circuits are required to ensure continuous and reliable operation of the part under all conditions. The protection circuit can take the form of an external series resistor and capacitor to ground, see Figure 1. The values shown are typical, and may need adjusting depending on the characteristics of the overall system to provide the necessary protection.

The rail being hot swapped is also usually the supply that powers the ADM106x device. The value of the resistor should be kept low to minimize the voltage drop across the resistor in normal operation. If this supply voltage is also being monitored by an ADC channel within the part, this voltage drop can be compensated and allowed for within the software.
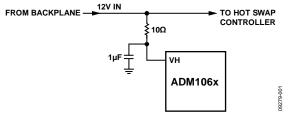

Figure 1. Using an RC Network to Provide Hot Swap Transient Protection

An alternative protection method, shown in Figure 2, is to use a suitably rated transient voltage suppresser (TVS) diode. This avoids the voltage drop associated with the resistor in the first method, and removes the need to compensate and correct the ADC reading to account for the resistor voltage drop. The minimum conduction voltage for the TVS diode must be above the maximum supply voltage for the ADM106x device, but at the same time, must be low enough that it prevents any transients from exceeding the maximum ratings of the device.
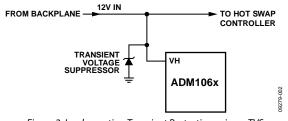

Figure 2. Implementing Transient Protection using a TVS

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