

Monitoring Negative Voltages with the ADM1062 to ADM1069 Super Sequencers

by Alan Moloney

INTRODUCTION

The ADM1062 to ADM1069 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 undervoltage only, overvoltage only, or undervoltage and overvoltage, trip points can be set up around each monitored supply. These trip points are 1% accurate at all allowable voltages and across the entire operational temperature range of the devices.

The VH pin is a high voltage input; it can detect voltages as high as 14.4 V and as low as 2.5 V. This range is broken down to two smaller selectable ranges for better resolution.

The VP1 to VP3 pins can monitor from 0.573 V to 6 V. This range is broken down to three smaller selectable ranges for better resolution, which is especially important for accuracy at low voltages.

The VX1 to VX4 pins are dual-purpose pins. They can be configured as normal voltage monitors. In this instance, they have a single programmable range of 0.573 V to 1.375 V, which is identical to the lowest range on the VP1 to VP4 pins. They can also be set up as digital input pins, looking for logic signals to trigger a certain event.

Note that if any of the VX1 to VX5 pins are set up as logic inputs, their undervoltage and overvoltage comparators are not being used. These unused circuits can then be mapped onto the corresponding VP1 to VP4 pins and used to set up a second undervoltage and overvoltage window around the supply on that pin. This is useful for setting up a warning window around a supply and an outside fault window.

Each input pin on the ADM1062, [ADM1063](#), [ADM1064](#), [ADM1066](#), and ADM1069 is multiplexed to an internal 12-bit ADC to add another degree of monitoring. The ADC can be programmed to detect another undervoltage or overvoltage threshold on each supply. The ADC can operate in a round-robin fashion when enabled. Note that the ADM1066 offers two auxiliary ADC inputs that allow 12 supplies to be connected to the ADC.

Information based on the monitoring circuits is available to the user in many ways. The most obvious way of determining the status of the input is to simply look at the outputs of a programmed ADM1062 to ADM1069 device to see which inputs are good and which are faulting. Some of the outputs can be programmed as dedicated status signals such as a power good or an interrupt.

All devices have an on-board fault register that stores information on which inputs are reporting faults. For example, a user can poll the device over the SMBus to find out which faulting supply generated an interrupt or warning. The ADM1062 to ADM1069 Configuration Tool displays this information for the user.

To download the ADM1062 to ADM1069 Configuration Tool visit: www.analog.com/sequencers.

The devices with an on-board 12-bit ADC (ADM1062, ADM1063, ADM1064, ADM1066, ADM1069) offer voltage readback over SMBus. An SMBus master can poll the device at any time to read back the current voltage level on any or all of the inputs (up to a total of 12 in the ADM1066). These readings are accurate to 0.25% for all allowable voltages and across the entire operational temperature range of the devices. Note that the ADM1062 to ADM1069 Configuration Tool also displays this information.

This application note describes how the ADM1062 to ADM1069 can be configured to monitor negative supplies.

MONITORING NEGATIVE VOLTAGES

In certain systems, it is necessary to monitor negative voltage rails. The ADM1062 to ADM1069 devices can be configured to provide this function.

An external resistor divider between the negative rail and the 2.048 V ($\pm 0.05\%$ accurate) reference can be used to bring the negative voltage into range for monitoring. Figure 1 shows a -12 V supply being level-shifted for monitoring at the VX1 pin, which can detect voltages in the range of 0.573 V to 1.375 V. The programmed undervoltage and overvoltage thresholds correspond to a $\pm 5\%$ window around the scaled down -12 V supply. When programming undervoltage and overvoltage thresholds around negative supplies, this configuration dictates that these two parameters be reversed so that an OV fault on the -12 V is actually detected with the UV circuitry and vice versa.

Note that an error is introduced by the external resistors which affects the accuracy of the desired thresholds (and accuracy of voltage readback if a 12-bit ADC is included). Accurate resistors minimize this error.

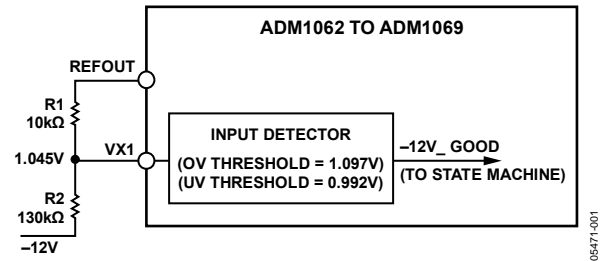


Figure 1. Monitoring a -12 V Supply on a VX1 Pin via a Resistor Divider

For more information on Analog Devices Super Sequencers visit: www.analog.com/sequencers.

For other queries, email: sequencing@analog.com.