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AN-782 APPLICATION NOTE

Monitoring High Voltages with the ADM1062–ADM1069 Super Sequencers™

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INTRODUCTION

The ADM1062–ADM1069 Super Sequencers accurately monitor a number of input rails. The ADM1062–ADM1067 have 10 input pins dedicated to monitoring (VH, VP1 to VP4, VX1 to VX5), and the ADM1068 and 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. These pins 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, 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 which allow 12 supplies to be connected to the ADC.

Information based on the monitoring circuits is available to the user in a variety of ways. The most obvious way of determining the status of the inputs is to simply look at the outputs of a programmed ADM1062–ADM1069 device to see which inputs are good and which are faulting. Some of the output 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 ADM106x Configuration Tool will display this information for the user.

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 will be accurate to 0.25% for all allowable voltages and across the entire operational temperature range of the devices. Note that the ADM106x Configuration Tool will also display this information.

This application note describes how the ADM1062–ADM1069 can be used to monitor voltages higher than the maximum detectable voltage at each input.

Monitoring High Voltages

In certain situations supplies that are above allowable voltage ranges of the input pins may need to be monitored. These are voltages above 14.4 V on the VH pin; above 6 V on the VP1 to VP4 pins; or above 1.375 V on the VX1 to VX5 pins.

The solution to this problem is to use a resistor divider externally to scale the voltage rail down to a level at which it can be monitored. Figure 1 shows a 3.3 V supply being scaled down for monitoring at the VX1 pin, which can detect a maximum voltage of 1.375 V. The programmed undervoltage and overvoltage thresholds correspond to a $\pm 5\%$ window around the 3.3 V supply. Note that an error will be introduced by the external resistors which will affect the accuracy of the desired thresholds (and the accuracy of voltage readback if a 12-bit ADC is included). Accurate resistors will minimize this error.

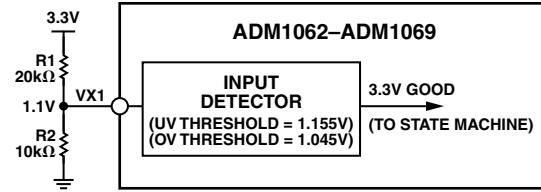


Figure 1. Monitoring a Supply Above the Range for a VX1 Pin via Resistor Divider

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

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

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