



Compensating for the 0 g Offset Drift of the ADXL50 Accelerometer

by Charles Kitchen and Paul Brokaw

The ADXL50 accelerometer has a nominal sensitivity of 19 mV per g of applied acceleration. This is centered around a +1.8 volt offset. The offset will typically drift 35 mV over a 0 to +70 °C temperature range. This drift is very small compared with the amplitude of high g level signals but becomes more significant as the measured acceleration level decreases. For applications not needing a dc (i.e., gravity sensing) response, ac coupling between the preamplifier and the on-chip buffer amplifier will eliminate almost all of the 0 g drift. But, in cases where a dc response is needed, an external temperature compensation circuit will greatly improve the low g performance of the accelerometer.

For those applications where the ADXL50 output drives a μP , it can be used to subtract out the 0 g drift over temperature. This can be indirectly approximated by using the formula:

where T is the temperature in degrees centigrade, or by directly digitizing the output of a temperature sensor, using an ADC.

In the circuit of Figure 1, an AD590 temperature sensor and a 1 k Ω resistor are added to the board containing the accelerometer. The AD590 provides a 1 μ A/ $^{\circ}$ K current output which, together with the 1 k Ω resistor, provides a 1 mV/ $^{\circ}$ K output to the μ P. For best temperature tracking, the AD590 should be attached to the case of the ADXL50. The outputs of the ADXL50 and the AD590 both run to the μ P. The circuit is then placed in an oven and operated over temperature; the μ P then stores the drift curve in its memory and subtracts it out for all succeeding measurements.



