Economical Triaxial Accelerometer with Minimal Power Draw

Description

The Model 834 is a low power triaxial accelerometer designed to be mounted on circuit boards. The accelerometer is ideal for embedded applications and is packaged in a hermetic ceramic LCC package. The Model 834 features stable piezo-ceramic crystals with full power and signal conditioning that draws a maximum current of 4 micro-Amps. This allows continuous monitoring without resorting to power cycling to preserve power. The accelerometer is offered in ranges from ±2000g to ±6000g with a flat response up to greater than 2000Hz.

Applications

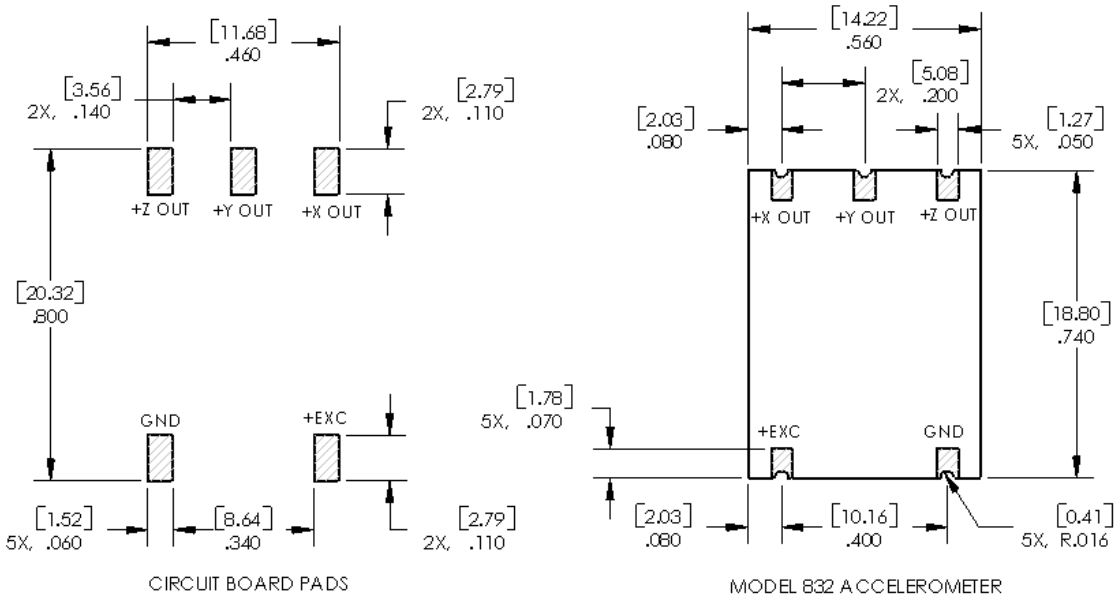
This device was designed to be incorporated into a broad range of measuring devices used for dynamic shock and vibration. Whether used as a wake-up switch or for continuous monitoring purposes, the Model 834 is equally at home in controlled laboratory conditions or in harsh environments with wide temperature swings. Its low power requirements make it ideal for a variety of data logging applications and in remote areas where long-term battery life is a necessity.

Installation

The model 834 accelerometer is designed to be soldered to printed circuit boards or hybrid substrates. It is critical that the substrate has a low coefficient of expansion and that a good mechanical coupling exists between the sensor and the mounting surface to ensure good transmissibility. Ceramic circuit boards are recommended but FR4 boards can also be used with a thickness of 0.062" (1.57mm). The model 834 accelerometer is not to be reflow soldered in an oven since the reflow temperatures may shift the output sensitivity. It is recommended to reflow solder on a hot plate or manually solder the accelerometer to the circuit boards. The following guidelines should be followed.

- The recommended dimensions for the mounting pads on the circuit board are detailed in Figure 1.
- Pre-tinning of the accelerometer pads is recommended to prevent gold embrittlement.
- Use a suitable RMA flux coated solder paste.
- A recommended stencil thickness is .008" (0.2mm).
- If using a hot plate, do not heat above +250°C and leave only on plate long enough for solder to reflow.

Figure 1: Recommended Mounting Pad Dimensions



If the accelerometer is to be subjected to high amplitude shocks during operation then a thin layer of epoxy should be applied underneath the accelerometer after solder reflow attachment. A cyanoacrylate with an operating temperature up to +125°C is recommended.

Excitation
Although the model 834 is designed to be operated by 3.3Vdc battery power for optimum performance, the accelerometer can also be powered by excitation voltages ranging from 3.3 to 5.5Vdc. However, excitation voltages other than 3.3Vdc will affect the full scale range of the accelerometer since the bias voltage is a function of excitation voltage. The following formula can be used to calculate the full scale range of the accelerometer when using different excitation voltages other than 3.3Vdc.

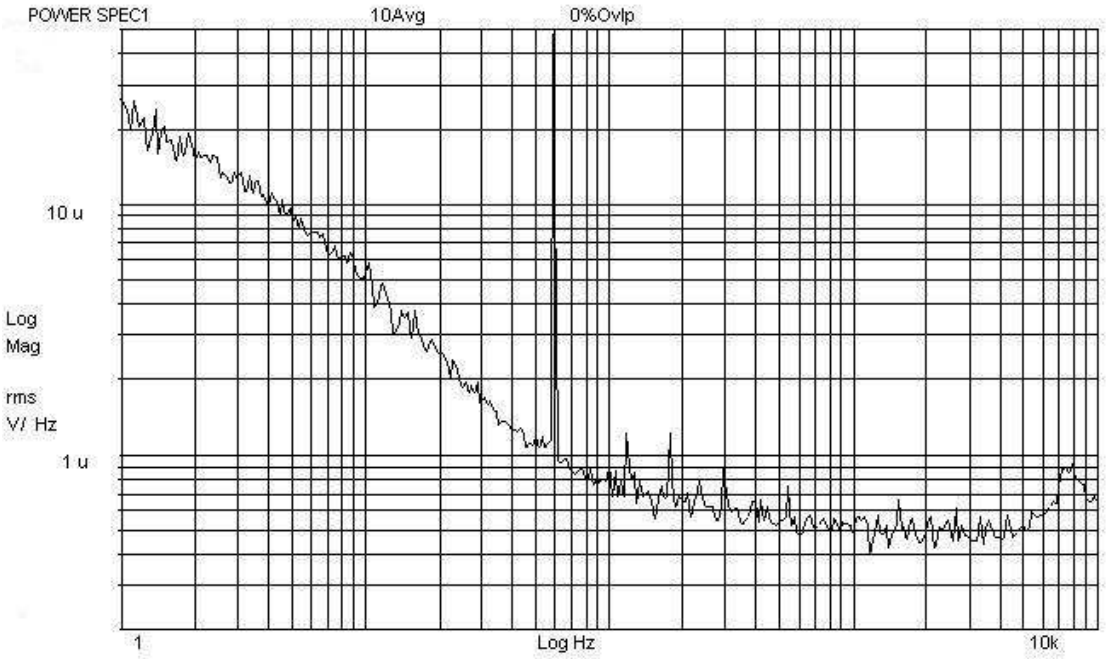
Full scale range (g) = [3.0V – (Excitation Voltage / 2)] / Sensitivity (V/g)

Example; a model 834-2000 with z-axis sensitivity of 0.65mV/g and 3.3Vdc excitation
Full scale range = [3.0V – (3.3V / 2)] / .00065V/g = 2077g

Temperature Compensation
The model 834 accelerometer incorporates piezo-ceramic crystals in shear mode that have a stable temperature performance of the operating range of the accelerometer. Additional temperature compensation can be accomplished by using an external ASIC with onboard temperature sensing to further correct temperature induced errors.

Residual Noise
The PSD noise plots for the various ranges of the model 834 accelerometer are illustrated in Figure 2. The spikes in the plots are 60Hz input and harmonics.

Figure 2: PSD Noise Plots for Model 834



About Measurement Specialties

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