

LOW NOISE MEMS ACCELEROMETERS FOR CONDITION MONITORING

Enabling intelligent, reliable condition monitoring solutions that are easy to deploy and cost-effective.



Why MEMS Accelerometers for Condition Monitoring?

There has been a great deal of interest in the potential for MEMS accelerometers to serve condition monitoring applications in recent years due to the reduced cost of deploying continuous online condition monitoring systems. Indeed, low cost, fully integrated systems or semi-autonomous solutions based on MEMS accelerometers have been offered by several companies over the last 10 years, expanding the market and serving new applications. MEMS electronics enable more highly integrated solutions, leading the way toward localized decision making, reducing the amount of raw data sent upstream, and saving transmit power of wireless edge nodes.

MEMS technology is built in semiconductor foundries and leverages the scale, cost structure, and integration levels of solid-state electronic manufacturing techniques. Several intrinsic characteristics make MEMS accelerometer technology compelling for condition monitoring applications, such as small size, low weight, low power, low cost, reliable and repeatable sensitivity, and high levels of functionality.

Intrinsic Properties Offer a Compelling Solution

Highly integrated, low power MEMS accelerometers with flexible and easy to use interfaces enable the design of creative new product categories that are easier to deploy and lower the overall cost per node, expanding market penetration to new industries and classes of equipment.

Attractive characteristics of MEMS accelerometers include:

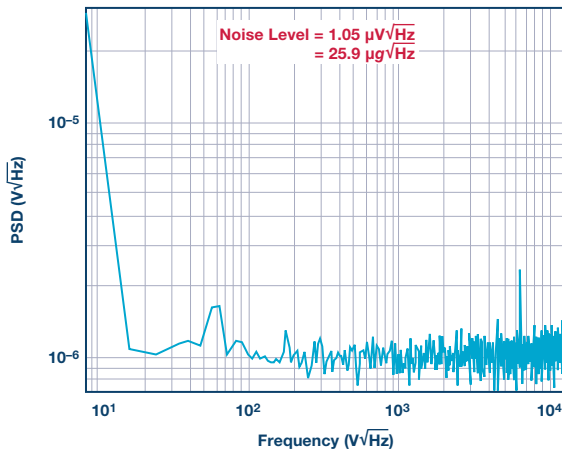
- ▶ Stable and repeatable sensitivity with high tolerance to shock and cross-axis vibration.
- ▶ A frequency response to 0.1 Hz for low RPM machinery and fast recovery from saturation.
- ▶ Consistent quality, reliability, and performance with scalable semiconductor manufacturing.
- ▶ Longer battery life with low power, single-supply operation.
- ▶ Features that increase confidence in embedded applications such as electrostatic self-test and overrange indicator.
- ▶ High levels of functional integration that can include signal processing and digital interface in compact, surface-mount packages.

Breakthrough Noise Performance with High Frequency Resonance

New architectures and careful design of signal condition electronics now deliver noise performance comparable to commercially available PZT accelerometer technologies, with a frequency response from dc to 50 kHz.

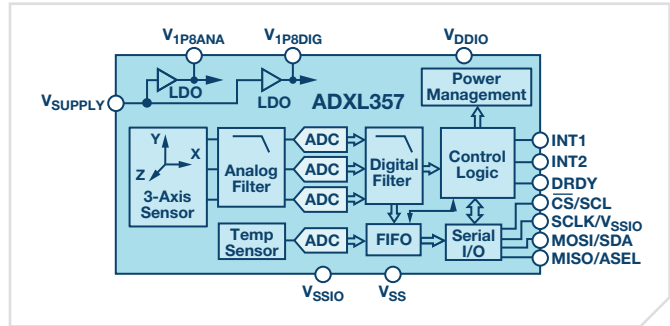
The **ADXL1001** and **ADXL1002** MEMS accelerometers with 21 kHz resonant frequency from Analog Devices deliver $25 \mu\text{g}\sqrt{\text{Hz}}$ noise density across the frequency spectrum with full-scale ranges (FSR) of $\pm 100 g$ and $\pm 50 g$, respectively. These devices come in compact $5 \text{ mm} \times 5 \text{ mm}$ LFCSP packages and can operate over the -40°C to $+125^\circ\text{C}$ temperature range.

Operating on a single 3.3 V to 5.25 V power supply, with low resistance analog output and useful features such as full electrostatic self-test and an overrange indicator, the ADXL1001 and ADXL1002 are easy to use, high frequency MEMS accelerometers for a broad range of condition monitoring applications.



Low Power, Low Noise Triaxial MEMS Accelerometers

For wireless or embedded solutions, the new triaxial **ADXL356** and **ADXL357** deliver compact, low noise 3-axis orientation with very low $200 \mu\text{A}$ current consumption on a 3.3 V power supply. With high levels of functional integration, this pair comes with both an analog and digital output interface and operate over a -40°C to $+125^\circ\text{C}$ temperature range. The ADXL357 integrates a 3-channel, high resolution ADC and includes features such as digital filtering and external clock synchronization. The analog ADXL356 gives the designer access to the 5.5 kHz resonant response of the sensor, maximizing vibration sensing flexibility for your condition monitoring application.



Game Changing Products from a Market Leader

New, high performance MEMS accelerometers from Analog Devices are enabling the market expansion for condition monitoring applications, helping to deliver IoT for the smart factory. These breakthrough accelerometers open the door to smarter, smaller, easier to deploy products and services by reliably delivering high quality data.

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