

# Smart Piezoresistive Accelerometer

**MODEL  
2600**

- **Digital Output**
- **Programmable Full Scale:**  
± 12.5 g to ± 1000 g
- **Noise Floor: 12 mg rms**
- **Freq Response: DC to 5 kHz**
- **Programmable Digital Filter**  
64 Order FIR Type  
Filter Corners: 10Hz to 12 kHz
- **A/D Converter**  
16-bit, Programmable Sample Rate  
up to 250 Ksps
- **IntelliBus Compliant**



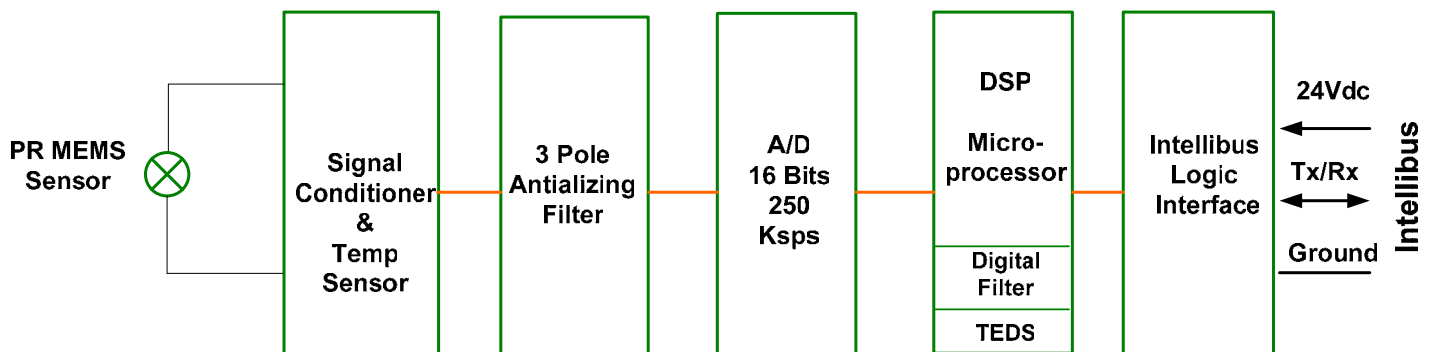
Size: 1.5 x 1.5 x 0.8inches

## Description

The **VIP Sensors Model 2600 Smart Accelerometer** consists of a Piezoresistive MEMS sensor, a semiconductor temperature sensor, and all of the necessary front-end signal conditioning which includes data acquisition, data processing and the IntelliBus-compliant digital bus. It is packaged in a small, low-profile metal case with two pig-tail connectors which are used for daisy chaining the IntelliBus-based network. Its low-noise front end signal conditioning and programmable gain allows for measurement of a wide range of vibration levels. Temperature readings from its built in sensor may be used for on- or off-board temperature correction.

There are two software selectable 3-pole anti-aliasing filters. One with a cut-off frequency at 2 kHz and the other at 360 Hz. The 16-bit A/D converter samples data at a programmable rate up to 250 ksps. A powerful processor performs digital signal processing algorithms such as digital filter, etc.

The Transducer Electronic Data Sheet stored in non-volatile memory provides the information needed to set up the highly versatile signal conditioner and data acquisition parameters.



Smart Piezoresistive Accelerometer Functional Diagram

# Smart Piezoresistive Accelerometer

## MODEL 2600

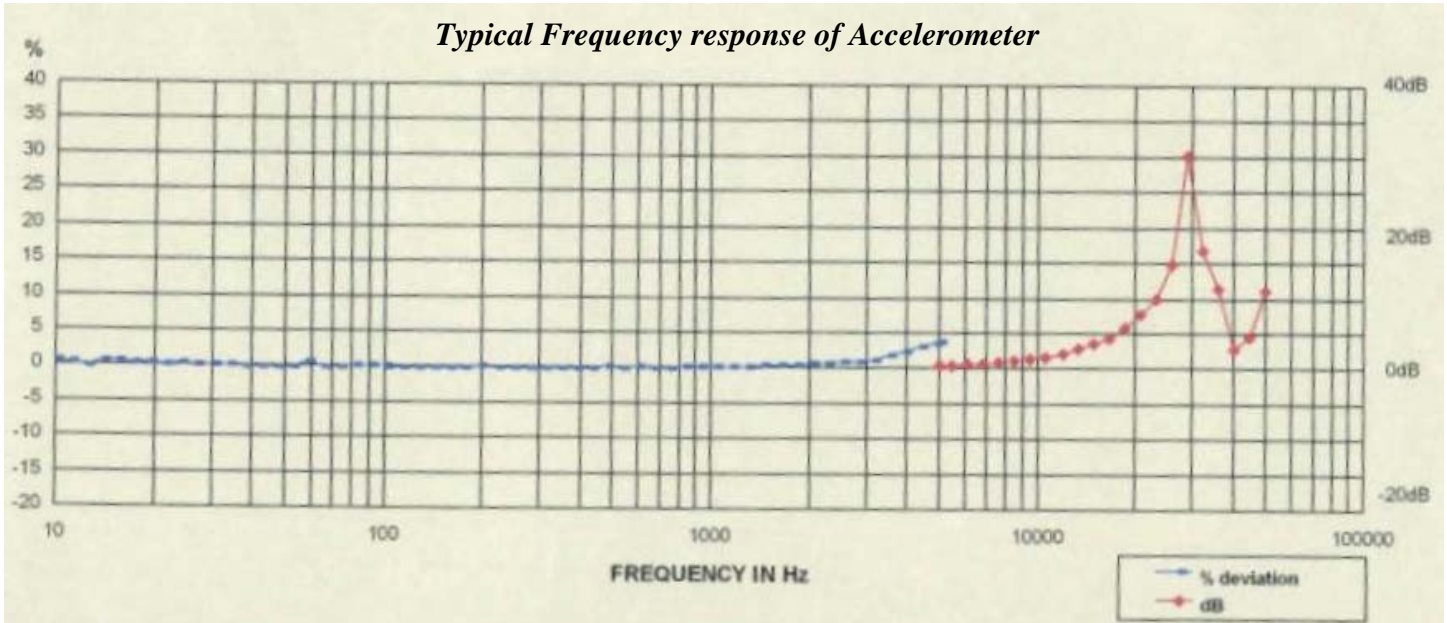
### SPECIFICATIONS

The following performance specifications conform to ISA-RP-37.2 (1964) and are typical values, referenced at +75°F (+24°C) and 100 Hz, unless otherwise noted. Calibration data, traceable to National Institute of Standards and Technology (NIST), is supplied.

PERFORMANCE	UNITS	
<b>DYNAMIC CHARACTERISTICS</b>		
Full Scale Input Range	g pk	± 12.5 to ± 1000 programmable
Accuracy	%	±0.2 Electronic signal conditioner and Data Acquisition ±1.5 Sensor Calibration Uncertainty at 100 Hz
Noise	%	0.2 of full scale max
Thermal Sensitivity shift	%/°F	0.002
Transverse Sensitivity	%	< 5 typical
Amplitude Linearity	%	< 2
Bandwidth (F-5%)	Hz	1 to 5,000 No filter, accelerometer and signal conditioner only
Anti-aliasing Low Pass Filter	Hz	3 pole Butterworth
-3dB Upper Freq. Corner	Hz	2,000 or 360 Software selectable and factory customized
Programmable Digital Filter		64th Order FIR type – TEDS programmable coefficients
Cutoff Frequency		Programmable, proportional to sample rate, decimation factor and filter's coefficients – See application notes
<b>ANALOG/DIGITAL CONVERSION</b>		
Sample Rate	Ksps	Programmable up to 250
Resolution	bps	16
<b>Transducer Bus</b>		½ Duplex IntelliBus compatible
Data Rate	Mbps	15Mbps. See sample rate Vs Number of IBIMs plot
	V	
	V	
<b>POWER</b>		
Supply Voltage		12 to 28 VDC 2.4 Watts Maximum
Warm-Up Time		3 seconds to within 10% of final basis
Case Isolation		Output and signal ground, 100 MΩ minimum @ 100 Vdc
<b>ENVIRONMENTAL</b>		
Operating Temperature	°F (°C)	-40 to +255 (-40 to +125)
Shock	g	6,000 (0.5 ms Half-sine period in each directional axis)
Vibration	g rms	2000 (20-2000 Hz random)
Humidity		Epoxy sealed
<b>PHYSICAL</b>		
Size	Inch (mm)	1.5L × 1.5W × 0.6D (38 x 38 x 16)
Weight		2 Oz.
Case Material		Anodized Aluminum
Cable Type		Double shielded 2 pairs, 24AWG: Tensolite NF24Q100-01
IntelliBus Connector		Lemo: FGG-OB-304-CLAD42 and FGG-OB-304-CLLD42

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## Digital Filter:

Different analysis and control functions may be implemented using DSP algorithms that can be downloaded to an IBIM through the transducer bus. A 64 order FIR filter is provided as a standard function. Its coefficients may be customized and downloaded through the IntelliBus network as part of the system setup and stored in TEDS memory. The low pass filter cutoff frequency ( $F_c$ ) is determined by the A/D sample frequency and a preset constant

$$F_c = F_{ad}/R$$

Where  $R = 4, 8, 12, 16, 24, 32$

The Sample rate frequency over the transducer bus ( $F_s$ ) is determined by the A/D sample frequency and the decimation factor  $D$

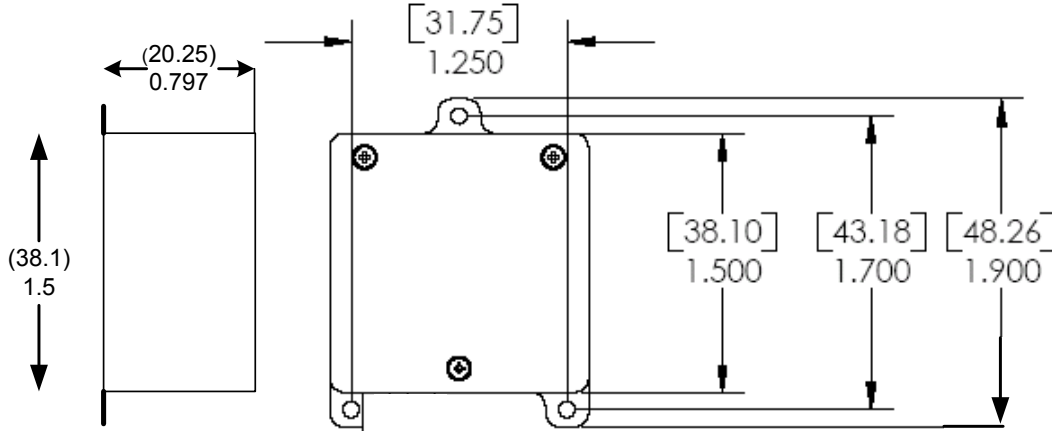
$$F_s = F_{ad}/D$$

Where  $D \leq R/2$  Integer

One of the two anti-aliasing filters is selected depending on the over sample frequency according to the Nyquist criteria. The recommended over sample frequency should be between 100 kHz and 16 kHz when the 2 kHz anti-aliasing filter is used, or between 11,520 Hz and 2,880 Hz when the 360 Hz anti-aliasing filter is used.

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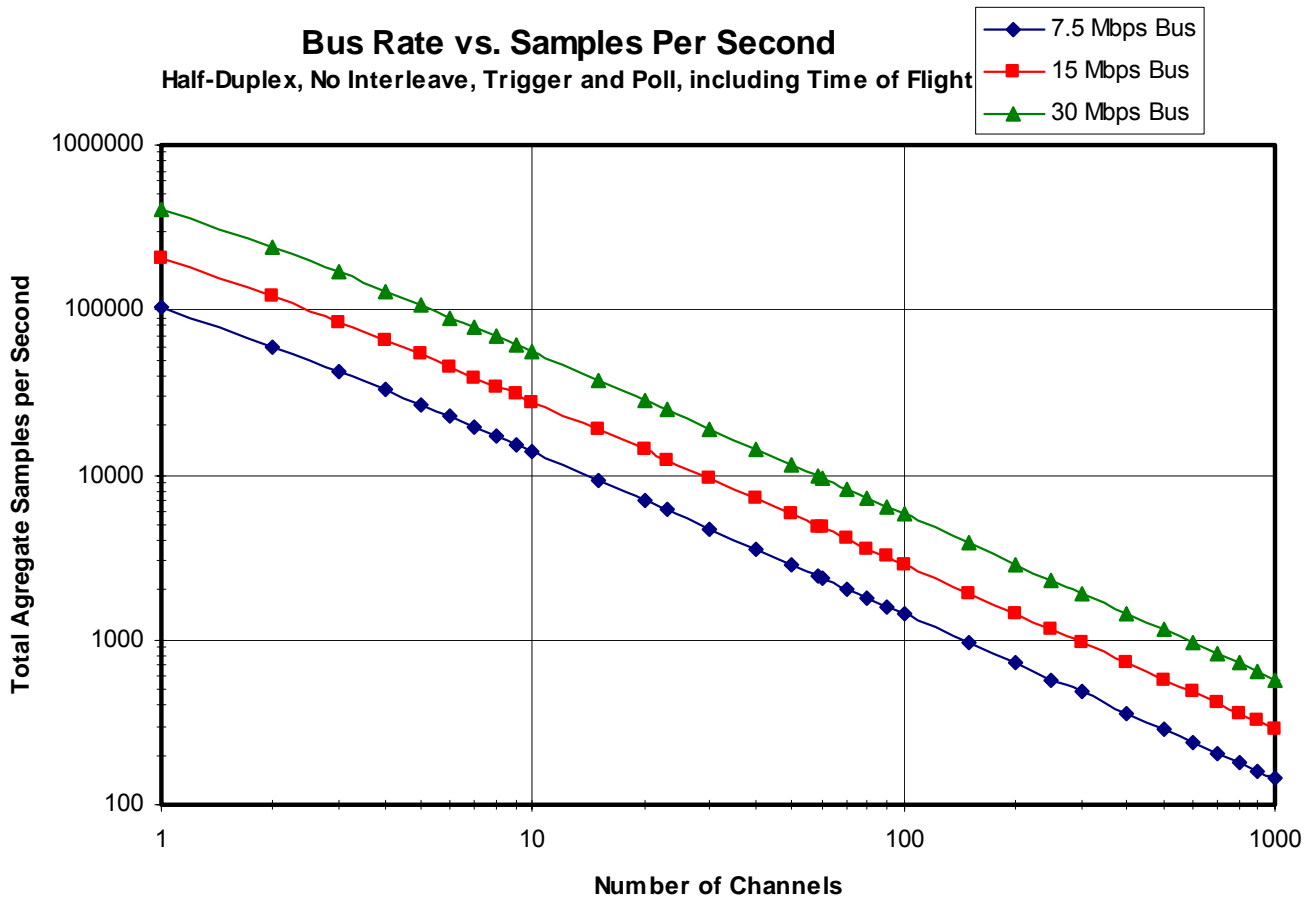
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*Sensor Outline Drawing*

## Bus Rate vs. Samples Per Second

Half-Duplex, No Interleave, Trigger and Poll, including Time of Flight



*Bus Transfer Rate – Sample Rate Versus Number of IBIMs*