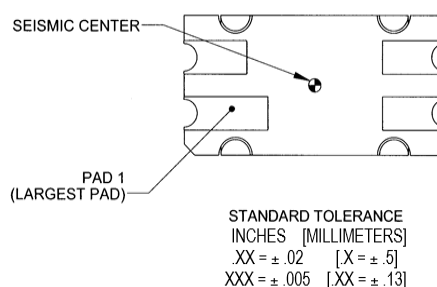
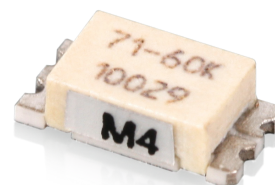
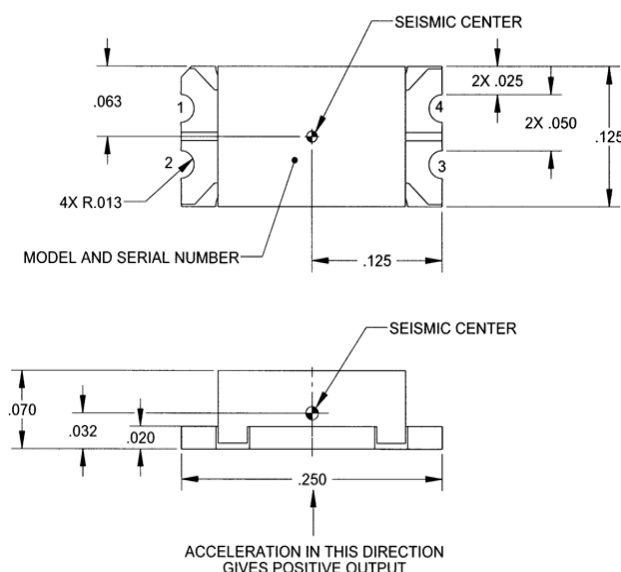


Piezoresistive accelerometer

Model 71M series



Key features

- 2000 to 60 000 g full range
- High resonant frequency
- DC response
- 200 mV full scale output
- Negligible zero shift after shock
- 0.06 gram weight

Description

The Endevco® model 71M series of subminiature SMT piezoresistive accelerometers are rugged undamped accelerometers designed for shock measurements.

Endevco micro-machines the sensing system of the 71M from a single piece of silicon. This etched silicon chip includes the inertial mass and strain gages arranged in an active four-arm Wheatstone bridge circuit complete with a novel on-chip zero balance network.

The low mass, extremely small size and unique construction of the element blends an exceptionally high resonant frequency with characteristics such as low output impedance, 3x overrange, and zero damping for no phase shift. The high resonant frequency of these sensors permits their survival in the presence of the high frequency components in a shock pulse that could shatter the seismic system of accelerometers having lower resonance.

High resonant frequencies and zero damping also allow the accelerometers to respond accurately to fast rise time, short duration shock motion. With a frequency response extending down to dc (steady state accelerations) these transducers are ideal for measurement of long duration transients, and permit integration of the acceleration data to obtain velocity and displacement.

U.S. Patents 4,498, 229, 4,605,919 and 4,689,600 apply to this unit.

Piezoresistive accelerometer | Model 71M series

All specifications are referenced at +75°F (+24°C) and 10 Vdc, unless otherwise noted. Calibration data, traceable to National Institute of Standards and Technology (NIST), is supplied.

Specifications					
Dynamic characteristics	Units	2K	6K	20K	60K
Linear range	g	2,000	6,000	20,000	60,000
Sensitivity min/typ	µV/g	50/100	15/30	5/10	1.5/3
Frequency response +/-5%	Hz	0 to 10,000	0 to 20,000	0 to 50,000	0 to 100,000
Natural frequency (typ)	kHz	90	180	350	700
Shock limit [max]	g	10,000	18,000	60,000	120,000
Zero measureand output (max at 10V)	mV	+/-100	+/-100	+/-100	+/-100
Transverse sensitivity (max)	%	5	5	5	5
Thermal zero shift	mV	<10	<10	<10	<10
-18°C to +66°C (0°F to +150°F)					
Thermal sensitivity shift	%/C	-0.12	-0.12	-0.12	-0.12
Electrical characteristics					
Excitation	Vdc	2 to 12 (10 standard)			
Resistance					
input	Ω	650 ± 300			
output	Ω	650 ± 300			
Physical characteristics					
Case material		Alumina substrate with plastic cover			
Weight (excluding cable)	grams	0.06			
Mounting		Recommended mounting is with structural epoxy across the entire surface of the alumina substrate, with electrical connections made via solder or conductive epoxy to the metalized castellations. If electrical contact is made to the mounting surface, epoxy underfill is required to enable the unit to withstand high g shocks. Refer to instruction manual IM71 for detailed mounting instructions.			
Environmental					
Temperature					
Operating	°C (F°)	-54 to 121°C (-65 to +250°F)			
Storage	°C (F°)	-54 to 149°C (-65 to +300°F)			
Humidity		epoxy sealed			
ESD		susceptible to ESD damage; handle using ESD precautions			
Calibration data					
Data for sensitivity, ZMO, input and output resistance are supplied on the calibration. Sensitivity is measured at 2000 g for 2K and 5000 g for 6K, 20K and 60K.					

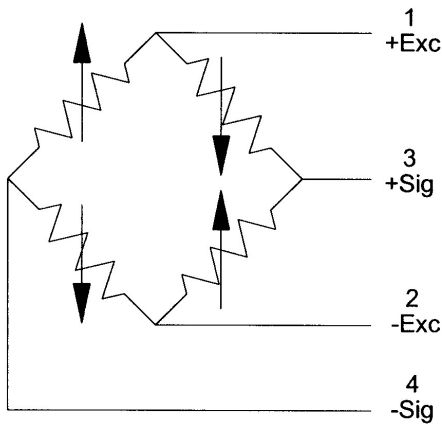
Piezoresistive accelerometer | Model 71M series

Options	
Options	Description
71M1	Un-tinned for conductive epoxy or wire bonding or resistance welding, 5V excitation
71M4	Un-tinned for conductive epoxy or wire bonding or resistance welding, 10V excitation
71M5	Pre-tinned for hand solder reflow, 5V excitation
71M10	Pre-tinned for hand solder reflow, 10V excitation

Accessories		
Options	Description	
136	DC amplifier, 3 channel benchtop	Optional

Notes

- 1. Maintain high levels of precision and accuracy using Endevco’s factory calibration services. Call Endevco’s inside sales force at 866-ENDEVCO for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.
- 2. Model number definition:

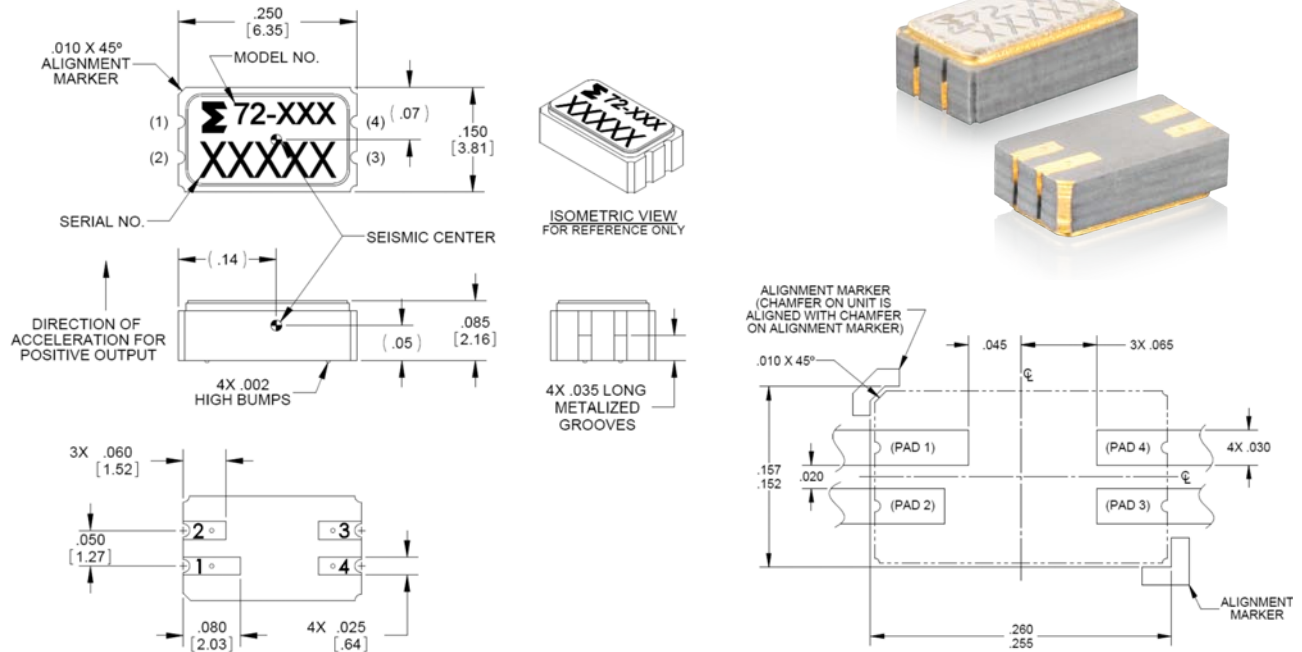


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Piezoresistive accelerometer

Model 72



Key features

- 2,000, 20,000 and 60,000 g ranges
- Lightly damped to attenuate resonance
- DC response
- Minimal zero shift after shock
- Miniature SMT package (0.16 grams)
- High overrange capability
- Integral ESD protection

Description

The Endevco model 72 series are low mass accelerometers suitable for SMT mounting. The accelerometers are intended to be used in a wide range of acceleration, vibration, and shock applications. The model 72 features minimal mass loading, broad frequency response, minimum zero shift following a shock event and a Class 3 Rating (>4000 V – Human Body Model) for ESD Protection. For high g applications, the strength of the solder joints is not sufficient to withstand high forces, so the model 72 must be epoxied (underfilled) to the PCB, or hard potted.

The model 72 uses a unique micro-machined, piezoresistive sensor with light gas damping to attenuate resonant amplitudes, and mechanical stops to reduce breakage under overload conditions. The monolithic sensor incorporates the latest MEMS technology for ruggedness, stability and reliability to 4X overrange. The accelerometer features a four-active arm bridge circuit. With a frequency response extending down to dc (steady state acceleration) and a minimum post shock zero shift, this accelerometer is ideal for measuring long duration shocks.

U.S. Patent 6,988,412 applies to this unit.

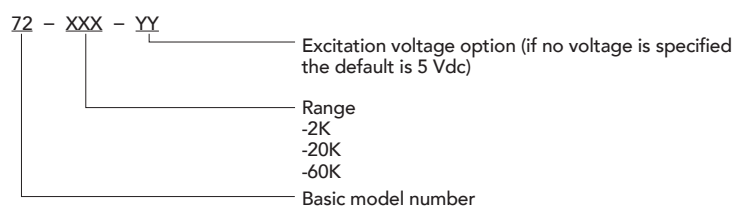
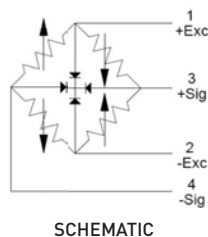
Piezoresistive accelerometer | Model 72

All specifications are referenced at +75°F (+24°C) and 5 Vdc, unless otherwise noted. Calibration data, traceable to National Institute of Standards and Technology (NIST), is supplied.

Specifications				
Dynamic characteristics		-2K	-20K	-60K
Range	g	2000	20000	60000
Sensitivity (min/typ)	μV/V/g	15/30	0.8/1.6	0.25/0.5
Non-linearity	%	±2.0	±2.0	±2.0
Zero measurand output	mV/V	±20	±20	±20
Transverse sensitivity	%	3.0	3.0	3.0
Frequency response (±1db typical)	Hz	0 to 10000	0 to 10000	0 to 20000
Thermal zero shift				
-54° to 71°C	%FSO/°C	0.06	0.06	0.06
-65° to 160°F	%/°F	-0.11	-0.11	-0.11
Thermal sensitivity shift				
-54° to 71°C	%/°C	-0.2	-0.2	-0.2
-65° to 160°F	%/°F	-0.11	-0.11	-0.11
Electrical characteristics				
Excitation	Vdc	5 Standard/15 Maximum		
Resistance	ohms	6,500 +/- 2,500		
Physical characteristics				
Case	Alumina Leadless Chip Carrier (LCC) with .002 inch bumps to facilitate epoxy underfill			
Lid	Kovar with Nickel plating			
Solder pads	Tungsten with ENIG plating			
Weight	g	0.16		
Environmental characteristics				
Shock limit	g	10,000	80,000	240,000
Temperature				
Operating	-54°C to + 71°C (-65°F to + 160°F)			
Storage	-65°C to + 121°C (-85°F to + 250°F)			
Humidity/Altitude	Hermetic (<10X-3 atm-cc/sec)			
ESD Protection	>4,000V - Human Body Model			
Calibration data				
Sensitivity @ 5V	2K tested at 1,000g; 20K and 60K tested at 5,000g			
ZMO @ 5V	mV			
Input and output resistance	ohms			

Notes

1. Maintain high levels of precision and accuracy using Endevco's factory calibration services. Call Endevco's inside sales force at 866-ENDEVCO for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.
2. Model number definition:



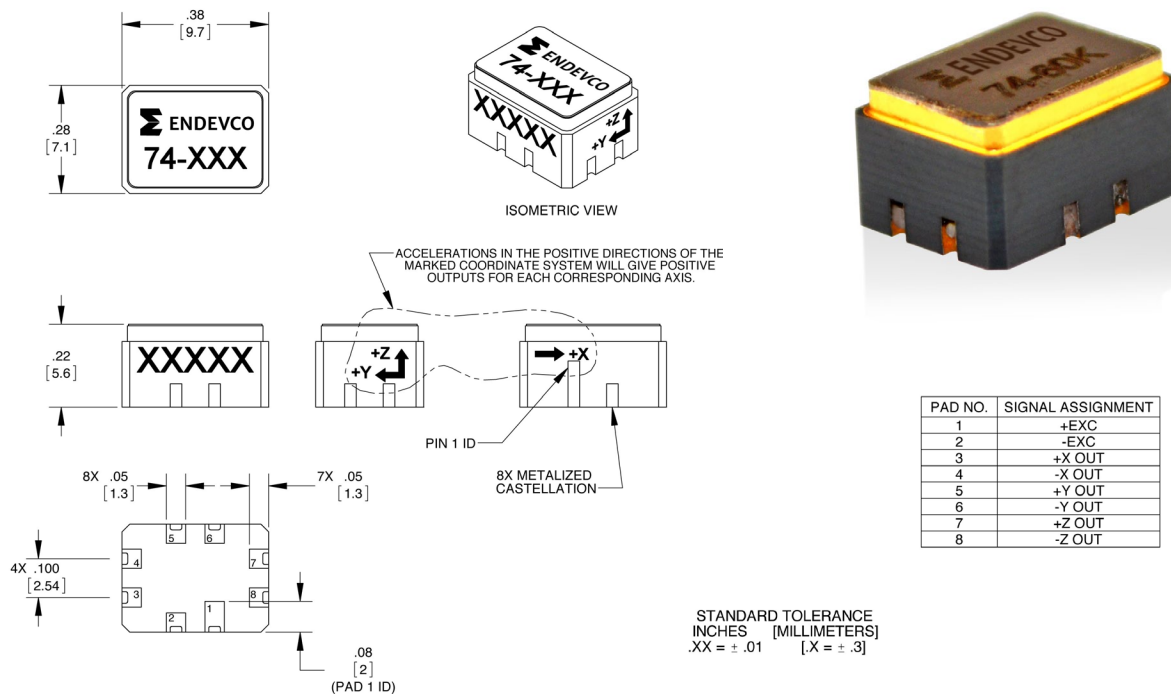
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EDV-DS-72-080921

Damped piezoresistive triaxial accelerometer

Model 74



Key features

- 2K, 20K and 60K g full scale ranges
- Damped for exceptional survivability
- LCC package is SMT or hand solder compatible
- Low power consumption
- Minimal zero shift after shock

Description

The Endevco® Model 74 series is a family of rugged, damped, piezoresistive triaxial accelerometers designed for high-acceleration shock measurements in three mutually perpendicular axes. This family uses three sensors that are packaged in a mutually orthogonal arrangement in a leadless chip carrier (LCC) package that supports mounting by surface mount technology (SMT) re-flow soldering (with epoxy underfill) or adhesive mounting (with hand soldering).

The Model 74 utilizes the same sensing element as the Model 72, 7280A and 7284A accelerometer families. Each axis uses a unique micro-machined, piezoresistive sensor with light gas damping to attenuate resonant amplitudes, and mechanical stops to reduce breakage under over load conditions. The Model 74 is available in 2,000 g, 20,000 g, and 60,000 g full scale ranges, with all three axes having the same range.

U.S. patent numbers 6,988,412 applies to this unit.

Damped piezoresistive triaxial accelerometer | Model 74

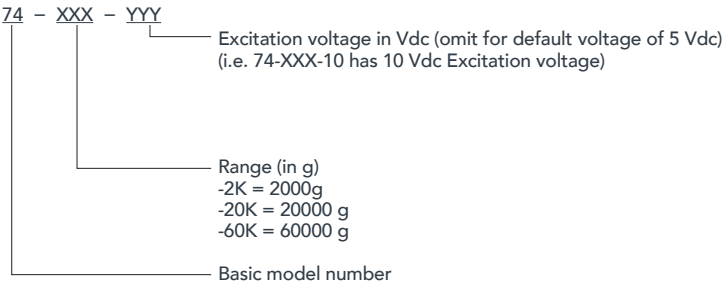
All specifications are referenced at +75°F (+24°C) and 5 Vdc, unless otherwise noted. Calibration data, traceable to National Institute of Standards and Technology (NIST), is supplied.

Specifications				
Dynamic characteristics		-2k	-20K	-60K
Range	g	2,000	20,000	60,000
Sensitivity (min/typ)	µV/V/g	15/30	0.8/1.6	0.25/0.5
Non-linearity (typ)	%	±2.0	±2.0	±2.0
Zero measurand output	mV/V	±20	±20	±20
Transverse sensitivity	%	5	5	5
Frequency response (± 1 dB)	kHz	0 to 10	0 to 10	0 to 20
Thermal zero shift				
-55° to 121°C	%FSO/°C	0.007	0.007	0.007
-67° to 250°F	%/FSO/°F	0.004	0.004	0.004
Thermal sensitivity shift				
-55° to 121°C	%/°C	-0.08	-0.08	-0.08
-67° to 250°F	%/°F	-0.04	-0.04	-0.04
Electrical characteristics				
Excitation	Vdc		5 Standard/12 Maximum	
Input resistance	ohms		2200 ± 700	
Output resistance	ohms		6500 ± 2000	
Physical characteristics				
Case	Alumina Leadless Chip Carrier (LCC)			
Lid	Kovar with Nickel plating			
Solder pads	Gold over nickel plated Tungsten			
Weight	g		1.2	
Environmental characteristics				
Shock limit	g	10,000	60,000	180,000
Temperature				
Operating	-55°C to + 121°C (-67°F to +250°F)			
Storage	-55°C to + 121°C (-67°F to +250°F)			
Humidity/Altitude	Hermetic (<5 x 10 ⁻⁸ atm/cc/sec He)			
ESD Protection	Class 3B (>8000V) per section 5.2 of MIL-STD-1686C			
Calibration data				
Sensitivity @ 5V	at 5,000g (1,000 g for 2K range)			
ZMO @ 5V	mV			
Input and output resistance	ohms			

Damped piezoresistive triaxial accelerometer | Model 74

Notes

1. Maintain high levels of precision and accuracy using Endevco's factory calibration services. Call Endevco's inside sales force at 866-ENDEVCO for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.
2. Model number definition:



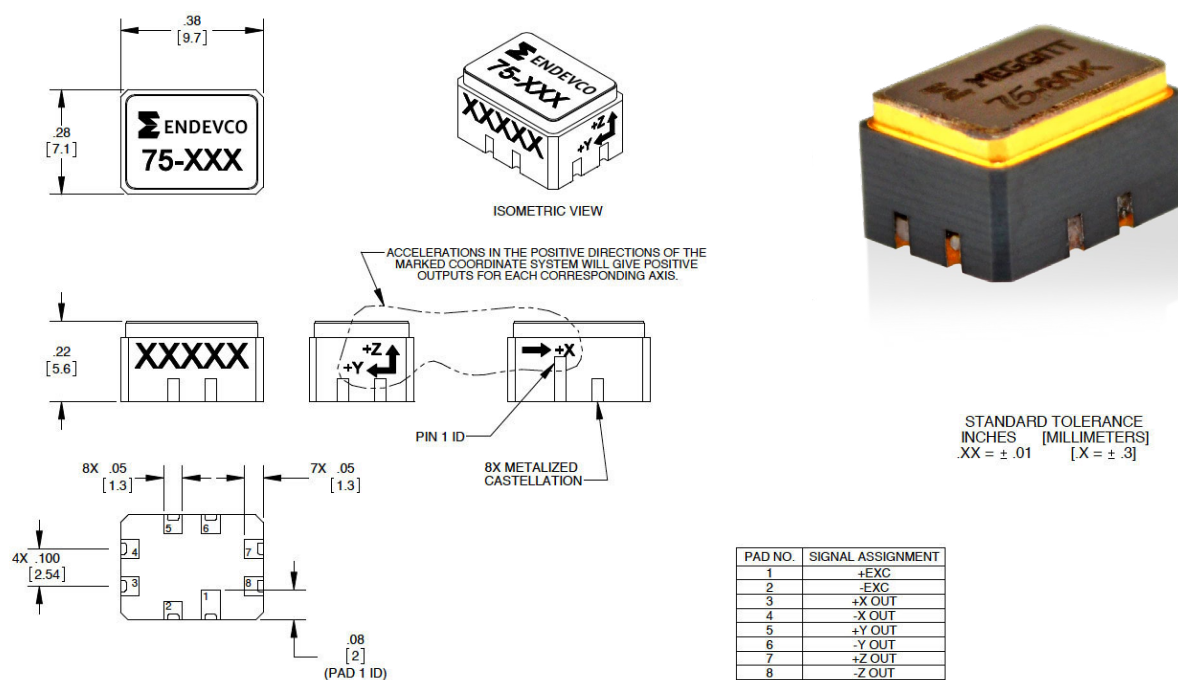
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Undamped piezoresistive triaxial accelerometer

Model 75



Key features

- 2000, 6000, 20 000 and 60 000 g ranges
- High resonance frequency
- LCC package is SMT or hand older compatible
- No damping for fast response time
- Minimal zero shift after shock

Description

The Endevco® Model 75 series is a family of rugged, undamped, piezoresistive triaxial accelerometers designed for high-acceleration shock measurements in three mutually perpendicular axes. This family uses three sensors that are packaged in a mutually orthogonal arrangement in a leadless chip carrier (LCC) package that supports mounting by surface mount technology (SMT) re-flow soldering (with epoxy underfil) or adhesive mounting (with hand soldering).

The Model 75 utilizes the same highly efficient sensing system as the Model 71, 7270A and 7274 accelerometer families. For each axis, the sensor is sculptured from a single chip of silicon, which includes the inertial mass and strain gages arranged in a four-active-arm Wheatstone bridge circuit. The Model 75 is available in ranges from 2000 g to 60 000 g, with all three axes having the same range.

U.S. patent numbers 4,498,229; 4,605,919 and 4,689,600 apply to this unit.

Undamped piezoresistive triaxial accelerometer | Model 75

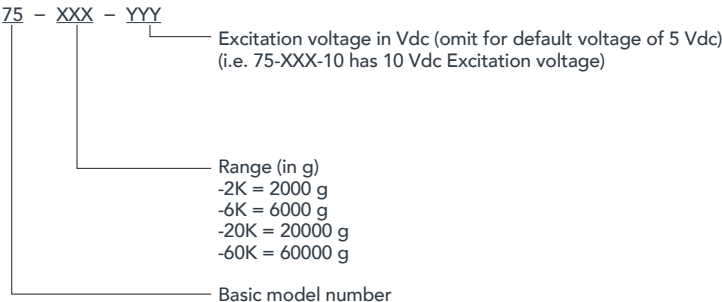
All specifications are referenced at +75°F (+24°C) and 5 Vdc, unless otherwise noted. Calibration data, traceable to National Institute of Standards and Technology (NIST), is supplied.

Specifications					
Dynamic characteristics		-2K	-6K	-20K	-60K
Range	g	±2000	±6000	±20000	±60000
Sensitivity (min/typ)	µV/V/g	5/10/15	1.5/3.0/5.0	0.5/1.0/1.5	0.15/0.3/0.5
Non-linearity (typ)	%	±5	±5	±5	±5
Zero measurand output	mV/V	±10	±10	±10	±10
Transverse sensitivity	%	5	5	5	5
Frequency response (± 5% typ)	Hz	0 to 18	0 to 36	0 to 70	0 to 140
Thermal zero shift					
-18° to 66°C	%FSO/°C	0.006	0.006	0.006	0.006
0° to 150°F	%/FSO/°F	0.003	0.003	0.003	0.003
Thermal sensitivity shift					
-18° to 66°C	%/°C	0.05	0.05	0.05	0.05
0° to 150°F	%/°F	0.03	0.03	0.03	0.03
Electrical characteristics					
Excitation	Vdc			5 Standard/12 Maximum	
Input resistance	ohms			217 ± 100	
Output resistance, each axis	ohms			650 ± 300	
Physical characteristics					
Case	Alumina Leadless Chip Carrier (LCC)				
Lid	Kovar with Nickel plating				
Solder pads	Gold over nickel plated Tungsten				
Weight	1.2 grams				
Environmental characteristics					
Shock limit	g	10,000	18,000	60,000	180,000
Temperature					
Operating	-55°C to + 121°C (-67°F to +250°F)				
Storage	-55°C to + 121°C (-67°F to +250°F)				
Humidity/Altitude	Hermetic (<5 x 10 ⁻⁸ atm/cc/sec He)				
ESD Protection	Class 3B (>8000V) per section 5.2 of MIL-STD-1686C				
Calibration data					
Sensitivity @ 5V		at 2,000g	at 5,000g	at 5,000g	at 5,000g
ZMO @ 5V	mV				
Input and output resistance	ohms				

Undamped piezoresistive triaxial accelerometer | Model 75

Notes

1. Maintain high levels of precision and accuracy using Endevco's factory calibration services. Call Endevco's inside sales force at 866-ENDEVCO for recommended intervals, pricing and turn-around time for these services as well as for quotations on our standard products.
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