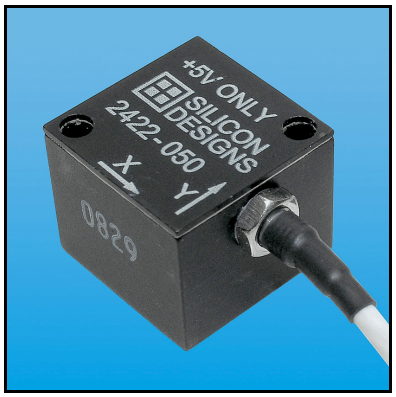
SILICON DESIGNS, INC

Model 2422

TRIAXIAL ANALOG ACCELEROMETER MODULE

- 3 Axis Acceleration Sensing
- Capacitive Micromachined
- Nitrogen Damped
- ±4V Differential or +4V Single Ended Outputs
- Low Power Consumption
- -55 to +125°C Operation
- +5 V DC Power
- 8 Wire Connection
- Responds to DC & AC Acceleration
- Non Standard Ranges Available
- Rugged Anodized Aluminum Module
- Fully Calibrated



ACTUAL SIZE

DESCRIPTION

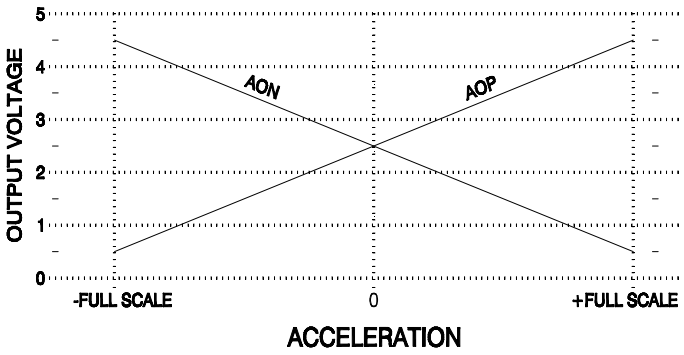
The Model 2422 triaxial accelerometer module combines three orthogonally mounted model 1210 integrated accelerometers in a rugged case for measuring accelerations in commercial/industrial environments. It is tailored for zero to medium frequency instrumentation applications. The anodized aluminum case is epoxy sealed and is easily mounted via two #8 (or M4) screws. It is relatively insensitive to temperature changes and gradients. An optional initial calibration sheet (2422-CAL) and periodic calibration checking are also available.

ORDERING INFORMATION

Full Scale Acceleration	Model Number
± 2 g	2422-002
± 5 g	2422-005
± 10 g	2422-010
± 25 g	2422-025
± 50 g	2422-050
±100 g	2422-100
±200 g	2422-200
±400 g	2422-400

OPERATION

The Model 2422 produces three differential analog output voltage pairs (**AON** & **AOP**) which vary with acceleration as shown in the figure (at right). The outputs can be used in differential mode or single ended, referenced to halfway between **VDD** and **GND**. The output scale factor is ratiometric to the applied **VDD** voltage and at zero acceleration, both **AON** & **AOP** are equal to halfway between **VDD** and **GND**. The "Z" axis is perpendicular to the bottom of the package, with positive acceleration defined as a force pushing on the bottom of the package. The "X" and "Y" axis directions are marked on the cover with positive acceleration defined as acceleration in the direction of the axis arrow.



SIGNALS

+5V:	(Power)	reddish brown wire		
GND:	(Ground)	black wire		
AOPX:	(Output)	green wire	X-Axis	positive output.
AONX:	(Output)	white wire	X-Axis	negative output.
AOPY:	(Output)	light brown wire . . .	Y-Axis	positive output.
AONY:	(Output)	orange wire	Y-Axis	negative output.
AOPZ:	(Output)	light blue wire	Z-Axis	positive output.
AONZ:	(Output)	yellow wire	Z-Axis	negative output.

APPLICATIONS

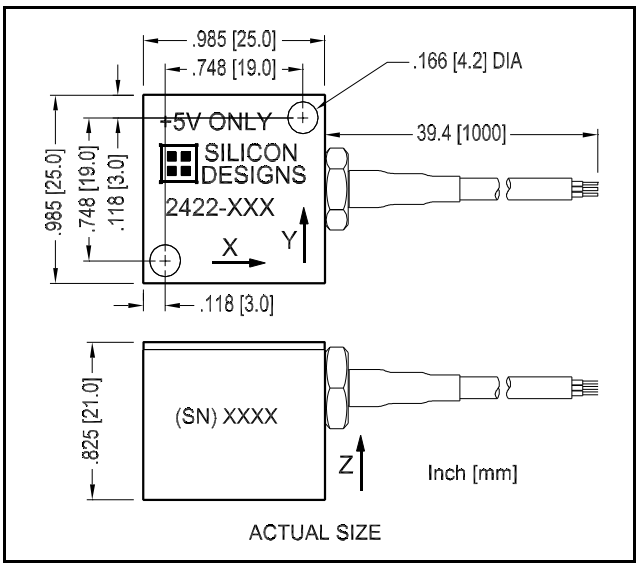
VIBRATION MONITORING
VIBRATION ANALYSIS
MACHINE CONTROL
MODAL ANALYSIS
ROBOTICS
CRASH TESTING
INSTRUMENTATION
ROTATING MACHINERY CONTROL

*ABSOLUTE MAXIMUM RATINGS **

Case Operating Temperature . . . . . -55 to +125°C
Storage Temperature . . . . . -55 to +125°C
Acceleration Over-range . . . . . 2000g for 0.1 ms
Voltage on V_{DD} to GND . . . . . -0.5V to 6.5V
Voltage on Any Pin to GND [1] . . . . . -0.5V to V_{DD}+0.5V
Power Dissipation . . . . . 250 mW

**** NOTICE:*** *Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at or above these conditions is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.*

ESD CONSIDERATIONS: The model 2422 accelerometer is a CMOS device subject to damage by large electrostatic discharges. Diode protection is provided on the outputs but care should be exercised during handling of the cable wire ends. Individuals and tools should be grounded before coming in contact with the cable wire ends .



PERFORMANCE - By Model: V_{DD}=5.0VDC, T_C=25°C.									
MODEL NUMBER	**2422-002**	**2422-005**	**2422-010**	**2422-025**	**2422-050**	**2422-100**	**2422-200**	**2422-400**	**UNITS**
Input Range	±2	±5	±10	±25	±50	±100	±200	±400	g
Frequency Response (Nominal, 3 dB)	0 - 300	0 - 400	0 - 600	0 - 1000	0 - 1500	0 - 2000	0 - 2500	0 - 3500	Hz
Sensitivity (Differential) [2]	2000	800	400	160	80	40	20	10	mV/g
Output Noise, Differential (RMS, typical)	13	32	63	158	316	632	1265	2530	µg/(root Hz)
Max Mechanical Shock (0.1 ms)	2000								g

PERFORMANCE - All Models: Unless otherwise specified V_{DD}=5.0VDC, T_C=25°C, Differential Mode.					
Parameter		**Min**	**Typ**	**Max**	**Units**
Cross Axis Sensitivity			2	3	%
Bias Calibration Error [3]	-002 & -005		2	4	% of span
	-010 thru -200		1	2	
Bias Temperature Shift (T_C= -55 to +125°C) [3]	-002 & -005		100	300	(ppm of span)/°C
	-010 thru -200		50	200	
Scale Factor Calibration Error [3, 4]			1	2	%
Scale Factor Temperature Shift (T_C= -55 to +125°C) [3]			+300		ppm/°C
Non-Linearity (-90 to +90% of Full Scale) [3, 4]	-002 thru -100		0.5	1.0	% of span
	-200		0.7	1.5	
	-400		1.0	2.0	
Power Supply Rejection Ratio			25		dB
Output Impedance			90		Ω
Operating Voltage		4.75	5.0	5.25	V
Operating Current [3]			21	30	mA
Mass (not including cable)			21		grams
Cable Mass			18		grams/meter

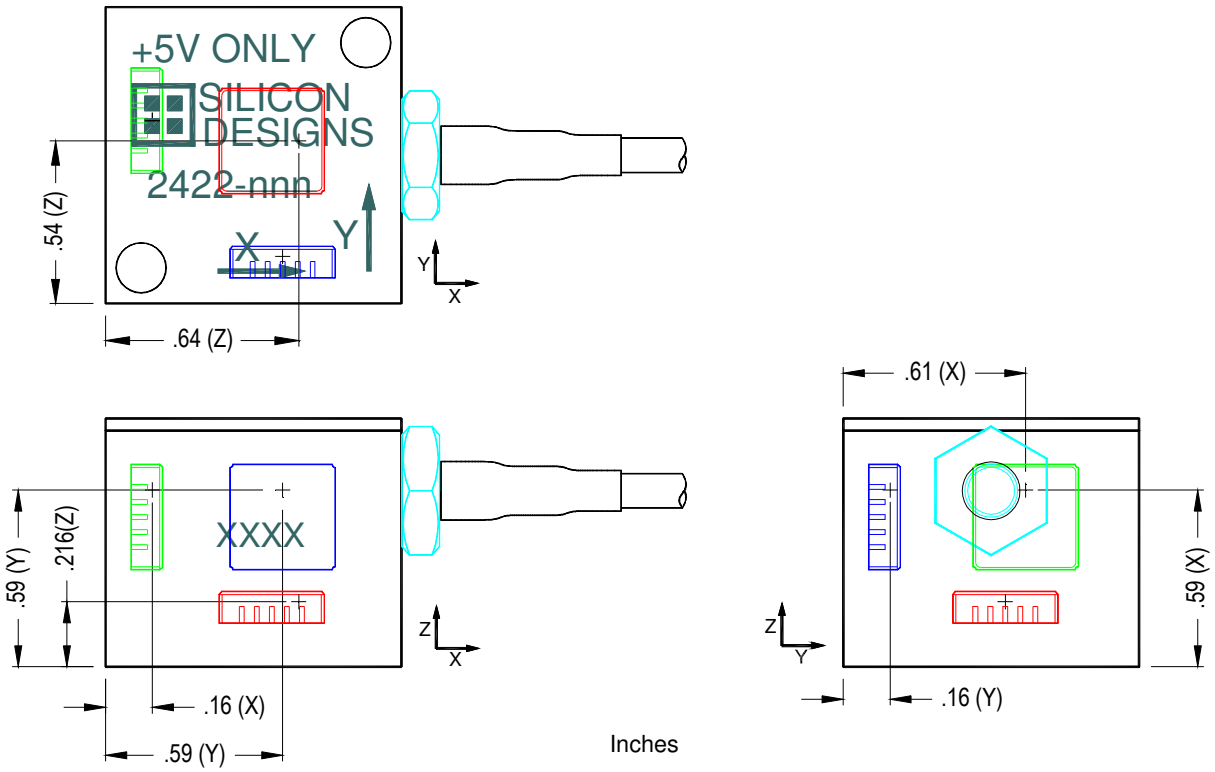
Notes:

1. Voltages AOP & AON may exceed 0.5 volt above or below the supply voltage, provided the current into or out of the wire is limited to 1mA.
2. Single ended sensitivity is half of values shown.
3. Tighter tolerances are available on special order.
4. 100g versions and above are tested from -65 to +65g.

CABLE SPECIFICATION & LENGTH CONSIDERATIONS

The cable consists of seven 28 AWG (7x36) and one 26 AWG (7x34) tin plated copper wires. The seven smaller 28 AWG wires are covered by 6.5 mils of Teflon FEP insulation. The larger single 26 AWG wire is covered by 9 mils of black Teflon FEP insulation. The seven smaller gauge wires surround the single larger gauge (black) wire and the bundle is covered by a 10 mil thick Teflon FEP jacket with a nominal outer diameter of 0.115". We do not recommend extending the standard 1 meter cable cable length of the model 2422. If you decide to extend the cable length, we recommend you check each individual installation for oscillation by tapping the accelerometer and watching the differential output for oscillation in the 20kHz to 50kHz region. If no oscillation is present then the cable length being used is OK for that particular device. Different devices will tolerate different cable lengths.

SENSOR LOCATIONS:



Inches