Model 2220
Analog Accelerometer Module

- Capacitive Micromachined
- Nitrogen Damped
- ±4V Differential Output or 0.5V to 4.5V Single Ended Output
- Fully Calibrated
- Low Power Consumption
- -55 to +125°C Operation
- +9 to +32V DC Power
- Simple Four Wire Connection
- Low Impedance Outputs Will Drive Up To 15 Meters of Cable
- Responds to DC and AC Acceleration
- Non Standard g Ranges Available
- Rugged Anodized Aluminum Module
- Low Noise
- Serialized for Traceability

Available G-Ranges

Full Scale Acceleration	Model Number
± 2 g	2220-002
± 5 g	2220-005
± 10 g	2220-010
± 25 g	2220-025
± 50 g	2220-050
±100 g	2220-100
±200 g	2220-200

DESCRIPTION

The model 2220 accelerometer is a higher performance and wider temperature range version of the model 2210. This rugged module combines an integrated model 1221L accelerometer with high drive, low impedance buffering for measuring acceleration 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 #4 (or M3) screws. On-board regulation is provided to minimize the effects of supply voltage variation. It is relatively insensitive to temperature changes and gradients. The cable's shield is electrically connected to the case while the ground (GND) wire is isolated from the case. An initial calibration sheet (2220-CAL) is included and periodic calibration checking is available.

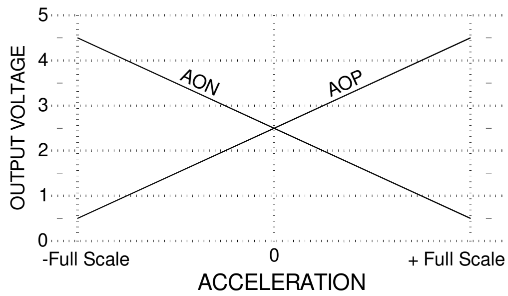
OPERATION

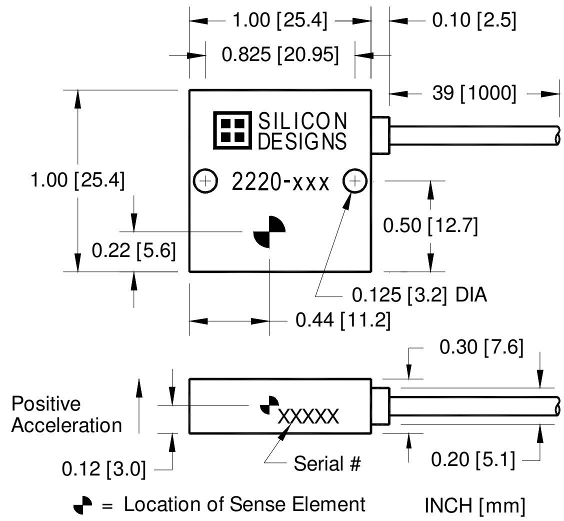
The Model 2220 accelerometer module produces two analog voltage outputs, which vary with acceleration as shown in the graph on the next page. The sensitive axis is perpendicular to the bottom of the package, with positive acceleration defined as a force pushing on the bottom of the package. The signal outputs are fully differential about a common mode voltage of approximately 2.5 volts. The output scale factor is independent from the supply voltage of +9 to +32 volts. At zero acceleration the output differential voltage is nominally 0 volts DC; at ±full scale acceleration the output differential voltage is ±4 volts DC respectively.

APPLICATIONS

- FLIGHT TESTS
- VIBRATION MONITORING
- VIBRATION ANALYSIS
- MACHINE CONTROL
- MODAL ANALYSIS
- ROBOTICS
- CRASH TESTING
- INSTRUMENTATION

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE





SIGNAL DESCRIPTIONS

Vs and GND (Power): Red and Black wires respectively. Power (+9 to +32 Volts DC) and ground.

AOP and AON (Output): Green and White wires respectively. Analog output voltages proportional to acceleration; AOP voltage increases (AON decreases) with positive acceleration. At zero acceleration both outputs are nominally equal to 2.5 volts. The device experiences positive (+1g) acceleration with its lid facing up in the Earth's gravitational field. Either output can be used individually or the two outputs can be used differentially. (See output response plot below)

PERFORMANCE - By Model: V_S=+9 to +32VDC, T_C=25°C

MODEL NUMBER	2220-002	2220-005	2220-010	2220-025	2220-050	2220-100	2220-200	UNITS
Input Range	±2	±5	±10	±25	±50	±100	±200	g
Frequency Response (Nominal, 3 dB) [1]	0 - 400	0 - 600	0 - 1000	0 - 1500	0 - 2000	0 - 2500	0 - 3000	Hz
Sensitivity, Differential [2]	2000	800	400	160	80	40	20	mV/g
Output Noise, Differential (RMS, typical)	8	9	10	25	50	100	200	µg/(root Hz)
Max. Mechanical Shock (0.1 ms)	2000							g

Note 1: 250Hz ±100Hz, -3dB bandwidth, optionally available. Note 2: Single ended sensitivity is half of values shown.

PERFORMANCE - All Models: Unless otherwise specified, Vs=+9 to +32VDC, T_C=25°C, Differential Mode.

PARAMETER		MIN	TYP	MAX	UNITS
Cross Axis Sensitivity			1	2	%
Bias Calibration Error	-002			4.0	% of span
	-005 thru -200			1.5	
Bias Temperature Shift (T_C= -40 to +80°C)	-002		100	200	(ppm of span)/°C
	-005 thru -200		50	100	
Scale Factor Calibration Error [3]			1	2	%
Scale Factor Temperature Shift (T_C= -40 to +80°C)	-002 thru -010	-250		+150	ppm/°C
	-025 thru -200	-150			
Non-Linearity (-90 to +90% of Full Scale) [3, 4]	-002 thru -050		0.15	0.5	% of span
	-100		0.25	1.0	
	-200		0.40	1.5	
Power Supply Rejection Ratio		50	>65		dB
Output Impedance			1		Ω
Output Common Mode Voltage			2.45		VDC
Operating Voltage		9		32	VDC
Operating Current (AOP & AON open)			12	14	mA DC
Mass (not including cable)			10		grams
Cable Mass			25		grams/meter

Note 3: 100g versions and above are tested from -65g to +65g. Note 4: Tighter tolerances available upon request.

CABLE SPECIFICATIONS & LENGTH CONSIDERATIONS

The cable consists of four 28 AWG (7x36) tin plated copper wires with Teflon FEP insulation surrounded by a 40 AWG tin plated copper braided shield. The shield jacket is Teflon FEP with a nominal outer diameter of 0.096”. Cable lengths of up to 15 meters (50 feet) can be added to the standard 1 meter cable without the need to test for output instability. For lengths longer than 15 meters, 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. From the standpoint of output current drive and slew rate limitations, the model 2220 is capable of driving over 600 meters (2000 feet) of its cable type but at some length between 15 and 600 meters, each device will likely begin to exhibit oscillation.

DIFFERENTIAL vs. SINGLE ENDED OPERATION

The model 2220 accelerometer will provide its best performance when you connect it to your instrumentation in a differential configuration using both the **AOP** and **AON** output signals. But a differential connection may not always be possible. In such cases, it is perfectly fine to connect the accelerometer to your instrumentation in single ended mode by connecting **AOP** and **GND** to your instrumentation and leaving **AON** disconnected. Keep in mind however, that for a single-ended connection, the signal to noise ratio is reduced by half, the signal is more susceptible to external noise pickup, and the accelerometer=s output will vary directly with any change in the +2.5V reference that you provide.