

- **Low Noise: 10  $\mu\text{g}/\sqrt{\text{Hz}}$  Typical for  $\pm 2\text{g}$  Full Scale Versions**
- **-55 to +125°C Operating Temperature Range**
- Rugged IP 67 Hermetically Sealed Titanium Case
- Connector Meets IP 67 when Sealed
- Acceleration and Vibration Sensing
- Excellent Long Term Stability
- $\pm 4\text{V}$  Differential Output or 0.5V to 4.5V Single Ended Output
- Flexible +8 to +32V DC Power
- Responds to both DC and AC Acceleration (0 to 2000+ Hz)
- Low Impedance Outputs Support up to 2000 Feet of Cable
- Fully Calibrated and Serialized for Traceability

**AVAILABLE G-RANGES**

FULL SCALE ACCELERATION	MODEL SUFFIX
$\pm 2\text{ g}$	-002
$\pm 5\text{ g}$	-005
$\pm 10\text{ g}$	-010
$\pm 25\text{ g}$	-025
$\pm 50\text{ g}$	-050
$\pm 100\text{ g}$	-100
$\pm 200\text{ g}$	-200
$\pm 400\text{ g}$	-400



The SDI Models 2240 and 2480 Specialty Hermetic MEMS Variable Capacitive Accelerometers from Silicon Designs (SDI) are low-cost, integrated plug-and-play measurement devices in hermetically sealed titanium cases. They are suitable for zero-to-medium frequency commercial and industrial applications, and particularly where reliable performance, extremely low noise, and long-term stability are absolute requirements. The cases are rated IP 67; the connector is rated IP 61 and can meet IP 67 when sealed with a boot, sleeve, or heat shrink.

Each SDI 2240 and 2480 accelerometer features onboard voltage regulation and an internal voltage reference to eliminate the need for precision power supplies. They are relatively insensitive to temperature changes and gradients from **-55 to +125°C**. The case is easily mounted via two screws, adhesive, or by attaching a magnet.

**ZERO (DC) TO MEDIUM FREQUENCY APPLICATIONS**



**PERFORMANCE BY G RANGE**

INPUT RANGE	FREQUENCY RESPONSE (MINIMUM, 3 DB)	SENSITIVITY, DIFFERENTIAL	OUTPUT NOISE, DIFFERENTIAL (RMS, TYPICAL)	MAX. MECHANICAL SHOCK (0.1 MS)
g	Hz	mV/g	$\mu\text{g}/(\text{root Hz})$	g (peak)
$\pm 2$	0 – 300	2000	10	2000
$\pm 5$	0 – 400	800	15	
$\pm 10$	0 – 600	400	23	
$\pm 25$	0 – 900	160	38	
$\pm 50$	0 – 1200	80	60	
$\pm 100$	0 – 1400	40	121	
$\pm 200$	0 – 1750	20	243	5000
$\pm 400$	0 – 2000	10	475	

$V_{DD}=V_R=5.0\text{ VDC}$ ,  $T_c=25\text{ }^\circ\text{C}$

Single ended sensitivity is half of values shown.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

**PERFORMANCE - ALL VERSIONS**

**All Models:** Unless otherwise specified, Vs=+8 to +32 VDC, TC=25°C, Differential Mode. Span = ±g range = 8000 mV.

PARAMETER	MIN	TYP	MAX	UNITS
Bias Calibration Error		0.25	0.9	% of span
Bias Temperature Shift (T <sub>c</sub> = -55 to +125°C)	-100	0	+100	(PPM of span)/°C
Scale Factor Calibration Error <sup>1</sup>		0.5	1.25	%
Scale Factor Temperature Shift (T <sub>c</sub> = -55 to +125°C)	-150	0	+50	PPM/°C
Non-Linearity (-90 to +90% of span) <sup>1</sup>		0.15	0.5	% of span
Cross Axis Sensitivity		2	3	%
Power Supply Rejection Ratio	50	>65		dB
Output Impedance		1		Ω
Output Common Mode Voltage		2.5		VDC
Operating Voltage	8		32	VDC
Operating Current (AOP & AON open, 2240/2480)	6/19	7/23	12/27	mA DC
Mass 2240 / 2480		15 / 25		grams

Note 1: For 2g thru 50g only; 100g and greater versions are tested and specified from -65 to +65g.

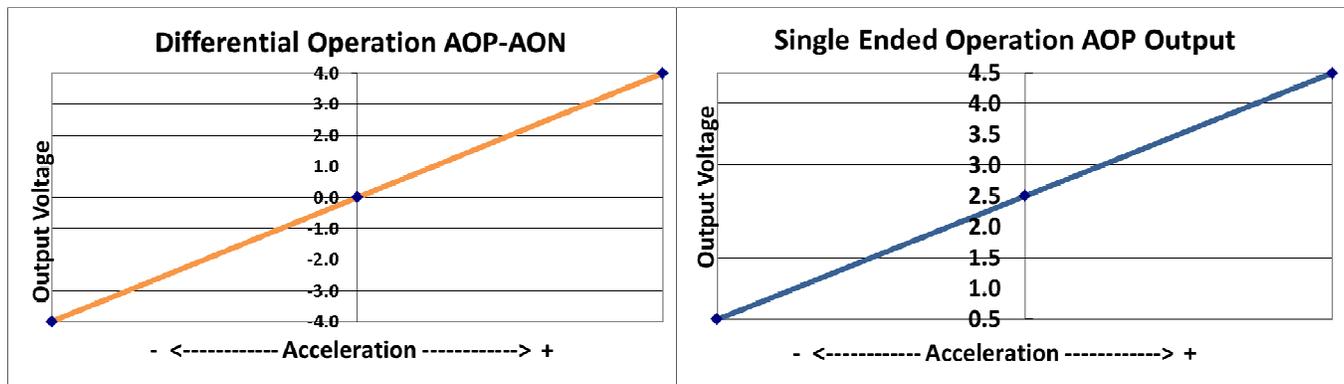
**NOTICE:** Stresses greater than those listed may cause permanent damage to the device. These are maximum stress ratings only. Functional operation of the device at or above these conditions is not implied.

**OPERATION**

SDI Models 2240 and 2480 MEMS Specialty Hermetic Variable Capacitive Accelerometers provide optimal performance when they are connected to instrumentation in a differential configuration using both the AOP and AON output signals, but they also support single ended operation for complete flexibility.

These Accelerometers produce differential analog output voltage pairs (AON & AOP) which vary with acceleration. The signal outputs are fully differential about a common mode voltage of approximately 2.5 volts. At zero acceleration, the output differential voltage is nominally 0 volts DC; at ±full scale acceleration, the output is ±4 volts DC, respectively, as shown in the figure (below). The output scale factor is independent from the supply voltage of +8 to +32 volts.

When a differential connection is not possible, SDI recommends connecting the accelerometer to instrumentation in single ended mode by **connecting AOP and GND** to the instrumentation and **leaving AON disconnected**. Keep in mind that the signal to noise ratio is reduced by half for a single-ended vs. a differential connection.



**SIGNALS & CABLE SPECIFICATIONS**



**2240:** The connector shells, pins and sockets are gold plated brass. The 4PIN-CAB cable consists of four 30 AWG (7x38) silver-plated copper wires with PTFE insulation surrounded by a braided shield. The black FEP shield jacket has a nominal outer diameter of 0.100”.

**2480:** The SDI Model 2480 has a 9-pin connector and only eight pins are used for the 8-wire cable; the 8PIN-CAB cable consists of eight 26 AWG tin-plated copper wires. All eight of the 26 AWG wires are covered by 8.5 mils of Teflon insulation.

VS: red wire	Power	<b>4-WIRE PIGTAIL</b> 	VS: red wire	Power	<b>8-WIRE PIGTAIL</b> 
GND: black wire	Ground		GND: black wire	Ground	
AOP: (Output) green wire	Positive output		AOPX: (Output) green wire	X-Axis positive output	
AON: (Output) white wire	Negative output		AONX: (Output) white wire	X-Axis negative output	
			AOPY: (Output) brown wire	Y-Axis positive output	
			AONY: (Output) orange wire	Y-Axis negative output	
			AOPZ: (Output) blue wire	Z-Axis positive output	
			AONZ: (Output) yellow wire	Z-Axis negative output	

**CABLE LENGTH CONSIDERATIONS**

Cable lengths of up to 15 meters (50 feet) can be used without the need to test for output instability. For cable lengths exceeding 15 meters, Silicon Designs recommends checking each individual installation for oscillation by tapping the accelerometer and watching the differential output for oscillation in the 20 kHz to 50 kHz region. If no oscillation is present, extended cable length should behave as expected. From the standpoint of output current drive and slew rate limitations, all SDI Universal Accelerometers are capable of driving over 600 meters (2000 feet) of cable. However, at some length ranging between 15 and 600 meters, each device will likely begin to exhibit oscillation.

**STANDARD CABLE LENGTHS**

The 4PIN-CAB is available in four standard lengths, and custom lengths may be available for special order.

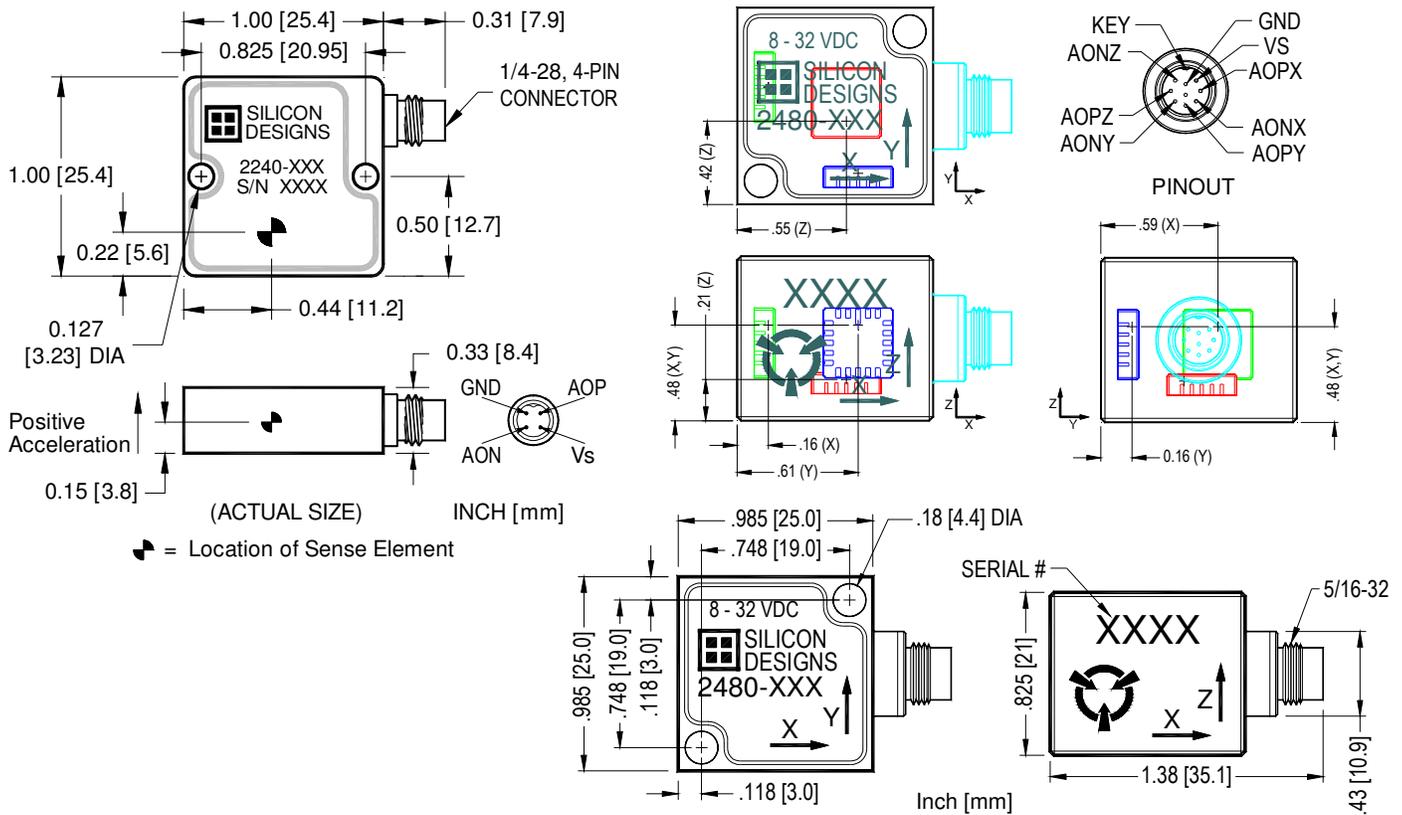
NAME	LENGTH - FEET	LENGTH - METERS (APPROXIMATE)
4PIN-CAB-04	4 Feet	1.2 Meters
4PIN-CAB-14	14 Feet	4.4 Meters
4PIN-CAB-33	33 Feet	10 Meters
4PIN-CAB-50	50 Feet	15.4 Meters

The 8PIN-CAB is available in five standard lengths, and custom lengths may be available for special order.

NAME	LENGTH - FEET	LENGTH - METERS (APPROXIMATE)
8PIN-CAB-04	4 Feet	1.2 Meters
8PIN-CAB-10	10 Feet	3 Meters
8PIN-CAB-20	20 Feet	6 Meters
8PIN-CAB-33	33 Feet	10 Meters
8PIN-CAB-50	50 Feet	15.4 Meters

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PACKAGE DIMENSIONS



ALTERNATIVE MODELS



The SDI Models 2210, 2220, 2260, 2266, and 2276 Single Axis MEMS Variable Capacitive Accelerometers from Silicon Designs are lower-cost versions of the 2240 in non-hermetic anodized aluminum, epoxy sealed cases.

The SDI Models 2210, 2260 and 2266 offer a cost savings for applications that still need SDI's excellent performance but have less demanding environments from -40 to +85°C.



The SDI Models 2220 and 2276 are the high-performance versions of the 2210 and 2266, respectively, and are internally the equivalent of the 2240 but housed in aluminum cases. The 2220 and 2276 have the same upgraded SDI accelerometer chip inside as the 2240, similarly improving the bias and scale factor temperature shift performance and supporting greater temperatures, functioning from -55 to +125°C.



The SDI Models 2470, 2476, 2460 and 2466 are the triaxial aluminum case versions of the 2480. The SDI Models 2470 and 2476 are internally identical to the 2480 with upgraded bias and scale factor temperature shift performance and a wider temperature range from -55 to +125°C. The SDI Models 2460 and 2466 are the three axis low-cost versions of the 2480, rounding out the SDI Universal Module family for lower-temperature applications from -40 to +85°C.



**Data sheets dated 1-November-2015 and newer apply to 2240's with serial numbers above 3000 and 2480's with serial numbers above 195. Contact SDI for data sheets pertaining to parts made prior to these.**

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