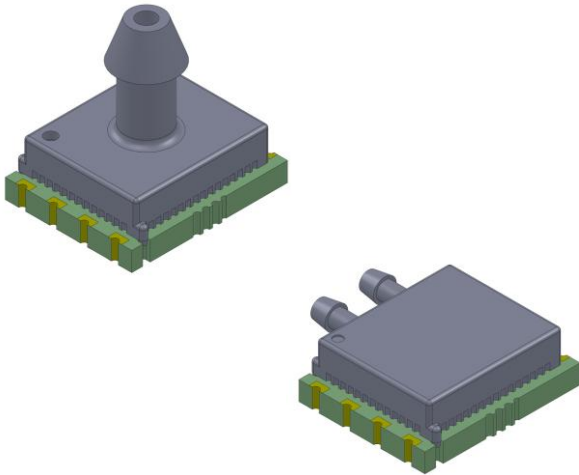


ELVX Series – Digital Pressure Sensors



Features

- ± 0.5 inH₂O to ± 60 inH₂O
- Gage or Differential Pressure
- Precision ASIC Conditioning
- Digital I²C and SPI Options
- 3.3V and 5V Supply Voltage Options
- PCB Surface Mount
- Improved Warm-up Stability

Applications

- Medical Devices
- Medical Instrumentation
- Respiratory
- Portable / Hand-Held Equipment
- Environmental Controls / Monitoring
- HVAC
- Industrial Controls

Description

The ELVX Digital Pressure Sensor Series are leadless with dual die configuration which provides best-in-class stability for low and ultra-low pressure applications.

These calibrated and compensated sensors provides accurate and stable output over a wide temperature range. This series is intended for use with non-corrosive, non-ionic working fluids such as air and other dry gases. A protective parylene coating is optionally available for moisture/harsh media protection.

For more information or to discuss your specific application needs, please contact our application experts who will assist you in selecting the right solution for your pressure-sensing needs.

Environmental Specifications

Characteristic	Parameter
Compensated Temperature Standard	0°C to 50°C [32°F to 122°F]
Industrial	-20°C to 85°C [-4°F to 185°F]
Operating Temperature	-25°C to 85°C [-13°F to 185°F]
Storage Temperature	-40°C to 85°C [-40°F to 185°F]

Pressure Sensor Maximum Ratings

Characteristic	Parameter
Supply Voltage	2.7 to 5.5 VDC
Device Temperature (Reflow Soldering)	250°C [482°F]

ELVX Series Pressure Range Specifications

Code	Operating Range ⁽¹⁾ inH2O	Proof Pressure ⁽²⁾ inH2O	Burst Pressure ⁽³⁾ inH2O	Common Mode Pressure ⁽⁴⁾ inH2O
F50D	± 0.5	270	415	415
L01D/G	± 1	270	415	415
L02D/G	± 2	270	415	415
L04D/G	± 4	300	415	415
L05D/G	± 5	300	415	415
L10D/G	± 10	350	415	415
L20D/G	± 20	350	415	415
L30D/G	± 30	350	415	415
L60D/G	± 60	350	415	415

Code	Operating Range mbar	Proof Pressure mbar	Burst Pressure mbar	Common Mode Pressure mbar
MF25D/G	± 2.5	675	1034	1034
MF12D/G	± 12.5	750	1034	1034
M025D/G	± 25	850	1034	1034
M050D/G	± 50	850	1034	1034
M060D/G	± 60	850	1034	1034
M075D/G	± 75	850	1034	1034

ELVX Performance Characteristics

Performance specified at 5V $\pm$ 5% for 5V nominal, 3.3V $\pm$ 5% for 3.3V nominal. Ref Temp 25°C

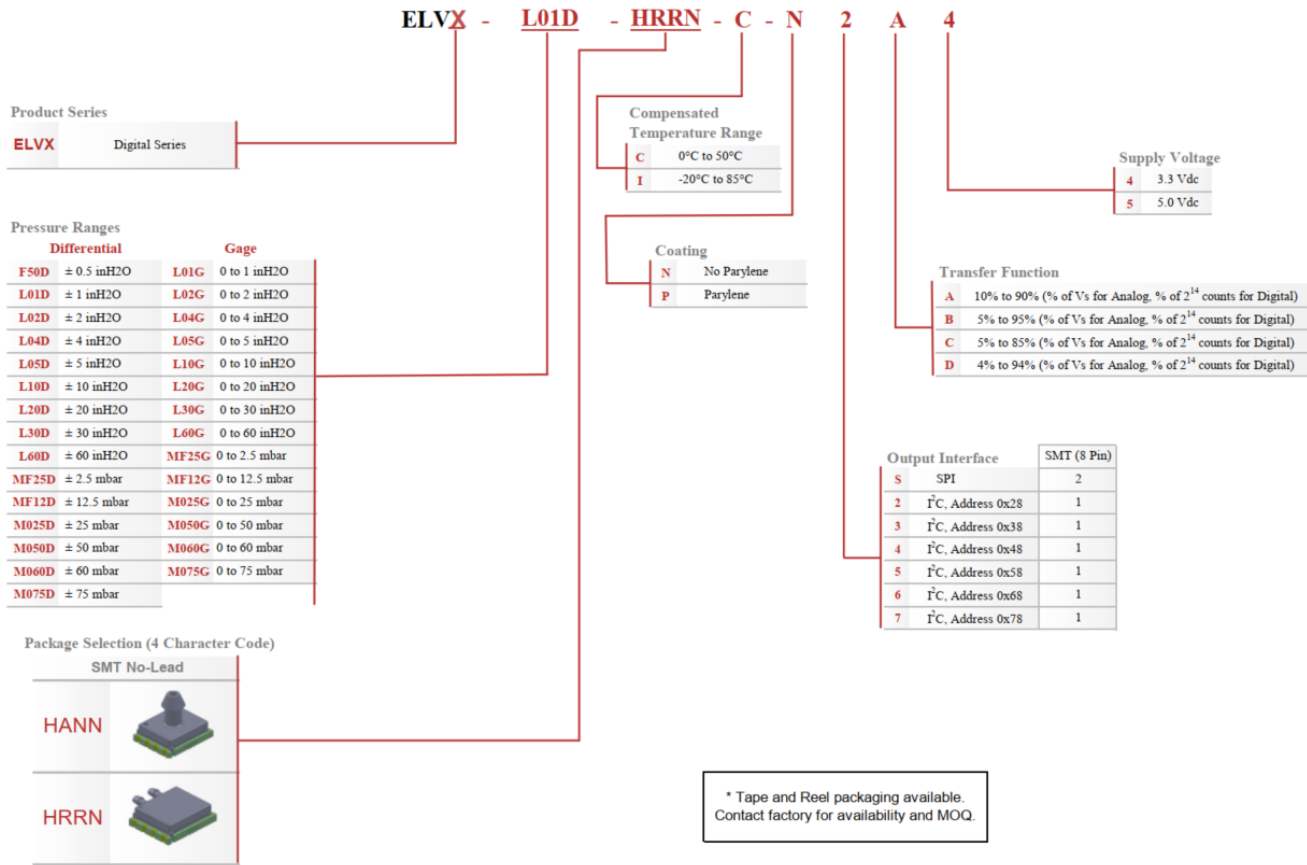
Parameter	Digital			
	Min	Typ	Max	Units
Full Scale Span ⁽⁵⁾				
(10% - 90% or 5%-85% Transfer Function)				
xxxD (Differential)	-	$\pm$ 6554	-	Count (Dec)
xxxG (Gage)	-	13108	-	Count (Dec)
(5% - 95% or 4%-94% Transfer Function)				
xxxD (Differential)	-	$\pm$ 7373	-	Count (Dec)
xxxG (Gage)	-	14746	-	Count (Dec)
Offset ⁽⁶⁾				
(10% - 90% Transfer Function Options)				
xxxD (Differential)	-	8192	-	Count (Dec)
xxxG (Gage)	-	1638	-	Count (Dec)
(5% - 95% Transfer Function Options)				
xxxD (Differential)	-	8192	-	Count (Dec)
xxxG (Gage)	-	819	-	Count (Dec)
(5%-85% Transfer Function Options)				
xxxD (Differential)	-	7373	-	Count (Dec)
xxxG (Gage)	-	819	-	Count (Dec)
(4% - 94% Transfer Function Options)				
xxxD (Differential)	-	8028	-	Count (Dec)
xxxG (Gage)	-	655	-	Count (Dec)
Total Error Band (TEB) ⁽⁷⁾ [-20C to 85C]				
F50D, L01G, MF25G	-	-	$\pm$ 3.5	%FSS
L01D, L02G, MF25D	-	-	$\pm$ 2.5	%FSS
Remaining Ranges	-	-	$\pm$ 1.5	%FSS
Total Error Band (TEB) [0C to 50C]				
F50D, L01G, MF25G	-	-	$\pm$ 2.5	%FSS
L01D, L02G, MF25D	-	-	$\pm$ 1.5	%FSS
L02D, L04G	-	-	$\pm$ 1	%FSS
Remaining Ranges	-	-	$\pm$ 0.75	%FSS
Position Sensitivity ⁽⁸⁾				
L02x, MF25x, & Below	-	$\pm$ 0.2	-	%FSS
Above L02x & MF25x	-	$\pm$ 0.1	-	%FSS
Supply Current				
3.3V Supply	-	3.1	3.9	mA
5V Supply	-	3.7	4.6	mA
Accuracy ⁽⁹⁾				
	-	-	$\pm$ 0.25	%FSS
Startup Time				
	-	-	3	ms
Response Time				
	-	0.46	-	ms

NOTES:

1. Minimum and maximum pressures of specified range
2. Proof pressure is the maximum pressure which may safely be applied to one port of the device for it to remain in specification once pressure is returned to the operating pressure range.
3. Burst pressure is the maximum pressure which may be applied to one port of the device without causing escape of pressure media. The device should not be expected to function after exposure to any pressure beyond the burst pressure.
4. Common Mode pressure is the maximum pressure which can be applied simultaneously to both ports of a differential pressure sensor without causing escape of pressure media. The device should not be expected to function after exposure to any pressure beyond this maximum pressure.
5. Full Scale Span (FSS) is the algebraic difference between the maximum and minimum output signals of specified pressure.
6. Offset is the output value when zero pressure is applied to the device.
7. Total Error Band (TEB) is the combination of errors including offset, span, linearity, pressure hysteresis, temperature effect on offset, and temperature effect on span.
8. Parameter is characterized and not 100% tested.
9. Accuracy is the combination errors of pressure non-linearity (based on Best Fit Straight Line), pressure hysteresis, and pressure non-repeatability at 25°C.

How to Order ELVX Series

For example, **ELVX-L01D-HRRN-C-N2A4**, defines an All Sensors ELVX series, ± 1 inH2O differential pressure range, HRRN package, compensated temperature from 0°C to 50°C, no parylene coating, I²C output, 10% to 90% of V_{supply} transfer function, 3.3 Vdc supply voltage



Device Options

Parylene Coating

Parylene coating provides a moisture barrier and protection from some harsh media.

Unlike other pressure sensor suppliers offering a Parylene coating, All Sensors performs this process in-house and uses an advanced production system to achieve the highest accuracy and reliability. This avoids transferring products out of and back to the pressure sensor manufacturing facility, provides complete quality control and improves the delivery time to customers. Specially designed masking techniques allow All Sensors to apply a cost-effective, high-volume Parylene coating in-house.

Consult factory for applicability of Parylene for the target application and sensor type.

This option is not available for pressure ranges below ± 10 inH₂O or ± 25 mbar configurations.

For HANN package, parylene coating is available on the high pressure port only.

Evaluation Kit

Part Number for Evaluation Kit with Adapter: **EK-02-02**

Part Number for Adapter only: **EK-02-ADPT02**

Sensor Application Information

Transfer Functions

Measurement systems employing ELVX sensors typically need to process the sensor output in terms of standard pressure units. Converting the sensor outputs to these units is done using the transfer function equations defined below.

Digital versions of ELVX sensors have an output range of 14 bits, or 0 to 16383 counts, referred to as the Full Scale Range (FSR).

Depending on the calibration Transfer Function option, the output at minimum and maximum calibrated pressures corresponds to different fractions of this Full Scale Range.

The difference in output at the maximum and minimum calibrated pressures is the Full Scale Span (FSS) of the sensor.

The general form of the equation for converting sensor output to pressure is

$$P \text{ (units)} = \text{Offset Pressure (units)} + \left(\frac{\text{Sensor Output} - \text{Offset Output}}{\text{Full Scale Span}} \right) * \text{Calibrated Range (Units)}$$

Offset Pressure (Units) is the minimum absolute value of pressure applied: for all Standard Gage and Differential, this value is zero.

Sensor Output is the pressure reading, in counts for I2C or SPI output.

Offset Output is the sensor reading with no pressure applied; this is specified in the Performance Tables as **Offset**. This value depends on the Transfer Function option selected.

Full Scale Span as defined above is the difference in output at maximum and minimum calibrated pressures. This is specified in the Performance Tables as **Full Scale Span**.

For ELVX Transfer Function options A and C (10%-90%, 5%-85% FSR), this corresponds to 80% of FSR;
for ELVX Transfer Function options B and D (5%-95%, 4%-94% FSR), this corresponds to 90% of FSR.

Note that for Differential ranges, this is expressed as positive / negative values: this is to clarify the excursions above and below the offset value for positive / negative pressure.

Calibrated Range is the difference between highest and lowest calibrated pressures.

For standard symmetrical Differential sensors, this is **twice** the maximum positive calibrated pressure.

That is, for example, a 5 PSID pressure range would have a 10 PSI Calibrated Range.

Transfer Function Calculation Examples

Example 1: ELVX-L10G-xxxx-x-x2Ax

Calibrated from 0 to 10 inches H₂O; I²C Digital output; 10% - 90% FSR transfer function. Full Scale Span = 80% of FSR = 0.8 * 16384 = 13108; Offset Output = 1638

For a reading of 12250 counts, the pressure is then:

$$P_{out} = 0 + (12250 - 1638) / 13108 * 10 \text{ inH}_2\text{O}.$$

$$P_{out} = (10612 / 13108) * 10 \text{ inH}_2\text{O} = \mathbf{8.096 \text{ inH}_2\text{O}}.$$

Example 2: ELVX-L05D-xxxx-x-xSBx

Calibrated from -5 to 5 inH₂O; SPI Digital output; 5% - 95% FSR transfer function.

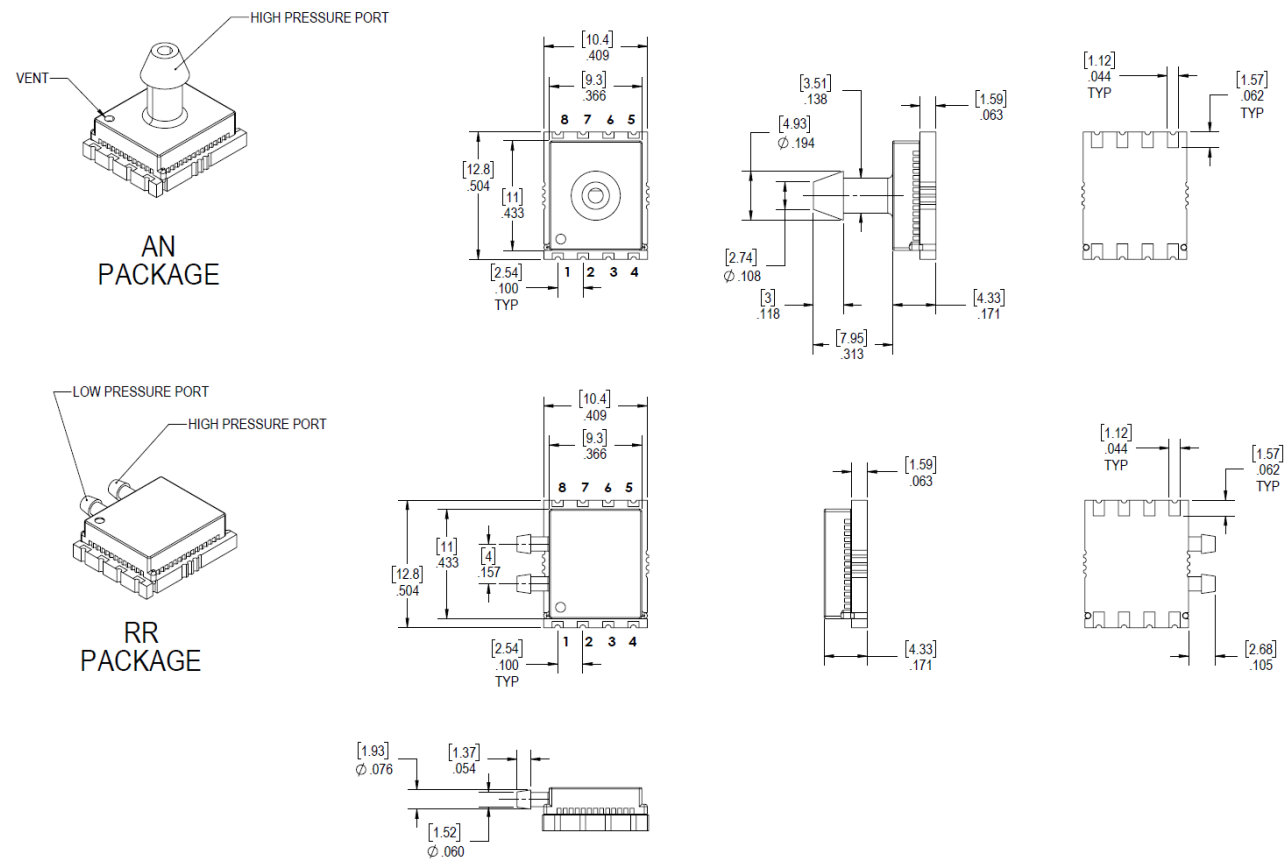
Full Scale Span = 90% of FSR = 0.9 * 16384 = 14746; Offset Output = 8192.

The Calibrated Range is 5 inH₂O – (-5 inH₂O) = 10 inH₂O.

For a reading of 4250 counts, the pressure is then:

$$P_{out} = 0 + (4250 - 8192) / 14746 * 10 \text{ inH}_2\text{O}.$$

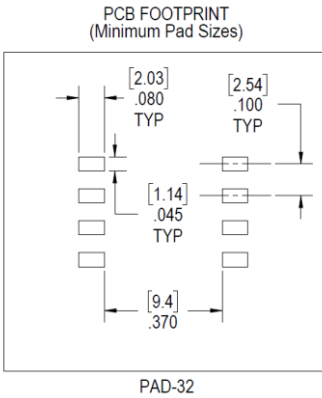
$$P_{out} = (-3942 / 14716) * 10 \text{ inH}_2\text{O} = \mathbf{-2.67 \text{ inH}_2\text{O}}.$$



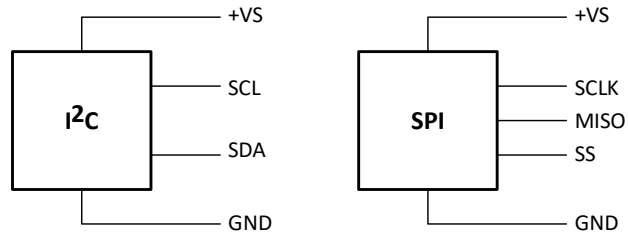
Pinout

Recommended PCB Pad Layout

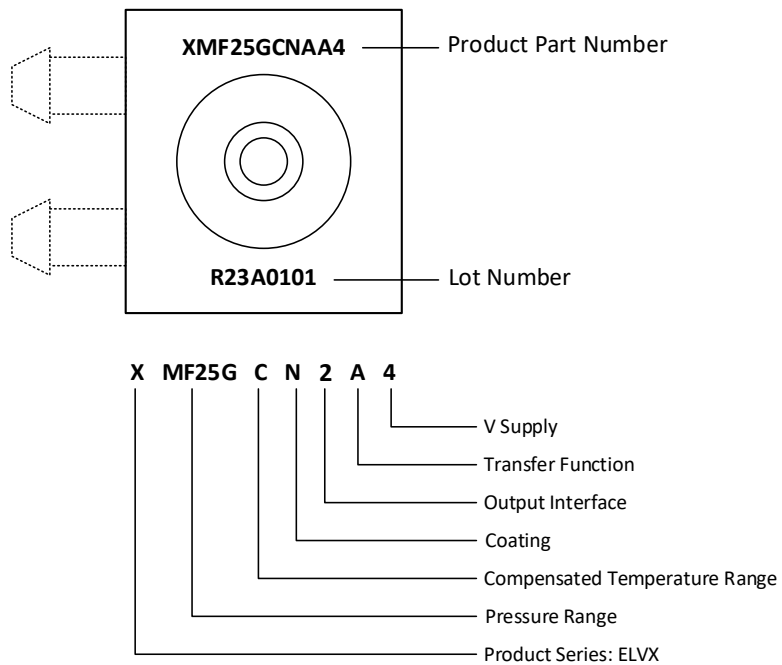
PIN CODE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
I ² C	GND	VS	SDA	SCL	N/C	N/C	N/C	N/C
SPI	GND	VS	MISO	SCLK	SS	N/C	N/C	N/C



Equivalent Circuit



Product Marking



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