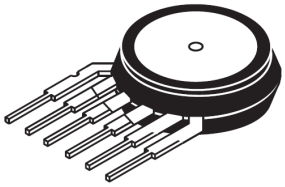
MPX4080D

Datasheet

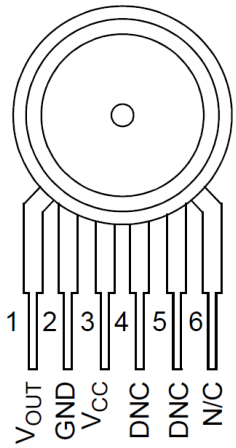
0 to 80 kPa, differential, integrated, pressure sensor

Unibody package



98ASB42793B

Top view



Pinout

Features

- 3.0% maximum error over 0 to 85 °C
- Ideally suited for microprocessor or microcontroller-based systems
- Temperature compensated from -40 to 105 °C
- Easy-to-use, durable epoxy unibody package

Applications

- Differential pressure measurement up to 80 kPa

Description

The MPX4080 series piezoresistive transducer is a state-of-the-art monolithic silicon pressure sensor designed for a wide range of applications, but particularly those employing a microcontroller or microprocessor with A/D inputs. This patented, single element transducer combines advanced micromachining techniques, thin-film metallization, and bipolar processing to provide an accurate, high level analog output signal that is proportional to the applied pressure.

1 Ordering information

			Ordering information						
Device name	Shipping	Package	# of Ports				Pressure type		Device marking
			None	Single	Dual	Gauge	Differential	Absolute	
Unibody package									
MPX4080D	Tray	98ASB42793B	•				•		MPX4080

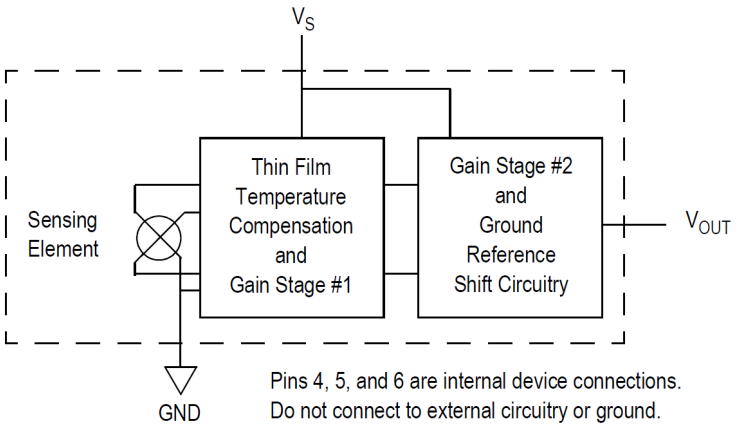
ST reserves the right to change the detail specifications as may be required to permit improvements in the design of its products.

2 General Description

2.1 Block diagram

Figure 1 shows a block diagram of the internal circuitry integrated on a pressure sensor chip in a unibody package.

Figure 1. Integrated pressure sensor block diagram



2.2 Pinout

Figure 2. Device pinout (top view)

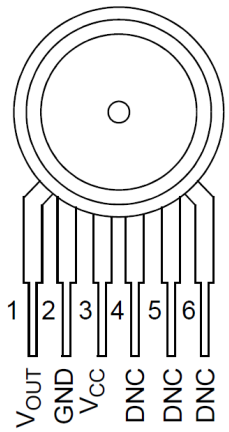


Table 1. Pin functions

Pin	Name	Function
1	V_{OUT}	Output voltage
2	GND	Ground
3	V_S	Voltage supply
4	DNC	Do not connect to external circuitry or ground.

Pin	Name	Function
5	DNC	Do not connect to external circuitry or ground.
6	DNC	Do not connect to external circuitry or ground.

3 Mechanical and Electrical Specifications

3.1 Maximum ratings

Table 2. Maximum ratings(1)

Rating	Symbol	Value	Unit
Maximum pressure	P_{max}	400	kPa
Storage temperature	T_A	-40 to +105	°C
Operating temperature	T_{stg}	-40 to +125	°C

1. Exposure beyond the specified limits may cause permanent damage or degradation to the device.

3.2 Operating characteristics

Table 3. Operating characteristics (V_S = 5.1 Vdc, T_A = 25 °C unless otherwise noted, P1 > P2. Decoupling circuit shown in Figure 5 required to meet electrical specifications.)

Characteristic	Symbol	Min	Typ	Max	Unit
Pressure range(1)	P_{OP}	0	—	80	kPa
Supply voltage(2)	V_S	4.85	5.1	5.35	Vdc
Supply current	I_o	—	7.0	10	mAdc
Minimum pressure offset(3)(0 to 85 °C) @ V_S = 5.1 V	V_{off}	0.478	0.575	0.672	Vdc
Full-scale output(4) (0 to 85 °C) @ V_S = 5.1 V	V_{FSO}	4.772	4.900	5.020	Vdc
Full-scale span(5) (0 to 85 °C) @ V_S = 5.1 V	V_{FSS}	—	4.325	—	Vdc
Accuracy	—	—	—	3.0	%V_{FSS}
Sensitivity	V/P	—	54	—	mV/kPa

1. 1 kPa (kilo Pascal) equals 0.145 psi.
2. Device is ratiometric within this specified excitation range.
3. Offset (V_{off}) is defined as the output voltage at the minimum rated pressure.
4. Full-scale output (V_{FSO}) is defined as the output voltage at the maximum or full-rated pressure.
5. Full-scale span (V_{FSS}) is defined as the algebraic difference between the output voltage at full-rated pressure and the output voltage at the minimum rated pressure.

4 On-chip Temperature Compensation and Calibration

Figure 3 shows the sensor output signal relative to differential pressure input. Typical, minimum, and maximum output curves are shown for operation over a temperature range of 0 ° to 85 °C using the decoupling circuit shown in Figure 5. The output will saturate outside of the specified pressure range.

Figure 4 illustrates the differential sensing chip in the basic chip carrier. A fluorosilicone gel isolates the die surface and wire bonds from the environment, while allowing the pressure signal to be transmitted to the sensor diaphragm.

The MPX4080D pressure sensor operating characteristics, internal reliability, and qualification tests are based on use of dry air as the pressure media. Media, other than dry air, may have adverse effects on sensor performance and long-term reliability. Contact the factory for information regarding media compatibility in your application.

Figure 5 shows the recommended decoupling circuit for interfacing the output of the integrated sensor to the A/D input of a microprocessor or microcontroller. Proper decoupling of the power supply is recommended.

Figure 3. Output versus pressure differential

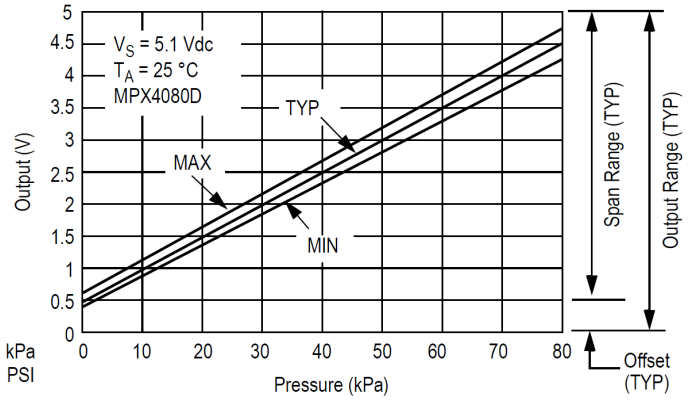


Figure 4. Cross-sectional diagrams (not-to-scale)

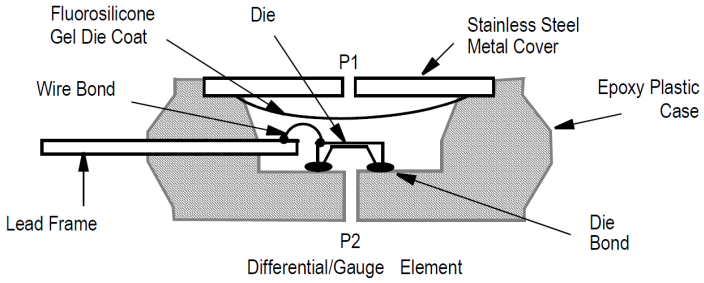
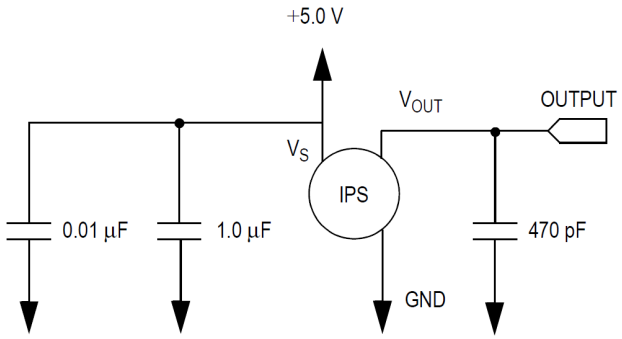


Figure 5. Recommended power supply decoupling and output filtering [1]

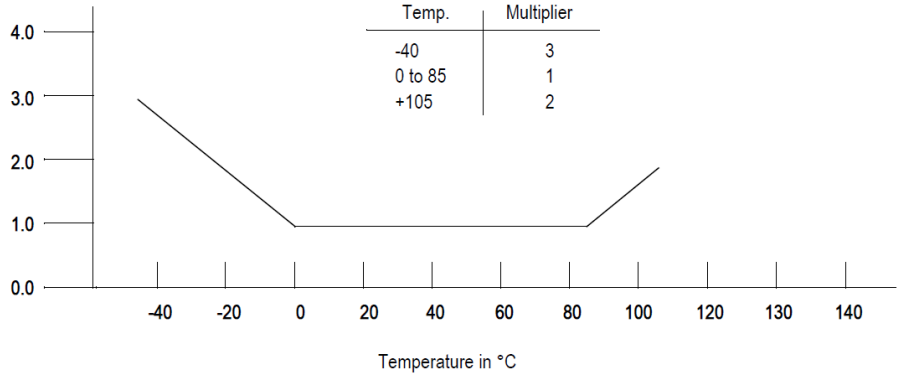


[1] For additional output filtering, please refer to application note AN1646.

Figure 6. Transfer function

Nominal Transfer Value: $V_{OUT} = V_S (P \times 0.01059 + 0.11280)$
$\pm$ (Pressure Error x Temp. Mult. x 0.01059 x V_S)
$V_S = 5.1\ V \pm 0.25\ V_{DC}$

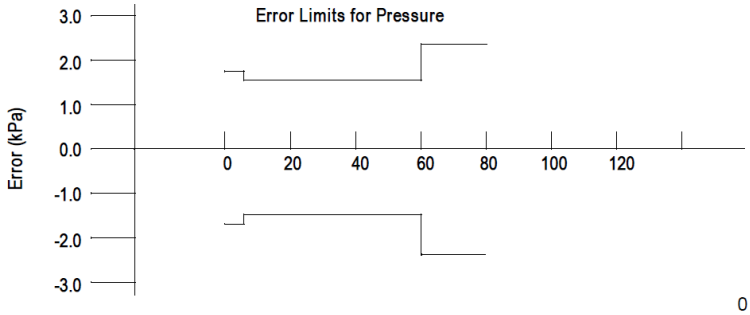
Figure 7. Temperature error multiplier



Temp.	Multiplier
-40	3
0 to 85	1
+105	2

NOTE: The Temperature Multiplier is a linear response from 0 to -40 °C and from 85 to 105 °C.

Figure 8. Pressure error band



Pressure	Error (max)
0 to 6 kPa	±1.8 kPa
0 to 60 kPa	±1.5 kPa
60 to 80 kPa	±2.3 kPa

5 Package Information

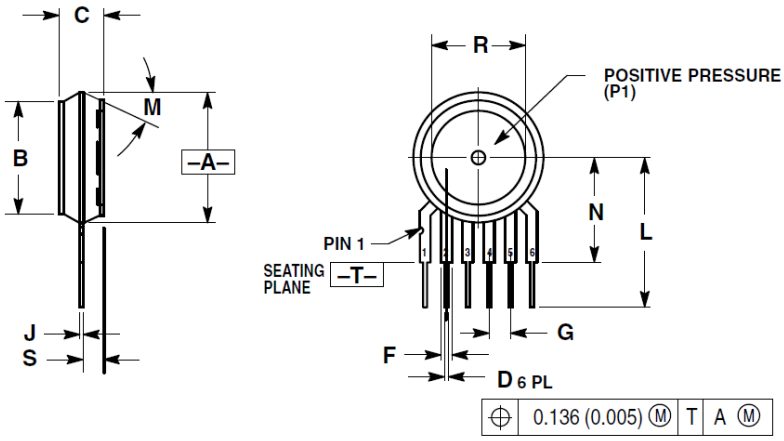
5.1 Pressure (P1)/Vacuum (P2) side identification

ST designates the two sides of the pressure sensor as the Pressure (P1) side and the Vacuum (P2) side. The Pressure (P1) side is the side containing fluorosilicone gel which protects the die from harsh media. The pressure sensor is designed to operate with positive differential pressure applied, P1 > P2.

The Pressure (P1) side is identified by the stainless steel cap.

5.2 Package dimensions

Figure 9. Case 98ASB42796B, 6-lead unibody package



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION –A– IS INCLUSIVE OF THE MOLD STOP RING. MOLD STOP RING NOT TO EXCEED 16.00 (0.630).

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.595	0.630	15.11	16.00
B	0.514	0.534	13.06	13.56
C	0.200	0.220	5.08	5.59
D	0.027	0.033	0.68	0.84
F	0.048	0.064	1.22	1.63
G	0.100 BSC		2.54 BSC	
J	0.014	0.016	0.36	0.40
L	0.695	0.725	17.65	18.42
M	30 °NOM		30 °NOM	
N	0.475	0.495	12.07	12.57
R	0.430	0.450	10.92	11.43
S	0.090	0.105	2.29	2.66

Revision history

Table 2. **Document revision history**

Date	Revision	Changes
24-Jun-2026	1	Initial release from ST, rebranded NXP document.

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