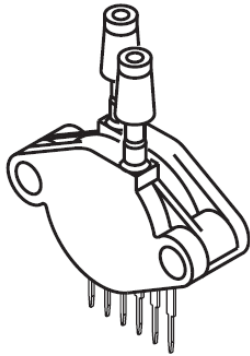

Integrated silicon pressure sensor on-chip signal conditioned, temperature compensated and calibrated



MPX5500DP
CASE 867C-05

Features

- 2.5% Maximum Error over 0° to 85°C
- Ideally suited for Microprocessor or Microcontroller-Based Systems
- Patented Silicon Shear Stress Strain Gauge
- Durable Epoxy Unibody Element
- Available in Differential Configuration

Description

The MPX5500DP 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

Table 1. Ordering information

Device Name	Case No.	# of Ports			Pressure Type			Device Marking
		None	Single	Dual	Gauge	Differential	Absolute	
Unibody Package								
MPX5500DP	867C			•		•		MPX5500DP

2 Operating Characteristics

Table 2. Operating Characteristics ($V_S = 5.0$ Vdc, $T_A = 25^\circ\text{C}$ unless otherwise noted, $P1 > P2$. Decoupling circuit shown in Figure 4. required to meet electrical specifications)

Characteristic		Symbol	Min	Typ	Max	Unit
Pressure Range ⁽¹⁾		P_{OP}	0	—	500	kPa
Supply Voltage ⁽²⁾		V_S	4.75	5.0	5.25	Vdc
Supply Current		I_O	—	7.0	10	mAdc
Zero Pressure Offset ⁽³⁾	(0 to 85°C)	V_{off}	0.088	0.20	0.313	Vdc
Full Scale Output ⁽⁴⁾	(0 to 85°C)	V_{FSO}	4.587	4.70	4.813	Vdc
Full Scale Span ⁽⁵⁾	(0 to 85°C)	V_{FSS}	—	4.50	—	Vdc
Accuracy ⁽⁶⁾	(0 to 85°C)	—	—	—	±2.5	%VFSS
Sensitivity		V/P	—	9.0	—	mV/kPa
Response Time ⁽⁷⁾		t_R	—	1.0	—	ms
Output Source Current at Full Scale Output		I_{O+}	—	0.1	—	mAdc
Warm-Up Time ⁽⁸⁾		—	—	20	—	ms

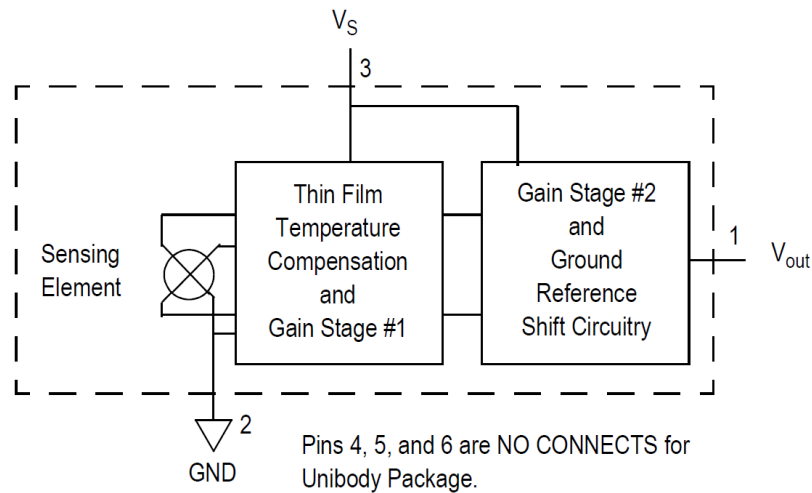
1. 1.0 kPa (kiloPascal) equals 0.145 psi.
2. Device is ratiometric within this specified excitation range.
3. Offset (V_{off}) is defined as the output voltage at the minimum rated pressure.
4. Full Scale Output (V_{FSO}) is defined as the output voltage at the maximum or full rated pressure.
5. Full 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.
6. Accuracy (error budget) consists of the following:
 Linearity: Output deviation from a straight line relationship with pressure over the specified pressure range.
 Temperature Hysteresis: Output deviation at any temperature within the operating temperature range, after the temperature is cycled to and from the minimum or maximum operating temperature points, with zero differential pressure applied.
 Pressure Hysteresis: Output deviation at any pressure within the specified range, when this pressure is cycled to and from the minimum or maximum rated pressure, at 25°C.
 TcSpan: Output deviation over the temperature range of 0° to 85°C, relative to 25°C.
 TcOffset: Output deviation with minimum rated pressure applied, over the temperature range of 0° to 85°C, relative to 25°C. Variation from Nominal: The variation from nominal values, for Offset or Full Scale Span, as a percent of V_{FSS} , at 25°C.
7. Response Time is defined as the time for the incremental change in the output to go from 10% to 90% of its final value when subjected to a specified step change in pressure.
8. Warm-up Time is defined as the time required for the device to meet the specified output voltage after the pressure has been stabilized.

3 Maximum Ratings

Table 3. Maximum Ratings⁽¹⁾

Rating	Symbol	Value	Unit
Maximum Pressure ⁽²⁾ ($P_2 \leq 1$ Atmosphere)	P_{1max}	2000	kPa
Storage Temperature	T_{stg}	-40 to +125	°C
Operating Temperature	T_A	-40 to +125	°C

1. Maximum Ratings apply to Case 867 only. Extended exposure at the specified limits may cause permanent damage or degradation to the device.
2. This sensor is designed for applications where P_1 is always greater than, or equal to P_2 . P_2 maximum is 500 kPa. [Figure 1](#) shows a block diagram of the internal circuitry integrated on a pressure sensor chip.

Figure 1. Fully Integrated Pressure Sensor Schematic


4 On-chip Temperature Compensation and Calibration

Figure 3 illustrates the Differential/Gauge basic chip carrier (Case 867). 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 MPX5500DP pressure sensor operating characteristics, and 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 2 shows the sensor output signal relative to 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 4. The output will saturate outside of the specified pressure range.

Figure 4 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 2. Output vs. Pressure Differential

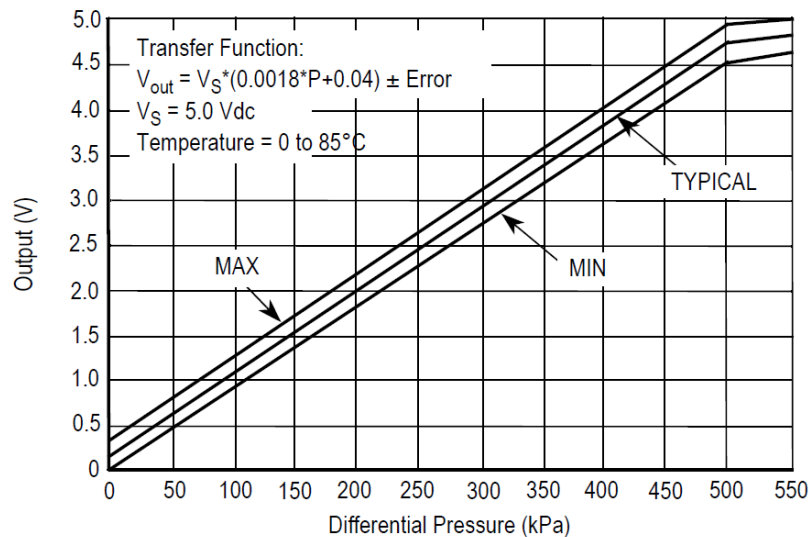


Figure 3. Cross-Sectional Diagrams (not to scale)

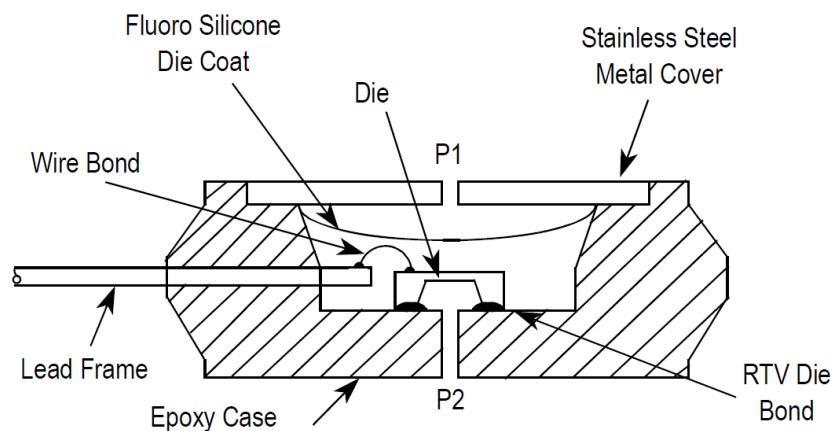
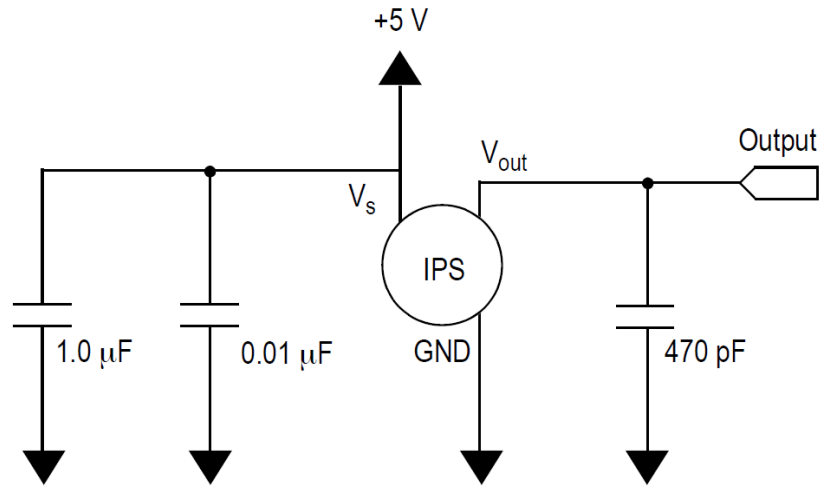


Figure 4. Recommended Power Supply Decoupling and Output Filtering (for additional output filtering, please refer to Application Note AN1646)



4.1 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 MPX pressure sensor is designed to operate with positive differential pressure applied, $P1 > P2$.

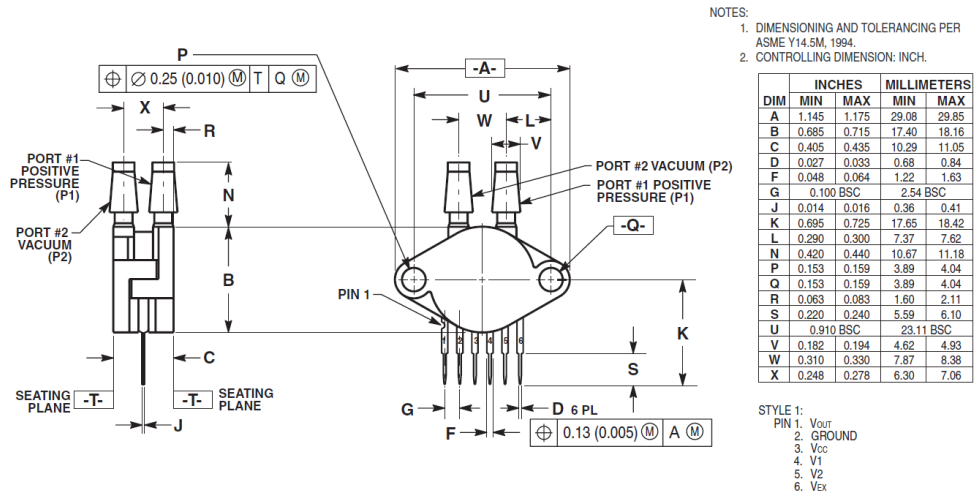
The Pressure (P1) side may be identified by using the following table.

Table 4. Pressure (P1)/Vacuum (P2) Side Identification

Part Number	Case Type	Pressure (P1) Side Identifier
MPX5500DP	867C	Side with Part Marking

5 Package dimensions

Figure 5. PRESSURE AND VACUUM SIDES PORTED (DP)



Revision history

Table 5. Document revision history

Date	Revision	Changes
14-May-2026	1	Initial release from ST, rebranded NXP document



Contents

1	Ordering information	2
2	Operating Characteristics	3
3	Maximum Ratings	4
4	On-chip Temperature Compensation and Calibration	5
4.1	Pressure (p1)/vacuum (p2) side identification	6
5	Package dimensions	7
	Revision history	8

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