

Integrated Silicon Pressure Sensor On-Chip Signal Conditioned, Temperature Compensated and Calibrated

The MPX5010/MPXV5010G series piezoresistive transducers are state-of-the-art monolithic silicon pressure sensors designed for a wide range of applications, but particularly those employing a microcontroller or microprocessor with A/D inputs. This 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.

Features

- 5.0% Maximum Error over 0° to 85°C
- Ideally Suited for Microprocessor or Microcontroller-Based Systems
- Durable Epoxy Unibody and Thermoplastic (PPS) Surface Mount Package
- Temperature Compensated over -40° to +125°C
- Patented Silicon Shear Stress Strain Gauge
- Available in Differential and Gauge Configurations
- Available in Surface Mount (SMT) or Through-hole (DIP) Configurations

Application Examples

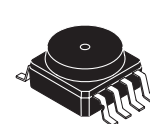
- Hospital Beds
- HVAC
- Respiratory Systems
- Process Control

ORDERING INFORMATION					
Device Type	Options	Case No.	MPX Series Order No.	Packing Options	Device Marking
SMALL OUTLINE PACKAGE (MPXV5010G SERIES)					
Basic Elements	Gauge, Element Only, SMT	482	MPXV5010G6U	Rails	MPXV5010G
	Gauge, Element Only, DIP	482B	MPXV5010G7U	Rails	MPXV5010G
Ported Elements	Gauge, Axial Port, SMT	482A	MPXV5010GC6U	Rails	MPXV5010G
	Gauge, Axial Port, DIP	482C	MPXV5010GC7U	Rails	MPXV5010G
	Gauge, Axial Port, SMT	482A	MPXV5010GC6T1	Tape & Reel	MPXV5010G
	Gauge, Side Port, SMT	1369	MPXV5010GP	Trays	MPXV5010G
	Gauge, Dual Port, SMT	1351	MPXV5010DP	Trays	MPXV5010G
UNIBODY PACKAGE (MPX2202 SERIES)					
Basic Element	Differential	867	MPX5010D	—	MPXV5010D
Ported Elements	Differential, Gauge	867C	MPX5010DP	—	MPXV5010DP
	Gauge	867B	MPX5010GP	—	MPXV5010GP
	Gauge, Axial	867E	MPX5010GS	—	MPXV5010D
	Gauge, Axial PC Mount	867F	MPX5010GSX	—	MPXV5010D

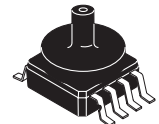
MPX5010 MPXV5010G SERIES

INTEGRATED
PRESSURE SENSOR
0 to 10 kPa (0 to 1.45 psi)
0.2 to 4.7 V OUTPUT

SMALL OUTLINE PACKAGE



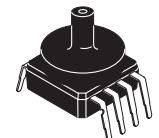
MPXV5010G6U
CASE 482-01



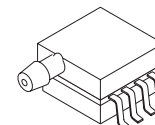
MPXV5010GC6U/C6T1
CASE 482A-01



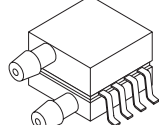
MPXV5010G7U
CASE 482B-03



MPXV5010GC7U
CASE 482C-03



MPXV5010GP
CASE 1369-01



MPXV5010DP
CASE 1351-01

UNIBODY PACKAGE PIN NUMBERS⁽¹⁾

1	V _{out}	4	N/C
2	Gnd	5	N/C
3	V _S	6	N/C

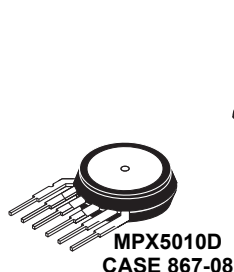
1. Pins 4, 5, and 6 are internal device connections. Do not connect to external circuitry or ground. Pin 1 is noted by the notch in the lead.

SMALL OUTLINE PACKAGE PIN NUMBERS⁽¹⁾

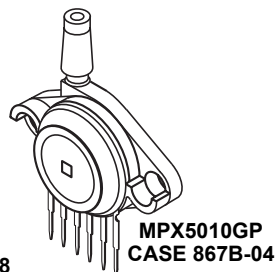
1	N/C	5	N/C
2	V _S	6	N/C
3	Gnd	7	N/C
4	V _{out}	8	N/C

1. Pins 1, 5, 6, 7, and 8 are internal device connections. Do not connect to external circuitry or ground. Pin 1 is noted by the notch in the lead.

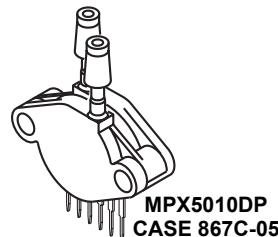
UNIBODY PACKAGES



MPX5010D
CASE 867-08



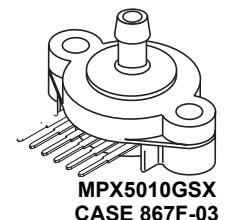
MPX5010GP
CASE 867B-04



MPX5010DP
CASE 867C-05



MPX5010GS
CASE 867E-03



MPX5010GSX
CASE 867F-03

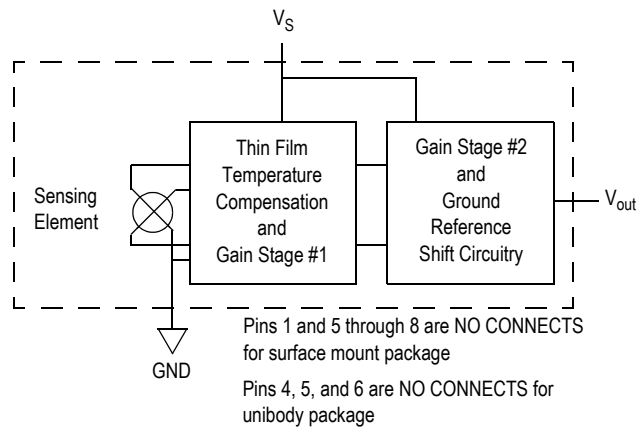


Figure 1. Fully Integrated Pressure Sensor Schematic

Table 1. Maximum Ratings⁽¹⁾

Rating	Symbol	Value	Unit
Maximum Pressure ($P_1 > P_2$)	P_{max}	75	kPa
Storage Temperature	T_{stg}	-40 to +125	°C
Operating Temperature	T_A	-40 to +125	°C

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

Table 2. Operating Characteristics ($V_S = 5.0$ Vdc, $T_A = 25^\circ\text{C}$ unless otherwise noted, $P_1 > P_2$. Decoupling circuit shown in Figure 3 required to meet specification.)

Characteristic	Symbol	Min	Typ	Max	Unit
Pressure Range ⁽¹⁾	P_{OP}	0	—	10	kPa
Supply Voltage ⁽²⁾	V_S	4.75	5.0	5.25	Vdc
Supply Current	I_o	—	5.0	10	mAdc
Minimum Pressure Offset ⁽³⁾ @ $V_S = 5.0$ Volts	V_{off}	0	0.2	0.425	Vdc
Full Scale Output ⁽⁴⁾ @ $V_S = 5.0$ Volts	V_{FSO}	4.475	4.7	4.925	Vdc
Full Scale Span ⁽⁵⁾ @ $V_S = 5.0$ Volts	V_{FSS}	4.275	4.5	4.725	Vdc
Accuracy ⁽⁶⁾	—	—	—	± 5.0	% V_{FSS}
Sensitivity	V/P	—	450	—	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
Offset Stability ⁽⁹⁾	—	—	± 0.5	—	% V_{FSS}

- 1.0 kPa (kiloPascal) equals 0.145 psi.
- Device is ratiometric within this specified excitation range.
- Offset (V_{off}) is defined as the output voltage at the minimum rated pressure.
- Full Scale Output (V_{FSO}) is defined as the output voltage at the maximum or full rated pressure.
- 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.
- 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 .
- 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.
- Warm-up Time is defined as the time required for the product to meet the specified output voltage after the Pressure has been stabilized.
- Offset Stability is the product's output deviation when subjected to 1000 hours of Pulsed Pressure, Temperature Cycling with Bias Test.

Table 3. Mechanical Characteristics

Characteristics	Typ	Unit
Weight, Basic Element (Case 867)	4.0	grams
Weight, Basic Element (Case 482)	1.5	grams

PRESSURE (P1)/VACUUM (P2) SIDE IDENTIFICATION TABLE

Freescale 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 table below:

Part Number	Case Type	Pressure (P1) Side Identifier
MPX5010D	867	Stainless Steel Cap
MPX5010DP	867C	Side with Part Marking
MPX5010GP	867B	Side with Port Attached
MPX5010GS	867E	Side with Port Attached
MPX5010GSX	867F	Side with Port Attached
MPXV5010G6U	482	Stainless Steel Cap
MPXV5010G7U	482B	Stainless Steel Cap
MPXV5010GC6U/T1	482A	Side with Port Attached
MPXV5010GC7U	482C	Side with Port Attached
MPXV5010GP	1369	Side with Port Attached
MPXV5010DP	1351	Side with Part Marking