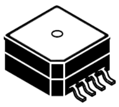
MPXH6101A

Datasheet

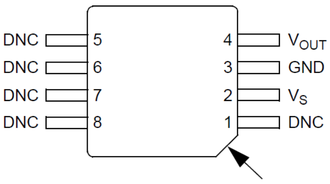
15 to 102 kPa, absolute, integrated pressure sensor

Super small outline package



MPXH6101A6U/6T1
Case 98ARH99066A

Top view



Pin 1 identification, chamfered corner

Features

- 1.72% maximum error over 0 °C to 85 °C
- Specifically designed for intake manifold absolute pressure sensing in engine control systems
- Temperature compensated over -40 °C to +125 °C
- Thermoplastic (PPS) surface mount package

Applications

- Manifold sensing for automotive systems
- Ideally suited for microprocessor or microcontroller-based system
- Also ideal for non-automotive applications

Description

ST's MPXH6101A manifold absolute pressure (MAP) sensor for engine control is designed to sense absolute air pressure within the intake manifold. This measurement can be used to compute the amount of fuel required for each cylinder. The small form factor and high reliability of on-chip integration makes the MAP sensor a logical and economical choice for automotive system designers.

MPXH6101A piezoresistive transducer is a state-of-the-art, monolithic, signal conditioned, silicon pressure sensor. This sensor combines advanced micromachining techniques, thin film metallization, and bipolar semiconductor processing to provide an accurate, high level analog output signal that is proportional to applied pressure.

1 Ordering information

Table 1. Ordering information

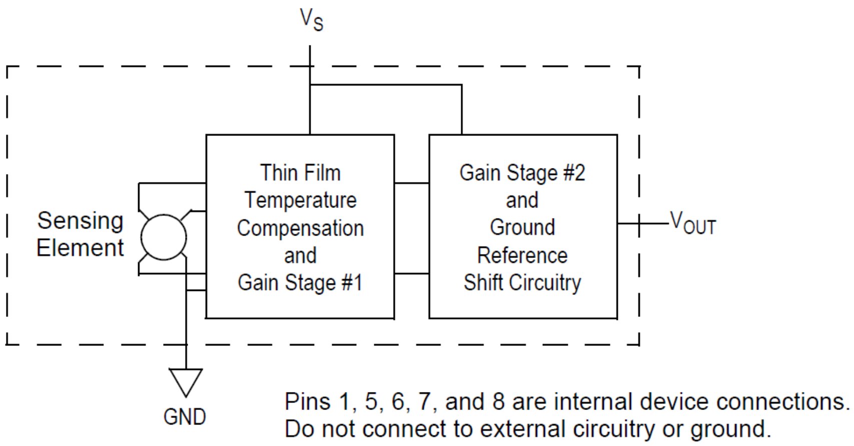
Part number	Shipping	Package	# of Ports			Pressure type			Device marking
			None	Single	Dual	Gauge	Differential	Absolute	
Super Small Outline Package									
MPXH6101A6U	Rails	98ARH99066A	•					•	MPXH6101A
MPXH6101A6T1	Tape and Reel	98ARH99066A	•					•	MPXH6101A

2 General Description

2.1 Block diagram

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

Figure 1. Fully integrated pressure sensor schematic



2.2 Pinout

Figure 2. Device pinout (top view)

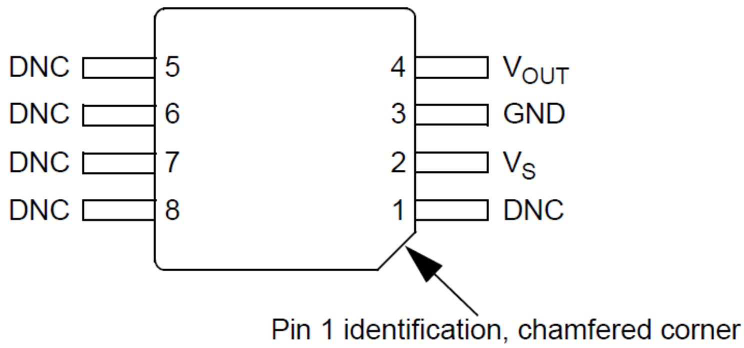


Table 2. Pin functions

Pin	Name	Function
1	DNC	Do not connect to external circuitry or ground. Pin 1 is denoted by chamfered corner.
2	V_S	Voltage supply
3	GND	Ground
4	V_{OUT}	Output voltage
5	DNC	Do not connect to external circuitry or ground.
6	DNC	Do not connect to external circuitry or ground.
7	DNC	Do not connect to external circuitry or ground.
8	DNC	Do not connect to external circuitry or ground.

3 Mechanical and Electrical Specifications

3.1 Maximum ratings

Table 3. Maximum ratings[1]

Rating	Symbol	Value	Unit
Maximum pressure (P1 > P2)	P_{MAX}	400	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.

3.2 Operating characteristics

Table 4. Operating characteristics (V_S = 5.0 Vdc, T_A = 25 °C unless otherwise noted, P1 > P2. Decoupling circuit shown in Figure 4 is required to meet electrical specifications.)

Characteristic	Symbol	Min	Typ	Max	Unit
Pressure range[1]	P_{OP}	15	—	102	kPa
Supply voltage[2]	V_S	4.75	5	5.25	Vdc
Supply current	I_o	—	7.0	10	mAdc
Minimum pressure offset[3] (0 to 85 °C)	V_{off}	0.168	0.247	0.326	Vdc
Full-scale output[4] (0 to 85 °C)	V_{FSO}	4.775	4.854	4.933	Vdc
Full-scale span[5] (0 to 85 °C)	V_{FSS}	4.448	4.607	4.765	Vdc
Accuracy[6] (0 to 85 °C)	—	—	—	±1.72	$\%V_{FSS}$
Sensitivity	V/P	—	52.950	—	mV/kPa
Response time[7]	tR	—	15	—	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. 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 VFSS, 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 product to meet the specified output voltage after the pressure has been stabilized.
9. Offset stability is the product's output deviation when subjected to 1000 hours of pulsed pressure, temperature cycling with bias test.

4 On-chip temperature compensation and calibration

Figure 3 illustrates an absolute sensing chip in the super small outline package (case 98ARH99066A).

Figure 5 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 °C to 85 °C. The output will saturate outside of the specified pressure range.

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 MPXH6101A 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 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 3. Cross-sectional diagram SSOP (not to scale)

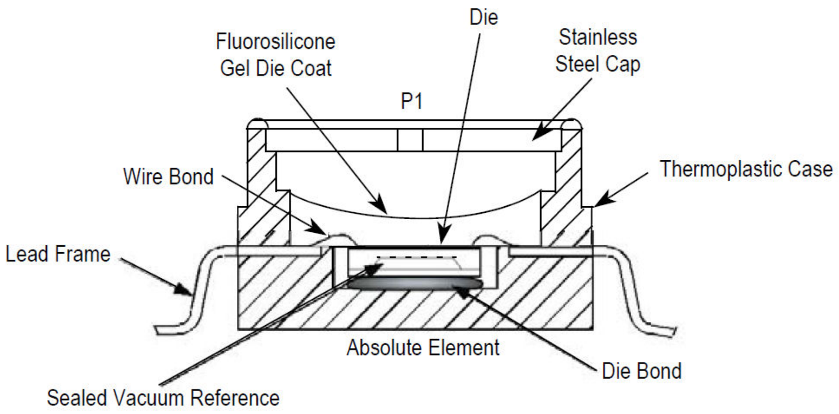


Figure 4. Recommended power supply decoupling and output filtering

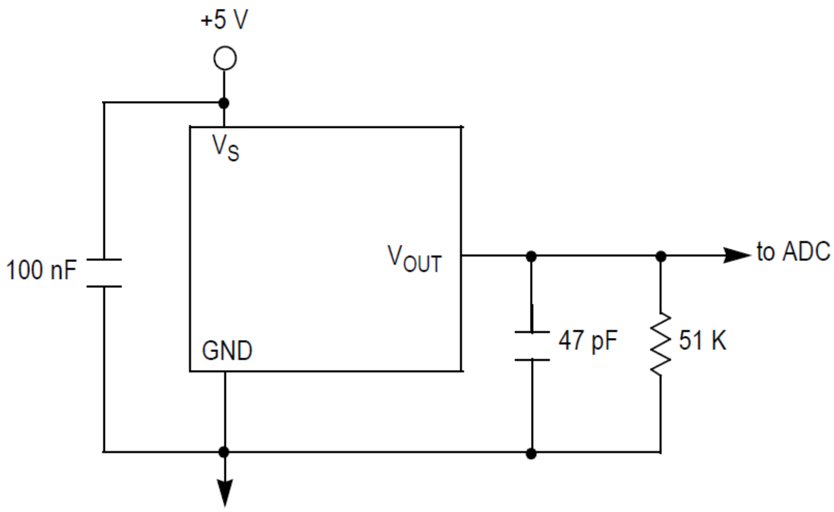
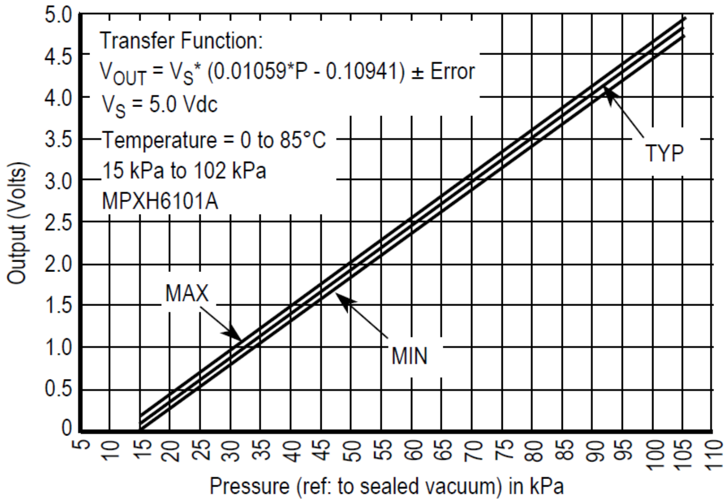


Figure 5. Output versus absolute pressure



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 may be identified by using the following table:

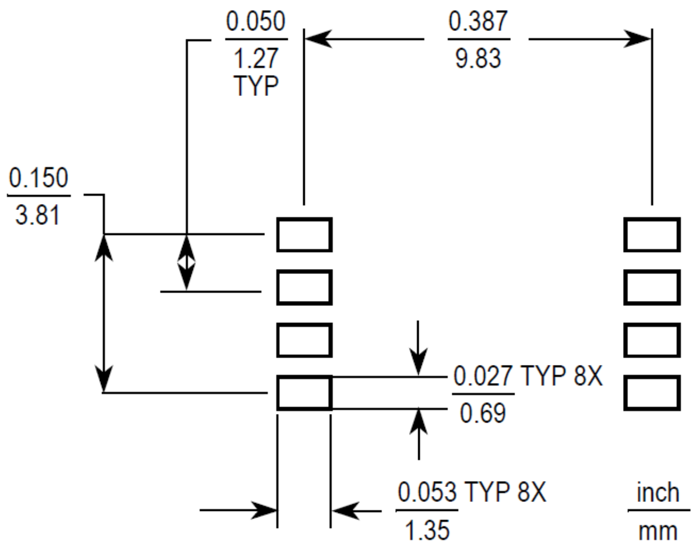
Table 5. **Pressure (P1)/vacuum (P2) side identification**

Part number	Package	Pressure (P1) side identifier
MPXH6101A6U/T1	98ARH99066A	Stainless steel cap

5.2 Minimum recommended footprint for surface mounted applications

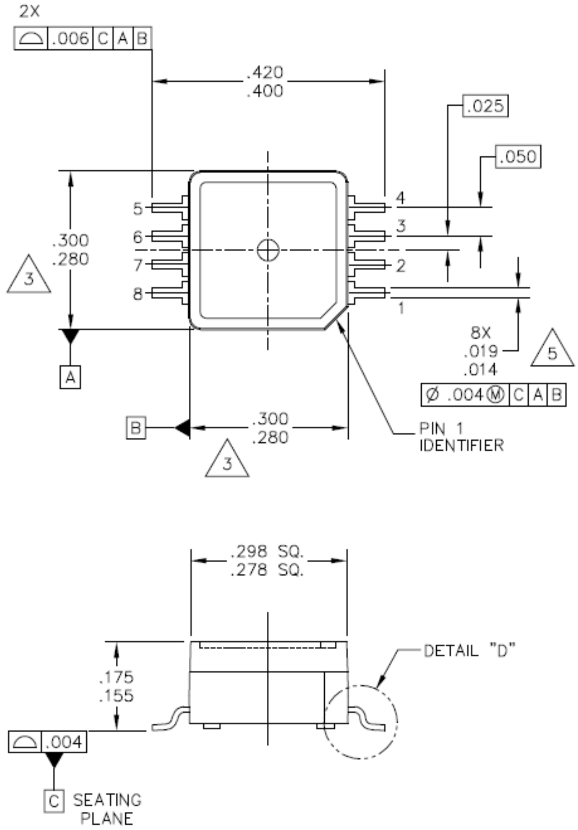
Surface mount board layout is a critical portion of the total design. The footprint for the surface mount packages must be the correct size to ensure proper solder connection interface between the board and the package. With the correct footprint, the packages will self-align when subjected to a solder reflow process. It is always recommended to design boards with a solder mask layer to avoid bridging and shorting between solder pads.

Figure 6. **SSOP footprint (case 98ARH99066A)**



6 Package dimensions

Figure 7. **Case 98ARH99066A, 8-lead super small outline package**



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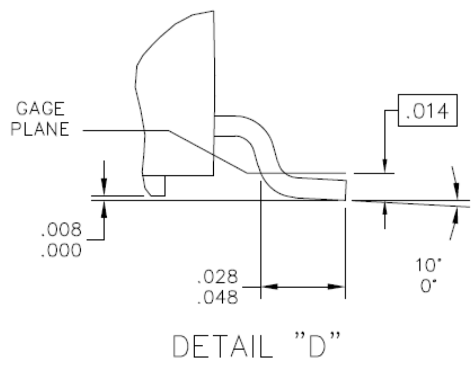
TITLE: 8 LEAD SSOP		DOCUMENT NO: 98ARH99066A	REV: H
		CASE NUMBER: 1317–04	13 APR 2012
		STANDARD: NON–JEDEC	

Figure 8. Case 98ARH99066A, 8-lead super small outline package



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		CASE NUMBER: 1317–04	13 APR 2012
		STANDARD: NON–JEDEC	

Figure 9. **Case 98ARH99066A, 8-lead super small outline package**

NOTES:

1. ALL DIMENSIONS IN INCHES.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994.
3. (△) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSION SHALL NOT EXCEED .006 INCHES PER SIDE.
4. ALL VERTICAL SURFACES TO BE 5° MAXIMUM.
5. (△) DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .008 INCHES MAXIMUM.

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Revision history

Table 6. **Document revision history**

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

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