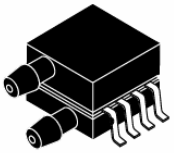
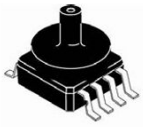
MPXV5004DP, MPXV5004GC6
MPVZ5004G6, MPVZ5004GW7

Datasheet

0 to 3.92 kPa, differential and gauge, integrated pressure sensor



MPXV5004DP
Case 98ASA99255D



MPXV5004GC6T1/6U, MPVZ5004GC6U
Case 98ASB17757C

MPVZ5004G6U/6T1
Case 98ASB17756C

MPVZ5004GW7U
Case 98ASA10611D

Features

- 1.5% maximum error for 0 to 100 mm H_2O over +10 °C to +60 °C with autozero
- 2.5% maximum error for 100 to 400 mm H_2O over +10 °C to +60 °C with autozero
- 6.25% maximum error for 0 to 400 mm H_2O over 10 °C to +60 °C without autozero
- Temperature compensated over 10 °C to 60 °C
- Available in gauge surface mount (SMT) or through-hole (DIP) configurations
- Durable thermoplastic (PPS) package

Applications

- Washing machine water level
- Ideally suited for microprocessor or microcontroller-based systems
- Appliance liquid level and pressure measurement
- Respiratory equipment

Description

The MPxx5004 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 sensor combines a highly sensitive implanted strain gauge with 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**

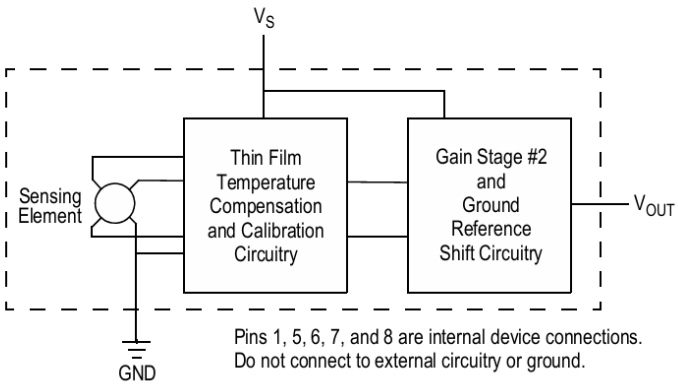
Part number	Shipping	Package	# of Ports				Pressure type		Device marking
			None	Single	Dual	Gauge	Differential	Absolute	
Small outline package (MPXV5004 series)									
MPXV5004DP	Tray	98ASA99255D			•		•		MPXV5004DP
MPXV5004GC6T1	Reel	98ASB17757C		•		•			MPXV5004G
MPXV5004GC6U	Rail	98ASB17757C		•		•			MPXV5004G
Small outline package (Media resistant gel) (MPVZ5004 series)									
MPVZ5004G6T1	Reel	98ASB17756C	•			•			MPVZ5004G
MPVZ5004G6U	Rail	98ASB17756C	•			•			MPVZ5004G
MPVZ5004GW7U	Rail	98ASA10611D		•		•			MZ5004GW

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. Integrated pressure sensor schematic



2.2 Pinout

Figure 2. Device pinout (top view)

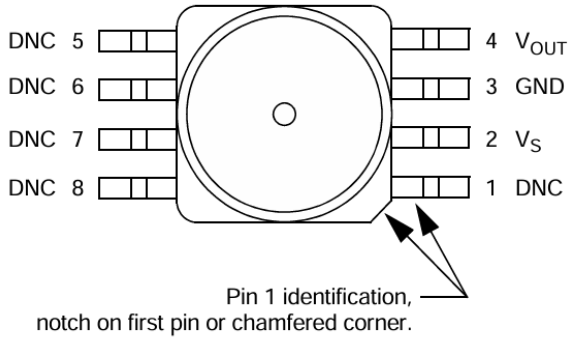


Table 1. Pin functions

Table 2. Pin functions

Pin	Name	Function
1	DNC	Do not connect to external circuitry or ground. Pin 1 is notated by the notch in the lead or 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. Table 2. Maximum ratings(1)

Rating	Symbol	Value	Unit
Maximum pressure (P1 > P2)	P_{MAX}	16	kPa
Storage temperature	T_{STG}	–30 to +100	°C
Operating temperature	T_A	0 to +85	°C

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

3.2 Operating characteristics

Table 4. Table 3. Operating characteristics (V_S = 5.0 V_{DC}, T_A = 25 °C unless otherwise noted, P1 > P2)

Characteristic		Symbol	Min	Typ	Max	Units
Pressure range		P_{OP}	0	—	3.92 400	kPa mm H_2O
Supply voltage(1)		V_S	4.75	5.0	5.25	V_{DC}
Supply current		I_S	—	—	10	mAdc
Span @ 306 mm H_2O (3 kPa)(2) Full-scale span @ 400 mm H_2O (3.92 kPa)(2)		V_{FSS}	— —	3.0 3.92	— —	V
Offset(3)		V_{OFF}	0.75	1.0	1.25	V
Sensitivity		V/P	—	1.0	—	V/kPa
Accuracy (4) (5)	0 to 100 mm H_2O (10 °C to 60 °C) 100 to 400 mm H_2O (10 °C to 60 °C) 0 to 400 mm H_2O (10 °C to 60 °C)	— — —	— — —	— — —	±1.5 ±2.5 ±6.25	$\%V_{FSS}$ with autozero $\%V_{FSS}$ with autozero $\%V_{FSS}$ without autozero

1. Device is ratiometric within this specified excitation range.
2. Span is defined as the algebraic difference between the output voltage at specified pressure and the output voltage at the minimum rated pressure.
3. Offset (V_{off}) is defined as the output voltage at the minimum rated pressure.
4. Accuracy (error budget) consists of the following:
   Linearity: Output deviation from a straight line relationship with pressure, using endpoint method, 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 10°C to 60°C, relative to 25°C.
   TcOffset: Output deviation with minimum rated pressure applied, over the temperature range of 10°C to 60°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

5. Autozero at factory installation: Due to the sensitivity of the MPxx5004G, external mechanical stresses and mounting position can affect the zero pressure output reading. Autozeroing is defined as storing the zero pressure output reading and subtracting this from the device's output during normal operations. Reference AN1636 for specific information. The specified accuracy assumes a maximum temperature change of ±5 °C between autozero and measurement.

4 On-chip temperature compensation and calibration

The performance over temperature is achieved by integrating the shear-stress strain gauge, temperature compensation, calibration and signal conditioning circuitry onto a single monolithic chip.

Figure 3 illustrates the gauge configuration in the basic chip carrier (case 98ASB17756C). A fluorosilicone gel isolates the die surface and wire bonds from the environment, while allowing the pressure signal to be transmitted to the silicon diaphragm.

The MPxx5004 series sensor operating characteristics are based on use of dry air as pressure media. Media, other than dry air, may have adverse effects on sensor performance and long-term reliability. Internal reliability and qualification test for dry air, and other media, are available from the factory. Contact the factory for information regarding media tolerance in your application.

Figure 4 shows the recommended decoupling circuit for interfacing the output of the MPxx5004 to the A/D input of the microprocessor or microcontroller. Proper decoupling of the power supply is recommended.

Typical, minimum and maximum output curves are shown for operation over a temperature range of 10 °C to 60 °C using the decoupling circuit shown in Figure 4. The output will saturate outside of the specified pressure range.

Figure 3. Cross-sectional diagram (not to scale)

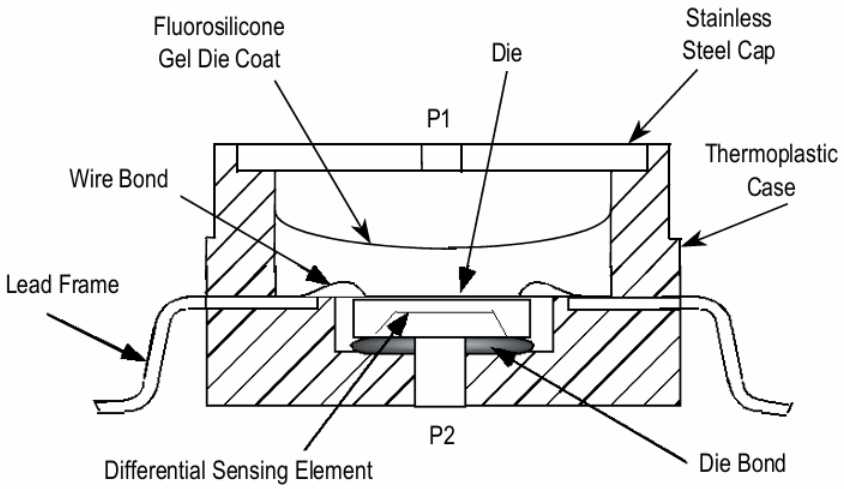


Figure 4. Recommended power supply decoupling and output filtering (For additional output filtering, please refer to AN1646.)

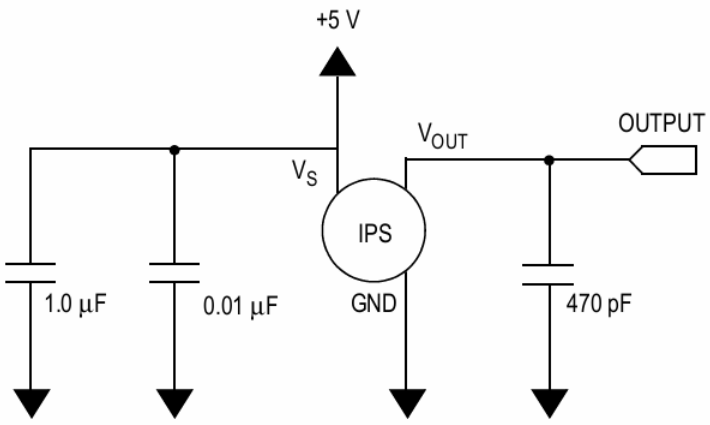


Figure 5. Output vs. pressure differential at ±6.25% VFSS (without autozero, Table 3, note 5)

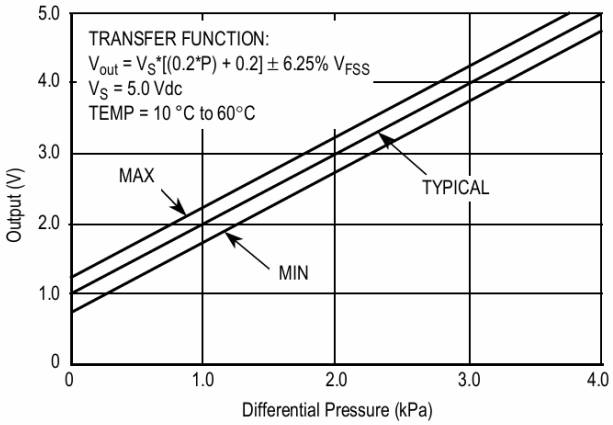
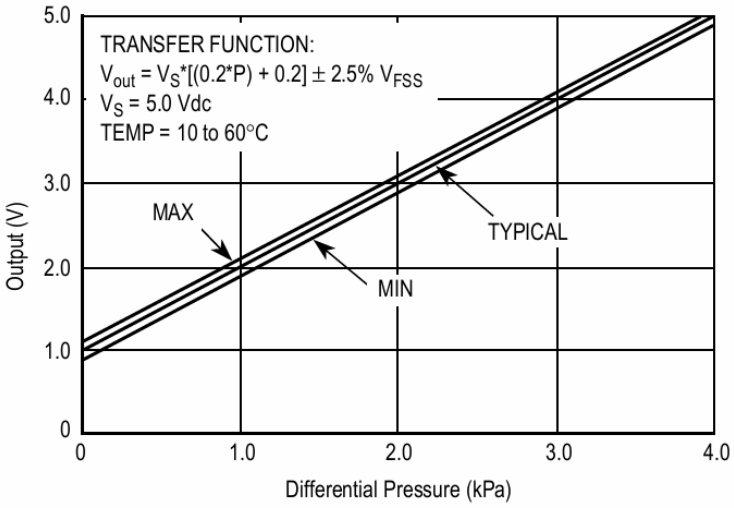


Figure 6. Output vs. pressure differential at ±2.5% VFSS (with autozero, Table 3, note 5)



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 silicone gel which isolates the die from the environment.

This 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.

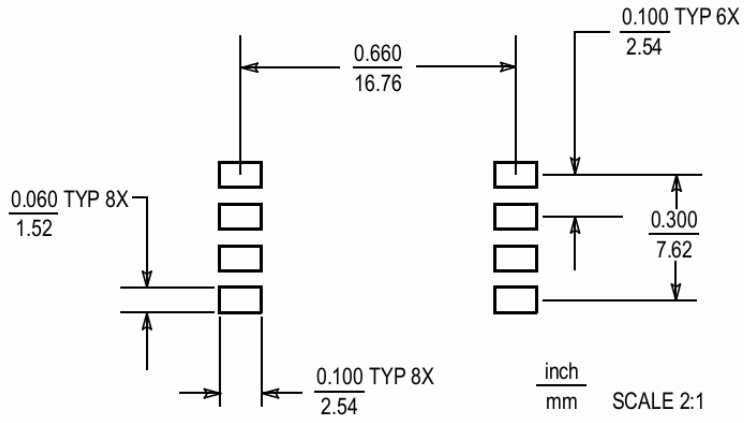
Table 5. Pressure (P1) / Vacuum (P2) side identification table

Part number	Case number	Pressure (P1) side identifier
MPXV5004DP	98ASA99255D	Side with part marking
MPXV5004GC6U/6T1	98ASB17757C	Side with port attached
MPVZ5004G6U/6T1	98ASB17756C	Stainless steel cap
MPVZ5004GW7U	98ASA10611D	Vertical port attached

5.2 Minimum recommended footprint for surface mounted applications

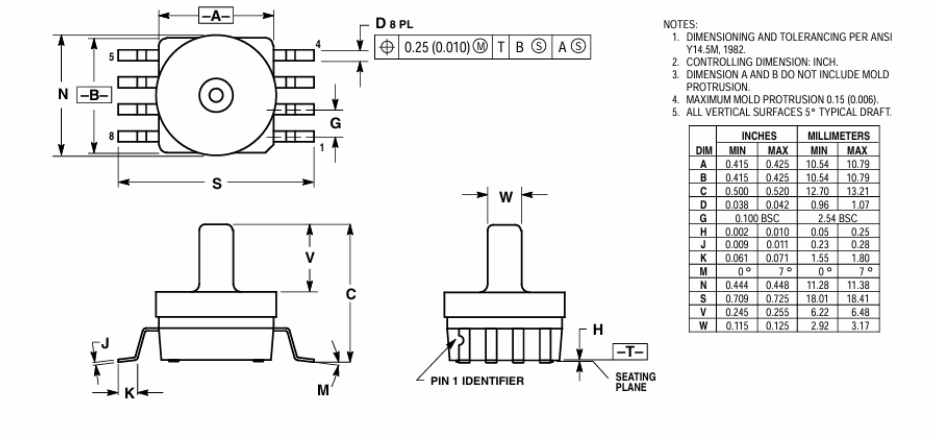
Surface mount board layout is a critical portion of the total design. The footprint for the surface mount packages must be the correct size to ensure proper solder connection interface between the board and the package. With the correct footprint, the packages will self align when subjected to a solder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

Figure 7. SOP footprint (case 98ASB17756C)



6 Package dimensions

Figure 8. **Case 98ASB17757C, small outline package, through-hole**



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006).
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.415	0.425	10.54	10.79
B	0.415	0.425	10.54	10.79
C	0.500	0.520	12.70	13.21
D	0.038	0.042	0.96	1.07
G	0.100 BSC		2.54 BSC	
H	0.002	0.010	0.05	0.25
J	0.009	0.011	0.23	0.28
K	0.061	0.071	1.55	1.80
M	0 °	7 °	0 °	7 °
N	0.444	0.448	11.28	11.38
S	0.709	0.725	18.01	18.41
V	0.245	0.255	6.22	6.48
W	0.115	0.125	2.92	3.17

Figure 9. Case 98ASA99255D, small outline package, surface mount

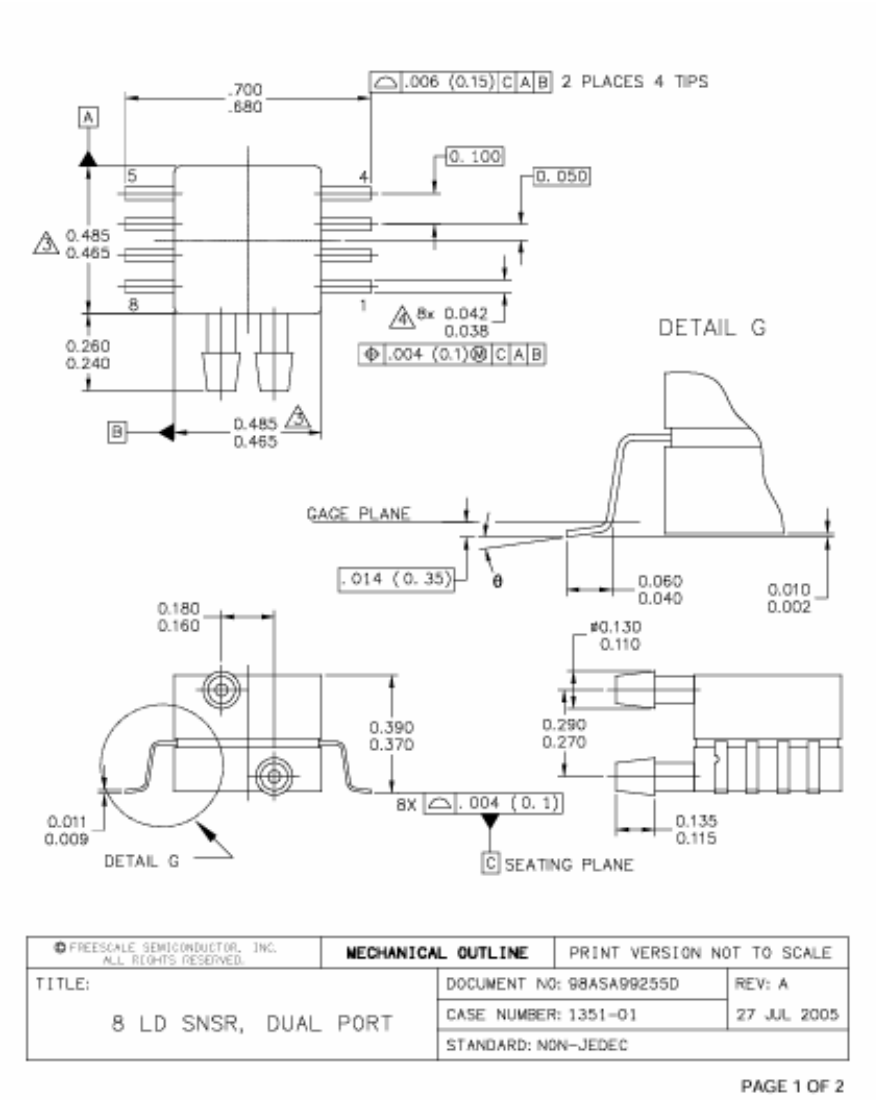


Figure 10. Case 98ASA99255D, small outline package, surface mount

NOTES:

1. CONTROLLING DIMENSION: INCH

2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994.

3. DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PPROTRUSIONS. MOLD FLASH AND PROTRUSIONS SHALL NOT EXCEED .006 PER SIDE.

4. DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .008 MAXIMUM.

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TITLE: 8 LD SNSR, DUAL PORT	DOCUMENT NO: 98ASA99255D	REV: A
	CASE NUMBER: 1351-01	27 JUL 2005
	STANDARD: NON-JEDEC	

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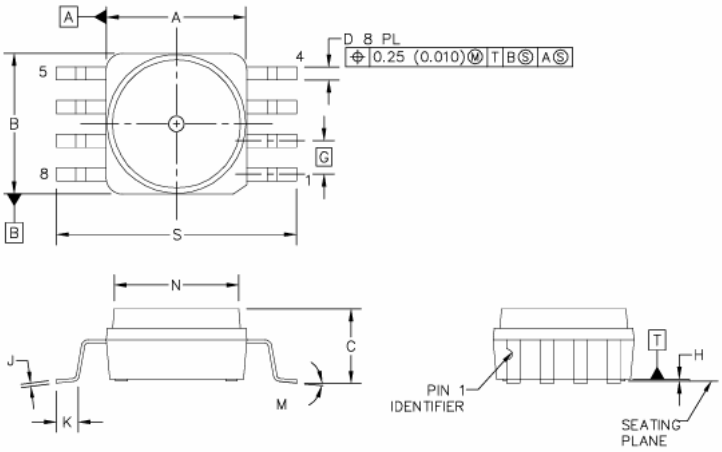
Figure 11. Case 98ASB17756C, small outline package, surface mount



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	10.54	10.79	0.415	0.425
B	10.54	10.79	0.415	0.425
C	5.38	5.84	0.212	0.230
D	0.96	1.07	0.038	0.042
G	2.54 BSC		0.100 BSC	
H	0.05	0.25	0.002	0.010
J	0.23	0.28	0.009	0.011
K	1.55	1.80	0.061	0.071
M	0°	7°	0°	7°
N	10.29	10.54	0.405	0.415
S	18.01	18.41	0.709	0.725

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION "A" AND "B" DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006).
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.

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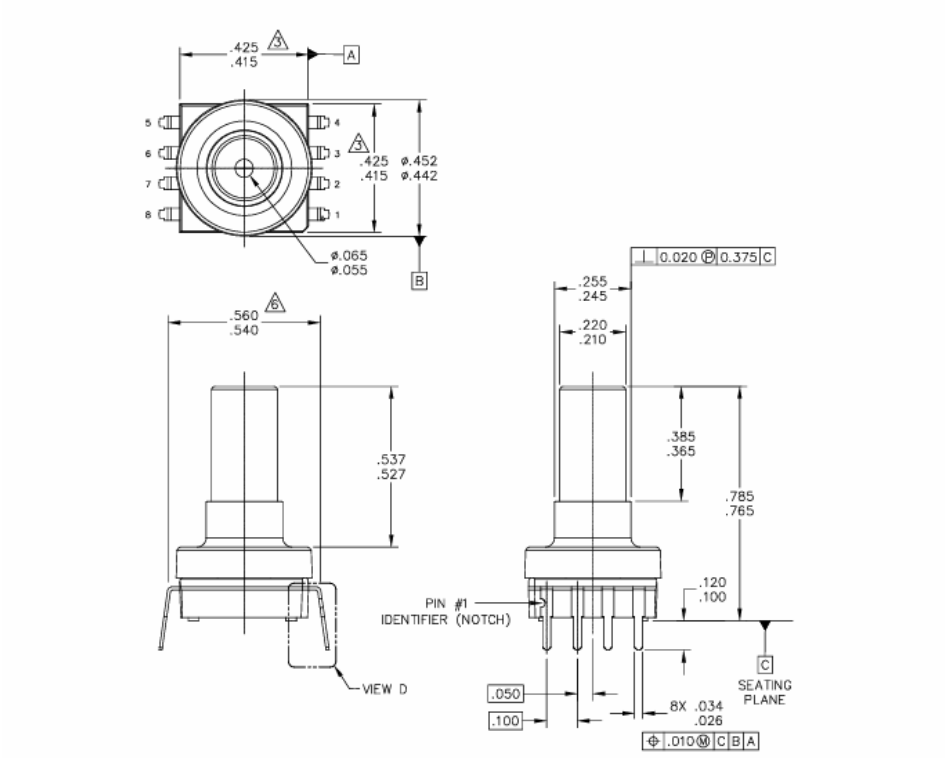
	STANDARD: NON-JEDEC	
	10 JAN 2013	

Figure 12. Case 98ASA10611D, small outline package



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TITLE: SO, 8 I/O, .420 X .420 PKG, .100 IN PITCH	DOCUMENT NO: 98ASA10611D	REV: D
	CASE NUMBER: 1560–03	25 FEB 2009
	STANDARD: NON–JEDEC	

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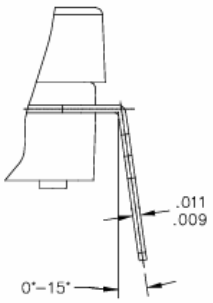
Figure 13. **Case 98ASA10611D, small outline package**



VIEW D

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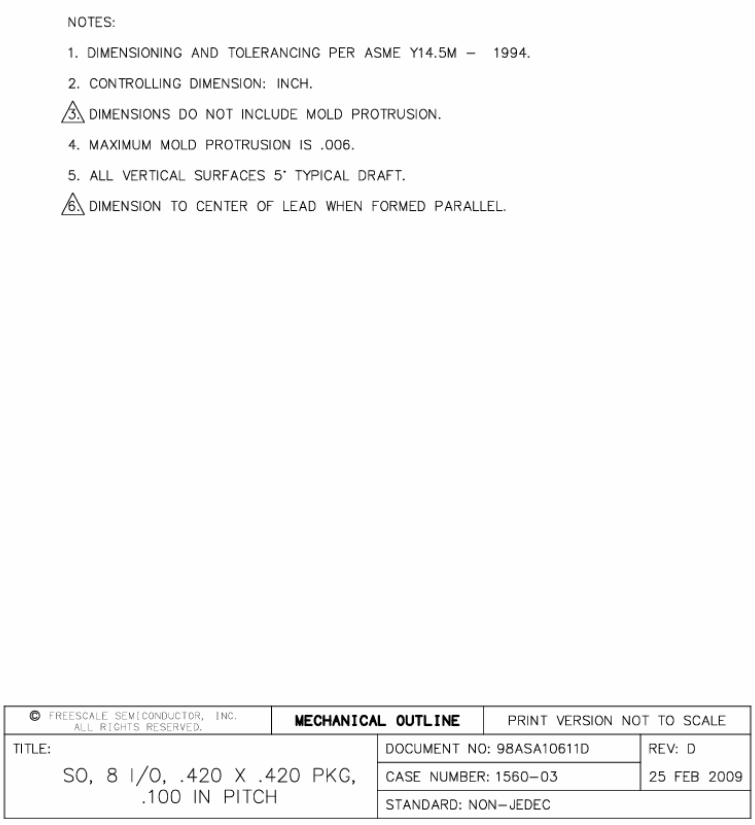
TITLE: SO, 8 I/O, .420 X .420 PKG, .100 IN PITCH	DOCUMENT NO: 98ASA10611D	REV: D
	CASE NUMBER: 1560–03	25 FEB 2009
	STANDARD: NON–JEDEC	

PAGE 2 OF 3

Figure 14. Case 98ASA10611D, small outline package



Revision history

Table 6. **Document revision history**

Date	Revision	Changes
22-Jul-2026	1	Initial release from ST, rebranded NXP document

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