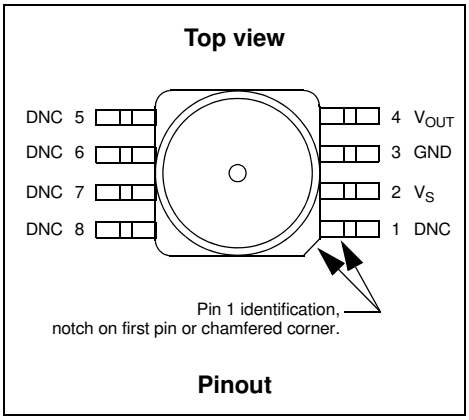
Document Number: MPxx5004
Rev. 12.1, 05/2015

RoHS

# MPxx5004, 0 to 3.92 kPa, Differential and Gauge, Integrated Pressure Sensor

**MPXV5004**
**MPVZ5004**

Freescale's 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.




**Pinout**

## 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

**Small outline packages, through-hole**



**MPVZ5004G7U**
**Case 98ASB17758C**



**MPXV5004GC7U**
**Case 98ASB17759C**



**MPVZ5004GW7U**
**Case 98ASA10611D**

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

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freescale Sensors

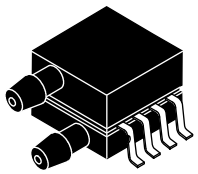
## Small outline packages, surface mount



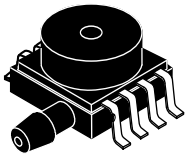
**MPVZ5004G6U/6T1**
**Case 98ASB17756C**



**MPXV5004GC6T1/6U, MPVZ5004GC6U**
**Case 98ASB17757C**



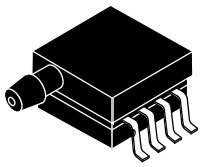
**MPXV5004DP**
**Case 98ASA99255D**



**MPXV5004GVP**
**Case 98ASA99302D**



**MPVZ5004GW6U**
**Case 98ASA10686D**



**MPXV5004GP/GPT1**
**Case 98ASA99303D**

| 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 |
| MPXV5004GC7U | Rail | 98ASB17759C | | • | | • | | | MPXV5004G |
| MPXV5004GP | Tray | 98ASA99303D | | • | | • | | | MPXV5004GP |
| MPXV5004GPT1 | Reel | 98ASA99303D | | • | | • | | | MPXV5004GP |
| MPXV5004GVP | Tray | 98ASA99302D | | • | | • | | | MPXV5004GVP |
| **Small outline package (Media resistant gel) (MPVZ5004 series)** | | | | | | | | | |
| MPVZ5004G6T1 | Reel | 98ASB17756C | • | | | • | | | MPVZ5004G |
| MPVZ5004G6U | Rail | 98ASB17756C | • | | | • | | | MPVZ5004G |
| MPVZ5004G7U | Rail | 98ASB17758C | • | | | • | | | MPVZ5004G |
| MPVZ5004GC6U | Rail | 98ASB17757C | | • | | • | | | MPVZ5004G |
| MPVZ5004GW6U | Rail | 98ASA10686D | | • | | • | | | MZ5004GW |
| MPVZ5004GW7U | Rail | 98ASA10611D | | • | | • | | | MZ5004GW |

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**5 Revision History . . . . . 25**


## Related Documentation

The MPXV5004G device features and operations are described in a variety of reference manuals, user guides, and application notes. To find the most-current versions of these documents:

1. Go to the Freescale homepage at:

   http://www.freescale.com/

2. In the Keyword search box at the top of the page, enter the device number MPXV5004G.
3. In the Refine Your Result pane on the left, click on the Documentation link.

# 1 General Description

## 1.1 Block diagram

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

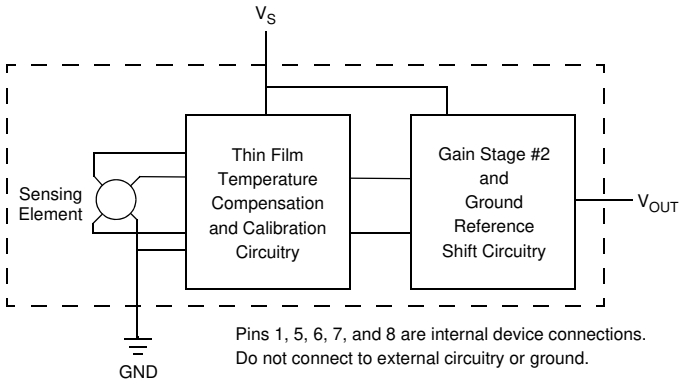



**Figure 1. Integrated pressure sensor schematic**

## 1.2 Pinout

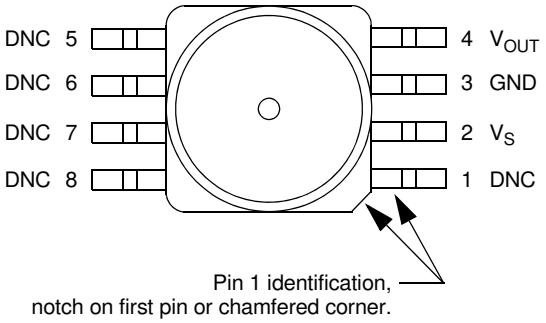



**Figure 2. Device pinout (top view)**

**Table 1. 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. |

# 2 Mechanical and Electrical Specifications

## 2.1 Maximum ratings

**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.

## 2.2 Operating characteristics

**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<br>400 | kPa<br>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)<br>Full-scale span @ 400 mm $H_2O$ (3.92 kPa)(2) | | $V_{FSS}$ | —<br>— | 3.0<br>3.92 | —<br>— | 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) | — | — | — | ±1.5 | %$V_{FSS}$ with autozero |
| | 100 to 400 mm $H_2O$ (10 °C to 60 °C) | — | — | — | ±2.5 | %$V_{FSS}$ with autozero |
| | 0 to 400 mm $H_2O$ (10 °C to 60 °C) | — | — | — | ±6.25 | %$V_{FSS}$ 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 $V_{FSS}$, 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.

# 3 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.

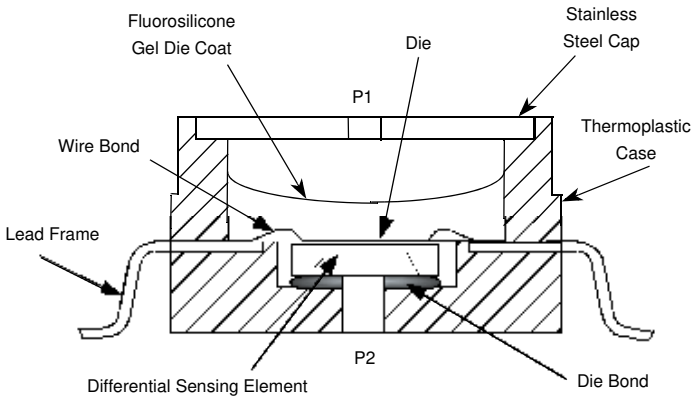



**Figure 3. Cross-sectional diagram (not to scale)**

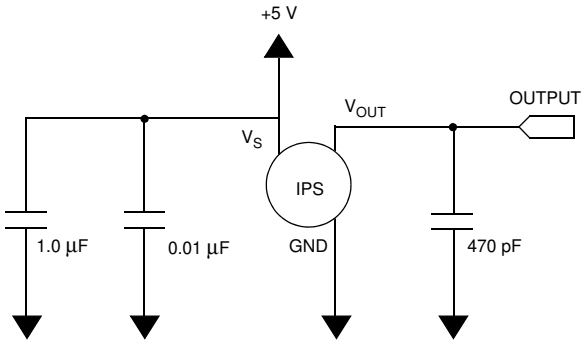



**Figure 4. Recommended power supply decoupling and output filtering**
(For additional output filtering, please refer to AN1646.)

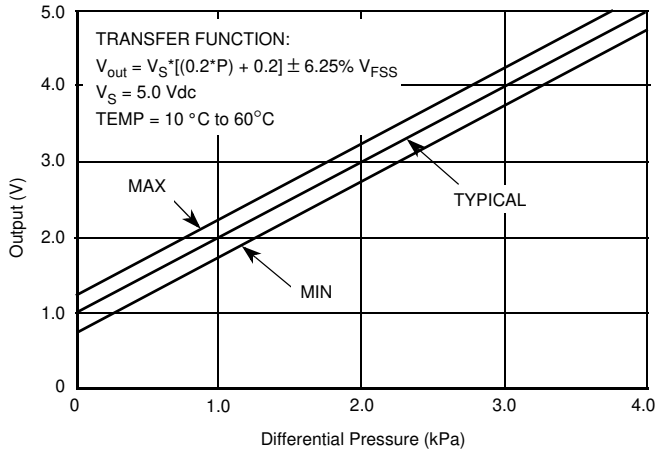



**Figure 5. Output vs. pressure differential at ±6.25% $V_{FSS}$ (without autozero, Table 3, note 5)**

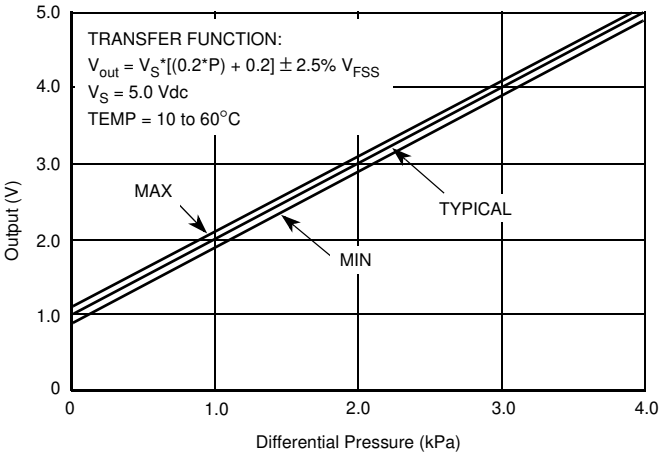



**Figure 6. Output vs. pressure differential at ±2.5% $V_{FSS}$ (with autozero, Table 3, note 5)**

# 4 Package Information

## 4.1 Pressure (P1)/Vacuum (P2) side identification

Freescale Semiconductor 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.

The Freescale Semiconductor 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 4. Pressure (P1)/Vacuum (P2) side identification table**

| Part number | Case number | Pressure (P1) side identifier |
|---|---|---|
| MPXV5004DP | 98ASA99255D | Side with part marking |
| MPXV5004GC6U/6T1, MPVZ5004GC6U | 98ASB17757C | Side with port attached |
| MPXV5004GC7U | 98ASB17759C | Side with port attached |
| MPXV5004GP/GPT1 | 98ASA99303D | Side with port attached |
| MPXV5004GVP | 98ASA99302D | Stainless steel cap |
| MPVZ5004G6U/6T1 | 98ASB17756C | Stainless steel cap |
| MPVZ5004G7U | 98ASB17758C | Stainless steel cap |
| MPVZ5004GW6U | 98ASA10686D | Vertical port attached |
| MPVZ5004GW7U | 98ASA10611D | Vertical port attached |

## 4.2 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.

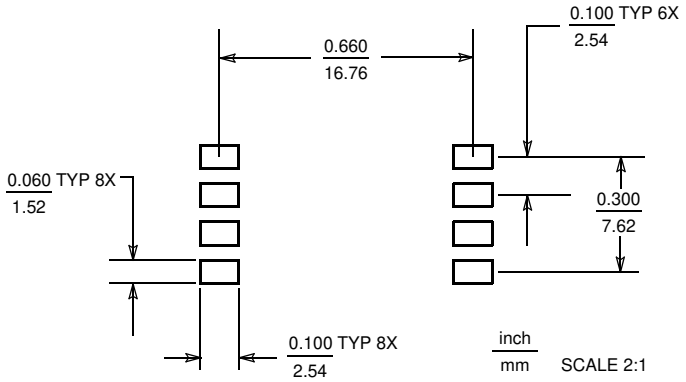
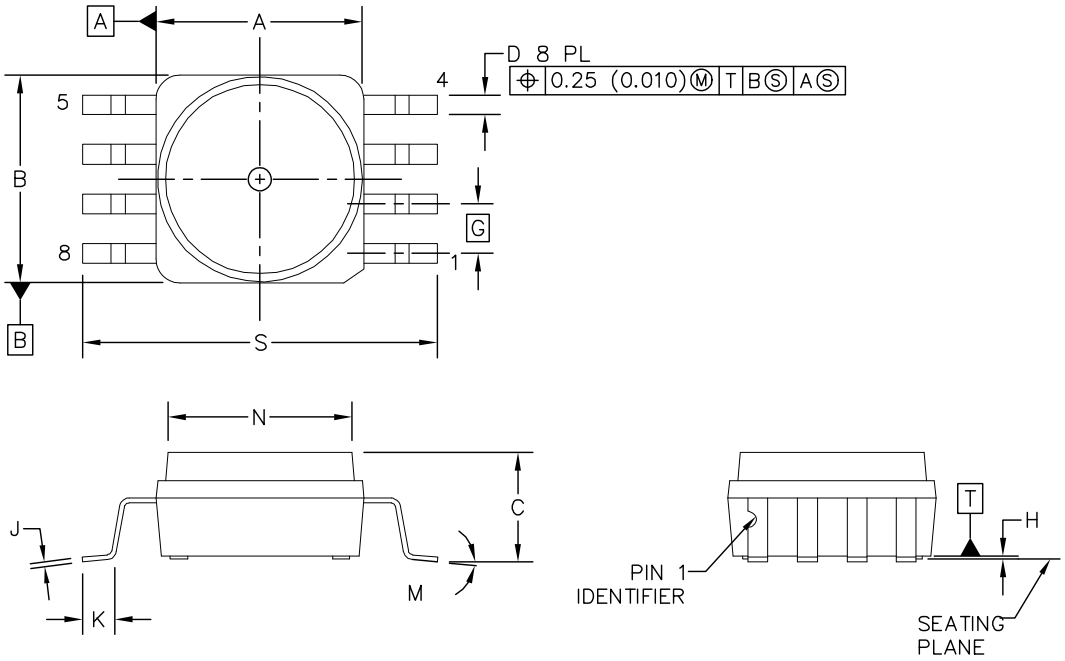



**Figure 7. SOP footprint (case 98ASB17756C)**

## 4.3 Package Dimensions

This drawing is located at http://cache.freescale.com/files/shared/doc/package_info/98ASB17756C.pdf.




| 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 |

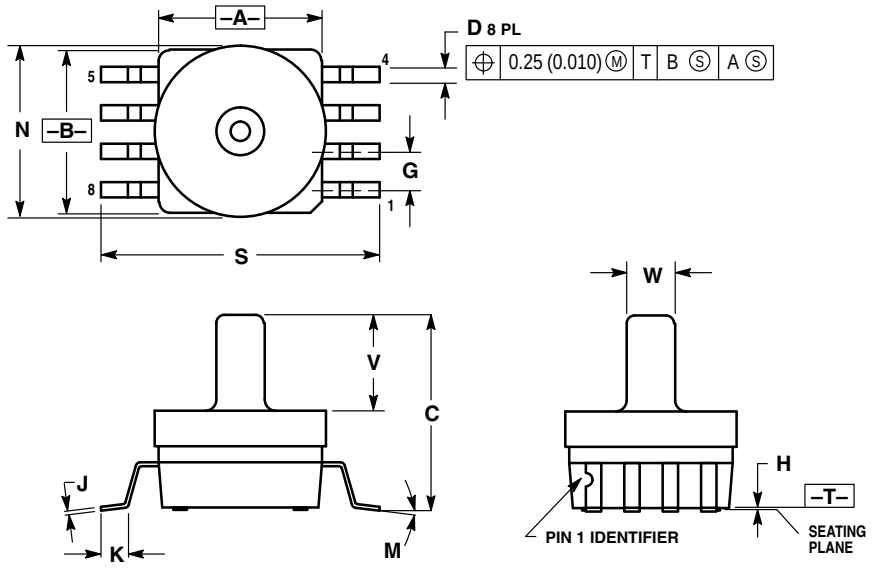
NOTES:

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 | |

**Case 98ASB17756C, small outline package, surface mount**

This drawing is located at http://cache.freescale.com/files/shared/doc/package_info/98ASB17757C.pdf.

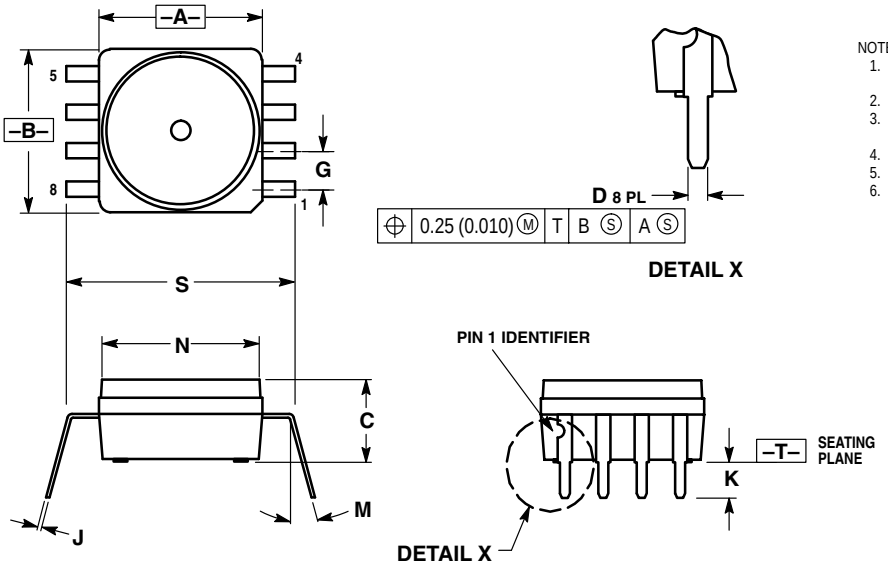



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006).
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.

| | 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 |

**Case 98ASB17757C, small outline package, through-hole**

This drawing is located at http://cache.freescale.com/files/shared/doc/package_info/98ASB17758C.pdf.



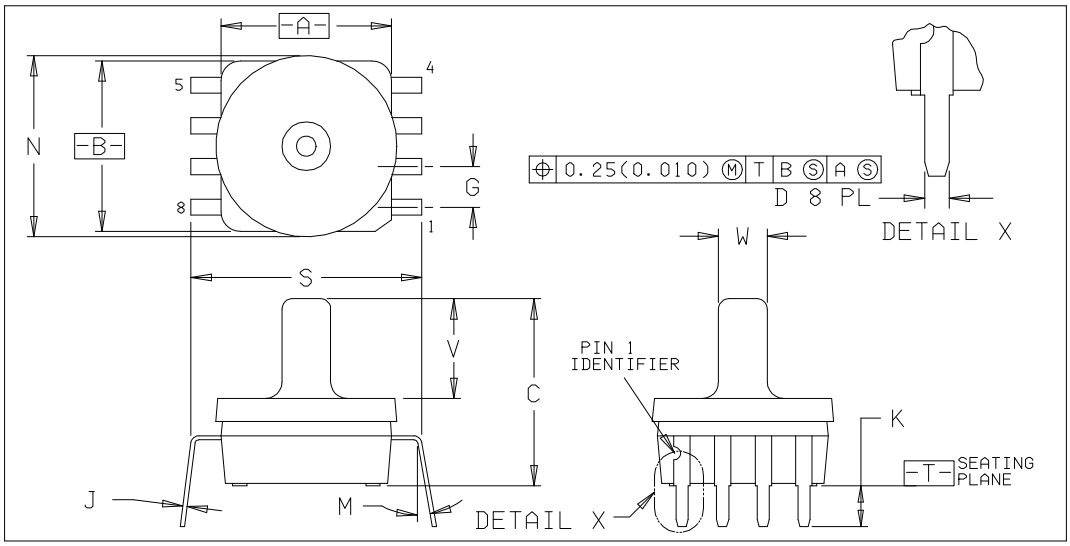

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006).
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.
6. DIMENSION S TO CENTER OF LEAD WHEN FORMED PARALLEL.

| | 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 | 0.210 | 0.220 | 5.33 | 5.59 |
| D | 0.026 | 0.034 | 0.66 | 0.864 |
| G | 0.100 BSC | | 2.54 BSC | |
| J | 0.009 | 0.011 | 0.23 | 0.28 |
| K | 0.100 | 0.120 | 2.54 | 3.05 |
| M | 0° | 15° | 0° | 15° |
| N | 0.405 | 0.415 | 10.29 | 10.54 |
| S | 0.540 | 0.560 | 13.72 | 14.22 |

**Case 98ASB17758C, small outline package, through-hole**

This drawing is located at http://cache.freescale.com/files/shared/doc/package_info/98ASB17759C.pdf.

| FREESCALE | MECHANICAL OUTLINES DICTIONARY | 98ASB17759C |
|---|---|---|
| | | PAGE 482C |
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| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 10.54 | 10.79 | 0.415 | 0.425 |
| B | 10.54 | 10.79 | 0.415 | 0.425 |
| C | 12.70 | 13.21 | 0.500 | 0.520 |
| D | 0.66 | 0.864 | 0.026 | 0.034 |
| G | 2.54 BSC | | 0.100 BSC | |
| J | 0.23 | 0.28 | 0.009 | 0.011 |
| K | 2.54 | 3.05 | 0.100 | 0.120 |
| M | 0° | 15° | 0° | 15° |
| N | 11.28 | 11.38 | 0.444 | 0.448 |
| S | 13.72 | 14.22 | 0.540 | 0.560 |
| V | 6.22 | 6.48 | 0.245 | 0.255 |
| W | 2.92 | 3.17 | 0.115 | 0.125 |

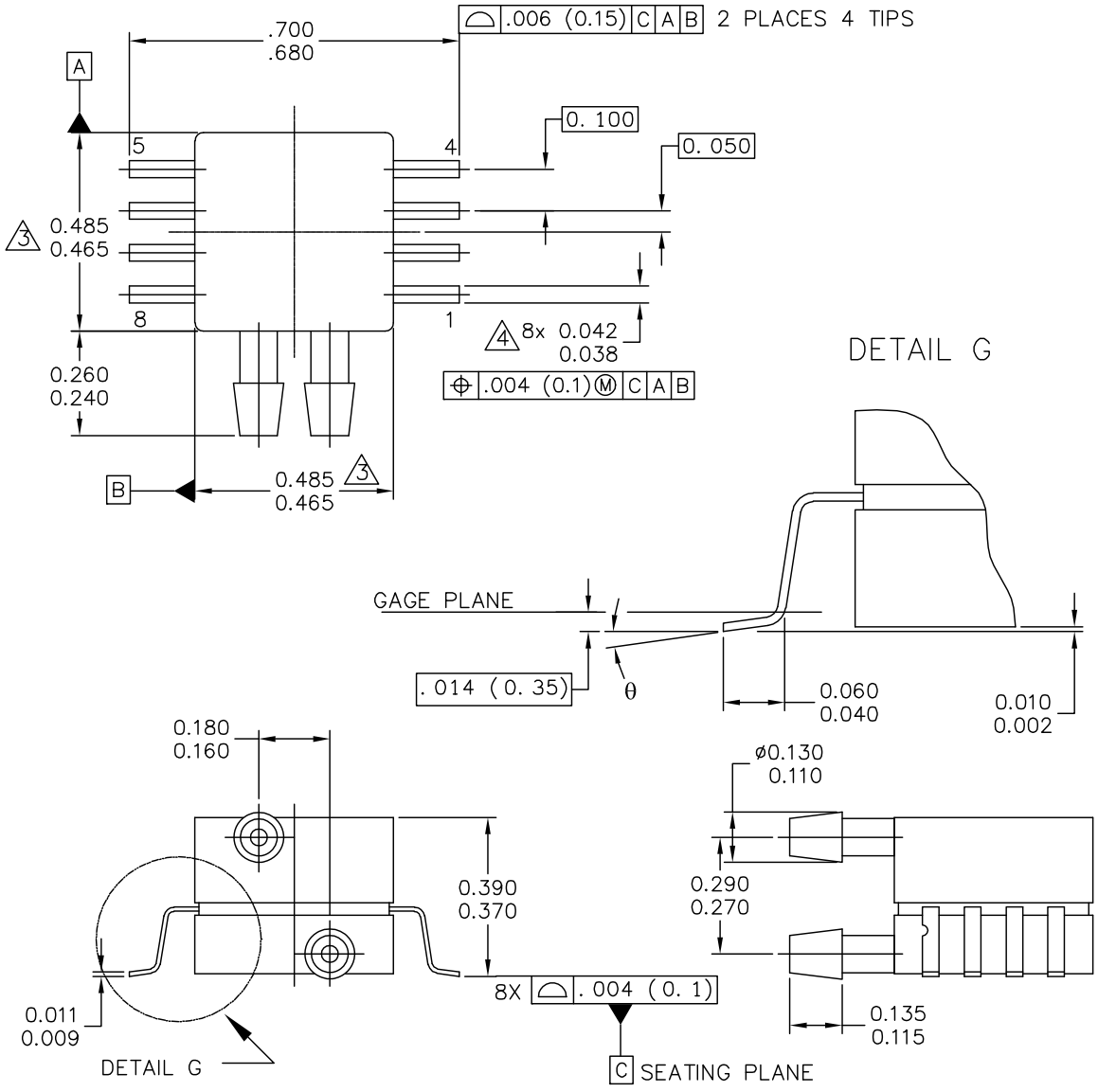
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION 'A' AND 'B' DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15(0.006).
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.
6. DIMENSION 'S' TO CENTER OF LEAD WHEN FORMED PARALLEL.
7. 482C-01 AND -02 OBSOLETE. NEW STANDARD 482C-03.

| | |
|---|---|
| CASE NO. | 482C-03 |
| STATUS | MOTOROLA STANDARD |
| NEW STD | |
| USED ON | |

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**Case 98ASB17759C, small outline package, through-hole**

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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 | |

PAGE 1 OF 2

**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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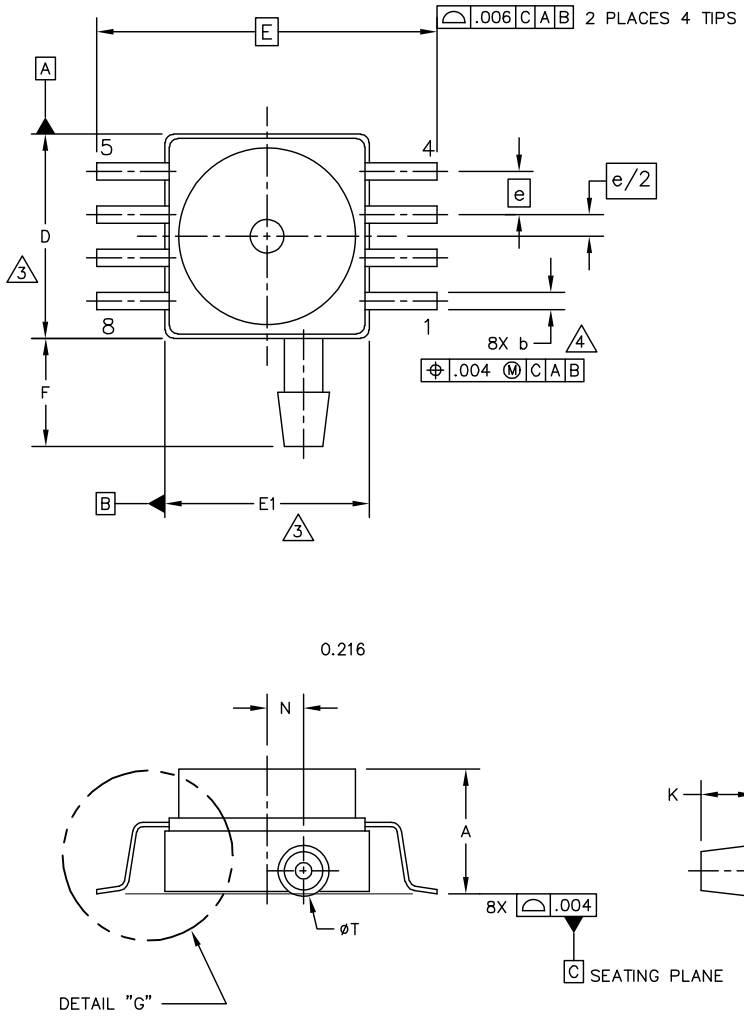
| MECHANICAL OUTLINE | PRINT VERSION NOT TO SCALE |
|---|---|

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



**Case 98ASA99255D, small outline package, surface mount**

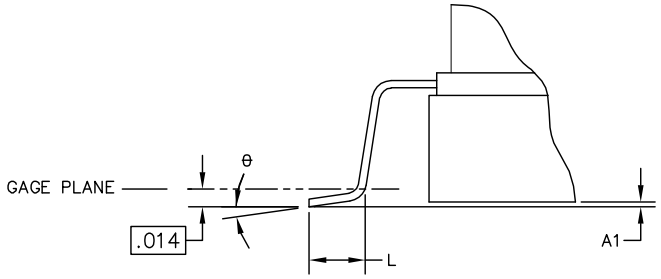
This drawing is located at http://cache.freescale.com/files/shared/doc/package_info/98ASA99302D.pdf.




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|---|---|---|
| TITLE: 8 LD SOP, GVP | DOCUMENT NO: 98ASA99302D | REV: C |
| | CASE NUMBER: 1368–01 | 18 DEC 2008 |
| | STANDARD: NON–JEDEC | |

PAGE 1 OF 3

**Case 98ASA99302D, small outline package, surface mount**




DETAIL "G"

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|---|---|---|
| TITLE: 8 LD SOP, GVP | DOCUMENT NO: 98ASA99302D | REV: C |
| | CASE NUMBER: 1368–01 | 18 DEC 2008 |
| | STANDARD: NON–JEDEC | |



**Case 98ASA99302D, small outline package, surface mount**

NOTES:

1. CONTROLLING DIMENSION: INCH

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

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

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

| DIM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX | DIM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|---|---|---|---|---|
| A | .280 | .300 | 7.11 | 7.62 | R | .405 | .415 | 10.28 | 10.54 |
| A1 | .002 | .010 | 0.05 | 0.25 | θ | 0° | 7° | 0° | 7° |
| b | .038 | .042 | 0.96 | 1.07 | – | --- | --- | --- | --- |
| D | .465 | .485 | 11.81 | 12.32 | – | --- | --- | --- | --- |
| E | .690 BSC | | 17.52 BSC | | – | --- | --- | --- | --- |
| E1 | .465 | .485 | 11.81 | 12.32 | – | --- | --- | --- | --- |
| e | .100 BSC | | 2.54 BSC | | – | --- | --- | --- | --- |
| F | .240 | .260 | 6.10 | 6.60 | – | --- | --- | --- | --- |
| K | .115 | .135 | 2.92 | 3.43 | – | --- | --- | --- | --- |
| L | .040 | .060 | 1.02 | 1.52 | – | --- | --- | --- | --- |
| M | .035 | .055 | 0.89 | 1.39 | – | --- | --- | --- | --- |
| N | .075 | .095 | 1.90 | 2.41 | – | --- | --- | --- | --- |
| P | .009 | .011 | 0.23 | 0.28 | – | --- | --- | --- | --- |
| T | .110 | .130 | 2.79 | 3.30 | – | --- | --- | --- | --- |

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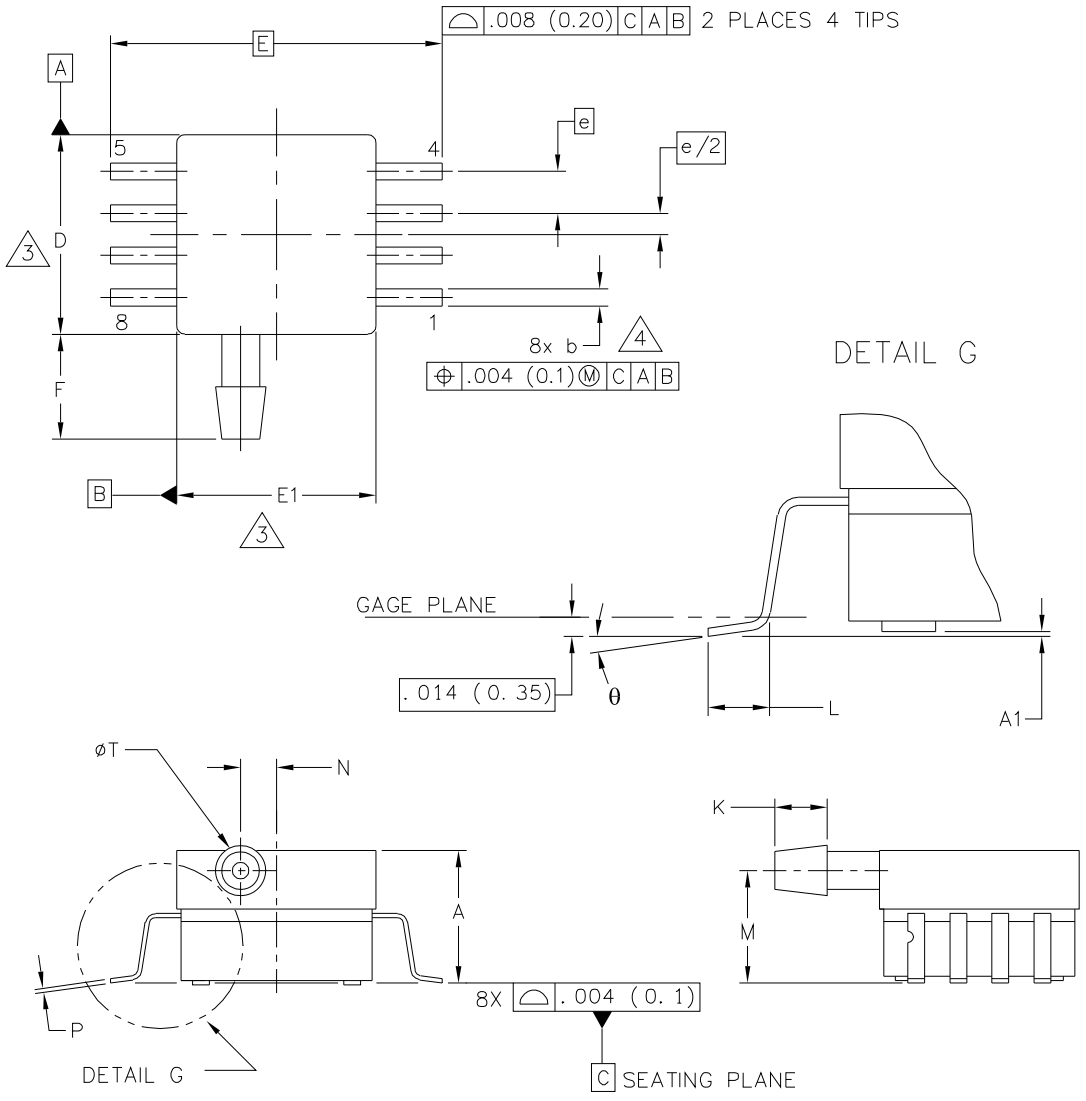
**MECHANICAL OUTLINE** | PRINT VERSION NOT TO SCALE

| TITLE: | DOCUMENT NO: 98ASA99302D | REV: C |
|---|---|---|
| 8 LD SOP, GVP | CASE NUMBER: 1368–01 | 18 DEC 2008 |
| | STANDARD: NON–JEDEC | |



**Case 98ASA99302D, small outline package, surface mount**

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|---|---|---|
| TITLE: 8 LD SOP, SIDE PORT | DOCUMENT NO: 98ASA99303D | REV: D |
| | CASE NUMBER: 1369-01 | 13 DEC 2010 |
| | STANDARD: NON-JEDEC | |

PAGE 1 OF 2

**Case 98ASA99303D, small outline package**

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 (0.152) PER SIDE.

4. DIMENSION DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR
PROTRUSION SHALL BE .008 (0.203) MAXIMUM.

| DIM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX | DIM | INCHES MIN | INCHES MAX | MILLIMETERS MIN | MILLIMETERS MAX |
|---|---|---|---|---|---|---|---|---|---|
| A | .300 | .330 | 7.62 | 8.38 | θ | 0° | 7° | 0° | 7° |
| A1 | .002 | .010 | 0.05 | 0.25 | – | --- | --- | --- | --- |
| b | .038 | .042 | 0.96 | 1.07 | – | --- | --- | --- | --- |
| D | .465 | .485 | 11.81 | 12.32 | – | --- | --- | --- | --- |
| E | .717 BSC | | 18.21 BSC | | – | --- | --- | --- | --- |
| E1 | .465 | .485 | 11.81 | 12.32 | – | --- | --- | --- | --- |
| e | .100 BSC | | 2.54 BSC | | – | --- | --- | --- | --- |
| F | .245 | .255 | 6.22 | 6.47 | – | --- | --- | --- | --- |
| K | .120 | .130 | 3.05 | 3.30 | – | --- | --- | --- | --- |
| L | .061 | .071 | 1.55 | 1.80 | – | --- | --- | --- | --- |
| M | .270 | .290 | 6.86 | 7.36 | – | --- | --- | --- | --- |
| N | .080 | .090 | 2.03 | 2.28 | – | --- | --- | --- | --- |
| P | .009 | .011 | 0.23 | 0.28 | – | --- | --- | --- | --- |
| T | .115 | .125 | 2.92 | 3.17 | – | --- | --- | --- | --- |

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MECHANICAL OUTLINE | PRINT VERSION NOT TO SCALE

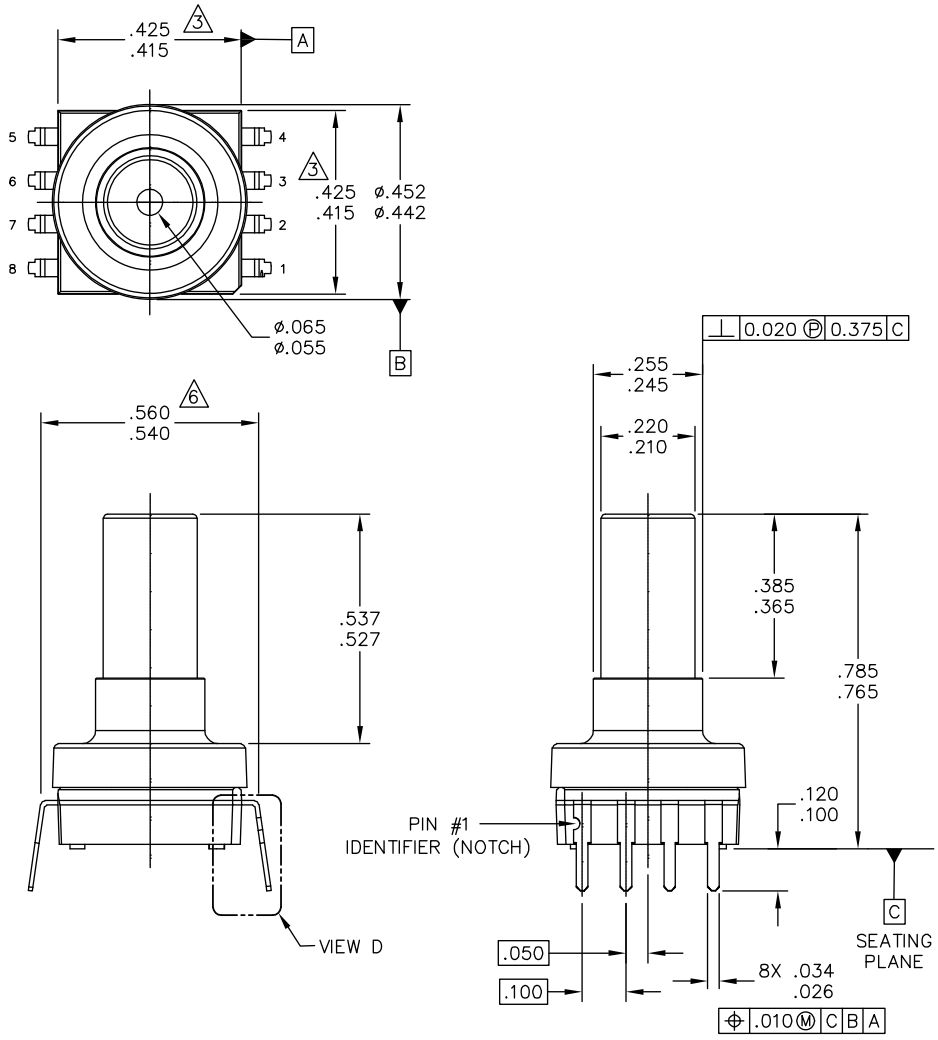
TITLE:
8 LD SOP, SIDE PORT

DOCUMENT NO: 98ASA99303D | REV: D
CASE NUMBER: 1369-01 | 13 DEC 2010
STANDARD: NON-JEDEC



**Case 98ASA99303D, small outline package**

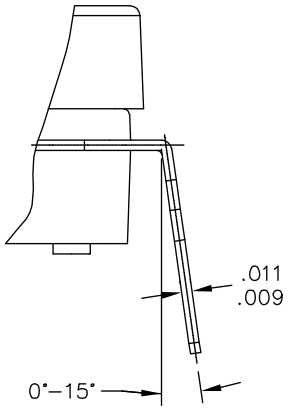
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|---|---|---|
| TITLE: SO, 8 I/O, .420 X .420 PKG, .100 IN PITCH | DOCUMENT NO: 98ASA10611D | REV: D |
| | CASE NUMBER: 1560–03 | 25 FEB 2009 |
| | STANDARD: NON–JEDEC | |

PAGE 1 OF 3

**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

**Case 98ASA10611D, small outline package**

NOTES:

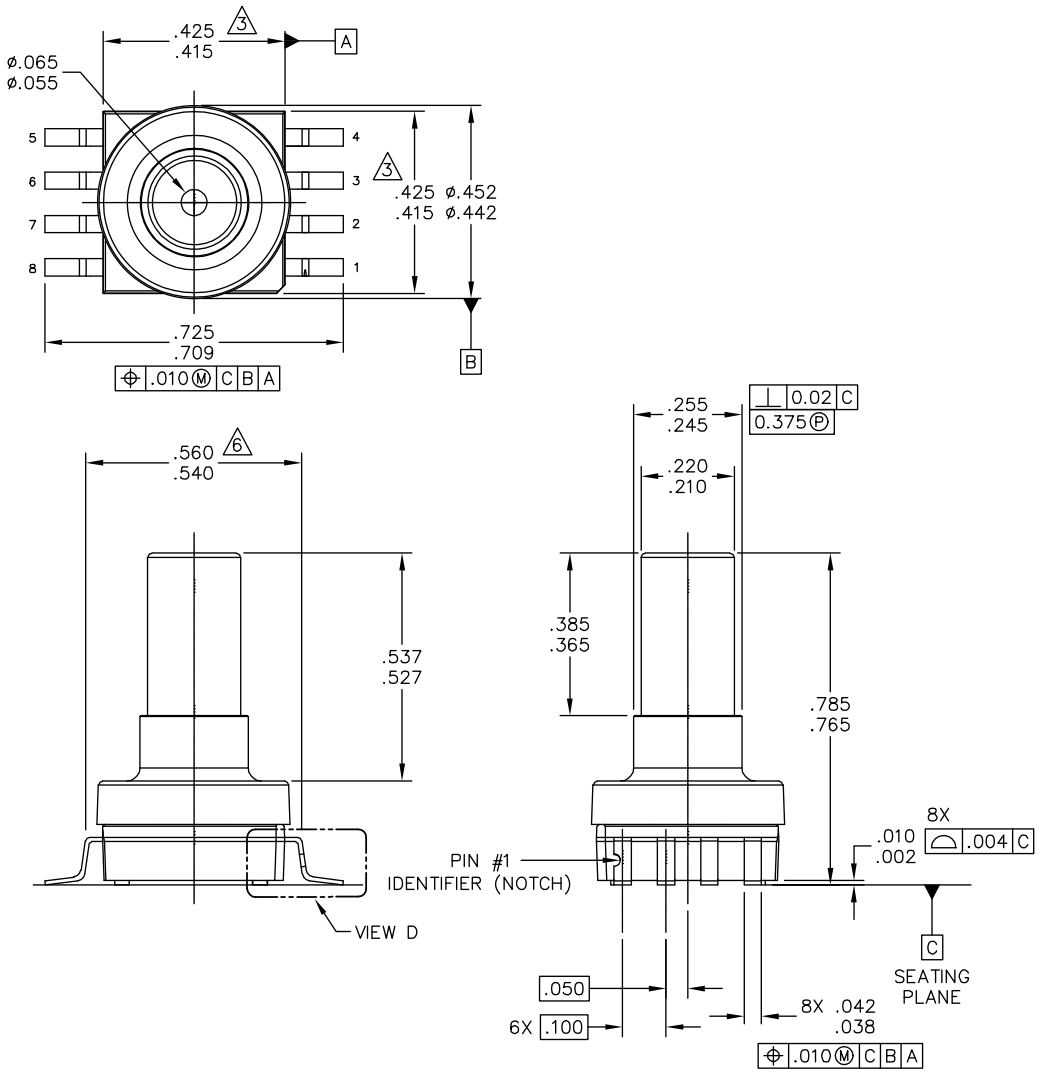
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M – 1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION IS .006.
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.
6. DIMENSION TO CENTER OF LEAD WHEN FORMED PARALLEL.

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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 3 OF 3

**Case 98ASA10611D, small outline package**

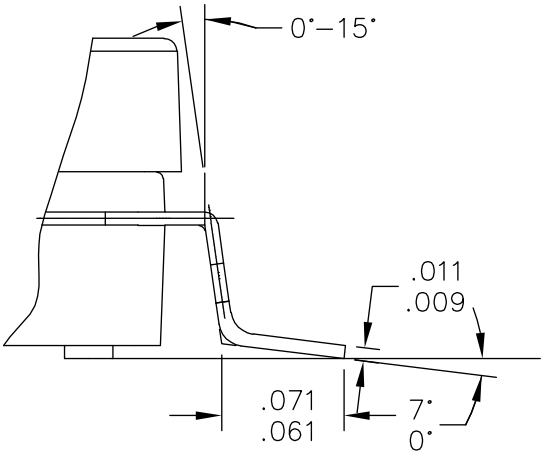
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|---|---|---|
| TITLE: SO, 8 I/O, .420 X .420 PKG, .100 IN PITCH | DOCUMENT NO: 98ASA10686D | REV: B |
| | CASE NUMBER: 1735-02 | 19 FEB 2009 |
| | STANDARD: NON-JEDEC | |

PAGE 1 OF 3

**Case 98ASA10686D, small outline package**



VIEW D

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| TITLE: SO, 8 I/O, .420 X .420 PKG, .100 IN PITCH | DOCUMENT NO: 98ASA10686D | REV: B |
| | CASE NUMBER: 1735–02 | 19 FEB 2009 |
| | STANDARD: NON–JEDEC | |



**Case 98ASA10686D, small outline package**

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M – 1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION IS .006.
5. ALL VERTICAL SURFACES 5° TYPICAL DRAFT.
6. DIMENSION TO CENTER OF LEAD WHEN FORMED PARALLEL.

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|---|---|---|
| TITLE: SO, 8 I/O, .420 X .420 PKG, .100 IN PITCH | DOCUMENT NO: 98ASA10686D | REV: B |
| | CASE NUMBER: 1735–02 | 19 FEB 2009 |
| | STANDARD: NON–JEDEC | |

PAGE 3 OF 3

**Case 98ASA10686D, small outline package**

# 5 Revision History

**Table 5. Revision history**

| Revision number | Revision date | Description |
|---|---|---|
| 12.1 | 05/2015 | • Updated format.<br>• Table 3: Updated Full-scale span Typ value, was 4.0 to 3.92. Updated Linearity defintion in note 4.<br>• Updated package drawings with current versions. |

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Rev. 12.1
05/2015