

NC7WZ125

TinyLogic® UHS Dual Buffer with 3-STATE Outputs

General Description

The NC7WZ125 is a Dual Non-Inverting Buffer with independent active LOW enables for the 3-STATE outputs. The Ultra High Speed device is fabricated with advanced CMOS technology to achieve superior switching performance with high output drive while maintaining low static power dissipation over a broad V_{CC} operating range. The device is specified to operate over the 1.65V to 5.5V V_{CC} operating range. The inputs and outputs are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 5.5V independent of V_{CC} operating range. Outputs tolerate voltages above V_{CC} when in the 3-STATE condition.

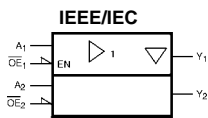
Features

- Space saving US8 surface mount package
- MicroPak™ leadless package
- Ultra High Speed; t_{PD} 2.6 ns typ into 50 pF at 5V V_{CC}
- High Output Drive; ± 24 mA at 3V V_{CC}
- Broad V_{CC} Operating Range; 1.65V to 5.5V
- Matches the performance of LCX when operated at 3.3V V_{CC}
- Power down high impedance inputs/outputs
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Outputs are overvoltage tolerant in 3-STATE mode
- Patented noise/EMI reduction circuitry implemented

Ordering Code:

| Order Number | Package Number | Product Code Top Mark | Package Description | Supplied As |
|--------------|----------------|-----------------------|---|---------------------------|
| NC7WZ125K8X | MAB08A | WZ25 | 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide | 3k Units on Tape and Reel |
| NC7WZ125L8X | MAC08A | P3 | 8-Lead MicroPak, 1.6 mm Wide | 5k Units on Tape and Reel |

Logic Symbol



Pin Descriptions

| Pin Names | Description |
|-------------------|-----------------------------------|
| \overline{OE}_n | Enable Inputs for 3-STATE Outputs |
| A_n | Input |
| Y_n | 3-STATE Outputs |

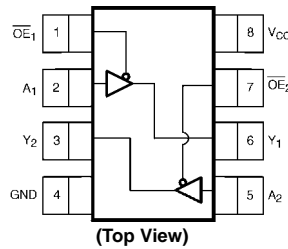
Function Table

| Inputs | | Output |
|-----------------|-------|--------|
| \overline{OE} | A_n | Y_n |
| L | L | L |
| L | H | H |
| H | L | Z |
| H | H | Z |

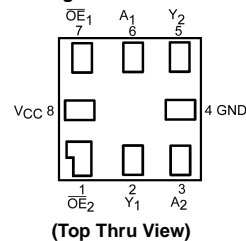
H = HIGH Logic Level L = LOW Logic Level Z = 3-STATE

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Connection Diagrams



Pad Assignments for MicroPak



MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

Absolute Maximum Ratings (Note 1)

| | |
|--|-----------------|
| Supply Voltage (V_{CC}) | -0.5V to +7V |
| DC Input Voltage (V_{IN}) (Note 2) | -0.5V to +7V |
| DC Output Voltage (V_{OUT}) | -0.5V to +7V |
| DC Input Diode Current (I_{IK}) @ $V_{IN} < 0V$ | -50 mA |
| DC Output Diode Current (I_{OK}) @ $V_{OUT} < 0V$ | -50 mA |
| DC Output Source/Sink Current (I_{OUT}) | ± 50 mA |
| DC V_{CC} /Ground Current (I_{CC}/I_{GND}) | ± 100 mA |
| Storage Temperature Range (T_{STG}) | -65°C to +150°C |
| Junction Lead Temperature under Bias (T_J) | +150°C |
| Junction Lead Temperature (T_L) (Soldering, 10 seconds) | +260°C |
| Power Dissipation (P_D) @ +85°C | 250 mW |

Recommended Operating Conditions (Note 3)

| | |
|--|-------------------|
| Supply Voltage Operating (V_{CC}) | 1.65V to 5.5V |
| Supply Voltage Data Retention (V_{CC}) | 1.5V to 5.5V |
| Input Voltage (V_{IN}) | 0V to 5.5V |
| Output Voltage (V_{OUT}) | |
| Active State | 0V to V_{CC} |
| 3-STATE | 0V to 5.5V |
| Operating Temperature (T_A) | -40°C to +85°C |
| Input Rise and Fall Time (t_r, t_f) | |
| V_{CC} @ 1.8V, 0.15V, 2.5V $\pm 0.2V$ | 0 ns/V to 20 ns/V |
| V_{CC} @ 3.3V $\pm 0.3V$ | 0 ns/V to 10 ns/V |
| V_{CC} @ 5.0V $\pm 0.5V$ | 0 ns/V to 5 ns/V |
| Thermal Resistance (θ_{JA}) | 250°C/W |

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside datasheet specifications.

Note 2: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

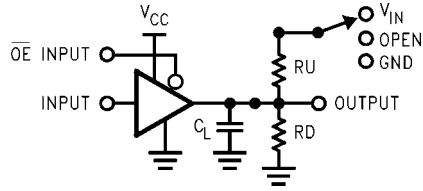
Note 3: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

| Symbol | Parameter | V_{CC} (V) | $T_A = +25^\circ\text{C}$ | | | $T_A = -40^\circ\text{C to } +85^\circ\text{C}$ | | Units | Conditions | |
|-----------|---------------------------|----------------------------|-------------------------------|------|------|---|----------------------------------|---|--|----------------------------|
| | | | Min | Typ | Max | Min | Max | | | |
| V_{IH} | HIGH Level Input Voltage | 1.65 to 1.95 2.3 to 5.5 | 0.75 V_{CC} 0.7 V_{CC} | | | 0.75 V_{CC} 0.7 V_{CC} | | V | | |
| V_{IL} | LOW Level Input Voltage | 1.65 to 1.95 2.3 to 5.5 | 0.25 V_{CC} 0.3 V_{CC} | | | 0.25 V_{CC} 0.3 V_{CC} | | V | | |
| V_{OH} | HIGH Level Output Voltage | 1.65 | 1.55 | 1.65 | 1.55 | | V | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OH} = -100 \mu\text{A}$ | |
| | | 2.3 | 2.2 | 2.3 | 2.2 | | | | | |
| | | 3.0 | 2.9 | 3.0 | 2.9 | | | | | |
| | | 4.5 | 4.4 | 4.5 | 4.4 | | | | | |
| | 1.65 | 1.29 | 1.52 | 1.29 | | V | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OH} = -4 \text{ mA}$ $I_{OH} = -8 \text{ mA}$ $I_{OH} = -16 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -32 \text{ mA}$ | | |
| | 2.3 | 1.9 | 2.15 | 1.9 | | | | | | |
| | 3.0 | 2.4 | 2.80 | 2.4 | | | | | | |
| | 3.0 | 2.3 | 3.68 | 2.3 | | | | | | |
| 4.5 | 3.8 | 4.20 | 3.8 | | | | | | | |
| V_{OL} | LOW Level Output Voltage | 1.65 | 0.0 | | | 0.10 | | V | $V_{IN} = V_{IH}$ or V_{IL} | $I_{OL} = 100 \mu\text{A}$ |
| | | 2.3 | 0.0 | | | 0.10 | | | | |
| | | 3.0 | 0.0 | | | 0.10 | | | | |
| | | 4.5 | 0.0 | | | 0.10 | | | | |
| | 1.65 | 0.08 | | | 0.24 | | V | | $I_{OL} = 4 \text{ mA}$ $I_{OL} = 8 \text{ mA}$ $I_{OL} = 16 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 32 \text{ mA}$ | |
| | 2.3 | 0.10 | | | 0.3 | | | | | |
| | 3.0 | 0.15 | | | 0.4 | | | | | |
| | 3.0 | 0.22 | | | 0.55 | | | | | |
| 4.5 | 0.22 | | | 0.55 | | | | | | |
| I_{IN} | Input Leakage Current | 0 to 5.5 | | | | ± 0.1 | | μA | $V_{IN} = 5.5V, \text{GND}$ | |
| I_{OZ} | 3-STATE Output Leakage | 1.65 to 5.5 | | | | ± 0.5 | | μA | $V_{IN} = V_{IH}$ or V_{IL} $0 \leq V_{OUT} \leq 5.5V$ | |
| I_{OFF} | Power Off Leakage Current | 0.0 | | | | 1 | | μA | V_{IN} or $V_{OUT} = 5.5V$ | |
| I_{CC} | Quiescent Supply Current | 1.65 to 5.5 | | | | 1 | | μA | $V_{IN} = 5.5V, \text{GND}$ | |

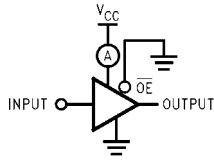
| Noise Characteristics | | | | | | | | | | |
|--|---|------------------------|-------------------------|-----|-------|---------------------------------|------|-------|--|-----------------|
| Symbol | Parameter | V _{CC} (V) | T _A = + 25°C | | Units | Conditions | | | | |
| | | | Typ | Max | | | | | | |
| V _{OLP} (Note 4) | Quiet Output Maximum Dynamic V _{OL} | 5.0 | | 1.0 | V | C _L = 50 pF | | | | |
| V _{OLV} (Note 4) | Quiet Output Minimum Dynamic V _{OL} | 5.0 | | 1.0 | V | C _L = 50 pF | | | | |
| V _{OHV} (Note 4) | Quiet Output Minimum Dynamic V _{OH} | 5.0 | | 4.0 | V | C _L = 50 pF | | | | |
| V _{IHD} (Note 4) | Minimum HIGH Level Dynamic Input Voltage | 5.0 | | 3.5 | V | C _L = 50 pF | | | | |
| V _{ILD} (Note 4) | Maximum LOW Level Dynamic Input Voltage | 5.0 | | 1.5 | V | C _L = 50 pF | | | | |
| Note 4: Parameter guaranteed by design. | | | | | | | | | | |
| AC Electrical Characteristics | | | | | | | | | | |
| Symbol | Parameter | V _{CC} (V) | T _A = +25°C | | | T _A = -40°C to +85°C | | Units | Conditions | Figure Number |
| | | | Min | Typ | Max | Min | Max | | | |
| t _{PLH} , t _{PHL} | Propagation Delay A _N to Y _N | 1.8 ± 0.15 | 2.0 | | 12.0 | 2.0 | 13.0 | ns | C _L = 15 pF R _D = 1 MΩ S1 = Open | Figures 1, 3 |
| | | 2.5 ± 0.2 | 1.0 | | 7.5 | 1.0 | 8.0 | | | |
| | | 3.3 ± 0.3 | 0.8 | | 5.2 | 0.8 | 5.5 | | | |
| | | 5.0 ± 0.5 | 0.5 | | 4.5 | 0.5 | 4.8 | | | |
| t _{PLH} , t _{PHL} | Propagation Delay A _N to Y _N | 3.3 ± 0.3 | 1.2 | | 5.7 | 1.2 | 6.0 | ns | C _L = 50 pF R _D = 500Ω S1 = Open | Figures 1, 3 |
| | | 5.0 ± 0.5 | 0.8 | | 5.0 | 0.8 | 5.3 | | | |
| t _{OSLH} , t _{OSHL} | Output to Output Skew (Note 5) | 3.3 ± 0.3 | | | 1.0 | | 1.0 | ns | C _L = 50 pF R _D = 500Ω S1 = Open | Figures 1, 3 |
| | | 5.0 ± 0.5 | | | 0.8 | | 0.8 | | | |
| t _{PZL} , t _{PZH} | Output Enable Time | 1.8 ± 0.15 | 3.0 | | 14.0 | 3.0 | 15.0 | ns | C _L = 50 pF R _D , R _U = 500 Ω S1 = GND for t _{PZH} S1 = V _I for t _{PZL} V _I = 2 x V _{CC} | Figures 1, 3 |
| | | 2.5 ± 0.2 | 1.8 | | 8.5 | 1.8 | 9.0 | | | |
| | | 3.3 ± 0.3 | 1.2 | | 6.2 | 1.2 | 6.5 | | | |
| | | 5.5 ± 0.5 | 0.8 | | 5.5 | 0.8 | 5.8 | | | |
| t _{PLZ} , t _{PHZ} | Output Disable Time | 1.8 ± 0.15 | 2.5 | | 12.0 | 2.5 | 13.0 | ns | C _L = 50 pF R _D , R _U = 500 Ω S1 = GND for t _{PZH} S1 = V _I for t _{PZL} V _I = 2 x V _{CC} | Figures 1, 3 |
| | | 2.5 ± 0.2 | 1.5 | | 8.0 | 1.5 | 8.5 | | | |
| | | 3.3 ± 0.3 | 0.8 | | 5.7 | 0.8 | 6.0 | | | |
| | | 5.0 ± 0.5 | 0.3 | | 4.7 | 0.3 | 5.0 | | | |
| C _{IN} | Input Capacitance | 0 | | 2.5 | | | | pF | | |
| C _{OUT} | Output Capacitance | 5.0 | | 4 | | | | pF | | |
| C _{PD} | Power Dissipation Capacitance | 3.3 | | 10 | | | | pF | (Note 6) | Figure 2 |
| | | 5.0 | | 12 | | | | pF | | |
| Note 5: Parameter guaranteed by design. t _{OSLH} = t _{PLHmax} - t _{PLHmin} ; t _{OSHL} = t _{PHLmax} - t _{PHLmin} . | | | | | | | | | | |
| Note 6: C _{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I _{CCD}) at no output loading and operating at 50% duty cycle. (See Figure 2.) C _{PD} is related to I _{CCD} dynamic operating current by the expression: I _{CCD} = (C _{PD})(V _{CC})(f _{IN}) + (I _{CCstatic}). | | | | | | | | | | |

AC Loading and Waveforms



C_L includes load and stray capacitance
 Input PRR = 1.0 MHz; $t_w = 500$ ns

FIGURE 1. AC Test Circuit



Input = AC Waveform; $t_r = t_f = 1.8$ ns;
 PRR = 10 MHz; Duty Cycle = 50%

FIGURE 2. I_{CCD} Test Circuit

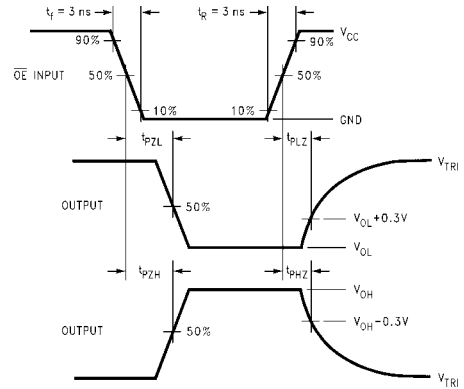
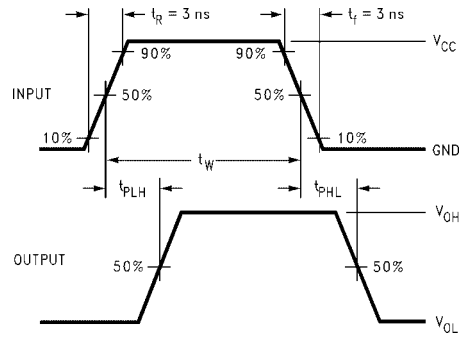


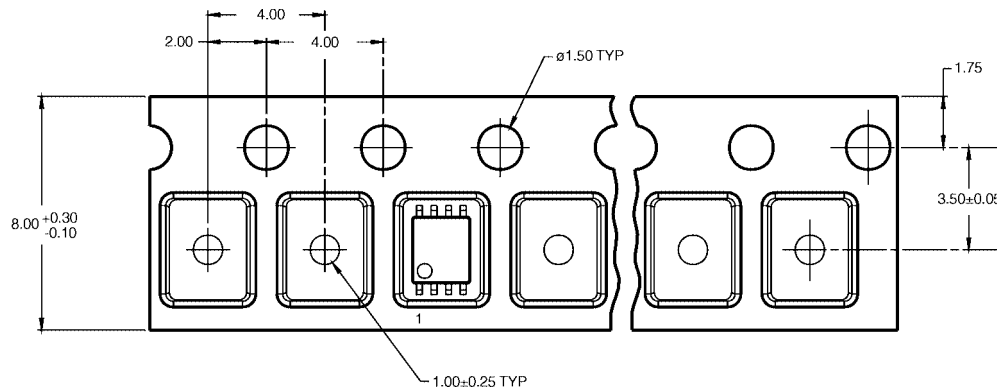
FIGURE 3. AC Waveforms

Tape and Reel Specification

Tape Format for US8

| Package Designator | Tape Section | Number Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|-----------------|---------------|-------------------|
| K8X | Leader (Start End) | 125 (typ) | Empty | Sealed |
| | Carrier | 3000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (typ) | Empty | Sealed |

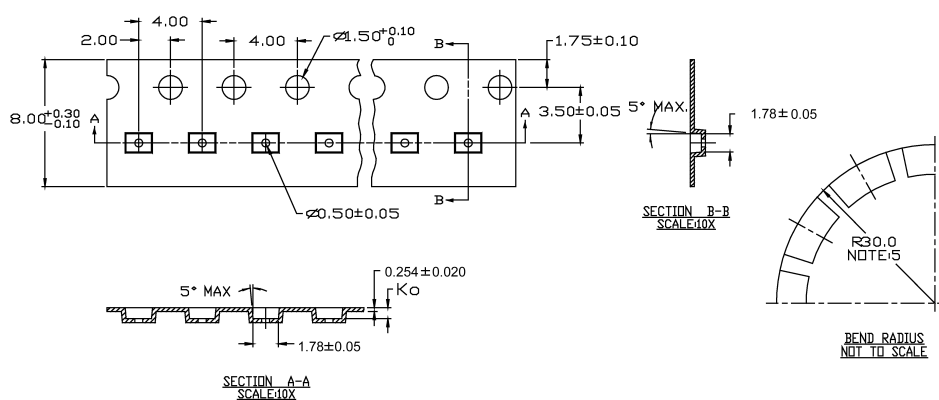
TAPE DIMENSIONS inches (millimeters)



Tape Format for MicroPak

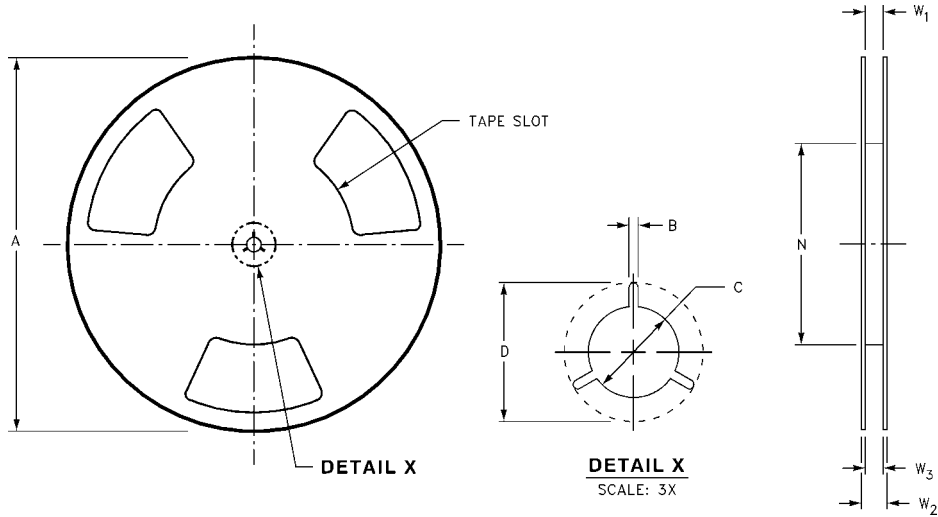
| Package Designator | Tape Section | Number Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|-----------------|---------------|-------------------|
| L8X | Leader (Start End) | 125 (typ) | Empty | Sealed |
| | Carrier | 3000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (typ) | Empty | Sealed |

TAPE DIMENSIONS inches (millimeters)



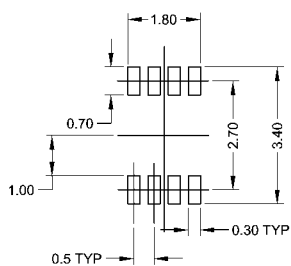
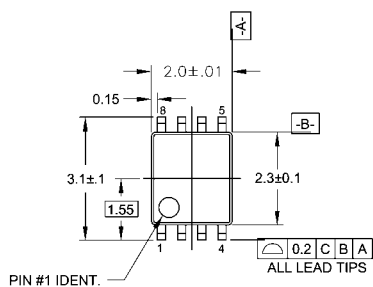
Tape and Reel Specification (Continued)

REEL DIMENSIONS inches (millimeters)

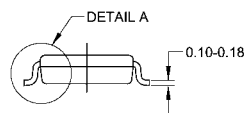
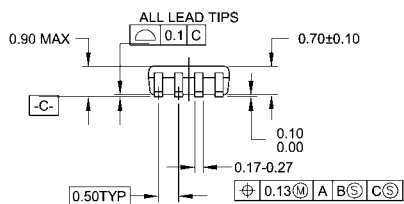


| Tape Size | A | B | C | D | N | W1 | W2 | W3 |
|-----------|----------------|-----------------|------------------|------------------|------------------|---|------------------|--|
| 8 mm | 7.0 (177.8) | 0.059 (1.50) | 0.512 (13.00) | 0.795 (20.20) | 2.165 (55.00) | $0.331 + 0.059/-0.000$ ($8.40 + 1.50/-0.00$) | 0.567 (14.40) | $W1 + 0.078/-0.039$ ($W1 + 2.00/-1.00$) |

Physical Dimensions inches (millimeters) unless otherwise noted

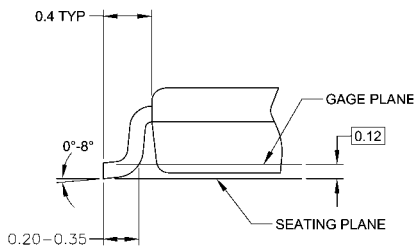


LAND PATTERN RECOMMENDATION



NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-187
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

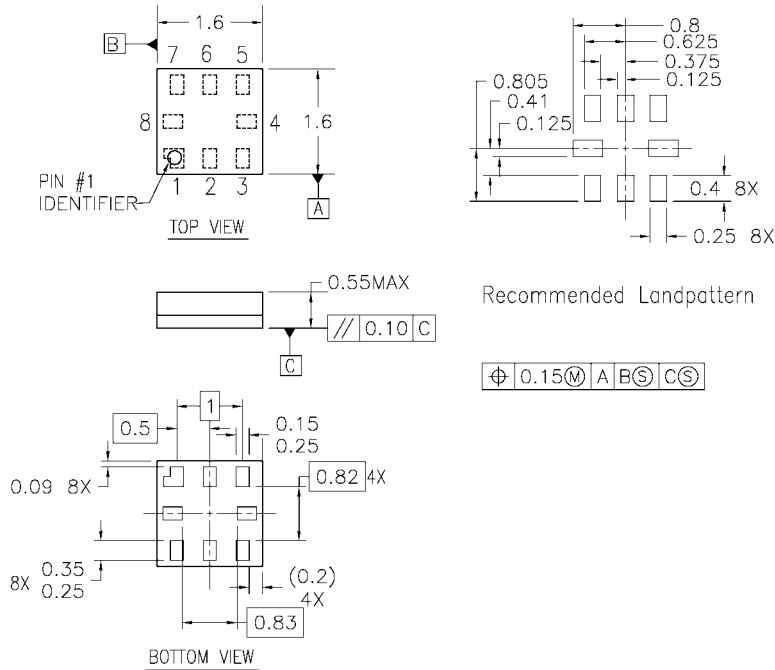


DETAIL A

MAB08AREVC

**8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide
Package Number MAB08A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



Notes:

1. PACKAGE REGISTRATION WITH JEDEC IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y.14M-1994

MAC08AREVB

**8-Lead MicroPak, 1.6 mm Wide
Package Number MAC08A**

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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