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NC7WZ132

TinyLogic® UHS Dual 2-Input NAND Gate with Schmitt Trigger Inputs

Features

- Space saving US8 surface mount package
- MicroPak™ leadless package
- Ultra High Speed; t_{PD} 3.1ns typ. into 50pF at 5V V_{CC}
- High Output Drive; $\pm 24mA$ 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/output
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Proprietary noise/EMI reduction circuitry implemented
- Schmitt trigger inputs are tolerant of slow changing input signals


General Description

The NC7WZ132 is a dual 2-Input NAND Gate from Fairchild's Ultra High Speed Series of TinyLogic®. The device is fabricated with advanced CMOS technology to achieve ultra high speed 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 output are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage. Schmitt trigger inputs achieve typically 1V hysteresis between the positive-going and negative-going input threshold voltage at 5V V_{CC} .

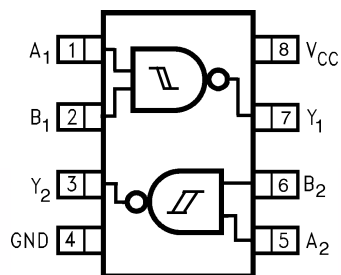
Ordering Information

| Order Number | Package Number | Product Code Top Mark | Package Description | Supplied As |
|--------------|----------------|-----------------------|---|---------------------------|
| NC7WZ132K8X | MAB08A | WZD2 | 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide | 3k Units on Tape and Reel |
| NC7WZ132L8X | MAC08A | T5 | 8-Lead MicroPak, 1.6 mm Wide | 5k Units on Tape and Reel |

Device also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering number.

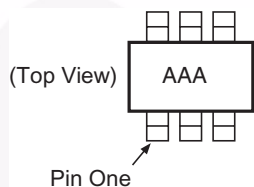
 All packages are lead free per JEDEC: J-STD-020B standard.

Connection Diagram



(Top View)

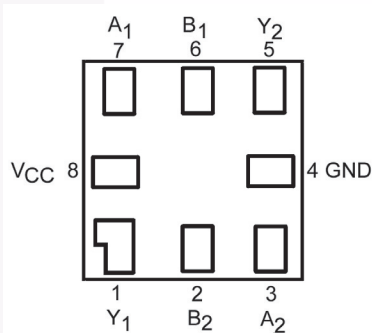
Pin One Orientation Diagram



AAA represents Product Code Top Mark – see ordering code

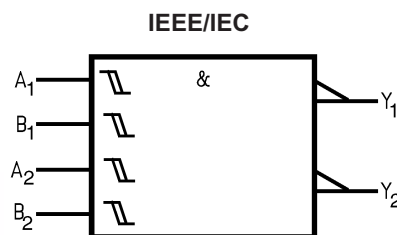
Note: Orientation of Top Mark determines Pin One location. Read the top product code mark left to right, Pin One is the lower left pin (see diagram).

Pad Assignments for MicroPak



(Top Thru View)

Logic Symbol



Function Table

$$Y = \overline{AB}$$

| Inputs | | Output |
|--------|---|--------|
| A | B | Y |
| L | L | H |
| L | H | H |
| H | L | H |
| H | H | L |

H = HIGH Logic Level

L = LOW Logic Level

Pin Description

| Pin Names | Description |
|---------------------------------|-------------|
| A _n , B _n | Inputs |
| Y _n | Output |

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

| Symbol | Parameter | Rating |
|------------------|---|-----------------|
| V_{CC} | Supply Voltage | -0.5V to +7V |
| V_{IN} | DC Input Voltage | -0.5V to +7V |
| V_{OUT} | DC Output Voltage | -0.5V to +7V |
| I_{IK} | DC Input Diode Current @ $V_{IN} < -0.5V$ | -50mA |
| I_{OK} | DC Output Diode Current @ $V_{OUT} < -0.5V$ | -50mA |
| I_{OUT} | DC Output Current | $\pm 50mA$ |
| I_{CC}/I_{GND} | DC V_{CC}/GND Current | $\pm 100mA$ |
| T_{STG} | Storage Temperature | -65°C to +150°C |
| T_J | Junction Temperature Under Bias | 150°C |
| T_L | Junction Lead Temperature (Soldering, 10 seconds) | 260°C |
| P_D | Power Dissipation @ +85°C | 250mW |

Recommended Operating Conditions⁽¹⁾

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

| Symbol | Parameter | Rating |
|---------------|-------------------------------|----------------|
| V_{CC} | Supply Voltage Operating | 1.65V to 5.5V |
| | Supply Voltage Data Retention | 1.5V to 5.5V |
| V_{IN} | Input Voltage | 0V to 5.5V |
| V_{OUT} | Output Voltage | 0V to V_{CC} |
| T_A | Operating Temperature | -40°C to +85°C |
| θ_{JA} | Thermal Resistance | 250°C/W |

Note:

1. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

| Symbol | Parameter | V _{CC} (V) | Conditions | | T _A = +25°C | | | T _A = -40°C to +85°C | | Units |
|------------------|-----------------------------------|---------------------|--|--------------------------|-----------------------------------|-------------------------|------|---------------------------------|------|-------|
| | | | | | Min. | Typ. | Max. | Min. | Max. | |
| V _P | Positive Threshold Voltage | 1.65 | | | 0.6 | 0.99 | 1.4 | 0.6 | 1.4 | V |
| | | 2.3 | | | 1.0 | 1.39 | 1.8 | 1.0 | 1.8 | |
| | | 3.0 | | | 1.3 | 1.77 | 2.2 | 1.3 | 2.2 | |
| | | 4.5 | | | 1.9 | 2.49 | 3.1 | 1.9 | 3.1 | |
| | | 5.5 | | | 2.2 | 2.96 | 3.6 | 2.2 | 3.6 | |
| V _N | Negative Threshold Voltage | 1.65 | | | 0.2 | 0.53 | 0.9 | 0.2 | 0.9 | V |
| | | 2.3 | | | 0.4 | 0.78 | 1.15 | 0.4 | 1.15 | |
| | | 3.0 | | | 0.6 | 1.02 | 1.5 | 0.6 | 1.5 | |
| | | 4.5 | | | 1.0 | 1.48 | 2.0 | 1.0 | 2.0 | |
| | | 5.5 | | | 1.2 | 1.76 | 2.3 | 1.2 | 2.3 | |
| V _H | Hysteresis Voltage | 1.65 | | | 0.15 | 0.46 | 0.9 | 0.15 | 0.9 | V |
| | | 2.3 | | | 0.25 | 0.61 | 1.1 | 0.25 | 1.1 | |
| | | 3.0 | | | 0.4 | 0.75 | 1.2 | 0.4 | 1.2 | |
| | | 4.5 | | | 0.6 | 1.01 | 1.5 | 0.6 | 1.5 | |
| | | 5.5 | | | 0.7 | 1.20 | 1.7 | 0.7 | 1.7 | |
| V _{OH} | HIGH Level Output Voltage | 1.65 | V _{IN} = V _{IL} | I _{OH} = -100μA | 1.55 | 1.65 | | 1.55 | | V |
| | | 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 | V _{IN} = V _{IH} | I _{OH} = -4mA | 1.29 | 1.52 | | 1.29 | | |
| | | 2.3 | | I _{OH} = -8mA | 1.9 | 2.15 | | 1.9 | | |
| | | 3.0 | | I _{OH} = -16mA | 2.4 | 2.80 | | 2.4 | | |
| | | 3.0 | | I _{OH} = -24mA | 2.3 | 2.68 | | 2.3 | | |
| | | 4.5 | | I _{OH} = -32mA | 3.8 | 4.20 | | 3.8 | | |
| | | V _{OL} | LOW Level Output Voltage | 1.65 | V _{IN} = V _{IH} | I _{OL} = 100μA | | 0.0 | 0.10 | |
| 2.3 | | | | 0.0 | | | 0.10 | | 0.10 | |
| 3.0 | | | | 0.0 | | | 0.10 | | 0.10 | |
| 4.5 | | | | 0.0 | | | 0.10 | | 0.10 | |
| 1.65 | V _{IN} = V _{IH} | | | I _{OL} = 4mA | | 0.08 | 0.24 | | 0.24 | |
| 2.3 | | | | I _{OL} = 8mA | | 0.10 | 0.3 | | 0.3 | |
| 3.0 | | | | I _{OL} = 16mA | | 0.15 | 0.4 | | 0.4 | |
| 3.0 | | | | I _{OL} = 24mA | | 0.22 | 0.55 | | 0.55 | |
| 4.5 | | | | I _{OL} = 32mA | | 0.22 | 0.55 | | 0.55 | |
| | | | | | | | | | | |
| I _{IN} | Input Leakage Current | 0 to 5.5 | V _{IN} = 5.5V, GND | | | | ±0.1 | ±1 | μA | |
| I _{OFF} | Power Off Leakage Current | 0.0 | V _{IN} or V _{OUT} = 5.5V | | | | 1 | 10 | μA | |
| I _{CC} | Quiescent Supply Current | 1.65 to 5.5 | V _{IN} = 5.5V, GND | | | | 1 | 10 | μA | |

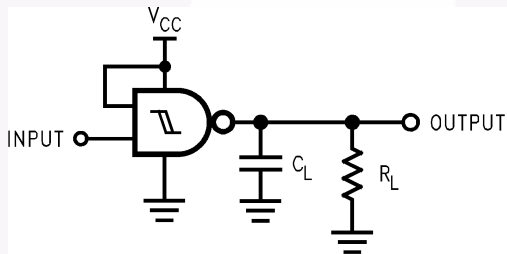
AC Electrical Characteristics

| Symbol | Parameter | V _{CC} (V) | Conditions | T _A = +25°C | | | T _A = -40°C to +85°C | | Units | Figure Number |
|-------------------------------------|-------------------------------|---------------------|---|------------------------|------|------|---------------------------------|------|-------|----------------------|
| | | | | Min. | Typ. | Max. | Min. | Max. | | |
| t _{PLH} , t _{PHL} | Propagation Delay | 1.8 ± 0.15 | C _L = 15 pF, R _L = 1MΩ | 3.0 | 7.1 | 13.0 | 3.0 | 13.5 | ns | Figure 1 Figure 3 |
| | | 2.5 ± 0.2 | | 2.0 | 4.5 | 7.5 | 2.0 | 8.0 | | |
| | | 3.3 ± 0.3 | | 1.2 | 3.4 | 5.0 | 1.2 | 5.5 | | |
| | | 5.0 ± 0.5 | | 0.8 | 2.6 | 3.8 | 0.8 | 4.2 | | |
| t _{PLH} , t _{PHL} | Propagation Delay | 3.3 ± 0.3 | C _L = 50pF, R _L = 500Ω | 1.8 | 4.0 | 5.8 | 1.8 | 6.3 | ns | Figure 1 Figure 3 |
| | | 5.0 ± 0.5 | | 1.2 | 3.1 | 4.5 | 1.2 | 4.9 | | |
| C _{IN} | Input Capacitance | 0 | | | 2.5 | | | | pF | |
| C _{PD} | Power Dissipation Capacitance | 3.3 | (2) | | 15 | | | | pF | Figure 2 |
| | | 5.0 | | | 18 | | | | | |

Note:

2. 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_{CC}static).

AC Loading and Waveforms



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

Figure 1. AC Test Circuit

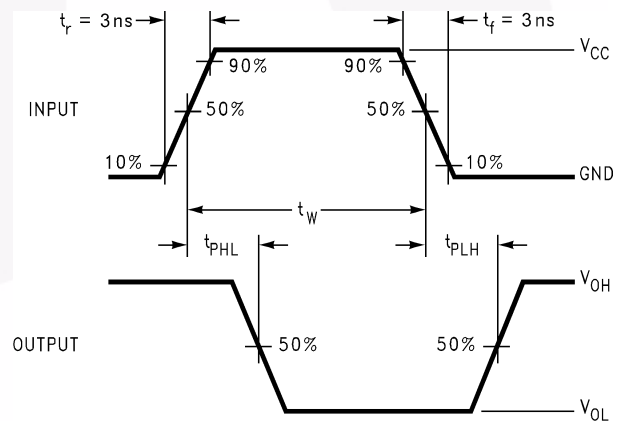
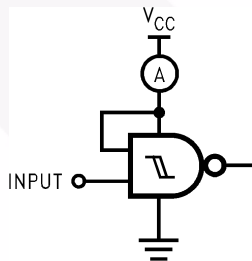


Figure 3. AC Waveforms



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

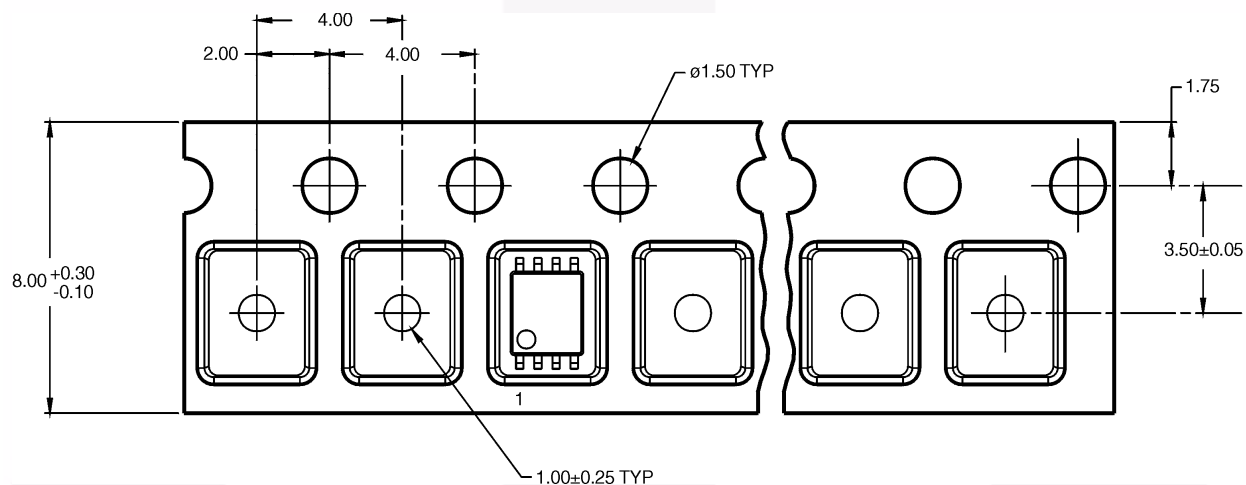
Figure 2. I_{CCD} Test Circuit

Tape and Reel Specifications

Tape Format for US8

| Package Designator | Tape Section | Number of 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 |

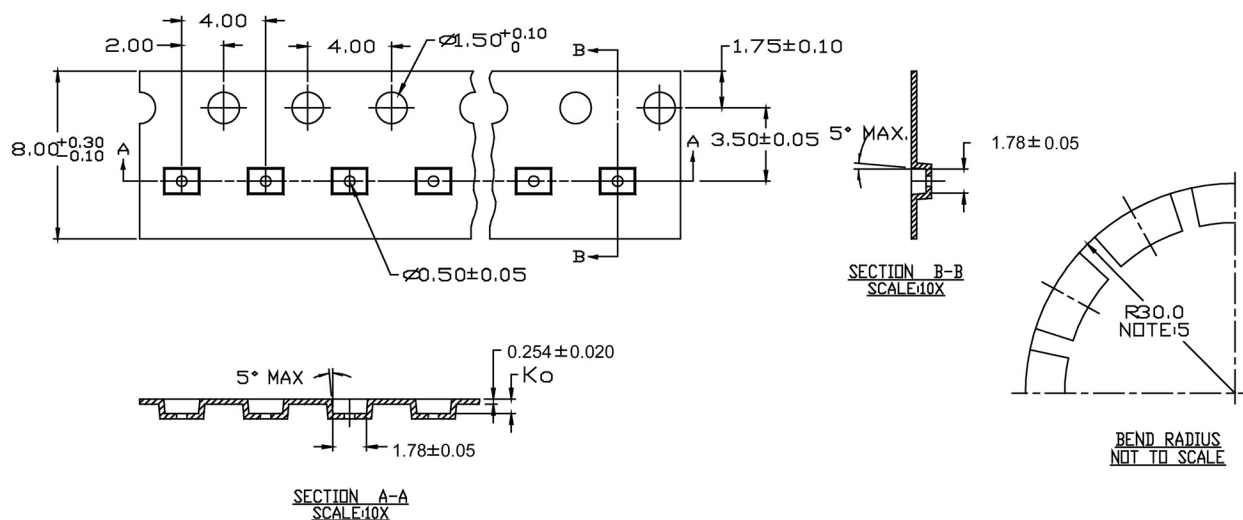
Tape Dimensions inches (millimeters)



Tape Format for MicroPak

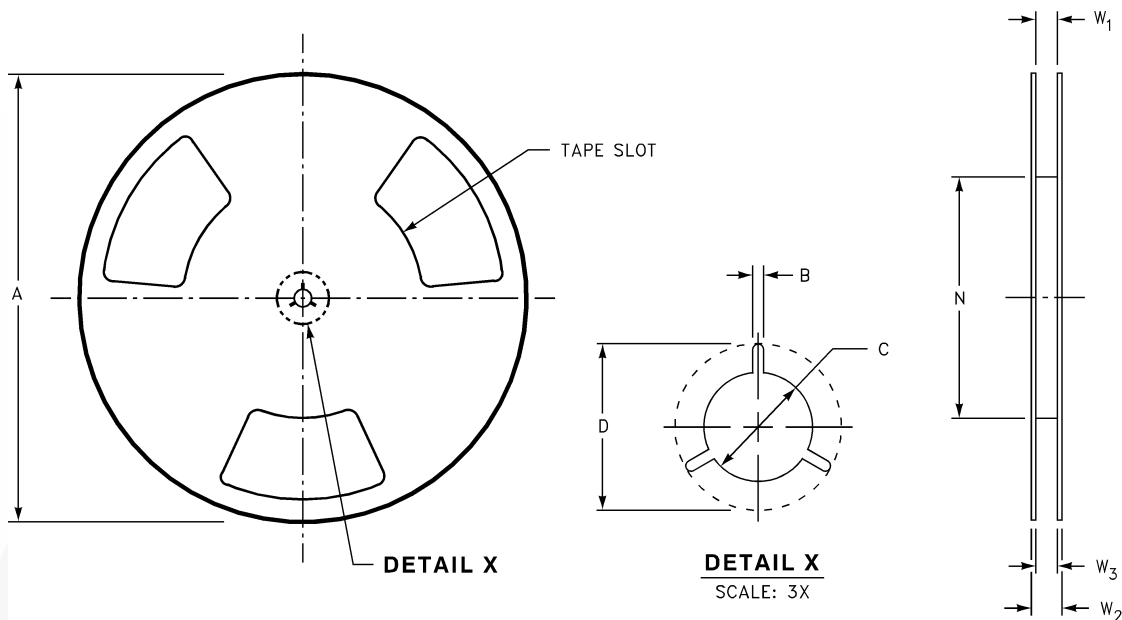
| Package Designator | Tape Section | Number of Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|--------------------|---------------|-------------------|
| L8X | Leader (Start End) | 125 (typ.) | Empty | Sealed |
| | Carrier | 3000 | Filled | Sealed |
| | Trailer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

Tape Dimensions inches (millimeters)



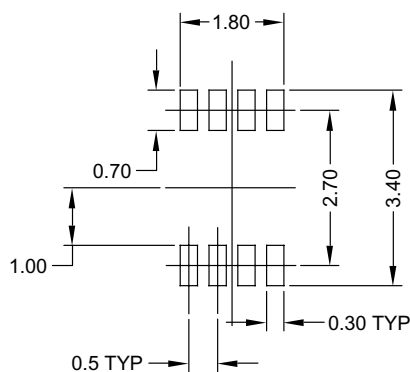
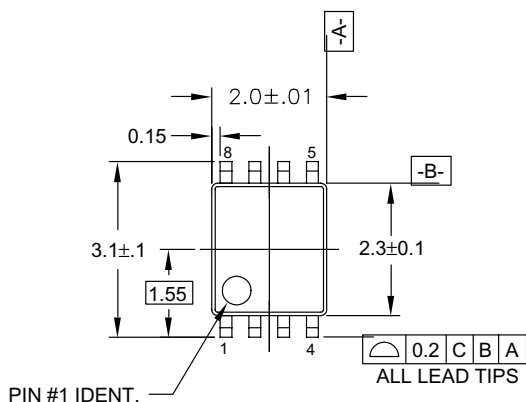
Tape and Reel Specifications (Continued)

Reel Dimensions inches (millimeters)

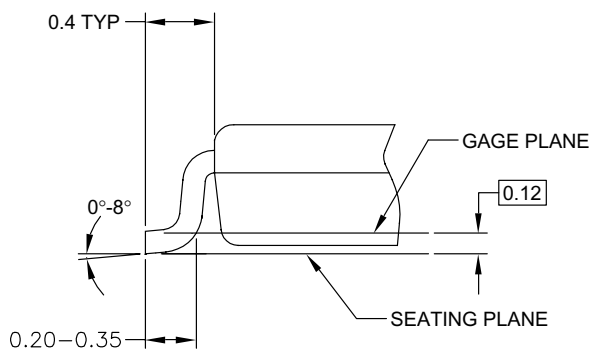
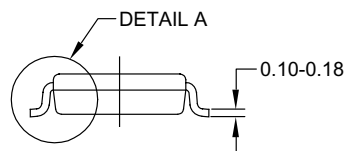
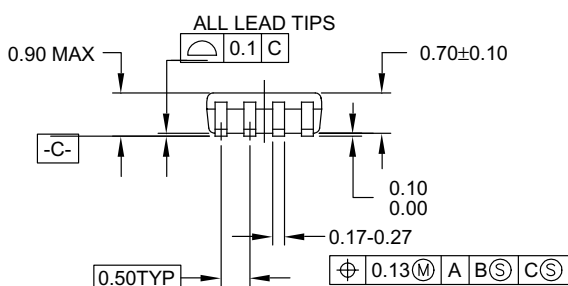


| Tape Size | A | B | C | D | N | W1 | W2 | W3 |
|-----------|----------------|-----------------|------------------|------------------|------------------|---|------------------|--------------------------------------|
| 8mm | 7.0 (177.8) | 0.059 (1.50) | 0.512 (13.00) | 0.795 (20.20) | 2.165 (55.00) | 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



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.

MAB08AREVC

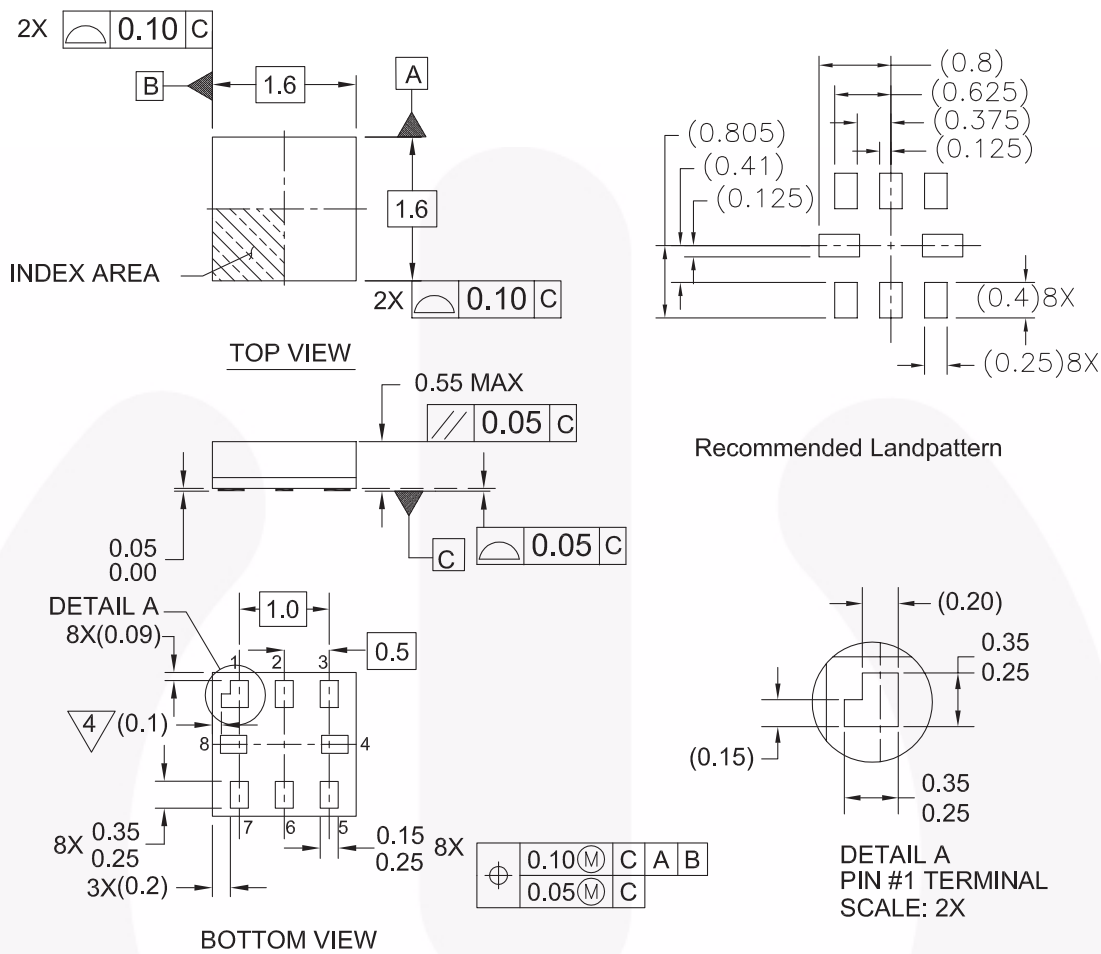
Figure 4. 8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide

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Physical Dimensions (Continued)



Notes:

1. PACKAGE CONFORMS TO JEDEC MO-255 VARIATION UAAD
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y.14M-1994
4. PIN 1 FLAG, END OF PACKAGE OFFSET
5. DRAWING FILE NAME: MKT-MAC08AREV4

MAC08AREV4

Figure 5. 8-Lead MicroPak, 1.6 mm Wide

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

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| | | SuperSOT [™] 8 | Ultra FRFET [™] |
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