

NC7WZ17

TinyLogic® UHS Dual Buffer with Schmitt Trigger Inputs

General Description

The NC7WZ17 is a dual buffer with Schmitt trigger inputs from Fairchild's Ultra High Speed Series of TinyLogic® in the SC70 6-lead package. 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 very broad V_{CC} operating range. The device is specified to operate over the 1.65V to 5.5V V_{CC} range. The inputs and outputs are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage. Schmitt trigger inputs typically achieve 1V hysteresis between the positive going and negative going input threshold voltage at 5V V_{CC} .

Features

- Space saving SC70 6-lead package
- Ultra small MicroPak™ Pb-Free leadless package
- Ultra high speed: t_{PD} 3.6ns 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/outputs
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented

Ordering Information

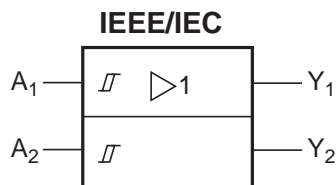
| Order Number | Package Number | Package Code Top Mark | Package Description | Supplied As |
|------------------------------|----------------|-----------------------|---|---------------------------|
| NC7WZ17P6X | MAA06A | Z17 | 6-Lead SC70, EIAJ SC88, 1.25mm Wide | 3k Units on Tape and Reel |
| NC7WZ17P6X_NL ⁽¹⁾ | MAA06A | Z17 | Pb-Free 6-Lead SC70, EIAJ SC88, 1.25mm Wide | 3k Units on Tape and Reel |
| NC7WZ17L6X | MAC06A | B5 | Pb-Free 6-Lead MicroPak, 1.0mm Wide | 5k Units on Tape and Reel |

Pb-Free package per JEDEC J-STD-020B.

Note:

1. “_NL” indicates Pb-Free product (per JEDEC J-STD-020B). Device is available in Tape and Reel only.

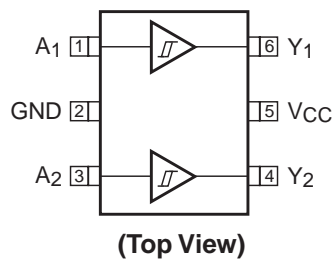
Logic Symbol



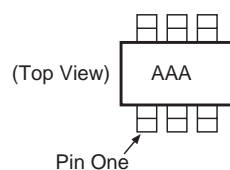
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Connection Diagrams

Pin Assignment for SC70



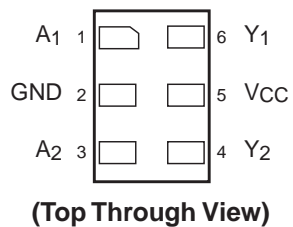
Pin One Orientation Diagram



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



Pin Descriptions

| Pin Name | Description |
|---------------------------------|-------------|
| A ₁ , A ₂ | Data Inputs |
| Y ₁ , Y ₂ | Outputs |

Function Table

$$Y = A$$

| Input | Output |
|-------|--------|
| A | Y |
| L | L |
| H | H |

H = HIGH Logic Level L = LOW Logic Level

Absolute Maximum Ratings

The “Absolute Maximum Ratings” are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The “Recommended Operating Conditions” table will define the conditions for actual device operation.

| 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 | ±50mA |
| I_{CC}/I_{GND} | DC V_{CC}/GND Current | ±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 | 180mW |

Recommended Operating Conditions⁽²⁾

| Symbol | Parameter | Rating |
|---------------|-------------------------------|----------------|
| V_{CC} | Supply Voltage Operating | 1.65V to 5.5V |
| V_{CC} | 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 | 350°C/W |

Note:

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

DC Electrical Characteristics

| Symbol | Parameter | Conditions | | V _{CC} (V) | T _A = | | | | | Units | | | | |
|-----------------|----------------------------|-----------------------------------|--------------------------|------------------------|-------------------------|-------------------------|-------------------------|------------------------|------|-------|------|------|------|------|
| | | | | | +25°C | | | -40°C to +85°C | | | | | | |
| | | | | | Min | Typ | Max | Min | Max | | | | | |
| V _P | Positive Threshold Voltage | | | 1.65 | 0.6 | 1.0 | 1.4 | 0.6 | 1.4 | V | | | | |
| | | | | 1.8 | 0.7 | 1.07 | 1.5 | 0.7 | 1.5 | | | | | |
| | | | | 2.3 | 1.0 | 1.38 | 1.8 | 1.0 | 1.8 | | | | | |
| | | | | 3.0 | 1.3 | 1.74 | 2.2 | 1.3 | 2.2 | | | | | |
| | | | | 4.5 | 1.9 | 2.43 | 3.1 | 1.9 | 3.1 | | | | | |
| | | | | 5.5 | 2.2 | 2.88 | 3.6 | 2.2 | 3.6 | | | | | |
| V _N | Netative Threshold Voltage | | | 1.65 | 0.2 | 0.5 | 0.8 | 0.2 | 0.8 | V | | | | |
| | | | | 1.8 | 0.25 | 0.56 | 0.9 | 0.25 | 0.9 | | | | | |
| | | | | 2.3 | 0.40 | 0.75 | 1.15 | 0.40 | 1.15 | | | | | |
| | | | | 3.0 | 0.6 | 0.98 | 1.5 | 0.6 | 1.5 | | | | | |
| | | | | 4.5 | 1.0 | 1.42 | 2.0 | 1.0 | 2.0 | | | | | |
| | | | | 5.5 | 1.2 | 1.68 | 2.3 | 1.2 | 2.3 | | | | | |
| V _H | Hystersis Voltage | | | 1.65 | 0.1 | 0.48 | 0.9 | 0.1 | 0.9 | V | | | | |
| | | | | 1.8 | 0.15 | 0.51 | 1.0 | 0.15 | 1.0 | | | | | |
| | | | | 2.3 | 0.25 | 0.62 | 1.1 | 0.25 | 1.1 | | | | | |
| | | | | 3.0 | 0.4 | 0.76 | 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 | V _{IN} = V _{IH} | I _{OH} = -100μA | 1.65 | 1.55 | 1.65 | | 1.55 | | V | | | | |
| | | | | 1.8 | 1.7 | 1.8 | | 1.7 | | | | | | |
| | | | | 2.3 | 2.2 | 2.3 | | 2.2 | | | | | | |
| | | | | 3.0 | 2.9 | 3.0 | | 2.9 | | | | | | |
| | | | | 4.5 | 4.4 | 4.5 | | 4.4 | | | | | | |
| | | | I _{OH} = -4mA | 1.65 | 1.29 | 1.52 | | 1.29 | | | | | | |
| | | | | I _{OH} = -8mA | 2.3 | 1.9 | 2.14 | | 1.9 | | | | | |
| | | | | | I _{OH} = -16mA | 3.0 | 2.4 | 2.75 | | | 2.4 | | | |
| | | | | | | I _{OH} = -24mA | 3.0 | 2.3 | 2.62 | | | 2.3 | | |
| | | | | | | | I _{OH} = -32mA | 4.5 | 3.8 | | 4.13 | | 3.8 | |
| V _{OL} | LOW Level Output Voltage | V _{IN} = V _{IL} | I _{OL} = 100μA | 1.65 | | 0.0 | 0.1 | | 0.1 | V | | | | |
| | | | | 1.8 | | 0.0 | 0.1 | | 0.1 | | | | | |
| | | | | 2.3 | | 0.0 | 0.1 | | 0.1 | | | | | |
| | | | | 3.0 | | 0.0 | 0.1 | | 0.1 | | | | | |
| | | | | 4.5 | | 0.0 | 0.1 | | 0.1 | | | | | |
| | | | | I _{OL} = 4mA | 1.65 | | 0.08 | 0.24 | | | 0.24 | | | |
| | | | | | I _{OL} = 8mA | 2.3 | | 0.10 | 0.3 | | | 0.3 | | |
| | | | | | | I _{OL} = 16mA | 3.0 | | 0.16 | | 0.4 | | 0.4 | |
| | | | | | | | I _{OL} = 24mA | 3.0 | | | 0.24 | 0.55 | | 0.55 |
| | | | | | | | | I _{OL} = 32mA | 4.5 | | | 0.25 | 0.55 | |

DC Electrical Characteristics (Continued)

| Symbol | Parameter | Conditions | V _{CC} (V) | T _A = | | | | | Units |
|------------------|---------------------------|--|---------------------|------------------|-----|------|----------------|------|-------|
| | | | | +25°C | | | -40°C to +85°C | | |
| | | | | Min | Typ | Max | Min | Max | |
| I _{IN} | Input Leakage Current | V _{IN} = 5.5V, GND | 0 to 5.5 | | | ±0.1 | | ±1.0 | µA |
| I _{OFF} | Power Off Leakage Current | V _{IN} or V _{OUT} = 5.5V | 0.0 | | | 1 | | 10 | µA |
| I _{CC} | Quiescent Supply Current | V _{IN} = 5.5V, GND | 1.65 to 5.5 | | | 1.0 | | 10 | µA |

AC Electrical Characteristics

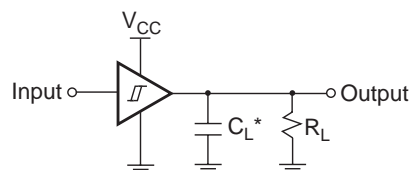
| Symbol | Parameter | Conditions | V _{CC} (V) | T _A = | | | | | Units | Figure Number |
|-------------------------------------|--|--|---------------------|------------------|-----|------|----------------|------|----------------------|----------------------|
| | | | | +25°C | | | −40°C to +85°C | | | |
| | | | | Min | Typ | Max | Min | Max | | |
| t _{PLH} , t _{PHL} | Propagation Delay | C _L = 15pF, R _L = 1MΩ | 1.65 | 2.0 | 8.3 | 14.3 | 2.0 | 15.8 | ns | Figure 1 Figure 3 |
| | | | 1.8 | 2.0 | 6.9 | 11.9 | 2.0 | 13.1 | | |
| | | | 2.5 ± 0.2 | 1.5 | 4.8 | 8.2 | 1.5 | 9.0 | | |
| | | | 3.3 ± 0.3 | 1.0 | 3.7 | 5.6 | 1.0 | 6.2 | | |
| | | | 5.0 ± 0.5 | 0.8 | 3.0 | 4.7 | 0.8 | 5.2 | | |
| | C _L = 50pF, R _L = 500Ω, | 3.3 ± 0.3 | 1.5 | 4.3 | 6.6 | 1.5 | 7.3 | ns | Figure 1 Figure 3 | |
| | | 5.0 ± 0.5 | 1.0 | 3.6 | 5.6 | 1.0 | 6.2 | | | |
| C _{IN} | Input Capacitance | | 0 | | 2.5 | | | | pF | |
| C _{PD} | Power Dissipation Capacitance | Note 3 | 3.3 | | 10 | | | | pF | Figure 2 |
| | | | 5.0 | | 12 | | | | | |

Notes:

3. 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:

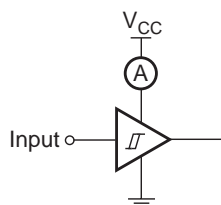
$$I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CCstatic}).$$

AC Loading and Waveforms



*C_L includes load and stray capacitance.
Input PRR = 1.0MHz; t_W = 500ns

Figure 1. AC Test Circuit



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

Figure 2. I_{CCD} Test Circuit

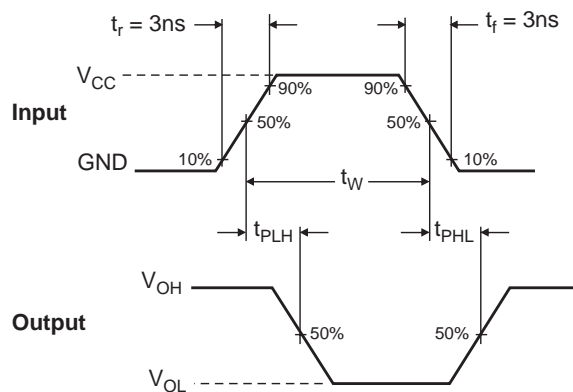


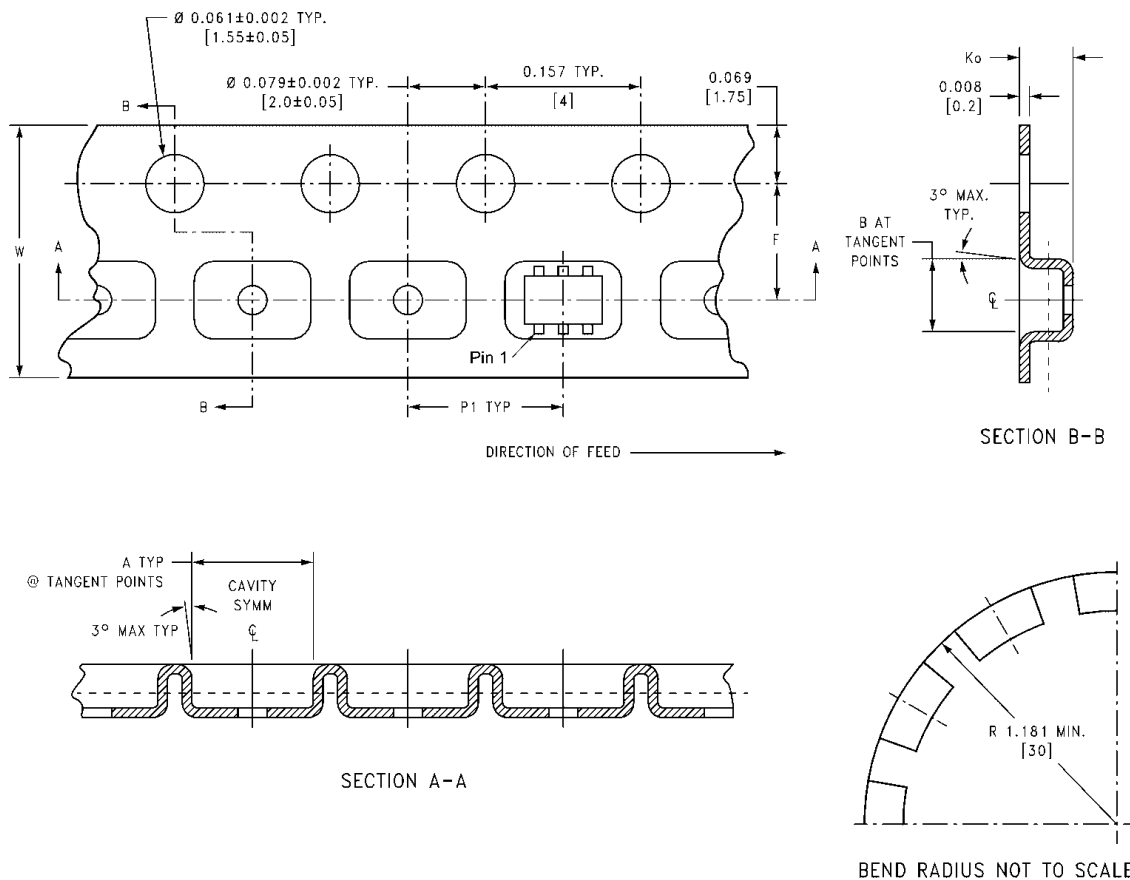
Figure 3. AC Waveforms

Tape and Reel Specification

Tape Format for SC70

| Package Designator | Tape Section | Number Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|-----------------|---------------|-------------------|
| P6X | Leader (Start End) | 125 (typ) | Empty | Sealed |
| | Carrier | 3000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (typ) | Empty | Sealed |

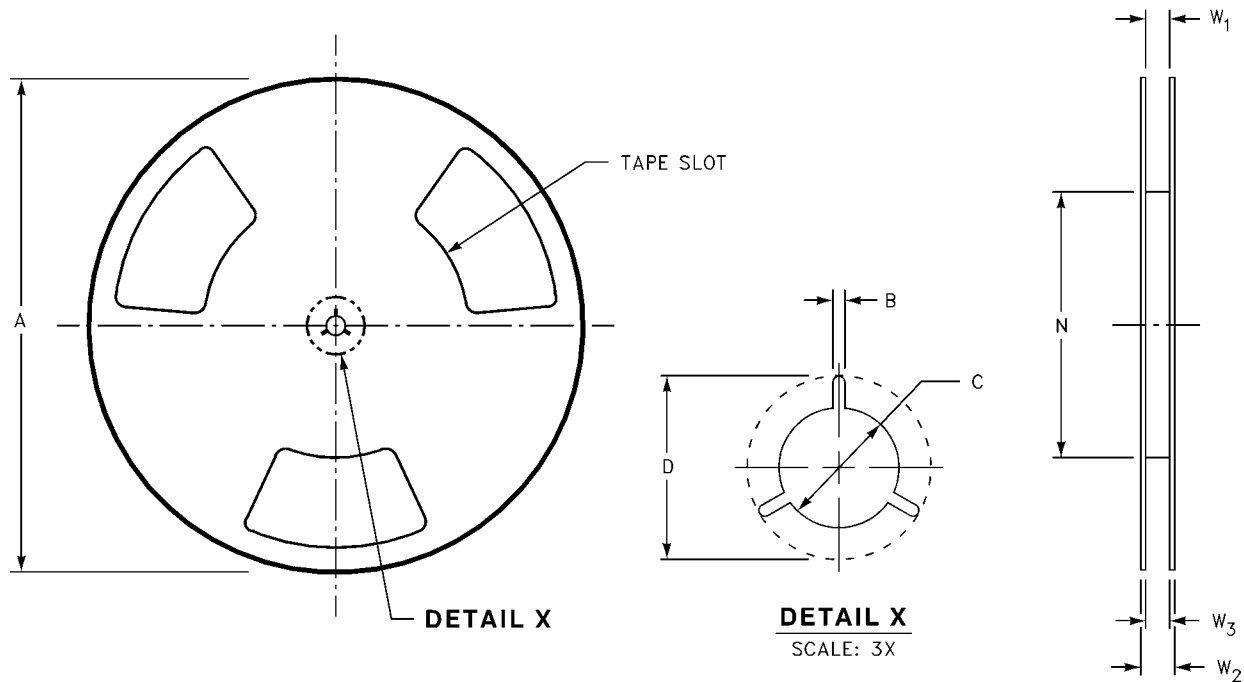
Tape Dimension inches (millimeters)



| Package | Tape Size | Dim A | Dim B | Dim F | Dim K_0 | Dim P1 | Dim W |
|---------|-----------|-----------------|-----------------|-------------------------------|--------------------------------|--------------|----------------------------|
| SC70-6 | 8mm | 0.093 (2.35) | 0.096 (2.45) | 0.138 ± 0.004 (3.5 ± 0.10) | 0.053 ± 0.004 (1.35 ± 0.10) | 0.157 (4) | 0.315 ± 0.004 (8 ± 0.1) |

Tape and Reel Specification (Continued)

Reel Dimension for MicroPak inches (millimeters)



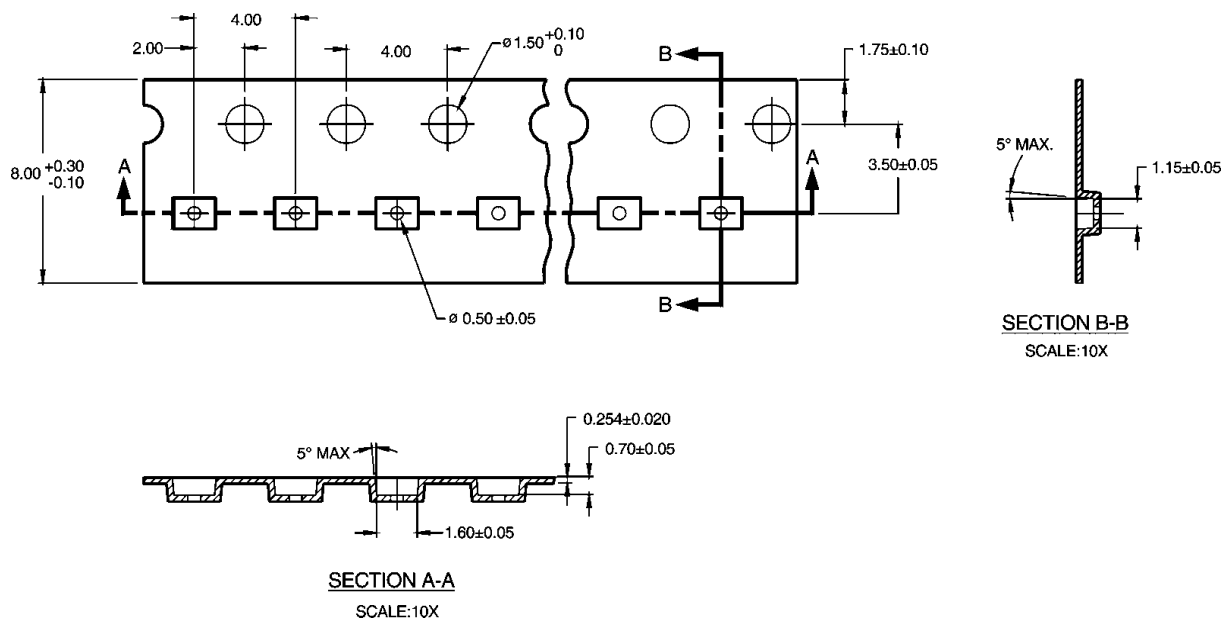
| Tape Size | A | B | C | D | N | W1 | W2 | W3 |
|-----------|----------------|-----------------|------------------|------------------|------------------|---|------------------|--|
| 8 mm | 7.0 (177.8) | 0.059 (1.50) | 0.512 (13.00) | 0.795 (20.20) | 2.165 (55.00) | 0.331 + 0.059/–0.000 (8.40 + 1.50/–0.00)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

Tape and Reel Specification (Continued)

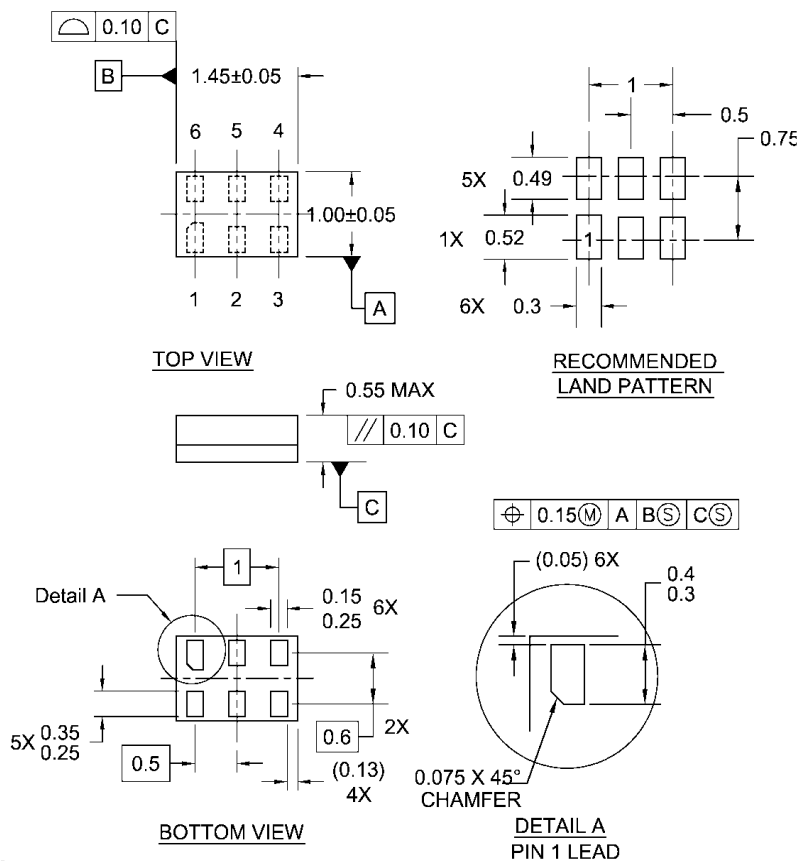
Tape Format for MicroPak

| Package Designator | Tape Section | Number Cavities | Cavity Status | Cover Tape Status |
|--------------------|--------------------|-----------------|---------------|-------------------|
| L6X | Leader (Start End) | 125 (typ) | Empty | Sealed |
| | Carrier | 3000 | Filled | Sealed |
| | Trailer (Hub End) | 75 (typ) | Empty | Sealed |

Tape Dimension inches (millimeters)



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



Notes:

1. JEDEC PACKAGE REGISTRATION IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06ARevB

**Pb-Free 6-Lead MicroPak, 1.0mm Wide
Package Number MAC06A**

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|--------------------------|------------------------|---|
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