

# 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

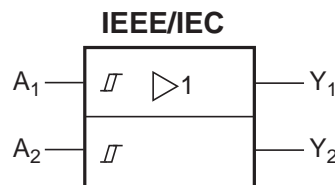
Order Number	Package Number	Package Code Top Mark	Package Description	Supplied As
NC7WZ17P6X	MAA06A	Z17	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7WZ17P6X_NL <sup>(1)</sup>	MAA06A	Z17	Pb-Free 6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel
NC7WZ17L6X	MAC06A	B5	Pb-Free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

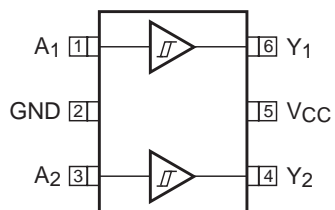
### Logic Symbol



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MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

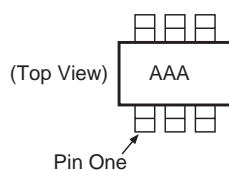
## Connection Diagrams

### Pin Assignment for SC70



(Top View)

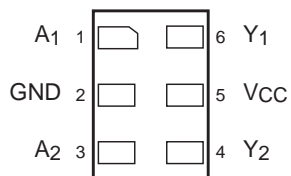
### Pin One Orientation Diagram



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 Through View)

## Pin Descriptions

Pin Name	Description
A <sub>1</sub> , A <sub>2</sub>	Data Inputs
Y <sub>1</sub> , Y <sub>2</sub>	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<sup>(2)</sup>

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
$\theta_{JA}$	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 <sub>CC</sub> (V)	T <sub>A</sub> =					Units		
				+25°C			-40°C to +85°C				
				Min	Typ	Max	Min	Max			
V <sub>P</sub>	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 <sub>N</sub>	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 <sub>H</sub>	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 <sub>OH</sub>	HIGH Level Output Voltage	V <sub>IN</sub> = V <sub>IH</sub>	I <sub>OH</sub> = -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			
		V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OH</sub> = -4mA	1.65	1.29	1.52		1.29			
				I <sub>OH</sub> = -8mA	2.3	1.9	2.14			1.9	
					I <sub>OH</sub> = -16mA	3.0	2.4	2.75			2.4
						I <sub>OH</sub> = -24mA	3.0	2.3		2.62	
					I <sub>OH</sub> = -32mA		4.5	3.8		4.13	
V <sub>OL</sub>	LOW Level Output Voltage	V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OL</sub> = 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			
		V <sub>IN</sub> = V <sub>IL</sub>	I <sub>OL</sub> = 4mA	1.65		0.08	0.24	0.24			
				I <sub>OL</sub> = 8mA	2.3		0.10	0.3	0.3		
					I <sub>OL</sub> = 16mA	3.0		0.16	0.4		0.4
						I <sub>OL</sub> = 24mA	3.0		0.24		0.55
					I <sub>OL</sub> = 32mA		4.5		0.25		0.55

### DC Electrical Characteristics (Continued)

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

## AC Electrical Characteristics

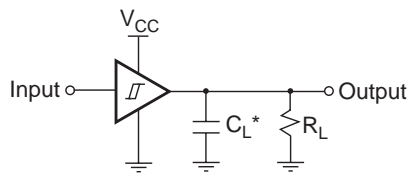
Symbol	Parameter	Conditions	V <sub>CC</sub> (V)	T <sub>A</sub> =					Units	Figure Number
				+25°C			-40°C to +85°C			
				Min	Typ	Max	Min	Max		
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay	C <sub>L</sub> = 15pF, R <sub>L</sub> = 1MΩ	1.65	2.0	8.3	14.3	2.0	15.8	ns	Figure 1 Figure 3
			1.8	2.0	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 <sub>L</sub> = 50pF, R <sub>L</sub> = 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 <sub>IN</sub>	Input Capacitance		0		2.5				pF	
C <sub>PD</sub>	Power Dissipation Capacitance	Note 3	3.3		10				pF	Figure 2
			5.0		12					

### Notes:

3. C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 2.) C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression:

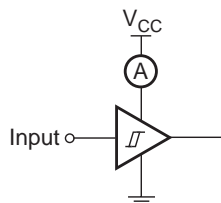
$$I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CCstatic}).$$

## AC Loading and Waveforms



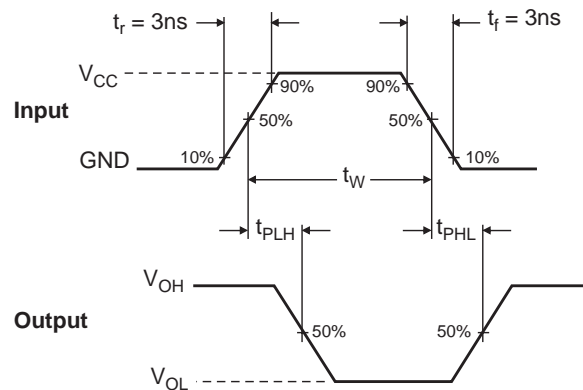
\*C<sub>L</sub> includes load and stray capacitance.  
Input PRR = 1.0MHz; t<sub>W</sub> = 500ns

**Figure 1. AC Test Circuit**



Input = AC Waveform; t<sub>r</sub>, t<sub>f</sub> = 1.8ns;  
PRR = 10MHz; Duty Cycle = 50%

**Figure 2. I<sub>CCD</sub> Test Circuit**



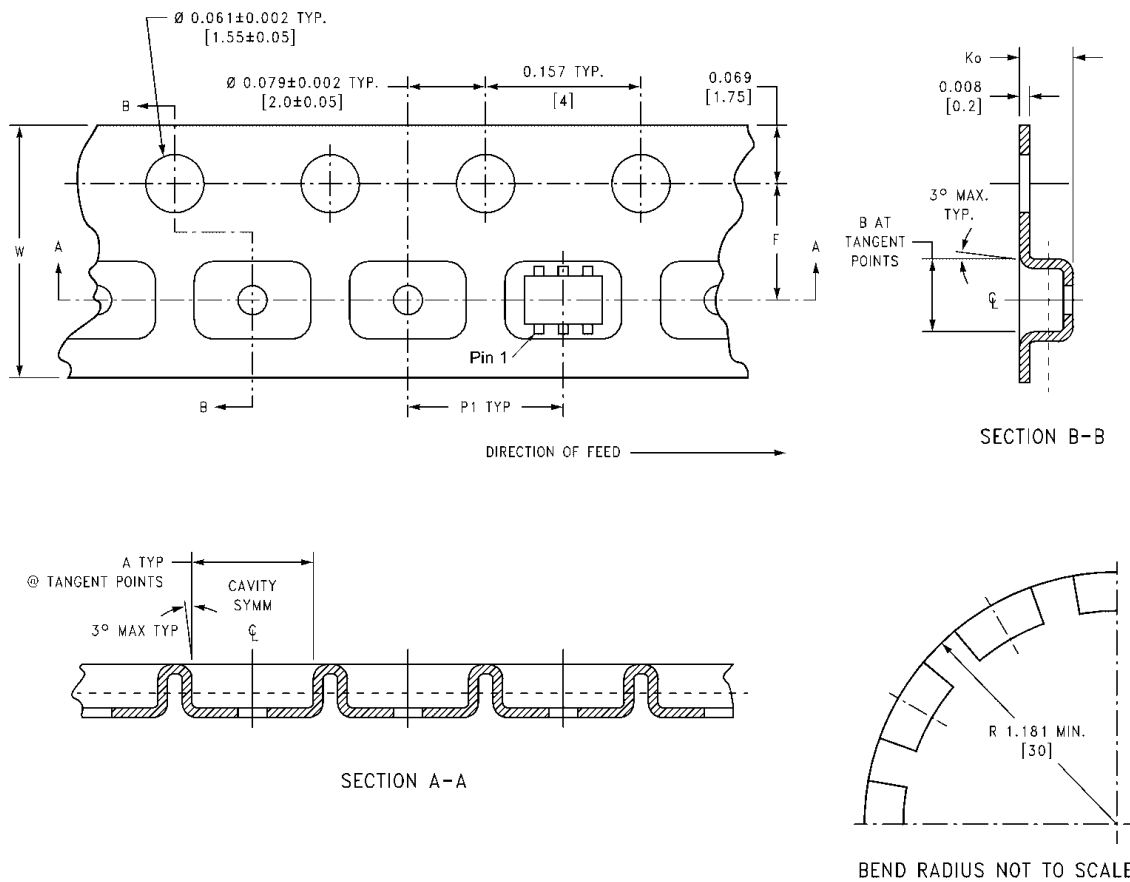
**Figure 3. AC Waveforms**

## 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

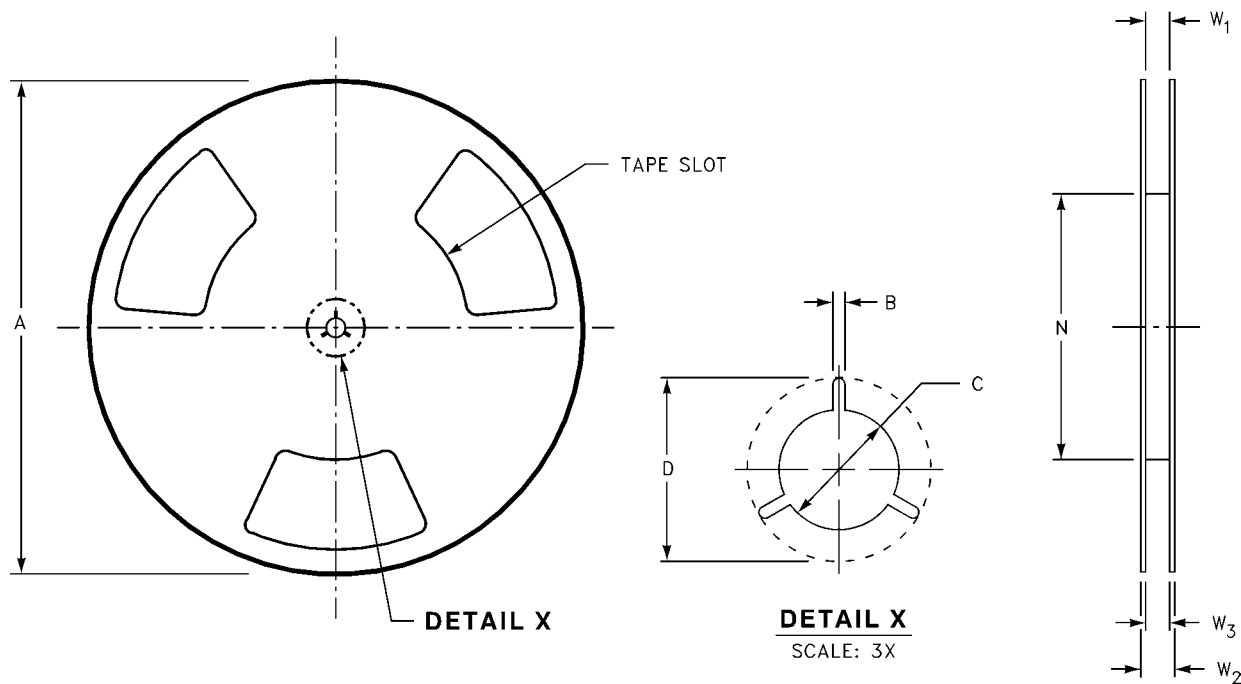
### Tape Dimension inches (millimeters)



Package	Tape Size	Dim A	Dim B	Dim F	Dim K <sub>0</sub>	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)

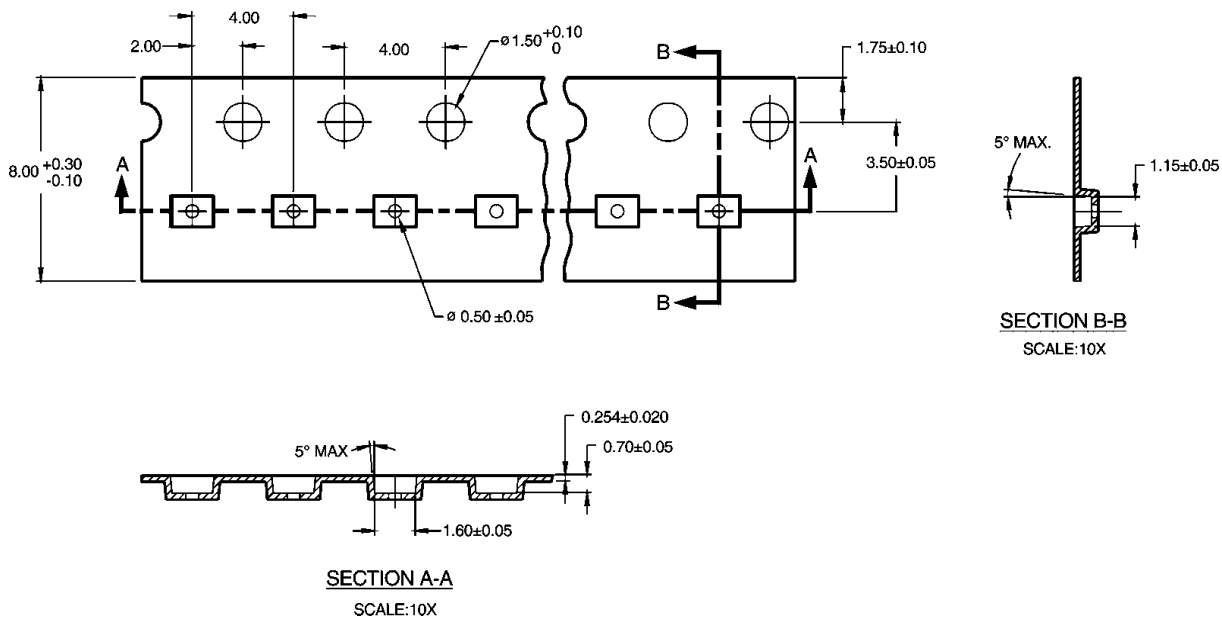


## Tape and Reel Specification (Continued)

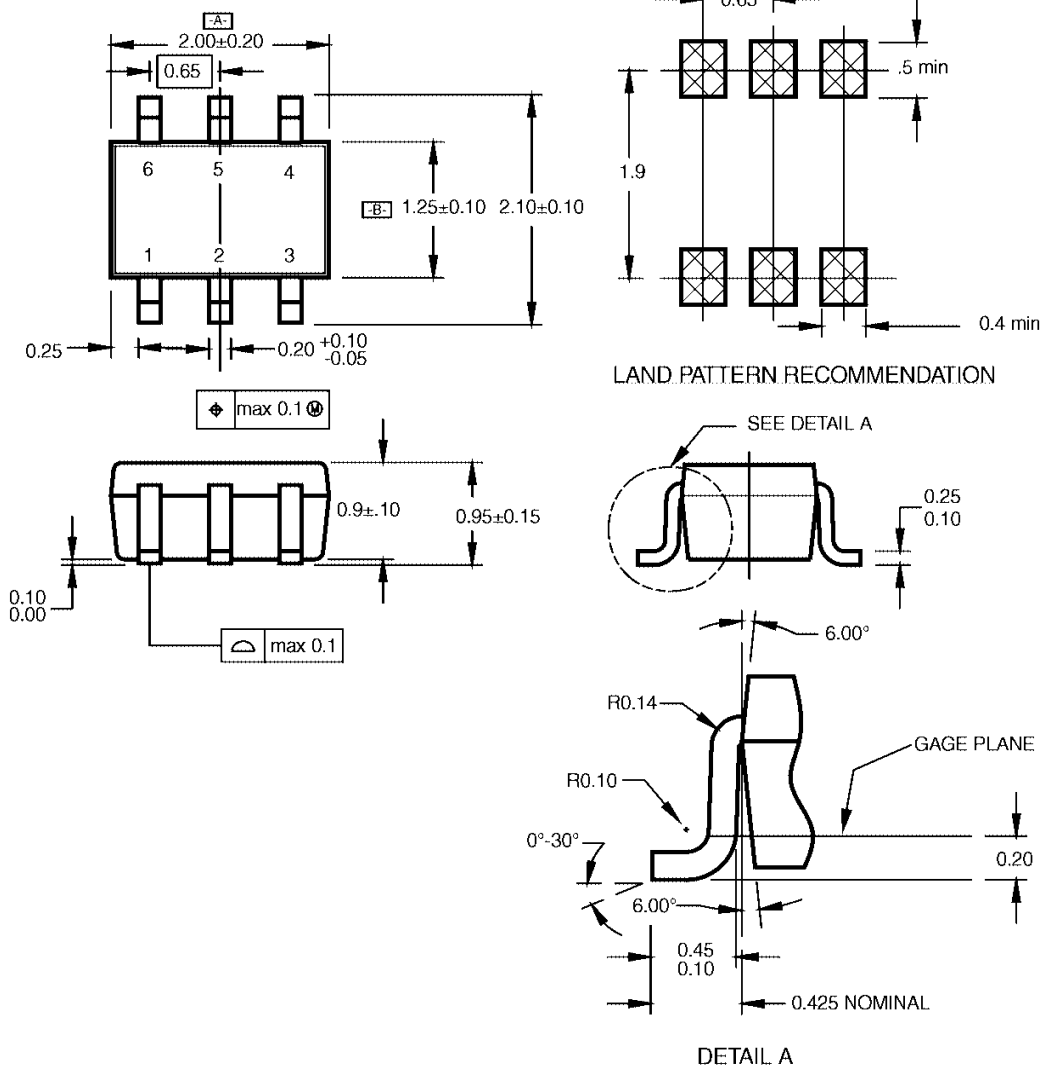
### Tape Format for MicroPak

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



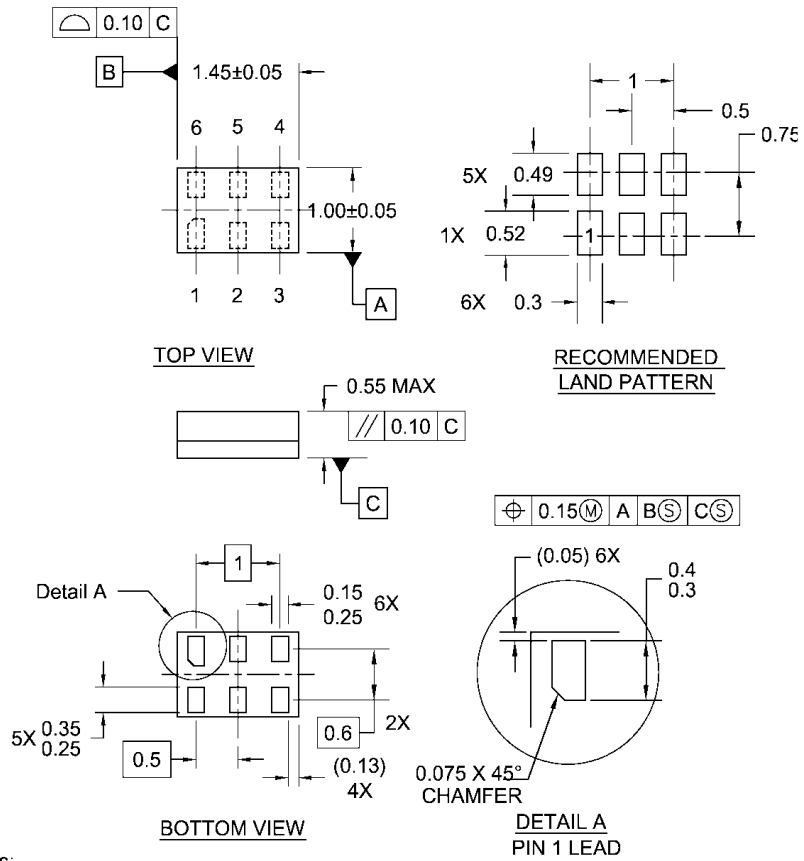
NOTES:

- A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88.
- B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- C. DIMENSIONS ARE IN MILLIMETERS.

MAA06ARevC

**6-Lead SC70, EIAJ SC88, 1.25mm Wide  
Package Number MAA06A**

**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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EcoSPARK™	I <sup>2</sup> C™	MSXPro™	RapidConnect™	UHC™
E <sup>2</sup> CMOS™	<i>i-Lo</i> ™	OCX™	μSerDes™	UltraFET®
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2. A critical component is 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.

## PRODUCT STATUS DEFINITIONS

### Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

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