

NC7SV17

TinyLogic® ULP-A Single Buffer with Schmitt Trigger Input

Features

- 0.9V to 3.6V V_{CC} supply operation
- 3.6V overvoltage tolerant I/O's at V_{CC} from 0.9V to 3.6V
- Extremely High Speed t_{PD} :
 - 1.5ns typ. for 2.7V to 3.6V V_{CC}
 - 1.8ns typ. for 2.3V to 2.7V V_{CC}
 - 2.0ns typ. for 1.65V to 1.95V V_{CC}
 - 3.2ns typ. for 1.4V to 1.6V V_{CC}
 - 5.9ns typ. for 1.1V to 1.3V V_{CC}
 - 12.0ns typ. for 0.9V V_{CC}
- Power-off high impedance inputs and outputs
- High static drive (I_{OH}/I_{OL}):
 - $\pm 24\text{mA}$ @ 3.00V V_{CC}
 - $\pm 18\text{mA}$ @ 2.30V V_{CC}
 - $\pm 6\text{mA}$ @ 1.65V V_{CC}
 - $\pm 4\text{mA}$ @ 1.4V V_{CC}
 - $\pm 2\text{mA}$ @ 1.1V V_{CC}
 - $\pm 0.1\text{mA}$ @ 0.9V V_{CC}
- Uses patented Quiet Series™ noise/EMI reduction circuitry
- Ultra small MicroPak™ leadfree package
- Ultra low dynamic power

General Description

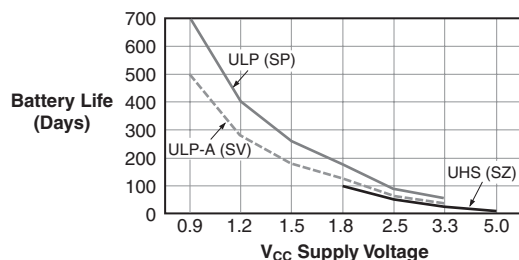
The NC7SV17 is a single buffer with Schmitt trigger input from Fairchild's Ultra Low Power-A (ULP-A) Series of TinyLogic®. ULP-A is ideal for applications that require extreme high-speed, high-drive and low-power. This product is designed for a wide low-voltage operating range (0.9V to 3.6V V_{CC}) and applications that require more drive and speed than the TinyLogic ULP series, but still offer best in class low power operation.

The NC7SV17 is uniquely designed for optimized power and speed, and is fabricated with an advanced CMOS technology to achieve high-speed operation while maintaining low CMOS power dissipation.

Ordering Information

Order Number	Package Number	Product Code Top Mark	Pb-Free	Package Description	Supplied As
NC7SV17P5X	MAA05A	V17	Yes	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel
NC7SV17L6X	MAC06A	G5	Yes	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

Battery Life vs. V_{CC} Supply Voltage



TinyLogic ULP and ULP-A with up to 50% less power consumption can extend your battery life significantly.

$$\text{Battery Life} = (V_{\text{battery}} \cdot I_{\text{battery}} \cdot 0.9) / (P_{\text{device}}) / 24\text{hrs/day}$$

$$\text{Where, } P_{\text{device}} = (I_{CC} \cdot V_{CC}) + (C_{PD} + C_L) \cdot V_{CC}^2 \cdot f$$

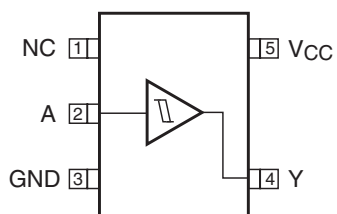
Assumes ideal 3.6V Lithium Ion battery with current rating of 900mAh and derated 90% and device frequency at 10MHz, with $C_L = 15\text{pF}$ load.

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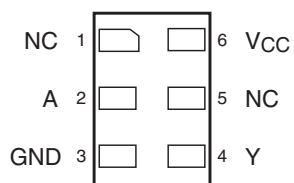
Connection Diagrams

Pin Assignment for SC70



(Top View)

Pad Assignments for MicroPak

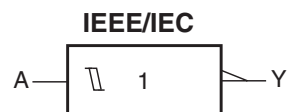


(Top Through View)

Pin Description

Pin Name	Description
A	Input
Y	Output
NC	No Connect

Logic Symbol



Function Table

$$Y = A$$

Input	Output
A	Y
L	L
H	H

H = HIGH Logic Level

L = LOW Logic Level

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 +4.6V
V_{IN}	DC Input Voltage	-0.5V to +4.6V
V_{OUT}	DC Output Voltage HIGH or LOW State ⁽¹⁾ $V_{CC} = 0V$	-0.5V to $V_{CC} + 0.5V$ -0.5V to +4.6V
I_{IK}	DC Input Diode Current @ $V_{IN} < 0V$	±50mA
I_{OK}	DC Output Diode Current $V_{OUT} < 0V$ $V_{OUT} > V_{CC}$	-50mA +50mA
I_{OH}/I_{OL}	DC Output Source/Sink Current	±50mA
I_{CC} or Ground	DC V_{CC} or Ground Current per Supply Pin	±50mA
T_{STG}	Storage Temperature Range	-65°C to +150°C

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	0.9V to 3.6V
V_{IN}	Input Voltage	0V to 3.6V
V_{OUT}	Output Voltage HIGH or LOW State $V_{CC} = 0V$	0V to V_{CC} 0V to 3.6V
I_{OH}/I_{OL}	Output Current in I_{OH}/I_{OL} $V_{CC} = 3.0V$ to 3.6V $V_{CC} = 2.3V$ to 2.7V $V_{CC} = 1.65V$ to 1.95V $V_{CC} = 1.4V$ to 1.6V $V_{CC} = 1.1V$ to 1.3V $V_{CC} = 0.9V$	±24mA ±18mA ±6mA ±4mA ±2mA ±0.1mA
T_A	Free Air Operating Temperature	-40°C to +85°C
$\Delta t/\Delta V$	Minimum Input Edge Rate @ $V_{IN} = 0.8V$ to 2.0V, $V_{CC} = 3.0V$	10ns/V

Notes:

1. I_O Absolute Maximum Rating must be observed.
2. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	Conditions	T _A =				Units
				+25°C		-40°C to +85°C		
				Min.	Max.	Min.	Max.	
V _P	Positive Threshold Voltage	0.90		0.3	0.7	0.3	0.7	V
		1.10		0.4	1.0	0.4	1.0	
		1.40		0.5	1.4	0.5	1.4	
		1.65		0.7	1.5	0.7	1.5	
		2.30		1.0	1.8	1.0	1.8	
		2.70		1.5	2.2	1.5	2.2	
V _N	Negative Threshold Voltage	0.90		0.10	0.6	0.10	0.6	V
		1.10		0.15	0.7	0.15	0.7	
		1.40		0.20	0.8	0.20	0.8	
		1.65		0.25	0.9	0.25	0.9	
		2.30		0.4	1.15	0.4	1.15	
		2.70		0.6	1.5	0.6	1.5	
V _H	Hysteresis Voltage	0.90		0.07	0.5	0.07	0.5	V
		1.10		0.08	0.6	0.08	0.6	
		1.40		0.09	0.8	0.09	0.8	
		1.65		0.15	1.0	0.15	1.0	
		2.30		0.25	1.1	0.25	1.1	
		2.70		0.60	1.2	0.60	1.2	
V _{OH}	HIGH Level Output Voltage	0.90	I _{OH} = -100μA	V _{CC} - 0.1		V _{CC} - 0.1		V
		1.10 ≤ V _{CC} ≤ 1.30		V _{CC} - 0.1		V _{CC} - 0.1		
		1.40 ≤ V _{CC} ≤ 1.60		V _{CC} - 0.2		V _{CC} - 0.2		
		1.65 ≤ V _{CC} ≤ 1.95		V _{CC} - 0.2		V _{CC} - 0.2		
		2.30 ≤ V _{CC} < 2.70		V _{CC} - 0.2		V _{CC} - 0.2		
		2.70 ≤ V _{CC} ≤ 3.60		V _{CC} - 0.2		V _{CC} - 0.2		
		1.10 ≤ V _{CC} ≤ 1.30	I _{OH} = -2mA	0.75 x V _{CC}		0.75 x V _{CC}		
		1.40 ≤ V _{CC} ≤ 1.60	I _{OH} = -4mA	0.75 x V _{CC}		0.75 x V _{CC}		
		1.65 ≤ V _{CC} ≤ 1.95	I _{OH} = -6mA	1.25		1.25		
		2.30 ≤ V _{CC} < 2.70		2.0		2.0		
		2.30 ≤ V _{CC} < 2.70	I _{OH} = -12mA	1.8		1.8		
		2.70 ≤ V _{CC} ≤ 3.60		2.2		2.2		
		2.30 ≤ V _{CC} < 2.70	I _{OH} = -18mA	1.7		1.7		
		2.70 ≤ V _{CC} ≤ 3.60		2.4		2.4		
2.70 ≤ V _{CC} ≤ 3.60	I _{OH} = -24mA	2.2		2.2				

DC Electrical Characteristics (Continued)

Symbol	Parameter	V _{CC} (V)	Conditions	T _A =				Units
				+25°C		-40°C to +85°C		
				Min.	Max.	Min.	Max.	
V _{OL}	LOW Level Output Voltage	0.90	I _{OL} = 100μA		0.1		0.1	V
		1.10 ≤ V _{CC} ≤ 1.30			0.1		0.1	
		1.40 ≤ V _{CC} ≤ 1.60			0.2		0.2	
		1.65 ≤ V _{CC} ≤ 1.95			0.2		0.2	
		2.30 ≤ V _{CC} < 2.70			0.2		0.2	
		2.70 ≤ V _{CC} ≤ 3.60			0.2		0.2	
		1.10 ≤ V _{CC} ≤ 1.30	I _{OL} = 2mA		0.25 x V _{CC}		0.25 x V _{CC}	
		1.40 ≤ V _{CC} ≤ 1.60	I _{OL} = 4mA		0.25 x V _{CC}		0.25 x V _{CC}	
		1.65 ≤ V _{CC} ≤ 1.95	I _{OL} = 6mA		0.3		0.3	
		2.30 ≤ V _{CC} < 2.70	I _{OL} = 12mA		0.4		0.4	
		2.70 ≤ V _{CC} ≤ 3.60			0.4		0.4	
		2.30 ≤ V _{CC} < 2.70	I _{OL} = 18mA		0.6		0.6	
		2.70 ≤ V _{CC} ≤ 3.60			0.4		0.4	
2.70 ≤ V _{CC} ≤ 3.60	I _{OL} = 24mA		0.55		0.55			
I _{IN}	Input Leakage Current	0.90 to 3.60	0 ≤ V _I ≤ 3.6V		±0.1		±0.5	μA
I _{OFF}	Power Off Leakage Current	0	0 ≤ (V _I , V _O) ≤ 3.6V		0.5		0.5	μA
I _{CC}	Quiescent Supply Current	0.90 to 3.60	V _I = V _{CC} or GND		0.9		0.9	μA
			V _{CC} ≤ V _I ≤ 3.6V				±0.9	

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	Conditions	T _A =					Units	Figure Number
				+25°C			-40°C to +85°C			
				Min.	Typ.	Max.	Min.	Max.		
t _{PHL} , t _{PLH}	Propagation Delay	0.90	C _L = 15pF, R _L = 1MΩ		12				ns	Figure 1 Figure 2
		1.10 ≤ V _{CC} ≤ 1.30	C _L = 15pF, R _L = 2kΩ	2.0	5.9	10.0	1.0	14.9		
		1.40 ≤ V _{CC} ≤ 1.60		1.0	3.2	6.1	0.9	7.0		
		1.65 ≤ V _{CC} ≤ 1.95	C _L = 30pF, R _L = 500Ω	1.0	2.0	5.2	0.7	6.2		
		2.30 ≤ V _{CC} < 2.70		0.8	1.8	3.7	0.6	4.4		
		2.70 ≤ V _{CC} ≤ 3.60		0.7	1.5	3.3	0.5	3.8		
C _{IN}	Input Capacitance	0			2.0			pF		
C _{OUT}	Output Capacitance	0			4.5			pF		
C _{PD}	Power Dissipation Capacitance	0.90 to 3.60	V _I = 0V or V _{CC} , f = 10MHz		10			pF		

AC Loading and Waveforms

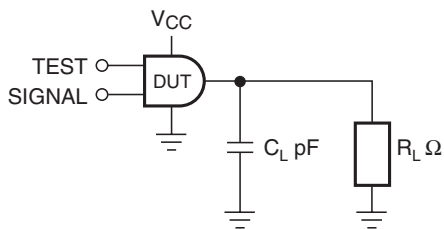


Figure 1. AC Test Circuit

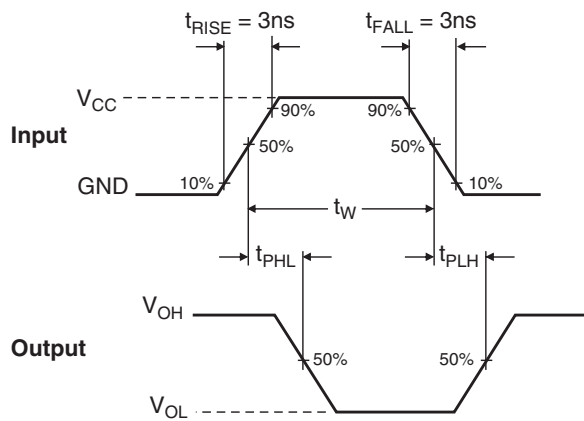


Figure 2. AC Waveforms

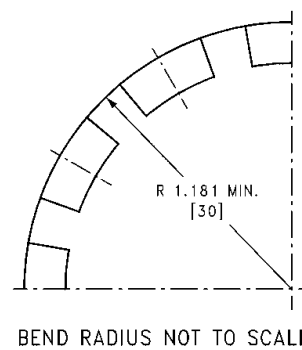
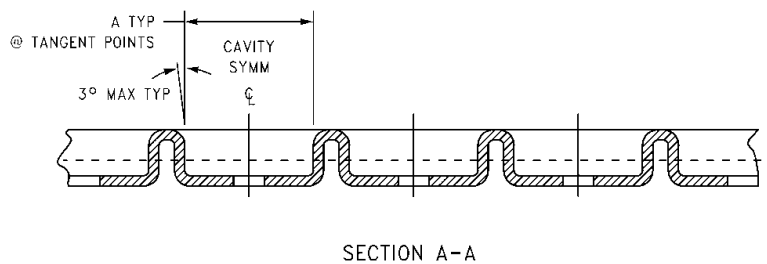
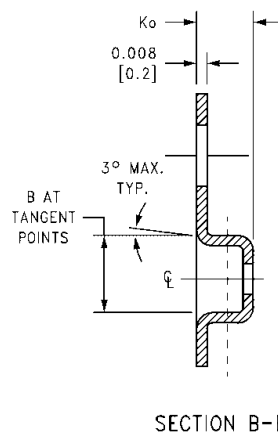
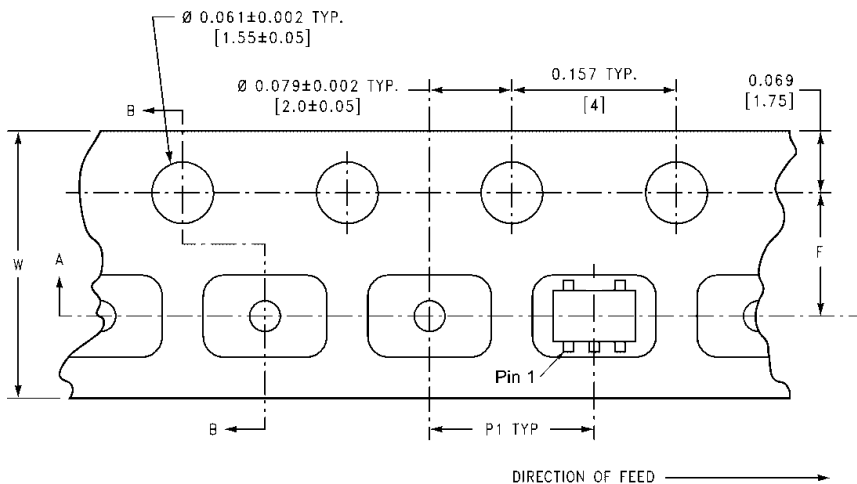
Symbol	V_{CC}					
	$3.3V \pm 0.3V$	$2.5V \pm 0.2V$	$1.8V \pm 0.15V$	$1.5V \pm 0.1V$	$1.2V \pm 0.1V$	$0.9V$
V_{mi}	1.5V	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$
V_{mo}	1.5V	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$	$V_{CC}/2$

Tape and Reel Specification

Tape Format for SC70

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
P5X	Leader (Start End)	125 (typ.)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ.)	Empty	Sealed

Tape Dimension inches (millimeters)

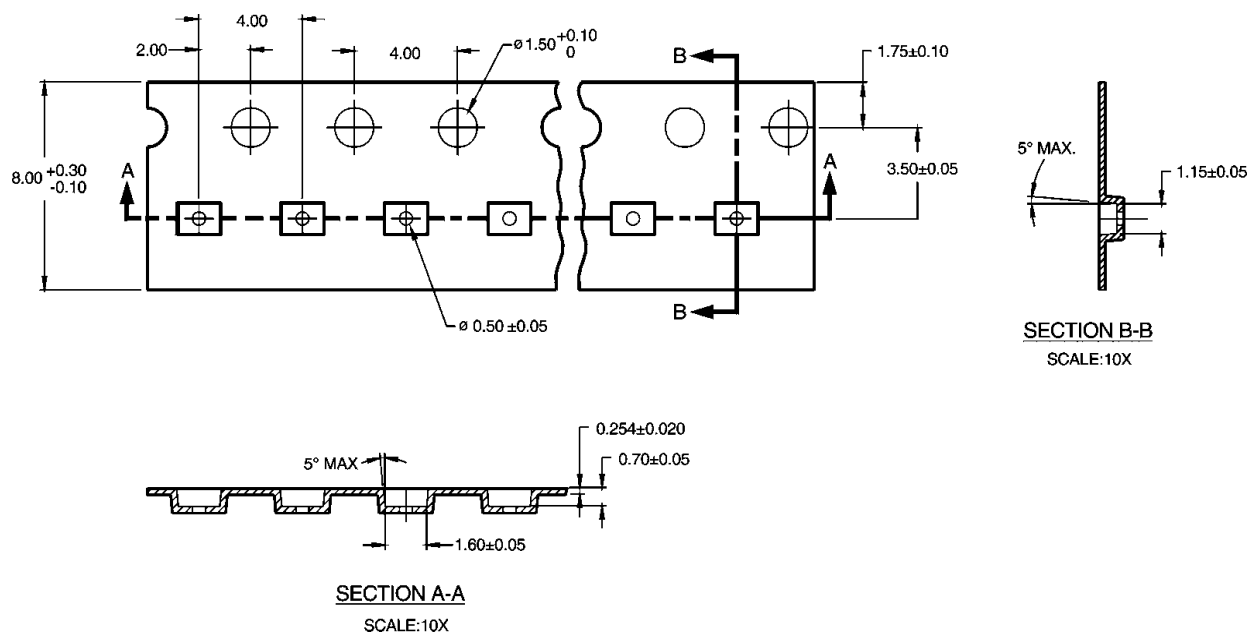


Tape and Reel Specification (Continued)

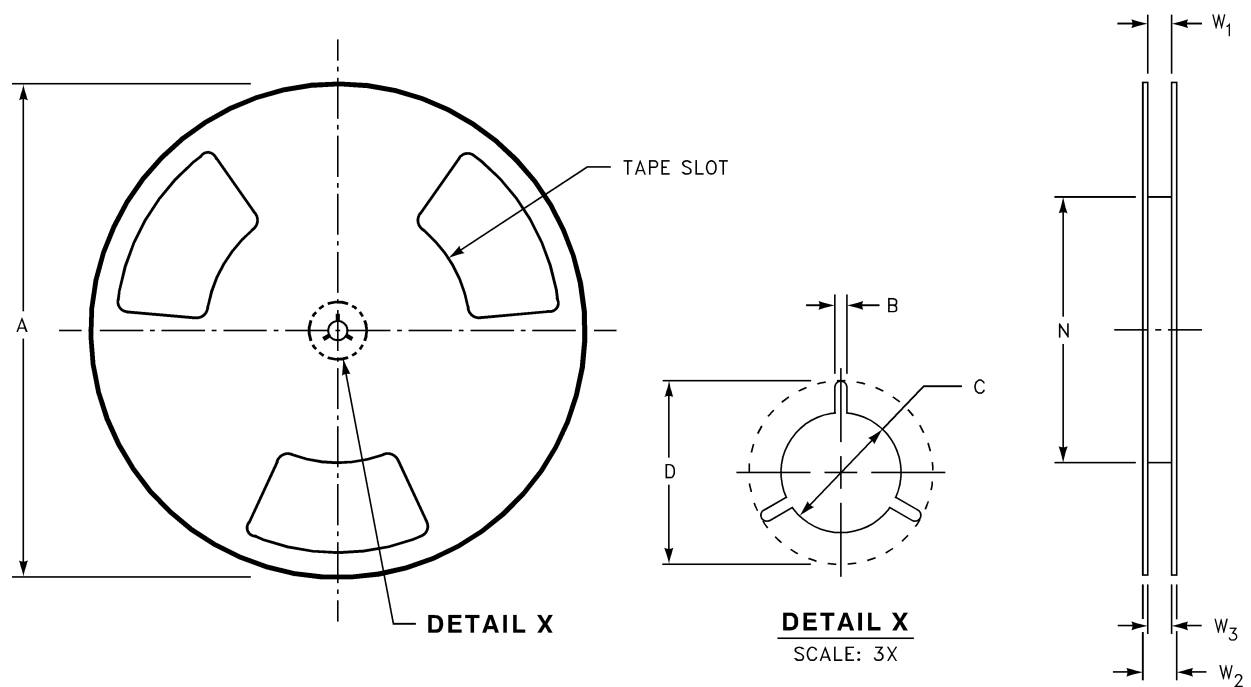
Tape Format for MicroPak

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
L6X	Leader (Start End)	125 (typ.)	Empty	Sealed
	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (typ.)	Empty	Sealed

Tape Dimension millimeters

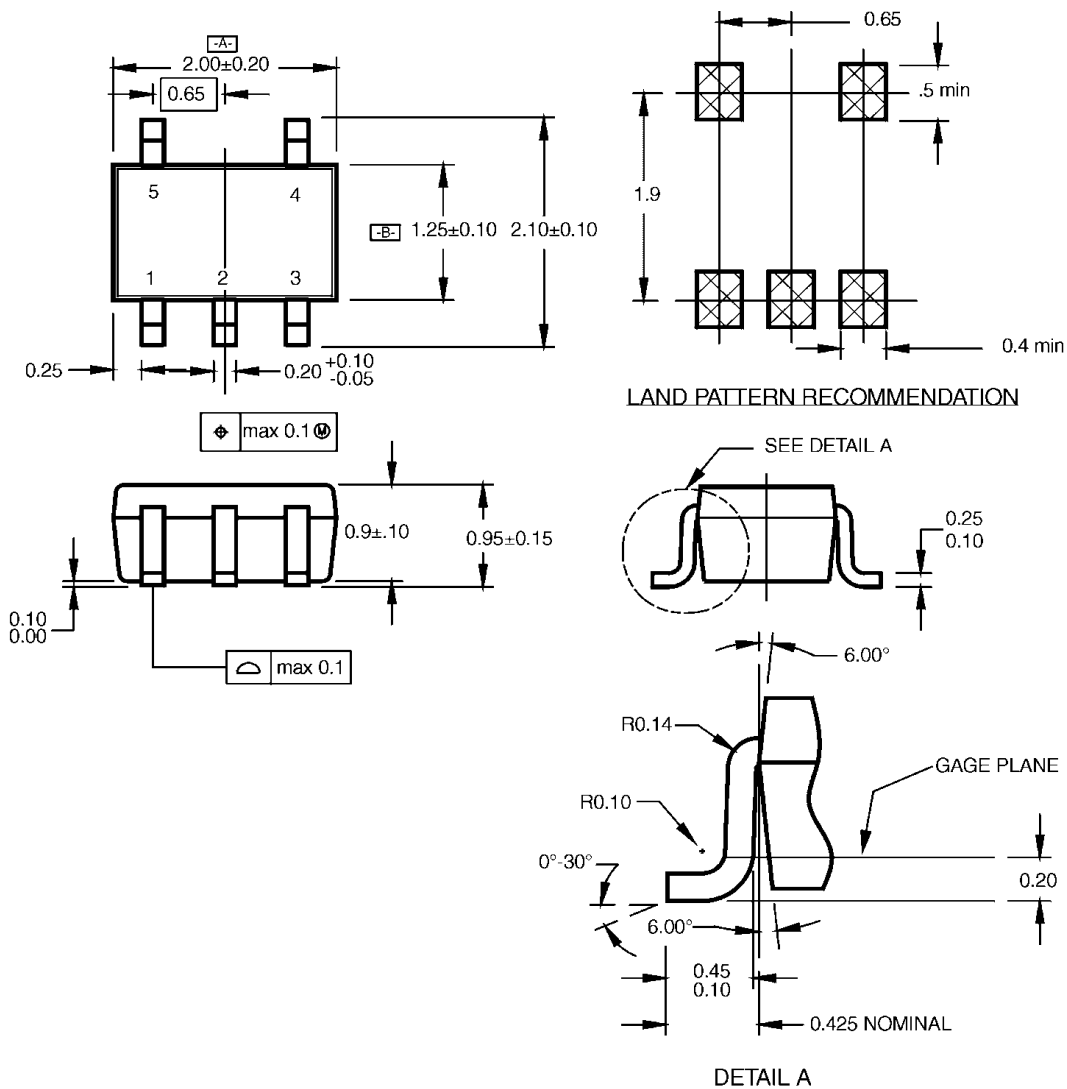


Tape and Reel Specification (Continued)
Reel Dimension for MicroPak inches (millimeters)



Tape Size	A	B	C	D	N	W ₁	W ₂	W ₃
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 millimeters unless otherwise noted



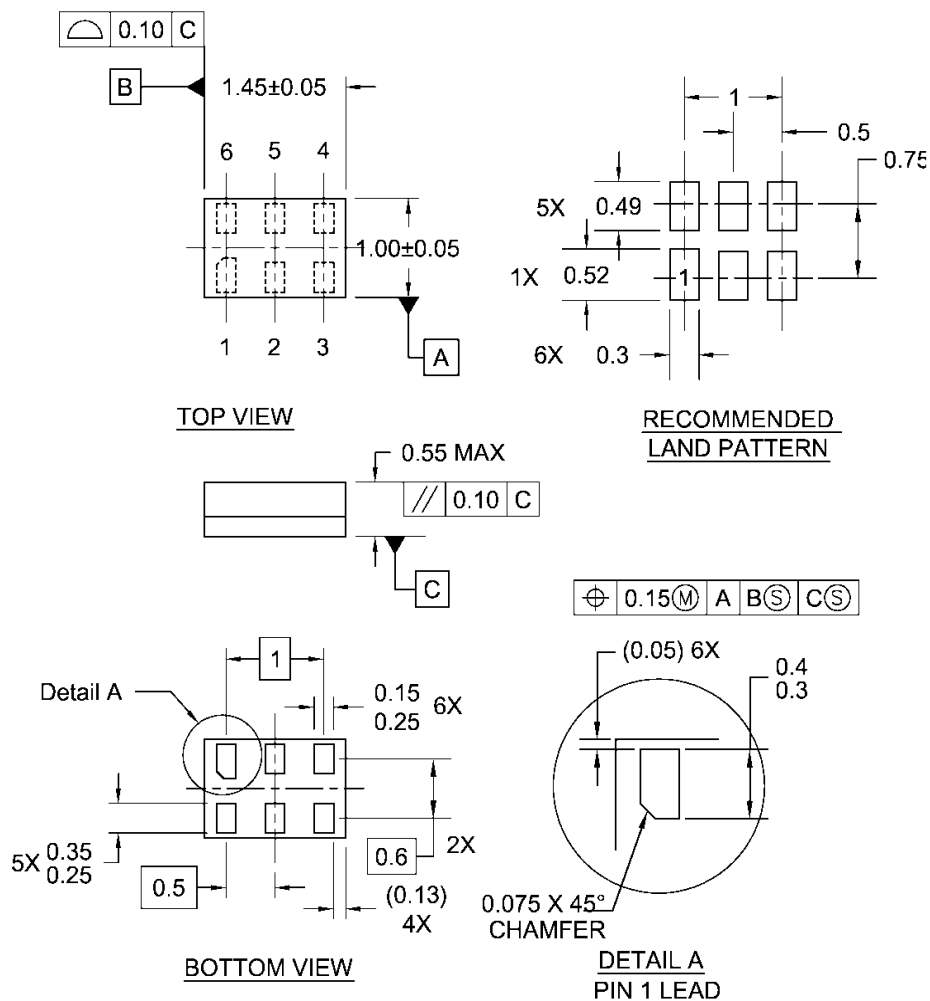
NOTES:

- A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88A.
- B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- C. DIMENSIONS ARE IN MILLIMETERS.

MAA05ARevC

**5-Lead SC70, EIAJ SC-88a, 1.25mm Wide
Package Number MAA05A**

Physical Dimensions 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 8-Lead MicroPak, 1.6 mm Wide
Package Number MAC06A**



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FastvCore™	 ®	SuperFET™	UniFET™
FPS™	PDP-SPM™	SuperSOT™-3	VCX™
FRFET®	Power220®	SuperSOT™-6	
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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.

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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; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
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