

## NC7WZ16 TinyLogic™ UHS Dual Buffer

### General Description

The NC7WZ16 is a dual buffer from Fairchild's Ultra High Speed Series of TinyLogic™ in the space saving 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 1.8V 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.

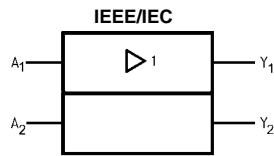
### Features

- Space saving SC70 6-lead package
- Ultra High Speed:  $t_{PD}$  2.4 ns Typ into 50 pF at 5V  $V_{CC}$
- High Output Drive:  $\pm 24$  mA at 3V  $V_{CC}$
- Broad  $V_{CC}$  Operating Range: 1.8V 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

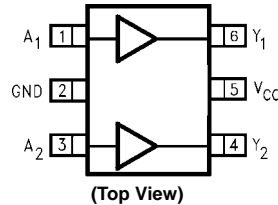
### Ordering Code:

Order Number	Package Number	Package Top Mark	Package Description	Supplied As
NC7WZ16P6	MAA06A	Z16	6-Lead SC70, EIAJ SC88, 1.25mm Wide	250 Units on Tape and Reel
NC7WZ16P6X	MAA06A	Z16	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel

### Logic Symbol



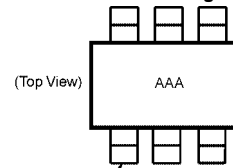
### Connection Diagrams



### Pin Descriptions

Pin Names	Description
A <sub>1</sub> , A <sub>2</sub>	Data Inputs
Y <sub>1</sub> , Y <sub>2</sub>	Output

### Pin One Orientation Diagram



Pin One

AAA represents Package Top Mark - see ordering code

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

### Function Table

$Y = A$

Input	Output
A	Y
L	L
H	H

H = HIGH Logic Level  
L = LOW Logic Level

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### Absolute Maximum Ratings (Note 1)

Supply Voltage ( $V_{CC}$ )	-0.5V to +7.0V
DC Input Voltage ( $V_{IN}$ )	-0.5V to +7.0V
DC Output Voltage ( $V_{OUT}$ )	-0.5V to +7.0V
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 ( $I_{OUT}$ )	$\pm 50$ mA
DC $V_{CC}/GND$ Current ( $I_{CC}/I_{GND}$ )	$\pm 100$ mA
Storage Temperature ( $T_{STG}$ )	-65°C to +150°C
Junction Temperature under Bias ( $T_J$ )	150°C
Junction Lead Temperature ( $T_L$ )	
(Soldering, 10 seconds)	260°C
Power Dissipation ( $P_D$ ) @ +85°C	180 mW

### Recommended Operating Conditions (Note 2)

Supply Voltage	
Operating ( $V_{CC}$ )	1.8V to 5.5V
Data Retention	1.5V to 5.5V
Input Voltage ( $V_{IN}$ )	0V to 5.5V
Output Voltage ( $V_{OUT}$ )	0V to $V_{CC}$
Input Rise and Fall Time ( $t_r, t_f$ )	
$V_{CC} = 1.8V, 2.5V \pm 0.2V$	0 to 20 ns/V
$V_{CC} = 3.3V \pm 0.3V$	0 to 10 ns/V
$V_{CC} = 5.5V \pm 0.5V$	0 to 5 ns/V
Operating Temperature ( $T_A$ )	-40°C to +85°C
Thermal Resistance ( $\theta_{JA}$ )	350°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:** Unused inputs must be held HIGH or LOW. They may not float.

### DC Electrical Characteristics

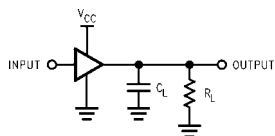
Symbol	Parameter	$V_{CC}$ (V)	$T_A = +25^\circ C$			$T_A = -40^\circ C$ to $+85^\circ C$		Units	Conditions	
			Min	Typ	Max	Min	Max			
$V_{IH}$	HIGH Level Control Input Voltage	1.8	0.75 $V_{CC}$			0.75 $V_{CC}$		V		
		2.3 to 5.5	0.7 $V_{CC}$			0.7 $V_{CC}$				
$V_{IL}$	LOW Level Control Input Voltage	1.8	0.25 $V_{CC}$			0.25 $V_{CC}$		V		
		2.3 to 5.5	0.3 $V_{CC}$			0.3 $V_{CC}$				
$V_{OH}$	HIGH Level Control Output Voltage	1.8	1.7	1.8	1.7		V	$V_{IN} = V_{IH}$	$I_{OH} = -100 \mu A$	
		2.3	2.2	2.3	2.2					
		3.0	2.9	3.0	2.9					
		4.5	4.4	4.5	4.4				$I_{OH} = -8 \text{ mA}$ $I_{OH} = -16 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -32 \text{ mA}$	
		2.3	1.9	2.14	1.9					
		3.0	2.4	2.75	2.4					
		3.0	2.3	2.62	2.3					
4.5	3.8	4.13	3.8							
$V_{OL}$	LOW Level Control Output Voltage	1.8	0.0			0.1		V	$V_{IN} = V_{IL}$	$I_{OL} = 100 \mu A$
		2.3	0.0			0.1				
		3.0	0.0			0.1				
		4.5	0.0			0.1				$I_{OL} = 8 \text{ mA}$ $I_{OL} = 16 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 32 \text{ mA}$
		2.3	0.10		0.3	0.3				
		3.0	0.16		0.4	0.4				
		3.0	0.24		0.55	0.55				
4.5	0.25		0.55	0.55						
$I_{IN}$	Input Leakage Current	0 to 5.5				$\pm 0.1$		$\mu A$	$0 \leq V_{IN} \leq 5.5V$	
$I_{OFF}$	Power Off Leakage Current	0.0				1.0		$\mu A$	$V_{IN}$ or $V_{OUT} = 5.5V$	
$I_{CC}$	Quiescent Supply Current	1.8 to 5.5				1.0		$\mu A$	$V_{IN} = 5.5V, GND$	

## AC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub> (V)	T <sub>A</sub> = +25°C			T <sub>A</sub> = -40°C to +85°C		Units	Conditions	Fig. No.
			Min	Typ	Max	Min	Max			
t <sub>PLH</sub>	Propagation Delay	1.8	1.8	4.6	8.0	1.8	8.8	ns	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 1 MΩ	Figure 1
t <sub>PHL</sub>		2.5 ± 0.2	1.0	3.0	5.2	1.0	5.8			
		3.3 ± 0.3	0.8	2.3	3.6	0.8	4.0			
		5.0 ± 0.5	0.5	1.8	2.9	0.5	3.2			
t <sub>PLH</sub>	Propagation Delay	3.3 ± 0.3	1.2	3.0	4.6	1.2	5.1	ns	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500Ω	Figure 1 Figure 3
t <sub>PHL</sub>		5.0 ± 0.5	0.8	2.4	3.8	0.8	4.2			
C <sub>IN</sub>	Input Capacitance	0	2.5					pF		
C <sub>PD</sub>	Power Dissipation	3.3	10					pF	(Note 3)	Figure 2
	Capacitance	5.0	12							

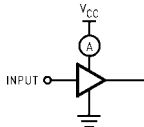
**Note 3:** C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 2.) C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating current by the expression:  
 $I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + I_{CCstatic}$ .

## AC Loading and Waveforms



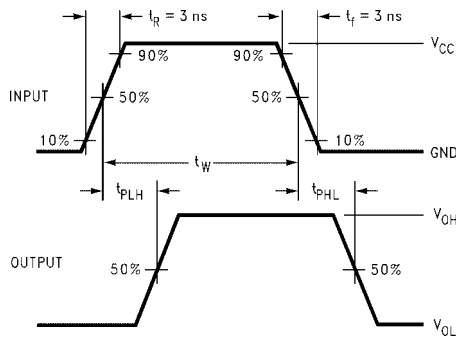
C<sub>L</sub> includes load and stray capacitance  
 Input PRR = 1.0 MHz; t<sub>W</sub> = 500 ns

**FIGURE 1. AC Test Circuit**



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

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



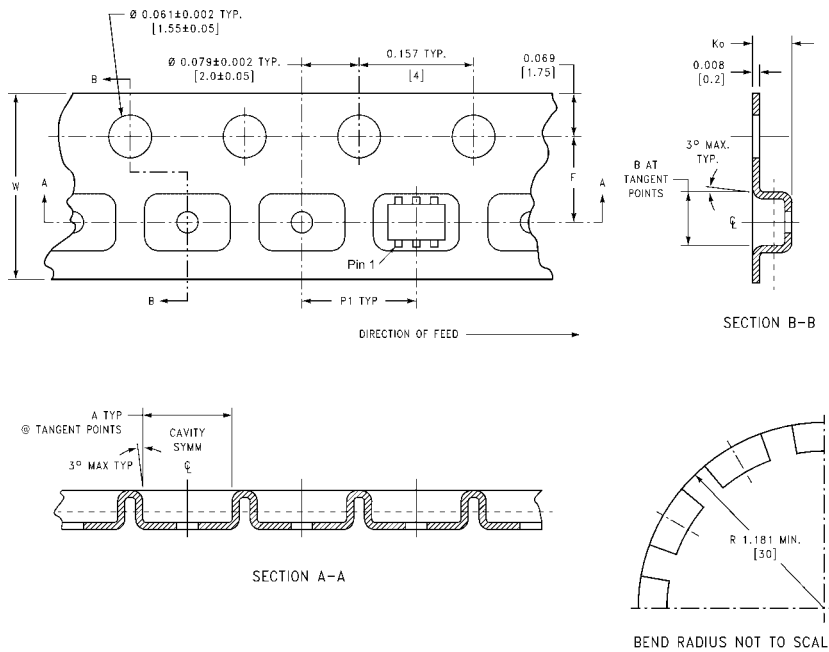
**FIGURE 3. AC Waveforms**

## Tape and Reel Specification

### TAPE FORMAT

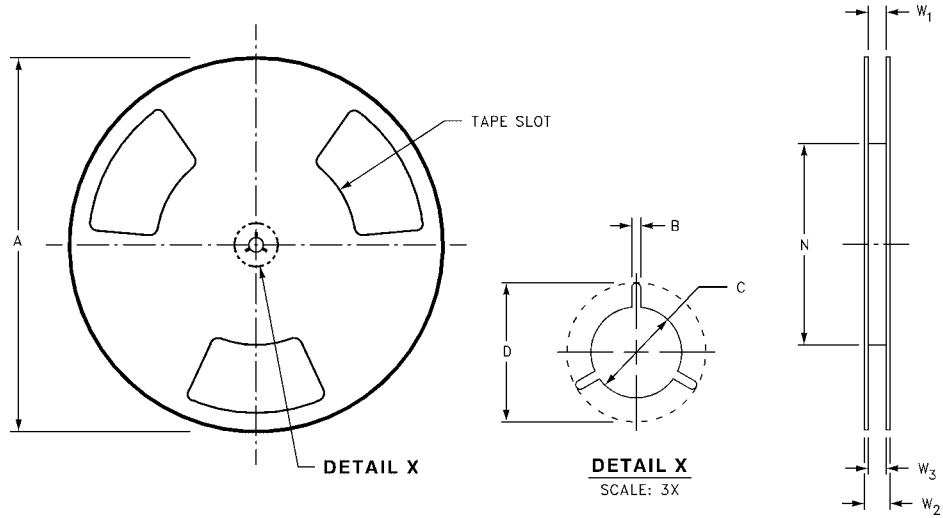
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
P6	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	250	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed
P6X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

### TAPE DIMENSIONS inches (millimeters)



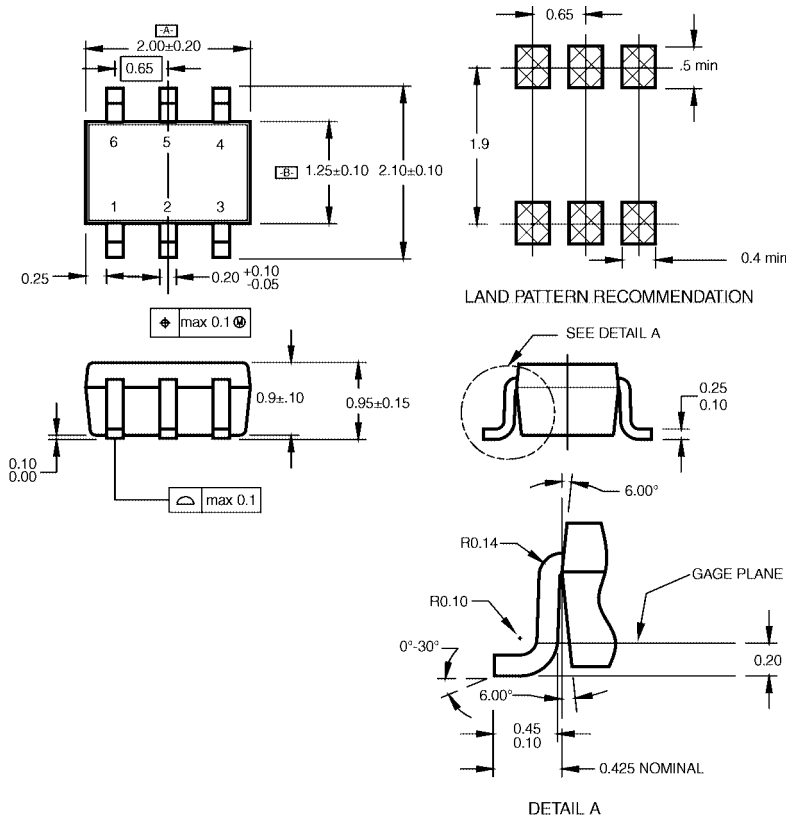
Package	Tape Size	DIM A	DIM B	DIM F	DIM K <sub>0</sub>	DIM P <sub>1</sub>	DIM W
SC70-6	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)

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



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**

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