

## NC7WZ14

# TinyLogic™ UHS Dual Inverter with Schmitt Trigger Inputs

### General Description

The NC7WZ14 is a dual inverter with Schmitt trigger input 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. Schmitt trigger inputs achieve typically 1V hysteresis between the positive-going and negative-going input threshold voltage at 5V  $V_{CC}$ .

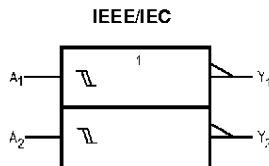
### Features

- Space saving SC70 6-lead package
- Ultra High Speed:  $t_{PD}$  3.2 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

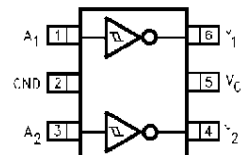
### Ordering Code:

Order Number	Package Number	Package Top Mark	Package Description	Supplied As
NC7WZ14P6	MAA06A	Z14	6-Lead SC70, EIAJ SC88, 1.25mm Wide	250 Units on Tape and Reel
NC7WZ14P6X	MAA06A	Z14	6-Lead SC70, EIAJ SC88, 1.25mm Wide	3k Units on Tape and Reel

### Logic Symbol

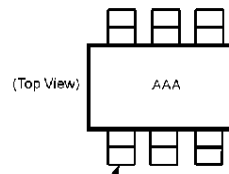


### Connection Diagrams



(Top View)

### 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)

### Pin Descriptions

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

### Function Table

$Y = \bar{A}$	
Input	Output
A	Y
L	H
H	L

H = HIGH Logic Level  
L = LOW Logic Level

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Absolute Maximum Ratings (Note 1)		Recommended Operating Conditions	
Supply Voltage ( $V_{CC}$ )	-0.5V to +7V	Supply Voltage Operating ( $V_{CC}$ )	1.8V to 5.5V
DC Input Voltage ( $V_{IN}$ )	-0.5V to +7V	Supply Voltage Data Retention ( $V_{CC}$ )	1.5V to 5.5V
DC Output Voltage ( $V_{OUT}$ )	-0.5V to +7V	Input Voltage ( $V_{IN}$ )	0V to 5.5V
DC Input Diode Current ( $I_{IK}$ )		Output Voltage ( $V_{OUT}$ )	0V to $V_{CC}$
@ $V_{IN} < -0.5V$	-50 mA	Operating Temperature ( $T_A$ )	-40°C to +85°C
DC Output Diode Current ( $I_{OK}$ )		Thermal Resistance ( $\theta_{JA}$ )	350°C/W
@ $V_{OUT} < -0.5V$	-50 mA		
DC Output Current ( $I_{OUT}$ )	$\pm 100$ mA		
DC $V_{CC}/GND$ Current ( $I_{CC}/I_{GND}$ )	$\pm 50$ 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		

**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.

**DC Electrical Characteristics**

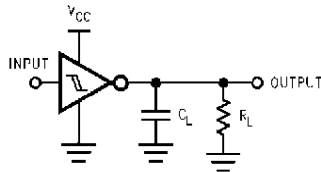
Symbol	Parameter	$V_{CC}$ (V)	$T_A = +25^\circ C$			$T_A = -40^\circ C$ to $+85^\circ C$		Units	Conditions		
			Min	Typ	Max	Min	Max				
$V_P$	Positive Threshold Voltage	1.8	0.7		1.5	0.7	1.5	V			
		2.3	1.0		1.8	1.0	1.8				
		3.0	1.3		2.2	1.3	2.2				
		4.5	1.9		3.1	1.9	3.1				
		5.5	2.2		3.6	2.2	3.6				
$V_N$	Negative Threshold Voltage	1.8	0.25	0.56	0.9	0.25	0.9	V			
		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				
$V_H$	Hysteresis Voltage	1.8	0.15	0.51	1.0	0.15	1.0	V			
		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	1.8	1.7	1.8		1.7		V	$V_{IN} = V_{IL}$	$I_{OH} = -100 \mu A$	
		2.3	2.2	2.3		2.2					
		3.0	2.9	3.0		2.9					
		4.5	4.4	4.5		4.4					
		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					
											$I_{OH} = -8 \text{ mA}$
											$I_{OH} = -16 \text{ mA}$
								$I_{OH} = -24 \text{ mA}$			
								$I_{OH} = -32 \text{ mA}$			
$V_{OL}$	LOW Level Output Voltage	1.8		0.0	0.1		0.1	V	$V_{IN} = V_{IH}$	$I_{OL} = 100 \mu A$	
		2.3		0.0	0.1		0.1				
		3.0		0.0	0.1		0.1				
		4.5		0.0	0.1		0.1				
		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				
											$I_{OL} = 8 \text{ mA}$
											$I_{OL} = 16 \text{ mA}$
								$I_{OL} = 24 \text{ mA}$			
								$I_{OL} = 32 \text{ mA}$			
$I_{IN}$	Input Leakage Current	0 to 5.5			$\pm 1$		$\pm 10$	$\mu A$	$V_{IN} = 5.5V, GND$		
$I_{OFF}$	Power Off Leakage Current	0.0			1		10	$\mu A$	$V_{IN}$ or $V_{OUT} = 5.5V$		
$I_{CC}$	Quiescent Supply Current	1.8 to 5.5			1.0		10	$\mu A$	$V_{IN} = 5.5V, GND$		

## 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	2.5	6.3	10.9	2.5	12	ns	C <sub>L</sub> = 15 pF, R <sub>L</sub> = 1 MΩ	Figure 1
t <sub>PHL</sub>		2.5 ± 0.2	1.8	4.3	7.4	1.8	8.1			Figure 3
		3.3 ± 0.3	1.5	3.3	5.0	1.5	5.5			
t <sub>PLH</sub>	Propagation Delay	3.3 ± 0.3	1.8	4.0	6.0	1.8	6.6	ns	C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500Ω	Figure 1
t <sub>PHL</sub>		5.0 ± 0.5	1.2	3.2	4.9	1.2	5.4			Figure 3
C <sub>IN</sub>	Input Capacitance	0	2.5					pF		
C <sub>PD</sub>	Power Dissipation	3.3	11						(Note 2)	Figure 2
	Capacitance	5.0	12.5					pF		

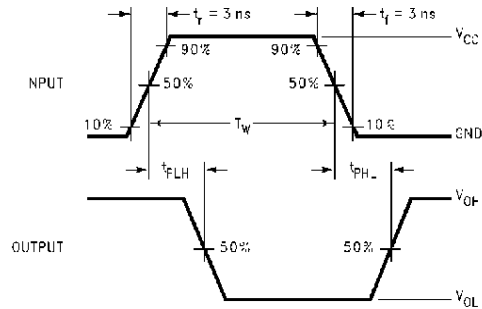
**Note 2:** C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 2.) C<sub>PD</sub> is related to I<sub>CCD</sub> dynamic operating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

## AC Loading and Waveforms

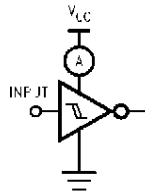


C<sub>L</sub> includes load and stray capacitance  
Input PRR = 1.0 MHz, t<sub>w</sub> = 500 ns

**FIGURE 1. AC Test Circuit**



**FIGURE 3. AC Waveforms**



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

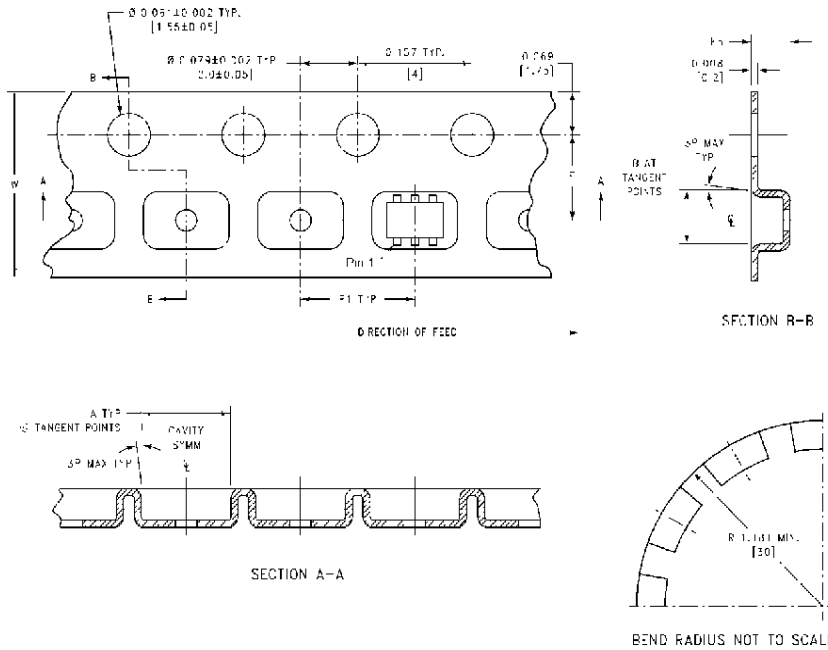
**FIGURE 2. I<sub>CCD</sub> Test Circuit**

### Tape and Reel Specification

TAPE FORMAT

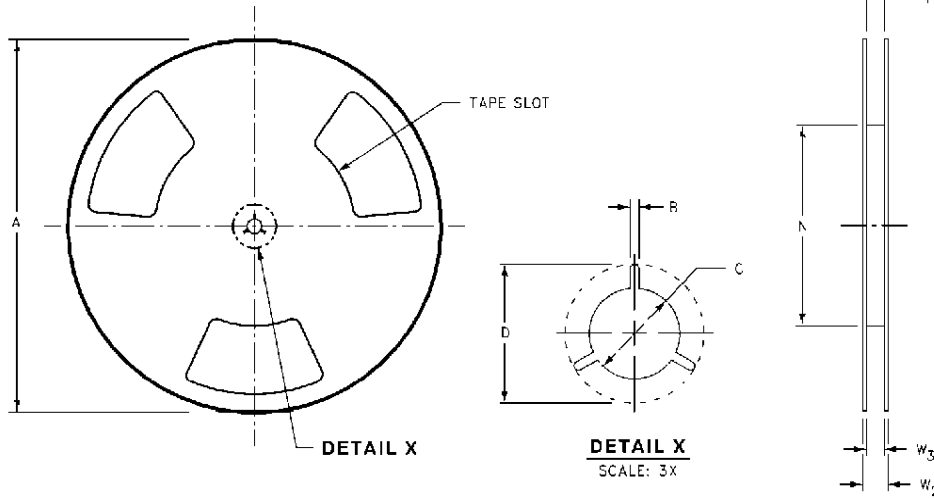
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
P6	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	250	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed
P6X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty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

TAPE DIMENSIONS inches (millimeters)



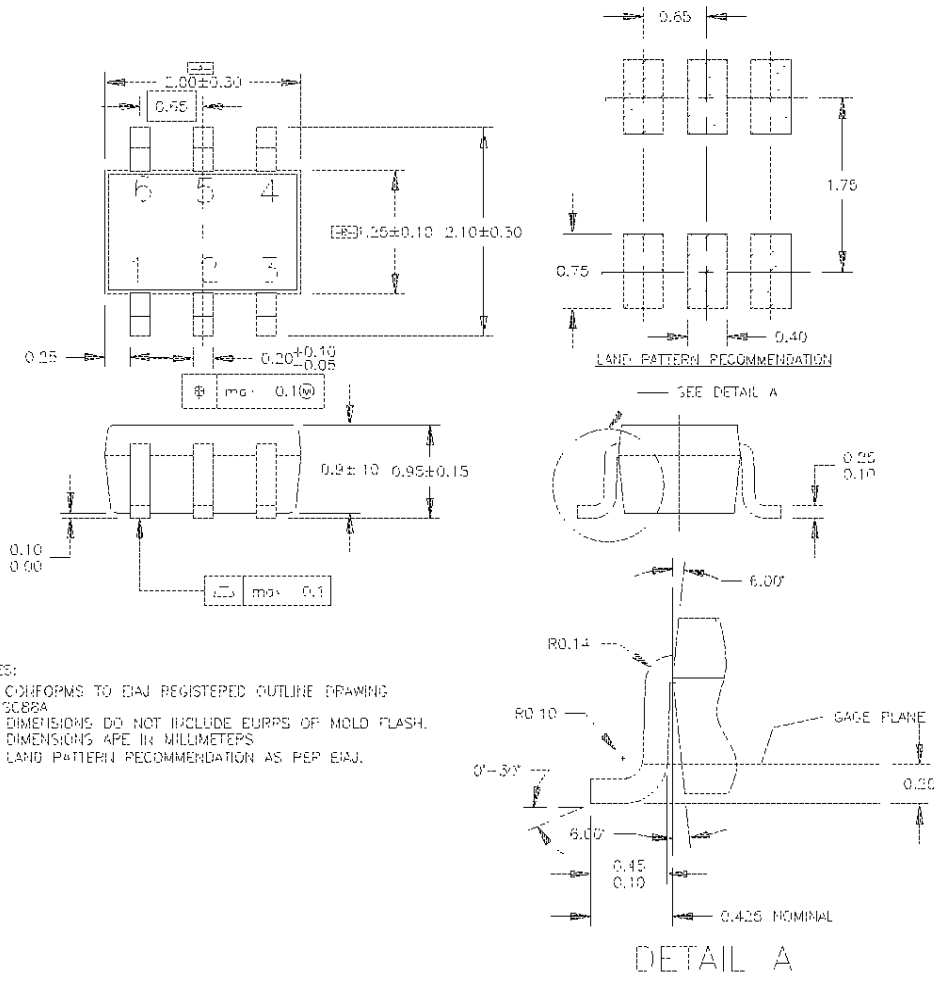
Package	Tape Size	DIM A	DIM B	DIM F	DIM K <sub>0</sub>	DIM P1	DIM W
SC70-6	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)

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 SC88A
  - B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
  - C. DIMENSIONS ARE IN MILLIMETERS
  - D. LAND PATTERN RECOMMENDATION AS PER EIAJ.

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

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