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January 2012

# NC7WZ17 TinyLogic<sup>®</sup> UHS Dual Buffer with Schmitt Trigger Inputs

### **Features**

- Ultra-High Speed: t<sub>PD</sub> 3.6ns (Typical) into 50pF at 5V V<sub>CC</sub>
- High Output Drive: ±24mA at 3V V<sub>CC</sub>
- Broad V<sub>CC</sub> Operating Range: 1.65V to 5.5V
- Matches Performance of LCX when Operated at 3.3V V<sub>CC</sub>
- Power Down High Impedance Inputs/Outputs
- Over-Voltage Tolerance Inputs Facilitate 5V to 3V Translation
- Proprietary Noise/EMI Reduction Circuitry
- Ultra-Small MicroPak™ Packages
- Space-Saving SC70 Package

# **Description**

The NC7WZ17 is a dual buffer with Schmitt trigger inputs from Fairchild's Ultra-High Speed (UHS) series of TinyLogic® products. 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  $V_{\rm CC}$  operating range. The device is specified to operate over the 1.65V to 5.5V  $V_{\rm CC}$  range. The inputs and outputs are high-impedance when  $V_{\rm CC}$  is 0V. Inputs tolerate voltages up to 7V, independent of  $V_{\rm CC}$  operating voltage. Schmitt trigger inputs achieve 1V typical hysteresis between the positive- and negative-going input threshold voltage at 5V.

# **Ordering Information**

Part Number	Operating Temperature	Top Mark	Package	Packing Method
NC7WZ17P6X	-40 to +85°C	Z17	6-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3000 Units on Tape & Reel
NC7WZ17L6X	-40 to +85°C	A5	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7WZ17FHX	-40 to +85°C	A5	6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel

# **Connection Diagrams**

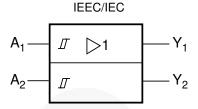
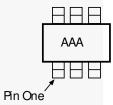


Figure 1. Logic Symbol

# **Pin Configurations**





### Notes:

- 1. AAA represents Product Code Top Mark (see ordering code).
- 2. Orientation of Top Mark determines Pin One location. Read the top product code mark left to right. Pin One is the lower left pin.

Figure 4. SC70 Pin 1 Orientation

## **Pin Definitions**

Pin # SC70	Pin # MicroPak	Name	Description
1	1	A <sub>1</sub>	Input
2	2	GND	Ground
3	3	$A_2$	Input
4	4	Y <sub>2</sub>	Output
5	5	V <sub>CC</sub>	Supply Voltage
6	6	Y <sub>1</sub>	Output

### **Function Table**

Y = A

Inputs	Output
Α	Υ
L	L
Н	Н

H = HIGH 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	Par	ameter	Min.	Max.	Unit
V <sub>CC</sub>	Supply Voltage		-0.5	7.0	V
V <sub>IN</sub>	DC Input Voltage		-0.5	7.0	V
$V_{OUT}$	DC Output Voltage		-0.5	7.0	V
I <sub>IK</sub>	DC Input Diode Current	V <sub>IN</sub> < -0.5V		-50	mA
I <sub>OK</sub>	DC Output Diode Current	V <sub>OUT</sub> < -0.5V		-50	mA
I <sub>OUT</sub>	DC Output Current			±50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current			±100	mA
T <sub>STG</sub>	Storage Temperature Range		-65	+150	°C
$T_J$	Junction Temperature Under E	Bias		+150	°C
TL	Junction Lead Temperature (S	Soldering, 10 Seconds)		+260	°C
		SC70-6		180	
$P_D$	Power Dissipation at 85°C	MicroPak-6		130	mW
		MicroPak2-6		120	
ESD	Human Body Model, JEDEC:J		4000	V	
EOD	Charge Device Model, JEDEC	:JESD22-C101		2000	V

# Recommended Operating Conditions<sup>(3)</sup>

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	Conditions	Min.	Max.	Unit
V	Supply Voltage Operating		1.65	5.50	V
$V_{CC}$	Supply Voltage Data Retention		1.5	5.5	\ \
V <sub>IN</sub>	Input Voltage		0	5.5	V
V <sub>OUT</sub>	Output Voltage		0	V <sub>CC</sub>	V
T <sub>A</sub>	Operating Temperature		-40	+85	°C
		SC70-6		350	
$\theta_{JA}$	Thermal Resistance	MicroPak-6		500	°C/W
		MicroPak2-6		560	$\mathcal{L}$

### Note:

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

# **DC Electrical Characteristics**

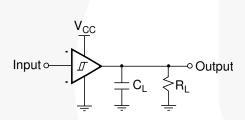
0	Danamatan	V 00	O a maliti a ma		T <sub>A</sub> =25°C	)	T <sub>A</sub> =-40	to 85°C	11
Symbol	Parameter	V <sub>CC</sub> (V) Conditions	Min.	Тур.	Max.	Min.	Max.	Units	
		1.65		0.60	1.00	1.40	0.60	1.40	
		1.80		0.70	1.07	1.50	0.70	1.50	
	Positive Threshold	2.30		1.00	1.38	1.80	1.00	1.80	
$V_P$	Voltage	3.00		1.30	1.74	2.20	1.30	2.20	V
		4.50		1.90	2.43	3.10	1.90	3.10	
		5.50		2.20	2.88	3.60	2.20	3.60	
		1.65		0.20	0.50	0.80	0.20	0.80	
		1.80		0.25	0.56	0.90	0.25	0.90	
V	Negative Threshold	2.30		0.40	0.75	1.15	0.40	1.15	
$V_N$	Voltage	3.00		0.60	0.98	1.50	0.60	1.50	V
		4.50		1.00	1.42	2.00	1.00	2.00	
		5.50		1.20	1.68	2.30	1.20	2.30	1
		1.65		0.10	0.48	0.90	0.10	0.90	
		1.80		0.15	0.51	1.00	0.15	1.00	1
V	I hasta gas is Malta a	2.30		0.25	0.62	1.10	0.25	1.10	.,
$V_H$	Hysteresis Voltage	3.00		0.40	0.76	1.20	0.40	1.20	- V -
		4.50		0.60	1.01	1.50	0.60	1.50	
		5.50		0.70	1.20	1.70	0.70	1.70	
		1.65		1.55	1.65		1.55		
		1.80	V <sub>IN</sub> =V <sub>IH</sub> , I <sub>OH</sub> =-100μA	1.70	1.80		1.70		
		2.30		2.20	2.30		2.20		
		3.00	- 10η- 100μΑ	2.90	3.00		2.90		
.,	HIGH Level Output	4.50		4.40	4.50		4.40		V
$V_{OH}$	Voltage	1.65	I <sub>OH</sub> =-4mA	1.29	1.52		1.29		
		2.30	I <sub>OH</sub> =-8mA	1.90	2.14		1.90		
		3.00	I <sub>OH</sub> =-16mA	2.40	2.75		2.40		
		3.00	I <sub>OH</sub> =-24mA	2.30	2.62		2.30		
		4.50	I <sub>OH</sub> =-32mA	3.80	4.13	- /	3.80		
		1.65			0.00	0.10		0.10	
		1.80	]		0.00	0.10		0.10	1
		2.30	$V_{IN}=V_{IL}$ , $I_{OL}=100\mu A$		0.00	0.10		0.10	
		3.00	]		0.00	0.10		0.10	1
V	LOW Level Output	4.50			0.00	0.10		0.10	.,
$V_{OL}$	Voltage	1.65	I <sub>OL</sub> =4mA		0.08	0.24		0.24	V
		2.30	I <sub>OL</sub> =8mA		0.10	0.30		0.30	2)
		3.00	I <sub>OL</sub> =16mA		0.16	0.40		0.40	
		3.00	I <sub>OL</sub> =24mA		0.24	0.55		0.55	
		4.50	I <sub>OL</sub> =32mA		0.25	0.55		0.55	
I <sub>IN</sub>	Input Leakage Current	0 to 5.5	V <sub>IN</sub> =5.5V, GND			±0.1		±1.0	μΑ
I <sub>OFF</sub>	Power Off Leakage Current	0	V <sub>IN</sub> or V <sub>OUT</sub> =5.5V			1		10	μΑ
Icc	Quiescent Supply Current	1.65 to 5.50	V <sub>IN</sub> =5.5V, GND			1		10	μΑ

## **AC Electrical Characteristics**

Symbol Parameter		V <sub>cc</sub> (V)	Conditions	T <sub>A</sub> =25°C		T <sub>A</sub> =-40 to 85°C		Units	Figure	
				Min.	Тур.	Max.	Min.	Max.		_
		1.65		2.0	8.3	14.3	2.0	15.8		
		1.80	0 15 5	2.0	6.9	11.9	2.0	13.1	ns	Figure 5 Figure 6
		2.50 ± 0.20	$C_L$ =15pF, $R_L$ =1MΩ	1.5	4.8	8.2	1.5	9.0		
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay	3.30 ± 0.30		1.0	3.7	5.6	1.0	6.2		
		5.00 ± 0.50		0.8	3.0	4.7	8.0	5.2		
		3.30 ± 0.30	C <sub>L</sub> =50pF,	1.5	4.3	6.6	1.5	7.3		
		5.00 ± 0.50	$R_L=500\Omega$	1.0	3.6	5.6	1.0	6.2		
C <sub>IN</sub>	Input Capacitance	0.00			2.5				pF	
	Power Dissipation	3.30			10.0				nE	Figure 7
$C_{PD}$	Capacitance <sup>(4)</sup>	5.00			12.0				pF	Figure 7

#### Note:

4.  $C_{PD}$  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.  $C_{PD}$  is related to  $I_{CCD}$  dynamic operating current by the expression:  $I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CCStatic})$ .



### Note:

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

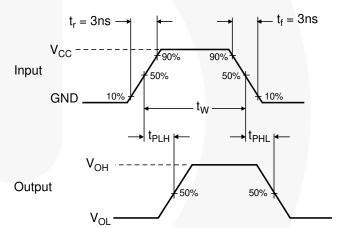
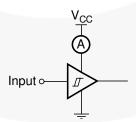


Figure 6. AC Waveforms





#### Note

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

Figure 7. I<sub>CCD</sub> Test Circuit

# **Physical Dimensions**

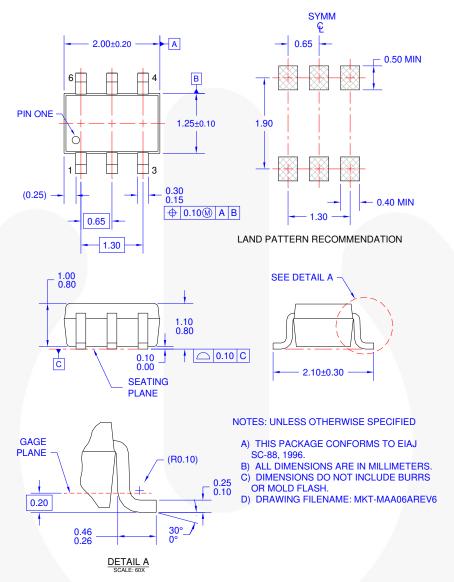


Figure 8. 6-Lead, SC70, EIAJ SC-88a, 1.25mm Wide

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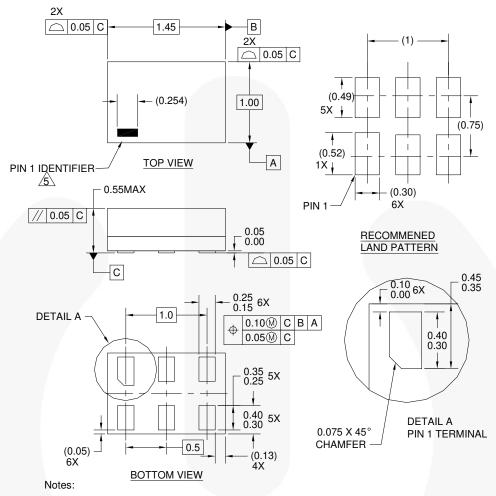
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Please visit Fairchild Semiconductor's online packaging area for the most recent tape and reel specifications: <a href="http://www.fairchildsemi.com/products/analog/pdf/sc70-6">http://www.fairchildsemi.com/products/analog/pdf/sc70-6</a> tr.pdf.

Package Designator	Tape Section	Tape Section Cavity Number		Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
P6X	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed

# **Physical Dimensions**



- 1. CONFORMS TO JEDEC STANDARD M0-252 VARIATION UAAD
- 2. DIMENSIONS ARE IN MILLIMETERS
- 3. DRAWING CONFORMS TO ASME Y14.5M-1994
- 4. FILENAME AND REVISION: MAC06AREV4
- 5. PIN ONE IDENTIFIER IS 2X LENGTH OF ANY OTHER LINE IN THE MARK CODE LAYOUT.

Figure 9. 6-Lead, MicroPak™, 1.0mm Wide

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Package Designator	Tape Section	Tape Section Cavity Number		<b>Cover Type Status</b>	
	Leader (Start End)	125 (Typical)	Empty	Sealed	
L6X	Carrier	5000	Filled	Sealed	
	Trailer (Hub End)	75 (Typical)	Empty	Sealed	

# **Physical Dimensions**

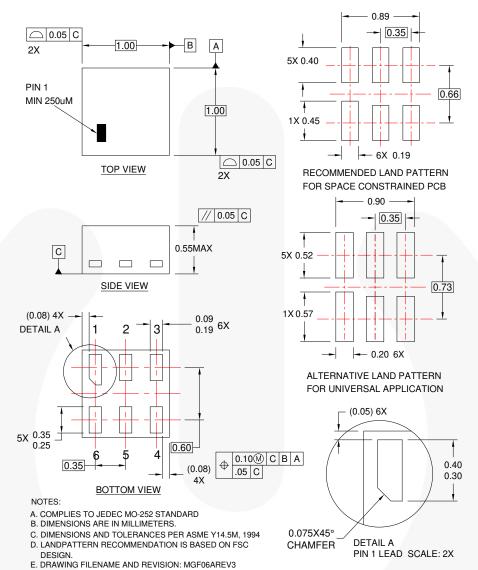


Figure 10. 6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch

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Package Designator	Tape Section	<b>Cavity Number</b>	Cavity Status	Cover Type Status
	Leader (Start End)	125 (Typical)	Empty	Sealed
FHX	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed





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Delimition of Terms		
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