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# NC7WZ07 TinyLogic® UHS Dual Buffer (Open-Drain Outputs)

## Features

- Ultra-High Speed:  $t_{pZL}$  2.3 ns (Typical)
- High  $I_{OL}$  Output Drive:  $\pm 24$  mA at 3 V  $V_{CC}$
- Broad  $V_{CC}$  Operating Range: 1.65 V to 5.50 V
- Power Down High Impedance Inputs/Outputs
- Over-Voltage Tolerance Inputs Facilitate 5 V to 3 V Translation
- Proprietary Noise/EMI Reduction Circuitry
- Ultra-Small MicroPak™ Packages

## Description

The NC7WZ07 is a dual buffer with open-drain outputs from Fairchild's Ultra-High Speed (UHS) series of TinyLogic®. 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 broad  $V_{CC}$  operating range. The device is specified to operate over a very broad  $V_{CC}$  operating range. The device is specified to operate over the 1.65 V to 5.5 V  $V_{CC}$  range. The inputs and outputs are high impedance when  $V_{CC}$  is 0 V. Inputs tolerate voltages up to 7 V independent of  $V_{CC}$  operating voltage.

## Ordering Information

Part Number	Top Mark	Package	Packing Method
NC7WZ07P6X	Z07	6-Lead SC70, EIAJ SC88 1.25 mm Wide	3000 Units on Tape & Reel
NC7WZ07L6X	D3	6-Lead MicroPak™, 1.00 mm Wide	5000 Units on Tape & Reel
NC7WZ07FHX	D3	6-Lead, MicroPak2™, 1x1 mm Body, .35 mm Pitch	5000 Units on Tape & Reel

## Connection Diagrams

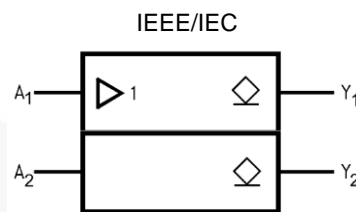


Figure 1. Logic Symbol

## Pin Configurations

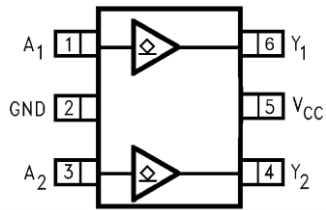


Figure 2. SC70 (Top View)

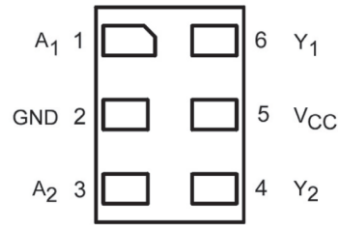


Figure 3. MicroPak™ (Top Through View)

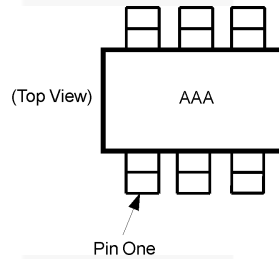


Figure 4. Pin 1 Orientation

### Notes:

1. AAA represents product code top mark (see *Ordering Information*).
2. Orientation of top mark determines pin one location.
3. Reading the top mark left to right, pin one is the lower left pin.

## Pin Definitions

Pin # SC70	Pin # MicroPak™	Name	Description
1	1	A <sub>1</sub>	Input
2	2	GND	Ground
3	3	A <sub>2</sub>	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
A	Y
LOW Logic Level	LOW Logic Level
HIGH Logic Level	High Impedance Output State, Open Drain

## 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		Min.	Max.	Unit
$V_{CC}$	Supply Voltage		-0.5	7.0	V
$V_{IN}$	DC Input Voltage		-0.5	7.0	V
$V_{OUT}$	DC Output Voltage		-0.5	7.0	V
$I_{IK}$	DC Input Diode Current	$V_{IN} < -0.5\text{ V}$		-50	mA
$I_{OK}$	DC Output Diode Current	$V_{OUT} < -0.5\text{ V}$		-50	mA
$I_{OUT}$	DC Output Current			±50	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or Ground Current			±100	mA
$T_{STG}$	Storage Temperature Range		-65	+150	°C
$T_J$	Junction Temperature Under Bias			+150	°C
$T_L$	Junction Lead Temperature (Soldering, 10 Seconds)			+260	°C
$P_D$	Power Dissipation at +85°C	SC70-6		150	mW
		MicroPak™-6		130	
		MicroPak2™-6		120	
ESD	Human Body Model, JEDEC:JESD22-A114			4000	V
	Charge Device Model, JEDEC:JESD22-C101			2000	

## Recommended Operating Conditions

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
$V_{CC}$	Supply Voltage Operating		1.65	5.50	V
	Supply Voltage Data Retention		1.5	5.5	
$V_{IN}$	Input Voltage		0	5.5	V
$V_{OUT}$	Output Voltage		0	5.5	V
$t_r, t_f$	Input Rise and Fall Times	$V_{CC}$ at 1.8 V, ±0.15 V, 2.5 V ± 0.2 V	0	20	ns/V
		$V_{CC}$ at 3.3 V ±0.3 V	0	10	
		$V_{CC}$ at 5.0 V ±0.5 V	0	5	
$T_A$	Operating Temperature		-40	+85	°C
$\theta_{JA}$	Thermal Resistance	SC70-6		425	°C/W
		MicroPak™-6		500	
		MicroPak2™-6		560	

**Note:**

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

### DC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub>	Conditions	T <sub>A</sub> =+25°C			T <sub>A</sub> =-40 to +85°C		Units
				Min.	Typ.	Max.	Min.	Max.	
V <sub>IH</sub>	HIGH Level Input Voltage	1.65 to 1.95		0.75V <sub>CC</sub>			0.75V <sub>CC</sub>		V
		2.30 to 5.50		0.70V <sub>CC</sub>			0.70V <sub>CC</sub>		
V <sub>IL</sub>	LOW Level Input Voltage	1.65 to 1.95				0.25V <sub>CC</sub>		0.25V <sub>CC</sub>	V
		2.30 to 5.50				0.30V <sub>CC</sub>		0.30V <sub>CC</sub>	
I <sub>LKG</sub>	HIGH Level Output Leakage Current	1.65 to 5.50	V <sub>IN</sub> =V <sub>IH</sub> , V <sub>OUT</sub> =V <sub>CC</sub> or GND			±5		±10	µA
V <sub>OL</sub>	LOW Level Output Voltage	1.65	V <sub>IN</sub> =V <sub>IL</sub> , I <sub>OL</sub> =100 µA		0.00	0.10		0.00	V
		1.80			0.00	0.10		0.10	
		2.30			0.00	0.10		0.10	
		3.00			0.00	0.10		0.10	
		4.50		0.00	0.10		0.10		
		1.65	I <sub>OL</sub> =4 mA		0.80	0.24		0.24	
		2.30	I <sub>OL</sub> =8 mA		0.10	0.30		0.30	
		3.00	I <sub>OL</sub> =16 mA		0.16	0.40		0.40	
		3.00	I <sub>OL</sub> =24 mA		0.24	0.55		0.55	
		4.50	I <sub>OL</sub> =32 mA		0.25	0.55		0.55	
I <sub>IN</sub>	Input Leakage Current	0 to 5.5	0 ≤ V <sub>IN</sub> ≤ 5.5 V			±0.1		±1.0	µA
I <sub>OFF</sub>	Power Off Leakage Current	0	V <sub>IN</sub> or V <sub>OUT</sub> =5.5 V			1		10	µA
I <sub>CC</sub>	Quiescent Supply Current	1.65 to 5.50	V <sub>IN</sub> =5.5 V, GND			1		10	µA

## AC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub>	Conditions	T <sub>A</sub> =+25°C			T <sub>A</sub> =-40 to +85°C		Units	Figure
				Min.	Typ.	Max.	Min.	Max.		
t <sub>PZL</sub> , t <sub>PLZ</sub>	Propagation Delay	1.65	C <sub>L</sub> =50 pF, R <sub>U</sub> =500 Ω, R <sub>D</sub> =500 Ω, V <sub>I</sub> =2 x V <sub>CC</sub>	1.8	6.6	11.5	1.8	12.6	ns	Figure 5 Figure 6
		1.80		1.8	5.5	9.5	1.8	10.5		
		2.50 ± 0.20		1.2	3.7	5.8	1.2	6.4		
		3.30 ± 0.30		0.8	2.9	4.4	0.8	4.8		
		5.00 ± 0.50		0.5	2.3	3.5	0.5	3.9		
		1.65	C <sub>L</sub> =50 pF, R <sub>U</sub> =500 Ω, R <sub>D</sub> =500 Ω, V <sub>I</sub> =2 x V <sub>CC</sub>	1.8	5.5	11.5	1.8	12.6		
		1.80		1.8	4.3	9.5	1.8	10.5		
		2.50 ± 0.20		1.2	2.8	5.8	1.2	6.4		
		3.30 ± 0.30		0.8	2.1	4.4	0.8	4.8		
		5.00 ± 0.50		0.5	1.4	3.5	0.5	3.9		
C <sub>IN</sub>	Input Capacitance	0			2.5				pF	
C <sub>OUT</sub>	Output Capacitance	0			4.0					
C <sub>PD</sub>	Power Dissipation Capacitance <sup>(5)</sup>	3.30			3				pF	Figure 7
		5.00			4					

**Note:**

5. 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. 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).

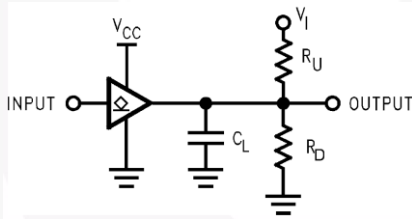


Figure 5. AC Test Circuit

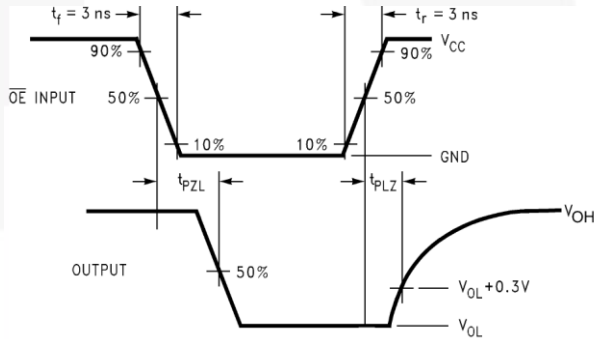


Figure 6. AC Waveforms

**Notes:**

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

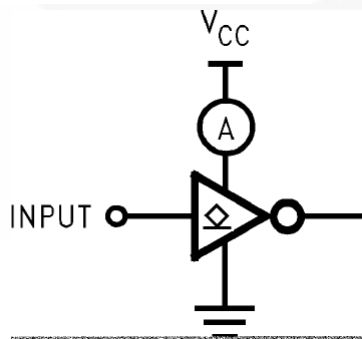
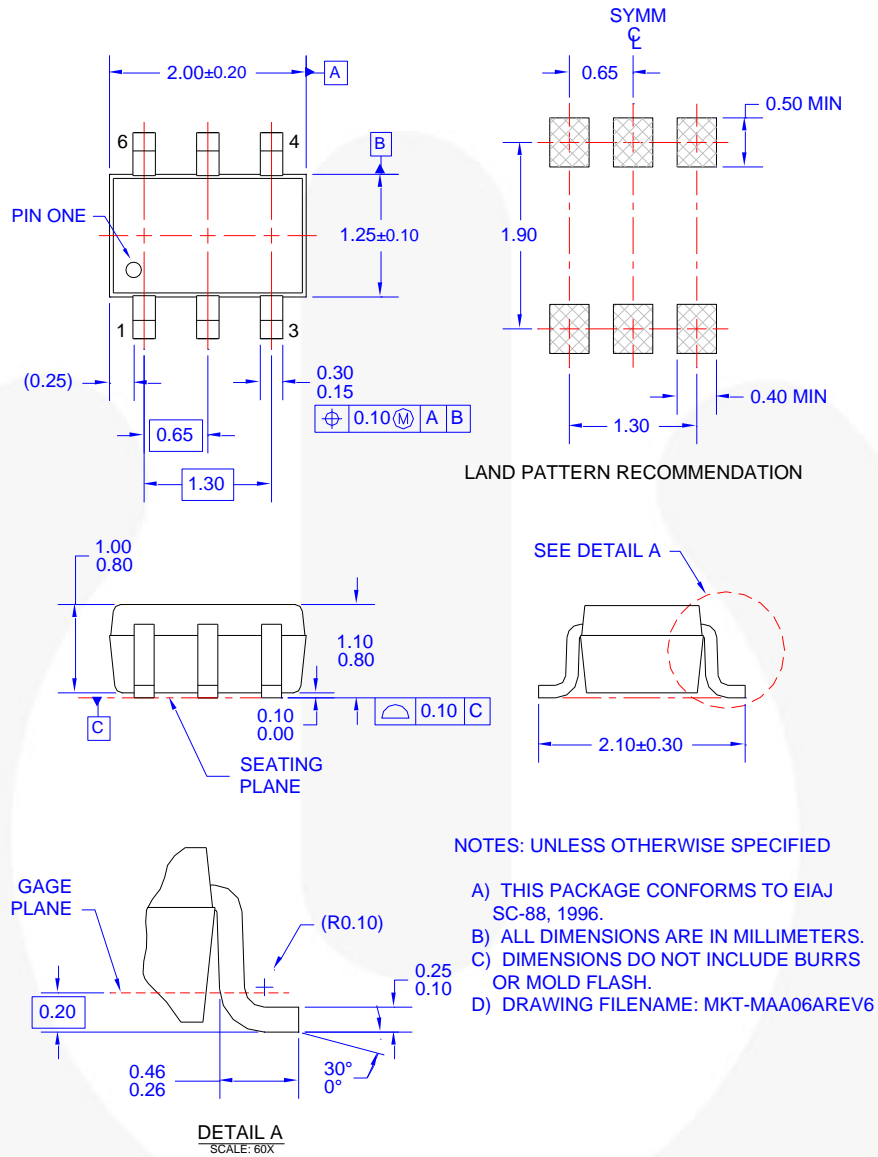


Figure 7. I<sub>CCD</sub> Test Circuit

**Note:**

8. Input=AC Waveform; t<sub>r</sub>=t<sub>f</sub>=1.8ns.  
9. PRR=Variable; Duty Cycle=50%.

## Physical Dimensions



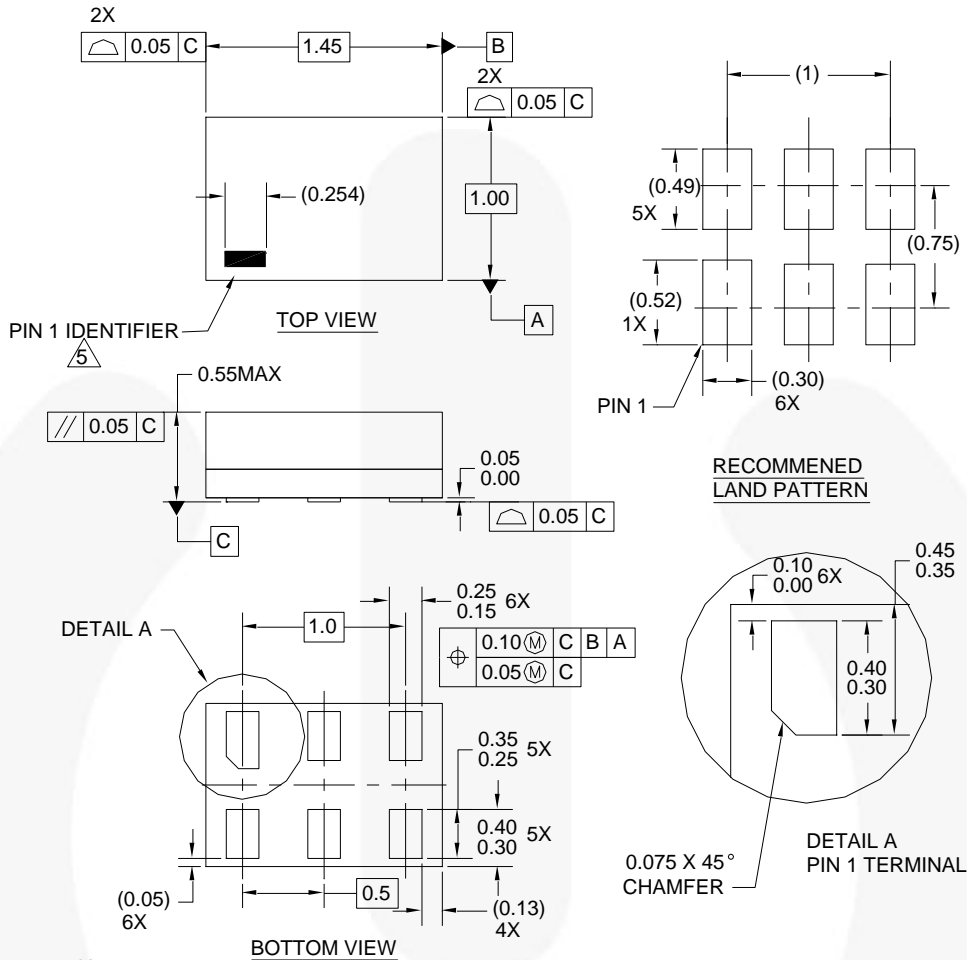
**Figure 8. 6-Lead, SC70, EIAJ SC88, 1.25 mm Wide**

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

## Physical Dimensions



**Notes:**

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™, 1.0 mm Wide**

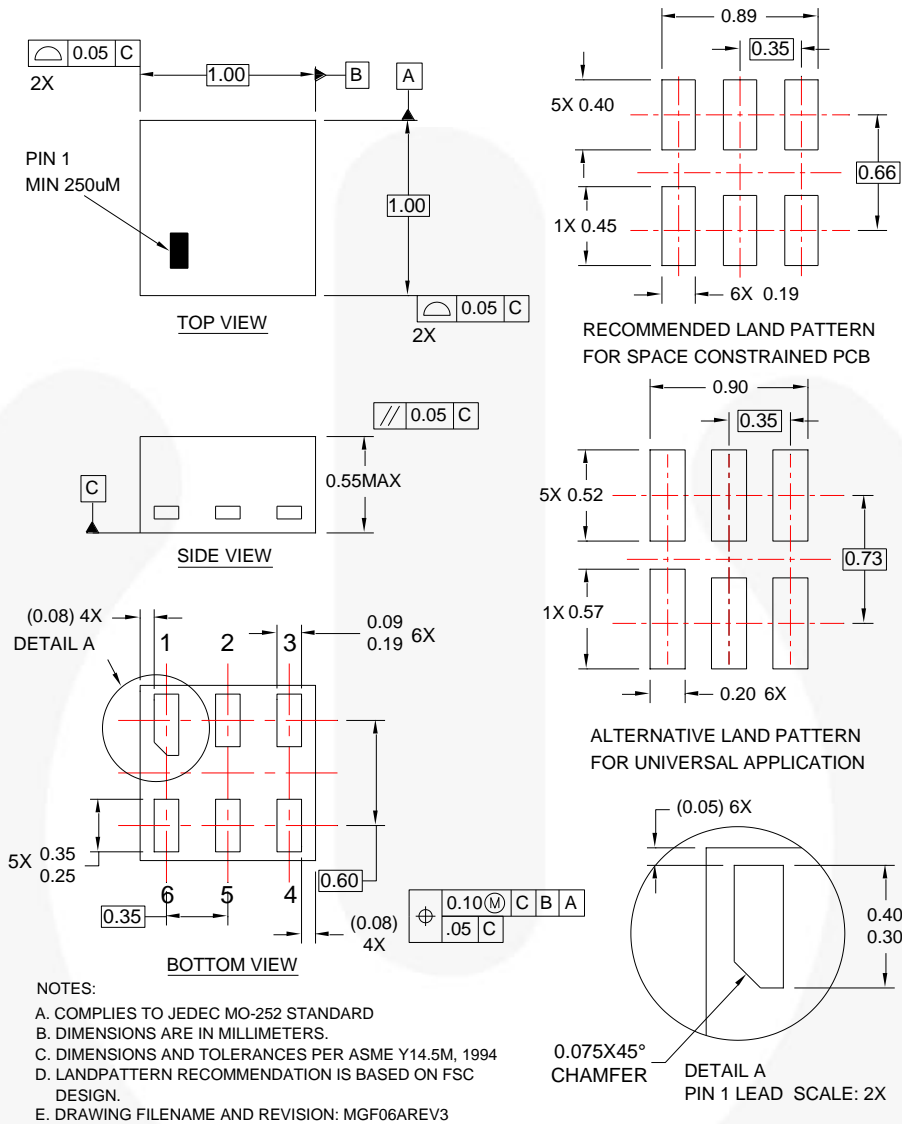
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Package Designator	Tape Section	Cavity Number	Cavity Status	Cover Type Status
L6X	Leader (Start End)	125 (Typical)	Empty	Sealed
	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (Typical)	Empty	Sealed



## Physical Dimensions



**Figure 10. 6-Lead, MicroPak2™, 1x1 mm Body, .35 mm Pitch**

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



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| Current Transfer Logic™  | IntelliMAX™                                    |                                       | TinyWire™        |
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