FAIRCHILD SEMICONDUCTOR™

September 1999
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NC7WZ00
TinyLogic™ UHS Dual 2-Input NAND Gate (Preliminary)

General Description

The NC7WZ00 is a dual 2-Input NAND Gate from Fairchild's Ultra High Speed 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 the 1.8V to 5.5V V_{CC} operating range. The inputs and output are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 7V independent of V_{CC} operating voltage.

Features

- Space saving US8 8-lead package
- Ultra High Speed; t_{PD} 2.4 ns typ into 50 pF at 5V V_{CC}
- High Output Drive; ±24 mA at 3V V_{CC}
- Broad V_{CC} Operating Range; 1.8V–5.5V
- Matches the performance of LCX when operated at 3.3V V_{CC}
- Power down high impedance inputs/output
- Overvoltage tolerant inputs facilitate 5V to 3V translation
- Patented noise/EMI reduction circuitry implemented

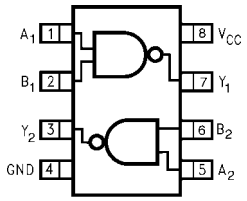
Ordering Code:

Order Number	Package Number	Package Top Mark	Package Description	Supplied As
NC7WZ00K8X	MAB08A	WZ00	8-Lead US8, 0.7mm x 3.1mm x 2.0 mm	3k Units on Tape and Reel

Logic Symbol

IEEE/IEC

Connection Diagram



(Top View)

Pin Descriptions

Pin Names	Description
A_n, B_n	Inputs
Y_n	Output

Function Table

$Y = \overline{AB}$

Inputs		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

H = HIGH Logic Level
L = LOW Logic Level

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Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	−0.5V to +7V
DC Input Voltage (V_{IN})	−0.5V to +7V
DC Output Voltage (V_{OUT})	−0.5V to +7V
DC Input Diode Current (I_{IK})	
@V_{IN} < −0.5V	−50 mA
DC Output Diode Current (I_{OK})	
@V_{OUT} < −0.5V	−50 mA
DC Output Current (I_{OUT})	± 50 mA
DC V_{CC}/GND Current (I_{CC}/I_{GND})	± 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	TBD

Recommended Operating Conditions (Note 2)

Supply Voltage Operating (V_{CC})	1.8V to 5.5V
Supply Voltage Data Retention (V_{CC})	1.5V to 5.5V
Input Voltage (V_{IN})	0V to 5.5V
Output Voltage (V_{OUT})	0V to V_{CC}
Operating Temperature (T_A)	−40°C to +85°C
Input Rise and Fall Time (t_r, t_f)	
V_{CC} @ 1.8V, 2.5V ±0.2V	0 ns/V to 20 ns/V
V_{CC} @ 3.3V ± 0.3V	0 ns/V to 10 ns/V
V_{CC} @ 5.0V ± 0.5V	0 ns/V to 5 ns/V
Thermal Resistance (θ_{JA})	TBD

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°C			T_A = −40°C to +85°C		Units	Conditions	
			Min	Typ	Max	Min	Max			
V_{IH}	HIGH Level Input Voltage	1.8	0.75 V_{CC}			0.75 V_{CC}		V		
		2.3–5.5	0.70 V_{CC}			0.70 V_{CC}				
V_{IL}	LOW Level Input Voltage	1.8			0.25 V_{CC}		0.25 V_{CC}	V		
		2.3–5.5			0.30 V_{CC}		0.30 V_{CC}			
V_{OH}	HIGH Level Output Voltage	1.8	1.7	1.8		1.7		V	V_{IN} = V_{IL}	I_{OH} = −100 µA
		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	2.15		1.9		V		I_{OH} = −8 mA
		3.0	2.4	2.80		2.4				I_{OH} = −16 mA
		3.0	2.3	2.68		2.3				I_{OH} = −24 mA
		4.5	3.8	4.20		3.8				I_{OH} = −32 mA
V_{OL}	LOW Level Output Voltage	1.8		0.0	0.1		0.1	V	V_{IN} = V_{IH}	I_{OL} = 100 µA
		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	V		I_{OL} = 8 mA
		3.0		0.15	0.4		0.4			I_{OL} = 16 mA
		3.0		0.22	0.55		0.55			I_{OL} = 24 mA
		4.5		0.22	0.55		0.55			I_{OL} = 32 mA
I_{IN}	Input Leakage Current	0-5.5			±0.1		±1.0	µA	V_{IN} = 5.5V, GND	
I_{OFF}	Power Off Leakage Current	0.0			1		10	µA	V_{IN} or V_{OUT} = 5.5V	
I_{CC}	Quiescent Supply Current	1.8-5.5			1		10	µA	V_{IN} = 5.5V, GND	

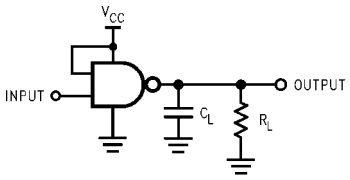
AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = +25°C$			$T_A = -40°C$ to $+85°C$		Units	Conditions	Fig. No.
			Min	Typ	Max	Min	Max			
t_{PLH}, t_{PHL}	Propagation Delay	1.8	2.0		9.5	2.0	10.0	ns	C_L = 15 pF, R_L = 1 MΩ	Figure 1, Figure 3
		2.5 ± 0.2	0.8		6.5	0.8	7.0			
		3.3 ± 0.3	0.5		4.5	0.5	4.7			
		5.0 ± 0.5	0.5		3.9	0.5	4.1			
t_{PLH}, t_{PHL}	Propagation Delay	3.3 ± 0.3	1.5		5.0	1.5	5.2	ns	C_L = 50 pF, R_L = 500Ω	Figure 1, Figure 3
		5.0 ± 0.5	0.8		4.3	0.8	4.5			
C_{IN}	Input Capacitance	0		TBD				pF		
C_{PD}	Power Dissipation Capacitance	3.3		TBD				pF	(Note 3)	Figure 2
		5.0		TBD						

Note 3: 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. (See Figure 2.) C_{PD} is related to I_{CCD} dynamic operating current by the expression:

$I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CC}static)$.

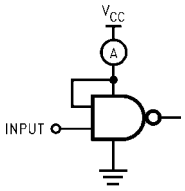
AC Loading and Waveforms



C_L includes load and stray capacitance

Input PRR = 1.0 MHz; t_w = 500 ns

FIGURE 1. AC Test Circuit



Input = AC Waveform; $t_r = t_f$ = 1.8 ns;

PRR = 10 MHz; Duty Cycle = 50%

FIGURE 2. I_{CCD} Test Circuit

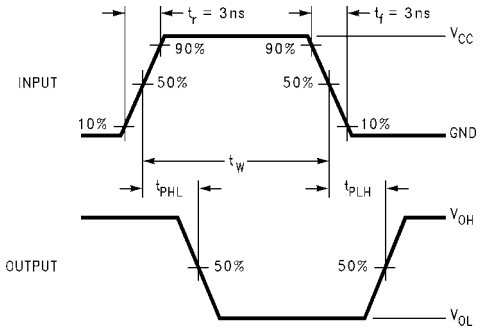


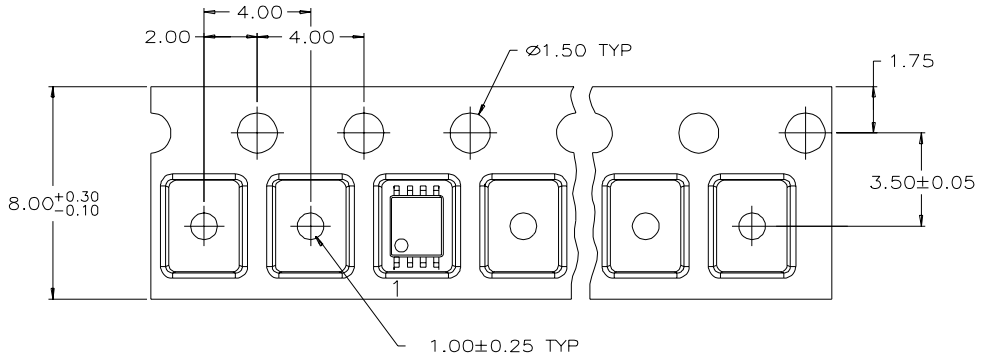
FIGURE 3. AC Waveforms

Tape and Reel Specification

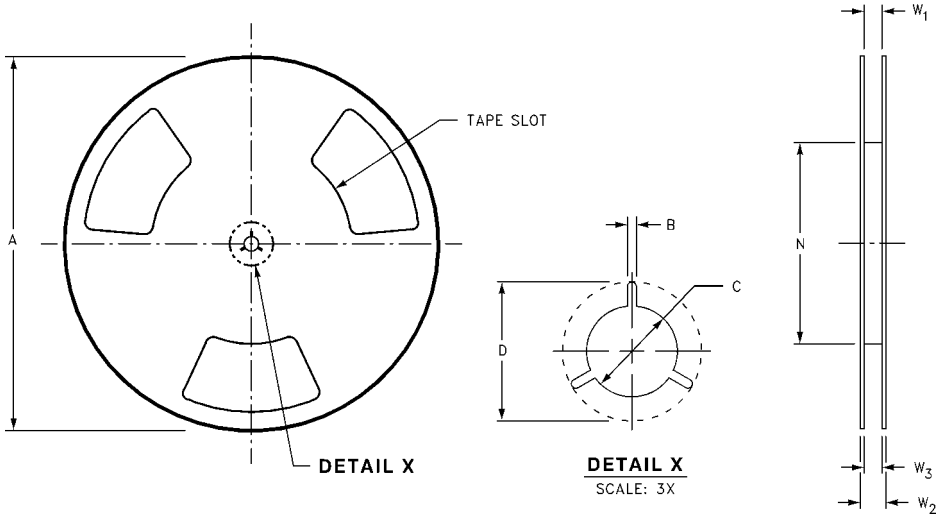
Tape Format

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
K8X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)

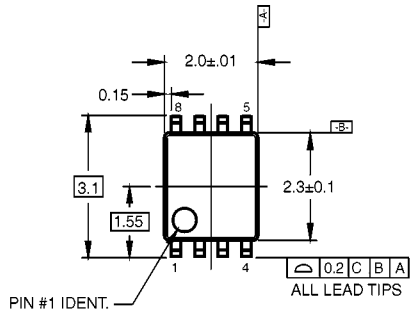


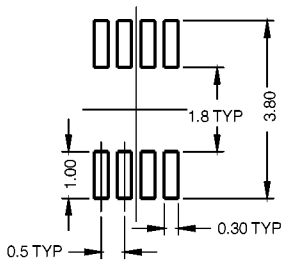
REEL DIMENSIONS inches (millimeters)



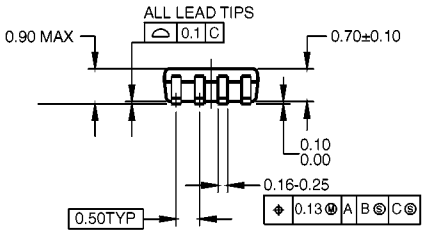
Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 + 0.059/–0.000 (8.40 + 1.50/–0.00)	0.567 (14.40)	W1 + 0.078/–0.039 (W1 + 2.00/–1.00)

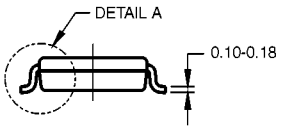
Physical Dimensions inches (millimeters) unless otherwise noted

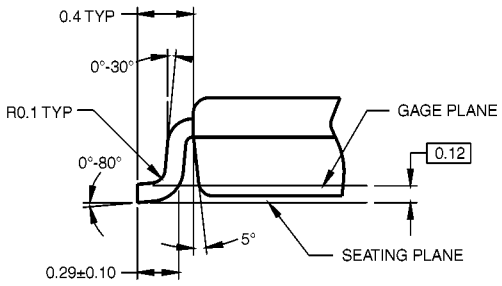




LAND PATTERN RECOMMENDATION







DETAIL A

NOTES:

A. DIMENSIONS ARE IN MILLIMETERS.

B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

C. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

D. JEDEC REGISTRATION PLANNED, PACKAGE DESCRIPTION MAY CHANGE ACCORDINGLY

8-Lead US8, 0.7mm x 3.1mm x 2.0 mm
Package Number MAB08A

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2. A critical component in 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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