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NC7WZ14 TinyLogic[®] UHS Dual Inverter with Schmitt Trigger Inputs

Features

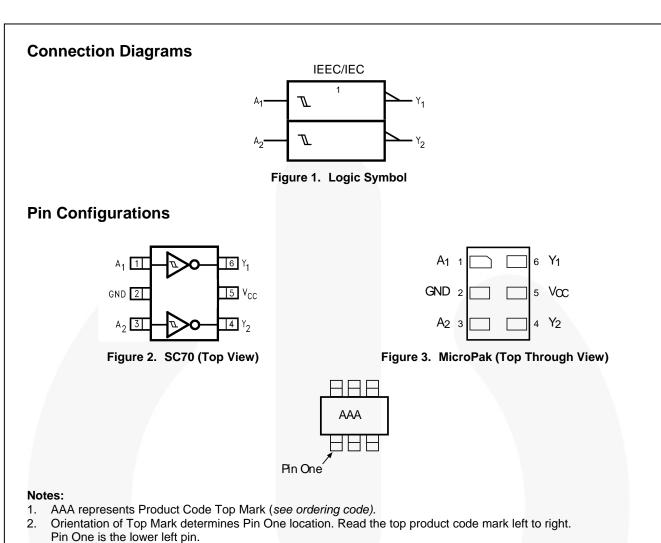
- Ultra-High Speed: t_{PD} 3.2ns (Typical) into 50pF at 5V V_{CC}
- High Output Drive: ±24mA at 3V V_{CC}
- Broad V_{CC} Operating Range: 1.65V to 5.5V
- Matches Performance of LCX when Operated at 3.3V V_{CC}
- Power Down High Impedance Inputs/Outputs
- Over-Voltage Tolerance Inputs Facilitate 5V to 3V Translation
- Proprietary Noise/EMI Reduction Circuitry
- Ultra-Small MicroPak[™] Packages
- Space-Saving SC70 Package

Description

The NC7WZ14 is a dual inverter with Schmitt trigger input 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 very broad V_{CC} operating range. The device is specified to operate over the 1.65V 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-and negative-going input threshold voltage at 5V.

Ordering Information

Part Number	Operating Temperature	Top Mark	Package	Packing Method
NC7WZ14P6X	-40 to +85°C	Z14	6-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3000 Units on Tape & Reel
NC7WZ14EP6X	-40 to +125°C	Z14	6-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3000 Units on Tape & Reel
NC7WZ14L6X	-40 to +85°C	A9	6-Lead MicroPak™, 1.00mm Wide	5000 Units on Tape & Reel
NC7WZ14FHX	-40 to +85°C	A9	6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch	5000 Units on Tape & Reel





Pin Definitions

Pin # SC70	Pin # MicroPak	Name	Description
1	1	A ₁	Input
2	2	GND	Ground
3	3	A ₂	Input
4	4	Y ₂	Output
5	5	V _{CC}	Supply Voltage
6	6	Y ₁	Output

Function Table

Y = /A

Inputs	Output
A	Y
L	Н
Н	L

H = HIGH Logic Level

L = LOW 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	Parar	neter		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} < -0.5V			-50	mA
Ι _{οκ}	DC Output Diode Current	V _{OUT} < -0.5V			-50	mA
I _{OUT}	DC Output Current				±100	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current				±50	mA
T _{STG}	Storage Temperature Range			-65	+150	°C
TJ	Junction Temperature Under Bia	S			+150	°C
TL	Junction Lead Temperature (Sol	dering, 10 Seco	onds)		+260	°C
		0.070.0	T _A =85°C		170	
Р	Dewer Dissinction	SC70-6	T _A =125°C		104	m\//
P _D	Power Dissipation	MicroPak-6			130	mW
		MicroPak2-6			120	
	Human Body Model, JEDEC:JES	SD22-A114			4000	V
ESD	Charge Device Model, JEDEC:JI	ESD22-C101			2000	V

Recommended Operating Conditions⁽³⁾

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	
N/	Supply Voltage Operating		1.65	5.50	v	
V _{CC}	Supply Voltage Data Retention		1.5	5.5	v	
V _{IN}	Input Voltage		0	5.5	V	
V _{OUT}	Output Voltage		0	V _{cc}	V	
		SC70-6	-40	+125		
T _A	Operating Temperature	MicroPak-6	-40	+85	°C	
		MicroPak2-6	-40	+85		
		SC70-6		390	KJ	
θ_{JA}	Thermal Resistance	MicroPak-6		500	°C/W	
		MicroPak2-6		560		

Note:

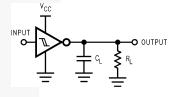
3. Unused inputs must be held HIGH or LOW. They may not float.

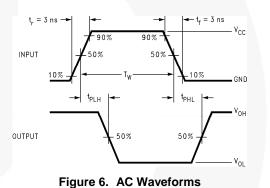
Symbol	Parameter	V _{cc} (V)	Conditions	т	_A =+25	°C		40 to 5°C		40 to 25°C	Units
-	i al al little le	,	Containente	Min.	Тур.	Max.	Min.	Max.	Min.	Max.	
		1.65		0.60		1.40	0.60	1.40	0.60	1.40	1
		1.80		0.70		1.50	0.70	1.50	0.70	1.50	
.,	Positive Threshold	2.30		1.00		1.80	1.00	1.80	1.00	1.80	
VP	Voltage	3.00		1.30		2.20	1.30	2.20	1.30	2.20	V
		4.50		1.90		3.10	1.90	3.10	2.00	3.20	
		5.50		2.20		3.60	2.20	3.60	2.30	3.70	
		1.65		0.20	0.50	0.80	0.20	0.80	0.30	0.90	
	Negative Threshold	1.80		0.25	0.56	0.90	0.25	0.90	0.35	1.00	
N/		2.30		0.40	0.75	1.15	0.40	1.15	0.50	1.20	v
V _N	Voltage	3.00		0.60	0.98	1.50	0.60	1.50	0.70	1.60	v
		4.50		1.00	1.42	2.00	1.00	2.00	1.10	2.20	
		5.50		1.20	1.68	2.30	1.20	2.30	1.40	2.50	
		1.65		0.10	0.48	0.90	0.10	0.90	0.10	0.90	
	7	1.80		0.15	0.51	1.00	0.15	1.00	0.15	1.00	
V _H	Hysteresis Voltage	2.30		0.25	0.62	1.10	0.25	1.10	0.25	1.10	
vн	Tysteresis voltage	3.00		0.40	0.76	1.20	0.40	1.20	0.40	1.20	v
		4.50		0.60	1.01	1.50	0.60	1.50	0.60	1.50	0
		5.50		0.70	1.20	1.70	0.70	1.70	0.70	1.70	
		1.65		1.55	1.65		1.55		1.55		
		1.80		1.70	1.80		1.70		1.70		
		2.30	V _{IN} =V _{IL} , I _{OH} =-100µА	2.20	2.30		2.20		2.20		
		3.00	_	2.90	3.00		2.90		2.90		
V _{OH}	HIGH Level Output	4.50		4.40	4.50		4.40		4.40		v
on	Voltage	1.65	I _{OH} =-4mA	1.29	1.52		1.29		1.26		
		2.30	I _{OH} =-8mA	1.90	2.14		1.90		1.80		_
		3.00	I _{OH} =-16mA	2.40	2.75		2.40		2.30		_
		3.00	I _{OH} =-24mA	2.30	2.62		2.30		2.20		
_		4.50	I _{OH} =-32mA	3.80	4.13		3.80		3.70		
		1.65	_		0.00	0.10		0.10		0.10	_
		1.80	V _{IN} =V _{IH} ,		0.00	0.10		0.10		0.10	_
		2.30	_ I _{oL} =100μA		0.00	0.10		0.10		0.10	_
		3.00	_		0.00	0.10		0.10		0.10	_
Vol	LOW Level Output Voltage	4.50	1 4		0.00	0.10		0.10		0.10	V
	vollage	1.65	I _{OL} =4mA		0.08	0.24		0.24		0.26	
		2.30	I _{OL} =8mA		0.10	0.30		0.30		0.32	
		3.00	I _{OL} =16mA		0.16	0.40		0.40		0.43	
		3.00	I _{OL} =24mA		0.24	0.55		0.55		0.60	_
	lanut Lankana	4.50	I _{OL} =32mA		0.25	0.55		0.55		0.60	
I _{IN}	Input Leakage Current	0 to 5.5	V _{IN} =5.5V, GND			±0.1		±1.0		±2.0	μA
I _{OFF}	Power Off Leakage Current	0	V _{IN} or V _{OUT} =5.5V			1		10		20	μA
I _{CC}	Quiescent Supply Current	1.65 to 5.50	V_{IN} =5.5V, GND			1.0		10		20	μA

Symbol	Parameter	V _{cc} (V)	Conditions	T _A =+25°C		T _A =-40 to +85°C		T _A =-40 to +125°C		Units	Figure	
-				Min.	Тур.	Max.	Min.	Max.	Min.	Max.		-
		1.65	C _L =15pF,	2.5	7.6	13.1	2.5	14.5	2.5	14.7	ns	
		1.80		2.5	6.3	10.9	2.5	12.0	2.5	12.3		Figure 5 Figure 6
t _{PLH} , t _{PHL} Propagation		2.50 ± 0.20		1.8	4.3	7.4	1.8	8.1	1.8	8.4		
	Propagation Delay	3.30 ± 0.30		1.5	3.3	5.0	1.5	5.5	1.5	5.8		
		5.00 ± 0.50		1.0	2.7	4.1	1.0	4.5	1.0	4.8		
		3.30 ± 0.30	C _L =50pF,	1.8	4.0	6.0	1.8	6.6	1.8	6.9		Figure 5
	5.00 ± 0.50	R∟=500Ω	1.2	3.2	4.9	1.2	5.4	1.2	5.7		Figure 6	
CIN	Input Capacitance	0.00			2.5						pF	
0	Power Dissipation Capacitance ⁽⁴⁾ 3.30 5.00			11.0						- 5		
C _{PD}		5.00			12.5			6			pF	Figure 7

Note:

 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_{CC}static).

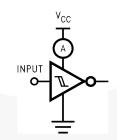






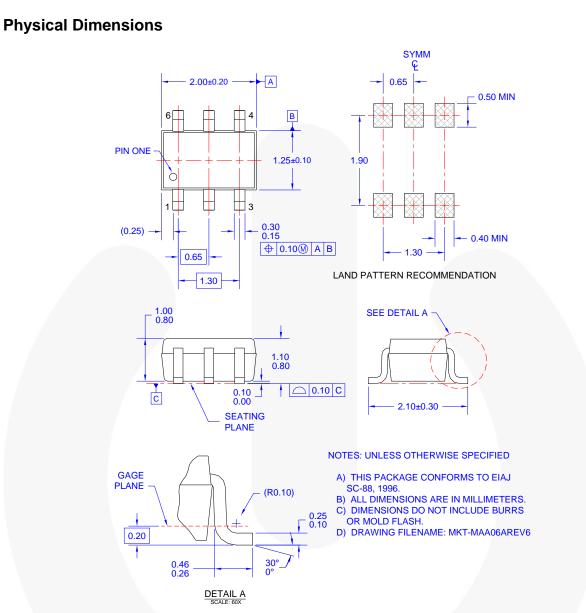
5. CL includes load and stray capacitance; Input PRR=1.0MHz; t_w=500ns





Note:

6. Input=AC Waveform; t_r=t_f=1.8ns; PRR=variable; Duty Cycle =50%. Figure 7. I_{CCD} Test Circuit





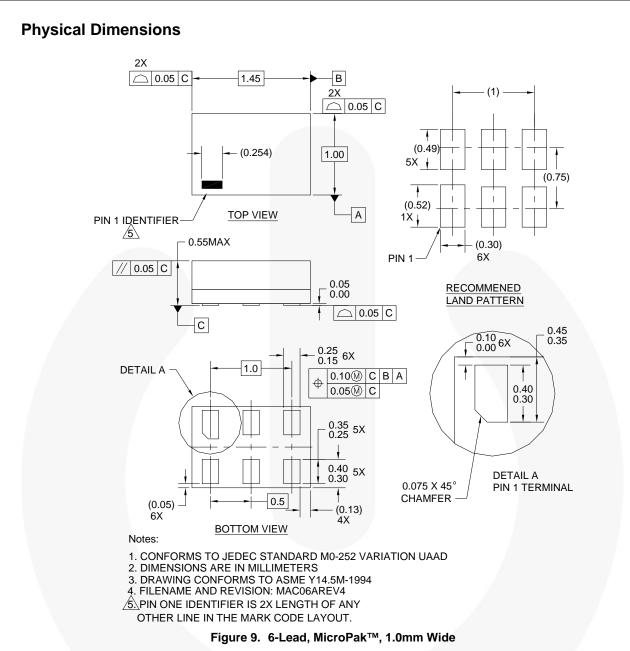
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Tape and Reel Specification

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



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

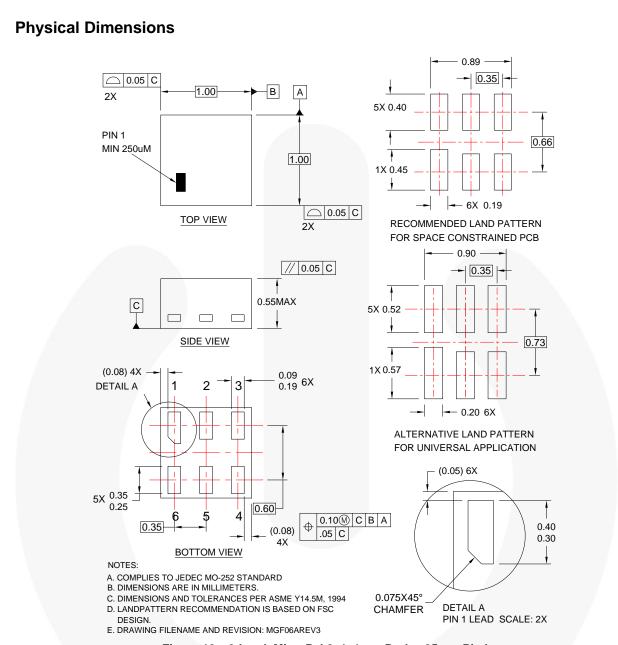


Figure 10. 6-Lead, MicroPak2, 1x1mm Body, .35mm Pitch

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

NC7WZ14 — TinyLogic[®] UHS Dual Inverter with Schmitt Trigger Inputs



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