

NC7SZ14

TinyLogic™ UHS Inverter with Schmitt Trigger Input

General Description

The NC7SZ14 is a single Inverter with Schmitt Trigger input 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 very broad V_{CC} operating range. The device is specified to operate over the 1.8V to 5.5V V_{CC} range. The input and output are high impedance when V_{CC} is 0V. Inputs tolerate voltages up to 6V independent of V_{CC} operating voltage.

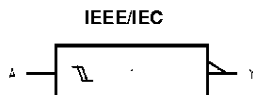
Features

- Space saving SOT23 or SC70 5-lead package
- Ultra High Speed; t_{PD} 3.7 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 to 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

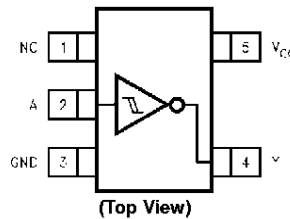
Ordering Code:

Order Number	Package Number	Package Top Mark	Package Description	Supplied As
NC7SZ14M5	MA05B	7Z14	5-Lead SOT23, JEDEC MO-178, 1.6mm	250 Units on Tape and Reel
NC7SZ14M5X	MA05B	7Z14	5-Lead SOT23, JEDEC MO-178, 1.6mm	3k Units on Tape and Reel
NC7SZ14P5	MAA05A	Z14	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	250 Units on Tape and Reel
NC7SZ14P5X	MAA05A	Z14	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel

Logic Symbol



Connection Diagram



Pin Descriptions

Pin Names	Description
A	Input
Y	Output
NC	No Connect

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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NC7SZ14 TinyLogic™ UHS Inverter with Schmitt Trigger Input

Absolute Maximum Ratings (Note 1)			Power Dissipation (P _D) @ +85°C	
Supply Voltage (V _{CC})	-0.5V to +6V		SOT23-5	200 mW
DC Input Voltage (V _{IN})	-0.5V to +6V		SC70-5	150 mW
DC Output Voltage (V _{OUT})	-0.5V to +6V			
DC Input Diode Current (I _{IK})				
@V _{IN} < -0.5V	-50 mA			
@V _{IN} > 6V	+20 mA			
DC Output Diode Current (I _{OK})				
@V _{OUT} < -0.5V	-50 mA			
@V _{OUT} > 6V, V _{CC} = GND	+20 mA			
DC Output Current (I _{OUT})	±50 mA			
DC V _{CC} /GND Current (I _{CC} /I _{GND})	±50 mA			
Storage Temperature (T _{STG})	-65°C to +150°C		SOT23-5	300°C/W
Junction Temperature under Bias (T _J)	150°C		SC70-5	425°C/W
Junction Lead Temperature (T _J): (Soldering, 10 seconds)	260°C			

Recommended Operating Conditions		Supply Voltage Operating (V _{CC})		Supply Voltage Data Retention (V _{CC})		Input Voltage (V _{IN})		Output Voltage (V _{OUT})		Operating Temperature (T _A)		Thermal Resistance (θ _{JA})	
		1.8V to 5.5V		1.5V to 5.5V		0V to 5.5V		0V to V _{CC}		-40°C to +85°C			

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specification 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 speci-

DC Electrical Characteristics

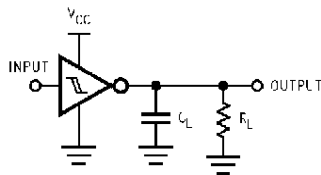
Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		Unit	Conditions		
			Min	Typ	Max	Min	Max				
V _P	Positive Threshold Voltage	1.8	0.7	1.1	1.5	0.7	1.5	V			
		2.3	1.0	1.4	1.8	1.0	1.8				
		3.0	1.3	1.75	2.2	1.3	2.2				
		4.5	1.9	2.45	3.1	1.9	3.1				
		5.5	2.2	2.9	3.6	2.2	3.6				
V _N	Negative Threshold Voltage	1.8	0.25	0.55	0.9	0.25	0.9	V			
		2.3	0.40	0.75	1.15	0.40	1.15				
		3.0	0.6	1.0	1.5	0.6	1.5				
		4.5	1.0	1.43	2.0	1.0	2.0				
		5.5	1.2	1.70	2.3	1.2	2.3				
V _H	Hysteresis Voltage	1.8	0.15	0.54	1.0	0.15	1.0	V			
		2.3	0.25	0.65	1.1	0.25	1.1				
		3.0	0.4	0.77	1.2	0.4	1.2				
		4.5	0.6	1.01	1.5	0.6	1.5				
		5.5	0.7	1.18	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 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					
		5.5	5.0	5.5		5.0					
			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
			5.5	4.5	5.0		4.5				
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			±1		±10	μA	V _{IN} = 5.5V, GND		
I _{OFF}	Power Off Leakage Current	0.0			1		10	μA	V _{IN} or V _{OUT} = 5.5V		

DC Electrical Characteristics (Continued)									
Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		Unit	Conditions
			Min	Typ	Max	Min	Max		
I _{CC}	Quiescent Supply Current	1.8-5.5	2.0			20		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		Unit	Conditions	Fig. No.
			Min	Typ	Max	Min	Max			
t _{PLH}	Propagation Delay	1.8	2.0	7.6	12.5	2.0	13	ns	C _L = 15 pF, R _L = 1 MΩ	Figure 1 Figure 3
t _{PHL}		2.5 ± 0.2	1.0	5.0	9.0	1.0	9.5			
		3.3 ± 0.3	1.0	3.7	6.3	1.0	6.5			
		5.0 ± 0.5	0.5	3.1	5.2	0.5	5.5			
t _{PLH}	Propagation Delay	3.3 ± 0.3	1.5	4.4	7.2	1.5	7.5	ns	C _L = 50 pF, R _L = 500Ω	Figure 1 Figure 3
t _{PHL}		5.0 ± 0.5	0.8	3.7	5.9	0.8	6.2			
C _{IN}	Input Capacitance	0	4					pF		
C _{PD}	Power Dissipation	3.3	24					pF	(Note 2)	Figure 2
	Capacitance	5.0	30							

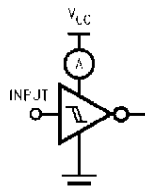
Note 2: C_{PD} is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current consumption (I_{CCD}) at no output loading and operating at 50% duty cycle. (See Figure 2.) C_{PD} is related to I_{CCD} dynamic operating current by the expression
 $I_{CCD} = (C_{PD})(V_{CC})(f_{IN}) + (I_{CC} \text{ static})$

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

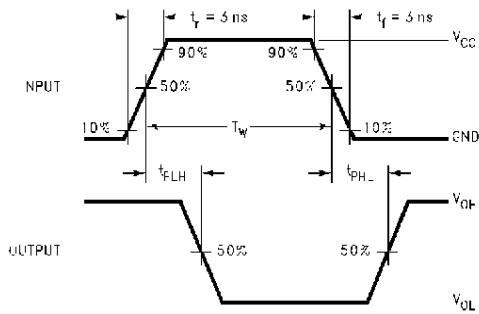


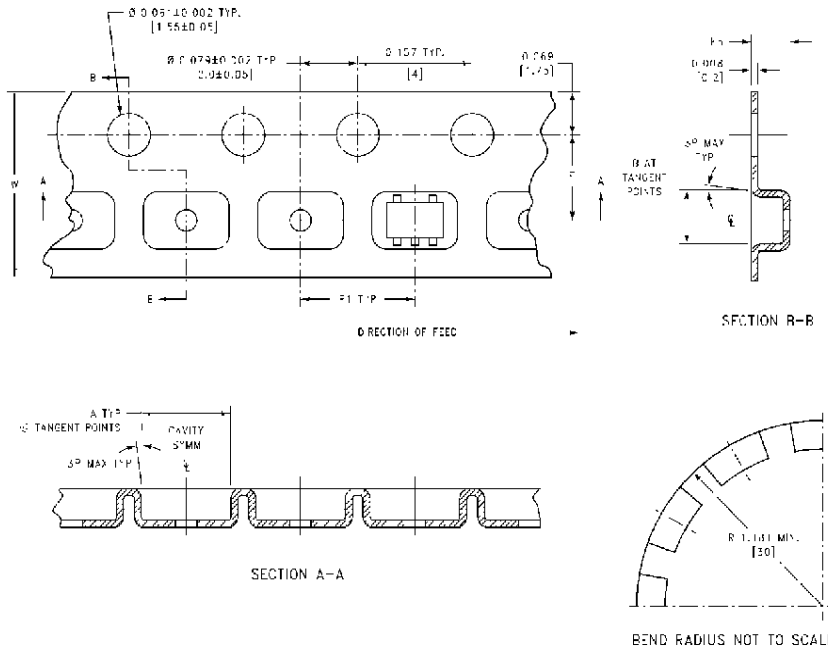
FIGURE 3. AC Waveforms

Tape and Reel Specification

TAPE FORMAT

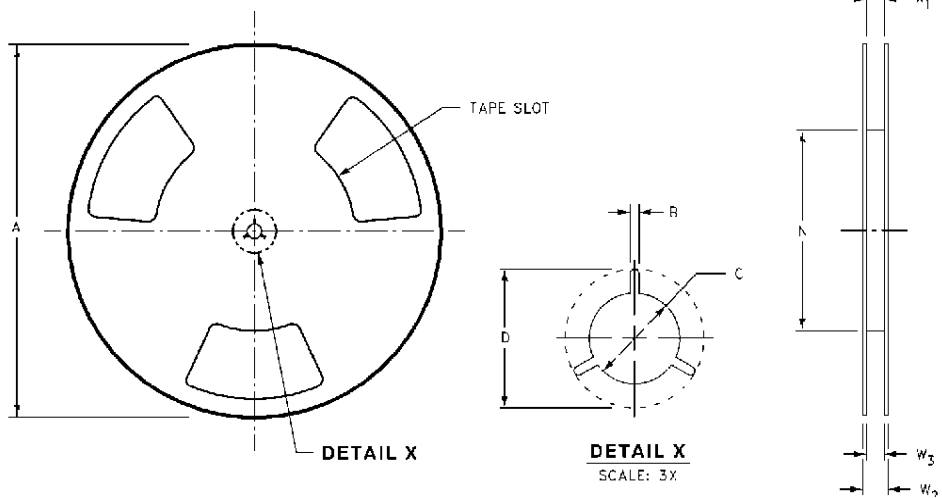
Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
M5, P5	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	250	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed
M5X, P5X	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)



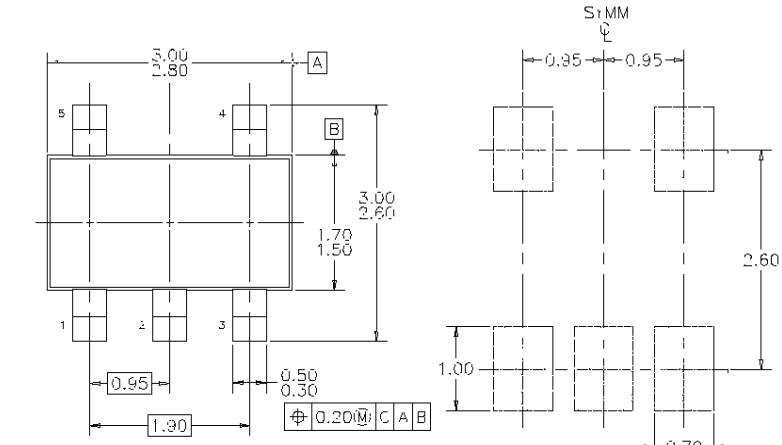
Package	Tape Size	DIM A	DIM B	DIM F	DIM K ₀	DIM P1	DIM W
SC70-5	8 mm	0.093 (2.35)	0.096 (2.45)	0.138 ± 0.004 (3.5 ± 0.10)	0.053 ± 0.004 (1.35 ± 0.10)	0.157 (4)	0.315 ± 0.004 (8 ± 0.1)
SOT23-5	8 mm	0.130 (3.3)	0.130 (3.3)	0.138 ± 0.002 (3.5 ± 0.05)	0.055 ± 0.004 (1.4 ± 0.11)	0.157 (4)	0.315 ± 0.012 (8 ± 0.3)

REEL DIMENSIONS inches (millimeters)

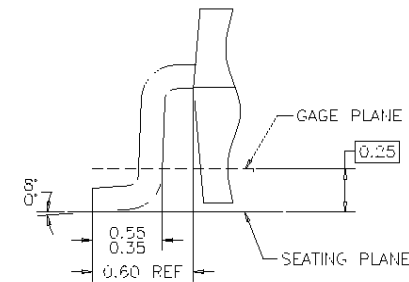
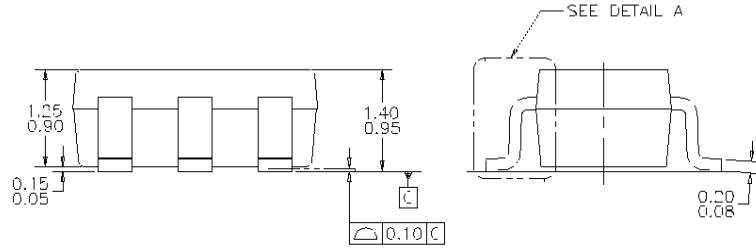


Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 + 0.059/-0.000 (8.40 + 1.50/-0.00)	0.567 (14.40)	W1 + 0.078/-0.039 (W1 + 2.00/-1.00)

Physical Dimensions inches (millimeters) unless otherwise noted



LAND PATTERN RECOMMENDATION



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO JEDEC MO-178, ISSUE B, VARIATION AA, DATED JANUARY 1999.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.

**5-Lead SOT23, JEDEC MO-178, 1.6mm
Package Number MA05B**

