## FAIRCHILD

SEMICONDUCTOR

# NC7ST00 TinyLogic® HST 2-Input NAND Gate

#### **General Description**

The NC7ST00 is a single 2-Input high performance CMOS NAND Gate, with TTL-compatible inputs. Advanced Silicon Gate CMOS fabrication assures high speed and low power circuit operation. ESD protection diodes inherently guard both inputs and output with respect to the  $\mathrm{V}_{\mathrm{CC}}$  and GND rails. High gain circuitry offers high noise immunity and reduced sensitivity to input edge rate. The TTL-compatible inputs facilitate TTL to NMOS/CMOS interfacing. Device performance is similar to MM74HCT but with 1/2 the output current drive of HC/HCT.

### Features

■ Space saving SOT23 or SC70 5-lead package

February 1997

Revised August 2004

Supplied As

5

4

6 Vcc

5 NC Vcc

- Ultra small MicroPak<sup>™</sup> leadless package
- High Speed; t<sub>PD</sub> < 7 ns typ, V<sub>CC</sub> = 5V, C<sub>L</sub> = 15 pF
- $\blacksquare$  Low Quiescent Power; I\_{CC} < 1  $\mu A$  typ, V\_{CC} = 5.5V
- Balanced Output Drive; 2 mA I<sub>OL</sub>, -2 mA I<sub>OH</sub>
- TTL-compatible inputs

#### **Ordering Code:** Package Product Code Package Description Number Number Top Mark NC7ST00M5X MA05B 3k Units on Tape and Reel 8S00 5-Lead SOT23, JEDEC MO-178, 1.6mm NC7ST00P5X MAA05A T00 5-Lead SC70, EIAJ SC-88a, 1.25mm Wide 3k Units on Tape and Reel NC7ST00L6X MAC06A E3 6-Lead MicroPak, 1.0mm Wide 5k Units on Tape and Reel

### Logic Symbol

Order



### **Connection Diagrams**

А

в

GND

3

А

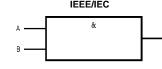
в 2

GND 3

Pin Assignments for SOT23 and SC70

(Top View) Pad Assignments for MicroPak

(Top Thru View)



#### **Pin Descriptions**

Pin Names	Description		
А, В	Inputs		
Y	Output		
NC	No Connect		

#### **Function Table**

	$\mathbf{Y} = \overline{\mathbf{AB}}$						
Inp	uts	Output					
Α	В	Y					
L	L	Н					
L	Н	н					
н	L	н					
н	н	L					

H = HIGH Logic Level L = LOW Logic Level

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### Absolute Maximum Ratings(Note 1)

Supply Voltage (V <sub>CC</sub> )	-0.5V to +7.0V
DC Input Diode Current (IIK)	
$V_{IN} < -0.5V$	–20 mA
$V_{IN} \ge V_{CC} + 0.5V$	+20 mA
DC Input Voltage V <sub>IN</sub>	-0.5V to V <sub>CC</sub> + 0.5V
DC Output Diode Current (I <sub>OK</sub> )	
$V_{OUT} < -0.5V$	–20 mA
$V_{OUT} > V_{CC} + 0.5V$	+20 mA
Output Voltage (V <sub>OUT</sub> )	–0.5V to $V_{CC}$ + 0.5V
DC Output Source or	
Sink Current (I <sub>OUT</sub> )	±12.5 mA
DC $V_{CC}$ or Ground Current per	
Supply Pin (I <sub>CC</sub> or I <sub>GND</sub> )	±25 mA
Storage Temperature (T <sub>STG</sub> )	-65°C to +150°C
Junction Temperature (T <sub>J</sub> )	150°C
Lead Temperature (T <sub>L</sub> );	
(Soldering, 10 seconds)	260°C
Power Dissipation (P <sub>D</sub> ) @ +85°C	
SOT23-5	200 mW
SC70-5	150 mW

#### Recommended Operating Conditions (Note 2)

Supply Voltage	4.5V to 5.5V
Input Voltage (V <sub>IN</sub> )	0.0V to $V_{CC}$
Output Voltage (V <sub>OUT</sub> )	0V to $V_{CC}$
Operating Temperature (T <sub>A</sub> )	$-40^\circ C$ to $+85^\circ C$
Input Rise and Fall Time $(t_r, t_f)$	
$V_{CC} = 5.0V$	0 to 500 ns
Thermal Resistance ( $\theta_{JA}$ )	
SOT23-5	300°C/W
SC70-5	425°C/W

Note 1: Absolute Maximum Ratings are those values beyond which damage to the device may occur. The databook specifications should be met, without exception, to ensure that the design is reliable over its power supply, temperature, and output/input loading variables Fairchild does not recommend operation of circuits outside the databook specifications. Note 2: Unused inputs must be held HIGH or LOW. They may not float.

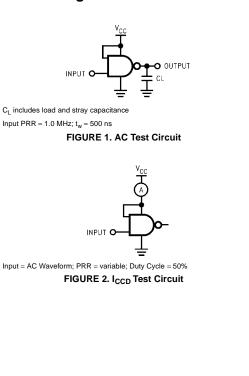
### DC Electrical Characteristics

Symbol I	Parameter	v <sub>cc</sub>	T <sub>A</sub> = +25°C Min Typ Max		$T_A = +25^{\circ}C$ $T_A = -40^{\circ}C \text{ to } +85^{\circ}C$		$\textbf{T}_{\textbf{A}}=-40^{\circ}\textbf{C} \text{ to }+85^{\circ}\textbf{C}$		Conditions
	Farailleter	(V)			Min Max		Units	Conditions	
VIH	HIGH Level Input Voltage	4.5–5.5	2.0			2.0		V	
V <sub>IL</sub>	LOW Level Input Voltage	4.5–5.5			0.8		0.8	V	
V <sub>OH</sub>	HIGH Level Output Voltage	4.5	4.4	4.5		4.4			I <sub>OH</sub> = -20 μA
		4.5	4.18	4.35		4.13		V	$I_{OH} = -2 \text{ mA}$
									$V_{IN} = V_{IL}$
V <sub>OL</sub>	LOW Level Output Voltage	4.5		0	0.1		0.1		$I_{OL} = 20 \ \mu A$
		4.5		0.10	0.26		0.33	V	$I_{OL} = 2 \text{ mA}$
									$V_{IN} = V_{IH}$
I <sub>IN</sub>	Input Leakage Current	5.5			±0.1		±1.0	μΑ	$0 \le V_{IN} \le 5.5V$
I <sub>CC</sub>	Quiescent Supply Current	5.5			1.0		10.0	μΑ	$V_{IN} = V_{CC}$ or GND
ICCT	I <sub>CC</sub> per Input	5.5			2.0		2.9	mA	One Input $V_{IN} = 0.5V$ or 2.4V,
									Other Input V <sub>CC</sub> or GND

Symbol	Parameter	V <sub>CC</sub>	T <sub>A</sub> = +25°C		$T_A = -40^{\circ}C$ to $+85^{\circ}C$		Units	Conditions	Figure	
		(V)	Min	Тур	Max	Min	Max	Units	Conditions	Number
t <sub>PLH</sub> ,	Propagation Delay	5.0		3.4	12				$C_L = 15 \text{ pF}$	
t <sub>PHL</sub>				6.3	17					
		4.5		6.0	16		20			Figures
				11.5	27		31	ns	0 50 - 5	Ĭ, 3
		5.5		4.1	14		18		$C_L = 50 \text{ pF}$	
		-		11.2	26		30			
t <sub>TLH</sub> ,	Output Transition Time	5.0		4	10			ns	$C_L = 15 \text{ pF}$	1
t <sub>THL</sub>		4.5		11	25		31		0 50 = 5	Figures 1, 3
		5.5		10	21		26	ns	$C_L = 50 \text{ pF}$	1, 0
CIN	Input Capacitance	Open		2	10			pF		
CPD	Power Dissipation Capacitance	5.0		6		1		pF	(Note 3)	Figure 2

Note 3:  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current. Current consumption (I<sub>CCD</sub>) at no output loading and operating at 50% duty cycle. (See Figure 2). CPD 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>CCstatic</sub>).

### AC Loading and Waveforms



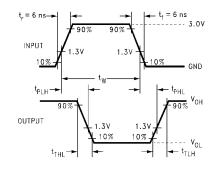
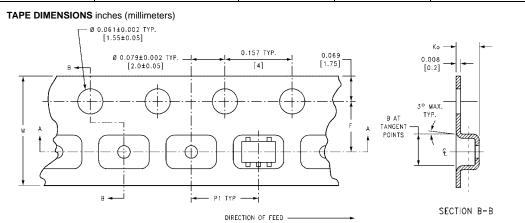


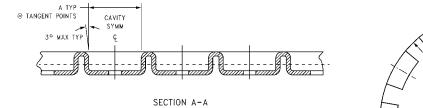
FIGURE 3. AC Waveforms



# Tape and Reel Specification

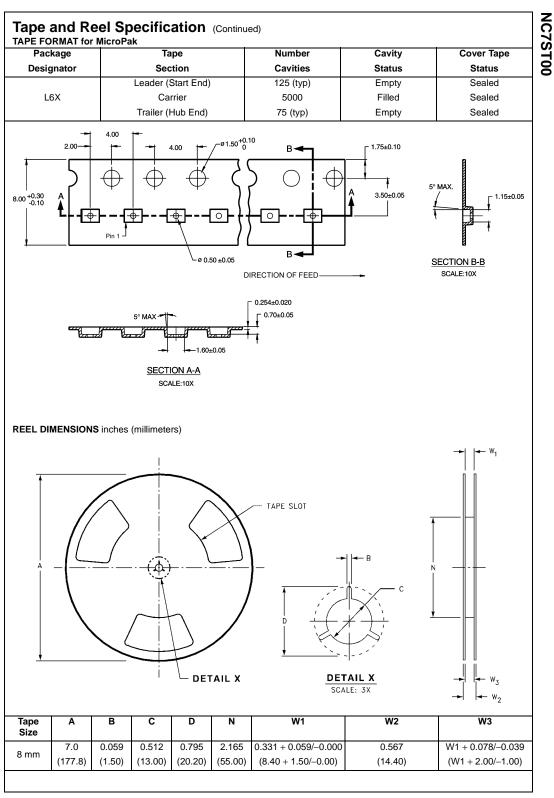
TAPE FORMAT				
Package	Таре	Number	Cavity	Cover Tape
Designator	Section	Cavities	Status	Status
	Leader (Start End)	125 (typ)	Empty	Sealed
M5X, P5X	Carrier	3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed





R 1.181 MIN. [30]

					BE	END RADIUS NO	T TO SCALE
Package	Tape Size	DIM A	DIM B	DIM F	DIM K <sub>o</sub>	DIM P1	DIM W
SC70-5 8 mm	0.093	0.096	$0.138\pm0.004$	$0.053\pm0.004$	0.157	$0.315\pm0.004$	
	0 11111	(2.35)	(2.45)	$(3.5\pm0.10)$	$(1.35 \pm 0.10)$	(4)	$(8 \pm 0.1)$
SOT23-5	8 mm	0.130	0.130	$0.138\pm0.002$	$0.055\pm0.004$	0.157	$0.315\pm0.012$
30123-3	0 11111	(3.3)	(3.3)	$(3.5\pm0.05)$	$(1.4 \pm 0.11)$	(4)	$(8\pm0.3)$



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