

## 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  $V_{CC}$  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.

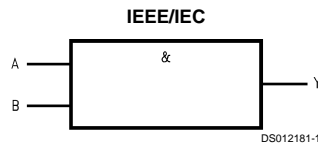
### Features

- Space saving SOT23 or SC70 5-lead surface mount package
- High Speed;  $T_{PD} < 7$  ns typ,  $V_{CC} = 5V$ ,  $C_L = 15$  pF
- Low Quiescent Power;  $I_{CC} < 1$   $\mu A$  typ,  $V_{CC} = 5.5V$
- Balanced Output Drive; 2 mA IOL, -2 mA IOH
- TTL-compatible inputs

### Ordering Code:

Product Code	Package	Package Drawing	Package Top Mark	Supplied As
NC7ST00M5	SOT23-5	MA05B	8S00	250 Units on Tape and Reel
NC7ST00M5X	SOT23-5	MA05B	8S00	3k Units on Tape and Reel
NC7ST00P5	SC70-5	MAA05A	T00	250 Units on Tape and Reel
NC7ST00P5X	SC70-5	MAA05A	T00	3k Units on Tape and Reel

### Logic Symbol

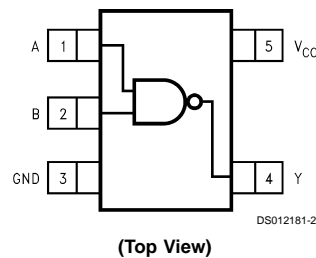


### Pin Descriptions

Pin Names	Description
A, B	Inputs
Y	Output

### Connection Diagram

Pin Assignment for 5-lead Packages



### 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

## Absolute Maximum Ratings (Note 1)

Supply Voltage ( $V_{CC}$ )	–0.5V to +7.0V
DC Input Diode Current ( $I_{IK}$ )	
$V_{IN} < -0.5V$	–20 mA
$V_{IN} \geq V_{CC} + 0.5V$	+20 mA
DC Input Voltage $V_{IN}$	–0.5V to $V_{CC} + 0.5V$
DC Output Diode Current ( $I_{OK}$ )	
$V_{OUT} < -0.5V$	–20 mA
$V_{OUT} > V_{CC} + 0.5V$	+20 mA
Output Voltage ( $V_{OUT}$ )	–0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current ( $I_{OUT}$ )	$\pm 12.5$ mA
DC $V_{CC}$ or Ground Current per Supply Pin ( $I_{CC}$ or $I_{GND}$ )	$\pm 25$ mA
Storage Temperature ( $T_{STG}$ )	–65°C to +150°C
Junction Temperature ( $T_J$ )	150°C
Lead Temp. ( $T_L$ ); (Soldering, 10s)	260°C
Power Dissipation ( $P_D$ ) @ +85°C	
SOT23-5	200 mW
SC70-5	150 mW

## ESD Tolerance

(Human Body Model)

MIL-STD-883D Method

3015.7

>2000V

## DC Latchup Tolerance

Source Current

(JEDEC Method 17)

$\pm 500$  mA

## Recommended Operating Conditions

Supply Voltage	4.5V–5.5V
Input Voltage ( $V_{IN}$ )	0.0V– $V_{CC}$
Output Voltage ( $V_{OUT}$ )	0V– $V_{CC}$
Operating Temperature ( $T_A$ )	–40°C to +85°C
Input Rise and Fall Time ( $t_r$ , $t_f$ )	
$V_{CC} = 5.0V$	0–500 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.

## DC Electrical Characteristics

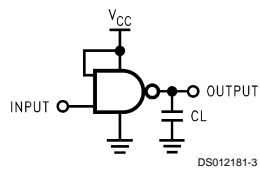
Symbol	Parameter	V <sub>CC</sub> (V)	NC7ST00			NC7ST00		Units	Conditions
			T <sub>A</sub> = +25°C			T <sub>A</sub> = −40°C to +85°C			
			Min	Typ	Max	Min	Max		
V <sub>IH</sub>	High Level Input Voltage	4.5–5.5	2.0			2.0		V	
V <sub>IL</sub>	Low Level Input Voltage	4.5–5.5			0.8		0.8	V	
V <sub>OH</sub>	High Level Output Voltage	4.5	4.4	4.5		4.4		V	I <sub>OH</sub> = −20 μA
		4.5	4.18	4.35		4.13		V	I <sub>OH</sub> = −2 mA V <sub>IN</sub> = V <sub>IL</sub>
V <sub>OL</sub>	Low Level Output Voltage	4.5		0	0.1		0.1	V	I <sub>OL</sub> = 20 μA
		4.5		0.10	0.26		0.33	V	I <sub>OL</sub> = 2 mA V <sub>IN</sub> = V <sub>IH</sub>
I <sub>IN</sub>	Input Leakage Current	5.5			±0.1		±1.0	μA	0 ≤ V <sub>IN</sub> ≤ 5.5V
I <sub>CC</sub>	Quiescent Supply Current	5.5			1.0		10.0	μA	V <sub>IN</sub> = V <sub>CC</sub> or GND
I <sub>CCT</sub>	I <sub>CC</sub> per Input	5.5			2.0		2.9	mA	One input V <sub>IN</sub> = 0.5V or 2.4V, other input V <sub>CC</sub> or GND

## AC Electrical Characteristics

Symbol	Parameter	V <sub>CC</sub> (V)	NC7ST00			NC7ST00		Units	Conditions	Fig. No.
			T <sub>A</sub> = +25°C			T <sub>A</sub> = −40°C to +85°C				
			Min	Typ	Max	Min	Max			
t <sub>PLH</sub> , t <sub>PHL</sub>	Propagation Delay	5.0		3.4	12			ns	C <sub>L</sub> = 15 pF	Figure 1, Figure 3
				6.3	17					
		4.5		6.0	16		20		C <sub>L</sub> = 50 pF	
				11.5	27		31			
		5.5		4.1	14		18			
				11.2	26		30			
t <sub>TLH</sub> , t <sub>THL</sub>	Output Transition Time	5.0		4	10			ns	C <sub>L</sub> = 15 pF	Figure 1, Figure 3
		4.5		11	25		31	ns	C <sub>L</sub> = 50 pF	
		5.5		10	21		26			
C <sub>IN</sub> (Note 2)	Input Capacitance (Note 2)	Open		2	10			pF		
C <sub>PD</sub>	Power Dissipation Capacitance	5.0		6				pF	(Note 3)	Figure 2

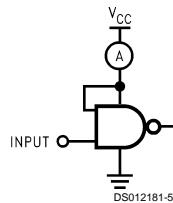
**Note 2:** Parameter guaranteed by design. Not tested.

**Note 3:** C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is derived from dynamic operating current. Current consumption (ICCD) at no output loading and operating at 50% duty cycle. (See Figure 2). CPD is related to ICCD dynamic operating current by the expression: ICCD = (C<sub>PD</sub>)(V<sub>CC</sub>)(f<sub>IN</sub>) + (I<sub>CCstatic</sub>).



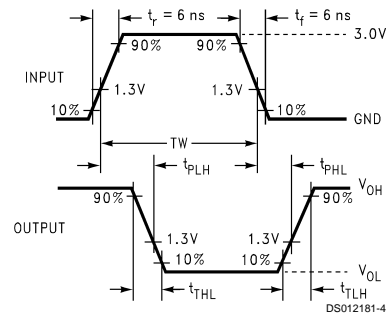
C<sub>L</sub> includes load and stray capacitance  
Input PRR = 1.0 MHz; t<sub>w</sub> = 500 ns

**FIGURE 1. AC Test Circuit**



Input = AC Waveform; PRR = variable; Duty Cycle = 50%

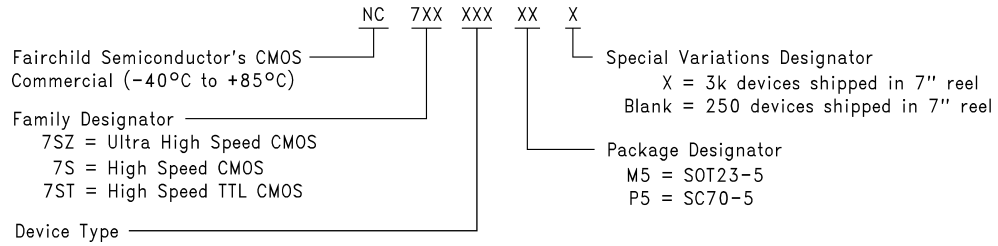
**FIGURE 2. ICCD Test Circuit**



**FIGURE 3. AC Waveforms**

## Ordering Information

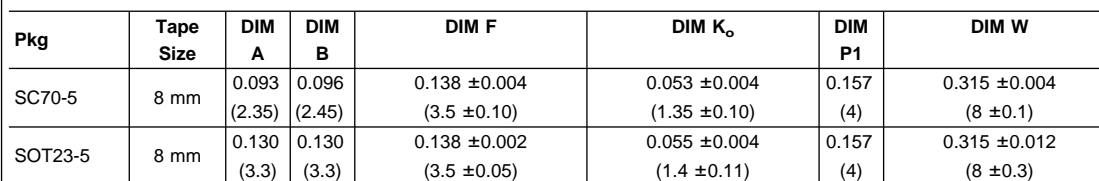
The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



DS012181-6

### TAPE FORMAT

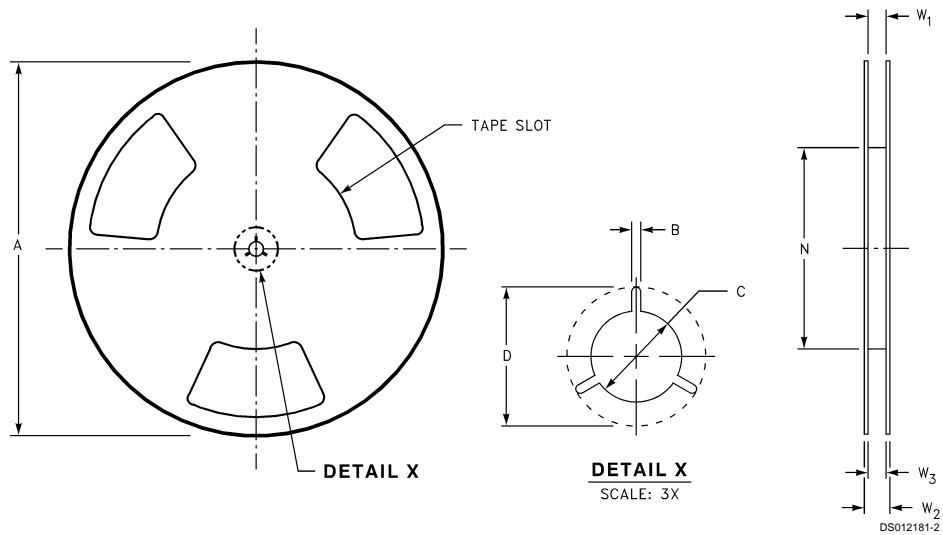
**TAPE DIMENSIONS** inches (millimeters)



## Tape and Reel Specification

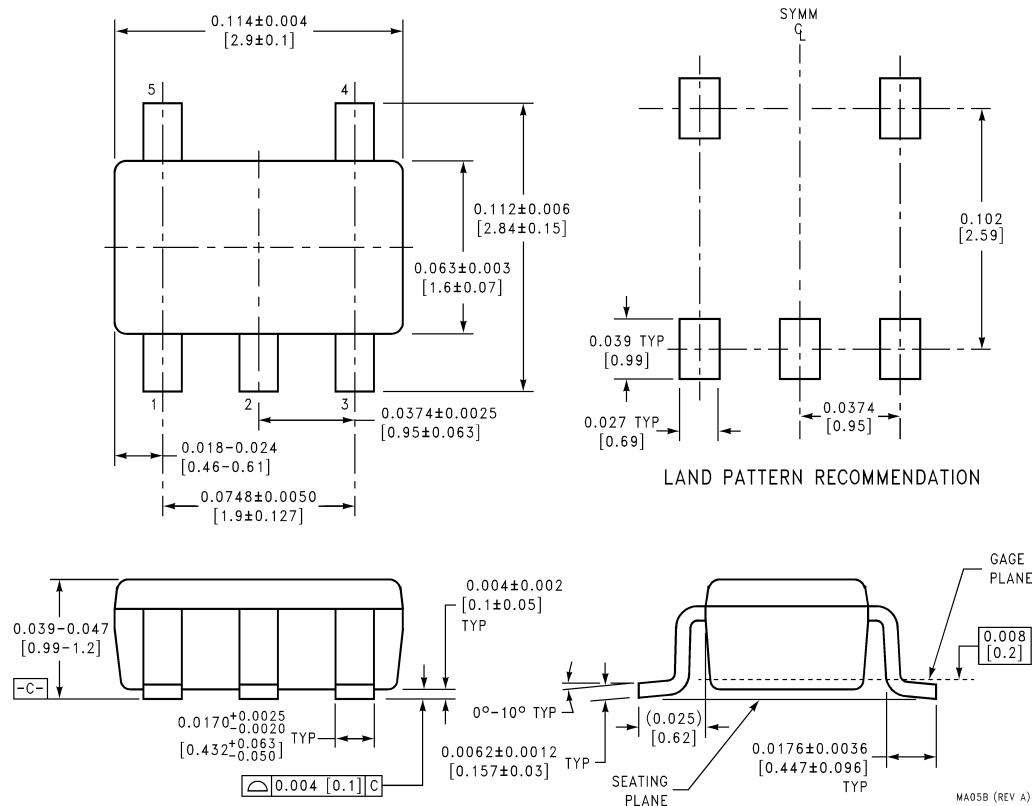
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REEL DIMENSIONS inches (millimeters)



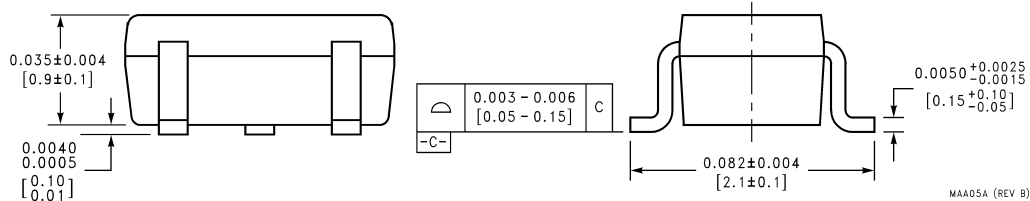
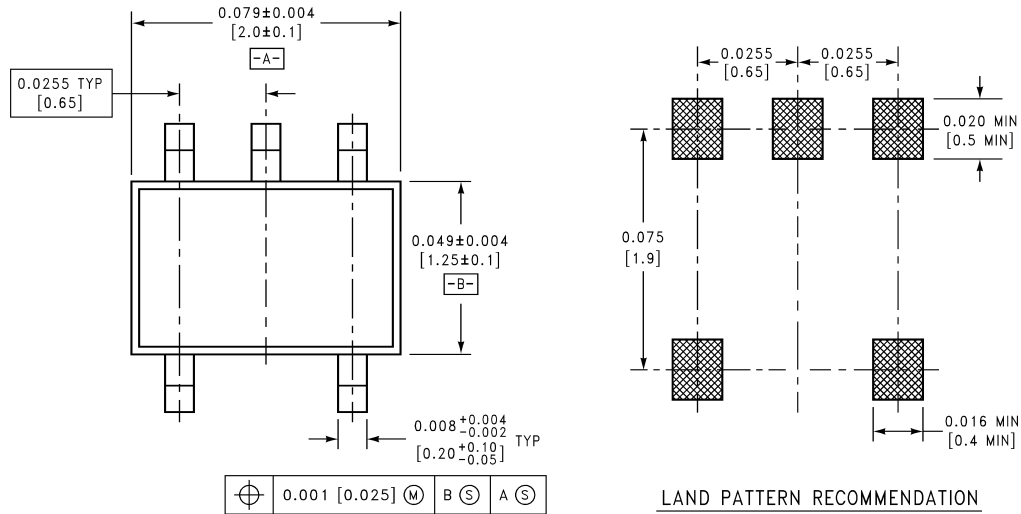
Tape Size	A	B	C	D	N	W1	W2	W3
8 mm	7.0 (177.8)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	2.165 (55.00)	0.331 +0.059/-0.000 (8.40 +1.50/-0.00)	0.567 (14.40)	W1 +0.078/-0.039 (W1 +2.00/-1.00)

**Physical Dimensions** inches (millimeters) unless otherwise noted



**5-Lead Molded SOT23, Enhanced Thermal  
Package Number MA05B**

## Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



5-Lead Molded SC70, Enhanced Thermal  
Package Number MAA05A

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