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 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.

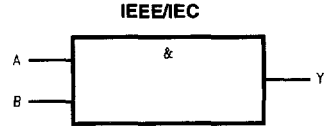
Features

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

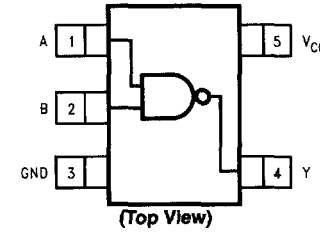
Ordering Code:

Order Number	Package Number	Package Top Mark	Package Description	Supplied As
NC7ST00M5	MA05B	8S00	5-Lead SOT23, JEDEC MO-178, 1.6mm	250 Units on Tape and Reel
NC7ST00M5X	MA05B	8S00	5-Lead SOT23, JEDEC MO-178, 1.6mm	3k Units on Tape and Reel
NC7ST00P5	MAA05A	T00	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	250 Units on Tape and Reel
NC7ST00P5X	MAA05A	T00	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel

Logic Symbol



Connection Diagram



(Top View)

Pin Descriptions

Pin Names	Description
A, B	Inputs
Y	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 +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})	±12.5 mA
DC V_{CC} or Ground Current per	
Supply Pin (I_{CC} or I_{GND})	±25 mA
Storage Temperature (T_{STG})	−65°C to +150°C
Junction Temperature (T_J)	150°C
Lead Temperature (T_L);	
(Soldering, 10 seconds)	260°C
Power Dissipation (P_D) @ +85°C	
SOT23-5	200 mW
SC70-5	150 mW

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 (θ_{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

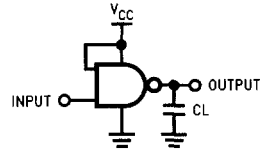
Symbol	Parameter	V_{CC}	T_A = +25°C			T_A = −40°C to +85°C		Units	Conditions
		(V)	Min	Typ	Max	Min	Max		
V_{IH}	HIGH Level Input Voltage	4.5–5.5	2.0			2.0		V	
V_{IL}	LOW Level Input Voltage	4.5–5.5			0.8		0.8	V	
V_{OH}	HIGH Level Output Voltage	4.5	4.4	4.5		4.4			I_{OH} = −20 μA
		4.5	4.18	4.35		4.13		V	I_{OH} = −2 mA
									V_{IN} = V_{IL}
V_{OL}	LOW Level Output Voltage	4.5		0	0.1		0.1		I_{OL} = 20 μA
		4.5		0.10	0.26		0.33	V	I_{OL} = 2 mA
									V_{IN} = V_{IH}
I_{IN}	Input Leakage Current	5.5			±0.1		±1.0	μA	0 ≤ V_{IN} ≤ 5.5V
I_{CC}	Quiescent Supply Current	5.5			1.0		10.0	μA	V_{IN} = V_{CC} or GND
I_{CCT}	I_{CC} per Input	5.5			2.0		2.9	mA	One input V_{IN} = 0.5V or 2.4V, other input V_{CC} or GND

AC Electrical Characteristics

Symbol	Parameter	V_{CC}	$T_A = +25°C$			$T_A = -40°C$ to $+85°C$		Units	Conditions	Fig. No.
		(V)	Min	Typ	Max	Min	Max			
t_{PLH}, t_{PHL}	Propagation Delay	5.0		3.4	12			ns	$C_L = 15$ pF	Figure 1, Figure 3
				6.3	17					
		4.5		6.0	16		20		$C_L = 50$ pF	
				11.5	27		31			
		5.5		4.1	14		18			
				11.2	26		30			
t_{TLH}, t_{THL}	Output Transition Time	5.0		4	10			ns	$C_L = 15$ pF	Figure 1, Figure 3
		4.5		11	25		31	ns	$C_L = 50$ pF	
		5.5		10	21		26			
C_{IN}	Input Capacitance	Open		2	10			pF		
C_{PD}	Power Dissipation Capacitance	5.0		6				pF	(Note 2)	Figure 2

Note 2: C_{PD} 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: $ICCD = (C_{PD})(V_{CC})(f_{IN}) + (I_{CCstatic})$.

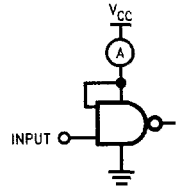
AC Loading and Waveforms



C_L includes load and stray capacitance

Input PRR = 1.0 MHz; t_w = 500 ns

FIGURE 1. AC Test Circuit



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

FIGURE 2. ICCD Test Circuit

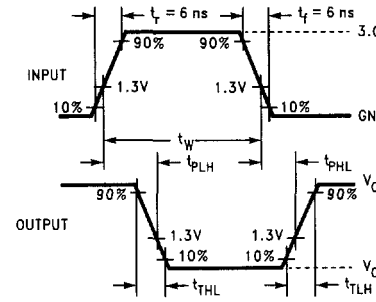


FIGURE 3. AC Waveforms