

NC7S02

TinyLogic® HS 2-Input NOR Gate

General Description

The NC7S02 is a single 2-Input high performance CMOS NOR Gate. Advanced Silicon Gate CMOS fabrication assures high speed and low power circuit operation over a broad V_{CC} range. ESD protection diodes inherently guard both inputs and output with respect to the V_{CC} and GND rails. Three stages of gain between inputs and outputs assures high noise immunity and reduced sensitivity to input edge rate.

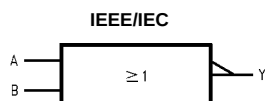
Features

- Space saving SOT23 or SC70 5-lead packages
- Ultra small MicroPak™ leadless package
- High Speed; t_{PD} 3.5 ns typ
- Low Quiescent Power; $I_{CC} < 1 \mu A$
- Balanced Output Drive; 2 mA I_{OL} , -2 mA I_{OH}
- Broad V_{CC} Operating Range; 2V–6V
- Balanced Propagation Delays
- Specified for 3V operation

Ordering Code:

Order Number	Package Number	Product Code Top Mark	Package Description	Supplied As
NC7S02M5X	MA05B	7S02	5-Lead SOT23, JEDEC MO-178, 1.6mm	3k Units on Tape and Reel
NC7S02P5X	MAA05A	S02	5-Lead SC70, EIAJ SC-88a, 1.25mm Wide	3k Units on Tape and Reel
NC7S02L6X	MAC06A	E4	6-Lead MicroPak, 1.0mm Wide	5k Units on Tape and Reel

Logic Symbol



Pin Descriptions

Pin Names	Description
A, B	Inputs
Y	Output
NC	No Connect

Function Table

$Y = \overline{A + B}$

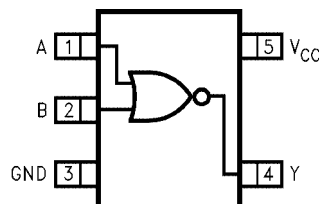
Inputs		Output
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

H = HIGH Logic Level
L = LOW Logic Level

TinyLogic® is a registered trademark of Fairchild Semiconductor Corporation.
MicroPak™ is a trademark of Fairchild Semiconductor Corporation.

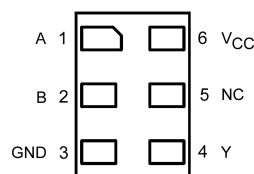
Connection Diagrams

Pin Assignments for SOT23 and SC70



(Top View)

Pad Assignments for MicroPak



(Top Through View)

Absolute Maximum Ratings(Note 1)

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	
@ $V_{IN} \leq -0.5V$	-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
DC 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 Output 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 (Note 2)

Supply Voltage (V_{CC})	2.0V to 6.0V
Input Voltage (V_{IN})	0V to V_{CC}
Output Voltage (V_{OUT})	0V to V_{CC}
Operating Temperature (T_A)	-40°C to +85°C
Input Rise and Fall Time (t_r, t_f)	
V_{CC} @ 2.0V	0 to 1000 ns
V_{CC} @ 3.0V	0 to 750 ns
V_{CC} @ 4.5V	0 to 500 ns
V_{CC} @ 6.0V	0 to 400 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 system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation of circuits outside databook specifications.

Note 2: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Units	Conditions
			Min	Typ	Max	Min	Max		
V_{IH}	HIGH Level Input Voltage	2.0 3.0-6.0	1.50 0.7 V_{CC}			1.50 0.7 V_{CC}		V	
V_{IL}	LOW Level Input Voltage	2.0 3.0-6.0		0.50 0.3 V_{CC}		0.50 0.3 V_{CC}		V	
V_{OH}	HIGH Level Output Voltage	2.0	1.90	2.0		1.90		V	$I_{OH} = -20 \mu\text{A}$ $V_{IN} = V_{IL}$
		3.0	2.90	3.0		2.90			
		4.5	4.40	4.5		4.40			
		6.0	5.90	6.0		5.90			
		3.0	2.68	2.85		2.63		V	$V_{IN} = V_{IL}$ $I_{OH} = -1.3 \text{ mA}$ $I_{OH} = -2 \text{ mA}$ $I_{OH} = -2.6 \text{ mA}$
		4.5	4.18	4.35		4.13			
		6.0	5.68	5.85		5.63			
V_{OL}	LOW Level Output Voltage	2.0		0.0	0.10		0.10	V	$I_{OL} = 20 \mu\text{A}$ $V_{IN} = V_{IH}$
		3.0		0.0	0.10		0.10		
		4.5		0.0	0.10		0.10		
		6.0		0.0	0.10		0.10		
		3.0		0.1	0.26		0.33	V	$V_{IN} = V_{IH}$ $I_{OL} = 1.3 \text{ mA}$ $I_{OL} = 2 \text{ mA}$ $I_{OL} = 2.6 \text{ mA}$
		4.5		0.1	0.26		0.33		
		6.0		0.1	0.26		0.33		
I_{IN}	Input Leakage Current	6.0			± 0.1		± 1.0	μA	$V_{IN} = V_{CC}, \text{ GND}$
I_{CC}	Quiescent Supply Current	6.0			1.0		10.0	μA	$V_{IN} = V_{CC}, \text{ GND}$

AC Electrical Characteristics										
Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		Units	Conditions	Figure Number
			Min	Typ	Max	Min	Max			
t _{PLH} , t _{PHL}	Propagation Delay	5.0		3.5	15			ns	C _L = 15 pF	Figures 1, 3
		2.0		19	100		125			
		3.0		10.5	27		35	ns	C _L = 50 pF	
		4.5		7.5	20		25			
		6.0		6.5	17		21			
t _{TLH} , t _{THL}	Output Transition Time	5.0		3	10			ns	C _L = 15 pF	Figures 1, 3
		2.0		25	125		155			
		3.0		16	35		45	ns	C _L = 50 pF	
		4.5		11	25		31			
		6.0		9	21		26			
C _{IN}	Input Capacitance	Open		2	10		10	pF		
C _{PD}	Power Dissipation Capacitance	5.0		6				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 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}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

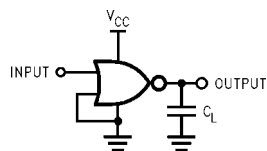
FIGURE 3. AC Waveforms

Input = AC Waveform;

PRR = variable; Duty Cycle = 50%

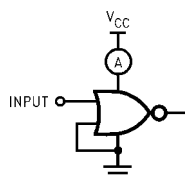
FIGURE 2. I_{CCD} Test Circuit

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. I_{CCD} Test Circuit

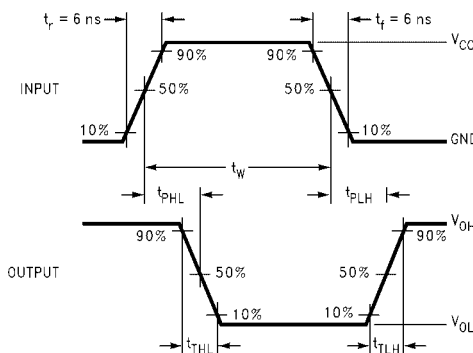


FIGURE 3. AC Waveforms

Technical drawing of a mechanical part, showing a front view and a cross-section B-B.

Front View Dimensions:

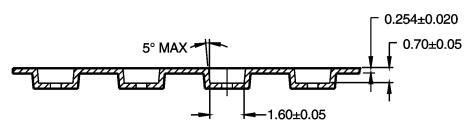
- Overall width: $8.00^{+0.30}_{-0.10}$
- Overall length: $17.75^{+0.10}_{-0.00}$
- Central slot width: 4.00
- Central slot depth: 3.50 ± 0.05
- Side section width: 4.00
- Side section height: 1.75 ± 0.10
- Central slot hole diameter: $\phi 0.50 \pm 0.05$
- Side section hole diameter: $\phi 1.50^{+0.10}_{-0.00}$

Cross-section B-B Dimensions:

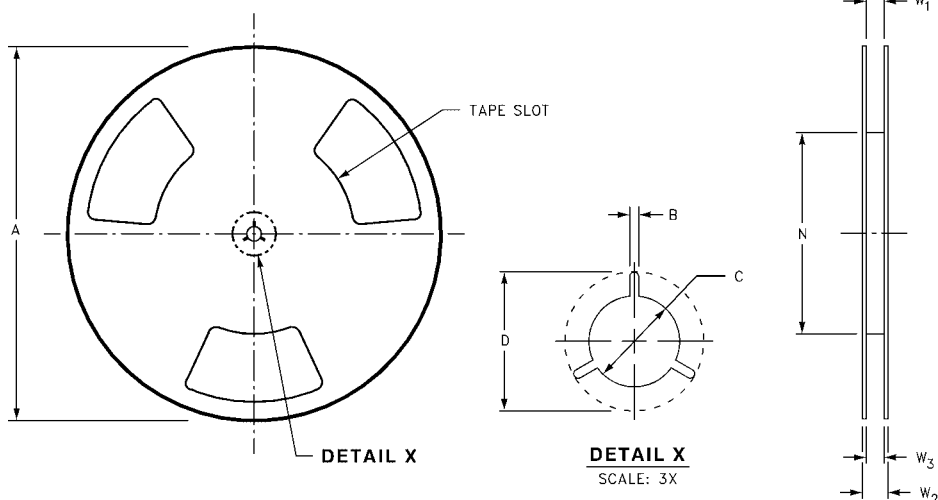
- Chamfer angle: 5° MAX.
- Dimension: 1.15 ± 0.05

Section B-B

SCALE: 10X

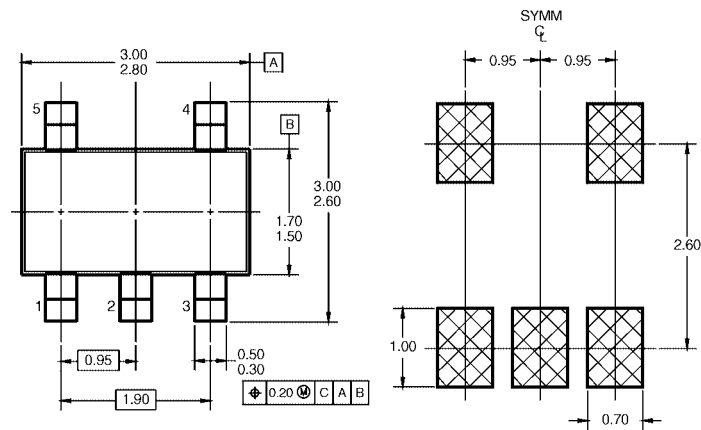


SECTION A-A
SCALE:10X

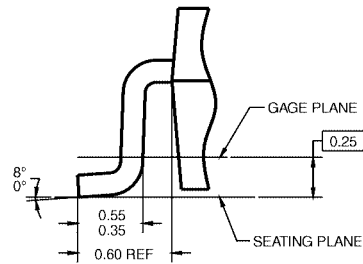
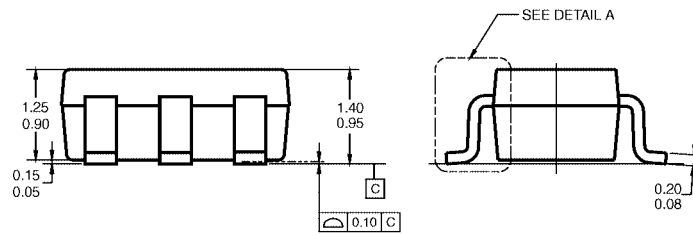
REEL DIMENSIONS inches (millimeters)

Tap 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



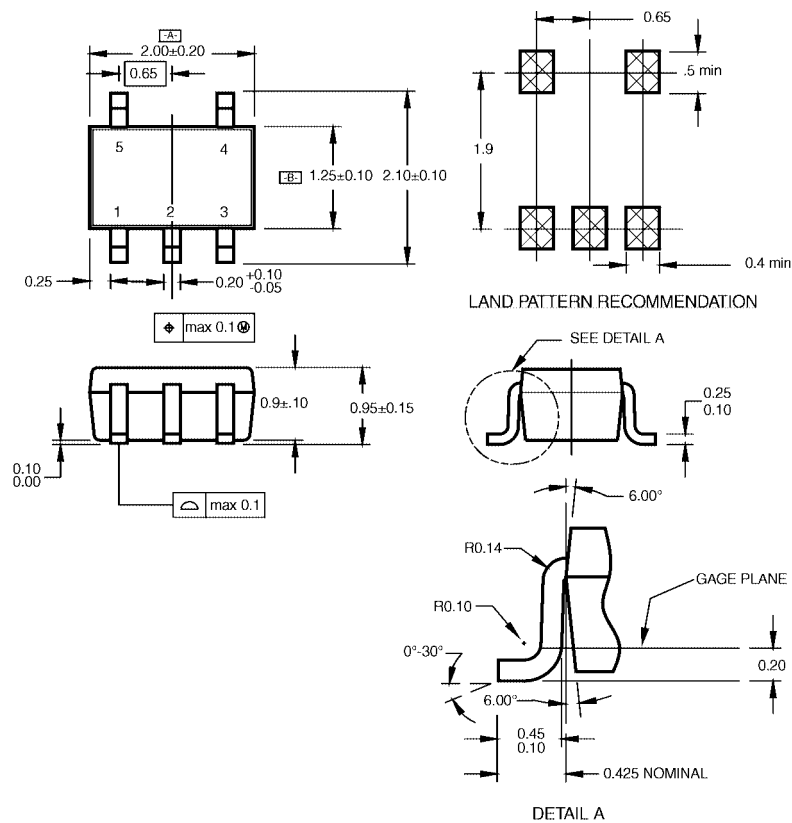
DETAIL A

- 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.

MA05BRevC

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

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



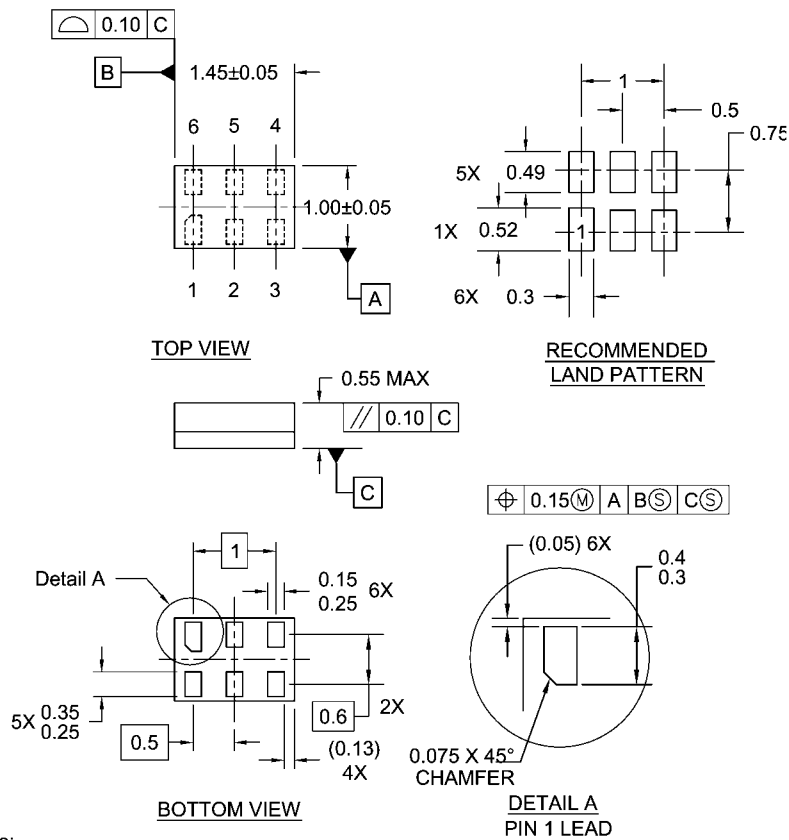
NOTES:

- A. CONFORMS TO EIAJ REGISTERED OUTLINE DRAWING SC88A.
- B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- C. DIMENSIONS ARE IN MILLIMETERS.

MAA05ARevC

**5-Lead SC70, EIAJ SC-88a, 1.25mm Wide
Package Number MAA05A**

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



Notes:

1. JEDEC PACKAGE REGISTRATION IS ANTICIPATED
2. DIMENSIONS ARE IN MILLIMETERS
3. DRAWING CONFORMS TO ASME Y14.5M-1994

MAC06ARevB

**6-Lead MicroPak, 1.0mm Wide
Package Number MAC06A**

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

www.fairchildsemi.com

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692
Email amall@ameya360.com
QQ 800077892
Skype ameyasales1 ameyasales2

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333
Email mkt@ameya360.com